

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

The inside cover & the front pages
DR. ① thru DR. ⑩ covers the basics...

Find the answers to your questions here...
If you still need help, give us a call!



The Portals™ Service Menu,
Section 3, is your Technical Friend...




Your Parts Sales & Technical Support Team



Susan White
Parts
Sales
MANAGER



Patty Schraps
Parts
Stockroom
MANAGER



Joe Blackwell
DIRECTOR,
Parts Sales &
Technical Support



Chas Siddizi
Technical
Support
ENGINEER



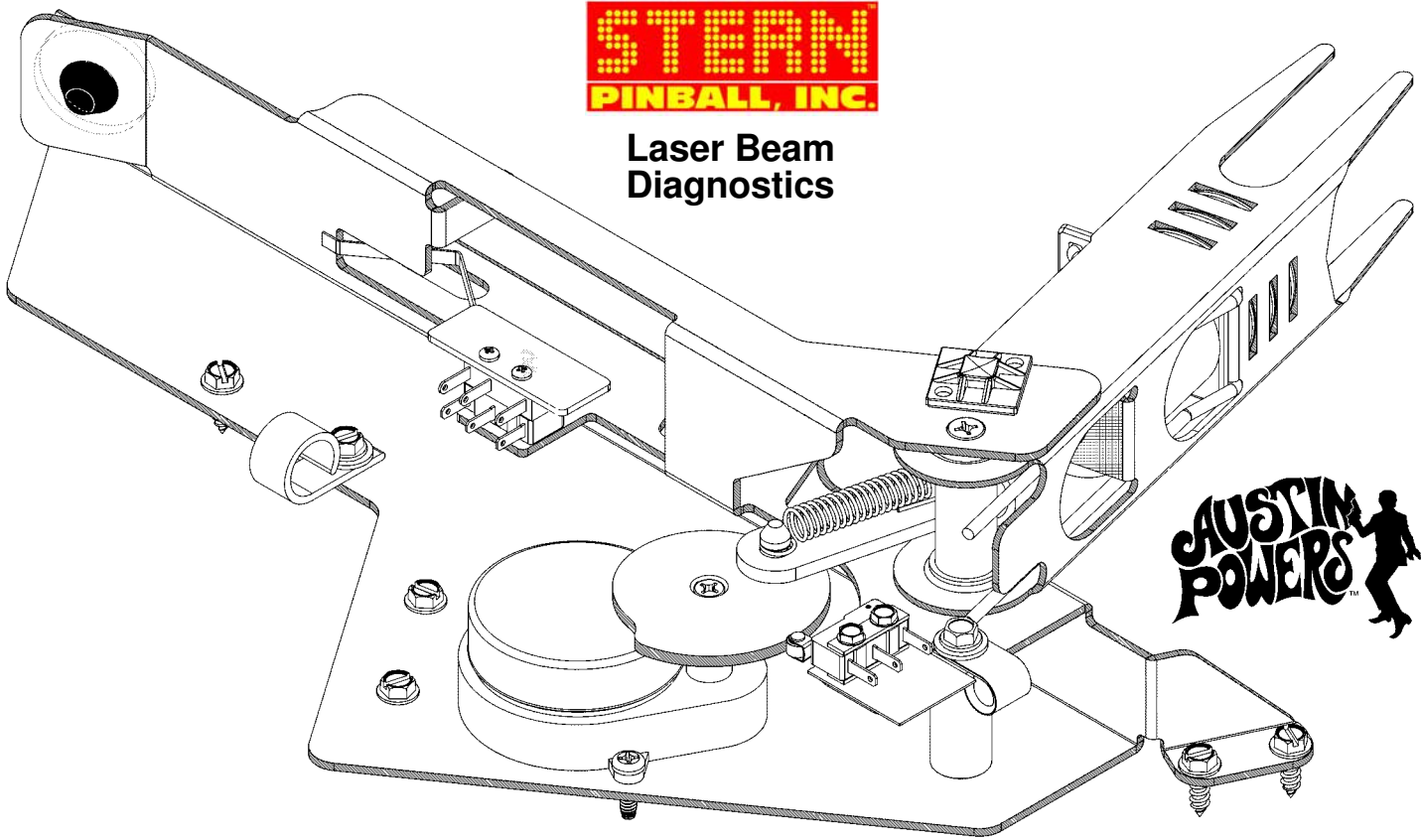
J. Alfer
Technical Support
Documentation
ADMINISTRATOR

Please call us at **1-800-542-5377** or **1-708-345-7700** for Technical Support.
Visit us at our Web Site www.SternPinball.com.

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SPI PN#: 780-5074-11

**Laser Beam
Diagnostics**



Access the Portals™ Service Menu, enter the Diagnostics Menu, and select the "A.P." Icon to proceed with this test.

For more details on the Portals™ Service Menu System, see Sec. 3, Chp. 1, Pages 8-10 & Sec. 3, Chp. 2, Pg. 26.



Laser Beam Test

Selecting the "LASER" Icon will bring up the **LASER BEAM TEST MENU**. This test is provided to allow a method of testing the **Laser Beam Home (Sw. 43)**, **Laser Beam Enable (Sw. 44)**, **Laser Beam Loaded (Sw. 45)**, **Motor Operation (Q21)** and **Coil Operation (Q4)**. Upon entering the test, the **Laser Beam Home Switch (Sw. 43)** is closed . Select the "RUN" Icon to activate the **Motor (Q21)** (Note: Selecting Run will automatically cycle the motor from Home, full out, and return Home). As the motor turns out the **Laser**, the **Sw. 43** box will turn and the **Sw. 44** box will turn solid . This indicates the switches are working properly. With ball-in-hand, roll the ball into the **Laser Beam Ball Trough from the Left Plastic Ramp** and note if **Sw. 45** is being closed (will turn solid .



Laser Beam Switch Terms



Home Switch: Lets the CPU know the Laser is lined up with the ramp and is ready to load.

Enable Switch: Lets the CPU know the Laser is clear of obstacles and is OK to fire.

Loaded Switch: Lets the CPU know the ball is loaded.

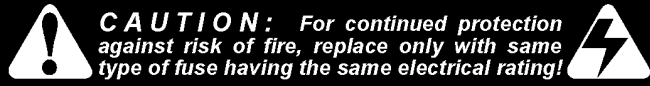
NOTE: If any of the noted switches are malfunctioning, or the coil and/or motor is inoperational, go to the Adjustments Menu, access Adj. 53, **LASER BEAM MTR ENABLED** and change to **NO**. When the problem is fixed, change back to **YES**. For more details on this adjustment, read Sec. 3, Chp. 4, Go To Adjustments Menu.

CAUTION: Upon switch closure of the **Laser Beam Loaded (Sw. 45)**, the **Motor (Q21)** will cycle and the **Laser Beam Eject (Q4)** will pulse. Be careful of moving parts and flying pinball if loaded!).

New to our Pinball Games?

Don't forget to go over **Section 3, Chapter 1, Portals™ Service Menu Introduction**. If using Diagnostics...very useful! Got confused? Comments? Questions? Call Technical Support at 800-542-5377 or 708-345-7700 (Option 1).

Backbox PCB Fuses, ROMs, Bridges, Relays, P/F & Cabinet Fuses, Cab. Switches



QUICK REFERENCE FUSE CHART

Backbox Fuses

LOC: DISPLAY POWER SUPPLY (P.S.) BOARD			
F1	¾A 250v S.B.	90v DC	High Voltage Display
LOC: I / O POWER DRIVER BOARD			
F6	7A 250v S.B.	50v DC	Primary High Power Coils/Flippers
F7	5A 250v S.B.	20v DC	Low Power Coils
F8	5A 250v S.B.	12v DC	Logic Power
F9	5A 250v S.B.	12v DC	Logic Power
F20	4A 250v S.B.	50v DC	Magnet ▶▶▶ THIS GAME ONLY ◀◀◀
F21	3A 250v S.B.	50v DC	Coils
F22	8A 250v S.B.	18v DC	Controlled Lamps
F23	4A 250v S.B.	5v DC	Logic
F24	5A 250v S.B.	6.3v AC	G.I. Lamps (BRN-WHT to WHT-BRN)
F25	5A 250v S.B.	6.3v AC	G.I. Lamps (YEL to WHT-YEL)
F26	5A 250v S.B.	6.3v AC	G.I. Lamps (GRN to WHT-GRN)
F27	5A 250v S.B.	6.3v AC	G.I. Lamps (VIO to WHT-VIO)
F28	3A 250v S.B.	24v AC	Not Used / Spare

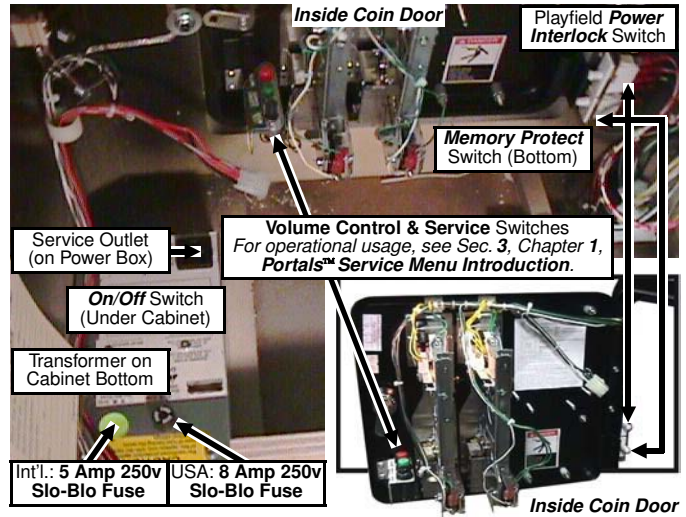
Cabinet Fuses

LOC: SERVICE (AC) OUTLET BOX (Cabinet Bottom)			
n/a	8A 250v S.B.	115v AC	Main Fuse Line (Domestic or USA)
n/a	5A 250v S.B.	220v AC	Main Fuse Line (International)

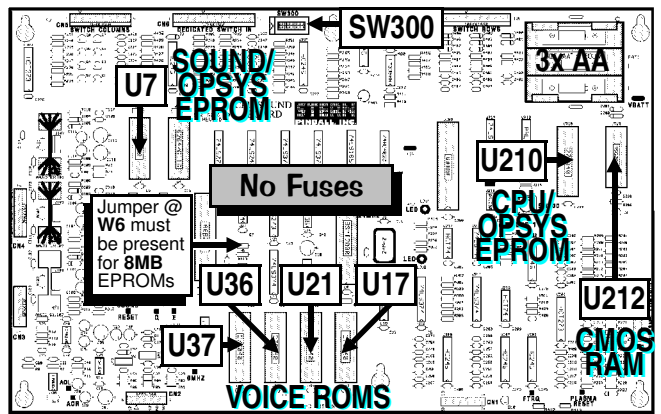
Playfield (P/F) Fuses

LOC: UNDER PLAYFIELD (near Flippers)			
n/a	3A 250v S.B.	50v DC	Rt. Flipper (BLU-YEL ↔ RED-YEL)
n/a	3A 250v S.B.	50v DC	Lt. Flipper (GRY-YEL ↔ RED-YEL)

For locations & more information on fuses, see Sec. 5, Chapter 2.



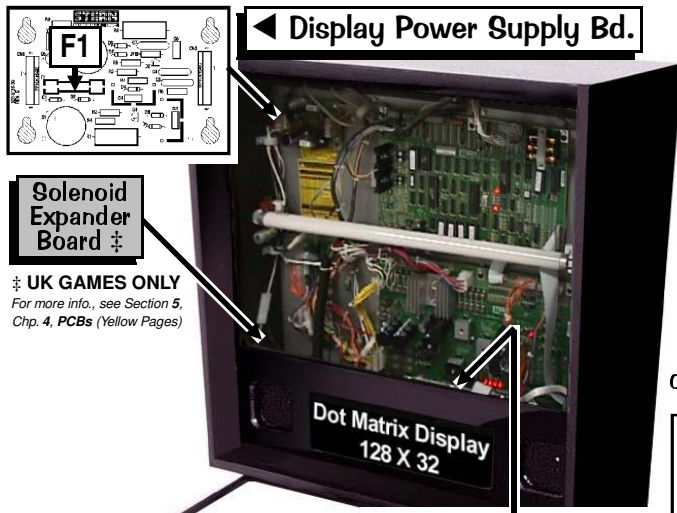
ROM TYPE on BD	LOCATION	SIZE	PART NUMBER
CPU Sound	U7	512K	965-0354-74
CPU Game	U210	1 MB	965-0353-74
CPU Voice ROM 1	U17	8 MB	965-0356-74
CPU Voice ROM 2	U21	8 MB	965-0357-74
CPU Voice ROM 3	U36	8 MB	965-0358-74
CPU Voice ROM 4	U37	8 MB	965-0359-74
DISPLAY Controller	U5	4 MB	965-0355-74



For Schematics and/or Component Parts on PC Boards shown on this page, review Section 5, Chapter 4, Printed Circuit Boards (The Yellow Pages).

CPU / Sound Board ▲

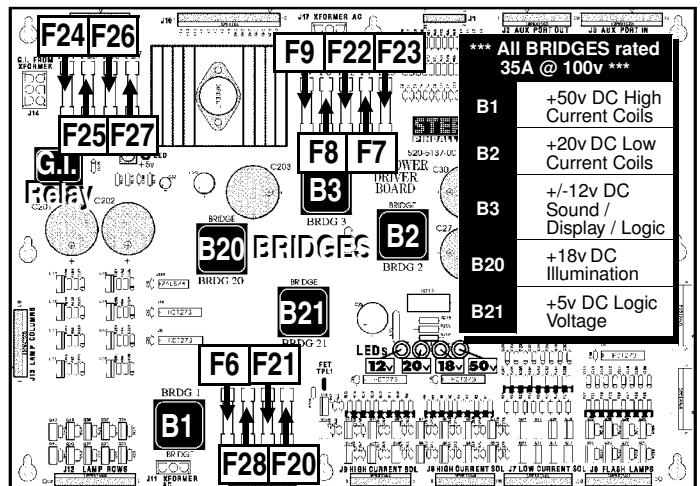
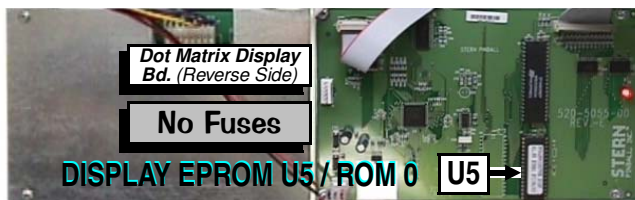
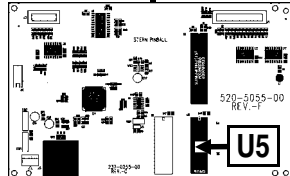
I/O Power Driver Board ▼



‡ UK GAMES ONLY
For more info., see Section 5, Chp. 4, PCBs (Yellow Pages)

Display Controller Bd. ▶

The Display Controller has the Display EPROM (Location: U5 / ROM 0). This board is located behind the 128 X 32 Dot Matrix Display Board.



*** All BRIDGES rated 35A @ 100v ***

B1	+50v DC High Current Coils
B2	+20v DC Low Current Coils
B3	+/- 12v DC Sound / Display / Logic
B20	+18v DC Illumination
B21	+5v DC Logic Voltage



Find-It-In-Front:
Dr. Pinball



////// 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 section (pages DR. ① - ⑩) will assist the technician in locating important technical information needed to troubleshoot the Pinball Machine. **Dr. Pinball** is also available in a Flow Chart Help Format in the Game Display. To access, enter the **Portals™ Service Menu**.

////// How It Works ////

First, the operator / technician must enter the **Service Menu Mode** (for a complete description of the **Portals™ Service Menu and ICONS Read! Section 3, Chapter 1**). To get into the **Service Menu Mode**, power-up the game (if not already) and open the **Coin Door**. On the **Coin Door** is the **Portals™ Service Switch Set** (Red, Green & Black Buttons).

Step 1: Push down the **Black "BEGIN TEST" Button**. Looking at the Video Display you will momentarily see the introductory screen followed by the **MAIN MENU**.

Step 2: Move through the Menus by pushing the **Red "LEFT" or Green "RIGHT" Buttons**.



Step 3: Select or activate the *Icons* by pushing the **Black "ENTER" Button**.

While in the **Portals™ Service Menu**, the **Start Button** can be used in lieu of the **Black Button**; the **Left & Right Flipper Buttons** can be used in lieu of the **Red & Green Buttons**. However, in *Switch or Active Switch Tests* **only** the **Red & Green Buttons** can be used.



In our **Portals™ Service Menu**, selecting the "DR." *Icon* will bring the operator/technician into **DR. PINBALL** (Flow Chart Menus), the "on-screen" diagnostic aide. This is a feature that will allow you to utilize the power of the micro-processor assisting in troubleshooting a problem with the machine in a **Flow Chart** format (follow the questions & answer by using the *Mini-Icons* in the display).



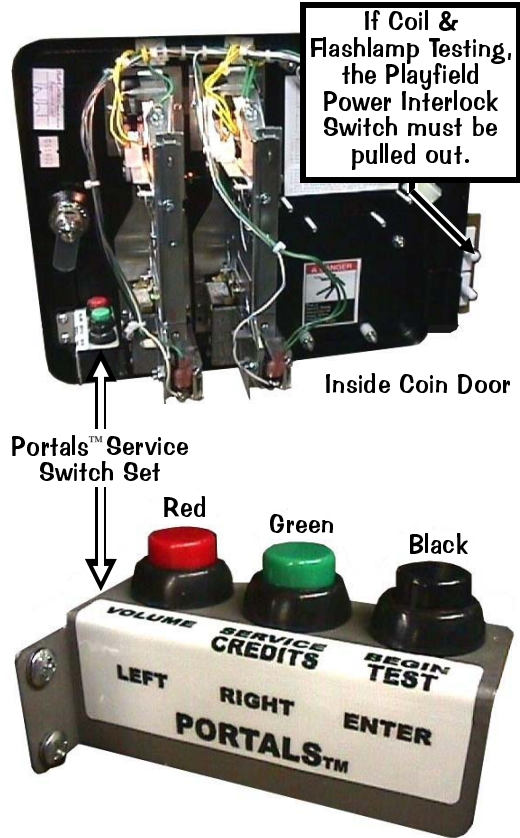
After entering **Portals™**, the **MAIN MENU** now appears with the "DIAG" *Icon* (GO TO DIAGNOSTICS MENU) flashing; press the **Black "ENTER" Button** to activate this **ICON**. The **DIAGNOSTICS MENU** now appears with the "SW" *Icon* (GO TO SWITCH MENU) flashing; use the **Red "LEFT" or Green "RIGHT" Buttons**, until the "DR." *Icon* (DR. PINBALL) is flashing:



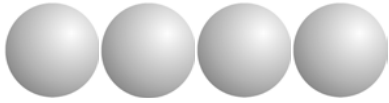
Press the **Black "ENTER" Button** to activate this **ICON**. The **DR. PINBALL MENU** (Flow Chart Menus) now appears with the **COIL "DR." Icon** flashing. Three (3) *Icons*, **Coil "DR."**, **Switch "DR."** and **Lamp "DR."** are available for selection. Selecting a particular *Icon* will give you a choice of which specific **Coil** (any and all coil assemblies such as *Flippers, VUKs, Magnets, etc.*), **Switch** or **Lamp Circuit** needs to be diagnosed. After selection, **Dr. Pinball** will now display a question or a procedure to follow such as "Does the lamp turn on?" or "Check bridge rectifier BR-20, if short replace." When **Dr. Pinball** displays a question or requests a procedure, **Dr. Pinball** will expect a response such as "NO" or "YES". You the operator/technician must respond by using the **Red or Green Buttons** to "SELECT" a *Mini-Icon* and the **Black Button** to "ACTIVATE or ENTER" your selection.



For *Mini-Icons* explanations & details, see the end of **Section 3, Chapter 2, GO TO DIAGNOSTICS MENU, Dr. Pinball**.



For proper operation of this Austin Powers™ Pinball,



FOUR (4) PINBALLS MUST BE INSTALLED!



The display reads "OPERATOR ALERT..."

— A message displayed during Game Mode or Power-Up to alert the operator of a problem.

OPERATOR ALERT works by monitoring any *switch activated coil* that has the potential to trap a ball when disabled (e.g. in the Auto Launch, Scoop, Eject, etc.). If this assembly has a closed switch indicating a ball is stuck or the switch is *stuck closed*, the **CPU/Sound Board** will activate the coil ten times. If the switch remains closed, the game will display a message indicating there is a problem (e.g. "OPERATOR ALERT AUTO LAUNCH NOT WORKING"). This not only warns the operator of a problem immediately, but indicates exactly where the operator should look to resolve it.

The display flashes "OPEN THE COIN DOOR"

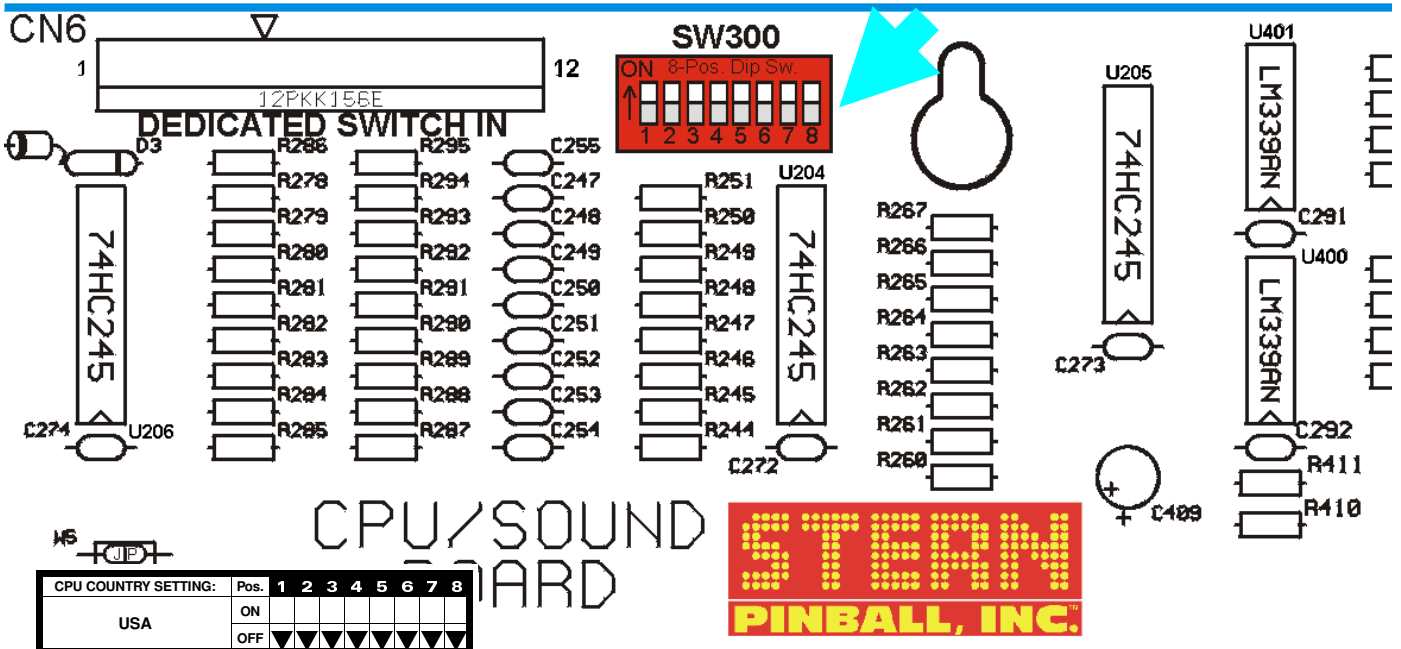
— This indicates that CMOS RAM memory (CPU Loc. U212) has been corrupted.

This is caused by either failure in memory (e.g. batteries are dead or faulty **RAM**) or upon installation of updated version of code. Opening the Coin Door will initiate a Factory Restore, by opening the Memory Protect Switch. Check battery voltage at **VBATT Test Point** on the **CPU/Sound Board**.



CPU DIP SWITCH SETTINGS

Location of Dip Switch [SW300] is on the CPU/Sound Board (Right of CN6, Top Mid)



CPU COUNTRY SETTING:		Pos.	1	2	3	4	5	6	7	8
USA	ON									
	OFF	▼	▼	▼	▼	▼	▼	▼	▼	▼

Custom Factory Adjustments By Country (All countries not noted use the "USA Setting")

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From the Main Menu in Portals™ GO TO DIAGNOSTICS MENU



From the Diagnostics Menu GO TO SWITCH MENU



From the Switch Menu GO TO SWITCH OR ACTIVE SWITCH TEST



From the Switch Menu GO TO DEDICATED SWITCH TEST

SWITCH MATRIX GRID & DEDICATED SWITCHES

D iode O n T ermal S trip :

Column (Drive)	1: Q1	2: Q2	3: Q3	4: Q4	5: Q5	6: Q6	7: Q7	8: Q8	0ND	Ground
Row (Return)	GRN-BRN CN5-P1	GRN-RED CN5-P3	GRN-ORG CN5-P4	GRN-YEL CN5-P5	GRN-BLK CN5-P6	GRN-BLU CN5-P7	GRN-VIO CN5-P8	GRN-GRY CN5-P9	IC U206 INPUT 8	BLK CN6-P1, -P11
1: U400	LEFT BUTTON (UK ONLY) on Cabinet side 1	NOT USED 9	NOT USED 17	(M) OJO STANDUP Under Playfield 25	LEFT ORBIT Under Playfield 33	LEFT RAMP ENTER On Ramp Assy. 41	LEFT BUMPER On Assembly 49	LEFT OUTLANE Under Playfield 57	1: U206 GRY-BRN CN6-P2	#1 LEFT FLIPPER BUTTON in Cabinet side D8-1
2: U400	4TH COIN SLOT On Coin Door 2	NOT USED 10	CENTER RAMP ENTER On Ramp Assy. 18	M(O) JO STANDUP Under Playfield 26	SPINNER (OPTO) On Assembly 34	LEFT RAMP EXIT On Ramp Assy. 42	RIGHT BUMPER On Assembly 50	LEFT RETURN LANE Under Playfield 58	2: U206 GRY-RED CN6-P3	#2 LEFT FLIPPER E.O.S (End-of-Stroke) in Cabinet side D8-2
3: U400	6TH COIN SLOT On Coin Door 3	4-BALL TROUGH #1 (LEFT) On Assembly 11	NOT USED 19	MO(J) O STANDUP Under Playfield 27	CENTER RAMP ENTER (OPTO) On Ramp Assy. 35	LASER BEAM HOME On Assembly 43	BOTTOM BUMPER On Assembly 51	LEFT SLINGSHOT On Assembly 59	3: U206 GRY-ORG CN6-P4	#3 RIGHT FLIPPER BUTTON in Cabinet side D8-3
4: U400	RIGHT COIN SLOT On Coin Door 4	4-BALL TROUGH #2 On Assembly 12	NOT USED 20	MOJ(O) STANDUP Under Playfield 28	NOT USED 36	LASER BEAM ENABLE On Assembly 44	DANCING AUSTIN On Assembly 52	RIGHT OUTLANE Under Playfield 60	4: U206 GRY-YEL CN6-P6	#4 RIGHT FLIPPER E.O.S (End-of-Stroke) in Cabinet side D8-4
5: U401	CENTER COIN SLOT / DBA On Coin Door 5	4-BALL TROUGH #3 On Assembly 13	TOILET Under Playfield 21	AUSTIN STANDUP Under Playfield 29	RIGHT RAMP ENTER On Ramp Assy. 37	LASER BEAM LOADED On Assembly 45	FIRE BUTTON Frnt Top Molding 53	RIGHT RETURN LANE Under Playfield 61	5: U206 NOT USED GRY-GRN CN6-P7	#5 NOT USED D8-5
6: U401	LEFT COIN SLOT On Coin Door 6	4-BALL TROUGH VUK OPTO On Assembly 14	DR. EVIL UP On Assembly 22	POWERS STANDUP Under Playfield 30	RIGHT RAMP EXIT On Ramp Assy. 38	SCOOP On Assembly 46	START BUTTON Cabinet Front 54	RIGHT SLINGSHOT On Assembly 62	6: U206 GRY-BLU CN6-P8	#6 VOLUME (RED BUTTON) (In Test: LEFT) on Coin Door D8-6
7: U401	5TH COIN SLOT On Coin Door 7	4-BALL STACKING OPTO On Assembly 15	DR. EVIL DOWN On Assembly 23	DR. EVIL LEFT STANDUP Under Playfield 31	RIGHT ORBIT Under Playfield 39	LEFT TOP LANE Under Playfield 47	SLAM TILT On Coin Door 55	NOT USED 63	7: U206 GRY-VIO CN6-P9	#7 SERV. CRED. (GREEN BUTTON) (In Test: RIGHT) on Coin Door D8-7
8: U401	RIGHT BUTTON (UK ONLY) on Cabinet side 8	SHOOTER LANE Under Playfield 16	DR. EVIL (TARGET) On Assembly 24	DR. EVIL RIGHT STANDUP Under Playfield 32	NOT USED 40	RIGHT TOP LANE Under Playfield 48	PLUMB BOB TILT Inside Cabinet 56	NOT USED 64	8: U206 GRY-BLK CN6-P10	#8 BEGIN TEST (BLACK BUTTON) (In Test: ENTER) on Coin Door D8-8



From the Diagnostics Menu GO TO LAMP MENU



From the Lamp Menu GO TO SINGLE LAMP TEST



From the Lamp Menu GO TO TEST ALL LAMPS



From the Lamp Menu GO TO ROW OR COLUMN TEST

LAMP MATRIX GRID

D iode O n T ermal S trip :

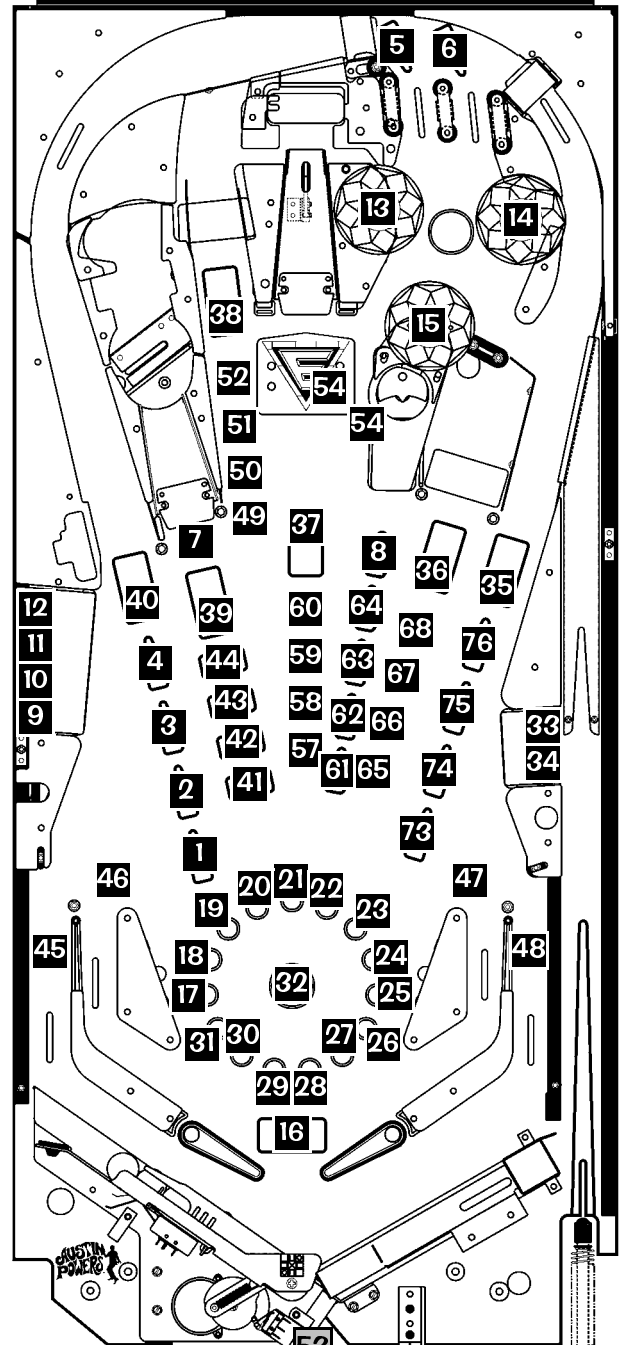
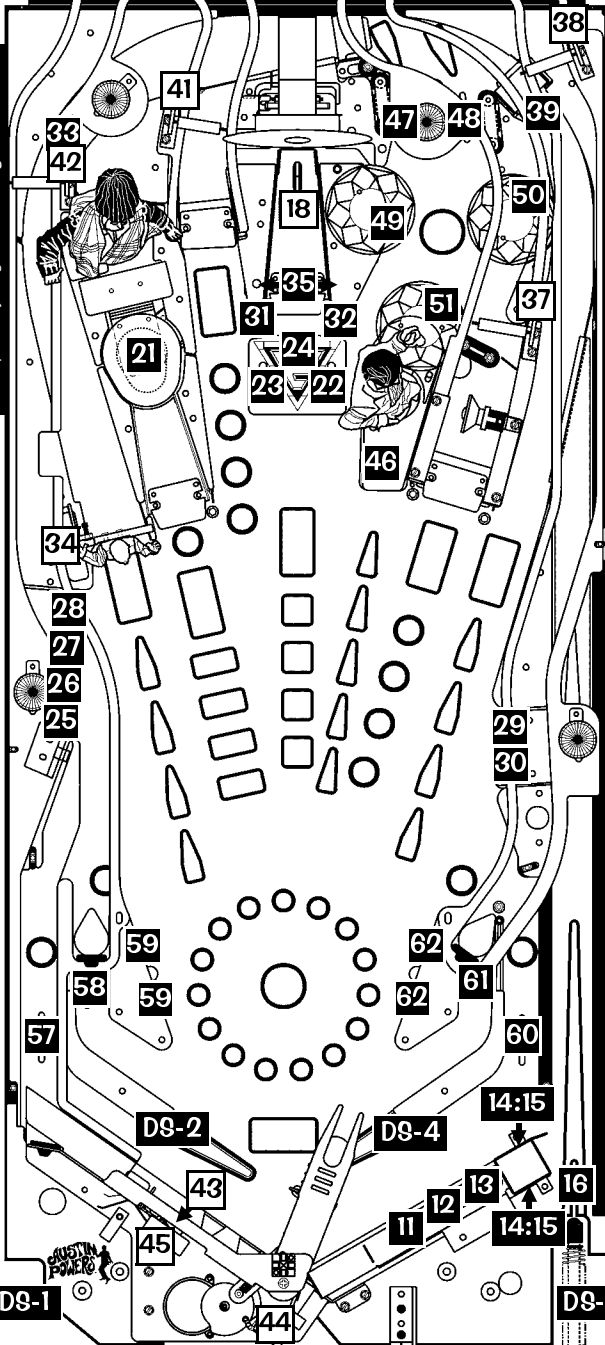
Column (18v)	1: U17	2: U16	3: U15	4: U14	5: U13	6: U12	7: U11	8: U10
Row (GND)	YEL-BRN J13-P9	YEL-RED J13-P8	YEL-ORG J13-P7	YEL-BLK J13-P6	YEL-GRN J13-P5	YEL-BLU J13-P4	YEL-VIO J13-P3	YEL-GRY J13-P1
1: Q33	MINI ME 1 (BOTTOM) #555 Bulb 1	MINI ME 2 #555 Bulb 2	MINI ME 3 #555 Bulb 3	MINI ME 4 (TOP) #555 Bulb 4	IVANA #555 Bulb 5	ALOTTA #555 Bulb 6	SPECIAL #555 Bulb 7	MYSTERY #44 Bulb 8
2: Q34	(M) OJO #44 Bulb 9	M(O) JO #44 Bulb 10	MO(J) O #44 Bulb 11	MOJ(O) #44 Bulb 12	LEFT BUMPER #555 Bulb 13	RIGHT BUMPER #555 Bulb 14	BOTTOM BUMPER #555 Bulb 15	SHOOT AGAIN BABY #555 Bulb 16
3: Q35	BONUS 1 #44 Bulb 17	BONUS 2 #44 Bulb 18	BONUS 3 #555 Bulb 19	BONUS 4 #555 Bulb 20	BONUS 5 #555 Bulb 21	BONUS 10 #555 Bulb 22	BONUS 25 #555 Bulb 23	BONUS 50 #44 Bulb 24
4: Q36	BONUS 75 #44 Bulb 25	BONUS 100 #555 Bulb 26	BONUS 200 #555 Bulb 27	BONUS 300 #555 Bulb 28	BONUS 400 #555 Bulb 29	BONUS 500 #555 Bulb 30	BONUS 1000 #555 Bulb 31	BONUS HELD #555 Bulb 32
5: Q37	(A) P #44 Bulb 33	A(P) #44 Bulb 34	EVIL HENCHMEN #555 Bulb 35	SUB DRILL #555 Bulb 36	TIME MACHINE #555 Bulb 37	LASER BEAM #555 Bulb 38	FAT BASTARD #555 Bulb 39	MINI ME #555 Bulb 40
6: Q38	TOILET 1 (BOTTOM) #555 Bulb 41	TOILET 2 #555 Bulb 42	TOILET 3 #555 Bulb 43	TOILET 4 (TOP) #555 Bulb 44	(S) HAG #555 Bulb 45	S(H) AG #555 Bulb 46	SH(A) G #555 Bulb 47	SHA(G) #555 Bulb 48
7: Q39	LASER BEAM 1 (BOTTOM) #555 Bulb 49	LASER BEAM 2 #44 Bulb 50	LASER BEAM 3 #44 Bulb 51	LASER BEAM 4 (TOP) #44 Bulb 52	FIRE BUTTON #555 Bulb 53	DR. EVIL SPOT-LIGHT X2 #555 Bulbs 54	NOT USED 55	NOT USED 56
8: Q40	TIME MACHINE 1 (BOTTOM) #555 Bulb 57	TIME MACHINE 2 #555 Bulb 58	TIME MACHINE 3 #555 Bulb 59	TIME MACHINE 4 (TOP) #555 Bulb 60	MOON BASE #555 Bulb 61	VIRTUCON #555 Bulb 62	MOJO #555 Bulb 63	EXTRA BALL #44 Bulb 64
9: Q41	SUB DRILL 1 (BOTTOM) #555 Bulb 65	SUB DRILL 2 #555 Bulb 66	SUB DRILL 3 #555 Bulb 67	SUB DRILL 4 (TOP) #555 Bulb 68	NOT USED 69	NOT USED 70	NOT USED 71	NOT USED 72
10: Q42	EVIL HENCHMEN 1 (BOT) #555 Bulb 73	EVIL HENCHMEN 2 #555 Bulb 74	EVIL HENCHMEN 3 #555 Bulb 75	EVIL HENCHMEN 4 (TOP) #555 Bulb 76	NOT USED 77	NOT USED 78	NOT USED 79	NOT USED 80



SWITCH MATRIX GRID LOCATIONS

LAMP MATRIX GRID LOCATIONS

View of "Fat Bastard" Figure may differ than actual part on your game. See Page 82 for details.

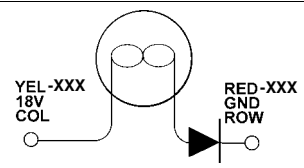
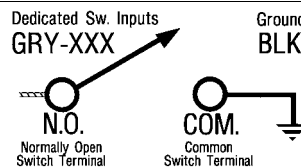
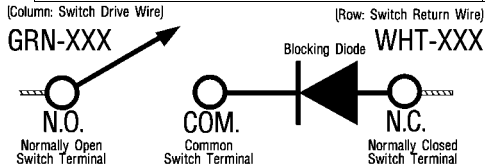


Legend Note: = Switches/Lamps mounted above P/F. = Switches/Lamps mounted below the P/F. = ...mounted on Cabinet.

TYPICAL SWITCH SCHEMATIC

DEDICATED SWITCH SCHEMATIC

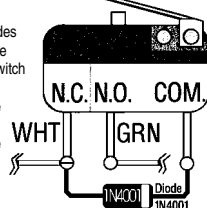
TYPICAL LAMP SCHEMATIC



Note:
All Switches require diodes. Some diodes are located on Terminal Strips OR Diode Boards (under playfield) & not on the switch itself.

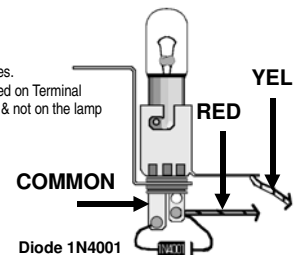
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D iode
O n
D iode



Note:
All Lamps require diodes. Some diodes are located on Terminal Strips (under playfield) & not on the lamp itself.

D iode
O n
T ermin al



Dr. Pinball
Find-It-In-Front:





From the Main Menu in Portals
GO TO
DIAGNOSTICS MENU



From the Diagnostics Menu
GO TO
COIL MENU



From the Coil Menu
GO TO
COIL TEST



From the Coil Menu
GO TO
CYCLING COILS

COILS DETAILED CHART TABLE

High Current Coils Group 1		Drive Transistor (D.T.)	Driver Output Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connection	Power Voltage	Coil GA-Turn or Bulb Type
#1	TROUGH UP-KICKER	Q1	I/O Pwr. Drvr.	BRN-BLK	J8-P1	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#2	AUTO LAUNCH	Q2	I/O Pwr. Drvr.	BRN-RED	J8-P3	YEL-VIO	J10-P4/5	50v DC	24-940 090-5036-00T
#3	SCOOP	Q3	I/O Pwr. Drvr.	BRN-ORG	J8-P4	YEL-VIO	J10-P4/5	50v DC	23-800 090-5001-00B
#4	LASER BEAM EJECT	Q4	I/O Pwr. Drvr.	BRN-YEL	J8-P5	YEL-VIO	J10-P4/5	50v DC	24-940 090-5002-10
#5	FLASH: TIME MACHINE	Q5	I/O Pwr. Drvr.	BRN-GRN	J8-P6	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#6	FLASH: RIGHT RAMP (LOW)	Q6	I/O Pwr. Drvr.	BRN-BLU	J8-P7	ORG	J6-P10	20v DC	#906 Bulb 165-5004-00
#7	DANCING AUSTIN	Q7	I/O Pwr. Drvr.	BRN-VIO	J8-P8	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#8	TOILET POST	Q8	I/O Pwr. Drvr.	BRN-GRY	J8-P9	BRN	J7-P1	20v DC	27-1500 090-5004-00T

High Current Coils Group 2		Drive Transistor (D.T.)	Driver Output Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connection	Power Voltage	Coil GA-Turn
#9	LEFT BUMPER	Q9	I/O Pwr. Drvr.	BLU-BRN	J9-P1	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#10	RIGHT BUMPER	Q10	I/O Pwr. Drvr.	BLU-RED	J9-P2	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#11	BOTTOM BUMPER	Q11	I/O Pwr. Drvr.	BLU-ORG	J9-P4	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#12	FLASH: LEFT RAMP (HIGH)	Q12	I/O Pwr. Drvr.	BLU-YEL	J9-P5	ORG	J6-P10	20v DC	#906 Bulb 165-5004-00
#13	FLASH: RIGHT RAMP (HIGH)	Q13	I/O Pwr. Drvr.	BLU-GRN	J9-P6	ORG	J6-P10	20v DC	#906 Bulb 165-5004-00
#14	TIME MACHINE MAGNET <small>DOTS</small>	Q14	I/O Pwr. Drvr.	BLU-BLK	J9-P7	VIO-YEL	J10-P3	50v DC	20½-480 090-5064-02
#15	LEFT FLIPPER (50v RED/YEL)	Q15	I/O Pwr. Drvr.	ORG-GRY	J9-P8	RED-YEL GRY-YEL	J10-P1/2	50v DC	23-900 090-5020-30T
#16	RIGHT FLIPPER (50v RED/YEL)	Q16	I/O Pwr. Drvr.	ORG-VIO	J9-P9	RED-YEL BLU-YEL	J10-P1/2	50v DC	23-1100 090-5030-00T

Low Current Coils Group 1		Drive Transistor (D.T.)	Driver Output Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connection	Power Voltage	Coil GA-Turn or Meter #
#17	LEFT SLINGSHOT	Q17	I/O Pwr. Drvr.	VIO-BRN	J7-P2	BRN	J7-P1	20v DC	23-800 090-5001-00T
#18	RIGHT SLINGSHOT	Q18	I/O Pwr. Drvr.	VIO-RED	J7-P3	BRN	J7-P1	20v DC	23-800 090-5001-00T
#19	DR. EVIL MOTOR RELAY BOARD	Q19	I/O Pwr. Drvr.	VIO-ORG	J7-P4	BRN	J7-P1	20v DC	Relay Bd. 520-5010-00
#20	TIME MACHINE MTR RELAY BD	Q20	I/O Pwr. Drvr.	VIO-YEL	J7-P6	BRN	J7-P1	20v DC	Relay Bd. 520-5010-00
#21	LASER BEAM MTR RELAY BD	Q21	I/O Pwr. Drvr.	VIO-GRN	J7-P7	BRN	J7-P1	20v DC	Relay Bd. 520-5010-00
#22	LASER BEAM DIVERTER	Q22	I/O Pwr. Drvr.	VIO-BLU	J7-P8	BRN	J7-P1	20v DC	29-1000 090-5059-00
#23	ORBIT DIVERTER	Q23	I/O Pwr. Drvr.	VIO-BLK	J7-P9	BRN	J7-P1	20v DC	32-1800 090-5031-00
#24	OPTIONAL COIN METER	Q24	I/O Pwr. Drvr.	VIO-GRY	J7-P10	RED	J16-P7	5v DC	Meter 5v 091-5000-00

Diode On Terminal Strip (if noted)

Low Current Coils Group 2		Drive Transistor (D.T.)	Driver Output Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connection	Power Voltage	Bulb Type
#25	FLASH: LEFT ORBIT	Q25	I/O Pwr. Drvr.	BLK-BRN	J6-P1	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#26	FLASH: TOILET	Q26	I/O Pwr. Drvr.	BLK-RED	J6-P2	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#27	FLASH: LEFT RAMP	Q27	I/O Pwr. Drvr.	BLK-ORG	J6-P3	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#28	FLASH: CENTER RAMP	Q28	I/O Pwr. Drvr.	BLK-YEL	J6-P4	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#29	FLASH: RIGHT RAMP	Q29	I/O Pwr. Drvr.	BLK-GRN	J6-P5	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#30	FLASH: RIGHT ORBIT	Q30	I/O Pwr. Drvr.	BLK-BLU	J6-P6	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#31	FLASH: POPS X2	Q31	I/O Pwr. Drvr.	BLK-VIO	J6-P7	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#32	FLASH: LEFT RAMP (LOW)	Q32	I/O Pwr. Drvr.	BLK-GRY	J6-P8	ORG	J6-P10	20v DC	#906 Bulb 165-5004-00

Note: In Test Flash Lamps Menu ("Flash" Icon), Flashers tested are all Flash Lamps located between Q1-Q32 (This Game.)

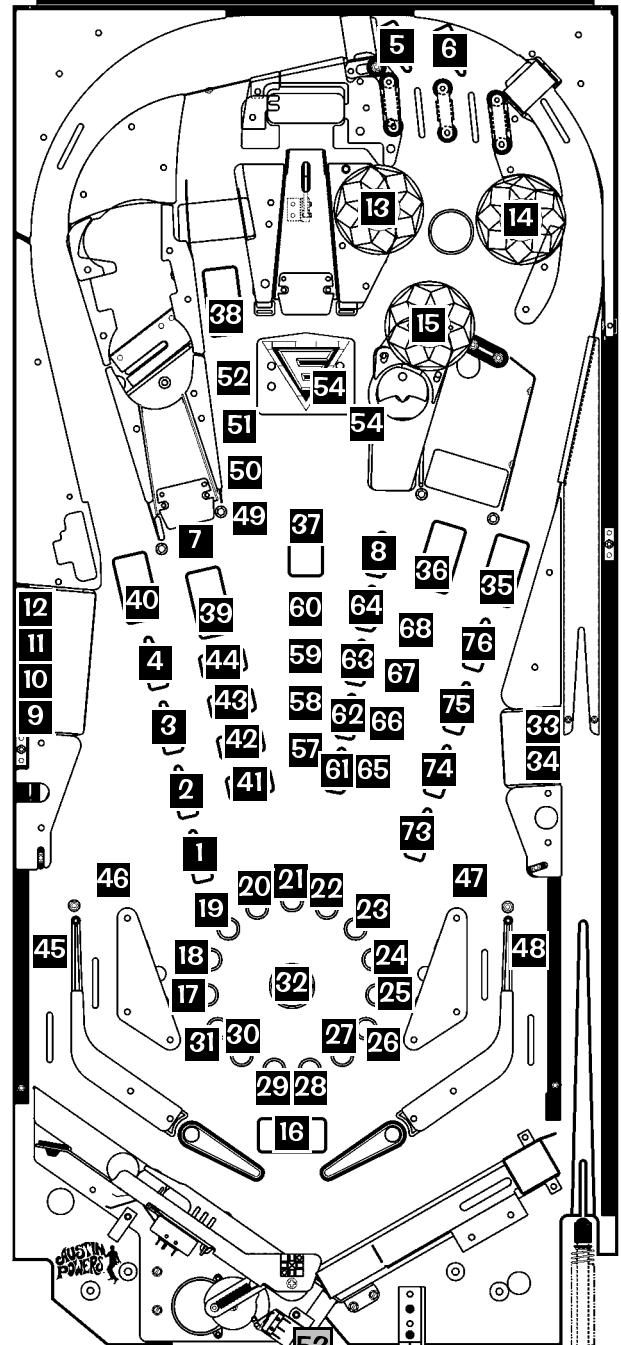
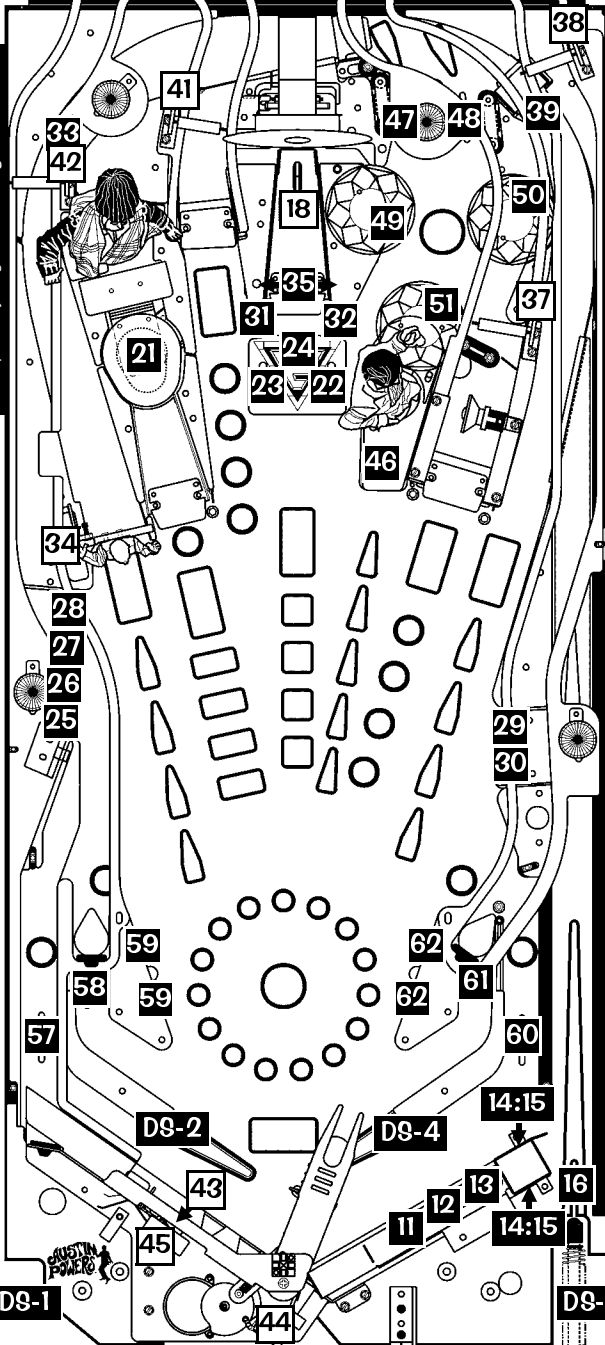
Auxiliary (UK ONLY)		Drive Transistor (D.T.)	Driver Output Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connection	Power Voltage	Coil GA-Turn
AUX 1:	LEFT UP/DOWN POST	Q1	Sol. Expander (Aux. Board)	WHT	J3-P11	BRN	J7-P1	20v DC	26-1200 090-5044-00T
AUX 2:	CENTER UP/DOWN POST	Q2	Sol. Expander (Aux. Board)	RED	J3-P10	BRN	J7-P1	20v DC	23-1100 090-5030-00T
AUX 3:	RIGHT UP/DOWN POST	Q3	Sol. Expander (Aux. Board)	ORG	J3-P9	BRN	J7-P1	20v DC	26-1200 090-5044-00T



SWITCH MATRIX GRID LOCATIONS

LAMP MATRIX GRID LOCATIONS

View of "Fat Bastard" Figure may differ than actual part on your game. See Page 82 for details.

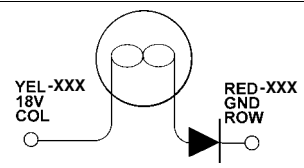
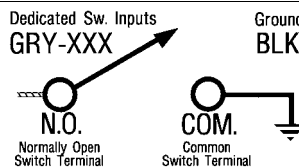
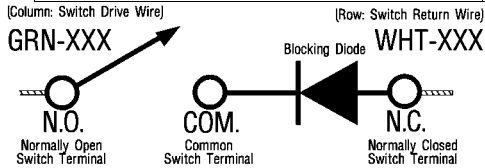


Legend Note: = Switches/Lamps mounted above P/F. = Switches/Lamps mounted below the P/F. = ...mounted on Cabinet.

TYPICAL SWITCH SCHEMATIC

DEDICATED SWITCH SCHEMATIC

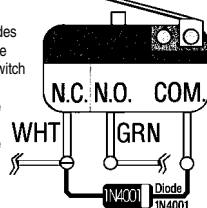
TYPICAL LAMP SCHEMATIC



Note:
All Switches require diodes. Some diodes are located on Terminal Strips OR Diode Boards (under playfield) & not on the switch itself.

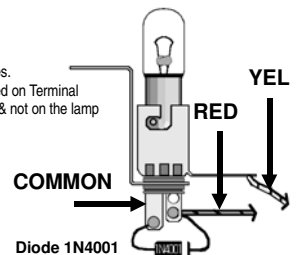
D iode
O n
T ermin al

D iode
O n
D iode



Note:
All Lamps require diodes. Some diodes are located on Terminal Strips (under playfield) & not on the lamp itself.

D iode
O n
T ermin al



Dr. Pinball
Find-It-In-Front:



Domestic Pinball & Redemption Distributors Directory

<p>ALABAMA</p> <p>Birmingham Vending Birmingham (1) 1-205-324-7526</p> <p>Franco Distributing Montgomery (2) 1-334-834-3455</p> <p>ARIZONA</p> <p>Mountain Coin Phoenix 1-602-269-7596</p> <p>CALIFORNIA</p> <p>Betson West Buena Park (1) 1-714-228-7500</p> <p>So. San Francisco (2) 1-650-952-4220</p> <p>C.A. Robinson Los Angeles (3) 1-323-735-3001</p> <p>San Francisco (4) 1-650-871-4280</p> <p>COLORADO</p> <p>Mountain Coin Denver 1-303-427-2133</p> <p>CONNECTICUT</p> <p>Betson Enterprises Milford (1) 1-203-878-6966</p> <p>TDM Distributing Williamantic (2) 1-860-423-1403</p> <p>FLORIDA</p> <p>Birmingham Vending Orlando (1) 1-407-425-1505</p> <p>Brady Distributing Miami [Miramar] (2) 1-954-874-1100</p> <p>Orlando (1) 1-407-872-1666</p> <p>GEORGIA</p> <p>Greater Southern Dist. Smyrna 1-770-803-3040</p> <p>ILLINOIS</p> <p>American Vending Elk Grove Village (1) 1-847-439-9400</p> <p>Atlas Distributing Elk Grove Village (1) 1-847-952-7500</p> <p>World Wide Distributing Chicago (2) 773-384-2300</p>	<p>IOWA</p> <p>Greater America Dist. Johnston 1-515-278-4455</p> <p>Moss Distributing Des Moines 1-515-266-6422</p> <p>INDIANA</p> <p>Atlas Distributing Indianapolis 1-317-786-6892</p> <p>Cleveland Coin Indianapolis 1-317-895-4270</p> <p>Shaffer Distributing Indianapolis 1-317-899-2530</p> <p>KANSAS</p> <p>United Dist., Inc. Wichita 1-316-263-6181</p> <p>KENTUCKY</p> <p>Atlas Distributing Louisville 1-502-966-5266</p> <p>LOUISIANA</p> <p>AMA Distributors, Inc. Metairie (1) 1-504-835-3232</p> <p>New Orleans Novelty New Orleans (2) 1-504-888-3500</p> <p>MARYLAND</p> <p>Betson Enterprises Baltimore 1-410-646-4100</p> <p>Weiner Distributing Baltimore 1-410-525-2600</p> <p>MASSACHUSETTS</p> <p>Betson Ent. (NECO) Norwood (1) 1-781-769-9760</p> <p>Gekay Sales E. Longmeadow (2) 1-413-525-2700</p> <p>MICHIGAN</p> <p>Atlas Distributing Wyoming (1) 1-616-241-1472</p> <p>Cleveland Coin Livonia (2) 1-734-432-1040</p>	<p>MINNESOTA</p> <p>Lieberman Music Minneapolis 1-612-887-5299</p> <p>MISSOURI</p> <p>Greater America Dist. Kansas City (1) 1-816-531-4300</p> <p>Shaffer Distributing St. Louis (2) 1-314-645-3393</p> <p>NEBRASKA</p> <p>Central Dist. Omaha 1-402-493-5600</p> <p>Greater America Dist. Omaha 1-402-553-2812</p> <p>NEVADA</p> <p>Mountain Coin Las Vegas (1) 1-702-798-0900</p> <p>Reno Game Sales Reno (2) 1-775-829-2080</p> <p>NEW JERSEY</p> <p>Betson Enterprises Carlstadt (1) 1-201-438-1300</p> <p>Carter (2) 1-732-750-2700</p> <p>Jack Guarnieri Service Co., Inc. (Pinballsales.com) Lakewood 1-732-364-9900</p> <p>NEW MEXICO</p> <p>Mountain Coin Albuquerque 1-505-345-7706</p> <p>NEW YORK</p> <p>Betson Enterprises New Hyde Park (1) 1-516-354-4647</p> <p>Syracuse (2) 1-315-455-5400</p> <p>Deith Distributing Roslyn Heights (3) 1-516-621-1234</p> <p>NORTH CAROLINA</p> <p>Brady Distributing Charlotte (1) 1-704-357-6284</p> <p>Operators Distributing Archdale (2) 1-336-884-5714</p>	<p>NORTH DAKOTA</p> <p>M.H. Associates, Inc. Fargo 1-701-282-7877</p> <p>OHIO</p> <p>Atlas Distributing Cincinnati (1) 1-513-851-4100</p> <p>Cleveland Coin Cleveland (2) 1-216-692-0960</p> <p>Shaffer Distributing Columbus (3) 1-614-421-6800</p> <p>Macedonia (4) 1-330-467-4850</p> <p>OKLAHOMA</p> <p>Galaxy Distributing Tulsa 1-918-835-1166</p> <p>OREGON</p> <p>Mountain Coin Portland 1-503-234-5491</p> <p>Specialty Coin Products Portland 1-800-987-4946</p> <p>PENNSYLVANIA</p> <p>Betson Enterprises King Of Prussia (1) 1-610-265-1155</p> <p>Pittsburgh (2) 1-412-331-8703</p> <p>Cleveland Coin Pittsburgh (2) 1-412-323-8400</p> <p>Green Coin Pittsburgh (2) 1-412-881-8804</p> <p>Roth Novelty (Superior) Wilkes-Barre (3) 1-570-824-9994</p> <p>SOUTH CAROLINA</p> <p>Green Coin Myrtle Beach 1-843-626-1900</p> <p>TENNESSEE</p> <p>Brady Distributing Memphis 1-901-345-7811</p> <p>Green G.A.M.E.S. Memphis 1-901-353-1000</p>	<p>TEXAS</p> <p>Commercial Music Dallas (1) 1-214-741-6381</p> <p>H.A. Franz, & Co. Houston (2) 1-713-523-7366</p> <p>San Antonio (3) 1-210-226-6322</p> <p>Master Sales Corsicana (4) 1-903-874-4740</p> <p>Southgate Amusement Houston (2) 1-713-691-7335</p> <p>San Antonio (3) 1-210-225-3844</p> <p>Southgate/Moss Dist. Irving (5) 1-972-721-4600</p> <p>UTAH</p> <p>Mountain Coin Salt Lake City 1-801-262-5494</p> <p>Struve Distributing Salt Lake City 1-801-328-1636</p> <p>WASHINGTON</p> <p>Mountain Coin Seattle 1-206-682-5700</p> <p>WISCONSIN</p> <p>Pioneer Sales & Svc. Green Bay (1) 1-920-336-5800</p> <p>Menomonee Falls (2) 1-262-781-1420</p> <p>Lieberman/Viking Vend. Menomonee Falls (2) 1-262-255-6580</p>	<p>CANADA</p> <p>ONTARIO</p> <p>Starburst Coin Mach. Toronto 1-416-251-2122</p> <p>Parts & Service Only:</p> <p>BRITISH COLUMBIA</p> <p>Can. Coin Machine Burnaby (1) 1-604-420-4008</p> <p>Pacific Vending Vancouver (2) 1-604-324-2164</p> <p>QUEBEC</p> <p>Laniel Automatic Mach. Montreal 1-514-731-8571</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: Distributors are subject to change. Visit us at www.SternPinball.com for current Distributor Information.

International Distributors Directory

<p>ARGENTINA</p> <p>Universe Electronics Buenos Aires [54] 1865-4730</p> <p>Electroport (Florenca) Mar Del Plata [54] 22-3495-5532</p> <p>AUSTRALIA</p> <p>Amusement Mach. Dist. Matraville [61] 2931-66000</p> <p>AUSTRIA</p> <p>R. Rupp Kaindorf [43] 3452-86105</p> <p>BELGIUM</p> <p>Brabo Antwerpen [32] 3238-9970</p>	<p>BRAZIL</p> <p>DiverBras São Paulo [55] 1166-741000</p> <p>CHILE</p> <p>Cuinsa Santiago [56] 2641-8520</p> <p>DENMARK</p> <p>Vendcomatic (Oslo, Norway) [47] 2291-8383</p> <p>FINLAND</p> <p>Pelika Ray-Oy Espoo [35] (0) 5892-90452-99</p>	<p>FRANCE</p> <p>Avranches Automatic Ducey [33] 2338-96162</p> <p>SFA Paris [33] 1532-68082</p> <p>GERMANY</p> <p>Bergmann Automaten Hamburg [49] 4101/30 24-0</p> <p>GREECE</p> <p>Elcoin Nikea [30] 1492-9357</p> <p>Greece Coin Athens [30] 1577-7012</p>	<p>ITALY (RSM)</p> <p>Tecnoplay S.A. San Marino [39] 5499-00361</p> <p>NEW ZEALAND</p> <p>Amco Machine Supplies Auckland [64] 9846-7606</p> <p>NORWAY</p> <p>Vendcomatic Oslo [47] 2291-8383</p> <p>PORTUGAL</p> <p>Jacinto & Martins, Lda. Amadora [35] 1214-963744</p>	<p>SINGAPORE</p> <p>Valibel Technologies Singapore [65] 748-8404</p> <p>SPAIN</p> <p>Commercial Cocomatic Madrid [34] 9167-16980</p> <p>SWEDEN</p> <p>Call for Information or visit our website www.SternPinball.com</p> <p>SWITZERLAND</p> <p>Novomat, A.G. Harkingon [41] 6238-88961</p>	<p>UNITED KINGDOM</p> <p>Electrocoin London, England [44] 2089-652055</p> <p>Electrocoin Aftersales Cardiff, S. Wales [44] (0) 2920 343888</p>
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**Dr. Pinball
Find-It-In-Front:**



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

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.

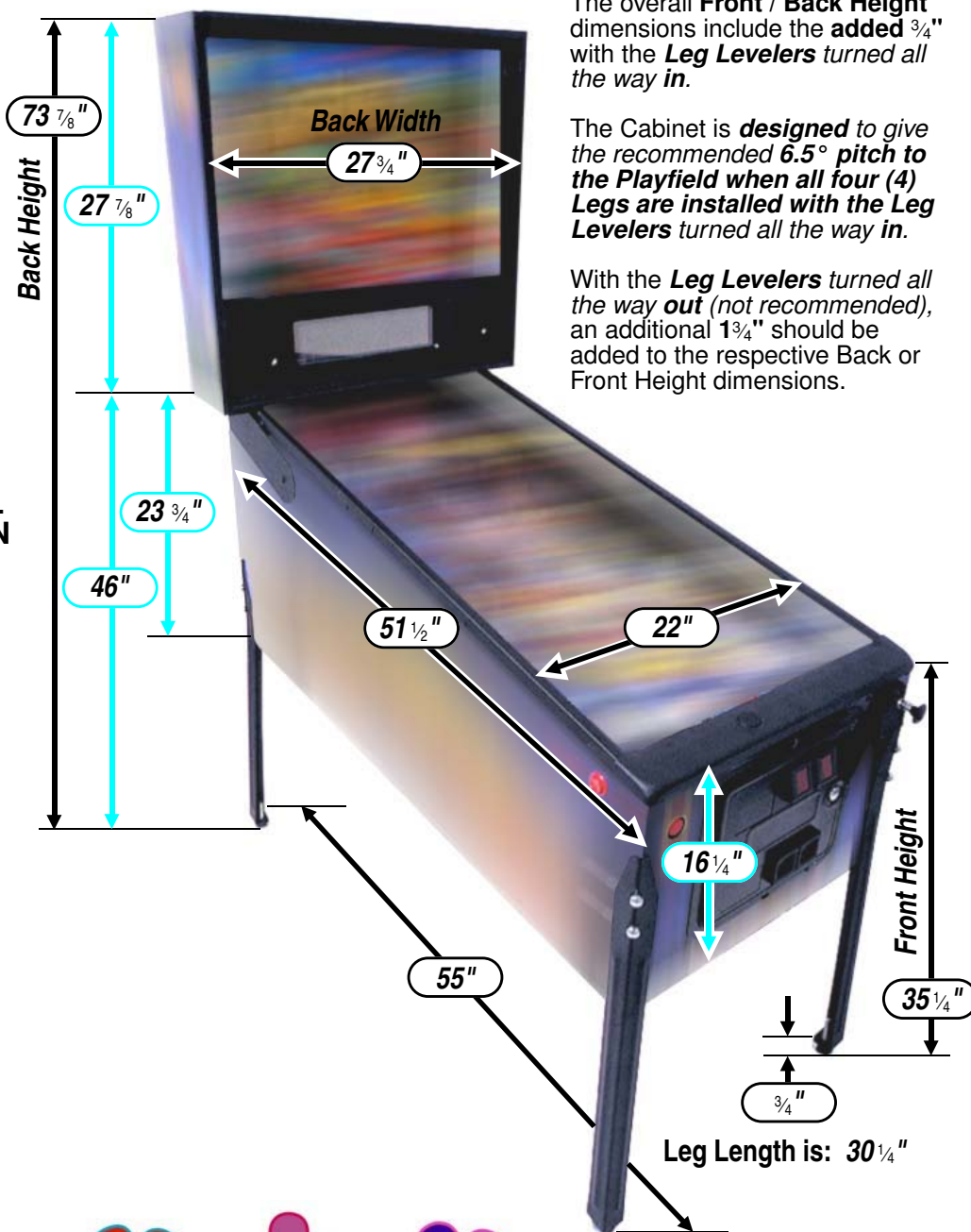
SAVE AND RETAIN ALL PRINTED INFORMATION INSIDE THE CABINET !

Shipping Box Dimensions

Height 56" Width 31"
 Depth 31"
 Approx. Unboxed Weight: 260lbs. (+/- 10)
 Boxed Weight:
Wt. 285lbs. (+/- 5)

CAUTION

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



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

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

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



Find-It-In-Front:
Dr. Pinball





Austin Powers Pinball Game Service Manual General Table of Contents
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After Set-Up

Pinball Game Set-Up Procedures

...after reading the Pinball Game Set-Up Instruction Sheet (SPI Part N^o 755-5310-00) included with your New Pinball Game, continue with the below procedures:

With the Back Glass Removed:

1. Check all connectors in the Backbox for loose wire terminations. Reseat any loose wire by pushing in on the terminal. **Push on all connectors** plugged into the CPU/Sound Board, I/O Power Driver Board, and the Display Power Bd. to check that they are properly seated. Ensure Fluorescent Light Tube is seated correctly. Check that all fuses are seated properly. *Close and lock the Backbox and secure its' keys back inside the Coin Door.*

With the Playfield Glass Removed:

2. Make sure the proper amount of pinballs were installed (*Amount of balls are always specified on decal attached to the lock down assembly and top of Page DR. 5 in the beginning of this manual*).

3. Remove all shipping tie downs, shipping blocks, packing foam, shipping instruction pages, etc. (if any) from the game. **READ ALL PRINTED INFORMATION!** Shipping instructions, labels and/or decals describe warnings, cautions, and/or important information specific to the game. **SAVE ALL PRINTED INFORMATION.**

4. Raise the playfield and support it, by lifting the **Prop Rod** (*located on the left, inside the cabinet*). The end of the Prop Rod should be placed into the hole under playfield. See the illustration "**Easy Access Service System**" on Page 4.

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


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. With the Leg Levelers turned all the way in (1.25" from floor to bottom of leg), the game pitch is 6.5°; depending on the condition of the floor, adjust the Leg Levelers as required.

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, Portals™ Service Menu Introduction**, and **Chapter 2, Go To Diagnostics Menu**, for instructions on how to enter "**Begin Play Test**" and "**Game Specific**" to test components on the game.

8. If desired, make **Game Pricing (Standard and/or Custom)** and **Add-A-Ball, Novelty, or X-Ball Play** adjustments at this time. See **Section 3, Chapter 4, Go To Adjustments Menu**, for instructions on how to enter adjustments. Follow instructions in the tables provided in the manual for suggestions of customizing.

➔ Per  "The appliance has to be placed in a horizontal position."
"This appliance is not to be cleaned by a Water Jet."

PINBALL GAME SET-UP

CAUTION: At least 2 people are required to move and maneuver game. Use proper moving equipment & extreme care while handling Pinball game is 200lbs (+/- 10). Refer to Game Manual for further Game Set-Up Procedures (Sec. 1, Chap. 1) and other important information.

TOOLS REQUIRED: 5/8" Socket Wrench & Utility Knife



1. Before opening box, lay the box flat on its side with "FRONT THIS SIDE ONLY" facing the floor.

2. Slide game out using the **Black Nylon Strapping** as a handle.

3. Remove the **Four (4) Identical Legs with Levelers** from the carton and set aside. (SAVE all packing materials and information sheets related to this pinball until Set-Up is complete.)

4. At this point **DO NOT CUT STRAPPING** (You want to keep the Backbox secured in the down position). Loosen and remove the 4 Leg Bolts (use 5/8" Socket Wrench) and set aside.

5. Lift game into an **UPRIGHT POSITION** (Coin Door Facing Up).

6. Install **FRONT LEGS** using the bolts removed from **Step 4**. Secure tightly! Take care not to scratch the Back Glass on any of the Legs.

7. Carefully set the game down on the **FRONT LEGS**. Care should be taken. Game is heavy; two (2) people are recommended for this and the following step.

8. Using supports or two (2) people, prop the rear of the cabinet up and install **REAR LEGS**. Secure tightly.

9. **CUT BLACK NYLON STRAPPING**. CAUTION: Strapping will SNAP protect your eyes! Use extreme care when using a utility knife or scissors.

10. Lift the Backbox into the **UPRIGHT POSITION** (ensure the cables do not get pinched).

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

12. The next step you will remove the **PLAYFIELD GLASS & BACK GLASS** to access the inside of the cabinet & Backbox.

13. Open the Coin Door and pull the **YELLOW HANDLE** to the **LEFT** and at the same time pull up on the **FRONT TOP MOLDING** and remove. The **GLASS** can now be pulled out downwards and removed. **TAKE CARE** while moving; set glass on a safe surface.

14. Through the open **Coin Door**, remove the **RETAINING RING** 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 into the **Outside Ball Trough**.

15. Install the **PLUMB BOB** on the **Hangar Wire** & tighten the **Thumb Screw**. Loosening the **Thumb Screw** & lowering or raising the **PLUMB BOB** makes the **Games Tilt Function** more or less sensitive.

Remove the **PINBALL GAME MANUAL**, (stapled to side of the actual top of cabinet). Review **Section 1, Chapter 1**, which describes how to get to the playfield to access the **Plumb Bob** & Assembly. The manual gives you all the important information you need to ensure the best setup and other important information (such as Parts, Diagnostics, Schematics and more...).

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

SPI Part N^o 755-5310-00



Pinball Game Set-Up Future Reference

CAUTION: At least 2 people are required to move and maneuver game.

Use proper moving equipment & extreme care while handling. Pinball game is 260lbs (+/- 10).

Refer to Game Manual for further Game Set-Up Procedures (Sec. 1, Chp. 1) and other important information!

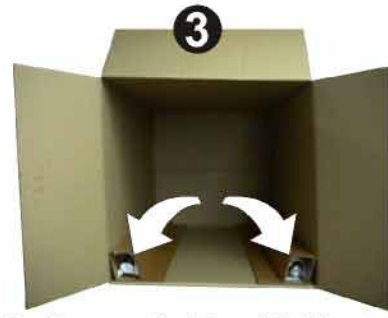
TOOLS REQUIRED: 5/8" Socket Wrench & Utility Knife



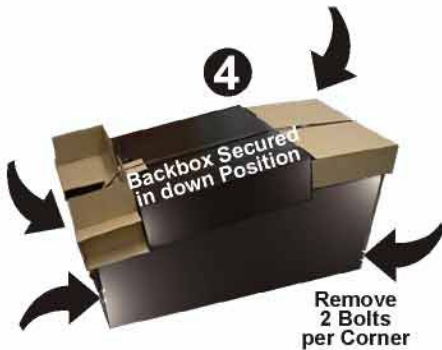
1. Before opening box, lay the box flat on its side with "TRUCK THIS SIDE ONLY" facing the floor.



2. Slide game out using the **Black Nylon Strapping** as a handle.



3. Remove the **Four (4) Identical Legs with Levelers** from the carton and set aside. (**SAVE!** all packing materials and information sheets related to this pinball until Set-Up is complete.)



4. At this point **DO NOT CUT STRAPPING** (You want to keep the Backbox secured in the down position). Loosen and remove the 8 Leg Bolts (use 5/8" Socket Wrench) and set aside.



5. Lift game into an **UPRIGHT POSITION** (Coin Door Facing Up).



6. Install **FRONT LEGS** using the bolts removed from **Step 4**. Secure tightly. **Take care not to scratch the Black Finish on any of the Legs.**



7. Carefully set the game down on the **FRONT LEGS**. Care should be taken...Game is heavy, two (2) people are recommended for this and the following step.



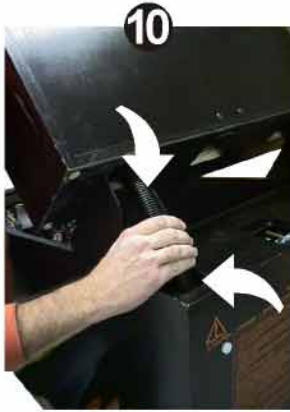
8. Using supports or two (2) people, prop the rear of the cabinet up and install **REAR LEGS**. Secure tightly.



9. Cut **BLACK NYLON STRAPPING**. **CAUTION:** Strapping will **SNAP**, protect your eyes! Use extreme care when using a utility knife or scissors.



Pinball Game Set-Up Future Reference Continued



10. Lift the Backbox into the **UPRIGHT POSITION** (Ensure the cables do not get pinched).

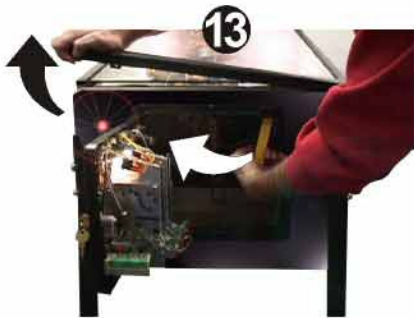


11. After the **BACKBOX** is in the **UPRIGHT POSITION**, locate the **5/16" HEX KEY**. While inserted, rotate **KEY** with a **3/4 turn** until latched & locked.



12. The next step you will remove the **PLAYFIELD GLASS & BACK GLASS** to access the inside of the cabinet & Backbox.

NOTE: KEYS are tied to the **Shooter Rod*** (if equipped) or taped to the **Playfield Glass** (if equipped with **Auto Plunger Button**). Remove keys. One (1) set of keys opens the **Coin Door**, the other set is used to unlock the **Back Glass** to gain access to the **White Star Board System**.



13. Open the **Coin Door** and pull the **YELLOW HANDLE** to the **LEFT** and at the same time pull up on the **FRONT TOP MOLDING** and remove. The **GLASS** can now be pulled out towards you and removed. **TAKE CARE** while moving; set glass on a safe surface.



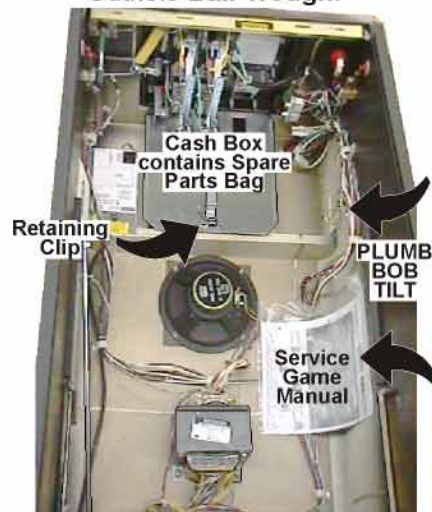
14. Through the open **Coin Door**, remove the **RETAINING RING** at the rear of the **CASH BOX** and open. Remove the **PINBALLS & the PLUMB BOB** from the **SPARE PARTS BAG**. (Save the other spare parts in cabinet). Install the **PINBALLS** by placing them on the playfield so they can roll into the **Outhole Ball Trough**.



15. Install the **PLUMB BOB** on 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.



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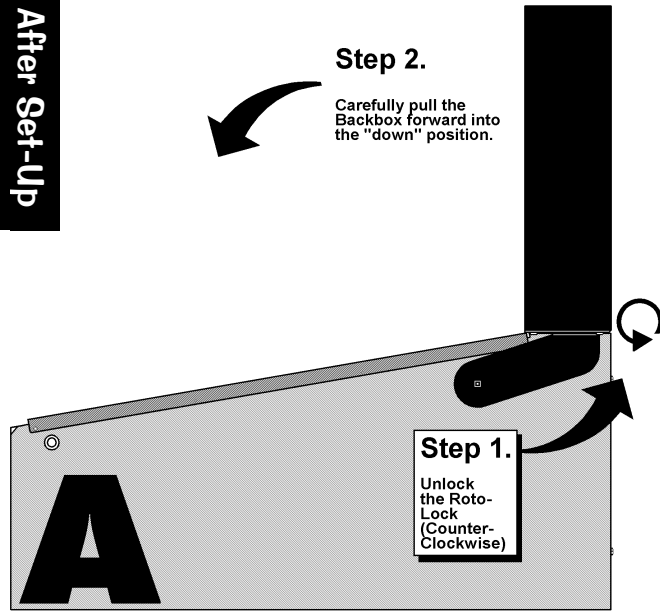
Remove the **PINBALL GAME MANUAL** (stapled to side of the left wall of the cabinet). Review **Section 1, Chapter 1**, which describes how to lift the playfield to access the **Plumb Bob Tilt Assembly**. The manual gives you all the important information you need to prepare for final set-up and other important information (such as Parts, Diagnostics, Schematics and more...).

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

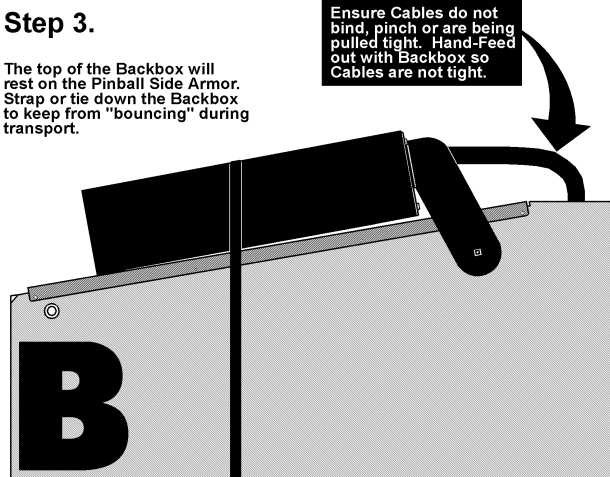


How to Secure the Backbox for Transporting

Sec. 1: After Set-Up



Step 2.
Carefully pull the Backbox forward into the "down" position.



See Section 4, Chapter 1, Backbox Assembly for more details and part numbers.

Leg Leveler Adjustment

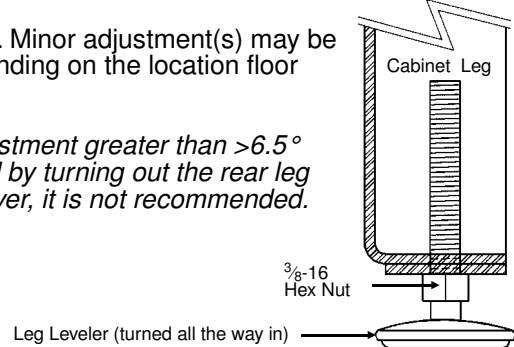
This cabinet is designed to automatically have a 6.5° pitch without any Leg Leveler adjustment!

Attach the four (4) Leg Assemblies to cabinet corners with the eight (8) leg bolts provided. See Section 4, Chapter 1, Cabinet - General Parts, for part numbers.

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

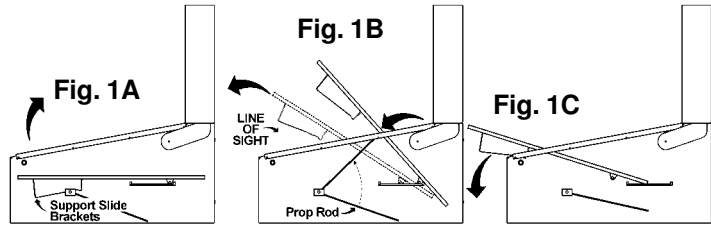
Verify 6.5° pitch. Minor adjustment(s) may be necessary depending on the location floor being level.

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



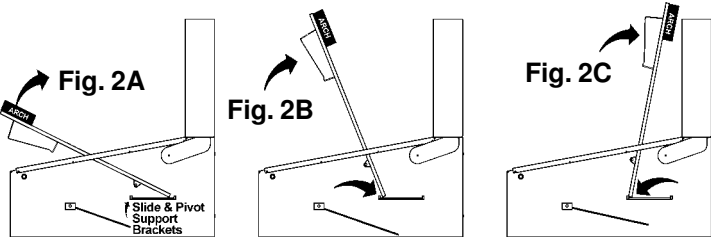
Easy Access Service System - 3 Positions

Carefully lift the playfield *using the Left and Right Ball Guides* upward.



Positions 1 & 2

When lifted high enough, the **Playfield Support Slide Brackets** (Fig. 1A) can be seen & can clear the cabinet front. 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); Or, the **Prop Rod** (located on the right inside of cabinet) can be used by positioning the **Prop Rod** end into the receiving playfield hole (Fig. 1B).



Position 3

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*. An introduction is shown followed by Skill Shot Graphics and/or instructions. 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 ball 1, or power down, will be eliminated.)

Starting Team Play (Doubles!)

Team Play is a four player game. The totals for players 1 & 3 (Team 1) and players 2 & 4 (Team 2) are displayed individually as well as the combined score for both teams. Team Play only works in a 4-Player game. In all other cases, the individual scores are shown.

Starting League Play

After credit is posted, while holding in the **Left Flipper Button**, press the **Start Button**. League Play has now begun. The differences between Normal Game Play and League/Tournament Play are: There is no "auto-percentaging" (awarding extra balls, specials, etc. to players with very low scores on the second or third ball). Mystery Features are awarded in a set order rather than random in Normal Game Play. Percentage Game Features are not automatically advanced as they are for the Regular Play Features.



During Game Features

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. Multiball may vary with the amount of balls used depending on game style.

Replay Feature

Replay awards are given as the player exceeds a High Score Level during game play. This can be adjusted with Adjustment 3, Replay Awards (Default=**CREDIT**, adjustable). 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 (Default = 2, adjustable) or its 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 Adj. 11, Match Percentage (Default=**9%**, adjustable) 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 (to award a credit). Changing this adjustment to **OFF** will not display the "Match Animation" nor award a credit.

Entering Initials/Name (Adjustable, see Sec. 3, Chp. 4, Adj. 27, High Score Initials)

If player achieved a new high score in any of the 3 categories (Regular, Wizard or Special Game Feature), the player may enter their 3 initials or 10-Letter Name. Use the **Left & Right Flipper Buttons** to choose 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: A **Custom Message** (Adjustable, see Sec. 3, Chp. 4, Adj. 29) can be displayed during the *Attract Mode*; enter letters in the same fashion.

Continued Next Page.



Auto Percentaging

This game is equipped with an Auto Percentaging Adjustment. The replay percent is automatically adjusted or you can set a fixed replay score. The factory default percentage is **20%**. Four levels may be selected. Adjustments allow awarding of a "credit" or an "extra ball" as each level is exceeded. 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). See Section 3, Chapter 4, Go To Adjustments Menu, Adj. 1 & Adj. 2. You may choose to make a different "score-to-beat" adjustment; this is done by utilizing Adj. 2, Replay Levels.

Sec. 2: Game Op.

Instruction Card

Below is a **COPY** of the Game Instruction Card (SPI N^o: 755-5174-00 USA) which is included with every game. If your card is lost or damaged, simply **COPY** this page and *cut out* the Instruction Card as a *temporary replacement* until a *new card* is ordered.

(Hint: **COPY & CUT** along the dotted line and fold in the center to keep the "COPY" sturdy.)

COPY & CUT 



For more detailed game rules, visit our website @ www.SternPinball.com and click on the "Austin Powers" or "Game Archive" Pop Bumper Link.

FOLD HERE 

SKILL SHOT Plunge ball into *Flashing Top Lane* for Skill Shot.

EVIL MODES Start all 6 Modes to light Virtucon Multiball.
 Complete all 6 Modes to light Moonbase Multiball.

Mini Me - Shoot *Left Orbit* to start Mini Me Hurryup Mode.

Fat Bastard - Shoot *Toilet* to start Fat Bastard Multiball.

Laser Beam - Shoot *Left Ramp* to start Frickin' Laser Beam Destruction Mode.

Time Machine - Shoot *Center Ramp* to start Time Machine Multiball.

Subterranean Drill - Shoot *Right Ramp* to start Subterranean Drill Mode.

Evil Henchmen - Shoot *Right Orbit* to start Evil Henchmen Round-Up Mode.

MOJO Hit all *MOJO Targets* on the left side to light MOJO Multiball. In MOJO Multiball, bash *Dr. Evil* to regain your MOJO!

SHAG Spell *S-H-A-G* in the *Bottom Lanes* to get SHAG awards.



MYSTERY Shoot *Austin Powers Targets* on right side to light Mystery.

BONUS All switches and shots contribute to end of ball bonus. *Top Lanes* increase **Bonus Multiplier**.


EXTRA BALL Light Extra Ball by starting modes, spelling *S-H-A-G*, completing **Fat Bastard Multiball**, and from *Mystery*.

SPECIAL Light Special at *Mystery* and *Moonbase Multiball*.

Note to Beginners: To score better, shoot at the ((FLASHING SHOTS)) !!
 Be sure to LOOK UP at the Dot Display for instructions when possible.








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FOLD HERE  corner must be turned in to fit properly on the bottom arch.

**CRIMEY
I've Lost My
MOJO!**

Portals™ Service Menu Introduction

Section 3 Table of Contents

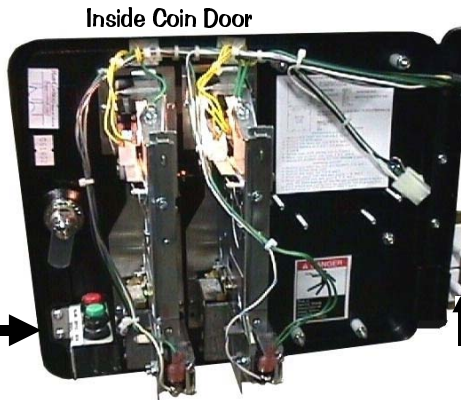
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Sec. 3: ...Menu Intro.



Service Switch Set (Red, Green & Black Buttons) Access & Use

The **Service Switch Set** provides access for **three (3) functions** available for your use. They are **Volume Menu**, **Service Credits Menu** and **Portals™ Service Menu**. All are accessed separately depending on which colored button (**Red**, **Green** or **Black**) is **pushed first**.



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

The Memory Protect Switch is disabled when the Coin Door is open (required for any changes...)

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).

Sec. 3: ...Menu Intro.

Function 1, Volume Menu

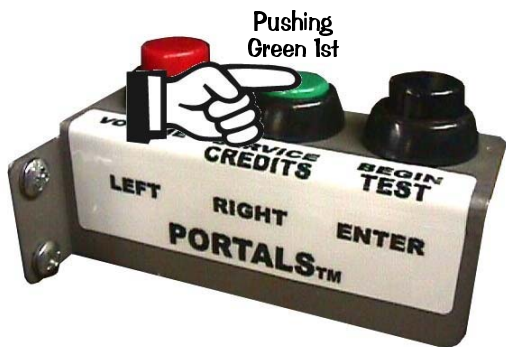


Pushing the **Red Button (VOLUME / LEFT)** first, enters the **Volume Menu**. While in this Mode, to **DECREASE** the volume, hold down or depress the **Red "LEFT" Button** until desired the volume is achieved; to **INCREASE** the volume, hold down or depress the **Green "RIGHT" Button** until the desired volume is achieved.

Note: Pushing the Left or Right Flipper Buttons operates the same as the Red or Green Buttons of the Service Switch Set, while in this Volume Mode.

Set between **0** and **31**; **15** is the *Factory Default*. Once your adjustments are made, this menu will **automatically exit** a few seconds after the last button depression.

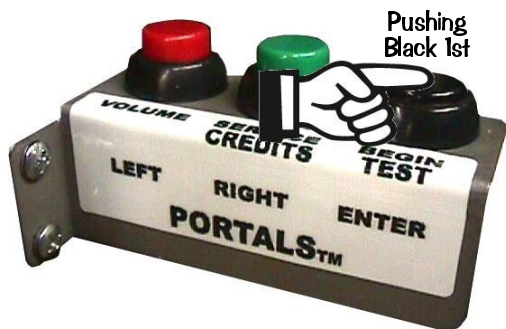
Function 2, Service Credits Menu



Pushing the **Green Button (SERVICE CREDITS / RIGHT)** first, adds **Service Credits** (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. **Adj. 15, Credit Limit**, determines this, however, it can be changed from 04-50; for details see *Chapter 4 of this Section 3*. Once your credits are added, this menu will **automatically exit** a few seconds after the last button depression.

Note: This function is disabled if Adjustment 28, 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, and there are 8 paid credits present, only 22 Service Credits can be applied.)

Function 3, Portals™ Service Menu



Pushing the **Black Button (BEGIN TEST / ENTER)** first, enters the **Portals™ Service Menu**. Once in, navigate through all menus depressing the **Red "LEFT"** or **Green "RIGHT"** Buttons.

Note: Pushing the Left or Right Flipper Buttons operates the same as the Red or Green Buttons of the Service Switch Set, while in this Service Mode.

Select or activate the **Icon** chosen (the **Icon** will be "flashing") by pushing down or depressing the **Black "ENTER"** Button.

Note: Pushing the Start Button operates the same as the Black Button of the Service Switch Set, while in this Service Mode.

Please read the remainder of this Chapter for more information on the **Portals™ Service Menu**. The remaining six (6) Chapters of this Section explains all **Icons & Menus** in detail. **Read! Read! Read!**

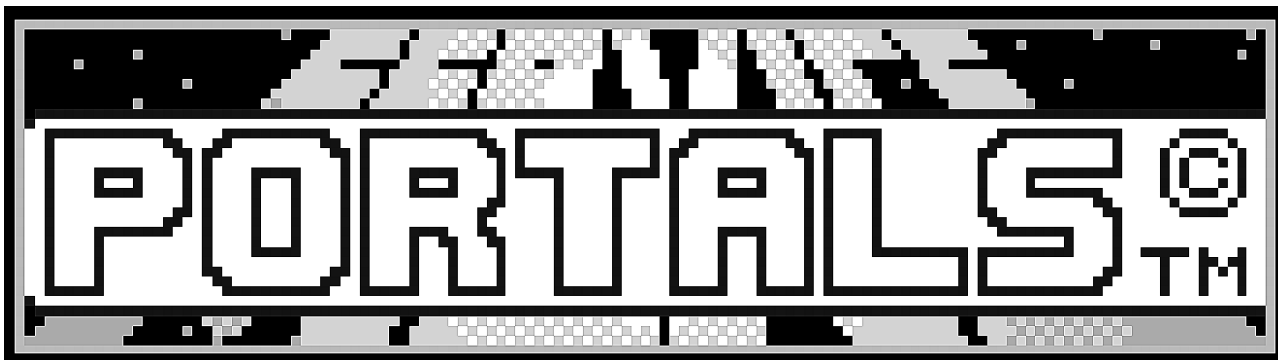


Important: The **Dual Switch Bracket** holds the **Playfield Power Interlock & Memory Protect Switches**. It is located just inside the Coin Door frame (see pictorial of the **Coin Door** on the previous page). The Button Switch at the top is the **Playfield Power Interlock Switch**. It must be pulled 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**. The Button Switch at the bottom is the **Memory Protect Switch**. It is enabled while the **Coin Door** is **CLOSED**; meaning any adjustment changes that are made **will not be written to memory**. If changing adjustments is required, ensure the **Coin Door** is **OPEN** to disable this switch, thus allowing for desired changes.

How to Use This Section

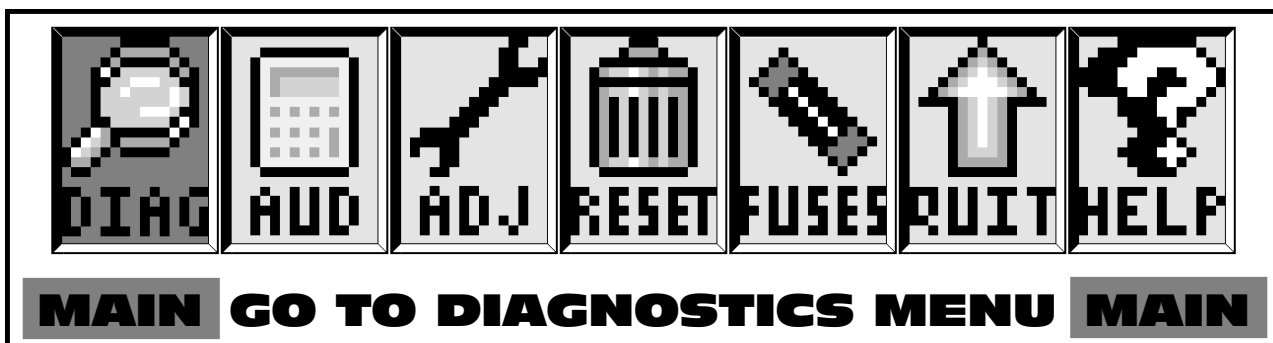
This section will cover all functions available in the **Portals™ Service Menu** in a *Step-By-Step* process. This section is divided into chapters which coincide with the **MAIN MENU**. The following pages in this chapter will instruct the operator on how to move through the menus. It's simple, easy and fun to use!



To get into the **Service Menu Mode** review "**Function 3, Portals™ Service Menu**" on the previous page. Push down the **Black "BEGIN TEST" Button** to begin. Looking at the Video Display you will momentarily see the introductory screen "**Service Menu**" with a *satellite flying from right to left pulling a banner "Portals©™"* followed by the **MAIN MENU**:



Use the **Red "LEFT" & Green "RIGHT" Buttons** (or **Left & Right Flipper Buttons**) to move the selected **Icon** left or right, and the **Black "ENTER" Button** (or **Start Button**) to activate the selected **Icon**. The use of the Service Switch Set (**Red, Green, & Black Buttons**) *is required* in **Switch Test** or **Active Switch Test**, as the **Start & Flipper Buttons** are a part of this test.

The **MAIN MENU** now appears with the "**DIAG**" **Icon** (**DIAGNOSTICS MENU**) flashing:



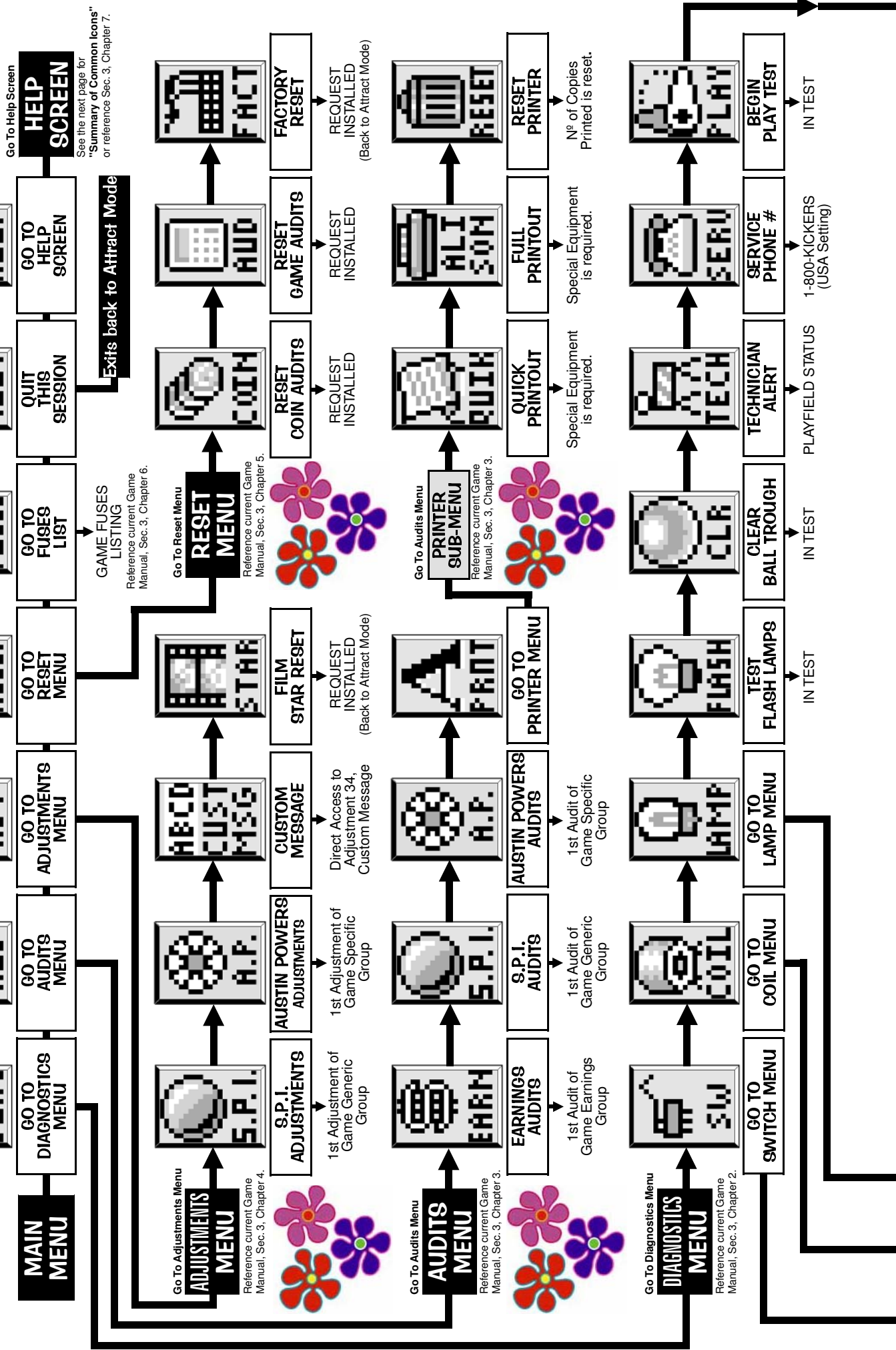
As the operator views the Menu Screen(s), the   **MORE MORE** symbols indicates that there are more **Icons** to select in each direction. The **Icon** selected will blink. Pushing the **Black "ENTER" Button** (or **Start Button**) will select the **Icon** and the Menu Screen will change to the menu selected. Select the "**PREV**" **Icons** to move backwards through the menu levels. Select the "**QUIT**" **Icon** to completely exit the Service Mode.

