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.

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

<table>
<thead>
<tr>
<th>SW1</th>
<th>SW2</th>
<th>SW3</th>
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<th>SW5</th>
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### DIP Switch Chart

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### SOLENOID/FLASHER TABLE

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<thead>
<tr>
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<th>Solenoid Type</th>
<th>Voltage Connections</th>
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<td>01</td>
<td>AUTO PLUNGER</td>
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<td>J133-2</td>
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### General Illumination

<table>
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<tr>
<th>Sol. No.</th>
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<th>Drive Connections</th>
<th>Drive Wire Color</th>
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### Flipper Circuits

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### Motor & Shot Clock Circuits

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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)

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.
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
PLAYFIELD SHOTS

Completing shots from all four shooter positions starts "Around the World Multiball".

- Shooter 1 Position
- Shooter 2 Position
- Shooter 3 Position
- Shooter 4 Position

Complete "©©©©" 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.
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-point 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 ball 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.
## (System WPC) ROM SUMMARY

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<tr>
<th>IC</th>
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### 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
- Foreign 230V @ 50Hz
- Japan 100V @ 50Hz

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

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

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

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

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

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

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

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.

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.](image)

   **IMPORTANT!**

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

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.

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.

17. IMPORTANT: Fill out and return the registration card.
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

<table>
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### 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.
GAME CONTROL LOCATIONS

Cabinet Switches
The On-Off Switch is on the bottom of the cabinet near the right front leg. The Start Button is a push-button to the left of the coin door on the cabinet exterior. Press the Start button to begin a game, or during the diagnostic mode, to ask for HELP.

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

Normal Function
   The Service Credits button puts credits on the games that are not included in any of the game audits. The Volume Up (+) button raises the sound level of the game. Press and hold the button until the desired level is reached. The Volume Down (-) button lowers the sound level of the game. Press and hold the button until the desired level is reached. See Adjustment A.1 28 to turn sound off completely. The Begin Test button starts the Menu System operation and changes the coin door buttons from Normal Function to Test Function.

Test Function
   The Escape button allows you to get out of a menu selection or return to the Attract mode. The Up (+) button allows you to cycle forward through the menu selections or adjustment choices. The Down (-) button allows you to cycle backward through the menu selections or adjustment choices. The *Enter button allows you to get into a menu selection or lock in an adjustment choice.

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

⚠️ CAUTION

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

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

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

Open the coin door and press the Begin Test switch. The display shows the game name, number, and software revision. The message changes 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™
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
B.2 Earning Audits
B.3 Standard Audits
B.4 Feature Audits
B.5 Histograms
B.6 Time-Stamp

Press Escape
To move out of a menu selection.

Press Enter
To get into a menu selection.

P. PRINTOUTS MENU

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

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

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

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

T. TEST MENU

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

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

U. UTILITIES MENU

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

A. ADJUSTMENT MENU

A.1 Standard Adjustments
A.2 Feature Adjustments
A.3 Pricing Adjustments
A.4 H.S.T.D. Adjustments
A.5 Printer Adjustments
Press the Up or Down buttons to 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 02** Recent Earnings 00
- **B.1 03** Free Play Percent 00
- **B.1 04** Average Ball Time 00
- **B.1 05** Time Per Credit 00
- **B.1 06** Total Plays 00
- **B.1 07** Replay Awards 00
- **B.1 08** Percent Replays 00
- **B.1 09** Extra Balls 00
- **B.1 10** Percent Extra Ball 00

**B.2 EARNING AUDITS**

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

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

**“Total Plays” only counts on completed games. A game is considered complete when the final ball begins. Audit information from incomplete games is ignored. Operation for test and service do not affect audits. †This Audit 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.
**FEATURE AUDITS CONTINUED...**

<table>
<thead>
<tr>
<th>Feature Code</th>
<th>Feature Description</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.4 17</td>
<td>TRIVIA WINS</td>
<td>00%</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td>Number of times the &quot;TRIVIA QUIZ&quot; was won.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.4 18</td>
<td>EGYPTIAN SODA</td>
<td>00%</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td>Number of times the &quot;EGYPTIAN SODA&quot; was played.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.4 19</td>
<td>FREE THROW EXTRA BALLS</td>
<td>00%</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td>Number of &quot;FREE THROW&quot; extra balls.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.4 20</td>
<td>HOOP LOOP EXTRA BALLS</td>
<td>00%</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td>Number of &quot;HOOP LOOP&quot; extra balls.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.4 21</td>
<td>SHOOT AROUND EXTRA BALLS</td>
<td>00%</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td>Number of &quot;SHOOT AROUND&quot; extra balls.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.4 22</td>
<td>AROUND WORLD EXTRA BALLS</td>
<td>00%</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td>Number of &quot;AROUND THE WORLD&quot; extra balls.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.4 23</td>
<td>COMBO EXTRA BALLS</td>
<td>00%</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td>Number of &quot;COMBO&quot; extra balls.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.4 24</td>
<td>1 EXTRA BALL GAMES</td>
<td>00%</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td>Number of games with one extra ball.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.4 25</td>
<td>2 EXTRA BALL GAMES</td>
<td>00%</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td>Number of games with two extra balls.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.4 26</td>
<td>3 EXTRA BALL GAMES</td>
<td>00%</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td>Number of games with three extra balls.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.4 27</td>
<td>IN THE PAINT</td>
<td>00%</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td>Number of times &quot;IN THE PAINT&quot; was made.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.4 28</td>
<td>TIP-OFF COMBOS</td>
<td>00%</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td>Number of times &quot;TIP-OFF&quot; combo was made.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.4 29</td>
<td>SLAM DUNK COMBOS</td>
<td>00%</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td>Number of times &quot;SLAM DUNK&quot; combo was made.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.4 30</td>
<td>ALLEY OOPS COMBOS</td>
<td>00%</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td>Number of times &quot;ALLEY OOP&quot; combo was made.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.4 31</td>
<td>FASTBREAK COMBOS</td>
<td>00%</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td>Number of times &quot;FASTBREAK&quot; combo was made.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.4 32</td>
<td>HALF COURT HOOPS</td>
<td>00%</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td>Number of times &quot;HALF COURT HOOPS&quot; was made.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.4 33</td>
<td>HOOK SHOT HOOPS</td>
<td>00%</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td>Number of times &quot;HOOK SHOT HOOPS&quot; was started.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.4 34</td>
<td>RUN &amp; SHOOT</td>
<td>00%</td>
<td>00</td>
</tr>
<tr>
<td></td>
<td>Number of times &quot;RUN &amp; SHOOT HOOPS&quot; was started.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
FEATURE AUDITS CONTINUED...

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.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**

(Optional board required to use 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

<table>
<thead>
<tr>
<th>T.1 Switch Edges Test</th>
<th>T.10 Lamps And Flasher Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>T.2 Switch Levels Test</td>
<td>T.11 Display Test</td>
</tr>
<tr>
<td>T.3 Single Switch Test</td>
<td>T.12 Flipper Coil Test</td>
</tr>
<tr>
<td>T.4 Solenoid Test</td>
<td>T.13 Ordered Lamps Test</td>
</tr>
<tr>
<td>T.5 Flasher Test</td>
<td>T.14 Lamp Row-Col.</td>
</tr>
<tr>
<td>T.6 General Illumination Test</td>
<td>T.15 DIP Switch Test</td>
</tr>
<tr>
<td>T.7 Sound &amp; Music Test</td>
<td>T.16 Motor Test</td>
</tr>
<tr>
<td>T.8 Single Lamps Test</td>
<td>T.17 Backbox Test</td>
</tr>
<tr>
<td>T.9 All Lamps Test</td>
<td>T.18 Empty Balls Test</td>
</tr>
</tbody>
</table>

**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梭引线圈测试
梭引线圈测试有三种模式——重复、停止和运行。只有一个梭引线圈应该一次只脉冲。系统检测到一个问题，如果超过一个梭引线圈脉冲，一个梭引线圈打开并保持打开，或者在重复和运行模式中没有梭引线圈脉冲。

重复：重复模式脉冲单个梭引线圈。按回车键开始此测试。显示的第一个梭引线圈显示，并且相应的线圈脉冲。按上或下按钮逐个循环梭引线圈。相同的梭引线圈脉冲直到你按上或下按钮向前移动到下一个梭引线圈。要返回测试菜单，按退出按钮。要前进到下一个测试模式，按回车按钮。

停止：停止模式暂停梭引线圈测试。不应该有任何梭引线圈亮。要返回测试菜单，按退出按钮。要前进到下一个测试模式，按回车按钮。

运行：运行模式自动循环梭引线圈。显示显示当前被脉冲的梭引线圈的名称和数字。当相应的灯光闪烁时。如果出现任何其他结果，系统检测到一个错误。要返回测试菜单，按退出按钮。要返回到重复模式，按回车按钮。

T.5闪烁器测试
这个测试检查梭引线圈的闪光器部分。有三种模式——重复、停止和运行。在这个测试中，显示中的闪光器电路应该闪烁。系统检测到一个问题，如果超过一个闪光器电路闪烁，灯点亮，或者在重复和运行模式中没有灯闪烁。

重复：重复模式脉冲单个闪光器。按回车键开始此测试。显示第一个闪光器和对应的灯泡闪烁。相同的灯泡闪烁直到你按上或下按钮向前移动到下一个。要返回到测试菜单，按退出按钮。要前进到下一个测试模式，按回车按钮。

停止：停止模式暂停闪光器测试。不应该有任何闪光器亮在该模式。要返回到测试菜单，按退出按钮。要前进到下一个测试模式，按回车按钮。

运行：运行模式自动循环闪光器。显示显示当前被脉冲的梭引线圈的名称和数字。当相应的灯光闪烁时。要返回到测试菜单，按退出按钮。要返回到重复模式，按回车按钮。

T.6一般照明测试
这个测试检查所有的一般照明电路。有两模式——停止和运行。

注意：一般照明字符串四和五不亮或不暗，它们总是ON。

停止：停止模式允许你手动循环一般照明测试。按上或下按钮前进通过测试。所有照明先被检查，然后由个别电路测试。电路名称和数字显示在显示中，当相应的灯泡亮时。如果出现任何其他结果，系统检测到一个错误。要返回到测试菜单，按退出按钮。要前进到下一个测试模式，按回车按钮。
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 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.

