

# Find-It-In-Front: Dr. Pinball Section

The inside cover & the front 16 pages cover the basics:  
Fuses, Matrixes, Adjustments, Audits and more!

# Section 3 details the Service Menu!

Diagnostics, Audits, Adjustments, Utilities  
(Installs, USB, etc.) and Tournament information!

|   |                           |                                  |                                  |  |   |  |                                     |
|---|---------------------------|----------------------------------|----------------------------------|--|---|--|-------------------------------------|
| Find-It-In-Front<br>Dr. Pinball Section | Section 1<br>After Set-Up | Section 2<br>Game Op. & Features | Section 3<br>Service Menu System | Section 4 (Pink)<br>Parts ID. & Location | Section 4 (Blue)<br>Drawings for Major... | Sec. 5 (Yellow)<br>Schematics, Wiring... | Appendixes<br>A - J Historical Data |
|---|---------------------------|----------------------------------|----------------------------------|--|---|--|-------------------------------------|



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## Pinball Service Game Manual

Please call, eMail or visit us online for technical support, questions or comments regarding this pinball game.

Go to [www.sternpinball.com](http://www.sternpinball.com) and click Tech. Support & Parts Sales



Find Service Game Manual (with updates), Game Code, Appendixes, Coin Cards, Service Bulletins and much more!

• Toll-Free: 1-800-KICKERS (542-5377) or 1-708-345-7700 • eMail: [parts.service@sternpinball.com](mailto:parts.service@sternpinball.com) •

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SPI Part Number  
**780-5098-00**



# HOW TO UPDATE YOUR GAME CODE FOR THE NEW S.A.M. SYSTEM

**USB Compatible Memory Stick** (aka Thumb, Flash or Jump Drives) required to copy game code into system.  
 S.A.M. System compatible, tested & SPI approved USB Memory Sticks 128MB+ available through your local distributor: Ask for **SPI Part Number 970-0128-00**

\* to get the Memory Stick with the latest **Game Code** copied to it, add "**the game title name**" to above part number.

STYLE, COLOR, SIZE AND MANUFACTURER SUBJECT TO CHANGE.

Game Code is subject to change. Update this game with the latest code downloaded from our website, from another game or order through your local distributor (use SPI PN + name above).

Upon power-up the display will describe the version of code installed in your game. When directed to do so (via Service Bulletin or website announcement) you will need to update your code ... with the **BOOT FLASH EPROM\*** installed, **here's how:**



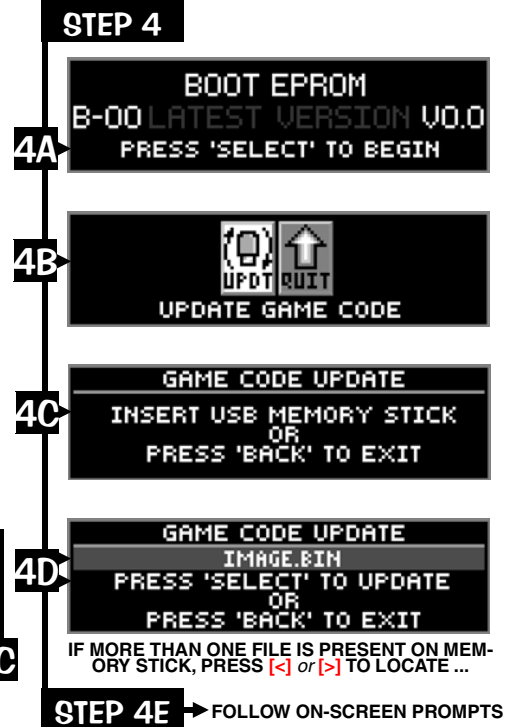
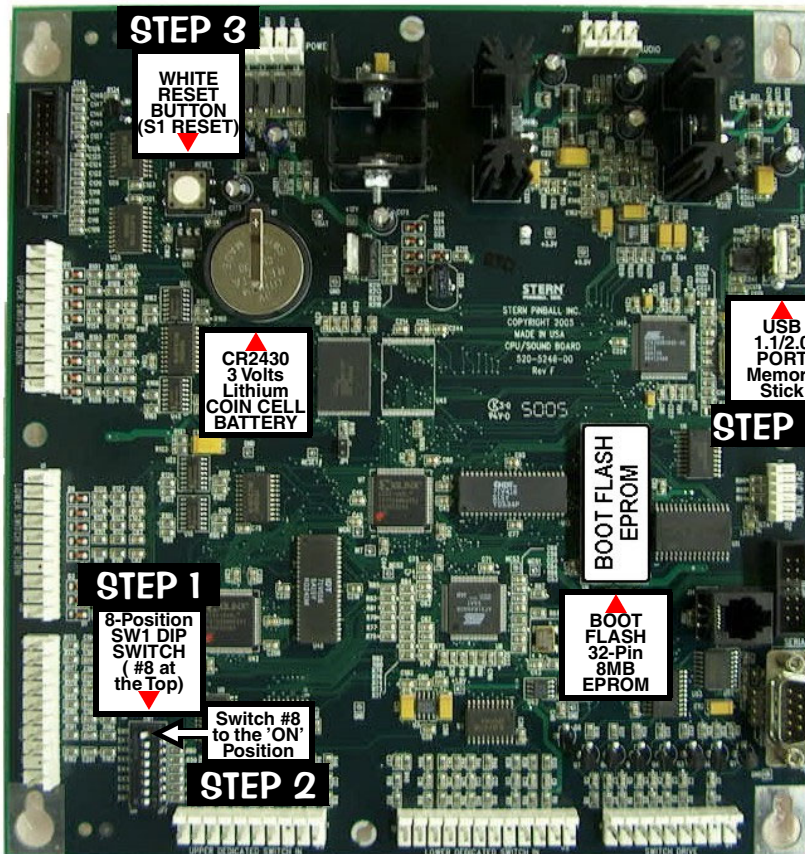
● **Green Button**  
 Press to **Escape Back** (or **Exit**).

●● **Red Buttons**  
 Press to move **< Left, Right >**.  
 Press to **- Decrease** or **+ Increase** values or to change settings.

● **Black Button**  
 Press to **Enter Select** (or **'OK'**).

- STEP 1** Open the Back Box and locate the **8-Position Dip Switch (SW1 on the CPU/Sound Board)**.
- STEP 2** Switch Dip Switch #8 to 'ON'.  
 (\***BOOT FLASH EPROM** must be installed.)
- STEP 3** Press the **White Reset Button (S1 RESET on the CPU/Sound Board)** or Power Cycle the game **OFF/ON** (ON/OFF Switch is located on the outside of the cabinet bottom, front right).
- STEP 4** Using the **4-Button Service Switch Set** (inside the Coin Door):
  - 4A }** Press [**SELECT**] to begin.
  - 4B }** With the "UPDT" *Icon highlighted*, press [**SELECT**].
  - 4C }** Insert the Memory Stick [with latest file(s)] into the USB Port.
  - 4D }** If more than one file is present on the Memory Stick, press [**<**] or [**>**] to locate your file. Press [**SELECT**] to update.
  - 4E }** Follow on-screen prompts.

## CPU/Sound Board (S.A.M. System)

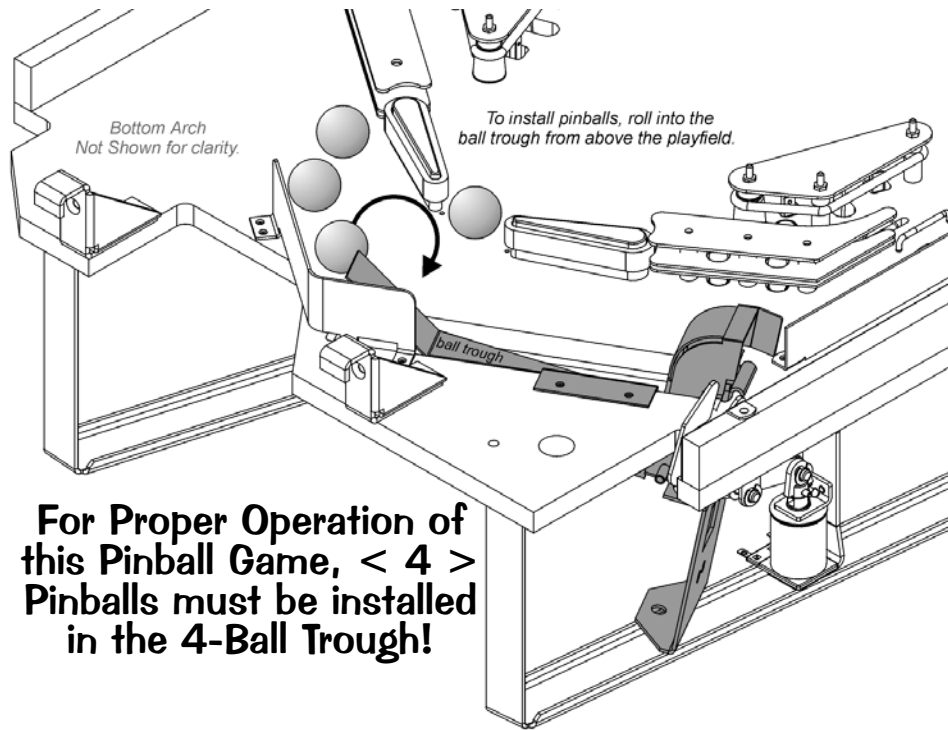


You can also retrieve your latest code from another game! From the **USB MENU** via the **UTILITIES MENU**, select the "BKUP" *Icon* instead and download to your Memory Stick. Review the end of Section 3, Chapter 5.



**! Quick Tip ~ Try backing up your current code prior to installing your new code, just in case your Memory Stick file was corrupted by a computer glitch while you were copying / downloading.**

Got confused? Comments? Questions? Call Technical Support at 800-542-5377 or 708-345-7700 (Option 1).



**For Proper Operation of this Pinball Game, < 4 > Pinballs must be installed in the 4-Ball Trough!**

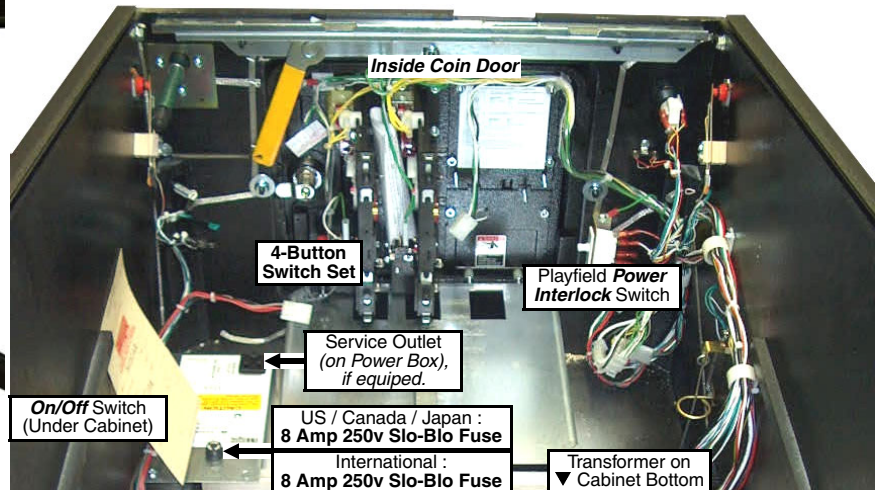
**Backbox Fuses\*, Cabinet Fuses, Playfield Fuses and Cabinet Switches**

*\*Note: The CPU/Sound PCB does not have fuses.*

| QUICK REFERENCE FUSE CHART  |  |                                   |   |
|---|--|-----------------------------------|---|
| 3/4A S.B. 200-5000-17   3A S.B. 200-5000-08   4A S.B. 200-5000-06   5A S.B. 200-5000-01   7A S.B. 200-5000-03   8A S.B. 200-5000-05 |  |                                   |   |
| <b>BACKBOX FUSES</b>  |  |                                   |   |
| <b>I/O POWER DRIVER BOARD</b>   |  |                                   |   |
| <i>with RED LED STATUS INDICATORS (if any RED LED is OFF, check the fuse)</i>   |  |                                   |   |
| F1  | 5A S.B.                                | 5.7VAC                            | G.I. Lamps [BROWN-WHITE↔WHT-BRN]        |
| F2  | 5A S.B.                                | 5.7VAC                            | G.I. Lamps [YELLOW↔WHITE-YEL Circuit]   |
| F3  | 5A S.B.                                | 5.7VAC                            | G.I. Lamps [GREEN↔WHITE-GRN Circuit]    |
| F4  | 5A S.B.                                | 5.7VAC                            | G.I. Lamps [VIOLET↔WHITE-VIO Circuit]   |
| F5  | 7A S.B.                                | 50VDC                             | Coils / Flippers [48VAC feed to BRDG 1] |
| F6  | 3A S.B.                                | 24VAC                             | Motor or Special Application            |
| F7  | 4A S.B.                                | 50VDC                             | Magnet(s) or Special Application        |
| F8  | 3A S.B.                                | 50VDC                             | Coils                                   |
| F9  | 8A S.B.                                | 18VDC                             | Control Lamps [13VAC feed to BRDG 4]    |
| F10   | 5A S.B.                                | 20VDC                             | Coils / Flashers [16VAC feed to BRDG 2] |
| F11   | 4A S.B.                                | 5VDC                              | Logic Power [8VAC feed to BRDG 5]       |
| F12   | 5A S.B.                                | 12VDC                             | Audio [19VAC feed to BRDG 3]            |
| F13   | 5A S.B.                                | 12VDC                             | Audio [19VAC feed to BRDG 3]            |
| <b>DISPLAY POWER SUPPLY BOARD</b>   |  |                                   |   |
| F1  | 3/4A S.B.                              | 90VDC                             | High Voltage Dot Display Board          |
| <b>CABINET FUSES</b>  |  |                                   |   |
| <b>POWER (SERVICE OUTLET) BOX</b>   |  |                                   |   |
| <i>(Access through Coin Door inside cabinet, front bottom.)</i>   |  |                                   |   |
| 8A S.B.   | 110-120V Main Line US / Canada / Japan |                                   |   |
| 5A S.B.   | 220-240V Main Line International       |                                   |   |
| <b>PLAYFIELD FUSES</b>  |  |                                   |   |
| <b>FLIPPER OR SPECIAL APPLICATION</b>   |  |                                   |   |
| <i>(Coil Fuses are located under the playfield near assembly.)</i>  |  |                                   |   |
| 3A S.B.   | 50VDC                                  | R. Flipper [BLU-YEL↔RED-YEL]      |   |
| 3A S.B.   | 50VDC                                  | L. Flipper [GRY-YEL↔RED-YEL]      |   |
| 3A S.B.   | 50VDC                                  | Additional Flipper Coil, if used. |   |
| 3A S.B.   | 50VDC                                  | Spcl. Application Coil, if used.  |   |
| <i>For location &amp; more details on fuses, see Sec. 5, Chp. 2.</i>  |  |                                   |   |
| ALL FUSES ARE 250V S.B. (SLO-BLO) SEE FUSE OR TABLES FOR AMP RATING   |  |                                   |   |
| CAUTION: FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH SAME TYPE FUSE WITH IDENTICAL ELECTRICAL RATING!          |  |                                   |   |
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**4-Button Switch Set:**  
For operational usage, see Sec. 3, Chapter 1, Service Menu Introduction.





# ////// FIND-IT-IN-FRONT: Dr. Pinball Section Explained ////

The key technical data from various parts of the manual were extracted and combined into the "Find- It-In-Front: Dr. Pinball Section." This front section ( Pages DR. 1 - 16) will assist the technician in locating important technical information needed to troubleshoot the Pinball Machine. To enter the **SERVICE MENU**, read below.

## ● ● ● ● Service Switch X4 Set Overview

The four buttons (inside Coin Door) have dual functions depending if you have entered the **Service Menu** or not.

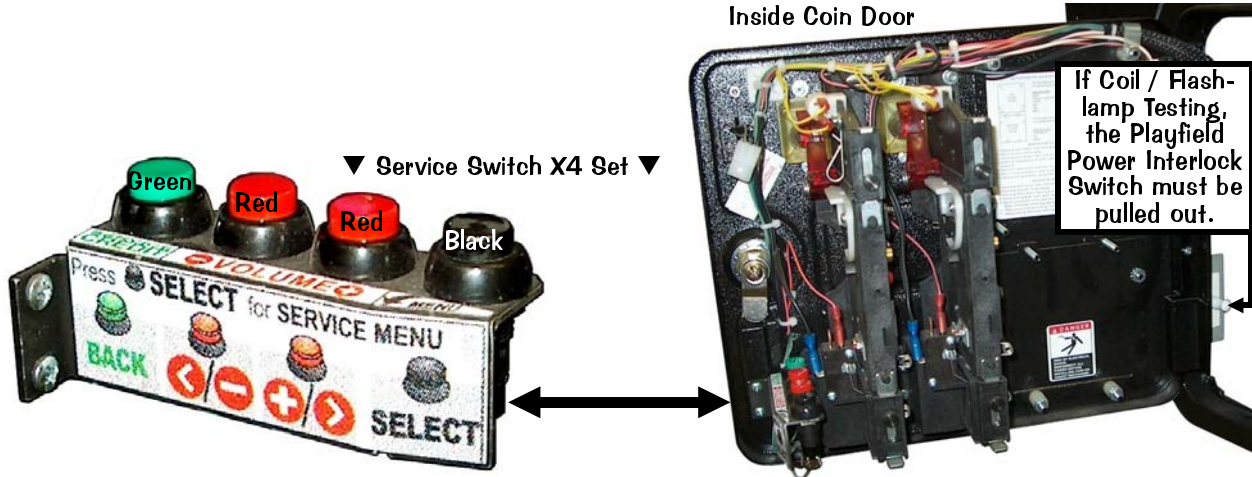
### Functions in Game or Attract Mode

|   |   |  |
|---|---|--|
| ● <b>Green Button</b><br>Press for <b>Service Credit(s)</b> . | ●● <b>Red Buttons</b><br>Press for <b>Volume Adjustment</b> - for less (quieter), + for more (louder) | ● <b>Black Button</b><br>Press for <b>Service Menu entry</b> . |
|---|---|--|

### Functions in the Service Menu

|   |  |  |
|---|--|--|
| ● <b>Green Button</b><br>Press to <b>Escape Back</b> (or <b>Exit</b> ). | ●● <b>Red Buttons</b><br>Press to move <b>&lt; Left , Right &gt;</b> . Press to - <b>Decrease</b> or + <b>Increase</b> values or to change settings. | ● <b>Black Button</b><br>Press to <b>Enter Select</b> (or <b>'OK'</b> ). |
|---|--|--|

## OPEN THE COIN DOOR TO ACCESS THE SERVICE SWITCH X4 SET.



### EXAMPLE:

To enter the **SERVICE MENU**, then enter the **SWITCH TEST MENU** via the **DIAGNOSTIC MENU**, perform the below steps.

**Step 1** Press [ **SELECT** ].

**Step 2** With the "DIAG" *Icon* highlighted, press [ **SELECT** ].

**Step 3** With the "SW" *Icon* highlighted, press [ **SELECT** ].

**Step 4** With the "TEST" *Icon* highlighted, press [ **SELECT** ].

Press any switch. If wired correctly, the information in the display will match the information in the Switch Matrix (see DR. 4).

Press [ **<** ] or [ **>** ] to move left or right through the menus.

Press [ **BACK** ] to go back a menu, exit or escape at any time.

Continue through the other menus.

More details & information about the **SERVICE MENU** is covered in Section 3. *The Service Menu is subject to change. Update this game with the latest code downloaded from our website with a USB Memory Stick (64MB min., recommendation 128MB or higher). See the inside front cover for directions or in the Service Menu "Go To Utilities Menu" then "Go To USB Menu" and follow prompts.*





# DIAGNOSTIC AIDS

**50V / 20V DISABLED**  
 CLOSE COIN DOOR  
 OR PULL INTERLOCK SWITCH  
 TO RESTORE POWER

This **audible / visual alert display** is shown when the **50V / 20V Power** is disabled (by opening the Coin Door). **PULL OUT THE INTERLOCK SWITCH ONLY WHILE IN THE SERVICE MENU FOR COIL, SWITCH OR PLAY TESTING WHEN THE COIN DOOR IS REQUIRED TO STAY OPEN FOR SERVICE BUTTON USE!** Pulling out the Power Interlock Switch or pressing the

'escape' **Green [ BACK ] Button** will remove the alert display. Initial display presentation is accompanied by 3 audible tones (the bright display warning will go dim after approximately 30 seconds).

**OPERATOR ALERT!**  
 AUTO PLUNGER  
 DEVICE MALFUNCTION

This **alert display** is shown momentarily during **Game Mode** or **Power-Up** to alert the operator of a device malfunction (device or mechanism doesn't energize or is energized repeatedly).

**OPERATOR ALERT!** works by monitoring any switch activated device that has the potential to trap a ball when disabled (e.g. in the Shooter Lane, Scoop or Eject Holes, etc.). This alert can also appear if a switch associated with a device (e.g. Ball Trough, Auto Plunger, etc.) is stuck closed (caused by a switch jam or stuck ball); the game will activate the device a predetermined number of times and if the problem is still detected, this device or switch will be noted in **Switch Alerts** (Page 14) and/or **Technician Alerts** (Page 18).

V0.00      GAME NAME  
 SYS. 0.00      HDW. 0  
**SERVICE MENU \***  
 USE -/+ TO VIEW TECH. ALERTS

Upon entering the **SERVICE MENU**, if an asterisk " \* " is displayed after the words "SERVICE MENU," the game has detected possible faulty devices, switches and/or missing pinballs. Press the either of the **Red Buttons** (short-cut to the **TECHNICIAN ALERTS MENU**) or continue into the **SERVICE MENU** (press the **Black Button** again), select the "DIAG" Icon and "TECH" Icon for the **Technician Alerts** information (Page 18).

## CPU DIP SWITCH SETTINGS

The 8-Pos. Dip Switch [SW1] is on the CPU/Sound Board (between Conn. J3 & J13, lower left corner)

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>USA</b>           | ON   |   |   |   |   |   |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>France</b>        | ON   | ▲ | ▲ |   |   |   |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>Portugal</b>      | ON   | ▲ |   |   |   | ▲ |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>Austria</b>       | ON   | ▲ |   |   |   |   |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>Germany</b>       | ON   | ▲ | ▲ | ▲ |   |   |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>Russia</b>        | ON   | ▲ |   |   | ▲ | ▲ |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>Australia</b>     | ON   | ▲ |   | ▲ | ▲ |   |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>Greece</b>        | ON   | ▲ | ▲ | ▲ | ▲ |   |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>So. Africa</b>    | ON   |   |   | ▲ |   | ▲ |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>Belgium</b>       | ON   | ▲ | ▼ |   |   |   |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>Italy</b>         | ON   |   |   |   |   | ▲ |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>Spain</b>         | ON   | ▲ | ▼ |   | ▲ |   |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>Canada 1</b>      | ON   | ▲ | ▲ |   |   |   |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>Japan</b>         | ON   | ▲ |   | ▲ | ▲ |   |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>Sweden</b>        | ON   | ▲ | ▲ | ▲ |   |   |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>Canada 2</b>      | ON   | ▲ | ▲ | ▲ | ▲ |   |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>Middle East</b>   | ON   | ▲ | ▲ | ▲ | ▲ |   |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>Switzerland</b>   | ON   | ▲ | ▲ | ▲ |   |   |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>Croatia</b>       | ON   | ▲ | ▲ |   | ▲ |   |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>Netherlands</b>   | ON   |   |   | ▲ |   |   |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>Taiwan</b>        | ON   |   |   |   | ▲ | ▲ |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>Denmark</b>       | ON   | ▲ |   | ▲ |   |   |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>New Zealand</b>   | ON   |   |   |   |   | ▲ |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>UK</b>            | ON   | ▲ | ▲ | ▲ |   |   |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>Finland</b>       | ON   | ▲ | ▲ |   |   |   |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU COUNTRY SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>Norway</b>        | ON   | ▲ | ▲ |   |   |   |   |   |   |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

|                      |      |   |   |   |   |   |   |   |   |
|----------------------|------|---|---|---|---|---|---|---|---|
| CPU/SND PCB SETTING: | Pos: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <b>UPDATE CODE</b>   | ON   | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
|                      | OFF  | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |

**Note:** Slide Dip Switch 8 to Position **ON** (with Dip Switches 1-7 in the **OFF** Position) only to reboot the game with the latest version **BOOT EPROM** installed at **U9** on the CPU/Sound Board (S.A.M. System only). Currently, this is also the procedure to update your game with the latest software code update file. For the latest version, visit our website. If you have questions about updating your game code, call Technical Support for assistance.

## SWITCH MATRIX GRID [ #1 - #64 ] {Switch Locations : next page}

|  |                                |                                |                          |                                |   |   |                         |                          |                           |                                |                                 |                           |                           |                    |                          |                            |         |
|--|--------------------------------|--------------------------------|--------------------------|--------------------------------|---|---|-------------------------|--------------------------|---------------------------|--------------------------------|---------------------------------|---------------------------|---------------------------|--------------------|--------------------------|----------------------------|---------|
| <b>CPU/<br/>Sound<br/>Board</b>        | <b>01</b>                      | IC-U22A                        | IC-U22B                  | IC-U22C                        | IC-U22D   | IC-U16A                                     | IC-U16B                 | IC-U16C                  | IC-U16D                   | IC-U36A                        | IC-U36B                         | IC-U36C                   | IC-U36D                   | IC-U40A            | IC-U40B                  | IC-U40C                    | IC-U40D |
|  | RETURN                         | RETURN                         | RETURN                   | RETURN                         | RETURN  | RETURN                                      | RETURN                  | RETURN                   | RETURN                    | RETURN                         | RETURN                          | RETURN                    | RETURN                    | RETURN             | RETURN                   | RETURN                     | RETURN  |
|  | WHT-BRN<br>J6-P9               | WHT-RED<br>J6-P8               | WHT-ORG<br>J6-P7         | WHT-YEL<br>J6-P6               | WHT-GRN<br>J6-P5                                  | WHT-BLU<br>J6-P3                            | WHT-VIO<br>J6-P2        | WHT-GRY<br>J6-P1         | TAN-BLK<br>J12-P9         | TAN-RED<br>J12-P8              | TAN-ORG<br>J12-P7               | TAN-YEL<br>J12-P6         | TAN-GRN<br>J12-P4         | TAN-BLU<br>J12-P3  | TAN-VIO<br>J12-P2        | TAN-WHT<br>J12-P1          |         |
| <b>Q1</b><br>DRIVE<br>GRN-BRN<br>J1-P1 | SW. # 1                        | SW. # 2                        | SW. # 3                  | SW. # 4                        | SW. # 5   | SW. # 6                                     | SW. # 7                 | SW. # 8                  | SW. # 9                   | SW. # 10                       | SW. # 11                        | SW. # 12                  | SW. # 13                  | SW. # 14           | SW. # 15                 | SW. # 16                   |         |
| CENTER<br>DRAIN<br>(L) EFT             | 500-6227-04<br>below playfield | 500-6227-03<br>below playfield | NOT USED                 | NOT USED                       | NOT USED  | LEFT<br>RAMP<br>MADE                        | M (U) LT-<br>BALL       | (M) ULT-<br>BALL         | MULTI-<br>(B) ALL         | MULTI-<br>B (A) LL             | MULTI-<br>BA (L) L              | MULTI-<br>BAL (L)         | MU (L) T-<br>BALL         | MULT (I) -<br>BALL | TOURNA-<br>MENT<br>START | START<br>BUTTON<br>CABINET |         |
| <b>Q2</b><br>DRIVE<br>GRN-RED<br>J1-P3 | SW. # 17                       | SW. # 18                       | SW. # 19                 | SW. # 20                       | SW. # 21  | SW. # 22                                    | SW. # 23                | SW. # 24                 | SW. # 25                  | SW. # 26                       | SW. # 27                        | SW. # 28                  | SW. # 29                  | SW. # 30           | SW. # 31                 | SW. # 32                   |         |
| NOT<br>USED                            | (4-BALL)<br>TROUGH<br>#4 (L)   | (4-BALL)<br>TROUGH<br>#3       | (4-BALL)<br>TROUGH<br>#2 | (MUK OPTO)<br>TROUGH<br>#1 (R) | TRANS. / REC.<br>Tx 515-5173-00<br>Rx 515-5174-00 | TRANS. / REC.<br>515-5173-00<br>515-5174-00 | SHOOTER<br>LANE         | LEFT<br>OUTLANE<br>(TOP) | LEFT<br>RETURN<br>(LANE)  | LEFT<br>SLING-<br>SHOT         | RIGHT<br>SLING-<br>SHOT         | RIGHT<br>RETURN<br>(LANE) | RIGHT<br>OUTLANE<br>(TOP) | LEFT<br>BUMPER     | RIGHT<br>BUMPER          | BOTTOM<br>BUMPER           |         |
| <b>Q3</b><br>DRIVE<br>GRN-ORG<br>J1-P4 | SW. # 33                       | SW. # 34                       | SW. # 35                 | SW. # 36                       | SW. # 37  | SW. # 38                                    | SW. # 39                | SW. # 40                 | SW. # 41                  | SW. # 42                       | SW. # 43                        | SW. # 44                  | SW. # 45                  | SW. # 46           | SW. # 47                 | SW. # 48                   |         |
| MINI-<br>RAMP<br>(LOCK)                | 500-6227-03<br>below playfield | NOT USED                       | NOT USED                 | RED<br>CONTEST<br>ANT          | YELLOW<br>CONTEST<br>ANT                          | BLUE<br>CONTEST<br>ANT                      | DROP<br>TARGET<br>FRONT | DROP<br>TARGET<br>MIDDLE | DROP<br>TARGET<br>BACK    | L (EFT)<br>OUTLANE<br>(BOTTOM) | R (IGHT)<br>OUTLANE<br>(BOTTOM) | NOT USED                  | WILD<br>CARD<br>LANE      | NOT USED           | WHEEL<br>HOME            | NOT USED                   |         |
| <b>Q4</b><br>DRIVE<br>GRN-YEL<br>J1-P5 | SW. # 49                       | SW. # 50                       | SW. # 51                 | SW. # 52                       | SW. # 53  | SW. # 54                                    | SW. # 55                | SW. # 56                 | SW. # 57                  | SW. # 58                       | SW. # 59                        | SW. # 60                  | SW. # 61                  | SW. # 62           | SW. # 63                 | SW. # 64                   |         |
| NOT<br>USED                            | SKILL<br>SHOT<br>MADE          | RIGHT<br>RAMP<br>MADE          | LEFT<br>RAMP<br>ENTER    | CENTER<br>RAMP<br>MADE         | NOT USED  | NOT USED                                    | NOT USED                | LEFT<br>ORBIT<br>(TOP)   | LEFT<br>ORBIT<br>(BOTTOM) | RIGHT<br>ORBIT<br>(TOP)        | RIGHT<br>ORBIT<br>(BOTTOM)      | MUL (T) I-                | NOT USED                  | NOT USED           | NOT USED                 | NOT USED                   |         |

« FOR MORE ABOUT DIODE ON TERMINAL STRIPS « D.O.T.S. » SEE SECTION 5, CHAPTER 2, PAGE 96. »

Wire Color Abbreviations used:  **BLK** Black  **BLU** Blue  **BRN** Brown  **GRY** Gray  **GRN** Green  **LGN** Light Gray  **ORG** Orange  **PNK** Pink  **RED** Red  **TAN** Tan  **VIO** Violet  **WHT** White  **YEL** Yellow

### Dedicated Switches [ #D-1 - #D-32 ] {Dedicated Switch Locations : next page}

|   |                          |                          |                          |                          |                             |                             |                             |                              |                             |                               |                             |                             |                             |                             |                             |                  |                  |       |
|---|--------------------------|--------------------------|--------------------------|--------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|-----------------------------|-------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|------------------|------------------|-------|
| <b>CPU/SND<br/>Board</b>                              | IC-U2                    | IC-U2                    | IC-U2                    | IC-U2                    | IC-U2                       | IC-U2                       | IC-U2                       | IC-U2                        | IC-U2                       | IC-U2                         | IC-U2                       | IC-U2                       | IC-U2                       | IC-U2                       | IC-U2                       | IC-U2            | IC-U2            | IC-U2 |
|   | PNK-BRN<br>J2-P2         | PNK-RED<br>J2-P3         | PNK-ORG<br>J2-P4         | PNK-YEL<br>J2-P6         | PNK-GRN<br>J2-P7            | PNK-BLU<br>J2-P8            | PNK-VIO<br>J2-P9            | PNK-GRY<br>J2-P10            | GRY-BRN<br>J3-P1            | GRY-RED<br>J3-P2              | GRY-ORG<br>J3-P4            | GRY-YEL<br>J3-P5            | GRY-GRN<br>J3-P6            | GRY-BLU<br>J3-P7            | GRY-VIO<br>J3-P8            | GRY-BLK<br>J3-P9 | GRY-BLK<br>J3-P9 |       |
| <b>GROUND<br/>(BLK)<br/>J2-P1/11<br/>&amp; J3-P10</b> | SW. # D-1                | SW. # D-2                | SW. # D-3                | SW. # D-4                | SW. # D-5                   | SW. # D-6                   | SW. # D-7                   | SW. # D-8                    | SW. # D-9                   | SW. # D-10                    | SW. # D-11                  | SW. # D-12                  | SW. # D-13                  | SW. # D-14                  | SW. # D-15                  | SW. # D-16       |                  |       |
| LEFT<br>COIN<br>SLOT                                  | CENTER<br>COIN<br>SLOT   | RIGHT<br>COIN<br>SLOT    | FOURTH<br>COIN<br>SLOT   | FIFTH<br>COIN<br>SLOT    | NOT USED                    | NOT USED                    | NOT USED                    | L (EFT)<br>FLIPPER<br>BUTTON | LEFT<br>FLIPPER<br>E.O.S.   | R (IGHT)<br>FLIPPER<br>BUTTON | RIGHT<br>FLIPPER<br>E.O.S.  | NOT USED                    | NOT USED                    | NOT USED                    | NOT USED                    |                  |                  |       |
| 180-5204-00<br>Coin Door                              | 180-5204-00<br>Coin Door | 180-5204-00<br>Coin Door | 180-5204-00<br>Coin Door | 180-5204-00<br>Coin Door | 180-5160-01<br>Cabinet Side | 180-5149-00<br>Flipper Asm. | 180-5160-01<br>Cabinet Side | 180-5149-00<br>Flipper Asm.  | 180-5149-00<br>Flipper Asm. | 180-5149-00<br>Flipper Asm.   | 180-5149-00<br>Flipper Asm. | 180-5149-00<br>Flipper Asm. | 180-5149-00<br>Flipper Asm. | 180-5149-00<br>Flipper Asm. | 180-5149-00<br>Flipper Asm. |                  |                  |       |

|  |                                 |                           |                   |                           |                              |                             |                             |                                     |                                     |                                     |                                     |                                     |                                     |                                     |                                     |                                     |        |        |
|--|---------------------------------|---------------------------|-------------------|---------------------------|------------------------------|-----------------------------|-----------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------|--------|
| <b>CPU/SND<br/>Board</b>                         | IC-G41                          | IC-G41                    | IC-G41            | IC-G41                    | IC-G41                       | IC-G41                      | IC-G41                      | IC-G41                              | IC-G41                              | IC-G41                              | IC-G41                              | IC-G41                              | IC-G41                              | IC-G41                              | IC-G41                              | IC-G41                              | IC-G41 | IC-G41 |
|  | LGN-BRN<br>J13-P1               | LGN-RED<br>J13-P3         | LGN-ORG<br>J13-P4 | LGN-YEL<br>J13-P5         | LGN-BLK<br>J13-P6            | LGN-BLU<br>J13-P7           | LGN-VIO<br>J13-P8           | LGN-GRY<br>J13-P9                   | DIP<br>(1)2345678<br>SW. POS. #1 ON | DIP<br>(1)2345678<br>SW. POS. #2 ON | DIP<br>(1)2345678<br>SW. POS. #3 ON | DIP<br>(1)2345678<br>SW. POS. #4 ON | DIP<br>(1)2345678<br>SW. POS. #5 ON | DIP<br>(1)2345678<br>SW. POS. #6 ON | DIP<br>(1)2345678<br>SW. POS. #7 ON | DIP<br>(1)2345678<br>SW. POS. #8 ON |        |        |
| <b>GROUND<br/>(BLK)<br/>J13-P10</b>              | SW. # D-17                      | SW. # D-18                | SW. # D-19        | SW. # D-20                | SW. # D-21                   | SW. # D-22                  | SW. # D-23                  | SW. # D-24                          | SW. # D-25                          | SW. # D-26                          | SW. # D-27                          | SW. # D-28                          | SW. # D-29                          | SW. # D-30                          | SW. # D-31                          | SW. # D-32                          |        |        |
| TILT<br>PENDULUM<br>(PLUMB BOB)                  | TILT<br>PENDULUM<br>(PLUMB BOB) | TICKET<br>NOTCH           | NOT USED          | BACK<br>(GREEN<br>BUTTON) | MINUS<br>(5 - RED<br>BUTTON) | PLUS<br>(+ / RED<br>BUTTON) | SELECT<br>(BLACK<br>BUTTON) | DIP<br>(1)2345678<br>SW. POS. #1 ON | DIP<br>(1)2345678<br>SW. POS. #2 ON | DIP<br>(1)2345678<br>SW. POS. #3 ON | DIP<br>(1)2345678<br>SW. POS. #4 ON | DIP<br>(1)2345678<br>SW. POS. #5 ON | DIP<br>(1)2345678<br>SW. POS. #6 ON | DIP<br>(1)2345678<br>SW. POS. #7 ON | DIP<br>(1)2345678<br>SW. POS. #8 ON |                                     |        |        |
| 502-5032-00<br>Crip. 1, Pg. 45<br>for cab. parts | 502-5032-00<br>Optional Kit     | 180-5119-02<br>Below P1/P | NOT USED          | 180-5192-04<br>Coin Door  | 180-5192-02<br>Coin Door     | 180-5192-02<br>Coin Door    | 180-5192-02<br>Coin Door    | 180-5192-02<br>Coin Door            | 180-5192-02<br>Coin Door            | 180-5192-02<br>Coin Door            | 180-5192-02<br>Coin Door            | 180-5192-02<br>Coin Door            | 180-5192-02<br>Coin Door            | 180-5192-02<br>Coin Door            | 180-5192-02<br>Coin Door            |                                     |        |        |

CPU/SOUND BD. SW1 DIP SWITCH (located between Connectors J3/J13)



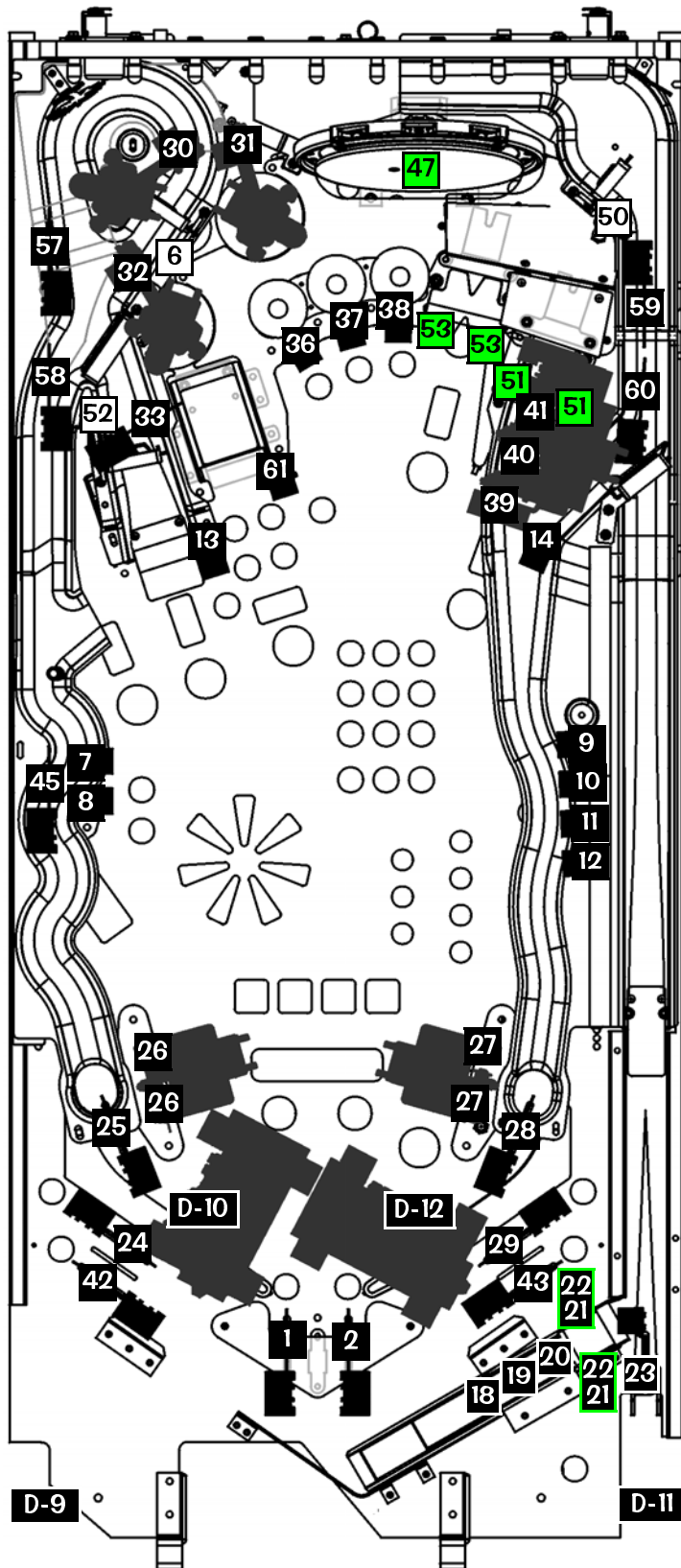




SWITCH MENU: SWITCH, ACTIVE, SINGLE & SERVICE

## SWITCH LOCATIONS

{Switch Matrix Grid : previous page}



### Typical Switch Wiring & Schematic

Column: Switch Drive Wire J1 **GRN-XXX**

Row: Switch Return Wire J6 or J12 **WHT-XXX** or **TAN-XXX**

Blocking Diode (1N4004) or

N.O. Normally Open Switch Terminal

COM. Common Switch Terminal

N.C. Normally Closed Switch Terminal

CATHODE (hatched side of diode)

Switches from CPU / Sound PCB

Row: Switch Return Wire **WHT-XXX** or **TAN-XX**

Column: Switch Drive Wire **GRN-XXX**

-XXX = Varying Wire Color. See Matrix Grid for color.

---

### Dedicated Switch Schematic

**PNK-XXX, GRY-XXX** or **LGN-XXX**  
Dedicated Switch Input Wire J2, J3 or J13

**BLACK** Ground Wire J2-P1/J1, J3-P10 or J13-P10

N.O. Normally Open Switch Terminal

COM. Common Switch Terminal

---

### Typical Switch Wiring & Schematic ... with Switch Diode on a Terminal Strip (DOTS)

**ORG-XXX** **ORG-XXX** **WHT-XXX** **TAN-XXX** **J6-#** **J12-#** **J1-#** **CPU PCB**

COMM. N.O. N.C.

TERMINAL STRIP

Wire IN from previous switch or CPU PCB ...

... Wire OUT to next switch ...

Wire **WHT-XXX** or **TAN-XXX**

Jump or **ORG-XXX** to Row: Switch Return

Column: Switch Drive Wire **GRN-XXX**

-XXX = Varying Wire Color. See Matrix Grid for color.

For more about Diode on Terminal Strips (DOTS), see Section 5, Chapter 2, Page 96.

- = Switches above Playfield.
- = Switches below Playfield.
- = OPTO Switches (Pairs / "U").

**Switch Part Notes:** ¥ Yen Coin Switch is 180-5091-00. Part Numbers which start with 515- or 500- include the bracket, target, and/or housing.

**Sw. D-17 Part Note:** The Switch is comprised of a Hanger Bracket (535-5319-00) and Contact Wire (535-7563-01) located in the Cabinet.

[C. = CENTER][L. = LEFT][R. = RIGHT]

LAMP MATRIX GRID [ #1 - #80 ] {Lamp Locations : next page}

| I/O                                 | 01   | 02  | 03   | 04   | 05  | 06  | 07  | 08  |
|-------------------------------------|--|---|--|--|---|---|---|---|
| Power Driver Board                  | IC-U17<br>18VDC<br>YEL-BRN<br>J13-P9                           | IC-U16<br>18VDC<br>YEL-RED<br>J13-P8                            | IC-U15<br>18VDC<br>YEL-ORG<br>J13-P7                           | IC-U14<br>18VDC<br>YEL-BLK<br>J13-P6                         | IC-U13<br>18VDC<br>YEL-GRN<br>J13-P5                          | IC-U12<br>18VDC<br>YEL-BLU<br>J13-P4                          | IC-U11<br>18VDC<br>YEL-VIO<br>J13-P3                          | IC-U10<br>18VDC<br>YEL-GRY<br>J13-P1                          |
| 01 Q33 GROUND<br>RED-BRN<br>J12-P1  | #555 Clear L.P. #1<br>START<br>BUTTON<br>165-5002-00           | #555 Clear L.P. #2<br>TOURNAMENT<br>START BUTTON<br>165-5002-00 | #555 Clear L.P. #3<br>YELLOW BANK<br>EXTRA BALL<br>165-5002-00 | #555 Clear L.P. #4<br>BONUS<br>WHEEL<br>165-5002-00          | #555 Clear L.P. #5<br>SUPER<br>JACKPOT<br>165-5002-00         | #555 Clear L.P. #6<br>LEFT OUTLANE<br>(BOTTOM)<br>165-5002-00 | #555 Clear L.P. #7<br>CENTER<br>DRAIN (L)<br>165-5002-00      | #555 Clear L.P. #8<br>CENTER<br>DRAIN (R)<br>165-5002-00      |
| 02 Q34 GROUND<br>RED-BLK<br>J12-P2  | #555 Clear L.P. #9<br>RIGHT OUTLANE<br>(BOTTOM)<br>165-5002-00 | #555 Clear L.P. #10<br>LEFT OUTLANE<br>(TOP)<br>165-5002-00     | #555 Clear L.P. #11<br>LEFT RETURN<br>(LANE)<br>165-5002-00    | #555 Clear L.P. #12<br>RIGHT RETURN<br>(LANE)<br>165-5002-00 | #555 Clear L.P. #13<br>RIGHT OUTLANE<br>(TOP)<br>165-5002-00  | #555 Clear L.P. #14<br>M ( U ) LTIBALL<br>165-5002-00         | #555 Clear L.P. #15<br>( M ) ULTIBALL<br>165-5002-00          | #555 Clear L.P. #16<br>WILD CARD<br>(LANE)<br>165-5002-00     |
| 03 Q35 GROUND<br>RED-ORG<br>J12-P3  | #555 Clear L.P. #17<br>MULTI ( B ) ALL<br>165-5002-00          | #555 Clear L.P. #18<br>MULTIB ( A ) LL<br>165-5002-00           | #555 Clear L.P. #19<br>MULTIBA ( L ) L<br>165-5002-00          | #555 Clear L.P. #20<br>MULTIBAL ( L )<br>165-5002-00         | #555 Clear L.P. #21<br>( B ) ONUS<br>165-5002-00              | #555 Clear L.P. #22<br>LEFT ORBIT<br>JACKPOT<br>165-5002-00   | #555 Clear L.P. #23<br>BONUS<br>165-5002-00                   | #555 Clear L.P. #24<br>MINI RAMP<br>JACKPOT<br>165-5002-00    |
| 04 Q36 GROUND<br>RED-YEL<br>J12-P4  | #555 Clear L.P. #25<br>MU ( L ) TIBALL<br>165-5002-00          | #555 Clear L.P. #26<br>B ( O ) NUS<br>165-5002-00               | #555 Clear L.P. #27<br>RED<br>CONTESTANT<br>165-5002-00        | #555 Clear L.P. #28<br>YELLOW<br>CONTESTANT<br>165-5002-00   | #555 Clear L.P. #29<br>BLUE<br>CONTESTANT<br>165-5002-00      | #555 Clear L.P. #30<br>MUL( T ) IBALL<br>165-5002-00          | #555 Clear L.P. #31<br>BONU ( S )<br>165-5002-00              | #555 Clear L.P. #32<br>RIGHT ORBIT<br>JACKPOT<br>165-5002-00  |
| 05 Q37 GROUND<br>RED-GRN<br>J12-P5  | #555 Clear L.P. #33<br>MULTIBALL<br>165-5002-00                | #555 Clear L.P. #34<br>EXTRA<br>BALL<br>165-5002-00             | #555 Clear L.P. #35<br>BON ( U ) S<br>165-5002-00              | #555 Clear L.P. #36<br>RIGHT RAMP<br>JACKPOT<br>165-5002-00  | #555 Clear L.P. #37<br>BO ( N ) US<br>165-5002-00             | #555 Clear L.P. #38<br>CENTER RAMP<br>JACKPOT<br>165-5002-00  | #555 Clear L.P. #39<br>MULT ( I ) BALL<br>165-5002-00         | #555 Clear L.P. #40<br>SPIN<br>WHEEL<br>165-5002-00           |
| 06 Q38 GROUND<br>RED-BLU<br>J12-P6  | #44 Clear L.P. #41<br>BUY VOWEL<br>(SIGN)<br>165-5000-44-HF    | #44 Yellow L.P. #42<br>SOLVE PUZZLE<br>(SIGN)<br>165-5035-06-HF | #44 Green L.P. #43<br>MULTIBALL<br>(SIGN)<br>165-5035-04-HF    | #44 Amber L.P. #44<br>EXTRA BALL<br>(SIGN)<br>165-5035-03-HF | #555 Clear L.P. #45<br>BLUE BANK<br>EXTRA BALL<br>165-5002-00 | #555 Clear L.P. #46<br>BLUE BANK<br>TRIP<br>165-5002-00       | #555 Clear L.P. #47<br>BLUE BANK<br>SPECIAL<br>165-5002-00    | #555 Clear L.P. #48<br>PUZZLES SOLVED<br>(BLU)<br>165-5002-00 |
| 07 Q39 GROUND<br>RED-VIO<br>J12-P8  | #555 Clear L.P. #49<br>YELLOW BANK<br>TRIP<br>165-5002-00      | #555 Clear L.P. #50<br>YELLOW BANK<br>SPECIAL<br>165-5002-00    | #555 Clear L.P. #51<br>PUZZLES SOLVED<br>(YEL)<br>165-5002-00  | #555 Clear L.P. #52<br>RED BANK<br>EXTRA BALL<br>165-5002-00 | #555 Clear L.P. #53<br>RED BANK<br>TRIP<br>165-5002-00        | #555 Clear L.P. #54<br>RED BANK<br>SPECIAL<br>165-5002-00     | #555 Clear L.P. #55<br>PUZZLES SOLVED<br>(RED)<br>165-5002-00 | #555 Clear L.P. #56<br>WIZARD<br>BONUS 4<br>165-5002-00       |
| 08 Q40 GROUND<br>RED-GRY<br>J12-P9  | #555 Clear L.P. #57<br>WIZARD<br>BONUS 3<br>165-5002-00        | #555 Clear L.P. #58<br>WIZARD<br>BONUS 2<br>165-5002-00         | #555 Clear L.P. #59<br>WIZARD<br>BONUS 1<br>165-5002-00        | LED WB WHT L.P. #60<br>LEFT<br>BUMPER<br>112-5024-08         | LED WB WHT L.P. #61<br>RIGHT<br>BUMPER<br>112-5024-08         | LED WB WHT L.P. #62<br>BOTTOM<br>BUMPER<br>112-5024-08        | #555 Clear L.P. #63<br>BUY A<br>VOWEL<br>165-5002-00          | #555 Clear L.P. #64<br>SOLVE<br>PUZZLE<br>165-5002-00         |
| 09 Q41 GROUND<br>RED-WHT<br>J12-P10 | #555 Clear L.P. #65<br>LEFT RAMP<br>JACKPOT<br>165-5002-00     | #555 Clear L.P. #66<br>WHEEL<br>FRENZY<br>165-5002-00           | #555 Clear L.P. #67<br>RISKY<br>SPINNING<br>165-5002-00        | #555 Clear L.P. #68<br>RAMP<br>RAMPAGE<br>165-5002-00        | #555 Clear L.P. #69<br>COMBOS<br>165-5002-00                  | #555 Clear L.P. #70<br>KEEP IT<br>SPINNING<br>165-5002-00     | #555 Clear L.P. #71<br>STOP THE<br>WHEEL<br>165-5002-00       | #555 Clear L.P. #72<br>CONTESTANT<br>HURRYUP<br>165-5002-00   |
| 10 Q42 GROUND<br>RED<br>J12-P11     | #555 Clear L.P. #73<br>4<br>PUZZLES<br>165-5002-00             | #555 Clear L.P. #74<br>ROUND<br>1<br>165-5002-00                | #555 Clear L.P. #75<br>ROUND<br>2<br>165-5002-00               | #555 Clear L.P. #76<br>ROUND<br>3<br>165-5002-00             | #555 Clear L.P. #77<br>ROUND<br>4<br>165-5002-00              | LED WB WHT L.P. #78<br>SHOOT<br>AGAIN<br>112-5024-08          | #555 Clear L.P. #79<br>2X<br>LEFT<br>165-5002-00              | #555 Clear L.P. #80<br>2X<br>RIGHT<br>165-5002-00             |

« FOR MORE ABOUT DIODE ON TER-  
MINAL STRIPS «DOTS» SEE  
SECTION 5, CHAPTER 2, PAGES 96.»

Wire Color Abbreviations used:

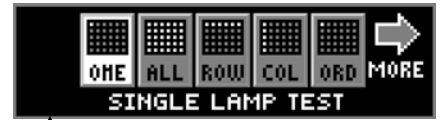
|       |      |       |      |       |        |     |        |       |        |
|-------|------|-------|------|-------|--------|-----|--------|-------|--------|
| BLK   | BLU  | BRN   | GRY  | GRN   | ORG    | RED | VIO    | WHT   | YEL    |
| Black | Blue | Brown | Gray | Green | Orange | Red | Violet | White | Yellow |



Find-It-In-Front:  
Dr. Pinball



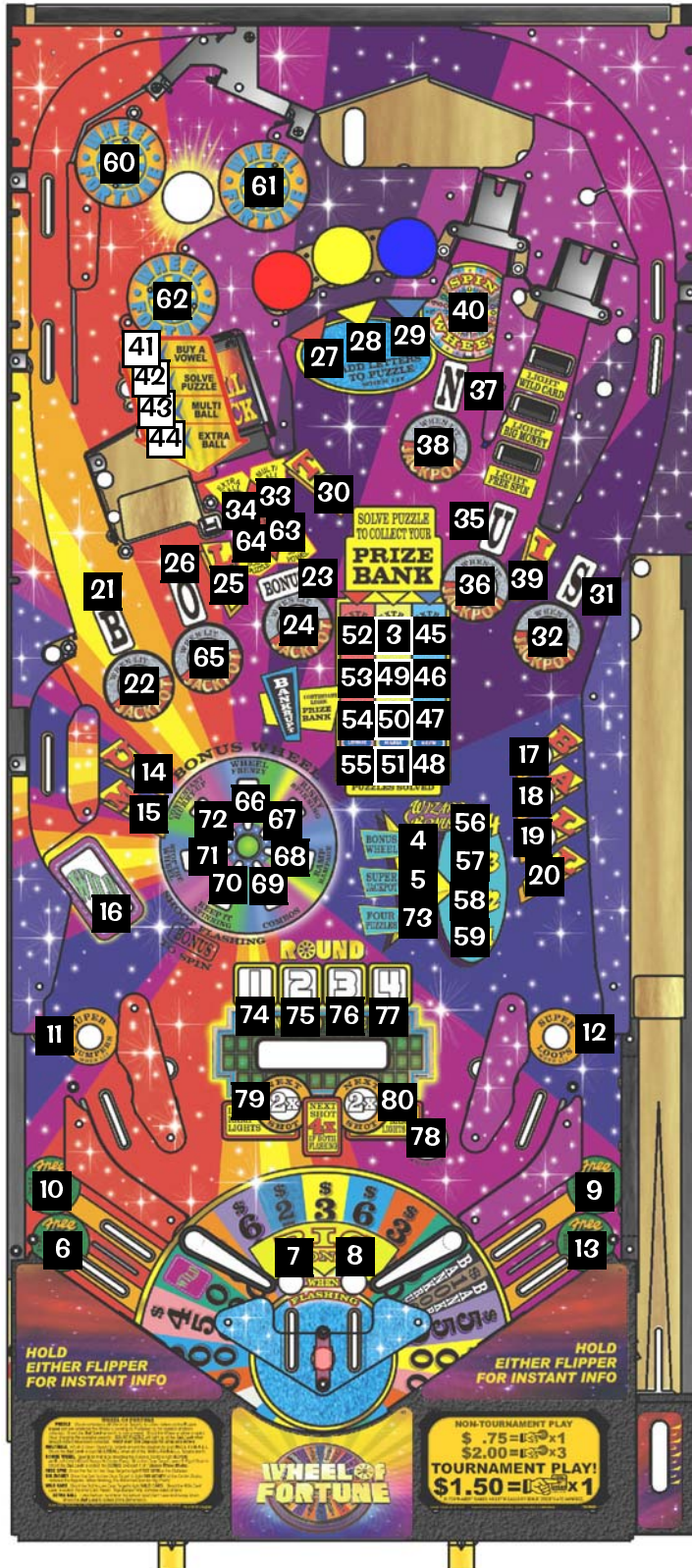




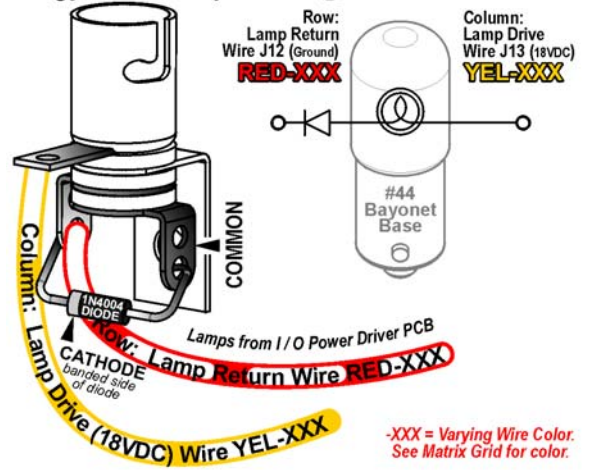
LAMP MENU: ONE, ALL, ROW, COLUMN & ORDERED

## LAMP LOCATIONS

{Lamp Matrix Grid : previous page}

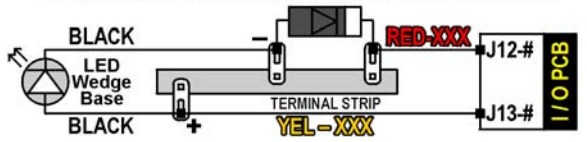


### Typical Lamp Wiring & Schematic



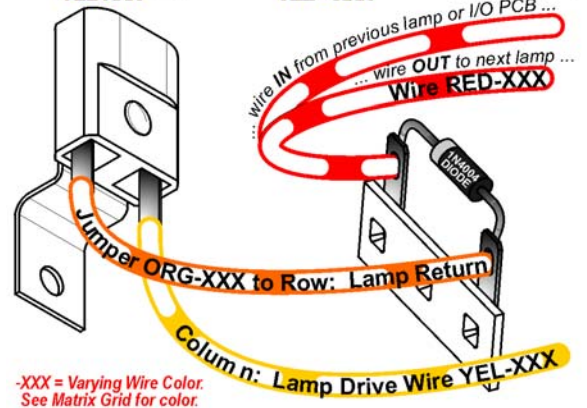
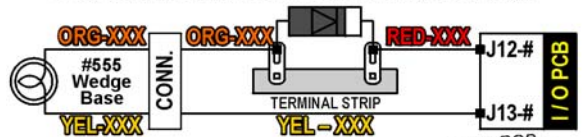
### Typical Lamp Wiring & Schematic ... with Lamp Diode on a Terminal Strip (DOTS)

Usually when an LED Module is used as a Controlled Lamp for a Pop Bumper.



### ... with Lamp Diode on a Terminal Strip (DOTS)

Usually when a #555 Bulb is used as a Controlled Lamp for a Spot Light.



For more about Diode on Terminal Strips (DOTS), see Section 5, Chapter 2, Page 96.

- = Lamps above Playfield.
- = Lamps below Playfield.
- = Lamps on Back Panel.

Lamp Part Notes: #555 Wedge Base (W.B.) Bulb Clear = 165-5002-00, #44 Bayonet Bulb (Heavy Filament) Clear = 165-5000-44-HF.

See Section 4, Chapter 1, Parts Identification & Location, Pages 60-62 for more details on bulbs and corresponding sockets.

# COILS DETAILED CHART TABLE

| High Current Coils Group 1 |                          | Drive Transistor | Driver Output PCB          | Power Line Color     | Power Line Connection | Power Voltage | Drive Transistor Control Line Color | D.T. Control Line Connect | Coil GA-Turn or Bulb Type             |
|----------------------------|--------------------------|------------------|----------------------------|----------------------|-----------------------|---------------|-------------------------------------|---------------------------|---------------------------------------|
| #1                         | TROUGH UP-KICKER         | Q1               | ▲<br>I/O Power Driver<br>▼ | YEL-VIO              | J10-P9/10             | 50VDC         | BRN-BLK                             | J8-P1                     | 26-1200 ∪<br>090-5044-ND              |
| #2                         | AUTO LAUNCH              | Q2               |                            | YEL-VIO              | J10-P9/10             | 50VDC         | BRN-RED                             | J8-P3                     | 24-940 ∪<br>090-5036-ND               |
| #3                         | NOT USED                 | Q3               |                            |                      |                       |               | BRN-ORG                             | J8-P4                     |                                       |
| #4                         | STEPPER MOTOR (#1)       | Q4               |                            | YEL & WHT to GRY-RED | J16-P3                | 12VDC         | >>RED<< to BRN-YEL                  | J8-P5                     | Stepper Motor with wiring 511-5072-00 |
| #5                         | STEPPER MOTOR (#2)       | Q5               |                            | YEL & WHT to GRY-RED | J16-P3                | 12VDC         | >>BLUE<< to BRN-GRN                 | J8-P6                     |                                       |
| #6                         | STEPPER MOTOR (#3)       | Q6               |                            | YEL & WHT to GRY-RED | J16-P3                | 12VDC         | >>GREEN<< to BRN-BLU                | J8-P7                     | Reference Only: 041-5105-00           |
| #7                         | STEPPER MOTOR (#4)       | Q7               |                            | YEL & WHT to GRY-RED | J16-P3                | 12VDC         | >>BLACK<< to BRN-VIO                | J8-P8                     |                                       |
| #8                         | INLINE DROP TARGET RESET | Q8               |                            | YEL-VIO              | J10-P9/10             | 50VDC         | BRN-GRY                             | J8-P9                     | 24-940 ∪<br>090-5036-ND               |

STEPPER MOTOR TEST IN DIAGNOSTICS: GAME-SPECIFIC TESTS: WHEEL MOTOR TEST (see Page 17)

| High Current Coils Group 2 |                                | Drive Transistor | Driver Output PCB          | Power Line Color        | Power Line Connection | Power Voltage | Drive Transistor Control Line Color | D.T. Control Line Connect | Coil GA-Turn or Bulb Type  |
|----------------------------|--------------------------------|------------------|----------------------------|-------------------------|-----------------------|---------------|-------------------------------------|---------------------------|----------------------------|
| #9                         | LEFT POP BUMPER                | Q9               | ▲<br>I/O Power Driver<br>▼ | YEL-VIO                 | J10-P9/10             | 50VDC         | BLU-BRN                             | J9-P1                     | 26-1200 ∪<br>090-5044-ND   |
| #10                        | RIGHT POP BUMPER               | Q10              |                            | YEL-VIO                 | J10-P9/10             | 50VDC         | BLU-RED                             | J9-P2                     | 26-1200 ∪<br>090-5044-ND   |
| #11                        | BOTTOM POP BUMPER              | Q11              |                            | YEL-VIO                 | J10-P9/10             | 50VDC         | BLU-ORG                             | J9-P4                     | 26-1200 ∪<br>090-5044-ND   |
| #12                        | RED CONTESTANT JUMP (LONNIE)   | Q12              |                            | BROWN                   | J7-P1                 | 20VDC         | BLU-YEL                             | J9-P5                     | 27-950 ∪<br>090-5046-01-ND |
| #13                        | YELLOW CONTESTANT JUMP (MARIA) | Q13              |                            | BROWN                   | J7-P1                 | 20VDC         | BLU-GRN                             | J9-P6                     | 27-950 ∪<br>090-5046-01-ND |
| #14                        | BLUE CONTESTANT JUMP (KEITH)   | Q14              |                            | BROWN                   | J7-P1                 | 20VDC         | BLU-BLK                             | J9-P7                     | 27-950 ∪<br>090-5046-01-ND |
| #15                        | LEFT FLIPPER (50v RED/YEL)     | Q15              |                            | GRY-YEL-3A Fuse-RED-YEL | J10-P6/7              | 50VDC         | ORG-GRY                             | J9-P8                     | 22-900 ∪<br>090-5020-30-ND |
| #16                        | RIGHT FLIPPER (50v RED/YEL)    | Q16              |                            | BLU-YEL-3A Fuse-RED-YEL | J10-P6/7              | 50VDC         | ORG-VIO                             | J9-P9                     | 22-900 ∪<br>090-5020-30-ND |

| Low Current Coils Group 1 |                            | Drive Transistor | Driver Output PCB          | Power Line Color | Power Line Connection | Power Voltage | Drive Transistor Control Line Color | D.T. Control Line Connect | Coil GA-Turn or Bulb Type |
|---------------------------|----------------------------|------------------|----------------------------|------------------|-----------------------|---------------|-------------------------------------|---------------------------|---------------------------|
| #17                       | LEFT SLINGSHOT             | Q17              | ▲<br>I/O Power Driver<br>▼ | BROWN            | J7-P1                 | 20VDC         | VIO-BRN                             | J7-P2                     | 23-800 ∪<br>090-5001-ND   |
| #18                       | RIGHT SLINGSHOT            | Q18              |                            | BROWN            | J7-P1                 | 20VDC         | VIO-RED                             | J7-P3                     | 23-800 ∪<br>090-5001-ND   |
| #19                       | FLASH : RED CONTESTANT     | Q19              |                            | ORANGE           | J6-P10                | 20VDC         | VIO-ORG                             | J7-P4                     | #89 Bulb 165-5000-89      |
| #20                       | FLASH : YELLOW CONTESTANT  | Q20              |                            | ORANGE           | J6-P10                | 20VDC         | VIO-WHT                             | J7-P6                     | #89 Bulb 165-5000-89      |
| #21                       | FLASH : BLUE CONTESTANT    | Q21              |                            | ORANGE           | J6-P10                | 20VDC         | VIO-GRN                             | J7-P7                     | #89 Bulb 165-5000-89      |
| #22                       | MINI-RAMP DOWN-POST        | Q22              |                            | BROWN            | J7-P1                 | 20VDC         | VIO-BLU                             | J7-P8                     | 26-1200 ∪<br>090-5044-ND  |
| #23                       | LEFT RAMP UP-POST          | Q23              |                            | BROWN            | J7-P1                 | 20VDC         | VIO-BLK                             | J7-P9                     | 26-1200 ∪<br>090-5044-ND  |
| #24                       | OPTIONAL (e.g. COIN METER) | Q24              |                            | RED              | J16-P4>8              | 5VDC          | VIO-GRY                             | J7-P10                    | Optional 5VDC             |

∪ Coil Note: ∪ -ND means 'No Diode'. -00B or -00T can be used for coil replacements, but the diode must be removed. Call for more info.

| Low Current Coils Group 2 |                         | Drive Transistor | Driver Output PCB          | Power Line Color | Power Line Connection | Power Voltage | Drive Transistor Control Line Color | D.T. Control Line Connect | Coil GA-Turn or Bulb Type      |
|---------------------------|-------------------------|------------------|----------------------------|------------------|-----------------------|---------------|-------------------------------------|---------------------------|--------------------------------|
| #25                       | FLASH : WHEEL (X4)      | Q25              | ▲<br>I/O Power Driver<br>▼ | ORANGE           | J6-P10                | 20VDC         | BLK-BRN                             | J6-P1                     | Super Brt. LED Line 25, Pg 141 |
| #26                       | FLASH : BACKPANEL LEFT  | Q26              |                            | ORANGE           | J6-P10                | 20VDC         | BLK-RED                             | J6-P2                     | #89 Bulb 165-5000-89           |
| #27                       | FLASH : LEFT ORBIT      | Q27              |                            | ORANGE           | J6-P10                | 20VDC         | BLK-ORG                             | J6-P3                     | #89 Bulb 165-5000-89           |
| #28                       | FLASH : RIGHT RAMPS     | Q28              |                            | ORANGE           | J6-P10                | 20VDC         | BLK-YEL                             | J6-P4                     | #89 Bulb 165-5000-89           |
| #29                       | FLASH : RIGHT ORBIT     | Q29              |                            | ORANGE           | J6-P10                | 20VDC         | BLK-GRN                             | J6-P5                     | #89 Bulb 165-5000-89           |
| #30                       | FLASH : POP BUMPER      | Q30              |                            | ORANGE           | J6-P10                | 20VDC         | BLK-BLU                             | J6-P6                     | #89 Bulb 165-5000-89           |
| #31                       | FLASH : MINI-RAMP       | Q31              |                            | ORANGE           | J6-P10                | 20VDC         | BLK-VIO                             | J6-P7                     | #89 Bulb 165-5000-89           |
| #32                       | FLASH : BACKPANEL RIGHT | Q32              |                            | ORANGE           | J6-P10                | 20VDC         | BLK-GRY                             | J6-P8                     | #89 Bulb 165-5000-89           |

Note: In Test Flash Lamps Menu ("Flash" Icon), only Flashers are tested in numeric order. This Game: Q19-Q21 & Q25-Q32

| If Ticket Meter / Dispenser Installed : |                                | Drive Trans. | Driver Output PCB     | Power Line Color | Power Line Connection | Power Voltage              | Drive Transistor Control Line Color | D.T. Control Line Connect | Ticket Meter or Dispenser |
|---|--------------------------------|--------------|-----------------------|------------------|-----------------------|----------------------------|-------------------------------------|---------------------------|---------------------------|
| #33                                     | AUX 1: TICKET ADVANCE (ENABLE) | Q1           | ▲<br>Aux. Driver<br>▼ | RED              | J16-P4>8              | 5VDC<br>1K RES.<br>PULL-UP | WHITE                               | J2-P3                     | Ticket Dispenser          |
| #34                                     | AUX 2: TICKET METER            | Q2           |                       | RED              | J16-P4>8              |                            | BROWN                               | J2-P4                     | Ticket Meter              |
| #35                                     | AUX 3: SWITCHED GROUND         | Q3           |                       | GRY-RED          | J16-P3                | 12VDC                      | BLK-WHT                             | J2-P7                     | Ticket Dispenser          |



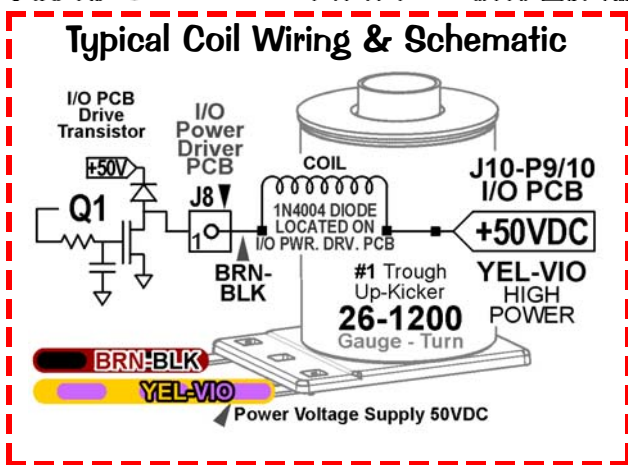
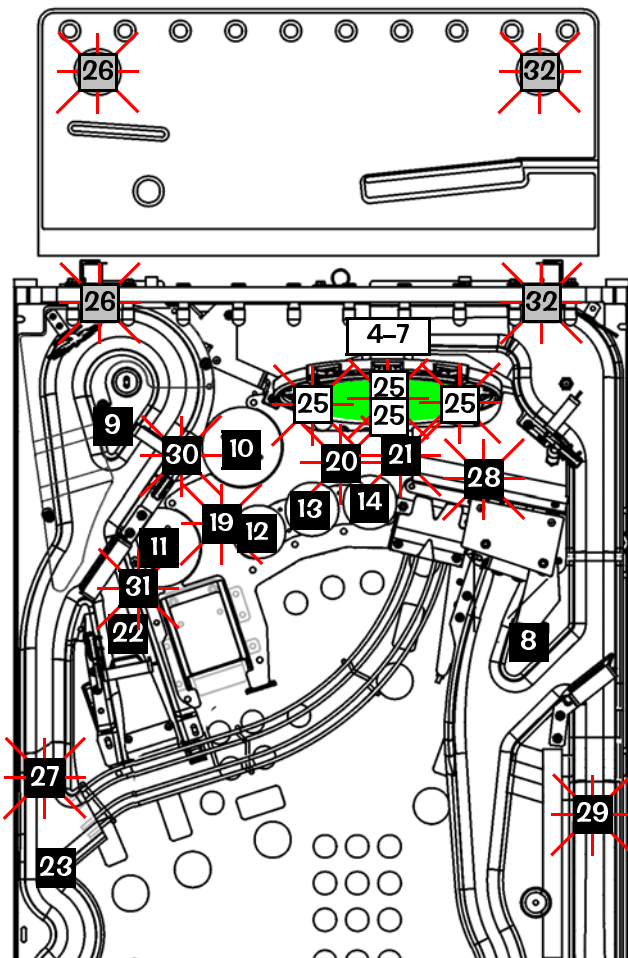
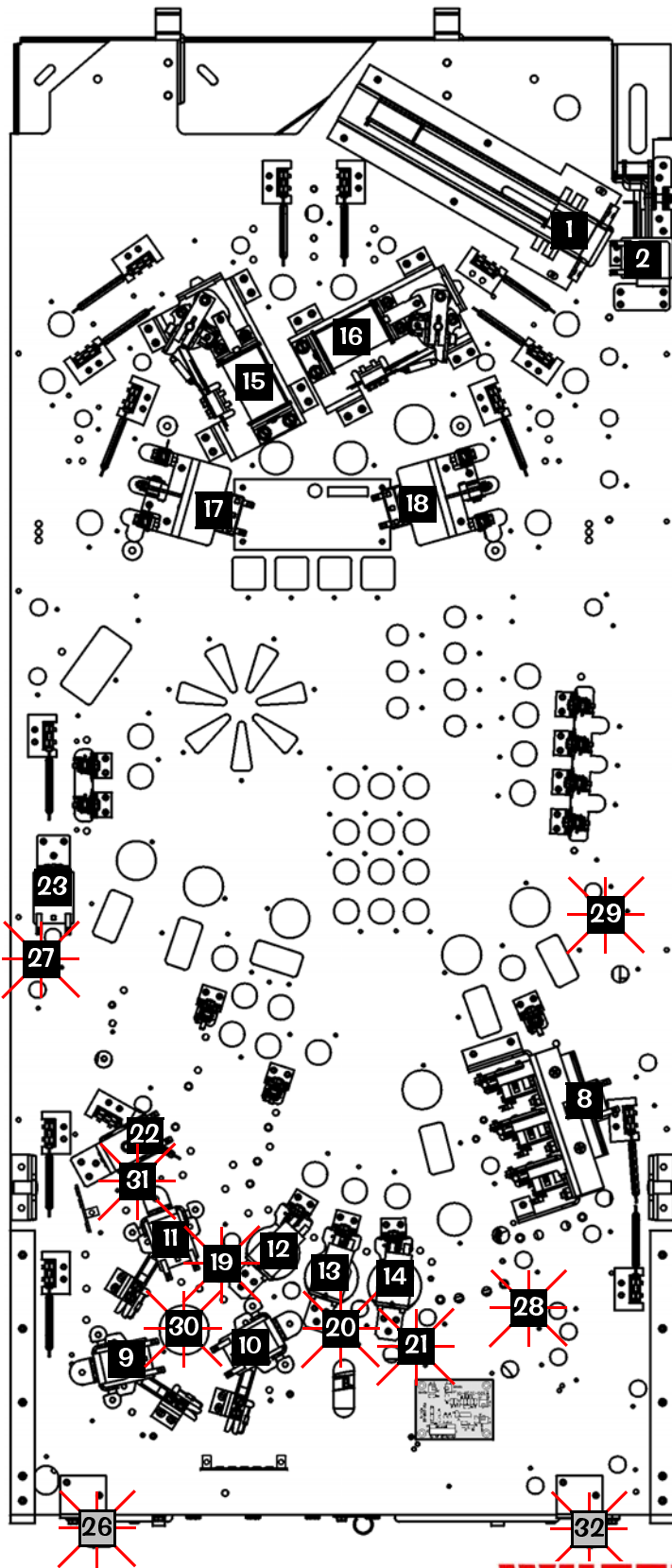




COIL MENU: SINGLE COIL & CYCLING COIL

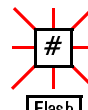
## COIL & FLASH LAMP LOCATIONS

{Coils Detailed Chart Table : previous page}



Color = Color of Mini-Mars or Flash Lamp Bulb.

- = Coils / Flash Lamps above Playfield.
- = Coils / Flash Lamps below Playfield.
- = Coils / Flash Lamps on Back Panel.



Coil Q24 is Optional. If either a Coin Meter, Token Dispenser or Knocker (all optional equipment) is required, call Technical Support for more information. 1-800-542-5377 or 1-708-345-7700.



STANDARD ADJUSTMENT #1

## GO TO ADJUSTMENTS MENU: STANDARD ADJUSTMENTS [ #1 – #63 ]

Perform the below steps to review the adjustments. Enter the **SERVICE MENU**, then enter the **STANDARD ADJUSTMENTS MENU**. For adjustment definitions or summary, review Section 3, Chapter 4, **GO TO ADJUSTMENTS MENU**. See Section 3, Chapter 5, **GO TO INSTALLS MENU** (via the **UTILITIES MENU**), to easily change all adjustments required depending on the Install Type (Easy, Hard, 5-Ball, Home Play, etc.) desired.

**Step 1** Press [ **SELECT** ]. Press [ **BACK** ] to exit or escape at any time.

**Step 2** Press [ **>** ]. Go to the "ADJ" Icon. Press [ **SELECT** ].

**Step 3** ... "S.P.I." Icon. Press [ **SELECT** ].



**Step 4** **STANDARD ADJUSTMENT #1** appears with the Adjustment Name [ **REPLAY TYPE** ] flashing. With the Adjustment Name flashing, press [ **<** ] [ **>** ] to move between adjustments.

**Step 5** To change the Adjustment Setting, press [ **SELECT** ]. With the Adjustment Setting flashing, press [ **<** ] [ **>** ] repeatedly until the desired setting appears. Press the [ **SELECT** ] to "install" the change. The Adjustment Comment (bottom text line) will indicate [ **INSTALLED/FACTORY DEFAULT** ], if the Factory Default Setting is selected or [ **INSTALLED** ] if the change is not the Factory Default Setting.

## STANDARD ADJUSTMENTS [ #1 – #63 ] ▼

| Nr. | STANDARD ADJUSTMENT NAME | USA DEFAULT | YOUR SETTING |
|-----|--------------------------|-------------|--------------|
| 1   | REPLAY TYPE              | AUTO        |              |
| 2   | ‡ REPLAY PERCENTAGE      | 10%         |              |
| 3   | ‡ REPLAY AWARD           | CREDIT      |              |
| 4   | ‡ REPLAY LEVELS          | 1           |              |
| 5   | ‡ AUTO REPLAY START      | 20,000,000  |              |
| 6   | ‡ DYNAMIC REPLAY START   | 60,000,000  |              |
| 7   | ‡ REPLAY LEVEL #1        | 15,000,000  |              |
| 8   | ‡ REPLAY LEVEL #2        | 30,000,000  |              |
| 9   | ‡ REPLAY LEVEL #3        | 45,000,000  |              |
| 10  | ‡ REPLAY LEVEL #4        | 60,000,000  |              |
| 11  | ‡ REPLAY BOOST           | YES         |              |
| 12  | SPECIAL LIMIT            | 1           |              |
| 13  | ‡ SPECIAL PERCENTAGE     | 10%         |              |
| 14  | SPECIAL AWARD            | CREDIT      |              |
| 15  | FREE GAME LIMIT          | 5           |              |
| 16  | EXTRA BALL LIMIT         | 5           |              |
| 17  | ‡ EXTRA BALL PERCENTAGE  | 25%         |              |
| 18  | GAME PRICING             | USA 10      |              |
| 19  | MATCH PERCENTAGE         | 9%          |              |
| 20  | MATCH AWARD              | CREDIT      |              |
| 21  | BALLS PER GAME           | 3           |              |
| 22  | TILT WARNINGS            | 2           |              |
| 23  | CREDIT LIMIT             | 30          |              |
| 24  | ALLOW HIGH SCORES        | YES         |              |
| 25  | HIGH SCORE AWARD         | CREDIT      |              |
| 26  | GRAND CHAMPION AWARDS    | 1           |              |
| 27  | HIGH SCORE #1 AWARDS     | 1           |              |
| 28  | HIGH SCORE #2 AWARDS     | 0           |              |
| 29  | HIGH SCORE #3 AWARDS     | 0           |              |
| 30  | HIGH SCORE #4 AWARDS     | 0           |              |
| 31  | GRAND CHAMPION SCORE     | 75,000,000  |              |

| Nr. | STANDARD ADJUSTMENT NAME | USA DEFAULT | YOUR SETTING |
|-----|--------------------------|-------------|--------------|
| 32  | HIGH SCORE #1            | 55,000,000  |              |
| 33  | HIGH SCORE #2            | 40,000,000  |              |
| 34  | HIGH SCORE #3            | 30,000,000  |              |
| 35  | HIGH SCORE #4            | 25,000,000  |              |
| 36  | HSTD INITIALS            | 3 INITIALS  |              |
| 37  | HSTD RESET COUNT         | 2000        |              |
| 38  | FREE PLAY                | NO          |              |
| 39  | LANGUAGE                 | ENGLISH     |              |
| 40  | PLAYER LANGUAGE SELECT   | YES         |              |
| 41  | CUSTOM MESSAGE           | ON          |              |
| 42  | FLASH LAMP POWER         | NORMAL      |              |
| 43  | COIL PULSE POWER         | NORMAL      |              |
| 44  | KNOCKER VOLUME           | NORMAL      |              |
| 45  | GAME RESTART             | YES         |              |
| 46  | BILL VALIDATOR           | NO          |              |
| 47  | MUSIC VOLUME             | 1           |              |
| 48  | BALL SAVE TIME           | 0:05        |              |
| 49  | TIMED PLUNGER            | OFF         |              |
| 50  | FLIPPER BALL LAUNCH      | OFF         |              |
| 51  | COINDOOR BALL SAVER      | NO          |              |
| 52  | COMPETITION MODE         | NO          |              |
| 53  | CONSOLATION BALL         | YES         |              |
| 54  | FAST BOOT                | YES         |              |
| 55  | Q24 OPTION               | COIN METER  |              |
| 56  | TICKET DISPENSER         | NO          |              |
| 57  | PLAYER COMPETITION       | YES         |              |
| 58  | TEAM SCORES              | NO          |              |
| 59  | LOCATION ID              | 0           |              |
| 60  | GAME ID                  | 0           |              |
| 61  | TIME FORMAT              | 12-HOUR     |              |
| 62  | COIN INPUT DELAY         | 30          |              |
| 63  | LOST BALL RECOVERY       | YES         |              |

**Factory Defaults Settings are subject to change during production (especially Standard Adjustments 2, 4, 5, 13, 16-17, 19, 31-35 & 47).**

‡ Not all Standard Adjustments are shown. Depending on the setting (whether Factory Default or if changed by the operator), associated adjustments do not appear, if not required. **Note:** If Game Dip Switch other than USA is installed, different Defaults will appear.







FEATURE ADJUSTMENT 1

**GO TO ADJUSTMENTS MENU: FEATURE ADJUSTMENTS [ #1 – #26 ]**

Perform the below steps to review the adjustments. Enter the **SERVICE MENU**, then enter the **FEATURE ADJUSTMENTS MENU**. For adjustment definitions or summary, review Section 3, Chapter 4, **GO TO ADJUSTMENTS MENU**. See Section 3, Chapter 5, **GO TO INSTALLS MENU** (via the **UTILITIES MENU**), to easily change all adjustments required depending on the Install Type (Easy, Hard, 5-Ball, Home Play, etc.) desired.

**Step 1** Press [ **SELECT** ]. Press [ **BACK** ] to exit or escape at any time.

**Step 2** Press [ **>** ]. Go to the "ADJ" Icon. Press [ **SELECT** ].

**Step 3** Press [ **>** ]. Go to the "GAME" Icon. Press [ **SELECT** ].

Adjustment Number → **FEATURE ADJUSTMENT #1**  
 Adjustment Name → **LETTER GUESSING DIFFICULTY**  
 Adjustment Setting → **MEDIUM**  
 Adjustment Comment → **(INSTALLED/FACTORY DEFAULT)**

**Step 4** **FEATURE ADJUSTMENT #1** appears with the Adjustment Name [ **LETTER GUESSING DIFFICULTY** ] flashing. With the Adjustment Name flashing, press [ **<** ] [ **>** ] to move between adjustments.

**Step 5** To change the Adjustment Setting, press [ **SELECT** ]. With the Adjustment Setting flashing, press [ **<** ] [ **>** ] repeatedly until the desired setting appears. Press the [ **SELECT** ] to "install" the change. The Adjustment Comment (bottom text line) will indicate [ **INSTALLED/FACTORY DEFAULT** ], if the Factory Default Setting is selected or [ **INSTALLED** ] if the change is not the Factory Default Setting.

**FEATURE ADJUSTMENTS [ #1 – #26 ] ▼**

| Nr. | FEATURE ADJUSTMENT NAME       | USA DEFAULT | YOUR SETTING |
|-----|-------------------------------|-------------|--------------|
| 1   | LETTER GUESSING DIFFICULTY    | MEDIUM      |              |
| 2   | PUZZLE SOLVING DIFFICULTY     | MEDIUM      |              |
| 3   | CONTESTANT DIFFICULTY         | EX. EASY    |              |
| 4   | FREE SPIN LIGHT DIFFICULTY    | MEDIUM      |              |
| 5   | FIRST HARD FREE SPIN COLLECT  | 3           |              |
| 6   | BIG MONEY LIGHT DIFFICULTY    | MEDIUM      |              |
| 7   | FIRST HARD BIG MONEY COLLECT  | 3           |              |
| 8   | WILD CARD DIFFICULTY          | MEDIUM      |              |
| 9   | WILD CARD EXTRA BALL MEMORY   | NO          |              |
| 10  | BONUS SPELLOUT DIFFICULTY     | EASY        |              |
| 11  | MULTIBALL SPELLOUT DIFFICULTY | EX. EASY    |              |
| 12  | WOF MB JACKPOT DIFFICULTY     | EX. EASY    |              |
| 13  | WOF MB JACKPOT RELIGHT DIFF.  | MEDIUM      |              |

| Nr. | FEATURE ADJUSTMENT NAME     | USA DEFAULT | YOUR SETTING |
|-----|-----------------------------|-------------|--------------|
| 14  | ADD-A-BALL DIFFICULTY       | MEDIUM      |              |
| 15  | LEFT LOOP AWARD THRESHOLD   | 4           |              |
| 16  | SUPER LOOPS TIMER           | 5           |              |
| 17  | SUPER POPS TIMER            | 10          |              |
| 18  | RAMP MULTIPLIER TIMER       | 5           |              |
| 19  | FIRST RAMP EXTRA BALL       | 10          |              |
| 20  | ADDITIONAL RAMP EXTRA BALLS | 50          |              |
| 21  | MAXIMUM RAMP EXTRA BALLS    | 5           |              |
| 22  | RAMP EXTRA BALL MEMORY      | YES         |              |
| 23  | DISABLE WHEEL MOTOR         | NO          |              |
| 24  | DISABLE AUX DISPLAY         | NO          |              |
| 25  | DISABLE DROP TARGETS        | NO          |              |
| 26  | DISABLE RAMP POST           | NO          |              |

| Nr. | FEATURE ADJUSTMENT NAME | USA DEFAULT | YOUR SETTING |
|-----|-------------------------|-------------|--------------|
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| Nr. | FEATURE ADJUSTMENT NAME | USA DEFAULT | YOUR SETTING |
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**Factory Defaults Settings are subject to change during production**  
 Note: If Game Dip Switch other than USA is installed, different Defaults will appear.



CHOOSE EARNINGS or STANDARD AUDITS

## GO TO AUDITS MENU: EARNINGS AUDITS [ #1 – #13 ] / STANDARD AUDITS [ #1 – #59 ]

Perform the below steps to review the audits. Enter the **SERVICE MENU**, then enter the **EARNINGS AUDITS** or **STANDARD AUDITS** MENUS. For audit definitions or summary, review Section 3, Chapter 3, **GO TO AUDITS MENU**. Try the "DUMP AUDITS TO USB" Feature to create a text file of your audits. Don't forget to set the **DATE & TIME** in the **UTILITIES MENU**. See Section 3, Chapter 5, **GO TO UTILITIES MENU**, for more information.

**Step 1** Press [ **SELECT** ].  
Press [ **BACK** ] to exit or escape at any time.



**Step 2** Press [ **>** ]. Go to the "AUD" Icon.  
Press [ **SELECT** ].

**Step 3** Press [ **>** ]. Go to the "EARN" or "S.P.I." Icon.  
Press [ **SELECT** ].

**Step 4** Press [ **<** ] [ **>** ] to move between audits.

### EARNINGS AUDITS [ #1 – #13 ] ▼

| Nr. | EARNINGS AUDIT NAME       | YOUR RESULT | Nr. | EARNINGS AUDIT NAME       | YOUR RESULT |
|-----|---------------------------|-------------|-----|---------------------------|-------------|
| 1   | TOTAL PAID CREDITS        |             | 8   | COINS THROUGH FOURTH SLOT |             |
| 2   | FREE GAME PERCENTAGE      |             | 9   | COINS THROUGH FIFTH SLOT  |             |
| 3   | AVERAGE BALL TIME         |             | 10  | TOTAL COINS               |             |
| 4   | AVERAGE GAME TIME         |             | 11  | TOTAL EARNINGS            |             |
| 5   | COINS THROUGH LEFT SLOT   |             | 12  | METER CLICKS              |             |
| 6   | COINS THROUGH RIGHT SLOT  |             | 13  | SOFTWARE METER            |             |
| 7   | COINS THROUGH CENTER SLOT |             |     |                           |             |

### STANDARD AUDITS [ #1 – #59 ] ▼

| Nr. | STANDARD AUDIT NAME   | YOUR RESULT | Nr. | STANDARD AUDIT NAME     | YOUR RESULT | Nr. | STANDARD AUDIT NAME   | YOUR RESULT |
|-----|-----------------------|-------------|-----|-------------------------|-------------|-----|-----------------------|-------------|
| 1   | TOTAL BALLS PLAYED    |             | 21  | 8.0M – 9.99M SCORES     |             | 41  | RIGHT DRAINS          |             |
| 2   | TOTAL EXTRA BALLS     |             | 22  | 10.0M – 12.49M SCORES   |             | 42  | TILTS                 |             |
| 3   | EXTRA BALL PERCENTAGE |             | 23  | 12.5M – 14.99M SCORES   |             | 43  | TOTAL BALLS SAVED     |             |
| 4   | REPLAY 1 AWARDS       |             | 24  | 15.0M – 17.49M SCORES   |             | 44  | LEFT FLIPPER USED     |             |
| 5   | REPLAY 2 AWARDS       |             | 25  | 17.5M – 19.99M SCORES   |             | 45  | RIGHT FLIPPER USED    |             |
| 6   | REPLAY 3 AWARDS       |             | 26  | 20.0M – 24.99M SCORES   |             | 46  | 0 – 1 MINUTE GAMES    |             |
| 7   | REPLAY 4 AWARDS       |             | 27  | 25.0M – 29.99M SCORES   |             | 47  | 1 – 1.5 MINUTE GAMES  |             |
| 8   | TOTAL REPLAYS         |             | 28  | 30.0M – 39.99M SCORES   |             | 48  | 1.5 – 2 MINUTE GAMES  |             |
| 9   | REPLAY PERCENTAGE     |             | 29  | 40.0M – 49.99M SCORES   |             | 49  | 2 – 2.5 MINUTE GAMES  |             |
| 10  | TOTAL SPECIALS        |             | 30  | 50.0M – 74.99M SCORES   |             | 50  | 2.5 – 3 MINUTE GAMES  |             |
| 11  | SPECIAL PERCENTAGE    |             | 31  | 75.0M – 99.99M SCORES   |             | 51  | 3 – 3.5 MINUTE GAMES  |             |
| 12  | TOTAL MATCHES         |             | 32  | 100.0M – 149.99M SCORES |             | 52  | 3.5 – 4 MINUTE GAMES  |             |
| 13  | HIGH SCORE AWARDS     |             | 33  | 150.0M+ SCORES          |             | 53  | 4 – 5 MINUTE GAMES    |             |
| 14  | HIGH SCORE PERCENT    |             | 34  | AVERAGE SCORES          |             | 54  | 5 – 6 MINUTE GAMES    |             |
| 15  | TOTAL FREE PLAYS      |             | 35  | SERVICE CREDITS         |             | 55  | 6 – 8 MINUTE GAMES    |             |
| 16  | TOTAL PLAYS           |             | 36  | BALL SEARCH STARTED     |             | 56  | 8 – 10 MINUTE GAMES   |             |
| 17  | 0.0M – 1.99M SCORES   |             | 37  | LOST BALL FEEDS         |             | 57  | 10 – 15 MINUTE GAMES  |             |
| 18  | 2.0M – 3.99M SCORES   |             | 38  | LOST BALL GAME STARTS   |             | 58  | 15+ MINUTE GAMES      |             |
| 19  | 4.0M – 5.99M SCORES   |             | 39  | LEFT DRAINS             |             | 59  | RECENT REPLAY PERCENT |             |
| 20  | 6.0M – 7.99M SCORES   |             | 40  | CENTER DRAINS           |             |     |                       |             |

Note: Audits are subject to change (with or without notice).







## GO TO AUDITS MENU: FEATURE AUDITS [ #1 - #107 ]

Perform the below steps to review the audits. Enter the **SERVICE MENU**, then enter the **FEATURE AUDITS MENU**. Try the **"DUMP AUDITS TO USB"** Feature to create a text file of your audits. Don't forget to set the **DATE & TIME** in the **UTILITIES MENU**. See Section 3, Chapter 5, **GO TO UTILITIES MENU**, for more information.

**Step 1** Press [ **SELECT** ]. Press [ **BACK** ] to exit or escape at any time.

**Step 2** Press [ **>** ]. Go to the "AUD" Icon.  
Press [ **SELECT** ].



**Step 3** Press [ **>** ]. Go to the "GAME" Icon. Press [ **SELECT** ].

**Step 4** Press [ **<** ] [ **>** ] to move between audits.

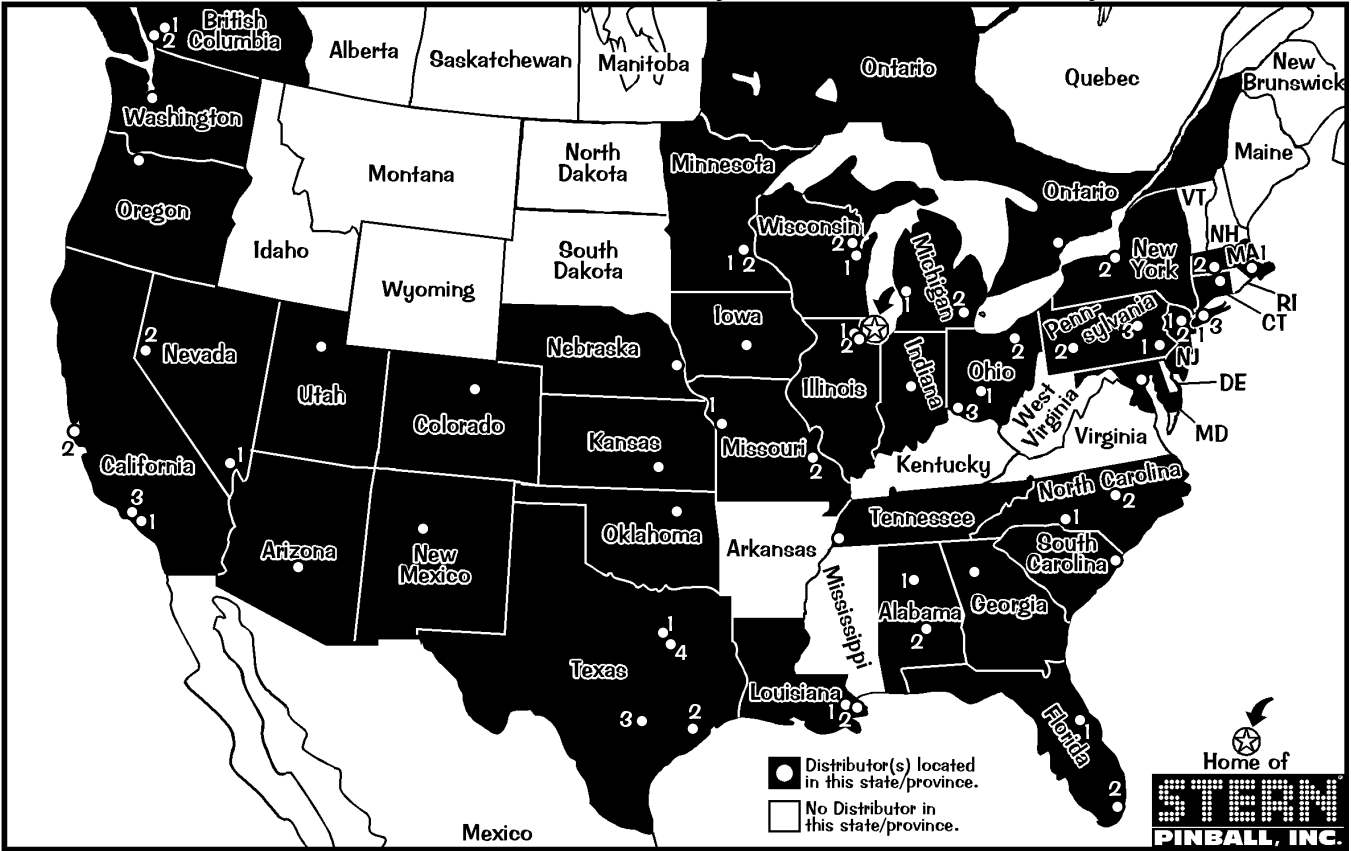
% = AUDIT RESULT DIVIDED BY STANDARD AUDIT 16 (TOTAL PLAYS).

## FEATURE AUDITS [ #1 - #107 ] ▼

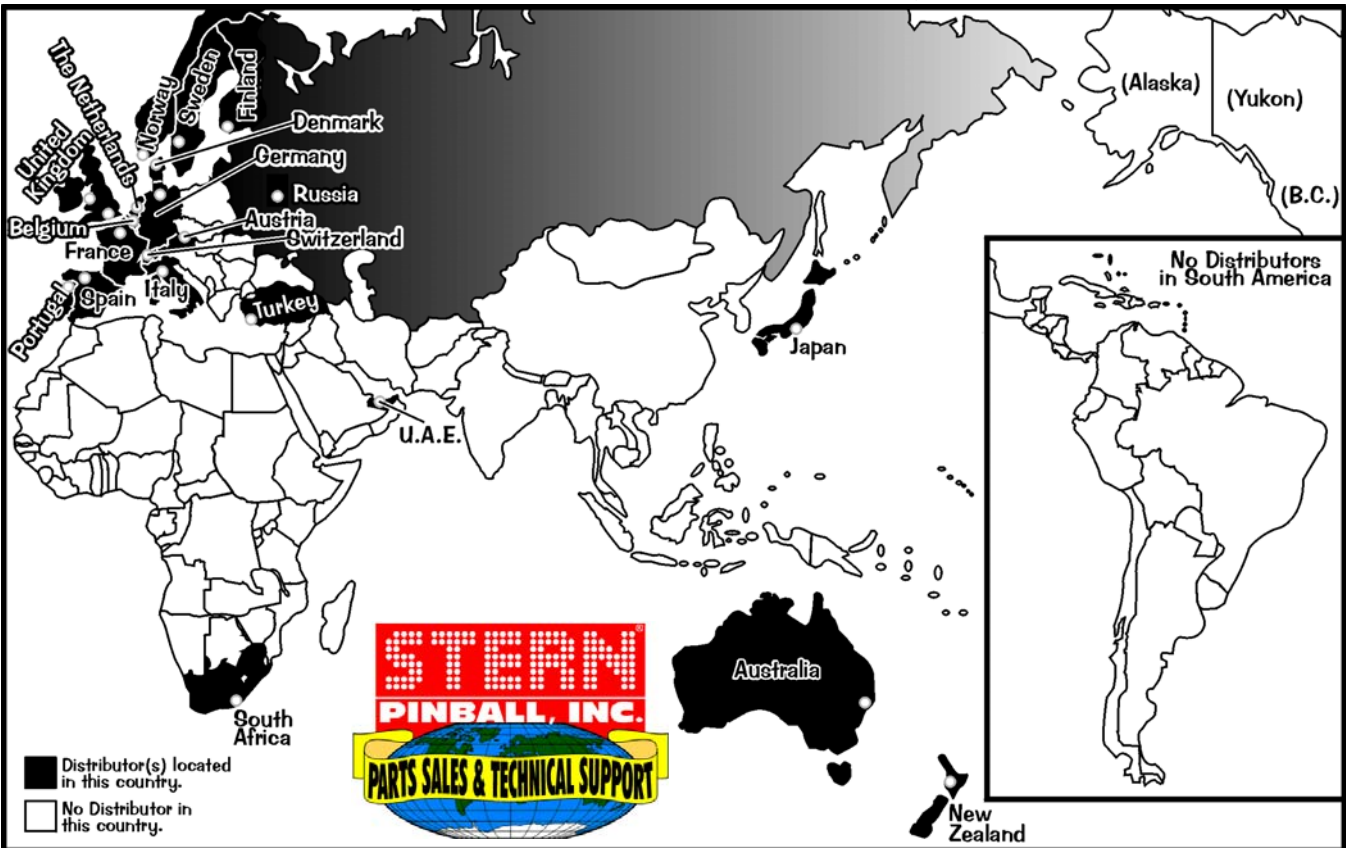
| Nr. | FEATURE AUDIT NAME        | YOUR RESULT | Nr. | FEATURE AUDIT NAME              | YOUR RESULT | Nr. | FEATURE AUDIT NAME             | YOUR RESULT | Nr. | FEATURE AUDIT NAME             | YOUR RESULT |
|-----|---------------------------|-------------|-----|---------------------------------|-------------|-----|--------------------------------|-------------|-----|--------------------------------|-------------|
| 1   | TOP LEFT OUTLANES         |             | 28  | WRONG VOWEL GUESSES             |             | 55  | WHEEL FRENZY STARTS            |             | 82  | CONTESTANT HURRYUP POINTS      |             |
| 2   | BOTTOM LEFT OUTLANES      |             | 29  | TOTAL PUZZLE LETTERS            |             | 56  | WHEEL FRENZY SWITCHES          |             | 83  | BONUS MODE WINS                |             |
| 3   | LEFT INLANES              |             | 30  | PUZZLE #1 SOLVED                |             | 57  | WHEEL FRENZY POINTS            |             | 84  | M-BALL LETTERS COMPLETED       |             |
| 4   | LEFT CENTER LANES         |             | 31  | PUZZLE #2 SOLVED                |             | 58  | RISKY SPINNING STARTS          |             | 85  | M-BALL LETTERS PROGRESSED      |             |
| 5   | RIGHT CENTER DRAINS       |             | 32  | PUZZLE #3 SOLVED                |             | 59  | RISKY SPINNING SPINS           |             | 86  | MULTIBALL LIT                  |             |
| 6   | RIGHT INLANES             |             | 33  | PUZZLE #4 SOLVED                |             | 60  | RISKY SPINNING COLLECTS        |             | 87  | MULTIBALL STARTS               |             |
| 7   | TOP RIGHT OUTLANES        |             | 34  | PRIZE PUZZLES WON               |             | 61  | RISKY SPINNING BANKRUPTS       |             | 88  | 2+ MULTIBALL STARTS            |             |
| 8   | RIGHT BOTTOM OUTLANES     |             | 35  | BANKRUPTS                       |             | 62  | RISKY SPINNING POINTS          |             | 89  | WOF MB 1X JACKPOT              |             |
| 9   | WILD CARD LANES           |             | 36  | BANKRUPT & LOST PRIZE BANK      |             | 63  | RAMP RAMPAGE STARTS            |             | 90  | WOF MB 2X JACKPOT              |             |
| 10  | LEFT ORBITS               |             | 37  | PRIZE BANK EXTRA BALL LIT       |             | 64  | RAMP RAMPAGE RAMP SHOTS        |             | 91  | WOF MB 3X JACKPOT              |             |
| 11  | LOOPING LEFT ORBITS       |             | 38  | PRIZE BANK EXTRA BALL COLLECTED |             | 65  | RAMP RAMPAGE POINTS            |             | 92  | WOF MB SUPER JACKPOT           |             |
| 12  | LEFT RAMPS                |             | 39  | PRIZE BANK TRIP LIT             |             | 66  | COMBOS STARTS                  |             | 93  | WOF MB BONUS JACKPOTS          |             |
| 13  | MINI-RAMPS                |             | 40  | PRIZE BANK TRIP COLLECTED       |             | 67  | COMBOS SHOTS                   |             | 94  | WOF MB SEQUENCE COMPLETED      |             |
| 14  | RED CONTESTANT HITS       |             | 41  | PRIZE BANK SPECIAL LIT          |             | 68  | COMBOS WEIGHTED SHOTS          |             | 95  | FREE SPIN LANES LIT            |             |
| 15  | YELLOW CONTESTANT HITS    |             | 42  | PRIZE BANK SPECIAL COLLECTED    |             | 69  | COMBOS POINTS                  |             | 96  | FREE SPIN COLLECTS             |             |
| 16  | BLUE CONTESTANT HITS      |             | 43  | SHARE THE WEALTH STARTED        |             | 70  | KEEP IT SPINNING STARTS        |             | 97  | BIG MONEY LANES LIT            |             |
| 17  | WHEEL RAMPS               |             | 44  | CLEAN SWEEP STARTED             |             | 71  | KEEP IT SPINNING REVOLUTIONS   |             | 98  | BIG MONEY COLLECTS             |             |
| 18  | FRONT INLINE DROPS        |             | 45  | PUZZLE JACKPOT STARTED          |             | 72  | KEEP IT SPINNING VALUE INCS    |             | 99  | BIG MONEY POINTS               |             |
| 19  | MIDDLE INLINE DROPS       |             | 46  | PUZZLE JACKPOT COLLECTED        |             | 73  | KEEP IT SPINNING POINTS        |             | 100 | BIG MONEY TRIPS                |             |
| 20  | BACK INLINE DROPS         |             | 47  | MYSTERY WEDGE OFFERED           |             | 74  | STOP THE WHEEL STARTS          |             | 101 | BIG MONEY EXTRA BALLS          |             |
| 21  | RIGHT RAMPS               |             | 48  | MYSTERY RISK TAKEN              |             | 75  | STOP THE WHEEL STOPS           |             | 102 | WILD CARD COLLECTS             |             |
| 22  | RIGHT ORBITS              |             | 49  | SKILL SHOT MADE                 |             | 76  | STOP THE WHEEL MULTIPLIER INCS |             | 103 | WILD CARD SPECIAL              |             |
| 23  | MULTIBALL STANDUPS        |             | 50  | TOSS-UP PUZZLE COLLECTED        |             | 77  | STOP THE WHEEL BANKRUPTS       |             | 104 | WILD CARD LIGHT EXTRA BALL     |             |
| 24  | POP BUMPER HITS           |             | 51  | QUICK PLUNGE SKILL SHOTS        |             | 78  | STOP THE WHEEL POINTS          |             | 105 | WILD CARD ANY PRIZE BANK AWARD |             |
| 25  | CORRECT CONSONANT GUESSES |             | 52  | BONUS LETTERS LIT               |             | 79  | CONTESTANT HURRYUP STARTS      |             | 106 | WILD CARD ANY OUTLANE AWARD    |             |
| 26  | CORRECT VOWEL GUESSES     |             | 53  | BONUS LETTERS PROGRESSED        |             | 80  | CONTESTANT H-UP CONTESTANTS    |             | 107 | WILD CARD ADD-A-BALL           |             |
| 27  | WRONG CONSONANT GUESSES   |             | 54  | BONUS WHEEL LIT                 |             | 81  | CONTESTANT H-UP COLLECTS       |             |     |                                |             |

*Note: Audits are subject to change (with or without notice).*

# Domestic Pinball & Redemption Distributors Map



# International Distributors Map



For *Parts & Service*, call your nearest Distributor. View the above maps & the directories on the next page to locate your closest Distributor in your state, province, or country. Distributors and phone numbers are subject to change. Call **Stern® Pinball, Inc. (Parts Sales & Technical Support)** with any questions or if your Distributor cannot help you: 1-800-542-5377 (in USA or Canada) or 1-708-786-5466. Visit us at [www.SternPinball.com](http://www.SternPinball.com) for current Distributor Information & other pinball needs.





# Domestic Pinball & Redemption Distributors Directory

|  |   |  |   |   |   |
|--|---|--|---|---|---|
| <b>ALABAMA</b>   | <b>INDIANA</b>  | <b>MISSOURI</b>  | <b>NORTH CAROLINA</b>   | <b>TEXAS</b>  | <b>CANADA</b>   |
| Birmingham Vending<br>Birmingham (1)<br>205-324-7526                                     | Shaffer Distributing<br>Indianapolis<br>317-899-2530                      | Greater America Dist.<br>Kansas City (1)<br>816-531-4300   | Brady Distributing<br>Charlotte (1)<br>704-357-6284   | Amusement Distributors<br>San Antonio (3)<br>210-225-3844                           | <b>ONTARIO</b>  |
| Franco Distributing<br>Montgomery (2)<br>334-834-3455                                    | <b>IOWA</b>   | Moss Distributing<br>Kansas City (1)<br>816-231-6600   | Parts & Service Only:<br>Operators Distributing<br>Archdale (2)<br>336-884-5714   | Betson Texas<br>Dallas (1)<br>214-638-4900  | Starburst Coin Mach.<br>Toronto<br>416-251-2122                           |
| <b>ARIZONA</b>   | Greater America Dist.<br>Johnston<br>515-278-4455                         | Shaffer Distributing<br>St. Louis (2)<br>314-645-3393  | <b>OHIO</b>   | Discount Arcade Games<br>Crowley (1)<br>817-297-0440                                | <b>BRITISH COLUMBIA</b>   |
| Betson West<br>Phoenix<br>602-442-6630   | Moss Distributing<br>Des Moines<br>515-266-6422                           | <b>NEBRASKA</b>  | Shaffer Distributing<br>Cincinnati (3)<br>800-282-0194<br>Columbus (1)<br>614-421-6800<br>Valley View (2)<br>216-447-1749 | H.A. Franz, & Co.<br>Houston (2)<br>713-523-7366<br>San Antonio (3)<br>210-226-6322 | Parts & Service Only:<br>Can. Coin Machine<br>Burnaby (1)<br>604-420-4008 |
| Mountain Coin<br>Phoenix<br>602-269-7596   | <b>KANSAS</b>   | Central Distributing<br>Omaha<br>402-493-5600  | <b>OKLAHOMA</b>   | Master Sales<br>Corsicana (4)<br>903-874-4740                                       | Parts & Service Only:<br>Pacific Vending<br>Vancouver (2)<br>604-324-2164 |
| <b>CALIFORNIA</b>  | United Dist., Inc.<br>Wichita<br>316-263-6181                             | Greater America Dist.<br>Omaha<br>402-553-2812   | Galaxy Distributing<br>Tulsa<br>918-835-1166  | <b>UTAH</b>   |   |
| Betson West<br>Buena Park (1)<br>714-228-7500<br>So. San Francisco (2)<br>650-952-4220   | <b>LOUISIANA</b>  | <b>NEVADA</b>  | <b>OREGON</b>   | Mountain Coin<br>Salt Lake City<br>801-262-5494                                     |   |
| C.A. Robinson<br>Los Angeles (3)<br>323-735-3001   | AMA Distributors, Inc.<br>Metairie (1)<br>504-835-3232                    | Mountain Coin<br>Las Vegas (1)<br>702-798-0900   | Mountain Coin<br>Portland<br>503-234-5491   | Struve Distributing<br>Salt Lake City<br>801-328-1636                               |   |
| <b>COLORADO</b>  | New Orleans Novelty<br>New Orleans (2)<br>504-888-3500                    | Reno Game Sales<br>Reno (2)<br>775-829-2080  | Specialty Coin Products<br>Portland<br>800-987-4946 or<br>503-786-9200  | <b>WASHINGTON</b>   |   |
| Game Exchange of CO<br>Denver<br>303-288-6500 (sales)<br>303-288-4300 (main)             | <b>MARYLAND</b>   | <b>NEW JERSEY</b>  | <b>PENNSYLVANIA</b>   | Mountain Coin<br>Auburn (Seattle)<br>253-736-6073                                   |   |
| Mountain Coin<br>Denver<br>303-427-2133  | Betson Enterprises<br>Baltimore<br>410-646-4100                           | Betson Enterprises<br>Carlstadt (1)<br>201-438-1300  | Betson Enterprises<br>King Of Prussia (1)<br>610-265-1155<br>Pittsburgh (2)<br>412-331-8703                               | <b>WISCONSIN</b>  |   |
| <b>CONNECTICUT</b>   | Parts & Service Only:<br>Weiner Distributing<br>Baltimore<br>410-525-2600 | Jack Guarnieri<br>Service Co., Inc.<br>(Pinballsales.com)<br>Lakewood (2)<br>800-473-5225 or<br>732-364-9900 | Superior Amusements<br>Wilkes-Barre (3)<br>570-824-9994   | Pioneer Sales & Svc.<br>Menomonee Falls (2)<br>262-781-1420                         |   |
| TDM Distributing<br>Williamantic<br>860-423-1403   | <b>MASSACHUSETTS</b>  | <b>NEW MEXICO</b>  | <b>SOUTH CAROLINA</b>   | Lieberman Companies<br>Menomonee Falls (2)<br>800-236-1880 or<br>262-703-4168       |   |
| <b>FLORIDA</b>   | Betson Ent. (NECO)<br>Norwood (1)<br>781-769-9760                         | Mountain Coin<br>Albuquerque<br>505-345-7706   | Parts & Service Only:<br>Green Coin<br>Myrtle Beach<br>843-626-1900   |   |   |
| Birmingham Vending<br>Orlando (1)<br>407-425-1505  | Gekay Sales<br>Ludlow (2)<br>413-583-7700                                 | <b>NEW YORK</b>  | Brady Distributing<br>Memphis<br>901-345-7811   |   |   |
| Brady Distributing<br>Miami [Miramar] (2)<br>954-874-1100<br>Orlando (1)<br>407-872-1666 | <b>MICHIGAN</b>   | Betson Enterprises<br>New Hyde Park (2)<br>516-354-4647<br>Syracuse (3)<br>315-437-2400                      | Parts & Service Only:<br>Green G.A.M.E.S.<br>Memphis<br>901-353-1000  |   |   |
| <b>GEORGIA</b>   | Shaffer Distributing<br>Livonia (2)<br>734-432-1040                       | Parts & Service Only:<br>Bay Coin<br>Richmond Hill (1)<br>718-291-5757                                       |   |   |   |
| Greater Southern Dist.<br>Smyrna<br>770-803-3040   | <b>MINNESOTA</b>  |  |   |   |   |
| <b>ILLINOIS</b>  | Lieberman Companies<br>Minneapolis (1)<br>800-879-0321 or<br>952-887-5299 |  |   |   |   |
| American Vending Sales<br>Elk Grove Village (1)<br>847-439-9400                          | Moss Distributing<br>Bloomington (2)<br>952-881-8770                      |  |   |   |   |
| Betson Midwest<br>Bensenville (2)<br>630-238-9400  |   |  |   |   |   |

**Note:** For states and Canadian Provinces which do not have Distributors, call the neighboring state or province with the city closest to you (indicated with a white dot). States or Provinces with more than 1 city containing a distributor are numbered. View the map on the previous page.

**Note:** From inside the US, use prefix 1-.

**Note:** Distributors are subject to change. Visit us at [www.SternPinball.com](http://www.SternPinball.com) for current Distributor Information.

# International Distributors Directory

|  |   |   |   |   |  |
|--|---|---|---|---|--|
| <b>AUSTRALIA</b>   | <b>FRANCE</b>   | <b>ITALY (RSM)</b>  | <b>NORWAY</b>   | <b>SOUTH AFRICA</b>   | <b>TURKEY</b>  |
| Amusement Mach. Dist.<br>Alexandria<br>+61 (2) 9700 9600 | Avranches Automatic<br>Saint Quentin<br>sur le Homme<br>+33 2 3389 6162 | Tecnoplay S.A.<br>San Marino<br>+39 549 901 508                             | Parts for Pinballs<br>Sandefjord<br>+47 9242 1402                           | K & W Amusements<br>Port Elizabeth<br>+27 41 484 3344 or<br>+27 41 484 2940 | Balo<br>Marmaris<br>+0 252 413 83 35   |
| <b>AUSTRIA</b>   | SFA<br>Paris<br>+33 1 5326 8080   | <b>JAPAN</b>  | Vendomatic AS<br>Skedsmokorset<br>+47 2 291 8383                            | <b>SPAIN</b>  | <b>UNITED ARAB EMIRATES</b>  |
| R. Rupp<br>Leibnitz<br>+43 3 4528 6105                   | <b>GERMANY</b>  | HIC, Inc.<br>Chiba-Ken<br>+04 7176 4040                                     | <b>PORTUGAL</b>   | Comercial Cocomatic<br>Coslada (Madrid)<br>+34 91 671 6980                  | Warehouse of Games<br>Dubai<br>+971 4 883 5880   |
| <b>BELGIUM</b>   | ADP Gauselmann GmbH<br>Espelkamp<br>+49 5741 27 32 85                   | <b>THE NETHERLANDS</b>  | Jacinto & Martins, S.A.<br>Belas<br>+35 1214 3256 24 or<br>+35 1214 3256 38 | <b>SWEDEN</b>   | <b>UNITED KINGDOM</b>  |
| NAMUSCO<br>Bruxelles<br>+32 2 414 4596                   | Crown Technologies GmbH<br>Rellingen<br>+49 4101 30 24 85               | GAME-XL B.V.<br>Kruisstraat (Rosmalen)<br>+31(0)73 522 2264                 | <b>RUSSIA</b>   | Bjuvia Fritid AB<br>Bjuv<br>+46 4238 6900                                   | Electrocoin<br>London, England<br>+44 208 965 2055   |
| <b>DENMARK</b>   | Merkur Gaming GmbH<br>Luebbecke<br>+49 5772 4 94 22                     | <b>NEW ZEALAND</b>  | Kalmancor Enterprise Ltd<br>Moscow<br>+95 124 5601 or<br>+95 124 5613       | <b>SWITZERLAND</b>  | Parts & Service Only:<br>Electrocoin Aftersales<br>Cardiff, S. Glamorgan<br>+44 292 045 0345 |
| JK Automater A/S<br>Thisted<br>+45 97 92 0925            | <b>HOLLAND</b>  | Coin Cascade Ltd.<br>Christchurch<br>+643 338 1411                          | O.D.A. Game Machines<br>Moscow<br>+95 219 2949 or<br>+95 219 8917           | Novomat, A.G.<br>Harkingon<br>+41 62 388 8961                               |  |
| <b>ENGLAND</b>   | See The Netherlands   | Parts & Service Only:<br>Amco Machine Supplies<br>Auckland<br>+64 9846 7606 | <b>SOUTH AMERICA</b>  | <b>TAIWAN, R.O.C.</b>   |  |
| see UNITED KINGDOM                                       |   |   |   | SEC<br>Taichung<br>+886 4 229 10646   |  |
| <b>FINLAND</b>   |   |   |   |   |  |
| Pelika net Oy<br>Vantaa<br>+358 9 290 450                |   |   |   |   |  |

**Note:** From inside the US, use prefix 011-.

From inside country listed, dial (0) first.



Find-It-In-Front:  
Dr. Pinball



# POWER REQUIREMENTS

**⚠️** This game **must be connected to a properly grounded outlet to reduce shock hazard** & insure proper game operation. See *Sec. 5, Schematics & Troubleshooting, Chp. 3, Cabinet Wiring (Transformer Power Wiring)*, for transformer connections required for **Normal, High, and Low Line** conditions. **⚠️**

| Normal Line:   |   | 110v AC - 125v AC @ 60Hz  |   |
|--|---|---|---|
| <b>Domestic</b><br>use an 8AMP 250v Slo-Blo Fuse.                              | <b>AVG OPERATION</b>  | CURRENT: <b>2.8AMP</b><br>WATTAGE: <b>329w</b>  | <b>MAX OPERATION</b><br>CURRENT: <b>8AMP</b><br>WATTAGE: <b>940w</b>                                      |
|  | <b>High Line:</b><br>use 2x 5AMP 250v Slo-Blo Fuses.<br>(*England & Hong Kong use an 8AMP 250v S/B Fuse.) |   | <b>218v AC - 240v AC @ 50Hz</b><br><b>AVG OPERATION</b><br>CURRENT: <b>1.8AMP</b><br>WATTAGE: <b>412w</b> |
|  |   | <b>MAX OPERATION</b><br>CURRENT: <b>5AMP</b>   <b>8AMP*</b><br>WATTAGE: <b>1145w</b>   <b>1832w*</b>            |   |
| <b>Low Line:</b><br><b>Export Japan Only</b><br>use an 8AMP 250v Slo-Blo Fuse. |   | <b>95v AC - 108v AC @ 50Hz / 60Hz</b><br><b>AVG OPERATION</b><br>CURRENT: <b>2.6AMP</b><br>WATTAGE: <b>264w</b> |   |
|  |   | <b>MAX OPERATION</b><br>CURRENT: <b>8AMP</b><br>WATTAGE: <b>812w</b>  |   |

England & Hong Kong use an 8A Fuse.

# TRANSPORTATION GAME DIMENSIONS

## BEFORE TRANSPORTING



To reduce the possibility of damage, observe **ALL** precautions whenever transporting the game.

**Read & follow Section 1, Chapter 1, Pinball Game Set-Up Procedures, and How to Secure the Backbox for Transporting.** Remove the legs and secure the game within the transporting vehicle.

**SAVE AND RETAIN ALL PRINTED INFORMATION INSIDE THE CABINET!**

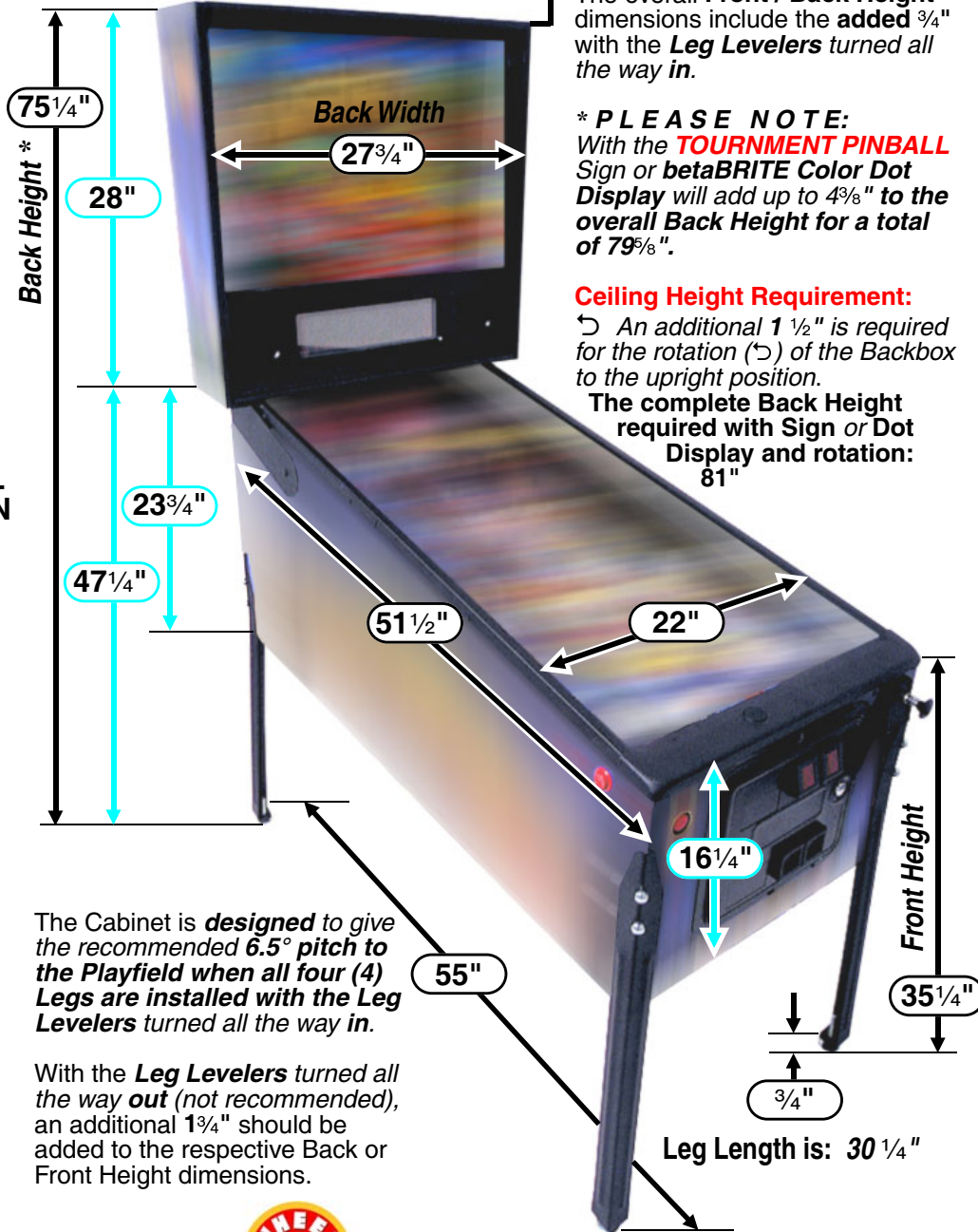
**Shipping Box Dimensions**

Height 56" Width 31"  
 Depth 31"  
 Approx. Unboxed Weight: 270lbs. (+/- 10)  
 Boxed Weight: Wt. 290lbs. (+/- 5)

**CAUTION**

At least 2 people are required to move and maneuver this game. Use proper moving equipment & extreme care while handling!

## TOURNAMENT SIGN +4<sup>3</sup>/<sub>8</sub>"



The overall **Front / Back Height** dimensions include the **added 3/4"** with the **Leg Levelers** turned all the way in.

**\* PLEASE NOTE:** With the **TOURNAMENT PINBALL Sign** or **betaBRITE Color Dot Display** will add up to **4<sup>3</sup>/<sub>8</sub>"** to the overall **Back Height** for a total of **79<sup>5</sup>/<sub>8</sub>"**.

**Ceiling Height Requirement:**  
 ↪ An additional **1 1/2"** is required for the rotation (↪) of the **Backbox** to the upright position.  
**The complete Back Height required with Sign or Dot Display and rotation: 81"**

The Cabinet is **designed** to give the recommended **6.5° pitch** to the **Playfield** when all four (4) **Legs** are installed with the **Leg Levelers** turned all the way in.

With the **Leg Levelers** turned all the way **out** (not recommended), an additional **1<sup>3</sup>/<sub>4</sub>"** should be added to the respective **Back** or **Front Height** dimensions.



Find-It-In-Front:  
 Dr. Pinball



**Wheel of Fortune™ Pinball**

**How To Update Your Game Code for the New S.A.M. System ..... Inside Front**

**Find-It-In-Front: Dr. Pinball ..... DR. 1 – 16**

- ▶ For Proper Operation of this Pinball Game, (4) Pinballs must be installed in the Ball Trough! // Backbox Fuses, Cabinet Fuses, Playfield Fuses and Cabinet Switches .....DR. 1
- ▶ Find-It-In-Front: Dr. Pinball Section Explained .....DR. 2
  - ▷ Service Switch X4 Set Overview ▷ Functions in Game or Attract Mode ▷ Functions in the Service Menu
- ▶ Diagnostic Aids .....DR. 3
- ▶ CPU Dip Switch Settings .....DR. 3
- ▶ Switch Matrix Grid (#1 – #64) and Dedicated Switches (D-1 – D-32).....DR. 4
- ▶ Switch Locations .....DR. 5
- ▶ Lamp Matrix Grid (#1 – #80) .....DR. 6
- ▶ Lamp Locations .....DR. 7
- ▶ Coils Detailed Chart Table .....DR. 8
- ▶ Coil & Flash Lamp Locations .....DR. 9
- ▶ Go To Adjustments Menu: Standard Adjustments [ #1 – #63 ].....DR. 10
- ▶ Go To Adjustments Menu: Feature Adjustments [ #1 – #26 ] .....DR. 11
- ▶ Go To Audits Menu: Earnings Audits [ #1 – #13 ] / Standard Audits [ #1 – #59 ] .....DR. 12
- ▶ Go To Audits Menu: Feature Audits [ #1 – #107 ] .....DR. 13
- ▶ Domestic Pinball & Redemption Distributors Map // International Distributors Map.....DR. 14
- ▶ Domestic Pinball & Redemption Distributors Directory // International Distributors Directory.....DR. 15
- ▶ Power Requirements // Transportation // Game Dimensions .....DR. 16

**Sections 1-5, General Table of Contents .....i – ii**

**Section 1, Chapter 1 of 1, After Set-Up .....1 – 4**

- ▶ Pinball Game Set-Up Procedures .....1
  - ▷ Backbox (backglass removed): ▷ Playfield (glass removed): ▷ With the Coin Door Open:
- ▶ Pinball Game Set-Up Future Reference..... 1-3
- ▶ How to Secure the Backbox ... // Leg Leveler Adjustment // Easy Access Service System - 2 Positions.....4

**Section 2, Chapter 1 of 1, Game Operation & Features .....5 – 6**

- ▶ Start of Game Features.....5
  - ▷ Starting a Normal Game ▷ Starting Team Play (Doubles!) ▷ Starting Tournament Play
- ▶ During Game Features.....5
  - ▷ Feature Mode & Combination Shots ▷ Multiball ▷ Replay Feature
- ▶ End of Game Features .....5
  - ▷ Game Endings ▷ Match Feature ▷ Entering Initials/Name
- ▶ Auto Percentaging .....6
- ▶ Instruction Card.....6

**Section 3, Chapter 1 of 6, Service Menu System .....7 – 12**

- ▶ Table of Contents for Section 3.....7

**Section 3, Chapter 2 of 6, Go To Diagnostics Menu .....13 – 20**

**Section 3, Chapter 3 of 6, Go To Audits Menu .....21 – 24**

**Section 3, Chapter 4 of 6, Go To Adjustments Menu .....25 – 34**

**Section 3, Chapter 5 of 6, Go To Utilities Menu .....35 – 38**

**Section 3, Chapter 6 of 6, Go To Tournament Menu .....39 – 40**

**Section 4, Chapter 1 of 2, Parts Identification & Location (The Pink Pages) .....41 – 62**

- ▶ Table of Contents for Section 4, Chapter 1 .....41

**Section 4, Chapter 2 of 2, Drawings for Major Asm. & Ramps (The Blue Pages) ....63 – 88 (-94)**

- ▶ Table of Contents for Section 4, Chapter 2 .....63

**Section 5, Chapter 1 of 4, Backbox Wiring.....95 – 98**

- ▶ Table of Contents for Section 5.....95

**Section 5, Chapter 2 of 4, Playfield Wiring.....99 – 104**

**Section 5, Chapter 3 of 4, Cabinet and Coin Door Wiring .....105 – 108**

**Section 5, Chapter 4 of 4, Printed Circuit Boards (PCBs) .....109 – 140**

**Appendixes A - J, Table of Contents ..... End of Manual**

- ▶ Stern Pinball, Inc. Limited Warranty // Cautions, Warnings & Notices ..... last page





# After Set-Up

## Machine Set-Up Procedures

...after reading the included Pinball Game Set-Up Instruction Sheet (SPI 755-5310-08) continue reading important info below:

**(a)** "The appliance has to be placed in a horizontal position." **(b)** "This appliance is not to be cleaned by a Water Jet."

**UL 603335-7.12.1 (i)** "Do not locate this appliance in an area where a Water Jet is used." **(ii)** "Do not clean this appliance with a Water Jet."

**60335-7.12.5 (b)** If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.

### Backbox (backglass removed):

1. Check all connectors for loose wire terminations. Reseat any loose wire by pushing in on the terminal. Push on all plugged in connectors for the CPU/Sound, I/O Power Driver and the Display Power Supply Boards (check that they are properly seated). Ensure the Fluorescent Light Tube is seated correctly. Check that all fuses are seated properly (fuses on the I/O PCB have Red LED Status indicators). Reinstall backglass, lock the Backbox and secure its keys inside the Coin Door.

### Playfield (glass removed):

2. Remove all shipping tie downs, shipping blocks, packing foam, etc., if present. **READ ALL PRINTED INFORMATION!** Shipping Instructions and/or Decals describe warnings, cautions, and/or important information specific to the game.

**SAVE ALL IN CABINET!**

If pinballs were already installed into the Ball Trough (under the arch), remove them before performing the following step. **\*\*\*Pinballs can fall out and away from the playfield\*\*\***

3. Raise the playfield and rest it against the Backbox. See the illustration "Easy Access Service System - 2 Positions" on Page 4.

4. Visually inspect all cabinet cables and connector terminations; ensure no wires or cables are pinched and that cable harnesses are not pulled tight.

5. Make sure the proper amount of pinballs are installed (decal on the lock down assembly and the inside manual cover describe how many pinballs are needed).

6. Lower the playfield and ensure game is level side-to-side by adjusting Leg Levelers, if required. See the illustration "Leg Leveler Adjustment" on Page 4. Start with the Leg Levelers turned all the way in (1.25" from floor to bottom of leg), depending on the condition of the floor, adjust the Leg Levelers as required until the game pitch is 6.5°, determined by the Bubble Level.

**USE THE BUBBLE LEVEL ON THE WOOD RAIL (LOWER RIGHT) TO DETERMINE IF LEVEL IS ACHIEVED. BUBBLE SHOULD APPEAR BETWEEN THE 2 BLACK LINES. SEE PAGE 4 FOR AN ILLUSTRATION.**

The playfield incline affects difficulty of play. Use the recommended incline; Game difficulty is best varied using game adjustments.

### With the Coin Door Open:

7. If desired, perform any self tests at this time (see Section 3, Chapter 1, Service Menu Introduction, and Chapter 2, GO TO DIAGNOSTICS MENU, for information on how to enter "Begin Play Test" and "Game Name Test" Menus, if any, to test components on the game).

8. If desired, adjust Game Pricing, Standard and/or Custom (see Section 3, Chapter 4, GO TO ADJUSTMENTS MENU and Section 3, Chapter 5, GO TO INSTALLS MENU to adjust Game Difficulty, 3- or 5-Ball Play, Competition or Home Settings, Novelty, Add-A-Ball, etc.).

If you saved your foam cushion packing materials and box, download the PINBALL MACHINE FOAM CUSHION PACKING 11" X 17" Color Sheet on-line on our website: <http://www.sternpinball.com/tips.shtml>

**PINBALL GAME SET-UP**

**CAUTION:** At least two (2) people are required to move and maneuver game. Use proper moving equipment & extreme care while handling. Pinball game is heavy! (200lbs +/- 5) Boxes. Refer to Service Game Manual for further After Set-Up Procedures (Section 3, Chapter 1) and other important information!

**TOOLS REQUIRED:** S/S Socket Wrench, Utility Knife & Snps

- Before unpacking box, note the side which says "TRUCK THIS SIDE ONLY" (this is the side the box will be cut). Note: If you want to "open" the box, lay box flat on its side, pull game out and sit back into the upright position as shown. Use a standard in-line ramp to protect floor.
- With top of the box open, remove the four (4) foam pieces and the two (2) narrow box tubes which contain the four (4) identical Legs with Levelers (2 per side).
- At this point DO NOT CUT STRAPPING (You want to keep the Backbox secured in the down position).
- With the utility knife, CAREFULLY cut down on the left and right sides of the box. Carefully remove the entire side by carefully cutting the bottom of the box.
- With the S/S Socket Wrench, remove the 2 Leg Bolts on each side of the front cabinet.
- Install FRONT LEGS using the bolts removed from Step 5. Secure tightly. Take care not to scratch the Finish on any of the Legs.
- Remove 2 Bolts per side.
- Carefully roll the game down on the FRONT LEGS. Care should be taken to ensure the game is level. For this step the Backbox should be in the UPRIGHT POSITION. **SEE SIDE OF THE OPEN BOX.**
- With the S/S Socket Wrench, loosen and remove the 2 Leg Bolts on each side of the rear cabinet.
- Using supports on two (2) people, prop the rear of the cabinet up. (See illustration for correct prop handling and note on the manual.)
- Install REAR LEGS using the bolts removed from Step 6. Secure tightly. Take care not to scratch the Finish on Legs.
- CUT NYLON STRAPPING. CAUTION: Strapping can SNAP - protect your eyes! Use extreme care when using a utility knife. Remove all V-Clamps.
- After the BACKBOX is in the UPRIGHT POSITION, locate the S/S HEX KEY. (S/S means: stainless steel with a S/S hex nut) - attached & locked.
- With the keys removed, open the COIN DOOR. Pull the YELLOW HANDLE to the LEFT and all the screws will pull up on the FRONT TOP MOLDING, remove and set aside.
- Install the PLUMB BOB (See illustration for details). The PLUMB BOB glass cover may be pulled out forwards and removed. TAKE CARE while moving, as glass can be quite sensitive (depending on recommended).
- Install the PLUMB BOB (See illustration for details). The PLUMB BOB glass cover may be pulled out forwards and removed. TAKE CARE while moving, as glass can be quite sensitive (depending on recommended).

**NOTE:** COIN DOOR KEYS are in the Service Menu of the Pinball Game. If you are using an S/S Plugger, please refer to the Service Manual for details.

**REAR SERVICE MESSAGES:** The REAR SERVICE MESSAGES are located on the back of the game. See the Service Manual for details. The REAR SERVICE MESSAGES are located on the back of the game. See the Service Manual for details.

**STERN PINBALL THE ORIGINAL**

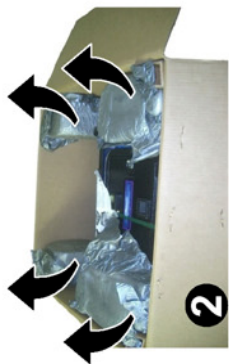
Sec. 1: After Set-Up

# PINBALL GAME SET-UP

**CAUTION:** At least two (2) people are required to move and maneuver game. Use proper moving equipment & extreme care while handling. Pinball game is heavy! 280lbs (+/- 5) Boxed. Refer to Service Game Manual for further **After Set-Up Procedures** (Section 1, Chapter 1) and other important information!

**TOOLS REQUIRED:**

- 5/8" Socket Wrench, Utility Knife & Snips



Pinball game is heavy!  
Use proper moving equipment & extreme care while handling.



Two (2) Legs with Levelers per box in plastic sleeves

1. Before unpacking box, note the side which says "TRUCK THIS SIDE ONLY" (this is the side the box will be cut). **Note:** If you want to "save" the box, lay box flat on this side, pull game out and tilt back into the upright position as shown. Use of a blanket is then required to protect floor.
2. With top of the box open, remove the four (4) foam pieces and the two (2) narrow box tubes which contain the **four (4) Identical Legs with Levelers (2 per tube)**.



3. At this point **DO NOT CUT STRAPPING** (You want to keep the Backbox secured in the down position).

4. With the utility knife, **CAREFULLY!** cut down on the left and right sides as shown. Let it fall forward and remove the entire side by carefully cutting the bottom.



Please be aware of the floor or carpet under the box while you are cutting so no damage occurs!

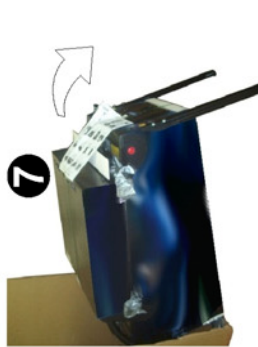
5. With the 5/8" Socket Wrench, loosen and remove the 2 Leg Bolts on each side of the front cabinet.



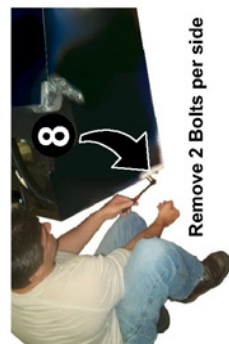
Remove 2 Bolts per side



6. Install **FRONT LEGS** using the bolts removed from Step 5. Secure tightly. **Take care not to scratch the Finish on any of the Legs.**



7. Carefully set the game down on the **FRONT LEGS**. Care should be taken... **Game is heavy, two (2) people are recommended for this and the following step. SET ASIDE THE OPEN BOX.**
8. With the 5/8" Socket Wrench, loosen and remove the 2 Leg Bolts on each side of the rear cabinet.



Remove 2 Bolts per side



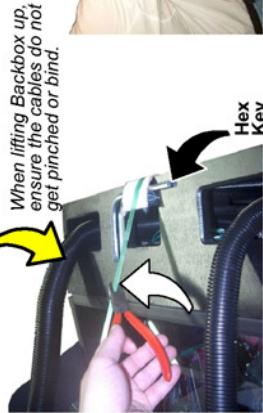
9

9. Using supports or two (2) people, prop the rear of the cabinet up. (Not shown in pictures is second person handling legs and bolts to the installer.)

10. Install **REAR LEGS** using the bolts removed from Step 8. Secure tightly. **Take care not to scratch the Finish on Legs.**

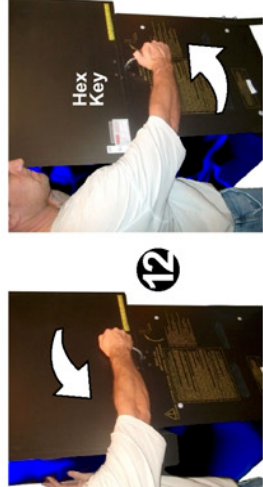






11

11. Cut NYLON STRAPPING. CAUTION: Strapping will SNAP, protect your eyes! Use extreme care when using a utility knife, snips. Remove all V boards.



12

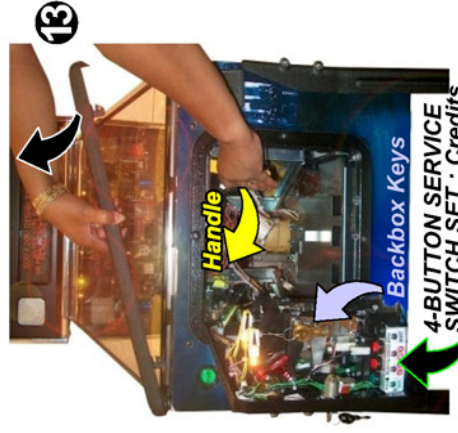
12. After the BACKBOX is in the UPRIGHT POSITION, locate the 5/16" HEX KEY. While inserted, rotate KEY with a 3/4 turn until latched & locked.

NOTE: COIN DOOR KEYS are tied to the Shooter Rod\* (if equipped) or taped to the Playfield Glass (if equipped with Auto Plunger Button). Remove keys. BACKBOX KEY are located inside Coin Door. Backbox Lock (remove Backglass to access the CPU/Sound and I/O PCBs).



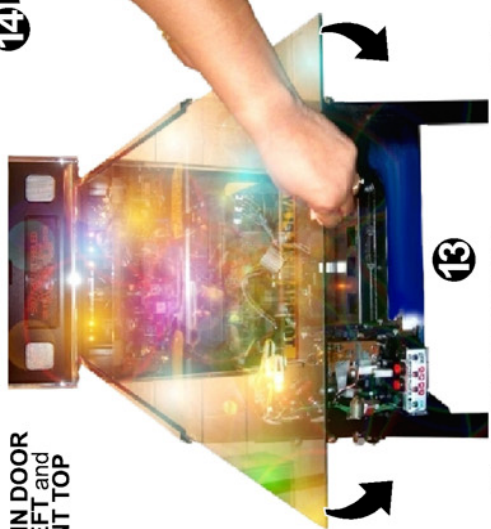
14

13. With the keys removed, open the COIN DOOR. Pull the YELLOW HANDLE to the LEFT and at the same time pull up on the FRONT TOP MOLDING, remove and set aside.



13

4-BUTTON SERVICE SWITCH SET : Credits, Volume & Service Menu  
● ● ● ● See Section 3, Chapter 1



13

The PLAYFIELD GLASS can now be pulled out forwards and removed. TAKE CARE while moving, set glass on a safe surface (carpeting recommended).



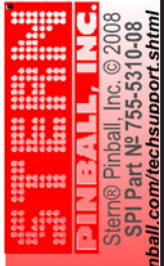
15

15. Install the PLUMB BOB (located in parts bag in cash box) onto the Hanger Wire & tighten the Thumb Screw. Loosening the Thumb Screw & lowering or raising the PLUMB BOB makes the Games Tilt Function more or less sensitive (tilt warnings adjustable through DIAGNOSTICS, GO TO ADJUSTMENTS MENU).

**ALWAYS STORE THE GAME SERVICE MANUAL & INFORMATION SHEETS INSIDE THE CABINET WHEN NOT USING.**

14. Through the open Coin Door, remove the RETAINING CLIP at the rear of the CASH BOX and open. Remove the PINBALLS & the PLUMB BOB from the SPARE PARTS BAG (save the other spare parts in cabinet). Install the PINBALLS by placing them on the playfield so they can roll down between the lower flippers into the Ball Trough (the amount of pinballs to install noted under FRONT TOP MOLDING or 1st page of manual). Remove any shipping materials which may be present. Check for parts which may have come loose during transportation and secure.

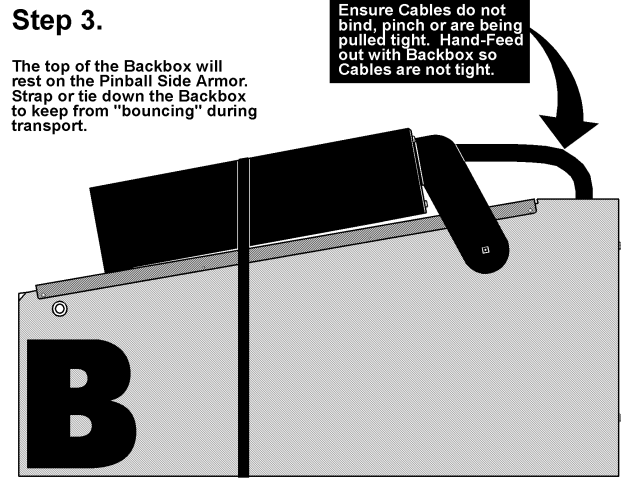
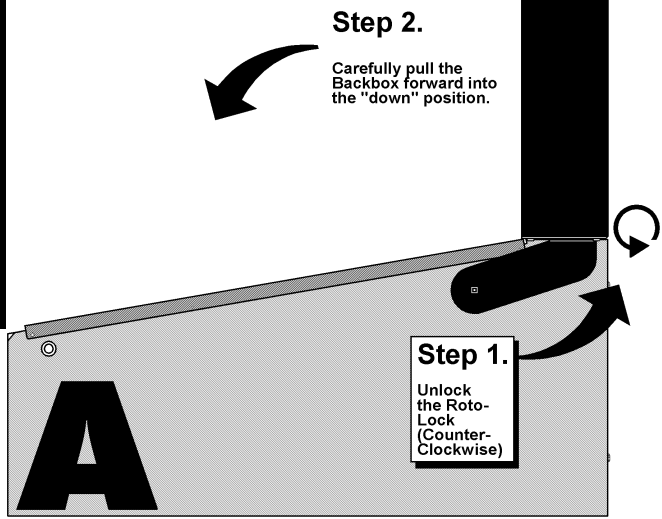
Remove the GAME SERVICE MANUAL (stapled to side of the left wall of the cabinet). Review Section 1, Chapter 1, Page 1, and perform Steps 1 - 8+. Review the end of this chapter on how to lift the playfield to access the Plumb Bob Tilt. READ YOUR SERVICE GAME MANUAL and review the SERVICE MENU (Diagnostics, Adjustments, Installs), Parts & Schematics. GAME SERVICE MANUALS ON-LINE: <http://www.sterminball.com/techsupport.shtml>



# How to Secure the Backbox for Transporting

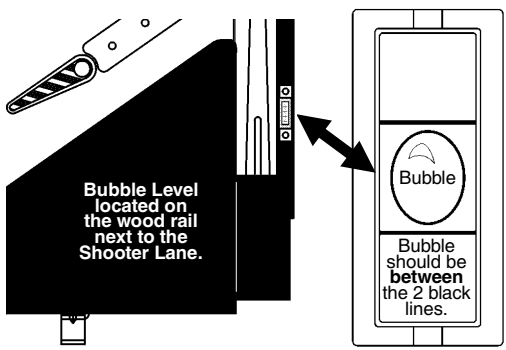
Sec. 1: After Set-Up

For more Backbox details & part numbers, see Section 4, Chapter 1, Parts Id. & Location, Backbox Assembly.



## Leg Leveler Adjustment

Attach the four (4) Leg Assemblies to cabinet corners with the eight (8) leg bolts provided .

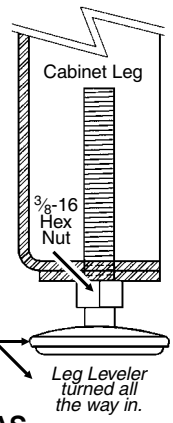


Start adjustment with the leg levelers *turned all the way in*.

View the *bubble* in the level provided on the right side wood rail.

Adjust the front or rear levelers as necessary to cause the bubble to float between the two (2) black lines.

Use a pinball to roll down the center of the playfield for side-to-side leveling.



**YOUR PLAYFIELD PITCH IS NOW AT 6.5° AS REQUIRED FOR PROPER GAME PLAY!**

*Note: For custom adjustment greater than >6.5° can be achieved by turning out the rear leg leveler(s), however, it is not recommended.*

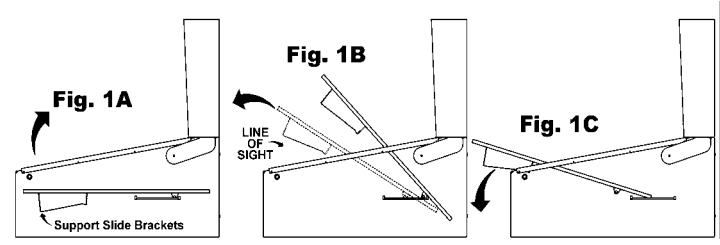


## Easy Access Service System - 2 Positions

With the front molding & glass removed, carefully lift the playfield (*take care when using the Bottom Arch to hoist*).

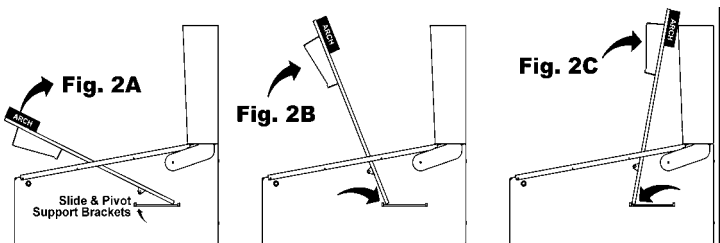
### Position 1

When lifted high enough, the **Playfield Support Slide Brackets** (Fig. 1A) can be seen and can clear the cabinet front (Fig. 1B). At this time, pull the playfield toward the front of the cabinet, checking that the mechanical components clear the cabinet front, then rest the playfield on the **Playfield Support Slide Brackets** at the front channel of cabinet (Fig. 1C);



### Position 2

With the playfield at rest, hold the sides & pull toward the front of the cabinet (*approx. 6" to 8"*), until resistance is felt from **Edge Slide Brackets** stopping against the **Slide & Pivot Support Brackets** located on either side of the cabinet (Fig. 2A). At this time, swivel the playfield toward the Backbox, then rest on the top edge (Fig. 2B & 2C).





## Game Operation & Features

### Start of Game Features

#### Starting a Normal Game

Insert coin(s). The game generates a sound for the first coin & for each subsequent coin with the display indicating the number of credits posted. Press the **Start Button** and a start-up sound is produced, and the posted credits are reduced by one. Subsequent players can be added (**up to 4 can play!**) by pressing the **Start Button** before the end of ball 1 (*with sufficient credit in the game*).

The display now indicates the player or # of players selected from the total depressions of the **Start Button**. The display indicates the ball in play, and a ball is served to the *Shooter Lane*. Pressing the **Start Button** after ball 1 of any player will start a new game (*if credits are available*), **but only** if the **Start Button** is depressed for 2-3 seconds. This delay is to avoid accidental "re-starts" of a game. **Note:** *Any partial credit remaining during game play after the end of the first ball, or power down, will be eliminated.*

#### Starting Team Play (Doubles!)

This option is adjustable with **Standard Adjustment (Adj.) 58, Team Scores** (Default = **NO**). If **Standard Adj. 58, Team Scores** is changed to **YES**, then Team Play will be made available. **Team Play only works in a 4-Player Game**. The totals for Players 1/ 3 (Team 1) & Players 2 / 4 (Team 2) are then displayed individually **as well as** the combined score for **BOTH TEAMS**.

#### Starting Tournament Play

This Pinball Game is **Tournament Ready**. **Optional Tournament betaBRITE Color Dot Display & hardware (sold separately) is available.** Review **Section 3, Chapter 6, GO TO TOURNAMENT MENU**, for more info!

Unlike a "Normal Game", the Tournament Game is started by depressing the **Tournament Start Button** (*located on the Front Molding, if installed*). If adequate credit(s) are posted **and a Tournament is started (set-up properly)** via the **Service Menu** (*select the "TOUR" Icon in the Main Menu*), the **Tournament Start Button** will flash. *Any adjustments or installs changed will not be in affect. Starting a Tournament Game defaults to preprogrammed Tournament Rules (e.g. No Extra Balls, Specials or Bonus Credits are awarded); however, starting a Normal Game after a Tournament Game will then revert back to any unique adjustments or installs performed previously.* **During and End of Game Features** operate in the same manner.

### During Game Features

#### Video Mode

Our games may feature video interactive play modes. *Also, don't forget to watch the display for hints or instructions.* The interactive video modes require the player to play on-screen using the flipper buttons. When in video mode, the ball-in-play is "held" (*usually in a Scoop, Eject Saucer or lock of some sort*).

### During Game Features Continued

#### Feature Mode & Combination Shots

Features are lit on the playfield and started by completing *certain shots (e.g. completion of Target Banks, Orbit(s), Ramp(s) and/or any combination of the shots)*.

#### Multiball

Multiball is started after completion of certain features (*amount of balls used depends on game rules*).

#### Replay Feature

Replay awards are given as the player exceeds a High Score Level during game play. This can be adjusted with **Standard Adj. 3, Replay Award** (Default = **CREDIT**). Players exceeding the High Score Levels can receive: **CREDIT, EXTRA BALL, or SPECIAL**. Adjust to **NONE** if a replay award is not desired.

### End of Game Features

#### Game Endings

When all player(s) have played all balls (including any Extra Balls), the game ends. If power is interrupted during the course of a game, it will end that game (**see Starting a Normal Game**). Closure of the Plumb Bob Tilt Switch according to the number of tilts set, **Standard Adj. 22, Tilt Warnings** (Default = **2**) or prolonged closure, will end the current Ball-In-Play. Closure of the Slam Tilt Switch on the Coin Door ends the current game(s).

#### Match Feature

At the end of each ball, earned bonuses are collected. At the end of the last ball of a game (including any extra balls, if applicable), earned bonuses are collected, then the system produces a random 2-digit number (a multiple of 10; 00 to 90). Matching the last 2 digits of the player's score with this number awards a credit. In **Std. Adj. 19, Match Percentage** (Default = **9%**) can be changed from 0-10%. Changing the percentage to **0% displays** the "Match Animation" at the end of the game, however, will never match nor award anything. Changing this adjustment to **OFF** will **not display** the "Match Animation" nor award anything.

#### Entering Initials/Name

If player achieved a new *High Score* in a game or achieved a *Special Feature (if given)* the player may enter 3 Initials. In **Std. Adj. 36, HSTD (High Score To Date) Initials** (Default = **3 Initials**) can also be changed to **10-Letter Name**. Use the **Flipper Buttons** to choose a letter or character as seen on the Dot Display. Hitting the **Start Button** locks in the letter or character and proceeds to the next letter. The game then proceeds into the **Game-Over Mode** and then to the **Attract Mode**.

**Note: Standard Adj. 41, Custom Message** (Default = **ON**) can be displayed during the Attract Mode; enter letters in the same fashion. For more details on Adjustments, see **Section 3, Chapter 4**.

... continued on the next page.

# Auto Percentaging

This game is equipped with Auto Percentaging, **Standard Adjustment (Adj.) 1, Replay Type** (Default = **AUTO**, adjustable). The *Replay Percent* is automatically adjusted, **Standard Adj. 2, Replay Percentage**, or you can set a *Fixed Replay Score*. Four levels may be selected. Adjustments allow awarding of a "CREDIT" (or your setting) as each level is exceeded. This can be adjusted with, **Standard Adj. 3, Replay Award** (Default = **CREDIT**). With the **Autopercentage Feature**, if the actual replay percentage is higher or lower than that desired, the game will automatically adjust for the new recommended percentage score(s). You may choose to make a different "score-to-beat" adjustment; this is done by utilizing **Standard Adj. 4, Replay Levels**. For more details with **Adjustments**, see *Section 3, Chapter 4, GO TO ADJUSTMENTS MENU*; also, see *Section 3, Chapter 5, GO TO INSTALLS MENU* (via the **UTILITIES MENU**) for further customization of your Pinball Game.



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Sec. 2: Game Op.

## Instruction Card

Below is a **COPY** of the Game Instruction Card (SPI Number: **755-5198-12-Y English Front / Spanish Back**). For a replacement *Game Instruction Card* simply **COPY** this page and *cut out* the card as a temporary replacement until a *new card is ordered through your distributor*; or download from our website, [www.sternpinball.com](http://www.sternpinball.com), and click on the pinball game desired or click the the *Game Archive link*. Multiple language *Instruction Cards* are included with the PDF.



**COPY & CUT**

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Traducción de: Language Exchange, Inc. www.langx.com

**ENIGMA**

Dispara a los participantes (Objetos Verticales Iluminados) para obtener las letras del Enigma y gana lo que marca la rueda, multiplicado por la cantidad de letras obtenidas. Dispara a la Trampa de Bola cuando este iluminada para comprar una vocal. Dispara a la Rueda en cualquier momento para hacerla girar (y cambiar los premios disponibles). Cuando se hayan obtenido letras suficientes, se encenderá "SOLVE PUZZLE".

**(RESOLVER ENIGMA).** Mira las Pantallas de Puntos para obtener pistas y letras.

Derriba los 9 Objetos Verticales Verdes en el campo de juego para detrear **M-U-L-T-I-B-A-L-L**. Cuando todos los objetivos **M-U-L-T-I-B-A-L-L** estén encendidos, dispara a la Trampa de Bola para iniciar **MULTIBALL**.

Detorea **B-O-N-U-S** disparándole a los 5 Tiros de Premio para encender "BONUS".

>> **B** Orbita Izquierda / **O** Rampa Izq. / **N** Rampa Central / **U** Calle de Objetos Derribables en Línea / **S** Orbita Der. <<

Dispara a la Trampa de Bola para obtener el **BONUS** y comenzar con el "1" de los 7 Modos de la Rueda del Bono.

Dispara al 1º Objetivo Derribable en Línea para encender **FREE SPIN** en las Calles de Salida.

Dispara el 2º Objetivo Derribable en Línea para encender **BIG MONEY** en los Hoyos de Salida.

Centrales entre los flippers. Cuando la Rueda parpadea, girará por ¡Grandes Puntos!

Dispara al 3º Objetivo Derribable en Línea para encender **WILD CARD**. Dispara a la Calle de Comodines para ganar el Comodin de Premio. Los Golpes en el Rebotador aumentan el valor de la calle.

**WILD CARD** Dispara a la 3ª Orbita Izquierda / 3ª Orbita Derecha para encender **WILD CARD**. Dispara a la Calle de Comodines para ganar el Comodin de Premio. Los Golpes en el Rebotador aumentan el valor de la calle.

**EXTRA BALL** Extra Ball se puede encender desde la Rueda, Calle de Comodines y Tiros a la Rampa.

Dispara a la Trampa de Bola cuando este iluminada para ganar una Bola Extra.

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**WHEEL OF FORTUNE**

**PUZZLE** Shoot contestants (*lit Stand-Up Targets*) to collect letters on the **Puzzle Board** and win whatever the *Wheel* is pointing at, multiplied by the number of letters collected. Shoot the **Ball Lock** when lit, to buy a vowel. Shoot the *Wheel* anytime to spin it (*thus changing the available awards*). **SOLVE PUZZLE** will light up at the **Ball Lock** when enough letters have been collected. **Watch both Dot Displays for hints and letters.**

**MULTIBALL** Hit all 9 *Green Stand-Up Targets* around the playfield to spell **M-U-L-T-I-B-A-L-L**. Shoot the **Ball Lock** to start **MULTIBALL** when all of the **M-U-L-T-I-B-A-L-L** Targets are lit.

**BONUS WHEEL** Spell **B-O-N-U-S** by shooting the 5 *Bonus Shots* to light **BONUS**. >> **B** Left Orbit / **O** Left Ramp / **N** Center Ramp / **U** In-line Drop Target Lane / **S** Right Orbit << Shoot the **Ball Lock** to collect the **BONUS** and start 1 of 7 *Bonus Wheel Modes*.

**FREE SPIN** Shoot the 1st *In-Line Drop Target* to light **FREE SPIN** at the *Outlanes*.

**BIG MONEY** Shoot the 2nd *In-Line Drop Target* to light **BIG MONEY** at the *Center Drains* between the flippers. When flashing, the *Wheel* will spin for *Big Points!*

**WILD CARD** Shoot the 3rd *In-Line Drop Target* to light **WILD CARD**. Shoot the *Wild Card Lane* to collect the *Wild Card Award*. *Pop Bumper Hits* increase value of lane.