View the **Portals™ Service Menu Icon Tree** on the next pages for a complete overview of all menus used in this system. View the last chapter (**HELP**) if more information is required. Selecting the "**QUIT**" **Icon** with the **Red "LEFT"** or **Green "RIGHT" Buttons** (or either **Flipper Button**), then pressing the **Black "ENTER" Button** (or **Start Button**) will exit the Service Mode. This applies to the large and small "**QUIT**" **Icons**.

The **chapters** in this **section**, which coincide with the **MAIN MENU**, will also provide more detailed information which could not fit in the display. Use both the manual and the display to help customize, troubleshoot and/or diagnose faults, if any.



Portals™ Service Menu Icon Tree for Austin Powers™ Pinball Game



Portals™ Service Menu Example

This example will demonstrate activation of *Icons* in the **DIAGNOSTICS MENU**. The example will show activation of the "SW" *Icon* (GO TO SWITCH MENU). In this menu, the switches can be tested individually and also all active switches can be tested. Use the same technique to access all the *Icons* in the **Portals™ Service Menu**. Follow **Portals™ Service Menu Icon Tree** on the previous pages as a guide to help navigate through the entire system (Also, go to the chapter in this manual explaining the icon(s) selected.).

If the display is in any other menu other than the **MAIN MENU**, use the **Red "LEFT" & Green "RIGHT" Buttons** to select the "PREV" *Icon* and press the **Black "ENTER" Button** to activate the **ICON** thus moving back to the previous menu. Do so until **MAIN MENU** appears.

Chapters 2 through 7 will cover all menu items within the **Portals™ Service Menu**. The *Icon* is shown preceding the text. Find the *Icon* in the **Portals™ Service Menu** by navigating with the **Red or Green Buttons**. Each chapter started is from the **MAIN MENU**. Within the chapter, the sub-menu's will be covered sequentially with their explanation & function. If the operator "*gets lost*", select and activate the "PREV" *Icon* until the display indicates **MAIN MENU**. For more help, see Chapter 7.



The "MORE" *symbols* are indicating that "*more icons*" are available which don't appear in the display and which way to move the selection to view the *Icons*.



Important Note:



PREV

Exit any sub-menu and return to the **MAIN MENU** by selecting & activating the "PREV" *Icons*.

If no Icons appear in the display because of a testing function or special display (e.g. Help, Schematic Display, etc.), press any service button to exit to the previous menu or sub-menu.



QUIT

Selecting & activating the "QUIT" *Icon* from any display will exit the *Service Session*.

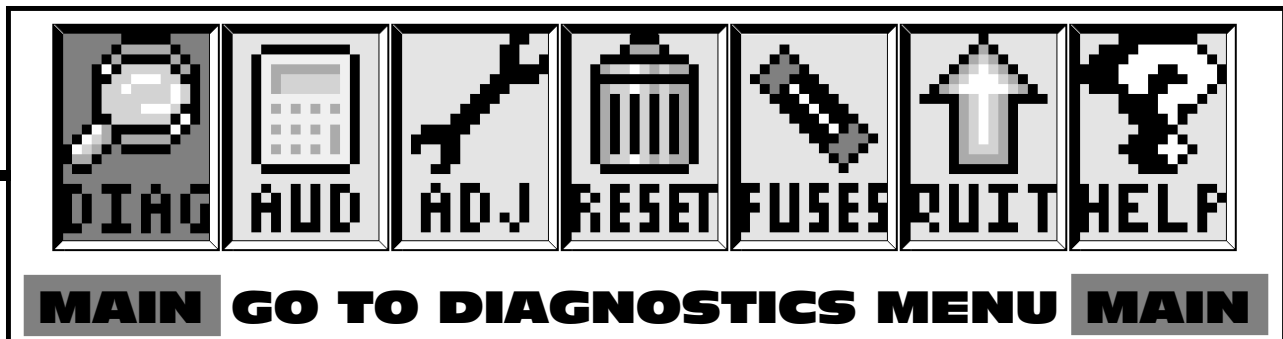


HELP

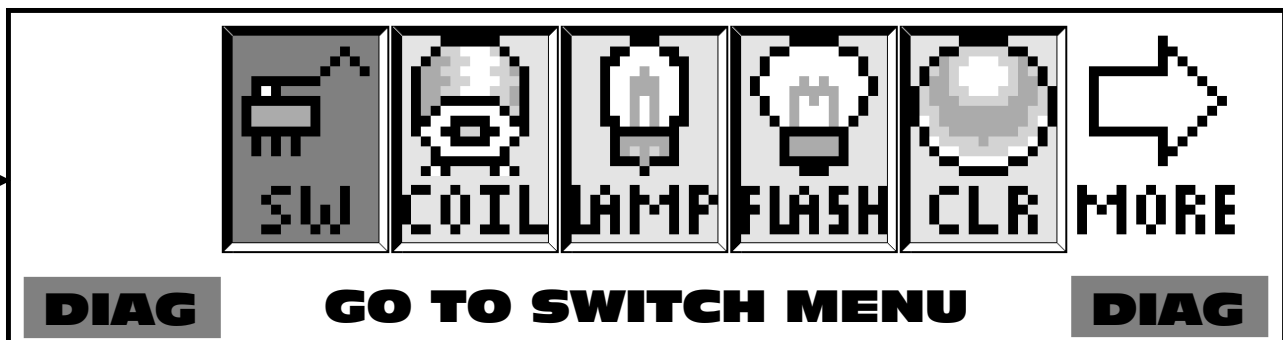
Selecting & activating the "HELP" *Icon* will show a help screen. (An explanation of each *Mini-Icon* at that level will cycle continuously until any active button is pressed.)

Sec. 3: ...Menu Intro.

Example: From the **MAIN MENU**, use the **Red "LEFT" or Green "RIGHT" Buttons** to select the "DIAG" *Icon* (GO TO DIAGNOSTICS MENU).



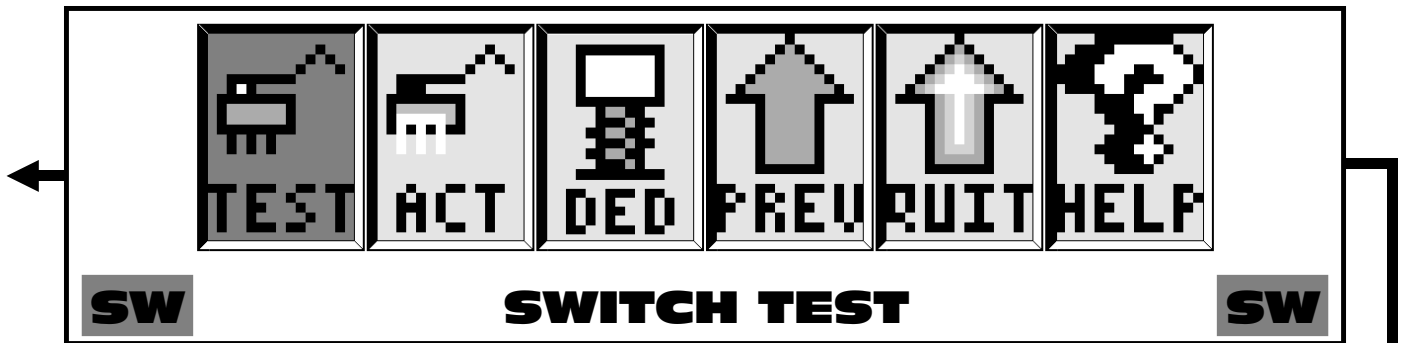
Press the **Black "ENTER" Button** to activate this **ICON**. This will bring up the **DIAGNOSTICS MENU**.



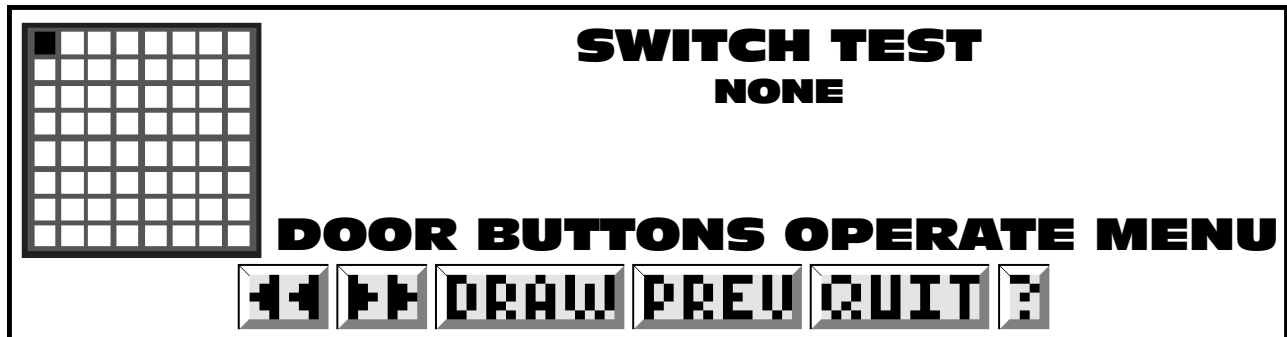
The **DIAGNOSTICS MENU** now appears with the "SW" *Icon* (GO TO SWITCH MENU) flashing. Press the **Black Button** to *activate* this icon. This will bring up the **SWITCH TEST MENU**.



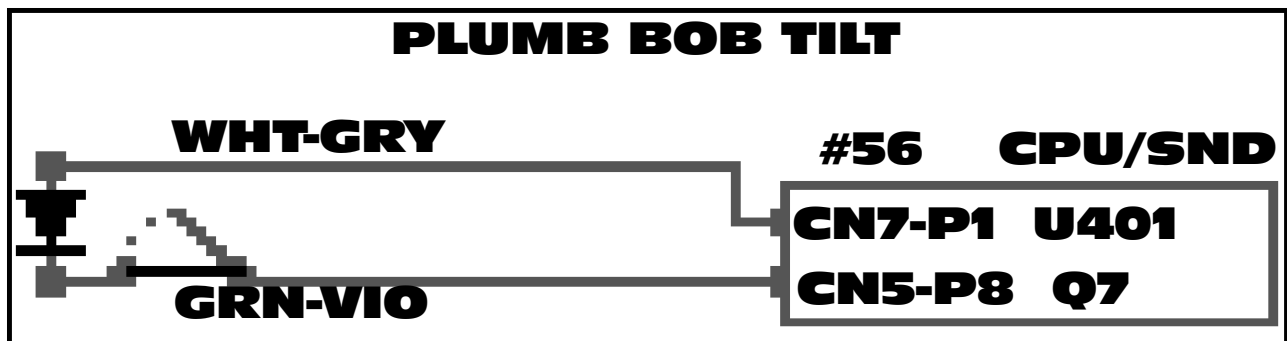
The **SWITCH TEST MENU** now appears with the "TEST" *Icon* (SWITCHTEST) flashing:
 Press the **Black "ENTER" Button** to *activate* this icon. This will bring up the **Switch Test Display**.



The **Switch Test Display** now appears.



All switches can be tested one at a time (When possible, use a pinball to close any playfield switches; rolling the ball at Stand-Up Targets or over/under switches is suggested. Use finger for all non-playfield switches.) As each switch is closed, the respective Switch Matrix Grid Position (1-64) will be lit. To view the schematic for the switch selected, press the **Red** or **Green Buttons** to select the "DRAW" *Icon*. Press the **Black Button** to *activate* this icon. This will bring up the **Switch Schematic Display** for the switch being closed.



An example is shown with Switch #56, Plumb Bob Tilt, selected. The display describes the switch in the Switch Matrix which includes the name of the switch, the Return (Row) Wire and the Drive (Column) Wire, drive transistor, the part number (not shown in the above example) and the "Pin-Outs" from the CPU/Sound Board.

While in Switch or Active Switch Tests, the **Flipper & Start Buttons** are deactivated. Use the **Red "LEFT," Green "RIGHT"** and/or **Black "ENTER" Buttons** to select and activate the "**MINI-ICONS**" at the bottom of the display. In Switch Test, if the "Left Arrow" or "Right Arrow" *Icon* is activated, the display will go to the previous tests (Active and Dedicated Switch Tests). Use the **Red** or **Green Buttons** to change the selected **ICON** to "PREV" *Icon*. Press the **Black "ENTER" Button** to go to the previous menu.

Note:

In **Dedicated Switch Test**, the **Flipper & Start Buttons** are to be used instead of the **Red, Green & Black Service Buttons**, as these buttons are deactivated for this test.

Exit out of the sub-menu by activating the big "PREV" *Icon* in the menu. This will bring up the **DIAGNOSTICS MENU**. The Switch Test Session is now complete. See the next page about exiting the **Portals™ Service Menu**.



Go To Diagnostics Menu

Special Note: If the *display flashes "OPEN THE DOOR"* the game is indicating that memory has been corrupted. This is caused by either failure in memory (e.g. batteries are dead and/or faulty **RAM**) or upon installation of updated version of game code. Opening the **Coin Door** will initiate a *Factory Restore (Reset)*, by opening the **Memory Protect Switch**. Check battery voltage at **VBATT Test Point** on the **CPU/Sound Board**.

Overview

The **Portals™ Service Menu System** provides tests for sounds, display, lamps, switches and coils. Each feature may be tested manually or automatically after entering the **Portals™ Service Menu** (see Chapter 1 of this section). Select the "DIAG" *Icon* from the **MAIN MENU** to go to the **DIAGNOSTICS MENU**. The automatic tests (e.g. **Cycling Coils**, **Test Flash Lamps**) may be used for a quick verification of automatic test functions and the manual tests (**Begin Play Test**, **Single Lamp / All / Row / Column Tests**, and **Game Specific Test**.) may be used for troubleshooting. All *Icons* and their usages are explained throughout this chapter.

During game play, activation of switches and operation of coils with associated switches are monitored. If the **CPU/Sound Board** does not detect a switch transition ("Stuck Open" / "Stuck Closed") for 50 games, it is considered faulty. When operation of a coil should close or open a switch and does not, the coil is considered faulty. In the Attract Mode, faulty switches and coils (if any) are reported (Select the "TECH" *Icon*, **Technician Alert**, from the **DIAGNOSTICS MENU**). *Note that reporting of an unused switch does not constitute a problem and that a bad coil could mean that the associated switch requires adjustment.*

CAUTION: Remove pinballs from the Ball Trough prior to lifting the playfield for servicing. This can easily be done in the **Portals™ Service Menu System**. Select the "DIAG" *Icon* from the **MAIN MENU** to go to the **DIAGNOSTICS MENU**. Select the "CLR" *Icon* to enter the **CLEAR BALL TROUGH MENU**. Select the "RUN" *Icon* & press the **Start Button** to remove one ball at a time. This is also useful to retrieve one ball for game testing in **Begin Play Test** & **Game Specific Test**. **Important:** The **Power Interlock Switch** must be pulled out.



GO TO DIAGNOSTICS MENU

With the game in the Attract Mode, open the Coin Door and press the **Black "BEGIN TEST" Button**. Select the "DIAG" *Icon* in the **MAIN MENU** with either **Flipper** or **Red "LEFT" & Green "Right" Buttons** (upon entry of the **Portals™ Service Menu**, the system defaults with the selection of the "DIAG" *Icon* flashing) and press the **Start** or **Black "ENTER" Buttons**. The **DIAGNOSTICS MENU** appears.



The "MORE" *symbols* are indicating that "more icons" are available which don't appear in the display and which way to move the selection to view the *Icons*.



Important Notes:



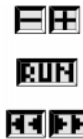
Exit any sub-menu and return to the **MAIN MENU** by selecting & activating the "PREV" *Icons*. If no *Icons* appear in the display because of a testing function or special display (e.g. "Help"), press any button to exit.



Selecting & activating the "QUIT" *Icon* from any display will exit the Service Session.



Selecting & activating the "HELP" *Icon* from any display will show a help screen. (An explanation of each *Mini-Icon* at that level will cycle continuously until any active button is pressed.)



In Diagnostics, selecting & activating the "-" or "+" *Icons* moves test forwards/backwards.



Selecting & activating the "RUN" *Icon* repeats the test on the coil or flash lamp left off at.



Selecting & activating the "ARROW" *Icons* moves between tests in the sub-menu.



Selecting & activating the "DRAW" *Icon* will show the schematic for that switch or coil.

Some tests require navigation through the menu(s) and selection of the *Icons* with **ONLY** the **Red "LEFT," Green "RIGHT"** and **Black "ENTER" Buttons**. This is required in **Switch & Active Switch Tests**, as the **Flipper & Start Buttons** are a part of the test.



In **Single Coil Test**, **Cycling Coil Test**, **Test Flash Lamps**, **Clear Ball Trough**, **Begin Play Test** & **Austin Specific Menu's**, the **Power Interlock Switch** (inside Coin Door) must be pulled out. (See **Access & Use** in Chapter 1 of this section for the location.)

If the **Power Interlock Switch** is not pulled out, all electro-mechanical devices (such as Coils) cannot be tested (20v & 50v DC power is disabled). Closing the **Coin Door** will automatically reset this switch.





Go To Switch Menu

From the **DIAGNOSTICS MENU**, select the "SW" *Icon* with either **Red "LEFT"** or **Green "RIGHT"** **Button** and press the **Black "ENTER"** **Button**. Switches are configured in an 8 x 8 Matrix of Columns (Switch Drives) and Rows (Switch Returns) with up to 64 switches possible. The Switch Test Menu consists of three (3) parts: Switch Test, Active Switches, and Dedicated Switch Test.

Note: The Flipper & Start Buttons are deactivated during Switch Tests.



Switch Test

To initiate, from the **SWITCH MENU**, select the "TEST" *Icon* with the **Red or Green Button** & press the **Black Button**. In Switch Test, close each switch and observe the display. The display will describe the switch in the Switch Matrix, which includes the switch name, Return (Row) Wire, Drive (Column) Wire, Part N^o, and the "Pin-Outs" from the CPU/SOUND Board. When the switch is released, the information of the last switch closed will remain in the display until another switch is closed or the test is exited. To view the switch schematic, select the "DRAW" *Mini-Icon* with the **Red or Green Button** & press the **Black Button**.



Active Switch Test

To initiate, from the **SWITCH MENU**, select the "ACT" *Icon* with either **Red or Green Button** & press the **Black Button**. If still in a previous test, select the "PREV" *Icon* to return to Switch Menu or selecting either of the "ARROW" *Icons* will move through the tests. If any switches are stuck closed (or made from the presence of a pinball), the display sequences through the Switch Names, Return (Row) Wire, Drive (Column) Wire, Drive Transistor, Part N^o, and the "Pin-Outs" from the CPU/SOUND Board. This cycle continues until all switches are cleared or until the test is exited.



Dedicated Switch Test

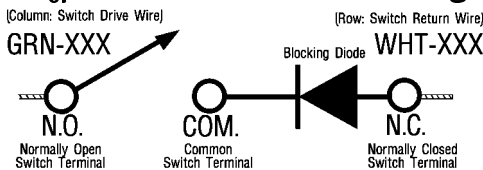
To initiate, from the **SWITCH MENU**, select the "DED" *Icon* with either **Flipper Button** & press the **Start Button** (The service switches are deactivated during this test.). The display will describe the switch which includes the Switch Name, Return (Row) Wire, Drive (Column) Wire, Part N^o, and the "Pin-Outs" from the CPU/SOUND Board.

SWITCH MATRIX GRID & DEDICATED SWITCHES

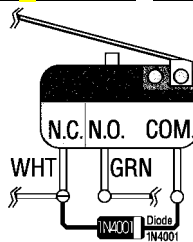
Column (Drive)	1: Q1	2: Q2	3: Q3	4: Q4	5: Q5	6: Q6	7: Q7	8: Q8	0ND	Ground
Row (Return)	GRN-BRN CN5-P1	GRN-RED CN5-P3	GRN-ORG CN5-P4	GRN-YEL CN5-P5	GRN-BLK CN5-P6	GRN-BLU CN5-P7	GRN-VIO CN5-P8	GRN-GRY CN5-P9	IC U206 INPUT 8	BLK CN6-P1, -P11
1: U400	LEFT BUTTON (UK ONLY) on Cabinet side	NOT USED	NOT USED	(M) OJO STANDUP Under Playfield	LEFT ORBIT Under Playfield	LEFT RAMP ENTER On Ramp Assy.	LEFT BUMPER On Assembly	LEFT OUTLANE Under Playfield	1: U206 GRY-BRN CN6-P2	#1 LEFT FLIPPER BUTTON in Cabinet side D8-1
2: U400	4TH COIN SLOT On Coin Door	NOT USED	CENTER RAMP ENTER On Ramp Assy.	M (O) JO STANDUP Under Playfield	SPINNER (OPTO) On Assembly	LEFT RAMP EXIT On Ramp Assy.	RIGHT BUMPER On Assembly	LEFT RETURN LANE Under Playfield	2: U206 GRY-RED CN6-P3	#2 LEFT FLIPPER E.O.S (End-of-Stroke) in Cabinet side D8-2
3: U400	6TH COIN SLOT On Coin Door	4-BALL TROUGH #1 (LEFT) On Assembly	NOT USED	MO (J) O STANDUP Under Playfield	CENTER RAMP ENTER (OPTO) On Ramp Assy.	LASER BEAM HOME On Assembly	BOTTOM BUMPER On Assembly	LEFT SLINGSHOT On Assembly	3: U206 GRY-ORG CN6-P4	#3 RIGHT FLIPPER BUTTON in Cabinet side D8-3
4: U400	RIGHT COIN SLOT On Coin Door	4-BALL TROUGH #2 On Assembly	NOT USED	MOJ (O) STANDUP Under Playfield	NOT USED	LASER BEAM ENABLE On Assembly	DANCING AUSTIN On Assembly	RIGHT OUTLANE Under Playfield	4: U206 GRY-YEL CN6-P6	#4 RIGHT FLIPPER E.O.S (End-of-Stroke) in Cabinet side D8-4
5: U401	CENTER COIN SLOT / DBA On Coin Door	4-BALL TROUGH #3 On Assembly	TOILET Under Playfield	AUSTIN STANDUP Under Playfield	RIGHT RAMP ENTER On Ramp Assy.	LASER BEAM LOADED On Assembly	FIRE BUTTON Frnt Top Molding	RIGHT RETURN LANE Under Playfield	5: U206 NOT USED GRY-GRN CN6-P7	#5 NOT USED D8-5
6: U401	LEFT COIN SLOT On Coin Door	4-BALL TROUGH VUK OPTO On Assembly	DR. EVIL UP On Assembly	POWERS STANDUP Under Playfield	RIGHT RAMP EXIT On Ramp Assy.	SCOOP On Assembly	START BUTTON Cabinet Front	RIGHT SLINGSHOT On Assembly	6: U206 GRY-BLU CN6-P8	#6 VOLUME (RED BUTTON) (In Test: LEFT) on Coin Door D8-6
7: U401	5TH COIN SLOT On Coin Door	4-BALL STACKING OPTO On Assembly	DR. EVIL DOWN On Assembly	DR. EVIL LEFT STANDUP Under Playfield	RIGHT ORBIT Under Playfield	LEFT TOP LANE Under Playfield	SLAM TILT On Coin Door	NOT USED	7: U206 GRY-VIO CN6-P9	#7 SERV. CRED. (GREEN BUTTON) (In Test: RIGHT) on Coin Door D8-7
8: U401	RIGHT BUTTON (UK ONLY) on Cabinet side	SHOOTER LANE Under Playfield	DR. EVIL (TARGET) On Assembly	DR. EVIL RIGHT STANDUP Under Playfield	NOT USED	RIGHT TOP LANE Under Playfield	PLUMB BOB TILT Inside Cabinet	NOT USED	8: U206 GRY-BLK CN6-P10	#8 BEGIN TEST (BLACK BUTTON) (In Test: ENTER) on Coin Door D8-8

Sec. 3: ... Diag. Menu

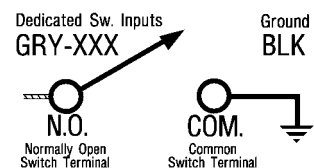
Typical Switch Schematic & Wiring



Note:
All Switches require diodes. Some diodes are located on Terminal Strips OR Diode Boards (under playfield) & not on the switch itself.
Diode On Terminal Strip
Diode On Diode Board

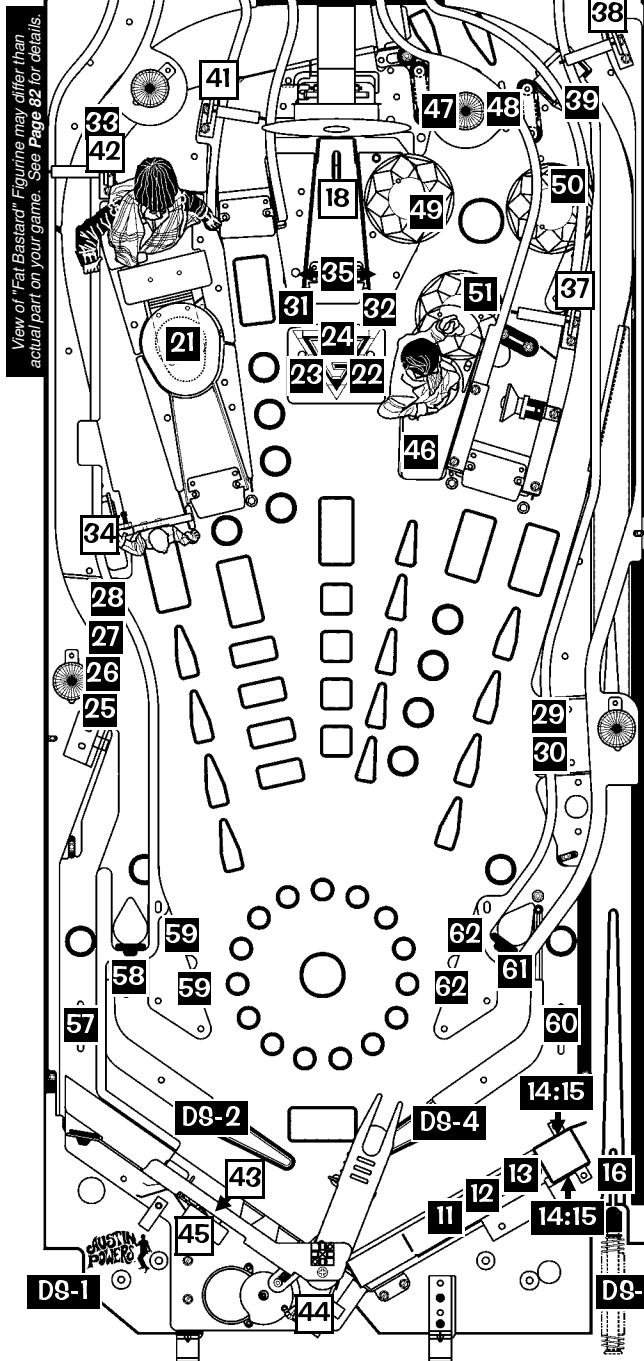


Dedicated Switch Schem.



Switch Matrix Grid Descriptions with Part Numbers and Locations

The Switch locations correspond with the Switch N° in the Part Number Table shown & the Switch Matrix Grid (previous page).



Legend Note:

□ = Switches mounted above playfield.

■ = Switches mounted below playfield.

DS: Dedicated Switches descriptions on previous page.
DOTS: Diode On Terminal Strip or DODB: Diode On Diode Board.

Note 1: Sw. 14 / Sw. 15 have both REC/TRANS on same board.
Note 2: For a detailed switch description, see Playfield - General Parts & Switches, Pages 54-55.

Note 3: Switch sold only with Bracket.

Note 4: Switch Only; for entire Button Assembly, see Cabinet - General Parts & Switches, Pages 52-53.

Note 5: Switch located in/on Cabinet.

Note 6: Future Use.

Note 7: UK Only.

Sw. N°	Col. N°	Row N°	See Notes:	Switch Matrix Description	Part N°
Note: The ¥ Coin Switch (for Japan) is 180-5091-00					
1	1	1	5, 7	LEFT BUTTON (UK ONLY)	180-5160-00
2	1	2	5	4TH COIN SLOT	180-5024-00
3	1	3	5, 6	6TH COIN SLOT	(Future Use)
4	1	4	5	RIGHT COIN SLOT	
5	1	5	5	CENTER COIN SLOT / DBA	180-5024-00
6	1	6	5	LEFT COIN SLOT	
7	1	7	5, 6	5TH COIN SLOT	(Future Use)
8	1	8	5, 7	RIGHT BUTTON (UK ONLY)	180-5160-00
9	2	1		NOT USED	
10	2	2		NOT USED	
11	2	3		4-BALL TROUGH #1 (LEFT)	
12	2	4		4-BALL TROUGH #2	180-5119-02
13	2	5		4-BALL TROUGH #3	
14	2	6	1	4-BALL TROUGH BOT TRANS: VUK OPTO	BOT REC: 515-5173-00 515-5174-00
15	2	7	1	4-BALL STACKING OPTO	TOP TRANS: 515-5173-00 TOP REC: 515-5174-00
16	2	8		SHOOTER LANE	180-5157-00
17	3	1		NOT USED	
18	3	2		CENTER RAMP ENTER	180-5057-00
19	3	3		NOT USED	
20	3	4		NOT USED	
21	3	5	2, 3	TOILET	Switch w/ Lt. Brkt. 500-6227-01
22	3	6		DR. EVIL UP	180-5052-00
23	3	7		DR. EVIL DOWN	
24	3	8		DR. EVIL (TARGET)	180-5083-00
25	4	1	2	(M) OJO	
26	4	2	2	M (O) JO	500-6139-04
27	4	3	2	MO (J) O	
28	4	4	2	MOJ (O)	
29	4	5	2	AUSTIN STANDUP	
30	4	6	2	POWERS STANDUP	500-6139-05
31	4	7	2	DR. EVIL LEFT STANDUP	
32	4	8	2	DR. EVIL RIGHT STANDUP	500-6138-04
33	5	1	2, 3	LEFT ORBIT	Switch w/ Lt. Brkt. 500-6227-01
34	5	2		SPINNER (OPTO)	520-5212-00
35	5	3		CENTER RAMP ENTER (OPTO)	TOP TRANS: 520-5082-00 TOP REC: 520-5083-01
36	5	4		NOT USED	
37	5	5		RIGHT RAMP ENTER	
38	5	6		RIGHT RAMP EXIT	180-5087-00
39	5	7	2, 3	RIGHT ORBIT	Switch w/ Rt. Brkt. 500-6227-02
40	5	8		NOT USED	
41	6	1		LEFT RAMP ENTER	180-5087-00
42	6	2		LEFT RAMP EXIT	
43	6	3		LASER BEAM HOME	180-5119-02
44	6	4		LASER BEAM ENABLE	
45	6	5		LASER BEAM LOADED	180-5181-00
46	6	6		SCOOP (KICKER)	180-5183-00
47	6	7	2, 3	LEFT TOP LANE	Switch w/ Rt. Brkt. 500-6227-02
48	6	8	2, 3	RIGHT TOP LANE	Switch w/ Rt. Brkt. 500-6227-02
49	7	4		LEFT BUMPER	
50	7	2		RIGHT BUMPER	180-5015-03
51	7	3		BOTTOM BUMPER	
52	7	4		DANCING AUSTIN	180-5119-02
53	7	5	4, 5	FIRE BUTTON	180-5174-00
54	7	6	4, 5	START BUTTON	
55	7	7	5	SLAM TILT	On Coin Door 180-5022-00
56	7	8	5	PLUMB BOB TILT	HANGER CONTACT 535-5319-00 535-7563-01
57	8	1	2, 3	LEFT OUTLANE	Switch w/ Rt. Brkt. 500-6227-02
58	8	2	2, 3	LEFT RETURN LANE	Switch w/ Rt. Brkt. 500-6227-02
59	8	3	2	LEFT SLINGSHOT	Leaf Sw. X2 180-5054-00
60	8	4	2, 3	RIGHT OUTLANE	Switch w/ Rt. Brkt. 500-6227-02
61	8	5	2, 3	RIGHT RETURN LANE	Sw. w/ Lt. Brkt. 500-6227-01
62	8	6	2	RIGHT SLINGSHOT	Leaf Sw. X2 180-5054-00
63	8	7		NOT USED	
64	8	8		NOT USED	

Sec. 3: ... Diag. Menu





Go To Coil Menu

From the **DIAGNOSTICS MENU**, select the "COIL" *Icon* with either **Red "LEFT"** or **Green "RIGHT"** **Button** and press the **Black "ENTER" Button**. The coils are listed in groups. 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 26-32 (although may be used in any position & will be noted), read **Single Coil Test** below.



Single Coil Test

To initiate, from the **COIL MENU**, select the "TEST" *Icon* with either **Red** or **Green Button** and press the **Black Button**. Ensure the **Power Interlock Switch** is pulled out. Select either the "-" or "+" *Icons*. Start with the "+" *Icon* to start the manual Coil Test from #1 (The test runs through all Coils and Flash Lamps #1-#32 & AUX 1-3 (*Auxilliary Positions are Optional UK Only*)). Press the **Black Button** on the "+" *Icon*, as each coil is selected, the display will describe the Coil or Flash Lamp Name with the corresponding number, the wire with colors, the "Pin-Outs" from the I/O Power Driver Board, the Coil Voltage & Gauge-Turns (e.g. 23-800). Press the **Black Button** again to move forward in the test. To test and view a particular Coil or Flash Lamp, select the "RUN" *Icon* and press the **Black Button**. Each time the **Black Button** is pushed, the Coil or Flash Lamp will fire on the Playfield and/or Backbox, with the display indicating the Coil or Flash Lamp information. Continue with the same procedure to run through the entire test.

Important: The **Power Interlock Switch** must be pulled out for this *test to function* while the **Coin Door** is **OPEN**.



Cycling Coil Test

To initiate, from the **COIL MENU**, select the "CYC" *Icon* with either **Red** or **Green Button** and press the **Black Button**. If still in a previous test, select the "PREV" *Icon* to return to Coil Menu or selecting either of the "ARROW" *Icons* will move to Cycling Coil Test (selecting again will return to Coil Test). The test pulses each regular Coil or Flash Lamp sequentially (cycling) on the Playfield and Backbox. The display indicates "CYCLING COILS."

Important: The **Power Interlock Switch** must be pulled out for this *test to function* while the **Coin Door** is **OPEN**.

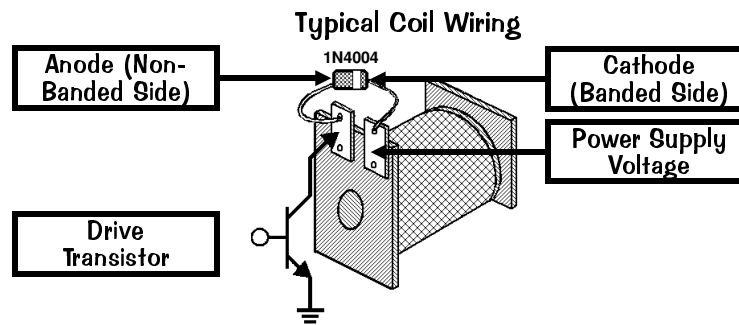
Sec. 3: ... Diag. Menu

Coil & Flash Lamp Descriptions

#	Type	Coil / Flash Lamp Descriptions
1	Coil	TROUGH UP-KICKER (VUK) (26-1200)
2	Coil	AUTO LAUNCH (24-940)
3	Coil	SCOOP (23-800)
4	Coil	LASER BEAM EJECT (24-940)
5	Flash	FLASH: TIME MACHINE (#89 Bulb)
6	Flash	FLASH: RIGHT RAMP (LOW) (#906 Bulb)
7	Coil	DANCING AUSTIN (26-1200)
8	Coil	TOILET POST (27-1500)
9	Coil	LEFT BUMPER (26-1200)
10	Coil	RIGHT BUMPER (26-1200)
11	Coil	BOTTOM BUMPER (26-1200)
12	Flash	FLASH: LEFT RAMP (HIGH) (#906 Bulb)
13	Flash	FLASH: RIGHT RAMP (HIGH) (#906 Bulb)
14	Coil	TIME MACHINE MAGNET (20 $\frac{1}{2}$ -480)
15	Coil	LEFT FLIPPER [50V RED/YEL] (23-900)
16	Coil	RIGHT FLIPPER [50V RED/YEL] (23-1100)

#	Type	Coil / Flash Lamp Descriptions
17	Coil	LEFT SLINGSHOT (23-800)
18	Coil	RIGHT SLINGSHOT (23-800)
19	Coil	DR. EVIL MOTOR RELAY BOARD
20	Coil	TIME MACHINE MTR RELAY BD
21	Coil	LASER BEAM MTR RELAY BD
22	Coil	LASER BEAM DIVERTER (29-1000)
23	Coil	ORBIT DIVERTER (32-1800)
24	Coil	(OPTIONAL COIN METER)
25	Flash	FLASH: LEFT ORBIT (#89 Bulb)
26	Flash	FLASH: TOILET (#89 Bulb)
27	Flash	FLASH: LEFT RAMP (#89 Bulb)
28	Flash	FLASH: CENTER RAMP (#89 Bulb)
29	Flash	FLASH: RIGHT RAMP (#89 Bulb)
30	Flash	FLASH: RIGHT ORBIT (#89 Bulb)
31	Flash	FLASH: POPS X2 (#89 Bulb)
32	Flash	FLASH: LEFT RAMP (LOW) (#906 Bulb)

See the next three (3) pages for the **Coil & Flash Lamp Location Maps** (corresponds to above tables), **Coils Detailed Chart Table** & the **Backbox I/O Power Driver Board Detailed Wiring Diagram**.



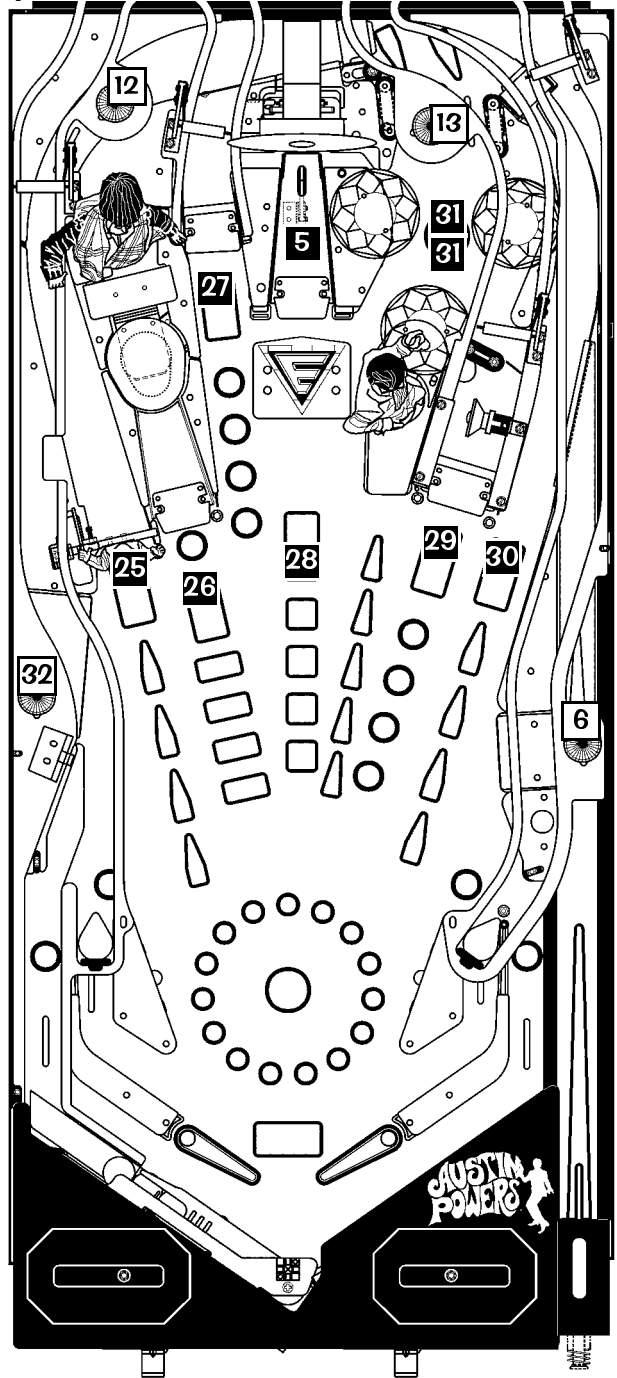
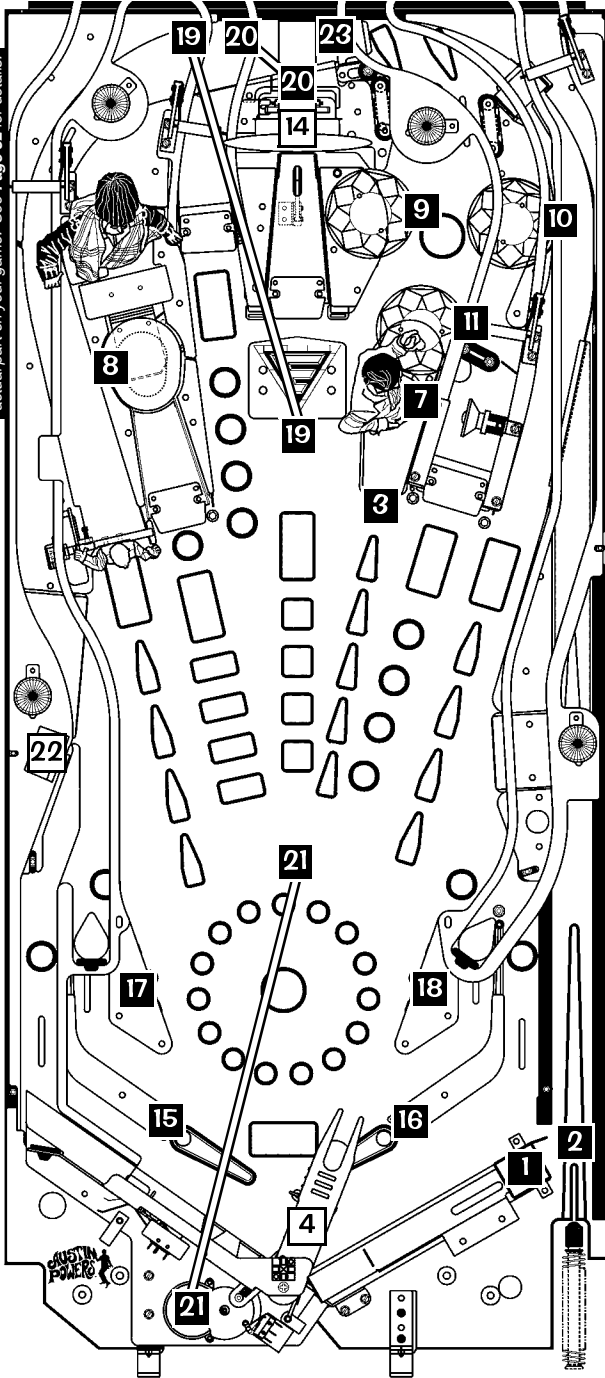
Note:
All Coils require diodes. Some diodes are located on Terminal Strips (under playfield) & not on the coil itself.

D iode
O n
T ermin
S trip



Coil & Flash Lamp Locations

View of "Fat Bastard" Figurine may differ than actual part on your game. See Page 82 for details.



Sec. 3: ... Diag. Menu

Use the previous page and the following two (2) pages in conjunction with above Coil and Flash Lamp Maps.

Legend Note:

- = Coils and Flash Lamps mounted above playfield.
- = Coils and Flash Lamps mounted below playfield.

The following Coil is optional:

24

The following Bulb Types are used for Flash Lamps:



#89 Bulb
(Bayonet)
165-5000-89



#906 Bulb
(Wedge Base)
165-5004-00

The following Coils are for **UK Only**:

Aux. 1 **Aux. 2** **Aux. 3**





From the Main Menu
in Portals™
GO TO DIAGNOSTICS
MENU



From the Diagnostics
Menu
GO TO COIL
MENU



From the Coil
Menu
GO TO COIL
TEST



From the Coil
Menu
GO TO CYCLING
COILS

COILS DETAILED CHART TABLE

High Current Coils Group 1		Drive Trans-istor (D.T.)	Driver Output Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connection	Power Voltage	Coil GA-Turn or Bulb Type
#1	TROUGH UP-KICKER	Q1	I/O Pwr. Drvr.	BRN-BLK	J8-P1	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#2	AUTO LAUNCH	Q2	I/O Pwr. Drvr.	BRN-RED	J8-P3	YEL-VIO	J10-P4/5	50v DC	24-940 090-5036-00T
#3	SCOOP	Q3	I/O Pwr. Drvr.	BRN-ORG	J8-P4	YEL-VIO	J10-P4/5	50v DC	23-800 090-5001-00B
#4	LASER BEAM EJECT	Q4	I/O Pwr. Drvr.	BRN-YEL	J8-P5	YEL-VIO	J10-P4/5	50v DC	24-940 090-5002-10
#5	FLASH: TIME MACHINE	Q5	I/O Pwr. Drvr.	BRN-GRN	J8-P6	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#6	FLASH: RIGHT RAMP (LOW)	Q6	I/O Pwr. Drvr.	BRN-BLU	J8-P7	ORG	J6-P10	20v DC	#906 Bulb 165-5004-00
#7	DANCING AUSTIN	Q7	I/O Pwr. Drvr.	BRN-VIO	J8-P8	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#8	TOILET POST	Q8	I/O Pwr. Drvr.	BRN-GRY	J8-P9	BRN	J7-P1	20v DC	27-1500 090-5004-00T

High Current Coils Group 2		Drive Trans-istor (D.T.)	Driver Output Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connection	Power Voltage	Coil GA-Turn
#9	LEFT BUMPER	Q9	I/O Pwr. Drvr.	BLU-BRN	J9-P1	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#10	RIGHT BUMPER	Q10	I/O Pwr. Drvr.	BLU-RED	J9-P2	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#11	BOTTOM BUMPER	Q11	I/O Pwr. Drvr.	BLU-ORG	J9-P4	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#12	FLASH: LEFT RAMP (HIGH)	Q12	I/O Pwr. Drvr.	BLU-YEL	J9-P5	ORG	J6-P10	20v DC	#906 Bulb 165-5004-00
#13	FLASH: RIGHT RAMP (HIGH)	Q13	I/O Pwr. Drvr.	BLU-GRN	J9-P6	ORG	J6-P10	20v DC	#906 Bulb 165-5004-00
#14	TIME MACHINE MAGNET <small>DOTS</small>	Q14	I/O Pwr. Drvr.	BLU-BLK	J9-P7	VIO-YEL	J10-P3	50v DC	20½-480 090-5064-02
#15	LEFT FLIPPER (50v RED/YEL)	Q15	I/O Pwr. Drvr.	ORG-GRY	J9-P8	RED-YEL GRY-YEL	J10-P1/2	50v DC	23-900 090-5020-30T
#16	RIGHT FLIPPER (50v RED/YEL)	Q16	I/O Pwr. Drvr.	ORG-VIO	J9-P9	RED-YEL BLU-YEL	J10-P1/2	50v DC	23-1100 090-5030-00T

Low Current Coils Group 1		Drive Trans-istor (D.T.)	Driver Output Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connection	Power Voltage	Coil GA-Turn or Meter #
#17	LEFT SLINGSHOT	Q17	I/O Pwr. Drvr.	VIO-BRN	J7-P2	BRN	J7-P1	20v DC	23-800 090-5001-00T
#18	RIGHT SLINGSHOT	Q18	I/O Pwr. Drvr.	VIO-RED	J7-P3	BRN	J7-P1	20v DC	23-800 090-5001-00T
#19	DR. EVIL MOTOR RELAY BOARD	Q19	I/O Pwr. Drvr.	VIO-ORG	J7-P4	BRN	J7-P1	20v DC	Relay Bd. 520-5010-00
#20	TIME MACHINE MTR RELAY BD	Q20	I/O Pwr. Drvr.	VIO-YEL	J7-P6	BRN	J7-P1	20v DC	Relay Bd. 520-5010-00
#21	LASER BEAM MTR RELAY BD	Q21	I/O Pwr. Drvr.	VIO-GRN	J7-P7	BRN	J7-P1	20v DC	Relay Bd. 520-5010-00
#22	LASER BEAM DIVERTER	Q22	I/O Pwr. Drvr.	VIO-BLU	J7-P8	BRN	J7-P1	20v DC	29-1000 090-5059-00
#23	ORBIT DIVERTER	Q23	I/O Pwr. Drvr.	VIO-BLK	J7-P9	BRN	J7-P1	20v DC	32-1800 090-5031-00
#24	OPTIONAL COIN METER	Q24	I/O Pwr. Drvr.	VIO-GRY	J7-P10	RED	J16-P7	5v DC	Meter 5v 091-5000-00

Diode On Terminal Strip (if noted)

Low Current Coils Group 2		Drive Trans-istor (D.T.)	Driver Output Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connection	Power Voltage	Bulb Type
#25	FLASH: LEFT ORBIT	Q25	I/O Pwr. Drvr.	BLK-BRN	J6-P1	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#26	FLASH: TOILET	Q26	I/O Pwr. Drvr.	BLK-RED	J6-P2	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#27	FLASH: LEFT RAMP	Q27	I/O Pwr. Drvr.	BLK-ORG	J6-P3	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#28	FLASH: CENTER RAMP	Q28	I/O Pwr. Drvr.	BLK-YEL	J6-P4	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#29	FLASH: RIGHT RAMP	Q29	I/O Pwr. Drvr.	BLK-GRN	J6-P5	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#30	FLASH: RIGHT ORBIT	Q30	I/O Pwr. Drvr.	BLK-BLU	J6-P6	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#31	FLASH: POPS X2	Q31	I/O Pwr. Drvr.	BLK-VIO	J6-P7	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#32	FLASH: LEFT RAMP (LOW)	Q32	I/O Pwr. Drvr.	BLK-GRY	J6-P8	ORG	J6-P10	20v DC	#906 Bulb 165-5004-00

Note: In Test Flash Lamps Menu ("Flash" Icon), Flashers tested are all Flash Lamps located between Q1-Q32 (This Game.)

Auxiliary (UK ONLY)		Drive Trans-istor (D.T.)	Driver Output Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connection	Power Voltage	Coil GA-Turn
AUX 1:	LEFT UP/DOWN POST	Q1	Sol. Expander (Aux. Board)	WHT	J3-P11	BRN	J7-P1	20v DC	26-1200 090-5044-00T
AUX 2:	CENTER UP/DOWN POST	Q2	Sol. Expander (Aux. Board)	RED	J3-P10	BRN	J7-P1	20v DC	23-1100 090-5030-00T
AUX 3:	RIGHT UP/DOWN POST	Q3	Sol. Expander (Aux. Board)	ORG	J3-P9	BRN	J7-P1	20v DC	26-1200 090-5044-00T

Sec. 3: ... Diag. Menu



Section 3, Chapter 2:
Go To Diagnostics Menu



Go To Lamp Menu

From the **DIAGNOSTICS MENU**, select the "LAMP" *Icon* with either **Red "LEFT"** or **Green "RIGHT"** **Button** and press the **Black "ENTER" Button**. Controlled lamps are configured in an 8 x 10 Matrix of Columns (Lamp Drives) and Rows (Lamp Returns) with up to 80 lamps possible. The Lamp Test Menu consists of four (4) parts: Single Lamp Test, Test All Lamps, Row Lamp Test and Column Lamp Test.



Single Lamp Test

To initiate, from the **LAMP MENU**, select the "ONE" *Icon* with either **Red** or **Green Button** and press the **Black Button**. Select either the "-" or "+" *Icons*. Start with the "+" *Icon* to start the manual Lamp Test from Column 1, Row 1, Lamp 1. Press the **Black Button** on the "+" *Icon*, as each lamp is selected, the lamp will light at its location on the playfield as well as the display, indicating the Lamp Matrix Grid Position, lamp name with the corresponding number, Return (Row) Wire & Color, Drive (Column) Wire & Color, and associated drive transistors. Press the **Black Button** again to move forward in the test. To test and view a particular lamp, select the "RUN" *Icon* and press the **Black Button**. Each time the **Black Button** is pushed, the lamp will light-up on the playfield, with the display indicating the lamp information. Continue with the same procedure to run through the entire test.



Test All Lamps

To initiate, from the **LAMP MENU**, select the "ALL" *Icon* with either **Red** or **Green Button** and press the **Black Button**. If still in Single Lamp Test (or any 1 of the 4 tests), select the "PREV" *Icon* to return to Lamp Menu or selecting either of the "ARROW" *Icons* will move through the tests, keep activating until Test All Lamps is displayed. The display will indicate "ALL LAMPS ON" and the lamps on the playfield will be lit, alternating between the rows in the Lamp Matrix Grid.



Row & Column Lamp Tests

To initiate, from the **LAMP MENU**, select the "ROW" or "COL" *Icon* with either **Red "LEFT"** or **Green "RIGHT"** **Button** and press the **Black Button**. If still in a previous test, select the "PREV" *Icon* to return to Lamp Menu or selecting either of the "ARROW" *Icons* will move through the tests, keep activating until Row or Column Lamp Test (whichever desired) is displayed. In this test, each set of lamps in each Row or Column of the Lamp Matrix Grid (respective to each test) will light-up on the playfield and is indicated in the display.



Sec. 3: ... Diag. Menu

LAMP MATRIX GRID

Diode On Terminal Strip:								
Column (18v)	1: U17	2: U16	3: U15	4: U14	5: U13	6: U12	7: U11	8: U10
Row (GND)	YEL-BRN J13-P9	YEL-RED J13-P8	YEL-ORG J13-P7	YEL-BLK J13-P6	YEL-GRN J13-P5	YEL-BLU J13-P4	YEL-VIO J13-P3	YEL-GRY J13-P1
1: Q33 RED-BRN J12-P1	MINI ME 1 (BOTTOM) #555 Bulb 1	MINI ME 2 #555 Bulb 2	MINI ME 3 #555 Bulb 3	MINI ME 4 (TOP) #555 Bulb 4	IVANA #555 Bulb 5	ALOTTA #555 Bulb 6	SPECIAL #555 Bulb 7	MYSTERY #44 Bulb 8
2: Q34 RED-BLK J12-P2	(M) OJO #44 Bulb 9	M (O) JO #44 Bulb 10	MO (J) O #44 Bulb 11	MOJ (O) #44 Bulb 12	LEFT BUMPER #555 Bulb 13	RIGHT BUMPER #555 Bulb 14	BOTTOM BUMPER #555 Bulb 15	SHOOT AGAIN BABY #555 Bulb 16
3: Q35 RED-ORG J12-P3	BONUS 1 #44 Bulb 17	BONUS 2 #44 Bulb 18	BONUS 3 #555 Bulb 19	BONUS 4 #555 Bulb 20	BONUS 5 #555 Bulb 21	BONUS 10 #555 Bulb 22	BONUS 25 #555 Bulb 23	BONUS 50 #44 Bulb 24
4: Q36 RED-YEL J12-P4	BONUS 75 #44 Bulb 25	BONUS 100 #555 Bulb 26	BONUS 300 #555 Bulb 27	BONUS 300 #555 Bulb 28	BONUS 400 #555 Bulb 29	BONUS 500 #555 Bulb 30	BONUS 1000 #555 Bulb 31	BONUS HELD #555 Bulb 32
5: Q37 RED-GRN J12-P5	(A) P #44 Bulb 33	A (P) #44 Bulb 34	EVIL HENCHMEN #555 Bulb 35	SUB DRILL #555 Bulb 36	TIME MACHINE #555 Bulb 37	LASER BEAM #555 Bulb 38	FAT BASTARD #555 Bulb 39	MINI ME #555 Bulb 40
6: Q38 RED-BLU J12-P6	TOILET 1 (BOTTOM) #555 Bulb 41	TOILET 2 #555 Bulb 42	TOILET 3 #555 Bulb 43	TOILET 4 (TOP) #555 Bulb 44	(S) HAG #555 Bulb 45	S (H) AG #555 Bulb 46	SH (A) G #555 Bulb 47	SHA (G) #555 Bulb 48
7: Q39 RED-VIO J12-P8	LASER BEAM 1 (BOTTOM) #555 Bulb 49	LASER BEAM 2 #44 Bulb 50	LASER BEAM 3 #44 Bulb 51	LASER BEAM 4 (TOP) #44 Bulb 52	FIRE BUTTON #555 Bulb 53	DR. EVIL SPOT-LIGHT X2 #555 Bulbs 54	NOT USED 55	NOT USED 56
8: Q40 RED-GRY J12-P9	TIME MACHINE 1 (BOTTOM) #555 Bulb 57	TIME MACHINE 2 #555 Bulb 58	TIME MACHINE 3 #555 Bulb 59	TIME MACHINE 4 (TOP) #555 Bulb 60	MOON BASE #555 Bulb 61	VIRTUCON #555 Bulb 62	MOJO #555 Bulb 63	EXTRA BALL #44 Bulb 64
9: Q41 RED-WHT J12-P10	SUB DRILL 1 (BOTTOM) #555 Bulb 65	SUB DRILL 2 #555 Bulb 66	SUB DRILL 3 #555 Bulb 67	SUB DRILL 4 (TOP) #555 Bulb 68	NOT USED 69	NOT USED 70	NOT USED 71	NOT USED 72
10: Q42 RED J12-P11	EVIL HENCHMEN 1 (BOT) #555 Bulb 73	EVIL HENCHMEN 2 #555 Bulb 74	EVIL HENCHMEN 3 #555 Bulb 75	EVIL HENCHMEN 4 (TOP) #555 Bulb 76	NOT USED 77	NOT USED 78	NOT USED 79	NOT USED 80





Test Flash Lamps

From the **DIAGNOSTICS MENU**, select the "FLASH" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. After selecting this *Icon* the display will indicate "CYCLING FLASHERS" and all the Flash Lamps will cycle continuously until the test is exited. This test allows the technician to easily spot any burned-out bulbs and replace them. Flashers tested are Flash Lamps in Positions: **Q1-Q32** and in this game Flash Lamp(s) are in Position(s): **Q5-6, Q12-13 & Q25-32**.

Important: The **Power Interlock Switch** must be pulled out for this *test to function* while the **Coin Door** is **OPEN**.



Clear Ball Trough

From the **DIAGNOSTICS MENU**, select the "CLR" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. This 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. After selecting this *Icon* the display will show a graphic of the ball trough with balls in the trough with its corresponding switch number. Select the "RUN" *Icon* to eject the ball in the first position. Simultaneously, the display and the playfield will eject the ball to the Trough Up-Kicker, eject from the Trough Up-Kicker into the Shooter Lane and will be ejected onto the playfield where the technician can easily retrieve the pinball or allow the ball(s) to re-enter the trough to continue Clear Ball Trough Test. **Important:** The **Power Interlock Switch** must be pulled out. **⚠ Caution:** *Continuous use of above test may overheat the Trough Up-Kicker Coil.* **⚠**



Technician Alert

From the **DIAGNOSTICS MENU**, select the "TECH" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. After selecting this *Icon* the display will indicate if there are any faulty switches (i.e., switches that are normally closed but remain open or open switches that have not been closed (activated) in 50 games.)



Service Phone

From the **DIAGNOSTICS MENU**, select the "SERV" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. After selecting this *Icon* the display will indicate a phone number to call if technical assistance is required.



Begin Play Test

From the **DIAGNOSTICS MENU**, select the "PLAY" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. After selecting this *Icon* the technician can test certain play functions to insure all switch activated coils function without entering game play. For example, by rolling the ball over the Shooter Lane switch, the Autoplunger should fire. If it kicks to early or too late, the switch actuator should be adjusted to compensate for this error. If it fails to fire, use the Switch Test or Coil Test to help determine the cause of the failure. During this function, similar tests may be performed on the "Ejects", Sling-shots, Vertical Up-Kickers, Pop Bumpers, etc. in the game. For unique Play Test functions, select the "GAME SPECIFIC" *Icon* in the **DIAGNOSTICS MENU**. **Important:** The **Power Interlock Switch** must be pulled out.



Fire Kicker

From the **DIAGNOSTICS MENU**, select the "KNOCKER" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. The digitally mastered "Knocker" is sounded.



Sound / Speaker Test

From the **DIAGNOSTICS MENU**, select the "SPKR" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. The BSMT 2000 Sound System produces true digital stereo sound from Backbox & Cabinet Speakers or "Mono" on the Cabinet Speaker (when used by itself). After selecting this *Icon*, select the "-" or "+" *Icons* and press the **Black "ENTER" Button** to activate the first test. Repeat to visually see & hear all tests. Select the "RUN" *Icon* to activate the test chosen without moving to the next test.

Note: *During Sound Tests, the display shows the speaker identification and the corresponding sound(s). The sound functions allow verification that both channels are functioning properly & that the speaker connections are correct.*

Sound / Speaker Test Continued Next Page



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 test to cycle through the Backbox & Cabinet, and Backbox Sine (repeated) functions. If the Cabinet Sine produces more volume and bass than the Left Sine, the speakers are connected properly. If it produces the same or less, one speaker is connected improperly. To isolate and correct reversed speaker connections, one of two methods may be used.

1. Check each speaker for polarity markings. If the speakers have polarity markings, verify that the Backbox Speaker RED/WHT Wire and the Cabinet Speaker YEL/WHT Wire is connected to the negative (-) terminal.
2. Disconnect the speaker output connector from the CPU / Sound Board and connect a 1.5-volt battery across each speaker pair one at a time while observing the speakers. Make sure the positive battery terminal is connected to the positive lead (CN4, Pin-3 (RED/BLK) or Pin-6 (YEL/BLK)) each time. As the connection is made, check speaker cone movement; proper connections are indicated by outward movement.

Auto / Manual Tests	Sounds Produced
Speaker Test	Tone
Sound/OPSYS EPROM (Loc. U7)	Level 1-3+ (Music Test)
Voice ROMs: 1 (U17) 2 (U21) 3 (U36) 4 (U37)	Speech Pattern 1-3+

Note: For ROM Locations, see Page DR. ❶. For ROM Usage (Summary Table) see Page DR. ❸ in the "Find-It-In-Front: Dr. Pinball Section". Voice ROMs (U17, U21, U36 & U37) which are 8MB must have a Jumper at W6 on the CPU/Sound Board to function properly.



Begin Burn In

From the **DIAGNOSTICS MENU**, select the "BURN" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. After selecting this *Icon* the Begin Burn-In Test will start. At this stage the game will exercise all CPU I/O Functions (Dot Matrix Display Test, Coil Testing, Lamp Testing, Sound, etc.). This is provided to constantly exercise sounds, coils, etc... Cumulative Burn-In minutes will be displayed. To reset Burn-In minutes to 00, select the "RESET" *Icon* in the **MAIN MENU** and select the "FACT" *Icon* (Factory Reset). See Chapter 5, Go To Reset Menu, of this section.



Dot Matrix Test

From the **DIAGNOSTICS MENU**, select the "DOT TEST" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. After selecting this *Icon* the Dot Matrix Test immediately begins. The display will immediately illuminate & cycle for 1 pass of each test continuously for each of the following tests:

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.
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.
3. Illuminates all the dots, except for one column from left to right.
4. Illuminates all the dots, except for one row from top to bottom.
5. Illuminates every other dot lit, in both the rows and columns.
6. Illuminates all dots at 30%, 70% & 100% brightness.

Note: Pressing any button will exit the test & return to **DIAGNOSTICS MENU**.

Dot Matrix Display Explained

The display utilizes a Micro-Processor Control Board mounted in piggyback fashion to the Dot Matrix Display (128 X 32) Driver Board. The purpose behind this board is to provide more information to the operator as well as displaying graphics to the player.

The board is controlled by a 6809E Microprocessor and its personality ROM (Unique to the Game). It receives Data, Reset & Clock Information from the CPU/Sound Board via the ribbon cable and sends back multiple Status and Busy Signals to the CPU. This is to insure synchronized communication between the CPU and the Display Controller Board. The Drivers for the rows and columns are provided on 5 surface mounted integrated circuits on the Dot Matrix Display Driver Board.





Austin Specific

To initiate, from the **DIAGNOSTICS MENU**, select the "A.P." *Icon* with either the **Red "LT"** or **Green "RT" Button** (the **FLIPPER Buttons** operates in the same manner) & press the **Black "ENTER" Button** (the **START Button** operates in the same manner).

This will bring up the **AUSTIN SPECIFIC MENU**. This Sub-Menu is used to test the operation of the **Time Machine Motor & Magnet with the Time Machine Ramp Switches** ("TIME" *Icon*); **Dr. Evil Target Up/Down Motor & Switches** ("DR. E" *Icon*); **Laser Beam Motor & Switches** ("LASER" *Icon*). To initiate, from the **AUSTIN SPECIFIC MENU**, select one of the 3 *Icons* with either the **Red "LEFT"** or **Green "RIGHT" Button** (the **LEFT** and **RIGHT FLIPPER Buttons** operates in the same manner) and press the **Black "ENTER" Button** (the **START Button** operates in the same manner). After finishing the Test, select the "PREV" *Icon* to return to the Sub-Menu or select either of the ">>" *Icon* to slip between the 3 Testing Menus.

CAUTION: Beware of MOVING PARTS!

Important: The **Power Interlock Switch** must be pulled out for the motors function while the **Coin Door** is **OPEN**.



Time Machine Test

Selecting the "TIME" *Icon* will bring up the **TIME MACHINE TEST MENU**.

This test is provided to allow a method of testing the **Center Ramp OPTO (Sw. 35) & Center Ramp Enter (Sw. 18), Motor**

Operation (Q20) and Magnet Operation (Q14). Upon entering the test, the **Time Machine Motor (Q20)** will begin to run. *With ball-in-hand, roll onto the ramp.* As the **OPTO Switch (Sw. 35)** is closed the box will turn solid ; as the **Rollover Switch (Sw. 18)** is closed the box will turn solid . This indicates the switches are working properly. The **Magnet (Q14)** is pulsed (*when the OPTO Switch is closed*) and will grab the ball and throw it back (*Note: This can vary depending how long the magnet is being pulsed; it may let the ball pass through and drop out in the rear.*). The motor will stop running after this Test Menu is exited.



Dr. Evil Test

Selecting the "DR. E" *Icon* will bring up the **DR. EVIL TEST MENU**. This test is provided to allow a method of testing the **Dr. Evil Top (Sw. 22), Dr. Evil Bottom (Sw. 23), Dr. Evil Bash (Sw. 24) and Motor Operation (Q19)**.

Upon entering the test, the **Dr. Evil Bottom Switch (Sw. 23)** is closed . Select either the "PULSE" or "RUN" *Icons* to activate the **Motor (Q19)** (*Note: Selecting Run will automatically bring the motor into the up position and stop*).

As the motor turns and brings up the **Dr. Evil Target**, the **Sw. 23** box will turn and the **Sw. 22** box will turn solid . This indicates the switches are working properly. *With ball-in-hand, roll the ball into the Dr. Evil Target and note if Sw. 24 is being closed (input type="checkbox"/> will turn solid).* (*Note: The Dr. Evil Target will automatically return to the down position after exiting the Portals Menu.*)



Laser Beam Test

Selecting the "LASER" *Icon* will bring up the **LASER BEAM TEST MENU**. This test is provided to allow a method of testing the **Laser Beam Home (Sw. 43), Laser Beam Enable (Sw. 44), Laser Beam Loaded (Sw. 45), Motor Operation (Q21) and Coil Operation (Q4)**.

Upon entering the test, the **Laser Beam Home Switch (Sw. 43)** is closed . Select the "RUN" *Icon* to activate the **Motor (Q21)** (*Note: Selecting Run will automatically cycle the motor from Home, full out, and return Home*).

As the motor turns out the **Laser**, the **Sw. 43** box will turn and the **Sw. 44** box will turn solid . This indicates the switches are working properly. *With ball-in-hand, roll the ball into the Laser Beam Ball Trough from the Left Plastic Ramp and note if Sw. 45 is being closed (input type="checkbox"/> will turn solid).*

CAUTION: Upon switch closure of the **Laser Beam Loaded (Sw. 45)**, the **Motor (Q21)** will cycle and the **Laser Beam Eject (Q4)** will pulse. Be careful of moving parts and flying pinball if loaded!

For more details of the Switches & Coils (Part N^os & views) tested on this page, see Sec. 4, Chp. 2, Drawings...





Dr. Pinball (Flow Chart Menus)

To initiate, from the **DIAGNOSTICS MENU**, select the Cross "DR." *Icon* with either the **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. This will bring you (the operator / technician) into **DR. PINBALL** (Flow Chart Menus) which offers you a choice of three sub-menus: Coil "DR.," Switch "DR." and Lamp "DR." *Icons*. Selecting a particular sub-menu will give you a choice of which specific Coil (any and all coil assemblies such as Flippers, VUKs, Magnets, etc.), Switch or Lamp circuit needs to be diagnosed. The display will now ask a question or give a procedure to follow such as "Does the lamp turn on?" or "Check bridge rectifier BR-20, if short replace." When Dr. Pinball asks a question or request a procedure the Dr. will expect a response such as "NO" or "YES" (see below examples of the *Mini-Icons* which will prompt the operator). You the operator/technician must respond by using your **Flipper Buttons** to "SELECT" a *Mini-Icon* and the **Start Button** to "ENTER" your selection.

The following are the *Mini-Icons* with explanations for the Dr. Pinball Sub-Menus to follow:



→ Select a Coil, Lamp or Switch to diagnose with "-" or "+" *Icon*; Then select the "RUN" *Icon* to activate the choice. "PREV" goes back to previous question. "QUIT" exits Portals completely. Help "?" gives direction on button usage.



→ Seen when a question is being asked on the Display. Select "YES" or "NO" to answer the question given. "END" lets you select a new item to test. "PREV", "QUIT" and "?" (see first example above).



→ Seen when diagnosis is given. Select any *Icon* for your next step. "END" lets you select a new item to test. "PREV", "QUIT" and "?" (see first example above).



→ In Coil Flow Chart Menu, select "PULSE" to pulse the coil selected. "END" lets you select a new item to test. "PREV", "QUIT" and "?" (see first example above).



Coil Flow Chart

To initiate, from the **DR. PINBALL MENU**, select the Coil "DR." *Icon* with either the **Red or Green Button** and press the **Black Button**. This is the Coil Flow Chart. Follow the questions, answering by using the *Mini-Icons* in the display.



Switch Flow Chart

To initiate, from the **DR. PINBALL MENU**, select the Switch "DR." *Icon* with either the **Red or Green Button** and press the **Black Button**. This is the Switch Flow Chart. Follow the questions, answering by using the *Mini-Icons* in the display.



Lamp Flow Chart

To initiate, from the **DR. PINBALL MENU**, select the Lamp "DR." *Icon* with either the **Red or Green Button** and press the **Black Button**. This is the Lamp Flow Chart. Follow the questions, answering by using the *Mini-Icons* in the display.





Pinball Game Audit Table

What's the current Replay Score Level?

CPU version:

LOCATION:

 -

DISPLAY ver.:

DATE: / /

 -

AUDITOR:

Copy for Field Audit Tracking Performance (Use blank boxes to fill-in Audit Information).

01
thru
12

Total Paid Credits	Average Ball Time	Coins Thru Left Slot	Coins Thru Center Slot	Total Coins	Meter Clicks
01:	03:	05:	07:	09:	11:
Free Game Percentage	Average Game Time	Coins Thru Right Slot	Coins Thru 4th Slot	Total Earnings	Software Meter
02:	04:	06:	08:	10:	12:

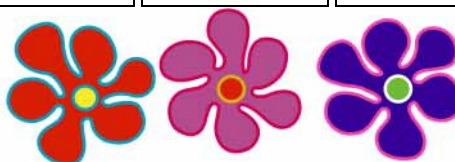
13
thru
55

Total Replays	Total Free Plays	130m+ Scores	Center Drains	Proprietary (46)	Right Flipper Used
18:	25:	32:	39:		53:
Replay Percent	Total Plays	Average Scores	Right Drains	Proprietary (47)	Proprietary (54)
19:	26:	33:	40:		
Total Balls Played	Total Specials	0-19.9m Scores	Service Credits	Slam Tilts	Proprietary (48)
20:	27:	34:	41:	42:	Proprietary (55)
Total Extra Balls	Special Percent	20m-49.9m Scores	Ball Search Started	Total Balls Saved	Proprietary (49)
21:	28:	35:	43:	44:	Proprietary (50)
Extra Ball Percent	Total Matches	50m-69.9m Scores	Lost Ball Feeds	Proprietary (43)	Proprietary (51)
22:	29:	36:	45:	46:	Proprietary (52)
Replay 1 Awards	High Score Awards	70m-99.9m Scores	Lost Ball Game Starts	Proprietary (44)	Proprietary (53)
23:	30:	37:	47:	48:	Proprietary (54)
Replay 2+ Awards	High Score Percent	100m-129.9m Scores	Left Drains	Proprietary (45)	Left Flipper Used
24:	31:	38:	49:	50:	52:

56
thru
173

Super Skill Made	MINI ME Lit	Laser Beam Complete	Henchmen Starts	Moon Base MB Lit	300 Flowers
73:	92:	111:	130:	149:	168:
Super Skill Missed	MINI ME Starts	1 Time Machine Shot	2+ Henchmen Starts	Moon Base Starts	400 Flowers
74:	93:	112:	131:	150:	169:
Left Orbits	Skill Shot Balks	2+ MINI ME Starts	2 Time Machine Shots	Henchmen Jackpots	2+ Moon Base Starts
75:	94:	94:	113:	132:	151:
Right Orbits	MOJO Completions	MINI ME Jackpots	Time Machine Lit	Henchmen Complete	Moon Base Jackpots
76:	95:	95:	114:	133:	152:
Left Ramps	MOJO Lit	MINI ME Complete	Time Machine Starts	1 Game Started	Moon Base Super JPS
77:	96:	96:	115:	134:	153:
Right Ramps	MOJO Starts	1 Fat Bast Shot	2+ Time Machine Starts	2 Games Started	Bonus 2X
78:	97:	97:	116:	135:	154:
Toilet Shots	2+ MOJO Starts	2 Fat Bast Shots	Time Machine Jackpots	3 Games Started	Bonus 3X
79:	98:	98:	117:	136:	155:
Time Machine Shots	MOJO Jackpots	Fat Bast Lit	Time Machine Super JPS	4 Games Started	Bonus 4X
80:	99:	99:	118:	137:	156:
Scoop Arrivals	MOJO Super Jackpots	Fat Bast Starts	Time Machine Complete	5 Games Started	Bonus 5X
81:	100:	100:	119:	138:	157:
MOJO Targets Hit	Mystery Lit	2+ Fat Bast Starts	1 Drill Shot	Virtucon Lit	Bonus 10X
82:	101:	101:	120:	139:	158:
Ramp Targets Hit	Mystery Awards	Fat Bast Jackpots	2 Drill Shots	Virtucon Starts	Bonus 25X
83:	102:	102:	121:	140:	159:
AP Targets Hit	SHAG Lanes Complete	Fat Bast Super JPS	Drill Lit	2+ Virtucon Starts	Bonus 50X
84:	103:	103:	122:	141:	160:
Spinner Spins	Super Pop Hits	Fat Bast Complete	Drill Starts	Virtucon Jackpots	Bonus X Maxed Awards
85:	104:	104:	123:	142:	161:
Pop Bumper Hits	EB Lit from SHAG	1 Laser Beam Shot	2+ Drill Starts	Virtucon Super JPS	Total Bonus X Awards
86:	105:	105:	124:	143:	162:
Left Return Lanes	EB Lit from Games	2 Laser Beam Shots	Drill Jackpots	1 Game Completed	25 Flowers
87:	106:	106:	125:	144:	163:
Right Return Lanes	EB Lit from FB MB	Laser Beam Lit	Drill Complete	2 Games Completed	50 Flowers
88:	107:	107:	126:	145:	164:
Dr. Evil Hits	EB Lit from Mystery	Laser Beam Starts	1 Henchmen Shot	3 Games Completed	75 Flowers
89:	108:	108:	127:	146:	165:
Skill Shots Made	1 MINI ME Shot	2+ Laser Beam Starts	2 Henchmen Shots	4 Games Completed	100 Flowers
90:	109:	109:	128:	147:	166:
Skill Shots Missed	2 MINI ME Shots	Laser Beam Jackpots	Henchmen Lit	5 Games Completed	200 Flowers
91:	110:	110:	129:	148:	167:

Sec. 3: ...Audits Menu



Go To Audits Menu

Overview

The **Portals™ Service Menu System** provides 173 Audit Functions for accounting purposes and for evaluation of *Game Difficulty Adjustments*. The Audit Functions are divided into 3 groups: • **Earnings (Coin) Audits**, are the first 12 most-used Audits • **S.P.I. Audits**, are the Game Play Generic Audits 13-55 • **Austin Powers™ Audits**, are the Game Play Specific Audits 56-173 (//// Programming Use Only ////); Audits left open (blank space in gray, e.g. Audits 43-51, 54 & 55) are currently **Not Used**, allowing for *Future Expansion*, if any, or are **Proprietary**. If the code version is upgraded, view Audits in the display & write the audit(s) in the blank(s) if any audit(s) were added. Each group may be viewed in the **Portals™ Service Menu** (see Chapter 1, **Portals™ Service Menu Introduction**, of this Section). View all audits with the **Game Audit Table** provided on the previous page.



GO TO AUDITS MENU

With the game in the Attract Mode, open the Coin Door and press the **Black "BEGIN TEST" Button**. Select the "AUD" *Icon* in the **MAIN MENU** with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. The **AUDITS MENU** appears.

Important Notes:



Exit any sub-menu and return to the **MAIN MENU** by selecting & activating the "PREV" *Icons*. If no *Icons* appear in the display because of a testing function or special display (e.g. "Help"), press any button to exit.



Selecting & activating the "QUIT" *Icon* from any display will exit the Service Session.



Selecting & activating the "HELP" *Icon* from any display will show a help screen. (An explanation of each *Mini-Icon* at that level will cycle continuously until any active button is pressed.)



Selecting & activating the "ARROW" *Icons* selects the next or previous audit in the group.



Earnings Audits (1-12)

From the **AUDITS MENU**, select the "EARN" *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. Select and activate the "RIGHT ARROW" *Icon* to view the 1st audit in this group. Continue to select either of the "ARROW" *Icons* to view each audit one at a time. The display will describe the audit number, the audit name, and the audit total or value. The current audit will remain in the display until the next audit is chosen or when the sub-menu is exited.

Au. N ^o	Audit Name	Audit Definition
Au. 1	TOTAL PAID CREDITS	Provides the total number of paid credits.
Au. 2	FREE GAME PERCENTAGE	This percentage is derived from dividing Audit 25, Total Free Plays, by Audit 26, Total Plays.
Au. 3	AVERAGE BALL TIME	In seconds, the average ball time is derived from the total play time divided by Audit 13, Total Balls Played.
Au. 4	AVERAGE GAME TIME	The average game time is expressed in minutes and seconds.
Au. 5	COINS THRU LEFT SLOT	Provides the total number of times Coin Switch (Sw. 6) was closed.
Au. 6	COINS THRU RIGHT SLOT	Provides the total number of times Coin Switch (Sw. 4) was closed.
Au. 7	COINS THRU CENTER SLOT	Provides the total number of times Coin Switch (Sw. 5) was closed.
Au. 8	COINS THRU 4TH SLOT	Provides the total number of times Coin Switch (Sw. 2) was closed.
Au. 9	TOTAL COINS	Provides the total amount of coins registered through all the slots.
Au. 10	TOTAL EARNINGS	The total cash value accumulated since the last <i>Factory Restore</i> occurred (see Chapter 5, Go to Reset Menu, of this section).
Au. 11	METER CLICKS	Provides the total number of money clicks accumulated. (Based on the country's lowest coin denomination used for the game credit.)
Au. 12	SOFTWARE METER	Provides the continuing total of Meter Clicks. This audit cannot be reset; the display shows the constant addition of Meter Clicks.





S.P.I. Audits (13-55)

From the **AUDITS MENU**, select the "S.P.I." *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. Select and activate the **"RIGHT ARROW" Icon** to view the 1st audit in this group. Continue to select either of the **"ARROW" Icons** to view each audit one at a time. The display will describe the audit number, the audit name, and the audit total or value. The current audit will remain in the display until the next audit is chosen or when the sub-menu is exited.

Au. Nº	Audit Name	Audit Definition
Au. 13	TOTAL BALLS PLAYED	Provides the total number of regular and extra balls.
Au. 14	TOTAL EXTRA BALLS	Provides the total number of extra balls awarded.
Au. 15	EXTRA BALLS PERCENT	Provides the percentage total from dividing Audit 14, Total Extra Balls, by Audit 26, Total Plays.
Au. 16	REPLAY 1 AWARDS	Provides the total awards (Credit, Extra Ball, Or Audit) for level 1.
Au. 17	REPLAY 2+ AWARDS	Provides the total awards (Credit, Extra Ball, Or Audit) for level(s) 2 or higher.
Au. 18	TOTAL REPLAYS	Provides the total awards (Credits, Extra Balls, Or Audit Only) for exceeding replay score levels.
Au. 19	REPLAY PERCENT	Provides the percentage total from dividing Audit 18, Total Replays, by Audit 26, Total Plays. The percentage reflects replay total awards for exceeding replay score levels.
Au. 20	TOTAL SPECIALS	Provides the total awards (Credits, Extra Balls, Or Scores) for making specials.
Au. 21	SPECIAL PERCENT	This percentage is derived from dividing Audit 20, Total Specials, by Audit 26, Total Plays.
Au. 22	TOTAL MATCHES	Provides the 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% by Adjustment 11, Match Percentage, if enabled. (See Chapter 4, Go to Adjustments Menu, of this section.)
Au. 23	HIGH SCORE AWARDS	Provides the total credits awarded for exceeding the High-Score-To-Date scores.
Au. 24	HIGH SCORE PERCENT	This percentage is derived from dividing Audit 23, High Score Awards, by Audit 26, Total Plays.
Au. 25	TOTAL FREE PLAYS	Provides the total free credits for replays, High-Score-To-Date, Specials, and Match.
Au. 26	TOTAL PLAYS	This total is derived by adding the sum of Audit 1, Total Paid Credits, and Audit 25, Total Free Plays. Note that free credits are not recorded in the Audit until they are actually used.
Au. 27	0—19.9M SCORES	Provides the total number of games the Player's final score was between 0 and 19,900,000 points.
Au. 28	20M—49.9M SCORES	Provides the total number of games the Player's final score was between 20,000,000 and 49,900,000 points.
Au. 29	50M—69.9M SCORES	Provides the total number of games the Player's final score was between 50,000,000 and 69,900,000 points.
Au. 30	70M—99.9M SCORES	Provides the total number of games the Player's final score was between 70,000,000 and 99,900,000 points.
Au. 31	100M—129.9M SCORES	Provides the total number of games the Player's final score was between 100,000,000 and 129,900,000 points.
Au. 32	130M+ SCORES	Provides the total number of games the Player's final score was over 130,000,000 points.
Au. 33	AVERAGE SCORES	This total is derived from adding the Final Score of each game to a table and dividing this sum by Audit 26, Total Plays.
Au. 34	SERVICE CREDITS	Provides the total number of times Dedicated Switch (DS-7) was closed, not in the Portals™ Service Menu. (See Chapter 1, Introduction [Access & Use] for instructions on how to receive Service Credits.)
Au. 35	BALL SEARCH STARTED	Provides the total number of times the game performed a ball search.
Au. 36	LOST BALL FEEDS	Provides the total number of times the game added a ball to play when it could not find a ball after ball search.

Sec. 3: ...Audits Menu





S.P.I. Audits Continued.

Audit Name	Audit Definition
Au. 37 LOST BALL GAME STARTS	Provides the total number of times the game started with a ball missing from the ball trough at the start of a game.
Au. 38 LEFT DRAINS	Provides the total number of times Rollover Switch 57 was closed.
Au. 39 CENTER DRAINS	Provides the total number of times the game ball had drained with the last switch closed was not Sw. 57 or Sw. 60.
Au. 40 RIGHT DRAINS	Provides the total number of times Rollover Switch 60 was closed.
Au. 41 SLAMTILTS	Provides the total number of times Contact Switch 55 was closed.
Au. 42 TOTAL BALLS SAVED	Provides the total number of times this feature was used. This feature is enabled at the start of each ball and is disabled as soon as the ball makes contact with 5 game switches or allocated time expired.
Au. 43- Au. 51	These audits are Not Used , allowing for Future Expansion , if any, and/or Proprietary (used for programming).
Au. 52 LEFT FLIPPER USED	Provides the total number of times Dedicated Sw. (DS-1) was closed.
Au. 53 RIGHT FLIPPER USED	Provides the total number of times Dedicated Sw. (DS-3) was closed.
Au. 54- Au. 55	These audits are Not Used , allowing for Future Expansion , if any, and/or Proprietary (used for programming).



Austin Powers™ Audits (56-173)

From the **AUDITS MENU**, select the "A.P." *Icon* with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. Select and activate the "RIGHT ARROW" *Icon* to view the 1st audit in this group. Continue to select either of the "ARROW" *Icons* to view each audit one at a time. The display will describe the audit number, the audit name, and the audit total or value. The current audit will remain in the display until the next audit is chosen or when the sub-menu is exited. These Game Specific Audits are primarily used for programming. They provide the total number of times a feature was started, awarded, lit, played and/or completed. They also may indicate the total number of Switch Closures during certain modes or features. Multiple variations of switch closures (see Diagnostics) are used to determine the lighting and/or completion of the feature stated.



Au. N°	Audit Name	Au. N°	Audit Name
Au. 56	LEFT ORBITS	Au. 77	MOJO LIT
Au. 57	RIGHT ORBITS	Au. 78	MOJO STARTS
Au. 58	LEFT RAMPS	Au. 79	2+ MOJO STARTS
Au. 59	RIGHT RAMPS	Au. 80	MOJO JACKPOTS
Au. 60	TOILET SHOTS	Au. 81	MOJO SUPER JACKPOTS
Au. 61	TIME MACHINE SHOTS	Au. 82	MYSTERY LIT
Au. 62	SCOOP ARRIVALS	Au. 83	MYSTERY AWARDS
Au. 63	MOJO TARGETS HIT	Au. 84	SHAG LANES COMPLETE
Au. 64	RAMP TARGETS HIT	Au. 85	SUPER POP HITS
Au. 65	AP TARGETS HIT	Au. 86	EB LIT FROM SHAG
Au. 66	SPINNER SPINS	Au. 87	EB LIT FROM GAMES
Au. 67	POP BUMPER HITS	Au. 88	EB LIT FROM FB MB
Au. 68	LEFT RETURN LANES	Au. 89	EB LIT FROM MYSTERY
Au. 69	RIGHT RETURN LANES	Au. 90	1 MINI ME SHOT
Au. 70	DR. EVIL HITS	Au. 91	2 MINI ME SHOTS
Au. 71	SKILL SHOTS MADE	Au. 92	MINI ME LIT
Au. 72	SKILL SHOTS MISSED	Au. 93	MINI ME STARTS
Au. 73	SUPER SKILL MADE	Au. 94	2+ MINI ME STARTS
Au. 74	SUPER SKILL MISSED	Au. 95	MINI ME JACKPOTS
Au. 75	SKILL SHOT BALKS	Au. 96	MINI ME COMPLETE
Au. 76	MOJO COMPLETIONS	Au. 97	1 FAT BAST SHOT





Audit Name	Au. N°	Audit Name	
Au. 98	2 FAT BAST SHOTS	Au. 146	3 GAMES COMPLETED
Au. 99	FAT BAST LIT	Au. 147	4 GAMES COMPLETED
Au. 100	FAT BAST STARTS	Au. 148	5 GAMES COMPLETED
Au. 101	2+ FAT BAST STARTS	Au. 149	MOON BASE MB LIT
Au. 102	FAT BAST JACKPOTS	Au. 150	MOON BASE STARTS
Au. 103	FAT BAST SUPER JPS	Au. 151	2+ MOON BASE STARTS
Au. 104	FAT BAST COMPLETE	Au. 152	MOON BASE JACKPOTS
Au. 105	1 LASER BEAM SHOT	Au. 153	MOON BASE SUPER JPS
Au. 106	2 LASER BEAM SHOTS	Au. 154	BONUS 2X
Au. 107	LASER BEAM LIT	Au. 155	BONUS 3X
Au. 108	LASER BEAM STARTS	Au. 156	BONUS 4X
Au. 109	2+ LASER BEAM STARTS	Au. 157	BONUS 5X
Au. 110	LASER BEAM JACKPOTS	Au. 158	BONUS 10X
Au. 111	LASER BEAM COMPLETE	Au. 159	BONUS 25X
Au. 112	1 TIME MACHINE SHOT	Au. 160	BONUS 50X
Au. 113	2 TIME MACHINE SHOTS	Au. 161	BONUS X MAXED AWARDS
Au. 114	TIME MACHINE LIT	Au. 162	TOTAL BONUS X AWARDS
Au. 115	TIME MACHINE STARTS	Au. 163	25 FLOWERS
Au. 116	2+ TIME MACHINE STARTS	Au. 164	50 FLOWERS
Au. 117	TIME MACHINE JACKPOTS	Au. 165	75 FLOWERS
Au. 118	TIME MACHINE SUPER JPS	Au. 166	100 FLOWERS
Au. 119	TIME MACHINE COMPLETE	Au. 167	200 FLOWERS
Au. 120	1 DRILL SHOT	Au. 168	300 FLOWERS
Au. 121	2 DRILL SHOTS	Au. 169	400 FLOWERS
Au. 122	DRILL LIT	Au. 170	500 FLOWERS
Au. 123	DRILL STARTS	Au. 171	1000 FLOWERS
Au. 124	2+ DRILL STARTS	Au. 172	TOTAL FLOWERS
Au. 125	DRILL JACKPOTS	Au. 173	SNEAK-INS
Au. 126	DRILL COMPLETE		
Au. 127	1 HENCHMEN SHOT		
Au. 128	2 HENCHMEN SHOTS		
Au. 129	HENCHMEN LIT		
Au. 130	HENCHMEN STARTS		
Au. 131	2+ HENCHMEN STARTS		
Au. 132	HENCHMEN JACKPOTS		
Au. 133	HENCHMEN COMPLETE		
Au. 134	1 GAME STARTED		
Au. 135	2 GAMES STARTED		
Au. 136	3 GAMES STARTED		
Au. 137	4 GAMES STARTED		
Au. 138	5 GAMES STARTED		
Au. 139	VIRTUCON LIT		
Au. 140	VIRTUCON STARTS		
Au. 141	2+ VIRTUCON STARTS		
Au. 142	VIRTUCON JACKPOTS		
Au. 143	VIRTUCON SUPER JPS		
Au. 144	1 GAME COMPLETED		
Au. 145	2 GAMES COMPLETED		

Sec. 3: ...Audits Menu





Go To Printer Menu

From the **AUDITS MENU**, select the "PRNT" *Icon* with either **Red "LEFT"** or **Green "RIGHT"** **Button** and press the **Black "ENTER"** **Button**. The **PRINTER MENU** appears.



Special equipment is required for this Sub-Menu

The **Portals™ Service Menu System** provides 3 Audit Printing Adjustment Functions to print information on a "Hand-Held" printer, download game information to a Laptop PC or clear the printout count. A printer interface board, hand-held printer and/or a special software program is required to run this menu. Entering this menu and selection/activation of the *Icons* without this equipment/software will not affect the game.



Quick Printout (Printer Interface)

From the **PRINTER MENU**, select the "QUIK" *Icon* with either **Red** or **Green Button** and press the **Black Button**. Select the "+" *Icon* and press the **Black Button** to start the printout. Only the Earnings Audits can be printed out to a "Hand-Held" Printer.



Full Printout (Alison Interface Program)

From the **PRINTER MENU**, select the "ALISON" *Icon* with either **Red** or **Green Button** and press the **Black Button**. Select the "+" *Icon* and press the **Black Button** to start the download. A special software program & a Lap Top PC is required. All game audits (Earnings, S.P.I. & Game Specific) can be retrieved.



Reset Printer (Nº of Copies Printed Reset)

From the **PRINTER MENU**, select the "RESET" *Icon* with either **Red** or **Green Button** and press the **Black Button**. Select the "+" *Icon* and press the **Black Button** to start the clear the "Nº of copies printed" count total.

RESETTING AUDIT NOTES:



Audit Note: 1st Way to Reset Audits

To reset audits, from the **MAIN MENU**, select the "ADJ" *Icon*. See Chapter 4, Go to Adjustments Menu, of this section.



Select the "S.P.I." *Icon*, from the **ADJUSTMENT MENU**, and advance to Adj. 8, Reset Coin Audits, with the "RIGHT ARROW" *Icon*. Select the "+" *Icon* to change setting to **YES**. When enabled, the *Coin Audits* (5-11) will be reset to zero. Advance to Adj. 9, Reset Game Audits, with the "RIGHT ARROW" *Icon*. Select the "+" *Icon* to change setting to **YES**. When enabled, *all the audits* will be reset to zero, **except** for the *Coin Audits* (5-11) **and** Audit 12, Software Meter (the only audit which cannot be reset to zero).



Audit Note: 2nd Way to Reset Audits

To reset audits, from the **MAIN MENU**, select the "RESET" *Icon*. See Chapter 5, Go to Reset Menu, of this section.



Selection of the "COIN" *Icon*, from the **RESET MENU**, will reset the *Coin Audits* (5-11) to zero.



Selection of the "AUD" *Icon*, from the **RESET MENU**, will reset all audits to zero, **except** for the *Coin Audits* (5-11) **and** Audit 12, Software Meter (the only audit which cannot be reset to zero).





Pinball Game Adjustment Table

Some adjustments have a "Drop-Down" Table for further customization.



S.P.I. Adjustments 1-43

S.P.I.	Adjustment Name	USA Default	Your Setting	Adjustment Name	USA Default	Your Setting
1	REPLAYS: FIXED/AUTO ‡	...20%...		22	DEFAULT HIGH SCORE #2	400,000,000
2	REPLAY LEVELS ‡	1 ...		23	DEFAULT HIGH SCORE #3	350,000,000
3	REPLAY AWARD	CREDIT		24	DEFAULT HIGH SCORE #4	325,000,000
4	FREE GAME LIMIT	05		25	DEFAULT HIGH SCORE #5	300,000,000
5	EXTRA BALL LIMIT	09		26	HSTD RESET COUNT	2,000
6	GAME DIFFICULTY ‡	MODERATE		27	HIGH SCORE INITIALS	3 Initials
7	GAME PRICING ‡	USA3		28	FREE PLAY	NO
8	RESET COIN AUDITS	NO		29	CUSTOM MESSAGE	ON
9	RESET GAME AUDITS	NO		30	FLASH LAMP POWER	NORMAL
10	RESET HIGH SCORES	NO		31	COIL PULSE POWER	NORMAL
11	MATCH PERCENTAGE	10%		32	KNOCKER VOLUME	NORMAL
12	BALLS PER GAME	03		33	GAME RESTART	YES
13	TILT WARNINGS	01		34	EXTRA BALL PERCENTAGE	10%
14	REPLAY BOOST	YES		35	BILL VALIDATOR	NO
15	CREDIT LIMIT	30		36	TOURNAMENT MODE	NONE
16	ALLOW HIGH SCORES	YES		37	BKGRND MUSIC VOLUME	01
17	HIGH SCORE #1 AWARDS	01		38	FREEZE TIME	AUTO
18	HIGH SCORE #2 AWARDS	00		39	FAST BONUS COUNTDOWN	YES
19	HIGH SCORE #3 AWARDS	00		40	UK COIN MECH. TYPE	CURRENT:
20	HIGH SCORE #4 AWARDS	00		41	UK POST SAVE ENABLED	NO
21	DEFAULT HIGH SCORE #1	500,000,000		42	LOCATION ID	00
				43	GAME ID	00

Sec. 3: ... Adj. Menu

PLEASE NOTE: All Factory Settings (Defaults) described in the tables above/below and within the Adjustment Definitions are for USA Settings only (CPU/Snd Bd. Dip Sw. 300 Settings 1-8 are all "OFF"). Different countries may have different Factory Settings (Defaults). ‡ Adj. 1, 2, 6 & 7 have "Drop-Down" Tables, see definitions.

Adj. 40 & 41 are utilized only for the UK, with UK Dip Switch Option Setting 2 (See **DR. 3**, in the front part of this manual.)



Austin Powers™ Adjustments 44-60

A.P.	Adjustment Name	USA Default	Your Setting	Adjustment Name	USA Default	Your Setting
44	MINI-ME DIFFICULTY	MODERATE		52	ADULT SPEECH ENABLED	YES
45	FAT BASTARD DIFFICULTY	MODERATE		53	LASER BEAM MTR ENABLED	YES
46	LASER BEAM DIFFICULTY	MODERATE		54	DR. EVIL MOTOR ENABLED	YES
47	TIME MACH. DIFFICULTY	MODERATE		55	TIME MACH. MTR ENABLED	YES
48	SUB. DRILL DIFFICULTY	MODERATE		56	SHAG EXTRA BALL EVERY	04
49	HENCHMEN DIFFICULTY	MODERATE		57	# GAMES FOR EB	04
50	MYSTERY DIFFICULTY	MODERATE		58	EXTRA BALL MEMORY	ON
51	MOJO DIFFICULTY	MODERATE		59	TIMED PLUNGER	OFF
				60	WASHINGTON D.C. ENABLED	OFF



Go To Adjustments Menu

Overview

The **Portals™ Service Menu System** provides **60** Adjustment Functions to vary game difficulty or to customize (e.g. Adjusting: High Score Levels; Balls per game; Game Pricing; Default High Scores; etc.). The Adjustment Functions are divided into 2 groups: • **S.P.I. Adjustments**, are the Game Play Generic Adjustments (1-43) • **Austin Powers™ Adjustments**, are the Game Play Specific Adjustments (**44-60**); Any Adjustment(s) left open or are currently *Not Used*, are allowing for Future Expansion, if any, or are Proprietary. If the code version is upgraded, view Adjustments in the display & write the adjustment(s) in the blank(s) if any adjustment(s) were added. Each group may be viewed manually after entering the **Portals™ Service Menu** (see Chapter 1, **Portals™ Service Menu Introduction**, of this Section). All adjustments can be viewed at a glance with the **Game Adjustment Table** provided on the previous page. If a value is changed, the display will indicate **REQUEST INSTALLED**.

Important: *The Coin Door must be OPEN allowing the Memory Protect Switch to be disabled so changes can be made.*



GO TO ADJUSTMENTS MENU

With the game in the Attract Mode, open the Coin Door and press the **Black "BEGIN TEST" Button**. Select the "ADJ" *Icon* in the **MAIN MENU** with either **Red "LEFT"** or **Green "RIGHT"** Button and press the **Black "ENTER" Button**. The **ADJUSTMENTS MENU** appears.

Important Notes:



Exit any sub-menu and return to the **MAIN MENU** by selecting & activating the "PREV" *Icons*. If no *Icons* appear in the display because of a testing function or special display (e.g. "Help"), press any button to exit.