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**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear Audits</td>
<td>Clear Coins</td>
<td>Reset H.S.T.D.</td>
<td>Set Time &amp; Date</td>
<td>Custom Message</td>
<td>Set Game I.D.</td>
<td>Factory Adjustments</td>
<td>Factory Reset</td>
<td>Preset</td>
<td>Clear Coins</td>
<td>Auto Burn-in</td>
</tr>
</tbody>
</table>

**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.

**DIFFICULTY SETTING TABLE FOR**
U.S., CANADIAN, FRENCH, GERMAN, AND EUROPEAN GAMES

<table>
<thead>
<tr>
<th>Adj. #</th>
<th>Adj. Description</th>
<th>Extra Easy</th>
<th>Easy U.9 02</th>
<th>Medium U.9 03 (factory)</th>
<th>Hard U.9 04</th>
<th>Extra Hard U.9 05</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.2 05</td>
<td>BALL SAVES</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>A.2 06</td>
<td>BALL SAVES TIME</td>
<td>10 sec.</td>
<td>8 sec.</td>
<td>6 sec.</td>
<td>4 sec.</td>
<td>2 sec.</td>
</tr>
<tr>
<td>A.2 11</td>
<td>FREE THROW EXTRA BALL LEVEL</td>
<td>4</td>
<td>8</td>
<td>12</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>A.2 12</td>
<td>HOOP LOOP EXTRA BALL LEVEL</td>
<td>8</td>
<td>16</td>
<td>24</td>
<td>32</td>
<td>40</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Adj. #</th>
<th>Adj. Description</th>
<th>Install 5-ball</th>
<th>Install 3-ball</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1 01</td>
<td>BALLS PER GAME</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>A.1 07</td>
<td>REPLAY START</td>
<td>180</td>
<td>100</td>
</tr>
<tr>
<td>A.2 11</td>
<td>FREE THROW EXTRA BALL LEVEL</td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>A.2 12</td>
<td>HOOP LOOP EXTRA BALL LEVEL</td>
<td>32</td>
<td>24</td>
</tr>
<tr>
<td>A.2 13</td>
<td>INBOUND PASS DIFFICULTY</td>
<td>Hard</td>
<td>Medium</td>
</tr>
<tr>
<td>A.2 14</td>
<td>JET BUMPER DIFFICULTY</td>
<td>Hard</td>
<td>Medium</td>
</tr>
<tr>
<td>A.2 15</td>
<td>IN THE PAINT DIFFICULTY</td>
<td>Hard</td>
<td>Medium</td>
</tr>
<tr>
<td>A.2 16</td>
<td>SHOT CLOCK DIFFICULTY</td>
<td>Hard</td>
<td>Medium</td>
</tr>
</tbody>
</table>
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:

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

U.9 09 INSTALL TICKET
This option deletes Credit awards and replaces them with Ticket awards. Individual adjustments are affected as follows:

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

U.9 10 INSTALL NOVELTY
This option removes all Free Play and Extra Ball awards. Individual adjustments are affected as follows:

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

U.9 11 NOT USED

U.9 12 SERIAL CAPTURE
This sets up the printer adjustments for a serial transmission to a laptop computer, (9600 baud, 40 column, no page breaks, serial printer). This option requires the installation of the optional printer kit; part number 63110.
U.9 13 TO U.9 16 NOT USED

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

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

U.10 CLEAR CREDITS
Press the Enter button to clear the game Credits.

U.11 AUTO BURN-IN
Press the Enter button to activate Auto Burn-in. This utility automatically cycles through several tests. This helps in finding intermittent problems. The tests that Auto Burn-in cycles through are: the Display Test, the Sound and Music Test, the All Lamps Test, the Solenoid Test, the Flashers Test, the General Illumination Test, and the Flipper Coil Test. All of the 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
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:
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.

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

ALLOW REPLY - 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.

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 TOURNAMENT 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.

TOURNAMENT 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. TOURNAMENT SETUP screen as follows:

OPERATOR TOURNAMENT INFO
Tourney Entries: 0
Earned Credits: 0
Prize:
??[NNNN] N RINGS: 0

This screen tells the operator the following information:

TOURNAMENT 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.

??[NNNN] - These are the initials 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: 3-15
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...

<table>
<thead>
<tr>
<th></th>
<th>GAME START</th>
<th>BALL START</th>
<th>MEMORY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IN-BOUND PASS</td>
<td>IN-BOUND PASS</td>
<td>IN-BOUND PASS</td>
</tr>
<tr>
<td>EXTRA EASY</td>
<td>----</td>
<td>On</td>
<td>----</td>
</tr>
<tr>
<td>EASY</td>
<td>On</td>
<td>----</td>
<td>Yes</td>
</tr>
<tr>
<td>MEDIUM</td>
<td>On</td>
<td>----</td>
<td>No</td>
</tr>
<tr>
<td>HARD</td>
<td>Off</td>
<td>----</td>
<td>Yes</td>
</tr>
<tr>
<td>EXTRA HARD</td>
<td>Off</td>
<td>----</td>
<td>No</td>
</tr>
</tbody>
</table>

### A.2 14 JET BUMPER DIFFICULTY

This determines the difficulty of the Jet Bumper feature. This affects the 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

<table>
<thead>
<tr>
<th>POWER POINTS</th>
<th>POWER HOOPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTRA EASY</td>
<td>30%</td>
</tr>
<tr>
<td>EASY</td>
<td>60%</td>
</tr>
<tr>
<td>MEDIUM</td>
<td>90%</td>
</tr>
<tr>
<td>HARD</td>
<td>120%</td>
</tr>
<tr>
<td>EXTRA HARD</td>
<td>150%</td>
</tr>
</tbody>
</table>

### 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

<table>
<thead>
<tr>
<th>BALL START IN THE PAINT</th>
<th>SECONDS DEFENDER DELAY</th>
<th>COUNT AROUND WORLD MULTIBALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTRA EASY</td>
<td>On</td>
<td>2.00</td>
</tr>
<tr>
<td>EASY</td>
<td>On</td>
<td>1.50</td>
</tr>
<tr>
<td>MEDIUM</td>
<td>On</td>
<td>1.00</td>
</tr>
<tr>
<td>HARD</td>
<td>Off</td>
<td>0.50</td>
</tr>
<tr>
<td>EXTRA HARD</td>
<td>Off</td>
<td>0.25</td>
</tr>
</tbody>
</table>
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. 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 MILISECONDS
This is the minimum width required for coin pulses to be accepted as valid coins. This may be
changed to prevent certain kinds of cheating.

A.3 24 NOT USED

A.3 25 ALLOW HUNDREDTHS
This is used for a custom door specifier. If set to YES, then the values for A.3 12-15 are specified
in units and hundredths (such as dollars and quarters). If set to NO, then all values are in units
(such as Francs and Lire.)

A.3 26 CREDIT FRACTION
This determines the smallest fraction used for credits. It must be even to accommodate the extra
ball buy-in option of 1/2 credit, and is typically 1/2 but may need to be a different value for modes
requiring more coins per credit.

A.3 27 PRICING EDITOR (CUSTOM PRICING IS NOT AVAILABLE FOR U.S.A. AND CANADIAN
GAMES).
This function is now used to enter information for a custom pricing mode. The adjustment A.3 26
(Credit Fraction) may need to be set before entering the custom pricing editor. This specifies the
smallest fraction available for partial credits.

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

<table>
<thead>
<tr>
<th>CUSTOM PRICING EDITOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) $0.25              1/2 cred.</td>
</tr>
<tr>
<td>2) $0.50              1 cred.</td>
</tr>
<tr>
<td>3) $0.75              2 cred.</td>
</tr>
<tr>
<td>4) $1.00              3 cred.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>1) $0.25</th>
<th>2) $0.50</th>
<th>3) $0.75</th>
<th>4) $1.00</th>
<th>5) $1.25</th>
<th>6) $1.50</th>
<th>7) $1.75</th>
<th>8) $2.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/2 cred.</td>
<td>1 cred.</td>
<td>1 1/2 cred.</td>
<td>2 cred.</td>
<td>2 1/2 cred.</td>
<td>4 cred.</td>
<td>4 1/2 cred</td>
<td>6 cred.</td>
</tr>
</tbody>
</table>

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

**Example:** 1/$0.50 2/$1.00

<table>
<thead>
<tr>
<th></th>
<th>1) $0.25</th>
<th>2) $0.50</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/2 cred.</td>
<td>1 cred.</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>CUSTOM PRICING EDITOR</th>
<th>DISPLAY VIEW</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) $0.50</td>
<td>1 cred.</td>
</tr>
<tr>
<td>2) $1.00</td>
<td>2 cred.</td>
</tr>
<tr>
<td>3) $1.50</td>
<td>4 cred.</td>
</tr>
<tr>
<td>4) $2.00</td>
<td>6 cred.</td>
</tr>
</tbody>
</table>
Use the Enter button to move to the $1.50 field. Now press the Down button once to create the following display:

<table>
<thead>
<tr>
<th>CUSTOM PRICING EDITOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) $0.50 1 cred.</td>
</tr>
<tr>
<td>2) $1.00 2 cred.</td>
</tr>
<tr>
<td>3) INSERT 4 cred.</td>
</tr>
<tr>
<td>4) $2.00 6 cred</td>
</tr>
</tbody>
</table>

DISPLAY VIEW

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

<table>
<thead>
<tr>
<th>CUSTOM PRICING EDITOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) $0.50 1 cred.</td>
</tr>
<tr>
<td>2) $1.00 2 cred.</td>
</tr>
<tr>
<td>3) $1.25 2 1/2 cred.</td>
</tr>
<tr>
<td>4) $1.50 4 cred.</td>
</tr>
<tr>
<td>5) $2.00 6 cred</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>CUSTOM PRICING EDITOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>2) $1.00 2 cred.</td>
</tr>
<tr>
<td>3) $1.25 2 1/2 cred.</td>
</tr>
<tr>
<td>4) $1.50 4 cred.</td>
</tr>
<tr>
<td>5) $2.00 6 cred</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>CUSTOM PRICING EDITOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) $0.25 1/2 cred.</td>
</tr>
</tbody>
</table>

DISPLAY VIEW

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

<table>
<thead>
<tr>
<th>CUSTOM PRICING EDITOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) $0.50 1 cred.</td>
</tr>
<tr>
<td>2) REPEAT 20</td>
</tr>
</tbody>
</table>

DISPLAY VIEW

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

<table>
<thead>
<tr>
<th>CUSTOM PRICING EDITOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) $0.25 1/2 cred.</td>
</tr>
<tr>
<td>2) $0.50 1 cred.</td>
</tr>
<tr>
<td>3) $0.75 1 1/2 cred.</td>
</tr>
<tr>
<td>4) $1.00 2 cred</td>
</tr>
</tbody>
</table>

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.

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

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

<table>
<thead>
<tr>
<th>CUSTOM PRICING EDITOR</th>
<th>17) $4.25 8 1/2 cred.</th>
</tr>
</thead>
<tbody>
<tr>
<td>18) $4.50 9 cred.</td>
<td></td>
</tr>
<tr>
<td>19) $4.75 9 1/2 cred.</td>
<td></td>
</tr>
<tr>
<td>20) $5.00 10 cred.</td>
<td></td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Choose an Option:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return to Editor</td>
</tr>
<tr>
<td>Clear Pricing</td>
</tr>
<tr>
<td>Ignore Changes</td>
</tr>
<tr>
<td>Save Changes</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>CUSTOM PRICING EDITOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) $0.25 1/2 cred.</td>
</tr>
<tr>
<td>2) $0.50 1 cred.</td>
</tr>
<tr>
<td>3) $0.75 1-1/2 cred.</td>
</tr>
<tr>
<td>4) $1.00 2 cred</td>
</tr>
</tbody>
</table>

