

Optional Kits available through your Distributor:

Flipper Rebuild Kit (Left) 500-6307-10

Flipper Base Plate Kit (Left) 515-6617-01

Kit includes: Flipper Base Plate (Left) pre-threaded with securing hardware; see the Flipper Drawing for view.

Flipper Rebuild Kit (Right) 500-6307-00

Flipper Base Plate Kit (Right) 515-6617-00

Kit includes: Flipper Base Plate (Left) pre-threaded with securing hardware; see the Flipper Drawing for view.

Pinball Location Maintenance Standard Kit (for AVENGERS LE Pinball) 502-6002-D4

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

Pinball Location Maintenance Deluxe Kit (for AVENGERS LE Pinball) 502-6003-D4

Deluxe Kit includes : Pinball Location Maintenance Standard Kit as described above plus a quantity of Flipper Rebuild Kits. Note: Quantity varies which equals the same quantity of flippers used in this game.

▲ THIS GAME KIT INCLUDES (2) FLIPPER REBUILD KITS ▲

Plastics*Kit (for AVENGERS Premium Pinball) 803-5000-D4

Plastics Kit includes: Plastic Sets (830-6166-XX) Clear Plastic (830-6183-XX)

Decals*Kit (for AVENGERS Premium Pinball) 802-5000-D4

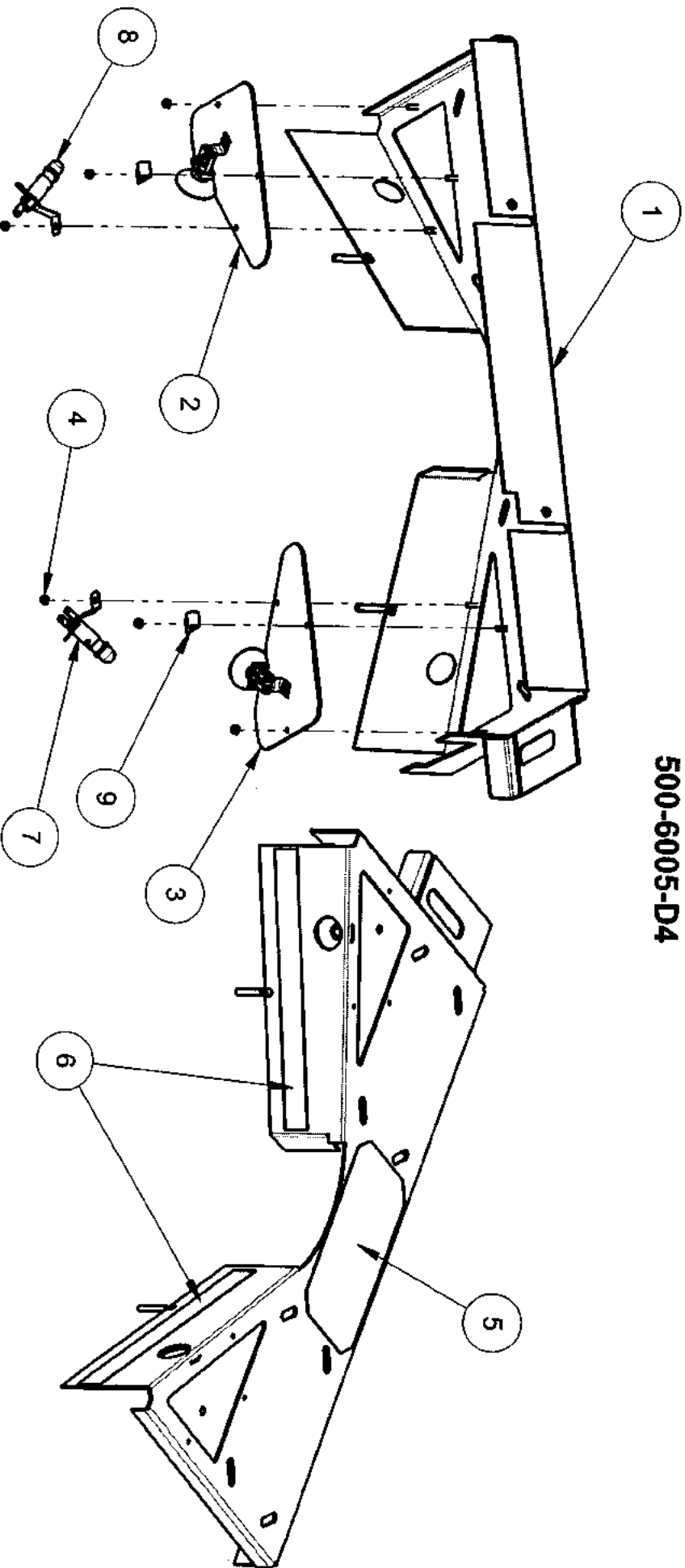
Decals Kit includes: Decal Sets (820-7002-XX) (820-6911-XX)

***Attention:** No individual Plastic or Decal can be ordered separately, unless noted otherwise. Plastics & Decals are subject to change without notice during and / or after production. Key Fobs subject to availability and may or may not be included in the plastic set. All designs, shapes & pieces used subject to change without notice. Kit contents subject to change. Service Bulletin(s) will announce any critical changes, if warranted. The last 2-digits shown on plastics or decals are for reference only.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	510-7448-46	BOTTOM ARCH, STEEL W/ SPADE BOLTS - GREEN	1
2	510-5793-00	RIVET ASSY, ARCH LEFT W/G.I. - D4	1
3	510-5793-01	RIVET ASSY, ARCH RIGHT W/ G.I. - D4	1
4	240-5303-00	4-40 NYLON LOCK NUT	6
5	820-7002-08	DECAL #8, ARCH CENTER, PEEL	1
6	545-5212-04	MYLAR PROTECT STRIP 7-5/8"	2
7	077-5035-00	SOCKET, 3-LUG LONG SHELL, 45-DEG.	2
8	112-5034-08	DOUBLE LED, BAYONET BASE - CLEAR	2
9	040-5000-03	1/4" CABLE CLAMP	2
99*	036-5594-20-D4	CABLE, ARCH GI PEEL LE	1

* ITEM NOT SHOWN

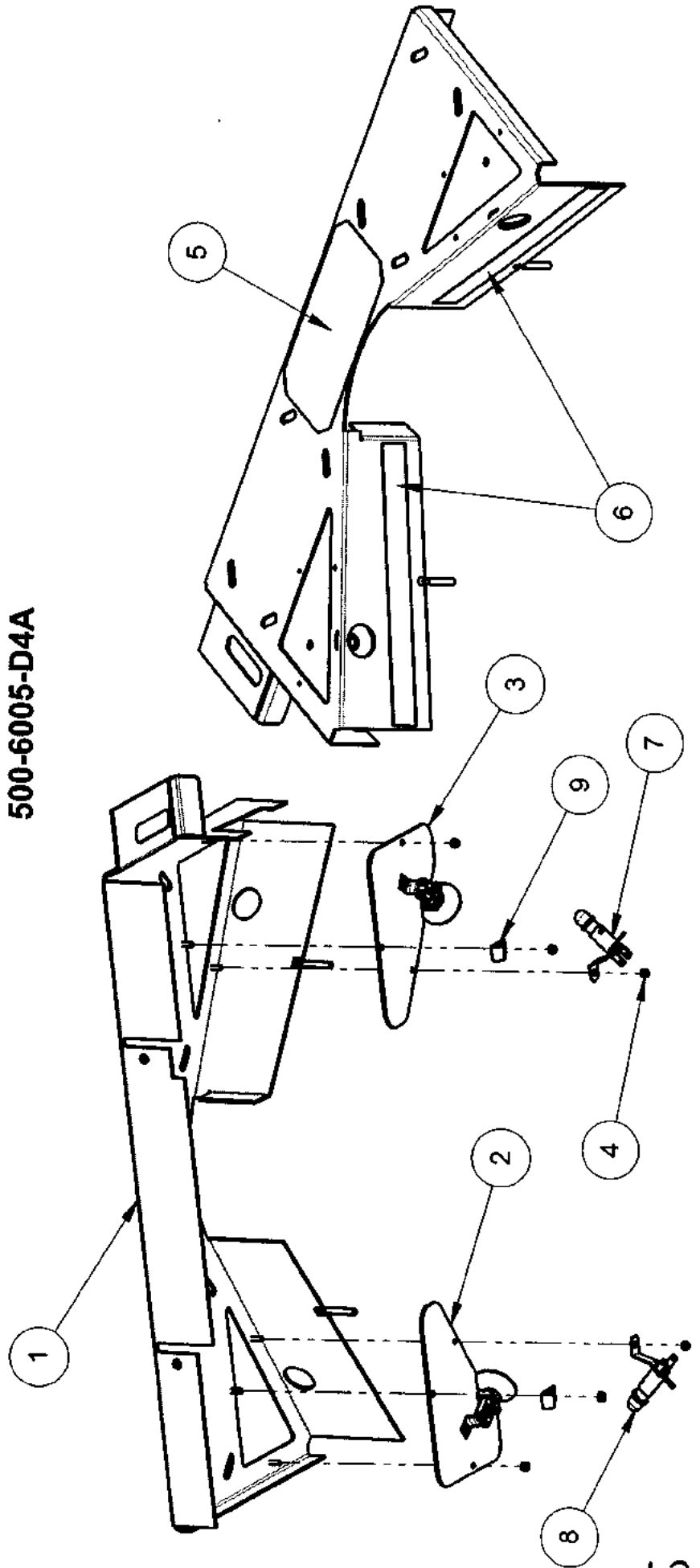
**METAL ARCH ASSEMBLY
AVENGERS LE - HULK EDITION
500-6005-D4**



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	510-7448-55	BOTTOM ARCH, STEEL W/ SPADE BOLTS - BLUE	1
2	510-5793-10	RIVET ASSY, ARCH LEFT W/ G.I. - D4A	1
3	510-5793-11	RIVET ASSY, ARCH RIGHT W/G.I. - D4A	1
4	240-5303-00	4-40 NYLON LOCK NUT	6
5	820-7002-08	DECAL #8, ARCH CENTER, PEEL	1
6	545-5212-04	MYLAR PROTECT STRIP 7-5/8"	2
7	077-5035-00	SOCKET, 3-LUG LONG SHELL, 45-DEG.	2
8	112-5034-08	DOUBLE LED, BAYONET BASE - CLEAR	2
9	040-5000-03	1/4" CABLE CLAMP	2
99*	036-5594-20-D4	CABLE, ARCH GI PEEL LE	1

* ITEM NOT SHOWN

**METAL ARCH ASSEMBLY
AVENGERS LE - AVENGERS EDITION
500-6005-D4A**



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

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

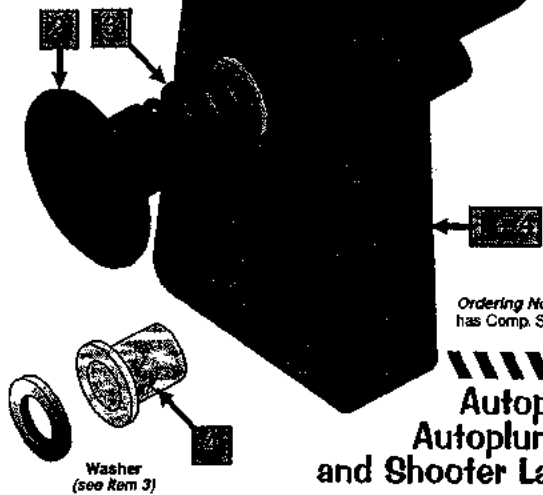
Assemble Into Housing in the following order:

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



and then ...

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



Nr.	BALL SHOOTER PARTS	QTY.	SPI PART Nr.
1	Housing Asm. + Bushings (Item 4)	1	535-5067-02
Item 1 is secured to the Cabinet by: Support Plate [not included with Item 1 or Assembly] (535-5027-00), #10-32 X 1/2" PFH (Sems) Zinc TF (Qty. 3) (237-6033-00), #10 Split Lock Washer (Qty. 3) (244-5003-00) and #6 X 1/2" HWH AB (Zinc) Red (Qty. 2) (234-5001-02)			
3	Comp. Spring (Short) (Knob Side)	1	266-5010-00
Item 3 is sandwiched onto Item 2 (Front Side) between the knob and by: Washer, 3/8" I.D. X 5/8" O.D. X 1/16" (242-5014-00)			
Item 4 is included with Item 1, Housing, (1 @ the front; 1 @ the back) as shown.			
5	Comp. Spring (Long) [GREEN, .035" @]	1	266-5001-04
Item 5 is sandwiched onto Item 2 (Rubber Tip Side) by: Washer, 3/8" I.D. X 5/8" O.D. X 1/16" (Qty. 1/ per side) (242-5014-00) and Retaining Ring, 3/8" @ Shaft (270-5012-00)			

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

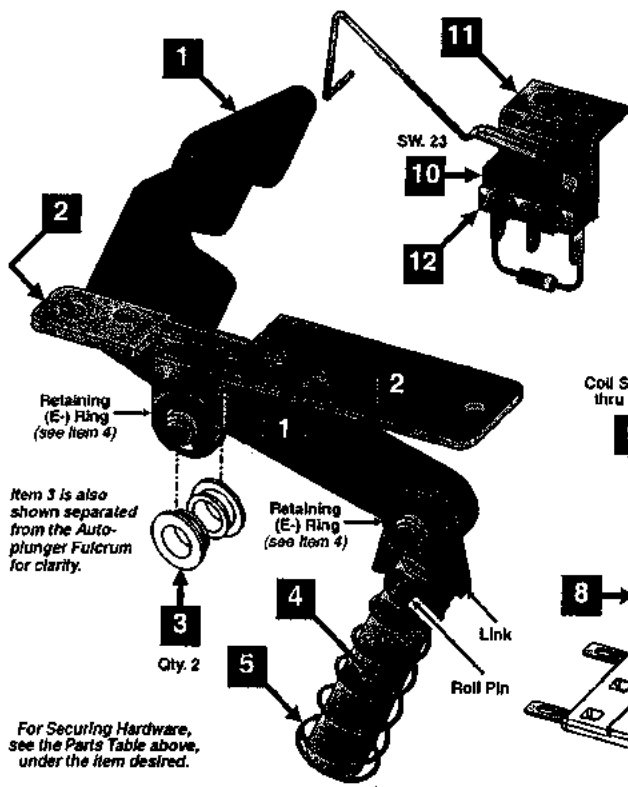
Autoplunger Arm Weld Asm., 500-6091-00 (Items 1-5), Autoplunger Coil Assembly, 500-6092-02-ND (Items 6-9) and Shooter Lane Switch Assembly, 500-6096-00 (Items 10-12)

Nr.	AUTOPL. ARM WELD PARTS	QTY.	SPI PART Nr.
2	Autoplunger Fulcrum	1	535-7697-00
4	Plunger & Link Assembly	0	511-5183-00
Item 4 is secured to Item 1 by: Retaining Ring, 1/4" @ Shaft (Qty. 1) (270-5002-00) For Individual Items use: Plunger 1.81" Lg. (530-5025-05), Plunger Link (545-5293-00) and Roll Pin 1/8" @ x 5/8" Lg. (251-5008-00)			

Nr.	AUTOPLNGR. COIL PARTS	QTY.	SPI PART Nr.
6	Autoplunger Coil Bracket Assembly	1	515-6527-00
Items 1 & 6 are secured below the P/F by: #8 X 1/2" SHW AB (Zc.) (Qty. 9) (234-5101-00)			
8	Coil, 24-940 [NO DIODE]	1	090-5036-ND
COIL DOES NOT REQUIRE A DIODE. SEE COIL NOTE BELOW FOR DETAILS.			

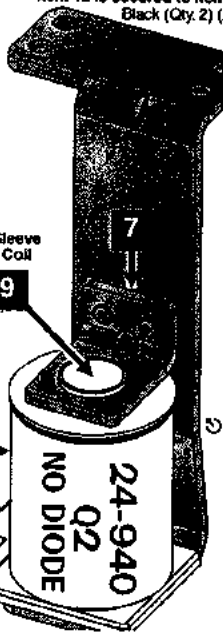
Nr.	SWITCH PARTS	QTY.	SPI PART Nr.
10	Switch (for Shooter Lane)	1	180-5157-00
Switch has a Diode (1N4004) (112-5003-00). Can be replaced with (1N4001) (112-5001-00).			
12	Switch Body Protect Plate	14	535-6539-00
Item 12 is secured to Items 10-11 by: #2-56 X 1/2" Unslotted Ser. HWH #4 Head TR3 Black (Qty. 2) (237-5937-02) and #2-56 Hex Nut (Qty. 2) (240-5301-0) (ASM. REF. 500-6096-00, Items 10-12)			

Assemblies & Ramps



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

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

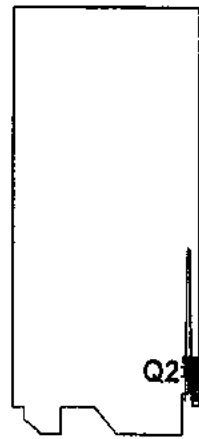


Coil Assembly shown turned 90° for clarity.

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

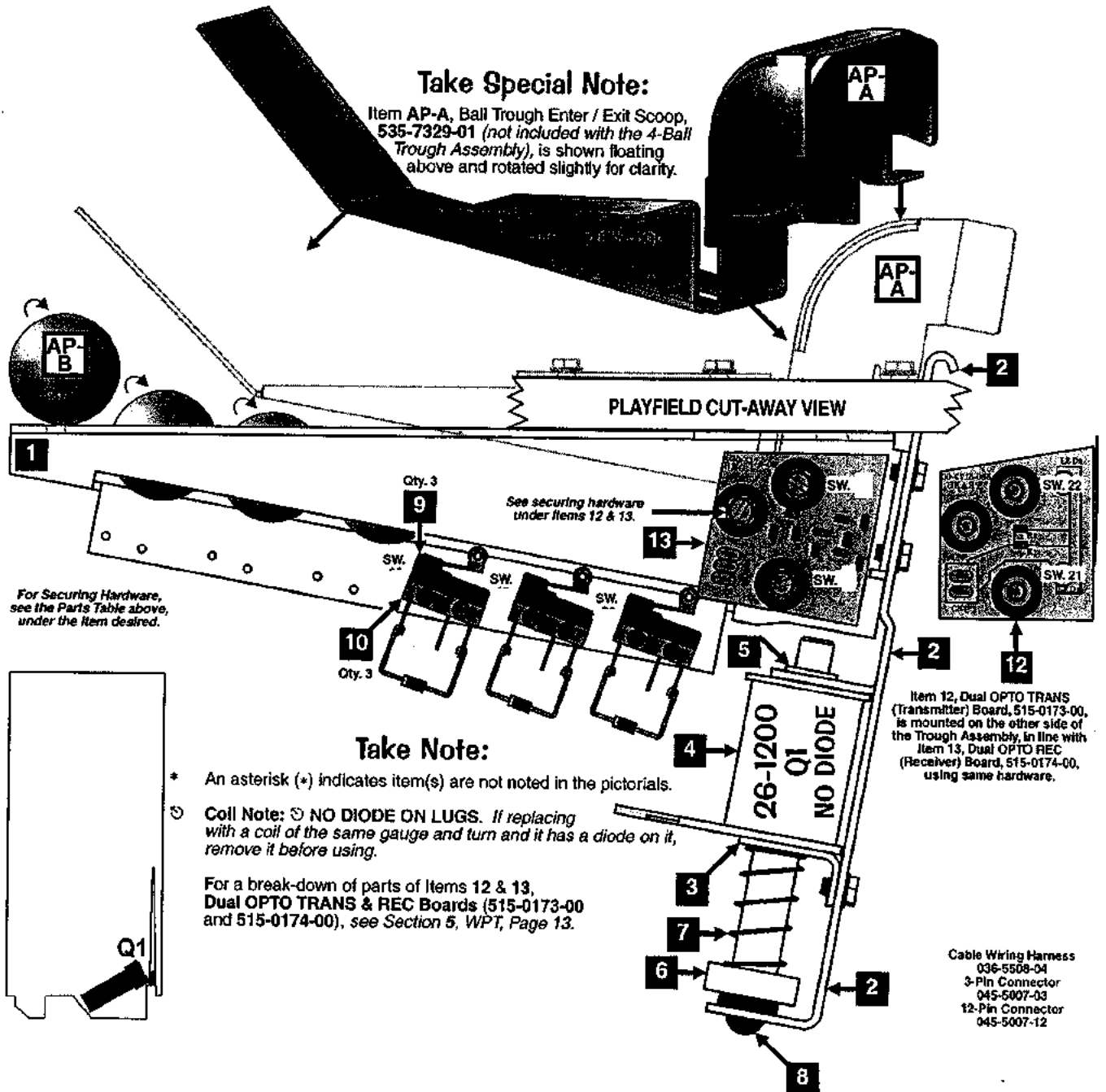
Take Note:
Coil Note: NO DIODE ON LUGS. If replacing with a coil of the same gauge and turn & it has a diode on it, remove it before using.

(Items 1-13)



6-Ball Trough Assembly, 500-6318-16-ND (Items 1-13) and Associated Parts: See Parts Table Below.

Nr.	4-BALL TROUGH PARTS	QTY.	SPI PART Nr.	Nr.	4-BALL TROUGH PARTS	QTY.	SPI PART Nr.
				11	Trough Ball Guide Plate	0	535-7801-00
2	Coil Mounting Bracket	1	535-7330-01	Item 11 is secured to Item 1 by: #4 X 5/16" X .144" LD Spacer Tab (Qty. 1) (234-5014-03) and #2-36 X 1/2" HWH (Ser) UNS #4HD T53 BO (Qty. 4) (237-3817-00).			
	Item 2 is secured to Item 1 by: #8-32 X 3/8" HWH Swage (Sr.) Zinc (Qty. 4) (237-5975-00)						
4	Coil, 26-1200 [NO DIODE]	1	090-5044-ND	12	Dual OPTO TRANS Board Assembly	1	515-0173-00
	COIL DOES NOT REQUIRE A DIODE. SEE COIL NOTE BELOW FOR DETAILS.						
6	Steel & Nylon Plunger Assembly	1	515-7309-01	Ordering Note: If 500-6318-16-ND is unavailable, order the individual part(s) actually required. This assembly is identical to 500-6318-24-ND, -15 or -25 except for the quantity of Items 9 & 10 (Qty. 4/per on 5-Ball Trough) and Item 11, required when a Magnet Mech. is used in the game (this game not required). -ND means no diode on item 4, Coil, 26-1200.			
8	Rubber Bumper (Grommet)	1	545-5105-00	ASSOCIATED PARTS ARE NOT INCLUDED WITH THE ABOVE ASSEMBLY.			
				Nr.	ASSOCIATED PART(S)	QTY.	SPI PART Nr.
10	Switch Body Protect Plate	3	535-6539-00	AP-A	Ball Trough Enter / Exit Scoop	1	535-7329-01
				Item AP-A secured to the playfield by: #8 X 1/2" SHWH AB (Zinc) (Qty. 4) (234-5101-00).			

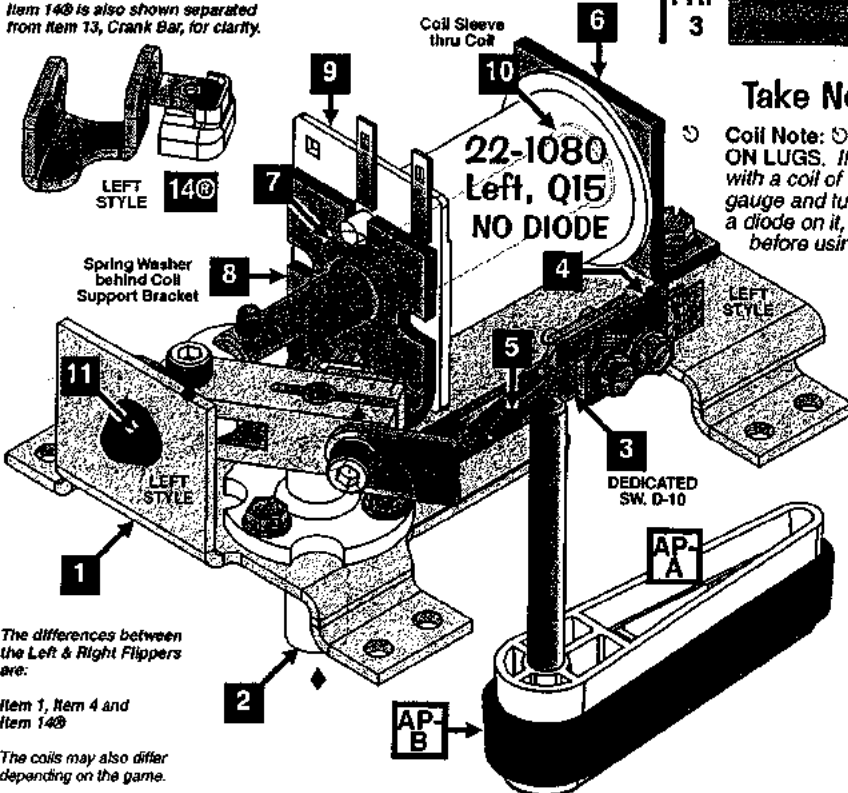


Flipper (Left) Assembly, 500-6543-12-ND (Items 1-15) and Associated Parts: White Flipper Bat & Shaft Asm., 515-5133-08-06 (Items AP-A / AP-B)

Nr.	FLIPPER (LEFT) PARTS	QTY.	SPI PART Nr.
1	Flipper Base Plate (LEFT) Item 1 is secured below by: #8 X 1/2" SHWH AB (Zinc) (Qty. 8) (234-5101-00) Ordering Note: Individual Part (535-7275-01) is not prethreaded, see Item FRP1.	1	See FRP1
3	Power (EOS / End-of-Stroke) Switch Item 3 is secured to Item 1 by: #6-32 X 5/8" HWH Swage (Ser.) Zc. (Qty. 2) (237-5976-04)	1	180-5149-00
5	Flipper Return Spring	1	265-5035-00
7	Spring Washer (17/32" ID X 3/4" X 1")	1	269-5002-00
9	Coil, 22-1080 [NO DIODE] YEL. WRAP COIL DOES NOT REQUIRE A DIODE. SEE COIL NOTE BELOW FOR DETAILS.	1	090-5032-ND
11	Deflector Pad (Bumper)	1	545-5428-00
13	Crank Bar (Pawl) Item 13 requires: Bushing, .192" ID X .312" OD X .195" (Qty. 1) (530-5139-00)	1	530-5070-02

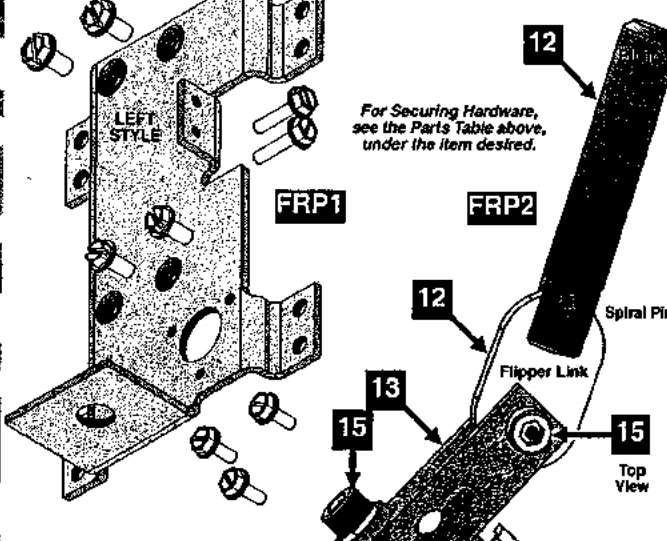
15	Set Screw: #10-32 X 3/4" Socket Hd. Item 15 requires: #10-32 Nylon Stop Nut (Qty. 1) Flipper Link Side Only (240-5203-00) and #10 Split Lock Washer (Qty. 1) Switch Actuator Side Only (244-5003-00) Tool required for Item 15: 5/32" or 4mm Allen Wrench	2	237-6144-00
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Item 14Ⓞ is also shown separated from Item 13, Crank Bar, for clarity.



Flipper Rebuild Parts for Easier Installation Save \$

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

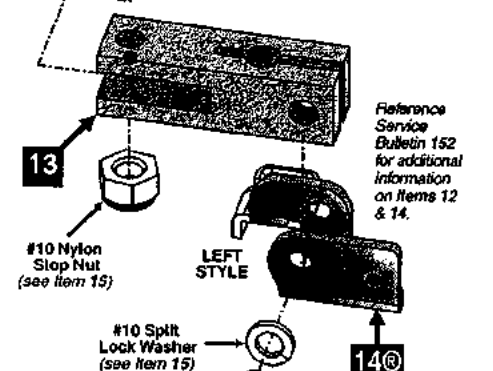
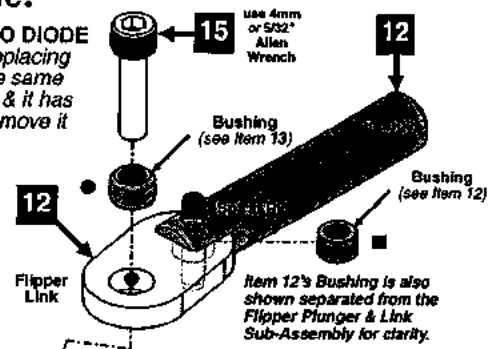


FRP 2 PLUNGER, LINK & CRANK (LEFT STYLE) ASSEMBLY: Includes Items 12, 13, 14 & 15 (comes assembled). 515-7203-01

FRP 3

Take Note:

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



Take Note:

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

Sec. 4: Drawings ...

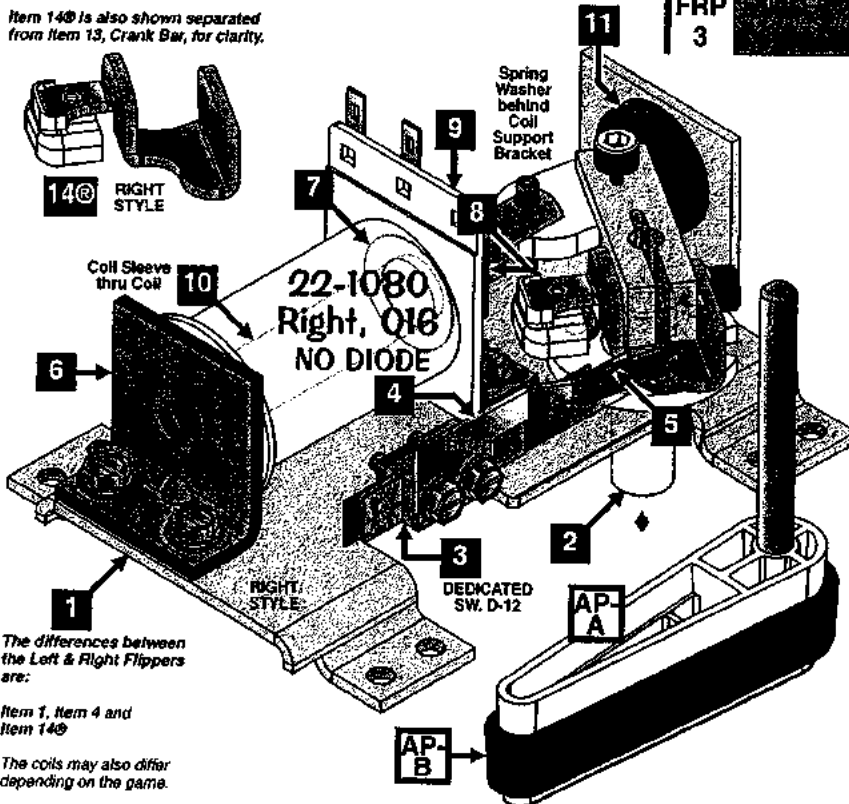
ASSOCIATED PARTS ARE NOT INCLUDED WITH THE ABOVE ASSEMBLY.

Nr.	ASSOCIATED PART(S)	QTY.	SPI PART Nr.
AP-A	WHITE Flipper Bat & Shaft Assembly (Non-Knuded End, without Rubber Ring)	2	515-5133-08-06
AP-B			

Flipper (Right) Assembly, 500-6543-02-ND (Items 1-15) and Associated Parts: White Flipper Bat & Shaft Asm., 515-5133-08-06 (Items AP-A / AP-B)

Nr.	FLIPPER (RIGHT) PARTS	QTY.	SPI PART Nr.
1	Flipper Base Plate (RIGHT) Item 1 is secured below by: #8 X 1/2" SHWH AB (Zinc) (Qty. 8) (234-5101-00) Ordering Note: Individual Part (535-7275-00) is not prethreaded, see Item FRP1.	1	See FRP1
3	Power (EOS / End-of-Stroke) Switch Item 3 is secured to Item 1 by: #6-32 X 5/8" HWH Swage (Ser.) Zc. (Qty. 2) (237-5976-04)	1	180-5149-00
5	Flipper Return Spring	1	265-5035-00
7	Spring Washer (17/32" ID X 3/4" X 1")	1	269-5002-00
9	Coil, 22-1080 [NO DIODE] YEL-WRAP COIL DOES NOT REQUIRE A DIODE. SEE COIL NOTE PREV. PAGE FOR DETAILS.	1	090-5032-ND
11	Deflector Pad (Bumper)	1	545-5428-00
13	Crank Bar (Pawl) Item 13 requires: Bushing, .192" ø ID X .312" ø OD X .195" (Qty. 1) (530-5139-00)	1	530-5070-02
15	Set Screw: #10-32 X 3/4" Socket Hd. Item 15 requires: #10-32 Nylon Stop Nut (Qty. 1) Flipper Link Side Only (240-5203-00) and #10 Split Lock Washer (Qty. 1) Switch Actuator Side Only (244-5003-00) Tool required for Item 15: 5/32" or 4mm Allen Wrench	2	237-6144-00

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



The differences between the Left & Right Flippers are:

Item 1, Item 4 and Item 14®

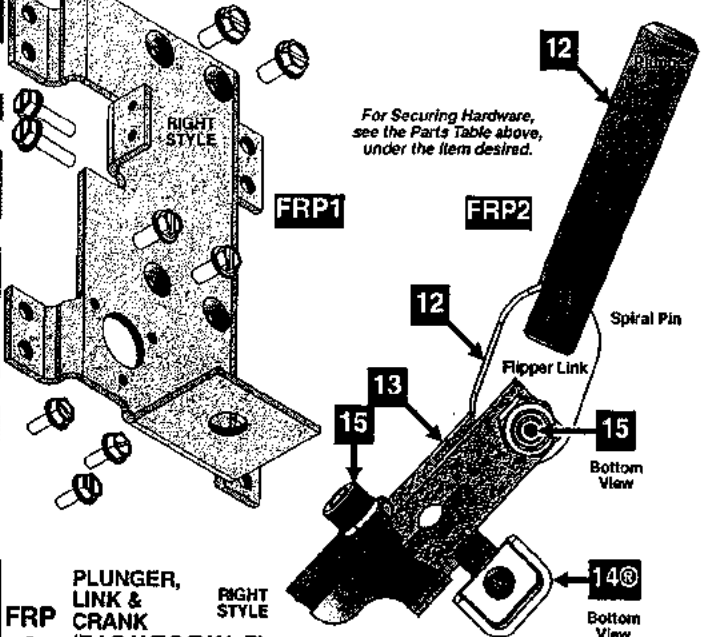
The coils may also differ depending on the game.

ASSOCIATED PARTS ARE NOT INCLUDED WITH THE ABOVE ASSEMBLY.

Nr.	ASSOCIATED PART(S)	QTY.	SPI PART Nr.
AP-A	WHITE Flipper Bat & Shaft Assembly (Non-Knotted End) <i>without Rubber Ring</i>	2	515-5133-08-06
AP-B	WHITE Flipper Bat & Shaft Assembly (Knotted End)	2	515-5133-08-06

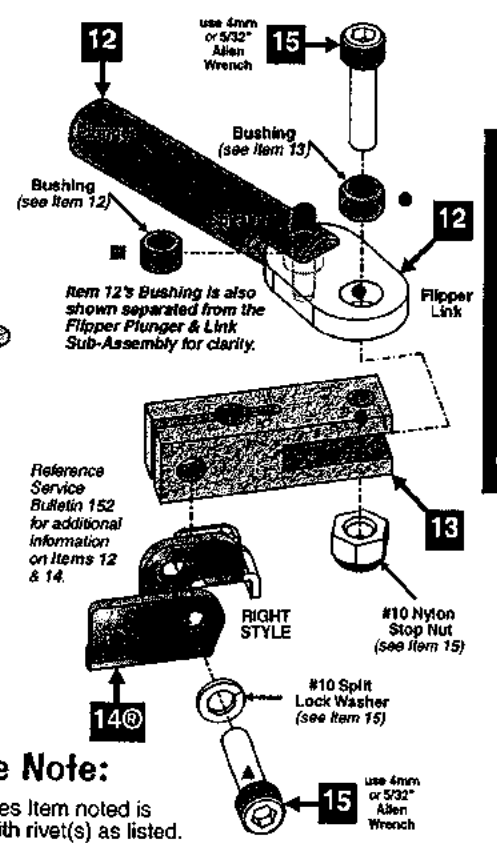
Flipper Rebuild Parts for Easier Installation, Save \$

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



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

FRP 3



Take Note:

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

Sec. 4: Drawings ...

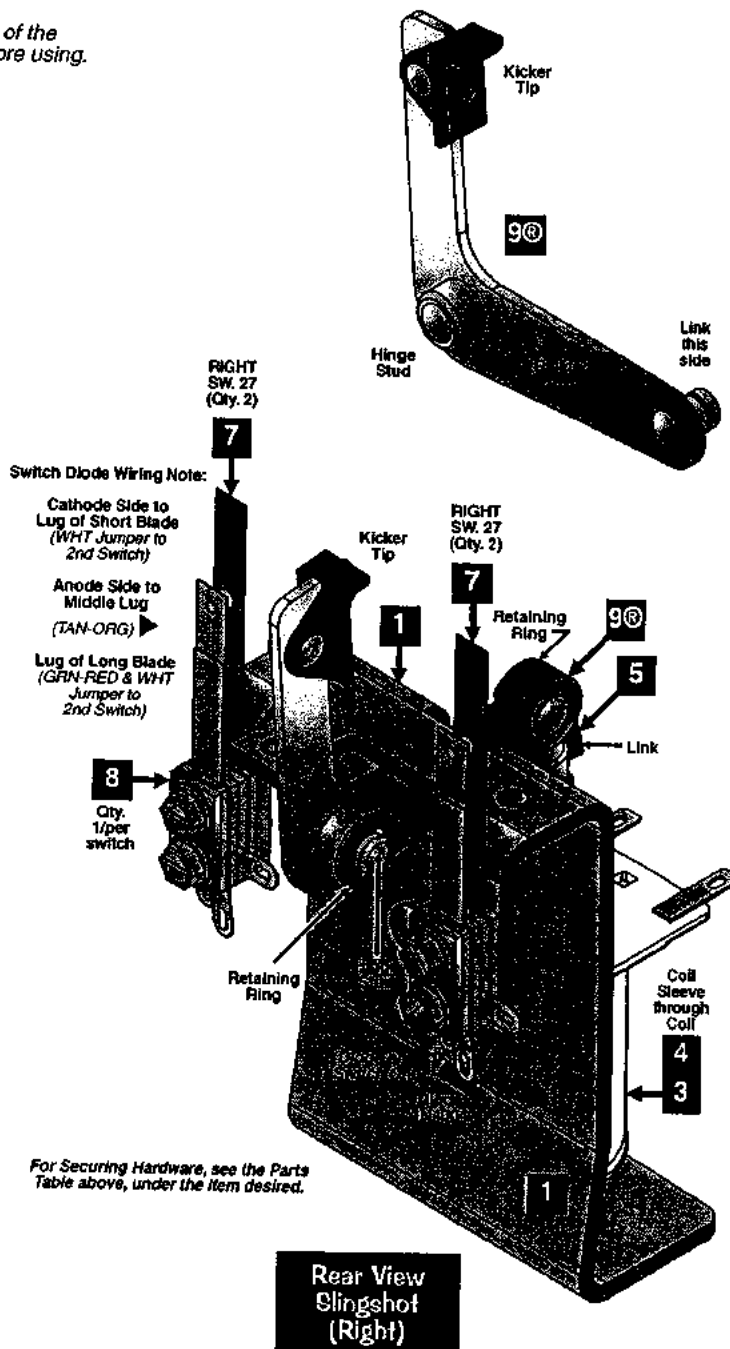
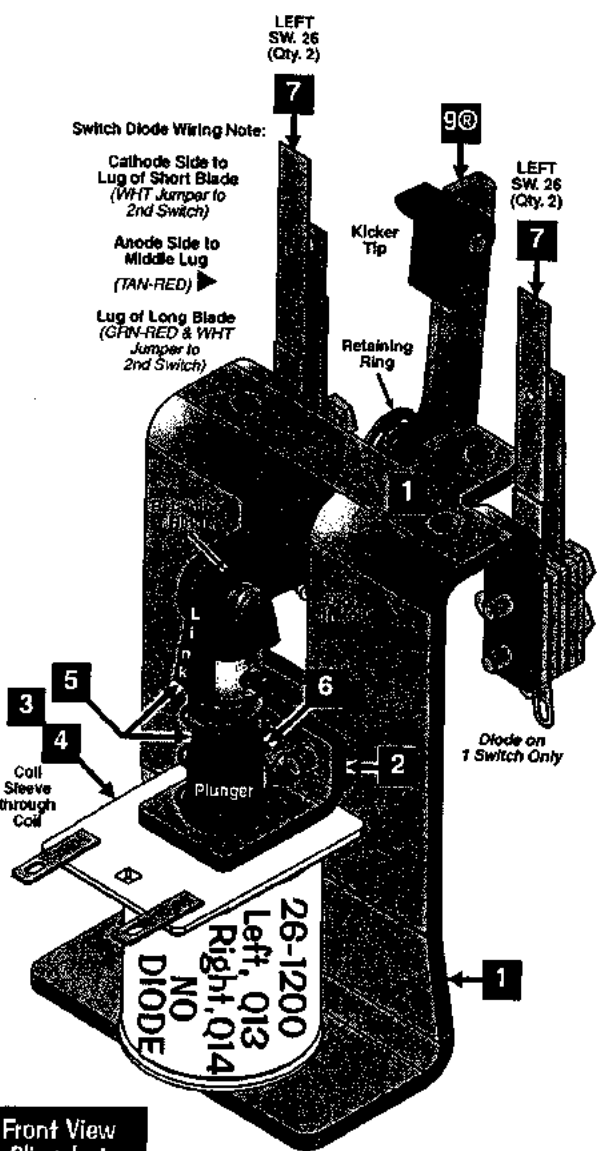
Slingshot (Left & Right) Assemblies, 500-5849-01-ND (Qty. 2) (Items 1-9)

Nr.	SLINGSHOT PARTS	QTY.	SPI PART Nr.	Nr.	SLINGSHOT PARTS	QTY.	SPI PART Nr.
2	Coil Retaining Bracket	1/per	535-5203-03	6	Compression (Return) Spring	1/per	266-5020-00
Item 2 is secured to item 1 by: #8-32 X 3/8" PPH MS (Sems) (Qty. 2) (232-5301-00)							
4	Coil Sleeve	1/per	545-5031-00	8	Switch Body Protect Plate	2/per	535-5045-00
				Items 7 & 8 are secured to item 1 by: #6-32 X 5/8" HWH Swage (Qty. 4) (237-5976-04)			

Take Note:

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

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



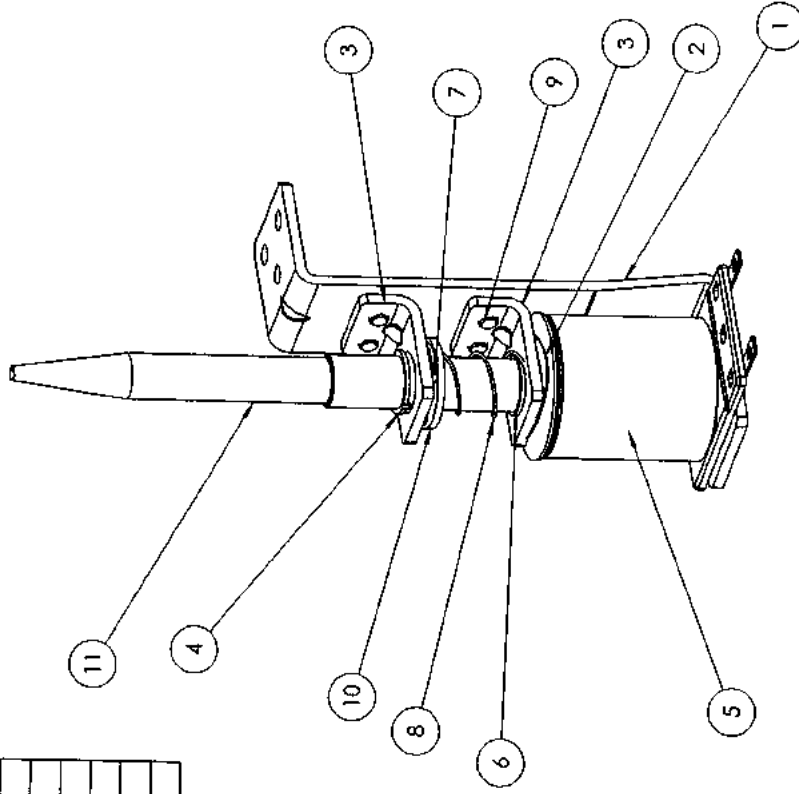
Assemblies & Ramps

Front View Slingshot (Left)

Rear View Slingshot (Right)

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

ITEM	QTY.	PART NUMBER	DESCRIPTION
1	1	515-7132-00	BALL LOCK MTG. BRKT SUB-ASSY
2	1	269-5002-00	SPRING WASHER
3	2	535-5203-03	COIL RETAINING BRACKET
4	1	545-5418-01	NYLINER - PLASTIC, 7/16"
5	1	090-5044-ND	COIL 26-1200 - NO DIODE
6	1	545-5411-00	COIL SLEEVE
7	1	270-5005-00	RETAINING E-RING, 7/16" SHAFT OD
8	1	266-5020-00	COMPRESSION SPRING-CONICAL
9	4	232-5300-00	SCREW, 8-32 X 1/4" PPH SEMS
10	1	242-5081-00	WASHER - NYLON .75 OD x .44 ID
11	1	515-7350-02	DOWN-POST PLUNGER SUB-ASSY



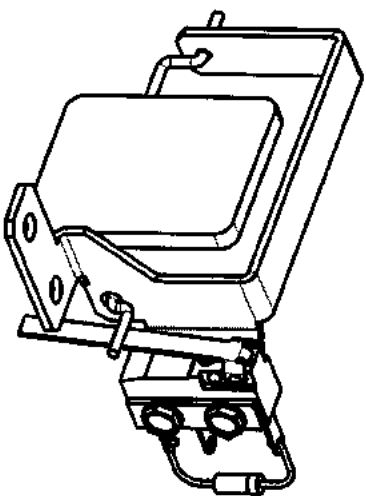
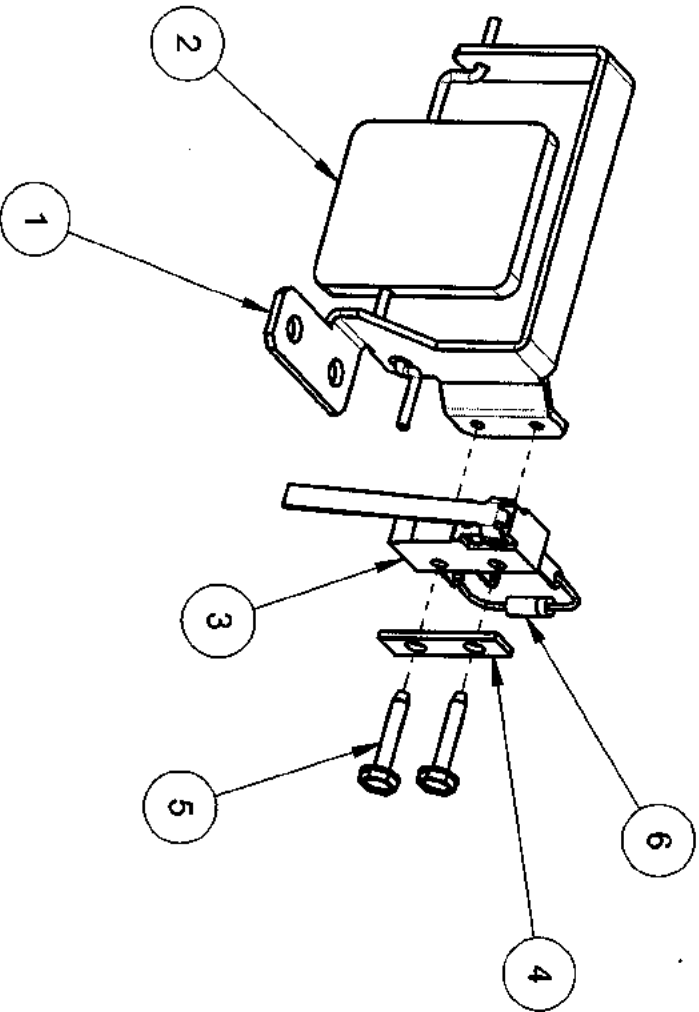
DOWN POST ASSEMBLY

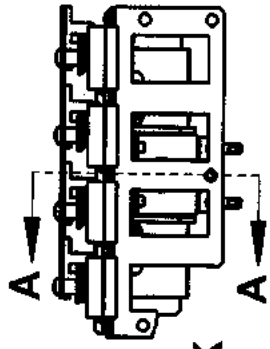
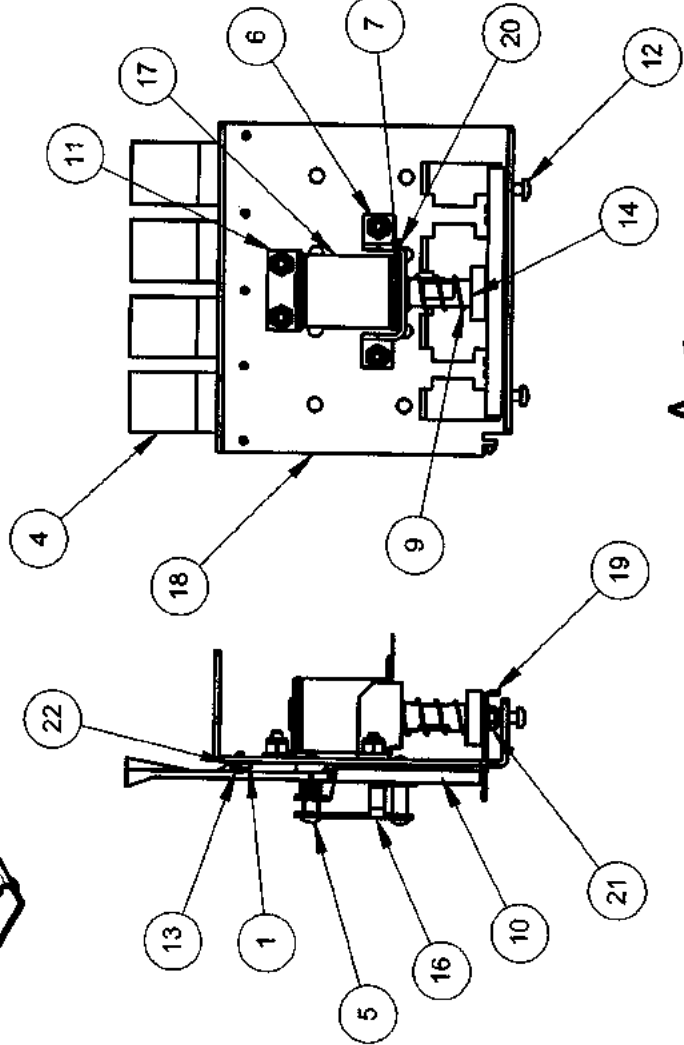
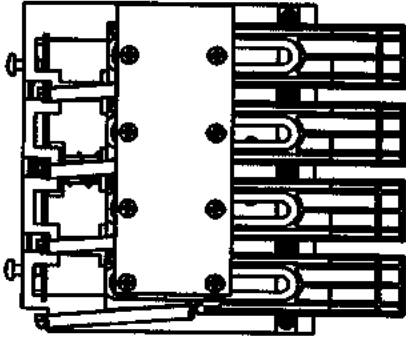
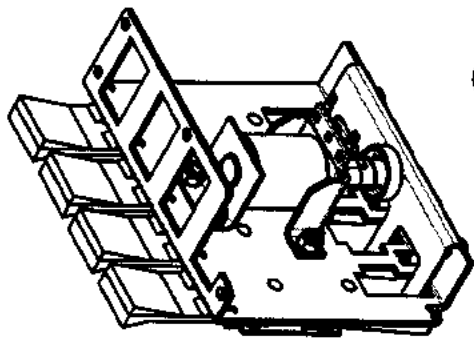
500-6752-04

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	535-0655-01	SPINNER BRKT, RAIL MNT, RIGHT	1
2	515-7088-00	SPINNER TARGET, NARROW	1
3	180-5010-04	MICRO-SWITCH	1
4	535-6539-00	SWITCH BODY PROTECT PLATE	1
5	237-5937-02	SCREW, 2-56 X 1/2" HWH MS	2
6	112-5003-00	DIODE - 1N4004	1
99*	036-5544-00	10" CABLE, GENERIC SPINNER	1

* ITEM NOT SHOWN

**SPINNER ASSEMBLY, RAIL MOUNT
RIGHT-HAND -- 511-7452-01**





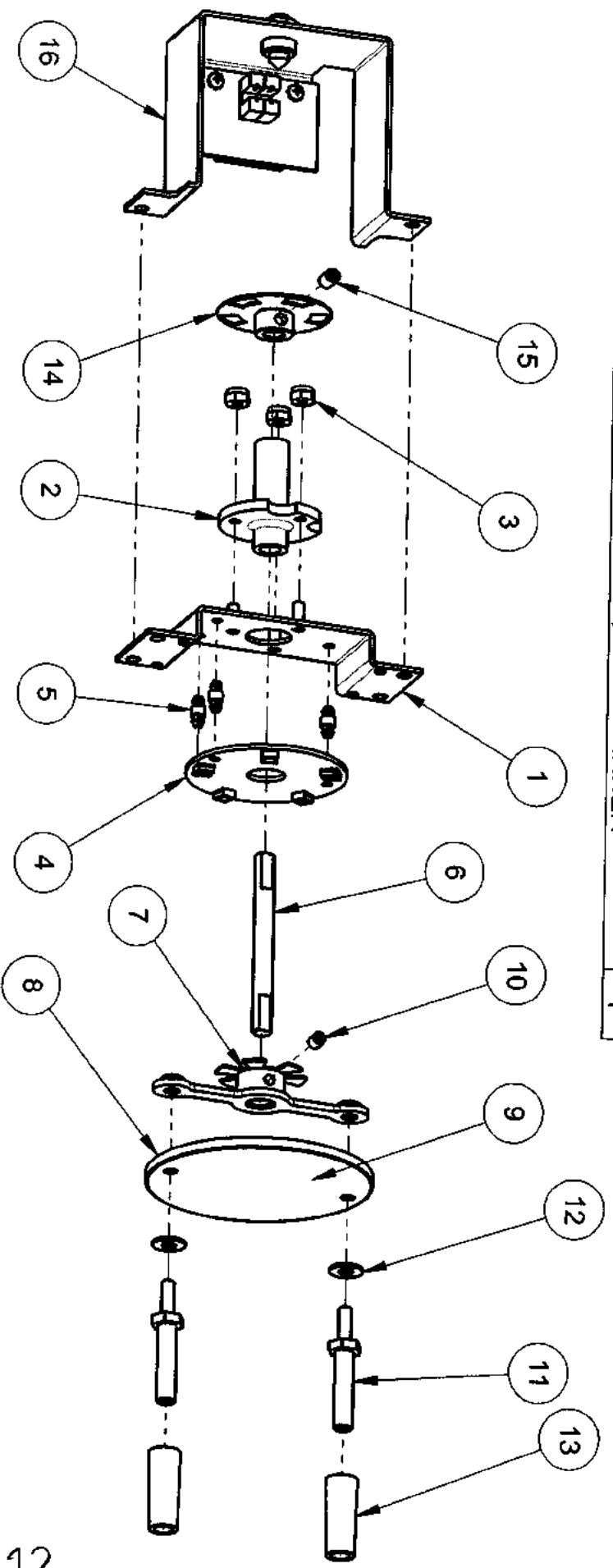
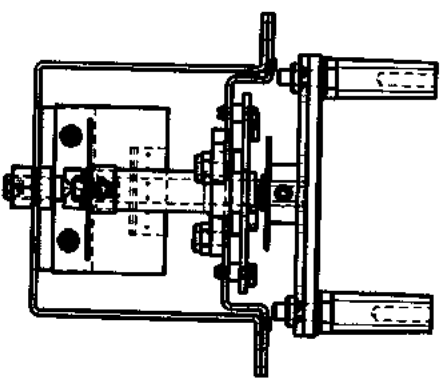
ITEM #	PART NUMBER	DESCRIPTION	QTY.
1	545-6163-04	LEDGE, 4-BANK DROP TARGET	1
2	242-5091-00	WASHER, 1/2 X 17/64 X .03 - DT	12
3	266-5089-00	SPRING COMPRESSION - DT	4
4	545-6305-00	TARGET - ROLLOVER - BLACK	4
5	237-5501-00	SCREW, 6-32 X 3/8" PPH MS ZINC	8
6	240-5102-00	8-32 NYLON LOCK NUT	4
7	269-5002-00	SPRING WASHER	1
8	270-5002-00	RETAINING RING - 1/4"	8
9	266-5020-00	COMPRESSION SPRING-CONICAL	1
10	265-5003-02	TARGET RESET SPRING	4
11	535-9959-00	STOP BRKT	1
12	237-5602-00	SCREW, 8-32 X 1/2 PPH MS, ZINC	2
13	237-6169-00	SCREW, 4-40 X 1/4 PPH MS	5
14	530-5757-00	PLUNGER - D.T. ASSY.	1
15	545-5076-01	COIL SLEEVE	1
16	520-5252-04	OPTO BOARD - 4 BK	1
17	090-5034-ND	COIL 25-1240 - NO DIODE	1
18	515-7604-04-D3	FRAME ASSY - 4-BANK DT - PEEL PRO	1
19	535-9996-04	LIFT BRACKET - 4 BANK	1
20	535-9995-01	COIL BRACKET	1
21	237-5985-00	10-32 X 3/8 SHWH SWAGE SCREW	1
22	545-6798-00	SHIM - FICHE PAPER - D.T. SINGLE	1
23	545-6798-01	SHIM - FICHE PAPER - D.T. DOUBLE	1
98*	605-5006-00	1/8" PVC TUBING	.1 FT
99*	036-5542-00	DROP TARGET CABLE	1

* ITEM NOT SHOWN

**ASSEMBLY, HULK DT 4-BANK
AVENGERS
500-7029-04-D3**

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	515-1023-00	BRKT: FLAT SPINNER	1
2	545-5070-04	FLIPPER BUSHING-MODIFIED	1
3	240-5005-00	6-32 NYLON STOP NUT	3
4	520-6782-01	LED PCB ASSY. FLAT SPINNER	1
5	254-5072-02	DOUBLE SIDED SNAP-IN SPACER	3
6	530-1004-00	SHAFT, FLAT SPINNER	1
7	515-1022-00	PLATER ARM, FLAT SPINNER	1
8	830-1004-00	PLATER, FLAT SPINNER ASSY	1
9	820-7015-00	DECAL, FLAT SPINNER, PEEL	1
10	237-6130-00	SET SCREW, 8-32 X 1/4" CUP PT	1
11	530-5332-04	HEX BUMPER POST - 8-32 TAP T-NUT	2
12	242-5005-00	#8 WASHER	2
13	545-5308-00	POST - RUBBER - 3/8 O.D. X 1-1/16 - 95 A - BLACK	2
14	530-1012-00	CHOPPER WHEEL, FLAT SPINNER	1
15	237-6092-00	SET SCREW, 10-32 X 5/16, SOCKET CUP PT	1
16	511-7469-00	ASSEM, LEVEL & OPTO, FLAT SPINNER	1

FLAT SPINNER ASSEMBLY
AVENGERS LE
500-7272-00



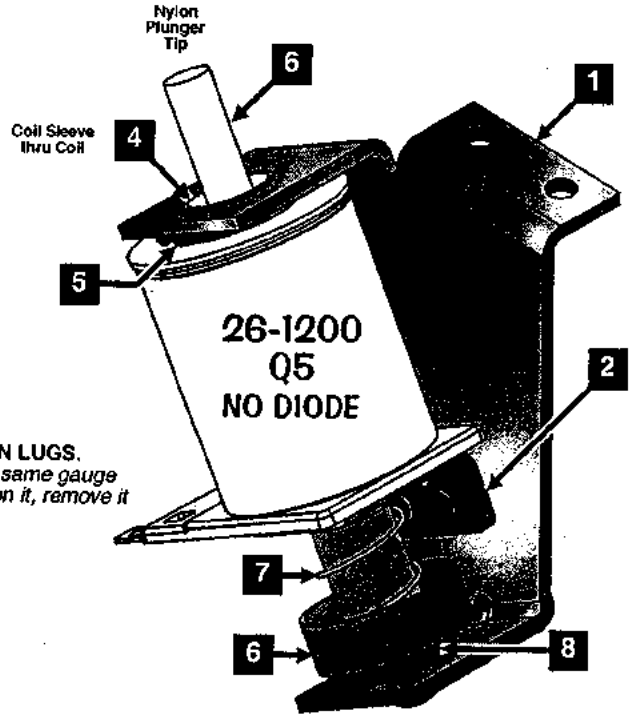
Eject (30°) Assembly, 500-6511-01-ND (Items 1-8)

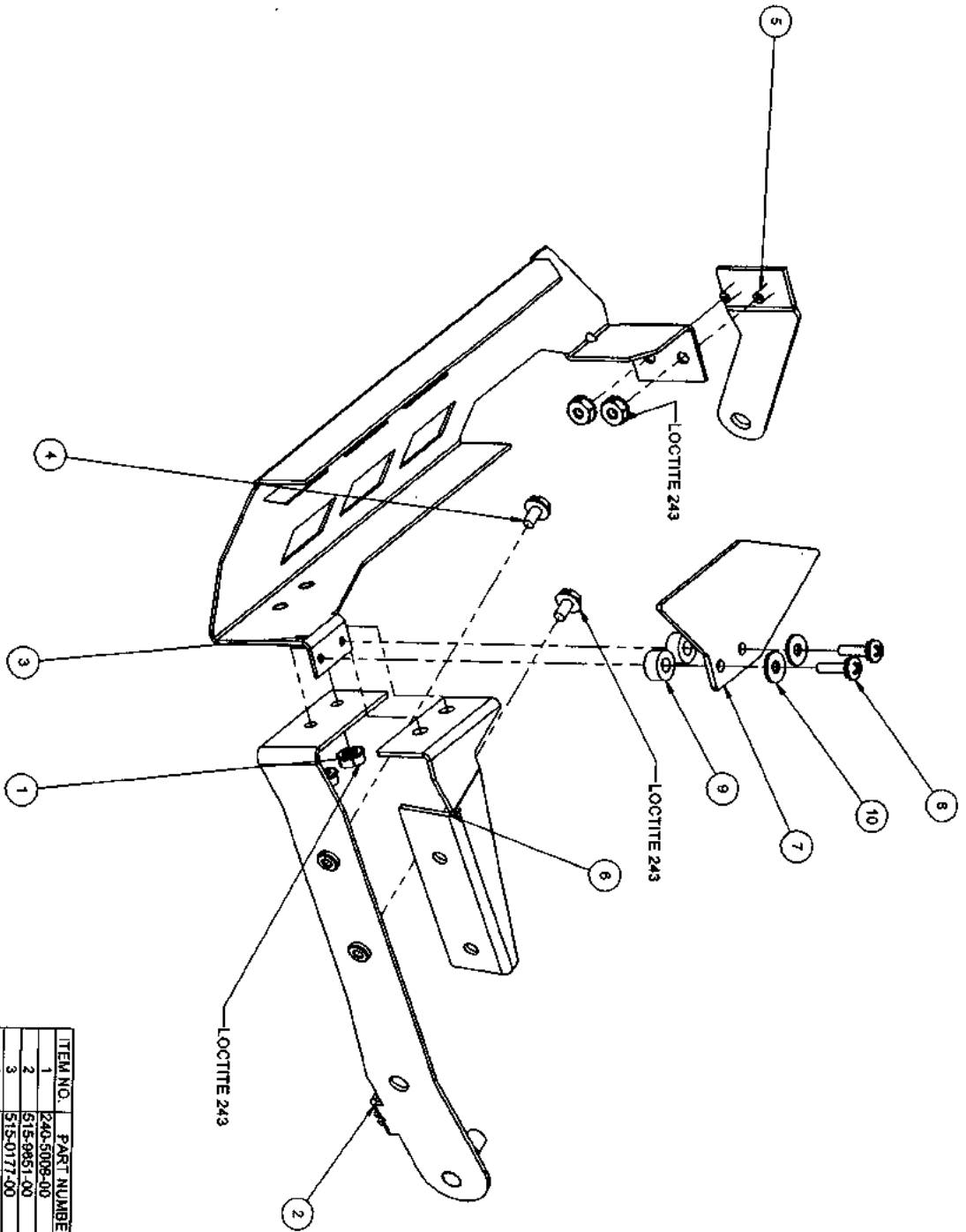
Nr.	30° EJECT PARTS	QTY.	SPI PART Nr.
2	Coil Retaining Bracket	1	535-5203-03
Item 2 is secured to Item 1 by: #8-32 X 1/4" PPH MS (Sems) (Qty: 2) (232-5300-00)			
4	Coil Sleeve (Short) (Formost #10-7077)	1	545-5076-01
6	Plunger (with Nylon Tip) Assembly	1	515-7197-00
8	Rubber Bumper (Grommet)	1	545-5105-00

Ordering Note: If 500-6511-01-ND is unavailable, order the individual part(s) actually required.

