

Schematics, Wiring & Printed Circuit Boards

Table of Contents for Section 5

- Chapter 1, Backbox Wiring.....96 – 98**
 - ▶ Table of Contents for Section 5.....95
 - ▶ Coils Detailed Chart Table96
 - ▶ Backbox I/O Power Driver Board Detailed Wiring Diagram.....97
 - ▶ Backbox Board Layout Wiring Diagram.....98
- Chapter 2, Playfield Wiring 99 – 103**
 - ▶ General Illumination Circuit Detailed Wiring Diagram99
 - ▶ Playfield Switch Wiring Diagram.....100
 - ▶ Playfield Lamp Wiring Diagram.....101
 - ▶ Playfield Terminal Strips, Fuses & Misc. Wiring Descriptions & Locations102
 - ▶ 4-Flipper Circuit Wiring Diagram103
- Chapter 3, Cabinet and Coin Door Wiring105 – 108**
 - ▶ Transformer Power Wiring Diagram105
 - ▶ Cabinet Wiring Diagram.....106
 - ▶ Coin Door Wiring Diagram.....107
- Chapter 4, Printed Circuit Boards (PCBs)109 – 143**
 - ▶ Trough Up-Kicker Dual OPTO PCBs (515-0173-00 & 515-0174-00) Theory of Op. & Schematic(Top) 109
 - ▷ Trough Up-Kicker Dual OPTO PCBs (515-0173-00 & 515-0174-00) Component Layout & Parts(Bot) 109
 - ▶ OPTO Troubleshooting(Top) 110
 - ▷ Trough Dual OPTO PCBs Alignment / Tests for LED1 & LED2..... 110-111
 - ▶ I/O Power Driver PCB S.A.M. System (520-5249-00) Schematic (Sheet 1 of 4).....112-113
 - ▶ I/O Power Driver PCB S.A.M. System (520-5249-00) Schematic (Sheet 2 of 4).....114-115
 - ▶ I/O Power Driver PCB S.A.M. System (520-5249-00) Schematic (Sheet 3 of 4).....116-117
 - ▶ I/O Power Driver PCB S.A.M. System (520-5249-00) Schematic (Sheet 4 of 4).....118-119
 - ▷ I/O Power Driver PCB S.A.M. System (520-5249-00) Component Layout (*call for page*)..... 120
 - ▷ I/O Power Driver PCB S.A.M. System (520-5249-00) Parts (*call for page*)..... 121
 - ▶ CPU / Sound PCB S.A.M. System (520-5246-00) Schematic (Sheet 1 of 5) 122-123
 - ▶ CPU / Sound PCB S.A.M. System (520-5246-00) Schematic (Sheet 2 of 5) 124-125
 - ▶ CPU / Sound PCB S.A.M. System (520-5246-00) Schematic (Sheet 3 of 5) 126-127
 - ▶ CPU / Sound PCB S.A.M. System (520-5246-00) Schematic (Sheet 4 of 5) 128-129
 - ▶ CPU / Sound PCB S.A.M. System (520-5246-00) Schematic (Sheet 5 of 5) 130-131
 - ▷ CPU / Sound PCB S.A.M. System (520-5246-00) Component Layout 132
 - ▷ CPU / Sound PCB S.A.M. System (520-5246-00) Parts (*call for page*) 133
 - ▶ Display Power Supply PCB (520-5138-00) Schematic.....134
 - ▷ Display Power Supply PCB (520-5138-00) Component Layout & Parts 134
 - ▶ OPTO Interrupter (520-5252-04) Schematic (on Drop Targets).....135
 - ▶ Playfield Switches OPTO Transceiver PCBs (500-6775-00) Schematic.....(Top) 136
 - ▷ Playfield Switches OPTO Transceiver PCBs (500-6775-00) Component Layout & Parts..... (Top) 136
 - ▶ Playfield OPTO Transmitter / Receiver Amplifier PCB (520-5239-01) Schematic(Bot) 136
 - ▷ Playfield OPTO Transmitter / Receiver Amplifier PCB (520-5239-01) Component Layout & Parts (Top) 137
 - ▷ Playfield OPTO Transmitter / Receiver Amplifier PCB (520-5239-01) Wiring (General) (Bot) 137
 - ▶ Mini PCB OPTOs (500-6775-00) to OPTO Trans/Rec Amp. Bd. Wiring Config.138
 - ▶ OPTO Interrupter (520-5251-00) Schematic(Top) 139
 - ▶ OPTO Transmitter (520-5247-00) Schematic(Bot) 139
 - ▶ 14-Block LED PCB (520-5250-14) Schematic (Sheet 1 of 2)140
 - ▶ 14-Block LED PCB (520-5250-14) Schematic (Sheet 2 of 2)141
 - ▶ Q21 50V Step-Up Driver PCB (520-5254-00) Schematic.....142
 - ▷ Q21 50V Step-Up Driver PCB (520-5254-00) Component Layout & Parts.....142
 - ▶ Auxiliary (3X Transistor) Driver PCB (in Backbox) with the Coin/Ticket Meter and Ticket Disp. Wiring Diagram143