Selecting & activating the "HELP" *Icon* from any display will show a help screen. (An explanation of each *Mini-Icon* at that level will cycle continuously until any active button is pressed.)



Selecting & activating the "QUIT" *Icon* from any display will exit the Service Session.



In Adjustments, selecting & activating the "-" *Icon* decrements the value setting. Selecting & activating the "+" *Icon* increments the value setting.



Selecting & activating the "ARROW" *Icons* selects the next or previous adj. in the group.



S.P.I. Adjustments (1-43)

From the **ADJUSTMENTS MENU**, select the "S.P.I." *Icon* with either **Red "LEFT"** or **Green "RIGHT"** Button and press the **Black "ENTER" Button**. Select and activate the "RIGHT ARROW" *Icon* to view the 1st adjustment in this group. Continue to select either of the "ARROW" *Icons* to view each adjustment one at a time. Select either the "-" or "+" *Icons* to change the value, if desired. The display will describe the adjustment number, the adjustment name, and the adjustment total or value. The current adjustment will remain in the display until the next adjustment is chosen or when the sub-menu is exited.

Adj. Nº	Adjustment Name	Adjustment Definition
Adj. 1	REPLAYS: FIXED / AUTO	Set between 01% - 50% and Fixed (0%) for Replay Levels. Default is 20% . Four levels may be selected. Adjustments allow awarding of a credit or an extra ball as each level is exceeded. 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).
Adj. 2	REPLAY LEVELS	Set between 1 - 4 or NONE for the number of replay levels to be active. A "Drop-Down" Table appears (after selection of number of replay levels) showing Replay Level 1. Adjust Replay Level 1 between 10M - 9.99B. Adjust Replay Level 2, 3 and/or 4 respectively.
Adj. 3	REPLAY AWARD	Set for replays to award: CREDIT, EXTRA BALL, NONE or SPECIAL (When score threshold is achieved, a Playfield Special is lit.) Default is CREDIT .
Adj. 4	FREE GAME LIMIT	Set between 01 - 09 or NO FREE GAMES . Default is 05 . Adjust the maximum number of <i>Free Games</i> that may be accumulated per game.
Adj. 5	EXTRA BALL LIMIT	Set between 01 - 09 or NO EXTRA BALLS . Default is 09 . Adjust the maximum number of <i>Extra Balls</i> that may be accumulated per game.





S.P.I. Adjustments Continued.

Adjustment Name	Adjustment Definition
-----------------	-----------------------

Adj. 6 GAME DIFFICULTY

Set to **EXTRA EASY, EASY, MODERATE, HARD** or **EXTRA HARD**. (Note: Additional game features which are not adjusted may also change when adjusting this adjustment; see below table.) Default is **MODERATE**. Any one of the **INSTALL** settings (in a "Drop-Down" Table) for this adjustment may be activated to automatically select settings for multiple adjustments affecting game difficulty. Select and activate the "-" or "+" *Icons* to choose the difficulty level required. After activation, the individual adjustments may be readjusted, if desired. Adjustments which typically automatically get changed when changing this adjustment are Game Specific with adjustments values of **EXTRA EASY, EASY, MODERATE, HARD, EXTRA HARD, ON** or **OFF**. After changing this adjustment, make note of it in the Table on Page 34 (in pencil), and check all Game Specific adjustments, noting all changes in the "Your Setting" Column. *Performing a Factory Reset will revert all adjustments back to the defaults.*

Play Rules: Novelty & 4-Ball, plus Add-A-Ball Settings

The following three combinations are recommended for situations where local laws restrict certain game features regarding the use of replays or the number of balls per game:

Novelty Play Rules - Set to establish recommended settings for no Free Play or Extra Balls:

Adj.	Adjustment Name	Setting	Adj.	Adjustment Name	Setting
1	Replays: Fixed/Auto	Fixed	5	Extra Ball Limit	00
2	Replay Levels	None	11	Match Percentage	Off
3	Replay Award	None	17	High Score #1 Awards	1
4	Free Game Limit	0	18	High Score #2 Awards	0

4-Ball Play Rules - Set to establish recommended settings for 4-Ball Play:

Adj.	Adjustment Name	Setting	Adj.	Adjustment Name	Setting
1	Replays: Fixed/Auto	07%	5	Extra Ball Limit	3
2	Replay Levels	1	11	Match Percentage	4
3	Replay Award	Credit	12	Balls Per Game	5
4	Free Game Limit	5	17	High Score #1 Awards	1
			18	High Score #2 Awards	0

Add-A-Ball Settings -To disable awarding of credits and provide awards with an Extra Ball:

Adj.	Adjustment Name	Setting	Adj.	Adjustment Name	Setting
3	Replay Award	Extra Ball	16	Allow High Scores	No
4	Free Game Limit	00	17-20	High Score #1 - #4 Awards	0
11	Match Percentage	Off			

Sec. 3: ... Adj. Menu

Adj. 7 GAME PRICING

Set between **USA1** thru **UK6** or **CUSTOM**. Default is **USA3** (*foreign Game Pricing Options are in the Standard Pricing Select Table on the following pages*). There are two methods available for coin switch programming: Standard & Custom. Standard pricing uses a single adjustment as seen in the first display. See the Standard Pricing Table. If "Custom" is selected, a "Drop-Down" Table appears. Select a pricing scheme shown in the Custom Pricing Table as seen below.

With Adjustment 7 set to **CUSTOM** operating the **Black "Enter" Button** again initiates a drop down menu representing coin switch pulses for the LEFT, CENTER, RIGHT and 4TH Coin Slots. The prescribed the number of pulses are required for 1 Credit. For example, if *Left Coin Pulses*, was set to 02 and *Coin Switch Pulses Required for 1 Credit*, to 01 a coin in the Left Slot would produce 2 Credits. Further, if *Left Coin Pulses*, was set to 01 and *Coin Switch Pulses Required for 1 Credit*, to 02, 2 Coins in the Left Slot would be required for 1 Credit.

Coin Switch Pulses Required for Bonus Credit may be set to post bonus credits when a minimum amount of coins are inserted at one time. For example, if *Left Coin Pulses* was set to 01, *Coin Switch Pulses Required for 1 Credit* to 01 and *Coin Switch Pulses Required for Bonus Credit* to 04, 1 Credit would be posted for each of the first 3 Coins in the Left Slot and 2 Credits for the 4th Coin.

S.P.I. Adjustment 7 Continues on the next page.





S.P.I. Adjustment 7 Continued.

Standard/Custom Pricing - Set for the desired pricing scheme from the Standard Pricing Table as indicated on the Dot Matrix Display. For Custom Pricing, set to **CUSTOM**. When set to **CUSTOM**, the following adjustments are utilized to tailor each individual coin chute:

Left Coin Switch Pulses	Set the number of pulses registered for closure of the Left Coin Switch; 00 to 99 .
Right Coin Switch Pulses	Set the number of pulses registered for closure of the Right Coin Switch; 00 to 99 .
Center Coin Switch Pulses	Set the number of pulses registered for closure of the Center Coin Switch; 00 to 99 .
4th Coin Switch Pulses	Set the number of pulses registered for closure of the Fourth Coin Switch; 00 to 99 .
Coin Switch Pulses Required for 1 Credit	Set the number of pulses required to post one credit; 00 to 99 .
Coin Switch Pulses Required for Bonus Credit	Set the number of pulses required to award the 1st Bonus credit(s); 00 to 99 .
Coin Sw. Pulses Req. for 2nd Bonus Credit	Set the number of pulses required to award the 2nd Bonus credit; 00 to 99 .
Credits awarded for 1st Bonus	Set the number of credits awarded for achieving the first Bonus level; 00 to 99 .

Custom Pricing Table

Coin Mechanisms				<<< Adjustments >>>										
LEFT	CENTER	RIGHT	4TH	Plays/Coins			LEFT Pulses	CENTER Pulses	RIGHT Pulses	4TH Pulses	Pulses /Credit	Pulses /Bonus	Pulses /2nd Bonus	Credit /1st Bonus
25¢	\$1.00	25¢	N/U	1/25¢ 3/50¢	01	04	01	00	01	02	00	01		
				1/25¢ 5/\$1.00	01	04	01	00	01	04	00	01		
				1/25¢ 6/\$1.00	05	20	05	00	04	20	00	01		
5SCH	10SCH	10SCH	N/U	1/10 S	01	02	02	00	02	00	00	00		
				1/10 S 4/30 S	04	08	08	00	06	00	00	00		
10p	50p	£1	20p	1/30p 2/50p 5/£1	01	06	15	02	03	00	00	00		
				1/50p 3/£1	01	05	15	02	05	00	00	00		
				1/30p 4/£1	01	05	12	02	03	00	00	00		
20¢	N/U	\$1.00	N/U	1/60¢ 2/\$1.00	01	00	05	00	03	05	00	01		

Below and the following page is the **Standard Pricing Select Table** for the individual countries listed. The *Pricing Scheme* is determined in two ways - **1**: The CPU/Sound Board Dip Switch (Sw. 300) Setting; and, **2**: The Country Setting Option. For each country listed, the Dip Switch Setting is shown (Column 1). At this time, not all countries have a *unique* Dip Switch Setting. For the countries without a unique setting, the USA Setting (or all positions in the "OFF" position) is used. In lieu of determining the best *Pricing Scheme* for your location, "pre-sets" were made available which would best suit any given situation. If the Factory Default setting is not the selection you feel is best for your location, choose any of the other pre-set settings. If any of these settings do not suit your needs, then **CUSTOM PRICING** will need to be accomplished (however, any "custom" changes made here will be lost after a **FACTORY RESET** so it is suggested to write down your unique set-up).

The Standard Pricing Select Table Explained:

Column 1: CPU/Sound Board Dip Switch 300 Settings: (self-explanatory). **Column 2:** Country Setting Option: The different available pre-sets are listed. **Columns 3-6:** Coin Mechanisms - These show the coinage through the available slots on the Coin Doors. Different countries use different Coin Doors. For example, USA style Coin Doors, which have only 2 coin acceptors (left & right) may utilize the "Center" slot cable for an optional Bill Validator. Different Coin Doors may have up to 4 coin acceptors. **Columns 7-10:** Pricing Scheme Explained - Shows the number of plays received for the monies required determined by the setting selected.

Standard Pricing Select Table

CPU/SOUND BOARD DIP SWITCH 300 SETTINGS	COUNTRY SETTING OPTION	Coin Mechanisms				Pricing Scheme Explained			
		COINS THRU ... SLOT:				Number of "Plays" for Price Amount Shown			
		LEFT	CENTER	RIGHT	4TH				
Pos. 1 2 3 4 5 6 7 8 ON OFF	USA 1	25¢	\$1.00	25¢		1 /25¢			
	USA 2					1 /50¢	2 /75¢	3 /\$1.00	
	USA 3 (Default)					1 /50¢			
	USA 4					1 /50¢			
	USA 5					1 /50¢	5 /\$2.00		
	USA 6					1 /50¢	2 /'4 X 25¢'	3 /\$1.00 Bill	← Used to promote the Bill Validator
	USA 7					1 /50¢	4 /\$1.50	6 /\$2.00	
	USA 8					1 /50¢	3 /\$1.00		
Pos. 1 2 3 4 5 6 7 8 ON OFF	Euro 1 (Default)	20¢	50¢	€1.00	€2.00	1 /50¢			
	Euro 2					2 /50¢			
	Euro 3					1 /50¢	5 /€2.00		
	Euro 4					1 /50¢	3 /€1.00		
	Euro 5					1 /€1.00	2 /€1.50	3 /€2.00	
	Euro 6					1 /€1.00	5 /€2.00		



Standard Pricing Select Table - (Continued)

CPU DIP SWITCH SETTINGS, Location SW300 CPU/SOUND BOARD		COUNTRY SETTING OPTION †‡	Coin Mechanisms				Pricing Scheme Explained				
			COINS THRU ... SLOT:				Number of "Plays" for Price Amount Shown				
				LEFT	CENTER	RIGHT	4TH				
Pos. 1 2 3 4 5 6 7 8		Please Note: for all USA Settings, see previous page (bottom).									
ON ▲											
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		Austria †									
ON ▲		5S 10S 10S 1 /10S 2 /15S 3 /20S									
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		Australia 1 ‡									
ON ▲		20¢ \$A 1 \$A 2 1 /\$A 1 3 /\$A 2									
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		Australia 2 ‡									
ON ▲		1 /\$A 1									
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		(Belgium †)									
ON ▲		5 BF 20 BF 50 BF 1 /20 BF 3 /50 BF									
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		This country uses unique Tokens and/or Debit Cards <i>only</i> (pricing varies).									
ON ▲		1 'coin' 4 'coins' 1 'coin' 1 /'2 coins'									
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		Canada †									
ON ▲		25¢ 25¢ Can\$ 1 1 /50¢ 2 /75¢ 3/ Can\$ 1									
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		Denmark 1 ‡									
ON ▲		1 DKr 5 DKr 10 DKr 20 DKr 1 /3 DKr 2 /5 DKr									
OFF ▼		1 /2 DKr 3 /5 DKr 7 /10DKr									
Pos. 1 2 3 4 5 6 7 8		Denmark 2 ‡									
ON ▲											
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		Finland ‡									
ON ▲		1 Fmk 5 Fmk 1 /5 Fmk 4 /10 Fmk									
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		France 1 †									
ON ▲		1 Fr 5 Fr 10 Fr 20 Fr 1 /3 Fr 2 /5 Fr 5 /10 Fr 11 /20 Fr									
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		France 2									
ON ▲		1 /5 Fr 3 /10 Fr 7 /20 Fr									
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		France 3									
ON ▲		1 /3 Fr 2 /5 Fr 4 /10 Fr 9 /20 Fr									
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		Germany 1									
ON ▲		1 DM 2 DM 5 DM 1 /1 DM 6/'1 X 5 DM'									
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		Germany 2									
ON ▲		1 /2 DM 2 /3 DM 3 /4 DM 4 /5 DM									
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		Germany 3 †									
ON ▲		1 /2 DM 2 /3 DM 3 /4 DM 5 /5 DM									
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		Germany 4									
ON ▲		1 /1 DM 6 /5 DM									
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		Greece ‡									
ON ▲		50 Dr 100 Dr 1 /50 Dr 3 /100 Dr									
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		Hong Kong ‡									
ON ▲		1 HK\$ 2 HK\$ 5 HK\$ 1 /5 HK\$									
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		Hungary ‡									
ON ▲		10 Ft 10 Ft 20 Ft 1 /20 Ft 3 /40 Ft									
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		Italy 1 †									
ON ▲		500 Lit 500 Lit 1 /500 Lit									
OFF ▼		1 /1000 Lit 3 /2000 Lit									
Pos. 1 2 3 4 5 6 7 8		Italy 2									
ON ▲											
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		Japan 1 †									
ON ▲		100¥ 1 /100¥									
OFF ▼		1 /100¥ 3 /200¥									
Pos. 1 2 3 4 5 6 7 8		Japan 2									
ON ▲											
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		Korea ‡									
ON ▲		100 Won 100 Won 1 /100 Won									
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		Netherlands 1									
ON ▲		1 Fls. 1 Fls. 2.5 Fls. 1 /1 Fls. 3 /2.5 Fls.									
OFF ▼		2.5 Fls. 5 Fls. 6 /5 Fls.									
Pos. 1 2 3 4 5 6 7 8		Netherlands 2 †									
ON ▲											
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		New Zealand 1 ‡									
ON ▲		\$NZ 1 \$NZ 2 1 /\$NZ 1									
OFF ▼		1 /\$NZ 1 3 /\$NZ 2									
Pos. 1 2 3 4 5 6 7 8		New Zealand 2 ‡									
ON ▲											
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		Norway 1 †									
ON ▲		10 NKr 5 NKr 20 NKr 2 /10 NKr 1 /5 NKr 4 /20 NKr									
OFF ▼		1 /10 NKr 3 /20 NKr									
Pos. 1 2 3 4 5 6 7 8		Norway 2									
ON ▲											
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		Spain ‡									
ON ▲		100 Pts 500 Pts 1 /100 Pts 6 /500 Pts									
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		Sweden 1 †									
ON ▲		1 SKr 5 SKr 10 SKr 1 /10 SKr 2 /15 SKr 3 /20 SKr									
OFF ▼		1 /5 SKr 2 /10 SKr									
Pos. 1 2 3 4 5 6 7 8		Sweden 2									
ON ▲											
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		Switzerland 1 †									
ON ▲		1 SwF 2 SwF 5 SwF 1 /1 SwF 6 /5 SwF									
OFF ▼		1 /1 SwF 3 /2 SwF 9 /5 SwF									
Pos. 1 2 3 4 5 6 7 8		Switzerland 2									
ON ▲											
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		UK 1 †									
ON ▲		3 /£1 7 /£2									
OFF ▼		4 /£1 8 /£2									
Dip Switch Setting for New 50p / £2:		1 /50p 2 /£1 5 /£2									
Pos. 1 2 3 4 5 6 7 8		UK 3									
ON ▲		1 /30p 2 /60p 3 /90p 4 /£1									
OFF ▼		1 /£1 3 /£2									
Pos. 1 2 3 4 5 6 7 8		UK 4									
ON ▲		10p 50p £1 20p									
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		UK 5									
ON ▲											
OFF ▼											
Pos. 1 2 3 4 5 6 7 8		UK 6									
ON ▲											
OFF ▼											

Sec. 3: ... Adj. Menu

Notes: † Indicates Factory Default for that setting. ‡ Indicates a USA Dip Switch Setting (all positions in the "OFF" position).



**Section 3, Chapter 4:
Go To Adjustments Menu**



S.P.I. Adjustments Continued.

	Adjustment Name	Adjustment Definition
Adj. 8	RESET COIN AUDITS	Set to YES or NO . Default is NO . ▲ When set to YES (select the "+" icon to change) all <i>Coin Audits</i> (Audits 5-11), will be reset to zero.
Adj. 9	RESET GAME AUDITS	Set to YES or NO . Default is NO . ▲ When set to YES (select the "+" icon to change) all audits will be reset to zero, except for the <i>Coin Audits</i> (Audits 5-11) and Audit 12, Software Meter (the only audit which cannot be reset to zero).
Adj. 10	RESET HIGH SCORES	Set to YES or NO . Default is NO . When set to YES (select the "+" icon to change) all the High Score Levels and associated initials will be restored to the backup settings.
Adj. 11	MATCH PERCENTAGE	Set between 0% - 10% or OFF . Default is 10% . At 0% the match display occurs at the end of the game but never awards a credit.
Adj. 12	BALLS PER GAME	Set between 02 - 05 . Default is 03 . Adjusts the number of balls per game.
Adj. 13	TILT WARNINGS	Set to 00 , 01 or 03 . Default is 01 . Adjusts the number of plumb bob tilt switch closures before the ball in play is tilted.
Adj. 14	REPLAY BOOST	Set to YES or NO . Default is YES . When set to YES , exceeding a replay will set a temporary replay level for each time a replay level is surpassed. This new level will equal the previous replay level (when the replay was awarded) plus 50M for each following game, until the replays have all been played (then the previous level is resumed).
Adj. 15	CREDIT LIMIT	Set between 04 - 50 . Default is 30 . Adjusts the maximum number of credits that may be posted.
Adj. 16	ALLOW HIGH SCORES	Set to YES or NO . Default is YES . When set to YES if a player exceeds any 1 of the 4 High Scores, the player may receive an award (depending on Adj. 3, Replay Award). Set to NO to disable this feature. There are 10 High Scores that will allow the player to enter their initials (or name) (See Adj. 27, High Score Initials), however, only the top 4 can receive an award if this adjustment is enabled.
Adj. 17	HIGH SCORE #1 AWARDS	Set between 00 - 05 . Default is 01 . Adjusts the number of awards awarded for exceeding Level 1 (<i>the highest of the four (4) Levels</i>).
Adj. 18	HIGH SCORE #2 AWARDS	Set between 00 - 03 . Default is 00 . Adjusts the number of awards awarded for exceeding Level 2.
Adj. 19	HIGH SCORE #3 AWARDS	Set between 00 - 02 . Default is 00 . Adjusts the number of awards awarded for exceeding Level 3.
Adj. 20	HIGH SCORE #4 AWARDS	Set between 00 - 01 . Default is 00 . Adjusts the number of awards awarded for exceeding Level 4.
Adj. 21	DEFAULT HIGH SCORE #1	Set between 1,000,000 - 9,999,000,000 or 00 (<i>increments of 1M</i>). Default is 500,000,000 . Adjusts the desired High Score Level to which Level 1 may be achieved (not affected by Adj. 26).
Adj. 22	DEFAULT HIGH SCORE #2	Set between 1,000,000 - 9,999,000,000 or 00 (<i>increments of 1M</i>). Default is 400,000,000 . Adjusts the desired High Score Level to which Level 2 may be achieved (not affected by Adj. 26).
Adj. 23	DEFAULT HIGH SCORE #3	Set between 1,000,000 - 9,999,000,000 or 00 (<i>increments of 1M</i>). Default is 350,000,000 . Adjusts the desired High Score Level to which Level 3 may be achieved (not affected by Adj. 26).
Adj. 24	DEFAULT HIGH SCORE #4	Set between 1,000,000 - 9,999,000,000 or 00 (<i>increments of 1M</i>). Default is 325,000,000 . Adjusts the desired High Score Level to which Level 4 may be achieved (not affected by Adj. 26).
Adj. 25	DEFAULT HIGH SCORE #5	Set between 1,000,000 - 9,999,000,000 or 00 (<i>increments of 1M</i>). Default is 300,000,000 . Adjusts the desired High Score Level to which Level 5 may be achieved (not affected by Adj. 26).
Adj. 26	HSTD RESET COUNT	Set between 100 - 9,900 or OFF (<i>increments of 100</i>). Default is 2,000 . HSTD (High Score To Date). Adjusts the number of games between automatic resets of high score levels to backup settings and ball time averager adjustments. Set to OFF for "no reset or adjustment".
Adj. 27	HIGH SCORE INITIALS	Set to 3 INITIALS or 10 LETTER . Default is 3 INITIALS . When set to 3 INITIALS , player is allowed only 3 initials to input. When set to 10 LETTER NAME , player is allowed to enter 10 initials to input.





S.P.I. Adjustments Continued.

Adjustment Name	Adjustment Definition
Adj. 28 FREE PLAY	Set to YES or NO . Default is NO . When set to YES , no coins are required for <i>Game Play</i> .
Adj. 29 CUSTOM MESSAGE	Set to ON , CHANGE or OFF . Default is ON . When set to CHANGE (select the "+" Icon to change settings until "CHANGE" appears in the display, then select the ">>" Icon to access.) This adjustment can be accessed in two (2) ways by either selecting the "S.P.I." Icon and advancing to this Adjustment 29 , or can be directly accessed by selecting the "ABCD CUST MSG" Icon in the ADJUSTMENTS MENU . View the definition at the end of this chapter under the Custom Message entry for the operation explanation.
Adj. 30 FLASH LAMP POWER	Set to NORMAL , DIM or OFF . Default is 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.
Adj. 31 COIL PULSE POWER	Set to NORMAL , HARD or SOFT . Default is NORMAL . When 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. These adjustments are provided to compensate for Low Line or High Line voltage conditions where the solenoids appear to kicking too weak or too hard. Adjust as required.
Adj. 32 KNOCKER VOLUME	Set to NORMAL , LOW or OFF . Default is NORMAL . When set to LOW , the volume is decreased 50%. When set to OFF , no sound is heard when the "knocker" is sounded.
Adj. 33 GAME RESTART	Set to YES or NO . Default is YES . When set to YES , a new game may be started during any ball after the first ball is completed (if credits are available). Pressing the Start Button during the first ball will add additional players. When set to NO , the game disables the Start Button after the first ball until the final ball is in play. Review Section 2, Chapter 1, Game Operations & Features for details.
Adj. 34 EXTRA BALL PERCENTAGE	Set between 0% - 50% . Default is 10% . This adjustment allows the operator to adjust how frequently the Extra Ball Feature is made available to the player.
Adj. 35 BILL VALIDATOR	Set to YES or NO . Default is NO . When set to YES , in <i>Game Attract Mode</i> the Display will show an "Insert Bill Animation." When set to NO , the Display will show an "Insert Coin Animation."
Adj. 36 TOURNAMENT MODE	Set to NONE , IFPA , EXPO , PAPA or HOME . Default is NONE . Tournament Mode determines the default conditions to quickly prepare a game for tournament play. When this setting is changed all audits will be reset and all adjustments will be initiated to the particular style selected. The game will then return to <i>Game Over Attract Mode</i> , as if a <i>Factory Reset</i> had been performed. NONE - Same as a Factory Reset conditions. IFPA - Straight 50¢ play, No Replay, No Extra Ball, No High Scores, 2 Tilt Warnings and No Match. EXPO or PAPA - Same as IFPA settings except Free Play is enabled. HOME - Sets game for Free Play , Extra Ball Play , No Replay , 10% Match & 30% Extra Ball .
Adj. 37 BKGRND (BACKGROUND) MUSIC VOLUME	Set between 01 - 15 . Default is 01 . After volume is set via Portals Service Buttons (See Sec. 3, Chp. 1, ...Intro) 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 FX the same level.
Adj. 38 FREEZE TIME (BALL SAVE)	Set to OFF , 0:01-0:15 or AUTO . Default is AUTO . When set to OFF 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 Freeze Timer based on the average ball time.
Adj. 39 FAST BONUS COUNTDOWN	Set to YES or NO . Default is YES . When set to NO , this feature is not available. When set to YES , this feature is available.

Sec. 3: ... Adj. Menu

Adjustments 40-43 continued on the next page.





S.P.I. Adjustments Continued.

Adjustment Name	Adjustment Definition
Adj. 40 UK COIN MECH. TYPE ////////// UK Only Dip Switch Set @ Option 2 //////////	Set to CURRENT: 2 POUND AT #5 if using a Coin Control Mech 74-1129-104U (latest version). Set to OLD: 2 POUND AT #6 if using older version Coin Control Mech 74-1129-104. Default is CURRENT: 2 POUND AT #5 .
Adj. 41 UK POST SAVE ENABLED ////////// UK Only Dip Switch Set @ Option 2 //////////	Set to YES or NO . Default is NO , (UK Default is YES). When set to YES this feature is available when lit. Set to NO to disable this feature. (UK Games have Outlane & Center Post Save Devices which are accessed in a different way; Non-UK Games cannot adjust this setting.)
Adj. 42 LOCATION ID	Set between 00 to 9999 . Default is 00 . This adjustment allows the operator to assign a location identification number to the audit print-out sheet. <i>(Will not be affected by Factory Reset.)</i>
Adj. 43 GAME ID	Set between 00 to 9999 . Default is 00 . This adjustment allows the operator to assign a game identification number to the audit print-out sheet. <i>(Will not be affected by Factory Reset.)</i>

Please Note: For more details on Audit Printing, review Section 3, Chapter 3, Go To Audits Menu (Go To Printer Menu, Page 33). For more details on Factory Reset, review Section 3, Chapter 5, Go To Reset Menu.



Austin Powers™ Adjustments (44-60)

From the **ADJUSTMENTS MENU**, select the "A.P." *Icon* with either **Red "LEFT"** or **Green "RIGHT"** **Button** and press the **Black "ENTER"** **Button**. Select and activate the "RIGHT ARROW" *Icon* to view the 1st adjustment in this group. Continue to select either of the "ARROW" *Icons* to view each adjustment one at a time. Select either the "-" or "+" *Icons* to change the value, if desired. The display will describe the adjustment number, the adjustment name, and the adjustment total or value. The current adjustment will remain in the display until the next adjustment is chosen or when the sub-menu is exited.

Adj. Nº	Adjustment Name	Adjustment Definition
Adj. 44	MINI-ME DIFFICULTY	
Adj. 45	FAT BASTARD DIFFICULTY	
Adj. 46	LASER BEAM DIFFICULTY	
Adj. 47	TIME MACH. DIFFICULTY	Set to EXEASY, EASY, MODERATE, HARD or EXHARD . Default is MODERATE . Determines how this Feature is started and played.
Adj. 48	SUB. DRILL DIFFICULTY	
Adj. 49	HENCHMEN DIFFICULTY	
Adj. 50	MYSTERY DIFFICULTY	
Adj. 51	MOJO DIFFICULTY	
Adj. 52	ADULT SPEECH ENABLED	Set to YES or NO . Default is YES .
Adj. 53	LASER BEAM MTR ENABLED CAUTION: <i>If set to NO, a Ball Trap can occur if the ball bounces into the Left Ramp Exit to the Kicker; ball search will not activate the disabled Kicker. Correct any problem coil or switch immediately.</i>	Set to YES or NO . Default is YES . When set to YES , the Laser Beam Motor Assembly Q21 (Motor Driver Relay Bd.) and Laser Beam Diverter Q22 (on Left Ramp) are operational. When set to NO , the Dir. Kicker Motor Q21 & Laser Beam Diverter Q22 are disabled. Change setting to NO if any of the following is malfunctioning or is awaiting service and/or repair: Directional Kicker Motor, the Relay Board Q21 (see page 19 for locations), Laser Beam Diverter Q22 or Switches 43, 44 or 45. <i>Game programming is changed to accomodate player not being able to use the Laser Beam Directional Kicker.</i>

Adjustments 54-60 continued on the next page.





Austin Powers™ Adjustments Continued.

Adjustment Name	Adjustment Definition
DR. EVIL MOTOR ENABLED Adj. 54 NOTE: <i>If set to NO, ensure the target is in the down position. Correct any problem coil or switch immediately.</i>	Set to YES or NO . Default is YES . When set to YES , the Dr. Evil Motor (Up/Down Target) Assembly Q19 (Motor Driver Relay Bd.) is operational. When set to NO , the Up/Down Target Motor Q19 is disabled. Change setting to NO if any of the following is malfunctioning or is awaiting service and/or repair: Motor Assembly for the Up/Down Target or Relay Board Q19 (see page 19 for location). <i>Game programming is changed to accomodate player not being able to hit the Dr. Evil Target.</i>
TIME MACHINE MTR ENABLED Adj. 55 CAUTION: <i>If set to NO, ensure the Disc Assembly (Ball Trough) is turned into the downward position to allow the ball to exit into the top lanes to prevent the ball from being trapped. Correct any problem coil or switch immediately.</i>	Set to YES or NO . Default is YES . When set to YES , the Time Machine (Magnet) Motor Assembly Q20 (Motor Driver Relay Bd.) is operational. When set to NO , the Time Machine (Magnet) Motor Q20 is disabled. Change setting to NO if any of the following is malfunctioning or is awaiting service and/or repair: Motor Assembly or Timing Chain for the Time Machine, Relay Board Q20 (see page 19 for location) or if BOTH Switches 18 & 35 are nonfunctional (see CAUTION at left). If only 1 or the other switch is nonfunctional, or the Magnet Q14 is nonfunctional, and the Motor is operational, it is not necessary to change setting to NO . Programming will accomodate noting the upper Left Orbit Switch Closure.
Adj. 56 S-H-A-G EXTRA BALL EVERY	Set to 01 through 10 . Default is 04 . After the Extra Ball Feature is qualified for the first time (to qualify, player must spell S-H-A-G by completing the Outlane & Return Lane Shots) the subsequent number of this mode being completed is needed to qualify, is the amount set in this adjustment.
Adj. 57 # GAMES FOR EB	Set to OFF (00) or 01 through 06 . Default is 04 . The Extra Ball Feature will be turned off after the amount set (equals the number of Game Modes Played) in this adjustment is acheived.
Adj. 58 EXTRA BALL MEMORY	Set to ON or OFF . Default is ON . When set to ON , this feature bonus will be retained in memory from ball-to-ball for the same player. When set to OFF , this feature will go out at the end of each ball.
Adj. 59 TIMED PLUNGER	Set to OFF or 0:15 - 1:00 . Default is OFF . When set to 0:15 to 1:00 , the plunger will "Autoplunge" the ball (at the time set) when the ball is at the beginning of play, awaiting the skill shot by the player.
Adj. 60 WASHINGTON D.C. ENABLED	Set to OFF or 0N . Default is OFF . When set to OFF , all references (speech & display) of Washington D.C. are removed.

Sec. 3: ... Adj. Menu



Custom Message

To go directly to **Adjustment 29, Custom Message**, from the **ADJUSTMENT MENU**, select the "CUST MSG" *Icon* either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. At the top left corner of the Display, the letter **A** is indicated (blinking) in the first available position (Thirty-Six (36) characters including spaces are available). Vary the letter(s) by operating the Left and Right Flipper Buttons (or **"RED"** or **"GREEN" Buttons**). With the desired letter indicated, depress the **Start Button** to lock in the letter and advance to the next character. Repeat this procedure until the desired message is completed in the display. Select the "<" or ">" characters to back-space (erase) and/or to move forward in an already typed message. After completion, press the **"BLACK" Button**, **"REQUEST INSTALLED"** is indicated and then exits this sub-menu.



Film Star Reset (For the Home Setting)

To reset the game with *Special Home Settings (not the normal Factory Setting)*, from the **ADJUSTMENT MENU**, select the "STAR" *Icon* either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. This *Special Setting* automatically changes **Adjustment 6, Game Difficulty**, to **EASY** and **Adjustment 28, Free Play**, to **YES**. This setting is determined to be ideal for the home environment.



Take Note:

To **Restore** or **Reset** any of the adjustments to the *Factory Settings (Default)*, review Sec. 3, Chp. 5, **Go To Reset Menu**. Follow the **"RESET" Icon** or **"FACT" Icon** and their explanations.



Eeeeeeeiii!

Go To Reset Menu

Overview

The **Portals™ Service Menu System** provides three (3) functions to reset adjustments and/or audits back to the *Factory Setting*. See Chapter 3, Go to Audits Menu, and Chapter 4, Go to Adjustments Menu, for the Game Audits & Adjustments Information. If a reset of **Coin** or **Game Audits** is performed, the display will indicate **REQUEST INSTALLED** and return to the **RESET MENU**. If a **Factory Reset** is performed, the display will indicate **REQUEST INSTALLED**, the **Service Session** is *exited* & returns to the **Attract Mode**. Please note that once reset, all customized settings are lost! Certain *Audits & Adjustments* cannot be reset (refer to the details below).



GO TO RESET MENU

With the game in the **Attract Mode**, open the **Coin Door** and press the **Black "BEGIN TEST" Button**. Select the "RESET" *Icon* in the **MAIN MENU** with either **Red "LEFT" Button** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. The **RESET MENU** appears.

Important Notes:



Exit any sub-menu and return to the **MAIN MENU** by selecting & activating the "PREV" *Icon*.



Selecting & activating the "QUIT" *Icon* from the display will exit the **Service Session**.



Selecting & activating the "HELP" *Icon* from the display will show a help screen. (An explanation of each *Mini-Icon* at that level will cycle continuously until any active button is pressed.)



Reset Coin Audits

From the **RESET MENU**, select the "COIN" *Icon* with either **Red** or **Green Button** and press the **Black Button**. ⚠ All Coin Audits (See **Fig. 1**) will be reset to **Factory Settings**. The display will indicate **REQUEST INSTALLED** and return to the **RESET MENU**. Coin Audits can also be reset from the **ADJUSTMENTS MENU, S.P.I. ADJUSTMENT 8**. See Chapter 4, Go to Adjustments Menu, of this section. After selecting this *Icon*, all of the **Coin Audits (5-11)** are reset to zero.



Reset Game Audits

From the **RESET MENU**, select the "AUD" *Icon* with either **Red** or **Green Button** and press the **Black Button**. ⚠ All Game Audits (See **Fig. 2**) will be reset to **Factory Settings**. The display will indicate **REQUEST INSTALLED** and return to the **RESET MENU**. Game Audits can also be reset from the **ADJUSTMENTS MENU, S.P.I. ADJUSTMENT 9**. See Chapter 4, Go to Adjustments Menu, of this section. After selecting this *Icon*, all of the **Audits** are reset to zero, except for the **Coin Audits (Audits 5-11)** and **Audit 12, Software Meter**. Audit 12 is the only audit which cannot be reset.

Fig. 1

• Reset Coin Audits	
Earnings Audits (Coin Audits Only 5-11)	
Au. N ^o	Description
1-4	The first 4 Audits in the game.
5	Coins Thru Left Slot
6	Coins Thru Right Slot
7	Coins Thru Center Slot
8	Coins Thru 4th Slot
9	Total Coins
10	Total Earnings
11	Meter Clicks
12	Software Meter
13 +	The remainder of the Audits.

Fig. 2

• Reset Game Audits	
Earnings (1-4), Generic/Specific Audits (13+)	
Au. N ^o	Description
1-4	The first 4 Audits in the game.
5	Coins Thru Left Slot
6	Coins Thru Right Slot
7	Coins Thru Center Slot
8	Coins Thru 4th Slot
9	Total Coins
10	Total Earnings
11	Meter Clicks
12	Software Meter
13 +	The remainder of the Audits.



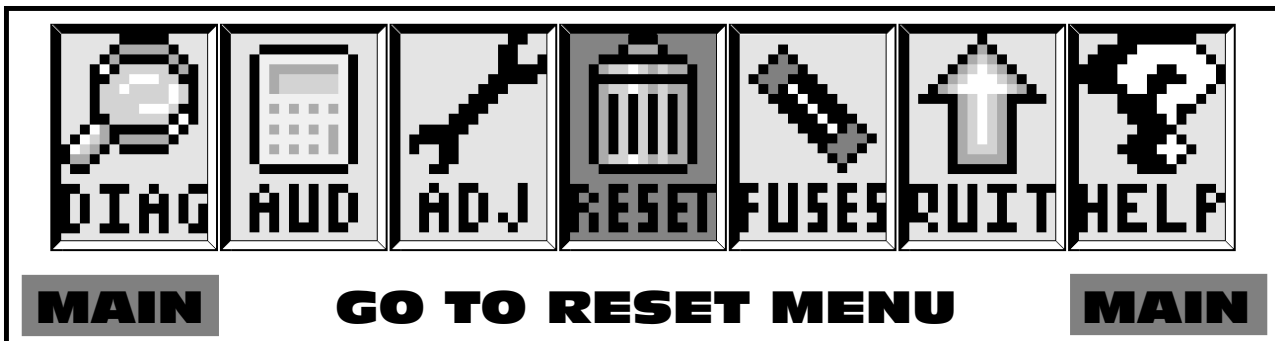
Factory Reset

From the **RESET MENU**, select the "FACT" *Icon* with either **Red** or **Green Button** and press the **Black Button**. ⚠ All adjustments will be reset to **Factory Settings** (except for **Proprietary Adjustments**). The display will indicate **REQUEST INSTALLED** and exit the **Service Session**. See Chapter 4, Go to Adjustments Menu, of this section, for the **Factory Settings** in the **Game Adjustment Table**.

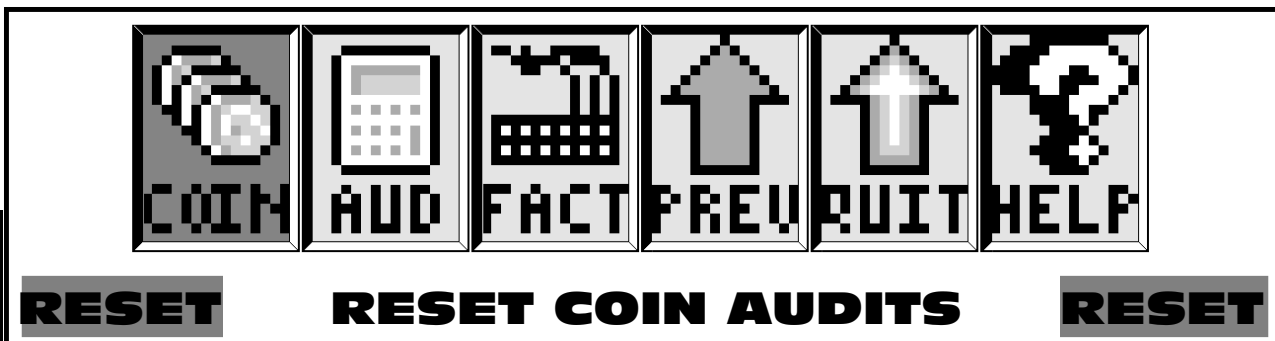


Example:

From the **MAIN MENU**, use the **Red** or **Green Buttons** to select the "RESET" *Icon* (GO TO RESET MENU).



Press the **Black Button** to activate this **ICON**. This will bring up the **RESET MENU**.



Sec. 3: ...Reset Menu

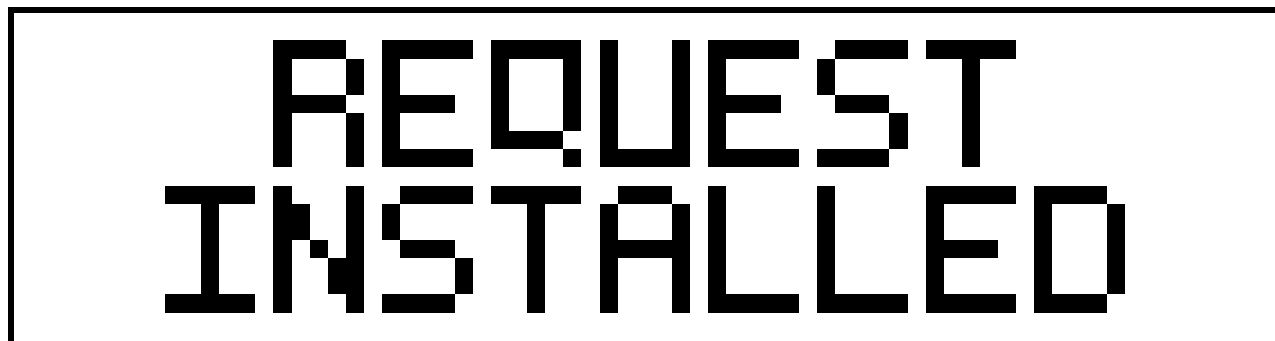
The **RESET MENU** now appears with the "COIN" *Icon* (RESET COIN AUDITS) flashing:



DO NOT PRESS THE START BUTTON AFTER SELECTING ANY THREE OF THESE ICONS UNLESS THIS IS WHAT IS DESIRED (SETTINGS WILL BE LOST)! PLEASE READ THE PREVIOUS PAGE FOR EXACTLY WHAT WILL HAPPEN IF ANY OF THESE THREE ICONS ARE ACTIVATED.



From the **RESET MENU**, select any of the *Icons* ("COIN", "AUD" or "FACT") with either **Red** or **Green Button** and press the **Black Button** to activate the **ICON** chosen.



If the "COIN" or "AUD" *Icons* are chosen and activated, the affected audits (see previous page) will be reset, the display will indicate **REQUEST INSTALLED** and the display will return to the **RESET MENU**.

If the "FACT" *Icon* is chosen and activated, all adjustments will be reset back to the *Factory Settings*. The display will indicate **REQUEST INSTALLED** (momentarily), the **Service Session** is automatically *exited* and returns to the **Attract Mode**.



Go To Fuses List

Overview

The **Portals™ Service Menu System** provides a current Fuse List for this game. The fuses are located in the Backbox (on the Display Power Supply Board and the I/O Power Driver Board), and also in the Cabinet (under the playfield by the Flippers and/or by any unique assembly, such as magnets). For the complete Fuse List in the *Quick Reference Fuse Chart & Pictorials*, see the next page (identical to page DR. ❶ in the front of this manual).



GO TO FUSES LIST

With the game in the Attract Mode, open the Coin Door and press the **Black "BEGIN TEST" Button**. Select the "FUSES" *Icon* in the **MAIN MENU** with either **Red "LEFT"** or **Green "RIGHT" Button** and press the **Black "ENTER" Button**. Select and activate the "RIGHT ARROW" *Icon* to view the 1st fuse in this group. Continue to select either of the "ARROW" *Icons* to view each fuse one at a time. The display will describe the fuse identification number (e.g. F1, F6, F7, etc.), location of fuse (i.e. Backbox: Board name located on; or Cabinet: Under the playfield or in Service Outlet), rating of fuse (e.g. 5A 250v S.B. - i.e. 5 Amp, 250 volt, Slo-Blo), and 'use of fuse' (e.g. 90v DC High Voltage Power, etc.). The current fuse listed will remain in the display until the next fuse is chosen or when the sub-menu is exited.

Important Notes:



Exit any sub-menu and return to the **MAIN MENU** by selecting & activating the "PREV" *Icons*. If no *Icons* appear in the display because of a testing function or special display (e.g. "Help"), press any button to exit.



Selecting & activating the "QUIT" *Icon* from any display will exit the Service Session.



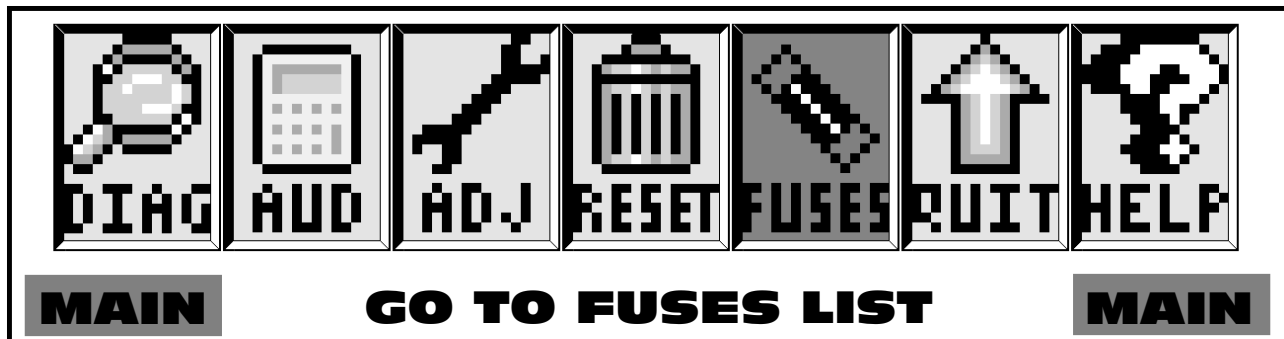
Selecting & activating the "HELP" *Icon* from any display will show a help screen. (An explanation of each *Mini-Icon* at that level will cycle continuously until any active button is pressed.)



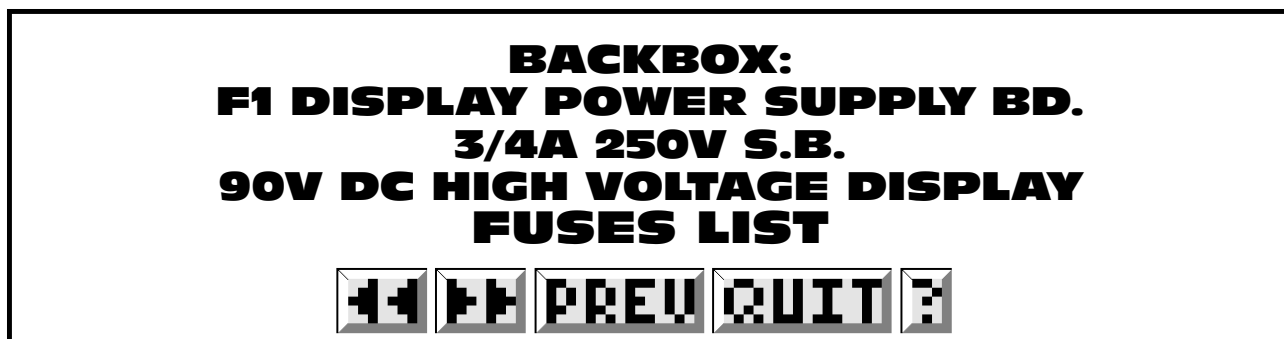
Selecting & activating the "ARROW" *Icons* selects the next or previous fuse in this group.

Example:

From the **MAIN MENU**, use the **Red** or **Green Buttons** to select the "FUSES" *Icon* (**GO TO FUSES LIST**).



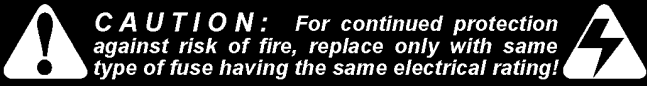
Press the **Black Button** to activate this **ICON**. This will bring up the **FUSES LIST**.



Sec. 3: ... Fuses List



▼ BACKBOX LAYOUT LOCATIONS: Fuses, Bridges, Relays & ROMs ▼



QUICK REFERENCE FUSE CHART

Backbox Fuses

LOC: DISPLAY POWER SUPPLY (P.S.) BOARD			
F1	¾A 250v S.B.	90v DC	High Voltage Display
LOC: I / O POWER DRIVER BOARD			
F6	7A 250v S.B.	50v DC	Primary High Power Coils/Flippers
F7	5A 250v S.B.	20v DC	Low Power Coils
F8	5A 250v S.B.	12v DC	Logic Power
F9	5A 250v S.B.	12v DC	Logic Power
F20	4A 250v S.B.	50v DC	Magnet // THIS GAME ONLY //
F21	3A 250v S.B.	50v DC	Coils
F22	8A 250v S.B.	18v DC	Controlled Lamps
F23	4A 250v S.B.	5v DC	Logic
F24	5A 250v S.B.	6.3v AC	G.I. Lamps (BRN-WHT to WHT-BRN)
F25	5A 250v S.B.	6.3v AC	G.I. Lamps (YEL to WHT-YEL)
F26	5A 250v S.B.	6.3v AC	G.I. Lamps (GRN to WHT-GRN)
F27	5A 250v S.B.	6.3v AC	G.I. Lamps (VIO to WHT-VIO)
F28	3A 250v S.B.	24v AC	Not Used / Spare

Cabinet Fuses

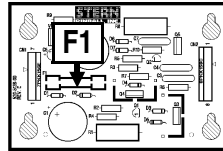
LOC: SERVICE (AC) OUTLET BOX (Cabinet Bottom)		
n/a	8A 250v S.B.	115v AC Main Fuse Line (Domestic or USA)
n/a	5A 250v S.B.	220v AC Main Fuse Line (International)

Playfield Fuses

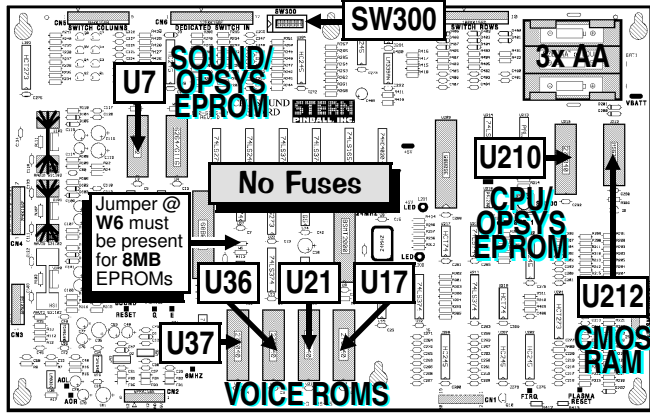
LOC: UNDER PLAYFIELD (near Flippers)		
n/a	3A 250v S.B.	50v DC Rt. Flipper (BLU-YEL ↔ RED-YEL)
n/a	3A 250v S.B.	50v DC Lt. Flipper (GRY-YEL ↔ RED-YEL)

For Backbox & Cabinet General Parts, review Section 4, Chapter 1, Parts Identification & Location (The Pink Pages).
For Schematics and/or Component Parts on above Boards, review Section 5, Chapter 4, Printed Circuit Boards (The Yellow Pages).

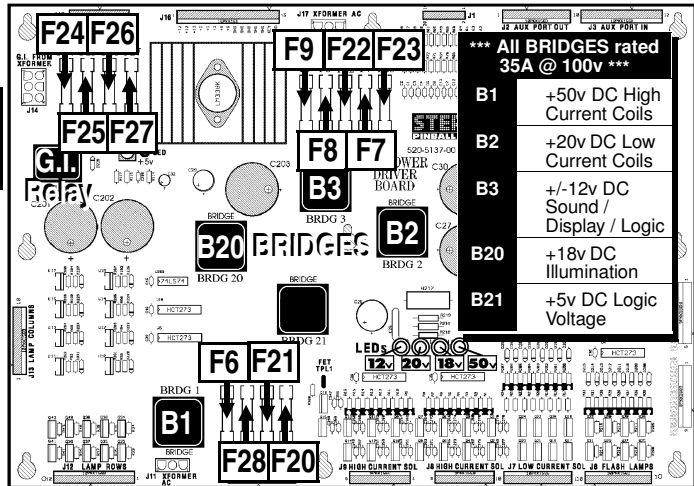
Display Power Supply Board



CPU / Sound Board



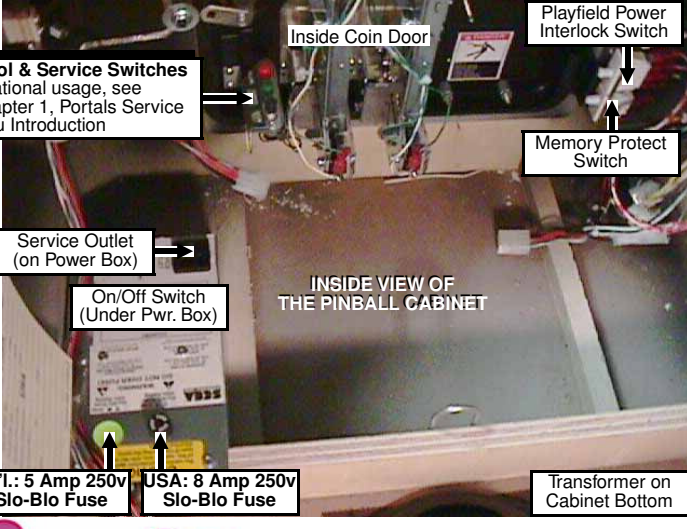
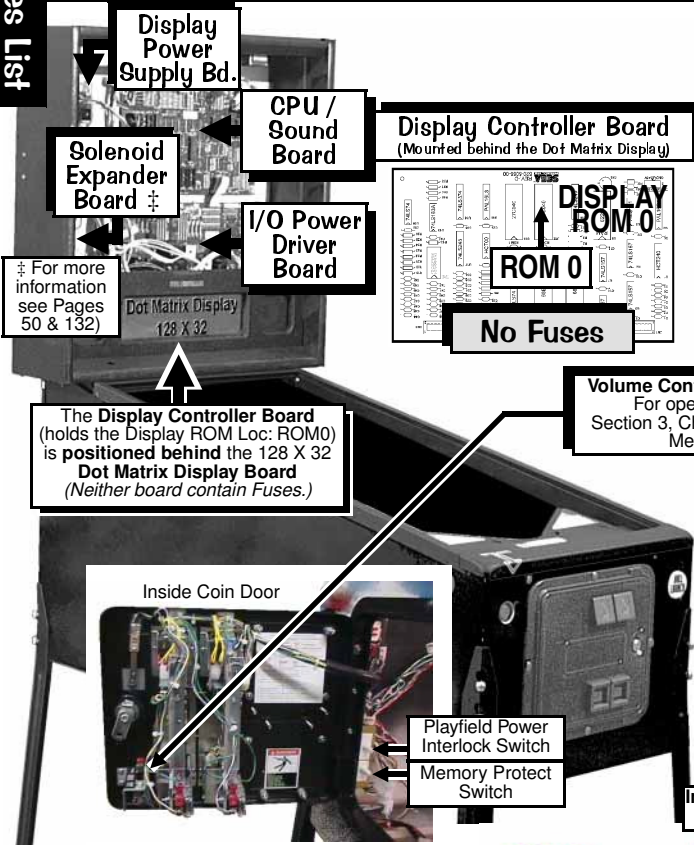
I/O Power Driver Board



*** All BRIDGES rated 35A @ 100v ***

B1	+50v DC High Current Coils
B2	+20v DC Low Current Coils
B3	+/-12v DC Sound / Display / Logic
B20	+18v DC Illumination
B21	+5v DC Logic Voltage

Sec. 3: ... Fuses List



Go To Help Screen

Overview

The **Portals™ Service Menu System** provides help screens in each display (except if the display is in a testing mode). Each screen is basic and some terms may vary. At the beginning of each chapter in this section, *Icons* are shown and described to give detail of the particular function of the individual *Icons*. The table on the previous page was designed to help answer some questions of situations which may arise.



GO TO HELP SCREEN

With the game in the Attract Mode, open the Coin Door and press the **Black "BEGIN TEST" Button**. Select the "HELP" *Icon* in the **MAIN MENU** with either **Red "LEFT" or Green "RIGHT" Button** and press the **Black "ENTER" Button**. The **HELP SCREEN** appears cycling through the different icon usages pertinent to that menu level.

MENU HELP SCREEN
USE THE RED OR GREEN BUTTONS
TO CHANGE THE SELECTED ICON.
PRESS THE BLACK BUTTON TO
ACTIVATE THE SELECTED ICON.
THE FLIPPER & START BUTTONS
FUNCTION IN THE SAME WAY.

Important Notes:



Exit any sub-menu and return to the **MAIN MENU** by selecting & activating the "PREV" *Icons*. If no *Icons* appear in the display because of a testing function or special display (e.g. "Help"), press any button to exit.



Selecting & activating the "HELP" *Icon* from any display will show a help screen. (An explanation of each *Mini-Icon* at that level will cycle continuously until any active button is pressed.)



Selecting & activating the "QUIT" *Icon* from any display will exit the Service Session.



These "Mini-Icons" vary in functionality depending in what sub-menu they are used. Refer to the beginning of each chapter in this section for the function they serve in that menu or select the "HELP" *Icons* in the display where the *Icon* in question is being used.



Review Chapter 1, Introduction:

How to enter the **Portals™ Service Menu**. The chapter outlines the entire **Portals™ Service Menu**. View the **Icon Tree** in this manual which describes the names and menu descriptions of each *Icon*. View the display, after selecting and activating either of the "HELP" or "?" *Icons*.

Review Chapter 2, Go to Diagnostics Menu:

Find all the tests needed to troubleshooting the game.

Review Chapter 3, Go to Audits Menu:

Gather play information and printing functions (downloading).

Review Chapter 4, Go to Adjustments Menu:

Customize the game to vary difficulty of play or to change functions of the game.

Review Chapter 5, Go to Reset Menu:

Reset audits and adjustments to Factory Settings.

Review Chapter 6, Go to Fuses Menu:

View the location & descriptions of the game fuses (the same information is referenced in the Fuse Chart Table on **DR. 1**).

This concludes the **Portals™ Service Menu**. Review the Table of Contents at the beginning of this manual, and the detailed Table of Contents for Section 3 to quickly find the information required. The remainder of the sections in this manual will cover all the parts in this game and provide helpful information to aide in troubleshooting. If questions still arise after reading this Section completely, call our Technical Support Department.





PORTALS™ SERVICE MENU PROBLEM/SOLUTION TABLE



Use this table for a quick simple solution(s) guide. For more technical assistance view Section 5.

PROBLEM	SOLUTION
Will not enter the Service Mode after depressing the Black "BEGIN TEST" Button .	<ul style="list-style-type: none"> • Check the Service Switch(es) (Red, Green & Black Buttons) for loose connections or bad Ground. • Check the associated wiring harness to/from the CPU Board Connector CN6. • Check CPU Board, possibly failed.
All Service Buttons (Red, Green and Black) appear nonfunctional.	<ul style="list-style-type: none"> • Check the Service Switches for poor connections or broken wires.
The Green Service Button in the Attract Mode will not enter the Service Credits Menu to add Service Credits.	<ul style="list-style-type: none"> • Check to make sure the Game is not in "Free Play." <i>If the game is set to Free Play, adding Service Credits is not required.</i> • Check the Service Switch(es) for poor connections or broken wires.
The display blanks out.	<ul style="list-style-type: none"> • Check the Dot Matrix Display for loose wiring harness connections. • Check F1 (3/4A Fuse) on the Display Pwr. Supply Bd. Refer to Section 5, Chapter 4, Schematics & Troubleshooting.
Icons "scroll" along continuously in the MAIN MENU .	<ul style="list-style-type: none"> • If the Service Switch Set and/or the Coin Door was replaced, ensure the Locking Mechanism on the Green Button is removed. If the Green Button "clicks" and locks into an up/down position, the Green Button has this lock switch. Remove it. (Ref. to Svc. Bulletin #74.)
The Start and Flipper Buttons do not select or activate <i>Icons</i> in the SWITCH TEST MENU .	<ul style="list-style-type: none"> • This is normal. These switches are deactivated, as they are a part of the Switch Test. Use the Red "LEFT" or Green "RIGHT" & Black "ENTER" Buttons in this Sub-Menu (see Chapter 1).
Can't move selection of <i>Icon</i> with the Left and/or Right Flipper Buttons .	<ul style="list-style-type: none"> • Check the Flipper Buttons for loose connections or bad Ground and refer to Section 5, Chapter 2, Playfield Wiring, #-Flipper Circuit Wiring Diagram. • This is normal only in Diagnostic's Switch & Active Switch Tests (see previous Problem).
Some <i>Icons</i> appear non-functional in the PRINTER MENU(S) .	<ul style="list-style-type: none"> • If no printing equipment is connected, the "-" <i>Icon</i>, "+" <i>Icon</i> and "RUN" <i>Icon</i> will appear not to function (see the end of Chapter 3).
Some <i>Icons</i> appear non-functional in the GAME SPECIFIC MENU under the DIAGNOSTICS MENU .	<ul style="list-style-type: none"> • If there is no other test under this Menu, the "Left Arrow" & "Right Arrow" <i>Icons</i> will appear not to function. The remaining <i>Icons</i> should function as normal. <i>Note: If there is no Game Specific Special Test, the "GAME SPECIFIC" Icon will not invoke another display.</i>
The display returns to the ATTRACT MODE exiting the Service Session from the FACTORY RESET MENU .	<ul style="list-style-type: none"> • This is normal. After a FACTORY RESET, the Service Session is automatically exited (see Chapter 4 (end) or Chapter 6).
In COIL TEST MENU , the coils and flashlamps do not fire after activating the "RUN" <i>Icon</i> .	<ul style="list-style-type: none"> • Ensure the POWER INTERLOCK SWITCH is pulled out (see Chapter 1).
In ADJUSTMENTS MENU , with the Coin Door CLOSED , adjustments are not getting changed as desired while using the Flipper & Start Buttons to select <i>Icons</i> and change values.	<ul style="list-style-type: none"> • This is normal. The Memory Protect Switch is enabled when the Coin Door is CLOSED. Changes can be made with the Coin Door OPEN only.
In Portals™ Service Menu , the volume cannot be adjusted with the Red or Green Buttons .	<ul style="list-style-type: none"> • The Volume adjustment can only be made when in the Attract Mode. The Volume Mode is entered by pressing the Red "VOLUME" Button. Then use the Red or Green Button to increase/decrease volume. (Red "LEFT" decrements; Green "RIGHT" increments.)
In Portals™ Service Menu , the display seems to lock up, or the Help Display appears to be non-functional.	<ul style="list-style-type: none"> • If you cannot clear the situation by exiting back one Menu, exit completely out of the Portals™ Service Menu, and re-enter. If the problem persists, call Technical Support for additional help.

Sec. 3: ...Help Screen

Felicity Shagwell, CIA.

Shagwell by name,
Shag-VERY-well by reputation.

Section 3, Chapter 7:
Go To Help Screen

Parts Identification & Location (The Pink Pages)

Overview

This section provides the Part N^os and locations of all the components in this pinball machine. The parts are arranged in three groups: **BACKBOX, CABINET & PLAYFIELD**. Generic parts which may change as production continues (quantity and/or size) are listed together. Quantities greater than 0 indicates that the part is used in this game. Since quantity changes *may occur*, an item indicating "0" may be used. Compare the item which needs to be replaced with the drawings provided (the *Posts, Sockets, Bulbs & Rubber Rings* are drawn actual size). Major Assemblies & Ramps are detailed in the Blue Pages, Chapter 2. **Important:** Read all "Take Note:" items.



Backbox

Speaker Panel & Display

Playfield

Cabinet

Section 4, Table of Contents

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Sec. .4: Parts Id. ...

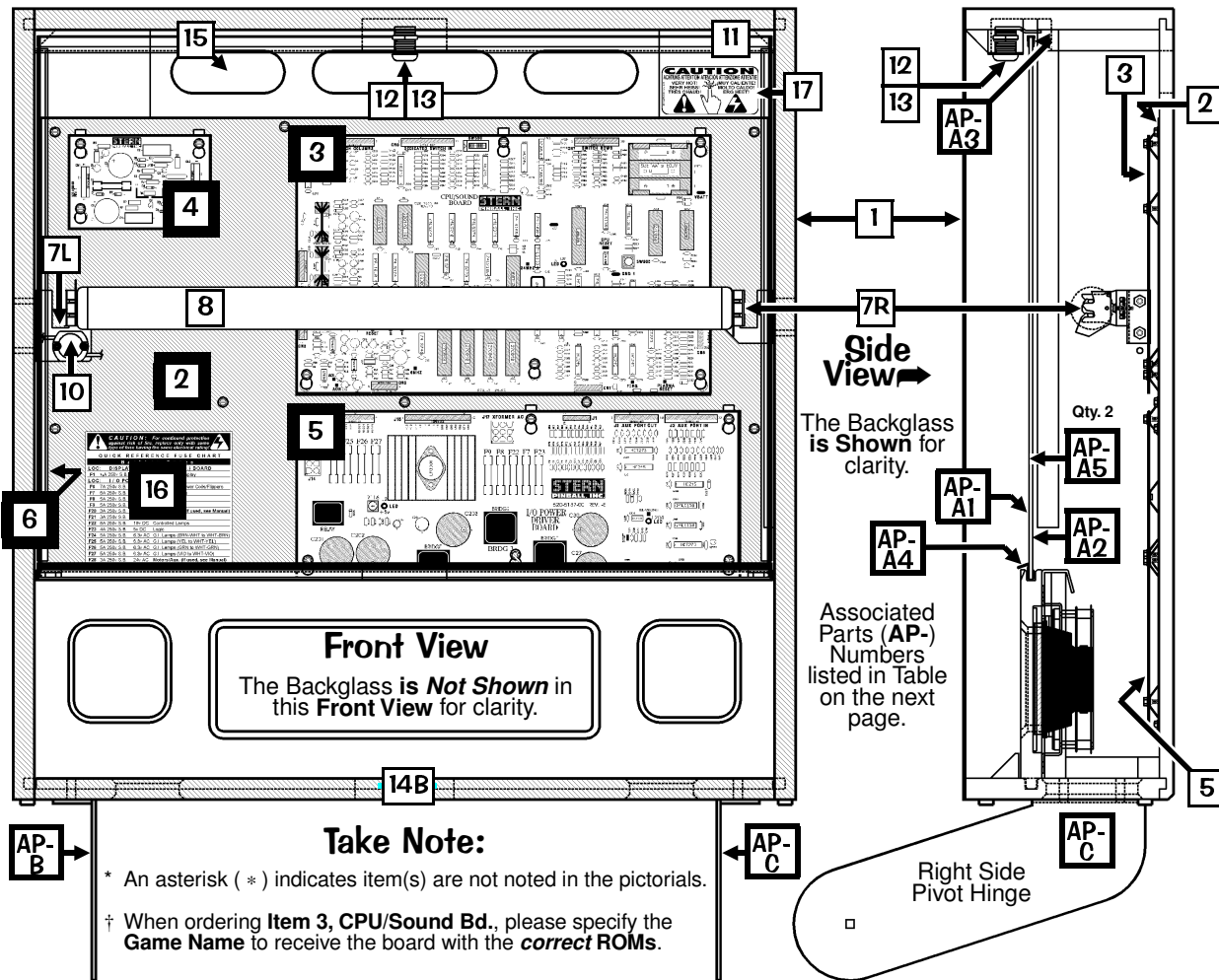
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Backbox (Austin Powers™) Assembly, 505-6002-74-74 (Items 1-25)



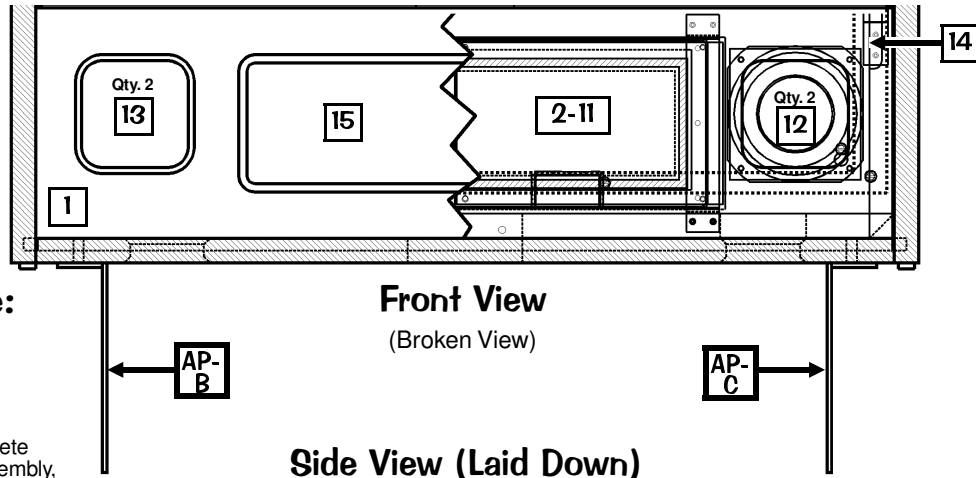
Sec. 4: Parts Id. ...

Nº	BACKBOX PART NAME	QTY.	SPI PART Nº
1	Backbox (Austin Powers™)	1	525-5558-74
<i>Item 1 Note: Black Textured T-Molding is installed and cannot be ordered separately.</i>			
2	PCB Metal Mounting Plate	1	535-5809-04
<i>Item 2 is secured to Item 1 by: #8 X 1/2" SHWH AB (Zinc) (Qty. 13) (234-5101-00) and #10 Washer 7/32" I.D. X .5" O.D. X 1/16" Thick (Qty. 4) (242-5003-00)</i>			
3 †	CPU/Sound Board (Mono) FCC-FEB98	1	520-5136-16
4	Display Power Supply Board	1	520-5138-00
5	I/O Power Driver Board	1	520-5137-01
<i>Items 3, 4 & 5 are secured to Item 2 by: #8-32 X 3/8" HWH MS (Qty. 19) (237-5903-00)</i>			
6	Solenoid Expander Board (UK Only)	0	520-5192-00
<i>Item 6 is required for UK Games Only to support the Left & Right Outlane Ball Deflectors & Center Up/Down Post Assemblies not supported in the Normal Coil Matrix of Q1-Q32.</i>			
7L	Fluorescent Light Bracket Assy. Left	1	515-6545-00
ORDERING ABOVE (ITEM 7L) SUB-ASSY. PART Nº WILL INCLUDE:			
7A	Fluorescent Light Bracket Left	1	535-7739-00
7B	Lamp Holder (Self-Locking)	1	077-5214-00
7C	#6-32 X 5/8" PPH MS (Sems) Zinc	1	232-5203-00
7D	Starter Base (with Leads)	1	077-5213-00
7E	#4-40 X 1/2" PPH MS (Sems) Zinc	2	237-5813-00
7R	Fluorescent Light Bracket Assy. Right	1	515-6545-01
ORDERING ABOVE (ITEM 7R) SUB-ASSY. PART Nº WILL INCLUDE:			
7A	Fluorescent Light Bracket Right	1	535-7739-01
7B-7C	Identical to Items 7B-7C above.		See 6B-6C
<i>Items 7L & 7R are secured by: #10-24 X 1-1/4" Carriage Bolt Sq. 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" Lengths only) (626-5040-00)</i>			
8	Fluorescent Tube (F20T12CW)	1	165-5031-02
9*	Ground Strap (5") (by Item 11)	1	600-5006-05
10	Starter - Fluorescent (FS2 Light)	1	165-5011-01

Nº	BACKBOX PART NAME	QTY.	SPI PART Nº
11	Ballast SP2/K 5/8" Core 120v 50/60 Hz 13W	1	010-5015-00
	Ballast Mounting Plate	1	535-8657-00
<i>Item 11 is secured to Item 1 by: #6 X 5/8" HWH AB (Zinc) (Qty. 2) (234-5102-04)</i>			
12	Lock Mounting Plate (2001)	1	535-8128-01
13	Camlock (Cam 440X) & Key	1	355-5018-02
<i>Items 12-13 are secured by: #8 X 5/8" TP Torx T20 (Qty. 4) (237-5947-00)</i>			
14A	#1 Roto Lock Male (on Cabinet)	1	355-5006-01
14B	#1 Roto Lock Female (R2-0002-02)	1	355-5006-02
<i>Item 14B is secured by: #10-24 X 1-3/4" CBSN (Qty. 2) (231-5022-00), #10-24 Keps Nut (Qty. 2) (240-5207-00) and #10 Washer 7/32" ID X .5" OD X 1/16" (Qty. 2) (242-5003-00)</i>			
15	Back Vent Grill 2-1/2" X 18"	1	545-5072-02
<i>Item 15 is secured by: Staple 5/16" (Qty. 24) (631-5000-00)</i>			
16	Fuse Description Decal (Generic)	1	820-6152-01
17	"CAUTION - VERY HOT" Decal	1	820-6266-00
18*	Fuse Label (UL)	1	820-6143-00
19*	Backbox Date Label	1	820-5091-00
20*	Ribbon Cable, 20-Pin (4")	1	036-5000-04
21*	Ribbon Cable, 26-Pin (30")	1	036-5001-30
22*	1/4" Clamp (Double)	3	040-5000-23
23*	1/2" Clamp (Single)	1	040-5000-06
24*	3/4" Clamp (Single)	2	040-5000-08
25*	1" Clamp (Single)	6	040-5000-09
<i>Items 22-25 are secured to Item 1 by: #8 X 1/2" SHWH AB (Zinc) (Qty. 13) (234-5101-00)</i>			



Speaker Panel Assy. for the Backbox (Austin Powers™), 515-6888-03 (Items 1-15) and Assoc. Parts: Backglass Assembly & Pivot Hinges (Left & Right) (See Below Table)

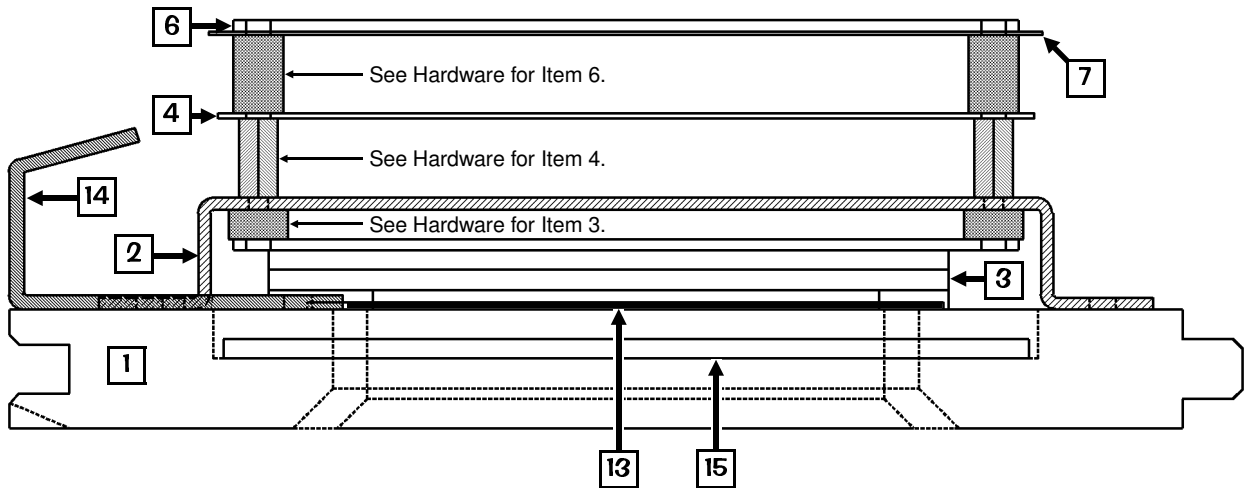


Take Note:

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

1. Ordering the complete Speaker Panel Assembly, 515-6888-03 (Items 1-15) will include all hardware.

For clarity, the below drawing **does not show** the speaker(s).

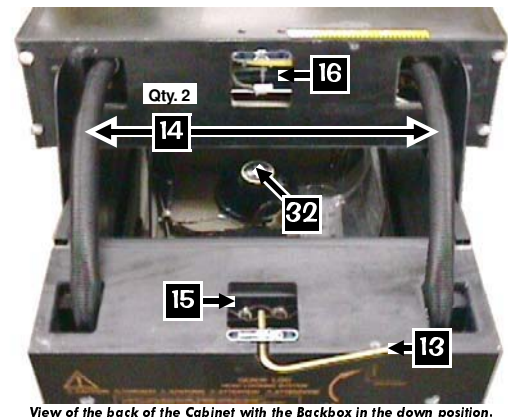


Nº	SPEAKER PANEL PART NAME	QTY.	SPI PART Nº	Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
1	Speaker Panel (Black Wood)	1	525-5515-00	14	Speaker Panel Hook Bracket	2	535-7009-02
2	Dot Matrix Disp. Bd. Mounting Bracket	2	535-8368-01	Items 12, 13 & 14 are secured by: #8 X 3/4" HWH AB (Zinc) (Items 12/13: Qty. 4/per; Item 14: Qty. 2/per) (234-5103-00)			
3	Dot Matrix Display Board 128 X 32	1	520-5052-00	15	Plastic Shield (Display Cover)	1	545-5884-00
4	Static Shield (Steel Plate)	1	535-6437-00	Item 15 is secured to Item 2 by: #6 X 3/8" HWH AB (Zinc) (Qty. 8) (234-5000-00)			
5*	Edge Protector (on Item 4)	2	545-5592-01	<i>The Associated Parts AP-A thru AP-C are also noted in the Backbox Assembly drawings on the previous page.</i>			
6	Display Controller Board FCC-FEB98	1	520-5055-03	ASSOC. PARTS ARE NOT INCLUDED WITH BACKBOX/SPKR. PANEL ASSY'S.			
7	RF Shield	1	820-5092-00	Nº	ASSOC. BACKBOX PART NAME	QTY.	SPI PART Nº
8*	Ground Strap (25") (on Items 4, 6, 12)	4	600-5006-25	AP-A	Backglass Assembly (Game Nº 74)	1	515-5450-00-74
9*	1/2" Clamp (Single) (on Item 4)	1	040-5000-06	ORDERING ABOVE (ITEM AP-A) ASSY. PART Nº WILL INCLUDE:			
10*	Ribbon Cable, 14-Pin	1	036-5260-00	AP-A1	Clear Backglass 25.906" X 19.187"	1	660-5038-02
11*	Foam 3/16" Thk. X 1/4" X 36"	6	626-5026-00	AP-A2	A. Powers™ Film Art (Game Nº 74)	1	830-5274-00
12	Speaker (Shld.) 4" 8Ω MG Elec #4060SH	2	031-5004-01	AP-A3	Top Plastic Channel - 26"	1	545-5018-15
13	Speaker Grill (Black w/no Artwork)	2	535-8081-01	AP-A4	Bottom Plastic Lift Channel - 26-1/16"	1	545-5021-01
				AP-A5	Plastic Edging (Left/Right) - 18-1/8"	2	545-5018-14
				AP-A6*	Tape (double-sided) (12" Length)	1/2	626-5005-00
				<i>Note: AP-A6 secures AP-A5 to AP-A1</i>			
				AP-B	Pivot Hinge Left	1	535-7999-00
				AP-C	Pivot Hinge Right	1	535-7999-01
				Items AP-B & AP-C are secured to Backbox by: 1/4"-20 X 1-1/4" C.B. Sq. 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. 1) (242-5009-00)			
				Items AP-B & AP-C are secured to Cabinet by: 1/4"-20 X 7/8" Carriage Bolt Sq. Neck (Qty. 2) (231-5014-00), Hinge Spacer (Qty. 2) (530-5099-00), Washer 1/4" I.D. X 7/8" O.D. X 1/8" Yellow (Qty. 1/per) (242-5016-01), Fend Washer 1/4" I.D. X 1" O.D. (Qty. 1/per) (242-5009-00) and 1/4"-20 Flange Nut (Qty. 1/per) (240-5300-00)			

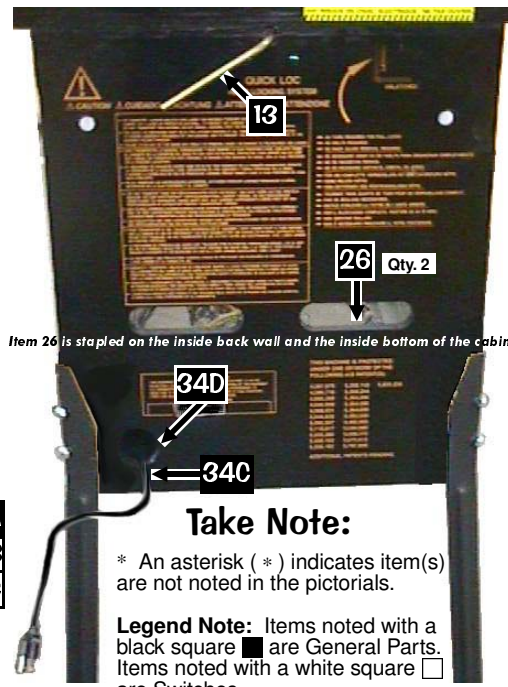


Cabinet - General Parts & Switches

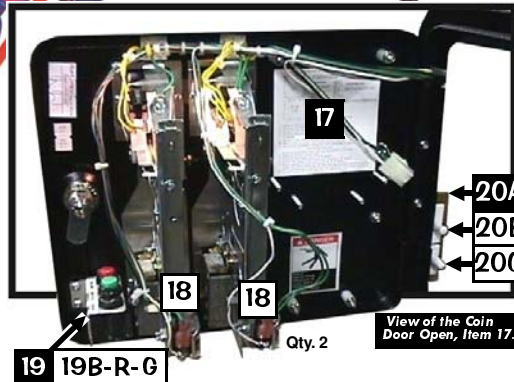
For Backbox Parts see the previous two pages.



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



Item 26 is stapled on the inside back wall and the inside bottom of the cabinet.



View of the Coin Door Open, Item 17.

Enlarged View of Item 19 inside the Coin Door, Item 17. Buttons, Bracket & Decal sold separately. For usage, see Section 3, Chapter 1, Portals Service Menu Introduction, Page 8.

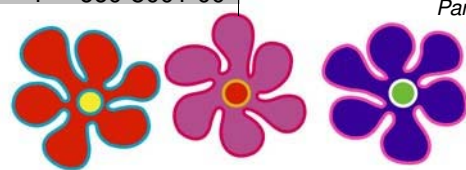
Take Note:

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

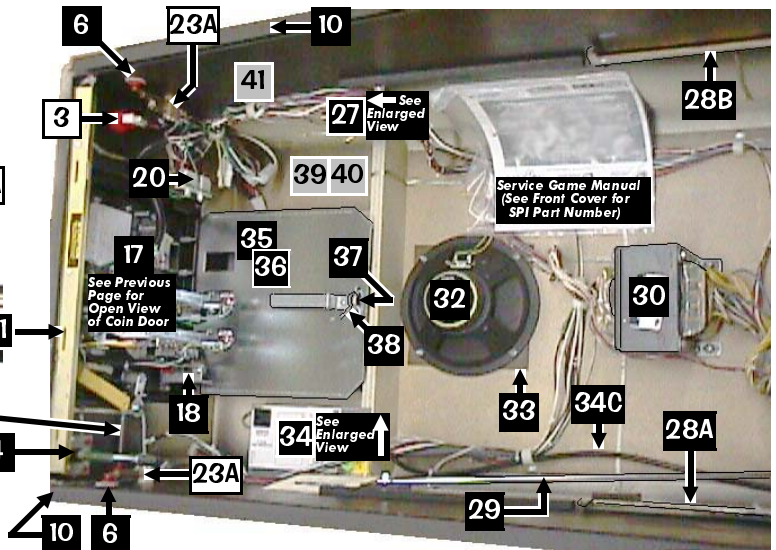
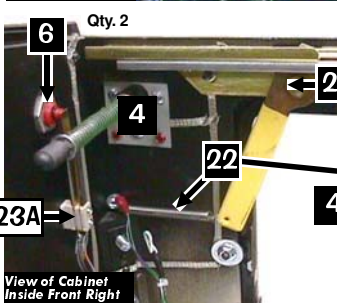
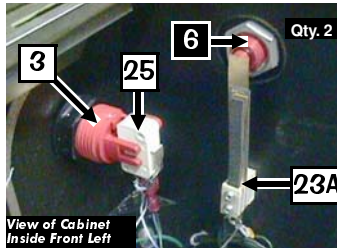
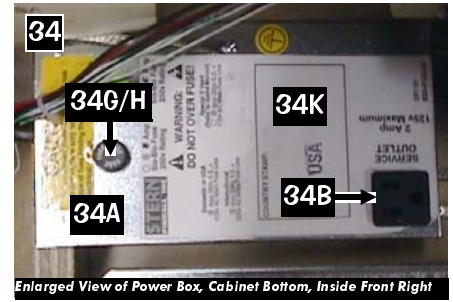
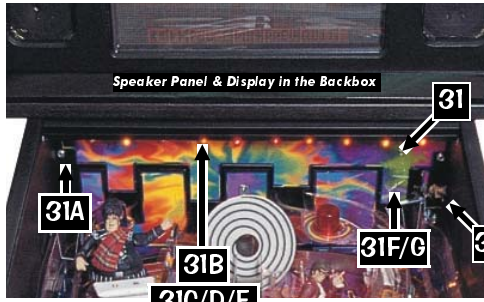
Legend Note: Items noted with a black square are General Parts. Items noted with a white square are Switches.

Sec. 4: Parts Id. ...

Nº	CABINET PART NAME	QTY.	SPI PART Nº	Nº	CABINET PART NAME	QTY.	SPI PART Nº
1	A. P. Screened Cabinet (No Parts)	1	525-6000-74	13	Hex Key Allen Wrench 5/16"	1	777-0001-00
2	Black Leg & Leveler Assembly	4	500-5921-50	14	Corrugated Tubing Black 1 1/4"Ø X 2.6' Lg.	2	605-5008-00
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). To order just a Leg Leveler (3/8" - 16 X 3") use SPI Nº: 500-5017-00. A Leg "without" a Leg Leveler is not available.				Above Item 14 covers the Cables Wiring Harnesses going into the Backbox from the Cab.			
3	Start Button (Red) + Lamp Assembly	1	500-6388-02	15	#1 Roto Lock Male (R2-0055-02)	1	355-5006-01
Item 3 includes the Switch. FOR SWITCH ONLY see Item 25 on the Next Page.				Item 15 is secured by: #10-24 X 1-3/4" Carr. Bolt Sq. Neck (Qty. 2) (231-5022-00), #10-24 Nylon Stop Nut (Qty. 2) (240-5206-00) and #10 Washer 7/32" X .5" X 1/16" (Qty. 2) (242-5003-00)			
4*	#555 Wedge Base Bulb (Clear)	1	165-5002-00	16	#1 Roto Lock Female (on Backbox)	1	355-5006-02
Item 4 is included with Item 3, for just a replacement Bulb use the above number.				Item 17 is secured by: 1/4"-20 X 1-1/4" Carriage Bolt Sq. 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 Nº.			
5	Ball Shooter (Plunger) Assembly	1	500-6146-00-04	17	Coin Door (with Validator) USA only	1	500-5018-172
Item 5 is secured by: Support Plate (Qty. 1) (535-5027-00), #10-32 X 3/8" SHWH (Serr) Swage (Qty. 3) (237-5985-00) and #6 X 5/8" HWH AB (Zinc) (Qty. 2) (234-5002-00). FOR A BREAKDOWN OF PARTS SEE: Sec. 4, Chp. 2, Drawings for ... Assemblies...				18 Coin Door Switch (USA) 2 180-5024-00 FYI: Coin Door Switch (¥ Japan) 0 180-5091-00			
6	Flipper Button (Red) Assembly	2	500-5026-32	19	Bracket for below Portals™ Switches	1	535-6860-03
Item 6 is secured by: Pal Nut for Flipper Button (Metal) (Qty. 2) (240-5003-01) and is fitted with: O-Ring 11/32" X 7/32" X 1/16" (Qty. 1/per) (545-5850-00) Item 6 DOES NOT include the Switch. FOR SWITCHES ONLY see Items 23A/B on the Next Page.				19B Push-Button Portals™ Switch (Black) 1 180-5192-00 19R Push-Button Portals™ Switch (Red) 1 180-5192-02 19G Push-Button Portals™ Switch (Green) 1 180-5192-04			
7	Rear Glass Channel 20-3/8" Length	1	545-5038-00	Ordering Note: Securing hardware for switches included. For Decal, see Page 63.			
8	Plastic Channel 42-5/8" Lg. (Left/Rt.)	2	545-5017-00	20	Dual Switch Assembly	1	500-5808-00
9	Side Armor "with holes" (Left & Right)	2	535-7297-02	ORDERING ABOVE (ITEM 20) ASSEMBLY PART Nº WILL INCLUDE:			
Item 9 is secured by: Pem Stud 1/4 X 1" FH (Qty. 2/per) (237-6116-01), 1/4-20 Flange Nut (Qty. 2/per) (240-5300-00) and #8 X 5/8" T20 Tamper Proof (Qty. 2/per) (237-5947-00)				20A Mounting Bracket 1 535-6958-00 20B Playfield Power Interlock Sw. (Top) 1 180-5136-00 20C Memory Protect Switch (Bottom) 1 180-5000-00			
10	Front Molding - Black	1	500-5757-02-00	Item 20 is secured to Cabinet by: #8 X 1/2" HWH AB (Zinc) (Qty. 2) (234-5101-00)			
Item 10 requires: Self-Adhesive Foam Rubber 3/8" X 3/16" X 20-3/8" (626-5001-00).				Parts Table & Views continue on the next page.			
11	1"Ø Rd. Red Button Lighted (Text = "Fire")	1	500-6388-02				
12*	P/F Glass (Tmprd.) 21" X 43" X 3/16"	1	660-5001-00				



Cabinet - General Parts & Switches Continued



Take Note: * An asterisk (*) indicates item(s) are not noted in the pictorials.

Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº	Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
21	Front Molding Lockdown Assy. Altered	1	500-6509-00	31	Cabinet Light Board Assy. Continued	1	500-6413-74
Item 21 is secured by: #10-24 X 1-1/4" Carr. Bolt (Qty. 2) (231-5012-00), #10-24 Keps Nut (Qty. 2) (240-5207-00), #8 X 5/8" HWH AB Zinc (Qty. 4) (234-5102-04) and #10 Washer 7/32" ID X 1/2" OD X 1/16" (Qty. 2) (242-5003-00)				31E*	#44 Bulb Yellow (Small Bayonet Type)	4	165-5053-06
22	Lockdown Spring (connected to handle)	1	265-5008-00	31F*	Clear Plastic (Butyrate) -010	1	830-5984-010
23A	Flipper Switch - Self-Cleaning	2	180-5160-00	31G*	Decal for Item 31F	1	820-6284-18
23B	Flipper Sw. - X2 Stack for Lwr./Up. Flipper(s)	0	180-5164-00	Item 31B is secured by: Staple (5/16") (Qty. 2/per) (631-5000-00)fp Item 31F is secured to Item 31A by: #6 X 1/2" PPH A Black (Qty. 3) (237-5805). Special Ordering note on Items 31F & 31G: The individual piece may not be available in which case the entire sheet must be ordered. See Section 4, Chapter 1, Parts Identification & Location, Page 57.			
24*	Foam Strip (2 on 23A; 1 on 23B)	3	626-5042-00	Item 31 is secured to the Cabinet by: #8-32 X 1 1/2" HWH MS (Ser) Zinc (Qty. 2) (237-5946-00) and #8 Washer (Qty. 2) (242-5005-00)			
25	Start Button (SWITCH ONLY)	1	180-5174-00	32	Speaker 8" ø Rd. 8010 4Ω	1	031-5007-00
26	Grills 2-1/2" X 18" (on Back & Bottom)	2	545-5072-02	33	Speaker Grill 7" X 7"	1	545-5072-03
27	Cabinet Plumb Bob Tilt Switch	1	see 27A-27D	Items 32 & 33 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)			
ORDER ONLY INDIVIDUAL PARTS NEEDED (NO ASSY. NUMBER):							
27A	Bracket for Hanger Wire	1	535-5221-00	34	Power Input Box Sub-Assy.	1	515-5360-07
27B	Hanger Wire	1	535-5319-00	ORDERING ABOVE (ITEM 34) SUB-ASSY. PART Nº WILL INCLUDE:			
27C	Contact Wire Form	1	535-7563-01	34A	Power Box (Plain)	1	535-5932-00
27D	Plumb Bob Weight (includes Thumb-Screw)	1	535-5029-00	34B	Service Outlet (for USA)	1	180-5008-01
Items 27A & 27C are secured by: #8 X 1/2" SHWH AB (Zinc) (Qty. 4) (234-5101-00)				34C	Line Cord 10' ROJ 3" Max.	1	034-5000-10
28A	Slide & Pivot Support Bracket - Right	1	535-5989-00	34D	Recessed Cup for Line Cord	1	545-5122-00
28B	Slide & Pivot Support Bracket - Left	1	535-5990-00	34E*	Line Filter	1	150-5000-00
Items 28A & 28B are secured by: #10-24 X 1-1/4" Carriage Bolt Sq. Neck (3/per) (231-5012-00) and #10-24 KEPS Nut (3/per) (240-5207-00)				34F*	Varistor TNR159211KM	1	150-5001-00
29	Prop Rod	1	535-7553-00	34G	Fuse 8 Amp 250v Slo-Blo (Domestic)	1	200-5000-05
Item 29 is secured by: #10-24 X 1-3/4" Carriage Bolt Sq. Neck (Qty. 1) (231-5022-00), Washer #10 7/32" ID X .5" OD X 1/16" Thk (Qty. 1) (242-5003-00) and #10-24 Nylon Stop Nut (Qty. 1) (240-5206-00)				34H	Fuse Holder	1	205-5001-00
30	Transformer 5.7v AC (with Ballast Winding)	1	010-5012-01	34J*	On/Off Switch Bracket	1	535-8318-00
Item 30 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)				34K	On/Off Rocker Sw. (Arcoelectric C1350AB)	1	180-5001-01
31	Cab. Light Bd. Assy. Austin Powers™	1	500-6413-74	34L	Power Box Decal	1	820-6123-03
ORDERING ABOVE (ITEM 31) ASSEMBLY PART Nº WILL INCLUDE:							
31A*	Cab. Light Bd. Plain (Austin Powers™)	1	525-5570-00	35	Cash Box Plastic Bottom	1	545-5090-00
31B*	2-Lug Staple Down Socket	10	077-5000-00	36	Cash Box Cover (Validator)	1	535-5013-03
31C*	#44 Bulb Red (Small Bayonet Type)	2	165-5053-02	37	Cash Box Lock Bracket (wire)	1	535-7562-00
31D*	#44 Bulb Amber (Small Bayonet Type)	4	165-5053-03	38	Large Hair-Pin Clip	1	535-7772-00
Item 31 continues in the next column				39	Mr. Bigglesworth Figurine (Ball Trap Prevention)	1	880-5053-00
Item 39 is secured to the Cabinet by: #6 X 1/4" PPH A Zinc (Qty. 1) (237-5804-00) and 3/8" X 3/8" Spacer Gray (Qty. 1) (254-5000-12)							

Sec. 4: Parts Id. ...

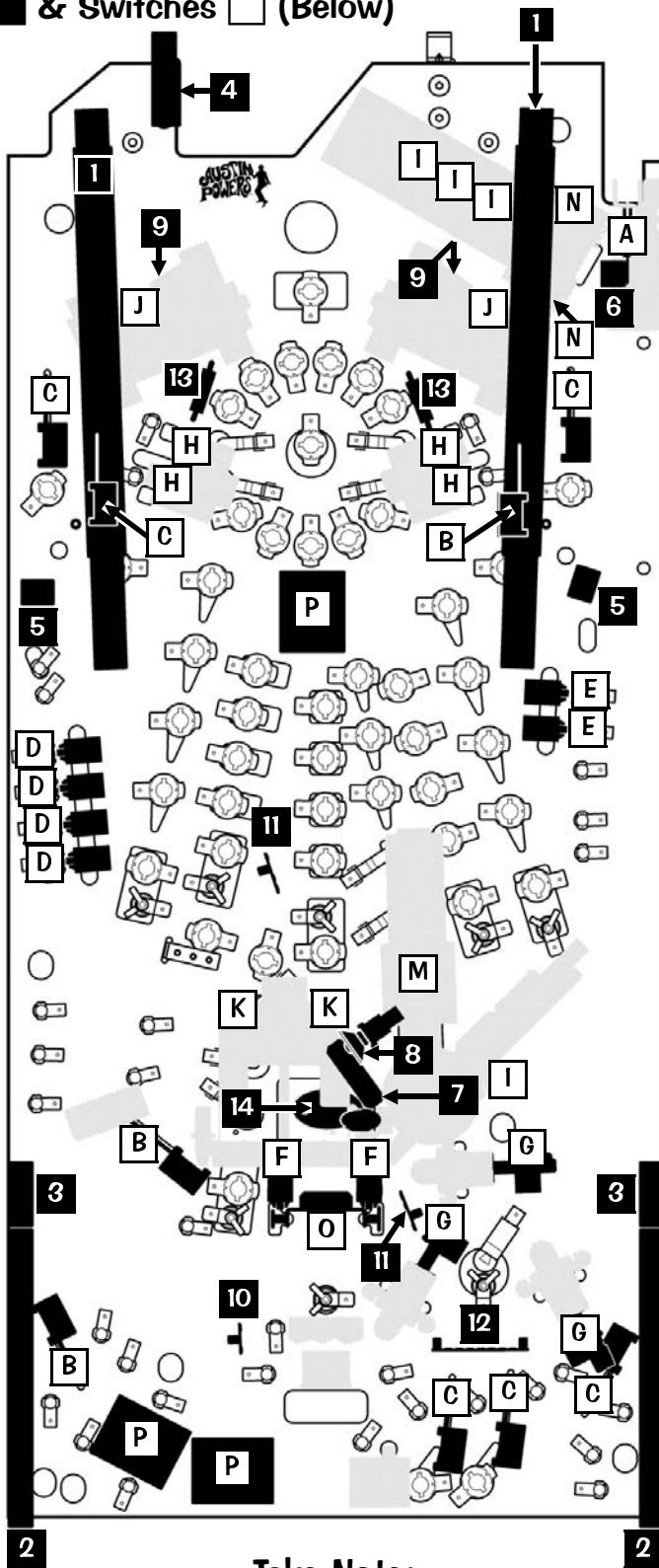


Playfield - General Parts & Switches (Below)

Nº	BELOW PLAYFIELD PART NAME	QTY.	SPI PART Nº
1	Playfield Support Slide Bracket	2	535-6862-02
Item 1 is secured by: #8 X 1/2" SHWH AB (Zinc) (Qty. 2/per) (234-5101-00) and #8-32 X 5/8" HWH Swage (Serr) Zinc (Qty. 1/per) (237-5975-03)			
2	Edge Slide Bracket (Extended)	2	535-5988-01
Item 2 is secured by: #4 X 1/2" PFH (Zinc) (Qty. 5/per) (237-5840-00)			
3	Pivot Pin Bracket Welded Assembly	2	500-5329-03
4	Playfield Hanger Bracket (Left)	1	535-8867-00
Items 3 & 4 are secured by: #8-32 X 5/8" HWH Swage (Ser) Zc. (Qty. 2/per) (237-5975-03)			
5	Outlane Adjustable Post Plate	2	535-5091-02
6	Switch Bracket (Shooter Lane)	1	535-6173-00
Items 5 & 6 are secured by: #6 X 1/2" HWH AB (Zinc) Red (Qty. 2/per) (234-5001-02)			
7	Mounting Bracket (for Ball Trap Prevent)	1	535-8916-00
Item 7 is secured by: #8 X 1/2" SHWH AB (Zinc) (Qty. 2) (234-5101-00)			
8	Light Reflector (Silver Plastic)	1	545-5409-01
Note: For #555 Socket & Bulb, see Page 64 (Items D & 1).			
9	Insulation Fiche Paper (Flipper Base)	2	545-5721-00
10	Diode Terminal Strip 2-Lug (810) Isolated	1	055-5203-00
11	Diode Terminal Strip 3-Lug (813) Isolated	2	055-5204-03
12	Diode Terminal Strip 7-Lug Isolated	1	055-5204-07
Items 10, 11 & 12 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. See Sec. 5, Chp. 2, Playfield Diode Terminal Strip...			
13	3A 250v Slo-Blo Fuse	2	200-5000-08
	Fuse Clip Holder (Socket)	2	205-5000-01
Item 13 is secured by: #6 X 1/2" PPH AB (Qty. 1/per) (237-5805-00). Note: Item 13, 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).			
14	Dr. Evil Figurine (Altered)	1	880-5052-00
Note: For how Item 14 is secured or for a better view, see Sec. 4, Chp. 2, Drawings for Major Assemblies & Ramps, Page 77.			
15*	#8 Solder Lug	5	055-5140-08
Item 14 is secured by: #6 X 3/8" HWH AB (Zinc) Red (Qty. 1/per) (234-5000-00)			

Nº	BELOW SWITCHES PART NAME	QTY.	SPI PART Nº
A	Shooter Lane Micro Switch	1	180-5157-00
	Switch Body Protect Plate	2	535-6539-00
Item A is secured to Item 5 (above) by: #2-56 X 1/2" HWH Ser UNS #4HD TR3 Black (Qty. 2) (237-5937-02) and #2-56 Hex Nut (Qty. 2) (240-5301-00).			
B	Micro Sw. Assy. R/O Lt. Mount Reg.	3	500-6227-01
C	Micro Sw. Assy. R/O Rt. Mount Reg.	6	500-6227-02
Items B & C are secured by: #8 X 1/2" SHWH AB (Zinc) (Qty. 2/per) (234-5101-00)			
D	Modular S-U Target Square (Green)	4	500-6139-04
E	Modular S-U Target Square (Blue)	2	500-6139-05
F	Modular S-U Target Narrow (Green)	2	500-6138-04
Items D - F are secured by: #8 X 3/4" HWH AB (Zinc) (Qty. 2/per) (234-5103-00). For better views, see Appendix I, Page A14 (end of manual).			
G	Micro Sw. Bumper	3	180-5015-03
H	Stack (Blade) Sw. Slingshot	4	180-5054-00
I	Micro Switch (Roller Actuator, Lite Force)	4	180-5119-02
J	EOS Switch Flipper	2	180-5149-00
K	Micro Switch	2	180-5052-00
L	Micro Switch	1	180-5083-00
M	Micro Switch Scoop	1	180-5183-00
Note: For how Items G-M are secured or for a better view, see Sec. 4, Chp. 2, Drawings for Major Assemblies & Ramps, Item G, Page 71; Item H, Page 70; Item I, Pages 67 & 74-75; Item J, Pages 68-69; Item K, Page 76; Item L, Page 77; Item M, Page 78 Top.			

