

# 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!



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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  
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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:**



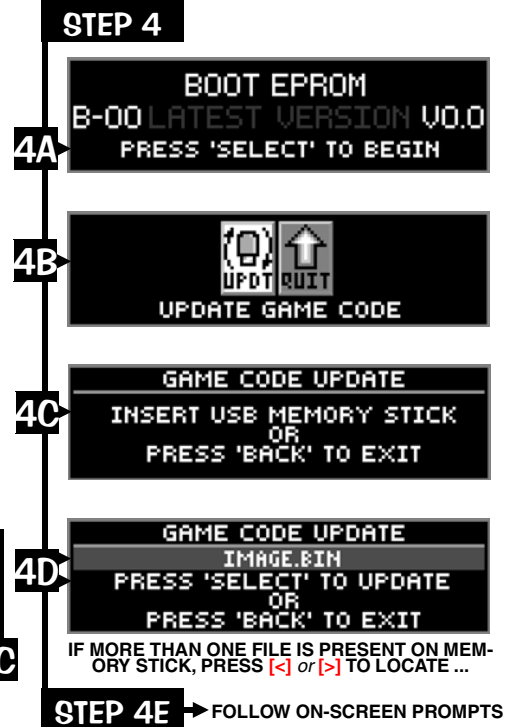
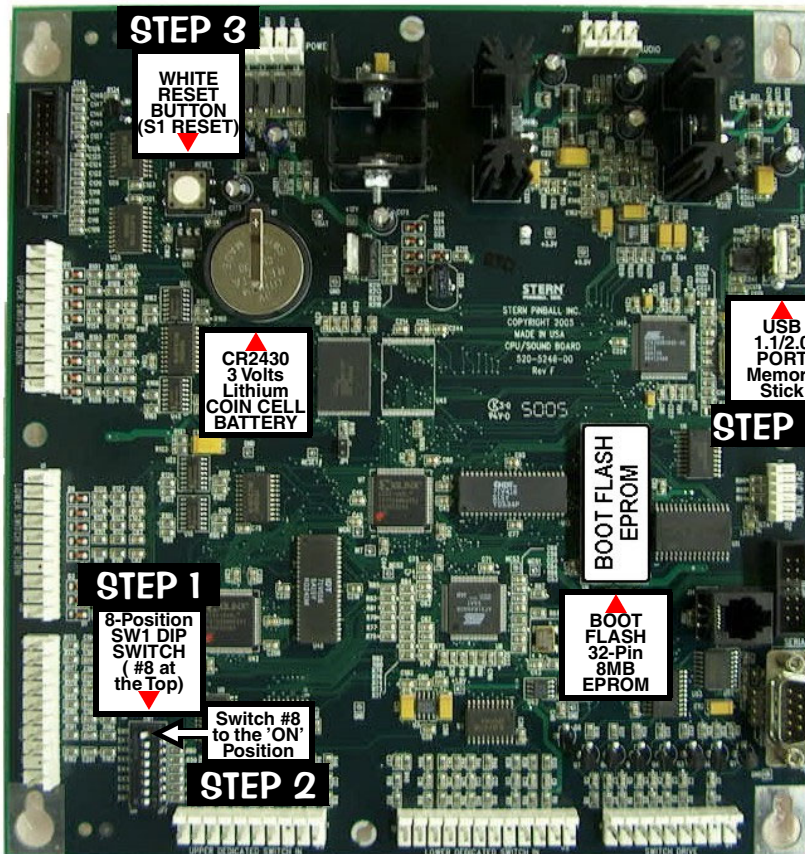
● **Green Button**  
Press to **Escape Back** (or **Exit**).

●● **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)

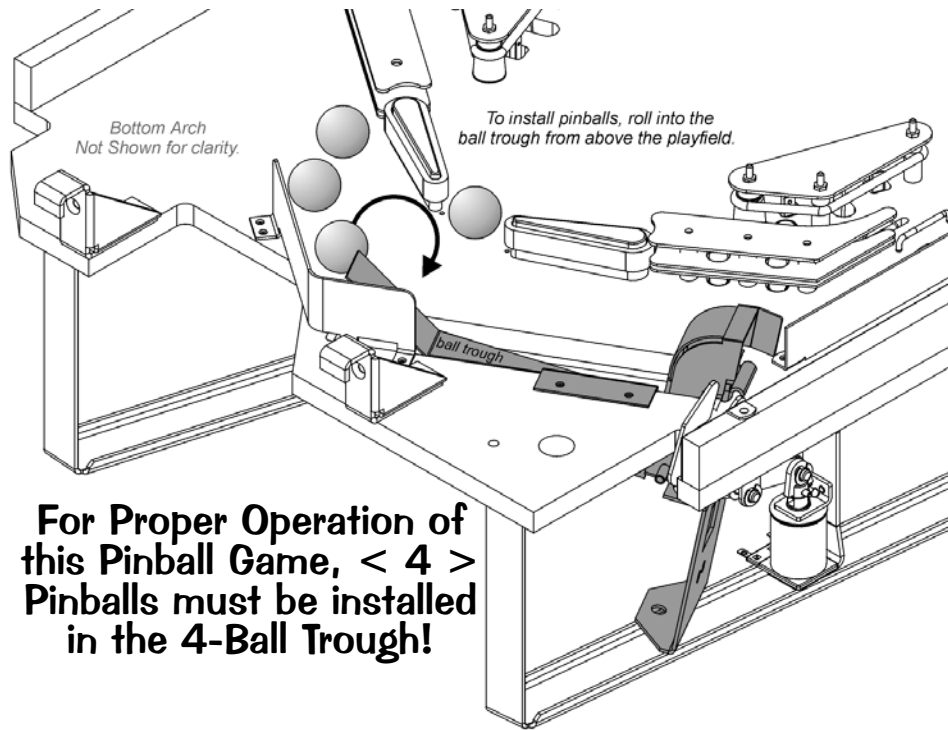


You can also retrieve your latest code from another game! From the **USB MENU** via the **UTILITIES MENU**, select the "BKUP" *Icon* instead and download to your Memory Stick. Review the end of Section 3, Chapter 5.



**! 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!**

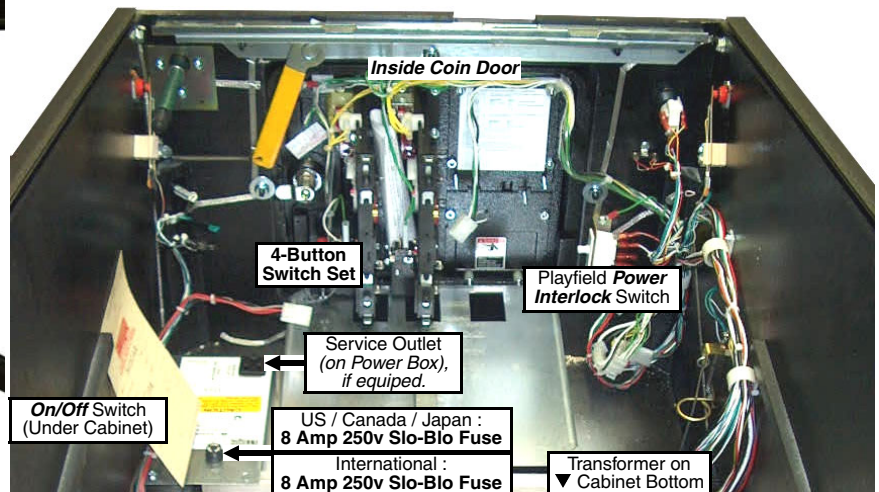
**Backbox Fuses\*, Cabinet Fuses, Playfield Fuses and Cabinet Switches**

*\*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!			
Stern Pinball®, Inc. ©2006		820-6384-00 Rev. A	



**4-Button Switch Set:**  
For operational usage, see Sec. 3, Chapter 1, Service Menu Introduction.



**Find-It-In-Front:  
Dr. Pinball**

**WHEEL OF FORTUNE**



# ////// 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.

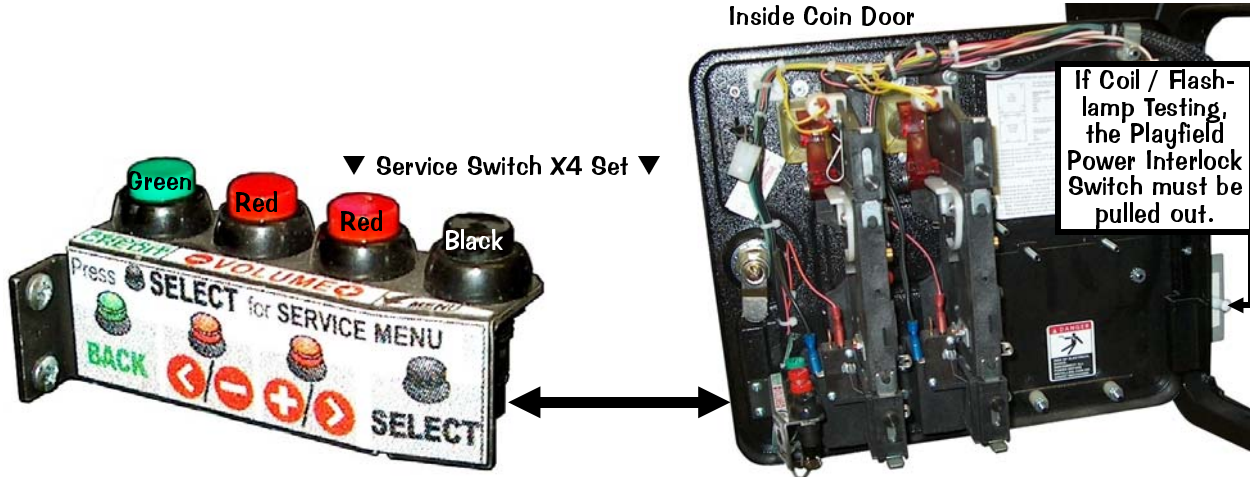
### Functions in Game or Attract Mode

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

### Functions in the Service Menu

● 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').
---	--	--

## 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}

CPU/ Sound Board	01 IC-U22A RETURN	02 IC-U22B RETURN	03 IC-U22C RETURN	04 IC-U22D RETURN	05 IC-U16A RETURN	06 IC-U16B RETURN	07 IC-U16C RETURN	08 IC-U16D RETURN	09 IC-U36A TAN-BLK J12-P9	10 IC-U36B TAN-RED J12-P8	11 IC-U36C TAN-ORG J12-P7	12 IC-U36D TAN-YEL J12-P6	13 IC-U40A TAN-GRN J12-P4	14 IC-U40B TAN-BLU J12-P3	15 IC-U40C TAN-VIO J12-P2	16 IC-U40D TAN-WHT J12-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	
Q1 DRAIN (L) EFT	CENTER DRAIN (R) IGH	NOT USED	NOT USED	NOT USED	LEFT RAMP MADE	M (U) LT- BALL	(M) ULT- BALL	MULTI- (B) ALL	MULTI- B (A) LL	MULTI- BA (L) L	MULTI- BAL (L)	MU (L) T- BALL	MULT (I) - BALL	TOURNA- MENT START	START BUTTON	
500-6227-04 below playfield	500-6227-03 below playfield				180-5087-00 above playfield	515-7588-04 below playfield	515-7588-04 below playfield	515-7588-04 below playfield	515-7588-04 below playfield	515-7588-04 below playfield	515-7588-04 below playfield	515-7581-04 below playfield	515-7581-04 below playfield	180-5174-00 in Cabinet	180-5174-00 in Cabinet	
Q2 DRAIN J1-P3	NOT USED	(4-BALL) TROUGH #4 (L)	(4-BALL) TROUGH #3	(4-BALL) TROUGH #2	TRANS. / REC. (MUK OPTO) TROUGH #1 (R)	TRANS. / REC. (STACK OPTO) TROUGH JAM	SHOOTER LANE	LEFT OUTLANE (TOP)	LEFT RETURN (LANE)	LEFT SLING- SHOT	RIGHT SLING- SHOT	RIGHT RETURN (LANE)	RIGHT OUTLANE (TOP)	LEFT BUMPER	RIGHT BUMPER	
180-5119-02 below playfield																
Q3 DRAIN J1-P4	MINI- RAMP (LOCK)	NOT USED	NOT USED	RED CONTEST ANT	YELLOW CONTEST ANT	BLUE CONTEST ANT	DROP TARGET FRONT	DROP TARGET MIDDLE	DROP TARGET BACK	L (EFT) OUTLANE (BOTTOM)	R (IGHT) OUTLANE (BOTTOM)	NOT USED	WILD CARD LANE	NOT USED	WHEEL HOME	
500-6227-03 below playfield				515-7568-02 below playfield	515-7568-06 below playfield	515-7568-05 below playfield	520-5255-00 below playfield	520-5255-00 below playfield	520-5255-00 below playfield	500-6227-04 below playfield	500-6227-04 below playfield	500-6227-04 below playfield	500-6227-03 below playfield	180-5015-04 below playfield	520-5283-00 above playfield	
Q4 DRIVE J1-P5	NOT USED	SKILL SHOT MADE	RIGHT RAMP MADE	LEFT RAMP ENTER	CENTER RAMP MADE	NOT USED	NOT USED	NOT USED	LEFT ORBIT (TOP)	LEFT ORBIT (BOTTOM)	RIGHT ORBIT (TOP)	RIGHT ORBIT (BOTTOM)	MUL (T) I- BALL	NOT USED	NOT USED	
180-5087-00 above playfield			500-6775-01 above playfield	180-5087-00 above playfield	500-6775-01 above playfield				500-6227-03 below playfield	500-6227-03 below playfield	500-6227-03 below playfield	500-6227-04 below playfield	515-7581-04 below playfield			

« 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  GRAY 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}

CPU/SND Board	01 IC-U12 PNK-BRN J2-P2	02 IC-U12 PNK-RED J2-P3	03 IC-U12 PNK-ORG J2-P4	04 IC-U12 PNK-YEL J2-P6	05 IC-U12 PNK-GRN J2-P7	06 IC-U12 PNK-BLU J2-P8	07 IC-U12 PNK-VIO J2-P9	08 IC-U12 PNK-GRY J2-P10	09 IC-U14 GRY-BRN J3-P1	10 IC-U14 GRY-RED J3-P2	11 IC-U14 GRY-ORG J3-P4	12 IC-U14 GRY-YEL J3-P5	13 IC-U14 GRY-GRN J3-P6	14 IC-U14 GRY-BLU J3-P7	15 IC-U14 GRY-VIO J3-P8	16 IC-U14 GRY-BLK J3-P9
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 COIN SLOT	CENTER COIN SLOT	RIGHT COIN SLOT	FOURTH COIN SLOT	FIFTH COIN SLOT	NOT USED	NOT USED	NOT USED	L (EFT) FLIPPER BUTTON	LEFT FLIPPER E.O.S.	R (IGHT) FLIPPER BUTTON	RIGHT FLIPPER E.O.S.	NOT USED	NOT USED	NOT USED	NOT USED	
180-5204-00 Coin Door	180-5204-00 Coin Door	180-5204-00 Coin Door	180-5204-00 Coin Door					180-5160-01 Cabinet Side	180-5149-00 Flipper Asm.	180-5160-01 Cabinet Side	180-5149-00 Flipper Asm.					

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

CPU/SND Board	01 IC-41 LGN-BRN J13-P1	02 IC-41 LGN-RED J13-P3	03 IC-41 LGN-ORG J13-P4	04 IC-41 LGN-YEL J13-P5	05 IC-41 LGN-BLK J13-P6	06 IC-41 LGN-BLU J13-P7	07 IC-41 LGN-VIO J13-P8	08 IC-41 LGN-GRY J13-P9	09 SW. # D-25	10 SW. # D-26	11 SW. # D-27	12 SW. # D-28	13 SW. # D-29	14 SW. # D-30	15 SW. # D-31	16 SW. # D-32
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 PENDULUM (PLUMB BOB)	SLAM TILT	TICKET NOTCH	NOT USED	BACK (GREEN BUTTON)	MINUS (5- RED BUTTON)	+ / PLUS (RED BUTTON)	SELECT (BLACK BUTTON)	DIP (1)2345678	DIP (1)2345678	DIP (1)2345678	DIP (1)2345678	DIP (1)2345678	DIP (1)2345678	DIP (1)2345678	DIP (1)2345678	DIP (1)2345678
502-5032-00 Optional Kit		180-5119-02 Below J1/P		180-5192-04 Coin Door	180-5192-02 Coin Door	180-5192-02 Coin Door	180-5192-02 Coin Door	180-5160-01 Cabinet Side	180-5149-00 Flipper Asm.	180-5160-01 Cabinet Side	180-5149-00 Flipper Asm.					



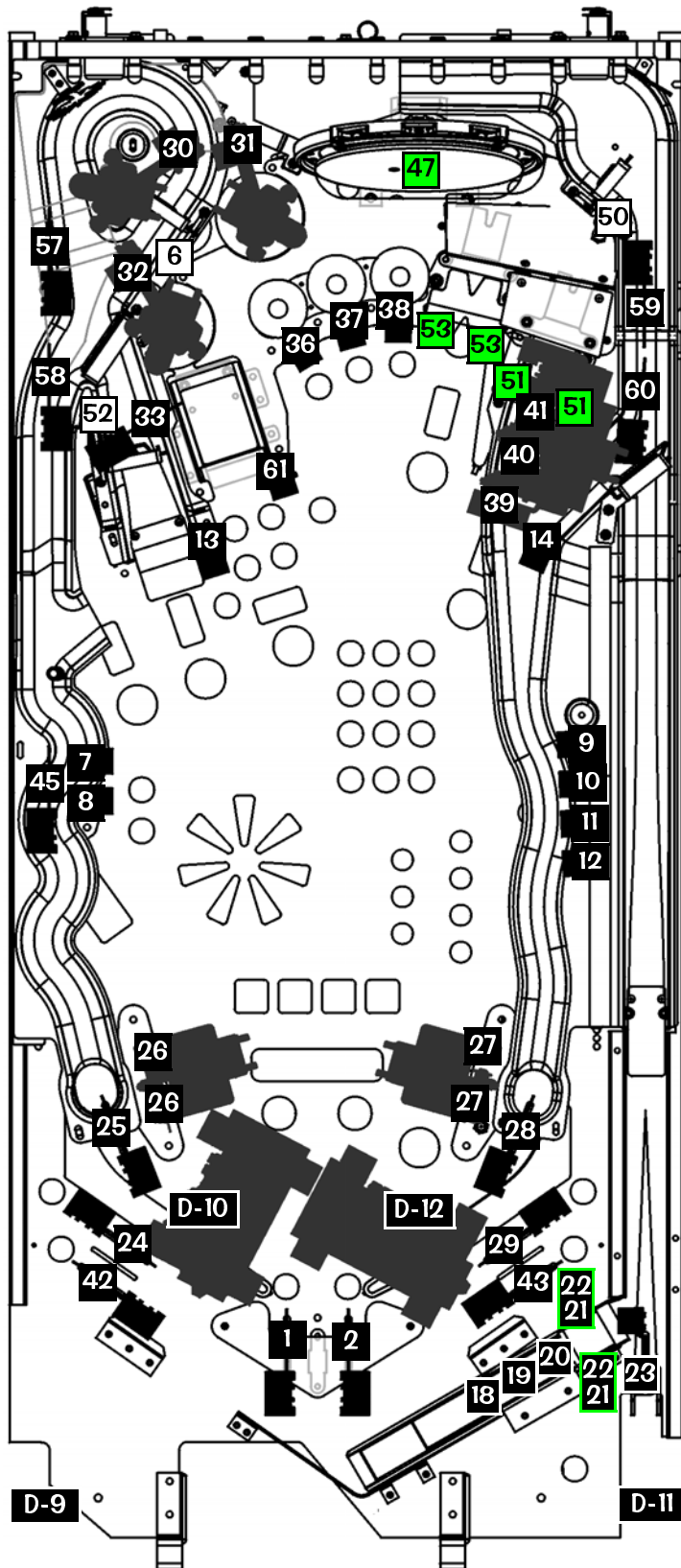




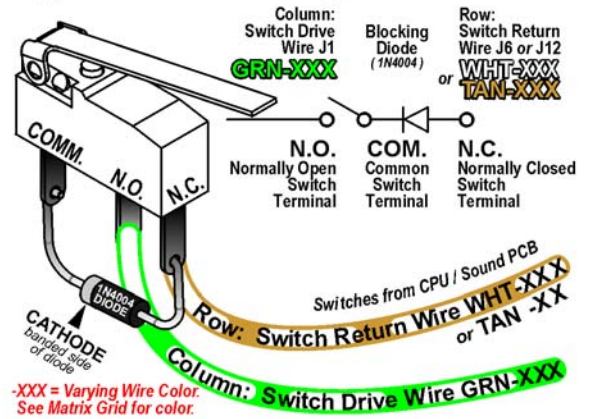
SWITCH MENU: SWITCH, ACTIVE, SINGLE & SERVICE

## SWITCH LOCATIONS

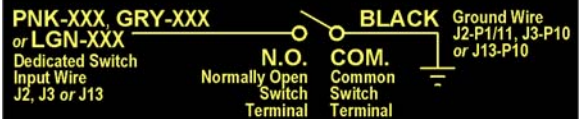
{Switch Matrix Grid : previous page}



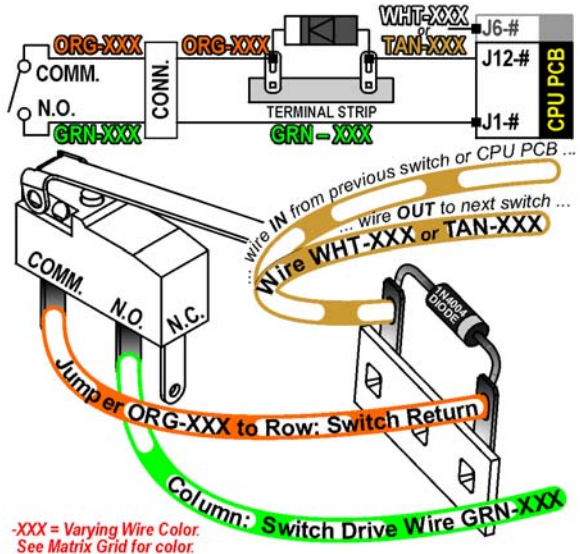
### Typical Switch Wiring & Schematic



### Dedicated Switch Schematic



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



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

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

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

Wire Color Abbreviations used:

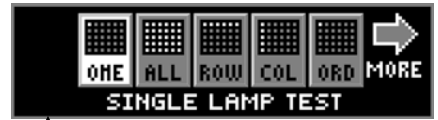
BLK	BLU	BRN	GRY	GRN	ORG	RED	VIO	WHT	YEL
Black	Blue	Brown	Gray	Green	Orange	Red	Violet	White	Yellow



Find-It-In-Front:  
Dr. Pinball



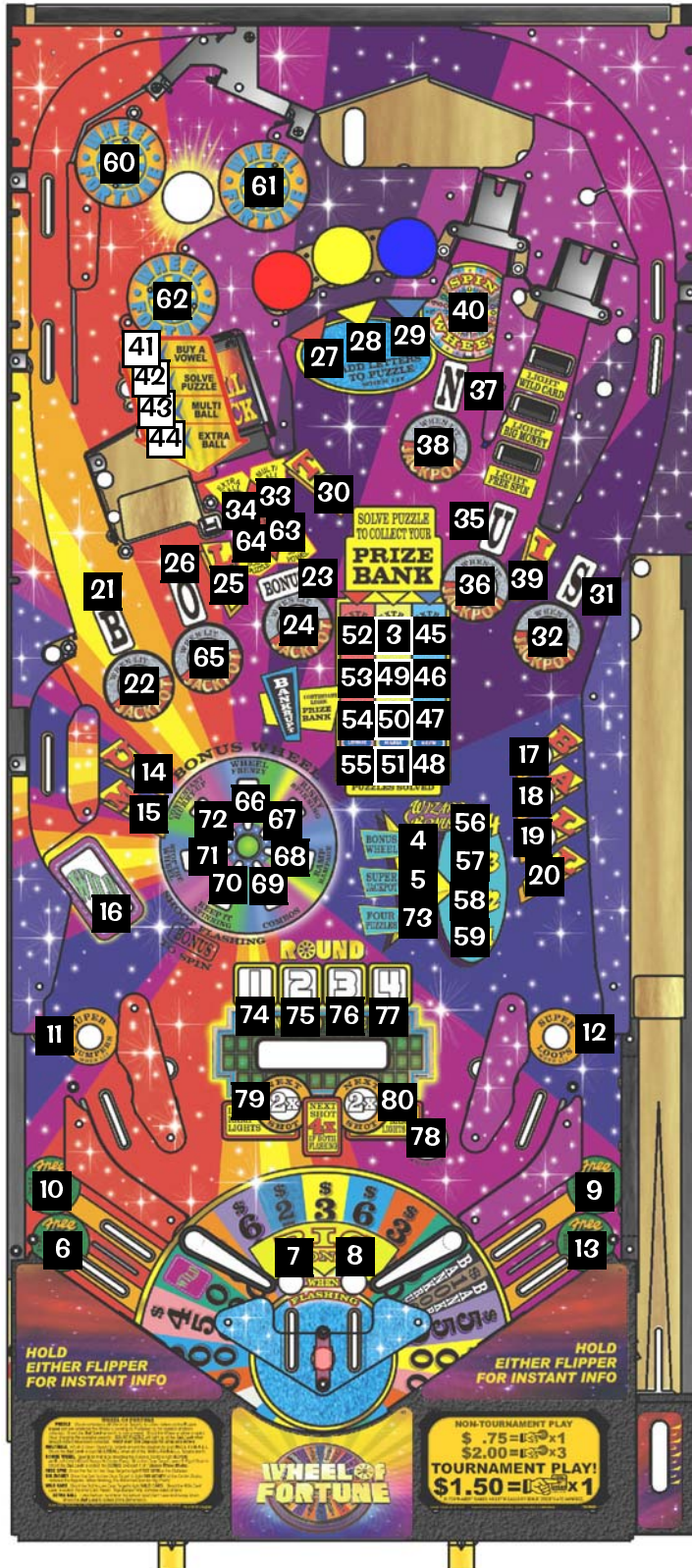




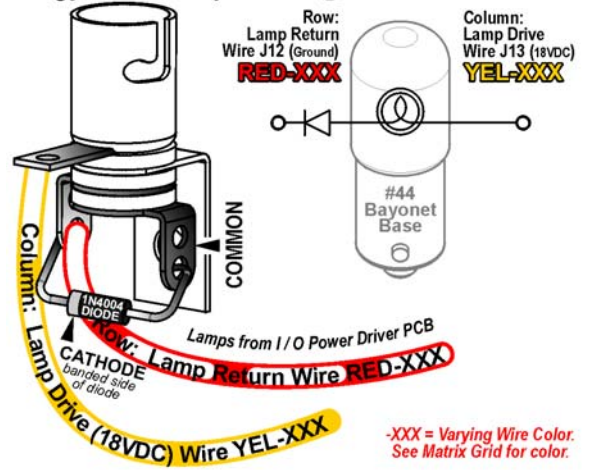
LAMP MENU: ONE, ALL, ROW, COLUMN & ORDERED

## LAMP LOCATIONS

{Lamp Matrix Grid : previous page}



### Typical Lamp Wiring & Schematic

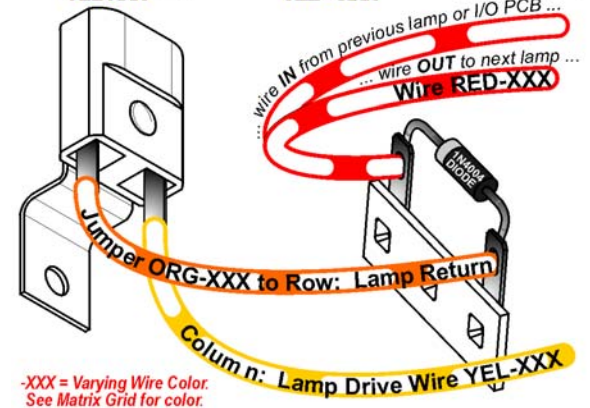
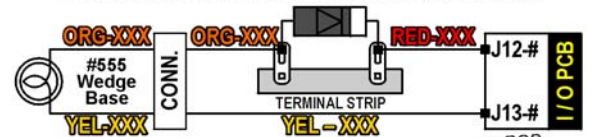


### Typical Lamp Wiring & Schematic

... 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	▲ I/O Power Driver ▼	YEL-VIO	J10-P9/10	50VDC	BRN-BLK	J8-P1	26-1200 ∪ 090-5044-ND
#2	AUTO LAUNCH	Q2		YEL-VIO	J10-P9/10	50VDC	BRN-RED	J8-P3	24-940 ∪ 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 ∪ 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	▲ I/O Power Driver ▼	YEL-VIO	J10-P9/10	50VDC	BLU-BRN	J9-P1	26-1200 ∪ 090-5044-ND
#10	RIGHT POP BUMPER	Q10		YEL-VIO	J10-P9/10	50VDC	BLU-RED	J9-P2	26-1200 ∪ 090-5044-ND
#11	BOTTOM POP BUMPER	Q11		YEL-VIO	J10-P9/10	50VDC	BLU-ORG	J9-P4	26-1200 ∪ 090-5044-ND
#12	RED CONTESTANT JUMP (LONNIE)	Q12		BROWN	J7-P1	20VDC	BLU-YEL	J9-P5	27-950 ∪ 090-5046-01-ND
#13	YELLOW CONTESTANT JUMP (MARIA)	Q13		BROWN	J7-P1	20VDC	BLU-GRN	J9-P6	27-950 ∪ 090-5046-01-ND
#14	BLUE CONTESTANT JUMP (KEITH)	Q14		BROWN	J7-P1	20VDC	BLU-BLK	J9-P7	27-950 ∪ 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 ∪ 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 ∪ 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	▲ I/O Power Driver ▼	BROWN	J7-P1	20VDC	VIO-BRN	J7-P2	23-800 ∪ 090-5001-ND
#18	RIGHT SLINGSHOT	Q18		BROWN	J7-P1	20VDC	VIO-RED	J7-P3	23-800 ∪ 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 ∪ 090-5044-ND
#23	LEFT RAMP UP-POST	Q23		BROWN	J7-P1	20VDC	VIO-BLK	J7-P9	26-1200 ∪ 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	▲ I/O Power Driver ▼	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	▲ Aux. Driver ▼	RED	J16-P4>8	5VDC 1K RES. 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



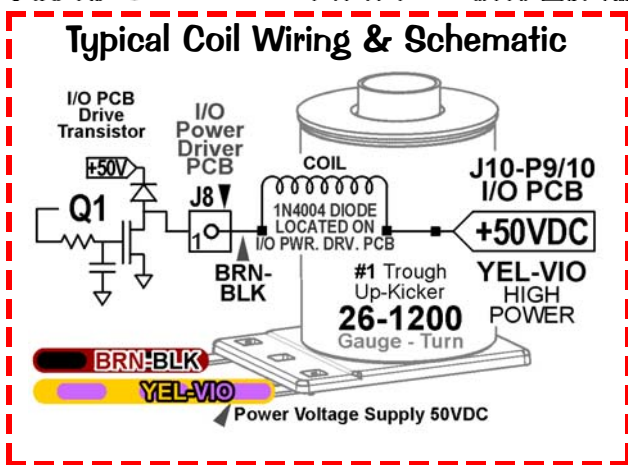
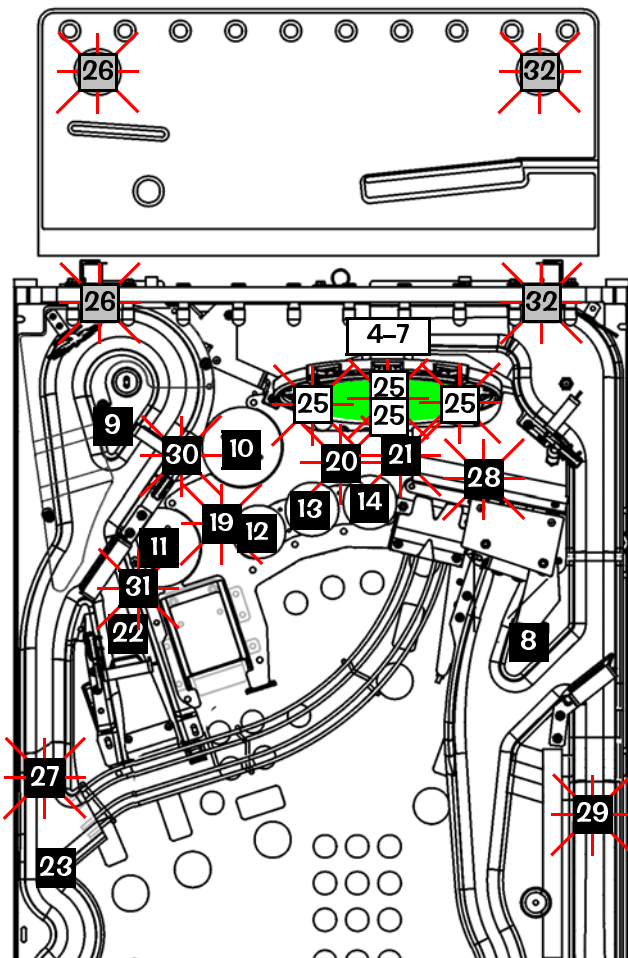
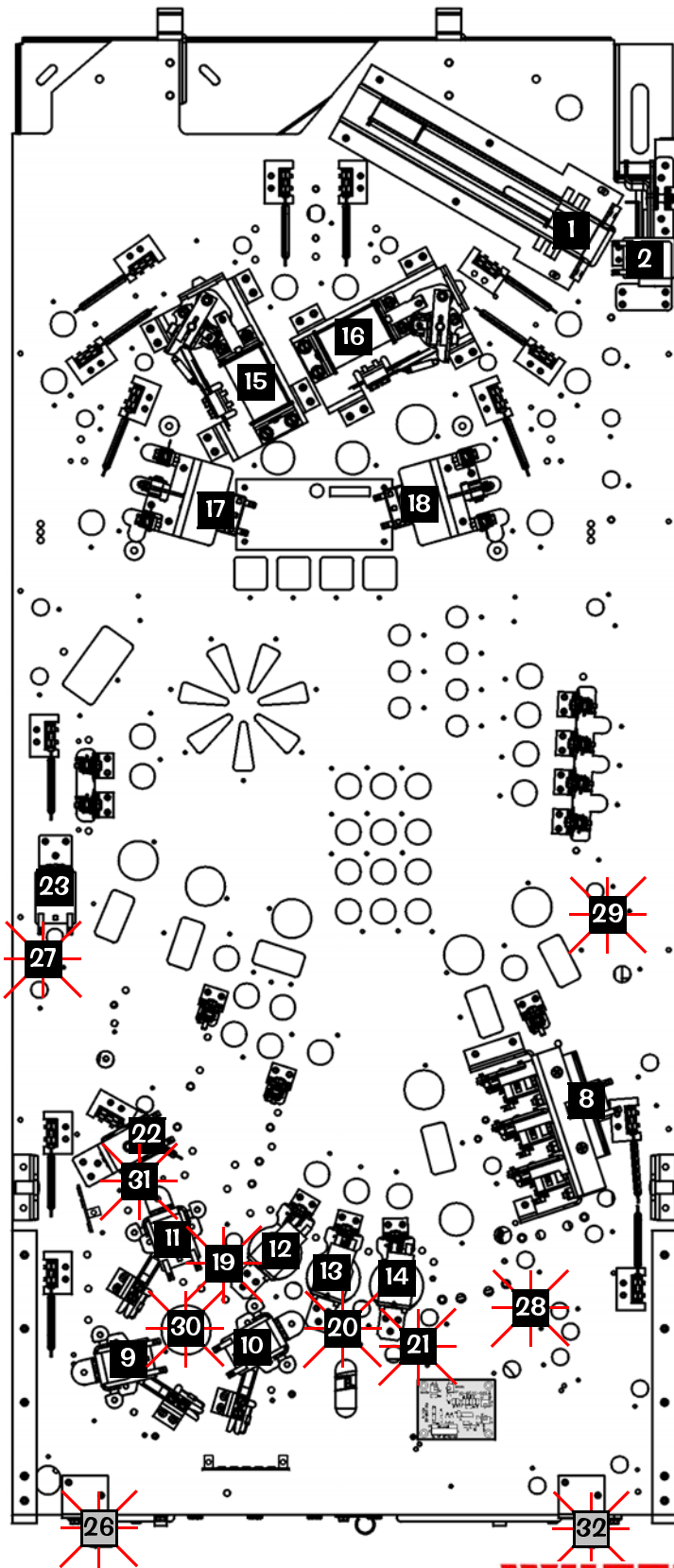




COIL MENU: SINGLE COIL & CYCLING COIL

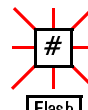
## COIL & FLASH LAMP LOCATIONS

{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.









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** ].

### EARNINGS AUDITS [ #1 – #13 ] ▼

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

Nr.	EARNINGS AUDIT NAME	YOUR RESULT
1	TOTAL PAID CREDITS	
2	FREE GAME PERCENTAGE	
3	AVERAGE BALL TIME	
4	AVERAGE GAME TIME	
5	COINS THROUGH LEFT SLOT	
6	COINS THROUGH RIGHT SLOT	
7	COINS THROUGH CENTER SLOT	

Nr.	EARNINGS AUDIT NAME	YOUR RESULT
8	COINS THROUGH FOURTH SLOT	
9	COINS THROUGH FIFTH SLOT	
10	TOTAL COINS	
11	TOTAL EARNINGS	
12	METER CLICKS	
13	SOFTWARE METER	

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

### STANDARD AUDITS [ #1 – #59 ] ▼

Nr.	STANDARD AUDIT NAME	YOUR RESULT
1	TOTAL BALLS PLAYED	
2	TOTAL EXTRA BALLS	
3	EXTRA BALL PERCENTAGE	
4	REPLAY 1 AWARDS	
5	REPLAY 2 AWARDS	
6	REPLAY 3 AWARDS	
7	REPLAY 4 AWARDS	
8	TOTAL REPLAYS	
9	REPLAY PERCENTAGE	
10	TOTAL SPECIALS	
11	SPECIAL PERCENTAGE	
12	TOTAL MATCHES	
13	HIGH SCORE AWARDS	
14	HIGH SCORE PERCENT	
15	TOTAL FREE PLAYS	
16	TOTAL PLAYS	
17	0.0M – 1.99M SCORES	
18	2.0M – 3.99M SCORES	
19	4.0M – 5.99M SCORES	
20	6.0M – 7.99M SCORES	

Nr.	STANDARD AUDIT NAME	YOUR RESULT
21	8.0M – 9.99M SCORES	
22	10.0M – 12.49M SCORES	
23	12.5M – 14.99M SCORES	
24	15.0M – 17.49M SCORES	
25	17.5M – 19.99M SCORES	
26	20.0M – 24.99M SCORES	
27	25.0M – 29.99M SCORES	
28	30.0M – 39.99M SCORES	
29	40.0M – 49.99M SCORES	
30	50.0M – 74.99M SCORES	
31	75.0M – 99.99M SCORES	
32	100.0M – 149.99M SCORES	
33	150.0M+ SCORES	
34	AVERAGE SCORES	
35	SERVICE CREDITS	
36	BALL SEARCH STARTED	
37	LOST BALL FEEDS	
38	LOST BALL GAME STARTS	
39	LEFT DRAINS	
40	CENTER DRAINS	

Nr.	STANDARD AUDIT NAME	YOUR RESULT
41	RIGHT DRAINS	
42	TILTS	
43	TOTAL BALLS SAVED	
44	LEFT FLIPPER USED	
45	RIGHT FLIPPER USED	
46	0 – 1 MINUTE GAMES	
47	1 – 1.5 MINUTE GAMES	
48	1.5 – 2 MINUTE GAMES	
49	2 – 2.5 MINUTE GAMES	
50	2.5 – 3 MINUTE GAMES	
51	3 – 3.5 MINUTE GAMES	
52	3.5 – 4 MINUTE GAMES	
53	4 – 5 MINUTE GAMES	
54	5 – 6 MINUTE GAMES	
55	6 – 8 MINUTE GAMES	
56	8 – 10 MINUTE GAMES	
57	10 – 15 MINUTE GAMES	
58	15+ MINUTE GAMES	
59	RECENT REPLAY PERCENT	

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.

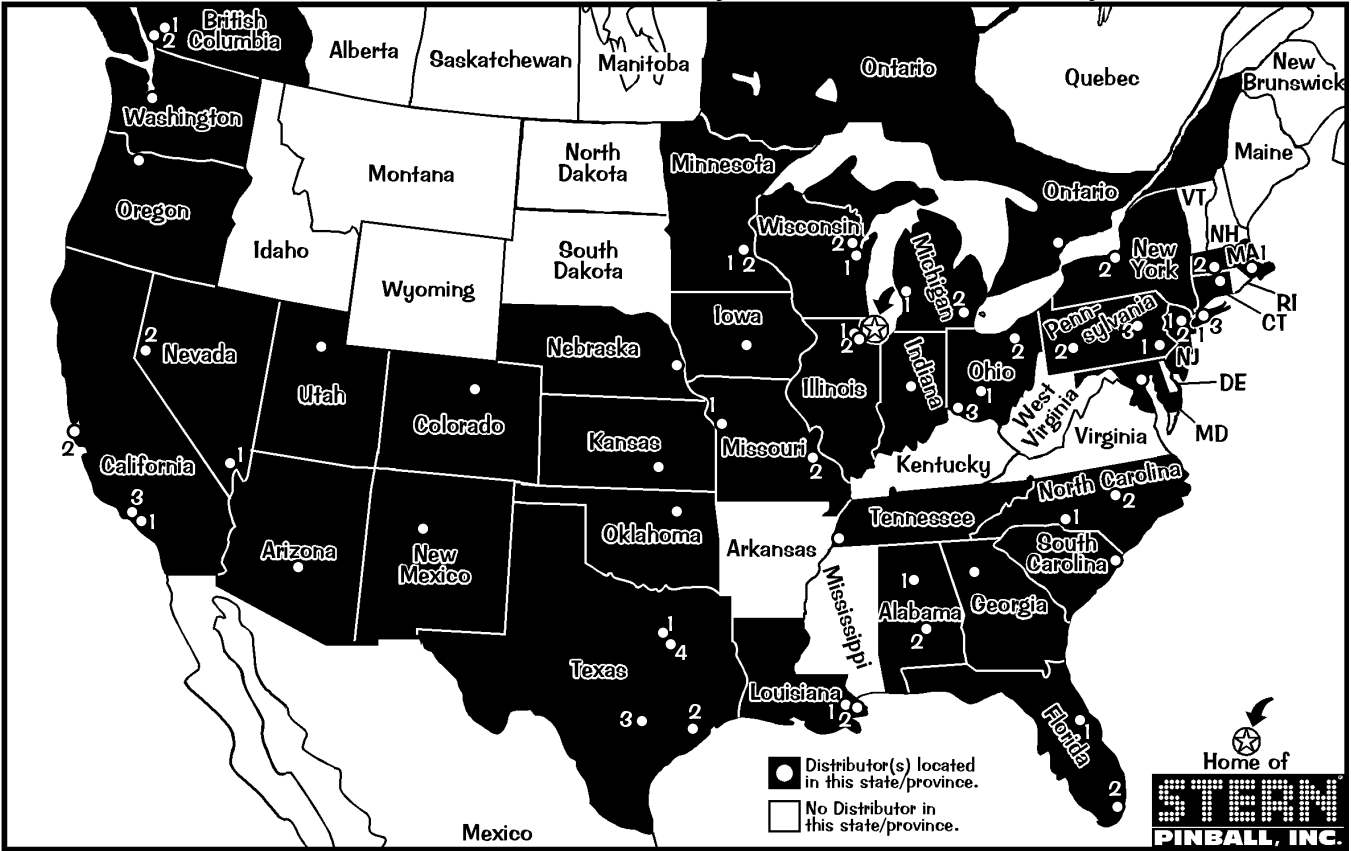
% = AUDIT RESULT DIVIDED BY STANDARD AUDIT 16 (TOTAL PLAYS).

## FEATURE AUDITS [ #1 - #107 ] ▼

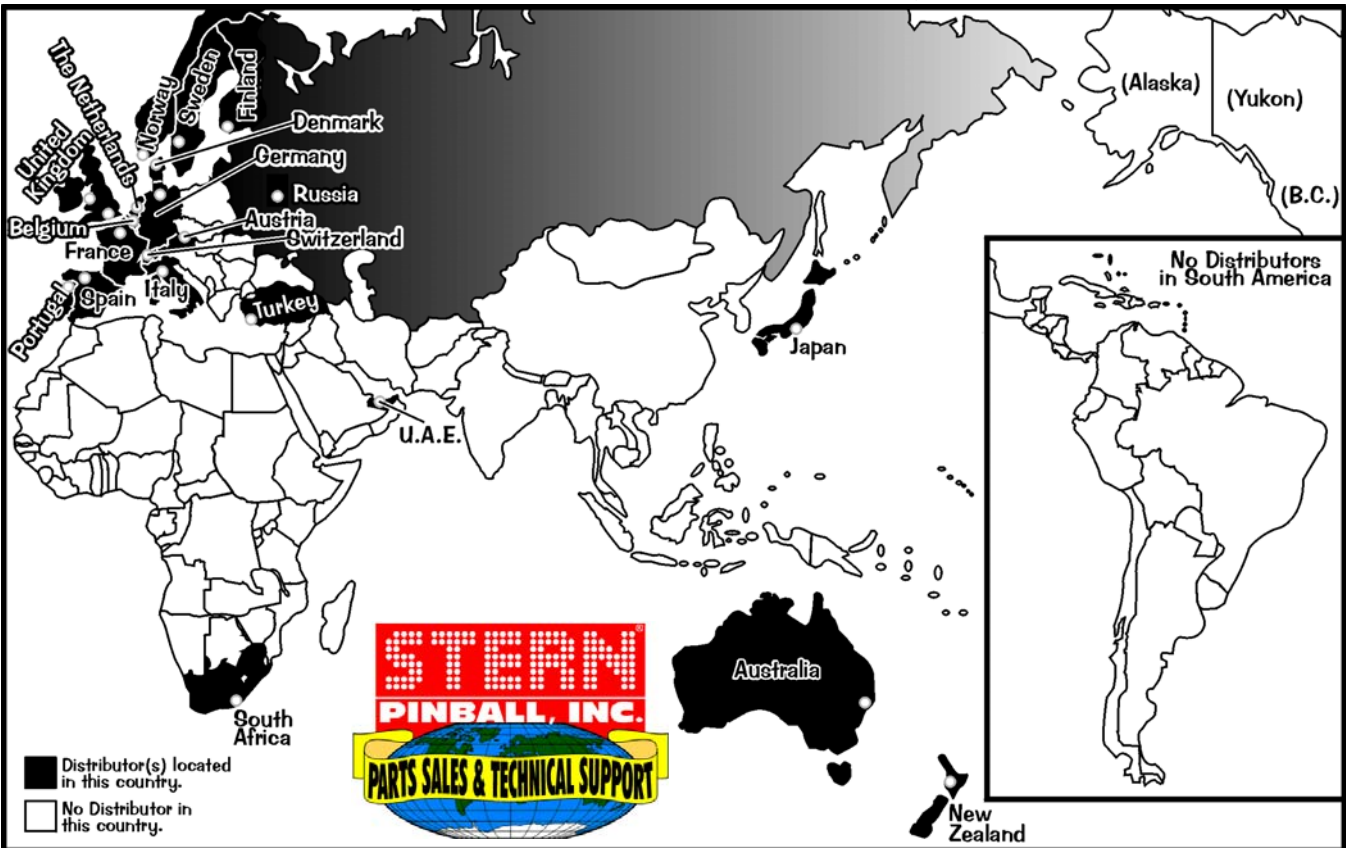
Nr.	FEATURE AUDIT NAME	YOUR RESULT	Nr.	FEATURE AUDIT NAME	YOUR RESULT	Nr.	FEATURE AUDIT NAME	YOUR RESULT	Nr.	FEATURE AUDIT NAME	YOUR RESULT
1	TOP LEFT OUTLANES		28	WRONG VOWEL GUESSES		55	WHEEL FRENZY STARTS		82	CONTESTANT HURRYUP POINTS	
2	BOTTOM LEFT OUTLANES		29	TOTAL PUZZLE LETTERS		56	WHEEL FRENZY 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

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

<p><b>AUSTRALIA</b> Amusement Mach. Dist. Alexandria +61 (2) 9700 9600</p> <p><b>AUSTRIA</b> R. Rupp Leibnitz +43 3 4528 6105</p> <p><b>BELGIUM</b> NAMUSCO Bruxelles +32 2 414 4596</p> <p><b>DENMARK</b> JK Automater A/S Thisted +45 97 92 0925</p> <p><b>ENGLAND</b> see UNITED KINGDOM</p> <p><b>FINLAND</b> Pelika net Oy Vantaa +358 9 290 450</p>	<p><b>FRANCE</b> Avranches Automatic Saint Quentin sur le Homme +33 2 3389 6162</p> <p><b>SFA</b> Paris +33 1 5326 8080</p> <p><b>GERMANY</b> ADP Gauselmann GmbH Espelkamp +49 5741 27 32 85</p> <p><b>Crown Technologies GmbH</b> Rellingen +49 4101 30 24 85</p> <p><b>Merkur Gaming GmbH</b> Luebbecke +49 5772 4 94 22</p> <p><b>HOLLAND</b> See The Netherlands</p>	<p><b>ITALY (RSM)</b> Tecnoplay S.A. San Marino +39 549 901 508</p> <p><b>JAPAN</b> HIC, Inc. Chiba-Ken +04 7176 4040</p> <p><b>THE NETHERLANDS</b> GAME-XL B.V. Kruisstraat (Rosmalen) +31(0)73 522 2264</p> <p><b>NEW ZEALAND</b> Coin Cascade Ltd. Christchurch +643 338 1411</p> <p><b>Parts &amp; Service Only:</b> Amco Machine Supplies Auckland +64 9846 7606</p>	<p><b>NORWAY</b> Parts for Pinballs Sandefjord +47 9242 1402</p> <p><b>Vendomatic AS</b> Skedsmokorset +47 2 291 8383</p> <p><b>PORTUGAL</b> Jacinto &amp; Martins, S.A. Belas +35 1214 3256 24 or +35 1214 3256 38</p> <p><b>RUSSIA</b> Kalmancor Enterprise Ltd Moscow +95 124 5601 or +95 124 5613</p> <p><b>O.D.A. Game Machines</b> Moscow +95 219 2949 or +95 219 8917</p> <p><b>SOUTH AMERICA</b> See Betson Enterprises New Jersey, USA</p>	<p><b>SOUTH AFRICA</b> K &amp; W Amusements Port Elizabeth +27 41 484 3344 or +27 41 484 2940</p> <p><b>SPAIN</b> Comercial Cocomatic Coslada (Madrid) +34 91 671 6980</p> <p><b>SWEDEN</b> Bjuvia Fritid AB Bjuv +46 4238 6900</p> <p><b>SWITZERLAND</b> Novomat, A.G. Harkingon +41 62 388 8961</p> <p><b>TAIWAN, R.O.C.</b> SEC Taichung +886 4 229 10646</p>	<p><b>TURKEY</b> Balo Marmaris +0 252 413 83 35</p> <p><b>UNITED ARAB EMIRATES</b> Warehouse of Games Dubai +971 4 883 5880</p> <p><b>UNITED KINGDOM</b> Electrocoin London, England +44 208 965 2055</p> <p><b>Parts &amp; Service Only:</b> Electrocoin Aftersales Cardiff, S. Glamorgan +44 292 045 0345</p>
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*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> use an 8AMP 250v Slo-Blo Fuse.	<b>AVG OPERATION</b>	CURRENT: <b>2.8AMP</b> WATTAGE: <b>329w</b>	<b>MAX OPERATION</b> CURRENT: <b>8AMP</b> WATTAGE: <b>940w</b>
	<b>High Line:</b> use 2x 5AMP 250v Slo-Blo Fuses. (*England & Hong Kong use an 8AMP 250v S/B Fuse.)		<b>218v AC - 240v AC @ 50Hz</b> <b>AVG OPERATION</b> CURRENT: <b>1.8AMP</b> WATTAGE: <b>412w</b>
		<b>MAX OPERATION</b> CURRENT: <b>5AMP</b>   <b>8AMP*</b> WATTAGE: <b>1145w</b>   <b>1832w*</b>	
<b>Low Line:</b> <b>Export Japan Only</b> use an 8AMP 250v Slo-Blo Fuse.		<b>95v AC - 108v AC @ 50Hz / 60Hz</b> <b>AVG OPERATION</b> CURRENT: <b>2.6AMP</b> WATTAGE: <b>264w</b>	
		<b>MAX OPERATION</b> CURRENT: <b>8AMP</b> 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!**

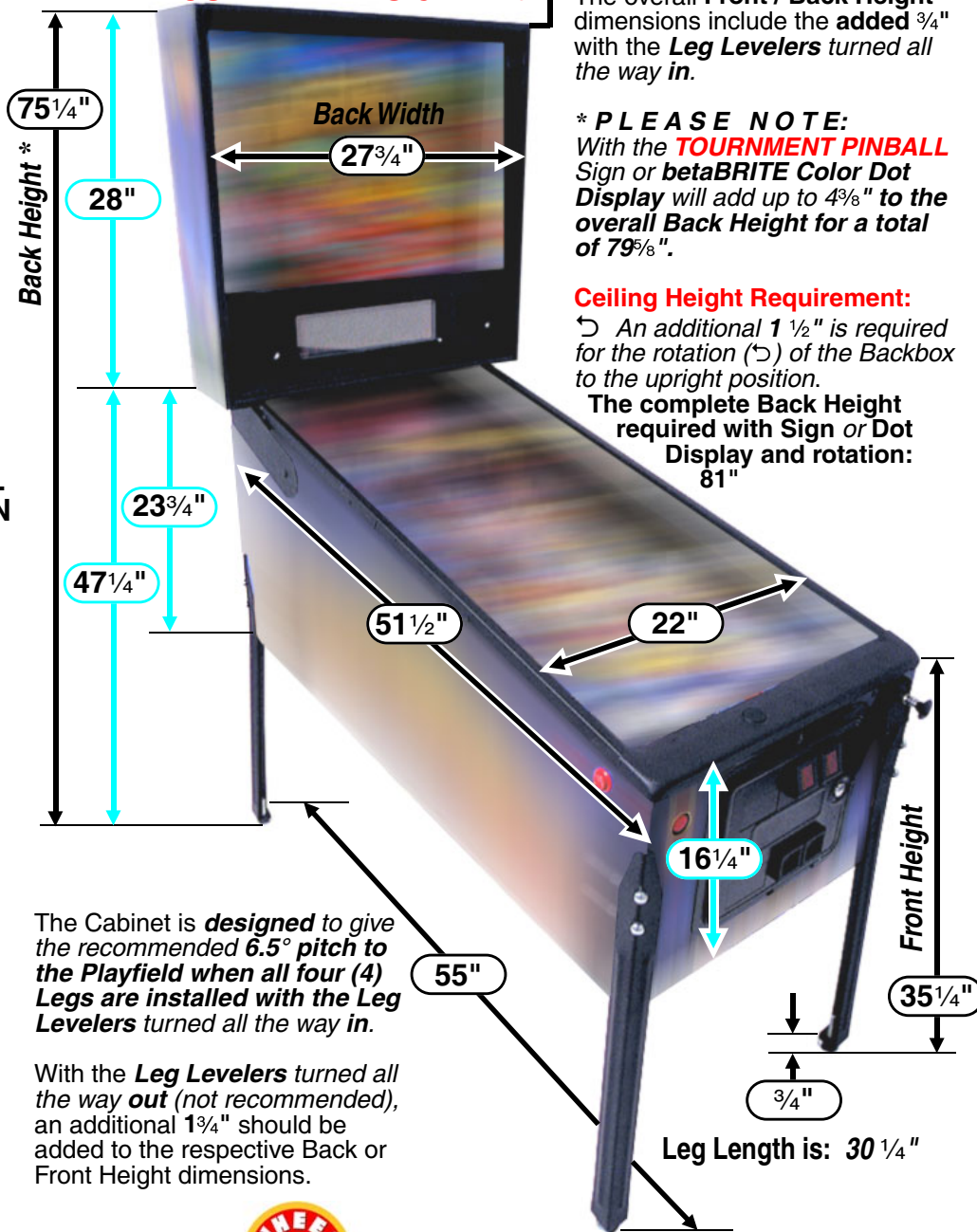
**Shipping Box Dimensions**

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>"



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
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- ▶ 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
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- ▶ Power Requirements // Transportation // Game Dimensions .....DR. 16

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  - ▷ 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

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# 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 edge.
- 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 lift the game down on the FRONT LEGS. Care should be taken to keep the game level. Note: The game should be placed on the FRONT LEGS. SET ASIDE 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 4. 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 hex key is located next to a S/S turn lock - attached & locked).
- With the keys removed, open the COIN DOOR. Pull the YELLOW HANDLE to the LEFT and all the turn keys pull up on the FRONT TOP MOLDING, remove and set aside.
- Install the PLUMB BOB. (The PLUMB BOB glass side cover is pulled out forwards and removed. TAKE CARE while moving, as glass can be quite sensitive (depending recommended).)
- Install the PLUMB BOB. (The PLUMB BOB glass side cover is pulled out forwards and removed. TAKE CARE while moving, as glass can be quite sensitive (depending 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 further information.

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

**STERN PINBALL THE ORIGINAL**

Sec. 1: After Set-Up

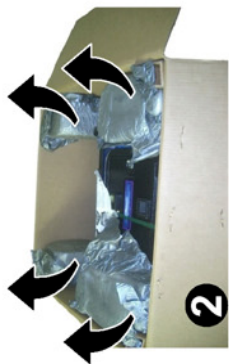


# PINBALL GAME SET-UP

**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



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.

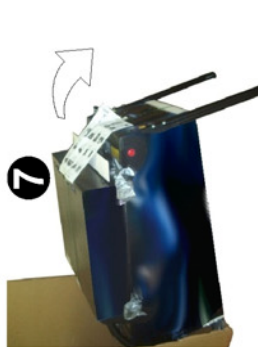


Please be aware of the floor or carpet under the box while you are cutting so no damage occurs!

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



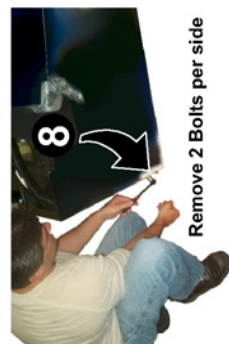
Remove 2 Bolts per side



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.**



9

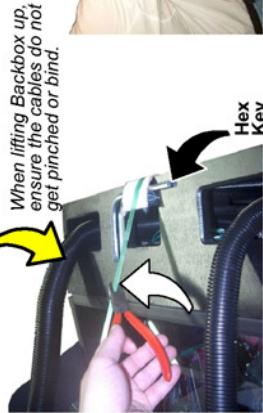


Remove 2 Bolts per side

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.
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**

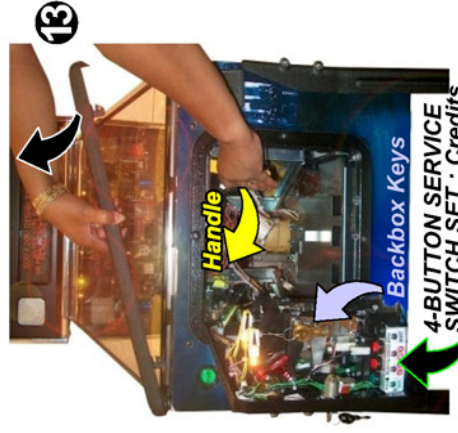
12. After the **BACKBOX** is in the **UPRIGHT POSITION**, locate the **5/16" HEX KEY**. While inserted, rotate **KEY** with a **3/4 turn** until latched & locked.

**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

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

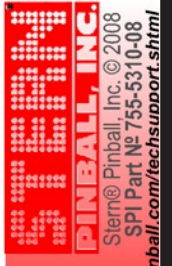


**15**

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**).

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.**

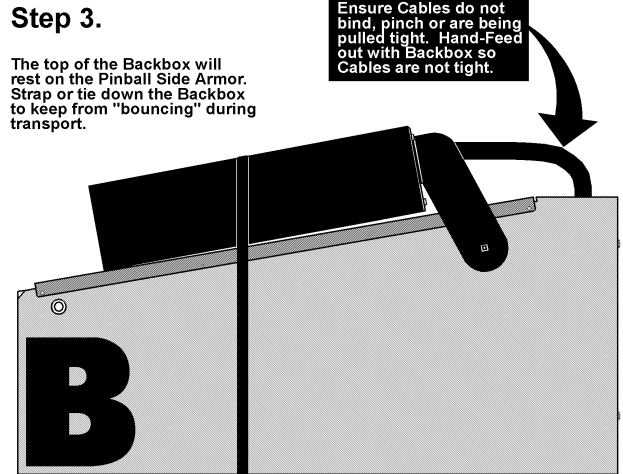
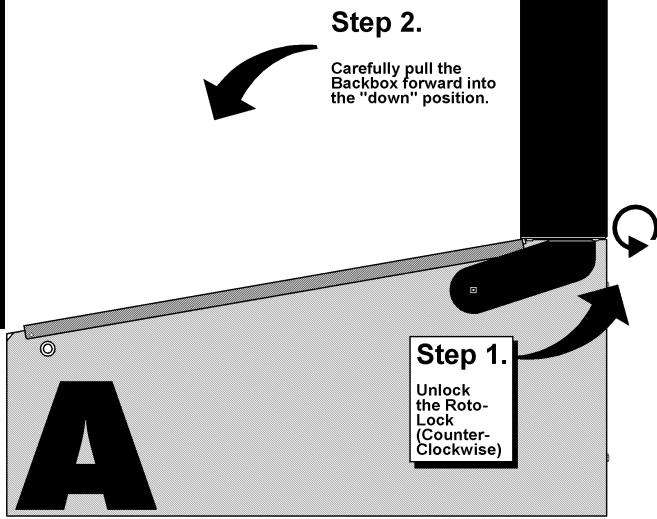
Remove the **GAME SERVICE MANUAL** (stapled to side of the left wall of the cabinet). Review Section 1, Chapter 1, Page 1, and perform Steps 1 - 8+. Review the end of this chapter on how to lift the playfield to access the **Plumb Bob Tilt, R E A D ! YOUR SERVICE GAME MANUAL** and review the **SERVICE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



# How to Secure the Backbox for Transporting

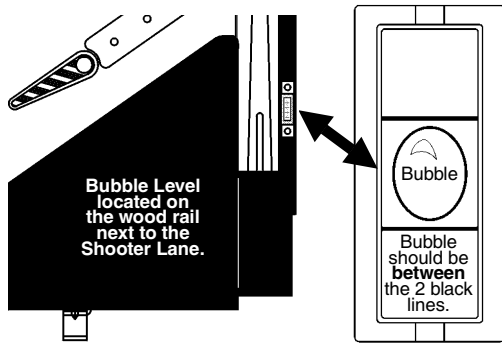
Sec. 1: After Set-Up

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 .

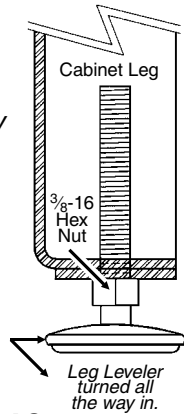


Start adjustment with the leg levelers *turned all the way in*.

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!**

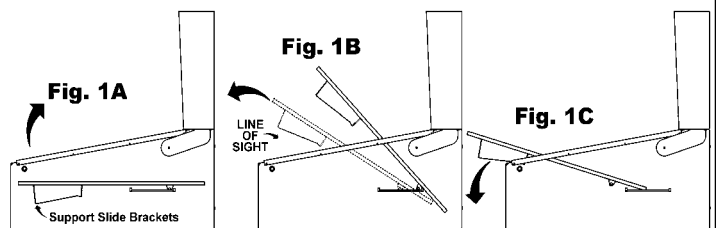
*Note: For custom adjustment greater than >6.5° can be achieved by turning out the rear leg leveler(s), however, it is not recommended.*

## 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*).

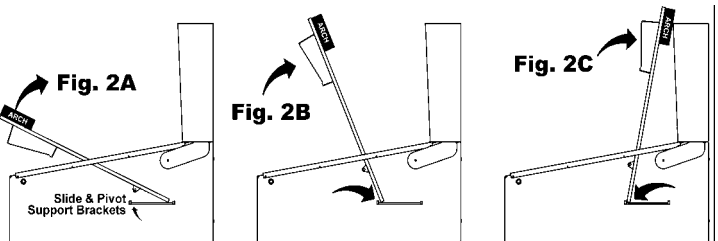
### Position 1

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.



Print on Astrobrights® Solar Yellow #65  
Wausau Paper Products (Stock #22731).

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**

**WHEEL OF FORTUNE**

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 encendera "SOLVE PUZZLE".

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

**MULTIBALL** 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**.

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

>> B Orbita Izquierda / O Rampa Izq. / N Rampa Central / U Calle de Objetos Derribables en Linea / 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 Linea para encender **FREE SPIN** en las Calles de Salida.

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

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

Dispara al 3º Objetivo Derribable en Linea 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 para encender **WILD CARD**.

**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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**FOLD HERE**





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    - ▷ 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

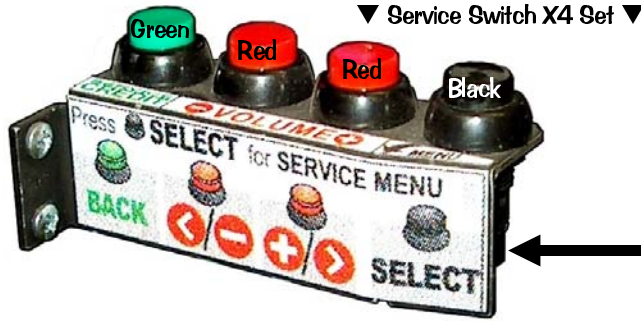
Sec. 3: ...Menu Intro.

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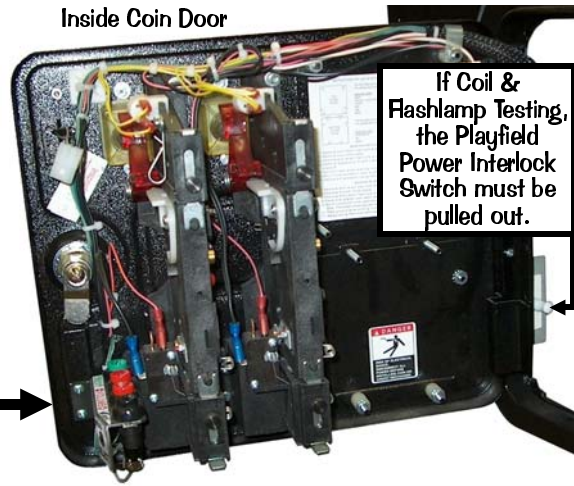


# Service Switch X4 Set Access & Use

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

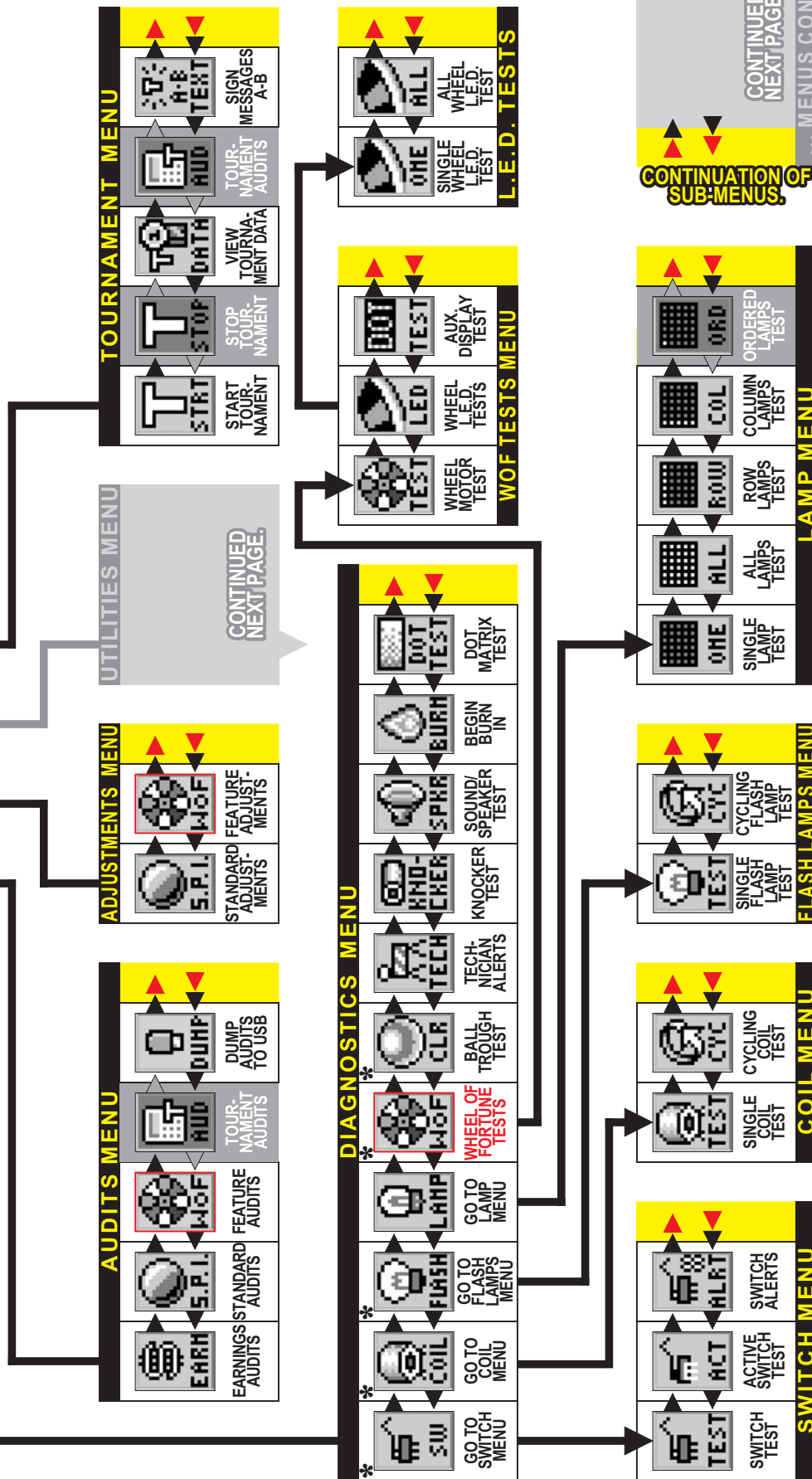
\*WHEN ENTERING THE NOTED MENUS, YOU MUST  
 PULL OUT THE POWER INTERLOCK SWITCH FOR  
 OPERATION WITH THE COIN DOOR OPEN.

**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**

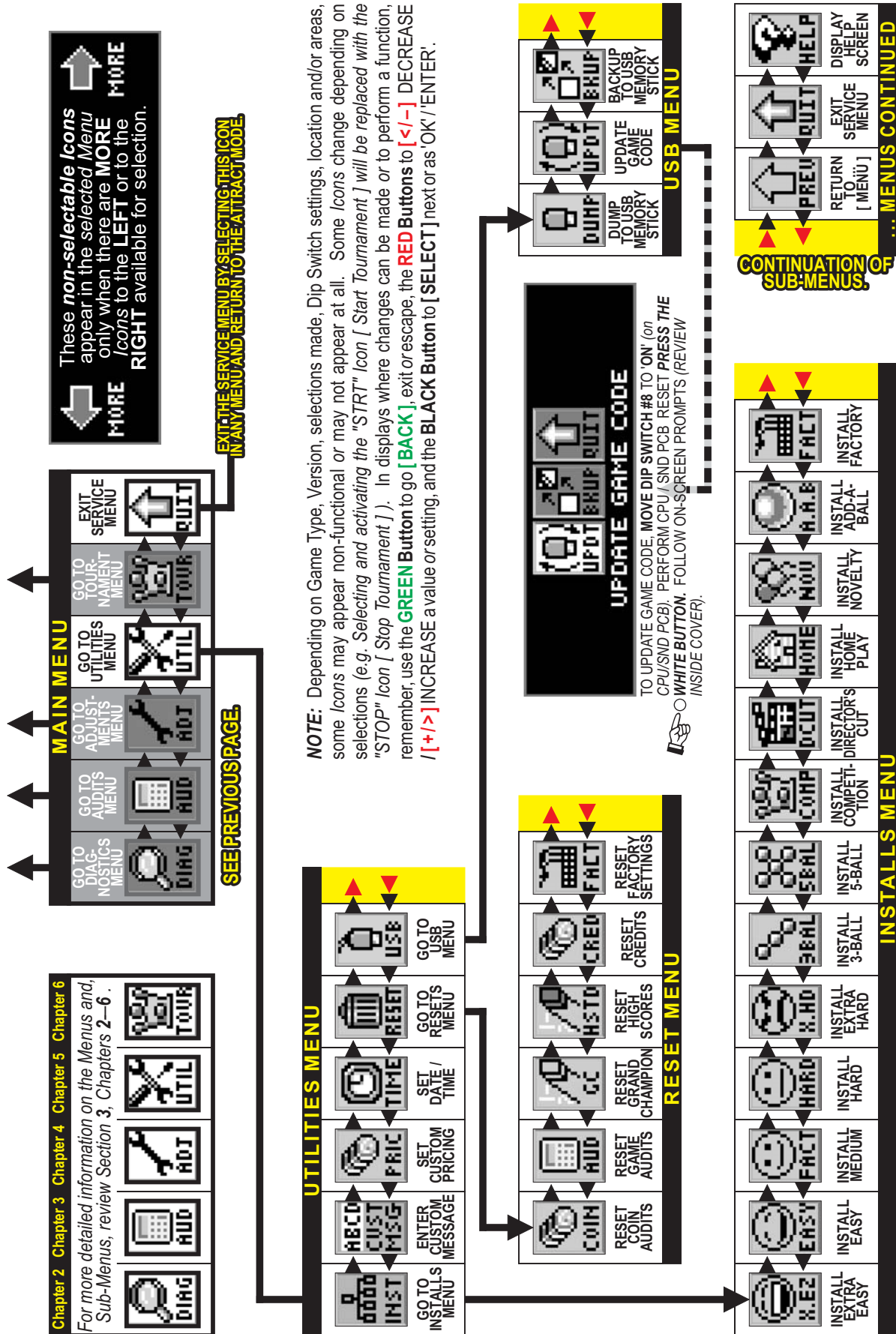
These **non-selectable Icons** appear in the selected **Menu** only when there are **MORE** icons to the **LEFT** or to the **RIGHT** available for selection.

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





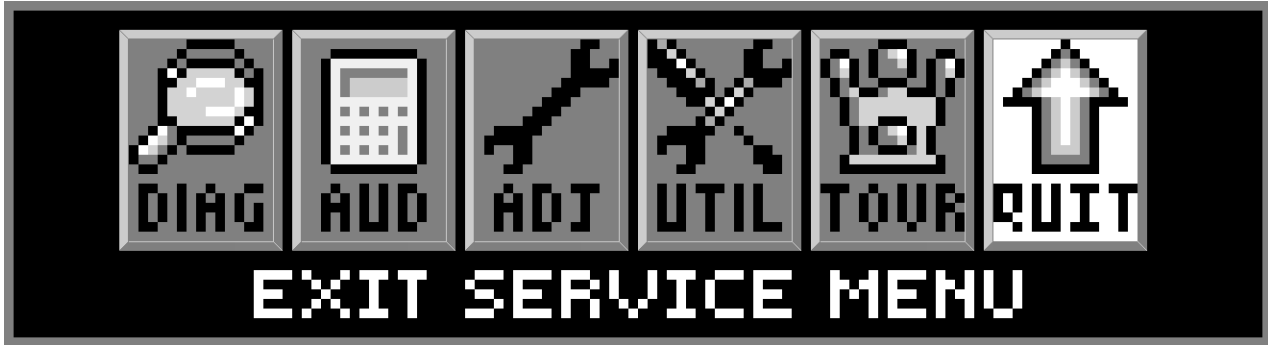
# Wheel of Fortune™ Pinball Service Menu Icon Tree Continued





## 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

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</b> (x2) &amp; <b>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 <i>only</i> 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 <i>do not</i> 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>

Sec. 3: ...Menu Intro.