**EXTRA BALL** *Extra Ball* can be lit from the *Wheel*, *Wild Card Lane* and *Ramp Shots*. Shoot the **Ball Lock** to collect *Extra Ball* when lit.

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**FOLD HERE**





**Chapter 1, Service Menu Introduction .....8 – 12**

- ▶ Table of Contents for Section 3.....7
- ▶ **Service Switch X4 Set Acces & Use** .....8
  - ▷ Function 1: SERVICE CREDITS MENU ▷ Function 2: VOLUME MENU ▷ Function 3: SERVICE MENU
- ▶ **Service Menu Introduction** .....9
  - ▷ How to Use This Section
- ▶ **Wheel of Fortune Pinball Service Menu Icon Tree** .....10-11
- ▶ **Exit Service Menu**.....12
  - ▷ Problem / Solution Table

**Chapter 2, GO TO DIAGNOSTICS MENU .....13 – 20**

- ▶ **Go To Switch Menu** .....14
  - ▷ Switch Test ▷ Active Switch Test ▷ Switch Alerts
- ▶ **Go To Coil Menu** .....15
  - ▷ Single Coil Test ▷ Cycling Coil Test
- ▶ **Go To Flash Lamps Menu** .....15
  - ▷ Single Flash Lamp Test ▷ Cycling Flash Lamp Test
- ▶ **Go To Lamp Menu** .....16
  - ▷ Single Lamp Test ▷ All Lamps Test ▷ Row Lamps Test ▷ Column Lamps Test ▷ Ordered Lamps Test
- ▶ **Wheel of Fortune Tests** .....17
  - ▷ Wheel Motor Test ▷ Wheel L.E.D. Tests (One & All) ▷ Auxiliary Dot Display Test
- ▶ **Ball Trough Test** .....17
- ▶ **Technician Alerts**.....18
- ▶ **Knocker Test ▶ Sound / Speaker Test ▶ Begin Burn-In** .....19
- ▶ **Dot Matrix Test**.....20

**Chapter 3, GO TO AUDITS MENU .....21 – 24**

- ▶ **Earnings Audits [ #1 – #13 Definitions ]**.....21
- ▶ **Standard Audits [ #1 – #59 Definitions ]**.....22-23
- ▶ **Feature Audits [ #1 – #107 ]**.....24
- ▶ **Tournament Audits [ #1 – #14 ] subject to change** .....24
- ▶ **Dump Audits to USB** .....24

**Chapter 4, GO TO ADJUSTMENTS MENU .....25 – 34**

- ▶ **Standard Adjustments [ #1 – #63 ]**.....25-32
- ▶ **Feature Adjustments [ #1 – #26 ]** .....32-34

**Chapter 5, GO TO UTILITIES MENU .....35 – 38**

- ▶ **Go To Installs Menu**.....35-36
  - ▷ Install Extra Easy ▷ Install Easy ▷ Install Medium ▷ Install Hard ▷ Install Extra Hard ▷ Install 3-Ball ▷ Install 5-Ball
  - ▷ Install Competition ▷ Install Directors Cut ▷ Install Home Play ▷ Install Novelty ▷ Install Add-A-Ball ▷ Install Factory
- ▶ **Enter Custom Message**.....37
- ▶ **Set Custom Pricing** .....37
- ▶ **Set Date / Time**.....38
- ▶ **Go To Resets Menu** .....38
  - ▷ Reset Coin Audits ▷ Reset Game Audits ▷ Reset Grand Champion (Score) ▷ Reset High Scores ▷ Reset Credits
  - ▷ Reset Factory Settings
- ▶ **Go To USB Menu** .....38
  - ▷ Dump to USB Memory Stick ▷ Update Game Code ▷ Backup to USB Memory Stick

**Chapter 6, GO TO TOURNAMENT MENU .....39 – 40**

- ▶ **Start Tournament / Stop Tournament** .....39-40
- ▶ **View Tournament Data ▶ Tournament Audits [ #1 – #14 ] ▶ Sign Messages A-B** .....40

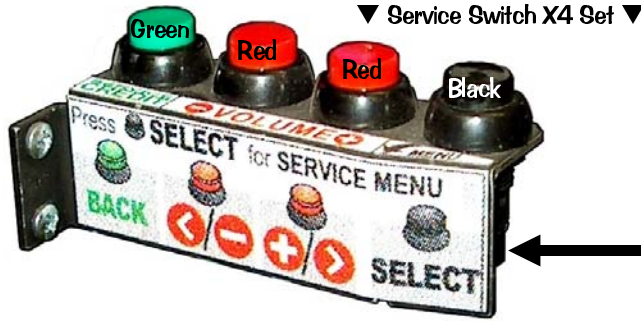
Sec. 3: ...Menu Intro.

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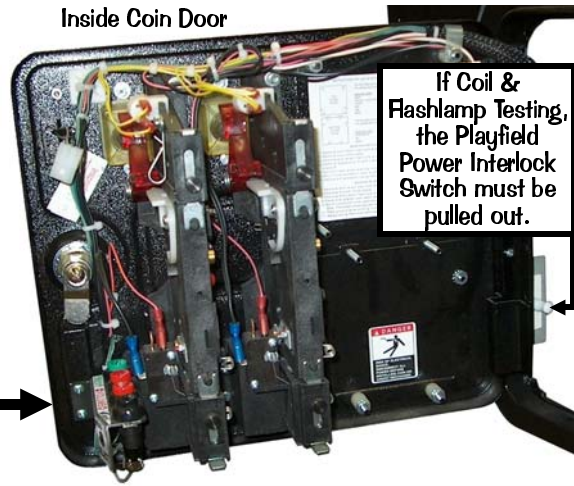


# Service Switch X4 Set Access & Use

The 4-Button Service Switch Set provides access for **three (3) functions** available for your use: 1: **SERVICE CREDIT**, 2: **VOLUME [-] / [+]** and 3: **SERVICE MENU**.



Inside Coin Door



If Coil & Flashlamp Testing, the Playfield Power Interlock Switch must be pulled out.

To access any of these **three (3) functions** you must first open the **Coin Door** (see pictorial above) with the Game in the **Attract Mode** (not already in any Function or Menu stated below) and then follow below.

Pushing the **GREEN** BUTTON first.



## ◀ Function 1: SERVICE CREDITS MENU

Pushing the **Green [ SERVICE CREDIT ] Button** first, adds a **Service Credit** per push (will not affect your audits as "paid" credits). This is useful for the technician to test games in regular play without affecting the game audits. Each depression adds **1 credit**; up to **50 credits** can be applied. **Standard Adjustment 23, Credit Limit**, determines this, however, it can be changed from 04-50; for details see Chapter 4 of this Section 3.

**Note:** Once your credits are added, this menu will **automatically exit** a few seconds after the last button depression or when the **Green [ BACK ]** or **Black [ SELECT ] Button** is pushed. This function is disabled if **Standard Adjustment**

**38, Free Play**, is set to **YES**. The Service Credits are limited to the Credit Limit in addition to any paid credits present in the game (e.g. If the Credit Limit is 30, with 8 paid credits present, only 22 Credits can be applied.)

Pushing either **RED** BUTTON first.



Pushing either **RED** BUTTON first.



## ▲ Function 2: VOLUME MENU ▲

Pushing either of the **Red [ VOLUME ] Buttons** first, enters the **VOLUME MENU**. While in this Mode, to **DECREASE** the volume, hold down or depress the **1st Red [ < / - ] Button** until desired the volume is achieved; to **INCREASE** the volume, hold down or depress the **2nd Red [ + / > ] Button** until the desired volume is achieved.

**Note:** The volume can be set between **0-63**; Once your adjustments are made, this menu will **automatically exit** a few seconds after the last button depression or when the **Green [ BACK ]** or **Black [ SELECT ] Button** is pushed.

Pushing the **BLACK** BUTTON first.



## ◀ Function 3: SERVICE MENU

Pushing the **Black [ SELECT ] Button** first, enters the **SERVICE MENU**. Once in, navigate through all menus by depressing the **Service Menu Buttons**. Use the **Red [ < / - ]** or **[ + / > ] Buttons** to move **LEFT / RIGHT, NEXT/PREVIOUS (audits/adjustments)** or to **INCREASE / DECREASE** an adjustment (setting). Use the **Black [ SELECT ] Button** to select a highlighted **Icon**, move to the next line of text or to answer **"OK"** where applicable. Use the **Green [ BACK ] Button** to exit or escape back.

**Please read** Section 3, Chapters 2-6, for explanation on all **Icons and Menus. Read! Read! Read!**

Sec. 3: ...Menu Intro.



# Service Menu Introduction

**Important:** The **Switch Bracket** holds the **Playfield Power Interlock**. It is located just inside the **Coin Door** frame (see pictorial of the **Coin Door** on the previous page). The **Button Switch** for the **Playfield Power Interlock Switch** must be pulled out for electro-mechanical device testing or diagnostic purposes (this is required). If this button is pushed in, the **Playfield Power** is disabled while the **Coin Door** is **OPEN**.

## How to Use This Section

This section will cover all functions available in the **SERVICE MENU** in a *Step-By-Step* process. This section is divided into **chapters** which coincide with the **MAIN MENU** (will also provide more detailed information). The previous and following pages in this Chapter will instruct the operator on how to move through the Menus. *It's simple, easy and fun to use!*

To get into the **SERVICE MENU MODE** review "**Function 3: SERVICE MENU**" on the previous page. After Power-Up, push down the **Black [ SELECT ] Button** to begin. Looking at the display you will momentarily see "**SERVICE MENU**" followed by the **MAIN MENU**:



Use the **Red [ </- ] / [ + / > ] Buttons** to move the selected **Icon** left or right, and the **Black [ SELECT ] Button** to activate the selected **Icon**.

The **MAIN MENU** now appears with the "DIAG" **Icon** (**GO TO DIAGNOSTICS MENU**) highlighted:



As the operator views the Menu Screen(s), the **MORE MORE** symbols indicates that there are more **Icons** to select in each direction. The **Icon** selected will blink. Pushing the **Black [ SELECT ] Button** will select the **Icon** and the Menu Screen will change to the menu selected. Select the **Green [ BACK ] Button** to move backwards through the menu levels. Press the **Green [ BACK ] Button** repeatedly or select the "**QUIT**" **Icon** to completely exit the **SERVICE MENU** Mode.

View the **SERVICE MENU Icon Tree** on the next pages for a complete overview of all menus used in this system. The "**HELP**" **Icon** provides an explanation of **ICON** usage or any other information in the Menu where the "**HELP**" **Icon** was selected (when available).

**DIAG:** GO TO DIAGNOSTICS MENU | **AUD:** GO TO AUDITS MENU | **ADJ:** GO TO ADJUSTMENTS MENU  
**UTIL:** GO TO UTILITIES MENU (INSTALLS, CUSTOM MSG., CUSTOM PRICING, SET TIME, RESET & USB)  
**TOUR:** GO TO TOURNAMENT MENU (START TOURNAMENT, VIEW TOURNAMENT DATA, SIGN MESSAGES)

**>> TO UPDATE THE GAME CODE, REVIEW THE STEPS ON THE INSIDE FRONT COVER OF THIS MANUAL.**

Use both the manual and the display to help customize, troubleshoot and/or diagnose faults, if any.

# Wheel of Fortune™ Pinball Service Menu Icon Tree

## Sec. 3: ...Menu Intro.

**50V / 20V DISABLED**  
 CLOSE COIN DOOR  
 OR FULL INTERLOCK SWITCH  
 TO RESTORE POWER

\*WHEN ENTERING THE NOTED MENUS, YOU MUST  
 PULL OUT THE POWER INTERLOCK SWITCH FOR  
 OPERATION WITH THE COIN DOOR OPEN.

**MAIN MENU**

- GO TO DIAGNOSTICS MENU **DIAG**
- GO TO ADJUSTMENTS MENU **ADJ**
- GO TO UTILITIES MENU **UTIL**
- GO TO TOUR-NAMING MENU **TOUR**
- EXIT SERVICE MENU **QUIT**

These **non-selectable icons** appear in the selected **Menu** only when there are **MORE** icons to the **LEFT** or to the **RIGHT** available for selection.

**EXIT THE SERVICE MENU BY SELECTING THIS ICON IN ANY MENU AND RETURN TO THE ATTRACT MODE.**

**AUDITS MENU**

- EARNINGS STANDARD AUDITS **EMR**
- 5.P.I. FEATURE AUDITS **S.P.I.**
- WOF FEATURE AUDITS **WOF**
- TOUR-NAMING AUDITS **AUD**
- DUMP AUDITS TO USB **DUMP**

**ADJUSTMENTS MENU**

- STANDARD FEATURE ADJUSTMENTS **S.P.I.**
- WOF FEATURE ADJUSTMENTS **WOF**

**UTILITIES MENU**

- CONTINUED NEXT PAGE

**TOURNAMENT MENU**

- START TOUR-NAMING **\$START**
- STOP TOUR-NAMING **\$STOP**
- VIEW TOUR-NAMING DATA **DATA**
- TOUR-NAMING AUDITS **AUD**
- SIGN MESSAGES A-B **TEXT**

**DIAGNOSTICS MENU**

- GO TO SWITCH MENU **S-W**
- GO TO COIL MENU **COIL**
- GO TO FLASH LAMPS MENU **FLASH**
- GO TO LAMP MENU **LAMP**
- WOF **WOF** *WHEEL OF FORTUNE TESTS*
- BALL TROUGH TEST **CLR**
- TECHNICIAN ALERTS **TECH**
- KNOCKER TEST **KNOCK**
- SOUND/SPEAKER TEST **SPEAK**
- BEGIN BURN-IN **BURN**
- DOT MATRIX TEST **DOT**

**WOF TESTS MENU**

- WHEEL MOTOR TEST **TEST**
- WHEEL L.E.D. TESTS **LED**
- AUX. DISPLAY TEST **DOT**

**L.E.D. TESTS**

- SINGLE WHEEL L.E.D. TEST **ONE**
- ALL WHEEL L.E.D. TEST **ALL**

**SWITCH MENU**

- SWITCH TEST **TEST**
- ACTIVE SWITCH TEST **ACT**
- SWITCH ALERTS **ALRT**

**COIL MENU**

- SINGLE COIL TEST **TEST**
- CYCLING COIL TEST **CYC**

**FLASH LAMPS MENU**

- SINGLE FLASH LAMP TEST **TEST**
- CYCLING FLASH LAMP TEST **CYC**

**LAMP MENU**

- SINGLE LAMP TEST **ONE**
- ALL LAMPS TEST **ALL**
- ROW LAMPS TEST **ROW**
- COLUMN LAMPS TEST **COL**
- ORDERED LAMPS TEST **ORD**

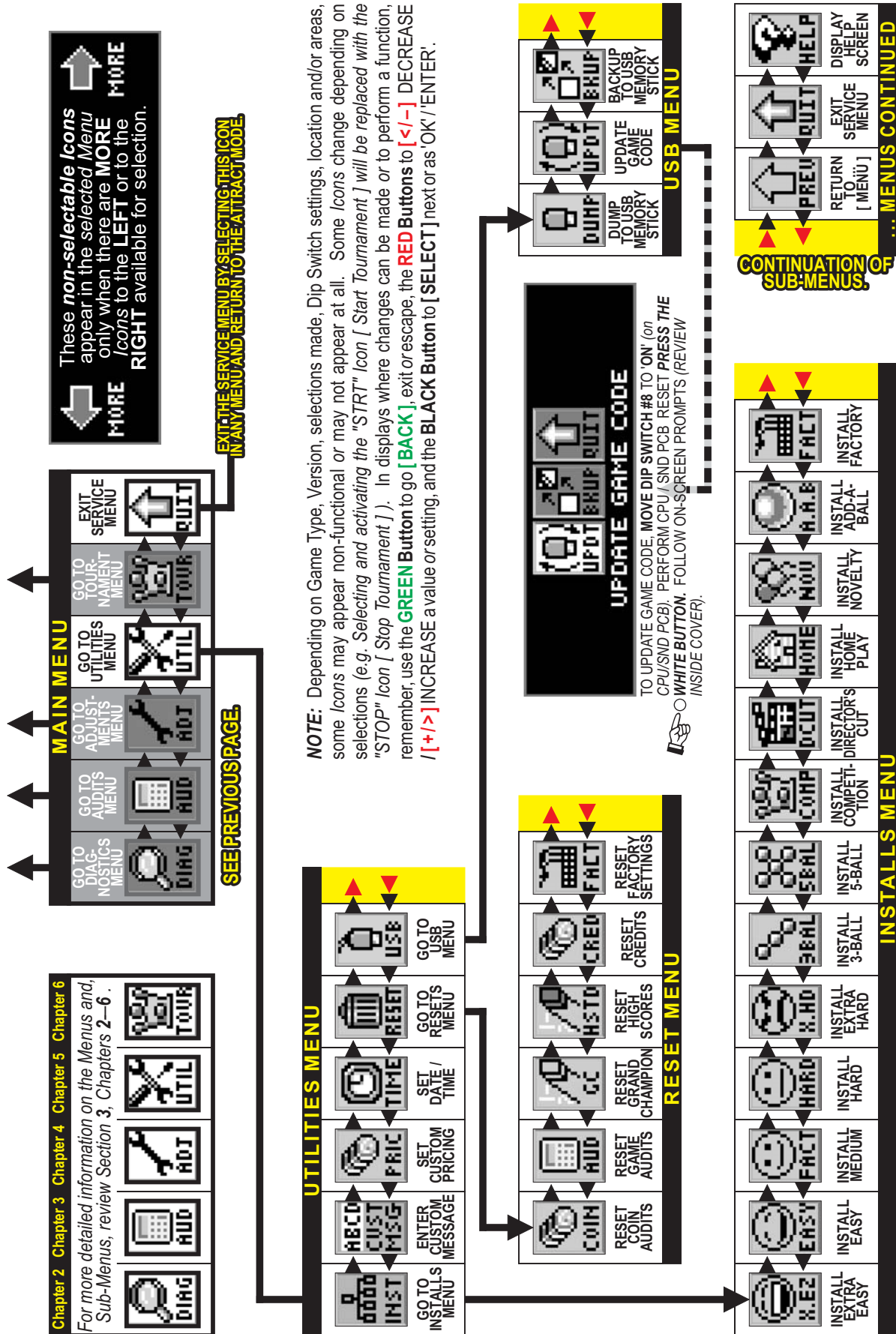
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 ... MENU CONT.

CONTINUATION OF SUB-MENUS





# Wheel of Fortune™ Pinball Service Menu Icon Tree Continued



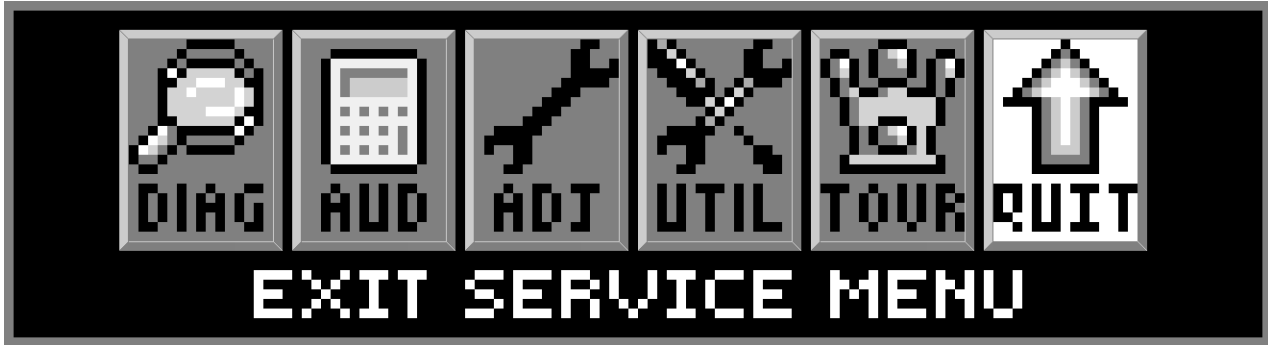
**NOTE:** Depending on Game Type, Version, selections made, Dip Switch settings, location and/or areas, some Icons may appear non-functional or may not appear at all. Some Icons change depending on selections (e.g. Selecting and activating the "STRT" Icon [ Start Tournament ] will be replaced with the "STOP" Icon [ Stop Tournament ] ). In displays where changes can be made or to perform a function, remember, use the **GREEN Button** to go [BACK], exit or escape, the **RED Buttons** to [ < / - ] DECREASE [ + / > ] INCREASE a value or setting, and the **BLACK Button** to [ SELECT ] next or as 'OK' / 'ENTER'.

**Note:** Press [ SELECT ] to Install; Press [ BACK ] to cancel. After selection of any of the Install Icons, the request is installed and returns to the Install Menu. The last icon activated before exiting this menu will supersede any previous icon selected in the group.



# Exit Service Menu

In the **MAIN MENU** and in all **SUB-MENUS** (where the "QUIT" Icon is present), if the "QUIT" Icon is selected and *activated*, or the **Green [BACK] Button** is selected repeatedly (depending on which sub-menu you're in...), the **SERVICE MENU Session** will be exited and returned to the **Attract Mode**.



Turning the game on/off will start the *Power-Up Routine*. Upon **Power-Up**, the **DISPLAY** will indicate the **COUNTRY, FILE VERSION** and **LANGUAGE(S)** installed. **LANGUAGE/COUNTRY**: change via Dip Switch.



The below **Problem / Solution Table** was designed to answer some common problems frequently asked.

## Problem / Solution Table

Sec. 3: ...Menu Intro.

| PROBLEM  | SOLUTION  |
|--|---|
| Will not enter the <b>SERVICE MENU</b> after depressing the <b>Black [SELECT] Button</b> .                               | <ul style="list-style-type: none"> <li>• Check the Service Switches [ <b>GREEN, RED (x2) &amp; BLACK Buttons</b> ] for loose connections or bad ground.</li> <li>• Check the associated wiring harness to/from the CPU/Sound Board, Connector <b>J13</b>.</li> <li>• Check CPU/Sound Board for possible failure.</li> </ul>   |
| All <b>Service Buttons</b> [ <b>••••</b> Buttons ] appear nonfunctional.   | <ul style="list-style-type: none"> <li>• Check the Service Switches wiring harness for poor or no connection and/or broken wires.</li> </ul>  |
| The <b>Green Button</b> in the Attract Mode will not enter the <b>SERVICE CREDITS MENU</b> to add Service Credits.       | <ul style="list-style-type: none"> <li>• Check to make sure the Game is not in "<b>Free Play</b>." <i>If the game is set to Free Play, adding Service Credits is not required.</i></li> <li>• Check the Service Switches wiring harness for poor or no connection and/or broken wires.</li> </ul>   |
| The <b>Display</b> "blanks out."   | <ul style="list-style-type: none"> <li>• Check the Dot Matrix Display for loose wiring harness for poor or no connection and/or broken wires.</li> <li>• Check <b>F1 (3/4A Fuse)</b> on the Display Power Supply Board. Refer to Section 5, <b>SCHEMATICS &amp; TROUBLESHOOTING</b>.</li> </ul>   |
| Icons "scroll" along continuously in the <b>MAIN MENU</b> .  | <ul style="list-style-type: none"> <li>• Check for a stuck switch on either of the <b>Red Buttons</b>.</li> </ul>   |
| The <b>Start</b> and <b>Flipper Buttons</b> do not select or activate <b>Icons</b> in the <b>SWITCH TEST MENU</b> .      | <ul style="list-style-type: none"> <li>• This is normal. These switches are deactivated, as they are a part of the Switch Test. Refer to Section 3, Chapter 2, <b>GO TO DIAGNOSTICS MENU, Switch Test</b>.</li> </ul>   |
| Can't move selection of <b>Icon</b> with the <b>Left</b> and/or <b>Right Flipper Buttons</b> .                           | <ul style="list-style-type: none"> <li>• Check the <b>Flipper Buttons</b> for loose connections or bad Ground and refer to Section 5, Chapter 2, <b>Playfield Wiring, #-Flipper Circuit Wiring Diagram</b>.</li> <li>• This is normal <b>only</b> in <b>Diagnostic's Switch &amp; Active Switch Tests</b> (see previous Problem).</li> </ul>  |
| Some <b>Icons</b> appear non-functional in the <b>MENU</b> or missing.   | <ul style="list-style-type: none"> <li>• Some functionality of the Service Menu may not have been completed during development. If exists, it should only be a non-critical function, such as the "HELP" <b>Icon</b>, which will explain the usage of icons. When completed, a software update will correct the problem. Software updates are announced via Service Bulletins (if critical) and on our website <a href="http://www.sternpinball.com/GAME-code.shtml">http://www.sternpinball.com/GAME-code.shtml</a>; view the Game Code Library Message Board Marquee or click <b>Previous Messages</b> for past announcements.</li> </ul> |
| In <b>COIL TEST MENU</b> , the coils and flashlamps <b>do not</b> fire after pressing the <b>Black [SELECT] Button</b> . | <ul style="list-style-type: none"> <li>• Ensure the <b>POWER INTERLOCK SWITCH is pulled out</b> (see the start of this Chapter).</li> </ul>   |
| In the <b>SERVICE MENU</b> , the volume cannot be adjusted with either of the <b>Red Buttons</b> .                       | <ul style="list-style-type: none"> <li>• The Volume adjustment can only be made when in the <b>Attract Mode</b> (see the start of this Chapter).</li> </ul>   |
| In the <b>SERVICE MENU</b> , the display seems to lock up, or the Help Display appears to be non-functional.             | <ul style="list-style-type: none"> <li>• If you cannot clear the situation by exiting back one Menu, exit completely out of the <b>SERVICE MENU</b>, and re-enter. If the problem persists, call Technical Support for additional help.</li> </ul>  |

**IF YOU NOTE ANY OTHER PROBLEMS or HAVE ANY SYMPTOMS NOT DESCRIBED ABOVE, PLEASE CALL TECHNICAL SUPPORT 800-542-5377 (708-345-7700 OPTION #1), SO WE MAY ASSIST YOU.**







To initiate, from the **MAIN MENU**, select the "DIAG" *Icon*. The **DIAGNOSTICS MENU** provides tests for switches, coils, flash lamps, lamps, sounds and dots in the Dot Matrix Display. Each feature may be tested manually or automatically after entering the **SERVICE MENU** (see Section 3, Chapter 1, Service Menu Introduction). The [ **CYCLING COIL TEST** ] / [ **FLASH LAMP TEST** ] may be used for a quick verification of automatic test functions. The [ **SWITCH TEST** ] / [ **SINGLE COIL TEST** ] / [ **SINGLE LAMP TEST** ] / [ **ALL LAMPS TEST** ] / [ **ROW LAMPS TEST** ] / [ **COLUMN LAMPS TEST** ] / [ **FLASH LAMP TEST** ] may be used for troubleshooting.

All **DIAGNOSTICS MENU** *Icons* and there usages are explained throughout this chapter in the same order as seen in the Dot Matrix Display. **NOTE:** Depending on Game Type, Version, selections made, Dip Switch settings, location and/or areas, some *Icons* may appear non-functional or may not appear at all. Some *Icons* change depending on selections (e.g. Selecting and activating the "STRT" *Icon* [ Start Tournament ] will be replaced with the "STOP" *Icon* [ Stop Tournament ] ). **Icons and/or functions, order and operation are subject to change.**

In displays where changes can be made or to perform a function, use the **GREEN Button** to go [ **BACK** ], exit or escape, the **RED Buttons** to [ **</-** ] MOVE BACK / LEFT / DECREASE / [ **+/>** ] MOVE FORWARD / RIGHT / INCREASE a value or setting, and the **BLACK Button** to [ **SELECT** ] next or as "OK / ENTER / ENERGIZE."

**Important:** Upon **Power-Up** (Game CPU Reset) or opening the **Coin Door** watch the **Display** for any **Alerts**.\*



This **audible / visual alert display** is shown when the **50V / 20V Power** is disabled (by opening the **Coin Door**). **PULL OUT THE INTERLOCK SWITCH ONLY WHILE IN THE SERVICE MENU FOR COIL OR SWITCH TESTING & BURN-IN WHEN THE COIN DOOR IS REQUIRED TO STAY OPEN FOR SERVICE BUTTON USE!** Pulling out the Power Interlock Switch or

pressing the 'escape' **Green [ BACK ] Button** will remove the alert display. Initial display presentation is accompanied by 3 audible tones (the bright display warning will go dim after approximately 30 seconds).



This **alert display** is shown momentarily during **Game Mode** or **Power-Up** to alert the operator of a device malfunction (device or mechanism doesn't energize or is energized repeatedly).

**OPERATOR ALERT!** works by monitoring any *switch activated device* that has the potential to trap a ball when disabled (e.g. in the Shooter Lane, Scoop or Eject Holes, etc.). This alert can

also appear if a switch associated with a device (e.g. Ball Trough, Auto Plunger, etc.) is stuck closed (caused by a switch jam or stuck ball); the game will activate the device a predetermined number of times and if the problem is still detected, this device or switch will be noted in **Switch Alerts** (next page) and/or **Technician Alerts** (Page 18).



Upon entering the **SERVICE MENU**, if an asterisk " \* " is displayed after the words "SERVICE MENU," the game has detected possible faulty devices, switches and/or missing pinballs. Press the either of the **Red Buttons** (short-cut to the **TECHNICIAN ALERTS MENU**) or continue into the **SERVICE MENU** (press the **Black Button** again), select the "DIAG" *Icon* and "TECH" *Icon* for the **Technician Alerts** information (Page 18).



**CAUTION!** Remove all pinballs from the Ball Trough prior to lifting the playfield to it's full upright position for servicing. **PULL OUT** the **Power Interlock Switch** for operation. To eject pinballs, select the "DIAG" *Icon* from the **MAIN MENU** to enter the **DIAGNOSTICS MENU**. Select the "CLR" *Icon* to enter the **BALL TROUGH TEST MENU**. Press the **Black [ SELECT ] Button**. To return to the **DIAGNOSTICS MENU**, press the **Green [ BACK ] Button**. This feature also useful to retrieve a pinball for game testing in **Switch** or **Coil Tests**.



## Go To Switch Menu

To initiate, from the **DIAGNOSTICS MENU**, select the "SW" *Icon*. Switches are configured in an 4 X 16 Matrix of Rows [ Switch Drives ] and Columns [ Sw. Returns ] with up to **64** possible switches. Dedicated Switches are configured in a 2 X 16 Matrix of Rows [ Dedicated Sw. Drives / Ground ] and Column [ Ded. Switch Returns ] with up to **32** possible dedicated switches (*includes the 8 dip switch positions*). The **SWITCH TEST MENU** consists of three (3) parts: **Switch & Active Switch Tests** and **Switch Alerts** to test *all* switches.

**Reminder:** The **Flipper & Start Buttons** (part of Switch Tests) are temporarily disabled as **Service Menu Navigation Buttons** during these test(s) so they can be tested and shown on-screen. Pressing the **Green [ BACK ] Button** (Dedicated Switch D-21), Light Green-Black / Black (GND), will exit **Switch Test** or **Active Switch Test**.



## Switch Test

To initiate, from the **SWITCH MENU**, select the "TEST" *Icon*. Ensure the **Power Interlock Switch** is pulled out if testing with the Coin Door open and the activation of coils is required. Upon entering **Switch Test**, you will notice that some switches are already indicated as closed. In the examples, the 4-Ball Trough Switches **#18, #19, #20 & #21** are shown closed (*pinballs at rest in the ball trough*), along with the Flipper E.O.S. Dedicated Switches **D-10 & D-12** (End-of-Stroke Switches are 'normally closed'). If the game has more flippers with E.O.S. Dedicated Switches, CPU Dip Switch Setting *other than 1-8 OFF* or switches stuck closed, more dots will be indicated (*enter Active Switch Test to reveal the names*).

In **Switch Test**, close each switch and observe the display (*switch closure is accompanied by a short audible tone*). In the example, the **Black [ SELECT ] Button** Dedicated Switch **D-24** is pressed. The Dot Matrix Display will light up (*highlight*) the corresponding dot in the on-screen matrix, display the *switch name, switch number and the Switch Drive / Return wire colors*. When not closing a switch, the display indicates **NONE** and the last switch number closure. For the Switch Matrix Grid and Dedicated Switch Grid, see **Find-It-In-Front: Dr. Pinball, DR. 4** or escape out of this test and enter **Active Switch Test** (*described below*) to view the names of the switches closed. **Note:** Pressing the **Green [ BACK ] Button** (Ded. Switch D-21), Lt. Green-Black / Black (GND), will exit the **Switch Test**.

**CAUTION! COIL MECHANISMS WHEN ACTIVATED HAVE FAST MOVING PARTS!** While performing **Switch Test** with the Coin Door closed *or* open (*with the Power Interlock Switch is pulled out*), **DO NOT USE YOUR FINGER** to test switches which are associated with a coil mechanism such as a Vertical Up-Kicker (*hole with a switch*), Slingshots, Bumpers, etc..



## Active Switch Test

To initiate, from the **SWITCH MENU**, select the "ACT" *Icon*. In **Active Switch Test**, if any switches are stuck closed (*or normally closed from the presence of pinball(s) as in the Ball Trough*), the display will flash the corresponding dot(s) in the on-screen matrix, display the *name and the Switch Drive / Return wire colors*. If more than one switch is closed, the switch information will change with each switch. This cycle continues until all switches are cleared *or* until **Active Switch Test** is exited. In the example, the **Black [ SELECT ] Button** Dedicated Switch **D-24** is pressed and held down. The display will cycle and flash each dot, naming each switch which is closed. To determine the *switch number*, compare the highlighted dot to the same position in the Switch Matrix Grid, see **Find-It- In- Front: Dr. Pinball, DR. 4**.



## Switch Alerts

To initiate, from the **SWITCH MENU**, select the "ALRT" *Icon*. In **Switch Alerts Menu**, possible inoperable switches are marked with an "X" (**OUT OF SERVICE**). Mark switches **IN** *or* **OUT OF SERVICE** by pressing the **Black Button** while the intended switch is highlighted and change with either of the **Red Buttons**. Switches which are determined as "OUT OF SERVICE" by the game *or* manually, will be automatically marked as "IN SERVICE" as soon as the game determines a valid switch closure (*after adjusting, fixing or replacing the switch, then testing/actuating the switch*). **Note:** A **Factory Reset** will also put the switch back "IN SERVICE" in which the game will need to redetermine if the switch should be marked **OUT OF SERVICE**.

Upon entering **Switch Test**, you will notice that some switches are already indicated as 'closed'. ▼



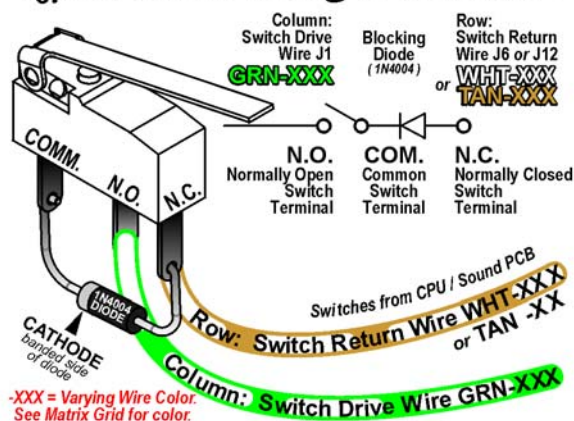
D-24 position is highlighted and accompanied by a short audible tone when pressed. ▼



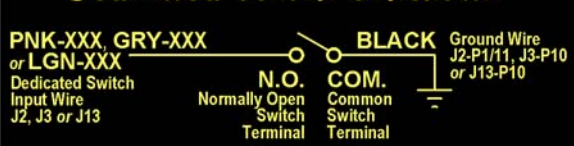
After pressing the switch (*to make it close*), the display will indicate the last switch number. ▼



## Typical Switch Wiring & Schematic



## Dedicated Switch Schematic



... D-24 is held down. The display will cycle and flash each dot, naming each switch ... closed. ▼







## Go To Coil Menu

To initiate, from the **DIAGNOSTICS MENU**, select the "COIL" *Icon*. Coils **#01 – #16** are typically High Current Coils (*although Low Current Coils may be used in these positions & will be noted*). Coils **#17 – #32** are typically Low Current Coils. Flash Lamps are typically used in positions **#25 – #32** (*although Flash Lamps may be used in any position and will be noted*). Auxiliary Coils may be used in positions **#33 – #35**.

Remember, use the **GREEN Button** to go [ **BACK** ], exit or escape, the **RED Buttons** to [ **</-** ] GO BACK [ **+ / >** ] GO FORWARD, and the **BLACK Button** to [ **SELECT** ] ENERGIZE the coil (*solenoid*) or flash lamp.



## Single Coil Test

To initiate, from the **COIL MENU**, select the "TEST" *Icon*. Ensure the **Power Interlock Switch** is pulled out if testing with the Coin Door open. Upon entering

**Single Coil Test**, you will notice the #1 coil is shown. The Dot Matrix Display will indicate the *coil or flash lamp name, coil (solenoid) or flash lamp number and the Coil or Flash Lamp Power Line / Drive Transistor Control Line wire colors*. To determine the "Pin-Outs" from the I/O Power Driver Board, the Coil Voltage Gauge-Turns (*e.g. 23-800*) or lamp type (*e.g. #89 or #906 Bulb*), view the Coils Detailed Chart Table, see **Find-It-In-Front: Dr. Pinball, DR. ③** or for more on troubleshooting and diagnosing, see Section 5.

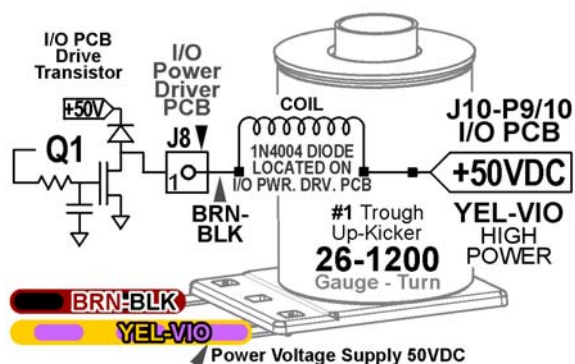


## Cycling Coil Test

To initiate, from the **COIL MENU**, select the "CYC" *Icon*. Ensure the **Power Interlock Switch** is pulled out if testing with the Coin Door open. The test pulses each regular coil or flash lamp sequentially (*cycling*) on the Playfield and in the Backbox (*if coils or flash lamps are used*). The Dot Matrix Display indicates the same information you will find in **Single Coil Test**.



## Typical Coil Wiring & Schematic



## Go To Flash Lamps Menu

To initiate, from the **DIAGNOSTICS MENU**, select the "FLASH" *Icon*. The two tests allows the technician to easily spot any burned-out flash lamps and replace them. Unlike **Single Coil Test**, which tests *all* coil (*solenoids*), including flash lamps, **Single** and **Cycling Flash Lamp Tests**, test only the flash lamps used in the game. Flash Lamps are typically used in positions **#25 – #32** (*although Flash Lamps may be used in any position and will be noted*).

Remember, use the **GREEN Button** to go [ **BACK** ], exit or escape, the **RED Buttons** to [ **</-** ] GO BACK / [ **+ / >** ] GO FORWARD, and the **BLACK Button** to [ **SELECT** ] ENERGIZE the flash lamp.



## Single Flash Lamp Test

To initiate, from the **FLASH LAMPS MENU**, select the "TEST" *Icon*. Ensure the **Power Interlock Switch** is pulled out if testing with the Coin Door open. Upon entering **Single Flash Lamp Test**, you will notice the first Flash Lamp is shown. The Dot Matrix Display will indicate the *flash lamp name, flash lamp number and the Flash Lamp Power Line / Drive Transistor Control Line wire colors*. To determine the "Pin-Outs" from the I/O Power Driver Board or lamp type (*e.g. #89 or #906 Bulb*), view the Coils Detailed Chart Table, see **Find-It-In-Front: Dr. Pinball, DR. ③** or for more on troubleshooting and diagnosing, see Section 5.

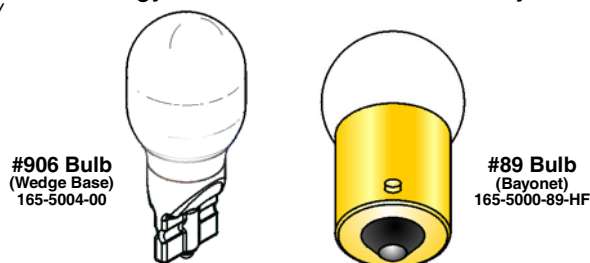


## Cycling Flash Lamp Test

To initiate, from the **FLASH LAMPS MENU**, select the "CYC" *Icon*. Ensure the **Power Interlock Switch** is pulled out if testing with the Coin Door open. The test pulses each flash lamp sequentially (*cycling*) on the Playfield and in the Backbox (*if flash lamps are used*). The Dot Matrix Display indicates the same information you will find in **Single Flash Lamp Test**.



## Bulb Types used for Flash Lamps





## Go To Lamp Menu

To initiate, from the **DIAGNOSTICS MENU**, select the "LAMP" *Icon*. Controlled lamps are configured in and 8 X 10 Matrix of Rows [ Lamp Returns / Ground ] and Columns [ Lamp Drives / 18VDC ] with up to 80 lamps possible. The **LAMP TEST MENU** consists of five (5) parts: **Single Lamp Test**, **Test All Lamps**, **Row Lamps Test**, **Column Lamps Test** and **Ordered Lamps Test\*** to test *all* lamps.

Remember, use the **GREEN Button** to go [ **BACK** ], exit or escape, the **RED Buttons** to [ **</->** ] GO BACK / LEFT / [ **+/>** ] GO FORWARD / RIGHT, and the **BLACK Button** to [ **SELECT** ] next or as "OK / ENTER."

Upon entering **Single Lamp Test**, ... the #1 lamp is shown. .... Display will light up ... the dot ... ▶



### Single Lamp Test

To initiate, from the **LAMP MENU**, select the "ONE" *Icon*. As each lamp is selected, the lamp will light at it's location on the playfield as well as the Dot Matrix

Display. Upon entering **Single Lamp Test**, you will notice the #1 lamp is shown. The Dot Matrix Display will light up (*highlight*) the corresponding *dot* in the on-screen matrix, display the *lamp name*, *lamp number* and the *Lamp Return / Drive wire colors*. For the Lamp Matrix Grid, see **Find-it-in-Front: Dr. Pinball, DR. Ⓞ**, at the beginning section of this Service Game Manual.



Upon entering **All Lamps Test**, ... the Dot Matrix Display is flashing "ALL LAMPS ON" ... ▶



### All Lamps Test

To initiate, from the **LAMP MENU**, select the "ALL" *Icon*. Upon entering **All Lamps Test**, you will notice the Dot Matrix Display is flashing **ALL LAMPS ON** and the

lamps on the playfield will be lit, alternating between the rows in the Lamp Matrix Grid. The Dot Matrix Display will light up (*highlight*) all of the *dots* in the on-screen matrix.



Upon entering **Row Lamps Test**, you will notice the #1 lamp row is shown. ▶



### Row Lamps Test

To initiate, from the **LAMP MENU**, select the "ROW" *Icon*. As each lamp row is selected, the lamps in the row will light on the playfield as well as the Dot Matrix

Display. Upon entering **Row Lamps Test**, you will notice the #1 lamp row is shown. The Dot Matrix Display will light up (*highlight*) the corresponding row of *dots* in the on-screen matrix, display the *lamp row number*, the *Lamp Return wire colors*, the *I/O PCB Connector* and *transistor number*.



Upon entering **Column Lamps Test**, you will notice the #1 lamp column is shown. ▶



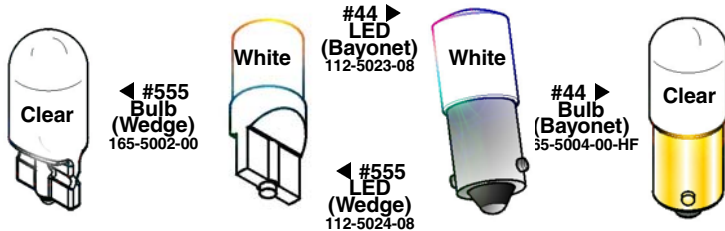
### Column Lamps Test

To initiate, from the **LAMP MENU**, select the "COL" *Icon*. As each lamp column is selected, the lamps in the column will light on the playfield as well as the Dot

Matrix Display. Upon entering **Column Lamps Test**, you will notice the #1 lamp column is shown. The Dot Matrix Display will light up (*highlight*) the corresponding row of *dots* in the on-screen matrix, display the *lamp column number*, the *Lamp Drive (18VDC) wire colors*, the *I/O PCB Connector* and *IC number*.



## Bulb Types used for Control Lamps



\* If not required in this game, *Icon* will not be shown.

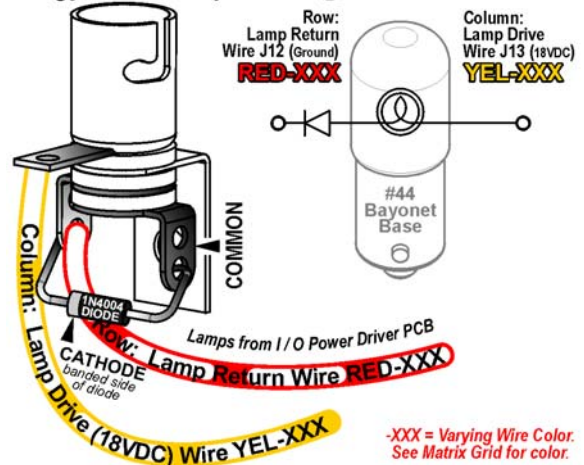


### Ordered Lamps Test

To initiate, from the **LAMP MENU**, select the "ORD" *Icon*. If required, this *Icon* will appear in the **LAMP MENU**.

Identical to **Single Lamp Test**, however, the lamps lit are not in the Lamp Matrix numeric order, but ordered or arranged in separate localized grouping(s) for easier lamp checking.

## Typical Lamp Wiring & Schematic







## Wheel of Fortune Tests

To initiate, from the **DIAGNOSTICS MENU**, select the "WoF" *Icon*. Ensure the **Power Interlock Switch** is pulled out when testing with the Coin Door open. The **GAME TEST MENU** consists of three (3) parts: **Wheel Motor Test**, **Wheel L.E.D. Tests (Single & All Wheel L.E.D. Tests)** and **Auxiliary Display Test**. Follow the on-screen prompts. Menu subject to change. These Menus are provided to allow the technician a simple method of testing game specific coils, switches and PCBs, if required.:



### Wheel Motor Test

To initiate, from the **WoF TEST MENU**, select the "TEST" *Icon*. Ensure the **Power Interlock Switch** is pulled out when testing with the Coin Door open. This test lines up the Wheel Point/Award Amount with the Dot Display & programming. *Coil Transistors Q4 – Q7 are energized in this test in specific pairing which results in a smooth wheel rotation. Switch 47 is the OPTO on the PCB (see Switch Test, Page 14; as you move the wheel, Sw. 47 will light up.)* This alignment test is also done automatically at power-up or wheel usage.



### Wheel L.E.D. Tests (Single Wheel L.E.D. Test & All Wheel L.E.D. Test)

To initiate, from the **WoF TEST MENU**, select the "LED" *Icon*. Ensure the **Power Interlock Switch** is pulled out when testing with the Coin Door open. Select either the "ONE" or "ALL" *Icons*.



Upon entering **Single Wheel L.E.D. Test**, you will notice the first LED is shown along with the LED lit up on the actual Wheel. The Dot Matrix Display will light up (*highlight*) the corresponding '4-square' dots in the on-screen matrix and display its name for reference (*see Single Coil or Flash Lamp Test, #25 FLASH: WHEEL (X4), Page 15, to energize F1–F4*).

Upon entering **All Wheel L.E.D. Test**, you will notice all of the LEDs will blink on and off along with the LEDs on the actual Wheel. For troubleshooting, wiring & schematics, review Section 5, Chapter 4, PCBs, Pages 132–135.



### Auxiliary Dot Display Test

To initiate, from the **WoF TEST MENU**, select the "DOT TEST" *Icon*. Ensure the **Power Interlock Switch** is pulled out when testing with the Coin Door open. Both the actual Auxiliary Display and the corresponding "Mini-Dot Display" shown on the main Dot Display will cycle through tests to determine all LEDs in each LED block are lighting up correctly. For schematic, review Section 5, Chapter 4, PCBs, Pages 136–137.



## Ball Trough Test

To initiate, from the **DIAGNOSTICS MENU**, select the "CLR" *Icon*. Ensure the **Power Interlock Switch** is pulled out if testing with the Coin Door open. This Menu is provided to allow the technician a simple method of removing the balls from the trough and also, to test functionality of the trough, ensuring proper trough operation. Upon entering **Ball Trough Test**, you will notice that four switches are already indicated as closed. In the example, the 4-Ball Trough Switches #18, #19, #20 & #21 are shown closed (*pinballs at rest in the ball trough*). To return to the **DIAGNOSTICS MENU**, press the **Green [ BACK ] Button**.



Press the **Black [ SELECT ] Button** to eject the ball in the first position Switch #21 (VUK OPTO Trough #1 (R)). Simultaneously, the Dot Matrix Display and the playfield will eject the ball to the Trough Up-Kicker, eject from the Trough Up-Kicker into the Shooter Lane, momentarily closing Switch #23 (*Shooter Lane*), and is ejected onto the playfield where the technician can easily

retrieve the pinball or allow the ball(s) to re-enter the trough to continue **Ball Trough Test**. The Dot Matrix Display indicates Switch #18 (4-Ball Trough #4 (L)) as open as the remaining three (3) pinballs shift over one (1) position to the right. If the technician allows the ejected pinball to reenter the ball trough, the Dot Matrix Display will indicate Switch #18 as closed. **REMINDER:** Switch #22 is the stacking OPTO switch; If more than five (5) pinballs are used, the additional switches will be noted. In this game, **four (4)** pinballs are used and required for proper operation.



**CAUTION!** Continuous use off the above test may overheat the Trough Up-Kicker Coil.



## Technician Alerts

To initiate, from the **DIAGNOSTICS MENU**, select the "TECH" *Icon*. This Menu is provided to show any switch or solenoid problems and/or missing pinballs. If upon entering the **SERVICE MENU** the display indicated an asterisk (\*) and "USE -/+ TO VIEW TECH. ALERTS", alerts are present.



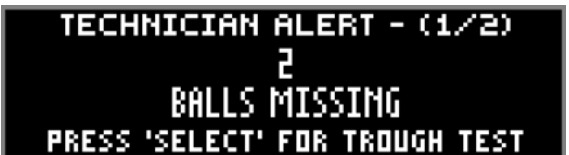
After pressing either **Red [ </- ] / [ + / > ] Button** or selecting this *Icon* in the **DIAGNOSTICS MENU**, the display will indicate the alert(s). If there are 2 alerts present, the display will indicate (1/2) with the 1st alert on the display. Press the **Red [ + / > ] Button** to view the second alert (2/2). The second number in the parenthesis ( ) after the slash (/) indicates how many alerts are

present. Refer to the start of this chapter (*bottom of Page 13*) regarding "Upon entering the **SERVICE MENU \***" indication and to **SWITCH ALERTS** (*Page 14*). To return to the **DIAGNOSTICS MENU**, press the **Green [ BACK ] Button**. **Note:** While in this menu, an option may be present to jump (short-cut) to the appropriate Testing Menu (e.g. *Coil Test, Switch Test, Game Specific Test or Ticket Dispenser Test, if installed*).

**NOTE ON SWITCH DETECTION :** During game play, activation of switches are continuously monitored. For a switch to be determined as inoperable or **OUT OF SERVICE**, up to twenty games or so must be played for a switch to be automatically marked as **OUT OF SERVICE**. In programming, if a switch is determined to be faulty, game play is compensated. Switches noted as **OUT OF SERVICE** are determined to be stuck closed or open depending on switch usage. Free up the switch actuator, adjust or replace, if necessary. Performing a valid switch closure will put the switch back "IN SERVICE."

Determination of switch usage can be checked in **Audits** (*review Sec. 3, Chp. 3, GO TO AUDITS MENU*). Find the associated Audit with the switch in question and check usage; compare the numbers to commonly used switches. After any switch is checked and repaired or replaced, it's suggested to test the switch in the **Switch Test or Single Coil Test** (*reviewed earlier in this chapter, Pages 14-15*) where the associated coil to the switch can be tested as well. After correcting the problem, the switch will marked "IN SERVICE" and the switch is again monitored as specified above. *Only you can determine if a switch marked OUT OF SERVICE is actually inoperable, or if it is just not getting actuated during game play.*

**NOTE ON PINBALL DETECTION :** While in **TECHNICIAN ALERTS MENU**, if the following is displayed, the game has detected one (1) or more pinball(s) missing and has compensated for the lost pinball(s) to provide normal game play.



During game play, a pinball can get trapped or stuck. If after approximately 15 seconds of inactivity or "no scoring," **Ball Search** is started. **Note:** *If the pinball is in the Plunger Lane or "held" on the flipper, no Ball Search will be performed.* The game will perform one **Ball Search** in an attempt to "find" or free-up the pinball.

If the game does not see a switch closure (*indicating the pinball has not been found*), the Dot Matrix Display may indicate [ **LOCATING PINBALLS PLEASE WAIT ...** ], during which **Ball Search** will continue until the timer runs out (*this feature will not happen if the game is in Competition Mode; Ball Search will continue until the pinball is found, unstuck and/or replaced manually*). The display will momentarily acknowledge the missing pinball(s). The game will provide another pinball into play and will compensate for the lost pinball. Game play will appear normal.

**Note:** *This detection and compensation will happen with every pinball, if each suffers the same fate of a ball trap. If all balls get trapped, the game cannot be played or started until the situation is rectified.*

**Important:** *Determine where the pinball is! Do not add pinball(s) until it is determined the pinball(s) are indeed missing and not just stuck. The most common places for a pinball to be stuck is in device holes (ejects and VUKs) or ball troughs. Determine that all devices are functionally properly. Check around plastic pieces and ramps to see if the pinball got jammed or stuck.*

When the found pinball or a replacement pinball is added to the Ball Trough, the **Technican Alert** will immediately clear and will then indicate any remaining alerts (*if present*) or **NO TECHNICIAN ALERTS**.

Enter the **BALL TROUGH TEST** (*review the previous page*) to cycle the pinballs and to check proper switch and coil operation. *If a pinball was added, and the originally stuck pinball has freed itself at a later time, the game will not operate correctly.*

**NOTE ON DEVICE MALFUNCTION :** While in **TECHNICIAN ALERTS MENU**, if the following is displayed, the game has detected a "device malfunction." Check the device indicated (coil and/or switch).





## Knocker Test

To initiate, from the **DIAGNOSTICS MENU**, select the "KNO-CKER" *Icon*. The digitally mastered "Knocker" is sounded. The *knocker sound* is used to alert the player if he/she has received a special, replay or a credit from the Match Award feature. Press the **Black [ SELECT ] Button** to activate the knocker. To return to the **DIAGNOSTICS MENU**, press the **Green [ BACK ] Button**.

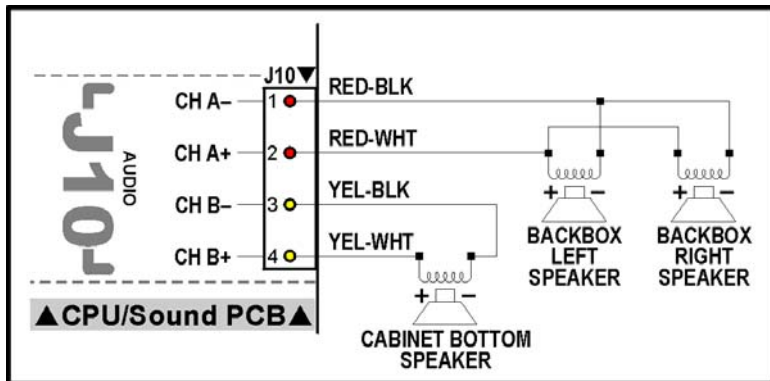
**FACTOID:** *The knocker got it's name from the 'original knocker' (20th century pinball games), which used a coil and when energized (fired), the plunger would strike a wood panel inside the cabinet.*



## Sound / Speaker Test

To initiate, from the **DIAGNOSTICS MENU**, select the "SPKR" *Icon*. This system produces true digital stereo sound from Backbox & Cabinet Speakers or "Mono" on the Cabinet Speaker (*when used by itself*). This Menu is provided to allow the technician a simple method of testing the speakers if rewired or replaced.

Upon entering **Sound / Speaker Test**, you will notice the Dot Matrix Display indicating the first option of *available music and/or sound(s)* in this test. Press the **Red [ + / > ] Button** to cycle through the *available music and/or sounds*, and press the **Black [ SELECT ] Button** to play the option shown in the Dot Matrix Display. Press the **Green [ BACK ] Button** to exit.



## Speaker Phase Testing

Connections to each of speakers are polarized and each must be connected appropriately for the best quality sound. If one speaker has the positive and negative connections reversed with respect to the other one, bass frequencies will not be produced properly and the overall sound quality will be poor. To test for proper speaker phasing, use the **Sound / Speaker Test** to cycle through the available music and sound. If the sound is not balanced or doesn't sound correct, check the speaker wiring.

1. Check each speaker for polarity markings. If the speakers have polarity markings, verify that the Backbox Speaker's **RED-BLK** Wires and the Cabinet Speaker **YEL-BLK** Wire(s) are connected to the negative (-) terminal.
2. Disconnect the speaker output **Connector J10 (AUDIO)** from the CPU / Sound PCB (*in the Backbox*) and connect a 1.5-volt battery across each speaker pair one at a time while observing the speakers.
3. Make sure the positive (+) battery terminal is connected to the positive lead [ J10, Pin-2, **CH A+** ] (**RED-WHT**) or [ J10, Pin-4, **CH B+** ] (**YEL-WHT**) each time. As the connection is made, check speaker cone movement; proper connections are indicated by outward movement.



## Begin Burn-In

To initiate, from the **DIAGNOSTICS MENU**, select the "BURN" *Icon*. After selecting this *Icon*, press the **Black [ SELECT ] Button** to begin (initiate) the **Burn-In Test**. Ensure the **Power Interlock Switch** is pulled out if testing with the Coin Door open (*required for coil function*). Upon entering **Burn-In Test**, the game will exercise all CPU I/O Functions: **Dot Matrix Display Test**, **Coil Cycling Testing**, **All Lamps Test** and **Sound / Speaker Test**. Press the **Green [ BACK ] Button**, to pause and to view the cumulative Burn-In minutes. Press the **Green [ BACK ] Button** again to return to the **DIAGNOSTICS MENU**.

**Note:** *To reset Burn-In minutes back to 0:00, see Section 3, Chapter 5, GO TO RESET MENU (via the UTILITIES MENU), Reset Factory Settings. CAUTION: Performing a FACTORY RESET will reset all other information as well (read Section 3, Chapter 5, GO TO UTILITIES MENU, for more information).*

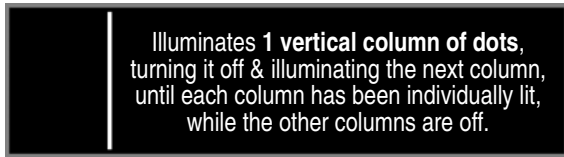




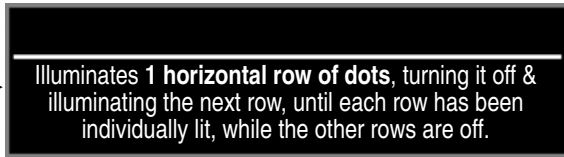
# Dot Matrix Test

To initiate, from the **DIAGNOSTICS MENU**, select the "DOT TEST" *Icon*. After selecting this *Icon* the **Dot Matrix Test** immediately begins. The Dot Matrix Display will immediately and continuously illuminate and cycle each of the **5 Tests for 1 pass each**. To return to the **DIAGNOSTICS MENU**, press the **Green [ BACK ] Button**.

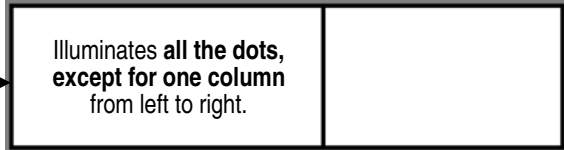
### Test 1



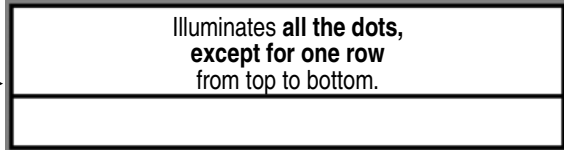
### Test 2



### Test 3



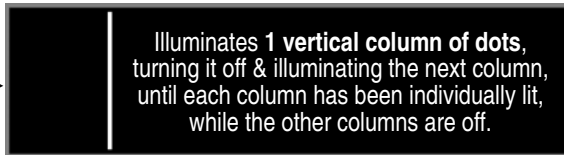
### Test 4



### Test 5



### Test 1



Illuminates all the dots alternating even & odd, in both the *rows and columns*.

Sec. 3: ... Diagnostics





To initiate, from the **MAIN MENU**, select the "AUD" *Icon*. The **AUDITS MENU** provides **179\*** Audits for accounting purposes and for evaluation of *Game Programming*. The Audits are divided into 4 groups: • **Earnings Audits [ #1 – #13 ]**, • **Standard Audits [ #1 – #59 ]**, • **Feature Audits (Programming Use Only) [ #1 – #107 ]** and • **Tournament Audits [ #1 – #14 ]**, "T AUD" *Icon* provided as an alternate access to Tournament Audits (*\*if data is available*). For more information on the **TOURNAMENT MENU**, review **Section 3, Chapter 6, GO TO TOURNAMENT MENU**). Try the "**DUMP AUDITS TO USB**" feature to create a text file of your audits. Don't forget to set the **DATE & TIME** in the **UTILITIES MENU**. See **Sec. 3, Chp. 5, GO TO UTILITIES MENU**, for more information.

Audits which are named **Proprietary** are also for **Future Expansion** or **Programming**. Game code may get upgraded during production; compare all Audits in the Dot Matrix Display with the manual and make any corrections, as necessary. Audits are subject to change (*with or without notice*).

All **AUDITS MENU** *Icons* and their usages are explained throughout this chapter in the same order as seen in the Dot Matrix Display. **NOTE:** Depending on Game Type, Version, selections made, Dip Switch settings, location and/or areas, some *Icons* may appear non-functional or may not appear at all. **Icons and/or functions, order and operation are subject to change.**

In displays where changes can be made or to perform a function, use the **GREEN Button** to go [ **BACK** ], exit or escape, the **RED Buttons** to [ **</-** ] MOVE BACK / LEFT / [ **+ / >** ] MOVE FORWARD / RIGHT to view the next audit in the group, and the **BLACK Button** to [ **SELECT** ] the sub-menus.



### Earnings Audits [ #1 – #13 ]

To initiate, from the **AUDITS MENU**, select the "EARN" *Icon*. The Dot Matrix Display will indicate the *audit number (in this group), audit name and the audit total or value*. The current audit will remain on the display until the next audit is viewed or when this sub-menu is exited.

- #1 **TOTAL PAID CREDITS [ 0 ]**: Total number of *Paid Credits*.
- #2 **FREE GAME PERCENTAGE [ 0% ]**: Percentage value is 'Total Free Plays' (Standard Audit 15) divided by 'Total Plays' (Standard Audit 16).
- #3 **AVERAGE BALL TIME [ 0:00 ]**: In seconds, the average ball time is derived from the total play time divided by Standard Audit 1, Total Balls Played.
- #4 **AVERAGE GAME TIME [ 0:00 ]**: The average game time is expressed in minutes and seconds.
- #5 **COINS THROUGH LEFT SLOT [ 0 ]**: Total 'Left Coin Slot' Dedicated Switch (**D-1**) closures.
- #6 **COINS THROUGH RIGHT SLOT [ 0 ]**: Total 'Right Coin Slot' Dedicated Switch (**D-3**) closures.
- #7 **COINS THROUGH CENTER SLOT [ 0 ]**: Total 'Center Coin Slot' Dedicated Switch (**D-2**) closures.
- #8 **COINS THROUGH FOURTH SLOT**: Total '4th Coin Slot' Dedicated Switch (**D-4**) closures.
- #9 **COINS THROUGH FIFTH SLOT**: Total '5th Coin Slot' Dedicated Switch (**D-5**) closures.
- #10 **TOTAL COINS [ 0 ]**: Total amount of coins registered through all the *Coin Slots*.
- #11 **TOTAL EARNINGS [ USD 0.00 ]**: Total cash value accumulated since the last Factory Reset occurred (review **Section 3, Chapter 5, GO TO RESET MENU** (via the **UTILITIES MENU**), **Reset Coin Audits**).
- #12 **METER CLICKS [ 0 ]**: Total number of money clicks accumulated.  
*Based on the country's lowest coin denomination used for the game credit.*
- #13 **SOFTWARE METER [ 0 ]**: Continuing total of Meter Clicks.  
*This audit cannot be reset; the display shows the constant addition of Meter Clicks.*



## Standard Audits [ #1 – #59 ]

To initiate, from the **AUDITS MENU**, select the "S.P.I." *Icon*. The Dot Matrix Display will indicate the *audit number (in this group)*, *audit name* and the *audit total or value*. The current audit will remain on the display until the next audit is viewed or when this sub-menu is exited.

- #1 **TOTAL BALLS PLAYED [ 0 ]**: Total number of *Regular* and *Extra Balls*.
- #2 **TOTAL EXTRA BALLS [ 0 ]**: Total number of *Extra Balls* awarded.
- #3 **EXTRA BALLS PERCENTAGE [ 0% ]**: Percentage value is 'Total Extra Balls' (Standard Audit 2) divided by 'Total Plays' (Standard Audit 16).
- #4 **REPLAY 1 AWARDS [ 0 ]**: Total Awards (*Credits, Extra Balls or Scores*) for Level 1.
- #5 **REPLAY 2 AWARDS [ 0 ]**: Total Awards (*Credits, Extra Balls or Scores*) for Level 2.
- #6 **REPLAY 3 AWARDS [ 0 ]**: Total Awards (*Credits, Extra Balls or Scores*) for Level 3.
- #7 **REPLAY 4 AWARDS [ 0 ]**: Total Awards (*Credits, Extra Balls or Scores*) for Level 4.
- #8 **TOTAL REPLAYS [ 0 ]**: Total Awards (*Credits, Extra Balls or Scores*) for exceeding *Replay Score Levels*.
- #9 **REPLAY PERCENTAGE [ 0% ]**: Percentage value is 'Total Replays' (Standard Audit 8) divided by 'Total Plays' (Standard Audit 16). *The percentage reflects replay total awards for exceeding replay score levels.*
- #10 **TOTAL SPECIALS [ 0 ]**: Total Awards (*Credits, Extra Balls, or Scores*) for making *Specials*.
- #11 **SPECIAL PERCENTAGE [ 0% ]**: Percentage value is 'Total Specials' (Standard Audit 10) divided by 'Total Plays' (Standard Audit 16).
- #12 **TOTAL MATCHES [ 0 ]**: Total *Credits* awarded for matching the last two digits of the score with the *System-Generated Match Number* at the end of the game. Percentage of *Match Credits* is adjustable from 0% to 10% or **OFF** by Standard Adjustment 19, *Match Percentage, if enabled (review Section 3, Chapter 4, GO TO ADJUSTMENTS MENU, Standard Adjustments)*.
- #13 **HIGH SCORE AWARDS [ 0 ]**: Total Awards (*Credits, Extra Balls, or Scores*) for exceeding the High-Score-To-Date scores.
- #14 **HIGH SCORE PERCENT [ 0% ]**: Percentage value is 'High Score Awards' (Standard Audit 13) divided by 'Total Plays' (Standard Audit 16).
- #15 **TOTAL FREE PLAYS [ 0 ]**: Total *Free Credits* for *Replays, High-Score-To-Date, Specials and Match*.
- #16 **TOTAL PLAYS [ 0 ]**: This total is derived by adding the sum of 'Total Paid Credits' (Earnings Audit 1) and 'Total Free Plays' (Standard Audit 15). *Note: Free credits are not recorded in the Audit until actually used.*
- #17 **0.0M–1.99M SCORES [ 00 ]**: Total number of games the Player's final score was between 0 and 1,999,990 points.
- #18 **2.0M–3.99M SCORES [ 00 ]**: Total number of games the Player's final score was between 2,000,000 and 3,999,990 points.
- #19 **4.0M–5.99M SCORES [ 00 ]**: Total number of games the Player's final score was between 4,000,000 and 5,999,990 points.
- #20 **6.0M–7.99M SCORES [ 00 ]**: Total number of games the Player's final score was between 6,000,000 and 7,999,990 points.
- #21 **8.0M–9.99M SCORES [ 00 ]**: Total number of games the Player's final score was between 8,000,000 and 9,999,990 points.
- #22 **10.0M–12.49M SCORES [ 00 ]**: Total number of games the Player's final score was between 10,000,000 and 12,499,990 points.
- #23 **12.5M–14.99M SCORES [ 00 ]**: Total number of games the Player's final score was between 12,500,000 and 14,499,990 points.
- #24 **15.0M–17.49M SCORES [ 00 ]**: Total number of games the Player's final score was between 15,000,000 and 17,499,990 points.
- #25 **17.50M–19.99M SCORES [ 00 ]**: Total number of games the Player's final score was between 17,500,000 and 19,999,990 points.
- #26 **20.0M–24.99M SCORES [ 00 ]**: Total number of games the Player's final score was between 20,000,000 and 24,999,990 points.
- #27 **25.0M–29.99M SCORES [ 00 ]**: Total number of games the Player's final score was between 25,000,000 and 29,999,990 points.

Standard Audits 28-59 continued on the next page.

Sec. 3: Go To Audits







## Standard Audits Continued

- #28 **30.0M–39.99M SCORES [ 00 ]** : Total number of games the Player's final score was between **30,000,000** and **39,999,990** points.
- #29 **40.0M–49.99M SCORES [ 00 ]** : Total number of games the Player's final score was between **40,000,000** and **49,999,990** points.
- #30 **50.0M–74.99M SCORES [ 00 ]** : Total number of games the Player's final score was between **50,000,000** and **74,999,990** points.
- #31 **75.0M–99.99M SCORES [ 00 ]** : Total number of games the Player's final score was between **75,000,000** and **99,999,990** points.
- #32 **100.0M–149.99M SCORES [ 00 ]** : Total number of games the Player's final score was between **100,000,000** and **149,999,990** points.
- #33 **150.0+M SCORES**: Total number of games the Player's final score was **150,000,000** points and over.
- #34 **AVERAGE SCORES [ 00 ]** : This total is derived by adding the Final Score of each game to a table and dividing this sum by 'Total Plays' (Standard Audit 16).
- #35 **SERVICE CREDITS [ 0 ]** : Total 'Green [ SERVICE CREDIT ] Button' Dedicated Switch (**D-21**) closures in **Attract Mode** (not while in the **SERVICE MENU**). See Section 3, Chapter 1, **Service Switch X4 Set Access & Use**, for how to receive Service Credits. See Section 3, Chapter 5, **GO TO RESET MENU** (via **GO TO UTILITIES MENU**), **Reset Credits**, for how to delete credits.
- #36 **BALL SEARCH STARTED [ 0 ]** : Total number of times the game performed a *Ball Search*.
- #37 **LOST BALL FEEDS [ 0 ]** : Total number of times the game added a pinball to play when it could not find a pinball after *Ball Search* (review Section 3, Chapter 2, **GO TO DIAGNOSTICS MENU, Technicians Alert [ Pinball Detection ]**).
- #38 **LOST BALL GAME STARTS [ 0 ]** : Total number of times the game started with a pinball missing from the ball trough at the start of a game (review Section 3, Chapter 2, **GO TO DIAGNOSTICS MENU, Technicians Alert [ Pinball Detection ]**).
- #39 **LEFT DRAINS [ 0 ]** : Total 'Left Outlane' Switch (**24**) closures.
- #40 **CENTER DRAINS [ 0 ]** : Total number of times the pinball had drained when the last switch closed was not the 'Left Outlane' (**24**) or the 'Right Outlane' Switch (**29**).
- #41 **RIGHT DRAINS [ 0 ]** : Total 'Right Outlane' Switch (**29**) closures.
- #42 **TILTS [ 0 ]** : Total 'Tilt Pendulum' Dedicated Switch (**D-17**) closures.
- #43 **TOTAL BALLS SAVED [ 0 ]** : Total number of times this feature was used. This feature is adjustable from **0:01–0:15, AUTO** or **NO BALL SAVES** (review Section 3, Chapter 4, **GO TO ADJUSTMENTS MENU, Standard Adjustment 48, Ball Save Time**). This feature is enabled at the start of each pinball and is disabled as soon as a predetermined number of switches are "closed" or the allocated time has expired.
- #44 **LEFT FLIPPER USED [ 0 ]** : Total 'Left Flipper Button' Dedicated Switch (**D-9**) closures in **Game Mode**.
- #45 **RIGHT FLIPPER USED [ 0 ]** : Total 'Right Flipper Button' Dedicated Switch (**D-11**) closures in **Game Mode**.
- #46 **0 - 1 MINUTE GAMES [ 0 ]** : Total games in which the total game time was between **0:00** and **1:00** minute.
- #47 **1 – 1.5 MINUTE GAMES [ 0 ]** : Total games where play time was between **1:00** and **1:30** minutes.
- #48 **1.5 – 2 MINUTE GAMES [ 0 ]** : Total games where play time was between **1:30** and **2:00** minutes.
- #49 **2 – 2.5 MINUTE GAMES [ 0 ]** : Total games where play time was between **2:00** and **2:30** minutes.
- #50 **2.5 – 3 MINUTE GAMES [ 0 ]** : Total games where play time was between **2:30** and **3:00** minutes.
- #51 **3 – 3.5 MINUTE GAMES [ 0 ]** : Total games where play time was between **3:00** and **3:30** minutes.
- #52 **3.5 – 4 MINUTE GAMES [ 0 ]** : Total games where play time was between **3:30** and **4:00** minutes.
- #53 **4 – 5 MINUTE GAMES [ 0 ]** : Total games where play time was between **4:00** and **5:00** minutes.
- #54 **5 – 6 MINUTE GAMES [ 0 ]** : Total games where play time was between **5:00** and **6:00** minutes.
- #55 **6 – 8 MINUTE GAMES [ 0 ]** : Total games where play time was between **6:00** and **8:00** minutes.
- #56 **8 – 10 MINUTE GAMES [ 0 ]** : Total games where play time was between **8:00** and **10:00** minutes.
- #57 **10 – 15 MINUTE GAMES [ 0 ]** : Total games where play time was between **10:00** and **15:00** minutes.
- #58 **15+ MINUTE GAMES**: Total games in which the total game time was **15:00** minutes and over.
- #59 **RECENT REPLAY PERCENT**: Percent figured with programming thresholds for a determined number of games. The % reflects replay total awards for exceeding replay score levels.



## Feature Audits [ #1 - #107 ]

To initiate, from the **AUDITS MENU**, select the "WoF" *Icon*. The Dot Matrix Display will indicate the *audit number (in this group)*, *audit name* and the *audit total or value*. The current audit will remain on the display until the next audit is viewed or when this sub-menu is exited.

**Feature Audits Definition: Programming Use Only.** *The proprietary information Total number of times a feature was started, awarded, lit, played and/or completed (awarded); also, the total number of Switch Closures during certain modes or features are tracked (a predetermined single/multiple variations of switch closures are used to determine the lighting and/or completion of the feature stated).*

**SEE DOT MATRIX DISPLAY FOR CURRENT FEATURE AUDITS**

## FEATURE AUDITS [ #1 - #107 ] ▼

| Nr. | FEATURE AUDIT NAME        | YOUR RESULT | Nr. | FEATURE AUDIT NAME              | YOUR RESULT | Nr. | FEATURE AUDIT NAME             | YOUR RESULT | Nr. | FEATURE AUDIT NAME             | YOUR RESULT |
|-----|---------------------------|-------------|-----|---------------------------------|-------------|-----|--------------------------------|-------------|-----|--------------------------------|-------------|
| 1   | TOP LEFT OUTLANES         |             | 28  | WRONG VOWEL GUESSES             |             | 55  | WHEEL FRENZY STARTS            |             | 82  | CONTESTANT HURRYUP POINTS      |             |
| 2   | BOTTOM LEFT OUTLANES      |             | 29  | TOTAL PUZZLE LETTERS            |             | 56  | WHEEL FRENZY SWITCHES          |             | 83  | BONUS MODE WINS                |             |
| 3   | LEFT INLANES              |             | 30  | PUZZLE #1 SOLVED                |             | 57  | WHEEL FRENZY POINTS            |             | 84  | M-BALL LETTERS COMPLETED       |             |
| 4   | LEFT CENTER LANES         |             | 31  | PUZZLE #2 SOLVED                |             | 58  | RISKY SPINNING STARTS          |             | 85  | M-BALL LETTERS PROGRESSED      |             |
| 5   | RIGHT CENTER DRAINS       |             | 32  | PUZZLE #3 SOLVED                |             | 59  | RISKY SPINNING SPINS           |             | 86  | MULTIBALL LIT                  |             |
| 6   | RIGHT INLANES             |             | 33  | PUZZLE #4 SOLVED                |             | 60  | RISKY SPINNING COLLECTS        |             | 87  | MULTIBALL STARTS               |             |
| 7   | TOP RIGHT OUTLANES        |             | 34  | PRIZE PUZZLES WON               |             | 61  | RISKY SPINNING BANKRUPTS       |             | 88  | 2+ MULTIBALL STARTS            |             |
| 8   | RIGHT BOTTOM OUTLANES     |             | 35  | BANKRUPTS                       |             | 62  | RISKY SPINNING POINTS          |             | 89  | WOF MB 1X JACKPOT              |             |
| 9   | WILD CARD LANES           |             | 36  | BANKRUPT & LOST PRIZE BANK      |             | 63  | RAMP RAMPAGE STARTS            |             | 90  | WOF MB 2X JACKPOT              |             |
| 10  | LEFT ORBITS               |             | 37  | PRIZE BANK EXTRA BALL LIT       |             | 64  | RAMP RAMPAGE RAMP SHOTS        |             | 91  | WOF MB 3X JACKPOT              |             |
| 11  | LOOPING LEFT ORBITS       |             | 38  | PRIZE BANK EXTRA BALL COLLECTED |             | 65  | RAMP RAMPAGE POINTS            |             | 92  | WOF MB SUPER JACKPOT           |             |
| 12  | LEFT RAMPS                |             | 39  | PRIZE BANK TRIP LIT             |             | 66  | COMBOS STARTS                  |             | 93  | WOF MB BONUS JACKPOTS          |             |
| 13  | MINI-RAMPS                |             | 40  | PRIZE BANK TRIP COLLECTED       |             | 67  | COMBOS SHOTS                   |             | 94  | WOF MB SEQUENCE COMPLETED      |             |
| 14  | RED CONTESTANT HITS       |             | 41  | PRIZE BANK SPECIAL LIT          |             | 68  | COMBOS WEIGHTED SHOTS          |             | 95  | FREE SPIN LANES LIT            |             |
| 15  | YELLOW CONTESTANT HITS    |             | 42  | PRIZE BANK SPECIAL COLLECTED    |             | 69  | COMBOS POINTS                  |             | 96  | FREE SPIN COLLECTS             |             |
| 16  | BLUE CONTESTANT HITS      |             | 43  | SHARE THE WEALTH STARTED        |             | 70  | KEEP IT SPINNING STARTS        |             | 97  | BIG MONEY LANES LIT            |             |
| 17  | WHEEL RAMPS               |             | 44  | CLEAN SWEEP STARTED             |             | 71  | KEEP IT SPINNING REVOLUTIONS   |             | 98  | BIG MONEY COLLECTS             |             |
| 18  | FRONT INLINE DROPS        |             | 45  | PUZZLE JACKPOT STARTED          |             | 72  | KEEP IT SPINNING VALUE INCS    |             | 99  | BIG MONEY POINTS               |             |
| 19  | MIDDLE INLINE DROPS       |             | 46  | PUZZLE JACKPOT COLLECTED        |             | 73  | KEEP IT SPINNING POINTS        |             | 100 | BIG MONEY TRIPS                |             |
| 20  | BACK INLINE DROPS         |             | 47  | MYSTERY WEDGE OFFERED           |             | 74  | STOP THE WHEEL STARTS          |             | 101 | BIG MONEY EXTRA BALLS          |             |
| 21  | RIGHT RAMPS               |             | 48  | MYSTERY RISK TAKEN              |             | 75  | STOP THE WHEEL STOPS           |             | 102 | WILD CARD COLLECTS             |             |
| 22  | RIGHT ORBITS              |             | 49  | SKILL SHOT MADE                 |             | 76  | STOP THE WHEEL MULTIPLIER INCS |             | 103 | WILD CARD SPECIAL              |             |
| 23  | MULTIBALL STANDUPS        |             | 50  | TOSS-UP PUZZLE COLLECTED        |             | 77  | STOP THE WHEEL BANKRUPTS       |             | 104 | WILD CARD LIGHT EXTRA BALL     |             |
| 24  | POP BUMPER HITS           |             | 51  | QUICK PLUNGE SKILL SHOTS        |             | 78  | STOP THE WHEEL POINTS          |             | 105 | WILD CARD ANY PRIZE BANK AWARD |             |
| 25  | CORRECT CONSONANT GUESSES |             | 52  | BONUS LETTERS LIT               |             | 79  | CONTESTANT HURRYUP STARTS      |             | 106 | WILD CARD ANY OUTLANE AWARD    |             |
| 26  | CORRECT VOWEL GUESSES     |             | 53  | BONUS LETTERS PROGRESSED        |             | 80  | CONTESTANT H-UP CONTESTANTS    |             | 107 | WILD CARD ADD-A-BALL           |             |
| 27  | WRONG CONSONANT GUESSES   |             | 54  | BONUS WHEEL LIT                 |             | 81  | CONTESTANT H-UP COLLECTS       |             |     |                                |             |

*Note: Audits are subject to change (with or without notice).*



## Tournament Audits [ #1 - #14 ] subject to change

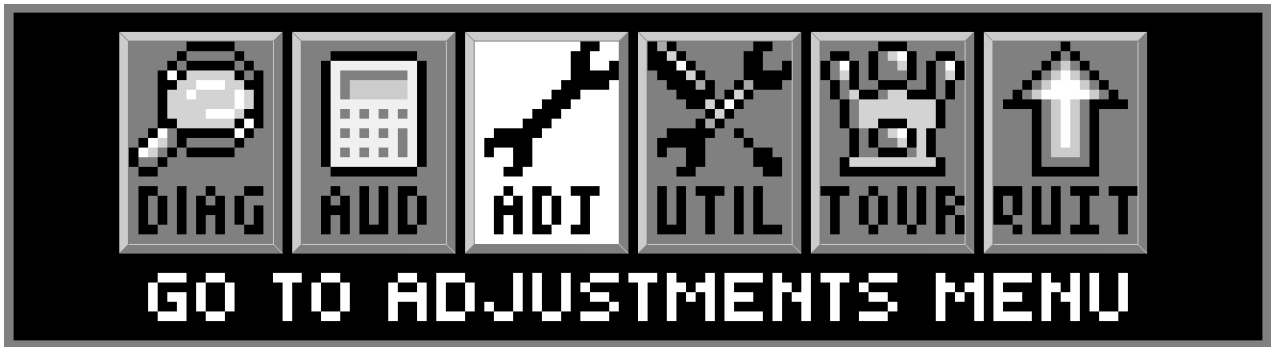
"T AUD" *Icon* provided as an alternate access to Tournament Audits (if data is available). For more information on the **TOURNAMENT MENU**, review **Section 3, Chapter 6, GO TO TOURNAMENT MENU**.



## Dump Audits To USB (Memory Stick)

To initiate, from the **USB MENU**, select the "DUMP" *Icon*. Follow the on-screen prompts to perform a **Data Dump (download)**. A dated text file will be created on your USB Memory Stick. *Don't forget to set the DATE & TIME first. See Section 3, Chapter 5, GO TO UTILITIES MENU, for more information.*





To initiate, from the **MAIN MENU**, select the "ADJ" *Icon*. The **ADJUSTMENTS MENU** provides **89** Adjustments to vary Game Functions to customize for your particular needs. The Adjustments are divided into 2 groups:

• **Standard Adjustments [ #1 – #63 ]** and • **Feature Adjustments (Programming Use Only) [ #1 – #26 ]**.  
 For **quick and easy customization of Game Play Difficulty or Game Play Type** or how to **RESET ONLY** the Adjustments, review **Section 3, Chapter 5, GO TO INSTALLS MENU** (via the **UTILITIES MENU**). **Shortcut: Enter Custom Message** (Standard Adj. 41) and **Set Custom Pricing** (via Standard Adjustment 18, Game Pricing) can be quickly accessed via the **UTILITIES MENU**, see **Section 3, Chapter 5, GO TO UTILITIES MENU**.

Adjustments which are named **Proprietary** are also for **Future Expansion** or **Programming**. Game code may get upgraded during production; compare all Adjustments in the Dot Matrix Display with the manual and make any corrections, as necessary. Adjustments are subject to change (*with or without notice*).

All **ADJUSTMENTS MENU** *Icons* and there usages are explained throughout this chapter in the same order as seen in the Dot Matrix Display. **NOTE:** Depending on Game Type, Version, selections made, Dip Switch settings, location and/or areas, some *Adjustments* may appear non-functional or may not appear at all. **Adjustments and/or functions, order and operation are subject to change. If in doubt use the Factory Default Settings.**

In displays where changes can be made or to perform a function, use the **GREEN Button** to go [ **BACK** ], exit or escape, the **RED Buttons** to [ **</-** ] SELECT PREVIOUS [ **+ / >** ] SELECT NEXT when the adjustment name or setting is flashing and the **BLACK Button** to [ **SELECT** ] toggle between the ADJUSTMENT and SETTING.



## Standard Adjustments [ #1 – #63 ]

To initiate, from the **ADJUSTMENTS MENU**, select the "S.P.I." *Icon*. The Dot Matrix Display will indicate the *adjustment number (in this group), adjust. name, adjust. setting and comment line*. The current adjustment will remain on the display until the next adjustment is viewed or when this sub-menu is exited.

- #1 **REPLAY TYPE:** Set to **AUTO, NONE, FIXED** or **DYNAMIC**. Factory Default = **AUTO**. **AUTO & DYNAMIC** are based on the **Replay Percentage** (Standard Adjustment 2). • Select **FIXED** to give the player a **Replay Award** (Standard Adjustment 3) as the **Replay Levels** (Standard Adjustments 7-10) are reached. The **Replay Level(s)** (Standard Adjustments 7-10) will not adjust up or down. • Select **AUTO** to give the player a **Replay Award** (Standard Adjustment 3) as the **Auto Replay Start** (Standard Adjustment 5) score level is reached. This *score threshold* will automatically adjust up or down based on the **Replay Percentage** chosen (Standard Adjustment 2). The game periodically adjusts based upon the Player Base Skill Level. • Select **DYNAMIC** to give the player a **Replay Award** (Standard Adjustment 3) as the **Dynamic Replay Start** (Standard Adjustment 6) score level is reached. This *score threshold* will go down every game based on the **Replay Percentage** (Standard Adjustment 2) selected. • Select **NONE** to turn off Standard Adjustments 2-11.
- #2 **REPLAY PERCENTAGE:** Set between 1% – 50%. Factory Default = **10%**. Adjustable only if **AUTO** or **DYNAMIC** is installed in Replay Type, Standard Adjustment 1. For [ **DYNAMIC** ] example, if the *score threshold* is 50,000,00 and the **Replay Percentage** selected is **10%**, every game a player does not reach the *score threshold*, the score to reach will drop by 5,000,000 (10% of 50M). This will continue every game until the *threshold score* is reached. Thus, if the score then drops to 15,000,000 after 7 games and is then achieved, the **Replay Award** (Standard Adjustment 3) is given. The original *score threshold* is added to 15,000,000 and is now 65,000,000. It will then take the same player 10 games to reach 15,000,000. *This adjustment is shown only if AUTO or DYNAMIC is installed in Replay Type* (Standard Adjustment 1).

Standard Adjustments 3-18 continued on the next page.





## Standard Adjustments continued.

- #3 **REPLAY AWARD:** Set to **CREDIT**, **TICKET\***, **TOKEN\*** or **EXTRA BALL**. Factory Default = **CREDIT**. Set the type of award to be given to the player when the appropriate Replay Score threshold or level is achieved. If awarding a **CREDIT**, **TICKET** or **TOKEN** is prohibited in your area, select **EXTRA BALL**. *This adjustment is not shown if NONE is installed in **Replay Type** (Standard Adjustment 1).*
- \*Note: If **TICKET** or **TOKEN** is selected, the game will require an optional Ticket or Token Dispenser and then **Q24 Option** (Standard Adj. 55) must be changed accordingly.*
- #4 **REPLAY LEVELS:** Set between **1 – 4** for the number of Replay Levels to be active. Factory Default = **1**. *This adjustment is not shown if NONE is installed in **Replay Type** (Standard Adjustment 1).*
- #5 **AUTO REPLAY START:** Set between **5,000,000 – 150,000,000** (increments of 1,000,000) for the Auto Replay Start threshold. Factory Default = **\_,000,000**. *This adjustment is shown only if **AUTO** is installed in **Replay Type** (Standard Adjustment 1).*
- #6 **DYNAMIC REPLAY START:** Set between **5,000,000 – 150,000,000** (increments of 1,000,000) for the Dynamic Replay Start threshold. Factory Default = **\_,000,000**. *This adjustment is shown only if **DYNAMIC** is installed in **Replay Type** (Standard Adjustment 1).*
- #7 **REPLAY LEVEL #1:** Set between **5,000,000 – 150,000,000** (increments of 1,000,000). Factory Default = **\_,000,000**. Set the first or only Replay Level. *This adjustment is shown only if **FIXED** is installed in **Replay Type** (Standard Adjustment 1).*
- #8 **REPLAY LEVEL #2:** Set between **5,000,000 – 150,000,000** (increments of 1,000,000). Factory Default = **\_,000,000**. Set the second Replay Level. *This adjustment is shown only if **FIXED** is installed in **Replay Type** (Standard Adjustment 1) and 2 is installed in **Replay Levels** (Standard Adjustment 4).*
- #9 **REPLAY LEVEL #3:** Set between **5,000,000 – 150,000,000** (increments of 1,000,000). Factory Default = **\_,000,000**. Set the third Replay Level. *This adjustment is shown only if **FIXED** is installed in **Replay Type** (Standard Adjustment 1) and 3 is installed in **Replay Levels** (Standard Adjustment 4).*
- #10 **REPLAY LEVEL #4:** Set between **5,000,000 – 150,000,000** (increments of 1,000,000). Factory Default = **\_,000,000**. Set the fourth Replay Level. *This adjustment is shown only if **FIXED** is installed in **Replay Type** (Standard Adjustment 1) and 4 is installed in **Replay Levels** (Standard Adjustment 4).*
- #11 **REPLAY BOOST:** Set to **YES** or **NO**. Factory Default = **YES**. When set to **YES**, while **FIXED** or **AUTO** maintains the Replay Levels, Replay Boost works as follows: If the Replay Level is 7,000,000 (regardless of the Replay Percentage), and the Player scores 20M, and receives the Replay Award, the next game the Current Replay Level is added to this base. Thus the next game, the Replay Level is 14,000,000. The Player again scores 20M. The next game the Player will need to achieve 21,000,000 to earn the Replay Award. If the Player does not achieve 21,000,000, the next game reverts back to the original 7,000,000 or the new adjusted level maintained by the Fixed or Autopercentaging Feature. *This adjustment is shown only if **AUTO** or **FIXED** is installed in **Replay Type** (Standard Adjustment 1).*
- #12 **SPECIAL LIMIT:** Set between **1 – 5**, **UNLIMITED** or **NO SPECIALS**. Factory Default = **1**. Set the maximum number of *Specials* that may be accumulated per game.
- #13 **SPECIAL PERCENTAGE:** Set between **1% – 50%**. Factory Default = **10%**. This adjustment allows the operator to adjust how frequently the **Special Feature** is made available to the player. *This adjustment is not shown if **NO SPECIALS** is installed in **Special Limit** (Standard Adjustment 12).*
- #14 **SPECIAL AWARD:** Set to **CREDIT**, **TICKET\***, **TOKEN\***, **POINTS** or **EXTRA BALL**. Factory Default = **CREDIT**. Select **EX. BALL** or **POINTS** if awarding a **CREDIT** or **TICKET / TOKEN** is prohibited in your area. *This adjustment is not shown if **NO SPECIALS** is installed in **Special Limit** (Standard Adjustment 12).*
- \*Note: If **TICKET** or **TOKEN** is selected, the game will require an optional Ticket or Token Dispenser and then **Q24 Option** (Standard Adj. 55) must be changed accordingly.*
- #15 **FREE GAME LIMIT:** Set between **1 – 9**, **UNLIMITED** or **NO FREE GAMES**. Factory Default = **5**. Set the maximum number of *Free Games* that may be accumulated per game.
- #16 **EXTRA BALL LIMIT:** Set between **1 – 9**, **UNLIMITED** or **NO EXTRA BALLS**. Factory Default = **5**. Set the number of *Extra Balls* that may be accumulated per game.
- #17 **EXTRA BALL PERCENTAGE:** Set between **1% – 50%**. Factory Default = **25%**. This adjustment allows the operator to adjust how frequently the **Extra Ball Feature** is made available to the player. *This adjustment is not shown if **NO EXTRA BALLS** is installed in **Extra Ball Limit** (Standard Adjustment 16).*
- #18 **GAME PRICING:** There are two (2) methods available for *Coin Switch Programming*: **Standard & Custom**. Set between **AUSTRALIA 1 – UK 6** or **CUSTOM**. Factory Default = **USA 10**. *Shortcut: **Set Custom Pricing** and instructions, review Section 3, Chapter 5, **GO TO UTILITIES MENU**, **Set Custom Pricing**. The appropriate Dip Switch Setting (Dip Sw. 1-8 location CPU/Sound PCB SW1) in relationship to the Pricing Scheme selected is important (view the tables on the following pages for more information).*

Standard Adjustment 18, Game Pricing, continued on the next page.





# Standard Adjustment 18, Game Pricing, continued.

## USA & International (non-Euro) Standard Pricing Select Table

| CPU/SOUND PCB<br>DIP SWITCH SW1<br>SETTING     |                 | COUNTRY<br>SETTING<br>OPTION(S) | COIN MECHANISMS (SWITCHES)<br>COINS THRU ... SLOT:  |        |       |      |  | PRICING SCHEME<br>Number of Plays (Credits) for Price Amount Shown<br>See "Appendix J" for Coin Cards Examples & Info! | Requires SPI<br>Coin Card(s)<br>Part Number |                      |                                       |
|--|-----------------|---------------------------------|---|--------|-------|------|--|--|---|----------------------|---------------------------------------|
| Pos.   | 1 2 3 4 5 6 7 8 |                                 | LEFT  | CENTER | RIGHT | 4TH  |  |  |   |                      |                                       |
| ON   |                 | USA 1                           | 0.25  | 1.00   | 0.25  |      | USD // UNITED STATES DOLLAR // [ \$ ]                        |  |   |                      |                                       |
| OFF  | ▼▼▼▼▼▼▼▼        | USA 2                           |   |        |       |      |  |  |   | 1/0.25               | 755-5400-01-Y                         |
| <b>HIGHLIGHTED</b><br>= Factory Default        |                 | USA 3                           |   |        |       |      |  |  |   | 1/0.50               | 755-5400-02-Y                         |
| <b>HIGHLIGHTED</b><br>= Not Shown on Coin Card |                 | USA 4                           |   |        |       |      |  |  |   | 1/0.50               | 755-5400-02-Y                         |
|  |                 | USA 5                           |   |        |       |      |  |  |   | 1/0.50 2/1.00        | 755-5400-00-Y                         |
|  |                 | USA 6                           |   |        |       |      |  |  |   | 3/1.50 5/2.00        | 755-5400-00-Y                         |
|  |                 | USA 7                           |   |        |       |      |  |  |   | 1/0.50 2/1.00 3/1.50 | 755-5400-00-Y                         |
|  |                 | USA 8                           |   |        |       |      |  |  |   | 4/1.50 6/2.00        | 755-5400-00-Y                         |
|  |                 | USA 9                           |   |        |       |      |  |  |   | 1/1.00               | 755-5400-07-Y                         |
|  |                 | USA 10                          |   |        |       |      |  |  |   | 1/0.75 2/1.50 3/2.00 | 755-5400-11-Y                         |
| ON   | ▲▲▲▲▲▲▲▲        | AUSTRALIA 1                     | 0.20  | 1.00   | 2.00  |      | AUD // AUSTRALIAN DOLLARS // [ \$AUS ]                       |  |   |                      |                                       |
| OFF  | ▼▼▼▼▼▼▼▼        | AUSTRALIA 2                     |   |        |       |      |  |  |   | 1/1.00 3/2.00        | 755-5406-00-Y<br>(1 Side)             |
| ON   | ▲▲▲▲▲▲▲▲        | CANADA 1<br>[ 25¢ door ]        | 0.25  | 0.25   | 1.00  | 2.00 | CAD // CANADIAN DOLLARS // [ \$CAN ]                         |  |   |                      |                                       |
| OFF  | ▼▼▼▼▼▼▼▼        | CANADA 2<br>[ dollar door ]     |   |        |       |      |  |  |   | 1/0.50 2/0.75 3/1.00 | 755-5400-00-Y<br>-01-Y or -02-Y       |
| ON   | ▲▲▲▲▲▲▲▲        | CANADA 1                        | 1.00  |        | 2.00  |      | 1/1.00 3/2.00  | 755-5400-10-Y  |   |                      |                                       |
| ON   | ▲▲▲▲▲▲▲▲        | CROATIA                         | 1   | 2      | 5     |      | HRK // CROATIAN KUNA // [ kuna ]                             |  |   |                      |                                       |
| OFF  | ▼▼▼▼▼▼▼▼        |                                 |   |        |       |      | 1/3 2/5  | 755-5410-00-Y<br>(2-Sided)   |   |                      |                                       |
| ON   | ▲▲▲▲▲▲▲▲        | DENMARK 1                       | 1   | 5      | 10    | 20   | DKK // DANISH KRONER // [ Kr ]                               |  |   |                      |                                       |
| OFF  | ▼▼▼▼▼▼▼▼        | DENMARK 2                       |   |        |       |      |  |  |   | 1/3 2/5              | 755-5402-00-Y<br>(2-Sided)            |
| ON   | ▲▲▲▲▲▲▲▲        | DENMARK 1                       |   |        |       |      | 1/2 2/4 3/5 4/7 5/9 7/10                                     |  |   |                      |                                       |
| ON   | ▲▲▲▲▲▲▲▲        | JAPAN 1                         | 100   |        | 100   |      | JPY // JAPANESE YEN // [ ¥ ]                                 |  |   |                      |                                       |
| OFF  | ▼▼▼▼▼▼▼▼        | JAPAN 2                         |   |        |       |      |  |  |   | 1/100 3/200          | 755-5408-01-Y<br>(2-Sided)            |
| ON   | ▲▲▲▲▲▲▲▲        | MIDDLE EAST                     | token   |        | token |      | TOKEN // Middle East currency used to buy token // [ TOKEN ] |  |   |                      |                                       |
| OFF  | ▼▼▼▼▼▼▼▼        |                                 |   |        |       |      | 1/1  | 755-5400-06-Y<br>(use Side 1)  |   |                      |                                       |
| ON   | ▲▲▲▲▲▲▲▲        | NEW ZEALAND 1                   | 1   |        | 2     |      | NZD // NEW ZEALAND DOLLAR // [ \$NZD ]                       |  |   |                      |                                       |
| OFF  | ▼▼▼▼▼▼▼▼        | NEW ZEALAND 2                   |   |        |       |      |  |  |   | 1/1 3/2              | 755-5406-00-Y<br>(Side 2)             |
| ON   | ▲▲▲▲▲▲▲▲        | NORWAY 1                        | 10  | 5      | 20    |      | NOK // NORWEGIAN KRONE // [ Kr ]                             |  |   |                      |                                       |
| OFF  | ▼▼▼▼▼▼▼▼        | NORWAY 2                        |   |        |       |      |  |  |   | 1/10 3/20            | 755-5403-01-Y or<br>-02-Y / (2-Sided) |
|  |                 | NORWAY 3                        |   |        |       |      |  |  |   | 1/20                 | 755-5403-03-Y                         |
|  |                 | NORWAY 4                        |   |        |       |      |  |  |   | 1/20 3/40            | (2-Sided)                             |
| ON   | ▲▲▲▲▲▲▲▲        | RUSSIA                          | ▼ LEFT SWITCH CAN BE WIRED TO BILL ACCEPTOR ▼       |        |       |      |  | RUB // RUSSIAN RUBLE // [ Ruble ]  |   |                      |                                       |
| OFF  | ▼▼▼▼▼▼▼▼        |                                 | 10  | 5      | 1     |      | 1/5  | 755-5411-00-Y<br>(2-Sided)   |   |                      |                                       |
| ON   | ▲▲▲▲▲▲▲▲        | SO. AFRICA 1                    | 0.50  | 1.00   | 1.00  | 1.00 | ZAR // SOUTH AFRICAN RAND // [ R ]                           |  |   |                      |                                       |
| OFF  | ▼▼▼▼▼▼▼▼        | SO. AFRICA 2                    |   |        |       |      |  |  |   | 1/2.00 2/5.00        | 755-5409-01-Y<br>(2-Sided)            |
| ON   | ▲▲▲▲▲▲▲▲        | SWEDEN 1                        | 1   | 5      | 10    |      | SEK // SWEDISH KRONOR // [ kr ]                              |  |   |                      |                                       |
| OFF  | ▼▼▼▼▼▼▼▼        | SWEDEN 2                        |   |        |       |      |  |  |   | 1/10 2/15 3/20       | 755-5404-00-Y<br>(2-Sided)            |
| ON   | ▲▲▲▲▲▲▲▲        | SWEDEN 1                        |   |        |       |      | 1/5  |  |   |                      |                                       |
| ON   | ▲▲▲▲▲▲▲▲        | SWITZERLAND 1                   | 1   | 2      | 5     |      | CHF // SWISS FRANCS // [ Sf ]                                |  |   |                      |                                       |
| OFF  | ▼▼▼▼▼▼▼▼        | SWITZERLAND 2                   |   |        |       |      |  |  |   | 1/1 2/2 3/3 4/4 6/5  | 755-5405-00-Y<br>(2-Sided)            |
| ON   | ▲▲▲▲▲▲▲▲        | SWITZERLAND 1                   |   |        |       |      | 1/1 3/2 5/3 7/4 9/5  |  |   |                      |                                       |
| ON   | ▲▲▲▲▲▲▲▲        | TAIWAN                          | 10  |        | 10    |      | TWD // TAIWANESE DOLLAR // [ TWD ]                           |  |   |                      |                                       |
| OFF  | ▼▼▼▼▼▼▼▼        |                                 |   |        |       |      | 1/10   | 755-5412-00-Y<br>(use Side 1)  |   |                      |                                       |
| ON   | ▲▲▲▲▲▲▲▲        | UK 1                            | ▼ 5TH COIN SLOT NOT AVAILABLE WITH CUSTOM PRICING ▼ |        |       |      |  | GPB // UNITED KINGDOM POUNDS // [ £ ]  |   |                      |                                       |
| OFF  | ▼▼▼▼▼▼▼▼        | UK 2                            | LEFT  | CENTER | RIGHT | 4TH  | 5TH  | 3/1.00 7/2.00  | 755-5407-00-Y                               |                      |                                       |
|  |                 | UK 3                            |   |        |       |      |  | 4/1.00   | 755-5407-01-Y*                              |                      |                                       |
|  |                 | UK 4                            | 0.10  | 0.50   | 1.00  | 0.20 | 2£   | 1/0.50 2/1.00 3/1.50   | 755-5407-01                                 |                      |                                       |
|  |                 | UK 5                            |   |        |       |      |  | 5/2.00   | 755-5407-01-Y*                              |                      |                                       |
|  |                 | UK 6                            |   |        |       |      |  | 1/0.30 2/0.60 3/0.90   | 755-5407-01-Y*                              |                      |                                       |
|  |                 |                                 |   |        |       |      |  | 4/1.00   | 755-5407-01                                 |                      |                                       |
|  |                 |                                 |   |        |       |      |  | 1/1.00 3/2.00  | 755-5407-01                                 |                      |                                       |
|  |                 |                                 |   |        |       |      |  | 3/2.00   | 755-5407-01-Y*                              |                      |                                       |

Sec. 3: Go To Adjust.

Standard Adjustment 18, Game Pricing, continued on the next page.





# Standard Adjustment 18, Game Pricing, continued.

## Euro 1-12 Summary & International (Euro) Standard Pricing Select Table

| CPU/SOUND PCB DIP SWITCH SW1 SETTING |                        | COUNTRY SETTING OPTION(S) | COIN MECHANISMS (SWITCHES) |        |       |      | PRICING SCHEME   |        |        |        | Requires SPI Coin Card(s) Part Number |        |        |               |               |
|--------------------------------------|------------------------|---------------------------|----------------------------|--------|-------|------|--|--------|--------|--------|---------------------------------------|--------|--------|---------------|---------------|
|                                      |                        |                           | COINS THRU ... SLOT:       |        |       |      | Number of Plays (Credits) for Price Amount Shown<br>See "Appendix J" for Coin Cards Examples & Info! |        |        |        |                                       |        |        |               |               |
| Pos.                                 | 1 2 3 4 5 6 7 8        |                           | LEFT                       | CENTER | RIGHT | 4TH  | EUR // EUROPEAN UNION EUROS //   € 1   |        |        |        |                                       |        |        |               |               |
| ON                                   | <b>S E E B E L O W</b> | Euro 1                    | 0.50                       | 1.00   | 2.00  | 0.20 | 1/0.50   |        |        |        | 755-5401-01-Y                         |        |        |               |               |
| OFF                                  | <b>S E T T I N G S</b> | Euro 2                    |                            |        |       |      | 1/0.50   | 2/1.00 | 3/1.50 | 5/2.00 |                                       |        |        | 755-5401-02-Y |               |
|                                      |                        | Euro 3                    |                            |        |       |      |  |        |        |        | 1/0.50                                |        | 3/1.00 |               | 755-5401-03-Y |
|                                      |                        | Euro 4                    |                            |        |       |      |  |        |        |        | 1/0.50                                | 2/1.00 | 3/1.50 | 6/2.00        | 755-5401-04-Y |
|                                      |                        | Euro 5                    |                            |        |       |      |  |        |        |        | 1/0.50                                | 3/1.00 | 4/1.50 | 7/2.00        | 755-5401-05-Y |
|                                      |                        | Euro 6                    |                            |        |       |      |  |        |        |        | 2/0.50                                |        |        |               | 755-5401-06-Y |
|                                      |                        | Euro 7                    |                            |        |       |      |  |        |        |        | 1/1.00                                | 2/2.00 | 3/3.00 | 5/4.00        | 755-5401-07-Y |
|                                      |                        | Euro 8                    |                            |        |       |      |  |        |        |        | 1/1.00                                |        | 3/2.00 |               | 755-5401-08-Y |
|                                      |                        | Euro 9                    |                            |        |       |      |  |        |        |        | 1/1.00                                |        | 2/1.50 | 3/2.00        | 755-5401-09-Y |
|                                      |                        | Euro 10                   |                            |        |       |      |  |        |        |        | 1/1.00                                |        | 3/2.00 | 7/3.00        | 755-5401-10-Y |
|                                      |                        | Euro 11                   |                            |        |       |      |  |        |        |        | 1/1.00                                |        | 4/2.00 |               | 755-5401-11-Y |
|                                      |                        | Euro 12                   |                            |        |       |      |  |        |        |        | 2/1.00                                | 4/2.00 | 6/3.00 | 9/4.00        | 755-5401-12-Y |

For a different Euro Pricing Scheme (other than Factory Default listed below), scroll through Standard Adjustment 18: Euro 1-12 or CUSTOM\* for new setting (reference above Euro 1-12 Summary). Keep the Country Dip Switch Setting the same as listed below.

| Pos. | 1 2 3 4 5 6 7 8 | Default Highlighted | COINS THRU ... SLOT: |      |      |  | EUR // EUROPEAN UNION EUROS //   € 1 |        |        |        |               |  |  |               |
|------|-----------------|---------------------|----------------------|------|------|--|--------------------------------------|--------|--------|--------|---------------|--|--|---------------|
| ON   | ▲               | AUSTRIA Euro 9      | 0.50                 | 1.00 | 2.00 |  | 1/1.00                               | 2/1.50 | 3/2.00 |        | 755-5401-09-Y |  |  |               |
| OFF  | ▼               |                     |                      |      |      |  |                                      |        |        |        |               |  |  |               |
| ON   | ▲               | BELGIUM Euro 1      | 0.50                 | 1.00 | 2.00 |  | 1/0.50                               |        |        |        | 755-5401-01-Y |  |  |               |
| OFF  | ▼               |                     |                      |      |      |  |                                      |        |        |        |               |  |  |               |
| ON   | ▲               | FINLAND Euro 8      | 0.50                 | 1.00 | 2.00 |  | 1/1.00                               | 3/2.00 |        |        | 755-5401-08-Y |  |  |               |
| OFF  | ▼               |                     |                      |      |      |  |                                      |        |        |        |               |  |  |               |
| ON   | ▲               | FRANCE Euro 10      | 0.50                 | 1.00 | 2.00 |  | 1/1.00                               | 3/2.00 | 7/3.00 |        | 755-5401-10-Y |  |  |               |
| OFF  | ▼               |                     |                      |      |      |  |                                      |        |        |        |               |  |  |               |
| ON   | ▲               | GERMANY 1           | 0.50                 | 1.00 | 2.00 |  | 1/0.50                               |        |        |        | 755-5401-01-Y |  |  |               |
| OFF  | ▼               | GERMANY 2           |                      |      |      |  | 1/0.50                               | 2/1.00 | 3/1.50 | 5/2.00 |               |  |  | 755-5401-02-Y |
|      |                 | GERMANY 3           |                      |      |      |  | 1/0.50                               | 2/1.00 | 3/1.50 | 6/2.00 |               |  |  | 755-5401-04-Y |
| ON   | ▲               | GREECE Euro 8       | 0.50                 | 1.00 | 2.00 |  | 1/1.00                               | 3/2.00 |        |        | 755-5401-08-Y |  |  |               |
| OFF  | ▼               |                     |                      |      |      |  |                                      |        |        |        |               |  |  |               |
| ON   | ▲               | ITALY 1             | 0.50                 |      | 0.50 |  | 1/0.50                               |        |        |        | 755-5401-01-Y |  |  |               |
| OFF  | ▼               | ITALY 2             |                      |      |      |  | 1/1.00                               | 3/2.00 |        |        | 755-5401-08-Y |  |  |               |
| ON   | ▲               | NETHERLANDS Euro 3  | 0.50                 | 1.00 | 2.00 |  | 1/0.50                               | 3/1.00 |        |        | 755-5401-03-Y |  |  |               |
| OFF  | ▼               |                     |                      |      |      |  |                                      |        |        |        |               |  |  |               |
| ON   | ▲               | PORTUGAL            | 0.50                 |      | 0.50 |  | 1/0.50                               |        |        |        | 755-5401-01-Y |  |  |               |
| OFF  | ▼               |                     |                      |      |      |  |                                      |        |        |        |               |  |  |               |
| ON   | ▲               | SPAIN Euro 8        | 0.50                 | 1.00 | 2.00 |  | 1/1.00                               | 3/2.00 |        |        | 755-5401-08-Y |  |  |               |
| OFF  | ▼               |                     |                      |      |      |  |                                      |        |        |        |               |  |  |               |

Sec. 3: Go To Adjust.

**HIGHLIGHTED** = Factory Default      **HIGHLIGHTED** = Not Shown on Coin Card

For the associated Coinage Card required if the Factory Default Setting was changed, view on-line at: <http://www.sternpinball.com/coinagecards.shtml>

You can download and print the replacement card. Adobe® Reader 5.0 or higher required (links on site). Use Yellow Card Stock: ASTROBRIGHTS® SOLAR YELLOW #65 FROM WAUSAU PAPER PRODUCTS (Stock #22731)

- #19 MATCH PERCENTAGE: Set between 0% – 10% or OFF. Factory Default = 9%. At 0% the Match Animation Feature occurs at the end of the game but never awards the Match Award (Standard Adjustment 20). Set to OFF, no Match Animation Feature is shown.
- #20 MATCH AWARD: Set to CREDIT, TICKET\* or TOKEN\*. Factory Default = CREDIT. This adjustment is not shown if OFF is installed in Match Percentage (Standard Adjustment 19).  
\*Note: If TICKET or TOKEN is selected, the game will require an optional Ticket or Token Dispenser and then Q24 Option (Standard Adj. 55) must be changed accordingly.
- #21 BALLS PER GAME: Set between 1 – 10. Factory Default = 3. Set the number of balls per game.

Standard Adjustments 22-36 continued on the next page.





## Standard Adjustments continued.

- #22 **TILT WARNINGS:** Set between **0 – 3**. Factory Default = **2**. Set the number of Plumb Bob Tilt Switch closures before the ball in play is tilted. *Each closure generates an audible alert and/or display alert.*
- #23 **CREDIT LIMIT:** Set between **4 – 50**. Factory Default = **30**. Set the maximum credits allowed.
- #24 **ALLOW HIGH SCORES:** Set to **YES** or **NO**. Factory Default = **YES**. When set to **YES**, if a player exceeds the Default Grand Champion or 1-4 High Scores, the player may receive a **High Score Award** (Standard Adjustment 25) and enter their **3 Initials** or **10-Letter Name** (Standard Adjustment 36). Set to **NO** to disable this feature. *The following Standard Adjustments 25-37 are not shown if **NO** is installed.*
- #25 **HIGH SCORE AWARD:** Set to **CREDIT**, **TICKET\*** or **TOKEN\***. Factory Default = **CREDIT**. Set the type of award to be given to the player when the appropriate **Grand Champion Score** or **High Score #1 – #4** threshold or level is achieved. If awarding a **CREDIT**, **TICKET** or **TOKEN** is prohibited in your area, install **NO** in **Allow High Scores** (Standard Adjustment 24). *This adjustment is not shown if **NO** is installed in **Allow High Scores** (Standard Adjustment 24).*
- \*Note: If **TICKET** or **TOKEN** is selected, the game will require an optional Ticket or Token Dispenser and then **Q24 Option** (Standard Adj. 55) must be changed accordingly.*
- #26 **GRAND CHAMPION AWARDS:** Set between **0 – 5**. Factory Default = **1**. Set the number of **High Score Award(s)** (Std. Adj. 25), awarded for exceeding the Grand Champion Score (Standard Adjustment 31). *This adjustment is not shown if **NO** is installed in **Allow High Scores** (Standard Adjustment 24).*
- #27 **HIGH SCORE #1 AWARDS:** Set between **0 – 3**. Factory Default = **1**. Set the number of **High Score Award(s)** (Std. Adj. 25), awarded for exceeding the High Score #1 (Standard Adjustment 32). *This adjustment is not shown if **NO** is installed in **Allow High Scores** (Standard Adjustment 24).*
- #28 **HIGH SCORE #2 AWARDS:** Set between **0 – 2**. Factory Default = **0**. Set the number of **High Score Award(s)** (Std. Adj. 25), awarded for exceeding the High Score #2 (Standard Adjustment 33). *This adjustment is not shown if **NO** is installed in **Allow High Scores** (Standard Adjustment 24).*
- #29 **HIGH SCORE #3 AWARDS:** Set between **0 – 1**. Factory Default = **0**. Set the number of **High Score Award(s)** (Std. Adj. 25), awarded for exceeding the High Score #3 (Standard Adjustment 34). *This adjustment is not shown if **NO** is installed in **Allow High Scores** (Standard Adjustment 24).*
- #30 **HIGH SCORE #4 AWARDS:** Set between **0 – 1**. Factory Default = **0**. Set the number of **High Score Award(s)** (Std. Adj. 25), awarded for exceeding the High Score #4 (Standard Adjustment 35). *This adjustment is not shown if **NO** is installed in **Allow High Scores** (Standard Adjustment 24).*
- #31 **GRAND CHAMPION SCORE:** Set between **1,000,000 – 1,000,000,000** (increments of 1,000,000). Factory Default = **\_\_,000,000**. Set the desired **Grand Champion Score** level a player needs to exceed to earn the **High Score Award** (Standard Adjustment 25). A score higher than the default, cannot be reset by Standard Adjustment 37, **HSTD Reset Count**. *The Grand Champion Score will revert to the Factory Default Score **ONLY** if a **Reset Grand Champion** is performed in the **RESET MENU** (via the **UTILITIES MENU**, see Section 3, Chapter 5) or if the game is without power for more than 12 hours after the CPU/Sound PCB Coin Cell Battery is expired or removed. This adjustment is not shown if **NO** is installed in **Allow High Scores** (Standard Adjustment 24).*
- #32 **HIGH SCORE #1:** Set between **1,000,000 – 1,000,000,000**. Factory Default = **\_\_,000,000**. Set the desired **High Score #1** level a player needs to exceed to earn the **High Score Award** (Standard Adjustment 25). A score higher than the default, will be reset by Standard Adjustment 37, **HSTD Reset Count**. *The High Score will revert to the Factory Default Score **ONLY** if a **Reset High Scores** is performed in the **RESET MENU** (via the **UTILITIES MENU**, see Section 3, Chapter 5) or if the game is without power for more than 12 hours after the CPU/Sound PCB Coin Cell Battery is expired or removed. This adjustment is not shown if **NO** is installed in **Allow High Scores** (Standard Adjustment 24).*
- #33 **HIGH SCORE #2:** Set between **1,000,000 – 1,000,000,000**. Factory Default = **\_\_,000,000**. Set the desired **High Score #2** level a player needs to exceed ... (continued in Standard Adjustment 32 definition above).
- #34 **HIGH SCORE #3:** Set between **1,000,000 – 1,000,000,000**. Factory Default = **\_\_,000,000**. Set the desired **High Score #3** level a player needs to exceed ... (continued in Standard Adjustment 32 definition above).
- #35 **HIGH SCORE #4:** Set between **1,000,000 – 1,000,000,000**. Factory Default = **\_\_,000,000**. Set the desired **High Score #4** level a player needs to exceed ... (continued in Standard Adjustment 32 definition above).
- #36 **HSTD (HIGH SCORE TO DATE) INITIALS:** Set to **3 INITIALS** or **10 LETTER NAME**. Factory Default = **3 INITIALS**. When set to **3 INITIALS**, the player is allowed only 3 initials to input. When set to **10 LETTER NAME**, the player is allowed to enter 10 initials to input. *This adjustment is not shown if **NO** is installed in **Allow High Scores** (Standard Adjustment 24).*

Standard Adjustments 37-49 continued on the next page.



## Standard Adjustments continued.

- #37 **HSTD (HIGH SCORE TO DATE) RESET COUNT:** Set between **100 – 9900** or **OFF** (increments of 100). Factory Default = **2000**. Set the number of games between "automatic resets" of High Scores back to the Factory Defaults for **ONLY** Standard Adj. **32 – 35, High Score #1 – #4**. The High Score will revert to the Factory Default Scores when the number of games stated is reached. **Reset High Scores** can be performed in the **RESET MENU** (via the **UTILITIES MENU**, see Sec. 3, Chp. 5) anytime or if the game is without power for more than 12 hours after the CPU/Sound PCB Coin Cell Battery is expired or removed. This adjustment is not shown if **NO** is installed in **Allow High Scores** (Standard Adj. 24).
- #38 **FREE PLAY:** Set to **YES** or **NO**. Factory Default = **NO**. When set to **YES**, no coins are required for Game Play.
- #39 **LANGUAGE:** Set to **ENGLISH, GERMAN, FRENCH, SPANISH** or **ITALIAN**. Factory Default = **ENGLISH**. Set the language for the game. Language of game is also shown in the Dot Display (along with the Game Title and code version) at the start-up routine which follows a game reset or power-up.
- #40 **PLAYER LANGUAGE SELECT:** Set to **YES** or **NO**. Factory Default = **YES**. When set to **YES**, after the player presses the **Start Button** (to start a game with adequate credit), the player has the option to choose a language by pressing either **Flipper Button** before game start (options of languages installed are shown on the Dot Display). **Note:** If set to **NO** or if only one language is installed and the setting is set to **YES**, the game will start immediately after the **Start Button** press. Language(s) available are dependent on game destination from the factory. Other languages may be available on-line for download and installed on your game. With the proper dip switch installed, the language option(s) can be changed. For more information or help, call Technical Support at 800-542-5377 (708-345-7700).
- #41 **CUSTOM MESSAGE:** Set to **ON, CHANGE** or **OFF**. Factory Default = **ON**. Shortcut: **Enter Custom Message** and instructions, review Sec. 3, Chp. 5, **GO TO UTILITIES MENU, Enter Custom Message**.
- #42 **FLASH LAMP POWER:** Set to **NORMAL, OFF** or **DIM**. Factory Default = **NORMAL**. When set to **DIM**, the Flash Lamps impulse power is reduced by **25%** and when set to **OFF** the Flash Lamps will not flash. For Flash Lamps used in this game, **Go To Flash Lamps Menu** via the **DIAGNOSTICS MENU** (see Section 3, Chapter 2, **GO TO DIAGNOSTICS MENU, Page 15**).
- #43 **COIL PULSE POWER:** Set to **NORMAL, HARD** or **SOFT**. Factory Default = **NORMAL**. When set to **HARD**, the coil pulse power is **increased** by **12.5%** of the normal pulse rate. When set to **SOFT** the coil pulse power is **decreased** by **12.5%** of the normal pulse rate. This adjustment is provided to compensate for **Low Line** or **High Line voltage** conditions where the solenoids (coils) appear to **kicking too weak** or **too hard**. Adjust as required.
- #44 **KNOCKER VOLUME:** Set to **NORMAL, OFF** or **LOW**. Factory Default = **NORMAL**. When set to **LOW**, the volume is decreased **50%**. When set to **OFF**, no sound is heard when the "knocker" is sounded. Test the knocker sound in the **Fire Knocker Test** via the **DIAGNOSTICS MENU** (see Section 3, Chapter 2, **GO TO DIAGNOSTICS MENU, Page 19**).
- #45 **GAME RESTART:** Set to **YES** or **NO**. Factory Default = **YES**. When set to **YES**, a new game may be started during any ball after the first ball is completed (if credits allow). Pressing the Start Button during the first ball will add additional players (up to 4, if credits allow). When set to **NO**, the game disables the Start Button after the first ball until the final ball is in play.
- #46 **BILL VALIDATOR:** Set to **YES** or **NO**. Factory Default = **NO**. When set to **YES**, in **Game Attract Mode** an "Insert Bill Animation" is shown in the display (or just the absence of the Coin Animation). When set to **NO**, an "Insert Coin Animation" is shown. **Not yet implemented.**
- #47 **MUSIC VOLUME:** Set between **1 – 15**. Factory Default = **1**. After volume is set via Service Buttons this adjustment can be utilized to adjust the background music (1 all the way on, 15 all the way off) while keeping the Special Sound Effects at the same level.
- #48 **BALL SAVE TIME:** Set between **0:01 – 0:15, AUTO** or **NO BALL SAVES**. Factory Default = **0:05**. When set to **NO BALL SAVES** this feature is unavailable. Set between **0:01** through **0:15** (single increments) for the ball to be sent back into play if the time set is not met (per ball). Set to **AUTO** to automatically adjust the Ball Save Timer based on the average ball time.
- #49 **TIMED PLUNGER:** Set to **OFF** or **0:01 – 1:00**. Factory Default = **OFF**. The plunger will "Autoplunge" the ball (at the time set) when the ball is at the beginning of play, waiting for the player.

Sec. 3: Go To Adjust.

Standard Adjustments 50-63 continued on the next page.





## Standard Adjustments continued.

- #50 **FLIPPER BALL LAUNCH:** Set to **OFF**, **LEFT FLIPPER**, **RIGHT FLIPPER**, **EITHER FLIPPER** or **BOTH FLIPPERS**. Default is **OFF**. This feature allows the player to operate the Auto Ball Launch with the Flipper Button(s) depending on which setting is chosen.
- #51 **COINDOOR BALL SAVER:** Set to **YES** or **NO**. Factory Default = **NO**. When set to **NO**, this feature is not available. When set to **YES**, this feature allows the Coin Door to be opened during game play; the ball will drain but the game will be placed "on hold". When the Coin Door is closed, the pinball will return to the Shooter Lane, and the game will resume. *Useful at locations where technicians change the cash box regularly at exact times of the day where players can be on the game.*
- #52 **COMPETITION MODE:** Set to **YES** or **NO**. Factory Default = **NO**. When set to **NO**, this feature is not available. Set to **YES**, this feature will equalize random game features and global score values during multi-player games by predetermined competition rules set by programming. If an **Install Competition** was made via the **INSTALLS MENU** (which automatically changes this setting to **YES**), and this setting was changed back to **NO**, the **Competition Mode** will be turned **OFF** (cancelled).
- #53 **CONSOLATION BALL:** Set to **YES** or **NO**. Factory Default = **YES**. When set to **YES**, the **EXTRA BALL** (lamp insert, location varies) will be lit on the last ball in play, if certain programming criteria is met.
- #54 **FAST BOOT:** Set to **YES** or **NO**. Factory Default = **YES**. When set to **NO** or if you hold both **Flipper Buttons** during Power-Up, this feature is not available and will display all normal Power-Up screens. When set to **YES**, the game will not display the normal informative Power-Up screens, specifically the CPU Version screen and the Location/Game ID screen. Regardless of the setting, normal Power-Up safety checks are still performed. **Not yet implemented.**
- #55 **Q24 OPTION:** Set to **COIN METER**, **TOKEN DISPENSER** or **KNOCKER**. Factory Default = **COIN METER**. This Coil (Solenoid) Location is left "open" at the Factory to allow for these optional Mechanisms to be added to the game. If selecting **TOKEN DISPENSER**, Standard Adjustments 3, 14, 20 & 25 should be changed to **TOKEN**. *Call Tech. Support at 1-800-542-5377 if more information is required on this option.*
- #56 **TICKET DISPENSER:** Set to **YES** or **NO**. Factory Default = **NO**. *This adjustment is required only for games which have an optional Deltronics (DL-1275-2 PCB Style, SPI Part Nr. 515-7275-00) Ticket Dispenser installed. Unique CPU Sound Bd. Dip Switch Setting required, changes the Default to YES.*
- #57 **PLAYER COMPETITION:** Set to **YES** or **NO**. Factory Default = **YES**. **Competition Mode** unrandomizes feature events, and standardizes game play and rule sets (varies from game to game) for fair competitions. With at least one credit posted, or with the game set for 'FREE PLAY', during the game-over Attract Mode, press the **Left Flipper Button** and hold it in for approximately one second. The following message will appear on the display for approximately 10 seconds: '**COMPETITION MODE READY ... PRESS START NOW**'. If a game is started (either by pressing the 'START' button for a regular game, or by pressing the 'TOURNAMENT START' button for a tournament game) while this message appears on the display, then competition mode will be enabled for all players during the game. General rules are covered in the Instruction Card. Other *Hints and/or Rules* can be made known on this game either visually (the *Dot Display* or *Flashing Light Inserts*) or can be audible.
- #58 **NOT AVAILABLE THIS GAME / TEAM SCORES:** Set to **YES** or **NO**. Factory Default = **NO**. Set to **YES**, then Team Play will be made available. **Team Play only works in a 4-Player Game**. The totals for Players 1 / 3 (Team 1) & Players 2 / 4 (Team 2) are then displayed individually **as well as** the combined score for **BOTH TEAMS** to enable **Team Play (Doubles)**. *See Section 2, Chapter 1, Game Operation & Features, for non-adjustable Features.*
- #59 **LOCATION ID:** Set between **0** to **9999**. Factory Default = **0**. This adjustment allows the operator to assign a location identification number to the audit print-out sheet. *(Will not be affected by a Factory Reset.)*
- #60 **GAME ID:** Set between **0** to **9999**. Factory Default = **0**. This adjustment allows the operator to assign a game identification number to the audit print-out sheet. *(Will not be affected by a Factory Reset.)*
- #61 **TIME FORMAT:** Set to **12-HOUR** or **24-HOUR**. Factory Default = **12-HOUR**. This adjustments determines how the time is displayed. *Time used for Tournament and Data Dumps where a time stamp is required.*
- #62 **COIN INPUT DELAY:** Set between **30** to **60** or **OFF**. Factory Default = **30**. This adjustment creates a short time delay between the moment the coin is inserted into the **Coin Slot** to the moment the CPU/Sound PCB registers the coin (*30 = approximately 1/2 second*).
- #63 **LOST BALL RECOVERY:** Set to **YES** or **NO**. Factory Default = **NO**. Set to **YES**, at the start of the 5th consecutive ball search (with no scoring between searches), the game will consider any balls in play to be permanently lost and will attempt to recover from this situation by serving a new ball into play from the ball trough. Set to **NO** (to suppress this adjustment behavior) for the game to perform the "ball search" indefinitely until the lost balls are found or replaced.

Sec. 3: Go To Adjust.



# STANDARD ADJUSTMENTS [ #1 – #63 ] ▼

| Nr. | STANDARD ADJUSTMENT NAME | USA DEFAULT | YOUR SETTING |
|-----|--------------------------|-------------|--------------|
| 1   | REPLAY TYPE              | AUTO        |              |
| 2   | ‡ REPLAY PERCENTAGE      | 10%         |              |
| 3   | ‡ REPLAY AWARD           | CREDIT      |              |
| 4   | ‡ REPLAY LEVELS          | 1           |              |
| 5   | ‡ AUTO REPLAY START      | 20,000,000  |              |
| 6   | ‡ DYNAMIC REPLAY START   | 60,000,000  |              |
| 7   | ‡ REPLAY LEVEL #1        | 15,000,000  |              |
| 8   | ‡ REPLAY LEVEL #2        | 30,000,000  |              |
| 9   | ‡ REPLAY LEVEL #3        | 45,000,000  |              |
| 10  | ‡ REPLAY LEVEL #4        | 60,000,000  |              |
| 11  | ‡ REPLAY BOOST           | YES         |              |
| 12  | SPECIAL LIMIT            | 1           |              |
| 13  | ‡ SPECIAL PERCENTAGE     | 10%         |              |
| 14  | SPECIAL AWARD            | CREDIT      |              |
| 15  | FREE GAME LIMIT          | 5           |              |
| 16  | EXTRA BALL LIMIT         | 5           |              |
| 17  | ‡ EXTRA BALL PERCENTAGE  | 25%         |              |
| 18  | GAME PRICING             | USA 10      |              |
| 19  | MATCH PERCENTAGE         | 9%          |              |
| 20  | MATCH AWARD              | CREDIT      |              |
| 21  | BALLS PER GAME           | 3           |              |
| 22  | TILT WARNINGS            | 2           |              |
| 23  | CREDIT LIMIT             | 30          |              |
| 24  | ALLOW HIGH SCORES        | YES         |              |
| 25  | HIGH SCORE AWARD         | CREDIT      |              |
| 26  | GRAND CHAMPION AWARDS    | 1           |              |
| 27  | HIGH SCORE #1 AWARDS     | 1           |              |
| 28  | HIGH SCORE #2 AWARDS     | 0           |              |
| 29  | HIGH SCORE #3 AWARDS     | 0           |              |
| 30  | HIGH SCORE #4 AWARDS     | 0           |              |
| 31  | GRAND CHAMPION SCORE     | 75,000,000  |              |

| Nr. | STANDARD ADJUSTMENT NAME | USA DEFAULT | YOUR SETTING |
|-----|--------------------------|-------------|--------------|
| 32  | HIGH SCORE #1            | 55,000,000  |              |
| 33  | HIGH SCORE #2            | 40,000,000  |              |
| 34  | HIGH SCORE #3            | 30,000,000  |              |
| 35  | HIGH SCORE #4            | 25,000,000  |              |
| 36  | HSTD INITIALS            | 3 INITIALS  |              |
| 37  | HSTD RESET COUNT         | 2000        |              |
| 38  | FREE PLAY                | NO          |              |
| 39  | LANGUAGE                 | ENGLISH     |              |
| 40  | PLAYER LANGUAGE SELECT   | YES         |              |
| 41  | CUSTOM MESSAGE           | ON          |              |
| 42  | FLASH LAMP POWER         | NORMAL      |              |
| 43  | COIL PULSE POWER         | NORMAL      |              |
| 44  | KNOCKER VOLUME           | NORMAL      |              |
| 45  | GAME RESTART             | YES         |              |
| 46  | BILL VALIDATOR           | NO          |              |
| 47  | MUSIC VOLUME             | 1           |              |
| 48  | BALL SAVE TIME           | 0:05        |              |
| 49  | TIMED PLUNGER            | OFF         |              |
| 50  | FLIPPER BALL LAUNCH      | OFF         |              |
| 51  | COINDOOR BALL SAVER      | NO          |              |
| 52  | COMPETITION MODE         | NO          |              |
| 53  | CONSOLATION BALL         | YES         |              |
| 54  | FAST BOOT                | YES         |              |
| 55  | Q24 OPTION               | COIN METER  |              |
| 56  | TICKET DISPENSER         | NO          |              |
| 57  | PLAYER COMPETITION       | YES         |              |
| 58  | TEAM SCORES              | NO          |              |
| 59  | LOCATION ID              | 0           |              |
| 60  | GAME ID                  | 0           |              |
| 61  | TIME FORMAT              | 12-HOUR     |              |
| 62  | COIN INPUT DELAY         | 30          |              |
| 63  | LOST BALL RECOVERY       | YES         |              |

Sec. 3: Go To Adjust.

*Factory Defaults Settings are subject to change during production (especially Standard Adjustments 2, 4, 5, 13, 16-17, 19, 31-35 & 47). ‡ Not all Standard Adjustments are shown. Depending on the setting (whether Factory Default or if changed by the operator), associated adjustments do not appear, if not required. Note: If Game Dip Switch other than USA is installed, different Defaults will appear.*



## Feature Adjustments [ #1 – #26 ]

To initiate, from the **ADJUSTMENTS MENU**, select the "WoF" *Icon*. The Dot Matrix Display will indicate the *adjustment number (in this group), adjust. name, adjust. setting and comment line*. The current adjustment will remain on the display until the next adjustment is viewed or when this sub-menu is exited.

- #1 **LETTER GUESSING DIFFICULTY** : Set to **EXTRA EASY, EASY, MEDIUM, HARD** or **EXTRA HARD**.  
Factory Default = **MEDIUM**. Controls how likely it is that a contestant MAY select an incorrect letter when they are hit to add a letter to the puzzle, according to the following table. The chance increases with each puzzle solved.
- #2 **PUZZLE SOLVING DIFFICULTY** : Set to **EXTRA EASY, EASY, MEDIUM, HARD** or **EXTRA HARD**.  
Factory Default = **MEDIUM**. Controls how much of the puzzle must be filled in before the "Solve Puzzle" light comes on, according to the following table. The difficulty increases with each puzzle solved.

| FEATURE ADJ. #1 | INITIAL % | % INCREASE | MAXIMUM % | FEATURE ADJ. #2 | INITIAL % | % INCREASE | MAXIMUM % |
|-----------------|-----------|------------|-----------|-----------------|-----------|------------|-----------|
| EXTRA EASY      | 0         | 3          | 9         | EXTRA EASY      | 30        | 5          | 50        |
| EASY            | 0         | 4          | 16        | EASY            | 40        | 5          | 65        |
| MEDIUM          | 0         | 5          | 25        | MEDIUM          | 50        | 5          | 75        |
| HARD            | 0         | 7          | 49        | HARD            | 55        | 5          | 80        |
| EXTRA HARD      | 10        | 10         | 70        | EXTRA HARD      | 60        | 5          | 90        |

*Feature Adjustments 3-19 continued on the next page.*





## Feature Adjustments continued.

- #3 **CONTESTANT DIFFICULTY** : Set to **EXTRA EASY, EASY, MEDIUM, HARD** or **EXTRA HARD**.  
Factory Default = **EXTRA EASY**. Controls how easy it is to guess a letter in the puzzle. The difficulty increases after each time 4 puzzles are completed.
- EX. EASY - all 3 contestants add letters; wheel autospins after guessing. • EASY - all 3 contestants add letters; can hit contestants to respin wheel. • MEDIUM - all 3 contestants add letters; must shoot ramp to respin. • Hard - only 1 contestant adds letters; wheel autospins after guessing. • EX. HARD - only 1 contestant adds letters; can hit contestants to respin wheel. • EX. HARD+ - only 1 contestant adds letters; must shoot ramp to respin.
- #4 **FREE SPIN LIGHT DIFFICULTY** : Set to **EASY, MEDIUM** or **HARD**. Factory Default = **MEDIUM**.  
Controls how many Free Spin lights turn on when you shoot the Free Spin Drop Target. This gets harder each target hit.
- EASY - light 4 outlanes. • MEDIUM - light 2 outlanes. • HARD - light 1 outlane.
- #5 **FIRST HARD FREE SPIN COLLECT** : Set between **1 – 10**. Factory Default = **3**. Specifies the first Free Spin collect where ALL of the lanes will turn off instead of just the used one.
- #6 **BIG MONEY LIGHT DIFFICULTY** : Set to **EASY** or **MEDIUM**. Factory Default = **MEDIUM**.  
Controls controls how many Big Money lights turn on when you shoot the Big Money Drop Target. This gets harder each target hit.
- EASY - light 2 lanes. • MEDIUM - light 1 lane
- #7 **FIRST HARD BIG MONEY COLLECT** : Set between **1 – 10**. Factory Default = **3**. Specifies the first Big Money collect where ALL of the lanes will turn off instead of just the used one.
- #8 **WILD CARD DIFFICULTY** : Set to **EASY, MEDIUM, HARD** or **EXTRA HARD**. Factory Default = **MEDIUM**.  
Specifies whether an Extra Ball lit by Wild Card will remain if the ball drains before it's collected.
- EASY - Lit at ball start. • MEDIUM - Lit at game start. • HARD - Off at game start. • EXTRA HARD - Off at ball start
- #9 **WILD CARD EXTRA BALL MEMORY** : Set to **NO** or **YES**. Factory Default = **NO**. Controls how many Free Spin lights turn on when you shoot the Free Spin drop target. This gets harder each target hit.
- #10 **BONUS SPELLOUT DIFFICULTY** : Set to **EXTRA EASY, EASY, MEDIUM, HARD** or **EXTRA HARD**.  
Factory Default = **EASY**. Controls how easy it is to complete the BONUS sequence. This gets harder after each completion of the Bonus Wheel.
- EXTRA EASY - any BONUS shot will spot an unlit BONUS letter. • EASY - each BONUS shot needs to be hit once. • MEDIUM - each BONUS shot needs to be hit twice. • HARD - need to complete BONUS once, then complete BONUS again. • EXTRA HARD - need to spell BONUS once, only one letter lit at a time. • EXTRA HARD+ - need to hit each letter twice, but must hit each letter twice in a row. • EXTRA HARD++ - need to complete BONUS twice, one letter lit at a time.
- #11 **MULTIBALL SPELLOUT DIFFICULTY** : Set to **EXTRA EASY, EASY, MEDIUM, HARD** or **EXTRA HARD**.  
Factory Default = **EXTRA EASY**. Controls how easy it is to complete the MULTIBALL sequence. This gets harder after each Wheel of Fortune Multiball.
- EXTRA EASY - any MULTIBALL target will spot an unlit MULTIBALL letter. • EASY - each MULTIBALL target needs to be hit once. • MEDIUM - each MULTIBALL target needs to be hit twice. • HARD - need to complete MULTIBALL once, then complete MULTIBALL again. • Extra hard - need to spell MULTIBALL once, only one letter lit at a time. • EXTRA HARD+ - need to hit each letter twice, but must hit each letter twice in a row. • EXTRA HARD++ - need to complete MULTIBALL twice, one letter lit at a time.
- #12 **WOF MB JACKPOT DIFFICULTY** : Set to **EXTRA EASY, EASY, MEDIUM, HARD** or **EXTRA HARD**.  
Factory Default = **EXTRA EASY**. Specifies how many jackpots are lit to collect each jackpot level during Wheel of Fortune Multiball. This increases after every Wheel of Fortune Super Jackpot collected.
- EXTRA EASY - all 6 jackpot shots lit. • EASY - 5 jackpot shots lit. • MEDIUM - 4 jackpot shots lit. • HARD - 3 jackpot shots lit. • EXTRA HARD - 2 jackpot shots lit. • EXTRA HARD+ - 1 jackpot shot lit
- #13 **WOF MB JACKPOT RELIGHT DIFFICULTY** : Set to **MEDIUM** or **HARD**. Factory Default = **MEDIUM**.  
Specifies how hard it is to relight jackpots during Wheel of Fortune Multiball. This gets harder after the first Super Jackpot collected that had only 1 shot lit.
- MEDIUM - all 3 contestants always count towards relighting the jackpot. • HARD - cannot shoot the same contestant more than once to relight the jackpot
- #14 **ADD-A-BALL DIFFICULTY** : Set to **EASY, MEDIUM** or **HARD**. Factory Default = **MEDIUM**.  
Specifies how easy it is to complete MULTIBALL in order to add a ball into play during multiball.
- EASY - each MULTIBALL target needs to be hit once. • MEDIUM - each MULTIBALL target needs to be hit twice. • Hard - each MULTIBALL target needs to be hit once, only one lit at a time.
- #15 **LEFT LOOP AWARD THRESHOLD** : Set between **1 – 6**. Factory Default = **4**. Specifies how many loop shots are required to give an award.
- #16 **SUPER LOOPS TIMER** : Set between **3 – 10**. Factory Default = **5**. Controls how long Super Loops are lit after going through a right inlane and after each successful Super Loops shot.
- #17 **SUPER POPS TIMER** : Set between **5 – 15**. Factory Default = **10**. Controls how long Super Pops are lit after going through a left inlane and after each pop bumper hit.
- #18 **RAMP MULTIPLIER TIMER** : Set between **4 – 10**. Factory Default = **5**. Controls how long 2x or 4x scoring is lit after shooting a ramp.
- #19 **FIRST RAMP EXTRA BALL** : Set between **3 – 20**. Factory Default = **10**. Specifies how many ramp shots are required to light the first extra ball.

Feature Adjustments 20-26 continued on the next page.



# Feature Adjustments continued.

- #20 **ADDITIONAL RAMP EXTRA BALLS** : Set between **20 – 75**. Factory Default = **50**. Specifies how many more ramp shots are required to light extra balls after the previous one.
- #21 **MAXIMUM RAMP EXTRA BALLS** : Set between **0 – 10**. Factory Default = **5**. Specifies how many extra balls may be lit from the ramps.
- #22 **RAMP EXTRA BALL MEMORY** : Set to **NO** or **YES**. Factory Default = **YES**. Specifies whether extra balls lit from ramp shots will stay lit if the ball drains before collecting them.
- Use the following if any malfunction and/or are awaiting repair/replacement or its' operation is not desired.
- #23 **DISABLE WHEEL MOTOR** : Set to **YES** or **NO**. Factory Default = **NO**. See #4–#7 Coil and/or Switch 47.
- #24 **DISABLE AUX. DISPLAY (PLAYFIELD)** : Set to **YES** or **NO**. Factory Default = **NO**.
- #25 **DISABLE DROP TARGETS** : Set to **YES** or **NO**. Fact. Def. = **NO**. See #8 Coil and/or Switches 39–41.
- #26 **DISABLE RAMP POST** : Set to **YES** or **NO**. Factory Default = **NO**. See #23 Coil.

## FEATURE ADJUSTMENTS [ #1 – #26 ] ▼

| Nr. | FEATURE ADJUSTMENT NAME       | USA DEFAULT | YOUR SETTING |
|-----|-------------------------------|-------------|--------------|
| 1   | LETTER GUESSING DIFFICULTY    | MEDIUM      |              |
| 2   | PUZZLE SOLVING DIFFICULTY     | MEDIUM      |              |
| 3   | CONTESTANT DIFFICULTY         | EX. EASY    |              |
| 4   | FREE SPIN LIGHT DIFFICULTY    | MEDIUM      |              |
| 5   | FIRST HARD FREE SPIN COLLECT  | 3           |              |
| 6   | BIG MONEY LIGHT DIFFICULTY    | MEDIUM      |              |
| 7   | FIRST HARD BIG MONEY COLLECT  | 3           |              |
| 8   | WILD CARD DIFFICULTY          | MEDIUM      |              |
| 9   | WILD CARD EXTRA BALL MEMORY   | NO          |              |
| 10  | BONUS SPELLOUT DIFFICULTY     | EASY        |              |
| 11  | MULTIBALL SPELLOUT DIFFICULTY | EX. EASY    |              |
| 12  | WOF MB JACKPOT DIFFICULTY     | EX. EASY    |              |
| 13  | WOF MB JACKPOT RELIGHT DIFF.  | MEDIUM      |              |

| Nr. | FEATURE ADJUSTMENT NAME     | USA DEFAULT | YOUR SETTING |
|-----|-----------------------------|-------------|--------------|
| 14  | ADD-A-BALL DIFFICULTY       | MEDIUM      |              |
| 15  | LEFT LOOP AWARD THRESHOLD   | 4           |              |
| 16  | SUPER LOOPS TIMER           | 5           |              |
| 17  | SUPER POPS TIMER            | 10          |              |
| 18  | RAMP MULTIPLIER TIMER       | 5           |              |
| 19  | FIRST RAMP EXTRA BALL       | 10          |              |
| 20  | ADDITIONAL RAMP EXTRA BALLS | 50          |              |
| 21  | MAXIMUM RAMP EXTRA BALLS    | 5           |              |
| 22  | RAMP EXTRA BALL MEMORY      | YES         |              |
| 23  | DISABLE WHEEL MOTOR         | NO          |              |
| 24  | DISABLE AUX DISPLAY         | NO          |              |
| 25  | DISABLE DROP TARGETS        | NO          |              |
| 26  | DISABLE RAMP POST           | NO          |              |

## FEATURE ADJUSTMENTS DIFFICULTY INSTALLS SUMMARY ▼

| Nr. | FEATURE ADJUSTMENT NAME       | RANGE LOW | RANGE HIGH | INSTALL EXTRA EASY | INSTALL EASY | INSTALL MEDIUM (DEFAULT) or 3-BALL | INSTALL HARD or 5-BALL | INSTALL EXTRA HARD |
|-----|-------------------------------|-----------|------------|--------------------|--------------|------------------------------------|------------------------|--------------------|
| 1   | LETTER GUESSING DIFFICULTY    | EX. EASY  | EX. HARD   | EX. EASY           | EASY         | MEDIUM                             | HARD                   | EX. HARD           |
| 2   | PUZZLE SOLVING DIFFICULTY     | EX. EASY  | EX. HARD   | EX. EASY           | EASY         | MEDIUM                             | HARD                   | EX. HARD           |
| 3   | CONTESTANT DIFFICULTY         | EX. EASY  | EX. HARD   | EX. EASY           | EX. EASY     | EX. EASY                           | EASY                   | MEDIUM             |
| 4   | FREE SPIN LIGHT DIFFICULTY    | EASY      | HARD       | EASY               | EASY4        | MEDIUM                             | HARD                   | HARD               |
| 5   | FIRST HARD FREE SPIN COLLECT  | 1         | 10         | 5                  |              | 3                                  | 2                      | 1                  |
| 6   | BIG MONEY LIGHT DIFFICULTY    | EASY      | MEDIUM     | EASY               | EASY         | MEDIUM                             | MEDIUM                 | MEDIUM             |
| 7   | FIRST HARD BIG MONEY COLLECT  | 1         | 10         | 5                  | 5            | 3                                  | 2                      | 1                  |
| 8   | WILD CARD DIFFICULTY          | EASY      | EX. HARD   | EASY               | EASY         | MEDIUM                             | HARD                   | EX. HARD           |
| 9   | WILD CARD EXTRA BALL MEMORY   | NO        | YES        | YES                | YES          | NO                                 | NO                     | NO                 |
| 10  | BONUS SPELLOUT DIFFICULTY     | EX. EASY  | EX. HARD   | EX. EASY           | EASY         | EASY                               | MEDIUM                 | HARD               |
| 11  | MULTIBALL SPELLOUT DIFFICULTY | EX. EASY  | EX. HARD   | EX. EASY           | EX. EASY     | EX. EASY                           | EASY                   | MEDIUM             |
| 12  | WOF MB JACKPOT DIFFICULTY     | EX. EASY  | EX. HARD   | EX. EASY           | EX. EASY     | EX. EASY                           | EASY                   | MEDIUM             |
| 13  | WOF MB JACKPOT RELIGHT DIFF.  | MEDIUM    | HARD       | MEDIUM             | MEDIUM       | MEDIUM                             | HARD                   | HARD               |
| 14  | ADD-A-BALL DIFFICULTY         | EASY      | HARD       | EASY               | EASY         | MEDIUM                             | MEDIUM                 | HARD               |
| 15  | LEFT LOOP AWARD THRESHOLD     | 1         | 6          | 2                  | 3            | 4                                  | 5                      | 6                  |
| 16  | SUPER LOOPS TIMER             | 3         | 10         | 10                 | 7            | 5                                  | 4                      | 3                  |
| 17  | SUPER POPS TIMER              | 5         | 15         | 15                 | 12           | 10                                 | 7                      | 5                  |
| 18  | RAMP MULTIPLIER TIMER         | 4         | 10         | 7                  | 6            | 5                                  | 4                      | 4                  |
| 19  | FIRST RAMP EXTRA BALL         | 3         | 20         | 5                  | 8            | 10                                 | 12                     | 15                 |
| 20  | ADDITIONAL RAMP EXTRA BALLS   | 20        | 75         | 25                 | 40           | 50                                 | 60                     | 75                 |
| 21  | MAXIMUM RAMP EXTRA BALLS      | 0         | 10         | 5                  | 5            | 5                                  | 5                      | 5                  |
| 22  | RAMP EXTRA BALL MEMORY        | NO        | YES        | YES                | YES          | YES                                | YES                    | NO                 |
| 23  | DISABLE WHEEL MOTOR           | NO        | YES        |                    |              | NO                                 |                        |                    |
| 24  | DISABLE AUX DISPLAY           | NO        | YES        |                    |              | NO                                 |                        |                    |
| 25  | DISABLE DROP TARGETS          | NO        | YES        |                    |              | NO                                 |                        |                    |
| 26  | DISABLE RAMP POST             | NO        | YES        |                    |              | NO                                 |                        |                    |

SOME INSTALLS MAY CHANGE ADJUSTMENTS NOT NOTED ABOVE WITH FUTURE UPGRADES. VIEW THE DOT DISPLAY FOR THE LATEST CHANGES OR ADDITIONS. IF ANY, SEE SECTION 3, CHAPTER 5, GO TO INSTALLS MENU, FOR EXPLANATION OF ALL INSTALLS IN THE UTILITIES MENU. WHEN CHANGING INSTALLS, VIEW THE DOT DISPLAY TO SEE THE NEW SETTINGS OF THE ADJUSTMENT. IF THE SETTING STILL INDICATES "(INSTALLED/FACTORY DEFAULT)", INSTALL CHANGE DID NOT AFFECT THE ADJ.

Sec. 3: Go To Adjust.







To initiate, from the **MAIN MENU**, select the "UTIL" *Icon*. The **UTILITIES MENU** provides ways to quickly and easily customize your game with **Installs** (*pre-sets for game Standard & Feature Adjustments*), set-up a **Custom Message** (*short-cut to Standard Adjustment 41, Custom Message*), set-up **Custom Pricing** (*short-cut to Standard Adjustment 18, to the Custom Pricing Sub-Menu*), set-up the **Date and Time** (*required if the date and time is needed to be accurate for data dumps and for tournaments*), reset certain particular game data or perform a complete **Factory Reset** and to download game data, update or backup game code in the **USB MENU**.

All **UTILITIES, INSTALLS, RESETS MENU** and **USB MENU** *Icons* and there usages are explained throughout this chapter in the same order as seen in the Dot Matrix Display. **NOTE:** Depending on Game Type, Version, selections made, Dip Switch settings, location and/or areas, some *Icons* may appear non-functional or may not appear at all. **Installs (Adjustments), Icons and/or functions, order and operation are subject to change. If in doubt use the Factory Default Settings** (*review Install Factory on the next page*).

In displays where changes can be made or to perform a function, use the **GREEN Button** to go [ **BACK** ], exit or escape, the **RED Buttons** to [ **</-** ] MOVE BACK / LEFT / [ **+ / >** ] MOVE FORWARD / RIGHT to view the next audit in the group, and the **BLACK Button** to [ **SELECT** ] the sub-menus.



## Go To Installs Menu

To initiate, from the **UTILITIES MENU**, select the "INST" *Icon*. The **INSTALLS MENU** provides **13** **Installs** to vary **Game Play Difficulty** (*set with Feature Adjustments*) or **Game Play Type** and **Install Factory** (*restores all adjustments to Factory Defaults*).

For **detailed customization** or to check current **Adjustments Defaults** (*either changed by YOU in the Adjustments Menu or by this INSTALLS MENU or for Factory Default Settings*), see **Section 3, Chapter 4, GO TO ADJUSTMENTS MENU**. After completing one or more of the **Installs** in this chapter, go back to the **ADJUSTMENTS MENU** to see which **Standard and/or Feature Adjustments** have changed (*Feature Adjustments and/or settings are subject to change during production, and may differ than what is described in the tables at the end of this chapter*). The Dot Display will indicate if a setting is a **Factory Default** or not. If the settings are not to your liking, perform **one** of the following:

- 1.: Manually change the Standard & Feature Adjustments Settings** (*perform this task in the ADJUSTMENTS MENU, see Section 3, Chapter 4, GO TO ADJUSTMENTS MENU*).
- 2.: Install Factory** (*see the last install*) on how to reset all of the **Standard & Feature Adjustments** back to the **Factory Default Settings**.

Multiple **Installs can be set** to vary game play; however, for **Installs** that have *one or more* Adjustments in common, the **last** "Install" selected & **activated**, will **supersede** any previously changed Adjustment(s) from any prior **Installs**. Any adjustments which you changed and are not affected by the Install will remain as set.

For example, if you want a **5-BALL Game** set to **EXTRA EASY**: Select and **activate** the "5BAL" *Icon first* (which will typically change any **Feature** Difficulty Adjustments to **HARD**), **then** select & **activate** the "X.EZ" *Icon* to **change back** the Difficulty Adjustments to **EXTRA EASY**. However, if the "X.EZ" *Icon* was selected & **activated** first, **then** the "5BAL" *Icon* was selected & **activated**, the game will be set to a **5-BALL Game** set to **HARD**.

Remember, use the **GREEN Button** to go [ **BACK** ], exit or escape and the **BLACK Button** to [ **SELECT** ] to **INSTALL** your new setting(s).

**INSTALLS MENU** continued on the next page.

## INSTALLS MENU Continued.



Install Extra Easy, Easy, Medium (**Normal or Factory Settings**), Hard or Extra Hard

To initiate, from the **INSTALLS MENU**, select one of the "X.EZ," "EASY," "FACT," "HARD," or "X.HD" *Icons*. The Dot Matrix Display will indicate the **INSTALL EXTRA EASY, EASY, MEDIUM, HARD or EXTRA HARD** depending on choice. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Difficulty** level.



### Install 3-Ball

To initiate, from the **INSTALLS MENU**, select the "3BAL" *Icon*. The Dot Matrix Display will indicate the **INSTALL 3-BALL**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Type** to 3 Balls per game (*Factory Default is 3 Balls per game, not including extra's...*).



### Install 5-Ball

To initiate, from the **INSTALLS MENU**, select the "5BAL" *Icon*. The Dot Matrix Display will indicate the **INSTALL 5-BALL**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Type** to 5 Balls per game (*not including extra balls earned by the player, if any*).



### Install Competition

To initiate, from the **INSTALLS MENU**, select the "COMP" *Icon*. The Dot Matrix Display will indicate the **INSTALL COMPETITION**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Type** to "Tournament" Rules. *Programming varies and is subject to change.*



### Install Director's Cut

To initiate, from the **INSTALLS MENU**, select the "DCUT" *Icon*. The Dot Matrix Display will indicate the **INSTALL DIRECTOR'S CUT**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Type** to programmer's choice. *Programming varies and is subject to change.*



### Install Home Play

To initiate, from the **INSTALLS MENU**, select the "HOME" *Icon*. The Dot Matrix Display will indicate the **INSTALL HOME PLAY**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Type** to "Home" Rules. *Programming varies and is subject to change.*



### Install Novelty

To initiate, from the **INSTALLS MENU**, select the "NOV" *Icon*. The Dot Matrix Display will indicate the **INSTALL NOVELTY**. Follow the on-screen prompts to perform the **Install**.

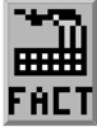
\*\*\*\*\* This setting is recommended where local laws restrict certain game features. \*\*\*\*\*  
Set the **Game Play Type** to "Restricted" Rules. *Programming varies and is subject to change.*



### Install Add-A-Ball

To initiate, from the **INSTALLS MENU**, select the "A.A.B." *Icon*. The Dot Matrix Display will indicate the **INSTALL ADD-A-BALL**. Follow the on-screen prompts to perform the **Install**.

\*\*\*\*\* This setting is recommended where local laws restrict certain game features. \*\*\*\*\*  
Set the **Game Play Type** to "Restricted" Rules. *Programming varies and is subject to change.*



### Install Factory

To initiate, from the **INSTALLS MENU**, select the "FACT" *Icon*. The Dot Matrix Display will indicate the **INSTALL FACTORY**. Follow the on-screen prompts to perform the **Install**. **CAUTION!** All **Standard and Feature Adjustments** which were changed in the **INSTALLS MENU** or **ADJUSTMENTS MENU** are returned to the **Factory Defaults** (as indicated in the Dot Display in the **ADJUSTMENTS MENU**). *Note: To perform a complete **Factory Reset**, GO TO THE RESETS MENU. Escape back to the UTILITIES MENU, select the "RESET" Icon, then select the "FACT" Icon in the RESETS MENU (review the end of this chapter, Page 38, Reset Factory Settings).*





## Enter Custom Message

To initiate, from the **UTILITIES MENU**, select the "ABCD CUST MSG" *Icon*. The **SET CUSTOM MESSAGE** (a short-cut for Standard Adjustment **41, Custom Message**) provides an opportunity to have a text message appear in the the **Attract Mode**. Follow the on-screen prompts to complete [ END ].

Remember, use the **GREEN Button** to go [ **BACK** ], exit or escape, the **RED Buttons** to [ **</-** ] MOVE LEFT / CHOOSE NEXT [ **+/>** ] MOVE RIGHT / CHOOSE PREVIOUS, and the **BLACK Button** to [ **SELECT** ] as 'OK'.



## Set Custom Pricing

To initiate, from the **UTILITIES MENU**, select the "PRIC" *Icon*. The **CUSTOM PRICING MENU** (a short-cut for Standard Adjustment **18, Game Pricing**, and setting selected is **CUSTOM**) provides an opportunity to set **Custom Pricing**.

**Note ! MONETARY AMOUNT MUST BE SELECTED FIRST!** Press [ **BACK** ] to - DECREASE or [ **SELECT** ] to + INCREASE the [ **< \$ >** ] monetary amount (e.g. look at the right side of the display from **\$0.25** to **\$0.50** ). Press [ **</-** ] to - DECREASE or [ **+/>** ] to + INCREASE the **credit quantity** (e.g. look at the left side of the display from **0 CREDITS AT:** to **1 CREDIT AT:**).

**IF EXAMPLE CUSTOM PRICING SETTING DESIRED IS :**

1 Play for \$0.50, 3 Plays for \$1.00 and 7 Plays for \$2.00

**THEN YOU WILL NEED TO PERFORM THE FOLLOWING :**

### REMINDER

In these menus:

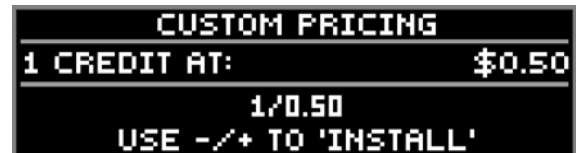
Press [ **BACK** ] to - DECREASE [ **< \$** ]

Press [ **SELECT** ] to + INCREASE [ **\$ >** ]

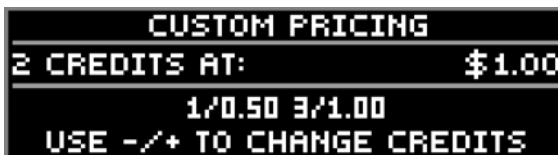
**Step 1** The starting display appears as below if no prior **Custom Pricing** was installed.



**Step 2** Press [ **SELECT** ] to + INCREASE to **\$0.50**. Press [ **+/>** ] to + INCREASE to 1 CREDIT AT:



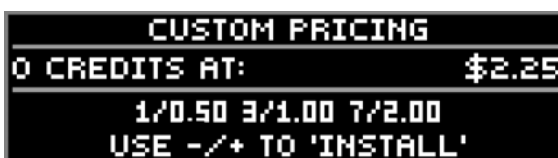
**Step 3** Press [ **SELECT** ] to + INCREASE to **\$1.00**. Press [ **+/>** ] to + INCREASE to 2 CREDITS AT:



**Step 4** Press [ **SELECT** ] to + INCREASE to **\$2.00**. Press [ **+/>** ] to + INCREASE to 4 CREDITS AT:



**Step 5** Press [ **SELECT** ] to + INCREASE the amount once (example = **\$2.25**). Press [ **</-** ] once ...



**Step 6** Press [ **SELECT** ] to **INSTALL**. Press [ **</-** ]/[ **+/>** ] or [ **BACK** ] to edit.



... or press [ **+/>** ] eleven times until **INSTALL** appears.

**Step 7** Press [ **SELECT** ], press [ **BACK** ] twice to exit the **SERVICE MENU** with your **Custom Pricing** installed.



To correct or make new changes, reenter, which brings you to **Step 6**. Press [ **BACK** ] repeatedly until the monetary amount shown is the desired amount and then continue following the above steps with your new or corrected settings. *If you are still having difficulty or if you have any questions, please call Technical Support 800-542-5377 or 708-345-7700, option 1.*





## Set Date / Time

To initiate, from the **UTILITIES MENU**, select the "TIME" *Icon*. The **SET TIME MENU** appears with the **MONTH** flashing. Setting the date and time is required for 'Data Dumps' and Tournament Start and End Dates. If the setting of Standard Adjustment **61, Time Format**, is set to **12-HOUR** (*Factory Default*) the time will be expressed in the **AM / PM format**. If Standard Adjustment **61, Time Format**, is set to **24-HOUR** the time will be expressed in the **24-hour format**.