Nº	BELOW MISC. PCB PART NAME	QTY.	SPI PART Nº
N	Dual OPTO TRANS Bd. (on Ball Trough)	1	520-5173-00
	Dual OPTO REC Board (on Ball Trough)	1	520-5174-00
Note: For more details on Item N and a break-down of parts, see Section 5, Chapter 4, Printed Circuit Boards, Page 99. For how Item N is secured or for a better view, see Sec. 4, Chp. 2, Drawings for Major Assemblies & Ramps, Page 67.			
O	Long Hop OPTO TRANS Bd. (on Brkt.)	1	520-5082-00
	Long Hop OPTO REC Board (on Brkt.)	1	520-5083-01
Note: For more details on Item O and a break-down of parts, see Section 5, Chapter 4, Printed Circuit Boards, Page 131. For how Item O is secured or for a better view, see Sec. 4, Chp. 2, Drawings for Major Assemblies & Ramps, Page 78 (Bottom).			
P	Relay Board	3	520-5010-00
Item P is secured by: #6 X 3/4" HWH AB (Zinc) (Qty. 4/per) (234-5003-00) and 3/8" Sfl. Rtn. Spacer White (Qty. 1/per) (254-5007-01)			



Take Note:

- * An asterisk (*) indicates item(s) are not noted in the pictorials.
- 1. For Sockets & Bulbs (drawings & part numbers) see Pgs. 62-64.
- 2. Some unique parts may be included with or associated with a Major Assembly or Ramp Assembly; see the Blue Pages, Sec. 4, Chp. 2, for parts required not appearing on this page. If you still cannot find the part required, Call Stern™ Pinball Technical Support, 1-800-542-5377 or 1-708-345-7700.
- 3. Legend Note: Items noted with a black square ■ are General Parts. Items noted with a white square □ are Switches, OPTO Boards, or Misc. PC Boards.

Sec. 4: Parts Id. ...



Playfield - General Parts & Switches (Above)



Nº	ABOVE PLAYFIELD PART NAME	QTY.	SPI PART Nº
1	P/F Screened w/ Inserts & NO Parts	1	830-5100-74
1	P/F Complete w/ Inserts & ALL Parts	1	505-6004-74
2	Playfield Hanger Bracket (Right)	1	535-8385-00
Item 2 is secured to the P/F by: #8-32 X 7/8" HWH MS Zinc (Qty. 2) (237-5890-00)			
3	A. Powers Bottom Arch (Plastic)	1	545-5995-01
Item 3 is secured to the playfield by: Playfield Support Hex Post (double male threaded end #8-32 (Qty. 2) (530-5285-00) [see Page 59, Item 15 for view], #8 Washer (Qty. 2) (242-5005-00) and #8-32 Nylon Stop Nut (Qty. 2) (240-5102-00). Ball Trap Prevent under Arch by ball drain: 1" X 3/8" Spacer Gray (Qty. 1) (254-5000-04), #8 Washer (Qty. 1) (242-5005-00), #8-32 Nylon Stop Nut (Qty. 1) (240-5102-00) and #8-32 X 1 1/2" PFH MS Black (Qty. 1) (237-5940-01) Note: For Decals, see Playfield - Plastics (Screened & Clear), Mylar & Decals, Page 57.			
4	Instruction Card (USA) Nº: 74	1	755-5174-00
Note: Visit www.sternpinball.com for a PDF copy of the Game Instruction Card which will contain any translated instruction cards made for this game. Find Game Link or Archives.			
5	Coin Card (2-Sided) New for 2002	1	755-5400-00
Usage Note: Use Item 5 (Back: 1 Play 50¢ - 5 Plays \$2) for Adj. 6, Game Pricing, USA 5 Setting, or (Front: 1 Play 50¢ - 3 Plays \$1) for Adj. 6, Game Pricing, USA 8 Setting.			
6	Coin Card (2-Sided) New for 2002	1	755-5400-02
Usage Note: Use Item 6 (Front: 1 Play 50¢) for Adj. 6, Game Pricing, USA 2-7 Setting, (Back: is Blank) for Custom Settings.			
Availability: See Appendix J (back of manual) for all current Coin Cards (USA, Canada, Euro & other International). If this is a non-US Game, Coin Card(s) provided will differ.			
7	1-1/16" Steel Balls	4	260-5000-00
8	Mini-Mars Light Cover (Snap-In)	4	550-5030-□□
Note: When ordering fill-in the last 2-digits will the 2-digits after the colors noted below. Green -04 Blue -05 Yellow -06 Orange -07			
9	Light Reflector (Silver Plastic)	1	545-5409-01
Note: For #555 Socket & Bulb, see Page 64 (Items D & 1).			
10*	Plug-Cap (3/16") Black Plastic	1	545-5232-01
Note: Item 10 should plug hole if the Center Post (@ Drain) is Not Used.			
11	Ramp Mounting Welded Bracket	2	515-6508-00
Item 11 is secured on Wood Rail: #6 X 1/2" PTH A (Zinc) (Qty. 2/per) (237-5809-00)			
12	Control & 1-Way Gates	2	Read Note Below
Note: Control Gates (Left Style with & without Wire Form) are detailed in Sec. 4, Chp. 2, Drawings for Major Assemblies & Ramps, Page 73.			
13	Back Panel A. Powers™ (No Parts)	1	525-5589-00
Item 13 is secured by: #6 X 13" PFH A (Zinc) (Qty. 6) (237-5850-00) and #6 X 3/4" HWH AB Zinc (Qty. 4) (234-5003-00)			
14*	Clear Dot (Self-Adhesive)	5	280-5012-00
Item 14 are located on the following Plastics: Clear -002, Clear -004, Clear -007 and Screened -09 (X2). See this Section Page 57 for plastic locations.			
15	Protect Bracket	1	535-8912-00
Item 15 is located under the following Plastic: Screened -16.			
16	Trap Wire	1	265-5059-00
17	Austin Powers Figurine (Altered)	1	880-5051-01
18	Dr. Evil Figurine (Altered) (under P/F)	1	880-5052-00
19	Fat Bastard Figurine (Altered)	1	880-5050-01
20	Mini-Me Figurine (Altered)	1	880-5049-01
Note: For how Items 17-20 are secured or for a better view, see Sec. 4, Chp. 2, Drawings for Major Assemblies ..., Item 17, Pg. 74; Item 18, Pg. 77; Item 19, Pg. 82; Item 20, Pg. 83;			
21	Level Assembly	1	515-7214-00
For Individual Items use : .882" 8MM Vial Mtg. Flange (545-6027-00), Level .8mm Empire #0224 (545-6001-01) or Level Bracket (535-9010-00). Flange secured by: #6-32 X 1/4" PPH MS (no Sems) Zinc (Qty. 1) (237-5500-00) and #6-32 Keps Nut (Qty. 1) (240-5008-00) Item 21 is secured to wood rail by: #6 X 1/2" HWH AB Zinc Red (Qty. 2) (234-5001-02)			

Nº	ABOVE SWITCHES PART NAME	QTY.	SPI PART Nº
A	Micro Switch (on Roll-Under Gates on Ramps)	4	180-5087-00
B	Micro Switch (Roll Over on Laser Beam)	1	180-5181-00
C	Micro Switch (Roller Actuator on Laser Beam)	2	180-5119-02
D	Micro Switch (Roll Over on Time Mach. Ramp)	1	180-5057-00

Nº	ABOVE MISC. PCB PART NAME	QTY.	SPI PART Nº
E	Pulse-Stretcher OPTO PC Board	1	515-7212-00

Note: For more details on Item E and a break-down of parts, see Section 5, Chapter 4, Printed Circuit Boards, Page 130. For how Items A-E is secured or for a better view, see Section 4, Chapter 2, Drawings for Major Assemblies & Ramps.

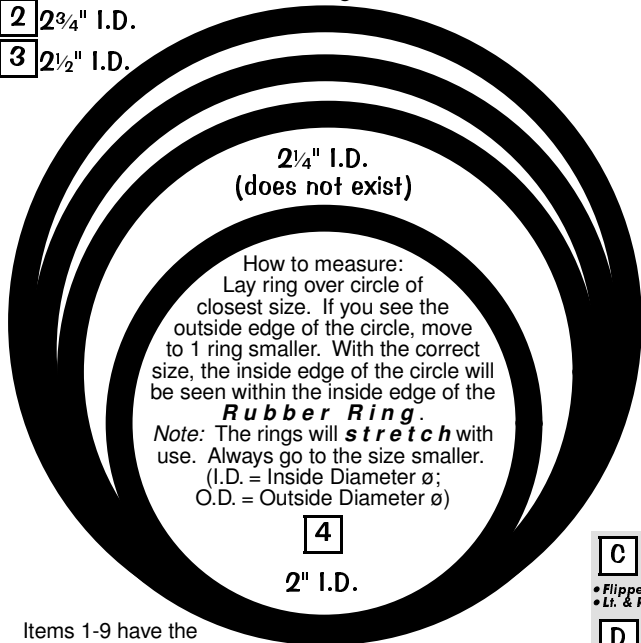
Take Note:

- * An asterisk (*) indicates item(s) are not noted in the pictorials.
- 1. Some unique parts may be included with or associated with a Major Assembly or Ramp Assembly; see the Blue Pages, Sec. 4, Chp. 2. for parts required not appearing on this page. If you still cannot find the part required, Call Stern™ Pinball Technical Support, 1-800-542-5377 or 1-708-345-7700.
- 2. Legend Note: Items noted with a black square ■ are General Parts. Items noted with a white square □ are Switches.



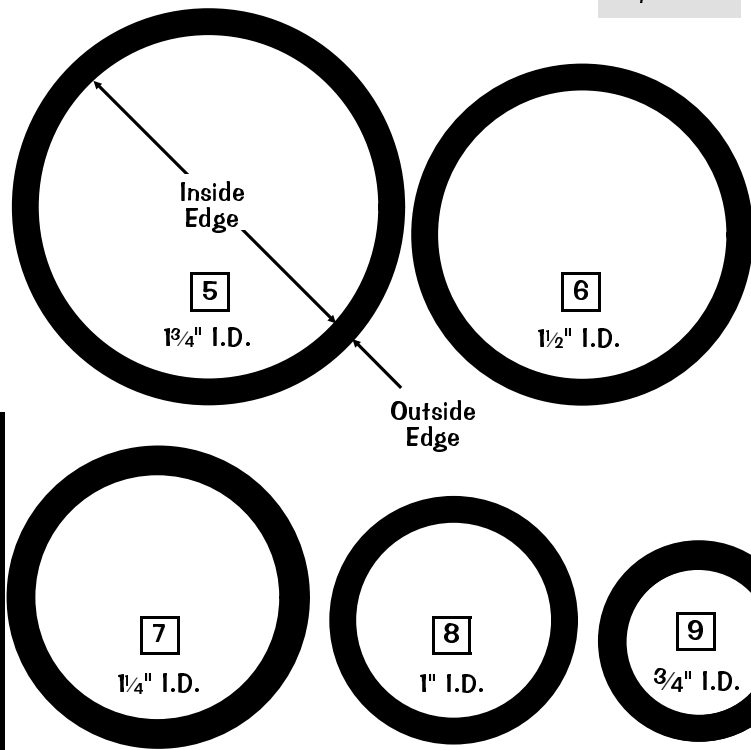
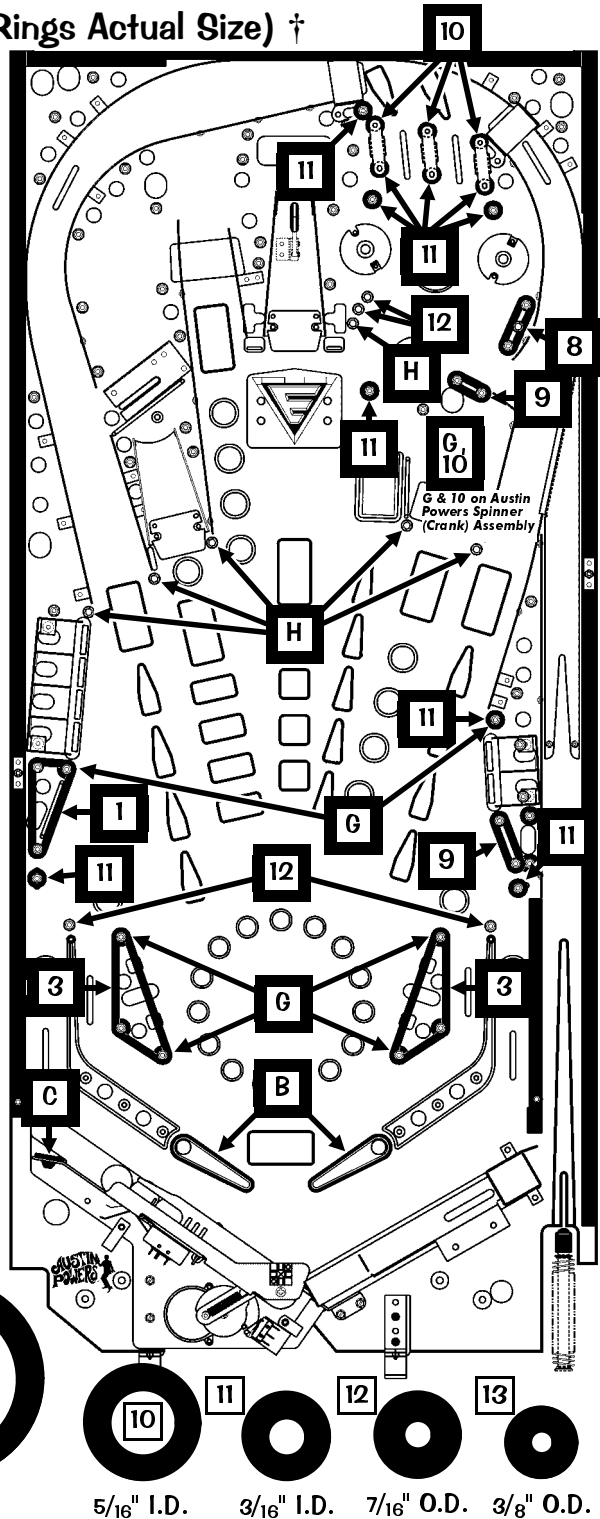
- 1 3" I.D.
- 2 2¾" I.D.
- 3 2½" I.D.

Playfield - Rubber Parts (Rings Actual Size) †



Items 1-9 have the "size" molded onto the Rubber Ring.

- C** Not Shown: Qty. 4
• Flipper Assemblies
• Lt. & Rt. Plas. Ramps
- D** Not Shown: Qty. 2
• Trough Up-Kicker
• Scoop



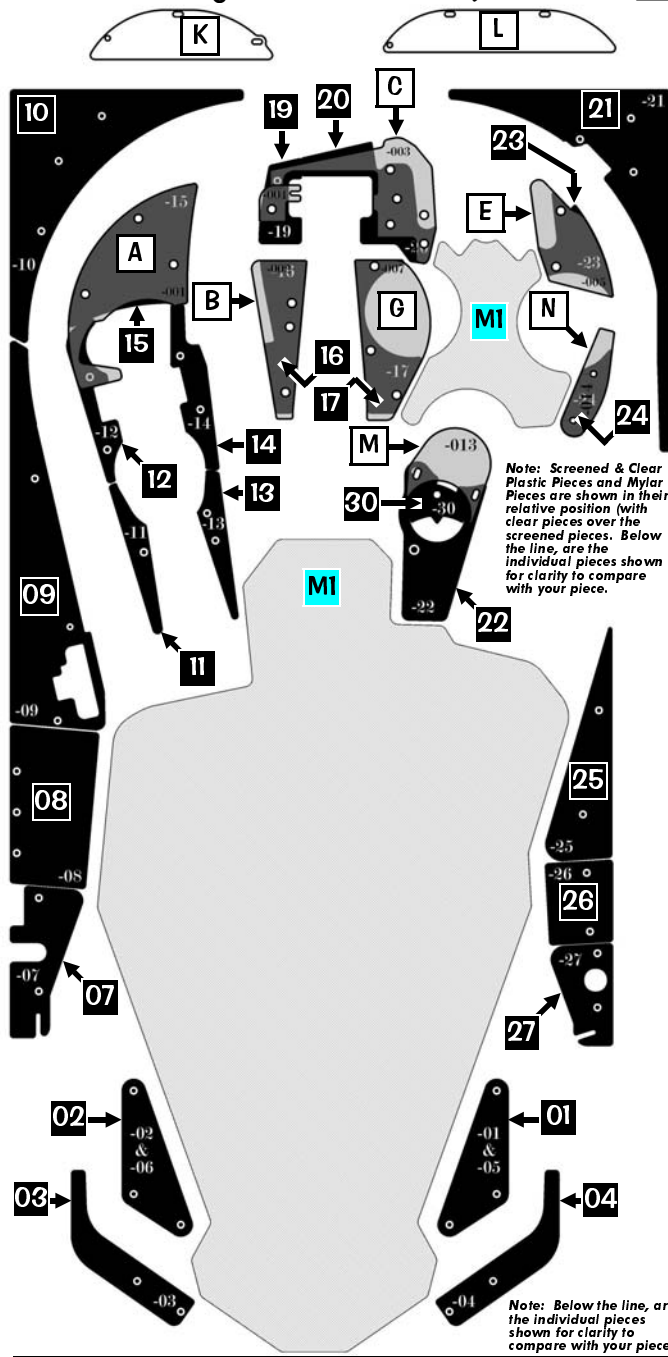
Sec. 4: Parts Id. ...

Nº	RUBBER PART NAME	QTY.	SPI PART Nº	Nº	RUBBER PART NAME	QTY.	SPI PART Nº
A	Small Flipper Rubber Ring	0	545-5207-00	4	2" I.D. Black Rubber Ring	1	545-5348-08
B	Large Flipper Black Rubber Ring	2	545-5277-00	5	1¾" I.D. Black Rubber Ring	0	545-5348-21
C	Rubber Deflector Pad (Bumper)	5	545-5428-00	6	1½" I.D. Black Rubber Ring	0	545-5348-07
D*	Rubber Bumper (Grommet)	2	545-5105-00	7	1¼" I.D. Black Rubber Ring	0	545-5348-06
E	Bumper Post Rubber	0	545-5009-00	8	1" I.D. Black Rubber Ring	1	545-5348-05
F	Rubber Flange Bumper	0	545-5965-00	9	¾" I.D. Black Rubber Ring	2	545-5348-04
G	Post Rubber (Sleeve Short)	7	545-5151-00	10	5/16" I.D. Black Rubber Ring	4	545-5348-02
H	Post Black Rubber (Sleeve Tall)	6	545-5308-00	11	3/16" I.D. Black Rubber Ring	10	545-5348-01
1	3" I.D. BLK Rubber Ring	0	545-5348-10	12	7/16" O.D. Black Rubber Ring	4	545-5348-17
2	2¾" I.D. Black Rubber Ring	0	545-5348-20	13	3/8" O.D. Black Rubber Ring	0	545-5348-19
3	2½" I.D. Black Rubber Ring	2	545-5348-09	14*	O-Ring 11/32" X 7/32" X 1/16"	1	545-5850-00

† Items with Ø Qty. are not used in this game. Size and/or quantities may change during production.

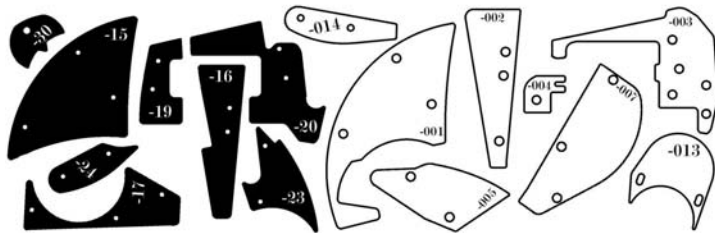


Playfield - Plastics (Screened & Clear), Mylar & Decals*



Note: Screened & Clear Plastic Pieces and Mylar Pieces are shown in their relative position (with clear pieces over the screened pieces). Below the line, are the individual pieces shown for clarity to compare with your piece.

Note: Below the line, are the individual pieces shown for clarity to compare with your piece.



Take Note:

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

- To order the entire Plastic Sheet Set (Screened & Clear), use the Part N^o with the "-XX" ending. For individual pieces replace the "-XX" with appropriate last 2-Digit N^o. *Attention: Individual pieces are not available.*
- Legend Note:** Items noted with a black square ■ are Screened; ...a white square □ are © Clear; ...a gray square ■ is Mylar Set.

N ^o	SCREENED PLASTIC PART NAME	SPI PART N ^o
<i>Attention: Individual Pieces may not be available. Piece -28 is Not Used.</i>		
01	Right Slingshot	830-5982-01
02	Left Slingshot	830-5982-02
03	Left Return Lane	830-5982-03
04	Right Return Lane	830-5982-04
05*	Right Slingshot (Spare in Parts Bag)	830-5982-05
06*	Left Slingshot (Spare in Parts Bag)	830-5982-06
07	Left Side, Lower	830-5982-07
08	Left Side, Middle	830-5982-08
09	Left Side, Upper	830-5982-09
10	Top Left Corner	830-5982-10
11	Toilet Front, Left Side	830-5982-11
12	Toilet Back, Left Side	830-5982-12
13	Toilet Front, Right Side	830-5982-13
14	Toilet Back, Right Side	830-5982-14
15	Behind Fat Bastard (under "-001", Item A)	830-5982-15
16	Time Machine Ramp, Left (under "-002", Item B)	830-5982-16
17	Time Mach. Ramp, Right (under "-007", Item G)	830-5982-17
18*	Key Fob	830-5982-18
19	Time Mach., Left (under "-004", Item D)	830-5982-19
20	Time Mach., Left & Back (under "-003", Item C)	830-5982-20
21	Top Right Corner	830-5982-21
22	Front of Austin Powers	830-5982-22
23	Top Right Bumper (under "-005", Item E)	830-5982-23
24	Bottom Rt. Bumper (under "-014", Item N)	830-5982-24
25	Right Side, Upper	830-5982-25
26	Right Side, Middle	830-5982-26
27	Right Side, Lower	830-5982-27
28*	Not Used	Not Used
29*	Spini-Me (see Sec. 4, Chp. 2, Pg. 83 for Location)	830-5982-29
30	Behind A. Powers (see also Sec. 4, Chp. 2, Pg. 83)	830-5982-30

N ^o	CLEAR PLASTIC PART NAME	SPI PART N ^o
<i>Attention: Individual Pieces may not be available. Pieces -006, -008 & -009 are Identical.</i>		
A	Behind Fat Bastard (over "-15", Item 15)	830-5984-001
B	Time Mach. Ramp, Left (over "-16", Item 16)	830-5984-002
C	Time Mach., Left & Back (over "-020", Item 20)	830-5984-003
D	Not Used	Not Used
E	Right Bumper, Top (over "-23", Item 23)	830-5984-005
F*	Laser Ring (see Sec. 4, Chp. 2, Pgs. 80/81 for Loc'n)	830-5984-006
G	Time Mach. Ramp, Right (over "-17", Item 17)	830-5984-007
H*	Laser Ring (see Sec. 4, Chp. 2, Pgs. 80/81 for Loc'n)	830-5984-008
I*	Laser Ring (see Sec. 4, Chp. 2, Pgs. 80/81 for Loc'n)	830-5984-009
J*	Light Strip (located in Cabinet, requires Decal)	830-5984-010
K	Left Ramp Cover (see Sec. 4, Chp. 2, Pgs. 84/85)	830-5984-011
L	Right Ramp Cover (see Sec. 4, Chp. 2, Pgs. 86/87)	830-5984-012
M	Over Bottom Bumper	830-5984-013
N	Right Bumper, Bottom (over "-24", Item 24)	830-5984-014

N ^o	MYLAR PART NAME	QTY.	SPI PART N ^o
M1	Clear - Playfield Pieces (A. Powers)	1	820-5883-XX
M2*	Clear - Slingshot Front Protect	2	820-5821-00
M3*	Clear - Square Ball Drop	3	820-5815-00
M4*	Black Mylar - Cover Discs (In Cabinet)	2	820-5041-00

N ^o	GAME DECAL PART NAME	SPI PART N ^o
D1*	Time Machine Disc (see Sec. 4, Chp. 2, Pg. 79)	820-6280-00
D2*	Under Ramp Decal Sheet Set	820-6293-XX
<i>Note: Individual pieces are not available, thus entire sheet set must be ordered.</i>		
-01:	Right Ramp Enter; -02: Left Ramp Enter	
D3*	Game Decal Sheet Set	820-6284-XX
<i>Note: Individual pieces are not available, thus entire sheet set must be ordered.</i>		
-01:	Arch Left; -02: Arch Center; -03: Arch Right; -04, -05, -06: Bumper Cap; -07: Dr. E Flip; -08: Flip. Bat Left; -09: Flip. Bat Rt.; -10: Tech. Support; -11: Install 4 Balls; -12: Back Panel; -13, -14: Nar. Stand-Up Target; -15: Toilet Flusher; -16: Portals; -17: Up Post; -18: Cab. Light Strip; -19: Arch Shooter; -20: Coin Door Front; -21: Dr. Evil Target Brkt. Back; -22: Dr. Evil Trgt. Brkt. Left; -23: Dr. E Trgt. Brkt. Rt.; -24: Disc. Fire Button; -25, -25A: Rt. Ramp Lower; -26: Lt. Ramp Lower; -27: Left Ramp; -28: Right Ramp Top	
D4*	Diode Terminal Strip Desc. Decals	820-6221-74
<i>See Section 5, Chapter 2, Playfield Wiring, Page 95 for more details.</i>		
Misc. Decals: Power Box (820-6223-00); Protective Earth (820-6224-00); Gen. Backbox Fuse Location (820-6152-01); Suitable ... Use (UL) (820-6001-01); Can. UL Listing (820-6141-01); High Voltage Label (UL) (820-6082-01); Shock Hazard Label (UL)(820-6263-00)		

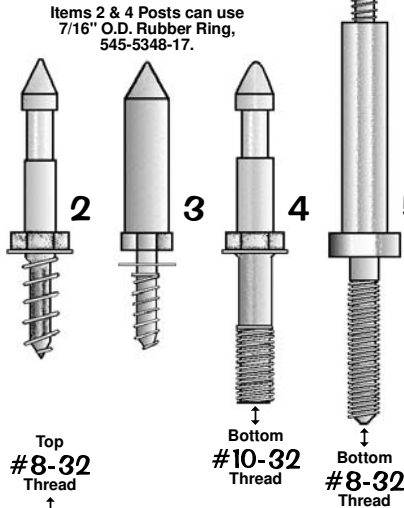


Sec. 4: Parts Id. ...

Playfield - Metal Posts (Screws) and Nuts (Actual Size) †



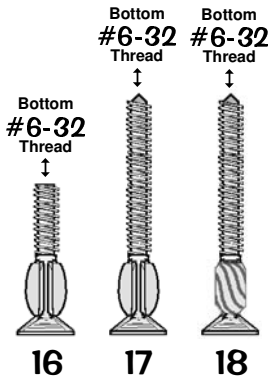
Item 1 Post can use
3/16" I.D. Rubber Ring,
545-5348-01;
or if Item 1 Post is
used in pairs, can use
3/4" - 3" Rubber Rings.



Items 2 & 4 Posts can use
7/16" O.D. Rubber Ring,
545-5348-17.



Bottom
#8-32
Thread

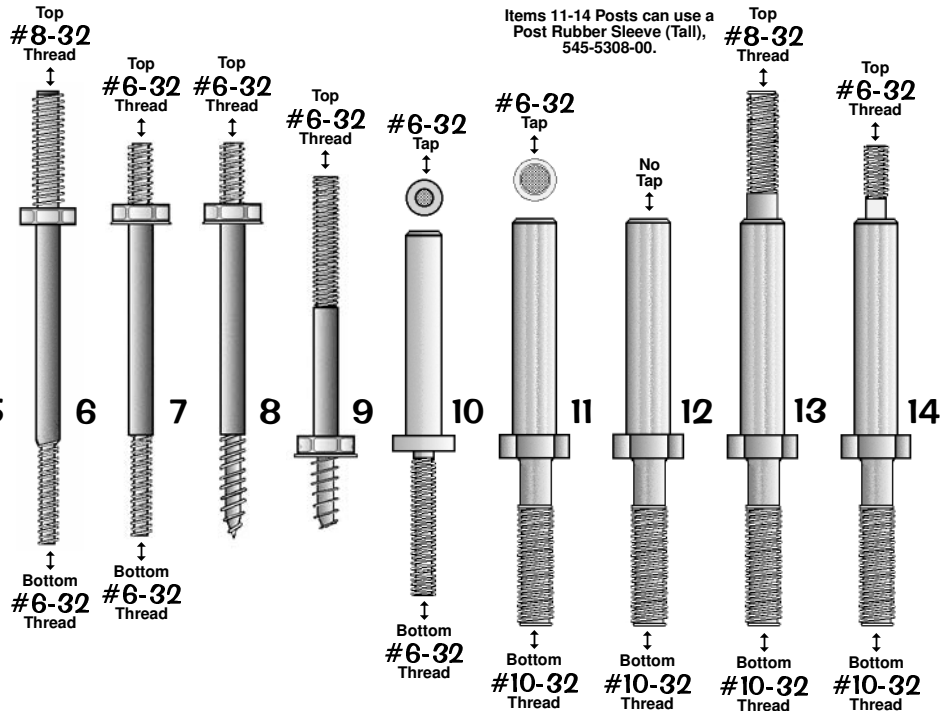


Item 16 is typically used to hold Hex
Spacers onto the Playfield Top.

Item 17 is typically used to hold the
bottom Cabinet Speaker (used with
#6-32 Nylon Stop Nut, 240-5005-00).

Item 18 is typically used to hold Item
15 (515-5939-00) in Turbo Bumper
Assy., 515-6459-04.

Note: The "Fins" keep the screw
from turning inside the wood hole.



Items 11-14 Posts can use a
Post Rubber Sleeve (Tall),
545-5308-00.

Top
#8-32
Thread

Top
#6-32
Thread

Nut Note: All nuts shown with a "✓" are used in this game. The quantities (not specified) vary. The remaining items listed are not used in this game and are noted for reference only (used in prior games).

Shown Below~	Shown Below~	Shown Below~	Shown Below~	Shown Below~
• #6-32 Nylon Stop Nut: 240-5005-00 ✓	• #6-32 KEPS Nut (with Star Washer): 240-5008-00 ✓	• #6-32 Hex Nut (No Star Washer): 240-5004-00 ✓	• #6-32 T-Nut: 240-5002-00 ✓	• #1/4" X 20 Flange Nut: 240-5300-00 ✓
Top & Side Views	Bottom & Side Views	Top View	Bottom & Side Views	Top & Side Views
Nylon Stop Nuts Not Shown:	KEPS Nuts Not Shown:	Hex Nuts Not Shown:	T-Nuts Not Shown:	Miscellaneous Nuts Not Shown:
<ul style="list-style-type: none"> • #6-32 (w/ 1/4" Hex Body): 240-5010-00 ✓ • #8-32: 240-5102-00 ✓ • #10-32: 240-5203-00 ✓ • #10-24: 240-5206-00 ✓ • #4-40: 240-5303-00 ✓ • #4-40 (18/8 Stainless): 240-5303-01 • 5/16"-18: 240-5316-00 	<ul style="list-style-type: none"> • #6-32 (w/ 1/4" Hex Body): 240-5011-00 • #8-32: 240-5104-00 • #10-32: 240-5208-00 ✓ • #10-24: 240-5207-00 ✓ • #4-40: 240-5318-00 	<ul style="list-style-type: none"> • #8-32: 240-5103-00 • #10-32: 240-5201-00 • #10-24: 240-5202-00 ✓ • #10-32 X 3/8": 240-5209-00 • 3/4-16: 240-5315-00 ✓ • #2-56: 240-5301-00 ✓ • 7/8"-14: 240-5317-00 	<ul style="list-style-type: none"> • #6-32 (w/Side Cut Off): 240-5003-01 • #8-32: 240-5101-00 ✓ • #10-32 (Black Oxide): 240-5007-00 • #10-32 (w/Side Cut Off): 240-5205-00 • #10-24: 240-5200-00 	<ul style="list-style-type: none"> • Plastic Pal Nut (on Flipper Buttons): 240-5003-00 • Metal Pal Nut (on Flipper Buttons): 240-5003-01 ✓ • #6-32 Wing Nut: 240-5001-00 • #8-32 Wing Nut: 240-5100-00 • 1/4"-20 Wing Nut: 240-5302-00 • 1/4"-20 Toggle Wing: 240-5324-00

† Items with a Zero Qty. are not used in this game. Size and/or quantities may change during production.

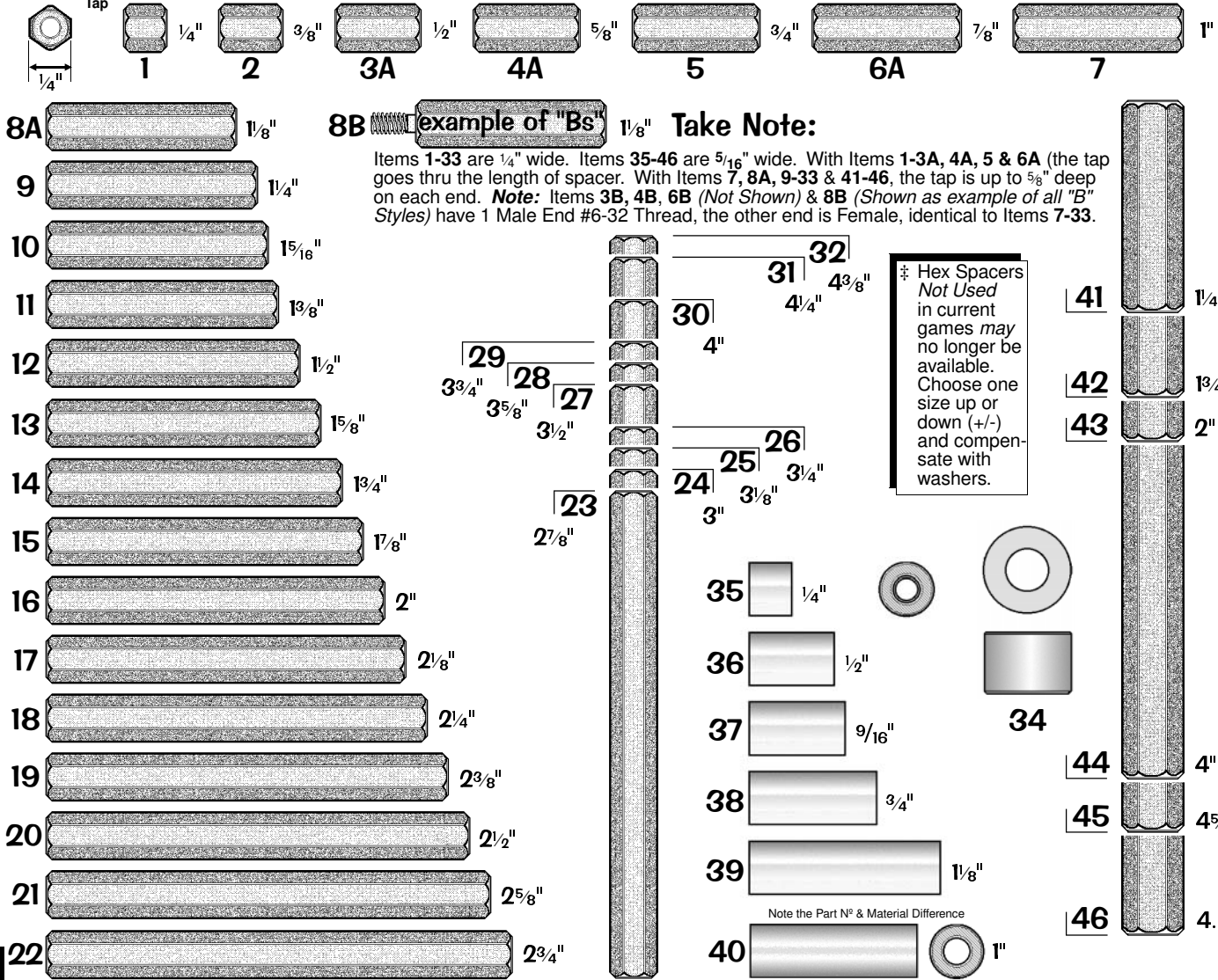
Nº	METAL POST NAME	QTY.	SPI PART Nº	Nº	METAL POST NAME	QTY.	SPI PART Nº
1	Stand-Off Double Groove Post 1 1/16"	0	530-5102-01	10	Post #6-32 Tap / #6-32 Bottom	0	530-5127-00
2	Mini-Post Wood Screw	2	530-5004-00	11	Post Hex Base #6-32 Tap/#10-32 Bot.	1	530-5332-01
3	Mini-Post Wood Screw (no cut-away)	0	530-5004-01	12	Post Hex Base (No Tap)/#10-32 Bot.	5	530-5332-00
4	Mini-Post Mach. Screw / #10-32 Bot.	3	530-5005-00	13	Post Hex Base #8-32 Top/#10-32 Bot.	0	530-5332-02
5	Post Fasten #6-32 Top / #8-32 Bot.	0	530-5007-00	14	Post Hex Base #6-32 Top/#10-32 Bot.	0	530-5332-03
6	Post Fasten #8-32 Top / #6-32 Bot.	0	530-5008-00	15	Playfield Support #8-32 Top/Bottom	2	530-5285-00
7	Post Fasten #6-32 Top / #6-32 Bot.	42	530-5012-02	16	#6-32 X 3/4" Fin Shank Screw	0	237-5921-02
8	Post Fstr. #6-32 Top / Wood Scr. Bot.	4	530-5010-02	17	#6-32 X 1 1/4" Fin Shank Screw	4	237-5883-00
9	Post #6-32 Top / Wood Screw Bottom	0	530-5263-01	18	#6-32 X 1 3/16" Spirol Fin Shank Screw	9	237-5957-00



Playfield - Metal Spacers (Actual Size) †

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

Hex Spacers:
#6-32
Tap



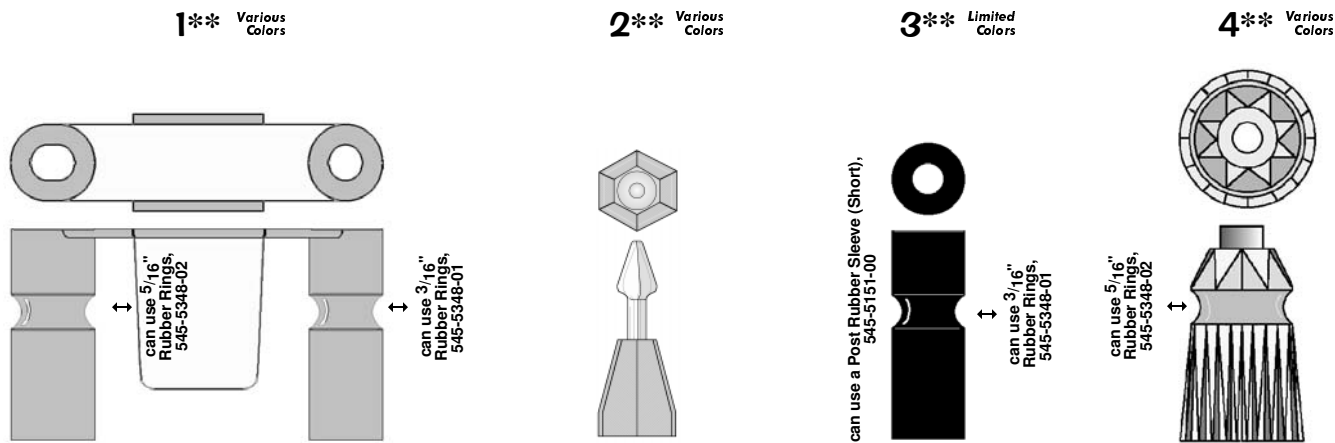
Sec. 4: Parts Id. ...

N ^o	METAL SPACER NAME	QTY.	SPI PART N ^o	N ^o	METAL SPACER NAME	QTY.	SPI PART N ^o
1	1/4" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-00	22	2 3/4" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-15
2	3/8" X 1/4" Hex Spacer #6-32 Tap	1	254-5008-12	23	2 7/8" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-31
3A	1/2" X 1/4" Hex Spacer #6-32 Tap	8	254-5008-03	24	3" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-14
3B	Same as 3A but with Male End #6-32	0	254-5024-03	25	3 1/8" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-19
4A	5/8" X 1/4" Hex Spacer #6-32 Tap	6	254-5008-02	26	3 1/4" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-26
4B*	Same as 4A but with Male End #6-32	0	254-5024-02	27	3 1/2" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-27
5	3/4" X 1/4" Hex Spacer #6-32 Tap	6	254-5008-04	28	3 5/8" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-25
6A	7/8" X 1/4" Hex Spacer #6-32 Tap	5	254-5008-05	29	3 3/4" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-36
6B*	Same as 6A but with Male End #6-32	0	254-5024-05	30	4" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-21
7	1" X 1/4" Hex Spacer #6-32 Tap	3	254-5008-06	31	4 1/4" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-30
8A	1 1/8" X 1/4" Hex Spacer #6-32 Tap	1	254-5008-17	32	4 3/8" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-29
8B	Same as 8A but with Male End #6-32	0	254-5024-17	33*	5 1/4" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-35
9	1 1/4" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-11	34	3/8" X 1/2" Spacer (Used with Backbox)	2	530-5099-00
10	1 5/16" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-34	35	1/4" X 5/16" X .144" I.D. Spacer Tap	1	254-5014-03
11 ‡	1 3/8" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-33	36	1/2" X 5/16" X .144" I.D. Spacer Tap	3	254-5014-00
12	1 1/2" X 1/4" Hex Spacer #6-32 Tap	1	254-5008-09	37	9/16" X 5/16" X .144" I.D. Spacer Tap	0	254-5014-04
13 ‡	1 5/8" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-13	38	3/4" X 5/16" X .144" I.D. Spacer Tap	0	254-5014-01
14	1 3/4" X 1/4" Hex Spacer #6-32 Tap	2	254-5008-10	39	1 1/8" X 5/16" X .144" I.D. Spacer Tap	0	254-5014-02
15 ‡	1 7/8" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-20	40	1" X 5/16" X .144" I.D. Spacer Tap	0	254-5001-00
16	2" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-07	41	1 1/4" X 5/16" Hex Spacer #6-32 Tap	3	254-5018-09
17	2 1/8" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-32	42	1 3/4" X 5/16" Hex Spacer #6-32 Tap	0	254-5018-06
18	2 1/4" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-18	43	2" X 5/16" Hex Spacer #6-32 Tap	0	254-5018-07
19	2 3/8" X 1/4" Hex Spacer #6-32 Tap	0	254-5008-28	44	4" X 5/16" Hex Spacer #6-32 Tap	0	254-5018-03
20	2 1/2" X 1/4" Hex Spacer #6-32 Tap	1	254-5008-16	45	4 5/16" X 5/16" Hex Spacer #6-32 Tap	0	254-5018-00
21	2 5/8" X 1/4" Hex Spacer #6-32 Tap	1	254-5008-08	46	4.92" X 5/16" Hex Spacer #6-32 Tap	0	254-5018-04

† Items with a Zero Qty. are not used in this game. Size and/or quantities may change during production.



Playfield - Plastic Posts and Spacers (Actual Size) †

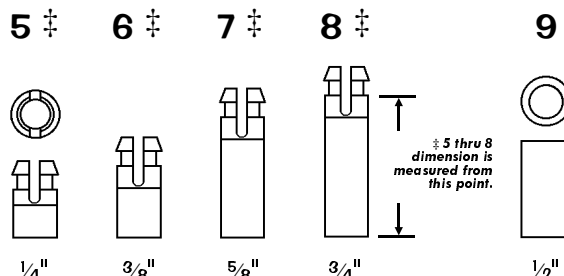


Take Note:

PLASTIC PART COLOR CHART					
Nº	Color	Nº	Color	Nº	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, 2 & 4 come in various colors (may not be available in every color). Item 3 is currently only available in the color stated in this game manual (other colors used in prior games may no longer be available). The "-XX" in Part N^os which may come in various colors should be replaced with the desired 2-Digit N^o. corresponding to the color desired. Some colors may no longer be available for desired item.

Items 3-4 Posts used in pairs can use 3/4" through 3" Rubber Rings, (See Rubber Parts for Part N^os).

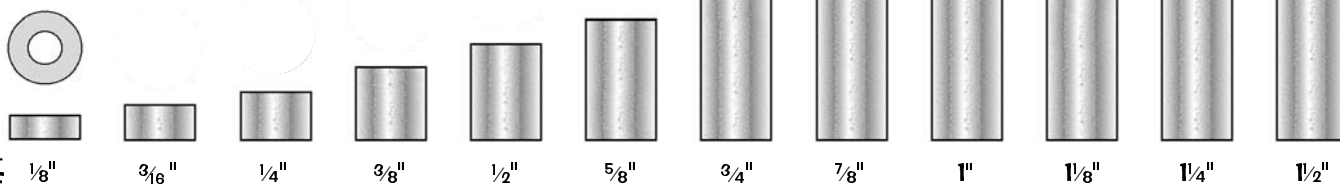


‡ Items 5 through 8 (Board Spacers) dimensions are measured from bottom to just under cut-away (see pictorial with Item 8 above).

- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21

Take Note:

If any one of Items 10-21 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" & stack to = 1 1/8").



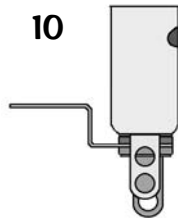
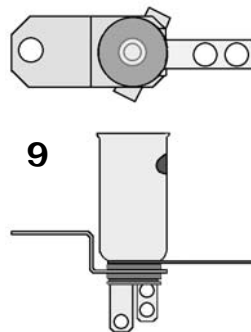
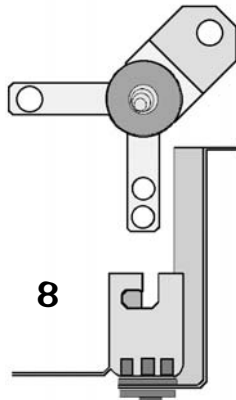
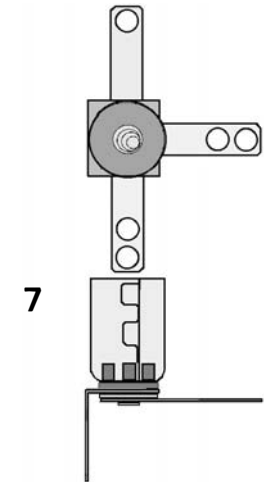
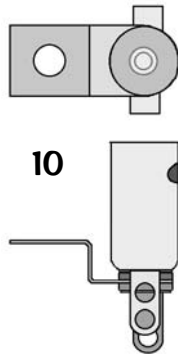
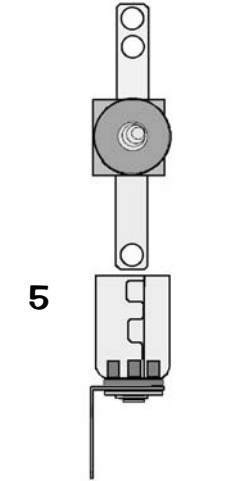
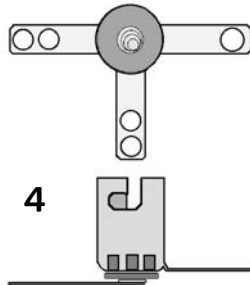
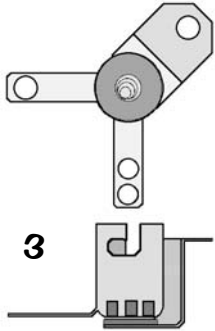
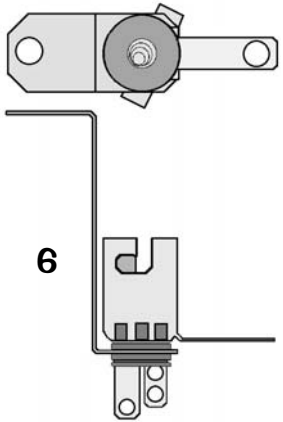
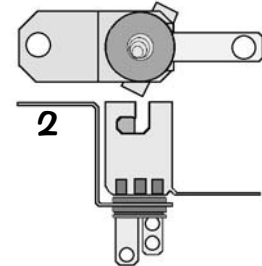
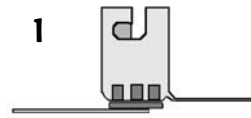
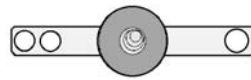
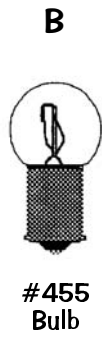
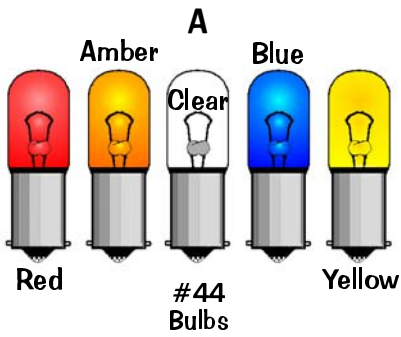
† Items with a Zero Qty. are not used in this game. Size and/or quantities may change during production.

Nº	PLASTIC POST/SPACER NAME	QTY.	SPI PART Nº	Nº	PLASTIC POST/SPACER NAME	QTY.	SPI PART Nº
1**	Top Lane Mini-Light Hood (Red)	3	550-5061-02	10	1/8" X 3/8" Spacer Gray	2	254-5000-19
Item 1 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)				11	3/16" X 3/8" Spacer Gray (4 for Dot Display)	4	254-5000-18
2**	Mini-Jewel Post Clear	0	550-5052-01	12	1/4" X 3/8" Spacer Gray	0	254-5000-02
Item 2 typically secured by: #6 X 3/8" HWH AB (Zinc) (Qty. 1/per) (234-5000-00)				13	3/8" X 3/8" Spacer Gray	7	254-5000-12
3**	1 1/16" Single Groove Post (Black)	56	550-5059-00	14	1/2" X 3/8" Spacer Gray	0	254-5000-01
4**	Single Groove Jewel Post (Clear)	0	550-5034-01	15	5/8" X 3/8" Spacer Gray	0	254-5000-14
Items 3 & 4 typically secured by: Post Fastening Screw #6-32 Top / #6-32 Bottom (Qty. 1/per) (530-5012-02, Item 7 Page 59)				16	3/4" X 3/8" Spacer Gray	1	254-5000-07
5 ‡	1/4" Slf. Rtn. Spacer White	0	254-5007-02	17	7/8" X 3/8" Spacer Gray	1	254-5000-11
6 ‡	3/8" Slf. Rtn. Spacer White	12	254-5007-01	18	1" X 3/8" Spacer Gray/Black	5	254-5000-04
7 ‡	5/8" Slf. Rtn. Spacer White	0	254-5007-00	19	1 1/8" X 3/8" Spacer Gray	0	254-5000-06
8 ‡	3/4" Slf. Rtn. Spacer White	0	254-5007-03	20	1 1/4" X 3/8" Spacer Gray	0	254-5000-05
9	1/2" X 1/4" Spacer White (Narrow)	0	254-5000-03	21	1 1/2" X 3/8" Spacer Gray	2	254-5000-08

Sec. 4: Parts Id. ...



Playfield - Small Bayonet Type Bulbs and Sockets (Actual Size) †



Sec. 4: Parts Id. ...

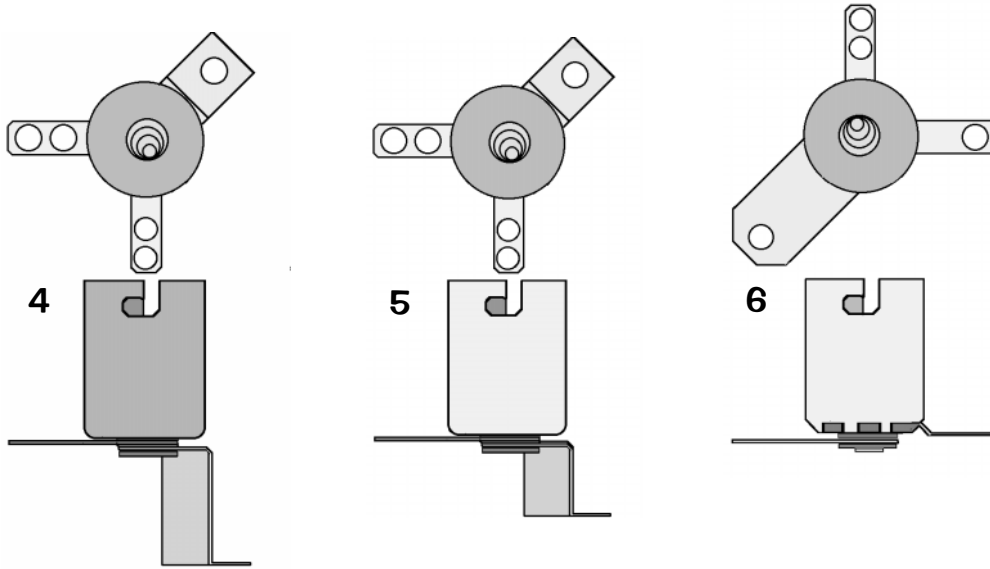
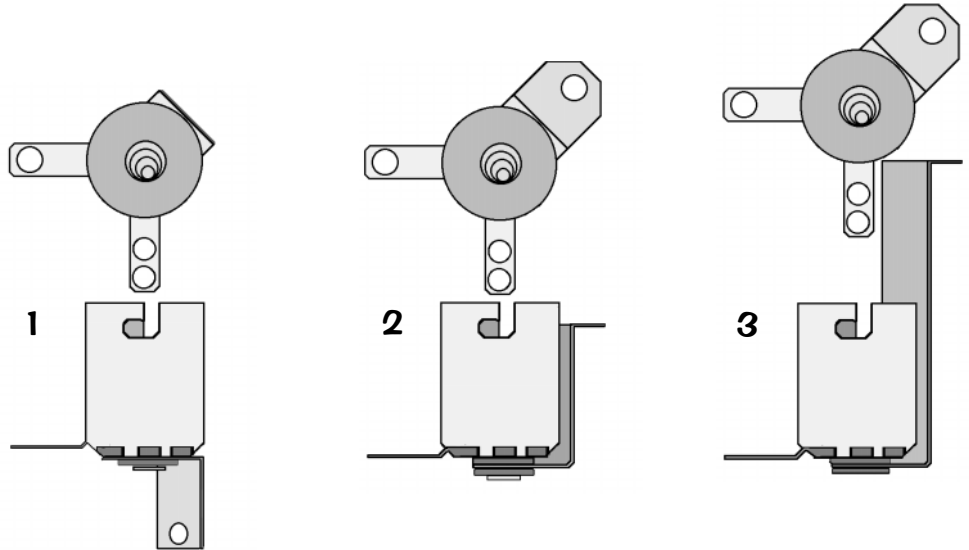
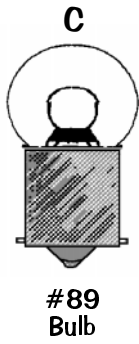
Nº	SMALL BULB & SOCKET NAME	QTY.	SPI PART Nº
	#44 Bulb (Clear)	50	165-5000-44
	#44 Bulb (Red)	2	165-5053-02
A	#44 Bulb (Amber)	4	165-5053-03
	#44 Bulb (Blue)	0	165-5053-05
	#44 Bulb (Yellow)	4	165-5053-06
B	#455 Twinkle Bulb	0	165-5003-00
1	2-Lug Staple Down Socket	14	077-5000-00
2	3-Lug Stand-Up Short Socket	0	077-5008-00
3	2-Lug Stand-Up Short Socket	1	077-5002-00
4	3-Lug Staple Down Socket	0	077-5001-00
5	2-Lug Laydown Socket	0	077-5003-00
6	3-Lug Stand-Up Long Socket	0	077-5009-00
7	3-Lug Laydown Socket (3 Lugs Flat)	9	077-5006-00
8	2-Lug Stand-Up Long Socket	0	077-5005-00
9	3-Lug Stand-Up Long Shell Socket	6	077-5013-00
10	2-Lug Stand-Up Lg. Shell Socket (G1S)	31	077-5031-00

Nº	SMALL BULB & SOCKET NAME	QTY.	SPI PART Nº
11	1-Lug Stand-Up Long Shell Socket	0	077-5012-00
12	3-Lug Laydown Socket (2 Lugs Bent)	0	077-5032-00

† Items with a Zero Qty. are not used in this game. Size and/or quantities may change during production.



Playfield - Large Bayonet Type Bulb and Sockets (Actual Size) †



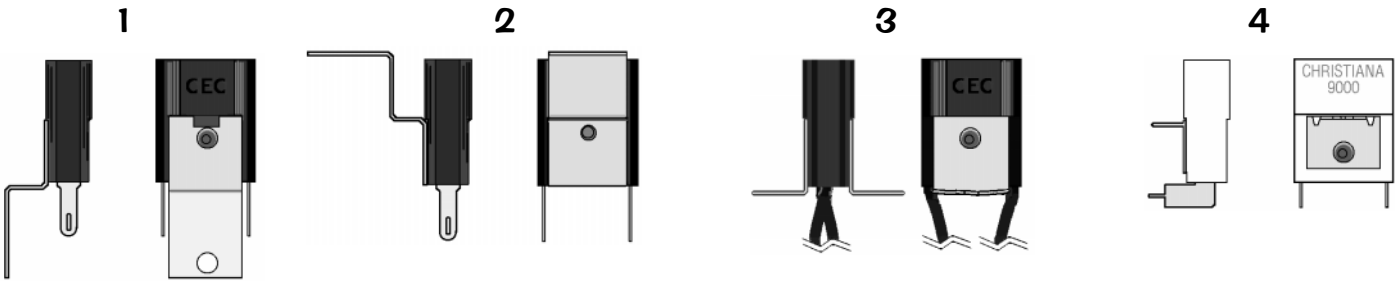
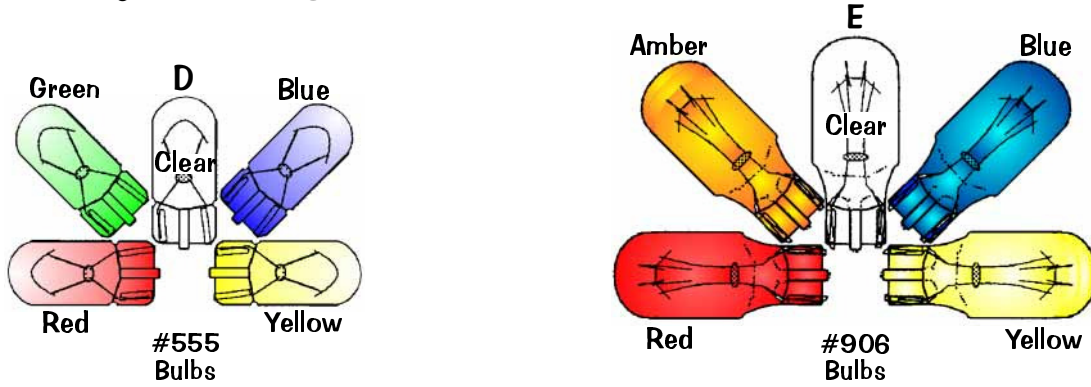
† Items with a Zero Qty. are not used in this game. Size and/or quantities may change during production.

Nº	LARGE BULB & SOCKET NAME	QTY.	SPI PART Nº	Nº	LARGE BULB & SOCKET NAME	QTY.	SPI PART Nº
C	#89 Bulb	9	165-5000-89	4	Stand-Up Socket Rev. Short	0	077-5103-00
1	Laydown Standard Socket	1	077-5100-00	5	2-Lug Stand-Up Small Socket	0	077-5106-00
2	2-Lug Stand-Up Short Socket	0	077-5101-00	6	Straight Leg Socket	0	077-5107-00
3	2-Lug Stand-Up Long Socket	8	077-5102-00				

Sec. 4: Parts Id. ...



Playfield - Wedge Base Bulbs and Sockets (Actual Size) †



1

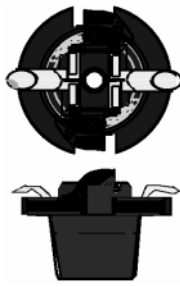
2

3

4

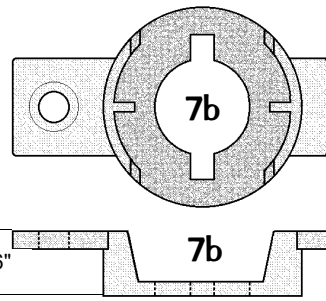


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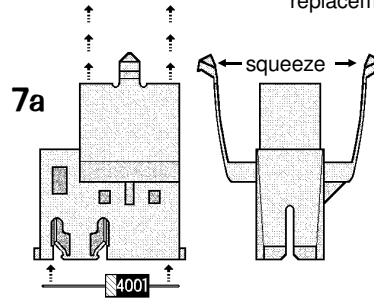
6

7b/8 Top View (8 Side View is Not Shown)



Take Special Note

Item 7a is an IDC (Insulation Displacement Connection) Style Socket. This style is solderless, and has a built-in diode. This socket is secured to the playfield or component by Items 7a and 8 Snap-On Socket Brackets, or may also be snapped into Item 9 Socket Mounting Board. Just squeeze the "side arms" of the socket together and pull away from the bracket or mounting board for easy Bulb replacement.



Note: Item 9 Clear Plastic (Buty.) Socket Mounting Board is used only when sockets are positioned too close together.

This Game Item 9 is Not Used.

This Socket is equipped with a built-in Diode, 1N4003, (112-5003-00). However, replacement can be made with Diode, 1N4001, (112-5001-00).

Take Note:

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

- Item 3 Socket has 2 Wires attached are approximately 12" ea.
- Item 4 Socket **was** used on PC Light Boards to position bulbs horizontally; Item 4 Socket is secured by soldering into place.
- Item 5 Socket **was** used on PC Light Boards to position bulbs vertically; Item 5 Socket is secured by "twisting" into place.
- Item E Bulb (#906) is normally used in conjunction with Item 6 Socket, but **can** be used with Items 1, 2, 4 or 7a.

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

- See the start of this chapter for Fluor. Bulb & Assoc. Parts.

Sec. 4: Parts Id. ...

Nº	WEDGE BULB & SOCKET NAME	QTY.	SPI PART Nº	Nº	WEDGE BULB & SOCKET NAME	QTY.	SPI PART Nº
	#555 Wedge Base Bulb (Clear)	57	165-5002-00	1	#555 Wedge Base Socket (Laydown)	4	077-5026-01
	#555 Wedge Base Bulb (Red)	0	165-5054-02	2	#555 Wedge Base Socket (Offset)	4	077-5029-00
D	#555 Wedge Base Bulb (Green)	0	165-5054-04	3	#555 W.B. Socket (for Pop Bumper)	3	077-5206-00
	#555 Wedge Base Bulb (Blue)	0	165-5054-05	4	#555 W.B. Socket (Solder Type)	0	077-5207-00
	#555 Wedge Base Bulb (Yellow)	0	165-5054-06	5	#555 Wedge Base Socket (Twist)	0	077-5007-00
	#906 Wedge Base Bulb (Clear)	4	165-5004-00	6	#906 Wedge Base Socket (Twist)	0	077-5016-00
	#906 Wedge Base Bulb (Red)	0	165-5004-02	7a	#555 IDC Snap-On Socket	50	077-5216-00
E	#906 Wedge Base Bulb (Amber)	0	165-5004-03	7b	5/16" Ht. Snap-On Socket Bracket	50	545-5760-18
	#906 Wedge Base Bulb (Blue)	0	165-5004-05	8*	19/32" Ht. Snap-On Socket Bracket	0	545-5760-19
	#906 Wedge Base Bulb (Yellow)	0	165-5004-06	9*	Clear Plastic (Buty.) Socket Mtg. Bd.	0	

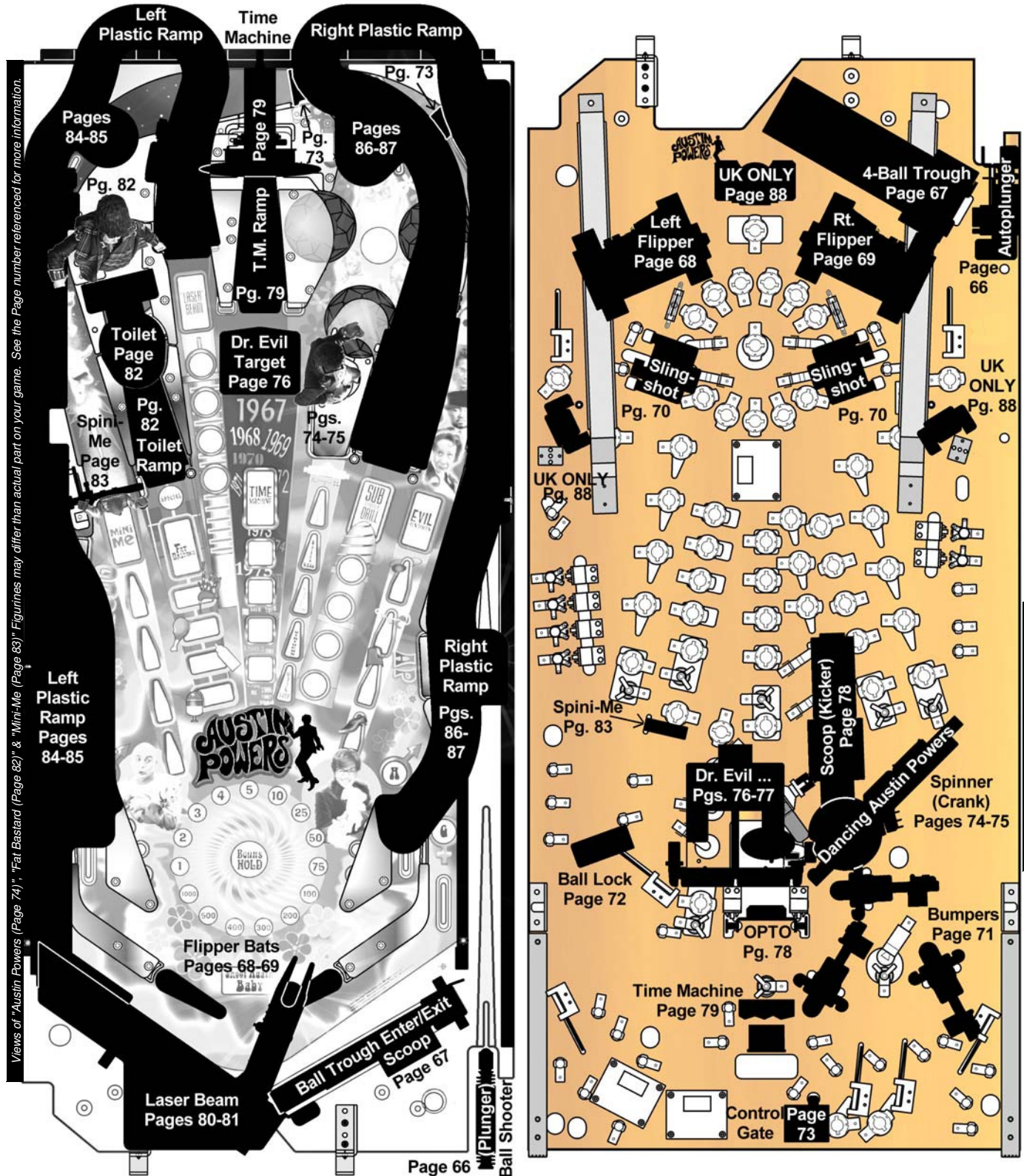
† Items with a Zero Qty. are not used in this game. Size and/or quantities may change during production.



Drawings for Major Assemblies & Ramps (The Blue Pages)

Overview

Drawings are provided for the Major Assemblies in this game with individual parts of each assembly numbered. Items noted with a white circle ○ are mounted above the playfield; items noted with a black circle ● are mounted below. All numbered parts describe the **NAME, QUANTITY & PART N°**. **ASSOCIATED PARTS (AP-)** are noted and/or viewed with the associated Major Assembly. **Important:** Read all "Take Note:" items.

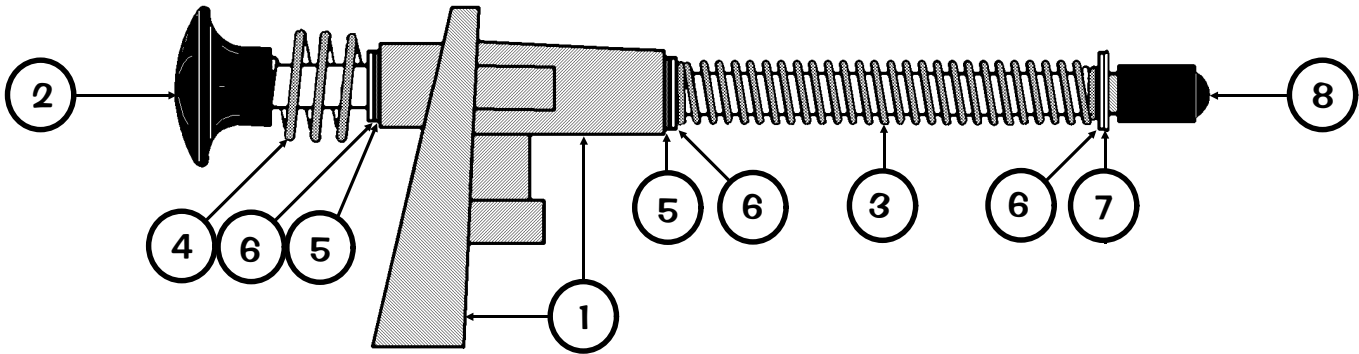


Sec. 4: Drawings ...

Ball Shooter (Plunger) Assembly, 500-6146-00-04 (Items 1-8)

Manually launch the ball into play.

Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº	Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
1	Housing (Shooter Assembly)	1	535-5067-02	4	Compression Spring (Short Plunger)	1	266-5010-00
Item 1 is secured to the Cabinet by: Support Plate (Qty. 1) (535-5027-00), #10-32 X 1/2" PPH (Sems) Zinc TF (Qty. 3) (237-6033-00), #10 Split Lock Washer (Qty. 3) (234-5003-00) and #6 X 5/8" HWH AB (Zinc) (Qty. 2) (234-5002-00)							
2	Rod Assembly (w/Black Knob)	1	515-6557-00	5	Bushing, 3/8" I.D. (Oilite)	2	280-5010-00
3	Comp. (Return) Spring (GRN, .035" ø)	1	266-5001-04	6	Washer, 3/8" I.D. X 5/8" O.D. X 1/16"	3	242-5014-00
				7	Retaining Ring, 3/8" ø Shaft	1	270-5012-00
				8	Plunger Tip (Black 50 Duro)	1	545-5276-00

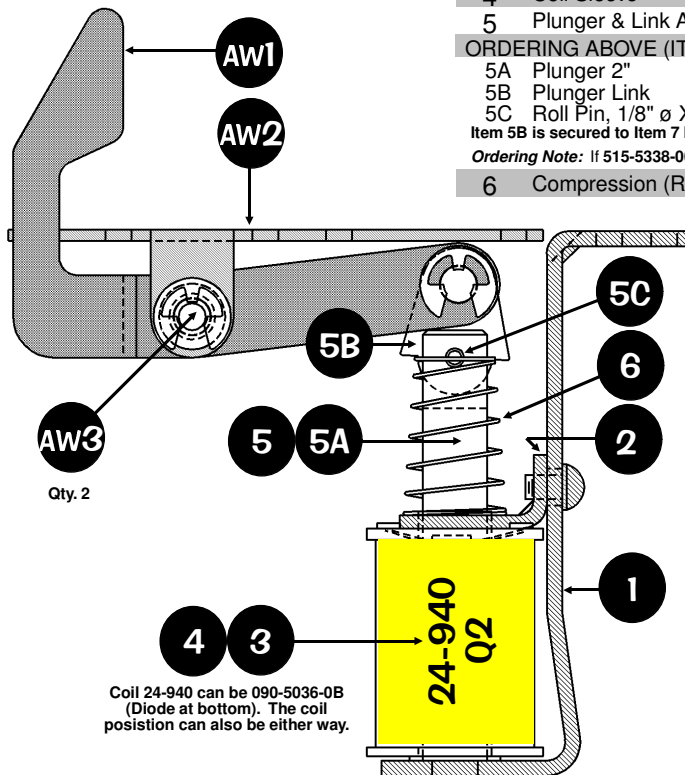


Autoplunger Arm Weld Assembly, 500-6091-00 (Items AW1-AW3)

Autoplunger Coil Assembly, 500-6092-02 (Items 7-9)

Automatically launches the ball into play.

Nº	... ARM WELD PART NAME	QTY.	SPI PART Nº	Nº	'PLUNGER COIL PART NAME	QTY.	SPI PART Nº
AW1	Arm Weld Assembly	1	515-6526-00	1	Autoplunger Coil Bracket Assembly	1	515-6527-00
Item AW1 is secured to Item AW2 by: Retaining Ring, 1/4" ø Shaft (Qty. 1) (270-5002-00)							
AW2	Autoplunger Fulcrum	1	535-7697-00	2	Coil Retainer Bracket	1	535-5203-03
AW3	Nyliner, 1/4" (Thomson #411-FF)	2	545-5423-00	Item 2 is secured to Item 1 by: #8-32 X 1/4" PPH MS (Sems) Zinc (Qty. 2) (232-5300-00)			
				3	Coil, 24-940	1	090-5036-00T
ORDERING ABOVE (ITEM 3) COIL PART Nº WILL INCLUDE:							
				—	Diode, 1N4004 (positioned at top)	1	112-5003-00
				4	Coil Sleeve	1	545-5031-00
				5	Plunger & Link Assembly	1	515-5338-00
ORDERING ABOVE (ITEM 5) SUB-ASSY. PART Nº WILL INCLUDE:							
				5A	Plunger 2"	1	530-5025-01
				5B	Plunger Link	1	545-5293-00
				5C	Roll Pin, 1/8" ø X 5/8" Lg.	1	251-5008-00
Item 5B is secured to Item 7 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.							
				6	Compression (Return) Spring	1	266-5020-00



Coil 24-940 can be 090-5036-0B (Diode at bottom). The coil position can also be either way.

Sec. 4: Drawings ...

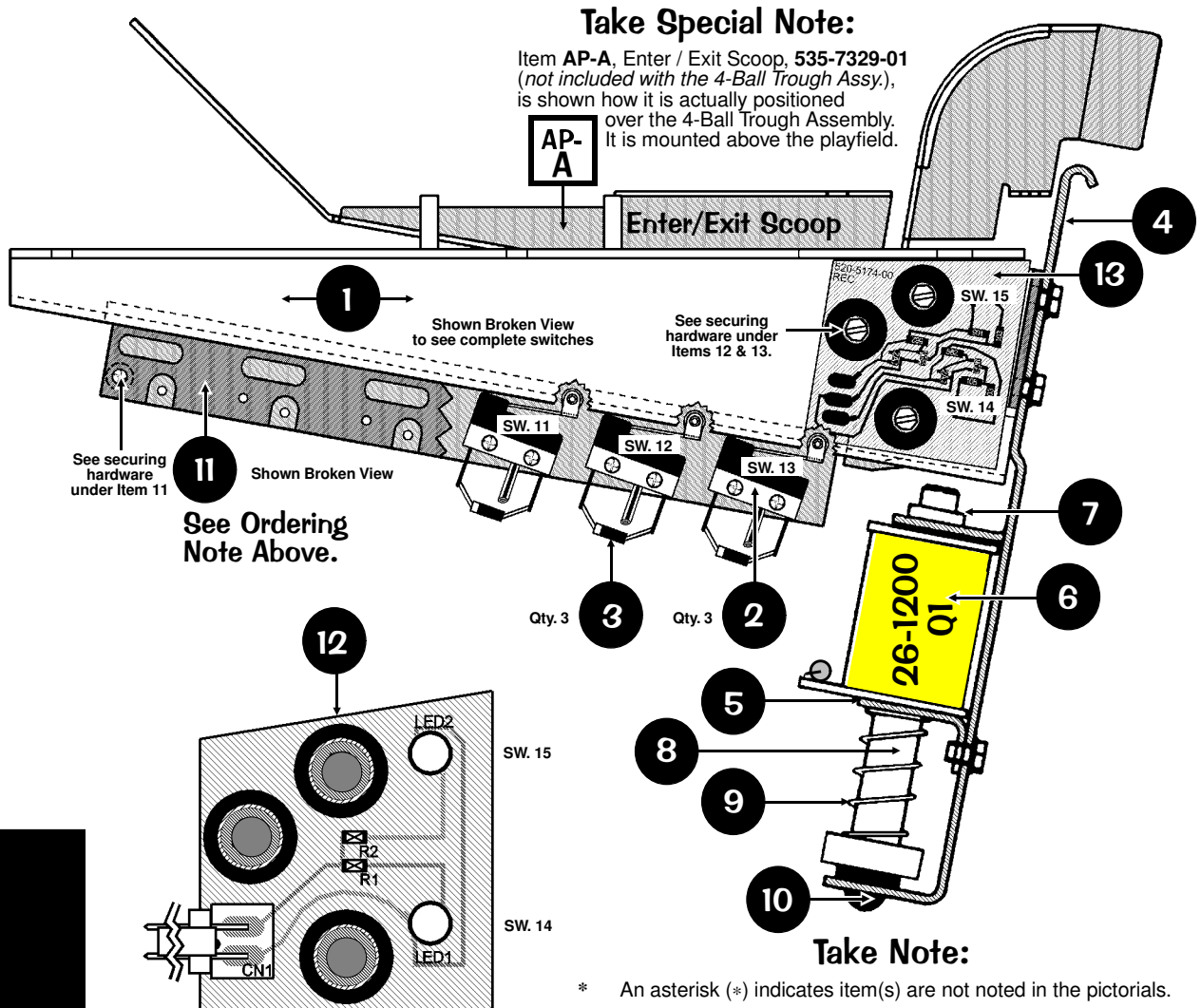
**I MAKE
THE DECISIONS HERE.
I DEMAND
A LITTLE RESPECT.**

4-Ball Trough Assembly, 500-6318-24 (Items 1-13)

and Associated Parts: See Parts Table below.

Ordering Note: Identical to 500-6318-14 except it does require Item 11, Trough Ball Guide Plate (used only when magnets are present in the game).

Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº	Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
1	Ball Trough Outhole Mounting Bracket	1	515-6580-01	10	Rubber Bumper (Grommet)	1	545-5105-00
Item 1 is secured below the playfield by: #8 X 1/2" HWH AB (Zinc) (Qty. 6) (234-5101-00)				11	Trough Ball Guide Plate <i>Not Required</i>	1	535-7801-00
2	Micro Switch (Roller Actuator, Lite-Force)	3	180-5119-02	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)			
Item 2 is secured to Item 1 by: #2-56 X 1/2" HWH (Sr) UNS #4HD TR3 BO (Qty. 6) (237-5937-02)				12	Dual OPTO TRANS Board Assembly	1	515-0173-00
Item 2 requires: Heat Shrink Tubing 1/8" ø PUI-24 (Qty. 1"/per) (605-5006-00)				13	Dual OPTO REC Board Assembly	1	515-0174-00
3	Switch Diode, 1N4001	3	112-5001-00	Items 12 & 13 are by: #6-32 X 5/8" HWH Swage (Serr) Zinc (Qty. 3/per) (237-5976-04)			
4	Coil Mounting Bracket	1	535-7330-01	For Individual Items use: Dual OPTO TRANS Bd. (Qty. 1) (520-5173-00), Dual OPTO REC Bd. (Qty. 1) (520-5174-00), OPTO PCB Tube Spacer (Brass) (Qty. 3/per) (530-5308-02) or OPTO PCB Rubber Grommet (Qty. 3/per) (545-5518-00)			
Item 4 is secured to Item 1 by: #8-32 X 3/8" HWH Swage (Sr.) Zinc (Qty. 4) (237-5975-00)				ASSOCIATED PARTS ARE NOT INCLUDED WITH THE ABOVE ASSEMBLY.			
5	Coil Retaining Bracket	1	535-5203-03	Nº ASSOCIATED PART NAME QTY. SPI PART Nº			
Item 5 is secured to Item 4 by: #8-32 X 1/4" HWH MS (Serr) Zinc (Qty. 2) (237-5964-01)				AP-A	Ball Trough Enter / Exit Scoop	1	535-7329-01
6	Coil, 26-1200	1	090-5044-00T	Item AP-A secured to the playfield by: #8 X 1/2" HWH AB (Zinc) (Qty. 4) (234-5101-00).			
ORDERING ABOVE (ITEM 6) COIL PART Nº WILL INCLUDE:				AP-B*	Steel Balls (1-1/16" ø)	4	260-5000-00
—	Diode, 1N4004 (positioned at top)	1	112-5003-00				
7	Coil Sleeve (Short) (Formost #10-7077)	1	545-5076-01				
8	Plunger Assembly	1	515-5941-01				
9	Compression (Return) Spring	1	266-5020-00				



Sec. 4: Drawings ...

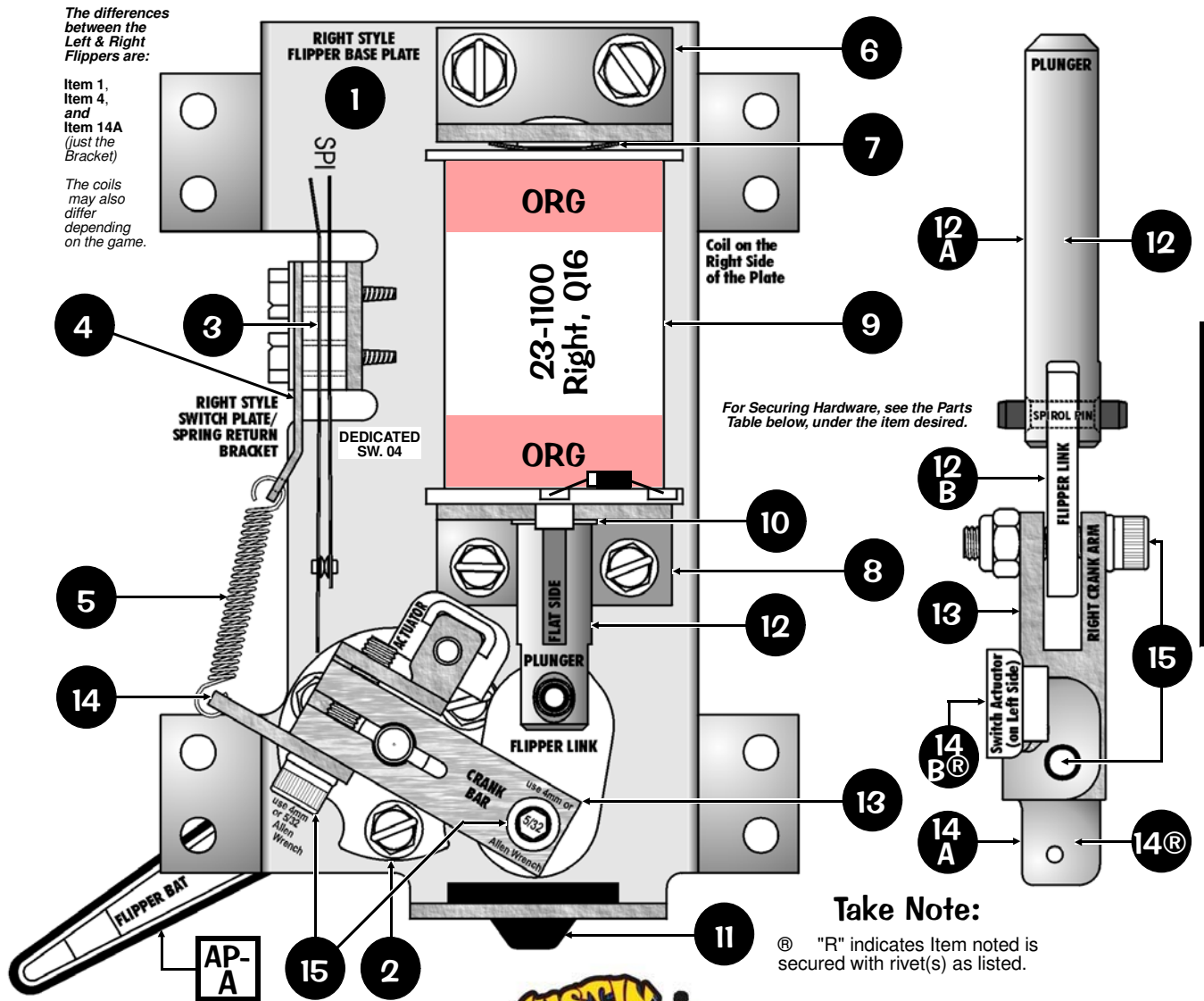


Flipper (Right) Assembly, 500-6543-04 (Items 1-15) and Associated Part: White Flipper Bat & Shaft Assy., 515-5133-08-06 (Item AP-A)



Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº	Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
1	Flipper Base Plate (RIGHT)	1	See FRP1	13*	Crank Bar	1	530-5070-02
Item 1 is secured below the playfield by: #10 X 1/2" HWH MS (Serr) Zinc ST (Qty. 8) (237-5949-00) Ordering Note: Use Item FRP1, see the end of this Parts Table.				Item 13 requires: Bushing, .192" ø ID X .312" ø OD X .195" (Qty. 1) (530-5139-00)			
2	Flipper Bat Bushing (White Plastic)	1	545-5070-00	14*	® Switch Actuator (RIGHT) Sub-Assy.	1	515-7257-00
Item 2 is secured to Item 1 by: #6-32 X 3/8" HWH Swage (Ser.) Zc. (Qty. 3) (237-5976-02)				ORDERING ABOVE (ITEM 14) SUB-ASSY. PART Nº WILL INCLUDE:			
3	Power (End of Stroke) Switch	1	180-5149-00	14A	Actuator & Spring Bracket (RIGHT)	1	535-9038-00
Item 3 is secured to Item 1 by: #6-32 X 5/8" HWH Swage (Ser.) Zc. (Qty. 2) (237-5976-04)				14B	® Switch Actuator (White Plastic)	1	545-5612-00
4	Sw. Plate/Spring Return Brkt. (RIGHT)	1	535-7354-00	Item 14B is secured to 14A by: Rivet, 1/8" ø X 1/4" Lg. (Qty. 1) (249-5003-00)			
5	Flipper Return Spring	1	265-5035-00	15*	Set Screw: #10-32 X 7/8" Socket Hd.	2	237-5966-00
6*	Coil Stop Bracket Sub-Assembly	1	515-6308-01	Item 15 requires: #10 Split Lock Washer (Qty. 1/per) (244-5003-00) and #10-32 Nylon Stop Nut (Qty. 1/per) (240-5203-00) Tool Required for Item 15: 5/32" or 4mm Allen Wrench			
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)				Flipper Rebuild Parts for Easier Installation, Save \$:			
7	Spring Washer (17/32" ID X 3/4" X 1")	1	269-5002-00	FRP1	Flipper Base Plate Kit (RIGHT) Includes Item 1 pre-threaded, with the Securing Hardware for Items 2, 3, 6 & 8.		515-6617-00
8	Coil Support Bracket	1	535-7356-00	FRP2	Plunger, Link & Crank (RIGHT) Assy. Includes above Items 12, 13, 14 and 15 and is pre-assembled.		515-7203-00
Item 8 is secured to Item 1 by: #8-32 X 3/8" HWH Swage (Ser.) Zc. (Qty. 2) (237-5975-00)				FRP3	Flipper (RIGHT) Rebuild Kit Same as FRP2, but also includes above Items 6 & 10.		500-6307-00
9	Coil, 23-1100 (ORG) (Right)	1	090-5030-00T	ORDERING ABOVE (ITEM 9) COIL PART Nº WILL INCLUDE:			
ORDERING ABOVE (ITEM 9) COIL PART Nº WILL INCLUDE:				ASSOCIATED PARTS ARE NOT INCLUDED WITH THE ABOVE ASSEMBLY.			
—	Diode, 1N4004 (positioned at top)	1	112-5003-00	Nº	ASSOCIATED PART NAME	QTY.	SPI PART Nº
10*	Coil Sleeve	1	545-5388-00	AP-A	WHITE Flipper Bat & Shaft (Plain) (Non-Knurled End) Assembly	1	515-5133-08-06
11	Deflector Pad (Bumper)	1	545-5428-00	Large Flipper BLACK Rubber Ring			
12*	Flipper Plunger & Link Sub-Assy.	1	515-6304-03			1	545-5277-00
ORDERING ABOVE (ITEM 12) SUB-ASSY. PART Nº WILL INCLUDE:							
12A	Flipper Plunger with "Flat"	1	530-5349-01				
12B	Plunger "Flipper" Link	1	545-5611-01				
Item 12B is secured to 12A by: Bushing, .16" ø ID X .281" ø OD X .187" (Qty. 1) (530-5532-00) and Spirol Pin ø 5/32" X 3/4" Lg. (Qty. 1) (251-5015-02)							

* To Order the Flipper (Right) Rebuild Kit ask for Part Nr.: 500-6307-00 (includes Items 6, 10, 12, 13, 14 & 15)



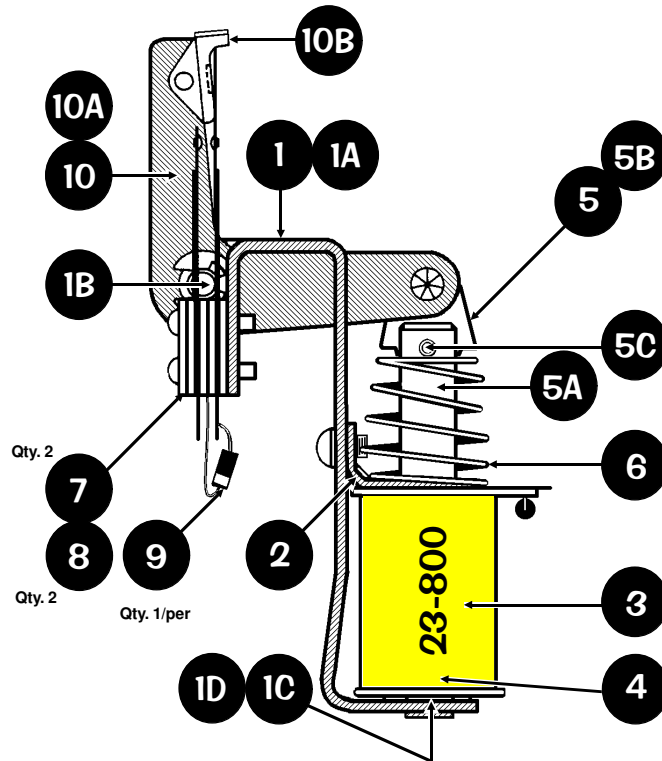
The differences between the Left & Right Flippers are:
Item 1, Item 4, and Item 14A (just the Bracket)
The coils may also differ depending on the game.

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

Sec. 4: Drawings ...



Slingshot Assemblies, 500-5849-00 (Qty. 2) (Items 1-10)



Sec. 4: Drawings ...

Take Note:

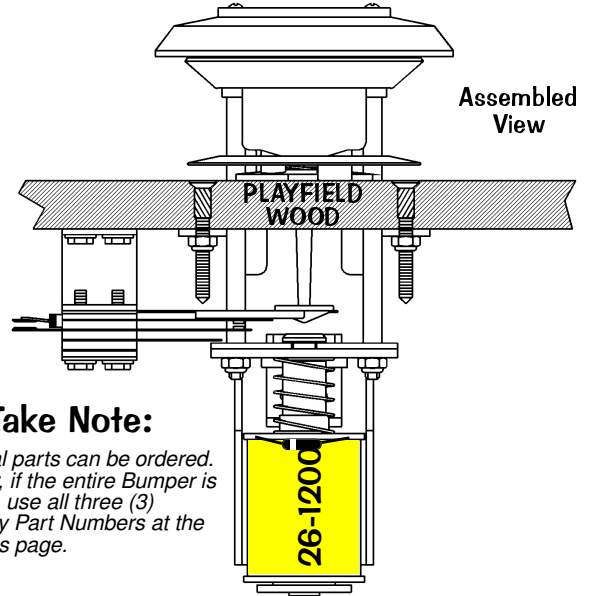
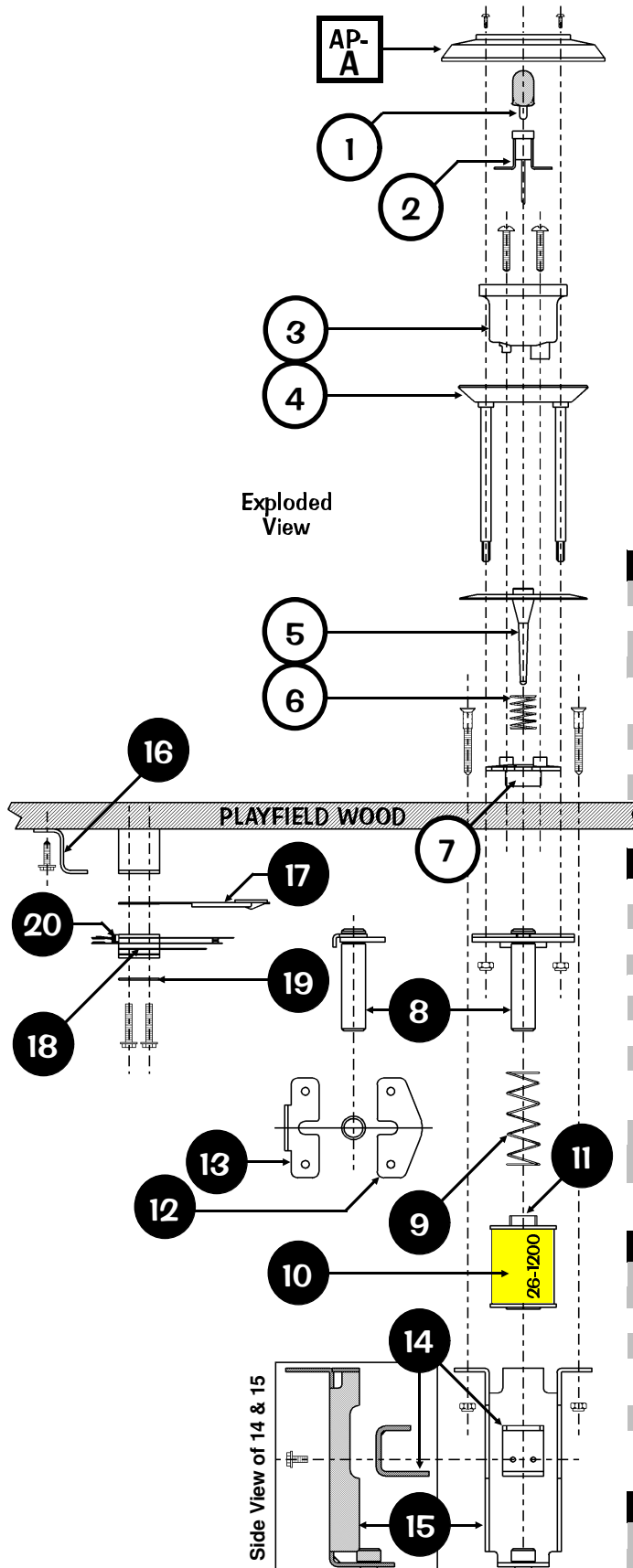
* An asterisk (*) indicates item(s) are not noted in the pictorials.

® "R" indicates item has a riveted-on part, if removing/adding rivets is not an option, order the entire ® Sub-Assembly.

Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº	Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
1	Slingshot Bracket Assembly	1	515-5339-01	6	Compression Spring	1	266-5020-00
2	Coil Retaining Bracket	1	535-5203-03	7	Slingshot Stack (Blade) Switch	2	180-5054-00
Item 2 is secured to Item 1A by: #8-32 X 3/8" PPH MS (Sems) (Qty. 2) (232-5301-00)				8	Switch Body Protect Plate	2	535-5045-00
3	Coil, 23-800	1	090-5001-00T	Items 7 & 8 are secured to Item 1A by: #6-32 X 5/8" HWH Swage (Qty. 4) (237-5976-04)			
ORDERING ABOVE (ITEM 3) COIL PART Nº WILL INCLUDE:							
—	Diode, 1N4004 (positioned at top)	1	112-5003-00	9	Switch Diode, 1N4001	2	112-5001-00
4	Coil Sleeve	1	545-5031-00	10®	Riveted Arm & Tip Assembly	1	515-5340-01
5	Plunger & Link Assembly	1	515-5338-00	ORDERING ABOVE ® RIVETED ASSY. PART Nº WILL INCLUDE:			
ORDERING ABOVE (ITEM 5) SUB-ASSY. PART Nº WILL INCLUDE:							
5A	Plunger 2" Lg.	1	530-5025-01	10A	Arm	1	515-5341-01
5B	Plunger Link	1	545-5293-00	10B	Kicker Tip	1	545-5216-01
5C	Roll Pin 1/8" ø x 5/8" Lg.	1	251-5008-00	10C	Rivet, 1/8" ø x 1/4" Lg.	1	249-5003-00
Item 5B is secured to Item 10A by: Retaining Ring, 1/4" ø Shaft (Qty. 1) (270-5002-00)				Item 10A is secured to Item 1A by: Retaining Ring, 1/4" ø Shaft (Qty. 1) (270-5002-00)			
Slingshot Assemblies (500-5849-00) are secured below the playfield by: #8 X 1/2" SHWH AB (Zinc) (Qty. 3/per) (234-5101-00)							



**Bumper Top Assy., 515-6459-01 (Qty. 3) (Items 1-7),
 Bumper Bottom Assy., 515-6459-04 (Qty. 3) (Items 8-15),
 Bumper Switch Assy., 515-6459-03 (Qty. 3) (Items 16-20)
 and Associated Part(s): See Table Below (Item AP-A)**



Take Note:

Individual parts can be ordered.
 However, if the entire Bumper is
 required, use all three (3)
 Assembly Part Numbers at the
 top of this page.