**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'. ▼



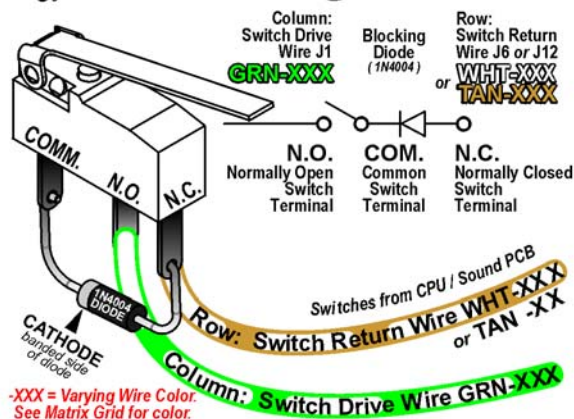
D-24 position is highlighted and accompanied by a short audible tone when pressed. ▼



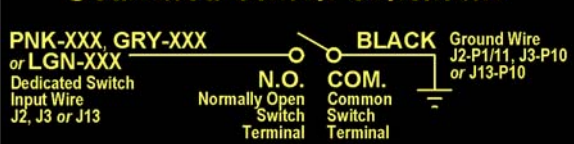
After pressing the switch (*to make it close*), the display will indicate the last switch number. ▼



## 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.

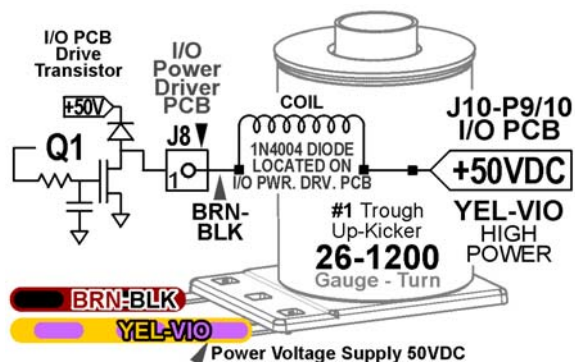


## Cycling Coil Test

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.

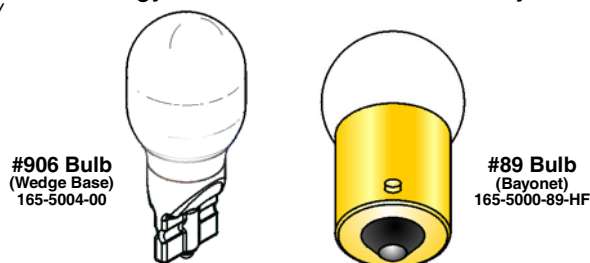


## Cycling Flash Lamp Test

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

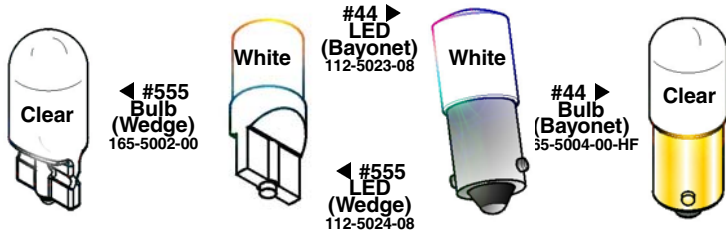
To initiate, from the **LAMP MENU**, select the "COL" *Icon*. As each lamp column is selected, the lamps in the column will light on the playfield as well as the Dot

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*.



Sec. 3: ... Diagnostics

## Bulb Types used for Control Lamps



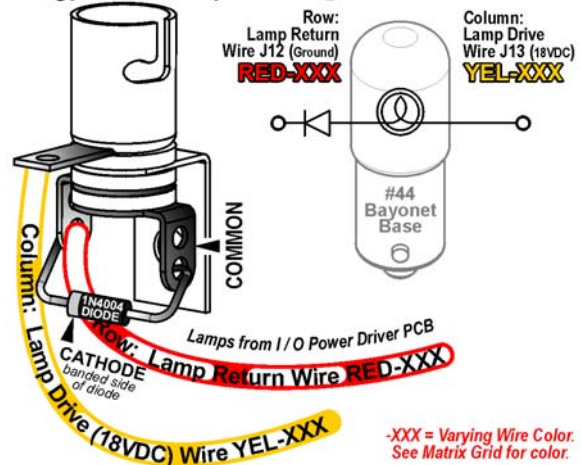
\* If not required in this game, *Icon* will not be shown.



### 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**.

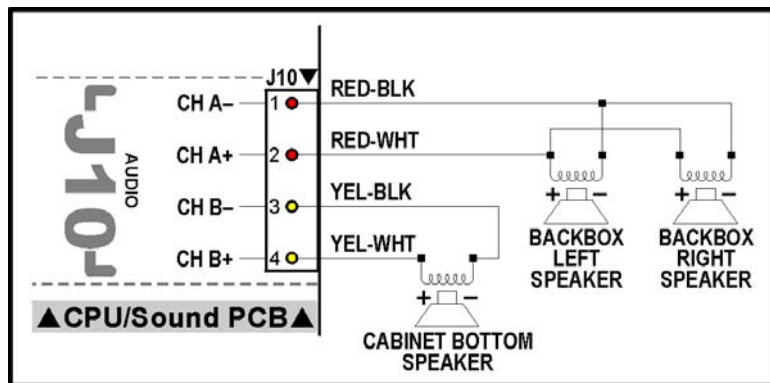
**FACTOID:** *The knocker got it's name from the 'original knocker' (20th century pinball games), which used a coil and when energized (fired), the plunger would strike a wood panel inside the cabinet.*



## 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).*

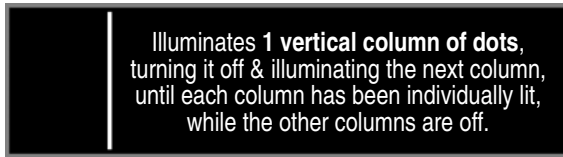




## Dot Matrix Test

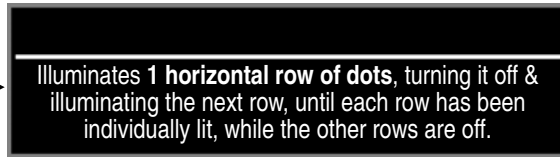
To initiate, from the **DIAGNOSTICS MENU**, select the "DOT TEST" *Icon*. After selecting this *Icon* the **Dot Matrix Test** immediately begins. The Dot Matrix Display will immediately and continuously illuminate and cycle each of the **5 Tests for 1 pass each**. To return to the **DIAGNOSTICS MENU**,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

### Test 1



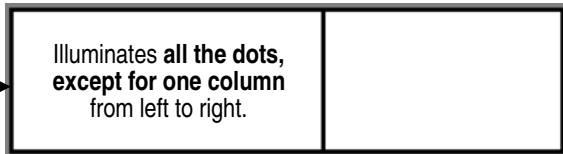
Illuminates **1 vertical column of dots**, turning it off & illuminating the next column, until each column has been individually lit, while the other columns are off.

### Test 2



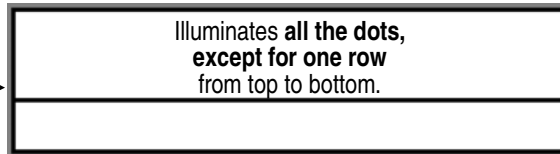
Illuminates **1 horizontal row of dots**, turning it off & illuminating the next row, until each row has been individually lit, while the other rows are off.

### Test 3



Illuminates **all the dots, except for one column** from left to right.

### Test 4



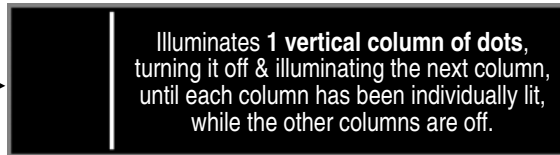
Illuminates **all the dots, except for one row** from top to bottom.

### Test 5



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

### Test 1



Illuminates **1 vertical column of dots**, turning it off & illuminating the next column, until each column has been individually lit, while the other columns are off.





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

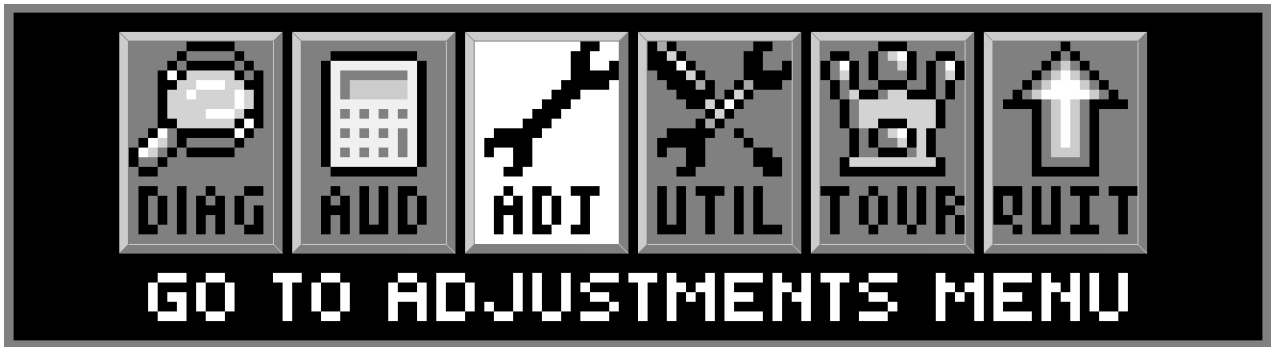
"T AUD" *Icon* provided as an alternate access to Tournament Audits (if data is available). For more information on the **TOURNAMENT MENU**, review **Section 3, Chapter 6, GO TO TOURNAMENT MENU**.



## 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 DIP SWITCH SW1 SETTING		COUNTRY SETTING OPTION(S)	COIN MECHANISMS (SWITCHES) COINS THRU ... SLOT:					PRICING SCHEME Number of Plays (Credits) for Price Amount Shown See "Appendix J" for Coin Cards Examples & Info!	Requires SPI Coin Card(s) 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> = Factory Default		USA 3								1/0.50	755-5400-02-Y		
<b>HIGHLIGHTED</b> = 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 (1 Side)		
ON	▲▲▲▲▲▲▲▲	CANADA 1 [ 25¢ door ]	0.25	0.25	1.00	2.00	CAD // CANADIAN DOLLARS // [ \$CAN ]						
OFF	▼▼▼▼▼▼▼▼	CANADA 2 [ dollar door ]								1/0.50 2/0.75 3/1.00	755-5400-00-Y -01-Y or -02-Y		
ON	▲▲▲▲▲▲▲▲	CANADA 1	1.00		2.00			755-5400-10-Y					
OFF	▼▼▼▼▼▼▼▼	CANADA 2								1/1.00 3/2.00			
ON	▲▲▲▲▲▲▲▲	CROATIA	1	2	5		HRK // CROATIAN KUNA // [ kuna ]	755-5410-00-Y (2-Sided)					
OFF	▼▼▼▼▼▼▼▼						1/3 2/5						
ON	▲▲▲▲▲▲▲▲	DENMARK 1	1	5	10	20	DKK // DANISH KRONER // [ Kr ]						
OFF	▼▼▼▼▼▼▼▼	DENMARK 2								1/3 2/5	755-5402-00-Y (2-Sided)		
ON	▲▲▲▲▲▲▲▲	DENMARK 1					1/2 2/4 3/5 4/7 5/9 7/10						
OFF	▼▼▼▼▼▼▼▼	DENMARK 2											
ON	▲▲▲▲▲▲▲▲	JAPAN 1	100		100		JPY // JAPANESE YEN // [ ¥ ]						
OFF	▼▼▼▼▼▼▼▼	JAPAN 2								1/100	755-5408-01-Y (2-Sided)		
ON	▲▲▲▲▲▲▲▲	JAPAN 1					1/100 3/200						
OFF	▼▼▼▼▼▼▼▼	JAPAN 2											
ON	▲▲▲▲▲▲▲▲	MIDDLE EAST	token		token		TOKEN // Middle East currency used to buy token // [ TOKEN ]	755-5400-06-Y (use Side 1)					
OFF	▼▼▼▼▼▼▼▼						1/1						
ON	▲▲▲▲▲▲▲▲	NEW ZEALAND 1	1		2		NZD // NEW ZEALAND DOLLAR // [ \$NZD ]						
OFF	▼▼▼▼▼▼▼▼	NEW ZEALAND 2								1/1	755-5406-00-Y (Side 2)		
ON	▲▲▲▲▲▲▲▲	NEW ZEALAND 1					1/1 3/2						
OFF	▼▼▼▼▼▼▼▼	NEW ZEALAND 2											
ON	▲▲▲▲▲▲▲▲	NORWAY 1	10	5	20		NOK // NORWEGIAN KRONE // [ Kr ]						
OFF	▼▼▼▼▼▼▼▼	NORWAY 2								1/10	755-5403-01-Y or -02-Y / (2-Sided)		
		NORWAY 3								1/10 3/20	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 ]	755-5411-00-Y (2-Sided)				
OFF	▼▼▼▼▼▼▼▼		10	5	1		1/5						
ON	▲▲▲▲▲▲▲▲	SO. AFRICA 1	0.50	1.00	1.00	1.00	ZAR // SOUTH AFRICAN RAND // [ R ]						
OFF	▼▼▼▼▼▼▼▼	SO. AFRICA 2								1/2.00	755-5409-01-Y (2-Sided)		
ON	▲▲▲▲▲▲▲▲	SO. AFRICA 1					1/3.00 2/5.00						
OFF	▼▼▼▼▼▼▼▼	SO. AFRICA 2											
ON	▲▲▲▲▲▲▲▲	SWEDEN 1	1	5	10		SEK // SWEDISH KRONOR // [ kr ]						
OFF	▼▼▼▼▼▼▼▼	SWEDEN 2								1/10 2/15 3/20	755-5404-00-Y (2-Sided)		
ON	▲▲▲▲▲▲▲▲	SWEDEN 1					1/5						
OFF	▼▼▼▼▼▼▼▼	SWEDEN 2											
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 (2-Sided)		
ON	▲▲▲▲▲▲▲▲	SWITZERLAND 1					1/1 3/2 5/3 7/4 9/5						
OFF	▼▼▼▼▼▼▼▼	SWITZERLAND 2											
ON	▲▲▲▲▲▲▲▲	TAIWAN	10		10		TWD // TAIWANESE DOLLAR // [ TWD ]	755-5412-00-Y (use Side 1)					
OFF	▼▼▼▼▼▼▼▼						1/10						
ON	▲▲▲▲▲▲▲▲	UK 1	▼ 5TH COIN SLOT NOT AVAILABLE WITH CUSTOM PRICING ▼					GPB // UNITED KINGDOM POUNDS // [ £ ]	755-5407-00-Y				
OFF	▼▼▼▼▼▼▼▼	UK 2	LEFT	CENTER	RIGHT	4TH	5TH	755-5407-01-Y*					
		UK 3	0.10	0.50	1.00	0.20	2£	3/1.00 7/2.00					
		UK 4										4/1.00	755-5407-01-Y*
		UK 5										1/0.50 2/1.00 3/1.50	755-5407-01
		UK 6										5/2.00	755-5407-01-Y*
												1/0.30 2/0.60 3/0.90	755-5407-01
												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 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	▼													

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**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.



# 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**.

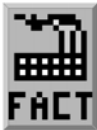
\*\*\*\*\* This setting is recommended where local laws restrict certain game features. \*\*\*\*\*  
Set the **Game Play Type** to "Restricted" Rules. *Programming varies and is subject to change.*



### 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:

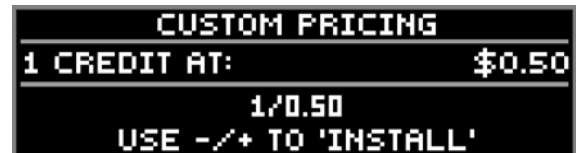
Press [ **BACK** ] to - DECREASE [ **< \$** ]

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

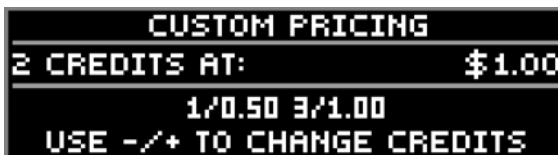
**Step 1** The starting display appears as below if no prior **Custom Pricing** was installed.



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



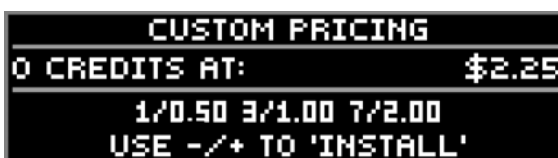
**Step 3** Press [ **SELECT** ] to + INCREASE to **\$1.00**. Press [ **+/>** ] to + INCREASE to 2 CREDITS AT:



**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</i> ( <i>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</i> ( <i>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'.



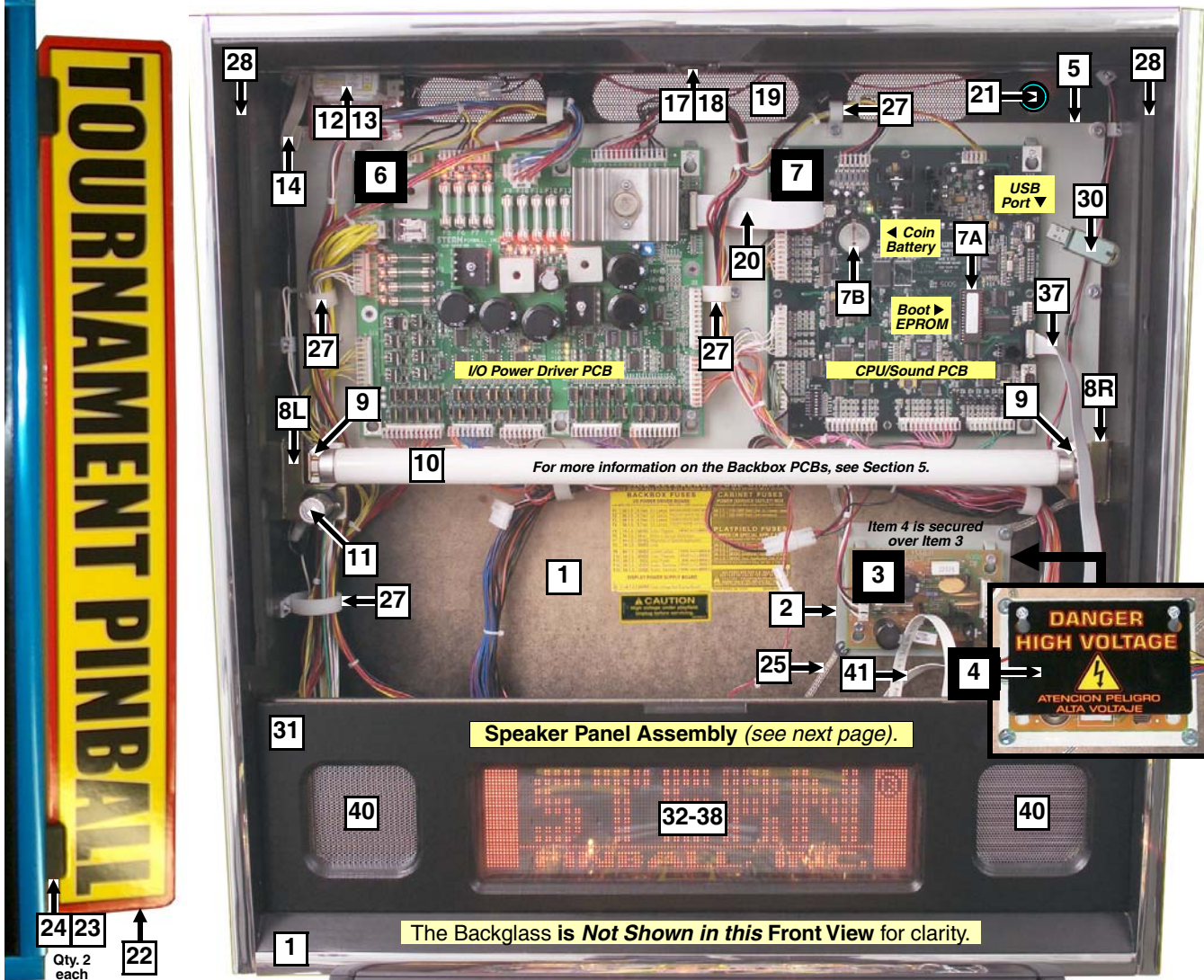


# Parts Identification & Location (The Pink Pages)

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



Sec. 4: Parts Id. ...

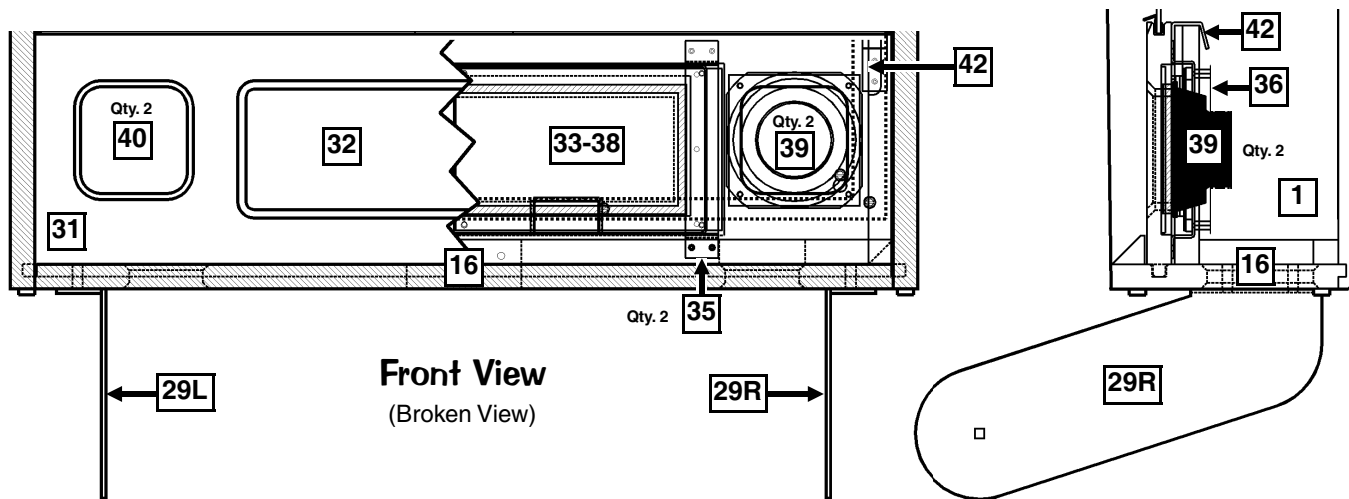
Nr.	BACKBOX PARTS	QTY.	SPI PART Nr.	Nr.	BACKBOX PARTS	QTY.	SPI PART Nr.
1	Backbox <b>WoF™</b> (No Parts)	1	<b>525-5631-18-98</b>	11	Starter - Fluorescent (FS2 Light)	1	165-5011-01
<i>Item 1 Note: Chrome T-Molding is installed and cannot be ordered separately. Fuse Description (820-6384-00) and High Voltage 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) <b>&gt;&gt;&gt; CAUTION - VERY HOT! Decal (820-6266-00)</b> 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) 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) Ordering Note: Programmed EPROM (965-BOOT-SAM) 7B: Coin Cell Battery (CR2430 3V) (000-0644-01) 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. ▶

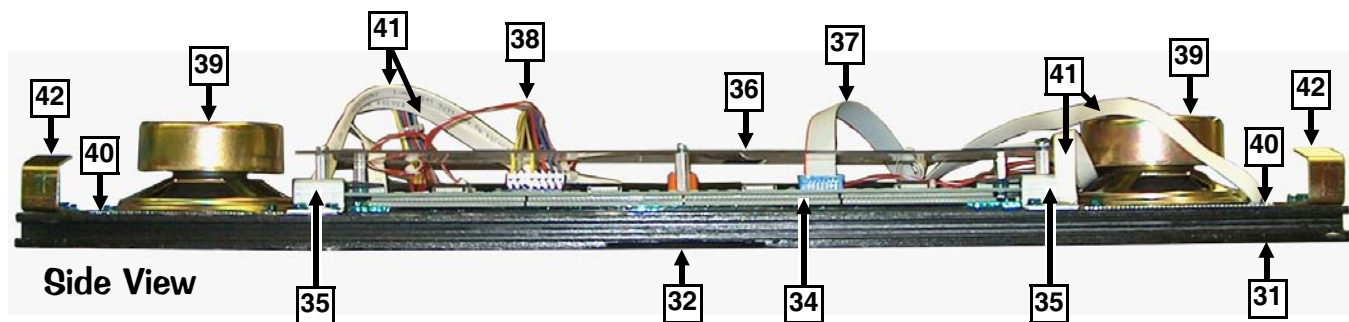




## Backbox [ S.A.M. System ] - Parts



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



Nr.	BACKBOX PARTS	QTY.	SPI PART Nr.	Nr.	SPEAKER PANEL PARTS	QTY.	SPI PART Nr.
<p>← PARTS TABLE &amp; VIEWS CONTINUED FROM THE PREVIOUS PAGE.</p>							
25	Braided Wire (1-1/2 Feet)	1	600-5001-00	31	Speaker Panel (Black Wood)	1	525-5515-00
<p>Item 25 is secured by: Staple 5/16" (Qty. 23) (631-5000-00)</p>				32	Plastic Shield (Display Front Cover)	1	545-5884-00
26*	Zip Cable Tie (Screw Down Style)	2	040-5005-00	<p>Item 33 is secured to inside Item 31 by: #6 X 3/8" SHWH AB (Zinc) (Qty. 8) (234-5000-00)</p>			
<p>Item 26 is secured @ inside bot. by: #8 X 1/2" SHWH AB (Zinc) (Qty. 1/per) (234-5101-00)</p>				33*	Foam 3/16" Thick X 1/4" Wide X 12"	3	626-5026-00
27	Clamps [Multiple Sizes]	15	040-5000-XX	<p>Above Item 33 is self-adhesive. Located between Items 32-34. Sold in 12" Lengths only.</p>			
<p>Item 27 secured by: #8 X 1/2" SHWH AB (Zinc) (Qty. 1/per) (234-5101-00)</p>				34	/// EURO ONLY RoHS /// 128 X 32 DM Pin-LED PCB	1	520-5052-04
<p>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)</p>				<p>/// EURO ONLY RoHS /// Dot Matrix Pin-LED Bezel</p>			
28	Foam 3/16" Thick X 1/4" Wide X 12"	3	626-5026-00	<p>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)</p>			
<p>Above Item 28 is self-adhesive. 17.5" strip on each side. Sold in 12" Lengths only.</p>				35	Dot Matrix Display Mounting Bracket	2	535-8368-01
29L	Pivot Hinge (Left Style)	1	535-7999-00	<p>Item 35 is secured to Item 31 by: #8 X 1/2" SHWH AB (Zinc) (Qty. 4/per) (234-5101-00)</p>			
29R	Pivot Hinge (Right Style)	1	535-7999-01	36	Plastic Shield (Display Back Cover)	1	830-6040-00
<p>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)</p>				<p>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)</p>			
<p>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)</p>				37	Ribbon Cable, 14-Pin (32")	1	036-5260-32
30*	Memory Stick USB 1.1+ [Generic] 64MB		970-0064-00	<p>/// EURO ONLY RoHS /// LED Ribbon Cable Filter PCB</p>			
<p>Memory Stick USB 1.1+ [Generic] 128MB</p>				38	Display Cable (Wiring Harness)	1	036-5454-01
<p>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])</p>				<p>/// EURO ONLY RoHS /// LED Display Adapter Harness</p>			
<p><b>Take Note:</b></p>				39	Speaker (Shld.) 4" 8Ω #MG ELE 4060SH	2	031-5004-02
<p>* An asterisk ( * ) indicates item(s) are not noted in the pictorials.</p>				40	Speaker Grill (Brass w/no Artwork)	2	535-8081-03
<p></p>				<p>Items 39-40 are secured by: #8 X 1/2" SHWH AB (Black) (Qty. 4/per) (234-5101-01)</p>			
<p></p>				41	Ground Strap (25") [ 2 per : Items 35 & 39 ]	4	600-5006-25
<p></p>				42	Speaker Panel Hook Bracket	2	535-7009-02
<p></p>				<p>Item 42 is secured by: #8 X 1/2" SHWH AB (Zinc) (Qty. 2/per) (234-5101-00)</p>			
<p></p>				<p>(ASM. REF. 515-6888-06, Items 31-42 Only [includes wiring])</p>			

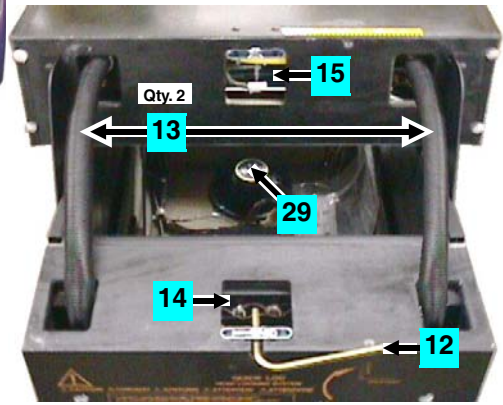
Nr.	BACKGLASS PARTS	QTY.	SPI PART Nr.	Nr.	BACKGLASS PARTS	QTY.	SPI PART Nr.
i*	Clear Backglass 25.906" X 19.187"	1	660-5038-02	iv*	Bottom Plastic Lift Channel - 26-1/16"	1	545-5021-01
ii*	Wheel of Fortune™ Film Art (#98)	1	830-5298-00	v*	Plastic Edging (Left/Right) - 18-1/8"	2	545-5018-14
iii*	Top Plastic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

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

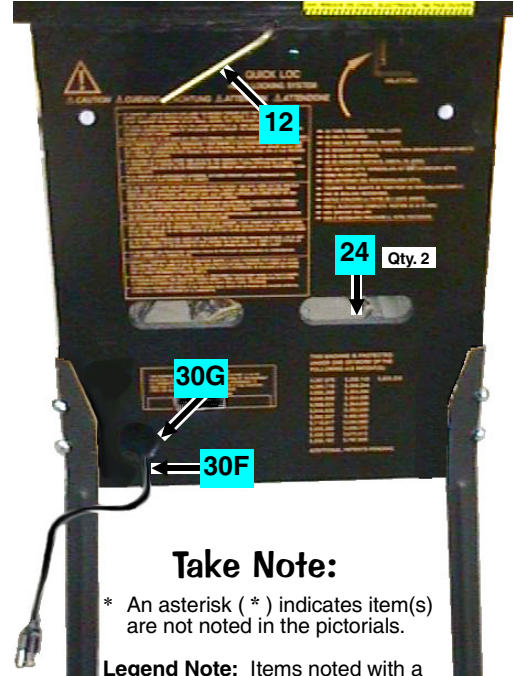


# Cabinet - Parts & Switches

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.

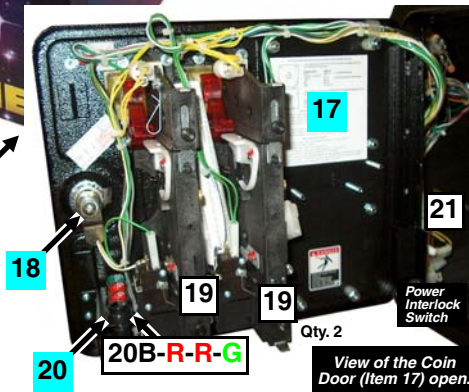
**Item 30D**  
(Power On/Off Switch)  
is located under the Cabinet  
(Front Right) directly below the  
Power Box (in the Cabinet).

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.

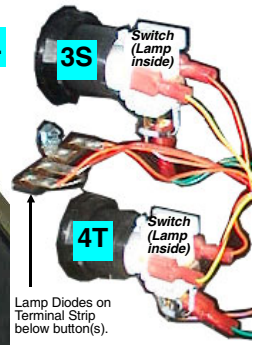
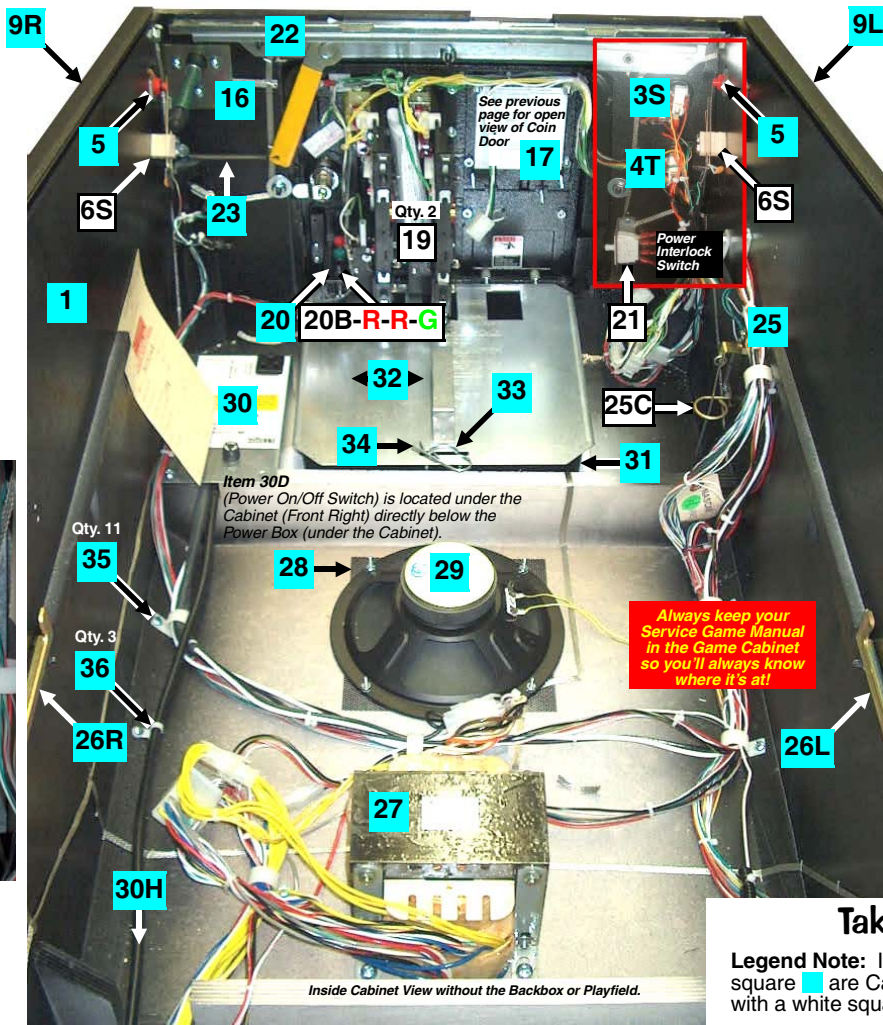
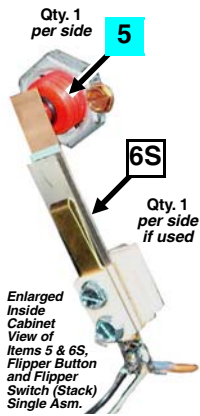
Sec. 4: Parts Id. ...

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).				9L	Side Armor (Left) with Button Guard	1	535-9596-00
3S	Start Button (Green Round) with Sw. + Lamp	1	500-6388-44-TL	9R	Side Armor (Right) with Button Guard	1	535-9596-01
4T	Tournament Button (Yellow Sq.), w/Sw. + Lmp.	1	500-6587-06-TL	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)			
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.)				10	Front Molding (Black) < NO BUTTON HOLE >	1	500-6882-02-00
5	Flipper Button (Red) Assembly (No Switch)	2	500-5026-32	Item 10 includes: Self-Adhesive Foam Rubber 3/8" X 3/16" X 20-3/8" (3') (626-5001-00) Items 10 works with Item 22 (next page) <b>ONLY</b> .			
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)				11	Playfield Glass (Tempered) 21" X 43" X 3/16"	1	660-5001-00
6S	Flipper Switch Single Assembly	2	500-6889-01	12	Hex Key Allen Wrench 5/16"	1	777-0001-00
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)				13	Corrugated Tubing Black 1"ø X 2.6" Lg.	1	605-5008-03
6D	Flipper Switch Double Assembly	0	500-6890-01	Above Item 13 covers the Cable Wiring Harnesses going into the Backbox from the Cabinet.			
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)				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
				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. ▶							

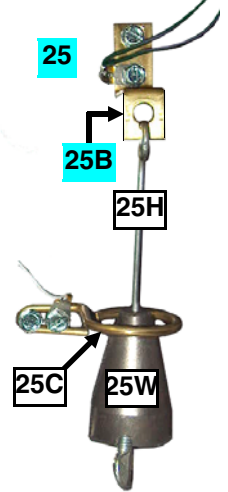




# Cabinet - Parts & Switches Continued



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)					
<b>Ordering Note:</b> Securing hardware for switches included. Decal in kit sold separately.				30	30D incl.: 30D: On/Off Rocker Switch + Bracket Assembly (515-7085-00)	SWITCH: 30D: On/Off Rocker Switch + Bracket Assembly (515-7085-00)			
21 Power Interlock-Memory Protect Switch Asm.				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.				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)				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)				30J: Fuse Holder (205-5001-00)					
Plumb Bob Tilt Switch Individual 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)				35 Clamps [Multiple Sizes]				12	040-5000-XX
26R Slide & Pivot Support Bracket (Right)				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				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 <i>Playfield Top - Plastics Kit, Decals &amp; Mylar Kits</i>.</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 online : <a href="http://www.sternpinball.com/coinagecards.shtml">http://www.sternpinball.com/coinagecards.shtml</a></small>			

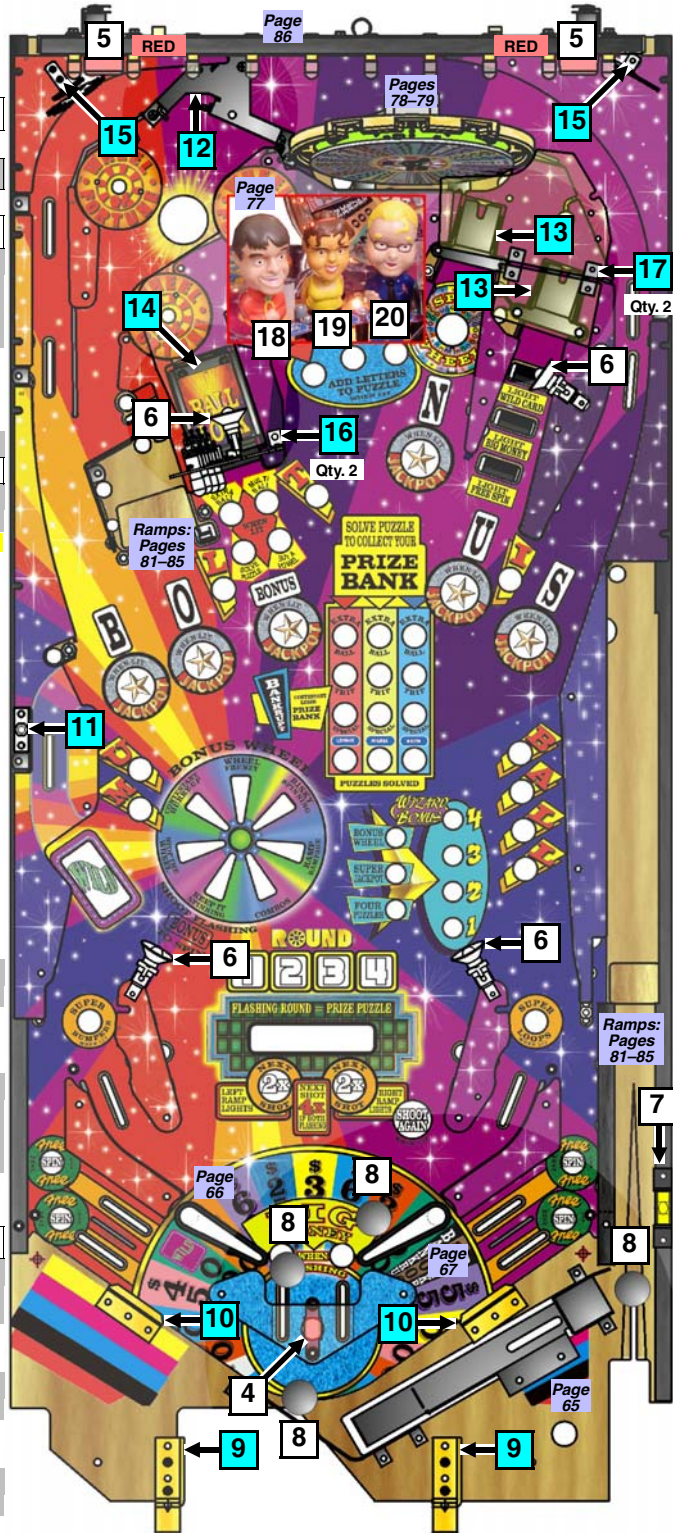
**Ordering Note :** If this is a non-US Game, Coin Card(s) Part Numbers provided will differ.



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:

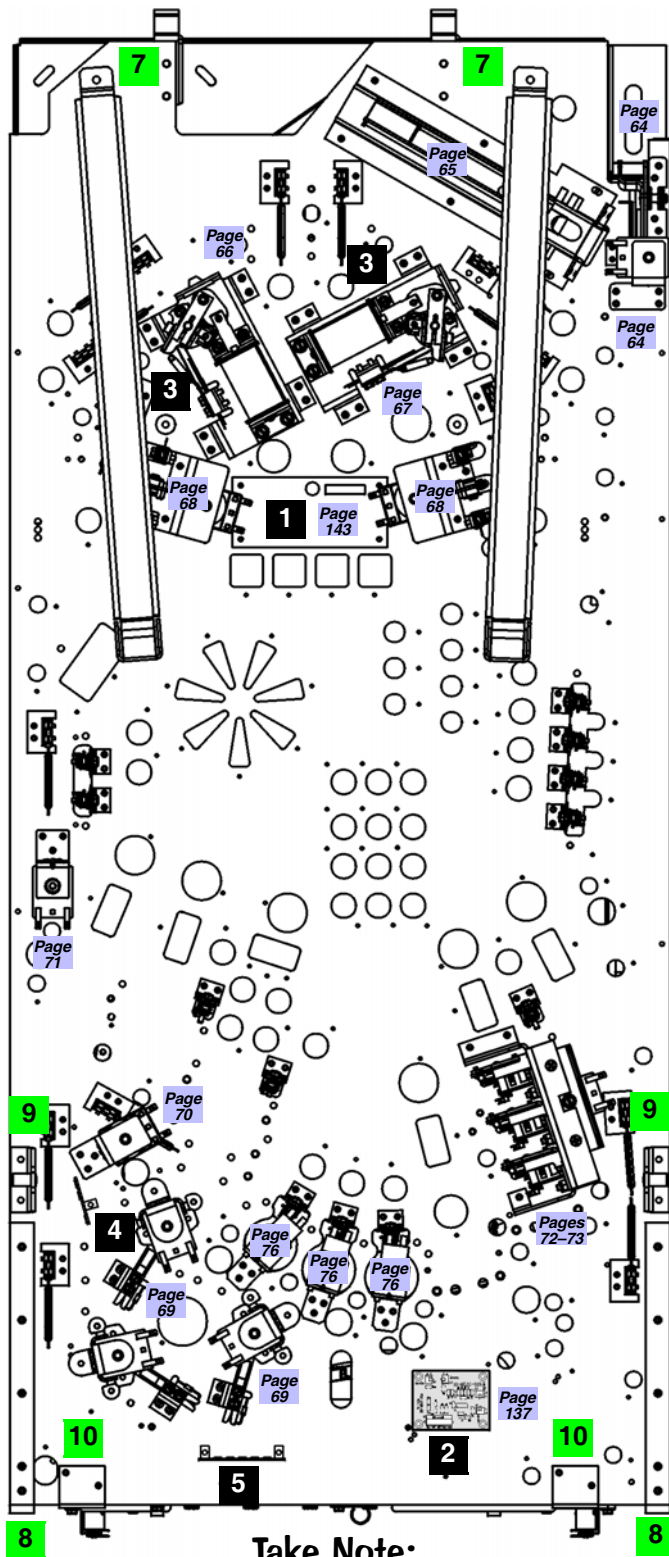
### Pinball Location Maintenance Standard Kit: 502-6002-98

**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) 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) 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 ▶

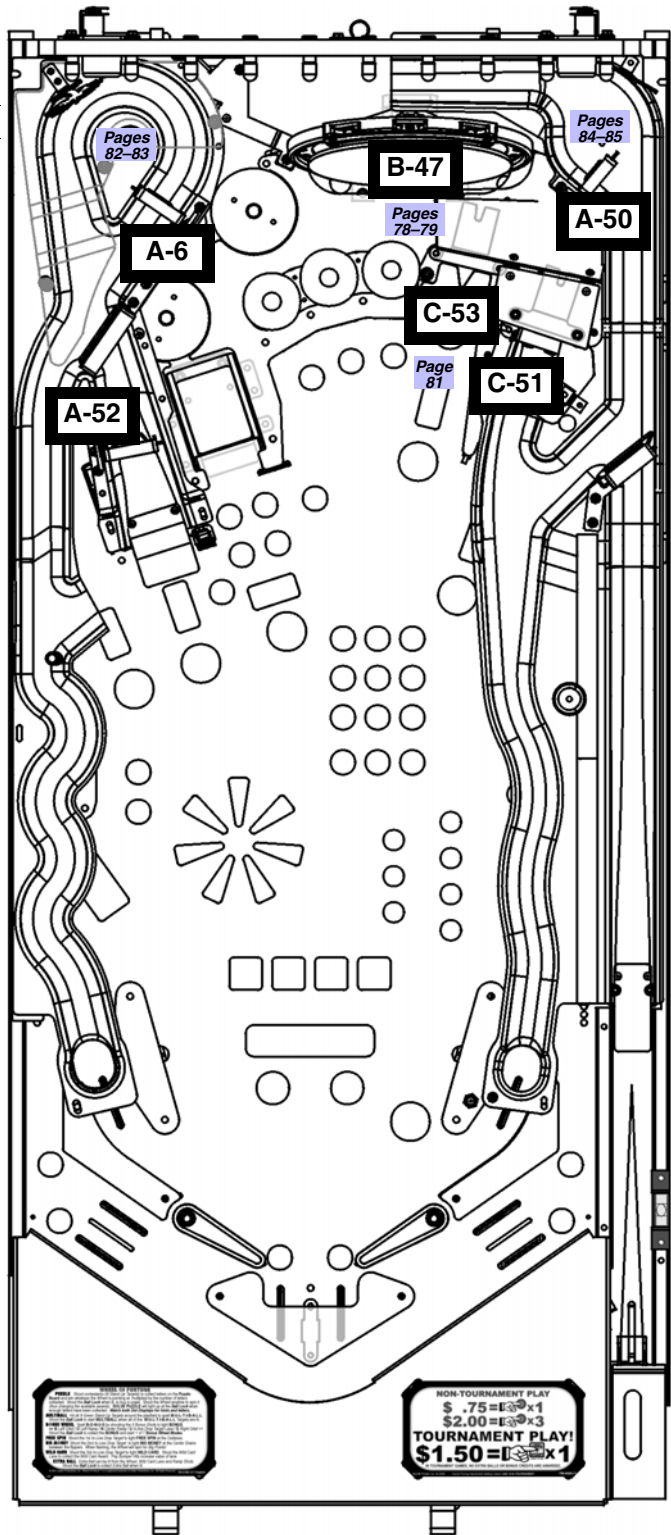
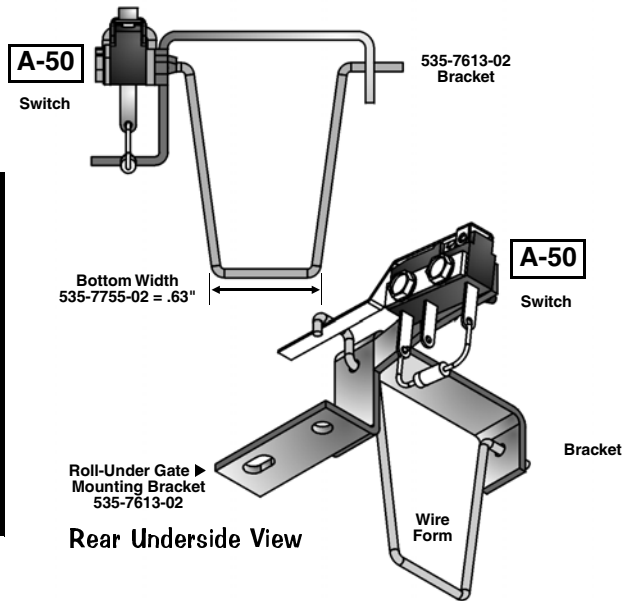
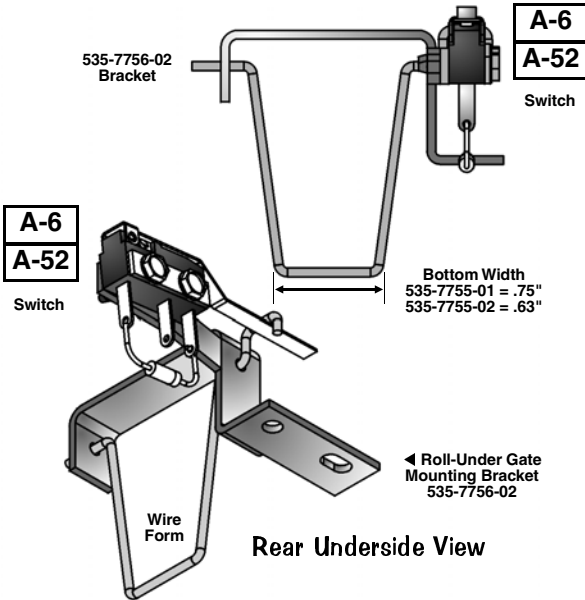
Sec. 4: Parts Id. ...

# 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.



Sec. 4: Parts Id. ...

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

Switch Matrix Number 47

**Application Note:** OPTO Interrupter 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.

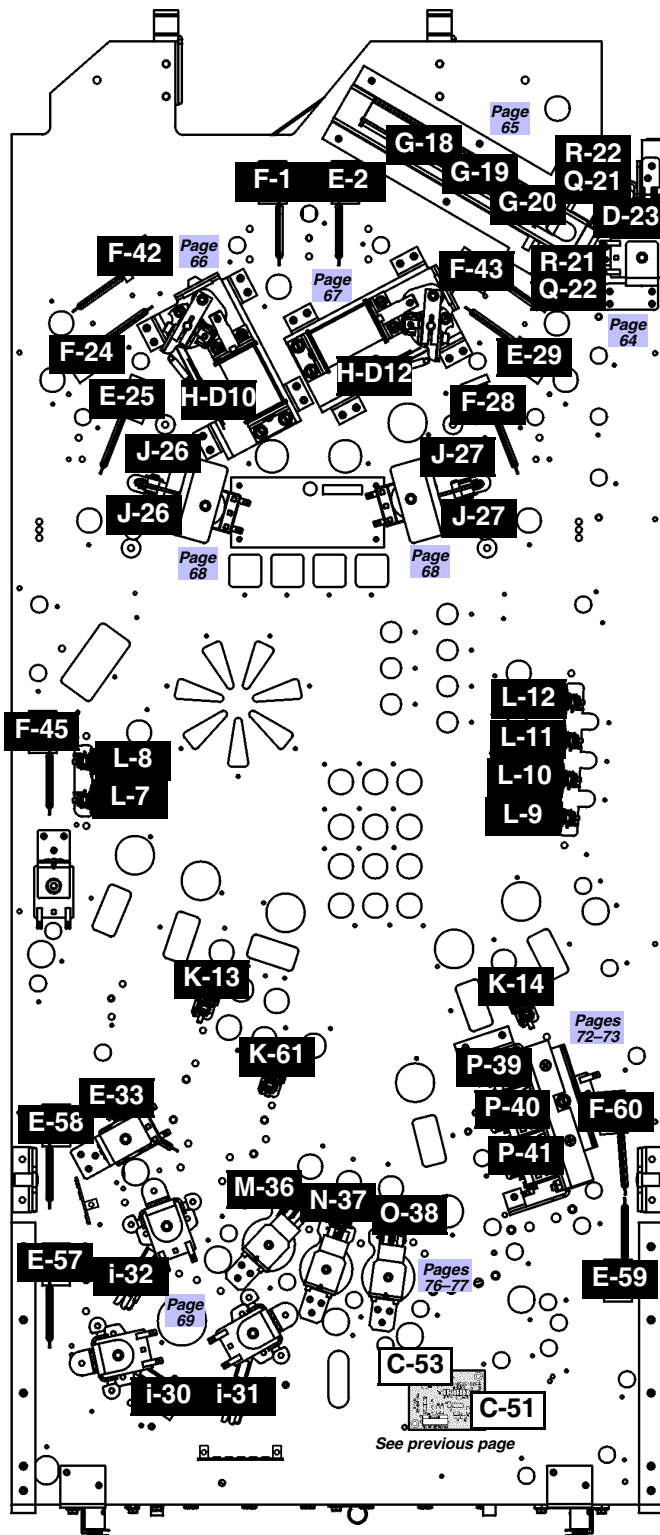
**Usage Note:** See Section 4, Chapter 2, (Blue Pages): Wire Ramp Assembly, Individual Parts Only, Page 86, and Right Ramp Assembly, Individual Parts Only, Pages 84 - 85.

**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).



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



Nr.	SWITCHES	QTY.	SPI PART Nr.
D-23	Switch (for Shooter Lane) <i>Associated Part Not Included</i> : Switch Mounting Bracket (535-6173-00) Bracket secured to Playfield by: #6 X 1/2" SHWH AB (Zinc) (Qty. 2) (234-5001-02) 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) Switch Matrix Numbers 2, 25, 29, 33, 57, 58 & 59	7	500-6227-03
F-#	Sw., Roll-Over Std. Force (Right Mount Style) Bracket secured to Playfield by: #6 X 1/2" SHWH AB (Zinc) (Qty. 2/per) (234-5001-02) Switch Matrix Numbers 1, 24, 28, 42, 43, 45 & 60	7	500-6227-04
G-#	Switch (Roller Actuator, Lite-Force) <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) Item G-# is secured by: #2-56 X 1/2" Unslit HWH #4 Hex TR3 Blk (Qty. 2/per) (237-5937-02) Also see Section 4, Chapter 2, (Blue Pages): 4-Ball Trough Assembly, Page 65. Switch Matrix Numbers 18, 19 & 20	3	180-5119-02
H-#	Switch (End-of-Stroke), Stack (Blade) Item H-# is secured by: #6-32 X 5/8" SHWH Swage (Serr.) Zinc (Qty. 2/per) (237-5976-04) Also see Section 4, Chapter 2, (Blue Pages): ... Flipper Assemblies, Pages 66 - 67. Dedicated Switch Numbers D10 & D12	2	180-5149-00
i-#	Switch Asm., Stack (Blade) (for Pops) <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) Bracket secured to Playfield by: #8 X 1/2" SHWH AB (Z) (Qty. 2) (234-5101-00) Also see Section 4, Chapter 2, (Blue Pages): Bumper Switch Individual Parts ..., Page 69. Switch Matrix Numbers 30, 31 & 32	3	515-6459-09
J-#	Switch, Stack (Blade) <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) Item L-# is secured by: #6-32 X 5/8" HWH Swage (Serr.) Zinc (Qty. 2/per) (237-5976-04) Also see Section 4, Chapter 2, (Blue Pages): Slingshot Assemblies (Qty. 2/per), Page 68. Switch Matrix Numbers 26 & 27 (Dual Switches = Slingshots)	4	180-5054-00
K-#	Switch & Target Riveted Asm. 1/2" (Green) <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. Switch Matrix Numbers 13, 14 & 61	3	515-7581-04
L-#	Switch & Target Riveted Asm. 1" Sq. (Green) <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). Note: Smaller foam pad creates the Lite Anti-Loft Assembly (500-5232-XX). Switch Matrix Numbers 7, 8, 9, 10, 11 & 12	6	515-7568-04
M-36	Switch & Target Riveted Asm. 1" Sq. (Red) <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) <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) <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) 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. Switch Matrix Numbers 39, 40 & 41	3	520-5255-00
Q-21	Dual OPTO TRANS PCB Asm. <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 <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) Items Q-#-R-# are secured by: #6-32 X 5/8" HWH Sw. (Ser.) Zc. (Qty. 3/per) (237-5976-04) 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. 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

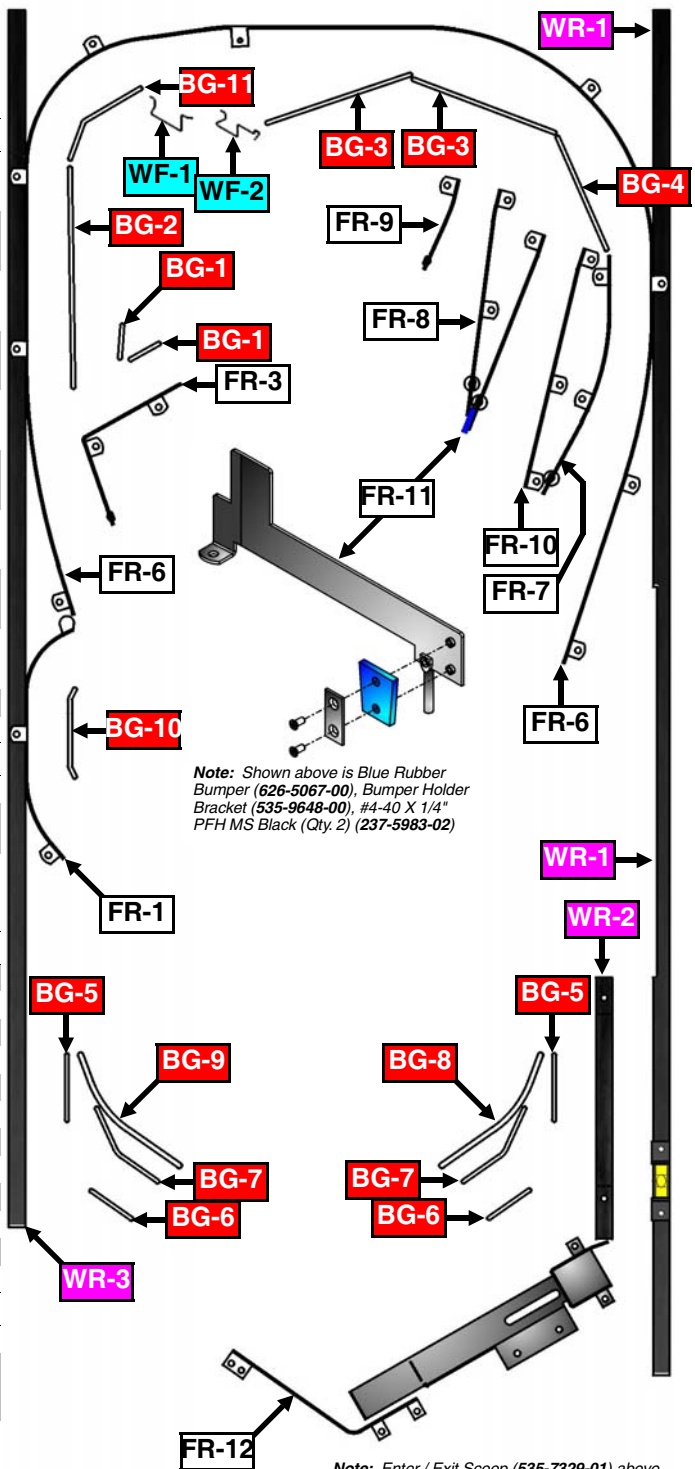
## Wood Rails, Ball Guides and Wire Forms

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. 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)

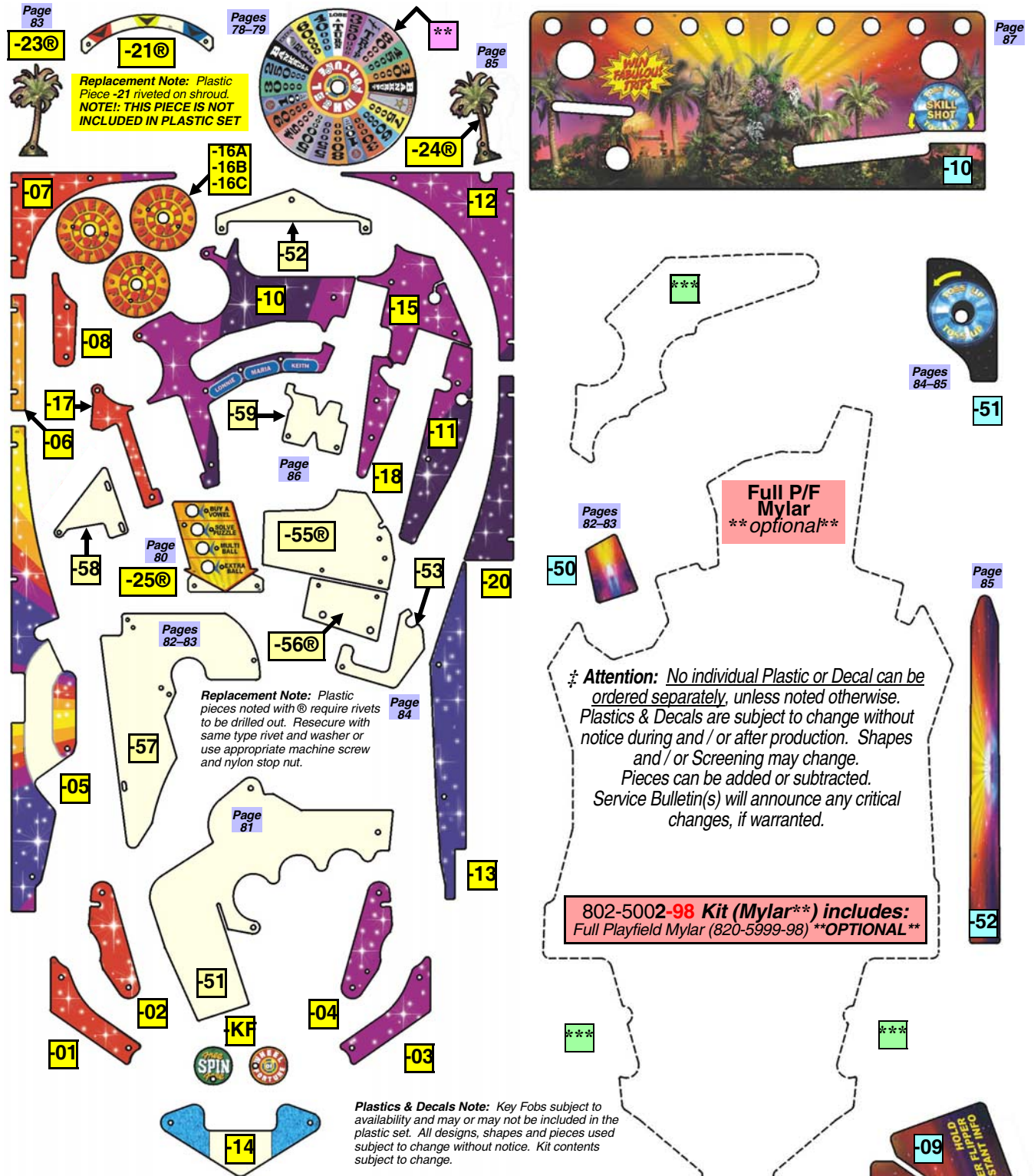
#### Playfield Legend Note:

- 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. ...



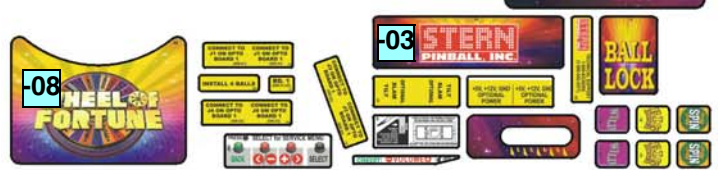
# Playfield Top - Plastics (Screened & Clear) Kit, Decals\* & Mylar\* Kits ‡



‡ **Attention:** No individual Plastic or Decal can be ordered separately, unless noted otherwise. Plastics & Decals are subject to change without notice during and / or after production. Shapes and / or Screening may change. Pieces can be added or subtracted. Service Bulletin(s) will announce any critical changes, if warranted.

**802-5002-98 Kit (Mylar\*\*) includes:**  
Full Playfield Mylar (820-5999-98) \*\*OPTIONAL\*\*

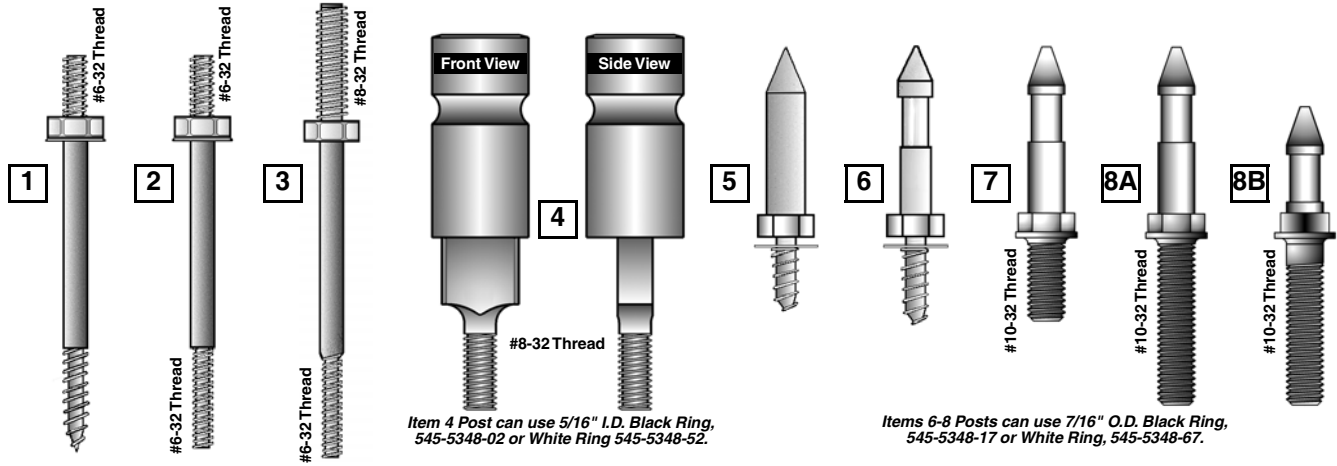
- 803-5000-98 Kit (Plastics\*) includes:**  
Plastic Sets (830-6066-XX, 830-6078-XX & 830-6081-25)
- 803-5001-98 Kit (Plastic\*\*) includes:**  
Plastic Wheel Lexan .125" Screened (830-6069-00)
- 802-5000-98 Kit (Decals\*) includes:**  
Decal Sets (820-6396-XX & 820-6416-XX)
- 802-5001-98 Kit (Mylar\*\*\*) includes:**  
Bumper Area / Ball Drop X2 (820-6415-00/820-5815-00)



Sec. 4: Parts Id. ...

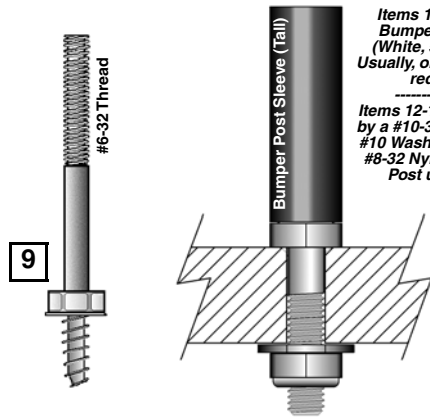


# Playfield Top & Bottom - Metal Posts & Fin Shank Screws (Actual Size) †



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:

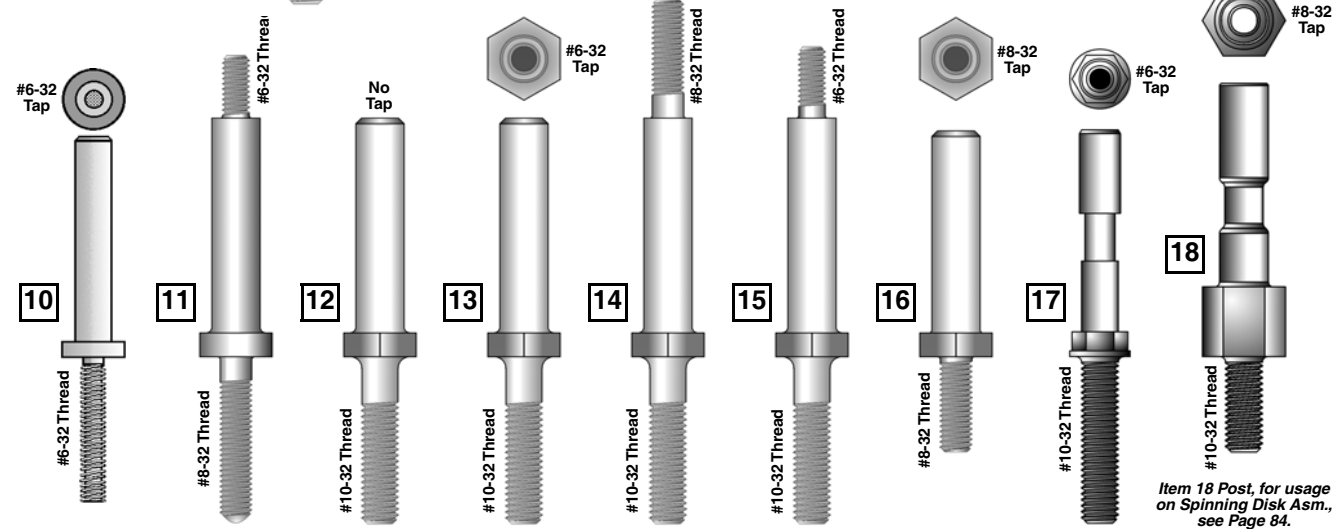
**Legend Note:**  
Items noted with a white square  are Metal Posts. Items noted with a black square  are Fin Shank Screws.

**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.

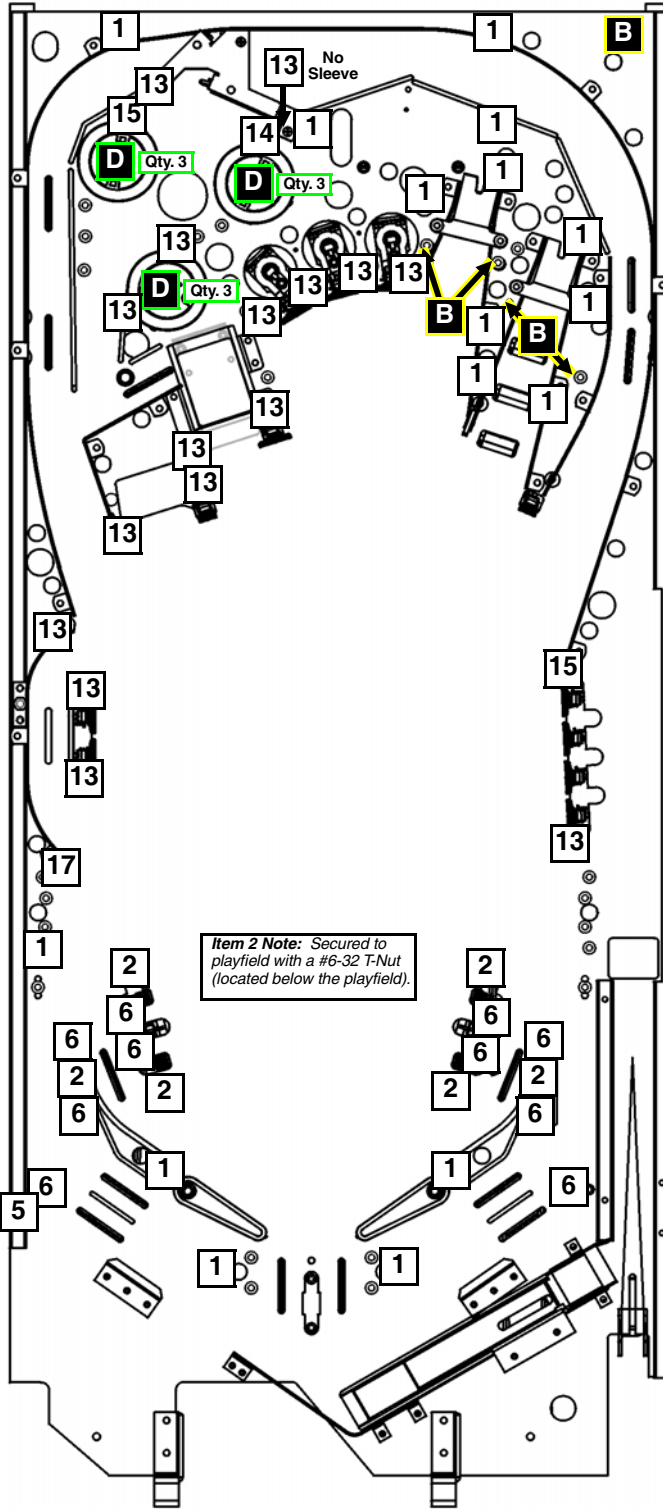




Playfield Top & Bottom - Metal Posts  
 □ & Fin Shank Screws ■ Continued

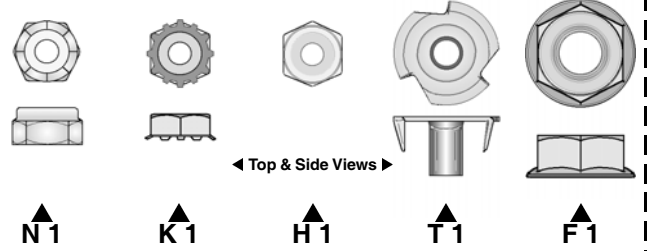
Playfield Top & Bottom -  
 Nylon Stop, KEPS, Hex, T-, Flange,  
 Pal & Wing Nuts\* (Actual Size) †

† 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 Side 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

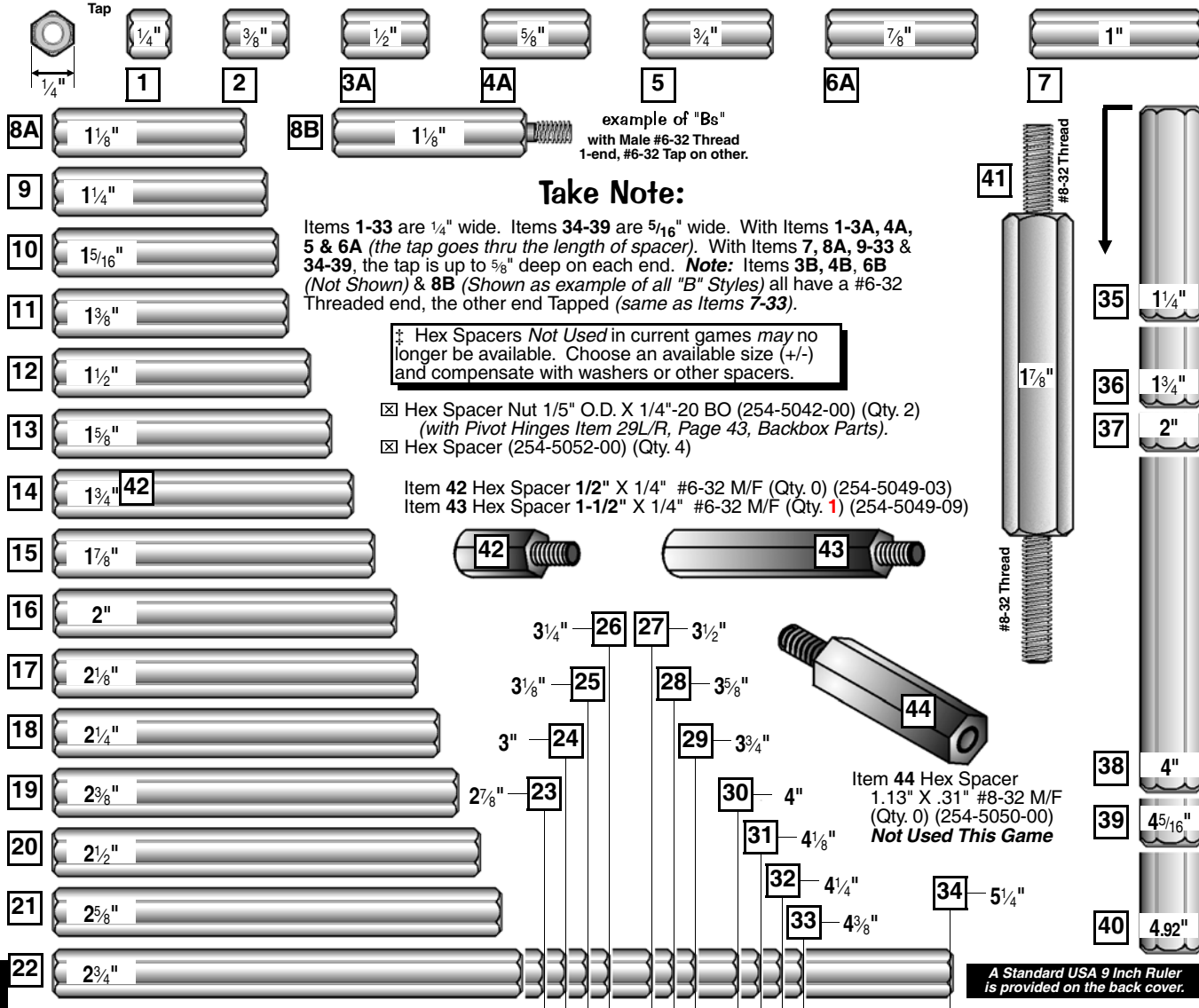
Nr.	WING NUTS*	QTY.	SPI PART Nr.
W1	#6-32 Wing Nut		240-5001-00
W2	#8-32 Wing Nut		240-5100-00
W3	#10-24 Wing Nut		240-5211-00
W4	1/4"-20 Wing Nut		240-5302-00
W5	1/4"-20 Toggle Wing		240-5324-00

\* 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

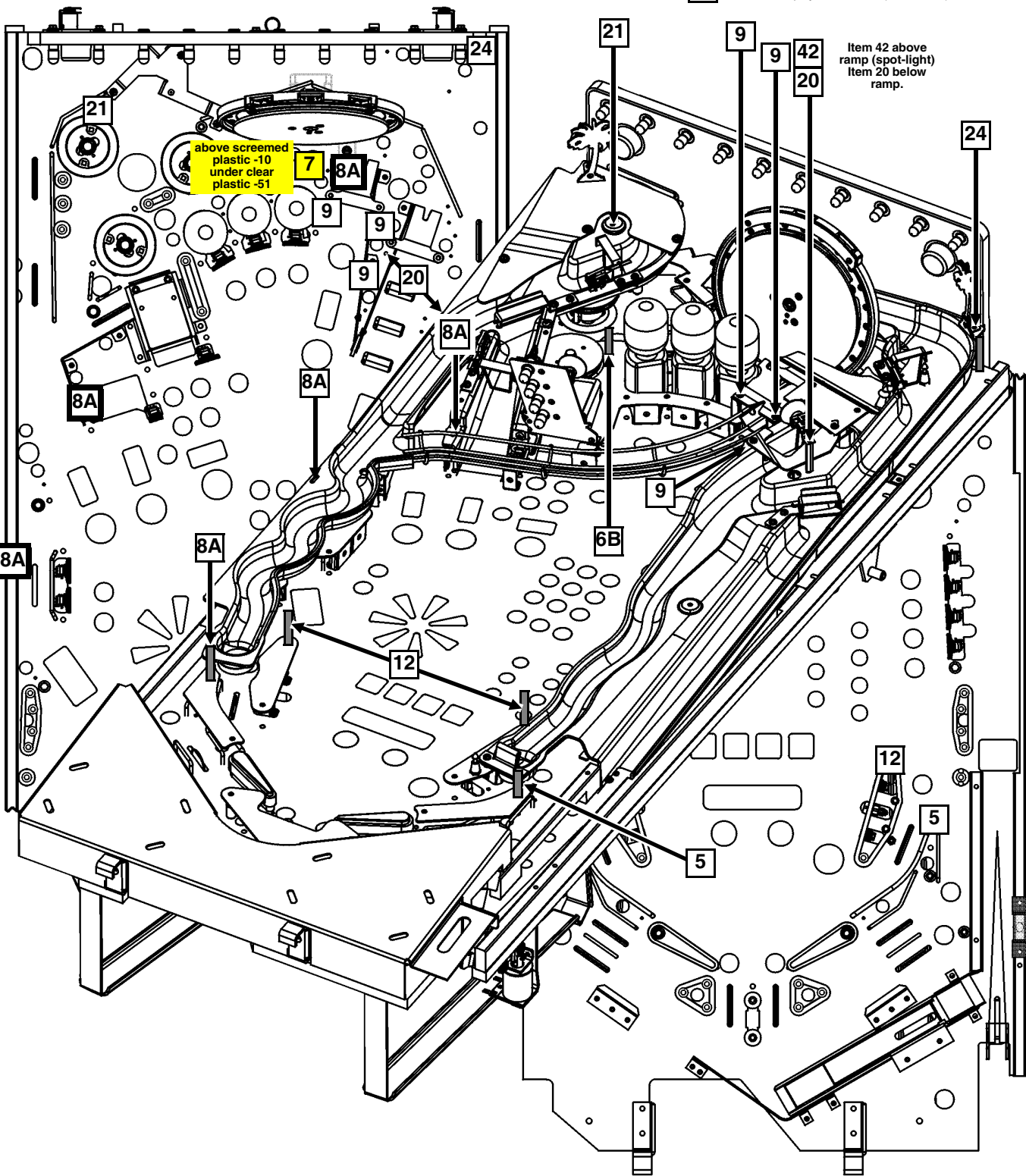
† The item type (size / description), the quantity and/or location used, are subject to change without notice. Service Bulletins will announce any changes, if warranted.