Take Note:

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



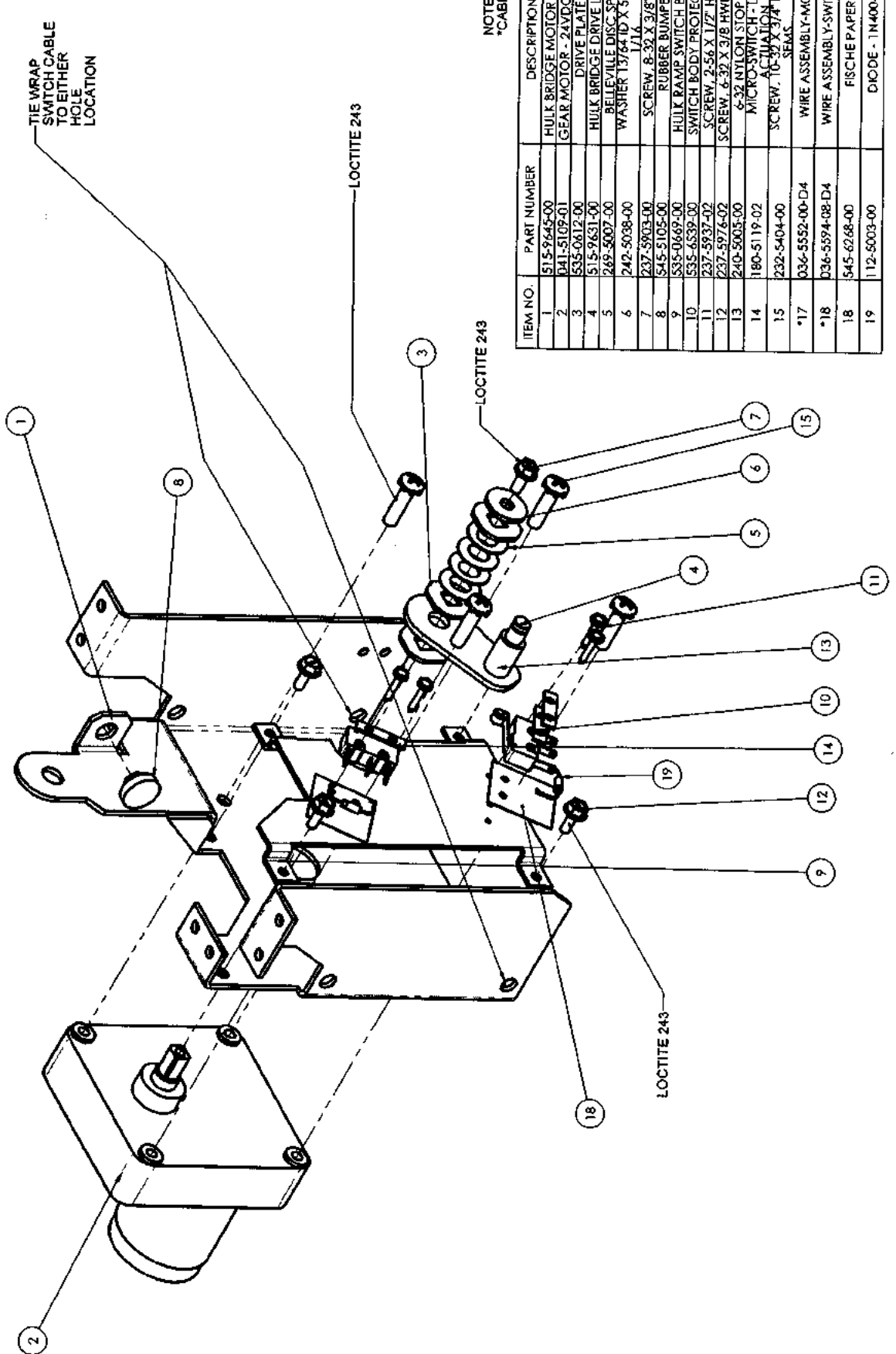


ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	246-5009-00	# 8-32 KEPS NUT	4
2	515-9951-00	HULK RAMP WELDMENT	1
3	515-0177-00	HULK RAMP CHANNEL	1
4	237-5976-01	SCREW 6-32 X 1/4 FWH SWAGE	2
5	535-0649-00	HULK BRIDGE PIVOT	1
6	535-0674-00	HULK RAMP GUSSET	1
7	830-8183-72	BUTYRATE #72 PEELE	1
8	232-5202-00	SCREW 6-32 X 1/2 FPH MS	2
9	254-5000-18	NYLON SPACERS BLACK - 3/8	2
10	242-5001-00	OD X .175 ID X 3/16 #8 WASHER	2

HULK BRIDGE ASSEMBLY

DRAWING NO.

511-7448-01



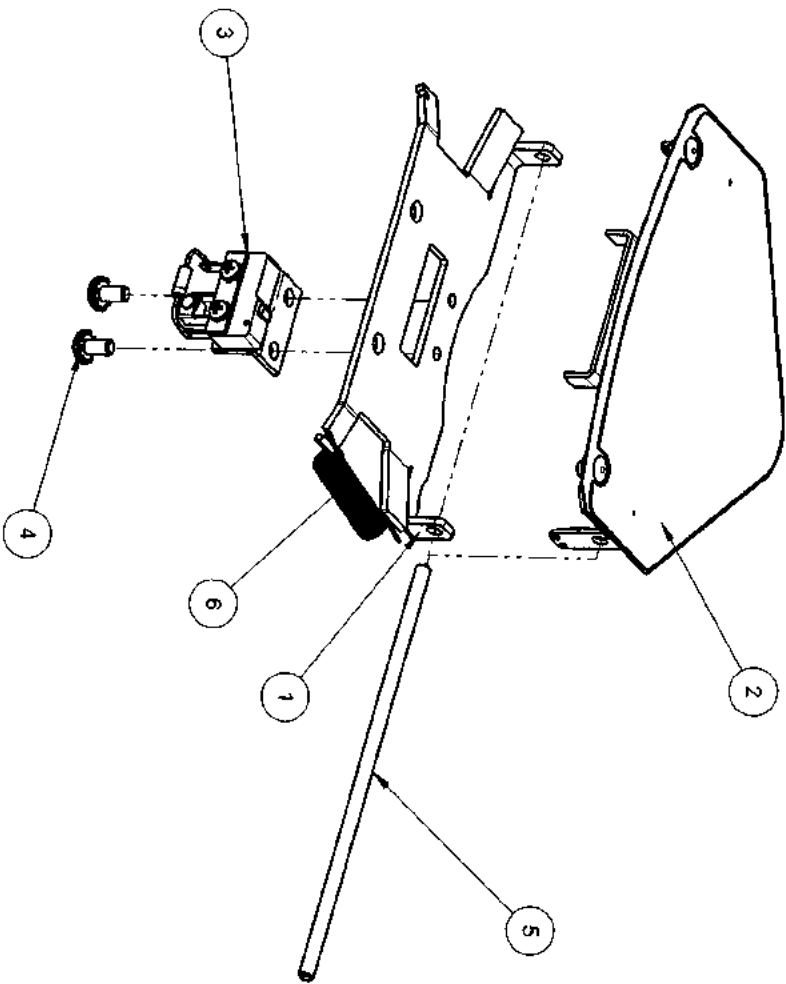
NOTE:
*CABLE NOT SHOWN

ITEM NO.	PART NUMBER	DESCRIPTION	QTY
1	515-9645-00	HULK BRIDGE MOTOR BRACKET	1
2	041-5109-01	GEAR MOTOR - 24VDC - 40 RPM	1
3	535-0812-00	DRIVE PLATE	3
4	515-9631-00	HULK BRIDGE DRIVE LINKAGE	1
5	269-5007-00	BELLEVILLE DISC SPRING	4
6	242-5008-00	WASHER 13/64 ID X 5/8 OD X 1/16	1
7	237-5903-00	SCREW, 8-32 X 3/8" HW/H	1
8	545-5105-00	RUBBER BUMPER	1
9	535-0869-00	HULK RAMP SWITCH BRACKET	1
10	535-4639-00	SWITCH BODY PROTECT PLATE	3
11	237-5937-02	SCREW, 2-56 X 1/2" HW/H MS	4
12	237-5974-02	SCREW, 6-32 X 3/8 HW/H SWAGE	3
13	240-5005-00	6-32 NYLON STOP NUT	1
14	180-5119-02	MICRO-SWITCH - LIGHT ACTIVATION	2
15	232-5404-00	SCREW, 10-32 X 3/4 PPH MS SEAS	4
*17	036-5592-00-D4	WIRE ASSEMBLY-MOTOR	
*18	036-5594-08-D4	WIRE ASSEMBLY-SWITCHES	
18	545-6268-00	FISCHE PAPER	2
19	112-5003-00	DIODE - 1N4004	2

HULK BRIDGE MOTOR ASSEMBLY

DRAWING NO. 511-7447-00

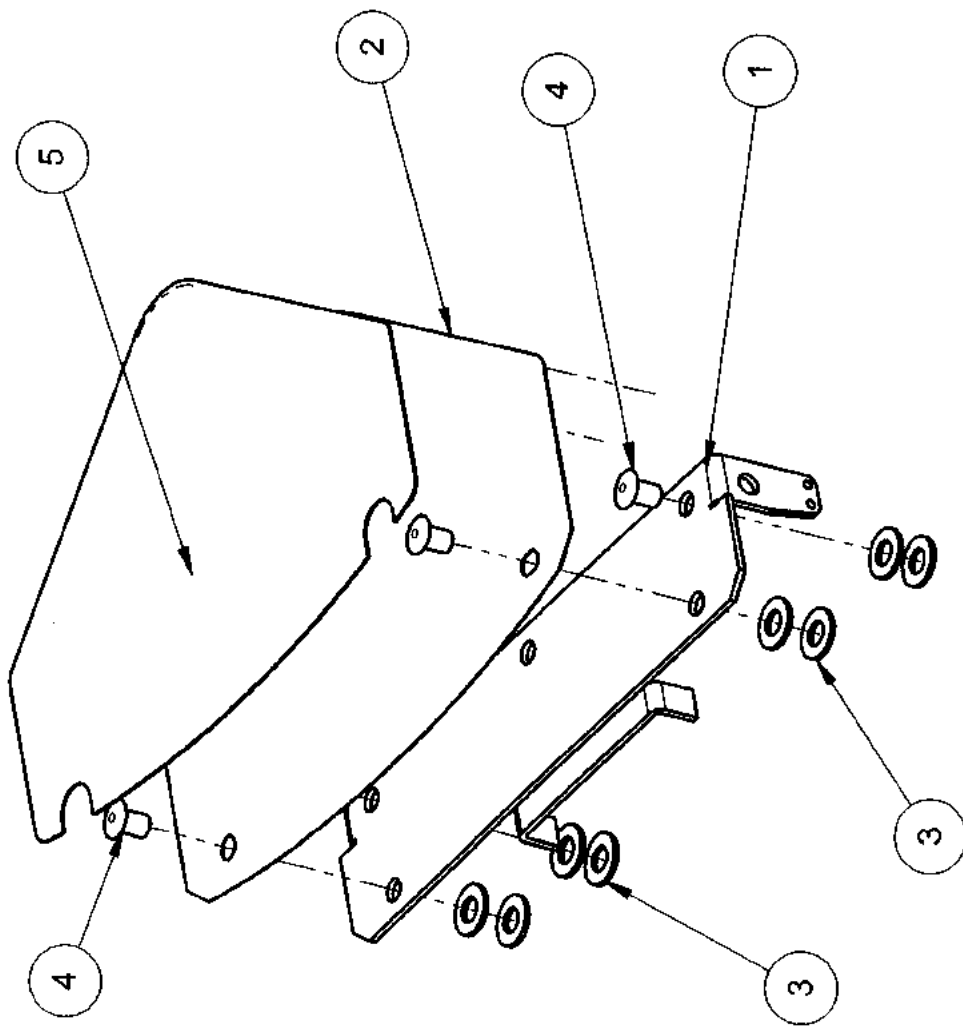
ITEM #	QTY	PART #	DESCRIPTION
1	1	535-0467-00	ACTUATOR BRACKET
2	1	510-7446-00	RIVETED ACTUATOR ASSEMBLY - HULK
3	1	511-7462-00	SWITCH ASSEMBLY
4	2	232-5200-00	SCREW, 6-32 X 1/4" PPH SEMS
5	1	530-6575-00	PIVOT PIN
6	1	265-5002-00	TRIP SPRING - TARGET



SWITCH ACTUATOR ASSEMBLY - HULK

500-9805-00

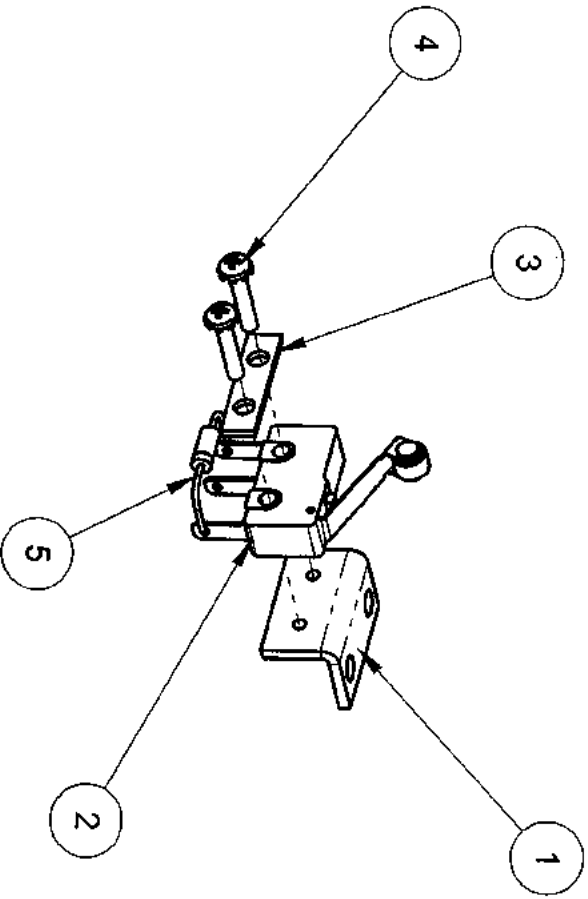
ITEM #	QTY	PART #	DESCRIPTION
1	1	535-0468-00	ACTUATOR PLATE
2	1	535-0469-00	ACTUATOR FLAP - HULK
3	8	242-5017-00	WASHER, 9/64 ID X 5/16 OD X 1/32
4	4	249-5001-00	RIVET - 1/8 X 3/16
5	1	820-7002-27	DECAL - HULK - SWITCH INSERT



RIVETED ACTUATOR ASSEMBLY - HULK

510-7446-00

ITEM #	QTY	PART #	DESCRIPTION
1	1	535-0635-01	SWITCH BRACKET
2	1	180-5119-02	MICRO-SWITCH - LIGHT ACTUATION
3	1	535-6539-00	SWITCH BODY PROTECT PLATE
4	2	237-5872-01	SCREW, 2-56 X 7/16" PPH SEMS
5	1	112-5003-00	DIODE - 1N4004
NOT SHN	1	036-5544-01	3" GENERIC SWITCH CABLE

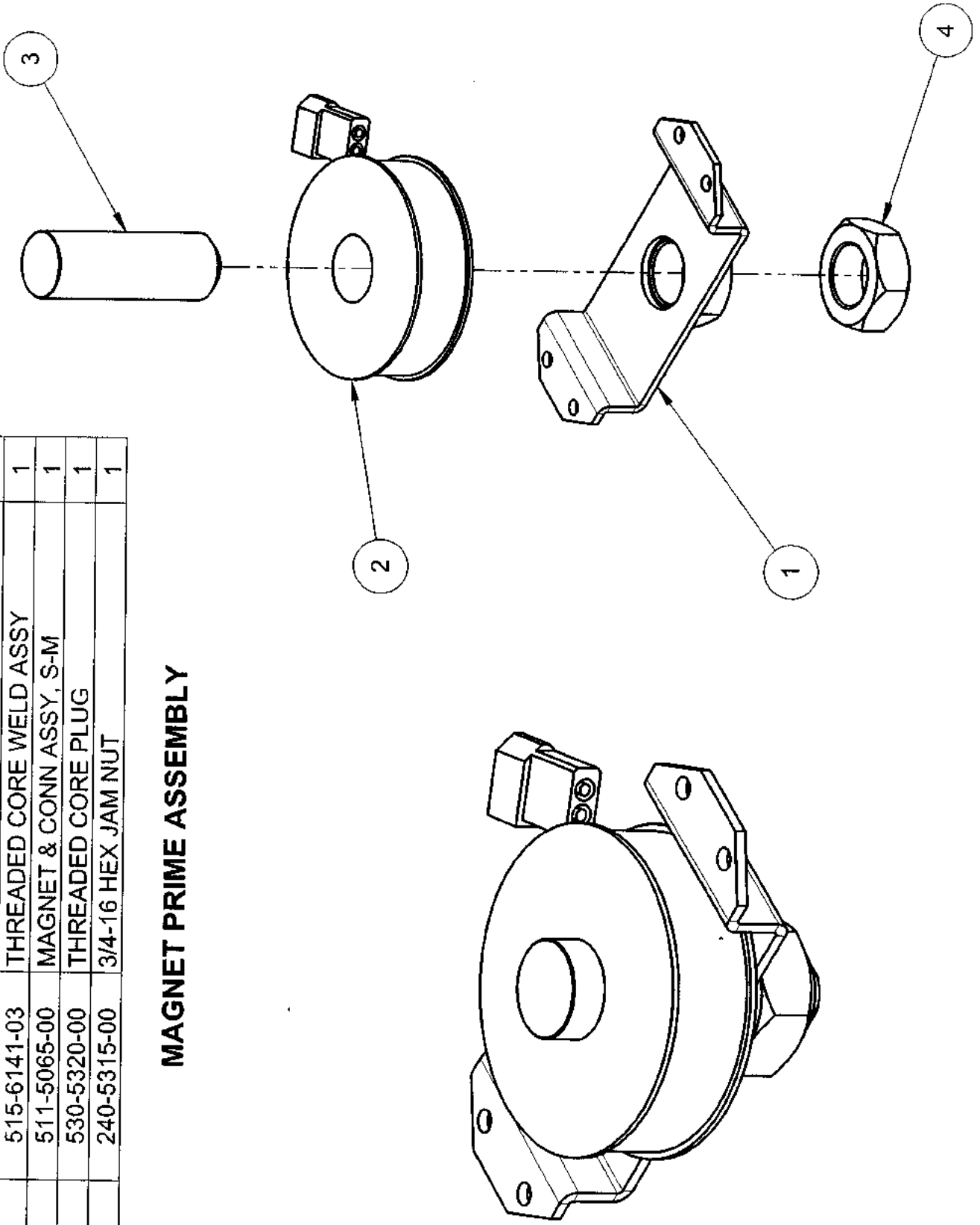


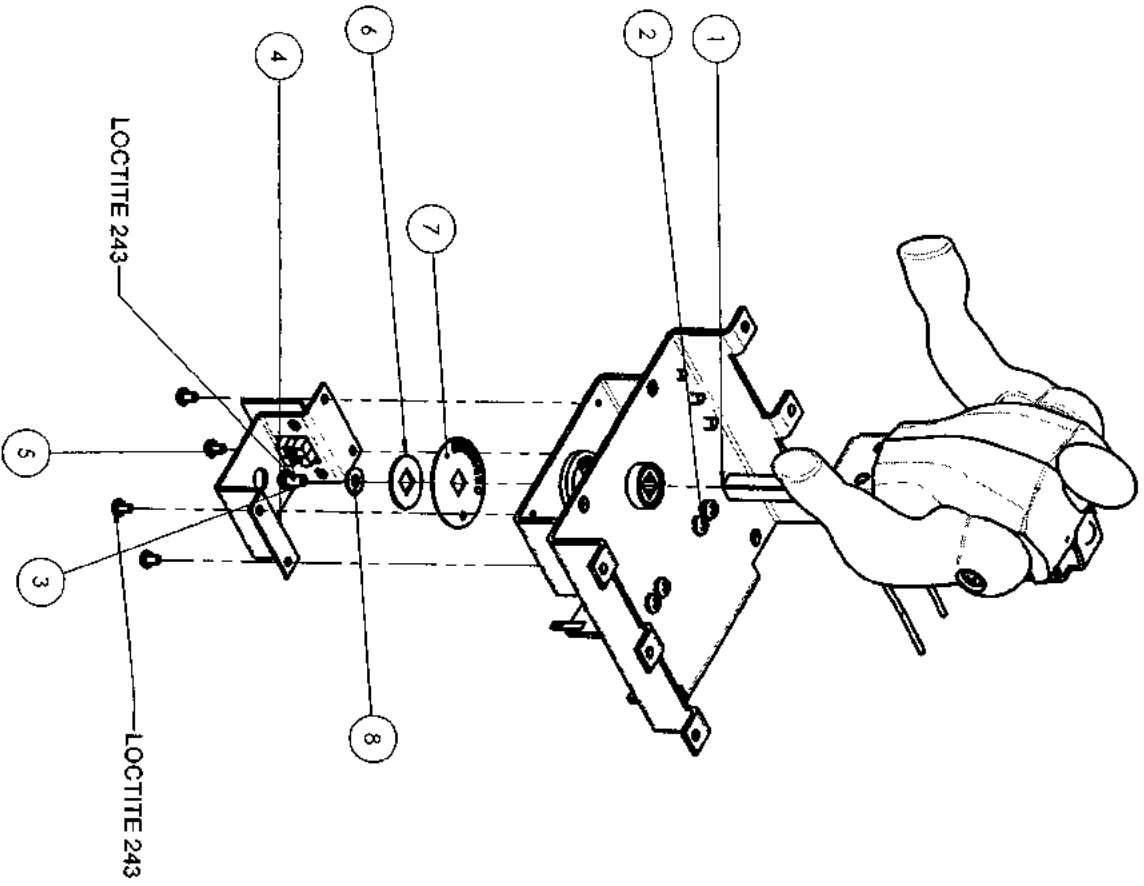
SWITCH ASSEMBLY

511-7462-00

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	515-6141-03	THREADED CORE WELD ASSY	1
2	511-5065-00	MAGNET & CONN ASSY, S-M	1
3	530-5320-00	THREADED CORE PLUG	1
4	240-5315-00	3/4-16 HEX JAM NUT	1

MAGNET PRIME ASSEMBLY



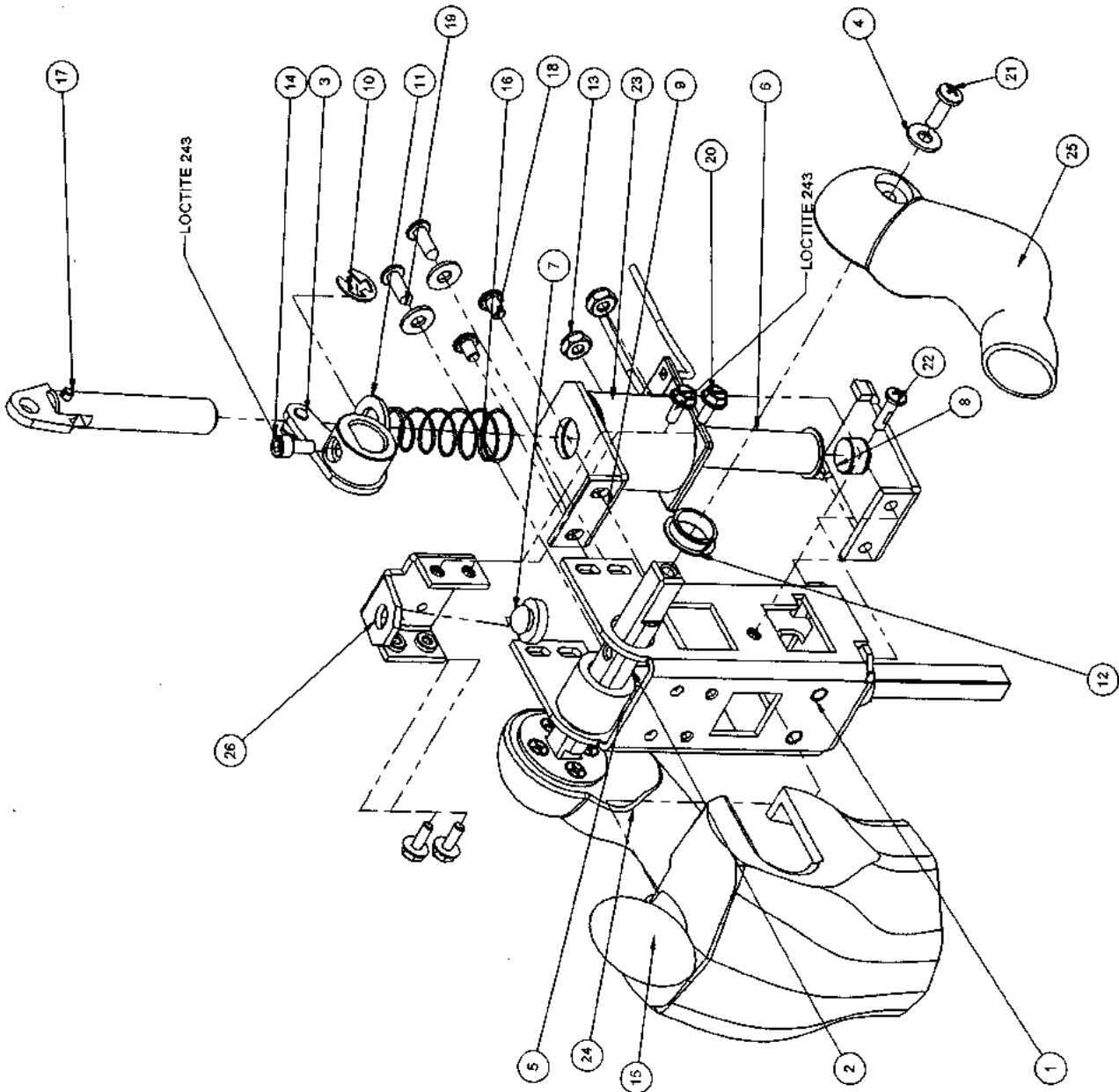


ITEM NO.	PART NUMBER	DESCRIPTION	CENTER/QTY.
1	511-7445-00	HULK TOP ASSEMBLY	1
2	511-7446-00	HULK TOWER PLAYFIELD ASSEMBLY	1
3	232-5301-00	SCREW, 8-32 X 3/8" PPH SEMS	1
4	511-7459-00	HULK OPTO WHEEL ASSEMBLY	1
5	232-5200-00	SCREW, 6-32 X 1/4" PPH SEMS	4
6	535-0658-00	SPACER-5/16 SQ SHAFT	1
7	535-0664-00	HULK OPTO SENSOR WHEEL	1
8	242-5005-00	#8 WASHER	1

HULK PLAYFIELD ASSEMBLY

DAVIDSON INC.

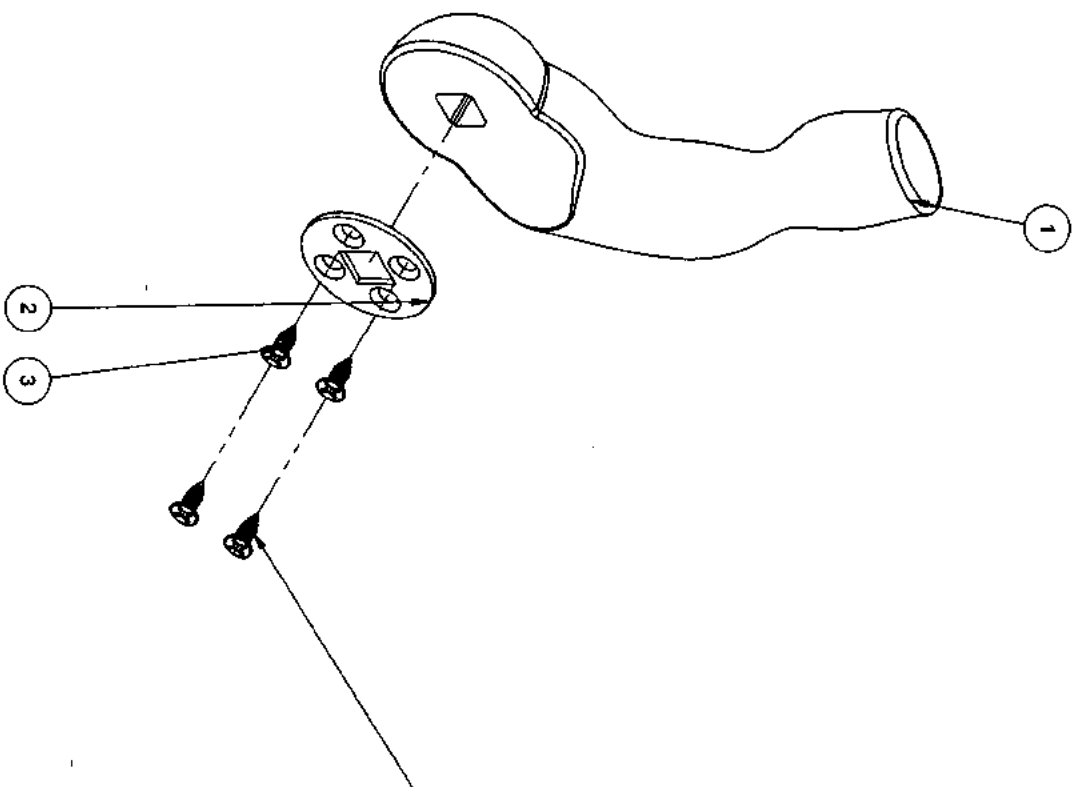
500-9799-00



ITEM NO.	PART NUMBER	DESCRIPTION	Default Qty
1	515-9629-00	Hulk-Upper Playfield Bracket	1
2	530-7813-00	Hulk-Rage Drive Shaft	1
3	515-9932-00	SOLENOID PIVOT WELDMENT	1
4	242-5005-00	#3 WASHER	4
5	545-6504-00	SPACER - .505 ID X .770 OD	1
6	545-5031-00	COIL SLEEVE	1
7	545-5105-00	RUBBER BUMPER	1
8	515-9690-00	COIL SUPPORT AND PLUNGER	1
9	535-0534-00	COIL BRACKET, HULK	1
10	270-5002-00	RETAINING RING - 1/4"	1
11	242-5081-00	WASHER - NYLON .75 OD X .44 ID	1
12	545-5984-00	NYLINER BEARING	2
13	240-5105-00	8-32 NYLON LOCK NUT, LOW-PROFILE	2
14	237-5897-00	SCREW, 8-32 X 3/8 SHCS ZINC	1
15	545-7333-00	HULK TORSO	1
16	266-5020-01	COMPRESSION SPRING-CONICAL	1
17	515-5338-07	PLUNGER ASSEMBLY	1
18	232-5300-00	SCREW, 8-32 X 1/4" PPH SEMS #8 X 1/2" PPH ZINC WOOD SCREW	2
19	232-5100-00	SCREW, 6-32 X 3/8 HWH SWAGE	4
20	237-5976-02	SCREW, 8-32 X 1/2 PPH MS ZINC	2
21	237-5602-01	SCREW, 8-32 X 1/2 PPH MS ZINC	2
22	237-5502-01	COIL AND CONNECTOR ASSEMBLY	1
23	500-7051-04	RIGHT ARM ASSEMBLY	1
24	511-7466-01	LEFT ARM ASSEMBLY	1
25	511-7468-02	HULK STOP BRACKET	1
26	535-0654-00	HULK STOP BRACKET	1

HULK TOP ASSEMBLY

DRAWING NO. 511-7445-00 REV D

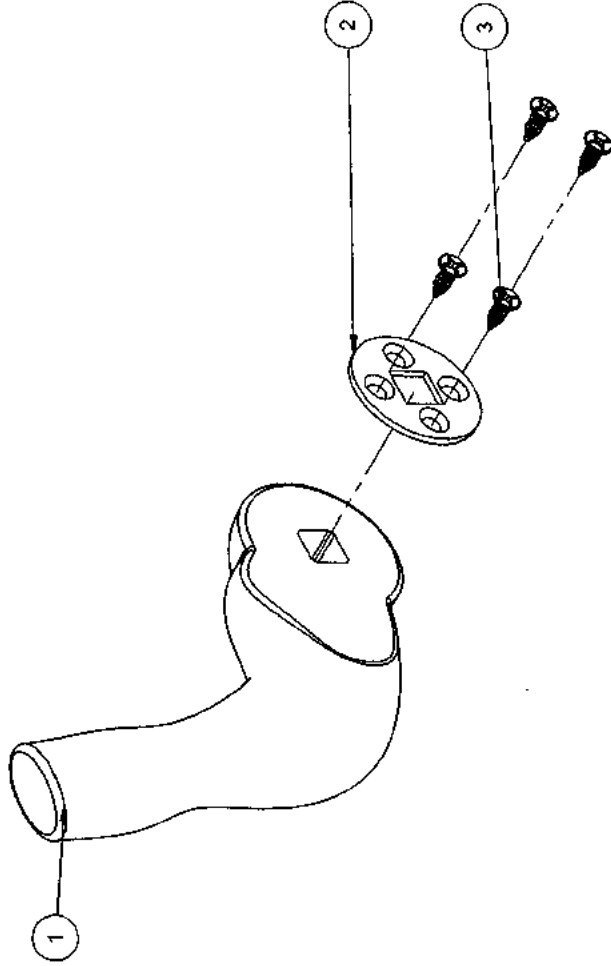


NOTE:
 INSERT
 SCREWS WITH
 SCREWDRIVER
 CAREFULLY

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	545-7332-00	HULK LEFT ARM	1
2	535-0673-00	HULK ARM PLATE	1
3	237-5895-00	SCREW, #6 X 3/8" PFH ZINC SMS	4

LEFT ARM ASSEMBLY

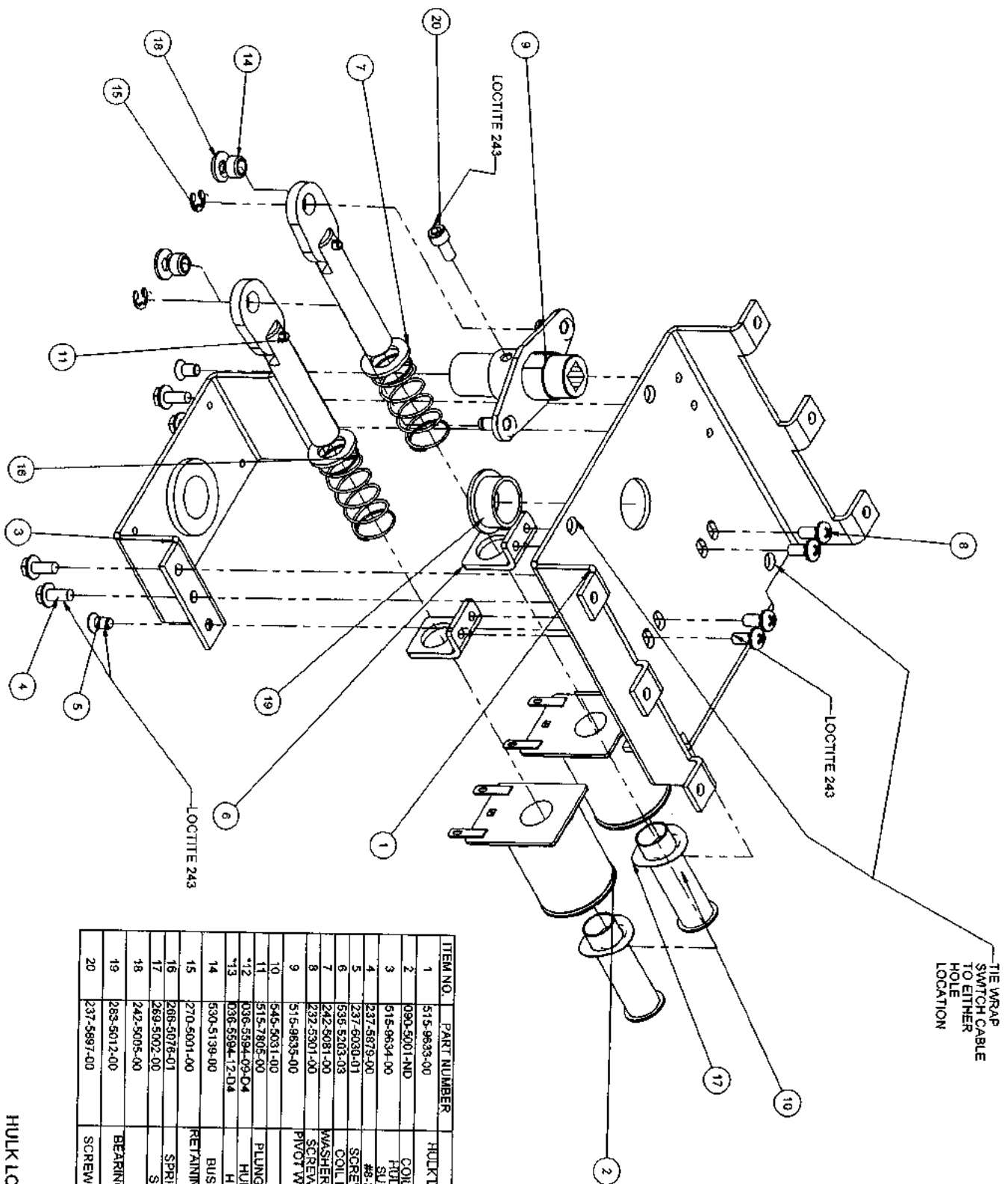
DRAWING NO. 511-7466-02



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	545-7331-00	HULK RIGHT ARM	1
2	535-0673-00	HULK ARM PLATE	1
3	237-5895-00	SCREW, #6 X 3/8" PFH ZINC SMS	4

RIGHT ARM ASSEMBLY

DRAWING NO 511-7466-01



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	515-9633-00	HULK TOWER MGT. BRACKET ASSEMBLY	1
2	090-5001-ND	COIL - 23-800 NO DIODE	2
3	515-6634-00	HULK TOWER BEARING SUPPORT ASSEMBLY	1
4	237-6879-00	#8-32 X 3/8 HW#1 ZINC	4
5	237-6030-01	SCREW, 8-32 X 5/16 PH MS	2
6	535-5203-03	COIL RETAINING BRACKET	2
7	242-8081-00	WASHER - NYLON .75 OD X .44 ID	2
8	232-5301-00	SCREW, 8-32 X 3/8 PPH SEMS PIVOT WELDMENT-HULK TOWER ASSEMBLY	4
9	515-9635-00	ASSEMBLY	1
10	545-5031-00	COIL SLEEVE	2
11	515-7805-00	PLUNGER & LINK ASSEMBLY	2
*12	036-5594-09-04	HULK SWITCH CABLE	2
*13	036-5594-12-04	HULK COIL CABLE	2
14	530-5139-00	BUSHING (CRANK BAR)	2
15	270-5001-00	RETAINING E-RING, 3/16" SHAFT OD	2
16	266-5076-01	SPRING COMPRESSION	2
17	269-5002-00	SPRING WASHER	2
18	242-5005-00	#8 WASHER	2
19	263-5012-00	BEARING, 3/8" ID X 3/4" OD X 3/8 LG.	1
20	237-5897-00	SCREW, 8-32 X 3/8 SHCS ZINC	1

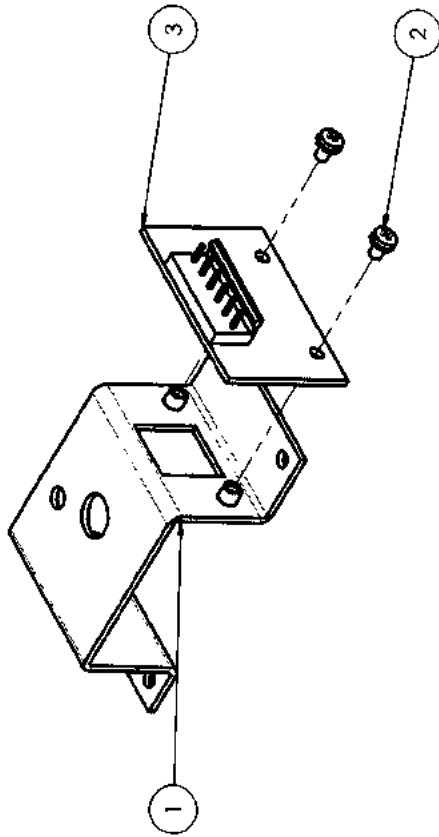
NOTE:
*CABLE NOT SHOWN

HULK TOWER PLAYFIELD ASSEMBLY

DRAWING NO.

511-7445-00

726

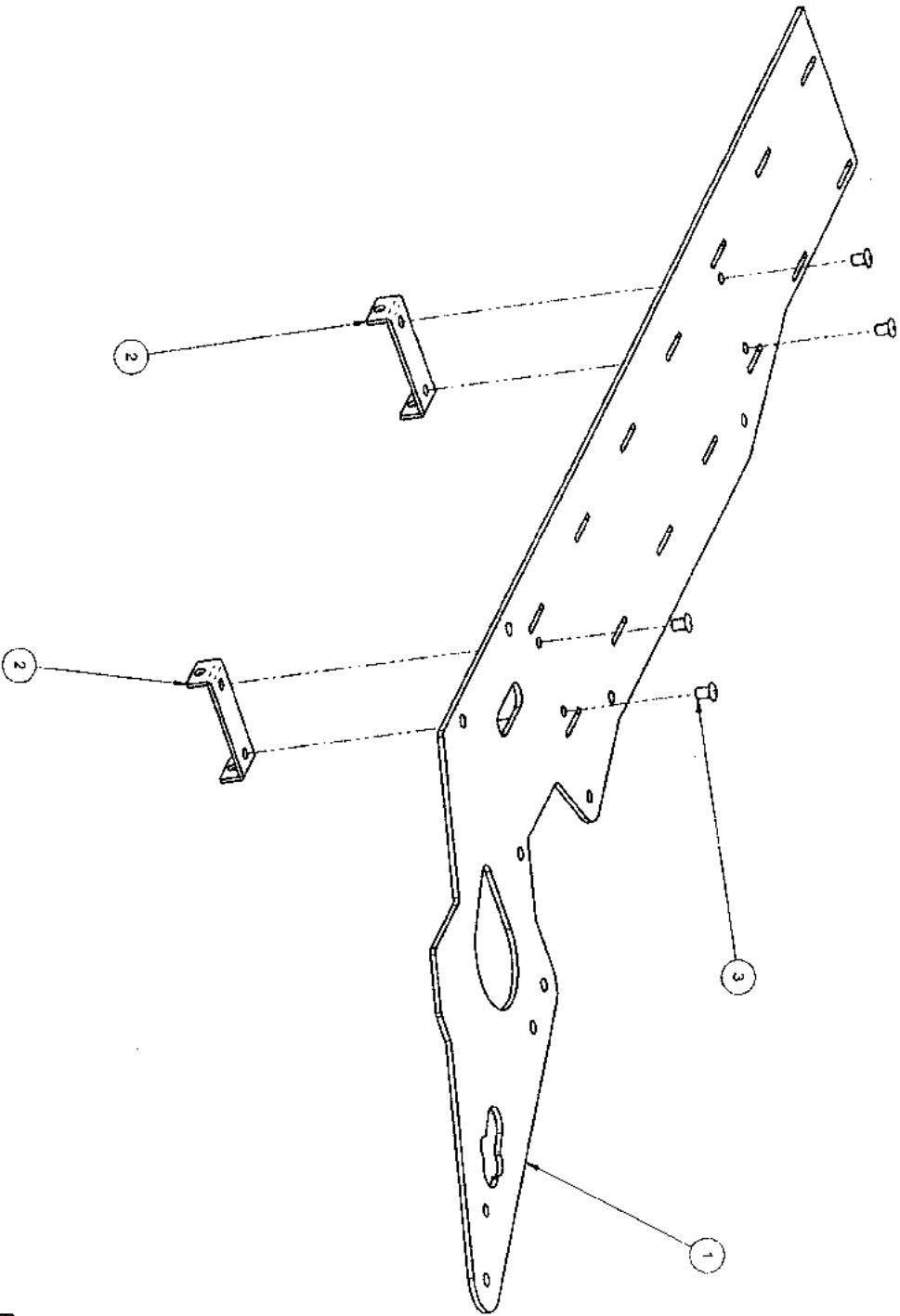


ITEM NO.	PART NUMBER	QTY
1	535-0667-00	1
2	237-5884-00	2
3	520-6796-00	1

HULK OPTO WHEEL ASSEMBLY

DRAWING NO. 511-7459-00

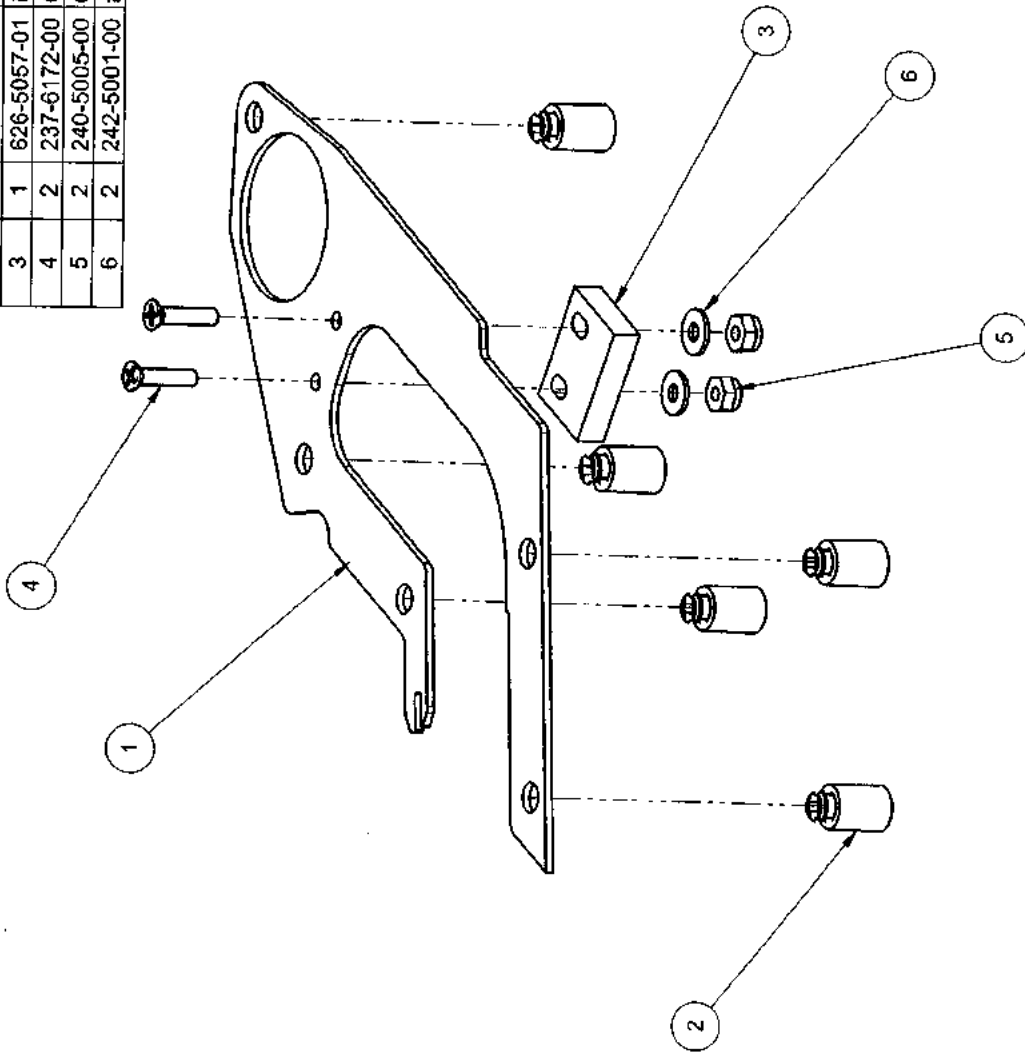
ITEM #	QTY	PART #	DESCRIPTION
1	1	830-6766-02	BUTY # 2 - RATED - PEEL L E
2	2	535-0222-01	BRKT - UPPER RAMP
3	4	249-5001-00	RIVET - 1/8 X 3/16