Nº	BUMPER TOP PART NAME	QTY.	SPI PART Nº
1	#555 Wedge Base Bulb	1	165-5002-00
2	#555 Wedge Base Socket	1	077-5206-00
3	Bumper Body	1	545-5197-00
Item 3 is secured by: #5 X 7/8" PRH AB (Zinc) (Qty. 2) (237-5826-00)			
4	Ring Assembly	1	515-5085-00
Item 4 is secured by: #6-32 Nylon Stop Nut (Qty. 2) (240-5005-00)			
5	Bumper Skirt	1	545-5607-00
6	Bumper Skirt Compression Spring	1	266-5048-00
7	Bumper Base	1	545-5195-00

Nº	BUMPER BOTTOM PART NAME	QTY.	SPI PART Nº
8	Plunger	1	530-5348-00
9	Coil Compression Spring	1	266-5047-00
10	Coil, 26-1200	1	090-5044-00T
ORDERING ABOVE (ITEM 10) COIL PART Nº WILL INCLUDE:			
—	Diode, 1N4004 (positioned at top)	1	112-5003-00
11	Coil Sleeve	1	545-5031-00
12	Fiber Yoke	1	545-5609-00
13	Metal Yoke	1	535-7346-00
14	Metal Yoke Stop	1	535-7347-00
Item 14 is secured by: #6-32 X 1/4" HWH Swage (Serr.) Zinc (Qty. 2) (237-5976-01)			
15	Coil Bracket Welded Assembly	1	515-5939-00
Item 15 is secured by: #6-32 X 1-3/16" Spiral Fin Shank (Qty. 3) (237-5957-00) and #6-32 Nylon Stop Nut (Qty. 3) (240-5005-00)			

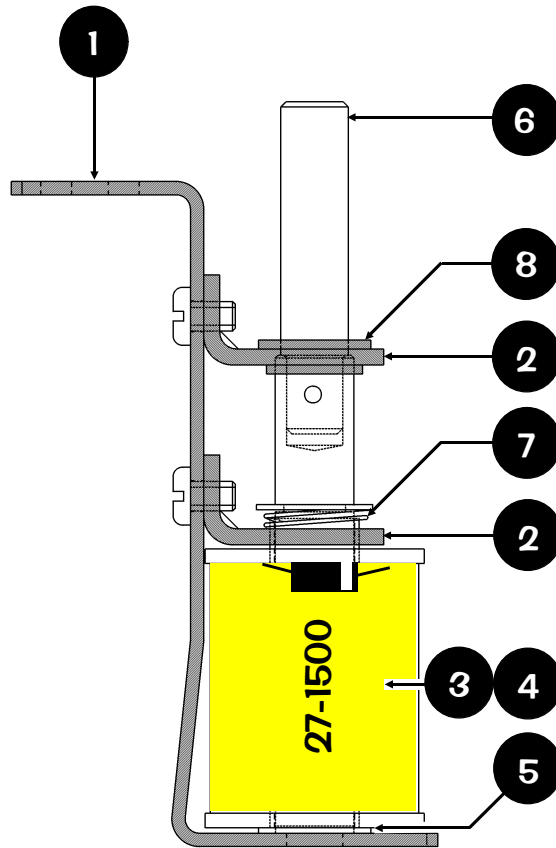
Nº	BUMPER SWITCH PART NAME	QTY.	SPI PART Nº
16	Switch Bracket	1	535-7342-00
Item 16 is secured by: #8 X 1/2" SHWH AB (Zinc) (Qty. 2) (234-5101-00)			
17	Spoon Switch Actuator	1	545-5610-01
18	Bumper Stack (Blade) Switch	1	180-5015-03
19	Switch Body Protect Plate	1	535-7344-00
Items 18 & 19 are secured by: #6-32 X 3/4" HWH Swage (Serr.) Zc. (Qty. 2) (237-5976-05)			
20	Switch Diode, 1N4001	1	112-5001-00
The Top & Bottom Assemblies are secured together by hardware included in assemblies.			

Nº	ASSOCIATED PART NAME	QTY.	SPI PART Nº
AP-A	Bumper Cap (Red)	3	550-5057-02
Item AP-A is secured to Item 4 by: #4 X 3/4" PRH (Zinc) T-25 (Qty. 2/per) (237-5873-00)			

Sec. 4: Drawings ...



Ball Lock (Short Plunger) Assembly, 500-5867-02 (Items 1-8)
 (Located below under the Toilet Assembly, Upper Left of the Playfield.)



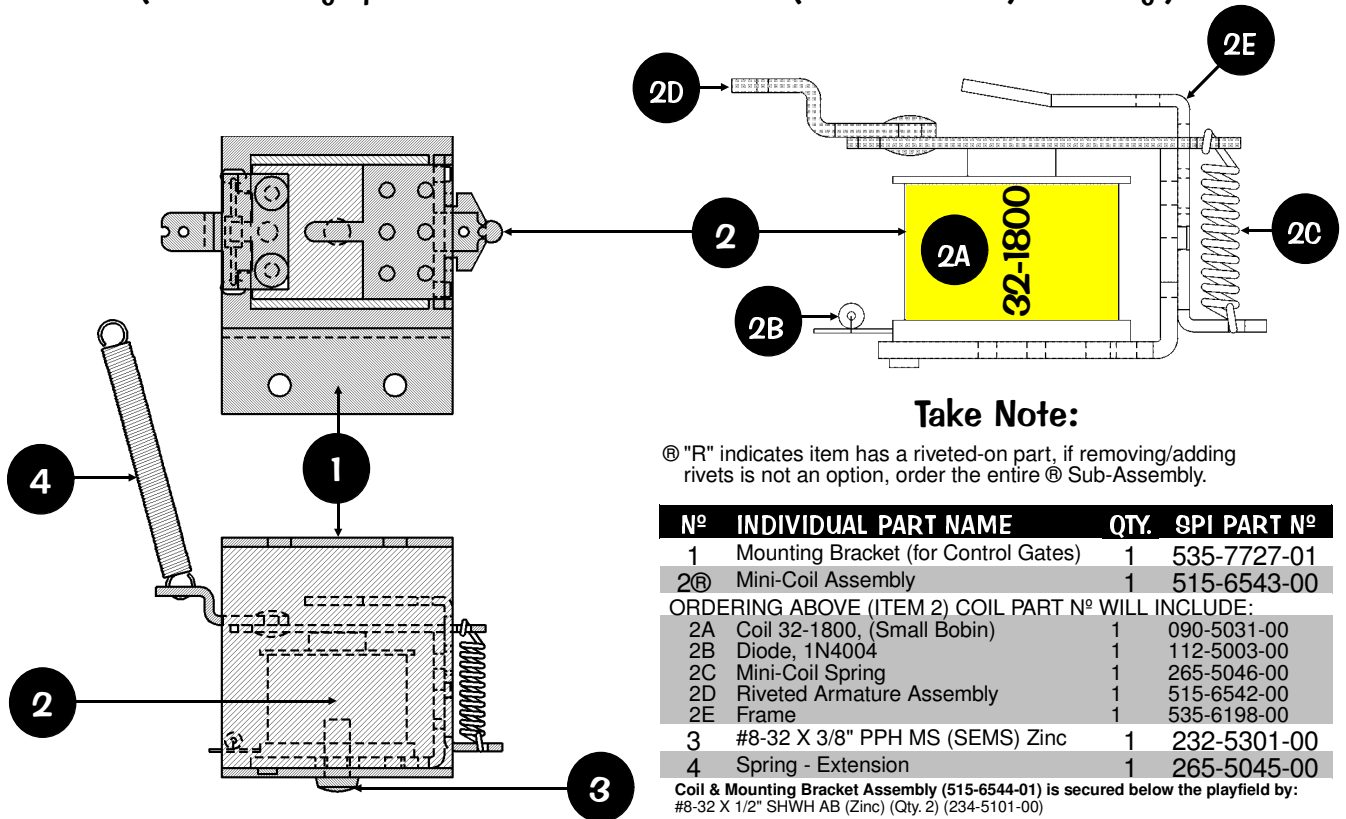
Sec. 4: Drawings ...

Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº	Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
1	Ball Lock Mounting Bracket Assy.	1	515-7132-00	4	Coil Sleeve	1	545-5411-00
2	Coil Retaining Bracket	2	535-5203-03	5	Spring Washer (17/32" ID X 3/4" X 1")	1	269-5002-00
Item 2 is secured by: #8-32 X 1/4" PPH MS (Sems) Zinc (Qty. 2/per) (232-5300-00)				6	Solid Plunger Assy. (Short)	1	515-6119-02
3	Coil, 27-1500	1	090-5004-00T	7	Compression (Relay) Spring	1	266-5020-00
ORDERING ABOVE (ITEM 3) COIL PART Nº WILL INCLUDE:				8	Nyliner 7/16" Shaft (7L2-FF)	1	545-5418-01
— Diode, 1N4004 (positioned at top) 1 112-5003-00				Ball Lock (Short Plunger) Assembly (500-5867-02) is secured below the playfield by: #8-32 X 1/2" SHWH AB (Zinc) (Qty. 3) (234-5101-00)			

**I SHAGGED HIM,
 I SHAGGED HIM
 ROTTEN.**

Section 4, Chapter 2:
 Drawings...Major Assemblies & Ramps

Coil & Mounting Bracket Assembly, 515-6544-01 (Items 1-4)
 (This assembly operates the below Control Gate (with Wire Form) Assembly.)



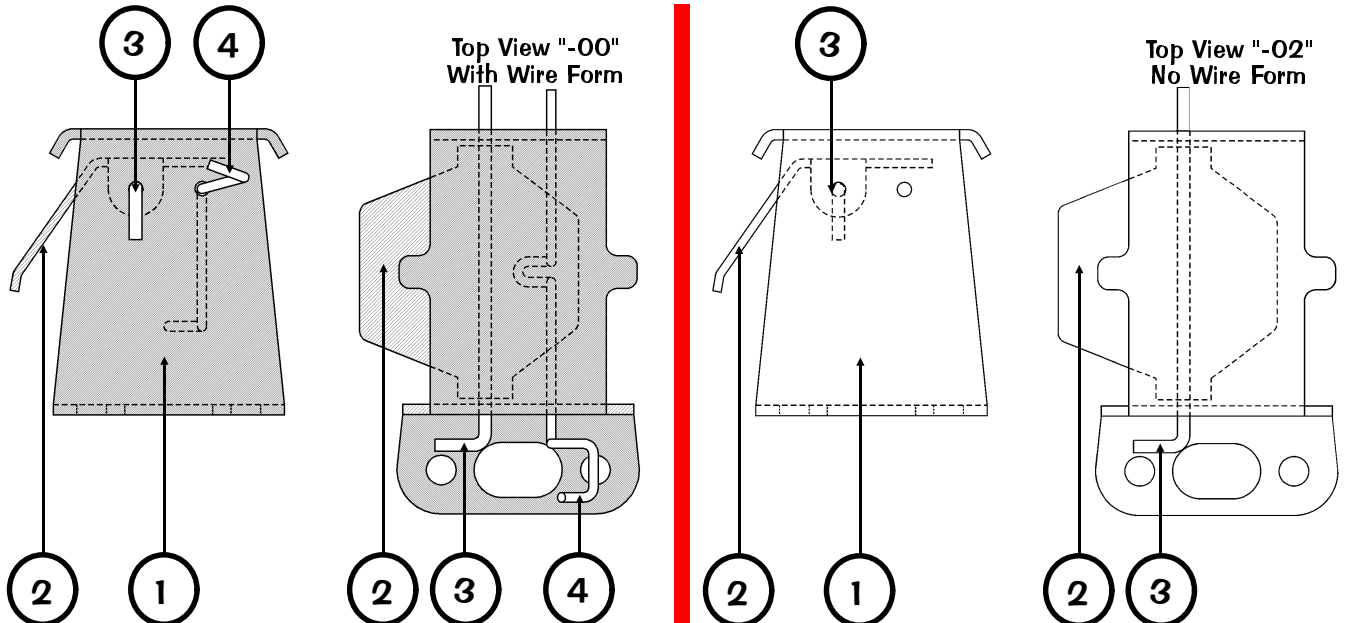
Take Note:

® "R" indicates item has a riveted-on part, if removing/adding rivets is not an option, order the entire ® Sub-Assembly.

Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
1	Mounting Bracket (for Control Gates)	1	535-7727-01
2®	Mini-Coil Assembly	1	515-6543-00
ORDERING ABOVE (ITEM 2) COIL PART Nº WILL INCLUDE:			
2A	Coil 32-1800, (Small Bobin)	1	090-5031-00
2B	Diode, 1N4004	1	112-5003-00
2C	Mini-Coil Spring	1	265-5046-00
2D	Riveted Armature Assembly	1	515-6542-00
2E	Frame	1	535-6198-00
3	#8-32 X 3/8" PPH MS (SEMS) Zinc	1	232-5301-00
4	Spring - Extension	1	265-5045-00

Coil & Mounting Bracket Assembly (515-6544-01) is secured below the playfield by:
 #8-32 X 1/2" SHWH AB (Zinc) (Qty. 2) (234-5101-00)

Control Gate (Left Style with Wire Form) Assembly, 500-6100-00 (Items 1-4) and
Control Gate (Lt. Style no Wire Form) Assembly, 500-6100-02 (Items 1-3)
 (Only Assembly 500-6100-00 is operated by the above Coil & Mounting Bracket Assembly)



Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº	Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
1	Ball Gate Mounting Bracket	1	535-7720-00	1	Ball Gate Mounting Bracket	1	535-7720-00
2	Ball Gate	1	535-7722-00	2	Ball Gate	1	535-7722-00
3	Rebound Hinge	1	535-5372-04	3	Rebound Hinge	1	535-5372-04
4	Wire Form (for "500-6100-00" Control Gate)	1	535-7721-01				

Control Gate Assembly (500-6100-00) is secured above the playfield by:
 #8-32 X 1/2" SHWH AB (Zinc) (Qty. 2) (234-5101-00), 1 1/8" Single Groove Post (Blk) (Qty. 2) (550-5059-00), 3/4" I.D. Black Rubber Ring (Qty. 1) (545-5348-04) and #6-32 DX 1 1/4" PPH MS (Zinc) (Qty. 2) (237-5511-00)

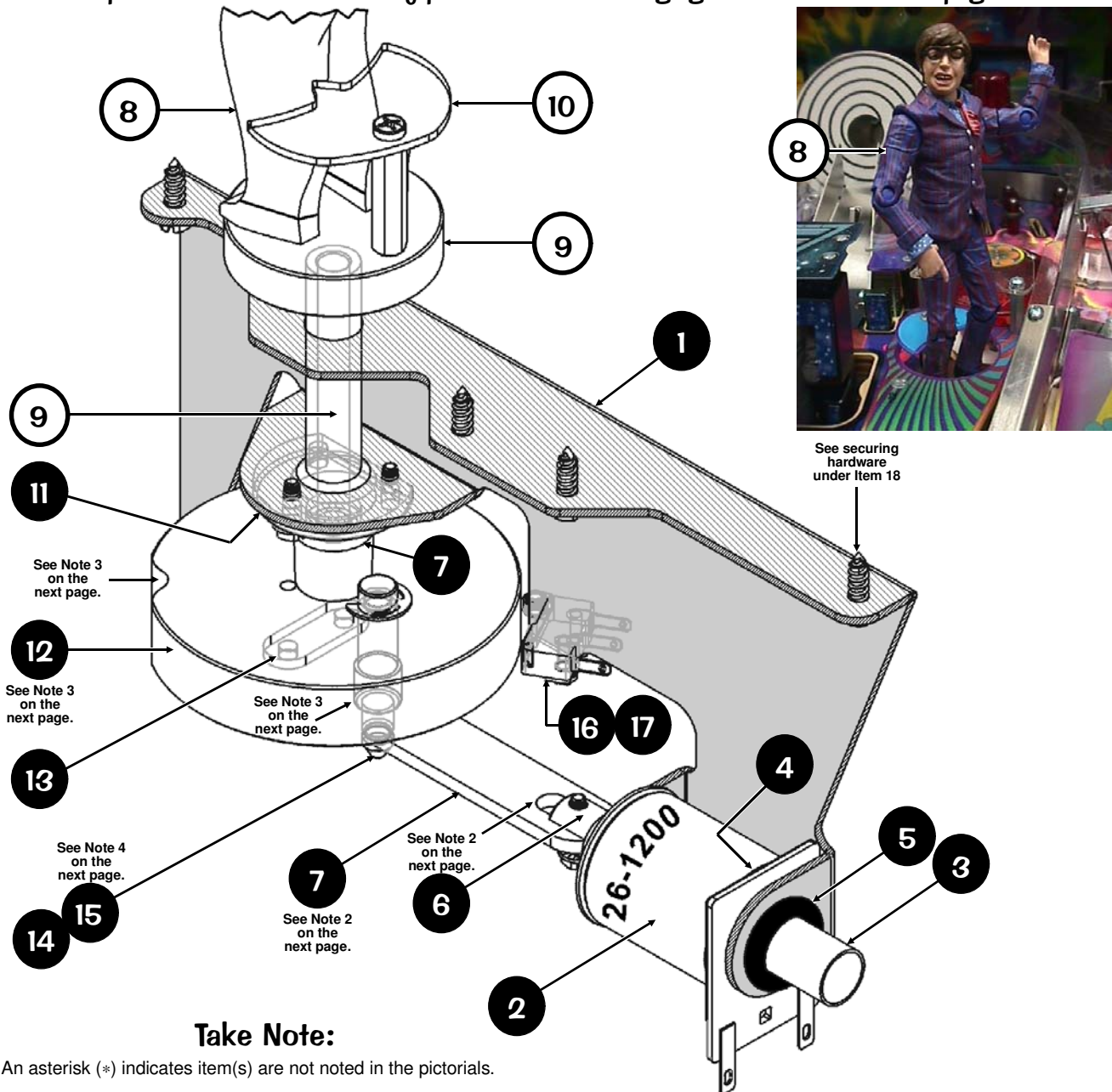
Control Gate Assembly (500-6100-02) is secured above the playfield by:
 #8-32 X 1/2" SHWH AB (Zinc) (Qty. 2) (234-5101-00), 1 1/8" Single Groove Post (Blk) (Qty. 2) (550-5059-00), 3/4" I.D. Black Rubber Ring (Qty. 1) (545-5348-04) and #6-32 DX 1 1/4" PPH MS (Zinc) (Qty. 2) (237-5511-00)

Sec. 4: Drawings ...



Dancing Austin Powers Spinner (Crank) Individual Parts Only (Items 1-18)

Special Note on disassembly procedures for changing the coil on the next page.



Take Note:

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

Sec. 4: Drawings ...

Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº	Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
1	Spinner Frame	1	535-8909-00	10	Screened Plastic (Butyrate) -30	1	830-5982-30
2	Coil, 26-1200	1	090-5044-00T	11	Bushing (Bearing)	1	545-5715-00
ORDERING ABOVE (ITEM 2) COIL PART Nº WILL INCLUDE:							
—	Diode, 1N4004 (positioned at top)	1	112-5003-00	12	Flywheel	1	530-5595-00
3	Coil Sleeve with Extension	1	545-5847-00	13	Mounting Plate	1	535-8910-00
4	Spring Washer	1	269-5002-00	14	Spring (Return)	1	265-5062-00
5	5/16" I.D. Black Rubber Ring	1	545-5348-02	15	Shoulder Pin	1	530-5597-00
6	Plunger Assembly	1	515-7163-00	16	Micro Switch (Roller Actuator, Lite Force)	1	180-5119-02
ORDERING ABOVE (ITEM 6) SUB-ASSY. PART Nº WILL INCLUDE:							
6A	Plunger 2½"	1	530-5025-02	17	Switch Body Protect Plate	1	535-6539-00
6B	Plunger Link	1	535-8863-00	18*	Switch Diode, 1N4001	1	112-5001-00
6C	Spacer	1	545-5988-00	Dancing A.P. Spinner (Crank) completed Assembly is secured under the playfield by: #8-32 X 1/2" SHWH AB (Zinc) (Qty. 4) (234-5101-00),			
7	Post Rubber (Sleeve Short)	1	545-5151-00				
8	Austin Powers Figurine	1	880-5051-01				
9	Shaft	1	530-5594-00				
Item 9 requires: Washer Teflon 1/4" I.D. X 1/2" O.D. X .062" Thk. (Qty. 1) (242-5040-01)							



Special Note on disassembly procedures for changing the coil
Dancing Austin Powers Spinner (Crank) Individual Parts Table on previous page.

Use the below drawing as a guide referencing the Items 1, 2, 3, 4, 5, 6, 7, 14 & 15 to change the coil, if necessary.

Step 1: Remove the **SPRING (14)** from the **SHOULDER PIN (15)**.

Step 2: Pull the **LINK (7)** to remove the **PLUNGER (6)** from the **COIL (2)**.

Step 3: Remove the **RUBBER RING (5)** from the end of the **COIL SLEEVE (3)**, and proceed to pull the **COIL SLEEVE (3)** from the **COIL (2)**.

Step 4: The **COIL (2)** will slide out from the **BRACKET (1)** very easily now.

Step 5: Be careful when removing the **COIL (2)** from the **BRACKET (1)** so you can retain the **SPRING WASHER (4)**.

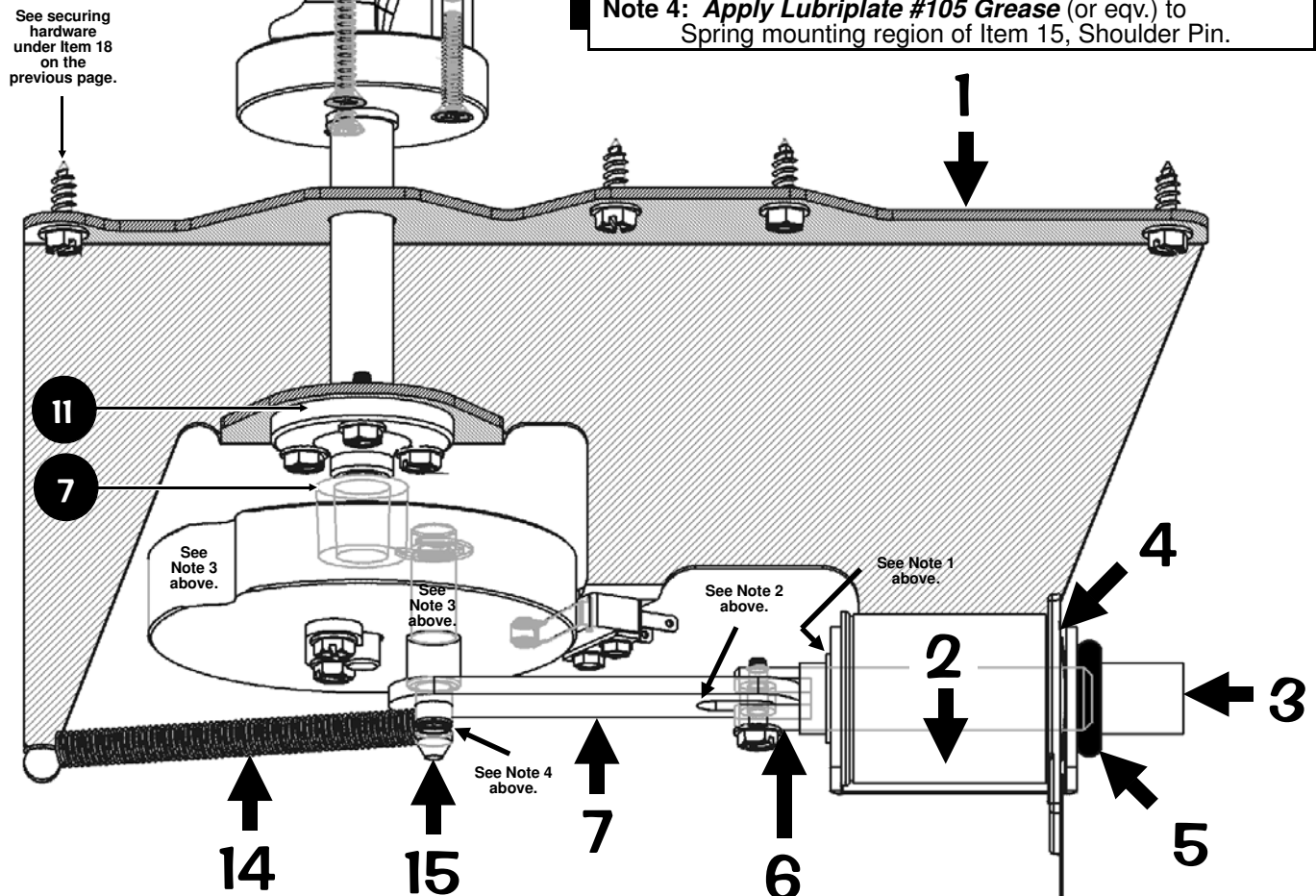
Step 6: Replace the **COIL (2)** and reassemble.

Note 1: Note orientation and position of Item 3, Coil Sleeve.
Flange must be located as shown.

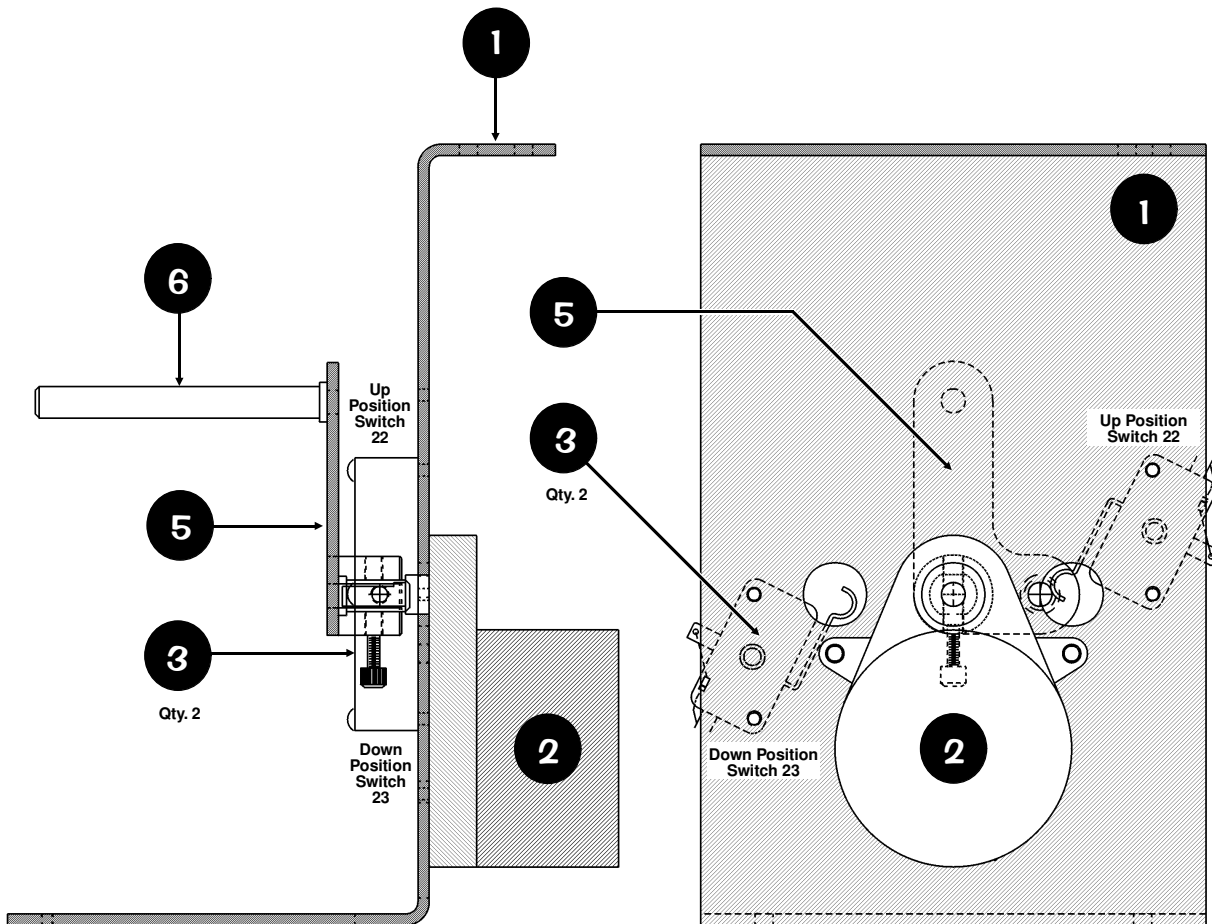
Note 2: Note orientation of Item 6B, Plunger Link.
Slotted Hole must be at Plunger End shown.

Note 3: Note orientation of Cam Recess on Item 12, Flywheel,
in relation to Item 15, Shoulder Pin.
Do not install upside-down.

Note 4: *Apply Lubriplate #105 Grease* (or eqv.) to
Spring mounting region of Item 15, Shoulder Pin.



Dr. Evil (Target) Motor, Cam & Switches Individual Parts Only (Items 1-6) (Works in conjunction with parts on the next page)



Sec. 4: Drawings ...

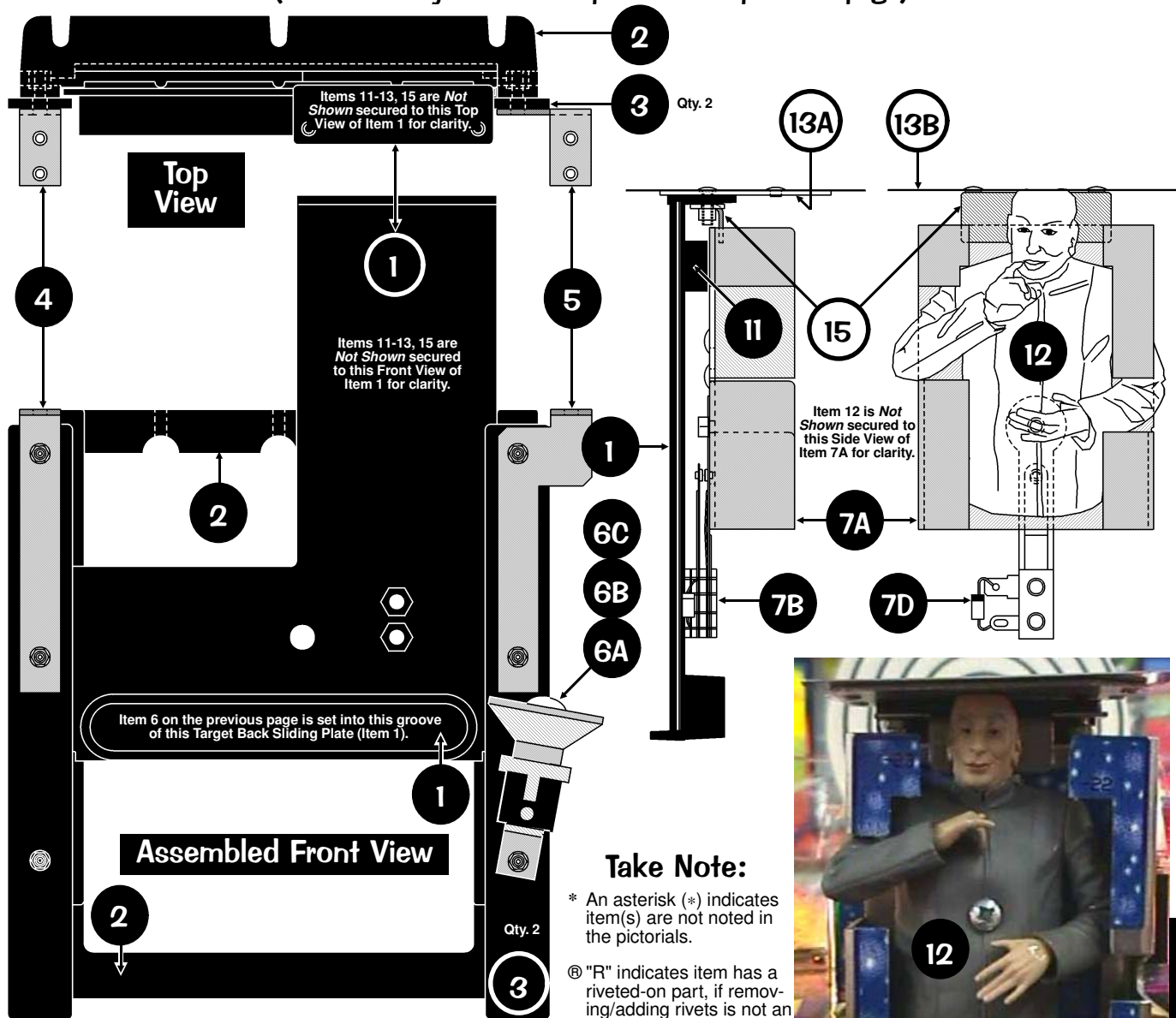
Take Note:

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

Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº	Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
1	Motor Bracket	1	535-8865-00	3	Micro Switch	2	180-5052-00
2	Motor Assembly	1	515-5900-00	Item 3 is secured by: #4-40 X 5/8" PPH MS (Sems) Zinc (Qty. 2/per) (237-5832-00)			
ORDERING ABOVE (ITEM 2) ASSEMBLY PART Nº WILL INCLUDE:							
2A	Motor "E" 24v AC 50/60Hz 6RPM CCW	1	041-5030-00	4*	Diode, 1N4001	1	180-5001-00
2B	1X2 .093" Conn. Male 03-09-2022	1	045-5004-02	5	Cam Assembly	1	515-7160-00
2C*	Capacitor, Tecate .1 MFD 500v Disc (used to eliminate Line Noise)	1	130-5000-00	Item 5 is secured by: #8-32 X 3/8" Soc. Hd. Cap. Screw (Zinc) (Qty. 1) (237-5897-00)			
2D*	Neon Bulb (NE-2) (used for Spike Suppression)	1	165-5021-00	6	Nylon Sleeve Spacer 2 1/4"	1	530-5083-02
Item 2 is secured to Item 1 by: #6-32 X 3/8" PPH MS (Sems) Zinc (Qty. 2) (232-5201-00)							
Motor, Cam & Switches completed Assembly is secured below the playfield by: #8-32 X 1/2" SHWH AB (Zinc) (Qty. 4) (234-5101-00),							



Dr. Evil (Target) Back Plate Guide & Dr. Evil Target Individual Parts Only (Items 1-15) (Works in conjunction with parts on the previous page)



Take Note:

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

® "R" indicates item has a riveted-on part, if removing/adding rivets is not an option, order the entire ® Sub-Assembly.

Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº	Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
1	Target Back Sliding Plate (Modified)	1	545-5427-01	9*	Decal -22 (from Decal Sheet Set) Left	1	820-6284-22
2	Target Back Plate Guide Frame	1	545-5728-00	10*	Decal -23 (from Decal Sheet Set) Right	1	820-6284-23
3	Target Extension for Frame	2	545-5430-00	Items 8, 9 & 10 are secured to Item 7A. Special Ordering note on Items 8, 9 & 10: The individual piece may not be available in which case the entire sheet must be ordered. See Section 4, Chapter 1, Parts Identification & Location, Page 57.			
4	Support Bracket (Left Front)	1	535-6794-00	11	Foam Pad, Blk. (1½" X 1/2") Self-Adh.	1	626-5018-00
5	Support Bracket (Right Front)	1	535-8870-00	12	Dr. Evil Figurine (Altered)	1	880-5052-00
Items 2, 4 & 5 are secured below the playfield by: #8-32 X 1/2" SHWH AB (Zc) (Qty. 7) (234-5101-00)				Item 12 is secured to Item 7 by: #6 X 1/2" PTH A Zinc (Qty. 1) (237-5809-00) and #6-32 1¼" PPH MS (Zinc) (Qty. 1) (237-5508-00)			
6A	#555 Wedge Base Socket (Laydown)	1	077-5026-01	13®	Pem Plate & Flap Riveted Assembly	1	515-7173-00
6B	#555 Wedge Base Bulb (Clear)	1	165-5002-00	ORDERING ABOVE ® RIVETED ASSY. PART Nº WILL INCLUDE:			
6C	Light Reflector	1	545-5409-01	13A	Pem Plate	1	535-8907-00
Items 3, 4, 5 & 6A are secured to Item 2 by: #6 X 5/8" HWH Indented T-25 (Zinc) (Qty. 6) (237-5870-00)				13B	Flap (secured to 10A by 10C & 10D)	1	535-8908-01
7®	Target Plate & Switch Assembly	1	515-7167-00	13C*	Rivet, 1/8" ø X 1/8" Nickel	4	249-5008-00
ORDERING ABOVE (ITEM 7) SUB-ASSY. PART Nº WILL INCLUDE:				13D*	#6 Lock Washer	4	246-5004-00
7A	Target Plate Frame	1	535-8864-01	14*	Decal -07 (from Decal Sheet Set)	1	820-6284-07
7B	Target Switch (secured to 7A by 7C)	1	180-5083-00	Item 14 secured to Item 13B. Special Ordering note on Item 14: The individual piece may not be available in which case the entire sheet must be ordered. See Section 4, Chapter 1, Parts Identification & Location, Page 57.			
7C*	#4-40 Nylon Stop Nut	1	240-5303-00	15	Limit Bracket	1	535-8953-00
7D	Diode, 1N4001	1	112-5001-00	Items 13 & 15 are secured to Item 1 @ Top by: #4-40 Nylon Stop Nut (Qty. 1 Left Side Only) (240-5303-00)			
8*	Decal -21 (from Decal Sheet Set) Back	1	820-6284-21				

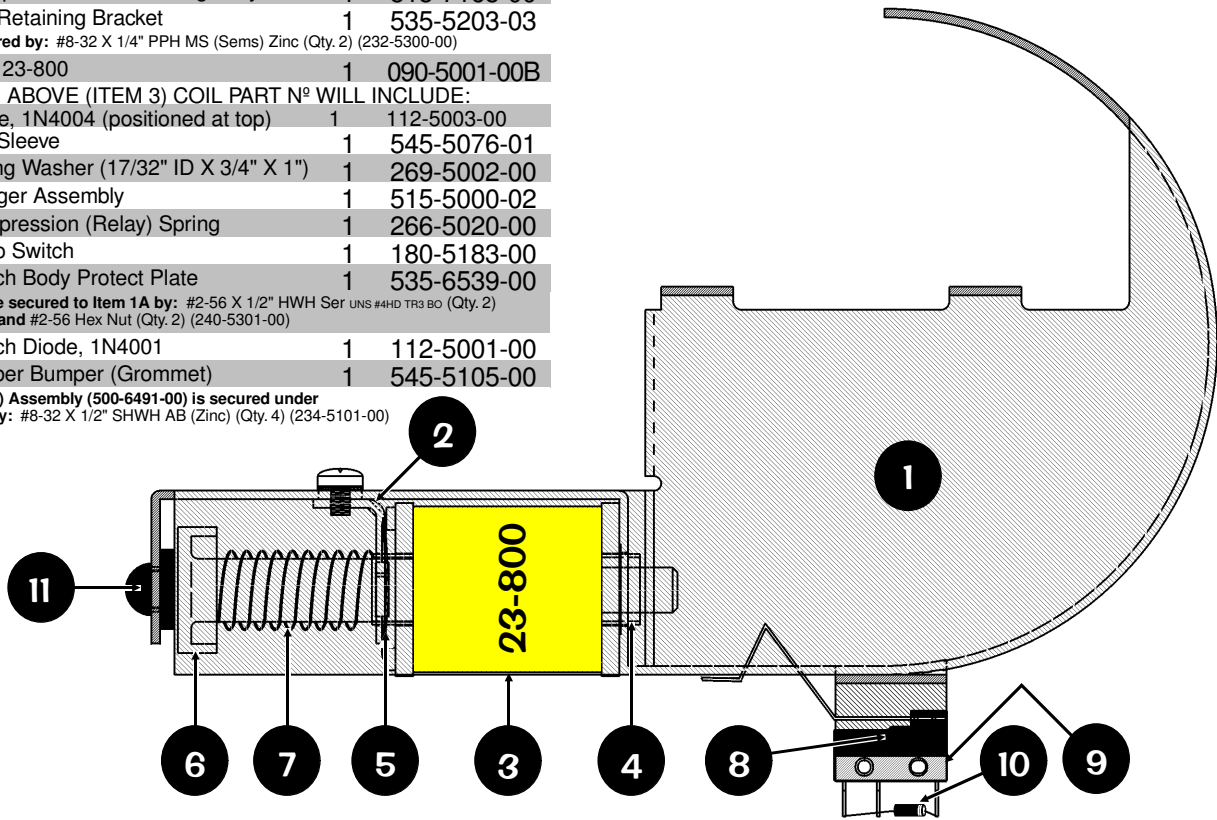
Sec. 4: Drawings ...



Scoop (Kicker) Assembly, 500-6491-00 (Items 1-11)

Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
1	Scoop Weldment Mounting Assy.	1	515-7165-00
2	Coil Retaining Bracket	1	535-5203-03
Item 2 is secured by: #8-32 X 1/4" PPH MS (Sems) Zinc (Qty. 2) (232-5300-00)			
3	Coil, 23-800	1	090-5001-00B
ORDERING ABOVE (ITEM 3) COIL PART Nº WILL INCLUDE:			
—	Diode, 1N4004 (positioned at top)	1	112-5003-00
4	Coil Sleeve	1	545-5076-01
5	Spring Washer (17/32" ID X 3/4" X 1")	1	269-5002-00
6	Plunger Assembly	1	515-5000-02
7	Compression (Relay) Spring	1	266-5020-00
8	Micro Switch	1	180-5183-00
9	Switch Body Protect Plate	1	535-6539-00
Items 8 & 9 are secured to Item 1A by: #2-56 X 1/2" HWH Ser UNS #4HD TR3 BC (Qty. 2) (237-5937-02) and #2-56 Hex Nut (Qty. 2) (240-5301-00)			
10	Switch Diode, 1N4001	1	112-5001-00
11	Rubber Bumper (Grommet)	1	545-5105-00

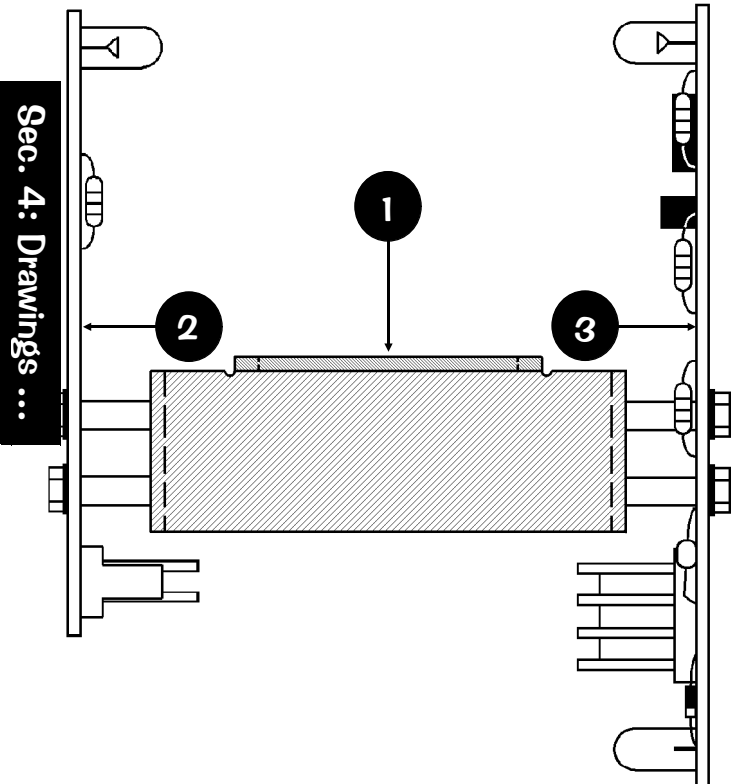
Scoop (Kicker) Assembly (500-6491-00) is secured under the playfield by: #8-32 X 1/2" SHWH AB (Zinc) (Qty. 4) (234-5101-00)



OPTO (Bracket & PEM) Individual Parts Only (Items 1-3)

Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
1	OPTO Mounting Bracket (w/Pems)	1	535-8869-00
2	OPTO Transmitter (TRANS) Board	1	520-5082-00
3	OPTO Receiver (REC) Board	1	520-5083-01
Items 2 & 3 are secured by: #4-40 X 5/8" HWH (Serr) Zinc (Qty. 2/per) (237-5945-00)			

OPTO Bracket is secured under the playfield by: #8-32 X 1/2" SHWH AB (Zinc) (Qty. 2) (234-5101-00)



Take Note:

For a break-down of parts on the OPTO Boards (520-5082-00 & 520-5083-01), see Section 5, Chapter 4, Playfield Sw. OPTO "Long-Hop" Boards Component Layout & Parts, Page 131.

ISN'T THAT DIABOLICAL?

Section 4, Chapter 2:
Drawings...Major Assemblies & Ramps

Time Machine Individual Parts Only (Items 1-11)

Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
1	Magnet Coil Support Bracket	1	535-8783-00

Item 1 is secured below through the top of the playfield by: #8-32 Nylon Stop Nut (Qty. 3) (240-5102-00) and #8 Washer (Qty. 3) (242-5005-00)

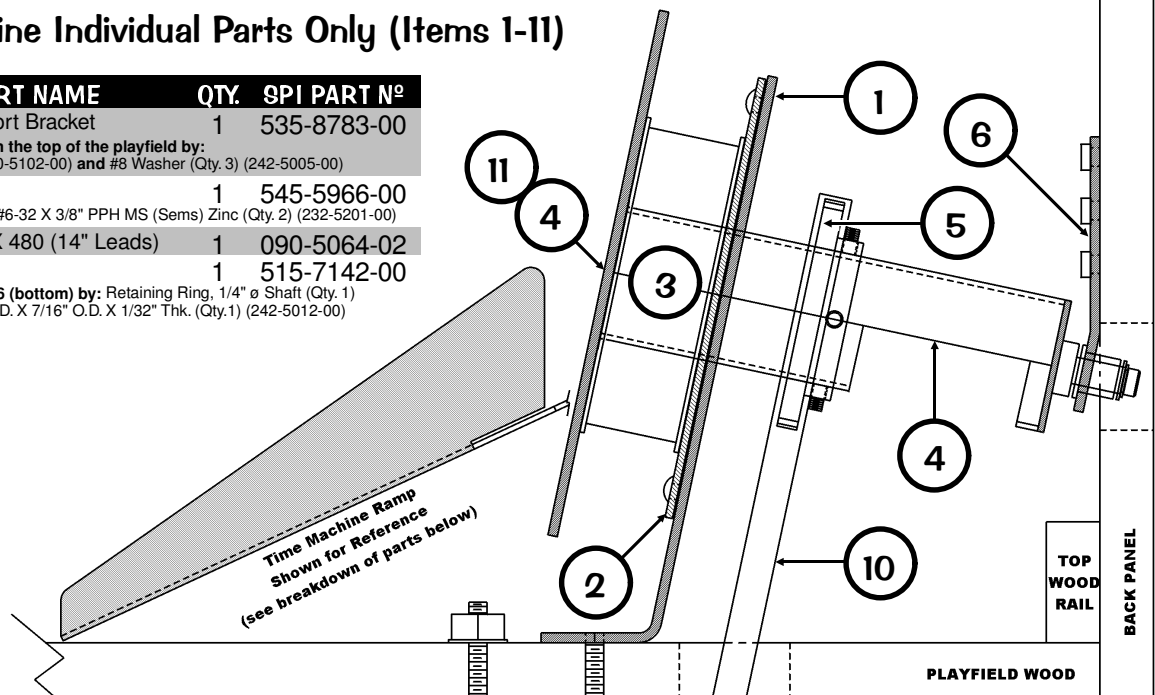
2	Magnet Bushing	1	545-5966-00
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Item 2 is secured to Item 1 by: #6-32 X 3/8" PPH MS (Sems) Zinc (Qty. 2) (232-5201-00)

3	Magnet Coil, 20½ X 480 (14" Leads)	1	090-5064-02
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4	Disc Weldment	1	515-7142-00
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Item 4 is secured through Item 6 (bottom) by: Retaining Ring, 1/4" ø Shaft (Qty. 1) (270-5002-00) and Washer 1/4" I.D. X 7/16" O.D. X 1/32" Thk. (Qty. 1) (242-5012-00)



5	Gear (Upper) 303 Stainless	1	530-5576-01
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Item 5 is secured by: #6-32 X 1/4" Soc. Head Cap Screw (Zinc) (Qty. 4) (237-6063-00)

6	Bearing Bracket Assembly	1	515-7147-00
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Item 6 is secured to the Back Panel by: #6-32 X 3/4" HWH Swage (Ser) Zinc (Qty. 3) (237-5976-05)

7	Motor Bracket (with Pem Studs)	1	535-8777-00
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Item 7 is secured above through the bottom of the playfield by: #8-32 Nylon Stop Nut (Wht) (Qty. 3) (240-5102-00) and #8 Washer (Qty. 3) (242-5005-00)

8	Motor Assembly	1	515-7141-00
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ORDERING ABOVE (ITEM 8) ASSEMBLY PART Nº WILL INCLUDE:

8A	Motor 24v AC 50/60Hz 20RPM CCW	1	041-5079-00
8B*	1X2 .093" Conn. Male 03-09-2022	1	045-5004-02
8C*	Capacitor, Tecate .1 MFD 500v Disc	1	130-5000-00
<i>(used to eliminate Line Noise)</i>			
8D*	Neon Bulb (NE-2)	1	165-5021-00
<i>(used for Spike Suppression)</i>			

Item 8 is secured to Item 7 by: #8-32 X 3/8" HWH Swage (Ser) Zinc (Qty. 4) (237-5975-00)

9	Gear (Lower) 303 Stainless	1	530-5575-01
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Item 9 is secured by: Retaining Ring, 1/4" ø Shaft (Qty. 1) (270-5002-00) and #6-32 X 3/8" Cap Screw (Zinc) (Qty. 1) (237-5944-00)

10	Drive Belt (Drive Pins = 120)	1	545-5967-01
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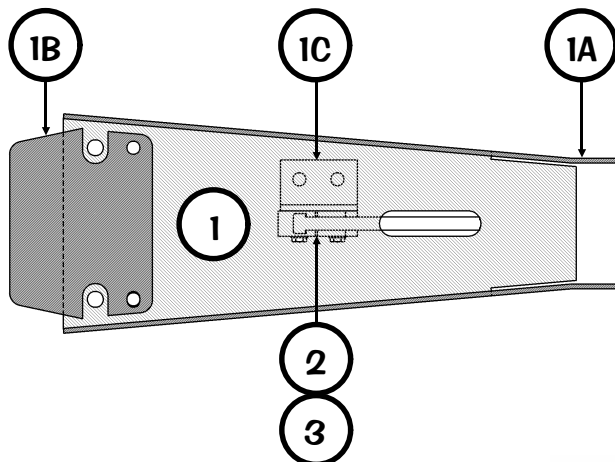
11	Disc Decal (Time Machine)	1	820-6280-00
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Take Note:

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

The Magnet Coil Diode, 1N4004, is not located on this assembly (nor included); it's located on a *Terminal Strip* under the playfield. See Section 5, Chapter 2, Playfield Terminal Strips..., Page 95.

Time Machine Ramp Individual Parts Only (Items 1-4)



Take Note:

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

@ "R" indicates item has a riveted-on part, if removing/adding rivets is not an option, order the entire @ Sub-Assembly.

Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
1®	Ramp Riveted Assembly	1	515-7200-00

ORDERING ABOVE ® RIVETED ASSY. PART Nº WILL INCLUDE:

1A	Ramp (Plain No Parts)	1	535-8780-00
1B	Ramp Flap (secured to 1A by 1D)	1	535-8778-00
1C	Switch Bracket (secured to 1A by 1E)	1	535-7319-05
1D*	Rivet, 1/8" ø X 3/16" Lg.	2	249-5001-00
1E*	Rivet, 1/8" ø X 5/32" Lg.	2	249-5009-00

Item 1 is secured to above the playfield by: #4 X 5/8" PFH (Black) (Qty. 2) (237-5833-00)

2	Micro Switch	1	180-5057-00
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3	Switch Body Protect Plate	1	535-6539-00
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Items 2 & 3 are secured to Item 1C by: #2-56 X 1/2" HWH (Ser) (Qty. 2) (237-5937-02)

4*	Switch Diode, 1N4001	1	112-5001-00
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Laser Beam Drawing Views on previous page.

- Note 1:** When reassembling, ensure Item 20, Washer, is *installed in front* of Item 21, Clear Plastics (Qty. 2).
- Note 2:** When reassembling, ensure Item 18, Coil Sleeve, is *installed such that the flange end touches the rearward side* of Item 22, Shoulder Pin.
- Note 3:** *Apply Loctite 243 to thread contact regions* of the securing hardware of Item 2, Motor Assembly; Item 11, Switch Plate; Item 13, Cam Plate Assembly; and, Item 25, 1 $\frac{3}{8}$ " x 1/2" Post Spacer.
- Note 4:** *Apply Lubriplate #105 Grease* (or eqv.) to Spring mounting region of Item 13, Cam Plate Assy.

Take Note:

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

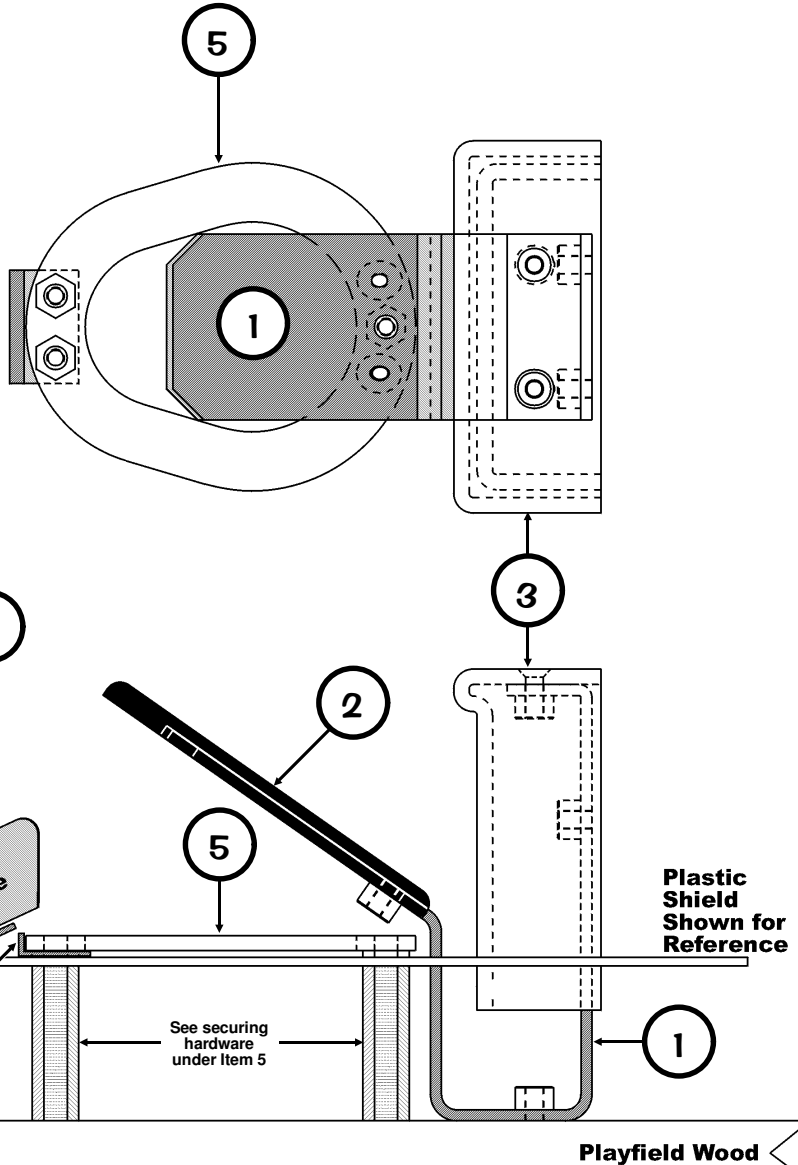
Use **SPI Part Number: 502-6001-00** to receive **Items 3, 7, 11, 15, 20, 21, 22 & 25** (highlighted below in ■■) *which cannot be ordered separately*. They will **all be included** (with quantities stated) in the **Laser Beam Misc. Parts Pkg.** If the individual part number(s) is given, you will receive all items referenced.

N°	INDIVIDUAL PART NAME	QTY.	SPI PART N°	N°	INDIVIDUAL PART NAME	QTY.	SPI PART N°
1	Motor Platform	1	535-8859-00	13	Cam Plate Assembly	1	515-7158-00
2	Motor Assembly	1	515-7171-00	ORDERING ABOVE (ITEM 13) COIL PART N° WILL INCLUDE:			
ORDERING ABOVE (ITEM 2) ASSEMBLY PART N° WILL INCLUDE:				13A	Cam Plate	1	535-8860-00
2A	Motor 24v AC 50/60Hz 4W 10RPM B/D	1	041-5081-00	13B	Shoulder Pin	1	530-5586-00
2B*	1X2 .093" Conn. Male 03-09-2022	1	045-5004-02	Item 13 is secured by: #6-32 X 3/8" PFH MS (Zinc) (Qty. 1) (237-5850-00)			
2C*	Capacitor, Tecate .1 MFD 500v Disc <i>(used to eliminate Line Noise)</i>	1	130-5000-00	14	Deflector Pad (Rubber Bumper)	1	545-5428-00
2D*	Neon Bulb (NE-2) <i>(used for Spike Suppression)</i>	1	165-5021-00	15	Mounting Pad Black Self-Adhesive	1	040-5002-01
Item 2 is secured to Item 1 by: #6-32 X 1/2" PPH MS (Zinc) TF T-23 (Qty. 2) (237-5842-00)				16	Kicker (Turret) Platform	1	535-8858-00
3	1" x 1/2" Post Spacer White Nylon	1	530-5590-00	17	Coil, 24-940 (Lugless)	1	090-5002-10
4	1/4" Clamp (Double)	1	040-5000-23	ORDERING ABOVE (ITEM 17) COIL PART N° WILL INCLUDE:			
Items 3-4 are secured to Item 1 by: #8 Washer (Qty. 1) (242-5005-00) and #8-32 X 1 1/2" HWH MS (Ser) Zinc (Qty. 1) (237-5946-00)				—	Diode, 1N4004 (positioned at top)	1	112-5003-00
5	1/2" Clamp (Single)	1	040-5000-06	18	Coil Sleeve with Extension	1	545-5847-00
Item 5 is secured to Item 1 by: #8 Washer (Qty. 1) (242-5005-00) and #8-32 X 3/8" HWH MS Type C (Qty. 1) (237-5903-00)				19	Plunger w/Nylon Rod Extension Assy.	1	515-7157-00
6	Micro Switch (Roller Actuator, Lite-Force)	1	180-5119-02	20	Washer (Brass) 11/32" ID X 1-5/16" OD X .089"	1	535-8862-00
7	Switch Protector Fiche Paper	1	545-5633-00	21	Clear Plastic (Buty.) -006, -008 or -009	2	830-5984-006
8	Switch Body Protect Plate	2	535-6539-00	Item 21 Replacement Note: Items may be marked with 3 different numbers but are identical.			
Items 6-8 are secured to Item 1 by: #2-56 X 1/2" HWH (Ser) UNS #4HD TR3 BO (Qty. 2) (237-5937-02)				22	Shoulder Pin (Single Groove, Wht. Nylon)	1	530-5589-00
9	Micro Switch (Rollover)	1	180-5181-00	23	Link	1	535-8863-00
10	Micro Switch (Roller Actuator, Lite-Force)	1	180-5119-02	24	Spring (Return)	1	265-5061-00
11	Switch Plate	1	535-8861-00	25	1 $\frac{3}{8}$ " x 1/2" Post Spacer White Nylon	1	530-5591-00
Items 9-11 are secured to Item 1 by: #2-56 X 3/4" PPH Zinc (Qty. 2) (237-6064-00)				Item 25 is secured by: #8-32 X 1 $\frac{1}{4}$ " PFH MS (Zinc) (Qty. 1) (237-5953-00)			
12*	Diode, 1N4001	3	112-5001-00	26	1/2" Clamp (Single)	1	040-5000-06
				Item 26 is secured by: Curled end placed around Item 19, Plunger Assembly.			
				Laser Beam Assembly (500-6483-00) is secured above the playfield by: #8-32 X 1/2" SHWH AB (Zinc) (Qty. 5) (234-5101-00)			

Sec. 4: Drawings ...



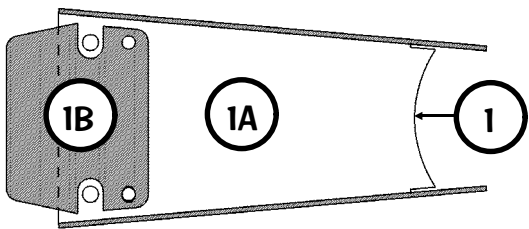
Toilet Assembly Individual Parts Only (Items 1-6)



Sec. 4: Drawings ...

Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº	Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
1	Deflector Bracket	1	535-8872-00	5	Toilet Seat	1	535-8871-00
Item 1 is secured below the playfield by: #6-32 X 1" HH MS (Zinc) (Qty. 2) (237-5881-00)				Item 5 is secured above the playfield by: 1/4" X 5/16" Hex Spacer #6-32 Tap (Qty. 3) (254-5018-09) and #6-32 X 3/8" PFH MS (Zinc) (Qty. 3) (237-5850-00). Item 5 is also secured below the playfield by: #6-32 X 3/8" PFH (Zinc) (Qty. 3) (237-6021-0)			
2	Toilet Lid	1	545-5985-00	6	Fat Bastard Figurine	1	880-5050-01
3	Reservoir Tank	1	545-5986-00	Item 6 is secured below the playfield by: #6 X 1 1/4" PFH A (Zinc) (Qty. 2) (237-5804-00)			
4	Trap Bracket	1	535-9009-00				

Toilet Ramp Individual Part Only (Item 1)



Take Note:

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

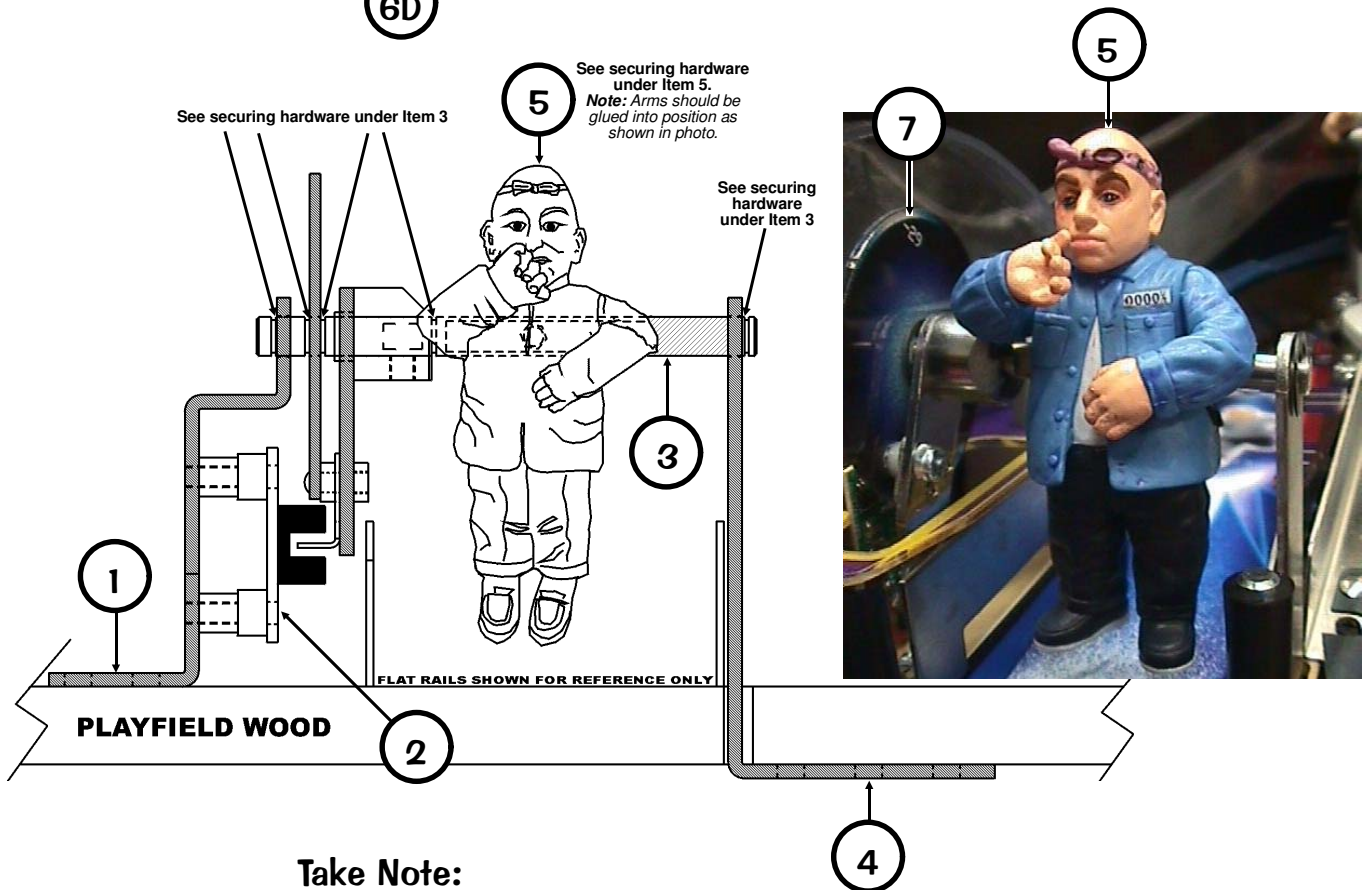
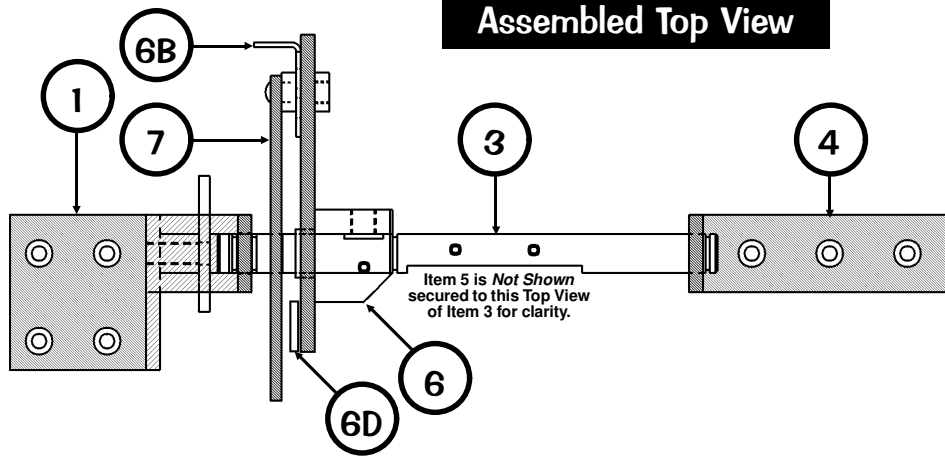
® "R" indicates item has a riveted-on part, if removing/adding rivets is not an option, order the entire ® Sub-Assembly.

Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
1®	Ramp Riveted Assembly	1	500-6503-00
ORDERING ABOVE ® RIVETED ASSY. PART Nº WILL INCLUDE:			
1A	Ramp (Plain No Parts)	1	535-8905-00
1B	Ramp Flap (secured to 1A by 1C)	1	535-8778-00
1C*	Rivet, 1/8" ø X 5/32" Lg.	2	249-5009-00
Item 1 is secured above the playfield by: #4 X 5/8" PFH (Black) (Qty. 2) (237-5833-00)			



Spini-Me Individual Parts Only (Items 1-7)

Assembled Top View



Take Note:

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

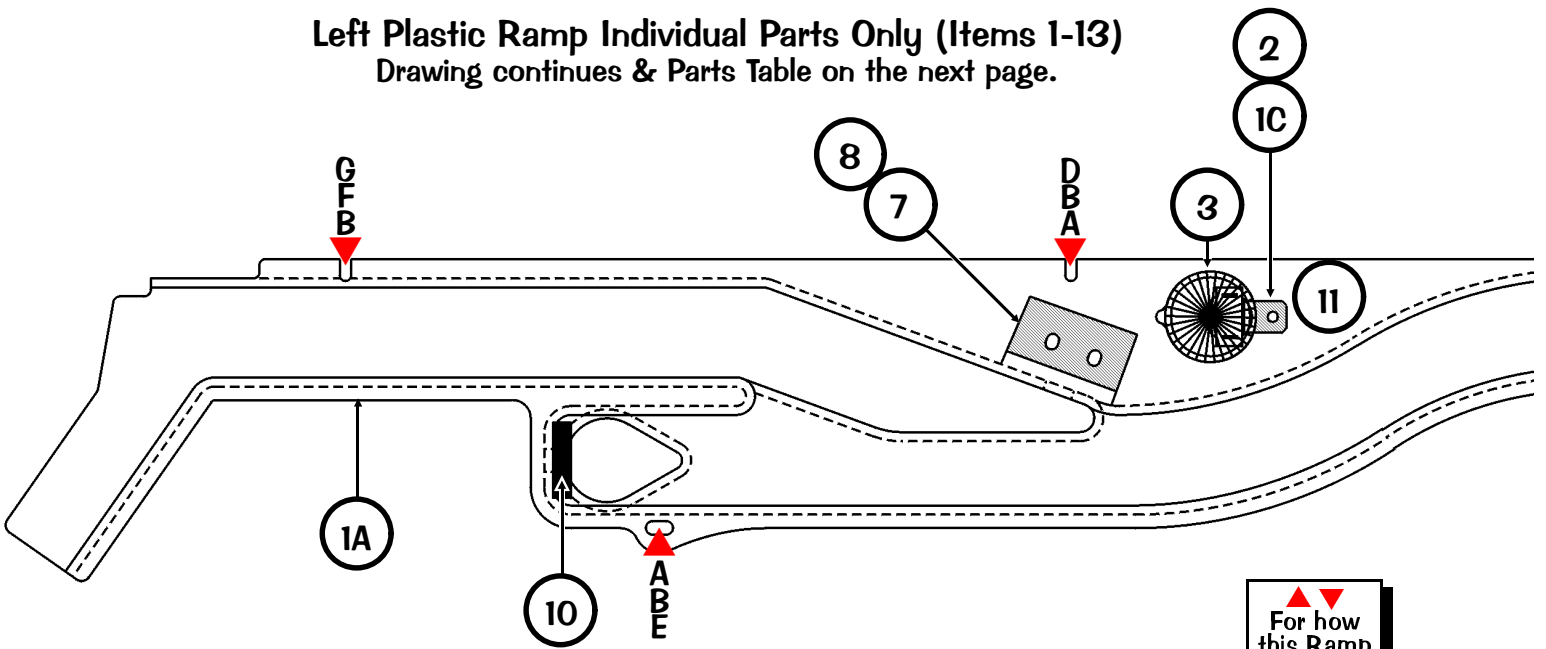
For a break-down of parts of Item 2, OPTO Board (515-7212-00), see Section 5, Chapter 4, Pulse-Stretcher OPTO PC Board Schematic, Component Layout & Parts, Page 130.

® "R" indicates item has a riveted-on part, if removing/adding rivets is not an option, order the entire ® Sub-Assembly.

Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº	Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
1	Spinner Support Bracket - Left	1	535-8775-00	5	Mini-Me Figurine	1	880-5049-01
Item 1 is secured above the playfield by: #8-32 X 1/2" SHWH AB (Zinc) (Qty. 4) (234-5101-00)				Item 5 is secured to Item 3 by: #5 X 7/8" PRH AB Zinc (Qty. 1) (237-5826-00)			
2	Pulse-Stretcher OPTO PC Bd. Assy.	1	515-7212-00	6®	Cam Assembly	1	515-7140-00
ORDERING ABOVE (ITEM 2) ASSEMBLY PART Nº WILL INCLUDE:				ORDERING ABOVE ® RIVETED ASSY. PART Nº WILL INCLUDE:			
2A	Pulse-Stretcher OPTO PC Board	1	520-5212-00	6A	Cam Plate/Hub Sub-Assy.	1	515-7139-00
2B*	Soldered Cable Harness	1	See Take Note	6B	Flag Bracket (secured to 6A by 6C)	1	535-8774-00
Item 2 is secured to Item 1 by: #6-32 X 1/2" PPH (Qty. 2) (232-5202-00) and 1/8" X 3/8" Spacer Gray (Qty. 2) (254-5000-19)				6C*	Rivet, 1/8" ø X 3/16" Lg.	2	249-5001-00
3	Shaft	1	530-5572-00	6D	Counter Weight (secured to 6A by 6E)	1	535-9011-00
Item 3 is secured by: Retaining Ring, 1/4" ø Shaft (Qty. 5) (270-5002-00)				6E*	#4-40 X 3/16" PFH MS (Zinc)	1	237-6087-00
4	Spinner Support Bracket - Right	1	535-8776-00	7	Screened Plastic (Butyrate) -29	1	830-5982-29
Item 4 is secured below the playfield by: #8-32 X 1/2" SHWH AB (Zinc) (Qty. 3) (234-5101-00)				Item 7 is secured to Item 6 by: Spacer .093" (Qty. 1) (254-5029-01), #4-40 X 1/2" PPH MS (Sems) Zinc (Qty. 1) (237-5813-00) and #4-40 Nylon Stop Nut (Qty. 1) (240-5303-00)			
Special Ordering note on Item 7: The individual pieces may not be available in which case the entire sheet must be ordered. See Sec. 4, Chp. 1, Parts Identification & Location, Pg. 57.							



Left Plastic Ramp Individual Parts Only (Items 1-13)
 Drawing continues & Parts Table on the next page.



▲ ▼
 For how this Ramp is Secured to the Playfield see the Securing Hardware at the bottom of the next page.

Assembled Top View

Sec. 4: Drawings ...

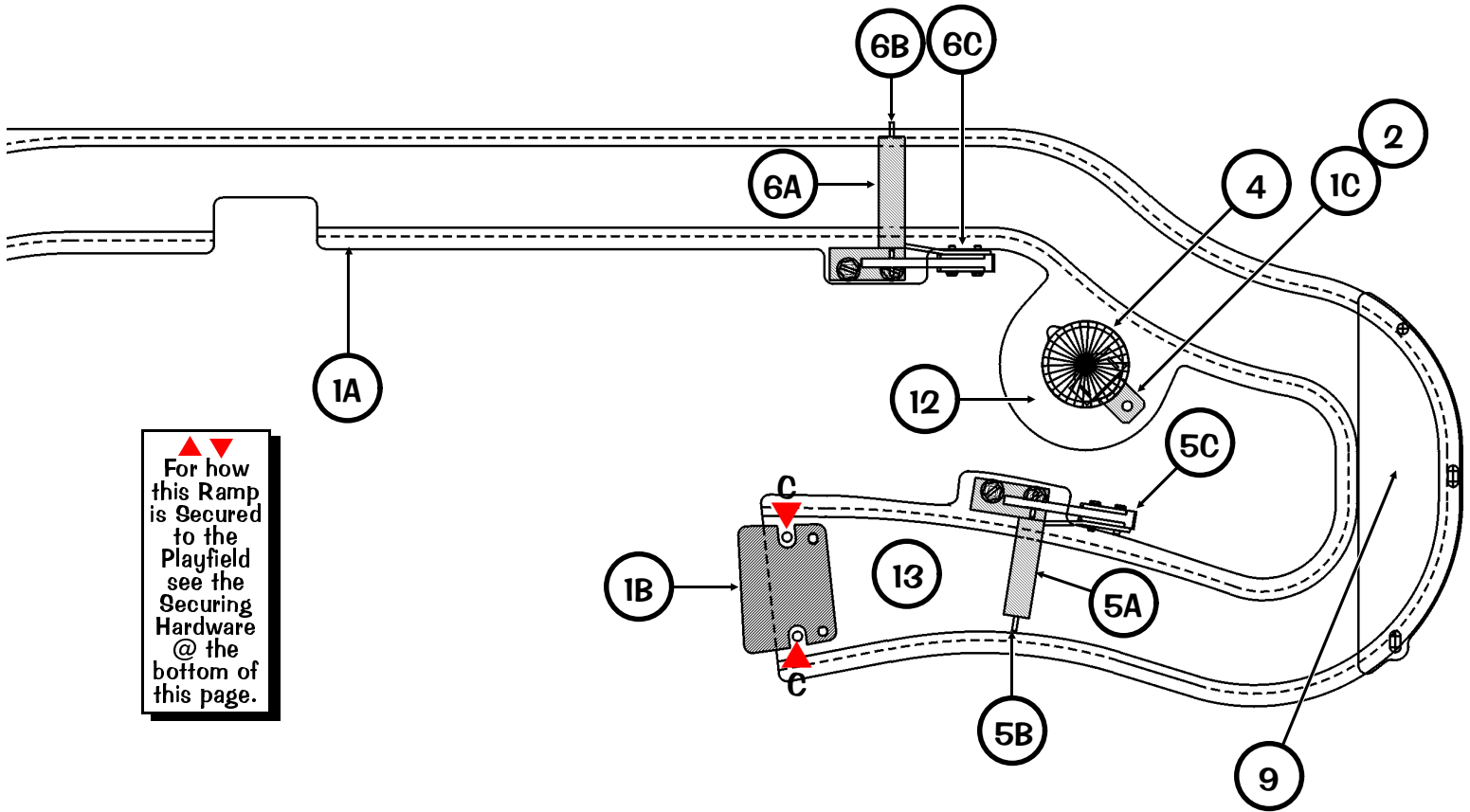
Views of "Austin Powers (Page 74)", "Fat Bastard (Page 82)" & "Mini-Me (Page 83)" Figurines may differ than actual part on your game.



I'VE GOT A LOT OF DEMONS KICKIN'
AROUND IN MY NOGGIN, BUT
WEIGHT ISSUES AIN'T ONE OF THEM.

Left Plastic Ramp Individual Parts Only (Items 1-13) Continued

Drawing continues on the previous page.



▲▼
For how
this Ramp
is Secured
to the
Playfield
see the
Securing
Hardware
@ the
bottom of
this page.

Take Note:

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

® "R" indicates item has a riveted-on part, if removing/adding rivets is not an option, order the entire ® Sub-Assembly.

Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
1®	Left Plastic Ramp Riveted Assembly	1	515-7154-01
ORDERING ABOVE® RIVETED ASSY. PART Nº WILL INCLUDE:			
1A	Ramp (Plain No Parts)	1	545-5978-01
1B	Ramp Flap (secured to 1A by 1D/1E)	1	535-8841-00
1C	#555 Wedge Base Offset Socket (secured to 1A by 1D)	2	077-5029-00
1D*	Rivet, 1/8" ø X 3/16" Lg.	4	249-5001-00
1E*	#6 Lock Washer (Riveting)	2	246-5000-00
2	#906 Wedge Base Bulb (Clear)	2	165-5004-00
3	Mini-Mars Light Cvr. (Snap-In) Yellow	1	550-5030-06
4	Mini-Mars Light Cover (Snap-In) Blue	1	550-5030-05
5	Gate (Roll-Under) Assembly	1	515-6556-02
ORDERING ABOVE (ITEM 5) SUB-ASSY. PART Nº WILL INCLUDE:			
5A	Gate Bracket	1	535-7756-02
5B	Wire Form (on above item)	1	535-7755-02
5C	Micro Switch (for Roll-Under Gate)	1	180-5087-00
5D*	Switch Body Protect Plate	1	535-6539-00
5E*	Diode, 1N4001	1	112-5001-00
5F*	#2-56 X 1/2" HWH Ser UNS #4HD TR3 BO	2	237-5937-02
6	Gate (Roll-Under) Assembly	1	515-6556-04
ORDERING ABOVE (ITEM 6) SUB-ASSY. PART Nº WILL INCLUDE:			
6A	Gate Bracket	1	535-7756-01
6B	Wire Form (on above item)	1	535-7755-02
6C	Micro Switch (for Roll-Under Gate)	1	180-5087-00
6D*	Switch Body Protect Plate	1	535-6539-00
6E*	Diode, 1N4001	1	112-5001-00
6F*	#2-56 X 1/2" HWH Ser UNS #4HD TR3 BO	2	237-5937-02
Items 5 & 6 are secured to Item 1A by: #6-32 X 3/8" PPH MS (Sems) Zinc (Qty. 2/per) (232-5201-00) and #6-32 Nylon Stop Nut (Qty. 2/per) (240-5005-00)			

Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
7	Magnet Support Bracket	1	535-7994-00
Item 7 is secured to Item 1A by: #6-32 X 3/8" HWH Swage (Ser) Zinc (Qty. 2) (237-5976-02) and #6 Washer (Qty. 2) (242-5001-00)			
8	Mini-Coil, 29-1000	1	090-5059-00
Item 8 is secured to Item 7 by: #8-32 X 3/8" PPH MS (Sems) Zinc (Qty. 1) (232-5301-00)			
9	Clear Plastic (Butyrate) -011	1	830-5984-011
Item 9 is secured to Item 1A by: #6 X 3/4" PPH (Zinc) (Qty. 3) (232-5003-00) and 3/8" X 3/8" Spacer Gray (Qty. 3) (254-5000-12) Special Ordering note on Item 9: The individual piece may not be available in which case the entire sheet must be ordered. See Section 4, Chapter 1, Parts Identification & Location, Page 57.			
10	Deflector Pad (Rubber Bumper)	1	545-5428-00
11	Decal -26 (from Decal Sheet Set) Lower	1	820-6284-26
12	Decal -27 (from Decal Sheet Set)	1	820-6284-27
Items 11/12 are adhered to the top of Item 1A. Special Ordering note on Items 11/12: The individual piece may not be available in which case the entire sheet must be ordered. See Section 4, Chapter 1, Parts Identification & Location, Page 57.			
13	Decal Left Ramp (from Decal Sheet Set)	1	820-6293-02
Item 13 is adhered to the bottom of Item 1A. Special Ordering note on Item 13: The individual piece may not be available in which case the entire sheet must be ordered. See Section 4, Chapter 1, Parts Identification & Location, Page 57.			

Left Plastic Ramp is secured above the playfield by:
A ▲▼ #6-32 X 3/8" PPH MS (Sems) Zinc (Qty. 2) (232-5201-00)
B ▲▼ #6 Washer (Qty. 3) (242-5001-00)
C ▲▼ #4 X 5/8" PFH (Black) (Qty. 2) (237-5833-00)
D ▲▼ 1-3/4" X 1/4" Hex Spacer #6-32 Tap (Qty. 1) (254-5008-10)
E ▲▼ 1-1/2" X 1/4" Hex Spacer #6-32 Tap (Qty. 1) (254-5008-09)
F ▲▼ #6 X 1 1/2" PPH Zinc (Qty. 1) (232-5007-00)
G ▲▼ 1" X 3/8" Spacer Gray (Qty. 1) (254-5000-04)

Note: Item D ▼ is mounted on a Ramp Mounting Bracket (515-6508-00) on the wood rail.

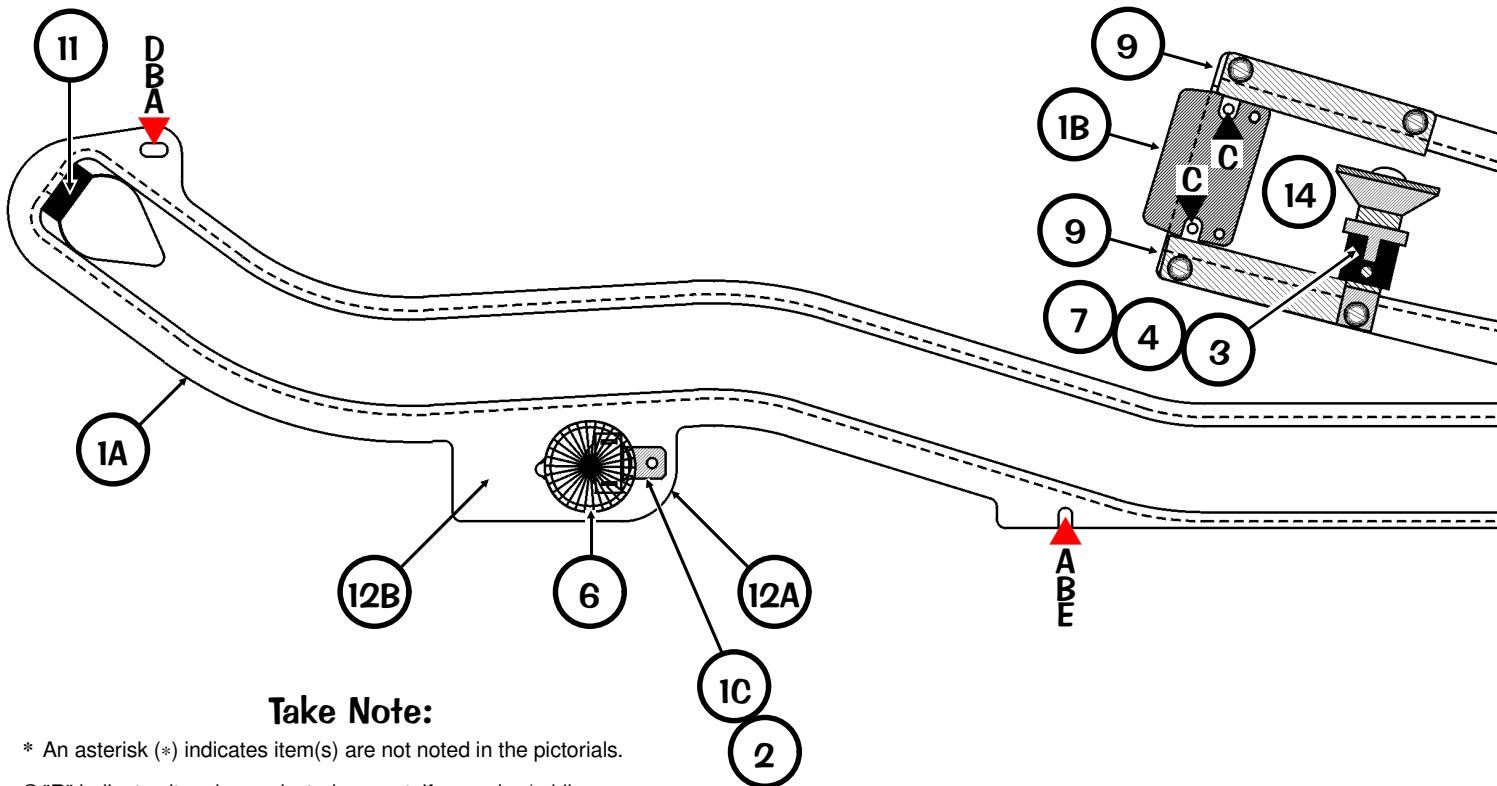
Sec. 4: Drawings ...



Right Plastic Ramp Individual Parts Only (Items 1-14)

Drawing continues on the next page.

▲▼
For how
this Ramp
is Secured
to the
Playfield
see the
Securing
Hardware
@ the
bottom of
this page.



Take Note:

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

@ "R" indicates item has a riveted-on part, if removing/adding rivets is not an option, order the entire @ Sub-Assembly.

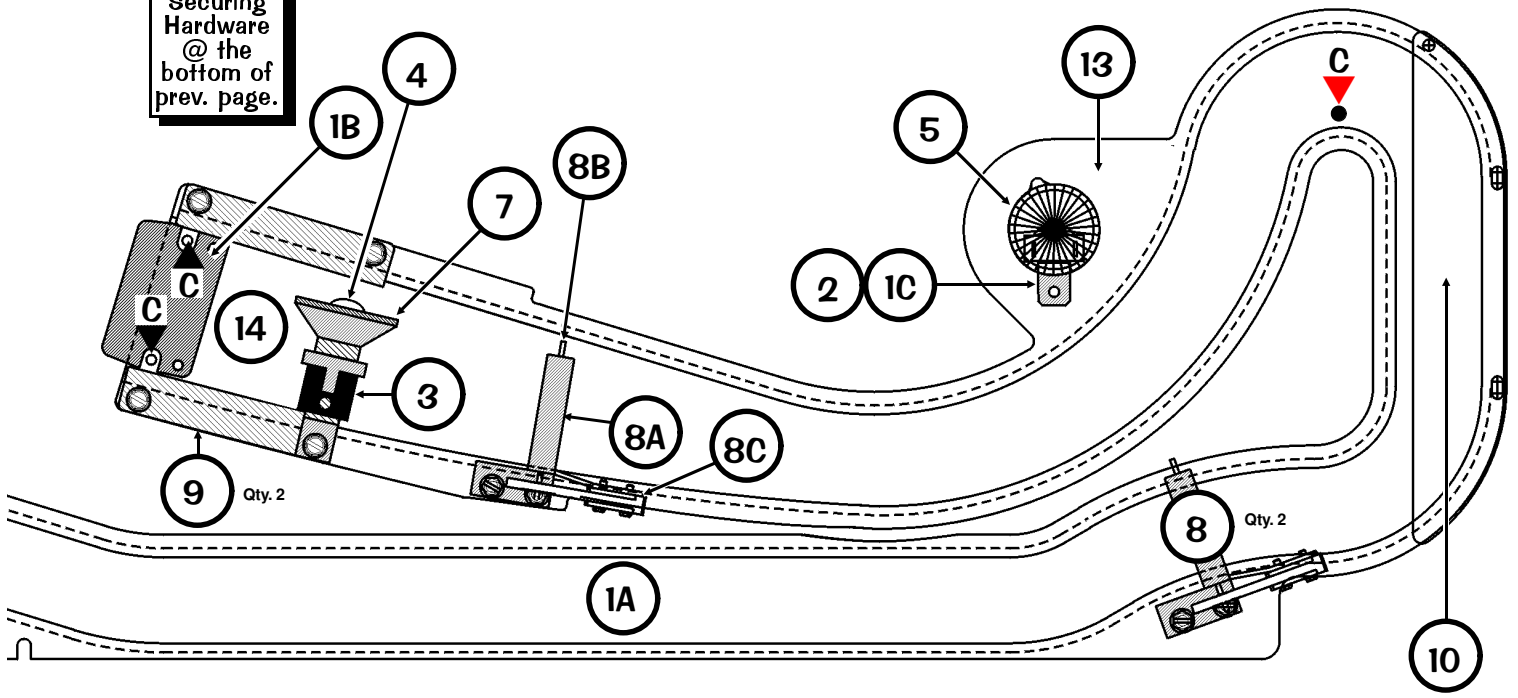
Sec. 4: Drawings ...

Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº	Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
1@	Right Plastic Ramp Riveted Assembly	1	515-7155-00	9	Ramp Protector Bracket	2	535-6707-00
ORDERING ABOVE @ RIVETED ASSY. PART Nº WILL INCLUDE:							
1A	Ramp (Plain No Parts)	1	545-5979-00	Item 9 is secured to Item 1A by: #6-32 X 3/8" PPH MS (Sems) Zinc (Qty. 2/per) (232-5201-00) and #6-32 Nylon Stop Nut (Qty. 2/per) (240-5010-00)			
1B	Ramp Flap (secured to 1A by 1D/1E)	1	535-8840-00	10	Clear Plastic (Butyrate) -012	1	830-5984-012
1C	#555 Wedge Base Offset Socket (secured to 1A by 1D)	2	077-5029-00	Item 10 is secured to Item 1A by: #6 X 3/4" PPH (Zinc) (Qty. 3) (232-5003-00) and 3/8" X 3/8" Spacer Gray (Qty. 3) (254-5000-12) Special Ordering note on Item 10: The individual piece may not be available in which case the entire sheet must be ordered. See Section 4, Chapter 1, Parts Identification & Location, Page 57.			
1D*	Rivet, 1/8" ø X 3/16" Lg.	4	249-5001-00	11	Deflector Pad (Rubber Bumper)	1	545-5428-00
1E*	#6 Lock Washer (Riveting)	2	246-5000-00	12A	Decal -25 (from Decal Sheet Set) Lwr. Top	1	820-6284-25
2	#906 Wedge Base Bulb (Clear)	2	165-5004-00	12B	Decal -25A (from Decal Sheet Set) Lower	1	820-6284-25A
3	#555 Wedge Base Socket Laydown	1	077-5026-01	13	Decal -28 (from Decal Sheet Set)	1	820-6284-28
Item 3 is secured to Item 1A by: 1" X 3/8" Spacer Gray (Qty. 1) (254-5000-04), #6-32 X 1/2" PPH MS Zinc (Qty. 1) (237-5510-00) and #6-32 Nylon Stop Nut (Qty. 1) (240-5010-00)							
Item 3 Special Note: Location may differ than that of the drawings. It can be positioned in front of Item 9, same side. All securing hardware referenced is correct.							
4	#555 Wedge Base Bulb (Clear)	1	165-5002-00	Items 12/13 are adhered to the top of Item 1A. Special Ordering note on Items 12/13: The individual piece may not be available in which case the entire sheet must be ordered. See Section 4, Chapter 1, Parts Identification & Location, Page 57.			
5	Mini-Mars Light Cvr. (Snap-In) Orange	1	550-5030-07	14	Decal Right Ramp (from Decal Sheet Set)	1	820-6293-01
6	Mini-Mars Light Cvr. (Snap-In) Green	1	550-5030-04	Item 14 is adhered to the bottom of Item 1A. Special Ordering note on Item 14: The individual piece may not be available in which case the entire sheet must be ordered. See Section 4, Chapter 1, Parts Identification & Location, Page 57.			
7	Light Reflector (Silver Plastic)	1	545-5409-01	Right Plastic Ramp is secured above the playfield by:			
8	Gate (Roll-Under) Assembly	2	515-6556-04	A ▲▼ #6-32 X 3/8" PPH MS (Sems) Zinc (Qty. 2) (232-5201-00)			
ORDERING ABOVE (ITEM 8) SUB-ASSY. PART Nº WILL INCLUDE:							
8A	Gate Bracket	1	535-7756-01	B ▲▼ #6 Washer (Qty. 2) (242-5001-00)			
8B	Wire Form (on above item)	1	535-7755-02	C ▲▼ #4 X 5/8" PFH (Black) (Qty. 2) (237-5833-00)			
8C	Micro Switch (for Roll-Under Gate)	1	180-5087-00	D ▼ 1-3/4" X 1/4" Hex Spacer #6-32 Tap (Qty. 1) (254-5008-10)			
8D*	Switch Body Protect Plate	1	535-6539-00	E ▲ 2-1/2" X 1/4" Hex Spacer #6-32 Tap (Qty. 1) (254-5008-16)			
8E*	Diode, 1N4001	1	112-5001-00	Right Plastic Ramp is secured onto the Back Panel by:			
8F*	#2-56 X 1/2" HWH Ser UNS #4HD TR3 BO	2	237-5937-02	C ▼ #4 X 5/8" PFH (Black) (Qty. 1) (237-5833-00)			
Item 8 is secured to Item 1A by: #6-32 X 3/8" PPH MS (Sems) Zinc (Qty. 2/per) (232-5201-00) and #6-32 Nylon Stop Nut (Qty. 2/per) (240-5005-00)							
Note: Item E ▼ is mounted on a Ramp Mounting Bracket (515-6508-00) on the wood rail.							



Right Plastic Ramp Individual Parts Only (Items 1-14) Continued
 Drawing continues & Parts Table on the previous page.

▲▼
 For how
 this Ramp
 is Secured
 to the
 Playfield
 see the
 Securing
 Hardware
 @ the
 bottom of
 prev. page.



Assembled Top View



Views of "Austin Powers (Page 74)", "Fat Bastard (Page 82)" & "Mini-Me (Page 83)" Figurines may differ than actual part on your game.

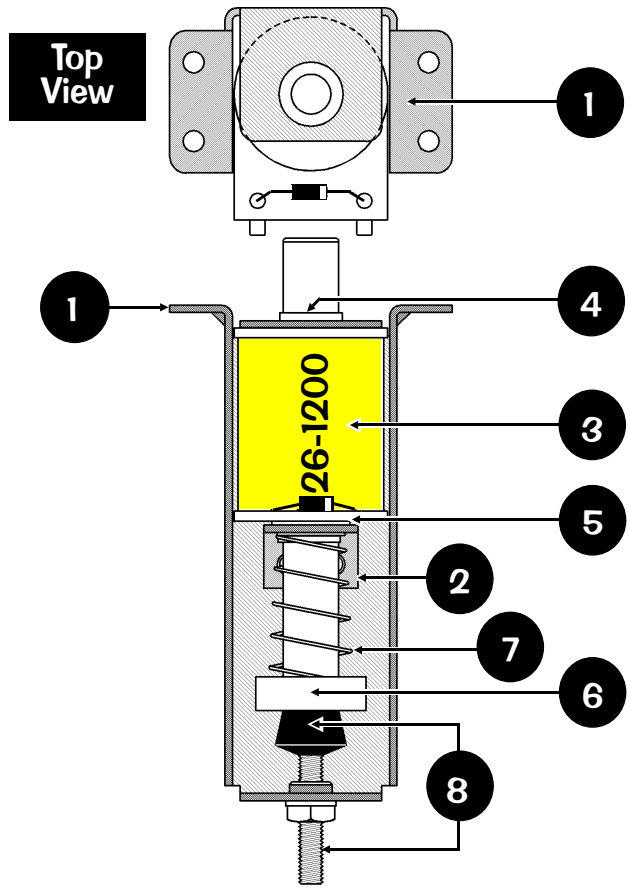
Sec. 4: Drawings ...