# 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.

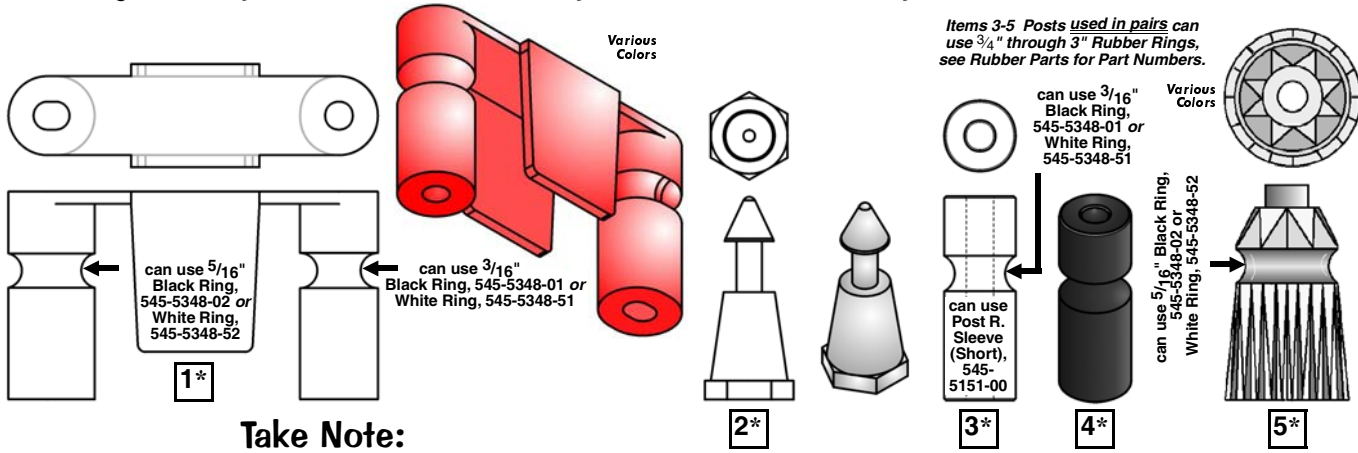
Sec. 4: Parts Id. ...

## Take Note:

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



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

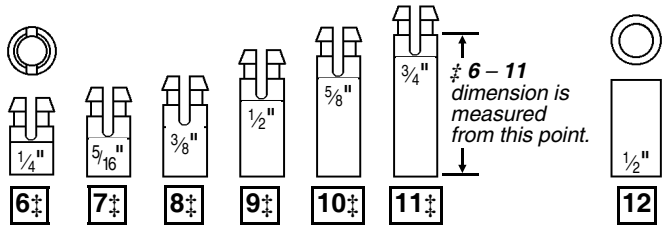


**Take Note:**

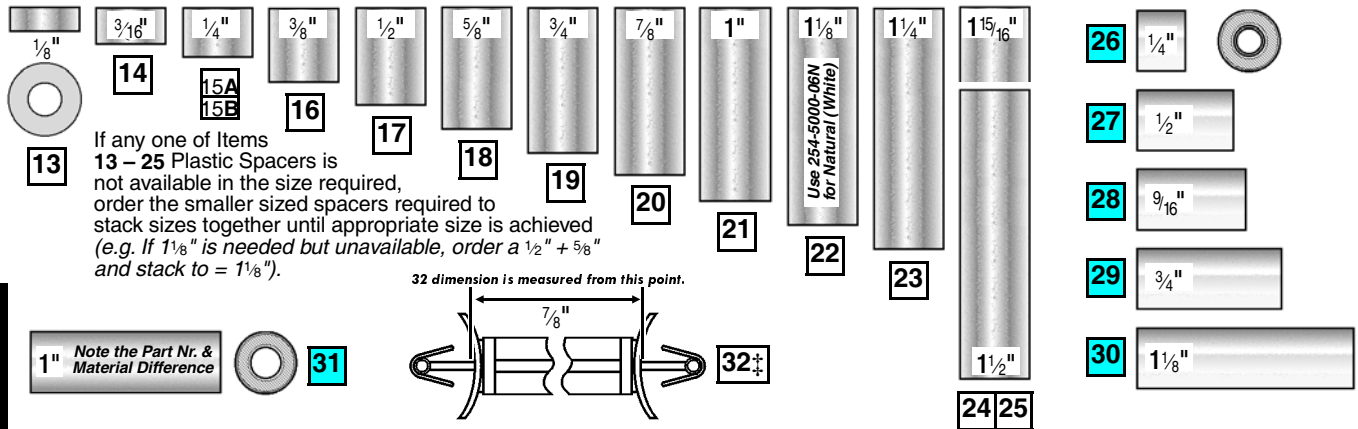
## PLASTIC PART COLOR CHART

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").

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 5/16" 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. ▶

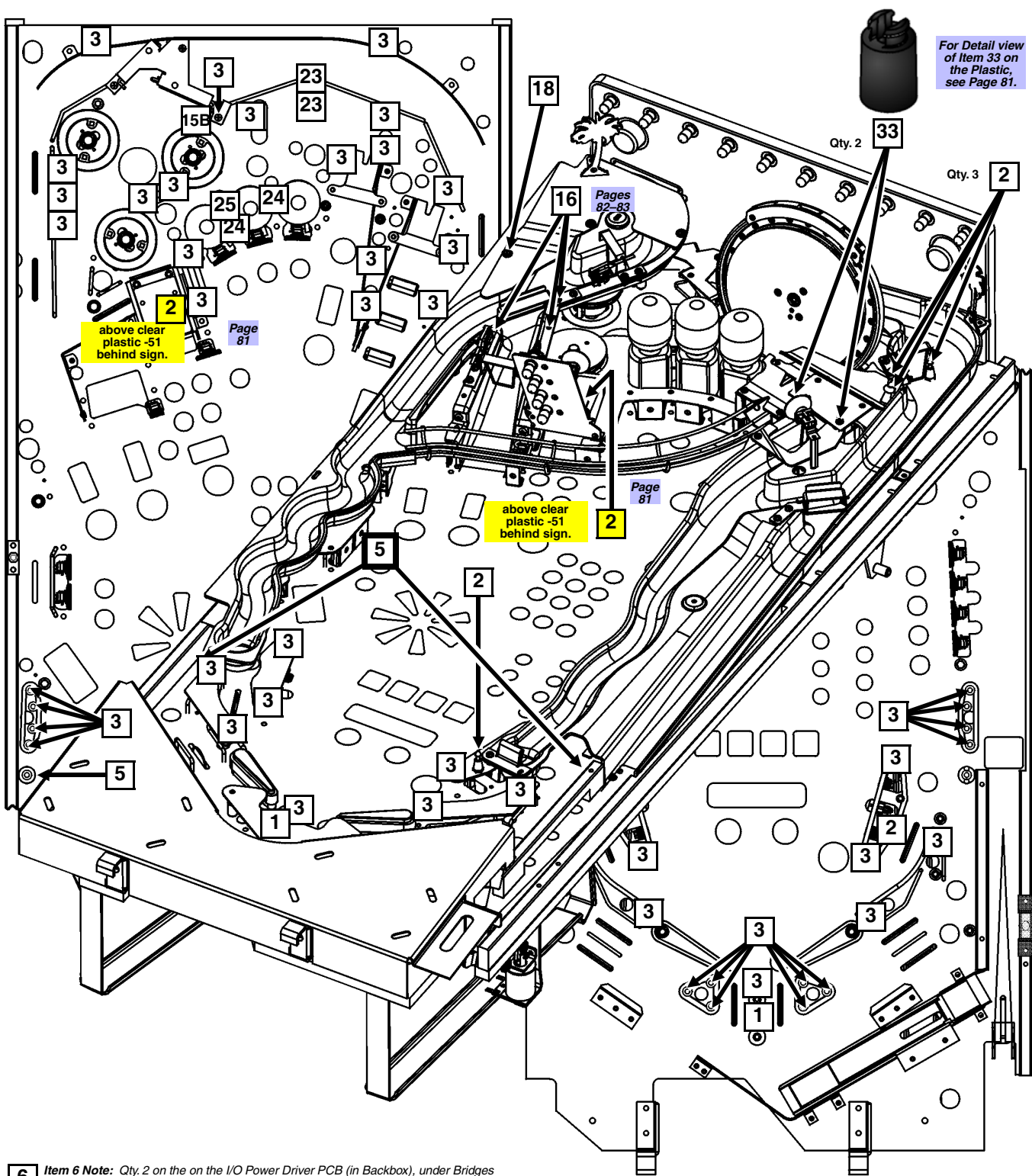
† The item type (size / description), the quantity and/or location used, are subject to change without notice. Service Bulletins will announce any changes, if warranted.



# 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.

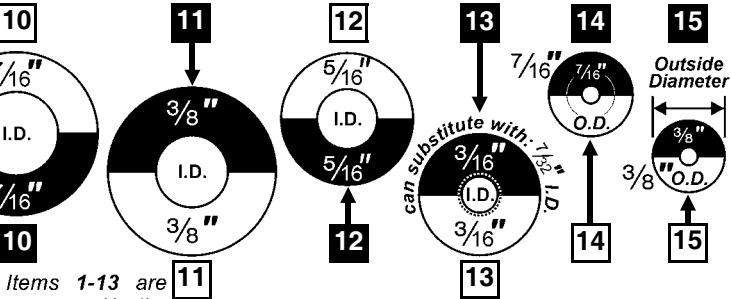
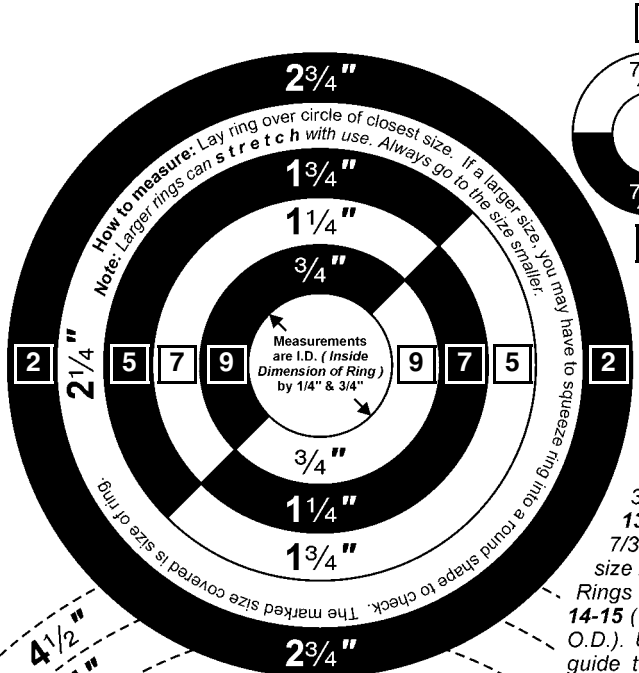
- 6** **Item 6 Note:** Qty. 2 on the on the I/O Power Driver PCB (in Backbox), under Bridges 4 & 5; Qty. 4 per on the OPTO Amplifier PCBs;
- 7** **Item 7 Note:** Qty. 5 on the I/O Power Driver PCB, under Bridges 1, 2 & 3 and outside edge support holes; Qty. 4 on the CPU/Sound outside edge support holes;
- 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
15	3/8" O.D. Rubber Ring BLK		545-5348-19
	3/8" O.D. Rubber Ring WHT		545-5348-69
16	Small Flipper BLACK Ring (Soft Duro)		545-5207-00
	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

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).

Sec. 4: Parts Id. ...

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).

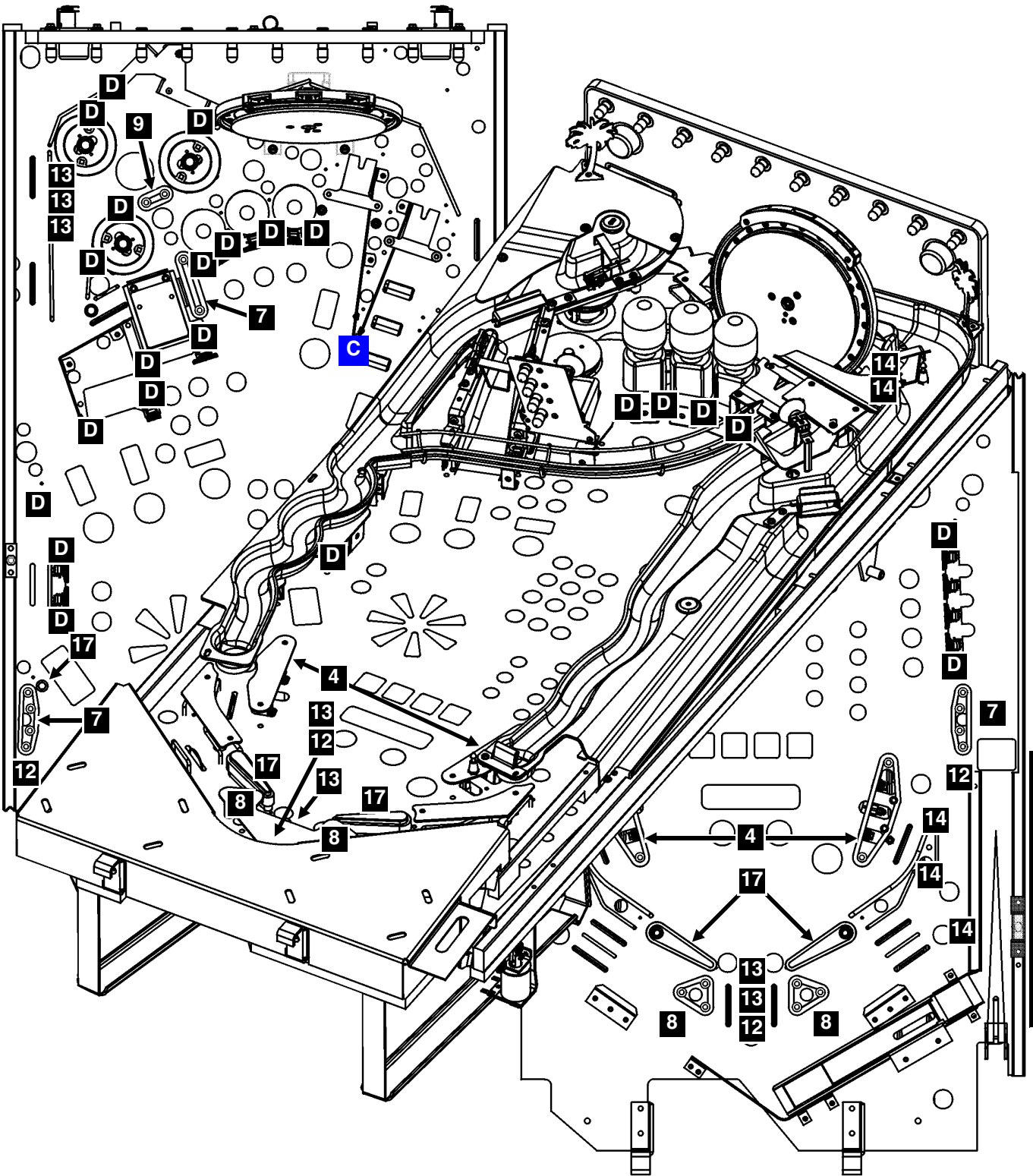
Legend Note: Items noted with a black square are Black Rubber Parts. Items noted with a blue square are Blue Rubber Parts.

† 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.

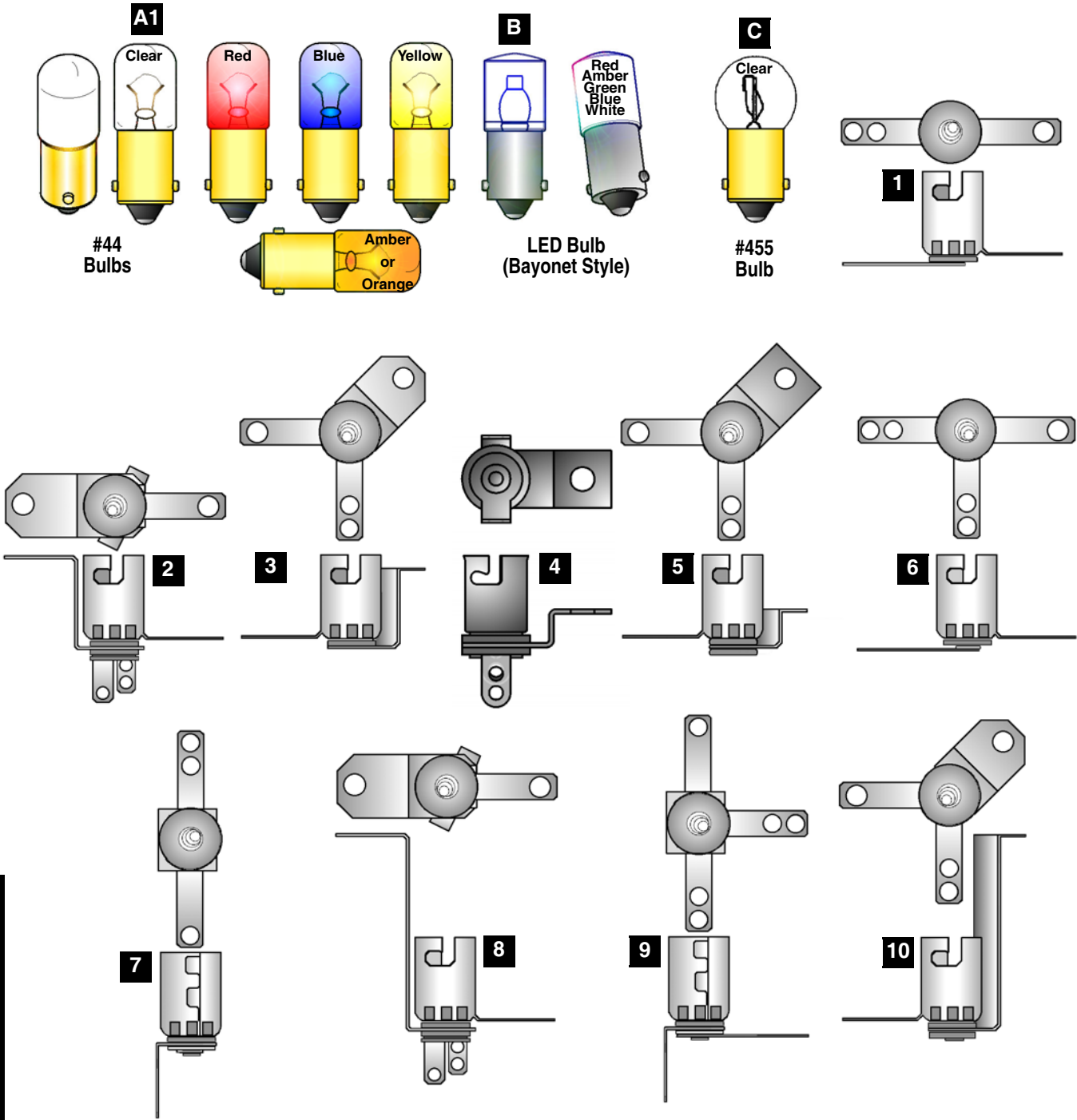


Sec. 4: Parts Id. ...

**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) ~ Red (112-5023-02); Amber (112-5023-03); Green (112-5023-04); Blue (112-5023-05);</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>				C	#455 Twinkle Bulb		165-5003-00

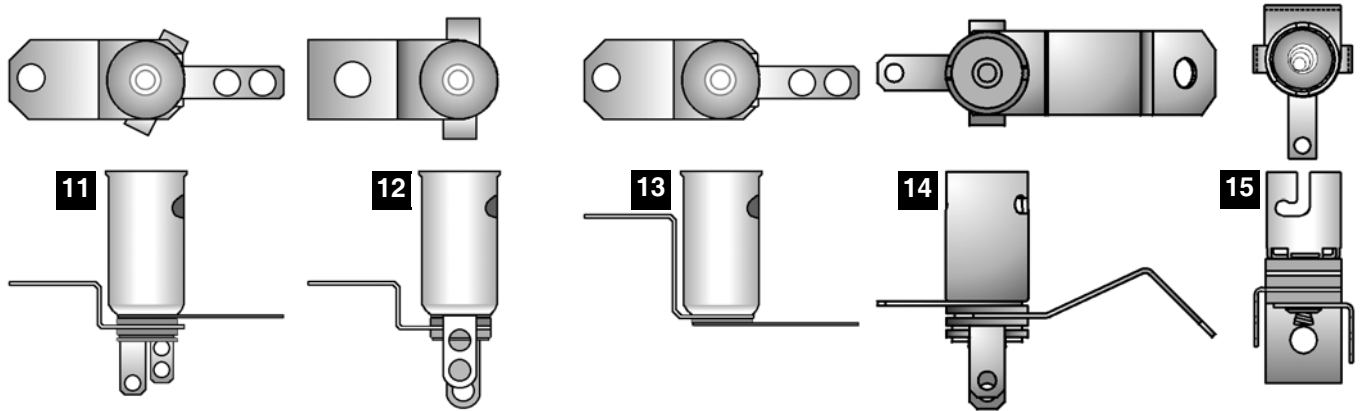
  

Nr.	SMALL BAYONET SOCKETS	QTY.	SPI PART Nr.	Nr.	SMALL BAYONET SOCKETS	QTY.	SPI PART Nr.
1	2-Lug Staple Down Socket	12	077-5000-00	9	3-Lug Laydown Socket (3 Lugs Flat)		077-5006-00
2	3-Lug Stand-Up Socket (Med. Brkt.)	4	077-5008-00	10	2-Lug Stand-Up Socket (Tall Bracket)		077-5005-00
3	2-Lug Stand-Up 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 (Gls)	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				

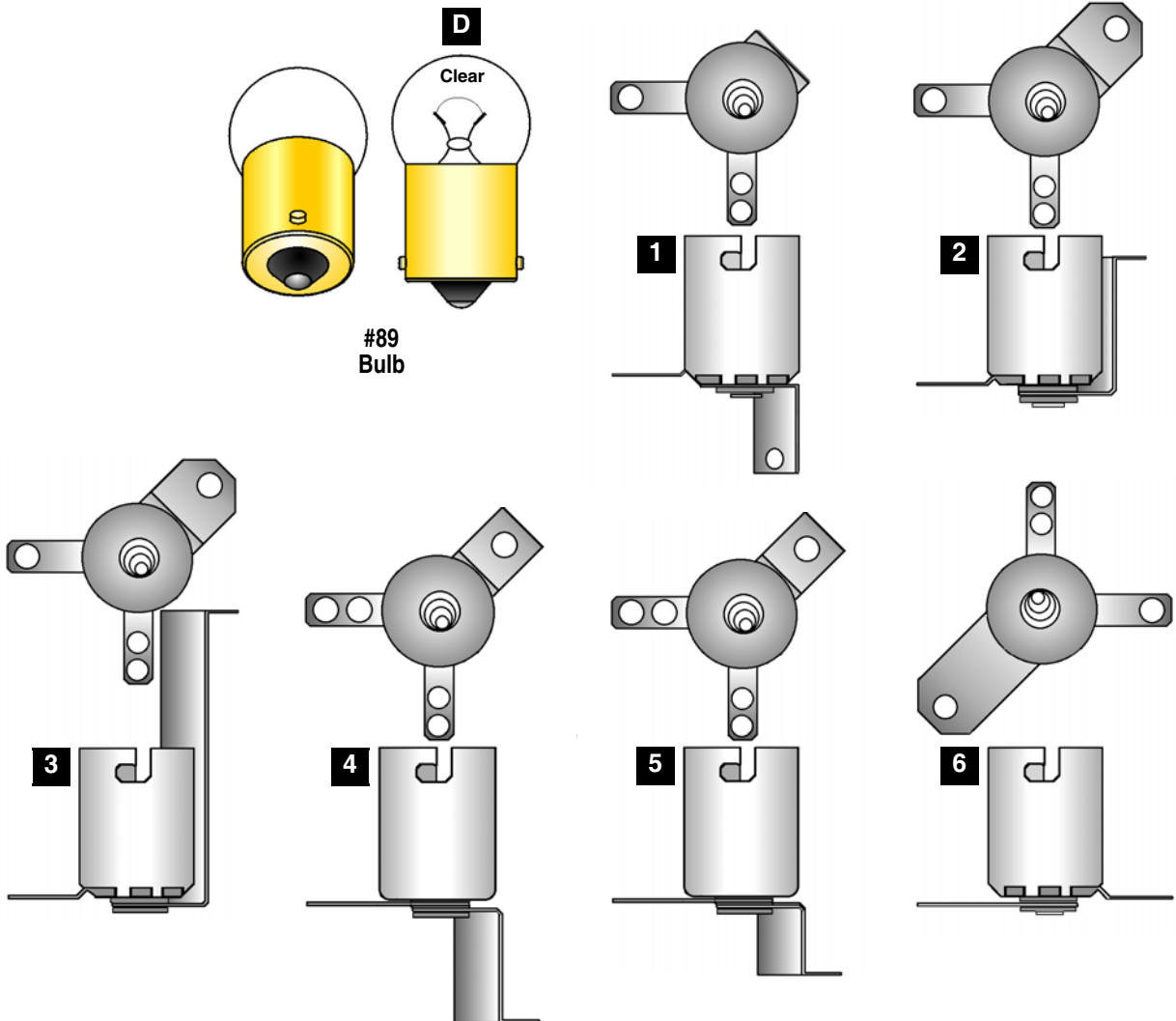


Playfield Top & Bot. - Small Bayonet Sockets & Bulbs ■ (Actual Size) † Continued

† 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) †



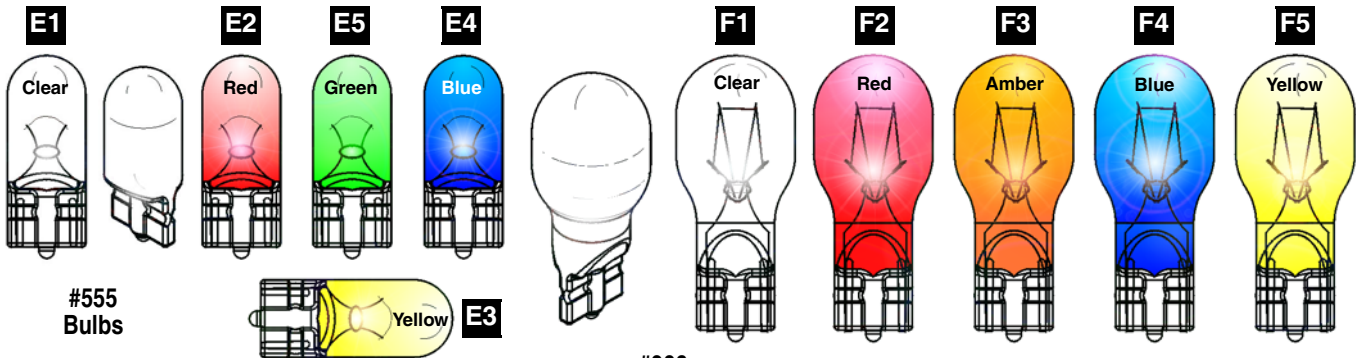
Nr.	BULBS (#89)	QTY.	SPI PART Nr.
D	#89 Bulb Heavy Filament	10	165-5000-89-HF

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. ...



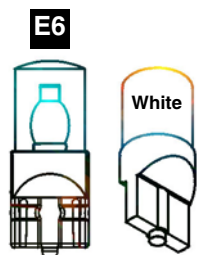
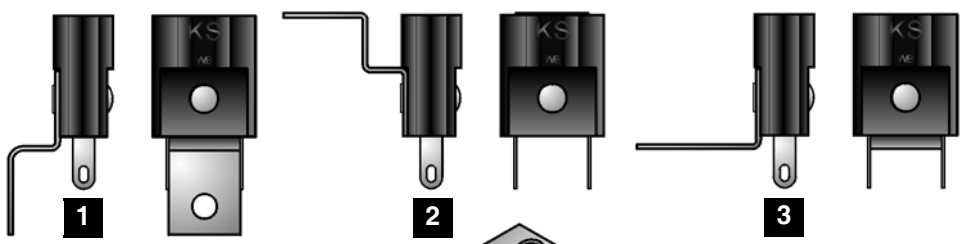
# Playfield Top & Bottom - Wedge Base Sockets & Bulbs (Actual Size) †



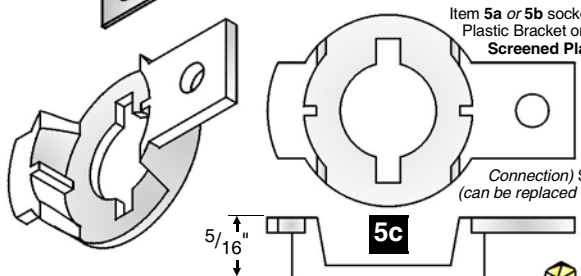
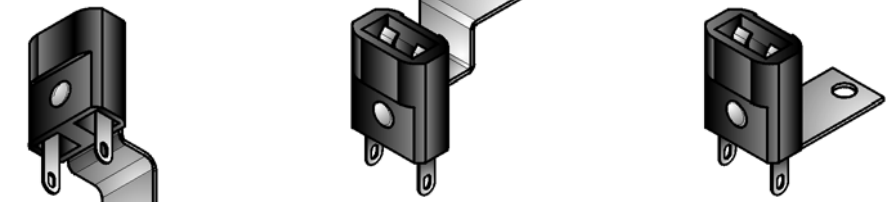
#555 Bulbs

#906 Bulbs

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



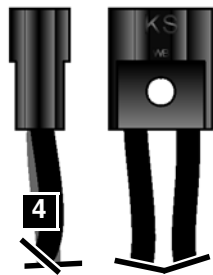
LED Bulb (Wedge Base)



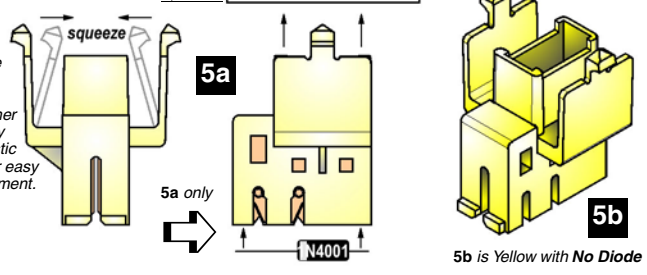
Item 5a or 5b sockets are secured to the playfield or assembly by Item 5c Plastic Bracket or may also be snapped into specially cut Clear and / or Screened Plastic Pieces or Metal Brackets (used for multiple mounting of sockets when positioned closely together or in tight areas). If Plastic Pieces or 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).

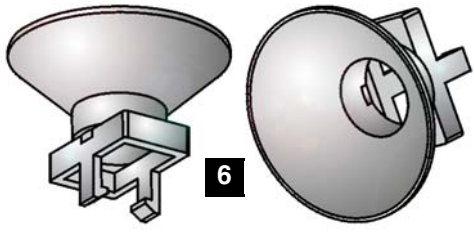
Item 4 Socket does not require brackets. Old stock may include "L" style brackets (each side); do not secure to assembly. Black Wires (Qty. 2) are 12" each.



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



5b is Yellow with No Diode



6

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 (#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	Item E6 Bulb Note : Typically used with Item 4 Socket in Pop Bumpers.			
	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);			F	#906 Wedge Base Bulb (Clear)		165-5004-00
				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)			

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
				Note Item 6 : Typically used with Item 1 (but will fit on any similar Wedge Base Socket).			



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

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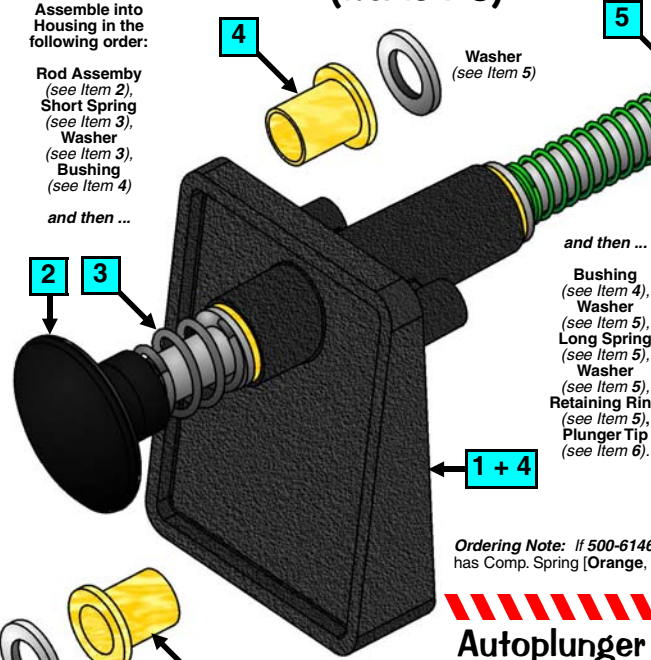
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# Ball Shooter (Plunger) Assembly, 500-6146-00-04 (Items 1-6)

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 5),  
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) [GREEN, .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).

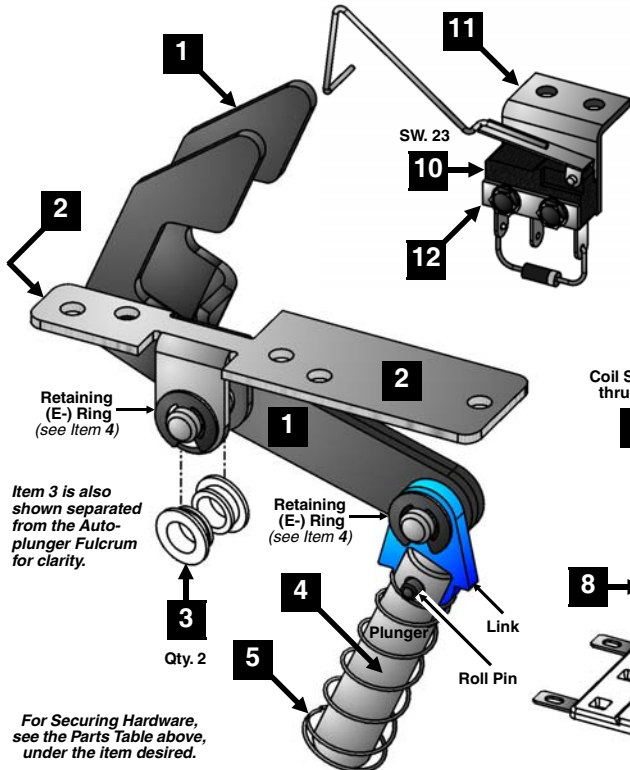
# Autoplunger Arm Weld Asm., 500-6091-00 (Items 1-5), Autoplunger Coil Assembly, 500-6092-02-ND (Items 6-9) and Shooter Lane Switch Assembly, 500-6096-00 (Items 10-12)

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)			

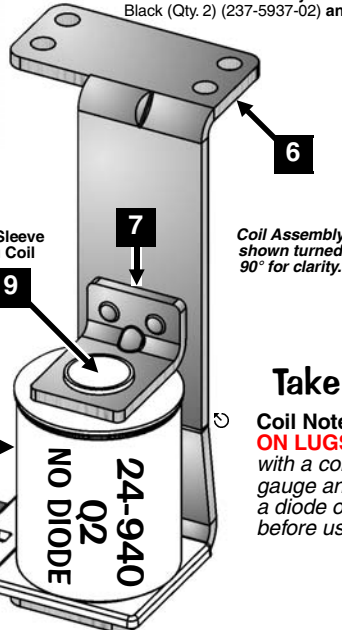
Nr.	AUTOPLNGR. COIL PARTS	QTY.	SPI PART Nr.
6	Autoplunger Coil Bracket Assembly	1	515-6527-00
Items 1 & 6 are secured below the P/F by: #8 X 1/2" SHWH AB (Zc.) (Qty. 9) (234-5101-00)			
7	Coil Retainer Bracket	1	535-5203-03
Item 7 is secured to Item 6 by: #8-32 X 1/4" PPH MS (Sems) Zinc (Qty. 2) (232-5300-00)			
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 ...



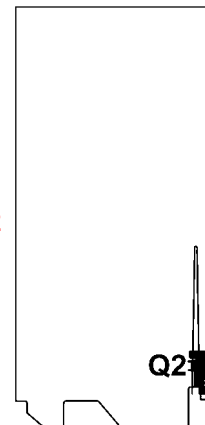
For Securing Hardware, see the Parts Table above, under the item desired.



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

### 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.

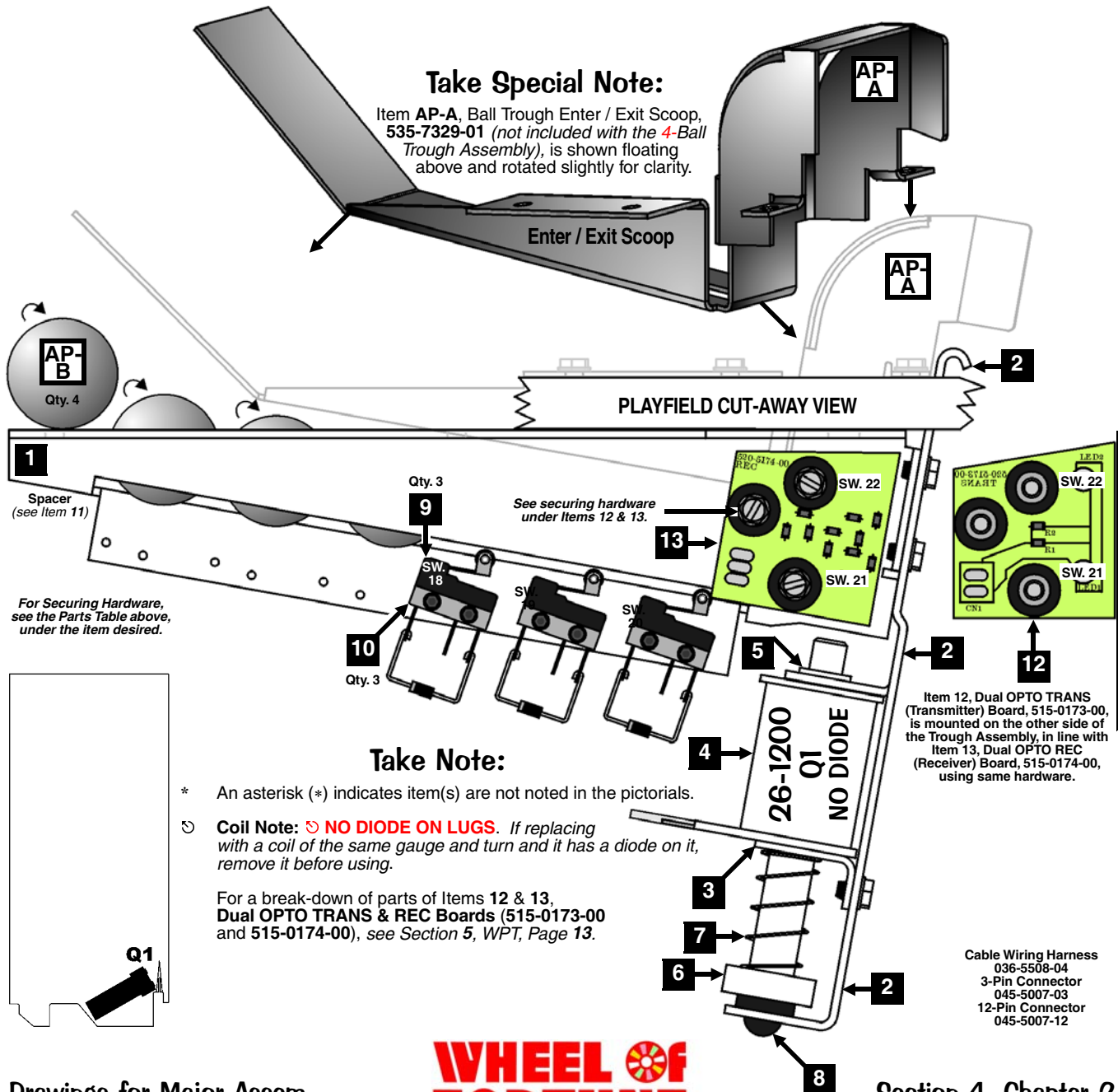




# 4-Ball Trough Assembly, 500-6318-14-ND (Items 1-13) and Associated Parts: See Parts Table Below.

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

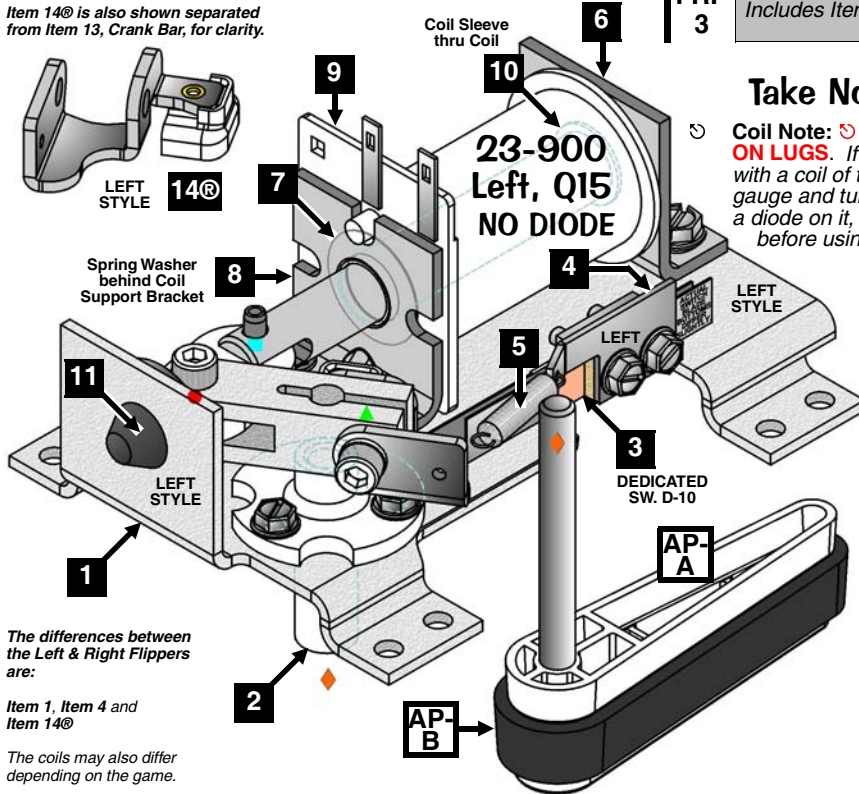
Nr.	4-BALL TROUGH PARTS	QTY.	SPI PART Nr.	Nr.	4-BALL TROUGH PARTS	QTY.	SPI PART Nr.
1	Ball Trough Outhole Mounting Bracket <small>Item 1 is secured below the playfield by: #8 X 1/2" SHWH AB (Zc.) (Qty. 4) (234-5101-00)</small>	1	515-6580-01	11	<b>Not Used</b> Trough Ball Guide Plate <small>Item 11 is 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 <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 <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 <small>Items 12 &amp; 13 are secured by: #6-32 X 5/8" HWH Swg (Ser) Zc (Qty. 3/per) (237-5976-04) 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 ] <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	1	535-7329-01
8	Rubber Bumper (Grommet)	1	545-5105-00	<small>Item AP-A secured to the playfield by: #8 X 1/2" SHWH AB (Zinc) (Qty. 4) (234-5101-00).</small>			
9	Micro Switch (Roller Actuator, Lite-Force) <small>Item 9 requires: Heat Shrink Tubing 1/8" ø PUI-24 (Qty. 1"/per) (605-5006-00) Switch has a Diode (1N4004) (112-5003-00). Can be replaced with (1N4001) (112-5001-00).</small>	3	180-5119-02	AP-B	* Steel Balls (1-1/16" ø)	4	260-5000-00
10	Switch Body Protect Plate	3	535-6539-00				



# 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) <i>Ordering Note : Individual Part (535-7275-01) 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. (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) 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®

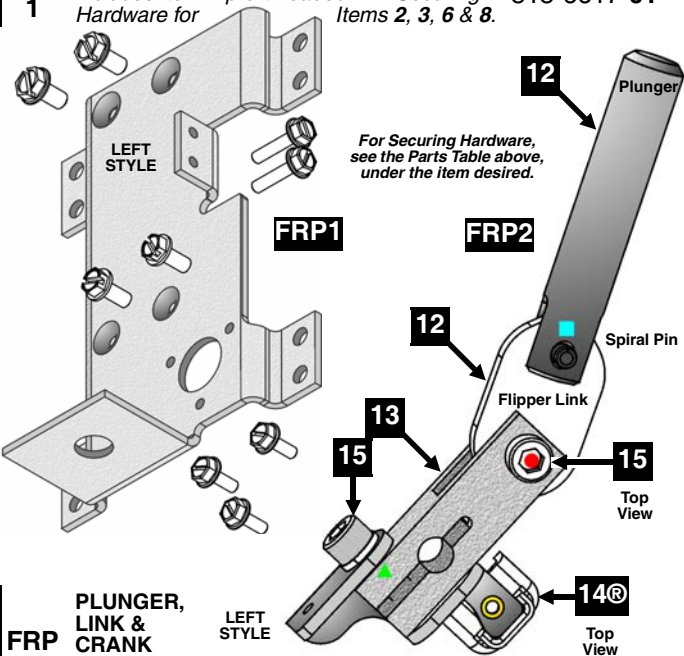
The coils may also differ depending on the game.

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

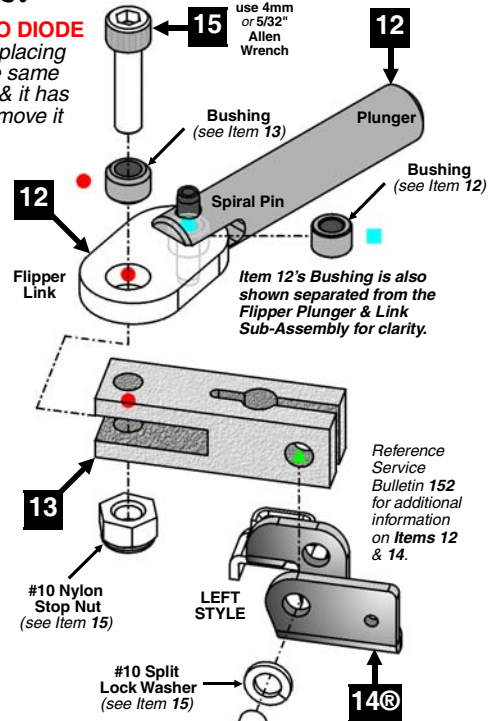


**FRP 2 PLUNGER, LINK & CRANK (LEFT STYLE) ASSEMBLY :** Includes Items 12, 13, 14 & 15 (comes assembled). 515-7203-01

**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 ...

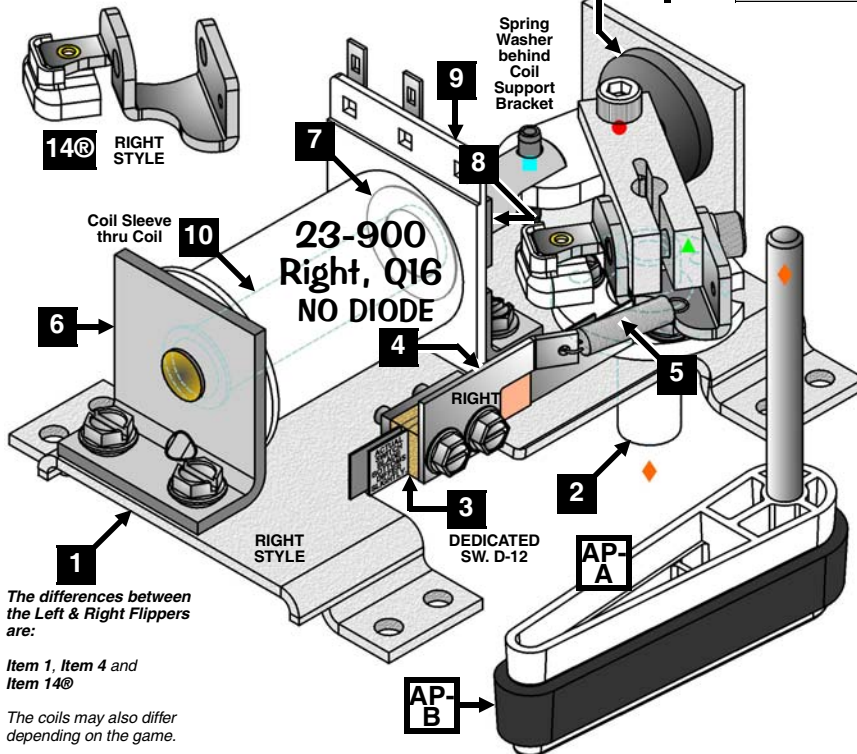




# Flipper (Right) Assembly, 500-6543-03-ND (Items 1-15) and Associated Parts: White Flipper Bat & Shaft Asm., 515-5133-08-06 (Items AP-A / AP-B)

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) Ordering Note : Individual Part (535-7275-00) 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. (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
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 (RIGHT) Sub-Assy.	1	515-7257-00
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) 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®

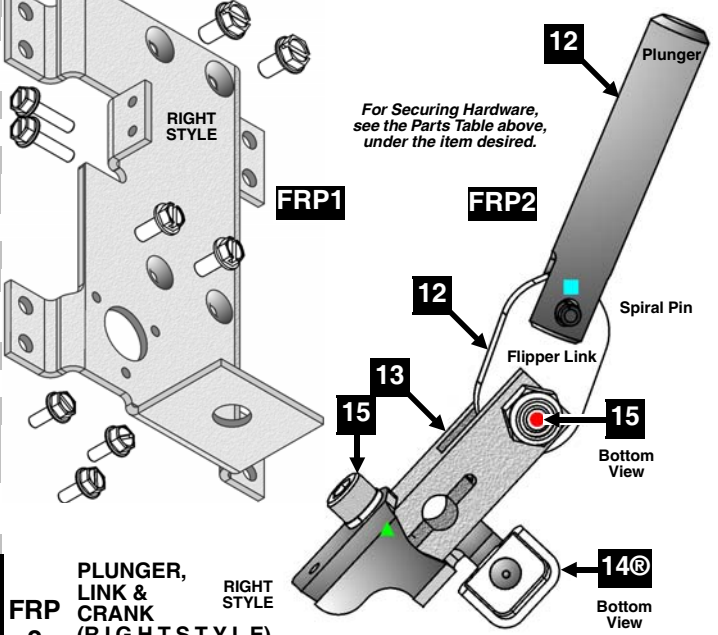
The coils may also differ depending on the game.

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

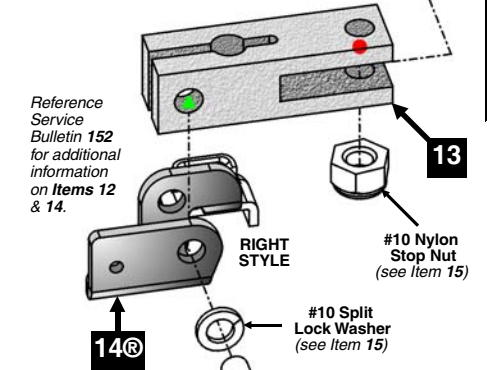
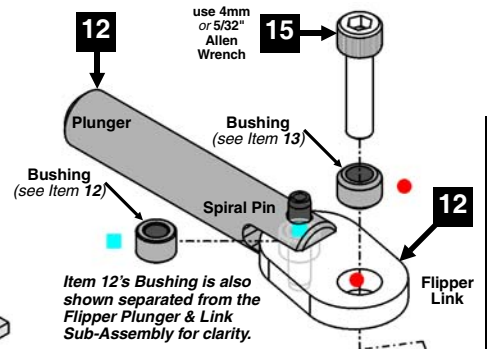
## Flipper Rebuild Parts for Easier Installation, Save \$:

**FRP 1 FLIPPER BASE PLATE KIT (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 ...

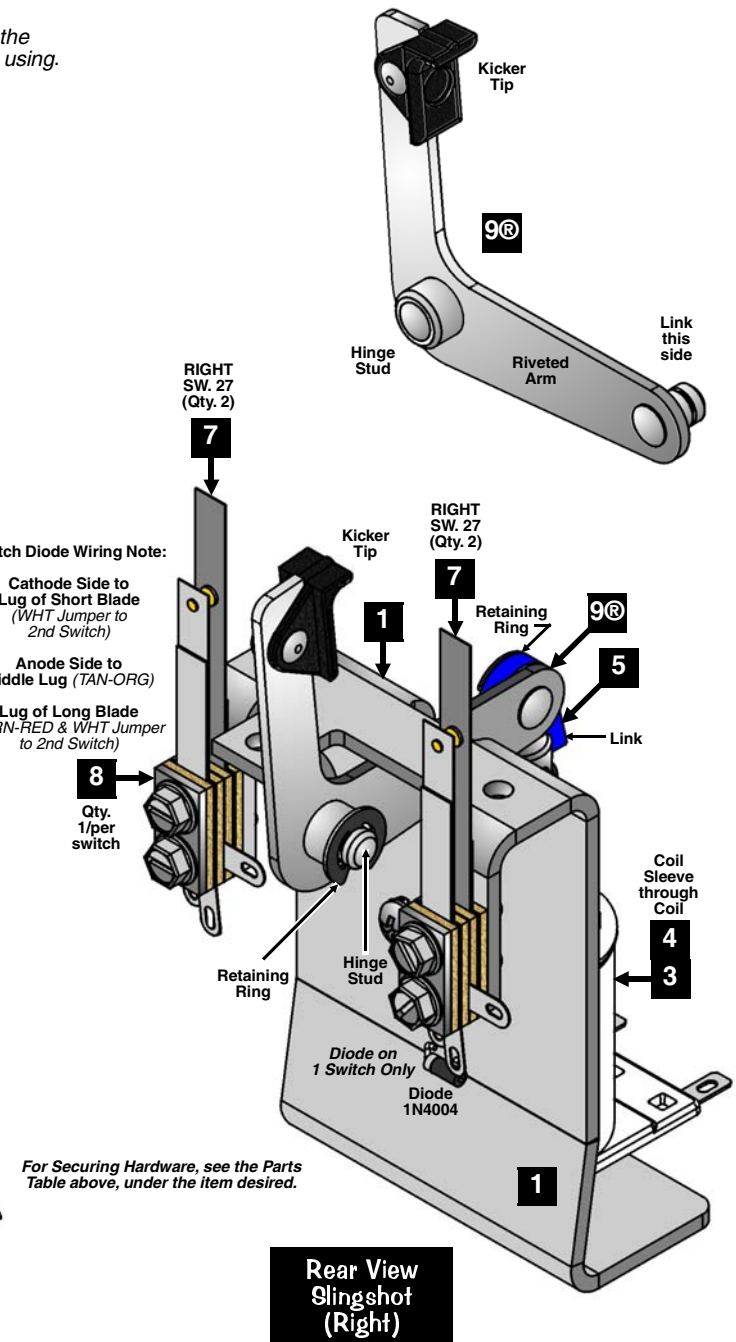
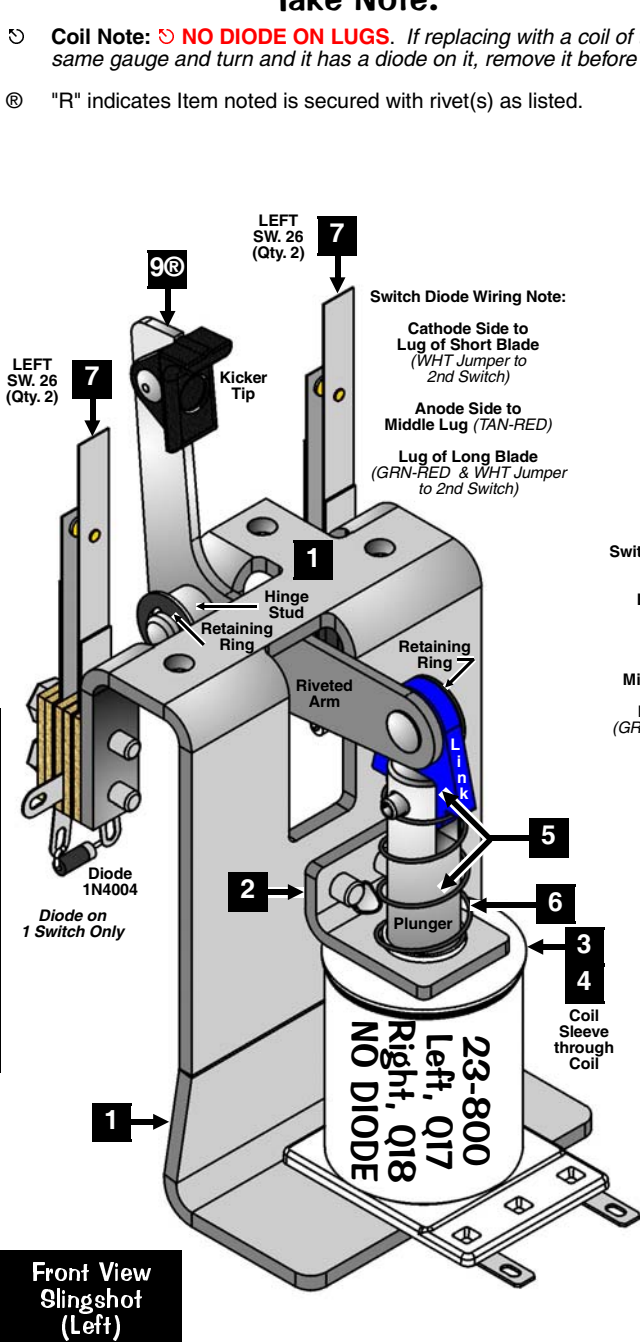


# Slingshot (Left & Right) Assemblies, 500-5849-00-ND (Qty. 2) (Items 1-9)

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.



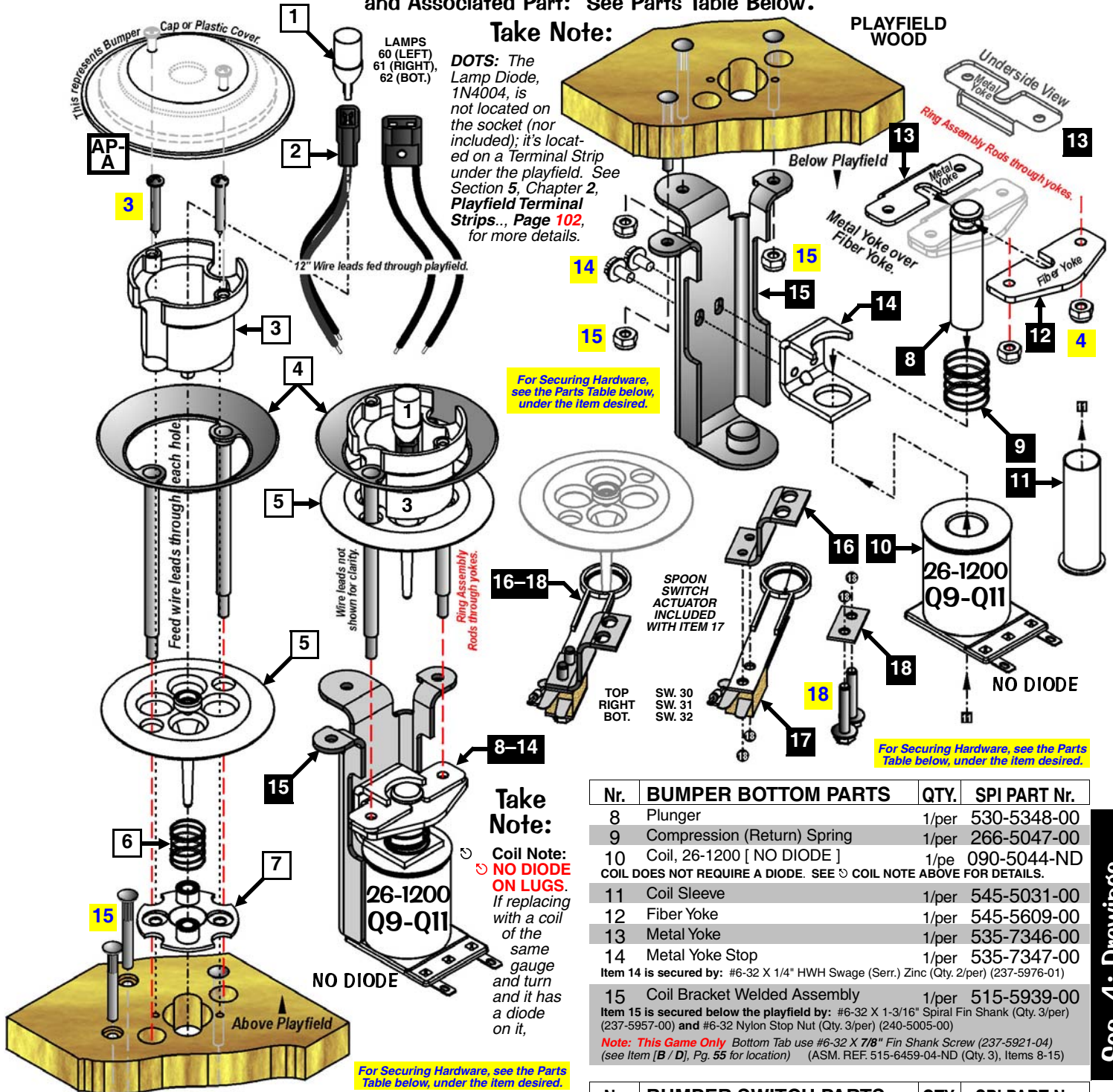
Sec. 4: Drawings ...

Front View Slingshot (Left)

Rear View Slingshot (Right)



# 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,

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 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 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)			

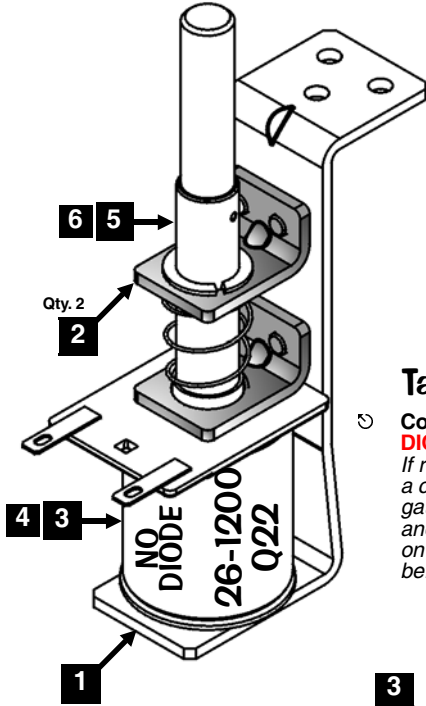
Sec. 4: Drawings ...

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

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

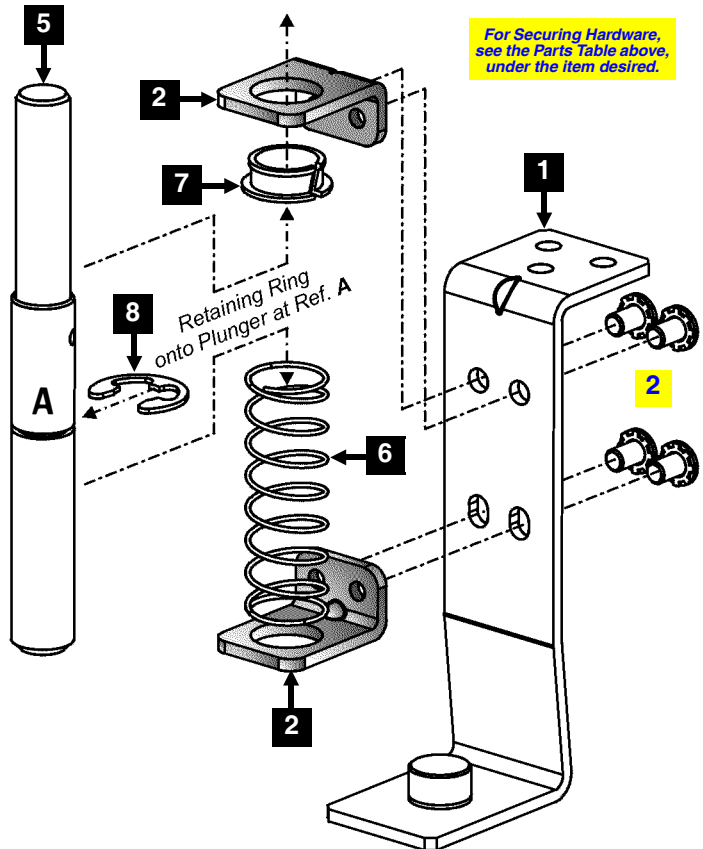
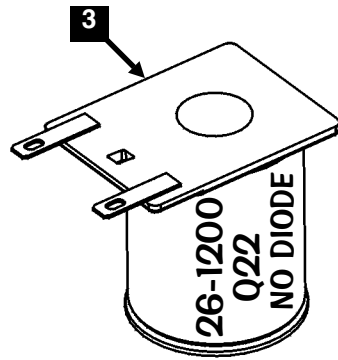
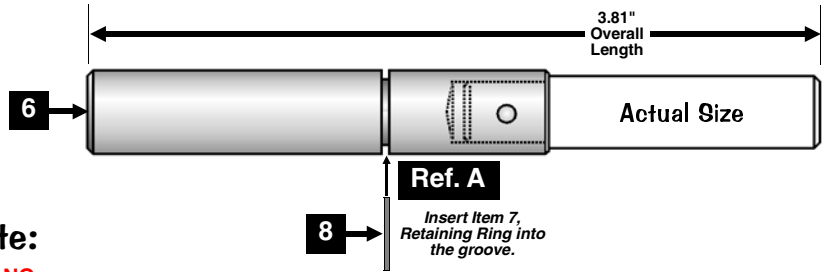
Nr.	DOWN-POST PARTS	QTY.	SPI PART Nr.	Nr.	DOWN-POST PARTS	QTY.	SPI PART Nr.
1	Bracket, Coil Mounting Asm.	1	515-7132-00	4	Coil Sleeve	1	545-5411-00
Item 1 is secured below the P/F by: #8 X 1/2" SHWH AB (Zinc) (Qty. 3) (234-5101-00)							
2	Coil Retaining Bracket	2	535-5203-03	5	Plunger, 3.81" Lg. (w/ 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 ...



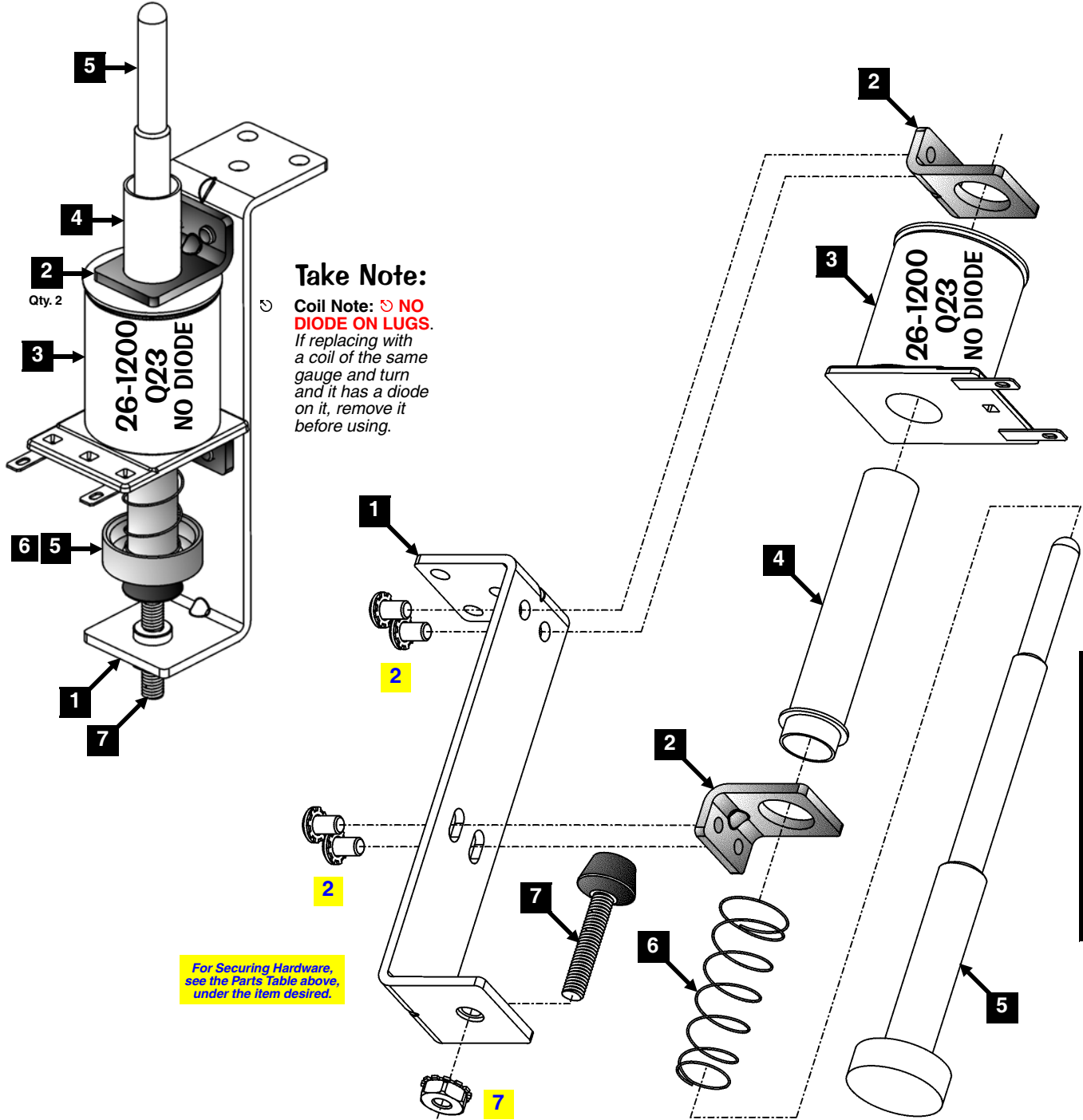


# Up-Post Assembly, 500-7094-00 (Items 1-7)

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).