RIVETED BUTY ASSY # 2 - PEEL L E

510-5780-02

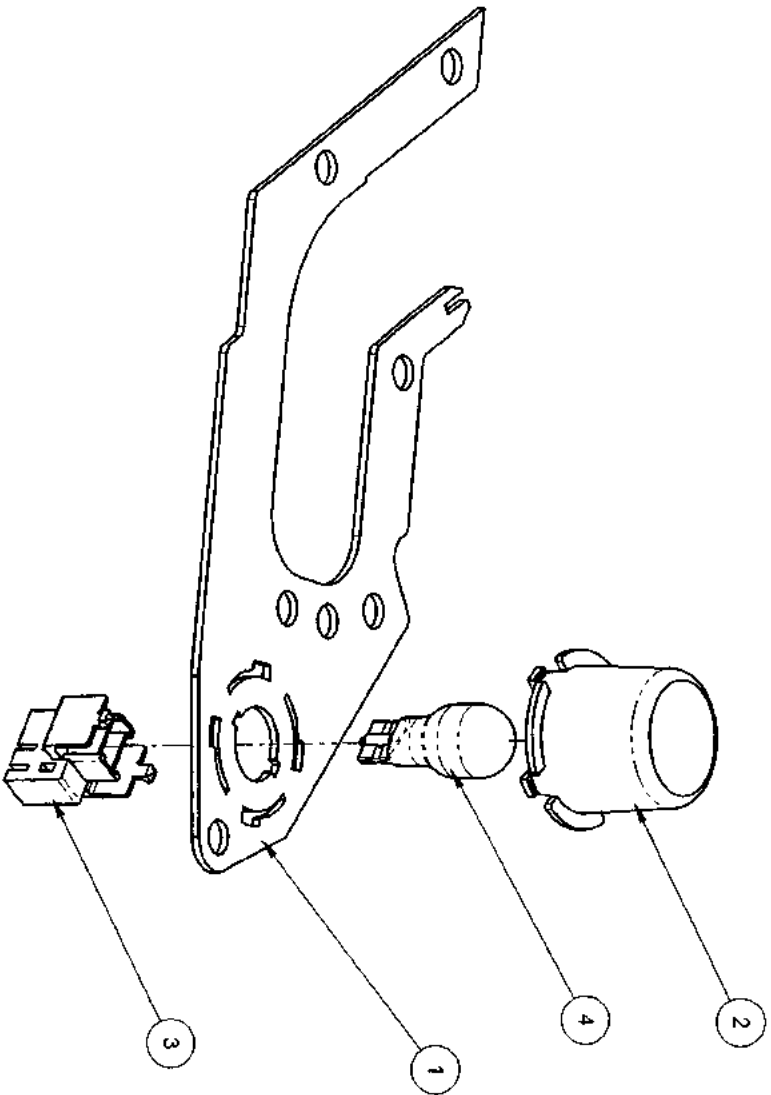
ITEM #	QTY	PART #	DESCRIPTION
1	1	830-6183-62	BUTY # 62 - CLEAR - PEEL L E
2	5	254-5054-00	PLASTICS MTG SPACER, .500
3	1	626-5057-01	RUBBER BUMPER - BLUE
4	2	237-6172-00	6-32 x 5/8 PHILLIPS FLAT HEAD ZINC
5	2	240-5005-00	6-32 NYLOK STOP NUT
6	2	242-5001-00	#6 WASHER



BUTY ASSEMBLY # 62 - PEEL L E

511-7229-62

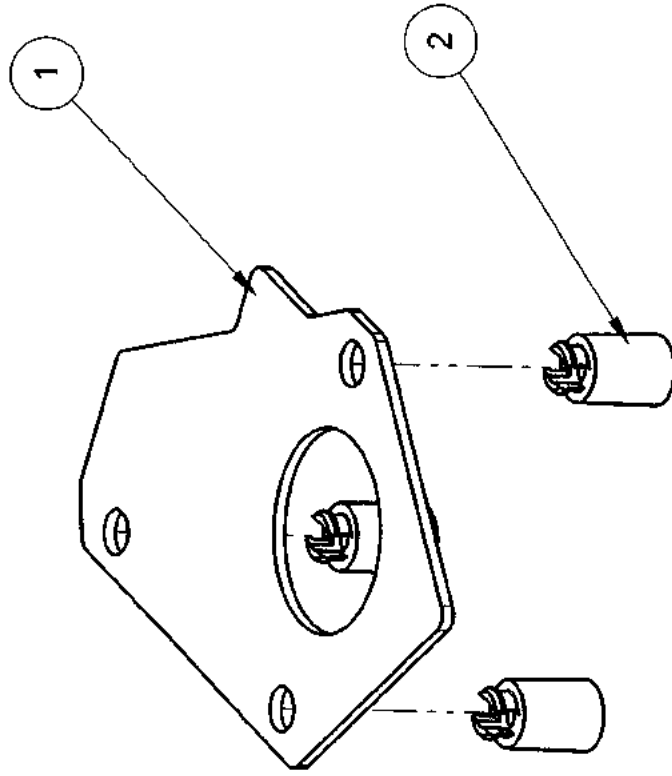
ITEM #	QTY	PART #	DESCRIPTION
1	1	830-6166-22	BUTY # 22 - ARTED - PEEL L E
2	1	550-5030-04	MINI MARS CAP SNAP-IN GREEN
3	1	036-5549-04	LAMP SOCKET - WEDGE IDC SNAP-ON W/LEADS
4	1	165-5004-00	LAMP - #906 WEDGE CLEAR



BUTY ASSEMBLY # 22 - PEEL L E

511-7229-22

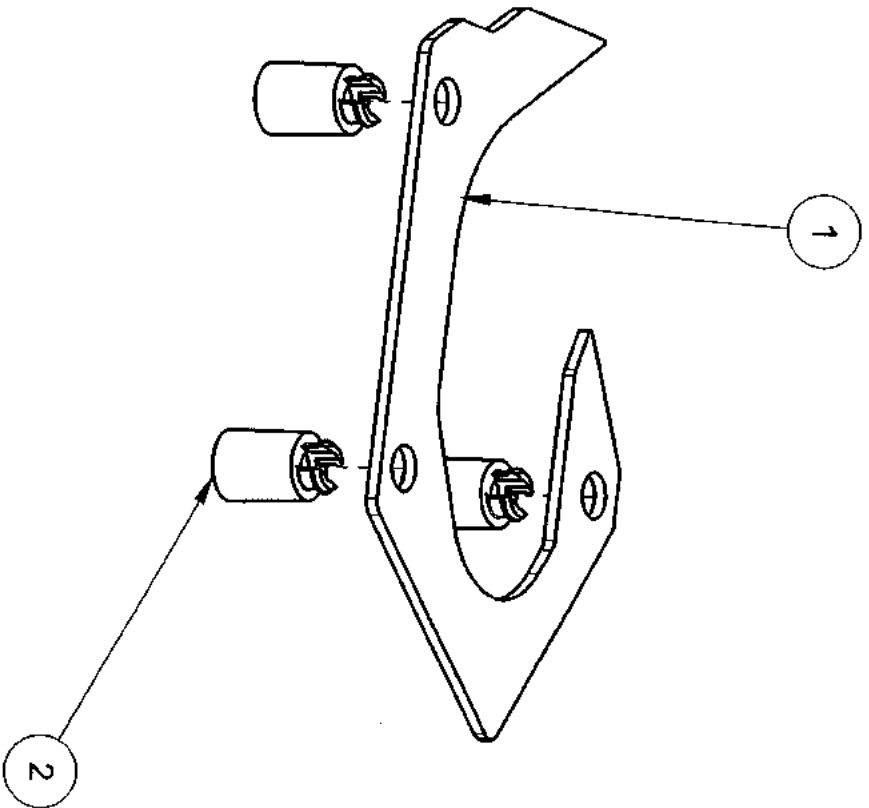
ITEM #	QTY	PART #	DESCRIPTION
1	1	830-6183-61	BUTY #61 - CLEAR - PEEL L E
2	3	254-5054-00	PLASTICS MTG SPACER, .500



BUTY ASSEMBLY # 61 - PEEL L E

511-7229-61

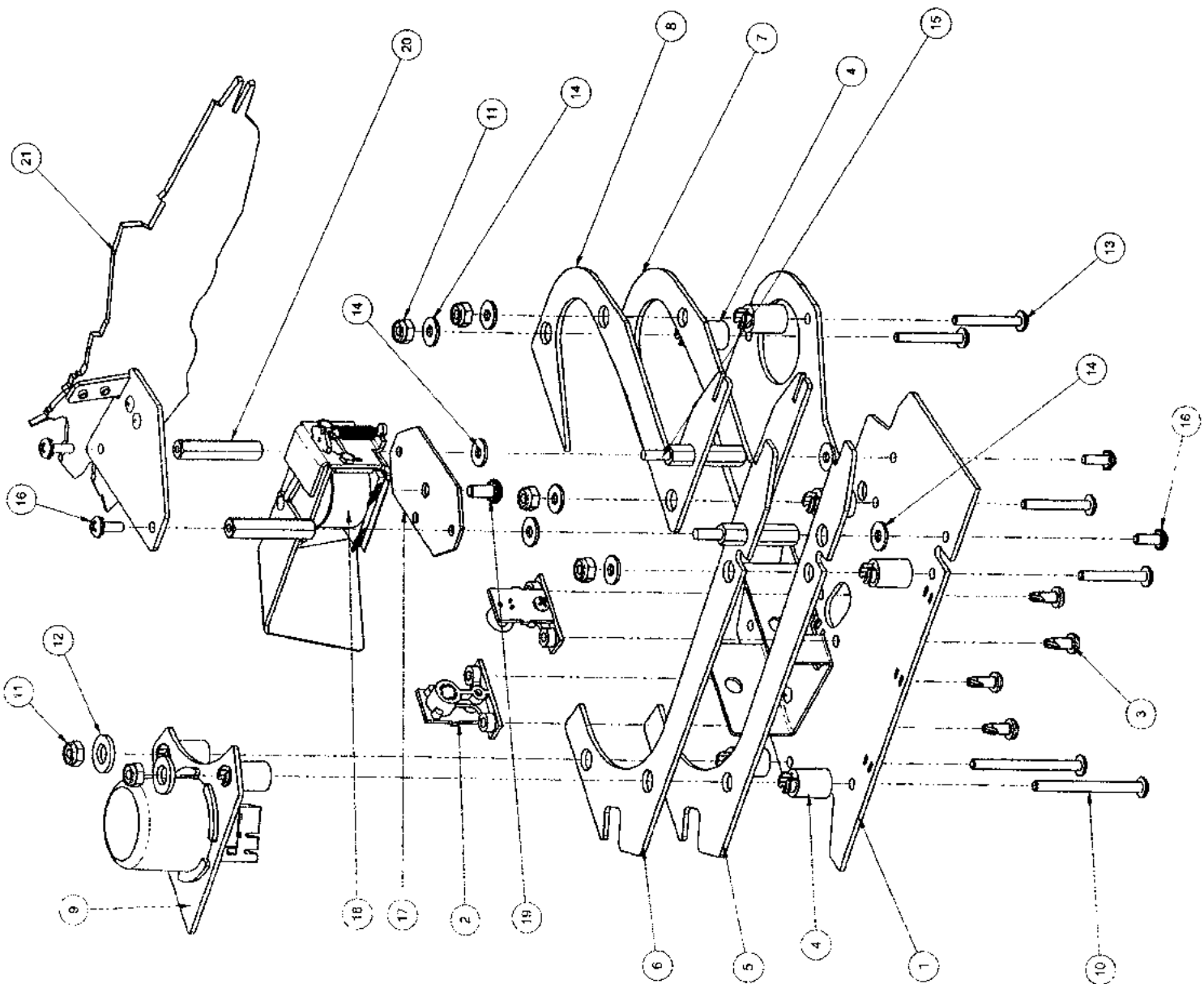
ITEM #	QTY	PART #	DESCRIPTION
1	1	830-6183-80	BUTY # 80 - CLEAR - PEEL L E
2	3	254-5054-00	PLASTICS MTG SPACER, .500



BUTY ASSEMBLY # 80 - PEEL L E

511-7229-80

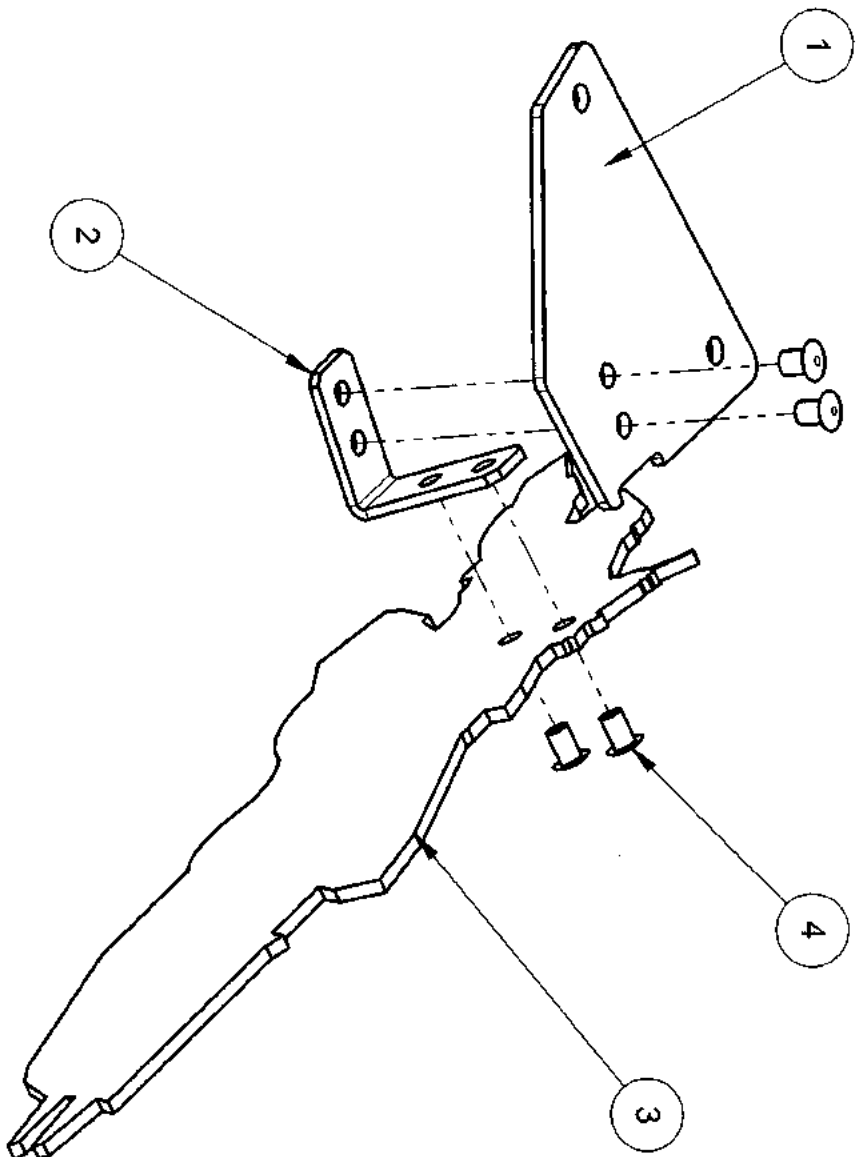
ITEM#	QTY	PART #	DESCRIPTION
1	1	510-5780-05	RIVETED BUTY ASSY # 5 - PEEL L E
2	2	506-6775-01	OPTO TRANSCEIVER ASSY, 15' LEADS
3	4	237-5880-00	SCREW, #6 X 3/8 PPH T-25
4	6	254-5054-00	PLASTICS MTG SPACER, 500
5	1	830-6193-69	BUTY # 69 - CLEAR - PEEL L E
6	1	830-6166-34	BUTY # 34 - ARTED - PEEL L E
7	1	830-6193-68	BUTY # 68 - CLEAR - PEEL L E
8	1	830-6166-18	BUTY # 18 - ARTED - PEEL L E
9	1	511-7229-41	WIDOW FLASHER ASSEMBLY - PEEL L E
10	2	237-5516-00	SCREW, 6-32 X 1-5/8" PPH
11	6	240-5005-00	6-32 NYLON STOP NUT
12	2	242-5008-00	WASHER, 1/4" ID X 1/2" OD X 1/16" THICK
13	4	237-5506-00	SCREW, 6-32 X 1" PPH MS
14	8	242-5001-00	#6 WASHER
15	2	254-5024-17	HEX SPACER MALE/FEMALE - 1 1/8"
16	4	232-5201-00	SCREW, 6-32 X 3/8" PPH MS SEMS
17	1	595-0671-00	DIVERTER MTG. PLATE
18	1	515-6595-00-ND	COIL ASSEMBLY, LEFT, NO DIODE
19	1	232-5301-00	SCREW, 8-32 X 3/8" PPH SEMS
20	2	254-5008-11	HEX SPACER - 1 1/4"
21	1	510-5780-16	BUTY ASSY # 16 - HELICARRIER - PEEL L E



LEFT RAMP - UPPER - PEEL L E

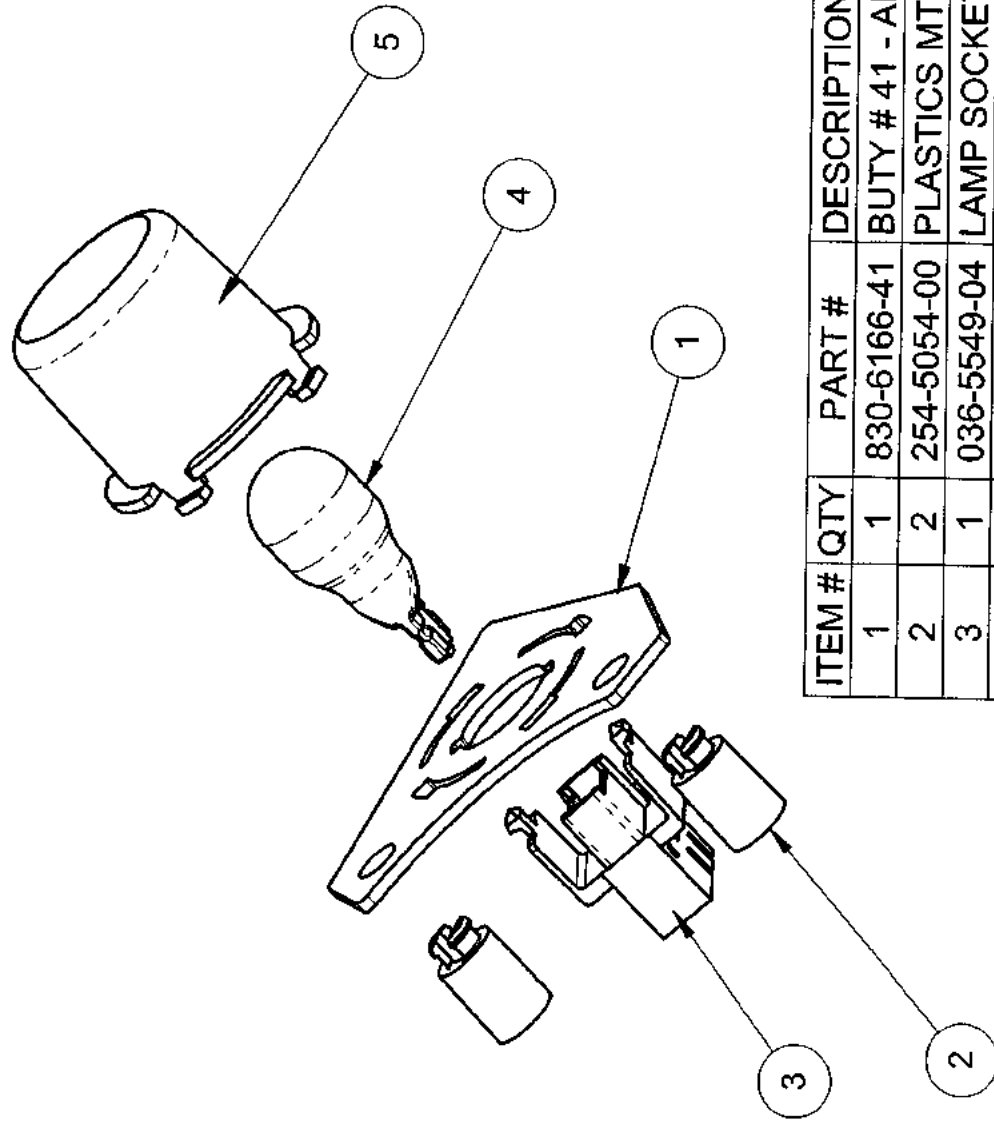
511-7229-05

ITEM #	QTY	PART #	DESCRIPTION
1	1	830-6183-74	BUTY # 74 - CLEAR - PEEL L E
2	1	535-0283-00	BRACKET, SKULL BALL STOP, CSI
3	1	830-6166-16	BUTY # 16 - ARTED - PEEL L E
4	4	249-5001-00	RIVET - 1/8 X 3/16



BUTY ASSY # 16 - HELICARRIER - PEEL L E

510-5780-16

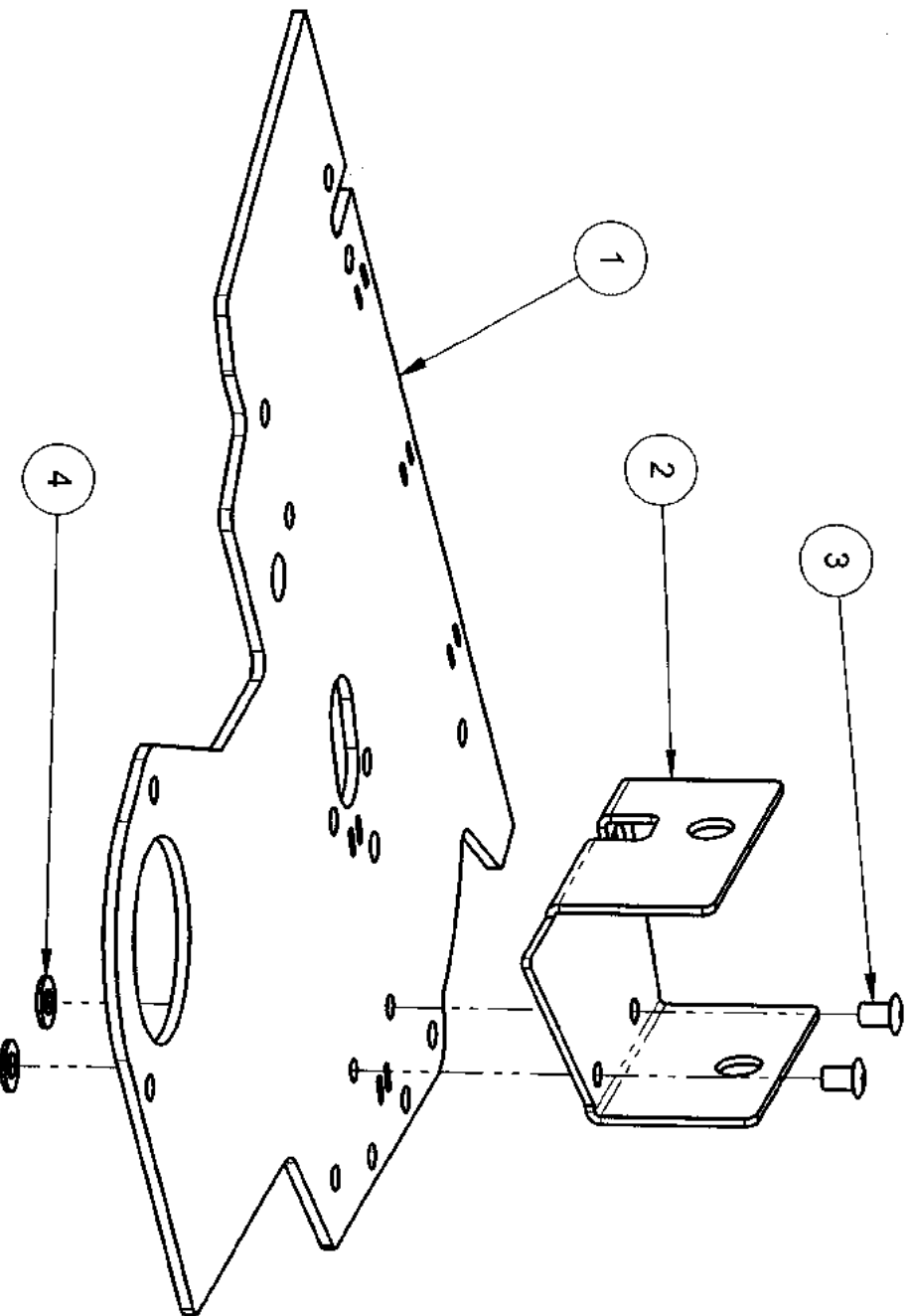


ITEM #	QTY	PART #	DESCRIPTION
1	1	830-6166-41	BUTY # 41 - ARTED
2	2	254-5054-00	PLASTICS MTG SPACER, .500
3	1	036-5549-04	LAMP SOCKET - WEDGE, IDC SNAP-ON W/LEADS
4	1	165-5004-00	LAMP - #906 WEDGE, CLEAR
5	1	550-5030-02	MINI MARS CAP, SNAP-IN, RED

WIDOW FLASHER ASSEMBLY - PEEL LE

511-7229-41

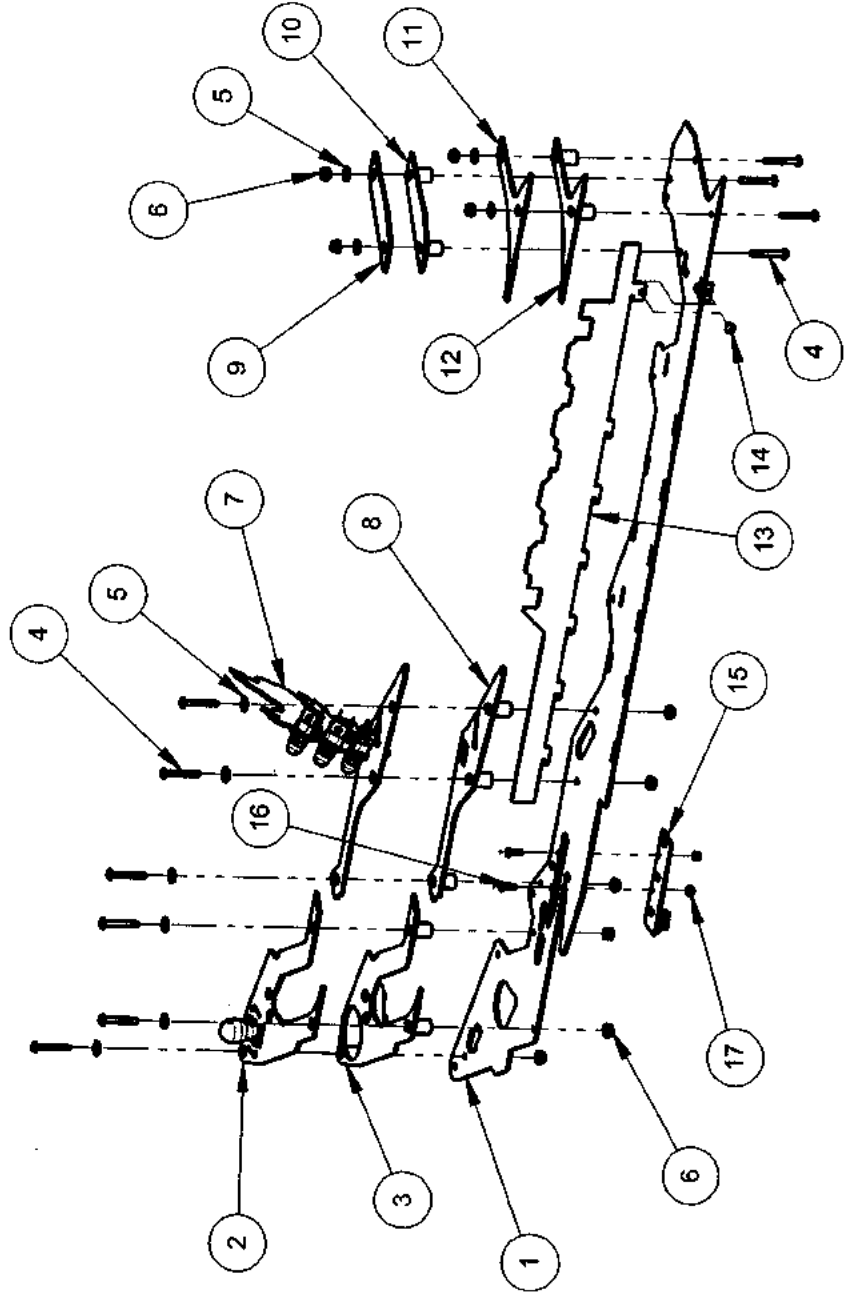
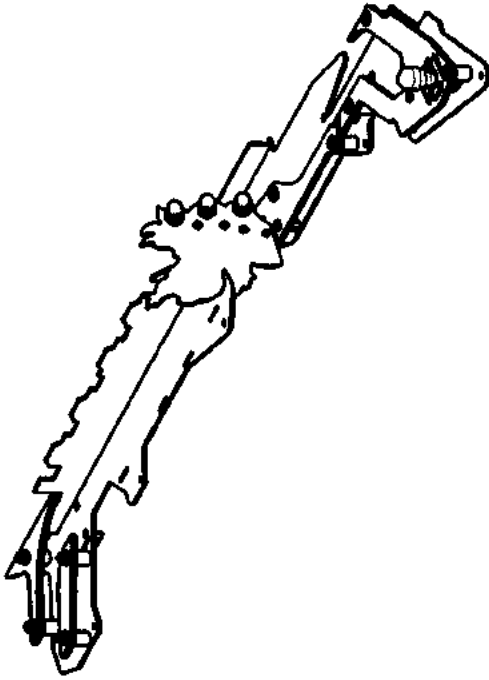
ITEM #	QTY	PART #	DESCRIPTION
1	1	830-6166-05	BUTY # 5 - PEEL LE - ARTED
2	1	535-0625-11	BALL GUIDE # 11 - UPPER LEFT RAMP
3	2	249-5001-00	RIVET - 1/8 X 3/16
4	2	242-5017-00	WASHER, 9/64 ID X 5/16 OD X 1/32



RIVETED BUTY ASSY # 5 - PEEL LE

510-5780-05

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	510-5780-04	RIVETED ASSEMBLY #4, PEEL LE	1
2	511-7229-24	BUTY ASSEMBLY #24, PEEL LE	1
3	511-7229-64	BUTY ASSEMBLY #64, PEEL LE	1
4	237-5506-00	SCREW, 6-32 X 1" PPH MS	10
5	242-5001-00	#6 WASHER	10
6	240-5005-00	6-32 NYLON STOP NUT	10
7	511-7229-23	BUTY ASSEMBLY #23, PEEL LE	1
8	511-7229-63	BUTY ASSEMBLY #63, PEEL LE	1
9	830-6166-25	BUTYRATE #25, PEEL LE	1
10	511-7229-65	BUTY ASSEMBLY #65, PEEL LE	1
11	830-6166-26	BUTYRATE #26, PEEL LE	1
12	511-7229-66	BUTY ASSEMBLY #66, PEEL LE	1
13	830-6183-28	BUTYRATE #28, PEEL LE	1
14	249-5025-00	POP RIVET - 1/8D X 1/8-3/16 GRIP	1
15	520-6780-01	PCB ASSY, BALL TROUGH SAM SYSTEM	1
16	237-5997-00	SCREW, 4-40 X 3/8" PPH MS BLACK	2
17	240-5303-00	4-40 NYLON LOCK NUT	2

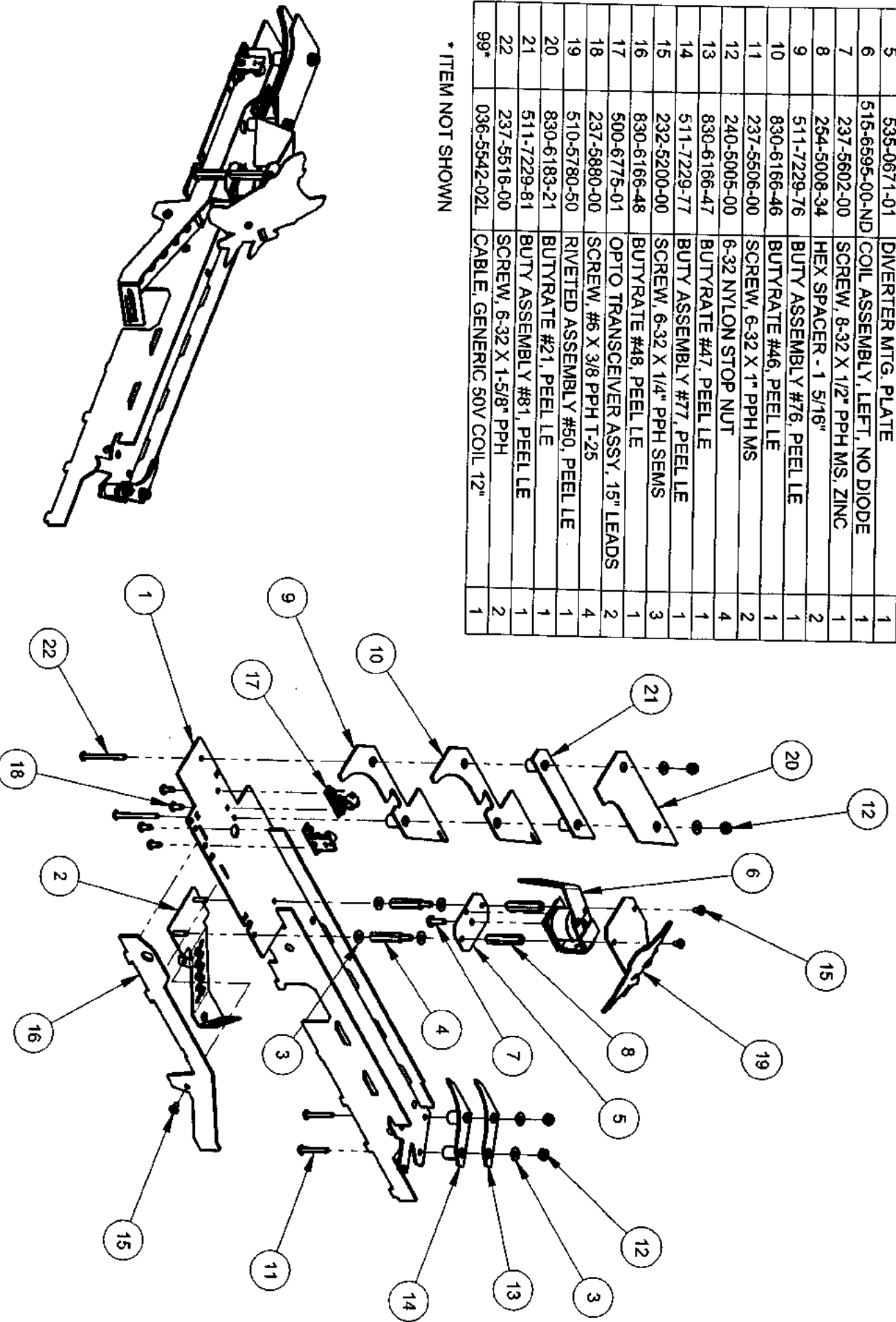


**RIGHT RAMP ASSEMBLY
AVENGERS LE
511-7229-04**

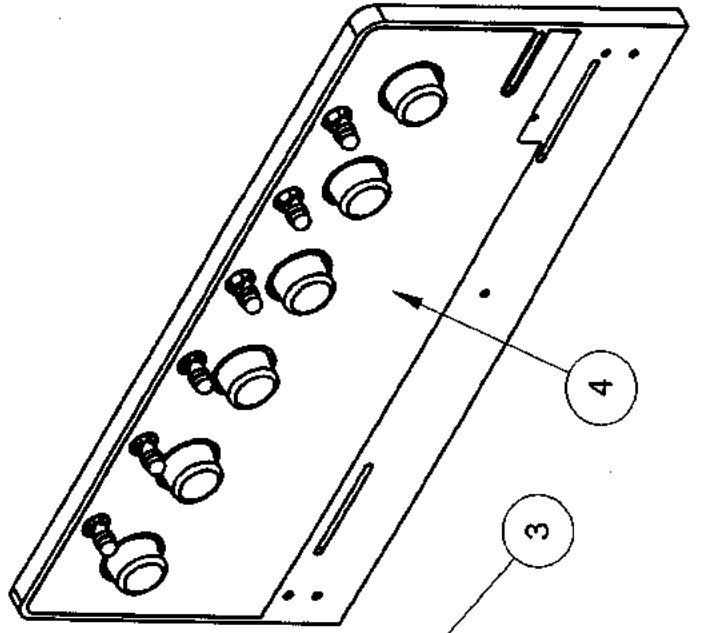
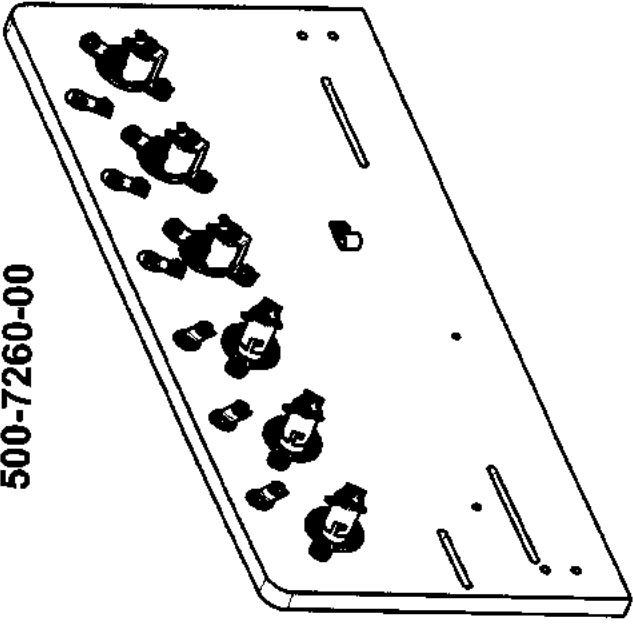
**RAMP ASSEMBLY, RIGHT UPPER
AVENGERS LE
500-7262-00**

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	510-5780-44	RIVET ASSEMBLY, BUTY #44, PEEL LE	1
2	515-7807-00	DOWN RAMP, PEEL LE	1
3	242-5001-00	#6 WASHER	8
4	254-5024-17	HEX SPACER MALE/FEMALE - 1 1/8"	2
5	535-0671-01	DIVERTER MTG. PLATE	1
6	515-6595-00-ND	COIL ASSEMBLY, LEFT, NO DIODE	1
7	237-5602-00	SCREW, 8-32 X 1/2" PPH MS, ZINC	1
8	254-5008-34	HEX SPACER - 1 5/16"	2
9	511-7229-76	BUTYRATE ASSEMBLY #76, PEEL LE	1
10	830-6166-46	BUTYRATE #46, PEEL LE	1
11	237-5506-00	SCREW, 6-32 X 1" PPH MS	2
12	240-5005-00	6-32 NYLON STOP NUT	4
13	830-6166-47	BUTYRATE #47, PEEL LE	1
14	511-7229-77	BUTY ASSEMBLY #77, PEEL LE	1
15	232-5200-00	SCREW, 6-32 X 1/4" PPH SEMS	3
16	830-6166-48	BUTYRATE #48, PEEL LE	1
17	500-6775-01	OPTO TRANSCEIVER ASSY, 15" LEADS	2
18	237-5880-00	SCREW, #6 X 3/8 PPH T-25	4
19	510-5780-50	RIVETED ASSEMBLY #50, PEEL LE	1
20	830-6183-21	BUTYRATE #21, PEEL LE	1
21	511-7229-81	BUTY ASSEMBLY #81, PEEL LE	1
22	237-5516-00	SCREW, 6-32 X 1-5/8" PPH	2
99*	036-5542-02L	CABLE, GENERIC 50V COIL 12"	1

* ITEM NOT SHOWN

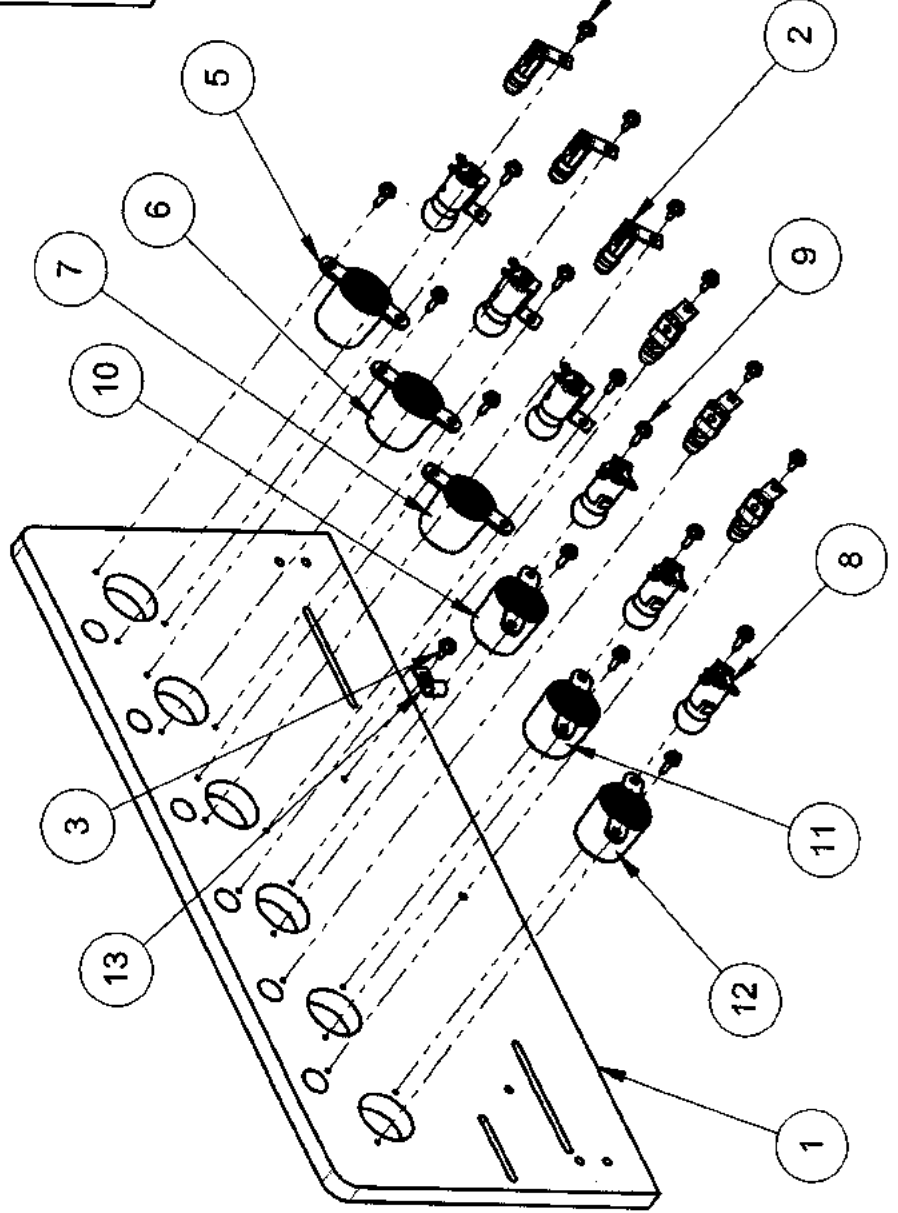


**BACK PANEL ASSEMBLY
AVENGERS LE
500-7260-00**



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	525-5819-00	BACK PANEL, PEEL LE	1
2	519-5033-88-LED	SOCKET/LED ASSY, WEDGE LAYDOWN, WHITE DOUBLE	6
3	234-5000-00	SCREW, #6 X 3/8" HWH	7
4	820-7002-10	DECAL #10, BACK PANEL, PEEL PRO	1
5	550-5031-05	MINI MARS W/ EARS - BLUE SB	1
6	550-5031-09	MINI MARS W/ EARS - PURPLE SB	1
7	550-5031-04	MINI MARS W/ EARS - GREEN SB	1
8	519-5101-00-HF	SOCKET/#89 BULB ASSY - HEAVY FILAMENT	6
9	234-5001-02	SCREW, #6 X 1/2" HWH	12
10	550-5031-02	MINI MARS W/ EARS - RED SB	1
11	550-5031-01	MINI MARS W/ EARS - CLEAR SB	1
12	550-5031-06	MINI MARS W/ EARS - YELLOW SB	1
13	040-5000-03	1/4" CABLE CLAMP	1
99*	036-5594-04-D4	CABLE, BACK PANEL, PEEL LE	1

* ITEM NOT SHOWN



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Optional Kits available through your Distributor:

Pinball Location Maintenance Standard Kit (for AVENGERS Premium Pinball) 502-6002-D4

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

Pinball Location Maintenance Deluxe Kit (for AVENGERS Premium Pinball) 502-6003-D4

Deluxe Kit includes : Pinball Location Maintenance Standard Kit as described above plus a quantity of Flipper Rebuild Kits. Note: Quantity varies which equals the same quantity of flippers used in this game.

▲ THIS GAME KIT INCLUDES (2) FLIPPER REBUILD KITS ▲

Plastics*Kit (for AVENGERS Premium Pinball) 803-5000-D4

Plastics Kit includes: Plastic Sets (830-6166-XX) Clear Plastic (830-6183-XX)

Decals*Kit (for AVENGERS Premium Pinball) 802-5000-D4

Decals Kit includes: Decal Set (820-7002-XX) (820-6911-XX)

***Attention:** No individual Plastic or Decal can be ordered separately, unless noted otherwise. Plastics & Decals are subject to change without notice during and / or after production. Key Fobs subject to availability and may or may not be included in the plastic set. All designs, shapes & pieces used subject to change without notice. Kit contents subject to change. Service Bulletin(s) will announce any critical changes, if warranted. The last 2-digits shown on plastics or decals are for reference only.

AVENGERS PREMIUM Parts available through your Distributor:

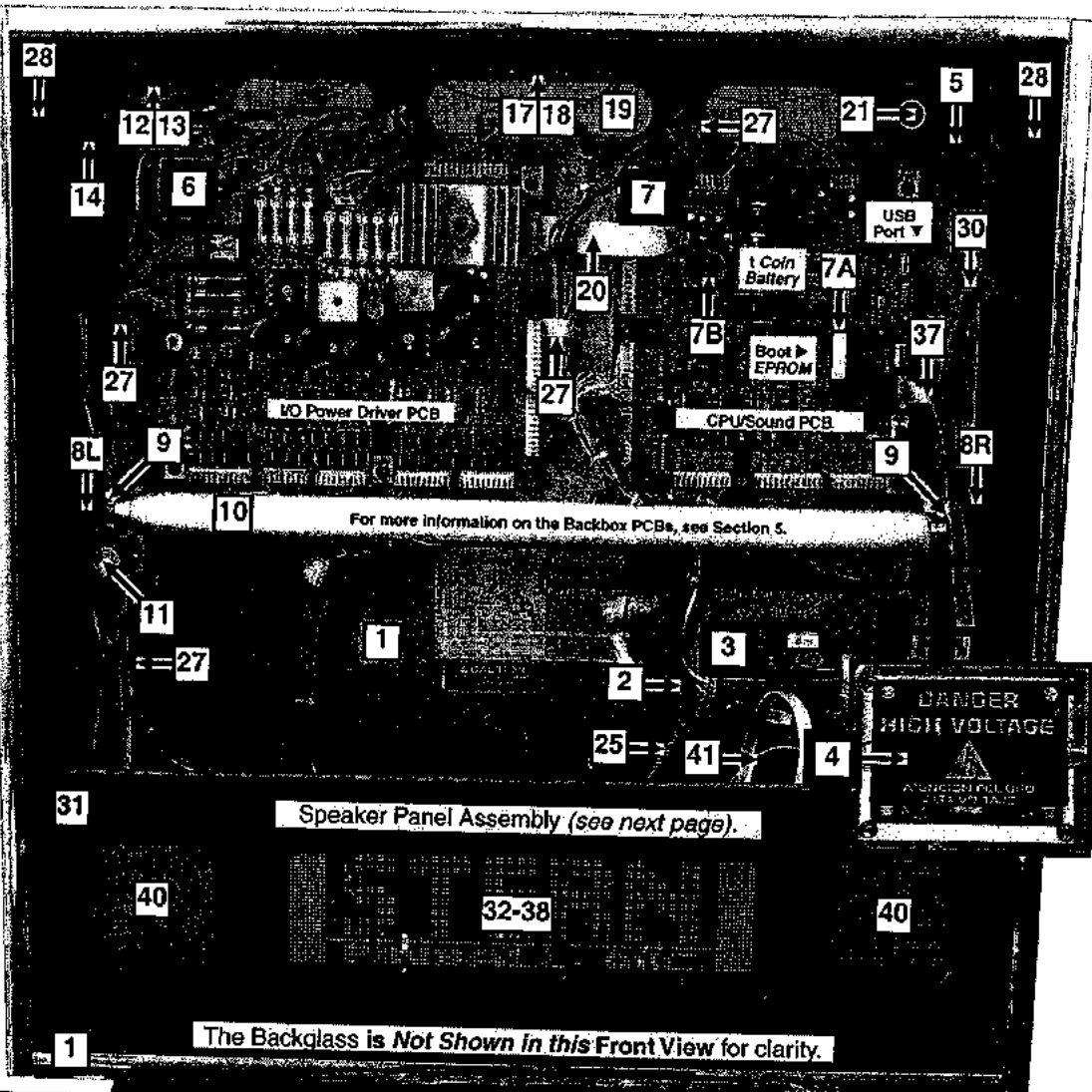
Flip Button Assy Red..... 500-5026-32
Leg Assy Black.....500-5921-50
Front Molding No Hole Black.....500-6882-02-00
Bottom Arch Black.....535-0645-00
Pivot Hinges Lt Black.....535-7999-00
Pivot Hinges Rt. Black.....535-7999-01
Left Side Armor Black.....535-9596-00
Right Side Armor Black.....535-9596-01
Back Box Decal Left Side are sold in a set.....820-66D3-01
Back Box Decal Right Side are sold in a set.....820-66D3-02
Cabinet Decal Left Side are sold in a set.....820-66D3-03
Cabinet Decal Right Side are sold in a set.....820-66D3-04
Cabinet Decal Front are sold in a set.....820-66D3-05
Backglass Avengers Premium.....830-52D4-00P

AVENGERS LE BLUE Parts available through your Distributor:

Flip Button Assy Blue	500-5026-35
Leg Assy Metallic Blue.....	500-5921-55
<i>Front Molding No Hole Blue.....</i>	<i>500-6882-02-55</i>
Back-Box Offset Sides Metallic Blue.....	525-5822-05
Bottom Arch Metallic Blue.....	535-0645-55
Pivot Hinges Lt Metallic Blue.....	535-7999-55L
<i>Pivot Hinges Rt. Metallic Blue.....</i>	<i>535-7999-55R</i>
Left Side Armor Metallic Blue.....	535-9596-55L
Right Side Armor Metallic Blue.....	535-9596-55R
Back Box Decal Left Side are sold in a set.....	820-66D4-01A
Back Box Decal Right Side are sold in a set.....	820-66D4-02A
Cabinet Decal Left Side are sold in a set.....	820-66D4-03A
Cabinet Decal Right Side are sold in a set.....	820-66D4-04A
Cabinet Decal Front are sold in a set.....	820-66D4-05A
Mirrored Backglass Avenger Le Blue.....	830-52D4-00A

AVENGERS LE HULK Parts available through your Distributor:

Flip Button Assy Green.....	500-5026-34
Leg Assy Sparkle Granny Smith.....	500-5921-46
Front Molding No Hole Sparkle Granny Smith.....	500-6882-02-46
New Green Led Dot Matrix.....	520-5052-44
Back-Box Offset Sides Green.....	525-5822-04
Bottom Arch Sparkle Granny Smith.....	535-0645-46
Pivot Hinges Lt SGS.....	535-7999-46L
Pivot Hinges Rt. SGS.....	535-7999-46L
Left Side Armor Sparkle Granny Smith.....	535-9596-46L
Right Side Armor Sparkle Granny Smith.....	535-9596-46R
Back Box Decal Left Side Hulk are sold in a set.....	820-66D4-01
Back Box Decal Right Side Hulk are sold in a set.....	820-66D4-02
Cabinet Decal Left Side Hulk are sold in a set.....	820-66D4-03
Cabinet Decal Right Side Hulk are sold in a set.....	820-66D4-04
Cabinet Decal Front Hulk are sold in a set.....	820-66D4-05
Mirrored Backglass Avenger Le Hulk.....	830-52D4-00



For more information on the Backbox PCBs, see Section 5.

Speaker Panel Assembly (see next page).

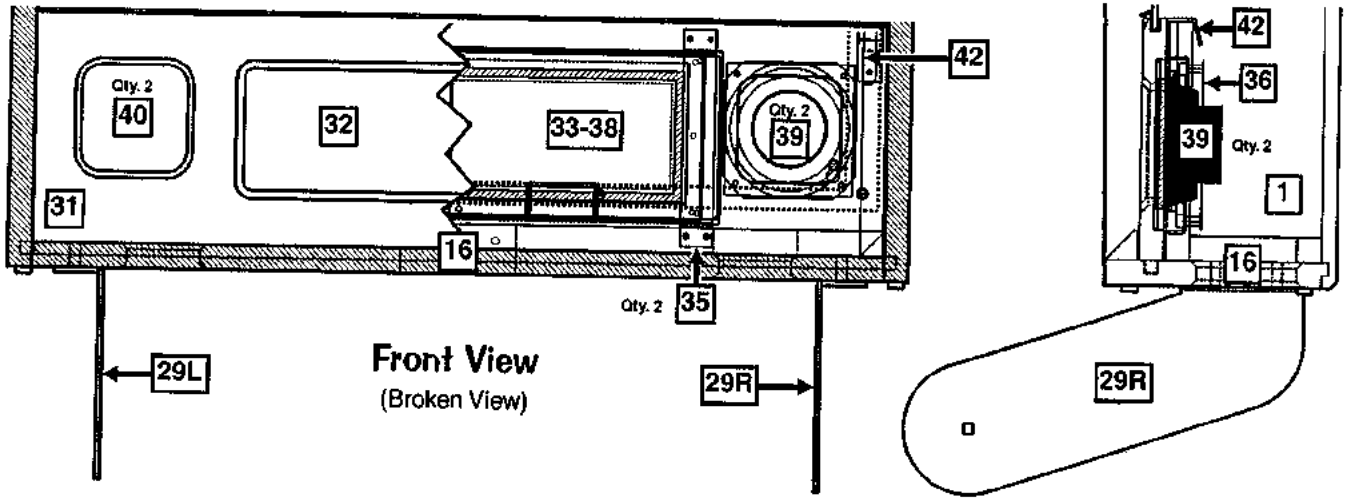
The Backglass is **Not** Shown in this Front View for clarity.