## Go To Resets Menu

To initiate, from the **UTILITIES MENU**, select the "RESET" *Icon*. The **RESETS MENU** provides six (6) functions to reset *only the Coin Audits*, reset *only the Game Audits*, reset *only the Grand Champion Score*, reset *only the High Score(s)*, reset *only the paid Credits (includes Service Credits)* or to reset **ALL DATA** back to the **Factory Default Settings**.



### Reset Coin Audits

To initiate, from the **RESET MENU**, select the "COIN" *Icon*. **⚠ ONLY the Coin Audits** [ Earnings Audits **5-12** ], will be reset to zero (0), *Factory Default Settings*. Follow the on-screen prompts to perform the **Reset**.



### Reset Game Audits

To initiate, from the **RESET MENU**, select the "AUD" *Icon*. **⚠ ONLY the Game Audits** [ Earnings Audits **1-4**, Standard Audits **1-59** and Feature Audits **1-XX\*** ], will be reset to zero (0), *Factory Default Settings*. Follow the on-screen prompts to perform the **Reset**. \*varies per game title.



### Reset Grand Champion (Score)

To initiate, from the **RESET MENU**, select the "GC" *Icon*. **⚠ ONLY the Grand Champion Score** [ adjustable via Standard Adjustment **31** ], will be reset to *Factory Default Setting*. Follow the on-screen prompts to perform the **Reset**.



### Reset High Scores

To initiate, from the **RESET MENU**, select the "HSTD" *Icon*. **⚠ ONLY the High Score(s)** [ adjustable via Standard Adjustments **32-35** ], will be reset to *Factory Default Setting(s)*. Follow the on-screen prompts to perform the **Reset**. **Note:** *High Scores (but not Grand Champion Score) are reset automatically every 2,000 games (Factory Default Setting) [adjustable via Standard Adjustment **37, HSTD Reset Count** ]*.



### Reset Credits

To initiate, from the **RESET MENU**, select the "CRED" *Icon*. **⚠ ONLY the Credits (includes Service Credits)** [ adjustable via Standard Adjustment **23, Credit Limit** ], will be reset to zero (0), *Factory Default Settings*. Follow the on-screen prompts to perform the **Reset**.



### Reset Factory Settings

To initiate, from the **RESET MENU**, select the "FACT" *Icon*. **⚠ ALL GAME DATA IS RESET!** (*with the exception of Earnings Audit **13**, Software Meter*). **NOTE: IF YOU HAD SET-UP CUSTOM PRICING OR HAD CHANGED ANY ADJUSTMENTS OR PERFORMED INSTALLS, IT IS SUGGESTED TO WRITE DOWN YOUR CHANGES PRIOR TO THE FACTORY RESET.** Follow the on-screen prompts to perform the **Reset**.



## Go To USB Menu

To initiate, from the **UTILITIES MENU**, select the "USB" *Icon*. The **USB MENU** provides three (3) functions to download game data, update your game code or backup your code onto a USB Memory Stick. *Review the inside cover for information on how to update your game code.*



### Dump to USB Memory Stick

To initiate, from the **USB MENU**, select the "DUMP" *Icon*. Follow the on-screen prompts to perform a **Data Dump** (download).



### Update Game Code

To initiate, from the **USB MENU**, select the "UPDT" *Icon*. Follow the on-screen prompts *or review the inside cover for more information.*



### Backup to USB Memory Stick

To initiate, from the **USB MENU**, select the "BKUP" *Icon*. Follow the on-screen prompts to perform a **Backup** (game code only). This backup feature does not retain adjustments and/or settings changes made.





To initiate, from the **MAIN MENU**, select the "TOUR" *Icon*. The **TOURNAMENT MENU** provides ways to quickly and easily start and stop a tournament. Also, tournament data can be viewed (*audits, prize info, etc.*).

All **TOURNAMENT MENU** *Icons* and their usages are explained throughout this chapter in the same order as seen in the Dot Matrix Display. **NOTE:** Depending on Game Type, Version, selections made, Dip Switch settings, location and/or areas, some *Icons* may appear non-functional or may not appear at all. **Icons and/or functions, order and operation are subject to change.**

In displays where changes can be made or to perform a function, use the **GREEN Button** to go [ **BACK** ], exit or escape, the **RED Buttons** to [ **</-** ] HIGHLIGHT PREVIOUS or DECREASE / [ **+ / >** ] HIGHLIGHT NEXT or INCREASE to highlight the desired option, and the **BLACK Button** to [ **SELECT** ] it or activate.



## Start Tournament

To initiate, from the **TOURNAMENT MENU**, select the "STRT" *Icon*. The **START TOURNAMENT MENU** allows the operator to start a tournament. Select **QUICK START** or **CUSTOM** Tournament Start. For the first time Tournament Set-Up, it is recommended to select **CUSTOM**. Follow the on-screen prompts.

After completion of all options in **QUICK START** or **CUSTOM**, the Tournament is started, the **START TOURNAMENT MENU** is exited and returns to the **TOURNAMENT MENU**.

### QUICK START :

Increase or decrease the: • **DAYS, HOURS and MINUTES** • **PRIZE POOL \$ (DOLLAR) and ¢ (CENT) AMOUNT**  
• **INCREMENT THE PRIZE POOL PER PLAY INCREASES \$ and ¢ AMOUNT**

### CUSTOM START :

- Confirm the current date and time (*if it was not set previous via the UTILITIES MENU it can be set-up in this display as well*). Enter the **MONTH, DAY, YEAR** and **TIME**
- Choose the Tournament **Start Date: MONTH, DAY, YEAR** and **TIME**
- Choose the Tournament **End Date: MONTH, DAY, YEAR** and **TIME**
- Choose the **CREDITS** per play desired (01-10). Set the maximum number of *Credits* that may be accumulated per game. **Note:** *The current pricing is displayed; to change pricing GO TO THE ADJUSTMENTS MENU.*

Increase or decrease the: • **PRIZE POOL \$ (DOLLAR) and ¢ (CENT) AMOUNT**  
• **INCREMENT THE PRIZE POOL PER PLAY INCREASES \$ and ¢ AMOUNT**  
• **MAXIMUM (CAP) PRIZE POOL \$ and ¢ AMOUNT.**

- Increase or decrease the number of **PRIZES** (01-05 **HIGH SCORE**; 02-05 **B'N'W**). Set the maximum # of *Prize Positions* to be awarded during a Tournament. **Selections are as follows** (*% distribution cannot be changed*):

|           |           | HIGH SCORE: |     |            |  |           | BUMP N' WIN : |           |           |           |           |           |           |     |     |     |     |     |     |     |     |     |     |
|-----------|-----------|-------------|-----|------------|--|-----------|---------------|-----------|-----------|-----------|-----------|-----------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Set to 01 | 1 Winner  | 100%        | (1) | Prize Pool | Cannot set to 01. Minimum of 2 winners required. |           |               |           |           |           |           |           |           |     |     |     |     |     |     |     |     |     |     |
| Set to 02 | 2 Winners | 65%         | (1) | 35%        | (2)  | Set to 02 | 2 Winners     | 65%       | (1)       | 35%       | (2)       |           |           |     |     |     |     |     |     |     |     |     |     |
| Set to 03 | 3 Winners | 50%         | (1) | 30%        | (2)  | 20%       | (3)           | Set to 03 | 3 Winners | 50%       | (1)       | 25%       | (2)       | 25% | (3) |     |     |     |     |     |     |     |     |
| Set to 04 | 4 Winners | 50%         | (1) | 25%        | (2)  | 15%       | (3)           | 10%       | (4)       | Set to 04 | 4 Winners | 40%       | (1)       | 20% | (2) | 20% | (3) | 20% | (4) |     |     |     |     |
| Set to 05 | 5 Winners | 50%         | (1) | 20%        | (2)  | 15%       | (3)           | 10%       | (4)       | 5%        | (5)       | Set to 05 | 5 Winners | 40% | (1) | 15% | (2) | 15% | (3) | 15% | (4) | 15% | (5) |

- Select the **AWARD TYPE** (**CASH, POINTS, PRIZE, TICKETS** or **NONE**). Select **CASH** for the displays to represent the Prize Pool amount (*based on Jackpot Base and Max.*) in **\$Dollars**. Select **POINTS** for the display to represent the Prize Pool amount in **Points**. Select **PRIZE**, if applicable. Select **TICKET** for the display to represent the Prize Pool amount in **Tickets**. Select **NONE NOTTO** represent anything.

*Custom Start continued on the next page.*

## CUSTOM START Continued.

The following option is available only if **CASH** was selected as the **AWARD TYPE**.

- Select the option to **SHOW PLAYER CASH** (YES or NO). Select **YES** for the display to represent the >>> **previous** <<< Tournament Winners & Cash amount (or Points, Prizes, etc.) will show in the **Attract Mode**.
- Select the kind of **TOURNAMENT** desired (BUMP 'N' WIN or HIGH SCORE).

The following options are available only if **BUMP 'N' WIN** was selected as the **TOURNAMENT TYPE**.

- Select or confirm the **BASE POINT AMOUNT** (00 or 1,000,000 – 4,294,967,295 increments of 1,000,000).
- Select or confirm the **RANGE AMOUNT** (00 or 1,000,000 – 4,294,967,295 increments of 1,000,000).
- Select the **BALLS** per game (1 – 10).



## STOP TOURNAMENT

To initiate, from the **TOURNAMENT MENU**, select the "STOP" *Icon*. The **STOP TOURNAMENT MENU** allows the operator to stop a tournament. **Note:** This *Icon* only appears if a Tournament was set-up and is running (in place of the Start *Icon*).

### STOP TOURNAMENT ARE YOU SURE?

- Use the **BLACK Button** to [ **SELECT** ] to confirm. Press the **BLACK Button** again to continue.

The **STOP TOURNAMENT MENU** is exited and returns to the **TOURNAMENT MENU**.



## VIEW TOURNAMENT DATA

To initiate, from the **TOURNAMENT MENU**, select the "DATA" *Icon*. If no data is available, the display will indicate NO PREVIOUS DATA. Press the **GREEN Button** to escape [ **BACK** ] to the **TOURNAMENT MENU**.



## TOURNAMENT AUDITS [ #1 – #14 ]

To initiate, from the **TOURNAMENT MENU**, select the "AUD" *Icon*. The Dot Matrix Display will indicate the *audit number (in this group)*, *audit name* and the *audit total or value*. The current audit will remain on the display until the next audit is viewed or when this sub-menu is exited.

- |    |   |
|----|---|
| 01 | <b>TOTAL PLAYS</b> : Total number of <i>Regular</i> and <i>Tournament Games</i> played while a <i>Tournament</i> is in progress. This total is derived by adding the below <i>Tournament Audit 02</i> with <b>Regular Plays</b> . |
| 02 | <b>TOURNAMENT PLAYS</b> : Total number of <i>Tournament Games</i> played while a <i>Tournament</i> is in progress.  |
| 03 | <b>TOTAL QUALIFYING PLAYS</b> : Total number of times a player qualified ( <i>invited to enter name</i> ).  |
| 04 | <b>TOTAL GAME EARNINGS</b> : Total Gross Earnings <i>accepted</i> , while a <i>Tournament</i> is active ( <i>in progress</i> ).   |
| 05 | <b>TOTAL TOUR. EARNINGS</b> : <i>Tournament Earnings (Audit 04 less Reg. Game Earnings)</i> while a <i>Tournament</i> is in progress.   |
| 06 | <b>JACKPOT (PRIZE POOL TOTAL)</b> : Total Prize Pool ( <i>Jackpot</i> ) Amount to be paid out while a <i>Tournament</i> is in progress.   |
| 07 | <b>NET EARNINGS</b> : Provides the total Net Earnings ( <i>Gross Earnings less Prize Pool</i> ) while a <i>Tournament</i> is active ( <i>in progress</i> ).   |
| 08 | <b>ACCUM. TOTAL PLAYS</b> : Accumulative total amount of <i>Regular &amp; Tour. Games</i> played since the first <i>Tournament</i> was played.  |
| 09 | <b>ACCUM. TOUR. PLAYS</b> : Accumulative total amount of <i>Tournament Games</i> played since the first <i>Tournament</i> was played.   |
| 10 | <b>ACCUM. QUALIFYING PLAYS</b> : Accumulative total number of times a player qualified ( <i>invited to enter name</i> ).  |
| 11 | <b>ACCUM. EARNINGS</b> : Total Gross Earnings <i>accepted</i> , since the first <i>Tournament</i> was played.   |
| 12 | <b>ACCUM. TOUR EARNINGS</b> : Accumulative total <i>Tournament Game Earnings</i> since the first <i>Tournament</i> was played.  |
| 13 | <b>ACCUM. JACKPOT</b> : Accumulative total of Prize Pool ( <i>Jackpot</i> ) Amounts paid out since the 1st <i>Tourn.</i> was played.  |
| 14 | <b># TOURNAMENTS</b> : Number of <i>Tournaments (not individual Tournament Games)</i> since the first <i>Tournament</i> was played.   |



## SIGN MESSAGES A-B

To initiate, from the **TOURNAMENT MENU**, select the "A-B TEXT" *Icon*. *At time of print, menu non-functional. If made available in future code updates, this menu will allow the operator to display "Location" and "Prize" Messages.* Follow the on-screen prompts to complete [ **END** ].

Remember, use the **GREEN Button** to go [ **BACK** ], exit or escape, the **RED Buttons** to [ **< / -** ] MOVE LEFT / CHOOSE NEXT [ **+ / >** ] MOVE RIGHT / CHOOSE PREVIOUS, and the **BLACK Button** to [ **SELECT** ] as 'OK'.



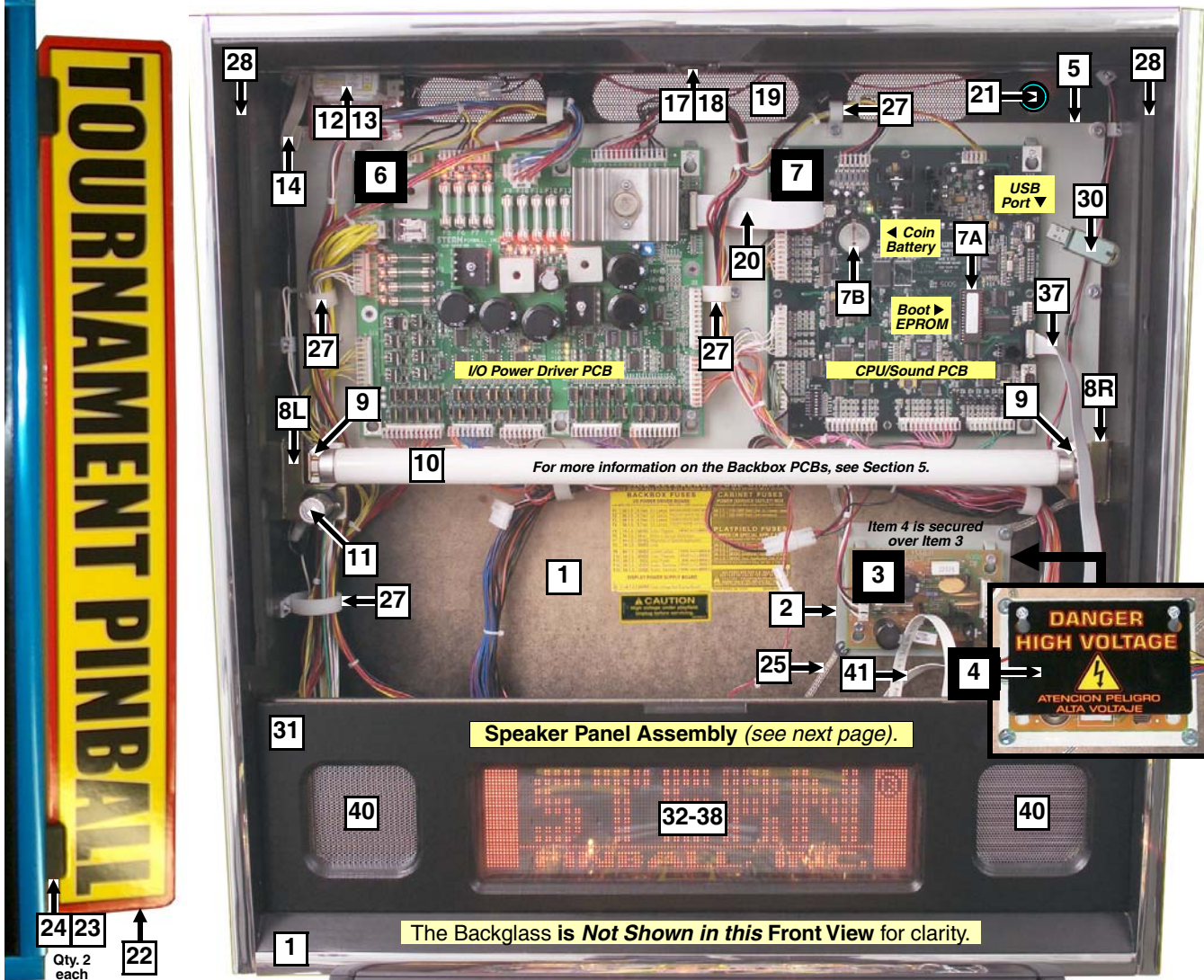


# Parts Identification & Location (The Pink Pages)

## Table of Contents for Section 4, Chapter 1 of 2

|  |                |
|--|----------------|
| <b>Table of Contents for Section 4, Chapter 1</b> .....  | <b>41</b>      |
| <b>Backbox [ S.A.M. System ] - Parts</b> □ .....   | <b>42 – 43</b> |
| ▷ Backbox & Tournament Header Sign Front Views ▷ Backbox Parts Table ▷ Backglass Parts Table                       |                |
| <b>Speaker Panel [ S.A.M. System ] - Parts</b> □ .....   | <b>43</b>      |
| ▷ Speaker Panel Side View ▷ Speaker Panel Parts Table  |                |
| <b>Cabinet - Parts</b> ■ <b>&amp; Switches</b> □ .....   | <b>44 – 45</b> |
| ▷ Cabinet Inside Views ▷ Cabinet Parts & Switches Table  |                |
| <b>Playfield Top - Miscellaneous Parts</b> □ <b>&amp; Brackets</b> ■ .....   | <b>46</b>      |
| ▷ Playfield Location & Bottom Arch Drawings ▷ Misc. Parts (Above) Table ▷ Misc. Brackets (Above) Table             |                |
| <b>Playfield Bottom - Miscellaneous Parts</b> ■ <b>&amp; Brackets</b> ■ .....                                      | <b>47</b>      |
| ▷ Playfield & Back Panel Location Drawings ▷ Misc. Parts (Below) Table ▷ Misc. Brackets (Below) Table              |                |
| <b>Playfield Top - Switches (Above)</b> □ .....  | <b>48</b>      |
| ▷ Playfield Location Drawing   |                |
| <b>Playfield Bottom - Switches (Below)</b> ■ .....   | <b>49</b>      |
| ▷ Playfield Location Drawing   |                |
| <b>Playfield Top - Flat Rails</b> □, <b>Wood Rails</b> ■, <b>Ball Guides</b> ■ <b>&amp; Wire Forms</b> ■ .....     | <b>50</b>      |
| ▷ Playfield Location Drawing ▷ Flat Rails Table ▷ Wood Rails Table ▷ Ball Guides Table ▷ Wire Forms Table          |                |
| <b>Playfield Top - Plastics (Screened &amp; Clear) Kit, Decals &amp; Mylar Kits</b> .....                          | <b>51</b>      |
| ▷ Plastic Shape & Decal Art Drawings   |                |
| <b>Playfield Top &amp; Bottom - Metal Posts</b> □ <b>&amp; Fin Shank Screws</b> ■ (Actual Size) .....              | <b>52 – 53</b> |
| ▷ Metal Posts & Fin Shank Screw Drawings ▷ Metal Posts Table ▷ Fin Shank Screws Table ▷ Playfield Location Drawing |                |
| <b>Playfield Top &amp; Bottom - Nylon Stop, KEPS, Hex, T-, Flange, Pal &amp; Wing Nuts (Actual Size) ....</b>      | <b>53</b>      |
| ▷ Nylon Stop Nuts Table ▷ Keps Nuts Table ▷ Hex Nuts Table ▷ T-Nuts Table ▷ Flange Nuts Table ▷ Pal Nuts Table     |                |
| ▷ Wing Nuts Table  |                |
| <b>Playfield Top - Hex Spacers</b> □ (Actual Size) .....   | <b>54 – 55</b> |
| ▷ Hex Spacers Drawings ▷ Hex Spacers Table ▷ Playfield Location Drawing  |                |
| <b>Playfield Top - Plastic Posts &amp; Spacers</b> □ <b>&amp; Metal Spacers</b> ■ .....                            | <b>56 – 57</b> |
| ▷ Plastic Posts & Spacers Drawings ▷ Plastic Posts & Spacers Table ▷ Playfield Location Drawings                   |                |
| <b>Playfield Top &amp; Bottom - Rubber Parts Black</b> ■ <b>&amp; Blue</b> ■ (Rings Actual Size) .....             | <b>58 – 59</b> |
| ▷ Rubber Parts Drawings ▷ Rubber Bumper Pads Table ▷ Rubber Bumper Post Sleeves Table ▷ Rubber Rings Table         |                |
| ▷ Playfield Location Drawing(s)  |                |
| <b>Playfield Top &amp; Bottom - Small Bayonet Sockets &amp; Bulbs</b> ■ (Actual Size) .....                        | <b>60 – 61</b> |
| ▷ Bulbs & Socket Drawings ▷ Bulbs (#44 / LED & #455) Table ▷ Small Bayonet Sockets Table                           |                |
| <b>Playfield Bottom - Large Bayonet Sockets &amp; Bulbs</b> ■ (Actual Size) .....                                  | <b>61</b>      |
| ▷ Bulbs & Socket Drawings ▷ Bulbs (#89) Table ▷ Large Bayonet Sockets Table  |                |
| <b>Playfield Top &amp; Bottom - Wedge Base Sockets &amp; Bulbs</b> ■ (Actual Size) .....                           | <b>62</b>      |
| ▷ Bulbs & Socket Drawings ▷ Bulbs (#555 & LED / #906) Table ▷ Wedge Base Sockets Table                             |                |

# Backbox [ S.A.M. System ] - Parts



Sec. 4: Parts Id. ...

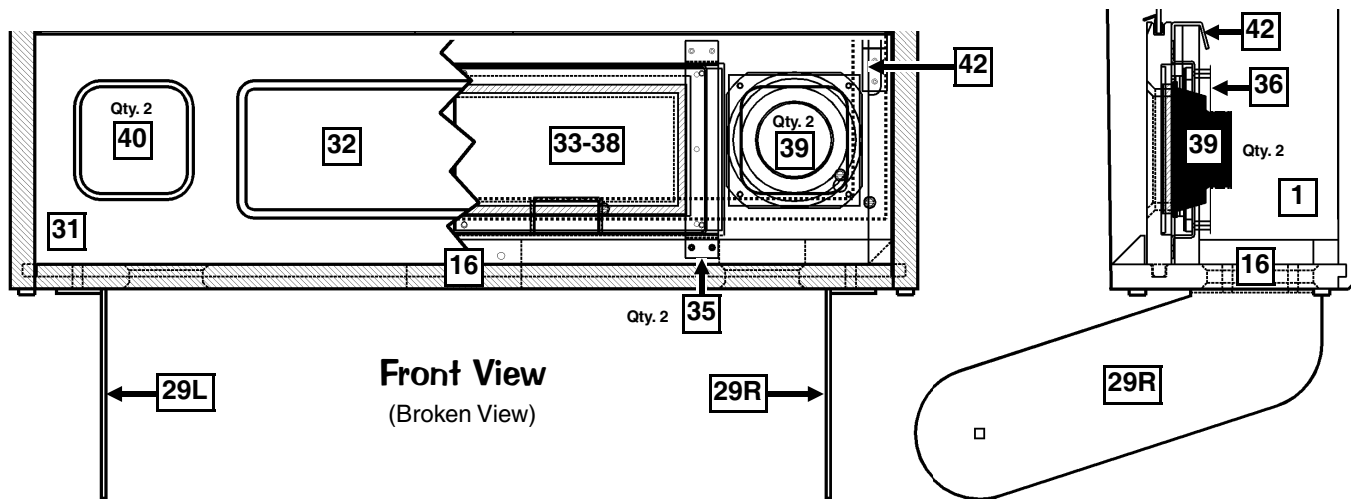
| Nr.   | BACKBOX PARTS                          | QTY. | SPI PART Nr.          | Nr.   | BACKBOX PARTS                             | QTY. | SPI PART Nr. |
|---|--|------|-----------------------|---|---|------|--------------|
| 1   | Backbox <b>WoF™</b> (No Parts)         | 1    | <b>525-5631-18-98</b> | 11  | Starter - Fluorescent (FS2 Light)         | 1    | 165-5011-01  |
| <i>Item 1 Note: Chrome T-Molding is installed and cannot be ordered separately.<br/>Fuse Description (820-6384-00) and High Voltage Caution (UL) (820-6082-01) Decals.</i>  |  |      |                       | 11  | Starter Base (with leads) [on Item 8L]    | 1    | 077-5213-00  |
| 2   | PCB Metal Mounting Plate [Display]     | 1    | 535-9769-00           | Item 11 is secured to Item 8L by: #4-40 X 1/2" PPH MS (Sems) Zc. (Qty. 2) (237-5813-00)   |   |      |              |
| 3   | Display Power Supply PCB               | 1    | <b>520-5138-00</b>    | 12  | Ballast Mounting Plate                    | 1    | 535-8657-00  |
| Item 3 is secured to @ bottom by: #8-32 X 3/8" SHWH Swg. (Zinc) (Qty. 2) (237-5975-00)  |  |      |                       | 13  | Ballast CU452-W 1/2" Core 120v 60 Hz 13W  | 1    | 010-5015-00  |
| 4   | Plastic Cover [DANGER HIGH VOLTAGE]    | 1    | 830-6053-00           | Items 12 & 13 are secured to Item 1 by: #8 X 1/2" SHWH AB (Zinc) (Qty. 2) (234-5101-00)<br><b>&gt;&gt;&gt; CAUTION - VERY HOT! Decal (820-6266-00)</b><br>EU / UK Only : Ballast, 5/8" Core 50/60 Hz (010-5015-01)  |   |      |              |
| Items 3 & 4 are secured to @ top by: 1-1/4" X 3/8" Plastic Spacer Gray (Qty. 2) (254-5000-05) and #8-32 X 1-3/4" SHWH Ser. (Zinc) (Qty. 2) (237-5975-28)  |  |      |                       | 14  | Ground Strap (5")                         | 1    | 600-5006-05  |
| 5   | PCB Metal Mounting Plate [I/O+CPU]     | 1    | 535-9664-00           | 15*   | Roto Lock Male (on Cabinet)               | 1    | 355-5006-01  |
| Items 2 & 5 are secured to Item 1 by: #8 X 1/2" SHWH AB (Zinc) (Qty. 1/hole) (234-5101-00) and #10 Washer 7/32" I.D. X .5" O.D. X 1/16" Thick (Qty. 1/hole) (242-5003-00)<br>Note: Where a Wire Clamp (Item 27) is mounted, a #10 Washer is not required. |  |      |                       | 16  | Roto Lock Female (R2-0002-02)             | 1    | 355-5006-02  |
| 6   | I/O Power Driver PCB [S.A.M. Sys.]     | 1    | <b>520-5249-00</b>    | Item 16 is secured by: #10-24 X 1-3/4" CBSN (231-5022-00), #10-24 Keps Nut (Qty. 2) (240-5207-00), #10-24 X 2" CBSN (231-5045-00) and #10 Washer 7/32" I.D. X .5" O.D. X 1/16" (Qty. 5) (242-5003-00); See opposite next page.                              |   |      |              |
| 7   | CPU/Sound PCB [S.A.M. System]          | 1    | <b>520-5246-00</b>    | 17  | Lock Mounting Plate                       | 1    | 535-0072-00  |
| 7A: 8MB EPROM #M27C801-100F1 (960-5016-00)<br>Ordering Note: Programmed EPROM (965-BOOT-SAM)<br>7B: Coin Cell Battery (CR2430 3V) (000-0644-01)<br>For USB Memory Stick Information, see Item 30 on the next page.  |  |      |                       | 18  | Lock 5/8" Barrel, 3/4"ø, 1.5" Flat Cam    | 1    | 355-5055-00  |
| Items 6 & 7 are secured to Item 5 by: #8-32 X 3/8" SHWH Swage (Zinc) (Qty. 10) (237-5975-00) and 1/4" Sif. Rtn. Spacer White (Qty. 5 [I/O] / Qty. 4 [CPU]) (254-5007-05)  |  |      |                       | Items 17 & 18 are secured by: #8 X 1/2" TP Torx T20 Black (Qty. 2) (237-6173-05)  |   |      |              |
| 8L  | Fluorescent Light Bracket (Left Style) | 1    | 535-7739-00           | 19  | Back Vent Grill 2-1/2" X 18"              | 1    | 545-5072-02  |
| 8R  | Fluorescent Light Brckt. (Right Style) | 1    | 535-7739-01           | 20  | Ribbon Cable, 20-Pin (3.5")               | 1    | 036-5000-350 |
| Items 8L & 8R are secured to Item 1 by: #10-24 X 1-1/4" Carriage Bolt Square Neck (Qty. 2/per) (231-5012-00), #10-24 Keps Nut (Qty. 2/per) (240-5207-00) and 3/4" X 3" Reinforced Strapping Tape (Qty. 1, sold in 12" length only) (626-5040-00)          |  |      |                       | Item 20 connects the I/O Pwr. Drvr. PCB to the CPU/Sound PCB; For 14-Pin see next page.   |   |      |              |
| 9   | Fluorescent Lamp Holder (Socket)       | 2    | 077-5214-01           | 21  | Button Hole Plug (Blk) (Happ #52-6214-00) | 1    | 500-6566-00  |
| Item 9 is secured to Items 8L and 8R by: #6-32 X 5/8" PPH MS (Sems) Zinc (Qty. 1/per) (232-5203-00) Lock-In Fluor. Bulb with Yellow Socket Clip (Qty. 1/per) (545-6271-00)  |  |      |                       | Item 21 plugs the Access Hole required if using optional BETAbrite Sign or Data cables.   |   |      |              |
| 10  | Fluorescent Tube 24" (F20T9CW)         | 1    | 165-5061-00           | 22  | Header Sign TOURNAMENT PINBALL            | 1    | 545-6133-00  |
|   |  |      |                       | 23  | Friction Hinge (Black) behind ▲▼          | 2    | 390-5053-00  |
|   |  |      |                       | 24  | Block / Sign & Hinge Stop (Black)         | 2    | 545-6174-00  |
|   |  |      |                       | Item 22 is sandwiched between Items 23 & 24 through 2 holes on each side. Item 23 is secured to Item 1 by: #8-32 X 3/8" PPH MS Ext. Sems (Zinc) (Qty. 2/per) (232-5301-00) and Item 24 to Items 22-23 by: #8 X 5/8" PPH AB Black (Qty. 2/per) (232-5101-01) |   |      |              |

PARTS TABLE & VIEWS CONTINUED ON THE NEXT PAGE. ▶

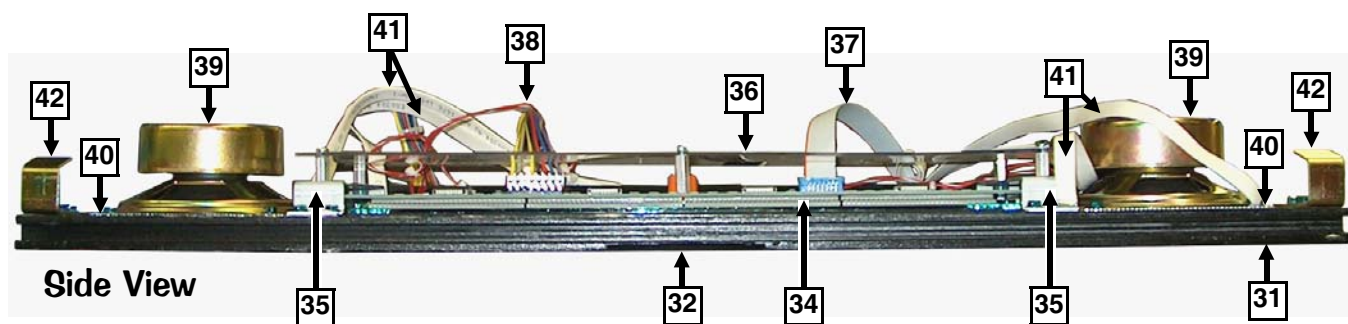




## Backbox [ S.A.M. System ] - Parts



## Speaker Panel [ S.A.M. System ] - Parts



| Nr.   | BACKBOX PARTS                        | QTY. | SPI PART Nr.       | Nr.  | SPEAKER PANEL PARTS                          | QTY. | SPI PART Nr.       |
|---|--------------------------------------|------|--------------------|--|--|------|--------------------|
| <b>← PARTS TABLE &amp; VIEWS CONTINUED FROM THE PREVIOUS PAGE.</b>  |                                      |      |                    |  |  |      |                    |
| 25  | Braided Wire (1-1/2 Feet)            | 1    | 600-5001-00        | 31   | Speaker Panel (Black Wood)                   | 1    | 525-5515-00        |
| Item 25 is secured by: Staple 5/16" (Qty. 23) (631-5000-00)   |                                      |      |                    | 32   | Plastic Shield (Display Front Cover)         | 1    | 545-5884-00        |
| 26*   | Zip Cable Tie (Screw Down Style)     | 2    | 040-5005-00        | Item 33 is secured to inside Item 31 by: #6 X 3/8" SHWH AB (Zinc) (Qty. 8) (234-5000-00)   |  |      |                    |
| Item 26 is secured @ inside bot. by: #8 X 1/2" SHWH AB (Zinc) (Qty. 1/per) (234-5101-00)  |                                      |      |                    | 33*  | Foam 3/16" Thick X 1/4" Wide X 12"           | 3    | 626-5026-00        |
| Item 33 is self-adhesive. Located between Items 32-34. Sold in 12" Lengths only.  |                                      |      |                    | 34   | 128 X 32 Dot Matrix Display PCB              | 1    | <b>520-5052-00</b> |
| 27  | Clamps [Multiple Sizes]              | 15   | 040-5000-XX        | Item 34 is secured to Item 35 by (at corners): 3/16" X 3/8" Spacer Gray (Qty. 4) (254-5000-18) and #6-32 X 1/2" SHWH Swage (Serr) Zinc (Qty. 4) (237-5976-03)  |  |      |                    |
| Item 27 secured by: #8 X 1/2" SHWH AB (Zinc) (Qty. 1/per) (234-5101-00)   |                                      |      |                    | Item 34 is secured to Item 35 by (at corners): 3/16" X 3/8" Spacer Gray (Qty. 4) (254-5000-18) and #6-32 X 1/2" SHWH Swage (Serr) Zinc (Qty. 4) (237-5976-03)  |  |      |                    |
| For following sizes, replace -XX with: 1/4" Double = -23 (Qty. 5); 1/2" Single = -06 (Qty. 3); 3/4" Single = -08 (Qty. 3); 1" Single = -09 (Qty. 0); 1-1/4" Double = -30 (Qty. 1)   |                                      |      |                    | 35   | Dot Matrix Display Mounting Bracket          | 2    | 535-8368-01        |
| 28  | Foam 3/16" Thick X 1/4" Wide X 12"   | 3    | 626-5026-00        | Item 35 is secured to Item 31 by: #8 X 1/2" SHWH AB (Zinc) (Qty. 4/per) (234-5101-00)  |  |      |                    |
| Above Item 28 is self-adhesive. 17.5" strip on each side. Sold in 12" Lengths only.   |                                      |      |                    | 36   | Plastic Shield (Display Back Cover)          | 1    | 830-6040-00        |
| 29L   | Pivot Hinge (Left Style)             | 1    | 535-7999-00        | Item 36 is secured to Item 34 by: 1/2" X 1/4" Hex Spacer #6-32 Tap (Qty. 4) (254-5008-03), 3/4" X 1/4" Hex Spacer #6-32 Tap (Qty. 2) (254-5008-04), #6-32 X 1/4" PPH MS (Sems) Zinc (Qty. 2) (232-5200-00) and #6-32 X 3/8" PPH (Qty. 6) (232-5201-00) |  |      |                    |
| 29R   | Pivot Hinge (Right Style)            | 1    | 535-7999-01        | 37   | Ribbon Cable, 14-Pin (32")                   | 1    | 036-5260-32        |
| Items 29L-29R are secured to Backbox by: 1/4"-20 X 1-1/4" C.B. Sq. Neck (Qty. 4) (231-5003-00) and 1/4"-20 Flange Nut (Qty. 4) (240-5300-00)  |                                      |      |                    | Item 37 (14-Pin) connects the 128 X 32 Dot Matrix Display PCB to the CPU/Sound PCB.  |  |      |                    |
| Items 29L-29R are secured to Cabinet by: Spacer Hex Nut 1/2" O.D. - 1/4-20 X 1/2" TD (Black) (Qty. 1/per) (254-5042-00), Nylon Spacer (Black) (Qty. 1/per) (242-5084-00), 1/4-20 X 1/2" Carriage Bolt Square Neck (Black) (Qty. 1/per) (231-5072-00) and Washer 1" O.D. X 1/2" I.D. X 1/16" (Black) (Qty. 1/per side, only if required) (242-5087-00)   |                                      |      |                    | 38   | Display Cable (Wiring Harness)               | 1    | 036-5454-01        |
| 30*   | Memory Stick USB 1.1+ [Generic] 64MB |      | <b>970-0064-00</b> | Item 38 is secured to Item 35 by: 1/2" X 1/4" Hex Spacer #6-32 Tap (Qty. 4) (254-5008-03), 3/4" X 1/4" Hex Spacer #6-32 Tap (Qty. 2) (254-5008-04), #6-32 X 1/4" PPH MS (Sems) Zinc (Qty. 2) (232-5200-00) and #6-32 X 3/8" PPH (Qty. 6) (232-5201-00) |  |      |                    |
| Memory Stick USB 1.1+ [Generic] 128MB   |                                      |      |                    | 39   | Speaker (Shld.) 4" 8Ω #MG ELE 4060SH         | 2    | 031-5004-02        |
| Item 30 was not included with your game. Read the inside cover or go on-line for more info. To order with the latest game code copied onto it, add -98 to the Part Nr. (970-0128-00-98). File(s) can be downloaded from our website (Files are 25MB or larger, DSL or Fast Modern recommended). Not all manufacturers of Memory Sticks are compatible with our system. Test it out, if it doesn't work properly, return your purchase and order the memory stick through you local pinball distributor (Stern Pinball Memory Sticks guaranteed compatible). (ASM. REF. 505-6002-98-98, Items 1-42 Only, [29-30 not included in assembly]) |                                      |      |                    | 40   | Speaker Grill (Brass w/no Artwork)           | 2    | 535-8081-03        |
|   |                                      |      |                    | Items 39-40 are secured by: #8 X 1/2" SHWH AB (Black) (Qty. 4/per) (234-5101-01)   |  |      |                    |
|   |                                      |      |                    | 41   | Ground Strap (25") [ 2 per : Items 35 & 39 ] | 4    | 600-5006-25        |
|   |                                      |      |                    | 42   | Speaker Panel Hook Bracket                   | 2    | 535-7009-02        |
|   |                                      |      |                    | Item 42 is secured by: #8 X 1/2" SHWH AB (Zinc) (Qty. 2/per) (234-5101-00) (ASM. REF. 515-6888-06, Items 31-42 Only [includes wiring])   |  |      |                    |

### Take Note:

\* An asterisk ( \* ) indicates item(s) are not noted in the pictorials.

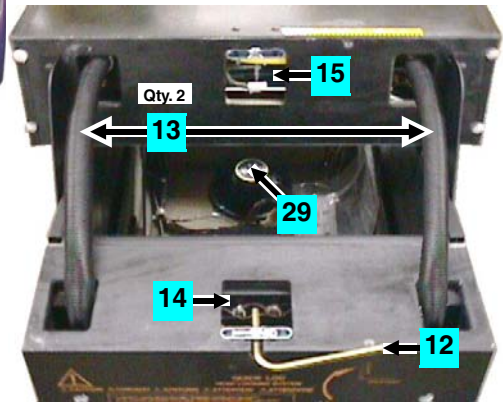
| Nr.   | BACKGLASS PARTS                   | QTY. | SPI PART Nr. | Nr.  | BACKGLASS PARTS                        | QTY. | SPI PART Nr. |
|---|-----------------------------------|------|--------------|--|--|------|--------------|
| i*  | Clear Backglass 25.906" X 19.187" | 1    | 660-5038-02  | iv*  | Bottom Plastic Lift Channel - 26-1/16" | 1    | 545-5021-01  |
| ii*   | Wheel of Fortune™ Film Art (#98)  | 1    | 830-5298-00  | v*   | Plastic Edging (Left/Right) - 18-1/8"  | 2    | 545-5018-14  |
| iii*  | Top Plastic Channel - 26"         | 1    | 545-5018-15  | Items i-v are secured to Item i by: Taple (Double-Sided), 12" (Qty. 1) (626-5005-00) |  |      |              |
| Note: Only 6" required, sold in 12" lengths only. |                                   |      |              |  |  |      |              |

(ASM. REF. 515-5450-00-98, Items i-v)

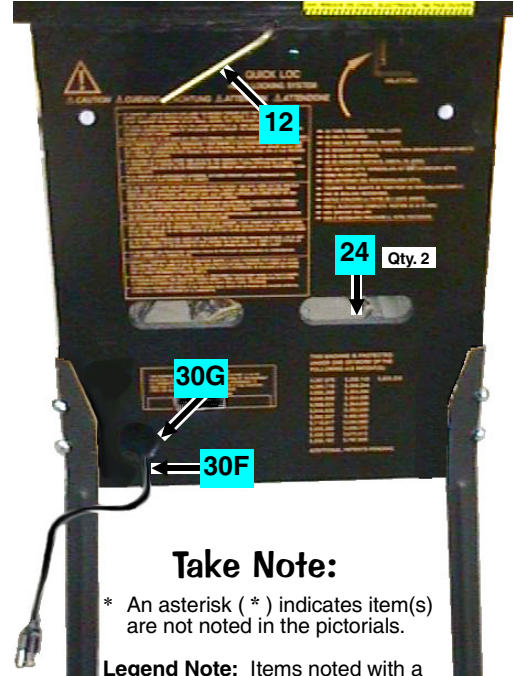


# Cabinet - Parts & Switches

For Backbox Parts see the previous two pages.



View of the back of the Cabinet with the Backbox in the down position.



### Take Note:

\* An asterisk ( \* ) indicates item(s) are not noted in the pictorials.

**Legend Note:** Items noted with a cyan square are Cabinet Parts. Items noted with a white square are Switches.

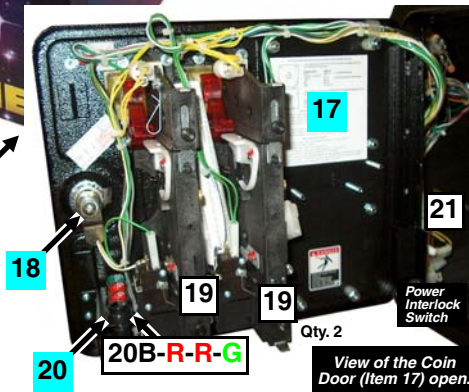
**Item 30D**  
(Power On/Off Switch)  
is located under the Cabinet  
(Front Right) directly below the  
Power Box (in the Cabinet).

Qty. 4

**Item 2 Ordering Note:**  
Leg comes with Leveler.  
Leveler can be purchased  
separately. Leg cannot be  
ordered **WITHOUT** Leveler  
(see Parts Table below, Item 2).



30D



View of the Coin Door (Item 17) open.

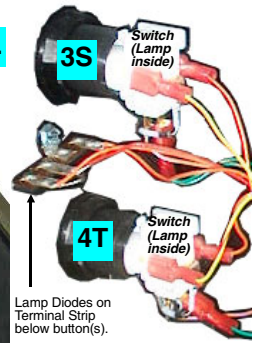
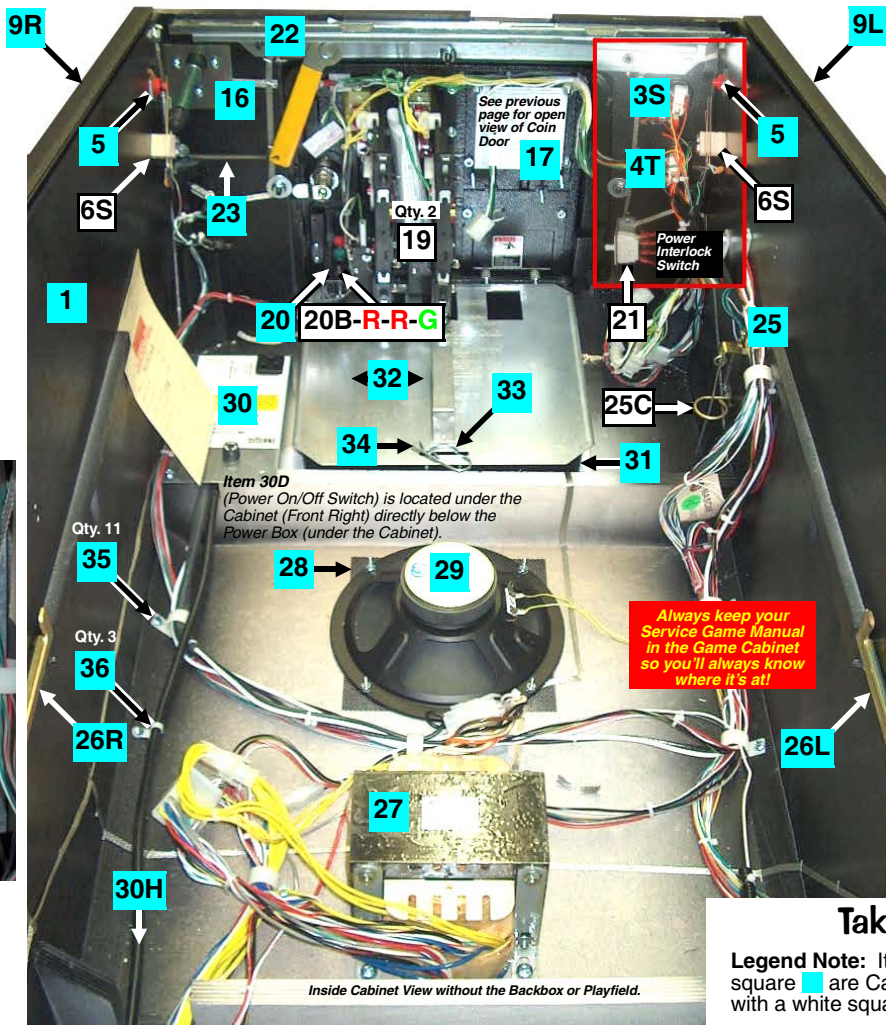
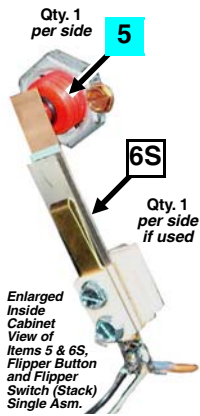
Sec. 4: Parts Id. ...

| Nr.  | CAB. PARTS & SWITCHES                        | QTY. | SPI PART Nr.    | Nr. | CAB. PARTS & SWITCHES  | QTY. | SPI PART Nr.   |
|--|--|------|-----------------|-----|--|------|----------------|
| 1  | Screened Cabinet <b>WoFM</b> (No Parts)      |      | 525-5395-15P-98 | 7   | Rear Glass Channel 20-3/8" Length  | 1    | 545-5038-00    |
| 2  | Black Leg with Leveler Asm.                  | 4    | 500-5921-50     | 8   | Plastic Channel 42-5/8" Lg. (Left/Rt.)   | 2    | 545-5017-00    |
| Item 2 is secured by: Leg Bolt Back Plate (535-5703-00) and Leg Bolt 3/8" X 16 X 2-1/2" Hex 5/8" Hd. (2/per) (231-5001-01) Leg Leveler <b>ONLY</b> (3/8"-16 X 3") (500-5017-00).   |  |      |                 |     |  |      |                |
| 3S   | Start Button (Green Round) with Sw. + Lamp   | 1    | 500-6388-44-TL  | 9L  | Side Armor (Left) with Button Guard  | 1    | 535-9596-00    |
| 4T   | Tournament Button (Yellow Sq.), w/Sw. + Lmp. | 1    | 500-6587-06-TL  | 9R  | Side Armor (Right) with Button Guard   | 1    | 535-9596-01    |
| Item 3S & 4T includes the Switch & Lamp (No Wiring; desolder old wiring where required). <b>Switch or Bulb replacement:</b> TWIST LOCK (-TL) >> not snap-in << <b>Assembly Parts Included:</b> Microswitch (180-5174-00); #555 Wedge Base Clear Bulb (165-5002-00); If 4T is not desired, use optional Button Plug Black (500-6566-00). Requires 3-Lug Terminal Strip (055-5204-03) and Diodes, 1N4004 (Qty. 2) (112-5003-00) inside cabinet under button(s) for Lamp Operation (Diode for Switch, located on Switch.) |  |      |                 |     |  |      |                |
| 5  | Flipper Button (Red) Assembly (No Switch)    | 2    | 500-5026-32     | 10  | Front Molding (Black) < NO BUTTON HOLE >   | 1    | 500-6882-02-00 |
| Item 5 is secured by: Pal Nut for Flipper Button (Metal) (Qty. 2/per) (240-5003-01) Pal Nut inside cabinet secured by: #8 X 1/2" SHWH AB (Zinc) (Qty. 1/per) (234-5101-00) and Washer (Zinc), .187" ID X .875" OD X .048" Thick (Qty. 1/per) (242-5059-00)   |  |      |                 |     |  |      |                |
| 6S   | Flipper Switch Single Assembly               | 2    | 500-6889-01     | 10  | Items 9L & 9R are secured @ front & side by: Pem Stud 1/4 X 1" Flange Head Black (Qty. 1/per) (237-6116-01), 1/4-20 Flange Nut (Qty. 1/per) (240-5300-00) and #8 X 1/2" T20 Tamper Proof Black (Qty. 5/per) (237-6173-05); @ rear (backbox) by: #10-24 X 1" Sq. Neck Carr. Bolt Black (Qty. 1/per) (231-5021-00) and #10-24 Hex Nut (Qty. 1/per) (240-5202-00) |      |                |
| Assembly Parts Included: Flipper Switch Stack Single (Paliney Contact) (180-5160-01) and Capacitor - Ceramic .05 Mfd 25 volt (130-5001-00)   |  |      |                 |     |  |      |                |
| Item 6S/6D are secured to Cab. by: #6 X 1-1/4 SHWH AB (Zinc) (Qty. 2/per) (237-5959-00)  |  |      |                 |     |  |      |                |
| 6D   | Flipper Switch Double Assembly               | 0    | 500-6890-01     | 11  | Playfield Glass (Tempered) 21" X 43" X 3/16"   | 1    | 660-5001-00    |
| Assembly Parts Included: Flipper Switch Stack Double (Paliney Contact) (180-5164-01) and Capacitor - Ceramic .05 Mfd 25 volt (130-5001-00)   |  |      |                 |     |  |      |                |
| Item 6S/6D are secured to Cab. by: #6 X 1-1/4 SHWH AB (Zinc) (Qty. 2/per) (237-5959-00)  |  |      |                 |     |  |      |                |
| 12   | Hex Key Allen Wrench 5/16"                   | 1    | 777-0001-00     | 12  | Hex Key Allen Wrench 5/16"   | 1    | 777-0001-00    |
| 13   | Corrugated Tubing Black 1"ø X 2.6" Lg.       | 1    | 605-5008-03     | 13  | Corrugated Tubing Black 1"ø X 2.6" Lg.   | 1    | 605-5008-03    |
| Above Item 13 covers the Cable Wiring Harnesses going into the Backbox from the Cabinet.   |  |      |                 |     |  |      |                |
| 14   | Roto Lock Male (R2-0055-02)                  | 1    | 355-5006-01     | 14  | Roto Lock Male (R2-0055-02)  | 1    | 355-5006-01    |
| Item 14 is secured by: #10-24 X 1-3/4" Carriage Bolt Square Neck (Qty. 2) (231-5022-00), #10-24 Nylon Stop Nut (Qty. 2) (240-5206-00) and #10 Washer, 7/32" ID X 1/2" OD X 1/16" Thick (Qty. 2) (242-5003-00)  |  |      |                 |     |  |      |                |
| 15   | Roto Lock Female (on Backbox)                | 1    | 355-5006-02     | 15  | Roto Lock Female (on Backbox)  | 1    | 355-5006-02    |
| 16   | Ball Shooter (Plunger) Assembly              | 1    | 500-6146-00-04  | 16  | Ball Shooter (Plunger) Assembly  | 1    | 500-6146-00-04 |
| FOR A BREAKDOWN OF PARTS SEE: Sec. 4, Chp. 2, Drawings for ... Assemblies...   |  |      |                 |     |  |      |                |
| PARTS TABLE & VIEWS CONTINUED ON THE NEXT PAGE. ▶  |  |      |                 |     |  |      |                |

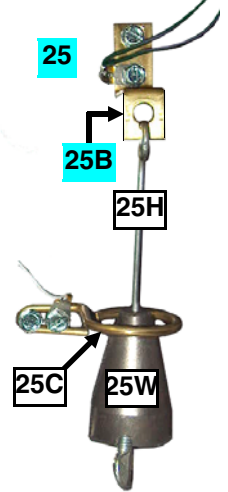




# Cabinet - Parts & Switches Continued



Enlarged Inside Cabinet View of Items 3S, 4T and 25 (25B, 25C, 25H & 25W), Plumb Bob Tilt Switch.



## Take Note:

**Legend Note:** Items noted with a cyan square ■ are Cabinet Parts. Items noted with a white square □ are Switches.

| Nr.  | CAB. PARTS & SWITCHES  | QTY.                | SPI PART Nr. | Nr.   | CAB. PARTS & SWITCHES                     | QTY. | SPI PART Nr. |   |             |
|--|--|---------------------|--------------|---|---|------|--------------|---|-------------|
| ◀ PARTS TABLE & VIEWS CONTINUED FROM THE PREVIOUS PAGE.  |  |                     |              |   |   |      |              |   |             |
| 17   | Coin Door 2-Cht \$V Up-Stk. 4-Button Bracket                       | 1                   | 501-5018-172 | 27  | Transformer 5.7VAC (with Ballast Winding) | 1    | 010-5012-01  |   |             |
| Item 17 is secured by: 1/4"-20 X 1-1/4" Carriage Bolt Square Neck (Qty. 4) (231-5003-00) 1/4"-20 Flange Nut (Qty. 4) (240-5300-00) and Fend Washer 1/4" I.D. X 1" O.D. (Qty. 3) (242-5009-00) Note: For Coin Door other than USA call Technical Support for SPI Part Nr. |  |                     |              | Item 27 is secured by: 1/4"-20 X 5/8" PPH MS (Zinc) (Qty. 4) (237-5854-00) and 1/4" Split Lock Washer (Qty. 4) (244-5000-00)  |   |      |              |   |             |
| 18   | Lock 7/8" Barrel, 435X, Offset Cam                                 | 1                   | 355-5021-03K | 28  | Woofers (Speaker) Grill 7" X 7"           | 1    | 545-5072-03  |   |             |
| Coin Door Switch (USA) (Happ)  |  |                     |              | 29  | Woofers 8" ø Round 8010 4Ω                | 1    | 031-5007-01  |   |             |
| 19   | ALT. SW.: 19C: Coin Door Switch (USA) (Coin Control) (180-5024-00) | 2                   | 180-5024-01  | Items 28 & 29 are secured by: #6-32 X 1-1/4" Fin Shank Screw (Qty. 4) (237-5883-00) and #6-32 Keps Nut (Qty. 4) (240-5008-00) |   |      |              |   |             |
| ALT. SW.: 19J: Coin Door Switch (¥ Japan) (180-5091-00)  |  |                     |              | Power Input Box Asm. + Univ. Cable  |   |      |              | 1 | 515-5360-08 |
| 4-Button Bracket (for Service Menu Buttons)  |  |                     |              | 30A: Power Box (No Parts) Mounting Frame (535-5932-00)  |   |      |              |   |             |
| 20   | SWITCH: 20B: Push-Button Service Switch (Black) (180-5192-00)      | 1                   | 535-6860-04  | 30B*: Line Filter (150-5000-00)   |   |      |              |   |             |
| SWITCH: 20R: Push-Button Service Switch (Red) (Qty. 2) (180-5192-02)   |  |                     |              | 30C*: Varistor* TNR159211KM (Domestic) (150-5001-00)  |   |      |              |   |             |
| SWITCH: 20G: Push-Button Service Switch (Green) (180-5192-04)  |  |                     |              | or Varistor TRM15G431KM (Euro) (150-5002-00)  |   |      |              |   |             |
| Ordering Note: Securing hardware for switches included. Decal in kit sold separately.  |  |                     |              | 30D: On/Off Rocker Switch + Bracket Assembly (515-7085-00)  |   |      |              |   |             |
| 21   | Power Interlock-Memory Protect Switch Asm.                         | 1                   | 500-5808-05  | 30E: Service Outlet (3-Prong / US) (180-5008-01) / International N/A  |   |      |              |   |             |
| Assembly Parts Included: Mounting Bracket (535-9794-00), Power Interlock (Playfield) Switch (180-5136-00) and secured by: #8 X 1/2" SHWH AB (Zinc) (Qty. 2) (234-5101-00)  |  |                     |              | 30F: Line Cord 10' ROJ 3" + Ring Terminal Asm. (515-6566-00)  |   |      |              |   |             |
| 22   | Front Molding Lockdown Asm.  | 1                   | 500-6881-00  | 30G: Recessed (Black) Cup (rear of Cabinet) (545-5122-00)   |   |      |              |   |             |
| Item 22 is secured by: #10-24 X 1-1/4" Carr. Bolt (Qty. 2) (231-5012-00) and #10-24 Keps Nut (Qty. 2) (240-5207-00)  |  |                     |              | 30H*: Snap Bushing 9/16" (White) (280-5001-01)  |   |      |              |   |             |
| 23   | Lockdown Spring (connected to handle)                              | 1                   | 265-5008-00  | 30I: Fuse 8 Amp 250V Slo-Blo (Domestic) (200-5000-05)   |   |      |              |   |             |
| Item 23 is secured by: #8 X 1/2" SHWH AB (Zinc) (Qty. 1) (234-5101-00) and #10 Washer, 7/32" ID X 1/2" OD X 1/16" Thick (Qty. 1) (242-5003-00)   |  |                     |              | or Fuse 5 Amp 250V Slo-Blo (International) (Qty. 2) (200-5003-00)   |   |      |              |   |             |
| 24   | Grills 2-1/2" X 18" (on Back & Bottom)                             | 2                   | 545-5072-02  | 30J: Fuse Holder (205-5001-00)  |   |      |              |   |             |
| Plumb Bob Tilt Switch Individual Parts Only Ind. Parts Only  |  |                     |              | Universal Cable & Jumper Caps (all voltage variations): See Sec. 5, Chapter 3, Page 102.                                      |   |      |              |   |             |
| 25   | SWITCH: 25B: Bracket for Hanger Wire (535-5221-00)                 |                     |              | 31  | Cash Box Plastic Bottom                   | 1    | 545-5090-00  |   |             |
| 25C: Contact Wire Form (535-7563-01)   |  |                     |              | 32  | Cash Box Cover (Validator)                | 1    | 535-5013-03  |   |             |
| 25H: Hanger Wire (535-5319-02)   |  |                     |              | 33  | Cash Box Lock Bracket (U-Wire)            | 1    | 535-7562-00  |   |             |
| 25W: Plumb Bob Weight (535-5029-00) (includes Thumb-Screw)   |  |                     |              | Item 33 is secured by: #8 X 5/8" HWH AB (Green) (Qty. 2) (234-5102-04)  |   |      |              |   |             |
| Item 25B is secured to Cabinet by: #6 X 5/8" SHWH AB (Zinc) (Qty. 4) (234-5002-00)   |  |                     |              | 34  | Large Hair-Pin Clip                       | 1    | 535-7772-00  |   |             |
| 26L  | Slide & Pivot Support Bracket (Left)                               | 1                   | 535-5989-00  | 35  | Clamps [Multiple Sizes]                   | 12   | 040-5000-XX  |   |             |
| 26R  | Slide & Pivot Support Bracket (Right)                              | 1                   | 535-5990-00  | Item 35 is secured to Item 1 by: #8 X 1/2" SHWH AB (Zinc) (Qty. 1/per) (234-5101-00)  |   |      |              |   |             |
| Items 26L & 26R are secured by: #10-24 X 1-1/4" Carriage Bolt Square Neck Black (3/per) (231-5012-00) and #10-24 KEPS Nut (3/per) (240-5207-00)  |  |                     |              | For following sizes, replace -XX with: 3/4" Single = -08 (Qty. 9); 1-1/2" Single = -10 (Qty. 3)                               |   |      |              |   |             |
| 37†  | Meter +12VDC with Bracket Optional                                 | opt. G-0053-013-102 |              | 36  | Zip Cable Tie (Screw Down Style)          | 3    | 040-5005-00  |   |             |
| † Meters (Diode included) are optional and were not included in this Pinball Machine. Order without the bracket use G-0053-013-102A. More information or Qs? Call Technical Support.   |  |                     |              | Item 36 is secured by: #8 X 1/2" SHWH AB (Zinc) (Qty. 1/per) (234-5101-00)  |   |      |              |   |             |

Sec. 4: Parts Id. ...



# Main Playfield Top - Miscellaneous Parts and Brackets

| Nr.  | THE PLAYFIELD                       | QTY. | SPI PART Nr.   |
|------|-------------------------------------|------|----------------|
| Main | P/F Screened w/ Inserts & NO Parts  | 1    | 830-5100-98    |
| P/F  | P/F Complete w/ Inserts & ALL Parts | 1    | 505-6004-98-98 |

| Nr.   | MISC. PARTS (ABOVE)                                | QTY. | SPI PART Nr.  |
|---|--|------|---------------|
| 1   | Arch (Black Metal) [ no Forks ]                    | 1    | 535-8392-01   |
| <small>Item 1 is secured to Item 9 below by: #10-32 X 5/16" PFH U/C MS (Zinc) (Qty. 2) (237-6013-00) Usage Note: When replacing the Arch, order new replacement Nelson Protect Strips 7-5/8" (not included) (Qty. 2) (545-5212-04; use -02 for 8-9/16" size) For Decals, see <a href="#">Playfield Top - Plastics Kit, Decals &amp; Mylar Kits</a>.</small> |  |      |               |
| 2   | Inst. Card [Eng./Spanish] <b>Wheel of Fortune™</b> | 1    | 755-5198-12-Y |
| <small>Note : Visit <a href="http://www.sternpinball.com">www.sternpinball.com</a> for a PDF copy of the Game Instruction Card which will also have any translated Instruction Cards made for this game. Find Game Link or Archives. Spanish 755-5198-12-Y; German 755-5198-03-Y; Italian 755-5198-04-Y; French 755-5198-05-Y.</small>                      |  |      |               |
| 3A  | Coin Card (2-Sided) USA 10 Default                 | 1    | 755-5400-11-Y |
| 3B  | Coin Card (2-Sided) USA 5                          | 1    | 755-5400-08-Y |
| 3C  | Coin Card (2-Sided) Blank for Custom               | 1    | 755-5400-04-Y |
| <small>For Coin Card views, see below or <a href="http://www.sternpinball.com/coinagecards.shtml">online</a> : <a href="http://www.sternpinball.com/coinagecards.shtml">http://www.sternpinball.com/coinagecards.shtml</a></small>  |  |      |               |

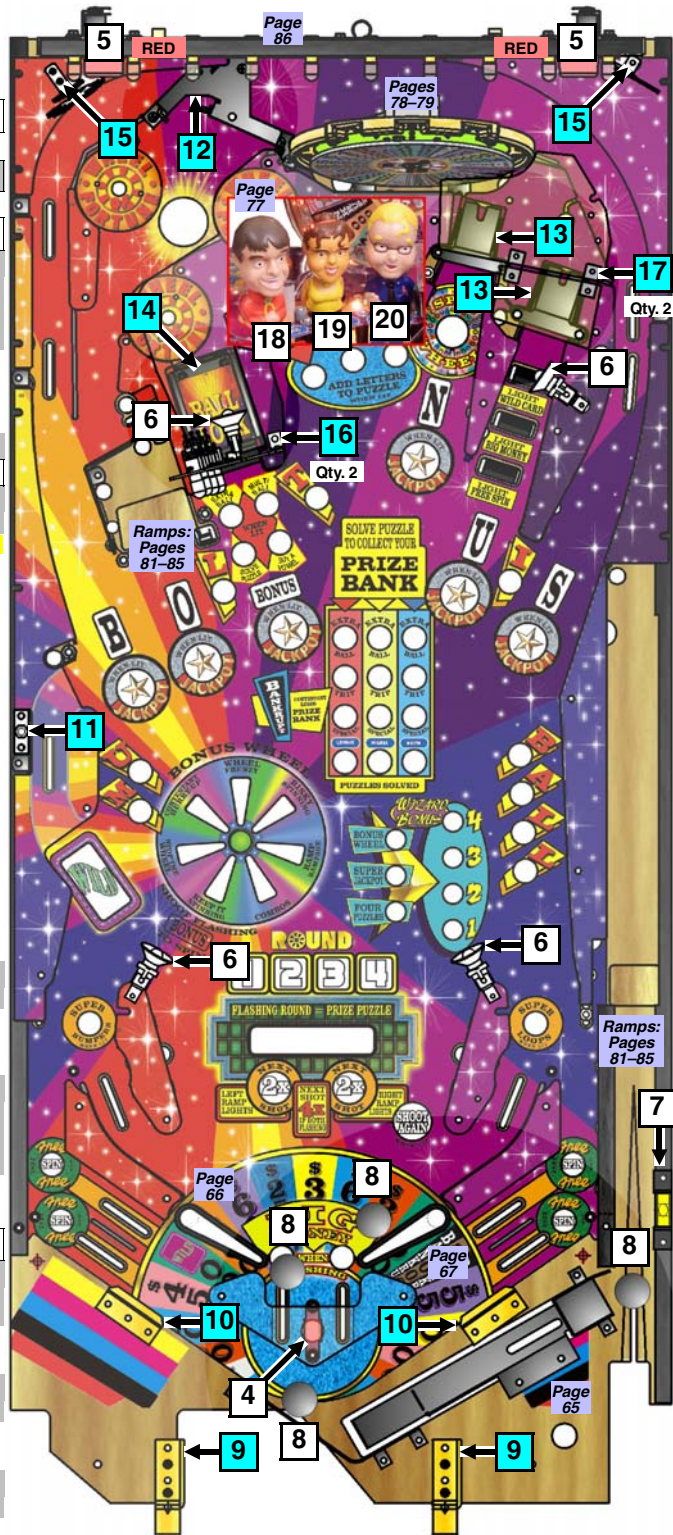
**Ordering Note :** If this is a non-US Game, Coin Card(s) Part Numbers provided will differ.



|   |                              |   |             |
|---|------------------------------|---|-------------|
| 4   | Plastic Mini-Lite Hood (Red) | 1 | 550-5061-02 |
| <small>Item 4 requires Rubber Rings. Typically @ the Top use 3/16" I.D. Rubber Ring Black (Qty. 1/per) (545-5348-01); @ the Bottom Thicker Post use 5/16" I.D. Rubber Ring Black</small>  |                              |   |             |
| 5   | Light Cover w/ tabs (Red)    | 2 | 550-5031-02 |
| <small>Item 5 is secured by: See Back Panel, Page 86.</small>   |                              |   |             |
| 6   | Light Reflector (Silver)     | 4 | 545-5409-01 |
| <small>Ordering Note : #555 Wedge Base Bulb (165-5002-00) (Qty. 1/per); Wedge Base Socket (Laydown) (077-5026-01) (Qty. 1/per) (views on Page 62)</small>   |                              |   |             |
| 7   | Bubble Level Assembly        | 1 | 500-6815-00 |
| <small>Assembly Parts Included : Level .8mm Empire #0224 (545-6001-01) or Level Mount (545-6068-00). Flange secured by: #6-32 X 1/4" PPH MS (no Sems) Zinc (237-5500-00) and #6-32 Keps Nut (240-5008-00) Item 7 is secured to the Wood Rail by: #6 X 1/2" HWH AB Zinc Red (Qty. 2) (234-5001-02)</small> |                              |   |             |
| 8   | Pinball (Steel) 1-1/16" ø    | 4 | 260-5000-00 |

| Nr.   | MISC. BRACKETS (ABOVE)                | QTY. | SPI PART Nr. |
|---|---------------------------------------|------|--------------|
| 9   | Bracket, Playfield Hanger             | 2    | 535-8385-00  |
| <small>Item 9 is secured to the Playfield (P/F) by: #8-32 X 7/8" HWH MS Zinc (Qty. 2/per) (237-5890-00) and #8-32 T-Nut (Qty. 2/per) (240-5101-00)</small>                                      |                                       |      |              |
| 10  | Bracket, Arch Retaining (Hold-Down)   | 2    | 535-8394-00  |
| <small>Item 10 is secured to the P/F by: #8 X 1/2" SHWH AB (Zinc) (Qty. 3/per) (234-5101-00)</small>  |                                       |      |              |
| 11  | Bracket, Ramp Mounting                | 1    | 515-6508-00  |
| <small>Item 11 is secured to the Wood Rail by: #6 X 1/2" PTH A (Zinc) (Qty. 2/per) (237-5809-00)</small>  |                                       |      |              |
| 12  | Bracket, Dual 1-Way Gate Asm.         | 1    | 510-5053-00  |
| <small>Item 12 is secured by: See Dual One-Way Gate Bracket, I.P.O., Page 80 (Items 10, 2-3).</small>   |                                       |      |              |
| 13  | Bracket, Reverse Scoop                | 2    | 535-0045-00  |
| <small>Item 13 is sec'd by: See Reverse Scoop ..., I.P.O., Pgs. 85 (Items 20-21). &amp; 86 (Items 5-6).</small>   |                                       |      |              |
| 14  | Mini-Bump Ramp & Flap Asm.            | 1    | 510-5050-00  |
| 15  | Cover, Mini-Bumper Ramp               | 1    | 535-0053-00  |
| <small>Item 14 is secured by: See Mini-Bump Ramp &amp; ..., I.P.O., Page 80 (Items 1-2 &amp; AP-A).</small>   |                                       |      |              |
| 16  | Bracket, Plastic (Palm Tree) Mounting | 2    | 535-0106-00  |
| 17  | Bracket, Plastic Mounting (90°)       | 2    | 535-8941-00  |
| 18  | Bracket, Plastic Mounting (135°)      | 2    | 535-8941-06  |
| <small>Items 15-17 Note : Drilling of rivets is required. Can resecure with appropriate screw and nut or rivet with Rivet, 1/8" X 3/16" (249-5001-00) and #6 Lock Washer (246-5000-00).</small> |                                       |      |              |

| Nr.   | FIGURINES (ABOVE)                 | QTY. | SPI PART Nr. |
|---|-----------------------------------|------|--------------|
| 18  | Bobble-Head, Red Shirt (Lonnie)   | 1    | 880-5098-00  |
| 19  | Bobble-Head, Yellow Shirt (Maria) | 1    | 880-5098-01  |
| 20  | Bobble-Head, Blue Shirt (Keith)   | 1    | 880-5098-02  |
| <small>Items 18-20 are secured by: See Bobble Heads, I.P.O., Page 77 (Items 1, 2 or 3).</small> |                                   |      |              |



## Take Note:

**Legend Note:**  
 Items noted with a white square □ are Misc. Parts (Above).  
 Items noted with a cyan square ■ are Misc. Brackets (Above).

Optional Kits available through your Distributor:

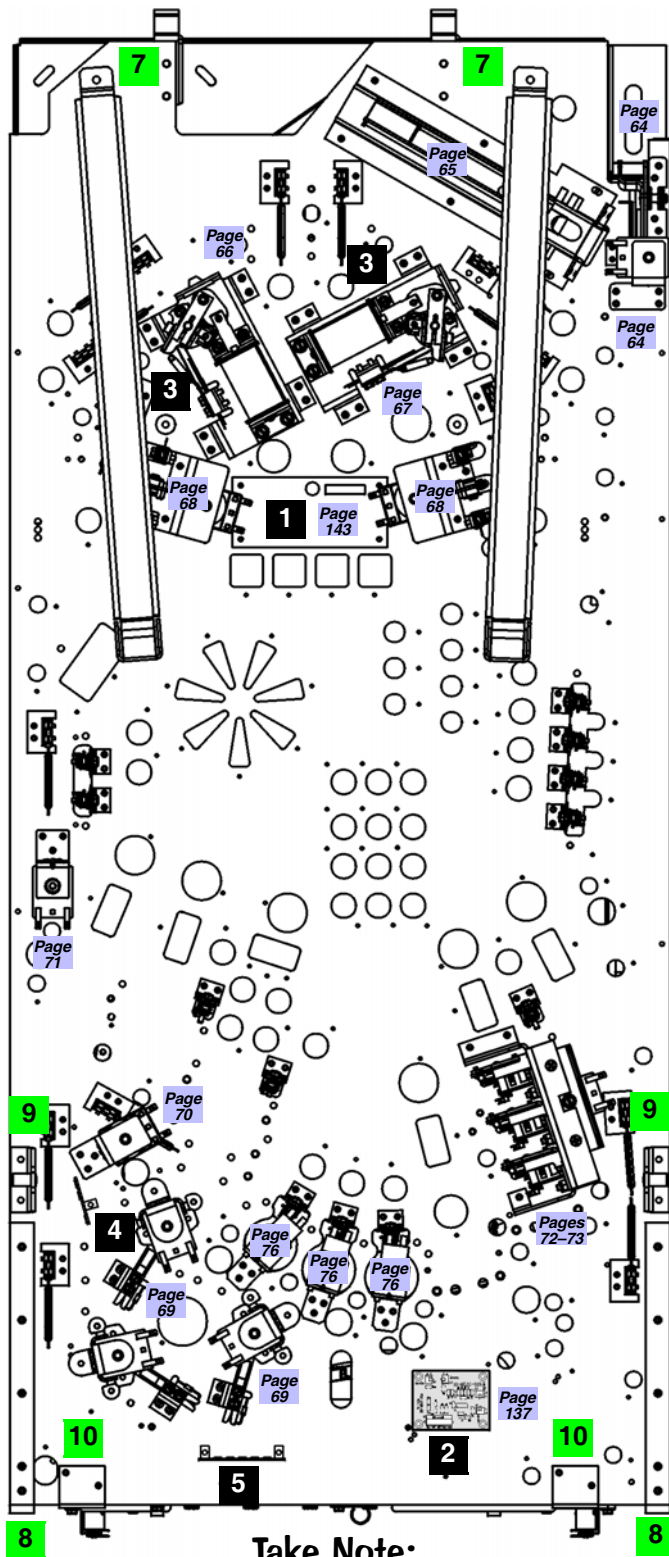
### Pinball Location Maintenance Standard Kit: 502-6002-98

**Kit includes :** 8 oz. Novus Wax #2 Fine (Red) (675-0003-01), Cloth, Rubber Rings (used above playfield), Bulbs (Bulb quantities vary and is limited to 25 per type), Fuses (1/per type) and 4 Pinballs. **Note:** Quantities, sizes and contents subject to change without notice.





# Main Playfield Bottom - Miscellaneous Parts and Brackets



| Nr.  | THE PLAYFIELD                       | QTY. | SPI PART Nr.   |
|------|-------------------------------------|------|----------------|
| Main | P/F Screened w/ Inserts & NO Parts  | 1    | 830-5100-98    |
| P/F  | P/F Complete w/ Inserts & ALL Parts | 1    | 505-6004-98-98 |

| Nr.   | MISC. PARTS (BELOW)              | QTY. | SPI PART Nr. |
|---|----------------------------------|------|--------------|
| 1   | PCB, P/F Mini-Dot (Aux.) Display | 1    | 520-5274-00  |
| Item 1 is secured by: #6 X 1/2" SHWH AB (Zinc) Red (Qty. 4) (234-5001-02)<br>More Details : See Section 5, Chapter 4, (Yellow Pages) PCBs, Pages 136 - 137.   |                                  |      |              |
| 2   | PCB, OPTO Transceiver Amplifier  | 1    | 520-5239-01  |
| Item 2 is secured by: #6 X 3/4" SHWH AB (Zinc) (Qty. 4) (234-5003-00)<br>Application Note : Required for OPTO Transceiver Pairs (500-6775-00) listed on the next page (... Switches). See Section 5, Chapter 4, (Yellow Pages) PCBs, Pages 130 - 131. |                                  |      |              |

|   |                           |   |             |
|---|---------------------------|---|-------------|
| 3 | 3A 250v Slo-Blo Fuse      | 3 | 200-5000-08 |
|   | Fuse Clip Holder (Socket) | 3 | 205-5000-01 |

Item 3 is secured by: #6 X 1/2" PPH AB (Qty. 1/per) (237-5805-00)  
Note: Item 3, Fuse Clip Holder (Socket) 205-5000-01 is part of a set of 12 (205-5000-12). You can order them as individuals (...-01) or a set of 12 (...-12).

|   |   |   |             |
|---|---|---|-------------|
| 4 | Diode Terminal Strip 3-Lug (813) Isolated | 1 | 055-5204-03 |
| 5 | Diode Terminal Strip 5-Lug (824) Isolated | 1 | 055-5204-05 |

Items 4-5 are secured by: #6 X 3/8 HWH AB Zinc (Qty. 1-2/per) (234-5000-00)  
Note: 1N4004 Diodes (112-5003-00) are used in all Diode applications. 1N4001 Diodes can be used for Switches and/or Lamps.

|    |                                |   |             |
|----|--------------------------------|---|-------------|
| 6* | Terminal Strip/Fuse Decals A-B | 1 | 820-6221-98 |
|----|--------------------------------|---|-------------|

Note: For Decal Descriptions & Locations, see Playfield Terminal Strips, Fuses & Misc. Wiring Descriptions & Locations, Section 5, Chapter 2, Playfield Wiring, Page 96.

| Nr. | MISC. BRACKETS (BELOW) | QTY. | SPI PART Nr. |
|-----|------------------------|------|--------------|
|-----|------------------------|------|--------------|

|   |                                  |   |             |
|---|----------------------------------|---|-------------|
| 7 | Bracket, Playfield Support Slide | 2 | 535-6862-05 |
|---|----------------------------------|---|-------------|

Item 7 is secured by: #10 X 1/2" HWH A (Zinc) (Qty. 2/per) (237-5817-00), #8-32 X 5/8" SHWH Swage (Zinc) Wax (Qty. 1/per) (237-5975-03) and #8-32 T-Nut (Qty. 1/per) (240-5101-00)

|   |                                |   |             |
|---|--------------------------------|---|-------------|
| 8 | Bracket, Edge Slide (Extended) | 2 | 535-5988-01 |
|---|--------------------------------|---|-------------|

Item 8 is secured by: #4 X 1/2" PPH (Zinc) (Qty. 5/per) (237-5840-00) and #8-32 T-Nut (Qty. 2/per) (240-5101-00)

|   |                                    |   |             |
|---|------------------------------------|---|-------------|
| 9 | Bracket, Pivot Pin Welded Assembly | 2 | 500-5329-03 |
|---|------------------------------------|---|-------------|

Item 9 is secured by: #8-32 X 5/8" SHWH Swage (Zinc) Wax (Qty. 2/per) (237-5975-03)

|    |                              |   |             |
|----|------------------------------|---|-------------|
| 10 | Bracket, Back Panel Mounting | 2 | 535-8964-00 |
|----|------------------------------|---|-------------|

Item 10 is secured by: #8 X 1/2" SHWH AB (Zinc) (Qty. 2/per) (234-5101-00) and #8-32 T-Nut (Qty. 2/per) (240-5101-00)  
For a 3D View : See Section 4, Chapter 2, (Blue Pages) Drawings for ..., Page 86.

|     |                               |    |             |
|-----|-------------------------------|----|-------------|
| 11* | Tie Post (White Nylon) 3-1/2" | 10 | 545-5253-01 |
|-----|-------------------------------|----|-------------|

Item 11 is secured by: #6 X 5/8" SHWH AB Green (Qty. 1/per) (234-5002-00) and wiring with Cable Tie, 5-1/2" (Qty. 1/per) (040-5001-02)

## Take Note:

\* An asterisk ( \* ) indicates item(s) are not noted in the pictorials.

### Legend Note:

Items noted with a black square ■ are Miscellaneous Parts (Below).  
Items noted with a green square ■ are Misc. Brackets (Below).

Optional Kits available through your Distributor:

**Pinball Location Maintenance Deluxe Kit: 502-6003-98**

Deluxe Kit includes : Pinball Location Maintenance Standard Kit as described plus a quantity of Flipper Rebuild Kits. Note: Quantity varies which equals the same quantity of flippers used in this game. ◀ THIS GAME KIT INCLUDES (2) FLIPPER REBUILD KITS ▶

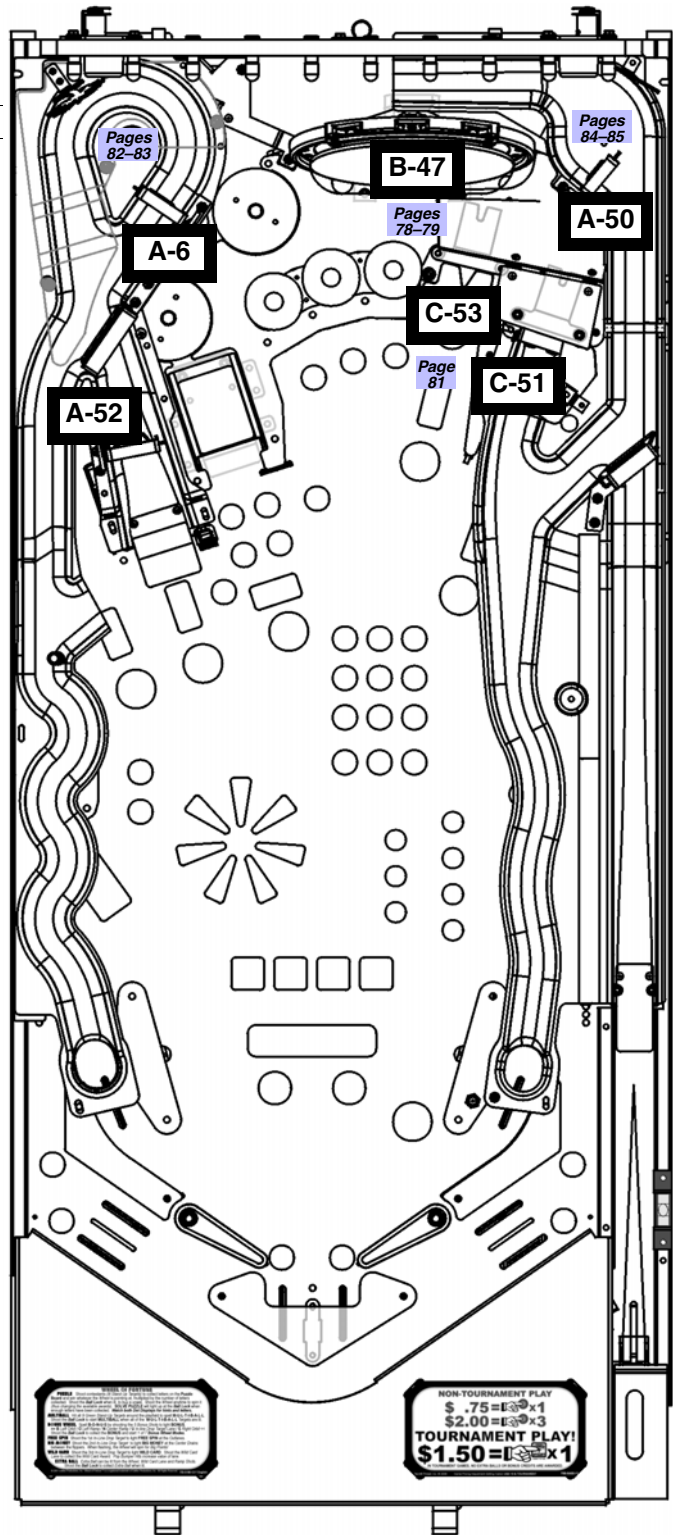
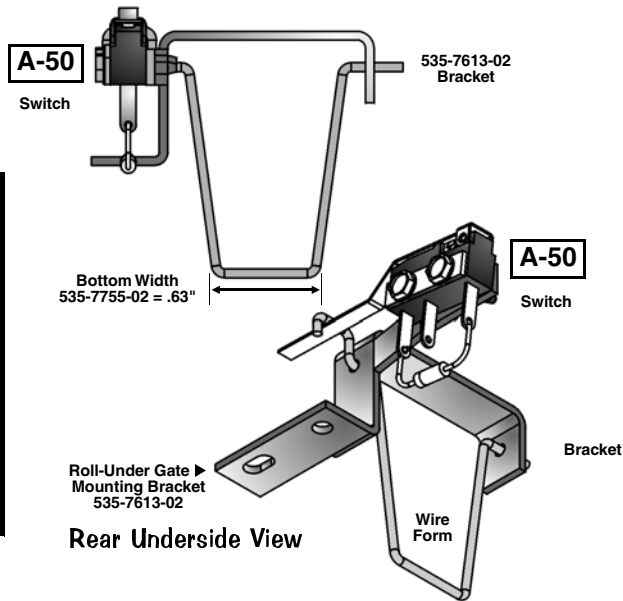
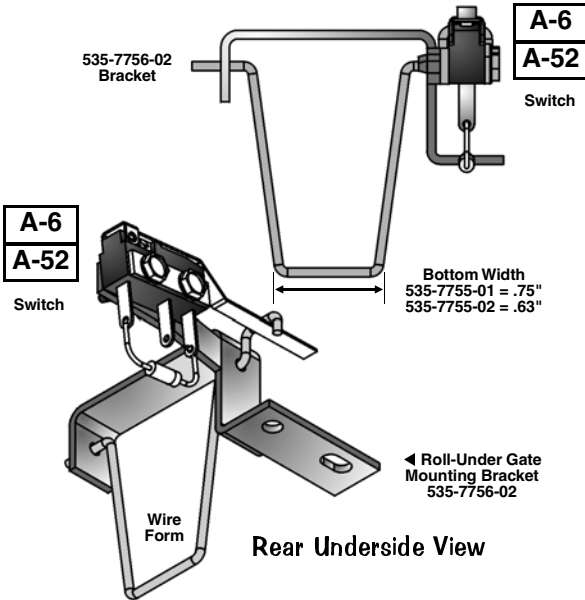
Sec. 4: Parts Id. ...

# Playfield Top - Switches (Above) (on Gates & Stand-Alone)

| Nr.        | SWITCHES   | QTY. | SPI PART Nr.           |
|------------|--|------|------------------------|
|            | Exit Gate Assembly (on Ramps)  | 3    | <b>Ind. Parts Only</b> |
| <b>A-#</b> | <i>Individual Parts Only</i> : Switch (180-5087-00), Switch Body Protect Plate (535-6539-00), Diode 1N4004 (112-5003-00), #2-56 X 1/2" Uns. Serr. HWH #4 Head TR3 Black (Qty. 2) (237-5937-02), Gate Bracket (Left Ramp) (Qty. 2) (535-7756-02), Wire Form (.75" Bottom) for A-52 (535-7755-01), Wire Form (.63" Bottom) for A-6 & A-50 (Qty. 1/per) (535-7755-02), Gate Bracket (Right Ramp) (535-7613-02) (ASM. REF. ONLY 515-6556-02/A & -03/A) |      |                        |
|            | Switch (for Plastic Ramp Wire Gates)   | 3    | 180-5087-00            |

Switch Matrix Numbers 6, 50 & 52

Also see Section 4, Chapter 2, (Blue Pages): ... Ramp Assemblies, see Pages 82 - 85.



**B-47** Wheel Lamp & Slotted OPTO PCB 1 520-5283-00

Switch Matrix Number 47

**Application Note:** OPTO Interuptor on PCB.

See Section 5, Chapter 4, (Yellow Pages) PCBs, Pages 132 - 133.

**Usage Note:** See Section 4, Chapter 2, (Blue Pages): Wheel of Fortune Assembly, Individual Parts Only, Page 78 - 79

**C-#** Transceiver OPTO PCB Asm. with 15" Leads 4 500-6775-01

Switch Matrix Numbers 51 & 53

**Application Note:** Pairs required per switch and an OPTO Transceiver Amplifier PCB (520-5239-01). See Section 5, Chapter 4, (Yellow Pages) PCBs, Pages 130 - 131.

**Usage Note:** See Section 4, Chapter 2, (Blue Pages): Wire Ramp Assembly, Individual Parts Only, Page 86, and Right Ramp Assembly, Individual Parts Only, Pages 84 - 85.

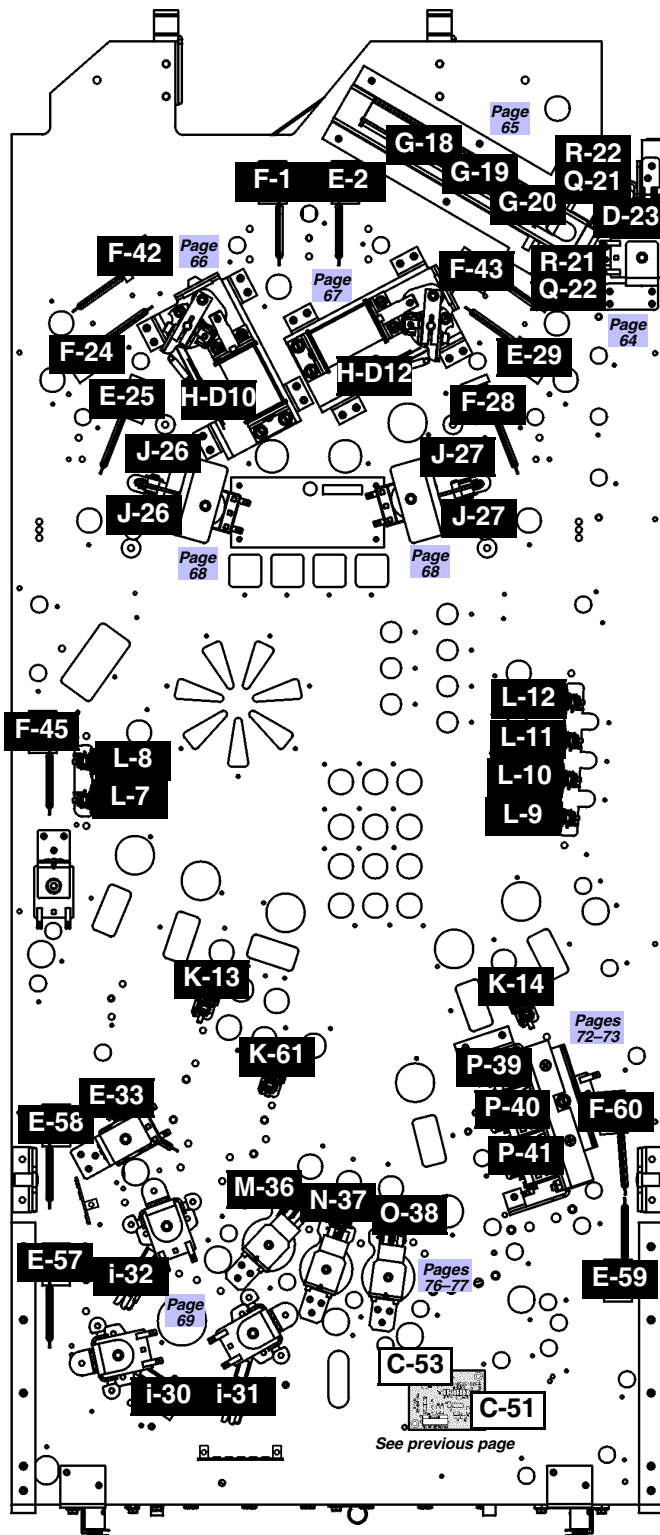
**example:**

"A-#" means, it is Item Number A-# in the Part Table. The "-#" indicates more than 1 switch is present. So it is replaced with the Switch's "Switch Matrix Number" (e.g. A-6, Item A Switch and one of the Switches referenced is from Switch Matrix Number 06).



Sec. 4: Parts Id. ...

# Playfield Bottom - Switches (Below) (on Assemblies & Stand-Alone)



| Nr.  | SWITCHES  | QTY. | SPI PART Nr. |
|--|---|------|--------------|
| D-23   | Switch (for Shooter Lane)<br><i>Associated Part Not Included</i> : Switch Mounting Bracket (535-6173-00)<br>Bracket secured to Playfield by: #6 X 1/2" SHWH AB (Zinc) (Qty. 2) (234-5001-02)<br>Also see Section 4, Chapter 2, (Blue Pages): Shooter Lane Switch Assembly, Page 64.   | 1    | 180-5157-00  |
| E-#  | Sw., Roll-Over Standard Force (Left Mnt. Style)<br>Switch Matrix Numbers 2, 25, 29, 33, 57, 58 & 59   | 7    | 500-6227-03  |
| F-#  | Sw., Roll-Over Std. Force (Right Mount Style)<br>Bracket secured to Playfield by: #6 X 1/2" SHWH AB (Zinc) (Qty. 2/per) (234-5001-02)<br>Switch Matrix Numbers 1, 24, 28, 42, 43, 45 & 60   | 7    | 500-6227-04  |
| G-#  | Switch (Roller Actuator, Lite-Force)<br><i>Associated Parts Not Included</i> : Heat Shrink Tubing 1/8" ø PUI-24 (Qty. 1" per) (605-5006-00) and Diode 1N4004 (Qty. 1/per) (112-5003-00)<br>Item G-# is secured by: #2-56 X 1/2" Unslit HWH #4 Hex TR3 Blk (Qty. 2/per) (237-5937-02)<br>Also see Section 4, Chapter 2, (Blue Pages): 4-Ball Trough Assembly, Page 65.<br>Switch Matrix Numbers 18, 19 & 20  | 3    | 180-5119-02  |
| H-#  | Switch (End-of-Stroke), Stack (Blade)<br>Item H-# is secured by: #6-32 X 5/8" SHWH Swage (Serr.) Zinc (Qty. 2/per) (237-5976-04)<br>Also see Section 4, Chapter 2, (Blue Pages): ... Flipper Assemblies, Pages 66 - 67.<br>Dedicated Switch Numbers D10 & D12   | 2    | 180-5149-00  |
| i-#  | Switch Asm., Stack (Blade) (for Pops)<br><i>Assembly Parts Included</i> : Switch (180-5015-04), Sw. Mounting Bracket (535-7342-00), Spoon Actuator (545-5610-02), Switch Body Protect Plate (535-7344-00), Diode 1N4004 (Qty. 1/per) (112-5003-00) and #6-32 X 3/4" HWH Zc (Qty. 2/per) (237-5976-05)<br>Bracket secured to Playfield by: #8 X 1/2" SHWH AB (Z) (Qty. 2) (234-5101-00)<br>Also see Section 4, Chapter 2, (Blue Pages): Bumper Switch Individual Parts ..., Page 69.<br>Switch Matrix Numbers 30, 31 & 32  | 3    | 515-6459-09  |
| J-#  | Switch, Stack (Blade)<br><i>Associated Parts Not Included</i> : Switch Body Protect Plate (Qty. 1/per) (535-5045-00) and Diode 1N4004 (Qty. 1 for every 2 connected together) (112-5003-00)<br>Item L-# is secured by: #6-32 X 5/8" HWH Swage (Serr.) Zinc (Qty. 2/per) (237-5976-04)<br>Also see Section 4, Chapter 2, (Blue Pages): Slingshot Assemblies (Qty. 2/per), Page 68.<br>Switch Matrix Numbers 26 & 27 (Dual Switches = Slingshots)   | 4    | 180-5054-00  |
| K-#  | Switch & Target Riveted Asm. 1/2" (Green)<br><i>Asm. Parts Included</i> : Stack Sw. (180-5208-00) and 1/2" Narrow Target Green (545-5210-04); Use 500-6985-04 to include : Bracket, Switch Mounting (535-6896-00), Anti-Loft Switch Back Plate (535-9823-01), Foam Pad .4" X .6" X .19" Thick (626-5078-00) and hardware.<br>Switch Matrix Numbers 13, 14 & 61  | 3    | 515-7581-04  |
| L-#  | Switch & Target Riveted Asm. 1" Sq. (Green)<br><i>Asm. Parts Included</i> : Stack Sw. (180-5207-00) and 1" Square Target Green (545-5470-04); Use 500-5232-04 to include : Bracket, Switch Mounting (535-6896-00), Anti-Loft Sw. Back Plate (535-9823-01) & Foam Pad .44" X .44" X .125" Th. (626-5029-00).<br>Note: Smaller foam pad creates the Lite Anti-Loft Assembly (500-5232-XX).<br>Switch Matrix Numbers 7, 8, 9, 10, 11 & 12  | 6    | 515-7568-04  |
| M-36   | Switch & Target Riveted Asm. 1" Sq. (Red)<br><i>Asm. Parts Included</i> : Stack Sw. (180-5207-00) and 1" Square Target Red (545-5470-02); Use 500-6984-02 to include : Bracket, Switch Mounting (535-6896-00), Anti-Loft Switch Back Plate (535-9823-01) & Foam Pad .4" X .6" X .19" Thick (626-5078-00)  | 1    | 515-7568-02  |
| N-37   | Switch & Target Riveted Asm. 1" Sq. (Yellow)<br><i>Asm. Parts Included</i> : Stack Sw. (180-5207-00) and 1" Square Target Yellow (545-5470-06); Use 500-6984-06 to include : Bracket, Switch Mounting (535-6896-00), Anti-Loft Switch Back Plate (535-9823-01) & Foam Pad .4" X .6" X .19" Thick (626-5078-00)  | 1    | 515-7568-06  |
| O-38   | Switch & Target Riveted Asm. 1" Sq. (Blue)<br><i>Asm. Parts Included</i> : Stack Sw. (180-5207-00) and 1" Square Target Blue (545-5470-05); Use 500-6984-05 to include : Bracket, Switch Mounting (535-6896-00), Anti-Loft Switch Back Plate (535-9823-01) & Foam Pad .4" X .6" X .19" Thick (626-5078-00)  | 1    | 515-7568-05  |
| K - O Plastic Targets are rivted with : Rivet 1/8" ø X 3/16" (Qty. 1/per) (249-5001-00) and Washer 9/64" I.D. X 5/16" O.D. X .048" Thick (Zinc) (Qty. 1/per) (242-5017-00) and require Diode, 1N4004 (112-5003-00) |   |      |              |
| P-#  | Slotted OPTO Int. PCB (In-Line D/T)<br>Also see Section 4, Chapter 2, (Blue Pages): In-Line Drop Target Assembly, Pages 72 - 73, or see Section 5, Chapter 4, (Yellow Pages): In-Line OPTO PCB ..., Page 129.<br>Switch Matrix Numbers 39, 40 & 41  | 3    | 520-5255-00  |
| Q-21   | Dual OPTO TRANS PCB Asm.<br><i>Assembly Parts Included</i> : Dual OPTO Trans. PCB (Qty. 1) (520-5173-00), OPTO PCB Tube Spacer (Brass) (Qty. 3) (530-5308-02) and Rubber Grommet (Qty. 3) (545-5518-00)   | 1    | 515-0173-00  |
| R-22   | Dual OPTO REC PCB Assembly<br><i>Assembly Parts Included</i> : Dual OPTO Rec. PCB (Qty. 1) (520-5174-00), OPTO PCB Tube Spacer (Brass) (Qty. 3) (530-5308-02) and Rubber Grommet (Qty. 3) (545-5518-00)<br>Items Q-#-R-# are secured by: #6-32 X 5/8" HWH Sw. (Ser.) Zc. (Qty. 3/per) (237-5976-04)<br>Also see Section 4, Chapter 2, (Blue Pages): 4-Ball Trough Assembly, Page 65, or see Sec. 5, Chapter 4, (Yellow Pages): Trough Up-Kicker Dual OPTO PCBs, Pages 103 - 108.<br>Switch Matrix Numbers 21 & 22 Switch Note: Both Q & R PCBs required per switch. | 1    | 515-0174-00  |

### example:

"E-#" means, it is Item Number E-# in the Part Table. The "-#" indicates more than 1 switch is present. So it is replaced with the Switch's "Switch Matrix Number" (e.g. E-25, Item E Switch and one of the Switches referenced is from Switch Matrix Number 25).

If only 1 switch type for the item exists, the Switch Number will be listed with the Item Number (e.g. D-23, Item D Switch and the Switch Matrix Number is 23).



# Playfield Top - Flat Rails & Ramp

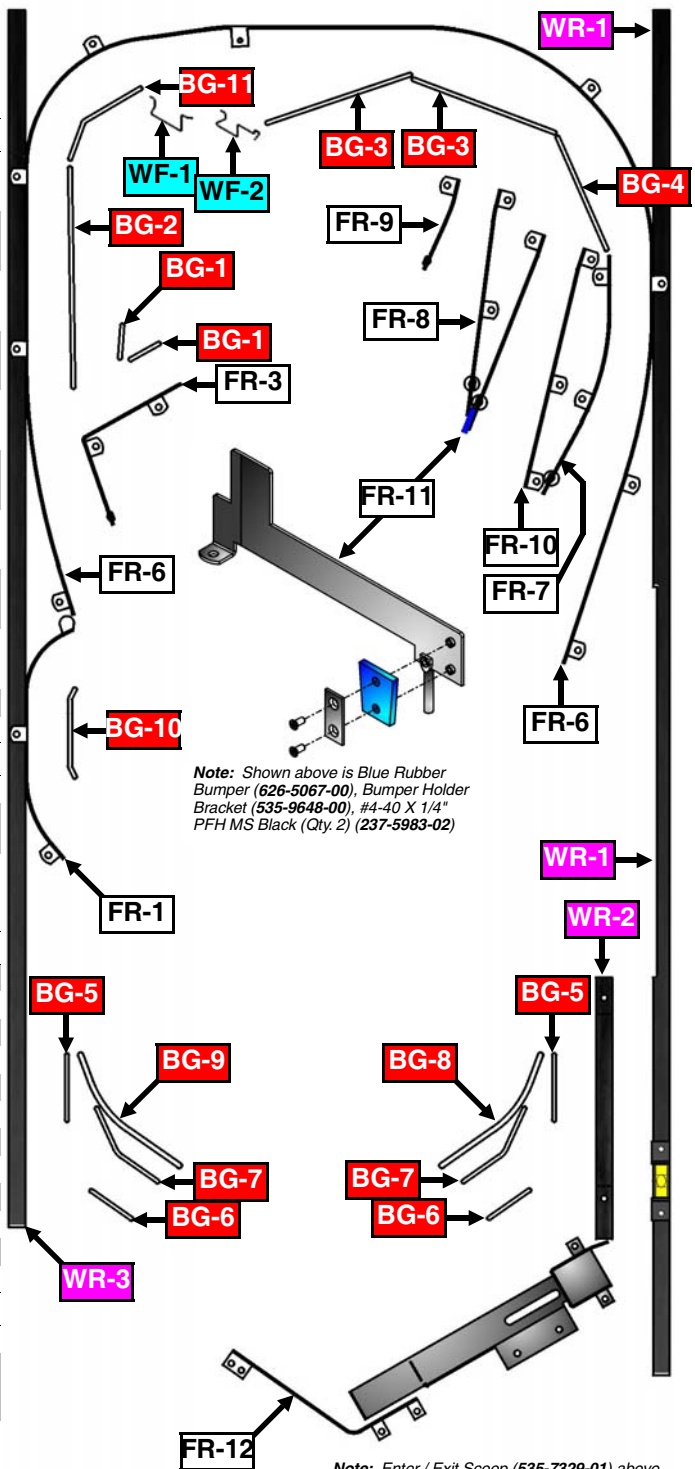
## Wood Rails, Ball Guides and Wire Forms

| Nr.  | FLAT RAILS                     | QTY. | SPI PART Nr. |
|--|--------------------------------|------|--------------|
| FR1  | Flat Rail #1                   | 1    | 535-0032-01  |
| Item FR1 is secured by: ■ (Qty. 1), ⌘ (Qty. 1) and ⌘ (Qty. 1)    |                                |      |              |
| FR3  | Flat Rail #3                   | 1    | 535-0032-03  |
| Item FR3 is secured by: ■ (Qty. 1), ◆ (Qty. 1) and ❖ (Qty. 1)    |                                |      |              |
| FR6  | Flat Rail #6                   | 1    | 535-0032-06  |
| Item FR6 is secured by: ■ (Qty. 5) and ⌘ (Qty. 3)                |                                |      |              |
| FR7  | Flat Rail #7                   | 1    | 535-0032-07  |
| Item FR7 is secured by: ■ (Qty. 2), ◆ (Qty. 1) and ❖ (Qty. 1)    |                                |      |              |
| FR8  | Flat Rail #8                   | 1    | 535-0032-08  |
| Item FR8 is secured by: ■ (Qty. 2), ◆ (Qty. 1) and ❖ (Qty. 1)    |                                |      |              |
| FR9  | Flat Rail #9                   | 1    | 535-0032-09  |
| Item FR9 is secured by: ■ (Qty. 1), ◆ (Qty. 1) and ❖ (Qty. 1)    |                                |      |              |
| FR10   | Flat Rail #10                  | 1    | 535-0032-10  |
| Item FR10 is secured by: ◆ (Qty. 3)                              |                                |      |              |
| FR11   | Flat Rail #11                  | 1    | 535-0032-11  |
| Item FR11 is secured by: ⌘ (Qty. 1), ◆ (Qty. 2) and ❖ (Qty. 2)   |                                |      |              |
| FR12   | Flat Rail (Bottom Arch Drain)  | 1    | 535-8393-00  |
| Item FR12 is secured by: ■ (Qty. 4) For 3D view, see Page DR. 1. |                                |      |              |
| FRX  | Flat Rail #2, #4 & #5 Not Used | 0    | Not Used     |

| Nr.   | WOOD RAILS                         | QTY. | SPI PART Nr. |
|---|------------------------------------|------|--------------|
| WR1   | Wood Rail (Right), 42" with notch  | 1    | 525-5674-00  |
| WR2   | Wood Rail (Shooter Lane), 8" w/cut | 1    | 525-5675-00  |
| Items WR1-WR2 are secured by: #6-32 X 1-3/4" PPH MS (Zinc) (Qty. 5/per) (237-5804-00) |                                    |      |              |
| WR3   | Wood Rail (Left), 37.5"            | 1    | 525-5007-22  |
| Items WR3 is secured by: #6 X 1-1/4" PFH A (Zinc) (Qty. 5) (237-5804-00)              |                                    |      |              |

| Nr.  | BALL GUIDES                          | QTY. | SPI PART Nr. |
|------|--------------------------------------|------|--------------|
| BG10 | Ball Guide, 1" (.12" ø)              | 2    | 535-5356-18  |
| BG2  | Ball Guide, 6.73" (.12" ø)           | 1    | 535-5356-12  |
| BG3  | Ball Guide, 4.62" (.12" ø)           | 2    | 535-5356-06  |
| BG4  | Ball Guide, 3.75" (.12" ø)           | 1    | 535-5356-03  |
| BG5  | Ball Guide, 2" (.12" ø)              | 2    | 535-5356-01  |
| BG6  | Ball Guide, 1.5" (.12" ø)            | 2    | 535-5356-20  |
| BG7  | Ball Guide, Return Lane Short        | 2    | 535-0056-00  |
| BG8  | Ball Guide, Return Lane Long (Right) | 1    | 535-0033-00  |
| BG9  | Ball Guide, Return Lane Long (Left)  | 1    | 535-0034-00  |
| BG10 | Ball Guide (@ Wild Lane)             | 1    | 535-0035-00  |
| BG11 | Ball Guide, Upper Left Orbit         | 1    | 535-0036-00  |

| Nr.   | WIRE FORMS                          | QTY. | SPI PART Nr. |
|---|-------------------------------------|------|--------------|
| WF1   | Wire Form on Dual One-Way Gate      | 1    | 535-0079-00  |
| WF2   | Wire Form over Right Ball Deflector | 1    | 535-0080-00  |
| For larger 3D view of above Wire Forms WF1 & 2, see Page 81, Items 2-3.<br>For other Wire Forms on Gates located on the Plastic Ramps, see Pages 82-85. |                                     |      |              |



### Take Note:

#### Parts Table Legend Note:

- #8 X 1/2" SHWH AB (Zinc) (234-5101-00)
- ❖ #8-32 Nylon Stop Nut (240-5102-00)
- ◆ #8 Washer (242-5005-00)
- ⊠ #6-32 X 7/8" Fin Shank Screw (237-5921-04)
- ⌘ #6-32 X 1/2" PTH A (Zinc) (237-5809-00) into Wood Rail.
- ⌘ #6-32 X 3/8" PPH Sems (Zinc) (232-5201-00)

#### Playfield Legend Note:

- Items noted with a white square □ are Flat Rails or Flat Ramps.
- Items noted with a magenta square ■ are Wood Rails.
- Items noted with a red square ■ are Ball Guides (Snubber Wires)
- Items noted with a cyan square ■ are Wire Forms.

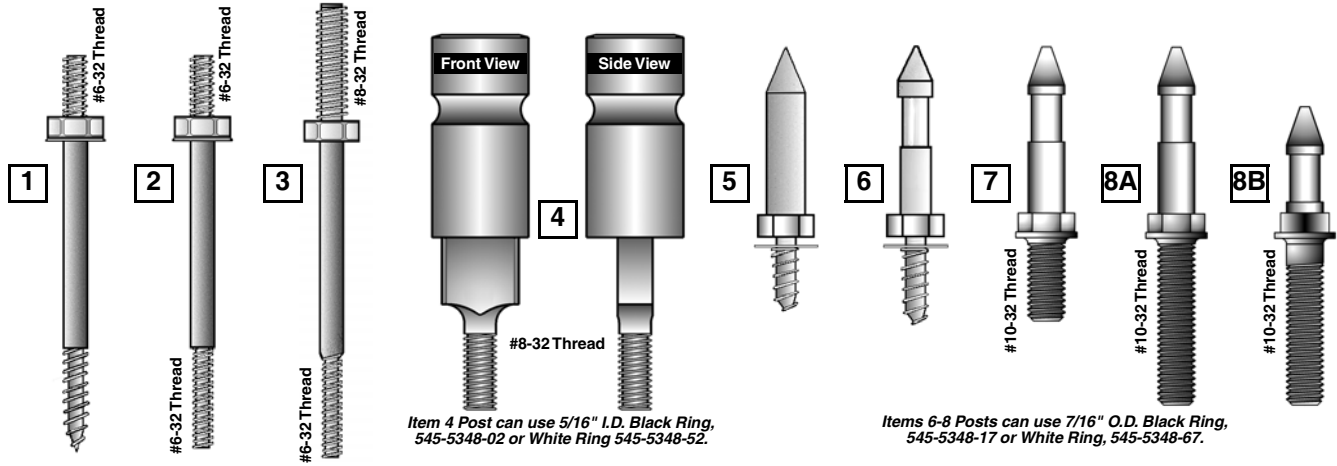
Sec. 4: Parts Id. ...





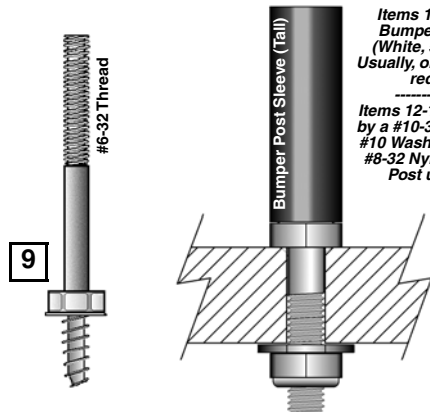


# Playfield Top & Bottom - Metal Posts & Fin Shank Screws (Actual Size) †



Item 4 Post can use 5/16" I.D. Black Ring, 545-5348-02 or White Ring 545-5348-52.

Items 6-8 Posts can use 7/16" O.D. Black Ring, 545-5348-17 or White Ring, 545-5348-67.



Items 11-16 & 18 Posts can use a Black Bumper Post Sleeve (Tall), 545-5308-00 (White, 545-5308-08 or Red, 545-5308-22) Usually, only Posts which are in the ball path require a Bumper Post Sleeve.

Items 12-15 & 18 Posts are typically secured by a #10-32 Nylon Stop Nut, 240-5203-00 and #10 Washer, 242-5010-00 (Item 11 Post use a #8-32 Nylon Stop Nut, 240-5102-00; Item 16 Post use a #8-32 T-Nut, 240-5101-00).

## Take Note:

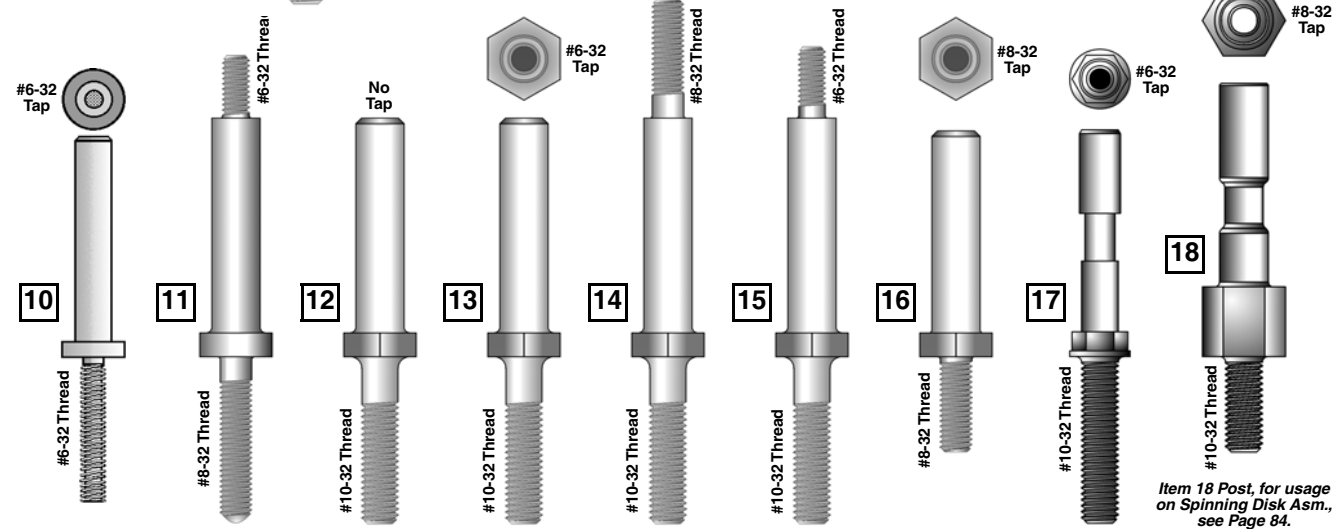
**Legend Note:**  
Items noted with a white square  are Metal Posts. Items noted with a black square  are Fin Shank Screws.

**A & B** Items A & B Note: Typically used to secure Hex Spacers onto the Playfield Wood or Back Panel.

**C** Item C Note: Quantity 4 on bottom Cabinet Speaker Grill (Qty. 4) (also requires #6-32 Nylon Stop Nut, 240-5005-00).

**D** Item D Note: Quantity 3/per on the Coil Bracket Welded Assembly (515-5939-00) in the Bumper Bottom Assembly (515-6459-04).

**A - D** Items A-D Note: The "Fins" keep the screw from turning inside the wood hole.



Item 18 Post, for usage on Spinning Disk Asm., see Page 84.

Sec. 4: Parts Id. ...

| Nr. | METAL POSTS                                   | QTY. | SPI PART Nr. | Nr. | METAL POSTS                                    | QTY. | SPI PART Nr. |
|-----|---|------|--------------|-----|--|------|--------------|
| 1   | Post [Fasten] #6-32 Thread // Wood Scr.       | 16   | 530-5010-02  | 12  | Post [Hex Base] NO TAP // #10-32 Thread        |      | 530-5332-00  |
| 2   | Post [Fasten] #6-32 Thread // #6-32 Thread    | 6    | 530-5012-02  | 13  | Post [Hex Bs.] #6-32 TAP // #10-32 Thread      | 16   | 530-5332-01  |
| 3   | Post [Fasten] #8-32 Thread // #6-32 Thread    |      | 530-5008-00  | 14  | Post [Hex Bs.] #8-32 Thread // #10-32 Thread   | 1    | 530-5332-02  |
| 4   | Post Brass [Adjustable, Sliding] #8-32 Thread |      | 530-5621-00  | 15  | Post [Hex Bs.] #6-32 Thread // #10-32 Thread   | 2    | 530-5332-03  |
| 5   | Mini-Post Wood Screw (no cut-away)            | 1    | 530-5004-01  | 16  | Post [Hex Bs.] #8-32 TAP // #8-32 Thread       |      | 530-5332-04  |
| 6   | Mini-Post Wood Screw                          | 10   | 530-5004-00  | 17  | Post [Hex Bs.+Groove] #6-32 TAP // #10-32 Thr. | 1    | 530-5679-00  |
| 7   | Mini-Post MS // #10-32 .4" Thread             |      | 530-5005-01  | 18  | Post [Hex Bs.+Groove] #8-32 TAP // #10-32 Thr. |      | 530-5753-00  |
| 8A  | Mini-Post MS // #10-32 .875" Thread           |      | 530-5005-00  | Nr. | <b>FIN SHANK SCREWS</b>                        | QTY. | SPI PART Nr. |
| 8B  | Mini-Post Short MS // #10-32 .875" Thread     |      | 530-5749-00  | A   | #6-32 X 3/4" Fin Shank Screw                   | 14   | 237-5921-02  |
| 9   | Post [Fasten] #6-32 Thread // Wood Screw      |      | 530-5263-01  | B   | #6-32 X 7/8" Fin Shank Screw                   | 7    | 237-5921-04  |
| 10  | Post #6-32 Tap // #6-32 Thread                |      | 530-5127-00  | C   | #6-32 X 1 1/4" Fin Shank Screw                 | (4)  | 237-5883-00  |
| 11  | Post [Fasten] #6-32 Thread // #8-32 Thread    |      | 530-5007-00  | D   | #6-32 X 1 3/16" Spiral Fin Shank Screw         | 9    | 237-5957-00  |

† The item type (size / description), the quantity and/or location used, are subject to change without notice. Service Bulletins will announce any changes, if warranted.

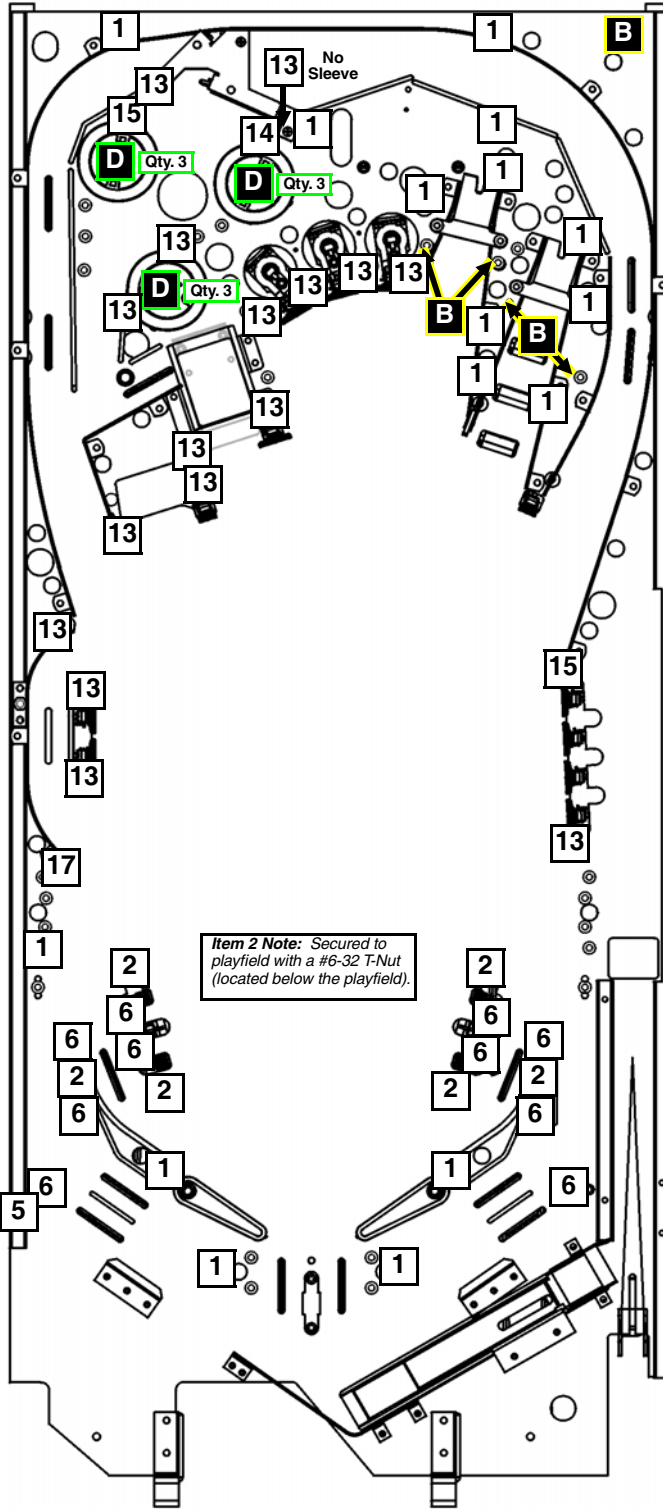




Playfield Top & Bottom - Metal Posts  
 □ & Fin Shank Screws ■ Continued

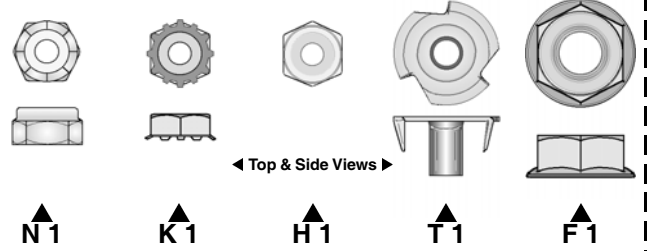
Playfield Top & Bottom -  
 Nylon Stop, KEPS, Hex, T-, Flange,  
 Pal & Wing Nuts\* (Actual Size) †

† The item type (size / description), the quantity and/or location used, are subject to change without notice. Service Bulletins will announce any changes, if warranted.



**Take Note:**

**Legend Note:**  
 Items noted with a white square □ are Metal Posts.  
 Items noted with a black square ■ are Fin Shank Screws.



| Nr.   | NYLON STOP NUTS*                      | QTY. | SPI PART Nr. |
|---|---------------------------------------|------|--------------|
| N1  | #6-32 Nylon Stop Nut                  | 56   | 240-5005-00  |
| N2  | #6-32 N.S. Nut (with 1/4" Hex Body)   |      | 240-5010-00  |
| N3  | #8-32 Nylon Stop Nut                  | 13   | 240-5102-00  |
| N4  | #10-32 Nylon Stop Nut                 | 22   | 240-5203-00  |
| N5  | #10-24 Nylon Stop Nut                 | 2    | 240-5206-00  |
| <small>Item N5 used with #10-24 X 1-3/4" Carriage Bolt Square Neck Black (231-5022-00) located in the Cabinet for the Roto Lock (Male) (355-5006-01).</small> |                                       |      |              |
| N6  | #4-40 Nylon Stop Nut                  |      | 240-5303-00  |
| N7  | #4-40 (18/8 Stainless) Nylon Stop Nut |      | 240-5303-01  |
| N8  | 5/16"-18 Nylon Stop Nut               |      | 240-5316-00  |

| Nr. | KEPS NUTS*                          | QTY. | SPI PART Nr. |
|-----|-------------------------------------|------|--------------|
| K1  | #6-32 Keps Nut (with Star Washer)   | 4    | 240-5008-00  |
| K2  | #6-32 Keps Nut (with 1/4" Hex Body) |      | 240-5011-00  |
| K3  | #8-32 Keps Nut                      |      | 240-5104-00  |
| K4  | #10-32 Keps Nut                     | 1    | 240-5208-00  |
| K5  | #10-24 Keps Nut                     | 14   | 240-5207-00  |
| K6  | #4-40 Keps Nut                      |      | 240-5318-00  |

| Nr. | HEX NUTS*                      | QTY. | SPI PART Nr. |
|-----|--------------------------------|------|--------------|
| H1  | #6-32 Hex Nut (No Star Washer) | 4    | 240-5004-00  |
| H2  | #8-32 Hex Nut                  |      | 240-5103-00  |
| H3  | #10-32 Hex Nut                 |      | 240-5201-00  |
| H4  | #10-24 Hex Nut                 | 2    | 240-5202-00  |

|  |                       |   |             |
|--|-----------------------|---|-------------|
| <small>Item H4 used with #10-24 X 1" Carriage Bolt Square Neck Black (231-5021-00) located in the Cabinet for the Side Armor Rear (towards Backbox).</small> |                       |   |             |
| H5   | #10-32 X 3/8" Hex Nut |   | 240-5209-00 |
| H6   | 3/4"-16 Hex Nut       |   | 240-5315-00 |
| H7   | #2-56 Hex Nut         | 2 | 240-5301-00 |
| H8   | 7/8"-14 Hex Nut       |   | 240-5317-00 |

| Nr. | T-NUTS*                          | QTY. | SPI PART Nr. |
|-----|----------------------------------|------|--------------|
| T1  | #6-32 T-Nut                      | 24   | 240-5002-00  |
| T2  | #6-32 T-Nut (with Side Cut Off)  |      | 240-5002-01  |
| T3  | #8-32 T-Nut                      | 15   | 240-5101-00  |
| T4  | #10-32 (Black Oxide) T-Nut       |      | 240-5007-00  |
| T5  | #10-32 T-Nut (with Side Cut Off) |      | 240-5205-00  |
| T6  | #10-32 X 5/16" 3-Prong T-Nut     | 4    | 240-5204-00  |
| T7  | #10-24 T-Nut                     |      | 240-5200-00  |

| Nr.   | FLANGE NUT*          | QTY. | SPI PART Nr. |
|---|----------------------|------|--------------|
| F1  | 1/4" X 20 Flange Nut | 10   | 240-5300-00  |
| <small>Item F1 used with 1/4-20 X 1-1/4 Sq. Neck Carriage Bolt Black (231-5003-00) located in the Cabinet for the Slide Armor (Front) and Pivot Hinges.</small> |                      |      |              |

| Nr. | PAL NUTS*                            | QTY. | SPI PART Nr. |
|-----|--------------------------------------|------|--------------|
| P1  | Plastic Pal Nut (on Flipper Buttons) |      | 240-5003-00  |
| P2  | Metal Pal Nut (on Flipper Buttons)   | 2    | 240-5003-01  |

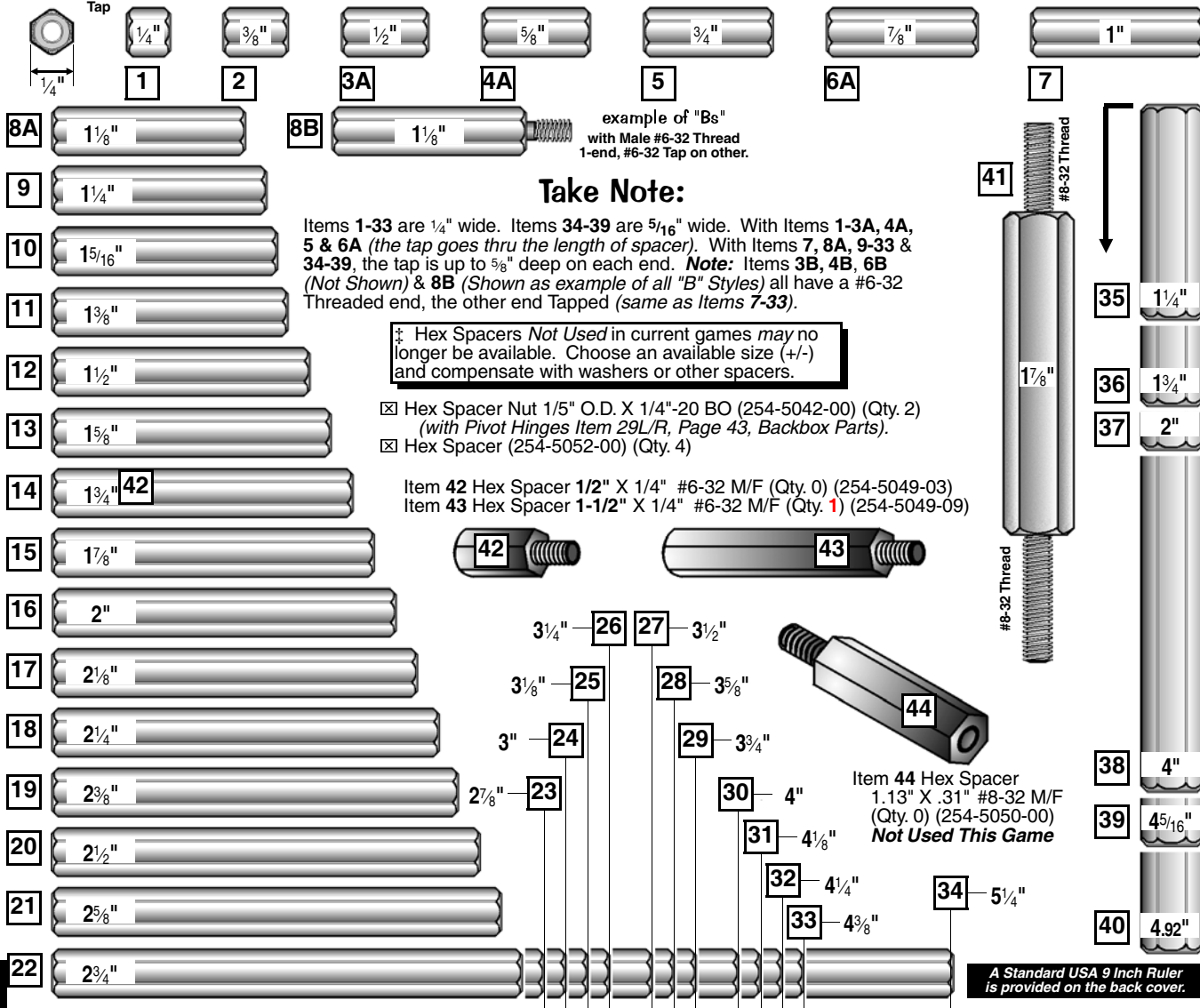
| Nr. | WING NUTS*          | QTY. | SPI PART Nr. |
|-----|---------------------|------|--------------|
| W1  | #6-32 Wing Nut      |      | 240-5001-00  |
| W2  | #8-32 Wing Nut      |      | 240-5100-00  |
| W3  | #10-24 Wing Nut     |      | 240-5211-00  |
| W4  | 1/4"-20 Wing Nut    |      | 240-5302-00  |
| W5  | 1/4"-20 Toggle Wing |      | 240-5324-00  |

\* Not Shown: Items N2-N8, K2-K6, H2-H8, T2-T7, P1-P2 & W1-W5

Sec. 4: Parts Id. ...

# Playfield Top - Hex Spacers   (Actual Size) †

Hex Spacers:  
#6-32  
Tap



## Take Note:

Items 1-33 are 1/4" wide. Items 34-39 are 5/16" wide. With Items 1-3A, 4A, 5 & 6A (the tap goes thru the length of spacer). With Items 7, 8A, 9-33 & 34-39, the tap is up to 5/8" deep on each end. **Note:** Items 3B, 4B, 6B (Not Shown) & 8B (Shown as example of all "B" Styles) all have a #6-32 Threaded end, the other end Tapped (same as Items 7-33).

‡ Hex Spacers *Not Used* in current games may no longer be available. Choose an available size (+/-) and compensate with washers or other spacers.

☒ Hex Spacer Nut 1/5" O.D. X 1/4"-20 BO (254-5042-00) (Qty. 2) (with Pivot Hinges Item 29L/R, Page 43, Backbox Parts).

☒ Hex Spacer (254-5052-00) (Qty. 4)

Item 42 Hex Spacer 1/2" X 1/4" #6-32 M/F (Qty. 0) (254-5049-03)  
Item 43 Hex Spacer 1-1/2" X 1/4" #6-32 M/F (Qty. 1) (254-5049-09)

Item 44 Hex Spacer  
1.13" X .31" #8-32 M/F  
(Qty. 0) (254-5050-00)  
**Not Used This Game**

A Standard USA 9 Inch Ruler is provided on the back cover.

Sec. 4: Parts Id. ...

| Nr.  | HEX SPACERS                            | QTY. | SPI PART Nr. | Nr. | HEX SPACERS                              | QTY. | SPI PART Nr. |
|------|--|------|--------------|-----|--|------|--------------|
| 1    | 1/4" X 1/4" : #6-32 Tap (both ends)    |      | 254-5008-00  | 19  | 2 3/8" X 1/4" : #6-32 Tap (both ends)    |      | 254-5008-28  |
| 2    | 3/8" X 1/4" : #6-32 Tap (both ends)    |      | 254-5008-12  | 20  | 2 1/2" X 1/4" : #6-32 Tap (both ends)    | 2    | 254-5008-16  |
| 3A   | 1/2" X 1/4" : #6-32 Tap (both ends)    | 4    | 254-5008-03  | 21  | 2 5/8" X 1/4" : #6-32 Tap (both ends)    | 1    | 254-5008-08  |
| 3B*  | Identical to 3A with #6-32 Thread end  |      | 254-5024-03  | 22  | 2 3/4" X 1/4" : #6-32 Tap (both ends)    |      | 254-5008-15  |
| 4A   | 5/8" X 1/4" : #6-32 Tap (both ends)    |      | 254-5008-02  | 23  | 2 7/8" X 1/4" : #6-32 Tap (both ends)    |      | 254-5008-31  |
| 4B*  | Identical to 4A with #6-32 Thread end  |      | 254-5024-02  | 24  | 3" X 1/4" : #6-32 Tap (both ends)        | 1    | 254-5008-14  |
| 5    | 3/4" X 1/4" : #6-32 Tap (both ends)    | 3    | 254-5008-04  | 25  | 3 1/8" X 1/4" : #6-32 Tap (both ends)    |      | 254-5008-19  |
| 6A   | 7/8" X 1/4" : #6-32 Tap (both ends)    | 1    | 254-5008-05  | 26  | 3 1/4" X 1/4" : #6-32 Tap (both ends)    |      | 254-5008-26  |
| 6B*  | Identical to 6A with #6-32 Thread end  | 1    | 254-5024-05  | 27  | 3 1/2" X 1/4" : #6-32 Tap (both ends)    |      | 254-5008-27  |
| 7    | 1" X 1/4" : #6-32 Tap (both ends)      | 1    | 254-5008-06  | 28  | 3 5/8" X 1/4" : #6-32 Tap (both ends)    |      | 254-5008-25  |
| 8A   | 1 1/8" X 1/4" : #6-32 Tap (both ends)  | 4    | 254-5008-17  | 29  | 3 3/4" X 1/4" : #6-32 Tap (both ends)    |      | 254-5008-36  |
| 8B   | Identical to 8A with #6-32 Thread end  |      | 254-5024-17  | 30  | 4" X 1/4" : #6-32 Tap (both ends)        |      | 254-5008-21  |
| 9    | 1 1/4" X 1/4" : #6-32 Tap (both ends)  | 3    | 254-5008-11  | 31  | 4 1/8" X 1/4" : #6-32 Tap (both ends)    |      | 254-5008-23  |
| 10   | 1 5/16" X 1/4" : #6-32 Tap (both ends) |      | 254-5008-34  | 32  | 4 1/4" X 1/4" : #6-32 Tap (both ends)    |      | 254-5008-30  |
| 11 ‡ | 1 3/8" X 1/4" : #6-32 Tap (both ends)  |      | 254-5008-33  | 33  | 4 3/8" X 1/4" : #6-32 Tap (both ends)    |      | 254-5008-29  |
| 12 ‡ | 1 1/2" X 1/4" : #6-32 Tap (both ends)  | 2    | 254-5008-09  | 34  | 5 1/4" X 1/4" : #6-32 Tap (both ends)    |      | 254-5008-35  |
| 13 ‡ | 1 5/8" X 1/4" : #6-32 Tap (both ends)  |      | 254-5008-13  | 35  | 1 1/4" X 5/16" : #6-32 Tap (both ends)   |      | 254-5018-09  |
| 14 ‡ | 1 3/4" X 1/4" : #6-32 Tap (both ends)  |      | 254-5008-10  | 36  | 1 3/4" X 5/16" : #6-32 Tap (both ends)   |      | 254-5018-06  |
| 15 ‡ | 1 7/8" X 1/4" : #6-32 Tap (both ends)  |      | 254-5008-20  | 37  | 2" X 5/16" : #6-32 Tap (both ends)       |      | 254-5018-07  |
| 16   | 2" X 1/4" : #6-32 Tap (both ends)      |      | 254-5008-07  | 38  | 4" X 5/16" : #6-32 Tap (both ends)       |      | 254-5018-03  |
| 17   | 2 1/8" X 1/4" : #6-32 Tap (both ends)  |      | 254-5008-32  | 39  | 4 5/16" X 5/16" : #6-32 Tap (both ends)  |      | 254-5018-00  |
| 18   | 2 1/4" X 1/4" : #6-32 Tap (both ends)  |      | 254-5008-18  | 40  | 4.92" X 5/16" : #6-32 Tap (both ends)    |      | 254-5018-04  |
|      |  |      |              | 41  | 1 7/8" X 3/8" : #8-32 Thread (both ends) |      | 530-5285-00  |

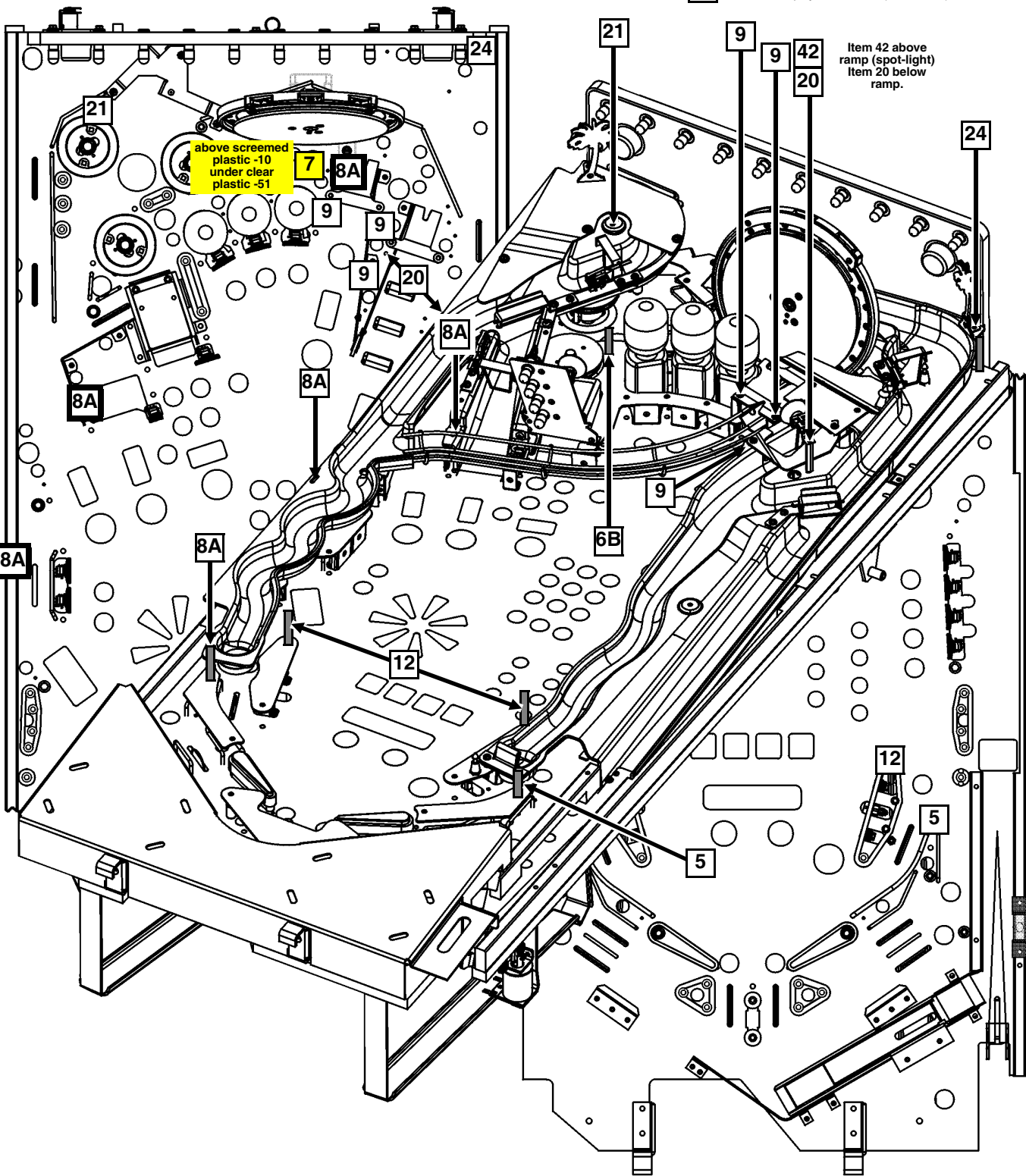
† The item type (size / description), the quantity and/or location used, are subject to change without notice. Service Bulletins will announce any changes, if warranted.



# Playfield Top - Hex Spacers Continued

- 3A** **Item 3A Note:** Quantity 4 on the Static Shield located on the Speaker Panel; Quantity 1 on the Display Controller PCB (both in Backbox).
- 5** **Item 5 Note:** Quantity 2 on the Display Shield located over the Display Power PCB (in Backbox).

The item type (size / description), the quantity and/or location used, are subject to change without notice. Service Bulletins will announce any changes, if warranted.



Item 42 above ramp (spot-light)  
Item 20 below ramp.

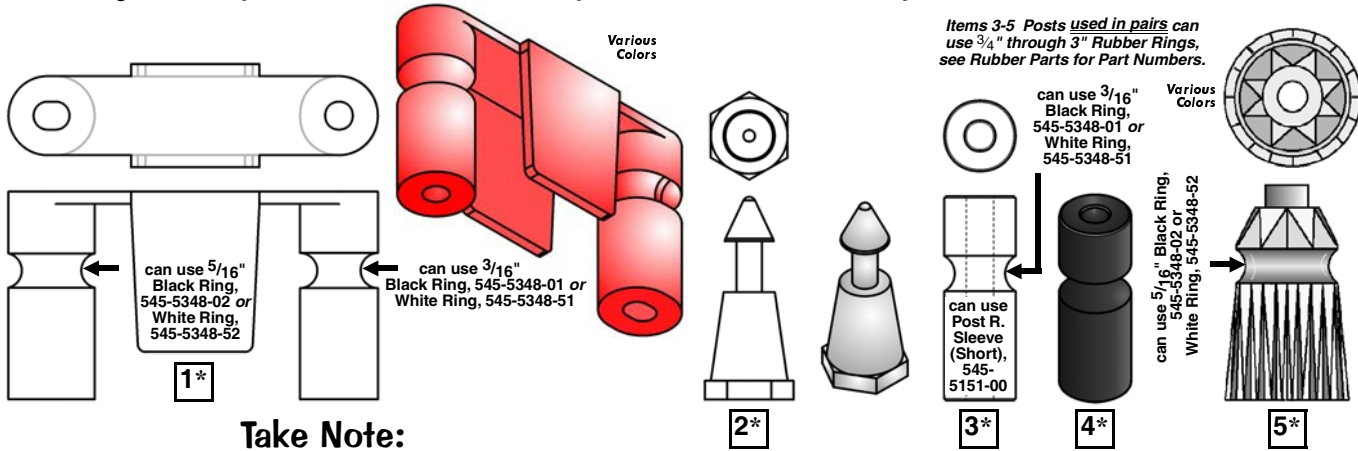
**Sec. 4: Parts Id. ...**

## Take Note:

**Legend Note:**  
Items noted with a white square  are Hex Spacers.



# Playfield Top - Plastic Posts & Spacers & Metal Spacers (Actual Size) †

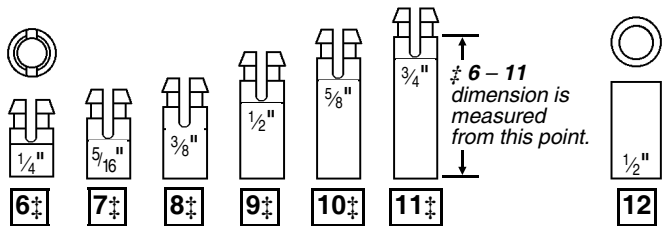


**Take Note:**

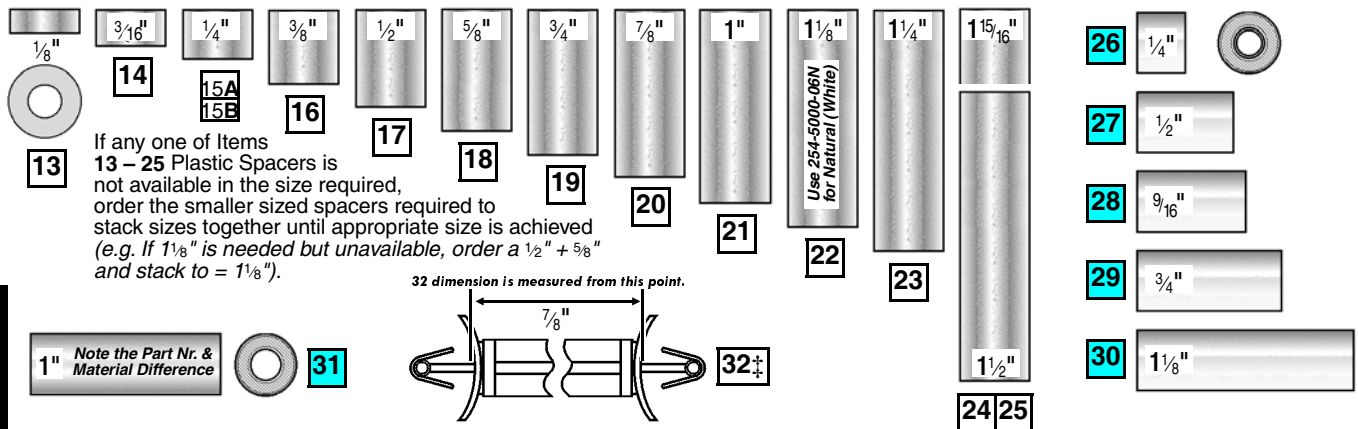
## PLASTIC PART COLOR CHART

| Nr. | Color | Nr. | Color         | Nr. | Color       |
|-----|-------|-----|---------------|-----|-------------|
| -00 | Black | -06 | Yellow        | -12 | Fluor. Blue |
| -01 | Clear | -07 | Orange        | -13 | Teal Green  |
| -02 | Red   | -08 | White         | -14 | Gray        |
| -03 | Amber | -09 | Purple        | -15 | Luminescent |
| -04 | Green | -10 | Fluor. Orange | -16 | Gold        |
| -05 | Blue  | -11 | Fluor. Green  |     |             |

\* Items 1 & 5 come in various colors. The "-XX" (last 2-Digits in part number), should be replaced with the desired 2-Digit number from the above Color Chart (may not be available in every color; other colors used in prior games may no longer be available).



‡ Items 6 through 11 dimensions are measured from bottom to just under the cut-away. Item 32 dimension is measured from top-to-top of curve. See pictorials with Items 11 & 32.



If any one of Items 13 – 25 Plastic Spacers is not available in the size required, order the smaller sized spacers required to stack sizes together until appropriate size is achieved (e.g. If 1 1/8" is needed but unavailable, order a 1/2" + 5/8" and stack to = 1 1/8").

32 dimension is measured from this point.

1" Note the Part Nr. & Material Difference

Sec. 4: Parts Id. ...

| Nr.   | PLASTIC POSTS & SPACERS                   | QTY. | SPI PART Nr. | Nr.  | PLASTIC POSTS & SPACERS                    | QTY. | SPI PART Nr. |
|---|---|------|--------------|------|--|------|--------------|
| 1**   | Bot. Lane Plastic Mini-Lite Hood (Red)    | 1    | 550-5061-02  | 15B  | 1/4" X 1.75" Plastic Spacer Gray           | 1    | 254-5000-09  |
| Item 2 typically secured by: #6-32 X 1-3/4" PPH MS (Zinc) (Qty. 2/per) (237-5511-00) and Washer 9/64" X 5/16" OD X 1/32" (Qty. 2/per) (242-5017-00), if used. |   |      |              | 16   | 3/8" X 3/8" Plastic Spacer Gray            | 3    | 254-5000-12  |
| 2**   | Mini-Jewel Plastic Post (Clear)           | 4    | 550-5052-01  | 17   | 1/2" X 3/8" Plastic Spacer Gray            | 1    | 254-5000-01  |
| Item 3 typically secured by: #6 X 3/8" HWH AB (Zinc) (Qty. 1/per) (234-5000-00)   |   |      |              | 18   | 5/8" X 3/8" Plastic Spacer Gray            | 1    | 254-5000-14  |
| 3**   | 1 1/16" 1-Groove Plastic Post (Clear)     | 42   | 550-5059-01  | 19   | 3/4" X 3/8" Plastic Spacer Gray            |      | 254-5000-07  |
| 4**   | 1 1/16" 1-Groove Plastic Post (Black)     |      | 550-5059-00  | 20   | 7/8" X 3/8" Plastic Spacer Gray            |      | 254-5000-11  |
| 5**   | 1-Groove Jewel Plastic Post (Clear)       | 2    | 550-5034-01  | 21   | 1" X 3/8" Plastic Spacer Gray or Black     |      | 254-5000-04  |
| Items 4 & 5 typically secured by: Post Fastening Screw #6-32 Top / #6-32 Bottom (Qty. 1/per) (530-5012-02) For view of post, see Item 2, Page 54.             |   |      |              | 22   | 1 1/8" X 3/8" Plastic Spacer Gray          |      | 254-5000-06  |
| 6 ‡   | 1/4" Slf. Rtn. Plastic Spacer White       | *    | 254-5007-02  |      | 1 1/8" X 3/8" Plastic Spacer Natural       |      | 254-5000-06N |
| 7 ‡   | 5/16" Slf. Rtn. Plastic Spacer White      | *    | 254-5007-05  | 23   | 1 1/4" X 3/8" Plastic Spacer Gray          | 2    | 254-5000-05  |
| 8 ‡   | 3/8" Slf. Rtn. Plastic Spacer White       |      | 254-5007-01  | 24   | 1 1/2" X 3/8" Plastic Spacer Gray          | 2    | 254-5000-08  |
| 9 ‡   | 1/2" Slf. Rtn. Plastic Spacer White       |      | 254-5007-04  | 25   | 1 15/16" X 3/8" Plastic Spacer Gray        | 1    | 254-5000-15  |
| 10 ‡  | 5/8" Slf. Rtn. Plastic Spacer White       |      | 254-5007-00  | 26   | 1/4" X 5/16" X .144" I.D. Metal Spacer     |      | 254-5014-03  |
| 11 ‡  | 3/4" Slf. Rtn. Plastic Spacer White       |      | 254-5007-03  | 27   | 1/2" X 5/16" X .144" I.D. Metal Spacer     |      | 254-5014-00  |
| 12  | 1/2" X 1/4" Plastic Spacer White (Narrow) |      | 254-5000-03  | 28   | 9/16" X 5/16" X .144" I.D. Metal Spacer    |      | 254-5014-04  |
| 13  | 1/8" X 3/8" Plastic Spacer Gray           |      | 254-5000-19  | 29   | 3/4" X 5/16" X .144" I.D. Metal Spacer     |      | 254-5014-01  |
| 14  | 3/16" X 3/8" Plastic Spacer Gray          | 4    | 254-5000-18  | 30   | 1 1/8" X 5/16" X .144" I.D. Metal Spacer   |      | 254-5014-02  |
| 15A   | 1/4" X 3/8" Plastic Spacer Gray           |      | 254-5000-02  | 31   | 1" X 5/16" X .144" I.D. Metal Spacer       |      | 254-5001-00  |
|   |   |      |              | 32 ‡ | 7/8" Plastic Spacer Support (Dual-Locking) |      | 254-5039-14  |

PARTS TABLE & VIEWS CONTINUED ON THE NEXT PAGE. ▶

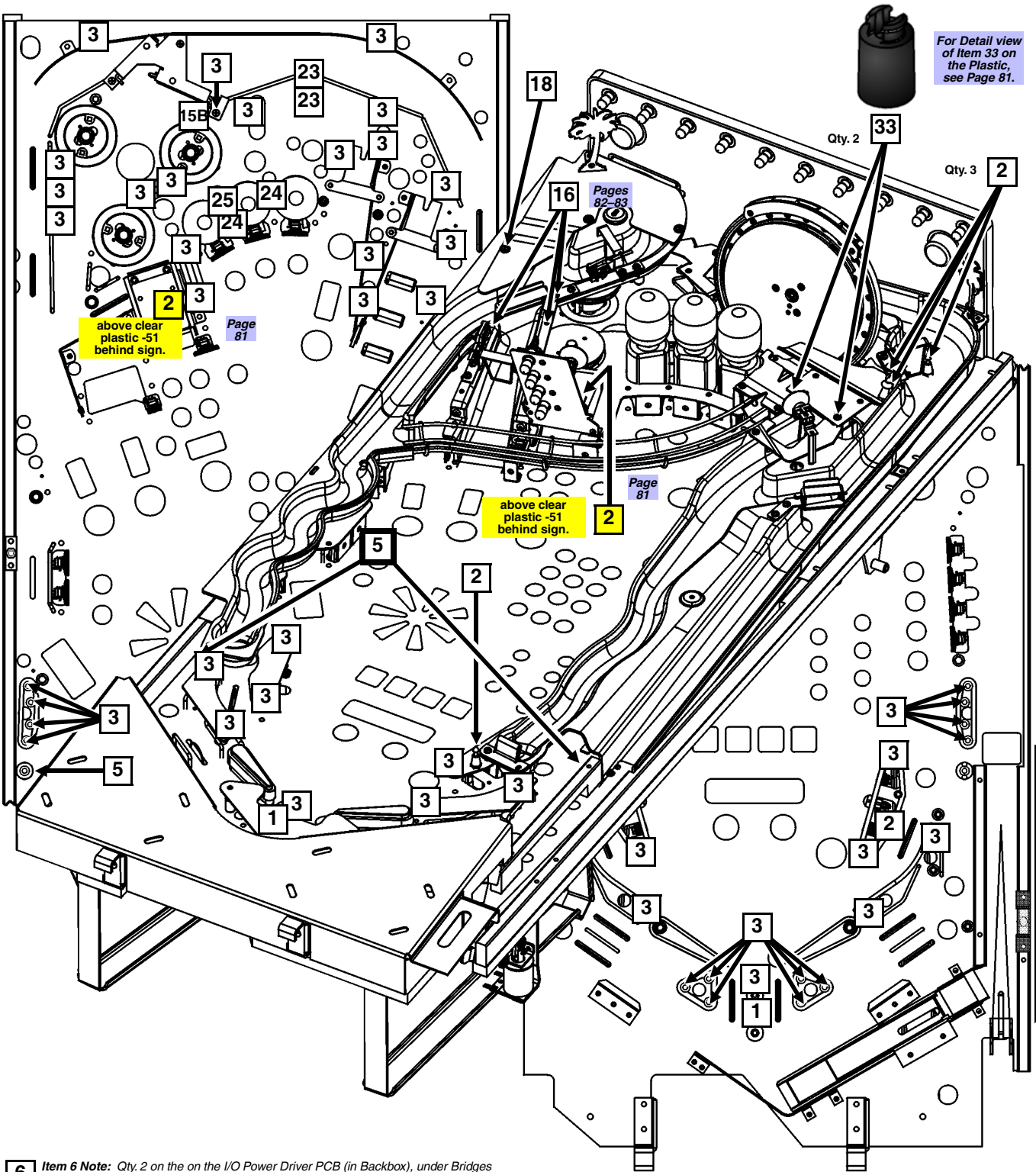
† The item type (size / description), the quantity and/or location used, are subject to change without notice. Service Bulletins will announce any changes, if warranted.



# Playfield Top - Plastic Posts & Spacers & Metal Spacers Continued

| Nr. | PLASTIC POSTS & SPACERS              | QTY. | SPI PART Nr. |
|-----|--------------------------------------|------|--------------|
| 33  | Plastic Spacer, Plastic Mounting .5" | 2    | 254-5054-00  |

The item type (size / description), the quantity and/or location used, are subject to change without notice. Service Bulletins will announce any changes, if warranted.



For Detail view of Item 33 on the Plastic, see Page 81.

above clear plastic -51 behind sign.

Page 81

above clear plastic -51 behind sign.

Page 81

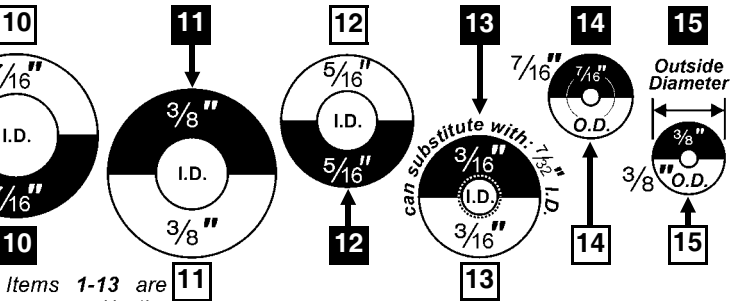
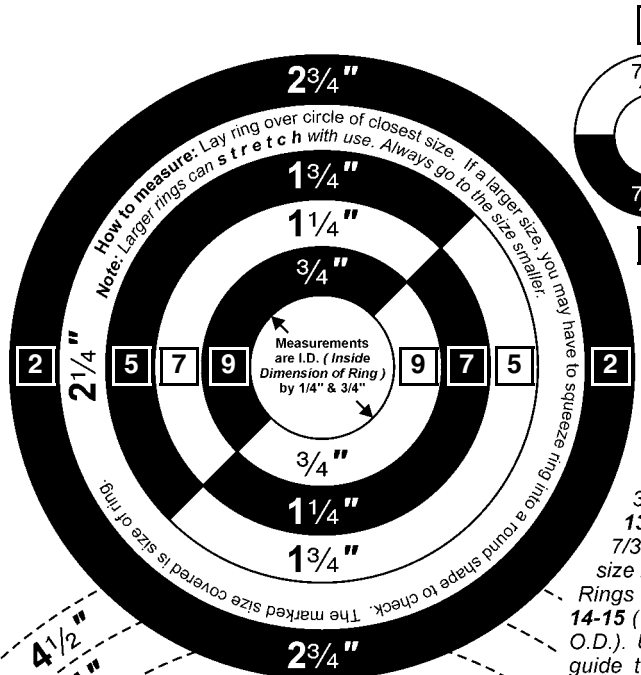
- 6** *Item 6 Note:* Qty. 2 on the on the I/O Power Driver PCB (in Backbox), under Bridges 4 & 5; Qty. 4 per on the OPTO Amplifier PCBs;
- 7** *Item 7 Note:* Qty. 5 on the I/O Power Driver PCB, under Bridges 1, 2 & 3 and outside edge support holes; Qty. 4 on the CPU/Sound outside edge support holes;
- 14** *Item 14 Note:* Qty. 4 on the Dot Matrix Display (in Backbox);
- 23** *Item 23 Note:* Qty. 2 support the Display Controller PCB Warning Cover (in Backbox);

### Take Note:

**Legend Note:**  
Items noted with a white square  are Plastic Posts & Spacers.  
Items noted with a cyan square  are Metal Spacers.

**Sec. 4: Parts Id. ...**

# Playfield Top & Bottom - Rubber Parts Black & Blue (Rings Actual Size) †



Items 1-13 are measured by the Inside Diameter (I.D.). Items 1-9 and 11 are approximately 1/4" thick. Items 10, 12-15 are approximately 3/16" thick. Item 13 can also be a 7/32" I.D. Ring. The size is imprinted on all Rings except for Items 14-15 (7/16" O.D. & 3/8" O.D.). Use this page as a guide to measure rings where the size imprint or mark does not exist. Size 2 1/4" I.D. (Black or White) was never used. Choose a Ring Size +/- 1/4" I.D. if required.