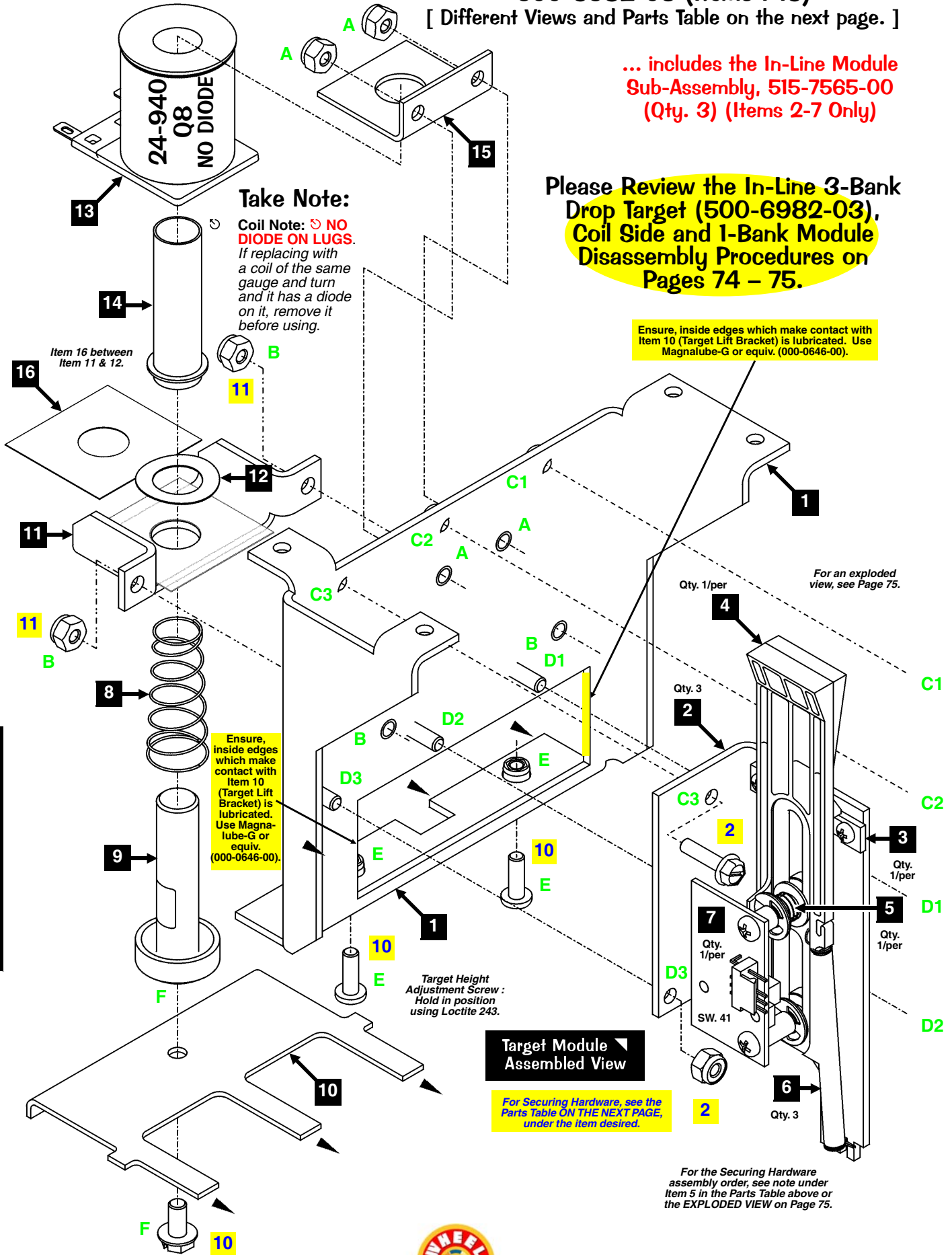
Target Height  
Adjustment Screw :  
Hold in position  
using Loctite 243.

**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 ...

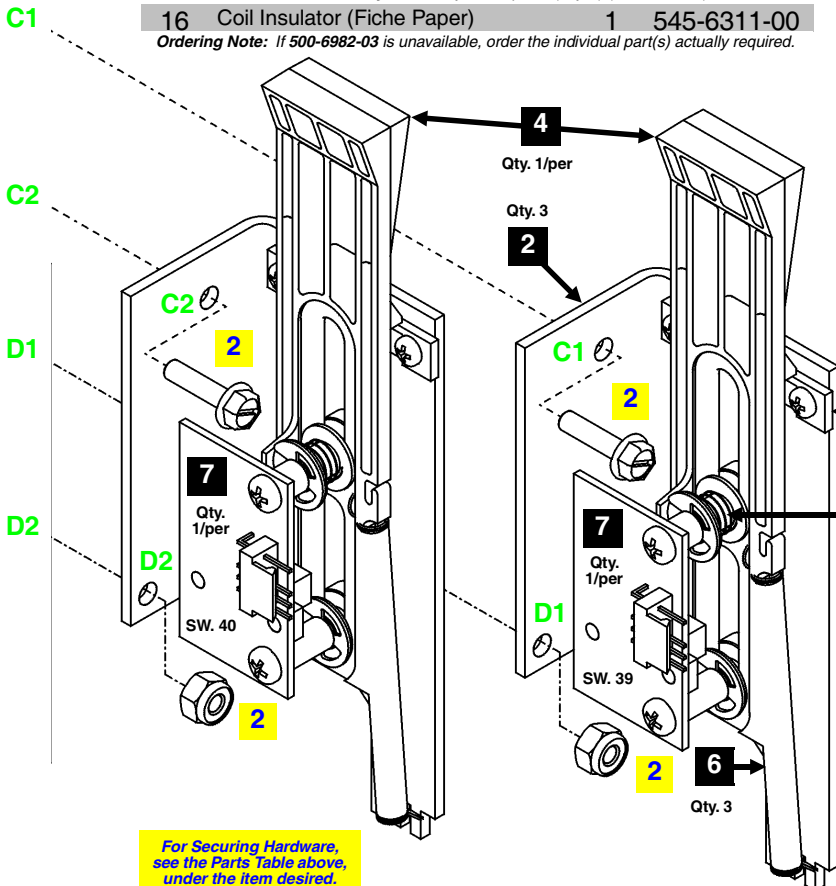
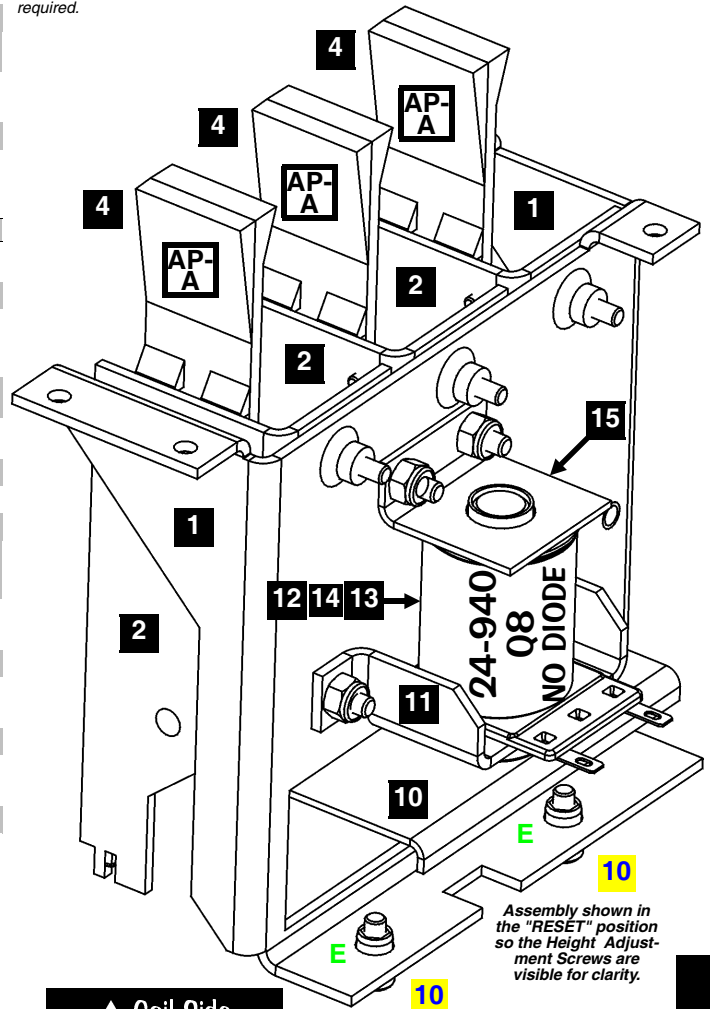


# In-Line 3-Bank Drop Target Assembly, 500-6982-03 (Items 1-16) Continued

[ Different Views on the previous page. ]

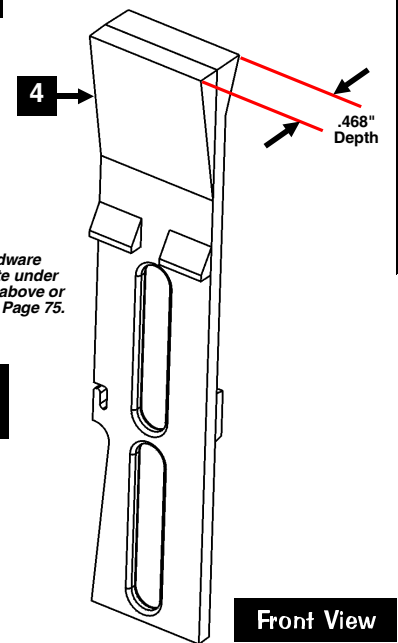
ASSOCIATED PARTS ARE NOT INCLUDED WITH THE ABOVE ASSEMBLY.

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 NOT INCLUDED 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

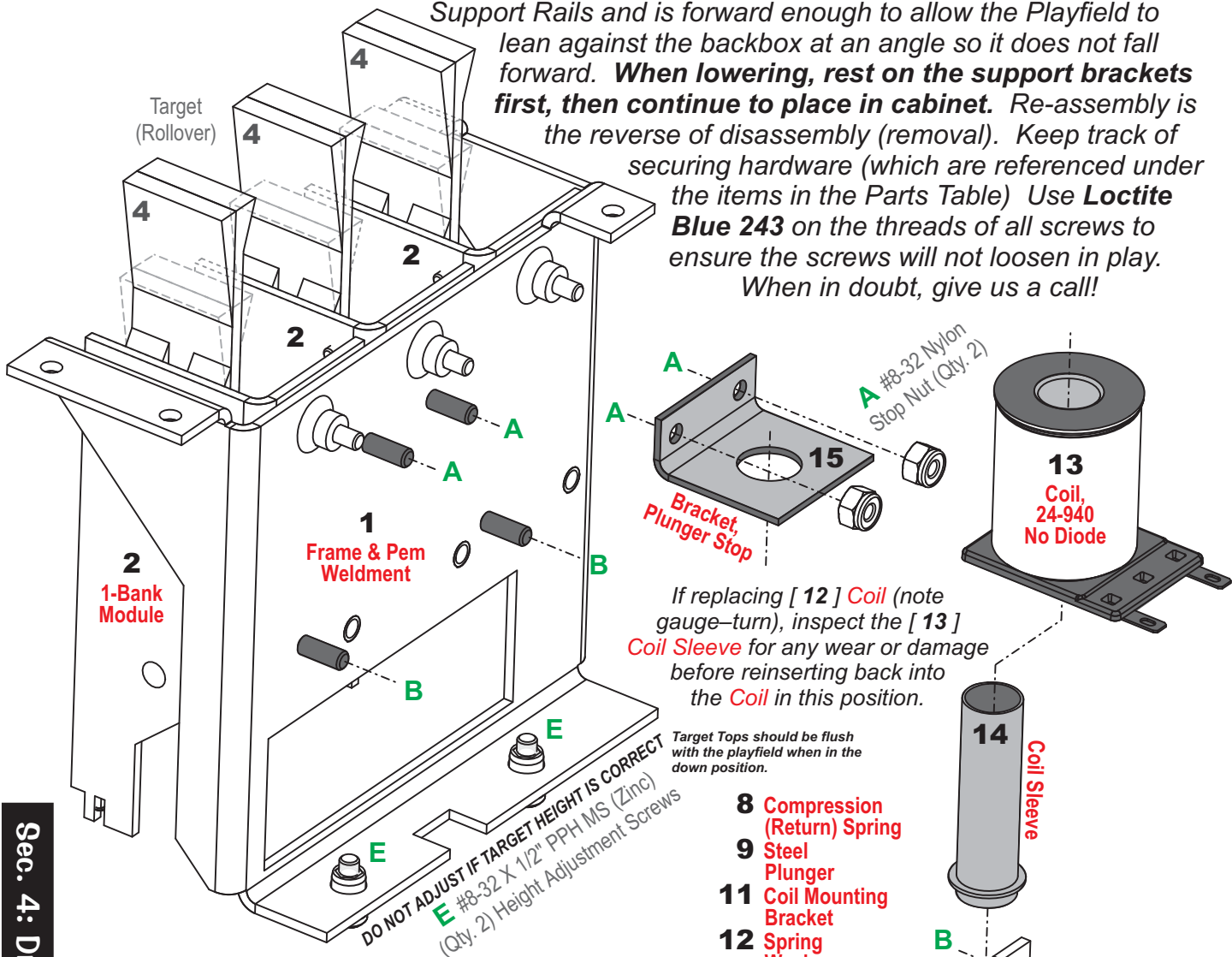
Sec. 4: Drawings ...



# 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 ]**.

- 8 Compression (Return) Spring
- 9 Steel Plunger
- 11 Coil Mounting Bracket
- 12 Spring Washer
- 16 Coil Insulator (Fiche Paper)

13  
Coil,  
24-940  
No Diode

14  
Coil Sleeve

11  
Coil Mounting Bracket

9  
Steel Plunger

**Only remove this screw if the plunger needs to be replaced.**

F #10-32 X 1/2" HWH (Qty. 1)

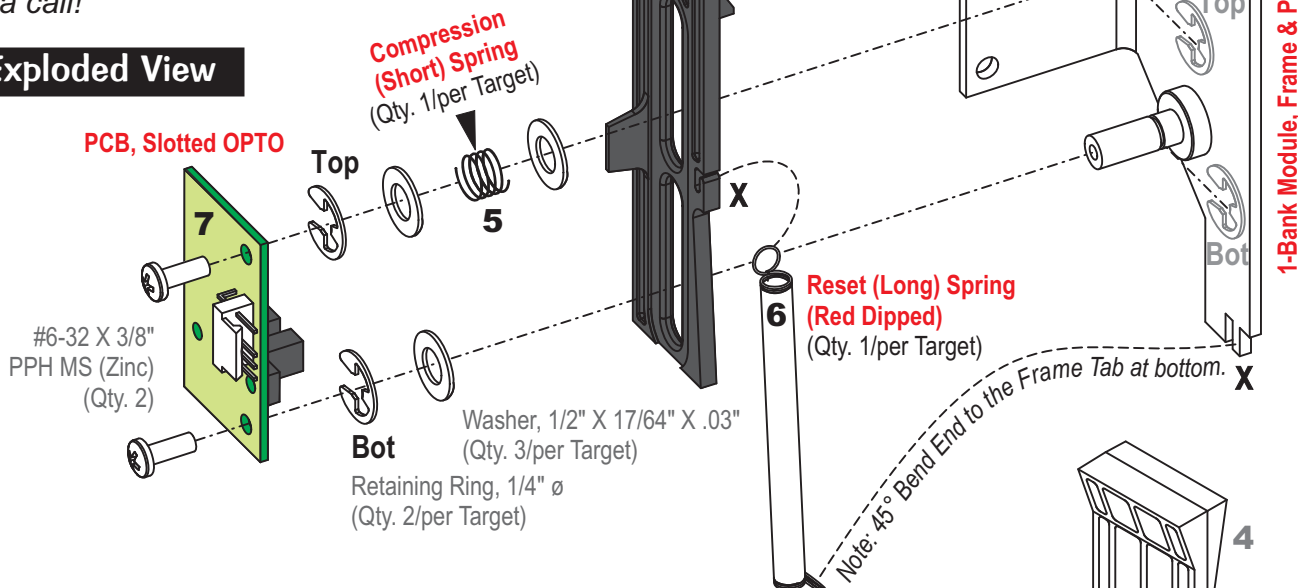
Sec. 4: Drawings ...



# 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!

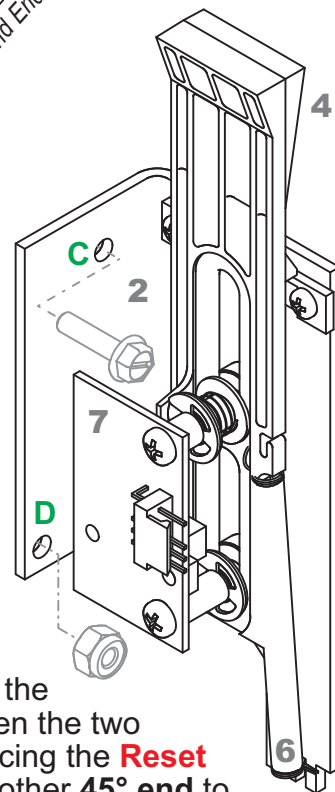
## Exploded View



**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:

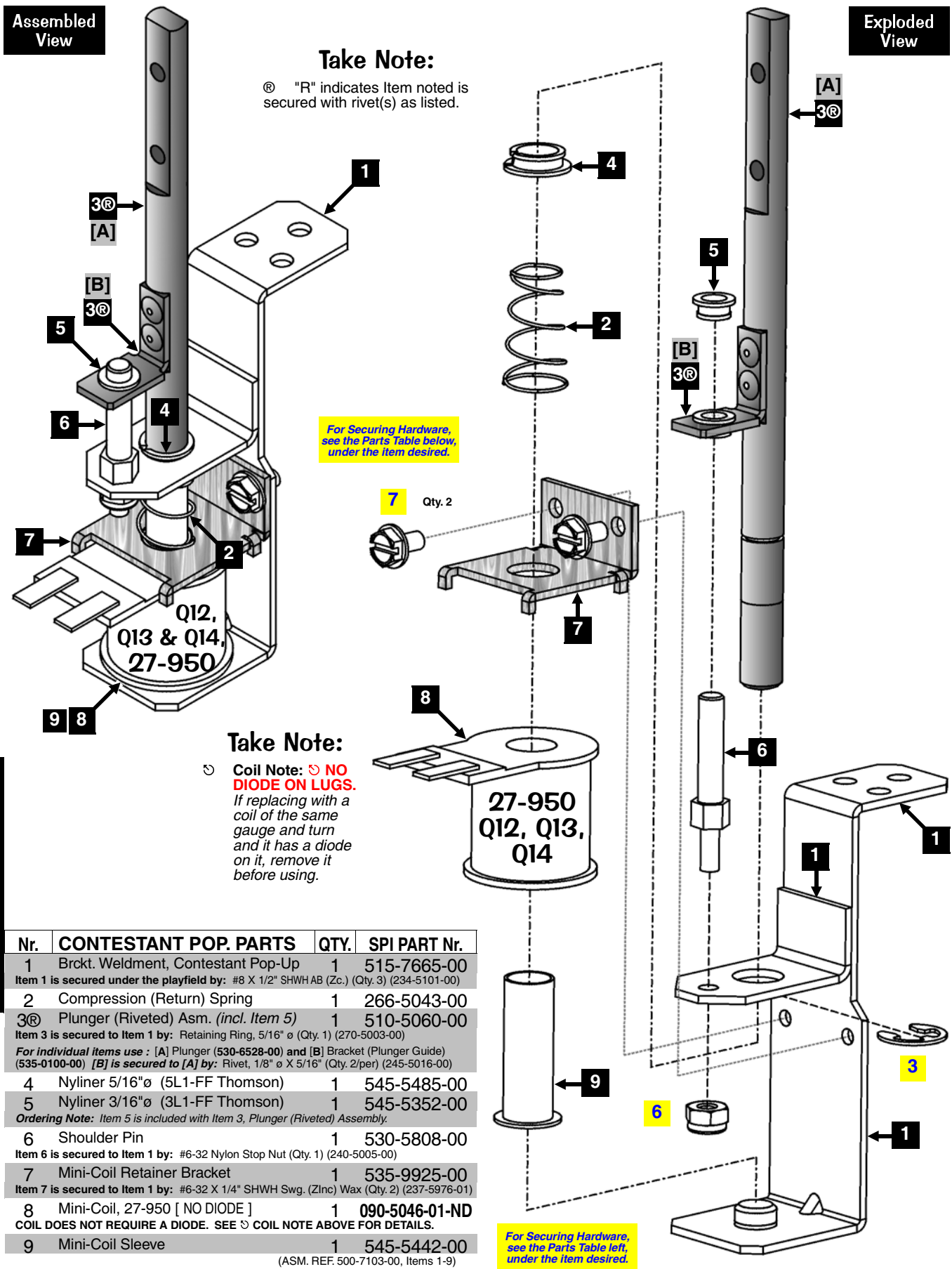
1. Remove the #6-32 x 3/8" PPH MS Screws securing the **PCB, Slotted OPTO [ 7 ]** from the **1-Bank Module [ 2 ]**.
2. Remove the top [ **Top** ] Retaining Ring, 1/4" ø and Washer and set aside the **Compression (Short) Spring [ 5 ]** and second Washer. Remove the bottom [ **Bot** ] Retaining Ring & 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)



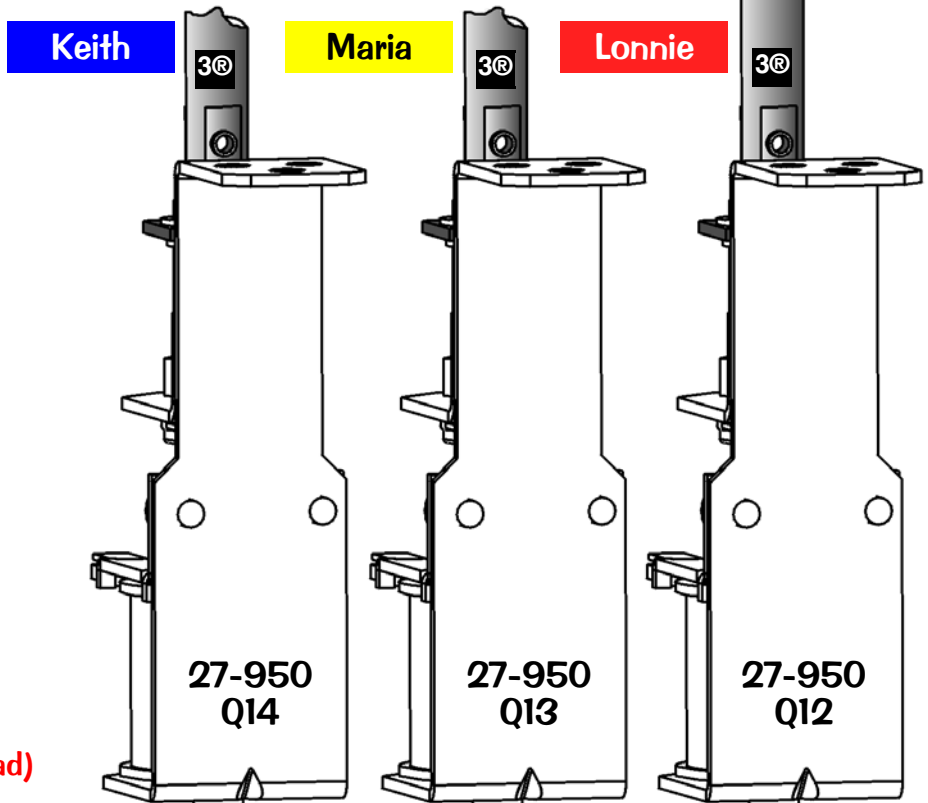
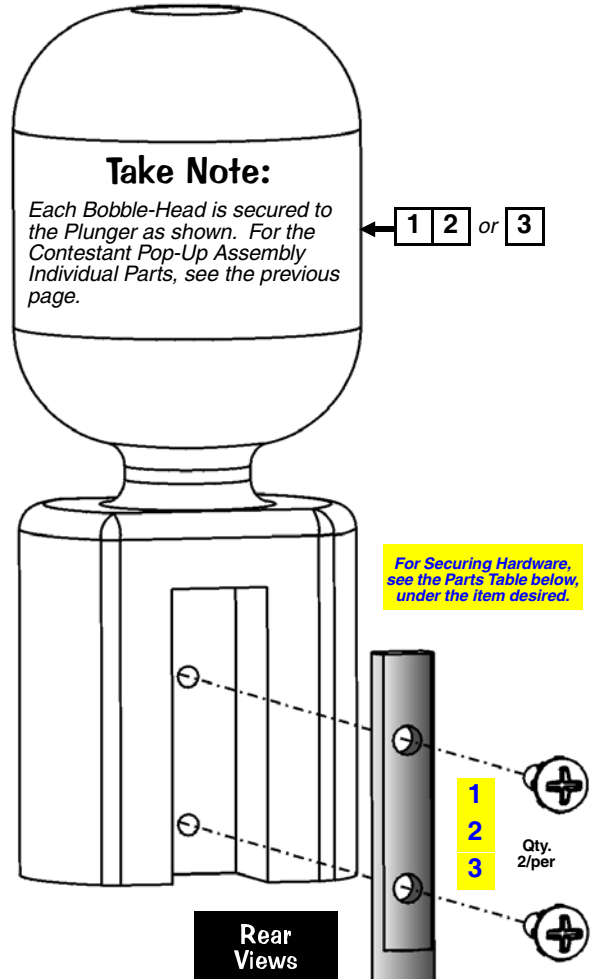
Sec. 4: Drawings ...





# 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) (ASM. REF. 500-7104-00 (for Item 1), -01 (for Item 2), -02 (for Item 3), sec'd. to 500-7103-00)			

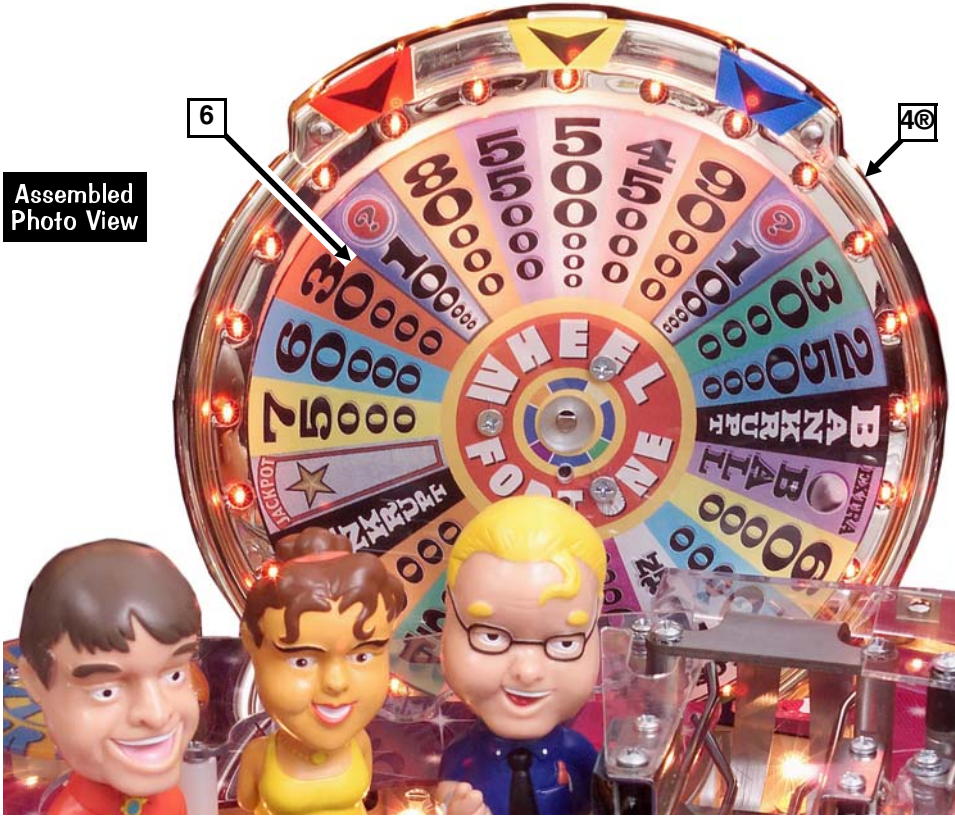


See the Previous Page for the Individual Parts of the Contestant Pop-Up Assemblies (1 per Bobble Head)

Sec. 4: Drawings ...

**Wheel of Fortune Assembly, Individual Parts Only (Items 1-6)**  
 [ Different Views & Parts Table on the next page. ]

**Assembled Photo View**



**Take Note:**

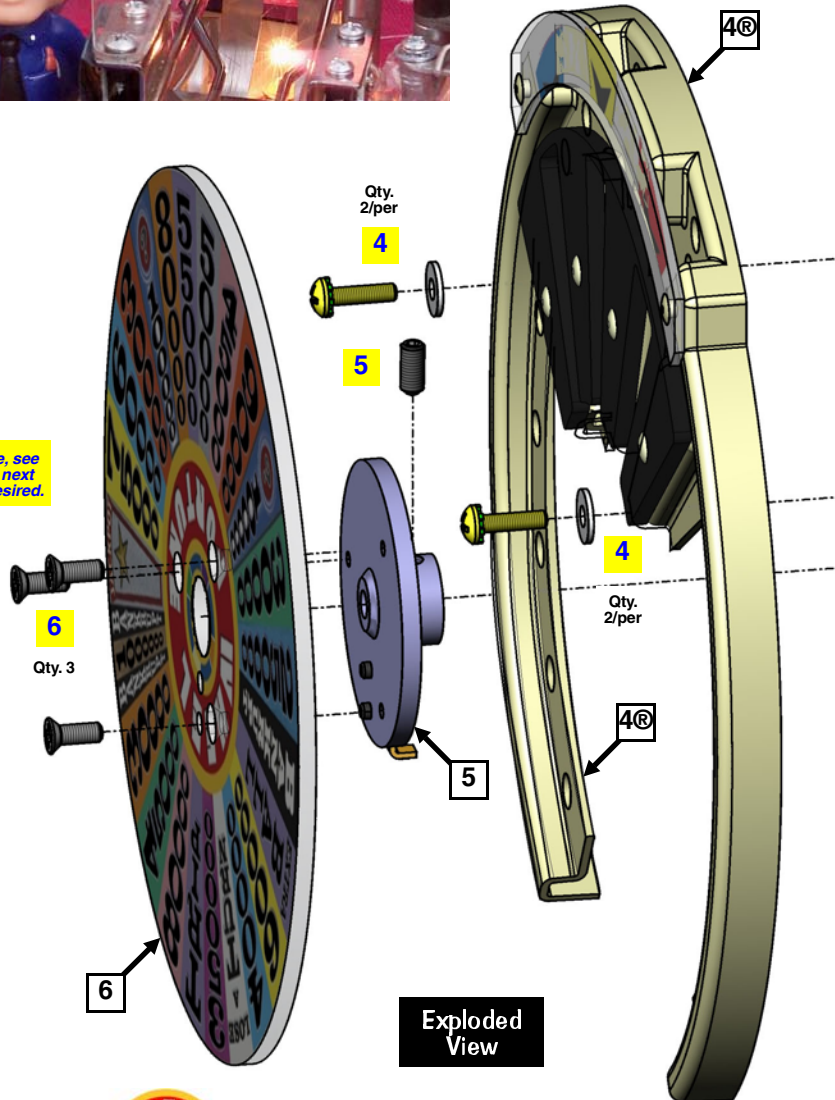
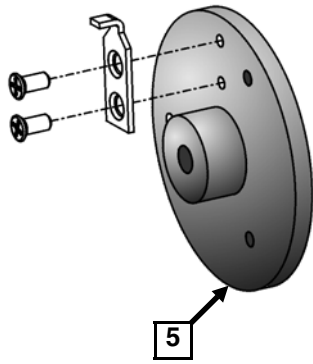
Ⓜ "R" indicates Item noted is secured with rivet(s) as listed.

**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**

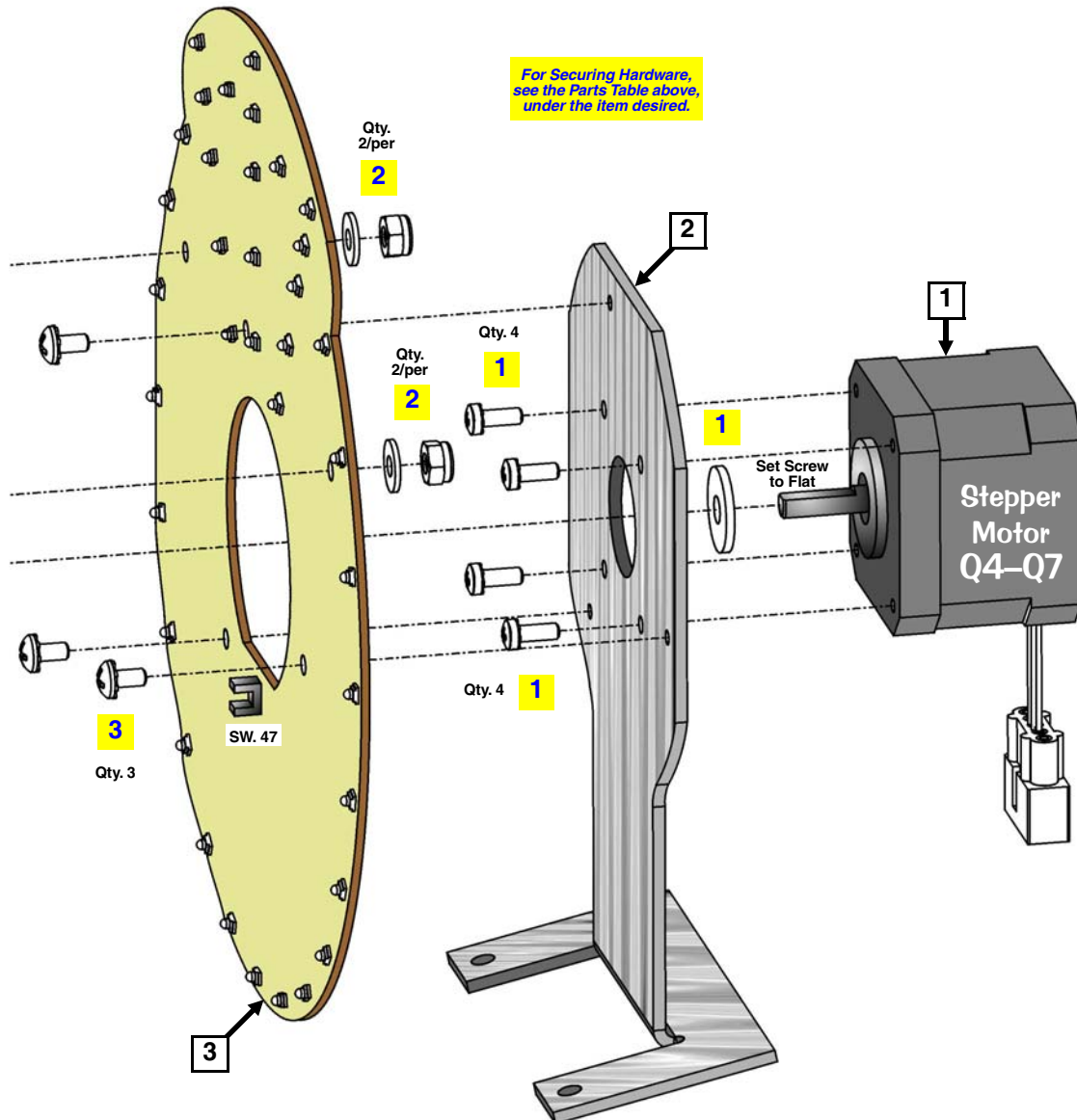


# Wheel of Fortune Assembly, Individual Parts Only (Items 1-6) Continued

[ 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 <i>For individual Items use</i> : Stepper Motor Lin. Eng. 4118570-RO +12VDC (041-5105-00) and 5-Pin Connector (045-5002-05). <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) <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 <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) <i>Ordering Note</i> : Individual parts not available. Screened Plastic -21 (830-6066-21, <i>not included in the Kit: Plastics 803-5000-98</i> ) and 830-6082-00 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 <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 <b>Item 5 is secured to Item 1 @ Flat by:</b> #8-32 X 3/8" Set Screw (Zc.) (Qty. 1) (237-5839-00) <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. <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) <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> <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> . <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)

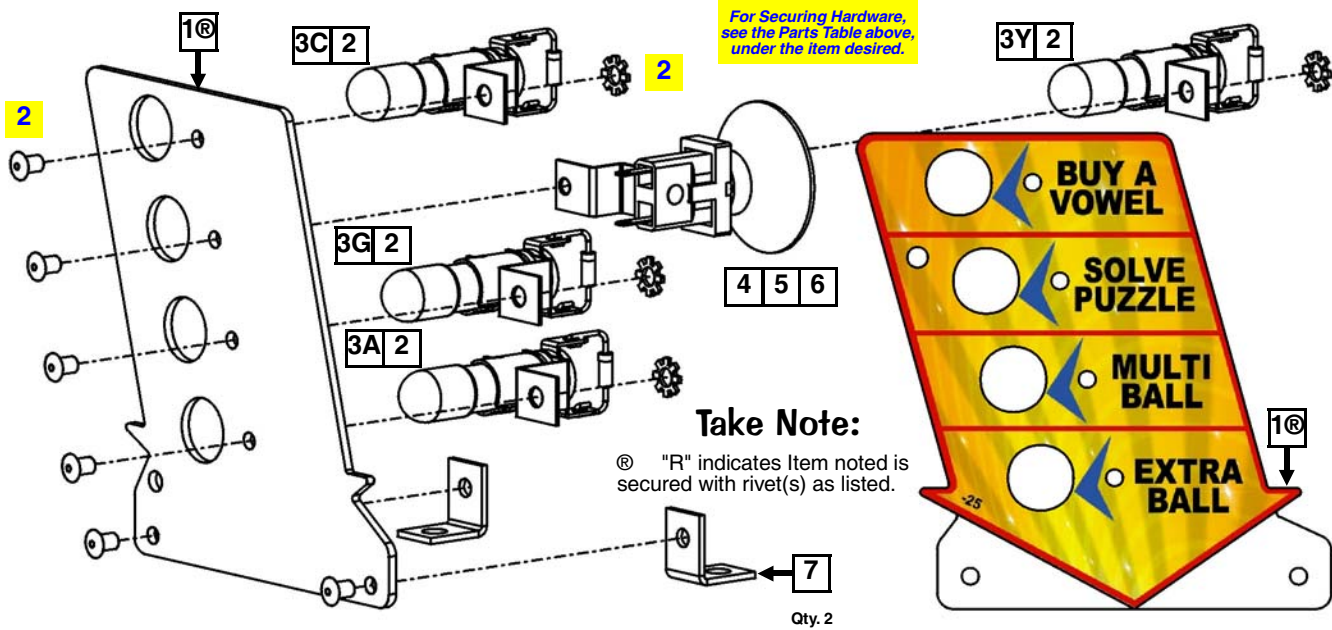


Sec. 4: Drawings ...



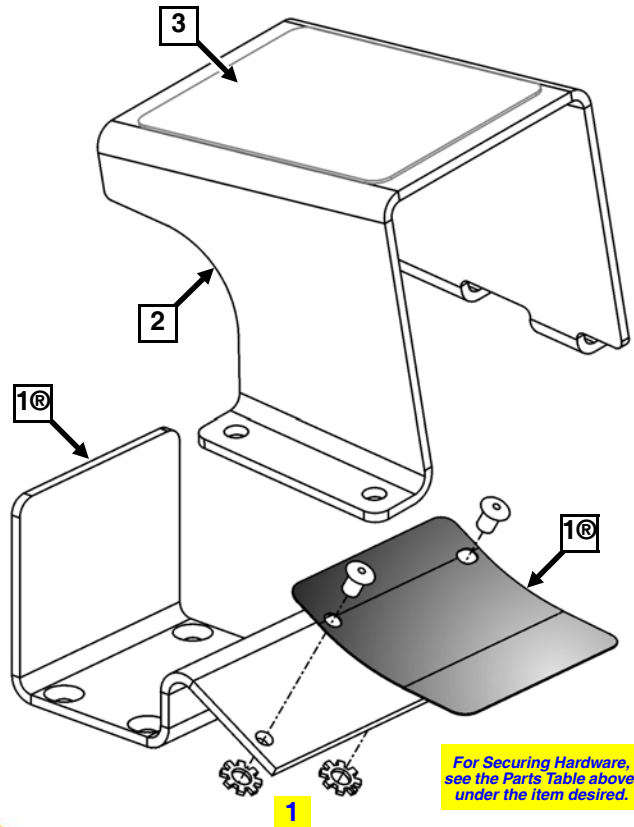
## Billboard Sign, Individual Parts Only (Items 1-7)

Nr.	SIGN PARTS	QTY.	SPI PART Nr.	Nr.	SIGN PARTS	QTY.	SPI PART Nr.
1 <sup>®</sup>	<b>Kit: Plastic</b> (incl. 830-6081-25)	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>	Mini-Bump Ramp & Flap Asm.	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</b> (includes -11)	1	802-5000-98
<i>Note: Individual Decals (820-6396-XX) are not available individually, ordering of kit is required.</i>			



Sec. 4: Drawings ...

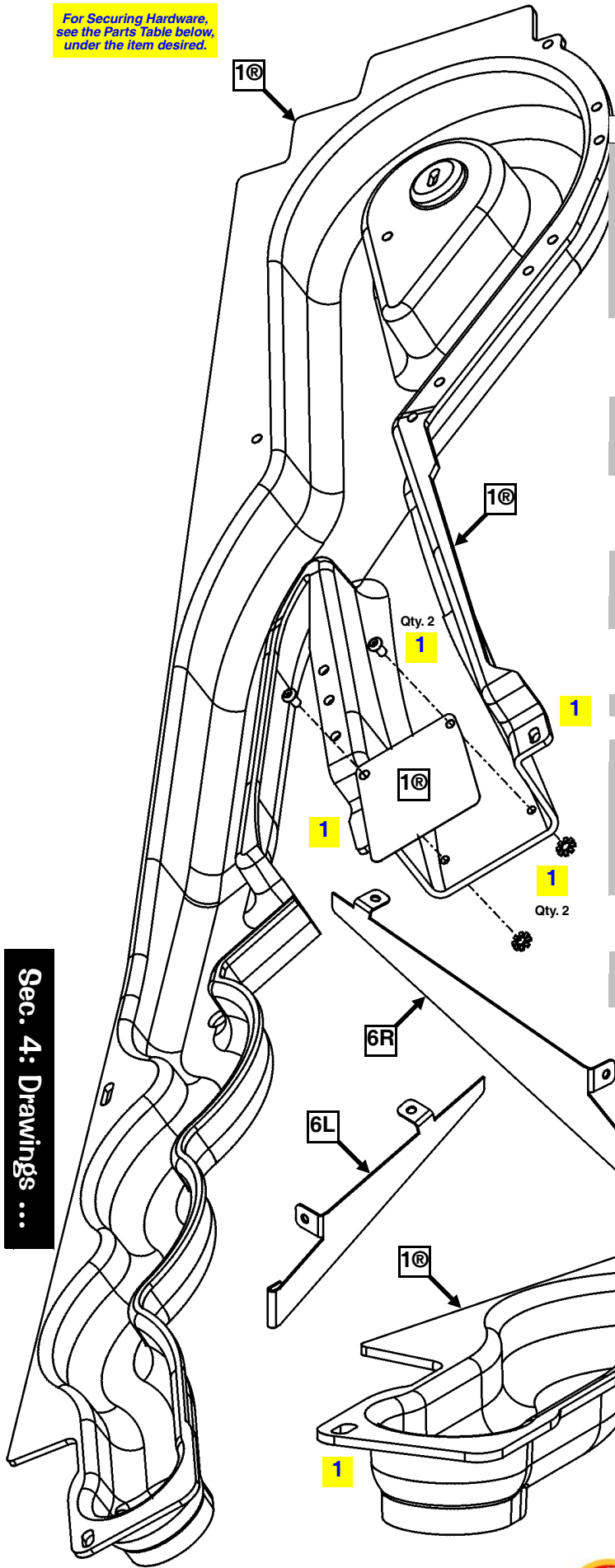




For Securing Hardware, see the Parts Table below, under the item desired.

# 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.
1R	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
9R	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 9R 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>			
10R	Bracket, 90° Plastic Mounting	1	535-0106-00
<b>Item 10R is secured to Item 9R (-23) front by: Rivet, 1/8" X 3/16" (Qty. 1) (249-5001-00) and is secured to Item 9R (-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. ]

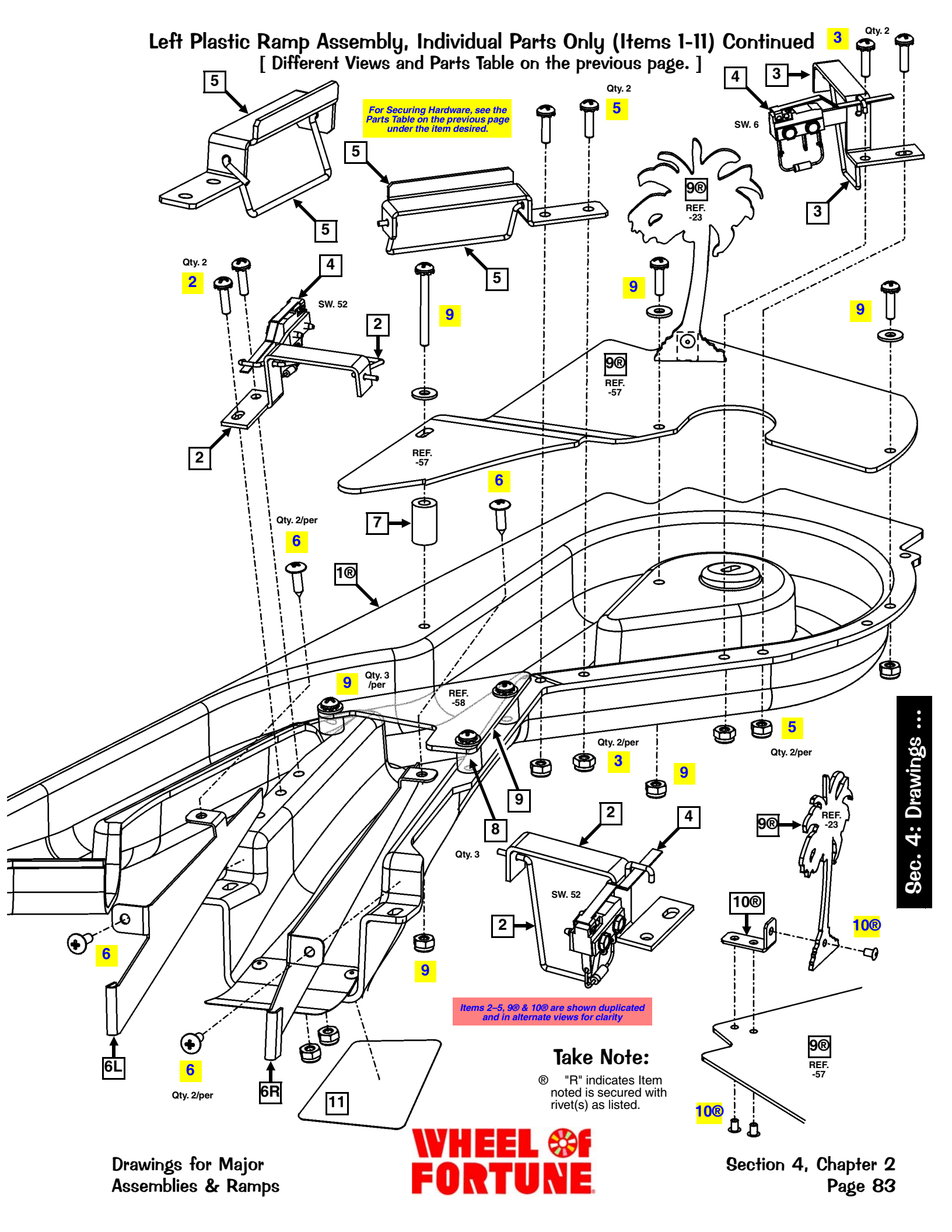
For Securing Hardware, see the Parts Table on the previous page under the item desired.

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.

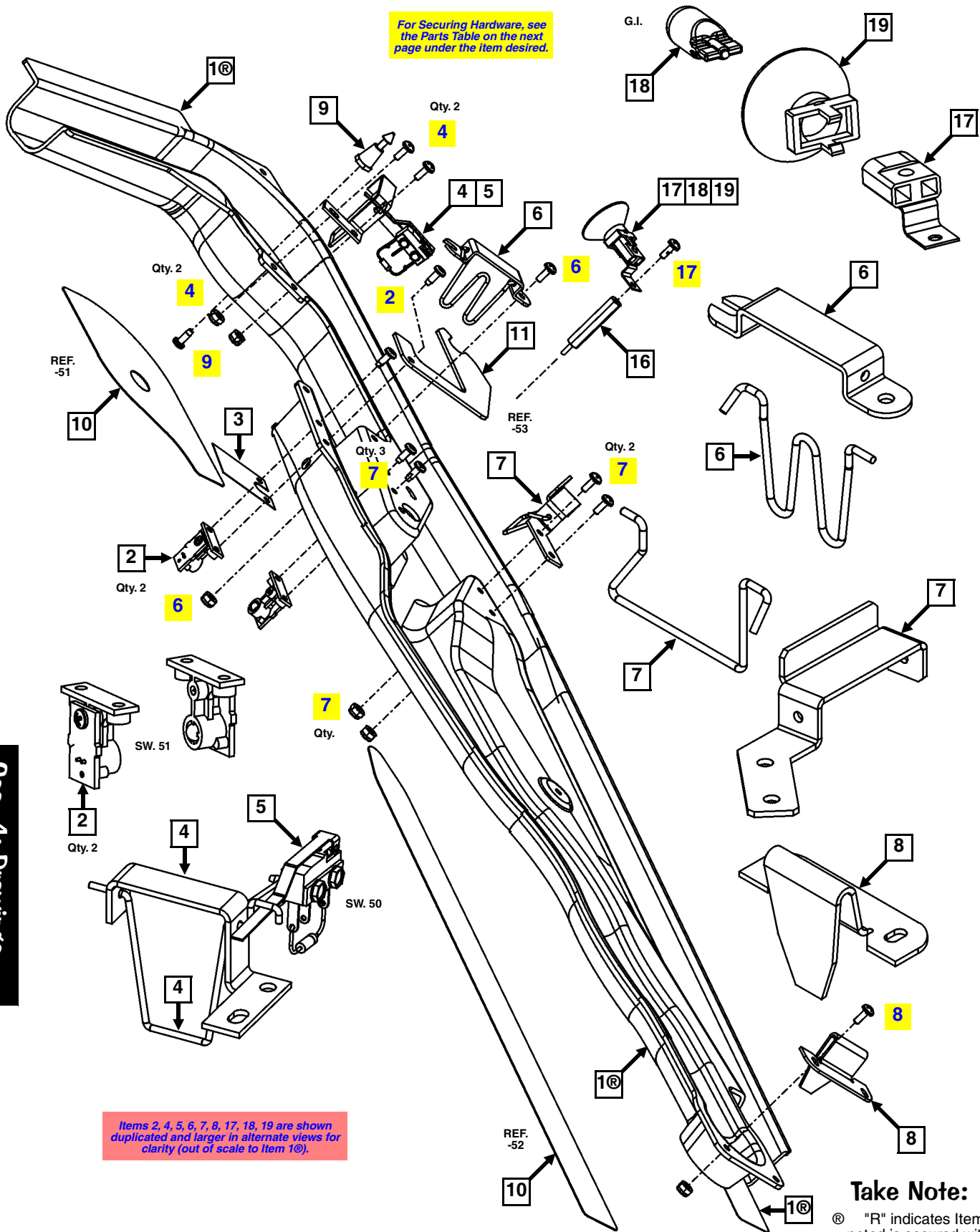
Sec. 4: Drawings ...



# 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 ...

Items 2, 4, 5, 6, 7, 8, 17, 18, 19 are shown duplicated and larger in alternate views for clarity (out of scale to Item 1®).

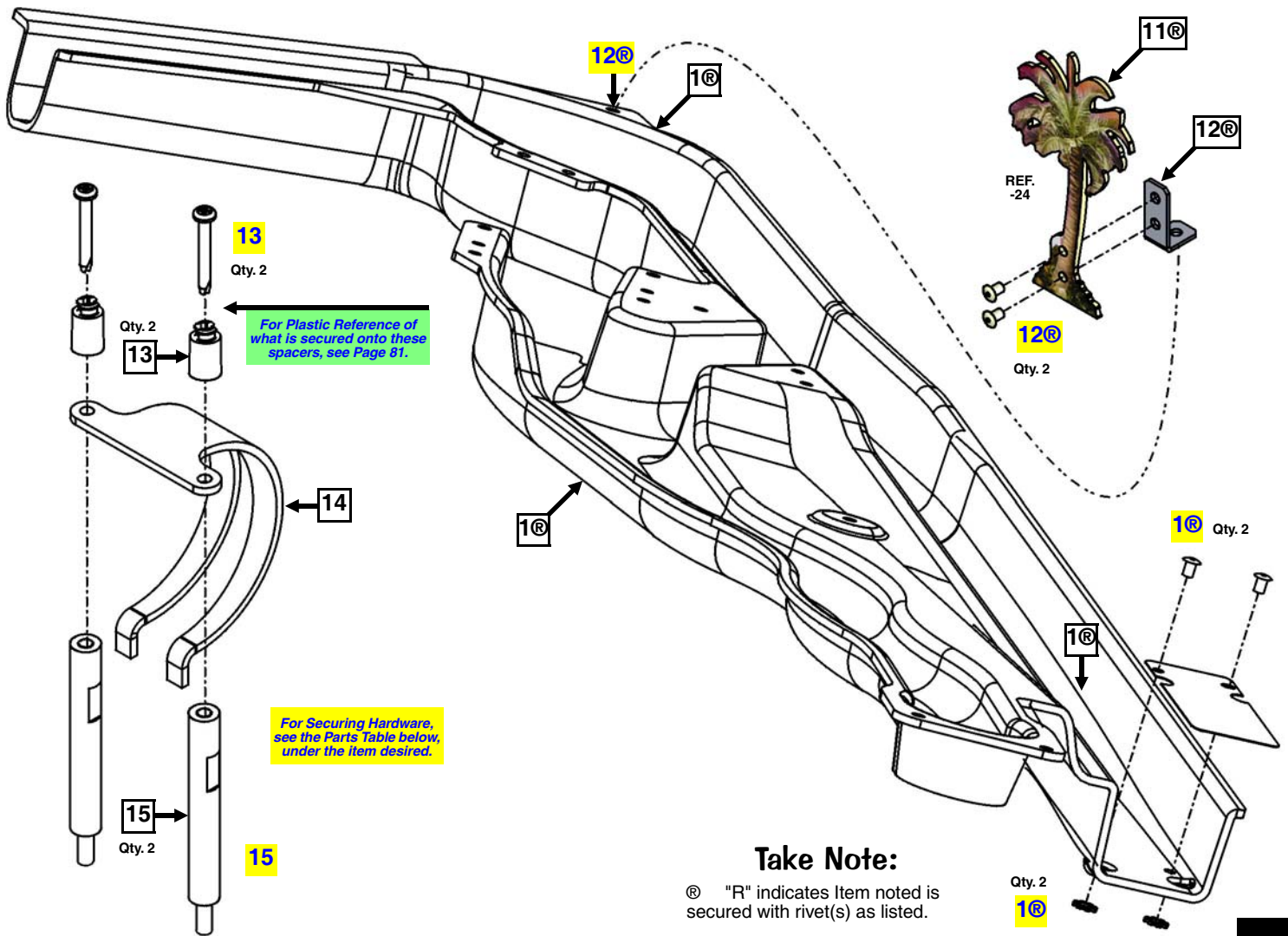
**Take Note:**

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



# Right Plastic Ramp Assembly, Individual Parts Only (Items 1-19) Continued

[ Exploded View of entire Assembly on the previous page. ]



Nr.	RAMP PARTS	QTY.	SPI PART Nr.
1®	Plastic Right Ramp & Flap Asm. <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> 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).	1	510-5052-00
2	OPTO Trans. PCB Asm. w/15" Leads <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> 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)	2	500-6775-01
3	OPTO Shield (Fiche Paper)	1	545-6145-00
4	Bracket, Exit Gate Wire Form (.63" Bot. for above Gate)	1	535-7613-02 535-7755-02
5	Switch (for Exit Gate) Switch has a Diode (1N4004) (112-5003-00). Can be replaced with (1N4001) (112-5001-00). 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)	1	180-5087-00
6	Bracket, Entrance Gate Wire Form ("W" for above Gate)	1	535-0074-00 535-0075-00
7	Bracket, Gate Wire Form (for above Gate)	1	535-9943-00 535-0071-00
	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)		

Nr.	RAMP PARTS	QTY.	SPI PART Nr.
8	Bracket, Bumper Ball Stop (@ Exit) 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)	1	535-0047-00
9	Mini-Jewel Plastic Post (Clear) Item 9 is secured to Item 1 by: #6 X 1/2" PTH A (Zinc) (Qty. 1) (237-5809-00)	1	550-5052-01
10	Kit: Decals (incl. -13, -14, -51 & -52) Note: Individual Decals (820-6396-XX : -13 & -14 PCB Ref. Not Shown & 820-6416-XX : 51 & -52 Ramp Decals) are not available individually, ordering of kit is required.	1	802-5000-98
11®	Kit: Plastics (incl. -53 Clr. & -24 Scr.) 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.	1	803-5000-98
12®	Bracket, 90° Plastic Mounting 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)	1	535-0106-00
13	Plastic Spacer, Plastic Mntg., .5" (Blk.)	2	254-5054-00
14	Bracket, Reverse Scoop 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.	1	535-0045-00
15	Post, Reverse Scoop Support Item 15 is secured above the playfield by: #10-32 X 5/16" 3-Prong T-Nut (Qty. 1/per) (240-5204-00)	2	530-6525-00
16	Hex Spacer, 1-1/2" X 1/4" #6-32 MF	1	254-5049-09
17	Wedge Base Socket (Offset) Item 17 is secured to Item 16 by: #6-32 X 3/8" PPH Sems (Zinc) (Qty. 1) (232-5201-00)	1	077-5029-00
18	#555 Wedge Base Bulb	1	165-5002-00
19	Light Reflector (Silver Plastic)	1	545-5409-01
	(ASM. REF. 511-5071-00, Items 1-10 and Item 11's -53 REF. ONLY)		

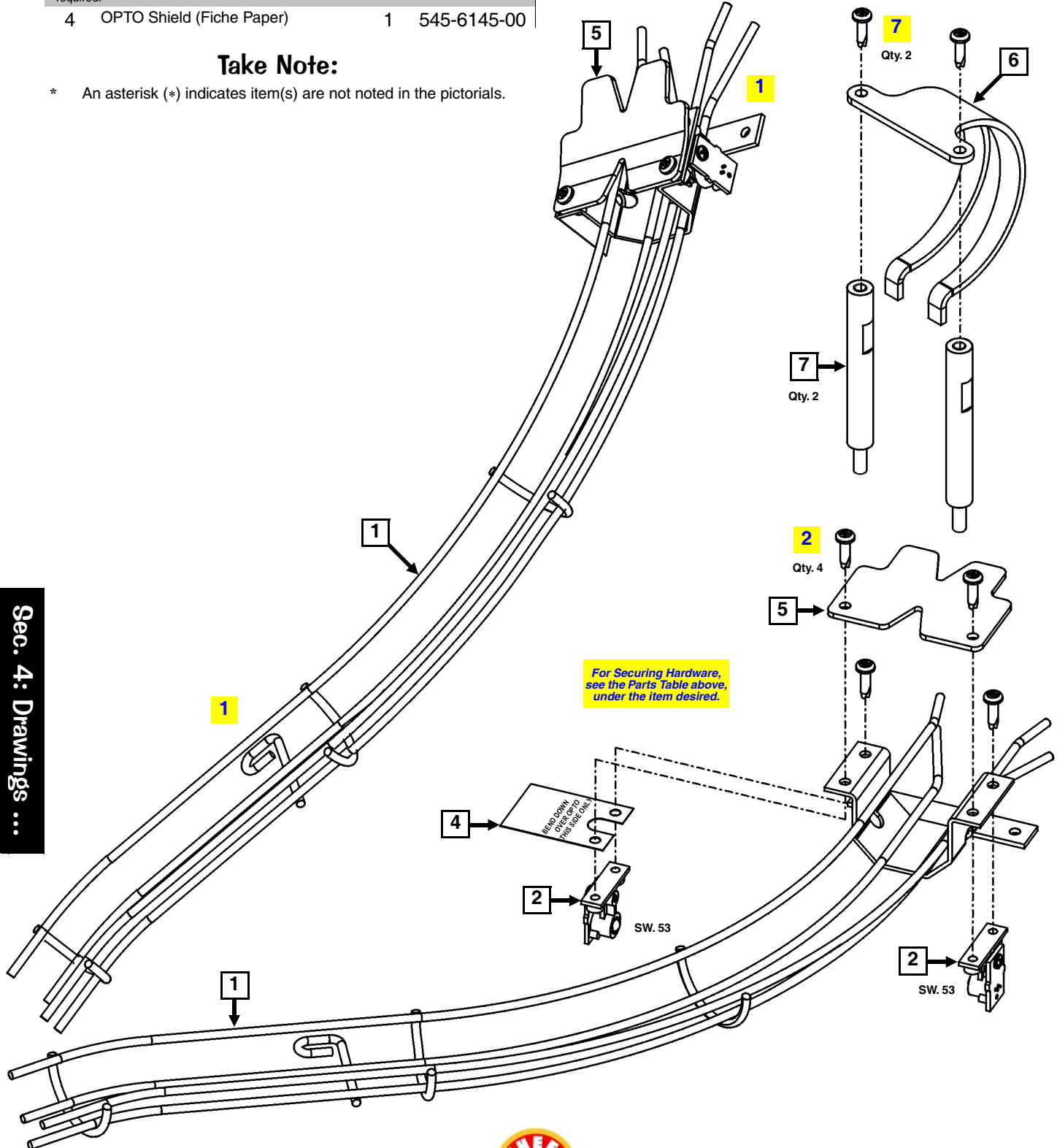


# Reverse Scoop Bracket & Wire Ramp Assembly, Individual Parts Only (Items 1-7)

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. 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. 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.



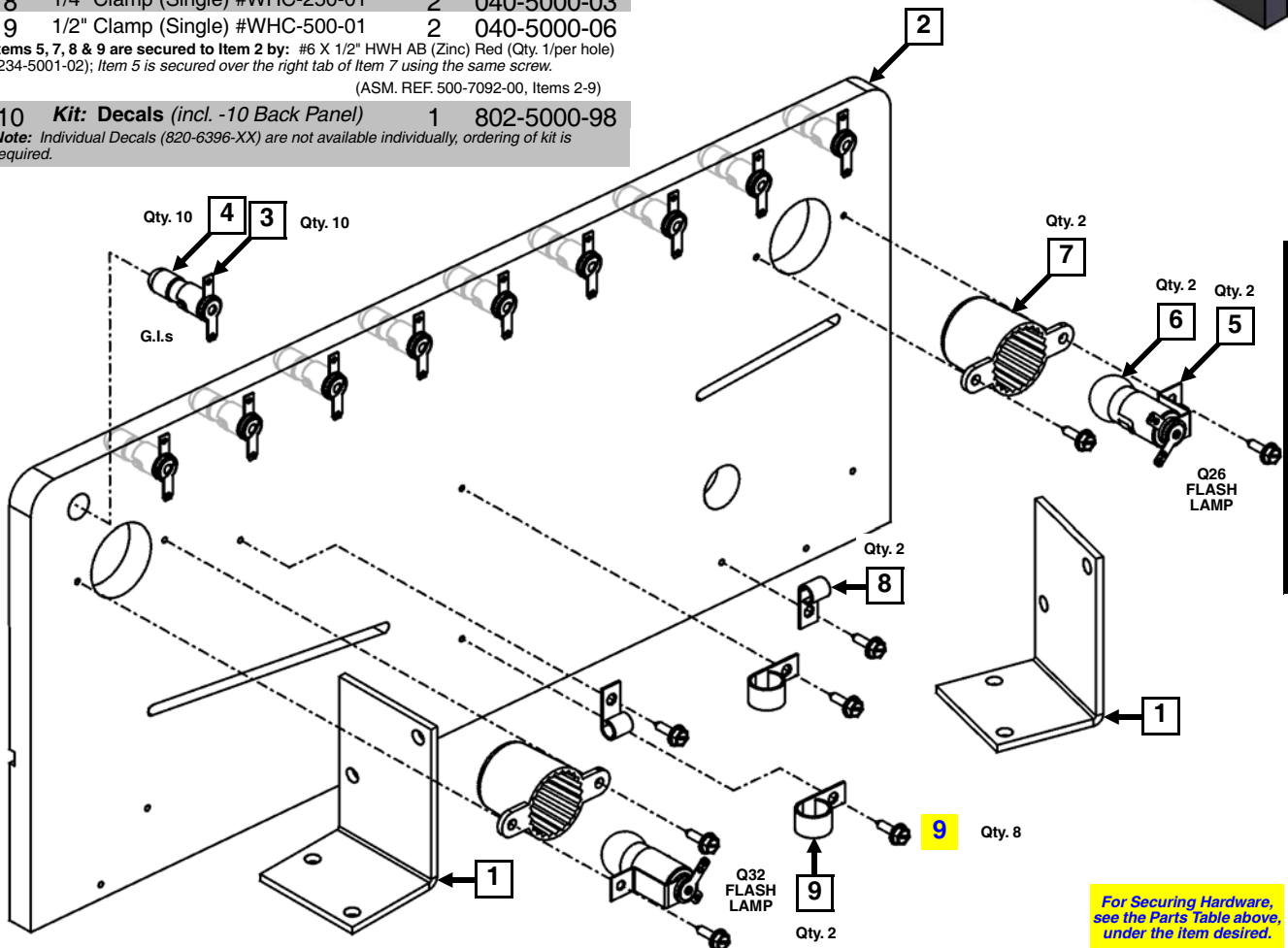
Sec. 4: Drawings ...



# 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. (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

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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	▲ I/O Power Driver ▼	YEL-VIO	J10-P9/10	50VDC	BRN-BLK	J8-P1	26-1200 ∪ 090-5044-ND
#2	AUTO LAUNCH	Q2		YEL-VIO	J10-P9/10	50VDC	BRN-RED	J8-P3	24-940 ∪ 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 ∪ 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	▲ I/O Power Driver ▼	YEL-VIO	J10-P9/10	50VDC	BLU-BRN	J9-P1	26-1200 ∪ 090-5044-ND
#10	RIGHT POP BUMPER	Q10		YEL-VIO	J10-P9/10	50VDC	BLU-RED	J9-P2	26-1200 ∪ 090-5044-ND
#11	CENTER POP BUMPER	Q11		YEL-VIO	J10-P9/10	50VDC	BLU-ORG	J9-P4	26-1200 ∪ 090-5044-ND
#12	RED CONTESTANT JUMP (LONNIE)	Q12		BROWN	J7-P1	20VDC	BLU-YEL	J9-P5	27-950 ∪ 090-5046-01-ND
#13	YEL. CONTESTANT JUMP (MARIA)	Q13		BROWN	J7-P1	20VDC	BLU-GRN	J9-P6	27-950 ∪ 090-5046-01-ND
#14	BLUE CONTESTANT JUMP (KEITH)	Q14		BROWN	J7-P1	20VDC	BLU-BLK	J9-P7	27-950 ∪ 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 ∪ 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 ∪ 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	▲ I/O Power Driver ▼	BROWN	J7-P1	20VDC	VIO-BRN	J7-P2	23-800 ∪ 090-5001-ND
#18	RIGHT SLINGSHOT	Q18		BROWN	J7-P1	20VDC	VIO-RED	J7-P3	23-800 ∪ 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 ∪ 090-5044-ND
#23	LEFT RAMP UP-POST	Q23		BROWN	J7-P1	20VDC	VIO-BLK	J7-P9	26-1200 ∪ 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	▲ I/O Power Driver ▼	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	▲ Aux. Driver ▼	RED	J16-P4>8	5VDC 1K RES. 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

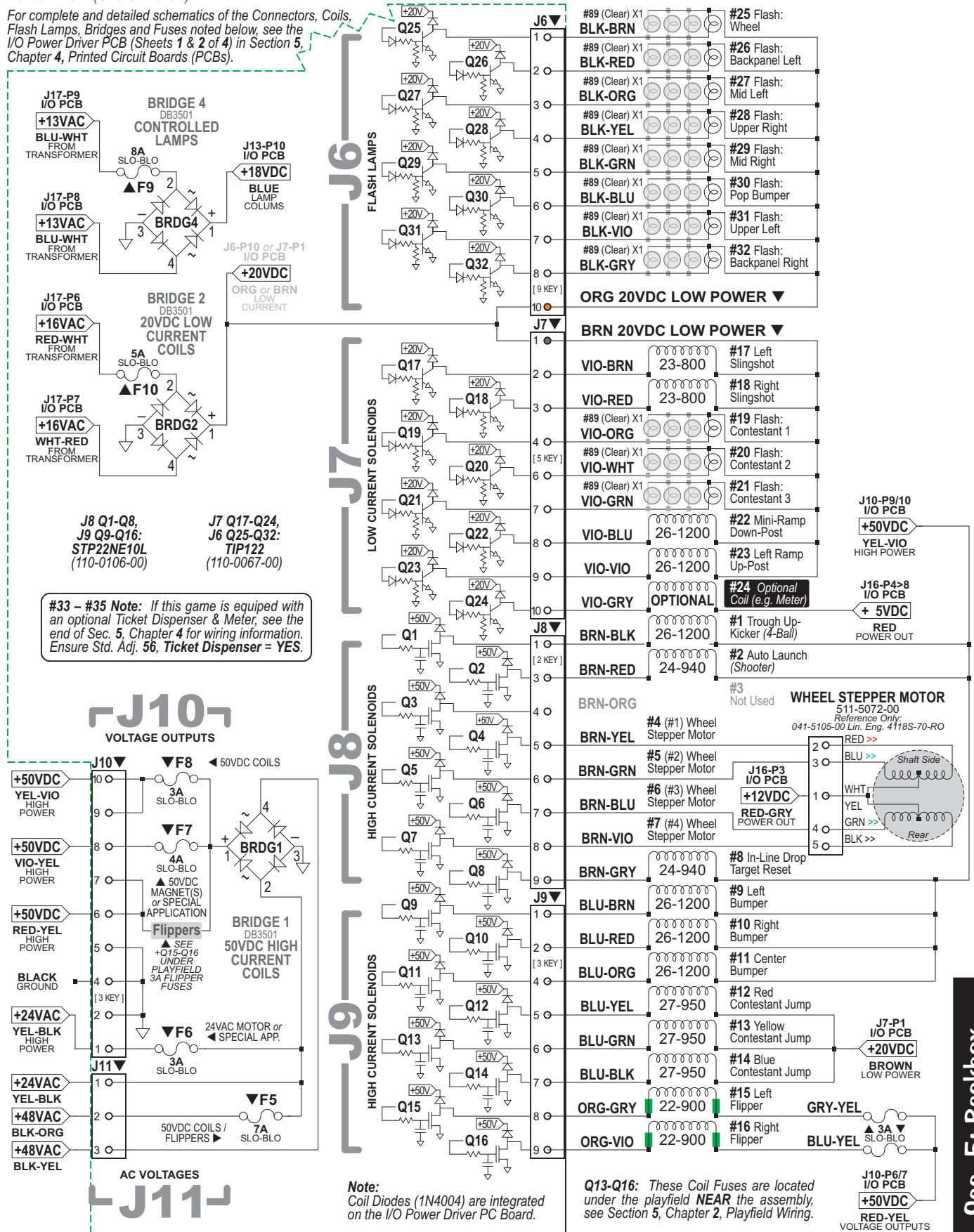
Sec. 5: Schematics...



# 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).



**#33 - #35 Note:** If this game is equipped with an optional Ticket Dispenser & Meter, see the end of Sec. 5, Chapter 4 for wiring information. Ensure Std. Adj. 56, Ticket Dispenser = YES.

**Note:** Coil Diodes (1N4004) are integrated on the I/O Power Driver PC Board.

**Q13-Q16:** These Coil Fuses are located under the playfield NEAR the assembly, see Section 5, Chapter 2, Playfield Wiring.

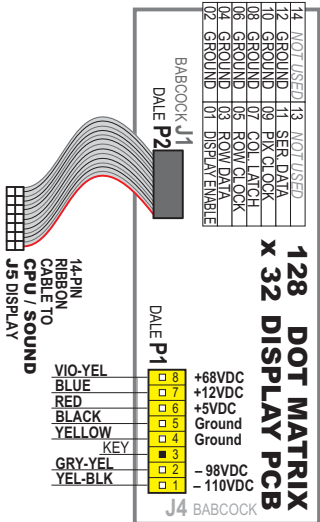
J10-P6/P7 I/O PCB  
+50VDC  
RED-YEL VOLTAGE OUTPUTS

Sec. 5: Backbox ...

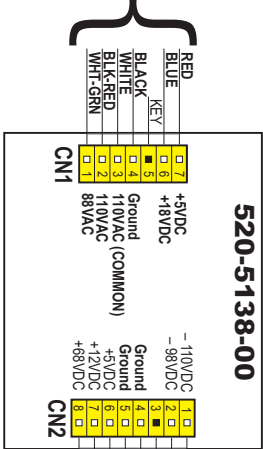


# Backbox Board Layout Wiring Diagram

- 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
- FOR ALL PARTS IN TABLE, SEE SEC. 4, CHP. 1, SPEAKER PANEL PARTS, PG. 45.