UK ONLY OPTIONAL
Ball Deflector (over Lt. & Rt. Outlanes) Assy., 500-5788-02 (Qty. 2) (Items 1-8)

Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
1	Ball Deflector Coil Mounting Bracket	1	535-6857-02
2	Coil Retaining Bracket	1	535-5203-03
Item 2 is secured by: #8-32 X 1/4" PPH MS (Sems) Zinc (Qty. 2) (232-5300-00)			
3	Coil, 26-1200	1	090-5044-00T
ORDERING ABOVE (ITEM 3) COIL PART Nº WILL INCLUDE:			
—	Diode, 1N4004 (positioned at top)	1	112-5003-00
4	Coil Sleeve (Short) (Formost #10-7077)	1	545-5076-01
5	Spring Washer (17/32" ID X 3/4" X 1")	1	269-5002-00
6	Solid Plunger Assembly	1	515-6858-00
7	Compression (Relay) Spring	1	266-5022-01
8	#10-32 Adj. Spindle Stop w/Rubber Tip	1	280-5014-00
Item 8 is secured by: #10-32 Keps Nut (Qty. 1) (240-5208-00)			

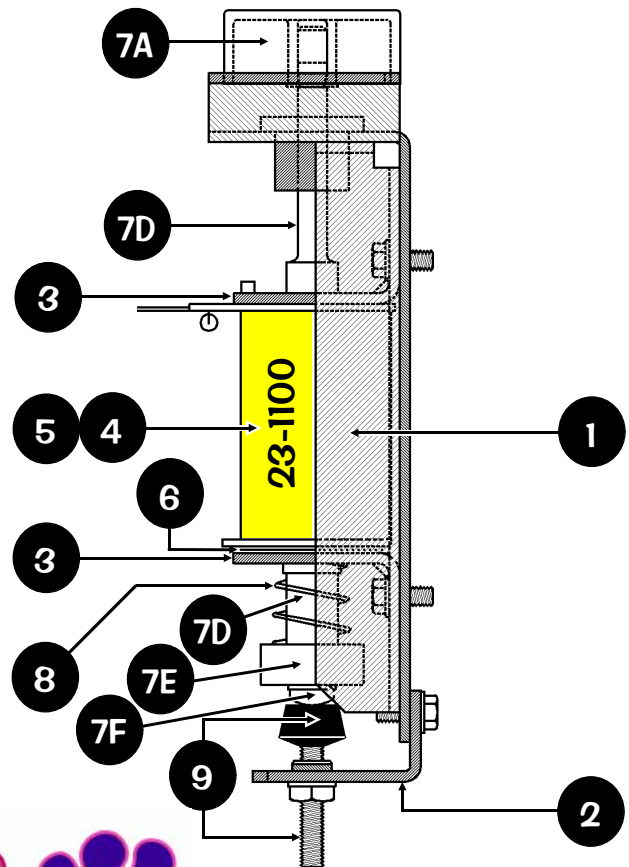
Ball Deflector Assembly (500-5788-02) is secured under the playfield by:
 #8-32 X 1/2" SHWH AB (Zinc) (Qty. 4) (234-5101-00)



UK ONLY OPTIONAL
Up/Down Post Assembly, 500-6293-00 (Items 1-9)

Nº	INDIVIDUAL PART NAME	QTY.	SPI PART Nº
1	Up/Down Post Coil Mounting Bracket	1	515-6840-00
2	Adjustment Spindle Stop Bracket	1	535-8303-00
3	Coil Retaining Bracket	2	535-7356-00
Items 2 & 3 are secured by: #8-32 X 3/8" Swage (Serr) Zinc (Qty. 2/per) (237-5975-00)			
4	Coil, 23-1100 (ORG)	1	090-5030-00T
ORDERING ABOVE (ITEM 4) COIL PART Nº WILL INCLUDE:			
—	Diode, 1N4004 (positioned at top)	1	112-5003-00
5	Coil Sleeve (with extension)	1	545-5847-00
6	Spring Washer, 17/32" ID X 3/4" X 1"	1	269-5002-00
7	Plunger & Shaft Assembly	1	515-6844-00
ORDERING ABOVE (ITEM 7) SUB-ASSY. PART Nº WILL INCLUDE:			
7A	Ball Bumper Plastic (Top) Red	1	550-5029-02
7B*	Roll Pin, 3/32" ø X 1/2" Long	1	251-5002-00
7C*	Retaining Ring, 1/4" ø Shaft	1	270-5002-00
7D	Plunger & Shaft Sub-Assembly	1	515-6841-00
7E	Plunger Head	1	530-5511-00
7F	#10-32 X 3/8" PPH MS (Sems) Zinc	1	232-5401-00
8	Compression (Relay) Spring	1	266-5022-01
9	#10-32 Adj. Spindle Stop w/Rubber Tip	1	280-5014-00
Item 9 is secured by: #10-32 Keps Nut (Qty. 1) (240-5208-00)			

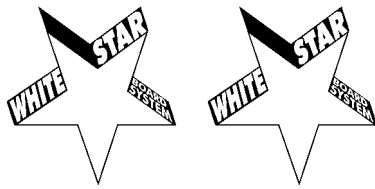
Up/Down Post Assembly (500-6293-00) is secured under the playfield by:
 #8-32 X 1/2" SHWH AB (Zinc) (Qty. 6) (234-5101-00)



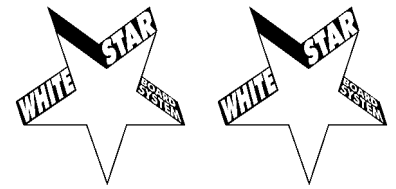
Take Note:

- * An asterisk (*) indicates item(s) are not noted in the pictorials.
- 1. Item 7D, part of Item 7, Plunger & Shaft Sub-Assembly, is 1 piece and cannot be ordered separated.





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Visit www.SternPinball.com/schematics.htm for the latest 11" X 17" Schematics (or "Split 8-1/2" X 11") for the Display Power Supply, Display Controller, I/O Power Driver & CPU/Sound Boards (White Star System Only). Along with the schematics you'll find the component layout and theory of operation. Keep visiting, as these files are updated frequently. If you find a link that is broken, please let us know. If you have any questions, please email us at info@sternpinball.com.
 If you are unable to view the schematics, you can download them to your hard drive. To do this, click on the "Download" link in the instructions within the document. To "download" once open, in your browser click "File" "Send" "Page by eMail". It will be sent to your eMail Address, where there you can save the file to your hardrive.

Sec. 5: Schematics ...



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:

COILS DETAILED CHART TABLE

High Current Coils Group 1		Drive Transistor (D.T.)	Driver Output Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connection	Power Voltage	Coil GA-Turn or Bulb Type
#1	TROUGH UP-KICKER	Q1	I/O Pwr. Drvr.	BRN-BLK	J8-P1	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#2	AUTO LAUNCH	Q2	I/O Pwr. Drvr.	BRN-RED	J8-P3	YEL-VIO	J10-P4/5	50v DC	24-940 090-5036-00T
#3	SCOOP	Q3	I/O Pwr. Drvr.	BRN-ORG	J8-P4	YEL-VIO	J10-P4/5	50v DC	23-800 090-5001-00B
#4	LASER BEAM EJECT	Q4	I/O Pwr. Drvr.	BRN-YEL	J8-P5	YEL-VIO	J10-P4/5	50v DC	24-940 090-5002-10
#5	FLASH: TIME MACHINE	Q5	I/O Pwr. Drvr.	BRN-GRN	J8-P6	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#6	FLASH: RIGHT RAMP (LOW)	Q6	I/O Pwr. Drvr.	BRN-BLU	J8-P7	ORG	J6-P10	20v DC	#906 Bulb 165-5004-00
#7	DANCING AUSTIN	Q7	I/O Pwr. Drvr.	BRN-VIO	J8-P8	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#8	TOILET POST	Q8	I/O Pwr. Drvr.	BRN-GRY	J8-P9	BRN	J7-P1	20v DC	27-1500 090-5004-00T

High Current Coils Group 2		Drive Transistor (D.T.)	Driver Output Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connection	Power Voltage	Coil GA-Turn
#9	LEFT BUMPER	Q9	I/O Pwr. Drvr.	BLU-BRN	J9-P1	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#10	RIGHT BUMPER	Q10	I/O Pwr. Drvr.	BLU-RED	J9-P2	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#11	BOTTOM BUMPER	Q11	I/O Pwr. Drvr.	BLU-ORG	J9-P4	YEL-VIO	J10-P4/5	50v DC	26-1200 090-5044-00T
#12	FLASH: LEFT RAMP (HIGH)	Q12	I/O Pwr. Drvr.	BLU-YEL	J9-P5	ORG	J6-P10	20v DC	#906 Bulb 165-5004-00
#13	FLASH: RIGHT RAMP (HIGH)	Q13	I/O Pwr. Drvr.	BLU-GRN	J9-P6	ORG	J6-P10	20v DC	#906 Bulb 165-5004-00
#14	TIME MACHINE MAGNET DOTS	Q14	I/O Pwr. Drvr.	BLU-BLK	J9-P7	VIO-YEL	J10-P3	50v DC	20½-480 090-5064-02
#15	LEFT FLIPPER (50v RED/YEL)	Q15	I/O Pwr. Drvr.	ORG-GRY	J9-P8	RED-YEL GRY-YEL	J10-P1/2	50v DC	23-900 090-5020-30T
#16	RIGHT FLIPPER (50v RED/YEL)	Q16	I/O Pwr. Drvr.	ORG-VIO	J9-P9	RED-YEL BLU-YEL	J10-P1/2	50v DC	23-1100 090-5030-00T

Low Current Coils Group 1		Drive Transistor (D.T.)	Driver Output Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connection	Power Voltage	Coil GA-Turn or Meter #
#17	LEFT SLINGSHOT	Q17	I/O Pwr. Drvr.	VIO-BRN	J7-P2	BRN	J7-P1	20v DC	23-800 090-5001-00T
#18	RIGHT SLINGSHOT	Q18	I/O Pwr. Drvr.	VIO-RED	J7-P3	BRN	J7-P1	20v DC	23-800 090-5001-00T
#19	DR. EVIL MOTOR RELAY BOARD	Q19	I/O Pwr. Drvr.	VIO-ORG	J7-P4	BRN	J7-P1	20v DC	Relay Bd. 520-5010-00
#20	TIME MACHINE MTR RELAY BD	Q20	I/O Pwr. Drvr.	VIO-YEL	J7-P6	BRN	J7-P1	20v DC	Relay Bd. 520-5010-00
#21	LASER BEAM MTR RELAY BD	Q21	I/O Pwr. Drvr.	VIO-GRN	J7-P7	BRN	J7-P1	20v DC	Relay Bd. 520-5010-00
#22	LASER BEAM DIVERTER	Q22	I/O Pwr. Drvr.	VIO-BLU	J7-P8	BRN	J7-P1	20v DC	29-1000 090-5059-00
#23	ORBIT DIVERTER	Q23	I/O Pwr. Drvr.	VIO-BLK	J7-P9	BRN	J7-P1	20v DC	32-1800 090-5031-00
#24	OPTIONAL COIN METER	Q24	I/O Pwr. Drvr.	VIO-GRY	J7-P10	RED	J16-P7	5v DC	Meter 5v 091-5000-00

D iode O n T ermi n al S tri p (if noted)

Low Current Coils Group 2		Drive Transistor (D.T.)	Driver Output Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connection	Power Voltage	Bulb Type
#25	FLASH: LEFT ORBIT	Q25	I/O Pwr. Drvr.	BLK-BRN	J6-P1	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#26	FLASH: TOILET	Q26	I/O Pwr. Drvr.	BLK-RED	J6-P2	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#27	FLASH: LEFT RAMP	Q27	I/O Pwr. Drvr.	BLK-ORG	J6-P3	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#28	FLASH: CENTER RAMP	Q28	I/O Pwr. Drvr.	BLK-YEL	J6-P4	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#29	FLASH: RIGHT RAMP	Q29	I/O Pwr. Drvr.	BLK-GRN	J6-P5	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#30	FLASH: RIGHT ORBIT	Q30	I/O Pwr. Drvr.	BLK-BLU	J6-P6	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#31	FLASH: POPS X2	Q31	I/O Pwr. Drvr.	BLK-VIO	J6-P7	ORG	J6-P10	20v DC	#89 Bulb 165-5000-89
#32	FLASH: LEFT RAMP (LOW)	Q32	I/O Pwr. Drvr.	BLK-GRY	J6-P8	ORG	J6-P10	20v DC	#906 Bulb 165-5004-00

Note: In Test Flash Lamps Menu ("Flash" Icon), Flashers tested are all Flash Lamps located between Q1-Q32 (This Game.)

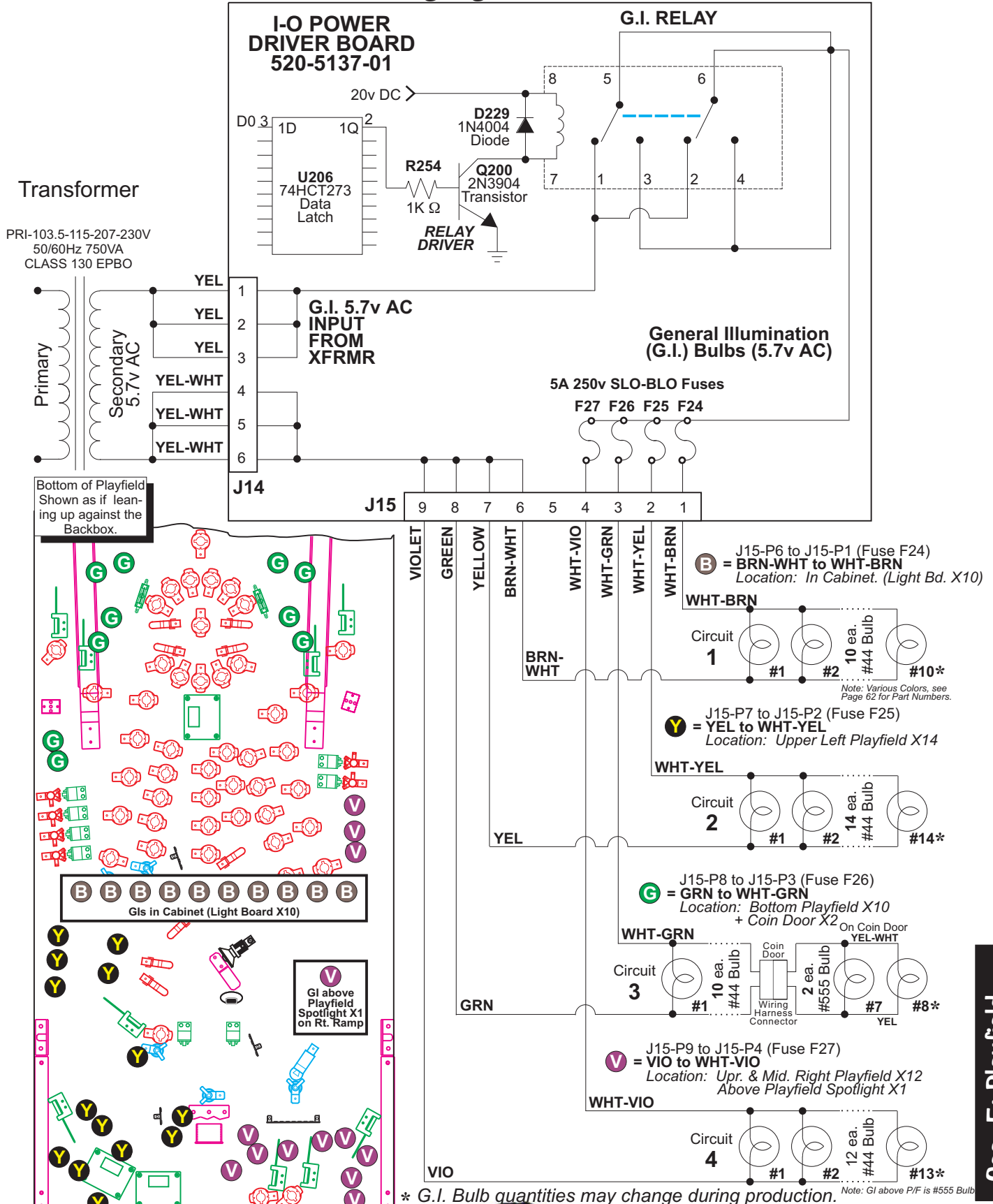
Auxiliary (UK ONLY)		Drive Transistor (D.T.)	Driver Output Board	D.T. Control Line Color	D.T. Control Line Connect	Power Line Color	Power Line Connection	Power Voltage	Coil GA-Turn
AUX 1:	LEFT UP/DOWN POST	Q1	Sol. Expander (Aux. Board)	WHT	J3-P11	BRN	J7-P1	20v DC	26-1200 090-5044-00T
AUX 2:	CENTER UP/DOWN POST	Q2	Sol. Expander (Aux. Board)	RED	J3-P10	BRN	J7-P1	20v DC	23-1100 090-5030-00T
AUX 3:	RIGHT UP/DOWN POST	Q3	Sol. Expander (Aux. Board)	ORG	J3-P9	BRN	J7-P1	20v DC	26-1200 090-5044-00T

Sec. 5: Schematics ...



Playfield Wiring

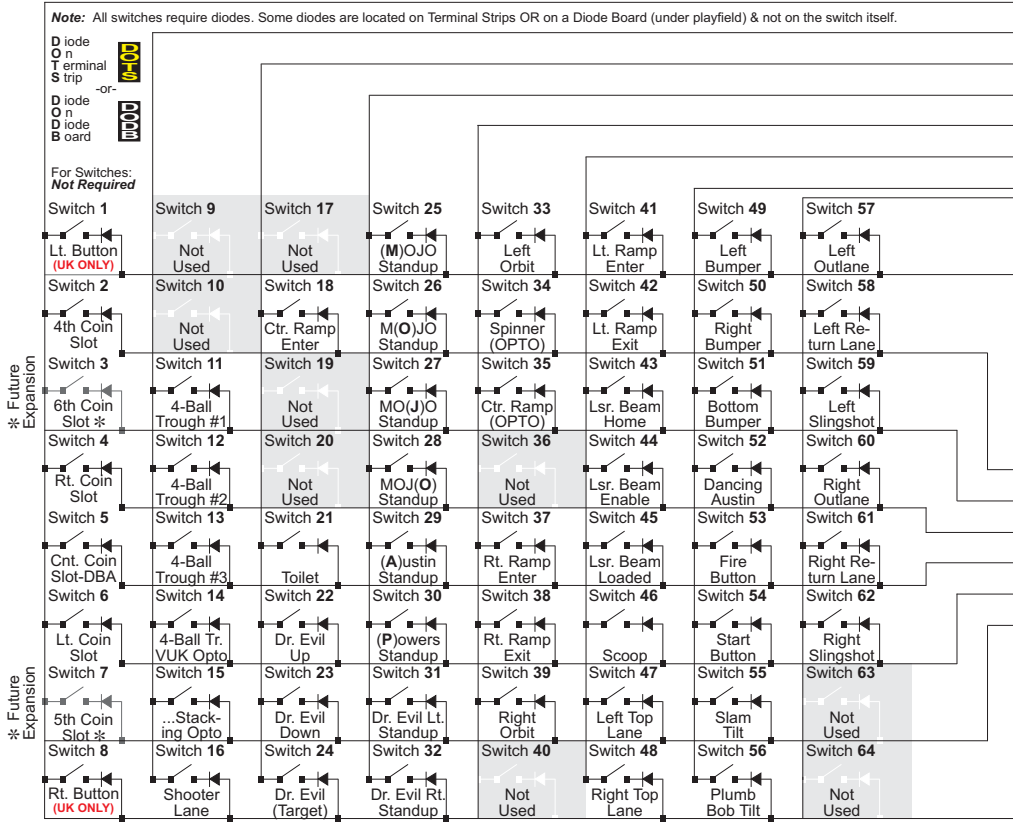
General Illumination Circuit Detailed Wiring Diagram



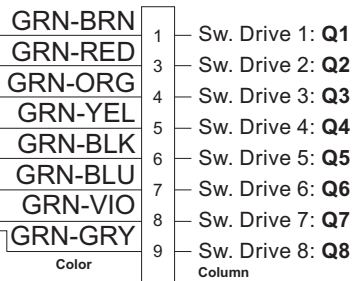
Sec. 5: Playfield ...



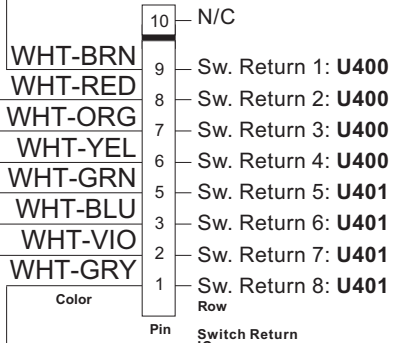
Playfield Switch Wiring Diagram



CPU-Snd. Bd. CN5-

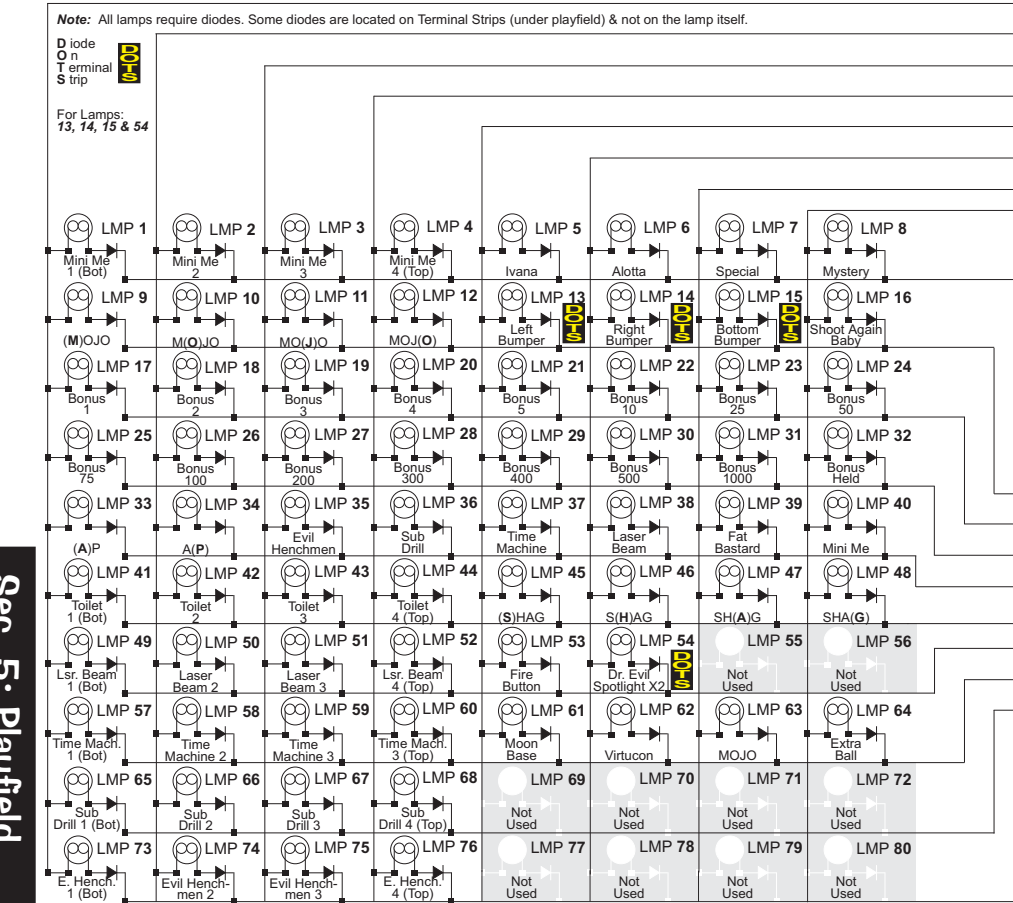


CPU-Snd. Bd. CN7-

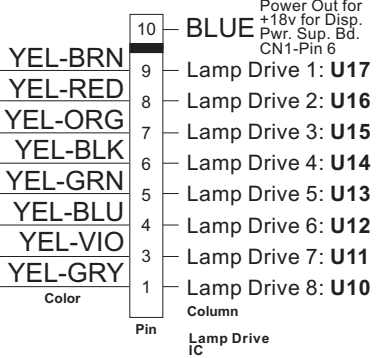


Please Note: Switch & Lamp Descriptions may differ slightly than that of the Dot Display due to space restraints.

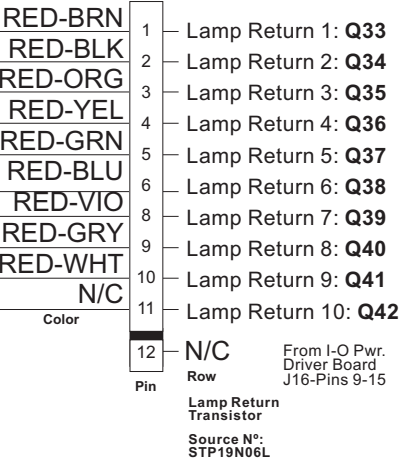
Playfield Lamp Wiring Diagram



I-O Bd. J13-



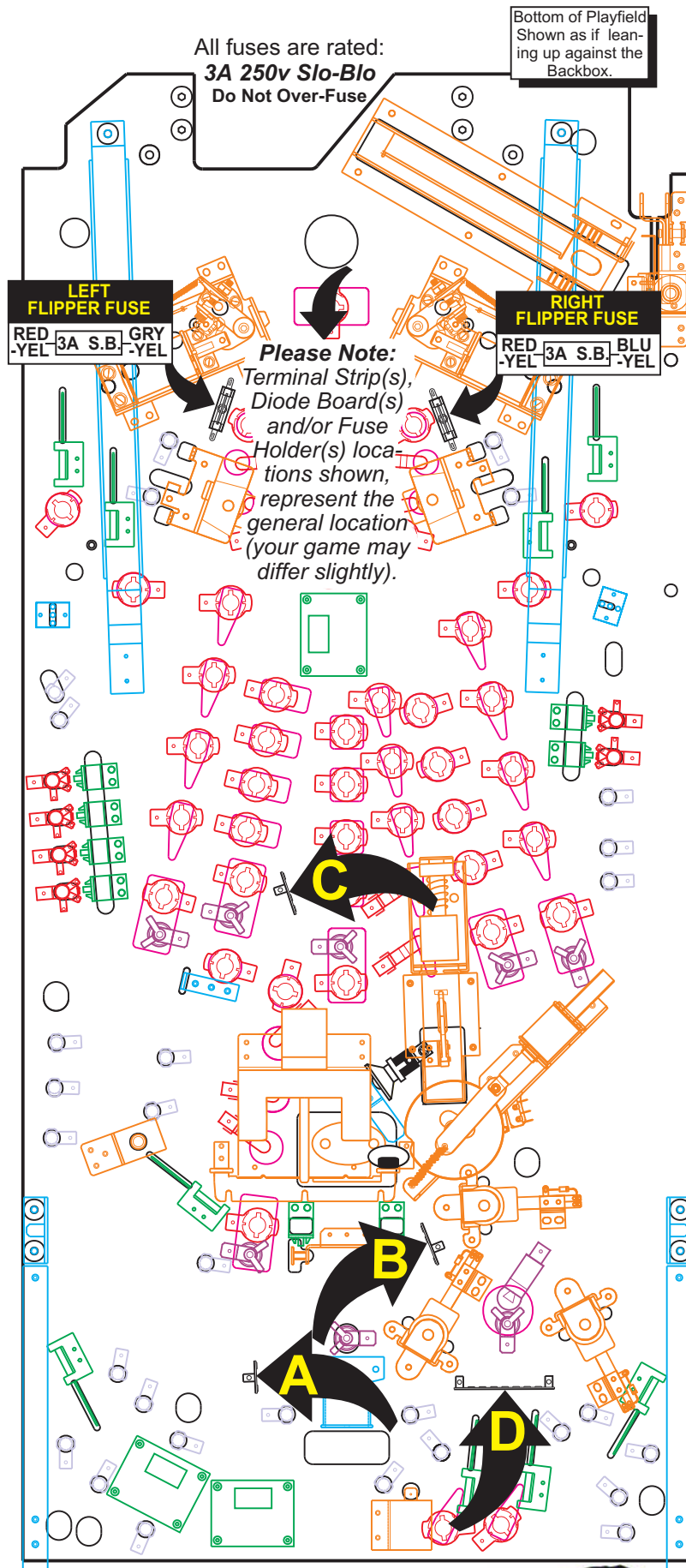
I-O Bd. J12-



Sec. 5: Playfield ...



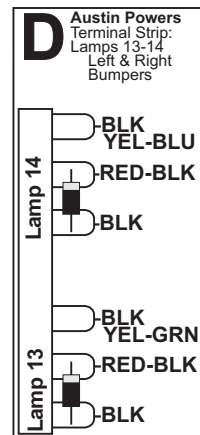
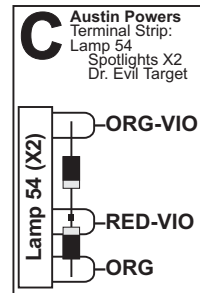
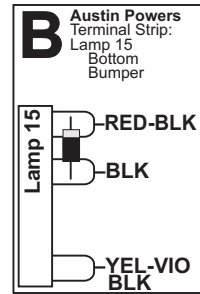
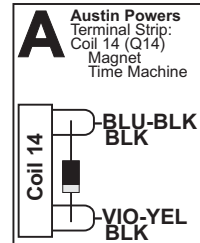
Playfield Terminal Strips, Fuses & Misc. Wiring Descriptions & Locations



Explanation:

All switches, lamps, coils require diodes. The diodes not physically located on the switch, lamp or coil are located on Terminal Strips or Diode Bd. under the playfield. The Switch & Lamp Matrix Grids also note which switch or lamp has a diode on a Terminal Strip (noted by "DOTS" meaning: "Diode on Terminal Strip") or Diode Board (noted by "DODB" meaning: "Diode on Diode Board").

Note: This game there is no Diode Board used.



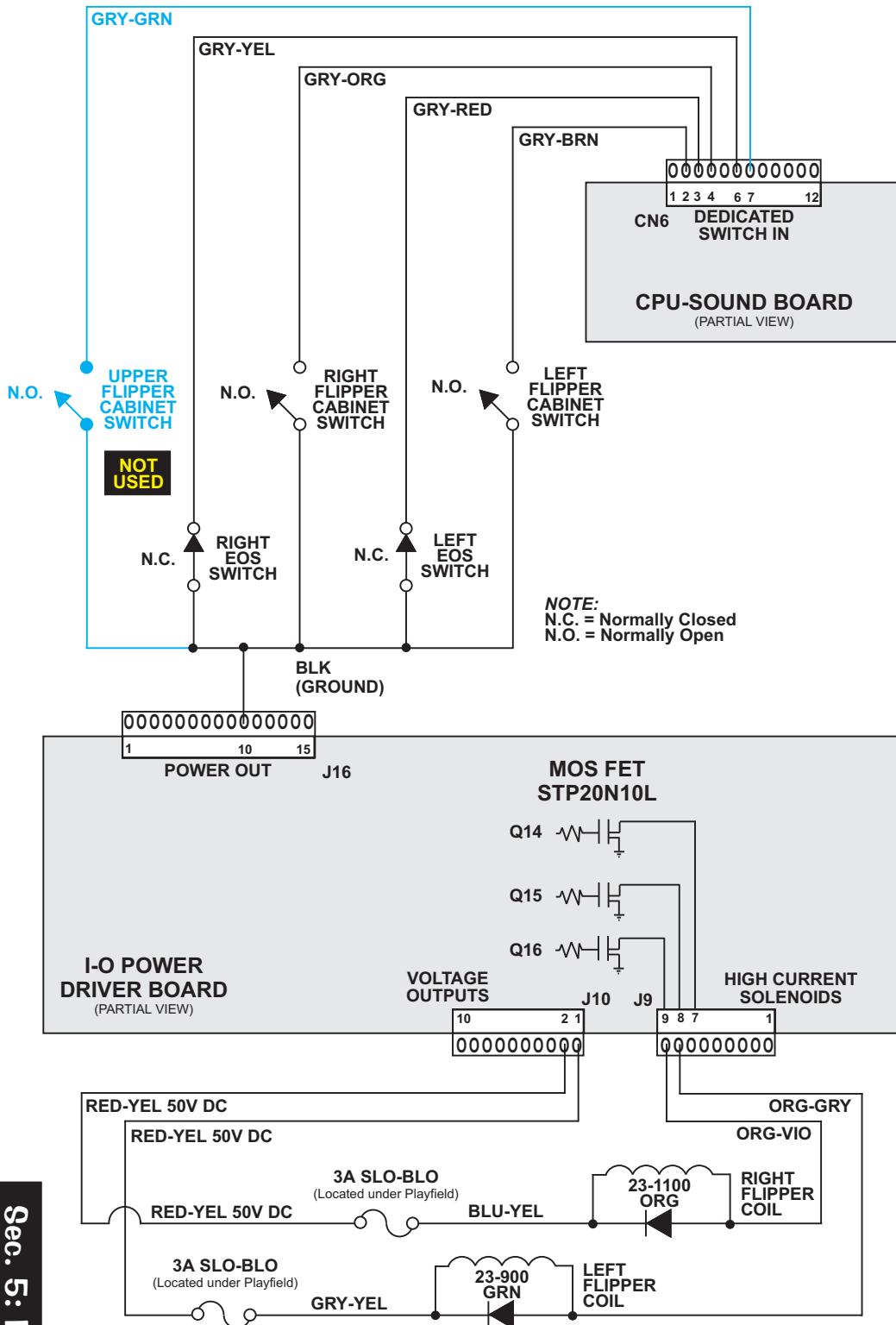
See the Pink Pages, *Playfield - General Parts (Below)* (Page 54) for Terminal Strips, Diodes, Fuses and Fuse Holders Part N^{os}.

Sec. 5: Playfield ...



2-Flipper Circuit Wiring Diagram

The **White Star Board System™** has allowed us to *simplify* the *Flipper Circuit* to the point where we have *eliminated* the *Flipper Board* all together. The *Flipper Circuit* is now configured the same as any other Solenoid Drive Circuit.



Technical Overview

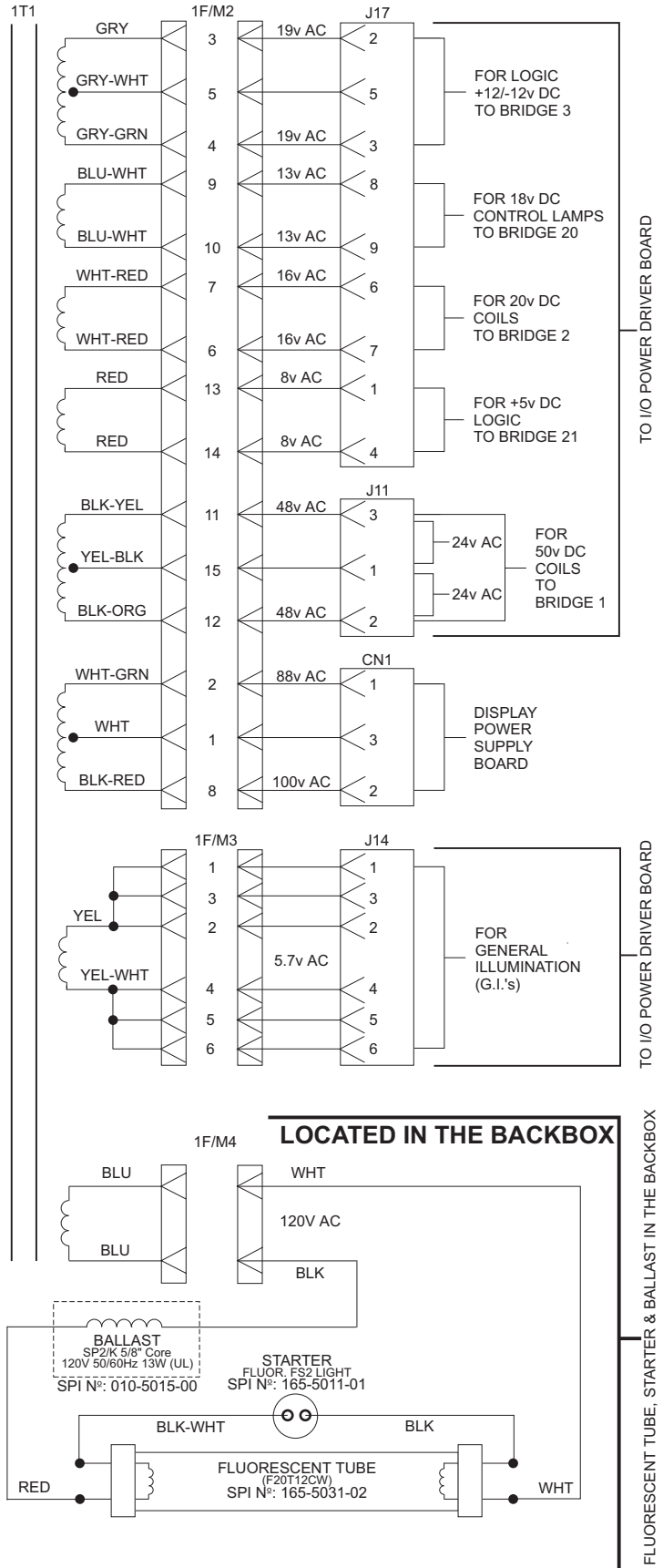
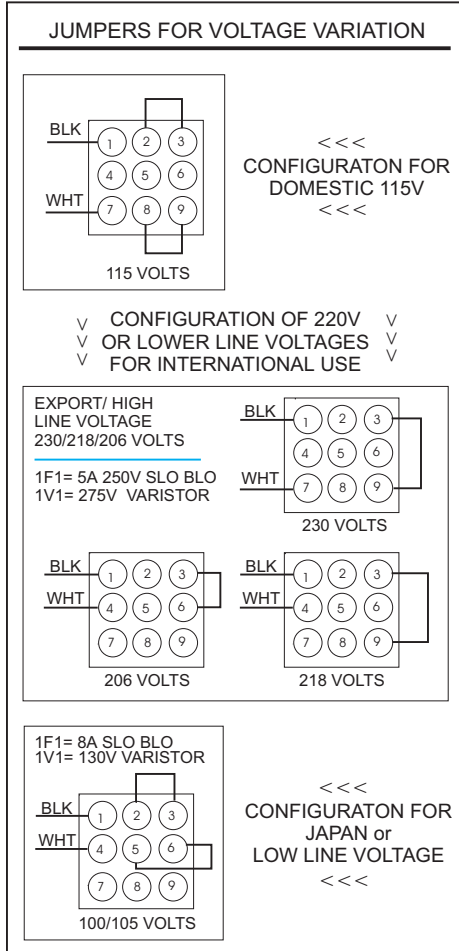
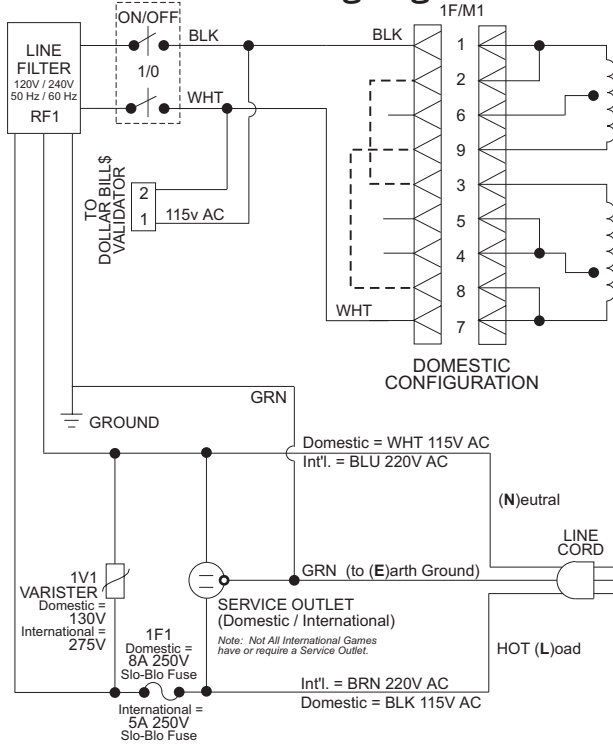
Our **Flipper System** uses one supply voltage (50v DC) for both **kick** & **hold**. Once the **Game CPU** detects a Flipper Cabinet Switch closure (during game play) it applies a 40msec pulse to the gate of the Flipper Drive Transistor (STP-20N10L). If it continues to detect a Flipper Cabinet Switch 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.

The **E.O.S.** (End-Of-Stroke) **Switch** serves the same function as before as it prevents foldback when the player has the flipper energized to capture balls. The **E.O.S. Switch** is a normally closed switch which opens approximately 1/16" when the flipper is energized. The **Game CPU** will detect a switch closure if the flipper bat is forced back by a high velocity shot or rebound on the playfield and will apply another 40msec pulse of 50v DC to the coil.

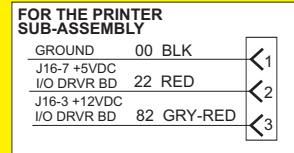
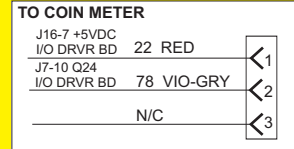
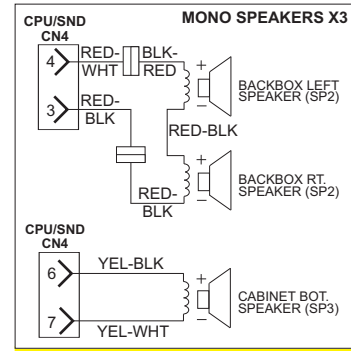
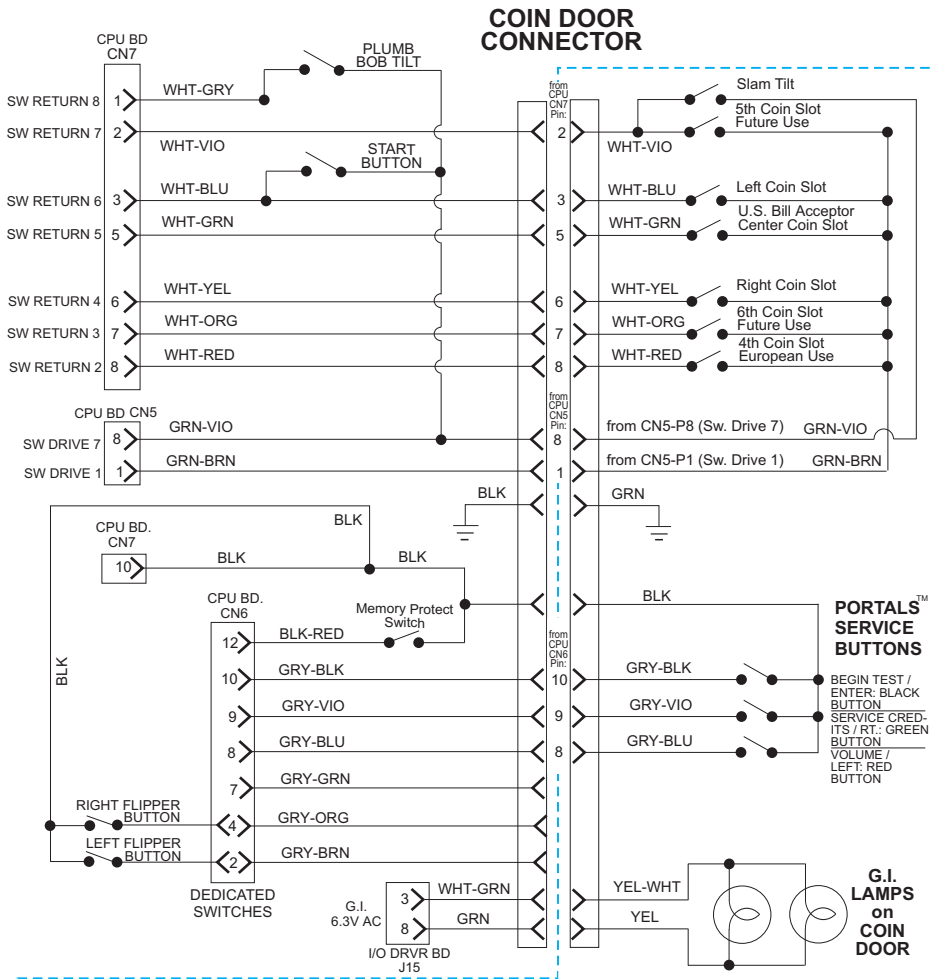
Note: If an Upper Flipper is used, the Flipper Button on the side of the Upper Flipper will have a **"Double-Stacked" E.O.S. Switch**. This allows the player to push the Flipper Button half-way down to energize only the Lower Flipper; pushing the Flipper Button all the way down will energize both the Lower & Upper Flippers.

Cabinet Wiring

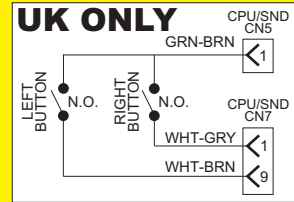
Transformer Power Wiring Diagram



Cabinet / Coin Door Wiring Diagram

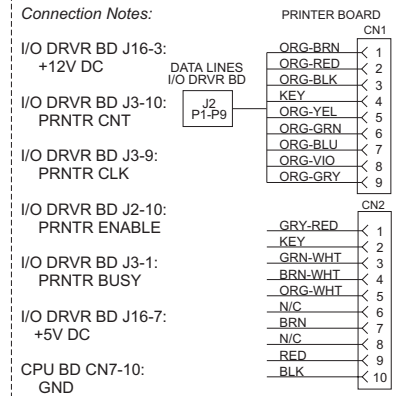


UK ONLY: 2 Extra Cabinet Buttons for the Post Save™ Feature are used. The Left Button operates the Left Outlane Ball Deflector. The Right Button operates the Right Outlane Ball Deflector. Both buttons pushed together operate the Center Up/Down Post. Both buttons are located under the Flipper Buttons.

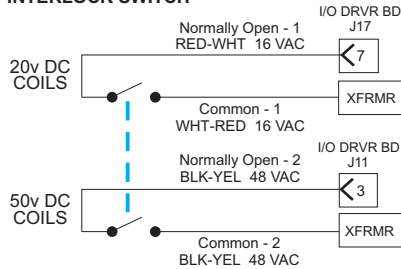


PRINTER INTERFACE OPTIONAL

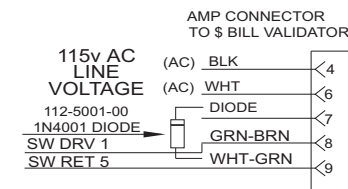
Cable Wiring Harness SPI Part N°:
036-5408-00
RS-232 Printer Interface Board SPI Part N°:
520-5069-00



COIL POWER INTERLOCK SWITCH

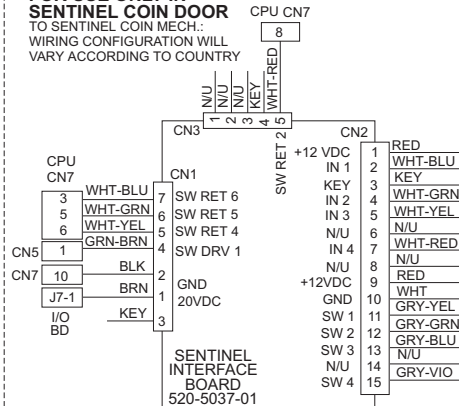


FOR USA 2 SLOT COIN DOOR ONLY

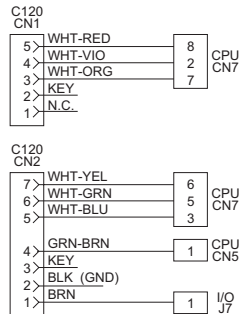


FOR USE ONLY IN SENTINEL COIN DOOR

TO SENTINEL COIN MECH.:
WIRING CONFIGURATION WILL VARY ACCORDING TO COUNTRY



FOR C120 INTERFACE BOARD



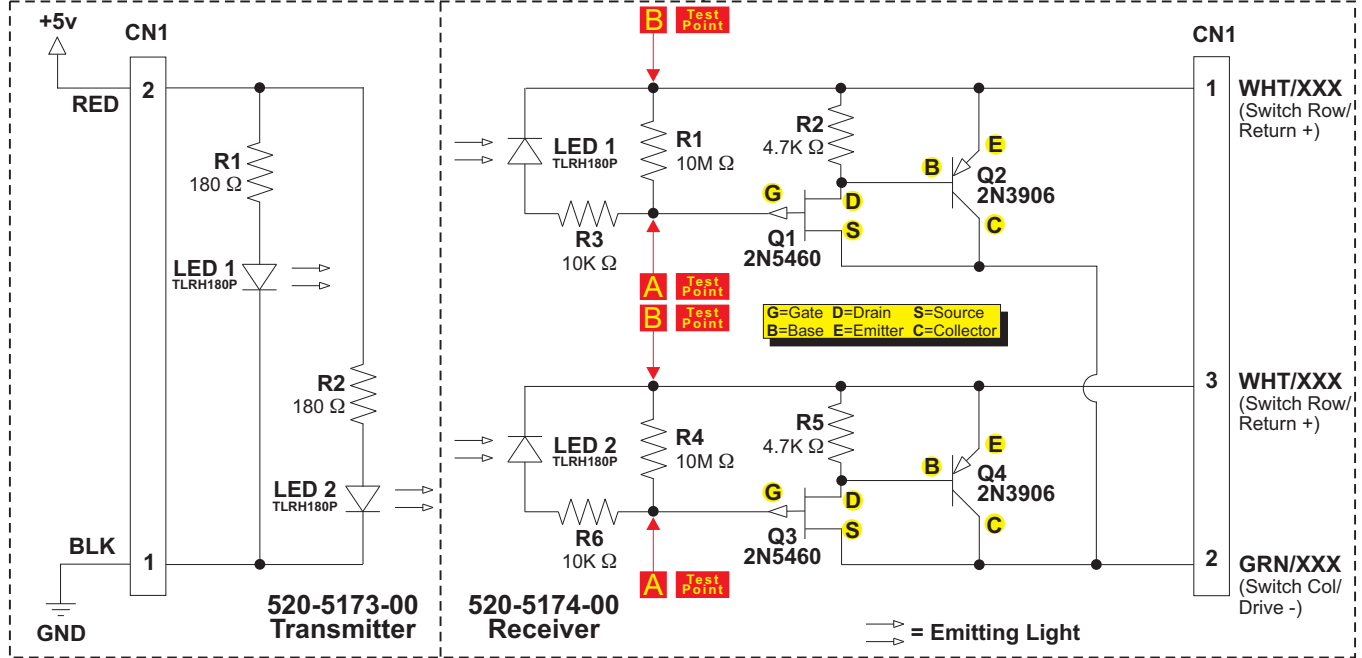
COIN DOOR



Printed Circuit Boards (PCBs)

Trough Up-Kicker Dual OPTO Boards Theory of Operation & 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**.



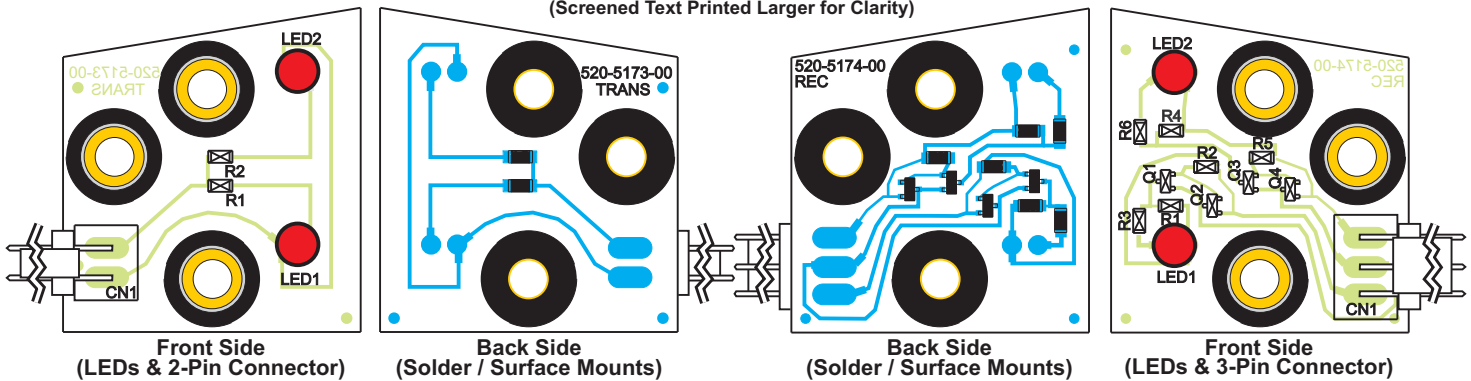
Trough Up-Kicker Dual OPTO Boards Component Layout & Parts

520-5173-00 (TRANS)

Boards Actual Size

520-5174-00 (REC)

(Screened Text Printed Larger for Clarity)



ITEM	QTY	PART NUMBER	REF-DESIGNATOR	DESCRIPTION
A	1	515-0173-00	Dual-OPTO Trans. Bd. Assy.	PCB Assy. (with all Items 1-5) PCB Assy. (with Items 1-3 only) 2X, .156" Rt. Angle (26-60-5020) Conn. LED TLRH180P (Ultra Bright Red) 180 Ω 1/8W Chip Res. (CRCW) OPTO PCB Brass Tube Spacer OPTO PCB Rubber Grommet
—	1	520-5173-00	Dual-OPTO Trans. Board	
01	1	045-5111-02	CN1	
02	2	165-5052-00	LED1, LED2	
03	2	121-5067-00	R1, R2	
04	3	530-5308-02	n/a	
05	3	545-5518-00	n/a	
B	1	515-0174-00	Dual-OPTO Rec. Bd. Assy.	
—	1	520-5174-00	Dual-OPTO Rec. Board	
01	1	045-5111-03	CN1	
02	2	165-5052-00	LED 1, LED 2	PCB Assy. (with all Items 1-9) PCB Assy. (with Items 1-7 only) 3X, .156" Rt. Angle (26-60-5030) Conn. LED TLRH180P (Ultra Bright Red) 2N5460, Transistor (P-FET SOT-23) 2N3906 , Transistor 10M Ω 1/8W Chip Res. (CRCW) 4.7K Ω 1/8W Chip Res. (CRCW) 10K Ω 1/8W Chip Res. (CRCW) OPTO PCB Brass Tube Spacer OPTO PCB Rubber Grommet
03	2	110-5006-00	Q1, Q3	
04	2	110-0086-00	Q2, Q4	
05	2	121-5082-00	R1, R4	
06	2	121-5083-00	R2, R5	
07	2	121-5011-00	R3, R6	
08	3	530-5308-02	n/a	
09	3	545-5518-00	n/a	

Replacement Part:
LED TLRH180P
(T1-3/4 GaAlAs)
 SPI Part N°:
165-5052-00



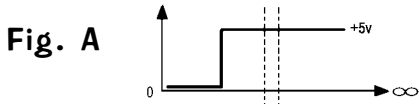
OPTO Troubleshooting

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

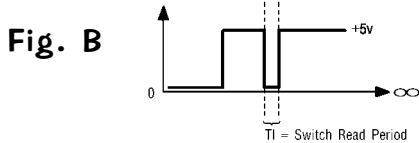
A. **OPEN OPTO** (Light Falling on LED) = *SWITCH OPEN*. Place meter leads across points **A** and **B** on the **LED1 Circuit** (Refer to Schematic Drawing on previous page, 520-5174-00 Receiver Side). It should read approximately 0.8 - 1.2v DC. The **LED2 Circuit** operates the same.

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.



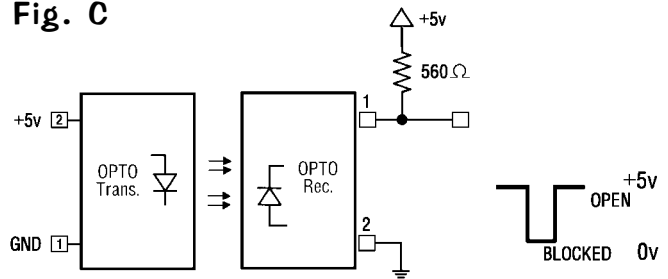
B. **CLOSED OPTO** (Light Blocked) = *SWITCH CLOSED*. Place Scope lead at **Pin-1** of OPTO Rec. Board with Scope Grounded (see Schematic). The Scope should display a **PULSE STREAM** indicating **Q2** has switched "On" as shown in **Fig. B**, Wave Form Diagram. This is your Switch Drive Pulse.

3. Bench Test (See Fig. C):

Please Note: To perform this test you must use a spare 560Ω Pull-Up Resistor, SPI N^o: 121-5047-00

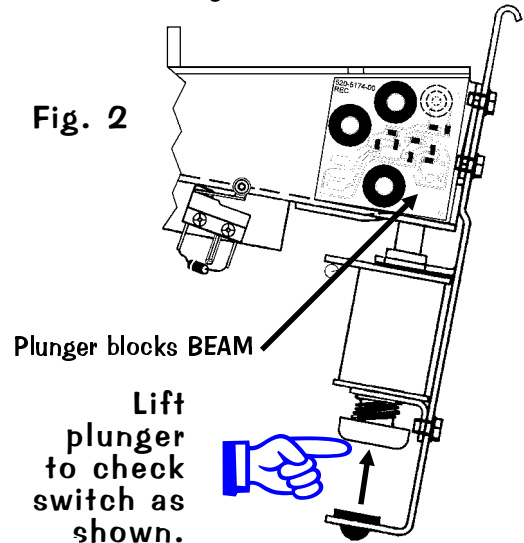
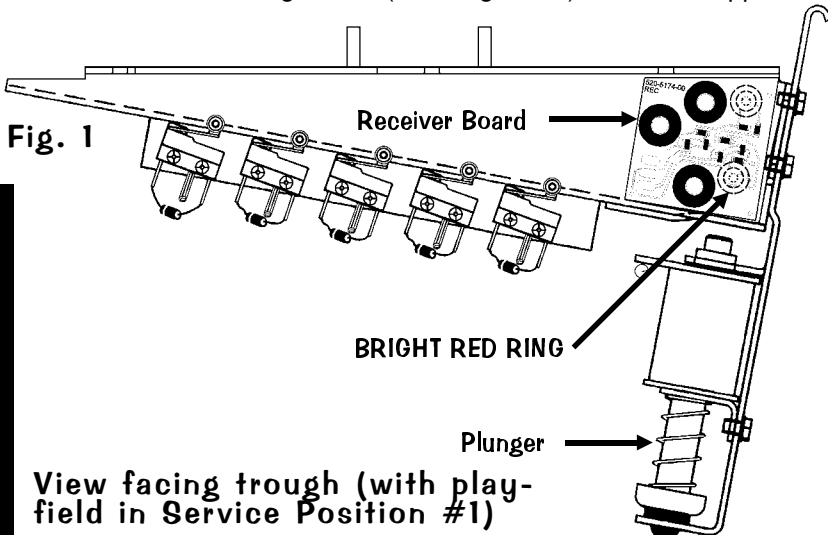
Disconnect the OPTO Transmitter / Receiver Board from the circuit. Connect one side of a 560Ω Pull-Up Resistor to **Pin-1** of the OPTO Receiver Bd. and the other side of the resistor to a 5v DC source. Connect **Pin-2** to GND. Connect a +5v DC source to **Pin-1** of the Transmitter & GND to **Pin-2**.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

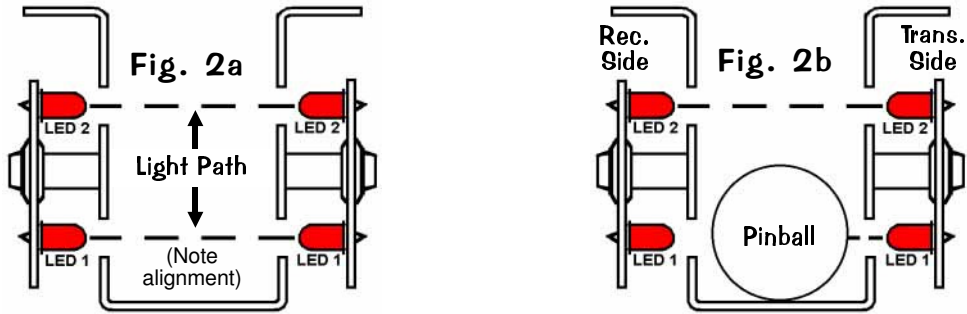


Trough Dual OPTO Boards Alignment / Test for LED1

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.

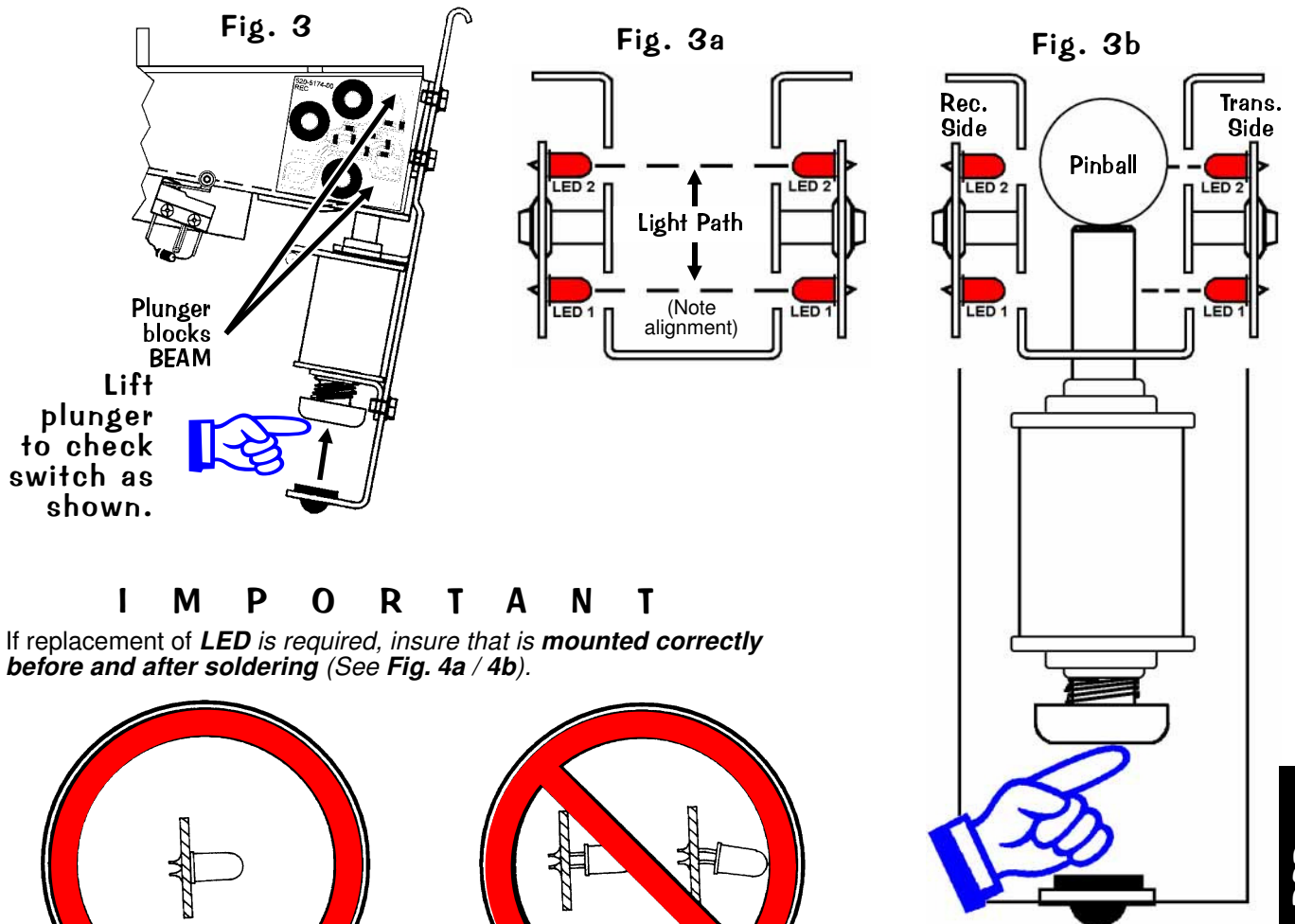


Sectional view from right (Fig. 2a & 2b)



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 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, 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**).

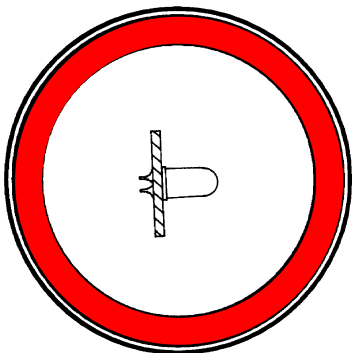


Fig. 4a
Correct Position

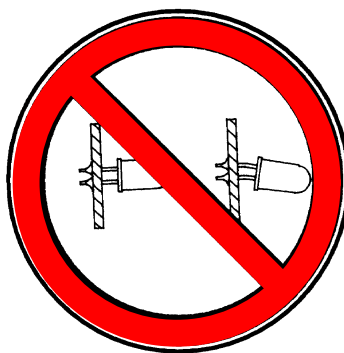
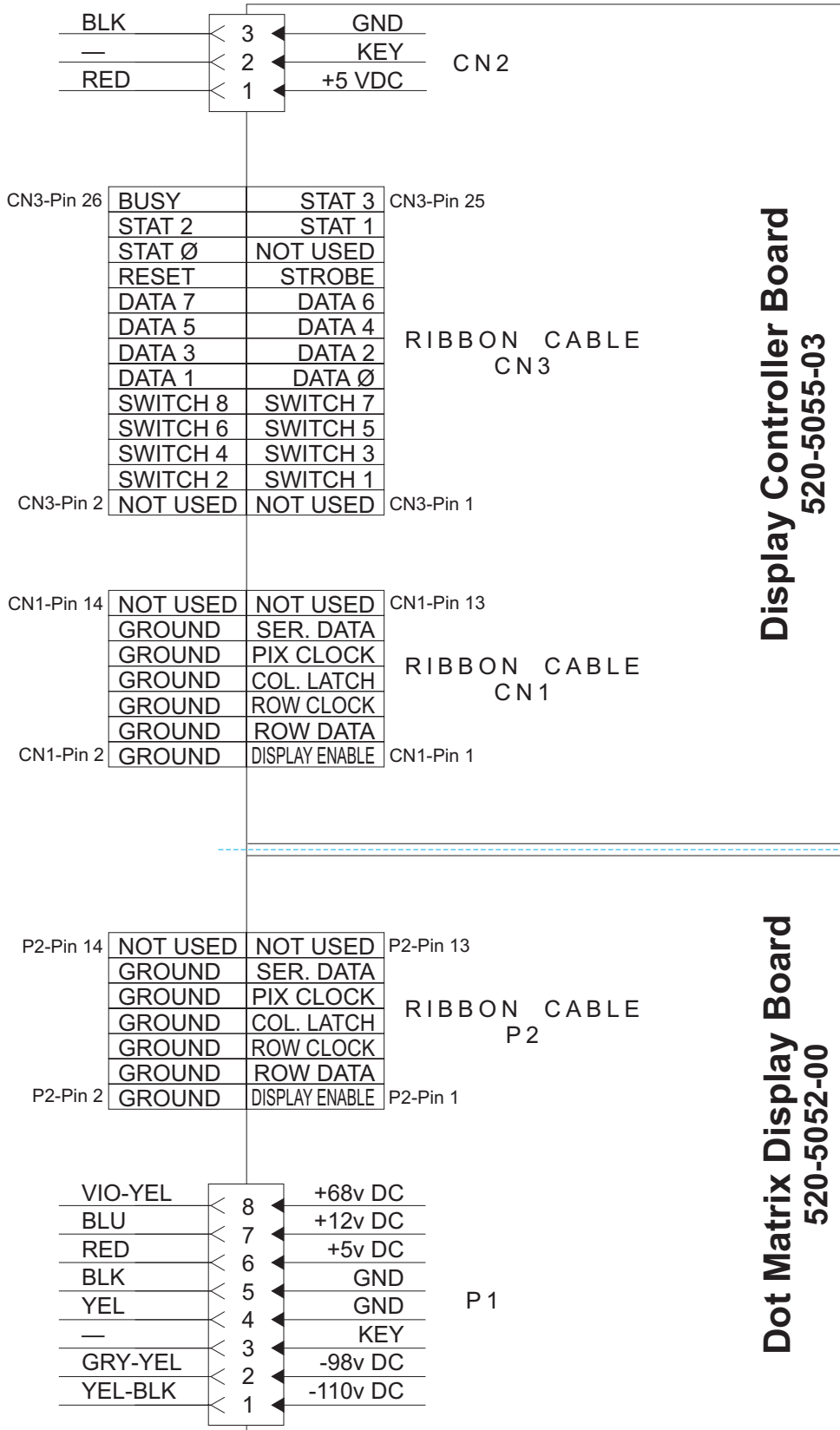
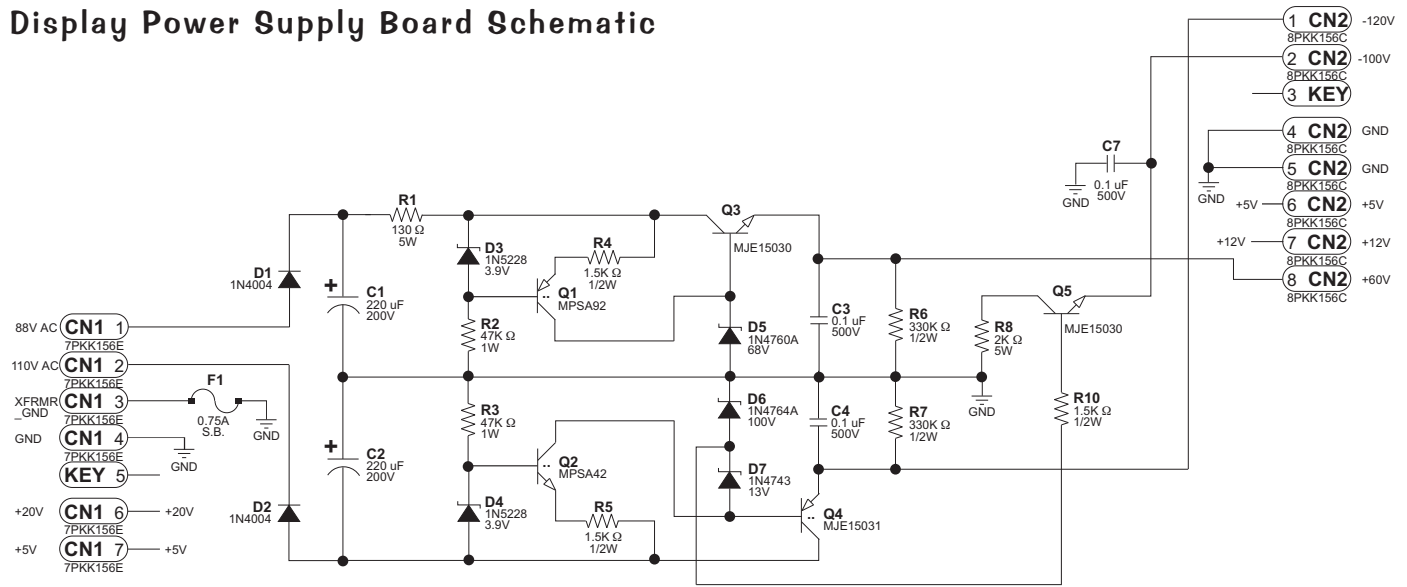


Fig. 4b
Incorrect Position

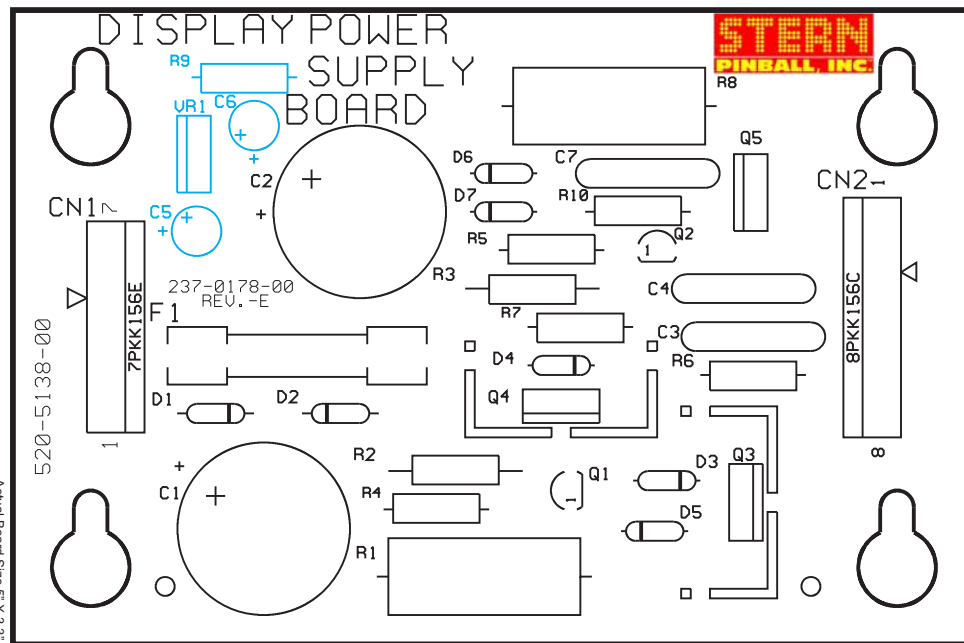
Dot Matrix Display / Display Controller Bd. Combined Display Connections



Display Power Supply Board Schematic



Display Power Supply Board Component Layout & Parts

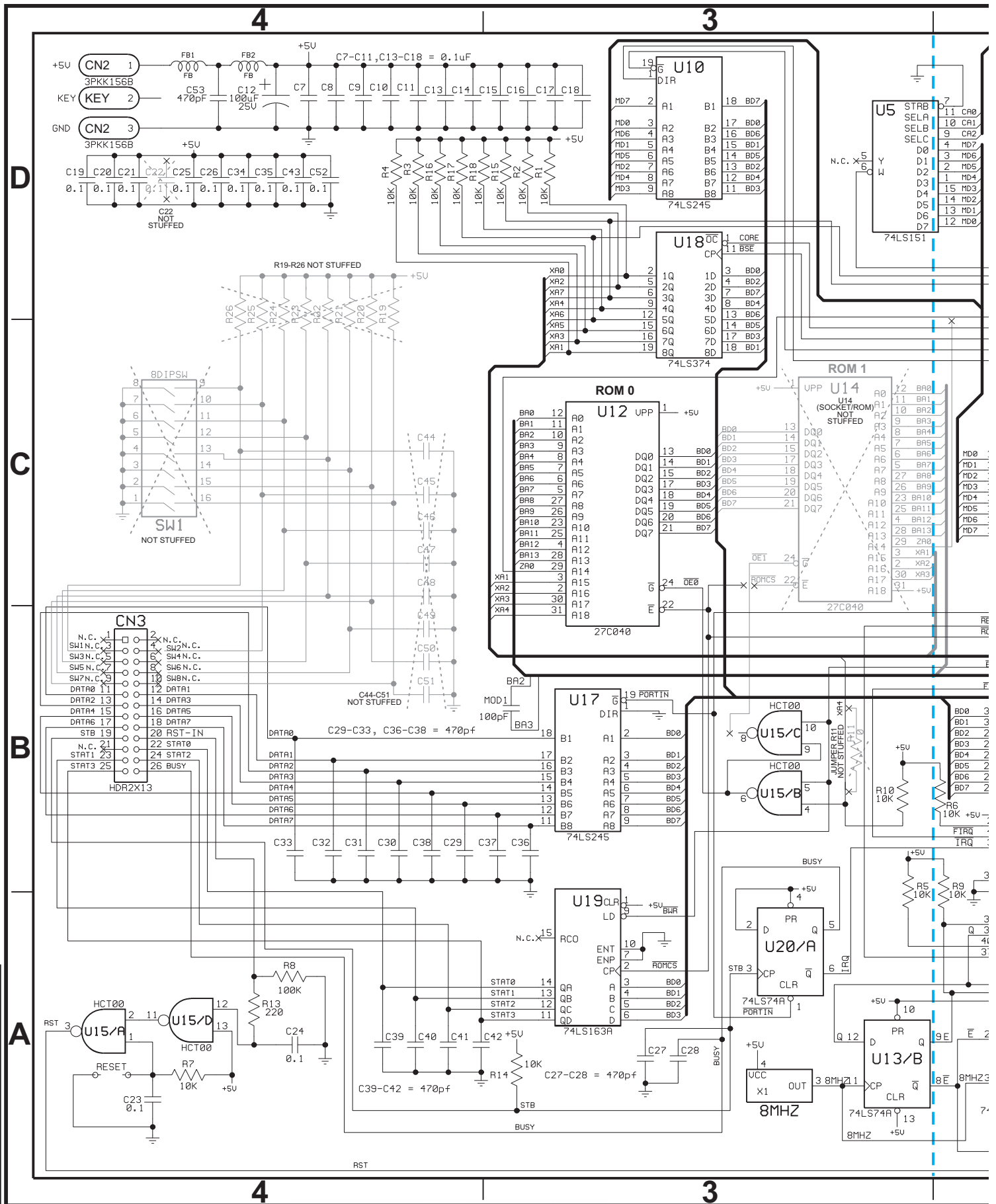


ITEM	QTY	PART NUMBER	REF-DESIGNATOR	DESCRIPTION (NS = Not Stuffed)
—	1	520-5138-00	Display Power Supply Board	Complete PCB Assembly
01	2	125-5044-00	C1, C2	220uF, 200v, Radial Lytic Cap.
02	3	125-5035-00	C3, C4, C7	0.1uF, 500v, Ceramic Disk Cap.
03	0	125-5003-00	(C5, C6: NS)	22uF, 35v, Rad Lytic Cap
04	1	045-5015-07	CN1	7PKK156E (PIN5=KEY)
05	1	045-5015-08	CN2	8PKK156 (PIN3=KEY)
06	2	112-5003-00	D1, D2	1N4004, Diode
07	2	112-0053-00	D3, D4	1N5228, 3.9v, Diode
08	1	112-0062-00	D5	1N4760A, 68v, Diode
09	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 5W Res.
21	2	121-5060-00	R2, R3	47K Ω 1W Res.
22	3	121-5038-00	R4, R5, R10	1.5K Ω 1/2W Res. (R9: NS)
23	2	121-5059-00	R6, R7	330K Ω 1/2W Res.
24	1	121-5062-00	R8	2K Ω 5W Res.
25	0	124-5003-00	(VR1: NS)	7812CT

Sec. 5: PCBs



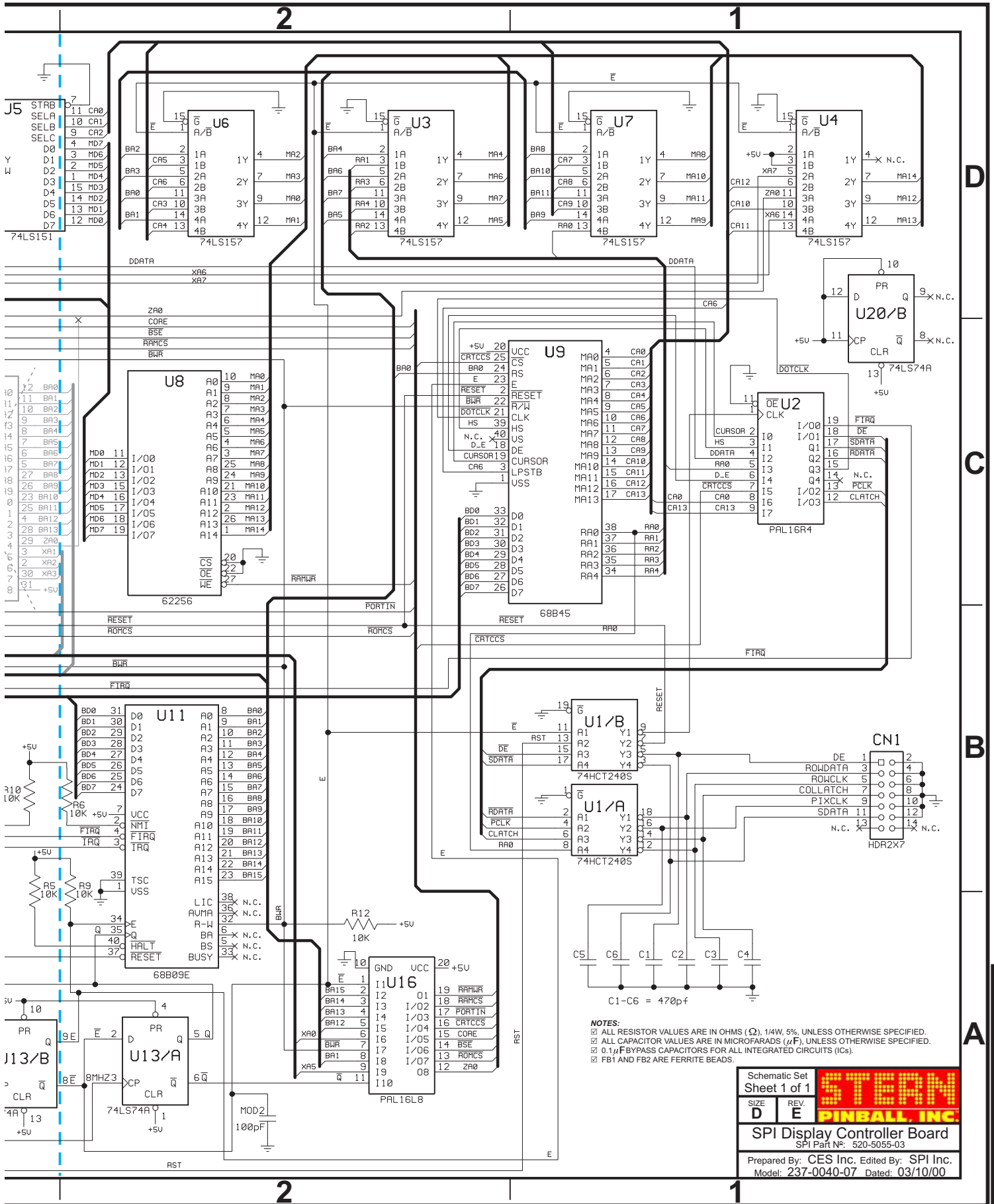
Display Controller Board Schematic



Sec. 5: PCBs



Display Controller Board Schematic



Schematic Set
Sheet 1 of 1

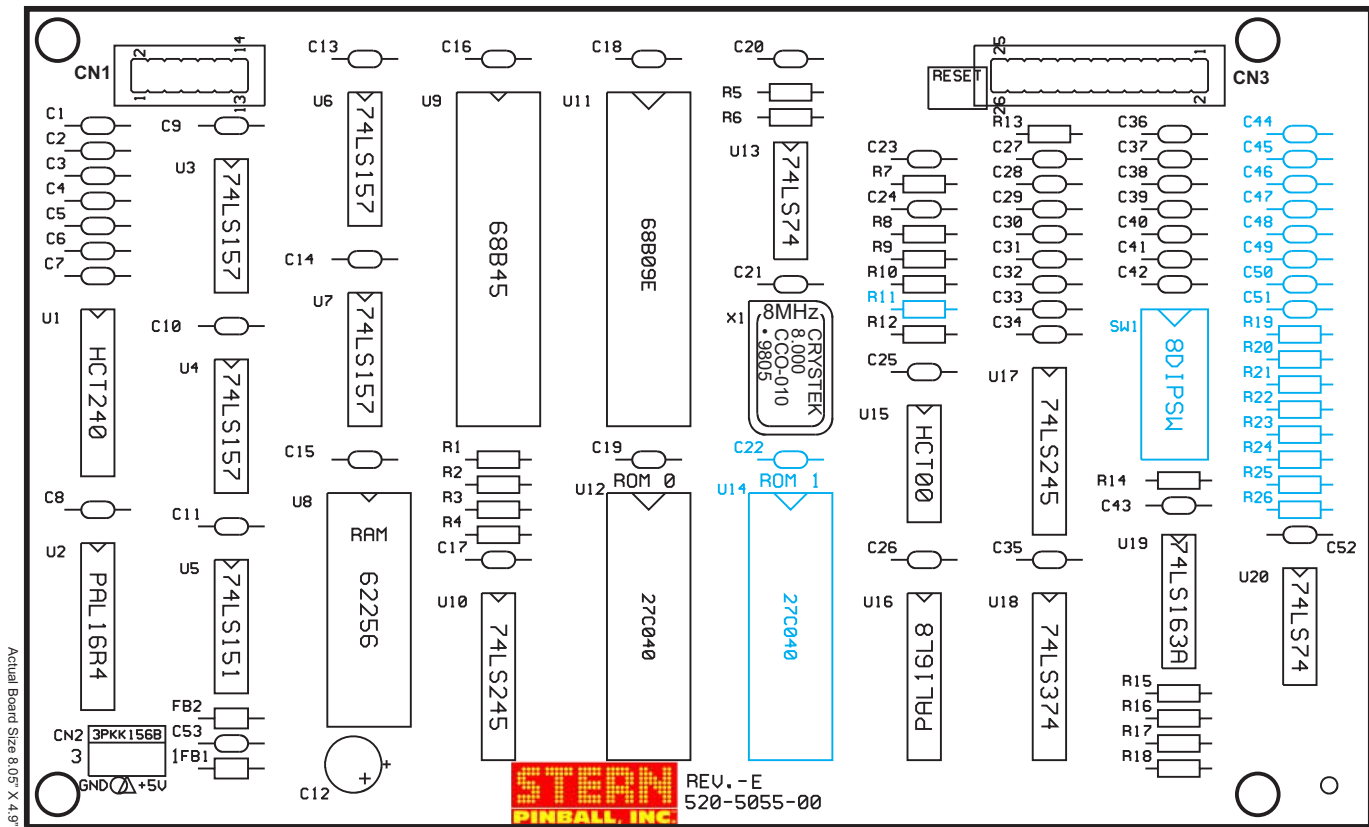
STERN
PINBALL, INC.

SPI Display Controller Board
SPI Part #: 520-5055-03

Prepared By: CES Inc. Edited By: SPI Inc.
Model: 237-0040-07 Dated: 03/10/00



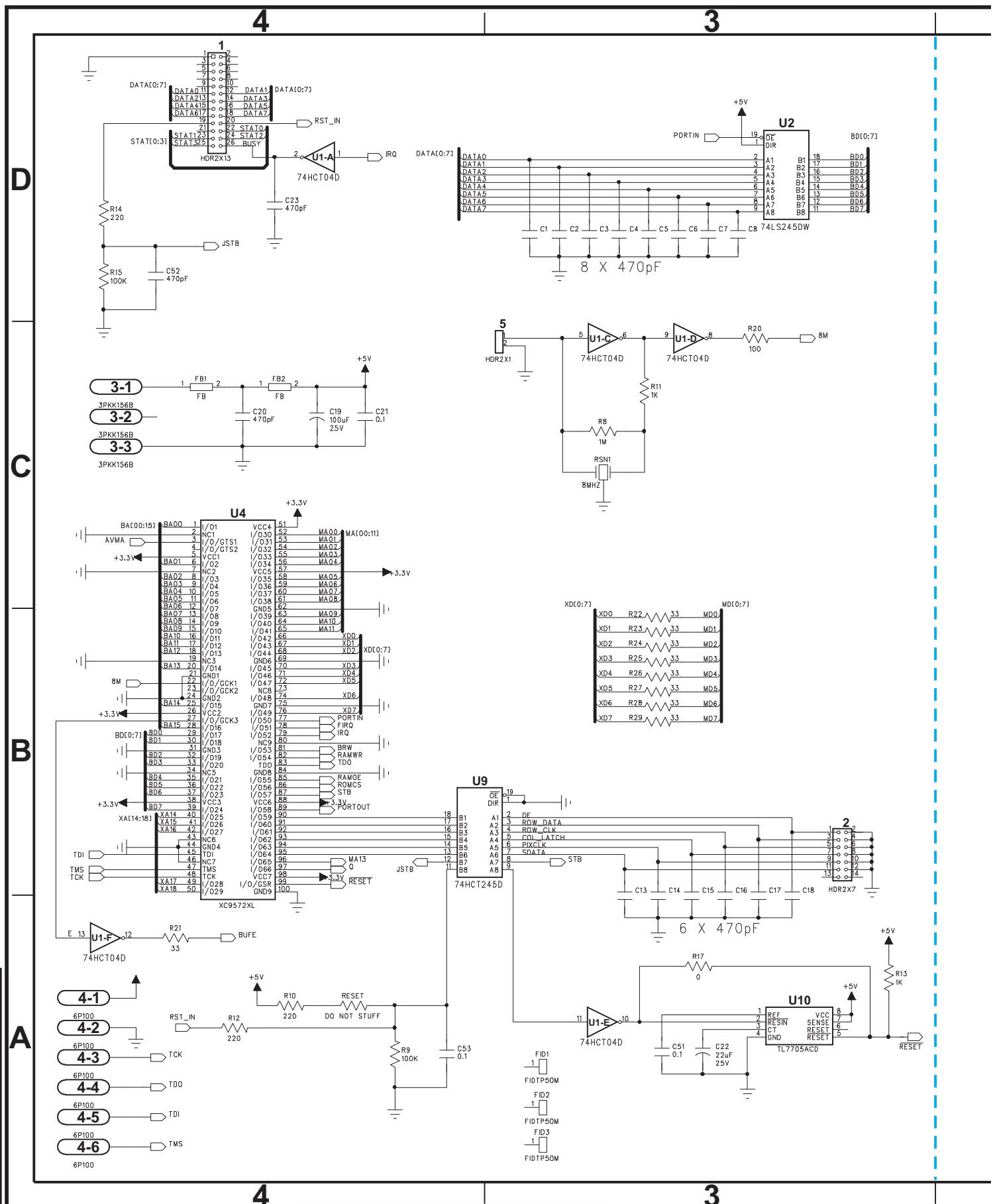
Display Controller Board Component Layout & Parts



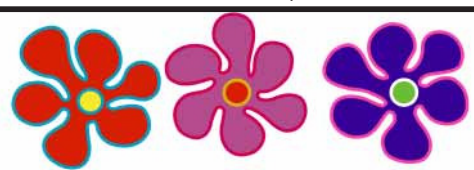
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1	1	520-5055-03	Display Controller Board (FCC FEB98) Rev. E	Complete PCB Assembly
01	14	125-5028-00	C1>C6, C27>C33, C36>C42, C53 (C44-C51: NS)	470pF, (471), Axl. Cap
02	23	125-5031-00	C7>C11, C13>C26, C34, C35, C43, C52 (C22: NS)	.1 uF, (104), Axial Cer. Cap
03	1	125-5015-00	C12	100uF, 25v, Cap. (Radial Elec.)
04	1	045-5015-02	CN1	7-Pin, Dual Row .1" Hdr. Conn.
05	1	045-5015-03	CN2	3-Pin, KK-156 Conn. (540445-3)
06	1	045-5015-26	CN3	13-Pin, Dual Row .1" HDR Conn.
07	2	n/a	FB1, FB2	Ferrite Bead (2743001182)
08	15	121-5011-00	R1>R7, R9, R10, R12, R14>R18 (R11: NS)	10K Ω 1/4W Res. 5%
09	1	121-5051-00	R8	100K Ω 1/4W C.F. Res. 5%
10	1	121-5014-00	R13	220 Ω 1/4W C.F. Res. 5%
11	0	n/a	(R19>R26: NS)	(SW1)
12	0	Not Used	(SW1: NS)	74HCT240
13	1	100-5001-00	U1	100pF, Cap.
14	1	n/a	U1 (@ Pins 9 & 10)	PAL16R4 (25CN), (Programmed)
15	1	965-0108-00	U2 - ORANGE DOT	- ORANGE DOT
16	4	100-0046-00	U3, U4, U6, U7	74LS157
17	1	100-5000-00	U5	74LS151
18	2	100-0058-00	U7, U10	74LS245
19	1	100-0397-00	U8	32K X 8 Static RAM (62256L-10PC)
20	1	100-0233-00	U9	68B45
21	1	100-0189-01	U11	68B09E
22	1 (See Pg. DR. Table)	077-5217-00	U12 (ROM 0) (U14 ROM 1: NS)	4MB ROM
23	1	100-0037-00	U13, U20	32-Pin, IC Dip Socket
24	2	100-0351-00	U15	74LS74
25	1	100-0351-00	U16 - ORANGE DOT	74HCT00
26	1	965-0107-00	U18	PAL16L8 (15CN), (Programmed)
27	1	100-0064-00	U19	- ORANGE DOT
28	1	100-0049-00	X1	74LS374
29	1	140-0013-00		74LS163A
				8Mhz Clock Oscillator



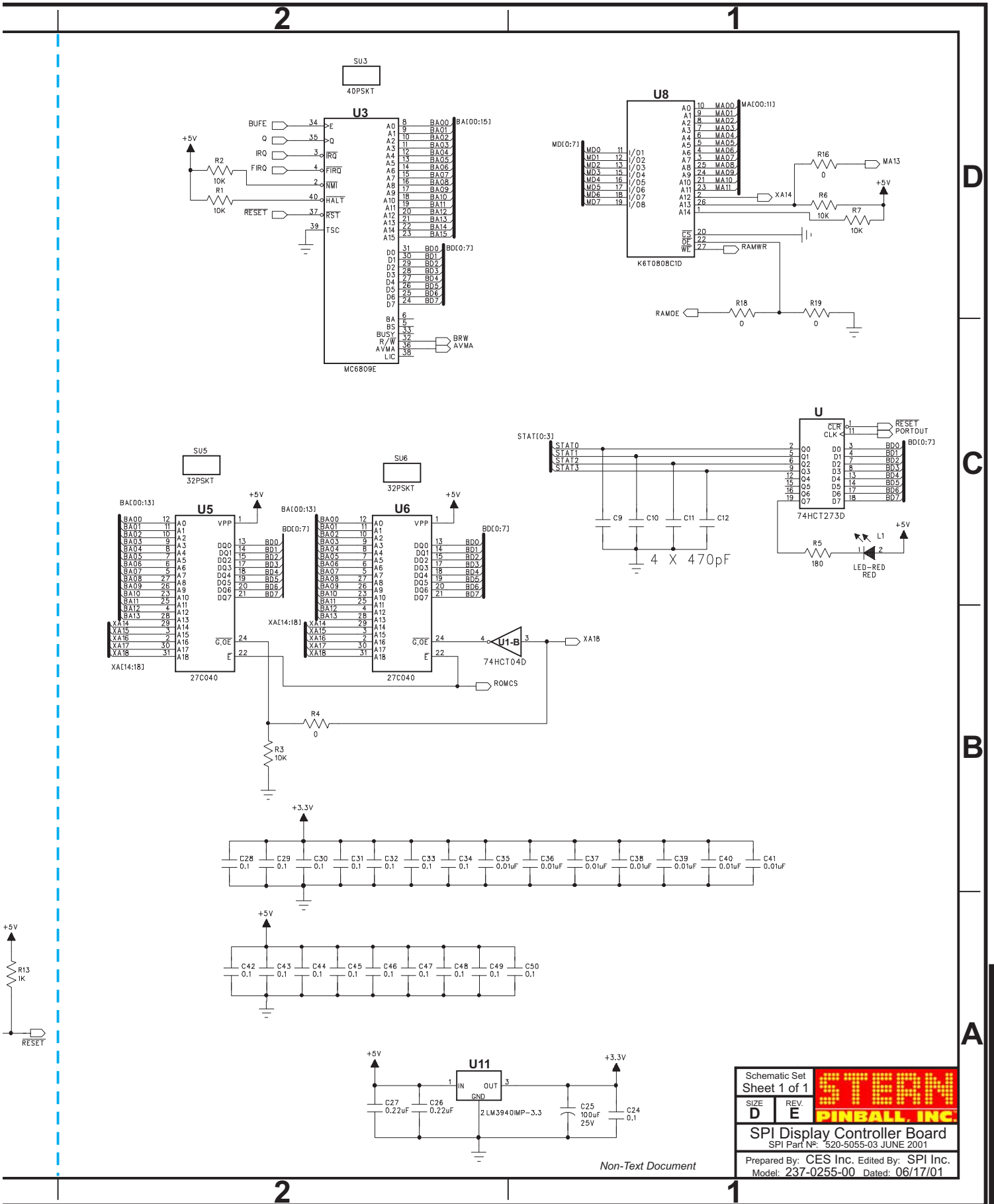
Display Controller Board Schematic



Sec. 5: PCBs



Display Controller Board Schematic



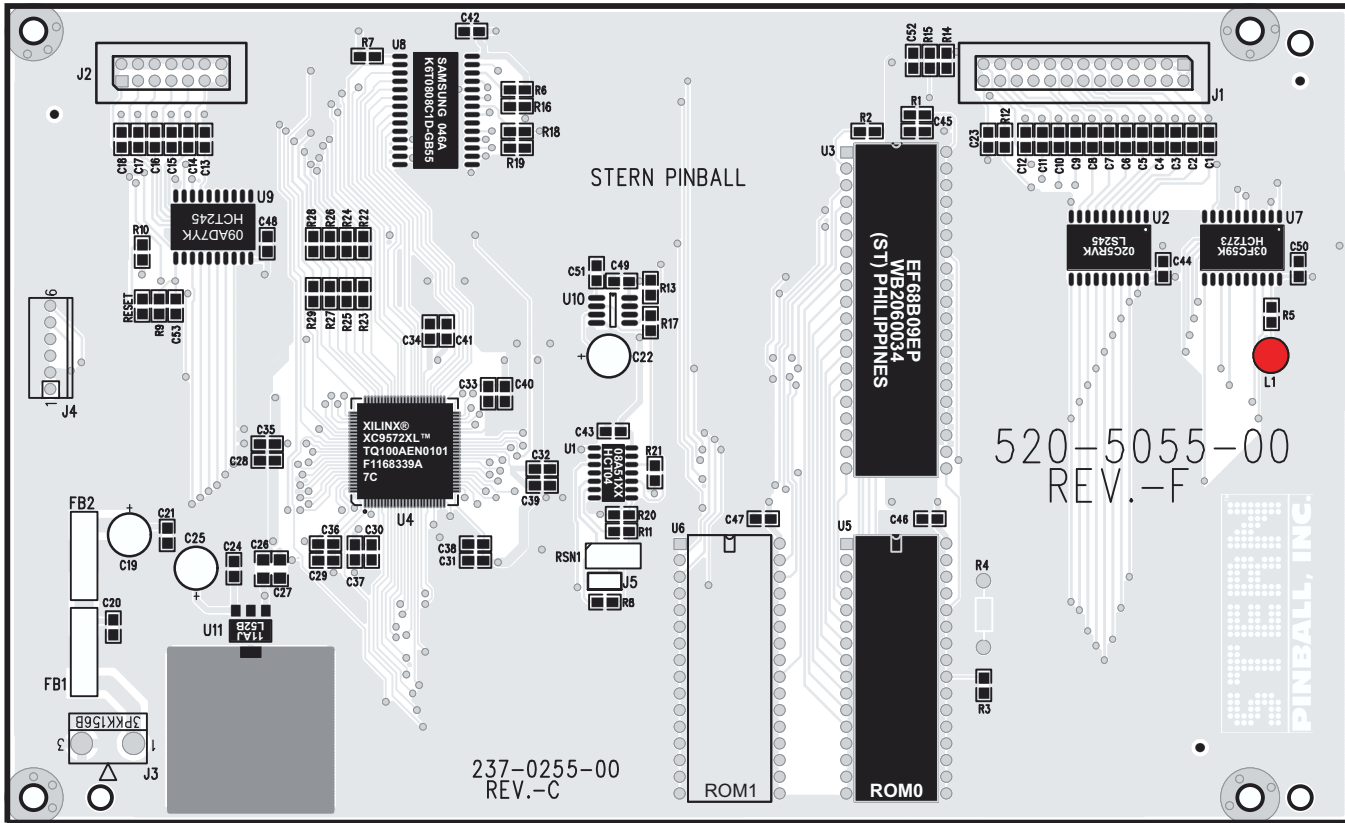
Schematic Set		STERN
Sheet 1 of 1		
SIZE	REV.	PINBALL, INC.
D	E	
SPI Display Controller Board		
SPI Part No: 520-5055-03 JUNE 2001		
Prepared By: CES Inc. Edited By: SPI Inc.		
Model: 237-0255-00 Dated: 06/17/01		

Non-Text Document

Sec. 5: PCBs



Display Controller Board Component Layout & Parts



ITEM	QTY	PART NUMBER	REF-DESIGNATOR	DESCRIPTION (NS = Not Stuffed)
—	1	520-5055-03	Display Controller Bd. (FCC FEB98) Rev. E June 2001	Complete PCB Assembly
1	2 (See Pg. DR. © Table)		U5 (ROM0) (U6 (ROM1): NS)	4mB ROM 27C040 (M27C401-100)
2	2	077-5217-00	U5 (U6: NS)	32-Pin, IC Dip Socket
3	1	045-5015-03	J3	3-Pin, PKK156B Connector
4A	1	100-0189-01	U3	MC6809E
4B	1	045-	U3	40-Pin, Socket
5	1	077-	J4	6-Pin (6P100)
6	1	100-	U1	74HCT04D (74LS04)
7	1	100-	U9	74HCT245D
8	1	100-	U7	74HCT273D
9	1	100-	U2	74LS245DW
10	1	140-	RSN1	8MHZRSN (8Mhz) Crystal
11	7	125-	C35-C39, C40, C41	CAP103-0805-X7R, 0.01uF, 50v
12	20	125-	C21, C24, C28-C32, C33, C34, C42, C43, C44, C45, C46 C47, C48, C49, C50, C53 (C51: NS)	CAP104-0805, 0.1, 50v
13	2	125-	C26, C27	CAP224-1206-Z5U, 0.22uF, 50v
14	21	125-	C1-C12, C13-C18, C20, C23, C52	CAP471-0805, 470pF, 50v
15	2	n/a	FB1, FB2	Ferrite Bead, FB0370
16	3		FID1-3	FIDTP50M
17	1	n/a	(J5: NS)	HDR2X1
18	1	045-5015-02	J2	7-Pin, Dual Row .1" Hdr. Conn HDR2X7
19	1	045-5015-26	J1	13-Pin, Dual row .1" Hdr. Conn HDR2X13
20	1	100-	U8	K6T0808C1D
21	1	165-5099-00	L1	LED T1-3/4 DIFFUSER RED
22	1	100-	U11	LM3940IMP-3.3
23	4	121-	R16-R18 (R19: NS)	RES0E1/10W0805, 0
24	1	n/a	RESET	DO NOT STUFF
25	1	n/a	(R4: NS)	RES0E1/4W5CF, 0
26	1	121-	R20	RES100E1/10W0805, 100
27	2	121-	R9, R15	RES100K1/10W0805, 100K
28	5	121-	R1, R2, R3, R7 (R6: NS)	RES10K1/10W0805, 10K
29	1	121-	R5	RES180E1/10W0805, 180
30	2	121-	R11, R13	RES1K1/10W0805, 1K
31	1	121-	R8	RES1M1/10W0805, 1M
32	3	121-	R10, R12, R14	RES220E1/10W0805, 220
33	9	121-	R21, R22-R29	RES33E1/10W0805, 33
34	2	125-5015-00	C19, C25	TCAP100M25VER, 100uF, 25v
35	1	n/a	(C22: NS)	TCAP22M25VER, 22uF, 25v
36	1	n/a	(U10: NS)	TL7705ACD
37	1	100-	U4	XC9572XL



I/O Power Driver Board Theory of Operation

5v Supply:

An AC voltage of approximately 9v comes into the board at [J17-(1-4)] this AC voltage is then *full-wave rectified* by bridge **BRDG 21** and filtered by Capacitor **C203**. The resulting voltage is 11v DC which is inserted into a linear voltage regulator for the output of 5v DC. This 5v regulated voltage can be adjusted by potentiometer **R116** the voltage should be set to 5.00v. Besides powering the I/O Board the regulated 5 volts supplies power to the CPU / Sound Board, Gas Plasma (Dot Matrix) Display and Plasma (Display) Controller Board. Power for these devices comes off the I/O Board on [J16-(4-8)].