Note: Sizes larger than 3" I.D. currently available in Black Only (Not Used): 3 1/2" (545-5348-11); 4" (-12); 4 1/2" (-13); 5" (-14); 5 1/2" (-15); 6" (-16). Sizes Not Shown on this page, listed in the Parts Table below or are noted with N/U (Not Used) are currently not available.

| Nr. | RUBBER RINGS   | QTY. | SPI PART Nr. |
|-----|--|------|--------------|
| 1   | 3" I.D. Rubber Ring BLACK  |      | 545-5348-10  |
|     | 3" I.D. Rubber Ring WHITE  |      | 545-5348-60  |
| 2   | 2 3/4" I.D. Rubber Ring BLK  |      | 545-5348-20  |
|     | 2 3/4" I.D. Rubber Ring WHT  | N/U  | 545-5348-70  |
| 3   | 2 1/2" I.D. Rubber Ring BLK  |      | 545-5348-09  |
|     | 2 1/2" I.D. Rubber Ring WHT  |      | 545-5348-59  |
| 4   | 2" I.D. Rubber Ring BLACK  | 2    | 545-5348-08  |
|     | 2" I.D. Rubber Ring WHITE  |      | 545-5348-58  |
| 5   | 1 3/4" I.D. Rubber Ring BLK  |      | 545-5348-21  |
|     | 1 3/4" I.D. Rubber Ring WHT  | N/U  | 545-5348-71  |
| 6   | 1 1/2" I.D. Rubber Ring BLK  |      | 545-5348-07  |
|     | 1 1/2" I.D. Rubber Ring WHT  |      | 545-5348-57  |
| 7   | 1 1/4" I.D. Rubber Ring BLK  | 3    | 545-5348-06  |
|     | 1 1/4" I.D. Rubber Ring WHT  |      | 545-5348-56  |
| 8   | 1" I.D. Rubber Ring BLACK  | 2    | 545-5348-05  |
|     | 1" I.D. Rubber Ring WHITE  |      | 545-5348-55  |
| 9   | 3/4" I.D. Rubber Ring BLACK  | 1    | 545-5348-04  |
|     | 3/4" I.D. Rubber Ring WHITE  |      | 545-5348-54  |
| 10  | 7/16" I.D. Rubber Ring BLK   |      | 545-5348-18  |
|     | 7/16" I.D. Rubber Ring WHT   |      | 545-5348-68  |
| 11  | 3/8" I.D. Rubber Ring BLACK  |      | 545-5348-03  |
|     | 3/8" I.D. Rubber Ring WHITE  | N/U  | 545-5348-53  |
| 12  | 5/16" I.D. Rubber Ring BLK   | 2    | 545-5348-02  |
|     | 5/16" I.D. Rubber Ring WHT   |      | 545-5348-52  |
| 13  | 3/16" I.D. Rubber Ring BLK   | 5    | 545-5348-01  |
|     | 3/16" I.D. Rubber Ring WHT   |      | 545-5348-51  |
| 14  | 7/16" O.D. Rubber Ring BLK   | 58   | 545-5348-17  |
|     | 7/16" O.D. Rubber Ring WHT   |      | 545-5348-67  |
|     | Note: Item 14, 7/16" O.D. Black Rings (Qty. 48 of 58) are used to cushion the Bayonet Sockets under the playfield (between bracket & playfield). |      |              |
| 15  | 3/8" O.D. Rubber Ring BLK  |      | 545-5348-19  |
|     | 3/8" O.D. Rubber Ring WHT  |      | 545-5348-69  |
|     | Small Flipper BLACK Ring (Soft Duro)   |      | 545-5207-00  |
| 16  | Small Flipper RED Ring (Soft Duro)   |      | 545-5207-22  |
|     | Large Flipper BLACK Ring (50 Duro)   | 2    | 545-5277-00  |
|     | Large Flipper YELLOW Ring (50 Duro) (use -06 40 Duro)  |      | 545-5277-04  |
| 17  | Large Flipper WHITE Ring (50 Duro)   |      | 545-5277-08  |
|     | Large Flipper RED Ring (Soft Duro)   |      | 545-5277-22  |

| Nr. | RUBBER BUMPER PADS   | QTY. | SPI PART Nr. |
|-----|--|------|--------------|
| A*  | Bumper BLK Pad (Lg. w/ grommet)  | 2    | 545-5428-00  |
|     | Item A are located on Flipper Assemblies. See Pages 66 & 67 for location.  |      |              |
| B*  | Bumper BLK Pad (Sm. w/ grommet)  | 1    | 545-5105-00  |
|     | Item B are located on the Ball Trough Up-Kicker. See Page 65 for location. |      |              |
| C*  | Bmpr. BLUE Pad (.88" Top / .7" Bot. 1" Ht.)                                | 1    | 626-5067-00  |
|     | Item C: For view of how it is used, see the Flat Rail #11 on Page 50.      |      |              |
| Nr. | RBR. BUMPER POST SLVS.   | QTY. | SPI PART Nr. |
| D*  | Bumper BLACK Post Sleeve (Tall)  | 18   | 545-5308-00  |
|     | Item D in RED use 545-5308-22; Item D in WHITE use 545-5308-08.            |      |              |
| E*  | Bumper Post Sleeve (Short)   |      | 545-5151-00  |

## Take Note:

\* An asterisk (\*) indicates view of item on the Assembly Drawing only (for location see next page). For better view(s), see Drawings for Major Assemblies... (The Blue Pages), Section 4, Chapter 2, (Page 65), (view Table of Contents for exact page).

### Legend Note:

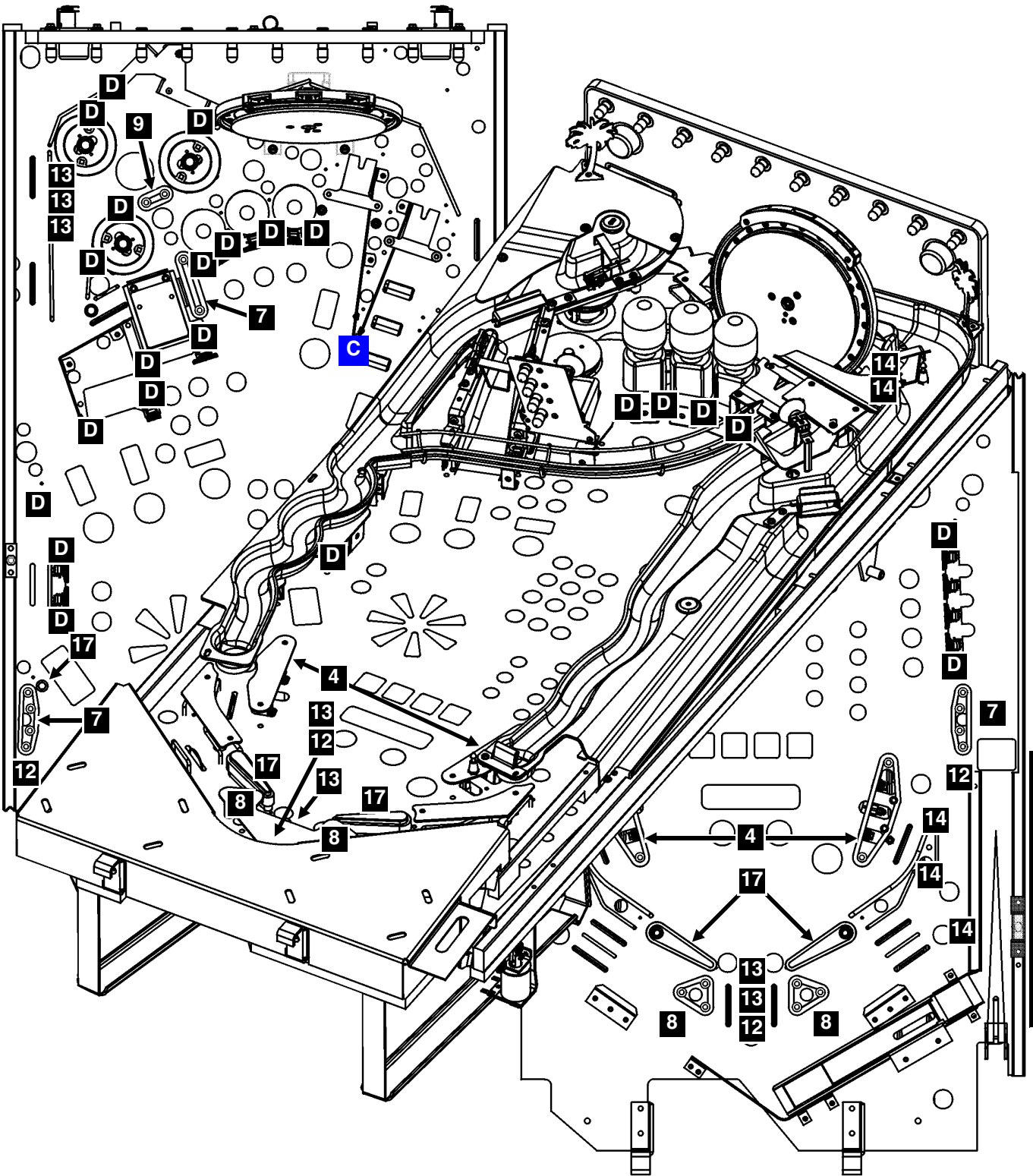
Items noted with a black square are Black Rubber Parts. Items noted with a blue square are Blue Rubber Parts.

† The item type (size / description), the quantity and/or location used, are subject to change without notice. Service Bulletins will announce any changes, if warranted.





The item type (size / description), the quantity and/or location used, are subject to change without notice. Service Bulletins will announce any changes, if warranted.

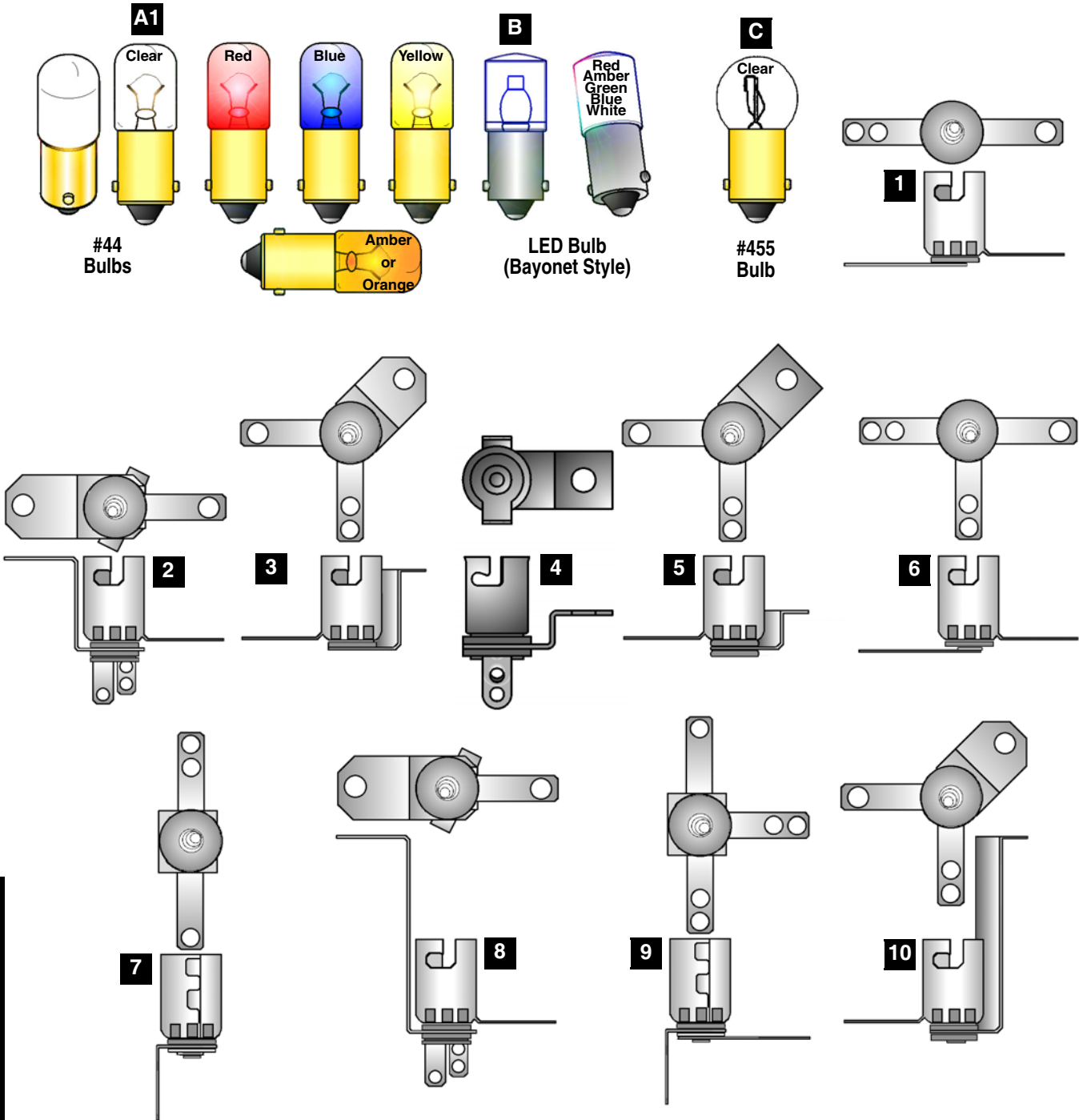


Sec. 4: Parts Id. ...

**Take Note:**

**Legend Note:**  
 Items noted with a black square ■ are Black Rubber Parts.  
 Items noted with a blue square ■ are Blue Rubber Parts.

# Playfield Top & Bottom - Small Bayonet Sockets & Bulbs ■ (Actual Size) †



Sec. 4: Parts Id. ...

† The item type (size / description), the quantity and/or location used, are subject to change without notice. Service Bulletins will announce any changes, if warranted.

| Nr. | BULBS (#44)   | QTY. | SPI PART Nr.   | Nr. | BULBS (LED & #455)  | QTY. | SPI PART Nr. |
|-----|---|------|----------------|-----|---|------|--------------|
| A   | #44 Bulb (Clear) Heavy Filament   | 53   | 165-5000-44-HF | B   | LED Module (WHT) (12.8v 20-25mA) Bynt.  |      | 112-5023-08  |
|     | #44 Bulb (replace -XX w/color below)  | 3    | 165-5053-XX-HF |     | <i>Item B Note: Different Colors available (not used in this game) ~</i>                |      |              |
|     | <i>Item A Note: Amber (165-5053-03-HF); Green (165-5053-04-HF); Yellow (165-5053-06-HF); (Not used in this game) : Red (165-5053-02-HF); Blue (165-5053-05-HF); Orange (165-5053-07-HF)</i> |      |                |     | <i>Red (112-5023-02); Amber (112-5023-03); Green (112-5023-04); Blue (112-5023-05);</i> |      |              |
|     |   |      |                | C   | #455 Twinkle Bulb   |      | 165-5003-00  |

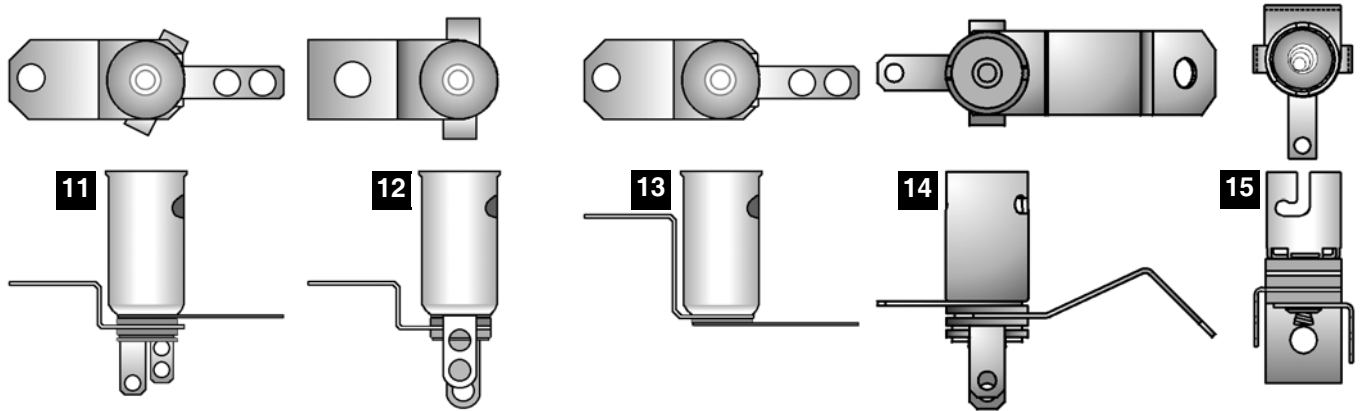
  

| Nr. | SMALL BAYONET SOCKETS                | QTY. | SPI PART Nr. | Nr. | SMALL BAYONET SOCKETS                  | QTY. | SPI PART Nr. |
|-----|--------------------------------------|------|--------------|-----|--|------|--------------|
| 1   | 2-Lug Staple Down Socket             | 12   | 077-5000-00  | 9   | 3-Lug Laydown Socket (3 Lugs Flat)     |      | 077-5006-00  |
| 2   | 3-Lug Stand-Up Socket (Med. Brkt.)   | 4    | 077-5008-00  | 10  | 2-Lug Stand-Up Socket (Tall Bracket)   |      | 077-5005-00  |
| 3   | 2-Lug Stand-Up Socket (Med. Brkt.)   |      | 077-5002-00  | 11  | 3-Lug Stand-Up Long Shell Socket       |      | 077-5013-00  |
| 4   | 2-Lug Stand-Up Socket (Short Brkt.)  | 17   | 077-5223-00  | 12  | 2-Lug Stand-Up Lg. Shell Socket (GIS)  | 23   | 077-5031-00  |
| 5   | 2-Lug Stand-Up Sckt. (Short Bracket) |      | 077-5002-31  | 13  | 1-Lug S-U Lg. Shell Sckt. (Med. Brkt.) |      | 077-5012-00  |
| 6   | 3-Lug Staple Down Socket             |      | 077-5001-00  | 14  | 3-Lug S-U Lg. Shell Sckt. (45° Brkt.)  |      | 077-5035-00  |
| 7   | 2-Lug Laydown Socket                 |      | 077-5003-00  | 15  | 3-Lug Laydown Socket (2 Lugs Bent)     |      | 077-5032-00  |
| 8   | 3-Lug Stand-Up Socket (Tall Bracket) |      | 077-5009-00  |     |  |      |              |

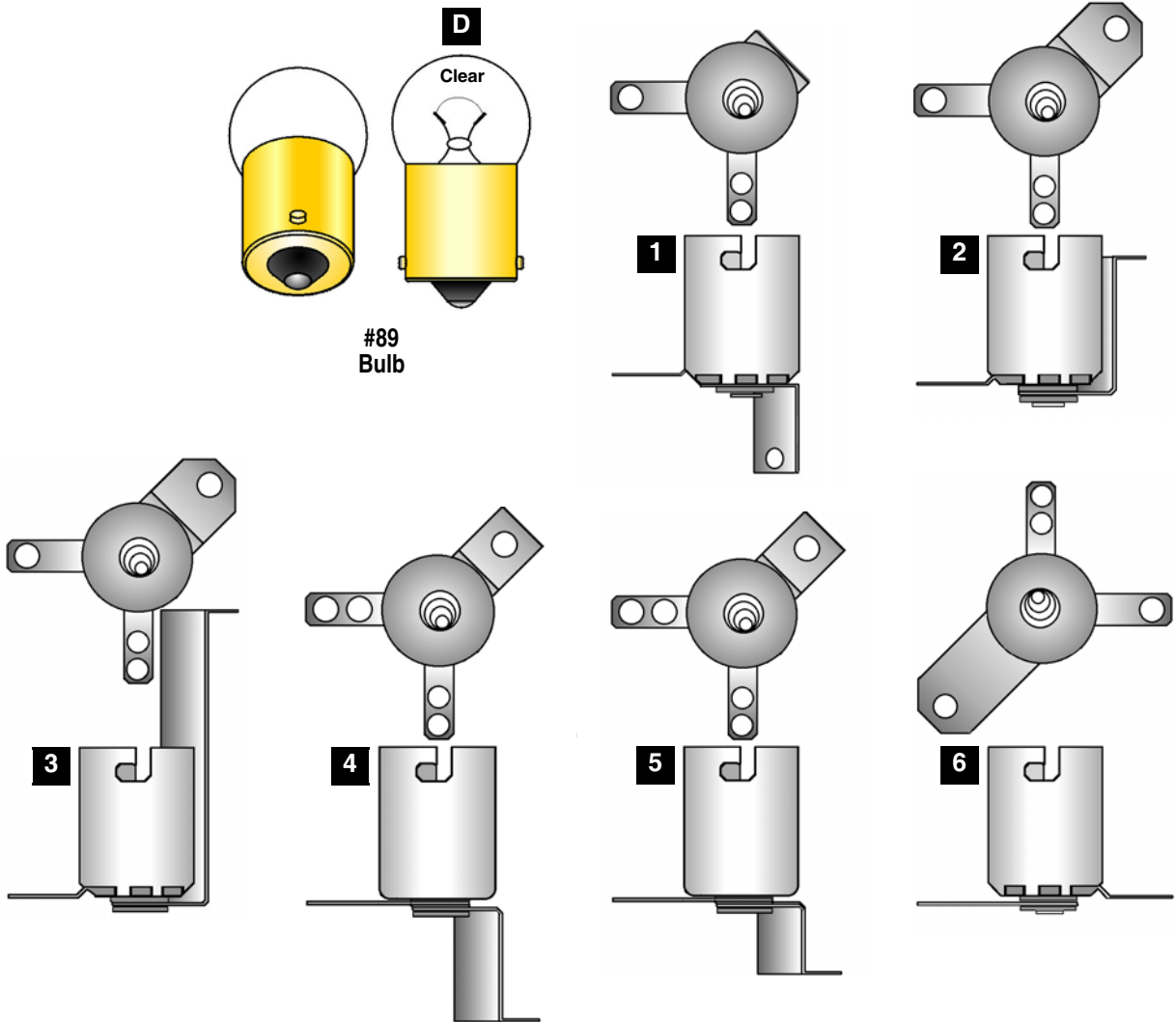


Playfield Top & Bot. - Small Bayonet Sockets & Bulbs ■ (Actual Size) † Continued

† The item type (size / description), the quantity and/or location used, are subject to change without notice. Service Bulletins will announce any changes, if warranted.



Playfield Bottom - Large Bayonet Sockets & Bulbs ■ (Actual Size) †



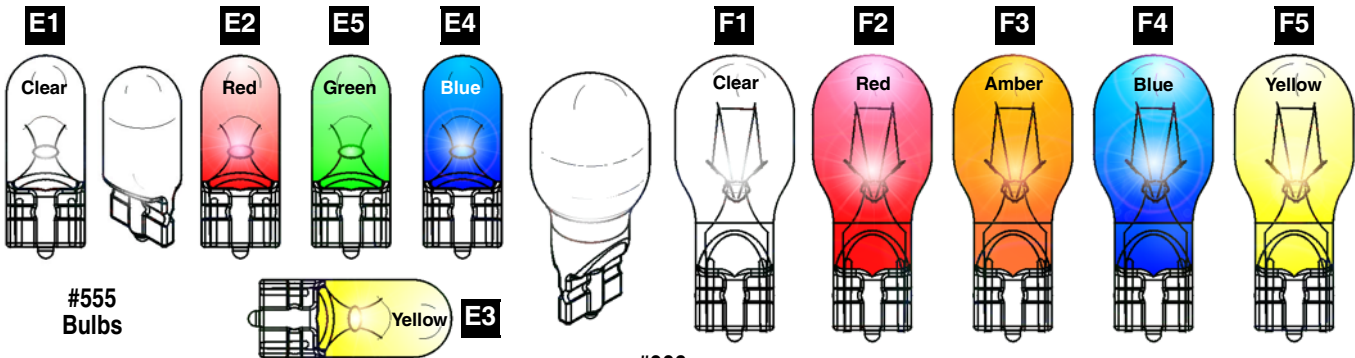
| Nr. | BULBS (#89)             | QTY. | SPI PART Nr.   |
|-----|-------------------------|------|----------------|
| D   | #89 Bulb Heavy Filament | 10   | 165-5000-89-HF |

| Nr. | LARGE BAYONET SOCKETS         | QTY. | SPI PART Nr. | Nr. | LARGE BAYONET SOCKETS                | QTY. | SPI PART Nr. |
|-----|-------------------------------|------|--------------|-----|--------------------------------------|------|--------------|
| 1   | 2-Lug Laydown Standard Socket |      | 077-5100-00  | 4   | 2-Lug Stand-Up Rev. Mount Socket     |      | 077-5103-00  |
| 2   | 2-Lug Stand-Up Short Socket   | 9    | 077-5101-00  | 5   | 2-Lug Stand-Up Rv. Mnt. Short Socket |      | 077-5106-00  |
| 3   | 2-Lug Stand-Up Long Socket    | 1    | 077-5102-00  | 6   | 2-Lug Straight Leg Socket            |      | 077-5107-00  |

Sec. 4: Parts Id. ...



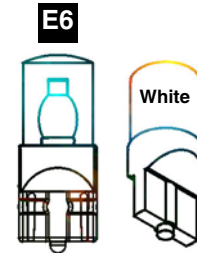
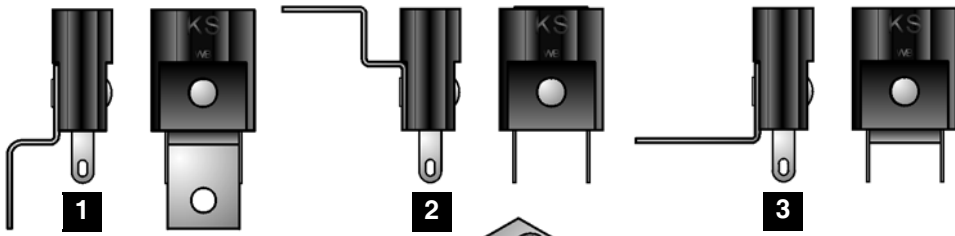
# Playfield Top & Bottom - Wedge Base Sockets & Bulbs (Actual Size) †



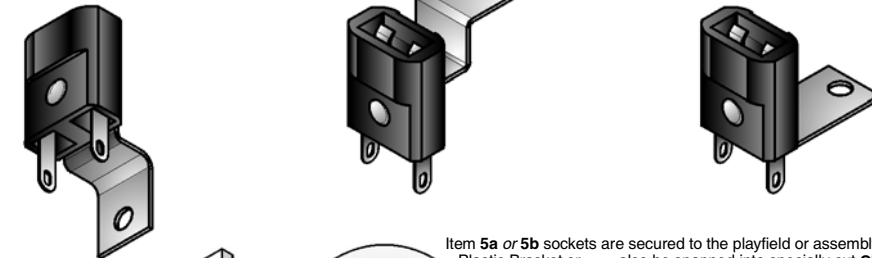
#555 Bulbs

#906 Bulbs

Note: Always replace with same type bulb in original application.



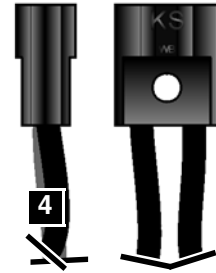
LED Bulb (Wedge Base)



Item 5a or 5b sockets are secured to the playfield or assembly by Item 5c Plastic Bracket or may also be snapped into specially cut Clear and / or Screened Plastic Pieces or Metal Brackets (used for multiple mounting of sockets when positioned closely together or in tight areas). If Plastic Pieces or Metal Brackets are used to mount Item 5a or 5b Sockets, it will be noted on Playfield Bottom - Miscellaneous Parts and Brackets, page earlier in this Chapter.

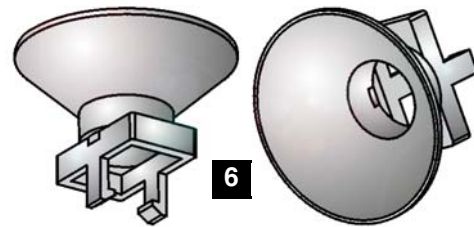
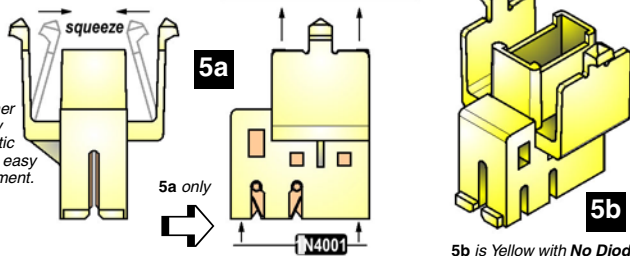
Item 5a is a solderless IDC (Insulation Displacement Connection) Socket with a built-in Diode, 1N4003 (112-5003-00) (can be replaced with 1N4001 Diode, 112-5001-00). Item 5b Socket (Yellow) is identical to 5a (Socket) except it does NOT REQUIRE a diode (Flash Lamp usage).

Item 4 Socket does not require brackets. Old stock may include "L" style brackets (each side); do not secure to assembly. Black Wires (Qty. 2) are 12" each.



Sec. 4: Parts Id. ...

Just squeeze the "side arms" of the socket together and pull away from the plastic or bracket for easy Bulb replacement.



| Nr.   | BULBS (#555)  | QTY.        | SPI PART Nr. | Nr.   | BULBS (LED & #906)                      | QTY.        | SPI PART Nr. |
|-------|---|-------------|--------------|---|---|-------------|--------------|
| E1    | #555 Wedge Base Bulb (Clear)  | 75          | 165-5002-00  | E6  | LED Module (WHT) (5v - 6.3v) Wedge Base | 3           | 112-5024-08  |
| E2-E5 | #555 Wedge Base Bulb (Multi-Color)  | 165-5054-XX |              | <i>Item E6 Bulb Note: Typically used with Item 4 Socket in Pop Bumpers.</i>   |   |             |              |
|       | <i>Item E2-E5 Bulb Note: Different Colors available (not used in this game) - Red (165-5054-02); Green (165-5054-04); Blue (165-5054-05); Yellow (165-5054-06);</i> |             |              | F   | #906 Wedge Base Bulb (Clear)            | 165-5004-00 |              |
|       |   |             |              | <i>Item F Note: Different Colors available (not used in this game) - Red (165-5004-02); Amber (165-5004-03); Blue (165-5004-05); Yellow (165-5004-06)</i> |   |             |              |

| Nr. | WEDGE BASE SOCKETS                 | QTY.        | SPI PART Nr. | Nr.   | WEDGE BASE SOCKETS                        | QTY.        | SPI PART Nr. |
|-----|------------------------------------|-------------|--------------|---|---|-------------|--------------|
| 1   | Wedge Base Socket (Laydown)        | 3           | 077-5026-01  | 5a  | IDC Snap-On Socket (Biege)                | 71          | 077-5216-00  |
| 2   | Wedge Base Socket (Offset)         | 1           | 077-5029-00  | 5b  | IDC Snap-On Socket <b>No Diode</b> (Yel.) | 077-5216-01 |              |
| 3   | Wedge Base Socket (Laydown GI)     | 077-5030-00 |              | 5c  | 5/16" Ht. Bracket (White)                 | 71          | 545-5760-18  |
| 4   | W.B. Socket (Bumpers/Special App.) | 3           | 077-5206-00  | 6   | Light Reflector (Silver Plastic)          | 4           | 545-5409-01  |
|     |                                    |             |              | <i>Note Item 6: Typically used with Item 1 (but will fit on any similar Wedge Base Socket).</i> |   |             |              |

† The item type (size / description), the quantity and/or location used, are subject to change without notice. Service Bulletins will announce any changes, if warranted.



# Drawings for Major Assemblies & Ramps (The Blue Pages)

## Table of Contents for Section 4, Chapter 2 of 2

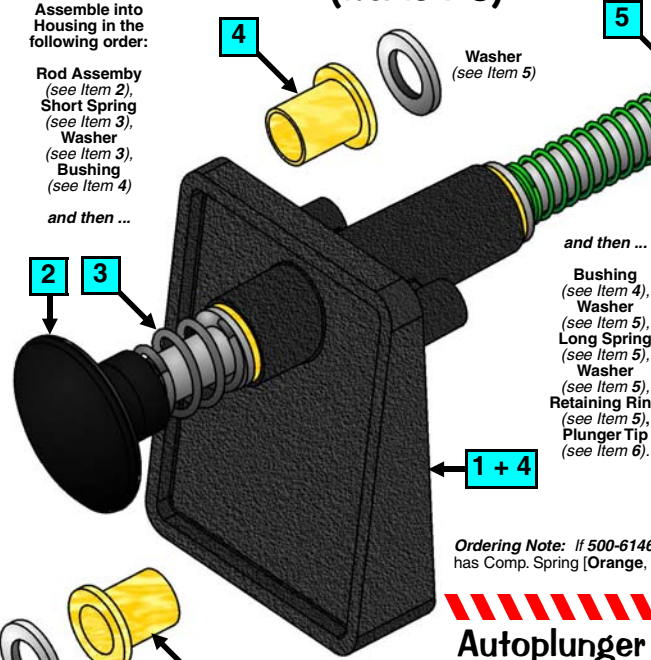
|   |           |
|---|-----------|
| Table of Contents for Section 4, Chapter 2 .....  | 63        |
| Ball Shooter (Plunger) Assembly, 500-6146-00-04..... (Top)  | 64        |
| ▷ Assembly View ▷ Ball Shooter Parts Table  |           |
| Autoplunger Arm Weld Assembly, 500-6091-00 Autoplunger Coil Assembly, 500-6092-02-ND<br>and Shooter Lane Switch Assembly, 500-6096-00 ..... | (Bot) 64  |
| 4-Ball Trough Assembly, 500-6318-14-ND .....  | 65        |
| ▶ Associated Parts: Ball Trough Enter/Exit Scoop, 535-7329-01; Steel Balls (1-1/16" $\phi$ ), 260-5000-00                                   |           |
| Flipper (Left) Assembly, 500-6543-13-ND .....   | 66        |
| ▶ Associated Parts: WHITE Flipper Bat & Shaft Asm., 515-5133-08-06; Large Flipper BLACK Rubber Ring, 545-5277-00                            |           |
| Flipper (Right) Assembly, 500-6543-03-ND .....  | 67        |
| ▶ Associated Parts: WHITE Flipper Bat & Shaft Asm., 515-5133-08-06; Large Flipper BLACK Rubber Ring, 545-5277-00                            |           |
| Slingshot (Left & Right) Assemblies, 500-5849-00-ND (Qty. 2) .....  | 68        |
| Bumper Top, Bumper Bottom & Bumper Switch Individual Parts Only .....   | 69        |
| Down-Post Assembly, 500-5867-12-ND .....  | 70        |
| Up-Post Assembly, 500-7094-00 .....   | 71        |
| In-Line 3-Bank Drop Target Assembly, 500-6982-03 .....  | 72-73     |
| <b>In-Line 3-Bank Drop Target (500-6982-03), Coil Side Disassembly Procedure .....</b>  | <b>74</b> |
| <b>In-Line 3-Bank Drop Target (500-6982-03), 1-Bank Module Disassembly Procedure .....</b>  | <b>75</b> |
| Contestant Pop-Up Assembly, Individual Parts Only (Qty. 3) .....  | 76        |
| Bobble Heads, Individual Parts Only.....  | 77        |
| Wheel of Fortune Assembly, Individual Parts Only .....  | 78-79     |
| Billboard Sign, Individual Parts Only .....   | (Top) 80  |
| Mini-Bump Ramp & Flap and Ramp Cover, Individual Parts Only .....   | (Bot) 80  |
| Dual One-Way Gate Bracket, Individual Parts Only .....  | (Top) 81  |
| Miscellaneous Plastics Shown for Reference Only .....   | (Bot) 81  |
| Left Plastic Ramp Assembly, Individual Parts Only.....  | 82-83     |
| Right Plastic Ramp Assembly, Individual Parts Only.....   | 84-85     |
| Reverse Scoop Bracket & Wire Ramp Assembly, Individual Parts Only .....   | 86        |
| Back Panel Assembly, Individual Parts Only.....   | 87        |
| (Blank) .....   | 88        |

# Ball Shooter (Plunger) Assembly, 500-6146-00-04 (Items 1-6)

Securing Hardware for Items 3 & 5 are also shown separated from the Ball Shooter (Plunger) Assembly for clarity.

Assemble into Housing in the following order:

Rod Assembly (see Item 2), Short Spring (see Item 3), Washer (see Item 3), Bushing (see Item 4) and then ...



and then ...

Bushing (see Item 4), Washer (see Item 5), Long Spring (see Item 5), Washer (see Item 5), Retaining Ring (see Item 6), Plunger Tip (see Item 6).

| Nr.   | BALL SHOOTER PARTS                            | QTY. | SPI PART Nr. |
|---|---|------|--------------|
| 1   | Housing Asm. + Bushings (Item 4)              | 1    | 535-5067-02  |
| Item 1 is secured to the Cabinet by: Support Plate [not included with Item 1 or Assembly] (535-5027-00), #10-32 X 1/2" PPH (Sems) Zinc TF (Qty. 3) (237-6033-00), #10 Split Lock Washer (Qty. 3) (244-5003-00) and #6 X 1/2" HWH AB (Zinc) Red (Qty. 2) (234-5001-02) |   |      |              |
| 2   | Rod Assembly (with <b>Black Knob</b> )        | 1    | 515-6557-00  |
| 3   | Comp. Spring (Short) (Knob Side)              | 1    | 266-5010-00  |
| Item 3 is sandwiched onto Item 2 (Front Side) between the knob and by: Washer, 3/8" I.D. X 5/8" O.D. X 1/16" (280-5010-00)  |   |      |              |
| 4   | Bushing, 3/8" I.D. (Oilite)                   | 2    | 280-5010-00  |
| Item 4 is included with Item 1, Housing, (1 @ the front; 1 @ the back) as shown.  |   |      |              |
| 5   | Comp. Spring (Long) [ <b>GREEN</b> , .035" ø] | 1    | 266-5001-04  |
| Item 5 is sandwiched onto Item 2 (Rubber Tip Side) by: Washer, 3/8" I.D. X 5/8" O.D. X 1/16" (Qty. 1/per side) (280-5010-00) and Retaining Ring, 3/8" ø Shaft (270-5012-00)   |   |      |              |
| 6   | Rubber [Plunger] Tip (Black 50 Duro)          | 1    | 545-5276-00  |

Ordering Note: If 500-6146-00-04 is unavailable, order the individual part(s) actually required. ... Identical to 500-6146-00-07 has Comp. Spring [Orange, .038" ø] (266-5001-07) or 500-6146-00-05 has Comp. Spring [Blue, .031" ø] (266-5001-05).

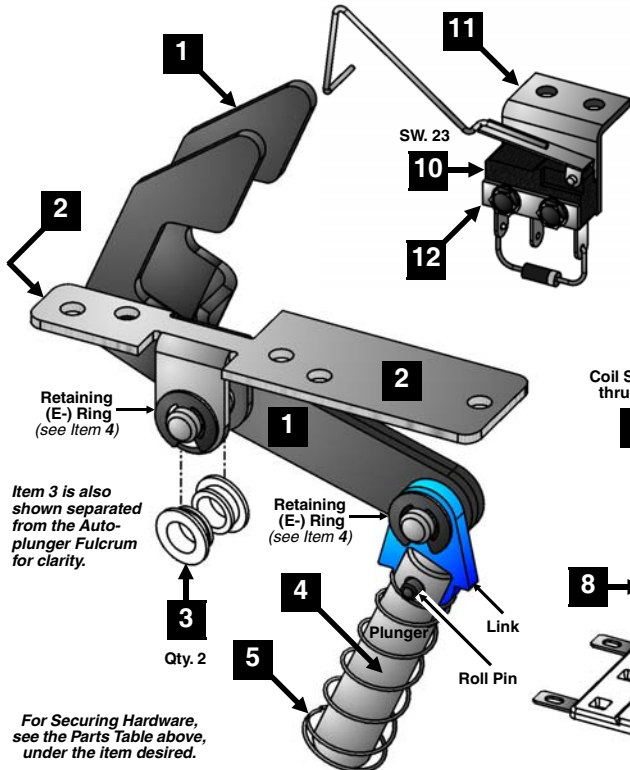
# Autoplunger Arm Weld Asm., 500-6091-00 (Items 1-5), Autoplunger Coil Assembly, 500-6092-02-ND (Items 6-9) and Shooter Lane Switch Assembly, 500-6096-00 (Items 10-12)

| Nr.  | AUTOPL. ARM WELD PARTS          | QTY. | SPI PART Nr. |
|--|---------------------------------|------|--------------|
| 1  | Arm Weld Assembly               | 1    | 515-6526-00  |
| Item 1 is secured to Item 2 by: Retaining Ring, 1/4" ø Shaft (Qty. 1) (270-5002-00)  |                                 |      |              |
| 2  | Autoplunger Fulcrum             | 1    | 535-7697-00  |
| 3  | Nyliner, 1/4" (Thomson #411-FF) | 2    | 545-5423-00  |
| 4  | Plunger & Link Assembly         | 1    | 511-5183-00  |
| Item 4 is secured to Item 1 by: Retaining Ring, 1/4" ø Shaft (Qty. 1) (270-5002-00)  |                                 |      |              |
| For Individual Items use: Plunger 1.81" Lg. (530-5025-05), Plunger Link (545-5293-00) and Roll Pin 1/8" ø x 5/8" Lg. (251-5008-00) |                                 |      |              |
| 5  | Compression (Return) Spring     | 1    | 266-5020-00  |
| (ASM. REF. 500-6091-00, Items 1-5)   |                                 |      |              |

| Nr.  | AUTOPLNGR. COIL PARTS             | QTY. | SPI PART Nr. |
|--|-----------------------------------|------|--------------|
| 6  | Autoplunger Coil Bracket Assembly | 1    | 515-6527-00  |
| Items 1 & 6 are secured below the P/F by: #8 X 1/2" SHWH AB (Zc.) (Qty. 9) (234-5101-00) |                                   |      |              |
| 7  | Coil Retainer Bracket             | 1    | 535-5203-03  |
| Item 7 is secured to Item 6 by: #8-32 X 1/4" PPH MS (Sems) Zinc (Qty. 2) (232-5300-00)   |                                   |      |              |
| 8  | Coil, 24-940 [ NO DIODE ]         | 1    | 090-5036-ND  |
| COIL DOES NOT REQUIRE A DIODE. SEE ☺ COIL NOTE BELOW FOR DETAILS.                        |                                   |      |              |
| 9  | Coil Sleeve                       | 1    | 545-5031-00  |
| (ASM. REF. 500-6092-02-ND, Items 6-9)  |                                   |      |              |

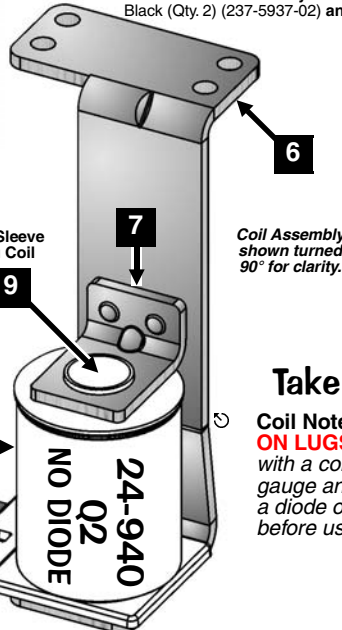
| Nr.   | SWITCH PARTS              | QTY. | SPI PART Nr. |
|---|---------------------------|------|--------------|
| 10  | Switch (for Shooter Lane) | 1    | 180-5157-00  |
| Switch has a Diode (1N4004) (112-5003-00). Can be replaced with (1N4001) (112-5001-00).   |                           |      |              |
| 11  | Switch Mounting Bracket   | 1    | 535-6173-00  |
| Item 11 is secured to Playfield by: #6 X 1/2" SLT HWH AB (Zinc) (Qty. 2) (234-5001-02)  |                           |      |              |
| 12  | Switch Body Protect Plate | 1    | 535-6539-00  |
| Item 12 is secured to Items 10-11 by: #2-56 X 1/2" Unslotted Ser. HWH #4 Head TR3 Black (Qty. 2) (237-5937-02) and #2-56 Hex Nut (Qty. 2) (240-5301-0) (ASM. REF. 500-6096-00, Items 10-12) |                           |      |              |

Sec. 4: Drawings ...



Item 3 is also shown separated from the Autoplunger Fulcrum for clarity.

For Securing Hardware, see the Parts Table above, under the item desired.

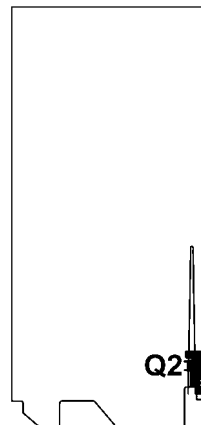


For Securing Hardware, see the Parts Table above, under the item desired.

Coil Assembly shown turned 90° for clarity.

### Take Note:

Coil Note: ☺ **NO DIODE ON LUGS.** If replacing with a coil of the same gauge and turn & it has a diode on it, remove it before using.

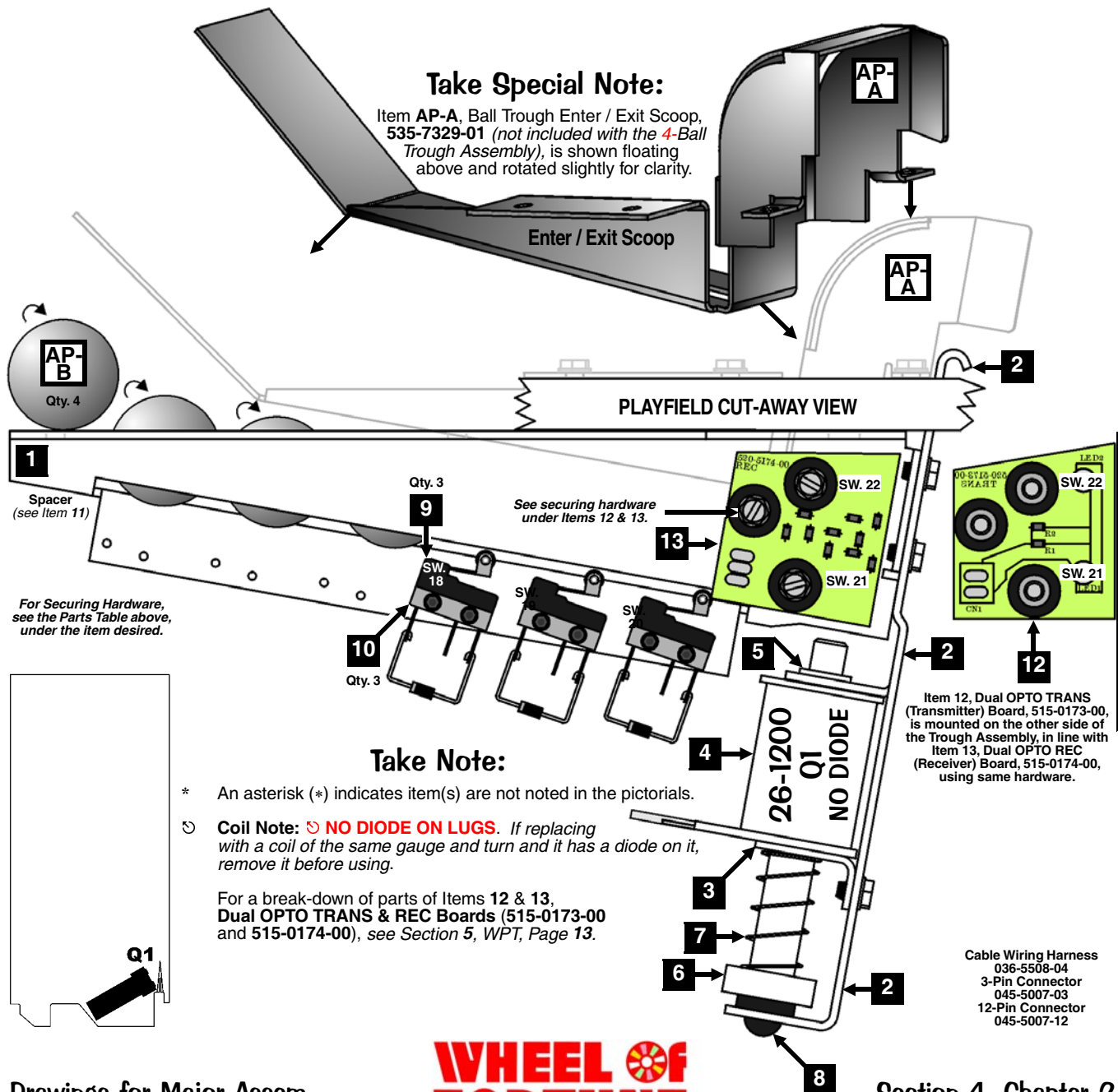




# 4-Ball Trough Assembly, 500-6318-14-ND (Items 1-13) and Associated Parts: See Parts Table Below.

**Ordering Note: Identical to 500-6318-24 with exceptions, see note below Item 13 (Parts Table).**

| Nr. | 4-BALL TROUGH PARTS  | QTY. | SPI PART Nr. | Nr.  | 4-BALL TROUGH PARTS  | QTY. | SPI PART Nr. |
|-----|--|------|--------------|--|--|------|--------------|
| 1   | Ball Trough Outhole Mounting Bracket<br><small>Item 1 is secured below the playfield by: #8 X 1/2" SHWH AB (Zc.) (Qty. 4) (234-5101-00)</small>  | 1    | 515-6580-01  | 11   | <b>Not Used</b> Trough Ball Guide Plate<br><small>Item 11 is secured to Item 1 by: 1/4" X 5/16" X .144" I.D. Spacer Tap. (Qty. 1) (254-5014-03) and #2-56 X 1/2" HWH (Ser) UNS #4HD TR3 BO (Qty. 4) (237-5937-02)</small>  | 0    | 535-7801-00  |
| 2   | Coil Mounting Bracket<br><small>Item 2 is secured to Item 1 by: #8-32 X 3/8" HWH Swage (Sr.) Zinc (Qty. 4) (237-5975-00)</small>   | 1    | 535-7330-01  | 12   | Dual OPTO TRANS Board Assembly   | 1    | 515-0173-00  |
| 3   | Coil Retaining Bracket<br><small>Item 3 is secured to Item 2 by: #8-32 X 1/4" SHWH (Serr) Zinc (Qty. 2) (237-5975-04)</small>  | 1    | 535-5203-03  | 13   | Dual OPTO REC Board Assembly<br><small>Items 12 &amp; 13 are secured by: #6-32 X 5/8" HWH Swg (Ser) Zc (Qty. 3/per) (237-5976-04)<br/>For Individual Items use : Dual OPTO Transmitter Board (Qty. 1) (520-5173-00), Dual OPTO Receiver Board (Qty. 1) (520-5174-00), OPTO PCB Tube Spacer (Brass) (Qty. 3/per) (530-5308-02) and OPTO PCB Rubber Grommet (Qty. 3/per) (545-5518-00)</small> | 1    | 515-0174-00  |
| 4   | Coil, 26-1200 [ NO DIODE ]<br><b>COIL DOES NOT REQUIRE A DIODE. SEE ♻️ COIL NOTE BELOW FOR DETAILS.</b>  | 1    | 090-5044-ND  | <b>Ordering Note:</b> If 500-6318-14-ND is unavailable, order the individual part(s) actually required. This assembly is identical to 500-6318-24-ND, -15 or -25 except for the quantity of Items 9 & 10 (Qty. 4/per on 5-Ball Trough) and Item 11, required when a Magnet Mech. is used in the game (this game it is required). -ND means <b>no diode</b> on Item 4, Coil, 26-1200. |  |      |              |
| 5   | Coil Sleeve (Short) (Formost #10-7077)   | 1    | 545-5076-01  | <small>ASSOCIATED PARTS ARE NOT INCLUDED WITH THE ABOVE ASSEMBLY.</small>  |  |      |              |
| 6   | Steel & Nylon Plunger Assembly   | 1    | 515-7309-01  | Nr.  | <b>ASSOCIATED PART(S)</b>  | QTY. | SPI PART Nr. |
| 7   | Compression (Return) Spring  | 1    | 266-5020-00  | AP-A   | Ball Trough Enter / Exit Scoop<br><small>Item AP-A secured to the playfield by: #8 X 1/2" SHWH AB (Zinc) (Qty. 4) (234-5101-00).</small>   | 1    | 535-7329-01  |
| 8   | Rubber Bumper (Grommet)  | 1    | 545-5105-00  | AP-B   | * Steel Balls (1-1/16" ø)  | 4    | 260-5000-00  |
| 9   | Micro Switch (Roller Actuator, Lite-Force)<br><small>Item 9 requires: Heat Shrink Tubing 1/8" ø PUI-24 (Qty. 1"/per) (605-5006-00)<br/>Switch has a Diode (1N4004) (112-5003-00). Can be replaced with (1N4001) (112-5001-00).</small> | 3    | 180-5119-02  |  |  |      |              |
| 10  | Switch Body Protect Plate  | 3    | 535-6539-00  |  |  |      |              |

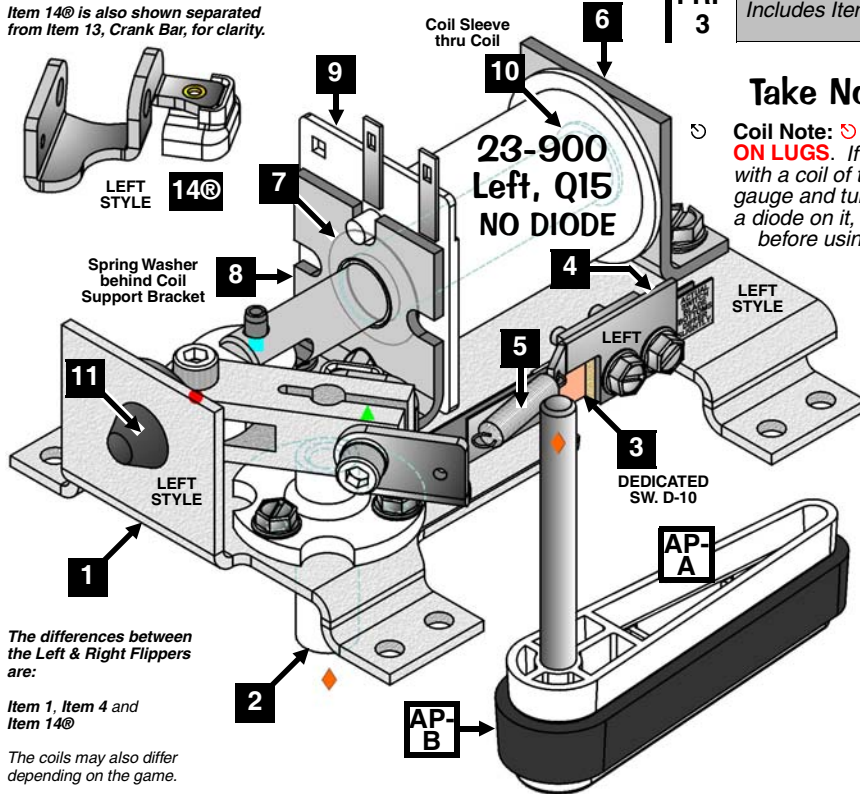


**Sec. 4: Drawings ...**

# Flipper (Left) Assembly, 500-6543-13-ND (Items 1-15) and Associated Parts: White Flipper Bat & Shaft Asm., 515-5133-08-06 (Items AP-A / AP-B)

| Nr.   | FLIPPER (LEFT) PARTS                            | QTY. | SPI PART Nr.   |
|---|---|------|----------------|
| 1   | Flipper Base Plate (LEFT)                       | 1    | See FRP1       |
| Item 1 is secured below by: #8 X 1/2" SHWH AB (Zinc) (Qty. 8) (234-5101-00)<br>Ordering Note : Individual Part (535-7275-01) is not prethreaded, see Item FRP1.   |   |      |                |
| 2   | Flipper Bat Bushing (White Plastic) .25" ø I.D. | 1    | 545-5070-00    |
| Item 2 is secured to Item 1 by: #6-32 X 3/8" HWH Swage (Ser.) Zc. (Qty. 3) (237-5976-02)  |   |      |                |
| 3   | Power (EOS / End-of-Stroke) Switch              | 1    | 180-5149-00    |
| Item 3 is secured to Item 1 by: #6-32 X 5/8" HWH Swage (Ser.) Zc. (Qty. 2) (237-5976-04)  |   |      |                |
| 4   | Sw. Plate/Spring Return Brkt. (LEFT)            | 1    | 535-7354-01    |
| 5   | Flipper Return Spring                           | 1    | 265-5035-00    |
| 6   | Coil Stop Bracket Sub-Assembly                  | 1    | 515-6308-01    |
| Item 6 is secured to Item 1 by: #10-32 X 3/8" SHWH Swage (Serr) Zinc (Qty. 2) (237-5985-00) and #10 Split Lock Washer (Qty. 2) (244-5003-00)  |   |      |                |
| 7   | Spring Washer (17/32" ID X 3/4" X 1")           | 1    | 269-5002-00    |
| 8   | Coil Support Bracket                            | 1    | 535-7356-00    |
| Item 8 is secured to Item 1 by: #8-32 X 3/8" HWH Swage (Ser.) Zc. (Qty. 2) (237-5975-00)  |   |      |                |
| 9   | Coil, 23-900 [ NO DIODE ] GRN WRAP              | 1    | 090-5020-30-ND |
| COIL DOES NOT REQUIRE A DIODE. SEE COIL NOTE BELOW FOR DETAILS.   |   |      |                |
| 10  | Coil Sleeve                                     | 1    | 545-5388-00    |
| 11  | Deflector Pad (Bumper)                          | 1    | 545-5428-00    |
| 12  | Flipper Plunger & Link Sub-Assy.                | 1    | 515-6304-03    |
| For Individual Items use : Flipper Plunger (530-5349-01) and Plunger "Flipper" Link (545-5611-01) and is secured to the Plunger by: Bushing, .16" ø ID X .281" ø OD X .187" (Qty. 1) (530-5532-00) and Spiral Pin ø 5/32" X 3/4" Lg. (Qty. 1) (251-5015-02) |   |      |                |
| 13  | Crank Bar (Pawl)                                | 1    | 530-5070-02    |
| Item 13 requires: Bushing, .192" ø ID X .312" ø OD X .195" (Qty. 1) (530-5139-00)   |   |      |                |
| 14®   | Switch Actuator (LEFT) Sub-Assy.                | 1    | 515-7257-01    |
| For Individual Items use : Actuator & Spring Bracket (LEFT) (535-9038-01) and ® Switch Actuator (White Plastic) (545-5612-00) and is secured to the Bracket by: Rivet, 1/8" ø X 1/4" Lg. (Qty. 1) (249-5003-00)   |   |      |                |
| 15  | Set Screw: #10-32 X 3/4" Socket Hd.             | 2    | 237-6144-00    |
| Item 15 requires: #10-32 Nylon Stop Nut (Qty. 1) Flipper Link Side Only (240-5203-00) and #10 Split Lock Washer (Qty. 1) Switch Actuator Side Only (244-5003-00)<br>Tool required for Item 15: 5/32" or 4mm Allen Wrench                                    |   |      |                |

Item 14® is also shown separated from Item 13, Crank Bar, for clarity.



The differences between the Left & Right Flippers are:

Item 1, Item 4 and Item 14®

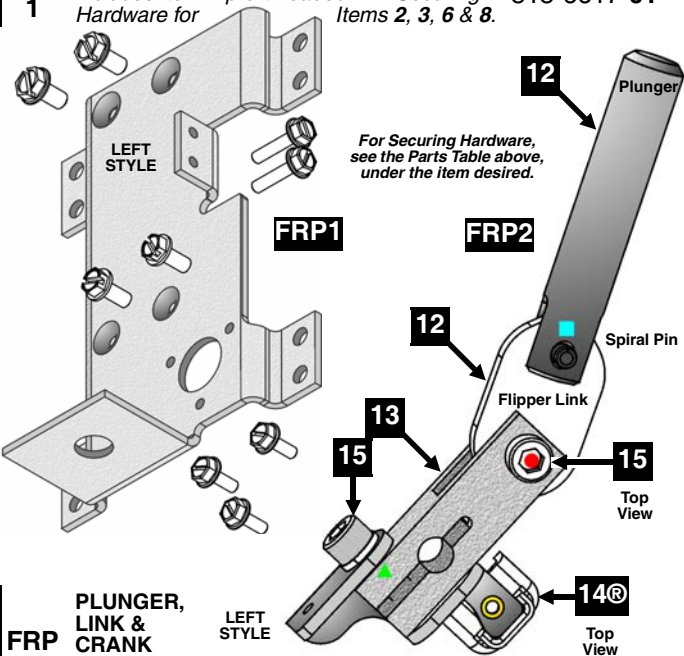
The coils may also differ depending on the game.

ASSOCIATED PARTS ARE NOT INCLUDED WITH THE ABOVE ASSEMBLY.

| Nr.  | ASSOCIATED PART(S)  | QTY. | SPI PART Nr.   |
|------|---|------|----------------|
| AP-A | WHITE Flipper Bat & Shaft Assembly (Non-Knurled End) <b>without Rubber Ring</b> | 1    | 515-5133-08-06 |
| AP-B | Large Flipper <b>BLACK</b> Rubber Ring  | 1    | 545-5277-00    |

## Flipper Rebuild Parts for Easier Installation, Save \$:

**FRP 1 FLIPPER BASE PLATE KIT (LEFT) :**  
Includes Item 1 pre-threaded >>< Securing Hardware for Items 2, 3, 6 & 8. 515-6617-01

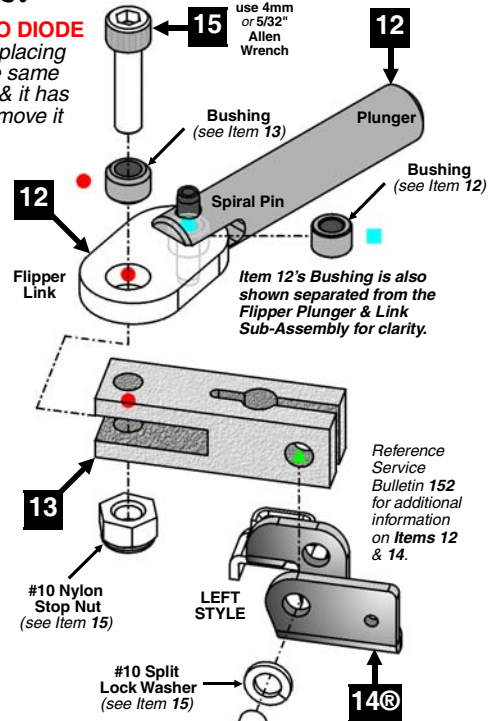


**FRP 2 PLUNGER, LINK & CRANK (LEFT STYLE) ASSEMBLY :** Includes Items 12, 13, 14 & 15 (comes assembled). 515-7203-01

**FRP 3 FLIPPER (LEFT) REBUILD KIT :** Includes Items 6, 10 AND above FRP2 500-6307-10

### Take Note:

Coil Note: NO DIODE ON LUGS. If replacing with a coil of the same gauge and turn & it has a diode on it, remove it before using.



### Take Note:

® "R" indicates Item noted is secured with rivet(s) as listed.

Sec. 4: Drawings ...

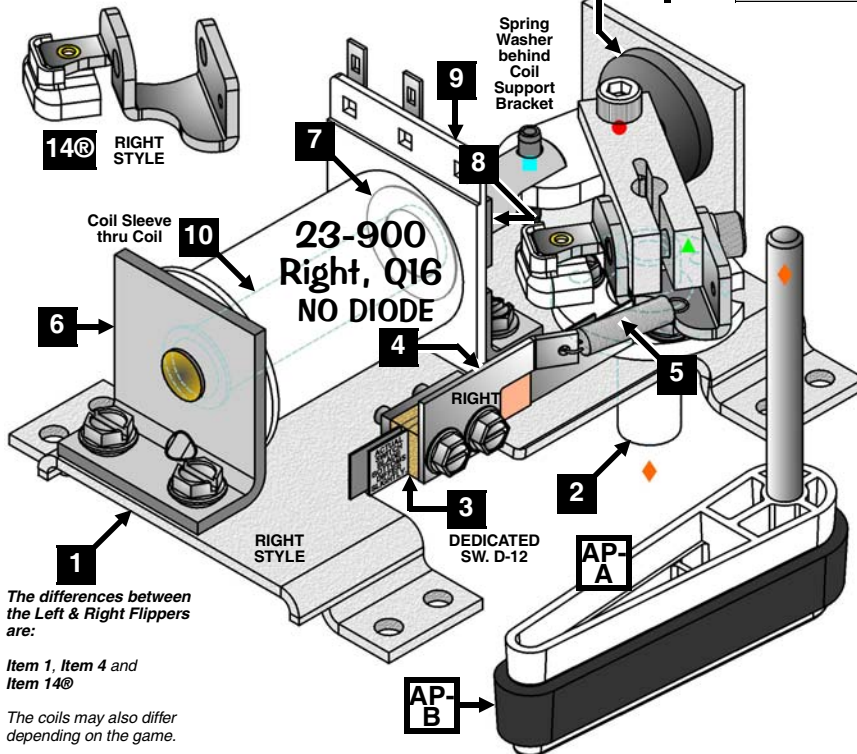




# Flipper (Right) Assembly, 500-6543-03-ND (Items 1-15) and Associated Parts: White Flipper Bat & Shaft Asm., 515-5133-08-06 (Items AP-A / AP-B)

| Nr.  | FLIPPER (RIGHT) PARTS                           | QTY. | SPI PART Nr.   |
|--|---|------|----------------|
| 1  | Flipper Base Plate (RIGHT)                      | 1    | See FRP1       |
| Item 1 is secured below by: #8 X 1/2" SHWH AB (Zinc) (Qty. 8) (234-5101-00)<br><i>Ordering Note : Individual Part (535-7275-00) is not prethreaded, see Item FRP1.</i>   |   |      |                |
| 2  | Flipper Bat Bushing (White Plastic) .25" ø I.D. | 1    | 545-5070-00    |
| Item 2 is secured to Item 1 by: #6-32 X 3/8" HWH Swage (Ser.) Zc. (Qty. 3) (237-5976-02)   |   |      |                |
| 3  | Power (EOS / End-of-Stroke) Switch              | 1    | 180-5149-00    |
| Item 3 is secured to Item 1 by: #6-32 X 5/8" HWH Swage (Ser.) Zc. (Qty. 2) (237-5976-04)   |   |      |                |
| 4  | Sw. Plate/Spring Return Brkt. (RIGHT)           | 1    | 535-7354-00    |
| 5  | Flipper Return Spring                           | 1    | 265-5035-00    |
| 6  | Coil Stop Bracket Sub-Assembly                  | 1    | 515-6308-01    |
| Item 6 is secured to Item 1 by: #10-32 X 3/8" SHWH Swage (Serr) Zinc (Qty. 2) (237-5985-00) and #10 Split Lock Washer (Qty. 2) (244-5003-00)   |   |      |                |
| 7  | Spring Washer (17/32" ID X 3/4" X 1")           | 1    | 269-5002-00    |
| 8  | Coil Support Bracket                            | 1    | 535-7356-00    |
| Item 8 is secured to Item 1 by: #8-32 X 3/8" HWH Swage (Ser.) Zc. (Qty. 2) (237-5975-00)   |   |      |                |
| 9  | Coil, 23-900 [ NO DIODE ] GRN WRAP              | 1    | 090-5020-30-ND |
| COIL DOES NOT REQUIRE A DIODE. SEE COIL NOTE PREV. PAGE FOR DETAILS.   |   |      |                |
| 10   | Coil Sleeve                                     | 1    | 545-5388-00    |
| 11   | Deflector Pad (Bumper)                          | 1    | 545-5428-00    |
| 12   | Flipper Plunger & Link Sub-Assy.                | 1    | 515-6304-03    |
| <i>For Individual Items use : Flipper Plunger (530-5349-01) and Plunger "Flipper" Link (545-5611-01) and is secured to the Plunger by: Bushing, .16" ø ID X .281" ø OD X .187" (Qty. 1) (530-5532-00) and Spiral Pin ø 5/32" X 3/4" Lg. (Qty. 1) (251-5015-02)</i> |   |      |                |
| 13   | Crank Bar (Pawl)                                | 1    | 530-5070-02    |
| Item 13 requires: Bushing, .192" ø ID X .312" ø OD X .195" (Qty. 1) (530-5139-00)  |   |      |                |
| 14®  | Switch Actuator (RIGHT) Sub-Assy.               | 1    | 515-7257-00    |
| <i>For Individual Items use : Actuator &amp; Spring Bracket (LEFT) (535-9038-01) and ® Switch Actuator (White Plastic) (545-5612-00) and is secured to the Bracket by: Rivet, 1/8" ø X 1/4" Lg. (Qty. 1) (249-5003-00)</i>   |   |      |                |
| 15   | Set Screw: #10-32 X 3/4" Socket Hd.             | 2    | 237-6144-00    |
| Item 15 requires: #10-32 Nylon Stop Nut (Qty. 1) Flipper Link Side Only (240-5203-00) and #10 Split Lock Washer (Qty. 1) Switch Actuator Side Only (244-5003-00)<br><i>Tool required for Item 15: 5/32" or 4mm Allen Wrench</i>                                    |   |      |                |

Item 14® is also shown separated from Item 13, Crank Bar, for clarity.



The differences between the Left & Right Flippers are:

Item 1, Item 4 and Item 14®

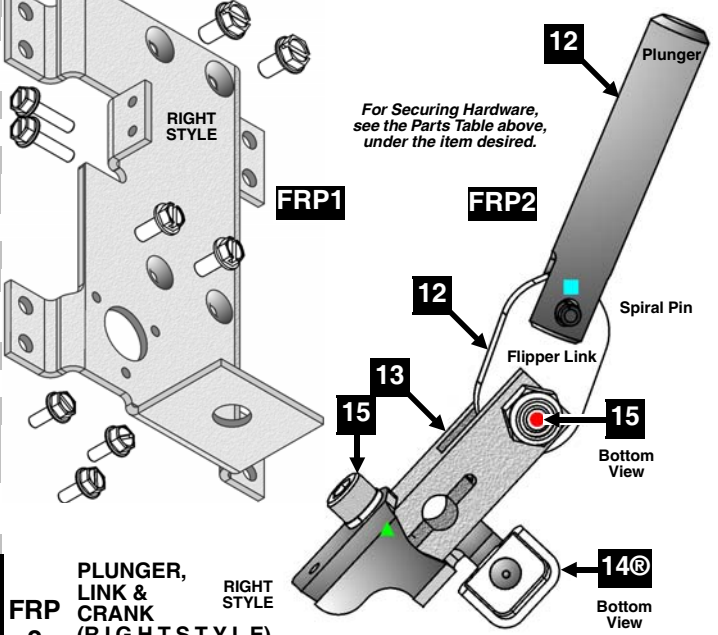
The coils may also differ depending on the game.

ASSOCIATED PARTS ARE NOT INCLUDED WITH THE ABOVE ASSEMBLY.

| Nr.  | ASSOCIATED PART(S)  | QTY. | SPI PART Nr.   |
|------|---|------|----------------|
| AP-A | WHITE Flipper Bat & Shaft Assembly (Non-Knurled End) <i>without Rubber Ring</i> | 1    | 515-5133-08-06 |
| AP-B | Large Flipper BLACK Rubber Ring   | 1    | 545-5277-00    |

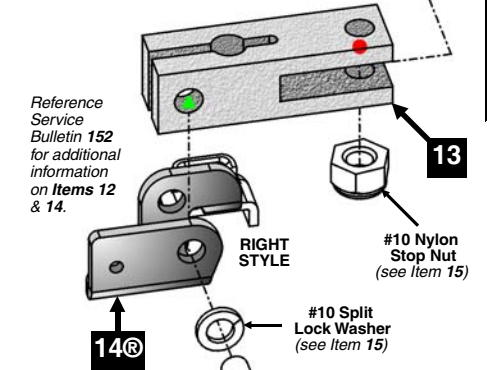
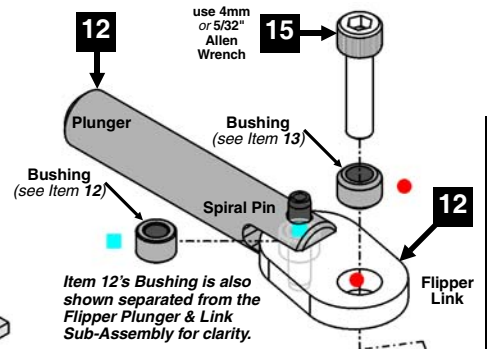
## Flipper Rebuild Parts for Easier Installation, Save \$:

**FRP 1 FLIPPER BASE PLATE KIT (RIGHT):**  
Includes Item 1 pre-threaded >>< Securing Hardware for Items 2, 3, 6 & 8. 515-6617-00



**FRP 2 PLUNGER, LINK & CRANK (RIGHT STYLE) ASSEMBLY:** Includes Items 12, 13, 14 & 15 (comes assembled). 515-7203-00

**FRP 3 FLIPPER (RIGHT) REBUILD KIT:** Includes Items 6, 10 AND above FRP2 500-6307-00



### Take Note:

® "R" indicates Item noted is secured with rivet(s) as listed.

use 4mm or 5/32" Allen Wrench

Sec. 4: Drawings ...

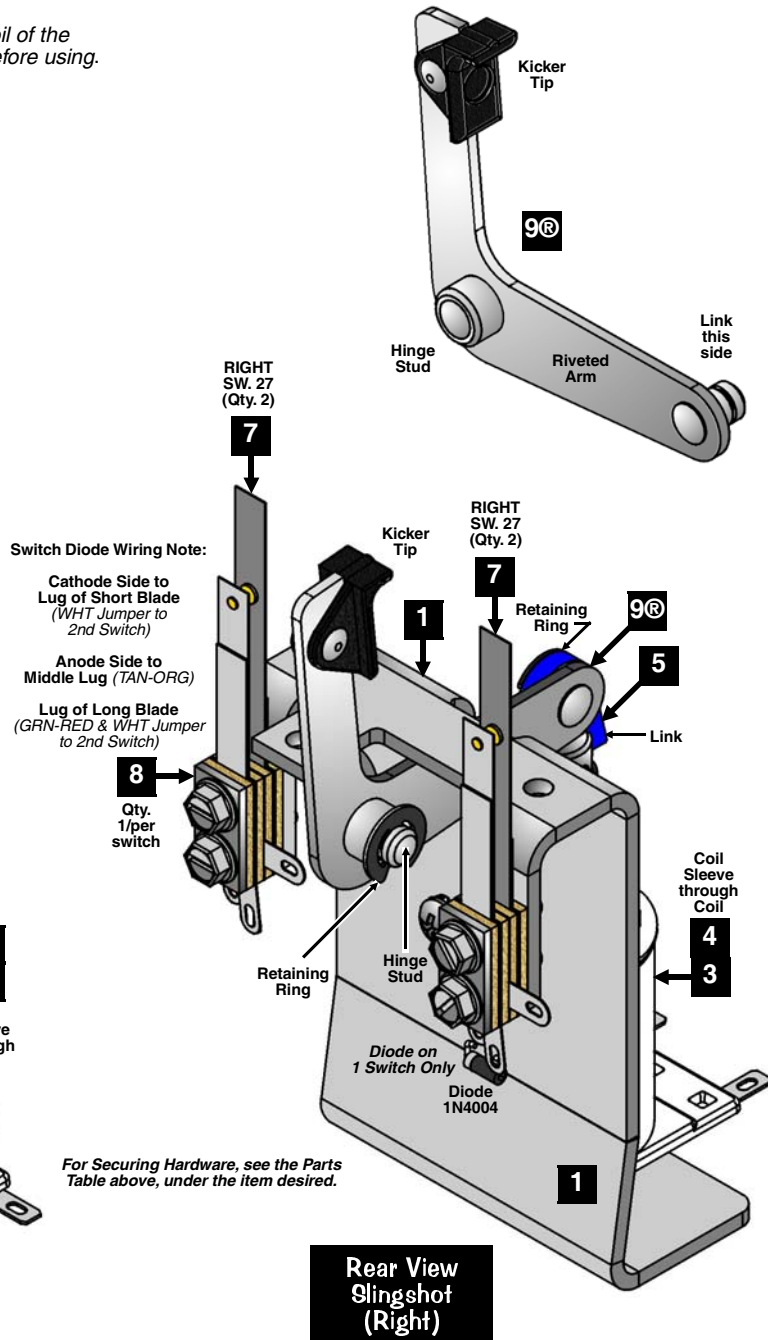
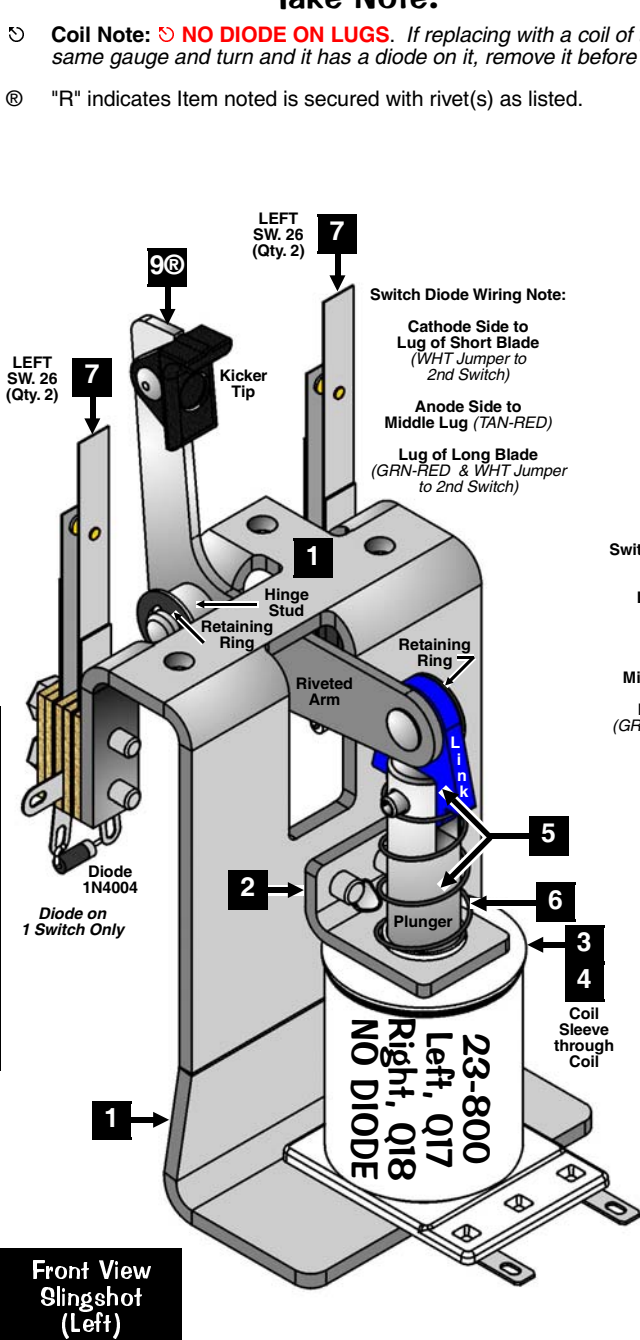


# Slingshot (Left & Right) Assemblies, 500-5849-00-ND (Qty. 2) (Items 1-9)

| Nr.  | SLINGSHOT PARTS            | QTY.  | SPI PART Nr. | Nr.   | SLINGSHOT PARTS                | QTY.  | SPI PART Nr. |
|--|----------------------------|-------|--------------|---|--------------------------------|-------|--------------|
| 1  | Slingshot Bracket Assembly | 1/per | 515-5339-01  | 6   | Compression (Return) Spring    | 1/per | 266-5020-00  |
| Item 1 is secured below the playfield by: #8 X 1/2" SHWH AB (Zc.) (Qty. 3) (234-5101-00)   |                            |       |              | 7   | Slingshot Stack (Blade) Switch | 2/per | 180-5054-00  |
| 2  | Coil Retaining Bracket     | 1/per | 535-5203-03  | Only 1 of the 2 Switches has a Diode (1N4004) (112-5003-00). See Note Below on Drawing. Can be replaced with (1N4001) (112-5001-00).  |                                |       |              |
| 3  | Coil, 23-800 [ NO DIODE ]  | 1/per | 090-5001-ND  | 8   | Switch Body Protect Plate      | 2/per | 535-5045-00  |
| COIL DOES NOT REQUIRE A DIODE. SEE ☺ COIL NOTE BELOW FOR DETAILS.  |                            |       |              | Items 7 & 8 are secured to Item 1 by: #6-32 X 5/8" HWH Swage (Qty. 4) (237-5976-04)   |                                |       |              |
| 4  | Coil Sleeve                | 1/per | 545-5031-00  | 9Ⓜ  | Riveted Arm & Tip Assembly     | 1/per | 515-5340-01  |
| 5  | Plunger & Link Assembly    | 1/per | 515-5338-00  | For Individual Parts use (requires drilling out rivet & re-venting): Arm (515-5341-01), Kicker Tip (545-5216-01) and Rivet, 1/8" ø x 1/4" Lg. (249-5003-00)   |                                |       |              |
| For Individual Items use: Plunger 2" Lg. (530-5025-01), Plunger Link (545-5293-00) and Roll Pin 1/8" ø x 5/8" Lg. (251-5008-00) The Plunger Link is secured to the Riveted Arm by: Retaining Ring, 1/4" ø Shaft (Qty. 1) (270-5002-00) |                            |       |              | The Riv. Arm is secured to Item 1 by: Retaining Ring, 1/4" ø Shaft (Qty. 1) (270-5002-00)   |                                |       |              |
| Ordering Note: If 515-5338-00 is unavailable, order the individual part(s) actually required.  |                            |       |              | Ordering Note: If 515-5340-01 is unavailable, order the individual part(s) actually required.   |                                |       |              |
|  |                            |       |              | Ordering Note: If 500-5849-02-ND is unavailable, order the individual part(s) actually required. This assembly is identical to 500-5849-00-ND with the exception of Item 3, which uses a Coil, 23-800 [NO DIODE] (090-5001-ND) instead. |                                |       |              |

## Take Note:

- ☺ **Coil Note:** ☹ **NO DIODE ON LUGS.** If replacing with a coil of the same gauge and turn and it has a diode on it, remove it before using.
- Ⓜ "R" indicates Item noted is secured with rivet(s) as listed.



**Switch Diode Wiring Note:**  
 Cathode Side to Lug of Short Blade (WHT Jumper to 2nd Switch)  
 Anode Side to Middle Lug (TAN-RED)  
 Lug of Long Blade (GRN-RED & WHT Jumper to 2nd Switch)

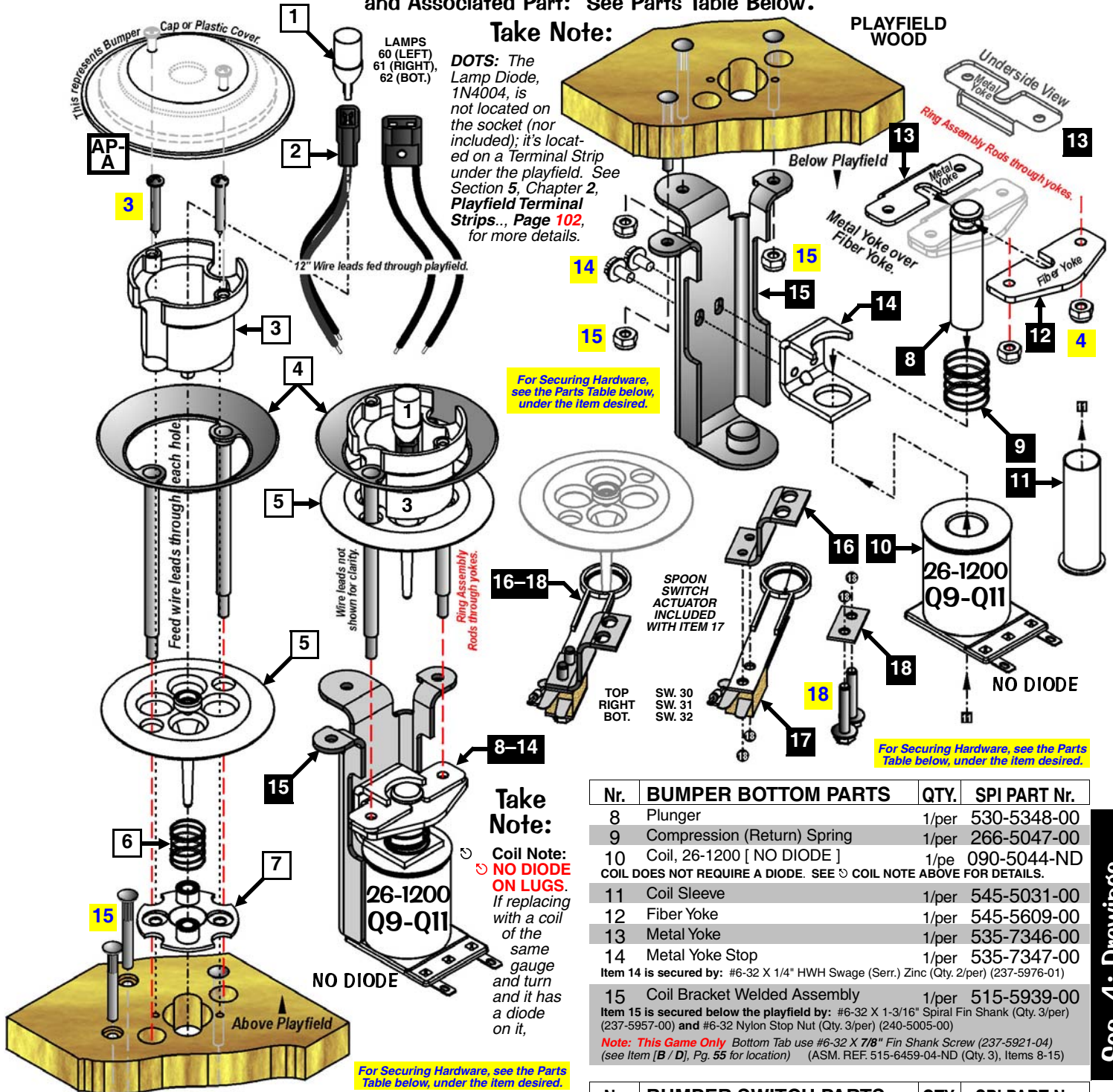
**Switch Diode Wiring Note:**  
 Cathode Side to Lug of Short Blade (WHT Jumper to 2nd Switch)  
 Anode Side to Middle Lug (TAN-ORG)  
 Lug of Long Blade (GRN-RED & WHT Jumper to 2nd Switch)

For Securing Hardware, see the Parts Table above, under the item desired.

Sec. 4: Drawings ...



# Bumper Top, Bumper Bottom & Bumper Switch Individual Parts Only (Items 1-18) and Associated Part: See Parts Table Below.



**Take Note:**  
 DOTS: The Lamp Diode, 1N4004, is not located on the socket (nor included); it's located on a Terminal Strip under the playfield. See Section 5, Chapter 2, Playfield Terminal Strips... Page 102, for more details.

For Securing Hardware, see the Parts Table below, under the item desired.

For Securing Hardware, see the Parts Table below, under the item desired.

**Take Note:**  
 Coil Note: NO DIODE ON LUGS. If replacing with a coil of the same gauge and turn and it has a diode on it, NO DIODE

For Securing Hardware, see the Parts Table below, under the item desired.

| Nr.  | BUMPER TOP PARTS                   | QTY.  | SPI PART Nr. |
|--|------------------------------------|-------|--------------|
| 1  | LED Module (WHT) (6.3v) Wedge Base | 1     | 112-5024-08  |
| 2  | Wedge Base Socket                  | 1     | 077-5206-00  |
| 3  | Bumper Body                        | 1/per | 545-5197-00  |
| Item 3 is secured above the P/F by: #5 X 7/8" PRH AB (Zinc) (Qty. 2/per) (237-5826-00) |                                    |       |              |
| 4  | Ring Assembly                      | 1/per | 515-5085-00  |
| Item 4 is secured by: #6-32 Nylon Stop Nut (Qty. 2/per) (240-5005-00)                  |                                    |       |              |
| 5  | Bumper Skirt (Switch Actuator)     | 1/per | 545-5607-00  |
| 6  | Bumper Skirt Compression Spring    | 1/per | 266-5048-00  |
| 7  | Bumper Base                        | 1/per | 545-5195-00  |
| (ASM. REF. 515-6459-01L (Qty. 1), Items 1-7; 515-6459-00 (Qty. 2), Items 3-7)          |                                    |       |              |

The Top & Bottom Assemblies are secured together by hardware noted in Item 4.

| Nr.  | BUMPER BOTTOM PARTS          | QTY.  | SPI PART Nr. |
|--|------------------------------|-------|--------------|
| 8  | Plunger                      | 1/per | 530-5348-00  |
| 9  | Compression (Return) Spring  | 1/per | 266-5047-00  |
| 10   | Coil, 26-1200 [ NO DIODE ]   | 1/pe  | 090-5044-ND  |
| COIL DOES NOT REQUIRE A DIODE. SEE COIL NOTE ABOVE FOR DETAILS.  |                              |       |              |
| 11   | Coil Sleeve                  | 1/per | 545-5031-00  |
| 12   | Fiber Yoke                   | 1/per | 545-5609-00  |
| 13   | Metal Yoke                   | 1/per | 535-7346-00  |
| 14   | Metal Yoke Stop              | 1/per | 535-7347-00  |
| Item 14 is secured by: #6-32 X 1/4" HWH Swage (Serr.) Zinc (Qty. 2/per) (237-5976-01)  |                              |       |              |
| 15   | Coil Bracket Welded Assembly | 1/per | 515-5939-00  |
| Item 15 is secured below the playfield by: #6-32 X 1-3/16" Spiral Fin Shank (Qty. 3/per) (237-5957-00) and #6-32 Nylon Stop Nut (Qty. 3/per) (240-5005-00)             |                              |       |              |
| Note: This Game Only Bottom Tab use #6-32 X 7/8" Fin Shank Screw (237-5921-04) (See Item [B / D], Pg. 55 for location) (ASM. REF. 515-6459-04-ND (Qty. 3), Items 8-15) |                              |       |              |

| Nr.   | BUMPER SWITCH PARTS               | QTY.  | SPI PART Nr. |
|---|-----------------------------------|-------|--------------|
| 16  | Switch Bracket                    | 1/per | 535-7342-00  |
| Item 16 is secured by: #8 X 1/2" HWH AB (Zinc) (Qty. 2/per) (234-5101-00)   |                                   |       |              |
| 17  | Bumper Stack (Blade) Switch Assy. | 1/per | 180-5015-04  |
| Included with Item 17: Spoon Switch Actuator (545-5610-02). Switch has a Diode (1N4004) (112-5003-00). Can be replaced with (1N4001) (112-5001-00). |                                   |       |              |
| 18  | Switch Body Protect Plate         | 1/per | 535-7344-00  |
| Items 17 & 18 are secured by: #6-32 X 3/4" HWH Swage (Serr.) Zc. (Qty. 2) (237-5976-05) (ASM. REF. 515-6459-09 (Qty. 3), Items 16-18)               |                                   |       |              |

ASSOCIATED PARTS ARE NOT INCLUDED WITH THE ABOVE ASSEMBLIES.

| Nr.  | ASSOCIATED PART(S)                    | QTY. | SPI PART Nr. |
|--|---------------------------------------|------|--------------|
| AP-A   | Kit: Plastic (incl. -16, -16B & -16C) | 1    | 803-5000-98  |
| Note: Individual Plastics (830-6066-XX & 830-6078-XX) are not available individually, ordering of kit is required. |                                       |      |              |
| AP-A are secured by: #4 X 3/8" PPH AB (Zinc) (Qty. 3/per) (237-5815-00)  |                                       |      |              |

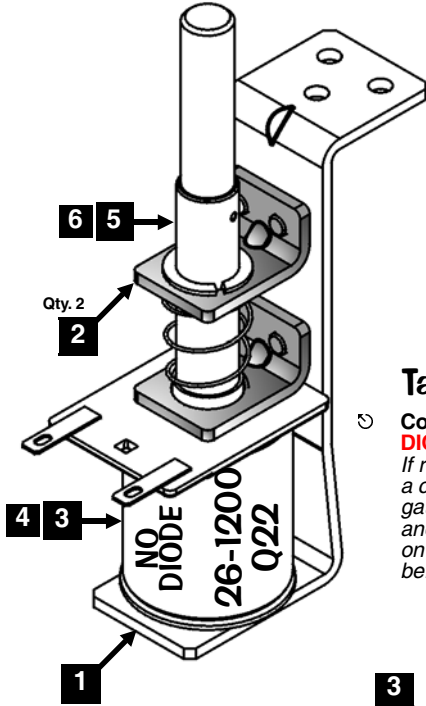
Sec. 4: Drawings ...

# Down-Post Assembly, 500-5867-12-ND (Items 1-8)

Ball is locked behind the Mini-Ramp; when energized, the post is pulled down.

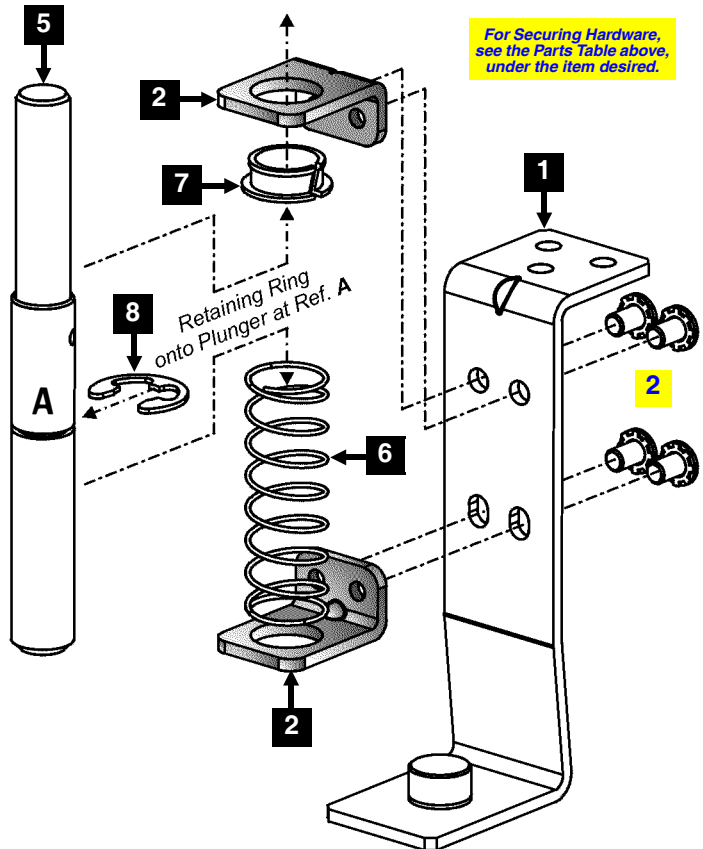
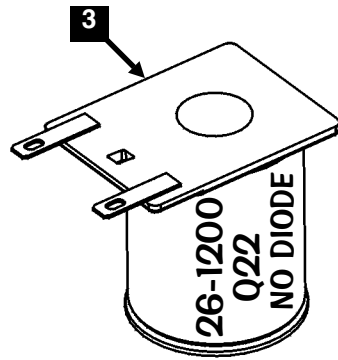
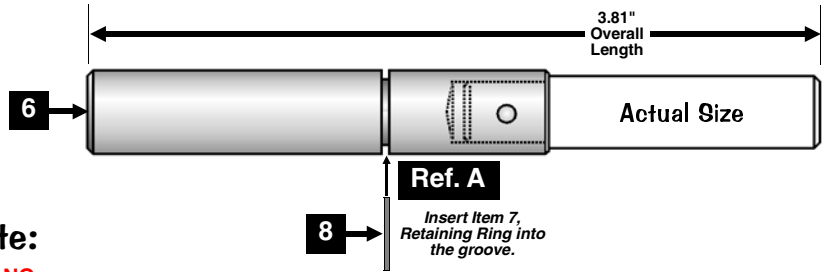
| Nr.   | DOWN-POST PARTS             | QTY. | SPI PART Nr. | Nr. | DOWN-POST PARTS                        | QTY. | SPI PART Nr. |
|---|-----------------------------|------|--------------|-----|--|------|--------------|
| 1   | Bracket, Coil Mounting Asm. | 1    | 515-7132-00  | 4   | Coil Sleeve                            | 1    | 545-5411-00  |
| Item 1 is secured below the P/F by: #8 X 1/2" SHWH AB (Zinc) (Qty. 3) (234-5101-00)     |                             |      |              |     |  |      |              |
| 2   | Coil Retaining Bracket      | 2    | 535-5203-03  | 5   | Plunger, 3.81" Lg. (w/ Nylon Tip) Asm. | 1    | 515-6119-02  |
| Item 2 is sec. to Item 1 by: #8-32 X 1/4" PPH MS (Sems) Zinc (Qty. 2/per) (232-5300-00) |                             |      |              |     |  |      |              |
| 3   | Coil, 26-1200 [ NO DIODE ]  | 1    | 090-5044-ND  | 6   | Compression (Relay) Spring             | 1    | 266-5020-00  |
| COIL DOES NOT REQUIRE A DIODE. SEE ☺ COIL NOTE ABOVE FOR DETAILS.                       |                             |      |              |     |  |      |              |
|   |                             |      |              | 7   | Nyliner 7/16" Shaft (7L2-FF)           | 1    | 545-5418-01  |
|   |                             |      |              | 8   | Retaining Ring, 7/16" ø Shaft          | 1    | 270-5005-00  |

*Ordering Note: If 500-5867-12-ND is unavailable, order the individual part(s) actually required.*



### Take Note:

☺ **Coil Note:** ☺ **NO DIODE ON LUGS.**  
 If replacing with a coil of the same gauge and turn and it has a diode on it, remove it before using.



Sec. 4: Drawings ...



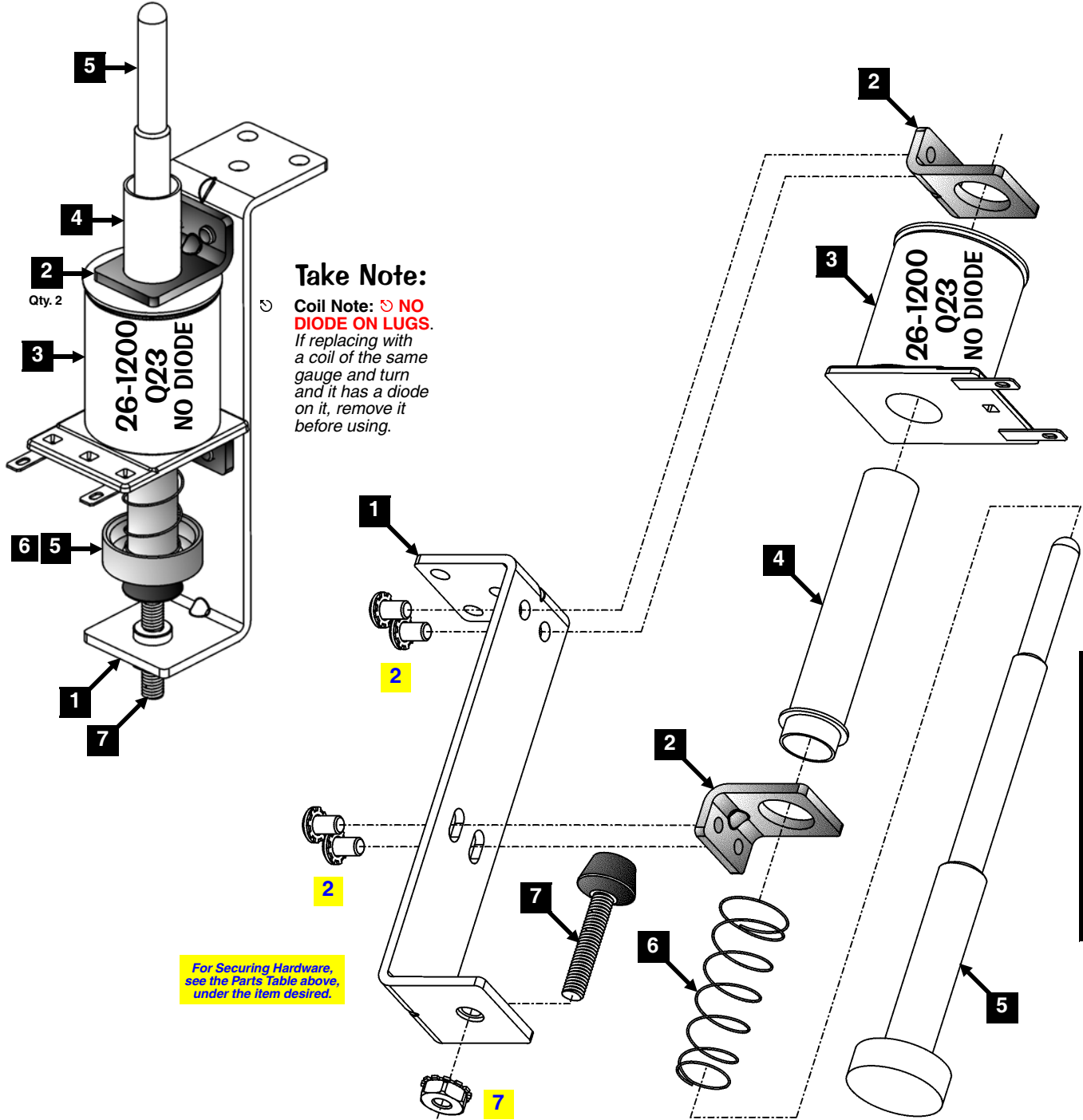


# Up-Post Assembly, 500-7094-00 (Items 1-7)

Ball can be stopped on the Left Plastic Ramp; when energized, the post is pushed up.

| Nr.   | UP-POST PARTS              | QTY. | SPI PART Nr. | Nr. | UP-POST PARTS                       | QTY. | SPI PART Nr. |
|---|----------------------------|------|--------------|-----|-------------------------------------|------|--------------|
| 1   | Bracket, Coil Mounting     | 1    | 535-9248-00  | 4   | Coil Sleeve (with extension)        | 1    | 545-5847-00  |
| Item 1 is secured below the P/F by: #8 X 1/2" SHWH AB (Zinc) (Qty. 3) (234-5101-00)     |                            |      |              |     |                                     |      |              |
| 2   | Coil Retaining Bracket     | 2    | 535-5203-03  | 5   | Plunger, 5.6" (1/4" Round Tip) Asm. | 1    | 515-7659-00  |
| Item 2 is sec. to Item 1 by: #8-32 X 1/4" PPH MS (Sems) Zinc (Qty. 2/per) (232-5300-00) |                            |      |              |     |                                     |      |              |
| 3   | Coil, 26-1200 [ NO DIODE ] | 1    | 090-5044-ND  | 6   | Compression (Relay) Conical Spring  | 1    | 266-5022-00  |
| COIL DOES NOT REQUIRE A DIODE. SEE ☺ COIL NOTE ABOVE FOR DETAILS.                       |                            |      |              |     |                                     |      |              |
| Item 7 is secured by: #10-32 Keps Nut (Qty. 1) (240-5208-00)                            |                            |      |              |     |                                     |      |              |

Ordering Note: If 500-7094-00 is unavailable, order the individual part(s) actually required.



Sec. 4: Drawings ...

**Coil Side Exploded View**

**In-Line 3-Bank Drop Target Assembly,  
500-6982-03 (Items 1-16)**

[ Different Views and Parts Table on the next page. ]

... includes the In-Line Module  
Sub-Assembly, 515-7565-00  
(Qty. 3) (Items 2-7 Only)

Please Review the In-Line 3-Bank  
Drop Target (500-6982-03),  
Coil Side and 1-Bank Module  
Disassembly Procedures on  
Pages 74 – 75.

Ensure, inside edges which make contact with  
Item 10 (Target Lift Bracket) is lubricated. Use  
Magnalube-G or equiv. (000-0646-00).

For an exploded  
view, see Page 75.

**Take Note:**

**Coil Note:** NO  
**DIODE ON LUGS.**  
If replacing with  
a coil of the same  
gauge and turn  
and it has a diode  
on it, remove it  
before using.

Ensure, inside edges  
which make contact  
with  
Item 10  
(Target Lift  
Bracket) is  
lubricated.  
Use Magna-  
lube-G or  
equiv. (000-0646-00).

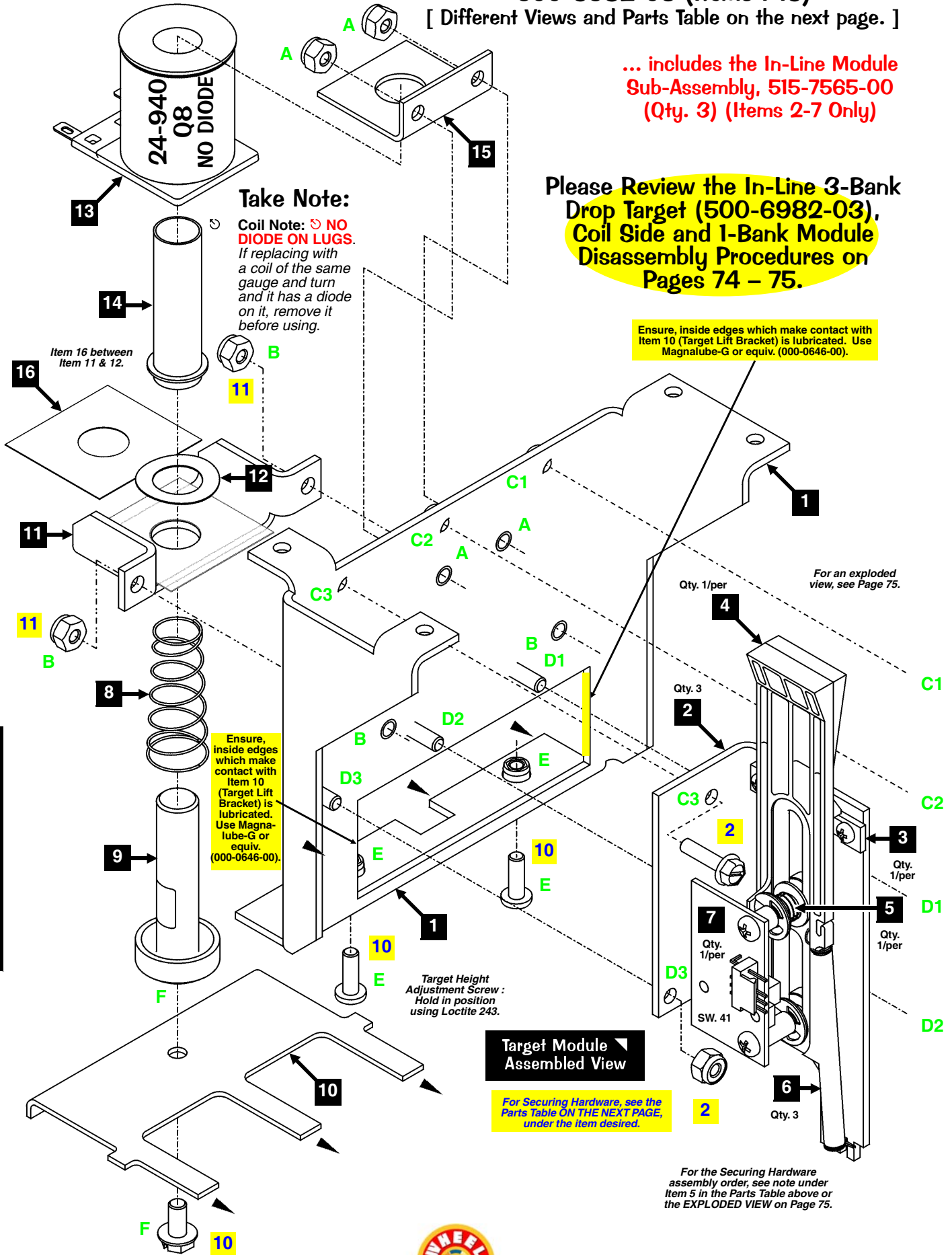
Target Height  
Adjustment Screw :  
Hold in position  
using Loctite 243.

**Target Module  
Assembled View**

For Securing Hardware, see the  
Parts Table ON THE NEXT PAGE,  
under the item desired.

For the Securing Hardware  
assembly order, see note under  
Item 5 in the Parts Table above or  
the EXPLODED VIEW on Page 75.

Sec. 4: Drawings ...

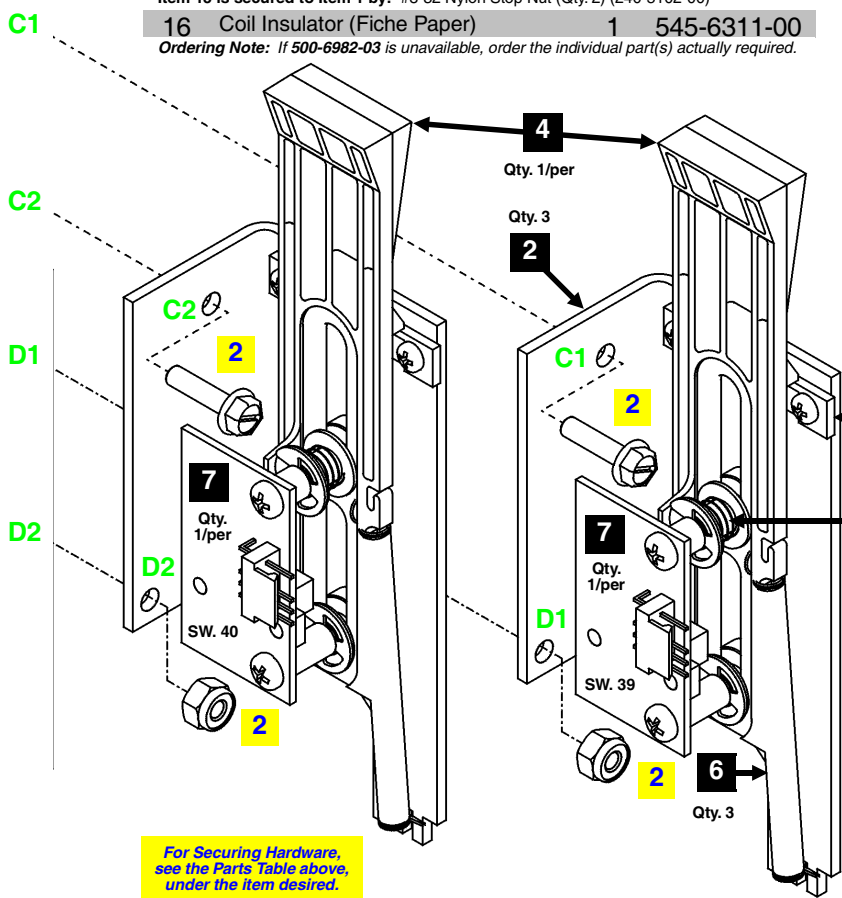
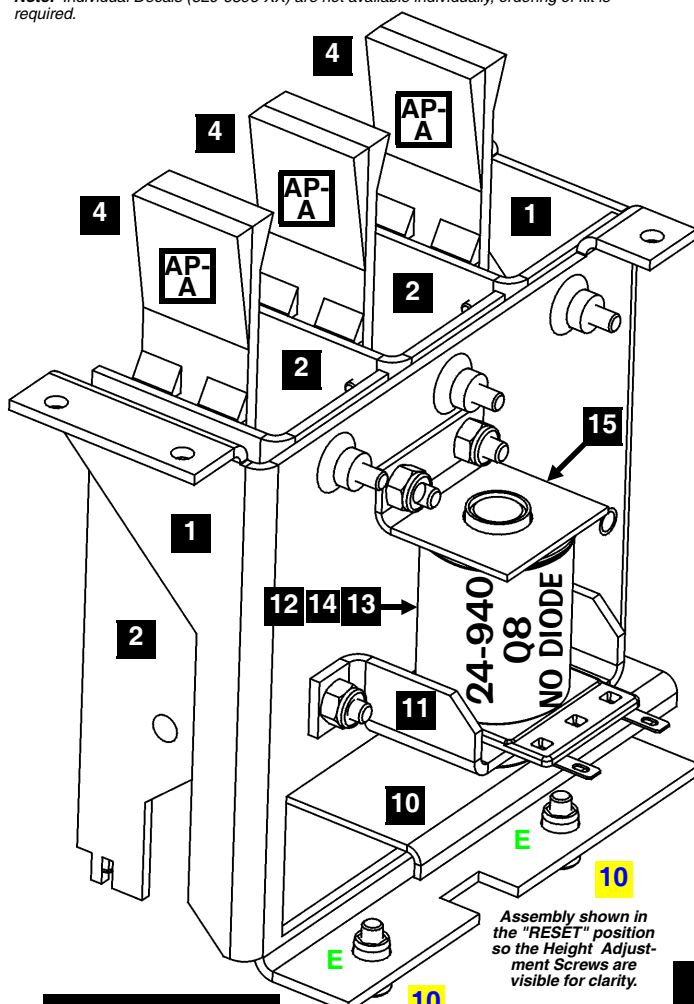


# In-Line 3-Bank Drop Target Assembly, 500-6982-03 (Items 1-16) Continued

[ Different Views on the previous page. ]

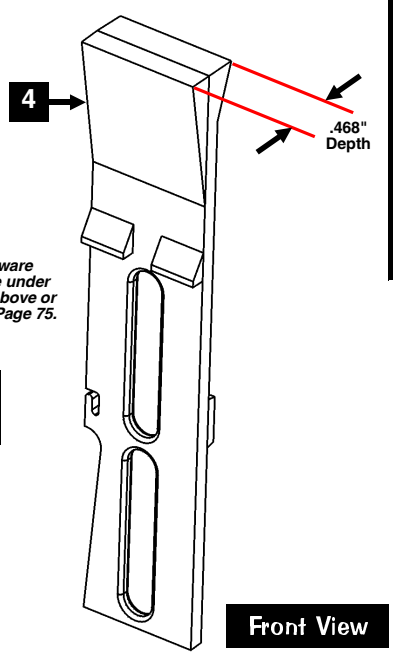
ASSOCIATED PARTS ARE NOT INCLUDED WITH THE ABOVE ASSEMBLY.

| Nr.   | IN-LINE DROP TRGT. PARTS                          | QTY. | SPI PART Nr. | Nr.   | ASSOCIATED PART(S)                   | QTY. | SPI PART Nr. |
|---|---|------|--------------|---|--------------------------------------|------|--------------|
| 1   | Frame & Pem Weldment, 1-Bank D/T                  | 1    | 515-7563-03  | AP-A  | Kit: Decals (incl. -17, -18, -19 DT) | 1    | 802-5000-98  |
| Item 1 is secured under the playfield by: #8 X 1/2" SHWH AB (Zc.) (Qty. 4) (234-5101-00)  |   |      |              | <b>Note:</b> Individual Decals (820-6396-XX) are not available individually, ordering of kit is required. |                                      |      |              |
| 2   | Module, 1-Bank In-Line Weldment                   | 3    | 515-7564-00  |   |                                      |      |              |
| Item 2 is secured to Item 1 by: #8-32 X 5/8" SHWH Swage (Zinc) (Qty. 1/per) (237-5975-03) and #8-32 Nylon Stop Nut (Qty. 1/per) (240-5102-00)             |   |      |              |   |                                      |      |              |
| 3   | Target Rest Ledge (Blk.), 1-Bank D/T              | 3    | 545-6163-01  |   |                                      |      |              |
| Item 3 is secured to Item 1 by: #4-40 X 1/4" PPH MS (Zinc) (Qty. 2) (237-6169-00)   |   |      |              |   |                                      |      |              |
| 4   | Drop Target (Black) R/O, .468" Depth              | 3    | 545-6305-00  |   |                                      |      |              |
| 5   | Compression (Short) Spring                        | 3    | 266-5089-00  |   |                                      |      |              |
| Items 4 & 5 are secured to Item 1 @ top by: Washer, 1/2" X 17/64" X .03" (Qty. 2/per) (242-5091-00) and Retaining Ring, 1/4" ø (Qty. 1/per) (270-5002-00) |   |      |              |   |                                      |      |              |
| <b>FRAME PEM → WASHER → SPRING → WASHER → RETAINING RING → OPTO PCB → SCREW</b>   |   |      |              |   |                                      |      |              |
| Item 4 is secured to Item 1 @ bottom by: Washer, 1/2" X 17/64" X .03" (Qty. 1/per) (242-5091-00) and Retaining Ring, 1/4" ø (Qty. 1/per) (270-5002-00)    |   |      |              |   |                                      |      |              |
| 6   | Reset (Long) Spring (Red Dipped)                  | 3    | 265-5003-02  |   |                                      |      |              |
| 7   | PCB, Slotted OPTO X1                              | 3    | 520-5255-00  |   |                                      |      |              |
| Item 7 is secured to Item 1 by: #6-32 X 3/8" PPH MS (Zinc) (Qty. 2/per) (237-5501-00)   |   |      |              |   |                                      |      |              |
| <b>Note:</b> Items 2-7 can be ordered assembled.  |   |      |              |   |                                      |      |              |
| For more information and wiring colors, schematics and parts of this PCB, see Section 5, Chapter 4, Printed Circuit Boards (PCBs), Page 129.              |   |      |              |   |                                      |      |              |
| (ASM. REF. 515-7565-00, Items 2-7 ONLY, Qty. 1/per Item + hardware & is assembled)  |   |      |              |   |                                      |      |              |
| <b>Ordering Note:</b> Securing Hardware for Item 2 is <b>NOT INCLUDED</b> with 515-7565-00.   |   |      |              |   |                                      |      |              |
| 8   | Compression (Return) Spring                       | 1    | 266-5020-00  |   |                                      |      |              |
| 9   | Steel Plunger with End Cap                        | 1    | 530-5757-00  |   |                                      |      |              |
| 10  | Bracket, Target Lift (3-Bank In-Line)             | 1    | 535-9801-03  |   |                                      |      |              |
| Item 10 is secured to Item 9 Plunger by: #10-32 X 3/8" SHWH Swage (Zinc) Wax (Qty. 1) (237-5985-00)   |   |      |              |   |                                      |      |              |
| <b>//// TARGET HEIGHT ADJUSTMENT: ////</b>  |   |      |              |   |                                      |      |              |
| Item 10 is adjusted through Item 1 by: #8-32 X 1/2" PPH MS (Zinc) (Qty. 2) (237-5602-00)  |   |      |              |   |                                      |      |              |
| 11  | Coil Mounting Brkt. <b>***For In-Line Only***</b> | 1    | 535-9995-04  |   |                                      |      |              |
| Item 11 is secured to Item 1 by: #8-32 Nylon Stop Nut (Qty. 2) (240-5102-00)  |   |      |              |   |                                      |      |              |
| 12  | Spring Washer (17/32" ID X 3/4" X 1")             | 1    | 269-5002-00  |   |                                      |      |              |
| 13  | Coil, 24-940 [ NO DIODE ]                         | 1    | 090-5036-ND  |   |                                      |      |              |
| COIL DOES NOT REQUIRE A DIODE. SEE ☺ COIL NOTE ABOVE FOR DETAILS.   |   |      |              |   |                                      |      |              |
| 14  | Coil Sleeve (Formost #10-7077)                    | 1    | 545-5076-01  |   |                                      |      |              |
| 15  | Bracket, Plunger Stop                             | 1    | 535-9959-00  |   |                                      |      |              |
| Item 15 is secured to Item 1 by: #8-32 Nylon Stop Nut (Qty. 2) (240-5102-00)  |   |      |              |   |                                      |      |              |
| 16  | Coil Insulator (Fiche Paper)                      | 1    | 545-6311-00  |   |                                      |      |              |
| <b>Ordering Note:</b> If 500-6982-03 is unavailable, order the individual part(s) actually required.  |   |      |              |   |                                      |      |              |



▲ Coil Side Assembled View

◀ Target Modules Assembled Views



Front View

For Securing Hardware, see the Parts Table above, under the item desired.

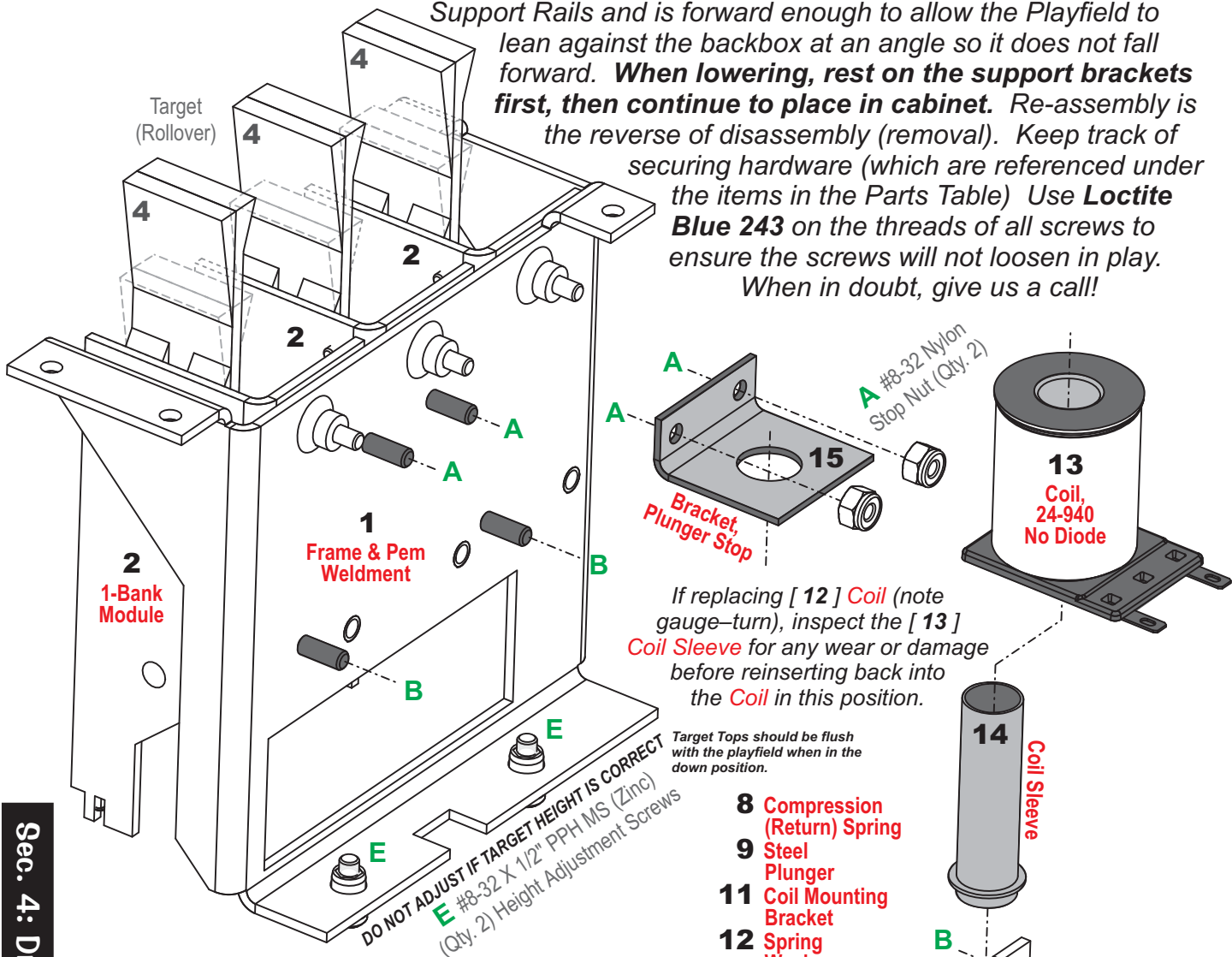
Sec. 4: Drawings ...



# In-Line 3-Bank Drop Target (500-6982-03), Coil Side Disassembly Procedure

**Technicians Remember the Basics:** All Service should be done by qualified personnel. **ALWAYS REMOVE POWER BEFORE SERVICING.** Service assemblies which are below the playfield, with the playfield in its' most upright position (leaning against the Backbox). Raise it carefully! Ensure the bottom edge (back) of the playfield is still resting on the Cabinet Side

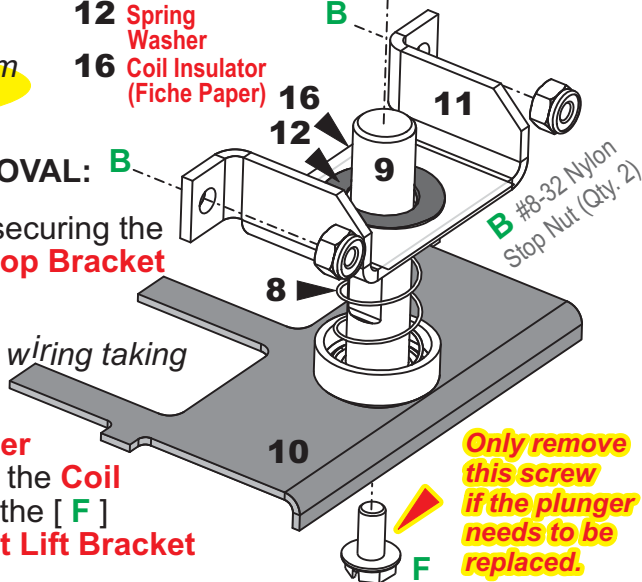
Support Rails and is forward enough to allow the Playfield to lean against the backbox at an angle so it does not fall forward. **When lowering, rest on the support brackets first, then continue to place in cabinet.** Re-assembly is the reverse of disassembly (removal). Keep track of securing hardware (which are referenced under the items in the Parts Table) Use **Loctite Blue 243** on the threads of all screws to ensure the screws will not loosen in play. When in doubt, give us a call!



**Note:** Assembly need not be removed from the playfield to perform this procedure.

## COIL AND/OR PLUNGER-LIFT BRACKET REMOVAL:

1. Remove the [ A & B ] #8-32 Nylon Stop Nuts securing the **Coil Mounting Bracket [ 11 ]** and **Plunger Stop Bracket [ 15 ]** from the **Frame & Pem Weldment [ 1 ]**.
2. **Coil [ 13 ]** can now be removed. Desolder the wiring taking note which color wire goes to either lug.
3. When reassembling, ensure the **Spring Washer [ 12 ]** is in place under the **Coil [ 13 ]** and over the **Coil Mounting Bracket [ 11 ]**. Retighten [ check ] the [ F ] #10-32 X 1/2" Screw which secures the **Target Lift Bracket [ 10 ]** to the **Plunger [ 9 ]**.



F #10-32 X 1/2" HWH (Qty. 1)

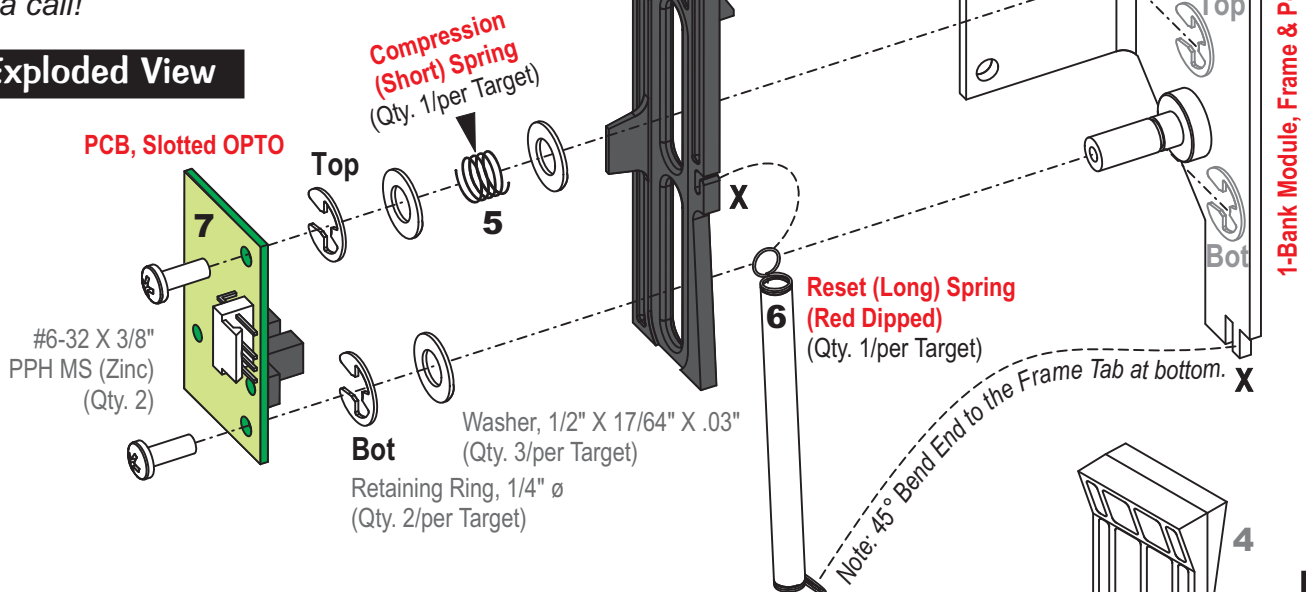
Sec. 4: Drawings ...



# In-Line 3-Bank Drop Target (500-6982-03), 1-Bank Module Disassembly Procedure

**Technicians Remember the Basics:** All Service should be done by qualified personnel. **ALWAYS REMOVE POWER BEFORE SERVICING.** Service assemblies which are below the playfield, with the playfield in its' most upright position (leaning against the Backbox). Raise it carefully! Ensure the bottom edge (back) of the playfield is still resting on the Cabinet Side Support Rails and is forward enough to allow the Playfield to lean against the backbox at an angle so it does not fall forward. **When lowering, rest on the support brackets first, then continue to place in cabinet.** Re-assembly is the reverse of disassembly (removal). Keep track of securing hardware (which are referenced under the items in the Parts Table) Use **Loctite Blue 243** on the threads of all screws to ensure the screws will not loosen in play. When in doubt, give us a call!

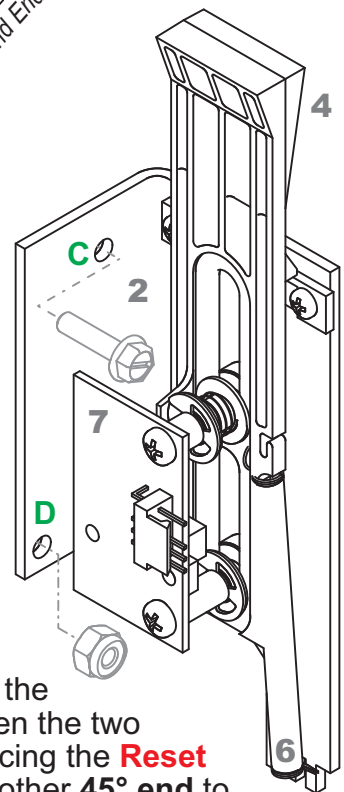
## Exploded View



**Note:** To make the Target & Spring Removal easier, you can first remove the **1-Bank Module from the Frame & Perm Weldment [ 2 ]** while keeping it secured to the playfield. Just remove the [ **C** ] #8-32 X 5/8" SHWH (Zinc) Screw and [ **D** ] #8-32 Nylon Stop Nut, then lift out the module (do only one at a time).

## TARGET AND SPRING REMOVAL:

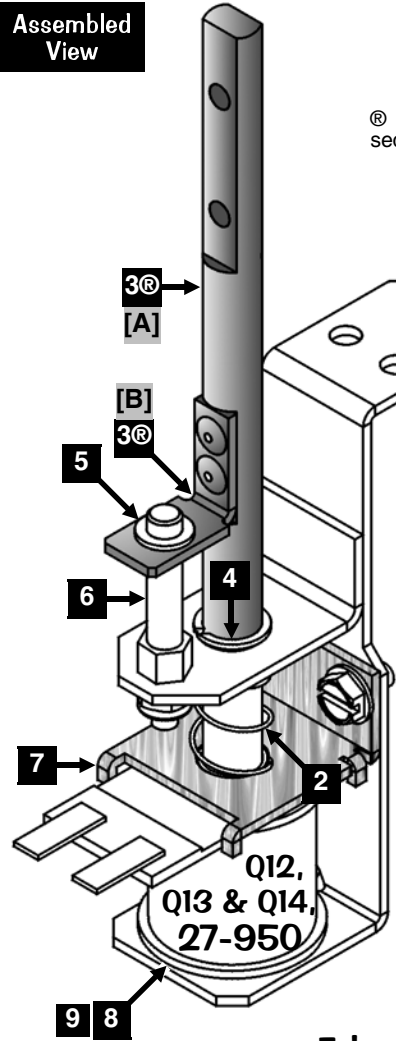
1. Remove the #6-32 x 3/8" PPH MS Screws securing the **PCB, Slotted OPTO [ 7 ]** from the **1-Bank Module [ 2 ]**.
2. Remove the top [ **Top** ] Retaining Ring, 1/4" ø and Washer and set aside the **Compression (Short) Spring [ 5 ]** and second Washer. Remove the bottom [ **Bot** ] Retaining Ring & Washer. Unhook the **Reset Spring [ 6 ]**.
3. The **Target [ 4 ]** can now be removed. When reassembling, note the other targets. The **Compression Spring [ 5 ]** is at the top between the two Washers, secure with the top [ **Top** ] Retaining Ring. When replacing the **Reset (Long) Spring [ 6 ]**, hook one end to the **Target** tab [ **X** ] and the other **45°** end to the tab [ **X** ] on the **1-Bank Module [ 2 ]**.



(ASM. REF. 515-7565-00, Items 2-7 ONLY, see Page 73)

Sec. 4: Drawings ...

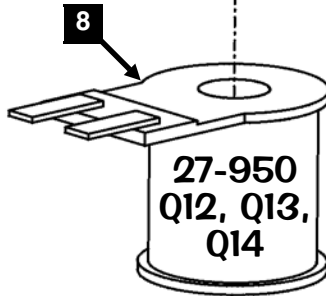
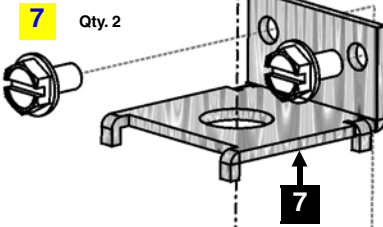
# Contestant Pop-Up Assembly, Individual Parts Only (Qty. 3) (Items 1-9)



### Take Note:

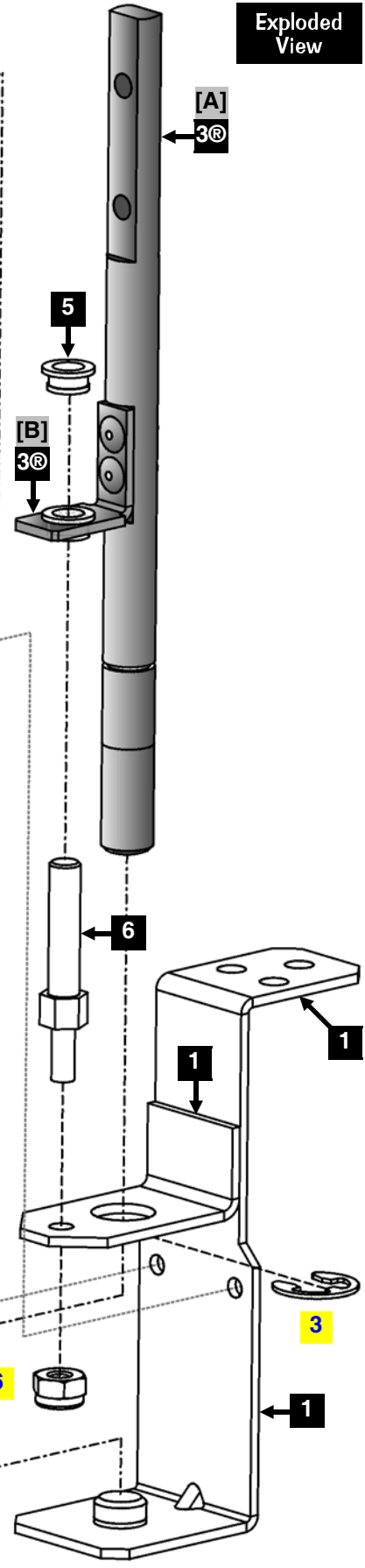
® "R" indicates Item noted is secured with rivet(s) as listed.

For Securing Hardware, see the Parts Table below, under the item desired.



### Take Note:

⊙ **Coil Note:** ⊙ **NO DIODE ON LUGS.**  
If replacing with a coil of the same gauge and turn and it has a diode on it, remove it before using.



For Securing Hardware, see the Parts Table left, under the item desired.

Sec. 4: Drawings ...

| Nr.   | CONTESTANT POP. PARTS                 | QTY. | SPI PART Nr.   |
|---|---------------------------------------|------|----------------|
| 1   | Brckt. Weldment, Contestant Pop-Up    | 1    | 515-7665-00    |
| Item 1 is secured under the playfield by: #8 X 1/2" SHWH AB (Zc.) (Qty. 3) (234-5101-00)  |                                       |      |                |
| 2   | Compression (Return) Spring           | 1    | 266-5043-00    |
| 3®  | Plunger (Riveted) Asm. (incl. Item 5) | 1    | 510-5060-00    |
| Item 3 is secured to Item 1 by: Retaining Ring, 5/16" ø (Qty. 1) (270-5003-00)  |                                       |      |                |
| For individual items use : [A] Plunger (530-6528-00) and [B] Bracket (Plunger Guide) (535-0100-00) [B] is secured to [A] by: Rivet, 1/8" ø X 5/16" (Qty. 2/per) (245-5016-00) |                                       |      |                |
| 4   | Nyliner 5/16"ø (5L1-FF Thomson)       | 1    | 545-5485-00    |
| 5   | Nyliner 3/16"ø (3L1-FF Thomson)       | 1    | 545-5352-00    |
| Ordering Note: Item 5 is included with Item 3, Plunger (Riveted) Assembly.  |                                       |      |                |
| 6   | Shoulder Pin                          | 1    | 530-5808-00    |
| Item 6 is secured to Item 1 by: #6-32 Nylon Stop Nut (Qty. 1) (240-5005-00)   |                                       |      |                |
| 7   | Mini-Coil Retainer Bracket            | 1    | 535-9925-00    |
| Item 7 is secured to Item 1 by: #6-32 X 1/4" SHWH Swg. (ZInc) Wax (Qty. 2) (237-5976-01)  |                                       |      |                |
| 8   | Mini-Coil, 27-950 [ NO DIODE ]        | 1    | 090-5046-01-ND |
| COIL DOES NOT REQUIRE A DIODE. SEE ⊙ COIL NOTE ABOVE FOR DETAILS.   |                                       |      |                |
| 9   | Mini-Coil Sleeve                      | 1    | 545-5442-00    |

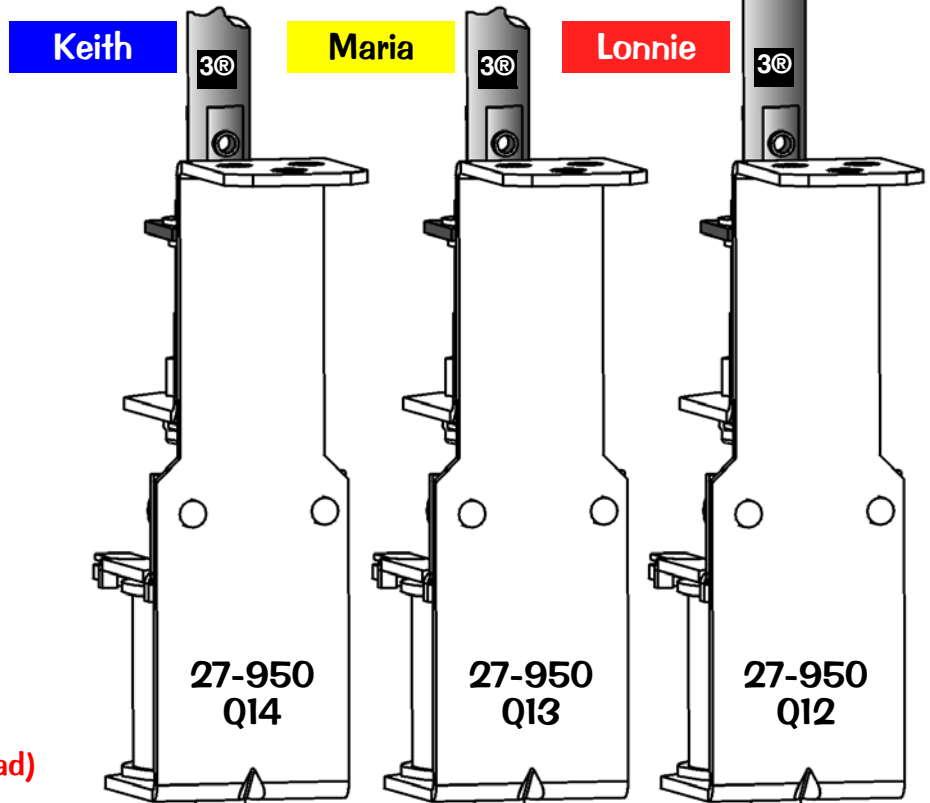
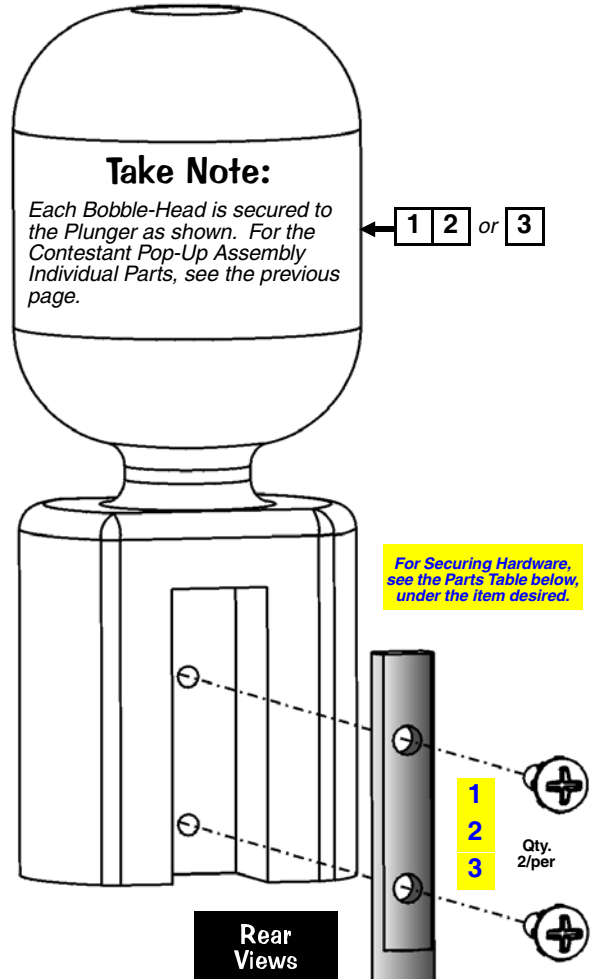
(ASM. REF. 500-7103-00, Items 1-9)





# Bobble Heads, Individual Parts Only (Items 1-3)

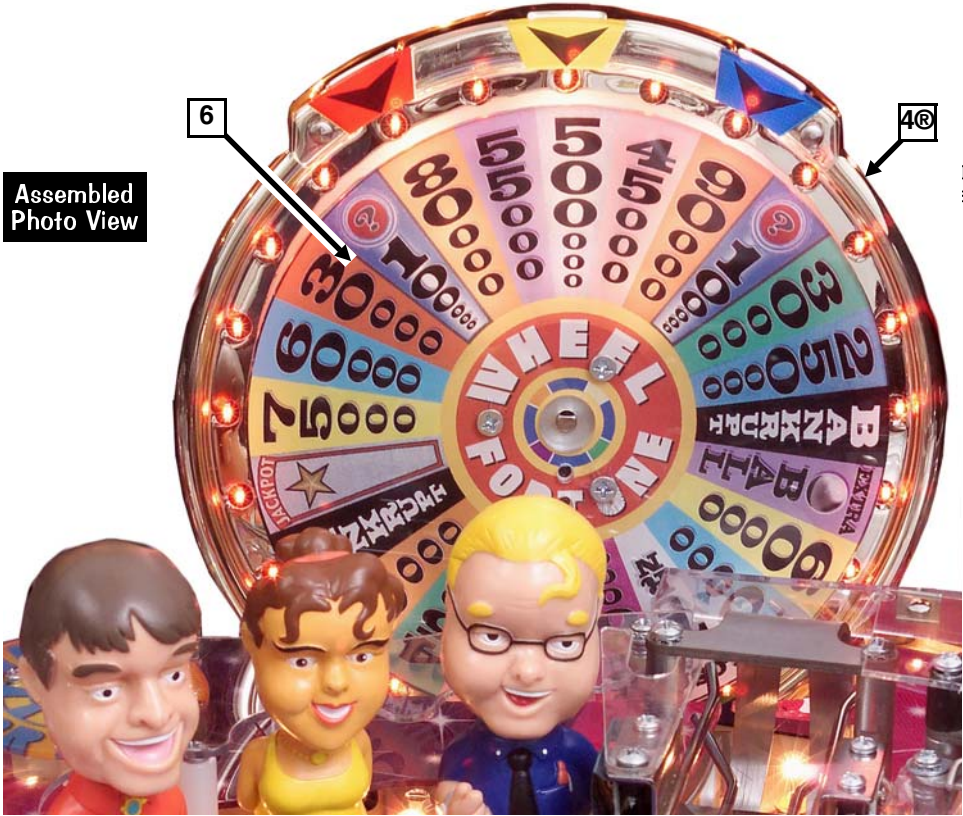
| Nr.  | BOBBLE-HEAD PARTS                 | QTY. | SPI PART Nr. |
|--|-----------------------------------|------|--------------|
| 1  | Bobble-Head, Red Shirt (Lonnie)   | 1    | 880-5098-00  |
| Item 1 is secured (onto Item 3®, Plunger (510-5060-00)), shown below & previous page) by: #6-32 X 3/8" PPH MS (Zinc) (Qty. 2) (237-5501-00)  |                                   |      |              |
| 2  | Bobble-Head, Yellow Shirt (Maria) | 1    | 880-5098-01  |
| Item 2 is secured (onto Item 3®, Plunger (510-5060-00)), shown below & previous page) by: #6-32 X 3/8" PPH MS (Zinc) (Qty. 2) (237-5501-00)  |                                   |      |              |
| 3  | Bobble-Head, Blue Shirt (Keith)   | 1    | 880-5098-02  |
| Item 3 is secured (onto Item 3®, Plunger (510-5060-00)), shown below & previous page) by: #6-32 X 3/8" PPH MS (Zinc) (Qty. 2) (237-5501-00)<br>(ASM. REF. 500-7104-00 (for Item 1), -01 (for Item 2), -02 (for Item 3), sec'd. to 500-7103-00) |                                   |      |              |



See the Previous Page for the Individual Parts of the Contestant Pop-Up Assemblies (1 per Bobble Head)

**Wheel of Fortune Assembly, Individual Parts Only (Items 1-6)**  
 [ Different Views & Parts Table on the next page. ]

**Assembled Photo View**



**Take Note:**

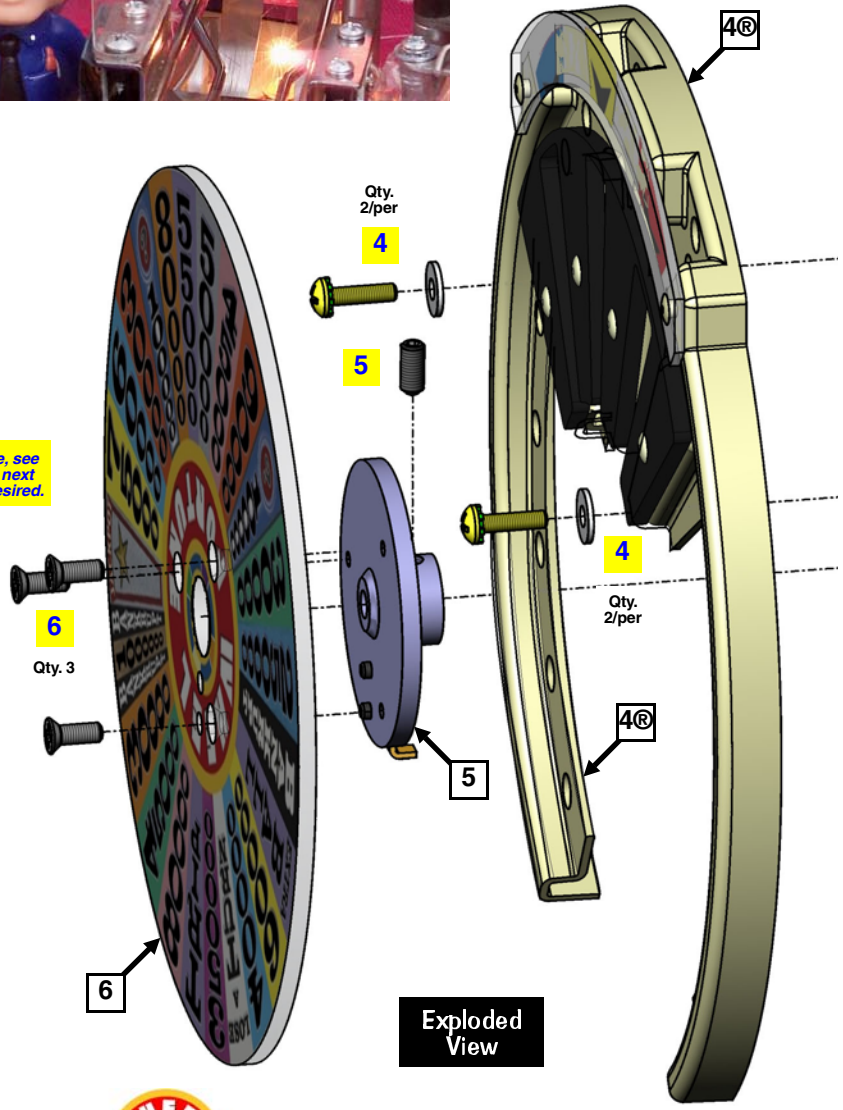
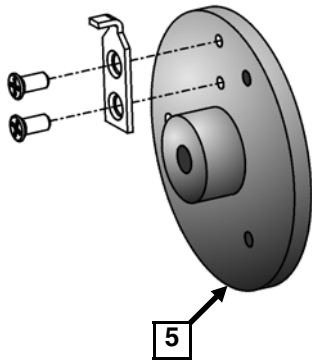
Ⓜ "R" indicates Item noted is secured with rivet(s) as listed.

See the Previous Page for the Bobble-Head Part Numbers.

Sec. 4: Drawings ...

For Securing Hardware, see the Parts Table on the next page, under the item desired.

Opposite View of Item 5, Wheel Hub Assembly for clarity (includes OPTO Flag Bracket).



**Exploded View**

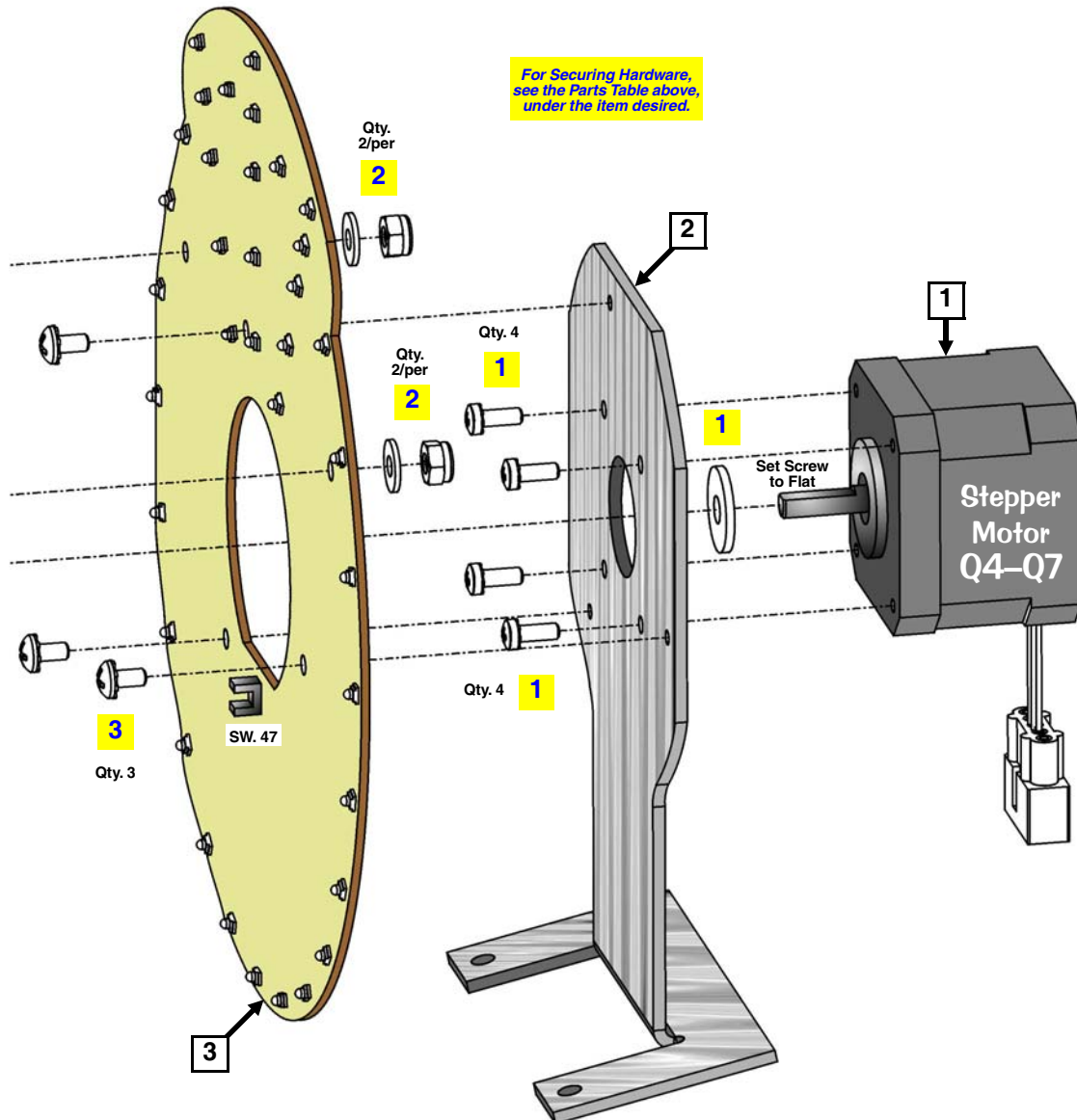


# Wheel of Fortune Assembly, Individual Parts Only (Items 1-6) Continued

[ Different Views continued on the previous page. ]

| Nr. | WHEEL PARTS  | QTY. | SPI PART Nr. | Nr. | WHEEL PARTS  | QTY. | SPI PART Nr. |
|-----|--|------|--------------|-----|--|------|--------------|
| 1   | Stepper Motor & Connector<br><i>For individual Items use</i> : Stepper Motor Lin. Eng. 4118570-RO +12VDC (041-5105-00) and 5-Pin Connector (045-5002-05).<br><b>Item 1 is secured to Item 2 by:</b> M3 X0.5 X 8mm PPH Sems (Zinc) (Qty. 4) (237-6188-00) and @ Motor Shaft by: Washer, .625" OD X .2" ID X .058" Thick (Qty. 1) (242-5038-00)<br><i>For more information and wiring colors + schematic of this Stepper Motor, see Section 5, Chapter 1, Backbox Wiring, Page 91.</i> | 1    | 511-5072-00  | 4Ⓞ  | Wheel Shroud (Riveted) Assembly<br><b>Item 4Ⓞ is secured to Item 3 front by:</b> #6-32 X 1/2" (Qty. 2) (232-5202-00) and #6 Washer (Qty. 2) (242-5001-00) and to <b>Item 3 back by:</b> #6 Washer (Qty. 2) (242-5001-00) and #6-32 Nylon Stop Nut (Qty. 2) (240-5005-00)<br><i>Ordering Note</i> : Individual parts not available. Screened Plastic -21 (830-6066-21, not included in the <b>Kit: Plastics 803-5000-98</b> ) and <b>830-6082-00</b> Black Plastic Cover are riveted onto the Golden Wheel Shroud (545-6302-00) with Rivet, 1/8" X 3/6" (Qty. 2) (249-5001-00). | 1    | 510-5057-00  |
| 2   | Bracket, Mounting Wheel & Stp. Motor<br><b>Item 2 is secured above the playfield by:</b> #8 X 1/2" SHWH AB (Zc.) (Qty. 2) (234-5101-00) <b>Item 2 is secured to Item 1 by:</b> See <i>Securing Hardware for Item 1.</i>  | 1    | 535-0041-00  | 5   | Wheel Hub Assembly<br><b>Item 5 is secured to Item 1 @ Flat by:</b> #8-32 X 3/8" Set Screw (Zc.) (Qty. 1) (237-5839-00)<br><i>For individual Items use</i> : OPTO Flag Bracket (535-0042-00), Hub Weldment (515-7655-00) and #4-40 X 1/4" PFH Black 82° Undercut (Qty. 2) (237-5983-04)  | 1    | 511-5073-00  |
| 3   | Wheel LED & Slotted OPTO PCB Asm.<br><b>Item 3 is sec'd to Item 2 by:</b> #6-32 X 1/4" PPH MS Ext. Sems (Zinc) (Qty. 3) (232-5200-00)<br><i>For more information and wiring colors, schematics and parts of this PCB, see Section 5, Chapter 4, Printed Circuit Boards (PCBs), Page 132-135.</i>   | 1    | 520-5283-00  | 6   | <b>Kit: Plastic Wheel (830-6069-00)</b> 1 <b>803-5001-98</b><br><i>Note:</i> This WoF Screened Lexan Rotating Wheel Plastic (1/8" Thick) is the only item in this kit. The part number was created to shelf next to the normal <b>Kit: Plastic 803-5000-98</b> .<br><b>Item 6 is secured to Item 5 by:</b> #6-32 X 3/8" PFH MS (Zinc) (Qty. 3) (237-5850-00)   | 1    | 803-5001-98  |

(ASM. REF. 500-7083-00, Items 1-6)

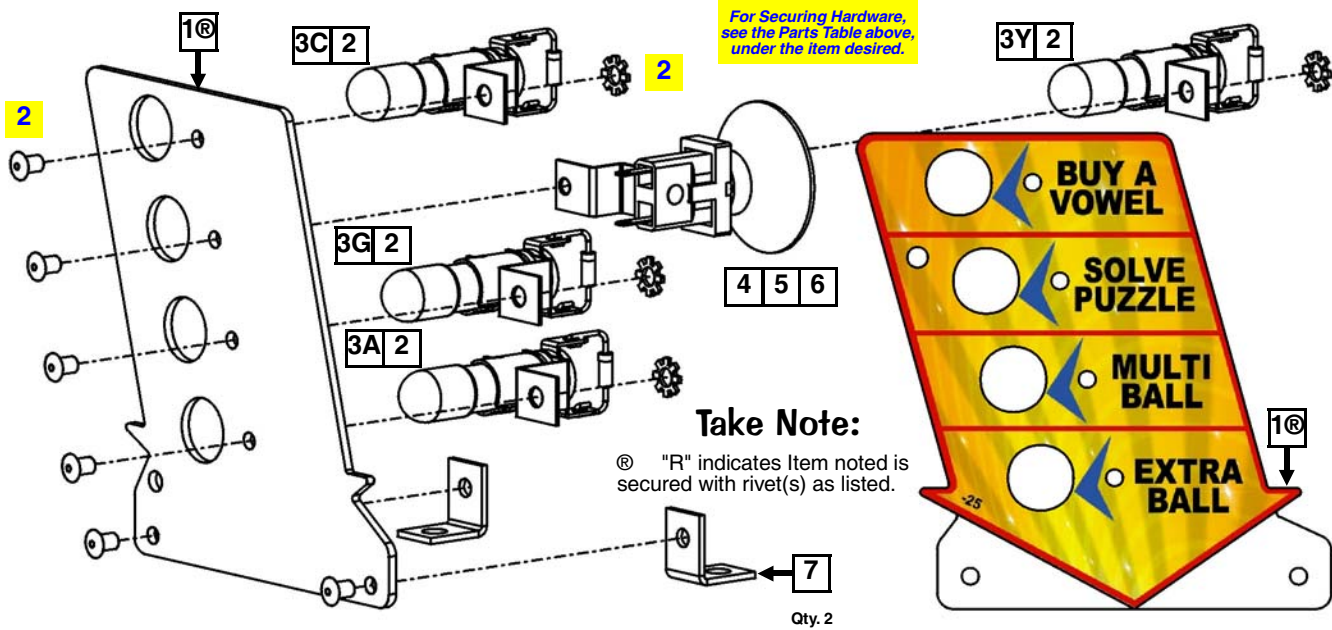


Sec. 4: Drawings ...



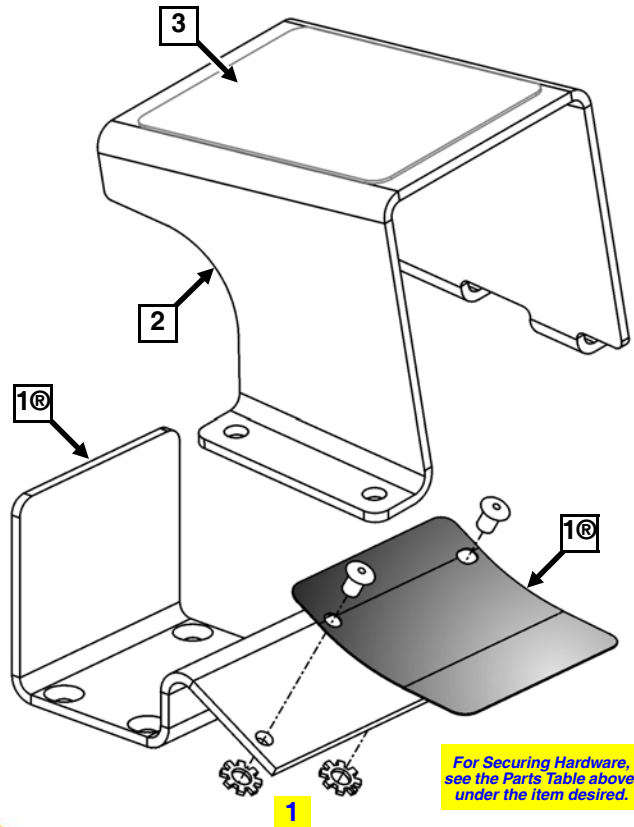
## Billboard Sign, Individual Parts Only (Items 1-7)

| Nr.   | SIGN PARTS                              | QTY. | SPI PART Nr.       | Nr.   | SIGN PARTS                       | QTY. | SPI PART Nr. |
|---|---|------|--------------------|---|----------------------------------|------|--------------|
| 1 <sup>®</sup>  | <b>Kit: Plastic (incl. 830-6081-25)</b> | 1    | <b>803-5000-98</b> | 4   | Wedge Base Socket (Offset)       | 1    | 077-5029-00  |
| <i>Note: Individual Plastics (830-6066-XX, 830-6078-XX &amp; 830-6081-25) are not available individually, ordering of kit is required. See Page 51 for details.</i> |   |      |                    |   |                                  |      |              |
| 2   | 3-Lug Stand-Up Socket (Med. Brkt.)      | 4    | 077-5008-00        | 5   | #555 Wedge Base Bulb             | 1    | 165-5002-00  |
| <i>Item 2 is secured to Item 1 front by: Rivet, 1/8" X 3/16" (Qty. 1/per) (249-5001-00) and #6 Lock Washer (Qty. 1/per) (246-5000-00)</i>                           |   |      |                    |   |                                  |      |              |
| 3C  | #44 Bulb (Clear) Heavy Filament         | 1    | 165-5000-44-HF     | 6   | Light Reflector (Silver Plastic) | 1    | 545-5409-01  |
| 3Y  | #44 Bulb (Yellow) Heavy Filament        | 1    | 165-5053-06-HF     | 7 <sup>®</sup>  | Bracket, 90° Plastic Mounting    | 2    | 535-8941-00  |
| 3G  | #44 Bulb (Green) Heavy Filament         | 1    | 165-5053-04-HF     | <i>Item 7<sup>®</sup> is secured to Item 1 front by: Rivet, 1/8" X 3/16" (Qty. 1/per) (249-5001-00) and is secured to the Playfield by: Post [Hex Base] #6-32 Tap // #10-32 Thread (Qty. 1/per) (530-5332-01), Rubber Sleeve on Post (Qty. 1/per) (545-5308-00), #10 Washer 13/64" I.D. X 1/2" O.D. X .047" (Qty. 1/per) (242-5010-00) and #10-32 Nylon Stop Nut (Qty. 1/per) (242-5203-00)</i> |                                  |      |              |
| 3A  | #44 Bulb (Amber) Heavy Filament         | 1    | 165-5053-03-HF     | (ASM. REF. ONLY 510-5061-25, Items 1-7)   |                                  |      |              |



## Mini-Bump Ramp & Flap and Ramp Cover, Individual Parts Only (Items 1-3)

| Nr.  | MINI-BUMP RAMP PARTS                  | QTY. | SPI PART Nr. |
|--|---------------------------------------|------|--------------|
| 1 <sup>®</sup>   | <b>Mini-Bump Ramp &amp; Flap Asm.</b> | 1    | 510-5050-00  |
| <i>For individual Items use : Mini-Bump Ramp (No Parts) (535-0051-00), Ramp Flap (535-0052-00), #6 Washer (Qty. 2) (246-5000-00) and Rivet, 1/8" X 3/16" (Qty. 2) (249-5001-00).</i> |                                       |      |              |
| <i>Item 1 is secured by: #6-32 X 1/2" PFH MS (Zinc) (Qty. 4) (237-5918-00) and #6-32 T-Nut (Qty. 4) (240-5002-00)</i>  |                                       |      |              |
| 2  | Cover, Mini-Bump Ramp                 | 1    | 535-0053-00  |
| <i>Item 2 is secured by: #8-32 X 5/8" SHWH Swage (Zinc) Wax (Qty. 5) (237-5975-03) and #8-32 T-Nut (Qty. 5) (240-5101-00)</i>  |                                       |      |              |
| 3  | <b>Kit: Decals (includes -11)</b>     | 1    | 802-5000-98  |
| <i>Note: Individual Decals (820-6396-XX) are not available individually, ordering of kit is required.</i>  |                                       |      |              |



Sec. 4: Drawings ...