Sec. 5: Schematics

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 PCBs (White Star™ System Only // SAM System PCBs **COMING SOON!**). Along with the schematics you'll find the component layout and theory of operation. Keep visiting as these files are continuously improved with more "search" links in the documents. The files are in PDF Format (*Adobe® Reader required*). They may be slow to open in the website only, but once on your harddrive they'll open fast. Inside the schematics you can utilize internal links where addresses may direct you to another sheet in the schematic set (*further instructions within documents*). 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. ALL 11 X 17 SCHEMATICS AND OTHER PDF FILES ARE ALSO AVAILABLE ON CD-ROM.



Use the below **Coils Detailed Chart Table** in conjunction with **Sec. 5, Chp. 1, Backbox I/O Power Driver Board Detailed Wiring Diagram (I/O Board Connectors J6, J7, J8 & J9)** and **Backbox Board Layout Wiring Diagram**:

High Current Coils Group 1		Drive Transistor	Driver Output Board	Power Line Color	Power Line Connection	Power Voltage	Drive Transistor Control Line Color	D.T. Control Line Connect	Coil GA-Turn or Bulb Type
#1	TROUGH UP-KICKER	Q1	▲ I/O Power Driver ▼	YEL-VIO	J10-P9/10	50v DC	BRN-BLK	J8-P1	26-1200 ∪ 090-5044-ND
#2	AUTO LAUNCH	Q2		YEL-VIO	J10-P9/10	50v DC	BRN-RED	J8-P3	23-800 ∪ 090-5001-ND
#3	SHOOTER LANE VUK	Q3		YEL-VIO	J10-P9/10	50v DC	BRN-ORG	J8-P4	26-1200 ∪ 090-5044-ND
#4	LEFT VUK	Q4		YEL-VIO	J10-P9/10	50v DC	BRN-YEL	J8-P5	26-1200 ∪ 090-5044-ND
#5	LOWER LEFT DROP RESET	Q5		YEL-VIO	J10-P9/10	50v DC	BRN-GRN	J8-P6	23-800 ∪ 090-5001-ND
#6	UPPER LEFT DROP RESET	Q6		YEL-VIO	J10-P9/10	50v DC	BRN-BLU	J8-P7	23-800 ∪ 090-5001-ND
#7	MIDDLE DROP RESET	Q7		YEL-VIO	J10-P9/10	50v DC	BRN-VIO	J8-P8	23-800 ∪ 090-5001-ND
#8	RIGHT DROP RESET	Q8		YEL-VIO	J10-P9/10	50v DC	BRN-GRY	J8-P9	23-800 ∪ 090-5001-ND

High Current Coils Group 2		Drive Transistor	Driver Output Board	Power Line Color	Power Line Connection	Power Voltage	Drive Transistor Control Line Color	D.T. Control Line Connect	Coil GA-Turn or Bulb Type
#9	LEFT BUMPER	Q9	▲ I/O Power Driver ▼	YEL-VIO	J10-P9/10	50v DC	BLU-BRN	J9-P1	26-1200 ∪ 090-5044-ND
#10	RIGHT BUMPER	Q10		YEL-VIO	J10-P9/10	50v DC	BLU-RED	J9-P2	26-1200 ∪ 090-5044-ND
#11	BOTTOM BUMPER	Q11		YEL-VIO	J10-P9/10	50v DC	BLU-ORG	J9-P4	26-1200 ∪ 090-5044-ND
#12	JAIL UP	Q12		YEL-VIO	J10-P9/10	50v DC	BLU-YEL	J9-P5	26-1200 ∪ 090-5044-ND-NL
#13	UPPER PF LEFT FLIPPER	Q13		GRY-YEL~3A Fuse~RED-YEL	J10-P6/7	50v DC	BLU-GRN	J9-P6	23-1100 ∪ 090-5030-ND
#14	UPPER PF RIGHT FLIPPER	Q14		BLU-YEL~3A Fuse~RED-YEL	J10-P6/7	50v DC	BLU-BLK	J9-P7	23-1100 ∪ 090-5030-ND
#15	LEFT FLIPPER (50v RED/YEL)	Q15		GRY-YEL~3A Fuse~RED-YEL	J10-P6/7	50v DC	ORG-GRY	J9-P8	22-1080 ∪ 090-5032-ND
#16	RIGHT FLIPPER (50v RED/YEL)	Q16		BLU-YEL~3A Fuse~RED-YEL	J10-P6/7	50v DC	ORG-VIO	J9-P9	22-1080 ∪ 090-5032-ND