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).
<table>
<thead>
<tr>
<th>Country</th>
<th>Coin/Chutes Left</th>
<th>Coin/Chutes Center</th>
<th>Coin/Chutes Right</th>
<th>Games/Coins</th>
<th>Display</th>
<th>Pricing Adjustments As</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>25¢</td>
<td>25¢</td>
<td>25¢</td>
<td>1/50¢</td>
<td>3/10¢</td>
<td>3/25¢</td>
</tr>
<tr>
<td></td>
<td>1/25¢</td>
<td>25¢</td>
<td>25¢</td>
<td>1/50¢</td>
<td>3/10¢</td>
<td>3/25¢</td>
</tr>
<tr>
<td></td>
<td>1/25¢</td>
<td>25¢</td>
<td>25¢</td>
<td>1/50¢</td>
<td>3/10¢</td>
<td>3/25¢</td>
</tr>
<tr>
<td></td>
<td>25¢</td>
<td>25¢</td>
<td>25¢</td>
<td>1/50¢</td>
<td>3/10¢</td>
<td>3/25¢</td>
</tr>
<tr>
<td>Canada</td>
<td>25¢</td>
<td>25¢</td>
<td>25¢</td>
<td>1/50¢</td>
<td>3/10¢</td>
<td>3/25¢</td>
</tr>
<tr>
<td></td>
<td>25¢</td>
<td>25¢</td>
<td>25¢</td>
<td>1/50¢</td>
<td>3/10¢</td>
<td>3/25¢</td>
</tr>
<tr>
<td></td>
<td>25¢</td>
<td>25¢</td>
<td>25¢</td>
<td>1/50¢</td>
<td>3/10¢</td>
<td>3/25¢</td>
</tr>
<tr>
<td></td>
<td>25¢</td>
<td>25¢</td>
<td>25¢</td>
<td>1/50¢</td>
<td>3/10¢</td>
<td>3/25¢</td>
</tr>
<tr>
<td>Chile</td>
<td>Token</td>
<td>Token</td>
<td>Token</td>
<td>USA</td>
<td>CUSTOM</td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>1Kr</td>
<td>1Kr</td>
<td>1Kr</td>
<td>CAN.$ Bonus</td>
<td>CUSTOM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1Kr</td>
<td>1Kr</td>
<td>1Kr</td>
<td>CAN.$ Bonus</td>
<td>CUSTOM</td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>1Mk</td>
<td>1Mk</td>
<td>1Mk</td>
<td>CAN.$ Bonus</td>
<td>CUSTOM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1Mk</td>
<td>1Mk</td>
<td>1Mk</td>
<td>CAN.$ Bonus</td>
<td>CUSTOM</td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td>5Kr</td>
<td>5Kr</td>
<td>5Kr</td>
<td>CAN.$ Bonus</td>
<td>CUSTOM</td>
<td></td>
</tr>
<tr>
<td>Argentina</td>
<td>10c</td>
<td>10c</td>
<td>10c</td>
<td>CAN.$ Bonus</td>
<td>CUSTOM</td>
<td></td>
</tr>
<tr>
<td>Greece</td>
<td>100P</td>
<td>100P</td>
<td>100P</td>
<td>CAN.$ Bonus</td>
<td>CUSTOM</td>
<td></td>
</tr>
<tr>
<td>Hungary</td>
<td>50Gd</td>
<td>50Gd</td>
<td>50Gd</td>
<td>CAN.$ Bonus</td>
<td>CUSTOM</td>
<td></td>
</tr>
</tbody>
</table>
| Pricing Table

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.
XXX 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:

<table>
<thead>
<tr>
<th>CPU BOARD</th>
<th>LED ERROR CODES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center LED blinks once</td>
<td>G11 ROM Failure</td>
</tr>
<tr>
<td>Center LED blinks twice</td>
<td>U8 RAM Failure</td>
</tr>
<tr>
<td>Center LED blinks three times</td>
<td>G10 Security Chip Failure</td>
</tr>
</tbody>
</table>
Upon game turn-on you will hear one of the following.

<table>
<thead>
<tr>
<th>AUDIO VISUAL BOARD BEEP ERROR CODES</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Beep</td>
<td>Audio Visual Board is O.K.</td>
</tr>
<tr>
<td>2 Beeps</td>
<td>S2 Failure</td>
</tr>
<tr>
<td>3 Beeps</td>
<td>S3 Failure</td>
</tr>
<tr>
<td>4 Beeps</td>
<td>S4 Failure</td>
</tr>
<tr>
<td>5 Beeps</td>
<td>S5 Failure</td>
</tr>
<tr>
<td>6 Beeps</td>
<td>S6 Failure</td>
</tr>
<tr>
<td>7 Beeps</td>
<td>S7 Failure</td>
</tr>
<tr>
<td>10 Beeps</td>
<td>Audio Static RAM Failure</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Loc.</th>
<th>Description</th>
<th>Part Number</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>F501</td>
<td>-25V</td>
<td>5731-14532-00</td>
<td>T2.5A, 250V</td>
</tr>
<tr>
<td>F502</td>
<td>+25V</td>
<td>5731-14532-00</td>
<td>T2.5A, 250V</td>
</tr>
<tr>
<td>F601</td>
<td>+62V</td>
<td>5731-14533-00</td>
<td>T0.25A, 250V</td>
</tr>
<tr>
<td>F602</td>
<td>-113V &amp; -125V</td>
<td>5731-14533-00</td>
<td>T0.25A, 250V</td>
</tr>
</tbody>
</table>

## CPU BOARD

There are no fuses on the CPU board.

## POWER DRIVER BOARD

<table>
<thead>
<tr>
<th>Loc.</th>
<th>Description</th>
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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

Ribbon Cables:

<table>
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<tr>
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<th>Item</th>
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<th>Description</th>
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<td>5795-12653-15</td>
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Miscellaneous Parts:
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### Item | Part Number | Description
--- | --- | ---
1 | A-21567 | Lever Guide Assembly
2 | A-21574 | Hand Guard Assembly
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 | Tilt 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" (6)
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.
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* See page 2-18 for Flipper Assembly details.
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Backbox Insert
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<td>5048-11030-00</td>
<td>C7</td>
<td>R24</td>
</tr>
<tr>
<td>5048-11033-00</td>
<td>C1</td>
<td>R24</td>
</tr>
<tr>
<td>5048-12036-00</td>
<td>C40, C41</td>
<td>R24</td>
</tr>
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</table>
# A-20028

## WPC '95 Power Driver PCB Assembly

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Designator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5040-14569-00</td>
<td>C1, C40</td>
<td>Capacitor, 100nF, 25v, Ax.</td>
</tr>
<tr>
<td>5043-08996-00</td>
<td>C2, C4, C5, C7, C13, C16-C21, C24-C39, C41-C43</td>
<td>Capacitor, 0.1mF, 50v (±20%) Ax.</td>
</tr>
<tr>
<td>5040-13417-00</td>
<td>C8 - C12</td>
<td>Capacitor, 10000nF, 35v Radial</td>
</tr>
<tr>
<td>5048-11031-00</td>
<td>C14, C15</td>
<td>Capacitor, 100pF, 100v (±20%) Ax.</td>
</tr>
<tr>
<td>5040-09537-00</td>
<td>C22, C23</td>
<td>Diode, 1N4004 1.0A</td>
</tr>
<tr>
<td>5070-08054-00</td>
<td>D1, D2, D23, D24, D33 - D100, D103</td>
<td>Diode P600G 6A 400 PIV</td>
</tr>
<tr>
<td>5070-14526-00</td>
<td>D33-D22, D25-D32</td>
<td>Resistor, 2700, 1/4w, 5%</td>
</tr>
<tr>
<td>5070-08919-00</td>
<td>D101, D102</td>
<td>Resistor, 560n, 1/4w, 5%</td>
</tr>
<tr>
<td>5731-14531-00</td>
<td>F101</td>
<td>Resistor, 22n, 1/4w, 5%</td>
</tr>
<tr>
<td>5731-14530-00</td>
<td>F102-F105, F107</td>
<td>Resistor, 100n, 1/4w, 5%</td>
</tr>
<tr>
<td>5731-14046-00</td>
<td>F106</td>
<td>Resistor, 68n, 1/4w, 5%</td>
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<tr>
<td>5731-14529-00</td>
<td>F108</td>
<td>Resistor, 100n, 1/4w, 5%</td>
</tr>
<tr>
<td>5731-14528-00</td>
<td>F101-F118</td>
<td>Resistor, 560n, 1/4w, 5%</td>
</tr>
<tr>
<td>5791-10862-07</td>
<td>J101, J129</td>
<td>Resistor, 10K, 1/4w, 5%</td>
</tr>
<tr>
<td>5791-12516-00</td>
<td>J102</td>
<td>Resistor, 4.7Kn, 1/4w, 5%</td>
</tr>
<tr>
<td>5791-10862-12</td>
<td>J103</td>
<td>Resistor, 470n, 1/4w, 5%</td>
</tr>
<tr>
<td>5791-10862-03</td>
<td>J104, J122, J132, J135</td>
<td>Resistor, 22n, 1/4w, 5%</td>
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<tr>
<td>5791-10862-11</td>
<td>J107, J108, J114, J115, J117, J119, J123, J128</td>
<td>Resistor, 100n, 1/4w, 5%</td>
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<tr>
<td>5791-10862-05</td>
<td>J109, J112, J113, J116, J119, J121, J123, J128</td>
<td>Resistor, 100n, 1/4w, 5%</td>
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<tr>
<td>5791-10862-09</td>
<td>J111, J112</td>
<td>Resistor, 100n, 1/4w, 5%</td>
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<tr>
<td>5791-10862-13</td>
<td>J124-J126</td>
<td>Resistor, 100n, 1/4w, 5%</td>
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<tr>
<td>5791-10862-06</td>
<td>J133</td>
<td>Resistor, 100n, 1/4w, 5%</td>
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<tr>
<td>5791-10862-04</td>
<td>J135-J138, J140, J141</td>
<td>Resistor, 100n, 1/4w, 5%</td>
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<tr>
<td>5791-10862-08</td>
<td>LED100-LED105</td>
<td>Resistor, 100n, 1/4w, 5%</td>
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<tr>
<td>5671-14516-00</td>
<td>Q1</td>
<td>Resistor, 100n, 1/4w, 5%</td>
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<tr>
<td>5250-14527-00</td>
<td>Q2</td>
<td>Resistor, 100n, 1/4w, 5%</td>
</tr>
<tr>
<td>5460-12423-00</td>
<td>Q3-Q5</td>
<td>Resistor, 100n, 1/4w, 5%</td>
</tr>
<tr>
<td>5131-12725-00</td>
<td>Q6-Q12, Q17-Q24, Q33-Q40, Q49-Q56, Q109, Q137-Q148, Q25-Q28, Q41-Q48, Q57-Q64, Q82, Q83, Q85, Q86, Q88, Q90, Q91, Q92, Q101-Q108, Q65-Q72, Q81, Q84, Q87, Q90, Q73-Q80</td>
<td>Resistor, 100n, 1/4w, 5%</td>
</tr>
<tr>
<td>5191-12179-00</td>
<td>Q93 - Q100</td>
<td>Resistor, 100n, 1/4w, 5%</td>
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<tr>
<td>5190-09016-00</td>
<td>R1</td>
<td>Resistor, 22n, 1/4w, 5%</td>
</tr>
<tr>
<td>5182-12426-00</td>
<td>R10</td>
<td>Resistor, 22n, 1/4w, 5%</td>
</tr>
<tr>
<td>5160-10269-00</td>
<td>R1</td>
<td>Resistor, 22n, 1/4w, 5%</td>
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<tr>
<td>5013-14535-00</td>
<td>R2</td>
<td>Resistor, 22n, 1/4w, 5%</td>
</tr>
<tr>
<td>5013-14534-00</td>
<td>R2</td>
<td>Resistor, 22n, 1/4w, 5%</td>
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<tr>
<td>5013-14535-00</td>
<td>R2</td>
<td>Resistor, 22n, 1/4w, 5%</td>
</tr>
<tr>
<td>5013-14534-00</td>
<td>R2</td>
<td>Resistor, 22n, 1/4w, 5%</td>
</tr>
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</table>