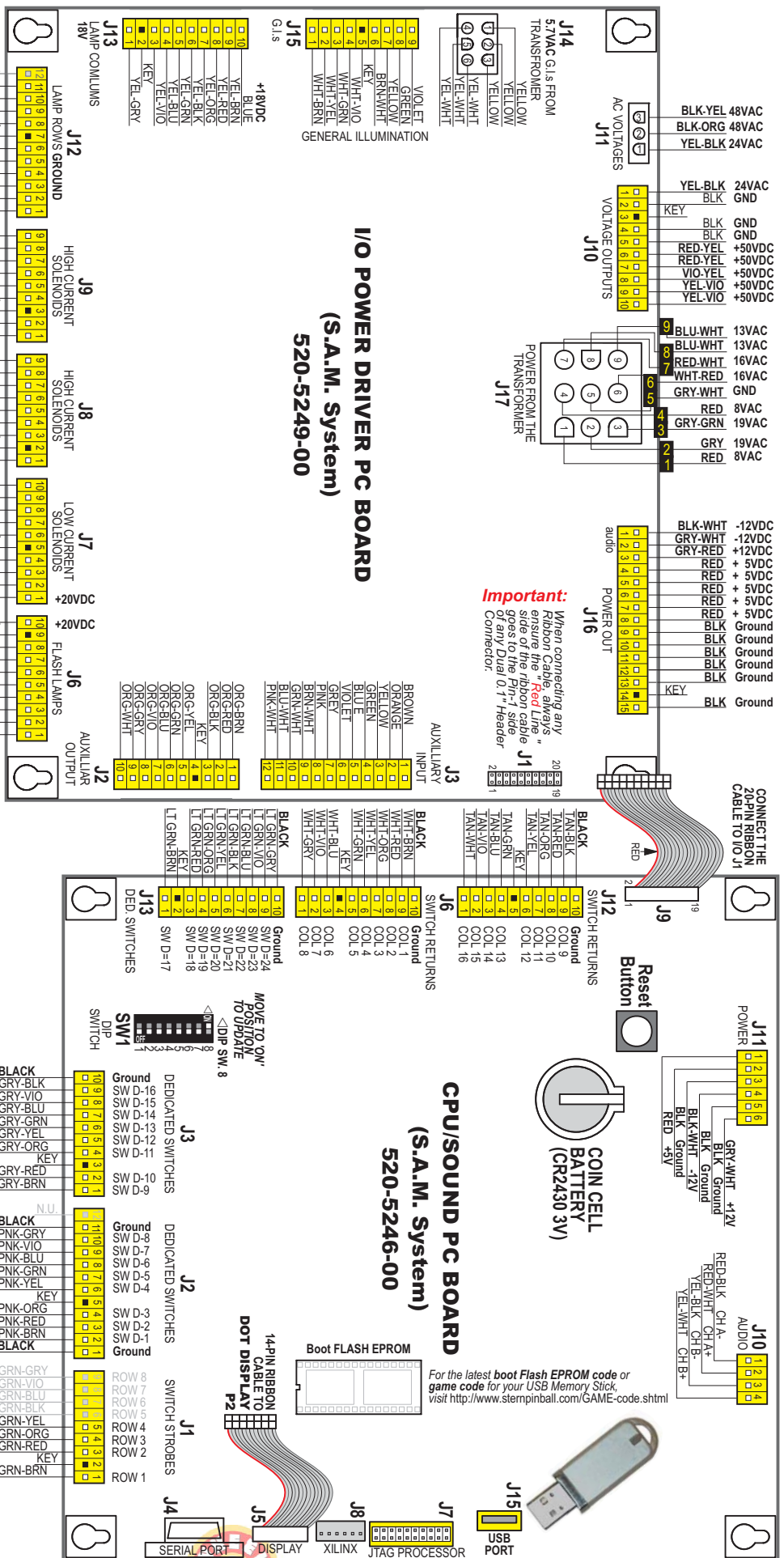
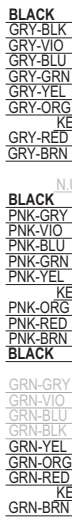


## CN1 to Transformer (Cabinet)



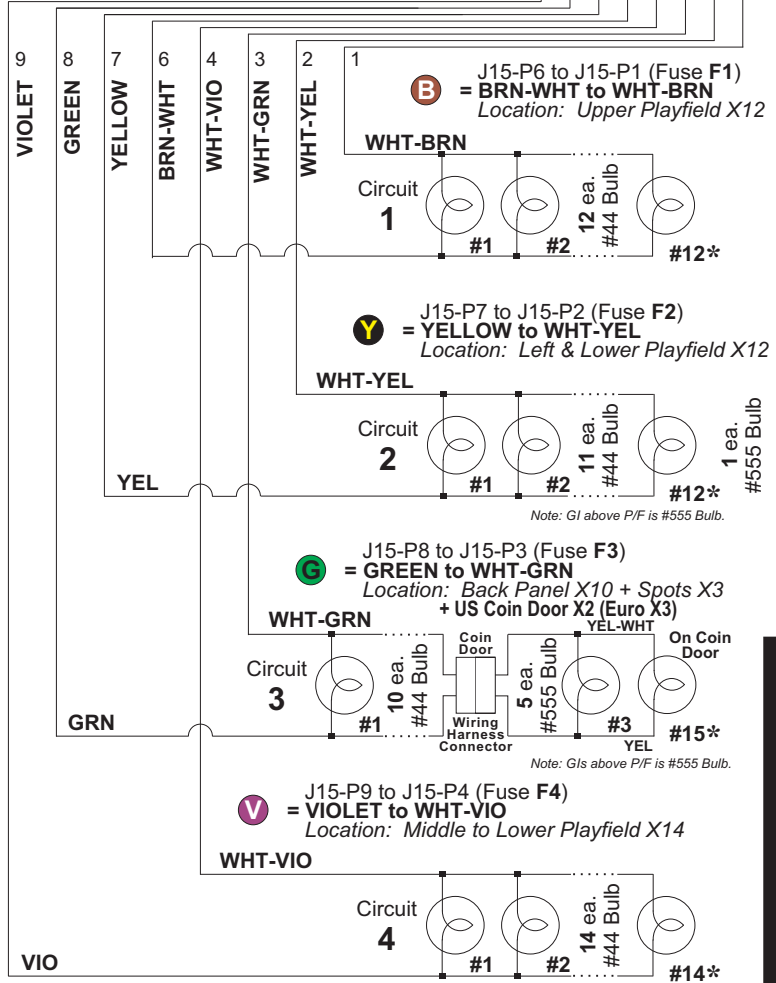
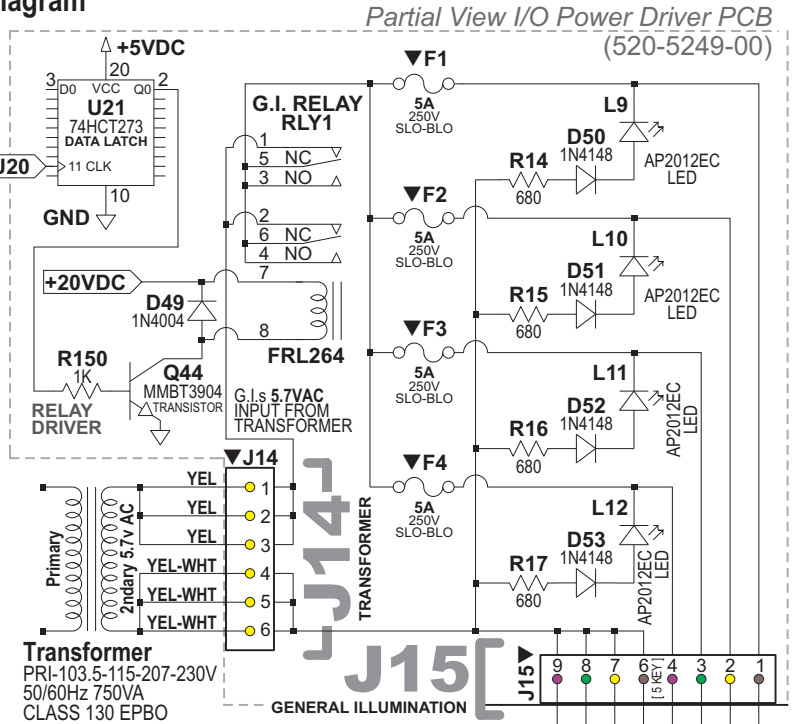
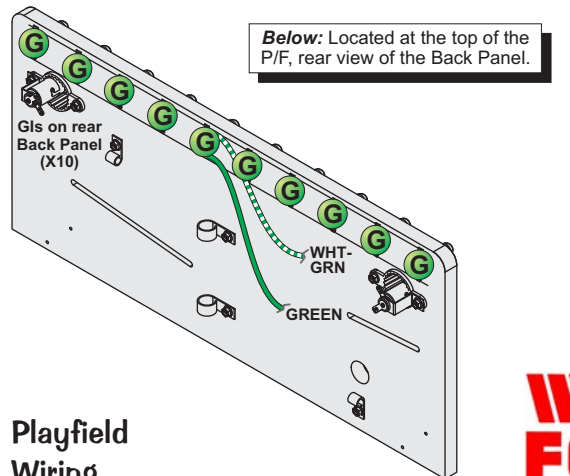
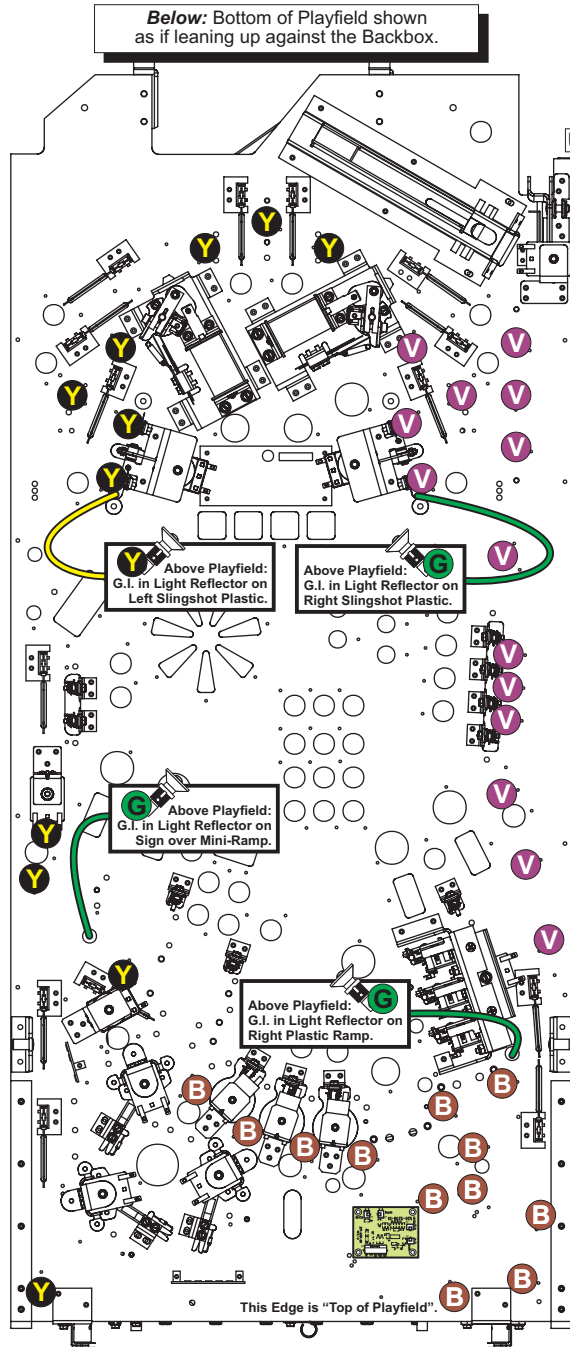
## CN2 to Display

## DISPLAY POWER SUPPLY PCB



# 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.

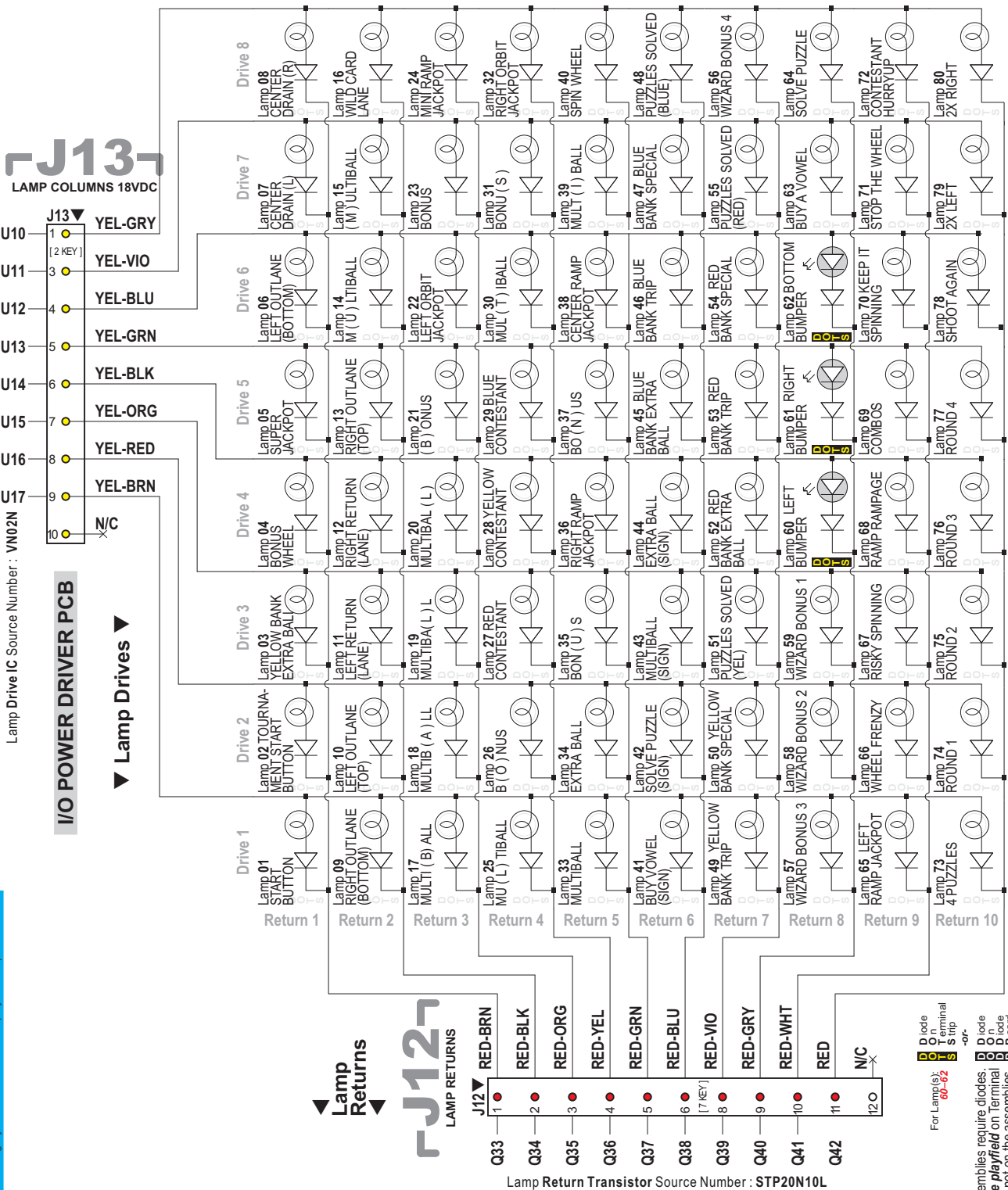
## Sec. 5: Playfield ...





# Playfield Lamp Wiring Diagram

Please NOTE: Switch & Lamp Descriptions may differ slightly than that of the Dot Display due to space restraints.



# 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

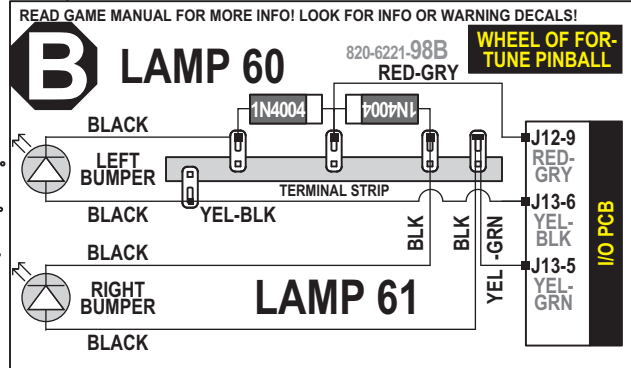
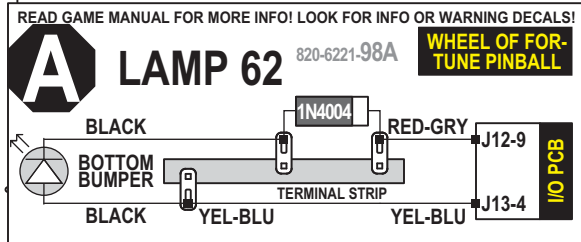
**LOWER LEFT FLIPPER FUSE**  
Rated 3A 250V S.B.  
RED -YEL 3A S.B. GRAY -YEL

**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

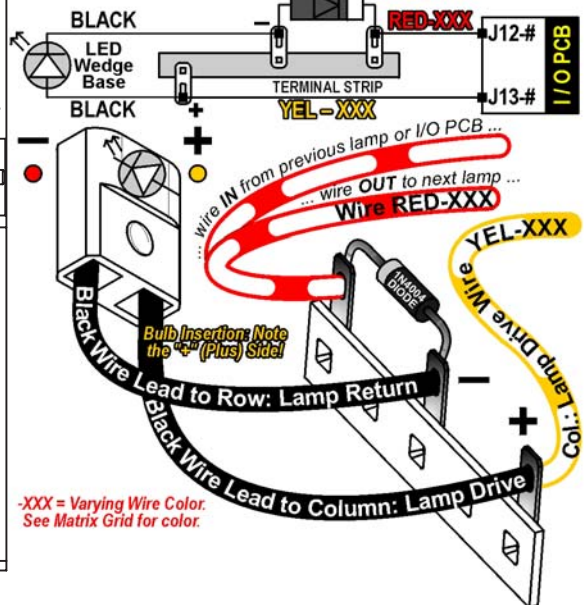


See Sec. 4, Chp. 1 (Pink Pages), Playfield Bottom - Misc. Parts and Brackets for Terminal Strips, Diodes, Fuses and Fuse Holders Part #s.



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

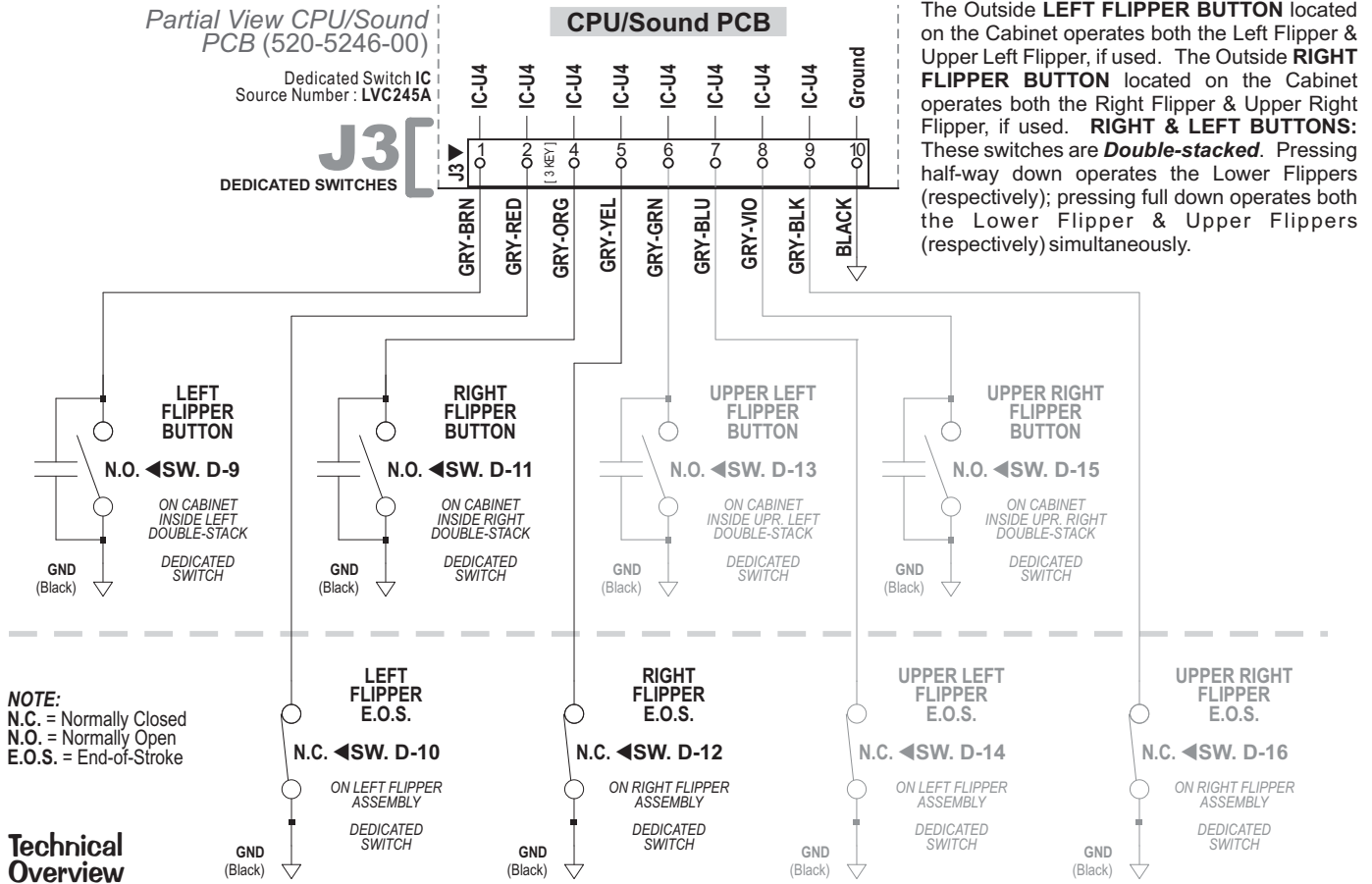
Usually when an LED Module is used as a Controlled Lamp for a Pop Bumper.



Sec. 5: Playfield ...

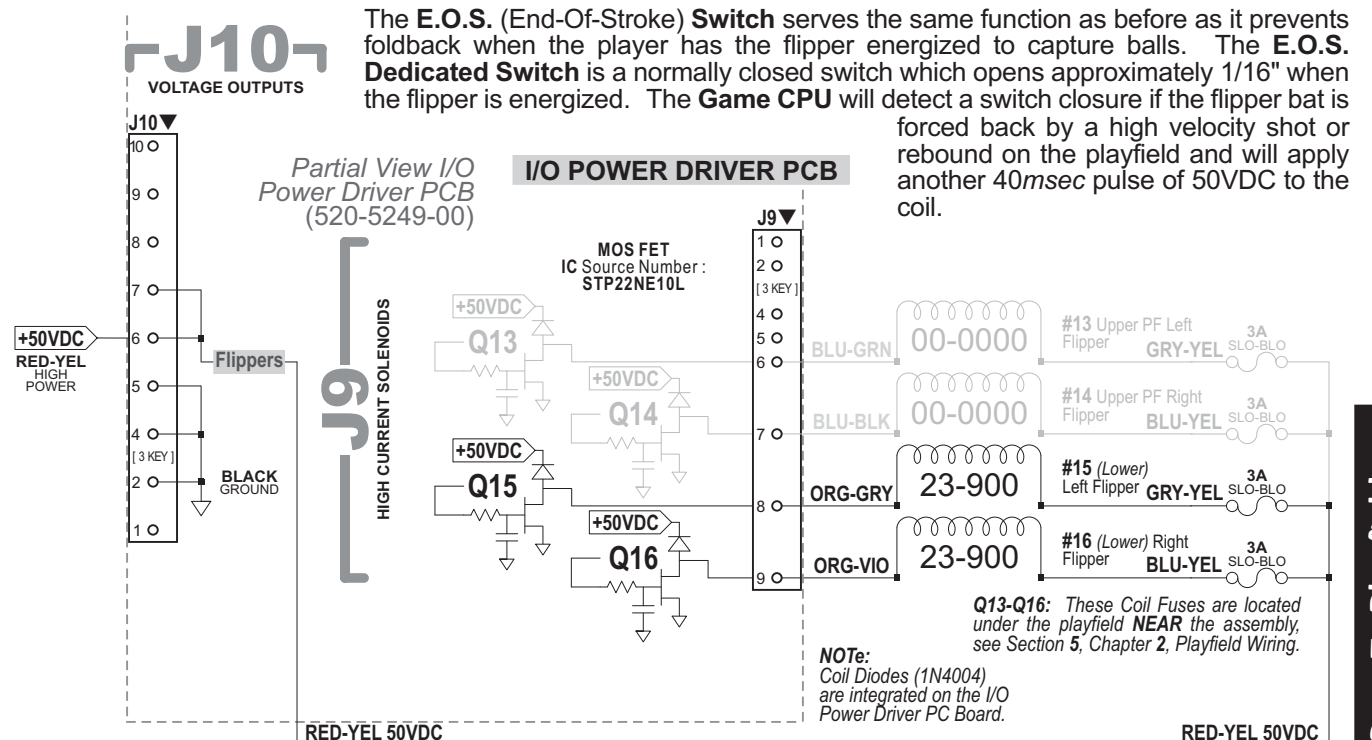


## 2-Flipper Circuit Wiring Diagram



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.



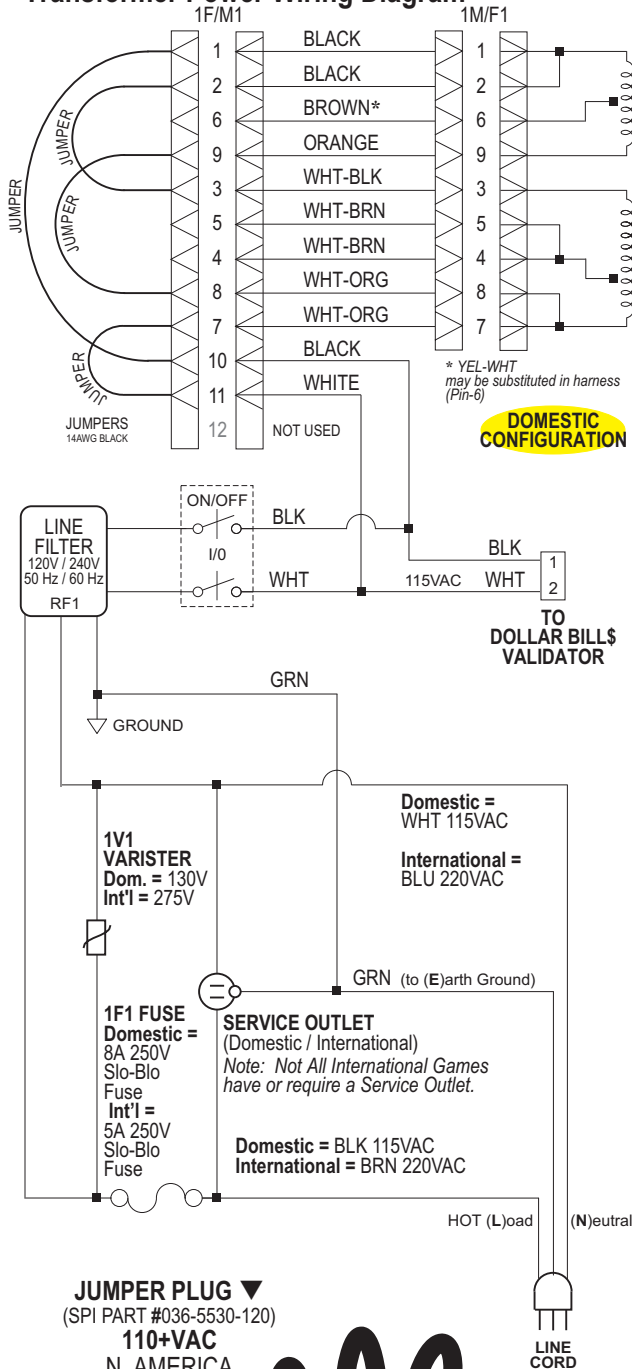
Sec. 5: Playfield ...



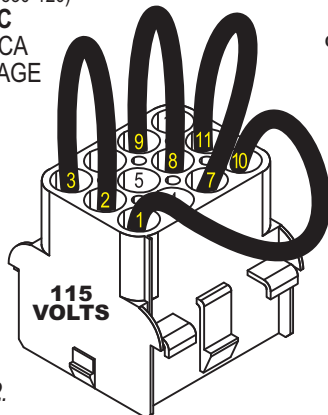


# Cabinet and Coin Door Wiring

## Transformer Power Wiring Diagram



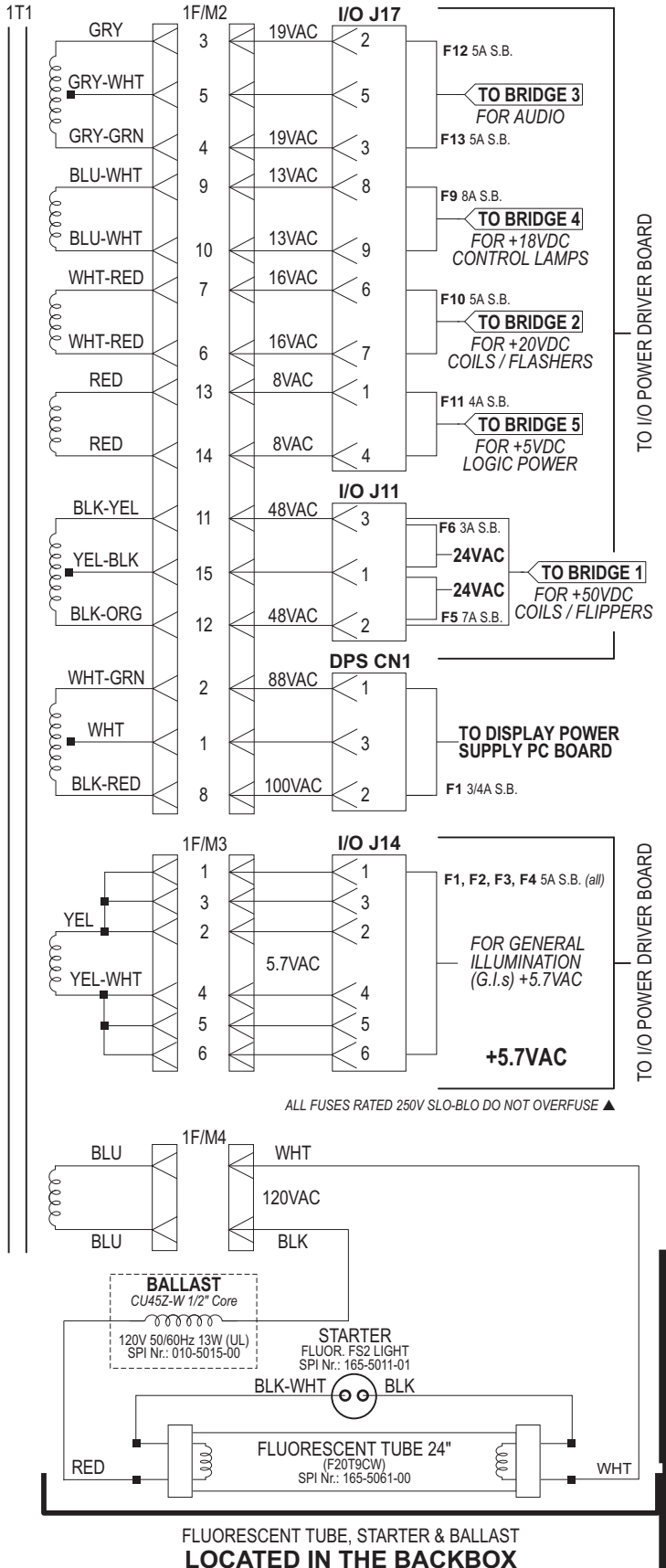
**JUMPER PLUG ▼**  
 (SPI PART #036-5530-120)  
**110+VAC**  
 N. AMERICA  
 LINE VOLTAGE



For all the Cabinet Universal Voltage Jumper Plug Configurations for voltage variations, see the end of this Chapter, Page 102.

**DOMESTIC CONFIGURATION**

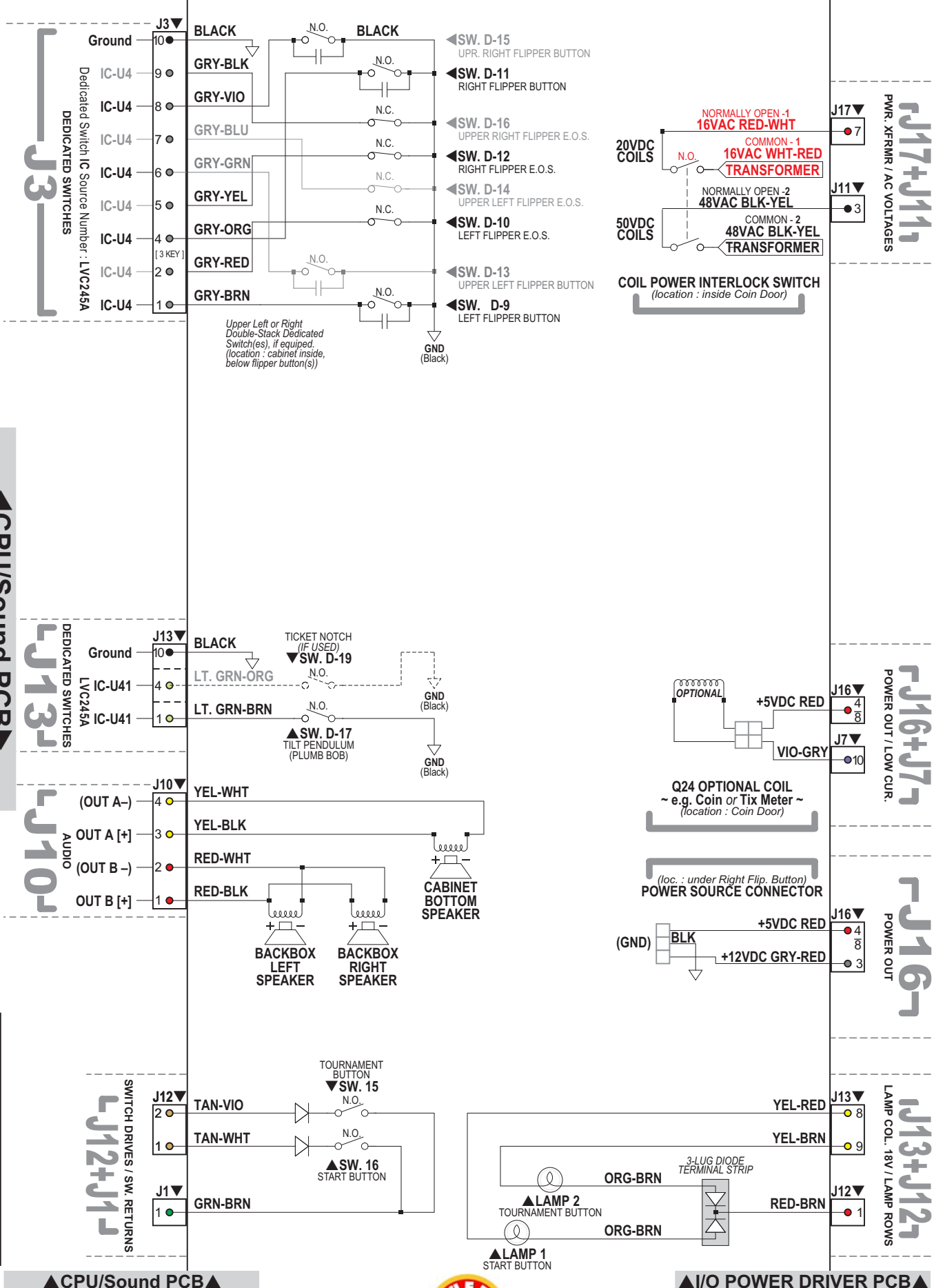
\* YEL-WHT may be substituted in harness (Pin-6)



ALL FUSES RATED 250V SLO-BLO DO NOT OVERFUSE ▲

FLUORESCENT TUBE, STARTER & BALLAST LOCATED IN THE BACKBOX

# Cabinet Wiring Diagram



▶ CPU/Sound PCB

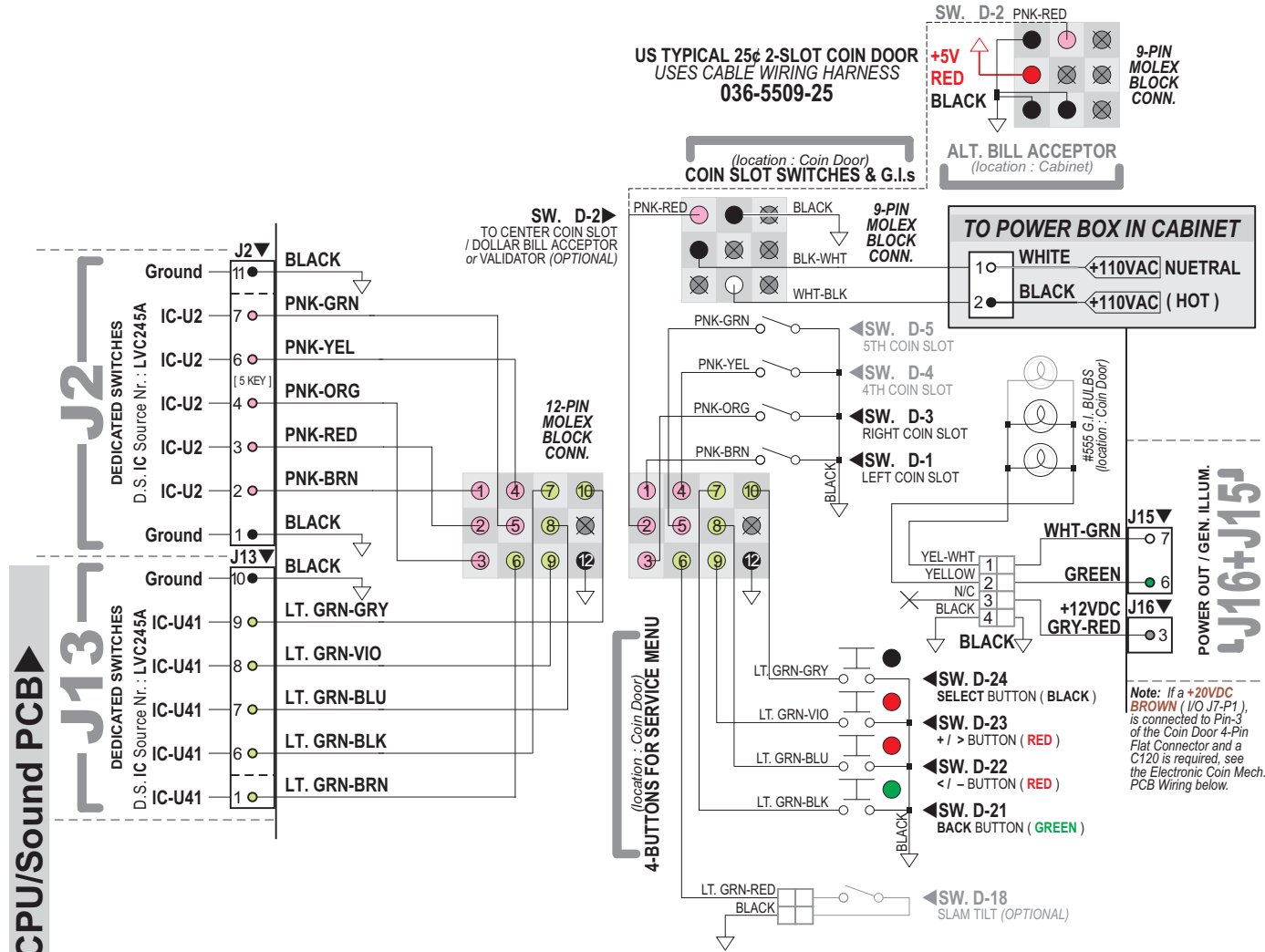
▶ I/O POWER DRIVER PCB

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)

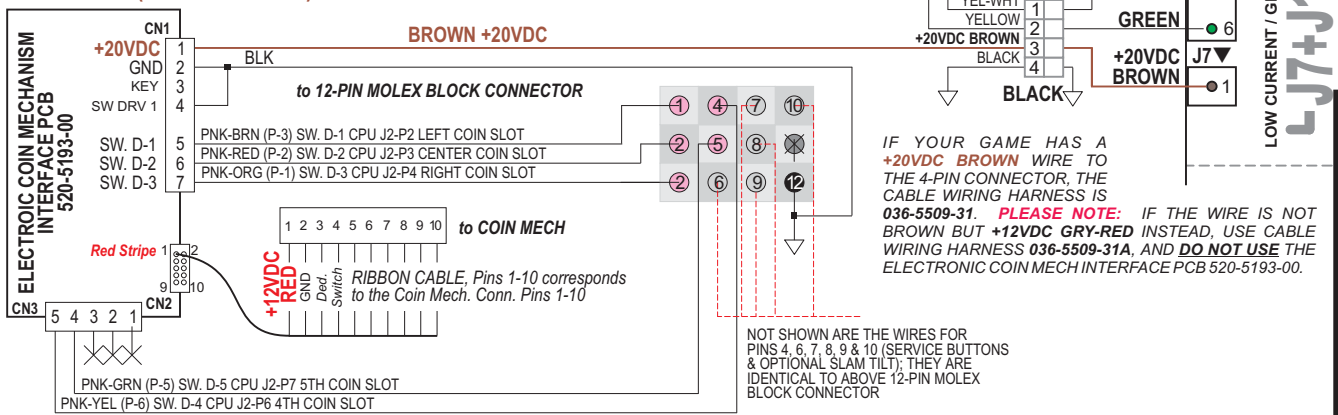
036-5509-31B (ICT/KAL ONLY) / 036-5509-31C (ODA ONLY) / 036-5509-31D (SPAIN ONLY)

**NON-US NON-C120 2-SLOT COIN DOOR**  
USES CABLE WIRING HARNESS  
036-5509-32

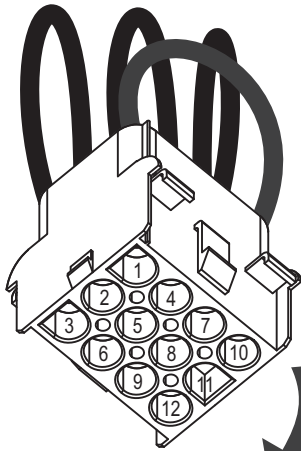
**NON-US NON-C120 3-SLOT COIN DOOR**  
USES CABLE WIRING HARNESS  
036-5509-33

**IF YOUR GAME HAS AN ELECTRONIC COIN MECH. INTERFACE PC BOARD (520-5193-00):**

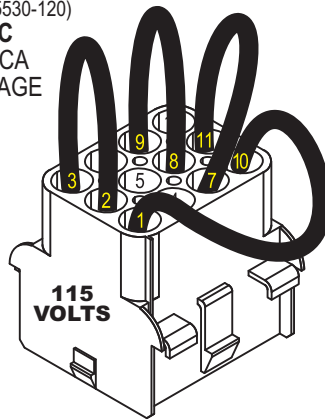
**1-SLOT COIN DOOR USE WITH C120 CAPABILITIES REQUIRING PCB 520-5193-00**  
USES CABLE WIRING HARNESS  
036-5509-31 (S.A.M. SYSTEM)



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



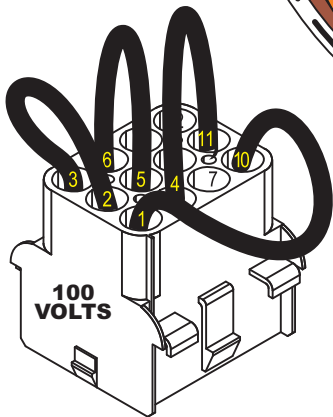
12-PIN FEMALE SIDE TO JUMPER  
12-PIN MALE SIDE CONNECTOR

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 ▲

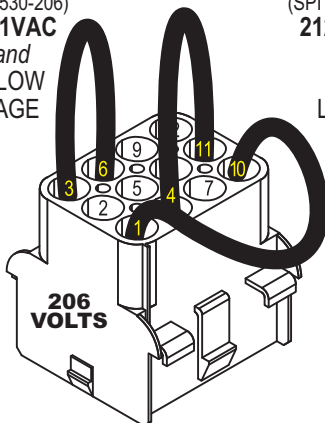
9-PIN F/M CONN.  
▲ BACK VIEW



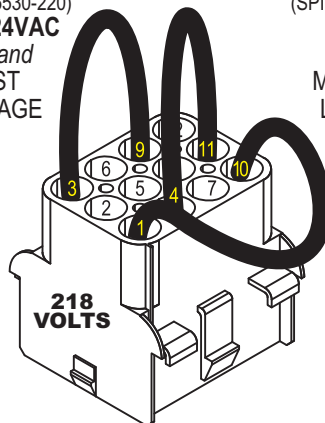
**JUMPER PLUG**  
(SPI PART #036-5530-100)  
**98VAC – 109VAC**  
JAPAN or  
N. AMERICA LOW  
LINE VOLTAGE

Black & White wires from  
the POWER BOX, cabinet bottom  
to 12-Pin Conn., Pins 10 & 11..

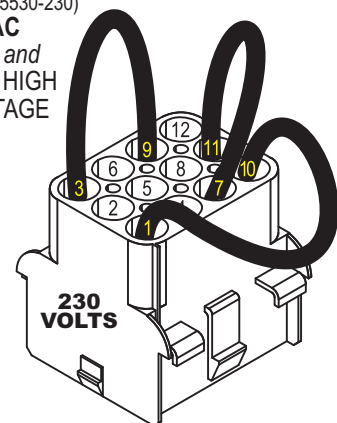
**JUMPER PLUG ▼**  
(SPI PART #036-5530-206)  
**200VAC – 211VAC**  
EUROPE and  
MID. EAST LOW  
LINE VOLTAGE



**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



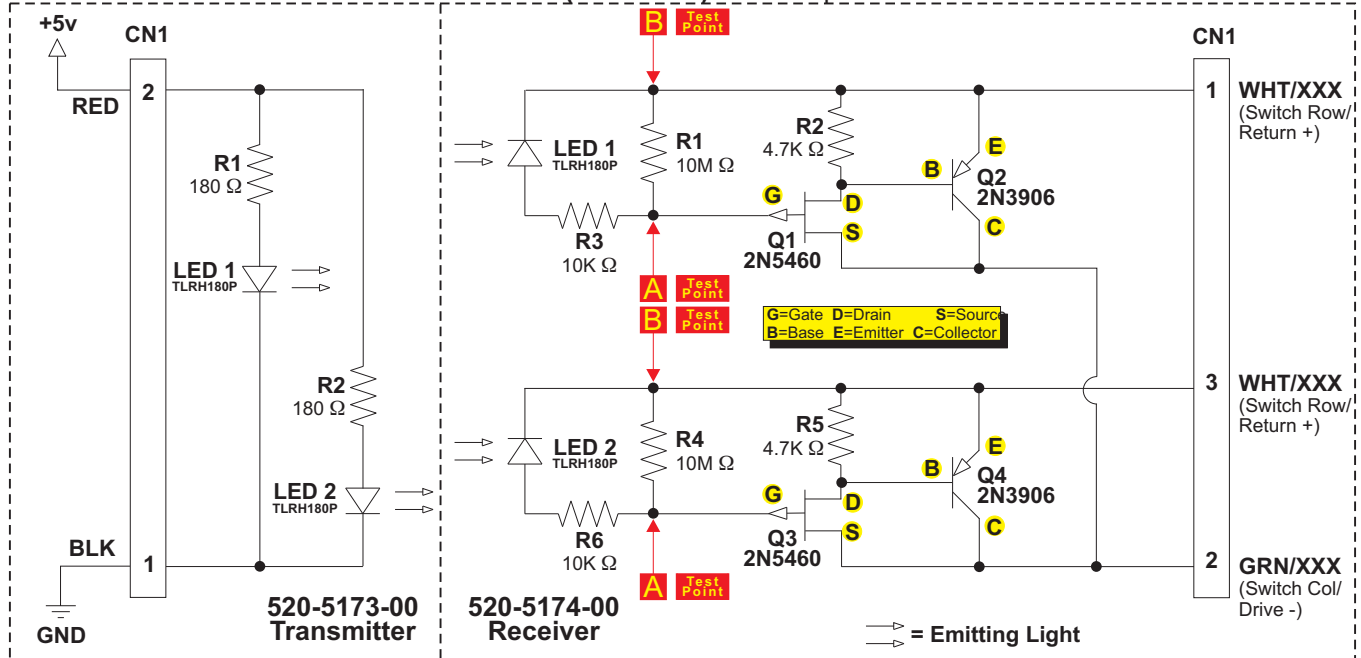
Sec. 5: Cab. & Coin



# 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**.

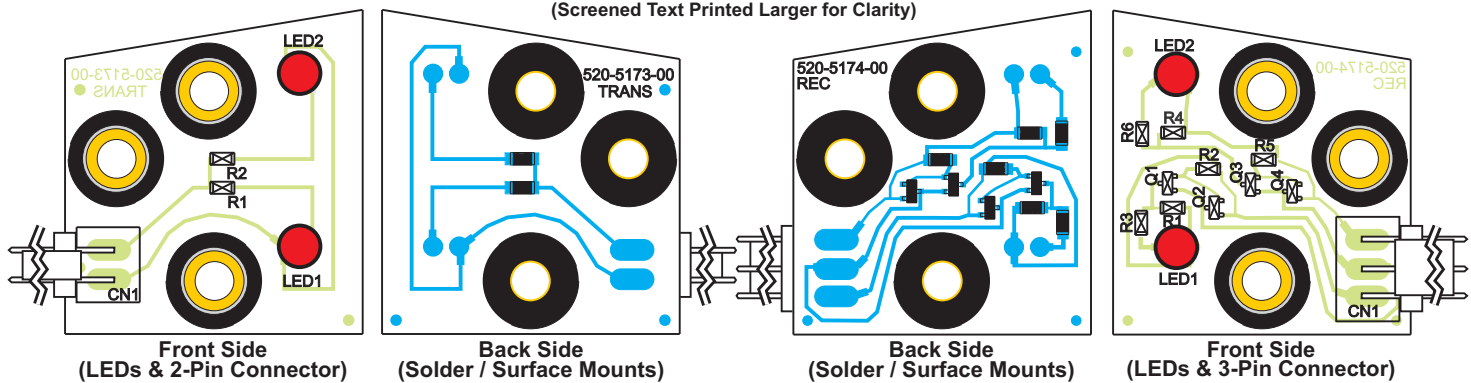


## Trough Up-Kicker Dual OPTO PCBs (515-0173-00 & 515-0174-00) Component Layout & Parts

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) 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) 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



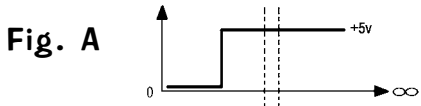
# OPTO Troubleshooting

## 1. Volt Meter Test (indicates normal operating condition):

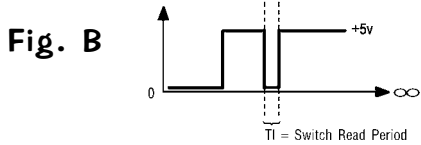
A. **OPEN OPTO** (Light Falling on LED) = *SWITCH OPEN*. Place meter leads across points **A** and **B** on the **LED1 Circuit** (Refer to Schematic Drawing on previous page, 520-5174-00 Receiver Side). It should read approximately 0.8 - 1.2v DC. The **LED2 Circuit** operates the same.

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.



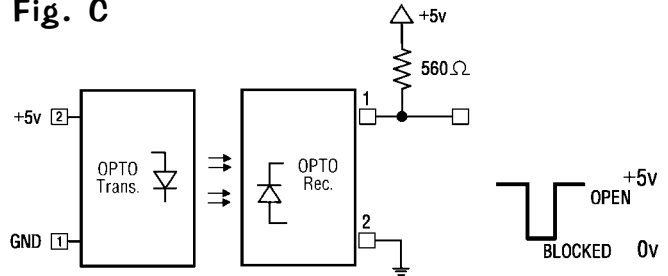
B. **CLOSED OPTO** (Light Blocked) = *SWITCH CLOSED*. Place Scope lead at **Pin-1** of OPTO Rec. Board with Scope Grounded (see Schematic). The Scope should display a **PULSE STREAM** indicating **Q2** has switched "On" as shown in **Fig. B**, Wave Form Diagram. This is your Switch Drive Pulse.

## 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

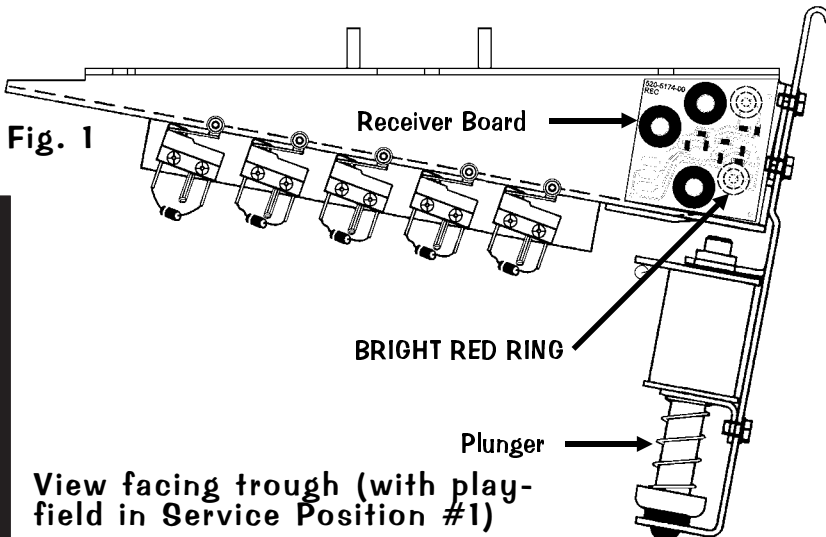
Disconnect the **OPTO Transmitter / Receiver Board** from the circuit. Connect one side of a 560Ω Pull-Up Resistor to **Pin-1** of the OPTO Receiver Bd. and the other side of the resistor to a 5v DC source. Connect **Pin-2** to GND. Connect a +5v DC source to **Pin-1** of the Transmitter & GND to **Pin-2**. 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)

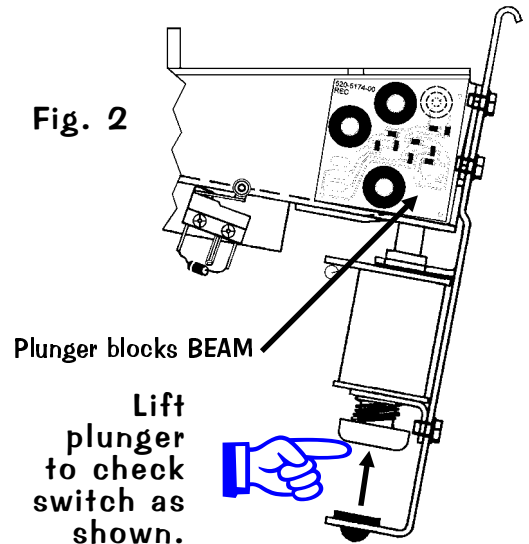
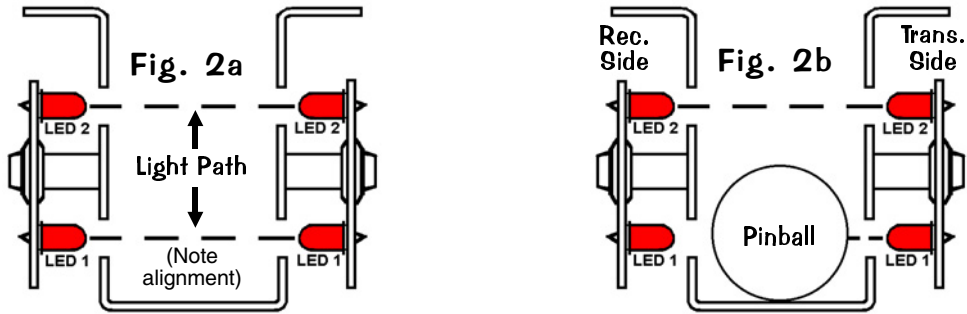


Fig. 2

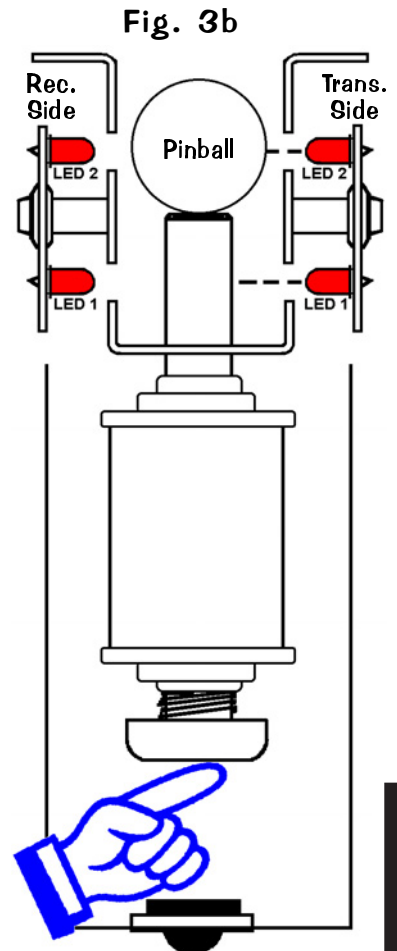
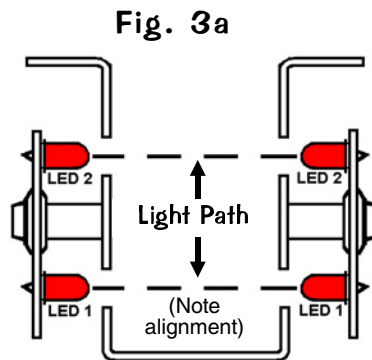
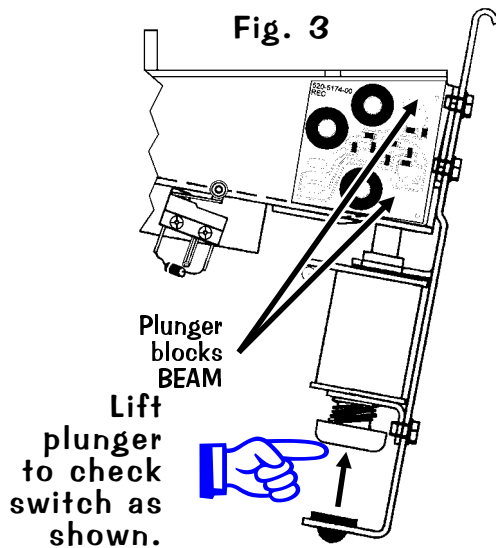


## Sectional view from right (Fig. 2a & 2b)



### 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).

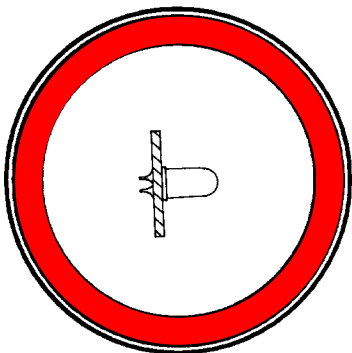


Fig. 4a  
Correct Position

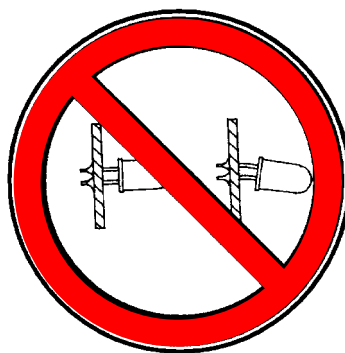
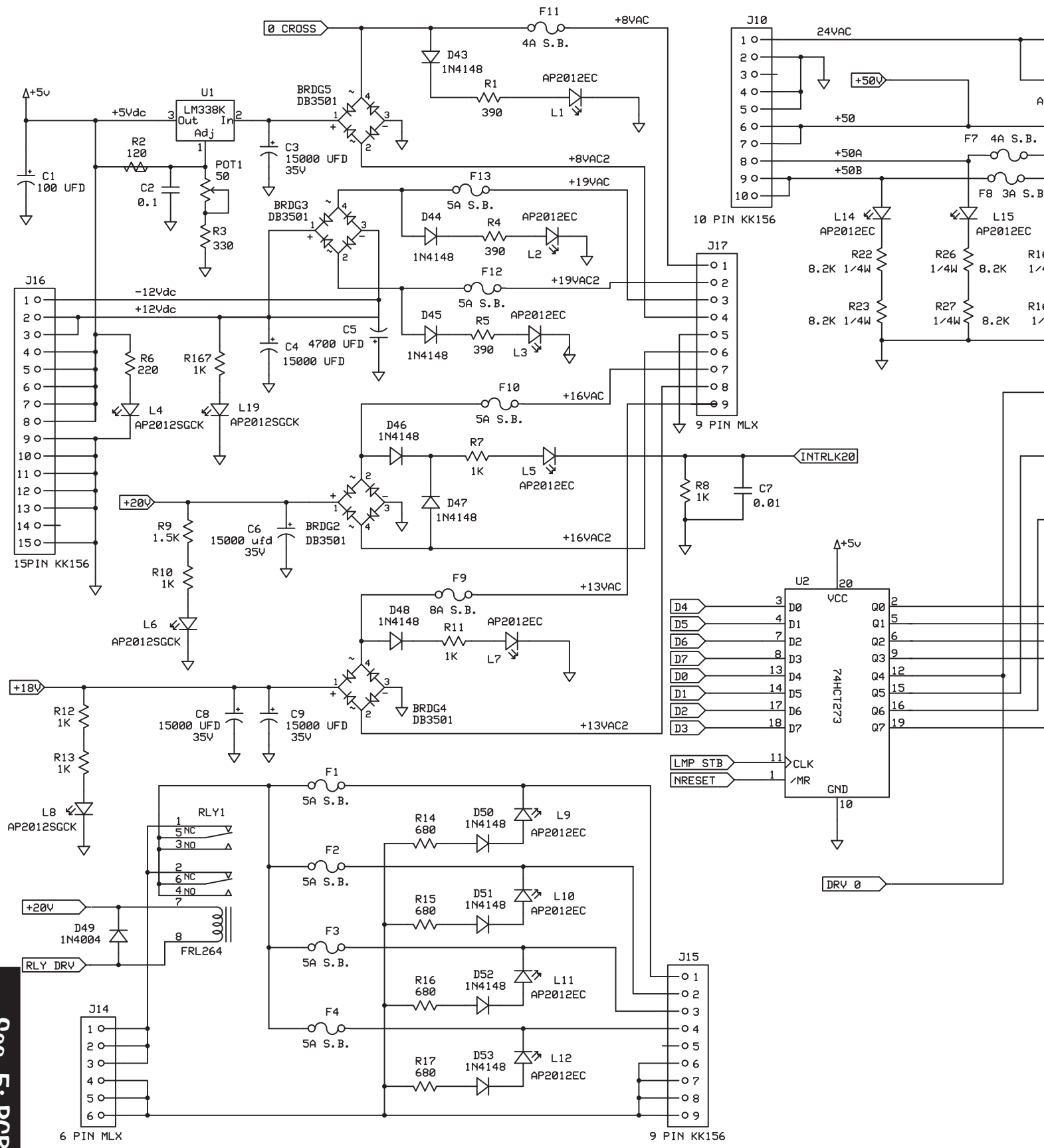


Fig. 4b  
Incorrect Position

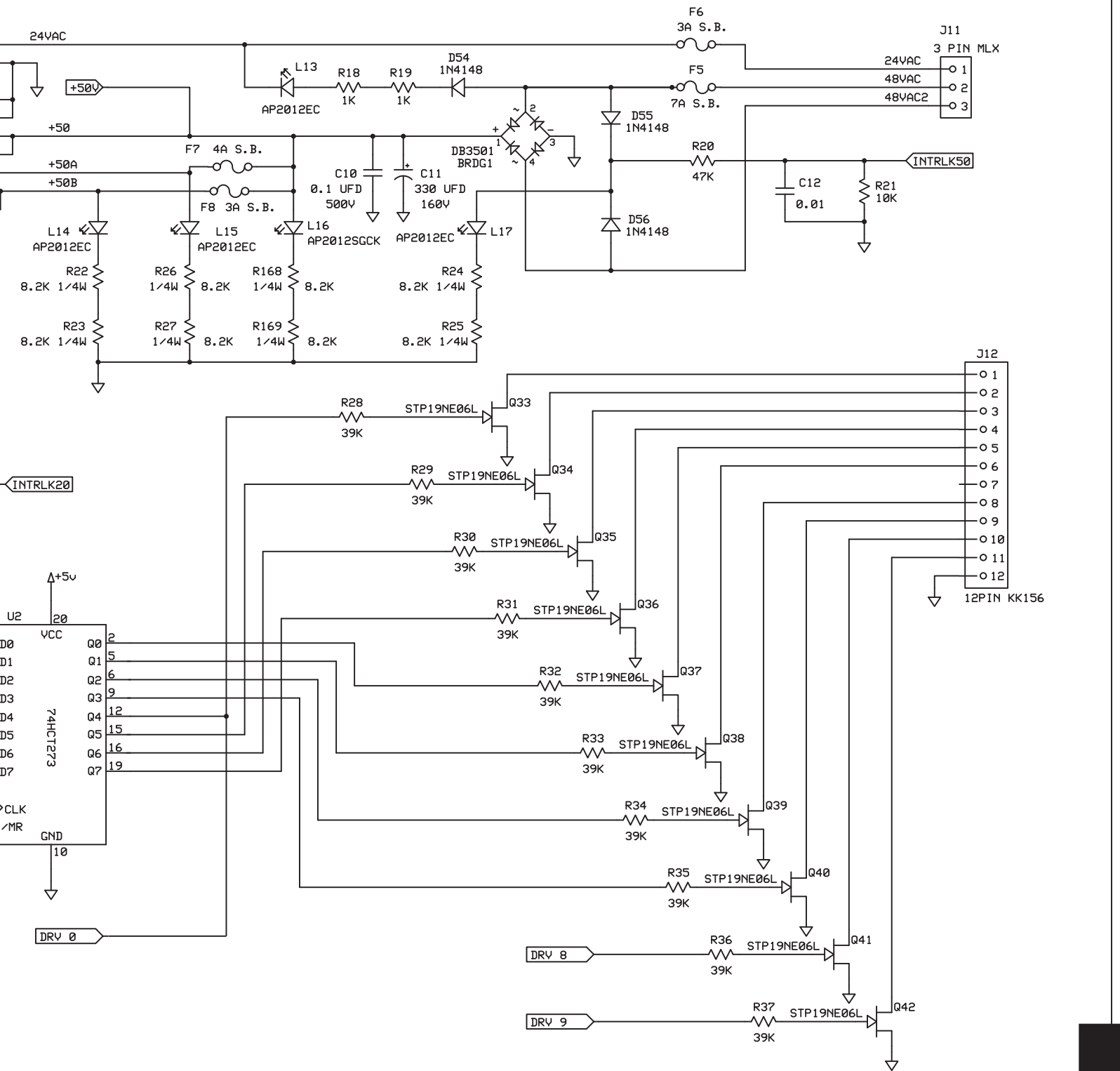
I/O POWER DRIVER PCB S.A.M. System (520-5249-00) Schematic (Sheet 1 of 4)



Sec. 5: PCBs

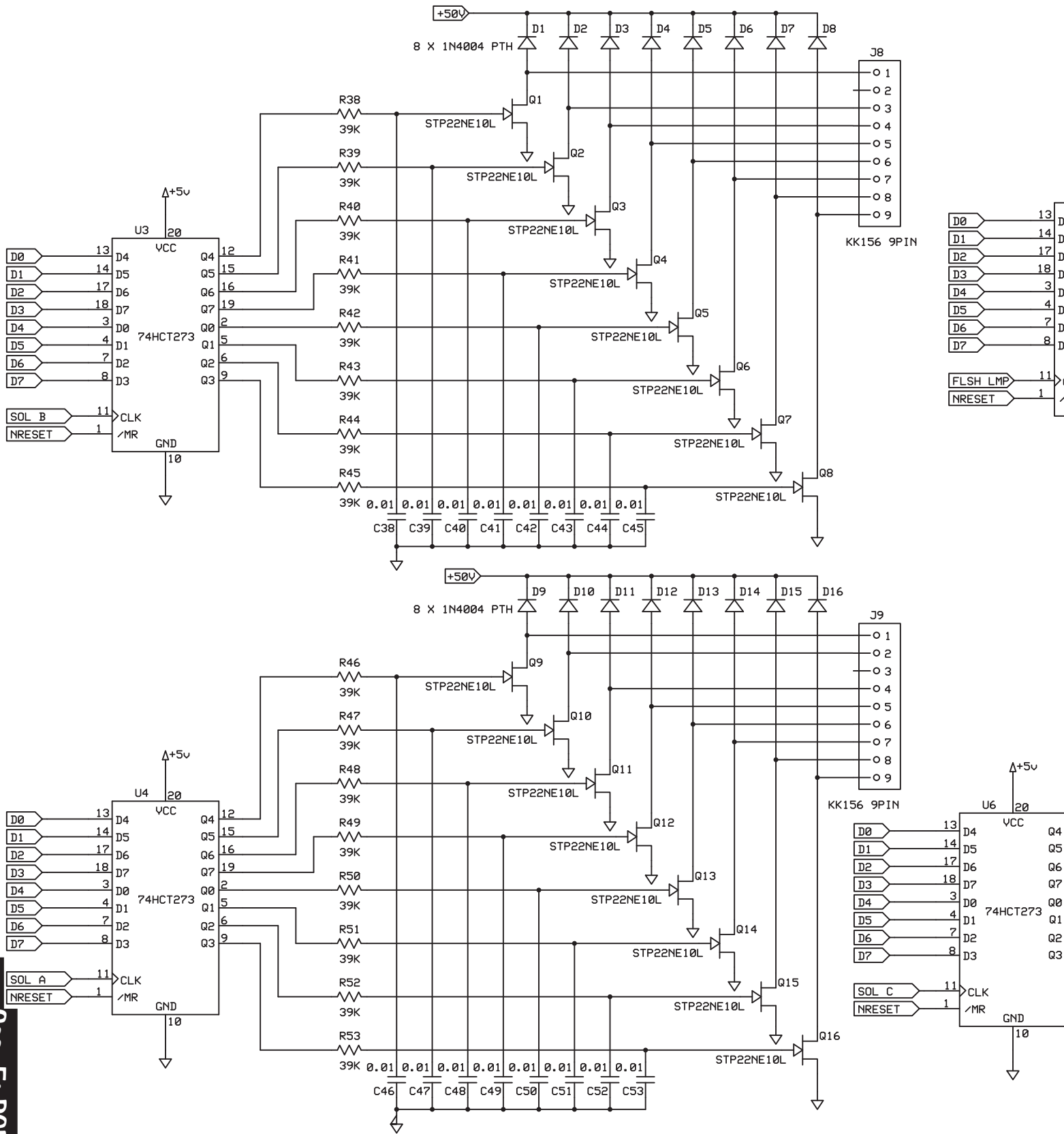






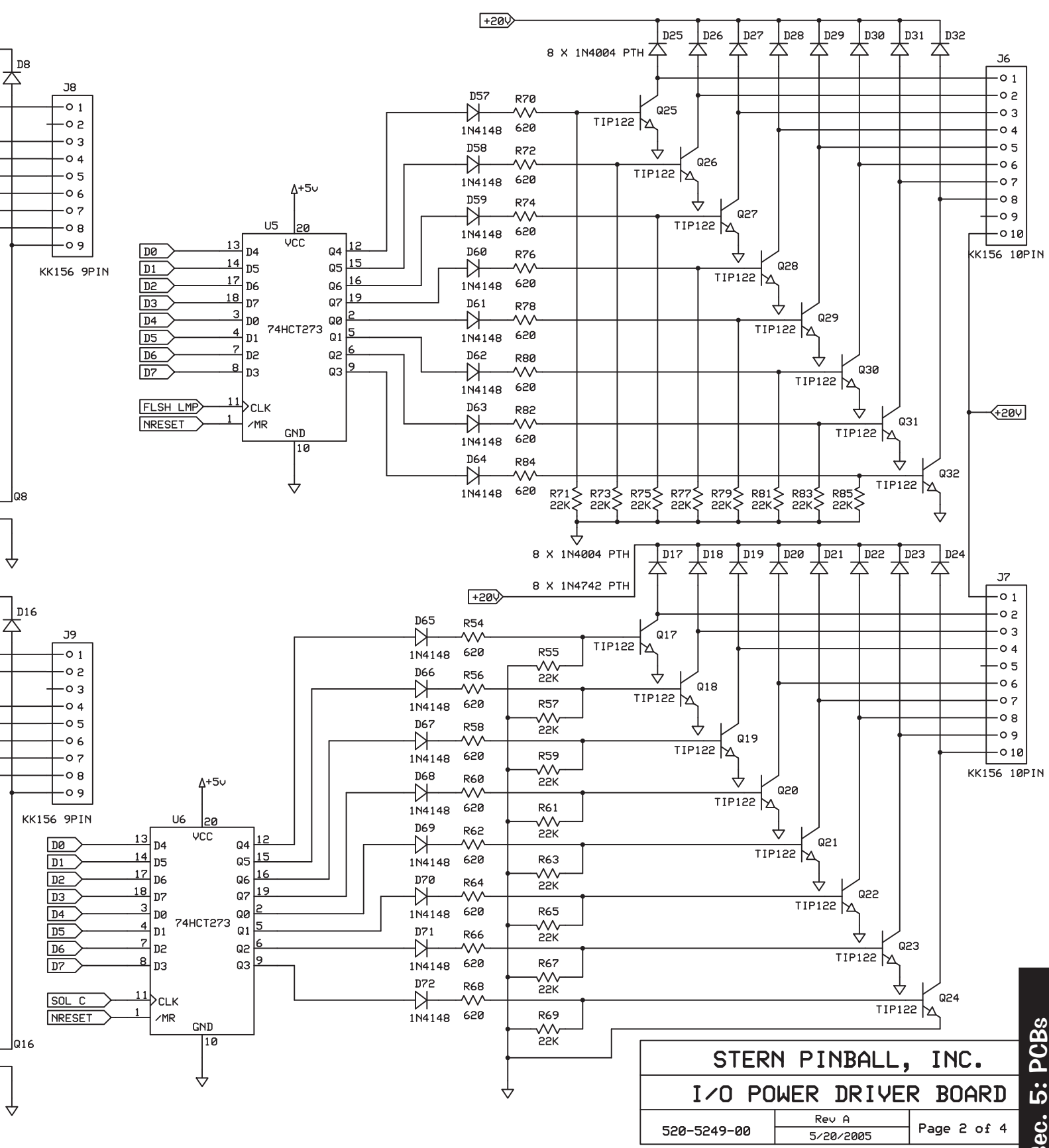
<b>STERN PINBALL, INC.</b>		
<b>I/O POWER DRIVER BOARD</b>		
520-5249-00	Rev A 5/20/2005	Page 1 of 4