Parts Identification

Nr.	BACKBOX PARTS	QTY.	SPI PART Nr.	Nr.	BACKBOX PARTS	QTY.	SPI PART Nr.
1	Backbox AVENGERS™ (No Parts)	1	525-5631-17-D4	11	Starter - Fluorescent (FS2 Light)	1	165-5011-01
<small>Item 1 Note: Chrome T-Molding is installed and cannot be ordered separately. Fuse Description (820-6384-00) and High Voltage Caution (UL) (820-6082-01 & -02) Decals.</small>				<small>Item 11 is secured to Item 8L by: #4-40 X 1/2" PPH MS (Sems) Zc. (Qty. 2) (237-5813-00)</small>			
3	Display Power Supply PCB			12	Ballast		
<small>Item 3 is secured to bottom by: #8-32 X 3/8" SHWH Swg. (Zinc) (Qty. 2) (237-5975-00)</small>				<small>Item 12 is secured to Item 1 by: #8 X 1/2" SHWH AB (Zinc) (Qty. 2) (234-5101-00)</small>			
5	PCB Metal Mounting Plate [I/O+CPU]	1	535-9664-00	13	Ballast CU452-W 1/2" Core 120v 60 Hz 13W	1	010-5015-00
<small>Items 2 & 5 are secured to Item 1 by: #8 X 1/2" SHWH AB (Zinc) (Qty. 1/hole) (234-5101-00) and #10 Washer 7/32" I.D. X .5" O.D. X 1/16" Thick (Qty. 1/hole) (242-5003-00)</small>				<small>>>> CAUTION - VERY HOT* Decal (820-6266-00)</small>			
<small>Note: Where a Wire Clamp (Item 27) is mounted, a #10 Washer is not required.</small>				<small>EU / UK Only : Ballast, 5/8" Core 50/60 Hz (010-5015-01)</small>			
7	CPU/Sound PCB LE GAMES NEW USB	1	520-5303-04	15*	Roto Lock Male (on Cabinet)	1	355-5006-01
<small>Items 6 & 7 are secured to item 5 by: #8-32 X 3/8" SHWH Swage (Zinc) (Qty. 10) (237-5975-00) and 1/4" Sil. Rtn. Spacer White (Qty. 5 [I/O] / Qty. 4 [CPU]) (254-5007-05)</small>				<small>Item 15* plugs the Access Hole required if using optional BETAbrite Sign or Data cables.</small>			
8	Fluorescent Light Brckt. (Right Style)	1	535-7739-01	17	Lock Mounting Plate	1	535-0072-00
<small>Item 8 is secured to Item 5 by: #6-32 X 5/8" PPH MS (Sems) Zinc (Qty. 1/per) (232-5203-00) Lock-In Fluor. Bulb with Yellow Socket Clip (Qty. 1/per) (545-6271-00)</small>				<small>Item 17 is secured to Item 5 by: #8-32 X 1/2" SHWH Swg. (Zinc) (Qty. 2) (237-5975-00)</small>			
9	Fluorescent Lamp Holder (Socket)	2	077-5214-01	19	Back Vent Grill 2-1/2" X 18"	3	545-5072-02
<small>Item 9 is secured to Items 8L and 8R by: #6-32 X 5/8" PPH MS (Sems) Zinc (Qty. 1/per) (232-5203-00) Lock-In Fluor. Bulb with Yellow Socket Clip (Qty. 1/per) (545-6271-00)</small>				<small>Item 19 is secured to Item 5 by: #8-32 X 1/2" SHWH Swg. (Zinc) (Qty. 3) (237-5975-00)</small>			
10	Fluorescent Lamp	2	165-5061-00	21	Button Hole Plug (Blk) (Happ #52-6214-00)	1	500-6566-00
<small>Item 10 is secured to Item 9 by: #6-32 X 1/2" SHWH Swg. (Zinc) (Qty. 2) (237-5975-00)</small>				<small>Item 21 plugs the Access Hole required if using optional BETAbrite Sign or Data cables.</small>			
23	Bracket, Tournament Sign (Black)	2	535-0081-02				

PARTS TABLE & VIEWS CONTINUED ON THE NEXT PAGE. ▶

125



Nr.	BACKBOX PARTS	QTY.	SPI PART Nr.
PARTS TABLE & VIEWS CONTINUED FROM THE PREVIOUS PAGE.			
25	Braided Wire (1-1/2 Feet)	1	600-5001-00
Item 25 is secured by: Staple 5/16" (Qty. 23) (631-5000-00)			
27	Clamps [Multiple Sizes]	26	040-5000-XX
Item 27 secured by: #8 X 1/2" SHWH AB (Zinc) (Qty. 1/per) (234-5101-00) For the following sizes, replace -XX with: .114" Double = -23 (Qty. 5); 1/2" Single = -06 (Qty. 3); 3/4" Single = -08 (Qty. 4); 1" Single = -09 (Qty. 1); 1-1/4" Double = -30 (Qty. 1)			
29L	Pivot Hinge (Left Style)		535-7999-00
29R			
Items 29L-29R are secured to Backbox by: 1/4"-20 X 1-1/4" C.B. Sq. Neck (Qty. 4) (231-5003-00) and 1/4"-20 Flange Nut (Qty. 4) (240-5300-00)			
Items 29L-29R are secured to Cabinet by: Spacer Hex Nut 1/2" O.D. - 1/4-20 X 1/2" TD (Black) (Qty. 1/per) (254-5042-00), Nylon Spacer (Black) (Qty. 1/per) (242-5084-00), 1/4-20 X 1/2" Carriage Bolt Square Neck (Black) (Qty. 1/per) (231-5072-00) and Washer 1" O.D. X 1/2" I.D. X 1/16" (Black) (Qty. 1/per side, only if required) (242-5087-00)			
	Memory Stick USB 1.1+ [Generic] 128MB		970-0128-00

(ASM. REF. 505-6002-A3-A3, Items 1-42 Only, [29-30 not included in assembly])

Take Note:

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

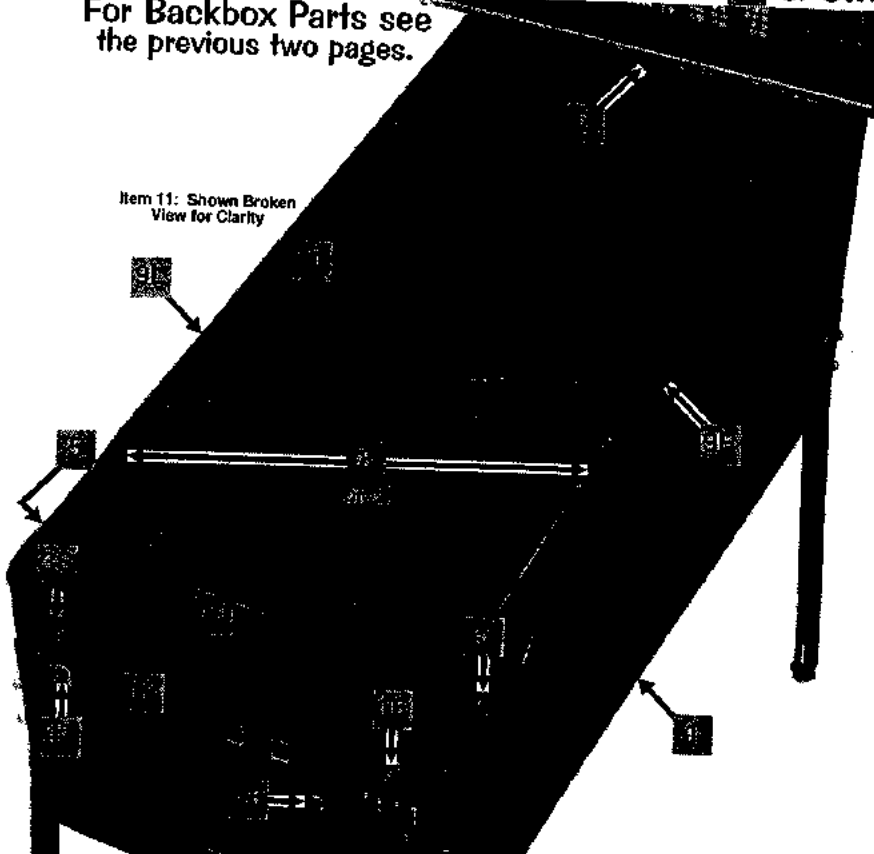
Nr.	BACKGLASS PARTS	QTY.	SPI PART Nr.
ii*	Avengers Pre.™ Film Art (#D4P)	1	830-52D4-00P

Nr.	SPEAKER PANEL PARTS	QTY.	SPI PART Nr.
31	Speaker Panel (Black Wood)	1	525-5515-00
33*	Foam 3/16" Thick X 1/4" Wide X 12"	6	626-5026-00
Above item 33 is self-adhesive. Located between items 32-34. Sold in 12" Lengths only.			
	// EURO ONLY RoHS // 128 X 32 DM PCB	1	520-5052-00
	// EURO ONLY RoHS // Dot Matrix Bezel		520-5052-15
			545-6281-00
35	Dot Matrix Display Mounting Bracket	2	535-8368-01
Item 35 is secured to Item 31 by: #8 X 1/2" SHWH AB (Zinc) (Qty. 4/per) (234-5101-00)			
37	Ribbon Cable, 14-Pin (33")	1	036-5260-33
// EURO ONLY RoHS // LED Ribbon Cable Filter PCB			
			520-5259-00
Item 37 (14-Pin) connects the 128 X 32 Dot Matrix Display PCB to the CPU/Sound PCB.			
	// EURO ONLY RoHS // LED Display Adapter Harness		036-5520-00
39	Speaker (Shld.) 4 x 4" 8Ω OHM MG	2	031-5004-02
ELE 4060SH			
41	Ground Strap (25") [2 per : Items 35 & 39]	4	600-5006-25

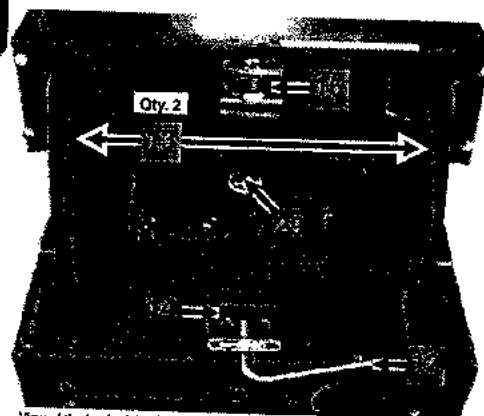
Parts Identification

Cabinet - Parts & Switches

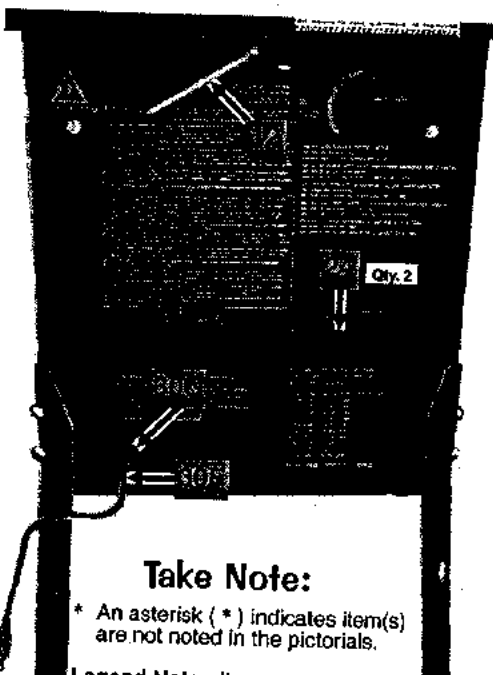
For Backbox Parts see the previous two pages.



Item 11: Shown Broken View for Clarity



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



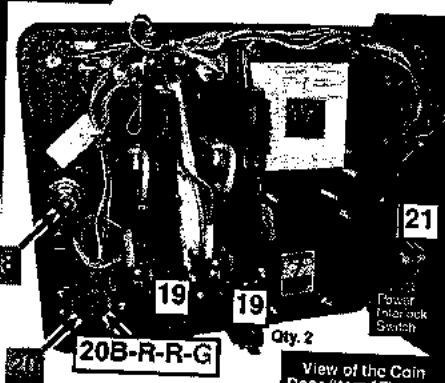
Take Note:

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

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

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

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



View of the Coin Door (Item 17) open.

Parts Identification

Nr.	CAB. PARTS & SWITCHES	QTY.	SPI PART Nr.
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2	Red Leg with Leveler Asm.	4	500-5921-50
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Item 2 is secured by: Leg Bolt Black Plate (535-5703-00) and Leg Bolt 3/8" X 1 1/2" Hex 5/8" Hd. (2/pcr) (231-5001-01) Leg Leveler ONLY (3/8"-16 X 3") (500-5017-00).

4T	Tournament Button (Yel. Sq.), w/Sw. + Lamp	1	500-6587-06-TL
----	--	---	----------------

Item 3S & 4T includes the Switch & Lamp (No Wiring; desolder old wiring where required). Switch or Bulb replacement: U TWIST U LOCK (-TL) >> not snap-in << Assembly Parts Included: Microswitch (180-5174-00); #555 Wedge Base Clear Bulb (166-5002-00); If 4T is not desired, use optional Button Plug Black (500-6566-00). Requires 3-Lug Terminal Strip (055-5204-03) and Diodes, 1N4004 (Qty. 2) (112-5003-00) inside cabinet under button(s) for Lamp Operation (Diode for Switch, located on Switch.)

6S	Flipper Switch Single Assembly	2	500-6889-01
----	--------------------------------	---	-------------

Assembly Parts Included: Flipper Switch Stack Single (Palney Contact) (180-5160-01) and Capacitor - Ceramic .05 Mfd 25 volt (130-5001-00) Item 6S/6D are secured to Cab. by: #6 X 1-1/4 SHWH AB (Zinc) (Qty. 2/pcr) (237-5959-00)

6D	Flipper Switch Double Assembly	2	500-6889-02
----	--------------------------------	---	-------------

Assembly Parts Included: Flipper Switch Stack Double (Palney Contact) (180-5164-01) and Capacitor - Ceramic .05 Mfd 25 volt (130-5001-00) Item 6S/6D are secured to Cab. by: #6 X 1-1/4 SHWH AB (Zinc) (Qty. 2/pcr) (237-5959-00)

Nr.	CAB. PARTS & SWITCHES	QTY.	SPI PART Nr.
-----	-----------------------	------	--------------

8	Plastic Channel 42-5/8" Lg. (Left/Rt.)	2	545-5017-00
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9	Side Armor (Right) Black		535-7297-01
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10	Front Molding (Black) < NO BUTTON HOLE >		515-7495-27
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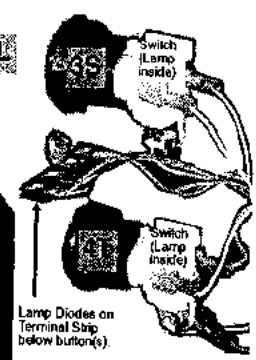
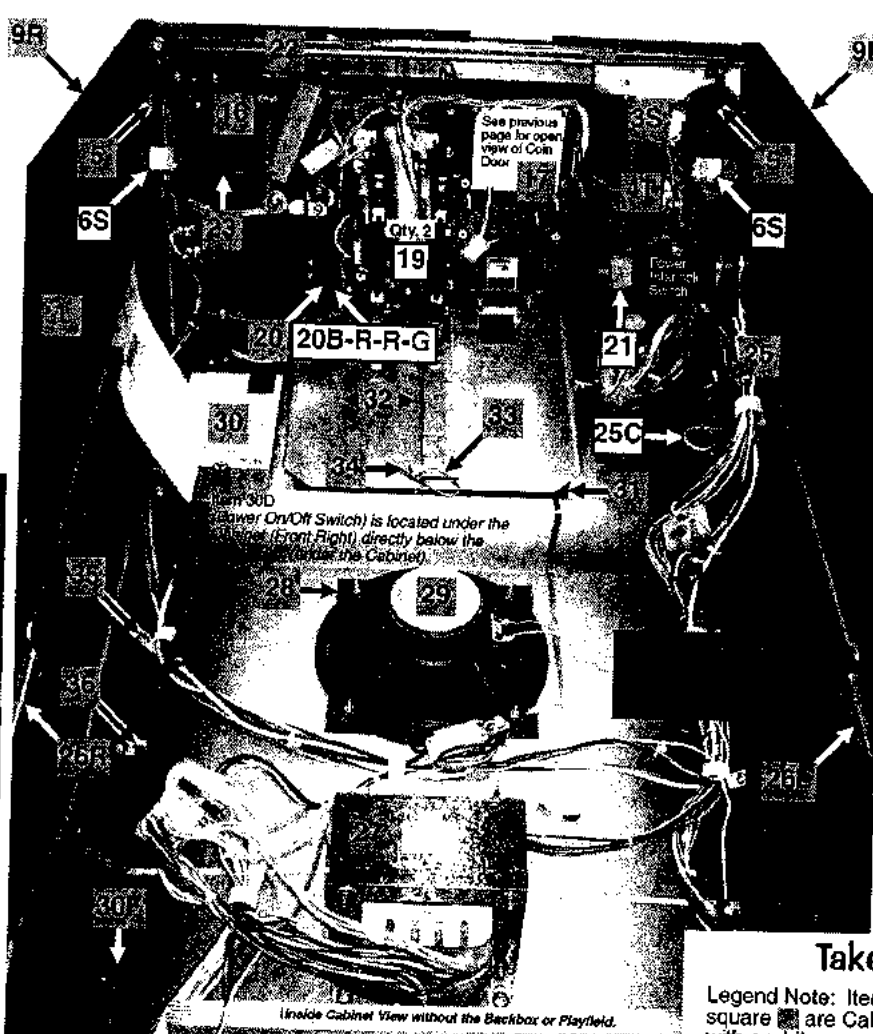
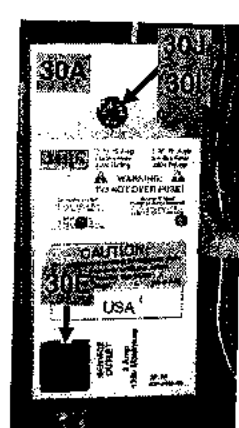
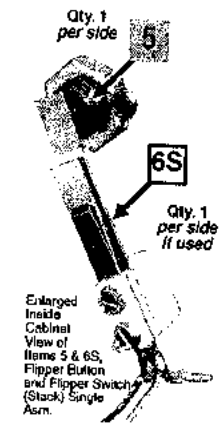
Item 10 includes: Self-Adhesive Foam Rubber 3/8" X 3/16" X 20-3/8" (3") (626-5001-00) Item 10 works with Item 22 (next page) ONLY.

12	Hex Key Allen Wrench 5/16"	1	777-0001-00
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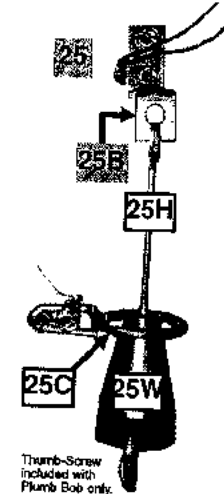
14	Roto Lock Male (R2-0055-02)	1	355-5006-01
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Item 14 is secured by: #10-24 X 1-3/4" Carriage Bolt Square Neck (Qty. 2) (231-5022-00), #10-24 Nylon Stop Nut (Qty. 2) (240-5206-00) and #10 Washer, 7/32" ID X 1/2" OD X 1/16" Thick (Qty. 2) (242-5003-00)

16	Ball Shooter (Plunger) Assembly	1	500-6146-00-04
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Enlarged Inside Cabinet View of Items 35, 41 and 25 (25B, 25C, 25H & 25W), Plumb Bob Tilt Switch.

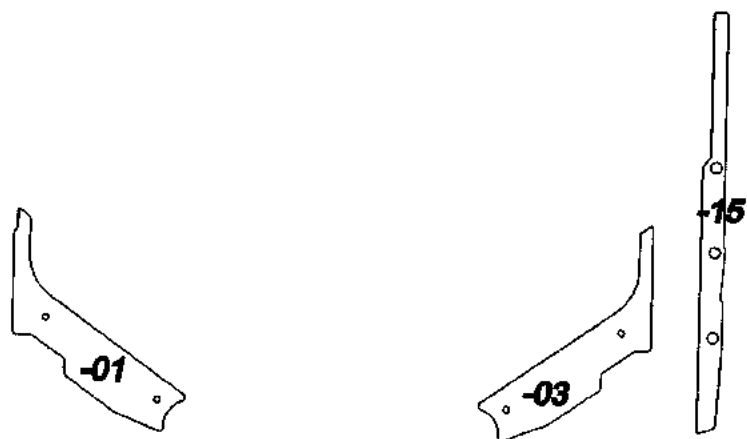
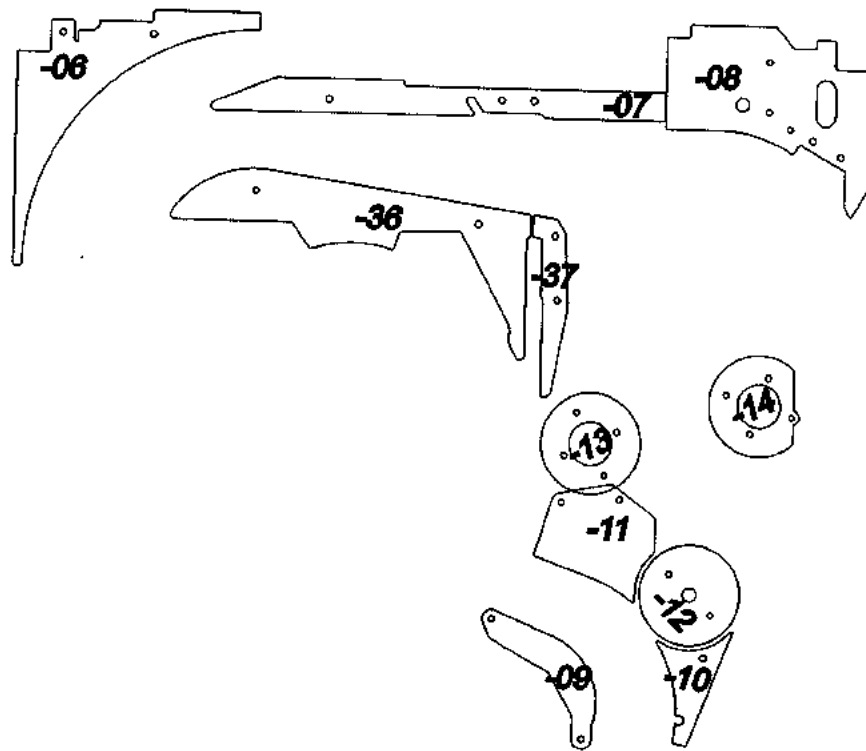


Take Note:
Legend Note: Items noted with a cyan square are Cabinet Parts. Items noted with a white square are Switches.

Nr.	CAB. PARTS & SWITCHES	QTY.	SPI PART Nr.	Nr.	CAB. PARTS & SWITCHES	QTY.	SPI PART Nr.
PARTS TABLE & VIEWS CONTINUED FROM THE PREVIOUS PAGE							
17	Coin Door 2-Prong TV Up Stop Button Bracket	1	501-5013-17	27	Transformer 5 VAC	1	010-5012-01
18	Lock 5/8" Barrel, 3/4" Flt. Cam	1	355-5055-00	28	Woofer (Speaker) Grill 7" X 7"	1	545-5072-03
19	Coin Door Switch (USA) (Happ)	2	180-5024-01	29	Woofer (Speaker) Round 301010	1	031-5007-03
20	4-Button Bracket (for Service Menu Buttons)	1	535-6860-04	30	Power Input Box Asm. + Univ. Cable	1	515-5360-08
21	Power On/Off Switch Asm.	1	500-5603-05	30A:	Power Box (No Parts) Mounting Frame (535-5932-00)		
22	Front Molding Lockdown Asm.	1	500-6881-00	30B:	Line Filter (150-5000-00)		
23	Lockdown Spring	1	265-5008-00	30C:	Varistor TNR159211KM (Domestic) (150-5001-00) or Varistor TRM15G431KM (Euro) (150-5002-00)		
24	Grills 2-1/2" X 18" (on Back & Bottom)	3	545-5072-02	30D:	On/Off Rocker Switch + Bracket Assembly (515-7085-00)		
25	Plumb Bob Tilt Switch (Individual Parts Only)		Ind. Parts Only	30E:	Service Outlet (3-Prong / US) (180-5001-03) + Bracket (535-8318-00)		
26L	Slide & Pivot Support Bracket (Left)	1	535-5989-00	30F:	Line Cord 10' ROJ 3" + Ring Terminal Asm. (515-6556-00)		
26R	Slide & Pivot Support Bracket (Right)	1	535-5990-00	30G:	Recessed (Black) Clip (rear of Cabinet) (545-5122-00)		
27	Transformer 5 VAC	1	010-5012-01	30H:	Snap Bushing 9/16" (White) (200-5001-01)		
28	Woofer (Speaker) Grill 7" X 7"	1	545-5072-03	30I:	Fuse 8 Amp 250V Slo-Blo (Domestic) (200-5000-05) or Fuse 5 Amp 250V Slo-Blo (International) (Qty. 2) (200-5003-00)		
29	Woofer (Speaker) Round 301010	1	031-5007-03	30J:	Fuse Holder (205-5001-00)		
30	Power Input Box Asm. + Univ. Cable	1	515-5360-08	Universal Cable & Jumper Caps (all voltage variations): See the Yellow Pages, Page y 10.			
30A:	Power Box (No Parts) Mounting Frame (535-5932-00)			31:	Cash Box Plastic Bottom	1	545-5090-00
30B:	Line Filter (150-5000-00)			32:	Cash Box Cover (Validator)	1	535-5013-03
30C:	Varistor TNR159211KM (Domestic) (150-5001-00) or Varistor TRM15G431KM (Euro) (150-5002-00)			33:	Coin Door Lock Bracket (U/Wire)	1	535-7562-00
30D:	On/Off Rocker Switch + Bracket Assembly (515-7085-00)			34:	Large Hair-Pin Clip	1	535-7772-00
30E:	Service Outlet (3-Prong / US) (180-5001-03) + Bracket (535-8318-00)			35:	Claims (Multiple Sizes)	26	040-5006-00
30F:	Line Cord 10' ROJ 3" + Ring Terminal Asm. (515-6556-00)			36:	Zip Cable Tie (Screw Down Style)	4	040-5005-00
30G:	Recessed (Black) Clip (rear of Cabinet) (545-5122-00)			37:	Water 12VDC with Bracket (Optional)	1	opt. G-0053-013-102
30H:	Snap Bushing 9/16" (White) (200-5001-01)			† Meters (Diode included) are optional and were not included in this Pinball Machine. Order without the bracket use G-0053-013-102A. More information or Qs? Call Technical Support.			
30I:	Fuse 8 Amp 250V Slo-Blo (Domestic) (200-5000-05) or Fuse 5 Amp 250V Slo-Blo (International) (Qty. 2) (200-5003-00)						
30J:	Fuse Holder (205-5001-00)						

Parts Identification

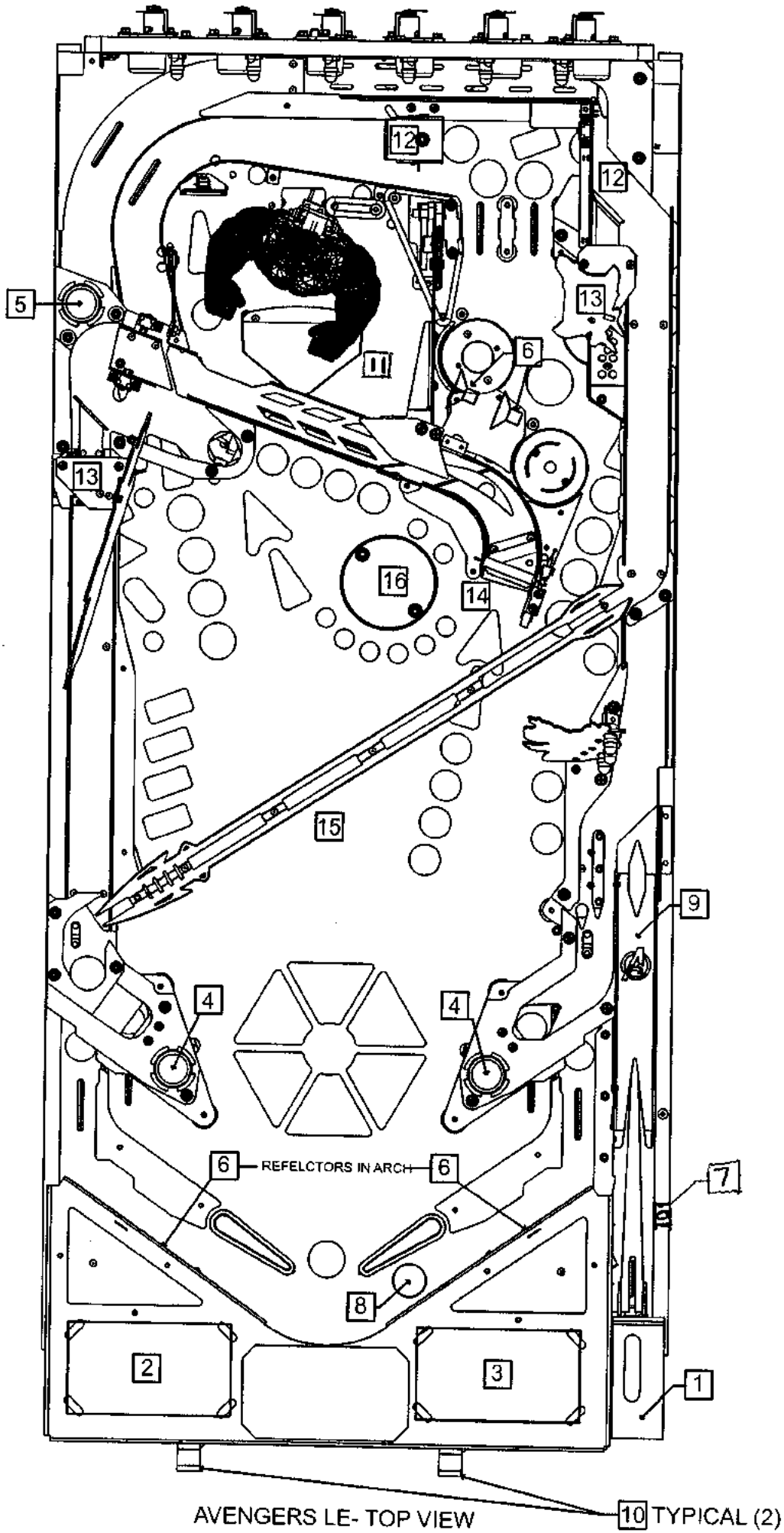
1283



AVENGERS LE PLAYFIELD PLASTICS

Playfield Top – Miscellaneous Parts

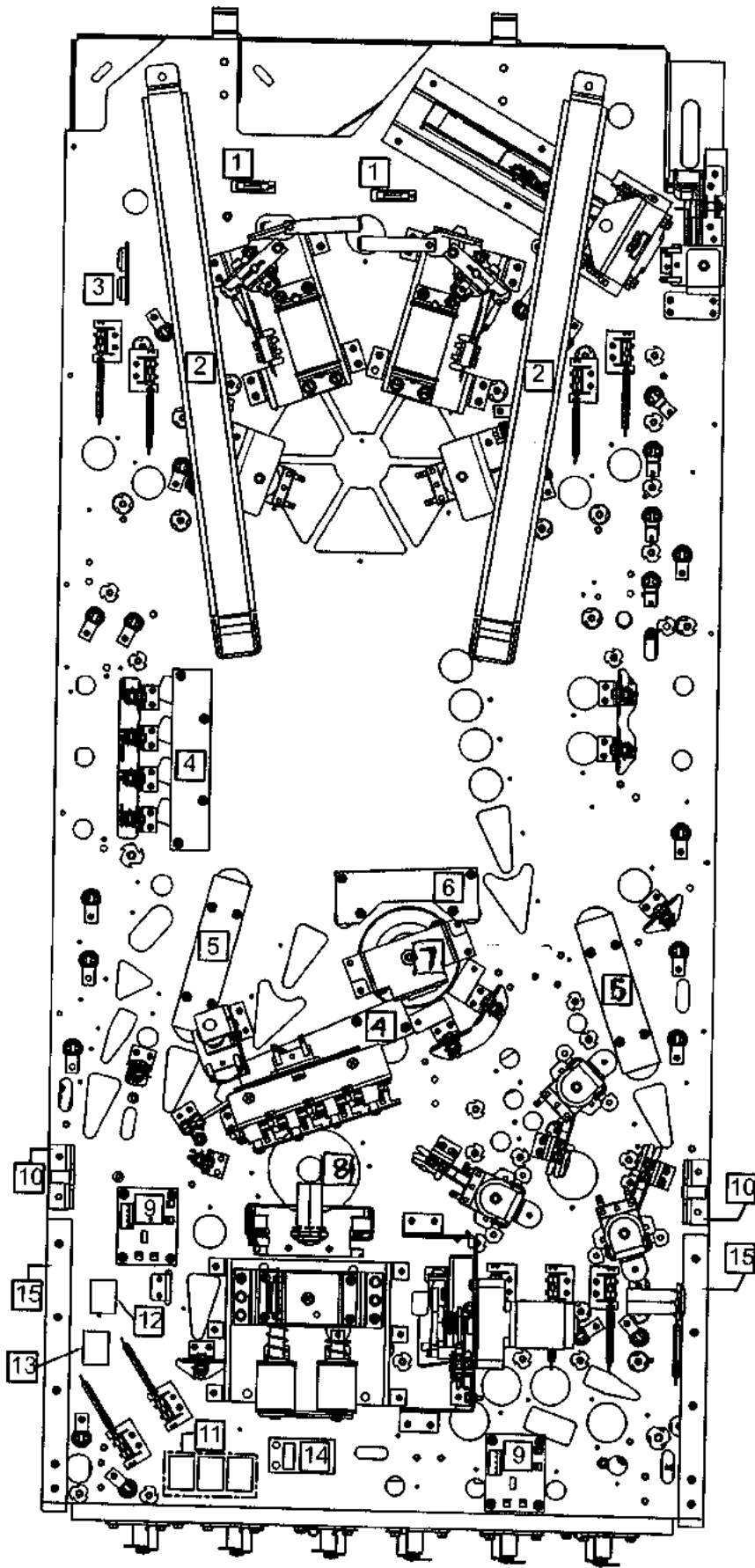
<u>Number</u>	<u>Description</u>	<u>QTY</u>	<u>SPI Part NR.</u>
P/F	Playfield Screened w/ inserts & No Parts	1	830-5100-D4
P/F	Playfield Complete w/ inserts & All Parts	1	505-6005-D4
1	Metal Arch Assy. (Pre-00) (Blu-D4A) (Gre-D4)	1	535-0645-XX
2	Instruction Card	1	755-51D3-12-Y
3	Coin Card	1	755-5400-02-Y
4	Flash Lamp Dome (Red-02), (Grn-04), (Blu-05)	2	550-5030-XX
5	Flash Lamp Dome (Red)	1	550-5030-02
6	Chrome Lamp Reflector	4	545-5409-01
7	Bubble Level Assembly	1	500-6815-00
8	Pinball (Steel) 1-1/16"	6	260-5000-00
9	Shooter Lane Ramp	1	515-9644-00
10	Playfield Hanger Brackets	2	535-8385-00
11	Hulk Assembly	1	500-9799-00
12	Electric Gate Assembly (Left-00) (Rt-01)	2	511-5033-XX
13	Ball Diverter Assembly	2	515-6595-00
14	Spinner Target (Narrow)	1	515-7088-00
15	Ramp (Steel)	1	510-7449-00
16	Tesseract Assembly	1	500-7272-00



1011

Playfield Bottom – Miscellaneous Parts

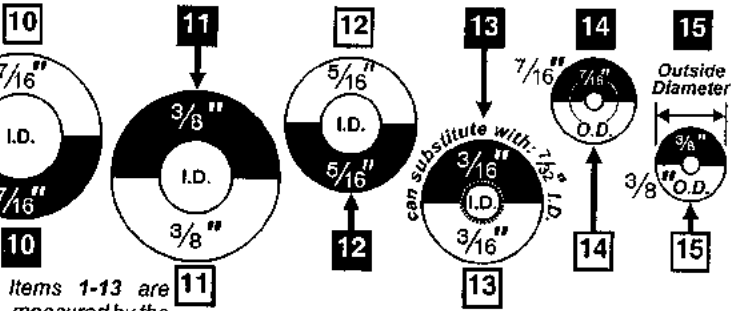
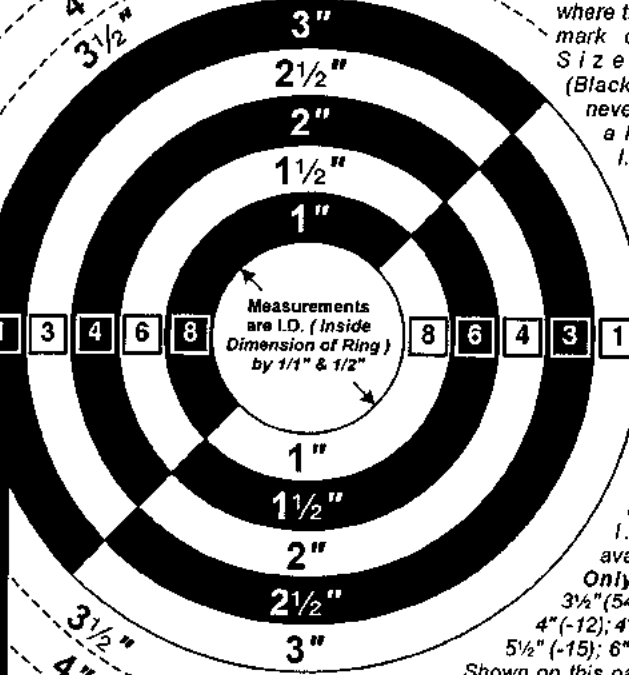
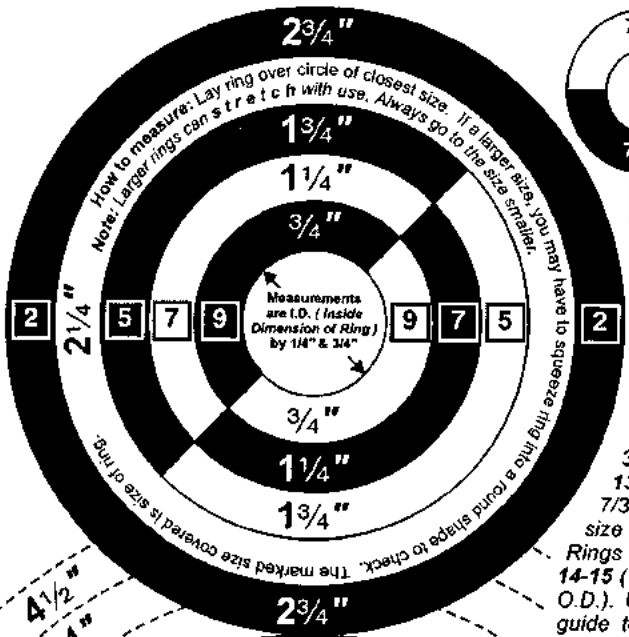
Number	Description	QTY	SPI Part NR.
1	Fuse Clip Holder	2	205-5001-01
2	Playfield Support Slide Brackets	2	535-6862-05
3	Resistor Pack	1	511-7443-01
4	LED Board	2	520-5324-04
5	LED Board	2	520-6786-01
6	LED Board	1	520-6786-02
7	LED Board	1	520-6782-01
8	Magnet Assembly	1	511-5065-ND
9	OPTO Amplifier Board	2	520-5239-01
10	Pivot Pin Slide Bracket	2	500-5329-03
11	General Illumination relay	3	511-7226-03
12	Motor Direction Relay	1	511-7226-02
13	Motor Brake Relay	1	511-7226-01
14	Step-Up Transistor Board	1	520-5254-00
15	Edge Slide Bracket	2	535-5988-01



AVENGERS LE - BOTTOM VIEW

P13

Playfield - Rubber Parts Black ■, White □ & Blue ■ (Rings Actual Size) †



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

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

Nr.	RUBBER RINGS	QTY.	SPI PART Nr.
1	3" I.D. Rubber Ring BLACK		545-5348-10
	3" I.D. Rubber Ring WHITE		545-5348-60
2	2 1/4" I.D. Rubber Ring BLK		545-5348-20
3	2 1/2" I.D. Rubber Ring BLK	2	545-5348-09
	2 1/2" I.D. Rubber Ring WHT		545-5348-59
4	2" I.D. Rubber Ring BLACK		545-5348-08
	2" I.D. Rubber Ring WHITE		545-5348-58
5	1 3/4" I.D. Rubber Ring BLK		545-5348-21
	1 3/4" I.D. Rubber Ring WHT	N/U	545-5348-71
6	1 1/2" I.D. Rubber Ring BLK		545-5348-07
	1 1/2" I.D. Rubber Ring WHT		545-5348-57
7	1 1/4" I.D. Rubber Ring BLK		545-5348-06
	1 1/4" I.D. Rubber Ring WHT		545-5348-56
8	1" I.D. Rubber Ring BLACK		545-5348-05
	1" I.D. Rubber Ring WHITE		545-5348-55
9	3/4" I.D. Rubber Ring BLACK	2	545-5348-04
	3/4" I.D. Rubber Ring WHITE		545-5348-54
10	7/16" I.D. Rubber Ring BLK		545-5348-10
	7/16" I.D. Rubber Ring WHT		545-5348-60
11	3/8" I.D. Rubber Ring BLACK		545-5348-03
	3/8" I.D. Rubber Ring WHITE	N/U	545-5348-53
12	5/16" I.D. Rubber Ring BLK	7	545-5348-02
	5/16" I.D. Rubber Ring WHT		545-5348-52
13	3/16" I.D. Rubber Ring BLK	12	545-5348-01
	3/16" I.D. Rubber Ring WHT		545-5348-51
14	7/16" O.D. Rubber Ring BLK	5	545-5348-19
	7/16" O.D. Rubber Ring WHT		545-5348-69
15	3/8" O.D. Rubber Ring BLK		545-5348-19
	3/8" O.D. Rubber Ring WHT		545-5348-69
16	Small Flipper BLACK Ring (Soft Duro)		545-5207-00
	Small Flipper RED Ring (Soft Duro)	2	545-5207-22
	Large Flipper BLACK Ring (50 Duro)		545-5277-00
	Large Flipper YELLOW Ring (50 Duro) (use -06 40 Duro)		545-5277-04
	Large Flipper WHITE Ring (50 Duro)		545-5277-08
	Large Flipper RED Ring (Soft Duro)	2	545-5277-22

Parts Identification

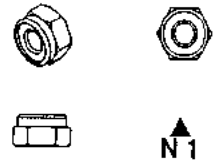
Take Notes
 to Bill of Materials. See next page for location of the Bill of Materials. Item A are located on multiple assemblies. See next page for location.

Nr.	RUBBER BUMPER PADS	QTY.	SPI PART Nr.
A*	Bumper BLK Pad (Lg. w/ grommet)		545-5105-00
B*	Bumper BLK Pad (Sm. w/ grommet)	6	545-5105-00

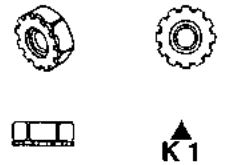
Nr.	RBR. BUMPER POST SLVS.	QTY.	SPI PART Nr.
D*	Bumper BLACK Post Sleeve (Tall)		545-5308-65
E*	Bumper Post Sleeve (Short)		545-5151-00

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

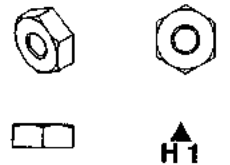
Nr.	NYLON STOP NUTS*	SPI PART Nr.
N1	#6-32 Nylon Stop Nut	240-5006-00
N2	#6-32 N.S. Nut (with 1/4" Hex Body)	240-5010-00
N3	#8-32 Nylon Stop Nut	240-5102-00
N4	#10-32 Nylon Stop Nut	240-5203-00
N5	#10-24 Nylon Stop Nut <small>Item N5 used with #10-24 X 1 3/4" Carriage Bolt Square Neck Black (231-5022-00) located in the Cabinet for the Bolt Lock (Male) (235-5006-01)</small>	240-5206-00
N6	#4-40 Nylon Stop Nut	240-5303-00
N7	#4-40 (18/9 Stainless) Nylon Stop Nut	240-5303-01
N8	5/16"-18 Nylon Stop Nut	240-5316-00



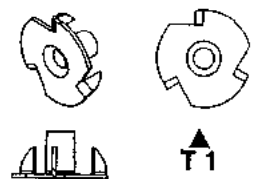
Nr.	KEPS NUTS*	SPI PART Nr.
K1	#6-32 Keps Nut (with Star Washer)	240-5008-00
K2	#6-32 Keps Nut (with 1/4" Hex Body)	240-5011-00
K3	#8-32 Keps Nut	240-5104-00
K4	#10-32 Keps Nut	240-5208-00
K5	#10-24 Keps Nut	240-5207-00
K6	#4-40 Keps Nut	240-5318-00



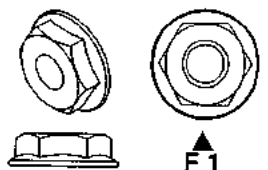
Nr.	HEX NUTS*	SPI PART Nr.
H1	#6-32 Hex Nut (No Star Washer)	240-5004-00
H2	#8-32 Hex Nut	240-5103-00
H3	#10-32 Hex Nut	240-5201-00
H4	#10-24 Hex Nut <small>Item H4 used with #10-24 X 1" Carriage Bolt Square Neck Black (231-5021-00) located in the Cabinet for the Side Armor Rear (towards Backbox).</small>	240-5202-00
H5	#10-32 X 3/8" Hex Nut	240-5209-00
H6	3/4"-16 Hex Nut	240-5315-00
H7	#2-56 Hex Nut	240-5301-00
H8	7/8"-14 Hex Nut	240-5317-00



Nr.	T-NUTS*	SPI PART Nr.
T1	#6-32 T-Nut	240-5002-00
T2	#6-32 T-Nut (with Side Cut Off)	240-5002-01
T3	#8-32 T-Nut	240-5101-00
T4	#10-32 (Black Oxide) T-Nut	240-5007-00
T5	#10-32 T-Nut (with Side cut Off)	240-5205-00
T6	#10-32 X 5/16" 3-Prong T-Nut	240-5204-00
T7	#10-24 T-Nut	240-5201-00



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



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

* Not Shown

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

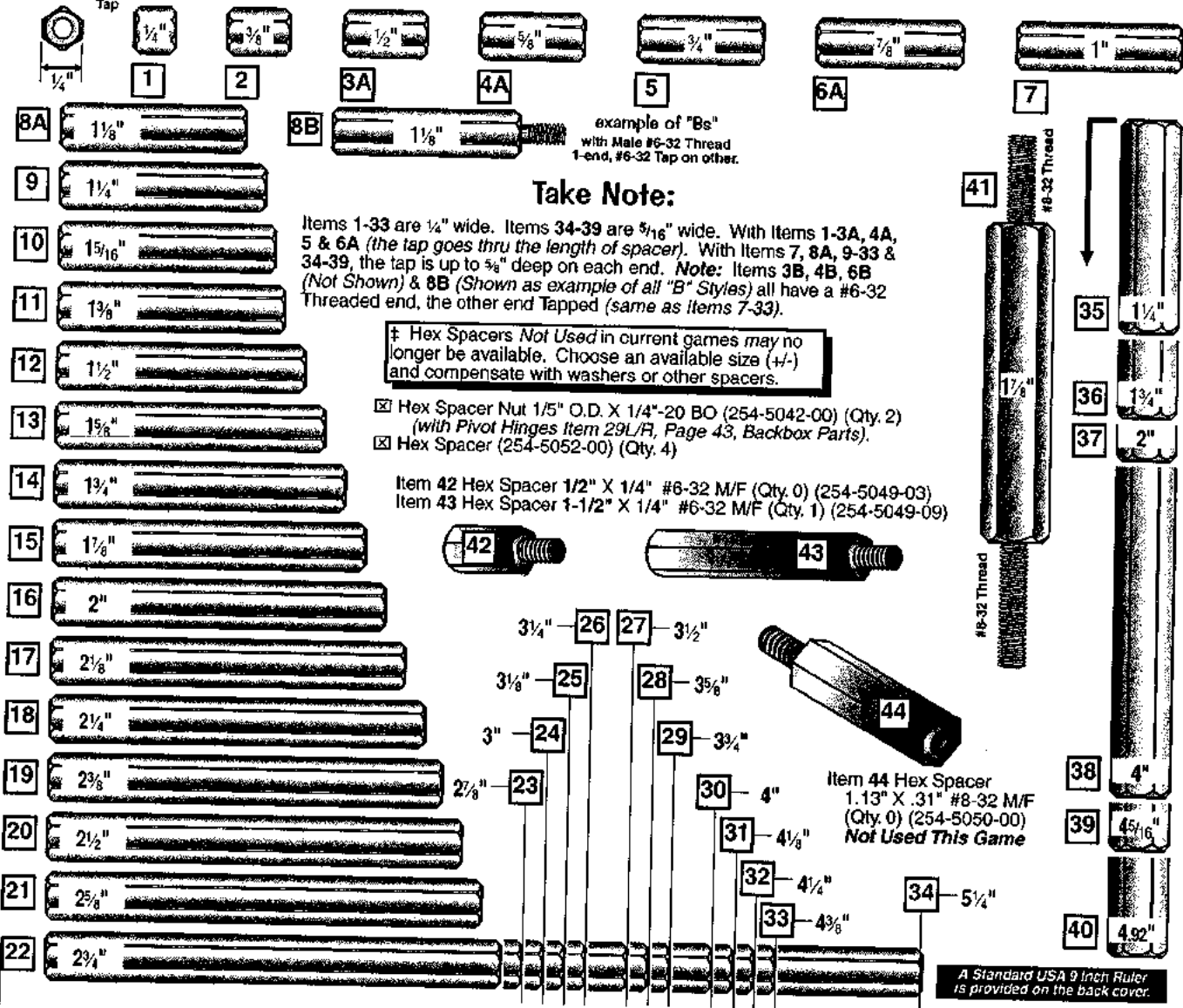
* Not Shown

Parts Identification

NOT ALL PARTS LISTED ABOVE ARE USED ON THIS GAME (QUANTITIES PER GAME WILL DIFFER).
COMPARE ACTUAL PART ON GAME TO ABOVE DRAWINGS TO IDENTIFY THE PART NUMBER REQUIRED.

Playfield Top - Hex Spacers (Actual Size) †

Hex Spacers:
#6-32
Tap



Take Note:

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

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

- ☒ Hex Spacer Nut 1/5" O.D. X 1/4"-20 BO (254-5042-00) (Qty. 2) (with Pivot Hinges Item 29L/R, Page 43, Backbox Parts).
- ☒ Hex Spacer (254-5052-00) (Qty. 4)

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

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

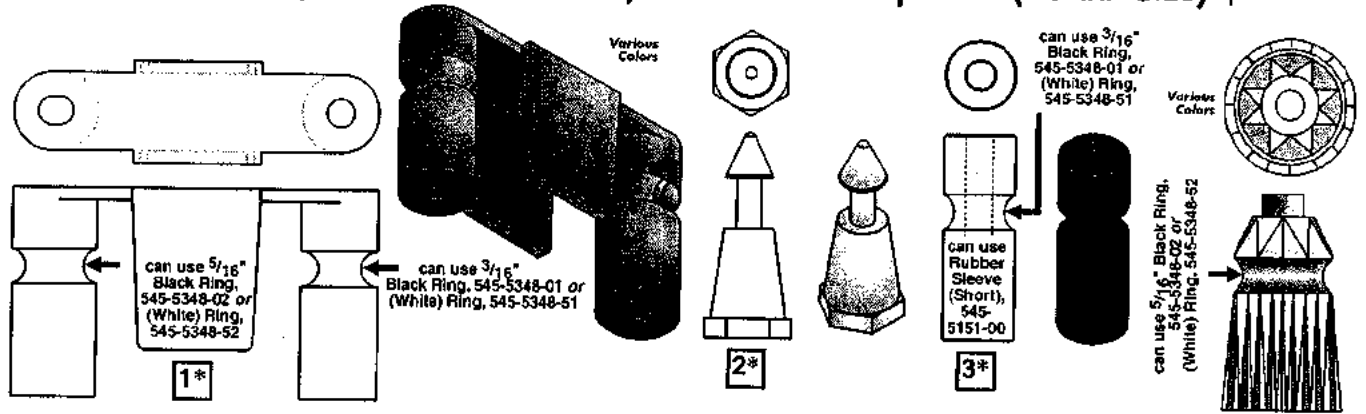
A Standard USA 9 Inch Ruler is provided on the back cover.

Parts Identification

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

NOT ALL PARTS LISTED ABOVE ARE USED ON THIS GAME (QUANTITIES PER GAME WILL DIFFER).
COMPARE ACTUAL PART ON GAME TO ABOVE DRAWINGS TO IDENTIFY THE PART NUMBER REQUIRED.

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



PLASTIC PART COLOR CHART

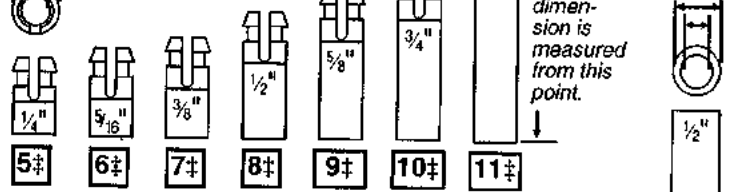
Nr.	Color	Nr.	Color	Nr.	Color
-00	Black	-06	Yellow	-12	Fluor. Blue
-01	Clear	-07	Orange	-13	Teal Green
-02	Red	-08	(White)	-14	(Gray)
-03	Amber	-09	Purple	-15	Luminescent
-04	Green	-10	Fluor. Org.	-16	Gold
-05	Blue				

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

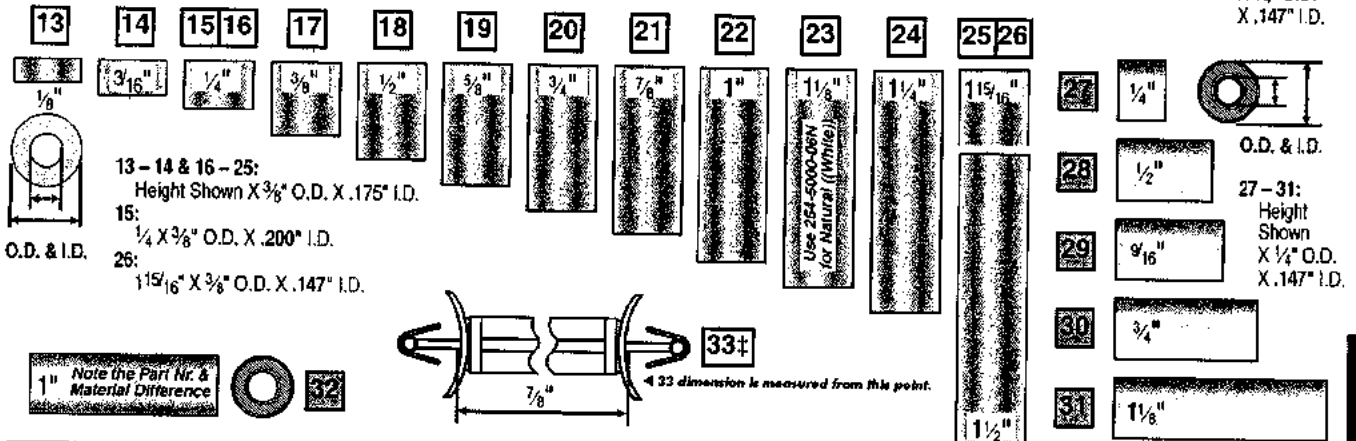
O.D. & I.D.



5-11: Height Shown X 3/32" O.D. X .153" I.D.



† Items 5 through 11 dimensions are measured from bottom to just under the cut-away. Item 33 dimension is measured from top-to-top of curve. See pictorials with Items 11 & 33.



O.D. & I.D.

13-14 & 16-25: Height Shown X 3/8" O.D. X .175" I.D.

15: 1/4 X 3/8" O.D. X .200" I.D.

26: 1 15/16" X 3/8" O.D. X .147" I.D.

1" Note the Part Nr. & Material Difference

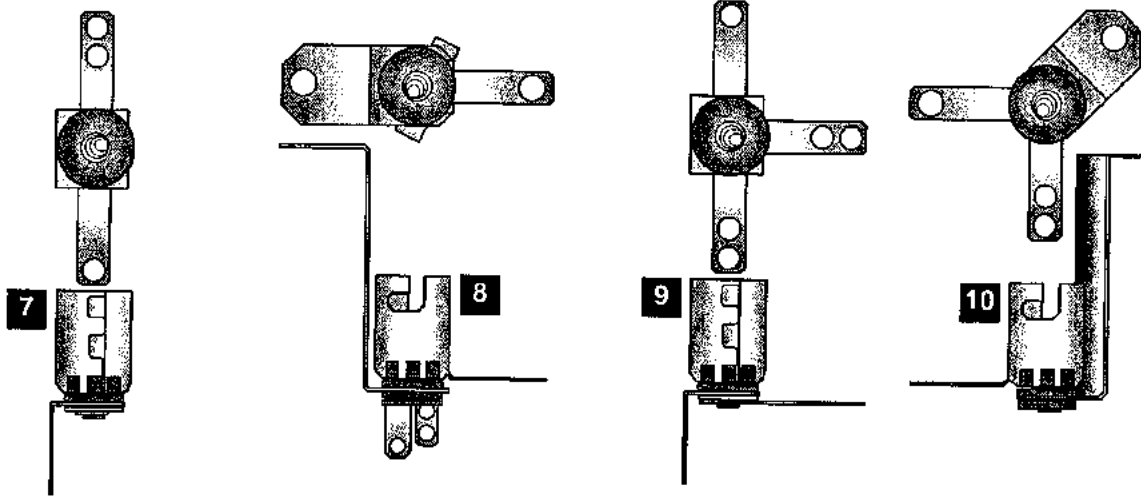
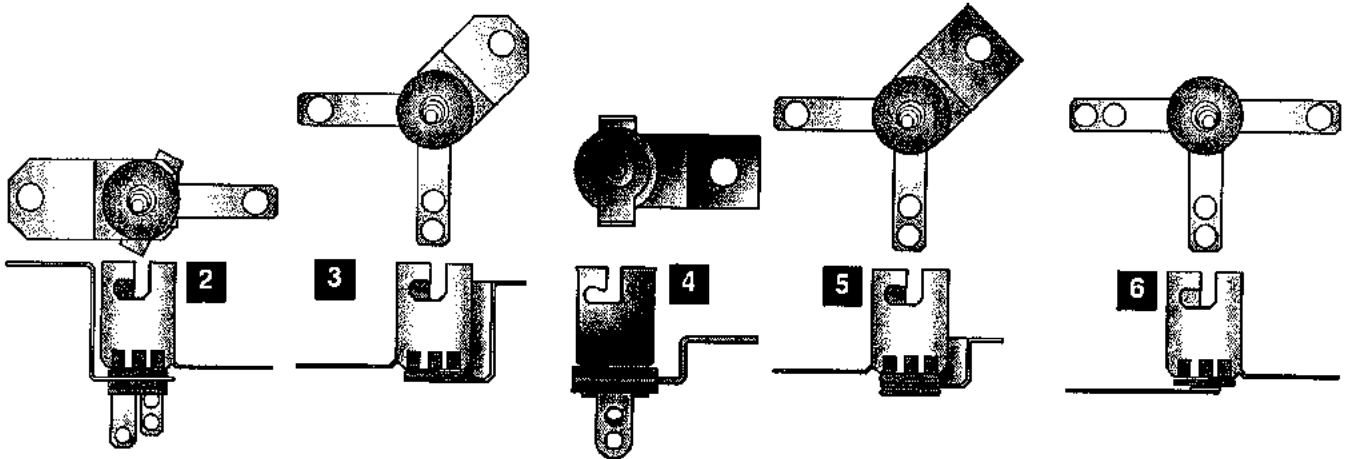
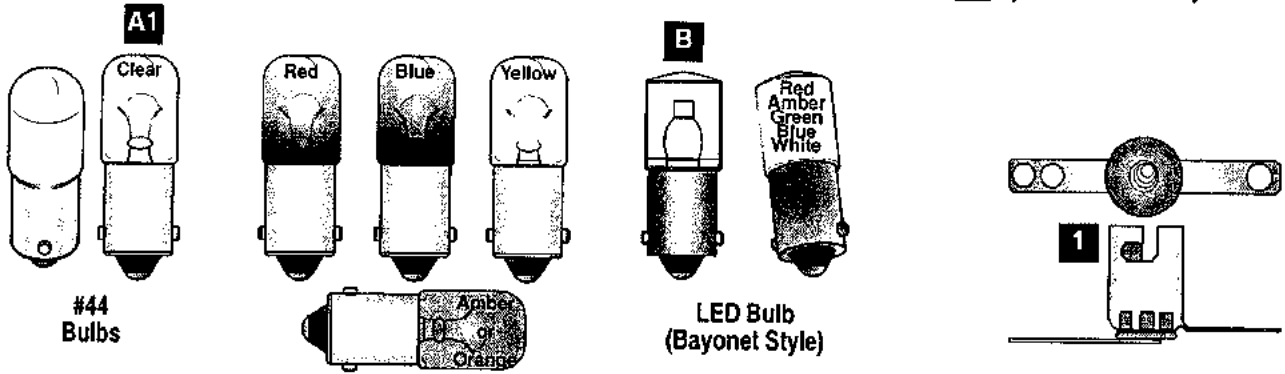
† 33 dimension is measured from this point.