## Description

- Capacitor: 100nF, 25v, Ax.
- Capacitor: 0.1mF, 50v (±20%) Ax.
- Capacitor: 10000nF, 35v Radial
- Capacitor: 0.01mF, 50v, 10% Ax.
- Capacitor: 100nF, 100v (±20%) Radial
- Diode, 1N4004 1.0A
- Diode P600G 6A 400 PIV
- Resistor, 2700, 1/4w, 5%
- Resistor, 560n, 1/4w, 5%
- Resistor, 100n, 1/4w, 5%
- Resistor, 22n, 1/4w, 5%
- Resistor, 560n, 1/4w, 5%
- Resistor, 100n, 1/4w, 5%
- Resistor, 22n, 1/4w, 5%
- Resistor, 560n, 1/4w, 5%
- Resistor, 100n, 1/4w, 5%
- Resistor, 560n, 1/4w, 5%
- Resistor, 100n, 1/4w, 5%
A-20028
WPC '95 Power Driver PCB Assembly
<table>
<thead>
<tr>
<th>Part Number</th>
<th>Designator</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>A-15814</td>
<td>B1</td>
<td>Battery Holder</td>
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<tr>
<td>5048-11033-00</td>
<td>C1, C42</td>
<td>Capacitor, 0.22m, 50v, 10% Axial</td>
</tr>
<tr>
<td>5048-11030-00</td>
<td>C3-C26, C34-C41</td>
<td>Capacitor, 470p, 50v, Axial</td>
</tr>
<tr>
<td>5043-09030-00</td>
<td>C27</td>
<td>Capacitor, 0.047m, 50v (±20%) Axial</td>
</tr>
<tr>
<td>5048-13375-00</td>
<td>C28</td>
<td>Capacitor, 100p, 50v (10%) Axial</td>
</tr>
<tr>
<td>5048-11028-00</td>
<td>C29, C30, C34, C44</td>
<td>Capacitor, 22p, 50v Axial</td>
</tr>
<tr>
<td>5040-14569-00</td>
<td>C31, C77</td>
<td>Capacitor, 0.1m, 50v (±20%) Axial</td>
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<tr>
<td>5048-11031-00</td>
<td>C32</td>
<td>Capacitor, 1000m, 25v Axial</td>
</tr>
<tr>
<td>5043-08996-00</td>
<td>C45-C70, C74-C78</td>
<td>Capacitor, 4.7uF, @35v (±20%) Axial</td>
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<tr>
<td>5040-13098-00</td>
<td>C73</td>
<td>Switch Dip 8 Pos</td>
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<tr>
<td>5645-00025-00</td>
<td>D1, D25</td>
<td>Diode 1N5817 1.0A</td>
</tr>
<tr>
<td>5070-08919-00</td>
<td>D2-D24, D26, D27</td>
<td>Diode 1N4148 150mA</td>
</tr>
<tr>
<td>5700-10176-00</td>
<td>G10A</td>
<td>Socket Dip 28.6</td>
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<tr>
<td>5700-12088-00</td>
<td>G11</td>
<td>Socket Dip 32.6p</td>
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<tr>
<td>5700-12424-00</td>
<td>U9</td>
<td>Socket 84 Pin PL CC</td>
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<tr>
<td>5700-10399-00</td>
<td>U20</td>
<td>Socket 18 Pin 3</td>
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<tr>
<td>5791-10850-00</td>
<td>J201</td>
<td>28H STR SQ. 100</td>
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<tr>
<td>5791-12516-00</td>
<td>J211, J202</td>
<td>34 HDR 2x17 100</td>
</tr>
<tr>
<td>5791-13830-12</td>
<td>J205</td>
<td>12H STR SQ PIN 100 Solid Tab</td>
</tr>
<tr>
<td>5791-13830-09</td>
<td>J206, J207, J209</td>
<td>9H STR SQ PIN 100 Solid Tab</td>
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<tr>
<td>5791-13830-14</td>
<td>J208</td>
<td>14H STR SQ PIN 100 Solid Tab</td>
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<tr>
<td>5791-10862-07</td>
<td>J210</td>
<td>7H STR SQ PIN 156</td>
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<tr>
<td>5791-13830-13</td>
<td>J212</td>
<td>13H STR SQ PIN 100 Solid Tab</td>
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<tr>
<td>5671-14516-00</td>
<td>LED201, LED202, LED203</td>
<td>LED DSPL RED T-1 3/4</td>
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<tr>
<td>5160-10269-00</td>
<td>Q1</td>
<td>Trans 2N3904 NPN</td>
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<tr>
<td>5019-09669-00</td>
<td>R1</td>
<td>SIP 1KR 10%</td>
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<tr>
<td>5010-09558-00</td>
<td>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, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100, R101, R102, R103, R104, R105, R106, R107, R108, R109, R110, R111, R112, R113, R114, R117</td>
<td>RES 1K 1/4w 5%</td>
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<tr>
<td>5010-09416-00</td>
<td>R5, R8, R7, R8, R12, R13, R87, R88, R89</td>
<td>RES 470 1/4w 5%</td>
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<tr>
<td>5010-09034-00</td>
<td>R14, R15, R16, R17, R18, R19, R20, R21, R22, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R40, R41, R42, R44, R46, R48, R50, 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, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98</td>
<td>RES 10K 1/4w 5%</td>
</tr>
<tr>
<td>5010-10040-00</td>
<td>R127</td>
<td>RES 470K 1/4w 5%</td>
</tr>
<tr>
<td>5010-09040-00</td>
<td>R127</td>
<td>RES 150 1/4w 5%</td>
</tr>
<tr>
<td>5010-08950-00</td>
<td>R118, R119, R120, R121, R122, R123, R124, R125</td>
<td>RES 22M 1/4w 5%</td>
</tr>
<tr>
<td>5010-08954-00</td>
<td>W3, W4, W7, W124, W125</td>
<td>RES 1M 1/4w 5%</td>
</tr>
<tr>
<td>5010-12258-00</td>
<td>R126</td>
<td>RES 33 1/4w 5%</td>
</tr>
<tr>
<td>5010-09040-00</td>
<td>R127</td>
<td>RES 470K 1/4w 5%</td>
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<tr>
<td>5281-09867-00</td>
<td>U1, U2</td>
<td>I C 74LS244 OCT BUF</td>
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<tr>
<td>5281-09308-00</td>
<td>U3</td>
<td>I C 74LS245 TRNC</td>
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<tr>
<td>5281-09851-00</td>
<td>U5</td>
<td>I C 74LS14 SMT/TRG</td>
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<tr>
<td>5315-12031-00</td>
<td>U7</td>
<td>I C 74HCT244</td>
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<tr>
<td>5340-13062-00</td>
<td>U8</td>
<td>I C RAM 32K x 8 Static Cmos 100ns</td>
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<tr>
<td>5370-12687-00</td>
<td>U10</td>
<td>I C MC 34064 Reset CHP</td>
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<tr>
<td>5281-10182-00</td>
<td>U11, U12, U13, U15</td>
<td>I C 74LS240 LDRVR</td>
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<td>5311-14068-00</td>
<td>U14, U24</td>
<td>I C 74HC574 OCTAL D-Latch</td>
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<tr>
<td>5370-12273-00</td>
<td>U16, U17, U18, U19, U25, U26</td>
<td>I C LM339 Quad Comp</td>
</tr>
<tr>
<td>5284-12651-00</td>
<td>U21</td>
<td>I C 4584 Hex Schmitt</td>
</tr>
<tr>
<td>5311-14554-00</td>
<td>U23</td>
<td>U I C 74HC237 3 to 8 NON I NV DE</td>
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<tr>
<td>5281-09247-00</td>
<td>U27</td>
<td>I C 74LS02 Quad Nor</td>
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<tr>
<td>5520-12084-00</td>
<td>X1</td>
<td>Crystal 32, 768 KHz</td>
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<tr>
<td>5520-14761-00</td>
<td>X2</td>
<td>XTAL 8MHz Anti-Res Parallel Cut</td>
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</tbody>
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### A-20580
#### Coin Interface PCB Assembly
*(This board does not contain optional items such as the coin counter and printer interface.)*

![Coin Interface PCB Assembly Diagram](image)

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Designator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5070-09054-00</td>
<td>D1-D14</td>
<td>Diode 1N4004 1.0A.</td>
</tr>
<tr>
<td>5791-10862-11</td>
<td>J1</td>
<td>Connector, 11-pin Header Str. Sq.</td>
</tr>
<tr>
<td>5791-10862-07</td>
<td>J2</td>
<td>Connector, 7-pin Header Str. Sq.</td>
</tr>
<tr>
<td>5791-10862-12</td>
<td>J3</td>
<td>Connector, 12-pin Header Str. Sq.</td>
</tr>
<tr>
<td>5791-11000-10</td>
<td>J4</td>
<td>Connector, 10-pin Header Str. Sq.</td>
</tr>
<tr>
<td>5791-10862-13</td>
<td>J5, J7</td>
<td>Connector, 13-pin Header Str. Sq.</td>
</tr>
<tr>
<td>5791-10862-15</td>
<td>J6</td>
<td>Connector, 15-pin Header Str. Sq.</td>
</tr>
<tr>
<td>5791-10862-03</td>
<td>J8</td>
<td>Connector, 3-pin Header Str. Sq.</td>
</tr>
<tr>
<td>5791-10862-05</td>
<td>J9</td>
<td>Connector, 5-pin Header Str. Sq.</td>
</tr>
<tr>
<td>5791-12462-10</td>
<td>J10</td>
<td>Connector, 10-pin Header Str. Sq.</td>
</tr>
<tr>
<td>5010-13517-00</td>
<td>R1</td>
<td>Resistor, 15Ω, 1/2w, 5%</td>
</tr>
<tr>
<td>5645-09025-00</td>
<td>SW5</td>
<td>Switch DIP 8 Pos.</td>
</tr>
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</table>

### A-17316
#### Flipper Opto PCB Assembly

![Flipper Opto PCB Assembly Diagram](image)

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

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Designator</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>5370-10891-00</td>
<td>U1</td>
<td>I.C. Opto Receiver MC3373</td>
</tr>
<tr>
<td>5490-10892-00</td>
<td>U2</td>
<td>I.C. Opto Isolator</td>
</tr>
<tr>
<td>5431-10449-00</td>
<td>U3</td>
<td>I.C. 555 Timer</td>
</tr>
<tr>
<td>5192-13591-00</td>
<td>Q1</td>
<td>Trans. MPSA64 PNP Darlington</td>
</tr>
<tr>
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<td>Capacitor, .0015µF</td>
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<tr>
<td>5043-09066-00</td>
<td>C4, C12</td>
<td>Capacitor, 470pF</td>
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<tr>
<td>5043-08996-00</td>
<td>C5, C11</td>
<td>Capacitor, 0.1µF</td>
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<td>5041-10588-00</td>
<td>C6</td>
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<td>C8</td>
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<tr>
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<td>5048-11031-00</td>
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<td>Capacitor, .001µF, 50v, 10%</td>
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<tr>
<td>5040-10974-00</td>
<td>C7, C10</td>
<td>Capacitor, 100µF, 35v, (+80%/20%)</td>
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<tr>
<td>5070-09054-00</td>
<td>D1-D3</td>
<td>Diode 1N4004, 1A</td>
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<tr>
<td>5010-09534-00</td>
<td>R12</td>
<td>Resistor, 0Ω Jumper</td>
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<td>5010-10257-00</td>
<td>R2</td>
<td>Resistor, 75KΩ, 1/4w, 5%</td>
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<tr>
<td>5010-13509-00</td>
<td>R9</td>
<td>Resistor, 330Ω, 1/2w, 5%</td>
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<tr>
<td>5010-08997-00</td>
<td>R1</td>
<td>Resistor, 2.7KΩ, 1/4w, 5%</td>
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<tr>
<td>5010-09162-00</td>
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<td>Resistor, 100KΩ, 1/4w, 5%</td>
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<tr>
<td>5010-09768-00</td>
<td>R3</td>
<td>Resistor, 180Ω, 1/4w, 5%</td>
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<tr>
<td>5010-09039-00</td>
<td>R4</td>
<td>Resistor, 10Ω, 1/4w, 5%</td>
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<tr>
<td>5010-09324-00</td>
<td>R5</td>
<td>Resistor, 27KΩ, 1/4w, 5%</td>
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<tr>
<td>5010-08930-00</td>
<td>R7</td>
<td>Resistor, 470Ω, 1.2w, 5%</td>
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<td>5010-09034-00</td>
<td>R8</td>
<td>Resistor, 10KΩ, 1/4w, 5%</td>
</tr>
<tr>
<td>5010-10022-00</td>
<td>R10</td>
<td>Resistor, 7.5KΩ, 1.4w, 5%</td>
</tr>
<tr>
<td>5010-08773-00</td>
<td>R11</td>
<td>Resistor, 18KΩ, 1/4w, 5%</td>
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<tr>
<td>5010-09085-00</td>
<td>R13</td>
<td>Resistor, 1.5KΩ, 1/4w, 5%</td>
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<tr>
<td>5671-13732-00</td>
<td>LED1</td>
<td>Display LED RED 1</td>
</tr>
<tr>
<td>5791-12273-03</td>
<td>J1</td>
<td>Connector, 3-pin Header STR SQ.</td>
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<tr>
<td>5791-12273-02</td>
<td>J2</td>
<td>Connector, 2-pin Header STR SQ.</td>
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<td>5551-10890-00</td>
<td>L1</td>
<td>Inductor, 10mH</td>
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2-14
A-21568
High Current Driver Assembly w/Bracket