**Sec. 5: PCBs**



Sec. 5: PCBs





**STERN PINBALL, INC.**

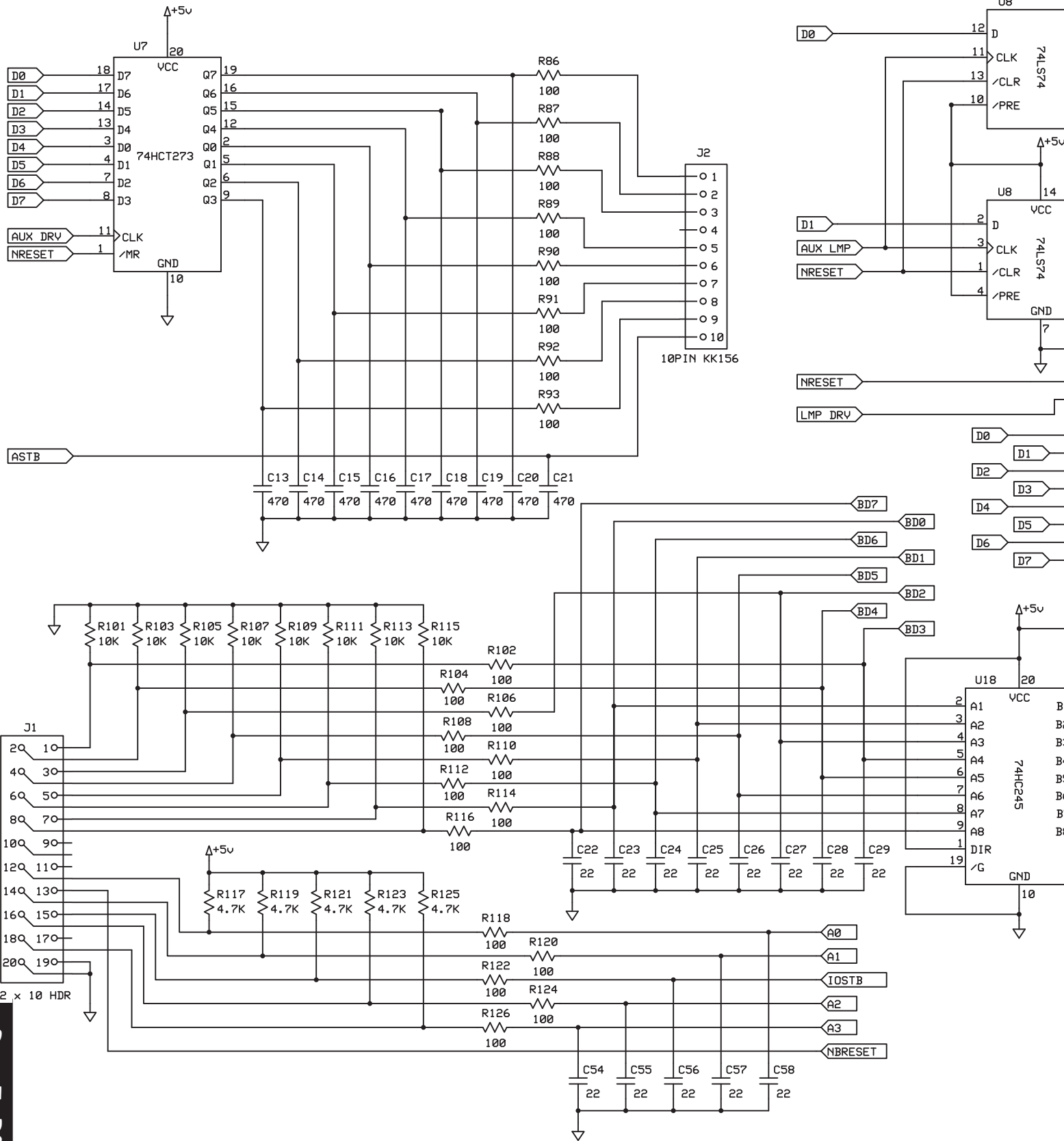
**I/O POWER DRIVER BOARD**

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**Sec. 5: PCBs**

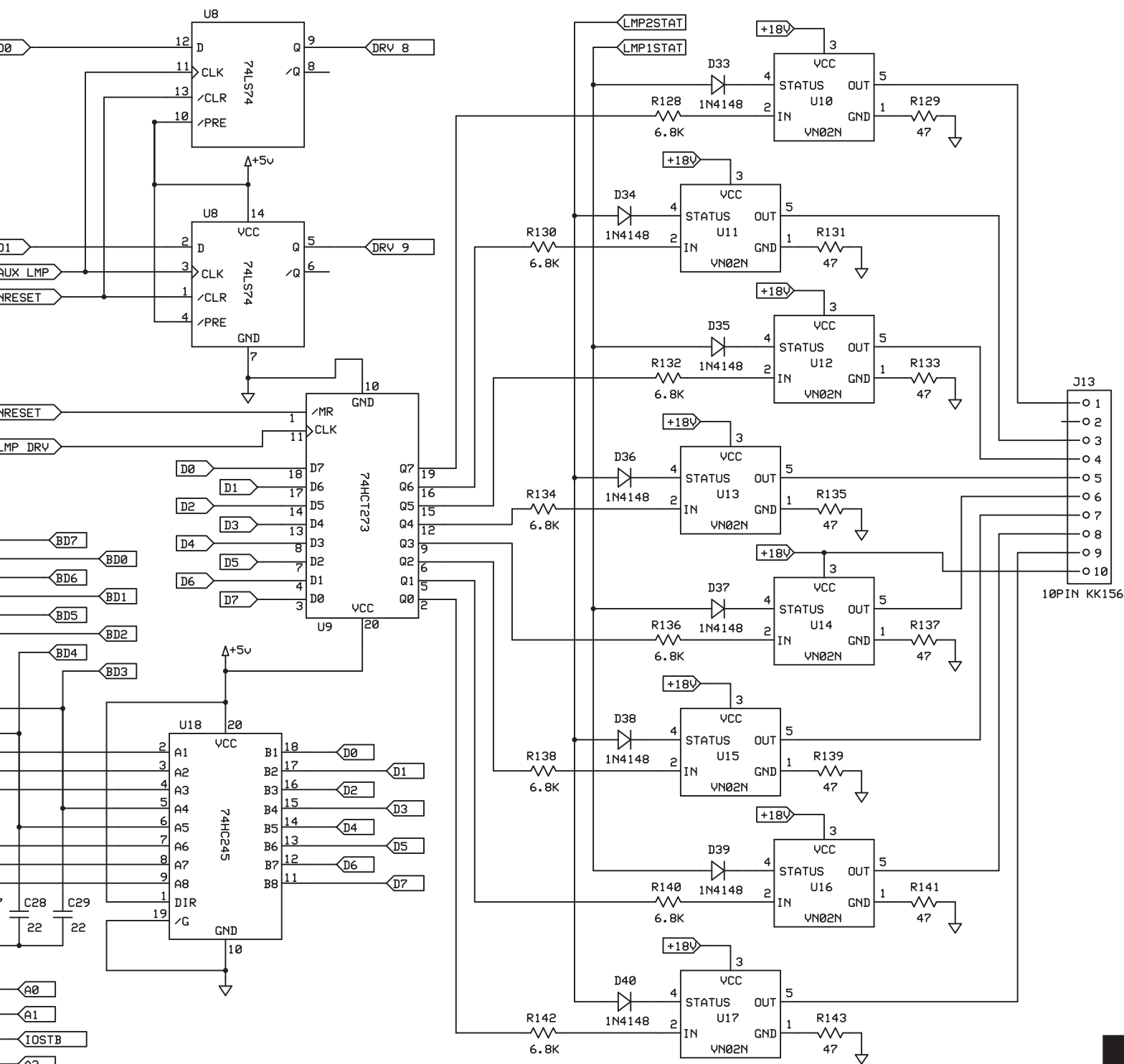






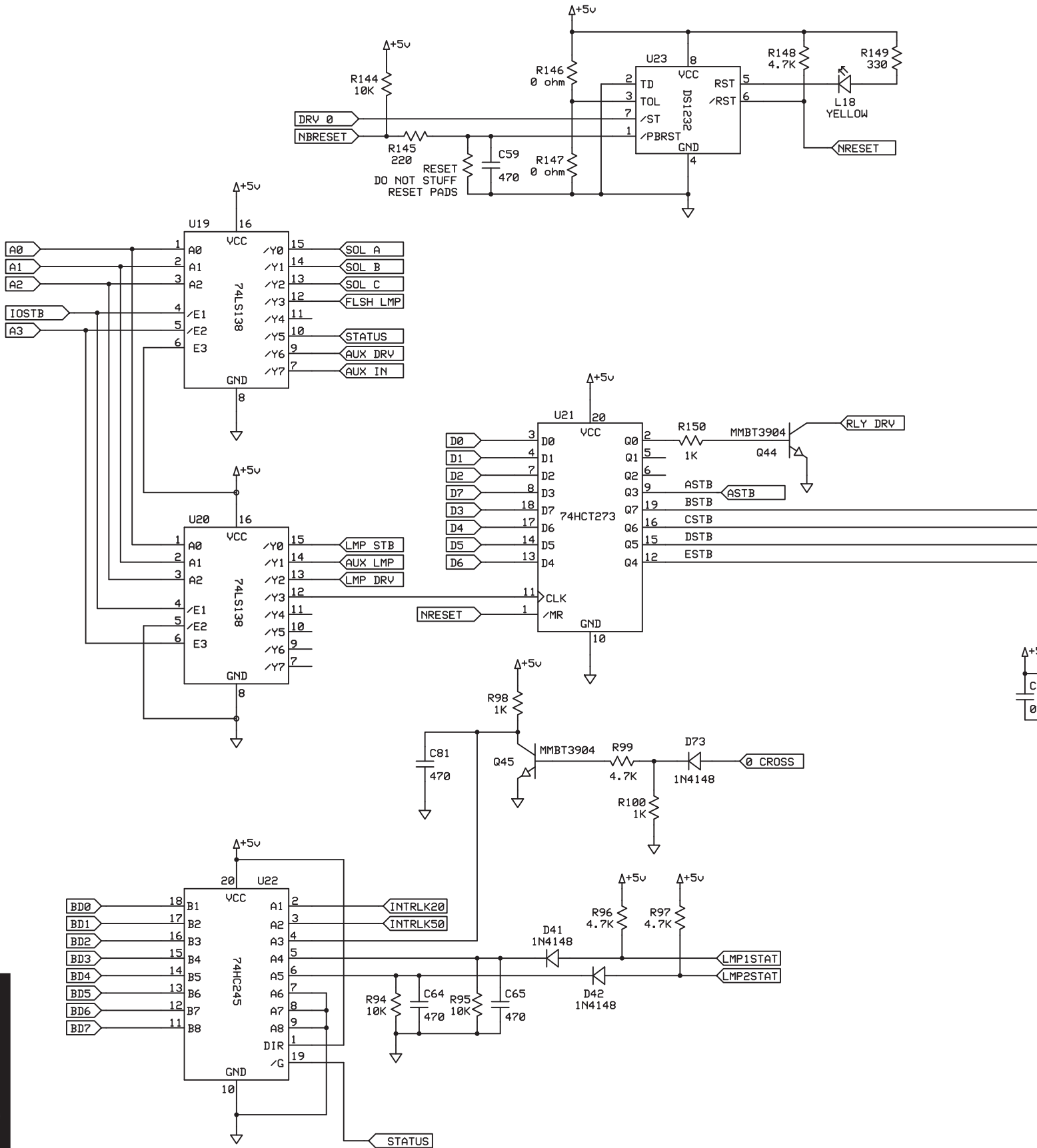
Sec. 5: PCBs





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<b>I/O POWER DRIVER BOARD</b>		
520-5249-00	Rev A 5/20/2005	Page 3 of 4

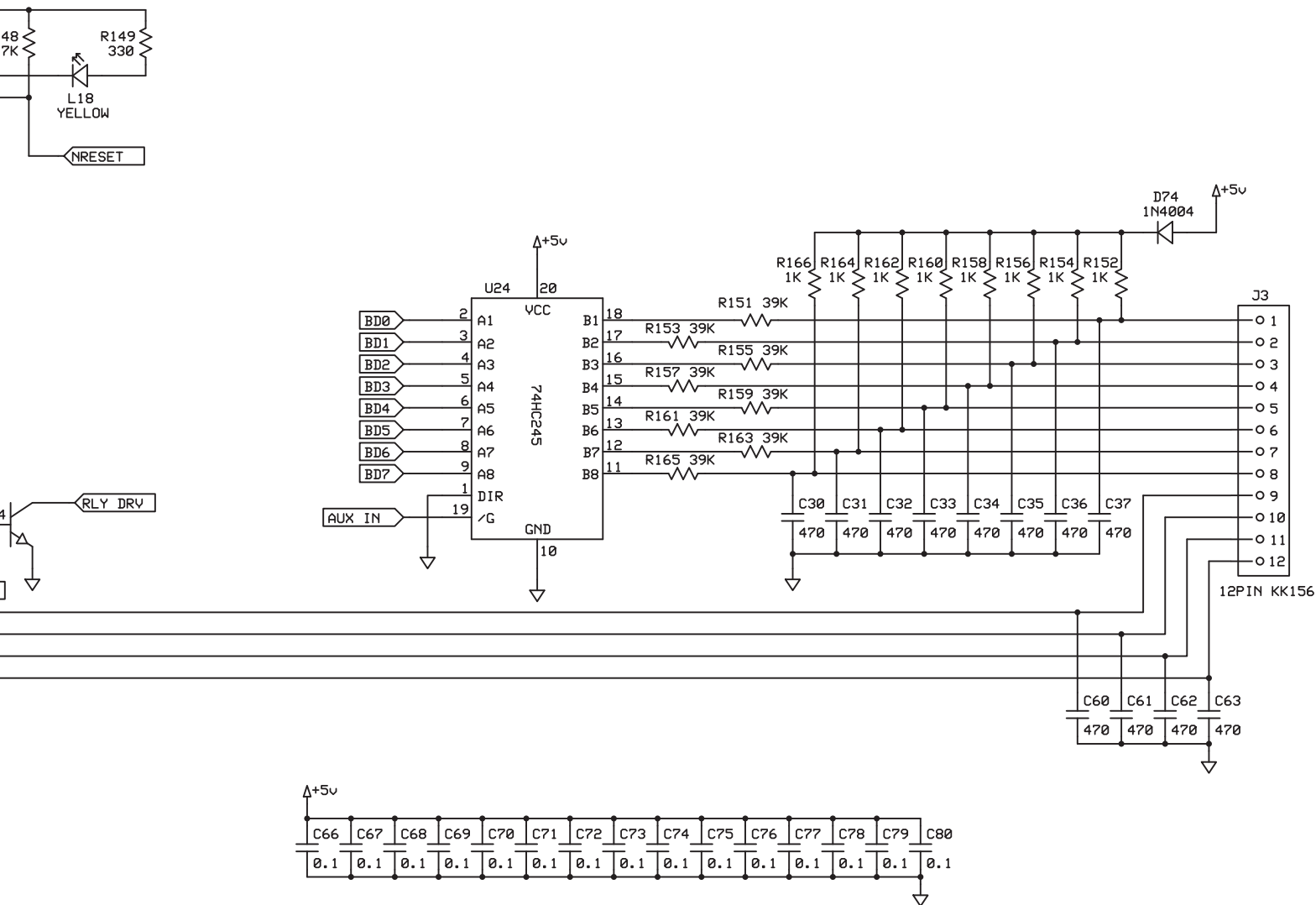
**Sec. 5: PCBs**



Sec. 5: PCBs





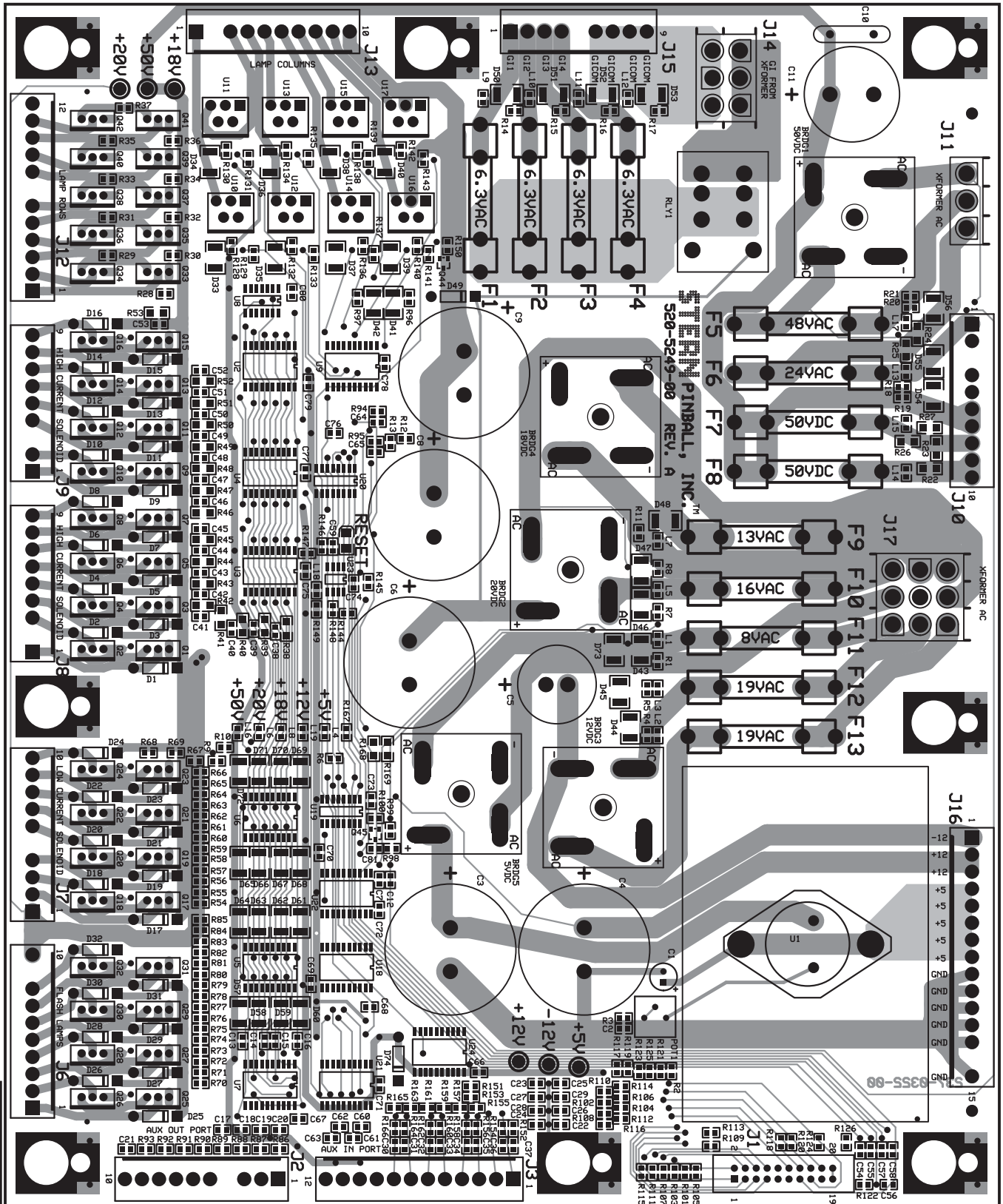


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<b>STERN PINBALL, INC.</b>		
<b>I/O POWER DRIVER BOARD</b>		
520-5249-00	Rev A 5/20/2005	Page 4 of 4

**Sec. 5: PCBs**

# I/O POWER DRIVER PCB S.A.M. System (520-5249-00) Component Layout



Sec. 5: PCBs



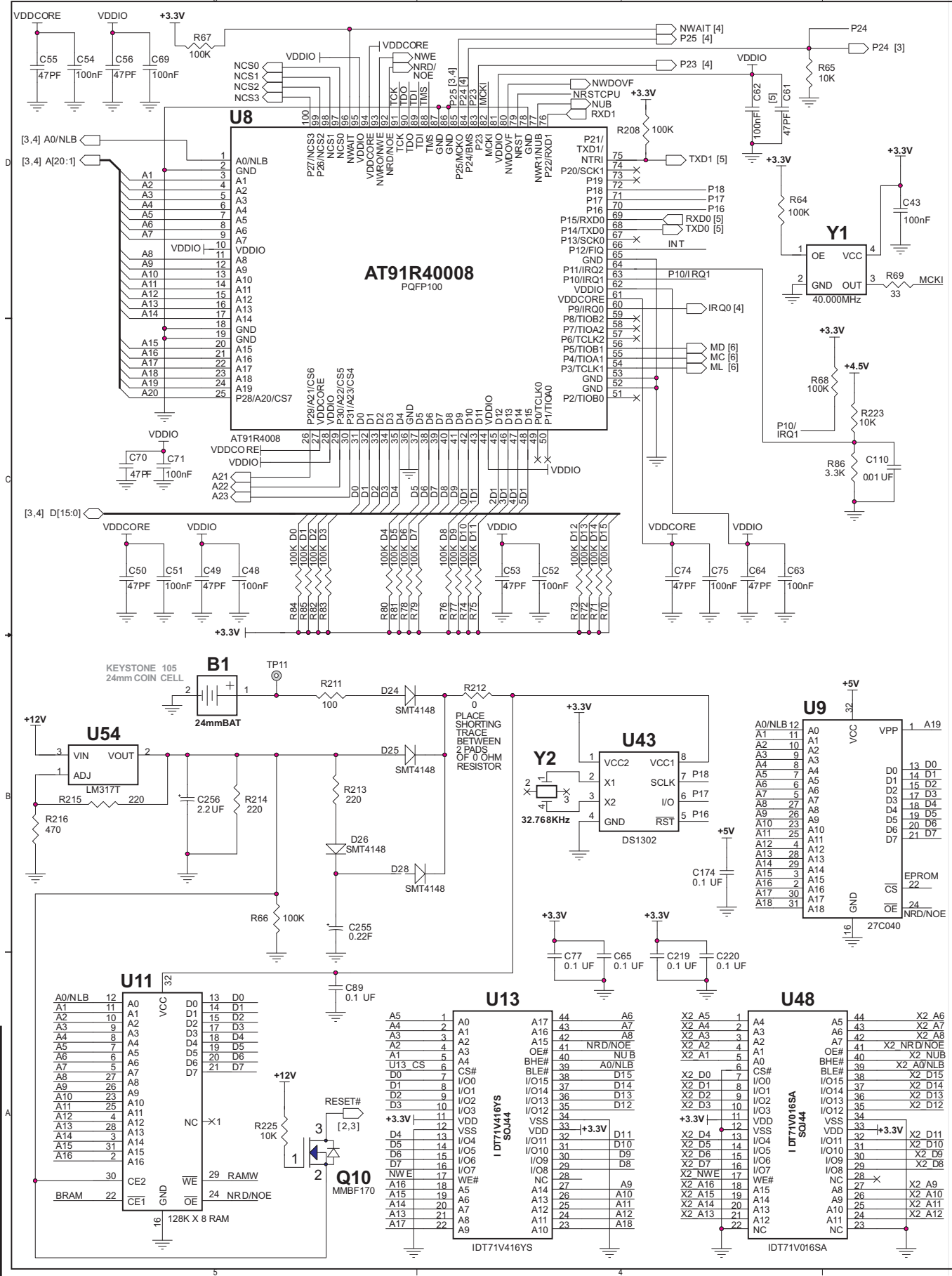
## I/O POWER DRIVER PCB S.A.M. System (520-5249-00) Parts

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

Sec. 5: PCBs



CPU / SOUND PCB S.A.M. System (520-5246-00) Schematic (Sheet 1 of 5)

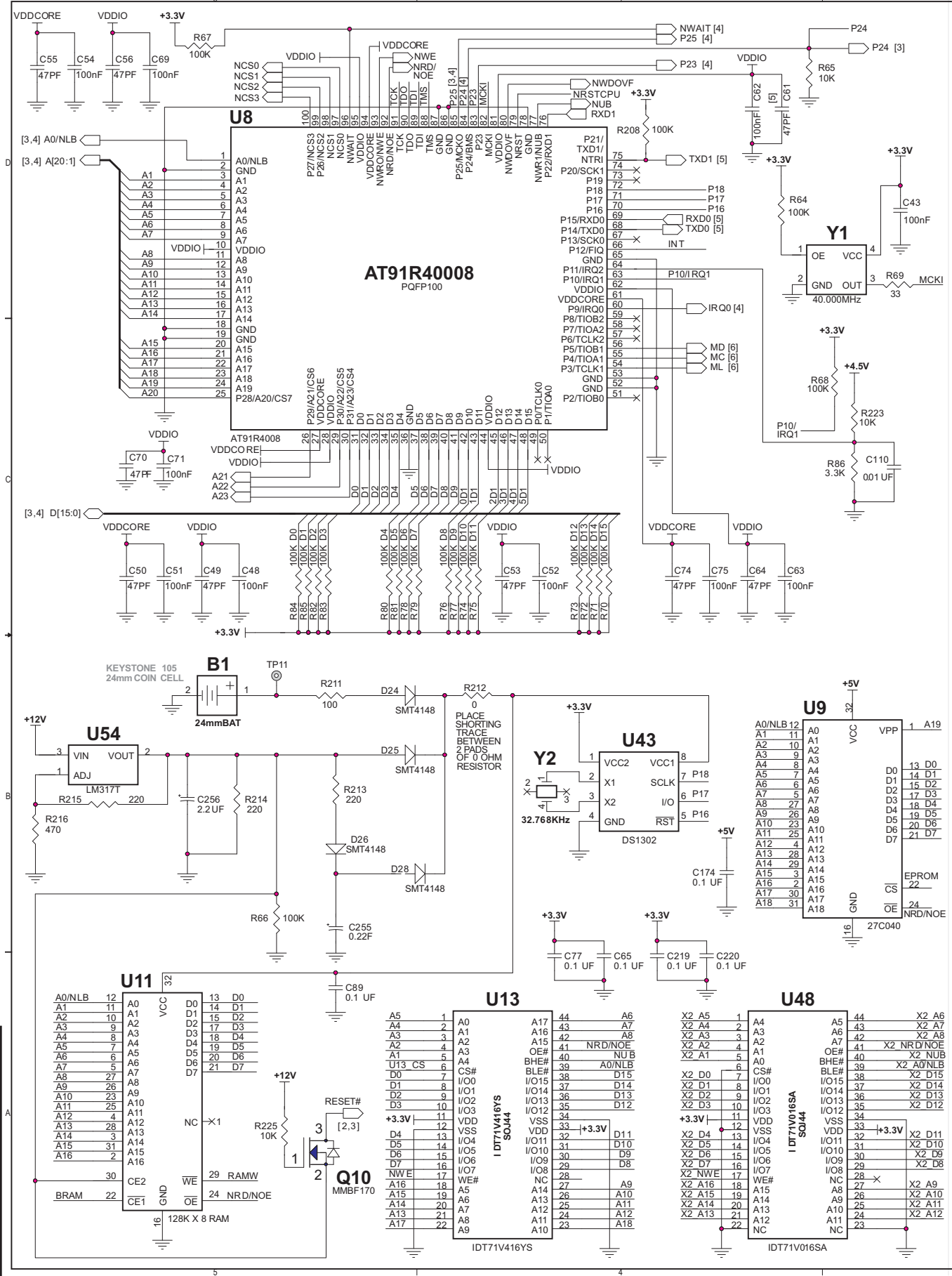


Sec. 5: PCBs





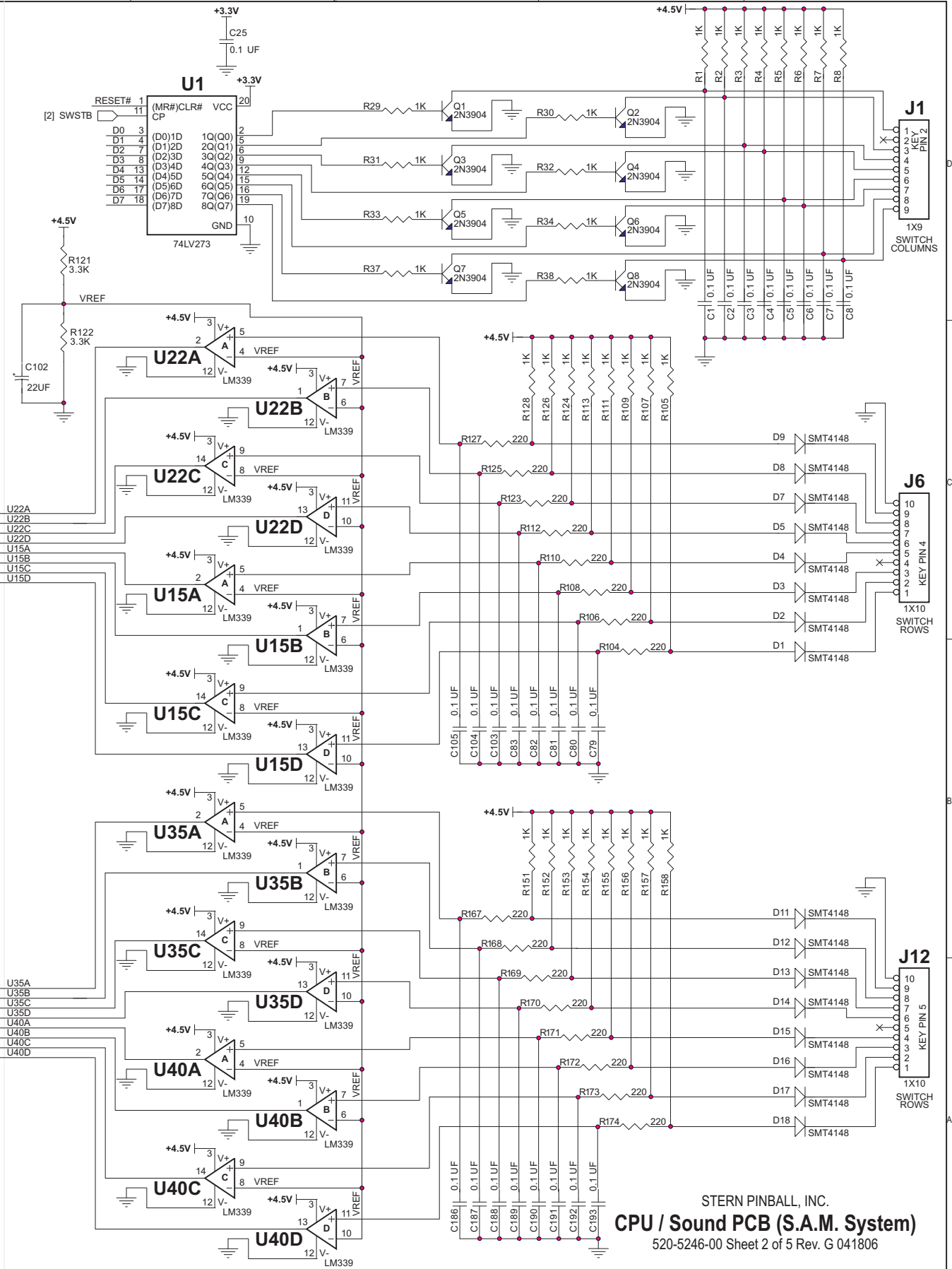
CPU / SOUND PCB S.A.M. System (520-5246-00) Schematic (Sheet 1 of 5)



Sec. 5: PCBs



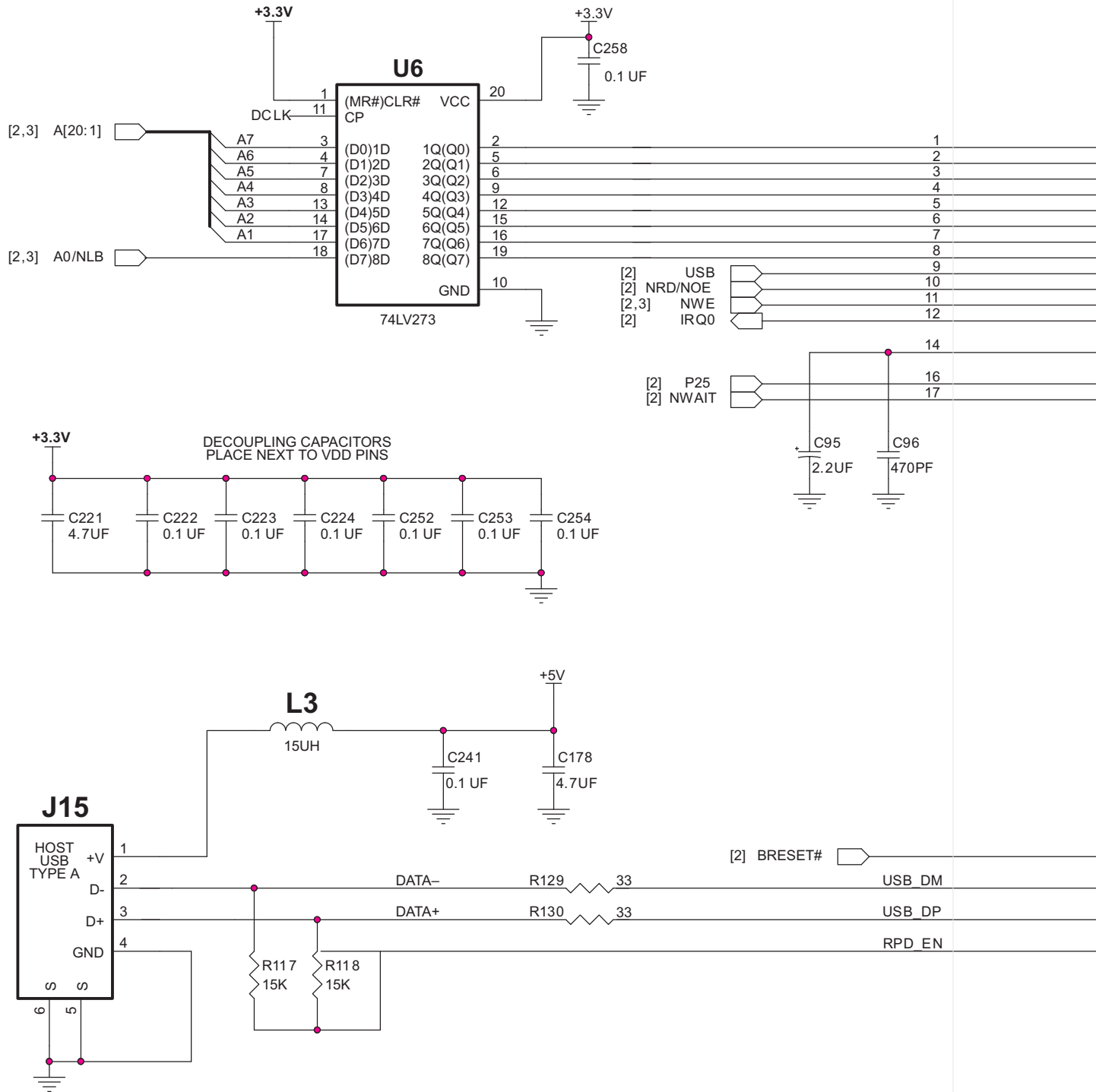


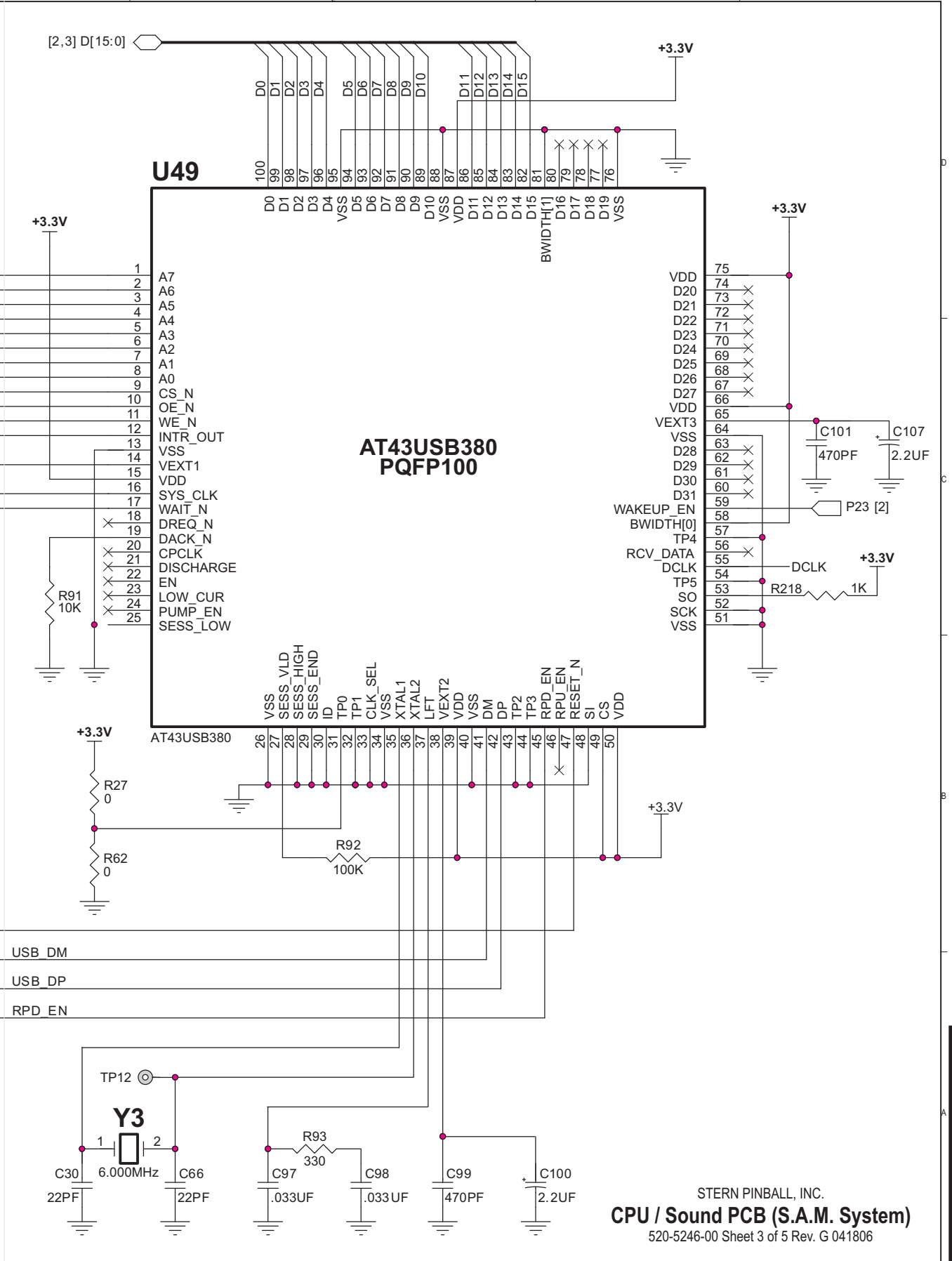


STERN PINBALL, INC.  
**CPU / Sound PCB (S.A.M. System)**  
 520-5246-00 Sheet 2 of 5 Rev. G 041806

Sec. 5: PCBs





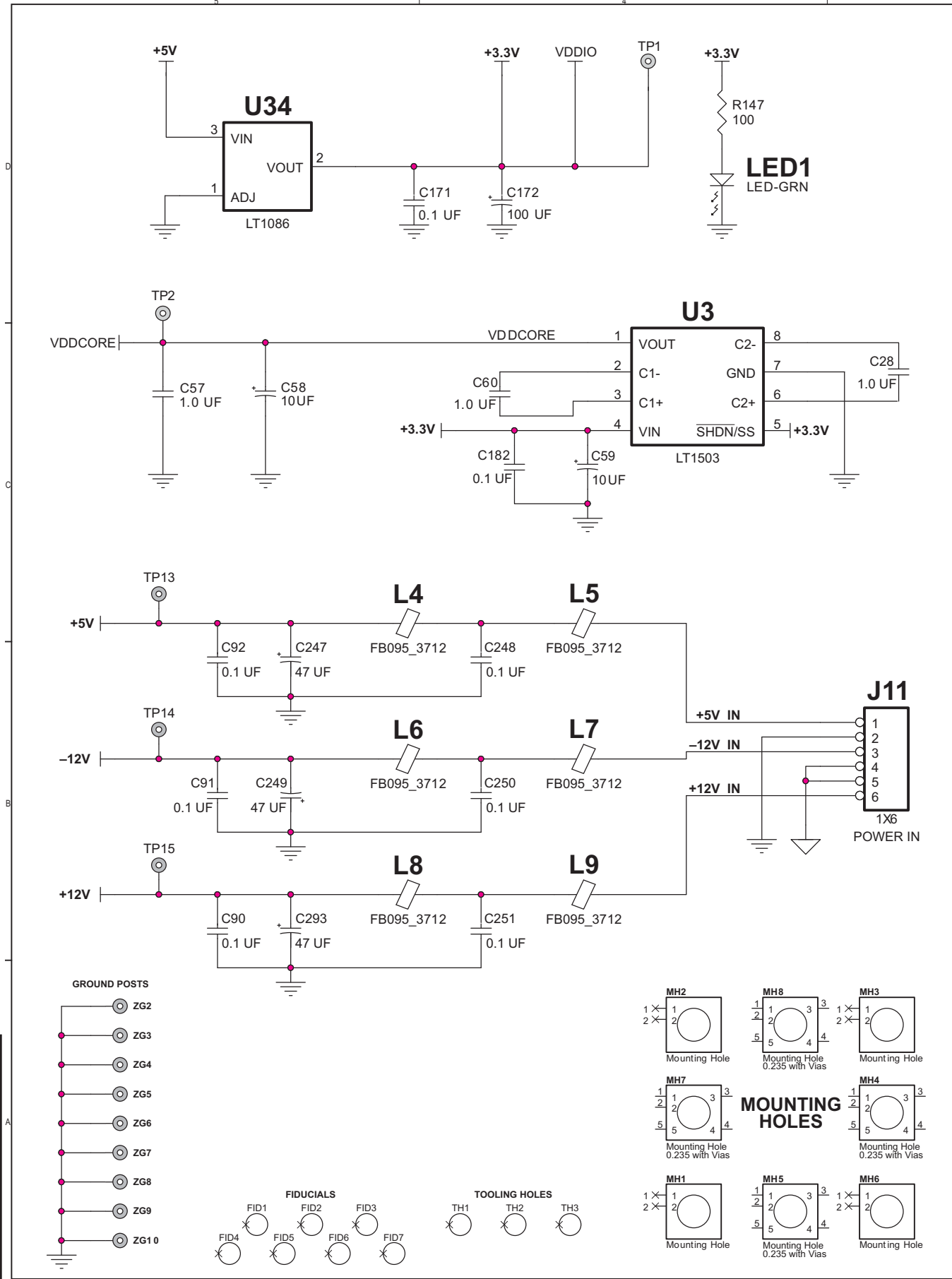


STERN PINBALL, INC.  
**CPU / Sound PCB (S.A.M. System)**  
 520-5246-00 Sheet 3 of 5 Rev. G 041806

Sec. 5: PCBs

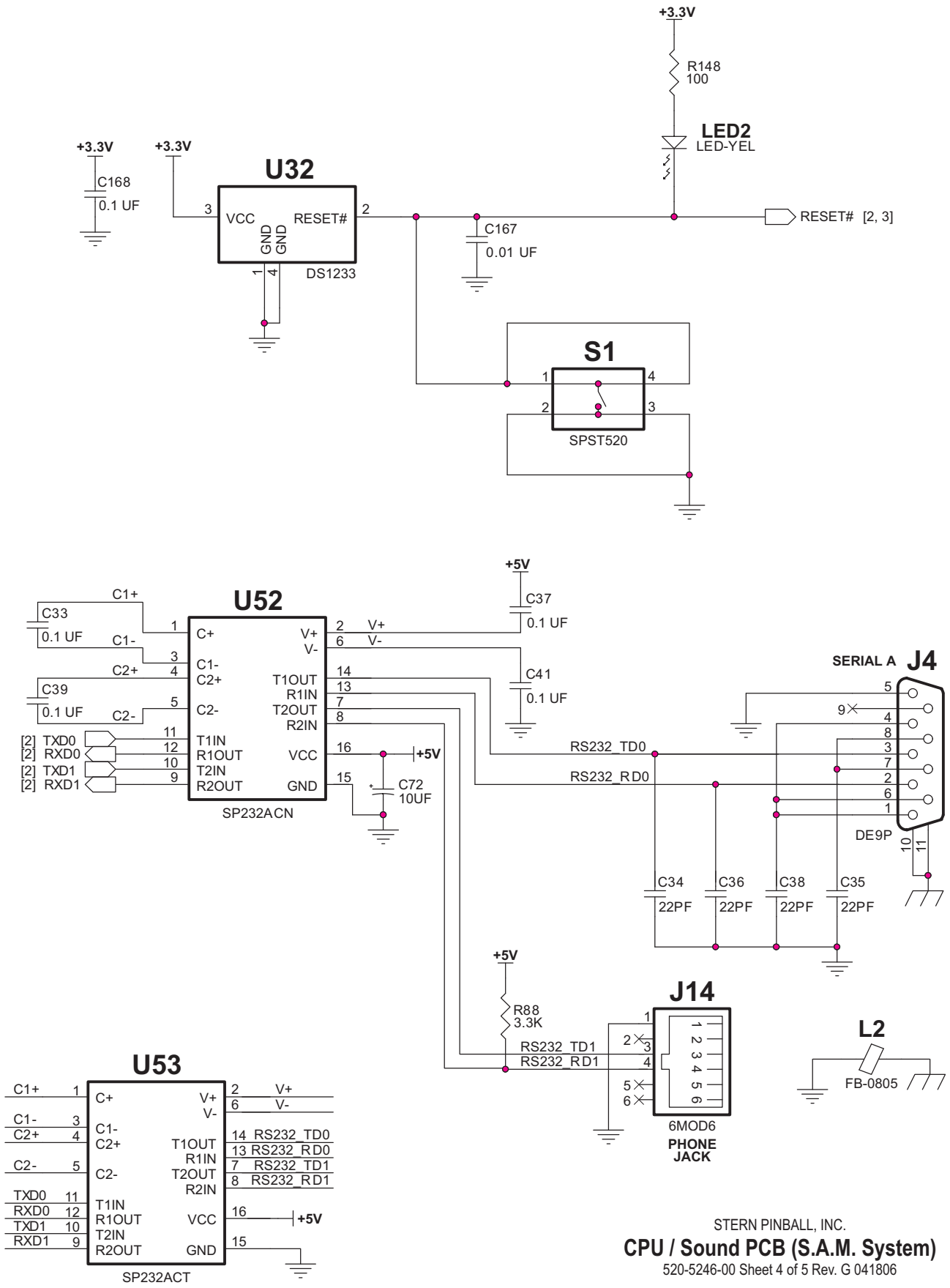






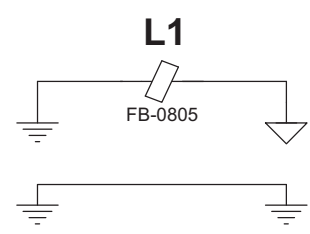
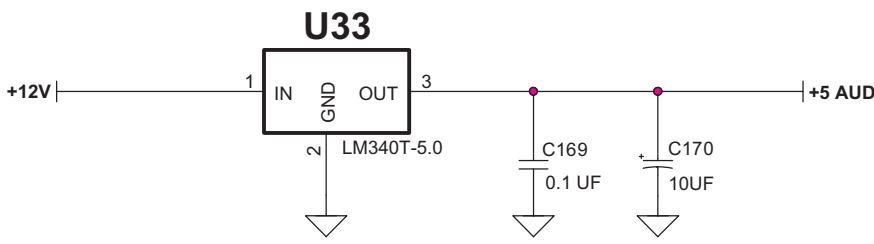
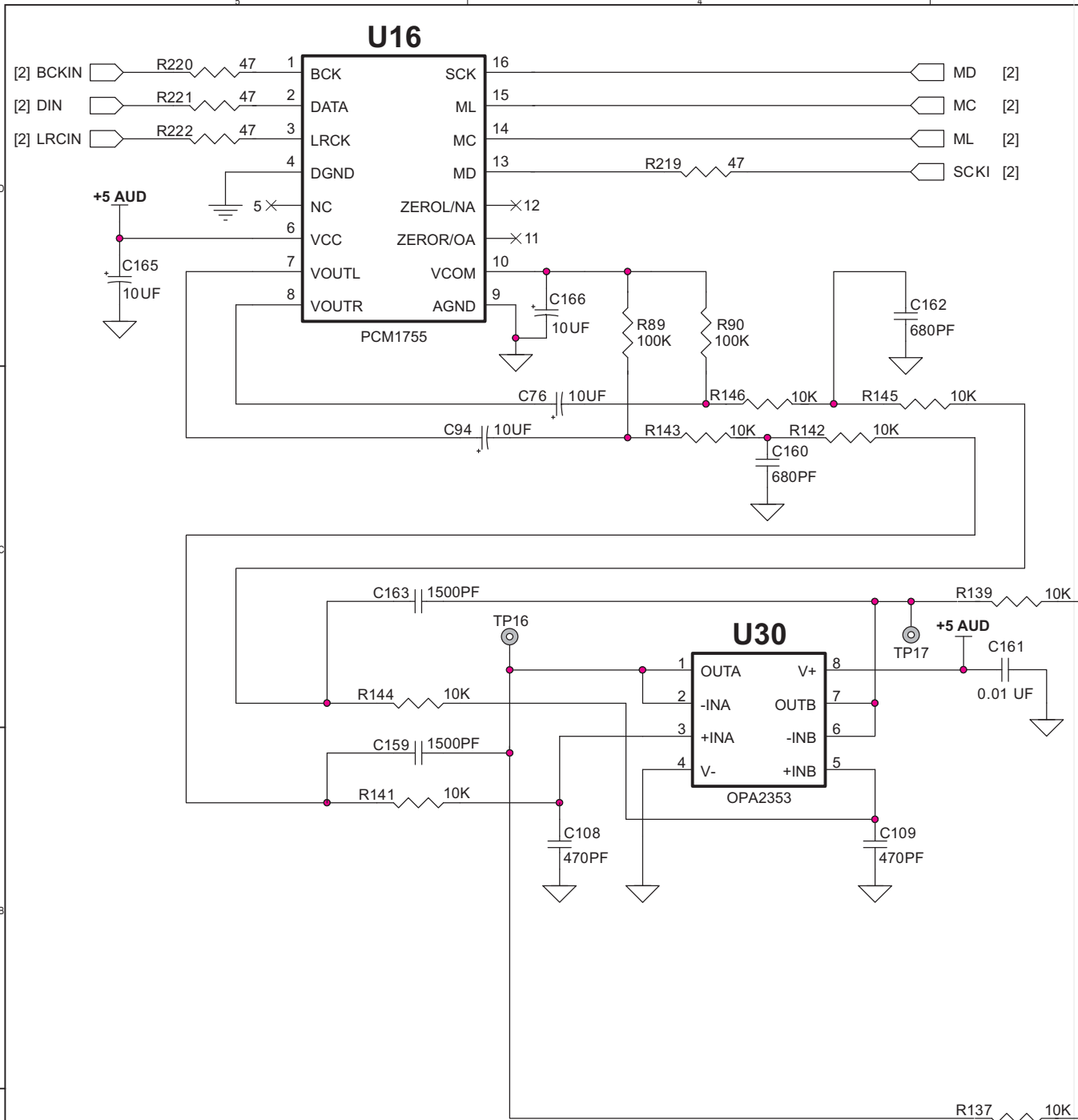
Sec. 5: PCBs





STERN PINBALL, INC.  
**CPU / Sound PCB (S.A.M. System)**  
 520-5246-00 Sheet 4 of 5 Rev. G 041806

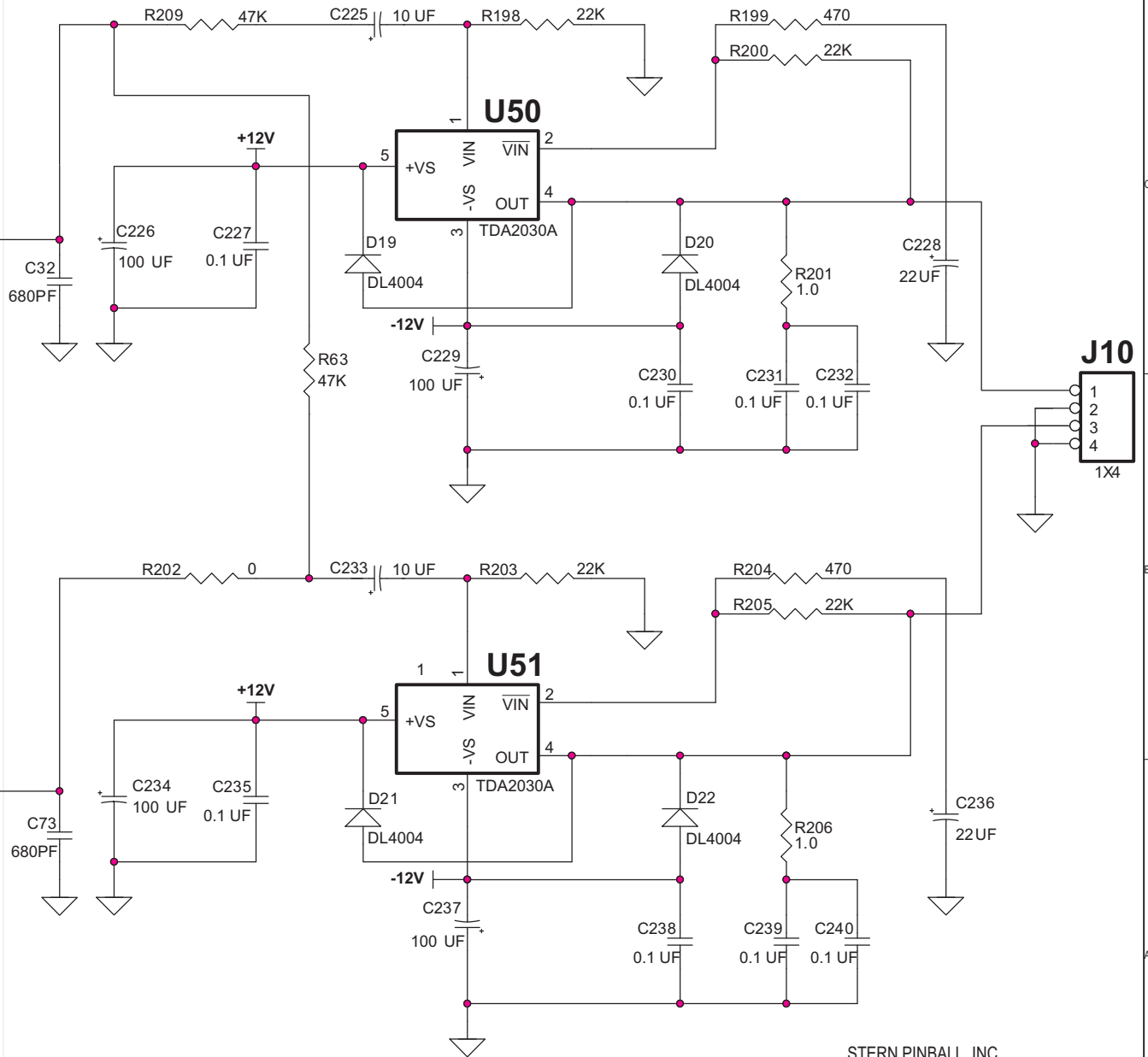
Sec. 5: PCBs



Sec. 5: PCBs



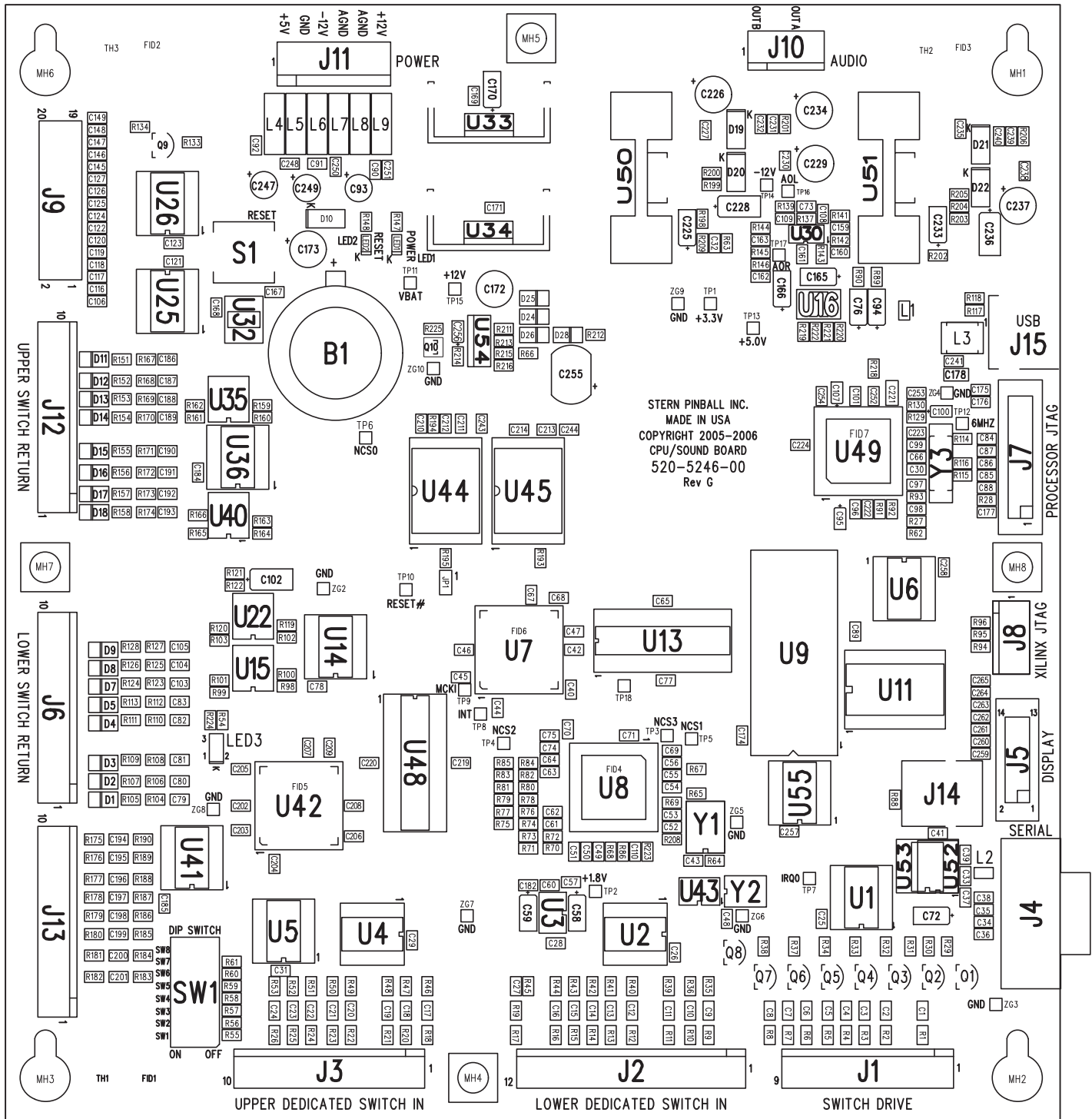




STERN PINBALL, INC.  
**CPU / Sound PCB (S.A.M. System)**  
 520-5246-00 Sheet 3 of 5 Rev. G 041806

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	<i>(includes Items 1-90)</i>
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)	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	Resistor SM 0805 Film 10KΩ 1/10W 5%
7	2	121-6021-00 (101-0001880)	R117, R118	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 Spst. 16 Pin X8 Slide 5VDC 100ma White Push-Button Reset Switch Spst. 4 Pin Momentary 24VDC 50ma
85	1	182-5001-00	(450-0004752)	S1	Heatsink All Vert Mount Ba TO-220 Heatsink All Vert Mount Ba TO-220 #4-40 X 3/8" PPH MS Sems (Zinc) Screw #4-40 Keps Nut 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)

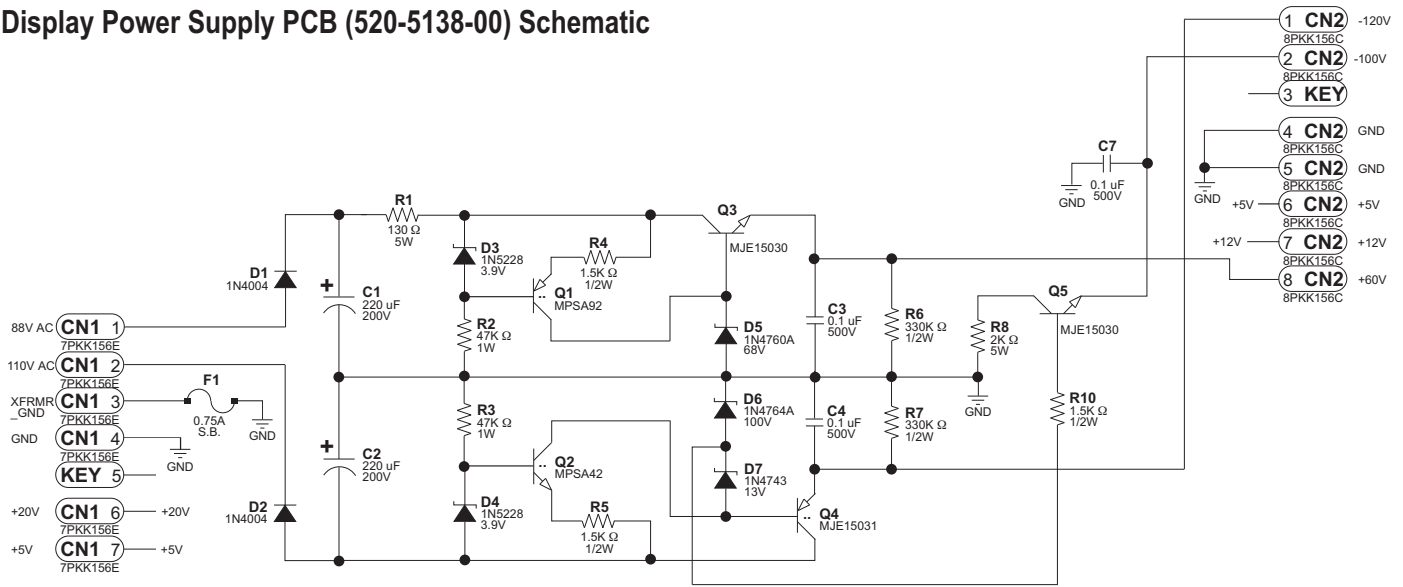
965-BOOT-SAM:  
(Latest Version Programmed)

Sec. 5: PCBs

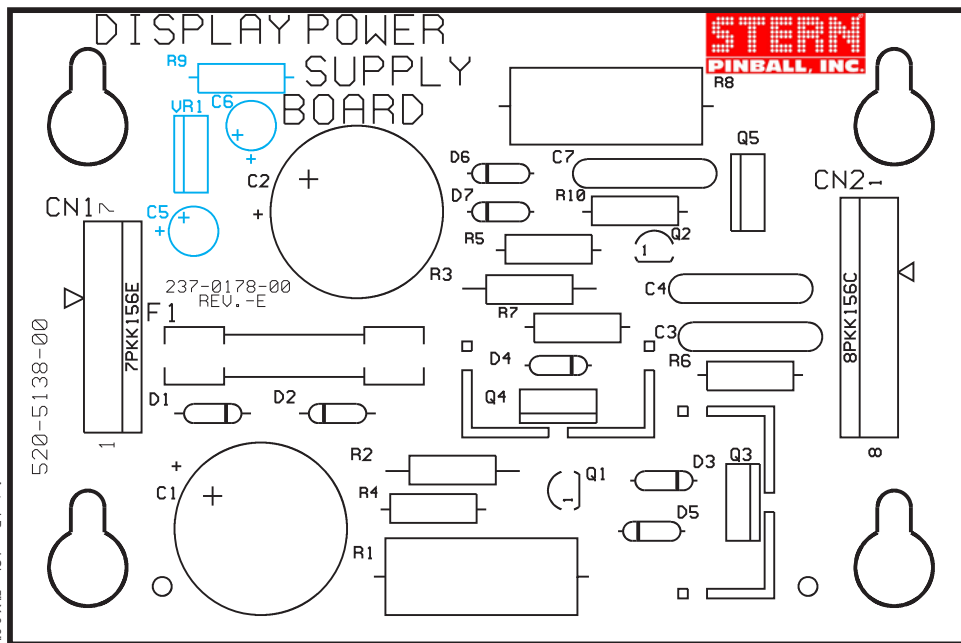




# Display Power Supply PCB (520-5138-00) Schematic



# Display Power Supply PCB (520-5138-00) Component Layout & Parts

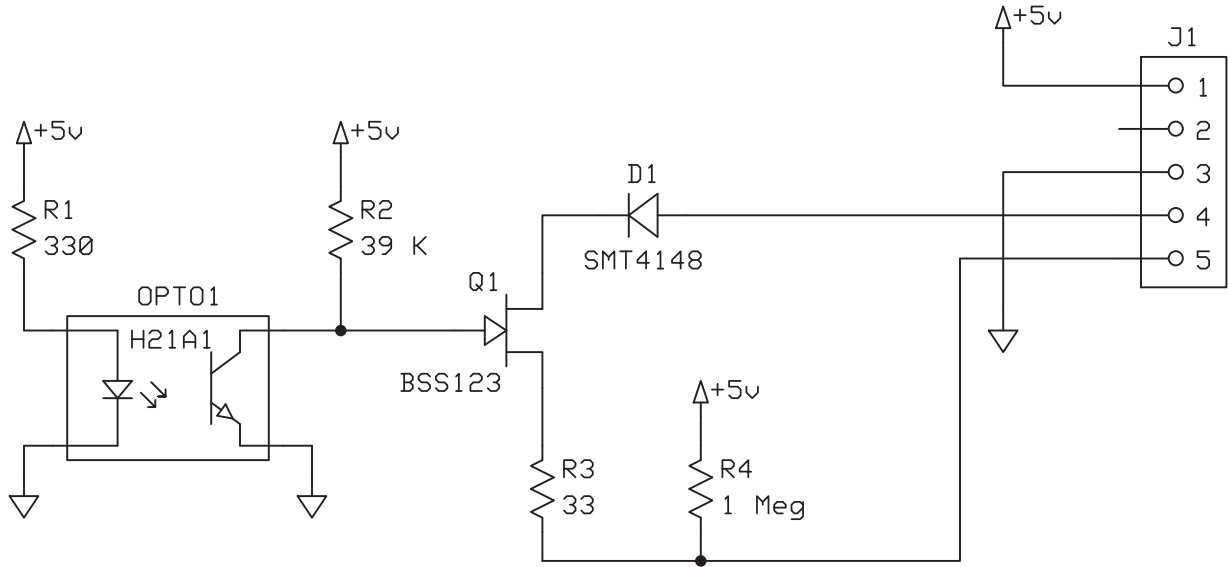


ITEM	QTY	PART NUMBER	REF-DESIGNATOR	DESCRIPTION (NS = Not Stuffed)
—	1	<b>520-5138-00</b>	<b>Display Power Supply PCB</b>	<i>(includes Items 1-2 + 4-24)</i>
1	2	125-5044-00	C1, C2	220uF, 200v, Radial Lytic Cap.
2	3	125-5035-00	C3, C4, C7	0.1uF, 500v, Ceramic Disk Cap.
3	0	125-5003-00	(C5, C6: NS)	22uF, 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

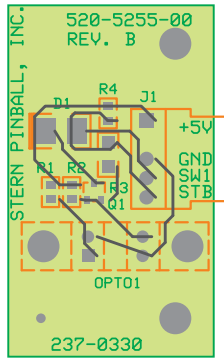


# In-Line OPTO PCB (520-5255-00) for 1-Bank Drop Target Module (515-7565-00) Schematic

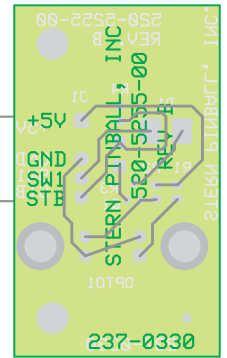


## In-Line OPTO PCB (520-5255-00) Component Layout & Parts

Connector Side



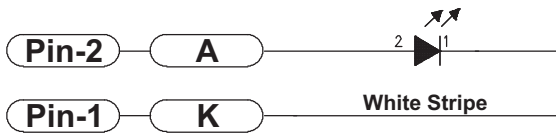
OPTO Side



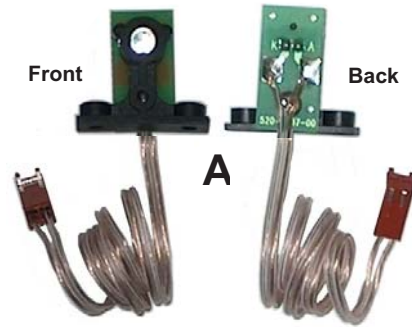
ITEM	QTY.	SPI PART NR.	(MFG. P.N.)	REF-DESIGNATOR	DESCRIPTION (SMT = Surface Mount)
—	1	<b>520-5255-00</b>	Ref. Only 237-0330	<b>In-Line OPTO PCB</b>	<b>Complete PCB Assembly</b>
1	1	121-6006-00	(101-0002012)	R1	Resistor SMT 0805, 330 Ω 1/10W 5%
2	1	121-6013-00	(101-0002035)	R2	Resistor SMT 0805, 39K 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



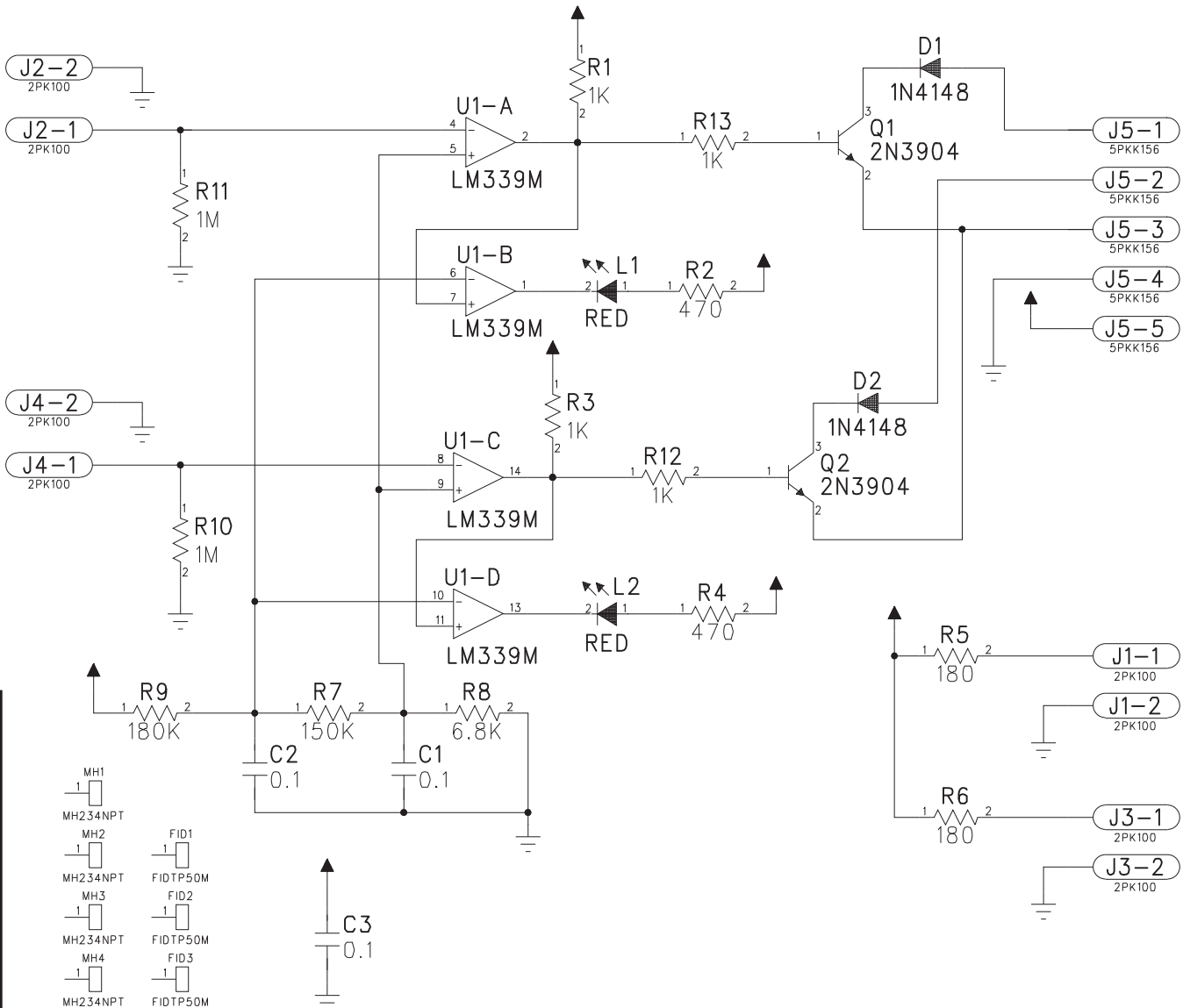
**Mini PCB  
OPTO 15" Lead  
(Black Bracket)  
500-6775-01**



## 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

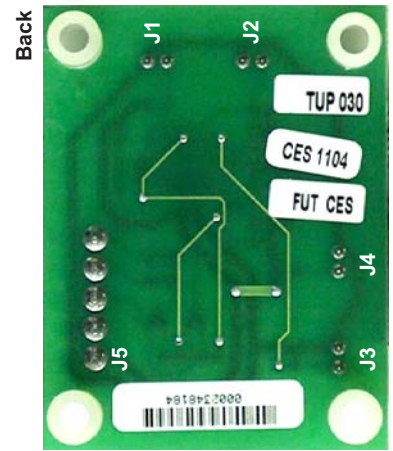
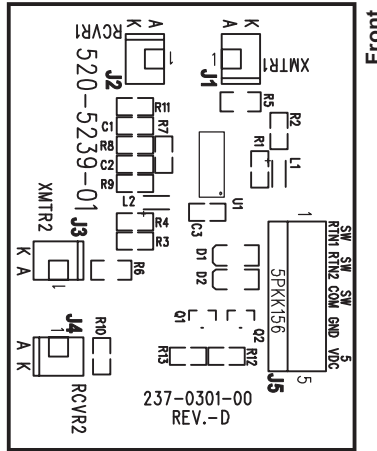
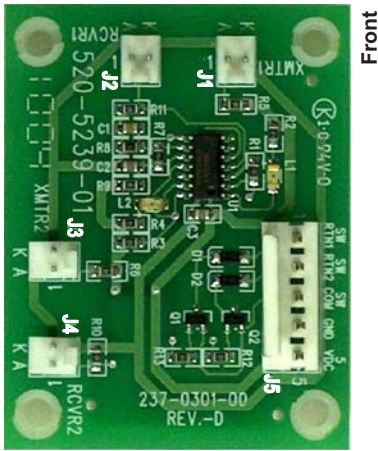
# Playfield OPTO Transmitter / Receiver Amplifier PCB (520-5239-01) Schematic





# Playfield OPTO Transmitter/Receiver Amplifier PCB (520-5239-01-ASY) Component Layout & Parts

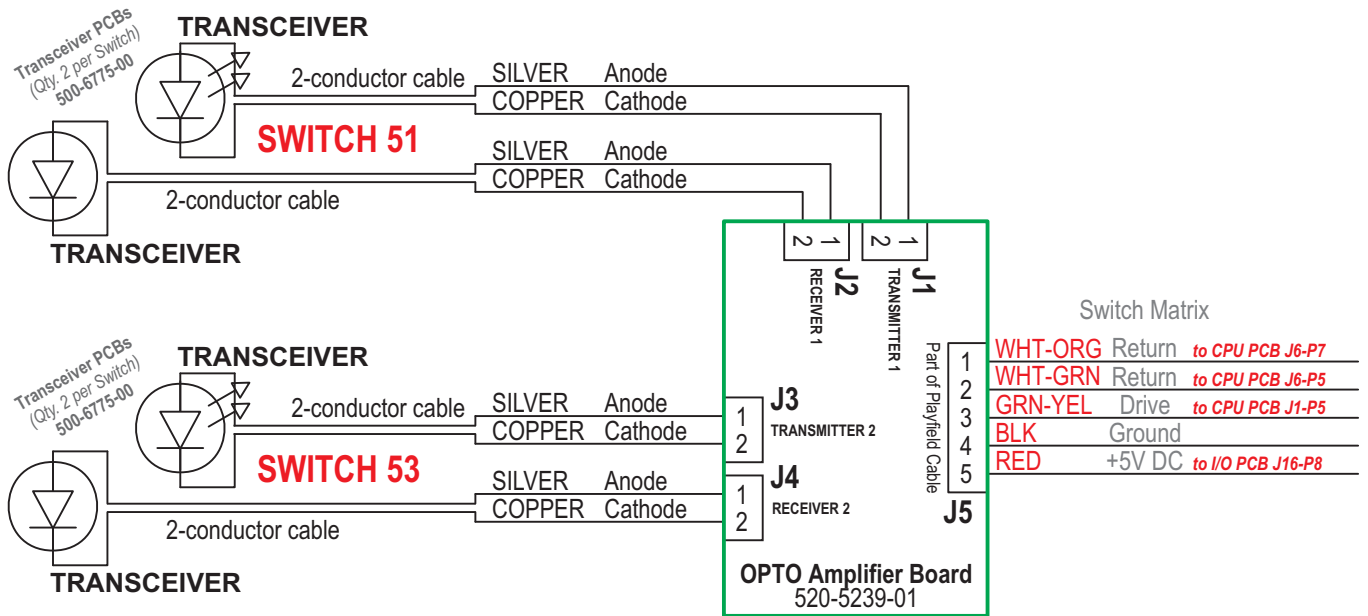
(for OPTO Switches 51 & 53)



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)
2	2		R7	Resistor SMT 805, 150K $\Omega$ 1/10W 5%
3	1		R5, R6	Resistor SMT 805, 180 $\Omega$ 1/10W 5%
4	4		R9	Resistor SMT 805, 180K $\Omega$ 1/10W 5%
5	4	<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, 1K $\Omega$ 1/10W 5%
6	2		R10, R11	Resistor SMT 805, 1M $\Omega$ 1/10W 5%
7	2		R2, R4	Resistor SMT 805, 470 $\Omega$ 1/10W 5%
8	1		R8	SResistor SMT 805, 6.8K $\Omega$ 1/10W 5%
9	3		C1, C2, C3	Cap.-SMT Cer. .1uF 50v 10% X7R
10	2		D1, D2	Diode, 1N4148W, 100v, 350MW
11	2		Q1, Q2	Transistor, MMST3904, NPN, 40v, .02A
12	1		U1	LM339M, Low Power Offset QUA
13	4	Mfg. 22-23-2021	J1, J2, J3, J4	Conn. 2-Pin, 0.1 Header (1 Row, VT, Tin)
14	1	Mfg. 640445-5	J5	Conn. 5-Pin, .156 Header (1 Row, VT, Tin)
15	2	Mfg. APT3216SURC	L1, L2	LEDD-SMT, Red 1206
	4	254-5007-02	corners	Spacer, 1/4" Sif. Rtn. (.153" ID X 9/32" OD X 3/8")