Nr.	PLASTIC POSTS & SPACERS	SPI PART Nr.	Nr.	PLASTIC POSTS & SPACERS	SPI PART Nr.
1**	1-Groove Jewel Plastic Post (XX-Color)	550-5051-XX	21	1" X 3/8" O.D. X .175" I.D. Pls. Spacer (Gray)	254-5000-01
2**	Mini-Jewel Plastic Post (XX-Color)	550-5052-XX	22	1" X 3/8" O.D. X .175" I.D. Pls. Spacer (Gray)	254-5000-04
3**	Mini-Jewel Plastic Post (XX-Color)	550-5053-XX	23	1" X 3/8" O.D. X .175" I.D. Pls. Spacer (Gray)	254-5000-06
4**	1-Groove Jewel Plastic Post (XX-Color)	550-5034-XX	24	1 1/4" X 3/8" O.D. X .175" I.D. Pls. Spcr. (Gray)	254-5000-05
5*	1/4" Self Retain. Plastic Spacer (White)	254-5007-02	25	1 1/2" X 3/8" O.D. X .175" I.D. Pls. Spcr. (Gray)	254-5000-08
6 †	3/16" Self Retain. Plastic Spacer (White)	254-5007-05	26	1 15/16" X 3/8" O.D. X .147" I.D. Plastic Spacer (Gray)	254-5000-15
7 †	1/8" Self Retain. Plastic Spacer (White)	254-5007-01	27	1/4" X 3/8" O.D. X .144" I.D. Metal Spacer	254-5014-03
8 †	1/2" Self Retain. Plastic Spacer (White)	254-5007-04	28	1/2" X 5/16" O.D. X .144" I.D. Metal Spacer	254-5014-00
9 †	3/8" Self Retain. Plastic Spacer (White)	254-5007-00	29	3/4" X 5/16" O.D. X .144" I.D. Metal Spacer	254-5014-04
10 †	1/4" Self Retain. Plastic Spacer (White)	254-5007-03	30	3/4" X 5/16" O.D. X .144" I.D. Metal Spacer	254-5014-01
11 †	1/2" Self Retain. Plastic Spacer (White)	254-5007-06	31	1 1/2" X 3/8" O.D. X .144" I.D. Metal Spacer	254-5014-02
12	1/2" X 1/4" O.D. X .147" I.D. Pls. Spacer (White)	254-5000-03	32	1" X 5/16" O.D. X .144" I.D. Metal Spacer	254-5001-00
13	1/8" X 3/8" O.D. X .175" I.D. Pls. Spacer (Gray)	254-5000-19	33	1" Plastic Spacer Support (Orange Ring)	254-5039-14
14	3/16" X 3/8" O.D. X .175" I.D. Pls. Spcr. (Gray)	254-5000-18	34	Plastic Spacer, 5" Plastic Mounting	254-5054-00
15	1/4" X 3/8" O.D. X .200" I.D. Pls. Spcr. (Gray)	254-5000-02	35	Plastic Spacer, 1 1/2" Plastic Mounting	254-5054-01
16	1/4" X 3/8" O.D. X .175" I.D. Pls. Spacer (Gray)	254-5000-09			
17	3/8" X 3/8" O.D. X .175" I.D. Pls. Spacer (Gray)	254-5000-12			
18	1/2" X 3/8" O.D. X .175" I.D. Pls. Spacer (Gray)	254-5000-01			
19	3/8" X 3/8" O.D. X .175" I.D. Pls. Spacer (Gray)	254-5000-14			
20	3/4" X 3/8" O.D. X .175" I.D. Pls. Spacer (Gray)	254-5000-07			

NOT ALL PARTS LISTED ABOVE ARE USED ON THIS GAME (QUANTITIES PER GAME WILL DIFFER). COMPARE ACTUAL PART ON GAME TO ABOVE DRAWINGS TO IDENTIFY THE P/N REQUIRED.

Parts Identification

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



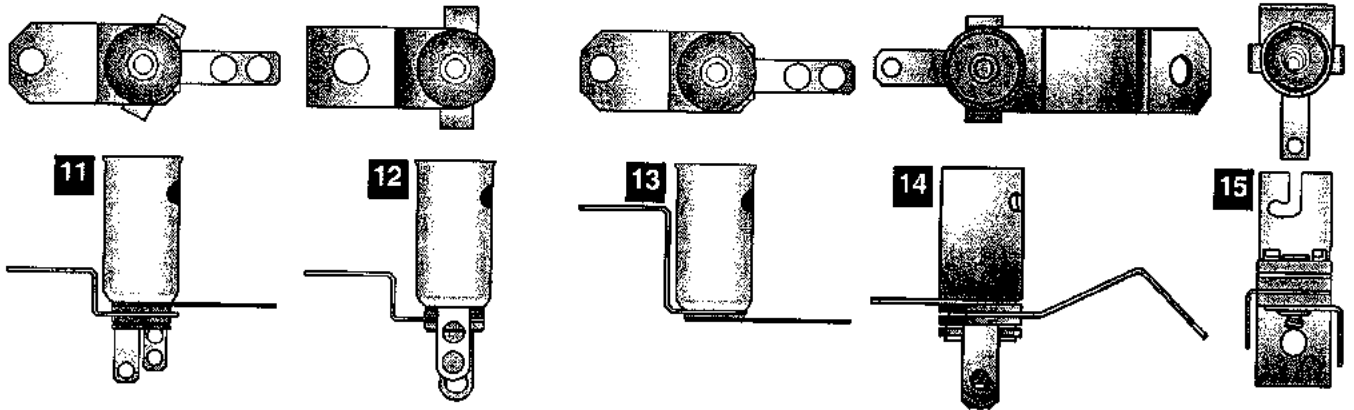
Parts Identification

Nr.	BULBS (#44)	SPI PART Nr.	Nr.	BULBS (LED & #455)	SPI PART Nr.
A	#44 Bulb (Clear / Heavy Flamber)	115-5000-00	B	LED Module (WHT) (12.8v 20-25mA) Bynt.	112-5023-08
A	#44 Bulb (Red / Blue / Yellow)	115-5001-00	<i>Note: Different Colors may be available -</i>		
<i>Note: Amber (112-5023-02), Green (112-5023-03), Yellow (112-5023-04), Red (112-5023-05), Blue (112-5023-06), Orange (112-5023-07)</i>					

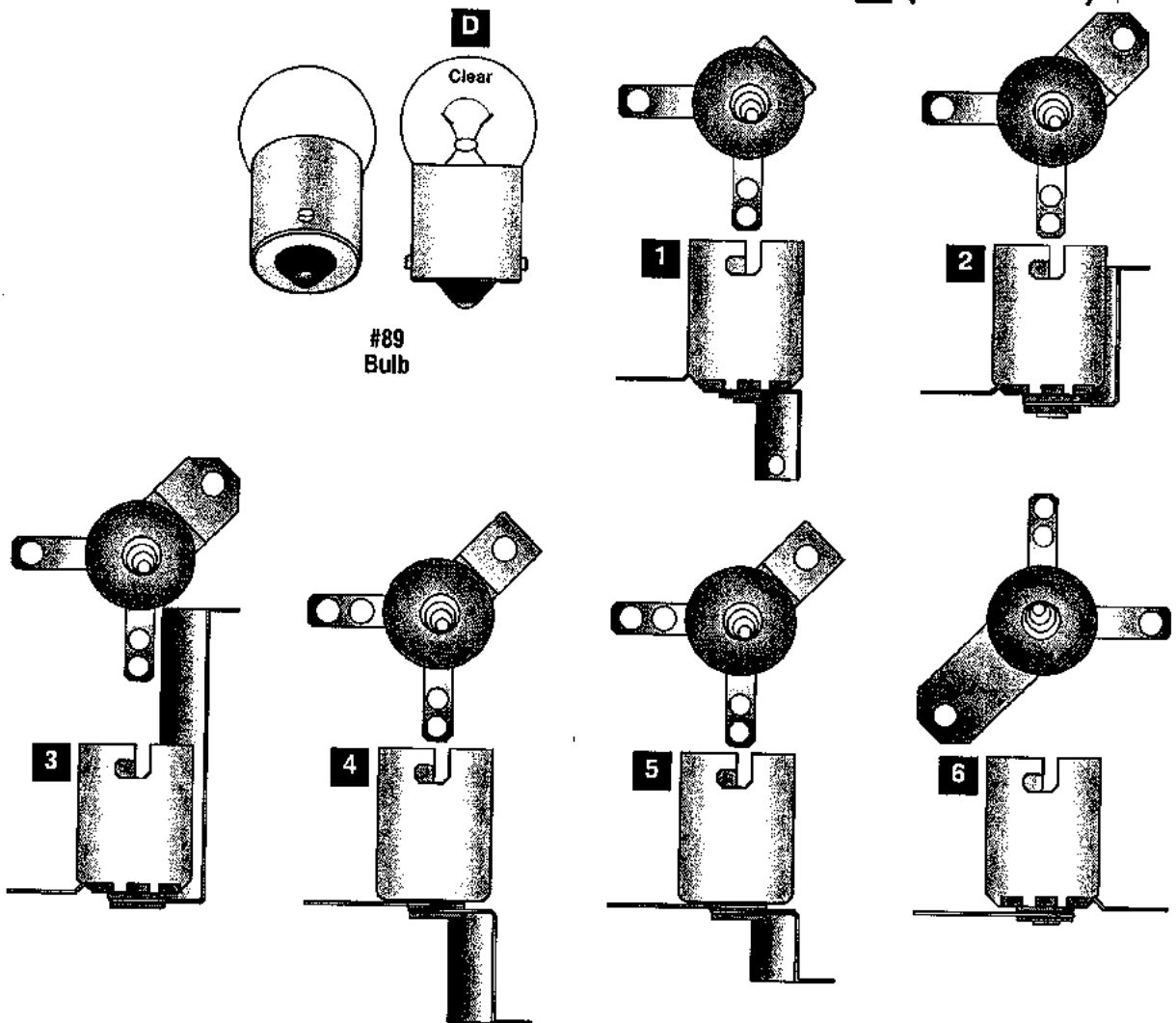
Nr.	SMALL BAYONET SOCKETS	SPI PART Nr.	Nr.	SMALL BAYONET SOCKETS	SPI PART Nr.
1	2-Lug Stand-Up Socket (Med. Brkt.)	077-5008-00	10	2-Lug Stand-Up Socket (Tall Bracket)	077-5005-00
2	3-Lug Stand-Up Socket (Med. Brkt.)	077-5008-00	11	3-Lug Stand-Up Long Shell Socket	077-5013-00
3	2-Lug Stand-Up Socket (Med. Brkt.)	077-5002-00	12	2-Lug Stand-Up Lg. Shell Socket (Gls)	077-5031-00
4	2-Lug Stand-Up Socket (Short Brkt.)	077-5223-00	13	1-Lug S-Lug Shell Sckt (Med. Brkt.)	077-5012-00
5	2-Lug Stand-Up Sckt (Short Bracket)	077-5002-01	14	3-Lug S-U Lg. Shell Sckt. (45° Brkt.)	077-5035-00
6	3-Lug Staple Down Socket	077-5001-00	15	3-Lug Laydown Socket (2 Lugs Bent)	077-5032-00
7	3-Lug Laydown Socket	077-5009-00			
8	3-Lug Stand-Up Socket (Tall Bracket)	077-5009-00			
Nr.	SMALL BAYONET SOCKETS	SPI PART Nr.			
9	3-Lug Laydown Socket (3 Lugs Flat)	077-5006-00			

20) NOT ALL PARTS LISTED ABOVE ARE USED ON THIS GAME (QUANTITIES PER GAME WILL DIFFER). COMPARE ACTUAL PART ON GAME TO ABOVE DRAWINGS TO IDENTIFY THE PART NUMBER REQUIRED.

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



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



Parts Identification

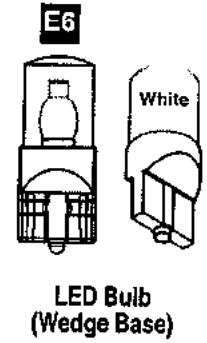
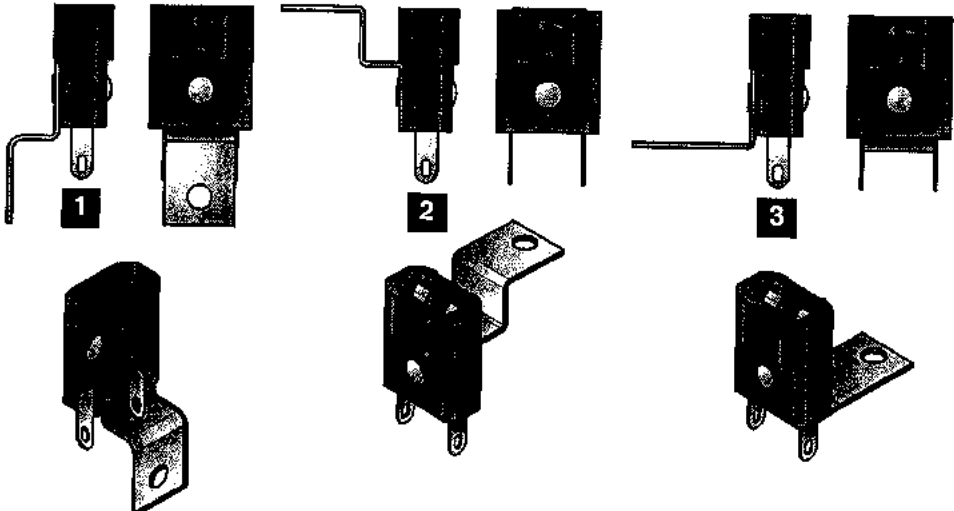
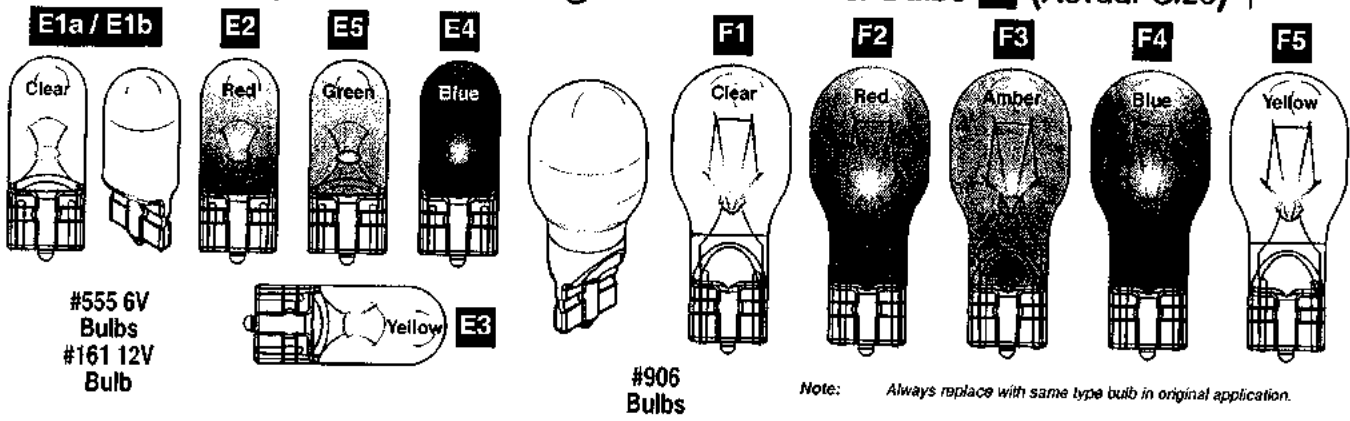
Nr.	BULBS (#89)	SPI PART Nr.		
D	#89 Bulb Heavy Filament	166-5000-89 HF	1	2-Lug Laydown Standard Socket 077-5100-00
			2	2-Lug Stand-Up Short Socket 077-5101-00
			3	2-Lug Stand-Up Long Socket 077-5102-00
			4	2-Lug Stand-Up Rv. Mount Socket 077-5103-00
			5	2-Lug Stand-Up Rv. Mnt. Short Socket 077-5106-00
			6	2-Lug Straight Leg Socket 077-5107-00

Nr.	LARGE BAYONET SOCKETS	SPI PART Nr.
-----	-----------------------	--------------

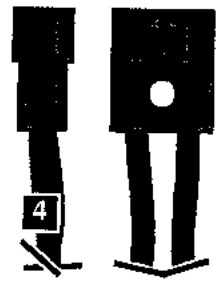
NOT ALL PARTS LISTED ABOVE ARE USED ON THIS GAME (QUANTITIES PER GAME WILL DIFFER).
 COMPARE ACTUAL PART ON GAME TO ABOVE DRAWINGS TO IDENTIFY THE PART NUMBER REQUIRED.

1221

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



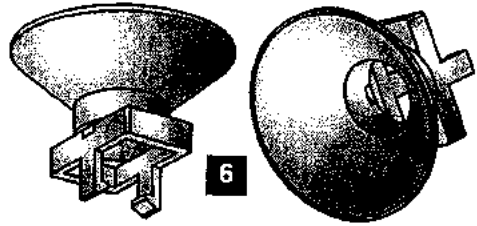
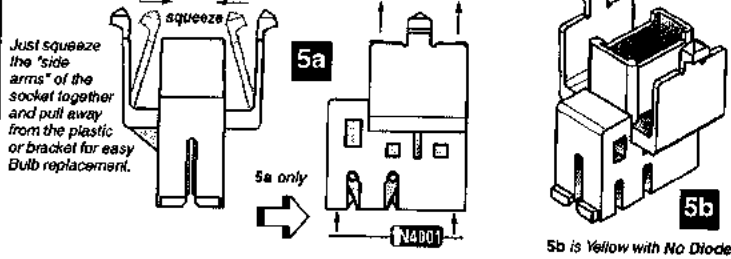
Item 4 Socket does not require brackets. Old stock may include "L" style brackets (each side); do not secure to assembly. Black Wires (Qty. 2) are 12" each.



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

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

Parts Identification



Nr.	BULBS (#555)	SPI PART Nr.	Nr.	BULBS (LED & #906)	SPI PART Nr.
E1a	#555 Wedge Base Bulb (Clear)	165-5002-00	E6	LED Module (WHT) (5v - 6.3v) Wedge Base	112-5024-08
E2-E5	#555 Wedge Base Bulb (Multi-Color)	165-5054-XX	Item E6 Bulb Note: Typically used with Item 4 Socket in Pop Bumpers.		
Item E2-E5 Bulb Note: Different Colors available (not used in this game) - Red (165-5054-02); Green (165-5054-04); Blue (165-5054-05); Yellow (165-5054-06);			F1	#906 Wedge Base Bulb (Clear)	165-5004-00
E1b	#161 12V Wedge Base Bulb (Clear)	165-5032-00	Item F Bulb Note: Different Colors available (not used in this game) - Red (165-5004-02); Amber (165-5004-03); Blue (165-5004-05); Yellow (165-5004-06)		

Nr.	WEDGE BASE SOCKETS	SPI PART Nr.	Nr.	WEDGE BASE SOCKETS	SPI PART Nr.
1	Wedge Base Socket (Laydown)	077-5026-01	5a	IDC Snap-On Socket (Bi-Color)	077-5216-00
2	Wedge Base Socket (Offset)	077-5028-00	5b	IDC Snap-On Socket No Diode (Yel.)	077-5216-01
3	Wedge Base Socket (Laydown GI)	077-5030-00	5c	5/16" HT Bracket (White)	546-5760-18
4	W.B. Socket (Bumpers/Special App.)	077-5206-00	6	Light Reflector (Silver Plst.) REF540N	545-5409-01

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

NOT ALL PARTS LISTED ABOVE ARE USED ON THIS GAME (QUANTITIES PER GAME WILL DIFFER). COMPARE ACTUAL PART ON GAME TO ABOVE DRAWINGS TO IDENTIFY THE PART NUMBER REQUIRED.

HOW TO UPDATE YOUR GAME CODE FOR S.A.M. SYSTEM MACHINES

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

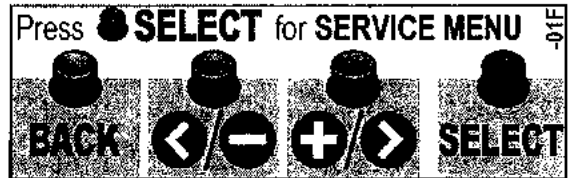
* to get the Data Storage Device with the latest Game Code copied to it, add "game title" to above part number.

STYLE, COLOR, SIZE AND MANUFACTURER SUBJECT TO CHANGE.

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

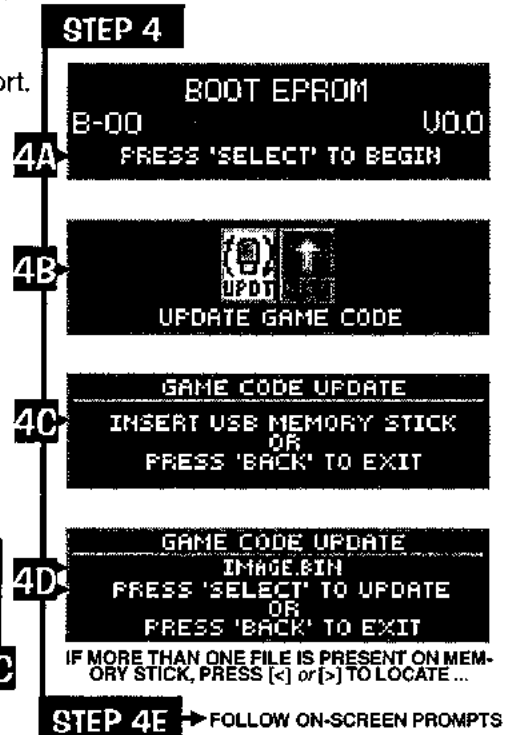
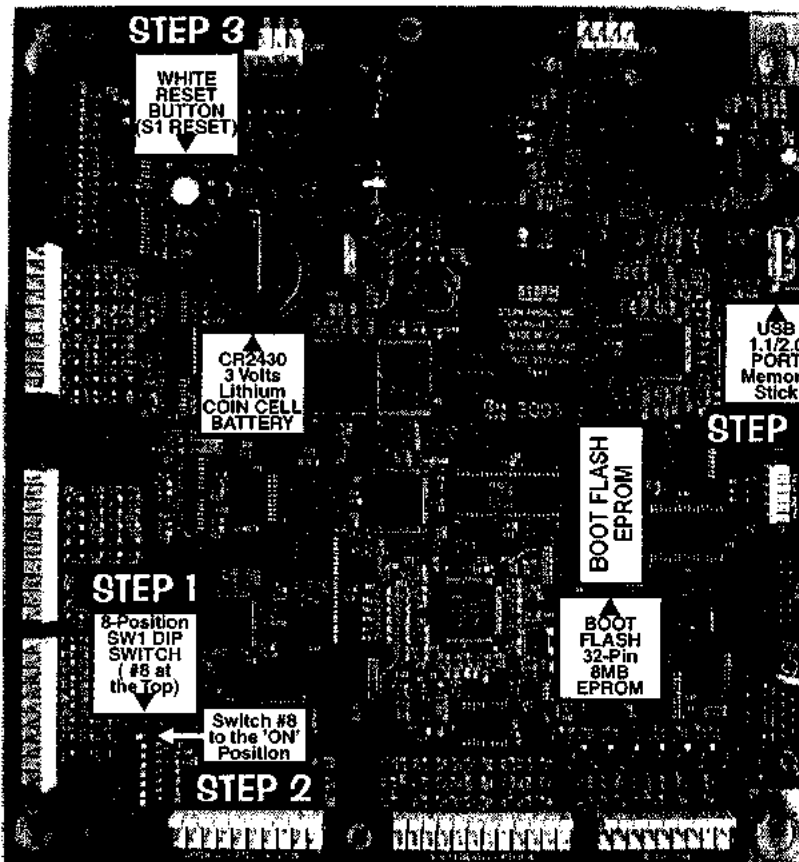
Upon power-up the display will describe the version of code installed in your game. When directed to do so (via Service Bulletin or website announcement) you will need to update your code ... with the **BOOT FLASH EPROM*** installed, here's how:

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



- **Green Button**
Press to **Escape Back** (or **Exit**).
- **Red Buttons**
Press to move **< Left , Right >**.
Press to **- Decrease** or **+ Increase** values or to change settings.
- **Black Button**
Press to **Enter Select** (or **'OK'**).

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

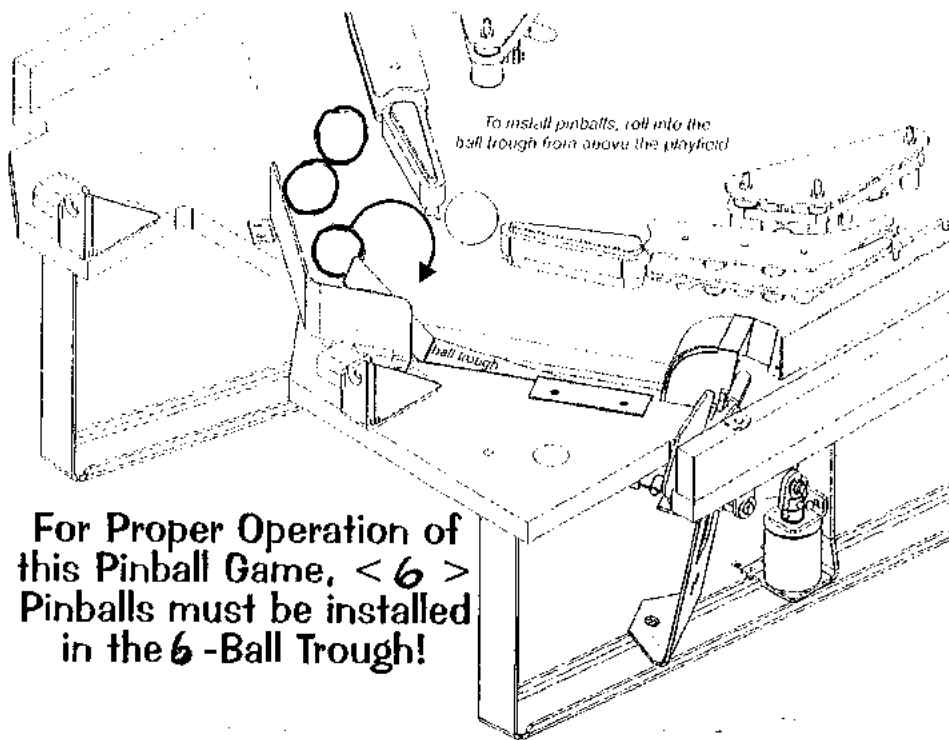


You can also retrieve your latest code from another game! From the **USB MENU** via the **UTILITIES MENU**, select the "BKUP" icon instead and download to your Data Storage Device.



! Quick Tip ~ Try backing up your current code prior to installing your new code, just in case your Data Storage Device file was corrupted by a computer glitch while you were copying /

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



For Proper Operation of this Pinball Game, < 6 > Pinballs must be installed in the 6 -Ball Trough!

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

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

QUICK REFERENCE FUSE CHART

BACKBOX FUSES

I/O POWER DRIVER BOARD

with RED LED STATUS INDICATORS (If any RED LED is OFF, check the fuse)

F1	5A S.B.	5 VAC	LED'S	RED/WHITE
F2	5A S.B.	5 VAC	LED'S	YELLOW/WHITE
F3	5A S.B.	5 VAC	LED'S	GREEN/WHITE
F4	5A S.B.	5 VAC	LED'S	WHITE/WHITE
F5	7A S.B.	50VDC	FLIPPER	10A/20A
F6	3A S.B.	24VAC	Motor	Special Application
F7	4A S.B.	50VDC	Motor	Special Application
F8	3A S.B.	50VDC	Motor	Special Application
F9	5A S.B.	50VDC	Motor	Special Application
F10	5A S.B.	20VDC	Motor	Special Application
F11	5A S.B.	20VDC	Motor	Special Application
F12	5A S.B.	20VDC	Motor	Special Application
F13	5A S.B.	20VDC	Motor	Special Application

CABINET FUSES

POWER (SERVICE OUTLET) BOX

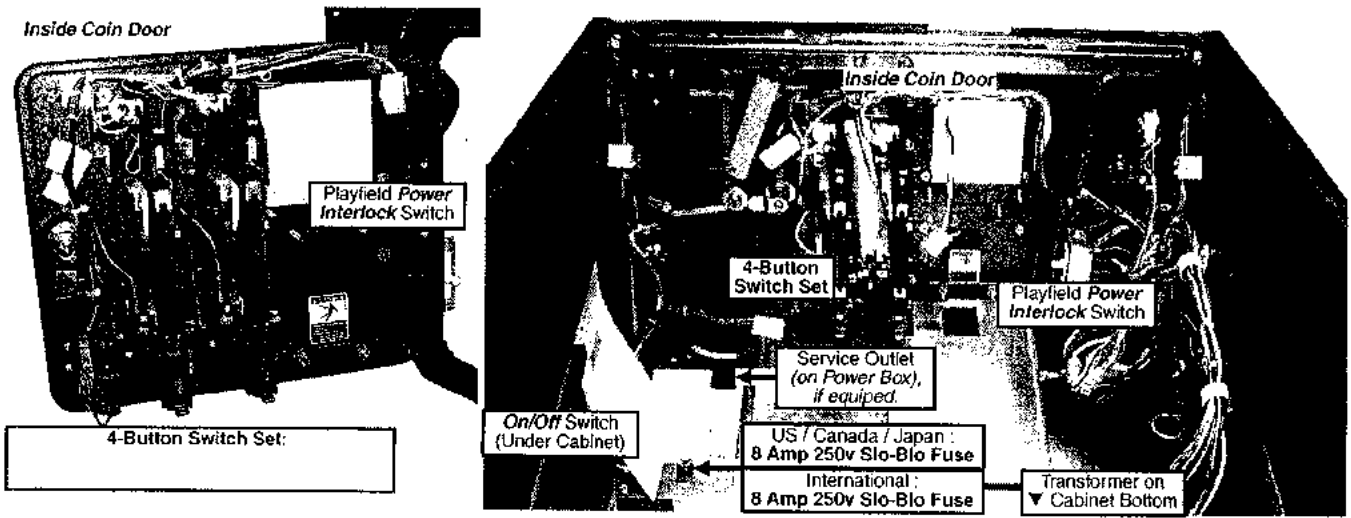
8A S.B.	110-120V	Line
5A S.B.	220-240V	Line

PLAYFIELD FUSES

FLIPPER OR SPECIAL APPLICATION

3A S.B.	50VDC	Flipper
3A S.B.	50VDC	Special Application
3A S.B.	50VDC	Special Application
3A S.B.	50VDC	Special Application
3A S.B.	50VDC	Special Application
3A S.B.	50VDC	Special Application

Same Type

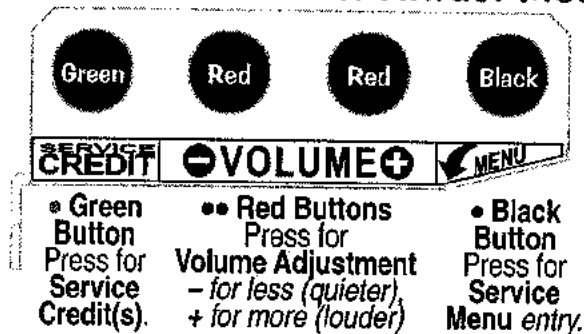


OPEN THE COIN DOOR TO ACCESS THE SERVICE SWITCH X4 SET.

● ● ● ● Service Switch X4 Set Overview

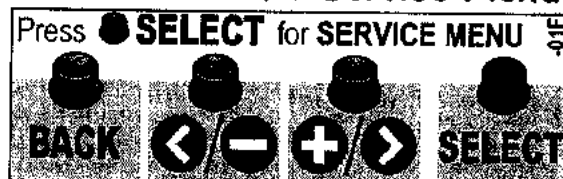
The four buttons (inside Coin Door) have dual functions depending if you have entered the Service Menu or not.

Functions in Game or Attract Mode

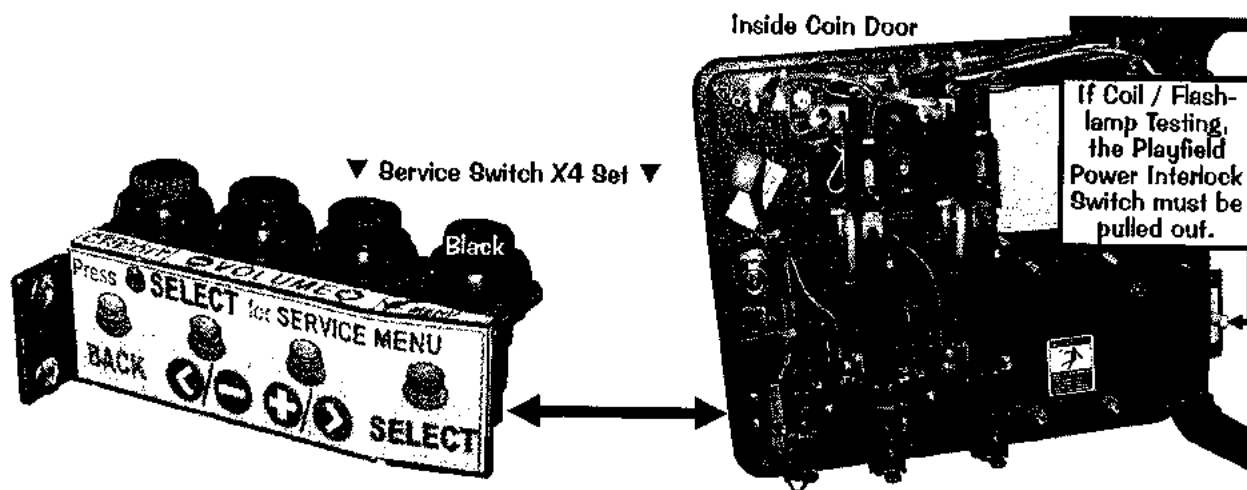


- Green Button Press for Service Credit(s).
- Red Buttons Press for Volume Adjustment - for less (quieter), + for more (louder)
- Black Button Press for Service Menu entry.

Functions in the Service Menu



- Green Button Press to Escape Back (or Exit).
- Red Buttons Press to move < Left , Right >. Press to - Decrease or + Increase values or to change settings.
- Black Button Press to Enter Select (or 'OK').



EXAMPLE:

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

Step 1 Press [SELECT].

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

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

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

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

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

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

Continue through the other menus.



The Service Menu is subject to change. Update this game with the latest code downloaded from our website with a USB Data Storage Device (64MB min., recommendation 128MB or higher). See the inside front cover for directions or in the Service Menu "Go To Utilities Menu" then "Go To USB Menu" and follow prompts.

DIAGNOSTIC AIDS

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

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

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

OPERATOR ALERT!
AUTO PLUNGER
DEVICE MALFUNCTION

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

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

GAME NAME
W0.00 SYS. 0.00 HDW. 0
SERVICE MENU *
USE +/- TO VIEW TECH. ALERTS

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

CPU DIP SWITCH SETTINGS

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

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

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

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

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

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

CPU COUNTRY SETTING:		Pos.	1	2	3	4	5	6	7	8
So. Africa	ON				▲	▲	▲			
	OFF									

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

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

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

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

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

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

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

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

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

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

CPU COUNTRY SETTING:		Pos.	1	2	3	4	5	6	7	8
Middle East	ON		▲	▲	▲	▲	▲			
	OFF									

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

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

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

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

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

CPU COUNTRY SETTING:		Pos.	1	2	3	4	5	6	7	8
New Zealand	ON					▲				
	OFF									

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

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

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

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

CPU/SND PCB SETTING:		Pos.	1	2	3	4	5	6	7	8
UPDATE CODE	ON									▲
	OFF									

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

SWITCH MATRIX GRID [#1 - #64] (Switch Locations : next page)

CPU/ Sound Board	01 IC-U22A RETURNNA J16-P9	02 IC-U22B RETURNNA J16-P8	03 IC-U22C RETURNNA J16-P7	04 IC-U22D RETURNNA J16-P6	05 IC-U58A RETURNNA J16-P5	06 IC-U16B RETURNNA J16-P4	07 IC-U16C RETURNNA J16-P3	08 IC-U16D RETURNNA J16-P2	09 IC-U58A RETURNNA J12-P9	10 IC-U58B RETURNNA J12-P8	11 IC-U58C RETURNNA J12-P7	12 IC-U58D RETURNNA J12-P6	13 IC-U40A RETURNNA J12-P4	14 IC-U40B RETURNNA J12-P3	15 IC-U40C RETURNNA J12-P2	16 IC-U40D RETURNNA J12-P1
01 DRIVE ▶ GRN-BRN J1-P1	S.W. #17 TROUGH # 6 LEFT	S.W. #18 TROUGH # 5	S.W. #19 TROUGH # 4	S.W. #20 TROUGH # 3	S.W. #21 TROUGH # 2	S.W. #22 TROUGH # 1 RIGHT	S.W. #23 TROUGH JAM	S.W. #24 LEFT OUTLANE	S.W. #25 LEFT RETURN LANE	S.W. #26 LEFT SLINSHOT	S.W. #27 RIGHT SLINSHOT	S.W. #28 RIGHT RETURN LANE	S.W. #29 RIGHT OUTLANE	S.W. #30 LEFT POP BUMPER	S.W. #31 RIGHT POP BUMPER	S.W. #32 BOTTOM POP BUMPER
02 DRIVE ▶ GRN-RED J1-P3	S.W. #33 LEFT INNER LOOP	S.W. #34 SHIELD TARGET	S.W. #35 RT. 2 BANK TARGET-TOP	S.W. #36 RT. 2 BANK TARGET-BOT	S.W. #37 HULK WHEEL OPTO #1	S.W. #38 HULK WHEEL OPTO #2	S.W. #39 LEFT RAMP EXIT	S.W. #40 SPINNER	S.W. #41 HULK WHEEL OPTO #1	S.W. #42 HULK WHEEL OPTO #2	S.W. #43 LEFT RAMP EXIT	S.W. #44 SPINNER	S.W. #45 TESSERACT WHEEL #1	S.W. #46 TESSERACT WHEEL #2	S.W. #47 LEFT ORBIT	S.W. #48 R. RAMP EXIT
03 DRIVE ▶ GRN-DRG J1-P4	S.W. #49 LOOK 1 LOOK 2	S.W. #50 LOOK 1 LOOK 2	S.W. #51 LOOK 1 LOOK 3	S.W. #52 (H)ULK	S.W. #53 (H)ULK	S.W. #54 (H)ULK	S.W. #55 (H)ULK	S.W. #56 HULK PLATE	S.W. #57 HULK RIGHT ORBIT	S.W. #58 HULK RIGHT ORBIT	S.W. #59 HULK EJECT	S.W. #60 HULK EJECT	S.W. #61 HULK EJECT	S.W. #62 HULK EJECT	S.W. #63 HULK EJECT	S.W. #64 HULK EJECT

Wire Color Abbreviations used: **BLK** Black **BLU** Blue **BRN** Brown **GRY** Grey **GRN** Green **LGHT** Light **ORG** Orange **PINK** Pink **RED** Red **TAN** Tan **VIO** Violet **YEL** Yellow

Dedicated Switches [#D-1 - #D-32] (Dedicated Switch Locations : next page)

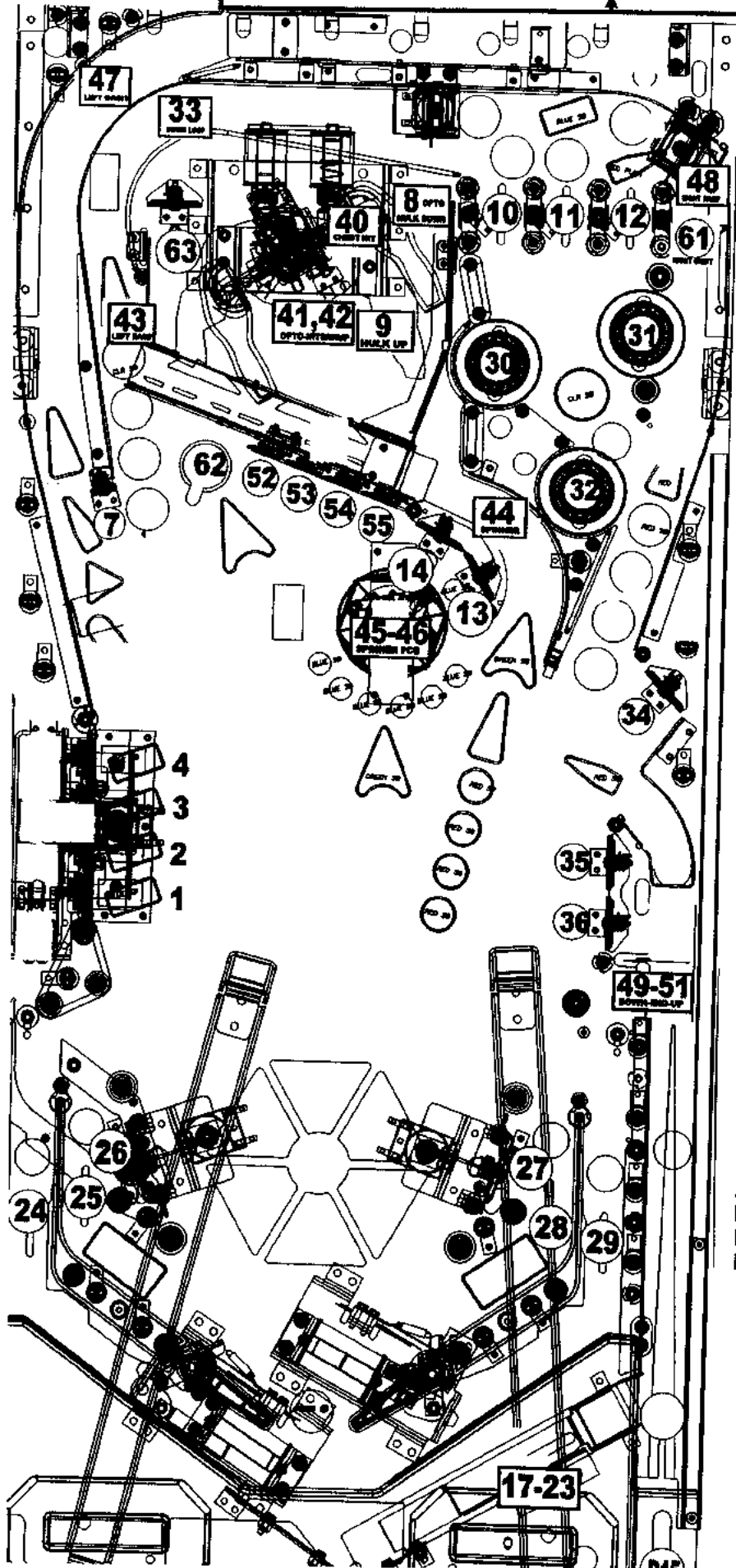
CPU/SND Board	01 S.W. D-1 LEFT COIN SLOT	02 S.W. D-2 CENTER COIN SLOT	03 S.W. D-3 RIGHT COIN SLOT	04 S.W. D-4 FRONT COIN SLOT	05 S.W. D-5 FRONT COIN SLOT	06 S.W. D-6 FRONT COIN SLOT	07 S.W. D-7 FRONT COIN SLOT	08 S.W. D-8 FRONT COIN SLOT	09 S.W. D-9 LEFT FLIPPER BUTTON	10 S.W. D-10 LEFT FLIPPER E.O.S.	11 S.W. D-11 RIGHT FLIPPER BUTTON	12 S.W. D-12 RIGHT FLIPPER E.O.S.	13 S.W. D-13 SHOOTER LANE	14 S.W. D-14 SHOOTER LANE	15 S.W. D-15 SHOOTER LANE	16 S.W. D-16 SHOOTER LANE
01 CPU/SND Board	S.W. D-1 LEFT COIN SLOT	S.W. D-2 CENTER COIN SLOT	S.W. D-3 RIGHT COIN SLOT	S.W. D-4 FRONT COIN SLOT	S.W. D-5 FRONT COIN SLOT	S.W. D-6 FRONT COIN SLOT	S.W. D-7 FRONT COIN SLOT	S.W. D-8 FRONT COIN SLOT	S.W. D-9 LEFT FLIPPER BUTTON	S.W. D-10 LEFT FLIPPER E.O.S.	S.W. D-11 RIGHT FLIPPER BUTTON	S.W. D-12 RIGHT FLIPPER E.O.S.	S.W. D-13 SHOOTER LANE	S.W. D-14 SHOOTER LANE	S.W. D-15 SHOOTER LANE	S.W. D-16 SHOOTER LANE

CPU/SND Board	01 S.W. D-17 RT PENOLUN	02 S.W. D-18 SLAM TILT	03 S.W. D-19 TICKET NOTCH	04 S.W. D-20 S.W. D-21 BLACK (GREEN)	05 S.W. D-22 MINUS (RED)	06 S.W. D-23 PLUS (RED)	07 S.W. D-24 SELECT (BLACK)	08 S.W. POS. #1 ON	09 S.W. POS. #2 ON	10 S.W. POS. #3 ON	11 S.W. POS. #4 ON	12 S.W. POS. #5 ON	13 S.W. POS. #6 ON	14 S.W. POS. #7 ON	15 S.W. POS. #8 ON
01 CPU/SND Board	S.W. D-17 RT PENOLUN	S.W. D-18 SLAM TILT	S.W. D-19 TICKET NOTCH	S.W. D-20 S.W. D-21 BLACK (GREEN)	S.W. D-22 MINUS (RED)	S.W. D-23 PLUS (RED)	S.W. D-24 SELECT (BLACK)	S.W. POS. #1 ON	S.W. POS. #2 ON	S.W. POS. #3 ON	S.W. POS. #4 ON	S.W. POS. #5 ON	S.W. POS. #6 ON	S.W. POS. #7 ON	S.W. POS. #8 ON

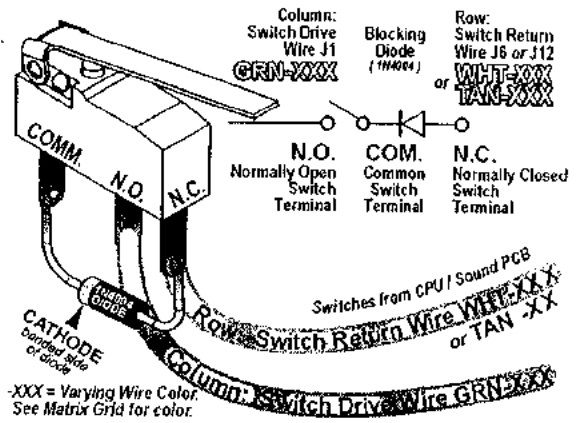
CPU/SOUND BD. SW1 DIP SWITCH (located between Connectors J3/J19)



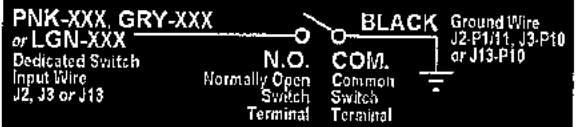
SWITCH MENU: SWITCH, ACTIVE, SINGLE & SERVICE



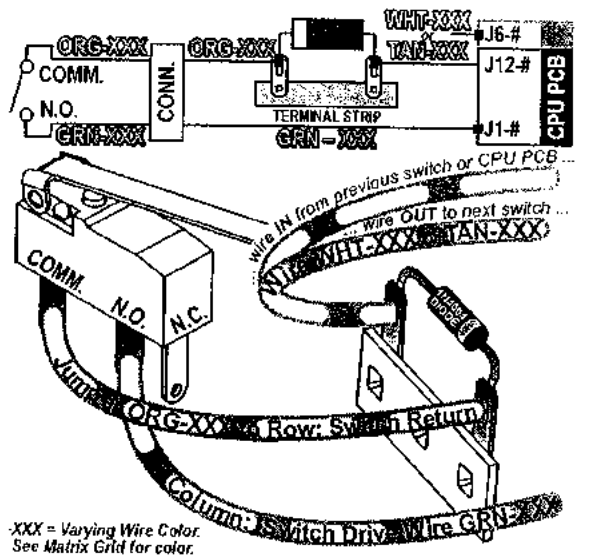
Typical Switch Wiring & Schematic



Dedicated Switch Schematic



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



LAMP MATRIX GRID [#1 - #80] (Lamp Locations : next page)

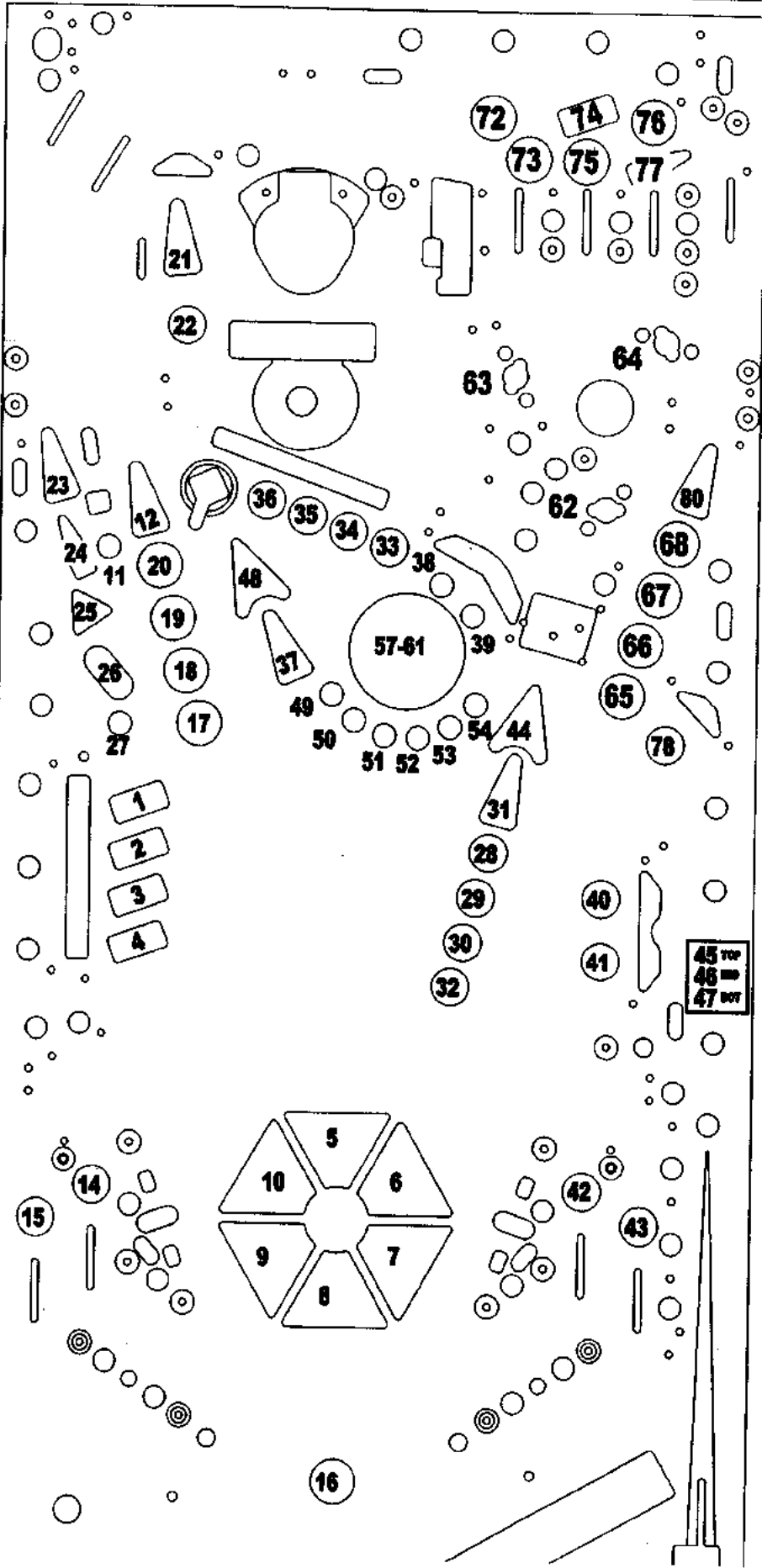
LED BD	LP #1	LED BD	LP #2	LED BD	LP #3	LED BD	LP #4	LED BD	LP #5	LED BD	LP #6	LED BD	LP #7	LED BD	LP #8
LED BD	LP #1	LED BD	LP #2	LED BD	LP #3	LED BD	LP #4	LED BD	LP #5	LED BD	LP #6	LED BD	LP #7	LED BD	LP #8
THO(R)	THO(R)	TH(O)R	T(H)OR	(T)HOR	CAPTAIN AMERICA	THOR	HAWKEYE	HULK							
LED BD	LP #9	LED BD	LP #10	LED BD	LP #11	LED BD	LP #12	LED BD	LP #13	LED BD	LP #14	LED BD	LP #15	LED BD	LP #16
BLACK WIDOW	IRONMAN	IRONMAN	TESSERACT STANDUP	LEFT INNER LOOP (RED)	CAPTAIN AMERICA #4	RETURN LANE	LEFT OUTLANE	LEFT ORBIT (PURPLE)	SHOOT AGAIN						
LED BD	LP #17	LED BD	LP #18	LED BD	LP #19	LED BD	LP #20	LED BD	LP #21	LED BD	LP #22	LED BD	LP #23	LED BD	LP #24
CAPTAIN AMERICA #1 (BOT)	CAPTAIN AMERICA #2	CAPTAIN AMERICA #3	CAPTAIN AMERICA #4	CAPTAIN AMERICA #4	HULK TARGET ARROW	SPECIAL	LEFT ORBIT (PURPLE)	HAWKEYE #4							
LED BD	LP #25	LED BD	LP #26	LED BD	LP #27	LED BD	LP #28	LED BD	LP #29	LED BD	LP #30	LED BD	LP #31	LED BD	LP #32
HAWKEYE #3	HAWKEYE #2	HAWKEYE #1 (BOT)	BLACK WIDOW #4	BLACK WIDOW #3	BLACK WIDOW #2	BLACK WIDOW #1	LEFT RAMP (RED)	BLACK WIDOW #1 (BOT)							
LED BD	LP #33	LED BD	LP #34	LED BD	LP #35	LED BD	LP #36	LED BD	LP #37	LED BD	LP #38	LED BD	LP #39	LED BD	LP #40
HULK	HULK	H(U)LK	(H)ULK	EXTRA BALL	TESSERACT STANDUP (L)	TESSERACT STANDUP (R)	R. 2 BANK TARGET (TOP)								
LED BD	LP #41	LED BD	LP #42	LED BD	LP #43	LED BD	LP #44	LED BD	LP #45	LED	LP #46	LED	LP #47	LED BD	LP #48
R. 2 BANK TARGET (BOT)	RIGHT RETURN LANE	RIGHT OUTLANE	LEFT RAMP GREEN	LOCK 3	LOCK 2	LOCK 1	HULK EJECT (GREEN)								
LED BD	LP #49	LED BD	LP #50	LED BD	LP #51	LED BD	LP #52	LED BD	LP #53	LED BD	LP #54	LED	LP #55	LED	LP #56
(C)OSMIC	(C(O)SMIC	CO(S)MIC	COS(M)IC	COSM(I)C	COSMIC(C)	START BUTTON	TOURNEY START								
LED BD	LP #57	LED BD	LP #58	LED BD	LP #59	LED BD	LP #60	LED	LP #61	LED	LP #62	LED	LP #63	LED	LP #64
TESSERACT #1	TESSERACT #2	TESSERACT #3	TESSERACT #4	TESSERACT #5	BOTTOM POP BUMPER	LEFT POP BUMPER	RIGHT POP BUMPER								
LED BD	LP #65	LED BD	LP #66	LED BD	LP #67	LED BD	LP #68	LED	LP #69	LED	LP #70	LED	LP #71	LED BD	LP #72
IRONMAN #1 (BOT)	IRONMAN #2	IRONMAN #3	IRONMAN #4												
LED BD	LP #73	LED BD	LP #74	LED BD	LP #75	LED BD	LP #76	LED BD	LP #77	LED BD	LP #78	LED	LP #79	LED BD	LP #80
TOP LANE (IRONMAN)	TOP LANE (THOR)	TOP LANE (CAPTAIN AMERICA)	TOP LANE (BLACK WIDOW)	TOP LANE (HAWKEYE)	SHIELD AGENT										
LED BD	LP #81	LED BD	LP #82	LED BD	LP #83	LED BD	LP #84	LED BD	LP #85	LED BD	LP #86	LED BD	LP #87	LED BD	LP #88