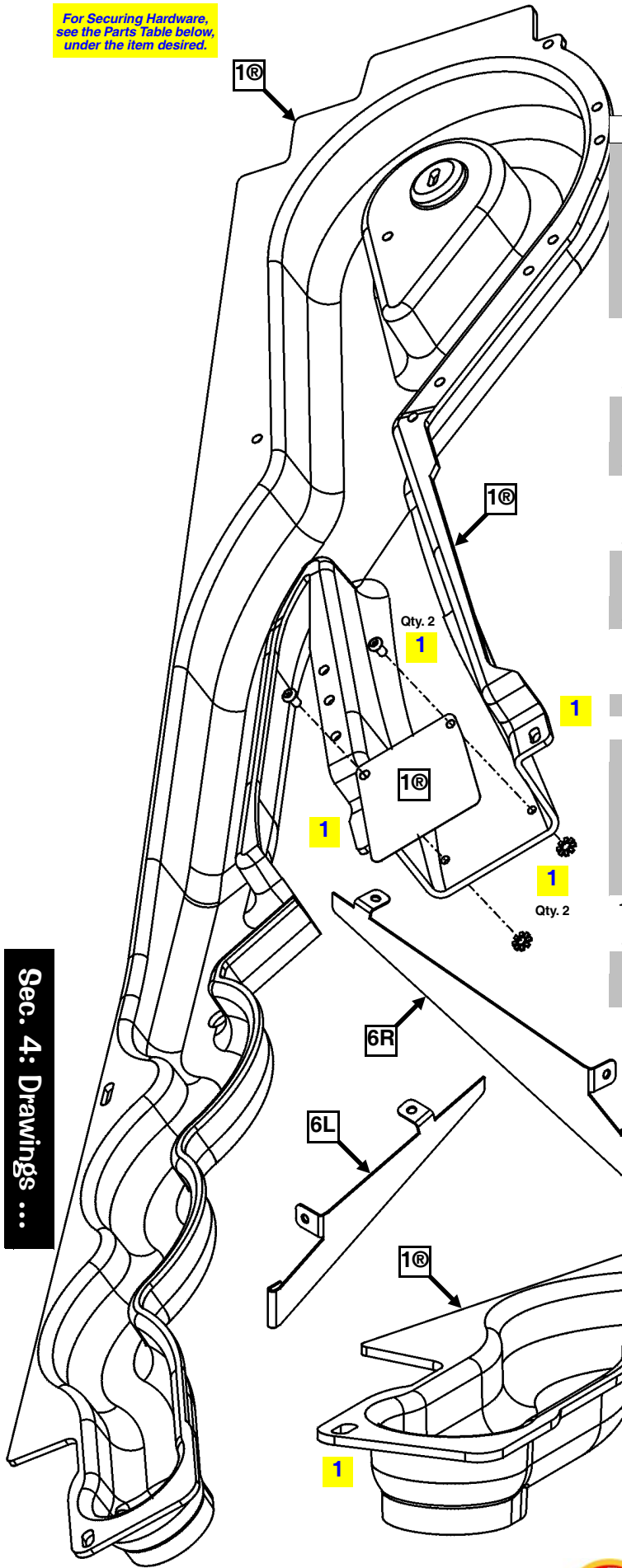




For Securing Hardware, see the Parts Table below, under the item desired.

# Left Plastic Ramp Assembly, Individual Parts Only (Items 1-11) [ Different Views on the next page. ]

Sec. 4: Drawings ...



| Nr.  | RAMP PARTS                               | QTY. | SPI PART Nr. |
|--|--|------|--------------|
| 1 <sup>®</sup>   | Plastic Left Ramp & Flap Asm.            | 1    | 510-5049-00  |
| <i>For Individual Parts Reference : Plastic Left Ramp (No Parts) (545-6296-00), Ramp Flap (535-0048-00), Rivet, 1/8" X 1/4" (Qty. 2) (249-5003-00) and #6 Lock Washer (Qty. 2) (246-5000-00)</i>   |  |      |              |
| <b>Item 1 is secured above the playfield @ Exit Left Slingshot Plastic, Left Side on Ramp Mounting Bracket (515-6508-00) and @ Entrance Left by: #6-32 X 3/8" PPH Sems (Zinc) (Qty. 3) (232-5201-00) &amp; #6 Washer (Qty. 3) (242-5001-00) onto Hex Spacer, 1-1/8" X 1/4" #6-32 Tap (Qty. 3) (254-5008-17).</b> |  |      |              |
| <b>Item 1 is secured above the playfield @ Entrance Right by: #6-32 X 3/8" PPH Sems (Zinc) (Qty. 1) (232-5201-00) onto Post [Hex Base] #6-32 Tap // #10-32 Thread (Qty. 1) (530-5331-01); Post requires Bumper BLACK Post Sleeve (Tall) (Qty. 1) (545-5308-00)</b>   |  |      |              |
| 2  | Bracket, (Entrance)/Exit Gate            | 1    | 535-7756-02  |
|  | Wire Form (.75" Bot. for above Gate)     | 1    | 535-7755-01  |
| <b>Item 2 is secured to Item 1 by: #6-32 X 1/2" PPH Sems (Zinc) (Qty. 2) (232-5202-00) and #6-32 Nylon Stop Nut (Qty. 2) (240-5005-00)</b>   |  |      |              |
| 3  | Bracket, Entrance/(Exit) Gate            | 1    | 535-7756-02  |
|  | Wire Form (.63" Bot. for above Gate)     | 1    | 535-7755-02  |
| <b>Item 3 is secured to Item 1 by: #6-32 X 1/2" PPH Sems (Zinc) (Qty. 2) (232-5202-00) and #6-32 Nylon Stop Nut (Qty. 2) (240-5005-00)</b>   |  |      |              |
| 4  | Switch (for Entrance Gate)               | 2    | 180-5087-00  |
| Switch has a Diode (1N4004) (112-5003-00). Can be replaced with (1N4001) (112-5001-00).  |  |      |              |
| <b>Item 4 is secured to Items 2 or 3 by: Switch Body Protect Plate (Qty. 1/per) (535-6539-00) and #2-56 X 1/2" Uns. Serr. HWH #4 Head TR3 Black (Qty. 2/per) (237-5937-02)</b>   |  |      |              |
| 5  | Bracket, 1-Way Gate                      | 1    | 535-0049-00  |
|  | Wire Form ("short" for above Gate)       | 1    | 535-0050-00  |
| <b>Item 5 is secured to Item 1 by: #6-32 X 1/2" PPH Sems (Zinc) (Qty. 2) (232-5202-00) and #6-32 Nylon Stop Nut (Qty. 2) (240-5005-00) (ASM. REF.511-5074-00)</b>  |  |      |              |
| 6L   | Bracket, Ramp Entr. Protector Left       | 1    | 535-0070-00  |
| 6R   | Bracket, Ramp Entr. Protector Right      | 1    | 535-0070-01  |
| <b>Items 6L/6R are secured to Item 1 by: #6 X 1/2" PTH A (Zinc) (Qty. 2/per) (237-5809-00)</b>   |  |      |              |
| 7  | Spacer (Gray), 5/8" X 3/8"               | 1    | 254-5000-14  |
| 8  | Spacer (Gray), 3/8" X 3/8"               | 3    | 254-5000-12  |
| 9 <sup>®</sup>   | Kit: Plastics (incl. -57/-58 & -23 Scr.) | 1    | 803-5000-98  |
| <i>Note: Individual Plastics (830-6066-XX, 830-6078-XX &amp; 830-6081-25) are not available individually, ordering of kit is required. See Page 51 for details.</i>  |  |      |              |
| <b>Item 9<sup>®</sup> Plastic -57 is secured to Item 1 by: #6-32 X 1-1/4" PPH MS Ext. Sems (Zinc) (Qty. 1), Spacer 5/8" X 3/8" (Item 7 above) (254-5000-14), #6-32 X 1/2" PPH Sems (Zinc) (Qty. 2) (232-5202-00), #6 Washer (Qty. 3) (242-5001-00) and #6-32 Nylon Stop Nut (Qty. 3) (240-5005-00)</b>           |  |      |              |
| <b>Item 9 Plastic -58 is secured to Item 1 by: Spacer 3/8" X 3/8" (Item 8 above) (254-5000-12), #6-32 X 7/8" PPH Sems (Zinc) (Qty. 3) (232-5205-00), #6 Washer (Qty. 3) (242-5001-00) and #6-32 Nylon Stop Nut (Qty. 3) (240-5005-00)</b>  |  |      |              |
| 10 <sup>®</sup>  | Bracket, 90° Plastic Mounting            | 1    | 535-0106-00  |
| <b>Item 10<sup>®</sup> is secured to Item 9<sup>®</sup> (-23) front by: Rivet, 1/8" X 3/16" (Qty. 1) (249-5001-00) and is secured to Item 9<sup>®</sup> (-57) by: Rivet, 1/8" X 3/16" (Qty. 2) (249-5001-00)</b>   |  |      |              |
| 11   | Kit: Decals (includes -50)               | 1    | 802-5000-98  |
| <i>Note: Individual Decals (820-6396-XX &amp; 820-6416-XX) are not available individually, ordering of kit is required.</i>  |  |      |              |
| (ASM. REF. 500-7084-00, Items 1-11, which will include all game plastics & decals)   |  |      |              |





# Left Plastic Ramp Assembly, Individual Parts Only (Items 1-11) Continued

[ Different Views and Parts Table on the previous page. ]

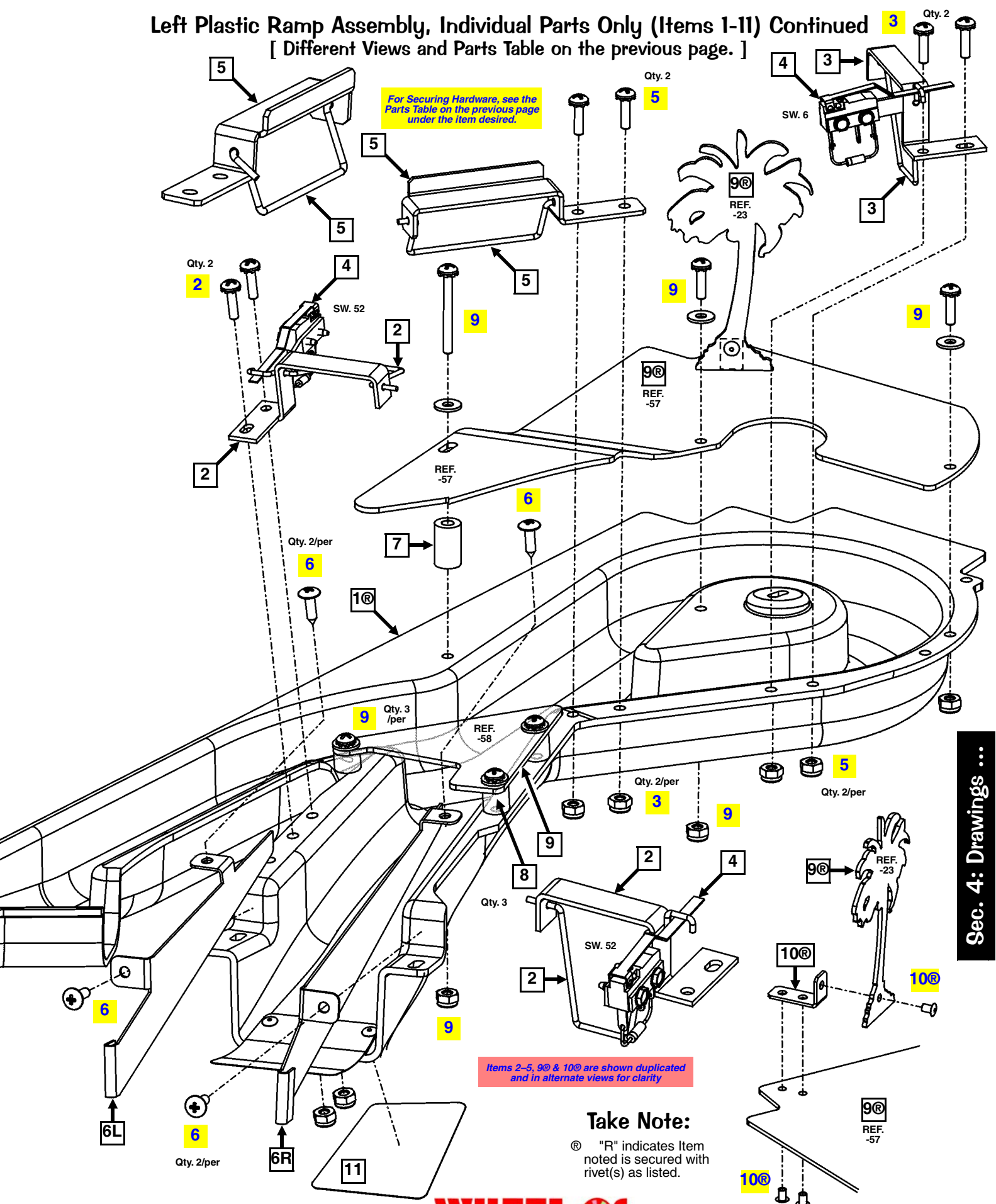
For Securing Hardware, see the Parts Table on the previous page under the item desired.

Items 2-5, 9® & 10® are shown duplicated and in alternate views for clarity

### Take Note:

® "R" indicates Item noted is secured with rivet(s) as listed.

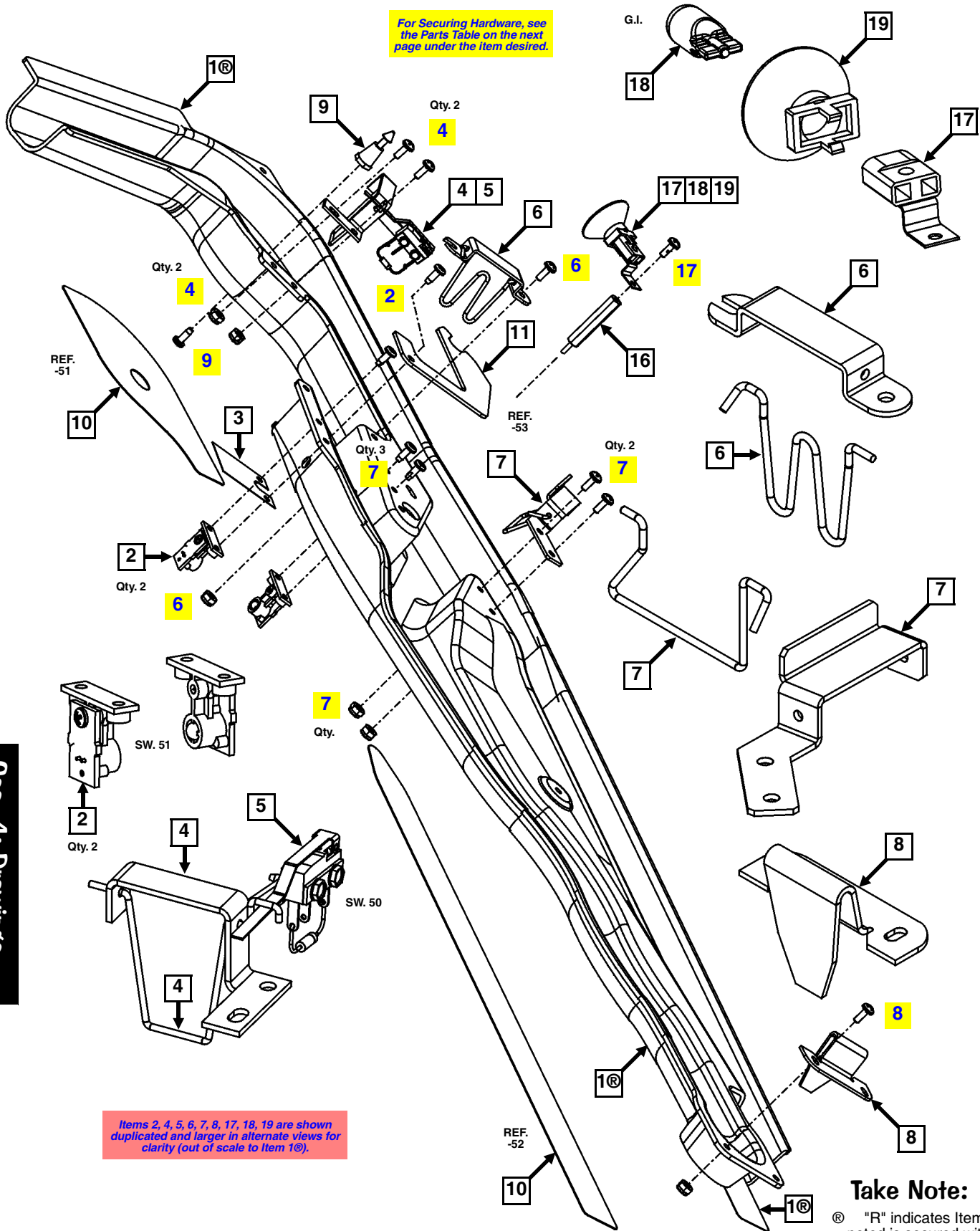
Sec. 4: Drawings ...



# Right Plastic Ramp Assembly, Individual Parts Only (Items 1-19)

[ Different Views and Parts Table on the next page. ]

For Securing Hardware, see the Parts Table on the next page under the item desired.

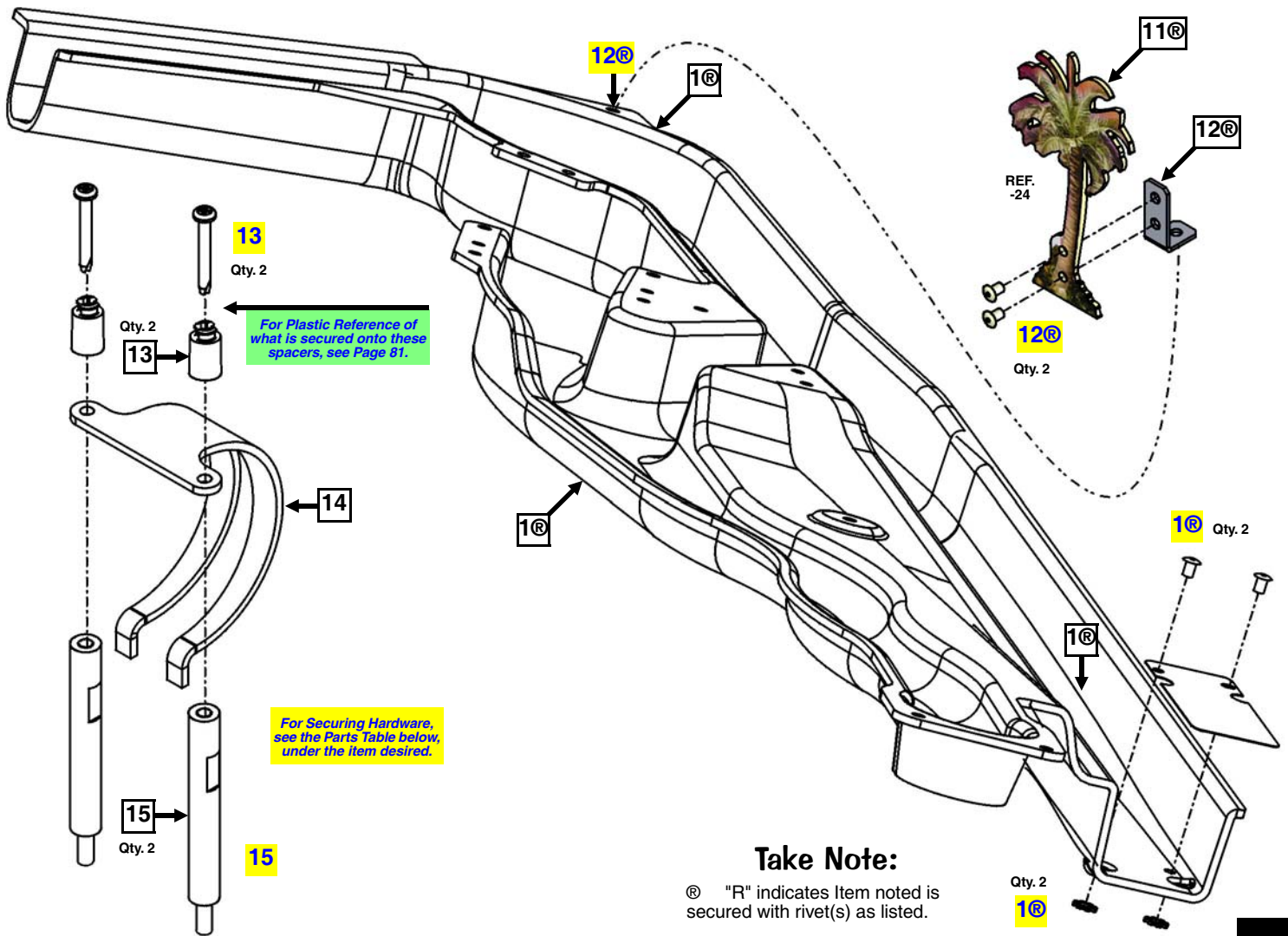


Sec. 4: Drawings ...



# Right Plastic Ramp Assembly, Individual Parts Only (Items 1-19) Continued

[ Exploded View of entire Assembly on the previous page. ]



### Take Note:

® "R" indicates Item noted is secured with rivet(s) as listed.

| Nr.   | RAMP PARTS                       | QTY. | SPI PART Nr. |
|---|----------------------------------|------|--------------|
| 1®  | Plastic Right Ramp & Flap Asm.   | 1    | 510-5052-00  |
| <i>For Individual Parts Reference : Plastic Right Ramp (No Parts) (545-6297-00), Ramp Flap (535-0066-00), Rivet, 1/8" X 3/16" (Qty. 2) (249-5001-00) and #6 Lock Washer (Qty. 2) (246-5000-00)</i>  |                                  |      |              |
| <i>Item 1 is secured above the playfield @ ramp flap by: #4 X 5/8" PFH Black (Qty. 2) (237-5833-00) and upper right corner (see Item 12®); bottom right exit (see Item 8).</i>  |                                  |      |              |
| 2   | OPTO Trans. PCB Asm. w/15" Leads | 2    | 500-6775-01  |
| <i>Application Note: Pairs required per switch and an OPTO Transceiver Amplifier PCB (520-5239-01). See Section 5, Chapter 4, (Yellow Pages) PCBs, Pages 130 - 131.</i>   |                                  |      |              |
| <i>Item 2 is secured to Item 1 by: #6 X 3/8" PPH Type 25 (Qty. 3) (237-5880-00) and with hole in Clear Plastic -53 side: #6 X 1/2" PPH Type 25 (Qty. 1) (237-5880-02)</i>   |                                  |      |              |
| 3   | OPTO Shield (Fiche Paper)        | 1    | 545-6145-00  |
| 4   | Bracket, Exit Gate               | 1    | 535-7613-02  |
| <i>Item 4 is secured to Item 1 by: #6-32 X 3/8" PPH Sems (Zinc) (Qty. 2) (232-5201-00) and #6-32 Nylon Stop Nut (Qty. 2) (240-5005-00)</i>  |                                  |      |              |
| 5   | Switch (for Exit Gate)           | 1    | 180-5087-00  |
| <i>Switch has a Diode (1N4004) (112-5003-00). Can be replaced with (1N4001) (112-5001-00).</i>  |                                  |      |              |
| <i>Item 5 is secured to Item 4 by: Switch Body Protect Plate (535-6539-00) and #2-56 X 1/2" Uns. Serr. HWH #4 Head TR3 Black (Qty. 2) (237-5937-02)</i>   |                                  |      |              |
| 6   | Bracket, Entrance Gate           | 1    | 535-0074-00  |
| <i>Item 6 is secured to Item 1 by: #6-32 X 3/8" PPH Sems (Zinc) (Qty. 2) (232-5201-00), on right side: #6-32 Nylon Stop Nut (Qty. 1) (240-5005-00) and on the open left side by: Hex Spacer, 1-1/4" X 1/4" #6-32 Tap (Qty. 1) (254-5008-11)</i> |                                  |      |              |
| 7   | Bracket, Gate                    | 1    | 535-9943-00  |
| <i>Item 7 is secured to Item 1 by: #6-32 X 3/8" PPH Sems (Zinc) (Qty. 2) (232-5201-00) and #6-32 Nylon Stop Nut (Qty. 2) (240-5005-00)</i>  |                                  |      |              |

| Nr.   | RAMP PARTS                                | QTY. | SPI PART Nr. |
|---|---|------|--------------|
| 8   | Bracket, Bumper Ball Stop (@ Exit)        | 1    | 535-0047-00  |
| <i>Item 8 is secured to Item 1 by: #6-32 X 3/8" PPH Sems (Zinc) (Qty. 2) (232-5201-00), on the left side by: #6-32 Nylon Stop Nut (Qty. 1) (240-5005-00) and on the right side by: Hex Spacer, 3/4" X 1/4" #6-32 Tap (Qty. 1) (254-5008-04)</i> |   |      |              |
| 9   | Mini-Jewel Plastic Post (Clear)           | 1    | 550-5052-01  |
| <i>Item 9 is secured to Item 1 by: #6 X 1/2" PTH A (Zinc) (Qty. 1) (237-5809-00)</i>  |   |      |              |
| 10  | Kit: Decals (incl. -13, -14, -51 & -52)   | 1    | 802-5000-98  |
| <i>Note: Individual Decals (820-6396-XX : -13 &amp; -14 PCB Ref. Not Shown &amp; 820-6416-XX : 51 &amp; -52 Ramp Decals) are not available individually, ordering of kit is required.</i>   |   |      |              |
| 11®   | Kit: Plastics (incl. -53 Clr. & -24 Scr.) | 1    | 803-5000-98  |
| <i>Note: Individual Plastics (830-6066-XX, 830-6078-XX &amp; 830-6081-25) are not available individually, ordering of kit is required. See Page 51 for details.</i>   |   |      |              |
| 12®   | Bracket, 90° Plastic Mounting             | 1    | 535-0106-00  |
| <i>Item 12® is secured to Item 11® (-24) front by: Rivet, 1/8" X 3/16" (Qty. 2) (249-5001-00) and is secured to Item 1 by: #6-32 X 3/8" PPH Sems (Zinc) (Qty. 1) (232-5201-00) onto Hex Spacer, 3" X 1/4" #6-32 Tap (Qty. 1) (254-5008-14)</i>  |   |      |              |
| 13  | Plastic Spacer, Plastic Mntg., .5" (Blk.) | 2    | 254-5054-00  |
| 14  | Bracket, Reverse Scoop                    | 1    | 535-0045-00  |
| <i>Item 14 is secured onto Item 15 @ top through Item 13 by: #8-32 X 1" PPH MS (Zinc) (Qty. 1/per) (237-5606-00). For 3D View of plastics (Not Shown Above), see Page 81.</i>   |   |      |              |
| 15  | Post, Reverse Scoop Support               | 2    | 530-6525-00  |
| <i>Item 15 is secured above the playfield by: #10-32 X 5/16" 3-Prong T-Nut (Qty. 1/per) (240-5204-00)</i>   |   |      |              |
| 16  | Hex Spacer, 1-1/2" X 1/4" #6-32 MF        | 1    | 254-5049-09  |
| 17  | Wedge Base Socket (Offset)                | 1    | 077-5029-00  |
| <i>Item 17 is secured to Item 16 by: #6-32 X 3/8" PPH Sems (Zinc) (Qty. 1) (232-5201-00)</i>  |   |      |              |
| 18  | #555 Wedge Base Bulb                      | 1    | 165-5002-00  |
| 19  | Light Reflector (Silver Plastic)          | 1    | 545-5409-01  |
| <i>(ASM. REF. 511-5071-00, Items 1-10 and Item 11's -53 REF. ONLY)</i>  |   |      |              |

Sec. 4: Drawings ...

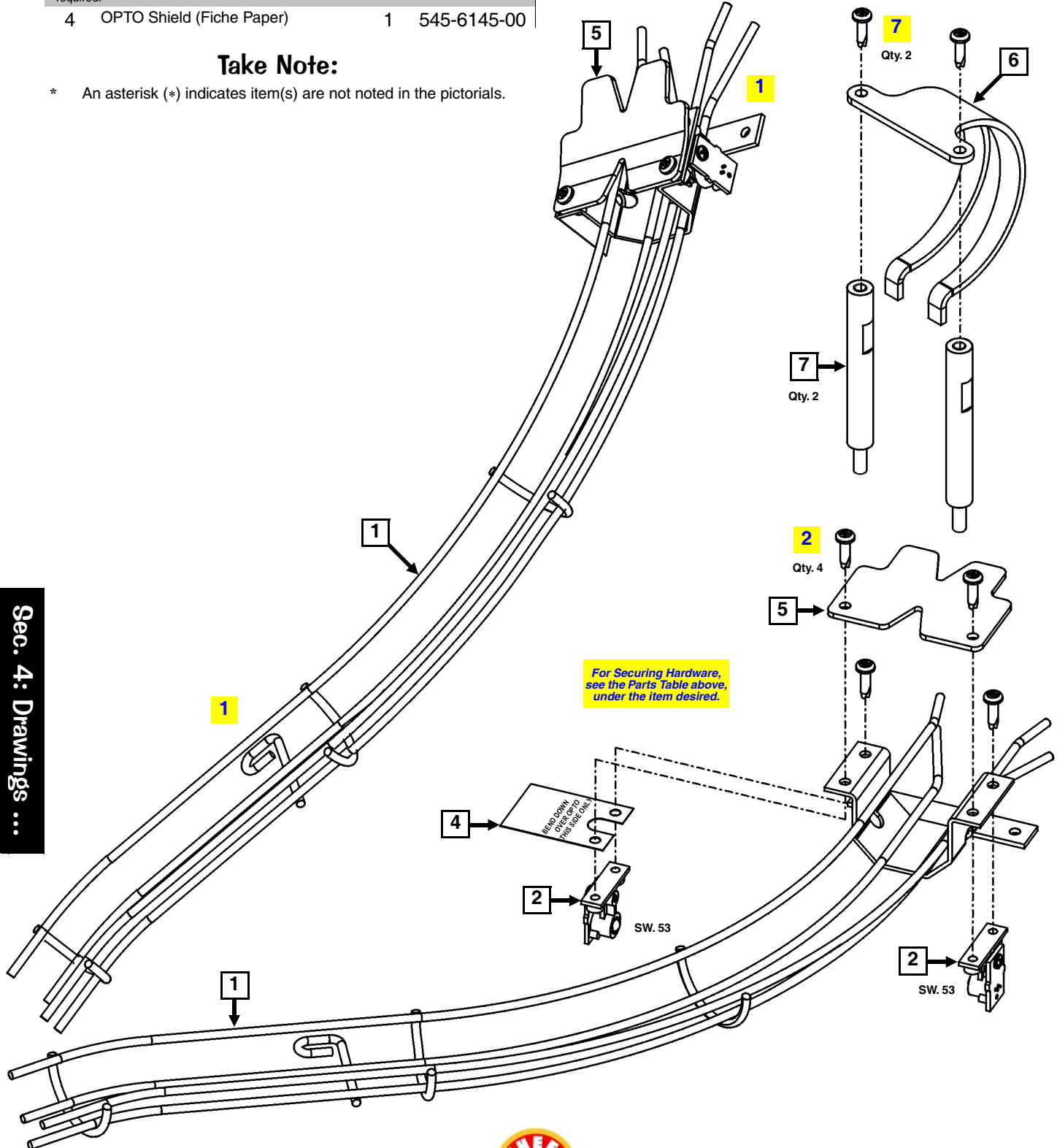


# Reverse Scoop Bracket & Wire Ramp Assembly, Individual Parts Only (Items 1-7)

| Nr.   | RAMP PARTS  | QTY. | SPI PART Nr. | Nr.   | RAMP PARTS                             | QTY. | SPI PART Nr.       |
|---|---|------|--------------|---|--|------|--------------------|
| 1   | Wire Ramp (No Parts)                              | 1    | 515-7657-00  | 5   | <b>Kit: Plastics (incl. -59 Clear)</b> | 1    | <b>803-5000-98</b> |
| Item 1 is secured above the playfield @ entrance by: #6-32 X 3/8" PPH Sems (Zinc) (Qty. 2) (232-5201-00) and @ exit by: #6-32 X 1/2" PPH Sems (Zinc) (Qty. 1) (232-5202-00) and #10 Washer (Qty. 1) (242-5010-00)                                 |   |      |              | Note: Individual Plastics (830-6066-XX, 830-6078-XX & 830-6081-25) are not available individually, ordering of kit is required. See Page 51 for details.<br>Items 4 & 5 are secured to Item 1 by: Uses same hardware for Item 2, see drawing. |  |      |                    |
| 2   | OPTO Trans. PCB Asm. w/15" Leads                  | 2    | 500-6775-01  | 6   | Bracket, Reverse Scoop                 | 1    | 535-0045-00        |
| Application Note: Pairs required per switch and an OPTO Transceiver Amplifier PCB (520-5239-01). See Section 5, Chapter 4, (Yellow Pages) PCBs, Pages 130 - 131.<br>Item 2 is secured to Item 1 by: #6 X 1/2" PPH T-25 (Qty. 2/per) (237-5880-02) |   |      |              | Item 6 is secured onto Item 7 @ top by: #8-32 X 3/8" PPH MS Ext. Sems (Zinc) (Qty. 1/per) (232-5301-00)   |  |      |                    |
| 3*  | <b>Kit: Decals (incl. Ref. PCB -15 &amp; -16)</b> | 1    | 802-5000-98  | 7   | Post, Reverse Scoop Support            | 2    | 530-6525-00        |
| Note: Individual Decals (820-6396-XX) are not available individually, ordering of kit is required.  |   |      |              | Item 7 is secured above the playfield by: #10-32 X 5/16" 3-Prong T-Nut (Qty. 1/per) (240-5204-00)   |  |      |                    |
| 4   | OPTO Shield (Fiche Paper)                         | 1    | 545-6145-00  |   |  |      |                    |

## Take Note:

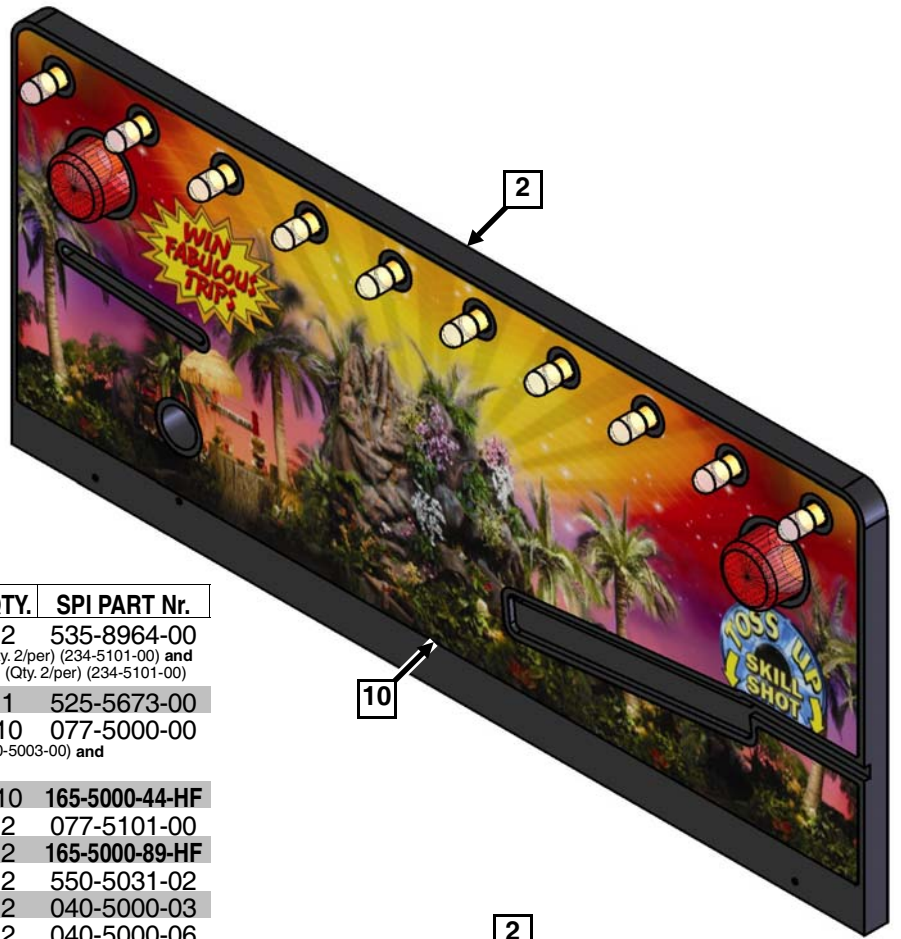
\* An asterisk (\*) indicates item(s) are not noted in the pictorials.



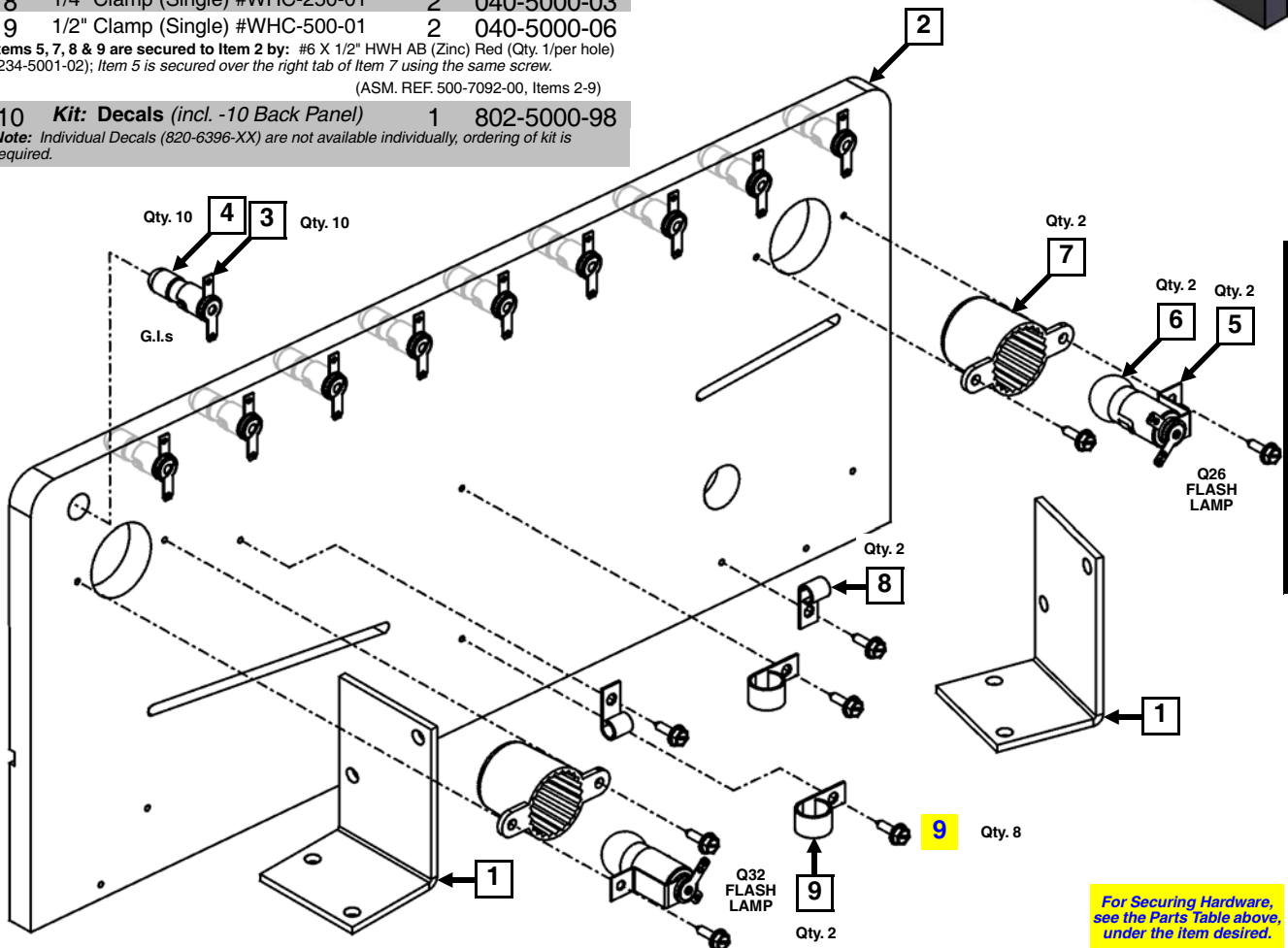
Sec. 4: Drawings ...



# Back Panel Assembly, Individual Parts Only (Items 1-10)



| Nr.   | BACK PANEL PARTS                   | QTY. | SPI PART Nr.   |
|---|------------------------------------|------|----------------|
| 1   | Bracket, Back Panel Mounting       | 2    | 535-8964-00    |
| Item 1 is secured to Item 2 by: #8 X 1/2" SHWH AB (Zinc) (Qty. 2/per) (234-5101-00) and is secured below the playfield by: #8 X 1/2" SHWH AB (Zinc) (Qty. 2/per) (234-5101-00)                                      |                                    |      |                |
| 2   | Back Panel Black Wood (No Parts)   | 1    | 525-5673-00    |
| 3   | 2-Lug Staple Down Socket (#44)     | 10   | 077-5000-00    |
| Item 3 is secured to Item 2 by: Braided Wire (Qty. 3 Feet) (600-5003-00) and Staples (Qty. 2/per) (631-5000-00)   |                                    |      |                |
| 4   | #44 Bulb (Clear) Heavy Filament    | 10   | 165-5000-44-HF |
| 5   | 2-Lug Stand-Up Short Socket (#89)  | 2    | 077-5101-00    |
| 6   | #89 Bulb (Clear) Heavy Filament    | 2    | 165-5000-89-HF |
| 7   | Light Cover w/ tabs (Red)          | 2    | 550-5031-02    |
| 8   | 1/4" Clamp (Single) #WHC-250-01    | 2    | 040-5000-03    |
| 9   | 1/2" Clamp (Single) #WHC-500-01    | 2    | 040-5000-06    |
| Items 5, 7, 8 & 9 are secured to Item 2 by: #6 X 1/2" HWH AB (Zinc) Red (Qty. 1/per hole) (234-5001-02); Item 5 is secured over the right tab of Item 7 using the same screw.<br>(ASM. REF. 500-7092-00, Items 2-9) |                                    |      |                |
| 10  | Kit: Decals (incl. -10 Back Panel) | 1    | 802-5000-98    |
| Note: Individual Decals (820-6396-XX) are not available individually, ordering of kit is required.  |                                    |      |                |



Sec. 4: Drawings ...

For Securing Hardware, see the Parts Table above, under the item desired.







## Schematics, Wiring &amp; Printed Circuit Boards

Table of Contents  
for Section 5

|   |                  |
|---|------------------|
| <b>Chapter 1, Backbox Wiring</b> .....  | <b>90 – 92</b>   |
| ▶ Table of Contents for Section 5.....  | 89               |
| ▶ Coils Detailed Chart Table.....   | 90               |
| ▶ Backbox I/O Power Driver Board Detailed Wiring Diagram.....   | 91               |
| ▶ Backbox Board Layout Wiring Diagram.....  | 92               |
| <b>Chapter 2, Playfield Wiring</b> .....  | <b>93 – 97</b>   |
| ▶ General Illumination Circuit Detailed Wiring Diagram.....   | 93               |
| ▶ Playfield Switch Wiring Diagram.....  | 94               |
| ▶ Playfield Lamp Wiring Diagram.....  | 95               |
| ▶ Playfield Terminal Strips, Fuses & Misc. Wiring Descriptions & Locations.....                                     | 96               |
| ▶ 2-Flipper Circuit Wiring Diagram.....   | 97               |
| <b>Chapter 3, Cabinet and Coin Door Wiring</b> .....  | <b>99 – 102</b>  |
| ▶ Transformer Power Wiring Diagram.....   | 99               |
| ▶ Cabinet Wiring Diagram.....   | 100              |
| ▶ Coin Door Wiring Diagram.....   | 101              |
| ▶ Cabinet Universal Voltage Jumper Plugs (for use with Universal AC Cable, 036-5530-00 ONLY).....                   | 102              |
| <b>Chapter 4, Printed Circuit Boards (PCBs)</b> .....   | <b>103 – 134</b> |
| ▶ Trough Up-Kicker Dual OPTO PCBs (515-0173-00 & 515-0174-00) Theory of Operation & Schematic.....                  | (Top) 103        |
| ▷ Trough Up-Kicker Dual OPTO PCBs (515-0173-00 & 515-0174-00) Component Layout & Parts.....                         | (Bot) 103        |
| ▶ OPTO Troubleshooting.....   | (Top) 104        |
| ▷ Trough Dual OPTO PCBs Alignment / Tests for LED1 & LED2.....  | 104-105          |
| ▶ I/O Power Driver PCB S.A.M. System (520-5249-00) Schematic (Sheet 1 of 4).....                                    | 106-107          |
| ▶ I/O Power Driver PCB S.A.M. System (520-5249-00) Schematic (Sheet 2 of 4).....                                    | 108-109          |
| ▶ I/O Power Driver PCB S.A.M. System (520-5249-00) Schematic (Sheet 3 of 4).....                                    | 110-111          |
| ▶ I/O Power Driver PCB S.A.M. System (520-5249-00) Schematic (Sheet 4 of 4).....                                    | 112-113          |
| ▷ I/O Power Driver PCB S.A.M. System (520-5249-00) Component Layout.....  | 114              |
| ▷ I/O Power Driver PCB S.A.M. System (520-5249-00) Parts.....   | 115              |
| ▶ CPU / Sound PCB S.A.M. System (520-5246-00) Schematic (Sheet 1 of 5).....   | 116-117          |
| ▶ CPU / Sound PCB S.A.M. System (520-5246-00) Schematic (Sheet 2 of 5).....   | 118-119          |
| ▶ CPU / Sound PCB S.A.M. System (520-5246-00) Schematic (Sheet 3 of 5).....   | 120-121          |
| ▶ CPU / Sound PCB S.A.M. System (520-5246-00) Schematic (Sheet 4 of 5).....   | 122-123          |
| ▶ CPU / Sound PCB S.A.M. System (520-5246-00) Schematic (Sheet 5 of 5).....   | 124-125          |
| ▷ CPU / Sound PCB S.A.M. System (520-5246-00) Component Layout.....   | 126              |
| ▷ CPU / Sound PCB S.A.M. System (520-5246-00) Parts.....  | 126-127          |
| ▶ Display Power Supply PCB (520-5138-00) Schematic.....   | 128              |
| ▷ Display Power Supply PCB (520-5138-00) Component Layout & Parts.....  | 128              |
| ▶ In-Line OPTO PCB (520-5255-00) for 1-Bank Drop Target Module (515-7565-00) Schematic.....                         | (Top) 129        |
| ▷ In-Line OPTO PCB (520-5255-00) Component Layout & Parts.....  | (Bot) 129        |
| ▶ Playfield Switches OPTO Transceiver PCBs (500-6755-00) Schematic.....   | (Top) 130        |
| ▶ Playfield OPTO Transmitter / Receiver Amplifier PCB (520-5239-01) Schematic.....                                  | (Bot) 130        |
| ▷ Playfield OPTO Transmitter / Receiver Amplifier PCB (520-5239-01-ASY) Component Layout & Parts.....               | (Top) 131        |
| ▷ Playfield OPTO Transmitter / Receiver Amplifier PCB (520-5239-01) Wiring.....                                     | (Bot) 131        |
| ▷ Playfield OPTO Transmitter / Receiver Amplifier PCB (520-5239-01) Wiring & Locations.....                         | 131              |
| ▶ Wheel LED & OPTO PCB (520-5283-00) Schematic & Wiring.....  | 132-133          |
| ▷ Wheel LED & OPTO PCB (520-5283-00) Component Layout & Parts.....  | 134-135          |
| ▶ Playfield Mini-Dot Display (5X7) X5 PCB (520-5274-00) Schematic.....  | 136              |
| ▷ Playfield Mini-Dot Display (5X7) X5 PCB (520-5274-00) Component Layout & Parts.....                               | 137              |
| ▶ Auxiliary (3X Transistor) Driver PCB (in Backbox) with the Coin/Ticket Meter and Ticket Disp. Wiring Diagram..... | 138              |
| ▶ Auxiliary (3X Transistor) Driver PCB Schematic.....   | (Top) 139        |
| ▷ Auxiliary (3X Transistor) Driver PCB Component Layout.....  | (Bot) 139        |
| ▶ Blank.....  | 140              |

Use the below **Coils Detailed Chart Table** in conjunction with **Sec. 5, Chp. 1, Backbox I/O Power Driver Board Detailed Wiring Diagram (I/O Board Connectors J6, J7, J8 & J9) and Backbox Board Layout Wiring Diagram:**

| High Current Coils Group 1 |                           | Drive Transistor | Driver Output PCB          | Power Line Color     | Power Line Connection | Power Voltage | Drive Transistor Control Line Color | D.T. Control Line Connect | Coil GA-Turn or Bulb Type             |
|----------------------------|---------------------------|------------------|----------------------------|----------------------|-----------------------|---------------|-------------------------------------|---------------------------|---------------------------------------|
| #1                         | TROUGH UP-KICKER          | Q1               | ▲<br>I/O Power Driver<br>▼ | YEL-VIO              | J10-P9/10             | 50VDC         | BRN-BLK                             | J8-P1                     | 26-1200 ∪<br>090-5044-ND              |
| #2                         | AUTO LAUNCH               | Q2               |                            | YEL-VIO              | J10-P9/10             | 50VDC         | BRN-RED                             | J8-P3                     | 24-940 ∪<br>090-5036-ND               |
| #3                         | NOT USED                  | Q3               |                            | BRN-ORG              |                       |               |                                     | J8-P4                     |                                       |
| #4                         | STEPPER MOTOR (#1)        | Q4               |                            | YEL & WHT to GRY-RED | J16-P3                | 12VDC         | >>RED<< to BRN-YEL                  | J8-P5                     | Stepper Motor with wiring 511-5072-00 |
| #5                         | STEPPER MOTOR (#2)        | Q5               |                            | YEL & WHT to GRY-RED | J16-P3                | 12VDC         | >>BLUE<< to BRN-GRN                 | J8-P6                     |                                       |
| #6                         | STEPPER MOTOR (#3)        | Q6               |                            | YEL & WHT to GRY-RED | J16-P3                | 12VDC         | >>GREEN<< to BRN-BLU                | J8-P7                     | Reference Only: 041-5105-00           |
| #7                         | STEPPER MOTOR (#4)        | Q7               |                            | YEL & WHT to GRY-RED | J16-P3                | 12VDC         | >>BLACK<< to BRN-VIO                | J8-P8                     |                                       |
| #8                         | IN-LINE DROP TARGET RESET | Q8               |                            | YEL-VIO              | J10-P9/10             | 50VDC         | BRN-GRY                             | J8-P9                     | 24-940 ∪<br>090-5036-ND               |

**STEPPER MOTOR TEST IN DIAGNOSTICS: GAME-SPECIFIC TESTS: WHEEL MOTOR TEST (see Page 17)**

| High Current Coils Group 2 |                              | Drive Transistor | Driver Output PCB          | Power Line Color        | Power Line Connection | Power Voltage | Drive Transistor Control Line Color | D.T. Control Line Connect | Coil GA-Turn or Bulb Type  |
|----------------------------|------------------------------|------------------|----------------------------|-------------------------|-----------------------|---------------|-------------------------------------|---------------------------|----------------------------|
| #9                         | LEFT POP BUMPER              | Q9               | ▲<br>I/O Power Driver<br>▼ | YEL-VIO                 | J10-P9/10             | 50VDC         | BLU-BRN                             | J9-P1                     | 26-1200 ∪<br>090-5044-ND   |
| #10                        | RIGHT POP BUMPER             | Q10              |                            | YEL-VIO                 | J10-P9/10             | 50VDC         | BLU-RED                             | J9-P2                     | 26-1200 ∪<br>090-5044-ND   |
| #11                        | CENTER POP BUMPER            | Q11              |                            | YEL-VIO                 | J10-P9/10             | 50VDC         | BLU-ORG                             | J9-P4                     | 26-1200 ∪<br>090-5044-ND   |
| #12                        | RED CONTESTANT JUMP (LONNIE) | Q12              |                            | BROWN                   | J7-P1                 | 20VDC         | BLU-YEL                             | J9-P5                     | 27-950 ∪<br>090-5046-01-ND |
| #13                        | YEL. CONTESTANT JUMP (MARIA) | Q13              |                            | BROWN                   | J7-P1                 | 20VDC         | BLU-GRN                             | J9-P6                     | 27-950 ∪<br>090-5046-01-ND |
| #14                        | BLUE CONTESTANT JUMP (KEITH) | Q14              |                            | BROWN                   | J7-P1                 | 20VDC         | BLU-BLK                             | J9-P7                     | 27-950 ∪<br>090-5046-01-ND |
| #15                        | LEFT FLIPPER (50v RED/YEL)   | Q15              |                            | GRY-YEL-3A Fuse-RED-YEL | J10-P6/7              | 50VDC         | ORG-GRY                             | J9-P8                     | 22-900 ∪<br>090-5020-30-ND |
| #16                        | RIGHT FLIPPER (50v RED/YEL)  | Q16              |                            | BLU-YEL-3A Fuse-RED-YEL | J10-P6/7              | 50VDC         | ORG-VIO                             | J9-P9                     | 22-900 ∪<br>090-5020-30-ND |

| Low Current Coils Group 1 |                            | Drive Transistor | Driver Output PCB          | Power Line Color | Power Line Connection | Power Voltage | Drive Transistor Control Line Color | D.T. Control Line Connect | Coil GA-Turn or Bulb Type |
|---------------------------|----------------------------|------------------|----------------------------|------------------|-----------------------|---------------|-------------------------------------|---------------------------|---------------------------|
| #17                       | LEFT SLINGSHOT             | Q17              | ▲<br>I/O Power Driver<br>▼ | BROWN            | J7-P1                 | 20VDC         | VIO-BRN                             | J7-P2                     | 23-800 ∪<br>090-5001-ND   |
| #18                       | RIGHT SLINGSHOT            | Q18              |                            | BROWN            | J7-P1                 | 20VDC         | VIO-RED                             | J7-P3                     | 23-800 ∪<br>090-5001-ND   |
| #19                       | FLASHER: CONTESTANT 1      | Q19              |                            | ORANGE           | J6-P10                | 20VDC         | VIO-ORG                             | J7-P4                     | #89 Bulb 165-5000-89      |
| #20                       | FLASHER: CONTESTANT 2      | Q20              |                            | ORANGE           | J6-P10                | 20VDC         | VIO-WHT                             | J7-P6                     | #89 Bulb 165-5000-89      |
| #21                       | FLASHER: CONTESTANT 3      | Q21              |                            | ORANGE           | J6-P10                | 20VDC         | VIO-GRN                             | J7-P7                     | #89 Bulb 165-5000-89      |
| #22                       | MINI-RAMP DOWN-POST        | Q22              |                            | BROWN            | J7-P1                 | 20VDC         | VIO-BLU                             | J7-P8                     | 26-1200 ∪<br>090-5044-ND  |
| #23                       | LEFT RAMP UP-POST          | Q23              |                            | BROWN            | J7-P1                 | 20VDC         | VIO-BLK                             | J7-P9                     | 26-1200 ∪<br>090-5044-ND  |
| #24                       | OPTIONAL (e.g. COIN METER) | Q24              |                            | RED              | J16-P4>8              | 5VDC          | VIO-GRY                             | J7-P10                    | Optional 5VDC             |

∪ Coil Note: ∪ -ND means 'No Diode'. -00B or -00T can be used for coil replacements, but the diode must be removed. Call for more info.

| Low Current Coils Group 2 |                          | Drive Transistor | Driver Output PCB          | Power Line Color | Power Line Connection | Power Voltage | Drive Transistor Control Line Color | D.T. Control Line Connect | Coil GA-Turn or Bulb Type      |
|---------------------------|--------------------------|------------------|----------------------------|------------------|-----------------------|---------------|-------------------------------------|---------------------------|--------------------------------|
| #25                       | FLASHER: WHEEL (X4)      | Q25              | ▲<br>I/O Power Driver<br>▼ | ORANGE           | J6-P10                | 20VDC         | BLK-BRN                             | J6-P1                     | Super Brt. LED Line 25, Pg 141 |
| #26                       | FLASHER: BACKPANEL LEFT  | Q26              |                            | ORANGE           | J6-P10                | 20VDC         | BLK-RED                             | J6-P2                     | #89 Bulb 165-5000-89           |
| #27                       | FLASHER: MID LEFT        | Q27              |                            | ORANGE           | J6-P10                | 20VDC         | BLK-ORG                             | J6-P3                     | #89 Bulb 165-5000-89           |
| #28                       | FLASHER: UPPER RIGHT     | Q28              |                            | ORANGE           | J6-P10                | 20VDC         | BLK-YEL                             | J6-P4                     | #89 Bulb 165-5000-89           |
| #29                       | FLASHER: MID RIGHT       | Q29              |                            | ORANGE           | J6-P10                | 20VDC         | BLK-GRN                             | J6-P5                     | #89 Bulb 165-5000-89           |
| #30                       | FLASHER: POP BUMPER      | Q30              |                            | ORANGE           | J6-P10                | 20VDC         | BLK-BLU                             | J6-P6                     | #89 Bulb 165-5000-89           |
| #31                       | FLASHER: UPPER LEFT      | Q31              |                            | ORANGE           | J6-P10                | 20VDC         | BLK-VIO                             | J6-P7                     | #89 Bulb 165-5000-89           |
| #32                       | FLASHER: BACKPANEL RIGHT | Q32              |                            | ORANGE           | J6-P10                | 20VDC         | BLK-GRY                             | J6-P8                     | #89 Bulb 165-5000-89           |

Note: In Test Flash Lamps Menu ("Flash" Icon), only Flashers are tested in numeric order. This Game: Q19-Q21 & Q25-Q32

| If Ticket Meter / Dispenser Installed : |                                | Drive Trans. | Driver Output PCB     | Power Line Color | Power Line Connection | Power Voltage              | Drive Transistor Control Line Color | D.T. Control Line Connect | Ticket Meter or Dispenser |
|---|--------------------------------|--------------|-----------------------|------------------|-----------------------|----------------------------|-------------------------------------|---------------------------|---------------------------|
| #33                                     | AUX 1: TICKET ADVANCE (ENABLE) | Q1           | ▲<br>Aux. Driver<br>▼ | RED              | J16-P4>8              | 5VDC<br>1K RES.<br>PULL-UP | WHITE                               | J2-P3                     | Ticket Dispenser          |
| #34                                     | AUX 2: TICKET METER            | Q2           |                       | RED              | J16-P4>8              |                            | BROWN                               | J2-P4                     | Ticket Meter              |
| #35                                     | AUX 3: SWITCHED GROUND         | Q3           |                       | GRY-RED          | J16-P3                | 12VDC                      | BLK-WHT                             | J2-P7                     | Ticket Dispenser          |

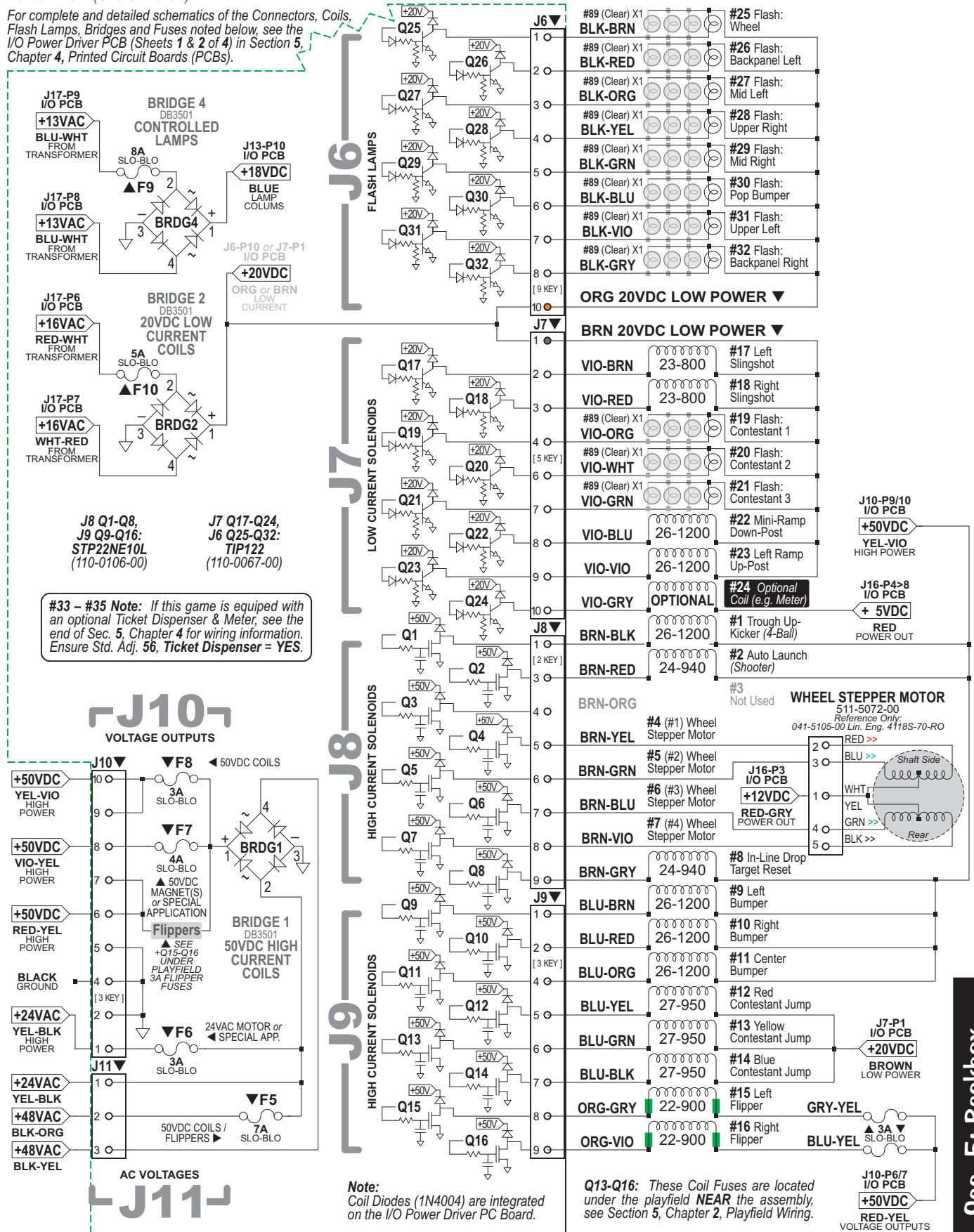
Sec. 5: Schematics...



# Backbox I/O Power Driver Board (Coils Q1-Q32) Detailed Wiring Diagram

Partial View (520-5249-00)

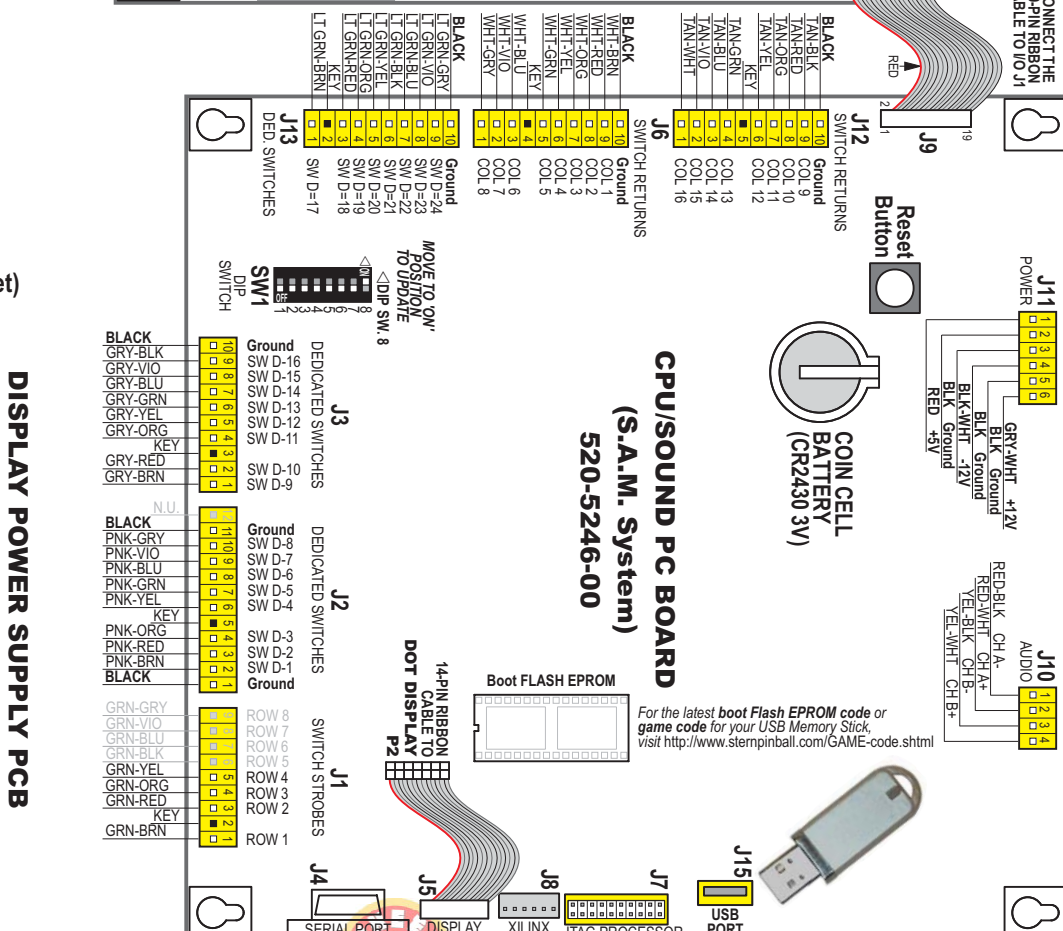
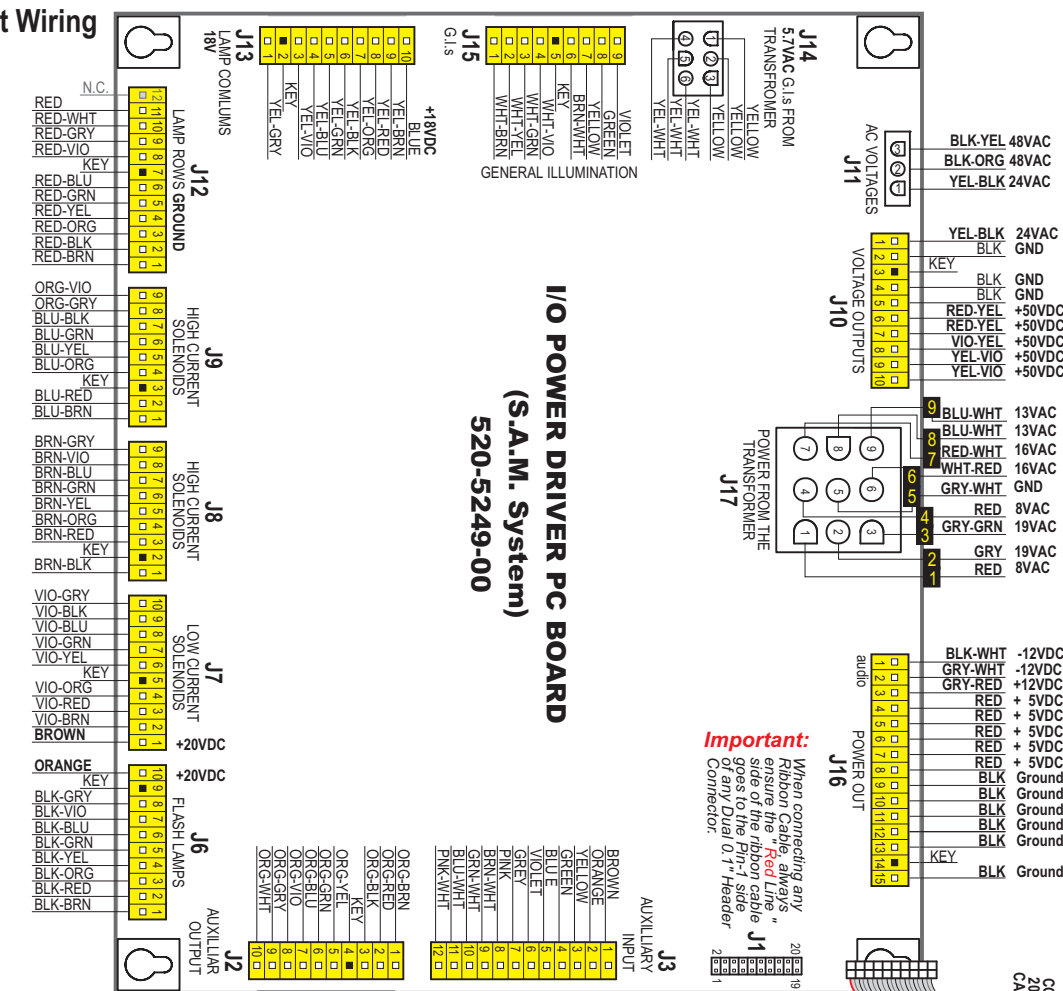
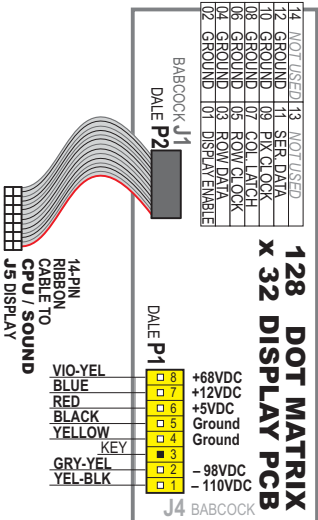
For complete and detailed schematics of the Connectors, Coils, Flash Lamps, Bridges and Fuses noted below, see the I/O Power Driver PCB (Sheets 1 & 2 of 4) in Section 5, Chapter 4, Printed Circuit Boards (PCBs).



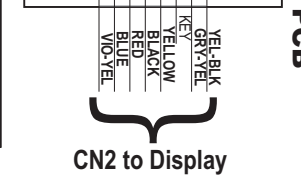
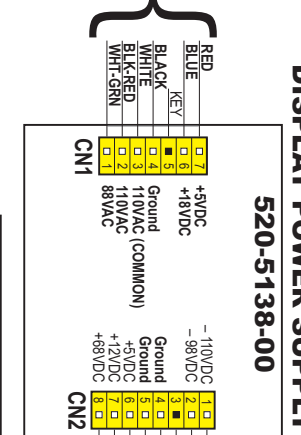


# Backbox Board Layout Wiring Diagram

- 128 X 32 Dot Matrix Display PCB (USA) **520-5052-00**
  - EURO ONLY RoHS Dot Matrix Pin-LED PCB **520-5052-04**
  - EURO ONLY RoHS Dot Matrix Pin-LED Bezel **545-6281-00**
  - Ribbon Cable, 14-Pin (32") **036-5260-32**
  - EURO ONLY RoHS LED Ribbon Cable Filter PCB **520-5299-00**
  - Display Cable (Wiring Harness) **036-5454-01**
  - EURO ONLY RoHS LED Display Adapter Harness **036-5520-00**
- FOR ALL PARTS IN TABLE, SEE SEC. 4, CHP. 1, SPEAKER PANEL PARTS, PG. 45.

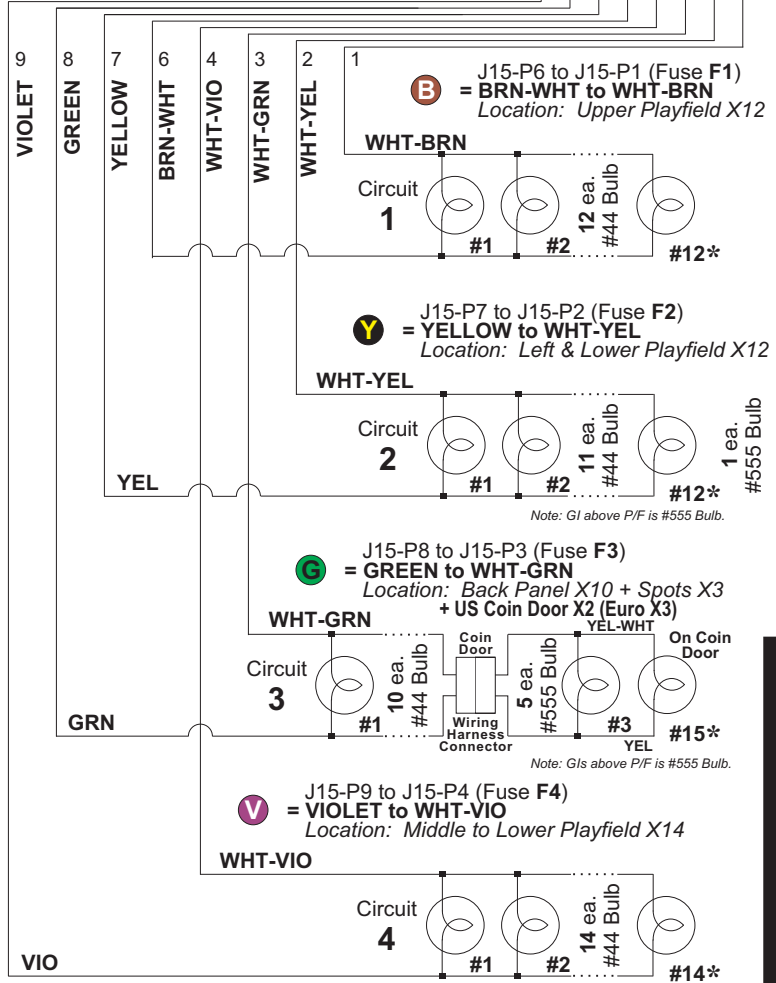
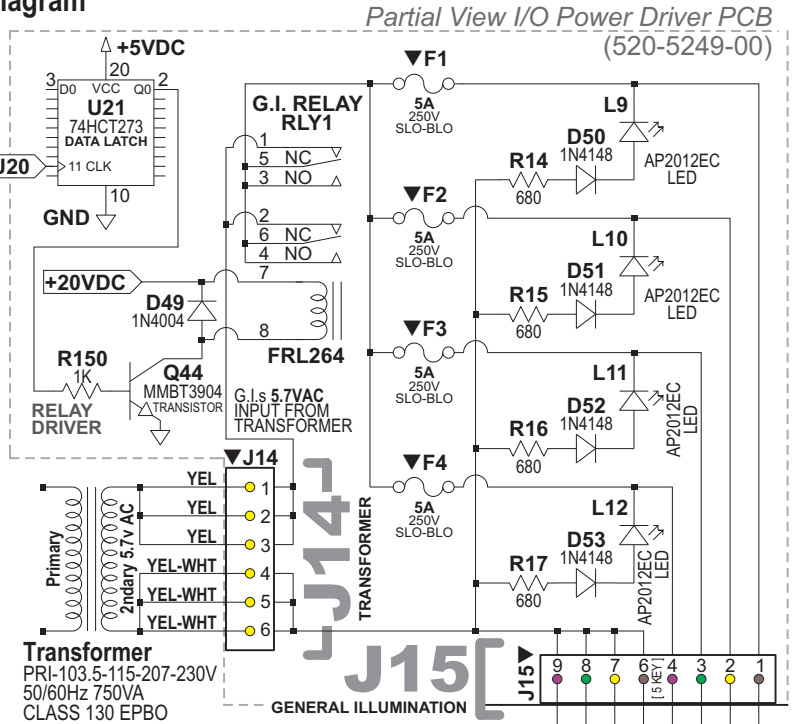
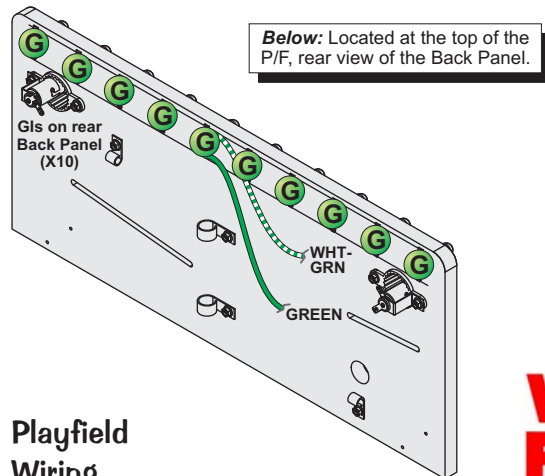
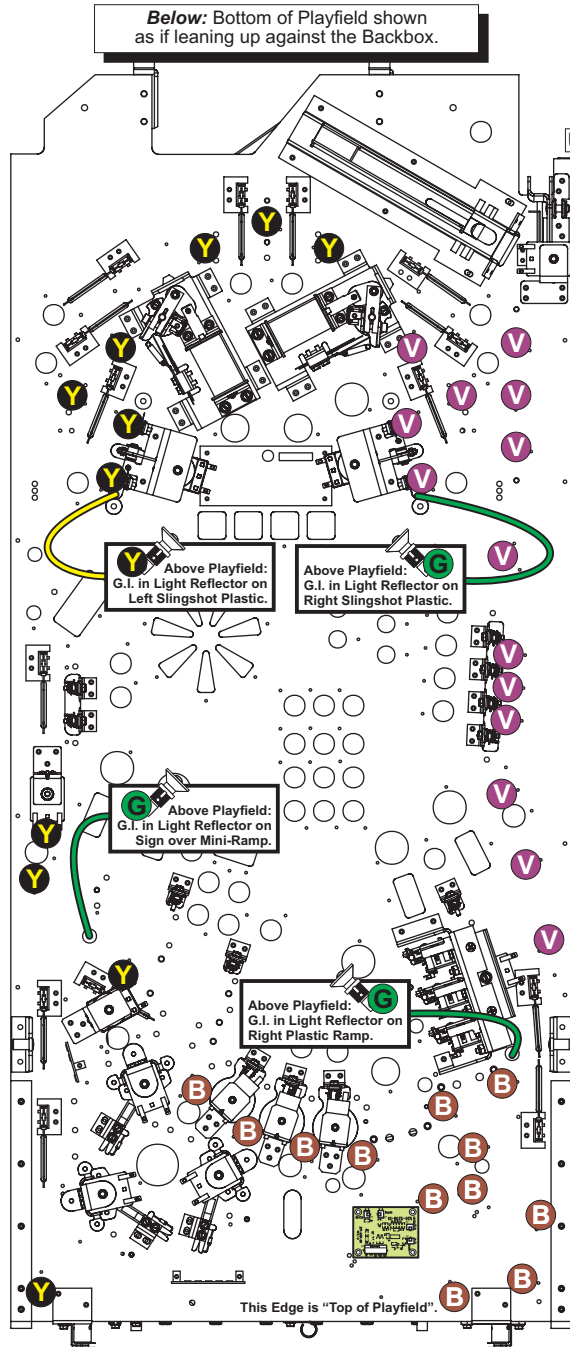


## CN1 to Transformer (Cabinet)



# Playfield Wiring

## General Illumination Circuit Detailed Wiring Diagram



Sec. 5: Playfield ...

# Playfield Switch Wiring Diagram



Please NOTE: Switch & Lamp Descriptions may differ slightly than that of the Dot Display due to space restraints.

For Switch(es)  
**NOV THIS GAME**

**NOTE:** All Switch, Lamp & Coil assemblies require diodes. Some diodes are located under the playfield on Terminal Strips or Diode Boards and not on the assemblies.

B Diode  
 O n Terminal  
 T n Terminal  
 S Strip  
 -/- n Diode  
 B Board

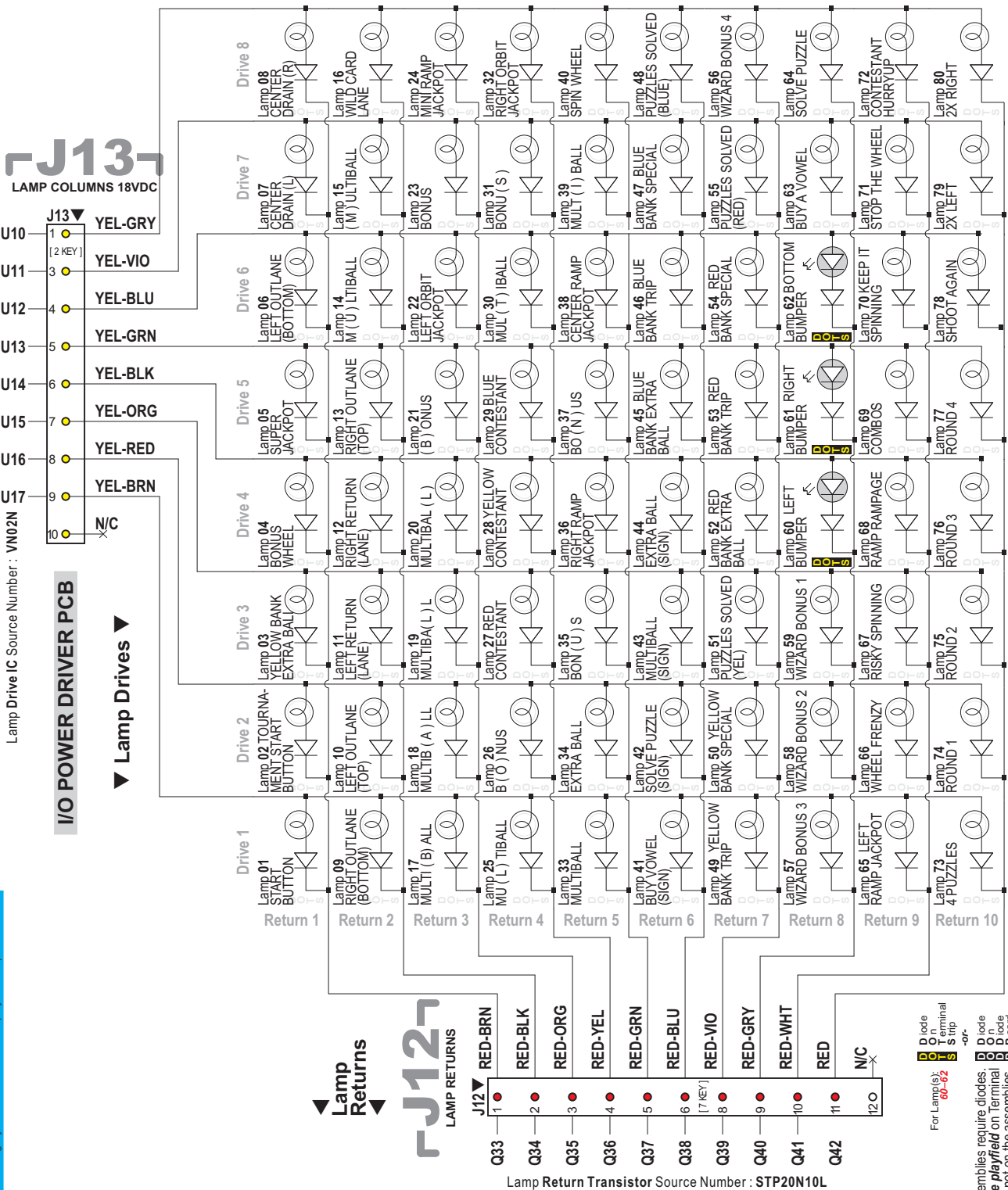
## Sec. 5: Playfield ...





# Playfield Lamp Wiring Diagram

Please NOTE: Switch & Lamp Descriptions may differ slightly than that of the Dot Display due to space restraints.



For Lamp(s):  
 D Diode  
 S Strip  
 B Board  
 N/C No Connection

NOTE: All Switch, Lamp & Coil assemblies require diodes. Some diodes are located under the playfield on Terminal Strips or Diode Boards and not on the assemblies.

## Sec. 5: Playfield ...

# Playfield Terminal Strips, Fuses & Misc. Wiring Descriptions & Locations

Please Note: Terminal Strip(s), Diode Board(s) and/or Fuse Holder(s) locations shown, represent the general location (your game may differ slightly).

Bottom of Playfield shown as if leaning up against the Backbox.

All fuses are rated:  
**3A 250v Slo-Blo**  
Do Not Over-Fuse

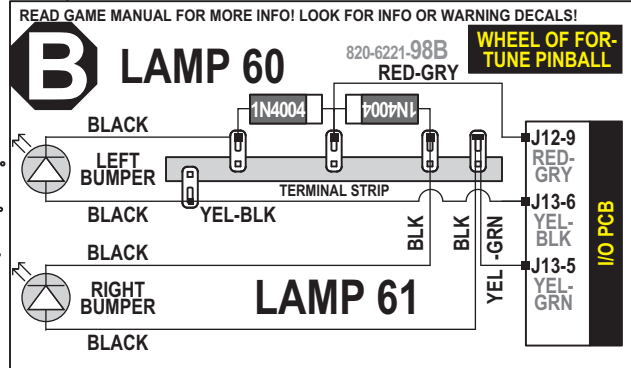
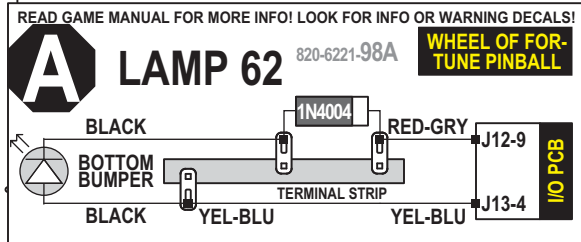
**LOWER LEFT FLIPPER FUSE**  
Rated 3A 250V S.B.  
RED -YEL 3A S.B. GRAY -YEL

**LOWER RIGHT FLIPPER FUSE**  
Rated 3A 250V S.B.  
RED -YEL 3A S.B. BLUE -YEL

## Explanation:

All Switches, Lamps & Coils require diodes. Coil diodes are located on the I/O Power Driver PCB (in Backbox). Some diodes from switches or lamps are moved onto Terminal Strips (**located under the playfield**). This is done where space constraints or excessive vibrations are present. The Switch & Lamp Matrix Grids also note which Switch or Lamp has a diode on a Terminal Strip, noted by **DOTS** (Diode On Terminal Strip).

**Note:** Some wires 'appear' to be doubled on the lugs. The switches and lamps are in a series, so you may see 1 or 2 wires depending where the switch or lamp is in the

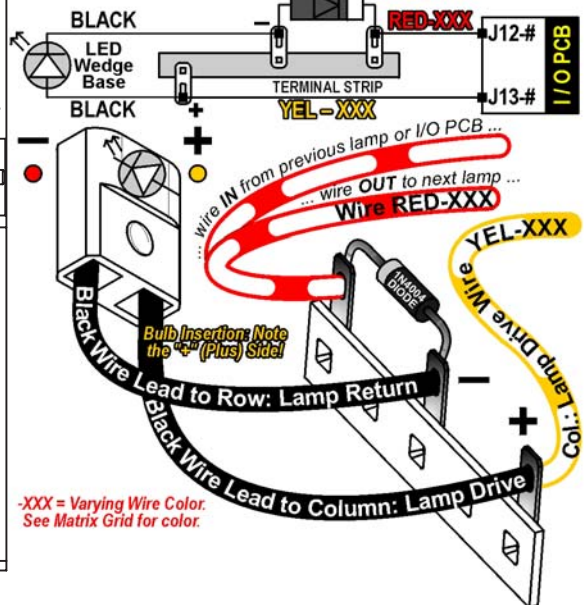


See Sec. 4, Chp. 1 (Pink Pages), Playfield Bottom - Misc. Parts and Brackets for Terminal Strips, Diodes, Fuses and Fuse Holders Part #s.



## Typical Lamp Wiring & Schematic ... with Lamp Diode on a Terminal Strip (DOTS)

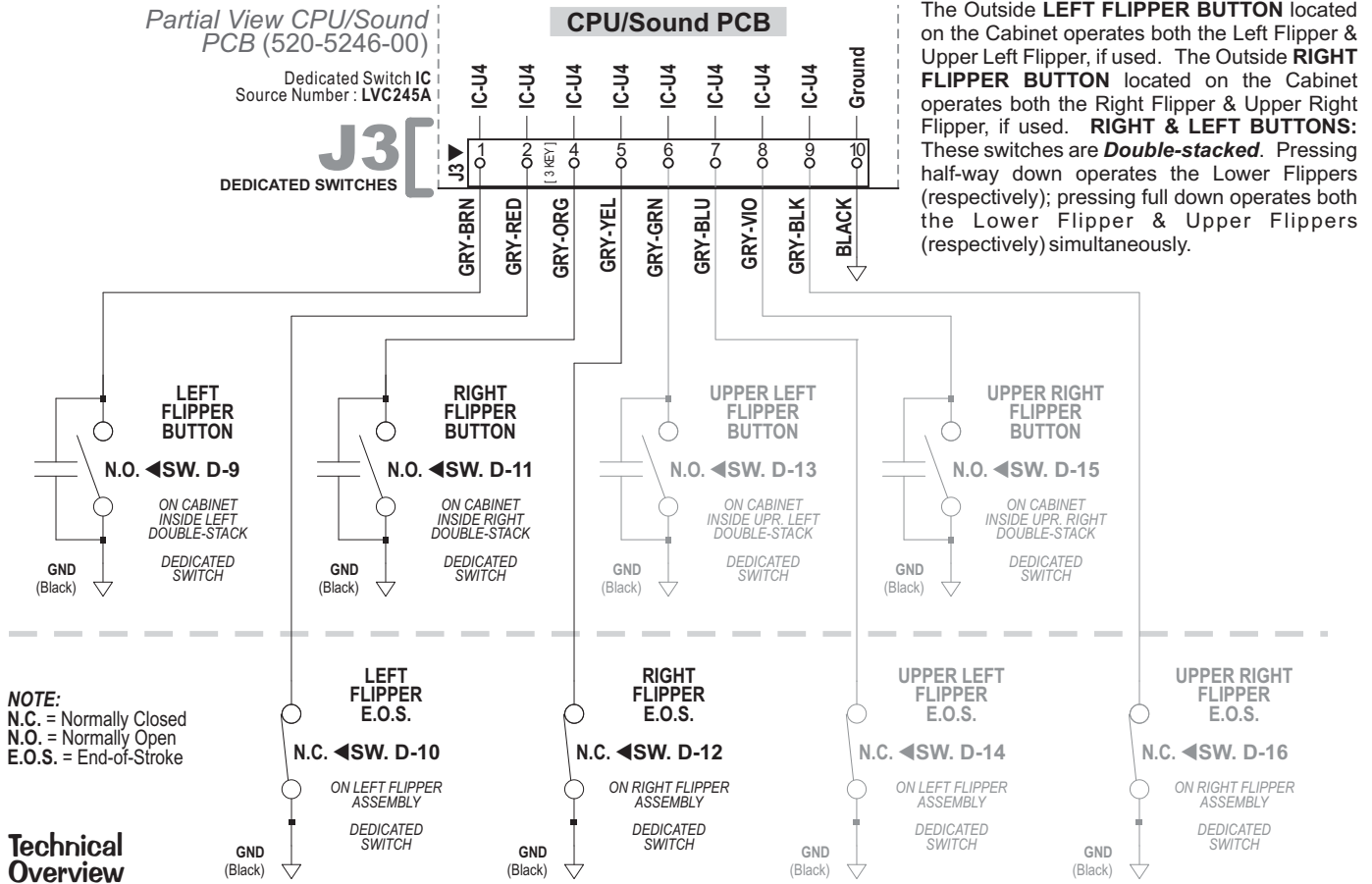
Usually when an LED Module is used as a Controlled Lamp for a Pop Bumper.



Sec. 5: Playfield ...

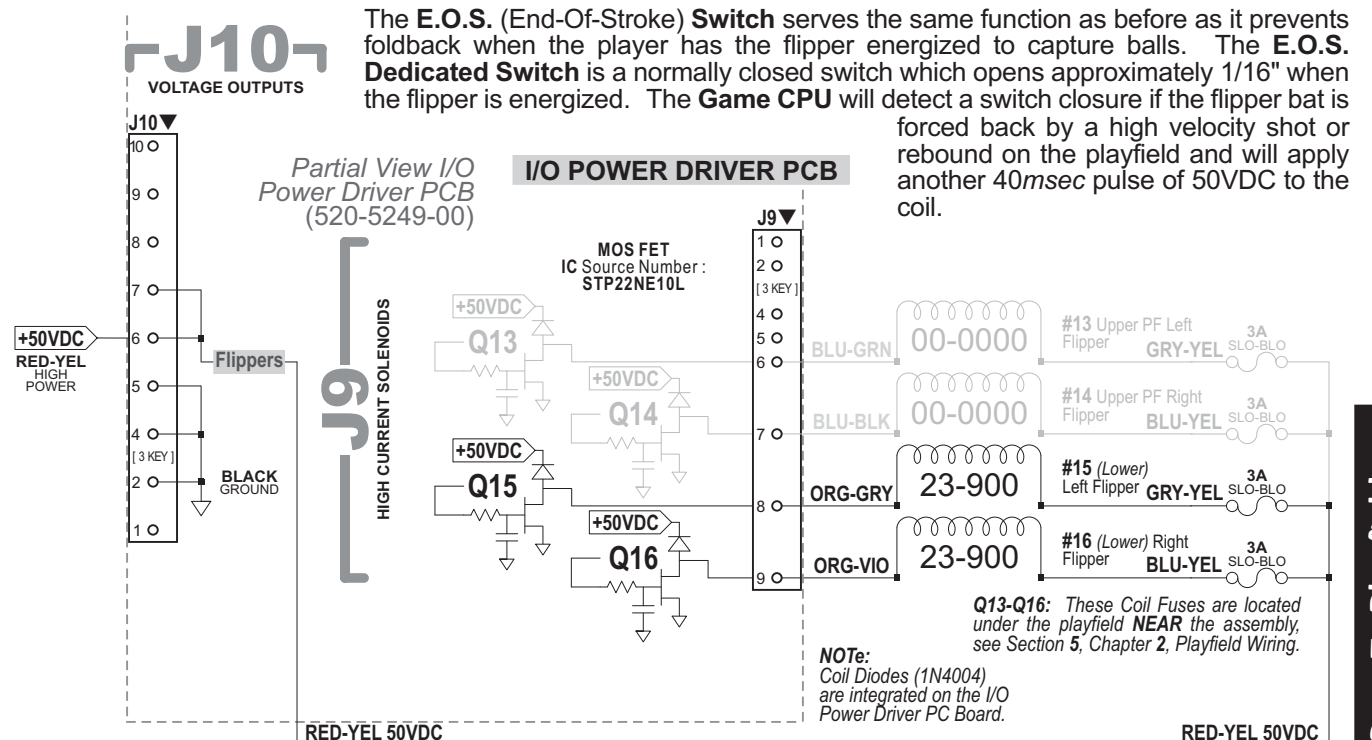


## 2-Flipper Circuit Wiring Diagram



The Outside **LEFT FLIPPER BUTTON** located on the Cabinet operates both the Left Flipper & Upper Left Flipper, if used. The Outside **RIGHT FLIPPER BUTTON** located on the Cabinet operates both the Right Flipper & Upper Right Flipper, if used. **RIGHT & LEFT BUTTONS:** These switches are **Double-stacked**. Pressing half-way down operates the Lower Flippers (respectively); pressing full down operates both the Lower Flipper & Upper Flippers (respectively) simultaneously.

Our **Flipper System** uses one supply voltage (+50VDC) for both **kick & hold**. Once the **Game CPU** detects a Flipper Cabinet Switch closure (*during game play*) it applies a 40msec pulse to the gate of the Flipper Drive Transistor (STP22NE10L). If it continues to detect a Flipper Cabinet Switch closure (*the player holding the button in*) it will continue to pulse the flipper drive transistor 1msec every 12msecs for the duration of the hold cycle.



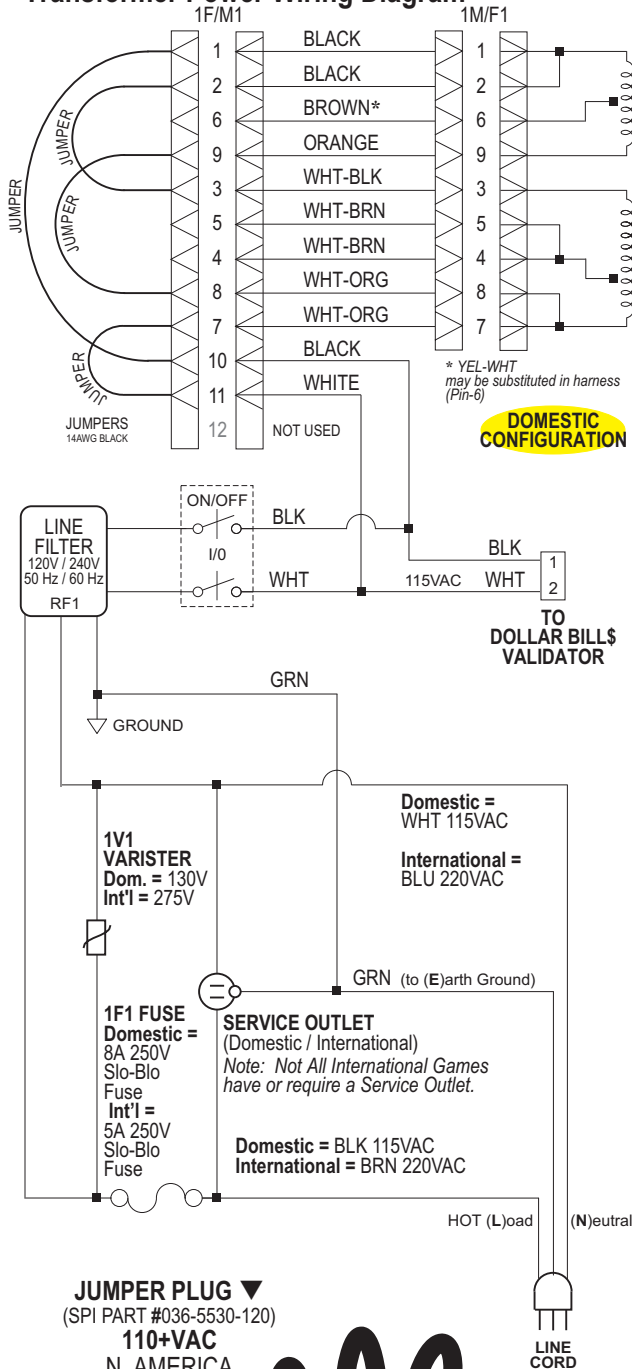
Sec. 5: Playfield ...



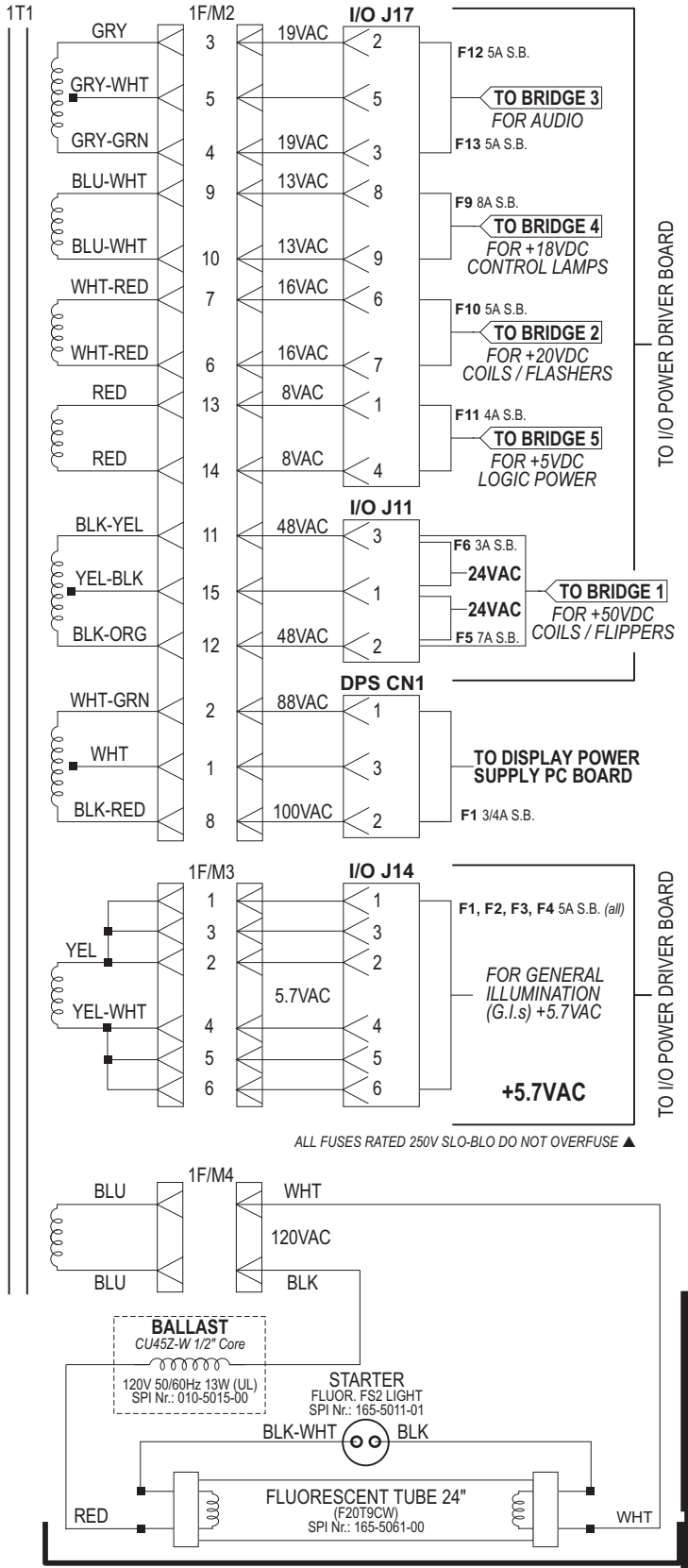
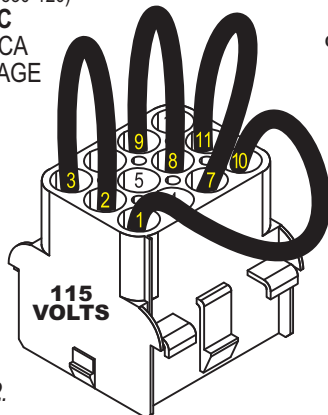


# Cabinet and Coin Door Wiring

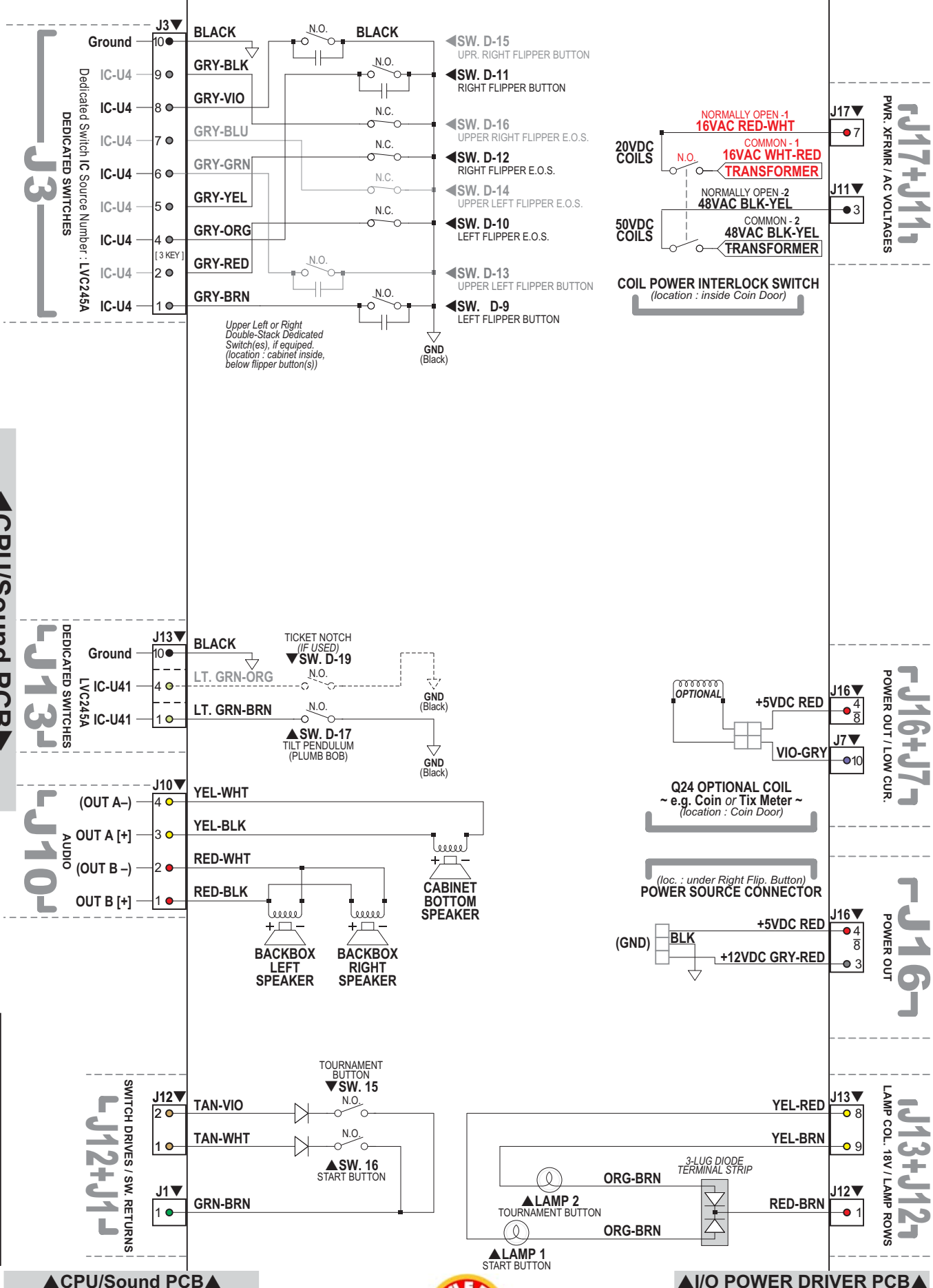
## Transformer Power Wiring Diagram



For all the Cabinet Universal Voltage Jumper Plug Configurations for voltage variations, see the end of this Chapter, Page 102.



# Cabinet Wiring Diagram



▶ CPU/Sound PCB

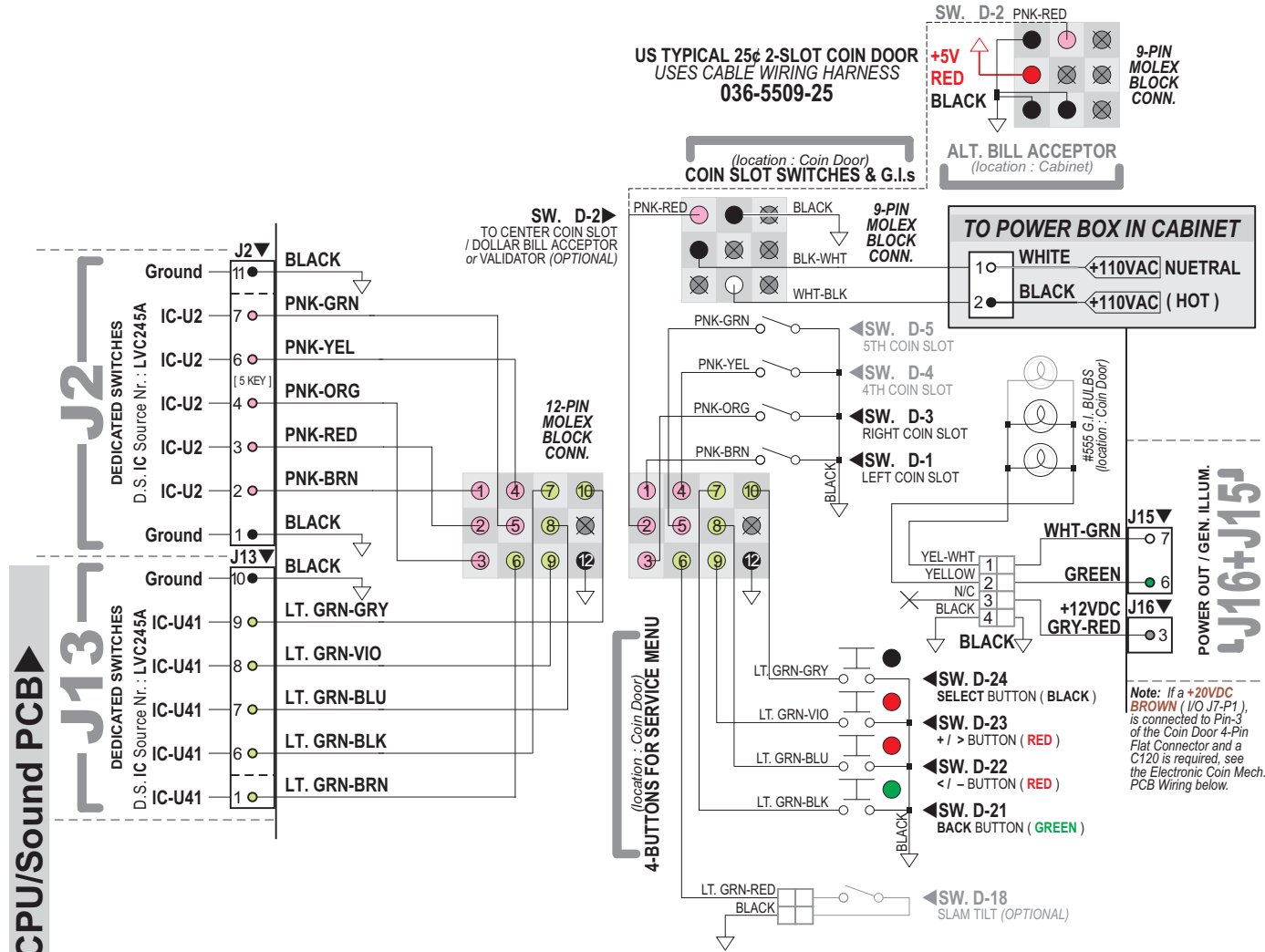
▶ I/O POWER DRIVER PCB

Sec. 5: Cab. & Coin





# Coin Door Wiring Diagram



**1-SLOT COIN DOOR WITH C120 CAPABILITIES (NO INTERFACE COIN MECH PCB REQUIRED)**  
USES CABLE WIRING HARNESS  
**036-5509-31A (+12VDC GRY-RED)**

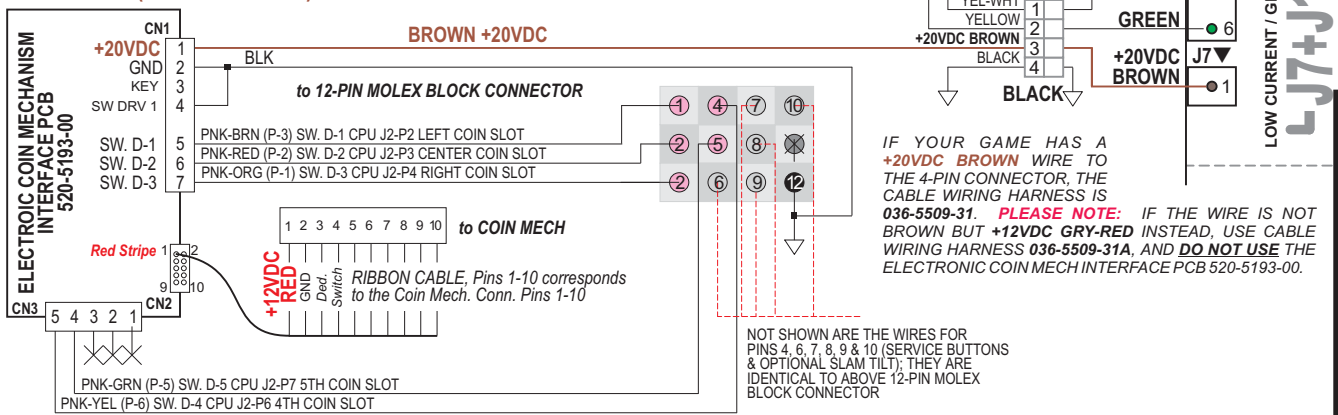
036-5509-31B (ICT/KAL ONLY) / 036-5509-31C (ODA ONLY) / 036-5509-31D (SPAIN ONLY)

**NON-US NON-C120 2-SLOT COIN DOOR**  
USES CABLE WIRING HARNESS  
**036-5509-32**

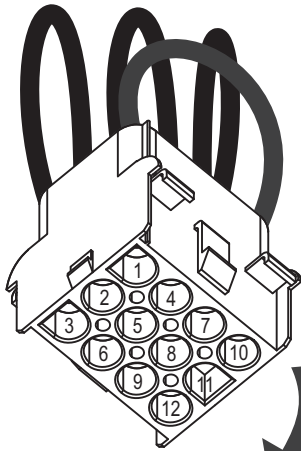
**NON-US NON-C120 3-SLOT COIN DOOR**  
USES CABLE WIRING HARNESS  
**036-5509-33**

**IF YOUR GAME HAS AN ELECTRONIC COIN MECH. INTERFACE PC BOARD ( 520-5193-00 ):**

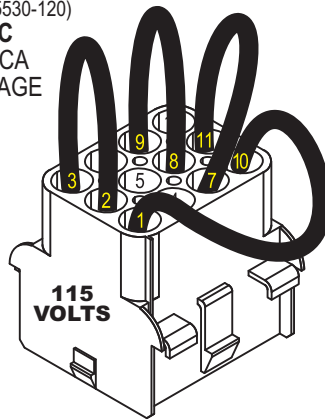
**1-SLOT COIN DOOR USE WITH C120 CAPABILITIES REQUIRING PCB 520-5193-00**  
USES CABLE WIRING HARNESS  
**036-5509-31 (S.A.M. SYSTEM)**



Cabinet Universal Voltage Jumper Plugs (for use with Universal AC Cable, 036-5530-00 ONLY)



**JUMPER PLUG ▼**  
(SPI PART #036-5530-120)  
**110+VAC**  
N. AMERICA  
LINE VOLTAGE



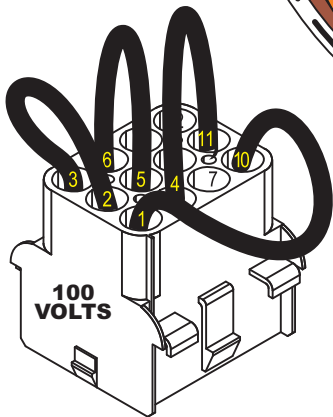
12-PIN FEMALE SIDE TO JUMPER  
12-PIN MALE SIDE CONNECTOR

9-PIN MALE SIDE TO TRANSFORMER  
9-PIN FEMALE SIDE CONN.

- 1 BLK
- 2 BLK
- 3 WHT-BLK
- 4 WHT-BRN
- 5 WHT-BRN
- 6 BRN (or YEL-WHT)
- 7 WHT-ORG
- 8 WHT-ORG
- 9 ORG
- 10 BLK
- 11 WHT
- 12 N/U

12-PIN F/M CONN.  
BACK VIEW ▲

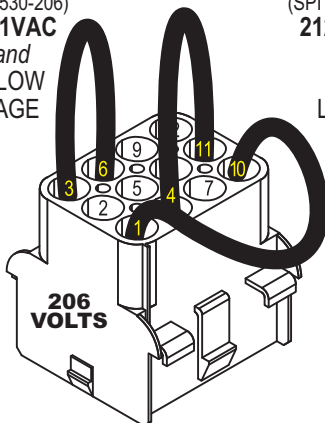
9-PIN F/M CONN.  
▲ BACK VIEW



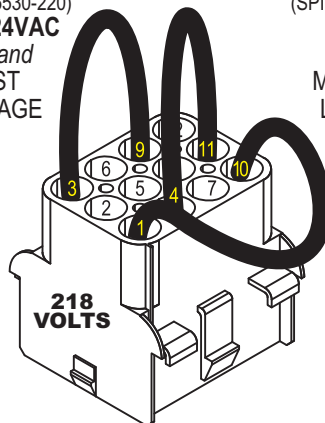
**JUMPER PLUG**  
(SPI PART #036-5530-100)  
**98VAC – 109VAC**  
JAPAN or  
N. AMERICA LOW  
LINE VOLTAGE

Black & White wires from  
the POWER BOX, cabinet bottom  
to 12-Pin Conn., Pins 10 & 11..

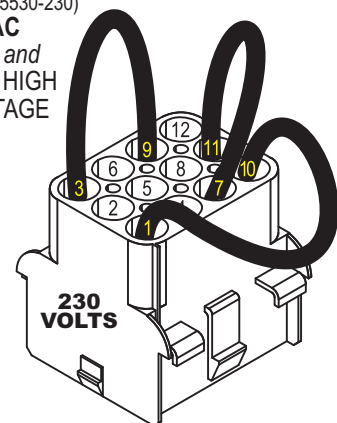
**JUMPER PLUG ▼**  
(SPI PART #036-5530-206)  
**200VAC – 211VAC**  
EUROPE and  
MID. EAST LOW  
LINE VOLTAGE



**JUMPER PLUG ▼**  
(SPI PART #036-5530-220)  
**212VAC – 224VAC**  
EUROPE and  
MID. EAST  
LINE VOLTAGE



**JUMPER PLUG ▼**  
(SPI PART #036-5530-230)  
**225+VAC**  
EUROPE and  
MID. EAST HIGH  
LINE VOLTAGE



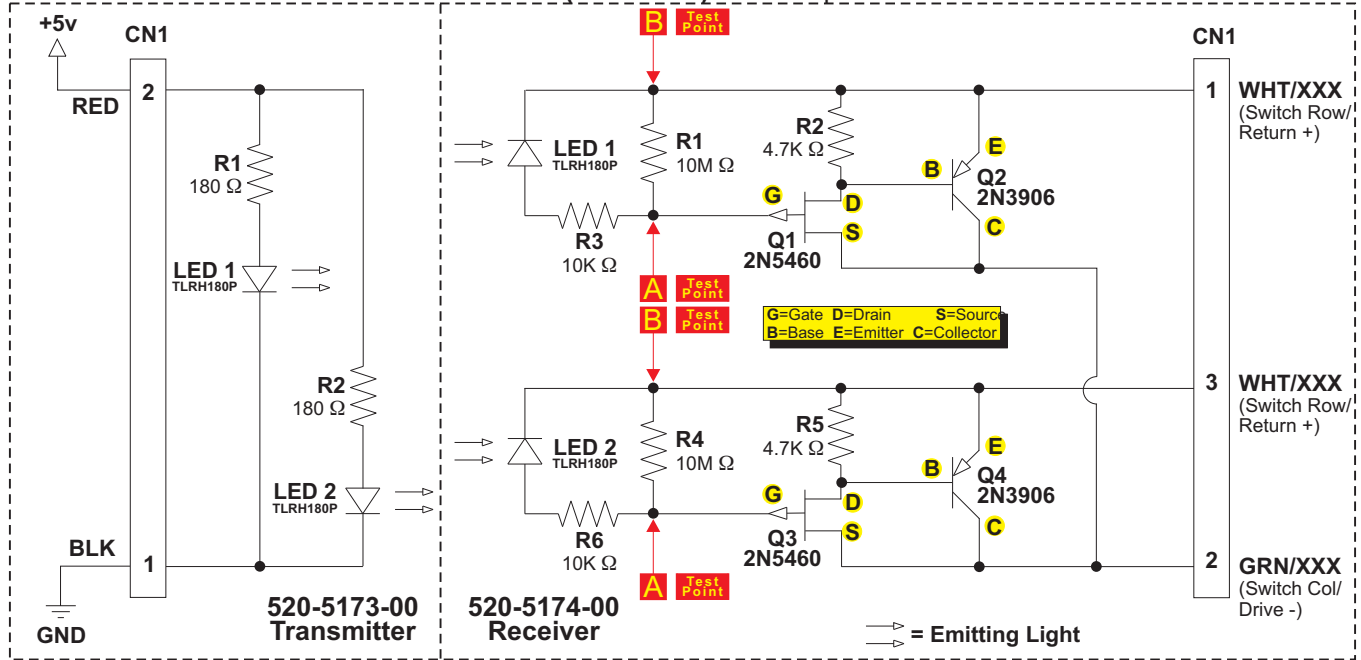
Sec. 5: Cab. & Coin



# Printed Circuit Boards (PCBs)

## Trough Up-Kicker Dual OPTO PCBs (515-0173-00 & 515-0174-00) Theory of Op. & Schematic

As light from the **Transmitter LED1** falls on the **Receiver LED1**, it generates a Positive Bias Voltage (0.7v to 1.5v) which is applied to the **Gate (G)** of **Q1 (Fet 2N5460)** turning **Q1** off. When **Q1** is held off, no current flows through **Q2's (2N3906) Base (B)**. With no *base current*, **Q2** is off and acts as an **OPEN SWITCH**. When the light is interrupted (**BLOCKED**) **R1 (Rec. Bd.)** bleeds the gate voltage off of **Q1** allowing it to conduct, switching **Q2** on, which acts as a **CLOSED SWITCH**. The **LED2 (Trans/Rec) Circuit** operates identical as the **LED1 Circuit**.

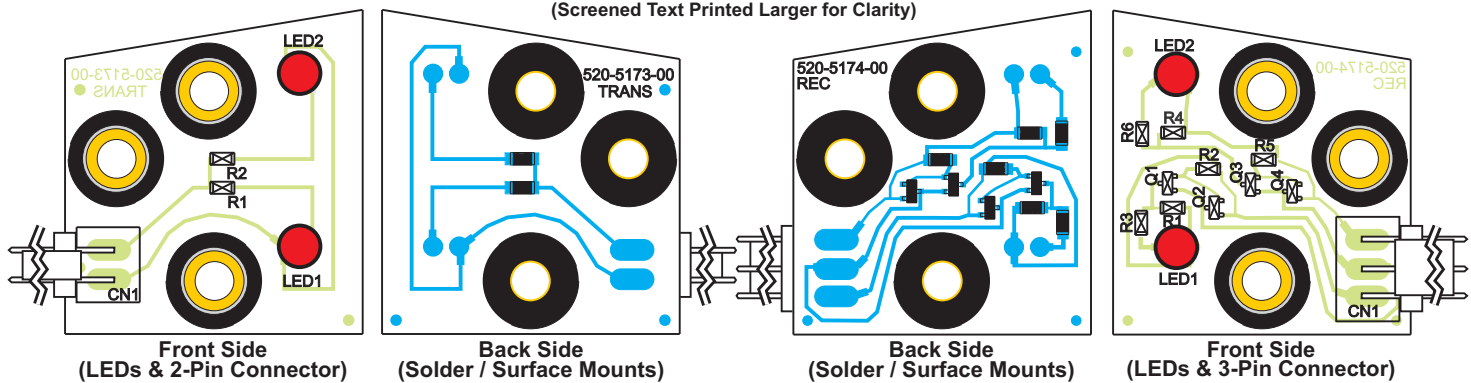


## Trough Up-Kicker Dual OPTO PCBs (515-0173-00 & 515-0174-00) Component Layout & Parts

520-5173-00 (TRANS)

Boards Actual Size  
(Screened Text Printed Larger for Clarity)

520-5174-00 (REC)



| ITEM    | QTY   | PART NUMBER | REF-DESIGNATOR | DESCRIPTION  |
|---------|-------|-------------|----------------|--|
| A+C & D | 1     | 515-0173-00 |                | Dual-OPTO Transmitter PCB Assembly (Item A PCB + Items C & D)          |
| A       | 1     | 520-5173-00 |                | Dual-OPTO Transmitter PCB  |
| A-1     | 1     | 045-5111-02 | CN1            | (includes Items A-1 – A-3)<br>2X, .156" Rt. Angle (26-60-5020) Conn.   |
| A-2     | 2     | 165-5052-00 | LED1, LED2     | LED TLRH180P (Ultra Bright Red)  |
| A-3     | 2     | 121-5067-00 | R1, R2         | 180 Ω Resistor SMT, 1/8W (CRCW)  |
| B+C & D | 1     | 515-0174-00 |                | Dual-OPTO Receiver PCB Assembly (Item B PCB + Items C & D)             |
| B       | 1     | 520-5174-00 |                | Dual-OPTO Receiver PCB   |
| B-1     | 1     | 045-5111-03 | CN1            | (includes Items B-1 – B-7)<br>3X, .156" Right Angle (26-60-5030) Conn. |
| B-2     | 2     | 165-5052-00 | LED1, LED2     | LED TLRH180P (Ultra Bright Red)  |
| B-3     | 2     | 110-5006-00 | Q1, Q3         | 2N5460, Transistor (P-FET SOT-23)                                      |
| B-4     | 2     | 110-0086-00 | Q2, Q4         | 2N3906, Transistor   |
| B-5     | 2     | 121-5082-00 | R1, R4         | 10M Ω Resistor SMT, 1/8W (CRCW)  |
| B-6     | 2     | 121-5083-00 | R2, R5         | 4.7K Ω Resistor SMT, 1/8W (CRCW)                                       |
| B-7     | 2     | 121-5011-00 | R3, R6         | 10K Ω Resistor SMT, 1/8W (CRCW)  |
| C       | 3/per | 530-5308-02 |                | OPTO PCB Brass Tube Spacer   |
| D       | 3/per | 545-5518-00 |                | OPTO PCB Rubber Grommet  |

Replacement Part:  
LED TLRH180P  
(T1-3/4 GaAIAs)  
SPI Part N<sup>o</sup>:  
165-5052-00



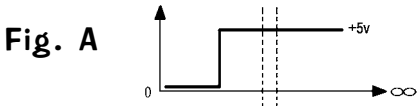
# OPTO Troubleshooting

## 1. Volt Meter Test (indicates normal operating condition):

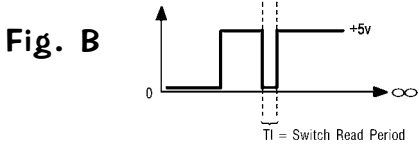
A. **OPEN OPTO** (Light Falling on LED) = *SWITCH OPEN*. Place meter leads across points **A** and **B** on the **LED1 Circuit** (Refer to Schematic Drawing on previous page, 520-5174-00 Receiver Side). It should read approximately 0.8 - 1.2v DC. The **LED2 Circuit** operates the same.

B. **CLOSED OPTO** (Light Blocked) = *SWITCH CLOSED*. Place meter leads across points **A** and **B** on the **LED1 Circuit** (Refer to Schematic Drawing on previous page, 520-5174-00 Receiver Side). It should read approximately 0.0 - 0.1v DC. The **LED2 Circuit** operates the same.

## 2. Oscilloscope Test (indicates normal operating condition):



A. **OPEN OPTO** (Light Falling on LED) = *SWITCH OPEN*. Place Scope lead at **Pin-1** of OPTO Rec. Board with Scope Grounded (see Schematic). The Scope should display a **STEADY +5v** as shown in **Fig. A**, Wave Form Diagram.



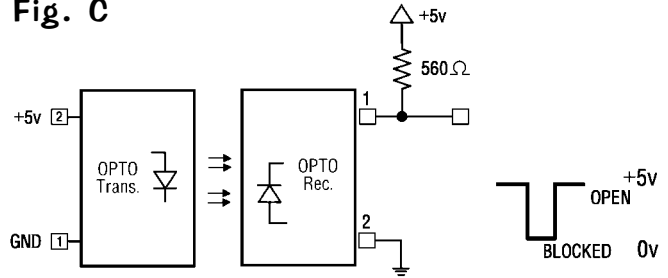
B. **CLOSED OPTO** (Light Blocked) = *SWITCH CLOSED*. Place Scope lead at **Pin-1** of OPTO Rec. Board with Scope Grounded (see Schematic). The Scope should display a **PULSE STREAM** indicating **Q2** has switched "On" as shown in **Fig. B**, Wave Form Diagram. This is your Switch Drive Pulse.

## 3. Bench Test (See Fig. C):

Please Note: To perform this test you must use a spare 560Ω Pull-Up Resistor, SPI N<sup>o</sup>: 121-5047-00

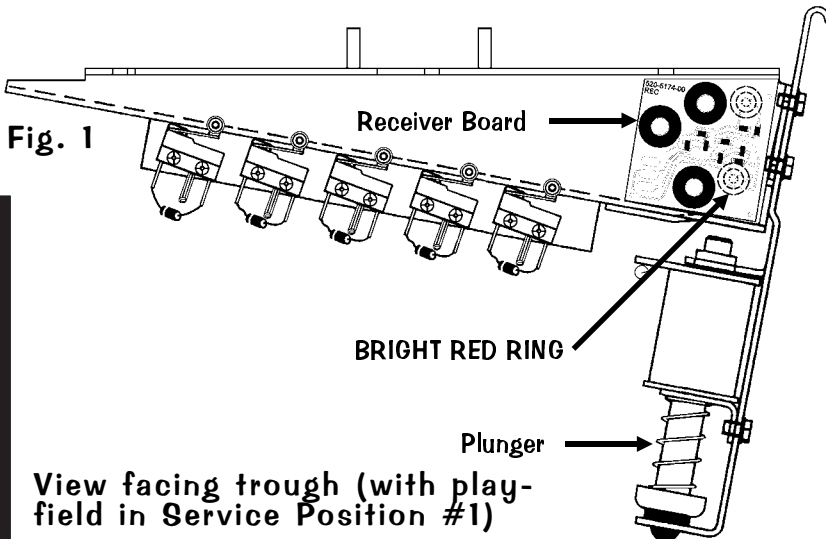
Disconnect the **OPTO Transmitter / Receiver Board** from the circuit. Connect one side of a 560Ω Pull-Up Resistor to **Pin-1** of the OPTO Receiver Bd. and the other side of the resistor to a 5v DC source. Connect **Pin-2** to GND. Connect a +5v DC source to **Pin-1** of the Transmitter & GND to **Pin-2**. Align with the Receiver OPTO approx. 3" distance. Using your Volt-Meter or an Oscilloscope, monitor **Pin-1** while **BLOCKING** and **UNBLOCKING** the **BEAM** from the Trans. The output will be approx. +5v DC when the **BEAM IS NOT BLOCKED** and approx. 0v when the **BEAM IS BLOCKED**.

Fig. C



## Trough Dual OPTO Boards Alignment / Test for LED1

When a working **OPTO** is installed and connected in a game, the transmitter should light (**LED1 lower & LED2 upper**) when the power is switched on. With the playfield in **Service Position #1** (playfield lifted up in the half-way position resting on the Prop Rod or edge slide support brackets) and the game on, the LED lights should show up as a **BRIGHT RED RINGS** through the back of the Receiver Board around the **Receivers LED1 & LED2** (see **Fig. 1**). Testing only **LED1**: With the game in **Switch Test Mode**, lifting the Trough Plunger with a fingertip should block the **BEAM** and cause the Switch Position to trigger (see **Fig. 2**). View **Fig. 2a & 2b** (on the next page) for a sectional view of the Light Path (note alignment) and what happens as a ball breaks the light beam.



View facing trough (with playfield in Service Position #1)

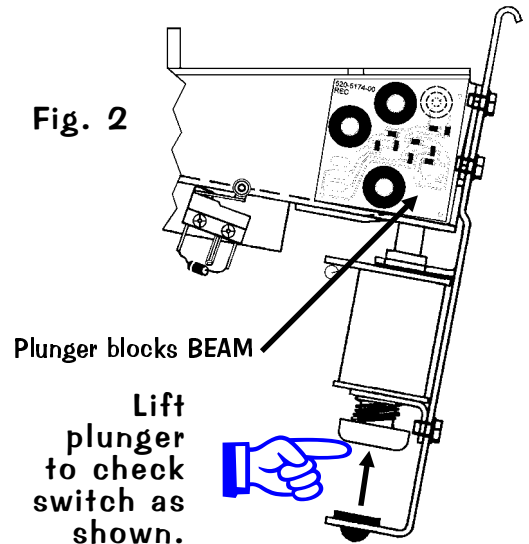
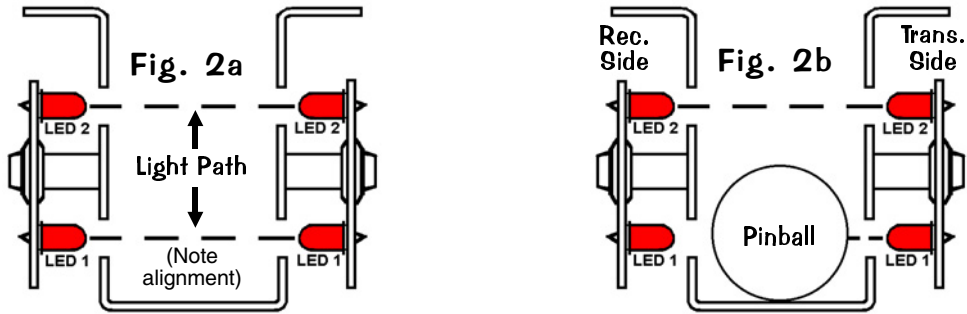


Fig. 2

Plunger blocks BEAM  
Lift plunger to check switch as shown.

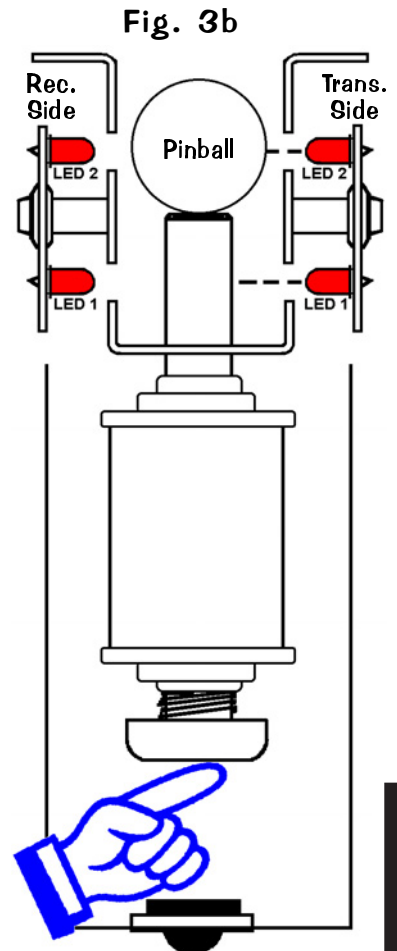
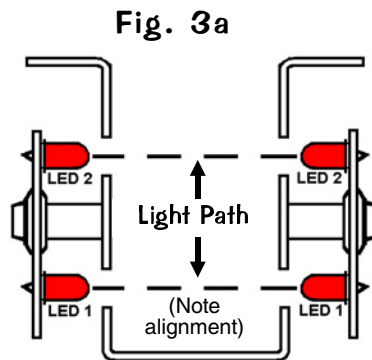
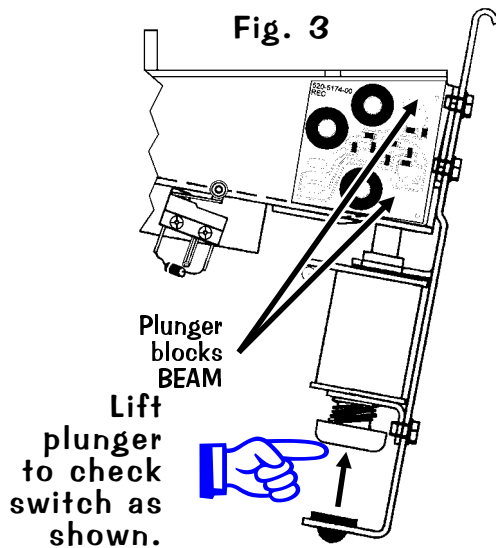


## Sectional view from right (Fig. 2a & 2b)



### Trough Dual OPTO Boards Alignment / Test for LED2

When a working **OPTO** is installed and connected in a game, the transmitter should light (**LED1 lower & LED2 upper**) when the power is switched on. With the playfield in **Service Position #1** (playfield lifted up and resting on the Playfield Support Slide Brackets) and the game on, the LED lights should show up as a **BRIGHT RED RINGS** through the back of the Receiver Board around the **Receivers LED1 & LED2** (see Fig. 1, previous page). Testing only **LED2**: **TO PERFORM THIS TEST, A PINBALL MUST BE IN THE BALL TROUGH.** With the game in **Switch Test Mode**, lifting the Trough Plunger with a finger tip should block the **BEAM** on LED2 and cause the Switch Position to trigger (see Fig. 3). View Fig. 3a & 3b for a sectional view of the Light Path (note alignment) and what happens as a "double-stacked" ball scenario breaks the light beam.



## I M P O R T A N T

If replacement of **LED** is required, insure that is **mounted correctly before and after soldering** (See Fig. 4a / 4b).

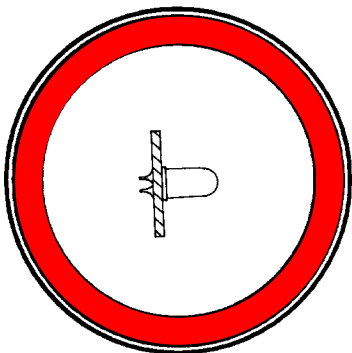


Fig. 4a  
Correct Position

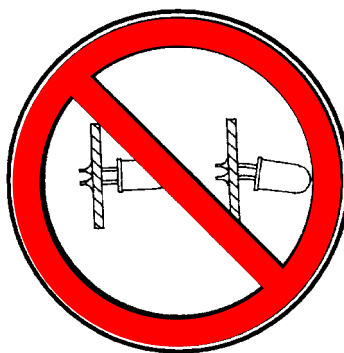
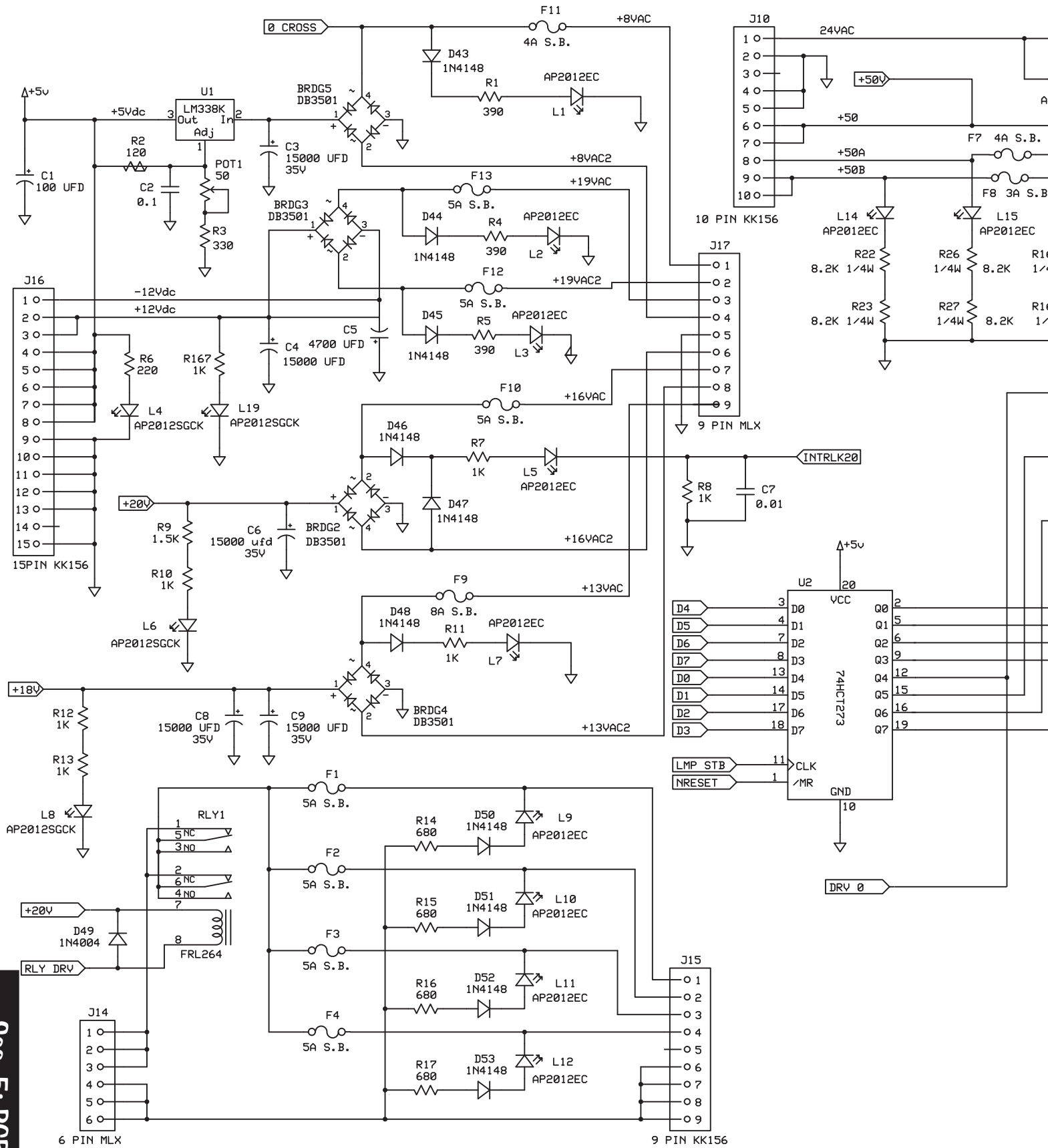


Fig. 4b  
Incorrect Position

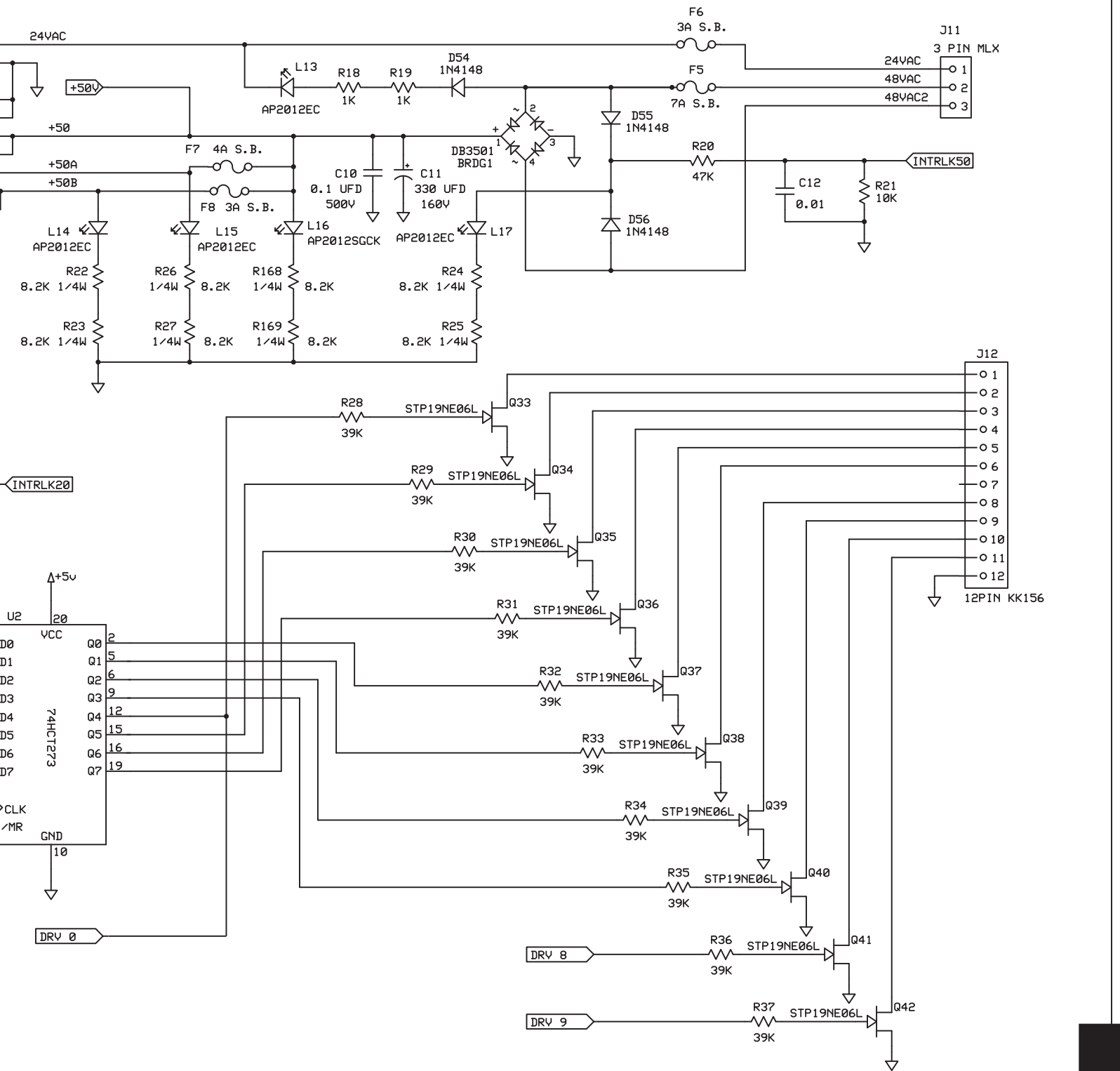
I/O POWER DRIVER PCB S.A.M. System (520-5249-00) Schematic (Sheet 1 of 4)



Sec. 5: PCBs

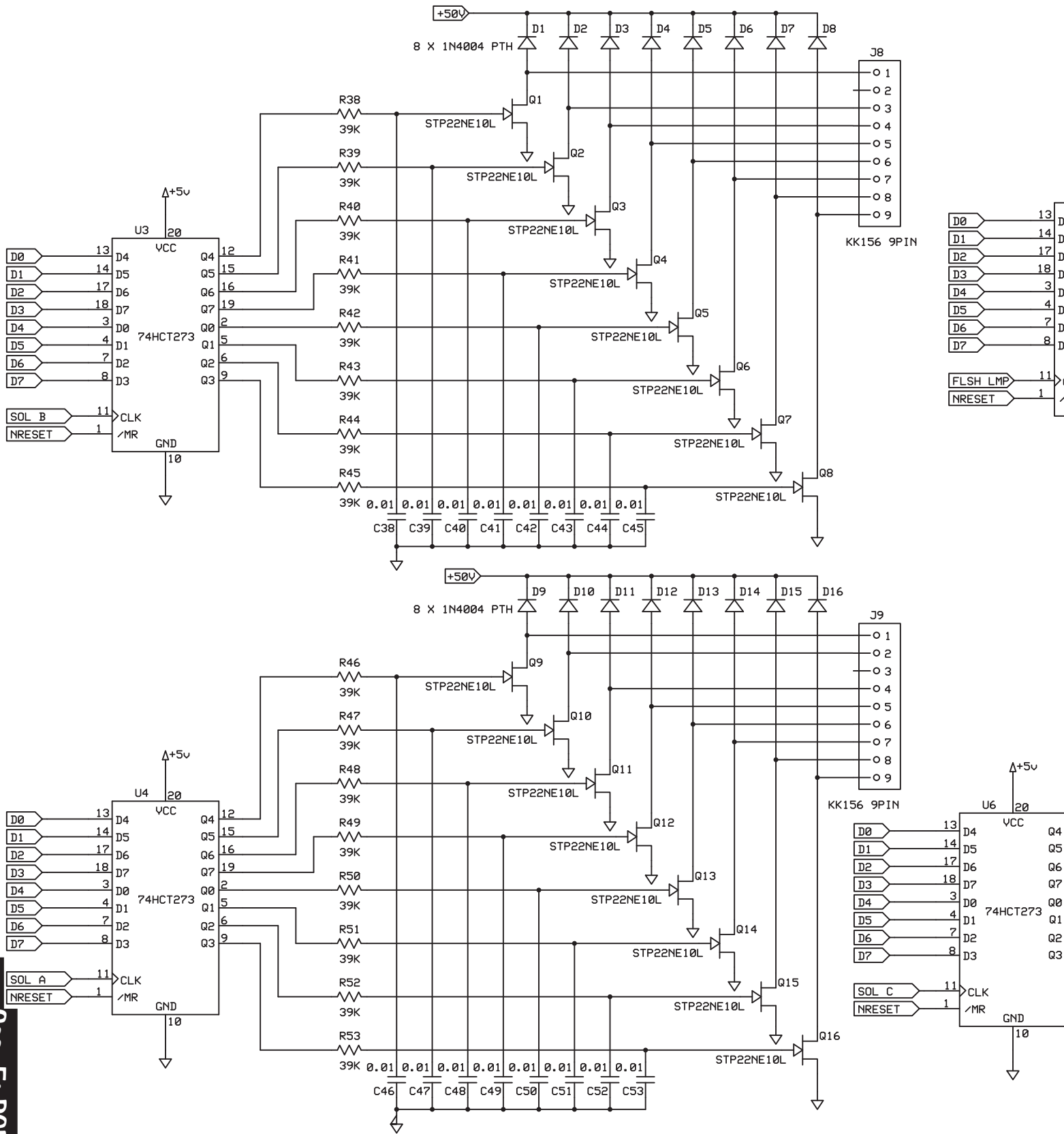






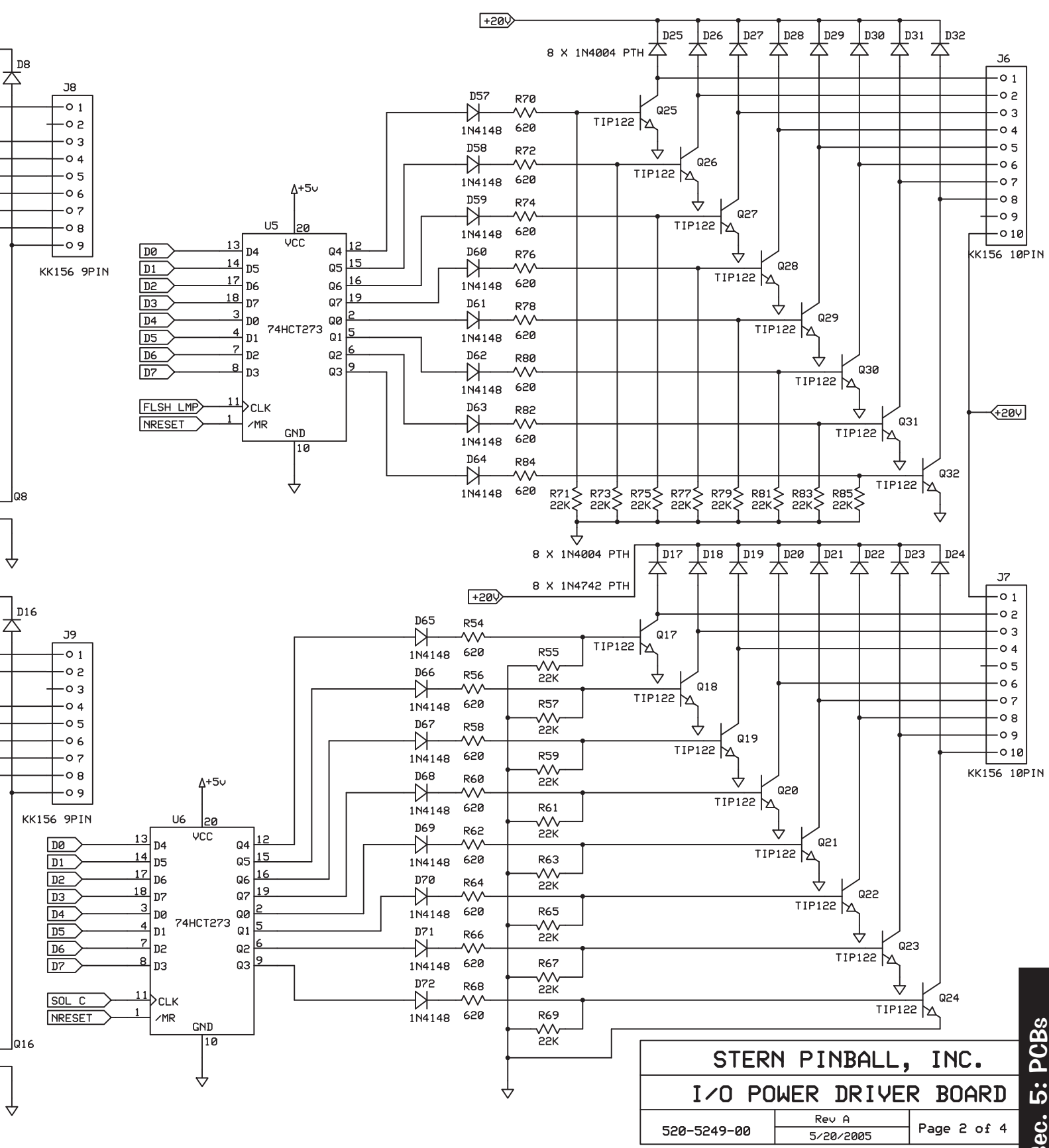
|                               |                    |             |
|-------------------------------|--------------------|-------------|
| <b>STERN PINBALL, INC.</b>    |                    |             |
| <b>I/O POWER DRIVER BOARD</b> |                    |             |
| 520-5249-00                   | Rev A<br>5/20/2005 | Page 1 of 4 |

**Sec. 5: PCBs**



Sec. 5: PCBs





**STERN PINBALL, INC.**

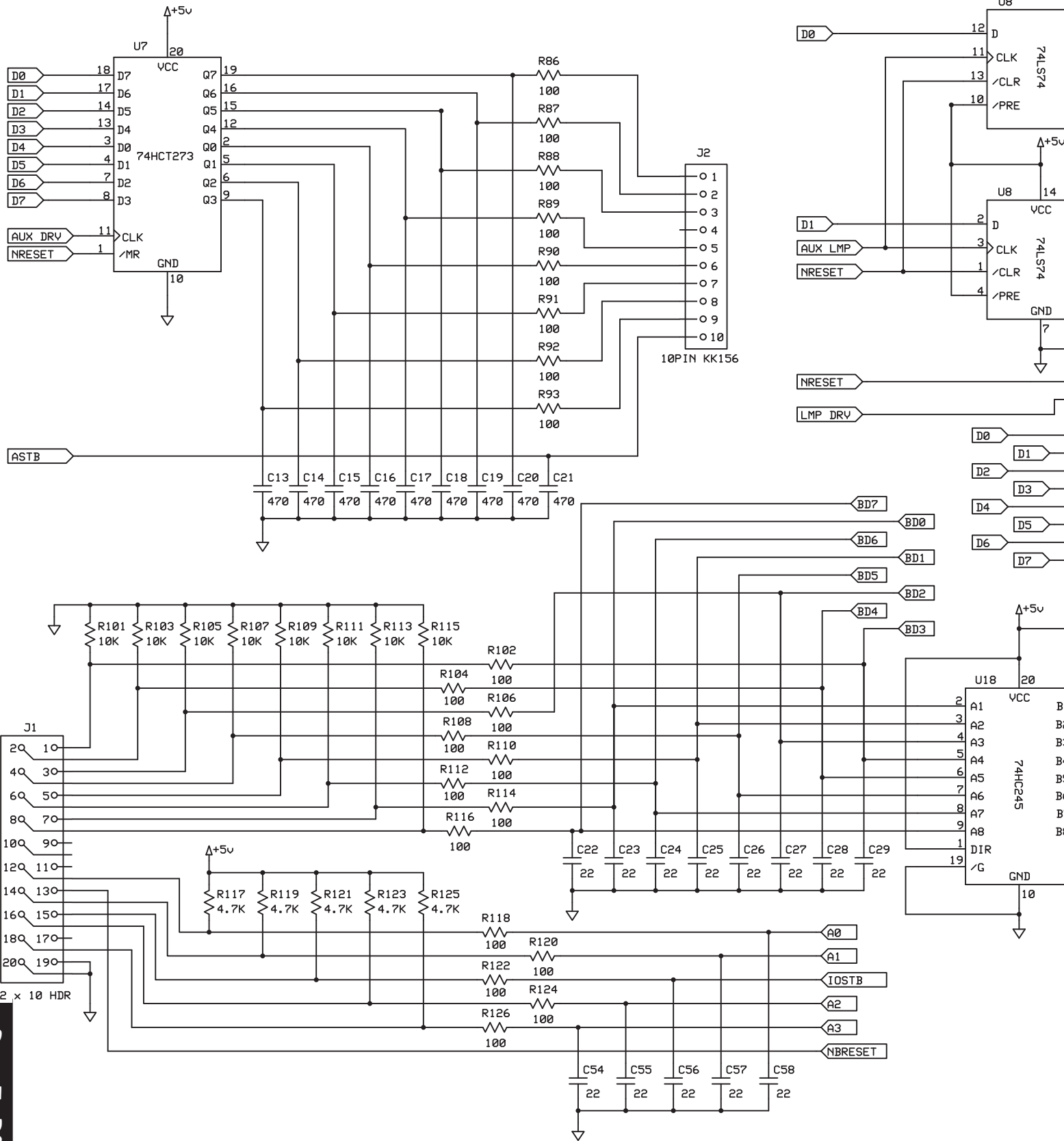
**I/O POWER DRIVER BOARD**

|             |                    |             |
|-------------|--------------------|-------------|
| 520-5249-00 | Rev A<br>5/20/2005 | Page 2 of 4 |
|-------------|--------------------|-------------|

**Sec. 5: PCBs**

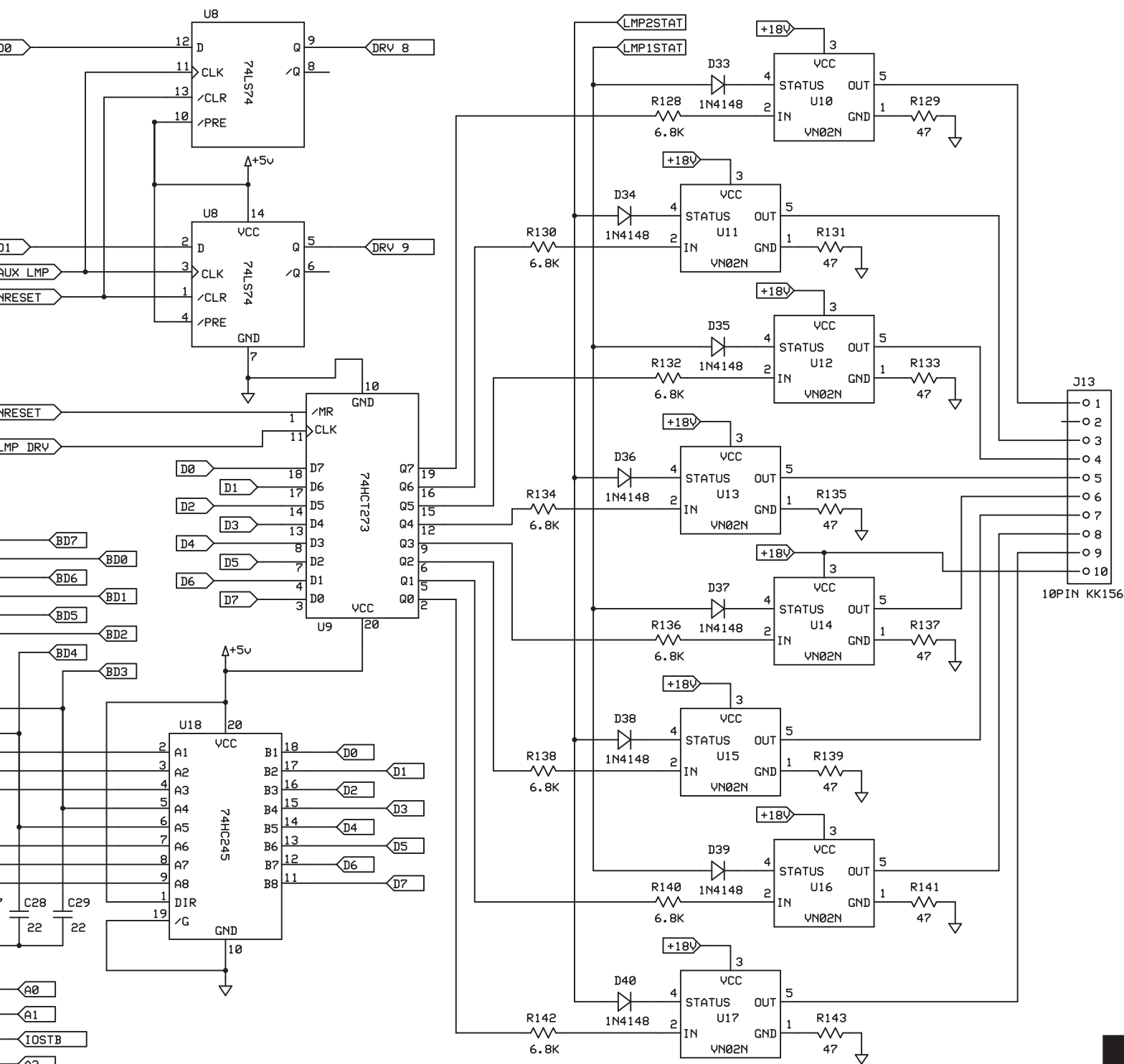






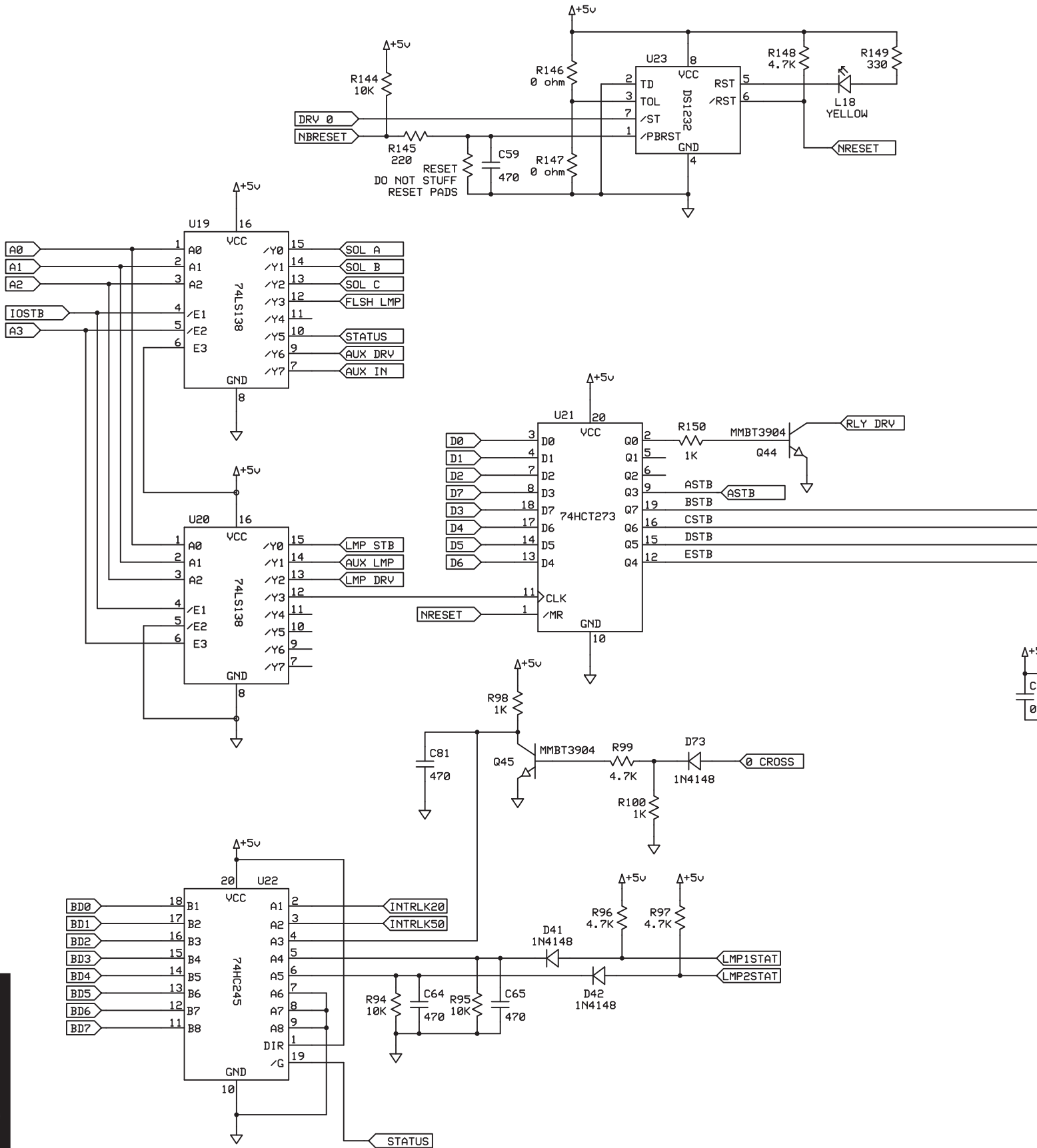
Sec. 5: PCBs





|                               |                    |             |
|-------------------------------|--------------------|-------------|
| <b>STERN PINBALL, INC.</b>    |                    |             |
| <b>I/O POWER DRIVER BOARD</b> |                    |             |
| 520-5249-00                   | Rev A<br>5/20/2005 | Page 3 of 4 |