A-21380
2-Digit LED Assembly
### A-15595
7-Switch Opto PCB Assembly w/Bracket

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<td>7-Opto PCB Assembly</td>
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<td>5040-10974-00</td>
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<td>Display LED Red</td>
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<td>5370-12272-00</td>
<td>U1, U2</td>
<td>ICLM339 Quad</td>
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<td>5070-09054-00</td>
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<td>Diode 1N4004 1.0A.</td>
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<td>5010-12928-00</td>
<td>R15 - R21</td>
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<td>5010-09999-00</td>
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<td>Resistor, 2K, 1/4w, 5%</td>
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<td>5010-08774-00</td>
<td>R22, R24, R28</td>
<td>Resistor, 22K, 1/4w, 5%</td>
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<td>R28</td>
<td>Resistor, 10K, 1/4w, 5%</td>
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<td>5791-13830-10</td>
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<td>Rivet, 1/8 x 3/16&quot;</td>
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### A-18618-1
Trough IR Transistor PCB Assembly

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<td>5791-12622-09</td>
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<td>Connector, 9-pin Header</td>
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2-16
# A-15849-L Flipper Assembly

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<td>B-13104-L</td>
<td>Flipper Base Assembly, Left</td>
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<tr>
<td>2</td>
<td>SW-1A-194</td>
<td>Switch Assembly</td>
</tr>
<tr>
<td>3</td>
<td>4701-00002-00</td>
<td>Lock Washer #6 Split</td>
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<tr>
<td>4</td>
<td>4105-01019-10</td>
<td>Sh. Metal Screw, #5 x 5/8&quot;</td>
</tr>
<tr>
<td>5</td>
<td>4008-01079-05</td>
<td>Mach. Screw, 8-32 x 5/16&quot;</td>
</tr>
<tr>
<td>6</td>
<td>4701-00003-00</td>
<td>Lock Washer #8 Split</td>
</tr>
<tr>
<td>7</td>
<td>01-9375</td>
<td>Switch Mounting Bracket</td>
</tr>
<tr>
<td>8</td>
<td>20-6516</td>
<td>Speednut, Tinnerman</td>
</tr>
<tr>
<td>9</td>
<td>4010-01066-06</td>
<td>Cap Screw, 10-32 x 3/8&quot;</td>
</tr>
<tr>
<td>10</td>
<td>4701-00004-00</td>
<td>Lock Washer #10 Split</td>
</tr>
<tr>
<td>11</td>
<td>A-12390</td>
<td>Flipper Stop Assembly</td>
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<tr>
<td>12</td>
<td>FL-11630</td>
<td>Flipper Coil, Red</td>
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<tr>
<td>13</td>
<td>01-7695-1</td>
<td>Solenoid Bracket</td>
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<tr>
<td>14</td>
<td>4006-01017-04</td>
<td>Mach. Screw, 6-32 x 1/4&quot;</td>
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<tr>
<td>15</td>
<td>10-364</td>
<td>Spring</td>
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<tr>
<td>16</td>
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<td>Mach. Screw, 6-32 x 3/8&quot;</td>
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<td>17</td>
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<td>Nut 6-32 Hex.</td>
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<tr>
<td>18</td>
<td>A-15848-L</td>
<td>Crank Link Assembly, Left</td>
</tr>
<tr>
<td>a)</td>
<td>A-17050-L</td>
<td>Flipper Crank Assembly, Left</td>
</tr>
<tr>
<td>1</td>
<td>01-11764-L</td>
<td>Flipper Crank, Left</td>
</tr>
<tr>
<td>2</td>
<td>4700-00107-01</td>
<td>Mod-Crank Washer</td>
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<tr>
<td>3</td>
<td>RM-23-06</td>
<td>H.S. Tubing ¼&quot;</td>
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<tr>
<td>4</td>
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<td>FW, 13/64 x 5/8 x 12ga.</td>
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<td>7</td>
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<tr>
<td>8</td>
<td>01-9376</td>
<td>Spring Retainer</td>
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<tr>
<td>b)</td>
<td>A-15847</td>
<td>Flipper Link Assembly</td>
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<table>
<thead>
<tr>
<th>Item</th>
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<tbody>
<tr>
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<td>Link Spacer Bushing</td>
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<tr>
<td>d)</td>
<td>4010-01086-14</td>
<td>Cap Screw, 10-32 x 7/8&quot;</td>
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<tr>
<td>e)</td>
<td>4700-00023-00</td>
<td>Flat Washer, 5/8 x 13/64 x 16ga.</td>
</tr>
<tr>
<td>f)</td>
<td>4701-00004-00</td>
<td>Lock Washer #10 Split</td>
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<tr>
<td>g)</td>
<td>4410-01113-00</td>
<td>Nut 10-32 ESN</td>
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<td>19</td>
<td>23-6577</td>
<td>Bumper Plug, 5/8&quot;</td>
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<td>20</td>
<td>03-7568</td>
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<tr>
<td>21</td>
<td>03-7066-5</td>
<td>Coil Tubing</td>
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</table>

**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.

* See page 2-19 for assembly detail drawing.
# A-21717

## Flipper Assembly

<table>
<thead>
<tr>
<th>Item</th>
<th>Part Number</th>
<th>Description</th>
<th>Item</th>
<th>Part Number</th>
<th>Description</th>
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<tbody>
<tr>
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<td>B-13104-L</td>
<td>Flipper Base Assembly, Left</td>
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<td>A-15848-L</td>
<td>Crank Link Assembly, Left</td>
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<tr>
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<tr>
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<td>Mod-Crank Washer</td>
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<tr>
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<td>Mach. Screw, 8-32 x 5/16&quot;</td>
<td>3</td>
<td>RM-23-06</td>
<td>H.S. Tubing 1/4&quot;</td>
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<td>4701-00004-00</td>
<td>Lockwasher #10 Split</td>
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<td>Flipper Link Assembly</td>
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<tr>
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<td>c)</td>
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<tr>
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<td>Spring</td>
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**Associated Parts: (Not Shown)**

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*See page 2-19 for assembly detail drawing.*
## A-14876-R
### Flipper Assembly

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<td>c)</td>
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<td>d)</td>
<td>RM-23-06</td>
<td>H.S. Tubing 3/4&quot;</td>
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</tr>
<tr>
<td>o)</td>
<td>4410-01132-00</td>
<td>Nut 10-32 ESN</td>
</tr>
<tr>
<td>p)</td>
<td>23-6695</td>
<td>Bumper Plug, 5/8&quot;</td>
</tr>
<tr>
<td>q)</td>
<td>03-7568</td>
<td>Flipper Bushing</td>
</tr>
<tr>
<td>r)</td>
<td>03-7066-5</td>
<td>Coil Tubing</td>
</tr>
</tbody>
</table>

**Associated Parts:** (Not Shown)

- 23-6695: Flipper Rubber Ring, Red
- 20-10110-15: Flipper Bat & Shaft Assembly
<table>
<thead>
<tr>
<th>Item</th>
<th>Part Number</th>
<th>Description</th>
<th>Item</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A-16809-2</td>
<td>Ball Trough Welded Assy.</td>
<td>12</td>
<td>4408-01119-00</td>
<td>Nut 8-32 ESN</td>
</tr>
<tr>
<td>2</td>
<td>01-11587</td>
<td>Ball Trough Front</td>
<td>13</td>
<td>4008-01017-06</td>
<td>Mach. Screw, 8-32 x 3/8&quot;</td>
</tr>
<tr>
<td>3</td>
<td>A-6306-2</td>
<td>Bell Armature Assembly</td>
<td>14</td>
<td>23-6702</td>
<td>Bumper Plug</td>
</tr>
<tr>
<td>4</td>
<td>AE-26-1500</td>
<td>Coil Assembly</td>
<td>15</td>
<td>A-18617-1</td>
<td>Trough IRED LED PCB Assembly</td>
</tr>
<tr>
<td>5</td>
<td>01-8-508-T</td>
<td>Solenoid Assembly</td>
<td>16</td>
<td>A-18618-1</td>
<td>Trough IRED Transistor PCB Assy.</td>
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<tr>
<td>6</td>
<td>03-7067-5</td>
<td>Coil Tubing</td>
<td>17</td>
<td>4006-01003-10</td>
<td>Mach. Screw, 6-32 x 5/8&quot; SEMS</td>
</tr>
<tr>
<td>7</td>
<td>10-135</td>
<td>Spring</td>
<td>18</td>
<td>23-6626</td>
<td>Rubber Grommet</td>
</tr>
<tr>
<td>8</td>
<td>23-6420</td>
<td>Rubber Grommet</td>
<td>19</td>
<td>4700-00004-00</td>
<td>Flat Washer, 9/64 x 7/16 x 21ga.</td>
</tr>
<tr>
<td>9</td>
<td>03-8523</td>
<td>Insulator</td>
<td>20</td>
<td>02-4975</td>
<td>Bushing</td>
</tr>
<tr>
<td>10</td>
<td>01-11586</td>
<td>Coil Mounting Bracket</td>
<td>21</td>
<td>H-19523</td>
<td>Mini Solenoid Cable</td>
</tr>
<tr>
<td>11</td>
<td>4008-01017-05</td>
<td>Mach. Screw, 8-32 x 5/16&quot;</td>
<td></td>
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</tbody>
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A-17811
Kicker Arm (Slingshot) Assembly

Associated Parts for Right & Left Kickers:

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

### B-9414-3

**Jet Bumper Assembly**

<table>
<thead>
<tr>
<th>Item</th>
<th>Part Number</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>A-4754</td>
<td>Bumper Ring Assembly</td>
</tr>
<tr>
<td>2</td>
<td>03-6009-A5</td>
<td>Bumper Base, White</td>
</tr>
<tr>
<td>3</td>
<td>03-6035-4</td>
<td>Bumper Wafer, Red</td>
</tr>
<tr>
<td>4</td>
<td>03-7443-5</td>
<td>Bumper Body, White</td>
</tr>
<tr>
<td>5</td>
<td>10-7</td>
<td>Spring</td>
</tr>
<tr>
<td>6</td>
<td>24-8776</td>
<td>Socket-Wedge Base</td>
</tr>
<tr>
<td>7</td>
<td>24-8768</td>
<td>Bulb #555 (6.3v., 0.25A.)</td>
</tr>
</tbody>
</table>

**Associated Part:**

<table>
<thead>
<tr>
<th>Item</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>03-9266-9</td>
<td>Jet Bumper Cap, Red</td>
</tr>
<tr>
<td>9</td>
<td>03-9267-9</td>
<td>Jet Bumper Dome, Red</td>
</tr>
</tbody>
</table>