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

AVENGERS LIMITED EDITION LED MAP

55 = Start
56 = Tournament Start



COILS DETAILED CHART TABLE

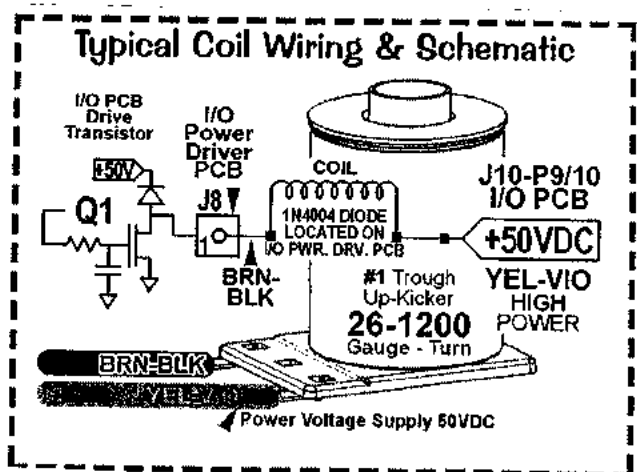
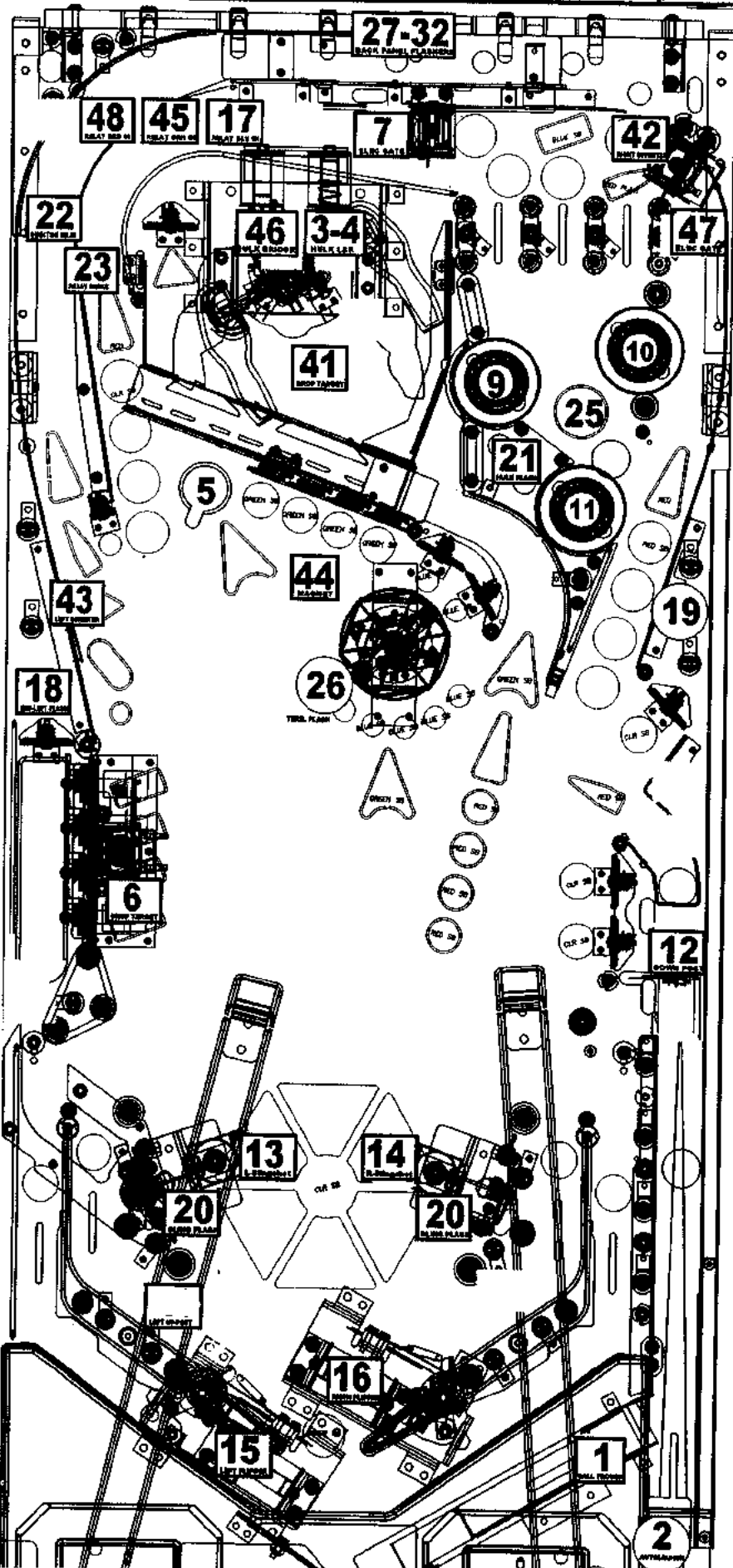
High Current Coils Group 1			Drive Transistor	Driver Output PCB	Power Line Color	Power Line Connection	Power Voltage	Drive Transistor Control Line Color	D.T. Control Line Connect	Coil GA-Turn or Bulb Type
#1	TROUGH UP-KICKER	Q1	▲ I/O Power Driver ▼		YEL-VIO	J10-P9/10	50VDC	BRN-BLK	J8-P1	28-1200 090-5044-ND
#2	AUTO LAUNCH	Q2		YEL-VIO	J10-P9/10	50VDC	BRN-RED	J8-P3	24-2940 090-5036-ND	
#3	HULK COUNTER CLOCKWISE	Q3		YEL-VIO	J10-P9/10	50VDC	BRN-ORG	J8-P4	23-800 090-5001-ND	
#4	HULK CLOCKWISE	Q4		YEL-VIO	J10-P9/10	50VDC	BRN-YEL	J8-P5	23-800 090-5001-ND	
#5	HULK EJECT	Q5		YEL-VIO	J10-P9/10	50VDC	BRN-GRN	J8-P6	28-1200 090-5044-ND	
#6	LEFT 4-BANK DROP RESET	Q6		YEL-VIO	J10-P9/10	50VDC	BRN-BLU	J8-P7	28-1240 090-5034-ND	
#7	ORBIT CONTROL GATE (LEFT)	Q7		YEL-VIO	J10-P9/10	50VDC	BRN-VIO	J8-P8	32-1250 090-5080-01- sin	
#8	SHAKER MOTOR (OPTIONAL)	Q8		RED-WHT	J17-P7	16VAC	BRN-GRY	J8-P9	502-5027-00	
High Current Coils Group 2			Drive Transistor	Driver Output PCB	Power Line Color	Power Line Connection	Power Voltage	Drive Transistor Control Line Color	D.T. Control Line Connect	Coil GA-Turn or Bulb Type
#9	LEFT POP BUMPER	Q9	▲ I/O Power Driver ▼		YEL-VIO	J10-P9/10	50VDC	BLU-BRN	J8-P1	28-1200 090-5044-ND
#10	RIGHT POP BUMPER	Q10		YEL-VIO	J10-P9/10	50VDC	BLU-RED	J8-P2	28-1200 090-5044-ND	
#11	BOTTOM POP BUMPER	Q11		YEL-VIO	J10-P9/10	50VDC	BLU-ORG	J8-P4	28-1200 090-5044-ND	
#12	LOKI LOCKUP	Q12		YEL-VIO	J10-P9/10	50VDC	BLU-YEL	J8-P5	28-1200 090-5044-ND	
#13	LEFT SLINGSHOT	Q13		YEL-VIO	J10-P9/10	50VDC	BLU-GRN	J8-P6	28-1200 090-5044-ND	
#14	RIGHT SLINGSHOT	Q14		YEL-VIO	J10-P9/10	50VDC	BLU-BLU	J8-P7	28-1200 090-5044-ND	
#15	LEFT FLIPPER (50V RED/YEL)	Q15		GRY-YEL-3A Fuse-RED-YEL	J10-P6/7	50VDC	ORG-GRY	J8-P8	22-1085 090-5032-ND	
#16	RIGHT FLIPPER (50V RED/YEL)	Q16		BL-YEL-3A Fuse-RED-YEL	J10-P6/7	50VDC	ORG-VIO	J8-P9	22-1089 090-5032-ND	
Low Current Coils Group 1			Drive Transistor	Driver Output PCB	Power Line Color	Power Line Connection	Power Voltage	Drive Transistor Control Line Color	D.T. Control Line Connect	Coil GA-Turn or Bulb Type
#17	RELAY (BLUE)	Q17	▲ I/O Power Driver ▼		BRN	J7-P1	20VDC	VIO-BRN	J7-P2	190-5004-00
#18	FLASH: LEFT SIDE	Q18		ORG	J6-P10	20VDC	VIO-RED	J7-P3	#88 BULB 185-5006-88	
#19	FLASH: RIGHT SIDE	Q19		ORG	J6-P10	20VDC	VIO-ORG	J7-P4	#89 BULB 185-5006-89	
#20	FLASH: SLINGSHOT (X2)	Q20		ORG	J6-P10	20VDC	VIO-WHT	J7-P6	#906 BULB 185-5004-00	
#21	FLASH: HULK	Q21		ORG	J6-P10	20VDC	VIO-GRN	J7-P7	#905 BULB 185-5004-00	
#22	BRIDGE MOTOR	Q22		BRN	J7-P1	20VDC	VIO-BLU	J7-P8	190-5004-00	
#23	BRIDGE MOTOR RELAY	Q23		BRN	J7-P1	20VDC	VIO-BLK	J7-P9	190-5004-00	
#24	OPTIONAL (e.g. COIN METER)	Q24		RED	J16-P4-8	5VDC	VIO-GRY	J7-P10	COIN METER	
Low Current Coils Group 2			Drive Transistor	Driver Output PCB	Power Line Color	Power Line Connection	Power Voltage	Drive Transistor Control Line Color	D.T. Control Line Connect	Coil GA-Turn or Bulb Type
#25	FLASH: POP BUMPER	Q25	▲ I/O Power Driver ▼		ORG	J6-P10	20VDC	BLK-BRN	J6-P1	#87 BULB 185-5000-89
#26	FLASH; TESSERACT	Q26		ORG	J6-P10	20VDC	BLK-RED	J6-P2	#908 BULB 185-5004-00	
#27	FLASH; BACKPANEL (LEFT)	Q27		ORG	J6-P10	20VDC	BLK-ORG	J6-P3	#89 BULB 185-5000-89	
#28	FLASH: BACKPANEL # 2	Q28		ORG	J6-P10	20VDC	BLK-YEL	J6-P4	#89 BULB 185-5000-89	
#29	FLASH: BACKPANEL # 3	Q29		ORG	J6-P10	20VDC	BLK-GRN	J6-P5	#89 BULB 185-5000-89	
#30	FLASH: BACKPANEL # 4	Q30		ORG	J6-P10	20VDC	BLK-BLU	J6-P6	#89 BULB 185-5000-89	
#31	FLASH: BACKPANEL # 5	Q31		ORG	J6-P10	20VDC	BLK-VIO	J6-P7	#89 BULB 185-5000-88	
#32	FLASH: BACKPANEL (RIGHT)	Q32		ORG	J6-P10	20VDC	BLK-GRY	J6-P8	#89 BULB 185-5000-89	

GO TO DIAGNOSTICS MENU

GO TO COIL MENU

SINGLE COIL TEST

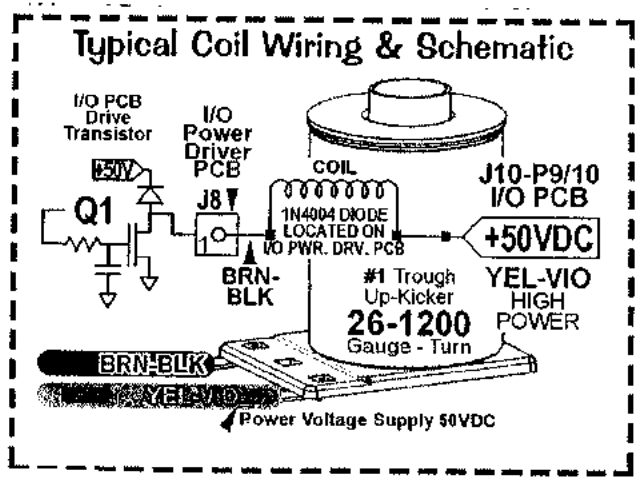
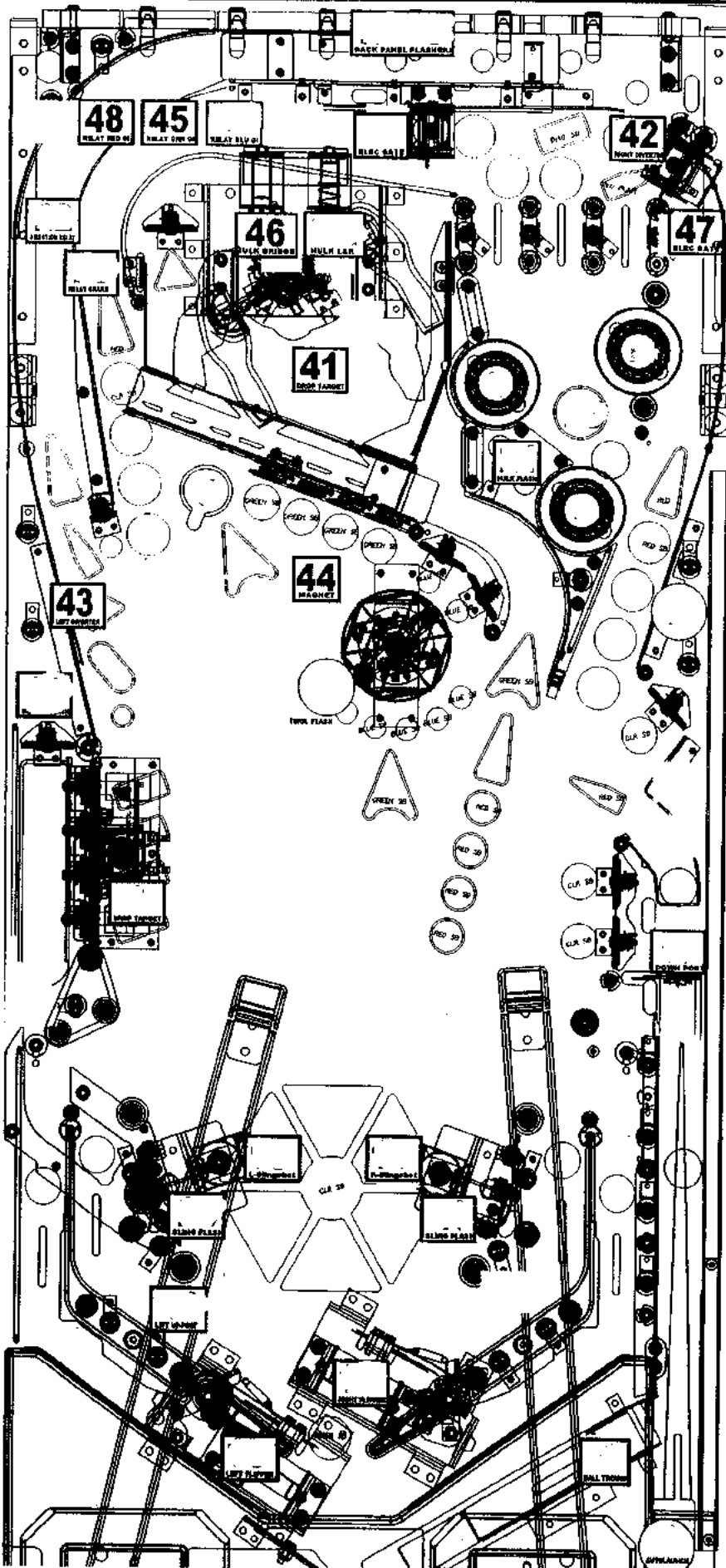
COIL MENU: SINGLE COIL & CYCLING COIL



Driver N.O	Assembly Name	Drive Transistor	PWR line color	PWR voltage	Control line color	Coil Type
#41	Center 4-bank drop reset	Q1	YEL-VIO	50VDC	ORG-GRY	25-1240 (090-5034-ND)
#42	Ramp control gate (Right)	Q2	YEL-VIO	50VDC	ORG-RED	32-1800 (515-6595-01-ND)
#43	Ramp control gate (Left)	Q3	YEL-VIO	50VDC	ORG-BLU	32-1800 (515-6595-01-ND)
#44	Hulk magnet	Q4	VIO-YEL	50VDC	ORG-BRN	22-650 (090-5076-00)
#45	Relay (Green)	Q5	GRY	20VDC	ORG-GRN	190-5004-00
#46	Hulk arms	Q6	YEL-VIO	50VDC	ORG-BLK (step-up)	24-940 (090-5036-ND-NLB)
#47	Orbit control gate (Right)	Q7	YEL-VIO	50VDC	ORG-VIO	32-1250 (090-5060-01-ND)
#48	Relay (Red)	Q8	GRY	20VDC	ORG-YEL	190-5004-00



COIL MENU: SINGLE COIL & CYCLING COIL





CHOOSE EARNINGS or STANDARD AUDITS

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

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

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



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

EARNINGS AUDITS [#1 - #13] ▼

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

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

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

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

STANDARD AUDITS [#1 - #59] ▼

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

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

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

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



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

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

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

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

Adjustment Number
Adjustment Name
Adjustment Setting
Adjustment Comment

STANDARD ADJUSTMENT #1
REPLAY TYPE
AUTO
(INSTALLED/FACTORY DEFAULT)

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

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

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

STANDARD ADJUSTMENTS [#1 - #63] ▼

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

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

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

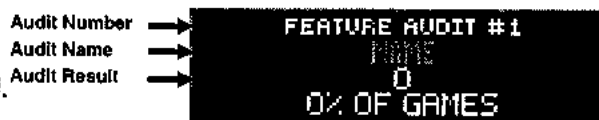


GO TO AUDITS MENU: FEATURE AUDITS [#1 - #+]

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

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

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



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

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

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

Feature Audits are subject to change (with or without notice). View **Feature Audits on the Dot Display only**. To export all audits to your memory stick (creating a text file), perform the following. Enter the **AUDITS MENU**, then enter the **DUMP AUDITS TO USB**. Note: The **"DUMP"** icon can also be accessed in the **USB MENU** via the **UTILITIES MENU** (see the *Utilities Section (GO TO USB MENU)* for details).



Step 1 Insert your **USB Compatible Memory Stick** into the USB port on the CPU/Sound Board (S.A.M. System). If the Memory Stick has space available and is free of errors, a dated file* is generated (* ensure your Date & Time is set prior to selecting or the dated file will have the default date of 20XX_01_01; see Section 3, Chapter 5, SET DATE / TIME via the **UTILITIES MENU** for details).



Step 2 Press [SELECT] to save the file to your Memory Stick. Press [SELECT] again to continue or [BACK] to exit or escape at any time.



Step 3 Remove the Memory Stick and insert into your PC or Mac to save the file (which can then be copied, printed or emailed). The audits are numbered sequentially *without* a number restart between the three types of audits (Earnings, Standard and Feature).



GO TO ADJUSTMENTS MENU: FEATURE ADJUSTMENTS [#1 - #+]

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

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

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



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

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

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

Feature Adjustments are subject to change (with or without notice). View **Feature Adjustments on the Dot Display only**. Use the **Installs Menu** (via the **UTILITIES MENU**) to automatically change a select group of Feature Adjustments (see the *Utilities Section*) or adjust them one-by-one.

POWER REQUIREMENTS



This game **must be connected to a properly grounded outlet to reduce shock hazard** and insure proper game operation. See the Yellow Pages (Schematics & Wiring), for transformer connections required for Normal, High, and Low Line conditions.



Normal Line	AVG OPERATION	MAX OPERATION
Domestic use an 8AMP 250v Slo-Blo Fuse.	CURRENT: 2.8AMP WATTAGE: 329w	CURRENT: 8AMP WATTAGE: 940w
High Line	AVG OPERATION	MAX OPERATION
Export use 2x 5AMP 250v Slo-Blo Fuses. (*England & Hong Kong use an 8AMP 250v S/B Fuse.)	CURRENT: 1.8AMP WATTAGE: 412w	CURRENT: 5AMP 8AMP* WATTAGE: 1145w 1832w*
<small>England & Hong Kong Use 8/1 SA Fuse</small>		
Low Line	AVG OPERATION	MAX OPERATION
Export Japan Only use an 8AMP 250v Slo-Blo Fuse.	CURRENT: 2.6AMP WATTAGE: 264w	CURRENT: 8AMP WATTAGE: 812w

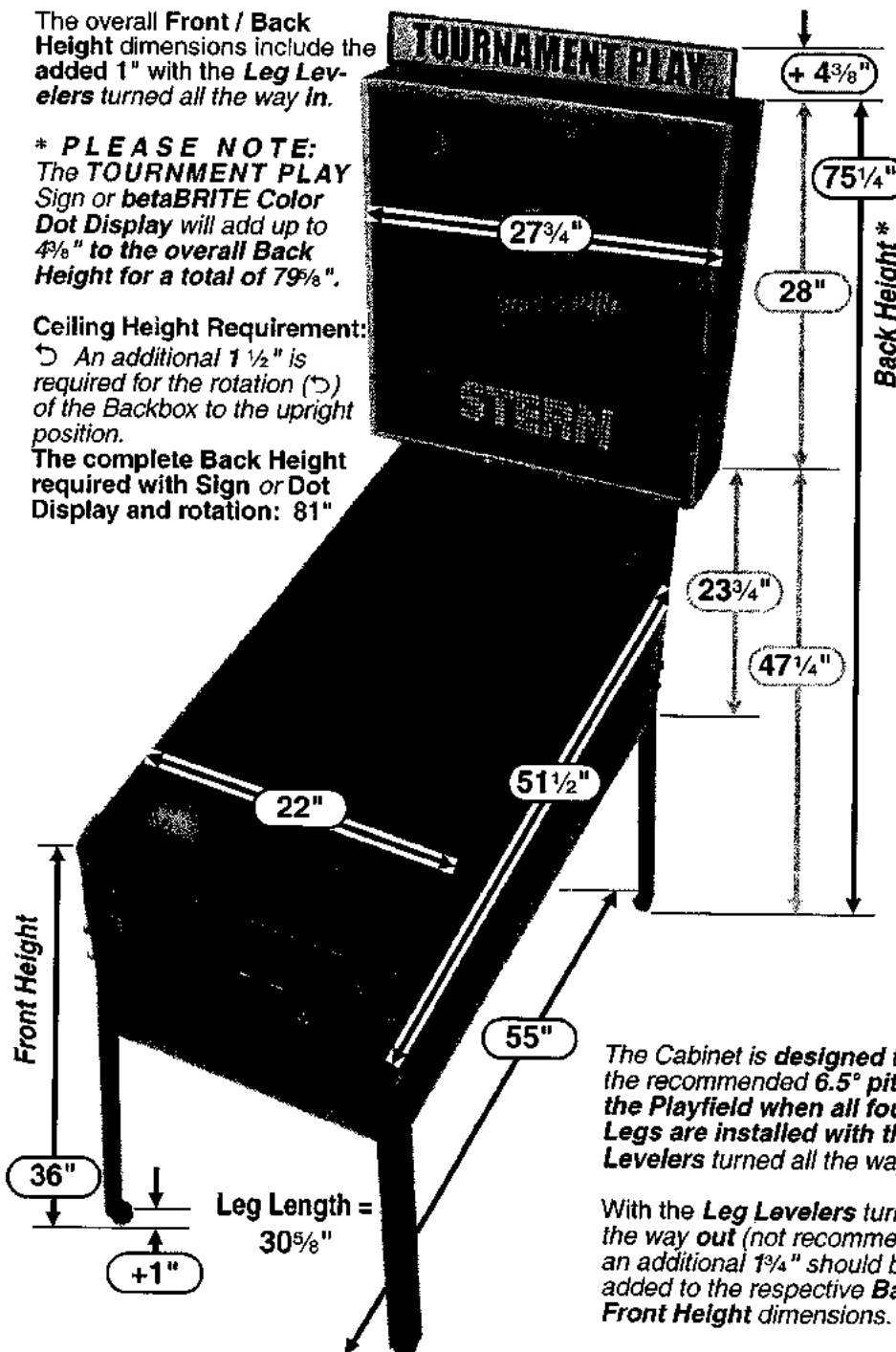
GAME DIMENSIONS

TRANSPORTATION

The overall Front / Back Height dimensions include the added 1" with the Leg Levelers turned all the way in.

*** PLEASE NOTE:** The TOURNAMENT PLAY Sign or betaBRITE Color Dot Display will add up to 4 7/8" to the overall Back Height for a total of 79 1/8".

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



BEFORE TRANSPORTING



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

Read & follow the next page on **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

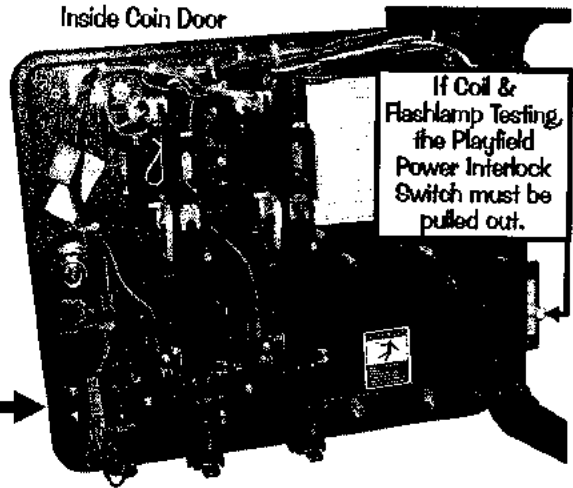
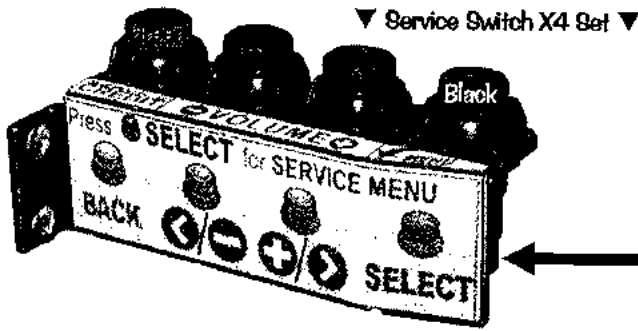
Height 56" Width 31"
Depth 31"
Approx. Unboxed Weight: 260lbs. (+/- 10)
Boxed Weight:
Wt. 290lbs. (+/- 15)

CAUTION

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

Service Switch X4 Set Access & Use

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



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

Pushing the **GREEN BUTTON** first.

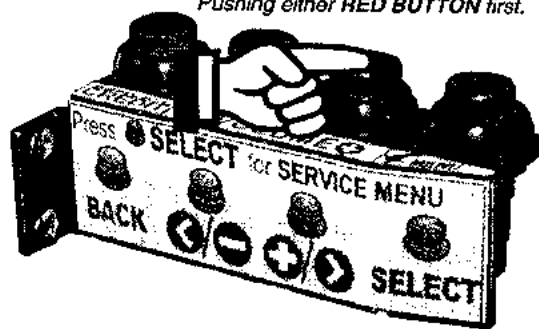
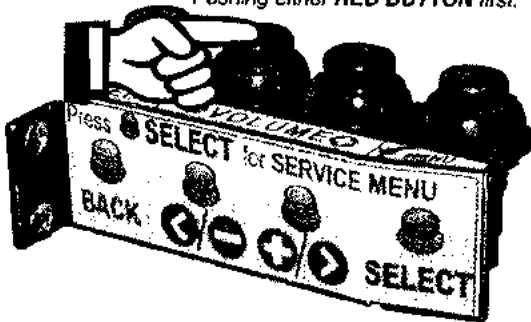
◀ Function 1: SERVICE CREDITS MENU

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

Note: Once your credits are added, this menu will automatically exit a few seconds after the last button depression or when the **Green [BACK]** or **Black [SELECT] Button** is pushed. This function is disabled if **Standard Adjustment 38, Free Play**, is set to **YES**. The **Service Credits** are limited to the **Credit Limit** in addition to any paid credits present in the game (e.g. If the **Credit Limit** is 30, with 8 paid credits present, only 22 Credits can be applied.).

Pushing either **RED BUTTON** first.

Pushing either **RED BUTTON** first.



▲ Function 2: VOLUME MENU ▲

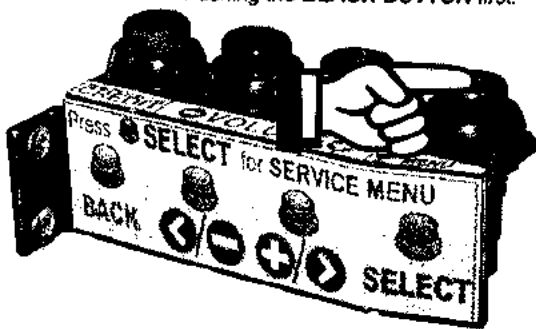
Pushing either of the **Red [VOLUME] Buttons** first, enters the **VOLUME MENU**. While in this Mode, to **DECREASE** the volume, hold down or depress the **1st Red [</-] Button** until desired the volume is achieved; to **INCREASE** the volume, hold down or depress the **2nd Red [+/>] Button** until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

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

Pushing the **BLACK BUTTON** first.

◀ Function 3: SERVICE MENU

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





Exit Service Menu

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



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



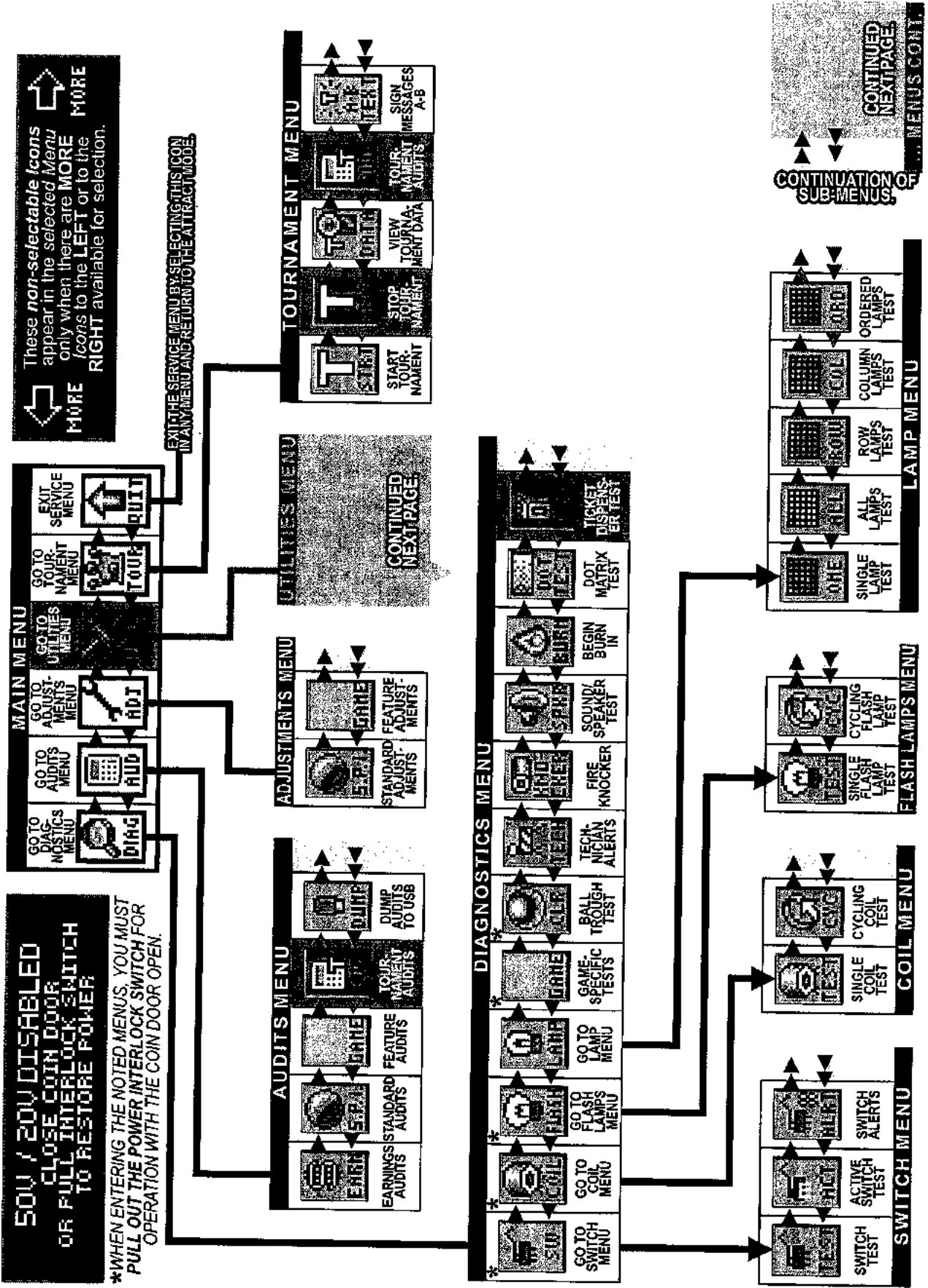
The below **Problem / Solution Table** was designed to answer some common problems frequently asked.

Problem / Solution Table

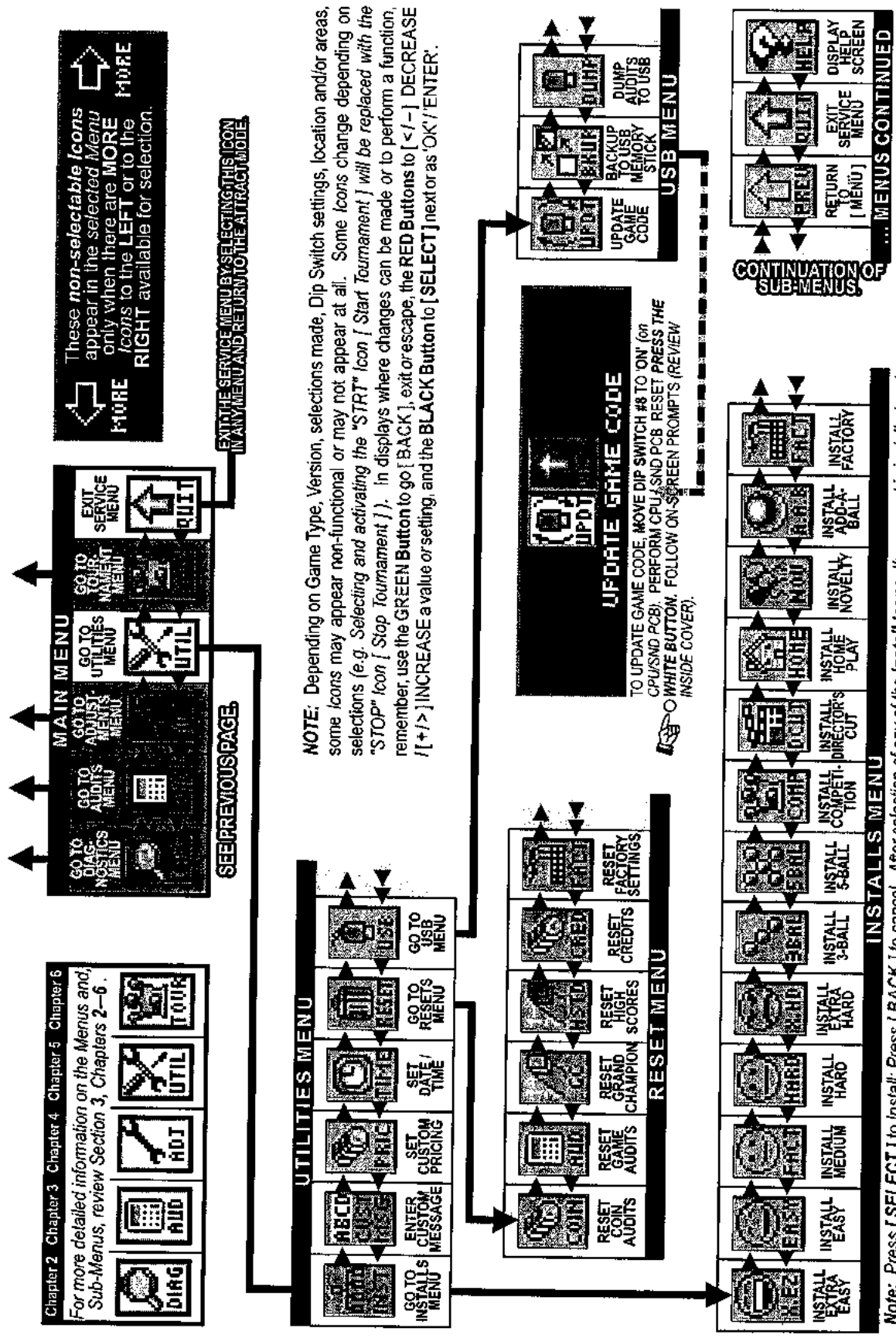
PROBLEM	SOLUTION
Will not enter the SERVICE MENU after depressing the Black [SELECT] Button .	<ul style="list-style-type: none"> • Check the Service Switches [GREEN, RED (x2) & BLACK Buttons] for loose connections or bad ground. • Check the associated wiring harness to/from the CPU/Sound Board, Connector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

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

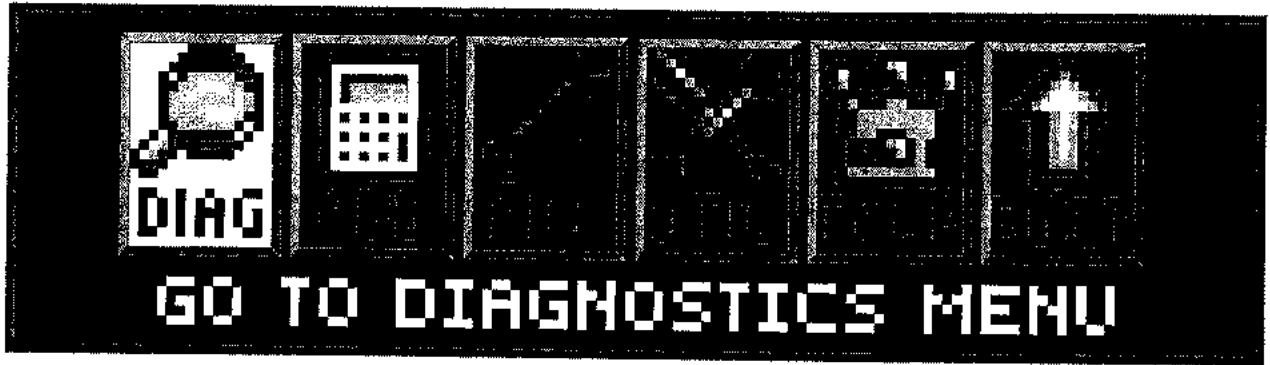
Pinball Service Menu Icon Tree



Pinball Service Menu Icon Tree Continued



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



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

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

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

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



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

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



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

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



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

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



Go To Switch Menu

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

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



Switch Test

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

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

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



Active Switch Test

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



Switch Alerts

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

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



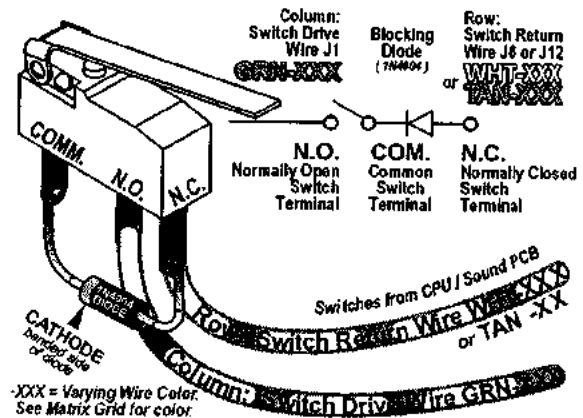
D-24 position is highlighted and accompanied by a short audible tone when pressed.



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

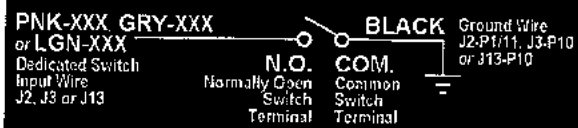


Typical Switch Wiring & Schematic



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

Dedicated Switch Schematic



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



Diagnosics



Go To Coil Menu

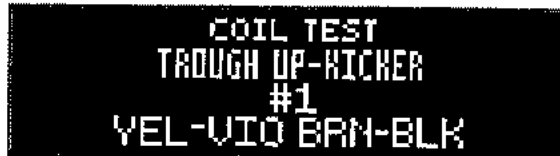
To initiate, from the **DIAGNOSTICS MENU**, select the "COIL" *Icon*. Coils #01 - #16 are typically High Current Coils (although Low Current Coils may be used in these positions & will be noted). Coils #17 - #32 are typically Low Current Coils. Flash Lamps are typically used in positions #25 - #32 (although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

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

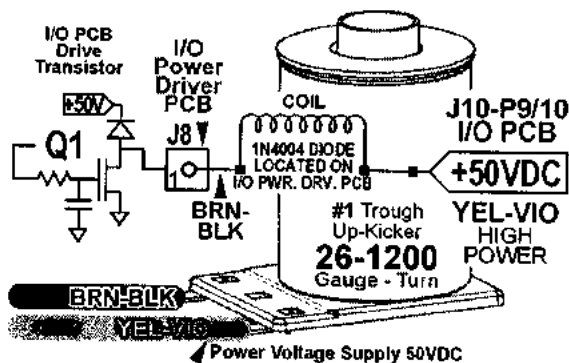


Single Coil Test

To initiate, from the **COIL MENU**, select the "TEST" *Icon*. Ensure the **Power Interlock Switch** is pulled out if testing with the Coin Door open. Upon entering **Single Coil Test**, you will notice the #1 coil is shown. The Dot Matrix Display will indicate the coil or flash lamp name, coil (solenoid) or flash lamp number and the Coil or Flash Lamp Power Line / Drive Transistor Control Line wire colors. To determine the "Pin-Outs" from the I/O Power Driver Board, the Coil Voltage Gauge-Turns (e.g. 23-800) or lamp type (e.g. #89 or #906 Bulb), view the Coils Detailed Chart Table at the beginning of this manual or for more on troubleshooting and diagnosing, see the Yellow Pages (Schematics & Wiring).



Typical Coil Wiring & Schematic



Cycling Coil Test

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



Go To Flash Lamps Menu

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

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

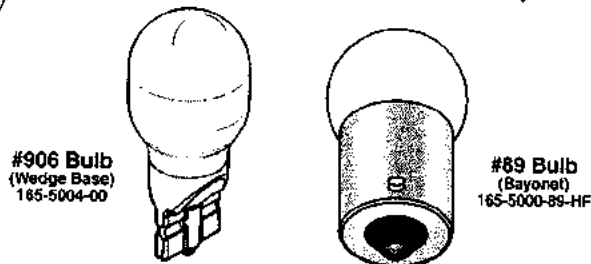


Single Flash Lamp Test

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



Bulb Types used for Flash Lamps



Cycling Flash Lamp Test

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



Go To Lamp Menu

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

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

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



Single Lamp Test

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

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

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



All Lamps Test

To initiate, from the **LAMP MENU**, select the "ALL" *Icon*. Upon entering **All Lamps Test**, you will notice the Dot Matrix Display is flashing **ALL LAMPS ON** and the lamps on the playfield will be lit, alternating between the rows in the Lamp Matrix Grid. The Dot Matrix Display will light up (*highlight*) all of the *dots* in the on-screen matrix.

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



Row Lamps Test

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

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

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

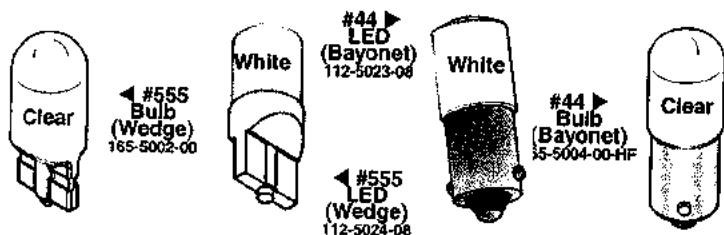


Column Lamps Test

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

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

Bulb Types used for Control Lamps



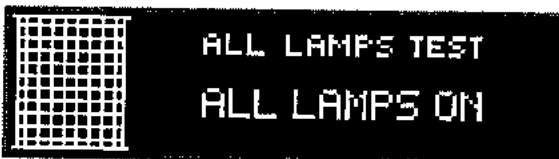
* If not required in this game, *Icon* will not be shown.



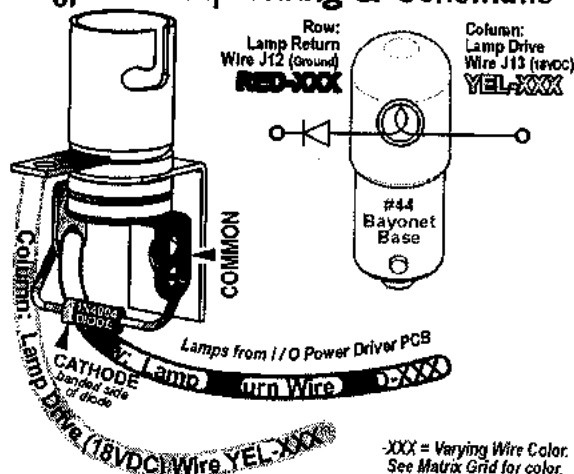
Ordered Lamps Test

To initiate, from the **LAMP MENU**, select the "ORD" *Icon*.

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



Typical Lamp Wiring & Schematic



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



Game-Specific Tests

To initiate, from the **DIAGNOSTICS MENU**, select the "GAME" *Icon*. Ensure the **Power Interlock Switch** is pulled out when testing with the Coin Door open. This Menu is provided to allow the technician a simple method of testing game specific coils and/or switches, if required. If used, select the *Icon* (and Sub-Menu *Icons*, if any) and follow on-screen prompts.



Ball Trough Test

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



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

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



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



Technician Alerts

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

TECHNICIAN ALERT - (0/0)

NO TECHNICIAN ALERTS

PRESS 'BACK' TO EXIT



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

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

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

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

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

Technician Alerts continued on the next page.



Technician Alerts continued from previous page.

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



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

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

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

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

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

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



Diagnoses



Knocker Test

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

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



Sound / Speaker Test

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

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



Speaker Phase Testing

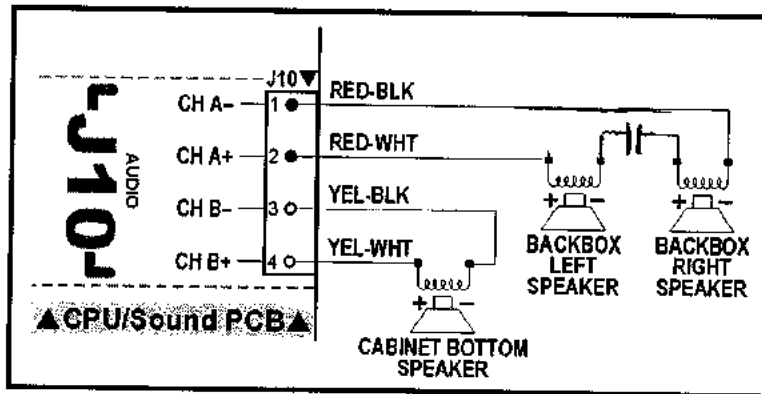
Connections to each of speakers are polarized and each must be connected appropriately for the best quality sound. If one speaker has the positive and negative connections reversed with respect to the other one, bass frequencies will not be produced properly and the overall sound quality will be poor.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

Speaker Phase Testing cont. next page.



Speaker Phase Testing continued from previous page.

If the sound is not balanced or doesn't sound correct, check the speaker wiring.



1. Check each speaker for polarity markings. If the speakers have polarity markings, verify that the Backbox Speaker's RED-BLK Wires and the Cabinet Speaker YEL-BLK Wire(s) are connected to the negative (-) terminal.

2. Disconnect the speaker output Connector J10 (AUDIO) from the CPU / Sound PCB (in the Backbox) and connect a 1.5-volt battery across each speaker pair one at a time while observing the speakers.

3. Make sure the positive (+) battery terminal is connected to the positive lead [J10, Pin-2, CH A+] (RED-WHT) or [J10, Pin-4, CH B+]

(YEL-WHT) each time. As the connection is made, check speaker cone movement; proper connections are indicated by outward movement.



Begin Burn-In

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

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



Dot Matrix Test

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

Test 1

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

Test 2

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

Test 3

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

Test 4

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

Test 5

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

Test 1

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



Ticket Dispenser Test

To initiate, from the **DIAGNOSTICS MENU**, select the "TIX" *Icon*. This Menu (*Icon*) will only appear if **Standard Adjustment 56, Ticket Dispenser**, is set to **YES** (Default = **NO***). ***Note:** *Some games shipped from the factory with a unique Dip Switch Setting will default to YES*. To view and/or change your setting, see *Adjustments Section (GO TO ADJUSTMENTS MENU)*. Please remember, if you install an optional Ticket Dispenser, and your default setting is "NO," you will have to reset it back to "YES" if a **Factory Reset** is performed.

After selecting this *Icon*, the **Ticket Dispenser Test** will start. With the Ticket Dispenser properly installed, manually feed your tickets into the dispenser. The dispenser will activate and pull in the first ticket. Press the **Black [SELECT] Button** (which energizes Coil #35, Aux 3: Switched Ground) to advance a ticket. Feeding your Tickets into the dispenser works because Coil #33, Aux 1: Ticket Advance (Enable) is always 'energized'. With a Ticket Meter installed, as one Ticket Passes through the Ticket Dispenser, one 'click' is fired to the Meter (Coil #34, Aux 2: Ticket Meter) for each ticket passing through. Dedicated Switch **D-19, Ticket Notch**, will also be indicated on-screen (*in combination with a audible sound*) as "closing" as the notch between the tickets passes through. In this test you can clear ticket jams and check and/or clear tickets in Escrow, if necessary. To return to the **DIAGNOSTICS MENU**, press the **Green [BACK] Button**.



To initiate, from the **MAIN MENU**, select the "AUD" *Icon*. The **AUDITS MENU** provides 99* Audits for accounting purposes and for evaluation of *Game Programming*. The Audits are divided into 4 groups: • **Earnings Audits** [#1 – #13], • **Standard Audits** [#1 – #59], • **Feature Audits (Programming Use Only)** [#1 – #+] and • **Tournament Audits** [#1 – #14], "T AUD" *Icon* provided as an alternate access to Tournament Audits (*if data is available). For more information on the **TOURNAMENT MENU**, review the *Tournament Section (GO TO TOURNAMENT MENU)*. Try the "DUMP AUDITS TO USB" feature to create a text file of your audits. Don't forget to set the **DATE & TIME** in the **UTILITIES MENU**. See the *Utilities Section (GO TO UTILITIES MENU)*, for more information.

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

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

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



Earnings Audits [#1 – #13]

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

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



Standard Audits [#1 - #59]

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

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

Standard Audits 28-59 continued on the next page.



Standard Audits Continued

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



Feature Audits [#1 - #+]

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

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

Feature Audits are subject to change (with or without notice). View **Feature Audits** on the Dot Display only. To export all audits to your memory stick (creating a text file), perform the following. Enter the **AUDITS MENU**, then enter the **DUMP AUDITS TO USB**. **Note:** The "DUMP" icon can also be accessed in the **USB MENU** via the **UTILITIES MENU** (see the Utilities Section (GO TO USB MENU) for details).



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

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



Dump Audits To USB (Memory Stick)

To initiate, from the **USB MENU**, select the "DUMP" icon. Follow the on-screen prompts to perform a **Data Dump (download)**. A dated text file will be created on your USB Memory Stick.

Audits



Step 1 Insert your **USB Compatible Memory Stick** into the USB port on the CPU/Sound Board (S.A.M. System). If the Memory Stick has space available and is free of errors, a dated file* is generated (* ensure your Date & Time is set prior to selecting or the dated file will have the default date of 20XX_01_01; see the Utilities Section (SET DATE / TIME) for details).

Step 2 Press [**SELECT**] to save the file to your Memory Stick. Press [**SELECT**] again to continue or [**BACK**] to exit or escape at any time.

Step 3 Remove the Memory Stick and insert into your PC or Mac to save the file (which can then be copied, printed or emailed). The audits are numbered sequentially *without* a number restart between the three types of audits (Earnings, Standard and Feature).

Note: The "DUMP" icon can also be accessed in the **USB MENU** via the **UTILITIES MENU** (see the Utilities Section (GO TO USB MENU) for details).

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

COUNTRY SETTING OPTION(S)		COIN MECHANISMS (SWITCHES)				PRICING SCHEME			Requires SPI Coin Card(s) Part Number		
		COINS THRU ... SLOT:									
		LEFT	CENTER	RIGHT	4TH						
Pos. 1 2 3 4 5 6 7 8	Default Highlighted					USD // UNITED STATES DOLLAR // (\$)					
ON	USA 1					1/0.25			755-5400-01-Y		
OFF	USA 2					1/0.50	2/0.75	3/1.00	755-5400-03-Y		
	USA 3					1/0.50			755-5400-02-Y		
	USA 4					1/0.50			755-5400-02-Y		
	USA 5	0.25 1.00 0.25				1/0.50 2/1.00	3/1.50	5/2.00	755-5400-03-Y		
	USA 6					1/0.50	2/1.4 X 25c	3/1.00			
	USA 7					1/0.50 2/1.00	4/1.50	6/2.00			
	USA 8					1/0.50	3/1.00		755-5400-00-Y		
	USA 9					1/1.00			755-5400-07-Y		
	USA 10					1/0.75	2/1.50	3/2.00	755-5400-11-Y		
	USA 11					1/1.00	3/2.00				
Pos. 1 2 3 4 5 6 7 8	Default Highlighted					AUD // AUSTRALIAN DOLLARS // (\$ AUS)					
ON	AUSTRALIA 1	0.20	1.00	2.00		1/1.00	3/2.00	755-5406-00-Y			
OFF	AUSTRALIA 2					1/1.00			(1 Side)		
	AUSTRALIA 3					1/2.00					
	AUSTRALIA 4					1/2.00	2/4.00	3/5.00			
	AUSTRALIA 5					1/3.00	2/5.00	3/8.00	5/10.00		
	AUSTRALIA 6					1/2.00	2/3.00				
Pos. 1 2 3 4 5 6 7 8	Default Highlighted					CAD // CANADIAN DOLLARS // (\$ CAN)					
ON	CANADA 1 [25c door]	0.25	0.25	1.00	2.00	1/0.50	2/0.75	3/1.00	755-5400-00-Y		
OFF	CANADA 2 [dollar door]	1.00		2.00		1/1.00	3/2.00		-01-Y or -02-Y		
	CANADA 3					1/1.00			755-5400-10-Y		
Pos. 1 2 3 4 5 6 7 8	Default Highlighted					HRK // CROATIAN KUNA // (kuna)					
ON	CROATIA	1	2	5		1/3	2/5		755-5410-00-Y		
OFF									(2-Sided)		
Pos. 1 2 3 4 5 6 7 8	Default Highlighted					DKK // DANISH KRONER // (Kr)					
ON	DENMARK 1	1	5	10	20	1/3	2/5		755-5402-00-Y		
OFF	DENMARK 2					1/2	2/4	3/5	4/7	5/9	7/10
	DENMARK 3									(2-Sided)	
Pos. 1 2 3 4 5 6 7 8	Default Highlighted					JPY // JAPANESE YEN // (¥)					
ON	JAPAN 1	100		100		1/100			755-5408-01-Y		
OFF	JAPAN 2					1/100	3/200		(2-Sided)		
Pos. 1 2 3 4 5 6 7 8	Default Highlighted					LTL // LITHUANIA LITAI // (Lt)					
ON	LITHUANIA	1	2	5		1/2			755-5416-00-Y		
OFF									(1 Side)		
Pos. 1 2 3 4 5 6 7 8	Default Highlighted					TOKEN // Middle East currency used to buy token // (TOKEN)					
ON	MIDDLE EAST	token		token		1/1			755-5416-00-Y		
OFF									(use Side 1)		
Pos. 1 2 3 4 5 6 7 8	Default Highlighted					NZD // NEW ZEALAND DOLLAR // (\$ NZD)					
ON	NEW ZEALAND 1	1		2		1/1			755-5405-00-Y		
OFF	NEW ZEALAND 2					1/1	3/2		(Side 2)		
Pos. 1 2 3 4 5 6 7 8	Default Highlighted					NOK // NORWEGIAN KRONE // (Kr)					
ON	NORWAY 1	10	5	20		1/10			755-5403-01-Y or		
OFF	NORWAY 2					1/10	3/20		-02-Y / (2-Sided)		
	NORWAY 3					1/20			755-5403-03-Y		
	NORWAY 4					1/20	3/40		(2-Sided)		
	NORWAY 5					1/10					
	NORWAY 6					1/10	3/20				
	NORWAY 7					1/20					
	NORWAY 8					1/20	3/40				
Pos. 1 2 3 4 5 6 7 8	Default Highlighted					RUB // RUSSIAN RUBLE // (Ruble)					
ON	RUSSIA	10	5	1		1/5			755-5411-00-Y		
OFF									(2-Sided)		
Pos. 1 2 3 4 5 6 7 8	Default Highlighted					ZAR // SOUTH AFRICAN RAND // (R)					
ON	SO. AFRICA 1	0.50	1.00	2.00	5.00	1/2.00			755-5409-01-Y		
OFF	SO. AFRICA 2					1/3.00	2/5.00		(2-Sided)		
Pos. 1 2 3 4 5 6 7 8	Default Highlighted					SEK // SWEDISH KRONOR // (kr)					
ON	SWEDEN 1	1	5	10		1/10	2/15	3/20	755-5404-00-Y		
OFF	SWEDEN 2					1/5			(2-Sided)		
Pos. 1 2 3 4 5 6 7 8	Default Highlighted					CHF // SWISS FRANCS // (Sfr)					
ON	SWITZERLAND 1	1	2	5		1/1	2/2	3/3	4/4	6/5	
OFF	SWITZERLAND 2					1/1	3/2		9/5	755-5405-00-Y	
	SWITZERLAND 3									(2-Sided)	
Pos. 1 2 3 4 5 6 7 8	Default Highlighted					TWD // TAIWANESE DOLLAR // (TWD)					
ON	TAIWAN	10		10		1/10			755-5412-00-Y		
OFF									(use Side 1)		
Pos. 1 2 3 4 5 6 7 8	Default Highlighted					GBP // UNITED KINGDOM POUNDS // (£)					
ON	UK 1	0.10	0.50	1.00	0.20	2£			755-5407-00-Y		
OFF	UK 2					3/1.00	7/2.00		755-5407-01-Y		
	UK 3					4/1.00			755-5407-01-Y		
	UK 4					1/0.50	2/1.00	5/2.00	755-5407-01-Y		
	UK 5					1/0.30	2/0.60	3/0.90	4/1.00	755-5407-01-Y	
	UK 6					1/1.00	3/2.00		755-5407-01		

Adjustments



Standard Adjustment 18, Game Pricing, continued.

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

CPU/SOUND/PB DIP SWITCH SW1 SETTING		COUNTRY SETTING OPTION(S)	COIN MECHANISMS (SWITCHES) COINS THRU ... SLOT:				PRICING SCHEME Number of Balls (Credits) for Price Amount Shown See Appendix 1 for Coin Cards Examples & Info				Requires SPI Coin Card(s) Part Number
Pos.	1 2 3 4 5 6 7 8	Default Highlighted	LEFT	CENTER	RIGHT	4TH	EUR // EUROPEAN UNION EUROS // (€)				
ON	SEE BELOW	Euro 1	0.50	1.00	2.00	0.20	1/0.50	2/1.00	3/1.50	5/2.00	755-5401-01-Y
OFF	SETTINGS	Euro 2					1/0.50	2/1.00	3/1.50	6/2.00	755-5401-02-Y
		Euro 3					1/0.50	2/1.00	3/1.50	7/2.00	755-5401-03-Y
		Euro 4					1/0.50	2/1.00	3/1.50	7/2.00	755-5401-04-Y
		Euro 5					2/0.50				755-5401-05-Y
		Euro 6					1/1.00	2/2.00	3/3.00	5/4.00	755-5401-06-Y
		Euro 7					1/1.00	2/1.50	3/2.00		755-5401-07-Y
		Euro 8					1/1.00	2/1.50	3/2.00		755-5401-08-Y
		Euro 9					1/1.00	2/1.50	3/2.00		755-5401-09-Y
		Euro 10					1/1.00	3/2.00	7/3.00		755-5401-10-Y
		Euro 11					1/1.00	4/2.00			755-5401-11-Y
		Euro 12					2/1.00	4/2.00	6/3.00	9/4.00	755-5401-12-Y

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

Adjustments

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

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

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

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

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

Standard Adjustments 22-36 continued on the next page. Standard Adjustments continued.