+5v, +20v, +50v, +18v, & +12v LED Indicators:

These DC voltages are derived on the I/O Board by rectification and filtering. Each has a **LED** indicating that power is being supplied to each of these voltage sources. The **-12v** supply comes from the same transformer winding as the **+12v** thus it does not have a **LED** indicator.

LED	SUPPLY VOLTAGE
L2	+ 5
L200	+ 20v
L201	+ 50v
L202	+ 18v
L203	+ 12v

**** Note** that the +50v & +20v power sources are turned off by the Interlock Switches when the Coin Door is OPEN.

Reset Circuitry:

The I/O will reset in three (3) cases:

1. The CPU is in reset. The CPU's reset signal is fed into the I/O through connector **J1** and forces the I/O into reset.
2. The 5v supply has fallen below 4.75v.
3. The watchdog is not being fed by the scanning of the light matrix. More specifically **Pin-19** of **U6** must be toggling once every **50ms** to prevent the watchdog from resetting. The scanning of the light matrix is controlled by the CPU through **J1**.

LED L204 shows the reset state of the I/O Board. If this **LED** is not lit either the 5v DC is below 4.75v or the CPU/Sound Board is holding the I/O in reset. If the **LED** is flashing this means that the watchdog is not being feed by the CPU/Sound Board and the I/O is oscillating into and out of reset. If the **LED** is continuously on the board is out of reset and communication from the CPU to the lamp matrix is confirmed. Testpoint Blanking is the actual reset signal on the I/O Board. A low voltage indicates that it is in reset this will turn off all Solenoid (Coil) Drivers, Flash Lamps, Lamp Matrix Drivers, Auxiliary Outputs and Flipper Outputs. A high voltage indicates that it is out of reset and normal operation can take place.

Address Decoding:

All Address decoding is done by two **74LS138's (U204 & U205)** (3 of 8 decoder). Both of these must be in operation for the I/O Board to function properly.

Solenoid (Coil) Drivers & Flash Lamps:

J8 & J9 are high side drivers for driving solenoids and other heavy loads. Each connector has its own buffer driving 8 drivers. **J8 & J9** consist of **MOSFET Drivers 20N10L** which can easily & safely be tested by clipping one end of a clip-lead to test point **FET TPL1** and then the other to the corresponding gate resistor **R1-R16** (see *Note 1*). This will apply 3.4v to the gate of the **MOSFET Transistor** thus switching it on. **J7 & J6** each are a bank of 8 low side driver for driving lamps or other lower current solenoids (coils). They use a Bipolar Power Transistor **TIP122** which can also be tested by using **TEST POINT TIP TPL3** and the corresponding resistors **R17-R32*** (see *Note 1*).

Note 1 • Clip on the resistor side with the white stripe. •• R1 controls Q1, R2 controls Q2, et cetera...

Auxiliary In & Out:

J2-8 CMOS Outputs sometimes used for a printer interface.

J3-8 CMOS Inputs general purpose inputs.

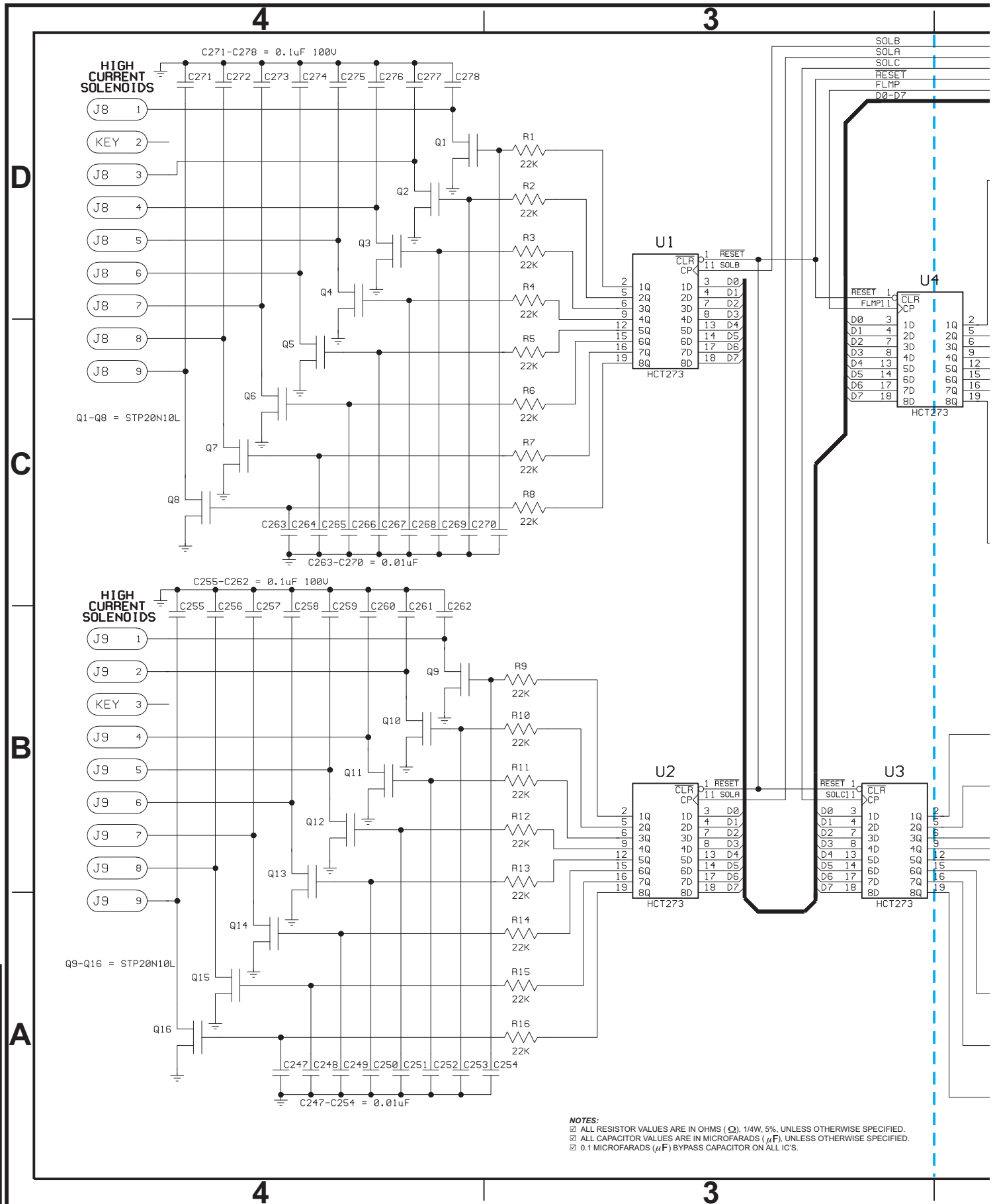
Lamp Matrix:

J12 has 10 low side drivers for the lamp strobes which consist of **19N06L MOSFETS**. Only one lamp strobe should be low at any time. Again the scanning of the lamp strobes keeps the I/O from resetting. **J13** has 8 high side drivers with each having a status indicator. All the status indicators are logically 'OR'ed together and fed back to the CPU/Sound Board. The status can identify open loads (for example open lamp filaments or intermittent connections) and short circuits. These drivers are also short-circuit protected.

General Illumination (G.I.) Lights:

J15 has 6v AC switched on & off by a relay on the I/O Board. The relay is controlled by **Q200** which supplies power to the 24v coil winding to activate the relay. There are 4 taps on **J15** each fused at 5A for this 6v AC source.





- NOTES:**
- ☑ ALL RESISTOR VALUES ARE IN OHMS (Ω), 1/4W, 5%, UNLESS OTHERWISE SPECIFIED.
 - ☑ ALL CAPACITOR VALUES ARE IN MICROFARADS (μ F), UNLESS OTHERWISE SPECIFIED.
 - ☑ 0.1 MICROFARADS (μ F) BYPASS CAPACITOR ON ALL IC'S.

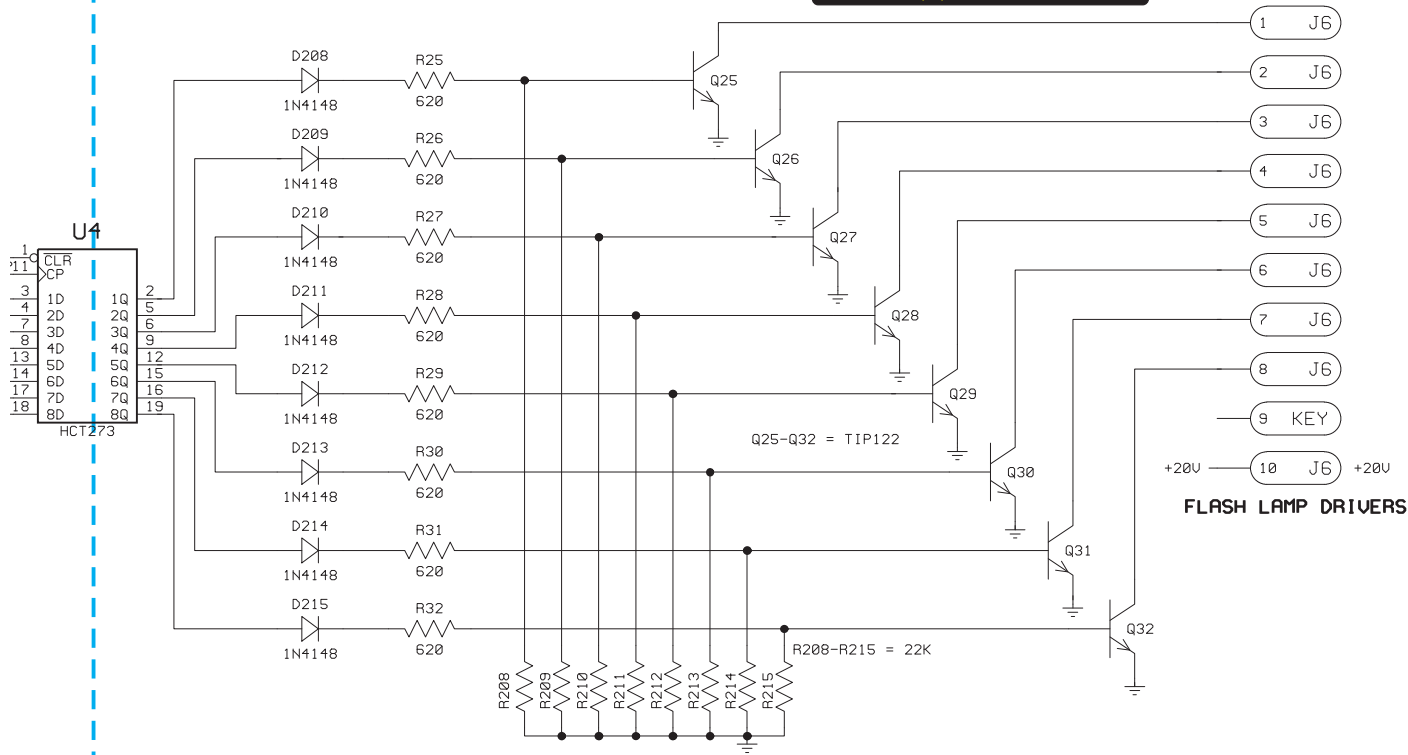
SILENCE!
I WILL NOT TOLERATE
YOUR INSOLENCE.

2

1

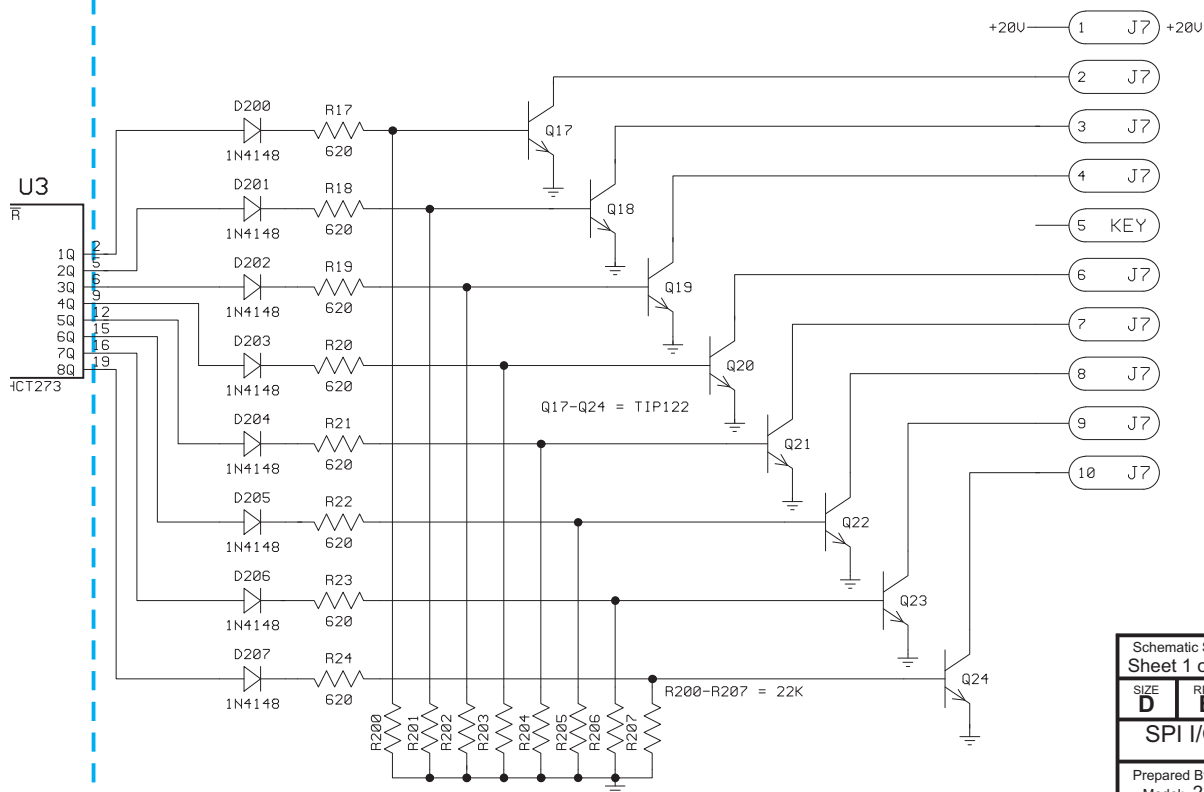
SOLB	(4-4D)
SOLA	(4-4D)
SOLC	(4-4D)
RESET	(2-4A, 3-4B, 4-1D)
FLMP	(4-4D)
D0-D7	(2-4A, 3-4B, 4-4B)

The above circuit(s) continue at the address shown (#-XY).
= Sheet Number (1-5), X = Column Grid, Y = Row Grid



FLASH LAMP DRIVERS

LOW CURRENT SOLENOIDS

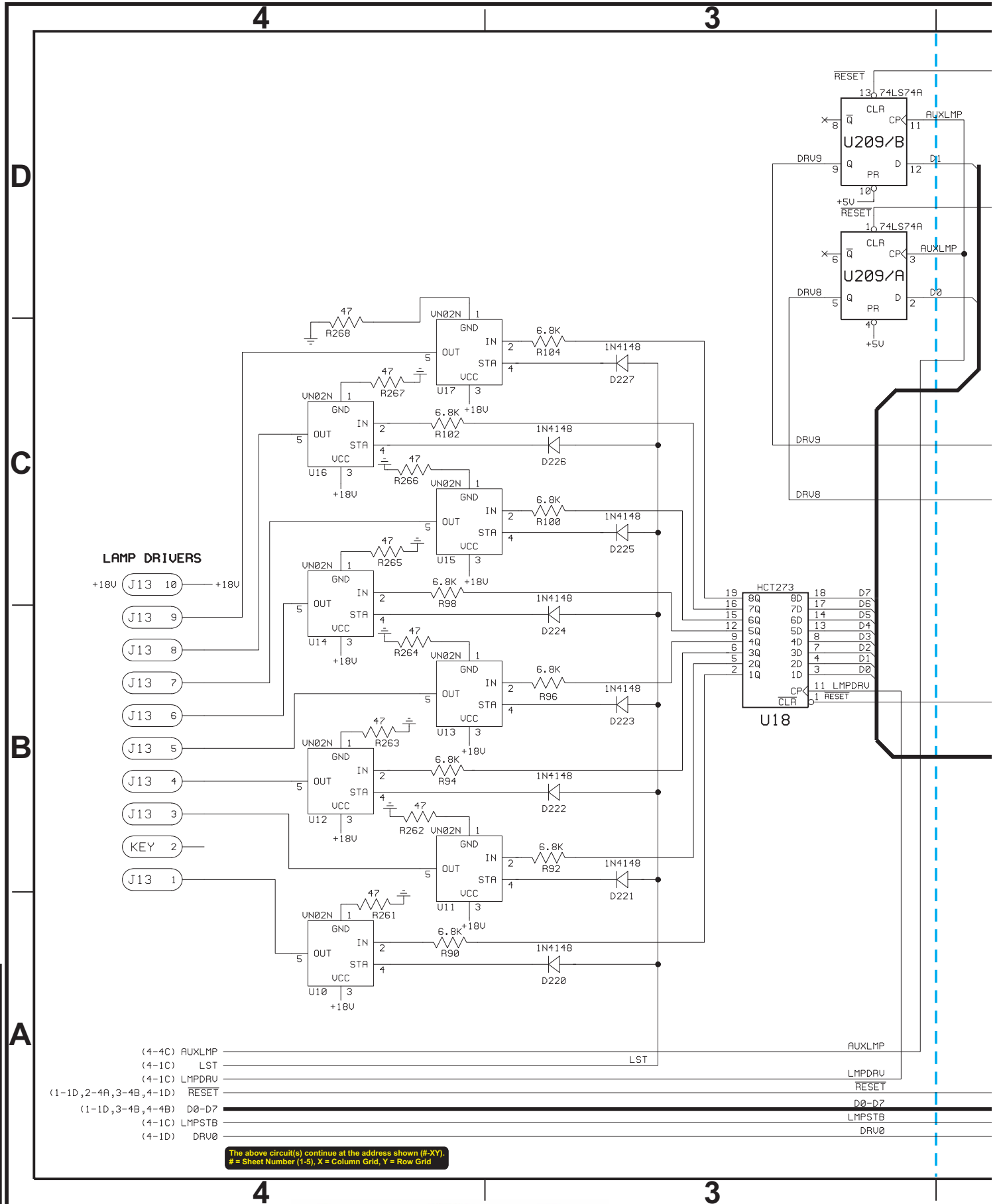


Schematic Set Sheet 1 of 5		STERN PINBALL, INC.
SIZE D	REV. E	
SPI I/O Power Driver Board SPI Part No: 520-5137-01		
Prepared By: CES Inc. Edited By: SPI Inc. Model: 237-0161-00 Dated: 09/05/97		

2

1





LAMP DRIVERS

- +18V J13 10 — +18V
- J13 9
- J13 8
- J13 7
- J13 6
- J13 5
- J13 4
- J13 3
- KEY 2
- J13 1

- (4-4C) AUXLMP
- (4-1C) LST
- (4-1C) LMPDRU
- (1-1D, 2-4A, 3-4B, 4-1D) RESET
- (1-1D, 3-4B, 4-4B) D0-D7
- (4-1C) LMPSTB
- (4-1D) DRU0

The above circuit(s) continue at the address shown (#.XY).
 # = Sheet Number (1-5), X = Column Grid, Y = Row Grid

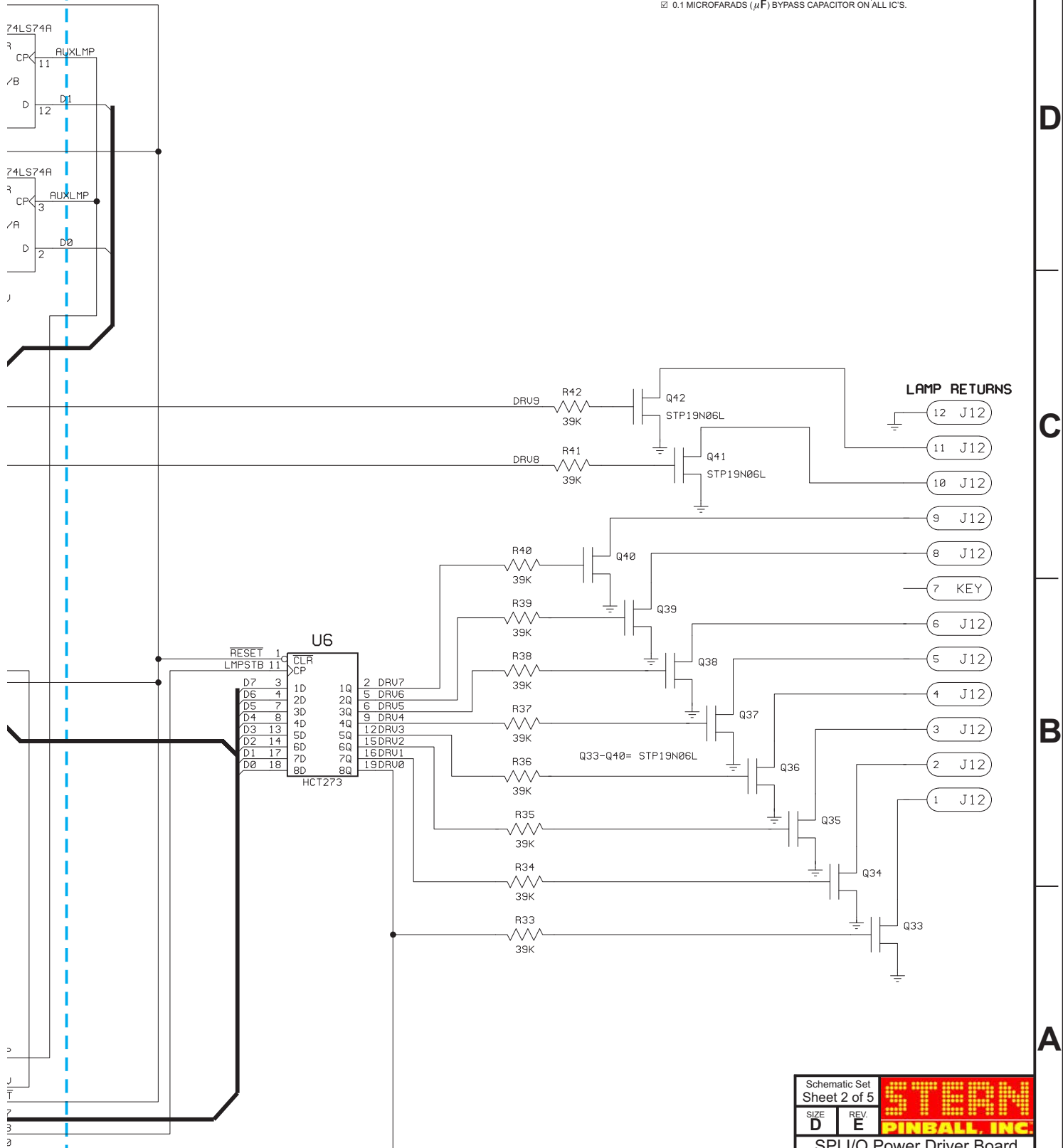
Sec. 5: PCBs



2

1

NOTES:
 ☑ ALL RESISTOR VALUES ARE IN OHMS (Ω), 1/4W, 5%, UNLESS OTHERWISE SPECIFIED.
 ☑ ALL CAPACITOR VALUES ARE IN MICROFARADS (μF), UNLESS OTHERWISE SPECIFIED.
 ☑ 0.1 MICROFARADS (μF) BYPASS CAPACITOR ON ALL IC'S.



D

C

B

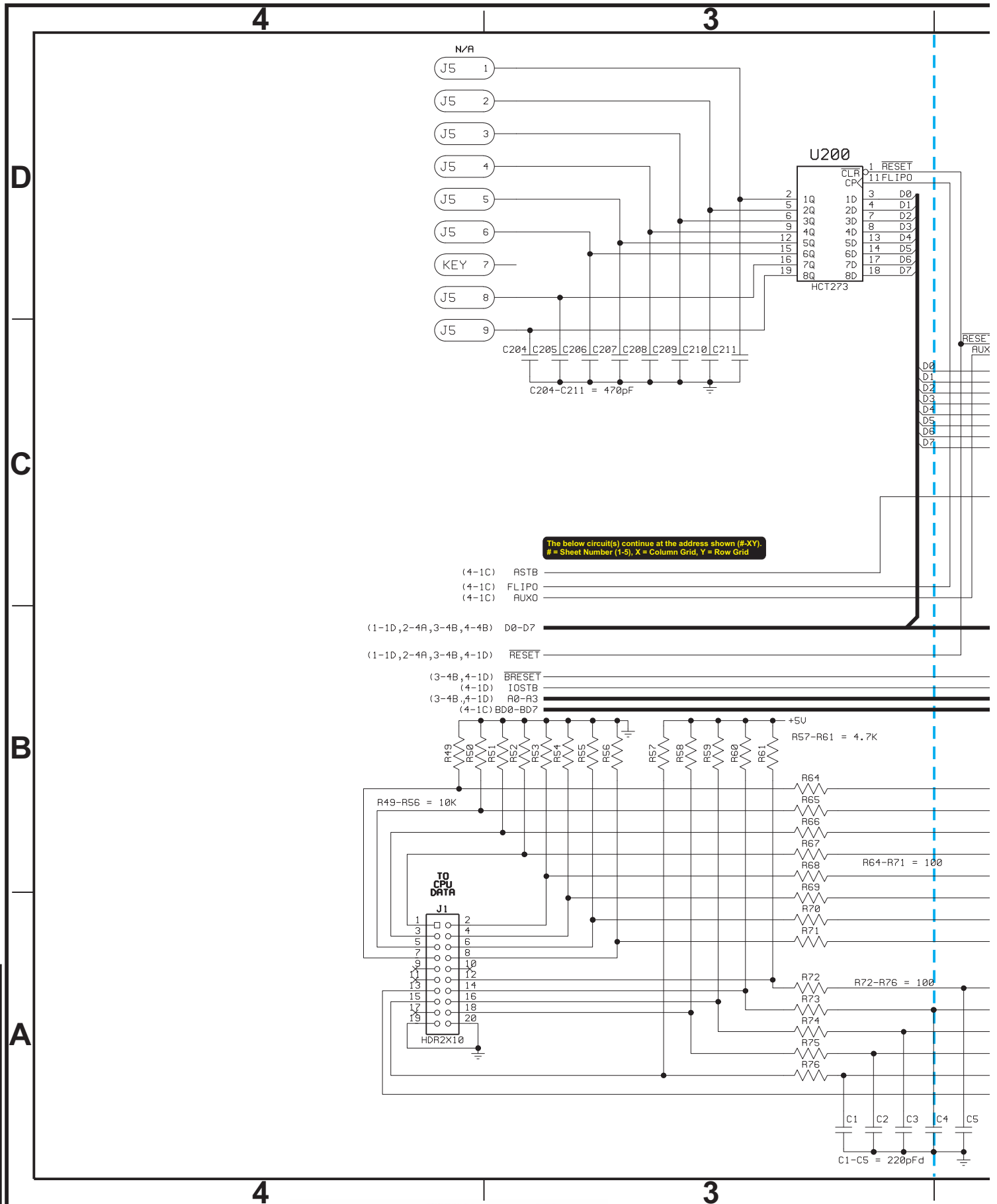
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Schematic Set Sheet 2 of 5		STERN PINBALL, INC.
SIZE D	REV. E	
SPI I/O Power Driver Board SPI Part No: 520-5137-01		
Prepared By: CES Inc. Edited By: SPI Inc. Model: 237-0161-00 Dated: 09/05/97		

Sec. 5: PCBs



I/O Power Driver Board Schematic (Sheet 3 of 5)



Sec. 5: PCBs

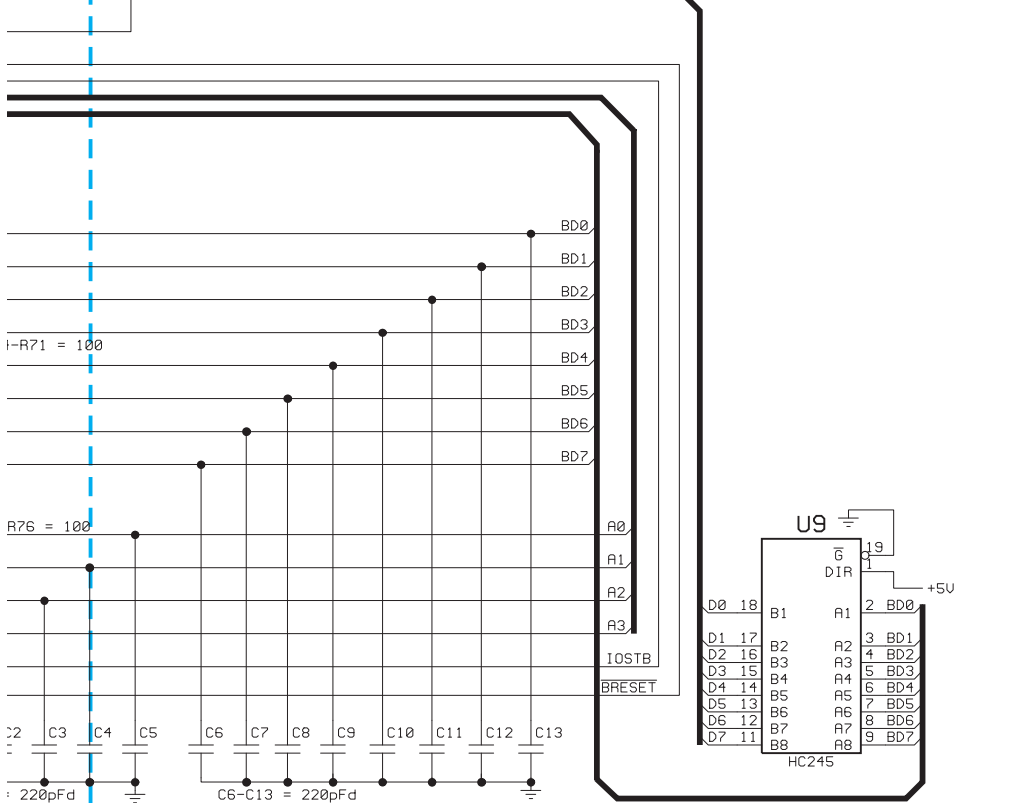
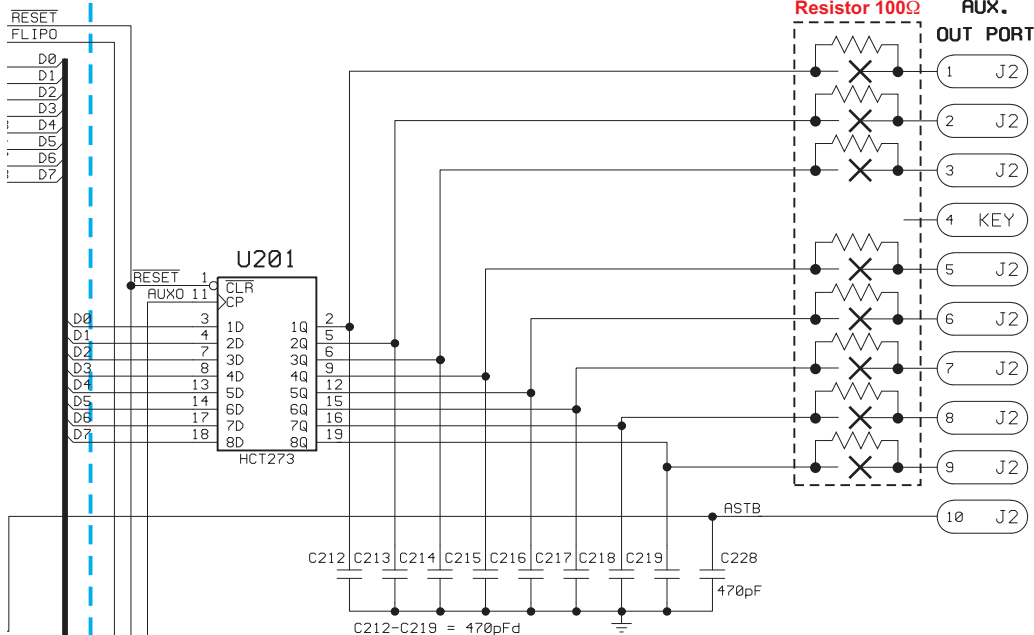


2

1

NOTES:
 ☑ ALL RESISTOR VALUES ARE IN OHMS (Ω), 1/4W, 5%, UNLESS OTHERWISE SPECIFIED.
 ☑ ALL CAPACITOR VALUES ARE IN MICROFARADS (μF), UNLESS OTHERWISE SPECIFIED.
 ☑ 0.1 MICROFARADS (μF) BYPASS CAPACITOR ON ALL IC'S.

DATE	DESCRIPTION OF CHANGES / REVISIONS	REQ.	BY.
JAN 2001	Cut trace on solder side at Aux. Out Port J2-PIN1 thru J2-PIN3 & J2-PIN5 thru J2-PIN9; Soldered Resistor 100Ω 1/4W 5% (SPI N#: 121-5007-00). This Modification (highlighted below at J2 with a dotted-line box) was accomplished on boards produced after Jan. 1, 2001. This board is backwards compatible for the White Star™ Board System.	TS	JET



2

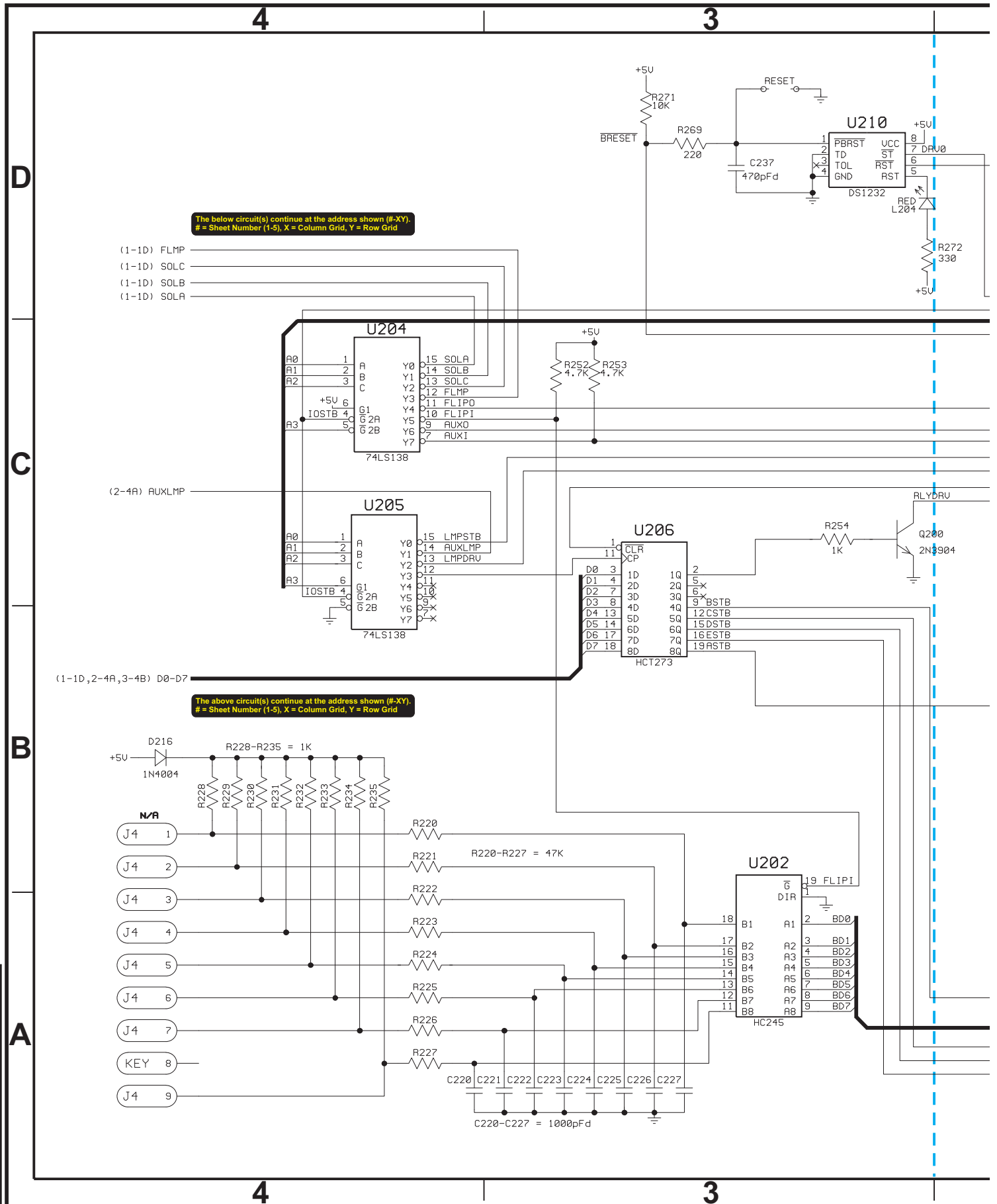
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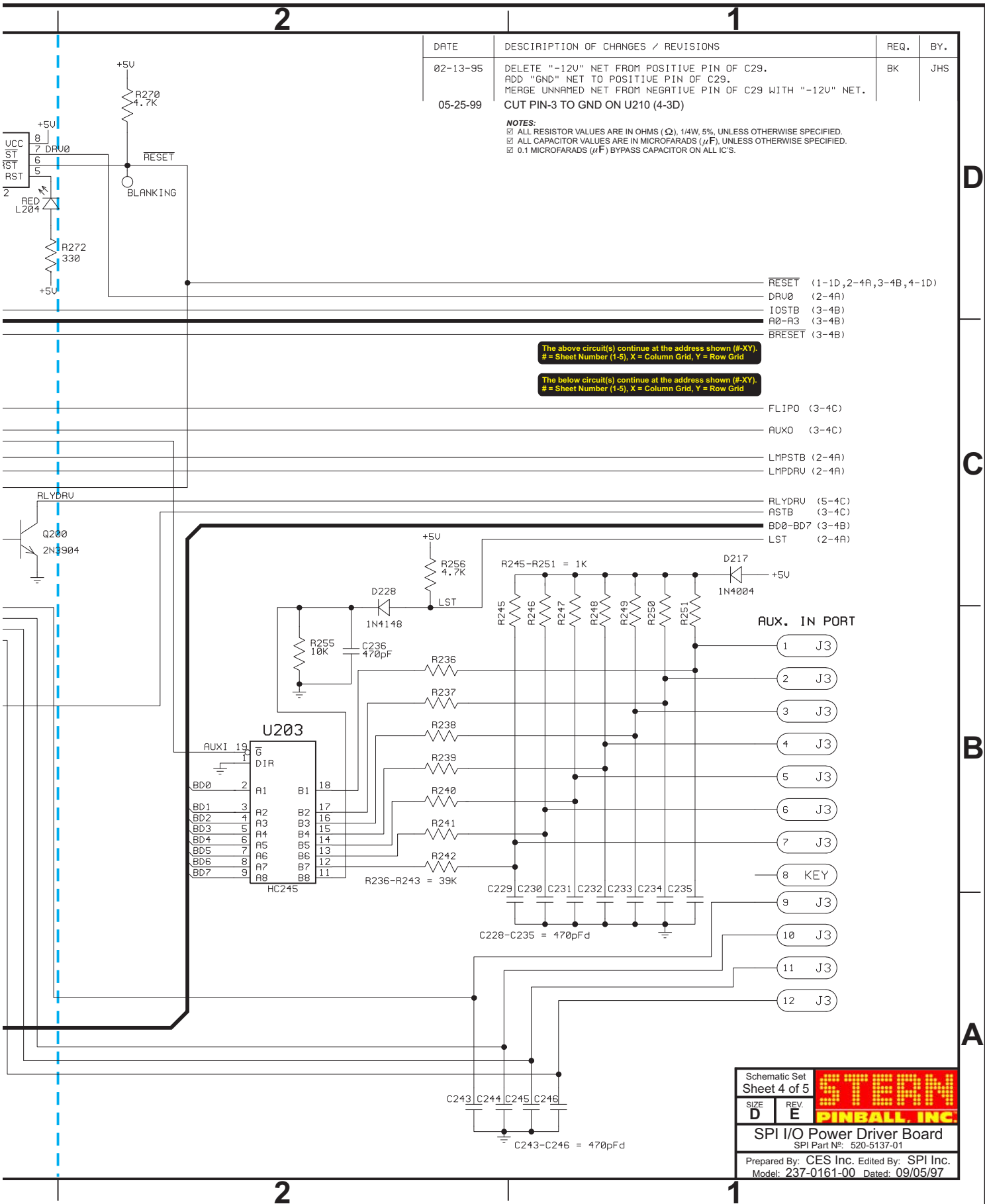
D
C
B
A

Schematic Set Sheet 3 of 5		STERN PINBALL, INC.
SIZE D	REV. E	
SPI I/O Power Driver Board SPI Part N#: 520-5137-01		
Prepared By: CES Inc. Edited By: SPI Inc. Model: 237-0161-00 Dated: 09/05/97		

Sec. 5: PCBs





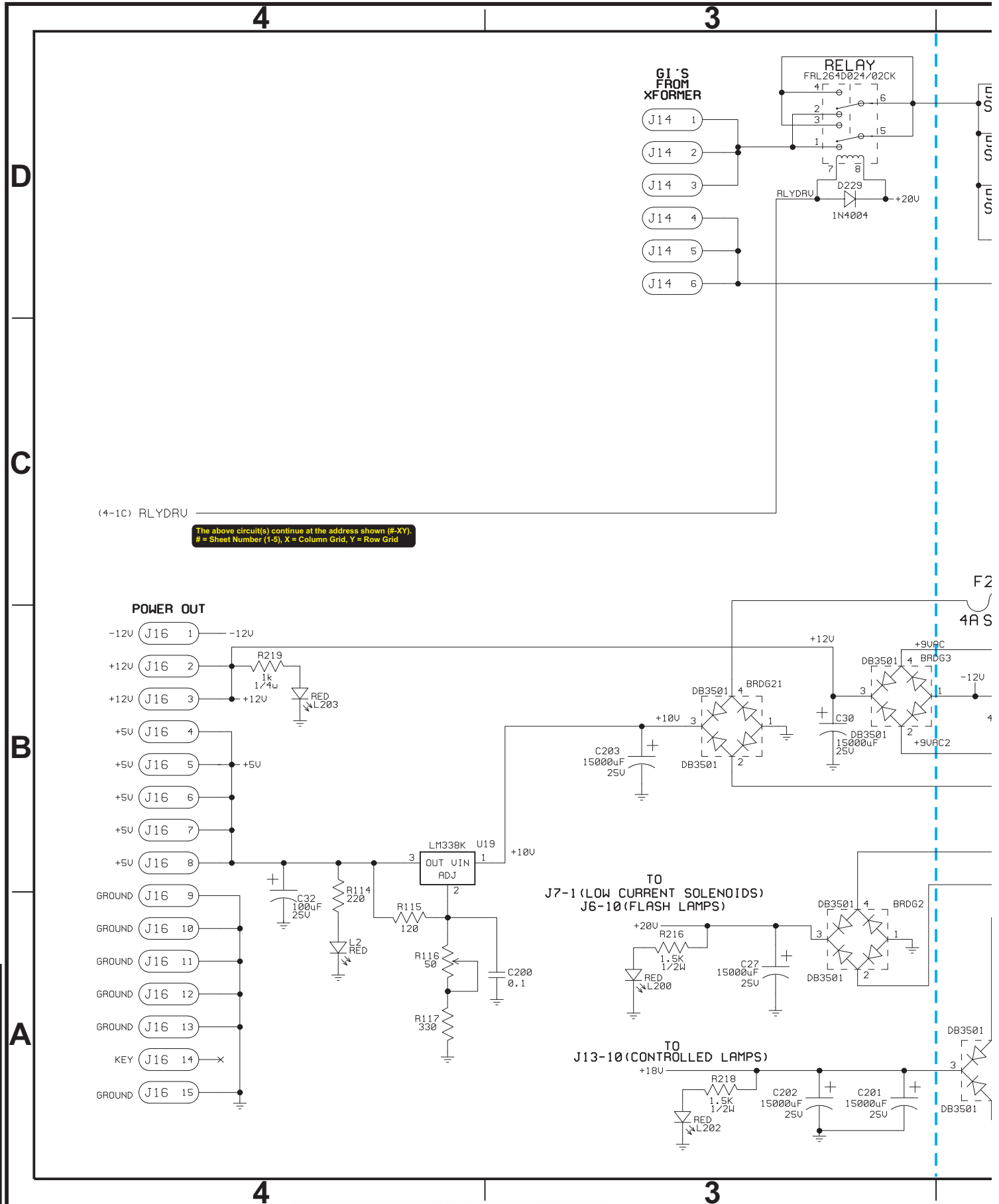


D
C
B
A

Sec. 5: PCBs

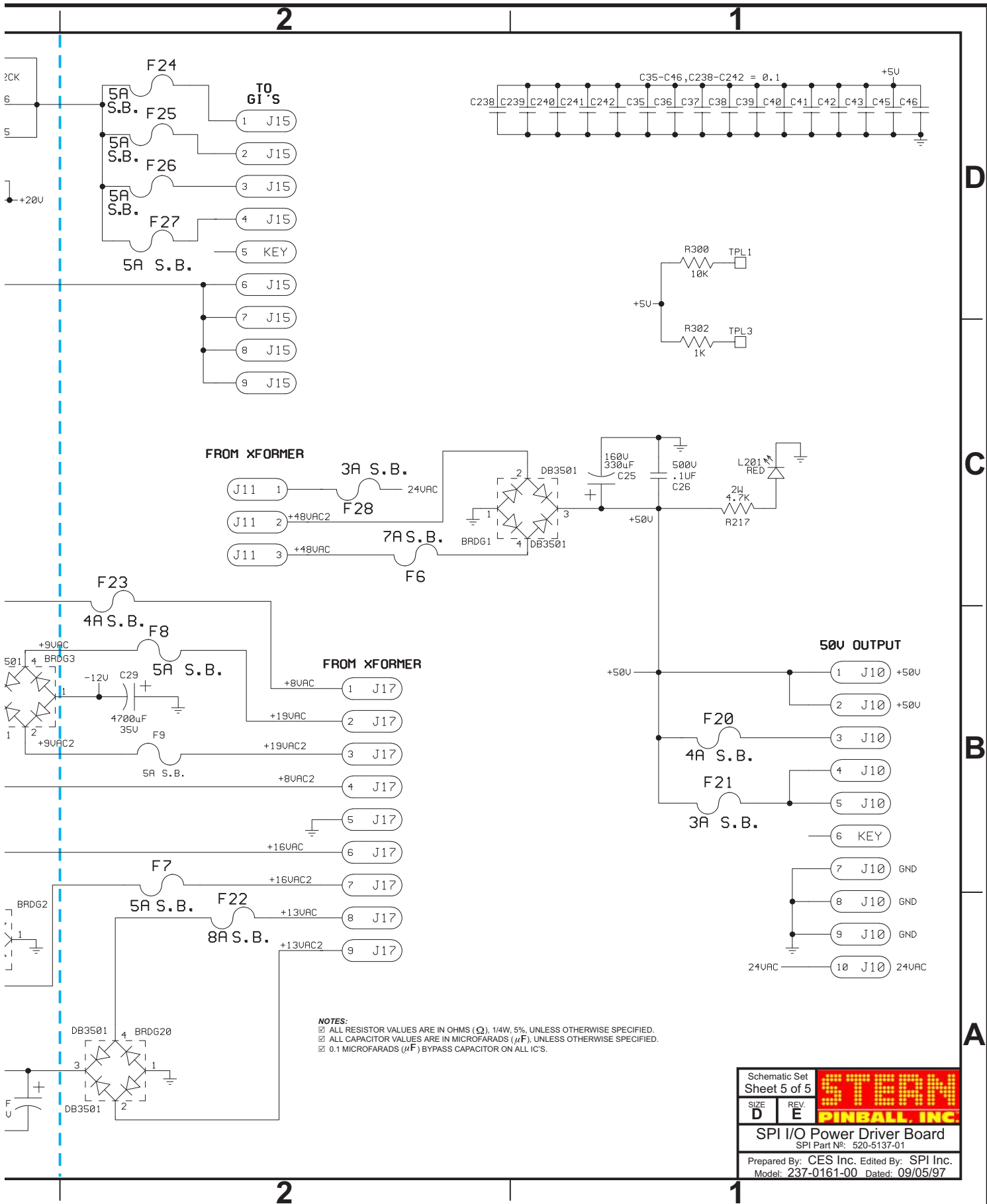
Schematic Set Sheet 4 of 5		STERN PINBALL, INC.
SIZE D	REV. E	
SPI I/O Power Driver Board SPI Part No: 520-5137-01		
Prepared By: CES Inc. Edited By: SPI Inc. Model: 237-0161-00 Dated: 09/05/97		





Sec. 5: PCBs



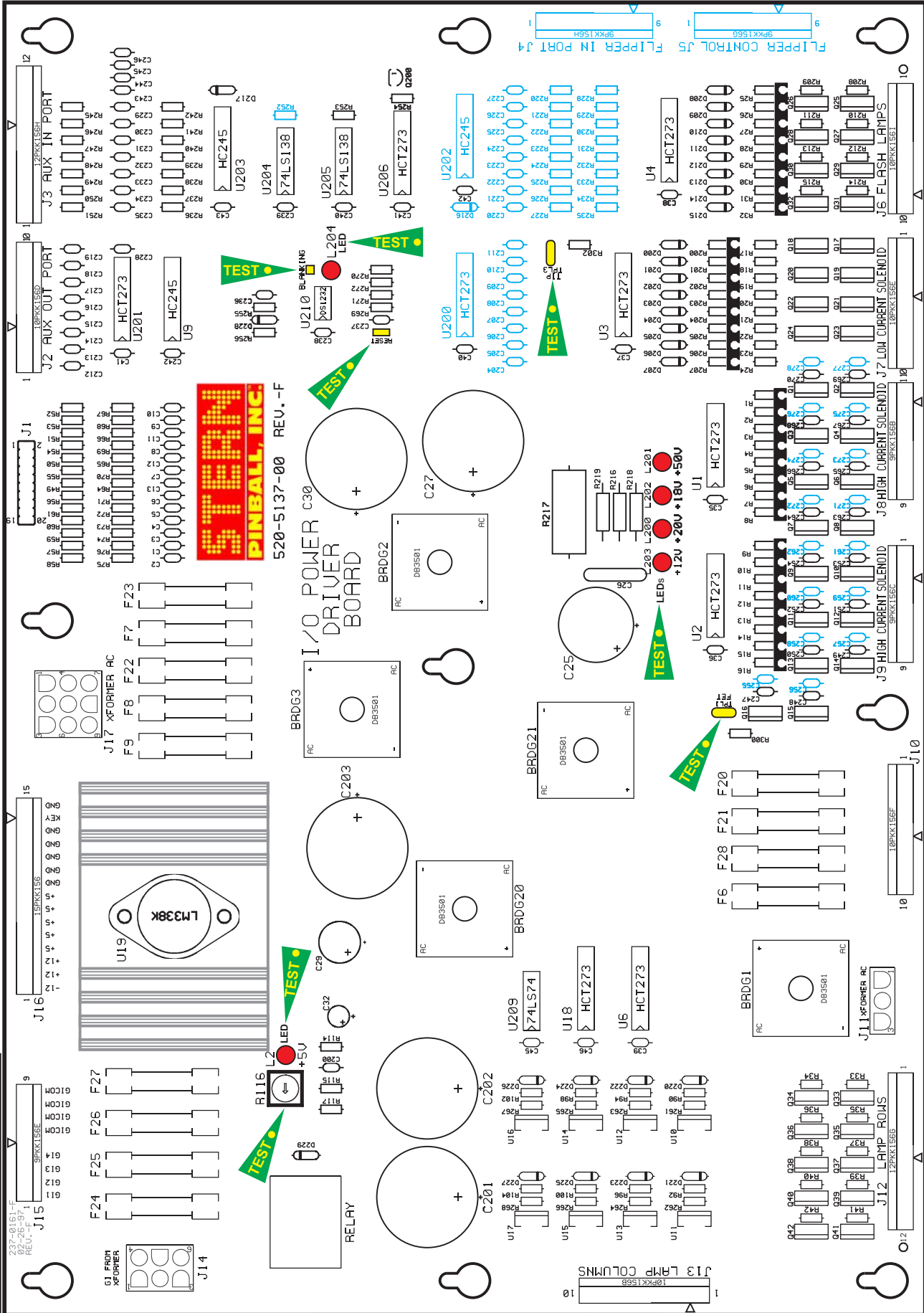


Schematic Set Sheet 5 of 5		STERN PINBALL, INC.	
SIZE D	REV. E		
SPI I/O Power Driver Board SPI Part No: 520-5137-01			
Prepared By: CES Inc. Edited By: SPI Inc. Model: 237-0161-00 Dated: 09/05/97			

Sec. 5: PCBs



I/O Power Driver Board Component Layout



Test Points:



← TIP TPL3
← BLANKING
← L204 LED

← RESET

LEDs :
← L201+50v
← L202+18v
← L200+20v
← L203+12v

← FET TPL1

LED :
← L2+5V
← R116 POT

Actual Board Size 15.698" X 11"



I/O Power Driver Board Parts

ITEM	QTY	PART NUMBER	REF-DESIGNATOR	DESCRIPTION (NS = Not Stuffed)
—	1	520-5137-01	I/O Power Driver Board	Complete PCB Assembly
01	5	112-5000-00	BRDG1, BRDG2, BRDG3, BRDG20, BRDG21	DB3501
02	13	125-5030-00	C1, C2, C3>C6, C7, C8, C9>C10, C11, C12	220pF, (221), Cap.
03	1	125-5033-00	C25	100uF, 150v, Radial Lytic Cap.
04	1	125-5035-00	C26	.1uF, 500v, Ceramic Disk Cap.
05	5	125-5036-00	C27, C30, C201, C202, C203	15000uF, 25v, Radial Lytic Cap.
06	1	125-5034-00	C29	4700uF, 35v, Radial Lytic Cap.
07	1	125-5032-00	C32	100uF, 25v, Radial Lytic Cap.
08	17	125-5031-00	C35, C36, C37, C38, C39, C40, C41, C42, C43, C45, C46, C200, C238, C239, C240, C241, C242	0.1uF, (104), Cap.
09	22	125-5028-00	C212>C219, C228>C237, C243>C246 (C204-C211: NS)	470pF, (471), Axial Cap.
10	0	n/a	(C220>C227: NS)	
11	16	125-5029-00	C247>C254, C263>C270	0.01uF, (103), 100v Cap.
12	0	125-5027-00	(C255>C262, C271>C278: NS)	0.1uF, (104), 100v, Cap.
13	25	112-0054-00	D200>D207, D208>D215, D220, D221, D222, D223, D224, D225, D226, D227	1N4148, Diode
14	2	112-5003-00	D217, D229 (D216: NS)	1N4004, Diode
15	26	205-0004-00	F6, F7, F8, F9, F20, F21, F22, F23, F24> F27, F28	Fuse Clips
16	1	200-5000-03	F6	7A 250v S.B. Fuse
17	7	200-5000-01	F7, F8, F9, F24>F27	5A 250v S.B. Fuse
18	2	200-5000-08	F21, F28	3A 250v S.B. Fuse
19	1	200-5000-05	F22	8A 250v S.B. Fuse
20	2	200-5000-06	F20, F23	4A 250v S.B. Fuse
21	1	045-5015-01	J1	20-Pin, 0.1 Dual Row Header
22	1	045-5014-01	J2 (Key Pin-4), J6 (Key Pin-9), J7 (Key Pin-5) J10 (Key Pin-6), J13 (Key Pin-2)	10PKK156
23	1	045-5015-00	J3 (Key Pin-8)	12PKK156
	0	n/a	(J4, J5: NS)	
24	1	045-5013-00	J8 (Key Pin-2), J9 (Key Pin-3), J15 (Key Pin-5)	9PKK156
25	1	045-0014-03	J11	10-84-4030 (3-Pin MOLEX)
26	1	045-5015-00	J12 (Key Pin-7)	12PKK156
27	1	045-0014-06	J14	10-84-4060 (6-Pin MOLEX)
28	1	045-5016-00	J16 (Key Pin-14)	15PKK156
29	1	045-0014-09	J17	10-84-4090 (9-Pin MOLEX)
30	6	165-5099-00	L2, L200, L201, L202, L203, L204	LED T1-3/4 DIFFUSER LED
31	16	110-0106-00	Q1>Q16	22NE10L STP, Transistor
32	16	110-0067-00	Q17>Q24, Q25>Q32	TIP122
33	10	110-0088-00	Q33>Q42	19N06L STP, Transistor
34	1	110-0069-00	Q200	2N3904, Transistor.
35	32	121-5042-00	R1>R8, R9>R16, R200>R207, R208>R215	22K Ω 1/4W Res.
36	16	121-5003-00	R17>R24, R25>R32	620 Ω 1/4W Res.
37	17	121-5045-00	R33>R42, R236>R242	39K Ω 1/4W Res.
38	8	121-5021-00	R49, R57>R61, R253, R256, R270 (R252: NS)	4.7K Ω 1/4W Res.
39	11	121-5011-00	R50>R56, R255, R271, R300	10K Ω 1/4W Res.
40	13	121-5007-00	R64>R76	100 Ω 1/4W Res.
Resistors on Solder Side @ J2-Pins: 1-3 & 5-9				
41	8	121-5029-00	R90, R92, R94, R96, R98, R100, R102, R104	6.8K Ω 1/4W Res.
42	2	121-5033-00	R114, R269	220 Ω 1/4W Res.
43	1	121-5030-00	R115	120 Ω 1/4W Res.
44	1	121-5039-00	R116	50 Ω Pot
45	2	121-5036-00	R117, R272	330 Ω 1/4W Res.
46	2	121-5038-00	R216, R218	1.5K Ω 1/2W Res.
47	1	121-5050-00	R217	4.7K Ω 2W Res. (SANDBAR)
48	1	121-5009-00	R219	1K Ω 1/4W Res.
49	0	n/a	(R220>R227: NS)	
50	9	121-5009-00	R245>R251, R254, R302 (R228>R235: NS)	1K Ω 1/4W Res.
51	8	121-5032-00	R261, R262, R263, R264, R265, R266, R267, R268	47 Ω 1/4W Res.
52	1	190-5002-00	RELAY	FRL264D024/02CK Relay
53	2	n/a	TPL1, TPL3	Test Point Wire (24ga.) Loops
54	8	100-5012-00	U1, U2, U3, U4, U6, U18, U201, U206 (U200: NS)	74HCT273
55	1	110-0058-00	U9	74LS245
56	1	100-5023-00	U210	DS1232
57	8	110-0089-00	U10, U11, U12, U13, U14, U15, U16, U17	VN02N
58	1	100-0356-00	U19	LM338K
59	1	n/a	U19	Heatsink (5v Reg.)
60	1	100-0338-00	U203 (U202: NS)	74HC245
61	2	100-0148-00	U204, U205	74LS138
62	1	100-0037-00	U209	74LS74
63	1	n/a	BLANKING, RESET	Test Points





YEAH,
BABY,
GRRR!

CPU/Sound Board Theory of Operation

CPU Section:

The CPU is a **68B09E (U209)** with up to 8 MBytes of CPU *Code Space (U210)*. The CPU code is bank selected by the use of **U211** and each bank consists of 16 KBytes. 8 KBytes of **RAM (U212)** is available to the CPU. The RAM is battery backed and has a write protected area. Battery back up is accomplished by **3-AA Cells (BAT1)** which have a **TEST POINT VBATT** to check the battery voltage status. The write protected area consists of 512 Bytes used for storing game settings. This section of **RAM** can only be written to when the coin door is open. The Coin Door switch comes into the CPU on **CN6-12** and is fed into the address decoding **PAL U213**. When this memory protect signal is low writes to the protected **RAM** area are prohibited. Address decoding for the system is accomplished by one **PAL U213** and one 1-of-8 decoder **U214**.

A watchdog is used to monitor the CPU and the 5v supply. If the 5v supply is below 4.75 the watchdog will hold the CPU/Sound Board & I/O Board in *reset*. The watchdog must be fed at a rate of **250ms** or faster. The signal used to feed the watchdog comes from the EPROM Bank select signal used to load **U211**. The CPU has a timer interrupt used as a heartbeat for the system this signal comes from counter **U2**. The clock for this counter is the **CPU Q CLOCK**. Clearing the timer interrupt is done by reading the **DIP Switch**. The timer interrupt can be observed at **TEST POINT FIRQ**. In normal operation "**FIRQ**" should be toggling at a rate of 976Hz.

The I/O Interface **CN1** is buffered by two (2) **HC245** Chips (**U207 & U208**). The CPU's reset line is buffered by **Q10** and fed over to the I/O through **CN1**. An *I/O Strobe Signal* is fed through **CN1-15** and is used to notify the I/O that a valid address is being sent.

Switches:

The Switch Matrix consists of eight (8) **2N3904** Transistors(**Q1-Q8**) which pull one of 8 strobes 'low' to *activate* a Single Column of switches. The *Switch Return Signals* are fed into **CN7** [SWITCH ROWS] and are highly filtered and compared to a 2.5v reference voltage. The *Switch Return Voltage* must be below 2.5v to make a *Valid Switch Closure*. If *false switches* are appearing, check that none of the **2N3904** Transistors are permanently pulling the *strobe line low*. Only one strobe from **CN5** [SWITCH COLUMNS] should be *low at any time*. **CN6** [DEDICATED SWITCH IN] is a *Dedicated Bank of Input Switches*. Switches connected to **CN6** are connected to ground instead of a strobe and may be read at any time.

Plasma Interface:

The data path for communication to and from the Plasma Controller Board is 8 bits wide. There are separate *Input and Output Busses*. The *Input Bus* from the Plasma Controller to the CPU/Sound Board comes in on **CN8** [PLASMA CONTROL]-Pins **3-10** and is fed into **U200** for input to the CPU's *Data Bus*. Data going out to the controller comes from the CPU's *Data Bus* through **U201** and onto **CN8-Pins 11-18**. Status back from the Plasma Controller comes in on **CN8-Pins 22-26** and is fed into **U202** for input to the CPU's *Data Bus*. Two control signals that go out to the Plasma Controller are **PRES** [PLASMA RESET] and **CN8-Pin 19** [**PSTB** - *Plasma Strobe*]. The Plasma Reset is software controllable through **U216/B** and also has a test point "Plasma Reset". The *Plasma Strobe Signal* to the controller is generated from **U216/A** and is *used to latch data* into the Plasma Controller.

Sound Section:

The audio section consists of a **BSMT SOUND CHIP U9** Sound (Voice) EPROMs (**U17 U21 U36 U37**) **68B09E U6** and Sound Code **EPROM U7**. The **BSMT** latches sound EPROM addresses in **U13 & U12** for output to the Sound EPROMs. Sound Data from the EPROMs is read through **U19** to the **BSMT**. The EPROMs are bank selected by **U22**. When the **BSMT** has sound data to be played out to the speakers it loads 16 bits into a 16 bit shift register made up of **U24 & U23**. The data stream from the shift register is serially shifted into a stereo 16 bit *Digital to Analog Converter (DAC, U26)*. When the system is operating properly the ws (word select) input of the **DAC** will be toggling. The ws input is used to latch the right and left channel sound data into the **DAC**. If the ws line is not oscillating no analog signal will come out of the **DAC**. The **DAC** outputs are a controlled current source. These outputs are converted to a voltage by an operational amplifier **U30** to form the analog signal. **TEST POINTS AOR** and **AOL** are the outputs of the operational amplifier. These outputs are then fed directly into the power amplifiers (**TDA2030A**) or optionally into an analog volume control chip **U35** for a potentiometer volume control. The analog section has its own +5v & -5v derived from **VR1 & VR2**. These separate supply voltages are for the **DAC U26** Operational Amplifier **U30** and analog volume control **U35**.

Sound calls are made from the CPU's **68B09E U209** to the sound section by latching data into **U5**. The sound section's **CPU 68B09E (U6)** reads in this data and handles the interfacing to the **BSMT**.

Other Test Points:

E & Q - The CPU signals for both **68B09E** processors. Should be at 2Mhz with **Q** leading **E** by **500 nsec**.

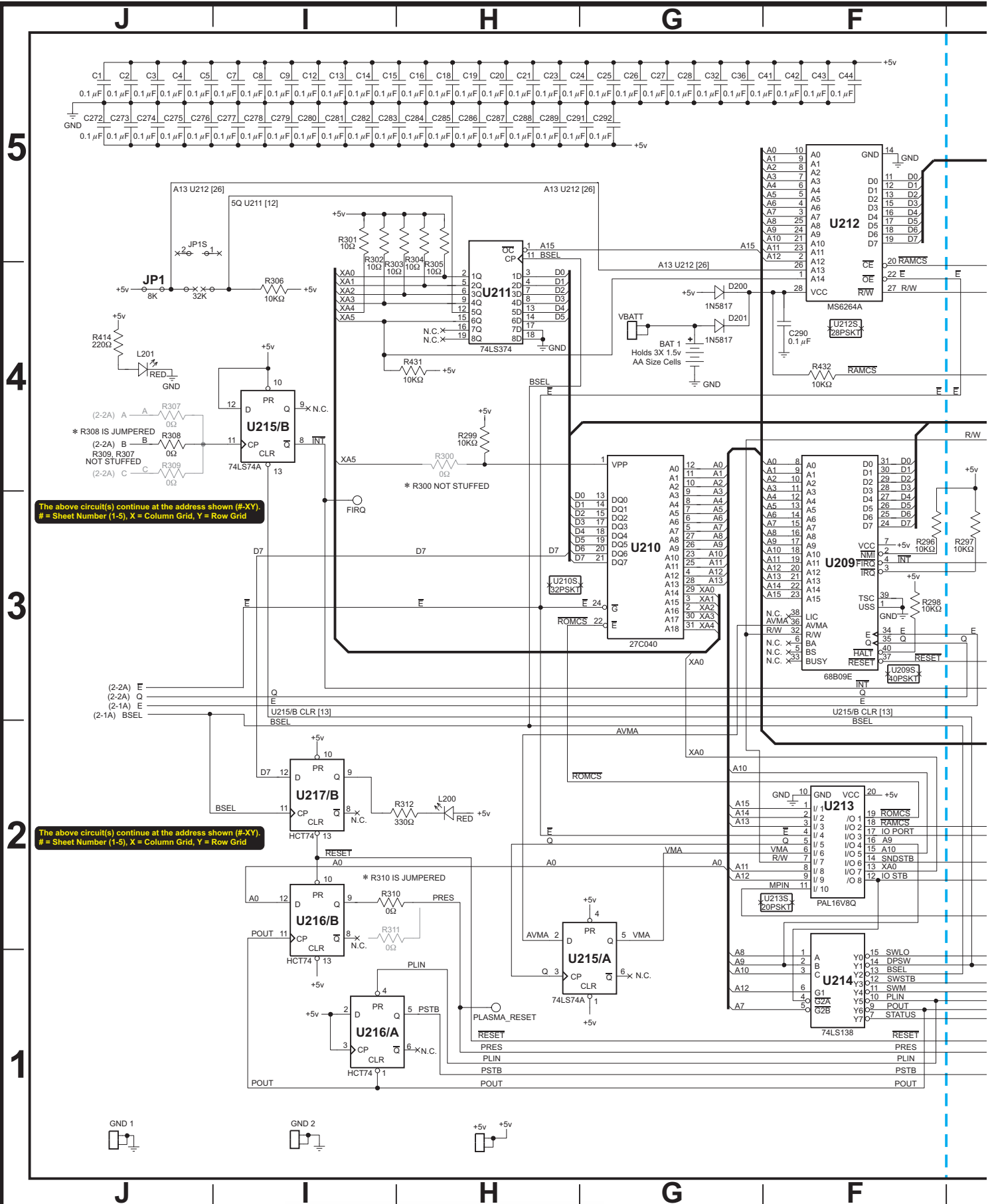
24Mhz - The oscillator used for the **BSMT** & derivation of **E & Q**.

SND-FIRQ - The sound sections **CPU Interrupt**.

6Mhz - This clock is generated internally on the **BSMT** and is used for shifting the data samples into the **DAC**.

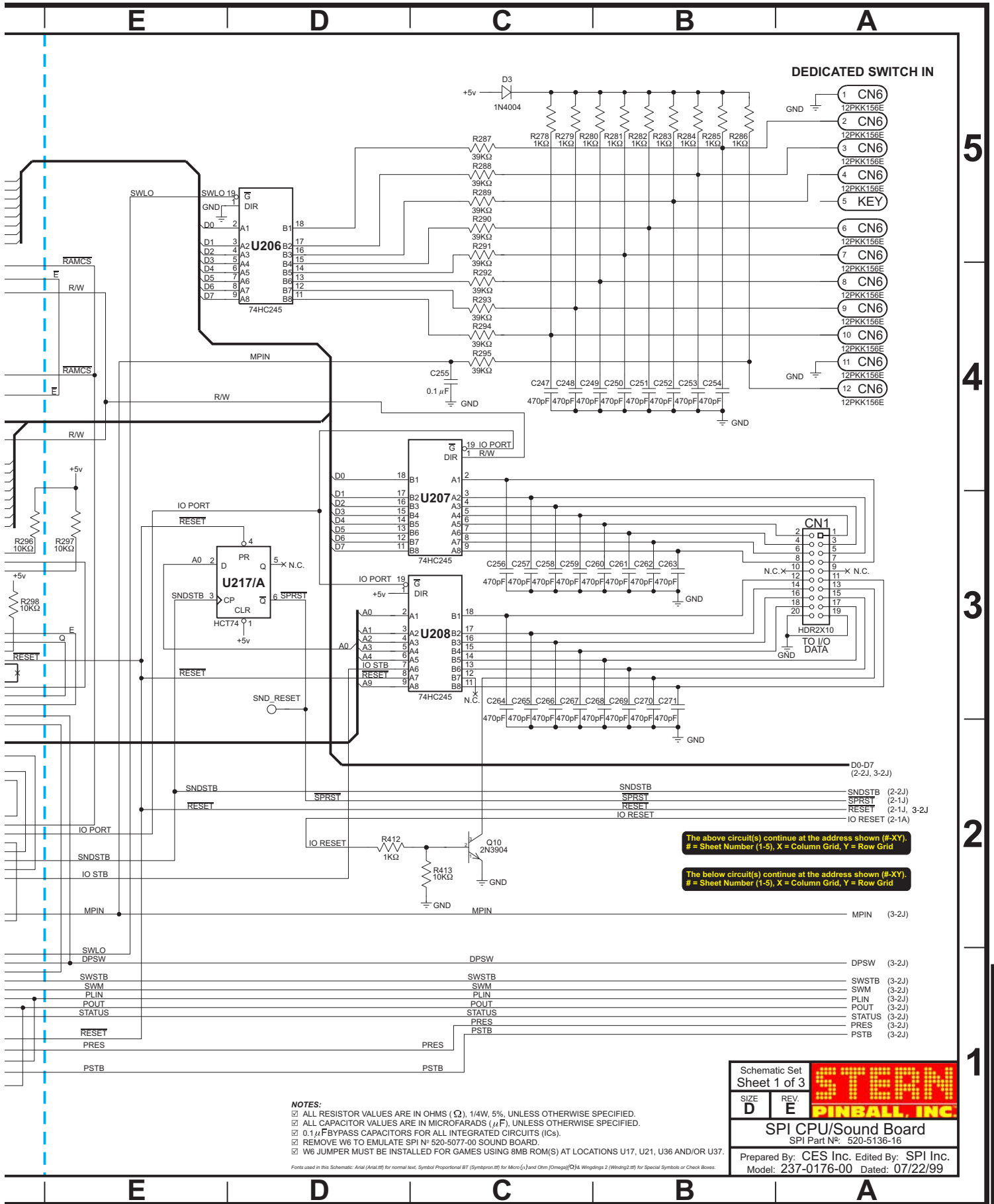
W6 Jumper - This jumper must be installed for games that use **8MB** Sound EPROMs (**U17 U21 U36 U37**). For games which use **4MB** Sound EPROMs this jumper is not installed but will operate on boards with **W6** installed.





Sec. 5: PCBs





5
4
3
2
1

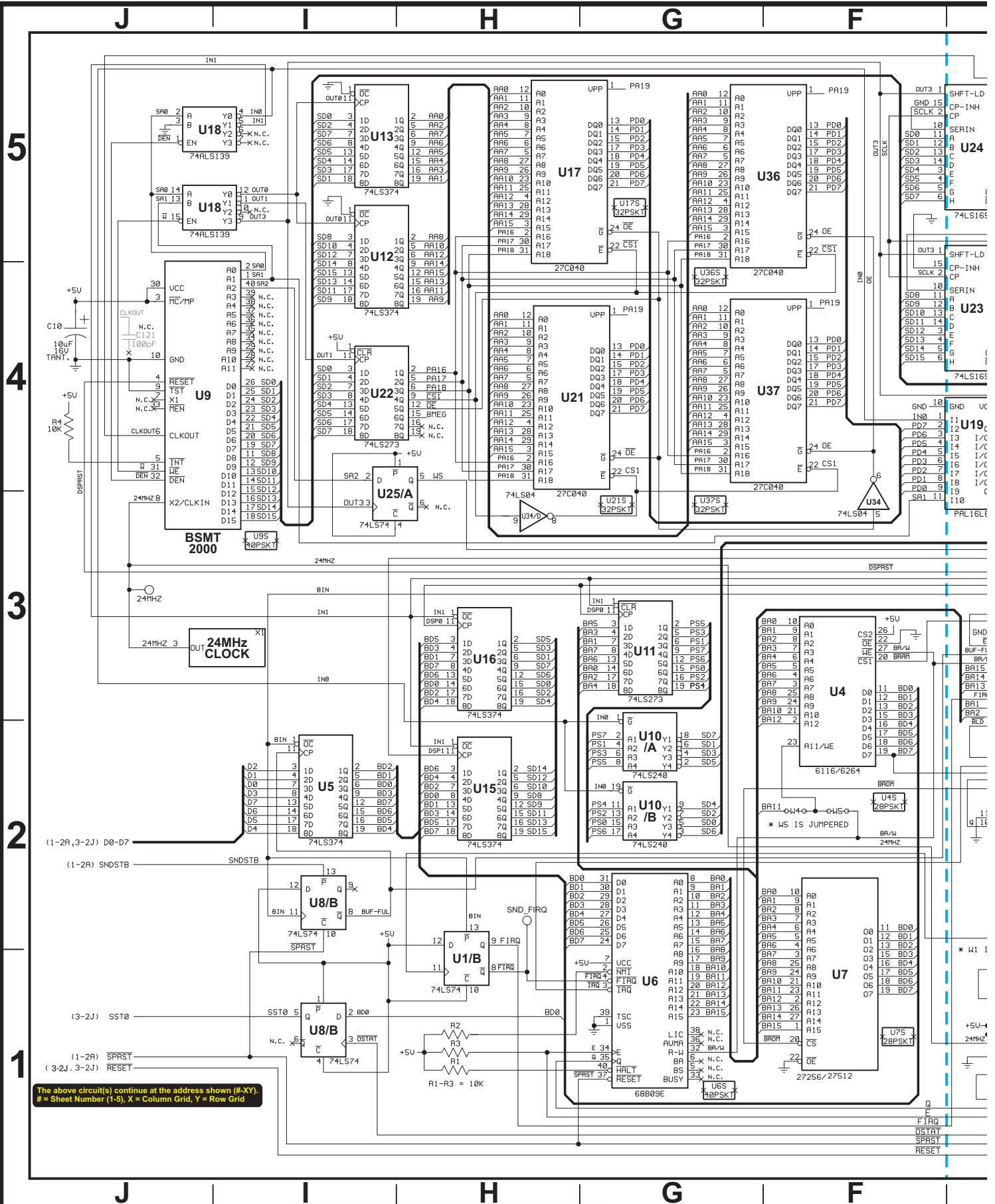
Sec. 5: PCBs

- NOTES:**
- ☑ ALL RESISTOR VALUES ARE IN OHMS (Ω), 1/4W, 5%, UNLESS OTHERWISE SPECIFIED.
 - ☑ ALL CAPACITOR VALUES ARE IN MICROFARADS (μF), UNLESS OTHERWISE SPECIFIED.
 - ☑ 0.1 μF BYPASS CAPACITORS FOR ALL INTEGRATED CIRCUITS (ICs).
 - ☑ REMOVE W6 TO EMULATE SPI N° 520-5077-00 SOUND BOARD.
 - ☑ W6 JUMPER MUST BE INSTALLED FOR GAMES USING 8MB ROM(S) AT LOCATIONS U17, U21, U36 AND/OR U37.

Fonts used in this Schematic: Arial (Arial.ttf) for normal text, Symbol Proportional BT (Symbolprop.ttf) for Micro (μ) and Ohm (Ω) and Omega (Ω) & Wingsdings 2 (Wingsd2.ttf) for Special Symbols or Check Boxes.

Schematic Set		STERN	
Sheet 1 of 3			
SIZE	REV	PINBALL, INC.	
D	E		
SPI CPU/Sound Board			
SPI Part N°: 520-5136-16			
Prepared By: CES Inc. Edited By: SPI Inc.			
Model: 237-0176-00 Dated: 07/22/99			

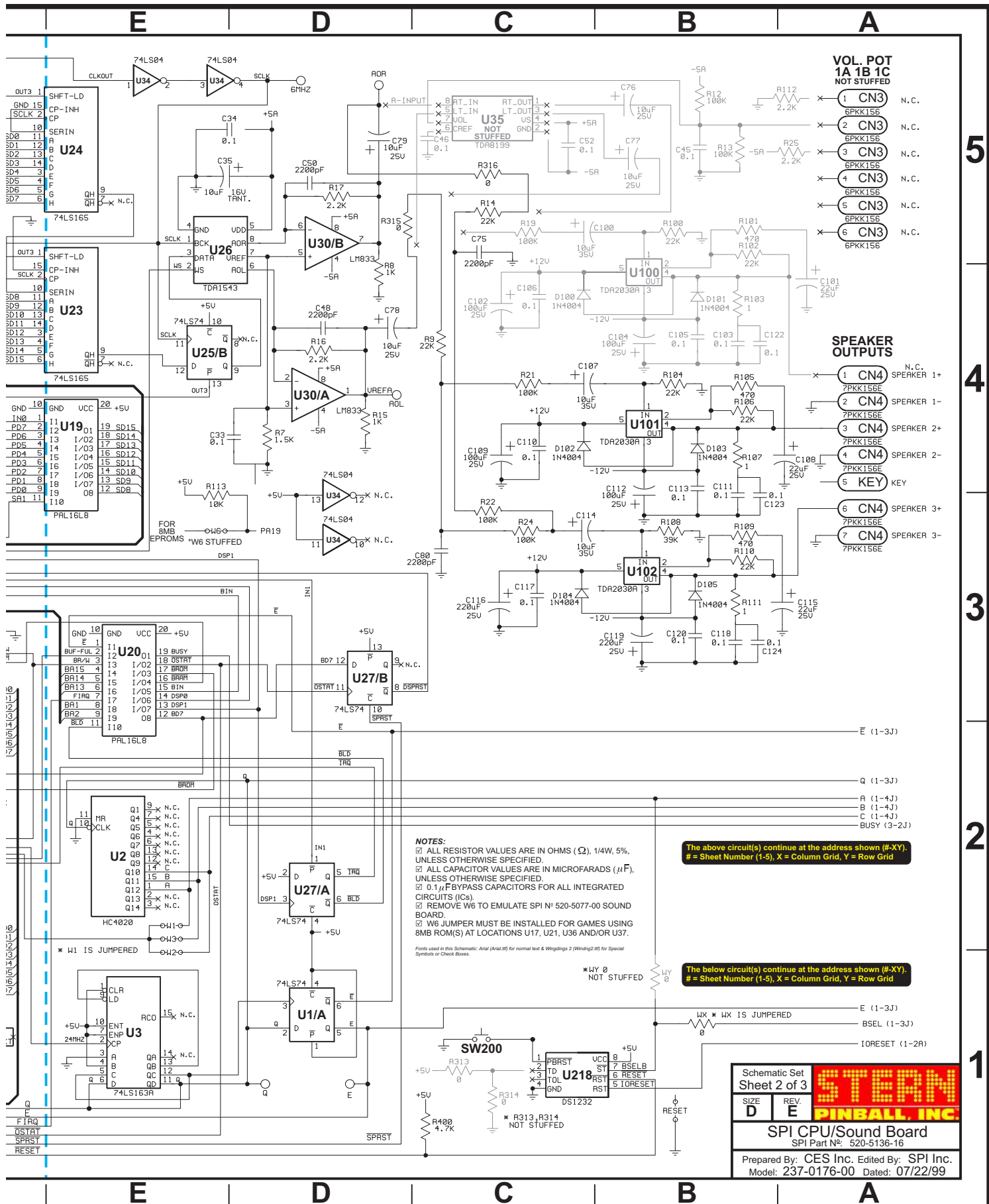


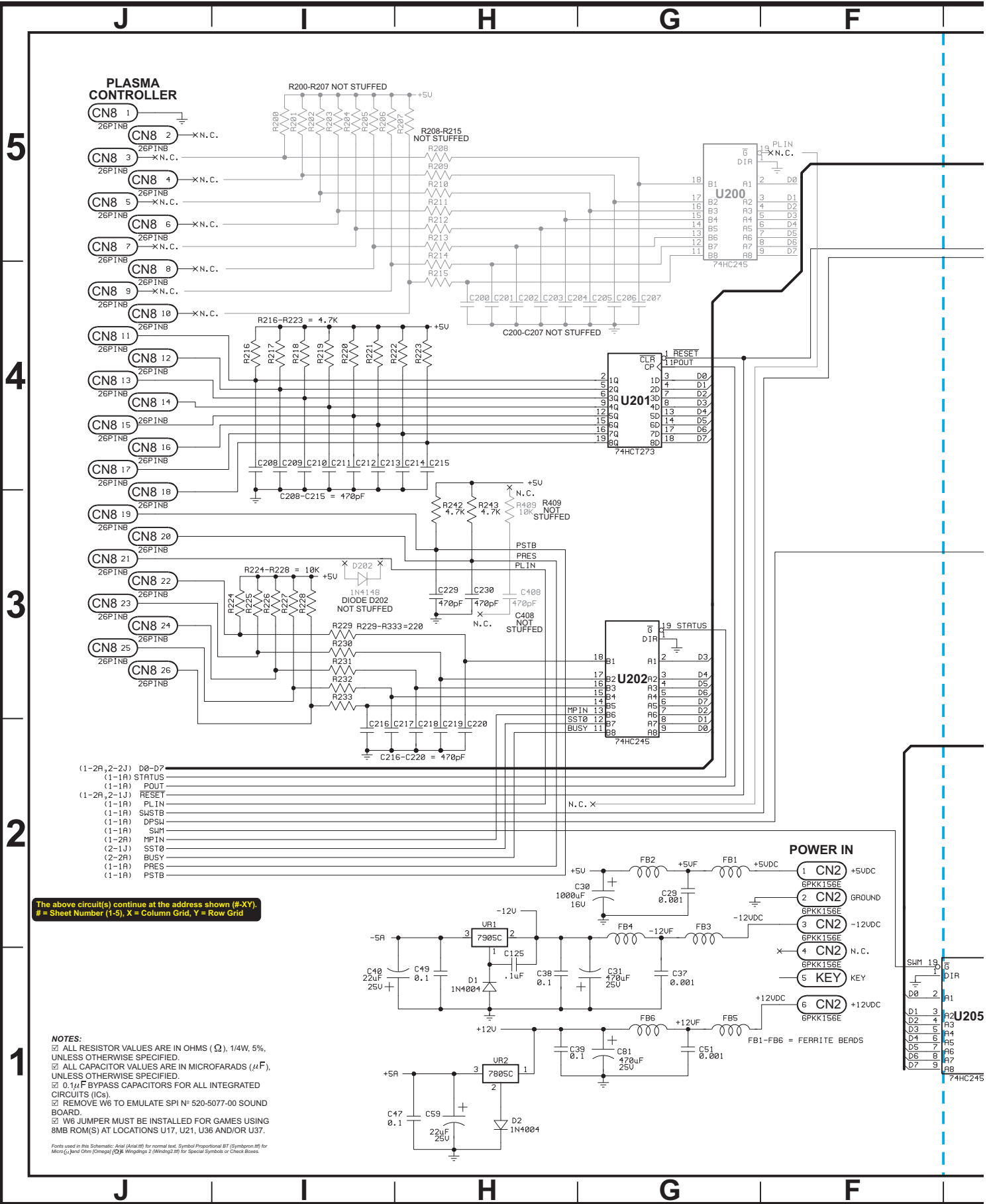


Sec. 5: PCBs

The above circuit(s) continue at the address shown (#-XY).
 # = Sheet Number (1-5), X = Column Grid, Y = Row Grid







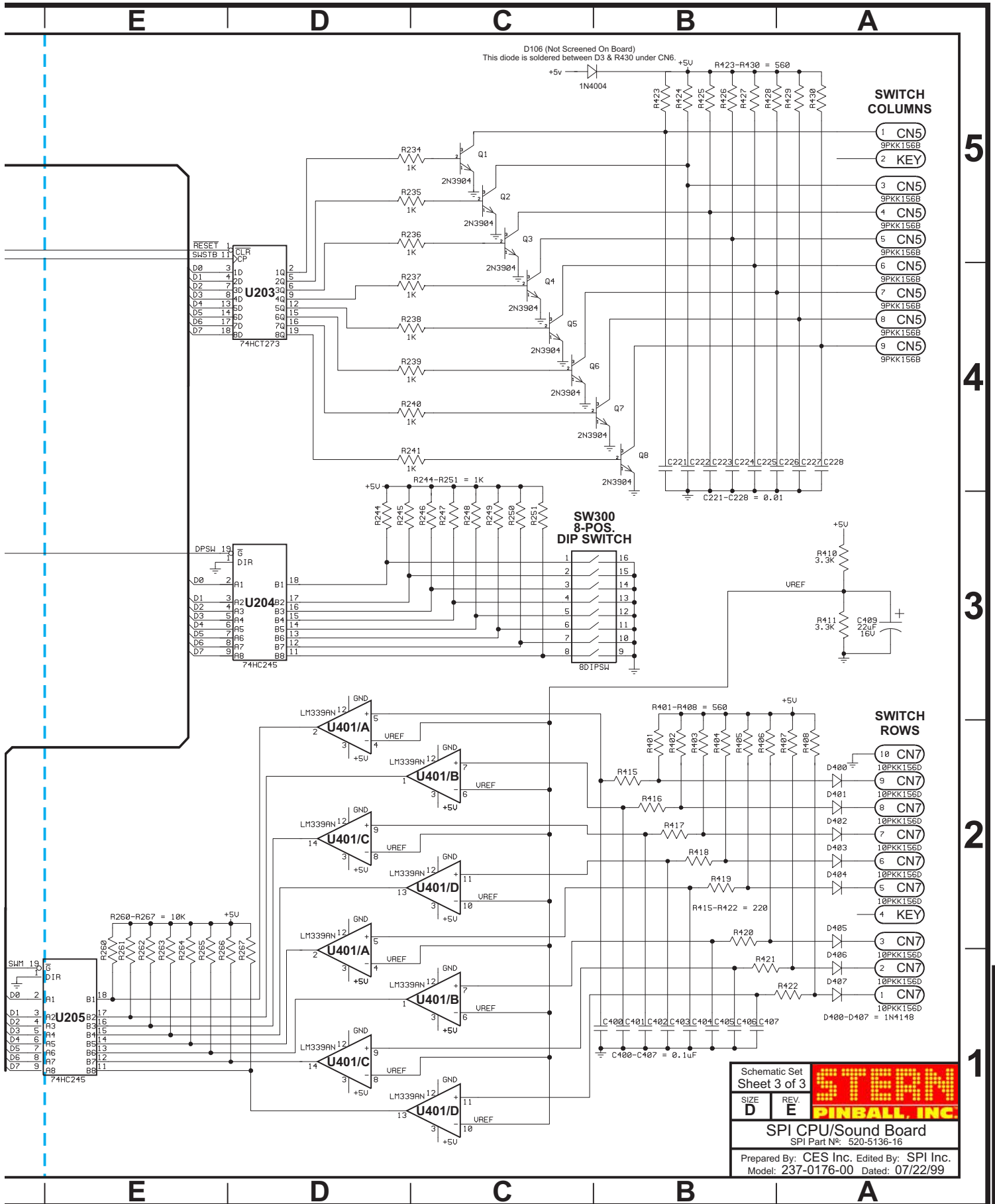
The above circuit(s) continue at the address shown (#-XY), # = Sheet Number (1-5), X = Column Grid, Y = Row Grid

- NOTES:**
- ☑ ALL RESISTOR VALUES ARE IN OHMS (Ω), 1/4W, 5%, UNLESS OTHERWISE SPECIFIED
 - ☑ ALL CAPACITOR VALUES ARE IN MICROFARADS (μF), UNLESS OTHERWISE SPECIFIED.
 - ☑ 0.1μF BYPASS CAPACITORS FOR ALL INTEGRATED CIRCUITS (ICs).
 - ☑ REMOVE W6 TO EMULATE SPI # 520-5077-00 SOUND BOARD.
 - ☑ W6 JUMPER MUST BE INSTALLED FOR GAMES USING 8MB ROM(S) AT LOCATIONS U17, U21, U36 AND/OR U37.
- Fonts used in this Schematic: Arial (Arial®) for normal text, Symbol Proportional BT (Symbolpro®) for Mount(-), and Open (Open) (Open) for Special Symbols or Check Boxes.

Sec. 5: PCBs

THE NAME IS FAT BASTARD! NOT FATTY.
I'M THE INCORRECT WEIGHT FOR MY HEIGHT AND I WAS BORN OUT OF WEDLOCK.
HENCE THE MONIKER FAT BASTARD.