### B-13123-1

**Jet Bumper Assembly**

(Same as B-9414-3 except for the following items)

<table>
<thead>
<tr>
<th>Item</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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<td>6</td>
<td>Not Used</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Not Used</td>
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</tr>
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<td>8</td>
<td>Not Used</td>
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</tr>
<tr>
<td>9</td>
<td>Not Used</td>
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</table>

### A-20432-3

**Jet Bumper Assembly**

(Same as B-9414-3 except for the following items)

<table>
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<tr>
<th>Item</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>24-8802</td>
<td>Bulb #906 (13v., 0.69A.)</td>
</tr>
<tr>
<td>8</td>
<td>Not Used</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Not Used</td>
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</tr>
</tbody>
</table>
A-9415-2
Jet Bumper Coil Assembly

<table>
<thead>
<tr>
<th>Item</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B-7417</td>
<td>Bracket &amp; Stop Assembly</td>
</tr>
<tr>
<td>2</td>
<td>01-1747</td>
<td>Coil Retaining Bracket</td>
</tr>
<tr>
<td>3</td>
<td>01-5492</td>
<td>Armature Link, Steel</td>
</tr>
<tr>
<td>4</td>
<td>01-5493</td>
<td>Armature Link, Bakeline</td>
</tr>
<tr>
<td>5</td>
<td>02-3406-1</td>
<td>Coil Plunger</td>
</tr>
<tr>
<td>6</td>
<td>10-326</td>
<td>Armature Spring</td>
</tr>
<tr>
<td>7</td>
<td>AE-26-1200</td>
<td>Coil Assembly</td>
</tr>
<tr>
<td>8</td>
<td>4006-01017-04</td>
<td>Mach. Screw, 6-32 x 1/4”</td>
</tr>
<tr>
<td>9</td>
<td>03-7066</td>
<td>Coil Tubing</td>
</tr>
<tr>
<td>10</td>
<td>H-19523</td>
<td>Cable</td>
</tr>
</tbody>
</table>

Associated Parts:
(Not Shown)

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<thead>
<tr>
<th>Item</th>
<th>Part Number</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>11</td>
<td>B-12030-2</td>
<td>Leaf Switch Assembly</td>
</tr>
<tr>
<td>a)</td>
<td>A-16443</td>
<td>Switch &amp; Diode Assembly</td>
</tr>
<tr>
<td>b)</td>
<td>01-1168</td>
<td>Switch Mounting Bracket</td>
</tr>
<tr>
<td>c)</td>
<td>01-3670</td>
<td>Switch Plate</td>
</tr>
<tr>
<td>d)</td>
<td>03-7395</td>
<td>Switch Actuator</td>
</tr>
<tr>
<td>e)</td>
<td>4005-01003-12</td>
<td>Mach. Screw, 5-40 x 3/4”</td>
</tr>
<tr>
<td>f)</td>
<td>4405-01117-00</td>
<td>Nut 5-40 Hex.</td>
</tr>
</tbody>
</table>

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

<table>
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<th>Item</th>
<th>Part Number</th>
<th>Description</th>
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<tbody>
<tr>
<td>10</td>
<td>H-19523-1</td>
<td>Cable</td>
</tr>
<tr>
<td>Item</td>
<td>Part Number</td>
<td>Description</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>04-10705-1</td>
<td>Bracket - Pass Mech. Right</td>
</tr>
<tr>
<td>2</td>
<td>01-14592</td>
<td>Pass Switch Mtg. Bracket</td>
</tr>
<tr>
<td>3</td>
<td>AE-23-800</td>
<td>Coil Assembly</td>
</tr>
<tr>
<td>4</td>
<td>AE-29-2000</td>
<td>Coil Assembly</td>
</tr>
<tr>
<td>5</td>
<td>04-10322-2</td>
<td>Coil Bracket</td>
</tr>
<tr>
<td>6</td>
<td>03-7067</td>
<td>Coil Tubing</td>
</tr>
<tr>
<td>7</td>
<td>H-16437</td>
<td>Switch Cable</td>
</tr>
<tr>
<td>8</td>
<td>A-15371</td>
<td>Plunger Assembly</td>
</tr>
<tr>
<td>9</td>
<td>A-17767</td>
<td>Bell Armature Assembly</td>
</tr>
<tr>
<td>10</td>
<td>10-135</td>
<td>Spring Plunger</td>
</tr>
<tr>
<td>11</td>
<td>5647-12693-66</td>
<td>Sub Mini Micro Switch</td>
</tr>
<tr>
<td>12</td>
<td>4408-01119-00</td>
<td>Nut 8-32 ESN</td>
</tr>
<tr>
<td>13</td>
<td>4002-01105-06</td>
<td>Mach. Screw, 2-56 x 3/8&quot;</td>
</tr>
<tr>
<td>14</td>
<td>23-6652</td>
<td>Foam Tape - Edge Protector</td>
</tr>
<tr>
<td>15</td>
<td>5070-09054-00</td>
<td>Diode 1N4004 1.0A.</td>
</tr>
<tr>
<td>16</td>
<td>H-21560</td>
<td>Shooter 1 Cable</td>
</tr>
<tr>
<td>17</td>
<td>23-6420</td>
<td>Rubber Grommet</td>
</tr>
</tbody>
</table>
## A-21411-2 Pass Assembly - No. 2
### Part Numbers and Descriptions:

<table>
<thead>
<tr>
<th>Item</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>04-10705-3</td>
<td>Bracket - Pass Mech. Center</td>
</tr>
<tr>
<td>2</td>
<td>01-14592</td>
<td>Pass Switch Mtg. Bracket</td>
</tr>
<tr>
<td>3</td>
<td>AE-23-800</td>
<td>Coil Assembly</td>
</tr>
<tr>
<td>4</td>
<td>AE-29-2000</td>
<td>Coil Assembly</td>
</tr>
<tr>
<td>5</td>
<td>04-10322-2</td>
<td>Coil Bracket</td>
</tr>
<tr>
<td>6</td>
<td>03-7067</td>
<td>Coil Tubing</td>
</tr>
<tr>
<td>7</td>
<td>H-16437</td>
<td>Switch Cable</td>
</tr>
<tr>
<td>8</td>
<td>A-15371</td>
<td>Plunger Assembly</td>
</tr>
<tr>
<td>9</td>
<td>A-17767</td>
<td>Bell Armature Assembly</td>
</tr>
<tr>
<td>10</td>
<td>10-135</td>
<td>Spring Plunger</td>
</tr>
<tr>
<td>11</td>
<td>5647-12693-66</td>
<td>Sub Mini Micro Switch</td>
</tr>
<tr>
<td>12</td>
<td>4408-01119-00</td>
<td>Nut 8-32 ESN</td>
</tr>
<tr>
<td>13</td>
<td>4002-01105-06</td>
<td>Mach. Screw, 2-56 x 3/8&quot;</td>
</tr>
<tr>
<td>14</td>
<td>23-6652</td>
<td>Foam Tape - Edge Protector</td>
</tr>
<tr>
<td>15</td>
<td>5070-09054-00</td>
<td>Diode 1N4004 1.0A</td>
</tr>
<tr>
<td>16</td>
<td>H-21561</td>
<td>Shooter 2 Cable <em>(use with A-21411-2)</em></td>
</tr>
<tr>
<td></td>
<td>H-21562</td>
<td>Shooter 3 Cable <em>(use with A-21411-3)</em></td>
</tr>
<tr>
<td>17</td>
<td>23-6420</td>
<td>Rubber Grommet</td>
</tr>
</tbody>
</table>

### Diagram:
- **Items 13, 14, 15, 16** refer to specific components in the diagram.
- **Diagram notes:**
  - *RED/BRN* and *BRN/GRY* wires connect specific components.
  - *WHT* and *GRN* wires are also connected to specific components.

---

**Note:**
- The diagram and part numbers are provided for assembly guidance.
- Use parts marked with specific notes in the assembly process.
### Pass Assembly - No. 4

**Item** | **Part Number** | **Description**
--- | --- | ---
1 | 04-10705-2 | Bracket - Pass Mech. Left
2 | 01-14592 | 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
<table>
<thead>
<tr>
<th>Item</th>
<th>Part Number</th>
<th>Description</th>
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<tbody>
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<td>1</td>
<td>01-14616</td>
<td>Bracket Assembly</td>
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<td>2</td>
<td>04-10723</td>
<td>Plunger Assembly</td>
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<td>3</td>
<td>03-7067-5</td>
<td>Coil Tubing</td>
</tr>
<tr>
<td>4</td>
<td>04-10322-2</td>
<td>Coil Bracket</td>
</tr>
<tr>
<td>5</td>
<td>AE-26-1500</td>
<td>Coil Sub-Assembly</td>
</tr>
<tr>
<td>6</td>
<td>10-135</td>
<td>Spring</td>
</tr>
<tr>
<td>7</td>
<td>23-6420</td>
<td>Rubber Grommet</td>
</tr>
<tr>
<td>8</td>
<td>4408-01119-00</td>
<td>Nut 8-32 ESN</td>
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<tr>
<td>9</td>
<td>H-19523</td>
<td>Mini Solenoid Cable</td>
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### A-21413
Defender Arm Assembly

<table>
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<tbody>
<tr>
<td>1</td>
<td>04-10706</td>
<td>Base Plate</td>
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<td>04-10707.1</td>
<td>Defender Arm</td>
</tr>
<tr>
<td>3</td>
<td>04-10708</td>
<td>Motor Bracket</td>
</tr>
<tr>
<td>4</td>
<td>04-10727</td>
<td>Stopper Bracket</td>
</tr>
<tr>
<td>5</td>
<td>23-6795</td>
<td>Bumper</td>
</tr>
<tr>
<td>6</td>
<td>03-7568</td>
<td>Flipper Bushing</td>
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<td>7</td>
<td>01-14608</td>
<td>Flap</td>
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<td>8</td>
<td>14-8034</td>
<td>Motor</td>
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<td>9</td>
<td>02-5049-6</td>
<td>F-F Spacer #8-32 x 1-5/8&quot;</td>
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<tr>
<td>10</td>
<td>5647-12693-04</td>
<td>Micro Switch</td>
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<tr>
<td>11</td>
<td>4010-01169-04</td>
<td>Set Screw, 10-32 x 1/4&quot;</td>
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<tr>
<td>12</td>
<td>4002-01105-07</td>
<td>Mach. Screw, 2-56 x 7/16&quot;</td>
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<tr>
<td>13</td>
<td>07-6668-17N</td>
<td>Rivet: 1/8 x 5/32&quot;</td>
</tr>
<tr>
<td>14</td>
<td>4008-01113-16</td>
<td>Mach. Screw: 8-32 x 1&quot;</td>
</tr>
<tr>
<td>15</td>
<td>4406-01119-00</td>
<td>Nut 6-32 ESN</td>
</tr>
<tr>
<td>16</td>
<td>4408-01119-00</td>
<td>Nut 8-32 ESN</td>
</tr>
<tr>
<td>17</td>
<td>4004-01003-05</td>
<td>Mach. Screw, 4-40 x 7/8&quot;</td>
</tr>
<tr>
<td>18</td>
<td>A-21402</td>
<td>Opto Board</td>
</tr>
<tr>
<td>19</td>
<td>H-21545.1</td>
<td>Defender Cable Assembly</td>
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</tbody>
</table>

**Associated Assembly:**
(Shown below)

- **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 1/4" Nickel
  - f) 07-6668-17N Rivet 1/8 x 5/32 Nickel
  - g) 31-2810-23B Playfield Plastic

![Defender Arm Assembly Diagram](image-url)
<table>
<thead>
<tr>
<th>Item</th>
<th>Part Number</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
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<td>04-10710</td>
<td>Mounting Bracket</td>
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<tr>
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* Not available for individual sale. Order Decal Set 31-2812.
### NBA Magnet Assembly

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### Ball Gate Actuator Assembly

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**Loop Diverter Assembly**

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### A-21531
**Hook Diverter Assembly**

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04-10346
Tilt Mechanism Assembly

B-10686-1
Knocker Assembly

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**Basket Switch Assembly**

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*See page 2-14 for PCB assembly.