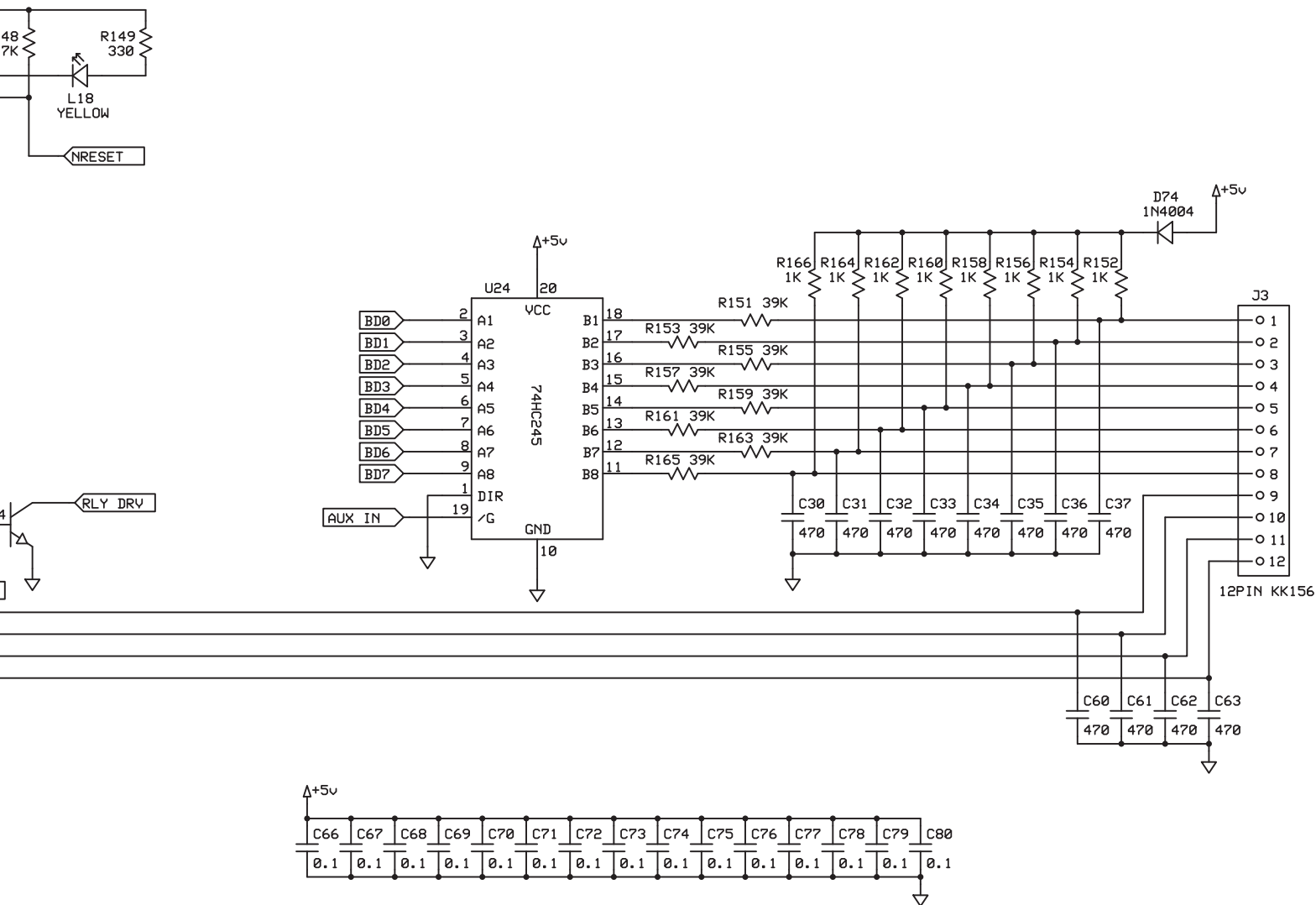
**Sec. 5: PCBs**



Sec. 5: PCBs





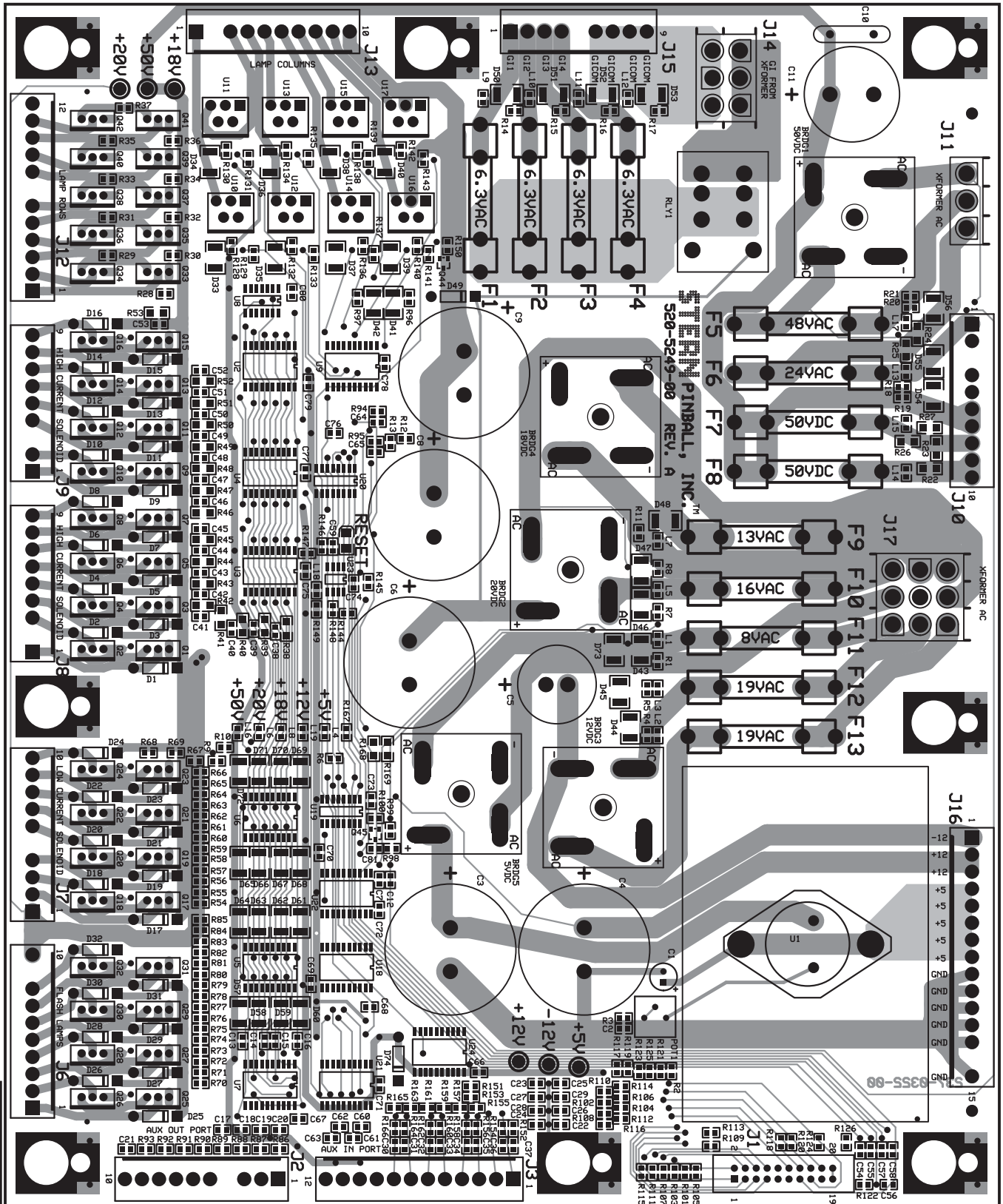


SS

|                        |                    |             |
|------------------------|--------------------|-------------|
| STERN PINBALL, INC.    |                    |             |
| I/O POWER DRIVER BOARD |                    |             |
| 520-5249-00            | Rev A<br>5/20/2005 | Page 4 of 4 |

Sec. 5: PCBs

# I/O POWER DRIVER PCB S.A.M. System (520-5249-00) Component Layout



Sec. 5: PCBs

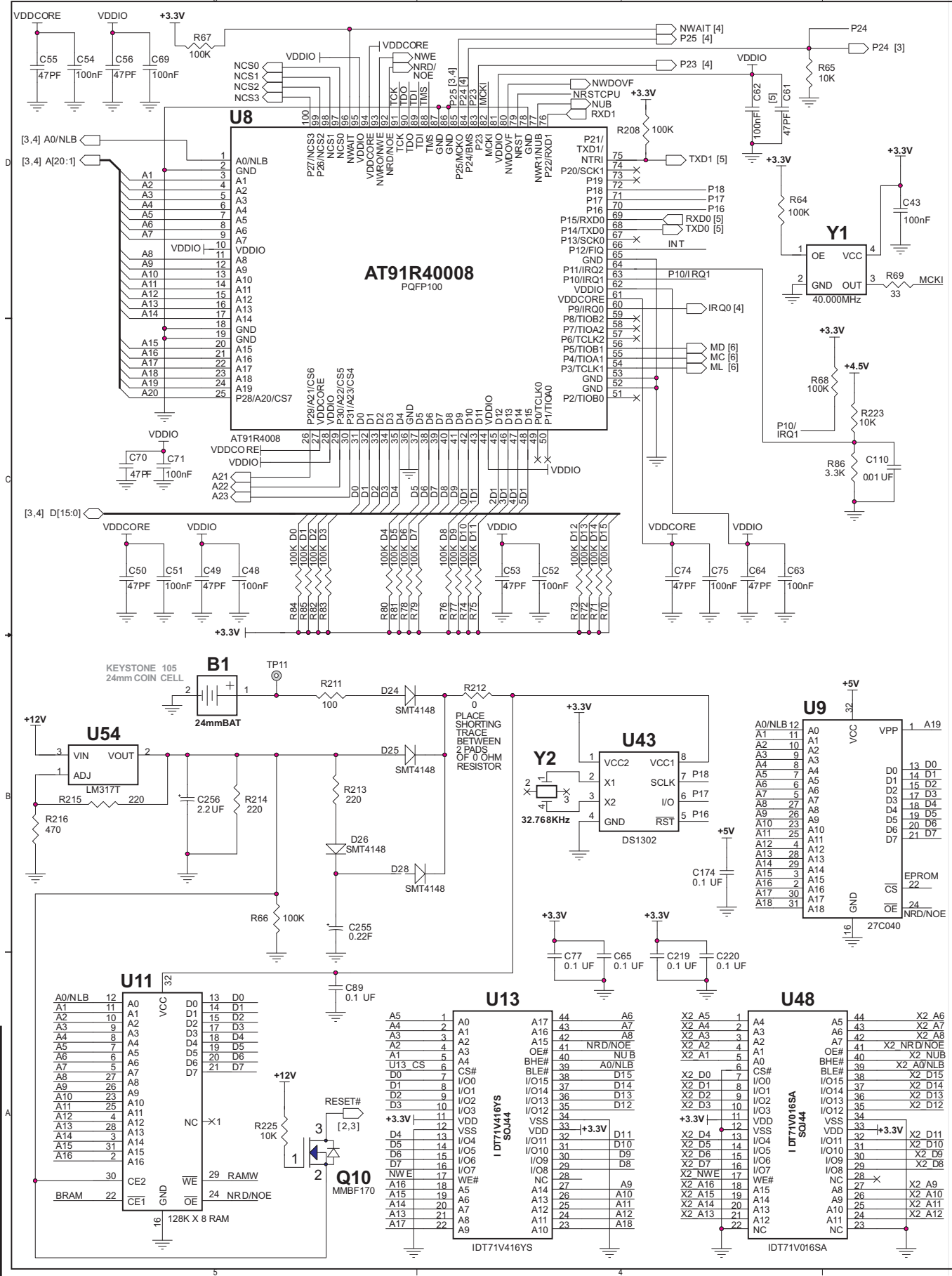


## I/O POWER DRIVER PCB S.A.M. System (520-5249-00) Parts

| ITEM | QTY. | SPI PART NUMBER    | (MFG. P.N.)     | REF-DESIGNATOR  | DESCRIPTION (SM = Surface Mount)                |
|------|------|--------------------|-----------------|---|---|
| —    | 1    | <b>520-5249-00</b> |                 | <b>I/O Power Driver PCB (S.A.M. System), Rev. A</b>   | <i>(includes Items 1-67)</i>                    |
| 1    | 1    | 121-6001-00        | (101-0001807)   | R9  | Resistor SM 0805 Film 1.5KΩ 1/10W 5%            |
| 2    | 22   | 121-6002-00        | (101-0001820)   | R86, R87, R88, R89, R90, R91, R92, R93, R102, R104, R106, R108, R110, R112, R114, R116, R118, R120, R122, R124, R126, R146                                      | Resistor SM 0805 Film 100Ω 1/10W 5%             |
| 3    | 12   | 121-6020-00        | (101-0001827)   | R21, R94, R95, R101, R103, R105, R107, R109, R111, R113, R115, R144   | Resistor SM 0805 Film 10KΩ 1/10W 5%             |
| 4    | 1    | 121-6003-00        | (101-0001845)   | R2  | Resistor SM 0805 Film 120Ω 1/10W 5%             |
| 5    | 20   | 121-6022-00        | (101-0001905)   | R7, R8, R10, R11, R12, R13, R18, R19, R98, R100, R150, R152, R154, R156, R158, R160, R162, R164, R166, R167   | Resistor SM 0805 Film 1KΩ 1/10W 5%              |
| 6    | 2    | 121-6004-00        | (101-0001943)   | R6, R145  | Resistor SM 0805 Film 220Ω 1/10W 5%             |
| 7    | 16   | 121-6005-00        | (101-0001849)   | R55, R57, R59, R61, R63, R65, R67, R69, R71, R73, R75, R77, R79, R81, R83, R85  | Resistor SM 0805 Film 22KΩ 1/10W 5%             |
| 8    | 2    | 121-6006-00        | (101-0002012)   | R3, R149  | Resistor SM 0805 Film 330Ω 1/10W 5%             |
| 9    | 3    | 121-6007-00        | (101-0002031)   | R1, R4, R5  | Resistor SM 0805 Film 390Ω 1/10W 5%             |
| 10   | 8    | 121-6013-00        | (101-0002035)   | R151, R153, R155, R157, R159, R161, R163, R165  | Resistor SM 0805 Film 39KΩ 1/10W 5%             |
| 11   | 9    | 121-6008-00        | (101-0002046)   | R96, R97, R99, R117, R119, R121, R123, R125, R148   | Resistor SM 0805 Film 4.7KΩ 1/10W 5%            |
| 12   | 8    | 121-6014-00        | (101-0002065)   | R129, R131, R133, R135, R137, R139, R141, R143  | Resistor SM 0805 Film 47Ω 1/10W 5%              |
| 13   | 1    | 121-6015-00        | (101-0002071)   | R20   | Resistor SM 0805 Film 47KΩ 1/10W 5%             |
| 14   | 8    | 121-6009-00        | (101-0002108)   | R128, R130, R132, R134, R136, R138, R140, R142  | Resistor SM 0805 Film 6.8KΩ 1/10W 5%            |
| 15   | 16   | 121-6010-00        | (101-0002116)   | R54, R56, R58, R60, R62, R64, R66, R68, R70, R72, R74, R76, R78, R80, R82, R84  | Resistor SM 0805 Film 620Ω 1/10W 5%             |
| 16   | 4    | 121-6016-00        | (101-0002126)   | R14, R15, R16, R17  | Resistor SM 0805 Film 680Ω 1/10W 5%             |
| 17   | 10   | 121-6011-00        | (101-0002296)   | R28, R29, R30, R31, R32, R33, R34, R35, R36, R37  | Resistor SM 1206 Film 22KΩ 1/10W 5%             |
| 18   | 8    | 121-6012-00        | (101-0002473)   | R22, R23, R24, R25, R26, R27, R168, R169  | Resistor SM 1206 Film 8.2KΩ 1/10W 5%            |
| 19   | 16   | 121-6013-01        | (101-0002378)   | R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53  | Resistor SM 1206 Film 39KΩ 1/10W 5%             |
| 20   | 16   | 125-6001-00        | (121-0000056)   | C2, C66, C67, C68, C69, C70, C71, C72, C73, C74, C75, C76, C77, C78, C79, C80   | Capacitor SM 0805 Cer. .1UF 50V 10% X7R         |
| 21   | 25   | 125-6002-00        | (121-0000096)   | C13, C14, C15, C16, C17, C18, C19, C20, C21, C30, C31, C32, C33, C34, C35, C36, C37, C59, C60, C61, C62, C63, C64, C65, C81                                     | Capacitor SM 0805 Cer. 470PF 50V 5% NPO         |
| 22   | 18   | 125-6003-00        | (121-0004236)   | C7, C12, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C51, C52, C53   | Capacitor SM 0805 Cer. .01UF 50V 10% X7R        |
| 23   | 13   | 125-6004-00        | (121-0005318)   | C22, C23, C24, C25, C26, C27, C28, C29, C54, C55, C56, C57, C58   | Capacitor SM 0805 Cer. 22PF 100V 5% NPO         |
| 24   | 1    | 125-5032-00        | (131-0003773)   | C1  | Capacitor Tht. Radial Alum. 100UF 25V 20%       |
| 25   | 1    | 125-5034-00        | (131-0003864)   | C5  | Capacitor Tht. Radial Alum. 4700UF 35V 20%      |
| 26   | 1    | 125-5029-01        | (133-0003741)   | C10   | Capacitor Tht. Disc Cer. .1UF 500V 20%          |
| 27   | 1    | 125-6022-00        | (134-0003846)   | C11   | Capacitor Tht. Radial Alum. 330UF 160V 20%      |
| 28   | 5    | 125-5036-01        | (134-0004000)   | C3, C4, C6, C8, C9  | Cap. Tht. Rad. Al. 15000UF 35V 20% Snap-In      |
| 29   | 34   | 112-6001-01        | (183-0004374)   | D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12, D13, D14, D15, D16, D17, D18, D19, D20, D21, D22, D23, D24, D25, D26, D27, D28, D29, D30, D31, D32, D49, D74 | Diode Tht. DO-41 1N4004 400V 1A                 |
| 30   | 5    | 112-5000-00        | (187-0004700)   | BRDG1, BRDG2, BRDG3, BRDG4, BRDG5   | Bridge Tht. Fullwave 100V 35A MB-35             |
| 31   | 10   | 110-0088-01        | (203-0003591)   | Q33, Q34, Q35, Q36, Q37, Q38, Q39, Q40, Q41, Q42  | Fet Tht. TO-220 STP20NE06L NFet 60V 20A         |
| 32   | 16   | 110-0106-00        | (203-0003592)   | Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15, Q16   | Fet Tht. TO-220 20N10L NFet 100V 20A            |
| 33   | 8    | 110-0089-00        | (203-0003597)   | U10, U11, U12, U13, U14, U15, U16, U17  | Fet Tht. PENTAWAT VN02N NFet HighSide 26V 6A    |
| 34   | 2    | 110-0069-01        | (211-0003589)   | Q44, Q45  | Trans. SM SOT-23 MMST3904 NPN 40V 0.2A          |
| 35   | 16   | 110-0067-00        | (213-0003565)   | Q17, Q18, Q19, Q20, Q21, Q22, Q23, Q24, Q25, Q26, Q27, Q28, Q29, Q30, Q31, Q32  | Transistor Tht. TO-220 TIP122 NPN 100V 5A       |
| 36   | 3    | 100-6003-00        | (221-0000972)   | U18, U22, U24   | I.C. SM SOIC 74HC245 Oct. Bus. Xcvr.            |
| 37   | 1    | 100-6000-00        | (221-0011253)   | U23   | I.C. SM SOIC DS1832S, SO-8                      |
| 38   | 8    | 100-5056-00        | (221-0001287)   | U2, U3, U4, U5, U6, U7, U9, U21   | I.C. SM SOIC 74HCT273 Oct. D F-F                |
| 39   | 2    | 100-6001-00        | (221-0003728)   | U19, U20  | I.C. SM SO 74LS138D Hex Inverter; 3-8 DC/DMX    |
| 40   | 1    | 100-6002-00        | (221-0011135)   | U8  | I.C. SM SOIC 74LS74AD SOIC-14                   |
| 41   | 1    | 100-0356-00        | (225-0003582)   | U1  | I.C. Tht. TO-3 LM338 5A Adjust. Voltage Reg.    |
| 42   | 5    | 045-               | (315-0003427)   | J2, J6, J7, J10, J13  | Con. Tht. Hdr. 10 Pin, 1 Row .156"              |
| 43   | 1    | 045-               | (315-0006910)   | J1  | Con. Tht. Hdr. 20 Pin, 2 Row .1"                |
| 44   | 2    | 045-               | (315-0003430)   | J3, J12   | Con. Tht. Hdr. 12 Pin, 1 Row .156"              |
| 45   | 1    | 045-               | (315-0003432)   | J16   | Con. Tht. Hdr. 15 Pin, 1 Row .156"              |
| 46   | 1    | 045-               | (315-0003503)   | J11   | Con. Tht. Pwr. 3 Pin, 1 Row .25"                |
| 47   | 1    | 045-               | (315-0003504)   | J14   | Con. Tht. Pwr. 6 Pin, 2 Row .25"                |
| 48   | 1    | 045-               | (315-0003505)   | J17   | Con. Tht. Pwr. 9 Pin, 3 Row .25"                |
| 49   | 3    | 045-               | (315-0003821)   | J8, J9, J15   | Con. Tht. Hdr. 9 Pin, 1 Row .156"               |
| 50   | 2    | 200-5000-08        | (407-0003117)   | F6, F8  | Fuse 3 Amp 250V Slo-Blo (Glass, Tht. 3AG)       |
| 51   | 2    | 200-5000-06        | (407-0003118)   | F7, F11   | Fuse 4 Amp 250V Slo-Blo (Glass, Tht. 3AG)       |
| 52   | 7    | 200-5000-01        | (407-0003119)   | F1, F2, F3, F4, F10, F12, F13   | Fuse 5 Amp 250V Slo-Blo (Glass, Tht. 3AG)       |
| 53   | 1    | 200-5000-03        | (407-0003121)   | F5  | Fuse 7 Amp 250V Slo-Blo (Glass, Tht. 3AG)       |
| 54   | 1    | 200-5000-05        | (407-0003122)   | F9  | Fuse 8 Amp 250V Slo-Blo (Glass, Tht. 3AG)       |
| 55   | 1    | 121-5039-00        | (415-0004788)   | POT1  | Potentiometer THT 50Ω Single Top Adjust. Trimr. |
| 56   | 1    | 165-6000-00        | (425-0006913)   | L18   | LED SM Yellow 0805 LED                          |
| 57   | 5    | 165-6001-00        | (425-0007753)   | L4, L6, L8, L16, L19  | LED SM Green Ultrabright Top                    |
| 58   | 13   | 165-6002-00        | (425-0007755)   | L1, L2, L3, L5, L7, L9, L10, L11, L12, L15, L17   | LED SM Red Ultrabright Top 0805 LED             |
| 59   | 1    | 190-5002-00        | (448-0004778)   | RLY1  | Relay Tht. GW DPDT10A DC24 2400VA PC MNT        |
| 60   | 1    | 127-5001-00        | (461-0003520)   | for BRDG 4, BRDG 5  | Heatsink, Sq. Finned Ba TO-220 Avid 531102      |
| 61   | 1    | 127-5001-02        | (461-0003534)   | for U1  | Heatsink All Large Finned Alum. TO-3            |
| 62   | 1    | 127-5001-04        | (579103B00000G) | for U1 on TO-3 LM338 5A Adj. Volt. Reg.   | Heatsink, Circular Finned (Mfg. Aavid)          |
| 63   | 4    | 240-5008-00        | (503-0004469)   | 2 pcs. for U1 1 pc. each for BRDG 4 & 5   | #6-32 Keps Nut                                  |
| 64   | 26   | 205-0004-00        | (503-0004667)   | 2 pcs. each for F1 - F13  | Fuseclip with End Stops (+ Ears)                |
| 65   | 4    | 237-5504-00        | (504-0004610)   | 2 pcs. for U1 1 pc. each for BRDG 4 & 5   | #6-32 X 3/4" PPH MS (Zinc) Screw                |
| 66   | 2    | 254-5007-02        | (507-0004544)   | for BRDG 4 & 5 (Mfg. .169" I.D. X 9/32" O.D. X 1/4")  | 1/4" Sif. Rtn. Spacer White                     |
| 67   | 5    | 254-5007-05        | (507-0004547)   | for BRDG1, 2 & 3 and for Mounting Holes   | 5/16" Sif. Rtn. Spacer White                    |

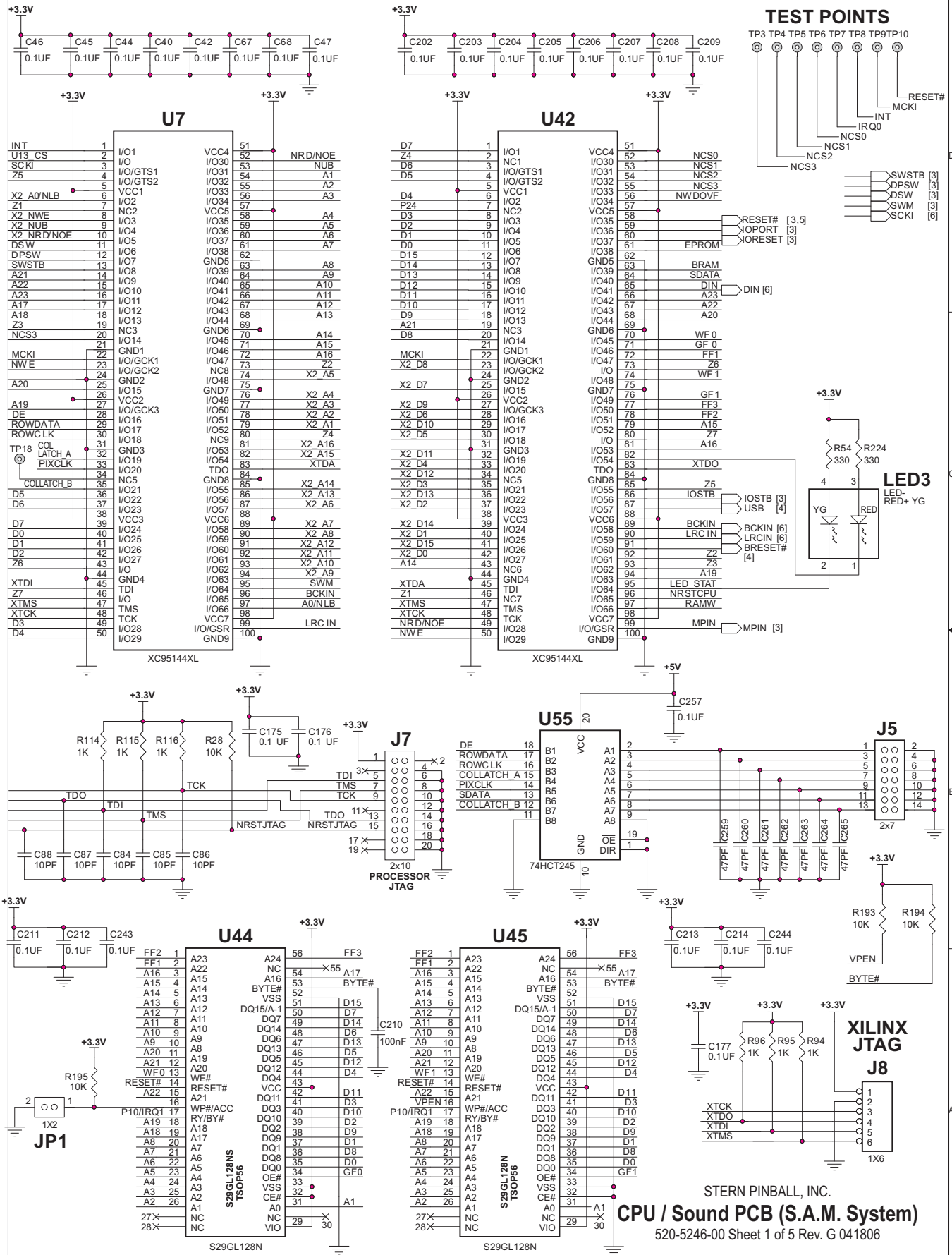


CPU / SOUND PCB S.A.M. System (520-5246-00) Schematic (Sheet 1 of 5)



Sec. 5: PCBs

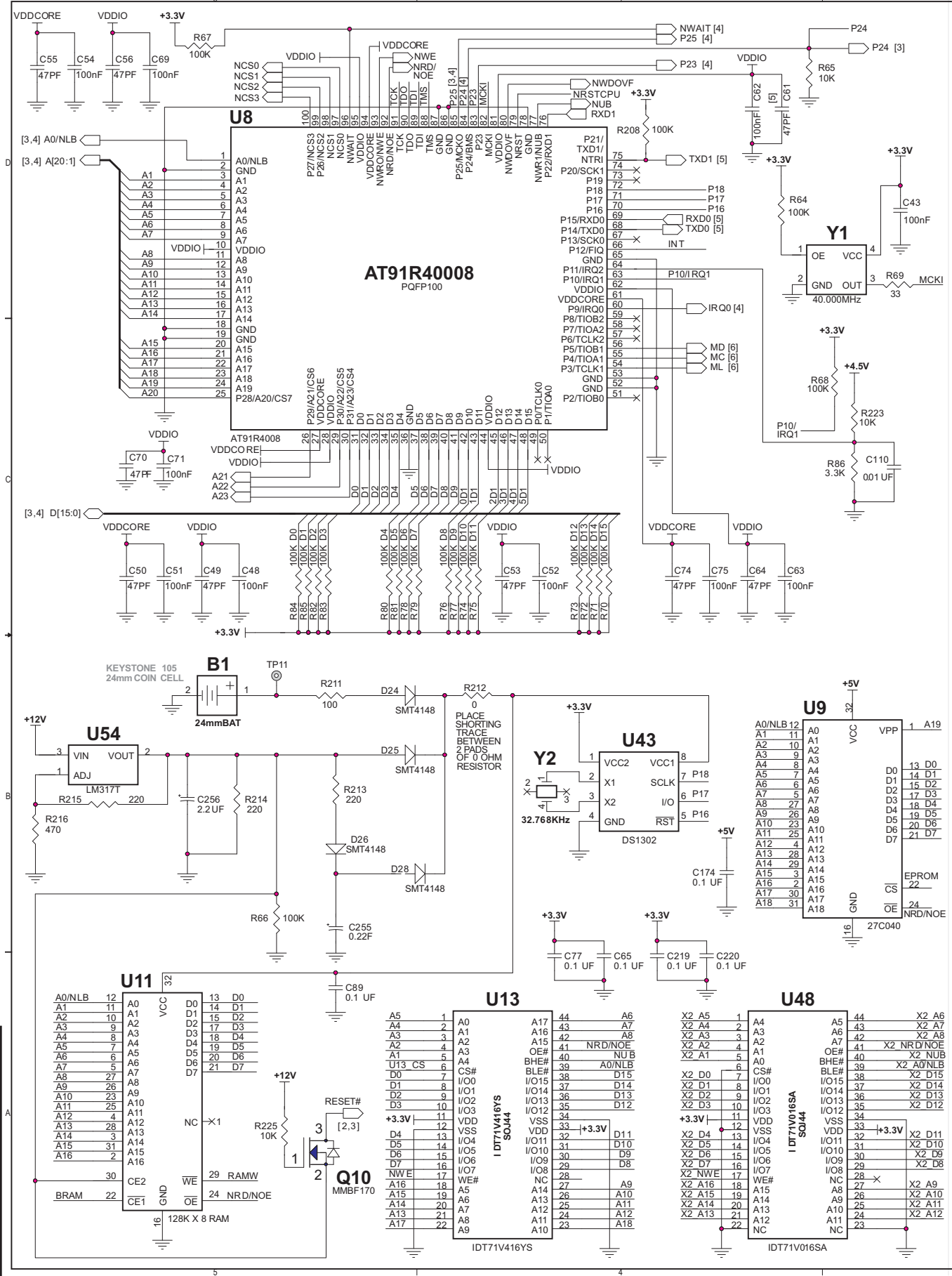




STERN PINBALL, INC.  
**CPU / Sound PCB (S.A.M. System)**  
 520-5246-00 Sheet 1 of 5 Rev. G 041806

Sec. 5: PCBs

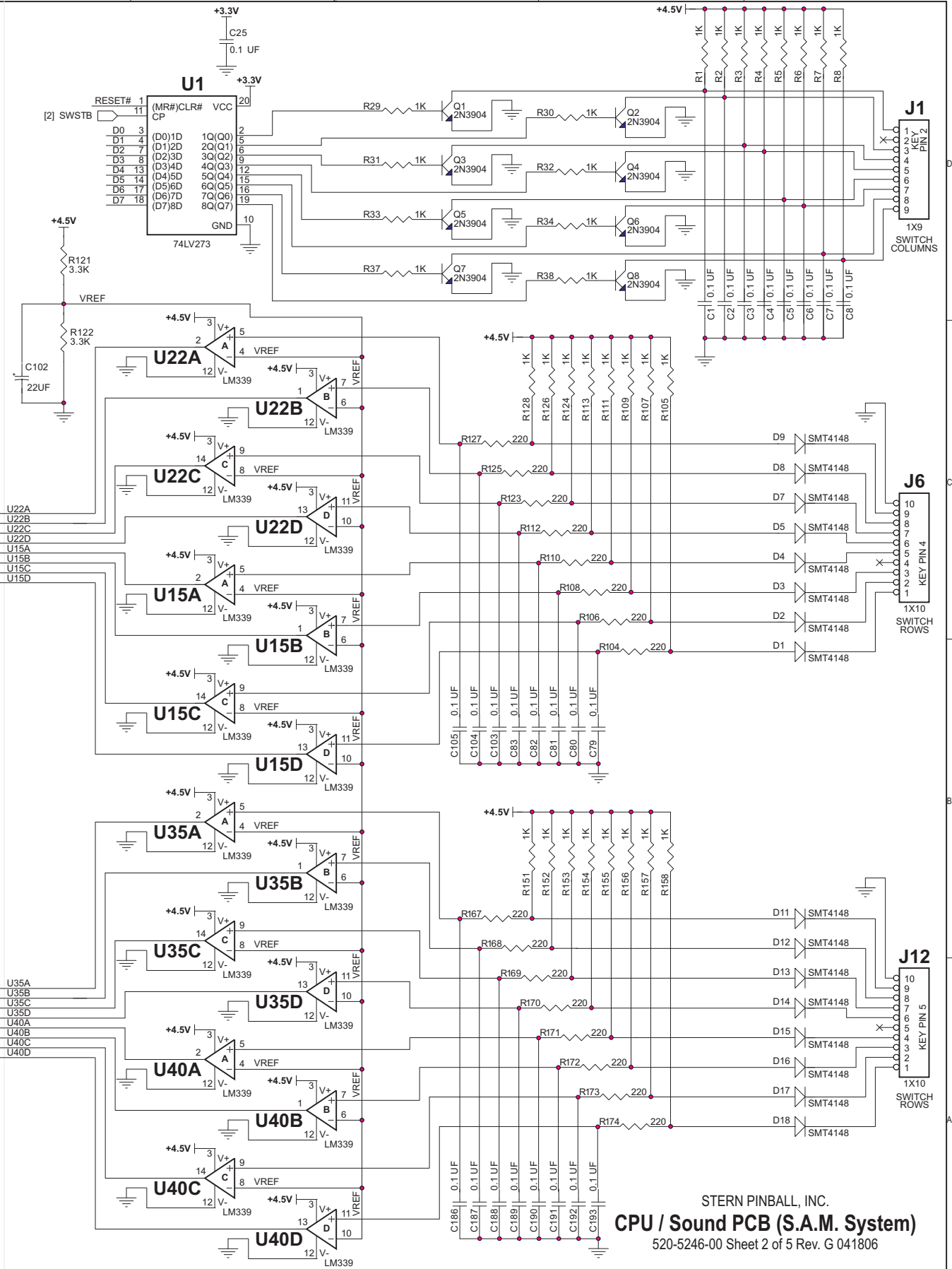
CPU / SOUND PCB S.A.M. System (520-5246-00) Schematic (Sheet 1 of 5)



Sec. 5: PCBs







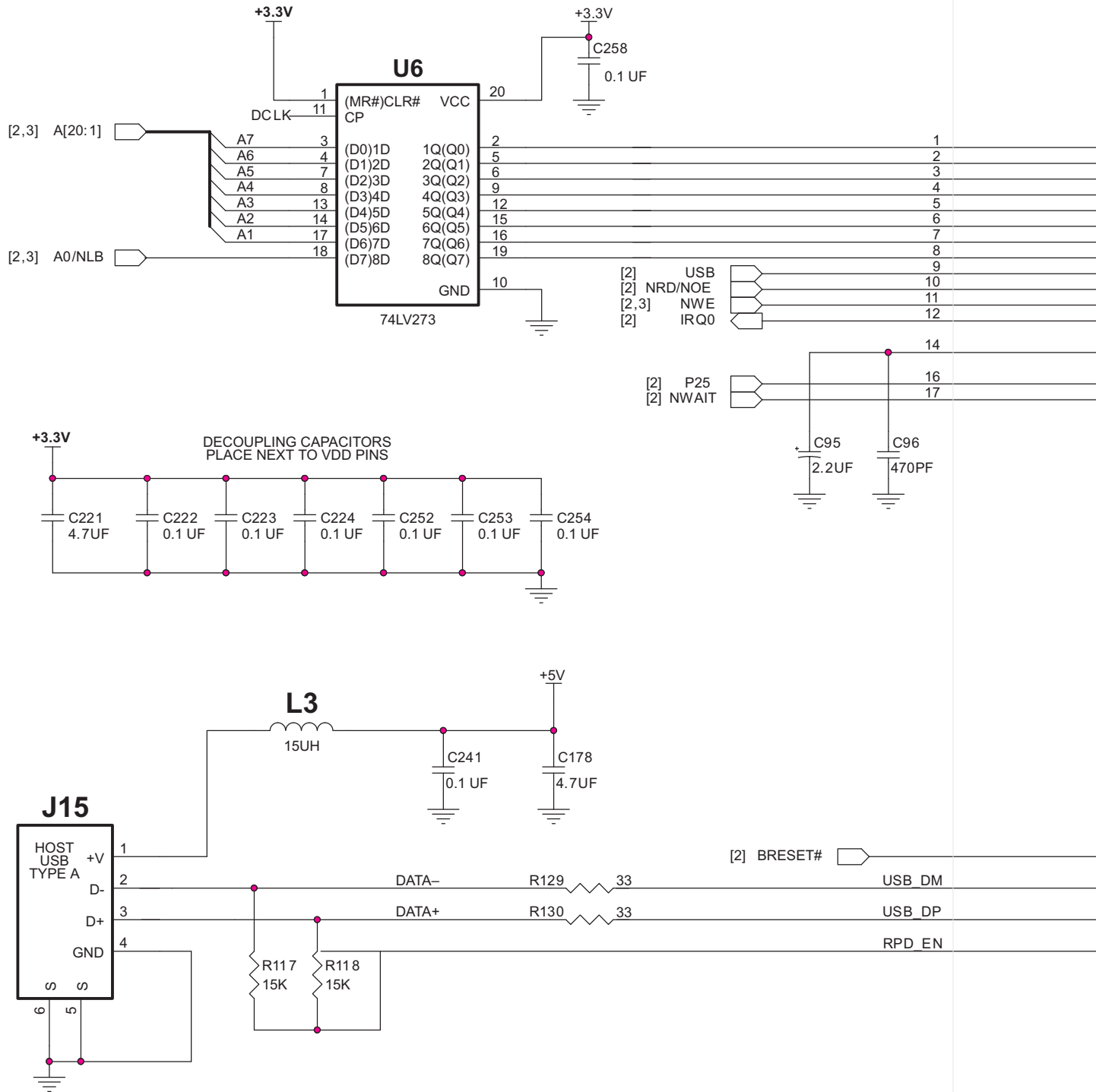
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U22B  
U22C  
U22D  
U15A  
U15B  
U15C  
U15D

U35A  
U35B  
U35C  
U35D  
U40A  
U40B  
U40C  
U40D

STERN PINBALL, INC.  
**CPU / Sound PCB (S.A.M. System)**  
 520-5246-00 Sheet 2 of 5 Rev. G 041806

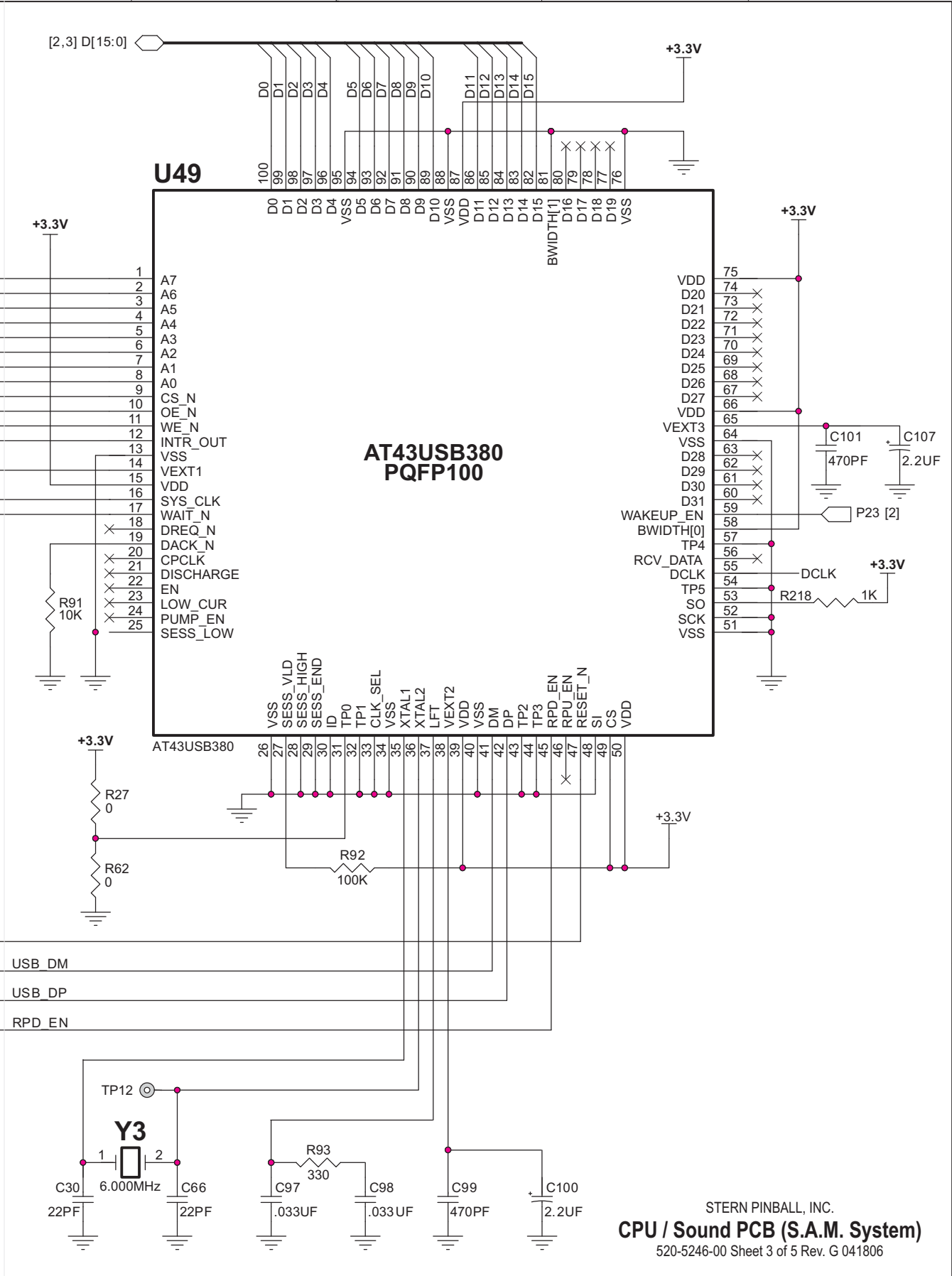
Sec. 5: PCBs





Sec. 5: PCBs



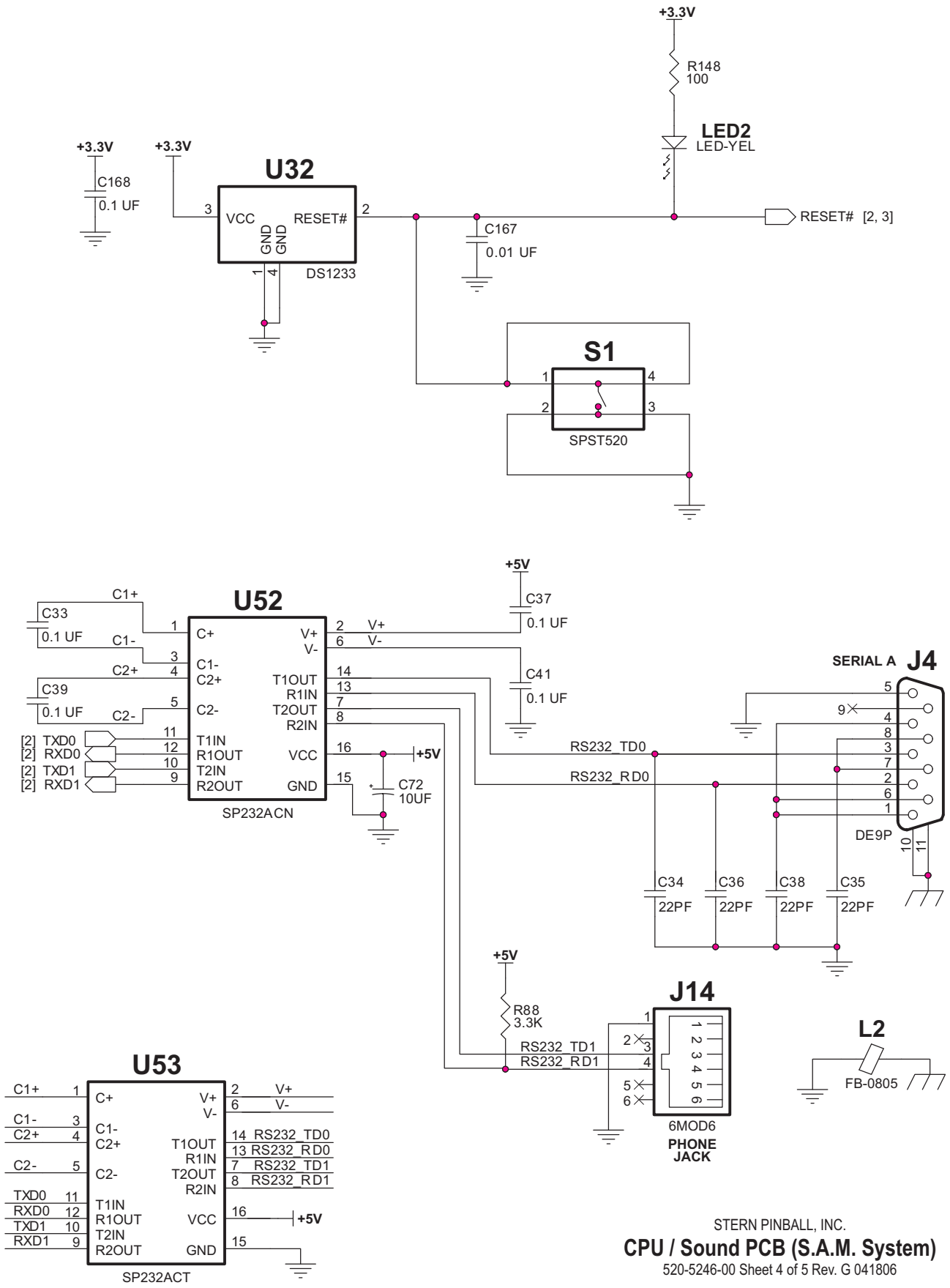


STERN PINBALL, INC.  
**CPU / Sound PCB (S.A.M. System)**  
 520-5246-00 Sheet 3 of 5 Rev. G 041806

Sec. 5: PCBs

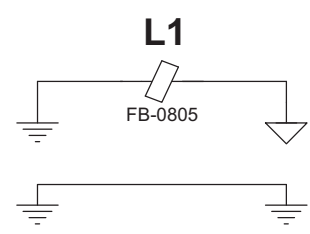
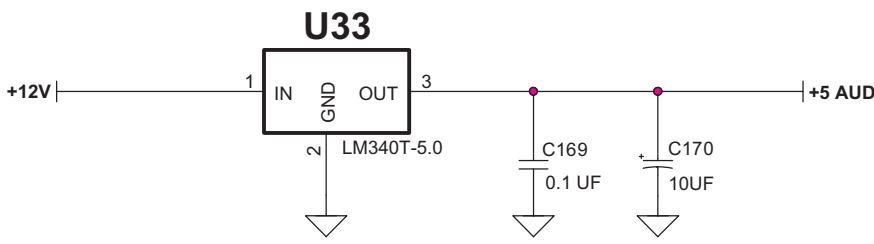
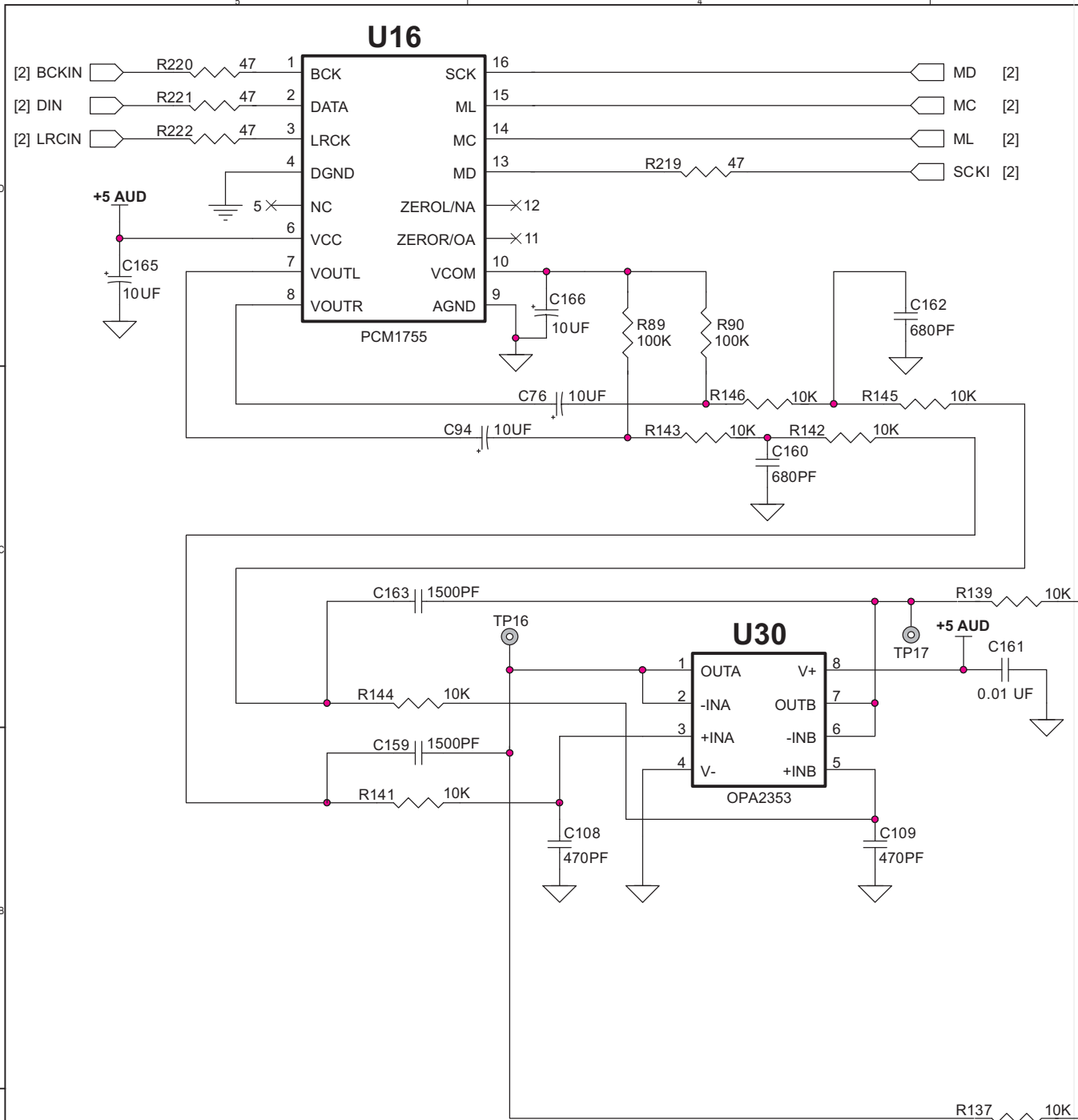






STERN PINBALL, INC.  
**CPU / Sound PCB (S.A.M. System)**  
 520-5246-00 Sheet 4 of 5 Rev. G 041806

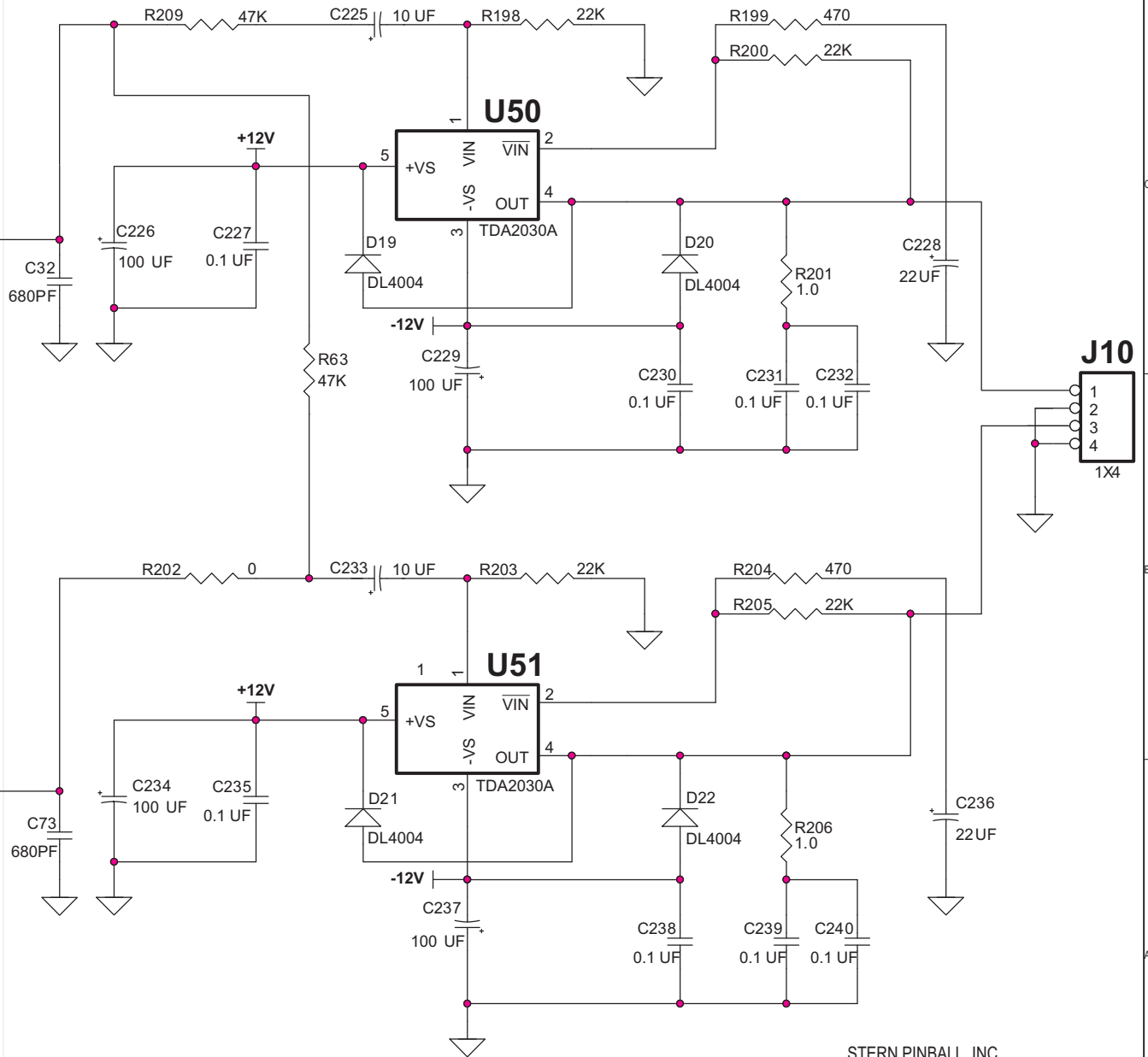
Sec. 5: PCBs



Sec. 5: PCBs



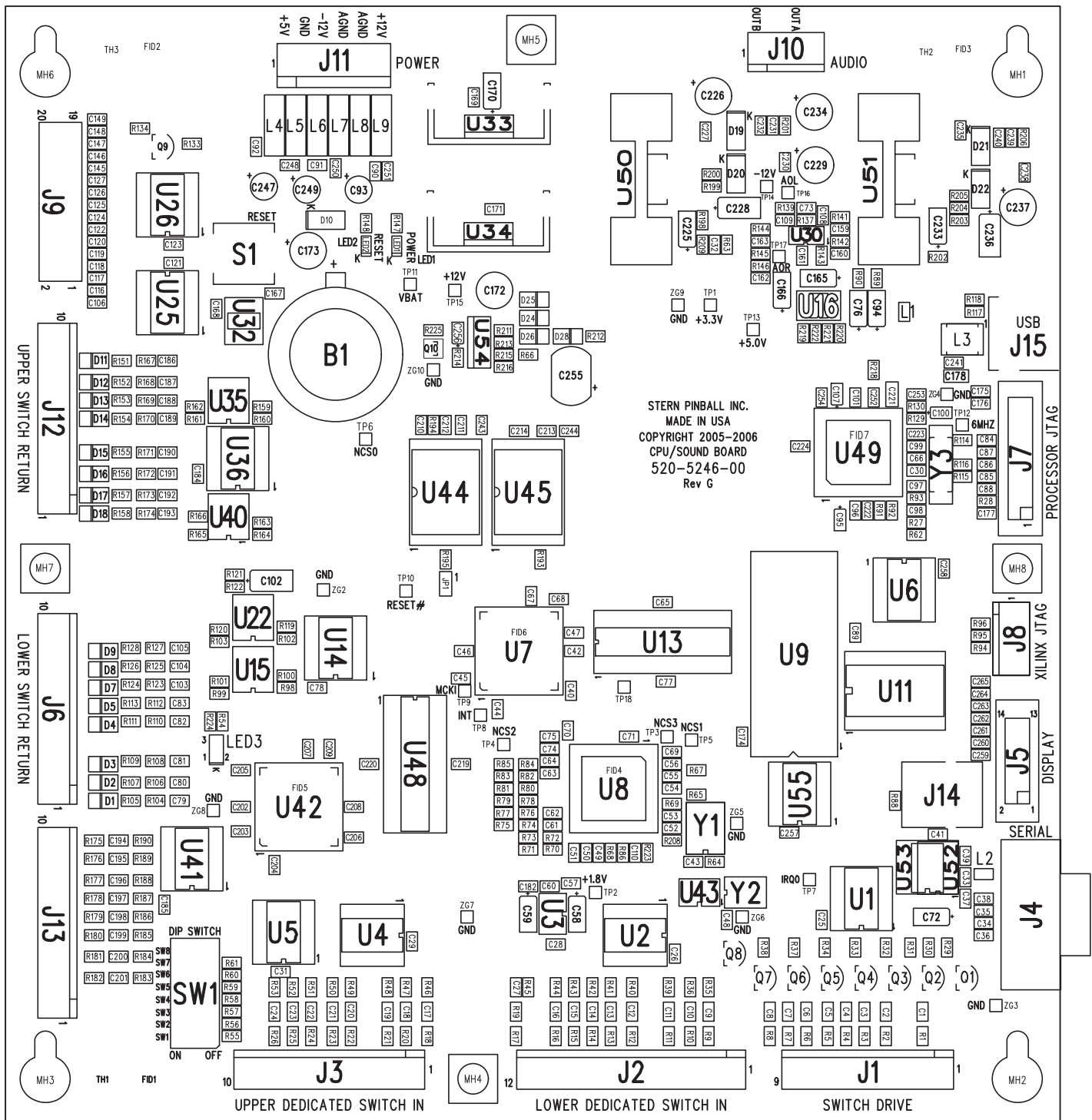




STERN PINBALL, INC.  
**CPU / Sound PCB (S.A.M. System)**  
 520-5246-00 Sheet 3 of 5 Rev. G 041806

Sec. 5: PCBs

# CPU / SOUND PCB S.A.M. System (520-5246-00) Component Layout



## CPU / SOUND PCB S.A.M. System (520-5246-00) Component Parts

| ITEM | QTY. | SPI PART NUMBER | (MFG. P.N.)   | REF-DESIGNATOR   | DESCRIPTION (SM = Surface Mount)    |
|------|------|-----------------|---------------|--|-------------------------------------|
| 1    | 1    | 520-5246-00     |               | CPU/Sound PCB (S.A.M. System), Rev. G  | (includes Items 1-90)               |
| 2    | 3    | 121-6017-00     | (101-0001790) | R27, R202, R212  | Resistor SM 0805 0.0Ω 1/10W 5%      |
| 3    | 24   | 121-6108-00     | (101-0001792) | R201, R206   | Resistor SM 0805 1.0Ω 1/10W 5%      |
| 4    | 3    | 121-6002-00     | (101-0001820) | R9, R10, R11, R12, R13, R14, R15, R16, R18, R20, R21, R22, R23, R24, R25, R26, R175, R176, R177, R178, R179, R180, R181, R182, R147, R148, R211  | Resistor SM 0805 Film 100Ω 1/10W 5% |
| 5    | 24   | 121-6019-00     | (101-0001823) | R64, R66, R67, R68, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R89, R90, R92, R208, R28, R65, R91, R98, R99, R100, R101, R102, R103, R119, R120, R134, R137, R139, R141, R142, R143, R144, R145, R146, R159, R160, R161, R162, R163, R164, R165, R166, R193, R194, R195, R223, R225, R117, R118 | Resistor SM 0805 100KΩ 1/10W 5%     |
| 6    | 33   | 121-6020-00     | (101-0001827) |  | Resistor SM 0805 Film 10KΩ 1/10W 5% |
| 7    | 2    | 121-6021-00     | (101-0001880) |  | Resistor SM 0805 15KΩ 1/10W 5%      |

Parts List Continued Next Page.

Sec. 5: PCBs



# CPU / SOUND PCB S.A.M. System (520-5246-00) Parts Continued

| ITEM | QTY. | SPI PART NUMBER | (MFG. P.N.)   | REF-DESIGNATOR  | DESCRIPTION (SM = Surface Mounted)  |
|------|------|-----------------|---------------|---|---|
| 8    | 47   | 121-6022-00     | (101-0001905) | R1, R2, R3, R4, R5, R6, R7, R8, R29, R30, R31, R32, R33, R34, R37, R38, R55, R56, R57, R58, R59, R60, R61, R94, R95, R96, R105, R107, R109, R111, R113, R114, R115, R116, R124, R126, R128, R133, R151, R152, R153, R154, R155, R156, R157, R158, R218, LED2  | Resistor SM 0805 1K $\Omega$ 1/10W 5%   |
| 9    | 19   | 121-6004-00     | (101-0001943) | R104, R106, R108, R110, R112, R123, R125, R127, R167, R168, R169, R170, R171, R172, R173, R174, R213, R214, R215  | Resistor SM 0805 Film 220 $\Omega$ 1/10W 5%   |
| 10   | 4    | 121-6005-00     | (101-0001849) | R198, R200, R203, R205  | Resistor SM 0805 Film 22K $\Omega$ 1/10W 5%   |
| 11   | 5    | 121-6023-00     | (101-0001889) | R45, R86, R88, R121, R122   | Resistor SM 0805 3.3K $\Omega$ 1/10W 5%   |
| 12   | 3    | 121-6024-00     | (101-0002009) | R69, R129, R130   | Resistor SM 0805 33 $\Omega$ 1/10W 5%   |
| 13   | 2    | 121-6006-00     | (101-0002012) | R54, R93  | Resistor SM 0805 Film 330 $\Omega$ 1/10W 5%   |
| 14   | 24   | 121-6013-00     | (101-0002035) | R35, R36, R39, R40, R41, R42, R43, R44, R46, R47, R48, R49, R50, R51, R52, R53, R183, R184, R185, R186, R187, R188, R189, R190  | Resistor SM 0805 Film 39K $\Omega$ 1/10W 5%   |
| 15   | 2    | 121-6008-00     | (101-0002046) | R17, R19  | Resistor SM 0805 Film 4.7K $\Omega$ 1/10W 5%  |
| 16   | 4    | 121-6014-00     | (101-0002065) | R219, R220, R221, R222  | Resistor SM 0805 Film 47 $\Omega$ 1/10W 5%  |
| 17   | 3    | 121-6025-00     | (101-0002067) | R199, R204, R216  | Resistor SM 0805 470 $\Omega$ 1/10W 5%  |
| 18   | 1    | 121-6015-00     | (101-0002071) | R209  | Resistor SM 0805 Film 47K $\Omega$ 1/10W 5%   |
| 19   | 99   | 125-6001-00     | (121-0000056) | C25, C26, C27, C29, C31, C33, C37, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C51, C52, C54, C62, C64, C65, C67, C68, C69, C71, C75, C77, C78, C79, C80, C81, C82, C83, C89, C90, C91, C92, C103, C104, C105, C121, C123, C168, C169, C171, C174, C175, C176, C177, C182, C184, C185, C186, C187, C188, C189, C190, C191, C192, C193, C202, C203, C204, C205, C206, C207, C208, C209, C210, C211, C212, C213, C214, C219, C220, C222, C223, C224, C227, C230, C231, C232, C235, C238, C239, C240, C241, C243, C244, C248, C250, C251, C252, C253, C254, C257, C258 | Capacitor SM 0805 Cer. 1UF 50V 10% X7R  |
| 20   | 3    | 125-6013-00     | (121-0000077) | C28, C57, C60   | Capacitor SM 0805 Cer. 1UF 10V 10% X7R  |
| 21   | 1    | 125-6014-00     | (121-0000086) | C97   | Capacitor SM 0805 Cer. 3300PF 50V 5% X7R  |
| 22   | 7    | 125-6002-00     | (121-0000096) | C259, C260, C261, C262, C263, C264, C265  | Capacitor SM 0805 Cer. 470PF 50V 5% NPO   |
| 23   | 3    | 125-6015-00     | (121-0000269) | C102, C228, C236  | Capacitor SM Case D Tant 22UF 25V 20%   |
| 24   | 11   | 125-6003-00     | (121-0004236) | C1, C2, C3, C4, C5, C6, C7, C8, C110, C161, C167  | Capacitor SM 0805 Cer. 01UF 50V 10% X7R   |
| 25   | 49   | 125-6016-00     | (121-0004245) | C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C49, C50, C53, C55, C56, C61, C63, C70, C74, C106, C116, C117, C118, C119, C120, C122, C124, C125, C126, C127, C145, C146, C147, C148, C149, C194, C195, C196, C197, C198, C199, C200, C201  | Capacitor SM 0805 Cer. 47PF 50V 5% NPO  |
| 26   | 4    | 125-6017-00     | (121-0005317) | C95, C100, C107, C256   | Capacitor SM Case A Tant 2.2UF 16V 10%  |
| 27   | 6    | 125-6004-00     | (121-0005318) | C30, C34, C35, C36, C38, C66  | Capacitor SM 0805 Cer. 22PF 100V 5% NPO   |
| 28   | 2    | 125-6005-00     | (121-0006113) | C178, C221  | Capacitor SM 1206 Cer. 4.7PF 16V 20% Y5V  |
| 29   | 2    | 125-6006-00     | (121-0007394) | C159, C163  | Capacitor SM 603 Cer. 1500PF 25V 10% X7R  |
| 30   | 10   | 125-6007-00     | (121-0007853) | C58, C59, C72, C76, C94, C165, C166, C170, C225, C233   | Capacitor SM Case C Tant 10UF 16V 20%   |
| 31   | 1    | 125-6018-00     | (121-0010097) | C98   | Cap. SM 805 Cer. .033UF 50V +80/-20% Y5V  |
| 32   | 4    | 125-6009-00     | (121-0010493) | C32, C73, C160, C162  | Capacitor SM 805 Cer. 680PF 50V 5% NPO  |
| 33   | 6    | 125-6019-00     | (134-0005415) | C172, C173, C226, C229, C234, C237  | Capacitor Tht. Radial Alum. 100UF 35V 20%   |
| 34   | 3    | 125-6020-00     | (134-0007336) | C93, C247, C249   | Capacitor Tht. Radial Alum. 47UF 35V 20%  |
| 35   | 1    | 125-6010-00     | (139-0006487) | C255  | Capacitor Tht. .22UF 5.5V, Gold, SD, Vert   |
| 36   | 6    | 125-6011-00     | (161-0004959) | L4, L5, L6, L7, L8, L9  | Ind.-SM Ferrite 100 $\Omega$ 1234 Smt.  |
| 37   | 2    | 125-6012-00     | (161-0007286) | L1, L2  | Ind.-SM 805 Bead 600 $\Omega$ 100MHz 25% 500mA  |
| 38   | 1    | 125-6021-00     | (161-0009686) | L3  | Ind.-SM EP Inductor 15uH 1100mA 20%   |
| 39   | 20   | 125-6000-00     | (181-0004347) | D1, D2, D3, D4, D5, D7, D8, D9, D11, D12, D13, D14, D15, D16, D17, D18, D24, D25, D26, D28, D10, D19, D20, D21, D22   | Diode SM MiniMELFDL/L4148 100V 500mW  |
| 40   | 5    | 112-6001-00     | (181-0004478) | Q10   | Diode SM MELF DL4004 400V 1.0A  |
| 41   | 1    | 110-6000-00     | (201-0006808) | Q1  | Fet-SM SOT-23 MMBF170 N-Chnnl. Fet  |
| 42   | 9    | 110-0069-00     | (213-0003546) | Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8, Q9  | Transistor Tht. TO-92 2N3904 NPN 40V 0.2A   |
| 43   | 1    | 124-6000-00     | (213-0005687) | U34   | Trans. Tht. TO-220 LT1086 3.3V 1.5A Volt Reg.   |
| 44   | 8    | 100-6004-00     | (221-0001000) | U2, U4, U5, U14, U25, U26, U36, U41   | I.C.-SM SO 74LVC245 Oct. Bus Xcvr.  |
| 45   | 1    | 100-5048-00     | (221-0003716) | U55   | I.C.-SM SOIC 74HCT245DW Octal Line Xvr. W/3S  |
| 46   | 4    | 100-6005-00     | (221-0003718) | U15, U22, U35, U40  | I.C.-SM SO LM339 Quad Diff. Comp.   |
| 47   | 1    | 100-6006-00     | (221-0005249) | U43   | I.C.-SM SOIC DS1302 Time Keeper   |
| 48   | 1    | 100-6008-00     | (221-0006578) | U52   | I.C.-SM SOIC SP232A SO-16   |
| 49   | 1    | 100-6009-00     | (221-0006914) | U32   | I.C.-SM SOT-223 DS1233A2-15 Reset   |
| 50   | 1    | 100-6007-00     | (221-0006919) | U30   | I.C.-SM OPA2353 Dual CMOS 0V/1A MSOP-8  |
| 51   | 1    | 100-6018-00     | (221-0006940) | U48   | I.C.-SM SOJ IDT71V016SA15Y SOJ-44   |
| 52A  | 1    | 100-6016-00     | (221-0007056) | U7 (must be programmed)   | U7 (I.C.-SM TQFP CPLD 144 Macro Cell 3.3V)  |
| 52B  | 1    | 100-6017-00     | (221-0007056) | U42 (must be programmed)  | U42 (I.C.-SM TQFP CPLD 144 Macro Cell 3.3V)   |
| 53   | 1    | 124-6001-00     | (221-0007298) | U3  | I.C.-SM SOIC LT1503CS8-1.8  |
| 54   | 1    | 100-6012-00     | (221-0010735) | U11   | I.C.-SM SOIC CY62128 SRAM 128Kx8 3V LP SO32   |
| 55   | 1    | 100-6013-00     | (221-0010736) | U49   | I.C.-SM QFP-L AT43 USB380 Processor USB 2.0   |
| 56   | 1    | 100-6014-00     | (221-0010738) | U16   | I.C.-SM SSO PCM1755 24-Bit Audio DAC 16-Pi  |
| 57   | 1    | 100-6010-00     | (221-0010978) | U13   | I.C.-SM SOJ IDT71V416S15Y SOJ-44  |
| 58   | 1    | 100-6011-00     | (221-0010981) | U44   | I.C.-SM TSSOP S29GL256N11 256MB Flash   |
| 59   | 1    | 100-6015-00     | (221-0011102) | U1  | I.C.-SM SOIC 74LV273 SOIC-20  |
| 60   | 1    | 124-6002-00     | (225-0003581) | U54   | I.C.-Tht. TO-220 LM317T Adjustable Volt Reg.  |
| 61   | 2    | 100-5016-20     | (225-0003635) | U50, U51  | I.C.-Tht. Pentawat TDA2030 18W Amplifier  |
| 62   | 1    | 124-6003-00     | (225-0006921) | U33   | I.C.-Tht. TO-220 LM340T 5V 1A Volt Regulator  |
| 63   | 1    | 077-5217-00     | (301-0004285) | SU9   | Socket DIP/SIP 32-Pin, Tin, .6, Dip   |
| 64   | 2    | n/a             | (303-0005944) | TP1, TP2  | Test Pt. All Test Point, White, Miniature   |
| 65   | 1    | 045-            | (315-0003511) | JP1   | Con.-Tht. Header 2 Pin, 1 Row, VT, Tin, .1"   |
| 66   | 1    | 045-            | (315-0004097) | J11   | Con.-Tht. Header 6 Pin, 1 Row, VT, Tin, .156"   |
| 67   | 1    | 045-            | (315-0004121) | J1  | Con.-Tht. Header 9 Pin, 1 Row, VT, Tin, .156"   |
| 68   | 4    | 045-            | (315-0004122) | J3, J6, J12, J13  | Con.-Tht. Hdr. 10 Pin, 1 Row, VT, Tin, .156"  |
| 69   | 1    | 045-            | (315-0004124) | J8  | Con.-Tht. Header 6 Pin, 1 Row, VT, Tin, .1"   |
| 70   | 1    | 045-            | (315-0006776) | J14   | Con.-Tht. Hdr. 6 Pos. Phone Jack, Vertical  |
| 71   | 1    | 045-            | (315-0006910) | J9  | Con.-Tht. Header 20 Pin, 2 Row, VT, Tin, .1"  |
| 72   | 1    | 045-            | (315-0009252) | J10   | Con.-Tht. Header 4 Pin, 1 Row, VT, Tin, .156"   |
| 73   | 1    | 045-            | (315-0009520) | J2  | Con.-Tht. Hdr. 12 Pin, 1 Row, VT, Tin, .156"  |
| 74   | 1    | 045-            | (315-0009626) | J15   | Con.-Tht. 4 Pos. USB Recept, VT, WHT/BLK  |
| 75   | 1    | 045-            | (315-0009627) | J4  | Con.-Tht. D-Sub 9 Pos, VT, w/lock & Hex Sc.   |
| 76   | 1    | 045-            | (315-0010979) | J5  | Con.-Tht. Hdr. 14 Pin, 2 Row, VT, Gold, .1" Shrou.  |
| 77   | 1    | 140-6000-00     | (401-0007295) | Y2  | XTAL -SM 32.768MHz Cl 12.5 FSR327   |
| 78   | 1    | 140-6001-00     | (401-0010737) | Y3  | XTAL -SM 600MHz 20PF  |
| 79   | 1    | 140-6002-00     | (403-0005489) | Y1  | Osc.-SM SO 400MHz 5V Tristate CMOS  |
| 80   | 1    | 515-            | (421-0010979) | B1  | Battery (Coin Cell 24.5mm) Holder with clip   |
| 81   | 1    | 000-0644-01     | (421-0010980) | for B1  | Coin Cell 3V 265mAh 24X3 mm (CR2430)  |
| 82   | 1    | 165-6003-00     | (425-0005320) | LED1  | LED SM Green 0805 LED   |
| 83   | 1    | 165-6004-00     | (425-0010803) | LED3  | LED SM Dual Red/Green 1210 Top  |
| 84   | 1    | 182-5002-00     | (450-0004750) | SW1   | 8-Position Dip Switch<br>Spst. 16 Pin X8 Slide 5VDC 100ma<br>White Push-Button Reset Switch<br>Spst. 4 Pin Momentary 24VDC 50ma                                   |
| 85   | 1    | 182-5001-00     | (450-0004752) | S1  | Heatsink All Vert Mount Ba TO-220<br>Heatsink All Vert Mount Ba TO-220<br>#4-40 X 3/8" PPH MS Sems (Zinc) Screw<br>#4-40 Keps Nut<br>5/16" Sif. Rtn. Spacer White |
| 86   | 2    | 127-5001-00     | (461-0003520) | for U33, U34  |   |
| 87   | 2    | 127-5001-01     | (461-0003528) | for U50, U51  |   |
| 88   | 4    | 237-5909-01     | (504-0004604) | for Heat Sinks U33, U34, U50, U51   |   |
| 89   | 4    | 240-5318-00     | (503-0004457) | for Heat Sinks U33, U34, U50, U51   |   |
| 90   | 4    | 254-5007-05     | (507-0004547) | for Mntg. Holes (Mfg. .169" I.D. X 9/32" O.D. X 5/16")  |   |

**BOOT FLASH**  
LOCATION U9  
8MB EPROM

960-5016-00 :  
(No File, Unprogrammed)

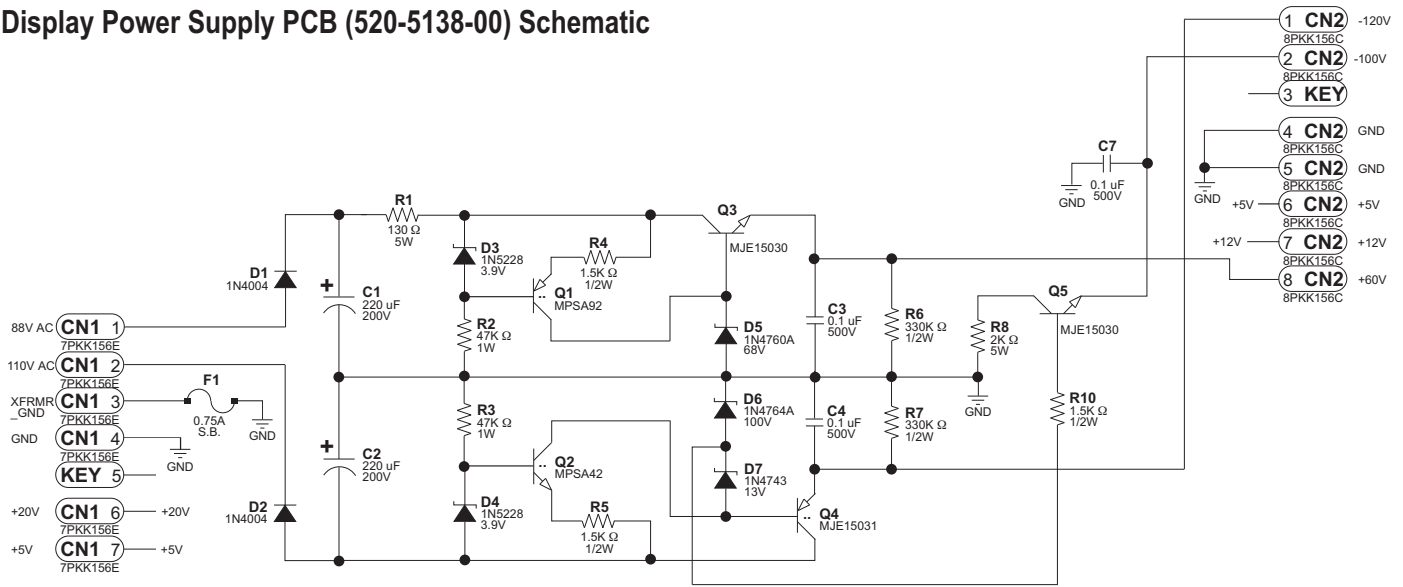
965-BOOT-SAM:  
(Latest Version Programmed)

Sec. 5: PCBs

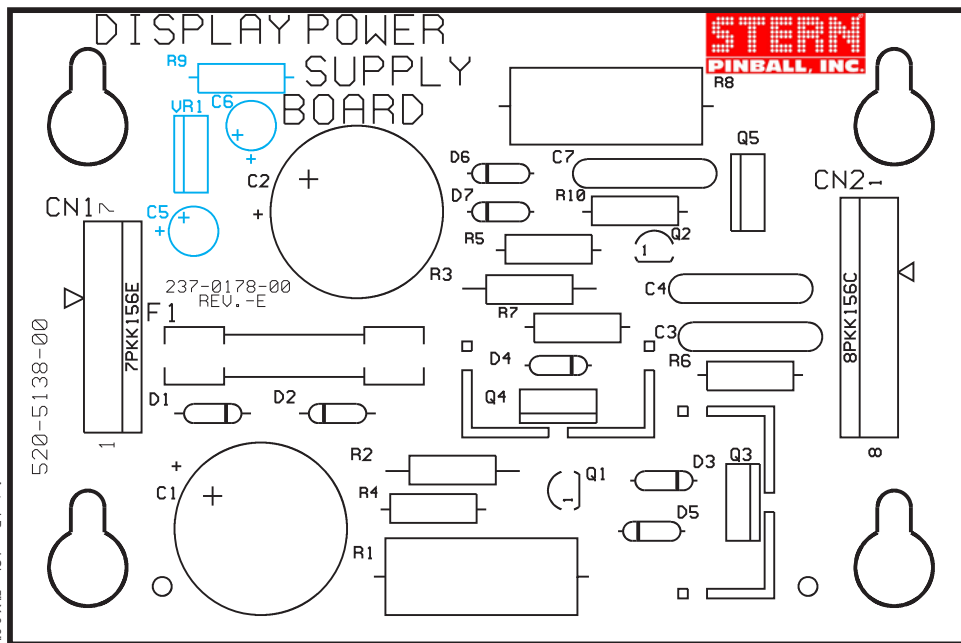




# Display Power Supply PCB (520-5138-00) Schematic



# Display Power Supply PCB (520-5138-00) Component Layout & Parts

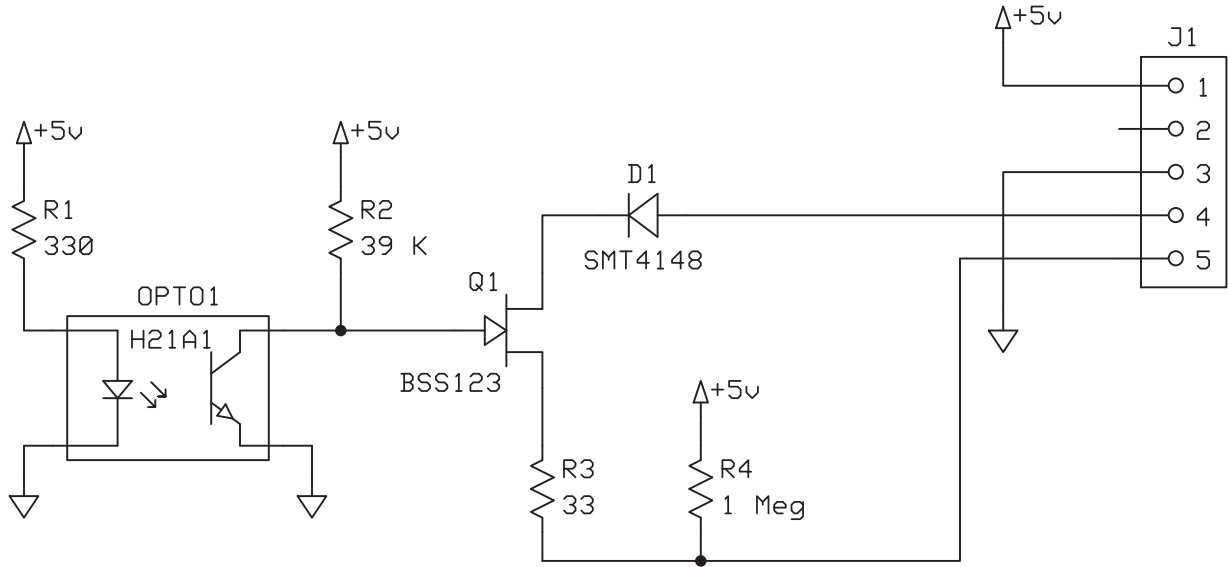


| ITEM | QTY | PART NUMBER        | REF-DESIGNATOR                  | DESCRIPTION (NS = Not Stuffed)     |
|------|-----|--------------------|---------------------------------|------------------------------------|
| —    | 1   | <b>520-5138-00</b> | <b>Display Power Supply PCB</b> | <i>(includes Items 1-2 + 4-24)</i> |
| 1    | 2   | 125-5044-00        | C1, C2                          | 220uF, 200v, Radial Lytic Cap.     |
| 2    | 3   | 125-5035-00        | C3, C4, C7                      | 0.1uF, 500v, Ceramic Disk Cap.     |
| 3    | 0   | 125-5003-00        | (C5, C6: NS)                    | 22uF, 35v, Rad Lytic Cap           |
| 4    | 1   | 045-5015-07        | CN1                             | 7PKK156E (PIN5=KEY)                |
| 5    | 1   | 045-5015-08        | CN2                             | 8PKK156 (PIN3=KEY)                 |
| 6    | 2   | 112-5003-00        | D1, D2                          | 1N4004, Diode                      |
| 7    | 2   | 112-0053-00        | D3, D4                          | 1N5228, 3.9v, Diode                |
| 8    | 1   | 112-0062-00        | D5                              | 1N4760A, 68v, Diode                |
| 9    | 1   | 112-0049-00A       | D6                              | 1N4764A, 100v, Diode               |
| 10   | 1   | 112-0061-00        | D7                              | 1N4743, 13v, Diode                 |
| 11   | 1   | 200-5000-17        | F1                              | 3/4A (0.75A) S.B. Fuse             |
| 12   | 2   | 205-0004-00        | F1                              | Fuse Clip                          |
| 13   | 1   | 110-0100-00        | Q1                              | MPSA92, Transistor                 |
| 14   | 1   | 110-0082-00        | Q2                              | MPSA42, Transistor                 |
| 15   | 2   | 110-0101-00        | Q3, Q5                          | MJE15030, Transistor               |
| 16   | 2   | 535-5000-11        | Q3, Q4                          | Heatsinks - AAVID #563002          |
| 17   | 2   | 240-5008-00        | Q3, Q4                          | #6-32 KEPS Nut                     |
| 18   | 2   | 237-5501-00        | Q3, Q4                          | #6-32 X 3/8" PPH Screw             |
| 19   | 1   | 110-0103-00        | Q4                              | MJE15031, Transistor               |
| 20   | 1   | 121-5061-00        | R1                              | 130 Ω Resistor SMT, 5W             |
| 21   | 2   | 121-5060-00        | R2, R3                          | 47K Ω Resistor SMT, 1W             |
| 22   | 3   | 121-5038-00        | R4, R5, R10                     | 1.5K Ω Resistor SMT, 1/2W (R9: NS) |
| 23   | 2   | 121-5059-00        | R6, R7                          | 330K Ω Resistor SMT, 1/2W          |
| 24   | 1   | 121-5062-00        | R8                              | 2K Ω Resistor SMT, 5W              |
| 25   | 0   | 124-5003-00        | (VR1: NS)                       | 7812CT                             |

Sec. 5: PCBs

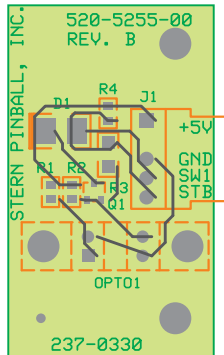


# In-Line OPTO PCB (520-5255-00) for 1-Bank Drop Target Module (515-7565-00) Schematic

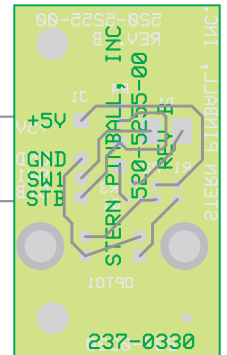


## In-Line OPTO PCB (520-5255-00) Component Layout & Parts

Connector Side



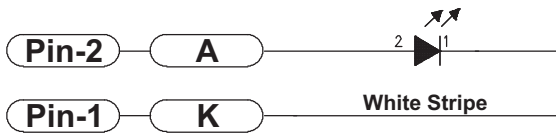
OPTO Side



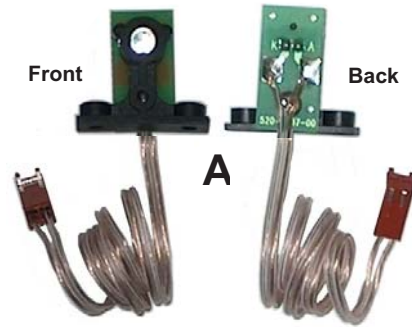
| ITEM | QTY. | SPI PART NR.       | (MFG. P.N.)        | REF-DESIGNATOR          | DESCRIPTION (SMT = Surface Mount)           |
|------|------|--------------------|--------------------|-------------------------|---|
| —    | 1    | <b>520-5255-00</b> | Ref. Only 237-0330 | <b>In-Line OPTO PCB</b> | <b>Complete PCB Assembly</b>                |
| 1    | 1    | 121-6006-00        | (101-0002012)      | R1                      | Resistor SMT 0805, 330 Ω 1/10W 5%           |
| 2    | 1    | 121-6013-00        | (101-0002035)      | R2                      | Resistor SMT 0805, 39K Ω 1/10W 5%           |
| 3    | 1    | 121-6024-01        | (101-0002350)      | R3                      | Resistor SMT 1206, 33 Ω 1/10W 5%            |
| 4    | 1    |                    | (101-0001907)      | R4                      | Resistor SMT 0805, 1M Ω 1/10W 5%            |
| 5    | 1    |                    | (181-0004888)      | D1                      | Diode SMT4148, 1N4148W 100V 350MW SOD123    |
| 6    | 1    | 110-6002-00        | (211-0011181)      | Q1                      | Transistor BSS123, 100V 6 Ω N-CHAN SOT-23   |
| 7    | 1    |                    | (315-0003439)      | J1                      | Conn., Hdr., 5-PIN, 1-ROW KEY PIN-2 CON-THT |
| 8    | 1    | 112-6002-00        | (430-0011146)      | OPTO1                   | SLOTTED OPTO, FI-23FF, H21A1 LEDO-THT       |

If a part is required where a part number is not provided, call Technical Support (see back of cover).

# Playfield Switches OPTO Transceiver PCBs (500-6775-01) Schematic



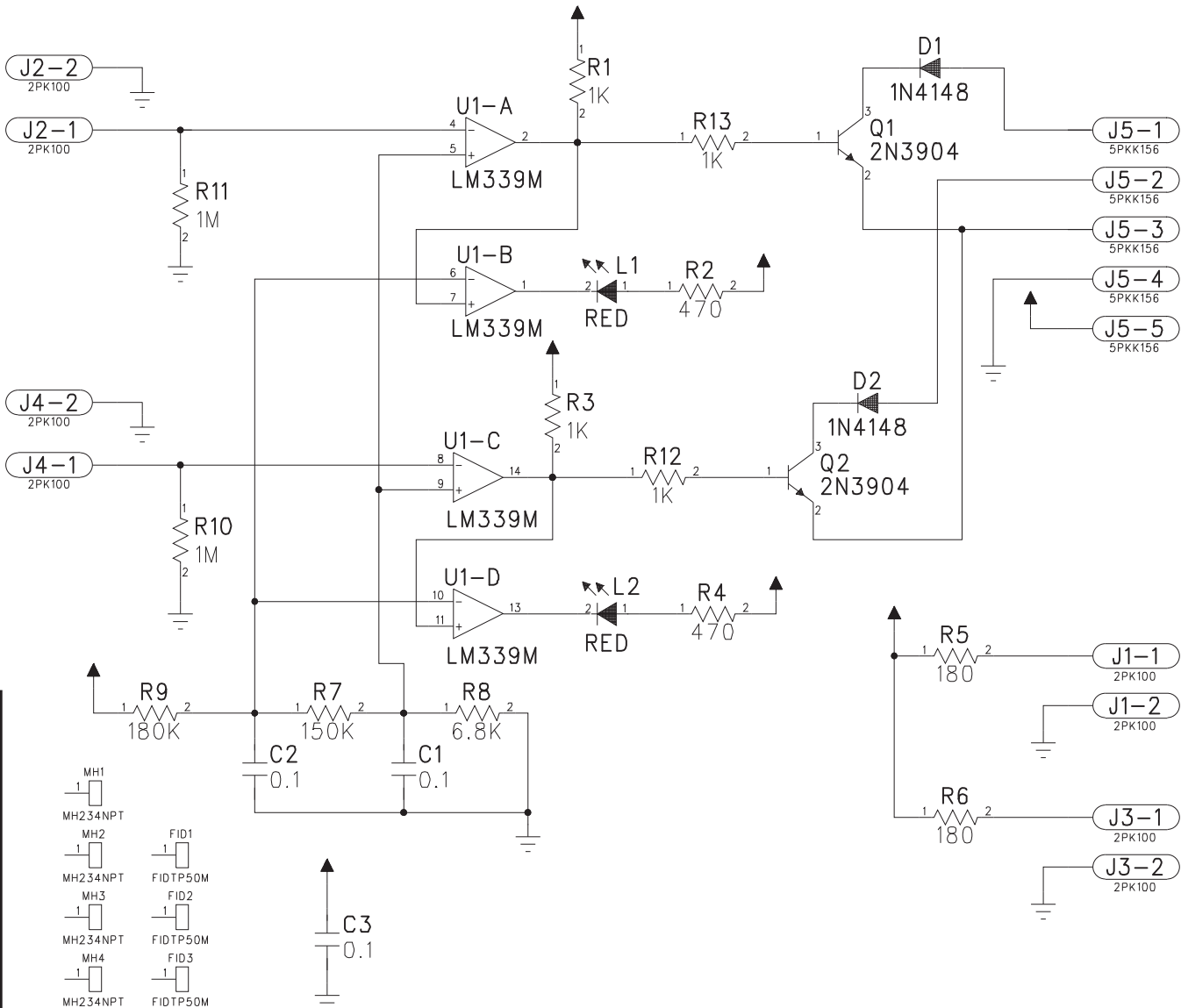
**Mini PCB  
OPTO 15" Lead  
(Black Bracket)  
500-6775-01**



## Playfield Switches OPTO Transceiver PCBs (500-6775-01) Component Layout & Parts

| ITEM                | QTY           | PART NUMBER        | REF-DESIGNATOR  | DESCRIPTION                                 |
|---------------------|---------------|--------------------|---|---|
| <b>A, B &amp; D</b> | <b>2 pair</b> | <b>500-6775-01</b> | <b>Mini OPTO Transceiver PCB Assembly (Items A PCB + B + C)</b> |   |
| <b>A</b>            | 1             | 520-5237-00        | <b>Mini OPTO Transceiver PCB</b>                                | (includes Items A-1 – A-3)                  |
| A-1                 | 1             | 545-6092-00        |   | Black Bracket (Plastic) Holder              |
| A-2                 | 1             | 237-5909-00        |   | #4-40 X 1/4 PPH Screw                       |
| A-3                 | 1             | <b>165-5052-00</b> |   | <b>LED (Ultra Bright Red)</b>               |
| <b>B</b>            | 1             | <b>601-5023-15</b> | K, A  | 15" Speaker Wire (1-Side White Stripe)      |
| <b>D</b>            | 1             | 045-5020-02        | Note White Strip to Pin-1                                       | 2-Pin Cn., .100 KK Cmp Trm Molex 08-50-0113 |

# Playfield OPTO Transmitter / Receiver Amplifier PCB (520-5239-01) Schematic



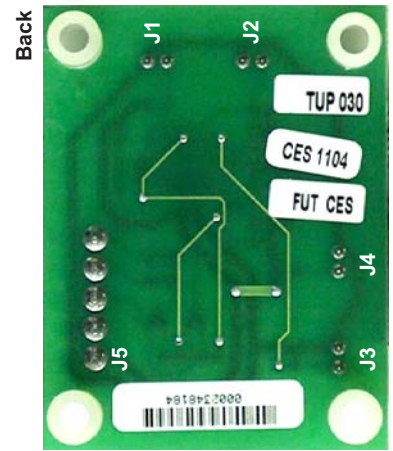
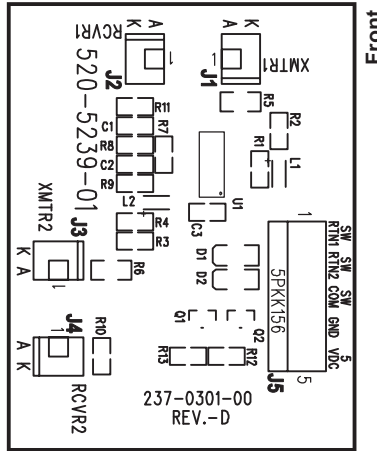
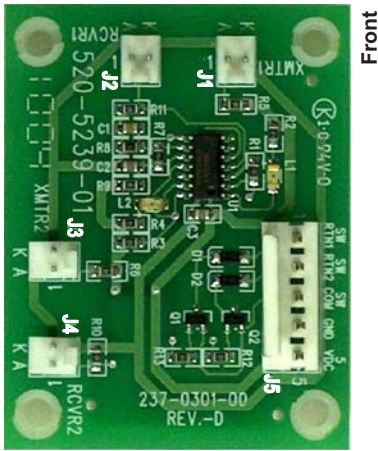
Sec. 5: PCBs





# Playfield OPTO Transmitter/Receiver Amplifier PCB (520-5239-01-ASY) Component Layout & Parts

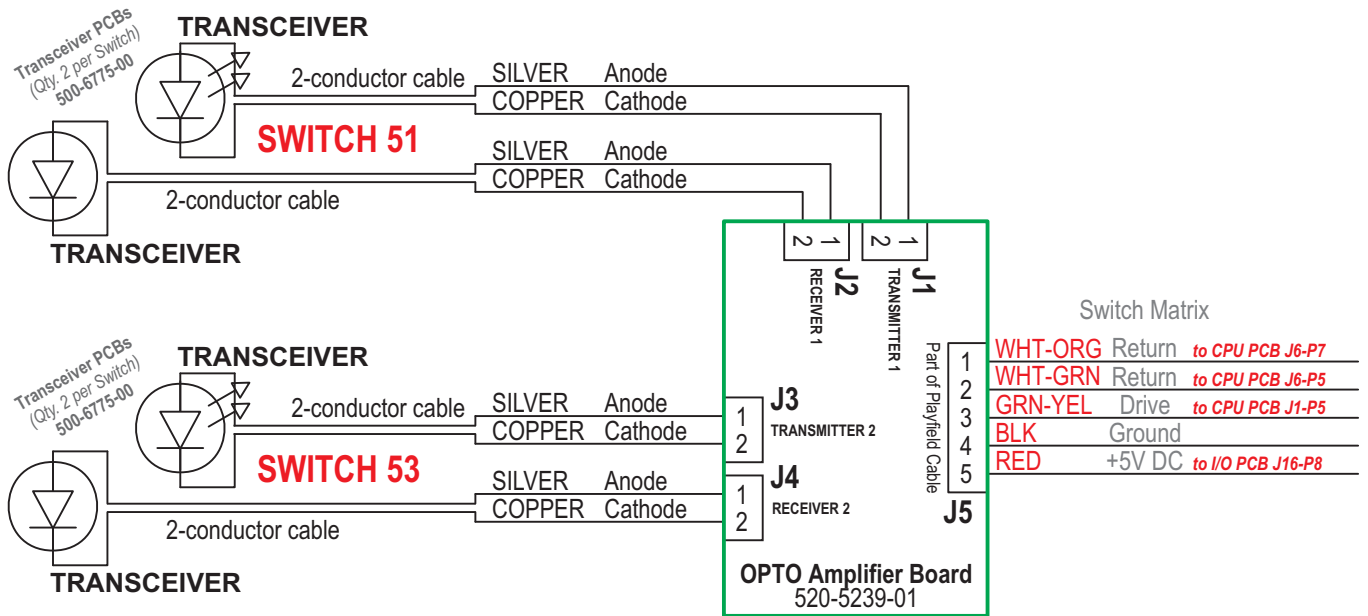
(for OPTO Switches 51 & 53)



| ITEM | QTY | PART NUMBER   | REF-DESIGNATOR                          | DESCRIPTION (SMT = Surface Mount)  |
|------|-----|---|---|--|
| 1    | 1   | 520-5239-01-ASY   | OPTO Transmitter/Receiver Amplifier PCB | (incl. Items 1-14 + Item 15 spacers)<br>Resistor SMT 805, 150K $\Omega$ 1/10W 5% |
| 2    | 2   |   | R7                                      | Resistor SMT 805, 180 $\Omega$ 1/10W 5%  |
| 3    | 1   |   | R5, R6                                  | Resistor SMT 805, 180K $\Omega$ 1/10W 5%   |
| 4    | 4   |   | R9                                      | Resistor SMT 805, 1K $\Omega$ 1/10W 5%   |
| 5    | 2   | <i>If a part is required where a part number is not provided, call Technical Support (see back of cover).</i> | R1, R3, R12, R13                        | Resistor SMT 805, 1M $\Omega$ 1/10W 5%   |
| 6    | 2   |   | R10, R11                                | Resistor SMT 805, 470 $\Omega$ 1/10W 5%  |
| 7    | 1   |   | R2, R4                                  | SRResistor SMT 805, 6.8K $\Omega$ 1/10W 5%                                       |
| 8    | 3   |   | R8                                      | Cap.-SMT Cer. .1uF 50v 10% X7R   |
| 9    | 2   |   | C1, C2, C3                              | Diode, 1N4148W, 100v, 350MW  |
| 10   | 2   |   | D1, D2                                  | Transistor, MMST3904, NPN, 40v, .02A   |
| 11   | 1   |   | Q1, Q2                                  | LM339M, Low Power Offset QUA   |
| 12   | 4   | Mfg. 22-23-2021   | U1                                      | Conn. 2-Pin, 0.1 Header (1 Row, VT, Tin)   |
| 13   | 1   | Mfg. 640445-5   | J1, J2, J3, J4                          | Conn. 5-Pin, .156 Header (1 Row, VT, Tin)  |
| 14   | 2   | Mfg. APT3216SURC  | J5                                      | LEDD-SMT, Red 1206   |
| 15   | 4   | 254-5007-02   | L1, L2 corners                          | Spacer, 1/4" Sif. Rtn. (.153" ID X 9/32" OD X 3/8")                              |

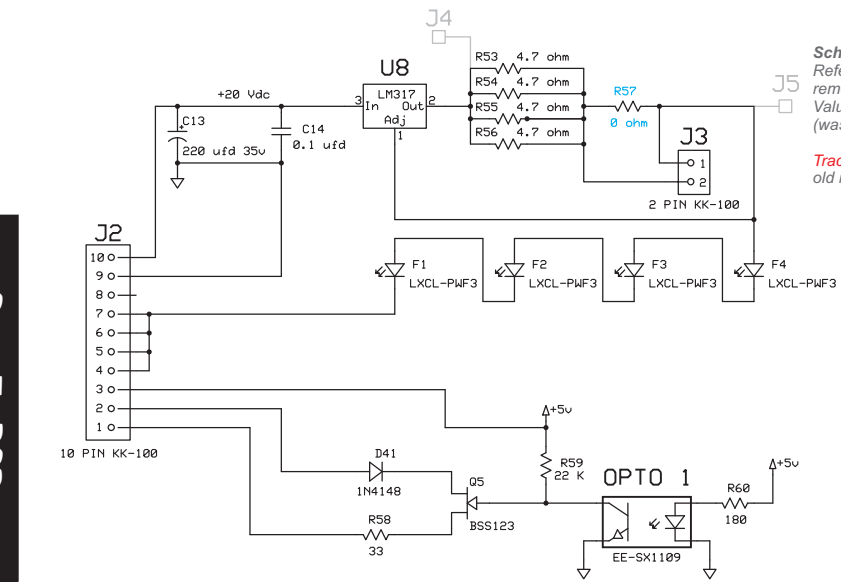
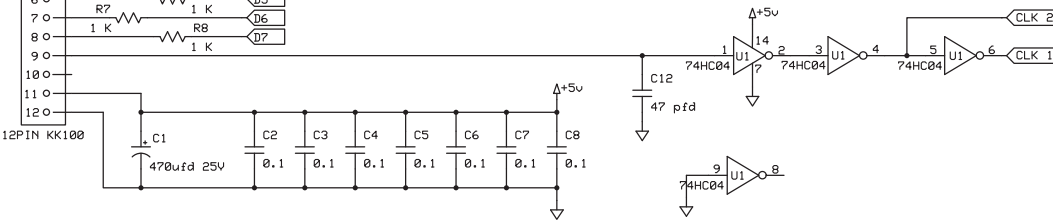
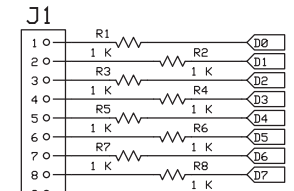
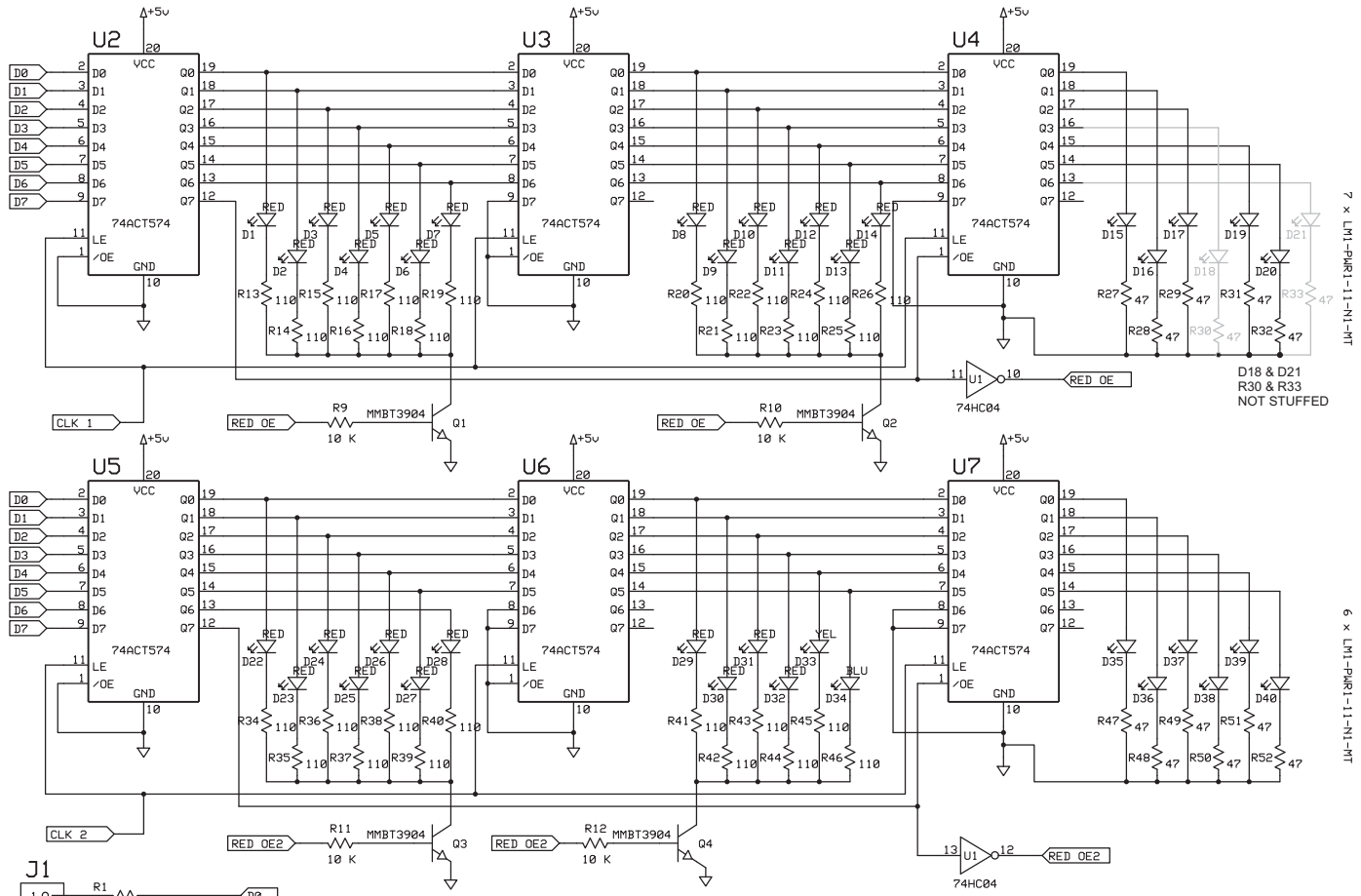
## Playfield OPTO Transmitter/Receiver Amplifier PCB (520-5239-01) Wiring (General)

(OPTO Switches 51 & 53)



Sec. 5: PCBs

# Wheel LED & OPTO PCB (520-5283-00) Schematic



## AUXILLARY OUTPUTS

| STROBE DATA | BRN/WHT                | GRN/WHT                  |
|-------------|------------------------|--------------------------|
| ORG/BRN     | WHEEL PCB DATA 0<br>B1 | DISPLAY PCB DATA 0<br>C1 |
| ORG/RED     | WHEEL PCB DATA 1<br>B1 | DISPLAY PCB DATA 1<br>C1 |
| ORG/BLK     | WHEEL PCB DATA 2<br>B2 | DISPLAY PCB DATA 2<br>C2 |
| ORG/YEL     | WHEEL PCB DATA 3<br>B3 | DISPLAY PCB DATA 3<br>C3 |
| ORG/GRN     | WHEEL PCB DATA 4<br>B4 | DISPLAY PCB DATA 4<br>C4 |
| ORG/BLU     | WHEEL PCB DATA 5<br>B5 | DISPLAY PCB DATA 5<br>C5 |
| ORG/IO      | WHEEL PCB DATA 6<br>B6 | DISPLAY PCB DATA 6<br>C6 |
| ORG/GRY     | WHEEL PCB DATA 7<br>B7 | DISPLAY PCB DATA 7<br>C7 |

**Schematic Only Update**  
Reference to J4 & J5 Test Pads removed.  
Value correction to R57 0 ohm (was 10 ohm).  
Trace line removed between old reference points (J4 & J5).

Sec. 5: PCBs

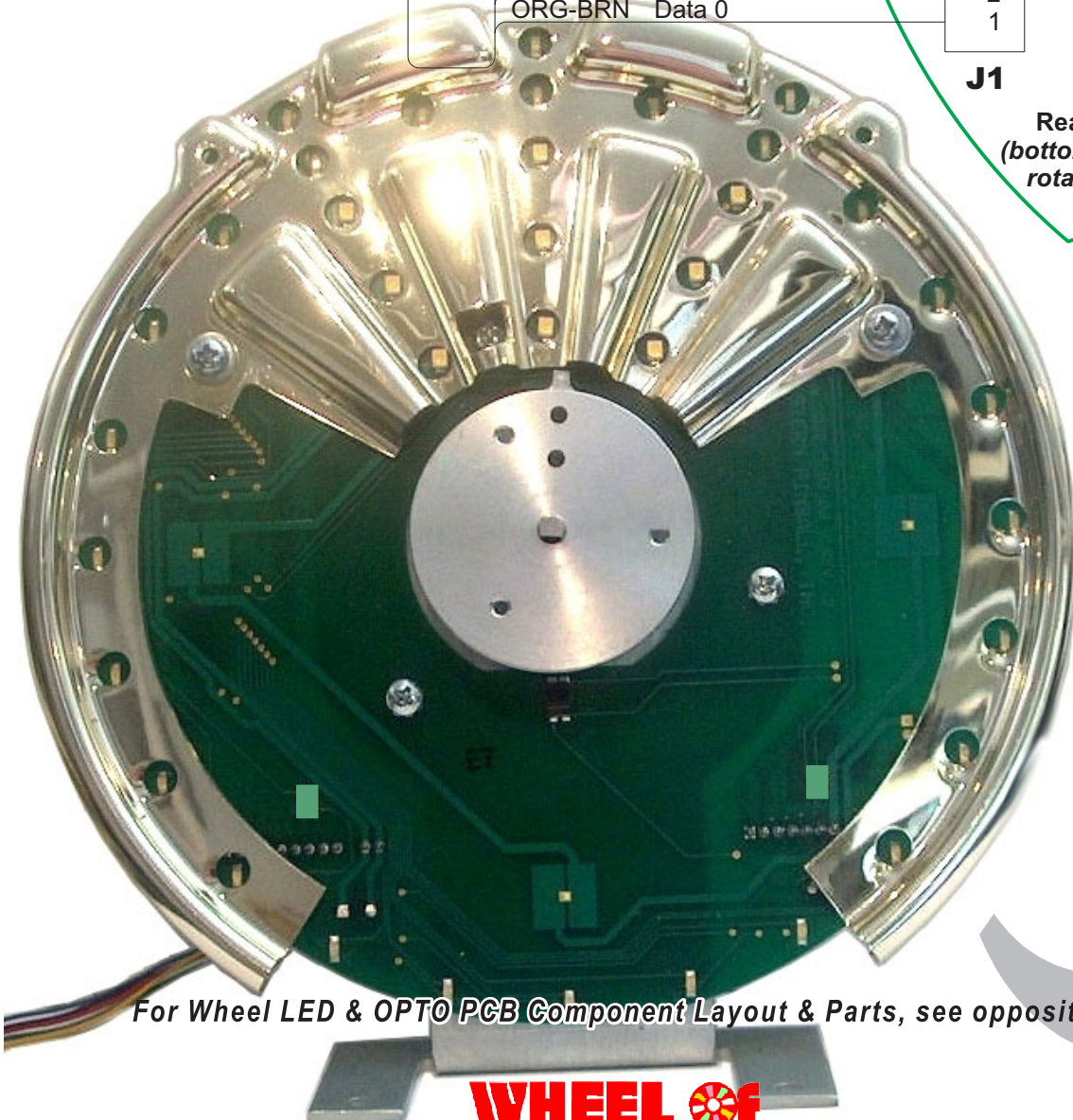
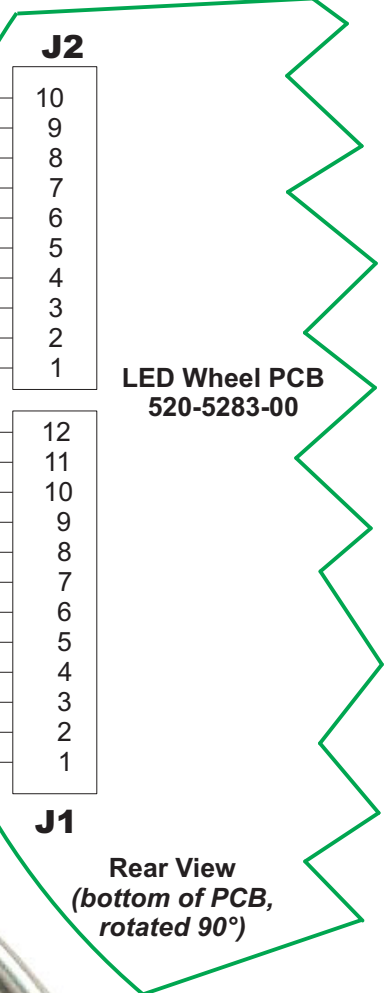


# Wheel LED & OPTO PCB (520-5283-00) Wiring

|                             |   |         |               |
|-----------------------------|---|---------|---------------|
| Connects to<br>Coil cable   | 1 | ORG     | +18V DC       |
|                             | 2 | BLK-BRN | Coil Drive 25 |
| Connects to<br>Switch cable | 1 | RED     | +5V DC        |
|                             | 2 | BLK     | Ground        |
|                             | 3 | BRN-WHT | Clock 2       |
|                             | 4 | KEY     |               |
|                             | 5 | TAN-VIO | Switch +      |
|                             | 6 | GRN-ORG | Switch -      |
| Connects to<br>Switch cable | 1 | ORG-BRN | Data 0        |
|                             | 2 | ORG-RED | Data 1        |
|                             | 3 | ORG-BLK | Data 2        |
|                             | 4 | ORG-YEL | ORG-YEL       |
|                             | 5 | ORG-GRN | ORG-GRN       |
|                             | 6 | ORG-BLU | ORG-BLU       |
|                             | 7 | ORG-VIO | ORG-VIO       |
|                             | 8 | ORG-GRY | ORG-GRY       |
|                             | 9 | KEY     |               |

Wheel Mech Cable  
036-5525-09-98

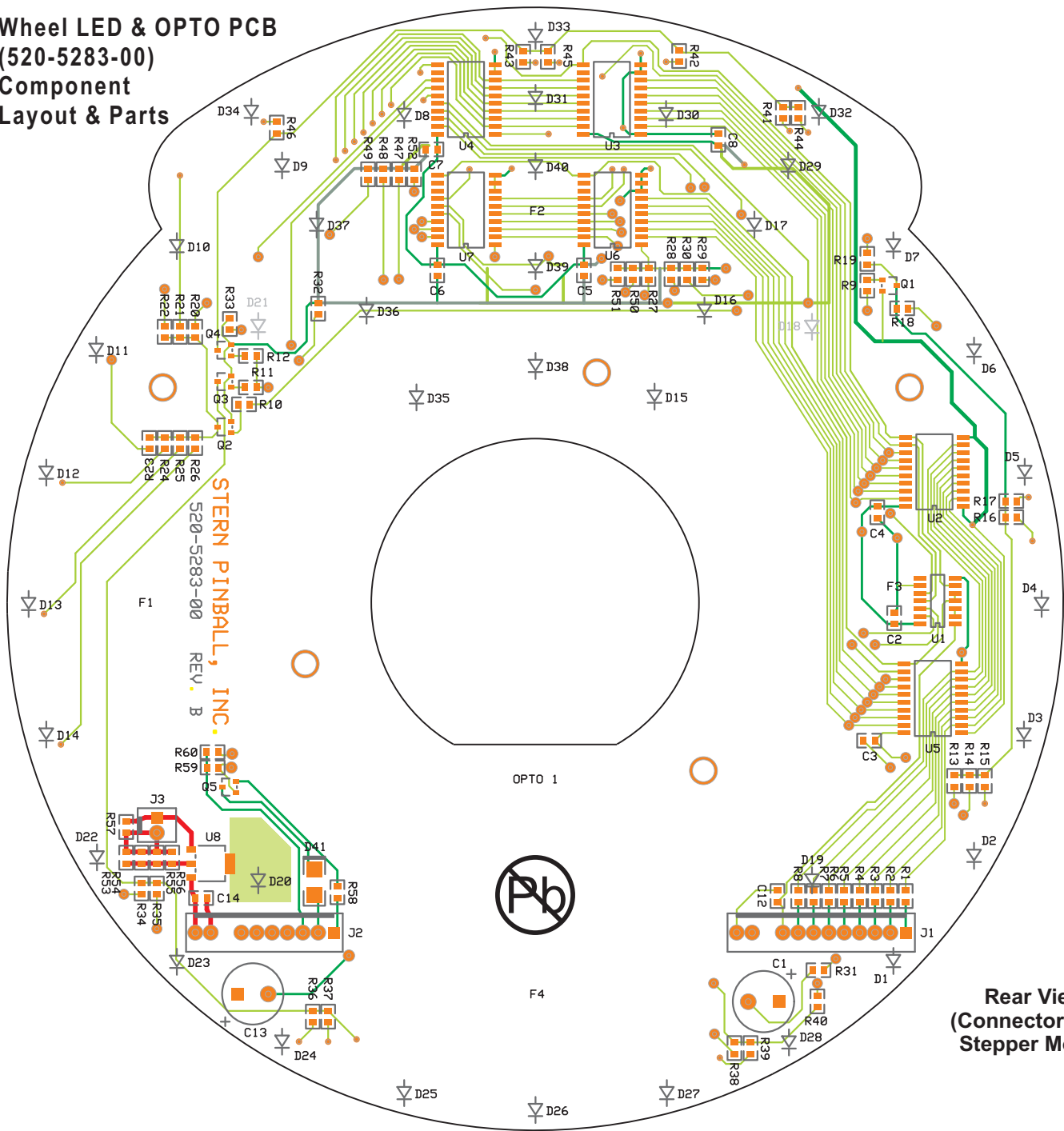
|         |               |
|---------|---------------|
| ORG     | +18V DC       |
| BLK     | Ground        |
|         | KEY           |
| BLK-BRN | Coil Drive 25 |
| BLK-BRN | Coil Drive 25 |
| BLK-BRN | Coil Drive 25 |
| BLK-BRN | Coil Drive 25 |
| RED     | +5V DC        |
| TAN-VIO | Switch +      |
| GRN-ORG | Switch -      |
| BLK     | Ground        |
| RED     | +5V DC        |
|         | KEY           |
| BRN WHT | Clock 2       |
| ORG-GRY | Data 7        |
| ORG-VIO | Data 6        |
| ORG-BLU | Data 5        |
| ORG-GRN | Data 4        |
| ORG-YEL | Data 3        |
| ORG-BLK | Data 2        |
| ORG-RED | Data 1        |
| ORG-BRN | Data 0        |



For Wheel LED & OPTO PCB Component Layout & Parts, see opposite pages.



**Wheel LED & OPTO PCB  
(520-5283-00)  
Component  
Layout & Parts**



**Rear View  
(Connectors  
and Stepper Motor)**

| ITEM     | QTY. | SPI PART NR.       | (MFG. P.N.)   | REF-DESIGNATOR   | DESCRIPTION (SMT = Surface Mount)        |
|----------|------|--------------------|---------------|--|--|
| >>>15-30 |      |                    |               |  |  |
| 1        | 1    | <b>520-5283-00</b> |               | <b>Wheel LED &amp; OPTO PCB</b>  | <b>Complete PCB Assembly</b>             |
| 1        | 1    | 121-6017-00        | (101-0001790) | R57  | Resistor SMT 0805, 0.0 Ω 5%              |
| 2        | 4    | 121-6020-00        | (101-0001827) | R9, R10, R11, R12  | Resistor SMT 0805, 10K 5%                |
| 3        | 27   |                    | (101-0001833) | R13, R14, R15, R16, R17, R18, R19,<br>R20, R21, R22, R23, R24, R25, R26,<br>R34, R35, R36, R37, R38, R39, R40,<br>R41, R42, R43, R44, R45, R46 | Resistor SMT 0805, 110 Ω 5%              |
| 4        | 1    |                    | (101-0001897) | R60  | Resistor SMT 0805, 180 Ω 5%              |
| 5        | 8    | 121-6022-00        | (101-0001905) | R1, R2, R3, R4, R5, R6, R7, R8   | Resistor SMT 0805, 1K Ω 5%               |
| 6        | 1    |                    | (101-0001949) | R59  | Resistor SMT 0805, 22K Ω 5%              |
| 7        | 1    | 121-6024-00        | (101-0002009) | R58  | Resistor SMT 0805, 33 Ω 5%               |
| 8        | 4    |                    | (101-0002044) | R53, R54, R55, R56   | Resistor SMT 0805, 4.7 Ω 5%              |
| 9        | 13   | 121-6014-00        | (101-0002065) | R27, R28, R29, R30, R31, R32, R33,<br>R47, R48, R49, R50, R51, R52   | Resistor SMT 0805, 47 Ω 5%               |
| 10       | 7    | 125-6001-00        | (121-0000056) | C2, C3, C4, C5, C6, C7, C8   | Capacitor SMT 0805, CER .1uF 50V 10% X7R |
| 11       | 1    | 125-6016-00        | (121-0004245) | C12  | Capacitor SMT 0805, CER 47pF 50V 5% NPO  |
| 12       | 1    |                    | (131-0003867) | C1   | Cap.-THT Radial Alum 470uF 25V 20% 85    |
| 13       | 1    |                    | (134-0005898) | C13  | Cap.-THT Radial Alum 220uF 35V 20% 105C  |
| 14       | 1    |                    | (181-0004347) | D41  | Diode SMT Minimeff DL/LL4148 100V 500mW  |

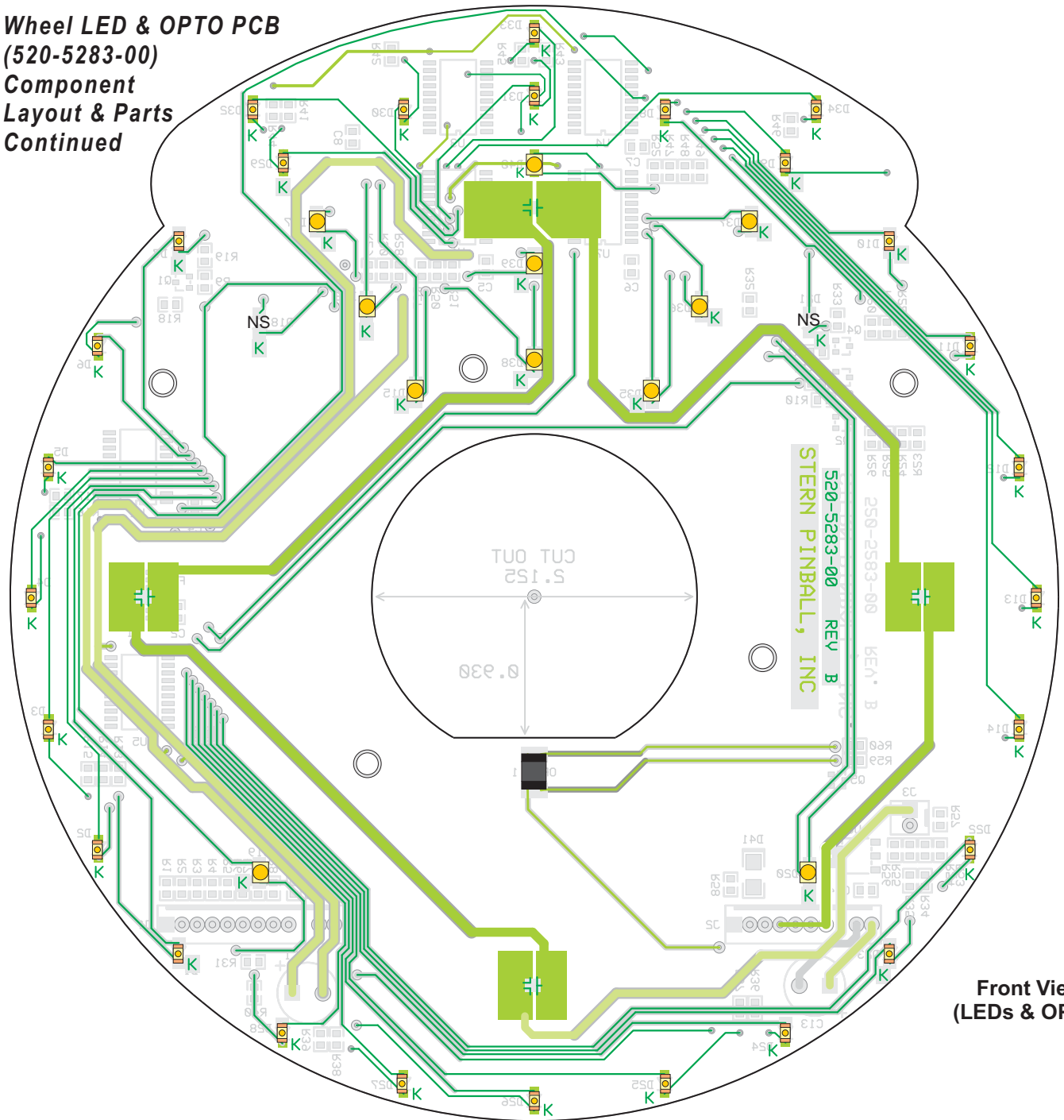
If a part is required where a part number is not provided, call Technical Support (see back of cover).

**Parts List Continued Next Page.**

**Sec. 5: PCBs**



**Wheel LED & OPTO PCB  
(520-5283-00)  
Component  
Layout & Parts  
Continued**

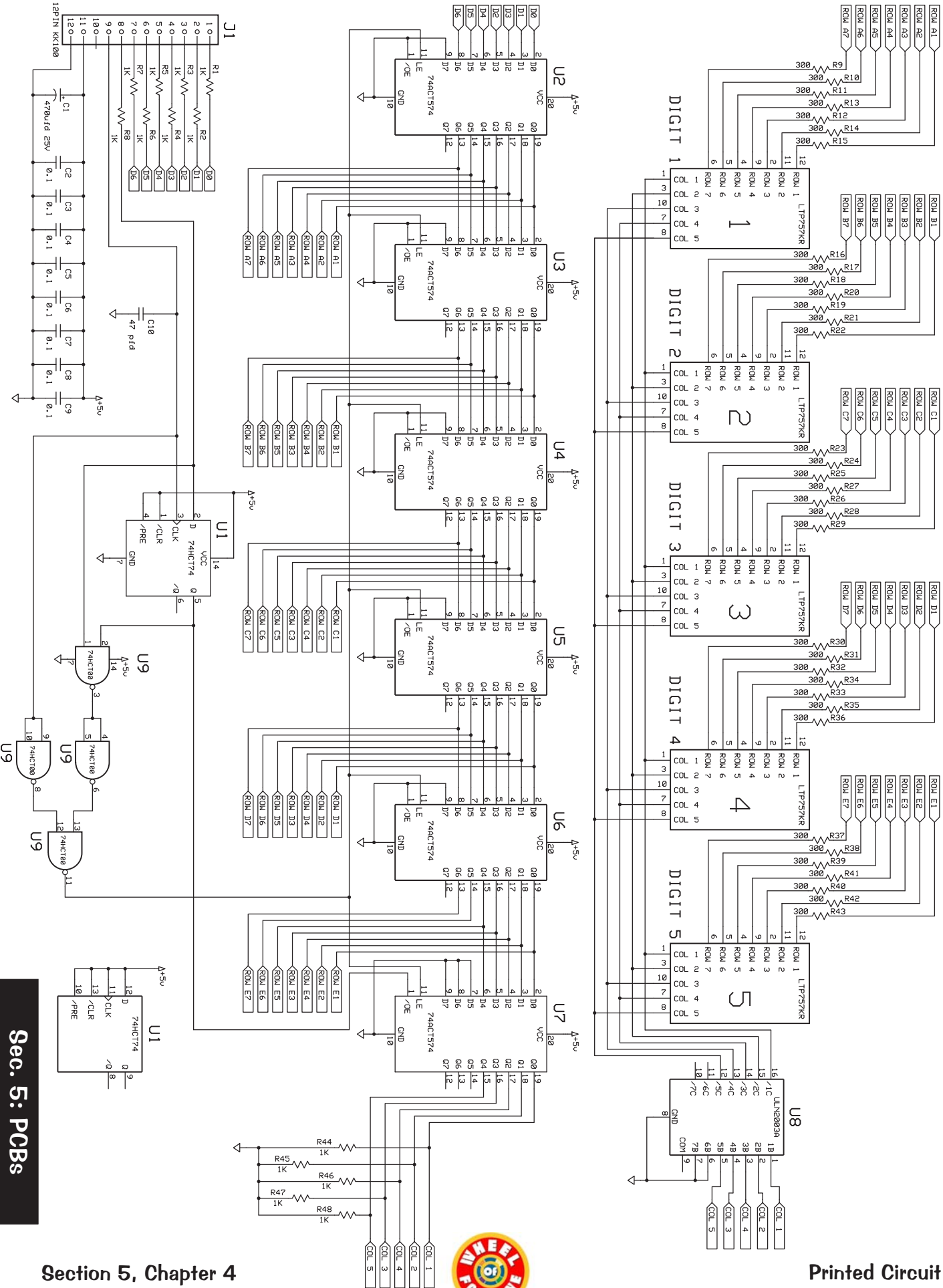


**Front View  
(LEDs & OPTO)**

| ITEM     | QTY. | SPI PART NR. | (MFG. P.N.)   | REF-DESIGNATOR   | DESCRIPTION (SMT = Surface Mount)                |
|----------|------|--------------|---------------|--|--|
| <<< 1-14 |      |              |               |  |  |
| 15       | 4    | 520-5283-00  |               | <b>Wheel LED &amp; OPTO PCB</b>  | <b>Complete PCB Assembly</b>                     |
| 16       | 1    | 110-6002-00  | (211-0003589) | Q1, Q2, Q3, Q4   | Trans.-SMT MMST/B3904, NPN, 40V, 0.2A SOT-23     |
| 17       | 1    |              | (211-0011181) | Q5   | Trans.-SMT BSS123, 100V 6 Ω N-CHAN SOT-23        |
| 18       | 6    |              | (221-0000956) | U1   | IC-SMT 74HC04 Hex Inverter SO                    |
| 19       | 1    |              | (221-0006048) | U2, U3, U4, U5, U6, U7   | IC-SMT 74ACT574 Octal D-Type W/3 SOIC            |
| 22       | 25   |              | (221-0009595) | U8   | IC-SMT LM317EMP, 1A 40V Linear SOT-223           |
|          |      |              | (425-0007678) | D1, D2, D3, D4, D5, D6, D7, D8, D9,<br>D10, D11, D12, D13, D14, D22, D23, D24,<br>D25, D26, D27, D28, D29, D30, D31, D32,<br>D33 | LEDD-SMT Red, 1206, Top                          |
| 23       | 1    |              | (425-0010706) | D34  | LEDD-SMT Ultrabright Yellow, 1206                |
| 24       | 1    |              | (425-0010805) | D35  | LEDD-SMT Blue, 1206, Top                         |
| 25       | 4    |              | (425-0015679) | F1, F2, F3, F4   | LEDD-SMT Superbright LXCL-PWF3                   |
| 26       | 11   |              | (425-0015681) | D15, D16, D17, D19, D20, D21, D35,<br>D36, D37, D38, D39, D40 (NS=NOT STUFFED D18, D21)  | LEDD-SMT White 1210, LM1-PWR1-11-N1-MT           |
| 27       | 1    | 112-6004-00  | (429-0015680) | OPTO1  | LEDO-SMT 3mm Horz. Slotted opto EE-SX11091       |
| 21       | 1    |              | (315-0004125) | J1   | Connector, 12-Pin KK100 Hdr. 1-Row, VT, Tin, .1" |
| 20       | 1    |              | (315-0003429) | J2   | Connector, 10-Pin Kk100 Hdr. 1-Row, VT, Tin, .1" |
| 29       | 1    |              |               | J3   | Connector, 2-Pin KK-100                          |

If a part is required where a part number is not provided, call Technical Support (see back of cover).

# Playfield Mini-Dot Display (5X7) X5 PCB (520-5274-00) Schematic

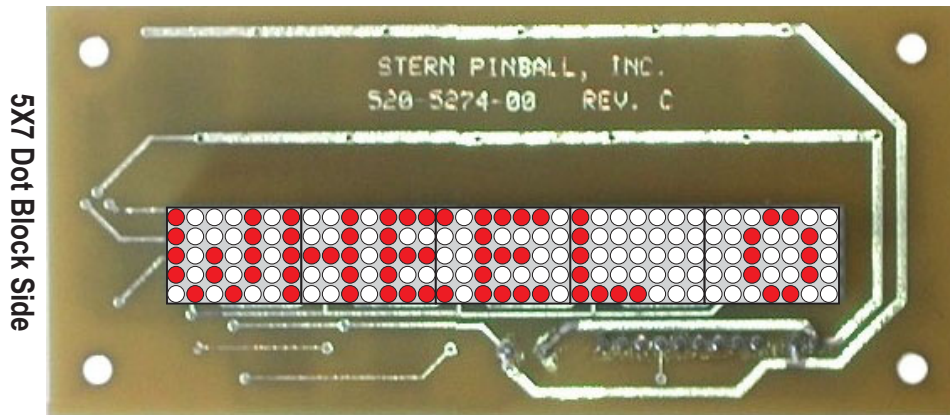
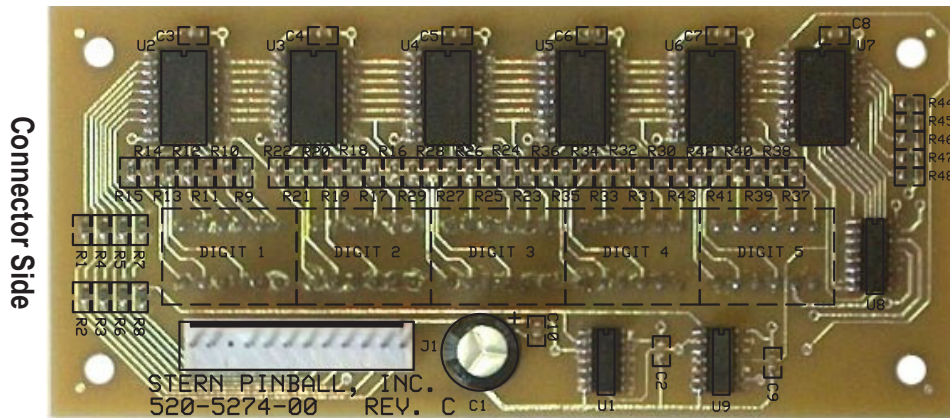
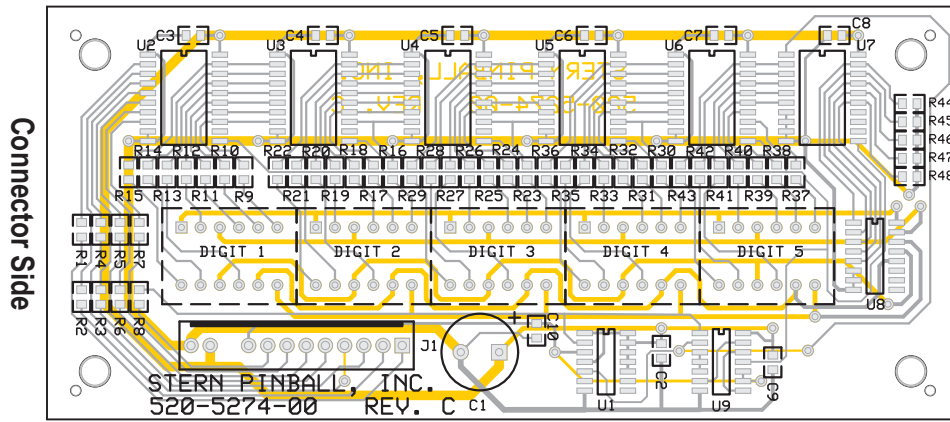


Sec. 5: PCBs





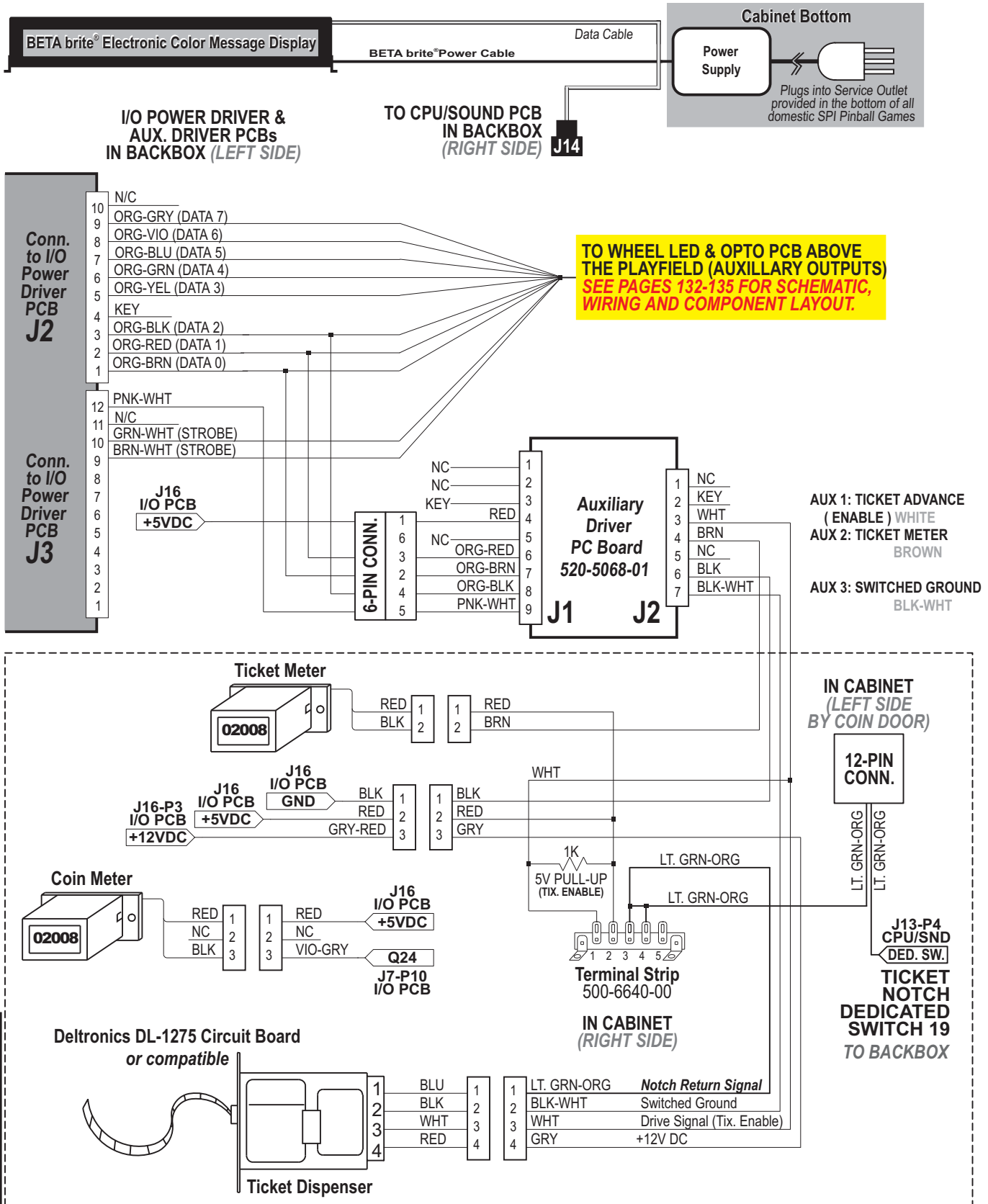
# Playfield Mini-Dot Display (5X7) X5 PCB (520-5274-00) Component Layout & Parts



| ITEM | QTY. | SPI PART NR. | (MFG. P.N.)   | REF-DESIGNATOR   | DESCRIPTION (SMT = Surface Mount)                |
|------|------|--------------|---------------|--|--|
| —    | 1    | 520-5274-00  |               | <b>P/F Mini-Dot Display (5X7) X5 PCB</b>   | <b>Complete PCB Assembly</b>                     |
| 1    | 13   | 121-6022-00  | (101-0001905) | R1, R2, R3, R4, R5, R6, R7, R8, R44, R45, R46, R47, R48  | Resistor SMT 0805, 1K Ω 5%                       |
| 2    | 35   |              | (101-0001997) | R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43 | Resistor SMT 0805, 300 Ω 5%                      |
| 3    | 8    | 125-6001-00  | (121-0000056) | C2, C3, C4, C5, C6, C7, C8, C9   | Capacitor SMT 0805, CER .1UF 50V 10% X7R         |
| 4    | 1    | 125-6016-00  | (121-0004245) | C10  | Capacitor SMT 0805, CER 47PF 50V 5% NPO          |
| 5    | 1    |              | (131-0003867) | C1   | Cap.-THT Radial Alum 470uF 25V 20% 85            |
| 6    | 1    |              | (221-0005340) | U8   | IC-SMT, ULN2003, 16-Pin SO                       |
| 7    | 6    |              | (221-0006048) | U2, U3, U4, U5, U6, U7   | IC-SMT, 74ACT574 Octal D-Type W/3 SOIC           |
| 8    | 1    |              | (221-0006853) | U1   | IC-SMT, 74HCT74D, Dual D FLIP/FLOP SOIC          |
| 9    | 1    |              | (221-0010245) | U9   | IC-SMT, 74HCT00 SO                               |
| 10   | 5    | 100-5040-01  | (428-0015692) | DIGIT1, DIGIT2, DIGIT3, DIGIT4, DIGIT5   | LEDA-THT, 5X7 Super Red Dot Block                |
| 11   | 1    |              | (315-0004125) | J1   | Connector, 12-Pin KK100 Hdr. 1-Row, VT, Tin, .1" |

If a part is required where a part number is not provided, call Technical Support (see back of cover).