Low Current Coils Group 1		Drive Transistor	Driver Output Board	Power Line Color	Power Line Connection	Power Voltage	Drive Transistor Control Line Color	D.T. Control Line Connect	Coil GA-Turn or Bulb Type
#17	LEFT SLINGSHOT	Q17	▲ I/O Power Driver ▼	BROWN	J7-P1	20v DC	VIO-BRN	J7-P2	23-800 ∪ 090-5001-ND
#18	RIGHT SLINGSHOT	Q18		BROWN	J7-P1	20v DC	VIO-RED	J7-P3	23-800 ∪ 090-5001-ND
#19	JAIL LATCH [MINI-COIL]	Q19		BROWN	J7-P1	20v DC	VIO-ORG	J7-P4	27-880 ∪ 090-5072-05
#20	LEFT RAMP UP POST	Q20		BROWN	J7-P1	20v DC	VIO-YEL	J7-P6	25-1240 ∪ 090-5034-ND
#21	BUMPER EJECT	Q21		YEL-VIO	J10-P9/10	50v DC	WHITE </> VIO-GRN	J7-P7	26-1200 P 090-5044-ND

For a wiring diagram, see Sec. 5, Chp. 1. For the Step-Up Driver PCB (520-5254-00) Schematic, see Sec. 5, Chp. 4. Q21 50V Step-Up Driver Board Schematic.

#22	FLASH: LEFT SLINGSHOT	Q22	▲ I/O Power Driver ▼	ORANGE	J6-P10	20v DC	VIO-BLU	J7-P8	#89 Bulb 165-5000-89
#23	FLASH: RIGHT SLINGSHOT	Q23		ORANGE	J6-P10	20v DC	VIO-BLK	J7-P9	#89 Bulb 165-5000-89
#24	OPTIONAL COIL	Q24		RED	J16-P4>8	5v DC	VIO-GRY	J7-P10	Opt. 5v

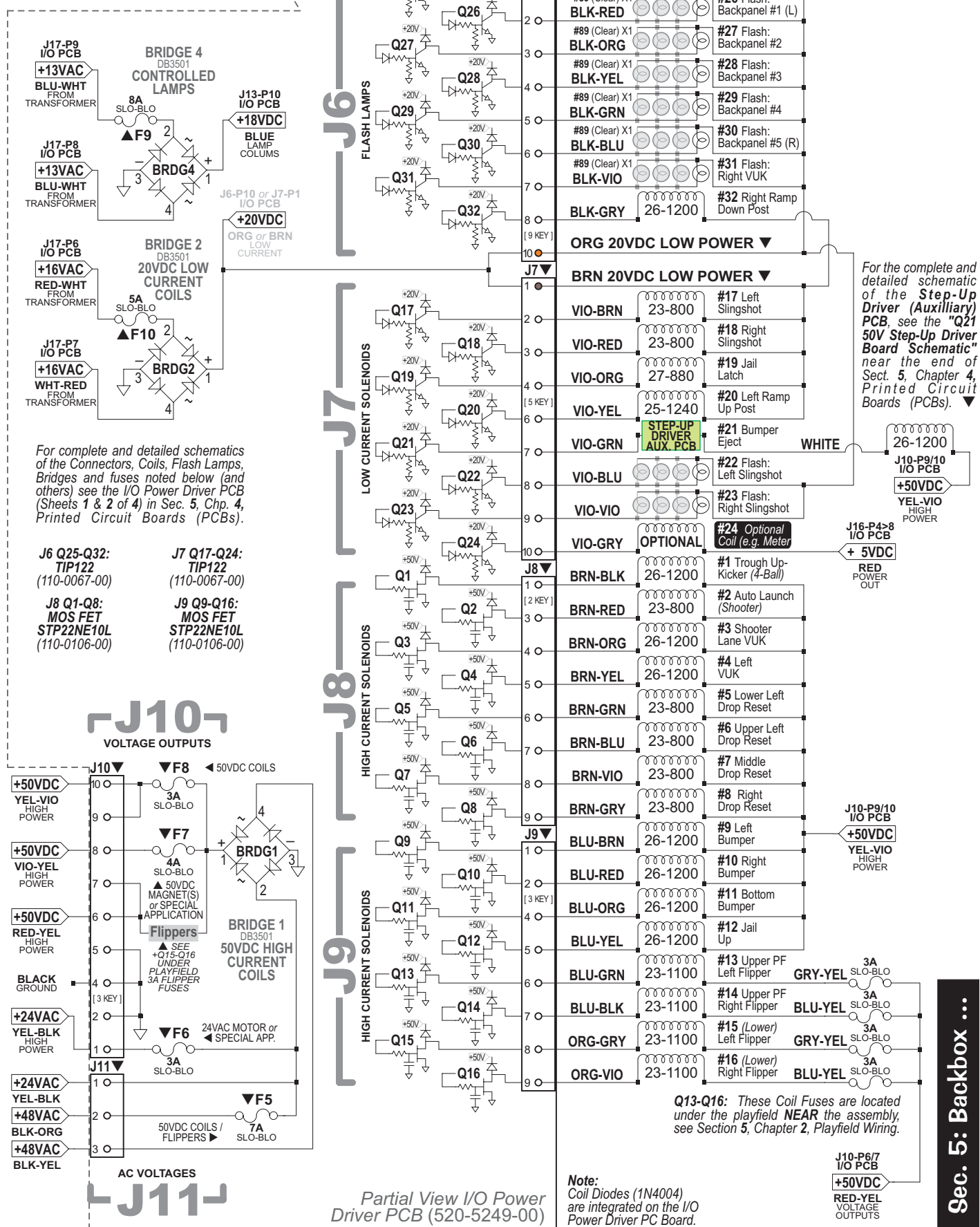
D lode O n T ermi n al S tri p (if noted)