### A-21405-1
**NBA Eject Assembly**

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### A-21529
**NBA Basket Assembly**

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### Power Interface Assembly

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2-35
Upper Playfield Parts

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PLASTIC SPIRALS

*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

2-36
## Lower Playfield Parts

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<th>Item</th>
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<td>A-15595</td>
<td>7-Opto PCB w/Bracket</td>
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2-38
Lower Playfield Parts Locations

(Underside of Playfield, Viewed in Raised Position)
### Solenoid/Flashlamp Locations

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<th>Item No.</th>
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### Flipper

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### Motor and Shot Clock

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### General Illumination

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<td>#44 / #555</td>
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24-6549 = #44 BULB
24-8756 = #555 BULB
24-8802 = #906 BULB

*IN BACKBOX
** NOT SHOWN
Solenoid/Flashlamp Locations
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<td>SW-1A-194</td>
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<td>SW-1A-194</td>
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<td>A-16909 (PHOTO TRANS)</td>
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<td>UPPER RIGHT FLIPPER CABINET</td>
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71 to 88 NOT USED

*NOT SHOWN. **SCORE SWITCHES HAVE DIODES ATTACHED.*
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* SOCKET IS NOT SOLD SEPARATELY.
** ITEM #61 LIGHTS TWO BULBS WHICH ARE LOCATED ON SEPARATE LAMP BOARDS.
24-6549 = #44 Bulb  24-8768 = #555
## SOLENOID/FLASHER TABLE

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### General Illumination

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<th>Drive Xistor</th>
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### Flipper Circuits

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### Motor & Shot Clock Circuits

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**TIEBACK DIODES FOR SOLENOIDS 25 THROUGH 28 ARE AT J109-5, J109-6, J109-8, AND J109-9 RESPECTIVELY.**

**THESE G.L. 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.**
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J1XX = Power Driver Board
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J2XX = CPU BOARD  |  = OPTO, TYPICALLY CLOSED
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.
The microprocessor is constantly strobing the column side of the switch. When point “A” on the column circuit toggles low, the column side is active. When a switch closes, the row side of the circuit activates. The “+” input to the LM339 drops below +5V, therefore, its output is low. Corresponding row and column switches must be low at the same time for the switch to be considered closed by the microprocessor. When the switch opens, the “+” input to the LM339 is above +5V, its output is high and the row is inactive.
DEDICATED SWITCHES

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

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

DEDICATED SWITCH CIRCUIT

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

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

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<tbody>
<tr>
<td>1 Red-Brown</td>
<td>1</td>
<td>Yellow-Brown</td>
<td>J121-1</td>
<td>Yellow-Red</td>
<td>J121-2</td>
<td>Yellow-Orange</td>
<td>J121-3</td>
<td>Yellow-Black</td>
<td>J121-4</td>
</tr>
<tr>
<td>1 Red-Brown</td>
<td>2</td>
<td>Points</td>
<td>Power Hoops</td>
<td>Multiball Hoops</td>
<td>Champion Ring</td>
<td>SODA</td>
<td>RAMPS: 3 Points (2)</td>
<td>LEFT LIGHT FASTBREAK</td>
<td>Light Alley Oop</td>
</tr>
<tr>
<td>2 Red-Black</td>
<td>3</td>
<td>Points</td>
<td>Power Hoops</td>
<td>Multiball Hoops</td>
<td>Champion Ring</td>
<td>QUESTION</td>
<td>Tip-Off</td>
<td>SLAM DUNK</td>
<td>LEFT &quot;IN THE PAINT&quot;</td>
</tr>
<tr>
<td>3 Red-Orange</td>
<td>4</td>
<td>Points</td>
<td>Power Hoops</td>
<td>Multiball Hoops</td>
<td>Champion Ring</td>
<td>HOT DOG</td>
<td>FASTBREAK</td>
<td>S(H)OOT</td>
<td>(S)HOOT</td>
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<tr>
<td>4 Red-Yellow</td>
<td>5</td>
<td>Points</td>
<td>Power Hoops</td>
<td>Multiball Hoops</td>
<td>Champion Ring</td>
<td>PIZZA</td>
<td>ALLEY OOP</td>
<td>RIGHT LIGHT FASTBREAK</td>
<td>(3)PT</td>
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<tr>
<td>5 Red-Green</td>
<td>6</td>
<td>Points</td>
<td>Power Hoops</td>
<td>Multiball Hoops</td>
<td>Champion Ring</td>
<td>CRAZY BOB'S</td>
<td>FREE THROW</td>
<td>LIGHT SLAM DUNK</td>
<td>3(P)T</td>
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<tr>
<td>6 Red-Blue</td>
<td>7</td>
<td>Points</td>
<td>Power Hoops</td>
<td>Multiball Hoops</td>
<td>Champion Ring</td>
<td>RIGHT &quot;IN THE PAINT&quot;</td>
<td>LOWER RIGHT STANDUP</td>
<td>EXTRA BALL</td>
<td>SH(O)OT</td>
</tr>
<tr>
<td>7 Red-Violet</td>
<td>8</td>
<td>Points</td>
<td>Power Hoops</td>
<td>Multiball Hoops</td>
<td>Champion Ring</td>
<td>RIGHT OUTLINE</td>
<td>IN THE PAINT</td>
<td>IN THE PAINT</td>
<td>BALL LAUNCH</td>
</tr>
<tr>
<td>8 Red-Gray</td>
<td>9</td>
<td>Points</td>
<td>Power Hoops</td>
<td>Multiball Hoops</td>
<td>Champion Ring</td>
<td>RIGHT OUTLINE</td>
<td>IN THE PAINT</td>
<td>IN THE PAINT</td>
<td>START BUTTON</td>
</tr>
</tbody>
</table>

J1XX = Power Driver Board

### LAMP MATRIX CIRCUIT

The microprocessor sends a signal to the column circuit causing the output of the UNL-2803 to toggle. When point "A" drops low, the TIP107 transistor conducts and point "B" changes to a high state. At the same time, the microprocessor drives the input of the 74LS74 low, causing a high at output "F". A high state at the base of the TIP102 causes the transistor to conducts, bringing the row circuit to ground and turning the lamp on. The microprocessor changes the input of the 74LS74 to a high state to turn the lamp off. In overcurrent conditions, the lamp is shut off through the comparator. If the voltage at the negative input of the LM339 rises above 1.4V, the output changes to a low, which is fed back to the 74LS74 and shuts the circuit off.
### SOLENOID/FLASHER TABLE

<table>
<thead>
<tr>
<th>Sol. No.</th>
<th>Function</th>
<th>Solenoid Type</th>
<th>Voltage Connections</th>
<th>Drive Xistor</th>
<th>Drive Connections</th>
<th>Drive Wire Color</th>
<th>Solenoid Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 AUTO PLUNGER</td>
<td>High Power</td>
<td>J133-2</td>
<td>Q72</td>
<td>J116-1</td>
<td>VIO-BRN</td>
<td>AE-24-900</td>
<td></td>
</tr>
<tr>
<td>02 NOT USED</td>
<td>High Power</td>
<td>J133-2</td>
<td>Q71</td>
<td>J116-4</td>
<td>VIO-ORG</td>
<td>AE-26-1500</td>
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</tr>
<tr>
<td>03 LEFT RAMP DIVERTER</td>
<td>High Power</td>
<td>J133-2</td>
<td>Q67</td>
<td>J116-5</td>
<td>VIO-YEL</td>
<td>AE-26-1500</td>
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</tr>
<tr>
<td>04 RIGHT LOOP DIVERTER</td>
<td>High Power</td>
<td>J133-2</td>
<td>Q70</td>
<td>J116-6</td>
<td>VIO-GRN</td>
<td>AE-30-2000</td>
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<tr>
<td>05 EJECT</td>
<td>High Power</td>
<td>J133-2</td>
<td>Q66</td>
<td>J116-7</td>
<td>VIO-BLU</td>
<td>A-14406</td>
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<tr>
<td>06 LOOP GATE</td>
<td>High Power</td>
<td>J133-2</td>
<td>Q69</td>
<td>J117-3</td>
<td>VIO-BLK</td>
<td>FL-11753</td>
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<tr>
<td>07 BALL CATCH MAGNET</td>
<td>High Power</td>
<td>J133-2</td>
<td>Q65</td>
<td>J116-9</td>
<td>VIO-GRY</td>
<td>B-13522</td>
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</tr>
<tr>
<td>08 TROUGH EJECT</td>
<td>Low Power</td>
<td>J133-3</td>
<td>Q44</td>
<td>J113-1</td>
<td>BRN-BLK</td>
<td>AE-28-1500</td>
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<tr>
<td>09 LEFT RAMP DIVERTER</td>
<td>Low Power</td>
<td>J133-3</td>
<td>Q45</td>
<td>J113-3</td>
<td>BRN-RED</td>
<td>AE-26-1200</td>
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<tr>
<td>10 RIGHT LOOP DIVERTER</td>
<td>Low Power</td>
<td>J133-3</td>
<td>Q43</td>
<td>J113-4</td>
<td>BRN-ORG</td>
<td>AE-26-1200</td>
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</tr>
<tr>
<td>11 MIDDLE JET BUMPER</td>
<td>Low Power</td>
<td>J133-3</td>
<td>Q47</td>
<td>J113-5</td>
<td>BRN-RED</td>
<td>AE-26-1200</td>
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<tr>
<td>12 RIGHT JET BUMPER</td>
<td>Low Power</td>
<td>J133-3</td>
<td>Q42</td>
<td>J113-6</td>
<td>BRN-RED</td>
<td>#906 (1)</td>
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<tr>
<td>13 EJECT</td>
<td>Low Power</td>
<td>J133-3</td>
<td>Q46</td>
<td>J113-7</td>
<td>BRN-RED</td>
<td>AE-30-2000</td>
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<tr>
<td>14 PASS RIGHT 2</td>
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<td>J133-3</td>
<td>Q41</td>
<td>J113-8</td>
<td>BRN-VIO</td>
<td>AE-29-2000</td>
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<tr>
<td>15 PASS LEFT 2</td>
<td>Low Power</td>
<td>J133-3</td>
<td>Q45</td>
<td>J113-9</td>
<td>BRN-VIO</td>
<td>AE-29-2000</td>
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<tr>
<td>16 PASS LEFT 3</td>
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<td>J133-3</td>
<td>Q47</td>
<td>J113-5</td>
<td>BRN-YEL</td>
<td>AE-26-1200</td>
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<tr>
<td>17 pass RIGHT 3</td>
<td>Low Power</td>
<td>J133-3</td>
<td>Q32</td>
<td>J111-2</td>
<td>BLK-RED</td>
<td>#906 (1)</td>
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<tr>
<td>18 pass LEFT 4</td>
<td>Low Power</td>
<td>J133-3</td>
<td>Q31</td>
<td>J111-4</td>
<td>BLK-YEL</td>
<td>#906 (1)</td>
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<tr>
<td>19 TROPHY INSERT FLASHER</td>
<td>Flasher</td>
<td>J133-6</td>
<td>Q28</td>
<td>J111-1</td>
<td>BLK-BRN</td>
<td>#906 (1)</td>
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<tr>
<td>20 UPPER RIGHT FLASHER</td>
<td>Flasher</td>
<td>J133-6</td>
<td>Q27</td>
<td>J111-3</td>
<td>BLK-ORG</td>
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<td>21 NOT USED</td>
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<td>22 TROPHY INSERT FLASHER</td>
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<td>J133-6</td>
<td>Q30</td>
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<tr>
<td>23 NOT USED</td>
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<tr>
<td>24 LOWER RIGHT/LEFT FLASHER</td>
<td>Flasher</td>
<td>J133-6</td>
<td>Q29</td>
<td>J111-8</td>
<td>BLK-YEL</td>
<td>#906 (1)</td>
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### General Illumination