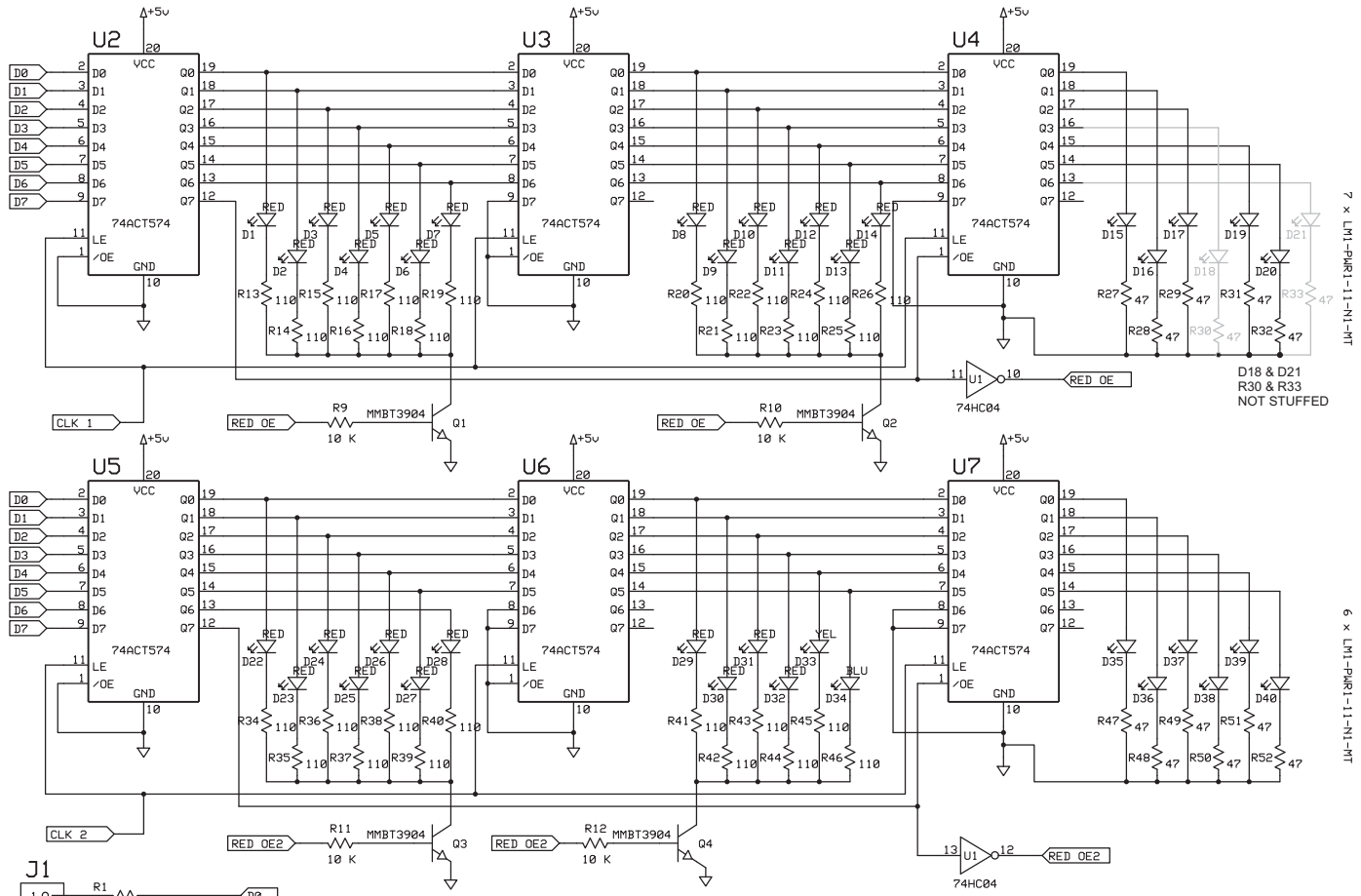
## Playfield OPTO Transmitter/Receiver Amplifier PCB (520-5239-01) Wiring (General)

(OPTO Switches 51 & 53)



Sec. 5: PCBs

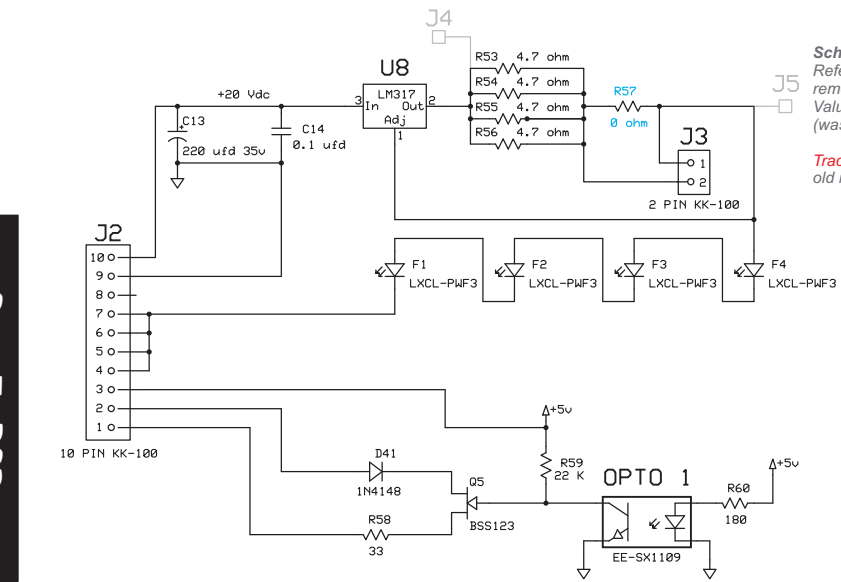
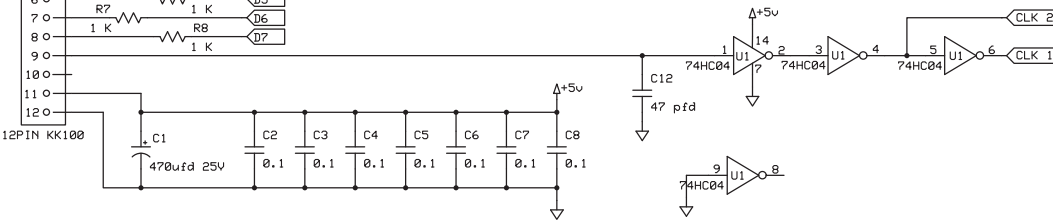
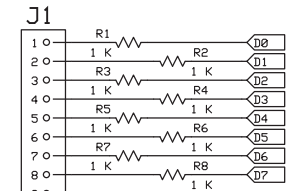
# Wheel LED & OPTO PCB (520-5283-00) Schematic



7 x LHT-PMR1-11-N1-N1-NT

6 x LHT-PMR1-11-N1-N1-NT

D18 & D21  
R30 & R33  
NOT STUFFED



**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).

## AUXILLARY OUTPUTS

STROBE DATA	BRN/WHT	GRN/WHT
ORG/BRN	WHEEL PCB DATA 0 B1	DISPLAY PCB DATA 0 C1
ORG/RED	WHEEL PCB DATA 1 B1	DISPLAY PCB DATA 1 C1
ORG/BLK	WHEEL PCB DATA 2 B2	DISPLAY PCB DATA 2 C2
ORG/YEL	WHEEL PCB DATA 3 B3	DISPLAY PCB DATA 3 C3
ORG/GRN	WHEEL PCB DATA 4 B4	DISPLAY PCB DATA 4 C4
ORG/BLU	WHEEL PCB DATA 5 B5	DISPLAY PCB DATA 5 C5
ORG/IVO	WHEEL PCB DATA 6 B6	DISPLAY PCB DATA 6 C6
ORG/GRY	WHEEL PCB DATA 7 B7	DISPLAY PCB DATA 7 C7

Sec. 5: PCBs

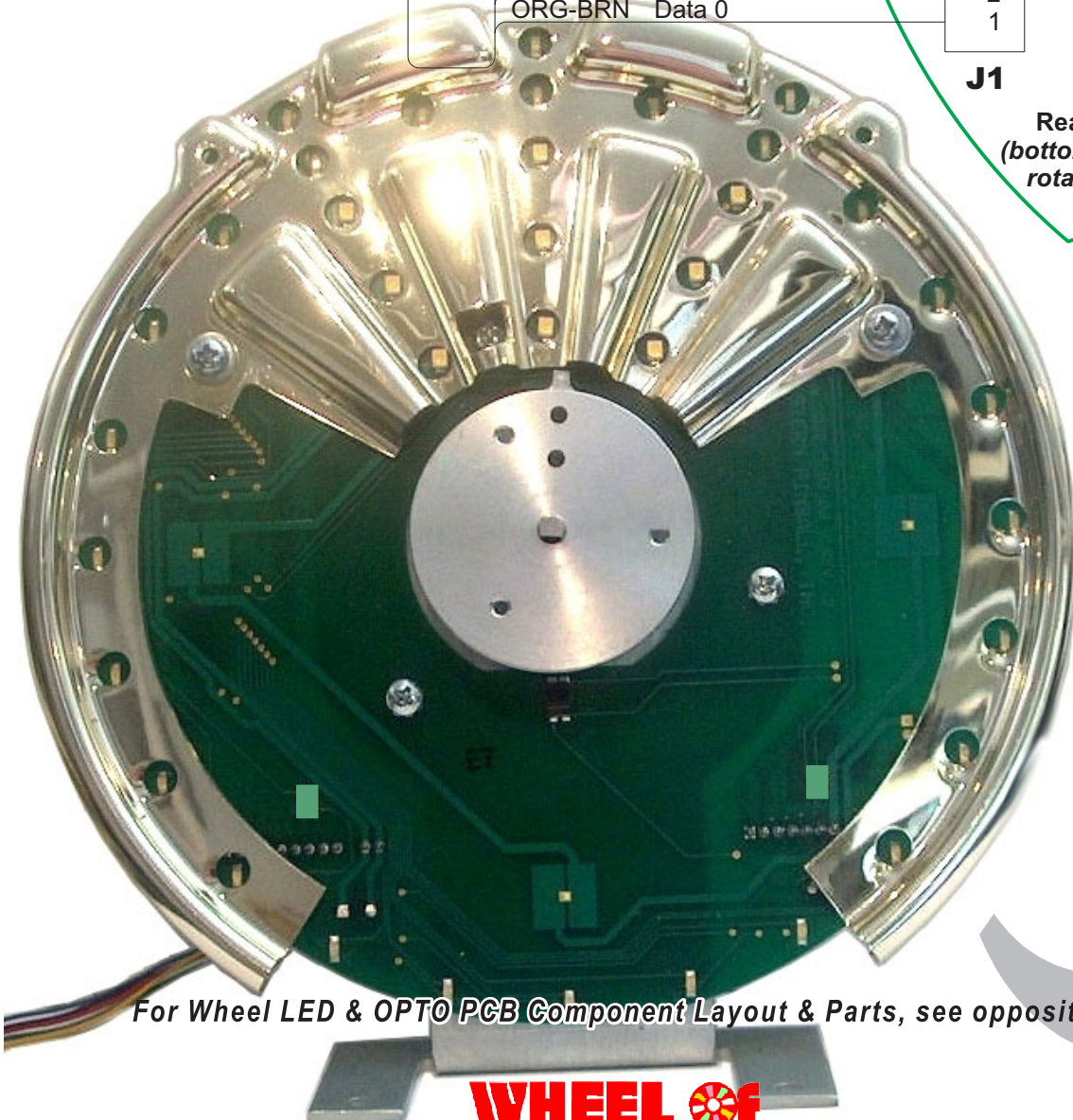
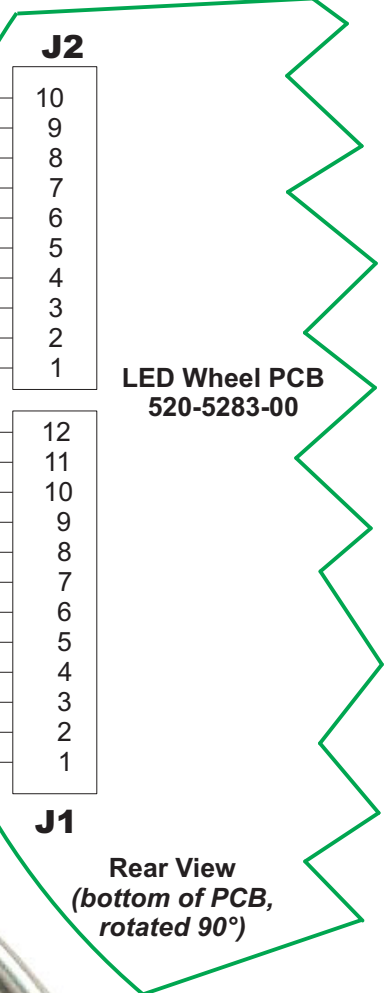


# Wheel LED & OPTO PCB (520-5283-00) Wiring

Connects to Coil cable	1	ORG	+18V DC
	2	BLK-BRN	Coil Drive 25
Connects to 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 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

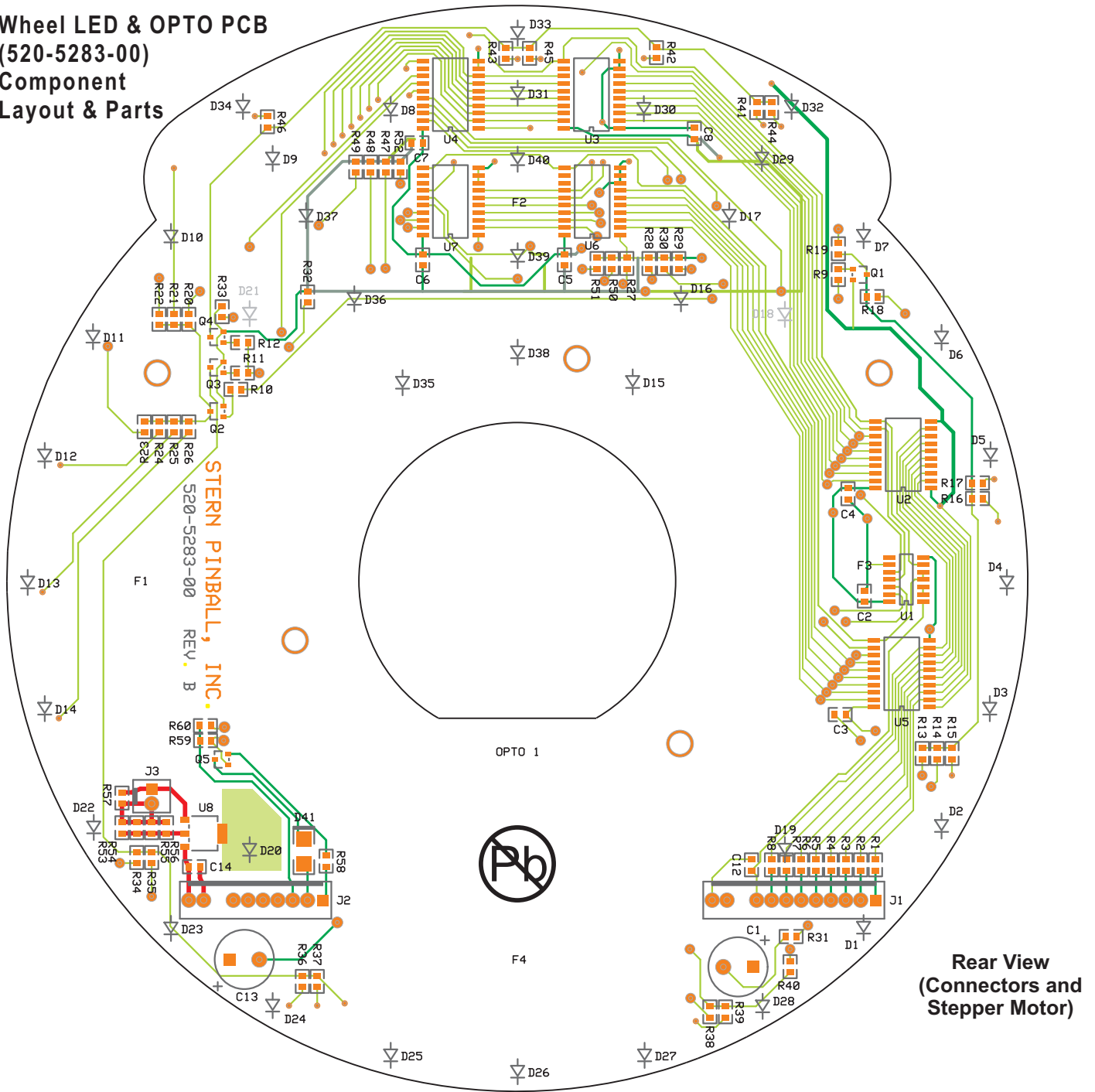
ORG	+18V DC
BLK	Ground
	KEY
BLK-BRN	Coil Drive 25
BLK-BRN	Coil Drive 25
BLK-BRN	Coil Drive 25
BLK-BRN	Coil Drive 25
RED	+5V DC
TAN-VIO	Switch +
GRN-ORG	Switch -
BLK	Ground
RED	+5V DC
	KEY
BRN WHT	Clock 2
ORG-GRY	Data 7
ORG-VIO	Data 6
ORG-BLU	Data 5
ORG-GRN	Data 4
ORG-YEL	Data 3
ORG-BLK	Data 2
ORG-RED	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, R20, R21, R22, R23, R24, R25, R26, R34, R35, R36, R37, R38, R39, R40, 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, 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

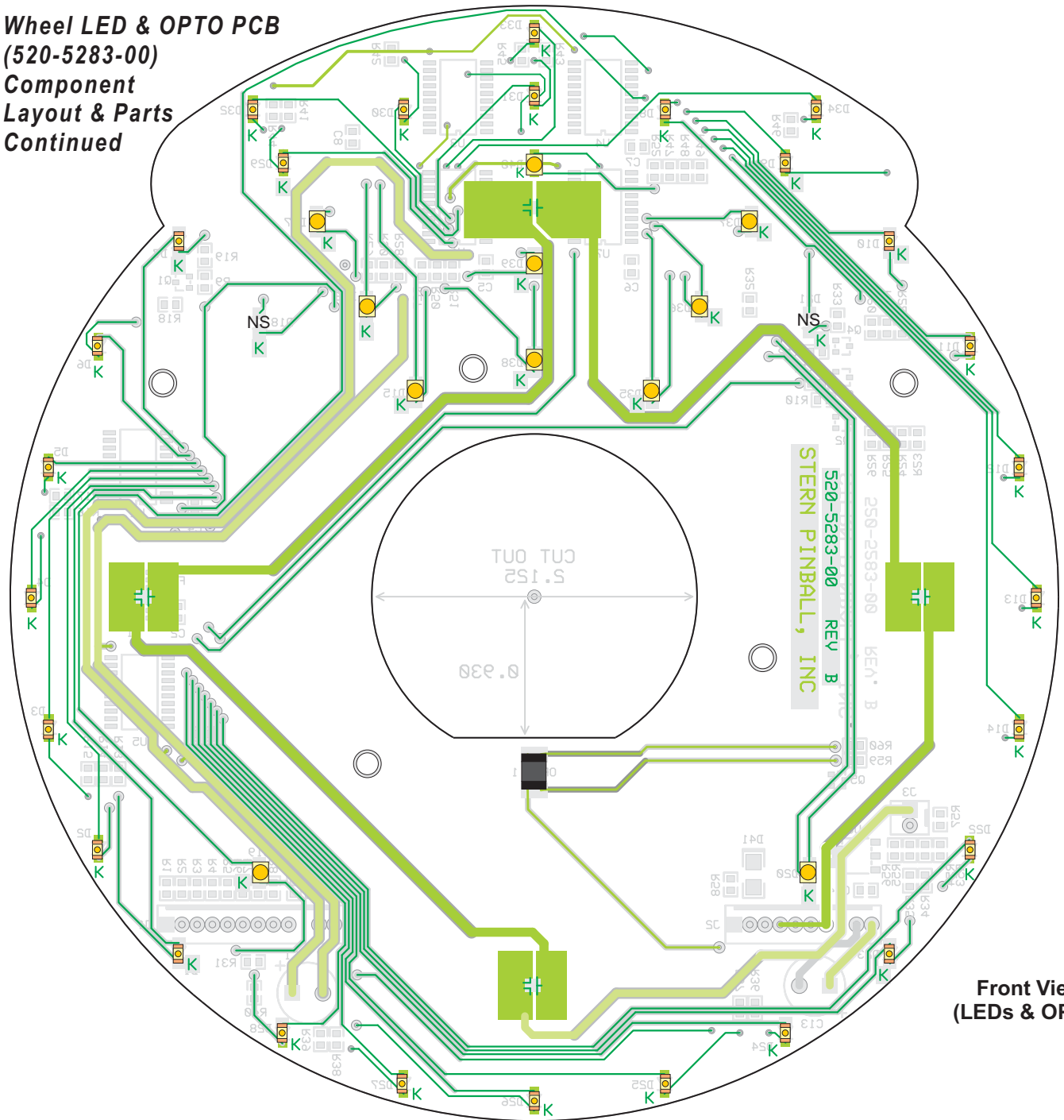
If a part is required where a part number is not provided, call Technical Support (see back of cover).

**Parts List Continued Next Page.**

**Sec. 5: PCBs**



**Wheel LED & OPTO PCB  
(520-5283-00)  
Component  
Layout & Parts  
Continued**

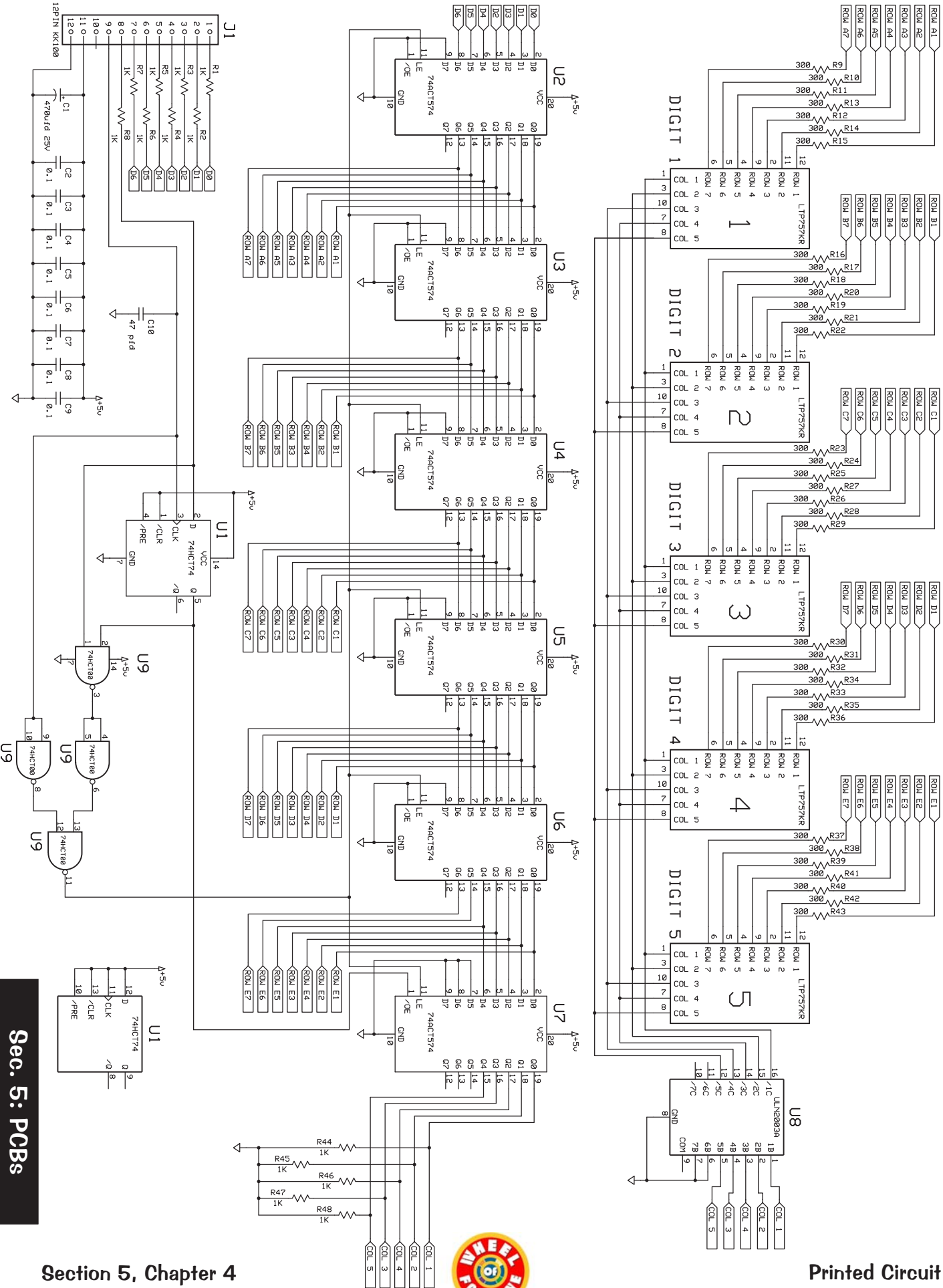


**Front View  
(LEDs & OPTO)**

ITEM	QTY.	SPI PART NR.	(MFG. P.N.)	REF-DESIGNATOR	DESCRIPTION (SMT = Surface Mount)
<<< 1-14					
15	4	<b>520-5283-00</b>		<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, D10, D11, D12, D13, D14, D22, D23, D24, D25, D26, D27, D28, D29, D30, D31, D32, D33	LEDD-SMT Red, 1206, Top
23	1		(425-0010706)	D34	LEDD-SMT Ultrabright Yellow, 1206
24	1		(425-0010805)	D36	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, 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

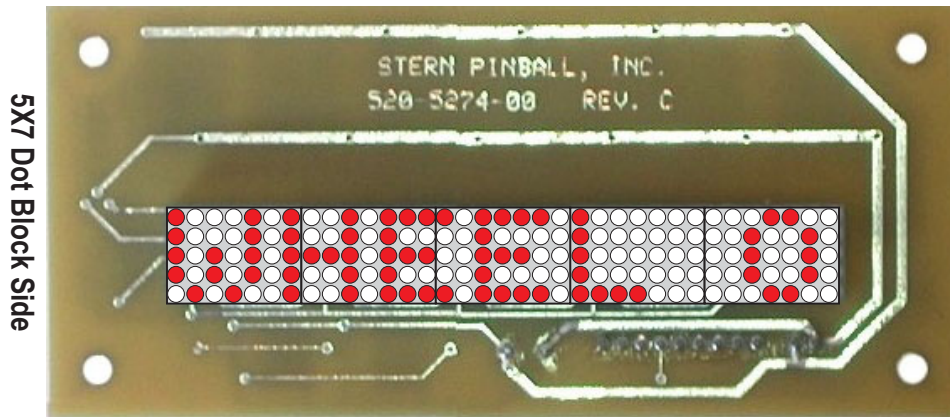
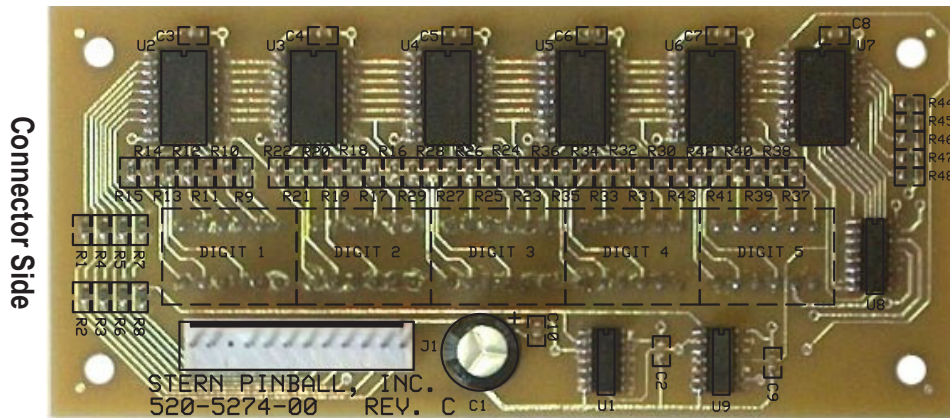
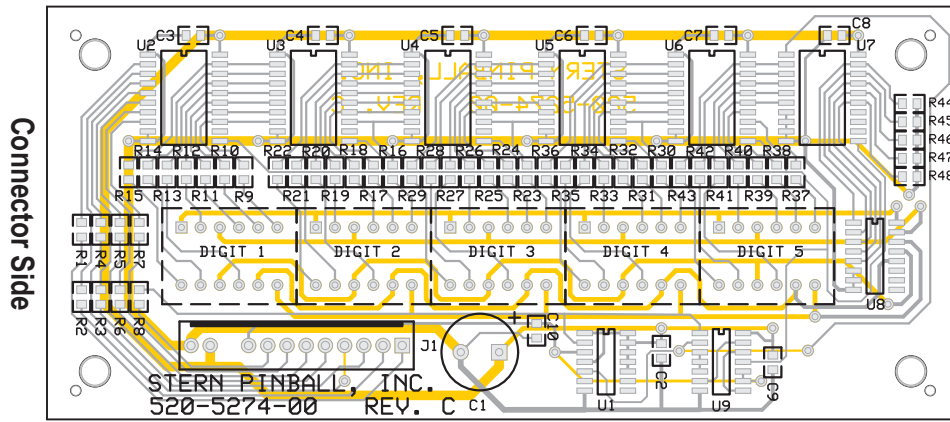


Sec. 5: PCBs





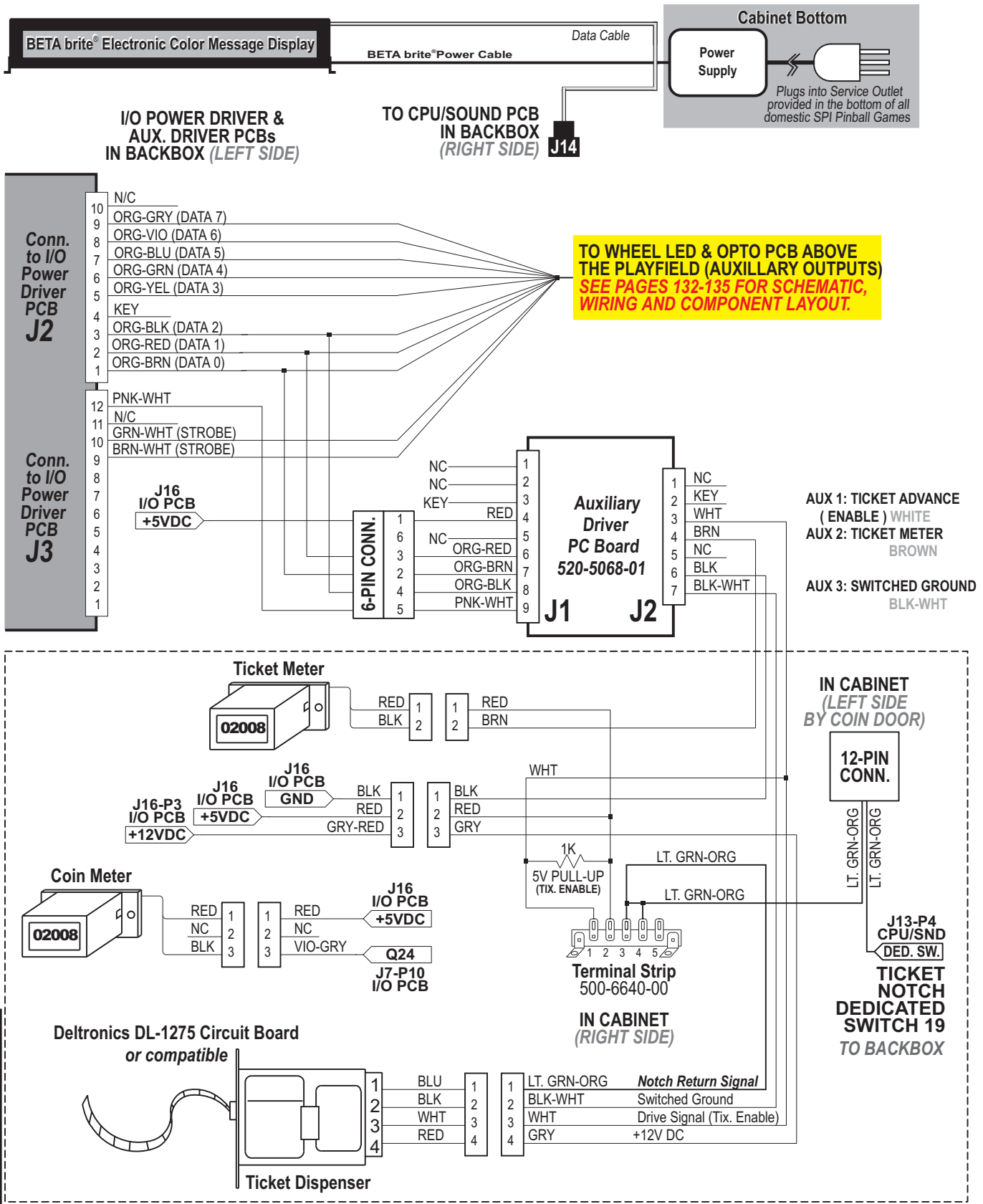
# Playfield Mini-Dot Display (5X7) X5 PCB (520-5274-00) Component Layout & Parts



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).

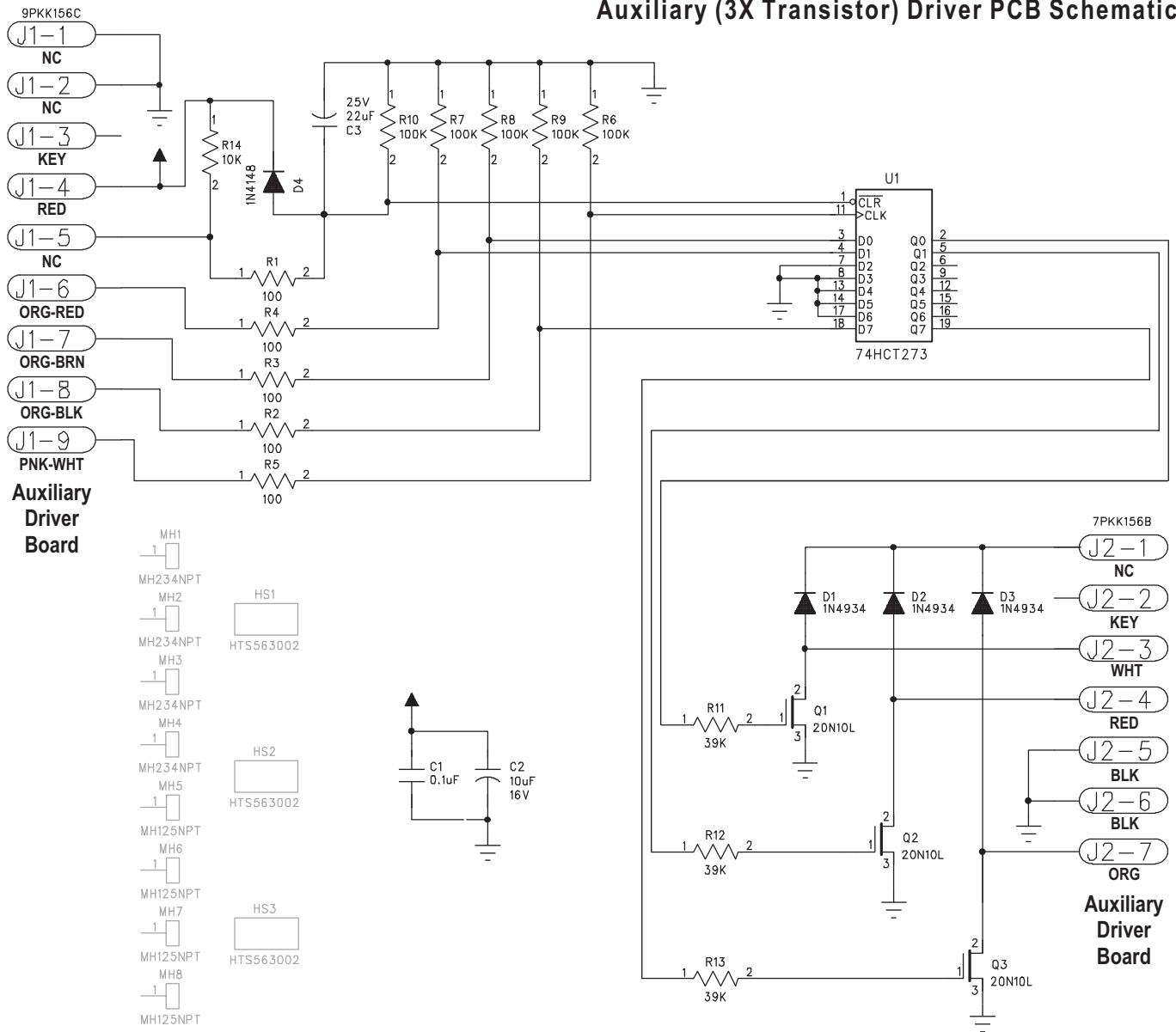
# Auxiliary (3X Transistor) Driver PCB (in Backbox) with the Coin/Ticket Meter and Ticket Dispenser Wiring Diagram



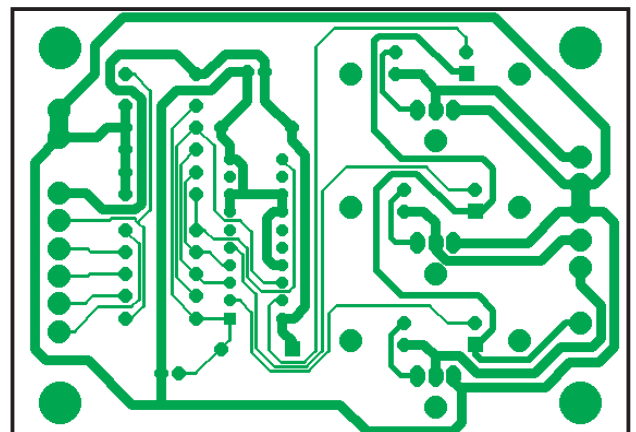
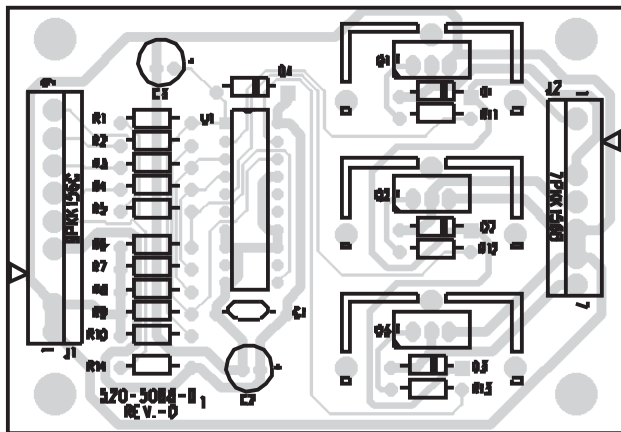
Sec. 5: PCBs



# 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 <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)	965-0217-42	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)	965-0290-40	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 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 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 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 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 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)	965-0170-00		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® 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 <b>TLRH180P</b> (T1-3/4 GaAlAs)	165-5052-00 <i>(old SPI Part No: 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 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 D024/02CK	190-5002-00	For PPB, Power Supply, & White Star I/O Boards, Relay = 24v DC 10 Amp DPDT			
	Relay	FRL-264 D006/04CV	190-5001-00	For CPU Boards, 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 White Star Bd. System™	Production Start Date and Manual Part Nr.	CPU/Sound Board Sound U7 512K CPU/Sound Board Game U210 1MB CPU/Sound Board Voice ROMS:				Jumper Installed (‡ 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 95 780-5044-00	4MB	4MB	4MB	Not Used	n / a
30	Golden Eye	FEB 96 780-5042-00	4MB	4MB	Not Used	Not Used	n / a
31	Twister	APR 96 780-5041-00	4MB	4MB	Not Used	Not Used	n / a
32	ID4: Independence Day	JUL 96 780-5045-00	4MB	4MB	Not Used	Not Used	n / a
33	Space Jam	OCT 96 780-5043-00	4MB	4MB	4MB	Not Used	n / a
34	The Star Wars Trilogy - Sp. Ed.	FEB 97 780-5056-00	4MB	4MB	Not Used	Not Used	n / a
35	The Lost World: Jurassic Park	JUN 97 780-5053-00	4MB	4MB	Not Used	Not Used	n / a
36	The X-Files	AUG 97 780-5046-00	4MB	4MB	Not Used	Not Used	n / a
37	Starship Troopers	NOV 97 780-5059-00	4MB	4MB	4MB	Not Used	n / a
38	Viper Night Drivin'	FEB 98 780-5035-00	4MB	4MB	4MB	4MB	n / a
39	Lost In Space	JUN 98 780-5060-00	4MB	4MB	4MB	4MB	n / a
40	Godzilla	SEP 98 780-5040-00	4MB	4MB	4MB	4MB	n / a
41	South Park	JAN 99 780-5071-00	8MB	8MB	8MB	8MB	W6
42a	Harley-Davidson®	AUG 99 780-5067-01	8MB	8MB	8MB	8MB	W6
42b	Harley-Davidson® 2nd Ed.	SEP 02 780-5067-10	8MB	8MB	8MB	8MB	W6
42c	Harley-Davidson® 3rd Ed.	OCT 04 780-5087-00	8MB	8MB	8MB	8MB	W6
43a	Striker Xtreme	MAR 00 780-5068-01	8MB	8MB	8MB	8MB	W6
43b	NFL	OCT 00 780-5073-00	8MB	8MB	8MB	8MB	W6
44	Sharkey's Shootout	JUL/OCT 00 780-5072-01	8MB	8MB	8MB	Not Used	W6
45	High Roller Casino	JAN 01 780-5065-00	8MB	8MB	8MB	8MB	W6
46	Austin Powers™	MAY 01 780-5074-00	8MB	8MB	8MB	8MB	W6
47	MONOPOLY®	SEP 01 780-5075-00	8MB	8MB	8MB	Not Used	W6
48	Playboy	FEB 02 780-5076-00	8MB	8MB	8MB	8MB	W6
49	RollerCoaster Tycoon™	AUG 02 780-5078-00	8MB	8MB	8MB	Not Used	W6
50	The Simpsons™ Pinball Party	JAN 03 780-5077-00	8MB	8MB	8MB	8MB	W6
51	T3®: Rise of the Machines™	MAY 03 780-5079-00	8MB	8MB	8MB	8MB	W6
52	The Lord of the Rings™	NOV 03 780-5080-00	8MB	8MB	8MB	8MB	
53	Ripley's Believe It or Not!®	APR 04 780-5081-00	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 White Star Board System™	Production Start Date and Manual Part Nr.	CPU/Sound Board Sound U7 512K CPU/Sound Board Game U210 1MB CPU/Sound Board Voice ROMS:				
		U17	U21	U36	U37	
54	Elvis®	AUG 04 780-5084-00	8MB	8MB	8MB	8MB
55	The Sopranos™	FEB 05 780-5085-00	8MB	8MB	8MB	8MB
56	NASCAR®	JUL 05 780-5086-00	8MB	8MB	8MB	8MB
57	Grand Prix	SEP 05 780-5091-00	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 S.A.M. System	Production Start Date and Manual Part Nr.	S.A.M. System CPU/Sound Board Boot EPROM U9			
		965-BOOT-SAM (Programmed)			
58	World Poker Tour™ (WPT)	JUN 06 780-5088-00	8MB	B-02 V2.1+ chksum \$F625	LOC: U9
59	The Simpsons™ Kooky Carnival	APR 06 780-5090-00	8MB	B-02 V2.1+ chksum \$F625	LOC: U9
60	©Disney's Pirates of the Caribbean	AUG 06 780-5092-00	8MB	B-02 V2.1+ chksum \$F625	LOC: U9
61	Famil Guy™	DEC 06 780-5093-00	8MB	B-02 V2.1+ chksum \$F625	LOC: U9
62	Spider-Man™	MAY 07 780-5094-00	8MB	B-02 V2.1+ chksum \$F625	LOC: 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 2-Flipper	520-5137-00	520-5136-00	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-01	520-5124-00 Single OPTO	520-5125-00 Single OPTO	5-Ball Trough over Up-Kicker
	Miscellaneous PC Boards:	Light Boards 520-5130-01, -04 & -05 Magnet Interface, 7-Segment Display & Light Bd. 520-5130-06 Magnet Driver Board 520-5130-02 Switch Membrane Board 520-5130-03				Relay Board 520-5010-00			
Golden Eye	520-5080-00 2-Flipper	520-5137-00	520-5136-00	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-01	520-5124-00 Single OPTO	520-5125-00 Single OPTO	5-Ball Trough over Up-Kicker
	Miscellaneous PC Boards:	Light Boards 520-5128-05 through -08		Mag. Processor X2 Driver Bd. 520-5143-00	Relay Board 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	520-5052-00 128 X 32 Dots	520-5055-01	520-5124-00 Single OPTO	520-5125-00 Single OPTO	5-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	Light Boards 520-5145-01 through -07		Mag. Drv. Bd. 520-5143-00	Relay Board 520-5010-00				
Independence Day (ID4)	520-5137-01	520-5136-10	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-01	520-5124-00 Single OPTO	520-5125-00 Single OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	Light Boards 520-5149-01 through -10		Servo Mtr. Bd. 520-5152-00		520-5082-00 Long Hop OPTO	520-5083-00 Long Hop OPTO	Alien Head Enter	
Space Jam	520-5137-01	520-5136-10	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-01	520-5124-00 Single OPTO	520-5125-00 Single OPTO	5-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	2X 7-Segment Display Board 520-5153-00							
The Star Wars Trilogy - Special Ed.	520-5137-01	520-5136-10	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-01	520-5124-00 Single OPTO	520-5125-00 Single OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	Relay Board 520-5010-00							
The Lost World: J.P.	520-5137-01	520-5136-10	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-01	520-5124-00 Single OPTO	520-5125-00 Single OPTO	4-Ball Trough over Up-Kicker	520-5162-00 2-Pos. Motor Sensor on Snagger Motor
	Miscellaneous PC Boards:	DC Relay Bd. 520-5066-00	Shaker Mtr. Bd. 520-5065-00						
The X-Files	520-5137-01	520-5136-10	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-01	520-5124-00 Single OPTO	520-5125-00 Single OPTO	4-Ball Trough over Up-Kicker	520-5155-00 3-Pos. Motor Sensor on File Cab. Motor
	Miscellaneous PC Boards:					520-5082-00 Long Hop OPTO	520-5083-00 Long Hop OPTO	File Cabinet Enter	
Starship Troopers	520-5137-01	520-5136-15	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-02	520-5124-00 Single OPTO	520-5125-00 Single OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	4X 7-Segment Display Board 520-5166-00					520-5082-00 Long Hop OPTO	520-5083-01 Long Hop OPTO	L/R Orbit Lane Enter
Viper Night Drivin'	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	520-5124-00 Single OPTO	520-5125-00 Single OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	Relay Board 520-5010-00					520-5082-00 Long Hop OPTO	520-5083-01 Long Hop OPTO	Jump Ramp
Lost In Space	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	Relay Board 520-5010-00							
Godzilla	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	Shaker Mtr. Bd. 520-5065-00							
South Park	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	5-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:					520-5082-00 Long Hop OPTO	520-5083-01 Long Hop OPTO	Kenny Under Trough Enter	
Harley-Davidson® 1st-3rd* Editions	520-5137-01	520-5136-16 *520-5300-00*	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	Relay Board 520-5010-00		Shaker Mtr. Bd. 520-5065-00	Diode Board 520-5146-00		520-5082-00 Long Hop OPTO	520-5083-01 Long Hop OPTO	Motorcycle Enter
Striker Xtreme (NFL)	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	520-5155-00 3-Pos. Motor Sensor on Goalie Motor
	Miscellaneous PC Boards:	DC Relay Bd. 520-5066-00	Relay Board 520-5010-00	Diode Board 520-5146-00	for UK ONLY- Solenoid Expander Bd. 520-5192-00	520-5082-00 Long Hop OPTO	520-5083-01 Long Hop OPTO	Goalie Under- Trough Enter	
Sharkey's Shootout	520-5137-64	520-5136-64	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	520-5194-00 4-Pos. Motor Sensor on ? -Ball Motor
	Miscellaneous PC Boards:	Relay Board 520-5010-00		Sol. Exp. Bd. 520-5192-00					
High Roller Casino	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	520-5194-00 4-Pos. Motor Sensor on Roulette Wheel Motor
	Miscellaneous PC Boards:	Dot Display (5X7) in Slot Mach. 520-5197-00			for UK ONLY- Solenoid Expander Bd. 520-5192-00		520-5082-00 Long Hop OPTO	520-5083-01 Long Hop OPTO	Ball Lock under Roulette
Austin Powers™	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	520-5212-00 Pulse-Stretcher OPTO on Spini-Me
	Miscellaneous PC Boards:	Relay Bd. (X3) 520-5010-00			for UK ONLY- Solenoid Expander Bd. 520-5192-00	520-5082-00 Long Hop OPTO	520-5083-01 Long Hop OPTO	Time Machine Ramp	
MONOPOLY®	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	DC Relay Bd. 520-5066-00	Mini-Dot Display (3 by 5X7) 520-5197-00 (Electric C- Sign)		for UK ONLY- Solenoid Expander Bd. 520-5192-00	520-5218-00 4-Pos. OPTO	520-5210-00 4-Pos. OPTO	Bank 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	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	DC Relay Bd. 520-5066-00	Relay Bd. 520-5010-00		for UK ONLY- Solenoid Expander Bd. 520-5192-00				
RollerCoaster Tycoon™	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	520-5222-00 1-Position Switch Detect on Wheel Spin
	Miscellaneous PC Boards:	DC Relay Bd. 520-5066-00	Mini-Dot Display (3 by 5X7) 520-5221-00 (Ramp Enter Sign)		for UK ONLY- Solenoid Expander Bd. 520-5192-00	520-5082-00 Long Hop OPTO	520-5083-01 Long Hop OPTO	Behind 1-Bank Drop Target	
The Simpsons™ Pinball Party	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	LED Bd. 520-5219-00	Color Dot Display (4 by 5X7) 520-5225-00 (TV Set)		for UK ONLY ◀◀◀ Aux. Driver Bd. 520-5068-01				
Terminator® 3: Rise of the Machines™	520-5137-01	<b>520-5136-16</b>	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:				for UK ONLY ◀◀◀ Aux. Driver Bd. 520-5068-01	515-7307-00 Single OPTO	515-7308-00 Single OPTO	TXCannon Trough	
The Lord of the Rings™	520-5137-01	<b>New</b> 520-5300-00	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	500-6746-00 (White Trans.) 500-6747-00 (Black Rec.)
	Miscellaneous PC Boards:	19-LED PCB 520-5242-00	OPTO Transmitter / Receiver Amplifier PCB 520-5239-00		for UK ONLY ◀◀◀ Aux. Driver Bd. 520-5068-01	515-7307-00 Single OPTO	515-7308-00 Single OPTO	Orthanc Tower Trough	
Ripley's Believe It or Not!®	520-5137-01	520-5300-00	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	500-6775-00 OPTO Trnscvr
	Miscellaneous PC Boards:	520-5236-00 X3 Dot Display	OPTO Transmitter / Receiver Amplifier PCB 520-5239-01		for UK ONLY ◀◀◀ Aux. Driver Bd. 520-5068-01	520-5234-00 3-Pos. OPTO	520-5234-00 3-Pos. OPTO	Vari-Target	520-5235-03 X3 Aux. Drvr
Elvis®	520-5137-01	520-5300-00	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:				for UK ONLY ◀◀◀ Aux. Driver Bd. 520-5068-01				
The Sopranos™	520-5137-01	520-5300-00	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:				for UK ONLY ◀◀◀ Aux. Driver Bd. 520-5068-01				
NASCAR® and [INDSE]	520-5137-01	520-5300-00	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	500-6775-00 OPTO Trans. (Qty. 16) Switch Detect.
	Miscellaneous PC Boards:	520-5235-03 X3 Aux. Drvr	OPTO Transmitter / Receiver Amplifier PCB 520-5239-01		for UK ONLY ◀◀◀ Aux. Driver Bd. 520-5068-01				
Grand Prix	520-5137-01	520-5300-00	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	500-6775-00 OPTO Trans. (Qty. 16) Switch Detect.
	Miscellaneous PC Boards:	520-5235-03 X3 Aux. Drvr	OPTO Transmitter / Receiver Amplifier PCB 520-5239-01		for UK ONLY ◀◀◀ Aux. Driver Bd. 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 Backbox	520-5246-00 Backbox	520-5138-00 Backbox	520-5052-00 128 X 32 Dots	515-0173-00 4-Ball Trough	515-0174-00 4-Ball Trough	500-6775-00 4 Switch Pairs (Qty. 8)	520-5251-00 'U' 1/per PCB Jail Bars Up Ace/Hole Mech 520-5252-04 'U' 4/per PCB Drop Targets 4- & 8- Banks
	Miscellaneous PCBs:	520-5254-00 50V Step-Up Drv	520-5250-14 14LED 5X7 Disp.	520-5239-01 OPTO Amplifier	520-5247-00 Ace/Hole Mech	520-5248-00 Ace/Hole Mech		
The Simpsons™ Kooky Carnival	520-5249-00 Back Door	520-5246-00 Back Door	520-5138-00 Cabinet Rear	520-5052-00 128 X 32 Dots			520-5253-00-ASY Coin Drop (Qty. 11)	
	Miscellaneous PCBs:	515-5742-00 Shaker PCB	500-6700-00 Relay (incl. Wiring + Conn.)					
©Disney's Pirates of the Caribbean	520-5249-00 Backbox	520-5246-00 Backbox	520-5138-00 Backbox	520-5052-00 128 X 32 Dots	515-0173-00 4-Ball Trough	515-0174-00 4-Ball Trough	500-6775-00 5 Switch Pairs (Qty. 10)	
	Miscellaneous PCBs:	520-5239-01 OPTO Amp. (X3)	511-5024-03 Relay (incl. Wiring + Conn.)	520-5238-00 : H-E-A-R-T LED PCB				
Family Guy™	520-5249-00 Backbox	520-5246-00 Backbox	520-5138-00 Backbox	520-5052-00 128 X 32 Dots	515-0173-00 4-Ball Trough	515-0174-00 4-Ball Trough	500-6775-00 3 Switch Pairs (Qty. 6)	520-5252-01 'U' 1/per PCB Drop Target 1-Bank
	Miscellaneous PCBs:	520-5239-01 OPTO Amp. (X2)	520-5261-00 Stepper Motor	511-5042-01 Trgt. Sensor (X2)			500-6775-01 1 Switch Pair (Qty. 2)	520-5252-04 'U' 4/per PCB Drop Target 4-Bank
Spider-Man™	520-5249-00 Backbox	520-5246-00 Backbox	520-5138-00 Backbox	520-5052-00 128 X 32 Dots	515-0173-00 4-Ball Trough	515-0174-00 4-Ball Trough	500-6775-00 3 Switch Pairs (Qty. 6)	
	Miscellaneous PCBs:	520-5239-01 OPTO Amp. (X2)						





# APPENDIX D

## Board Type Table

Game Name	Flipper	Sound	Power Supply	Display X-Digit
• Laser War	2-Flipper Board Not Required	<i>initial:</i> 520-5002-00 <i>replaced with:</i> 520-5002-02 <i>520-5002-01 was not used.</i>	520-5000-00	Master: 520-5004-00 plus: 520-5005-00 (Qty. 2); 7 Digit Alpha/Numeric 520-5006-00 (Qty. 2); 7 Digit Numeric 520-5007-00 (Qty. 1); 4 Digit Numeric
• Secret Service • Torpedo Alley	3-Flipper Board Not Required	520-5002-02		520-5014-01 7 Digit Alpha/Numeric Combined
• Time Machine	2-Flipper Board Not Required			520-5030-00 16 Digit Alpha/Numeric Combined
• Playboy 35th Anniversary *	520-5033-00 2-Flipper <i>(*only for 100 games of Playboy 35th Anniv. &amp; ABC Mon. Night Football)</i>			
• ABC Monday Night Football *				
• Robocop				
• Phantom of the Opera • Back to the Future				
• The Simpsons		520-5002-03		

Game Name	Flipper	Sound	Power Supply	Dot Matrix Display	Display Controller	OPTO Transmitter	OPTO Receiver	OPTO Application
• Checkpoint • Teenage Mutant Ninja Turtles	520-5033-00 2-Flipper	520-5002-03	520-5047-00	520-5042-00 128 X 16	520-5055-00			
• Batman • Star Trek 25th Anniv. • Hook		520-5050-01						
• Lethal Weapon 3		520-5050-02	520-5047-01					
• Star Wars • Rocky & Bullwinkle & Friends			520-5052-00 128 X 32					
• Jurassic Park								
• Last Action Hero	520-5076-00 3-Flipper	520-5050-03	520-5047-02	520-5055-01				
• Tales from the Crypt • The Who's Tommy	520-5070 / 5080 -00 4-Flipper (2X2)	520-5077-00						
• WWF Royal Rumble • Guns N' Roses	520-5076-00 3-Flipper	520-5050-03	520-5047-03	520-5075-00 192 X 64	520-5092-01	520-5102-00 Single OPTO	520-5103-00 Single OPTO	Paddle Boat Wheel Enter
• Maverick	520-5076-00 3-Flipper	520-5077-00						
• Mary Shelley's Frankenstein	520-5076-00 3-Flipper	520-5126-02						
• Baywatch	520-5070 / 5080 -00 4-Flipper (2X2)							
• Batman Forever	520-5076-00 3-Flipper					520-5124-00 Single OPTO	520-5125-00 Single OPTO	5-Ball Trough over Up-Kicker
						520-5124-00 Single OPTO	520-5125-00 Single OPTO	4-Ball Trough over Up-Kicker

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 -10 Diode Top <BROWN><RED>
22-500	1.7 Ω	090-5017-use : -00 Diode Top	22-750 / 30-2600	2.6 Ω 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> // -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 // -NL No Lugs 11" Leads // -ND No Diode	22-1080	4.2 Ω	090-5032-use : -0B D. Below // -0T D. Top <YEL-GRN> -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 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 use 090-5051-01 No Lugs 11" Leads	23-700 / 30-2600	3.0 Ω 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 // -NL No Lugs 11" Leads // -ND No Diode	23-800 / 30-2600	2.4 Ω 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> -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			
<b>LARGE, MEDIUM &amp; MINI COILS (MAGNET APPLICATIONS)</b>			23-1500	4.4 Ω	090-5062-use : -00 Diode Top <BLUE>
20.5-480	2.9 Ω	090-5064-use : -02 No Lugs or Core; 14" Leads // Large			
22-650	4.3 Ω	090-5042-use : -00 No Lugs or Core; 6" Leads // Large -01 No Lugs or Core; 12" Leads // Large	24-1570	9.5 Ω	090-5025-use : -00 Diode Top <BLUE>
24-780	8.0 Ω	090-5061-use : -00 No Lugs or Core; 6" Lds. // Medium			
29-1000	15.2 Ω	090-5059-use : -00 Lugs + Diode + Magnet Core // Mini	25-1400	call Ω	090-5067-use : -0T Diode Top <RED>
31-1500	52.0 Ω	090-5054-00 : Straight Lugs + Diode + Mag Core // Mini 090-5055-00 : 90° Lugs + Diode + Magnet Core // Mini			
<b>MINI COILS (RESET / TRIP APPLICATIONS)</b>			25-1600	call Ω	090-5068-use : -0T Diode Top <WHITE>
27-950	call Ω	090-5046-use : -01 Diode Top			
28-1050	11.5 Ω	090-5046-use : -00 Diode Top	27-880	call Ω	500-6976-01 No Lugs or Diode + 6" Leads & Conn.
27-880	call Ω	500-6976-01 No Lugs or Diode + 6" Leads & Conn.			
31-590	call Ω	090-5010-use : -00 Diode Top	32-1250	35.0 Ω	515-6916-01 : includes Flap & Screw <YELLOW>
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 (515-6110-00) use 515-# to include mounting & armature brackets	33-1590	59.0 Ω	515-6916-00 : includes brackets <WHITE>
33-1590	59.0 Ω	515-6916-00 : includes brackets <WHITE>			

Please Note: Ohm values may vary +/- .03 depending on meter calibration.  
 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.



## 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 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
Golden Eye	2	090-5032-0T 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
Twister	2	090-5020-20T 22-900 -YELLOW-	090-5032-0T 22-1080 -YEL-GRN-	Not Used	Not Used
ID4: Independence Day	3	090-5032-0T 22-1080 -YEL-GRN-	SAME	Not Used	090-5020-30 23-900 -GREEN-
Space Jam †	2	090-5032-0T 22-1080 -YEL-GRN-	090-5020-20T 22-900 -YELLOW-	Not Used	Not Used
The Star Wars Trilogy - Special Edition †	2	090-5032-0T 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
The Lost World: Jurassic Park †	2	090-5032-0T 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
The X-Files †	2	090-5032-0T 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
Starship Troopers †	3	090-5030-0T 23-1100 -ORANGE-	SAME	Not Used	090-5032-0T 22-1080 -YEL-GRN-
Viper Night Drivin' †	2	090-5030-0T 23-1100 -ORANGE-	SAME	Not Used	Not Used
Lost In Space †	2	090-5030-0T 23-1100 -ORANGE-	090-5032-0T 22-1080 -YEL-GRN-	Not Used	Not Used
Godzilla †	2	090-5032-0T 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
South Park †	2	090-5030-0T 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 <b>22-1080 -YEL-GRN-</b>	090-5030-0T <b>23-1100 -ORANGE-</b>	Not Used	Not Used
Striker Xtreme (NFL) †	3	090-5032-0T <b>22-1080 -YEL-GRN-</b>	090-5030-0T <b>23-1100 -ORANGE-</b>	090-5030-0T <b>23-1100 -ORANGE-</b>	Not Used
Sharkey's Shootout †	3	090-5030-0T <b>23-1100 -ORANGE-</b>	SAME	090-5030-0T <b>23-1100 -ORANGE-</b>	Not Used
High Roller Casino †	2	090-5032-20T <b>22-900 -YELLOW-</b>	090-5032-0T <b>22-1080 -YEL-GRN-</b>	Not Used	Not Used
Austin Powers™ †	2	090-5020-30 <b>23-900 -GREEN-</b>	090-5030-0T <b>23-1100 -ORANGE-</b>	Not Used	Not Used
MONOPOLY® †	3	090-5032-0T <b>22-1080 -YEL-GRN-</b>	SAME	Not Used	090-5062-0T <b>23-1500 -BLUE-</b>
Playboy †	2	090-5030-0T <b>23-1100 -ORANGE-</b>	SAME	Not Used	Not Used
RollerCoaster Tycoon™ †	4	090-5032-0T <b>22-1080 -YEL-GRN-</b>	SAME	090-5067-0T <b>25-1400 -RED-</b>	090-5068-0T <b>25-1600 -WHITE-</b>
The Simpsons™ Pinball Party †	6** (5 with Flipper Bats)	090-5032-0T <b>22-1080 -YEL-GRN-</b>	SAME	Not Used	090-5030-0T <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 <b>22-900 -YELLOW-</b>	090-5041-00T <b>25-1800 -BLU-GRN-</b>	090-5025-00 <b>24-1570 -BLUE-</b>
Terminator® 3: Rise of the Machines™ †	2	090-5032-0T <b>22-1080 -YEL-GRN-</b>	SAME	Not Used	Not Used
The Lord of the Rings™ †	2	090-5020-20T <b>22-900 -YELLOW-</b>	SAME	Not Used	Not Used
Ripley's Believe It or Not!® †	3	090-5032-0T <b>22-1080 -YEL-GRN-</b>	SAME	Not Used	090-5067-00T <b>25-1400 -RED-</b>
Elvis® †	4	090-5020-20T <b>22-900 -YELLOW-</b>	SAME	090-5020-30 <b>23-900 -GREEN-</b>	SAME
The Sopranos™ †	2	090-5032-0T <b>22-1080 -YEL-GRN-</b>	SAME	Not Used	Not Used
NASCAR® and [NDSE] †	2	090-5030-0T <b>23-1100 -ORANGE-</b>	SAME	Not Used	Not Used
Grand Prix †	2	090-5030-0T <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 <b>22-1080 [ NO DIODE ]</b>	SAME	090-5030-ND <b>23-1100 [ NO DIODE ]</b>	SAME
©Disney's Pirates of the Caribbean**	2	090-5030-ND <b>23-1100 [ NO DIODE ]</b>	SAME	Not Used	Not Used
Family Guy™ **	3 Norm.	090-5030-ND <b>23-1100 [ NO DIODE ]</b>	SAME	090-5062-ND <b>23-1500 [ NO DIODE ]</b>	Not Used
	2 Mini	090-5046-01-ND <b>27-950 [ NO DIODE ]</b>	SAME		
Spider-Man™ **	3	090-5032-ND <b>22-1080 [ NO DIODE ]</b>	SAME	Not Used	090-5032-ND <b>22-1080 [ NO DIODE ]</b>





# APPENDIX E

## Generic Coil Cross-Reference Guide † ‡

### 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
Laser War ‡	2	090-5011-00 22-750 / 30-2600	SAME	Not Used	Not Used
Secret Service ‡	3	090-5006-00 23-620 / 30-2600	SAME	Not Used	090-5006-00 23-620 / 30-2600
Torpedo Alley ‡	3	090-5011-00 22-750 / 30-2600	090-5013-00 23-700 / 30-2600	Not Used	090-5012-00 23-800 / 30-2600
Time Machine ‡	2	090-5011-00 22-750 / 30-2600	SAME	Not Used	Not Used
‡ These coils are dual-wound.					
Playboy 35th Anniversary ††	2	090-5020-02 22-900 -YEL-YEL-	SAME	Not Used	Not Used
ABC Monday Night Football ††	2	090-5020-02 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 22-900 -YEL-YEL-	SAME	Not Used	Not Used
Phantom of the Opera	2	090-5020-20 22-900 -YEL-YEL-	SAME	Not Used	Not Used
Back to the Future	2	090-5020-20 22-900 -YEL-YEL-	SAME	Not Used	Not Used
The Simpsons	2	090-5020-20 22-900 -YEL-YEL-	SAME	Not Used	Not Used
Checkpoint	2	090-5020-20 22-900 -YEL-YEL-	SAME	Not Used	Not Used
Teenage Mutant Ninja Turtles	2	090-5020-30 23-900 -GRN-GRN-	SAME	Not Used	Not Used
Batman	2	090-5020-30 23-900 -GRN-GRN-	SAME	Not Used	Not Used
Star Trek 25th Anniversary	2	090-5020-30 23-900 -GRN-GRN-	SAME	Not Used	Not Used
Hook	2	090-5030-00 23-1100 -ORG-ORG-	090-5020-30 23-900 -GRN-GRN-	Not Used	Not Used
Lethal Weapon 3	2	090-5030-00 23-1100 -ORG-ORG-	SAME	Not Used	Not Used
Star Wars	2	090-5032-00 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
Rocky & Bullwinkle & Friends	2	090-5020-30 23-900 -GRN-GRN-	SAME	Not Used	Not Used
Jurassic Park	3	090-5020-30 23-900 -GRN-GRN-	SAME	Not Used	090-5030-00 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 23-900 -GRN-GRN-	SAME	Not Used	Not Used
Tales from the Crypt	3	090-5032-00 22-1080 -YEL-GRN-	SAME	Not Used	090-5041-00 25-1800 -BLU-GRN-
The Who's Tommy	3	090-5020-30 23-900 -GRN-GRN-	SAME	090-5041-00 25-1800 -BLU-GRN-	Not Used
WWF Royal Rumble	4	090-5032-00 22-1080 -YEL-GRN-	SAME	090-5041-00 25-1800 -BLU-GRN-	SAME
Guns N' Roses	3	090-5032-00 22-1080 -YEL-GRN-	SAME	090-5030-00 23-1100 -ORG-ORG-	Not Used
Maverick	3	090-5032-00 22-1080 -YEL-GRN-	SAME	Not Used	090-5032-00 22-1080 -YEL-GRN-
Mary Shelley's Frankenstein	3	090-5030-00 23-1100 -ORG-ORG-	SAME	Not Used	090-5030-00 23-1100 -ORG-ORG-
Baywatch	4	090-5030-00 23-1100 -ORG-ORG-	090-5020-30 23-900 -GRN-GRN-	090-5025-00 24-1570 -See Note-	090-5030-00 23-1100 -ORG-ORG-
Batman Forever	3	090-5032-00 22-1080 -YEL-GRN-	090-5020-20 22-900 -YEL-YEL-	Not Used	090-5020-30 23-900 -GRN-GRN-
Apollo 13	2	090-5032-00 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
Golden Eye	2	090-5032-00 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
Twister	2	090-5020-20 22-900 -YEL-YEL-	090-5032-00 22-1080 -YEL-GRN-	Not Used	Not Used
ID4: Independence Day	3	090-5032-00 22-1080 -YEL-GRN-	SAME	Not Used	090-5020-30 23-900 -GRN-GRN-
Space Jam †	2	090-5032-00T 22-1080 -YEL-GRN-	090-5020-20T 22-900 -YEL-YEL-	Not Used	Not Used
The Star Wars Trilogy - Special Edition †	2	090-5032-00T 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
The Lost World: Jurassic Park †	2	090-5032-00T 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
The X-Files †	2	090-5032-00T 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
Starship Troopers †	3	090-5030-00T 23-1100 -ORG-ORG-	SAME	Not Used	090-5032-00T 22-1080 -YEL-GRN-
Viper Night Drivin' †	2	090-5030-00T 23-1100 -ORG-ORG-	SAME	Not Used	Not Used
Lost In Space †	2	090-5030-00T 23-1100 -ORG-ORG-	090-5032-00T 22-1080 -YEL-GRN-	Not Used	Not Used
Godzilla †	2	090-5032-00T 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
South Park †	2	090-5030-00T 23-1100 -ORG-ORG-	SAME	Not Used	Not Used
Harley-Davidson® † and Harley-Davidson® 2nd Ed. †	2	090-5032-00T 22-1080 -YEL-GRN-	090-5030-00T 23-1100 -ORG-ORG-	Not Used	Not Used
Striker Xtreme (NFL) †	3	090-5032-00T 22-1080 -YEL-GRN-	090-5030-00T 23-1100 -ORG-ORG-	090-5030-00T 23-1100 -ORG-ORG-	Not Used
Sharkey's Shootout †	3	090-5030-00T 23-1100 -ORG-ORG-	SAME	090-5030-00T 23-1100 -ORG-ORG-	Not Used
High Roller Casino †	2	090-5020-20T 22-900 -YEL-YEL-	090-5032-00T 23-1080 -YEL-GRN-	Not Used	Not Used
Austin Powers™ †	2	090-5020-30 23-900 -GRN-GRN-	090-5030-00T 23-1100 -ORG-ORG-	Not Used	Not Used
MONOPOLY® †	3	090-5032-00T 22-1080 -YEL-GRN-	SAME	Not Used	090-5062-00T 23-1500 -BLU-BLU-
Playboy †	2	090-5030-00T 23-1100 -ORG-ORG-	SAME	Not Used	Not Used
RollerCoaster Tycoon™ †	4	090-5032-00T 22-1080 -YEL-GRN-	SAME	090-5067-00T 25-1400 -RED-RED-	090-5068-00T 25-1600 -WHT-WHT
The Simpsons™ Pinball Party †	6* (5 with Flipper Bats)	090-5032-00T 22-1080 -YEL-GRN-	SAME	Not Used	090-5030-00T 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 22-900 -YEL-YEL-	090-5041-00T 25-1800 -BLU-GRN-	090-5025-00T 24-1570 -See Note-
Terminator® 3: Rise of the Machines™ †	2	090-5032-00T 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
The Lord of the Rings™ †	2	090-5020-20T 22-900 -YEL-YEL-	SAME	Not Used	Not Used
Ripley's Believe It or Not!® †	3	090-5032-00T 22-1080 -YEL-GRN-	SAME	Not Used	090-5067-00T 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 60Hz 3W 6 RPM CCW	515-6383-00 <i>incl. Connector</i>
	Moon Unit Rotational Orbit	Multi Products Motor 24VAC 50/60Hz 3W 6 RPM CCW	515-6487-00 <i>incl. Connector</i>
	Shaker	Johnson Motor (Vibrator) 10.5VDC 10 AMP 2950 RPM CW	041-5029-00 <b>MOTOR ONLY</b>
Golden Eye	Satellite Left/Right Movement	Bowman Motor 24VAC 60Hz 3W 6 RPM CW	515-6528-00 <i>incl. Connector</i>
Twister	Spinning Disc with Magnet	Multi Products Motor 24VAC (041-5026-00) 50/60Hz 3W 325 RPM CCW	515-6347-00 <i>incl. Connector</i>
	Backbox Fan (Tornado Wind)	Multi Products Motor 24VAC (041-5052-00) 50/60Hz 3W 3600 RPM CW	515-6531-00 <i>incl. Connector</i>
ID4: Independence Day	Alien Head Open/Close Movement	Servo Motor (94322)	041-5045-00 <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) 60Hz 3W 10 RPM CCW	515-6383-01 <i>incl. Connector</i>
The Lost World: Jurassic Park	Snagger & Center Link Lift Up/Down Movement	Multi Products Motor 20VDC (041-5059-03) 9 RPM Non-Directional	515-6715-03 <i>incl. Connector</i>
	Shaker	Johnson Motor (Vibrator) 10.5VDC 10 AMP 2950 RPM CW	041-5029-00 <b>MOTOR ONLY</b>
The X-Files	X-File Cabinet Lift Up/Down Movement	Multi Products Motor 20VDC 9 RPM CCW	041-5057-00 <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 <i>incl. Connector</i> 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) 50/60Hz 3W 325 RPM CCW	515-6347-00 <i>incl. Connector</i>
Godzilla	Shaker ‡	Multi #3811 0630 Motor (Vibrator) 12VDC 3100 RPM CW (w/DRL PTS) ‡	041-5029-01 <b>MOTOR ONLY</b>
<i>SOUTH PARK (NO MOTOR USED)</i>			
Harley-Davidson® 1st through 3rd Editions	Shaker ‡	Multi #3811 0630 Motor (Vibrator) 12VDC 3100 RPM CW (w/DRL PTS) ‡	041-5029-01 <b>MOTOR ONLY</b>
	Motorcycle Lift Up/Down Movement	Autotrol 24VAC (041-5072-02) 20 RPM CCW	515-7025-00 <i>incl. Connector</i>
Striker Xtreme (NFL)	Goalie (Linebacker) Left to Right Movement	Multi #3590 12VDC (041-5075-00) 60 RPM	515-7071-00 <i>incl. Connector</i>
Sharkey's Shootout	Mystery Ball Rotating Movement	Hankscraft Motor Model-E 24VAC (041-5076-00) 50/60Hz 3W 20 RPM CW	515-7095-00 <i>incl. Connector</i>
High Roller Casino	Roulette Wheel Rotating Movement	Multi Products Motor 20VDC (041-5078-00) 17 RPM CCW	515-7153-00 <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 <i>incl. Connector</i> Requires Shaft 4¼": 530-5503-01
Austin Powers™	Time Machine Rotating Movement	Multi Products Motor 24VAC (041-5079-00) 50/60Hz 20RPM CCW	515-7141-00 <i>incl. Connector</i>
	Laser Beam Left to Right Directional	Autotrol Motor 24VAC (041-5081-00) 50/60Hz 4W 10RPM Bi-Directional	515-7171-00 <i>incl. Connector</i>
	Dr. Evil Target Lift Up/Down Movement	Hankscraft Motor Model-E 24VAC (041-5030-00) 50/60Hz 6RPM CCW	515-5900-00 <i>incl. Connector</i>
Monopoly®	Mini-Flipper (Waterworks) Rotating Movement	Multi Prod. Motor & Gear Box #7000 EX00159A 20VDC 50/60Hz 85RPM CC/CCW	041-5083-00 <b>MOTOR ONLY</b>
Playboy	Triangular Billboard Rotating Movement	Autotrol Motor (BD511 150-1387) 24VAC 50/60Hz 12RPM Bi-Directional	041-5086-02 <b>MOTOR ONLY</b>
	Centerfold Mechanism Open/Close Movement	Multi Products (3680) Motor 12v DC 10/12 RPM CC/CCW	041-5075-04 <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 <i>incl. Connector</i> 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) 21 RPM CW	515-7317-00 <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.) 50/60Hz 10 RPM Bi-Directional	041-5088-01 <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), (Non-Captive Shaft <b>not included</b> ) HSI #46868-12-002	500-6809-00 <i>incl. Connector</i> Requires 7.25" Shaft: 530-5658-00
	▶▶▶ <b>OPTIONAL</b> ◀◀◀ Shaker	Multi #3811 0630 Motor (Vibrator) 12VDC (041-5029-01) 3100 RPM (w/DRL PTS)	515-5893-01 <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 <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 <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 <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 <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 <i>incl. Connector</i>
	Shaker <i>(details in SKC Manual, Page 24)</i>	Multi #3811 0630 Motor (Vibrator) 12VDC 3100 RPM (w/DRL PTS)	041-5029-01 <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) -04 is RoHS compliant; can substitute with -01 domestic	511-5024-04 <i>incl. Connector</i>
	Pirate Ship Sinking/Raising Movement	Multi Products Motor & Gear Box 24VDC Model #7000-DCM 12 RPM	041-5101-00 <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 <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 <i>incl. Connector</i>
	▶▶▶ <b>OPTIONAL</b> ◀◀◀ Shaker Motor Kit 502-5027-00	Multi #3811R 0630 Motor (Vibrator) 12VDC (041-5029-04) 3100 RPM (w/DRL PTS) -04 is RoHS compliant; can substitute with -01 domestic	515-5893-01 <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 Up/Down Movement	Motor 24v A.C. 60 RPM CW	515-5222-00
Phantom of the Opera	Organ Up/Down Movement	Bowman Motor 24v 60Hz 3W 11 RPM CCW	515-5256-00
Checkpoint	Mag Wheel (in Backbox)	Motor D.C. (KEN)	041-5005-00
	Shaker	Johnson Motor (Vibrator)	041-5002-00
Teenage Mutant Ninja Turtles	Spinning Pizza Ball Deflector	Gear Motor 24v A.C. 325 RPM CW	515-5397-00
Batman	Bar Target Up/Down Movement	Bowman Motor 24v 60Hz 3W 11 RPM CCW	515-5256-00
Star Trek 25th Anniversary	Swinging Target	Bowman Motor 24v 22½ RPM	515-5534-00
	Transporter F/X	Gear Motor 24v A.C. 3½ RPM	500-5421-00
	Cooling Fan (for Transporter F/X)	4½" Motor 12v	041-5014-00
Lethal Weapon 3	Spinning Light	Motor 2½ v A.C. 4000 RPM CCW	041-5017-00
Star Wars	Bar Target Up/Down Movement	Bowman Motor 24v 60hz 3W 11 RPM CCW	515-5256-00
	R2D2 Robot Left/Right Movement	Bowman Motor 24v A.C. 22½ RPM CW	515-5571-00
	Death Star Rotation	Bowman "G" Motor 24v A.C. 60Hz 6 RPM CW	515-5570-00
Rocky & Bullwinkle & Friends	Nell Log "Cutting Blade" Forward/Back Movement	Autotrol Model E Motor 24v 60hz 4W 3 RPM CCW	041-5023-00
Jurassic Park	T-Rex Left/Right Movement	Multi Motor 5v D.C.	041-5025-00
	T-Rex Up/Down Movement	Bowman Motor 24v 11 RPM CW	041-5026-00
	Shaker	Johnson Motor (Vibrator)	041-5002-00
Last Action Hero	Crane Left/Right Movement	Multi Products Motor 12v D.C. #3312 OSC	041-5027-00
	Shaker	Johnson Motor (Vibrator) 10.5v D.C. 10 AMP 2950 RPM CW	041-5029-00
Tales from the Crypt	Tombstone Up/Down Movement	Bowman Motor 24v A.C. 6 RPM CCW	515-5900-00
	Shaker	Johnson Motor (Vibrator) 10.5v D.C. 10 AMP 2950 RPM CW	041-5029-00
The Who's Tommy	Mirror Up/Down Movement	Bowman Motor 24v A.C. 6 RPM CCW	515-5900-00
	Flipper Blinders	Servo Motor (94102)	041-5032-00
	Spinning Airplane Propellers	Motor D.C.	041-5033-00
WWF Royal Rumble	Shaker	Johnson Motor (Vibrator) 10.5v D.C. 10 AMP 2950 RPM CW	041-5029-00
Maverick, The Movie	Turning Paddle Wheel	Motor 24v A.C. 10 RPM	041-5036-00
Mary Shelley's Frankenstein	Creature Head Left/Right Movement	Servo Motor (94102)	041-5032-00
Batman Forever	Cannon Left/Right Movement	Bowman Motor 24v A.C. 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








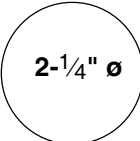
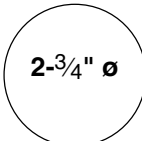
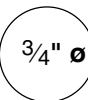
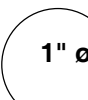
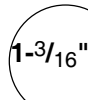
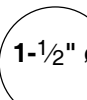
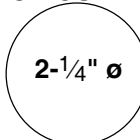
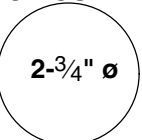

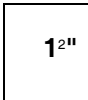
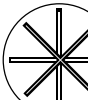
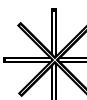
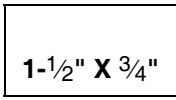
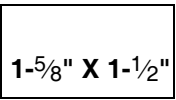
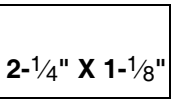
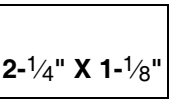
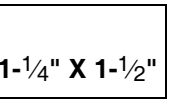
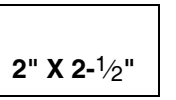


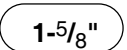
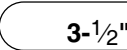




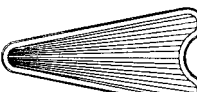
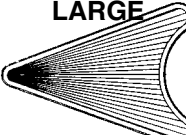
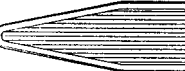
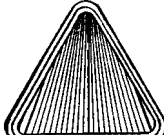
- 000- Tools (*see also 777-*) and Supplies
- 040- Clamps, Ties & Clips
- 042- Pulleys
- 091- Coin Mechs
- 205- Fuse Holders
- 631- Staples
- 660- Glass (Playfield, Backglass, etc.)
- 675- Cleaners
- 705- Packing & Shipping Items
- 755- Instruction, Coin Cards, Ins. Sheets
- 756- Information Sheets, 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> <b>STARBURST</b>  <b>STIPPLE</b> 	<b>STARBURST CIRCULAR</b>  <b>550-5000-XX</b>	<b>STARBURST CIRCULAR</b>  <b>550-5001-XX</b>	<b>STARBURST CIRCULAR</b>  <b>550-5002-XX</b>	<b>STARBURST CIRCULAR</b>  <b>550-5003-XX</b>	<b>STARBURST CIRCULAR</b>  <b>550-5004-XX</b>
<b>STARBURST CIRCULAR</b>  <b>550-5005-XX</b>	<b>STARBURST CIRCULAR</b>  <b>550-5006-XX</b>	<b>PLAIN CIRCULAR</b>  <b>550-5007-XX</b>	<b>PLAIN CIRCULAR</b>  <b>550-5008-XX</b>	<b>PLAIN CIRCULAR</b>  <b>550-5009-XX</b>	<b>PLAIN CIRCULAR</b>  <b>550-5010-XX</b>
<b>PLAIN CIRCULAR</b>  <b>550-5011-XX</b>	<b>PLAIN CIRCULAR</b>  <b>550-5012-XX</b>	<b>STIPPLE CIRCULAR</b>  <b>550-5048-XX</b>	<b>STIPPLE 1" SQUARE</b>  <b>550-5019-XX</b>	<b>ROLLOVER BUTTON BASE</b>  <b>550-5026-XX</b>	<b>WHITE STAR (only in white)</b>  <b>545-5015-00</b>
<b>STIPPLE RECTANGULAR</b>  <b>550-5018-XX</b>	<b>STIPPLE RECTANGULAR</b>  <b>550-5051-XX</b>	<b>STARBURST RECTANGULAR</b>  <b>550-5044-XX</b>	<b>PLAIN RECTANGULAR</b>  <b>550-5049-XX</b>	<b>PLAIN RECTANGULAR</b>  <b>550-5050-XX</b>	<b>PLAIN RECTANGULAR</b>  <b>550-5063-XX</b>
<b>STARBURST MINI SHIELD</b>  <b>550-5024-XX</b>	<b>STARBURST LARGE SHIELD</b>  <b>550-5025-XX</b>	<b>MINI HOT DOG</b>  <b>550-5020-XX</b>	<b>BEVEL HOT DOG</b>  <b>550-5021-XX</b>	<b>PLAIN HOT DOG</b>  <b>550-5022-XX</b>	<b>BANANA</b>  <b>550-5023-XX</b>
<b>STARBURST ARROW-SMALL</b>  <b>550-5013-XX</b>	<b>STARBURST ARROW-LARGE</b>  <b>550-5070-XX</b>	<b>STARBURST ARROW-HEAD SMALL</b>  <b>550-5014-XX</b>	<b>STARBURST ARROW-HEAD LARGE</b>  <b>550-5015-XX</b>	<b>STARBURST BULLET</b>  <b>550-5016-XX</b>	<b>STARBURST TRIANGLE</b>  <b>550-5017-XX</b>

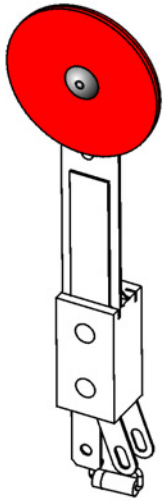
**Note:** The shapes and sizes shown above are not to scale. Some shapes may no longer be available in every color.