Low Current Coils Group 2		Drive Transistor	Driver Output Board	Power Line Color	Power Line Connection	Power Voltage	Drive Transistor Control Line Color	D.T. Control Line Connect	Coil GA-Turn or Bulb Type
#25	FLASH: LEFT SPINNER	Q25	▲ I/O Power Driver ▼	ORANGE	J6-P10	20v DC	BLK-BRN	J6-P1	#89 Bulb 165-5000-89
#26	FLASH: BACKPANEL #1 (L)	Q26		ORANGE	J6-P10	20v DC	BLK-RED	J6-P2	#89 Bulb 165-5000-89
#27	FLASH: BACKPANEL #2	Q27		ORANGE	J6-P10	20v DC	BLK-ORG	J6-P3	#89 Bulb 165-5000-89
#28	FLASH: BACKPANEL #3	Q28		ORANGE	J6-P10	20v DC	BLK-YEL	J6-P4	#89 Bulb 165-5000-89
#29	FLASH: BACKPANEL #4	Q29		ORANGE	J6-P10	20v DC	BLK-GRN	J6-P5	#89 Bulb 165-5000-89
#30	FLASH: BACKPANEL #5 (R)	Q30		ORANGE	J6-P10	20v DC	BLK-BLU	J6-P6	#89 Bulb 165-5000-89
#31	FLASH: RIGHT VUK	Q31		ORANGE	J6-P10	20v DC	BLK-VIO	J6-P7	#89 Bulb 165-5000-89
#32	RIGHT RAMP DOWN POST	Q32		BROWN	J7-P1	20v DC	BLK-GRY	J6-P8	26-1200 ∪ 090-5044-ND

Note: In Test Flash Lamps Menu ("Flash" Icon), Flashers tested are all Flash Lamps located between Q1-Q32 (This Game: Q22-Q23 & Q25-Q31)

Sec. 5: Schematics...

Backbox I/O Power Driver Board (Coils Q1-Q32) Detailed Wiring Diagram



For the complete and detailed schematic of the Step-Up Driver (Auxiliary) PCB, see the "Q21 50V Step-Up Driver Board Schematic" near the end of Sect. 5, Chapter 4, Printed Circuit Boards (PCBs).

For complete and detailed schematics of the Connectors, Coils, Flash Lamps, Bridges and fuses noted below (and others) see the I/O Power Driver PCB (Sheets 1 & 2 of 4) in Sec. 5, Chp. 4, Printed Circuit Boards (PCBs).

- J6 Q25-Q32: TIP122 (110-0067-00)
- J7 Q17-Q24: TIP122 (110-0067-00)
- J8 Q1-Q8: MOS FET STP22NE10L (110-0106-00)
- J9 Q9-Q16: MOS FET STP22NE10L (110-0106-00)

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

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

Partial View I/O Power Driver PCB (520-5249-00)