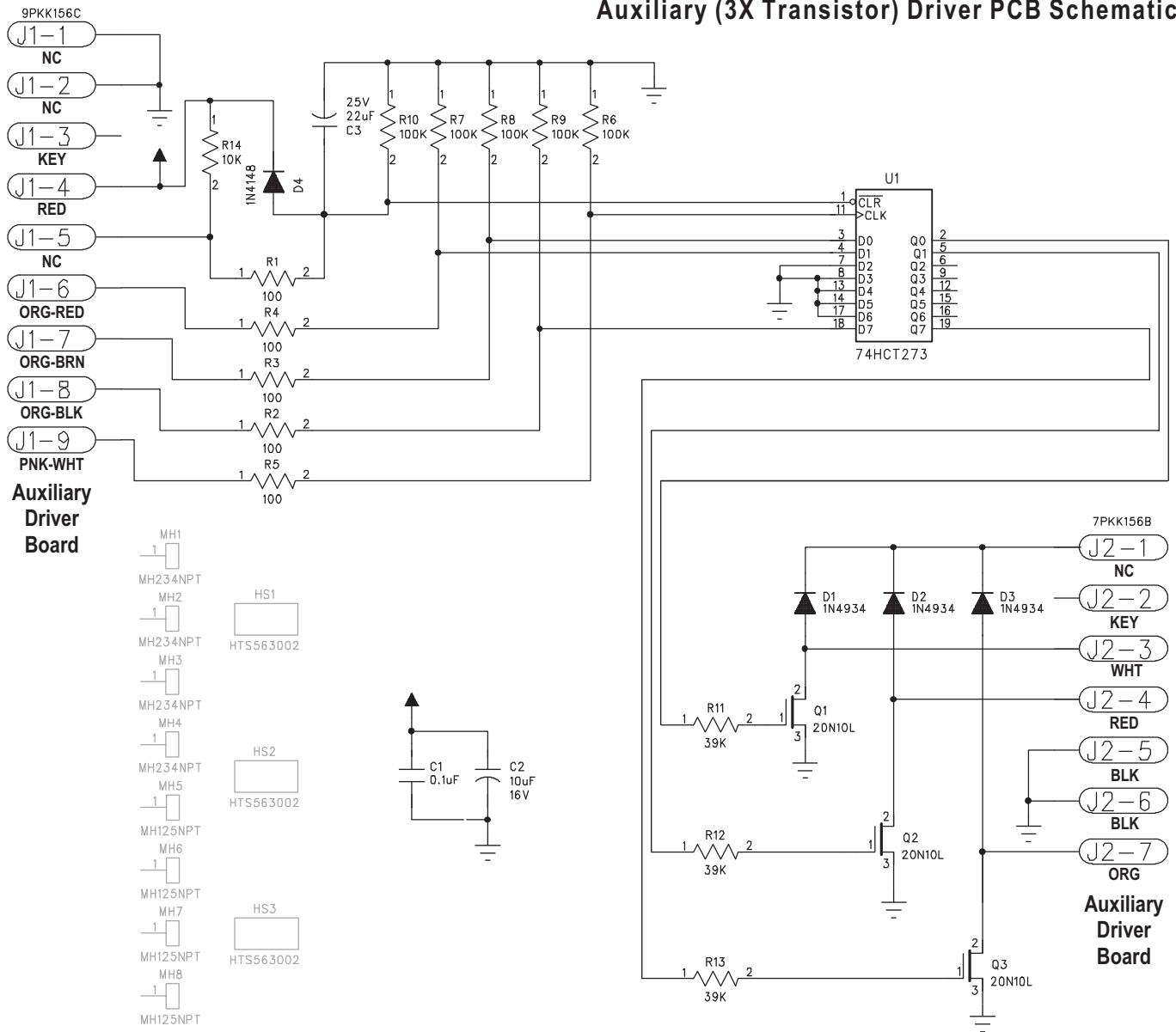
# Auxiliary (3X Transistor) Driver PCB (in Backbox) with the Coin/Ticket Meter and Ticket Dispenser Wiring Diagram



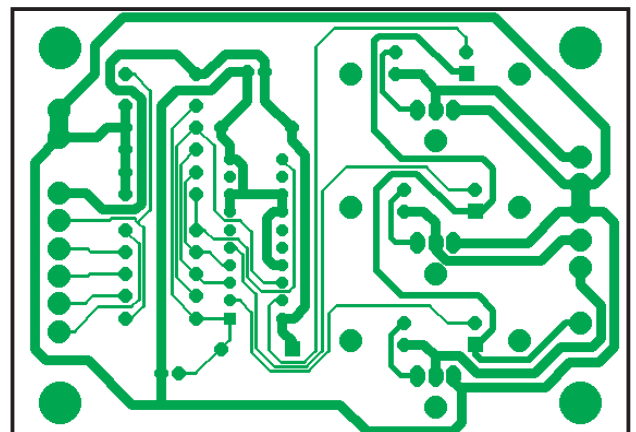
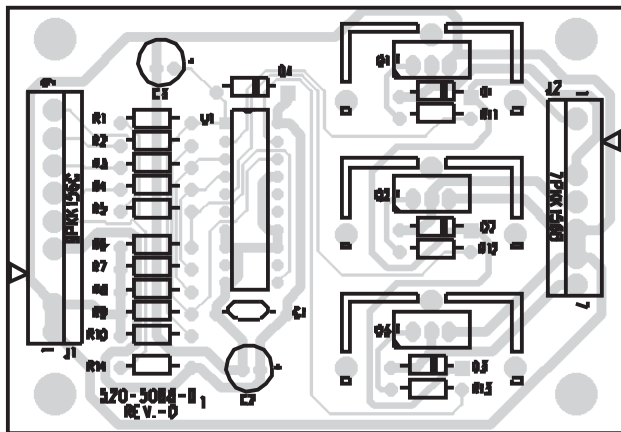
Sec. 5: PCBs



# Auxiliary (3X Transistor) Driver PCB Schematic



## Auxiliary (3X Transistor) Driver PCB Component Layout



| ITEM | QTY | PART NUMBER | REF-DESIGNATOR                               | DESCRIPTION           |
|------|-----|-------------|--|-----------------------|
| —    | 1   | 520-5068-01 | Aux. / Solenoid Expander PCB (x3 Transistor) | Complete PCB Assembly |





# Appendixes A through J

## Table of Contents for Appendixes

- **Appendix A : Pinball Game Firmware Table .....A1-A2**
  - ▶ [ White Star Board System and S.A.M. System Only\* ]
    - ▷ ... describes the ROM / Chip Size / Program & Raw Part Number / USA Version / Check Sum and CPU/Sound PCB I & II ROM locations for Games Apollo 13 — Grand Prix (White Star Games); World Poker Tour – current (S.A.M. Games).
- **Appendix B : Semi-Conductors / I.C.'s / Relays Cross-Reference Table ..... B1**
  - ▷ ...describes diodes and transistors with Source Number, SPI Part Number, NTE Number, ECG Number, Radio Shack Number & RCA Part Number (If applicable).
- **Appendix C : Production Start Date, Manual Part N<sup>o</sup>, ROM Size & Positions and Jumper W6 .. C1**
  - ▶ [ White Star Board System and S.A.M. System Only\* ]
    - ▷ ...provides the Production Start Date, Manual Part Number, ROM Position(s), and Jumpers Installed for Games Apollo 13 — Grand Prix (White Star Games); World Poker Tour – current (S.A.M. Games).
- **Appendix D : Board TyPe Table ..... D1-D2**
  - ▶ [ White Star Board System and S.A.M. System Only\* ]
    - ▷ ...provides the Flipper\*\*, I/O Power Driver, CPU/Sound, Display Power Supply, Dot Matrix Display, Display Controller, OPTOs and Misc. Board Part Numbers for Games Apollo 13 — Grand Prix (White Star Games); World Poker Tour – current (S.A.M. Games). \*\*Flipper Bd. with White Star Bd. System for A13 & Golden Eye only.)
- **Appendix E : Generic Coil Cross-Reference Guide & Flipper Coil Table .....E1-E2**
  - ▶ [ White Star Board System and S.A.M. System Only\* ]
    - ▷ ...provides the Coils used with Part Number and Gauge-Turns (of the coil) for Games Apollo 13 — Grand Prix (White Star Games); World Poker Tour – current (S.A.M. Games).
- **Appendix F : Motor Specification Table ..... F1-F2**
  - ▶ [ White Star Board System and S.A.M. System Only\* ]
    - ▷ ...provides all the Motor Function, Specifications and Part Number for Games Apollo 13 — Grand Prix (White Star Games); World Poker Tour – current (S.A.M. Games)..
- **Appendix G : Part Number Prefix Classification Codes ..... G1**
  - ▷ ...explains how our Part Numbers are developed to help sort parts easier.
- **Appendix H : Playfield Inserts (Plastic Light Covers) ..... H1**
  - ▷ ...gives a pictoral view with the name and Part Nr. of all the inserts used (with Color Code Chart).
- **Appendix I : Stand-Up Targets & Modular Stand-Up Targets ..... I1-I2**
  - ▷ ...gives a pictoral view with the name and Part Number of all the Single Stand-Up Targets used (with Color Code Chart).
- **Appendix J : Coin Cards (USA & International) ..... J1**
  - ▷ ...gives a pictoral view with the name and Part Number of all the current Coin Cards for USA, Canada, Euro and other International Countries. For all Coin Cards and/or free Coin Card files for download, visit our website : [www.sternpinball.com](http://www.sternpinball.com)



# APPENDIX A



## Pinball Game Firmware (White Star Board System\* Only) Table

See website for the latest International Code or Updated USA version / checksums

| ROM  | Chip Size | Program Part N° | USA ver. & Check Sum | Bd. Loc. | Raw Part N°  |
|--|-----------|-----------------|----------------------|----------|--------------|
| <b>Apollo 13 (Note 1)</b>                                      |           |                 |                      |          |              |
| Game ROM   | (1M)      | 965-0208-00     | A5.01   \$09FF       | U210     | 960-5009-00  |
| Sound  | (512K)    | 965-0212-00     | 1.00   \$5244        | U7       | 960-7001-02  |
| Display  | (4M)      | 965-0213-00     | A5.00   \$B92B       | ROM 0    | 960-5015-01  |
| Voice 1  | (4M)      | 965-0209-00     | 1.00   \$7FC7        | U17      | n/a (masked) |
| Voice 2  | (4M)      | 965-0210-00     | 1.00   \$8E55        | U21      | n/a (masked) |
| Voice 3  | (4M)      | 965-0211-00     | 1.00   \$08EE        | U36      | n/a (masked) |
| <b>Golden Eye (Note 1)</b>                                     |           |                 |                      |          |              |
| Game ROM   | (1M)      | 965-0214-42     | A4.04   \$3FFF       | U210     | 960-5009-00  |
| Sound  | (512K)    | 965-0217-42     | 1.00   \$D615        | U7       | 960-7001-02  |
| Display  | (4M)      | 965-0218-42     | A4.00   \$E6ED       | ROM 0    | 960-5015-01  |
| Voice 1  | (4M)      | 965-0215-42     | 1.00   \$3E32        | U17      | n/a (masked) |
| Voice 2  | (4M)      | 965-0216-42     | 1.00   \$71F0        | U21      | n/a (masked) |
| <b>Twister (Note 2)</b>  |           |                 |                      |          |              |
| Game ROM   | (1M)      | 965-0219-41     | A4.05   \$E9FF       | U210     | 960-5009-00  |
| Sound  | (512K)    | 965-0221-41     | 1.00   \$1FFF        | U7       | 960-7001-02  |
| Display  | (4M)      | 965-0222-41     | A4.00   \$FD01       | ROM 0    | 960-5015-01  |
| Voice 1  | (4M)      | 965-0220-41     | 1.00   \$3650        | U17      | 960-5015-01  |
| Voice 2  | (4M)      | 965-0223-41     | 1.00   \$9300        | U21      | 960-5015-01  |
| <b>ID4: Independence Day (Note 2)</b>                          |           |                 |                      |          |              |
| Game ROM   | (1M)      | 965-0224-45     | A2.02   \$9CFF       | U210     | 960-5009-00  |
| Sound  | (512K)    | 965-0227-45     | 1.00   \$222B        | U7       | 960-7001-02  |
| Display  | (4M)      | 965-0228-45     | A2.00   \$AB7        | ROM 0    | 960-5015-01  |
| Voice 1  | (4M)      | 965-0225-45     | 1.00   \$3AF1        | U17      | 960-5015-01  |
| Voice 2  | (4M)      | 965-0226-45     | 1.00   \$206E        | U21      | 960-5015-01  |
| <b>Space Jam (Note 2)</b>                                      |           |                 |                      |          |              |
| Game ROM   | (1M)      | 965-0229-43     | A3.00   \$E6FF       | U210     | 960-5009-00  |
| Sound  | (512K)    | 965-0233-43     | 1.00   \$F1E7        | U7       | 960-7001-02  |
| Display  | (4M)      | 965-0234-43     | A3.00   \$0057       | ROM 0    | 960-5015-01  |
| Voice 1  | (4M)      | 965-0230-43     | 1.00   \$DBA8        | U17      | 960-5015-01  |
| Voice 2  | (4M)      | 965-0231-43     | 1.00   \$DDF1        | U21      | 960-5015-01  |
| Voice 3  | (4M)      | 965-0232-43     | 1.00   \$F32A        | U36      | 960-5015-01  |
| <b>The Star Wars Trilogy - Special Edition (S.E.) (Note 2)</b> |           |                 |                      |          |              |
| Game ROM   | (1M)      | 965-0235-56     | A4.03   \$5EFF       | U210     | 960-5009-00  |
| Sound  | (512K)    | 965-0238-56     | 1.00   \$4A7D        | U7       | 960-7001-02  |
| Display  | (4M)      | 965-0239-56     | A4.00   \$8817       | ROM 0    | 960-5015-01  |
| Voice 1  | (4M)      | 965-0236-56     | 1.00   \$E66B        | U17      | 960-5015-01  |
| Voice 2  | (4M)      | 965-0237-56     | 1.00   \$8F54        | U21      | 960-5015-01  |
| <b>The Lost World: Jurassic Park (Note 2)</b>                  |           |                 |                      |          |              |
| Game ROM   | (1M)      | 965-0240-53     | A2.02   \$C8FF       | U210     | 960-5009-00  |
| Sound  | (512K)    | 965-0243-53     | 1.00   \$A35B        | U7       | 960-7001-02  |
| Display  | (4M)      | 965-0244-53     | A2.01   \$7F46       | ROM 0    | 960-5015-01  |
| Voice 1  | (4M)      | 965-0241-53     | 1.00   \$1D27        | U17      | 960-5015-01  |
| Voice 2  | (4M)      | 965-0242-53     | 1.00   \$8DA4        | U21      | 960-5015-01  |
| <b>The X-Files (Note 2)</b>                                    |           |                 |                      |          |              |
| Game ROM   | (1M)      | 965-0245-46     | A3.03   \$A2FF       | U210     | 960-5009-00  |
| Sound  | (512K)    | 965-0248-46     | 1.00   \$65A8        | U7       | 960-7001-02  |
| Display  | (4M)      | 965-0249-46     | A3.00   \$66D0       | ROM 0    | 960-5015-01  |
| Voice 1  | (4M)      | 965-0246-46     | 1.00   \$349D        | U17      | 960-5015-01  |
| Voice 2  | (4M)      | 965-0247-46     | 1.00   \$629C        | U21      | 960-5015-01  |
| <b>Starship Troopers (Note 3)</b>                              |           |                 |                      |          |              |
| Game ROM   | (1M)      | 965-0250-59     | A2.00   \$85FF       | U210     | 960-5009-00  |
| Sound  | (512K)    | 965-0253-59     | 1.00   \$64B2        | U7       | 960-7001-02  |
| Display  | (4M)      | 965-0254-59     | A2.00   \$E77B       | ROM 0    | 960-5015-01  |
| Voice 1  | (4M)      | 965-0251-59     | 1.00   \$152A        | U17      | 960-5015-01  |
| Voice 2  | (4M)      | 965-0252-59     | 1.00   \$0291        | U21      | 960-5015-01  |
| Voice 3  | (4M)      | 965-0255-59     | 1.00   \$95A7        | U36      | 960-5015-01  |
| <b>Viper Night Drivin' (Note 4)</b>                            |           |                 |                      |          |              |
| Game ROM   | (1M)      | 965-0266-35     | A2.01   \$C5FF       | U210     | 960-5009-00  |
| Sound  | (512K)    | 965-0271-35     | 1.00   \$4DF8        | U7       | 960-7001-02  |
| Display  | (4M)      | 965-0272-35     | A2.01   \$C17D       | ROM 0    | 960-5015-01  |
| Voice 1  | (4M)      | 965-0267-35     | 1.00   \$9018        | U17      | 960-5015-01  |
| Voice 2  | (4M)      | 965-0268-35     | 1.00   \$2157        | U21      | 960-5015-01  |
| Voice 3  | (4M)      | 965-0269-35     | 1.00   \$B5A6        | U36      | 960-5015-01  |
| Voice 4  | (4M)      | 965-0270-35     | 1.00   \$D01E        | U37      | 960-5015-01  |
| <b>Lost In Space (Note 4)</b>                                  |           |                 |                      |          |              |
| Game ROM   | (1M)      | 965-0282-60     | A1.01   \$B2FF       | U210     | 960-5009-00  |
| Sound  | (512K)    | 965-0287-60     | 1.00   \$A6AF        | U7       | 960-7001-02  |
| Display  | (4M)      | 965-0288-60     | A1.02   \$32AB       | ROM 0    | 960-5015-01  |
| Voice 1  | (4M)      | 965-0283-60     | 1.00   \$4391        | U17      | 960-5015-01  |
| Voice 2  | (4M)      | 965-0284-60     | 1.00   \$8215        | U21      | 960-5015-01  |
| Voice 3  | (4M)      | 965-0285-60     | 1.00   \$5B32        | U36      | 960-5015-01  |
| Voice 4  | (4M)      | 965-0286-60     | 1.00   \$8971        | U37      | 960-5015-01  |
| <b>Godzilla (Note 4)</b>                                       |           |                 |                      |          |              |
| Game ROM   | (1M)      | 965-0289-40     | A2.05   \$B1FF       | U210     | 960-5009-00  |
| Sound  | (512K)    | 965-0294-40     | 1.00   \$0CC9        | U7       | 960-7001-02  |
| Display  | (4M)      | 965-0295-40     | A2.00   \$C929       | ROM 0    | 960-5015-01  |
| Voice 1  | (4M)      | 965-0290-40     | 1.00   \$0D75        | U17      | 960-5015-01  |
| Voice 2  | (4M)      | 965-0291-40     | 1.00   \$CCCF        | U21      | 960-5015-01  |
| Voice 3  | (4M)      | 965-0292-40     | 1.00   \$227F        | U36      | 960-5015-01  |
| Voice 4  | (4M)      | 965-0293-40     | 1.00   \$DB69        | U37      | 960-5015-01  |
| <b>South Park (Notes 4, 5)</b>                                 |           |                 |                      |          |              |
| Game ROM   | (1M)      | 965-0301-71     | A1.03   \$58FF       | U210     | 960-5009-00  |
| Sound  | (512K)    | 965-0306-71     | 1.00   \$1286        | U7       | 960-7001-02  |
| Display  | (4M)      | 965-0307-71     | A1.01   \$166F       | ROM 0    | 960-5015-01  |
| Voice 1  | (8M)      | 965-0302-71     | 1.00   \$7BF8        | U17      | 960-5016-00  |
| Voice 2  | (8M)      | 965-0303-71     | 1.00   \$9CC0        | U21      | 960-5016-00  |
| Voice 3  | (8M)      | 965-0304-71     | 1.00   \$ADD9        | U36      | 960-5016-00  |
| Voice 4  | (8M)      | 965-0305-71     | 1.00   \$6559        | U37      | 960-5016-00  |

| ROM  | Chip Size | Program Part N° | USA Ver. & Check Sum | Bd. Loc.    | Raw Part N° |
|--|-----------|-----------------|----------------------|-------------|-------------|
| <b>Harley-Davidson® (Notes 4, 5, 6) Original (1999-2001)</b>                   |           |                 |                      |             |             |
| Game ROM   | (1M)      | 965-0319-67     | A1.03   \$3EFF       | U210        | 960-5009-00 |
| Sound  | (512K)    | 965-0320-67     | 1.00   \$F4FF        | U7          | 960-7001-02 |
| Display  | (4M)      | 965-0321-67     | A1.04   \$FC7C       | ROM 0       | 960-5015-01 |
| Voice 1  | (8M)      | 965-0322-67     | 1.00   \$CD26        | U17         | 960-5016-00 |
| Voice 2  | (8M)      | 965-0323-67     | 1.00   \$3936        | U21         | 960-5016-00 |
| Voice 3  | (8M)      | 965-0324-67     | 1.00   \$FB72        | U36         | 960-5016-00 |
| Voice 4  | (4M)      | 965-0325-67     | 1.00   \$6100        | U37         | 960-5015-01 |
| <b>► Harley-Davidson® (Notes 4, 5, 6, 8) 2nd Edition (2002-2003)</b>           |           |                 |                      |             |             |
| Game ROM   | (1M)      | 965-0319-67A    | A1.08   \$23FF       | U210        | 960-5009-00 |
| Display  | (4M)      | 965-0321-67A    | A1.05   \$B594       | ROM 0       | 960-5015-01 |
| <b>► Harley-Davidson® (Notes 4, 5, 6, 8) 3rd Edition (2004)</b>                |           |                 |                      |             |             |
| Game ROM   | (1M)      | 965-0319-87     | A4.00   \$1CFF       | U210        | 960-5009-00 |
| Display  | (4M)      | 965-0321-87     | A4.00   \$F4FF       | U5          | 960-5015-01 |
| <b>Striker Xtreme (Notes 4, 5)</b>   |           |                 |                      |             |             |
| Game ROM   | (1M)      | 965-0326-68     | A1.03   \$E4FF       | U210        | 960-5009-00 |
| Sound  | (512K)    | 965-0327-68     | 1.00   \$3BCA        | U7          | 960-7001-02 |
| Display  | (4M)      | 965-0328-68     | A1.03   \$1957       | ROM 0       | 960-5015-01 |
| Voice 1  | (8M)      | 965-0329-68     | 1.00   \$482A        | U17         | 960-5016-00 |
| Voice 2  | (8M)      | 965-0330-68     | 1.00   \$7312        | U21         | 960-5016-00 |
| Voice 3  | (8M)      | 965-0331-68     | 1.00   \$DE2F        | U36         | 960-5016-00 |
| Voice 4  | (8M)      | 965-0332-68     | 1.00   \$C508        | U37         | 960-5016-00 |
| <b>NFL (Notes 4, 5) Not on CD-R or Website: Code through Distributor Only.</b> |           |                 |                      |             |             |
| Game ROM   | (1M)      | 965-0339-73     | A1.00   \$D2FF       | U210        | 960-5009-00 |
| Sound  | (512K)    | 965-0340-73     | 1.00   U7            | 960-7001-02 |             |
| Display  | (4M)      | 965-0341-73     | A1.01   \$845A       | ROM 0       | 960-5015-01 |
| Voice 1  | (8M)      | 965-0342-73     | 1.00   U17           | 960-5016-00 |             |
| Voice 2  | (8M)      | 965-0343-73     | 1.00   U21           | 960-5016-00 |             |
| Voice 3  | (8M)      | 965-0344-73     | 1.00   U36           | 960-5016-00 |             |
| Voice 4  | (8M)      | 965-0345-73     | 1.00   U37           | 960-5016-00 |             |
| <b>Sharkey's Shootout (Notes 4, 5)</b>   |           |                 |                      |             |             |
| Game ROM   | (1M)      | 965-0333-72     | A2.11   \$49FF       | U210        | 960-5009-00 |
| Sound  | (512K)    | 965-0333-72     | 1.01   \$9796        | U7          | 960-7001-02 |
| Display  | (4M)      | 965-0335-72     | A2.01   \$6C33       | ROM 0       | 960-5015-01 |
| Voice 1  | (8M)      | 965-0336-72     | 1.00   \$58EA        | U17         | 960-5016-00 |
| Voice 2  | (8M)      | 965-0337-72     | 1.00   \$272B        | U21         | 960-5016-00 |
| Voice 3  | (8M)      | 965-0338-72     | 1.00   \$41AE        | U36         | 960-5016-00 |
| <b>High Roller Casino (Notes 4, 5)</b>   |           |                 |                      |             |             |
| Game ROM   | (1M)      | 965-0346-65     | A3.00   \$90FF       | U210        | 960-5009-00 |
| Sound  | (512K)    | 965-0347-65     | 1.00   \$581C        | U7          | 960-7001-02 |
| Display  | (4M)      | 965-0348-65     | A3.00   \$74B3       | ROM 0       | 960-5015-01 |
| Voice 1  | (8M)      | 965-0349-65     | 1.00   \$E12D        | U17         | 960-5016-00 |
| Voice 2  | (8M)      | 965-0350-65     | 1.00   \$38F4        | U21         | 960-5016-00 |
| Voice 3  | (8M)      | 965-0351-65     | 1.00   \$1B54        | U36         | 960-5016-00 |
| Voice 4  | (8M)      | 965-0352-65     | 1.00   \$D720        | U37         | 960-5016-00 |
| <b>Austin Powers™ (Notes 4, 5)</b>   |           |                 |                      |             |             |
| Game ROM   | (1M)      | 965-0353-74     | A3.02   \$5DFF       | U210        | 960-5009-00 |
| Sound  | (512K)    | 965-0354-74     | 1.00   \$D47B        | U7          | 960-7001-02 |
| Display  | (4M)      | 965-0355-74     | A3.00   \$6A3A       | ROM 0       | 960-5015-01 |
| Voice 1  | (8M)      | 965-0356-74     | 1.00   \$D2B9        | U17         | 960-5016-00 |
| Voice 2  | (8M)      | 965-0357-74     | 1.00   \$9E75        | U21         | 960-5016-00 |
| Voice 3  | (8M)      | 965-0358-74     | 1.00   \$51F3        | U36         | 960-5016-00 |
| Voice 4  | (8M)      | 965-0359-74     | 1.00   \$0AE5        | U37         | 960-5016-00 |
| <b>MONOPOLY® (Notes 4, 5)</b>  |           |                 |                      |             |             |
| Game ROM   | (1M)      | 965-0360-75     | A3.20   \$07FF       | U210        | 960-5009-00 |
| Sound  | (512K)    | 965-0361-75     | 1.00   \$8C18        | U7          | 960-7001-02 |
| Display  | (4M)      | 965-0362-75     | A3.01   \$A381       | ROM 0       | 960-5015-01 |
| Voice 1  | (8M)      | 965-0363-75     | 1.00   \$35E6        | U17         | 960-5016-00 |
| Voice 2  | (8M)      | 965-0364-75     | 1.00   \$B35A        | U21         | 960-5016-00 |
| Voice 3  | (8M)      | 965-0365-75     | 1.00   \$8A9F        | U36         | 960-5016-00 |
| <b>Playboy (Notes 4, 5, 7)</b>   |           |                 |                      |             |             |
| Game ROM   | (1M)      | 965-0367-76     | A5.00   \$7DFF       | U210        | 960-5009-00 |
| Sound  | (512K)    | 965-0368-76     | 1.02   \$E7C2        | U7          | 960-7001-02 |
| Display  | (4M)      | 965-0369-76     | A5.00   \$A5FF       | ROM 0       | 960-5015-01 |
| Voice 1  | (8M)      | 965-0370-76     | 1.00   \$9ABE        | U17         | 960-5016-00 |
| Voice 2  | (8M)      | 965-0371-76     | 1.00   \$9F34        | U21         | 960-5016-00 |
| Voice 3  | (8M)      | 965-0372-76     | 1.00   \$374B        | U36         | 960-5016-00 |
| Voice 4  | (8M)      | 965-0373-76     | 1.00   \$237A        | U37         | 960-5016-00 |
| <b>RollerCoaster Tycoon™ (Notes 4, 5, 7)</b>                                   |           |                 |                      |             |             |
| Sound  | (512K)    | 965-0374-78     | 1.00   \$F663        | U7          | 960-7001-02 |
| Game ROM   | (1M)      | 965-0375-78     | A7.02   \$55FF       | U210        | 960-5009-00 |
| Voice 1  | (8M)      | 965-0377-78     | 1.00   \$3C4A        | U17         | 960-5016-00 |
| Voice 2  |           |                 |                      |             |             |





# APPENDIX A

## Pinball Game Firmware (White Star Board System\* & S.A.M. System\*\* Only) Table



See website for the latest International Code or Updated USA version / checksums

| ROM  | Chip Size | Program Part N <sup>o</sup> | USA Ver. & Check Sum         | Bd. Loc.         | Raw Part N <sup>o</sup> |
|--|-----------|-----------------------------|------------------------------|------------------|-------------------------|
| <b>Ripley's Believe It or Not!® (Notes 7, 8)</b> |           |                             |                              |                  |                         |
| Sound  | (512K)    | 965-0408-81                 | 1.00   \$D93D                | U7               | 960-7001-02             |
| Game ROM   | (1M)      | 965-0409-81                 | <b>A3.20</b>   <b>\$43FF</b> | <b>U210</b>      | 960-5009-00             |
| Voice 1  | (8M)      | 965-0410-81                 | 1.00                         | \$067B U17       | 960-5016-00             |
| Voice 2  | (8M)      | 965-0411-81                 | 1.00                         | \$C8B8 U21       | 960-5016-00             |
| Voice 3  | (8M)      | 965-0412-81                 | 1.00                         | \$6402 U36       | 960-5016-00             |
| Voice 4  | (8M)      | 965-0413-81                 | 1.00                         | \$5341 U37       | 960-5016-00             |
| Display  | (4M)      | 965-0414-81                 | <b>A3.00</b>   <b>\$DE4B</b> | <b>U5</b> DC PCB | 960-5015-01             |

|                            |        |             |                              |                  |             |
|----------------------------|--------|-------------|------------------------------|------------------|-------------|
| <b>Elvis® (Notes 7, 8)</b> |        |             |                              |                  |             |
| Sound                      | (512K) | 965-0415-84 | 1.00   \$8CD2                | U7               | 960-7001-02 |
| Game ROM                   | (1M)   | 965-0416-84 | <b>A5.00</b>   <b>\$50FF</b> | <b>U210</b>      | 960-5009-00 |
| Voice 1                    | (8M)   | 965-0417-84 | 1.00                         | \$538D U17       | 960-5016-00 |
| Voice 2                    | (8M)   | 965-0418-84 | 1.00                         | \$8BCD U21       | 960-5016-00 |
| Voice 3                    | (8M)   | 965-0419-84 | 1.00                         | \$60F8 U36       | 960-5016-00 |
| Voice 4                    | (8M)   | 965-0420-84 | 1.00                         | \$14D8 U37       | 960-5016-00 |
| Display                    | (4M)   | 965-0421-84 | <b>A5.00</b>   <b>\$A1F6</b> | <b>U5</b> DC PCB | 960-5015-01 |

|   |        |             |                              |                  |             |
|---|--------|-------------|------------------------------|------------------|-------------|
| <b>The Sopranos<sup>SM</sup> (Notes 7, 8)</b> |        |             |                              |                  |             |
| Sound   | (512K) | 965-0422-85 | 4.00   \$9B5A                | U7               | 960-7001-02 |
| Game ROM                                      | (1M)   | 965-0423-85 | <b>A5.00</b>   <b>\$5BFF</b> | <b>U210</b>      | 960-5009-00 |
| Voice 1                                       | (8M)   | 965-0424-85 | 3.00                         | \$F01E U17       | 960-5016-00 |
| Voice 2                                       | (8M)   | 965-0425-85 | 1.04                         | \$C14C U21       | 960-5016-00 |
| Voice 3                                       | (8M)   | 965-0426-85 | 1.04                         | \$47A3 U36       | 960-5016-00 |
| Voice 4                                       | (8M)   | 965-0427-85 | 1.04                         | \$ADCD U37       | 960-5016-00 |
| Display                                       | (4M)   | 965-0428-85 | <b>A5.00</b>   <b>\$B4BB</b> | <b>U5</b> DC PCB | 960-5015-01 |

|                             |        |             |                              |                  |             |
|-----------------------------|--------|-------------|------------------------------|------------------|-------------|
| <b>NASCAR® (Notes 7, 8)</b> |        |             |                              |                  |             |
| Sound                       | (512K) | 965-0429-86 | 2.00   \$32B3                | U7               | 960-7001-02 |
| Game ROM                    | (1M)   | 965-0430-86 | <b>A4.50</b>   <b>\$39FF</b> | <b>U210</b>      | 960-5009-00 |
| Voice 1                     | (8M)   | 965-0431-86 | 2.00                         | \$CFFB U17       | 960-5016-00 |
| Voice 2                     | (8M)   | 965-0432-86 | 2.00                         | \$22C0 U21       | 960-5016-00 |
| Voice 3                     | (8M)   | 965-0433-86 | 2.00                         | \$5FC8 U36       | 960-5016-00 |
| Voice 4                     | (8M)   | 965-0434-86 | 2.00                         | \$2902 U37       | 960-5016-00 |
| Display                     | (4M)   | 965-0435-86 | <b>A4.00</b>   <b>\$92BD</b> | <b>U5</b> DC PCB | 960-5015-01 |

|                                |        |             |                              |                  |             |
|--------------------------------|--------|-------------|------------------------------|------------------|-------------|
| <b>Grand Prix (Notes 7, 8)</b> |        |             |                              |                  |             |
| Sound                          | (512K) | 965-0429-91 | V1.00   \$6F89               | U7               | 960-7001-02 |
| Game ROM                       | (1M)   | 965-0430-91 | <b>A4.50</b>   <b>\$5EFF</b> | <b>U210</b>      | 960-5009-00 |
| Voice 1                        | (8M)   | 965-0431-91 | 1.00                         | \$C0E5 U17       | 960-5016-00 |
| Voice 2                        | (8M)   | 965-0432-91 | 1.00                         | \$F40E U21       | 960-5016-00 |
| Voice 3                        | (8M)   | 965-0433-91 | 1.00                         | \$057D U36       | 960-5016-00 |
| Voice 4                        | (8M)   | 965-0434-91 | 1.00                         | \$2646 U37       | 960-5016-00 |
| Display                        | (4M)   | 965-0435-91 | <b>A4.00</b>   <b>\$DA8E</b> | <b>U5</b> DC PCB | 960-5015-01 |

|   |        |             |  |                  |             |
|---|--------|-------------|--|------------------|-------------|
| <b>[NDSE] (Notes 7, 8) <i>Call for more info if code update required.</i></b> |        |             |  |                  |             |
| Sound   | (512K) | 965-0436-97 |  | U7               | 960-7001-02 |
| Game ROM  | (1M)   | 965-0437-97 |  | <b>U210</b>      | 960-5009-00 |
| Voice 1   | (8M)   | 965-0438-97 |  | U17              | 960-5016-00 |
| Voice 2   | (8M)   | 965-0439-97 |  | U21              | 960-5016-00 |
| Voice 3   | (8M)   | 965-0440-97 |  | U36              | 960-5016-00 |
| Voice 4   | (8M)   | 965-0441-97 |  | U37              | 960-5016-00 |
| Display   | (4M)   | 965-0442-97 |  | <b>U5</b> DC PCB | 960-5015-01 |

**\*\* GAMES BELOW THIS LINE / NEXT COLUMN ARE S.A.M. SYSTEM GAMES**

**TO ORDER MEMORY STICK WITH GAME FILES FROM YOUR DISTRIBUTOR, USE SPI PART NUMBER 970-0128-00 & INCLUDE THE GAME NAME / LANGUAGE FILE(S) DESIRED.**

|   |      |              |               |        |                             |
|---|------|--------------|---------------|--------|-----------------------------|
| <b>World Poker Tour™ Pinball (WPT) (Notes 7, 9)</b> |      |              |               |        |                             |
| Boot B-02   | (8M) | 965-BOOT-SAM | 1.04   \$7E62 | U9     | 960-5016-00<br>unprogrammed |
| Memory Stick 128MB (970-0128-00)                    |      | Version      |               | System | Bin Files:                  |
| English + Spanish                                   |      | 1.12AL       |               | 1.17+  | WPT0112AL.bin               |
| English Only  |      | 1.12A        |               | 1.17+  | WPT0112A.bin                |
| English + French                                    |      | 1.12AF       |               | 1.17+  | WPT0112AF.bin               |
| French Only   |      | 1.12F        |               | 1.17+  | WPT0112F.bin                |
| German + French                                     |      | 1.12GF       |               | 1.17+  | WPT0112GF.bin               |
| German Only   |      | 1.12G        |               | 1.17+  | WPT0112G.bin                |
| English + Italian                                   |      | 1.12AI       |               | 1.17+  | WPT0112AI.bin               |
| Italian Only  |      | 1.12I        |               | 1.17+  | WPT0112I.bin                |

NOTE: THE TYPICAL SIZE PER UNZIPPED BIN FILE IS 25MB – 30MB+/-

|   |      |              |               |               |                             |
|---|------|--------------|---------------|---------------|-----------------------------|
| <b>The Simpsons™ Kooky Carnival Redemption (Note 9)</b> |      |              |               |               |                             |
| Boot B-02   | (8M) | 965-BOOT-SAM | 1.04   \$7E62 | U9            | 960-5016-00<br>unprogrammed |
| Memory Stick 128MB (970-0128-00)                        |      | Version      |               | Bin Files:    |                             |
| English Only  |      | 1.05         |               | SKC0105.bin   |                             |
| English New Jersey Only                                 |      | 0.09NJ       |               | SKC0090NJ.bin |                             |

NOTE: THE TYPICAL SIZE PER UNZIPPED BIN FILE IS 5.5MB +/-

|   |      |              |               |        |                             |
|---|------|--------------|---------------|--------|-----------------------------|
| <b>©Disney's Pirates of the Caribbean Pinball (POTC) (Notes 7, 9)</b> |      |              |               |        |                             |
| Boot B-02   | (8M) | 965-BOOT-SAM | 1.06   \$2014 | U9     | 960-5016-00<br>unprogrammed |
| Memory Stick 128MB (970-0128-00)                                      |      | Version      |               | System | Bin Files:                  |
| English + Spanish   |      | 1.15AS       |               | 1.17+  | POTC115AS.bin               |
| English + French  |      | 1.15AF       |               | 1.17+  | POTC115AF.bin               |
| German + French   |      | 1.15GF       |               | 1.17+  | POTC115GF.bin               |
| English + Italian   |      | 1.15AI       |               | 1.17+  | POTC115AI.bin               |

NOTE: THE TYPICAL SIZE PER UNZIPPED BIN FILE IS 25MB – 30MB+/-

|  |      |              |               |        |                             |
|--|------|--------------|---------------|--------|-----------------------------|
| <b>Family Guy™ Pinball (FG) (Notes 7, 9)</b> |      |              |               |        |                             |
| Boot B-02                                    | (8M) | 965-BOOT-SAM | 2.09   \$10A3 | U9     | 960-5016-00<br>unprogrammed |
| Memory Stick 128MB (970-0128-00)             |      | Version      |               | System | Bin Files:                  |
| English + Spanish                            |      | 10.00AL      |               | 1.23+  | FG1000AL.bin                |
| English + French                             |      | 10.00AF      |               | 1.23+  | FG1000AF.bin                |
| English + German                             |      | 10.00AG      |               | 1.23+  | FG1000GF.bin                |
| English + Italian                            |      | 10.00AI      |               | 1.23+  | FG1000AI.bin                |

NOTE: THE TYPICAL SIZE PER UNZIPPED BIN FILE IS 25MB – 30MB+/-

|   |      |              |               |        |                             |
|---|------|--------------|---------------|--------|-----------------------------|
| <b>Spider-Man™ Pinball (S-M) (Notes 7, 9)</b> |      |              |               |        |                             |
| Boot B-02                                     | (8M) | 965-BOOT-SAM | 2.10   \$F625 | U9     | 960-5016-00<br>unprogrammed |
| Memory Stick 128MB (970-0128-00)              |      | Version      |               | System | Bin Files:                  |
| English + Spanish                             |      | 1.3ES        |               | 1.27+  | spd_1_30_es.bin             |
| English + French                              |      | 1.3EF        |               | 1.27+  | spd_1_30_ef.bin             |
| German + French                               |      | 1.3GF        |               | 1.27+  | spd_1_30_gf.bin             |
| English + Italian                             |      | 1.3EI        |               | 1.27+  | spd_1_30_ei.bin             |

NOTE: THE TYPICAL SIZE PER UNZIPPED BIN FILE IS 25MB – 30MB+/-

### footnotes:

- 1 ROMs on CPU/Sound Bd.: 520-5136-00 (Stereo) & Display Cont. Bd.: 520-5055-01
- 2 ROMs on CPU/Sound Bd.: 520-5136-10 (Mono) & Display Cont. Bd.: 520-5055-01
- 3 ROMs on CPU/Sound Board: 520-5136-15\* (Mono) (\*FCC 11-97) & Display Controller Board: 520-5055-02\* (\*FCC 11-97)



# APPENDIX A

## Pinball Game Firmware Table

| EPROM                               | Chip Size | Program Part N <sup>o</sup> | USA Ver. | Bd. Loc. | Raw Part N <sup>o</sup> | EPROM                                       | Chip Size | Program Part N <sup>o</sup> | USA Ver.                          | Bd. Loc. | Raw Part N <sup>o</sup> |
|-------------------------------------|-----------|-----------------------------|----------|----------|-------------------------|---|-----------|-----------------------------|-----------------------------------|----------|-------------------------|
| <b>Laser War</b>                    |           |                             |          |          |                         | <b>Lethal Weapon 3</b>                      |           |                             |                                   |          |                         |
| CPU                                 | (256K)    | 965-0004-00                 | LWAR.C5  | C5       | 960-5007-00             | CPU   | (512K)    | 965-0082-00                 | A2.08                             | C5       | 960-7001-02             |
| Sound (old)                         | (256K)    | 965-0005-00                 |          | J5       | 960-5007-00             | Voice 1                                     | (2M)      | 965-0083-00                 |                                   | U17      | 960-5010-00             |
| Sound (old)                         | (256K)    | 965-0006-00                 |          | J6       | 960-5007-00             | Voice 2                                     | (2M)      | 965-0084-00                 |                                   | U21      | 960-5010-00             |
| Sound (old)                         | (256K)    | 965-0007-00                 |          | J7       | 960-5007-00             | Sound                                       | (256K)    | 965-0085-00                 |                                   | U7       | 960-5007-00             |
|                                     |           |                             | - OR -   |          |                         | Display                                     | (2M)      | 965-0086-00                 | A2.06                             | ROM 0    | 960-5010-00             |
| Sound                               | (256K)    | 965-0008-00                 |          | 7F       | 960-5007-00             | Display                                     | (2M)      | 965-0087-00                 | A2.06                             | ROM 1    | 960-5010-00             |
| Sound 1                             | (512K)    | 965-0009-00                 |          | 6F       | 960-7001-02             |   |           |                             | -OR-                              |          |                         |
| Sound 2                             | (512K)    | 965-0010-00                 |          | 4F       | 960-7001-02             | Display                                     | (4M)      | 965-0087-04                 | A2.06                             | ROM 0    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             | (Used on Display PCB 520-5055-01) |          |                         |
| <b>Secret Service</b>               |           |                             |          |          |                         | <b>Star Wars</b>                            |           |                             |                                   |          |                         |
| CPU                                 | (256K)    | 965-0011-00                 | A4-6     | B5       | 960-5007-00             | CPU   | (512K)    | 965-0119-00                 | A1.03                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0012-00                 | A4-6     | C5       | 960-5007-00             | Voice 0                                     | (4M)      | 965-0132-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (512K)    | 965-0014-00                 |          | 6F       | 960-7001-02             | Voice 1                                     | (2M)      | 965-0133-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (512K)    | 965-0015-00                 |          | 4F       | 960-7001-02             | Sound                                       | (256K)    | 965-0131-00                 |                                   | U7       | 960-5007-00             |
| Sound                               | (256K)    | 965-0013-00                 |          | 7F       | 960-5007-00             | Display                                     | (2M)      | 965-0120-00                 | A1.04                             | ROM 0    | 960-5010-00             |
|                                     |           |                             |          |          |                         | Display                                     | (2M)      | 965-0121-00                 | A1.04                             | ROM 1    | 960-5010-00             |
|                                     |           |                             |          |          |                         |   |           |                             | (Used on Display PCB 520-5055-00) |          |                         |
| <b>Torpedo Alley</b>                |           |                             |          |          |                         | <b>Rocky &amp; Bullwinkle &amp; Friends</b> |           |                             |                                   |          |                         |
| CPU                                 | (256K)    | 965-0016-00                 | A2-1     | B5       | 960-5007-00             | CPU   | (512K)    | 965-0138-00                 | A1.30                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0017-00                 | A2-1     | C5       | 960-5007-00             | Voice 0                                     | (4M)      | 965-0139-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (512K)    | 965-0018-00                 |          | 6F       | 960-7001-02             | Voice 1                                     | (2M)      | 965-0140-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (512K)    | 965-0019-00                 |          | 4F       | 960-7001-02             | Sound                                       | (256K)    | 965-0141-00                 |                                   | U7       | 960-5007-00             |
| Sound                               | (256K)    | 965-0018-00                 |          | 7F       | 960-5007-00             | Display                                     | (4M)      | 965-0142-00                 | A1.30                             | ROM 0    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             | -OR-                              |          |                         |
|                                     |           |                             |          |          |                         |   |           |                             | A1.05                             | ROM 0    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             | (Used on Display PCB 520-5055-01) |          |                         |
| <b>Time Machine</b>                 |           |                             |          |          |                         | <b>Jurassic Park</b>                        |           |                             |                                   |          |                         |
| CPU                                 | (128K)    | 965-0021-00                 | A2-4     | B5       | 960-5006-00             | CPU   | (512K)    | 965-0143-00                 | A5.13                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0022-00                 | A2-4     | C5       | 960-5007-00             | Voice 0                                     | (4M)      | 965-0144-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (512K)    | 965-0024-00                 |          | 6F       | 960-7001-02             | Voice 1                                     | (2M)      | 965-0145-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (512K)    | 965-0025-00                 |          | 4F       | 960-7001-02             | Sound                                       | (256K)    | 965-0146-00                 |                                   | U7       | 960-5007-00             |
| Sound                               | (256K)    | 965-0023-00                 |          | 7F       | 960-5007-00             | Display                                     | (4M)      | 965-0147-00                 | A5.10                             | ROM 0    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             |                                   |          |                         |
| <b>Playboy 35th Anniversary</b>     |           |                             |          |          |                         | <b>Last Action Hero</b>                     |           |                             |                                   |          |                         |
| CPU                                 | (256K)    | 965-0046-00                 | A2-4     | B5       | 960-5007-00             | CPU   | (512K)    | 965-0148-00                 | A1.12                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0047-00                 | A2-4     | C5       | 960-5007-00             | Voice 0                                     | (4M)      | 965-0149-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (512K)    | 965-0049-00                 |          | 6F       | 960-7001-02             | Voice 1                                     | (2M)      | 965-0150-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (512K)    | 965-0050-00                 |          | 4F       | 960-7001-02             | Sound                                       | (256K)    | 965-0151-00                 |                                   | U7       | 960-5007-00             |
| Sound                               | (256K)    | 965-0048-00                 |          | 7F       | 960-5007-00             | Display                                     | (4M)      | 965-0152-00                 | A1.06                             | ROM 0    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             |                                   |          |                         |
| <b>ABC Monday Night Football</b>    |           |                             |          |          |                         | <b>Tales from the Crypt</b>                 |           |                             |                                   |          |                         |
| CPU                                 | (128K)    | 965-0031-00                 | A2-7     | B5       | 960-5006-00             | CPU   | (512K)    | 965-0157-00                 | A3.03                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0032-00                 | A2-7     | C5       | 960-5007-00             | Voice 0                                     | (4M)      | 965-0158-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (512K)    | 965-0034-00                 |          | 6F       | 960-7001-02             | Voice 1                                     | (2M)      | 965-0159-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (512K)    | 965-0035-00                 |          | 4F       | 960-7001-02             | Sound                                       | (256K)    | 965-0160-00                 |                                   | U7       | 960-5007-00             |
| Sound                               | (256K)    | 965-0033-00                 |          | 7F       | 960-5007-00             | Display                                     | (4M)      | 965-0161-00                 | A3.01                             | ROM 0    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             |                                   |          |                         |
| <b>Robocop</b>                      |           |                             |          |          |                         | <b>The Who's Tommy</b>                      |           |                             |                                   |          |                         |
| CPU                                 | (256K)    | 965-0036-00                 | A3-4     | B5       | 960-5007-00             | CPU   | (512K)    | 965-0162-00                 | A4.00                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0037-00                 | A3-4     | C5       | 960-5007-00             | Voice 1                                     | (4M)      | 965-0163-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (512K)    | 965-0039-00                 |          | 6F       | 960-7001-02             | Voice 2                                     | (4M)      | 965-0166-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (512K)    | 965-0040-00                 |          | 4F       | 960-7001-02             | Voice 3                                     | (4M)      | 965-0167-00                 |                                   | U36      | 960-5015-00             |
| Sound                               | (256K)    | 965-0038-00                 |          | 7F       | 960-5007-00             | Voice 4                                     | (4M)      | 965-0168-00                 |                                   | U37      | 960-5015-00             |
|                                     |           |                             |          |          |                         | Sound                                       | (512K)    | 965-0164-00                 |                                   | U7       | 960-7001-02             |
|                                     |           |                             |          |          |                         | Display                                     | (4M)      | 965-0163-00                 | A4.00                             | ROM 0    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             |                                   |          |                         |
| <b>Phantom of the Opera</b>         |           |                             |          |          |                         | <b>WWF Royal Rumble</b>                     |           |                             |                                   |          |                         |
| CPU                                 | (128K)    | 965-0026-00                 | A3-2     | B5       | 960-5006-00             | CPU   | (512K)    | 965-0169-00                 | A1.06                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0027-00                 | A3-2     | C5       | 960-5007-00             | Voice 1                                     | (4M)      | 965-0172-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (512K)    | 965-0029-00                 |          | 6F       | 960-7001-02             | Voice 2                                     | (4M)      | 965-0173-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (512K)    | 965-0030-00                 |          | 4F       | 960-7001-02             | Voice 3                                     | (4M)      | 965-0174-00                 |                                   | U36      | 960-5015-00             |
| Sound                               | (256K)    | 965-0028-00                 |          | 7F       | 960-5007-00             | Sound                                       | (512K)    | 965-0171-00                 |                                   | U7       | 960-7001-02             |
|                                     |           |                             |          |          |                         | Display                                     | (4M)      | 965-0170-00                 | A1.02                             | ROM 0    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             |                                   |          |                         |
| <b>Back to the Future</b>           |           |                             |          |          |                         | <b>Guns N' Roses</b>                        |           |                             |                                   |          |                         |
| CPU                                 | (256K)    | 965-0041-00                 | A2-0     | B5       | 960-5007-00             | CPU   | (512K)    | 965-0175-00                 | A3.00                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0042-00                 | A2-0     | C5       | 960-5007-00             | Voice 1                                     | (4M)      | 965-0178-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (512K)    | 965-0044-00                 |          | 6F       | 960-7001-02             | Voice 2                                     | (4M)      | 965-0179-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (512K)    | 965-0045-00                 |          | 4F       | 960-7001-02             | Voice 3                                     | (4M)      | 965-0180-00                 |                                   | U36      | 960-5015-00             |
| Sound                               | (256K)    | 965-0043-00                 |          | 7F       | 960-5007-00             | Voice 4                                     | (4M)      | 965-0181-00                 |                                   | U37      | 960-5015-00             |
|                                     |           |                             |          |          |                         | Sound                                       | (512K)    | 965-0177-00                 |                                   | U7       | 960-7001-02             |
|                                     |           |                             |          |          |                         | Display                                     | (4M)      | 965-0176-00                 | A3.00                             | ROM 0    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             |                                   |          |                         |
| <b>The Simpsons</b>                 |           |                             |          |          |                         | <b>Maverick *</b>                           |           |                             |                                   |          |                         |
| CPU                                 | (128K)    | 965-0051-00                 | A2-7     | B5       | 960-5006-00             | CPU   | (512K)    | 965-0182-00                 | A4.04                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0052-00                 | A2-7     | C5       | 960-5007-00             | Voice 1                                     | (4M)      | 965-0186-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (512K)    | 965-0054-00                 |          | 6F       | 960-7001-02             | Voice 2                                     | (4M)      | 965-0187-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (512K)    | 965-0055-00                 |          | 4F       | 960-7001-02             | Voice 3                                     | (4M)      | 965-0187-01                 |                                   | U36      | 960-5015-00             |
| Sound                               | (256K)    | 965-0053-00                 |          | 7F       | 960-5007-00             | Sound                                       | (512K)    | 965-0185-00                 |                                   | U7       | 960-7001-02             |
|                                     |           |                             |          |          |                         | Display*                                    | (4M)      | 965-0183-00                 | A4.01                             | ROM 0    | 960-5015-00             |
|                                     |           |                             |          |          |                         | Display*                                    | (4M)      | 965-0184-00                 | A4.01                             | ROM 3    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             |                                   |          |                         |
| <b>Checkpoint</b>                   |           |                             |          |          |                         | <b>Mary Shelley's Frankenstein *</b>        |           |                             |                                   |          |                         |
| CPU                                 | (128K)    | 965-0056-00                 | A1-7     | B5       | 960-5006-00             | CPU   | (512K)    | 965-0188-00                 | A1.03                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0134-00                 | A1-7     | C5       | 960-5007-00             | Voice 1                                     | (4M)      | 965-0192-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (1M)      | 965-0057-00                 |          | F7       | 960-5009-00             | Voice 2                                     | (4M)      | 965-0193-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (1M)      | 965-0058-00                 |          | F5       | 960-5009-00             | Voice 3                                     | (4M)      | 965-0194-00                 |                                   | U36      | 960-5015-00             |
| Sound                               | (256K)    | 965-0059-00                 |          | F4       | 960-5007-00             | Sound                                       | (512K)    | 965-0191-00                 |                                   | U7       | 960-7001-02             |
| Display                             | (512K)    | 965-0060-00                 | CP80     | U8       | 960-7001-02             | Display*                                    | (4M)      | 965-0189-00                 | A1.03                             | ROM 0    | 960-5015-00             |
|                                     |           |                             |          |          |                         | Display*                                    | (4M)      | 965-0190-00                 | A1.03                             | ROM 3    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             |                                   |          |                         |
| <b>Teenage Mutant Ninja Turtles</b> |           |                             |          |          |                         | <b>Baywatch *</b>                           |           |                             |                                   |          |                         |
| CPU                                 | (128K)    | 965-0061-00                 | A1.04    | B5       | 960-5006-00             | CPU   | (512K)    | 965-0195-00                 | A4.00                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0062-00                 | A1.04    | C5       | 960-5007-00             | Voice 1                                     | (4M)      | 965-0196-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (1M)      | 965-0063-00                 |          | F5/6     | 960-5009-00             | Voice 2                                     | (4M)      | 965-0197-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (1M)      | 965-0064-00                 |          | F4/5     | 960-5009-00             | Sound                                       | (512K)    | 965-0199-00                 |                                   | U7       | 960-7001-02             |
| Sound                               | (256K)    | 965-0065-00                 |          | F7       | 960-5007-00             | Display*                                    | (4M)      | 965-0200-00                 | A4.00                             | ROM 0    | 960-5015-00             |
| Display                             | (512K)    | 965-0066-00                 | A1.04    | U8       | 960-7001-02             | Display*                                    | (4M)      | 965-0201-00                 | A4.00                             | ROM 3    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             |                                   |          |                         |
| <b>Batman</b>                       |           |                             |          |          |                         | <b>Batman Forever *</b>                     |           |                             |                                   |          |                         |
| CPU                                 | (128K)    | 965-0067-00                 | A1.06    | B5       | 960-5006-00             | CPU   | (512K)    | 965-0202-00                 | A3.02                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0135-00                 | A1.06    | C5       | 960-5007-00             | Voice 1                                     | (4M)      | 965-0203-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (2M)      | 965-0068-00                 |          | U17      | 960-5010-00             | Voice 2                                     | (4M)      | 965-0204-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (1M)      | 965-0069-00                 |          | U21      | 960-5010-00             | Sound                                       | (512K)    | 965-0205-00                 |                                   | U7       | 960-7001-02             |
| Sound                               | (256K)    | 965-0070-00                 |          | U7       | 960-5007-00             | Display*                                    | (4M)      | 965-0206-00                 | A3.00                             | ROM 0    | 960-5015-00             |

## APPENDIX B

### Semi-Conductors / Integrated Circuits (I.C.) / Relays Cross-Reference Table

| Table No   | Type   | Source Number  | STERN®<br>PINBALL | N T E®  | E C G®           | Radio Shack® | R C A®    |
|--|--|--|-------------------|---|------------------|--------------|-----------|
| <b>RECTIFICATION, BLOCKING, DAMPENING DIODES AND/OR LIGHT EMITTING DIODES (LEDs)</b> |  |  |                   |   |                  |              |           |
| <b>1</b>   | Diode  | 1N4001   | 112-5001-00       | NTE552  | ECG552           | - - - - -    | SK9000    |
|  | Diode  | 1N4004   | 112-5003-00       | NTE116  | ECG116           | 276-1103     | SK3312    |
|  | Diode  | 1N5401   | 112-0056-00       | NTE5801   | ECG5801          | 276-1143     | SK9004    |
|  | Diode  | 1N5404   | 112-5004-00       | NTE5804   | ECG5804          | 276-1144     | SK9007    |
|  | Diode  | T6A10L   | 112-5006-01       | NTE5812   | ECG5812          | - - - - -    | - - - - - |
|  | Diode  | FR302  | 112-5009-00       | NTE588  | ECG588           | - - - - -    | SK5014    |
|  | Diode, Signal  | 1N914  | 112-5014-00       | - - - - -   | - - - - -        | - - - - -    | - - - - - |
| LED  | <b>MT5000UR</b> or<br><b>TLRH180P</b><br>(T1-3/4 GaAlAs) | 165-5052-00<br><i>(old SPI Part No:<br/>165-5100-00)</i> | - - - - -         | - - - - -   | 276-066B         | - - - - -    |           |
| <b>ZENER DIODES</b>  |  |  |                   |   |                  |              |           |
| <b>2</b>   | Diode  | 1N4742A 12v  | 112-0061-00       | NTE142A   | ECG142A          | 276-563      | SK12V     |
|  | Diode  | 1N4760B 68v  | 112-0062-00B      | NTE5092A  | ECG5092A         | - - - - -    | SK68V     |
|  | Diode  | 1N4764A 100v   | 112-0049-00A      | NTE5096A  | ECG5096A         | - - - - -    | SK100V    |
|  | Diode  | 1N5228 3.9v  | 112-0053-00       | NTE5007A  | ECG5007A         | - - - - -    | SK3A9     |
|  | Diode  | 1N5234B 6.2v   | 112-0047-00B      | NTE5013A  | ECG5013A         | 276-561      | SK6A2     |
|  | Diode  | 1N5379 110v  | 112-0072-00       | NTE5157   | ECG5157          | - - - - -    | SK110X    |
|  | Diode  | 1N6267A 6.8v   | 112-5011-00       | NTE4902   | ECG4902          | - - - - -    | - - - - - |
|  | Diode  | 1N4752A 33v  | 112-5010-00A      | NTE147A   | ECG147A          | - - - - -    | SK33V     |
| Diode  | 1N4736 6.8v 1w   | 112-5007-00  | NTE5071A          | ECG5071A  | - - - - -        | - - - - -    |           |
| <b>TRANSISTORS - TYPE FET, NPN, PNP AND/OR SCR</b>                                   |  |  |                   |   |                  |              |           |
| <b>3</b>   | FET Trans.   | STP20N10L  | 110-0106-00       | NTE2987   | ECG2987          | - - - - -    | - - - - - |
|  | FET Trans.   | STP19N06L  | 110-0088-00       | NTE2985   | ECG2985          | - - - - -    | - - - - - |
|  | FET Trans.   | VN02N  | 110-0089-00       | - - - - -   | - - - - -        | - - - - -    | - - - - - |
|  | NPN Trans.   | 2N4401   | 110-0073-00       | NTE85   | ECG85            | 276-2009     | SK3124A   |
|  | NPN Trans.   | 2N6427   | 110-0070-00       | NTE48   | ECG48            | - - - - -    | SK4906    |
|  | NPN Trans.   | MJE340   | 110-0071-00       | NTE157  | ECG157           | - - - - -    | SK3747    |
|  | NPN Trans.   | MPSA42   | 110-0082-00       | NTE287  | ECG287           | - - - - -    | SK3232    |
|  | NPN Trans.   | 2N3904   | 110-0069-00       | NTE123AP  | ECG123AP         | 276-2009     | - - - - - |
|  | NPN Trans.   | TIP122   | 110-0067-00       | NTE261  | ECG261           | 276-2068     | SK3896    |
|  | NPN Trans.   | MJE15030   | 110-0101-00       | NTE375  | ECG375           | - - - - -    | SK9118    |
|  | PNP Trans.   | 2N5401   | 110-0078-00       | NTE288  | ECG288           | - - - - -    | SK3434    |
|  | PNP Trans.   | MJE15031   | 110-0103-00       | NTE292  | ECG292           | - - - - -    | SK3441    |
|  | PNP Trans.   | MJE350   | 110-0072-00       | NTE374  | ECG374           | - - - - -    | SK9042    |
|  | PNP Trans.   | MPSA92   | 110-0100-00       | NTE288  | ECG278           | - - - - -    | SK3434    |
|  | PNP Trans.   | TIP42  | 110-0068-00       | NTE332  | ECG332           | - - - - -    | SK9236    |
|  | PNP Trans.   | TIP32C   | 110-0081-00       | NTE292  | ECG292           | - - - - -    | SK3441    |
|  | PNP Trans.   | TIP36C   | 110-0077-00       | NTE393  | ECG393           | - - - - -    | SK3961    |
|  | SCR Trans.   | 2N5060   | 110-0074-00       | NTE5400   | ECG5400          | 276-1067     | SK3950    |
| SCR Trans.   | SCR2800B   | 110-0083-00  | NTE5461-8         | ECG5461-8   | - - - - -        | - - - - -    |           |
| <b>BRIDGE RECTIFIERS (BR)</b>  |  |  |                   | <b>Comments:</b>  |                  |              |           |
| <b>4</b>   | BR (Present)   | DB3501 or<br>CM3501                                      | 112-5000-00       | For White Star I/O Bds., BR = 35 Amp @ 100v P.I.V.                            |                  |              |           |
|  | <b>RELAYS</b>  |  |                   |   | <b>Comments:</b> |              |           |
| <b>5</b>   | Relay  | FRL-264<br>D024/02CK                                     | 190-5002-00       | For PPB, Power Supply, & White Star I/O Boards,<br>Relay = 24v DC 10 Amp DPDT |                  |              |           |
|  | Relay  | FRL-264<br>D006/04CV                                     | 190-5001-00       | For CPU Boards,<br>Relay = 6v DC 5 Amp 4 Pole DT                              |                  |              |           |







# APPENDIX C

## Production Start Date, Manual Part No., ROM Size & Positions and Jumper W6 Installed Note‡ (White Star Board System & S.A.M. System Only\*)



| Game Name<br>White Star<br>Bd. System™   | Production<br>Start Date<br>and Manual<br>Part Nr. | CPU/Sound Board Sound U7 512K<br>CPU/Sound Board Game U210 1MB<br>CPU/Sound Board Voice ROMS: |     |     |          | Jumper<br>Installed<br>(‡ see Note) |       |
|--|--|---|-----|-----|----------|-------------------------------------|-------|
|  |  | U17   | U21 | U36 | U37      |                                     |       |
| * Note: For complete Appendix Information for Games <i>Laser War</i> through <i>Batman Forever</i> , see any Service Game Manual between <i>Apollo 13</i> through <i>Ripley's Believe It or Not!</i> or on-line at our website <a href="http://www.sternpinball.com/parts.htm">www.sternpinball.com/parts.htm</a> ; also available on CD-R, 970-2003-00 ( <i>The Simpsons™ Pinball Party</i> , <i>T3®</i> and <i>The Lord of the Rings™</i> ). |  |   |     |     |          |                                     |       |
| 29   | Apollo 13 (A13)                                    | NOV 95<br>780-5044-00   | 4MB | 4MB | 4MB      | Not Used                            | n / a |
| 30   | Golden Eye   | FEB 96<br>780-5042-00   | 4MB | 4MB | Not Used | Not Used                            | n / a |
| 31   | Twister  | APR 96<br>780-5041-00   | 4MB | 4MB | Not Used | Not Used                            | n / a |
| 32   | ID4: Independence Day                              | JUL 96<br>780-5045-00   | 4MB | 4MB | Not Used | Not Used                            | n / a |
| 33   | Space Jam  | OCT 96<br>780-5043-00   | 4MB | 4MB | 4MB      | Not Used                            | n / a |
| 34   | The Star Wars Trilogy - Sp. Ed.                    | FEB 97<br>780-5056-00   | 4MB | 4MB | Not Used | Not Used                            | n / a |
| 35   | The Lost World: Jurassic Park                      | JUN 97<br>780-5053-00   | 4MB | 4MB | Not Used | Not Used                            | n / a |
| 36   | The X-Files  | AUG 97<br>780-5046-00   | 4MB | 4MB | Not Used | Not Used                            | n / a |
| 37   | Starship Troopers                                  | NOV 97<br>780-5059-00   | 4MB | 4MB | 4MB      | Not Used                            | n / a |
| 38   | Viper Night Drivin'                                | FEB 98<br>780-5035-00   | 4MB | 4MB | 4MB      | 4MB                                 | n / a |
| 39   | Lost In Space                                      | JUN 98<br>780-5060-00   | 4MB | 4MB | 4MB      | 4MB                                 | n / a |
| 40   | Godzilla   | SEP 98<br>780-5040-00   | 4MB | 4MB | 4MB      | 4MB                                 | n / a |
| 41   | South Park   | JAN 99<br>780-5071-00   | 8MB | 8MB | 8MB      | 8MB                                 | W6    |
| 42a  | Harley-Davidson®                                   | AUG 99<br>780-5067-01   | 8MB | 8MB | 8MB      | 8MB                                 | W6    |
| 42b  | Harley-Davidson® 2nd Ed.                           | SEP 02<br>780-5067-10   | 8MB | 8MB | 8MB      | 8MB                                 | W6    |
| 42c  | Harley-Davidson® 3rd Ed.                           | OCT 04<br>780-5087-00   | 8MB | 8MB | 8MB      | 8MB                                 | W6    |
| 43a  | Striker Xtreme                                     | MAR 00<br>780-5068-01   | 8MB | 8MB | 8MB      | 8MB                                 | W6    |
| 43b  | NFL  | OCT 00<br>780-5073-00   | 8MB | 8MB | 8MB      | 8MB                                 | W6    |
| 44   | Sharkey's Shootout                                 | JUL/OCT 00<br>780-5072-01   | 8MB | 8MB | 8MB      | Not Used                            | W6    |
| 45   | High Roller Casino                                 | JAN 01<br>780-5065-00   | 8MB | 8MB | 8MB      | 8MB                                 | W6    |
| 46   | Austin Powers™                                     | MAY 01<br>780-5074-00   | 8MB | 8MB | 8MB      | 8MB                                 | W6    |
| 47   | MONOPOLY®  | SEP 01<br>780-5075-00   | 8MB | 8MB | 8MB      | Not Used                            | W6    |
| 48   | Playboy  | FEB 02<br>780-5076-00   | 8MB | 8MB | 8MB      | 8MB                                 | W6    |
| 49   | RollerCoaster Tycoon™                              | AUG 02<br>780-5078-00   | 8MB | 8MB | 8MB      | Not Used                            | W6    |
| 50   | The Simpsons™ Pinball Party                        | JAN 03<br>780-5077-00   | 8MB | 8MB | 8MB      | 8MB                                 | W6    |
| 51   | T3®: Rise of the Machines™                         | MAY 03<br>780-5079-00   | 8MB | 8MB | 8MB      | 8MB                                 | W6    |
| 52   | The Lord of the Rings™                             | NOV 03<br>780-5080-00   | 8MB | 8MB | 8MB      | 8MB                                 |       |
| 53   | Ripley's Believe It or Not!®                       | APR 04<br>780-5081-00   | 8MB | 8MB | 8MB      | 8MB                                 |       |

‡ Additional Information for Installed Jumper (above games 41-51):

- Installed **W6** so 8MB ROMS can be utilized. See the **CPU/Sound Board Schematic** (Sheet 2 of 3, Address Location 3E) in the games' Service Game Manual. Games 52 - 57 CPU/Sound Board differ than <51 (See Appendix D).

See **Apdx. A** for more detailed information on **Pinball Game Firmware** (ROM Name, Size, Part Numbers, USA Version & Checksum and Board Locations).

| Game Name<br>White Star<br>Board System™ | Production<br>Start Date<br>and Manual<br>Part Nr. | CPU/Sound Board Sound U7 512K<br>CPU/Sound Board Game U210 1MB<br>CPU/Sound Board Voice ROMS: |     |     |     |     |
|--|--|---|-----|-----|-----|-----|
|  |  | U17   | U21 | U36 | U37 |     |
| 54                                       | Elvis®   | AUG 04<br>780-5084-00   | 8MB | 8MB | 8MB | 8MB |
| 55                                       | The Sopranos™                                      | FEB 05<br>780-5085-00   | 8MB | 8MB | 8MB | 8MB |
| 56                                       | NASCAR®  | JUL 05<br>780-5086-00   | 8MB | 8MB | 8MB | 8MB |
| 57                                       | Grand Prix   | SEP 05<br>780-5091-00   | 8MB | 8MB | 8MB | 8MB |

See **Apdx. A** for more detailed information on **Pinball Game Firmware** (ROM Name, Size, Part Numbers, USA Version & Checksum and Board Locations).

| Game Name<br>S.A.M. System | Production<br>Start Date<br>and Manual<br>Part Nr. | S.A.M. System CPU/Sound Board<br>Boot EPROM U9 |     |                                   |            |
|----------------------------|--|--|-----|-----------------------------------|------------|
|                            |  | 965-BOOT-SAM (Programmed)                      |     |                                   |            |
| 58                         | World Poker Tour™ (WPT)                            | JUN 06<br>780-5088-00                          | 8MB | B-02<br>V2.1+<br>chksum<br>\$F625 | LOC:<br>U9 |
| 59                         | The Simpsons™ Kooky Carnival                       | APR 06<br>780-5090-00                          | 8MB | B-02<br>V2.1+<br>chksum<br>\$F625 | LOC:<br>U9 |
| 60                         | ©Disney's Pirates of the Caribbean                 | AUG 06<br>780-5092-00                          | 8MB | B-02<br>V2.1+<br>chksum<br>\$F625 | LOC:<br>U9 |
| 61                         | Famil Guy™   | DEC 06<br>780-5093-00                          | 8MB | B-02<br>V2.1+<br>chksum<br>\$F625 | LOC:<br>U9 |
| 62                         | Spider-Man™  | MAY 07<br>780-5094-00                          | 8MB | B-02<br>V2.1+<br>chksum<br>\$F625 | LOC:<br>U9 |

**Games 58 – current, S.A.M. System** : CPU/Sound & I/O Power Driver PCBs differ than White Star (previous Games 29 – 57); Disp. Controller Not Required.





# APPENDIX D

## Board Type (White Star Board System\* Only) Table



| Game Name   | Flipper                     | I/O Power Driver  | CPU/Sound Stereo  | Disp. Power Supply                          | Dot Matrix Display                                | Display Controller           | OPTO Transmitter             | OPTO Receiver                   | OPTO Application   |
|---|-----------------------------|---|---|---|---|------------------------------|------------------------------|---------------------------------|--|
| Apollo 13   | 520-5080-00<br>2-Flipper    | 520-5137-00   | 520-5136-00   | 520-5138-00                                 | 520-5052-00<br>128 X 32 Dots                      | 520-5055-01                  | 520-5124-00<br>Single OPTO   | 520-5125-00<br>Single OPTO      | 5-Ball Trough<br>over Up-Kicker  |
|   | Miscellaneous<br>PC Boards: | Light Boards 520-5130-01, -04 & -05 Magnet Interface,<br>7-Segment Display & Light Bd. 520-5130-06 Magnet Driver<br>Board 520-5130-02 Switch Membrane Board 520-5130-03 |   |   |   | Relay Board<br>520-5010-00   |                              |                                 |  |
| Golden Eye  | 520-5080-00<br>2-Flipper    | 520-5137-00   | 520-5136-00   | 520-5138-00                                 | 520-5052-00<br>128 X 32 Dots                      | 520-5055-01                  | 520-5124-00<br>Single OPTO   | 520-5125-00<br>Single OPTO      | 5-Ball Trough<br>over Up-Kicker  |
|   | Miscellaneous<br>PC Boards: | Light Boards<br>520-5128-05 through -08   |   | Mag. Processor X2 Driver Bd.<br>520-5143-00 | Relay Board<br>520-5010-00                        |                              |                              |                                 |  |
| <b>GAMES HEREON NO LONGER REQUIRE THE FLIPPER BOARD WITH THE WHITE STAR BOARD SYSTEM™</b> |                             |   |   |   |   |                              |                              |                                 |  |
| Game Name   | I/O Power Driver            | CPU/Sound Mono  | Disp. Power Supply  | Dot Matrix Display                          | Display Controller                                | OPTO Transmitter             | OPTO Receiver                | OPTO Application                | Misc OPTO & App.   |
| Twister   | 520-5137-01                 | 520-5136-10   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-01                                       | 520-5124-00<br>Single OPTO   | 520-5125-00<br>Single OPTO   | 5-Ball Trough<br>over Up-Kicker |  |
|   | Miscellaneous<br>PC Boards: | Light Boards<br>520-5145-01 through -07   |   | Mag. Drv. Bd.<br>520-5143-00                | Relay Board<br>520-5010-00                        |                              |                              |                                 |  |
| Independence Day (ID4)  | 520-5137-01                 | 520-5136-10   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-01                                       | 520-5124-00<br>Single OPTO   | 520-5125-00<br>Single OPTO   | 4-Ball Trough<br>over Up-Kicker |  |
|   | Miscellaneous<br>PC Boards: | Light Boards<br>520-5149-01 through -10   |   | Servo Mtr. Bd.<br>520-5152-00               |   | 520-5082-00<br>Long Hop OPTO | 520-5083-00<br>Long Hop OPTO | Alien Head<br>Enter             |  |
| Space Jam   | 520-5137-01                 | 520-5136-10   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-01                                       | 520-5124-00<br>Single OPTO   | 520-5125-00<br>Single OPTO   | 5-Ball Trough<br>over Up-Kicker |  |
|   | Miscellaneous<br>PC Boards: | 2X 7-Segment Display Board<br>520-5153-00   |   |   |   |                              |                              |                                 |  |
| The Star Wars Trilogy - Special Ed.   | 520-5137-01                 | 520-5136-10   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-01                                       | 520-5124-00<br>Single OPTO   | 520-5125-00<br>Single OPTO   | 4-Ball Trough<br>over Up-Kicker |  |
|   | Miscellaneous<br>PC Boards: | Relay Board<br>520-5010-00  |   |   |   |                              |                              |                                 |  |
| The Lost World: J.P.  | 520-5137-01                 | 520-5136-10   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-01                                       | 520-5124-00<br>Single OPTO   | 520-5125-00<br>Single OPTO   | 4-Ball Trough<br>over Up-Kicker | 520-5162-00<br>2-Pos. Motor<br>Sensor on<br>Snagger Motor              |
|   | Miscellaneous<br>PC Boards: | DC Relay Bd.<br>520-5066-00   | Shaker Mtr. Bd.<br>520-5065-00                                |   |   |                              |                              |                                 |  |
| The X-Files   | 520-5137-01                 | 520-5136-10   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-01                                       | 520-5124-00<br>Single OPTO   | 520-5125-00<br>Single OPTO   | 4-Ball Trough<br>over Up-Kicker | 520-5155-00<br>3-Pos. Motor<br>Sensor on<br>File Cab.<br>Motor         |
|   | Miscellaneous<br>PC Boards: |   |   |   |   | 520-5082-00<br>Long Hop OPTO | 520-5083-00<br>Long Hop OPTO | File Cabinet<br>Enter           |  |
| Starship Troopers   | 520-5137-01                 | 520-5136-15   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-02                                       | 520-5124-00<br>Single OPTO   | 520-5125-00<br>Single OPTO   | 4-Ball Trough<br>over Up-Kicker |  |
|   | Miscellaneous<br>PC Boards: | 4X 7-Segment Display Board<br>520-5166-00   |   |   |   |                              | 520-5082-00<br>Long Hop OPTO | 520-5083-01<br>Long Hop OPTO    | L/R Orbit<br>Lane Enter  |
| Viper Night Drivin'   | 520-5137-01                 | 520-5136-16   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-03                                       | 520-5124-00<br>Single OPTO   | 520-5125-00<br>Single OPTO   | 4-Ball Trough<br>over Up-Kicker |  |
|   | Miscellaneous<br>PC Boards: | Relay Board<br>520-5010-00  |   |   |   |                              | 520-5082-00<br>Long Hop OPTO | 520-5083-01<br>Long Hop OPTO    | Jump Ramp  |
| Lost In Space   | 520-5137-01                 | 520-5136-16   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker |  |
|   | Miscellaneous<br>PC Boards: | Relay Board<br>520-5010-00  |   |   |   |                              |                              |                                 |  |
| Godzilla  | 520-5137-01                 | 520-5136-16   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker |  |
|   | Miscellaneous<br>PC Boards: | Shaker Mtr. Bd.<br>520-5065-00  |   |   |   |                              |                              |                                 |  |
| South Park  | 520-5137-01                 | 520-5136-16   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 5-Ball Trough<br>over Up-Kicker |  |
|   | Miscellaneous<br>PC Boards: |   |   |   |   | 520-5082-00<br>Long Hop OPTO | 520-5083-01<br>Long Hop OPTO | Kenny Under<br>Trough Enter     |  |
| Harley-Davidson® 1st-3rd* Editions  | 520-5137-01                 | 520-5136-16<br>*520-5300-00*  | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker |  |
|   | Miscellaneous<br>PC Boards: | Relay Board<br>520-5010-00  |   | Shaker Mtr. Bd.<br>520-5065-00              | Diode Board<br>520-5146-00                        |                              | 520-5082-00<br>Long Hop OPTO | 520-5083-01<br>Long Hop OPTO    | Motorcycle<br>Enter  |
| Striker Xtreme (NFL)  | 520-5137-01                 | 520-5136-16   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker | 520-5155-00<br>3-Pos. Motor<br>Sensor on<br>Goalie Motor               |
|   | Miscellaneous<br>PC Boards: | DC Relay Bd.<br>520-5066-00   | Relay Board<br>520-5010-00                                    | Diode Board<br>520-5146-00                  | for UK ONLY- Solenoid Expander Bd.<br>520-5192-00 | 520-5082-00<br>Long Hop OPTO | 520-5083-01<br>Long Hop OPTO | Goalie Under-<br>Trough Enter   |  |
| Sharkey's Shootout  | 520-5137-64                 | 520-5136-64   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker | 520-5194-00<br>4-Pos. Motor<br>Sensor on<br>? -Ball Motor              |
|   | Miscellaneous<br>PC Boards: | Relay Board<br>520-5010-00  |   | Sol. Exp. Bd.<br>520-5192-00                |   |                              |                              |                                 |  |
| High Roller Casino  | 520-5137-01                 | 520-5136-16   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker | 520-5194-00<br>4-Pos. Motor<br>Sensor on<br>Roulette<br>Wheel<br>Motor |
|   | Miscellaneous<br>PC Boards: | Dot Display (5X7) in Slot Mach.<br>520-5197-00  |   |   | for UK ONLY- Solenoid Expander Bd.<br>520-5192-00 |                              | 520-5196-00<br>3-Pos. OPTO   | 520-5195-00<br>3-Pos. OPTO      | Ball Lock<br>under Roulette<br>Up/Dn Ramp<br>in Slot Mach.             |
| Austin Powers™  | 520-5137-01                 | 520-5136-16   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker | 520-5212-00<br>Pulse-Stretcher<br>OPTO on Spini-Me                     |
|   | Miscellaneous<br>PC Boards: | Relay Bd. (X3)<br>520-5010-00   |   |   | for UK ONLY- Solenoid Expander Bd.<br>520-5192-00 | 520-5082-00<br>Long Hop OPTO | 520-5083-01<br>Long Hop OPTO | Time Machine<br>Ramp            |  |
| MONOPOLY®   | 520-5137-01                 | 520-5136-16   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker |  |
|   | Miscellaneous<br>PC Boards: | DC Relay Bd.<br>520-5066-00   | Mini-Dot Display (3 by 5X7)<br>520-5197-00 (Electric C- Sign) |   | for UK ONLY- Solenoid Expander Bd.<br>520-5192-00 | 520-5218-00<br>4-Pos. OPTO   | 520-5210-00<br>4-Pos. OPTO   | Bank<br>Door                    |  |

Table continued on the next page.





# APPENDIX D

## Board Type (White Star Board System\* & S.A.M. System\*\* Only) Table



| Game Name                            | I/O Power Driver         | CPU/Sound (old & new)         | Disp. Power Supply   | Dot Matrix Display           | Display Controller                                | OPTO Transmitter             | OPTO Receiver                | OPTO Application                | Misc OPTO & App.   |
|--------------------------------------|--------------------------|-------------------------------|--|------------------------------|---|------------------------------|------------------------------|---------------------------------|--|
| Playboy                              | 520-5137-01              | 520-5136-16                   | 520-5138-00  | 520-5052-00<br>128 X 32 Dots | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker |  |
|                                      | Miscellaneous PC Boards: | DC Relay Bd.<br>520-5066-00   | Relay Bd.<br>520-5010-00                                     |                              | for UK ONLY- Solenoid Expander Bd.<br>520-5192-00 |                              |                              |                                 |  |
| RollerCoaster Tycoon™                | 520-5137-01              | 520-5136-16                   | 520-5138-00  | 520-5052-00<br>128 X 32 Dots | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker | 520-5222-00<br>1-Position<br>Switch Detect<br>on Wheel Spin  |
|                                      | Miscellaneous PC Boards: | DC Relay Bd.<br>520-5066-00   | Mini-Dot Display (3 by 5X7)<br>520-5221-00 (Ramp Enter Sign) |                              | for UK ONLY- Solenoid Expander Bd.<br>520-5192-00 | 520-5082-00<br>Long Hop OPTO | 520-5083-01<br>Long Hop OPTO | Behind 1-Bank<br>Drop Target    |  |
| The Simpsons™ Pinball Party          | 520-5137-01              | 520-5136-16                   | 520-5138-00  | 520-5052-00<br>128 X 32 Dots | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker |  |
|                                      | Miscellaneous PC Boards: | LED Bd.<br>520-5219-00        | Color Dot Display (4 by 5X7)<br>520-5225-00 (TV Set)         |                              | for UK ONLY ◀◀◀<br>Aux. Driver Bd.<br>520-5068-01 |                              |                              |                                 |  |
| Terminator® 3: Rise of the Machines™ | 520-5137-01              | <b>520-5136-16</b>            | 520-5138-00  | 520-5052-00<br>128 X 32 Dots | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker |  |
|                                      | Miscellaneous PC Boards: |                               |  |                              | for UK ONLY ◀◀◀<br>Aux. Driver Bd.<br>520-5068-01 | 515-7307-00<br>Single OPTO   | 515-7308-00<br>Single OPTO   | TXCannon<br>Trough              |  |
| The Lord of the Rings™               | 520-5137-01              | <b>New</b><br>520-5300-00     | 520-5138-00  | 520-5052-00<br>128 X 32 Dots | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker | 500-6746-00<br>(White Trans.)<br>500-6747-00<br>(Black Rec.) |
|                                      | Miscellaneous PC Boards: | 19-LED PCB<br>520-5242-00     | OPTO Transmitter / Receiver<br>Amplifier PCB 520-5239-00     |                              | for UK ONLY ◀◀◀<br>Aux. Driver Bd.<br>520-5068-01 | 515-7307-00<br>Single OPTO   | 515-7308-00<br>Single OPTO   | Orthanc Tower<br>Trough         |  |
| Ripley's Believe It or Not!®         | 520-5137-01              | 520-5300-00                   | 520-5138-00  | 520-5052-00<br>128 X 32 Dots | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker | 500-6775-00<br>OPTO Trnscvr                                  |
|                                      | Miscellaneous PC Boards: | 520-5236-00<br>X3 Dot Display | OPTO Transmitter / Receiver<br>Amplifier PCB 520-5239-01     |                              | for UK ONLY ◀◀◀<br>Aux. Driver Bd.<br>520-5068-01 | 520-5234-00<br>3-Pos. OPTO   | 520-5234-00<br>3-Pos. OPTO   | Vari-Target                     | 520-5235-03<br>X3 Aux. Drvr                                  |
| Elvis®                               | 520-5137-01              | 520-5300-00                   | 520-5138-00  | 520-5052-00<br>128 X 32 Dots | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker |  |
|                                      | Miscellaneous PC Boards: |                               |  |                              | for UK ONLY ◀◀◀<br>Aux. Driver Bd.<br>520-5068-01 |                              |                              |                                 |  |
| The Sopranos™                        | 520-5137-01              | 520-5300-00                   | 520-5138-00  | 520-5052-00<br>128 X 32 Dots | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker |  |
|                                      | Miscellaneous PC Boards: |                               |  |                              | for UK ONLY ◀◀◀<br>Aux. Driver Bd.<br>520-5068-01 |                              |                              |                                 |  |
| NASCAR® and [INDSE]                  | 520-5137-01              | 520-5300-00                   | 520-5138-00  | 520-5052-00<br>128 X 32 Dots | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker | 500-6775-00<br>OPTO Trans.<br>(Qty. 16)<br>Switch Detect.    |
|                                      | Miscellaneous PC Boards: | 520-5235-03<br>X3 Aux. Drvr   | OPTO Transmitter / Receiver<br>Amplifier PCB 520-5239-01     |                              | for UK ONLY ◀◀◀<br>Aux. Driver Bd.<br>520-5068-01 |                              |                              |                                 |  |
| Grand Prix                           | 520-5137-01              | 520-5300-00                   | 520-5138-00  | 520-5052-00<br>128 X 32 Dots | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker | 500-6775-00<br>OPTO Trans.<br>(Qty. 16)<br>Switch Detect.    |
|                                      | Miscellaneous PC Boards: | 520-5235-03<br>X3 Aux. Drvr   | OPTO Transmitter / Receiver<br>Amplifier PCB 520-5239-01     |                              | for UK ONLY ◀◀◀<br>Aux. Driver Bd.<br>520-5068-01 |                              |                              |                                 |  |

| Game Name                          | I/O Power Driver**       | CPU / Sound**                  | Disp. Power Supply                          | Dot Matrix Display               | Dual OPTO Transmitter        | Dual OPTO Receiver           | Dual OPTO Transceiver                      | OPTO Transceiver Miscellaneous   |
|------------------------------------|--------------------------|--------------------------------|---|----------------------------------|------------------------------|------------------------------|--|--|
| World Poker Tour™ (WPT)            | 520-5249-00<br>Backbox   | 520-5246-00<br>Backbox         | 520-5138-00<br>Backbox                      | 520-5052-00<br>128 X 32 Dots     | 515-0173-00<br>4-Ball Trough | 515-0174-00<br>4-Ball Trough | 500-6775-00<br>4 Switch Pairs<br>(Qty. 8)  | 520-5251-00 'U' 1/per PCB<br>Jail Bars Up Ace/Hole Mech<br>520-5252-04 'U' 4/per PCB<br>Drop Targets 4- & 8- Banks |
|                                    | Miscellaneous PCBs:      | 520-5254-00<br>50V Step-Up Drv | 520-5250-14<br>14LED 5X7 Disp.              | 520-5239-01<br>OPTO Amplifier    | 520-5247-00<br>Ace/Hole Mech | 520-5248-00<br>Ace/Hole Mech |  |  |
| The Simpsons™ Kooky Carnival       | 520-5249-00<br>Back Door | 520-5246-00<br>Back Door       | 520-5138-00<br>Cabinet Rear                 | 520-5052-00<br>128 X 32 Dots     |                              |                              | 520-5253-00-ASY<br>Coin Drop<br>(Qty. 11)  |  |
|                                    | Miscellaneous PCBs:      | 515-5742-00<br>Shaker PCB      | 500-6700-00<br>Relay (incl. Wiring + Conn.) |                                  |                              |                              |  |  |
| ©Disney's Pirates of the Caribbean | 520-5249-00<br>Backbox   | 520-5246-00<br>Backbox         | 520-5138-00<br>Backbox                      | 520-5052-00<br>128 X 32 Dots     | 515-0173-00<br>4-Ball Trough | 515-0174-00<br>4-Ball Trough | 500-6775-00<br>5 Switch Pairs<br>(Qty. 10) |  |
|                                    | Miscellaneous PCBs:      | 520-5239-01<br>OPTO Amp. (X3)  | 511-5024-03<br>Relay (incl. Wiring + Conn.) | 520-5238-00 : H-E-A-R-T LED PCB  |                              |                              |  |  |
| Family Guy™                        | 520-5249-00<br>Backbox   | 520-5246-00<br>Backbox         | 520-5138-00<br>Backbox                      | 520-5052-00<br>128 X 32 Dots     | 515-0173-00<br>4-Ball Trough | 515-0174-00<br>4-Ball Trough | 500-6775-00<br>3 Switch Pairs<br>(Qty. 6)  | 520-5252-01 'U' 1/per PCB<br>Drop Target 1-Bank  |
|                                    | Miscellaneous PCBs:      | 520-5239-01<br>OPTO Amp. (X2)  | 520-5261-00<br>Stepper Motor                | 511-5042-01<br>Trgt. Sensor (X2) |                              |                              | 500-6775-01<br>1 Switch Pair<br>(Qty. 2)   | 520-5252-04 'U' 4/per PCB<br>Drop Target 4-Bank  |
| Spider-Man™                        | 520-5249-00<br>Backbox   | 520-5246-00<br>Backbox         | 520-5138-00<br>Backbox                      | 520-5052-00<br>128 X 32 Dots     | 515-0173-00<br>4-Ball Trough | 515-0174-00<br>4-Ball Trough | 500-6775-00<br>3 Switch Pairs<br>(Qty. 6)  |  |
|                                    | Miscellaneous PCBs:      | 520-5239-01<br>OPTO Amp. (X2)  |   |                                  |                              |                              |  |  |





# APPENDIX D

## Board Type Table

| Game Name  | Flipper   | Sound  | Power Supply | Display X-Digit  |
|--|---|--|--------------|--|
| <ul style="list-style-type: none"> <li>Laser War</li> </ul>  | 2-Flipper<br>Board Not Required   | <i>initial:</i><br>520-5002-00<br><i>replaced with:</i><br>520-5002-02<br><i>520-5002-01 was not used.</i> | 520-5000-00  | Master: 520-5004-00 plus:<br>520-5005-00 (Qty. 2); 7 Digit Alpha/Numeric<br>520-5006-00 (Qty. 2); 7 Digit Numeric<br>520-5007-00 (Qty. 1); 4 Digit Numeric |
| <ul style="list-style-type: none"> <li>Secret Service</li> <li>Torpedo Alley</li> </ul>  | 3-Flipper<br>Board Not Required   | 520-5002-02  |              | 520-5014-01<br>7 Digit Alpha/Numeric Combined  |
| <ul style="list-style-type: none"> <li>Time Machine</li> </ul>   | 2-Flipper<br>Board Not Required   |  |              | 520-5030-00<br>16 Digit Alpha/Numeric Combined   |
| <ul style="list-style-type: none"> <li>Playboy 35th Anniversary *</li> <li>ABC Monday Night Football *</li> <li>Robocop</li> <li>Phantom of the Opera</li> <li>Back to the Future</li> <li>The Simpsons</li> </ul> | 520-5033-00<br>2-Flipper<br><i>(*only for 100 games of<br/>Playboy 35th Anniv. &amp;<br/>ABC Mon. Night Football)</i> |  |              |  |
|  |   | 520-5002-03  |              |  |

| Game Name   | Flipper                                | Sound       | Power Supply | Dot Matrix Display      | Display Controller | OPTO Transmitter           | OPTO Receiver              | OPTO Application                |
|---|--|-------------|--------------|-------------------------|--------------------|----------------------------|----------------------------|---------------------------------|
| <ul style="list-style-type: none"> <li>Checkpoint</li> <li>Teenage Mutant Ninja Turtles</li> </ul>        | 520-5033-00<br>2-Flipper               | 520-5002-03 | 520-5047-00  | 520-5042-00<br>128 X 16 | 520-5055-00        |                            |                            |                                 |
| <ul style="list-style-type: none"> <li>Batman</li> <li>Star Trek 25th Anniv.</li> <li>Hook</li> </ul>     |  | 520-5050-01 |              |                         |                    |                            |                            |                                 |
| <ul style="list-style-type: none"> <li>Lethal Weapon 3</li> </ul>   |  | 520-5050-02 | 520-5047-01  |                         |                    |                            |                            |                                 |
| <ul style="list-style-type: none"> <li>Star Wars</li> <li>Rocky &amp; Bullwinkle &amp; Friends</li> </ul> |  |             | 520-5047-02  | 520-5052-00<br>128 X 32 |                    |                            |                            |                                 |
| <ul style="list-style-type: none"> <li>Jurassic Park</li> </ul>   |  |             |              |                         |                    |                            |                            |                                 |
| <ul style="list-style-type: none"> <li>Last Action Hero</li> </ul>  | 520-5070-00<br>2-Flipper               | 520-5050-03 | 520-5047-03  | 520-5075-00<br>192 X 64 | 520-5092-01        | 520-5102-00<br>Single OPTO | 520-5103-00<br>Single OPTO | Paddle Boat<br>Wheel Enter      |
| <ul style="list-style-type: none"> <li>Tales from the Crypt</li> <li>The Who's Tommy</li> </ul>           | 520-5076-00<br>3-Flipper               | 520-5077-00 |              |                         |                    |                            |                            |                                 |
| <ul style="list-style-type: none"> <li>WWF Royal Rumble</li> </ul>  | 520-5070 / 5080 -00<br>4-Flipper (2X2) | 520-5126-02 |              |                         |                    | 520-5124-00<br>Single OPTO | 520-5125-00<br>Single OPTO | 5-Ball Trough<br>over Up-Kicker |
| <ul style="list-style-type: none"> <li>Guns N' Roses</li> </ul>   | 520-5076-00<br>3-Flipper               |             |              |                         |                    | 520-5124-00<br>Single OPTO | 520-5125-00<br>Single OPTO | 4-Ball Trough<br>over Up-Kicker |
| <ul style="list-style-type: none"> <li>Maverick</li> </ul>  | 520-5076-00<br>3-Flipper               |             |              |                         |                    |                            |                            |                                 |
| <ul style="list-style-type: none"> <li>Mary Shelley's Frankenstein</li> </ul>                             | 520-5076-00<br>3-Flipper               |             |              |                         |                    |                            |                            |                                 |
| <ul style="list-style-type: none"> <li>Baywatch</li> </ul>  | 520-5070 / 5080 -00<br>4-Flipper (2X2) |             |              |                         |                    |                            |                            |                                 |
| <ul style="list-style-type: none"> <li>Batman Forever</li> </ul>  | 520-5076-00<br>3-Flipper               |             |              |                         |                    |                            |                            |                                 |

Miscellaneous Boards (Lamp Boards & Relay Boards) not listed above can be found in each individual game manual.





# APPENDIX E

## Flipper Coil (White Star Board System\* & S.A.M. System\*\* Only) Table



Typical Coil Diode 1N4004 unless noted otherwise (Diode Top = above lugs next to windings; Diode Below (Bottom) = under lugs opposite of windings).

| STANDARD COILS (TYPICAL APPLICATIONS)  |         |  | LARGE COILS (FLIPPERS & SPECIAL APPLICATIONS) |                 |  |
|--|---------|--|---|-----------------|--|
| Ga.-Turn   | Res (Ω) | SPI Part Number and Comments   | Ga.-Turn                                      | Res (Ω)         | SPI Part Number and Comments   |
| 20-400   | 1.0 Ω   | 090-5021-use : -00 Diode Top   | 21-900  | call Ω          | 090-5020-use : -01 3-Lugs + 1N4004 & 1N5404 Diodes<br>-10 Diode Top <BROWN><RED>                                   |
| 22-500   | 1.7 Ω   | 090-5017-use : -00 Diode Top   | 22-750 / 30-2600                              | 2.6 Ω<br>92.0 Ω | 090-5011-use : -00 DUAL WND COIL // 3-Lugs Diode x2  |
| 22-600   | 2.2 Ω   | 090-5017-use : -0B Diode Below // -0T Diode Top  |   |                 |  |
| 23-700   | 3.1 Ω   | 090-5022-use : -0B Diode Below // -0T Diode Top  | 22-900  | 3.45 Ω          | 090-5020-use : -20T Diode Top <YELLOW> //<br>-20-ND No Diode   |
| 23-750   | 3.4 Ω   | 090-5019-use : -00 Diode Top   |   |                 |  |
| 23-800   | 3.6 Ω   | 090-5001-use : -0B Diode Below // -0T Diode Top //<br>-NL No Lugs 11" Leads // -ND No Diode                    | 22-1080                                       | 4.2 Ω           | 090-5032-use : -0B D. Below // -0T D. Top <YEL-GRN><br>-NL No Diode  |
| 23-840   | 4.0 Ω   | 090-5005-use : -00 Diode Top   |   |                 |  |
| 23.5-765   | 3.6 Ω   | 090-5037-use : -03 Diode Top   | 23-620 / 30-2600                              | 2.4 Ω<br>75.0 Ω | 090-5006-use : -00 DUAL WND COIL // 3-Lugs Diode x2  |
| 24-900   | 5.0 Ω   | 090-5002-use : -02 Diode Top // -10 No Lugs 14" Leads  |   |                 |  |
| 24-940   | 5.5 Ω   | 090-5036-use : -0B Diode Below // -0T Diode Top<br>use 090-5051-01 No Lugs 11" Leads                           | 23-700 / 30-2600                              | 3.0 Ω<br>83.5 Ω | 090-5013-use : -00 DUAL WOUND COIL // Diode Top  |
| 25-1240  | 9.3 Ω   | 090-5034-use : -00 Diode Below   |   |                 |  |
| 26-1200  | 10.3 Ω  | 090-5044-use : -0B Diode Below // -0T Diode Top //<br>-NL No Lugs 11" Leads // -ND No Diode                    | 23-800 / 30-2600                              | 2.4 Ω<br>90.5 Ω | 090-5012-use : -00 DUAL WOUND COIL // Diode Top  |
| 27-1300  | 14.2 Ω  | 090-5003-use : -0T Diode Top   |   |                 |  |
| 27-1400  | 14.7 Ω  | 090-5015-use : -00 Diode Below   | 23-1100                                       | 5.1 Ω           | 090-5030-use : -0T Diode Top <ORANGE><br>-ND No Diode  |
| 27-1400  | 14.7 Ω  | 511-5031-00 Special App.: No Diode / Lugs + Conn.  |   |                 |  |
| 27-1500  | 16.3 Ω  | 090-5004-use : -0B Diode Below // -0T Diode Top  | 23-1200                                       | 7.1 Ω           | 090-5008-use : -00 Diode Top <BLACK>   |
| 29-2000  | 33.6 Ω  | 090-5016-use : -00 Diode Top   | 23-1500                                       | 4.4 Ω           | 090-5062-use : -00 Diode Top <BLUE>  |
| <b>LARGE, MEDIUM &amp; MINI COILS (MAGNET APPLICATIONS)</b>  |         |  | 24-1570                                       | 9.5 Ω           | 090-5025-use : -00 Diode Top <BLUE>  |
| 20.5-480   | 2.9 Ω   | 090-5064-use : -02 No Lugs or Core; 14" Leads // Large   | 25-1400                                       | call Ω          | 090-5067-use : -0T Diode Top <RED>   |
| 22-650   | 4.3 Ω   | 090-5042-use : -00 No Lugs or Core; 6" Leads // Large<br>-01 No Lugs or Core; 12" Leads // Large               | 25-1600                                       | call Ω          | 090-5068-use : -0T Diode Top <WHITE>   |
| 24-780   | 8.0 Ω   | 090-5061-use : -00 No Lugs or Core; 6" Lds. // Medium  | <b>MINI COILS (RESET / TRIP APPLICATIONS)</b> |                 |  |
| 29-1000  | 15.2 Ω  | 090-5059-use : -00 Lugs + Diode + Magnet Core // Mini  | 27-950  | call Ω          | 090-5046-use : -01 Diode Top   |
| 31-1500  | 52.0 Ω  | 090-5054-00 : Straight Lugs + Diode + Mag Core // Mini<br>090-5055-00 : 90° Lugs + Diode + Magnet Core // Mini | 28-1050                                       | 11.5 Ω          | 090-5046-use : -00 Diode Top   |
| <b>Please Note: Ohm values may vary +/- .03 depending on meter calibration.</b>  |         |  | 27-880  | call Ω          | 500-6976-01 No Lugs or Diode + 6" Leads & Conn.  |
| <b>Ordering Note: Coils typically should not come with Coil Sleeves. IF A SLEEVE EXISTS, ensure it is the correct sleeve for the application usage. For the correct Coil Sleeve, refer to the Game Assembly Drawing the coil exists on and order separately.</b> |         |  | 31-590  | call Ω          | 090-5010-use : -00 Diode Top   |
|  |         |  | 32-1250                                       | 35.0 Ω          | 515-6916-01 : includes Flap & Screw <YELLOW>   |
|  |         |  | 32-1800                                       | 50.2 Ω          | 090-5031-use : -0B Diode Below // -0T Diode Top<br>(515-6110-00) use 515-# to include mounting & armature brackets |
|  |         |  | 33-1590                                       | 59.0 Ω          | 515-6916-00 : includes brackets <WHITE>  |

## Flipper Coil (White Star Board System\* Only) Table

| GAME NAME                                 | Nº of Flippers | FLIPPERS                         |                                  | FLIPPERS no E.O.S. Switch    |                                  |
|---|----------------|----------------------------------|----------------------------------|------------------------------|----------------------------------|
|   |                | SPI Nº / GAUGE-TURNS / Color     |                                  | SPI Nº / GAUGE-TURNS / Color |                                  |
|   |                | LOWER LEFT                       | LOWER RIGHT                      | UPPER LEFT                   | UPPER RIGHT                      |
| Apollo 13                                 | 2              | 090-5032-0T<br>22-1080 -YEL-GRN- | SAME                             | Not Used                     | Not Used                         |
| Golden Eye                                | 2              | 090-5032-0T<br>22-1080 -YEL-GRN- | SAME                             | Not Used                     | Not Used                         |
| Twister                                   | 2              | 090-5020-20T<br>22-900 -YELLOW-  | 090-5032-0T<br>22-1080 -YEL-GRN- | Not Used                     | Not Used                         |
| ID4: Independence Day                     | 3              | 090-5032-0T<br>22-1080 -YEL-GRN- | SAME                             | Not Used                     | 090-5020-30<br>23-900 -GREEN-    |
| Space Jam †                               | 2              | 090-5032-0T<br>22-1080 -YEL-GRN- | 090-5020-20T<br>22-900 -YELLOW-  | Not Used                     | Not Used                         |
| The Star Wars Trilogy - Special Edition † | 2              | 090-5032-0T<br>22-1080 -YEL-GRN- | SAME                             | Not Used                     | Not Used                         |
| The Lost World: Jurassic Park †           | 2              | 090-5032-0T<br>22-1080 -YEL-GRN- | SAME                             | Not Used                     | Not Used                         |
| The X-Files †                             | 2              | 090-5032-0T<br>22-1080 -YEL-GRN- | SAME                             | Not Used                     | Not Used                         |
| Starship Troopers †                       | 3              | 090-5030-0T<br>23-1100 -ORANGE-  | SAME                             | Not Used                     | 090-5032-0T<br>22-1080 -YEL-GRN- |
| Viper Night Drivin' †                     | 2              | 090-5030-0T<br>23-1100 -ORANGE-  | SAME                             | Not Used                     | Not Used                         |
| Lost In Space †                           | 2              | 090-5030-0T<br>23-1100 -ORANGE-  | 090-5032-0T<br>22-1080 -YEL-GRN- | Not Used                     | Not Used                         |
| Godzilla †                                | 2              | 090-5032-0T<br>22-1080 -YEL-GRN- | SAME                             | Not Used                     | Not Used                         |
| South Park †                              | 2              | 090-5030-0T<br>23-1100 -ORANGE-  | SAME                             | Not Used                     | Not Used                         |

† Coil Part Numbers ending with a "T" signifies the Diode is on the top of the lug (on the coil-winding side); Coil Part Numbers ending with a "B" signifies the Diode is on the bottom of the lugs.

Table continued on the next page.





# APPENDIX E

## Flipper Coil (White Star Board System\* & S.A.M. System\*\* Only) Table



| GAME NAME  | N <sup>o</sup> of Flippers   | FLIPPERS w/E.O.S. Switch  |   | FLIPPERS no E.O.S. Switch                           |  |
|--|------------------------------|---|---|---|--|
|  |                              | SPI N <sup>o</sup> / GAUGE-TURNS / Color  |   | SPI N <sup>o</sup> / GAUGE-TURNS / Color            |  |
|  |                              | LOWER LEFT  | LOWER RIGHT                               | UPPER LEFT  | UPPER RIGHT                                |
| Harley-Davidson® † and 1st through 3rd Editions  | 2                            | 090-5032-0T<br><b>22-1080 -YEL-GRN-</b>   | 090-5030-0T<br><b>23-1100 -ORANGE-</b>    | Not Used  | Not Used                                   |
| Striker Xtreme (NFL) †   | 3                            | 090-5032-0T<br><b>22-1080 -YEL-GRN-</b>   | 090-5030-0T<br><b>23-1100 -ORANGE-</b>    | 090-5030-0T<br><b>23-1100 -ORANGE-</b>              | Not Used                                   |
| Sharkey's Shootout †   | 3                            | 090-5030-0T<br><b>23-1100 -ORANGE-</b>  | SAME                                      | 090-5030-0T<br><b>23-1100 -ORANGE-</b>              | Not Used                                   |
| High Roller Casino †   | 2                            | 090-5032-20T<br><b>22-900 -YELLOW-</b>  | 090-5032-0T<br><b>22-1080 -YEL-GRN-</b>   | Not Used  | Not Used                                   |
| Austin Powers™ †   | 2                            | 090-5020-30<br><b>23-900 -GREEN-</b>  | 090-5030-0T<br><b>23-1100 -ORANGE-</b>    | Not Used  | Not Used                                   |
| MONOPOLY® †  | 3                            | 090-5032-0T<br><b>22-1080 -YEL-GRN-</b>   | SAME                                      | Not Used  | 090-5062-0T<br><b>23-1500 -BLUE-</b>       |
| Playboy †  | 2                            | 090-5030-0T<br><b>23-1100 -ORANGE-</b>  | SAME                                      | Not Used  | Not Used                                   |
| RollerCoaster Tycoon™ †  | 4                            | 090-5032-0T<br><b>22-1080 -YEL-GRN-</b>   | SAME                                      | 090-5067-0T<br><b>25-1400 -RED-</b>                 | 090-5068-0T<br><b>25-1600 -WHITE-</b>      |
| The Simpsons™ Pinball Party †  | 6**<br>(5 with Flipper Bats) | 090-5032-0T<br><b>22-1080 -YEL-GRN-</b>   | SAME                                      | Not Used  | 090-5030-0T<br><b>23-1100 -ORANGE-</b>     |
|  |                              | <i>** The Homer Head Assembly is affixed to an Upr. Rt. Style Flipper (no E.O.S. Switch):</i> |   | <b>Flippers (Mini-Bats) on 2nd Level Playfield:</b> |  |
|  |                              |   | ** 090-5020-20T<br><b>22-900 -YELLOW-</b> | 090-5041-00T<br><b>25-1800 -BLU-GRN-</b>            | 090-5025-00<br><b>24-1570 -BLUE-</b>       |
| Terminator® 3: Rise of the Machines™ †   | 2                            | 090-5032-0T<br><b>22-1080 -YEL-GRN-</b>   | SAME                                      | Not Used  | Not Used                                   |
| The Lord of the Rings™ †   | 2                            | 090-5020-20T<br><b>22-900 -YELLOW-</b>  | SAME                                      | Not Used  | Not Used                                   |
| Ripley's Believe It or Not!® †   | 3                            | 090-5032-0T<br><b>22-1080 -YEL-GRN-</b>   | SAME                                      | Not Used  | 090-5067-00T<br><b>25-1400 -RED-</b>       |
| Elvis® †   | 4                            | 090-5020-20T<br><b>22-900 -YELLOW-</b>  | SAME                                      | 090-5020-30<br><b>23-900 -GREEN-</b>                | SAME                                       |
| The Sopranos™ †  | 2                            | 090-5032-0T<br><b>22-1080 -YEL-GRN-</b>   | SAME                                      | Not Used  | Not Used                                   |
| NASCAR® and [NDSE] †   | 2                            | 090-5030-0T<br><b>23-1100 -ORANGE-</b>  | SAME                                      | Not Used  | Not Used                                   |
| Grand Prix †   | 2                            | 090-5030-0T<br><b>23-1100 -ORANGE-</b>  | SAME                                      | Not Used  | Not Used                                   |
| † Coil Part Numbers ending with a "T" signifies the Diode is on the top of the lug (on the coil-winding side); Coil Part Numbers ending with a "B" signifies the Diode is on the bottom of the lugs. |                              |   |   |   |  |
| ** S.A.M. System Games <b>DO NOT REQUIRE DIODES</b> . If you use a coil from your stock which has a diode, remove it <b>ONLY FOR</b> S.A.M. System Games.  |                              |   |   |   |  |
| World Poker Tour™ (WPT)**  | 4                            | 090-5032-ND<br><b>22-1080 [ NO DIODE ]</b>  | SAME                                      | 090-5030-ND<br><b>23-1100 [ NO DIODE ]</b>          | SAME                                       |
| ©Disney's Pirates of the Caribbean**   | 2                            | 090-5030-ND<br><b>23-1100 [ NO DIODE ]</b>  | SAME                                      | Not Used  | Not Used                                   |
| Family Guy™ **   | 3 Norm.                      | 090-5030-ND<br><b>23-1100 [ NO DIODE ]</b>  | SAME                                      | 090-5062-ND<br><b>23-1500 [ NO DIODE ]</b>          | Not Used                                   |
|  | 2 Mini                       | 090-5046-01-ND<br><b>27-950 [ NO DIODE ]</b>  | SAME                                      |   |  |
| Spider-Man™ **   | 3                            | 090-5032-ND<br><b>22-1080 [ NO DIODE ]</b>  | SAME                                      | Not Used  | 090-5032-ND<br><b>22-1080 [ NO DIODE ]</b> |





# APPENDIX E

## Generic Coil Cross-Reference Guide † ‡

### Flipper Coil Table ‡ ††

| GAME NAME   | Nº of Flippers | FLIPPERS w/E.O.S. Switch         |                                 | FLIPPERS no E.O.S. Switch    |                                  |
|---|----------------|----------------------------------|---------------------------------|------------------------------|----------------------------------|
|   |                | SPI Nº / GAUGE-TURNS / Color     |                                 | SPI Nº / GAUGE-TURNS / Color |                                  |
|   |                | LOWER LEFT                       | LOWER RIGHT                     | UPPER LEFT                   | UPPER RIGHT                      |
| Laser War ‡   | 2              | 090-5011-00<br>22-750 / 30-2600  | SAME                            | Not Used                     | Not Used                         |
| Secret Service ‡  | 3              | 090-5006-00<br>23-620 / 30-2600  | SAME                            | Not Used                     | 090-5006-00<br>23-620 / 30-2600  |
| Torpedo Alley ‡   | 3              | 090-5011-00<br>22-750 / 30-2600  | 090-5013-00<br>23-700 / 30-2600 | Not Used                     | 090-5012-00<br>23-800 / 30-2600  |
| Time Machine ‡  | 2              | 090-5011-00<br>22-750 / 30-2600  | SAME                            | Not Used                     | Not Used                         |
| ‡ These coils are dual-wound.   |                |                                  |                                 |                              |                                  |
| Playboy 35th Anniversary ††   | 2              | 090-5020-02<br>22-900 -YEL-YEL-  | SAME                            | Not Used                     | Not Used                         |
| ABC Monday Night Football ††  | 2              | 090-5020-02<br>22-900 -YEL-YEL-  | SAME                            | Not Used                     | Not Used                         |
| †† A very small % of these games used a 090-5020-20 coil which used a proto-type Solid State Flipper System. The two types of coils both are 22-900 coils; the only difference is the addition of the 1N5404 Diode on the (-02) coils which was used in the Deger Design. |                |                                  |                                 |                              |                                  |
| Robocop   | 2              | 090-5020-20<br>22-900 -YEL-YEL-  | SAME                            | Not Used                     | Not Used                         |
| Phantom of the Opera  | 2              | 090-5020-20<br>22-900 -YEL-YEL-  | SAME                            | Not Used                     | Not Used                         |
| Back to the Future  | 2              | 090-5020-20<br>22-900 -YEL-YEL-  | SAME                            | Not Used                     | Not Used                         |
| The Simpsons  | 2              | 090-5020-20<br>22-900 -YEL-YEL-  | SAME                            | Not Used                     | Not Used                         |
| Checkpoint  | 2              | 090-5020-20<br>22-900 -YEL-YEL-  | SAME                            | Not Used                     | Not Used                         |
| Teenage Mutant Ninja Turtles  | 2              | 090-5020-30<br>23-900 -GRN-GRN-  | SAME                            | Not Used                     | Not Used                         |
| Batman  | 2              | 090-5020-30<br>23-900 -GRN-GRN-  | SAME                            | Not Used                     | Not Used                         |
| Star Trek 25th Anniversary  | 2              | 090-5020-30<br>23-900 -GRN-GRN-  | SAME                            | Not Used                     | Not Used                         |
| Hook  | 2              | 090-5030-00<br>23-1100 -ORG-ORG- | 090-5020-30<br>23-900 -GRN-GRN- | Not Used                     | Not Used                         |
| Lethal Weapon 3   | 2              | 090-5030-00<br>23-1100 -ORG-ORG- | SAME                            | Not Used                     | Not Used                         |
| Star Wars   | 2              | 090-5032-00<br>22-1080 -YEL-GRN- | SAME                            | Not Used                     | Not Used                         |
| Rocky & Bullwinkle & Friends  | 2              | 090-5020-30<br>23-900 -GRN-GRN-  | SAME                            | Not Used                     | Not Used                         |
| Jurassic Park   | 3              | 090-5020-30<br>23-900 -GRN-GRN-  | SAME                            | Not Used                     | 090-5030-00<br>23-1100 -ORG-ORG- |

*Table continued on the next page.*



## APPENDIX E

### Flipper Coil Table †

| GAME NAME  | N <sup>o</sup> of Flippers        | FLIPPERS w/ E.O.S. Switch   |                                    | FLIPPERS no E.O.S. Switch                    |                                    |
|--|-----------------------------------|---|------------------------------------|--|------------------------------------|
|  |                                   | SPI N <sup>o</sup> / GAUGE-TURNS / Color  |                                    | SPI N <sup>o</sup> / GAUGE-TURNS / Color     |                                    |
|  |                                   | LOWER LEFT  | LOWER RIGHT                        | UPPER LEFT                                   | UPPER RIGHT                        |
| Last Action Hero                                     | 2                                 | 090-5020-30<br>23-900 -GRN-GRN-   | SAME                               | Not Used                                     | Not Used                           |
| Tales from the Crypt                                 | 3                                 | 090-5032-00<br>22-1080 -YEL-GRN-  | SAME                               | Not Used                                     | 090-5041-00<br>25-1800 -BLU-GRN-   |
| The Who's Tommy                                      | 3                                 | 090-5020-30<br>23-900 -GRN-GRN-   | SAME                               | 090-5041-00<br>25-1800 -BLU-GRN-             | Not Used                           |
| WWF Royal Rumble                                     | 4                                 | 090-5032-00<br>22-1080 -YEL-GRN-  | SAME                               | 090-5041-00<br>25-1800 -BLU-GRN-             | SAME                               |
| Guns N' Roses  | 3                                 | 090-5032-00<br>22-1080 -YEL-GRN-  | SAME                               | 090-5030-00<br>23-1100 -ORG-ORG-             | Not Used                           |
| Maverick   | 3                                 | 090-5032-00<br>22-1080 -YEL-GRN-  | SAME                               | Not Used                                     | 090-5032-00<br>22-1080 -YEL-GRN-   |
| Mary Shelley's Frankenstein                          | 3                                 | 090-5030-00<br>23-1100 -ORG-ORG-  | SAME                               | Not Used                                     | 090-5030-00<br>23-1100 -ORG-ORG-   |
| Baywatch   | 4                                 | 090-5030-00<br>23-1100 -ORG-ORG-  | 090-5020-30<br>23-900 -GRN-GRN-    | 090-5025-00<br>24-1570 -See Note-            | 090-5030-00<br>23-1100 -ORG-ORG-   |
| Batman Forever                                       | 3                                 | 090-5032-00<br>22-1080 -YEL-GRN-  | 090-5020-20<br>22-900 -YEL-YEL-    | Not Used                                     | 090-5020-30<br>23-900 -GRN-GRN-    |
| Apollo 13  | 2                                 | 090-5032-00<br>22-1080 -YEL-GRN-  | SAME                               | Not Used                                     | Not Used                           |
| Golden Eye   | 2                                 | 090-5032-00<br>22-1080 -YEL-GRN-  | SAME                               | Not Used                                     | Not Used                           |
| Twister  | 2                                 | 090-5020-20<br>22-900 -YEL-YEL-   | 090-5032-00<br>22-1080 -YEL-GRN-   | Not Used                                     | Not Used                           |
| ID4: Independence Day                                | 3                                 | 090-5032-00<br>22-1080 -YEL-GRN-  | SAME                               | Not Used                                     | 090-5020-30<br>23-900 -GRN-GRN-    |
| Space Jam †  | 2                                 | 090-5032-00T<br>22-1080 -YEL-GRN-   | 090-5020-20T<br>22-900 -YEL-YEL-   | Not Used                                     | Not Used                           |
| The Star Wars Trilogy -<br>Special Edition †         | 2                                 | 090-5032-00T<br>22-1080 -YEL-GRN-   | SAME                               | Not Used                                     | Not Used                           |
| The Lost World: Jurassic Park †                      | 2                                 | 090-5032-00T<br>22-1080 -YEL-GRN-   | SAME                               | Not Used                                     | Not Used                           |
| The X-Files †  | 2                                 | 090-5032-00T<br>22-1080 -YEL-GRN-   | SAME                               | Not Used                                     | Not Used                           |
| Starship Troopers †                                  | 3                                 | 090-5030-00T<br>23-1100 -ORG-ORG-   | SAME                               | Not Used                                     | 090-5032-00T<br>22-1080 -YEL-GRN-  |
| Viper Night Drivin' †                                | 2                                 | 090-5030-00T<br>23-1100 -ORG-ORG-   | SAME                               | Not Used                                     | Not Used                           |
| Lost In Space †                                      | 2                                 | 090-5030-00T<br>23-1100 -ORG-ORG-   | 090-5032-00T<br>22-1080 -YEL-GRN-  | Not Used                                     | Not Used                           |
| Godzilla †   | 2                                 | 090-5032-00T<br>22-1080 -YEL-GRN-   | SAME                               | Not Used                                     | Not Used                           |
| South Park †   | 2                                 | 090-5030-00T<br>23-1100 -ORG-ORG-   | SAME                               | Not Used                                     | Not Used                           |
| Harley-Davidson® † and<br>Harley-Davidson® 2nd Ed. † | 2                                 | 090-5032-00T<br>22-1080 -YEL-GRN-   | 090-5030-00T<br>23-1100 -ORG-ORG-  | Not Used                                     | Not Used                           |
| Striker Xtreme (NFL) †                               | 3                                 | 090-5032-00T<br>22-1080 -YEL-GRN-   | 090-5030-00T<br>23-1100 -ORG-ORG-  | 090-5030-00T<br>23-1100 -ORG-ORG-            | Not Used                           |
| Sharkey's Shootout †                                 | 3                                 | 090-5030-00T<br>23-1100 -ORG-ORG-   | SAME                               | 090-5030-00T<br>23-1100 -ORG-ORG-            | Not Used                           |
| High Roller Casino †                                 | 2                                 | 090-5020-20T<br>22-900 -YEL-YEL-  | 090-5032-00T<br>23-1080 -YEL-GRN-  | Not Used                                     | Not Used                           |
| Austin Powers™ †                                     | 2                                 | 090-5020-30<br>23-900 -GRN-GRN-   | 090-5030-00T<br>23-1100 -ORG-ORG-  | Not Used                                     | Not Used                           |
| MONOPOLY® †  | 3                                 | 090-5032-00T<br>22-1080 -YEL-GRN-   | SAME                               | Not Used                                     | 090-5062-00T<br>23-1500 -BLU-BLU-  |
| Playboy †  | 2                                 | 090-5030-00T<br>23-1100 -ORG-ORG-   | SAME                               | Not Used                                     | Not Used                           |
| RollerCoaster Tycoon™ †                              | 4                                 | 090-5032-00T<br>22-1080 -YEL-GRN-   | SAME                               | 090-5067-00T<br>25-1400 -RED-RED-            | 090-5068-00T<br>25-1600 -WHT-WHT   |
| The Simpsons™ Pinball Party †                        | 6*<br>(5 with<br>Flipper<br>Bats) | 090-5032-00T<br>22-1080 -YEL-GRN-   | SAME                               | Not Used                                     | 090-5030-00T<br>23-1100 -ORG-ORG-  |
|  |                                   | * The Homer Head Assembly is affixed to an<br>Upr. Rt. Style Flipper<br>(no E.O.S. Switch): |                                    | Flippers (Mini-Bats) on 2nd Level Playfield: |                                    |
|  |                                   |   | * 090-5020-20T<br>22-900 -YEL-YEL- | 090-5041-00T<br>25-1800 -BLU-GRN-            | 090-5025-00T<br>24-1570 -See Note- |
| Terminator® 3:<br>Rise of the Machines™ †            | 2                                 | 090-5032-00T<br>22-1080 -YEL-GRN-   | SAME                               | Not Used                                     | Not Used                           |
| The Lord of the Rings™ †                             | 2                                 | 090-5020-20T<br>22-900 -YEL-YEL-  | SAME                               | Not Used                                     | Not Used                           |
| Ripley's<br>Believe It or Not!® †                    | 3                                 | 090-5032-00T<br>22-1080 -YEL-GRN-   | SAME                               | Not Used                                     | 090-5067-00T<br>25-1400 -RED-RED-  |

† Coil Part N<sup>o</sup>s ending with a "T" signifies the Diode is on the top of the lug (on the coil-winding side); Coil Part N<sup>o</sup>s ending with a "B" signifies the Diode is on the bottom of the lugs.



# APPENDIX F

## Motor Specification (White Star Board System\* Only) Table



| Game Name                                    | Function  | Specifications   | Part Number  |
|--|---|--|--|
| Apollo 13                                    | Rocket Up/Down Movement                         | Bowman Motor 24VAC<br>60Hz 3W 6 RPM CCW  | 515-6383-00<br><i>incl. Connector</i>                                    |
|  | Moon Unit Rotational Orbit                      | Multi Products Motor 24VAC<br>50/60Hz 3W 6 RPM CCW   | 515-6487-00<br><i>incl. Connector</i>                                    |
|  | Shaker  | Johnson Motor (Vibrator) 10.5VDC<br>10 AMP 2950 RPM CW   | 041-5029-00<br><b>MOTOR ONLY</b>   |
| Golden Eye                                   | Satellite Left/Right Movement                   | Bowman Motor 24VAC<br>60Hz 3W 6 RPM CW   | 515-6528-00<br><i>incl. Connector</i>                                    |
| Twister                                      | Spinning Disc with Magnet                       | Multi Products Motor 24VAC (041-5026-00)<br>50/60Hz 3W 325 RPM CCW   | 515-6347-00<br><i>incl. Connector</i>                                    |
|  | Backbox Fan (Tornado Wind)                      | Multi Products Motor 24VAC (041-5052-00)<br>50/60Hz 3W 3600 RPM CW   | 515-6531-00<br><i>incl. Connector</i>                                    |
| ID4: Independence Day                        | Alien Head Open/Close Movement                  | Servo Motor (94322)  | 041-5045-00<br><b>MOTOR ONLY</b>   |
| <i>SPACE JAM (NO MOTOR USED)</i>             |   |  |  |
| The Star Wars Trilogy - S.E.                 | X-Wing Left/Right Movement                      | Bowman Motor 24VAC (041-5058-00)<br>60Hz 3W 10 RPM CCW   | 515-6383-01<br><i>incl. Connector</i>                                    |
| The Lost World: Jurassic Park                | Snagger & Center Link Lift Up/Down Movement     | Multi Products Motor 20VDC (041-5059-03)<br>9 RPM Non-Directional  | 515-6715-03<br><i>incl. Connector</i>                                    |
|  | Shaker  | Johnson Motor (Vibrator) 10.5VDC<br>10 AMP 2950 RPM CW   | 041-5029-00<br><b>MOTOR ONLY</b>   |
| The X-Files                                  | X-File Cabinet Lift Up/Down Movement            | Multi Products Motor 20VDC<br>9 RPM CCW  | 041-5057-00<br><b>MOTOR ONLY</b>   |
| Starship Troopers                            | Warrior Bug Forward/Reverse Movement            | Haydon Switch & Instrument, Inc. Stepper Motor 12VDC 4.6W (041-5062-00), Series 36000: 1.4"ø (Non-Captive Shaft <b>not included</b> ) HSI #36864-12 (Unipolar) Travel per Step: .004 Step Angle: 15° | 515-6794-00<br><i>incl. Connector</i><br>Requires 7" Shaft: 530-5503-00  |
| <i>VIPER NIGHT DRIVIN' (NO MOTOR USED)</i>   |   |  |  |
| Lost In Space                                | Spinning Disc with Magnet                       | Multi Products Motor 24VAC (041-5046-00)<br>50/60Hz 3W 325 RPM CCW   | 515-6347-00<br><i>incl. Connector</i>                                    |
| Godzilla                                     | Shaker ‡  | Multi #3811 0630 Motor (Vibrator) 12VDC<br>3100 RPM CW (w/DRL PTS) ‡   | 041-5029-01<br><b>MOTOR ONLY</b>   |
| <i>SOUTH PARK (NO MOTOR USED)</i>            |   |  |  |
| Harley-Davidson®<br>1st through 3rd Editions | Shaker ‡  | Multi #3811 0630 Motor (Vibrator) 12VDC<br>3100 RPM CW (w/DRL PTS) ‡   | 041-5029-01<br><b>MOTOR ONLY</b>   |
|  | Motorcycle Lift Up/Down Movement                | Autotrol 24VAC (041-5072-02)<br>20 RPM CCW   | 515-7025-00<br><i>incl. Connector</i>                                    |
| Striker Xtreme (NFL)                         | Goalie (Linebacker) Left to Right Movement      | Multi #3590 12VDC (041-5075-00)<br>60 RPM  | 515-7071-00<br><i>incl. Connector</i>                                    |
| Sharkey's Shootout                           | Mystery Ball Rotating Movement                  | Hankscraft Motor Model-E 24VAC (041-5076-00)<br>50/60Hz 3W 20 RPM CW   | 515-7095-00<br><i>incl. Connector</i>                                    |
| High Roller Casino                           | Roulette Wheel Rotating Movement                | Multi Products Motor 20VDC (041-5078-00)<br>17 RPM CCW   | 515-7153-00<br><i>incl. Connector</i>                                    |
|  | Up/Dn. Ramp in Slot Mach. Lift Up/Down Movement | Haydon Switch & Instrument, Inc. Stepper Motor 12VDC 4.6W (041-5062-00), Series 36000: 1.4"ø (Non-Captive Shaft <b>not included</b> ) HSI #36864-12 (Unipolar) Travel per Step: .004 Step Angle: 15° | 515-6794-00<br><i>incl. Connector</i><br>Requires Shaft 4¼": 530-5503-01 |
| Austin Powers™                               | Time Machine Rotating Movement                  | Multi Products Motor 24VAC (041-5079-00)<br>50/60Hz 20RPM CCW  | 515-7141-00<br><i>incl. Connector</i>                                    |
|  | Laser Beam Left to Right Directional            | Autotrol Motor 24VAC (041-5081-00)<br>50/60Hz 4W 10RPM Bi-Directional  | 515-7171-00<br><i>incl. Connector</i>                                    |
|  | Dr. Evil Target Lift Up/Down Movement           | Hankscraft Motor Model-E 24VAC (041-5030-00)<br>50/60Hz 6RPM CCW   | 515-5900-00<br><i>incl. Connector</i>                                    |
| Monopoly®                                    | Mini-Flipper (Waterworks) Rotating Movement     | Multi Prod. Motor & Gear Box #7000 EX00159A<br>20VDC 50/60Hz 85RPM CC/CCW  | 041-5083-00<br><b>MOTOR ONLY</b>   |
| Playboy                                      | Triangular Billboard Rotating Movement          | Autotrol Motor (BD511 150-1387) 24VAC<br>50/60Hz 12RPM Bi-Directional  | 041-5086-02<br><b>MOTOR ONLY</b>   |
|  | Centerfold Mechanism Open/Close Movement        | Multi Products (3680) Motor 12v DC<br>10/12 RPM CC/CCW   | 041-5075-04<br><b>MOTOR ONLY</b>   |
|  | Tease Drop Screen Lift Up/Down Movement         | Haydon Switch & Instrument, Inc. Stepper Motor 12VDC 4.6W (041-5062-00), Series 36000: 1.4"ø (Non-Captive Shaft <b>not included</b> ) HSI #36864-12 (Unipolar) Travel per Step: .004 Step Angle: 15° | 515-6794-00<br><i>incl. Connector</i><br>Requires 7" Shaft: 530-5503-00  |

‡ Please Note: "01" Shaker Motor is **Not Compatible** with old Shaker Motor 041-5029-00 (Shaker Motor Assy. 515-5893-00). THIS NEW MOTOR CAN ONLY BE USED IN NEW SHAKER MOTOR ASSY. 515-5893-01.

Table continued on the next page.







# APPENDIX F

## Motor Specification (White Star Board System\* & S.A.M. System\*\* Only) Table



| Game Name   | Function   | Specifications   | Part Number   |
|---|--|--|---|
| <b>ROLLERCOASTER TYCOON™ (NO MOTOR USED)</b>        |  |  |   |
| <b>THE SIMPSONS™ PINBALL PARTY (NO MOTOR USED)</b>  |  |  |   |
| <b>Terminator® 3: Rise of the Machines™</b>         | Backbox Ball Shooter Up/Down Movement                      | Multi Products Motor 24VAC (041-5079-01)<br>21 RPM CW  | 515-7317-00<br><i>incl. Connector</i>   |
| <b>The Lord of the Rings™</b>                       | Balrog (Motor & Gate) Open/Close Movement                  | Multi Prod. Motor 20VDC Series 600B (or equiv.)<br>50/60Hz 10 RPM Bi-Directional   | 041-5088-01<br><b>MOTOR ONLY</b>  |
| <b>RIPLEY'S BELIEVE IT OR NOT!® (NO MOTOR USED)</b> |  |  |   |
| <b>Elvis®</b>                                       | Elvis™ Front/Back Movement                                 | Haydon Switch & Instrument, Inc. Stepper Motor 12VDC 10W (041-5089-00),<br>(Non-Captive Shaft <b>not included</b> )<br>HSI #46868-12-002 | 500-6809-00<br><i>incl. Connector</i><br>Requires 7.25" Shaft:<br>530-5658-00 |
|   | ▶▶▶ <b>OPTIONAL</b> ◀◀◀<br>Shaker                          | Multi #3811 0630 Motor (Vibrator) 12VDC (041-5029-01) 3100 RPM (w/DRL PTS)   | 515-5893-01<br><i>incl. Connector</i>   |
| <b>The Sopranos™</b>                                | Bada Bing! Girls x2 Rotating Posts Movement                | Autotrol Synchronous Motor 24VAC 4W 50/60Hz 45.7/54.9 RPM Bi-Directional   | 041-5092-00<br><i>w/1" Shaft + 12" Leads</i>                                  |
| <b>NASCAR® and [NDSE]</b>                           | Back Panel Rotating (Car) Windmill (Skill Ball Enter)      | Multi Products Motor & Gear Box 20VDC Model #8000 (EX-04-073) 10 RPM   | 041-5093-00<br><b>MOTOR ONLY</b>  |
| <b>Grand Prix</b>                                   | Back Panel Rotating (Car) Windmill (Skill Ball Enter)      | Multi Products Motor & Gear Box 20VDC Model #8000 (EX-04-073) 10 RPM   | 041-5093-00<br><b>MOTOR ONLY</b>  |
| <b>World Poker Tour™ (WPT) (NO MOTOR USED)</b>      |  |  |   |
| <b>The Simpsons™ Kooky Carnival</b>                 | Bart on Skateboard Left/Right Movement                     | Multi Products Motor with Crank 24VAC (041-5095-01) 50/60Hz 3W 14 RPM  | 500-6947-01<br><i>incl. Connector</i>   |
|   | Left & Right Ramps Up/Down Movement                        | Multi Products Motor 24VAC (041-5048-01) 50/60Hz 3W 15 RPM CCW (Qty. 2 in game)  | 515-7558-00<br><i>incl. Connector</i>   |
|   | Shaker<br><i>(details in SKC Manual, Page 24)</i>          | Multi #3811 0630 Motor (Vibrator) 12VDC 3100 RPM (w/DRL PTS)   | 041-5029-01<br><b>MOTOR ONLY</b>  |
| <b>©Disney's Pirates of the Caribbean</b>           | Spinning Disk  | Multi #3811R 0630 Motor (Vibrator) 12VDC (041-5029-04) 3100 RPM (w/DRL PTS)<br>-04 is RoHS compliant; can substitute with -01 domestic   | 511-5024-04<br><i>incl. Connector</i>   |
|   | Pirate Ship Sinking/Raising Movement                       | Multi Products Motor & Gear Box 24VDC Model #7000-DCM 12 RPM   | 041-5101-00<br><b>MOTOR ONLY</b>  |
| <b>Family Guy™</b>                                  | Stewie Figurine Left & Right Movement                      | Stepper Motor NPM PF35T-48D4STD 5V RVB (041-5102-00 Reference Only)  | 511-5043-00<br><i>incl. Connector</i>   |
| <b>Spider-Man™</b>                                  | Doc Ock, Sandman & 3-Bank Up/Down Movement                 | Sync. Motor 24VAC 50/60Hz 3W 12 RPM CW (041-5103-00 Reference Only)  | 511-5063-00<br><i>incl. Connector</i>   |
|   | ▶▶▶ <b>OPTIONAL</b> ◀◀◀<br>Shaker Motor Kit<br>502-5027-00 | Multi #3811R 0630 Motor (Vibrator) 12VDC (041-5029-04) 3100 RPM (w/DRL PTS)<br>-04 is RoHS compliant; can substitute with -01 domestic   | 515-5893-01<br><i>incl. Connector</i>   |



# APPENDIX F

## Motor Specification Table

The following table only list games that used motors. Part Numbers starting with "515-" will include the Wiring Harness & Connector.

| Game Name                    | Function  | Specifications  | Part N <sup>o</sup> |
|------------------------------|---|---|---------------------|
| ABC Monday Night Football    | Goal Post<br>Up/Down Movement                     | Motor 24v A.C.<br>60 RPM CW                               | 515-5222-00         |
| Phantom of the Opera         | Organ<br>Up/Down Movement                         | Bowman Motor 24v<br>60Hz 3W 11 RPM CCW                    | 515-5256-00         |
| Checkpoint                   | Mag Wheel<br>(in Backbox)                         | Motor D.C. (KEN)  | 041-5005-00         |
|                              | Shaker  | Johnson Motor<br>(Vibrator)                               | 041-5002-00         |
| Teenage Mutant Ninja Turtles | Spinning Pizza Ball<br>Deflector                  | Gear Motor 24v A.C.<br>325 RPM CW                         | 515-5397-00         |
| Batman                       | Bar Target<br>Up/Down Movement                    | Bowman Motor 24v<br>60Hz 3W 11 RPM CCW                    | 515-5256-00         |
| Star Trek 25th Anniversary   | Swinging Target                                   | Bowman Motor 24v<br>22½ RPM                               | 515-5534-00         |
|                              | Transporter F/X                                   | Gear Motor 24v A.C.<br>3½ RPM                             | 500-5421-00         |
|                              | Cooling Fan<br>(for Transporter F/X)              | 4½" Motor 12v   | 041-5014-00         |
| Lethal Weapon 3              | Spinning Light                                    | Motor 2½ v A.C.<br>4000 RPM CCW                           | 041-5017-00         |
| Star Wars                    | Bar Target<br>Up/Down Movement                    | Bowman Motor 24v<br>60hz 3W 11 RPM CCW                    | 515-5256-00         |
|                              | R2D2 Robot<br>Left/Right Movement                 | Bowman Motor 24v A.C.<br>22½ RPM CW                       | 515-5571-00         |
|                              | Death Star<br>Rotation                            | Bowman "G" Motor 24v A.C.<br>60Hz 6 RPM CW                | 515-5570-00         |
| Rocky & Bullwinkle & Friends | Nell Log "Cutting Blade"<br>Forward/Back Movement | Autotrol Model E Motor 24v<br>60hz 4W 3 RPM CCW           | 041-5023-00         |
| Jurassic Park                | T-Rex<br>Left/Right Movement                      | Multi Motor 5v D.C.                                       | 041-5025-00         |
|                              | T-Rex<br>Up/Down Movement                         | Bowman Motor 24v<br>11 RPM CW                             | 041-5026-00         |
|                              | Shaker  | Johnson Motor<br>(Vibrator)                               | 041-5002-00         |
| Last Action Hero             | Crane<br>Left/Right Movement                      | Multi Products Motor 12v D.C.<br>#3312 OSC                | 041-5027-00         |
|                              | Shaker  | Johnson Motor (Vibrator) 10.5v D.C.<br>10 AMP 2950 RPM CW | 041-5029-00         |
| Tales from the Crypt         | Tombstone<br>Up/Down Movement                     | Bowman Motor 24v A.C.<br>6 RPM CCW                        | 515-5900-00         |
|                              | Shaker  | Johnson Motor (Vibrator) 10.5v D.C.<br>10 AMP 2950 RPM CW | 041-5029-00         |
| The Who's Tommy              | Mirror<br>Up/Down Movement                        | Bowman Motor 24v A.C.<br>6 RPM CCW                        | 515-5900-00         |
|                              | Flipper Blinders                                  | Servo Motor<br>(94102)                                    | 041-5032-00         |
|                              | Spinning Airplane<br>Propellers                   | Motor D.C.  | 041-5033-00         |
| WWF Royal Rumble             | Shaker  | Johnson Motor (Vibrator) 10.5v D.C.<br>10 AMP 2950 RPM CW | 041-5029-00         |
| Maverick, The Movie          | Turning Paddle Wheel                              | Motor 24v A.C.<br>10 RPM                                  | 041-5036-00         |
| Mary Shelley's Frankenstein  | Creature Head<br>Left/Right Movement              | Servo Motor (94102)                                       | 041-5032-00         |
| Batman Forever               | Cannon<br>Left/Right Movement                     | Bowman Motor 24v A.C.<br>60Hz 3W 6 RPM CCW                | 515-6383-00         |

# APPENDIX G

## Part Number Prefix Classification Codes

### I. Electrical Source, Energy & Signal Converters

- 010- Transformers
- 031- Speakers
- 090- Solenoids (Coils)
- 150- Filters, Outlets, Varistors, Thermistors
- 200- Fuses

### II. Conductors, Connectors & Insulators

- 034- Line Cords
- 036- Cable Assemblies & Wiring Harnesses
- 041- Motors
- 045- Connectors (All Types)
- 055- Lugs (M/F), Pins (M/F), Discs, Ring Terminals, Terminal Strips, etc.
- 060- Polarizing Keys and Conn. Covers
- 077- Lamp Sockets

### III. Circuits & Circuit Elements

- 100- ICs
- 110- Transistors
- 112- Diodes (All Types including LEDs & Modules)
- 121- Resistors
- 123- Resistors (Variable & Adjustable)
- 124- Regulators & Bridge Rectifiers
- 125- Capacitors (Radial Lytics & Ferrites)
- 126- Piezo Crystal
- 127- Heatsinks
- 130- Capacitors (Tectates & Ceramics)
- 140- Oscillators (Clocks/Crystals)
- 165- Light Bulbs
- 180- Switches
- 181- Switch Membranes (Pads) & Piezo Sensors
- 190- Relays
- 960- EPROM (*Raw Part*)
- 965- EPROM (*Programmed Part*)

### IV. Bolts, Screws, Nuts, Washers & Nails

- 231- Bolts
- 232- Screws (Pan Head)
- 234- Screws (HWH)
- 237- Screws (Misc.)
- 240- Nuts (Misc.)
- 242- Washers (Flat, Round)
- 244- Washers (Split Lock)
- 245- Nyloners
- 246- Washers (Lockers, External Tooth)
- 281- Nails

### V. Mechanical Components

- 249- Rivets
- 251- Pins (Dowel), Finishing Nails, Hairpins, Spring Pins and Clevis Pins
- 254- Stand-Offs, Spacers and Shims
- 260- Steel Ball (All Types Steel, Glowing, Delrin, etc.)
- 265- Springs (Extension)
- 266- Springs (Compression)
- 267- Springs (Torsion)
- 269- Springs (Washers - Belleville, Wave)
- 270- Retaining Rings
- 280- Grommets, Bushings and Nyloners
- 283- Bearings

### VI. Handles, Locks, Catches, Latches, Keys

- 355- Handles, Locks, Catches, Latches and Keys

### VII. Fabricated Parts

- 390- Hinges
- 501- Coin Doors
- 515- Sub-Assemblies
- 520- Printed Circuit Boards (PCBs)
- 522- Display Glass
- 525- Wood Parts
- 530- Screw Machined Parts
- 535- Fabricated Parts
- 545- Molded (Extruded) Plastic and Rubber Parts (Rings, Sleeves, etc.)
- 550- Molded (Inserts)

### VIII. In-House Assemblies

- 500- End Product (Systems and Models)
- 502- Kits (Created In-House)
- 505- Cabinets (complete)
- 510- Riveted Sub-Assemblies (In-House)
- 511- Sub-Assemblies (In-House)
- 515- Sub-Assemblies\*

\*2 or more 515-'s but still a sub-assembly.

### IX. Bulk Materials

- 600- Braided Wire & Ground Straps
- 601- Stranded Wire
- 602- Ribbon Cable
- 604- Telephone Line Cord
- 605- Sleeving (Shrink Tubing)
- 625- Velcro (non-adhesive)
- 626- Foam Rubber, Foam Pads, Rubber Bumpers (Blue Pads), Tape (All Types) Velcro (adhesive) and String / Rope

### X. Miscellaneous








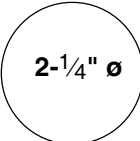
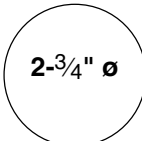
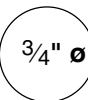
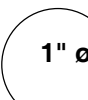
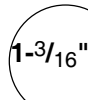
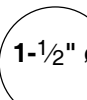
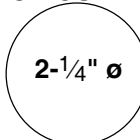
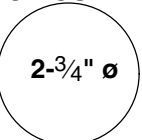

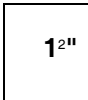
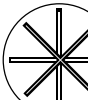
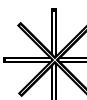
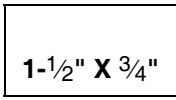
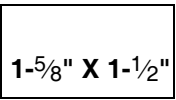
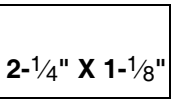
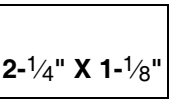
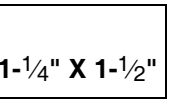
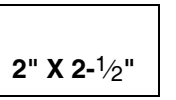


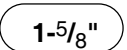
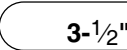




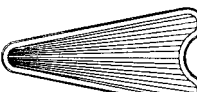
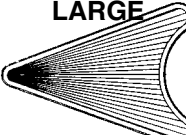
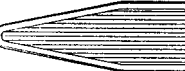
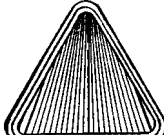
- 000- Tools (*see also 777-*) and Supplies
- 040- Clamps, Ties & Clips
- 042- Pulleys
- 091- Coin Mechs
- 205- Fuse Holders
- 631- Staples
- 660- Glass (Playfield, Backglass, etc.)
- 675- Cleaners
- 705- Packing & Shipping Items
- 755- Instruction, Coin Cards, Ins. Sheets
- 756- Information Sheets, Service Bulletins, Instruction Sheets in Kits and Templates
- 777- Tools (Wrenches and Drivers)
- 780- Manuals
- 802- Decal Kits (comprised of 820's)
- 820- Decals, Mylar and Labels (Sheets/Sets)
- 803- Plastic Kits (comprised of 830's)
- 830- Plastic Pieces (Butyrate Sheets/Sets)
- 880- Toys, Models, Figurines, etc.
- 900- Game Posters





# APPENDIX H

## Playfield Inserts (Plastic Light Covers)

|  |  |  |   |  |  |
|--|--|--|---|--|--|
| <b>Patterns:</b><br><b>STARBURST</b><br><br><b>STIPPLE</b><br> | <b>STARBURST CIRCULAR</b><br><br><b>550-5000-XX</b>       | <b>STARBURST CIRCULAR</b><br><br><b>550-5001-XX</b>           | <b>STARBURST CIRCULAR</b><br><br><b>550-5002-XX</b>            | <b>STARBURST CIRCULAR</b><br><br><b>550-5003-XX</b>   | <b>STARBURST CIRCULAR</b><br><br><b>550-5004-XX</b>         |
| <b>STARBURST CIRCULAR</b><br><br><b>550-5005-XX</b>   | <b>STARBURST CIRCULAR</b><br><br><b>550-5006-XX</b>       | <b>PLAIN CIRCULAR</b><br><br><b>550-5007-XX</b>               | <b>PLAIN CIRCULAR</b><br><br><b>550-5008-XX</b>                | <b>PLAIN CIRCULAR</b><br><br><b>550-5009-XX</b>       | <b>PLAIN CIRCULAR</b><br><br><b>550-5010-XX</b>             |
| <b>PLAIN CIRCULAR</b><br><br><b>550-5011-XX</b>   | <b>PLAIN CIRCULAR</b><br><br><b>550-5012-XX</b>           | <b>STIPPLE CIRCULAR</b><br><br><b>550-5048-XX</b>             | <b>STIPPLE 1" SQUARE</b><br><br><b>550-5019-XX</b>             | <b>ROLLOVER BUTTON BASE</b><br><br><b>550-5026-XX</b> | <b>WHITE STAR (only in white)</b><br><br><b>545-5015-00</b> |
| <b>STIPPLE RECTANGULAR</b><br><br><b>550-5018-XX</b>   | <b>STIPPLE RECTANGULAR</b><br><br><b>550-5051-XX</b>     | <b>STARBURST RECTANGULAR</b><br><br><b>550-5044-XX</b>       | <b>PLAIN RECTANGULAR</b><br><br><b>550-5049-XX</b>           | <b>PLAIN RECTANGULAR</b><br><br><b>550-5050-XX</b>   | <b>PLAIN RECTANGULAR</b><br><br><b>550-5063-XX</b>         |
| <b>STARBURST MINI SHIELD</b><br><br><b>550-5024-XX</b>  | <b>STARBURST LARGE SHIELD</b><br><br><b>550-5025-XX</b> | <b>MINI HOT DOG</b><br><br><b>550-5020-XX</b>               | <b>BEVEL HOT DOG</b><br><br><b>550-5021-XX</b>              | <b>PLAIN HOT DOG</b><br><br><b>550-5022-XX</b>      | <b>BANANA</b><br><br><b>550-5023-XX</b>                   |
| <b>STARBURST ARROW-SMALL</b><br><br><b>550-5013-XX</b>  | <b>STARBURST ARROW-LARGE</b><br><br><b>550-5070-XX</b>  | <b>STARBURST ARROW-HEAD SMALL</b><br><br><b>550-5014-XX</b> | <b>STARBURST ARROW-HEAD LARGE</b><br><br><b>550-5015-XX</b> | <b>STARBURST BULLET</b><br><br><b>550-5016-XX</b>   | <b>STARBURST TRIANGLE</b><br><br><b>550-5017-XX</b>       |

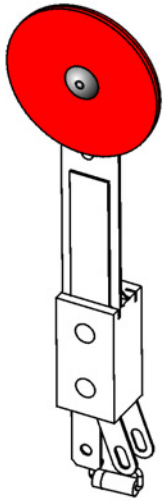
**Note:** The shapes and sizes shown above are not to scale. Some shapes may no longer be available in every color.

**Instructions:** Parts which may come in various colors (i.e. targets, some posts, playfield inserts, etc.) end in a 2-digit number which correspond to the color of that part. The "-XX" in part number which may come in various colors should be replaced with the desired 2-Digit number corresponding to the color desired below. *Not all colors may be available.*

| PLASTIC PART COLOR CHART |                      |     |       |     |        |     |               |     |             |     |              |
|--------------------------|----------------------|-----|-------|-----|--------|-----|---------------|-----|-------------|-----|--------------|
| Nº                       | Color                | Nº  | Color | Nº  | Color  | Nº  | Color         | Nº  | Color       | Nº  | Color        |
| -00                      | Black or Solid Clear | -03 | Amber | -06 | Yellow | -09 | Purple        | -12 | Fluor. Blue | -15 | Luminescent  |
| -01                      | Clear                | -04 | Green | -07 | Orange | -10 | Fluor. Orange | -13 | Teal Green  | -16 | Gold         |
| -02                      | Red                  | -05 | Blue  | -08 | White  | -11 | Fluor. Green  | -14 | Gray        | -17 | Trans. Brown |

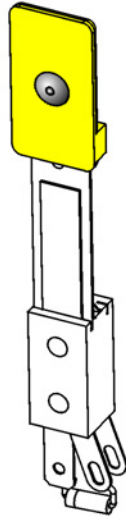
# APPENDIX I

## Stand-Up Targets

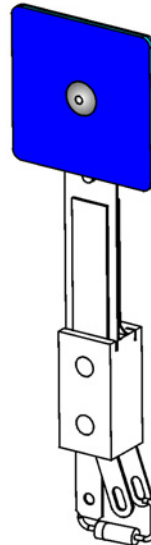


112-5003-00  
Switch Diode, 1N4004  
(all Stand-Up Targets)

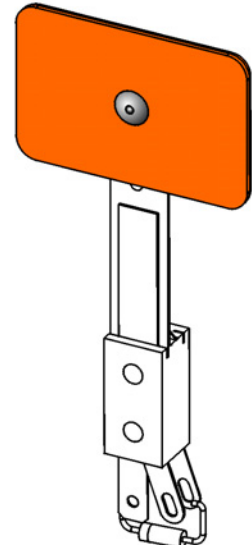
**515-5966-XX**  
1" ROUND STAND-UP  
SWITCH & TARGET  
RIVETED ASSEMBLY\*



**STANDARD**  
**515-5967-XX** or **ANTI-LOFT**  
**515-7581-XX**  
1" X 1/2" NARROW STAND-UP  
SWITCH & TARGET  
RIVETED ASSEMBLY\*



**515-5162-XX**  
1" X 1" SQUARE STAND-UP  
SWITCH & TARGET  
RIVETED ASSEMBLY\*



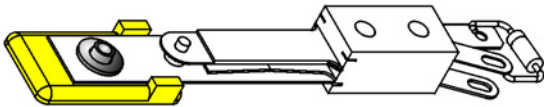
**515-6027-XX**  
1" X 1-1/2" RECTANGLE STAND-UP  
SWITCH & TARGET  
RIVETED ASSEMBLY\*

\*Note: Does not include the Switch Back Plate, Mounting Bracket or screws.

To include the Switch Back Plate, Foam Pad, and Switch Mounting Bracket assembled, use the follow assembly part numbers (replace the -XX with 2-digit number from chart):

500-5835-XX : 1" ROUND TARGET      500-5857-XX : 1" X 1/2" NARROW TARGET      500-5232-XX : 1" X 1" SQUARE TARGET      500-5321-XX : 1" X 1-1/2" RECT. TARGET

### REAR VIEW 515-5967-06 SHOWN



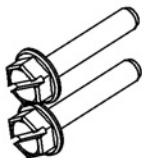
**SHOWN BELOW : 500-5857-06**  
1" X 1/2" NARROW STAND-UP  
TARGET ASSEMBLY COMPLETE

626-5029-00  
Foam Pad, Square  
.44" X .44" X .125" Thick (Self-Adhesive)\*\*

\*\* Note:  
Use with all Switch  
& Targets THIS page  
except for 515-7581-XX

535-6896-00  
Bracket, Switch  
Mounting  
(all targets THIS page)

237-5976-05  
#6-32 X 3/4" SHWH Sc.  
(all targets THIS page)



**515-5967-XX**  
1" X 1/2" NARROW  
STAND-UP (STANDARD)  
SWITCH & TARGET  
RIVETED ASSEMBLY\*

535-6452-00  
Switch Back Plate\*\*

### -XX REPLACE WITH 2-DIGIT FOR COLOR:

- 00 Black
- 01 Clear
- 02 Red
- 03 Amber
- 04 Green
- 05 Blue
- 06 Yellow
- 07 Orange
- 08 White
- 09 Purple
- 10 Fluor. Orange
- 11 Fluor. Green
- 12 Fluor. Blue
- 13 Teal Green
- 14 Gray
- 15 Luminescent
- 16 Gold

Note: Not all colors available.

### SHOWN BELOW : 500-6985-04

1" X 1/2" NARROW ANTI-LOFT  
STAND-UP TARGET  
ASSEMBLY COMPLETE

626-5069-00  
Foam Pad, Rectangle  
.6" X .4" X .25" Thick (Self-Adhesive) ‡

535-9823-01  
Switch Back  
Plate ‡

‡ Note: Use only with  
515-7581-XX Switch &  
Target Assembly unless  
otherwise noted.

535-6896-00  
Bracket, Switch  
Mounting  
(all targets THIS page)

237-5976-05  
#6-32 X 3/4" SHWH Sc.  
(all targets THIS page)

**515-7581-XX**  
1" X 1/2" NARROW  
STAND-UP TALL  
SWITCH & TARGET  
RIVETED ASSEMBLY\*

ORDERING NOTE: 515-7581-XX (500-6985-XX)

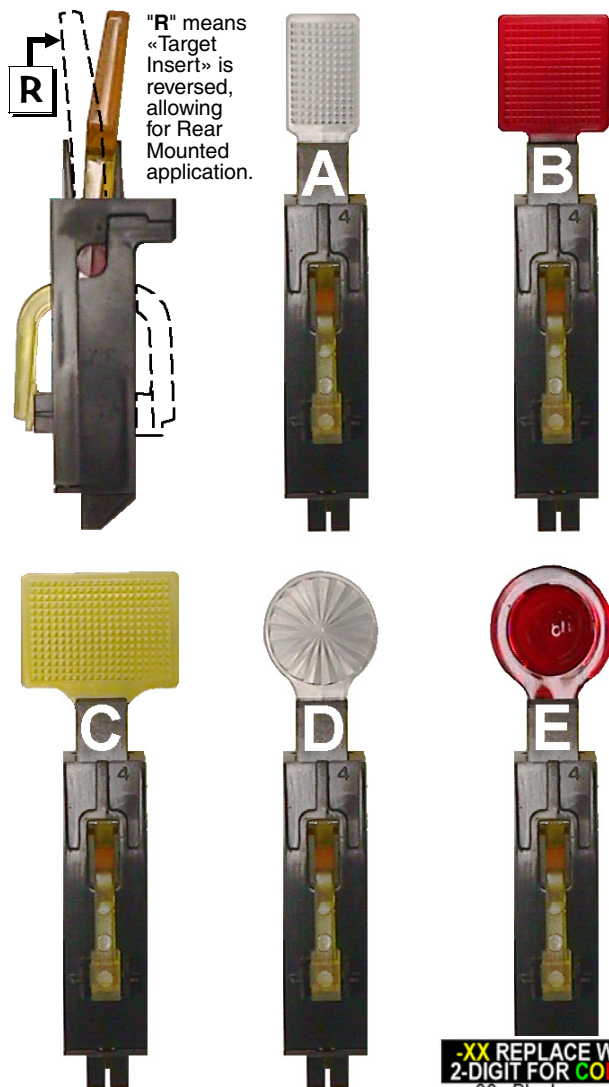
differences from 515-5967-XX (500-5857-XX) are:

1. Switch & Target Taller (Target sits higher over P/F)
2. Switch Back Plate differs (bend, shape & tab)
3. Foam Pad differs (thicker, taller, different type foam)

\*Note: Does not include the Switch Back Plate, Mounting Bracket or screws.

# APPENDIX I

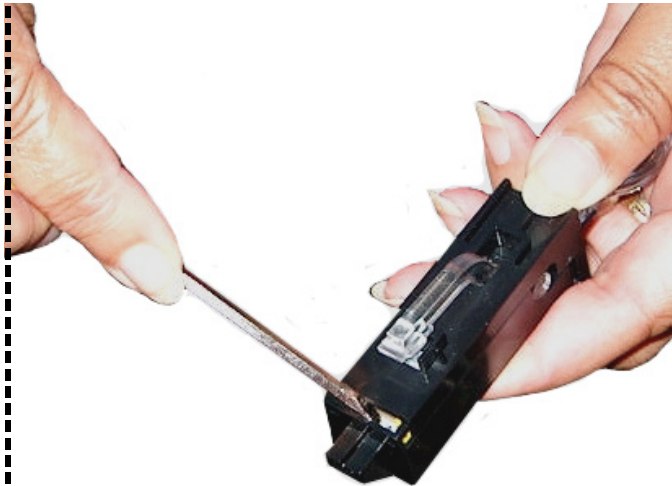
## Modular Stand-Up Targets



"R" means «Target Insert» is reversed, allowing for Rear Mounted application.

### To Replace the « Target Insert » or change Target Orientation :

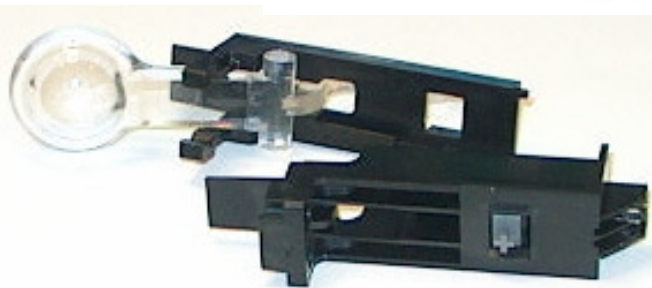
**Items A-E Note:** For the Target Assembly use the "500-" SPI Part Number(s) shown in the Parts Table below. To receive the Target Assembly with the « Target Insert » « Reversed » simply add a "R" at the end of the Part Number. See Side View picture left to compare (dashed line shows target reversed). For just the «Target Insert» use the "545-" SPI Part Number.



### To reverse it yourself or to just change the insert:

1. With a small flat head screwdriver, push into the small tab at the bottom of the target front and give a slight twist motion to "pop" the two halves.

2. Push the Target Insert bottom in at the same time while you slide the top (front) part up, then let go of the insert as the two halves come apart.



3. Replace target or reinsert it into the other size while sliding the two halves back together.

**Note:** If you were reversing the orientation, don't forget to also turn the Switch Actuator PCB 180°. Test Switch.

### Take Note:

- Items A-E come in various colors. These targets may not be available in every color. The "-XX" in should be replaced with the desired 2-Digit number for the color desired as described in the Color Chart below. As of print date, the following colors were used :  
 -01 Clear (A, D); -02 Red (A, B, C, D, E); -03 Amber (D, E);  
 -04 Green (A, B); -05 Blue (C); -06 Yellow (A, C),  
 -09 Purple (B, D); -11 Fluorescent Green (A, B, D)
- For location(s) and type of Stand-Up Targets used, if any, see Section 4, Chapter 1, Parts Identification & Location.

### -XX REPLACE WITH 2-DIGIT FOR COLOR:

- 00 Black
  - 01 Clear
  - 02 Red
  - 03 Amber
  - 04 Green
  - 05 Blue
  - 06 Yellow
  - 07 Orange
  - 08 White
  - 09 Purple
  - 10 Fluor. Orange
  - 11 Fluor. Green
  - 12 Fluor. Blue
  - 13 Teal Green
  - 14 Gray
  - 15 Luminescent
  - 16 Gold
- Note: Not all colors available.

| Nr. | STAND-UP TARGET PARTS                   | SPI PART Nr. |
|-----|---|--------------|
| A   | Modular Stand-Up Target Narrow Assy.    | 500-6138-XX  |
|     | Stand-Up Target Narrow (Insert)         | 545-6138-XX  |
| B   | Modular Stand-Up Target Square Assy.    | 500-6139-XX  |
|     | Stand-Up Target Square (Insert)         | 545-6139-XX  |
| C   | Modular Stand-Up Target Rectangle Assy. | 500-6228-XX  |
|     | Stand-Up Target Rectangle (Insert)      | 545-6228-XX  |
| D   | Modular Stand-Up Target Round Assy.     | 500-6075-XX  |
|     | Stand-Up Target Round (Insert)          | 545-6075-XX  |
| E   | Mod. Stand-Up Target 1" Spherical Assy. | 500-6189-XX  |
|     | Stand-Up Target 1" Spherical (Insert)   | 545-6189-XX  |



# APPENDIX J

## Coin Cards (USA & International Pricing Defaults) ▶ For Yellow Stock add -Y to the Part Number

If more than one Pricing Scheme is available for countries listed, the **F.** listed beside the option, denotes the Factory Default Setting.  
**FOR VIEWS OF THE LATEST or OPTIONAL USA, INTERNATIONAL / EURO AND CUSTOM COIN CARDS, VISIT OUR WEBSITE.**  
 Not Shown USA 755-5400-10 Tournament Option \$2 = X1; 755-5400-11 Tournament Option \$1.50 = X1

|  |  |  |  |   |  |   |  |  |  |   |  |
|--|--|--|--|---|--|---|--|--|--|---|--|
| <b>USA 10 F.</b><br><br>755-5400-11 Front      |  | <b>USA 10</b><br><br>755-5400-11 Back      |  | <b>USA 2-7 or CANADA</b><br><br>755-5400-02 Front |  | <b>FOR CUSTOM PRICING †</b><br><br>755-5400-01, -02 or -04 Back |  | <b>USA 3 with ToPS™</b><br><br>755-5400-03 or -09 Front  |  | <b>USA 5 with ToPS™</b><br><br>755-5400-03 Back / -08 Front |  |
| <b>AUSTRALIA 1 F.</b><br><br>755-5406-00 Front |  | <b>AUSTRALIA 2</b><br><br>755-5406-00 Back |  | <b>CROATIA</b><br><br>755-5410-00 Front           |  | <b>FOR CUSTOM PRICING †</b><br><br>755-5410-00 Back             |  | <b>DENMARK 1 F.</b><br><br>755-5402-00 Front   |  | <b>DENMARK 2</b><br><br>755-5402-00 Back                    |  |
| <b>JAPAN 1</b><br><br>755-5408-01 Front        |  | <b>JAPAN 2 F.</b><br><br>755-5408-01 Back  |  | <b>MIDDLE EAST</b><br><br>755-5400-06 Front       |  | <b>ANY COUNTRY CAN USE</b><br><br>755-5400-06 Back              |  | <b>NEW ZEALAND 1 F.</b><br><br>755-5406-00 Back  |  | <b>NEW ZEALAND 2</b><br><br>755-5406-00 Front               |  |
| <b>NORWAY 1 F.</b><br><br>755-5403-01 Front    |  | <b>NORWAY 2</b><br><br>755-5403-01 Back    |  | <b>RUSSIA F.</b><br><br>755-5411-00 Front         |  | <b>RUSSIA (ALTERNATE)</b><br><br>755-5411-00 Back               |  | <b>SOUTH AFRICA</b><br><br>755-5409-01 Front   |  | <b>FOR CUSTOM PRICING †</b><br><br>755-5409-01 Back         |  |
| <b>SWEDEN 1 F.</b><br><br>755-5404-00 Front    |  | <b>SWEDEN 2</b><br><br>755-5404-00 Back    |  | <b>SWITZERLAND 1 F.</b><br><br>755-5405-00 Front  |  | <b>SWITZERLAND 2</b><br><br>755-5405-00 Back                    |  | <b>TAIWAN</b><br><br>755-5412-00 Front   |  | <b>FOR CUSTOM PRICING †</b><br><br>755-5412-00 Back         |  |
| <b>UK 1</b><br><br>755-5407-00 Front           |  | <b>UK 3</b><br><br>755-5407-00 Back        |  | <b>UK 5 F.</b><br><br>755-5407-01 Front           |  | <b>FOR CUSTOM PRICING †</b><br><br>755-5407-01 Back             |  | <b>Appendix J Notes:</b><br>1. Coin Card on Game is determined by original shipping country destination.<br>2. Optional Coin Card(s), are available via your distributor or via free download @ <a href="http://www.sterpinball.com/coinagecards.shtml">www.sterpinball.com/coinagecards.shtml</a> .<br>Older style Coin Cards (foreign or domestic) not available on our website or no longer available through your distributor, are obsolete.<br>3. Coin Cards which have a Blank Backside can be used for †Custom Pricing. |  |   |  |

Not Shown EURO 755-5401-20 Tournament Custom (can fill in your own pricing).

|  |  |  |  |  |  |   |  |   |  |   |  |
|--|--|--|--|--|--|---|--|---|--|---|--|
| <b>EURO 1</b><br><br>755-5401-01 1-Side Only |  | <b>EURO 2</b><br><br>755-5401-02 1-Side Only |  | <b>EURO 3</b><br><br>755-5401-03 1-Side Only |  | <b>EURO 4</b><br><br>755-5401-04 1-Side Only  |  | <b>EURO 5</b><br><br>755-5401-05 1-Side Only  |  | <b>EURO 6</b><br><br>755-5401-06 1-Side Only  |  |
| <b>EURO 7</b><br><br>755-5401-07 1-Side Only |  | <b>EURO 8</b><br><br>755-5401-08 1-Side Only |  | <b>EURO 9</b><br><br>755-5401-09 1-Side Only |  | <b>EURO 10</b><br><br>755-5401-10 1-Side Only |  | <b>EURO 11</b><br><br>755-5401-11 1-Side Only |  | <b>EURO 12</b><br><br>755-5401-12 1-Side Only |  |

### ▶ EURO FACTORY DEFAULT SUMMARY TABLE ◀

|                                |           |                      |        |        |        |        |         |         |         |         |         |
|--------------------------------|-----------|----------------------|--------|--------|--------|--------|---------|---------|---------|---------|---------|
| EURO 1                         | EURO 2    | EURO 3               | EURO 4 | EURO 5 | EURO 6 | EURO 7 | EURO 8  | EURO 9  | EURO 10 | EURO 11 | EURO 12 |
| BELGIUM<br>ITALY 1<br>PORTUGAL | GERMANY 2 | NETHERLANDS<br>SPAIN |        |        | GREECE |        | FINLAND | AUSTRIA | FRANCE  |         |         |

Section 3, Chapter 4, GO TO ADJUSTMENTS MENU, Adj. 18, Game Pricing, USA & International (non-Euro) and Euro 1-12 Summary & International (Euro) Standard Pricing Select Tables, summarizes Standard or Custom Pricing Schemes & the Dip Switch Setting required.