**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

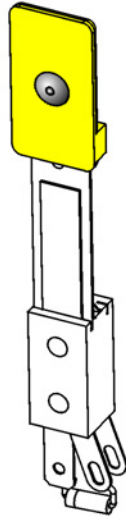
# APPENDIX I

## Stand-Up Targets

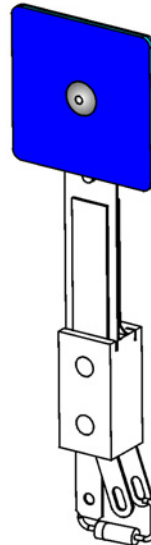


112-5003-00  
Switch Diode, 1N4004  
(all Stand-Up Targets)

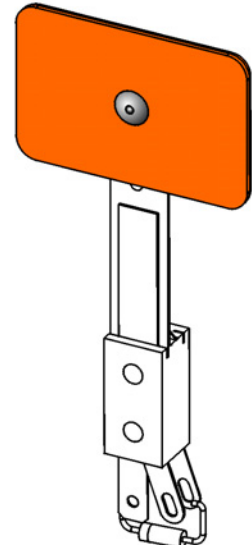
**515-5966-XX**  
1" ROUND STAND-UP  
SWITCH & TARGET  
RIVETED ASSEMBLY\*



**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\*



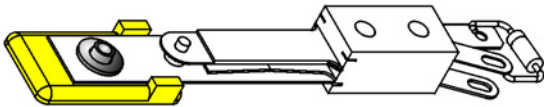
**515-6027-XX**  
1" X 1-1/2" RECTANGLE STAND-UP  
SWITCH & TARGET  
RIVETED ASSEMBLY\*

*\*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



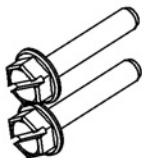
**SHOWN BELOW : 500-5857-06**  
1" X 1/2" NARROW STAND-UP  
TARGET ASSEMBLY COMPLETE

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:

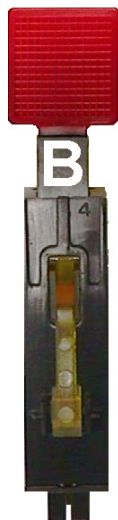
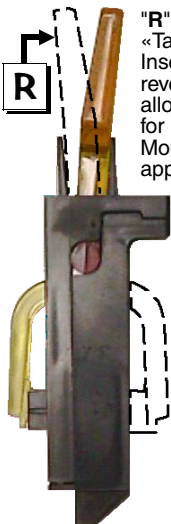
1. Switch & Target Taller (Target sits higher over P/F)
2. Switch Back Plate differs (bend, shape & tab)
3. Foam Pad differs (thicker, taller, different type foam)

*\*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.



### 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.

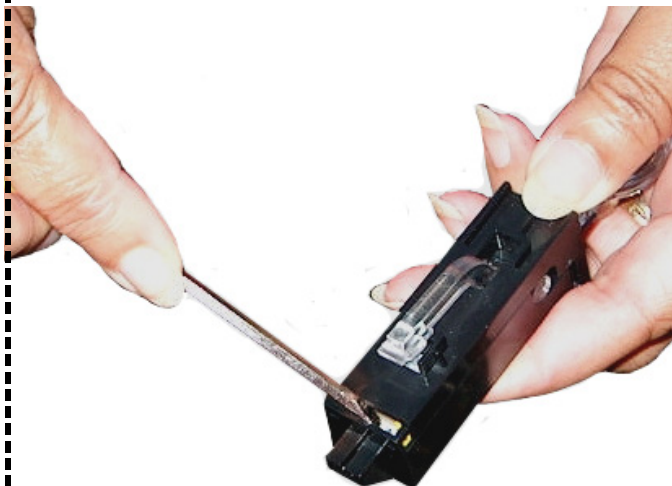
### -XX REPLACE WITH 2-DIGIT FOR COLOR:

- 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.
<b>A</b>	Modular Stand-Up Target Narrow Assy.	500-6138-XX
	Stand-Up Target Narrow (Insert)	545-6138-XX
<b>B</b>	Modular Stand-Up Target Square Assy.	500-6139-XX
	Stand-Up Target Square (Insert)	545-6139-XX
<b>C</b>	Modular Stand-Up Target Rectangle Assy.	500-6228-XX
	Stand-Up Target Rectangle (Insert)	545-6228-XX
<b>D</b>	Modular Stand-Up Target Round Assy.	500-6075-XX
	Stand-Up Target Round (Insert)	545-6075-XX
<b>E</b>	Mod. Stand-Up Target 1" Spherical Assy.	500-6189-XX
	Stand-Up Target 1" Spherical (Insert)	545-6189-XX

### To Replace the « Target Insert » or change Target Orientation :

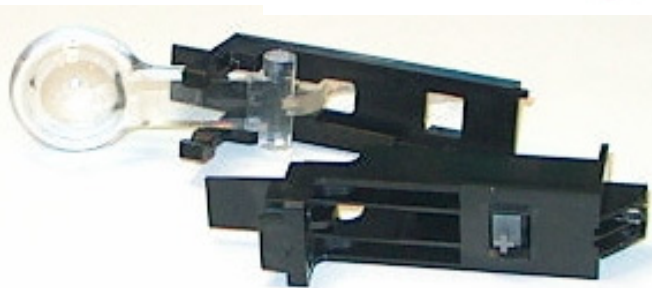
**Items A-E Note:** For the Target Assembly use the "500-" SPI Part Number(s) shown in the Parts Table below. To receive the Target Assembly with the « Target Insert » « Reversed » simply add a "R" at the end of the Part Number. See Side View picture left to compare (dashed line shows target reversed). For just the «Target Insert» use the "545-" SPI Part Number.



### To reverse it yourself or to just change the insert:

- 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.

- 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.



- 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.



# 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>  755-5400-11 Front		<b>USA 10</b>  755-5400-11 Back		<b>USA 2-7 or CANADA</b>  755-5400-02 Front		<b>FOR CUSTOM PRICING †</b>  755-5400-01, -02 or -04 Back		<b>USA 3 with ToPS™</b>  755-5400-03 or -09 Front		<b>USA 5 with ToPS™</b>  755-5400-03 Back / -08 Front	
<b>AUSTRALIA 1 F.</b>  755-5406-00 Front		<b>AUSTRALIA 2</b>  755-5406-00 Back		<b>CROATIA</b>  755-5410-00 Front		<b>FOR CUSTOM PRICING †</b>  755-5410-00 Back		<b>DENMARK 1 F.</b>  755-5402-00 Front		<b>DENMARK 2</b>  755-5402-00 Back	
<b>JAPAN 1</b>  755-5408-01 Front		<b>JAPAN 2 F.</b>  755-5408-01 Back		<b>MIDDLE EAST</b>  755-5400-06 Front		<b>ANY COUNTRY CAN USE</b>  755-5400-06 Back		<b>NEW ZEALAND 1 F.</b>  755-5406-00 Back		<b>NEW ZEALAND 2</b>  755-5406-00 Front	
<b>NORWAY 1 F.</b>  755-5403-01 Front		<b>NORWAY 2</b>  755-5403-01 Back		<b>RUSSIA F.</b>  755-5411-00 Front		<b>RUSSIA (ALTERNATE)</b>  755-5411-00 Back		<b>SOUTH AFRICA</b>  755-5409-01 Front		<b>FOR CUSTOM PRICING †</b>  755-5409-01 Back	
<b>SWEDEN 1 F.</b>  755-5404-00 Front		<b>SWEDEN 2</b>  755-5404-00 Back		<b>SWITZERLAND 1 F.</b>  755-5405-00 Front		<b>SWITZERLAND 2</b>  755-5405-00 Back		<b>TAIWAN</b>  755-5412-00 Front		<b>FOR CUSTOM PRICING †</b>  755-5412-00 Back	
<b>UK 1</b>  755-5407-00 Front		<b>UK 3</b>  755-5407-00 Back		<b>UK 5 F.</b>  755-5407-01 Front		<b>FOR CUSTOM PRICING †</b>  755-5407-01 Back		<b>Appendix J Notes:</b> 1. Coin Card on Game is determined by original shipping country destination. 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> . Older style Coin Cards (foreign or domestic) not available on our website or no longer available through your distributor, are obsolete. 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>  755-5401-01 1-Side Only		<b>EURO 2</b>  755-5401-02 1-Side Only		<b>EURO 3</b>  755-5401-03 1-Side Only		<b>EURO 4</b>  755-5401-04 1-Side Only		<b>EURO 5</b>  755-5401-05 1-Side Only		<b>EURO 6</b>  755-5401-06 1-Side Only	
<b>EURO 7</b>  755-5401-07 1-Side Only		<b>EURO 8</b>  755-5401-08 1-Side Only		<b>EURO 9</b>  755-5401-09 1-Side Only		<b>EURO 10</b>  755-5401-10 1-Side Only		<b>EURO 11</b>  755-5401-11 1-Side Only		<b>EURO 12</b>  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 ITALY 1 PORTUGAL	GERMANY 2	NETHERLANDS 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\* & 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 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 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 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 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 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-		
									(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)				

## APPENDIX B

### Semi-Conductors / Integrated Circuits (I.C.) / Relays Cross-Reference Table

Table No	Type	Source Number	STERN® 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 <b>TLRH180P</b> (T1-3/4 GaAlAs)	165-5052-00 <i>(old SPI Part No: 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 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 D024/02CK	190-5002-00	For PPB, Power Supply, & White Star I/O Boards, Relay = 24v DC 10 Amp DPDT			
	Relay	FRL-264 D006/04CV	190-5001-00	For CPU Boards, 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 White Star Bd. System™	Production Start Date and Manual Part Nr.	CPU/Sound Board Sound U7 512K CPU/Sound Board Game U210 1MB CPU/Sound Board Voice ROMS:				Jumper Installed (‡ see Note)	
		U17	U21	U36	U37		
<p><b>* Note:</b> 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>).</p>							
29	Apollo 13 (A13)	NOV 95 780-5044-00	4MB	4MB	4MB	Not Used	n / a
30	Golden Eye	FEB 96 780-5042-00	4MB	4MB	Not Used	Not Used	n / a
31	Twister	APR 96 780-5041-00	4MB	4MB	Not Used	Not Used	n / a
32	ID4: Independence Day	JUL 96 780-5045-00	4MB	4MB	Not Used	Not Used	n / a
33	Space Jam	OCT 96 780-5043-00	4MB	4MB	4MB	Not Used	n / a
34	The Star Wars Trilogy - Sp. Ed.	FEB 97 780-5056-00	4MB	4MB	Not Used	Not Used	n / a
35	The Lost World: Jurassic Park	JUN 97 780-5053-00	4MB	4MB	Not Used	Not Used	n / a
36	The X-Files	AUG 97 780-5046-00	4MB	4MB	Not Used	Not Used	n / a
37	Starship Troopers	NOV 97 780-5059-00	4MB	4MB	4MB	Not Used	n / a
38	Viper Night Drivin'	FEB 98 780-5035-00	4MB	4MB	4MB	4MB	n / a
39	Lost In Space	JUN 98 780-5060-00	4MB	4MB	4MB	4MB	n / a
40	Godzilla	SEP 98 780-5040-00	4MB	4MB	4MB	4MB	n / a
41	South Park	JAN 99 780-5071-00	8MB	8MB	8MB	8MB	W6
42a	Harley-Davidson®	AUG 99 780-5067-01	8MB	8MB	8MB	8MB	W6
42b	Harley-Davidson® 2nd Ed.	SEP 02 780-5067-10	8MB	8MB	8MB	8MB	W6
42c	Harley-Davidson® 3rd Ed.	OCT 04 780-5087-00	8MB	8MB	8MB	8MB	W6
43a	Striker Xtreme	MAR 00 780-5068-01	8MB	8MB	8MB	8MB	W6
43b	NFL	OCT 00 780-5073-00	8MB	8MB	8MB	8MB	W6
44	Sharkey's Shootout	JUL/OCT 00 780-5072-01	8MB	8MB	8MB	Not Used	W6
45	High Roller Casino	JAN 01 780-5065-00	8MB	8MB	8MB	8MB	W6
46	Austin Powers™	MAY 01 780-5074-00	8MB	8MB	8MB	8MB	W6
47	MONOPOLY®	SEP 01 780-5075-00	8MB	8MB	8MB	Not Used	W6
48	Playboy	FEB 02 780-5076-00	8MB	8MB	8MB	8MB	W6
49	RollerCoaster Tycoon™	AUG 02 780-5078-00	8MB	8MB	8MB	Not Used	W6
50	The Simpsons™ Pinball Party	JAN 03 780-5077-00	8MB	8MB	8MB	8MB	W6
51	T3®: Rise of the Machines™	MAY 03 780-5079-00	8MB	8MB	8MB	8MB	W6
52	The Lord of the Rings™	NOV 03 780-5080-00	8MB	8MB	8MB	8MB	
53	Ripley's Believe It or Not!®	APR 04 780-5081-00	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 White Star Board System™	Production Start Date and Manual Part Nr.	CPU/Sound Board Sound U7 512K CPU/Sound Board Game U210 1MB CPU/Sound Board Voice ROMS:				
		U17	U21	U36	U37	
54	Elvis®	AUG 04 780-5084-00	8MB	8MB	8MB	8MB
55	The Sopranos™	FEB 05 780-5085-00	8MB	8MB	8MB	8MB
56	NASCAR®	JUL 05 780-5086-00	8MB	8MB	8MB	8MB
57	Grand Prix	SEP 05 780-5091-00	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 S.A.M. System	Production Start Date and Manual Part Nr.	S.A.M. System CPU/Sound Board Boot EPROM U9			
		965-BOOT-SAM (Programmed)			
58	World Poker Tour™ (WPT)	JUN 06 780-5088-00	8MB	B-02 V2.1+ chksum \$F625	LOC: U9
59	The Simpsons™ Kooky Carnival	APR 06 780-5090-00	8MB	B-02 V2.1+ chksum \$F625	LOC: U9
60	©Disney's Pirates of the Caribbean	AUG 06 780-5092-00	8MB	B-02 V2.1+ chksum \$F625	LOC: U9
61	Famil Guy™	DEC 06 780-5093-00	8MB	B-02 V2.1+ chksum \$F625	LOC: U9
62	Spider-Man™	MAY 07 780-5094-00	8MB	B-02 V2.1+ chksum \$F625	LOC: 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 2-Flipper	520-5137-00	520-5136-00	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-01	520-5124-00 Single OPTO	520-5125-00 Single OPTO	5-Ball Trough over Up-Kicker
	Miscellaneous PC Boards:	Light Boards 520-5130-01, -04 & -05 Magnet Interface, 7-Segment Display & Light Bd. 520-5130-06 Magnet Driver Board 520-5130-02 Switch Membrane Board 520-5130-03				Relay Board 520-5010-00			
Golden Eye	520-5080-00 2-Flipper	520-5137-00	520-5136-00	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-01	520-5124-00 Single OPTO	520-5125-00 Single OPTO	5-Ball Trough over Up-Kicker
	Miscellaneous PC Boards:	Light Boards 520-5128-05 through -08		Mag. Processor X2 Driver Bd. 520-5143-00	Relay Board 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	520-5052-00 128 X 32 Dots	520-5055-01	520-5124-00 Single OPTO	520-5125-00 Single OPTO	5-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	Light Boards 520-5145-01 through -07		Mag. Drv. Bd. 520-5143-00	Relay Board 520-5010-00				
Independence Day (ID4)	520-5137-01	520-5136-10	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-01	520-5124-00 Single OPTO	520-5125-00 Single OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	Light Boards 520-5149-01 through -10		Servo Mtr. Bd. 520-5152-00		520-5082-00 Long Hop OPTO	520-5083-00 Long Hop OPTO	Alien Head Enter	
Space Jam	520-5137-01	520-5136-10	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-01	520-5124-00 Single OPTO	520-5125-00 Single OPTO	5-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	2X 7-Segment Display Board 520-5153-00							
The Star Wars Trilogy - Special Ed.	520-5137-01	520-5136-10	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-01	520-5124-00 Single OPTO	520-5125-00 Single OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	Relay Board 520-5010-00							
The Lost World: J.P.	520-5137-01	520-5136-10	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-01	520-5124-00 Single OPTO	520-5125-00 Single OPTO	4-Ball Trough over Up-Kicker	520-5162-00 2-Pos. Motor Sensor on Snagger Motor
	Miscellaneous PC Boards:	DC Relay Bd. 520-5066-00	Shaker Mtr. Bd. 520-5065-00						
The X-Files	520-5137-01	520-5136-10	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-01	520-5124-00 Single OPTO	520-5125-00 Single OPTO	4-Ball Trough over Up-Kicker	520-5155-00 3-Pos. Motor Sensor on File Cab. Motor
	Miscellaneous PC Boards:					520-5082-00 Long Hop OPTO	520-5083-00 Long Hop OPTO	File Cabinet Enter	
Starship Troopers	520-5137-01	520-5136-15	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-02	520-5124-00 Single OPTO	520-5125-00 Single OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	4X 7-Segment Display Board 520-5166-00				520-5082-00 Long Hop OPTO	520-5083-01 Long Hop OPTO	L/R Orbit Lane Enter	
Viper Night Drivin'	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	520-5124-00 Single OPTO	520-5125-00 Single OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	Relay Board 520-5010-00				520-5082-00 Long Hop OPTO	520-5083-01 Long Hop OPTO	Jump Ramp	
Lost In Space	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	Relay Board 520-5010-00							
Godzilla	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	Shaker Mtr. Bd. 520-5065-00							
South Park	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	5-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:					520-5082-00 Long Hop OPTO	520-5083-01 Long Hop OPTO	Kenny Under Trough Enter	
Harley-Davidson® 1st-3rd* Editions	520-5137-01	520-5136-16 *520-5300-00*	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	Relay Board 520-5010-00		Shaker Mtr. Bd. 520-5065-00	Diode Board 520-5146-00	520-5082-00 Long Hop OPTO	520-5083-01 Long Hop OPTO	Motorcycle Enter	
Striker Xtreme (NFL)	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	520-5155-00 3-Pos. Motor Sensor on Goalie Motor
	Miscellaneous PC Boards:	DC Relay Bd. 520-5066-00	Relay Board 520-5010-00	Diode Board 520-5146-00	for UK ONLY- Solenoid Expander Bd. 520-5192-00	520-5082-00 Long Hop OPTO	520-5083-01 Long Hop OPTO	Goalie Under- Trough Enter	
Sharkey's Shootout	520-5137-64	520-5136-64	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	520-5194-00 4-Pos. Motor Sensor on ? -Ball Motor
	Miscellaneous PC Boards:	Relay Board 520-5010-00		Sol. Exp. Bd. 520-5192-00					
High Roller Casino	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	520-5194-00 4-Pos. Motor Sensor on Roulette Wheel Motor
	Miscellaneous PC Boards:	Dot Display (5X7) in Slot Mach. 520-5197-00			for UK ONLY- Solenoid Expander Bd. 520-5192-00	520-5196-00 3-Pos. OPTO	520-5195-00 3-Pos. OPTO	Ball Lock under Roulette Up/Dn Ramp in Slot Mach.	
Austin Powers™	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	520-5212-00 Pulse-Stretcher OPTO on Spini-Me
	Miscellaneous PC Boards:	Relay Bd. (X3) 520-5010-00			for UK ONLY- Solenoid Expander Bd. 520-5192-00	520-5082-00 Long Hop OPTO	520-5083-01 Long Hop OPTO	Time Machine Ramp	
MONOPOLY®	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	DC Relay Bd. 520-5066-00	Mini-Dot Display (3 by 5X7) 520-5197-00 (Electric C- Sign)		for UK ONLY- Solenoid Expander Bd. 520-5192-00	520-5218-00 4-Pos. OPTO	520-5210-00 4-Pos. OPTO	Bank 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	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	DC Relay Bd. 520-5066-00	Relay Bd. 520-5010-00		for UK ONLY- Solenoid Expander Bd. 520-5192-00				
RollerCoaster Tycoon™	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	520-5222-00 1-Position Switch Detect on Wheel Spin
	Miscellaneous PC Boards:	DC Relay Bd. 520-5066-00	Mini-Dot Display (3 by 5X7) 520-5221-00 (Ramp Enter Sign)		for UK ONLY- Solenoid Expander Bd. 520-5192-00	520-5082-00 Long Hop OPTO	520-5083-01 Long Hop OPTO	Behind 1-Bank Drop Target	
The Simpsons™ Pinball Party	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	LED Bd. 520-5219-00	Color Dot Display (4 by 5X7) 520-5225-00 (TV Set)		for UK ONLY ◀◀◀ Aux. Driver Bd. 520-5068-01				
Terminator® 3: Rise of the Machines™	520-5137-01	<b>520-5136-16</b>	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:				for UK ONLY ◀◀◀ Aux. Driver Bd. 520-5068-01	515-7307-00 Single OPTO	515-7308-00 Single OPTO	TXCannon Trough	
The Lord of the Rings™	520-5137-01	<b>New</b> 520-5300-00	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	500-6746-00 (White Trans.) 500-6747-00 (Black Rec.)
	Miscellaneous PC Boards:	19-LED PCB 520-5242-00	OPTO Transmitter / Receiver Amplifier PCB 520-5239-00		for UK ONLY ◀◀◀ Aux. Driver Bd. 520-5068-01	515-7307-00 Single OPTO	515-7308-00 Single OPTO	Orthanc Tower Trough	
Ripley's Believe It or Not!®	520-5137-01	520-5300-00	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	500-6775-00 OPTO Trnscvr
	Miscellaneous PC Boards:	520-5236-00 X3 Dot Display	OPTO Transmitter / Receiver Amplifier PCB 520-5239-01		for UK ONLY ◀◀◀ Aux. Driver Bd. 520-5068-01	520-5234-00 3-Pos. OPTO	520-5234-00 3-Pos. OPTO	Vari-Target	520-5235-03 X3 Aux. Drvr
Elvis®	520-5137-01	520-5300-00	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:				for UK ONLY ◀◀◀ Aux. Driver Bd. 520-5068-01				
The Sopranos™	520-5137-01	520-5300-00	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:				for UK ONLY ◀◀◀ Aux. Driver Bd. 520-5068-01				
NASCAR® and [INDSE]	520-5137-01	520-5300-00	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	500-6775-00 OPTO Trans. (Qty. 16) Switch Detect.
	Miscellaneous PC Boards:	520-5235-03 X3 Aux. Drvr	OPTO Transmitter / Receiver Amplifier PCB 520-5239-01		for UK ONLY ◀◀◀ Aux. Driver Bd. 520-5068-01				
Grand Prix	520-5137-01	520-5300-00	520-5138-00	520-5052-00 128 X 32 Dots	520-5055-03	515-0173-00 Dual OPTO	515-0174-00 Dual OPTO	4-Ball Trough over Up-Kicker	500-6775-00 OPTO Trans. (Qty. 16) Switch Detect.
	Miscellaneous PC Boards:	520-5235-03 X3 Aux. Drvr	OPTO Transmitter / Receiver Amplifier PCB 520-5239-01		for UK ONLY ◀◀◀ Aux. Driver Bd. 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 Backbox	520-5246-00 Backbox	520-5138-00 Backbox	520-5052-00 128 X 32 Dots	515-0173-00 4-Ball Trough	515-0174-00 4-Ball Trough	500-6775-00 4 Switch Pairs (Qty. 8)	520-5251-00 'U' 1/per PCB Jail Bars Up Ace/Hole Mech 520-5252-04 'U' 4/per PCB Drop Targets 4- & 8- Banks
	Miscellaneous PCBs:	520-5254-00 50V Step-Up Drv	520-5250-14 14LED 5X7 Disp.	520-5239-01 OPTO Amplifier	520-5247-00 Ace/Hole Mech	520-5248-00 Ace/Hole Mech		
The Simpsons™ Kooky Carnival	520-5249-00 Back Door	520-5246-00 Back Door	520-5138-00 Cabinet Rear	520-5052-00 128 X 32 Dots			520-5253-00-ASY Coin Drop (Qty. 11)	
	Miscellaneous PCBs:	515-5742-00 Shaker PCB	500-6700-00 Relay (incl. Wiring + Conn.)					
©Disney's Pirates of the Caribbean	520-5249-00 Backbox	520-5246-00 Backbox	520-5138-00 Backbox	520-5052-00 128 X 32 Dots	515-0173-00 4-Ball Trough	515-0174-00 4-Ball Trough	500-6775-00 5 Switch Pairs (Qty. 10)	
	Miscellaneous PCBs:	520-5239-01 OPTO Amp. (X3)	511-5024-03 Relay (incl. Wiring + Conn.)	520-5238-00 : H-E-A-R-T LED PCB				
Family Guy™	520-5249-00 Backbox	520-5246-00 Backbox	520-5138-00 Backbox	520-5052-00 128 X 32 Dots	515-0173-00 4-Ball Trough	515-0174-00 4-Ball Trough	500-6775-00 3 Switch Pairs (Qty. 6)	520-5252-01 'U' 1/per PCB Drop Target 1-Bank
	Miscellaneous PCBs:	520-5239-01 OPTO Amp. (X2)	520-5261-00 Stepper Motor	511-5042-01 Trgt. Sensor (X2)			500-6775-01 1 Switch Pair (Qty. 2)	520-5252-04 'U' 4/per PCB Drop Target 4-Bank
Spider-Man™	520-5249-00 Backbox	520-5246-00 Backbox	520-5138-00 Backbox	520-5052-00 128 X 32 Dots	515-0173-00 4-Ball Trough	515-0174-00 4-Ball Trough	500-6775-00 3 Switch Pairs (Qty. 6)	
	Miscellaneous PCBs:	520-5239-01 OPTO Amp. (X2)						



# APPENDIX D

## Board Type Table

Game Name	Flipper	Sound	Power Supply	Display X-Digit
• Laser War	2-Flipper Board Not Required	<i>initial:</i> 520-5002-00 <i>replaced with:</i> 520-5002-02 <i>520-5002-01 was not used.</i>	520-5000-00	Master: 520-5004-00 plus: 520-5005-00 (Qty. 2); 7 Digit Alpha/Numeric 520-5006-00 (Qty. 2); 7 Digit Numeric 520-5007-00 (Qty. 1); 4 Digit Numeric
• Secret Service • Torpedo Alley	3-Flipper Board Not Required	520-5002-02		520-5014-01 7 Digit Alpha/Numeric Combined
• Time Machine	2-Flipper Board Not Required			520-5030-00 16 Digit Alpha/Numeric Combined
• Playboy 35th Anniversary * • ABC Monday Night Football * • Robocop • Phantom of the Opera • Back to the Future • The Simpsons	520-5033-00 2-Flipper <i>(*only for 100 games of Playboy 35th Anniv. &amp; 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	
• Checkpoint • Teenage Mutant Ninja Turtles	520-5033-00 2-Flipper	520-5002-03	520-5047-00	520-5042-00 128 X 16	520-5055-00				
• Batman • Star Trek 25th Anniv. • Hook		520-5050-01							
• Lethal Weapon 3		520-5050-02	520-5047-01						
• Star Wars • Rocky & Bullwinkle & Friends			520-5052-00 128 X 32						
• Jurassic Park				520-5076-00 3-Flipper					
• Last Action Hero	520-5070-00 2-Flipper	520-5050-03	520-5047-02	520-5055-01					
• Tales from the Crypt • The Who's Tommy	520-5076-00 3-Flipper	520-5077-00							
• WWF Royal Rumble	520-5070 / 5080 -00 4-Flipper (2X2)	520-5050-03	520-5047-03	520-5075-00 192 X 64	520-5092-01	520-5102-00 Single OPTO	520-5103-00 Single OPTO	Paddle Boat Wheel Enter	
• Guns N' Roses	520-5076-00 3-Flipper					520-5126-02	520-5124-00 Single OPTO	520-5125-00 Single OPTO	5-Ball Trough over Up-Kicker
• Maverick	520-5076-00 3-Flipper						520-5124-00 Single OPTO	520-5125-00 Single OPTO	4-Ball Trough over Up-Kicker
• Mary Shelley's Frankenstein	520-5076-00 3-Flipper								
• Baywatch	520-5070 / 5080 -00 4-Flipper (2X2)								
• Batman Forever	520-5076-00 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 -10 Diode Top <BROWN><RED>
22-500	1.7 Ω	090-5017-use: -00 Diode Top	22-750 / 30-2600	2.6 Ω 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> // -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 // -NL No Lugs 11" Leads // -ND No Diode	22-1080	4.2 Ω	090-5032-use: -0B D. Below // -0T D. Top <YEL-GRN> -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 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 use 090-5051-01 No Lugs 11" Leads	23-700 / 30-2600	3.0 Ω 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 // -NL No Lugs 11" Leads // -ND No Diode	23-800 / 30-2600	2.4 Ω 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> -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 (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 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
Golden Eye	2	090-5032-0T 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
Twister	2	090-5020-20T 22-900 -YELLOW-	090-5032-0T 22-1080 -YEL-GRN-	Not Used	Not Used
ID4: Independence Day	3	090-5032-0T 22-1080 -YEL-GRN-	SAME	Not Used	090-5020-30 23-900 -GREEN-
Space Jam †	2	090-5032-0T 22-1080 -YEL-GRN-	090-5020-20T 22-900 -YELLOW-	Not Used	Not Used
The Star Wars Trilogy - Special Edition †	2	090-5032-0T 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
The Lost World: Jurassic Park †	2	090-5032-0T 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
The X-Files †	2	090-5032-0T 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
Starship Troopers †	3	090-5030-0T 23-1100 -ORANGE-	SAME	Not Used	090-5032-0T 22-1080 -YEL-GRN-
Viper Night Drivin' †	2	090-5030-0T 23-1100 -ORANGE-	SAME	Not Used	Not Used
Lost In Space †	2	090-5030-0T 23-1100 -ORANGE-	090-5032-0T 22-1080 -YEL-GRN-	Not Used	Not Used
Godzilla †	2	090-5032-0T 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
South Park †	2	090-5030-0T 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 <b>22-1080 -YEL-GRN-</b>	090-5030-0T <b>23-1100 -ORANGE-</b>	Not Used	Not Used
Striker Xtreme (NFL) †	3	090-5032-0T <b>22-1080 -YEL-GRN-</b>	090-5030-0T <b>23-1100 -ORANGE-</b>	090-5030-0T <b>23-1100 -ORANGE-</b>	Not Used
Sharkey's Shootout †	3	090-5030-0T <b>23-1100 -ORANGE-</b>	SAME	090-5030-0T <b>23-1100 -ORANGE-</b>	Not Used
High Roller Casino †	2	090-5032-20T <b>22-900 -YELLOW-</b>	090-5032-0T <b>22-1080 -YEL-GRN-</b>	Not Used	Not Used
Austin Powers™ †	2	090-5020-30 <b>23-900 -GREEN-</b>	090-5030-0T <b>23-1100 -ORANGE-</b>	Not Used	Not Used
MONOPOLY® †	3	090-5032-0T <b>22-1080 -YEL-GRN-</b>	SAME	Not Used	090-5062-0T <b>23-1500 -BLUE-</b>
Playboy †	2	090-5030-0T <b>23-1100 -ORANGE-</b>	SAME	Not Used	Not Used
RollerCoaster Tycoon™ †	4	090-5032-0T <b>22-1080 -YEL-GRN-</b>	SAME	090-5067-0T <b>25-1400 -RED-</b>	090-5068-0T <b>25-1600 -WHITE-</b>
The Simpsons™ Pinball Party †	6** (5 with Flipper Bats)	090-5032-0T <b>22-1080 -YEL-GRN-</b>	SAME	Not Used	090-5030-0T <b>23-1100 -ORANGE-</b>
		** 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 <b>22-900 -YELLOW-</b>	090-5041-00T <b>25-1800 -BLU-GRN-</b>	090-5025-00 <b>24-1570 -BLUE-</b>
Terminator® 3: Rise of the Machines™ †	2	090-5032-0T <b>22-1080 -YEL-GRN-</b>	SAME	Not Used	Not Used
The Lord of the Rings™ †	2	090-5020-20T <b>22-900 -YELLOW-</b>	SAME	Not Used	Not Used
Ripley's Believe It or Not!® †	3	090-5032-0T <b>22-1080 -YEL-GRN-</b>	SAME	Not Used	090-5067-00T <b>25-1400 -RED-</b>
Elvis® †	4	090-5020-20T <b>22-900 -YELLOW-</b>	SAME	090-5020-30 <b>23-900 -GREEN-</b>	SAME
The Sopranos™ †	2	090-5032-0T <b>22-1080 -YEL-GRN-</b>	SAME	Not Used	Not Used
NASCAR® and [NDSE] †	2	090-5030-0T <b>23-1100 -ORANGE-</b>	SAME	Not Used	Not Used
Grand Prix †	2	090-5030-0T <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 <b>22-1080 [ NO DIODE ]</b>	SAME	090-5030-ND <b>23-1100 [ NO DIODE ]</b>	SAME
©Disney's Pirates of the Caribbean**	2	090-5030-ND <b>23-1100 [ NO DIODE ]</b>	SAME	Not Used	Not Used
Family Guy™ **	3 Norm.	090-5030-ND <b>23-1100 [ NO DIODE ]</b>	SAME	090-5062-ND <b>23-1500 [ NO DIODE ]</b>	Not Used
	2 Mini	090-5046-01-ND <b>27-950 [ NO DIODE ]</b>	SAME		
Spider-Man™ **	3	090-5032-ND <b>22-1080 [ NO DIODE ]</b>	SAME	Not Used	090-5032-ND <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 22-750 / 30-2600	SAME	Not Used	Not Used
Secret Service ‡	3	090-5006-00 23-620 / 30-2600	SAME	Not Used	090-5006-00 23-620 / 30-2600
Torpedo Alley ‡	3	090-5011-00 22-750 / 30-2600	090-5013-00 23-700 / 30-2600	Not Used	090-5012-00 23-800 / 30-2600
Time Machine ‡	2	090-5011-00 22-750 / 30-2600	SAME	Not Used	Not Used
‡ These coils are dual-wound.					
Playboy 35th Anniversary ††	2	090-5020-02 22-900 -YEL-YEL-	SAME	Not Used	Not Used
ABC Monday Night Football ††	2	090-5020-02 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 22-900 -YEL-YEL-	SAME	Not Used	Not Used
Phantom of the Opera	2	090-5020-20 22-900 -YEL-YEL-	SAME	Not Used	Not Used
Back to the Future	2	090-5020-20 22-900 -YEL-YEL-	SAME	Not Used	Not Used
The Simpsons	2	090-5020-20 22-900 -YEL-YEL-	SAME	Not Used	Not Used
Checkpoint	2	090-5020-20 22-900 -YEL-YEL-	SAME	Not Used	Not Used
Teenage Mutant Ninja Turtles	2	090-5020-30 23-900 -GRN-GRN-	SAME	Not Used	Not Used
Batman	2	090-5020-30 23-900 -GRN-GRN-	SAME	Not Used	Not Used
Star Trek 25th Anniversary	2	090-5020-30 23-900 -GRN-GRN-	SAME	Not Used	Not Used
Hook	2	090-5030-00 23-1100 -ORG-ORG-	090-5020-30 23-900 -GRN-GRN-	Not Used	Not Used
Lethal Weapon 3	2	090-5030-00 23-1100 -ORG-ORG-	SAME	Not Used	Not Used
Star Wars	2	090-5032-00 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
Rocky & Bullwinkle & Friends	2	090-5020-30 23-900 -GRN-GRN-	SAME	Not Used	Not Used
Jurassic Park	3	090-5020-30 23-900 -GRN-GRN-	SAME	Not Used	090-5030-00 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 23-900 -GRN-GRN-	SAME	Not Used	Not Used
Tales from the Crypt	3	090-5032-00 22-1080 -YEL-GRN-	SAME	Not Used	090-5041-00 25-1800 -BLU-GRN-
The Who's Tommy	3	090-5020-30 23-900 -GRN-GRN-	SAME	090-5041-00 25-1800 -BLU-GRN-	Not Used
WWF Royal Rumble	4	090-5032-00 22-1080 -YEL-GRN-	SAME	090-5041-00 25-1800 -BLU-GRN-	SAME
Guns N' Roses	3	090-5032-00 22-1080 -YEL-GRN-	SAME	090-5030-00 23-1100 -ORG-ORG-	Not Used
Maverick	3	090-5032-00 22-1080 -YEL-GRN-	SAME	Not Used	090-5032-00 22-1080 -YEL-GRN-
Mary Shelley's Frankenstein	3	090-5030-00 23-1100 -ORG-ORG-	SAME	Not Used	090-5030-00 23-1100 -ORG-ORG-
Baywatch	4	090-5030-00 23-1100 -ORG-ORG-	090-5020-30 23-900 -GRN-GRN-	090-5025-00 24-1570 -See Note-	090-5030-00 23-1100 -ORG-ORG-
Batman Forever	3	090-5032-00 22-1080 -YEL-GRN-	090-5020-20 22-900 -YEL-YEL-	Not Used	090-5020-30 23-900 -GRN-GRN-
Apollo 13	2	090-5032-00 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
Golden Eye	2	090-5032-00 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
Twister	2	090-5020-20 22-900 -YEL-YEL-	090-5032-00 22-1080 -YEL-GRN-	Not Used	Not Used
ID4: Independence Day	3	090-5032-00 22-1080 -YEL-GRN-	SAME	Not Used	090-5020-30 23-900 -GRN-GRN-
Space Jam †	2	090-5032-00T 22-1080 -YEL-GRN-	090-5020-20T 22-900 -YEL-YEL-	Not Used	Not Used
The Star Wars Trilogy - Special Edition †	2	090-5032-00T 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
The Lost World: Jurassic Park †	2	090-5032-00T 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
The X-Files †	2	090-5032-00T 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
Starship Troopers †	3	090-5030-00T 23-1100 -ORG-ORG-	SAME	Not Used	090-5032-00T 22-1080 -YEL-GRN-
Viper Night Drivin' †	2	090-5030-00T 23-1100 -ORG-ORG-	SAME	Not Used	Not Used
Lost In Space †	2	090-5030-00T 23-1100 -ORG-ORG-	090-5032-00T 22-1080 -YEL-GRN-	Not Used	Not Used
Godzilla †	2	090-5032-00T 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
South Park †	2	090-5030-00T 23-1100 -ORG-ORG-	SAME	Not Used	Not Used
Harley-Davidson® † and Harley-Davidson® 2nd Ed. †	2	090-5032-00T 22-1080 -YEL-GRN-	090-5030-00T 23-1100 -ORG-ORG-	Not Used	Not Used
Striker Xtreme (NFL) †	3	090-5032-00T 22-1080 -YEL-GRN-	090-5030-00T 23-1100 -ORG-ORG-	090-5030-00T 23-1100 -ORG-ORG-	Not Used
Sharkey's Shootout †	3	090-5030-00T 23-1100 -ORG-ORG-	SAME	090-5030-00T 23-1100 -ORG-ORG-	Not Used
High Roller Casino †	2	090-5020-20T 22-900 -YEL-YEL-	090-5032-00T 23-1080 -YEL-GRN-	Not Used	Not Used
Austin Powers™ †	2	090-5020-30 23-900 -GRN-GRN-	090-5030-00T 23-1100 -ORG-ORG-	Not Used	Not Used
MONOPOLY® †	3	090-5032-00T 22-1080 -YEL-GRN-	SAME	Not Used	090-5062-00T 23-1500 -BLU-BLU-
Playboy †	2	090-5030-00T 23-1100 -ORG-ORG-	SAME	Not Used	Not Used
RollerCoaster Tycoon™ †	4	090-5032-00T 22-1080 -YEL-GRN-	SAME	090-5067-00T 25-1400 -RED-RED-	090-5068-00T 25-1600 -WHT-WHT
The Simpsons™ Pinball Party †	6* (5 with Flipper Bats)	090-5032-00T 22-1080 -YEL-GRN-	SAME	Not Used	090-5030-00T 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 22-900 -YEL-YEL-	090-5041-00T 25-1800 -BLU-GRN-	090-5025-00T 24-1570 -See Note-
Terminator® 3: Rise of the Machines™ †	2	090-5032-00T 22-1080 -YEL-GRN-	SAME	Not Used	Not Used
The Lord of the Rings™ †	2	090-5020-20T 22-900 -YEL-YEL-	SAME	Not Used	Not Used
Ripley's Believe It or Not!® †	3	090-5032-00T 22-1080 -YEL-GRN-	SAME	Not Used	090-5067-00T 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 60Hz 3W 6 RPM CCW	515-6383-00 <i>incl. Connector</i>
	Moon Unit Rotational Orbit	Multi Products Motor 24VAC 50/60Hz 3W 6 RPM CCW	515-6487-00 <i>incl. Connector</i>
	Shaker	Johnson Motor (Vibrator) 10.5VDC 10 AMP 2950 RPM CW	041-5029-00 <b>MOTOR ONLY</b>
Golden Eye	Satellite Left/Right Movement	Bowman Motor 24VAC 60Hz 3W 6 RPM CW	515-6528-00 <i>incl. Connector</i>
Twister	Spinning Disc with Magnet	Multi Products Motor 24VAC (041-5026-00) 50/60Hz 3W 325 RPM CCW	515-6347-00 <i>incl. Connector</i>
	Backbox Fan (Tornado Wind)	Multi Products Motor 24VAC (041-5052-00) 50/60Hz 3W 3600 RPM CW	515-6531-00 <i>incl. Connector</i>
ID4: Independence Day	Alien Head Open/Close Movement	Servo Motor (94322)	041-5045-00 <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) 60Hz 3W 10 RPM CCW	515-6383-01 <i>incl. Connector</i>
The Lost World: Jurassic Park	Snagger & Center Link Lift Up/Down Movement	Multi Products Motor 20VDC (041-5059-03) 9 RPM Non-Directional	515-6715-03 <i>incl. Connector</i>
	Shaker	Johnson Motor (Vibrator) 10.5VDC 10 AMP 2950 RPM CW	041-5029-00 <b>MOTOR ONLY</b>
The X-Files	X-File Cabinet Lift Up/Down Movement	Multi Products Motor 20VDC 9 RPM CCW	041-5057-00 <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 <i>incl. Connector</i> 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) 50/60Hz 3W 325 RPM CCW	515-6347-00 <i>incl. Connector</i>
Godzilla	Shaker ‡	Multi #3811 0630 Motor (Vibrator) 12VDC 3100 RPM CW (w/DRL PTS) ‡	041-5029-01 <b>MOTOR ONLY</b>
<i>SOUTH PARK (NO MOTOR USED)</i>			
Harley-Davidson® 1st through 3rd Editions	Shaker ‡	Multi #3811 0630 Motor (Vibrator) 12VDC 3100 RPM CW (w/DRL PTS) ‡	041-5029-01 <b>MOTOR ONLY</b>
	Motorcycle Lift Up/Down Movement	Autotrol 24VAC (041-5072-02) 20 RPM CCW	515-7025-00 <i>incl. Connector</i>
Striker Xtreme (NFL)	Goalie (Linebacker) Left to Right Movement	Multi #3590 12VDC (041-5075-00) 60 RPM	515-7071-00 <i>incl. Connector</i>
Sharkey's Shootout	Mystery Ball Rotating Movement	Hankscraft Motor Model-E 24VAC (041-5076-00) 50/60Hz 3W 20 RPM CW	515-7095-00 <i>incl. Connector</i>
High Roller Casino	Roulette Wheel Rotating Movement	Multi Products Motor 20VDC (041-5078-00) 17 RPM CCW	515-7153-00 <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 <i>incl. Connector</i> Requires Shaft 4¼": 530-5503-01
Austin Powers™	Time Machine Rotating Movement	Multi Products Motor 24VAC (041-5079-00) 50/60Hz 20RPM CCW	515-7141-00 <i>incl. Connector</i>
	Laser Beam Left to Right Directional	Autotrol Motor 24VAC (041-5081-00) 50/60Hz 4W 10RPM Bi-Directional	515-7171-00 <i>incl. Connector</i>
	Dr. Evil Target Lift Up/Down Movement	Hankscraft Motor Model-E 24VAC (041-5030-00) 50/60Hz 6RPM CCW	515-5900-00 <i>incl. Connector</i>
Monopoly®	Mini-Flipper (Waterworks) Rotating Movement	Multi Prod. Motor & Gear Box #7000 EX00159A 20VDC 50/60Hz 85RPM CC/CCW	041-5083-00 <b>MOTOR ONLY</b>
Playboy	Triangular Billboard Rotating Movement	Autotrol Motor (BD511 150-1387) 24VAC 50/60Hz 12RPM Bi-Directional	041-5086-02 <b>MOTOR ONLY</b>
	Centerfold Mechanism Open/Close Movement	Multi Products (3680) Motor 12v DC 10/12 RPM CC/CCW	041-5075-04 <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 <i>incl. Connector</i> 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) 21 RPM CW	515-7317-00 <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.) 50/60Hz 10 RPM Bi-Directional	041-5088-01 <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), (Non-Captive Shaft <b>not included</b> ) HSI #46868-12-002	500-6809-00 <i>incl. Connector</i> Requires 7.25" Shaft: 530-5658-00
	▶▶▶ <b>OPTIONAL</b> ◀◀◀ Shaker	Multi #3811 0630 Motor (Vibrator) 12VDC (041-5029-01) 3100 RPM (w/DRL PTS)	515-5893-01 <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 <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 <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 <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 <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 <i>incl. Connector</i>
	Shaker <i>(details in SKC Manual, Page 24)</i>	Multi #3811 0630 Motor (Vibrator) 12VDC 3100 RPM (w/DRL PTS)	041-5029-01 <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) -04 is RoHS compliant; can substitute with -01 domestic	511-5024-04 <i>incl. Connector</i>
	Pirate Ship Sinking/Raising Movement	Multi Products Motor & Gear Box 24VDC Model #7000-DCM 12 RPM	041-5101-00 <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 <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 <i>incl. Connector</i>
	▶▶▶ <b>OPTIONAL</b> ◀◀◀ Shaker Motor Kit 502-5027-00	Multi #3811R 0630 Motor (Vibrator) 12VDC (041-5029-04) 3100 RPM (w/DRL PTS) -04 is RoHS compliant; can substitute with -01 domestic	515-5893-01 <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 Up/Down Movement	Motor 24v A.C. 60 RPM CW	515-5222-00
Phantom of the Opera	Organ Up/Down Movement	Bowman Motor 24v 60Hz 3W 11 RPM CCW	515-5256-00
Checkpoint	Mag Wheel (in Backbox)	Motor D.C. (KEN)	041-5005-00
	Shaker	Johnson Motor (Vibrator)	041-5002-00
Teenage Mutant Ninja Turtles	Spinning Pizza Ball Deflector	Gear Motor 24v A.C. 325 RPM CW	515-5397-00
Batman	Bar Target Up/Down Movement	Bowman Motor 24v 60Hz 3W 11 RPM CCW	515-5256-00
Star Trek 25th Anniversary	Swinging Target	Bowman Motor 24v 22½ RPM	515-5534-00
	Transporter F/X	Gear Motor 24v A.C. 3½ RPM	500-5421-00
	Cooling Fan (for Transporter F/X)	4½" Motor 12v	041-5014-00
Lethal Weapon 3	Spinning Light	Motor 2½ v A.C. 4000 RPM CCW	041-5017-00
Star Wars	Bar Target Up/Down Movement	Bowman Motor 24v 60hz 3W 11 RPM CCW	515-5256-00
	R2D2 Robot Left/Right Movement	Bowman Motor 24v A.C. 22½ RPM CW	515-5571-00
	Death Star Rotation	Bowman "G" Motor 24v A.C. 60Hz 6 RPM CW	515-5570-00
Rocky & Bullwinkle & Friends	Nell Log "Cutting Blade" Forward/Back Movement	Autotrol Model E Motor 24v 60hz 4W 3 RPM CCW	041-5023-00
Jurassic Park	T-Rex Left/Right Movement	Multi Motor 5v D.C.	041-5025-00
	T-Rex Up/Down Movement	Bowman Motor 24v 11 RPM CW	041-5026-00
	Shaker	Johnson Motor (Vibrator)	041-5002-00
Last Action Hero	Crane Left/Right Movement	Multi Products Motor 12v D.C. #3312 OSC	041-5027-00
	Shaker	Johnson Motor (Vibrator) 10.5v D.C. 10 AMP 2950 RPM CW	041-5029-00
Tales from the Crypt	Tombstone Up/Down Movement	Bowman Motor 24v A.C. 6 RPM CCW	515-5900-00
	Shaker	Johnson Motor (Vibrator) 10.5v D.C. 10 AMP 2950 RPM CW	041-5029-00
The Who's Tommy	Mirror Up/Down Movement	Bowman Motor 24v A.C. 6 RPM CCW	515-5900-00
	Flipper Blinders	Servo Motor (94102)	041-5032-00
	Spinning Airplane Propellers	Motor D.C.	041-5033-00
WWF Royal Rumble	Shaker	Johnson Motor (Vibrator) 10.5v D.C. 10 AMP 2950 RPM CW	041-5029-00
Maverick, The Movie	Turning Paddle Wheel	Motor 24v A.C. 10 RPM	041-5036-00
Mary Shelley's Frankenstein	Creature Head Left/Right Movement	Servo Motor (94102)	041-5032-00
Batman Forever	Cannon Left/Right Movement	Bowman Motor 24v A.C. 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








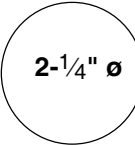
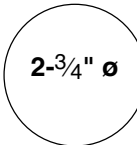




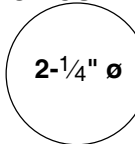
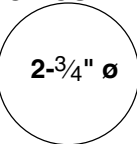
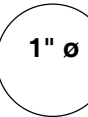
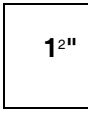

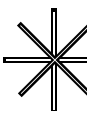
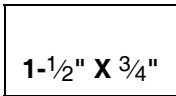
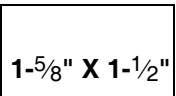
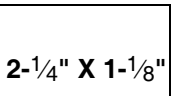
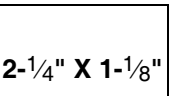
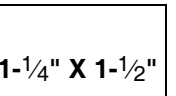
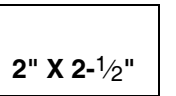


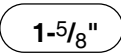
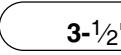
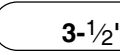

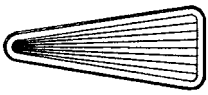
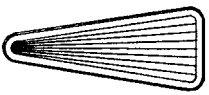
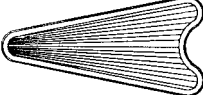
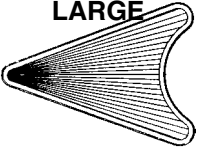
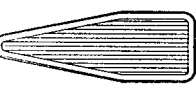
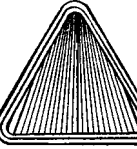
### X. Miscellaneous

- 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> <b>STARBURST</b>  <b>STIPPLE</b> 	<b>STARBURST CIRCULAR</b>  <b>550-5000-XX</b>	<b>STARBURST CIRCULAR</b>  <b>550-5001-XX</b>	<b>STARBURST CIRCULAR</b>  <b>550-5002-XX</b>	<b>STARBURST CIRCULAR</b>  <b>550-5003-XX</b>	<b>STARBURST CIRCULAR</b>  <b>550-5004-XX</b>
<b>STARBURST CIRCULAR</b>  <b>550-5005-XX</b>	<b>STARBURST CIRCULAR</b>  <b>550-5006-XX</b>	<b>PLAIN CIRCULAR</b>  <b>550-5007-XX</b>	<b>PLAIN CIRCULAR</b>  <b>550-5008-XX</b>	<b>PLAIN CIRCULAR</b>  <b>550-5009-XX</b>	<b>PLAIN CIRCULAR</b>  <b>550-5010-XX</b>
<b>PLAIN CIRCULAR</b>  <b>550-5011-XX</b>	<b>PLAIN CIRCULAR</b>  <b>550-5012-XX</b>	<b>STIPPLE CIRCULAR</b>  <b>550-5048-XX</b>	<b>STIPPLE 1" SQUARE</b>  <b>550-5019-XX</b>	<b>ROLLOVER BUTTON BASE</b>  <b>550-5026-XX</b>	<b>WHITE STAR (only in white)</b>  <b>545-5015-00</b>
<b>STIPPLE RECTANGULAR</b>  <b>550-5018-XX</b>	<b>STIPPLE RECTANGULAR</b>  <b>550-5051-XX</b>	<b>STARBURST RECTANGULAR</b>  <b>550-5044-XX</b>	<b>PLAIN RECTANGULAR</b>  <b>550-5049-XX</b>	<b>PLAIN RECTANGULAR</b>  <b>550-5050-XX</b>	<b>PLAIN RECTANGULAR</b>  <b>550-5063-XX</b>
<b>STARBURST MINI SHIELD</b>  <b>550-5024-XX</b>	<b>STARBURST LARGE SHIELD</b>  <b>550-5025-XX</b>	<b>MINI HOT DOG</b>  <b>550-5020-XX</b>	<b>BEVEL HOT DOG</b>  <b>550-5021-XX</b>	<b>PLAIN HOT DOG</b>  <b>550-5022-XX</b>	<b>BANANA</b>  <b>550-5023-XX</b>
<b>STARBURST ARROW-SMALL</b>  <b>550-5013-XX</b>	<b>STARBURST ARROW-LARGE</b>  <b>550-5070-XX</b>	<b>STARBURST ARROW-HEAD SMALL</b>  <b>550-5014-XX</b>	<b>STARBURST ARROW-HEAD LARGE</b>  <b>550-5015-XX</b>	<b>STARBURST BULLET</b>  <b>550-5016-XX</b>	<b>STARBURST TRIANGLE</b>  <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.

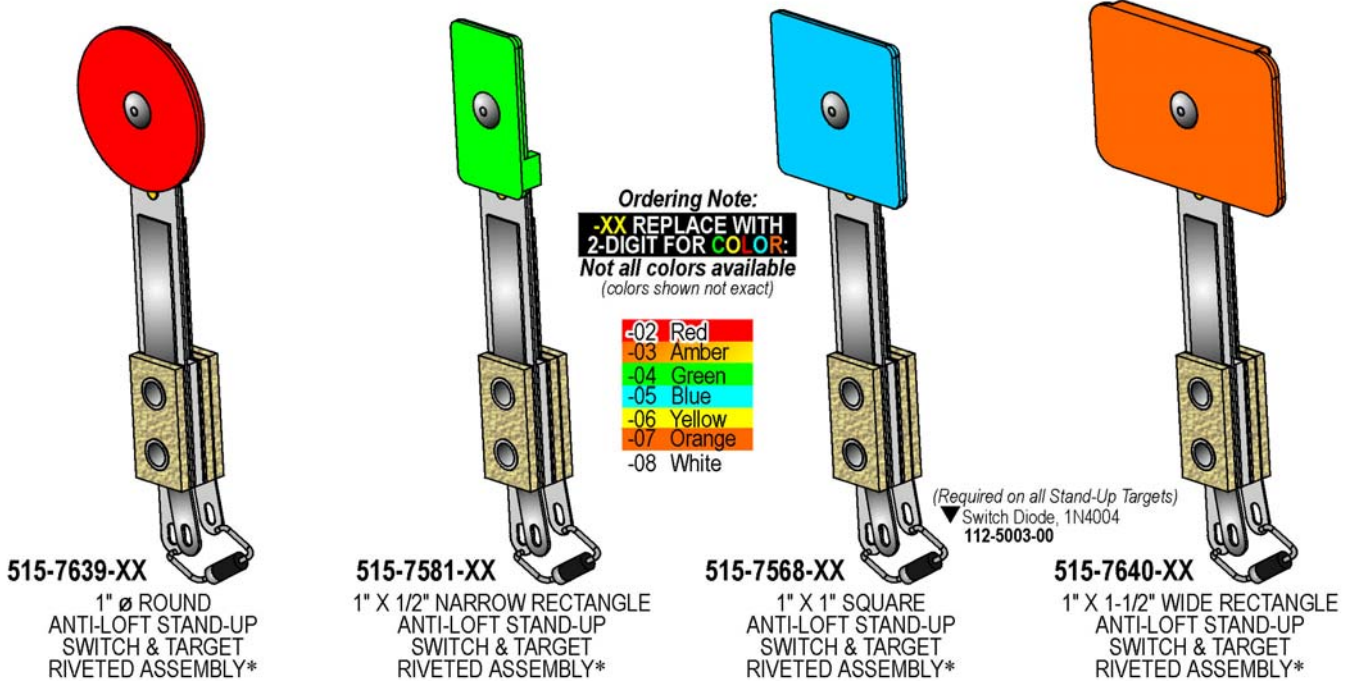
**Instructions:** Parts which may come in various colors (i.e. targets, some posts, playfield inserts, etc.) end in a 2-digit number which correspond to the color of that part. The "-XX" in part number which may come in various colors should be replaced with the desired 2-Digit number corresponding to 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

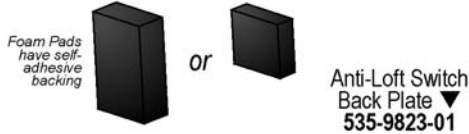
## Anti-Loft Stand-Up Targets



\*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.

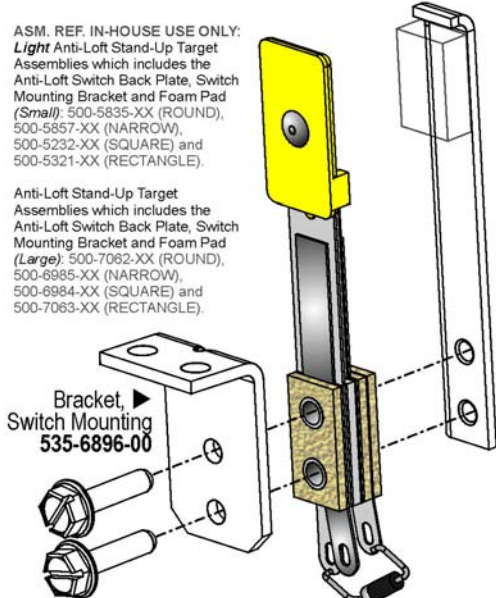
**For Anti-Loft Application use**  
 Large Foam Pad,  
 5/8" X 7/16" X 3/16" Thick  
**626-5078-00**

**For > Light < Anti-Loft Application use**  
 Small Foam Pad,  
 7/16" X 7/16" X 1/8" Thick  
**626-5029-00**

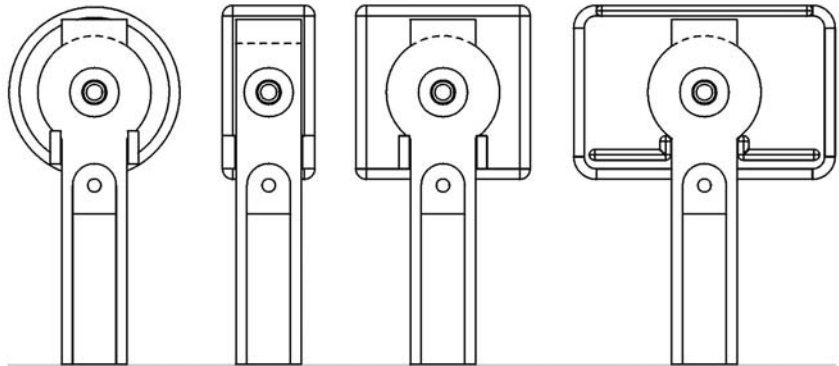


ASM. REF. IN-HOUSE USE ONLY:  
**Light** Anti-Loft Stand-Up Target Assemblies which includes the Anti-Loft Switch Back Plate, Switch Mounting Bracket and Foam Pad (Small): 500-5835-XX (ROUND), 500-5857-XX (NARROW), 500-5232-XX (SQUARE) and 500-5321-XX (RECTANGLE).

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**



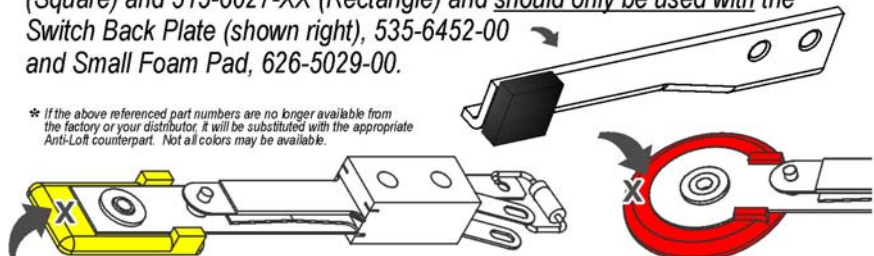
**REAR VIEWS OF ANTI-LOFT TARGET & SWITCH ASSEMBLIES**

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:

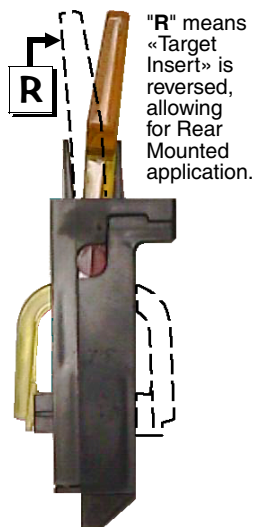
The Switch & Target Assemblies (X) without the extension have the following part numbers\*: 515-5966-XX (Round), 515-5967-XX (Narrow), 515-5162-XX (Square) and 515-6027-XX (Rectangle) and should only be used with the Switch Back Plate (shown right), 535-6452-00 and Small Foam Pad, 626-5029-00.

\* 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.

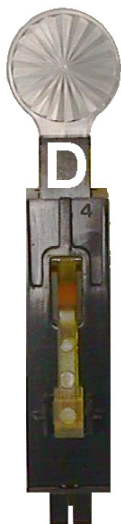
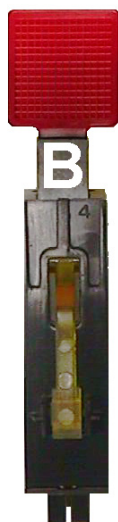


# APPENDIX I

## Modular Stand-Up Targets



"R" means «Target Insert» is reversed, allowing for Rear Mounted application.



### 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.

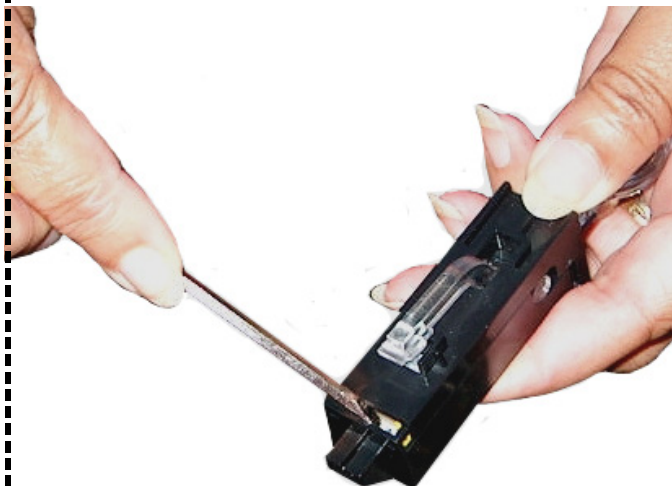
### -XX REPLACE WITH 2-DIGIT FOR COLOR:

- 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

### 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:

- 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.

- 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.



- 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.



# 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>  755-5400-11 Front		<b>USA 10</b>  755-5400-11 Back		<b>USA 2-7 or CANADA</b>  755-5400-02 Front		<b>FOR CUSTOM PRICING †</b>  755-5400-01, -02 or -04 Back		<b>USA 3 with ToPS™</b>  755-5400-03 or -09 Front		<b>USA 5 with ToPS™</b>  755-5400-03 Back / -08 Front	
<b>AUSTRALIA 1 F.</b>  755-5406-00 Front		<b>AUSTRALIA 2</b>  755-5406-00 Back		<b>CROATIA</b>  755-5410-00 Front		<b>FOR CUSTOM PRICING †</b>  755-5410-00 Back		<b>DENMARK 1 F.</b>  755-5402-00 Front		<b>DENMARK 2</b>  755-5402-00 Back	
<b>JAPAN 1</b>  755-5408-01 Front		<b>JAPAN 2 F.</b>  755-5408-01 Back		<b>MIDDLE EAST</b>  755-5400-06 Front		<b>ANY COUNTRY CAN USE</b>  755-5400-06 Back		<b>NEW ZEALAND 1 F.</b>  755-5406-00 Back		<b>NEW ZEALAND 2</b>  755-5406-00 Front	
<b>NORWAY 1 F.</b>  755-5403-01 Front		<b>NORWAY 2</b>  755-5403-01 Back		<b>RUSSIA F.</b>  755-5411-00 Front		<b>RUSSIA (ALTERNATE)</b>  755-5411-00 Back		<b>SOUTH AFRICA</b>  755-5409-01 Front		<b>FOR CUSTOM PRICING †</b>  755-5409-01 Back	
<b>SWEDEN 1 F.</b>  755-5404-00 Front		<b>SWEDEN 2</b>  755-5404-00 Back		<b>SWITZERLAND 1 F.</b>  755-5405-00 Front		<b>SWITZERLAND 2</b>  755-5405-00 Back		<b>TAIWAN</b>  755-5412-00 Front		<b>FOR CUSTOM PRICING †</b>  755-5412-00 Back	
<b>UK 1</b>  755-5407-00 Front		<b>UK 3</b>  755-5407-00 Back		<b>UK 5 F.</b>  755-5407-01 Front		<b>FOR CUSTOM PRICING †</b>  755-5407-01 Back		<b>Appendix J Notes:</b> 1. Coin Card on Game is determined by original shipping country destination. 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> . Older style Coin Cards (foreign or domestic) not available on our website or no longer available through your distributor, are obsolete. 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>  755-5401-01 1-Side Only		<b>EURO 2</b>  755-5401-02 1-Side Only		<b>EURO 3</b>  755-5401-03 1-Side Only		<b>EURO 4</b>  755-5401-04 1-Side Only		<b>EURO 5</b>  755-5401-05 1-Side Only		<b>EURO 6</b>  755-5401-06 1-Side Only	
<b>EURO 7</b>  755-5401-07 1-Side Only		<b>EURO 8</b>  755-5401-08 1-Side Only		<b>EURO 9</b>  755-5401-09 1-Side Only		<b>EURO 10</b>  755-5401-10 1-Side Only		<b>EURO 11</b>  755-5401-11 1-Side Only		<b>EURO 12</b>  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 ITALY 1 PORTUGAL	GERMANY 2	NETHERLANDS 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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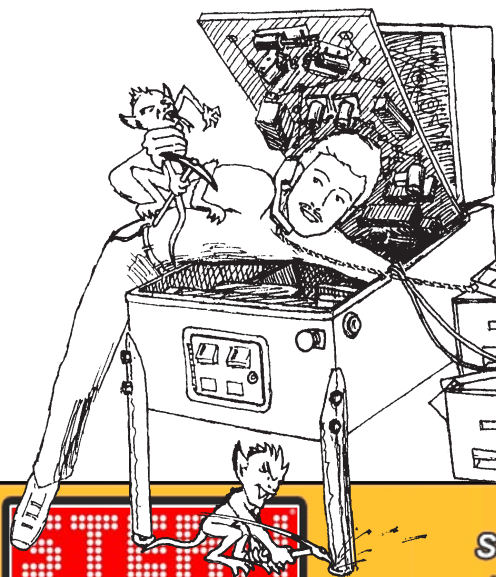
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- **2004 — 2005** Select Pinball Service Game Manual Excerpts only : Parts Identification & Location (**The Pink Pages**), Drawings for Major Assemblies & Ramps (**The Blue Pages**)
- Appendixes **A — J** (*updated with each game*)

#### 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*)

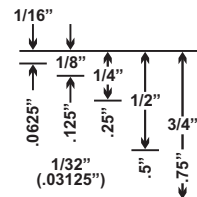
#### Tricks & Tips

- *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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### 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"

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