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

Standard Adjustments 37-50 continued on the next page.



Standard Adjustments continued.

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



Standard Adjustments continued.

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

STANDARD ADJUSTMENTS [#1 - #63] ▼

Nr.	STANDARD ADJUSTMENT NAME	USA DEFAULT	YOUR SETTING	Nr.	STANDARD ADJUSTMENT NAME	USA DEFAULT	YOUR SETTING
1	REPLAY TYPE	AUTO		32	HIGH SCORE #1	___,000,000	
2	‡ REPLAY PERCENTAGE	10%		33	HIGH SCORE #2	___,000,000	
3	‡ REPLAY AWARD	CREDIT		34	HIGH SCORE #3	___,000,000	
4	‡ REPLAY LEVELS	1		35	HIGH SCORE #4	___,000,000	
5	‡ AUTO REPLAY START	___,000,000		36	HSTD INITIALS	3 INITIALS	
6	‡ DYNAMIC REPLAY START	___,000,000		37	HSTD RESET COUNT	2000	
7	‡ REPLAY LEVEL #1	___,000,000		38	FREE PLAY	NO	
8	‡ REPLAY LEVEL #2	___,000,000		39	LANGUAGE	ENGLISH	
9	‡ REPLAY LEVEL #3	___,000,000		40	PLAYER LANGUAGE SELECT	YES	
10	‡ REPLAY LEVEL #4	___,000,000		41	CUSTOM MESSAGE	ON	
11	‡ REPLAY BOOST	YES		42	FLASH LAMP POWER	NORMAL	
12	SPECIAL LIMIT	1		43	COIL PULSE POWER	NORMAL	
13	‡ SPECIAL PERCENTAGE	10%		44	KNOCKER VOLUME	NORMAL	
14	SPECIAL AWARD	CREDIT		45	GAME RESTART	YES	
15	FREE GAME LIMIT	5		46	BILL VALIDATOR	NO	
16	EXTRA BALL LIMIT	5		47	MUSIC VOLUME	1	
17	‡ EXTRA BALL PERCENTAGE	25%		48	BALL SAVE TIME	0:05	
18	GAME PRICING	USA 10		49	TIMED PLUNGER	OFF	
19	MATCH PERCENTAGE	9%		50	FLIPPER BALL LAUNCH	OFF	
20	MATCH AWARD	CREDIT		51	COINDOOR BALL SAVER	NO	
21	BALLS PER GAME	3		52	COMPETITION MODE	NO	
22	TILT WARNINGS	2		53	CONSOLATION BALL	YES	
23	CREDIT LIMIT	30		54	FAST BOOT	YES	
24	ALLOW HIGH SCORES	YES		55	Q24 OPTION	COIN METER	
25	HIGH SCORE AWARD	CREDIT		56	TICKET DISPENSER	NO	
26	GRAND CHAMPION AWARDS	1		57	PLAYER COMPETITION	YES	
27	HIGH SCORE #1 AWARDS	1		58	TEAM SCORES	NO	
28	HIGH SCORE #2 AWARDS	0		59	LOCATION ID	0	
29	HIGH SCORE #3 AWARDS	0		60	GAME ID	0	
30	HIGH SCORE #4 AWARDS	0		61	TIME FORMAT	12-HOUR	
31	GRAND CHAMPION SCORE	___,000,000		62	COIN INPUT DELAY	30	
				63	LOST BALL RECOVERY	YES	

Adjustments

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



Feature Adjustments [#1 - #+]

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

- >>> **FACTORY RESET or CODE UPDATE NOTE:** Don't forget, any changes you make to your adjustments will revert back to the Factory Default settings if you perform a Factory Reset or update your Game Code. See Utilities Section (**GO TO RESETS MENU** and **GO TO USB MENU**).
- View the Coils Detailed Chart Menu to see if this game is Shaker Motor Enabled. If it is, set the options in the Feature Adjustment as seen below. (typically the last one).
- # **SHAKER MOTOR (OPTIONAL):** Set to NONE, MINIMAL USE, MODERATE USE or MAXIMAL USE. Factory Default = MODERATE USE. Set to any of the varying "... USES" if an Optional Shaker Motor Kit (SPI Part Number 502-5027-00) was installed correctly in this pinball machine. See the assembly (kit) on the last page of Blue Pages (Major Assemblies). Also see Shaker Motor Coil (Q8) in the Coils Detailed Chart Table at the begining of this Service Game Manual or the beginning of the Yellow Pages.



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

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

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



Go To Installs Menu

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

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

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

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

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

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



Install Extra Easy

To initiate, from the **INSTALLS MENU**, select the "X.EZ" *Icon*. The **Dot Matrix Display** will indicate the **INSTALL EXTRA EASY**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Difficulty** level.

Installs Menu continued on the next page.

Installs Menu continued from previous page.



Install Easy

To initiate, from the **INSTALLS MENU**, select the "EASY" *Icon*. The Dot Matrix Display will indicate the **INSTALL EASY**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Difficulty** level.



Install Medium (Normal or Factory Settings)

To initiate, from the **INSTALLS MENU**, select the "FACT" *Icon*. The Dot Matrix Display will indicate the **INSTALL MEDIUM**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Difficulty** level.



Install Hard

To initiate, from the **INSTALLS MENU**, select the "HARD" *Icon*. The Dot Matrix Display will indicate the **INSTALL HARD**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Difficulty** level.



Install Extra Hard

To initiate, from the **INSTALLS MENU**, select the "X.HD" *Icon*. The Dot Matrix Display will indicate the **INSTALL EXTRA HARD**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Difficulty** level.



Install 3-Ball or 5-Ball

To initiate, from the **INSTALLS MENU**, select either the "3BAL" or "5BAL" *Icons*. The Dot Matrix Display will indicate the **INSTALL 3-BALL** or **5-BALL** depending on choice. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Type** to 3 Balls per game

(Factory Default is 3 Balls per game, not including extra balls earned by the player, if any).



Install Competition

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



Install Director's Cut

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



Install Home Play

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



Install Novelty

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

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



Install Add-A-Ball

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

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



Install Factory

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

Utilities



ABCD Enter Custom Message



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

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



PRIC Set Custom Pricing



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

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

IF EXAMPLE CUSTOM PRICING SETTING DESIRED IS :
1 Play for \$0.50, 3 Plays for \$1.00 and 7 Plays for \$2.00
THEN YOU WILL NEED TO PERFORM THE FOLLOWING :

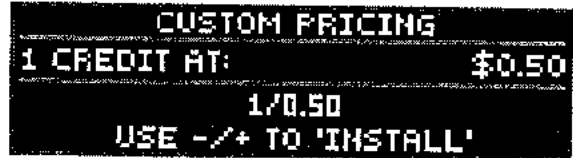
REMINDER
In these menus:

Press [BACK] to - DECREASE [< \$]
Press [SELECT] to + INCREASE [\$ >]

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



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



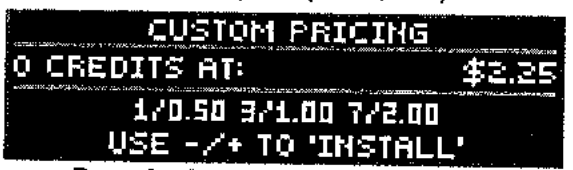
Step 3 Press [SELECT] to + INCREASE to \$1.00. Press [+ / >] to + INCREASE to 2 CREDITS AT:



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



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



Press [</-] once or press [+ / >] eleven times until INSTALL appears.

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



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



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

Utilities



Set Date / Time

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



Go To Resets Menu

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



Reset Coin Audits

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



Reset Game Audits

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



Reset Grand Champion (Score)

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



Reset High Scores

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



Reset Credits

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



Reset Factory Settings

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



Go To USB Menu

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



Update Game Code

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



Dump Audits to USB

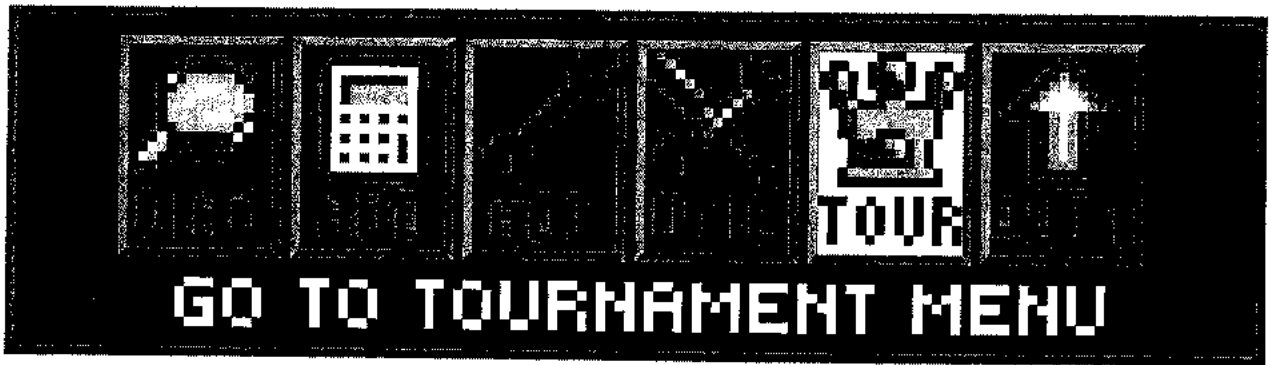
To initiate, from the **USB MENU**, select the "DUMP" *Icon*. Follow the on-screen prompts to perform a **Data Dump** (download).

Note: *If Icon is not present, access via the Audits Menu, see the Audits Section.*



Backup to USB Memory Stick

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



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

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

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



T Start Tournament

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

QUICK START :

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

CUSTOM START :

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

Increase or decrease the: • **PRIZE POOL \$ (DOLLAR) and ¢ (CENT) AMOUNT**

- **INCREMENT THE PRIZE POOL PER PLAY INCREASES \$ and ¢ AMOUNT**
- **MAXIMUM (CAP) PRIZE POOL \$ and ¢ AMOUNT.**

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

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

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

Custom Start continued on the next page.

CUSTOM START Continued.

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

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

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

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



STOP TOURNAMENT

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

STOP TOURNAMENT ARE YOU SURE?

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

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



VIEW TOURNAMENT DATA

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



TOURNAMENT AUDITS [#1 – #14]

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

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



SIGN MESSAGES A-B

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

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

Game Name	CPU Bd. No.	I/O PWR DRV Bd. No.	U9 Pinball Boot ROM
World Poker Tour	520-5246-00	520-5249-00	V3.1
Pirates Of The Caribbean	520-5246-00	520-5249-00	V3.1
Family Guy	520-5246-00	520-5249-00	V3.1
Spider-Man	520-5246-00	520-5249-00	V3.1
Wheel Of Fortune	520-5246-00	520-5249-00	V3.1
NBA	520-5246-00	520-5249-00	V3.1
CSI	520-5246-00	520-5249-00	V3.1
Batman	520-5246-00	520-5249-00	V3.1
Indiana Jones	520-5246-00	520-5249-00	V3.1
Shrek	520-5246-00	520-5249-00	V3.1
24	520-5246-00	520-5249-00	V3.1
Avatar	520-5246-00	520-5249-00	V3.1
Big Buck Hunter	520-5246-00	520-5249-00	V3.1
Iron Man	520-5246-00	520-5249-00	V3.1
The Rolling Stones	520-5246-00	520-5249-00	V3.1
Tron	520-5246-00	520-5249-00	V3.1
Avatar L/E	520-5303-03	520-5249-00	V3.1
The Rolling Stones L/E	520-5303-03	520-5249-00	V3.1
Tron L/E	520-5303-03	520-5317-00	V3.1
Transformers	520-5246-02	520-5249-00	V2.0
Transformers L/E	520-5303-04	520-5317-00	V2.0
AC/DC	520-5337-01	520-5249-00	AC/DC 1.0
AC/DC (L/E)	520-5337-00	520-5317-00	AC/DC 1.0
X-MEN	520-5246-02	520-5249-00	V2.0
X-MEN (L/E)	520-5303-04	520-5317-00	V2.0
Avengers	520-5246-02	520-5249-00	V2.0
Avengers L/E	520-5303-04	520-5317-00	V2.0
Batman (Standard)	520-5303-00	520-5249-00	V3.1
Iron Man (Classic)	520-5303-01	520-5304-00	Not Used
The Simpsons Kooky Carnival (RED)	520-5246-00	520-5249-00	V3.1

Backbox Wiring

- ▶ Coils Detailed Chart Table
- ▶ Backbox I/O Power Driver Board Detailed Wiring Diagram
- ▶ Backbox Board Layout Wiring Diagram
 - ▷ 128 X 32 Dot Matrix Display PCB (USA)..... 520-5052015
 - ▷ 128 X 32 Dot Matrix CES-LED // EURO ONLY RoHS //.....

Playfield Wiring

- ▶ General Illumination Circuit Detailed Wiring Diagram
- ▶ Playfield Switch Wiring Diagram
- ▶ Playfield Lamp Wiring Diagram
- ▶ Playfield Terminal Strips, Fuses & Misc. Wiring Descriptions & Locations
- ▶ #-Flipper Circuit Wiring Diagram

Cabinet and Coin Door Wiring

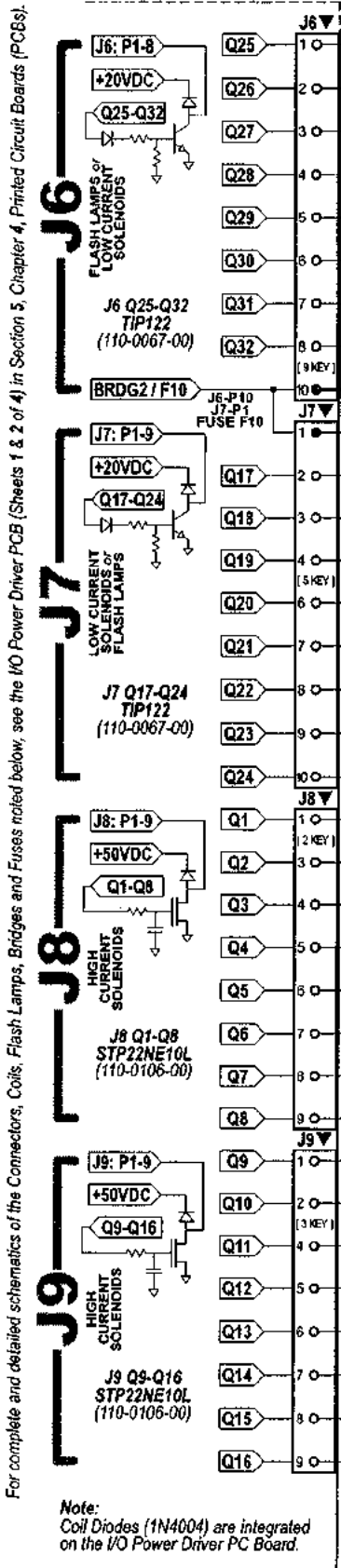
- ▶ Transformer Power Wiring Diagram
- ▶ Cabinet Wiring Diagram
- ▶ Coin Door Wiring Diagram
- ▶ Cabinet Universal Voltage Jumper Plugs (for use with Universal AC Cable, 036-5530-00 ONLY)

COILS DETAILED CHART TABLE

High Current Coils Group 1			Drive Transistor	Driver Output PCB	Power Line Color	Power Line Connection	Power Voltage	Drive Transistor Control Line Color	D.T. Control Line Connect	Coil GA-Turn or Bulb Type
#1	TROUGH UP-KICKER	Q1	I/O Power Driver	▲	YEL-VIO	J10-P9/10	50VDC	BRN-BLK	J8-P1	28-1200 090-5044-ND
#2	AUTO LAUNCH	Q2			YEL-VIO	J10-P9/10	50VDC	BRN-RED	J8-P3	24-940 090-5038-ND
#3	HULK COUNTER CLOCKWISE	Q3			YEL-VIO	J10-P9/10	50VDC	BRN-ORG	J8-P4	23-800 090-5001-ND
#4	HULK CLOCKWISE	Q4			YEL-VIO	J10-PP/10	50VDC	BRN-YEL	J8-P5	23-800 090-5001-ND
#5	HULK EJECT	Q5			YEL-VIO	J10-P9/10	50VDC	BRN-GRN	J8-P6	28-1200 090-5044-ND
#6	LEFT 4-BANK DROP RESET	Q6			YEL-VIO	J10-P9/10	50VDC	BRN-BLU	J8-P7	25-1200 090-5034-ND
#7	ORBIT CONTROL GATE (LEFT)	Q7			YEL-VIO	J10-P9/10	50VDC	BRN-VIO	J8-P8	32-1250 090-5060-01
#8	SHAKER MOTOR (OPTIONAL)	Q8			RED-WHT	J17-P7	16VAC	BRN-GRY	J8-P9	502-6027-00
High Current Coils Group 2			Drive Transistor	Driver Output PCB	Power Line Color	Power Line Connection	Power Voltage	Drive Transistor Control Line Color	D.T. Control Line Connect	Coil GA-Turn or Bulb Type
#9	LEFT POP BUMPER	Q9	I/O Power Driver	▲	YEL-VIO	J10-P9/10	50VDC	BLU-BRN	J8-P1	28-1200 090-5044-ND
#10	RIGHT POP BUMPER	Q10			YEL-VIO	J10-P9/10	50VDC	BLU-RED	J8-P2	28-1200 090-5044-ND
#11	BOTTOM POP BUMPER	Q11			YEL-VIO	J10-P9/10	50VDC	BLU-ORG	J8-P4	28-1200 090-5044-ND
#12	LOKI LOCKUP	Q12			YEL-VIO	J10-P9/10	50VDC	BLU-YEL	J8-P5	28-1200 090-5044-ND
#13	LEFT SLINGSHOT	Q13			YEL-VIO	J10-P9/10	50VDC	BLU-GRN	J8-P6	28-1200 090-5044-ND
#14	RIGHT SLINGSHOT	Q14			YEL-VIO	J10-P9/10	50VDC	BLU-BLU	J8-P7	28-1200 090-5044-ND
#15	LEFT FLIPPER (50V RED/YEL)	Q15			GRY-YEL-3A Fuse-RED-YEL	J10-P6/7	50VDC	ORG-GRY	J8-P8	22-1080 090-5032-ND
#16	RIGHT FLIPPER (50V RED/YEL)	Q16			GRY-YEL-3A Fuse-RED-YEL	J10-P6/7	50VDC	ORG-VIO	J8-P9	22-1080 090-5032-ND
Low Current Coils Group 1			Drive Transistor	Driver Output PCB	Power Line Color	Power Line Connection	Power Voltage	Drive Transistor Control Line Color	D.T. Control Line Connect	Coil GA-Turn or Bulb Type
#17	RELAY (BLUE)	Q17	I/O Power Driver	▲	BRN	J7-P1	20VDC	VIO-BRN	J7-P2	190-5004-00
#18	FLASH: LEFT SIDE	Q18			ORG	J6-P10	20VDC	VIO-RED	J7-P3	#89 BULB 185-5000-89
#19	FLASH: RIGHT SIDE	Q19			ORG	J6-P10	20VDC	VIO-ORG	J7-P4	#89 BULB 185-5000-89
#20	FLASH: SLINGSHOT (X2)	Q20			ORG	J6-P10	20VDC	VIO-YEL	J7-P6	#906 BULB 185-5004-00
#21	FLASH: HULK	Q21			ORG	J6-P10	20VDC	VIO-GRN	J7-P7	#908 BULB 185-5004-00
#22	BRIDGE MOTOR	Q22			BRN	J7-P1	20VDC	VIO-BLU	J7-P8	190-5004-00
#23	BRIDGE MOTOR RELAY	Q23			BRN	J7-P1	20VDC	VIO-BLK	J7-P9	190-5004-00
#24	OPTIONAL (e.g. COIN METER)	Q24			RED	J16-P4-8	5VDC	VIO-GRY	J7-P10	COIN METER
Low Current Coils Group 2			Drive Transistor	Driver Output PCB	Power Line Color	Power Line Connection	Power Voltage	Drive Transistor Control Line Color	D.T. Control Line Connect	Coil GA-Turn or Bulb Type
#25	FLASH: POP BUMPER	Q25	I/O Power Driver	▲	ORG	J6-P10	20VDC	BLK-BRN	J6-P1	#89 BULB 185-5000-89
#26	FLASH: TESSERACT	Q26			ORG	J6-P10	20VDC	BLK-RED	J6-P2	#906 BULB 185-5004-00
#27	FLASH: BACKPANEL (LEFT)	Q27			ORG	J6-P10	20VDC	BLK-ORG	J6-P3	#89 BULB 185-5000-89
#28	FLASH: BACKPANEL # 2	Q28			ORG	J6-P10	20VDC	BLK-YEL	J6-P4	#89 BULB 185-5000-89
#29	FLASH: BACKPANEL # 3	Q29			ORG	J6-P10	20VDC	BLK-GRN	J6-P5	#89 BULB 185-5000-89
#30	FLASH: BACKPANEL # 4	Q30			ORG	J6-P10	20VDC	BLK-BLU	J6-P6	#89 BULB 185-5000-89
#31	FLASH: BACKPANEL # 5	Q31			ORG	J6-P10	20VDC	BLK-VIO	J6-P7	#89 BULB 185-5000-89
#32	FLASH: BACKPANEL (RIGHT)	Q32			ORG	J6-P10	20VDC	BLK-GRY	J6-P8	#89 BULB 185-5000-89

Backbox I/O Power Driver Board (Coils Q1-Q32) Detailed Wiring Diagram Partial View (520-5317-00)

ALL FUSES RATED 250V SLO-BLO
I/O FUSE CHART INFO IN BACKBOX & PAGE DR. 1



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

Backbox
Wiring

Backbox Wiring

**Backbox Board Layout
Wiring Diagram**

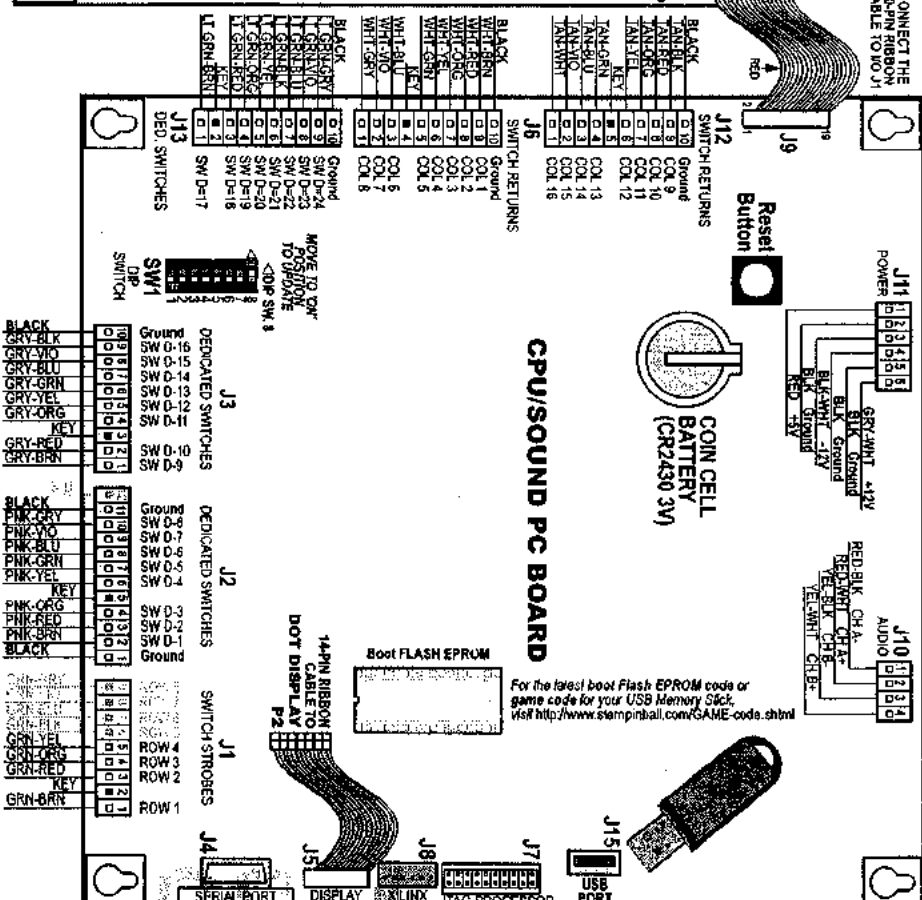
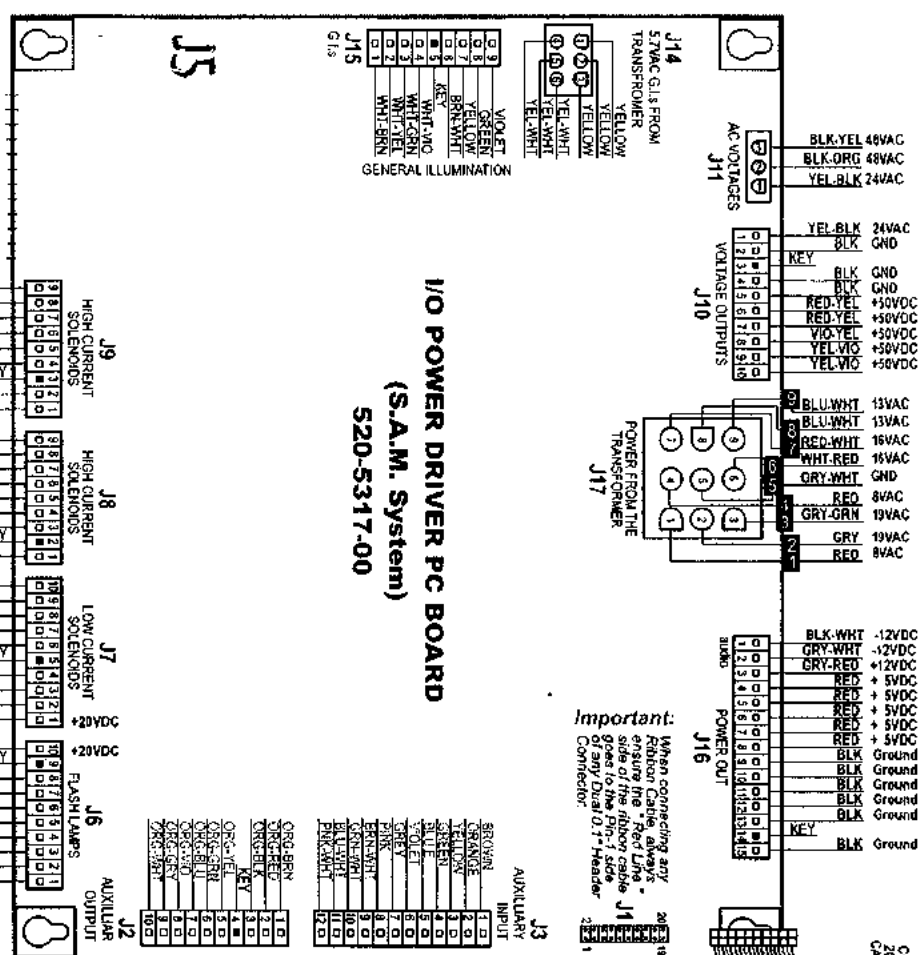
- 128 X 32 Dot Matrix Display PCB **520-5052-00**
- // EURO ONLY ROHS // 128 X 32 DM CES PCB **520-5052-05**
- // EURO ONLY ROHS // Dot Matrix Bezel **545-6261-00**
- Ribbon Cable, 14-Pin (33") **036-5260-33**
- // EURO ONLY ROHS // LED Ribbon Cable Filter PCB **520-5269-00**
- Display Cable (Wiring Harness) **036-5264-01**
- // EURO ONLY ROHS // LED Display Adapter Harness **036-5520-00**

14 Pin Header	
1	VIO-GRN
2	VIO-BLK
3	VIO-BLU
4	VIO-RED
5	VIO-ORG
6	BROWN
7	ORANGE
8	GRY-RED
9	GRY-BLK
10	GRY-BLU
11	GRY-YEL
12	GRY-ORG
13	GRY-WHT
14	GRY-GRN

32 Pin Header	
1	GRN-ORG
2	GRN-RED
3	GRN-BLU
4	GRN-YEL
5	GRN-WHT
6	GRN-GRN
7	GRN-BLK
8	GRN-ORG
9	GRN-RED
10	GRN-BLU
11	GRN-YEL
12	GRN-WHT
13	GRN-GRN
14	GRN-BLK
15	GRN-ORG
16	GRN-RED
17	GRN-BLU
18	GRN-YEL
19	GRN-WHT
20	GRN-GRN
21	GRN-BLK
22	GRN-ORG
23	GRN-RED
24	GRN-BLU
25	GRN-YEL
26	GRN-WHT
27	GRN-GRN
28	GRN-BLK
29	GRN-ORG
30	GRN-RED
31	GRN-BLU
32	GRN-YEL



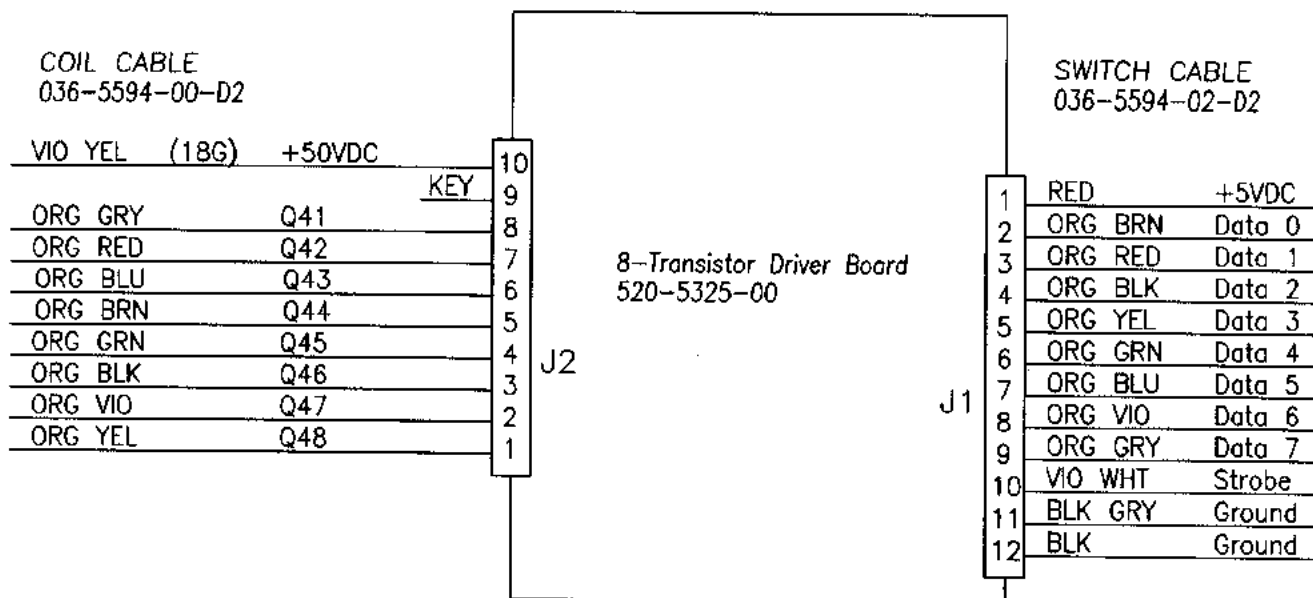
14 Pin Header	
1	VIO-GRN
2	VIO-BLK
3	VIO-BLU
4	VIO-RED
5	VIO-ORG
6	BROWN
7	ORANGE
8	GRY-RED
9	GRY-BLK
10	GRY-BLU
11	GRY-YEL
12	GRY-ORG
13	GRY-WHT
14	GRY-GRN



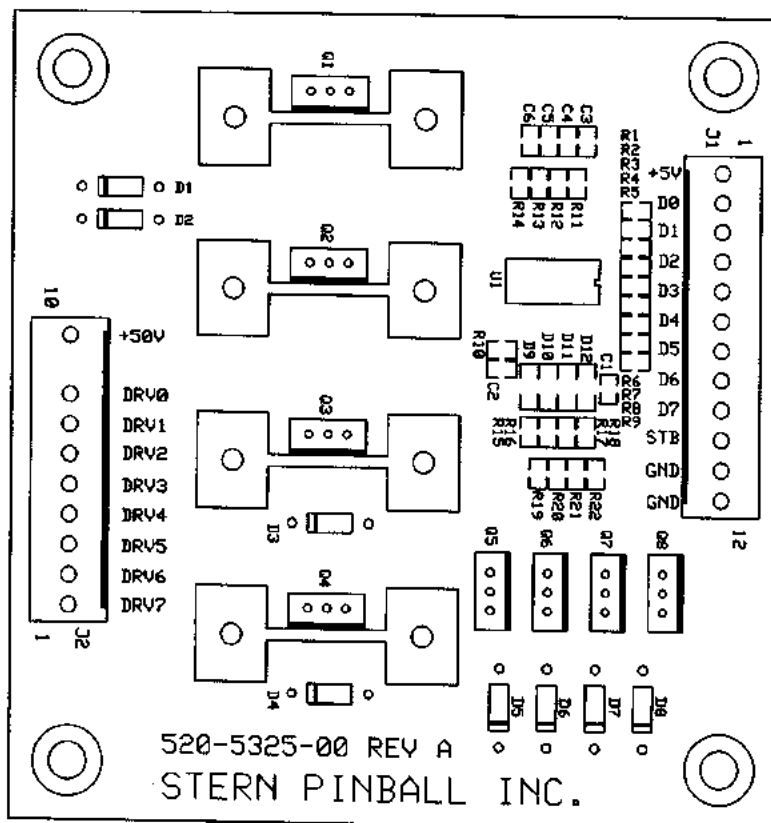
**Backbox
Wiring**

AVENGERS PREMIUM

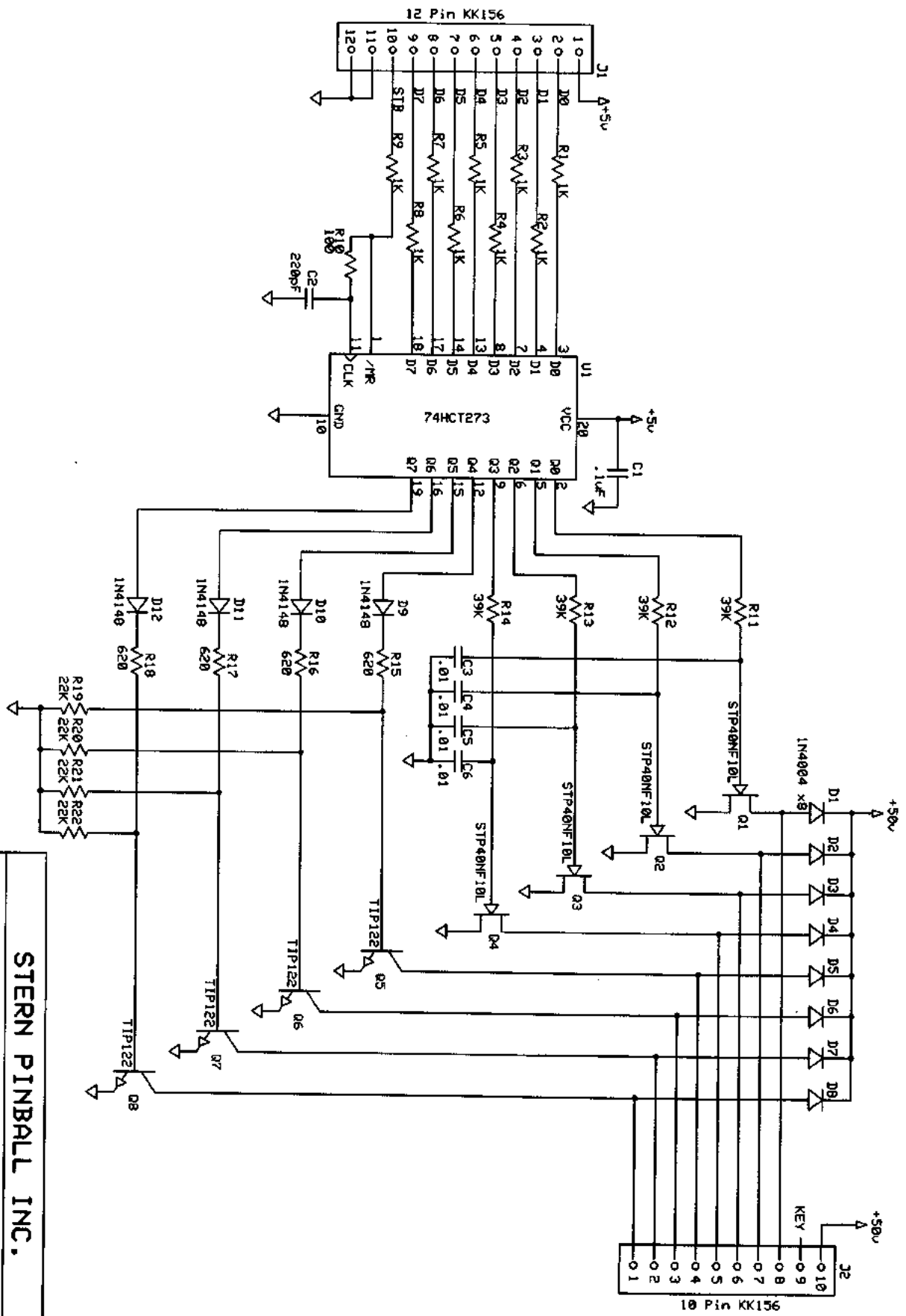
Wiring for the 8-Transistor driver board, 520-5325-00



Actual Board Layout



12-11-12



STERN PINBALL INC.

8 Auxiliary Driver

520-5325-00

Rev A

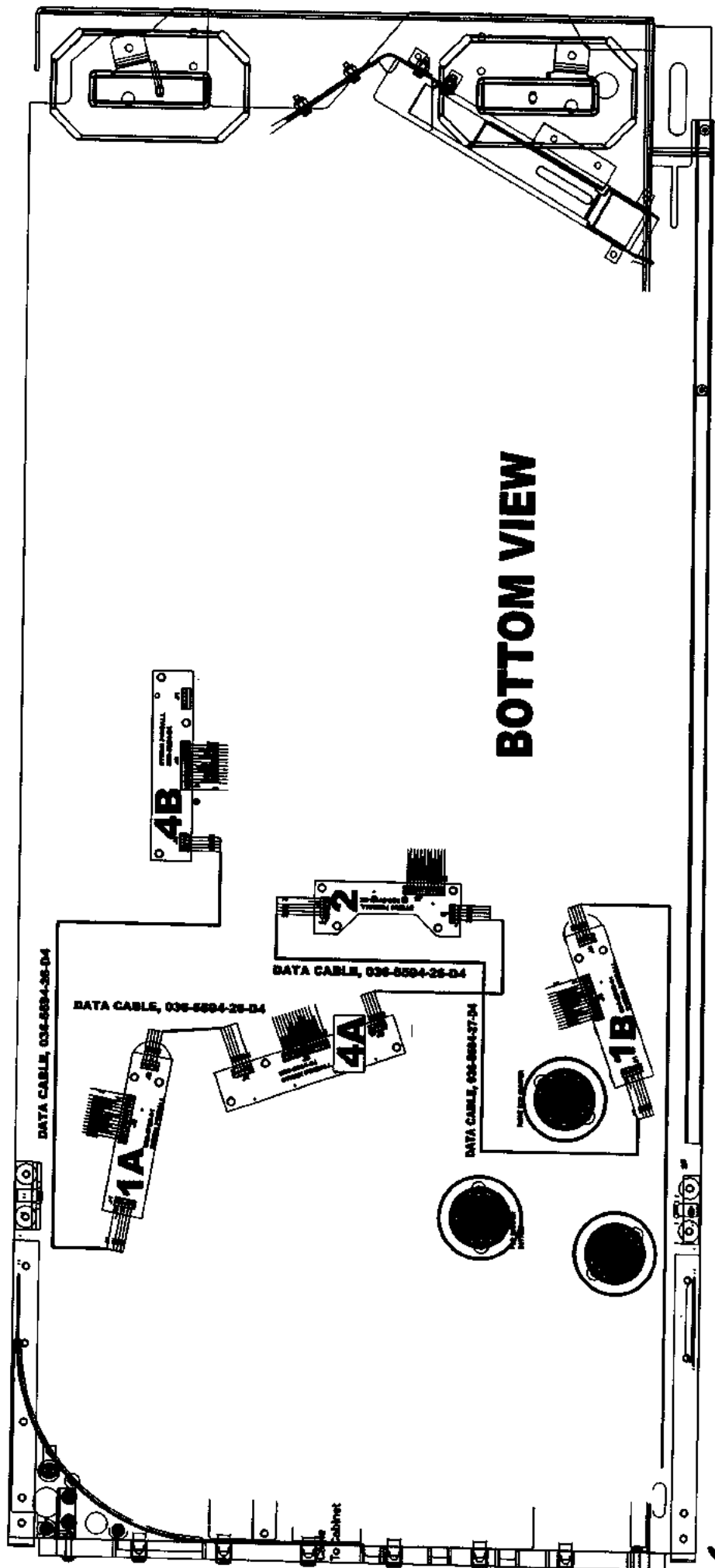
9/22/2011

Page 1 of 1

Y6

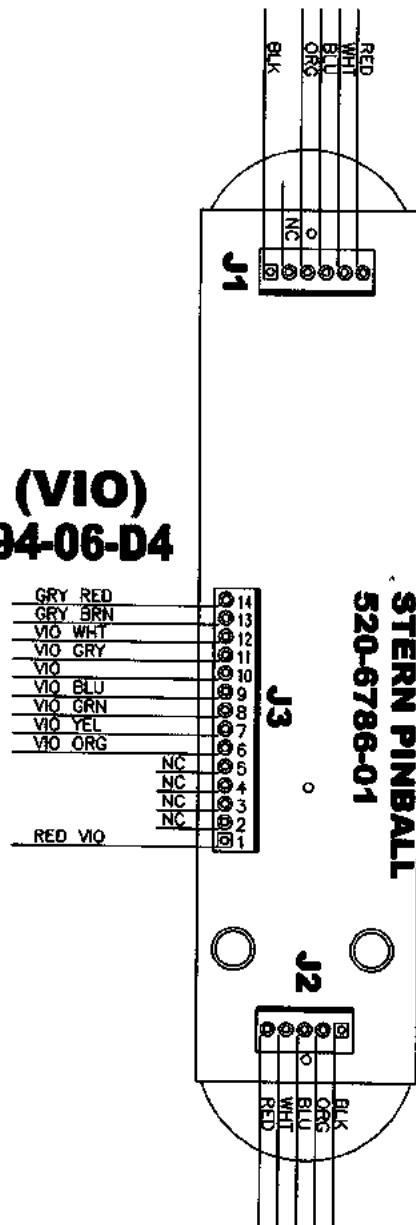
AVENGERS LIMITED EDITION

Location of LED boards and data cables

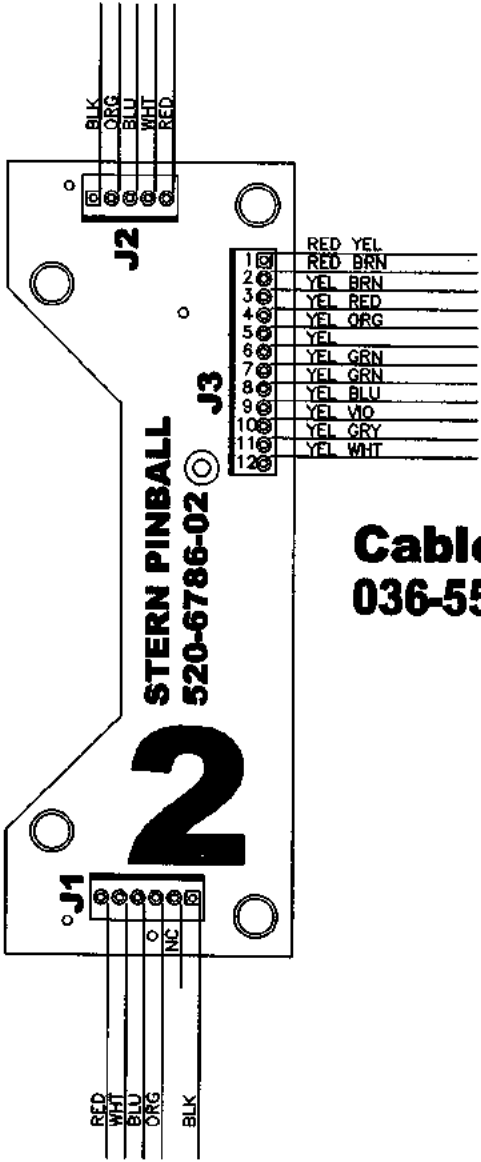


AVENGERS L.E. LED Board 1B Detail

**Cable (VIO)
036-5594-06-D4**

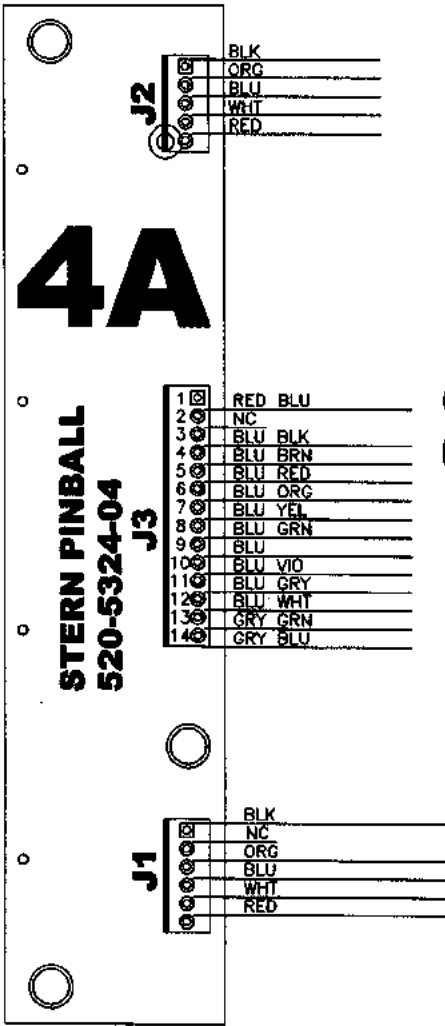


AVENGERS L.E. LED Board 2 Detail



**Cable (YEL)
036-5594-07-D4**

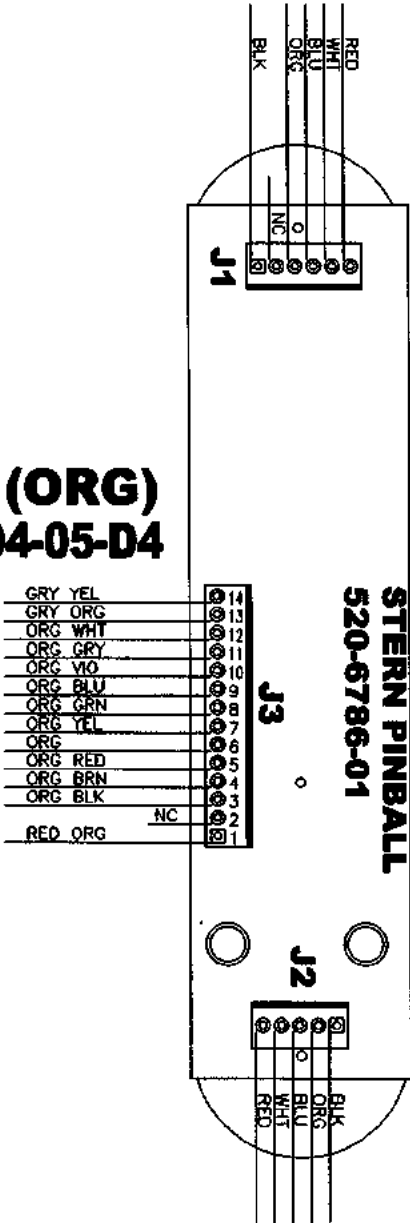
AVENGERS L.E. LED Board 4A Detail



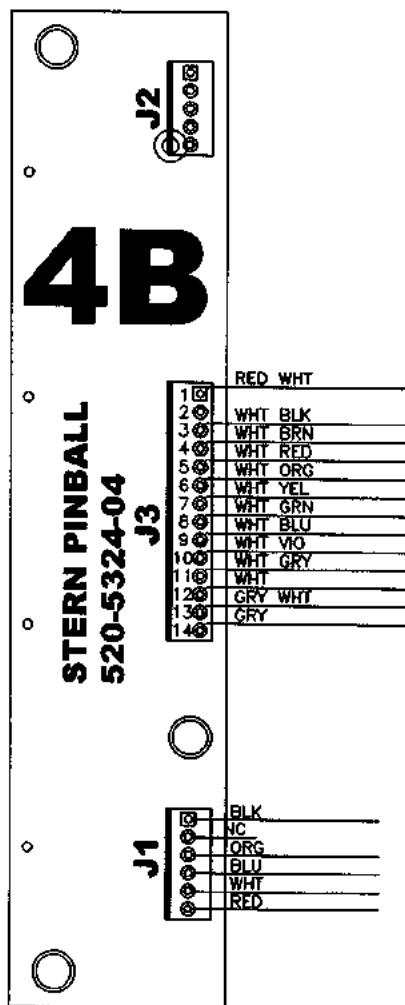
**Cable (BLU)
036-5594-18-D4**

AVENGERS L.E. LED Board 1A Detail

**Cable (ORG)
036-5594-05-D4**



AVENGERS L.E. LED Board 4B Detail



**Cable (WHT)
036-5594-19-D4**

Amplifier Board Wiring Configuration

Transceiver Boards
500-6775-01

Amplifier Board
520-5239-01

Switch 43

SILVER Anode
COPPER Cathode

2-conductor cable



SILVER Anode
COPPER Cathode

2-conductor cable



SILVER Anode
COPPER Cathode

2-conductor cable

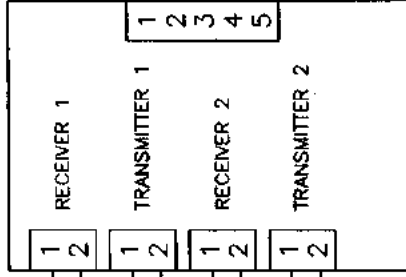


SILVER Anode
COPPER Cathode

2-conductor cable



Switch 48



TAN ORG Matrix Rows To CPU Board J12-7
TAN WHT Matrix Rows To CPU Board J12-1
GRN ORG Matrix Columns To CPU Board J1-4
BLK Ground To I/O Board J16 pin 15
RED +5V DC To I/O Board J16 pin 8

Part of Playfield Cable

Date: 11-20-12	TITLE		
Scale: N/S	Rev: -		
		DWN. SOUR	PART NO.
		1st USE AVENGERS L.E.	
PINBALL, INC.			

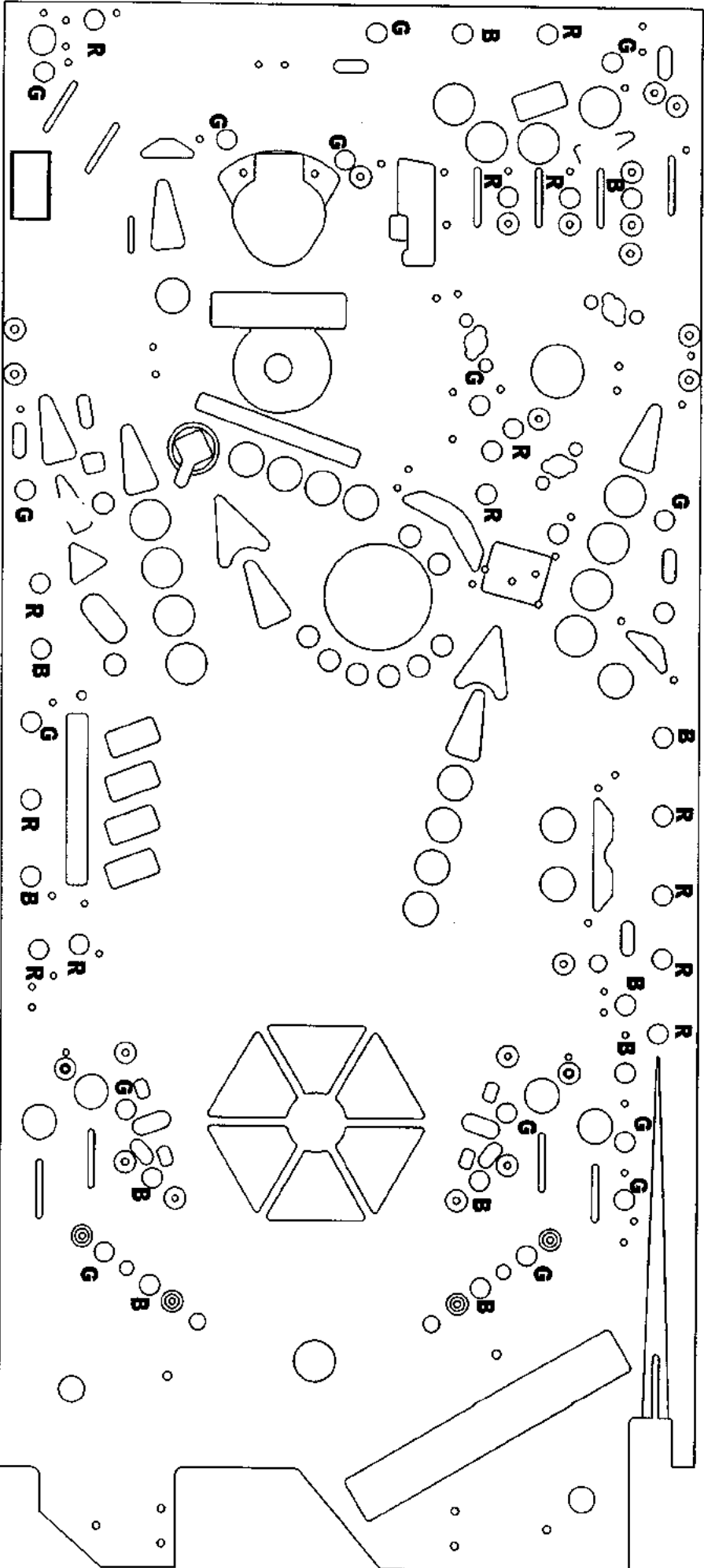
AVENGERS LIMITED EDITION

December 11, 2012

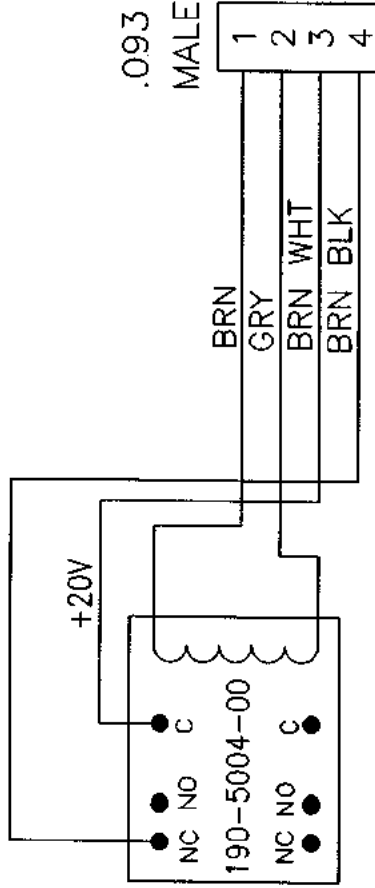
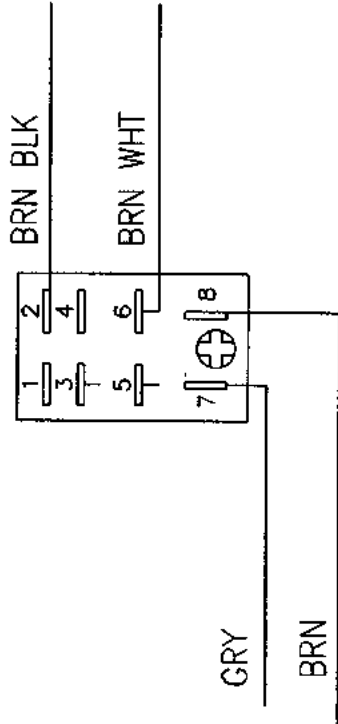
GREEN
RED
BLUE

GI LED LOCATIONS

GREEN 112-5033-04
RED 112-5033-02
BLUE 112-5033-05

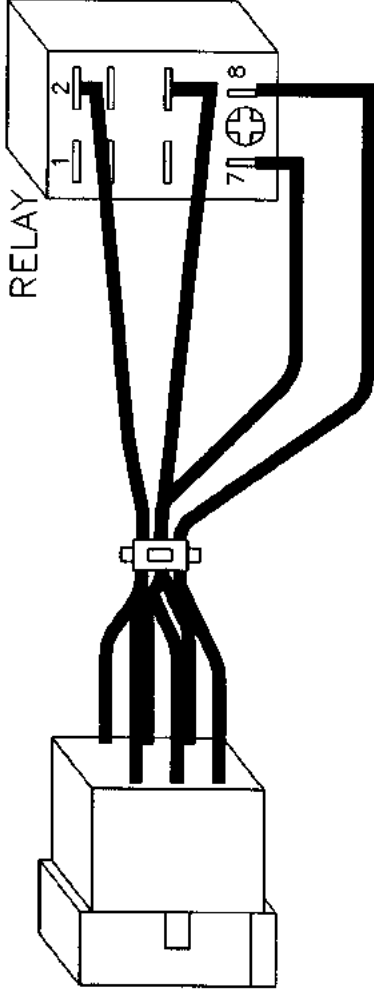


GI RELAY ASSY



036-5594-23-D4
CABLE

190-5004-00
RELAY



Rev	Description	Eng	Date
A	Released	SOUR	11-13-12
B	Moved BRN BLK	SOUR	12-05-12

Item	Part Number	Description	Qty
1	190-5004-00	Packer Relay	1
2	036-5594-23-D4	Relay Cable	1

DWN GABRIELA 1st USE	DATE	11-13-12	TITLE	GI RELAY ASSY
	SCALE	N/S	REV	A
Avengers LE				

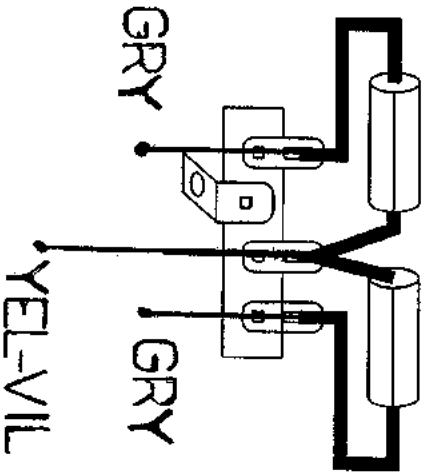
Stern Pinball, Inc		PART NO.
2220 JANICE AVE., MELROSE PARK, IL 60160		511-7226-03

AVENGERS LE 511-7226-03

Resistor Assy--511-7443-01

First Usage
 AVENGERS L.E.