<table>
<thead>
<tr>
<th>Sol. No.</th>
<th>Function</th>
<th>Voltage Connections</th>
<th>Drive Xistor</th>
<th>Drive Connections</th>
<th>Drive Wire Color</th>
<th>Solenoid Part Number</th>
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<tbody>
<tr>
<td>01 STRING 1</td>
<td>G.I.</td>
<td>J106-1</td>
<td>J105-1</td>
<td>Q5</td>
<td>J106-7</td>
<td>J105-7</td>
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<tr>
<td>02 STRING 2</td>
<td>G.I.</td>
<td>J106-2</td>
<td>J105-2</td>
<td>Q4</td>
<td>J106-8</td>
<td>J105-8</td>
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<td>03 STRING 3</td>
<td>G.I.</td>
<td>J106-3</td>
<td>J105-3</td>
<td>Q3</td>
<td>J106-9</td>
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<td>04** STRING 4</td>
<td>G.I.</td>
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<td>Q2</td>
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<td>05** STRING 5</td>
<td>G.I.</td>
<td>J106-6</td>
<td>J105-6</td>
<td>J104-3</td>
<td>Q1</td>
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### Flipper Circuits

<table>
<thead>
<tr>
<th>Solenoid Type</th>
<th>Voltage Connections</th>
<th>Drive Xistor</th>
<th>Drive Connections</th>
<th>Drive Wire Colors</th>
<th>Coil Part No.</th>
<th>Coil Colors</th>
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<tbody>
<tr>
<td>LOWER RIGHT FLIPPER</td>
<td>Low Power</td>
<td>J119-1</td>
<td>Q90</td>
<td>J120-13</td>
<td>YEL-GRN</td>
<td>FL-11630</td>
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<tr>
<td>LOWER LEFT FLIPPER</td>
<td>Low Power</td>
<td>J119-4</td>
<td>Q87</td>
<td>J120-9</td>
<td>YEL-BLU</td>
<td>FL-11630</td>
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<tr>
<td>SHOOT 1</td>
<td>Upr. Rt. Power</td>
<td>J119-6</td>
<td>Q84</td>
<td>J120-6</td>
<td>YEL-VIO</td>
<td>AE-23-800</td>
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<td>SHOOT 2</td>
<td>Upr. Rt. Power</td>
<td>J119-6</td>
<td>Q86</td>
<td>J120-4</td>
<td>ORG-VIO</td>
<td>AE-23-800</td>
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<td>SHOOT 4</td>
<td>Upr. Lt. Power</td>
<td>J119-8</td>
<td>Q83</td>
<td>J120-1</td>
<td>ORG-GRY</td>
<td>AE-23-800</td>
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### Motor & Shot Clock Circuits

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<th>Solenoid Type</th>
<th>Voltage Connections</th>
<th>Drive Xistor</th>
<th>Drive Connections</th>
<th>Drive Wire Colors</th>
<th>Device Part Number</th>
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<tbody>
<tr>
<td>MOTOR ENABLE</td>
<td>Low Power</td>
<td>J139-2</td>
<td>U3A, U3B</td>
<td>J110-1</td>
<td>BRN-BLU</td>
</tr>
<tr>
<td>MOTOR LOCATION</td>
<td>Low Power</td>
<td>J139-2</td>
<td>U3C, U3D</td>
<td>J110-3</td>
<td>ORG-WHT</td>
</tr>
<tr>
<td>SHOT CLOCK ENABLE</td>
<td>Low Power</td>
<td>J139-2</td>
<td>U3G, U3H</td>
<td>J110-4</td>
<td>YEL-WHT</td>
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<tr>
<td>SHOT CLOCK COUNT</td>
<td>Low Power</td>
<td>J139-2</td>
<td>U3E, U3F</td>
<td>J110-5</td>
<td>BLU-BLU</td>
</tr>
</tbody>
</table>

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.
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.
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.
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.
FLIPPER CIRCUIT DIAGRAM

POWER DRIVER BOARD

LOWER RIGHT FLIPPER COIL
YELLOW-GREEN POWER Q90
ORANGE-GREEN HOLD Q92

LOWER LEFT FLIPPER COIL
YELLOW-BLUE POWER Q87
ORANGE-BLUE HOLD Q89

YELLOW-VIOLET *SHOOT 1 Q84
ORANGE-VIOLET *SHOOT 2 Q86

YELLOW-GRAY *SHOOT 3 Q81
ORANGE-GRAY *SHOOT 4 Q83

GRAY-YELLOW +12V

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

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

* INDICATES A FLIPPER CIRCUIT USED FOR ANOTHER PURPOSE.
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.
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.
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
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)*

![Diagram of 7-Opto Switch Board Assembly](image)

<table>
<thead>
<tr>
<th>J1-1</th>
<th>GRY-VIO</th>
<th>To switch #37, RIGHT LOOP ENTER OPTO LED board</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1-2</td>
<td>GRY-BLU</td>
<td>To switch #36, CENTER RAMP OPTO LED board</td>
</tr>
<tr>
<td>J1-3</td>
<td>GRY-GRN</td>
<td>To switch #35, BALL TROUGH, LED board</td>
</tr>
<tr>
<td>J1-4</td>
<td>N/C</td>
<td></td>
</tr>
<tr>
<td>J1-5</td>
<td>GRY-BLK</td>
<td>To switch #34, BALL TROUGH LED board</td>
</tr>
<tr>
<td>J1-6</td>
<td>GRY-ORG</td>
<td>To switch #33, BALL TROUGH LED board</td>
</tr>
<tr>
<td>J1-7</td>
<td>GRY-RED</td>
<td>To switch #32, BALL TROUGH LED board</td>
</tr>
<tr>
<td>J1-8</td>
<td>GRY-BRN</td>
<td>To switch #31, BALL TROUGH LED board</td>
</tr>
<tr>
<td>J1-9</td>
<td>BLK</td>
<td>Ground to LED boards</td>
</tr>
<tr>
<td>J1-10</td>
<td>BLK</td>
<td>Ground to LED boards</td>
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<table>
<thead>
<tr>
<th>J2-1</th>
<th>ORG-VIO</th>
<th>To switch #37, RIGHT LOOP ENTER PHOTO TRANS. board</th>
</tr>
</thead>
<tbody>
<tr>
<td>J2-2</td>
<td>ORG-BLU</td>
<td>To switch #36, CENTER RAMP OPTO PHOTO TRANS. board</td>
</tr>
<tr>
<td>J2-3</td>
<td>ORG-GRN</td>
<td>To switch #35, BALL TROUGH PHOTO TRANS. board</td>
</tr>
<tr>
<td>J2-4</td>
<td>ORG-YEL</td>
<td>To switch #34, BALL TROUGH PHOTO TRANS. board</td>
</tr>
<tr>
<td>J2-5</td>
<td>ORG-BLK</td>
<td>To switch #33, BALL TROUGH PHOTO TRANS. board</td>
</tr>
<tr>
<td>J2-6</td>
<td>ORG-RED</td>
<td>To switch #32, BALL TROUGH PHOTO TRANS. board</td>
</tr>
<tr>
<td>J2-7</td>
<td>ORG-BRN</td>
<td>To switch #31, BALL TROUGH PHOTO TRANS. board</td>
</tr>
<tr>
<td>J2-8</td>
<td>N/C</td>
<td></td>
</tr>
<tr>
<td>J2-9</td>
<td>GRY-YEL</td>
<td>+12V to PHOTO TRANS. boards</td>
</tr>
<tr>
<td>J2-10</td>
<td>GRY-YEL</td>
<td>+12V to PHOTO TRANS. boards</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>J3-1</th>
<th>GRY-YEL</th>
<th>+12V from POWER DRIVER board J139-2</th>
</tr>
</thead>
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<tr>
<td>J3-2</td>
<td>N/C</td>
<td></td>
</tr>
<tr>
<td>J3-3</td>
<td>BLK</td>
<td>Ground from POWER DRIVER board J139-3</td>
</tr>
<tr>
<td>J3-4</td>
<td>N/C</td>
<td></td>
</tr>
<tr>
<td>J3-5</td>
<td>WHT-BRN</td>
<td>Switch Row 1, from CPU board J208-1</td>
</tr>
<tr>
<td>J3-6</td>
<td>WHT-RED</td>
<td>Switch Row 2, from CPU board J208-2</td>
</tr>
<tr>
<td>J3-7</td>
<td>WHT-ORG</td>
<td>Switch Row 3, from CPU board J208-3</td>
</tr>
<tr>
<td>J3-8</td>
<td>WHT-YEL</td>
<td>Switch Row 4, from CPU board J208-4</td>
</tr>
<tr>
<td>J3-9</td>
<td>WHT-GRN</td>
<td>Switch Row 5, from CPU board J208-5</td>
</tr>
<tr>
<td>J3-10</td>
<td>WHT-BLU</td>
<td>Switch Row 6, from CPU board J208-7</td>
</tr>
<tr>
<td>J3-11</td>
<td>WHT-VIO</td>
<td>Switch Row 7, from CPU board J208-8</td>
</tr>
<tr>
<td>J3-12</td>
<td>GRN-ORG</td>
<td>Switch Column 3, from CPU board J206-3</td>
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</table>
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)

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

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

3-22
Defender Switch Board
A-21402
(For Defender Positions and Defender Lock Opto Switches)

- R1
- R2
- R3
- R4
- R5
- R6
- R7
- R8
- R9
- R10

- U1
- U2
- U3
- U4
- U5
- U6
- U7
- U8

- Q1
- Q2
- Q3
- Q4
- Q5

- J1
- J2
- J3
- J4
- J5
- J6
- J7
- J8
- J9

- G1
- G2
- G3
- G4
- G5

- C1
- C2

- +12V from POWER DRIVER board J139-2
- Ground from POWER DRIVER board J139-3
- Switch Column 5, from CPU board J206-5
- Switch Row 1, from CPU board J206-1
- Switch Row 2, from CPU board J206-2
- Switch Row 3, from CPU board J206-3
- Switch Row 4, from CPU board J206-4
- Switch Row 5, from CPU board J206-5

3-23
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

3-26
Security CPU Board Assembly
A-21377-50053

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
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-BRN, 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
J209-9
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

3-27
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 N/C
J110-6 BLU-BLK, solenoid 22 drive to playfield flasher
J110-7 N/C
J110-8 BLU-GRY, solenoid 24 drive to playfield flasher
J110-9 KEY
J110-10 N/C
J110-11 N/C
J110-12 N/C
J110-13 N/C

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 to 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
J133-7 NOT USED
J133-8 NOT USED
J133-9 NOT USED
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.l. 6.8vac from Power Driver J104-1
J2-4 KEY
J2-5 VIO, G.l. 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-YEL, lamp row 8 from Power Driver J125-9
J4- NOT USED

J5-1 VIO, G.l. return to coin door
J5-2 WHT-VIO, G.l. 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-BRN, 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
WARNINGS & NOTICES

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Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

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TO MAINTAIN THESE LEVELS, reposition harnesses and reconnect ground straps to their original placements, if they become disconnected during maintenance.

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