# APPENDIX A



## Pinball Game Firmware (White Star Board System\* Only) Table

See website for the latest International Code or Updated USA version / checksums

| ROM  | Chip Size   | Program Part N <sup>o</sup> | USA ver. & Check Sum | Bd. Loc. | Raw Part N <sup>o</sup> |
|--|-------------|-----------------------------|----------------------|----------|-------------------------|
| <b>Apollo 13 (Note 1)</b>                                      |             |                             |                      |          |                         |
| Game ROM (1M)  | 965-0208-00 | A5.01                       | \$09FF               | U210     | 960-5009-00             |
| Sound (512K)   | 965-0212-00 | 1.00                        | \$5244               | U7       | 960-7001-02             |
| Display (4M)   | 965-0213-00 | A5.00                       | \$B92B               | ROM 0    | 960-5015-01             |
| Voice 1 (4M)   | 965-0209-00 | 1.00                        | \$7FC7               | U17      | n/a (masked)            |
| Voice 2 (4M)   | 965-0210-00 | 1.00                        | \$8E55               | U21      | n/a (masked)            |
| Voice 3 (4M)   | 965-0211-00 | 1.00                        | \$08EE               | U36      | n/a (masked)            |
| <b>Golden Eye (Note 1)</b>                                     |             |                             |                      |          |                         |
| Game ROM (1M)  | 965-0214-42 | A4.04                       | \$3FFF               | U210     | 960-5009-00             |
| Sound (512K)   | 965-0217-42 | 1.00                        | \$D615               | U7       | 960-7001-02             |
| Display (4M)   | 965-0218-42 | A4.00                       | \$E6ED               | ROM 0    | 960-5015-01             |
| Voice 1 (4M)   | 965-0215-42 | 1.00                        | \$3E32               | U17      | n/a (masked)            |
| Voice 2 (4M)   | 965-0216-42 | 1.00                        | \$71F0               | U21      | n/a (masked)            |
| <b>Twister (Note 2)</b>  |             |                             |                      |          |                         |
| Game ROM (1M)  | 965-0219-41 | A4.05                       | \$E9FF               | U210     | 960-5009-00             |
| Sound (512K)   | 965-0221-41 | 1.00                        | \$1FFF               | U7       | 960-7001-02             |
| Display (4M)   | 965-0222-41 | A4.00                       | \$FD01               | ROM 0    | 960-5015-01             |
| Voice 1 (4M)   | 965-0220-41 | 1.00                        | \$3650               | U17      | 960-5015-01             |
| Voice 2 (4M)   | 965-0223-41 | 1.00                        | \$9300               | U21      | 960-5015-01             |
| <b>ID4: Independence Day (Note 2)</b>                          |             |                             |                      |          |                         |
| Game ROM (1M)  | 965-0224-45 | A2.02                       | \$9CFF               | U210     | 960-5009-00             |
| Sound (512K)   | 965-0227-45 | 1.00                        | \$222B               | U7       | 960-7001-02             |
| Display (4M)   | 965-0228-45 | A2.00                       | \$AB7                | ROM 0    | 960-5015-01             |
| Voice 1 (4M)   | 965-0225-45 | 1.00                        | \$3AF1               | U17      | 960-5015-01             |
| Voice 2 (4M)   | 965-0226-45 | 1.00                        | \$206E               | U21      | 960-5015-01             |
| <b>Space Jam (Note 2)</b>                                      |             |                             |                      |          |                         |
| Game ROM (1M)  | 965-0229-43 | A3.00                       | \$E6FF               | U210     | 960-5009-00             |
| Sound (512K)   | 965-0233-43 | 1.00                        | \$F1E7               | U7       | 960-7001-02             |
| Display (4M)   | 965-0234-43 | A3.00                       | \$0057               | ROM 0    | 960-5015-01             |
| Voice 1 (4M)   | 965-0230-43 | 1.00                        | \$DBA8               | U17      | 960-5015-01             |
| Voice 2 (4M)   | 965-0231-43 | 1.00                        | \$DDF1               | U21      | 960-5015-01             |
| Voice 3 (4M)   | 965-0232-43 | 1.00                        | \$F32A               | U36      | 960-5015-01             |
| <b>The Star Wars Trilogy - Special Edition (S.E.) (Note 2)</b> |             |                             |                      |          |                         |
| Game ROM (1M)  | 965-0235-56 | A4.03                       | \$5EFF               | U210     | 960-5009-00             |
| Sound (512K)   | 965-0238-56 | 1.00                        | \$4A7D               | U7       | 960-7001-02             |
| Display (4M)   | 965-0239-56 | A4.00                       | \$8817               | ROM 0    | 960-5015-01             |
| Voice 1 (4M)   | 965-0236-56 | 1.00                        | \$E66B               | U17      | 960-5015-01             |
| Voice 2 (4M)   | 965-0237-56 | 1.00                        | \$8F54               | U21      | 960-5015-01             |
| <b>The Lost World: Jurassic Park (Note 2)</b>                  |             |                             |                      |          |                         |
| Game ROM (1M)  | 965-0240-53 | A2.02                       | \$C8FF               | U210     | 960-5009-00             |
| Sound (512K)   | 965-0243-53 | 1.00                        | \$A35B               | U7       | 960-7001-02             |
| Display (4M)   | 965-0244-53 | A2.01                       | \$7F46               | ROM 0    | 960-5015-01             |
| Voice 1 (4M)   | 965-0241-53 | 1.00                        | \$1D27               | U17      | 960-5015-01             |
| Voice 2 (4M)   | 965-0242-53 | 1.00                        | \$8DA4               | U21      | 960-5015-01             |
| <b>The X-Files (Note 2)</b>                                    |             |                             |                      |          |                         |
| Game ROM (1M)  | 965-0245-46 | A3.03                       | \$A2FF               | U210     | 960-5009-00             |
| Sound (512K)   | 965-0248-46 | 1.00                        | \$65A8               | U7       | 960-7001-02             |
| Display (4M)   | 965-0249-46 | A3.00                       | \$66D0               | ROM 0    | 960-5015-01             |
| Voice 1 (4M)   | 965-0246-46 | 1.00                        | \$349D               | U17      | 960-5015-01             |
| Voice 2 (4M)   | 965-0247-46 | 1.00                        | \$629C               | U21      | 960-5015-01             |
| <b>Starship Troopers (Note 3)</b>                              |             |                             |                      |          |                         |
| Game ROM (1M)  | 965-0250-59 | A2.00                       | \$85FF               | U210     | 960-5009-00             |
| Sound (512K)   | 965-0253-59 | 1.00                        | \$64B2               | U7       | 960-7001-02             |
| Display (4M)   | 965-0254-59 | A2.00                       | \$E77B               | ROM 0    | 960-5015-01             |
| Voice 1 (4M)   | 965-0251-59 | 1.00                        | \$152A               | U17      | 960-5015-01             |
| Voice 2 (4M)   | 965-0252-59 | 1.00                        | \$0291               | U21      | 960-5015-01             |
| Voice 3 (4M)   | 965-0255-59 | 1.00                        | \$95A7               | U36      | 960-5015-01             |
| <b>Viper Night Drivin' (Note 4)</b>                            |             |                             |                      |          |                         |
| Game ROM (1M)  | 965-0266-35 | A2.01                       | \$C5FF               | U210     | 960-5009-00             |
| Sound (512K)   | 965-0271-35 | 1.00                        | \$4DF8               | U7       | 960-7001-02             |
| Display (4M)   | 965-0272-35 | A2.01                       | \$C17D               | ROM 0    | 960-5015-01             |
| Voice 1 (4M)   | 965-0267-35 | 1.00                        | \$9018               | U17      | 960-5015-01             |
| Voice 2 (4M)   | 965-0268-35 | 1.00                        | \$2157               | U21      | 960-5015-01             |
| Voice 3 (4M)   | 965-0269-35 | 1.00                        | \$B5A6               | U36      | 960-5015-01             |
| Voice 4 (4M)   | 965-0270-35 | 1.00                        | \$D01E               | U37      | 960-5015-01             |
| <b>Lost In Space (Note 4)</b>                                  |             |                             |                      |          |                         |
| Game ROM (1M)  | 965-0282-60 | A1.01                       | \$B2FF               | U210     | 960-5009-00             |
| Sound (512K)   | 965-0287-60 | 1.00                        | \$A6AF               | U7       | 960-7001-02             |
| Display (4M)   | 965-0288-60 | A1.02                       | \$32AB               | ROM 0    | 960-5015-01             |
| Voice 1 (4M)   | 965-0283-60 | 1.00                        | \$4391               | U17      | 960-5015-01             |
| Voice 2 (4M)   | 965-0284-60 | 1.00                        | \$8215               | U21      | 960-5015-01             |
| Voice 3 (4M)   | 965-0285-60 | 1.00                        | \$5B32               | U36      | 960-5015-01             |
| Voice 4 (4M)   | 965-0286-60 | 1.00                        | \$8971               | U37      | 960-5015-01             |
| <b>Godzilla (Note 4)</b>                                       |             |                             |                      |          |                         |
| Game ROM (1M)  | 965-0289-40 | A2.05                       | \$B1FF               | U210     | 960-5009-00             |
| Sound (512K)   | 965-0294-40 | 1.00                        | \$0CC9               | U7       | 960-7001-02             |
| Display (4M)   | 965-0295-40 | A2.00                       | \$C929               | ROM 0    | 960-5015-01             |
| Voice 1 (4M)   | 965-0290-40 | 1.00                        | \$0D75               | U17      | 960-5015-01             |
| Voice 2 (4M)   | 965-0291-40 | 1.00                        | \$CCCF               | U21      | 960-5015-01             |
| Voice 3 (4M)   | 965-0292-40 | 1.00                        | \$227F               | U36      | 960-5015-01             |
| Voice 4 (4M)   | 965-0293-40 | 1.00                        | \$DB69               | U37      | 960-5015-01             |
| <b>South Park (Notes 4, 5)</b>                                 |             |                             |                      |          |                         |
| Game ROM (1M)  | 965-0301-71 | A1.03                       | \$58FF               | U210     | 960-5009-00             |
| Sound (512K)   | 965-0306-71 | 1.00                        | \$1286               | U7       | 960-7001-02             |
| Display (4M)   | 965-0307-71 | A1.01                       | \$166F               | ROM 0    | 960-5015-01             |
| Voice 1 (8M)   | 965-0302-71 | 1.00                        | \$7BF8               | U17      | 960-5016-00             |
| Voice 2 (8M)   | 965-0303-71 | 1.00                        | \$9CCC               | U21      | 960-5016-00             |
| Voice 3 (8M)   | 965-0304-71 | 1.00                        | \$ADD9               | U36      | 960-5016-00             |
| Voice 4 (8M)   | 965-0305-71 | 1.00                        | \$6559               | U37      | 960-5016-00             |

| ROM  | Chip Size    | Program Part N <sup>o</sup> | USA ver. & Check Sum | Bd. Loc.    | Raw Part N <sup>o</sup> |
|--|--------------|-----------------------------|----------------------|-------------|-------------------------|
| <b>Harley-Davidson® (Notes 4, 5, 6) Original (1999-2001)</b>                   |              |                             |                      |             |                         |
| Game ROM (1M)  | 965-0319-67  | A1.03                       | \$3EFF               | U210        | 960-5009-00             |
| Sound (512K)   | 965-0320-67  | 1.00                        | \$F4FF               | U7          | 960-7001-02             |
| Display (4M)   | 965-0321-67  | A1.04                       | \$FC7C               | ROM 0       | 960-5015-01             |
| Voice 1 (8M)   | 965-0322-67  | 1.00                        | \$CD26               | U17         | 960-5016-00             |
| Voice 2 (8M)   | 965-0323-67  | 1.00                        | \$3936               | U21         | 960-5016-00             |
| Voice 3 (8M)   | 965-0324-67  | 1.00                        | \$FB72               | U36         | 960-5016-00             |
| Voice 4 (4M)   | 965-0325-67  | 1.00                        | \$6100               | U37         | 960-5015-01             |
| <b>► Harley-Davidson® (Notes 4, 5, 6, 8) 2nd Edition (2002-2003)</b>           |              |                             |                      |             |                         |
| Game ROM (1M)  | 965-0319-67A | A1.08                       | \$23FF               | U210        | 960-5009-00             |
| Display (4M)   | 965-0321-67A | A1.05                       | \$B594               | ROM 0       | 960-5015-01             |
| <b>► Harley-Davidson® (Notes 4, 5, 6, 8) 3rd Edition (2004)</b>                |              |                             |                      |             |                         |
| Game ROM (1M)  | 965-0319-87  | A4.00                       | \$1CFF               | U210        | 960-5009-00             |
| Display (4M)   | 965-0321-87  | A4.00                       | \$F4FF               | U5          | 960-5015-01             |
| <b>Striker Xtreme (Notes 4, 5)</b>   |              |                             |                      |             |                         |
| Game ROM (1M)  | 965-0326-68  | A1.03                       | \$E4FF               | U210        | 960-5009-00             |
| Sound (512K)   | 965-0327-68  | 1.00                        | \$3BCA               | U7          | 960-7001-02             |
| Display (4M)   | 965-0328-68  | A1.03                       | \$1957               | ROM 0       | 960-5015-01             |
| Voice 1 (8M)   | 965-0329-68  | 1.00                        | \$482A               | U17         | 960-5016-00             |
| Voice 2 (8M)   | 965-0330-68  | 1.00                        | \$7312               | U21         | 960-5016-00             |
| Voice 3 (8M)   | 965-0331-68  | 1.00                        | \$DE2F               | U36         | 960-5016-00             |
| Voice 4 (8M)   | 965-0332-68  | 1.00                        | \$C508               | U37         | 960-5016-00             |
| <b>NFL (Notes 4, 5) Not on CD-R or Website: Code through Distributor Only.</b> |              |                             |                      |             |                         |
| Game ROM (1M)  | 965-0339-73  | A1.00                       | \$D2FF               | U210        | 960-5009-00             |
| Sound (512K)   | 965-0340-73  | 1.00                        | U7                   | 960-7001-02 |                         |
| Display (4M)   | 965-0341-73  | A1.01                       | \$845A               | ROM 0       | 960-5015-01             |
| Voice 1 (8M)   | 965-0342-73  | 1.00                        | U17                  | 960-5016-00 |                         |
| Voice 2 (8M)   | 965-0343-73  | 1.00                        | U21                  | 960-5016-00 |                         |
| Voice 3 (8M)   | 965-0344-73  | 1.00                        | U36                  | 960-5016-00 |                         |
| Voice 4 (8M)   | 965-0345-73  | 1.00                        | U37                  | 960-5016-00 |                         |
| <b>Sharkey's Shootout (Notes 4, 5)</b>   |              |                             |                      |             |                         |
| Game ROM (1M)  | 965-0333-72  | A2.11                       | \$49FF               | U210        | 960-5009-00             |
| Sound (512K)   | 965-0333-72  | 1.01                        | \$9796               | U7          | 960-7001-02             |
| Display (4M)   | 965-0335-72  | A2.01                       | \$6C33               | ROM 0       | 960-5015-01             |
| Voice 1 (8M)   | 965-0336-72  | 1.00                        | \$58EA               | U17         | 960-5016-00             |
| Voice 2 (8M)   | 965-0337-72  | 1.00                        | \$272B               | U21         | 960-5016-00             |
| Voice 3 (8M)   | 965-0338-72  | 1.00                        | \$41AE               | U36         | 960-5016-00             |
| <b>High Roller Casino (Notes 4, 5)</b>   |              |                             |                      |             |                         |
| Game ROM (1M)  | 965-0346-65  | A3.00                       | \$90FF               | U210        | 960-5009-00             |
| Sound (512K)   | 965-0347-65  | 1.00                        | \$581C               | U7          | 960-7001-02             |
| Display (4M)   | 965-0348-65  | A3.00                       | \$74B3               | ROM 0       | 960-5015-01             |
| Voice 1 (8M)   | 965-0349-65  | 1.00                        | \$E12D               | U17         | 960-5016-00             |
| Voice 2 (8M)   | 965-0350-65  | 1.00                        | \$38F4               | U21         | 960-5016-00             |
| Voice 3 (8M)   | 965-0351-65  | 1.00                        | \$1B54               | U36         | 960-5016-00             |
| Voice 4 (8M)   | 965-0352-65  | 1.00                        | \$D720               | U37         | 960-5016-00             |
| <b>Austin Powers™ (Notes 4, 5)</b>   |              |                             |                      |             |                         |
| Game ROM (1M)  | 965-0353-74  | A3.02                       | \$5DFF               | U210        | 960-5009-00             |
| Sound (512K)   | 965-0354-74  | 1.00                        | \$D47B               | U7          | 960-7001-02             |
| Display (4M)   | 965-0355-74  | A3.00                       | \$6A3A               | ROM 0       | 960-5015-01             |
| Voice 1 (8M)   | 965-0356-74  | 1.00                        | \$D2B9               | U17         | 960-5016-00             |
| Voice 2 (8M)   | 965-0357-74  | 1.00                        | \$9E75               | U21         | 960-5016-00             |
| Voice 3 (8M)   | 965-0358-74  | 1.00                        | \$51F3               | U36         | 960-5016-00             |
| Voice 4 (8M)   | 965-0359-74  | 1.00                        | \$0AE5               | U37         | 960-5016-00             |
| <b>MONOPOLY® (Notes 4, 5)</b>  |              |                             |                      |             |                         |
| Game ROM (1M)  | 965-0360-75  | A3.20                       | \$07FF               | U210        | 960-5009-00             |
| Sound (512K)   | 965-0361-75  | 1.00                        | \$8C18               | U7          | 960-7001-02             |
| Display (4M)   | 965-0362-75  | A3.01                       | \$A381               | ROM 0       | 960-5015-01             |
| Voice 1 (8M)   | 965-0363-75  | 1.00                        | \$35E6               | U17         | 960-5016-00             |
| Voice 2 (8M)   | 965-0364-75  | 1.00                        | \$B35A               | U21         | 960-5016-00             |
| Voice 3 (8M)   | 965-0365-75  | 1.00                        | \$8A9F               | U36         | 960-5016-00             |
| <b>Playboy (Notes 4, 5, 7)</b>   |              |                             |                      |             |                         |
| Game ROM (1M)  | 965-0367-76  | A5.00                       | \$7DFF               | U210        | 960-5009-00             |
| Sound (512K)   | 965-0368-76  | 1.02                        | \$E7C2               | U7          | 960-7001-02             |
| Display (4M)   | 965-0369-76  | A5.00                       | \$A5FF               | ROM 0       | 960-5015-01             |
| Voice 1 (8M)   | 965-0370-76  | 1.00                        | \$9ABE               | U17         | 960-5016-00             |
| Voice 2 (8M)   | 965-0371-76  | 1.00                        | \$9F34               | U21         | 960-5016-00             |
| Voice 3 (8M)   | 965-0372-76  | 1.00                        | \$374B               | U36         | 960-5016-00             |
| Voice 4 (8M)   | 965-0373-76  | 1.00                        | \$237A               | U37         | 960-5016-00             |
| <b>RollerCoaster Tycoon™ (Notes 4, 5, 7)</b>                                   |              |                             |                      |             |                         |
| Sound (512K)   | 965-0374-78  | 1.00                        | \$F663               | U7          | 960-7001-02             |
| Game ROM (1M)  | 965-0375-78  | A7.02                       | \$E5FF               | U210        | 960-5009-00             |
| Voice 1 (8M)   | 965-0377-78  | 1.00                        | \$3C4A               | U17         | 960-5016-00             |
| Voice 2 (8M)   | 965-0378-78  | 1.00                        | \$057A               | U21         | 960-5016-00             |
| Voice 3 (8M)   | 965-0379-78  |                             |                      |             |                         |



# APPENDIX A

## Pinball Game Firmware (White Star Board System\* & S.A.M. System\*\* Only) Table

See website for the latest International Code or Updated USA version / checksums

| ROM  | Chip Size | Program Part N <sup>o</sup> | USA Ver. & Check Sum         | Bd. Loc.         | Raw Part N <sup>o</sup> |
|--|-----------|-----------------------------|------------------------------|------------------|-------------------------|
| <b>Ripley's Believe It or Not!® (Notes 7, 8)</b> |           |                             |                              |                  |                         |
| Sound  | (512K)    | 965-0408-81                 | 1.00   \$D93D                | U7               | 960-7001-02             |
| Game ROM   | (1M)      | 965-0409-81                 | <b>A3.20</b>   <b>\$43FF</b> | <b>U210</b>      | 960-5009-00             |
| Voice 1  | (8M)      | 965-0410-81                 | 1.00                         | \$067B U17       | 960-5016-00             |
| Voice 2  | (8M)      | 965-0411-81                 | 1.00                         | \$C8B8 U21       | 960-5016-00             |
| Voice 3  | (8M)      | 965-0412-81                 | 1.00                         | \$6402 U36       | 960-5016-00             |
| Voice 4  | (8M)      | 965-0413-81                 | 1.00                         | \$5341 U37       | 960-5016-00             |
| Display  | (4M)      | 965-0414-81                 | <b>A3.00</b>   <b>\$DE4B</b> | <b>U5</b> DC PCB | 960-5015-01             |

|                            |        |             |                              |                  |             |
|----------------------------|--------|-------------|------------------------------|------------------|-------------|
| <b>Elvis® (Notes 7, 8)</b> |        |             |                              |                  |             |
| Sound                      | (512K) | 965-0415-84 | 1.00   \$8CD2                | U7               | 960-7001-02 |
| Game ROM                   | (1M)   | 965-0416-84 | <b>A5.00</b>   <b>\$50FF</b> | <b>U210</b>      | 960-5009-00 |
| Voice 1                    | (8M)   | 965-0417-84 | 1.00                         | \$538D U17       | 960-5016-00 |
| Voice 2                    | (8M)   | 965-0418-84 | 1.00                         | \$8BCD U21       | 960-5016-00 |
| Voice 3                    | (8M)   | 965-0419-84 | 1.00                         | \$60F8 U36       | 960-5016-00 |
| Voice 4                    | (8M)   | 965-0420-84 | 1.00                         | \$14D8 U37       | 960-5016-00 |
| Display                    | (4M)   | 965-0421-84 | <b>A5.00</b>   <b>\$A1F6</b> | <b>U5</b> DC PCB | 960-5015-01 |

|   |        |             |                              |                  |             |
|---|--------|-------------|------------------------------|------------------|-------------|
| <b>The Sopranos<sup>SM</sup> (Notes 7, 8)</b> |        |             |                              |                  |             |
| Sound   | (512K) | 965-0422-85 | 4.00   \$9B5A                | U7               | 960-7001-02 |
| Game ROM                                      | (1M)   | 965-0423-85 | <b>A5.00</b>   <b>\$5BFF</b> | <b>U210</b>      | 960-5009-00 |
| Voice 1                                       | (8M)   | 965-0424-85 | 3.00                         | \$F01E U17       | 960-5016-00 |
| Voice 2                                       | (8M)   | 965-0425-85 | 1.04                         | \$C14C U21       | 960-5016-00 |
| Voice 3                                       | (8M)   | 965-0426-85 | 1.04                         | \$47A3 U36       | 960-5016-00 |
| Voice 4                                       | (8M)   | 965-0427-85 | 1.04                         | \$ADCD U37       | 960-5016-00 |
| Display                                       | (4M)   | 965-0428-85 | <b>A5.00</b>   <b>\$B4BB</b> | <b>U5</b> DC PCB | 960-5015-01 |

|                             |        |             |                              |                  |             |
|-----------------------------|--------|-------------|------------------------------|------------------|-------------|
| <b>NASCAR® (Notes 7, 8)</b> |        |             |                              |                  |             |
| Sound                       | (512K) | 965-0429-86 | 2.00   \$32B3                | U7               | 960-7001-02 |
| Game ROM                    | (1M)   | 965-0430-86 | <b>A4.50</b>   <b>\$39FF</b> | <b>U210</b>      | 960-5009-00 |
| Voice 1                     | (8M)   | 965-0431-86 | 2.00                         | \$CFFB U17       | 960-5016-00 |
| Voice 2                     | (8M)   | 965-0432-86 | 2.00                         | \$22C0 U21       | 960-5016-00 |
| Voice 3                     | (8M)   | 965-0433-86 | 2.00                         | \$5FC8 U36       | 960-5016-00 |
| Voice 4                     | (8M)   | 965-0434-86 | 2.00                         | \$2902 U37       | 960-5016-00 |
| Display                     | (4M)   | 965-0435-86 | <b>A4.00</b>   <b>\$92BD</b> | <b>U5</b> DC PCB | 960-5015-01 |

|                                |        |             |                              |                  |             |
|--------------------------------|--------|-------------|------------------------------|------------------|-------------|
| <b>Grand Prix (Notes 7, 8)</b> |        |             |                              |                  |             |
| Sound                          | (512K) | 965-0429-91 | V1.00   \$6F89               | U7               | 960-7001-02 |
| Game ROM                       | (1M)   | 965-0430-91 | <b>A4.50</b>   <b>\$5EFF</b> | <b>U210</b>      | 960-5009-00 |
| Voice 1                        | (8M)   | 965-0431-91 | 1.00                         | \$C0E5 U17       | 960-5016-00 |
| Voice 2                        | (8M)   | 965-0432-91 | 1.00                         | \$F40E U21       | 960-5016-00 |
| Voice 3                        | (8M)   | 965-0433-91 | 1.00                         | \$057D U36       | 960-5016-00 |
| Voice 4                        | (8M)   | 965-0434-91 | 1.00                         | \$2646 U37       | 960-5016-00 |
| Display                        | (4M)   | 965-0435-91 | <b>A4.00</b>   <b>\$DA8E</b> | <b>U5</b> DC PCB | 960-5015-01 |

|   |        |             |  |                  |             |
|---|--------|-------------|--|------------------|-------------|
| <b>[NDSE] (Notes 7, 8) <i>Call for more info if code update required.</i></b> |        |             |  |                  |             |
| Sound   | (512K) | 965-0436-97 |  | U7               | 960-7001-02 |
| Game ROM  | (1M)   | 965-0437-97 |  | <b>U210</b>      | 960-5009-00 |
| Voice 1   | (8M)   | 965-0438-97 |  | U17              | 960-5016-00 |
| Voice 2   | (8M)   | 965-0439-97 |  | U21              | 960-5016-00 |
| Voice 3   | (8M)   | 965-0440-97 |  | U36              | 960-5016-00 |
| Voice 4   | (8M)   | 965-0441-97 |  | U37              | 960-5016-00 |
| Display   | (4M)   | 965-0442-97 |  | <b>U5</b> DC PCB | 960-5015-01 |

**\*\* GAMES BELOW THIS LINE / NEXT COLUMN ARE S.A.M. SYSTEM GAMES**

**TO ORDER MEMORY STICK WITH GAME FILES FROM YOUR DISTRIBUTOR, USE SPI PART NUMBER 970-0128-00 & INCLUDE THE GAME NAME / LANGUAGE FILE(S) DESIRED.**

|   |      |              |               |        |                             |
|---|------|--------------|---------------|--------|-----------------------------|
| <b>World Poker Tour™ Pinball (WPT) (Notes 7, 9)</b> |      |              |               |        |                             |
| Boot B-02   | (8M) | 965-BOOT-SAM | 1.04   \$7E62 | U9     | 960-5016-00<br>unprogrammed |
| Memory Stick 128MB (970-0128-00)                    |      | Version      |               | System | Bin Files:                  |
| English + Spanish                                   |      | 1.12AL       |               | 1.17+  | WPT0112AL.bin               |
| English Only  |      | 1.12A        |               | 1.17+  | WPT0112A.bin                |
| English + French                                    |      | 1.12AF       |               | 1.17+  | WPT0112AF.bin               |
| French Only   |      | 1.12F        |               | 1.17+  | WPT0112F.bin                |
| German + French                                     |      | 1.12GF       |               | 1.17+  | WPT0112GF.bin               |
| German Only   |      | 1.12G        |               | 1.17+  | WPT0112G.bin                |
| English + Italian                                   |      | 1.12AI       |               | 1.17+  | WPT0112AI.bin               |
| Italian Only  |      | 1.12I        |               | 1.17+  | WPT0112I.bin                |

NOTE: THE TYPICAL SIZE PER UNZIPPED BIN FILE IS 25MB – 30MB+/-

|   |      |              |               |               |                             |
|---|------|--------------|---------------|---------------|-----------------------------|
| <b>The Simpsons™ Kooky Carnival Redemption (Note 9)</b> |      |              |               |               |                             |
| Boot B-02   | (8M) | 965-BOOT-SAM | 1.04   \$7E62 | U9            | 960-5016-00<br>unprogrammed |
| Memory Stick 128MB (970-0128-00)                        |      | Version      |               | Bin Files:    |                             |
| English Only  |      | 1.05         |               | SKC0105.bin   |                             |
| English New Jersey Only                                 |      | 0.09NJ       |               | SKC0090NJ.bin |                             |

NOTE: THE TYPICAL SIZE PER UNZIPPED BIN FILE IS 5.5MB +/-

|   |      |              |               |        |                             |
|---|------|--------------|---------------|--------|-----------------------------|
| <b>©Disney's Pirates of the Caribbean Pinball (POTC) (Notes 7, 9)</b> |      |              |               |        |                             |
| Boot B-02   | (8M) | 965-BOOT-SAM | 1.06   \$2014 | U9     | 960-5016-00<br>unprogrammed |
| Memory Stick 128MB (970-0128-00)                                      |      | Version      |               | System | Bin Files:                  |
| English + Spanish   |      | 1.15AS       |               | 1.17+  | POTC115AS.bin               |
| English + French  |      | 1.15AF       |               | 1.17+  | POTC115AF.bin               |
| German + French   |      | 1.15GF       |               | 1.17+  | POTC115GF.bin               |
| English + Italian   |      | 1.15AI       |               | 1.17+  | POTC115AI.bin               |

NOTE: THE TYPICAL SIZE PER UNZIPPED BIN FILE IS 25MB – 30MB+/-

|  |      |              |               |        |                             |
|--|------|--------------|---------------|--------|-----------------------------|
| <b>Family Guy™ Pinball (FG) (Notes 7, 9)</b> |      |              |               |        |                             |
| Boot B-02                                    | (8M) | 965-BOOT-SAM | 2.09   \$10A3 | U9     | 960-5016-00<br>unprogrammed |
| Memory Stick 128MB (970-0128-00)             |      | Version      |               | System | Bin Files:                  |
| English + Spanish                            |      | 10.00AL      |               | 1.23+  | FG1000AL.bin                |
| English + French                             |      | 10.00AF      |               | 1.23+  | FG1000AF.bin                |
| English + German                             |      | 10.00AG      |               | 1.23+  | FG1000GF.bin                |
| English + Italian                            |      | 10.00AI      |               | 1.23+  | FG1000AI.bin                |

NOTE: THE TYPICAL SIZE PER UNZIPPED BIN FILE IS 25MB – 30MB+/-

|   |      |              |               |        |                             |
|---|------|--------------|---------------|--------|-----------------------------|
| <b>Spider-Man™ Pinball (S-M) (Notes 7, 9)</b> |      |              |               |        |                             |
| Boot B-02                                     | (8M) | 965-BOOT-SAM | 2.10   \$F625 | U9     | 960-5016-00<br>unprogrammed |
| Memory Stick 128MB (970-0128-00)              |      | Version      |               | System | Bin Files:                  |
| English + Spanish                             |      | 1.3ES        |               | 1.27+  | spd_1_30_es.bin             |
| English + French                              |      | 1.3EF        |               | 1.27+  | spd_1_30_ef.bin             |
| German + French                               |      | 1.3GF        |               | 1.27+  | spd_1_30_gf.bin             |
| English + Italian                             |      | 1.3EI        |               | 1.27+  | spd_1_30_ei.bin             |

NOTE: THE TYPICAL SIZE PER UNZIPPED BIN FILE IS 25MB – 30MB+/-

### footnotes:

- 1 ROMs on CPU/Sound Bd.: 520-5136-00 (Stereo) & Display Cont. Bd.: 520-5055-01
- 2 ROMs on CPU/Sound Bd.: 520-5136-10 (Mono) & Display Cont. Bd.: 520-5055-01
- 3 ROMs on CPU/Sound Board: 520-5136-15\* (Mono) (\*FCC 11-97) & Display Controller Board: 520-5055-02\* (\*FCC 11-97)





# APPENDIX A

## Pinball Game Firmware Table

| EPROM                               | Chip Size | Program Part N <sup>o</sup> | USA Ver. | Bd. Loc. | Raw Part N <sup>o</sup> | EPROM                                       | Chip Size | Program Part N <sup>o</sup> | USA Ver.                          | Bd. Loc. | Raw Part N <sup>o</sup> |
|-------------------------------------|-----------|-----------------------------|----------|----------|-------------------------|---|-----------|-----------------------------|-----------------------------------|----------|-------------------------|
| <b>Laser War</b>                    |           |                             |          |          |                         | <b>Lethal Weapon 3</b>                      |           |                             |                                   |          |                         |
| CPU                                 | (256K)    | 965-0004-00                 | LWAR.C5  | C5       | 960-5007-00             | CPU   | (512K)    | 965-0082-00                 | A2.08                             | C5       | 960-7001-02             |
| Sound (old)                         | (256K)    | 965-0005-00                 |          | J5       | 960-5007-00             | Voice 1                                     | (2M)      | 965-0083-00                 |                                   | U17      | 960-5010-00             |
| Sound (old)                         | (256K)    | 965-0006-00                 |          | J6       | 960-5007-00             | Voice 2                                     | (2M)      | 965-0084-00                 |                                   | U21      | 960-5010-00             |
| Sound (old)                         | (256K)    | 965-0007-00                 |          | J7       | 960-5007-00             | Sound                                       | (256K)    | 965-0085-00                 |                                   | U7       | 960-5007-00             |
|                                     |           |                             | - OR -   |          |                         | Display                                     | (2M)      | 965-0086-00                 | A2.06                             | ROM 0    | 960-5010-00             |
| Sound                               | (256K)    | 965-0008-00                 |          | 7F       | 960-5007-00             | Display                                     | (2M)      | 965-0087-00                 | A2.06                             | ROM 1    | 960-5010-00             |
| Sound 1                             | (512K)    | 965-0009-00                 |          | 6F       | 960-7001-02             |   |           |                             | -OR-                              |          |                         |
| Sound 2                             | (512K)    | 965-0010-00                 |          | 4F       | 960-7001-02             | Display                                     | (4M)      | 965-0087-04                 | A2.06                             | ROM 0    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             | (Used on Display PCB 520-5055-01) |          |                         |
| <b>Secret Service</b>               |           |                             |          |          |                         | <b>Star Wars</b>                            |           |                             |                                   |          |                         |
| CPU                                 | (256K)    | 965-0011-00                 | A4-6     | B5       | 960-5007-00             | CPU   | (512K)    | 965-0119-00                 | A1.03                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0012-00                 | A4-6     | C5       | 960-5007-00             | Voice 0                                     | (4M)      | 965-0132-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (512K)    | 965-0014-00                 |          | 6F       | 960-7001-02             | Voice 1                                     | (2M)      | 965-0133-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (512K)    | 965-0015-00                 |          | 4F       | 960-7001-02             | Sound                                       | (256K)    | 965-0131-00                 |                                   | U7       | 960-5007-00             |
| Sound                               | (256K)    | 965-0013-00                 |          | 7F       | 960-5007-00             | Display                                     | (2M)      | 965-0120-00                 | A1.04                             | ROM 0    | 960-5010-00             |
|                                     |           |                             |          |          |                         | Display                                     | (2M)      | 965-0121-00                 | A1.04                             | ROM 1    | 960-5010-00             |
|                                     |           |                             |          |          |                         |   |           |                             | (Used on Display PCB 520-5055-00) |          |                         |
| <b>Torpedo Alley</b>                |           |                             |          |          |                         | <b>Rocky &amp; Bullwinkle &amp; Friends</b> |           |                             |                                   |          |                         |
| CPU                                 | (256K)    | 965-0016-00                 | A2-1     | B5       | 960-5007-00             | CPU   | (512K)    | 965-0138-00                 | A1.30                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0017-00                 | A2-1     | C5       | 960-5007-00             | Voice 0                                     | (4M)      | 965-0139-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (512K)    | 965-0018-00                 |          | 6F       | 960-7001-02             | Voice 1                                     | (2M)      | 965-0140-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (512K)    | 965-0019-00                 |          | 4F       | 960-7001-02             | Sound                                       | (256K)    | 965-0141-00                 |                                   | U7       | 960-5007-00             |
| Sound                               | (256K)    | 965-0018-00                 |          | 7F       | 960-5007-00             | Display                                     | (4M)      | 965-0142-00                 | A1.30                             | ROM 0    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             | (Used on Display PCB 520-5055-01) |          |                         |
| <b>Time Machine</b>                 |           |                             |          |          |                         | <b>Jurassic Park</b>                        |           |                             |                                   |          |                         |
| CPU                                 | (128K)    | 965-0021-00                 | A2-4     | B5       | 960-5006-00             | CPU   | (512K)    | 965-0143-00                 | A5.13                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0022-00                 | A2-4     | C5       | 960-5007-00             | Voice 0                                     | (4M)      | 965-0144-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (512K)    | 965-0024-00                 |          | 6F       | 960-7001-02             | Voice 1                                     | (2M)      | 965-0145-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (512K)    | 965-0025-00                 |          | 4F       | 960-7001-02             | Sound                                       | (256K)    | 965-0146-00                 |                                   | U7       | 960-5007-00             |
| Sound                               | (256K)    | 965-0023-00                 |          | 7F       | 960-5007-00             | Display                                     | (4M)      | 965-0147-00                 | A5.10                             | ROM 0    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             |                                   |          |                         |
| <b>Playboy 35th Anniversary</b>     |           |                             |          |          |                         | <b>Last Action Hero</b>                     |           |                             |                                   |          |                         |
| CPU                                 | (256K)    | 965-0046-00                 | A2-4     | B5       | 960-5007-00             | CPU   | (512K)    | 965-0148-00                 | A1.12                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0047-00                 | A2-4     | C5       | 960-5007-00             | Voice 0                                     | (4M)      | 965-0149-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (512K)    | 965-0049-00                 |          | 6F       | 960-7001-02             | Voice 1                                     | (2M)      | 965-0150-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (512K)    | 965-0050-00                 |          | 4F       | 960-7001-02             | Sound                                       | (256K)    | 965-0151-00                 |                                   | U7       | 960-5007-00             |
| Sound                               | (256K)    | 965-0048-00                 |          | 7F       | 960-5007-00             | Display                                     | (4M)      | 965-0152-00                 | A1.06                             | ROM 0    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             |                                   |          |                         |
| <b>ABC Monday Night Football</b>    |           |                             |          |          |                         | <b>Tales from the Crypt</b>                 |           |                             |                                   |          |                         |
| CPU                                 | (128K)    | 965-0031-00                 | A2-7     | B5       | 960-5006-00             | CPU   | (512K)    | 965-0157-00                 | A3.03                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0032-00                 | A2-7     | C5       | 960-5007-00             | Voice 0                                     | (4M)      | 965-0158-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (512K)    | 965-0034-00                 |          | 6F       | 960-7001-02             | Voice 1                                     | (2M)      | 965-0159-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (512K)    | 965-0035-00                 |          | 4F       | 960-7001-02             | Sound                                       | (256K)    | 965-0160-00                 |                                   | U7       | 960-5007-00             |
| Sound                               | (256K)    | 965-0033-00                 |          | 7F       | 960-5007-00             | Display                                     | (4M)      | 965-0161-00                 | A3.01                             | ROM 0    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             |                                   |          |                         |
| <b>Robocop</b>                      |           |                             |          |          |                         | <b>The Who's Tommy</b>                      |           |                             |                                   |          |                         |
| CPU                                 | (256K)    | 965-0036-00                 | A3-4     | B5       | 960-5007-00             | CPU   | (512K)    | 965-0162-00                 | A4.00                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0037-00                 | A3-4     | C5       | 960-5007-00             | Voice 1                                     | (4M)      | 965-0163-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (512K)    | 965-0039-00                 |          | 6F       | 960-7001-02             | Voice 2                                     | (4M)      | 965-0166-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (512K)    | 965-0040-00                 |          | 4F       | 960-7001-02             | Voice 3                                     | (4M)      | 965-0167-00                 |                                   | U36      | 960-5015-00             |
| Sound                               | (256K)    | 965-0038-00                 |          | 7F       | 960-5007-00             | Voice 4                                     | (4M)      | 965-0168-00                 |                                   | U37      | 960-5015-00             |
|                                     |           |                             |          |          |                         | Sound                                       | (512K)    | 965-0164-00                 |                                   | U7       | 960-7001-02             |
|                                     |           |                             |          |          |                         | Display                                     | (4M)      | 965-0163-00                 | A4.00                             | ROM 0    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             |                                   |          |                         |
| <b>Phantom of the Opera</b>         |           |                             |          |          |                         | <b>WWF Royal Rumble</b>                     |           |                             |                                   |          |                         |
| CPU                                 | (128K)    | 965-0026-00                 | A3-2     | B5       | 960-5006-00             | CPU   | (512K)    | 965-0169-00                 | A1.06                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0027-00                 | A3-2     | C5       | 960-5007-00             | Voice 1                                     | (4M)      | 965-0172-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (512K)    | 965-0029-00                 |          | 6F       | 960-7001-02             | Voice 2                                     | (4M)      | 965-0173-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (512K)    | 965-0030-00                 |          | 4F       | 960-7001-02             | Voice 3                                     | (4M)      | 965-0174-00                 |                                   | U36      | 960-5015-00             |
| Sound                               | (256K)    | 965-0028-00                 |          | 7F       | 960-5007-00             | Sound                                       | (512K)    | 965-0171-00                 |                                   | U7       | 960-7001-02             |
|                                     |           |                             |          |          |                         | Display                                     | (4M)      | 965-0170-00                 | A1.02                             | ROM 0    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             |                                   |          |                         |
| <b>Back to the Future</b>           |           |                             |          |          |                         | <b>Guns N' Roses</b>                        |           |                             |                                   |          |                         |
| CPU                                 | (256K)    | 965-0041-00                 | A2-0     | B5       | 960-5007-00             | CPU   | (512K)    | 965-0175-00                 | A3.00                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0042-00                 | A2-0     | C5       | 960-5007-00             | Voice 1                                     | (4M)      | 965-0178-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (512K)    | 965-0044-00                 |          | 6F       | 960-7001-02             | Voice 2                                     | (4M)      | 965-0179-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (512K)    | 965-0045-00                 |          | 4F       | 960-7001-02             | Voice 3                                     | (4M)      | 965-0180-00                 |                                   | U36      | 960-5015-00             |
| Sound                               | (256K)    | 965-0043-00                 |          | 7F       | 960-5007-00             | Voice 4                                     | (4M)      | 965-0181-00                 |                                   | U37      | 960-5015-00             |
|                                     |           |                             |          |          |                         | Sound                                       | (512K)    | 965-0177-00                 |                                   | U7       | 960-7001-02             |
|                                     |           |                             |          |          |                         | Display                                     | (4M)      | 965-0176-00                 | A3.00                             | ROM 0    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             |                                   |          |                         |
| <b>The Simpsons</b>                 |           |                             |          |          |                         | <b>Maverick *</b>                           |           |                             |                                   |          |                         |
| CPU                                 | (128K)    | 965-0051-00                 | A2-7     | B5       | 960-5006-00             | CPU   | (512K)    | 965-0182-00                 | A4.04                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0052-00                 | A2-7     | C5       | 960-5007-00             | Voice 1                                     | (4M)      | 965-0186-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (512K)    | 965-0054-00                 |          | 6F       | 960-7001-02             | Voice 2                                     | (4M)      | 965-0187-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (512K)    | 965-0055-00                 |          | 4F       | 960-7001-02             | Voice 3                                     | (4M)      | 965-0187-01                 |                                   | U36      | 960-5015-00             |
| Sound                               | (256K)    | 965-0053-00                 |          | 7F       | 960-5007-00             | Sound                                       | (512K)    | 965-0185-00                 |                                   | U7       | 960-7001-02             |
|                                     |           |                             |          |          |                         | Display*                                    | (4M)      | 965-0183-00                 | A4.01                             | ROM 0    | 960-5015-00             |
|                                     |           |                             |          |          |                         | Display*                                    | (4M)      | 965-0184-00                 | A4.01                             | ROM 3    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             |                                   |          |                         |
| <b>Checkpoint</b>                   |           |                             |          |          |                         | <b>Mary Shelley's Frankenstein *</b>        |           |                             |                                   |          |                         |
| CPU                                 | (128K)    | 965-0056-00                 | A1-7     | B5       | 960-5006-00             | CPU   | (512K)    | 965-0188-00                 | A1.03                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0134-00                 | A1-7     | C5       | 960-5007-00             | Voice 1                                     | (4M)      | 965-0192-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (1M)      | 965-0057-00                 |          | F7       | 960-5009-00             | Voice 2                                     | (4M)      | 965-0193-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (1M)      | 965-0058-00                 |          | F5       | 960-5009-00             | Voice 3                                     | (4M)      | 965-0194-00                 |                                   | U36      | 960-5015-00             |
| Sound                               | (256K)    | 965-0059-00                 |          | F4       | 960-5007-00             | Sound                                       | (512K)    | 965-0191-00                 |                                   | U7       | 960-7001-02             |
| Display                             | (512K)    | 965-0060-00                 | CP80     | U8       | 960-7001-02             | Display*                                    | (4M)      | 965-0189-00                 | A1.03                             | ROM 0    | 960-5015-00             |
|                                     |           |                             |          |          |                         | Display*                                    | (4M)      | 965-0190-00                 | A1.03                             | ROM 3    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             |                                   |          |                         |
| <b>Teenage Mutant Ninja Turtles</b> |           |                             |          |          |                         | <b>Baywatch *</b>                           |           |                             |                                   |          |                         |
| CPU                                 | (128K)    | 965-0061-00                 | A1.04    | B5       | 960-5006-00             | CPU   | (512K)    | 965-0195-00                 | A4.00                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0062-00                 | A1.04    | C5       | 960-5007-00             | Voice 1                                     | (4M)      | 965-0196-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (1M)      | 965-0063-00                 |          | F5/6     | 960-5009-00             | Voice 2                                     | (4M)      | 965-0197-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (1M)      | 965-0064-00                 |          | F4/5     | 960-5009-00             | Sound                                       | (512K)    | 965-0199-00                 |                                   | U7       | 960-7001-02             |
| Sound                               | (256K)    | 965-0065-00                 |          | F7       | 960-5007-00             | Display*                                    | (4M)      | 965-0200-00                 | A4.00                             | ROM 0    | 960-5015-00             |
| Display                             | (512K)    | 965-0066-00                 | A1.04    | U8       | 960-7001-02             | Display*                                    | (4M)      | 965-0201-00                 | A4.00                             | ROM 3    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             |                                   |          |                         |
| <b>Batman</b>                       |           |                             |          |          |                         | <b>Batman Forever *</b>                     |           |                             |                                   |          |                         |
| CPU                                 | (128K)    | 965-0067-00                 | A1.06    | B5       | 960-5006-00             | CPU   | (512K)    | 965-0202-00                 | A3.02                             | C5       | 960-7001-02             |
| CPU                                 | (256K)    | 965-0135-00                 | A1.06    | C5       | 960-5007-00             | Voice 1                                     | (4M)      | 965-0203-00                 |                                   | U17      | 960-5015-00             |
| Voice 1                             | (2M)      | 965-0068-00                 |          | U17      | 960-5010-00             | Voice 2                                     | (4M)      | 965-0204-00                 |                                   | U21      | 960-5010-00             |
| Voice 2                             | (1M)      | 965-0069-00                 |          | U21      | 960-5010-00             | Sound                                       | (512K)    | 965-0205-00                 |                                   | U7       | 960-7001-02             |
| Sound                               | (256K)    | 965-0070-00                 |          | U7       | 960-5007-00             | Display*                                    | (4M)      | 965-0206-00                 | A3.00                             | ROM 0    | 960-5015-00             |
| Display                             | (1M)      | 965-0071-00                 | A1.06    | U8       | 960-5009-00             | Display*                                    | (4M)      | 965-0207-00                 | A3.00                             | ROM 3    | 960-5015-00             |
|                                     |           |                             |          |          |                         |   |           |                             |                                   |          |                         |

## APPENDIX B

### Semi-Conductors / Integrated Circuits (I.C.) / Relays Cross-Reference Table

| Table No   | Type   | Source Number  | STERN®<br>PINBALL | NTE®  | ECG®             | Radio Shack® | RCA®      |
|--|--|--|-------------------|---|------------------|--------------|-----------|
| <b>RECTIFICATION, BLOCKING, DAMPENING DIODES AND/OR LIGHT EMITTING DIODES (LEDs)</b> |  |  |                   |   |                  |              |           |
| <b>1</b>   | Diode  | 1N4001   | 112-5001-00       | NTE552  | ECG552           | - - - - -    | SK9000    |
|  | Diode  | 1N4004   | 112-5003-00       | NTE116  | ECG116           | 276-1103     | SK3312    |
|  | Diode  | 1N5401   | 112-0056-00       | NTE5801   | ECG5801          | 276-1143     | SK9004    |
|  | Diode  | 1N5404   | 112-5004-00       | NTE5804   | ECG5804          | 276-1144     | SK9007    |
|  | Diode  | T6A10L   | 112-5006-01       | NTE5812   | ECG5812          | - - - - -    | - - - - - |
|  | Diode  | FR302  | 112-5009-00       | NTE588  | ECG588           | - - - - -    | SK5014    |
|  | Diode, Signal  | 1N914  | 112-5014-00       | - - - - -   | - - - - -        | - - - - -    | - - - - - |
| LED  | <b>MT5000UR</b> or<br><b>TLRH180P</b><br>(T1-3/4 GaAlAs) | 165-5052-00<br><i>(old SPI Part No:<br/>165-5100-00)</i> | - - - - -         | - - - - -   | 276-066B         | - - - - -    |           |
| <b>ZENER DIODES</b>  |  |  |                   |   |                  |              |           |
| <b>2</b>   | Diode  | 1N4742A 12v  | 112-0061-00       | NTE142A   | ECG142A          | 276-563      | SK12V     |
|  | Diode  | 1N4760B 68v  | 112-0062-00B      | NTE5092A  | ECG5092A         | - - - - -    | SK68V     |
|  | Diode  | 1N4764A 100v   | 112-0049-00A      | NTE5096A  | ECG5096A         | - - - - -    | SK100V    |
|  | Diode  | 1N5228 3.9v  | 112-0053-00       | NTE5007A  | ECG5007A         | - - - - -    | SK3A9     |
|  | Diode  | 1N5234B 6.2v   | 112-0047-00B      | NTE5013A  | ECG5013A         | 276-561      | SK6A2     |
|  | Diode  | 1N5379 110v  | 112-0072-00       | NTE5157   | ECG5157          | - - - - -    | SK110X    |
|  | Diode  | 1N6267A 6.8v   | 112-5011-00       | NTE4902   | ECG4902          | - - - - -    | - - - - - |
|  | Diode  | 1N4752A 33v  | 112-5010-00A      | NTE147A   | ECG147A          | - - - - -    | SK33V     |
| Diode  | 1N4736 6.8v 1w   | 112-5007-00  | NTE5071A          | ECG5071A  | - - - - -        | - - - - -    |           |
| <b>TRANSISTORS - TYPE FET, NPN, PNP AND/OR SCR</b>                                   |  |  |                   |   |                  |              |           |
| <b>3</b>   | FET Trans.   | STP20N10L  | 110-0106-00       | NTE2987   | ECG2987          | - - - - -    | - - - - - |
|  | FET Trans.   | STP19N06L  | 110-0088-00       | NTE2985   | ECG2985          | - - - - -    | - - - - - |
|  | FET Trans.   | VN02N  | 110-0089-00       | - - - - -   | - - - - -        | - - - - -    | - - - - - |
|  | NPN Trans.   | 2N4401   | 110-0073-00       | NTE85   | ECG85            | 276-2009     | SK3124A   |
|  | NPN Trans.   | 2N6427   | 110-0070-00       | NTE48   | ECG48            | - - - - -    | SK4906    |
|  | NPN Trans.   | MJE340   | 110-0071-00       | NTE157  | ECG157           | - - - - -    | SK3747    |
|  | NPN Trans.   | MPSA42   | 110-0082-00       | NTE287  | ECG287           | - - - - -    | SK3232    |
|  | NPN Trans.   | 2N3904   | 110-0069-00       | NTE123AP  | ECG123AP         | 276-2009     | - - - - - |
|  | NPN Trans.   | TIP122   | 110-0067-00       | NTE261  | ECG261           | 276-2068     | SK3896    |
|  | NPN Trans.   | MJE15030   | 110-0101-00       | NTE375  | ECG375           | - - - - -    | SK9118    |
|  | PNP Trans.   | 2N5401   | 110-0078-00       | NTE288  | ECG288           | - - - - -    | SK3434    |
|  | PNP Trans.   | MJE15031   | 110-0103-00       | NTE292  | ECG292           | - - - - -    | SK3441    |
|  | PNP Trans.   | MJE350   | 110-0072-00       | NTE374  | ECG374           | - - - - -    | SK9042    |
|  | PNP Trans.   | MPSA92   | 110-0100-00       | NTE288  | ECG278           | - - - - -    | SK3434    |
|  | PNP Trans.   | TIP42  | 110-0068-00       | NTE332  | ECG332           | - - - - -    | SK9236    |
|  | PNP Trans.   | TIP32C   | 110-0081-00       | NTE292  | ECG292           | - - - - -    | SK3441    |
|  | PNP Trans.   | TIP36C   | 110-0077-00       | NTE393  | ECG393           | - - - - -    | SK3961    |
|  | SCR Trans.   | 2N5060   | 110-0074-00       | NTE5400   | ECG5400          | 276-1067     | SK3950    |
| SCR Trans.   | SCR2800B   | 110-0083-00  | NTE5461-8         | ECG5461-8   | - - - - -        | - - - - -    |           |
| <b>BRIDGE RECTIFIERS (BR)</b>  |  |  |                   | <b>Comments:</b>  |                  |              |           |
| <b>4</b>   | BR (Present)   | DB3501 or<br>CM3501                                      | 112-5000-00       | For White Star I/O Bds., BR = 35 Amp @ 100v P.I.V.                            |                  |              |           |
|  | <b>RELAYS</b>  |  |                   |   | <b>Comments:</b> |              |           |
| <b>5</b>   | Relay  | FRL-264<br>D024/02CK                                     | 190-5002-00       | For PPB, Power Supply, & White Star I/O Boards,<br>Relay = 24v DC 10 Amp DPDT |                  |              |           |
|  | Relay  | FRL-264<br>D006/04CV                                     | 190-5001-00       | For CPU Boards,<br>Relay = 6v DC 5 Amp 4 Pole DT                              |                  |              |           |





# APPENDIX C

## Production Start Date, Manual Part No., ROM Size & Positions and Jumper W6 Installed Note‡ (White Star Board System & S.A.M. System Only\*)



| Game Name<br>White Star<br>Bd. System™   | Production<br>Start Date<br>and Manual<br>Part Nr. | CPU/Sound Board Sound U7 512K<br>CPU/Sound Board Game U210 1MB<br>CPU/Sound Board Voice ROMS: |     |     |          | Jumper<br>Installed<br>(‡ see Note) |       |
|--|--|---|-----|-----|----------|-------------------------------------|-------|
|  |  | U17   | U21 | U36 | U37      |                                     |       |
| * Note: For complete Appendix Information for Games <i>Laser War</i> through <i>Batman Forever</i> , see any Service Game Manual between <i>Apollo 13</i> through <i>Ripley's Believe It or Not!</i> or on-line at our website <a href="http://www.sternpinball.com/parts.htm">www.sternpinball.com/parts.htm</a> ; also available on CD-R, 970-2003-00 ( <i>The Simpsons™ Pinball Party</i> , <i>T3®</i> and <i>The Lord of the Rings™</i> ). |  |   |     |     |          |                                     |       |
| 29   | Apollo 13 (A13)                                    | NOV 95<br>780-5044-00   | 4MB | 4MB | 4MB      | Not Used                            | n / a |
| 30   | Golden Eye   | FEB 96<br>780-5042-00   | 4MB | 4MB | Not Used | Not Used                            | n / a |
| 31   | Twister  | APR 96<br>780-5041-00   | 4MB | 4MB | Not Used | Not Used                            | n / a |
| 32   | ID4: Independence Day                              | JUL 96<br>780-5045-00   | 4MB | 4MB | Not Used | Not Used                            | n / a |
| 33   | Space Jam  | OCT 96<br>780-5043-00   | 4MB | 4MB | 4MB      | Not Used                            | n / a |
| 34   | The Star Wars Trilogy - Sp. Ed.                    | FEB 97<br>780-5056-00   | 4MB | 4MB | Not Used | Not Used                            | n / a |
| 35   | The Lost World: Jurassic Park                      | JUN 97<br>780-5053-00   | 4MB | 4MB | Not Used | Not Used                            | n / a |
| 36   | The X-Files  | AUG 97<br>780-5046-00   | 4MB | 4MB | Not Used | Not Used                            | n / a |
| 37   | Starship Troopers                                  | NOV 97<br>780-5059-00   | 4MB | 4MB | 4MB      | Not Used                            | n / a |
| 38   | Viper Night Drivin'                                | FEB 98<br>780-5035-00   | 4MB | 4MB | 4MB      | 4MB                                 | n / a |
| 39   | Lost In Space                                      | JUN 98<br>780-5060-00   | 4MB | 4MB | 4MB      | 4MB                                 | n / a |
| 40   | Godzilla   | SEP 98<br>780-5040-00   | 4MB | 4MB | 4MB      | 4MB                                 | n / a |
| 41   | South Park   | JAN 99<br>780-5071-00   | 8MB | 8MB | 8MB      | 8MB                                 | W6    |
| 42a  | Harley-Davidson®                                   | AUG 99<br>780-5067-01   | 8MB | 8MB | 8MB      | 8MB                                 | W6    |
| 42b  | Harley-Davidson®2nd Ed.                            | SEP 02<br>780-5067-10   | 8MB | 8MB | 8MB      | 8MB                                 | W6    |
| 42c  | Harley-Davidson®3rd Ed.                            | OCT 04<br>780-5087-00   | 8MB | 8MB | 8MB      | 8MB                                 | W6    |
| 43a  | Striker Xtreme                                     | MAR 00<br>780-5068-01   | 8MB | 8MB | 8MB      | 8MB                                 | W6    |
| 43b  | NFL  | OCT 00<br>780-5073-00   | 8MB | 8MB | 8MB      | 8MB                                 | W6    |
| 44   | Sharkey's Shootout                                 | JUL/OCT 00<br>780-5072-01   | 8MB | 8MB | 8MB      | Not Used                            | W6    |
| 45   | High Roller Casino                                 | JAN 01<br>780-5065-00   | 8MB | 8MB | 8MB      | 8MB                                 | W6    |
| 46   | Austin Powers™                                     | MAY 01<br>780-5074-00   | 8MB | 8MB | 8MB      | 8MB                                 | W6    |
| 47   | MONOPOLY®  | SEP 01<br>780-5075-00   | 8MB | 8MB | 8MB      | Not Used                            | W6    |
| 48   | Playboy  | FEB 02<br>780-5076-00   | 8MB | 8MB | 8MB      | 8MB                                 | W6    |
| 49   | RollerCoaster Tycoon™                              | AUG 02<br>780-5078-00   | 8MB | 8MB | 8MB      | Not Used                            | W6    |
| 50   | The Simpsons™ Pinball Party                        | JAN 03<br>780-5077-00   | 8MB | 8MB | 8MB      | 8MB                                 | W6    |
| 51   | T3®: Rise of the Machines™                         | MAY 03<br>780-5079-00   | 8MB | 8MB | 8MB      | 8MB                                 | W6    |
| 52   | The Lord of the Rings™                             | NOV 03<br>780-5080-00   | 8MB | 8MB | 8MB      | 8MB                                 |       |
| 53   | Ripley's Believe It or Not!®                       | APR 04<br>780-5081-00   | 8MB | 8MB | 8MB      | 8MB                                 |       |

‡ Additional Information for Installed Jumper (above games 41-51):

- Installed **W6** so 8MB ROMS can be utilized. See the **CPU/Sound Board Schematic** (Sheet 2 of 3, Address Location 3E) in the games' Service Game Manual. Games 52 - 57 CPU/Sound Board differ than <51 (See Appendix D).

See **Apdx. A** for more detailed information on **Pinball Game Firmware** (ROM Name, Size, Part Numbers, USA Version & Checksum and Board Locations).

| Game Name<br>White Star<br>Board System™ | Production<br>Start Date<br>and Manual<br>Part Nr. | CPU/Sound Board Sound U7 512K<br>CPU/Sound Board Game U210 1MB<br>CPU/Sound Board Voice ROMS: |     |     |     |     |
|--|--|---|-----|-----|-----|-----|
|  |  | U17   | U21 | U36 | U37 |     |
| 54                                       | Elvis®   | AUG 04<br>780-5084-00   | 8MB | 8MB | 8MB | 8MB |
| 55                                       | The Sopranos™                                      | FEB 05<br>780-5085-00   | 8MB | 8MB | 8MB | 8MB |
| 56                                       | NASCAR®  | JUL 05<br>780-5086-00   | 8MB | 8MB | 8MB | 8MB |
| 57                                       | Grand Prix   | SEP 05<br>780-5091-00   | 8MB | 8MB | 8MB | 8MB |

See **Apdx. A** for more detailed information on **Pinball Game Firmware** (ROM Name, Size, Part Numbers, USA Version & Checksum and Board Locations).

| Game Name<br>S.A.M. System | Production<br>Start Date<br>and Manual<br>Part Nr. | S.A.M. System CPU/Sound Board<br>Boot EPROM U9 |     |                                   |            |
|----------------------------|--|--|-----|-----------------------------------|------------|
|                            |  | 965-BOOT-SAM (Programmed)                      |     |                                   |            |
| 58                         | World Poker Tour™ (WPT)                            | JUN 06<br>780-5088-00                          | 8MB | B-02<br>V2.1+<br>chksum<br>\$F625 | LOC:<br>U9 |
| 59                         | The Simpsons™ Kooky Carnival                       | APR 06<br>780-5090-00                          | 8MB | B-02<br>V2.1+<br>chksum<br>\$F625 | LOC:<br>U9 |
| 60                         | ©Disney's Pirates of the Caribbean                 | AUG 06<br>780-5092-00                          | 8MB | B-02<br>V2.1+<br>chksum<br>\$F625 | LOC:<br>U9 |
| 61                         | Famil Guy™   | DEC 06<br>780-5093-00                          | 8MB | B-02<br>V2.1+<br>chksum<br>\$F625 | LOC:<br>U9 |
| 62                         | Spider-Man™  | MAY 07<br>780-5094-00                          | 8MB | B-02<br>V2.1+<br>chksum<br>\$F625 | LOC:<br>U9 |

**Games 58 – current, S.A.M. System** : CPU/Sound & I/O Power Driver PCBs differ than White Star (previous Games 29 – 57); Disp. Controller Not Required.







# APPENDIX D

## Board Type (White Star Board System\* Only) Table



| Game Name   | Flipper                     | I/O Power Driver  | CPU/Sound Stereo  | Disp. Power Supply                          | Dot Matrix Display                                | Display Controller           | OPTO Transmitter             | OPTO Receiver                   | OPTO Application   |
|---|-----------------------------|---|---|---|---|------------------------------|------------------------------|---------------------------------|--|
| Apollo 13   | 520-5080-00<br>2-Flipper    | 520-5137-00   | 520-5136-00   | 520-5138-00                                 | 520-5052-00<br>128 X 32 Dots                      | 520-5055-01                  | 520-5124-00<br>Single OPTO   | 520-5125-00<br>Single OPTO      | 5-Ball Trough<br>over Up-Kicker  |
|   | Miscellaneous<br>PC Boards: | Light Boards 520-5130-01, -04 & -05 Magnet Interface,<br>7-Segment Display & Light Bd. 520-5130-06 Magnet Driver<br>Board 520-5130-02 Switch Membrane Board 520-5130-03 |   |   |   | Relay Board<br>520-5010-00   |                              |                                 |  |
| Golden Eye  | 520-5080-00<br>2-Flipper    | 520-5137-00   | 520-5136-00   | 520-5138-00                                 | 520-5052-00<br>128 X 32 Dots                      | 520-5055-01                  | 520-5124-00<br>Single OPTO   | 520-5125-00<br>Single OPTO      | 5-Ball Trough<br>over Up-Kicker  |
|   | Miscellaneous<br>PC Boards: | Light Boards<br>520-5128-05 through -08   |   | Mag. Processor X2 Driver Bd.<br>520-5143-00 | Relay Board<br>520-5010-00                        |                              |                              |                                 |  |
| <b>GAMES HEREON NO LONGER REQUIRE THE FLIPPER BOARD WITH THE WHITE STAR BOARD SYSTEM™</b> |                             |   |   |   |   |                              |                              |                                 |  |
| Game Name   | I/O Power Driver            | CPU/Sound Mono  | Disp. Power Supply  | Dot Matrix Display                          | Display Controller                                | OPTO Transmitter             | OPTO Receiver                | OPTO Application                | Misc OPTO & App.   |
| Twister   | 520-5137-01                 | 520-5136-10   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-01                                       | 520-5124-00<br>Single OPTO   | 520-5125-00<br>Single OPTO   | 5-Ball Trough<br>over Up-Kicker |  |
|   | Miscellaneous<br>PC Boards: | Light Boards<br>520-5145-01 through -07   |   | Mag. Drv. Bd.<br>520-5143-00                | Relay Board<br>520-5010-00                        |                              |                              |                                 |  |
| Independence Day (ID4)  | 520-5137-01                 | 520-5136-10   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-01                                       | 520-5124-00<br>Single OPTO   | 520-5125-00<br>Single OPTO   | 4-Ball Trough<br>over Up-Kicker |  |
|   | Miscellaneous<br>PC Boards: | Light Boards<br>520-5149-01 through -10   |   | Servo Mtr. Bd.<br>520-5152-00               |   | 520-5082-00<br>Long Hop OPTO | 520-5083-00<br>Long Hop OPTO | Alien Head<br>Enter             |  |
| Space Jam   | 520-5137-01                 | 520-5136-10   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-01                                       | 520-5124-00<br>Single OPTO   | 520-5125-00<br>Single OPTO   | 5-Ball Trough<br>over Up-Kicker |  |
|   | Miscellaneous<br>PC Boards: | 2X 7-Segment Display Board<br>520-5153-00   |   |   |   |                              |                              |                                 |  |
| The Star Wars Trilogy - Special Ed.   | 520-5137-01                 | 520-5136-10   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-01                                       | 520-5124-00<br>Single OPTO   | 520-5125-00<br>Single OPTO   | 4-Ball Trough<br>over Up-Kicker |  |
|   | Miscellaneous<br>PC Boards: | Relay Board<br>520-5010-00  |   |   |   |                              |                              |                                 |  |
| The Lost World: J.P.  | 520-5137-01                 | 520-5136-10   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-01                                       | 520-5124-00<br>Single OPTO   | 520-5125-00<br>Single OPTO   | 4-Ball Trough<br>over Up-Kicker | 520-5162-00<br>2-Pos. Motor<br>Sensor on<br>Snagger Motor              |
|   | Miscellaneous<br>PC Boards: | DC Relay Bd.<br>520-5066-00   | Shaker Mtr. Bd.<br>520-5065-00                                |   |   |                              |                              |                                 |  |
| The X-Files   | 520-5137-01                 | 520-5136-10   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-01                                       | 520-5124-00<br>Single OPTO   | 520-5125-00<br>Single OPTO   | 4-Ball Trough<br>over Up-Kicker | 520-5155-00<br>3-Pos. Motor<br>Sensor on<br>File Cab.<br>Motor         |
|   | Miscellaneous<br>PC Boards: |   |   |   |   | 520-5082-00<br>Long Hop OPTO | 520-5083-00<br>Long Hop OPTO | File Cabinet<br>Enter           |  |
| Starship Troopers   | 520-5137-01                 | 520-5136-15   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-02                                       | 520-5124-00<br>Single OPTO   | 520-5125-00<br>Single OPTO   | 4-Ball Trough<br>over Up-Kicker |  |
|   | Miscellaneous<br>PC Boards: | 4X 7-Segment Display Board<br>520-5166-00   |   |   |   | 520-5082-00<br>Long Hop OPTO | 520-5083-01<br>Long Hop OPTO | L/R Orbit<br>Lane Enter         |  |
| Viper Night Drivin'   | 520-5137-01                 | 520-5136-16   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-03                                       | 520-5124-00<br>Single OPTO   | 520-5125-00<br>Single OPTO   | 4-Ball Trough<br>over Up-Kicker |  |
|   | Miscellaneous<br>PC Boards: | Relay Board<br>520-5010-00  |   |   |   | 520-5082-00<br>Long Hop OPTO | 520-5083-01<br>Long Hop OPTO | Jump Ramp                       |  |
| Lost In Space   | 520-5137-01                 | 520-5136-16   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker |  |
|   | Miscellaneous<br>PC Boards: | Relay Board<br>520-5010-00  |   |   |   |                              |                              |                                 |  |
| Godzilla  | 520-5137-01                 | 520-5136-16   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker |  |
|   | Miscellaneous<br>PC Boards: | Shaker Mtr. Bd.<br>520-5065-00  |   |   |   |                              |                              |                                 |  |
| South Park  | 520-5137-01                 | 520-5136-16   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 5-Ball Trough<br>over Up-Kicker |  |
|   | Miscellaneous<br>PC Boards: |   |   |   |   | 520-5082-00<br>Long Hop OPTO | 520-5083-01<br>Long Hop OPTO | Kenny Under<br>Trough Enter     |  |
| Harley-Davidson®<br>1st-3rd*<br>Editions  | 520-5137-01                 | 520-5136-16<br>*520-5300-00*  | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker |  |
|   | Miscellaneous<br>PC Boards: | Relay Board<br>520-5010-00  |   | Shaker Mtr. Bd.<br>520-5065-00              | Diode Board<br>520-5146-00                        | 520-5082-00<br>Long Hop OPTO | 520-5083-01<br>Long Hop OPTO | Motorcycle<br>Enter             |  |
| Striker Xtreme (NFL)  | 520-5137-01                 | 520-5136-16   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker | 520-5155-00<br>3-Pos. Motor<br>Sensor on<br>Goalie Motor               |
|   | Miscellaneous<br>PC Boards: | DC Relay Bd.<br>520-5066-00   | Relay Board<br>520-5010-00                                    | Diode Board<br>520-5146-00                  | for UK ONLY- Solenoid Expander Bd.<br>520-5192-00 | 520-5082-00<br>Long Hop OPTO | 520-5083-01<br>Long Hop OPTO | Goalie Under-<br>Trough Enter   |  |
| Sharkey's Shootout  | 520-5137-64                 | 520-5136-64   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker | 520-5194-00<br>4-Pos. Motor<br>Sensor on<br>? -Ball Motor              |
|   | Miscellaneous<br>PC Boards: | Relay Board<br>520-5010-00  |   | Sol. Exp. Bd.<br>520-5192-00                |   |                              |                              |                                 |  |
| High Roller Casino  | 520-5137-01                 | 520-5136-16   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker | 520-5194-00<br>4-Pos. Motor<br>Sensor on<br>Roulette<br>Wheel<br>Motor |
|   | Miscellaneous<br>PC Boards: | Dot Display (5X7) in Slot Mach.<br>520-5197-00  |   |   | for UK ONLY- Solenoid Expander Bd.<br>520-5192-00 | 520-5196-00<br>3-Pos. OPTO   | 520-5195-00<br>3-Pos. OPTO   | Ball Lock<br>under Roulette     | Up/Dn Ramp<br>in Slot Mach.  |
| Austin Powers™  | 520-5137-01                 | 520-5136-16   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker | 520-5212-00<br>Pulse-Stretcher<br>OPTO on Spini-Me                     |
|   | Miscellaneous<br>PC Boards: | Relay Bd. (X3)<br>520-5010-00   |   |   | for UK ONLY- Solenoid Expander Bd.<br>520-5192-00 | 520-5082-00<br>Long Hop OPTO | 520-5083-01<br>Long Hop OPTO | Time Machine<br>Ramp            |  |
| MONOPOLY®   | 520-5137-01                 | 520-5136-16   | 520-5138-00   | 520-5052-00<br>128 X 32 Dots                | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker |  |
|   | Miscellaneous<br>PC Boards: | DC Relay Bd.<br>520-5066-00   | Mini-Dot Display (3 by 5X7)<br>520-5197-00 (Electric C- Sign) |   | for UK ONLY- Solenoid Expander Bd.<br>520-5192-00 | 520-5218-00<br>4-Pos. OPTO   | 520-5210-00<br>4-Pos. OPTO   | Bank<br>Door                    |  |

Table continued on the next page.





# APPENDIX D

## Board Type (White Star Board System\* & S.A.M. System\*\* Only) Table



| Game Name                            | I/O Power Driver         | CPU/Sound (old & new)         | Disp. Power Supply   | Dot Matrix Display           | Display Controller                                | OPTO Transmitter             | OPTO Receiver                | OPTO Application                | Misc OPTO & App.   |
|--------------------------------------|--------------------------|-------------------------------|--|------------------------------|---|------------------------------|------------------------------|---------------------------------|--|
| Playboy                              | 520-5137-01              | 520-5136-16                   | 520-5138-00  | 520-5052-00<br>128 X 32 Dots | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker |  |
|                                      | Miscellaneous PC Boards: | DC Relay Bd.<br>520-5066-00   | Relay Bd.<br>520-5010-00                                     |                              | for UK ONLY- Solenoid Expander Bd.<br>520-5192-00 |                              |                              |                                 |  |
| RollerCoaster Tycoon™                | 520-5137-01              | 520-5136-16                   | 520-5138-00  | 520-5052-00<br>128 X 32 Dots | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker | 520-5222-00<br>1-Position<br>Switch Detect<br>on Wheel Spin  |
|                                      | Miscellaneous PC Boards: | DC Relay Bd.<br>520-5066-00   | Mini-Dot Display (3 by 5X7)<br>520-5221-00 (Ramp Enter Sign) |                              | for UK ONLY- Solenoid Expander Bd.<br>520-5192-00 | 520-5082-00<br>Long Hop OPTO | 520-5083-01<br>Long Hop OPTO | Behind 1-Bank<br>Drop Target    |  |
| The Simpsons™ Pinball Party          | 520-5137-01              | 520-5136-16                   | 520-5138-00  | 520-5052-00<br>128 X 32 Dots | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker |  |
|                                      | Miscellaneous PC Boards: | LED Bd.<br>520-5219-00        | Color Dot Display (4 by 5X7)<br>520-5225-00 (TV Set)         |                              | for UK ONLY ◀◀◀<br>Aux. Driver Bd.<br>520-5068-01 |                              |                              |                                 |  |
| Terminator® 3: Rise of the Machines™ | 520-5137-01              | <b>520-5136-16</b>            | 520-5138-00  | 520-5052-00<br>128 X 32 Dots | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker |  |
|                                      | Miscellaneous PC Boards: |                               |  |                              | for UK ONLY ◀◀◀<br>Aux. Driver Bd.<br>520-5068-01 | 515-7307-00<br>Single OPTO   | 515-7308-00<br>Single OPTO   | TXCannon<br>Trough              |  |
| The Lord of the Rings™               | 520-5137-01              | <b>New</b><br>520-5300-00     | 520-5138-00  | 520-5052-00<br>128 X 32 Dots | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker | 500-6746-00<br>(White Trans.)<br>500-6747-00<br>(Black Rec.) |
|                                      | Miscellaneous PC Boards: | 19-LED PCB<br>520-5242-00     | OPTO Transmitter / Receiver<br>Amplifier PCB 520-5239-00     |                              | for UK ONLY ◀◀◀<br>Aux. Driver Bd.<br>520-5068-01 | 515-7307-00<br>Single OPTO   | 515-7308-00<br>Single OPTO   | Orthanc Tower<br>Trough         |  |
| Ripley's Believe It or Not!®         | 520-5137-01              | 520-5300-00                   | 520-5138-00  | 520-5052-00<br>128 X 32 Dots | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker | 500-6775-00<br>OPTO Trnscvr                                  |
|                                      | Miscellaneous PC Boards: | 520-5236-00<br>X3 Dot Display | OPTO Transmitter / Receiver<br>Amplifier PCB 520-5239-01     |                              | for UK ONLY ◀◀◀<br>Aux. Driver Bd.<br>520-5068-01 | 520-5234-00<br>3-Pos. OPTO   | 520-5234-00<br>3-Pos. OPTO   | Vari-Target                     | 520-5235-03<br>X3 Aux. Drvr                                  |
| Elvis®                               | 520-5137-01              | 520-5300-00                   | 520-5138-00  | 520-5052-00<br>128 X 32 Dots | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker |  |
|                                      | Miscellaneous PC Boards: |                               |  |                              | for UK ONLY ◀◀◀<br>Aux. Driver Bd.<br>520-5068-01 |                              |                              |                                 |  |
| The Sopranos™                        | 520-5137-01              | 520-5300-00                   | 520-5138-00  | 520-5052-00<br>128 X 32 Dots | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker |  |
|                                      | Miscellaneous PC Boards: |                               |  |                              | for UK ONLY ◀◀◀<br>Aux. Driver Bd.<br>520-5068-01 |                              |                              |                                 |  |
| NASCAR® and [NDSE]                   | 520-5137-01              | 520-5300-00                   | 520-5138-00  | 520-5052-00<br>128 X 32 Dots | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker | 500-6775-00<br>OPTO Trans.<br>(Qty. 16)<br>Switch Detect.    |
|                                      | Miscellaneous PC Boards: | 520-5235-03<br>X3 Aux. Drvr   | OPTO Transmitter / Receiver<br>Amplifier PCB 520-5239-01     |                              | for UK ONLY ◀◀◀<br>Aux. Driver Bd.<br>520-5068-01 |                              |                              |                                 |  |
| Grand Prix                           | 520-5137-01              | 520-5300-00                   | 520-5138-00  | 520-5052-00<br>128 X 32 Dots | 520-5055-03                                       | 515-0173-00<br>Dual OPTO     | 515-0174-00<br>Dual OPTO     | 4-Ball Trough<br>over Up-Kicker | 500-6775-00<br>OPTO Trans.<br>(Qty. 16)<br>Switch Detect.    |
|                                      | Miscellaneous PC Boards: | 520-5235-03<br>X3 Aux. Drvr   | OPTO Transmitter / Receiver<br>Amplifier PCB 520-5239-01     |                              | for UK ONLY ◀◀◀<br>Aux. Driver Bd.<br>520-5068-01 |                              |                              |                                 |  |

| Game Name                          | I/O Power Driver**       | CPU / Sound**                  | Disp. Power Supply                          | Dot Matrix Display               | Dual OPTO Transmitter        | Dual OPTO Receiver           | Dual OPTO Transceiver                      | OPTO Transceiver Miscellaneous   |
|------------------------------------|--------------------------|--------------------------------|---|----------------------------------|------------------------------|------------------------------|--|--|
| World Poker Tour™ (WPT)            | 520-5249-00<br>Backbox   | 520-5246-00<br>Backbox         | 520-5138-00<br>Backbox                      | 520-5052-00<br>128 X 32 Dots     | 515-0173-00<br>4-Ball Trough | 515-0174-00<br>4-Ball Trough | 500-6775-00<br>4 Switch Pairs<br>(Qty. 8)  | 520-5251-00 'U' 1/per PCB<br>Jail Bars Up Ace/Hole Mech<br>520-5252-04 'U' 4/per PCB<br>Drop Targets 4- & 8- Banks |
|                                    | Miscellaneous PCBs:      | 520-5254-00<br>50V Step-Up Drv | 520-5250-14<br>14LED 5X7 Disp.              | 520-5239-01<br>OPTO Amplifier    | 520-5247-00<br>Ace/Hole Mech | 520-5248-00<br>Ace/Hole Mech |  |  |
| The Simpsons™ Kooky Carnival       | 520-5249-00<br>Back Door | 520-5246-00<br>Back Door       | 520-5138-00<br>Cabinet Rear                 | 520-5052-00<br>128 X 32 Dots     |                              |                              | 520-5253-00-ASY<br>Coin Drop<br>(Qty. 11)  |  |
|                                    | Miscellaneous PCBs:      | 515-5742-00<br>Shaker PCB      | 500-6700-00<br>Relay (incl. Wiring + Conn.) |                                  |                              |                              |  |  |
| ©Disney's Pirates of the Caribbean | 520-5249-00<br>Backbox   | 520-5246-00<br>Backbox         | 520-5138-00<br>Backbox                      | 520-5052-00<br>128 X 32 Dots     | 515-0173-00<br>4-Ball Trough | 515-0174-00<br>4-Ball Trough | 500-6775-00<br>5 Switch Pairs<br>(Qty. 10) |  |
|                                    | Miscellaneous PCBs:      | 520-5239-01<br>OPTO Amp. (X3)  | 511-5024-03<br>Relay (incl. Wiring + Conn.) | 520-5238-00 : H-E-A-R-T LED PCB  |                              |                              |  |  |
| Family Guy™                        | 520-5249-00<br>Backbox   | 520-5246-00<br>Backbox         | 520-5138-00<br>Backbox                      | 520-5052-00<br>128 X 32 Dots     | 515-0173-00<br>4-Ball Trough | 515-0174-00<br>4-Ball Trough | 500-6775-00<br>3 Switch Pairs<br>(Qty. 6)  | 520-5252-01 'U' 1/per PCB<br>Drop Target 1-Bank  |
|                                    | Miscellaneous PCBs:      | 520-5239-01<br>OPTO Amp. (X2)  | 520-5261-00<br>Stepper Motor                | 511-5042-01<br>Trgt. Sensor (X2) |                              |                              | 500-6775-01<br>1 Switch Pair<br>(Qty. 2)   | 520-5252-04 'U' 4/per PCB<br>Drop Target 4-Bank  |
| Spider-Man™                        | 520-5249-00<br>Backbox   | 520-5246-00<br>Backbox         | 520-5138-00<br>Backbox                      | 520-5052-00<br>128 X 32 Dots     | 515-0173-00<br>4-Ball Trough | 515-0174-00<br>4-Ball Trough | 500-6775-00<br>3 Switch Pairs<br>(Qty. 6)  |  |
|                                    | Miscellaneous PCBs:      | 520-5239-01<br>OPTO Amp. (X2)  |   |                                  |                              |                              |  |  |



# APPENDIX D

## Board Type Table

| Game Name                           | Flipper   | Sound  | Power Supply | Display X-Digit  |
|-------------------------------------|---|--|--------------|--|
| • Laser War                         | 2-Flipper<br>Board Not Required   | <i>initial:</i><br>520-5002-00<br><i>replaced with:</i><br>520-5002-02<br><i>520-5002-01 was not used.</i> | 520-5000-00  | Master: 520-5004-00 plus:<br>520-5005-00 (Qty. 2); 7 Digit Alpha/Numeric<br>520-5006-00 (Qty. 2); 7 Digit Numeric<br>520-5007-00 (Qty. 1); 4 Digit Numeric |
| • Secret Service<br>• Torpedo Alley | 3-Flipper<br>Board Not Required   | 520-5002-02  |              | 520-5014-01<br>7 Digit Alpha/Numeric Combined  |
| • Time Machine                      | 2-Flipper<br>Board Not Required   |  |              | 520-5030-00<br>16 Digit Alpha/Numeric Combined   |
| • Playboy 35th Anniversary *        | 520-5033-00<br>2-Flipper<br><i>(*only for 100 games of<br/>Playboy 35th Anniv. &amp;<br/>ABC Mon. Night Football)</i> |  |              |  |
| • ABC Monday Night Football *       |   |  |              |  |
| • Robocop                           |   |  |              |  |
| • Phantom of the Opera              |   |  |              |  |
| • Back to the Future                |   | 520-5002-03  |              |  |
| • The Simpsons                      |   |  |              |  |

| Game Name                                      | Flipper                                | Sound                      | Power Supply               | Dot Matrix Display         | Display Controller         | OPTO Transmitter           | OPTO Receiver              | OPTO Application                |
|--|--|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------------|
| • Checkpoint<br>• Teenage Mutant Ninja Turtles | 520-5033-00<br>2-Flipper               | 520-5002-03                | 520-5047-00                | 520-5042-00<br>128 X 16    | 520-5055-00                |                            |                            |                                 |
| • Batman<br>• Star Trek 25th Anniv.<br>• Hook  |  | 520-5050-01                |                            |                            |                            |                            |                            |                                 |
| • Lethal Weapon 3                              |  | 520-5050-02                | 520-5047-01                |                            |                            |                            |                            |                                 |
| • Star Wars<br>• Rocky & Bullwinkle & Friends  |  |                            | 520-5052-00<br>128 X 32    |                            |                            |                            |                            |                                 |
| • Jurassic Park                                |  |                            |                            |                            |                            |                            |                            |                                 |
| • Last Action Hero                             | 520-5076-00<br>3-Flipper               | 520-5050-03                | 520-5047-02                | 520-5055-01                |                            |                            |                            |                                 |
| • Tales from the Crypt                         | 520-5076-00<br>3-Flipper               | 520-5077-00                |                            |                            |                            |                            |                            |                                 |
| • The Who's Tommy                              | 520-5070 / 5080 -00<br>4-Flipper (2X2) | 520-5077-00                | 520-5047-03                | 520-5075-00<br>192 X 64    | 520-5092-01                | 520-5102-00<br>Single OPTO | 520-5103-00<br>Single OPTO | Paddle Boat<br>Wheel Enter      |
| • WWF Royal Rumble                             | 520-5076-00<br>3-Flipper               | 520-5050-03                |                            |                            |                            |                            |                            |                                 |
| • Guns N' Roses                                | 520-5076-00<br>3-Flipper               | 520-5077-00                |                            |                            |                            |                            |                            |                                 |
| • Maverick                                     | 520-5076-00<br>3-Flipper               | 520-5126-02                |                            |                            |                            |                            |                            |                                 |
| • Mary Shelley's Frankenstein                  | 520-5070 / 5080 -00<br>4-Flipper (2X2) | 520-5124-00<br>Single OPTO | 520-5125-00<br>Single OPTO | 520-5124-00<br>Single OPTO | 520-5125-00<br>Single OPTO | 520-5124-00<br>Single OPTO | 520-5125-00<br>Single OPTO | 5-Ball Trough<br>over Up-Kicker |
| • Baywatch                                     | 520-5076-00<br>3-Flipper               |                            |                            |                            |                            | 520-5124-00<br>Single OPTO | 520-5125-00<br>Single OPTO | 520-5124-00<br>Single OPTO      |
| • Batman Forever                               |  |                            |                            |                            |                            |                            |                            |                                 |

Miscellaneous Boards (Lamp Boards & Relay Boards) not listed above can be found in each individual game manual.







# APPENDIX E

## Flipper Coil (White Star Board System\* & S.A.M. System\*\* Only) Table



Typical Coil Diode 1N4004 unless noted otherwise (Diode Top = above lugs next to windings; Diode Below (Bottom) = under lugs opposite of windings).

| STANDARD COILS (TYPICAL APPLICATIONS)  |         |  | LARGE COILS (FLIPPERS & SPECIAL APPLICATIONS) |                 |   |
|--|---------|--|---|-----------------|---|
| Ga.-Turn   | Res (Ω) | SPI Part Number and Comments   | Ga.-Turn                                      | Res (Ω)         | SPI Part Number and Comments  |
| 20-400   | 1.0 Ω   | 090-5021-use: -00 Diode Top  | 21-900  | call Ω          | 090-5020-use: -01 3-Lugs + 1N4004 & 1N5404 Diodes<br>-10 Diode Top <BROWN><RED>                                   |
| 22-500   | 1.7 Ω   | 090-5017-use: -00 Diode Top  | 22-750 / 30-2600                              | 2.6 Ω<br>92.0 Ω | 090-5011-use: -00 DUAL WND COIL // 3-Lugs Diode x2  |
| 22-600   | 2.2 Ω   | 090-5017-use: -0B Diode Below // -0T Diode Top   |   |                 |   |
| 23-700   | 3.1 Ω   | 090-5022-use: -0B Diode Below // -0T Diode Top   | 22-900  | 3.45 Ω          | 090-5020-use: -20T Diode Top <YELLOW> //<br>-20-ND No Diode   |
| 23-750   | 3.4 Ω   | 090-5019-use: -00 Diode Top  |   |                 |   |
| 23-800   | 3.6 Ω   | 090-5001-use: -0B Diode Below // -0T Diode Top //<br>-NL No Lugs 11" Leads // -ND No Diode | 22-1080                                       | 4.2 Ω           | 090-5032-use: -0B D. Below // -0T D. Top <YEL-GRN><br>-NL No Diode  |
| 23-840   | 4.0 Ω   | 090-5005-use: -00 Diode Top  |   |                 |   |
| 23.5-765   | 3.6 Ω   | 090-5037-use: -03 Diode Top  | 23-620 / 30-2600                              | 2.4 Ω<br>75.0 Ω | 090-5006-use: -00 DUAL WND COIL // 3-Lugs Diode x2  |
| 24-900   | 5.0 Ω   | 090-5002-use: -02 Diode Top // -10 No Lugs 14" Leads                                       |   |                 |   |
| 24-940   | 5.5 Ω   | 090-5036-use: -0B Diode Below // -0T Diode Top<br>use 090-5051-01 No Lugs 11" Leads        | 23-700 / 30-2600                              | 3.0 Ω<br>83.5 Ω | 090-5013-use: -00 DUAL WOUND COIL // Diode Top  |
| 25-1240  | 9.3 Ω   | 090-5034-use: -00 Diode Below  |   |                 |   |
| 26-1200  | 10.3 Ω  | 090-5044-use: -0B Diode Below // -0T Diode Top //<br>-NL No Lugs 11" Leads // -ND No Diode | 23-800 / 30-2600                              | 2.4 Ω<br>90.5 Ω | 090-5012-use: -00 DUAL WOUND COIL // Diode Top  |
| 27-1300  | 14.2 Ω  | 090-5003-use: -0T Diode Top  |   |                 |   |
| 27-1400  | 14.7 Ω  | 090-5015-use: -00 Diode Below  | 23-1100                                       | 5.1 Ω           | 090-5030-use: -0T Diode Top <ORANGE><br>-ND No Diode  |
| 27-1400  | 14.7 Ω  | 511-5031-00 Special App.: No Diode / Lugs + Conn.  |   |                 |   |
| 27-1500  | 16.3 Ω  | 090-5004-use: -0B Diode Below // -0T Diode Top   | 23-1200                                       | 7.1 Ω           | 090-5008-use: -00 Diode Top <BLACK>   |
| 29-2000  | 33.6 Ω  | 090-5016-use: -00 Diode Top  | 23-1500                                       | 4.4 Ω           | 090-5062-use: -00 Diode Top <BLUE>  |
| <b>LARGE, MEDIUM &amp; MINI COILS (MAGNET APPLICATIONS)</b>  |         |  | 24-1570                                       | 9.5 Ω           | 090-5025-use: -00 Diode Top <BLUE>  |
| 20.5-480   | 2.9 Ω   | 090-5064-use: -02 No Lugs or Core; 14" Leads // Large                                      | 25-1400                                       | call Ω          | 090-5067-use: -0T Diode Top <RED>   |
| 22-650   | 4.3 Ω   | 090-5042-use: -00 No Lugs or Core; 6" Leads // Large                                       | 25-1600                                       | call Ω          | 090-5068-use: -0T Diode Top <WHITE>   |
|  |         | 090-5042-use: -01 No Lugs or Core; 12" Leads // Large                                      | 25-1800                                       | 13.8 Ω          | 090-5041-use: -0T Diode Top <BLUE-GREEN>  |
| 24-780   | 8.0 Ω   | 090-5061-use: -00 No Lugs or Core; 6" Lds. // Medium                                       | <b>MINI COILS (RESET / TRIP APPLICATIONS)</b> |                 |   |
| 29-1000  | 15.2 Ω  | 090-5059-use: -00 Lugs + Diode + Magnet Core // Mini                                       | 27-950  | call Ω          | 090-5046-use: -01 Diode Top   |
| 31-1500  | 52.0 Ω  | 090-5054-00: Straight Lugs + Diode + Mag Core // Mini                                      | 28-1050                                       | 11.5 Ω          | 090-5046-use: -00 Diode Top   |
|  |         | 090-5055-00: 90° Lugs + Diode + Magnet Core // Mini  | 27-880  | call Ω          | 500-6976-01 No Lugs or Diode + 6" Leads & Conn.   |
| <b>Please Note: Ohm values may vary +/- .03 depending on meter calibration.</b>  |         |  | 31-590  | call Ω          | 090-5010-use: -00 Diode Top   |
| <b>Ordering Note: Coils typically should not come with Coil Sleeves. IF A SLEEVE EXISTS, ensure it is the correct sleeve for the application usage. For the correct Coil Sleeve, refer to the Game Assembly Drawing the coil exists on and order separately.</b> |         |  | 32-1250                                       | 35.0 Ω          | 515-6916-01: includes Flap & Screw <YELLOW>   |
|  |         |  | 32-1800                                       | 50.2 Ω          | 090-5031-use: -0B Diode Below // -0T Diode Top<br>(515-6110-00) use 515-# to include mounting & armature brackets |
|  |         |  | 33-1590                                       | 59.0 Ω          | 515-6916-00: includes brackets <WHITE>  |

## Flipper Coil (White Star Board System\* Only) Table

| GAME NAME                                 | Nº of Flippers | FLIPPERS                         |                                  | FLIPPERS no E.O.S. Switch    |                                  |
|---|----------------|----------------------------------|----------------------------------|------------------------------|----------------------------------|
|   |                | SPI Nº / GAUGE-TURNS / Color     |                                  | SPI Nº / GAUGE-TURNS / Color |                                  |
|   |                | LOWER LEFT                       | LOWER RIGHT                      | UPPER LEFT                   | UPPER RIGHT                      |
| Apollo 13                                 | 2              | 090-5032-0T<br>22-1080 -YEL-GRN- | SAME                             | Not Used                     | Not Used                         |
| Golden Eye                                | 2              | 090-5032-0T<br>22-1080 -YEL-GRN- | SAME                             | Not Used                     | Not Used                         |
| Twister                                   | 2              | 090-5020-20T<br>22-900 -YELLOW-  | 090-5032-0T<br>22-1080 -YEL-GRN- | Not Used                     | Not Used                         |
| ID4: Independence Day                     | 3              | 090-5032-0T<br>22-1080 -YEL-GRN- | SAME                             | Not Used                     | 090-5020-30<br>23-900 -GREEN-    |
| Space Jam †                               | 2              | 090-5032-0T<br>22-1080 -YEL-GRN- | 090-5020-20T<br>22-900 -YELLOW-  | Not Used                     | Not Used                         |
| The Star Wars Trilogy - Special Edition † | 2              | 090-5032-0T<br>22-1080 -YEL-GRN- | SAME                             | Not Used                     | Not Used                         |
| The Lost World: Jurassic Park †           | 2              | 090-5032-0T<br>22-1080 -YEL-GRN- | SAME                             | Not Used                     | Not Used                         |
| The X-Files †                             | 2              | 090-5032-0T<br>22-1080 -YEL-GRN- | SAME                             | Not Used                     | Not Used                         |
| Starship Troopers †                       | 3              | 090-5030-0T<br>23-1100 -ORANGE-  | SAME                             | Not Used                     | 090-5032-0T<br>22-1080 -YEL-GRN- |
| Viper Night Drivin' †                     | 2              | 090-5030-0T<br>23-1100 -ORANGE-  | SAME                             | Not Used                     | Not Used                         |
| Lost In Space †                           | 2              | 090-5030-0T<br>23-1100 -ORANGE-  | 090-5032-0T<br>22-1080 -YEL-GRN- | Not Used                     | Not Used                         |
| Godzilla †                                | 2              | 090-5032-0T<br>22-1080 -YEL-GRN- | SAME                             | Not Used                     | Not Used                         |
| South Park †                              | 2              | 090-5030-0T<br>23-1100 -ORANGE-  | SAME                             | Not Used                     | Not Used                         |

† Coil Part Numbers ending with a "T" signifies the Diode is on the top of the lug (on the coil-winding side); Coil Part Numbers ending with a "B" signifies the Diode is on the bottom of the lugs.

Table continued on the next page.





# APPENDIX E

## Flipper Coil (White Star Board System\* & S.A.M. System\*\* Only) Table



| GAME NAME  | N <sup>o</sup> of Flippers   | FLIPPERS w/E.O.S. Switch  |   | FLIPPERS no E.O.S. Switch                           |  |
|--|------------------------------|---|---|---|--|
|  |                              | SPI N <sup>o</sup> / GAUGE-TURNS / Color  |   | SPI N <sup>o</sup> / GAUGE-TURNS / Color            |  |
|  |                              | LOWER LEFT  | LOWER RIGHT                               | UPPER LEFT  | UPPER RIGHT                                |
| Harley-Davidson® † and 1st through 3rd Editions  | 2                            | 090-5032-0T<br><b>22-1080 -YEL-GRN-</b>   | 090-5030-0T<br><b>23-1100 -ORANGE-</b>    | Not Used  | Not Used                                   |
| Striker Xtreme (NFL) †   | 3                            | 090-5032-0T<br><b>22-1080 -YEL-GRN-</b>   | 090-5030-0T<br><b>23-1100 -ORANGE-</b>    | 090-5030-0T<br><b>23-1100 -ORANGE-</b>              | Not Used                                   |
| Sharkey's Shootout †   | 3                            | 090-5030-0T<br><b>23-1100 -ORANGE-</b>  | SAME                                      | 090-5030-0T<br><b>23-1100 -ORANGE-</b>              | Not Used                                   |
| High Roller Casino †   | 2                            | 090-5032-20T<br><b>22-900 -YELLOW-</b>  | 090-5032-0T<br><b>22-1080 -YEL-GRN-</b>   | Not Used  | Not Used                                   |
| Austin Powers™ †   | 2                            | 090-5020-30<br><b>23-900 -GREEN-</b>  | 090-5030-0T<br><b>23-1100 -ORANGE-</b>    | Not Used  | Not Used                                   |
| MONOPOLY® †  | 3                            | 090-5032-0T<br><b>22-1080 -YEL-GRN-</b>   | SAME                                      | Not Used  | 090-5062-0T<br><b>23-1500 -BLUE-</b>       |
| Playboy †  | 2                            | 090-5030-0T<br><b>23-1100 -ORANGE-</b>  | SAME                                      | Not Used  | Not Used                                   |
| RollerCoaster Tycoon™ †  | 4                            | 090-5032-0T<br><b>22-1080 -YEL-GRN-</b>   | SAME                                      | 090-5067-0T<br><b>25-1400 -RED-</b>                 | 090-5068-0T<br><b>25-1600 -WHITE-</b>      |
| The Simpsons™ Pinball Party †  | 6**<br>(5 with Flipper Bats) | 090-5032-0T<br><b>22-1080 -YEL-GRN-</b>   | SAME                                      | Not Used  | 090-5030-0T<br><b>23-1100 -ORANGE-</b>     |
|  |                              | <i>** The Homer Head Assembly is affixed to an Upr. Rt. Style Flipper (no E.O.S. Switch):</i> |   | <b>Flippers (Mini-Bats) on 2nd Level Playfield:</b> |  |
|  |                              |   | ** 090-5020-20T<br><b>22-900 -YELLOW-</b> | 090-5041-00T<br><b>25-1800 -BLU-GRN-</b>            | 090-5025-00<br><b>24-1570 -BLUE-</b>       |
| Terminator® 3: Rise of the Machines™ †   | 2                            | 090-5032-0T<br><b>22-1080 -YEL-GRN-</b>   | SAME                                      | Not Used  | Not Used                                   |
| The Lord of the Rings™ †   | 2                            | 090-5020-20T<br><b>22-900 -YELLOW-</b>  | SAME                                      | Not Used  | Not Used                                   |
| Ripley's Believe It or Not!® †   | 3                            | 090-5032-0T<br><b>22-1080 -YEL-GRN-</b>   | SAME                                      | Not Used  | 090-5067-00T<br><b>25-1400 -RED-</b>       |
| Elvis® †   | 4                            | 090-5020-20T<br><b>22-900 -YELLOW-</b>  | SAME                                      | 090-5020-30<br><b>23-900 -GREEN-</b>                | SAME                                       |
| The Sopranos™ †  | 2                            | 090-5032-0T<br><b>22-1080 -YEL-GRN-</b>   | SAME                                      | Not Used  | Not Used                                   |
| NASCAR® and [NDSE] †   | 2                            | 090-5030-0T<br><b>23-1100 -ORANGE-</b>  | SAME                                      | Not Used  | Not Used                                   |
| Grand Prix †   | 2                            | 090-5030-0T<br><b>23-1100 -ORANGE-</b>  | SAME                                      | Not Used  | Not Used                                   |
| † Coil Part Numbers ending with a "T" signifies the Diode is on the top of the lug (on the coil-winding side); Coil Part Numbers ending with a "B" signifies the Diode is on the bottom of the lugs. |                              |   |   |   |  |
| ** S.A.M. System Games DO NOT REQUIRE DIODES. If you use a coil from your stock which has a diode, remove it ONLY FOR S.A.M. System Games.   |                              |   |   |   |  |
| World Poker Tour™ (WPT)**  | 4                            | 090-5032-ND<br><b>22-1080 [ NO DIODE ]</b>  | SAME                                      | 090-5030-ND<br><b>23-1100 [ NO DIODE ]</b>          | SAME                                       |
| ©Disney's Pirates of the Caribbean**   | 2                            | 090-5030-ND<br><b>23-1100 [ NO DIODE ]</b>  | SAME                                      | Not Used  | Not Used                                   |
| Family Guy™ **   | 3 Norm.                      | 090-5030-ND<br><b>23-1100 [ NO DIODE ]</b>  | SAME                                      | 090-5062-ND<br><b>23-1500 [ NO DIODE ]</b>          | Not Used                                   |
|  | 2 Mini                       | 090-5046-01-ND<br><b>27-950 [ NO DIODE ]</b>  | SAME                                      |   |  |
| Spider-Man™ **   | 3                            | 090-5032-ND<br><b>22-1080 [ NO DIODE ]</b>  | SAME                                      | Not Used  | 090-5032-ND<br><b>22-1080 [ NO DIODE ]</b> |



# APPENDIX E

## Generic Coil Cross-Reference Guide † ‡

### Flipper Coil Table ‡ ††

| GAME NAME   | Nº of Flippers | FLIPPERS w/E.O.S. Switch         |                                 | FLIPPERS no E.O.S. Switch    |                                  |
|---|----------------|----------------------------------|---------------------------------|------------------------------|----------------------------------|
|   |                | SPI Nº / GAUGE-TURNS / Color     |                                 | SPI Nº / GAUGE-TURNS / Color |                                  |
|   |                | LOWER LEFT                       | LOWER RIGHT                     | UPPER LEFT                   | UPPER RIGHT                      |
| Laser War ‡   | 2              | 090-5011-00<br>22-750 / 30-2600  | SAME                            | Not Used                     | Not Used                         |
| Secret Service ‡  | 3              | 090-5006-00<br>23-620 / 30-2600  | SAME                            | Not Used                     | 090-5006-00<br>23-620 / 30-2600  |
| Torpedo Alley ‡   | 3              | 090-5011-00<br>22-750 / 30-2600  | 090-5013-00<br>23-700 / 30-2600 | Not Used                     | 090-5012-00<br>23-800 / 30-2600  |
| Time Machine ‡  | 2              | 090-5011-00<br>22-750 / 30-2600  | SAME                            | Not Used                     | Not Used                         |
| ‡ These coils are dual-wound.   |                |                                  |                                 |                              |                                  |
| Playboy 35th Anniversary ††   | 2              | 090-5020-02<br>22-900 -YEL-YEL-  | SAME                            | Not Used                     | Not Used                         |
| ABC Monday Night Football ††  | 2              | 090-5020-02<br>22-900 -YEL-YEL-  | SAME                            | Not Used                     | Not Used                         |
| †† A very small % of these games used a 090-5020-20 coil which used a proto-type Solid State Flipper System. The two types of coils both are 22-900 coils; the only difference is the addition of the 1N5404 Diode on the (-02) coils which was used in the Deger Design. |                |                                  |                                 |                              |                                  |
| Robocop   | 2              | 090-5020-20<br>22-900 -YEL-YEL-  | SAME                            | Not Used                     | Not Used                         |
| Phantom of the Opera  | 2              | 090-5020-20<br>22-900 -YEL-YEL-  | SAME                            | Not Used                     | Not Used                         |
| Back to the Future  | 2              | 090-5020-20<br>22-900 -YEL-YEL-  | SAME                            | Not Used                     | Not Used                         |
| The Simpsons  | 2              | 090-5020-20<br>22-900 -YEL-YEL-  | SAME                            | Not Used                     | Not Used                         |
| Checkpoint  | 2              | 090-5020-20<br>22-900 -YEL-YEL-  | SAME                            | Not Used                     | Not Used                         |
| Teenage Mutant Ninja Turtles  | 2              | 090-5020-30<br>23-900 -GRN-GRN-  | SAME                            | Not Used                     | Not Used                         |
| Batman  | 2              | 090-5020-30<br>23-900 -GRN-GRN-  | SAME                            | Not Used                     | Not Used                         |
| Star Trek 25th Anniversary  | 2              | 090-5020-30<br>23-900 -GRN-GRN-  | SAME                            | Not Used                     | Not Used                         |
| Hook  | 2              | 090-5030-00<br>23-1100 -ORG-ORG- | 090-5020-30<br>23-900 -GRN-GRN- | Not Used                     | Not Used                         |
| Lethal Weapon 3   | 2              | 090-5030-00<br>23-1100 -ORG-ORG- | SAME                            | Not Used                     | Not Used                         |
| Star Wars   | 2              | 090-5032-00<br>22-1080 -YEL-GRN- | SAME                            | Not Used                     | Not Used                         |
| Rocky & Bullwinkle & Friends  | 2              | 090-5020-30<br>23-900 -GRN-GRN-  | SAME                            | Not Used                     | Not Used                         |
| Jurassic Park   | 3              | 090-5020-30<br>23-900 -GRN-GRN-  | SAME                            | Not Used                     | 090-5030-00<br>23-1100 -ORG-ORG- |

*Table continued on the next page.*





## APPENDIX E

### Flipper Coil Table †

| GAME NAME   | N <sup>o</sup> of Flippers  | FLIPPERS w/ E.O.S. Switch   |                                    | FLIPPERS no E.O.S. Switch                    |                                    |
|---|-----------------------------|---|------------------------------------|--|------------------------------------|
|   |                             | SPI N <sup>o</sup> / GAUGE-TURNS / Color  |                                    | SPI N <sup>o</sup> / GAUGE-TURNS / Color     |                                    |
|   |                             | LOWER LEFT  | LOWER RIGHT                        | UPPER LEFT                                   | UPPER RIGHT                        |
| Last Action Hero                                  | 2                           | 090-5020-30<br>23-900 -GRN-GRN-   | SAME                               | Not Used                                     | Not Used                           |
| Tales from the Crypt                              | 3                           | 090-5032-00<br>22-1080 -YEL-GRN-  | SAME                               | Not Used                                     | 090-5041-00<br>25-1800 -BLU-GRN-   |
| The Who's Tommy                                   | 3                           | 090-5020-30<br>23-900 -GRN-GRN-   | SAME                               | 090-5041-00<br>25-1800 -BLU-GRN-             | Not Used                           |
| WWF Royal Rumble                                  | 4                           | 090-5032-00<br>22-1080 -YEL-GRN-  | SAME                               | 090-5041-00<br>25-1800 -BLU-GRN-             | SAME                               |
| Guns N' Roses                                     | 3                           | 090-5032-00<br>22-1080 -YEL-GRN-  | SAME                               | 090-5030-00<br>23-1100 -ORG-ORG-             | Not Used                           |
| Maverick  | 3                           | 090-5032-00<br>22-1080 -YEL-GRN-  | SAME                               | Not Used                                     | 090-5032-00<br>22-1080 -YEL-GRN-   |
| Mary Shelley's Frankenstein                       | 3                           | 090-5030-00<br>23-1100 -ORG-ORG-  | SAME                               | Not Used                                     | 090-5030-00<br>23-1100 -ORG-ORG-   |
| Baywatch  | 4                           | 090-5030-00<br>23-1100 -ORG-ORG-  | 090-5020-30<br>23-900 -GRN-GRN-    | 090-5025-00<br>24-1570 -See Note-            | 090-5030-00<br>23-1100 -ORG-ORG-   |
| Batman Forever                                    | 3                           | 090-5032-00<br>22-1080 -YEL-GRN-  | 090-5020-20<br>22-900 -YEL-YEL-    | Not Used                                     | 090-5020-30<br>23-900 -GRN-GRN-    |
| Apollo 13   | 2                           | 090-5032-00<br>22-1080 -YEL-GRN-  | SAME                               | Not Used                                     | Not Used                           |
| Golden Eye  | 2                           | 090-5032-00<br>22-1080 -YEL-GRN-  | SAME                               | Not Used                                     | Not Used                           |
| Twister   | 2                           | 090-5020-20<br>22-900 -YEL-YEL-   | 090-5032-00<br>22-1080 -YEL-GRN-   | Not Used                                     | Not Used                           |
| ID4: Independence Day                             | 3                           | 090-5032-00<br>22-1080 -YEL-GRN-  | SAME                               | Not Used                                     | 090-5020-30<br>23-900 -GRN-GRN-    |
| Space Jam †                                       | 2                           | 090-5032-00T<br>22-1080 -YEL-GRN-   | 090-5020-20T<br>22-900 -YEL-YEL-   | Not Used                                     | Not Used                           |
| The Star Wars Trilogy - Special Edition †         | 2                           | 090-5032-00T<br>22-1080 -YEL-GRN-   | SAME                               | Not Used                                     | Not Used                           |
| The Lost World: Jurassic Park †                   | 2                           | 090-5032-00T<br>22-1080 -YEL-GRN-   | SAME                               | Not Used                                     | Not Used                           |
| The X-Files †                                     | 2                           | 090-5032-00T<br>22-1080 -YEL-GRN-   | SAME                               | Not Used                                     | Not Used                           |
| Starship Troopers †                               | 3                           | 090-5030-00T<br>23-1100 -ORG-ORG-   | SAME                               | Not Used                                     | 090-5032-00T<br>22-1080 -YEL-GRN-  |
| Viper Night Drivin' †                             | 2                           | 090-5030-00T<br>23-1100 -ORG-ORG-   | SAME                               | Not Used                                     | Not Used                           |
| Lost In Space †                                   | 2                           | 090-5030-00T<br>23-1100 -ORG-ORG-   | 090-5032-00T<br>22-1080 -YEL-GRN-  | Not Used                                     | Not Used                           |
| Godzilla †  | 2                           | 090-5032-00T<br>22-1080 -YEL-GRN-   | SAME                               | Not Used                                     | Not Used                           |
| South Park †                                      | 2                           | 090-5030-00T<br>23-1100 -ORG-ORG-   | SAME                               | Not Used                                     | Not Used                           |
| Harley-Davidson® † and Harley-Davidson® 2nd Ed. † | 2                           | 090-5032-00T<br>22-1080 -YEL-GRN-   | 090-5030-00T<br>23-1100 -ORG-ORG-  | Not Used                                     | Not Used                           |
| Striker Xtreme (NFL) †                            | 3                           | 090-5032-00T<br>22-1080 -YEL-GRN-   | 090-5030-00T<br>23-1100 -ORG-ORG-  | 090-5030-00T<br>23-1100 -ORG-ORG-            | Not Used                           |
| Sharkey's Shootout †                              | 3                           | 090-5030-00T<br>23-1100 -ORG-ORG-   | SAME                               | 090-5030-00T<br>23-1100 -ORG-ORG-            | Not Used                           |
| High Roller Casino †                              | 2                           | 090-5020-20T<br>22-900 -YEL-YEL-  | 090-5032-00T<br>23-1080 -YEL-GRN-  | Not Used                                     | Not Used                           |
| Austin Powers™ †                                  | 2                           | 090-5020-30<br>23-900 -GRN-GRN-   | 090-5030-00T<br>23-1100 -ORG-ORG-  | Not Used                                     | Not Used                           |
| MONOPOLY® †                                       | 3                           | 090-5032-00T<br>22-1080 -YEL-GRN-   | SAME                               | Not Used                                     | 090-5062-00T<br>23-1500 -BLU-BLU-  |
| Playboy †   | 2                           | 090-5030-00T<br>23-1100 -ORG-ORG-   | SAME                               | Not Used                                     | Not Used                           |
| RollerCoaster Tycoon™ †                           | 4                           | 090-5032-00T<br>22-1080 -YEL-GRN-   | SAME                               | 090-5067-00T<br>25-1400 -RED-RED-            | 090-5068-00T<br>25-1600 -WHT-WHT   |
| The Simpsons™ Pinball Party †                     | 6*<br>(5 with Flipper Bats) | 090-5032-00T<br>22-1080 -YEL-GRN-   | SAME                               | Not Used                                     | 090-5030-00T<br>23-1100 -ORG-ORG-  |
|   |                             | * The Homer Head Assembly is affixed to an Upr. Rt. Style Flipper (no E.O.S. Switch): |                                    | Flippers (Mini-Bats) on 2nd Level Playfield: |                                    |
|   |                             |   | * 090-5020-20T<br>22-900 -YEL-YEL- | 090-5041-00T<br>25-1800 -BLU-GRN-            | 090-5025-00T<br>24-1570 -See Note- |
| Terminator® 3: Rise of the Machines™ †            | 2                           | 090-5032-00T<br>22-1080 -YEL-GRN-   | SAME                               | Not Used                                     | Not Used                           |
| The Lord of the Rings™ †                          | 2                           | 090-5020-20T<br>22-900 -YEL-YEL-  | SAME                               | Not Used                                     | Not Used                           |
| Ripley's Believe It or Not!® †                    | 3                           | 090-5032-00T<br>22-1080 -YEL-GRN-   | SAME                               | Not Used                                     | 090-5067-00T<br>25-1400 -RED-RED-  |

† Coil Part N<sup>o</sup>s ending with a "T" signifies the Diode is on the top of the lug (on the coil-winding side); Coil Part N<sup>o</sup>s ending with a "B" signifies the Diode is on the bottom of the lugs.



# APPENDIX F

## Motor Specification (White Star Board System\* Only) Table



| Game Name                                    | Function  | Specifications   | Part Number  |
|--|---|--|--|
| Apollo 13                                    | Rocket Up/Down Movement                         | Bowman Motor 24VAC<br>60Hz 3W 6 RPM CCW  | 515-6383-00<br><i>incl. Connector</i>                                    |
|  | Moon Unit Rotational Orbit                      | Multi Products Motor 24VAC<br>50/60Hz 3W 6 RPM CCW   | 515-6487-00<br><i>incl. Connector</i>                                    |
|  | Shaker  | Johnson Motor (Vibrator) 10.5VDC<br>10 AMP 2950 RPM CW   | 041-5029-00<br><b>MOTOR ONLY</b>   |
| Golden Eye                                   | Satellite Left/Right Movement                   | Bowman Motor 24VAC<br>60Hz 3W 6 RPM CW   | 515-6528-00<br><i>incl. Connector</i>                                    |
| Twister                                      | Spinning Disc with Magnet                       | Multi Products Motor 24VAC (041-5026-00)<br>50/60Hz 3W 325 RPM CCW   | 515-6347-00<br><i>incl. Connector</i>                                    |
|  | Backbox Fan (Tornado Wind)                      | Multi Products Motor 24VAC (041-5052-00)<br>50/60Hz 3W 3600 RPM CW   | 515-6531-00<br><i>incl. Connector</i>                                    |
| ID4: Independence Day                        | Alien Head Open/Close Movement                  | Servo Motor (94322)  | 041-5045-00<br><b>MOTOR ONLY</b>   |
| <i>SPACE JAM (NO MOTOR USED)</i>             |   |  |  |
| The Star Wars Trilogy - S.E.                 | X-Wing Left/Right Movement                      | Bowman Motor 24VAC (041-5058-00)<br>60Hz 3W 10 RPM CCW   | 515-6383-01<br><i>incl. Connector</i>                                    |
| The Lost World: Jurassic Park                | Snagger & Center Link Lift Up/Down Movement     | Multi Products Motor 20VDC (041-5059-03)<br>9 RPM Non-Directional  | 515-6715-03<br><i>incl. Connector</i>                                    |
|  | Shaker  | Johnson Motor (Vibrator) 10.5VDC<br>10 AMP 2950 RPM CW   | 041-5029-00<br><b>MOTOR ONLY</b>   |
| The X-Files                                  | X-File Cabinet Lift Up/Down Movement            | Multi Products Motor 20VDC<br>9 RPM CCW  | 041-5057-00<br><b>MOTOR ONLY</b>   |
| Starship Troopers                            | Warrior Bug Forward/Reverse Movement            | Haydon Switch & Instrument, Inc. Stepper Motor 12VDC 4.6W (041-5062-00), Series 36000: 1.4"ø (Non-Captive Shaft <b>not included</b> ) HSI #36864-12 (Unipolar) Travel per Step: .004 Step Angle: 15° | 515-6794-00<br><i>incl. Connector</i><br>Requires 7" Shaft: 530-5503-00  |
| <i>VIPER NIGHT DRIVIN' (NO MOTOR USED)</i>   |   |  |  |
| Lost In Space                                | Spinning Disc with Magnet                       | Multi Products Motor 24VAC (041-5046-00)<br>50/60Hz 3W 325 RPM CCW   | 515-6347-00<br><i>incl. Connector</i>                                    |
| Godzilla                                     | Shaker ‡  | Multi #3811 0630 Motor (Vibrator) 12VDC<br>3100 RPM CW (w/DRL PTS) ‡   | 041-5029-01<br><b>MOTOR ONLY</b>   |
| <i>SOUTH PARK (NO MOTOR USED)</i>            |   |  |  |
| Harley-Davidson®<br>1st through 3rd Editions | Shaker ‡  | Multi #3811 0630 Motor (Vibrator) 12VDC<br>3100 RPM CW (w/DRL PTS) ‡   | 041-5029-01<br><b>MOTOR ONLY</b>   |
|  | Motorcycle Lift Up/Down Movement                | Autotrol 24VAC (041-5072-02)<br>20 RPM CCW   | 515-7025-00<br><i>incl. Connector</i>                                    |
| Striker Xtreme (NFL)                         | Goalie (Linebacker) Left to Right Movement      | Multi #3590 12VDC (041-5075-00)<br>60 RPM  | 515-7071-00<br><i>incl. Connector</i>                                    |
| Sharkey's Shootout                           | Mystery Ball Rotating Movement                  | Hankscraft Motor Model-E 24VAC (041-5076-00)<br>50/60Hz 3W 20 RPM CW   | 515-7095-00<br><i>incl. Connector</i>                                    |
| High Roller Casino                           | Roulette Wheel Rotating Movement                | Multi Products Motor 20VDC (041-5078-00)<br>17 RPM CCW   | 515-7153-00<br><i>incl. Connector</i>                                    |
|  | Up/Dn. Ramp in Slot Mach. Lift Up/Down Movement | Haydon Switch & Instrument, Inc. Stepper Motor 12VDC 4.6W (041-5062-00), Series 36000: 1.4"ø (Non-Captive Shaft <b>not included</b> ) HSI #36864-12 (Unipolar) Travel per Step: .004 Step Angle: 15° | 515-6794-00<br><i>incl. Connector</i><br>Requires Shaft 4¼": 530-5503-01 |
| Austin Powers™                               | Time Machine Rotating Movement                  | Multi Products Motor 24VAC (041-5079-00)<br>50/60Hz 20RPM CCW  | 515-7141-00<br><i>incl. Connector</i>                                    |
|  | Laser Beam Left to Right Directional            | Autotrol Motor 24VAC (041-5081-00)<br>50/60Hz 4W 10RPM Bi-Directional  | 515-7171-00<br><i>incl. Connector</i>                                    |
|  | Dr. Evil Target Lift Up/Down Movement           | Hankscraft Motor Model-E 24VAC (041-5030-00)<br>50/60Hz 6RPM CCW   | 515-5900-00<br><i>incl. Connector</i>                                    |
| Monopoly®                                    | Mini-Flipper (Waterworks) Rotating Movement     | Multi Prod. Motor & Gear Box #7000 EX00159A<br>20VDC 50/60Hz 85RPM CC/CCW  | 041-5083-00<br><b>MOTOR ONLY</b>   |
| Playboy                                      | Triangular Billboard Rotating Movement          | Autotrol Motor (BD511 150-1387) 24VAC<br>50/60Hz 12RPM Bi-Directional  | 041-5086-02<br><b>MOTOR ONLY</b>   |
|  | Centerfold Mechanism Open/Close Movement        | Multi Products (3680) Motor 12v DC<br>10/12 RPM CC/CCW   | 041-5075-04<br><b>MOTOR ONLY</b>   |
|  | Tease Drop Screen Lift Up/Down Movement         | Haydon Switch & Instrument, Inc. Stepper Motor 12VDC 4.6W (041-5062-00), Series 36000: 1.4"ø (Non-Captive Shaft <b>not included</b> ) HSI #36864-12 (Unipolar) Travel per Step: .004 Step Angle: 15° | 515-6794-00<br><i>incl. Connector</i><br>Requires 7" Shaft: 530-5503-00  |

‡ Please Note: ".01" Shaker Motor is **Not Compatible** with old Shaker Motor 041-5029-00 (Shaker Motor Assy. 515-5893-00). THIS NEW MOTOR CAN ONLY BE USED IN NEW SHAKER MOTOR ASSY. 515-5893-01.

Table continued on the next page.





# APPENDIX F

## Motor Specification (White Star Board System\* & S.A.M. System\*\* Only) Table



| Game Name   | Function   | Specifications   | Part Number   |
|---|--|--|---|
| <b>ROLLERCOASTER TYCOON™ (NO MOTOR USED)</b>        |  |  |   |
| <b>THE SIMPSONS™ PINBALL PARTY (NO MOTOR USED)</b>  |  |  |   |
| <b>Terminator® 3: Rise of the Machines™</b>         | Backbox Ball Shooter Up/Down Movement                      | Multi Products Motor 24VAC (041-5079-01)<br>21 RPM CW  | 515-7317-00<br><i>incl. Connector</i>   |
| <b>The Lord of the Rings™</b>                       | Balrog (Motor & Gate) Open/Close Movement                  | Multi Prod. Motor 20VDC Series 600B (or equiv.)<br>50/60Hz 10 RPM Bi-Directional   | 041-5088-01<br><b>MOTOR ONLY</b>  |
| <b>RIPLEY'S BELIEVE IT OR NOT!® (NO MOTOR USED)</b> |  |  |   |
| <b>Elvis®</b>                                       | Elvis™ Front/Back Movement                                 | Haydon Switch & Instrument, Inc. Stepper Motor 12VDC 10W (041-5089-00),<br>(Non-Captive Shaft <b>not included</b> )<br>HSI #46868-12-002 | 500-6809-00<br><i>incl. Connector</i><br>Requires 7.25" Shaft:<br>530-5658-00 |
|   | ▶▶▶ <b>OPTIONAL</b> ◀◀◀<br>Shaker                          | Multi #3811 0630 Motor (Vibrator) 12VDC (041-5029-01) 3100 RPM (w/DRL PTS)   | 515-5893-01<br><i>incl. Connector</i>   |
| <b>The Sopranos™</b>                                | Bada Bing! Girls x2 Rotating Posts Movement                | Autotrol Synchronous Motor 24VAC 4W<br>50/60Hz 45.7/54.9 RPM Bi-Directional  | 041-5092-00<br><i>w/1" Shaft + 12" Leads</i>                                  |
| <b>NASCAR® and [NDSE]</b>                           | Back Panel Rotating (Car) Windmill (Skill Ball Enter)      | Multi Products Motor & Gear Box 20VDC<br>Model #8000 (EX-04-073) 10 RPM  | 041-5093-00<br><b>MOTOR ONLY</b>  |
| <b>Grand Prix</b>                                   | Back Panel Rotating (Car) Windmill (Skill Ball Enter)      | Multi Products Motor & Gear Box 20VDC<br>Model #8000 (EX-04-073) 10 RPM  | 041-5093-00<br><b>MOTOR ONLY</b>  |
| <b>World Poker Tour™ (WPT) (NO MOTOR USED)</b>      |  |  |   |
| <b>The Simpsons™ Kooky Carnival</b>                 | Bart on Skateboard Left/Right Movement                     | Multi Products Motor with Crank 24VAC (041-5095-01) 50/60Hz 3W 14 RPM  | 500-6947-01<br><i>incl. Connector</i>   |
|   | Left & Right Ramps Up/Down Movement                        | Multi Products Motor 24VAC (041-5048-01) 50/60Hz 3W 15 RPM CCW (Qty. 2 in game)  | 515-7558-00<br><i>incl. Connector</i>   |
|   | Shaker<br><i>(details in SKC Manual, Page 24)</i>          | Multi #3811 0630 Motor (Vibrator) 12VDC 3100 RPM (w/DRL PTS)   | 041-5029-01<br><b>MOTOR ONLY</b>  |
| <b>©Disney's Pirates of the Caribbean</b>           | Spinning Disk  | Multi #3811R 0630 Motor (Vibrator) 12VDC (041-5029-04) 3100 RPM (w/DRL PTS)<br>-04 is RoHS compliant; can substitute with -01 domestic   | 511-5024-04<br><i>incl. Connector</i>   |
|   | Pirate Ship Sinking/Raising Movement                       | Multi Products Motor & Gear Box 24VDC<br>Model #7000-DCM 12 RPM  | 041-5101-00<br><b>MOTOR ONLY</b>  |
| <b>Family Guy™</b>                                  | Stewie Figurine Left & Right Movement                      | Stepper Motor NPM PF35T-48D4STD 5V RVB (041-5102-00 Reference Only)  | 511-5043-00<br><i>incl. Connector</i>   |
| <b>Spider-Man™</b>                                  | Doc Ock, Sandman & 3-Bank Up/Down Movement                 | Sync. Motor 24VAC 50/60Hz 3W 12 RPM CW (041-5103-00 Reference Only)  | 511-5063-00<br><i>incl. Connector</i>   |
|   | ▶▶▶ <b>OPTIONAL</b> ◀◀◀<br>Shaker Motor Kit<br>502-5027-00 | Multi #3811R 0630 Motor (Vibrator) 12VDC (041-5029-04) 3100 RPM (w/DRL PTS)<br>-04 is RoHS compliant; can substitute with -01 domestic   | 515-5893-01<br><i>incl. Connector</i>   |





# APPENDIX F

## Motor Specification Table

The following table only list games that used motors. Part Numbers starting with "515-" will include the Wiring Harness & Connector.

| Game Name                    | Function  | Specifications  | Part N <sup>o</sup> |
|------------------------------|---|---|---------------------|
| ABC Monday Night Football    | Goal Post<br>Up/Down Movement                     | Motor 24v A.C.<br>60 RPM CW                               | 515-5222-00         |
| Phantom of the Opera         | Organ<br>Up/Down Movement                         | Bowman Motor 24v<br>60Hz 3W 11 RPM CCW                    | 515-5256-00         |
| Checkpoint                   | Mag Wheel<br>(in Backbox)                         | Motor D.C. (KEN)  | 041-5005-00         |
|                              | Shaker  | Johnson Motor<br>(Vibrator)                               | 041-5002-00         |
| Teenage Mutant Ninja Turtles | Spinning Pizza Ball<br>Deflector                  | Gear Motor 24v A.C.<br>325 RPM CW                         | 515-5397-00         |
| Batman                       | Bar Target<br>Up/Down Movement                    | Bowman Motor 24v<br>60Hz 3W 11 RPM CCW                    | 515-5256-00         |
| Star Trek 25th Anniversary   | Swinging Target                                   | Bowman Motor 24v<br>22½ RPM                               | 515-5534-00         |
|                              | Transporter F/X                                   | Gear Motor 24v A.C.<br>3½ RPM                             | 500-5421-00         |
|                              | Cooling Fan<br>(for Transporter F/X)              | 4½" Motor 12v   | 041-5014-00         |
| Lethal Weapon 3              | Spinning Light                                    | Motor 2½ v A.C.<br>4000 RPM CCW                           | 041-5017-00         |
| Star Wars                    | Bar Target<br>Up/Down Movement                    | Bowman Motor 24v<br>60hz 3W 11 RPM CCW                    | 515-5256-00         |
|                              | R2D2 Robot<br>Left/Right Movement                 | Bowman Motor 24v A.C.<br>22½ RPM CW                       | 515-5571-00         |
|                              | Death Star<br>Rotation                            | Bowman "G" Motor 24v A.C.<br>60Hz 6 RPM CW                | 515-5570-00         |
| Rocky & Bullwinkle & Friends | Nell Log "Cutting Blade"<br>Forward/Back Movement | Autotrol Model E Motor 24v<br>60hz 4W 3 RPM CCW           | 041-5023-00         |
| Jurassic Park                | T-Rex<br>Left/Right Movement                      | Multi Motor 5v D.C.                                       | 041-5025-00         |
|                              | T-Rex<br>Up/Down Movement                         | Bowman Motor 24v<br>11 RPM CW                             | 041-5026-00         |
|                              | Shaker  | Johnson Motor<br>(Vibrator)                               | 041-5002-00         |
| Last Action Hero             | Crane<br>Left/Right Movement                      | Multi Products Motor 12v D.C.<br>#3312 OSC                | 041-5027-00         |
|                              | Shaker  | Johnson Motor (Vibrator) 10.5v D.C.<br>10 AMP 2950 RPM CW | 041-5029-00         |
| Tales from the Crypt         | Tombstone<br>Up/Down Movement                     | Bowman Motor 24v A.C.<br>6 RPM CCW                        | 515-5900-00         |
|                              | Shaker  | Johnson Motor (Vibrator) 10.5v D.C.<br>10 AMP 2950 RPM CW | 041-5029-00         |
| The Who's Tommy              | Mirror<br>Up/Down Movement                        | Bowman Motor 24v A.C.<br>6 RPM CCW                        | 515-5900-00         |
|                              | Flipper Blinders                                  | Servo Motor<br>(94102)                                    | 041-5032-00         |
|                              | Spinning Airplane<br>Propellers                   | Motor D.C.  | 041-5033-00         |
| WWF Royal Rumble             | Shaker  | Johnson Motor (Vibrator) 10.5v D.C.<br>10 AMP 2950 RPM CW | 041-5029-00         |
| Maverick, The Movie          | Turning Paddle Wheel                              | Motor 24v A.C.<br>10 RPM                                  | 041-5036-00         |
| Mary Shelley's Frankenstein  | Creature Head<br>Left/Right Movement              | Servo Motor (94102)                                       | 041-5032-00         |
| Batman Forever               | Cannon<br>Left/Right Movement                     | Bowman Motor 24v A.C.<br>60Hz 3W 6 RPM CCW                | 515-6383-00         |

# APPENDIX G

## Part Number Prefix Classification Codes

### I. Electrical Source, Energy & Signal Converters

- 010- Transformers
- 031- Speakers
- 090- Solenoids (Coils)
- 150- Filters, Outlets, Varistors, Thermistors
- 200- Fuses

### II. Conductors, Connectors & Insulators

- 034- Line Cords
- 036- Cable Assemblies & Wiring Harnesses
- 041- Motors
- 045- Connectors (All Types)
- 055- Lugs (M/F), Pins (M/F), Discs, Ring Terminals, Terminal Strips, etc.
- 060- Polarizing Keys and Conn. Covers
- 077- Lamp Sockets

### III. Circuits & Circuit Elements

- 100- ICs
- 110- Transistors
- 112- Diodes (All Types including LEDs & Modules)
- 121- Resistors
- 123- Resistors (Variable & Adjustable)
- 124- Regulators & Bridge Rectifiers
- 125- Capacitors (Radial Lytics & Ferrites)
- 126- Piezo Crystal
- 127- Heatsinks
- 130- Capacitors (Tectates & Ceramics)
- 140- Oscillators (Clocks/Crystals)
- 165- Light Bulbs
- 180- Switches
- 181- Switch Membranes (Pads) & Piezo Sensors
- 190- Relays
- 960- EPROM (*Raw Part*)
- 965- EPROM (*Programmed Part*)

### IV. Bolts, Screws, Nuts, Washers & Nails

- 231- Bolts
- 232- Screws (Pan Head)
- 234- Screws (HWH)
- 237- Screws (Misc.)
- 240- Nuts (Misc.)
- 242- Washers (Flat, Round)
- 244- Washers (Split Lock)
- 245- Nyloners
- 246- Washers (Lockers, External Tooth)
- 281- Nails

### V. Mechanical Components

- 249- Rivets
- 251- Pins (Dowel), Finishing Nails, Hairpins, Spring Pins and Clevis Pins
- 254- Stand-Offs, Spacers and Shims
- 260- Steel Ball (All Types Steel, Glowing, Delrin, etc.)
- 265- Springs (Extension)
- 266- Springs (Compression)
- 267- Springs (Torsion)
- 269- Springs (Washers - Belleville, Wave)
- 270- Retaining Rings
- 280- Grommets, Bushings and Nyloners
- 283- Bearings

### VI. Handles, Locks, Catches, Latches, Keys

- 355- Handles, Locks, Catches, Latches and Keys

### VII. Fabricated Parts

- 390- Hinges
- 501- Coin Doors
- 515- Sub-Assemblies
- 520- Printed Circuit Boards (PCBs)
- 522- Display Glass
- 525- Wood Parts
- 530- Screw Machined Parts
- 535- Fabricated Parts
- 545- Molded (Extruded) Plastic and Rubber Parts (Rings, Sleeves, etc.)
- 550- Molded (Inserts)

### VIII. In-House Assemblies

- 500- End Product (Systems and Models)
- 502- Kits (Created In-House)
- 505- Cabinets (complete)
- 510- Riveted Sub-Assemblies (In-House)
- 511- Sub-Assemblies (In-House)
- 515- Sub-Assemblies\*

\*2 or more 515-'s but still a sub-assembly.

### IX. Bulk Materials

- 600- Braided Wire & Ground Straps
- 601- Stranded Wire
- 602- Ribbon Cable
- 604- Telephone Line Cord
- 605- Sleeving (Shrink Tubing)
- 625- Velcro (non-adhesive)
- 626- Foam Rubber, Foam Pads, Rubber Bumpers (Blue Pads), Tape (All Types) Velcro (adhesive) and String / Rope








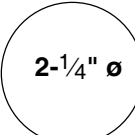
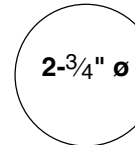

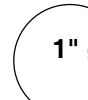
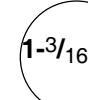
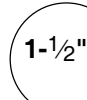
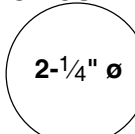
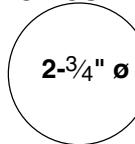
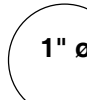


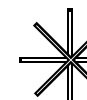
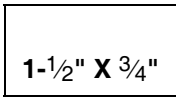
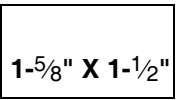
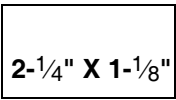
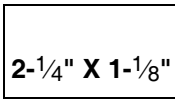
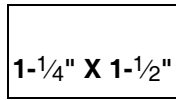
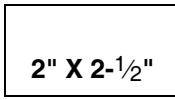


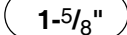
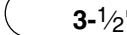




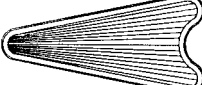
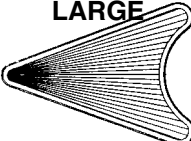

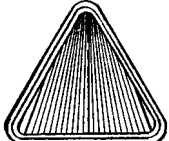
### X. Miscellaneous

- 000- Tools (*see also 777-*) and Supplies
- 040- Clamps, Ties & Clips
- 042- Pulleys
- 091- Coin Mechs
- 205- Fuse Holders
- 631- Staples
- 660- Glass (Playfield, Backglass, etc.)
- 675- Cleaners
- 705- Packing & Shipping Items
- 755- Instruction, Coin Cards, Ins. Sheets
- 756- Information Sheets, Service Bulletins, Instruction Sheets in Kits and Templates
- 777- Tools (Wrenches and Drivers)
- 780- Manuals
- 802- Decal Kits (comprised of 820's)
- 820- Decals, Mylar and Labels (Sheets/Sets)
- 803- Plastic Kits (comprised of 830's)
- 830- Plastic Pieces (Butyrate Sheets/Sets)
- 880- Toys, Models, Figurines, etc.
- 900- Game Posters



# APPENDIX H

## Playfield Inserts (Plastic Light Covers)

|  |  |  |   |  |  |
|--|--|--|---|--|--|
| <b>Patterns:</b><br><b>STARBURST</b><br><br><b>STIPPLE</b><br> | <b>STARBURST CIRCULAR</b><br><br><b>550-5000-XX</b>       | <b>STARBURST CIRCULAR</b><br><br><b>550-5001-XX</b>           | <b>STARBURST CIRCULAR</b><br><br><b>550-5002-XX</b>            | <b>STARBURST CIRCULAR</b><br><br><b>550-5003-XX</b>   | <b>STARBURST CIRCULAR</b><br><br><b>550-5004-XX</b>         |
| <b>STARBURST CIRCULAR</b><br><br><b>550-5005-XX</b>   | <b>STARBURST CIRCULAR</b><br><br><b>550-5006-XX</b>       | <b>PLAIN CIRCULAR</b><br><br><b>550-5007-XX</b>               | <b>PLAIN CIRCULAR</b><br><br><b>550-5008-XX</b>                | <b>PLAIN CIRCULAR</b><br><br><b>550-5009-XX</b>       | <b>PLAIN CIRCULAR</b><br><br><b>550-5010-XX</b>             |
| <b>PLAIN CIRCULAR</b><br><br><b>550-5011-XX</b>   | <b>PLAIN CIRCULAR</b><br><br><b>550-5012-XX</b>           | <b>STIPPLE CIRCULAR</b><br><br><b>550-5048-XX</b>             | <b>STIPPLE 1" SQUARE</b><br><br><b>550-5019-XX</b>             | <b>ROLLOVER BUTTON BASE</b><br><br><b>550-5026-XX</b> | <b>WHITE STAR (only in white)</b><br><br><b>545-5015-00</b> |
| <b>STIPPLE RECTANGULAR</b><br><br><b>550-5018-XX</b>   | <b>STIPPLE RECTANGULAR</b><br><br><b>550-5051-XX</b>     | <b>STARBURST RECTANGULAR</b><br><br><b>550-5044-XX</b>       | <b>PLAIN RECTANGULAR</b><br><br><b>550-5049-XX</b>           | <b>PLAIN RECTANGULAR</b><br><br><b>550-5050-XX</b>   | <b>PLAIN RECTANGULAR</b><br><br><b>550-5063-XX</b>         |
| <b>STARBURST MINI SHIELD</b><br><br><b>550-5024-XX</b>  | <b>STARBURST LARGE SHIELD</b><br><br><b>550-5025-XX</b> | <b>MINI HOT DOG</b><br><br><b>550-5020-XX</b>               | <b>BEVEL HOT DOG</b><br><br><b>550-5021-XX</b>               | <b>PLAIN HOT DOG</b><br><br><b>550-5022-XX</b>      | <b>BANANA</b><br><br><b>550-5023-XX</b>                   |
| <b>STARBURST ARROW-SMALL</b><br><br><b>550-5013-XX</b>  | <b>STARBURST ARROW-LARGE</b><br><br><b>550-5070-XX</b>  | <b>STARBURST ARROW-HEAD SMALL</b><br><br><b>550-5014-XX</b> | <b>STARBURST ARROW-HEAD LARGE</b><br><br><b>550-5015-XX</b> | <b>STARBURST BULLET</b><br><br><b>550-5016-XX</b>   | <b>STARBURST TRIANGLE</b><br><br><b>550-5017-XX</b>       |

**Note:** The shapes and sizes shown above are not to scale. Some shapes may no longer be available in every color.

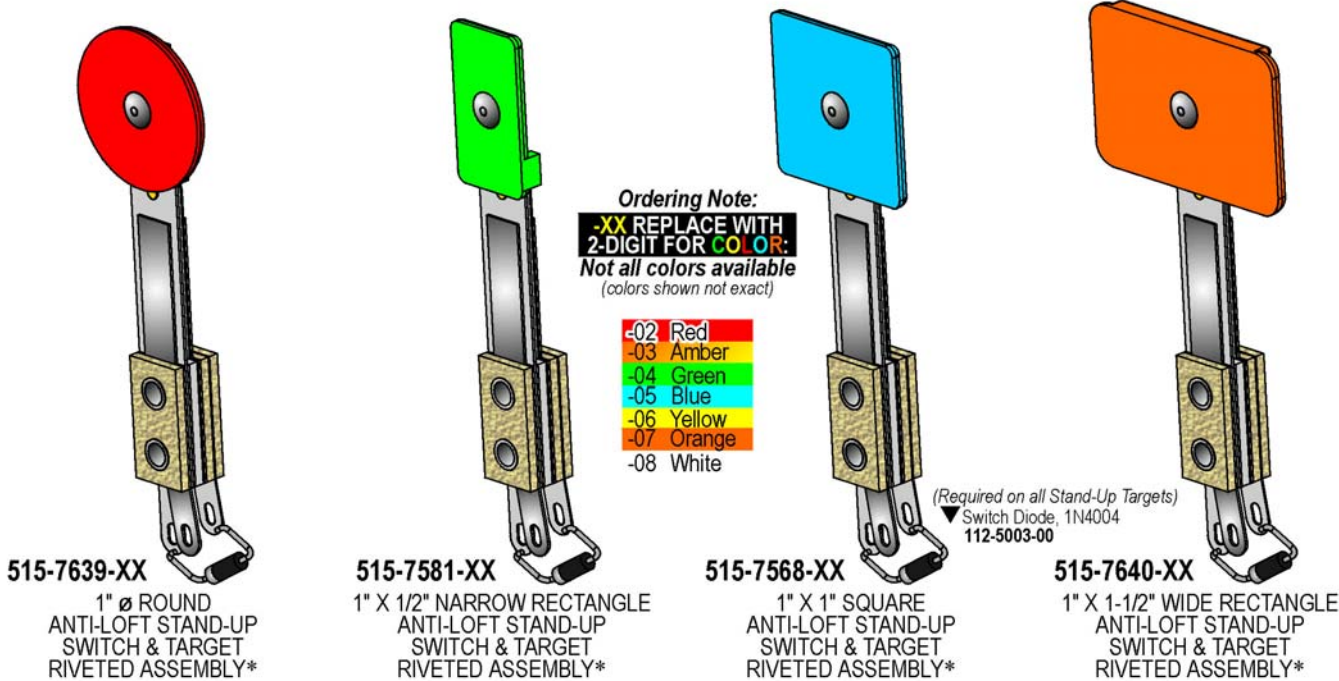
**Instructions:** Parts which may come in various colors (i.e. targets, some posts, playfield inserts, etc.) end in a 2-digit number which correspond to the color of that part. The "-XX" in part number which may come in various colors should be replaced with the desired 2-Digit number corresponding to the color desired below. *Not all colors may be available.*

| PLASTIC PART COLOR CHART |                      |     |       |     |        |     |               |     |             |     |              |
|--------------------------|----------------------|-----|-------|-----|--------|-----|---------------|-----|-------------|-----|--------------|
| Nº                       | Color                | Nº  | Color | Nº  | Color  | Nº  | Color         | Nº  | Color       | Nº  | Color        |
| -00                      | Black or Solid Clear | -03 | Amber | -06 | Yellow | -09 | Purple        | -12 | Fluor. Blue | -15 | Luminescent  |
| -01                      | Clear                | -04 | Green | -07 | Orange | -10 | Fluor. Orange | -13 | Teal Green  | -16 | Gold         |
| -02                      | Red                  | -05 | Blue  | -08 | White  | -11 | Fluor. Green  | -14 | Gray        | -17 | Trans. Brown |



# APPENDIX I

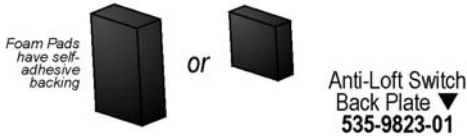
## Anti-Loft Stand-Up Targets



\*Some targets may require the lugs position be changed to the left or to the right, depending on the application; these targets will have a different part number and are called out in the game manual they are used in (see Section 4, Chapter 1, Parts Identification & Location, Playfield ... -Switches.) Review the game manual for the game desired for the original target used or application.

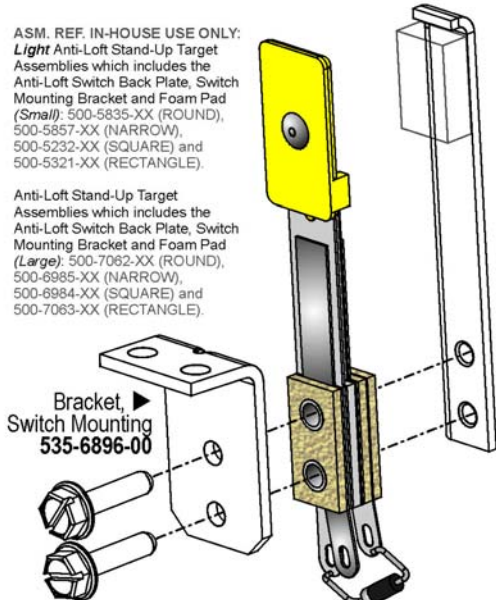
**For Anti-Loft Application use**  
 Large Foam Pad,  
 5/8" X 7/16" X 3/16" Thick  
**626-5078-00**

**For > Light < Anti-Loft Application use**  
 Small Foam Pad,  
 7/16" X 7/16" X 1/8" Thick  
**626-5029-00**

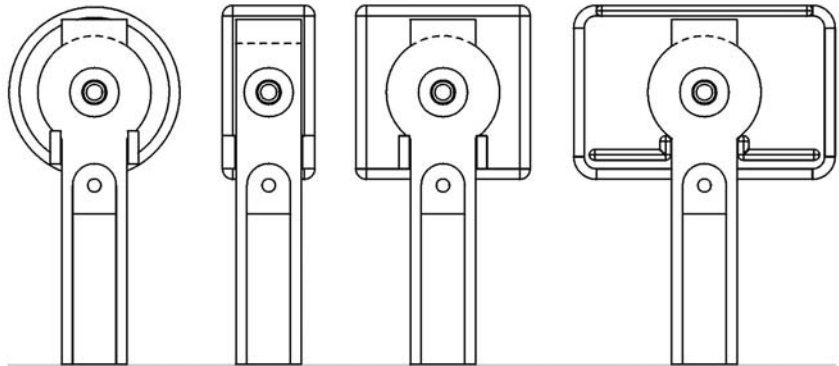


ASM. REF. IN-HOUSE USE ONLY:  
**Light** Anti-Loft Stand-Up Target Assemblies which includes the Anti-Loft Switch Back Plate, Switch Mounting Bracket and Foam Pad (Small): 500-5835-XX (ROUND), 500-5857-XX (NARROW), 500-5232-XX (SQUARE) and 500-5321-XX (RECTANGLE).

Anti-Loft Stand-Up Target Assemblies which includes the Anti-Loft Switch Back Plate, Switch Mounting Bracket and Foam Pad (Large): 500-7082-XX (ROUND), 500-6985-XX (NARROW), 500-6984-XX (SQUARE) and 500-7063-XX (RECTANGLE).



▲ #6-32 X 5/8" Slotted HWH Swage (Zinc) Screws (Qty. 2/per) **237-5976-04**



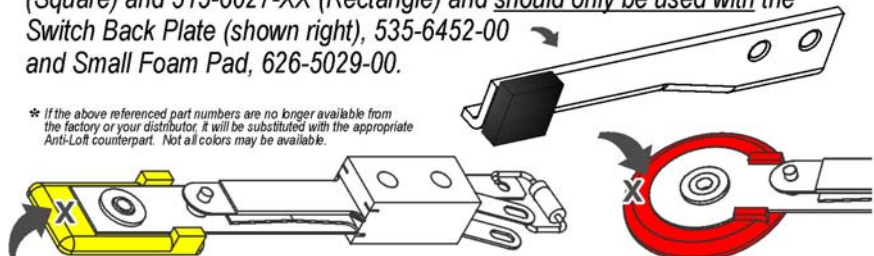
**REAR VIEWS OF ANTI-LOFT TARGET & SWITCH ASSEMBLIES**

The material of the Anti-Loft Switch has been extended higher to be used with the Anti-Loft Switch Back Plate. **IMPORTANT:** Switch & Target Assemblies (X) without the extension (the predecessors) **SHOULD NOT** be used with an Anti-Loft Switch Back Plate (shown left).

APPENDIX REFERENCE FOR PINBALL GAMES WHICH USED THE BELOW SWITCH & TARGET ASSEMBLIES NOTE:

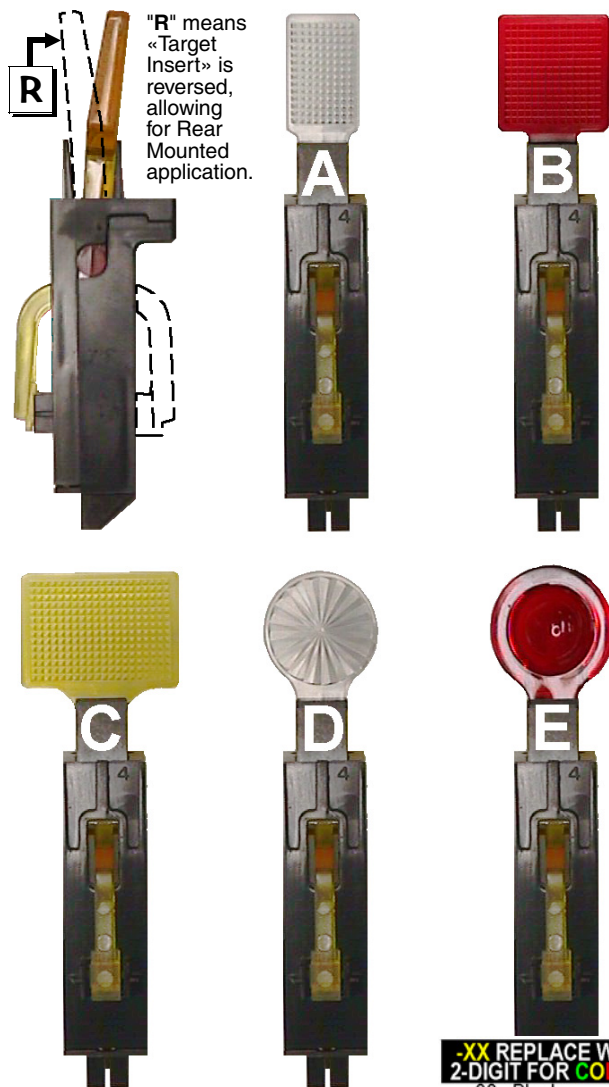
The Switch & Target Assemblies (X) without the extension have the following part numbers\*: 515-5966-XX (Round), 515-5967-XX (Narrow), 515-5162-XX (Square) and 515-6027-XX (Rectangle) and should only be used with the Switch Back Plate (shown right), 535-6452-00 and Small Foam Pad, 626-5029-00.

\* If the above referenced part numbers are no longer available from the factory or your distributor, it will be substituted with the appropriate Anti-Loft counterpart. Not all colors may be available.



# APPENDIX I

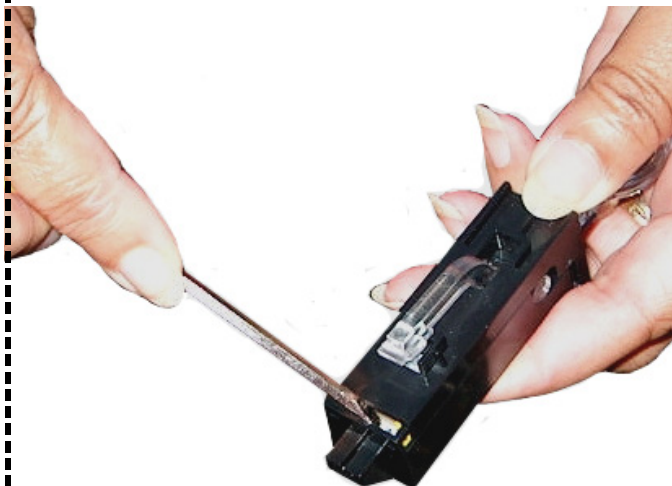
## Modular Stand-Up Targets



"R" means «Target Insert» is reversed, allowing for Rear Mounted application.

### To Replace the « Target Insert » or change Target Orientation :

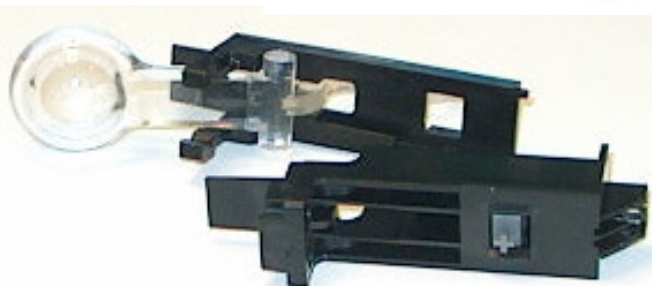
**Items A-E Note:** For the Target Assembly use the "500-" SPI Part Number(s) shown in the Parts Table below. To receive the Target Assembly with the « Target Insert » « Reversed » simply add a "R" at the end of the Part Number. See Side View picture left to compare (dashed line shows target reversed). For just the «Target Insert» use the "545-" SPI Part Number.



### To reverse it yourself or to just change the insert:

1. With a small flat head screwdriver, push into the small tab at the bottom of the target front and give a slight twist motion to "pop" the two halves.

2. Push the Target Insert bottom in at the same time while you slide the top (front) part up, then let go of the insert as the two halves come apart.



3. Replace target or reinsert it into the other size while sliding the two halves back together.

**Note:** If you were reversing the orientation, don't forget to also turn the Switch Actuator PCB 180°. Test Switch.

### Take Note:

- Items A-E come in various colors. These targets may not be available in every color. The "-XX" in should be replaced with the desired 2-Digit number for the color desired as described in the Color Chart below. As of print date, the following colors were used :  
 -01 Clear (A, D); -02 Red (A, B, C, D, E); -03 Amber (D, E);  
 -04 Green (A, B); -05 Blue (C); -06 Yellow (A, C),  
 -09 Purple (B, D); -11 Fluorescent Green (A, B, D)
- For location(s) and type of Stand-Up Targets used, if any, see Section 4, Chapter 1, Parts Identification & Location.

### -XX REPLACE WITH 2-DIGIT FOR COLOR:

- 00 Black
  - 01 Clear
  - 02 Red
  - 03 Amber
  - 04 Green
  - 05 Blue
  - 06 Yellow
  - 07 Orange
  - 08 White
  - 09 Purple
  - 10 Fluor. Orange
  - 11 Fluor. Green
  - 12 Fluor. Blue
  - 13 Teal Green
  - 14 Gray
  - 15 Luminescent
  - 16 Gold
- Note: Not all colors available.

| Nr. | STAND-UP TARGET PARTS                   | SPI PART Nr. |
|-----|---|--------------|
| A   | Modular Stand-Up Target Narrow Assy.    | 500-6138-XX  |
|     | Stand-Up Target Narrow (Insert)         | 545-6138-XX  |
| B   | Modular Stand-Up Target Square Assy.    | 500-6139-XX  |
|     | Stand-Up Target Square (Insert)         | 545-6139-XX  |
| C   | Modular Stand-Up Target Rectangle Assy. | 500-6228-XX  |
|     | Stand-Up Target Rectangle (Insert)      | 545-6228-XX  |
| D   | Modular Stand-Up Target Round Assy.     | 500-6075-XX  |
|     | Stand-Up Target Round (Insert)          | 545-6075-XX  |
| E   | Mod. Stand-Up Target 1" Spherical Assy. | 500-6189-XX  |
|     | Stand-Up Target 1" Spherical (Insert)   | 545-6189-XX  |



# APPENDIX J

## Coin Cards (USA & International Pricing Defaults) ► For Yellow Stock add -Y to the Part Number

If more than one Pricing Scheme is available for countries listed, the **F.** listed beside the option, denotes the Factory Default Setting.  
**FOR VIEWS OF THE LATEST or OPTIONAL USA, INTERNATIONAL / EURO AND CUSTOM COIN CARDS, VISIT OUR WEBSITE.**  
 Not Shown USA 755-5400-10 Tournament Option \$2 = X1; 755-5400-11 Tournament Option \$1.50 = X1

|  |  |  |  |   |  |   |  |  |  |   |  |
|--|--|--|--|---|--|---|--|--|--|---|--|
| <b>USA 10 F.</b><br><br>755-5400-11 Front      |  | <b>USA 10</b><br><br>755-5400-11 Back      |  | <b>USA 2-7 or CANADA</b><br><br>755-5400-02 Front |  | <b>FOR CUSTOM PRICING †</b><br><br>755-5400-01, -02 or -04 Back |  | <b>USA 3 with ToPS™</b><br><br>755-5400-03 or -09 Front  |  | <b>USA 5 with ToPS™</b><br><br>755-5400-03 Back / -08 Front |  |
| <b>AUSTRALIA 1 F.</b><br><br>755-5406-00 Front |  | <b>AUSTRALIA 2</b><br><br>755-5406-00 Back |  | <b>CROATIA</b><br><br>755-5410-00 Front           |  | <b>FOR CUSTOM PRICING †</b><br><br>755-5410-00 Back             |  | <b>DENMARK 1 F.</b><br><br>755-5402-00 Front   |  | <b>DENMARK 2</b><br><br>755-5402-00 Back                    |  |
| <b>JAPAN 1</b><br><br>755-5408-01 Front        |  | <b>JAPAN 2 F.</b><br><br>755-5408-01 Back  |  | <b>MIDDLE EAST</b><br><br>755-5400-06 Front       |  | <b>ANY COUNTRY CAN USE</b><br><br>755-5400-06 Back              |  | <b>NEW ZEALAND 1 F.</b><br><br>755-5406-00 Back  |  | <b>NEW ZEALAND 2</b><br><br>755-5406-00 Front               |  |
| <b>NORWAY 1 F.</b><br><br>755-5403-01 Front    |  | <b>NORWAY 2</b><br><br>755-5403-01 Back    |  | <b>RUSSIA F.</b><br><br>755-5411-00 Front         |  | <b>RUSSIA (ALTERNATE)</b><br><br>755-5411-00 Back               |  | <b>SOUTH AFRICA</b><br><br>755-5409-01 Front   |  | <b>FOR CUSTOM PRICING †</b><br><br>755-5409-01 Back         |  |
| <b>SWEDEN 1 F.</b><br><br>755-5404-00 Front    |  | <b>SWEDEN 2</b><br><br>755-5404-00 Back    |  | <b>SWITZERLAND 1 F.</b><br><br>755-5405-00 Front  |  | <b>SWITZERLAND 2</b><br><br>755-5405-00 Back                    |  | <b>TAIWAN</b><br><br>755-5412-00 Front   |  | <b>FOR CUSTOM PRICING †</b><br><br>755-5412-00 Back         |  |
| <b>UK 1</b><br><br>755-5407-00 Front           |  | <b>UK 3</b><br><br>755-5407-00 Back        |  | <b>UK 5 F.</b><br><br>755-5407-01 Front           |  | <b>FOR CUSTOM PRICING †</b><br><br>755-5407-01 Back             |  | <b>Appendix J Notes:</b><br>1. Coin Card on Game is determined by original shipping country destination.<br>2. Optional Coin Card(s), are available via your distributor or via free download @ <a href="http://www.sterpinball.com/coinagecards.shtml">www.sterpinball.com/coinagecards.shtml</a> .<br>Older style Coin Cards (foreign or domestic) not available on our website or no longer available through your distributor, are obsolete.<br>3. Coin Cards which have a Blank Backside can be used for †Custom Pricing. |  |   |  |

Not Shown EURO 755-5401-20 Tournament Custom (can fill in your own pricing).

|  |  |  |  |  |  |   |  |   |  |   |  |
|--|--|--|--|--|--|---|--|---|--|---|--|
| <b>EURO 1</b><br><br>755-5401-01 1-Side Only |  | <b>EURO 2</b><br><br>755-5401-02 1-Side Only |  | <b>EURO 3</b><br><br>755-5401-03 1-Side Only |  | <b>EURO 4</b><br><br>755-5401-04 1-Side Only  |  | <b>EURO 5</b><br><br>755-5401-05 1-Side Only  |  | <b>EURO 6</b><br><br>755-5401-06 1-Side Only  |  |
| <b>EURO 7</b><br><br>755-5401-07 1-Side Only |  | <b>EURO 8</b><br><br>755-5401-08 1-Side Only |  | <b>EURO 9</b><br><br>755-5401-09 1-Side Only |  | <b>EURO 10</b><br><br>755-5401-10 1-Side Only |  | <b>EURO 11</b><br><br>755-5401-11 1-Side Only |  | <b>EURO 12</b><br><br>755-5401-12 1-Side Only |  |

### ► EURO FACTORY DEFAULT SUMMARY TABLE ◄

|                                |           |                      |        |        |        |        |         |         |         |         |         |
|--------------------------------|-----------|----------------------|--------|--------|--------|--------|---------|---------|---------|---------|---------|
| EURO 1                         | EURO 2    | EURO 3               | EURO 4 | EURO 5 | EURO 6 | EURO 7 | EURO 8  | EURO 9  | EURO 10 | EURO 11 | EURO 12 |
| BELGIUM<br>ITALY 1<br>PORTUGAL | GERMANY 2 | NETHERLANDS<br>SPAIN |        |        | GREECE |        | FINLAND | AUSTRIA | FRANCE  |         |         |

Section 3, Chapter 4, GO TO ADJUSTMENTS MENU, Adj. 18, Game Pricing, USA & International (non-Euro) and Euro 1-12 Summary & International (Euro) Standard Pricing Select Tables, summarizes Standard or Custom Pricing Schemes & the Dip Switch Setting required.





# GLOSSARY OF TERMS

- A** Followed after a number means "Amp." or Ampage in an expression relating to an electrical object. (e.g. **8A**).
- AC** (Acronym) **Alternating Current**.
- Adj.** (Abbreviation) Adjustment(s).
- Assy.** (Abbreviation) Assembly.
- Au.** (Abbreviation) Audit(s).
- Bd.** (Abbreviation) Board.
- BOT** (Abbreviation) Bottom.
- Brkt.** (Abbreviation) Bracket.
- Bridge Rectifier** A configuration of a diode that allows current to flow in one direction producing both positive and negative pulsating DC Voltages.
- Color Coding** See Appendix H or I, Plastic Part Color Chart or Section 4, Chapter 1, Playfield - Plastic Posts & Spacers.
- Combination (Combo) [Shot]** Any variable pinball shot(s) made successively.
- Conn.** (Abbreviation) Connector.
- CMOS** Short for COSMOS (Complementary Symmetry M.O.S.); Complementary Metal-Oxide Semi-Conductor.
- CN** (Abbreviation) Connector (e.g. **CN5-P3**).
- CT** (Abbreviation) Center.
- DC** (Abbreviation) Direct Current.
- DT** (Abbreviation) Drop Target(s).
- DOTS** (Acronym) **Diode On Terminal Strip**.
- EB** (Abbreviation) Extra Ball.
- Eject** Playfield surface device to kick ball back into play; Saucer.
- EPROM** (Acronym) **Erasable Programmable Read Only Memory**. Can be erased using UV Light and re-programmed.
- e.g.** (Abbreviation) Latin- Exempla gratia. For Example.
- EOS** (Acronym) **End-Of-Stroke** (i.e. Switch for flipper).
- F** (Abbreviation) Fuse (i.e. **F23**).
- GA-Turn** Gauge & Turn describing the windings on a coil (e.g. **23-800**, **23** is the gauge of wire and **800** is the amount of windings).
- G.I.** (Abbreviation) General Illumination (Lamps).
- HWH** (Abbreviation) Hex Washer Head.
- IC** (Acronym) **Integrated Circuit** (As in after 24-Pin IC).
- ID or I.D.** (Acronym) **Inside Dimension**.
- i.e.** (Abbreviation) Latin- Id est. That is.
- IO or I/O** (Abbreviation) Input / Output (e.g. I/O Power Driver Bd.)
- LT, Lt. or L.** (Abbreviation) Left.
- Laser Kick** A coil/plunger used above the playfield to kick pinball back into play.
- LED** (Acronym) **Light Emitting Diode**.
- Loop [Shot]** Continuously up a ramp and back to the flipper.
- Lwr.** (Abbreviation) Lower.
- Orbit [Shot]** From the left or right flipper around the back rail of the playfield back to the flipper.
- MB** (Abbreviation) Magnet Board.
- M-BALL or MBALL** (Abbreviation) Multiball™ More than 1 ball in game play.
- MID** (Abbreviation) Middle
- Non-Reflexive** See Reflexive.
- No. or N° or #** (Abbreviation) Number
- NPF** (Acronym) **No Problem Found**.
- N.C. or NC** (Abbreviation) Normally Closed.
- N.O. or NO** (Abbreviation) Normally Open.
- NS** (Abbreviation) Not Stuffed. (Use in Part Listings, Sec. 5)
- OD or O.D.** (Abbreviation) Outside Dimension.
- P** (Abbreviation) Pin (e.g. **CN5-P3**).
- PCB** (Acronym) **Printed Circuit Board**
- P/F** (Abbreviation) Playfield.
- PIA LED** (Acronym) **Peripheral Interface Adapter Light Emitting Diode**. This is a diagnostic LED on the CPU; it should not be lit during normal operation of a pinball game.
- Plumb Bob Tilt** Weight on Tilt Assembly.
- PPH** (Abbreviation) Phillips Pan Head.
- Pop(s)** Another term for Turbo Bumper(s).
- PPB** (Acronym) Playfield Power Board ("Popcorn-Popping Bd.").
- PREV** (Abbreviation) Previous.
- PSB** (Abbreviation) Power Supply Board
- RAM** (Acronym) **Random Access Memory**. **RAM can** store input instructions and supply output information.
- Reflexive/Non-Reflexive Reflexive**—Solenoid Drive Transistor is enabled directly by a switch closure on the (Relating to CPU Boards) solenoid assembly (Ver. 1/2).
- Non-Reflexive**—Solenoid Drive Transistor is enabled by the CPU after reading a switch closure in the Switch Matrix (Ver. 3). Also note: All CPU Boards are backwards compatible (e.g. Jurassic Park/Ver. 3 to Time Machine/ Ver. 2). Swapping a Ver. 2 Board to a Ver. 3 is not possible due to the special solenoids section (i.e. Slingshots, Turbo Bumpers, etc.) changing from **REFLEXIVE** to **NON-REFLEXIVE** on Ver. 3 Boards.
- Relay** An automatic switch operated by current in a coil.
- ROM** (Acronym) **Read Only Memory**. **ROM cannot** store input instructions but can supply output information. **ROM can** be programmed only once.
- RMA** (Abbreviation) Return Merchandise Authorization Number
- RT, Rt. or R.** (Abbreviation) Right; ("**R**" at the end of Target Assy. Part N° signifies Target Insert is Reversed.)
- RO** (Abbreviation) Rollover (switches).
- Saucer** See Eject.
- Scoop** A hole into the playfield. A metal scoop is in place to guide the ball into the kick-back under the playfield.
- Slam Tilt** A switch which closes when the game is slammed into or the Coin Door is slammed shut. Depending on adjustable settings, will cancel game in play when the number of closures required is achieved.
- SMB** (Abbreviation) Shaker Motor Board.
- Solenoid** A coil used for Electro Magnetic devices such as relays, flippers, slingshots, etc.
- SSFB** (Abbreviation) Solid State Flipper Board.
- STEP** Refers to the service switches on the coin door.
- Sub-Assy.** (Abbreviation) Sub-Assembly.
- S-U or S/U** (Abbreviation) Stand-Up ( targets).
- TM** (Abbreviation) Trademark
- Transfer [Shot]** Maneuvering the ball in play from one flipper to the other. With flipper in the up position and the ball cradled by that flipper one would activate the flipper button in a quick repetitive manner to bounce the ball to the other side. Skilled players can rebound the ball off the slingshot.
- Tri-Ball** Three balls in play.
- TTL** (Abbreviation) Transistor-Transistor Logic
- Upr.** (Abbreviation) Upper.
- V or v** (Abbreviation) Volt(s).
- Ver.** (Abbreviation) Version.
- VUK** (Acronym) **Vertical Up-Kicker** (Super or Standard).
- X** (Abbreviation) "Times" A multiplier; also used in dimensions.
- X-Ball** An undetermined number of ball(s) during game play.
- Zener Diode** A semi-conductor diode used for voltage regulation. Application depends on reverse break-down voltage.
- "-00B"** "B" at the end of Coil Part Numbers signifies that the diode is attached to the bottom of the lug.
- "-00T"** "T" at the end of Coil Part Numbers signifies that the diode is attached to the top of the lug (the side nearest the coil-winding).

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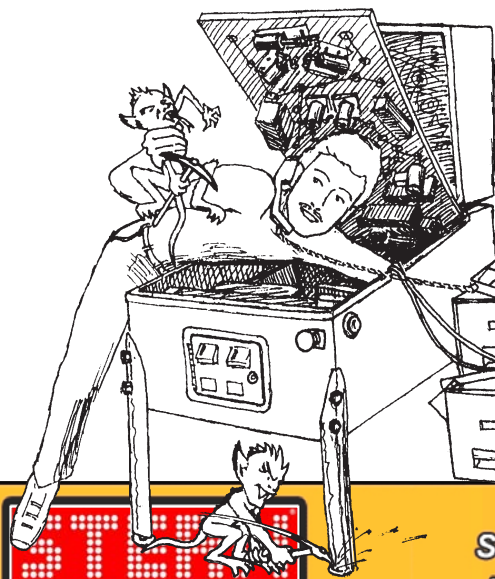
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#### Pinball Game Parts

- **2006+** Complete Pinball Service Game Manuals in PDF Format available (*includes parts and schematics*).
- **2004 — 2005** Select Pinball Service Game Manual Excerpts only : Parts Identification & Location (**The Pink Pages**), Drawings for Major Assemblies & Ramps (**The Blue Pages**)
- Appendixes **A — J** (*updated with each game*)

#### Schematics, Theory of Operation and Troubleshooting Tips

- Current S.A.M. System Games complete Schematic Section
- Archived Drawings for the White Star Board System™

#### Service Bulletins

- Detailing Technical Information, Tips, FYIs, Notices and Updates

#### NTE Semi-Conductor Cross Reference

#### Game Code Library

- Offering S.A.M. System Game Code
- Offering archived White Star Game Code for all Data East®, Sega™ and STERN® Pinballs (*EPRM Programmer required*)

#### Coinage Cards

- Offering a range of Coinage Cards for download
- Country Setting, Pricing Scheme, Dip Switch Setting (*opens a pop-up window*)
- [Custom Pricing Demonstration](#) (*for S.A.M. System*)

#### Tricks & Tips

- *Pinball Machine Foam Cushion Packing*
- *1st Time Pinball Set-Up & Preventative Maintenance*
- *Pinball Location Maintenance*
- *How to Update Your Game Code (S.A.M. System)*

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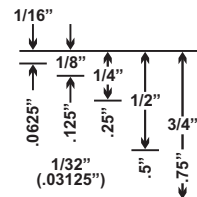
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### Metric Conversion



1" = 2.54 cm or 25.4 mm  
1 cm = .3937"  
1 mm = .03937"

For metric, multiply the inch value by the metric value:

e.g.: 5" X 2.54 cm = 12.7 cm or 127 mm

For US, multiply the metric value by the inch value:

e.g.: 13 cm X .3937" = 5.1181"



**800-KICKERS**

5 4 2 5 3 7 7