Section 5, Chapter 4:
 Printed Circuit Boards (PCBs)

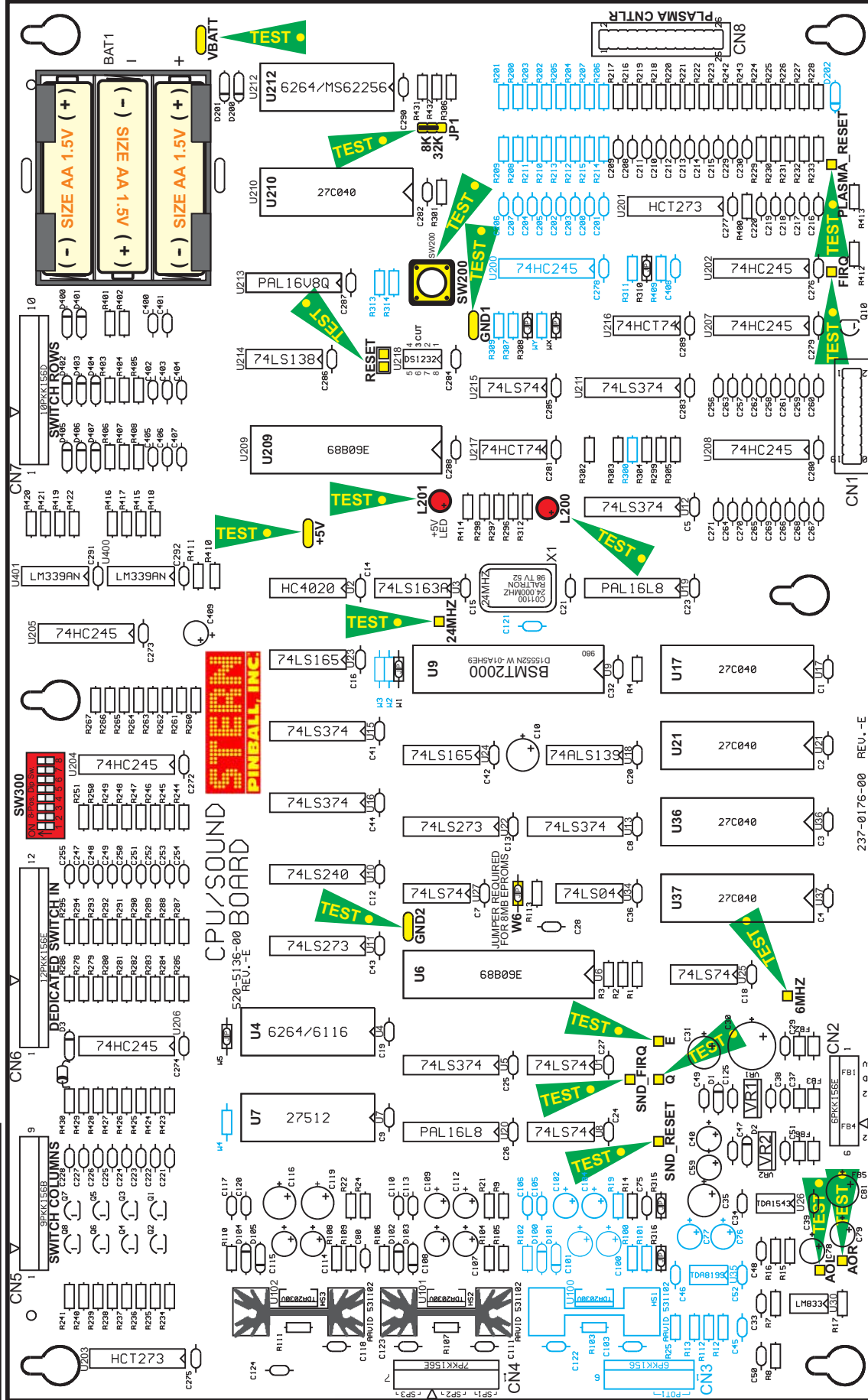


Sec. 5: PCBs

Schematic Set		STERN	
Sheet 3 of 3			
SIZE	REV	PINBALL, INC.	
D	E		
SPI CPU/Sound Board SPI Part No: 520-5136-16			
Prepared By: CES Inc. Edited By: SPI Inc. Model: 237-0176-00 Dated: 07/22/99			



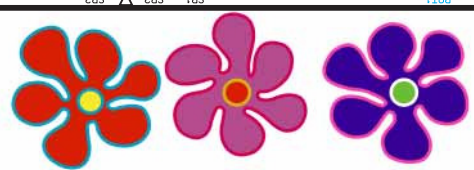
CPU/Sound Board Component Layout



- Test Points:**
- ← VBATT
 - ← 8K/32K JUMPER JP1
 - ← PLASMA_RESET
 - ← FIRQ SW200
 - ← GND1
 - ← RESET
 - LEDs :
 - ← L201+5v & L200
 - ← +5V
 - ← 24MHZ
 - ← 237-0176-00 REV.-E
 - REQUIRED FOR 8MB EPROM USE**
 - ← W6 JUMPER
 - ← GND2
 - ← 6MHZ
 - ← E
 - ← SND_FIRQ & Q
 - ← SND_RESET
 - ← AOL & AOR

Sec. 5: PCBs

Actual Board Size
14.67" X 9.125"



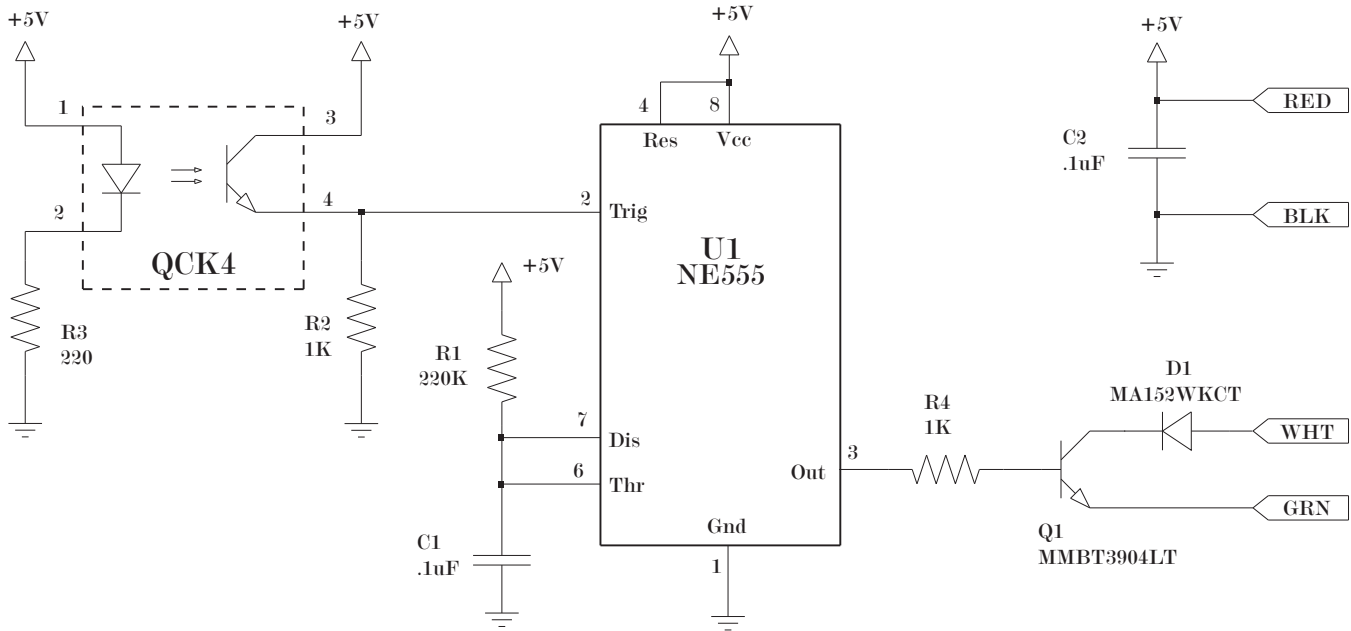
CPU/Sound Board Parts

ITEM	QTY	PART NUMBER	REF-DESIGNATOR	DESCRIPTION (NS = Not Stuffed)
—	1	520-5136-16	CPU/Sound Board Mono (FCC FEB98)	Complete PCB Assembly
01	1	545-5685-00	BAT1 HOLDER	(Always replace all 3, Size AA 1.5v Cells, with new ones, when required)
02	79	125-5031-00	C1, C2, C3, C4, C5, C7, C8, C9, C12, C13, C14, C15, C16, C18, C19, C20, C21, C23, C24, C25, C26, C28, C32, C33, C34, C36, C38, C39, C41, C42, C43, C44, C47, C49, C110, C111, C113, C117, C118, C120, C123, C124, C125, C255, C272, C273, C274, C275, C276, C277, C279, C280, C281, C282, C283, C284, C285, C286, C287, C288, C289, C290, C291, C292, C400>C401, C402>C404, C405>C407	0.1uF (104), Axial Cer. Cap. C45, C46, C52, C103, C105, C106, C122: NS)
03	2	125-5017-00	C10, C35	10uF, 16v, Radial Tant. Cap.
04	3	125-5043-00	C29, C37, C51	0.001uF, (102), Cap.
05	1	125-5037-00	C30	1000uF, 16v, Radial Lytic Cap.
06	2	125-5019-00	C31, C81	470uF, 25v, Radial Lytic Cap.
07	4	125-5020-00	C40, C59, C108, C115	22uF, 25v, Radial Lytic Cap.
08	4	125-5039-00	C48, C50, C75, C80	0.0022uF, (222), Cap.
09	6	125-5017-00	C78, C79, C107, C114	10uF, 25v-35v, Radial Lytic Cap.
10	2	125-5015-00	C109, C112	100uF, 25v, Rad. Ltc. Cap.
11	2	125-5012-00	C116, C119	220uF, 25v, Radial Lytic Cap.
12	0	125-5038-00	(C121: NS)	100pF (101), Cap.
13	44	125-5028-00	C208>C215, C216>C220, C229, C230, C247>C254, C256>C263, C264>C271	470pF, (471), Cer. Cap. (C200>C207: NS)
14	8	125-5029-00	C221>C228	0.01uF, (103), 100v Cap.
15	1	125-5014-00	C409	22uF, 16v, Radial Lytic Cap.
16	1	045-5015-01	CN1	20-Pin, 0.1 HEADER
17	1	045-5015-06	CN2 (Key Pin-5)	6PKK156
18	1	045-5015-07	CN4 (Key Pin-5)	7PKK156
19	1	045-5013-00	CN5 (Key Pin-2)	9PKK156
20	1	045-5015-00	CN6 (Key Pin-5)	12PKK156
21	1	045-5014-01	CN7 (Key Pin-4)	10PKK156
22	1	045-5015-26	CN8	26-Pin, 0.1 HEADER
23	7	112-5003-00	D1, D2, D3, D102, D103, D104, D105	1N4004, Diode (D100, D101: NS)
24	2	112-5008-00	D200, D201	1N5817, Diode
25	8	112-0054-00	D400, D401, D402>D404, D405>D407	1N4148, Diode (D202: NS)
26	6	n/a	(FB1)-FB2, FB3-(FB4), (FB5)-FB6	Ferrite Bead (if required, call Tech Support)
27	1	165-5099-00	L200, L201	LED T1-3/4 DIFFUSER LED
28	10	110-0069-00	Q1>Q8, Q10	2N3904, Transistor (Q9 Not Used)
29	36	121-5011-00	R1>R3, R4, R106, R113, R224>R228, R244>R251, R260>R267, R296>R298, R299, R301, R302>R305, R306, R413, R431>R432	10K Ω 1/4W Res. (R200>R207, R409: NS)
30	1	121-5018-00	R7	1.5K Ω 1/4W Res.
31	5	121-5023-00	R9, R14, R104, (R100, R102: NS)	22K Ω 1/4W Res.
32	20	121-5009-00	R15, R8, R234>R241, R278>R286, R412	1K Ω 1/4W Res.
33	2	121-5043-00	R16, R17	2.2K Ω 1/4W Res.
34	3	121-5051-00	R21, R22, R24	100K Ω 1/4W Res. (R12, R13, R19: NS)
35	2	121-5046-00	R105, R109	470K Ω 1/4W Res. (R101: NS)
36	2	121-5009-00	R107, R111	1K Ω 1/4W Res. (R103: NS)
37	9	121-5045-00	R108, R287>R294	39K Ω Res.
38	11	121-5021-00	R216>R223, R242, R243, R400	4.7K Ω 1/4W Res.
39	15	121-5033-00	R229>R233, R295, R414, R415>R422	220 Ω 1/4W Res. (R208>R215: NS)
40	5	n/a	R308, R310, R315>R316, WX	0Ω Jumper Wire (24ga.) (R300, R307, R309, R311, R313>R314, WX: NS)
41	1	121-5036-00	R312	330 Ω 1/4W Res.
42	16	121-5047-00	R401>R402, R403>R405, R406>R408, R423>R430	560 Ω 1/4W Res.
43	2	121-5048-00	R410, R411	3.3K Ω 1/4W Res.
44	1	n/a	SW200	B3F4000
45	1	181-5002-00	SW300	8-Pin, Dip Switch
46	5	100-0037-00	U1, U8, U25, U27, U215	74LS74
47	1	100-0249-00	U2	74HC4020
48	1	100-0049-00	U3	74LS163
49	1	105-0052-05	U4	6116 RAM
50	3	077-5208-00	U4, U7, U212	28-Pin, IC Dip Socket
51	6	100-0064-00	U5, U12, U13, U15, U16, U211	74LS374
52	1	100-0189-01	U6, U209	68B09E
53	3	077-5209-00	U6, U9, U209	40-Pin, IC Socket
54	1	(See Pg. DR. Table)	U7	27512 EPROM
55	1	105-0116-00	U9	BSMT2000
56	1	100-0149-00	U10	74LS240
57	5	(See Pg. DR. Table)	U17, U21, U36, U37, U210	27C040 EPROM
58	5	077-5217-00	U17, U21, U36, U37, U210	32-Pin, IC Socket
59	1	100-0043-00	U18	74ALS139
60	1	965-0136-00	U19	PAL16L8 (Programmed) YELLOW DOT
61	1	965-0137-00	U20	PAL16L8 (Programmed) WHITE DOT
62	2	100-0022-00	U22, U11	74LS273
63	2	100-5008-00	U23, U24	74LS165
64	1	100-5018-00	U26	TDA1543
65	1	100-0375-00	U30	LM833
66	1	100-0027-00	U34	74LS04
67	0	100-5016-00	(U35: NS)	TDA1899
68	2	100-5016-20	U101, U102	TDA2030A
69	3	535-5000-10	U101 (HS2), U102 (HS3)	AAVID 531102 (Heat Sink)
70	2	100-5012-00	U201, U203	74HCT273
71	6	100-0338-00	U202, U204, U205, U206, U207, U208	74HC245
72	1	105-5046-00	U212	MS6264A
73	1	965-6504-00	U213	PAL16L8 (Programmed) BLUE DOT
74	1	100-0148-00	U214	74LS138
75	2	100-5015-00	U216, U217	HCT74
76	1	100-5023-00	U218	DS1232
77	2	100-0377-00	U400, U401	LM339AN
78	4	n/a	VBATT, +5v, GND1, GND2	Test Point Wire (24ga.) Loops
79	1	124-5002-00	VR1	LM7905CT -5v Regulator
80	1	124-5001-00	VR2	LM7805CT +5v Regulator
81	6	n/a	W1, W5, W6* (*for 8MB EPROMs)	0Ω Jumper Wire (24ga.) (W2-W3, W4: NS)
82	1	140-0011-00	X1	24Mhz
83	12	n/a	AOR, AOL, SND, RESET, SND, FIRQ, Q, E, 6Mhz, 24Mhz, FIRQ, PLASMA, RESET, RESET (X2)	Test Points
84	1	(call Tech. Support)	R110	33K Ω 1/4W Res. (New Rev. Change Feb 02)

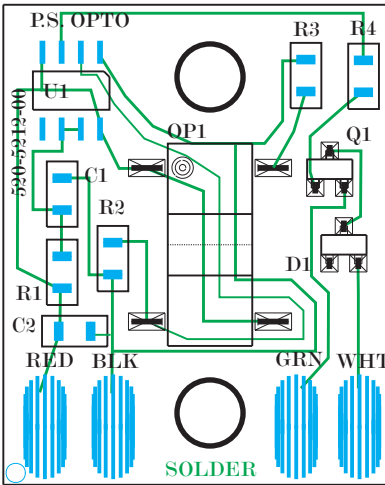
Sec. 5: PCBs



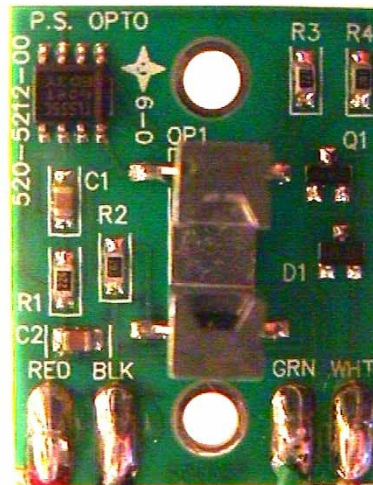
Pulse-Stretcher OPTO PC Board Schematic



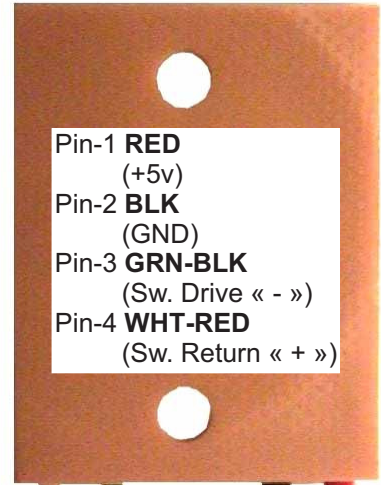
Pulse-Stretcher OPTO PC Board Component Layout & Parts



Component /Solder Side (Green)



Front Side (Green)



Back Side (Beige) No Parts

Note: In this game, this OPTO Board is used as a Playfield Detection Switch for the "Spini-Me" Assembly. See the Switch Matrix Grid (Pgs. 16-17 or 94). PCB is used for Switch 34, (GRN-BLK, WHT-RED).



ITEM	QTY	PART NUMBER	REF-DESIGNATOR
--	1	515-7212-00	Pulse-Stretcher OPTO PC Board
1	1	520-5212-00	Pulse-Stretcher OPTO Board (without soldered cable)
	1	045-5007-05	n/a
	1	605-5004-01	n/a
2	1	121-5090-00	R1
3	1	121-5091-00	R2, R4
4	1	121-5092-00	R3
5	2	125-5051-00	C1, C2
6	1	112-5018-00	D1
7	1	110-5010-00	Q1
8	1	100-5042-00	QP1
9	1	100-5043-00	U1

Please Note: If ordering PCB 520-5212-00 and require the cable & connector soldered to the board use Part Number 515-7212-00.

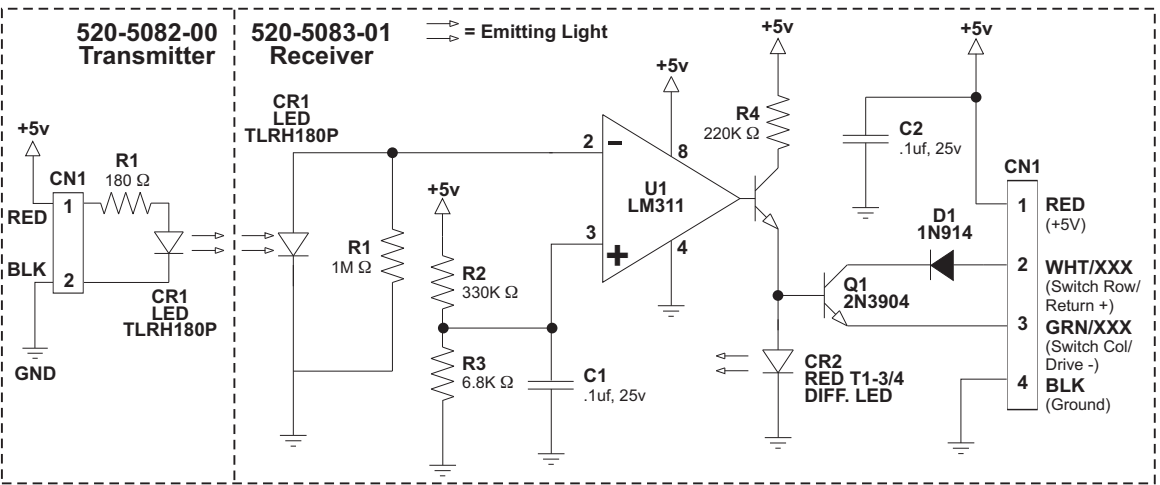
DESCRIPTION
PCB Assy. with Cable & Connector
 5-Pin, .156" Conn. (CE156F22-5)
 1/4" Shrink Tubing (Black)
 220K, 1/10W SMT Resistor, 0805 case
 1K, 1/10W SMT Resistor, 0805 case
 220, 1/10W SMT Resistor, 0805 case
 .1uF, 16V SMT Capacitor, 0805 case,
 Philips 08052R104K7B20D or eqv.
 Diode, Dual Common Cath, SOT-23
 case, Panasonic MA152WKCT or eqv.
 NPN Trans, Small Sig, SOT-23 case,
 Motorola MMBT3904LT or eqv.
 Slotted OPTO, QT OPTO QCK4 or eqv.
 TLC555CD Timer, Small-Outline
 Package

Sec. 5: PCBs



Playfield Switch OPTO "Long-Hop" Boards Theory of Operation & Schematic

The light falling on LED (CR1) generates a voltage which is applied to the input (Pin-2) of the LM311 Comparator (U1). R1 bleeds off excess charge. At about a volt input from LED (CR1) the Comparator (U1) trips & drives either Q1

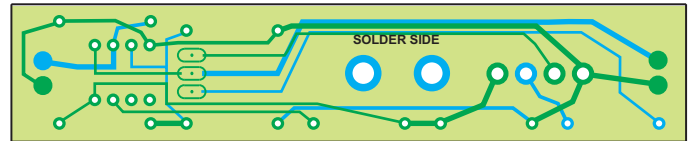


(during switch line strobos) or the indicator LED (CR2) (in between strobos). If a switch line is being strobed, the emitter of Q1 drops to the saturation voltage of the Switch Line Driver, about .3 volts. This plus the .7 volt drop on the base give a 1v forward bias voltage to Q1, which is lower than the 1.7v drop on LED (CR2) so the current flows through the Transistor during strobos. This drives Q1 on and makes the switch. If the strobe line is high, then the 1.7v path through LED (CR2) is lower than Q1's bias voltage so current flows through LED (CR2) and the indicator lights. D1 prevents reverse bleed, R2 and R3 form the voltage divider for the trip point, R4 is a current limiter for both Q1 and CR2, C1 and C2 are general noise-filter caps.

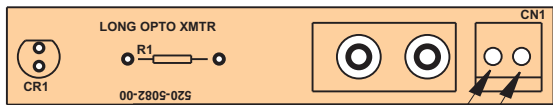
Playfield Switch OPTO "Long-Hop" Boards Component Layout & Parts



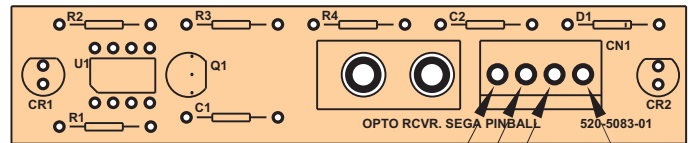
520-5082-00 (TRANS) Solder Side (Green)



520-5083-01 (REC) Solder Side (Green)



Component Side (Beige)
Pin-1 RED (+5v)
Pin-2 BLK (GROUND)
CN1



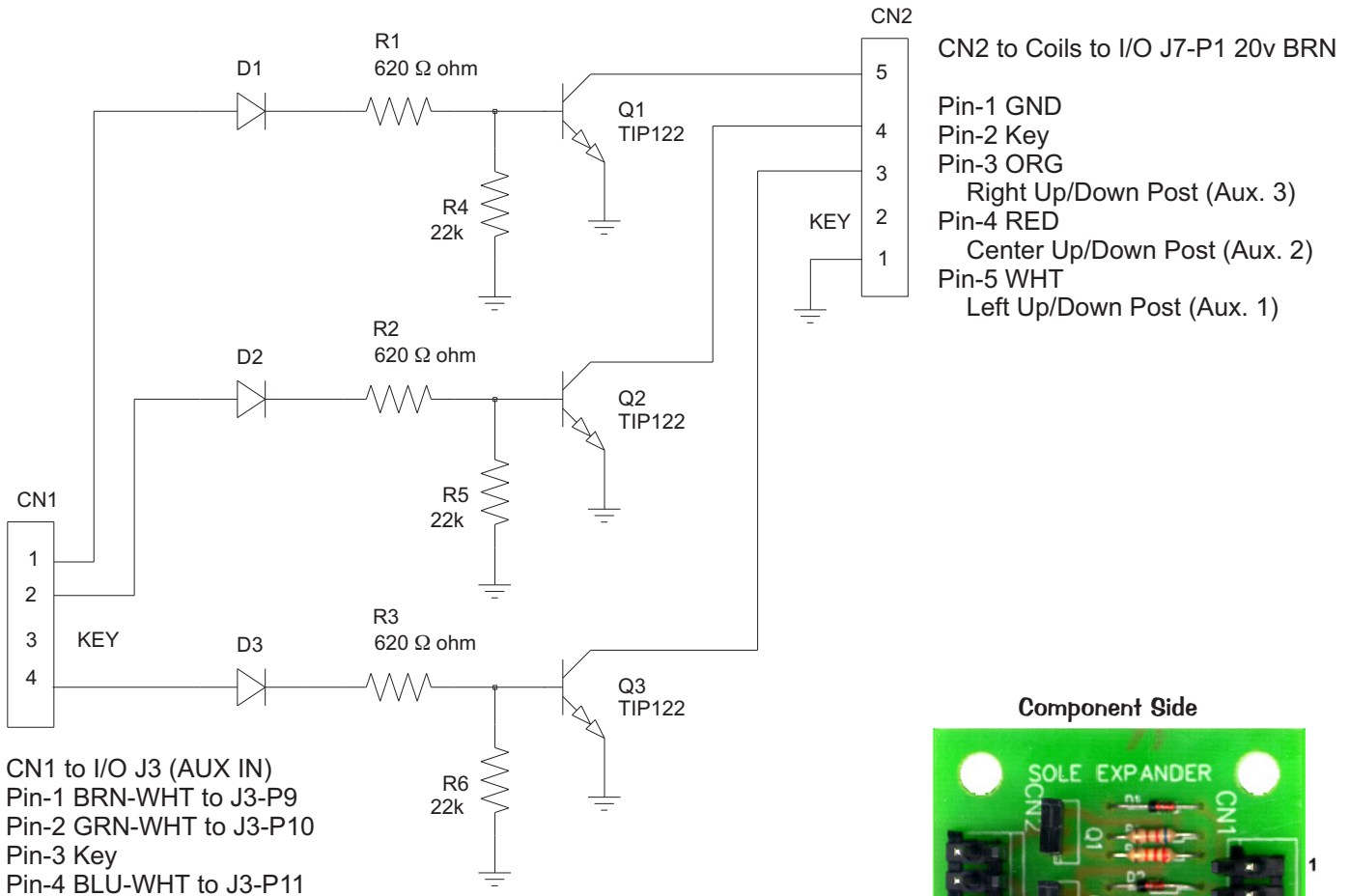
Component Side (Beige)
Pin-3 GRN/XXX (Sw. Drive « - »)
Pin-2 WHT/XXX (Sw. Return « + »)
Pin-1 RED (+5v)
CN1
Pin-4 BLK (GROUND)

Note: In this game, this Combo OPTO Board is used as a Playfield Detection Switch for the Time Machine Ramp. See the Switch Matrix Grid (Pgs. 16-17 or 94). 1 Pair is used for Switch 35, (GRN-BLK, WHT-ORG).

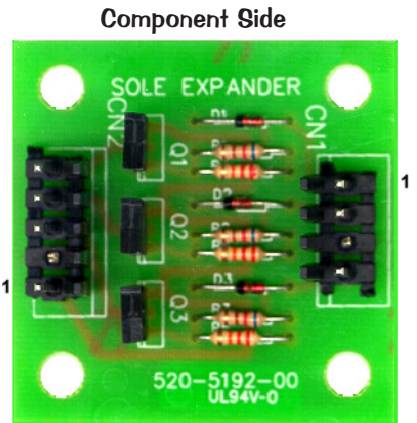
ITEM	QTY	PART NUMBER	REF-DESIGNATOR	DESCRIPTION
A	1	520-5083-01	OPTO Receiver Board	Complete PCB Assembly
1	1	165-5052-00	CR1	LED TLRH180P (Ultra Bright Red)
2	1	165-5099-00	CR2	LED T1-3/4 RED DIFFUSER
3	1	112-5014-00	D1	1N914, Diode
4	1	121-5013-00	R1	1M Ω 1/4W Res., 5%
5	1	121-5037-00	R2	330K Ω 1/4W Res., 5%
6	1	121-5077-00	R3	6.8K Ω 1/4W Res., 5%
7	1	121-5014-00	R4	220 Ω 1/4W Res., 5%
8	2	125-5023-00	C1, C2	.1uF, 25v, Axial Ceramic Cap.
6	1	100-5025-00	U1	LM311
7	1	110-0069-00	Q1	2N3904, Transistor
8	1	045-5200-04	CN1	4X1, .156" Locking Straight Hdr. Conn (Molex 50-84-1040)
B	1	520-5082-00	OPTO Transmitter Board	Complete PCB Assembly
1	1	165-5052-00	CR1	LED TLRH180P (Ultra Bright Red)
2	1	121-5066-00	R1	180 Ω 1/4W Res.
3	1	045-5206-02	CN1	2X1, .156" Locking Straight Hdr. Conn (Molex 50-84-1020)



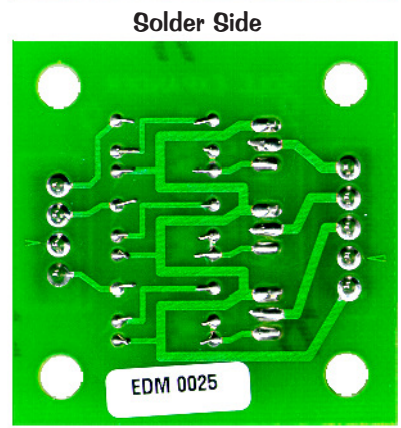
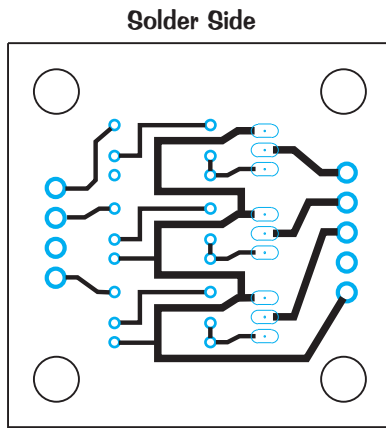
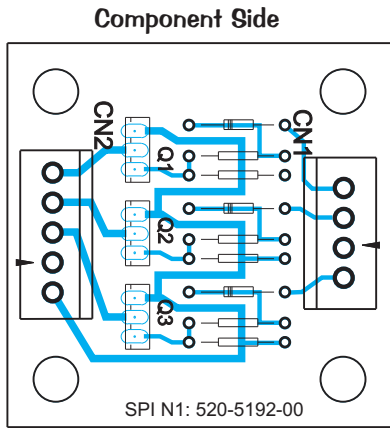
Solenoid Expander PC Board Schematic (UK Only)



See next page for more details.



Solenoid Expander PC Board Component Layout & Parts



Sec. 5: PCBs

ITEM	QTY	PART NUMBER	REF-DESIGNATOR
1	1	520-5192-00	Solenoid Expander PC Board
2	1		CN1
3	1		CN2
4	3	112-5014-00	D1, D2, D3
5	3	121-5003-00	R1, R2, R3
6	3	121-5042-00	R4, R5, R6
7	3	110-0067-00	Q1, Q2, Q3

DESCRIPTION
Complete PCB Assembly
Connector, 4X .156"
Connector, 5X .156"
1N914, Signal Diode
620Ω, 1/4W CF Resistor
22KΩ, 1/4W CF Resistor
Tip122 (NPN Darl. Transistor)



Appendixes A through J

Appendix Table of Contents

- **Appendix A, Pinball Game Firmware Table A1-A2**
...describes the EPROM with its chip size, the Stern™ Pinball, Inc. (SPI) Part N^o, version (if applicable), and CPU Board & CPU/Sound Board Pin location(s).
- **Appendix B, Semi-Conductors / I.C.'s / Relays Cross-Reference Table B1**
...describes diodes and transistors with Source N^o, SPI Part N^o, NTE N^o, ECG N^o, Radio Shack N^o & RCA Part N^o (If applicable).
- **Appendix C, Game Mfg. Date, Manual Part N^o & CPU Jumper Table C1**
...provides the Game Manufactured Date & Manual Part N^o, the CPU version, the EPROM Position, Jumpers Installed and Jumpers Removed (games specified).
- **Appendix D, Board Type Table D1-D2**
...provides Board Part N^os for Games Laser War through Batman Forever (Flipper, Sound, Power Supply, Dot Matrix Display, Display Controller & OPTOs) and the White Star Board System, Games Apollo 13 through current (Flipper*, I/O Power Driver, CPU/Sound, Display Power Supply, Dot Matrix Display, Display Controller & OPTOs; *Flipper Board with the White Star Bd. System for A13 & Golden Eye only.)
- **Appendix E, Generic Coil Cross-Reference Guide & Flipper Coil Table E1-E2**
...provides the Coils used with Part N^o and Gauge-Turns (of the coil).
- **Appendix F, Motor Specification Table F1-F2**
...provides all the Motor Function, Specifications and Part N^o for Games Laser War through current.
- **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 pictorial view with the name and Part N^o of all the inserts used (also gives the Color Code Chart).
- **Appendix I, Stand-Up Targets (Happ Modular & Regular) I1**
...gives a pictorial view with the name and Part N^o of all the Single Stand-Up Targets used (also gives the Color Code Chart).
- **Appendix J, Coin Cards (USA & International) J1**
...gives a pictorial view with the name and Part N^o of all the current Coin Cards for USA, Canada, Euro and other International Countries.
- **Glossary of Terms Last Page**
...gives definitions or explanations of some pinball terms and acronyms.
- **Limited Warranty, Cautions, Warnings & Notices Last Page**



APPENDIX A

Pinball Game Firmware Table

EPROM	Chip Size	Program Part N ^o	USA Ver.	Bd. Loc.	Raw Part N ^o
Laser War					
CPU	(256K)	965-0004-00	LWAR.C5	C5	960-5007-00
Sound (Old)	(256K)	965-0005-00		J5	960-5007-00
Sound (Old)	(256K)	965-0006-00		J6	960-5007-00
Sound (Old)	(256K)	965-0007-00		J7	960-5007-00
- OR -					
Sound	(256K)	965-0008-00		7F	960-5007-00
Sound 1	(512K)	965-0009-00		6F	960-7001-02
Sound 2	(512K)	965-0010-00		4F	960-7001-02
Secret Service					
CPU	(256K)	965-0011-00	A4-6	B5	960-5007-00
CPU	(256K)	965-0012-00	A4-6	C5	960-5007-00
Voice 1	(512K)	965-0014-00		6F	960-7001-02
Voice 2	(512K)	965-0015-00		4F	960-7001-02
Sound	(256K)	965-0013-00		7F	960-5007-00
Torpedo Alley					
CPU	(256K)	965-0016-00	A2-1	B5	960-5007-00
CPU	(256K)	965-0017-00	A2-1	C5	960-5007-00
Voice 1	(512K)	965-0019-00		6F	960-7001-02
Voice 2	(512K)	965-0020-00		4F	960-7001-02
Sound	(256K)	965-0018-00		7F	960-5007-00
Time Machine					
CPU	(128K)	965-0021-00	A2-4	B5	960-5006-00
CPU	(256K)	965-0022-00	A2-4	C5	960-5007-00
Voice 1	(512K)	965-0024-00		6F	960-7001-02
Voice 2	(512K)	965-0025-00		4F	960-7001-02
Sound	(256K)	965-0023-00		7F	960-5007-00
Playboy 35th Anniversary					
CPU	(256K)	965-0046-00	A2-4	B5	960-5007-00
CPU	(256K)	965-0047-00	A2-4	C5	960-5007-00
Voice 1	(512K)	965-0049-00		6F	960-7001-02
Voice 2	(512K)	965-0050-00		4F	960-7001-02
Sound	(256K)	965-0048-00		7F	960-5007-00
ABC Monday Night Football					
CPU	(128K)	965-0031-00	A2-7	B5	960-5006-00
CPU	(256K)	965-0032-00	A2-7	C5	960-5007-00
Voice 1	(512K)	965-0034-00		6F	960-7001-02
Voice 2	(512K)	965-0035-00		4F	960-7001-02
Sound	(256K)	965-0033-00		7F	960-5007-00
Robocop					
CPU	(256K)	965-0036-00	A3-4	B5	960-5007-00
CPU	(256K)	965-0037-00	A3-4	C5	960-5007-00
Voice 1	(512K)	965-0039-00		6F	960-7001-02
Voice 2	(512K)	965-0040-00		4F	960-7001-02
Sound	(256K)	965-0038-00		7F	960-5007-00
Phantom of the Opera					
CPU	(128K)	965-0026-00	A3-2	B5	960-5006-00
CPU	(256K)	965-0027-00	A3-2	C5	960-5007-00
Voice 1	(512K)	965-0029-00		6F	960-7001-02
Voice 2	(512K)	965-0030-00		4F	960-7001-02
Sound	(256K)	965-0028-00		7F	960-5007-00
Back to the Future					
CPU	(256K)	965-0041-00	A2-0	B5	960-5007-00
CPU	(256K)	965-0042-00	A2-0	C5	960-5007-00
Voice 1	(512K)	965-0044-00		6F	960-7001-02
Voice 2	(512K)	965-0045-00		4F	960-7001-02
Sound	(256K)	965-0043-00		7F	960-5007-00
The Simpsons					
CPU	(128K)	965-0051-00	A2-7	B5	960-5006-00
CPU	(256K)	965-0052-00	A2-7	C5	960-5007-00
Voice 1	(512K)	965-0054-00		6F	960-7001-02
Voice 2	(512K)	965-0055-00		4F	960-7001-02
Sound	(256K)	965-0053-00		7F	960-5007-00
Checkpoint					
CPU	(128K)	965-0056-00	A1-7	B5	960-5006-00
CPU	(256K)	965-0057-00	A1-7	C5	960-5007-00
Voice 1	(1M)	965-0057-00		F7	960-5009-00
Voice 2	(1M)	965-0058-00		F5	960-5009-00
Sound	(256K)	965-0059-00		F4	960-5007-00
Display	(512K)	965-0060-00	CP80	U8	960-7001-02
Teenage Mutant Ninja Turtles					
CPU	(128K)	965-0061-00	A1.04	B5	960-5006-00
CPU	(256K)	965-0062-00	A1.04	C5	960-5007-00
Voice 1	(1M)	965-0063-00		F5/6	960-5009-00
Voice 2	(1M)	965-0064-00		F4/5	960-5009-00
Sound	(256K)	965-0065-00		F7	960-5007-00
Display	(512K)	965-0066-00	A1.04	U8	960-7001-02
Batman					
CPU	(128K)	965-0067-00	A1.06	B5	960-5006-00
CPU	(256K)	965-0135-00	A1.06	C5	960-5007-00
Voice 1	(2M)	965-0068-00		U17	960-5010-00
Voice 2	(2M)	965-0069-00		U21	960-5010-00
Sound	(256K)	965-0070-00		U7	960-5007-00
Display	(1M)	965-0071-00	A1.06	U8	960-5009-00
Star Trek 25th Anniversary					
CPU	(512K)	965-0072-00	A2.01	C5	960-7001-02
Voice 1	(2M)	965-0073-00		U17	960-5010-00
Voice 2	(2M)	965-0074-00		U21	960-5010-00
Sound	(256K)	965-0075-00		U7	960-5007-00
Display	(1M)	965-0076-00	A1.09	U8	960-5009-00
Hook					
CPU	(512K)	965-0077-00	A4.08	C5	960-7001-02
Voice 1	(2M)	965-0078-00		U17	960-5010-00
Voice 2	(2M)	965-0079-00		U21	960-5010-00
Sound	(256K)	965-0080-00		U7	960-5007-00
Display	(1M)	965-0081-00	A4.01	U8	960-5009-00

EPROM	Chip Size	Program Part N ^o	USA Ver.	Bd. Loc.	Raw Part N ^o
Lethal Weapon 3					
CPU	(512K)	965-0082-00	A2.08	C5	960-7001-02
Voice 1	(2M)	965-0083-00		U17	960-5010-00
Voice 2	(2M)	965-0084-00		U21	960-5010-00
Sound	(256K)	965-0085-00		U7	960-5007-00
Display	(2M)	965-0086-00	A2.06	ROM 0	960-5010-00
Display	(2M)	965-0087-00	A2.06	ROM 1	960-5010-00
(Used on Display PCB 520-5055-00)					
Display	(4M)	965-0087-04	-OR- A2.06	ROM 0	960-5015-00
(Used on Display PCB 520-5055-01)					
Star Wars					
CPU	(512K)	965-0119-00	A1.03	C5	960-7001-02
Voice 0	(4M)	965-0132-00		U17	960-5015-00
Voice 1	(2M)	965-0133-00		U21	960-5010-00
Sound	(256K)	965-0131-00		U7	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)					
Display	(4M)	965-0122-00	-OR- A1.05	ROM 0	960-5015-00
(Used on Display PCB 520-5055-01)					
Rocky & Bullwinkle & Friends					
CPU	(512K)	965-0138-00	A1.30	C5	960-7001-02
Voice 0	(4M)	965-0139-00		U17	960-5015-00
Voice 1	(2M)	965-0140-00		U21	960-5010-00
Sound	(256K)	965-0141-00		U7	960-5007-00
Display	(4M)	965-0142-00	A1.30	ROM 0	960-5015-00
Jurassic Park					
CPU	(512K)	965-0143-00	A5.13	C5	960-7001-02
Voice 0	(4M)	965-0144-00		U17	960-5015-00
Voice 1	(2M)	965-0145-00		U21	960-5010-00
Sound	(256K)	965-0146-00		U7	960-5007-00
Display	(4M)	965-0147-00	A5.10	ROM 0	960-5015-00
Last Action Hero					
CPU	(512K)	965-0148-00	A1.12	C5	960-7001-02
Voice 0	(4M)	965-0149-00		U17	960-5015-00
Voice 1	(2M)	965-0150-00		U21	960-5010-00
Sound	(256K)	965-0151-00		U7	960-5007-00
Display	(4M)	965-0152-00	A1.06	ROM 0	960-5015-00
Tales from the Crypt					
CPU	(512K)	965-0157-00	A3.03	C5	960-7001-02
Voice 0	(4M)	965-0158-00		U17	960-5015-00
Voice 1	(2M)	965-0159-00		U21	960-5010-00
Sound	(256K)	965-0160-00		U7	960-5007-00
Display	(4M)	965-0161-00	A3.01	ROM 0	960-5015-00
The Who's Tommy					
CPU	(512K)	965-0162-00	A4.00	C5	960-7001-02
Voice 1	(4M)	965-0163-00		U17	960-5015-00
Voice 2	(4M)	965-0166-00		U21	960-5010-00
Voice 3	(4M)	965-0167-00		U36	960-5015-00
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
WWF Royal Rumble					
CPU	(512K)	965-0169-00	A1.06	C5	960-7001-02
Voice 1	(4M)	965-0172-00		U17	960-5015-00
Voice 2	(4M)	965-0173-00		U21	960-5010-00
Voice 3	(4M)	965-0174-00		U36	960-5015-00
Sound	(512K)	965-0171-00		U7	960-7001-02
Display	(4M)	965-0170-00	A1.02	ROM 0	960-5015-00
Guns N' Roses					
CPU	(512K)	965-0175-00	A3.00	C5	960-7001-02
Voice 1	(4M)	965-0178-00		U17	960-5015-00
Voice 2	(4M)	965-0179-00		U21	960-5010-00
Voice 3	(4M)	965-0180-00		U36	960-5015-00
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
Maverick *					
CPU	(512K)	965-0182-00	A4.04	C5	960-7001-02
Voice 1	(4M)	965-0186-00		U17	960-5015-00
Voice 2	(4M)	965-0187-00		U21	960-5010-00
Voice 3	(4M)	965-0187-01		U36	960-5015-00
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
Mary Shelley's Frankenstein *					
CPU	(512K)	965-0188-00	A1.03	C5	960-7001-02
Voice 1	(4M)	965-0192-00		U17	960-5015-00
Voice 2	(4M)	965-0193-00		U21	960-5010-00
Voice 3	(4M)	965-0194-00		U36	960-5015-00
Sound	(512K)	965-0191-00		U7	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
Baywatch * (CPU Board 520-5003-04)					
CPU	(512K)	965-0195-00	A4.00	C5	960-7001-02
Voice 1	(4M)	965-0196-00		U17	960-5015-00
Voice 2	(4M)	965-0197-00		U21	960-5010-00
Sound	(512K)	965-0199-00		U7	960-7001-02
Display*	(4M)	965-0200-00	A4.00	ROM 0	960-5015-00
Display*	(4M)	965-0201-00	A4.00		



APPENDIX A



Pinball Game Firmware (for White Star Board System) Table

ROM	Chip Size	Program Part N ^o	USA Ver. & Check Sum	Bd. Loc.	Raw Part N ^o
Apollo 13 (Note 1)					
Game ROM	(1M)	965-0208-00	A5.01 \$09FF	U210	960-5009-00
Sound	(512K)	965-0212-00		U7	960-7001-02
Display	(4M)	965-0213-00	A5.00 \$B92B	ROM 0	960-5015-01
Voice 1	(4M)	965-0209-00		U17	n/a (masked)
Voice 2	(4M)	965-0210-00		U21	n/a (masked)
Voice 3	(4M)	965-0211-00		U36	n/a (masked)
Golden Eye (Note 1)					
Game ROM	(1M)	965-0214-42	A4.04 \$3FFF	U210	960-5009-00
Sound	(512K)	965-0217-42		U7	960-7001-02
Display	(4M)	965-0218-42	A4.00 \$E6ED	ROM 0	960-5015-01
Voice 1	(4M)	965-0215-42		U17	n/a (masked)
Voice 2	(4M)	965-0216-42		U21	n/a (masked)
Twister (Note 2)					
Game ROM	(1M)	965-0219-41	A4.05 \$E9FF	U210	960-5009-00
Sound	(512K)	965-0221-41		U7	960-7001-02
Display	(4M)	965-0222-41	A4.01 \$FD01	ROM 0	960-5015-01
Voice 1	(4M)	965-0220-41		U17	960-5015-01
Voice 2	(4M)	965-0223-41		U21	960-5015-01
ID4: Independence Day (Note 2)					
Game ROM	(1M)	965-0224-45	A2.02 \$9CFF	U210	960-5009-00
Sound	(512K)	965-0227-45		U7	960-7001-02
Display	(4M)	965-0228-45	A2.00 \$ABF7	ROM 0	960-5015-01
Voice 1	(4M)	965-0225-45		U17	960-5015-01
Voice 2	(4M)	965-0226-45		U21	960-5015-01
Space Jam (Note 2)					
Game ROM	(1M)	965-0229-43	A3.00 \$E6FF	U210	960-5009-00
Sound	(512K)	965-0233-43		U7	960-7001-02
Display	(4M)	965-0234-43	A3.00 \$0057	ROM 0	960-5015-01
Voice 1	(4M)	965-0230-43		U17	960-5015-01
Voice 2	(4M)	965-0231-43		U21	960-5015-01
Voice 3	(4M)	965-0232-43		U36	960-5015-01
The Star Wars Trilogy - Special Edition (S.E.) (Note 2)					
Game ROM	(1M)	965-0235-56	A4.03 \$5EFF	U210	960-5009-00
Sound	(512K)	965-0238-56		U7	960-7001-02
Display	(4M)	965-0239-56	A4.00 \$8817	ROM 0	960-5015-01
Voice 1	(4M)	965-0236-56		U17	960-5015-01
Voice 2	(4M)	965-0237-56		U21	960-5015-01
The Lost World: Jurassic Park (Note 2)					
Game ROM	(1M)	965-0240-53	A2.02 \$C8FF	U210	960-5009-00
Sound	(512K)	965-0243-53		U7	960-7001-02
Display	(4M)	965-0244-53	A2.01 \$7F46	ROM 0	960-5015-01
Voice 1	(4M)	965-0241-53		U17	960-5015-01
Voice 2	(4M)	965-0242-53		U21	960-5015-01
The X-Files (Note 2)					
Game ROM	(1M)	965-0245-46	A3.03 \$A2FF	U210	960-5009-00
Sound	(512K)	965-0248-46		U7	960-7001-02
Display	(4M)	965-0249-46	A3.00 \$66D0	ROM 0	960-5015-01
Voice 1	(4M)	965-0246-46		U17	960-5015-01
Voice 2	(4M)	965-0247-46		U21	960-5015-01
Starship Troopers (Note 3)					
Game ROM	(1M)	965-0250-59	A2.01 \$85FF	U210	960-5009-00
Sound	(512K)	965-0253-59		U7	960-7001-02
Display	(4M)	965-0254-59	A2.00 \$E77B	ROM 0	960-5015-01
Voice 1	(4M)	965-0251-59		U17	960-5015-01
Voice 2	(4M)	965-0252-59		U21	960-5015-01
Voice 3	(4M)	965-0255-59		U36	960-5015-01
Viper Night Drivin' (Note 4)					
Game ROM	(1M)	965-0266-35	A2.01 \$C5FF	U210	960-5009-00
Sound	(512K)	965-0271-35		U7	960-7001-02
Display	(4M)	965-0272-35	A2.01 \$C17D	ROM 0	960-5015-01
Voice 1	(4M)	965-0267-35		U17	960-5015-01
Voice 2	(4M)	965-0268-35		U21	960-5015-01
Voice 3	(4M)	965-0269-35		U36	960-5015-01
Voice 4	(4M)	965-0270-35		U37	960-5015-01
Lost In Space (Note 4)					
Game ROM	(1M)	965-0282-60	A1.01 \$B2FF	U210	960-5009-00
Sound	(512K)	965-0287-60		U7	960-7001-02
Display	(4M)	965-0288-60	A1.02 \$32AB	ROM 0	960-5015-01
Voice 1	(4M)	965-0283-60		U17	960-5015-01
Voice 2	(4M)	965-0284-60		U21	960-5015-01
Voice 3	(4M)	965-0285-60		U36	960-5015-01
Voice 4	(4M)	965-0286-60		U37	960-5015-01
Godzilla (Note 4)					
Game ROM	(1M)	965-0289-40	A2.05 \$B1FF	U210	960-5009-00
Sound	(512K)	965-0294-40		U7	960-7001-02
Display	(4M)	965-0295-40	A2.00 \$C929	ROM 0	960-5015-01
Voice 1	(4M)	965-0290-40		U17	960-5015-01
Voice 2	(4M)	965-0291-40		U21	960-5015-01
Voice 3	(4M)	965-0292-40		U36	960-5015-01
Voice 4	(4M)	965-0293-40		U37	960-5015-01
South Park (Notes 4, 5)					
Game ROM	(1M)	965-0301-71	A1.03 \$58FF	U210	960-5009-00
Sound	(512K)	965-0306-71		U7	960-7001-02
Display	(4M)	965-0307-71	A1.01 \$166F	ROM 0	960-5015-01
Voice 1	(8M)	965-0302-71		U17	960-5016-00
Voice 2	(8M)	965-0303-71		U21	960-5016-00
Voice 3	(8M)	965-0304-71		U36	960-5016-00
Voice 4	(8M)	965-0305-71		U37	960-5016-00
Harley-Davidson® (Notes 4, 5)					
Game ROM	(1M)	965-0319-67	A1.03 \$3EFF	U210	960-5009-00
Sound	(512K)	965-0320-67		U7	960-7001-02
Display	(4M)	965-0321-67	A1.04 \$FC7C	ROM 0	960-5015-01
Voice 1	(8M)	965-0322-67		U17	960-5016-00
Voice 2	(8M)	965-0323-67		U21	960-5016-00
Voice 3	(8M)	965-0324-67		U36	960-5016-00
Voice 4	(4M)	965-0325-67		U37	960-5015-01

ROM	Chip Size	Program Part N ^o	USA Ver. & Check Sum	Bd. Loc.	Raw Part N ^o
Striker Xtreme (Notes 4, 5)					
Game ROM	(1M)	965-0326-68	A1.02 \$E4FF	U210	960-5009-00
Sound	(512K)	965-0327-68		U7	960-7001-02
Display	(4M)	965-0328-68	A1.03 \$1957	ROM 0	960-5015-01
Voice 1	(8M)	965-0329-68		U17	960-5016-00
Voice 2	(8M)	965-0330-68		U21	960-5016-00
Voice 3	(8M)	965-0331-68		U36	960-5016-00
Voice 4	(8M)	965-0332-68		U37	960-5016-00
NFL (Notes 4, 5)					
Game ROM	(1M)	965-0339-73	A1.00 \$D2FF	U210	960-5009-00
Sound	(512K)	965-0340-73		U7	960-7001-02
Display	(4M)	965-0341-73	A1.01 \$845A	ROM 0	960-5015-01
Voice 1	(8M)	965-0342-73		U17	960-5016-00
Voice 2	(8M)	965-0343-73		U21	960-5016-00
Voice 3	(8M)	965-0344-73		U36	960-5016-00
Voice 4	(8M)	965-0345-73		U37	960-5016-00
Sharkey's Shootout (Notes 4, 5)					
Game ROM	(1M)	965-0333-72	A2.04 \$5CFF	U210	960-5009-00
Sound	(512K)	965-0334-72		U7	960-7001-02
Display	(4M)	965-0335-72	A2.01 \$6C33	ROM 0	960-5015-01
Voice 1	(8M)	965-0336-72		U17	960-5016-00
Voice 2	(8M)	965-0337-72		U21	960-5016-00
Voice 3	(8M)	965-0338-72		U36	960-5016-00
High Roller Casino (Notes 4, 5)					
Game ROM	(1M)	965-0346-65	A2.10 \$19FF	U210	960-5009-00
Sound	(512K)	965-0347-65		U7	960-7001-02
Display	(4M)	965-0348-65	A2.00 \$13EE	ROM 0	960-5015-01
Voice 1	(8M)	965-0349-65		U17	960-5016-00
Voice 2	(8M)	965-0350-65		U21	960-5016-00
Voice 3	(8M)	965-0351-65		U36	960-5016-00
Voice 4	(8M)	965-0352-65		U37	960-5016-00
Austin Powers™ (Notes 4, 5)					
Game ROM	(1M)	965-0353-74	A3.00 \$ACFF	U210	960-5009-00
Sound	(512K)	965-0354-74		U7	960-7001-02
Display	(4M)	965-0355-74	A3.00 \$6A34	ROM 0	960-5015-01
Voice 1	(8M)	965-0356-74		U17	960-5016-00
Voice 2	(8M)	965-0357-74		U21	960-5016-00
Voice 3	(8M)	965-0358-74		U36	960-5016-00
Voice 4	(8M)	965-0359-74		U37	960-5016-00
Monopoly® (Notes 4, 5)					
Game ROM	(1M)	965-0360-75	A2.51 \$42FF	U210	960-5009-00
Sound	(512K)	965-0361-75		U7	960-7001-02
Display	(4M)	965-0362-75	A2.06 \$91F7	ROM 0	960-5015-01
Voice 1	(8M)	965-0363-75		U17	960-5016-00
Voice 2	(8M)	965-0364-75		U21	960-5016-00
Voice 3	(8M)	965-0365-75		U36	960-5016-00
Voice 4	(8M)	965-0366-75		U37	960-5016-00
Playboy (Notes 4, 5)					
Game ROM	(1M)	965-0360-75	A \$	U210	960-5009-00
Sound	(512K)	965-0361-75		U7	960-7001-02
Display	(4M)	965-0362-75	A \$	ROM 0	960-5015-01
Voice 1	(8M)	965-0363-75		U17	960-5016-00
Voice 2	(8M)	965-0364-75	GAME CODE	U21	960-5016-00
Voice 3	(8M)	965-0365-75	IN	U36	960-5016-00
Voice 4	(8M)	965-0366-75	PRODUCTION	U37	960-5016-00

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)
- 4 ROMs on CPU/Sound Bd.: 520-5136-16* (Mono) (FCC 02-98) & Display Controller Board: 520-5055-03* (FCC 02-98)
- 5 This game uses 8MB VOICE ROMS at U17, U21, U36 & U37 (if 3 ROMs use U37 will be unused) requiring a Jumper at Loc. W6. Refer to CPU/Snd. Bd. Schematic (2 of 3).

Game Revisions can be updated after the Production Run. This Table is accurate as of the printing of this manual. If any changes occurred, the next game manual will include the updated information. The version stated is USA. If there is a question of as to the latest Code Revision & Check Sum call our Technical Support Department, 1-800-542-5377 or 1-708-345-7700 (Select Option 1). Visit our website www.SternPinball.com where code can be downloaded (an EPROM Burner is required).



APPENDIX B

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

Table No	Type	Source Number	STERN™ PINBALL	NTE®	ECG®	Radio Shack®	RCA®
RECTIFICATION, BLOCKING, DAMPENING DIODES AND/OR LIGHT EMITTING DIODES (LEDs)							
1	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	MT5000UR or TLRH180P (T1-3/4 GaAlAs)	165-5052-00 <i>(old SPI Part No: 165-5100-00)</i>	-----	-----	276-066B	-----
ZENER DIODES							
2	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	-----	-----
TRANSISTORS - TYPE FET, NPN, PNP AND/OR SCR							
3	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	-----	-----	
BRIDGE RECTIFIERS (BR)				Comments:			
4	BR (Present)	DB3501 or CM3501	112-5000-00	For White Star I/O Bds., BR = 35 Amp @ 100v P.I.V.			
	RELAYS				Comments:		
5	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

Game Mfg. Date, Manual Part N^o & CPU Jumper Table†

Game Name	Game Mfg. Date and Manual PN ^o	CPU Ver.	EPROM Position	Jumpers Installed (see Note)	Jumpers Removed (see Note)
1. Laser War	MAY 87 780-5001-00	1	5C	J4 J6a J7a	J5 J6 J7b
		2	5B, 5C	J4 J5a J6a	J5 J5b J6b
2. Secret Service	MAR 88 780-5002-00	2	5B, 5C	J4	J5
3. Torpedo Alley	AUG 88 780-5003-00	2	5B, 5C	J4	J5
4. Time Machine	DEC 88 780-5004-00	2	5B, 5C	J4	J5
5. Playboy 35th Anniversary	MAY 89 780-5005-00	2	5B, 5C	J4	J5
6. ABC Monday Night Football	SEP 89 780-5007-00	2	5B, 5C	J4	J5
7. Robocop	NOV 89 780-5006-00	2	5B, 5C	J4	J5
8. Phantom of the Opera	JAN 90 780-5008-00	2	5B, 5C	J4	J5
9. Back to the Future	JUN 90 780-5009-00	3	5B, 5C	J4	J5
10. The Simpsons	SEP 90 780-5012-00	3	5B, 5C	J4	J5
11. Checkpoint	FEB 91 780-5010-00	3	5B, 5C	J4	J5
12. Teenage Mutant Ninja Turtles	MAY 91 780-5017-00	3	5B, 5C	J4	J5
13. Batman	JUL 91 780-5011-00	3	5B, 5C	J4	J5
14. Star Trek 25th Anniversary	OCT 91 780-5014-00	3	5C	J5	J4
15. Hook	JAN 92 780-5019-00	3	5C	J5	J4
16. Lethal Weapon 3	JUN 92 780-5026-00	3	5C	J5	J4
17. Star Wars	OCT 92 780-5024-00	3	5C	J5	J4
18. Rocky & Bullwinkle & Friends	FEB 93 780-5022-00	3	5C	J5	J4
19. Jurassic Park	APR 93 780-5020-00	3	5C	J5	J4
20. Last Action Hero	AUG 93 780-5027-00	3	5C	J5	J4
21. Tales from the Crypt	NOV 93 780-5018-00	3	5C	J5	J4
22. The Who's Tommy	FEB 94 780-5028-00	3	5C	J5	J4
23. WWF Royal Rumble	MAY 94 780-5023-00	3	5C	J5	J4
24. Guns-N'-Roses	JUL 94 780-5029-00	3	5C	J5	J4
25. Maverick	SEP 94 780-5031-00	3	5C	J5	J4
26. Mary Shelley's Frankenstein	DEC 94 780-5036-00	3	5C	J5	J4
27. Baywatch	MAR 95 780-5033-00	3	5C	J5	J4
28. Batman Forever	JUL 95 780-5038-00	3	5C	J5	J4
29. Apollo 13 (A13)	NOV 95 780-5044-00	—	U210	n / a	n / a
30. Golden Eye	FEB 96 780-5042-00	—	U210	n / a	n / a
31. Twister	APR 96 780-5041-00	—	U210	n / a	n / a
32. ID4: Independence Day	JUL 96 780-5045-00	—	U210	n / a	n / a
33. Space Jam	OCT 96 780-5043-00	—	U210	n / a	n / a
34. The Star Wars Trilogy - S.E.	FEB 97 780-5056-00	—	U210	n / a	n / a
35. The Lost World: J.P.	JUN 97 780-5053-00	—	U210	n / a	n / a
36. The X-Files	AUG 97 780-5046-00	—	U210	n / a	n / a
37. Starship Troopers	NOV 97 780-5059-00	—	U210	n / a	n / a
38. Viper Night Drivin'	FEB 98 780-5035-00	—	U210	n / a	n / a
39. Lost In Space	JUN 98 780-5060-00	—	U210	n / a	n / a
40. Godzilla	SEP 98 780-5040-00	—	U210	n / a	n / a
41. South Park	JAN 99 780-5071-00	—	U17 U21 U36 U37	W6 CPU/Snd.	n / a
42. Harley-Davidson®	AUG 99 780-5067-01	—	U17 U21 U36 U37	W6 CPU/Snd.	n / a
43a. Striker Xtreme	MAR 00 780-5068-01	—	U17 U21 U36 U37	W6 CPU/Snd.	n/a
43b. NFL	OCT 00 780-5073-00	—	U17 U21 U36 U37	W6 CPU/Snd.	n/a
44. Sharkey's Shootout	OCT 00 780-5072-01	—	U17 U21 U36	W6 CPU/Snd.	n/a
45. High Roller Casino	JAN 01 780-5065-00	—	U17 U21 U36 U37	W6 CPU/Snd.	n/a
46. Austin Powers™	MAY 01 780-5074-00	—	U17 U21 U36 U37	W6 CPU/Snd.	n/a
47. Monopoly®	SEP 01 780-5075-00	—	U17 U21 U36 U37	W6 CPU/Snd.	n/a
48. Playboy	FEB 02 780-5076-00	—	U17 U21 U36 U37	W6 CPU/Snd.	n/a

† Additional Information for Installed / Removed Jumpers (List 1-28 only):

Board Combinations with **ROM** at Location **5C** (Game 1, Ver1) **Installed** J1b, J3, J4, J6a, **J7a** & J8 **Removed** J1a, J2, J5, **J6** & **J7b**

Board Combinations w/ **ROM** at Locations **5B, 5C** (Game 1, Ver2) **Installed** J1b, J3, J4, **J5a, J6a, J7b** & J8 **Removed** J1a, J2, J5, **J5b, J6b, & J7a**

Board Combinations w/ **ROM** at Locations **5B, 5C** (Games 2-12, Ver2/3) **Installed** J1b, J3, **J4, J5b, J6b, J7b** & J8 **Removed** J1a, J2, **J5, J5a, J6a** & J7a

Board Combinations with **ROM** at Locations **5C** (Games 14-28, Ver3) **Installed** J1b, J3, **J5, J5b, J6b, J7b** & J8 **Removed** J1a, J2, **J4, J5a, J6a** & J7a

* Version 1 has a 2K RAM which is a 24-pin IC in Position 5D; Versions 2 & 3 have a 8K RAM which is a 28-PIN IC in Position 5D.



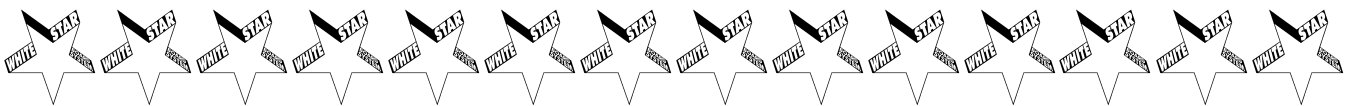
APPENDIX D

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 <small>520-5002-01 was not used.</small>	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	3-Flipper Board Not Required	520-5002-02	520-5000-00	520-5014-01 7 Digit Alpha/Numeric Combined
Torpedo Alley	3-Flipper Board Not Required	520-5002-02	520-5000-00	520-5014-01 7 Digit Alpha/Numeric Combined
Time Machine	2-Flipper Board Not Required	520-5002-02	520-5000-00	520-5014-01 7 Digit Alpha/Numeric Combined
Playboy 35th Anniversary	520-5033-00 2-Flipper (for 100 games)	520-5002-02	520-5000-00	520-5014-01 7 Digit Alpha/Numeric Combined
ABC Monday Night Football	520-5033-00 2-Flipper (for 100 games)	520-5002-02	520-5000-00	520-5030-00 16 Digit Alpha/Numeric Combined
Robocop	520-5033-00 2-Flipper	520-5002-02	520-5000-00	520-5030-00 16 Digit Alpha/Numeric Combined
Phantom of the Opera	520-5033-00 2-Flipper	520-5002-02	520-5000-00	520-5030-00 16 Digit Alpha/Numeric Combined
Back to the Future	520-5033-00 2-Flipper	520-5002-02	520-5000-00	520-5030-00 16 Digit Alpha/Numeric Combined
The Simpsons	520-5033-00 2-Flipper	520-5002-03	520-5000-00	520-5030-00 16 Digit Alpha/Numeric Combined

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



GAMES HEREON USE THE WHITE STAR BOARD SYSTEM™ (with the addition of the I/O Power Driver Board):

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	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	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			

Table continued on the next page.

APPENDIX D

Board Type Table

GAMES HEREON USE THE WHITE STAR BOARD SYSTEM™ (with the deletion of the Flipper Board):

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	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	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	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	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	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	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	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	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	520-5055-03	520-5173-00 Dual OPTO	520-5174-00 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	520-5055-03	520-5173-00 Dual OPTO	520-5174-00 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	520-5055-03	520-5173-00 Dual OPTO	520-5174-00 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®	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32	520-5055-03	520-5173-00 Dual OPTO	520-5174-00 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	520-5055-03	520-5173-00 Dual OPTO	520-5174-00 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	520-5055-03	520-5173-00 Dual OPTO	520-5174-00 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	520-5055-03	520-5173-00 Dual OPTO	520-5174-00 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	520-5055-03	520-5173-00 Dual OPTO	520-5174-00 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				
Monopoly®	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32	520-5055-03	520-5173-00 Dual OPTO	520-5174-00 Dual OPTO	4-Ball Trough over Up-Kicker	
	Miscellaneous PC Boards:	DC Relay Bd. 520-5066-00	Dot Display (5X7) in Elec. Sign 520-5197-00		for UK ONLY> Solenoid Expander Bd. 520-5192-00	520-5218-00 4-Pos. OPTO	520-5210-00 4-Pos. OPTO	Bank Door	
Playboy	520-5137-01	520-5136-16	520-5138-00	520-5052-00 128 X 32	520-5055-03	520-5173-00 Dual OPTO	520-5174-00 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				

† **Note:** To order Game Specific CPU/Sound Board please specify Game Name.



APPENDIX E

Generic Coil Cross-Reference Guide † ‡

STANDARD COILS						FLIPPER COILS			
GA-TURNS	Res. (Ω)	SPI PART N ^o	GA-TURNS	Res. (Ω)	SPI PART N ^o	GAUGE-TURNS	Res. (Ω)	COLOR	SPI PART N ^o
20-400	1.0 Ω	090-5021-00	24-940 †	5.5 Ω	090-5036-00T	21-900 †	<i>not available</i>	RED	090-5020-10T
22-500	1.7 Ω	090-5017-00			090-5036-00B	22-750/30-2600 ‡	2.6 / 92.0 Ω	N/A	090-5011-00
22-600	2.2 Ω	090-5023-00	25-1240	9.3 Ω	090-5034-00	22-900 †	3.4 Ω	YEL	090-5020-20T
23-700	3.1 Ω	090-5022-00			090-5044-00T	22-1080 †	4.3 Ω	YEL/GRN	090-5032-00T
23-750	3.4 Ω	090-5019-00	090-5044-00B	23-620/30-2600 ‡	2.4 / 75.0 Ω				N/A
23-800 †	3.6 Ω	090-5001-00T	27-1300	14.2 Ω	090-5003-00	23-700/30-2600 ‡	3.0 / 83.5 Ω	N/A	090-5006-00
		090-5001-00B	27-1400	14.7 Ω	090-5015-00	23-800/30-2600 ‡	2.8 / 90.5 Ω	N/A	090-5013-00
23-840	4.0 Ω	090-5005-00	27-1500	16.3 Ω	090-5004-00T	23-900	3.8 Ω	GRN	090-5012-00
23-1200	7.1 Ω	090-5008-00			090-5004-00B	23-1100	5.1 Ω	ORG	090-5020-30
23½-765	3.6 Ω	090-5037-03	28-1050	11.5 Ω	090-5046-00	23-1500	4.4 Ω	BLU	090-5030-00
24-900	5.0 Ω	090-5002-00	29-2000	33.6 Ω	090-5016-00	24-1570	9.5 Ω	N/A	090-5062-00T
						25-1800	13.8 Ω	BLU/GRN	090-5025-00
									090-5041-00

NOTE: Ohm values may vary +/- .03 Ω *depending on meter calibration.*

† Coil Part N^os ending with a "T" signifies the Diode is on the top of the lug; ...ending with a "B" signifies the Diode is on the bottom of the lug.

‡ These coils are dual-wound. **Also Note:** All Coil Part N^os listed **Do Not Include** Coil Sleeves (must be ordered separately).

MAGNET COILS w/12" leads			TRIP COILS (Miniature)						LUGLESS COILS	
GA-TURNS	Res. (Ω)	SPI PART N ^o	GA-TURNS	Res. (Ω)	SPI PART N ^o	GA-TURNS	Res. (Ω)	SPI PART N ^o	GA-TURNS	Res. (Ω)
22-650	4.3 Ω	090-5042-01	29-1000	15.2 Ω	090-5059-00	33-1590	59 Ω	515-6916-00	SPI PART N ^o	
24-780	8 Ω	090-5061-00	31-1500	52.0 Ω	090-5054-00	32-1250	35 Ω	515-6916-01	23-800	3.6 Ω
20½-480	2.9 Ω	090-5064-02	32-1800	50.2 Ω	090-5031-00	Note: 33-1590 WHT & 32-1250 YEL		090-5053-00		

Flipper Coil Table ‡ ††

GAME NAME	N ^o of Flippers	LOWER FLIPPERS		UPPER FLIPPERS	
		SPI N ^o / GAUGE-TURNS / Color		SPI N ^o / GAUGE-TURNS / Color	
		LEFT	RIGHT	LEFT	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-	SAME	Not Used	Not Used
ABC Monday Night Football ††	2	090-5020-02 22-900 -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 being 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-	SAME	Not Used	Not Used
Phantom of the Opera	2	090-5020-20 22-900 -YEL-	SAME	Not Used	Not Used
Back to the Future	2	090-5020-20 22-900 -YEL-	SAME	Not Used	Not Used
The Simpsons	2	090-5020-20 22-900 -YEL-	SAME	Not Used	Not Used
Checkpoint	2	090-5020-20 22-900 -YEL-	SAME	Not Used	Not Used
Teenage Mutant Ninja Turtles	2	090-5020-30 23-900 -GRN-	SAME	Not Used	Not Used
Batman	2	090-5020-30 23-900 -GRN-	SAME	Not Used	Not Used
Star Trek 25th Anniversary	2	090-5020-30 23-900 -GRN-	SAME	Not Used	Not Used
Hook	2	090-5030-00 23-1100 -ORG-	090-5020-30 23-900 -GRN-	Not Used	Not Used
Lethal Weapon 3	2	090-5030-00 23-1100 -ORG-	SAME	Not Used	Not Used

Table continued on the next page.



APPENDIX E

Flipper Coil Table †

GAME NAME	Nº of Flippers	LOWER FLIPPERS		UPPER FLIPPERS	
		SPI Nº / GAUGE-TURNS / Color		SPI Nº / GAUGE-TURNS / Color	
		LEFT	RIGHT	LEFT	RIGHT
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-	SAME	Not Used	Not Used
Jurassic Park	3	090-5020-30 23-900 -GRN-	SAME	Not Used	090-5030-00 23-1100 -ORG-
Last Action Hero	2	090-5020-30 23-900 -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-	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-	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-	SAME	Not Used	090-5030-00 23-1100 -ORG-
Baywatch	4	090-5030-00 23-1100 -ORG-	090-5020-30 23-900 -GRN-	090-5025-00 24-1570 -N/A-	090-5030-00 23-1100 -ORG-
Batman Forever	3	090-5032-00 22-1080 -YEL-GRN-	090-5020-20 22-900 -YEL-	Not Used	090-5020-30 23-900 -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-	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-
Space Jam †	2	090-5032-00T 22-1080 -YEL-GRN-	090-5020-20T 22-900 -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-	SAME	Not Used	090-5032-00T 22-1080 -YEL-GRN-
Viper Night Drivin' †	2	090-5030-00T 23-1100 -ORG-	SAME	Not Used	Not Used
Lost In Space †	2	090-5030-00T 23-1100 -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-	SAME	Not Used	Not Used
Harley-Davidson® †	2	090-5032-00T 22-1080 -YEL-GRN-	090-5030-00T 23-1100 -ORG-	Not Used	Not Used
Striker Xtreme (NFL) †	3	090-5032-00T 22-1080 -YEL-GRN-	090-5030-00T 23-1100 -ORG-	090-5030-00T 23-1100 -ORG-	Not Used
Sharkey's Shootout †	3	090-5030-00T 23-1100 -ORG-	090-5030-00T 23-1100 -ORG-	090-5030-00T 23-1100 -ORG-	Not Used
High Roller Casino †	2	090-5020-20T 22-900 -YEL-	090-5032-00T 23-1080 -YEL-GRN-	Not Used	Not Used
Austin Powers™ †	2	090-5020-30 23-900 -GRN-	090-5030-00T 23-1100 -ORG-	Not Used	Not Used
Monopoly® †	3	090-5032-00T 22-1080 -YEL-GRN-	090-5032-00T 22-1080 -YEL-GRN-	Not Used	090-5062-00T 23-1500 -BLU-
Playboy †	2	090-5030-00T 23-1100 -ORG-	090-5030-00T 23-1100 -ORG-	Not Used	Not Used

† Coil Part N^os ending with a "T" signifies the Diode is on the top of the lug (on the coil-winding side);
Coil Part N^os ending with a "B" signifies the Diode is on the bottom of the lugs.



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 No
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
Apollo 13	Rocket Up/Down Movement	Bowman Motor 24v A.C. 60Hz 3W 6 RPM CCW	515-6383-00
	Moon Unit Rotational Orbit	Multi Products Motor 24v A.C. 50/60Hz 3W 6 RPM CCW	515-6487-00
	Shaker	Johnson Motor (Vibrator) 10.5v D.C. 10 AMP 2950 RPM CW	041-5029-00
Golden Eye	Satellite Left/Right Movement	Bowman Motor 24v A.C. 60Hz 3W 6 RPM CW	515-6528-00

Table continued on the next page.

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 №
Twister	Spinning Disc with Magnet	Multi Products Motor 24v A.C. (041-5026-00) 50/60Hz 3W 325 RPM CCW	515-6347-00
	Backbox Fan (Tornado Wind)	Multi Products Motor 24v A.C. (041-5052-00) 50/60Hz 3W 3600 RPM CW	515-6531-00
ID4: Independence Day	Alien Head Open/Close Movement	Servo Motor (94322)	041-5045-00
The Star Wars Trilogy - S.E.	X-Wing Left/Right Movement	Bowman Motor 24v A.C. (041-5058-00) 60Hz 3W 10 RPM CCW	515-6383-01
The Lost World: J.P.	Snagger & Center Link Lift Up/Down Movement	Multi Products Motor 20v D.C. (041-5059-03) 9 RPM Non-Directional	515-6715-03
	Shaker	Johnson Motor (Vibrator) 10.5v D.C. 10 AMP 2950 RPM CW	041-5029-00
The X-Files	X-File Cabinet Lift Up/Down Movement	Multi Products Motor 20v D.C. 9 RPM CCW	041-5057-00
Starship Troopers	Warrior Bug Forward/Reverse Movement	Haydon Switch & Instrument, Inc. Stepper Motor 12v D.C. 4.6W (041-5062-00), Series 36000: 1.4"ø (Non-Captive Shaft not incl.) HSI #36864-12 (Unipolar) Travel per Step: .004 Step Angle: 15°	515-6794-00 Requires 7" Shaft: 530-5503-00
Lost In Space	Spinning Disc with Magnet	Multi Products Motor 24v A.C. (041-5046-00) 50/60Hz 3W 325 RPM CCW	515-6347-00
Godzilla	Shaker	Johnson Motor (Vibrator) 10.5v D.C. 10 AMP 2950 RPM CW ‡	041-5029-01
Harley-Davidson®	Shaker	Johnson Motor (Vibrator) 10.5v D.C. 10 AMP 2950 RPM CW ‡	041-5029-01
	Motorcycle Lift Up/Down Movement	Autotrol 24v A.C. (041-5072-01) 20 RPM CCW	515-7025-00
Striker Xtreme (NFL)	Goalie (Linebacker) Left to Right Movement	Multi #3590 12v D.C. (041-5075-00) 60 RPM	515-7071-00
Sharkey's Shootout	Mystery Ball Rotating Movement	Hankscraft Motor Model-E 24v A.C. (041-5076-00) 50/60Hz 3W 20 RPM CW	515-7095-00
High Roller Casino	Roulette Wheel Rotating Movement	Multi Products Motor 20V D.C. (041-5078-00) 17 RPM CCW	515-7153-00
	Up/Dn. Ramp in Slot Mach. Lift Up/Down Movement	Haydon Switch & Instrument, Inc. Stepper Motor 12v D.C. 4.6W (041-5062-00), Series 36000: 1.4"ø (Non-Captive Shaft not incl.) HSI #36864-12 (Unipolar) Travel per Step: .004 Step Angle: 15°	515-6794-00 Requires Shaft 4 1/4": 530-5503-01
Austin Powers™	Time Machine Rotating Movement	Multi Products Motor 24v A.C. (041-5079-00) 50/60Hz 20RPM CCW	515-7141-00
	Laser Beam Left to Right Directional	Autotrol Motor 24V A.C. (041-5081-00) 50/60Hz 4W 10RPM Bi-Directional	515-7171-00
	Dr. Evil Target Lift Up/Down Movement	Hankscraft Motor Model-E 24v A.C. (041-5030-00) 50/60Hz 6RPM CCW	515-5900-00
Monopoly®	Mini-Flipper (Waterworks) Rotating Movement	Multi Prod. Motor & Gear Box #7000 EX00159A 20v D.C. 50/60Hz 85RPM CC/CW	041-5083-00
Playboy	Triangular Billboard Rotating Movement	Autotrol Motor (BD511 150-1387) 24v A.C. 50/60Hz 12RPM Bi-Directional	041-5086-02
	Centerfold Mechanism Open/Close Movement	Multi Products (3680) Motor 12v DC 10/12 RPM CC/CW	041-5075-04
	Tease Drop Screen Lift Up/Down Movement	Haydon Switch & Instrument, Inc. Stepper Motor 12v D.C. 4.6W (041-5062-00), Series 36000: 1.4"ø (Non-Captive Shaft not incl.) HSI #36864-12 (Unipolar) Travel per Step: .004 Step Angle: 15°	515-6794-00 Requires 7" Shaft: 530-5503-00

No motors were used on the following games: Laser War, Secret Service, Torpedo Alley, Time Machine, Playboy 35th Anniversary, Robocop, Back to the Future, The Simpsons, Hook, Guns N' Roses, Baywatch, Space Jam, Viper Night Drivin', South Park.

‡ **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.



APPENDIX G








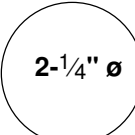
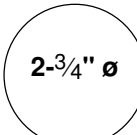




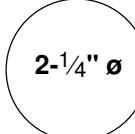
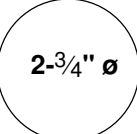




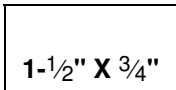
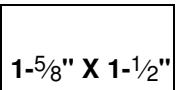
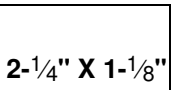
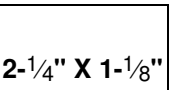
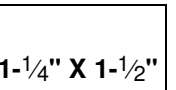
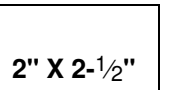
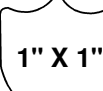

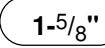
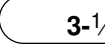
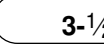

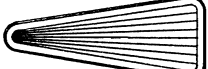
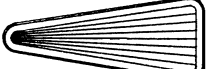

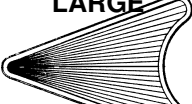
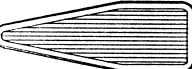

Part Number Prefix Classification Codes

- I. Electrical Source, Energy & Signal Converters**
 - 010- Transformers
 - 031- Speakers
 - 090- Solenoids (Coils)
- II. Conductors, Connectors & Insulators**
 - 034- Line Cords
 - 036- Cable and Harness Assemblies
 - 041- Motors
 - 045- Connectors (All Types)
 - 077- Lamp Sockets
- III. Circuits & Circuit Elements**
 - 100- ICs
 - 110- Transistors
 - 112- Diodes
 - 121- Resistors
 - 123- Resistors (Variable & Adjustable)
 - 124- Regulators & Bridge Rectifiers
 - 125- CAPS
 - 140- Crystals
 - 165- Light Bulbs
 - 180- Switches
 - 190- Relays
- IV. Bolts, Screws, Nuts & Washers**
 - 231- Bolts
 - 232- Screws (Pan Head)
 - 234- Screws (HWH)
 - 237- Screws (Misc.)
 - 240- Nuts (Misc.)
 - 242- Washers (Flat, Round)
 - 244- Washers (Split Lock)
 - 246- Washers (Lockers, External Tooth)
- V. Mechanical Components**
 - 249- Rivets
 - 251- Pins (Dowel)
 - 254- Stand-Offs, Spacers and Shims
 - 260- Steel Ball
 - 265- Springs (Extension)
 - 266- Springs (Compression)
 - 269- Springs (Washers - Belleville, Wave)
 - 280- Grommets and Bushing
- VI. Handles, Locks, Catches & Latches, Keys & Hinges**
 - 355- Handles, Locks, Catches & Latches and Keys
 - 390- Hinges
- VII. Fabricated Parts (In-House Assemblies)**
 - 500- End Product (Systems and Models)
 - 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/Rubber Parts
 - 550- Molded (Inserts)
- VIII. Bulk Materials**
 - 600- Braided Ground Wire
 - 601- Stranded Wire
 - 602- Ribbon Cable
 - 605- Sleeving (Shrink Tubing)
 - 626- Foam Rubber
- IX. Miscellaneous**
 - 705- Packing & Shipping Items
 - 820- Decals and Labels (Sets & Misc.)
 - 830- Butyrate (Plastic Pieces)
 - 900- Game Posters
 - 960- EPROM (Raw Part)
 - 965- EPROM (Programmed Part)



APPENDIX H

Playfield Inserts (Plastic Light Covers)

Patterns: STARBURST  STIPPLE 	STARBURST CIRCULAR  550-5000-XX	STARBURST CIRCULAR  550-5001-XX	STARBURST CIRCULAR  550-5002-XX	STARBURST CIRCULAR  550-5003-XX	STARBURST CIRCULAR  550-5004-XX
STARBURST CIRCULAR  550-5005-XX	STARBURST CIRCULAR  550-5006-XX	PLAIN CIRCULAR  550-5007-XX	PLAIN CIRCULAR  550-5008-XX	PLAIN CIRCULAR  550-5009-XX	PLAIN CIRCULAR  550-5010-XX
PLAIN CIRCULAR  550-5011-XX	PLAIN CIRCULAR  550-5012-XX	STIPPLE CIRCULAR  550-5048-XX	STIPPLE 1" SQUARE  550-5019-XX	ROLLOVER BUTTON BASE  550-5026-XX	WHITE STAR (only in white)  545-5015-00
STIPPLE RECTANGULAR  550-5018-XX	STIPPLE RECTANGULAR  550-5051-XX	STARBURST RECTANGULAR  550-5044-XX	PLAIN RECTANGULAR  550-5049-XX	PLAIN RECTANGULAR  550-5050-XX	PLAIN RECTANGULAR  550-5063-XX
STARBURST MINI SHIELD  550-5024-XX	STARBURST LARGE SHIELD  550-5025-XX	MINI HOT DOG  550-5020-XX	BEVEL HOT DOG  550-5021-XX	PLAIN HOT DOG  550-5022-XX	BANANA  550-5023-XX
STARBURST ARROW-SMALL  550-5013-XX	STARBURST ARROW-LARGE  550-5070-XX	STARBURST ARROW-HEAD SMALL  550-5014-XX	STARBURST ARROW-HEAD LARGE  550-5015-XX	STARBURST BULLET  550-5016-XX	STARBURST TRIANGLE  550-5017-XX

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

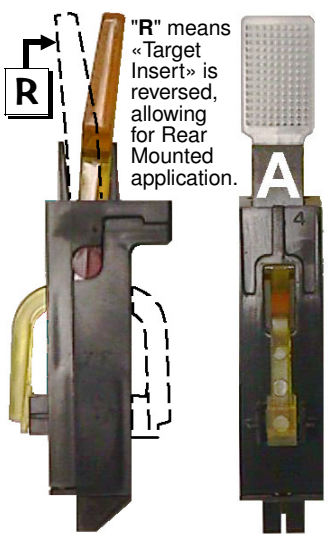
Instructions: Parts which may come in various colors (i.e. targets, some posts, playfield inserts, etc.) end in a 2-digit N^o which correspond to the color of that part. The "-XX" in Part N^os which may come in various colors should be replaced with the desired 2-Digit N^o. corresponding to the color desired. *Not all colors may be available.*

PLASTIC PART COLOR CHART											
N ^o	Color	N ^o	Color	N ^o	Color	N ^o	Color	N ^o	Color	N ^o	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

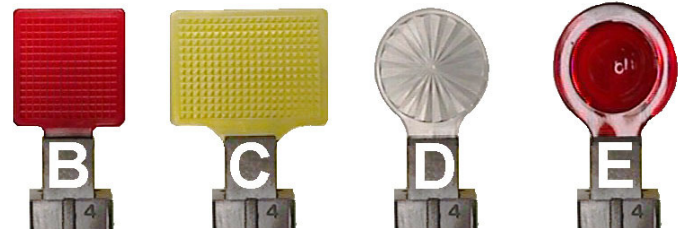


APPENDIX I

Stand-Up Targets



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

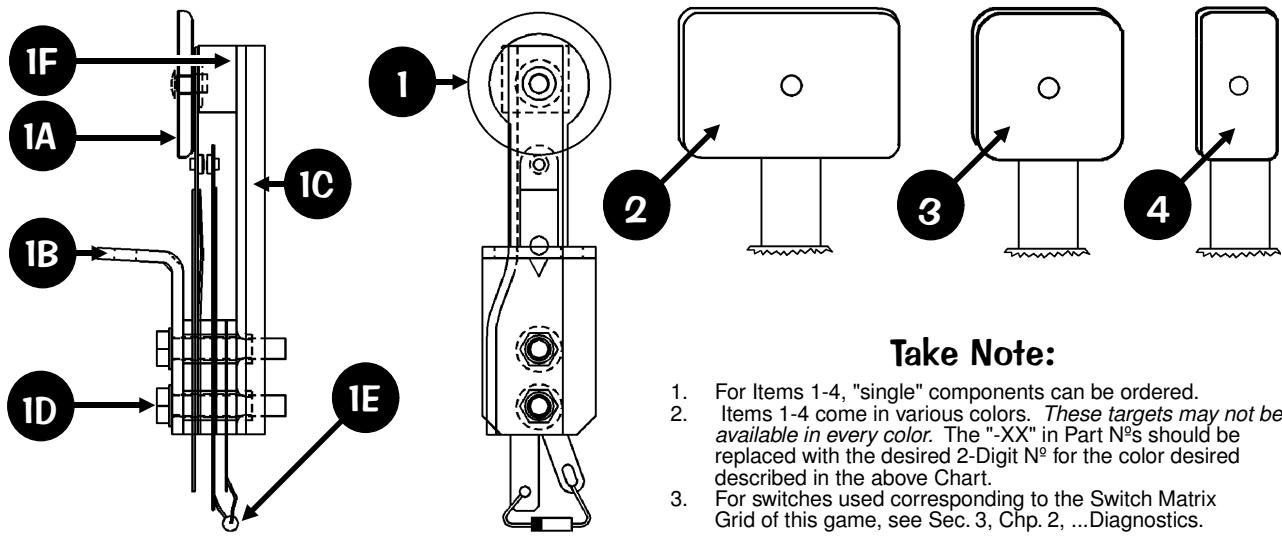


Take Note:

- For Items A-E, for the Target Assembly use the "500-" SPI N^o; For the Target Assy. with Rear Mount add "R" to "500-" SPI N^o; For just the «Target Insert» use the "545-" SPI N^o.
- 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 N^o for the color desired described in the Chart **1**.
As of date of print, the following colors were used for Items A-E:
-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).
- See Section 3, Chapter 2, Go To Diagnostics Menu, for switches used corresponding to the Switch Matrix Grid of this game.

PLASTIC PART COLOR CHART	
N ^o	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

N ^o	STAND-UP TARGET NAME	SPI PART N ^o	N ^o	STAND-UP TARGET NAME	SPI PART N ^o
A	Modular Stand-Up Target Narrow Assy.	500-6138-XX	D	Modular Stand-Up Target Round Assy.	500-6075-XX
	Stand-Up Target Narrow (Insert)	545-6138-XX		Stand-Up Target Round (Insert)	545-6075-XX
B	Modular Stand-Up Target Square Assy.	500-6139-XX	E	Mod. Stand-Up Target 1" Spherical Assy.	500-6189-XX
	Stand-Up Target Square (Insert)	545-6139-XX		Stand-Up Target 1" Spherical (Insert)	545-6189-XX
C	Modular Stand-Up Target Rectangle Assy.	500-6228-XX	Note: To receive the Target Assembly with the «Target Insert» «Reversed» simply add a "R" at the end of the Part N ^o . See Side View picture above to compare (dashed line shows target reversed).		
	Stand-Up Target Rectangle (Insert)	545-6228-XX			



Take Note:

- For Items 1-4, "single" components can be ordered.
- Items 1-4 come in various colors. *These targets may not be available in every color.* The "-XX" in Part N^os should be replaced with the desired 2-Digit N^o for the color desired described in the above Chart.
- For switches used corresponding to the Switch Matrix Grid of this game, see Sec. 3, Chp. 2, ...Diagnostics.

N ^o	STAND-UP (FLAT) TARGET NAME	SPI PART N ^o	N ^o	STAND-UP (FLAT) TARGET NAME	SPI PART N ^o
1	1" Round Stand-Up Target Assy.	500-5835-XX	Note: Item 2A, is a riveted Sub-Assy, which includes the following items for reference: A1 — Stack Switch Radius End (180-5133-00), A2 — Washer 5/16" (242-5017-00), A3 — Rivet 1/8" ø X 3/16" (249-5001-00) and A4 — Rectangular Target (545-5145-XX).		
ORDERING ABOVE (ITEM 1) ASSY. PART N^o WILL INCLUDE:					
1A	Switch & Target Assy. 1" Round	515-5966-XX	3	1" Sq. Stand-Up Target Assy.	500-5232-XX
1B	Mounting Bracket	535-6896-00	ORDERING ABOVE (ITEM 3) ASSY. PART N^o WILL INCLUDE:		
1C	Switch Back Plate	535-6452-00	3A	Sw. & Target Assy. 1" Square	515-5162-XX
1D	6-32 X 3/4 HWH Swage (Qty. 2)	237-5976-05	Items 3B-F are identical to 1B-F		
1E	Switch Diode, 1N4001	112-5001-00	Same as 1B-F		
1F	Foam Pad	626-5029-00	Note: Item 3A, is a riveted Sub-Assy, which includes the following items for reference: A1 — Stack Switch Radius End (180-5133-00), A2 — Washer 5/16" (242-5017-00), A3 — Rivet 1/8" ø X 3/16" (249-5001-00) and A4 — 1" Square Target (545-5470-XX).		
2	1" X 1 1/2" Stand-Up Rect. Target Assy.	500-5321-XX	4	Narrow Stand-Up Target Assy.	500-5857-XX
ORDERING ABOVE (ITEM 2) ASSY. PART N^o WILL INCLUDE:					
2A	Sw. & Target Assy. 1" X 1 1/2" Rect.	515-6027-XX	4A	Sw. & Target Assy. Narrow	515-5967-XX
Items 2B-F are identical to 1B-F			Items 4B-F are identical to 1B-F		
Same as 1B-F			Note: Item 4A, is a riveted Sub-Assy, which includes the following items for reference: A1 — Stack Switch Square End (180-5132-00), A2 — Washer 5/16" (242-5017-00), A3 — Rivet 1/8" ø X 3/16" (249-5001-00) and A4 — Narrow Target (545-5210-XX).		








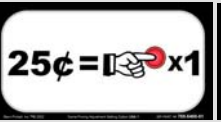





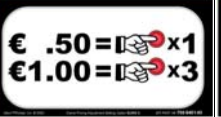
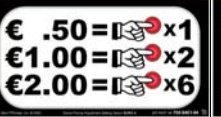


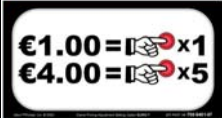
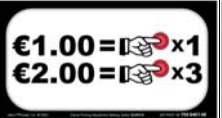
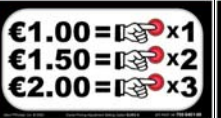
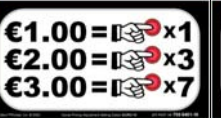
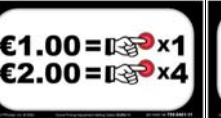
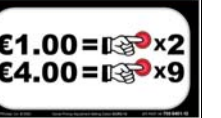

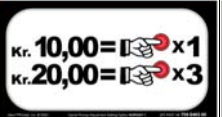
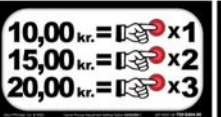

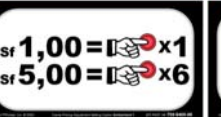
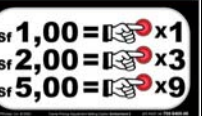

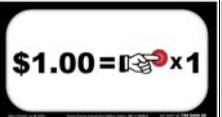
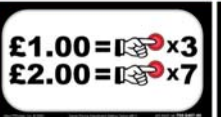
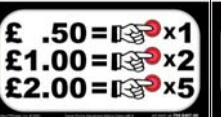
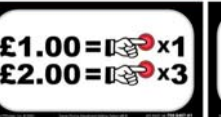

Item 2 Table Note continued in the next column.



Stand-Up Targets

APPENDIX J

Coin Cards (USA & International)

Pricing Default: (note):	USA 8 or Canada (used prior 03/2002)	USA 2-7 or Canada (used prior 03/2002)	USA or International (used prior Mar. 02)	USA 1* (optional) (used prior Mar. 02)	USA 5 (used prior Mar. 02)						
See Section 3, Chapter 4, Go To Adjustments Menu, Adj. 6. Game Pricing, USA & International Standard Pricing Select Table, to view Custom or Standard Pricing Schemes these Coin Cards correspond to.											
Description: SPI Part N°:	Front 755-5087-01	Back 755-5087-01	for Custom Pricing 755-5087-02	1-Sided 755-5087-03	1-Sided 755-5087-05						
USA 8 or Canada <i>(supercedes 755-5087-01)</i>	USA 5 or Canada <i>(supercedes 755-5087-05)</i>	USA 1* (optional) <i>(supercedes 755-5087-03)</i>	Custom Pricing† <i>(supercedes 755-5087-02)</i>	USA 2-7 or Canada <i>(supercedes 755-5087-01)</i>	Custom Pricing† <i>(supercedes 755-5087-02)</i>						
											
Front 755-5400-00	Back 755-5400-00	Front 755-5400-01	Back 755-5400-01	Front 755-5400-02	Back 755-5400-02						
EURO 1	EURO 2	EURO 3	EURO 4	EURO 5	EURO 6						
											
1-Sided 755-5401-01	1-Sided 755-5401-02	1-Sided 755-5401-03	1-Sided 755-5401-04	1-Sided 755-5401-05	1-Sided 755-5401-06						
EURO 7	EURO 8	EURO 9	EURO 10	EURO 11	EURO 12						
											
1-Sided 755-5401-07	1-Sided 755-5401-08	1-Sided 755-5401-09	1-Sided 755-5401-10	1-Sided 755-5401-11	1-Sided 755-5401-12						
NORWAY 1		NORWAY 2		SWEDEN 1		SWEDEN 2		SWITZERLAND 1		SWITZERLAND 2	
											
Front 755-5403-00		Back 755-5403-00		Front 755-5404-00		Back 755-5404-00		Front 755-5405-00		Back 755-5405-00	
AUSTRALIA 1		AUSTRALIA 2		UK 1		UK 3		UK 5		UK Custom	
											
Front 755-5406-00		Back 755-5406-00		Front 755-5407-00		Back 755-5407-00		Front 755-5407-01		Back 755-5407-01	

Note: You can download any Coin Card (in PDF Format) from our website www.sternpinball.com/coinagecards.htm. Only the Coin Cards shown on this page are available. Older styles (foreign or domestic), if no longer available through your distributor, cannot be replaced.*

*** Requires Adobe® Reader 5.0 available for free download through our website www.sternpinball.com/techsupport.htm. Printing Suggestions: Print on high-gloss paper with a color printer (the highest dpi possible) for best results. Check print preview to ensure page is not fit to size (print actual size). Finished Cards should be 5 1/2" x 2 1/8". Trim off borders. For double-sided cards, print both separately, as aligning may be difficult.*

† International can use the back side of this card for Custom Pricing.

* Optional Card not included with this game, but available.

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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In SWITCH MENU also select:

ACTIVE and DEDICATED SWITCH TESTS

SWITCH MATRIX GRID & DEDICATED SWITCHES

D iode O n T ermi n a l S tri p :										GND	
Column (Drive)	1: Q1	2: Q2	3: Q3	4: Q4	5: Q5	6: Q6	7: Q7	8: Q8	IC U206 INPUT 8	Ground	
Row (Return)	GRN-BRN CN5-P1	GRN-RED CN5-P3	GRN-ORG CN5-P4	GRN-YEL CN5-P5	GRN-BLK CN5-P6	GRN-BLU CN5-P7	GRN-VIO CN5-P8	GRN-GRY CN5-P9	BLK CN6-P1, -P11		
1: U400	LEFT BUTTON (UK ONLY) on Cabinet side 1	NOT USED 9	NOT USED 17	(M) OJO STANDUP Under Playfield 25	LEFT ORBIT Under Playfield 33	LEFT RAMP ENTER On Ramp Assy. 41	LEFT BUMPER On Assembly 49	LEFT OUTLINE Under Playfield 57	1: U206 GRY-BRN CN6-P2 #1 LEFT FLIPPER BUTTON in Cabinet side D8-1		
2: U400	4TH COIN SLOT On Coin Door 2	NOT USED 10	CENTER RAMP ENTER On Ramp Assy. 18	M (O) JO STANDUP Under Playfield 26	SPINNER (OPTO) On Assembly 34	LEFT RAMP EXIT On Ramp Assy. 42	RIGHT BUMPER On Assembly 50	LEFT RETURN LANE Under Playfield 58	2: U206 GRY-RED CN6-P3 #2 LEFT FLIPPER E.O.S (End-of-Stroke) in Cabinet side D8-2		
3: U400	6TH COIN SLOT On Coin Door 3	4-BALL TROUGH #1 (LEFT) On Assembly 11	NOT USED 19	MO (J) O STANDUP Under Playfield 27	CENTER RAMP ENTER (OPTO) On Ramp Assy. 35	LASER BEAM HOME On Assembly 43	BOTTOM BUMPER On Assembly 51	LEFT SLINGSHOT On Assembly 59	3: U206 GRY-ORG CN6-P4 #3 RIGHT FLIPPER BUTTON in Cabinet side D8-3		
4: U400	RIGHT COIN SLOT On Coin Door 4	4-BALL TROUGH #2 On Assembly 12	NOT USED 20	MOJ (O) STANDUP Under Playfield 28	NOT USED 36	LASER BEAM ENABLE On Assembly 44	DANCING AUSTIN On Assembly 52	RIGHT OUTLINE Under Playfield 60	4: U206 GRY-YEL CN6-P6 #4 RIGHT FLIPPER E.O.S (End-of-Stroke) in Cabinet side D8-4		
5: U401	CENTER COIN SLOT / DBA On Coin Door 5	4-BALL TROUGH #3 On Assembly 13	TOILET Under Playfield 21	AUSTIN STANDUP Under Playfield 29	RIGHT RAMP ENTER On Ramp Assy. 37	LASER BEAM LOADED On Assembly 45	FIRE BUTTON Frnt Top Molding 53	RIGHT RETURN LANE Under Playfield 61	5: U206 NOT USED GRY-GRN CN6-P7 #5 NOT USED D8-5		
6: U401	LEFT COIN SLOT On Coin Door 6	4-BALL TROUGH VUK OPTO On Assembly 14	DR. EVIL UP On Assembly 22	POWERS STANDUP Under Playfield 30	RIGHT RAMP EXIT On Ramp Assy. 38	SCOOP On Assembly 46	START BUTTON Cabinet Front 54	RIGHT SLINGSHOT On Assembly 62	6: U206 GRY-BLU CN6-P8 #6 VOLUME (RED BUTTON) in Cabinet side D8-6		
7: U401	5TH COIN SLOT On Coin Door 7	4-BALL STACKING OPTO On Assembly 15	DR. EVIL LEFT STANDUP Under Playfield 23	DR. EVIL LEFT STANDUP Under Playfield 31	RIGHT ORBIT Under Playfield 39	LEFT TOP LANE Under Playfield 47	SLAM TILT On Coin Door 55	NOT USED 63	7: U206 GRY-VIO CN6-P9 #7 SERV. CRED. (GREEN BUTTON) in Cabinet side D8-7		
8: U401	RIGHT BUTTON (UK ONLY) on Cabinet side 8	SHOOTER LANE Under Playfield 16	DR. EVIL (TARGET) Under Playfield 24	DR. EVIL RIGHT STANDUP Under Playfield 32	NOT USED 40	RIGHT TOP LANE Under Playfield 48	PLUMB BOB TILT Inside Cabinet 56	NOT USED 64	8: U206 GRY-BLK CN6-P10 #8 BEGIN TEST (BLACK BUTTON) in Cabinet side D8-8		



In LAMP MENU also select:

TEST ALL LAMPS, ROW & COLUMN LAMP TESTS

LAMP MATRIX GRID

D iode O n T ermi n a l S tri p :									
Column (18v)	1: U17	2: U16	3: U15	4: U14	5: U13	6: U12	7: U11	8: U10	
Row (GND)	YEL-BRN J13-P9	YEL-RED J13-P8	YEL-ORG J13-P7	YEL-BLK J13-P6	YEL-GRN J13-P5	YEL-BLU J13-P4	YEL-VIO J13-P3	YEL-GRY J13-P1	
1: Q33	MINI ME 1 (BOTTOM) #555 Bulb 1	MINI ME 2 #555 Bulb 2	MINI ME 3 #555 Bulb 3	MINI ME 4 (TOP) #555 Bulb 4	IVANA #555 Bulb 5	ALOTTA #555 Bulb 6	SPECIAL #555 Bulb 7	MYSTERY #44 Bulb 8	
2: Q34	(M) OJO #44 Bulb 9	M (O) JO #44 Bulb 10	MO (J) O #44 Bulb 11	MOJ (O) #44 Bulb 12	LEFT BUMPER #555 Bulb 13	RIGHT BUMPER #555 Bulb 14	BOTTOM BUMPER #555 Bulb 15	SHOOT AGAIN BABY #555 Bulb 16	
3: Q35	BONUS 1 #44 Bulb 17	BONUS 2 #44 Bulb 18	BONUS 3 #555 Bulb 19	BONUS 4 #555 Bulb 20	BONUS 5 #555 Bulb 21	BONUS 10 #555 Bulb 22	BONUS 25 #555 Bulb 23	BONUS 50 #44 Bulb 24	
4: Q36	BONUS 75 #44 Bulb 25	BONUS 100 #555 Bulb 26	BONUS 200 #555 Bulb 27	BONUS 300 #555 Bulb 28	BONUS 400 #555 Bulb 29	BONUS 500 #555 Bulb 30	BONUS 1000 #555 Bulb 31	BONUS HELD #555 Bulb 32	
5: Q37	(A) P #44 Bulb 33	A (P) #44 Bulb 34	EVIL HENCHMEN #555 Bulb 35	SUB DRILL #555 Bulb 36	TIME MACHINE #555 Bulb 37	LASER BEAM #555 Bulb 38	FAT BASTARD #555 Bulb 39	MINI ME #555 Bulb 40	
6: Q38	TOILET 1 (BOTTOM) #555 Bulb 41	TOILET 2 #555 Bulb 42	TOILET 3 #555 Bulb 43	TOILET 4 (TOP) #555 Bulb 44	(S) HAG #555 Bulb 45	S (H) AG #555 Bulb 46	SH (A) G #555 Bulb 47	SHA (G) #555 Bulb 48	
7: Q39	LASER BEAM 1 (BOTTOM) #555 Bulb 49	LASER BEAM 2 #44 Bulb 50	LASER BEAM 3 #44 Bulb 51	LASER BEAM 4 (TOP) #44 Bulb 52	FIRE BUTTON #555 Bulb 53	DR. EVIL SPOT-LIGHT X2 #555 Bulbs 54	NOT USED 55	NOT USED 56	
8: Q40	TIME MACHINE 1 (BOTTOM) #555 Bulb 57	TIME MACHINE 2 #555 Bulb 58	TIME MACHINE 3 #555 Bulb 59	TIME MACHINE 4 (TOP) #555 Bulb 60	MOON BASE #555 Bulb 61	VIRTUCON #555 Bulb 62	MOJO #555 Bulb 63	EXTRA BALL #44 Bulb 64	
9: Q41	SUB DRILL 1 (BOTTOM) #555 Bulb 65	SUB DRILL 2 #555 Bulb 66	SUB DRILL 3 #555 Bulb 67	SUB DRILL 4 (TOP) #555 Bulb 68	NOT USED 69	NOT USED 70	NOT USED 71	NOT USED 72	
10: Q42	EVIL HENCHMEN 1 (BOT) #555 Bulb 73	EVIL HENCHMEN 2 #555 Bulb 74	EVIL HENCHMEN 3 #555 Bulb 75	EVIL HENCHMEN 4 (TOP) #555 Bulb 76	NOT USED 77	NOT USED 78	NOT USED 79	NOT USED 80	



▼ U.S. ▼
Customary
Inch Ruler



Metric Conversion

1/16"	1/8"	1/4"	1/2"	3/4"
.0625"	.125"	.25"	.5"	.75"
1/32" (.03125")				

1" = 2.54cm / 25.4mm
1cm = .3937"
1mm = .03937"

- For metric, multiply inch value by metric value, e.g. 5" X 2.54cm = 12.7cm or 127mm.
- For US, multiply metric value by inch value, e.g. 13cm X .3937" = 5.1181"



PINBALL, INC.

Stern Pinball, Inc.®
2020 Janice Avenue
Melrose Park, IL 60160
ph. 708-345-7700
fax 708-345-7889

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