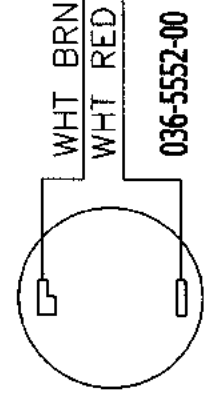
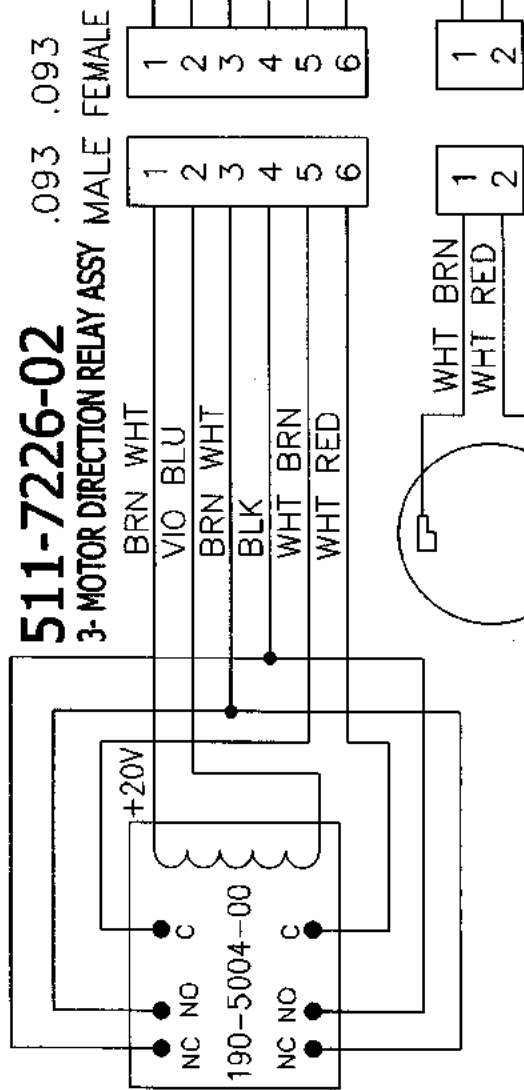
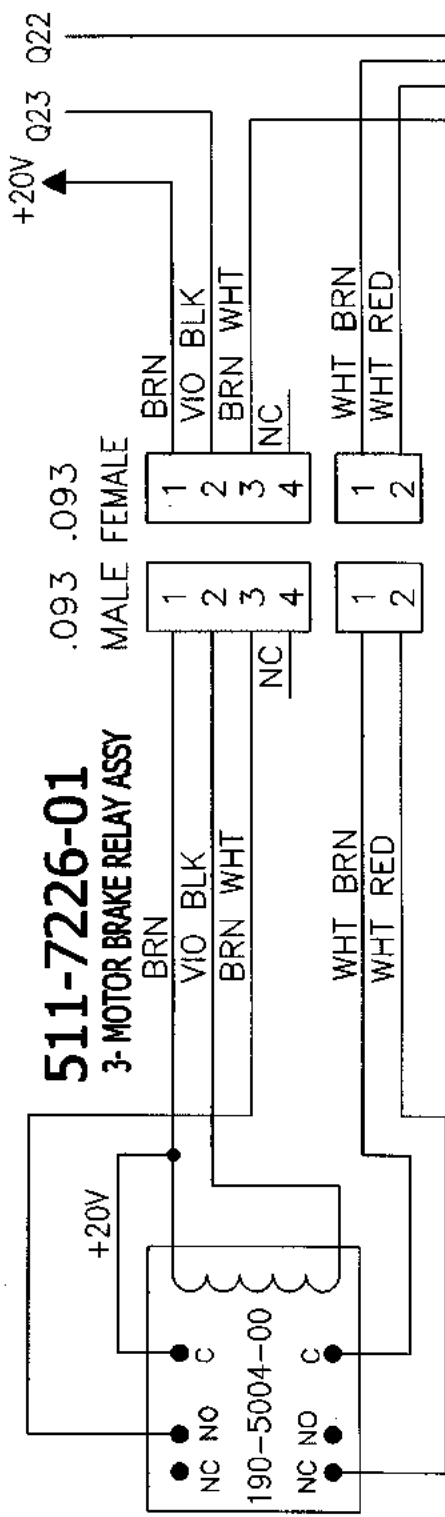
Note: Resistor may be 3W or 5W



Item	Part Number	Description	Qty
1	121-5097-00	Resistor 1.3K 3W	2
2	055-5203-00	3-Pos terminal strip	1

DWN.	DATE	TITLE
1st USE	9-15-12	RESISTOR ASSY
<small>SCALE</small>	<small>REV</small>	
<small>SCALE</small>	<small>REV</small>	
<small>SCALE</small>	<small>REV</small>	

Stern Pinball, Inc
 2020 JANICE AVE., MELROSE PARK, IL. 60160
 PART NO. 511-7443-01



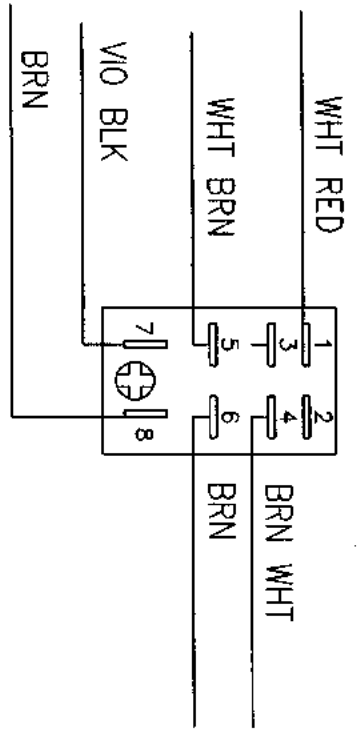
041-5109-01
GEAR MOTOR

DWN. SOUR	DATE	TITLE	
1st USE	11-20-12	HULK MOTOR WIRING	
AVENGERS L.E.	SCALE	REV	
	N/S	A	

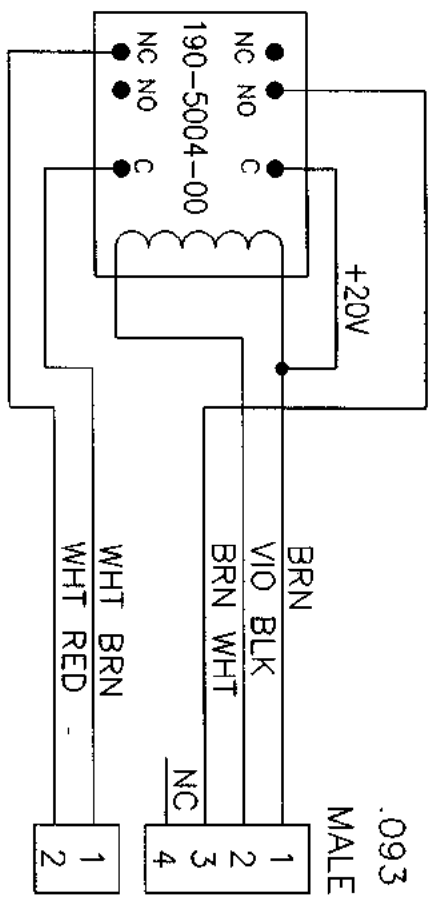
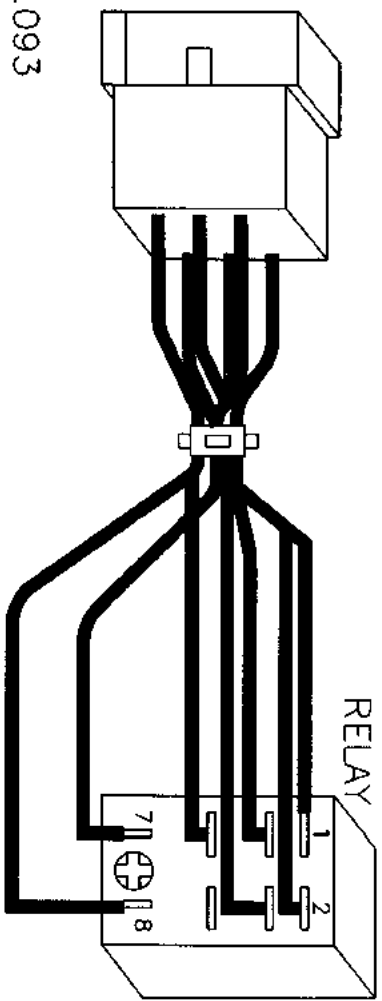
Stern Pinball, Inc
2220 JANICE AVE., MELROSE PARK, IL. 60160

MOTOR BRAKE RELAY ASSY

Rev	Description	Eng	Date
A	Released	Sheridan	11-13-12



036-5594-21-D4
CABLE
190-5004-00



PEEL LE

511-7226-01

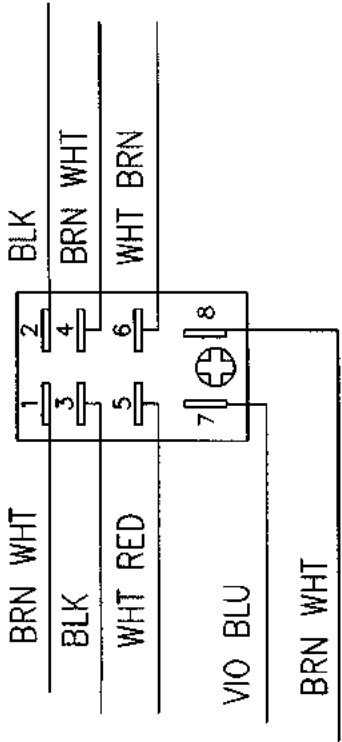
Item	Part Number	Description	Qty
1	190-5004-00	Packer Relay	1
2	036-5594-21-D4	Relay Cable	1

DWN
GABRIELA
11-13-12
SCALE N/S
REV A
TITLE
MOTOR BRAKE RELAY ASSY

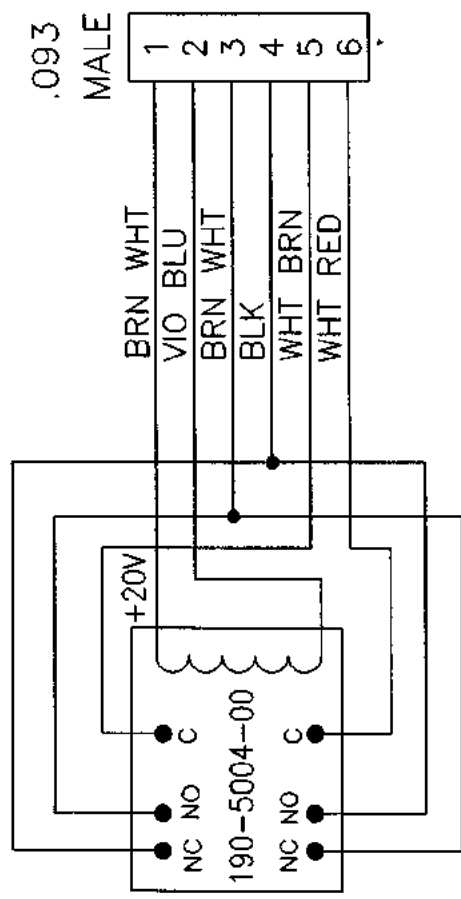
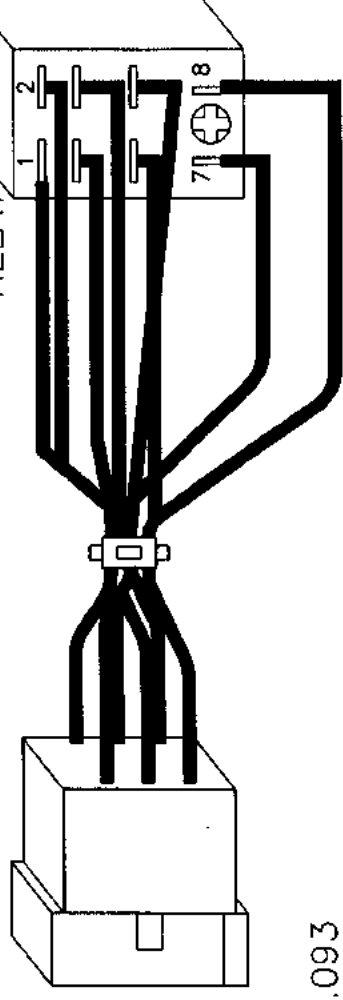
Stern Pinball, Inc
2220 JANICE AVE., MELROSE PARK, IL. 60160
PART NO. 511-7226-01

MOTOR DIRECTION RELAY ASSY

Rev	Description	Eng	Date
B	Animation update	SOUR	12-05-12



036-5594-22-D4
CABLE
190-5004-00
RELAY



Item	Part Number	Description	Qty
1	190-5004-00	Packer Relay	1
2	036-5594-22-D4	Relay Cable	1

DATE	TITLE
11-13-12	MOTOR DIRECTION RELAY ASSY

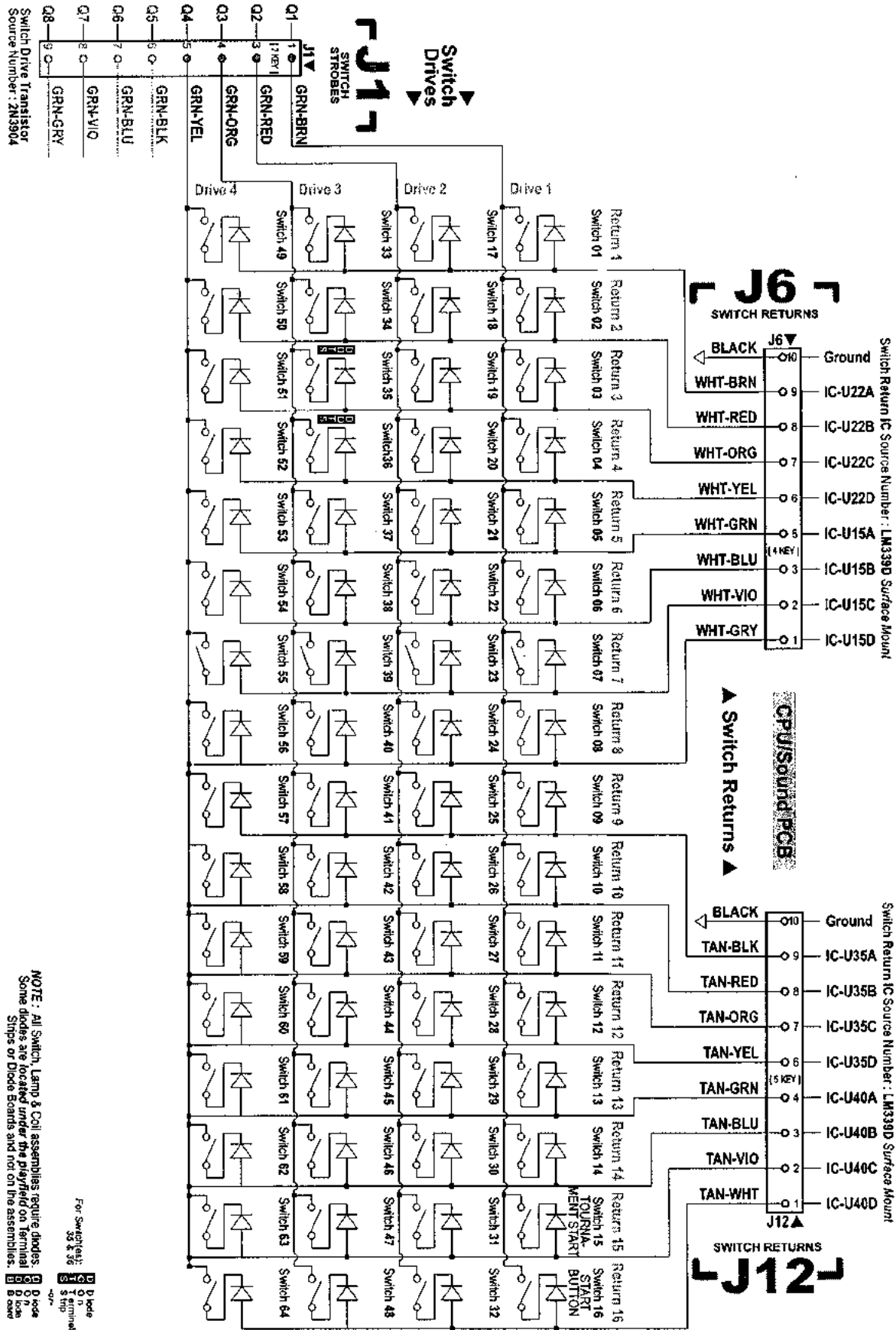
AWR/SCALE	REV	PART NO.
N/S	A	511-7226-02

AVENGER'S LE

511-7226-02

Stern Pinball, Inc
2220 JANICE AVE., MELROSE PARK, IL. 60160

Playfield Switch Wiring Diagram



Playfield Wiring

Playfield Wiring

#-Flipper Circuit Wiring Diagram

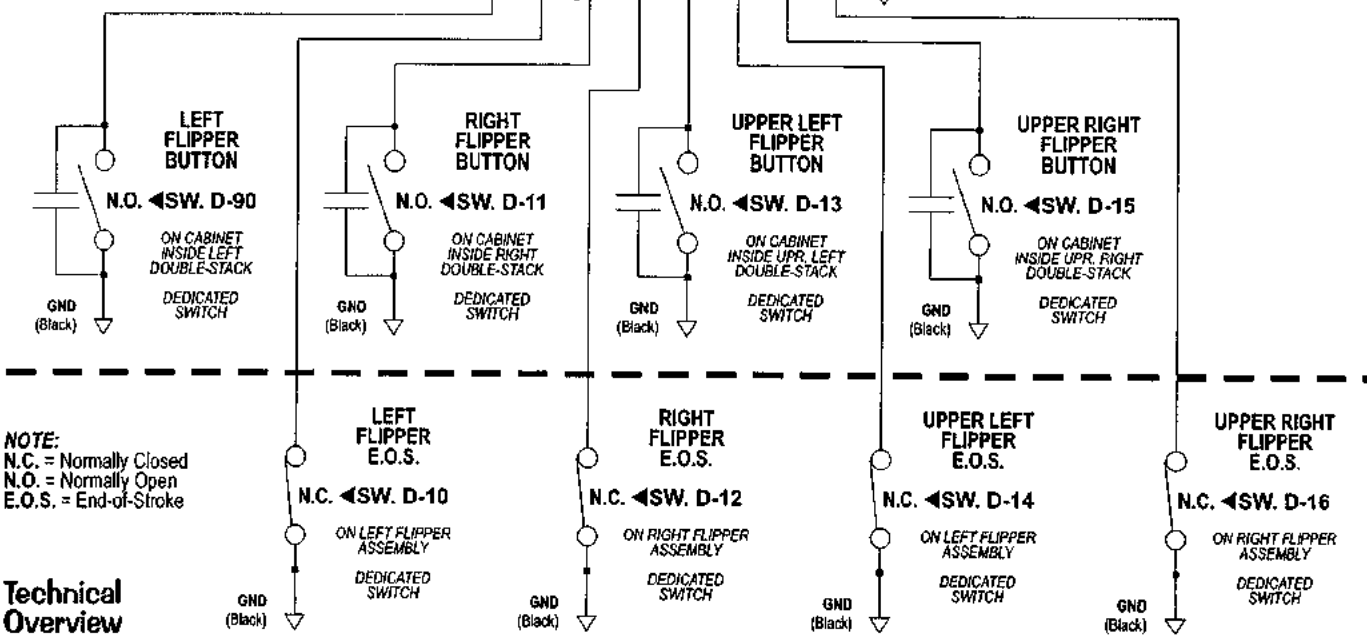
Partial View CPU/Sound PCB (520-5246-00)

CPU/Sound PCB

Dedicated Switch IC Source Number: LVC245A

J3
DEDICATED SWITCHES

The Outside **LEFT FLIPPER BUTTON** located on the Cabinet operates both the Left Flipper & Upper Left Flipper, if used. The Outside **RIGHT FLIPPER BUTTON** located on the Cabinet operates both the Right Flipper & Upper Right Flipper, if used. **RIGHT & LEFT BUTTONS:** These switches are **Double-stacked**. Pressing half-way down operates the Lower Flippers (respectively); pressing full down operates both the Lower Flipper & Upper Flippers (respectively) simultaneously.

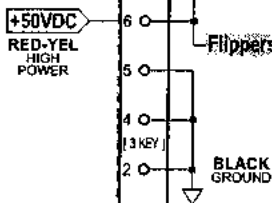
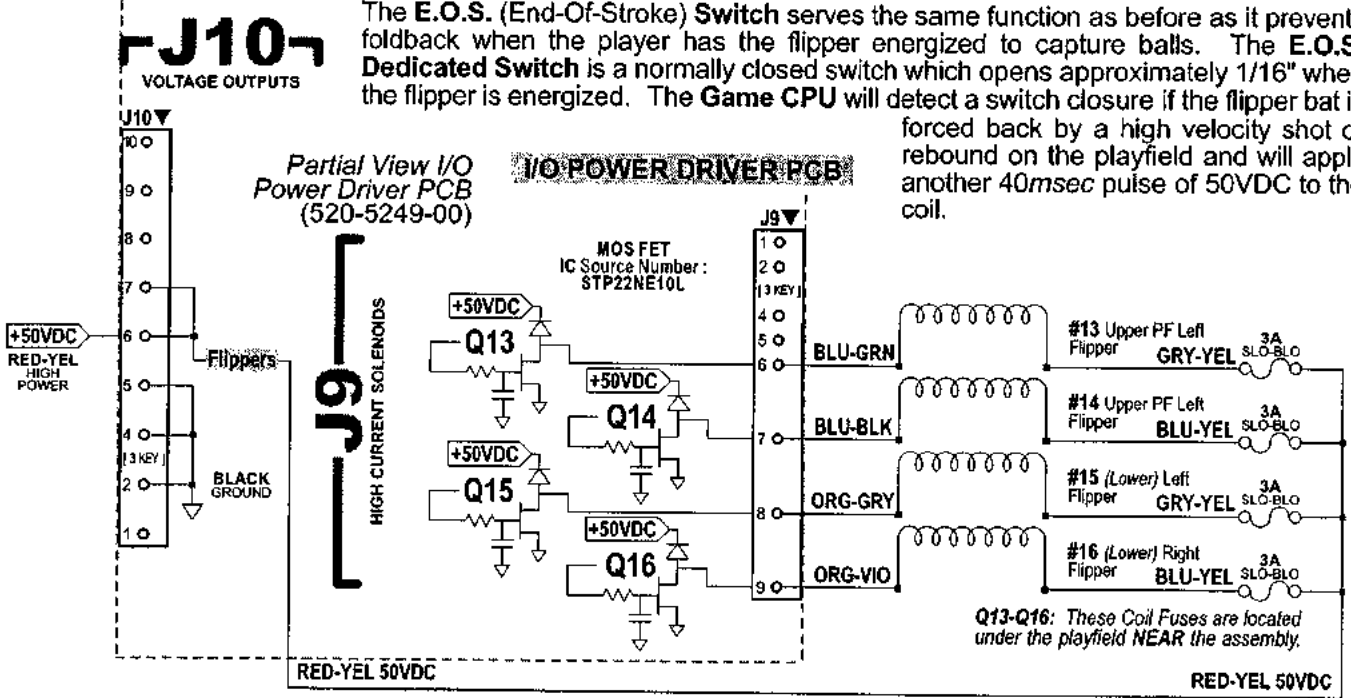


NOTE:
N.C. = Normally Closed
N.O. = Normally Open
E.O.S. = End-of-Stroke

Technical Overview

Our **Flipper System** uses one supply voltage (+50VDC) for both **kick & hold**. Once the **Game CPU** detects a Flipper Cabinet Switch closure (*during game play*) it applies a 40msec pulse to the gate of the Flipper Drive Transistor (STP22NE10L). If it continues to detect a Flipper Cabinet Switch closure (*the player holding the button in*) it will continue to pulse the flipper drive transistor 1msec every 12msecs for the duration of the hold cycle.

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. Dedicated 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 50VDC to the coil.



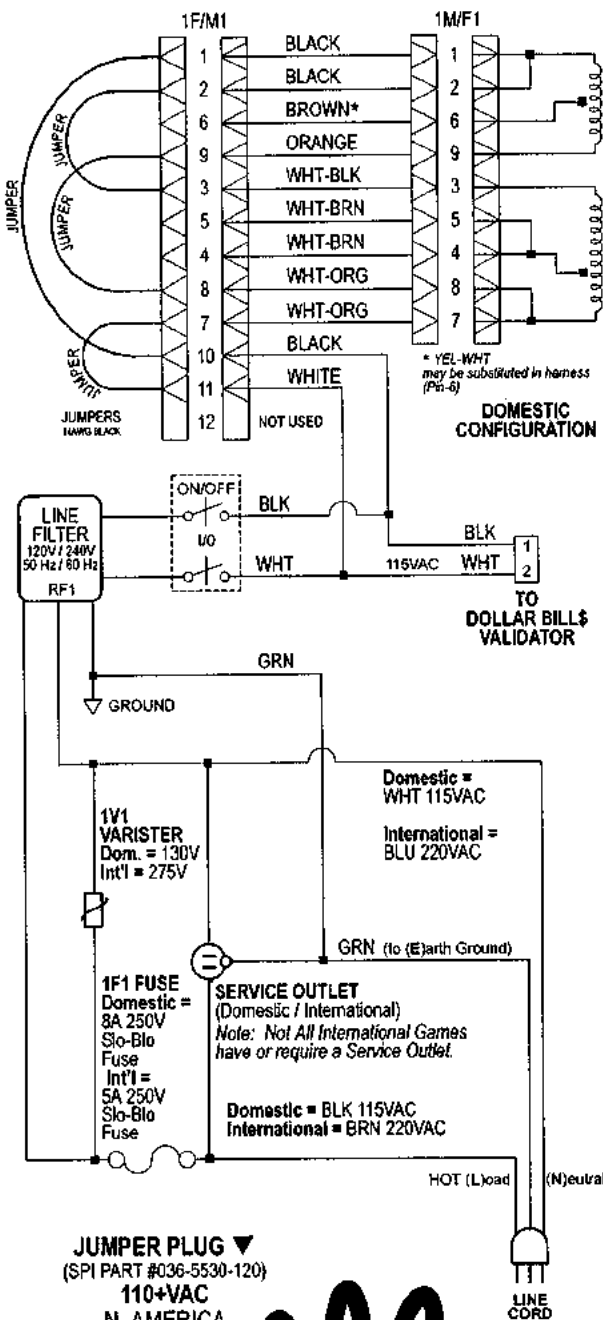
Typical Under-Playfield Fuses are rated: **3A 250v Slo-Blo**. Do Not Over-Fuse.

NOTE: Coil Diodes (1N4004) are integrated on the I/O Power Driver PCB. See Coils Detailed Wiring Diagram for actual number of flippers used on this game.

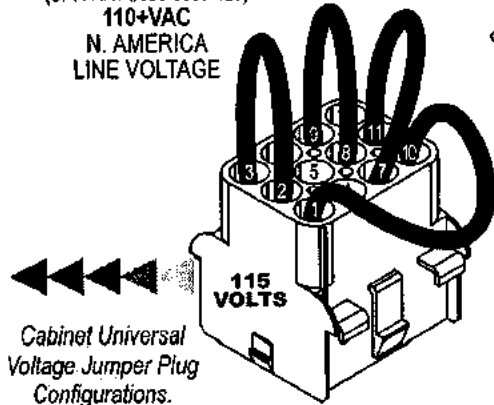
Playfield Wiring

Playfield Wiring

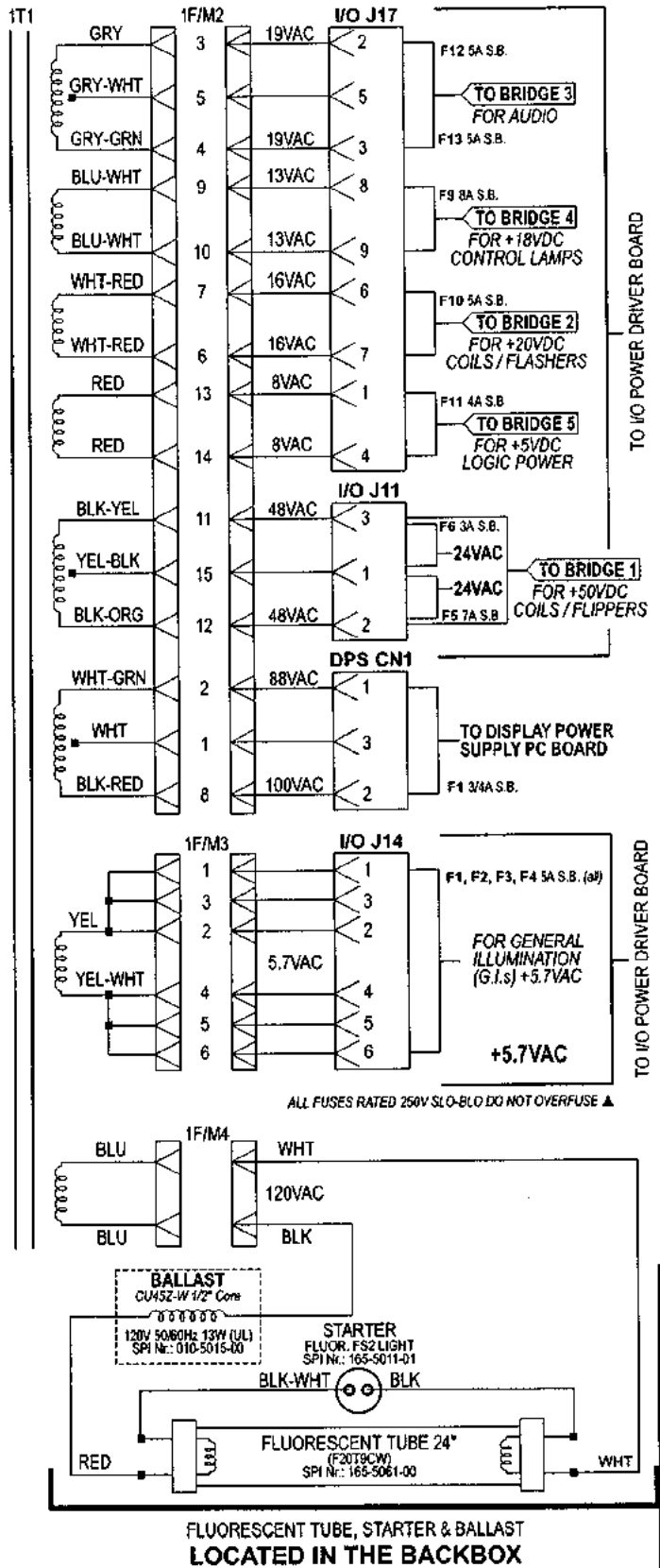
Transformer Power Wiring Diagram



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

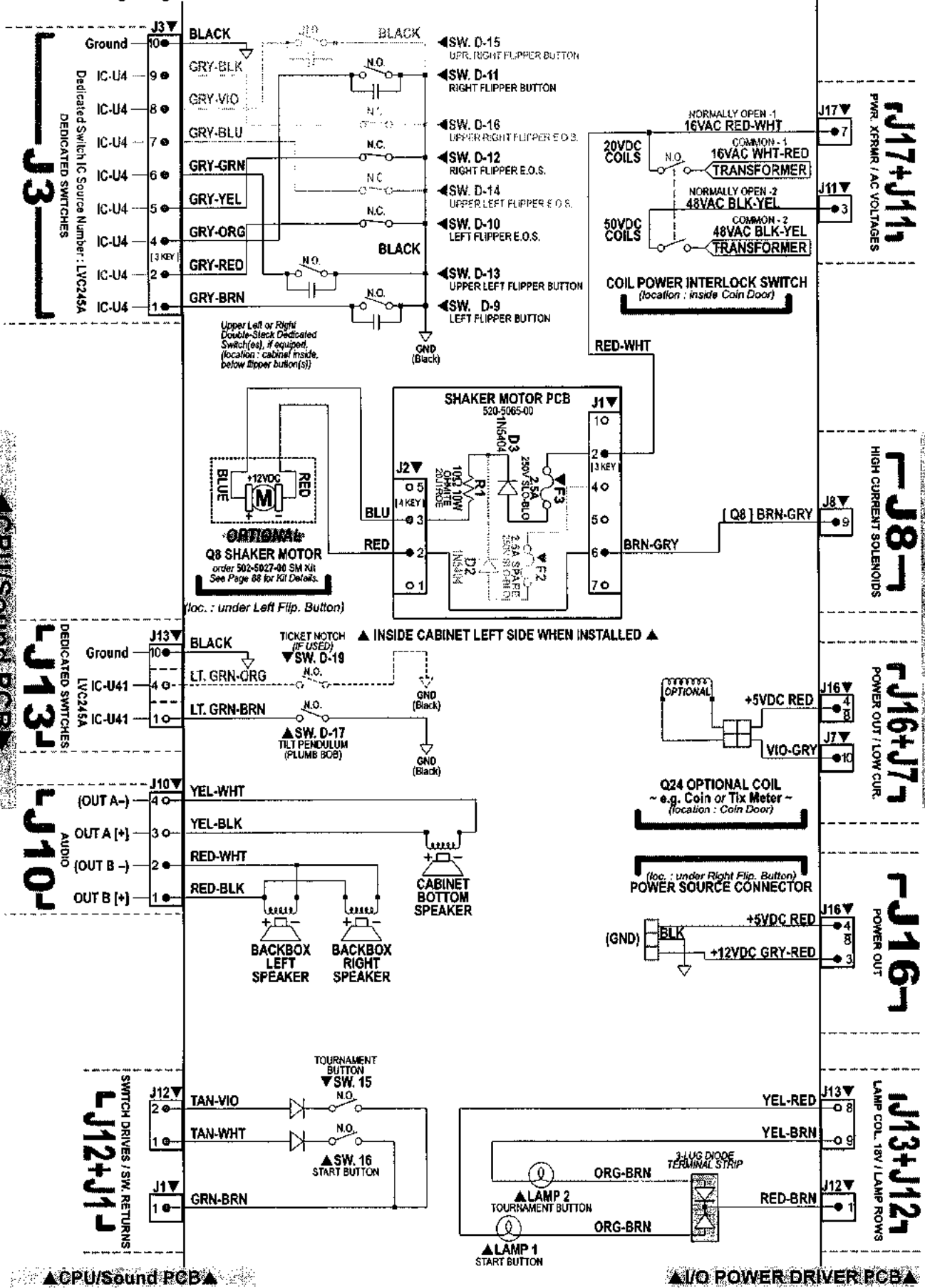


Cabinet Universal Voltage Jumper Plug Configurations.



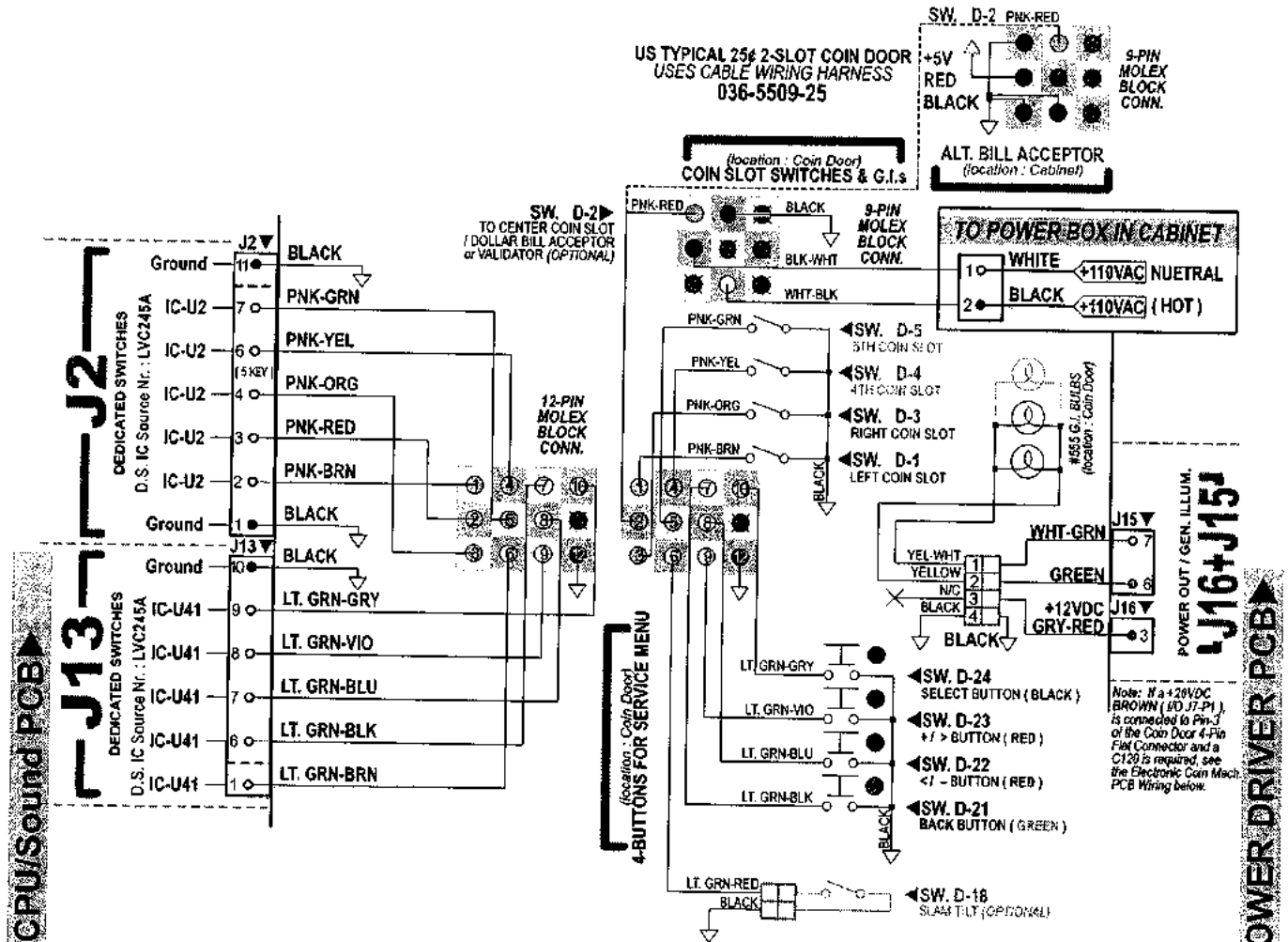
ALL FUSES RATED 250V SLO-BLO DO NOT OVERFUSE ▲

Cabinet Wiring Diagram



Cabinet and Coin Door Wiring

Coin Door Wiring Diagram



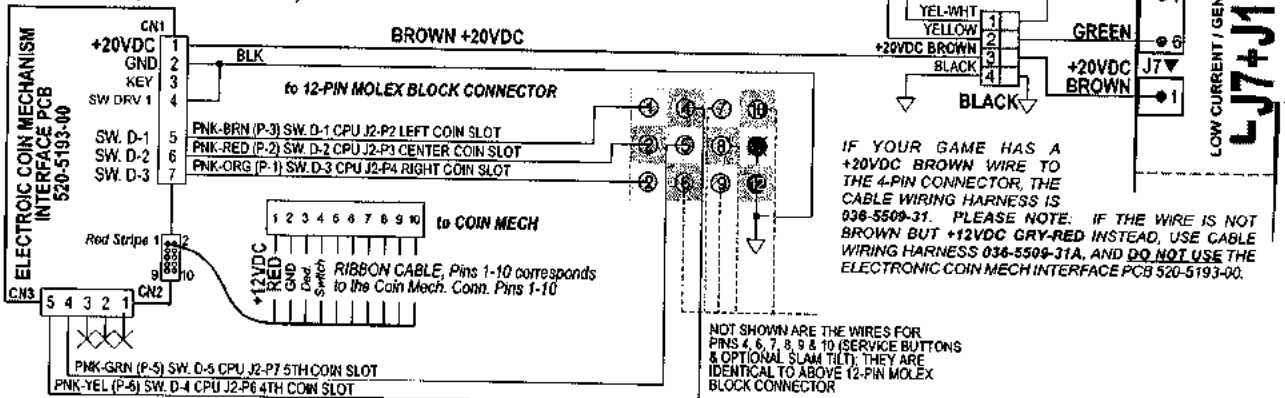
1-SLOT COIN DOOR WITH C120 CAPABILITIES (NO INTERFACE COIN MECH PCB REQUIRED)
USES CABLE WIRING HARNESS
036-5509-31A (+12VDC GRY-RED)

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

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

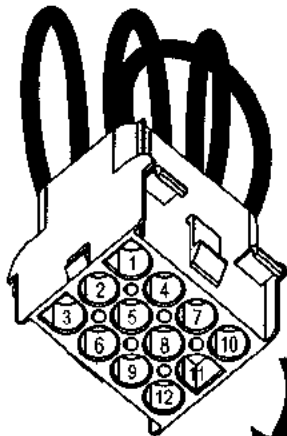
NON-US NON-C120 3-SLOT COIN DOOR
USES CABLE WIRING HARNESS
036-5509-33

IF YOUR GAME HAS AN ELECTRONIC COIN MECH. INTERFACE PC BOARD (520-5193-00):
1-SLOT COIN DOOR USE WITH C120 CAPABILITIES REQUIRING PCB 520-5193-00
USES CABLE WIRING HARNESS
036-5509-31 (S.A.M. SYSTEM)



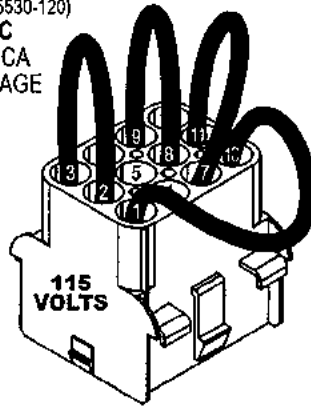
Cabinet and Coin Door Wiring

Cabinet Universal Voltage Jumper Plugs (for use with Universal AC Cable, 036-5530-00 ONLY)



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

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

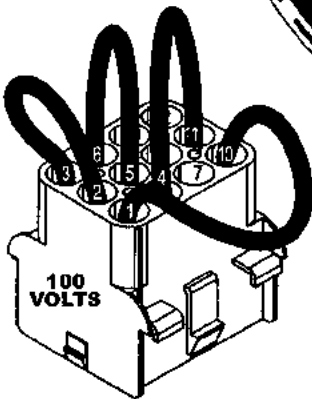


9-PIN MALE SIDE TO TRANSFORMER
9-PIN FEMALE SIDE CONN.

- 1 BLK
- 2 BLK
- 3 WHT-BLK
- 4 WHT-BRN
- 5 WHT-BRN
- 6 BRN (or YEL-WHT)
- 7 WHT-ORG
- 8 WHT-ORG
- 9 ORG
- 10 BLK
- 11 WHT
- 12 N/U

12-PIN F/M CONN.
BACK VIEW ▲

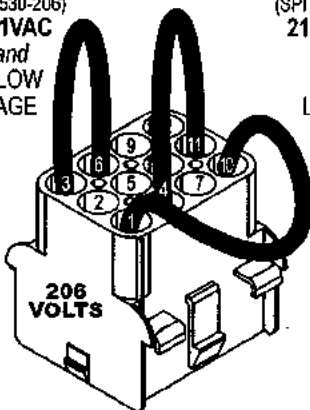
9-PIN F/M CONN.
▲ BACK VIEW



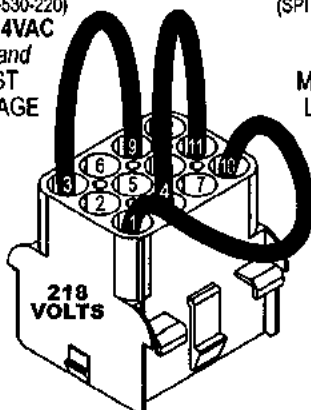
JUMPER PLUG
(SPI PART #036-5530-100)
98VAC - 109VAC
JAPAN or
N. AMERICA LOW
LINE VOLTAGE

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

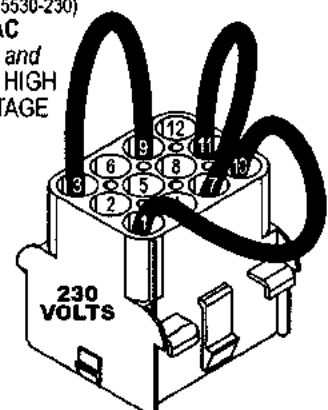
JUMPER PLUG ▼
(SPI PART #036-5530-206)
200VAC - 211VAC
EUROPE and
MID. EAST LOW
LINE VOLTAGE



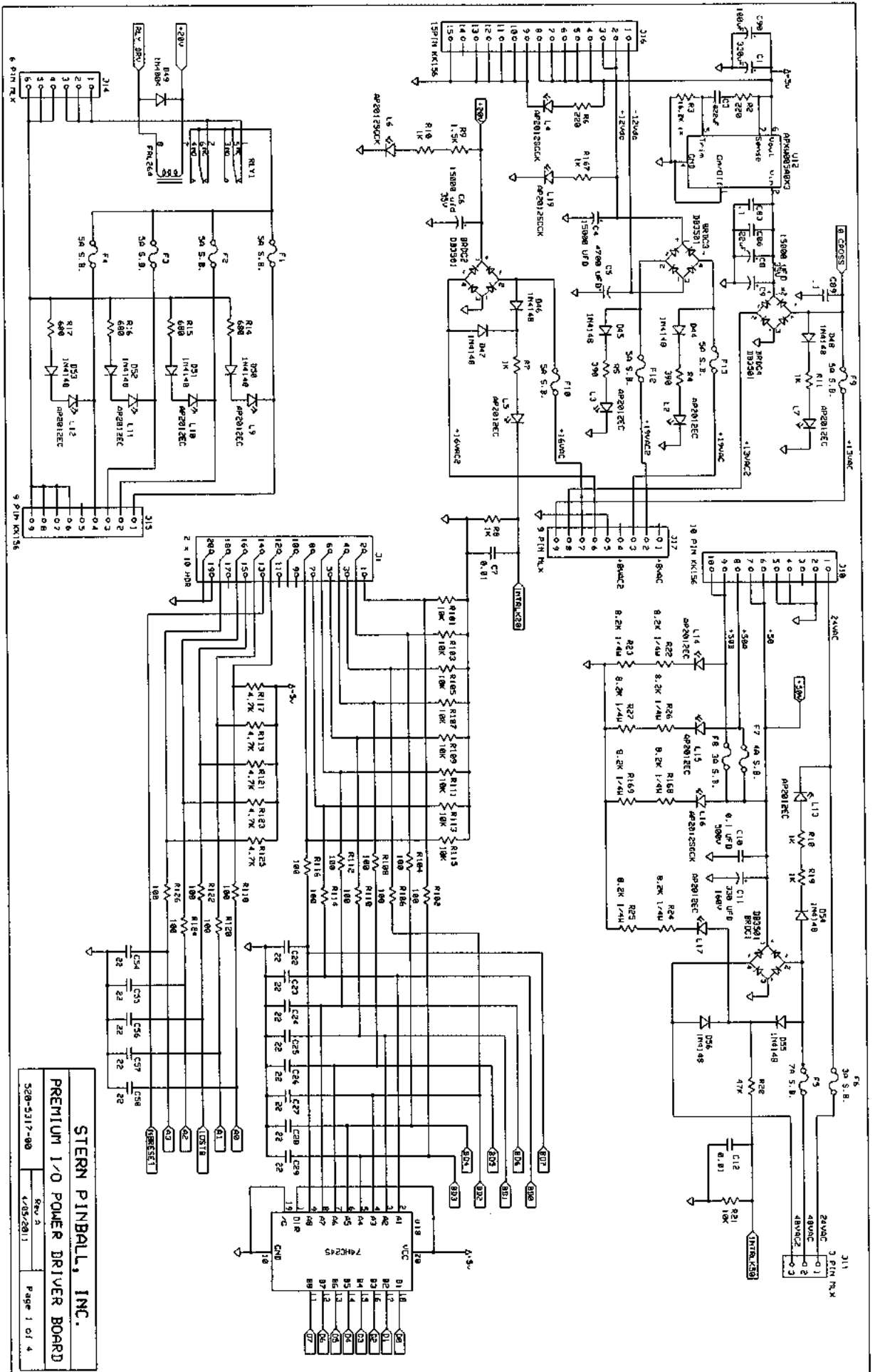
JUMPER PLUG ▼
(SPI PART #036-5530-220)
212VAC - 224VAC
EUROPE and
MID. EAST
LINE VOLTAGE

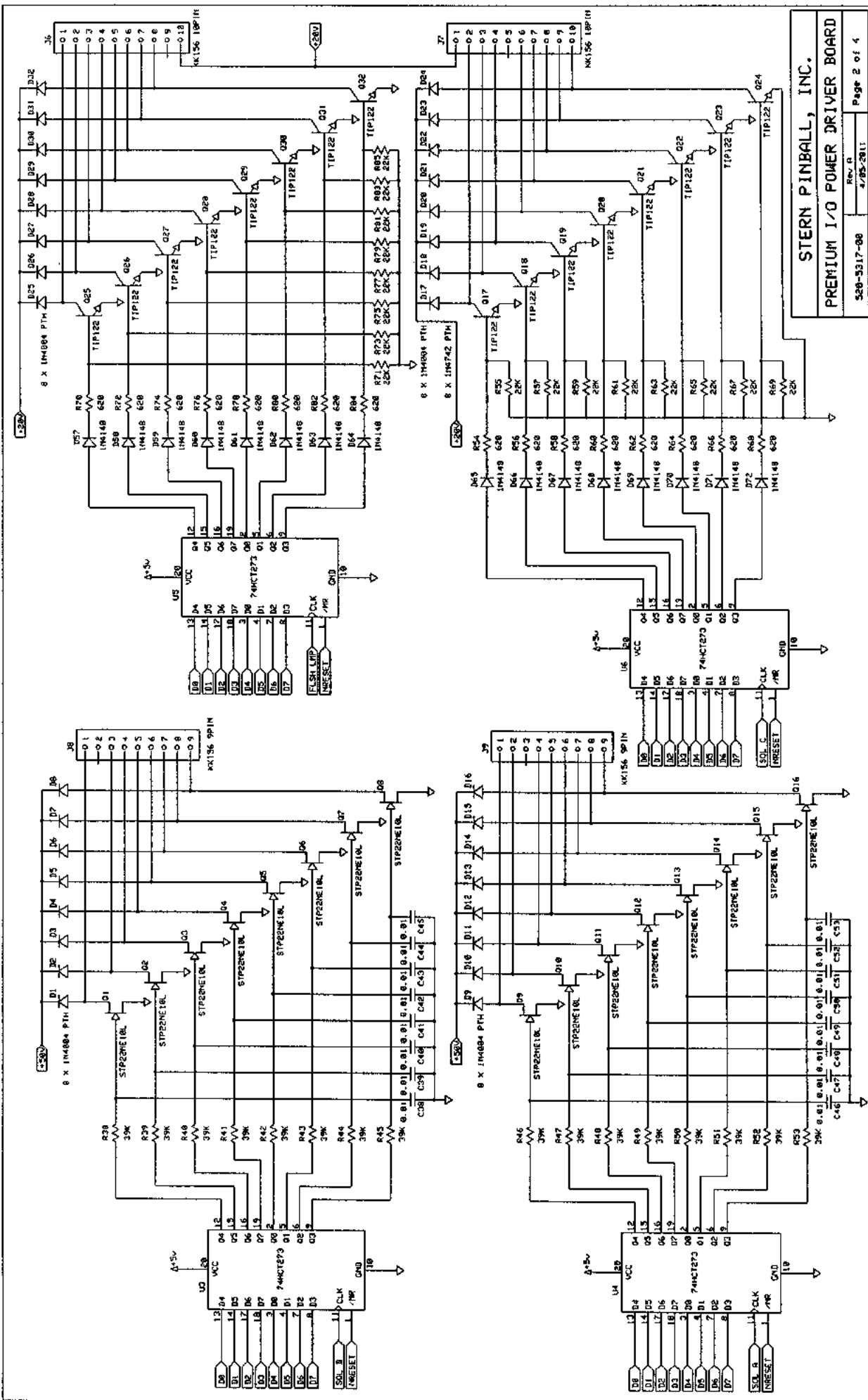


JUMPER PLUG ▼
(SPI PART #036-5530-230)
225+VAC
EUROPE and
MID. EAST HIGH
LINE VOLTAGE



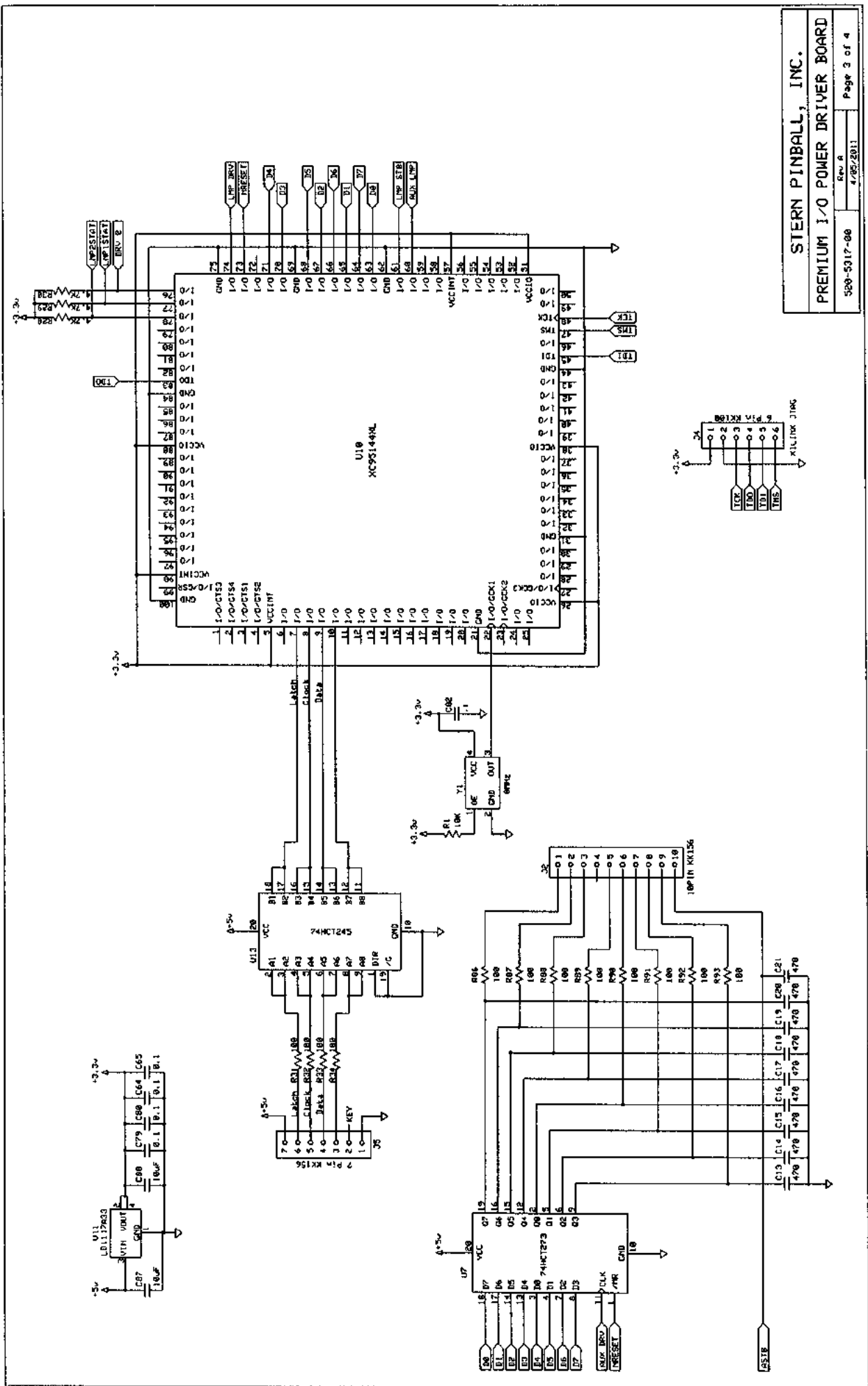
Cabinet and Coin
Door Wiring

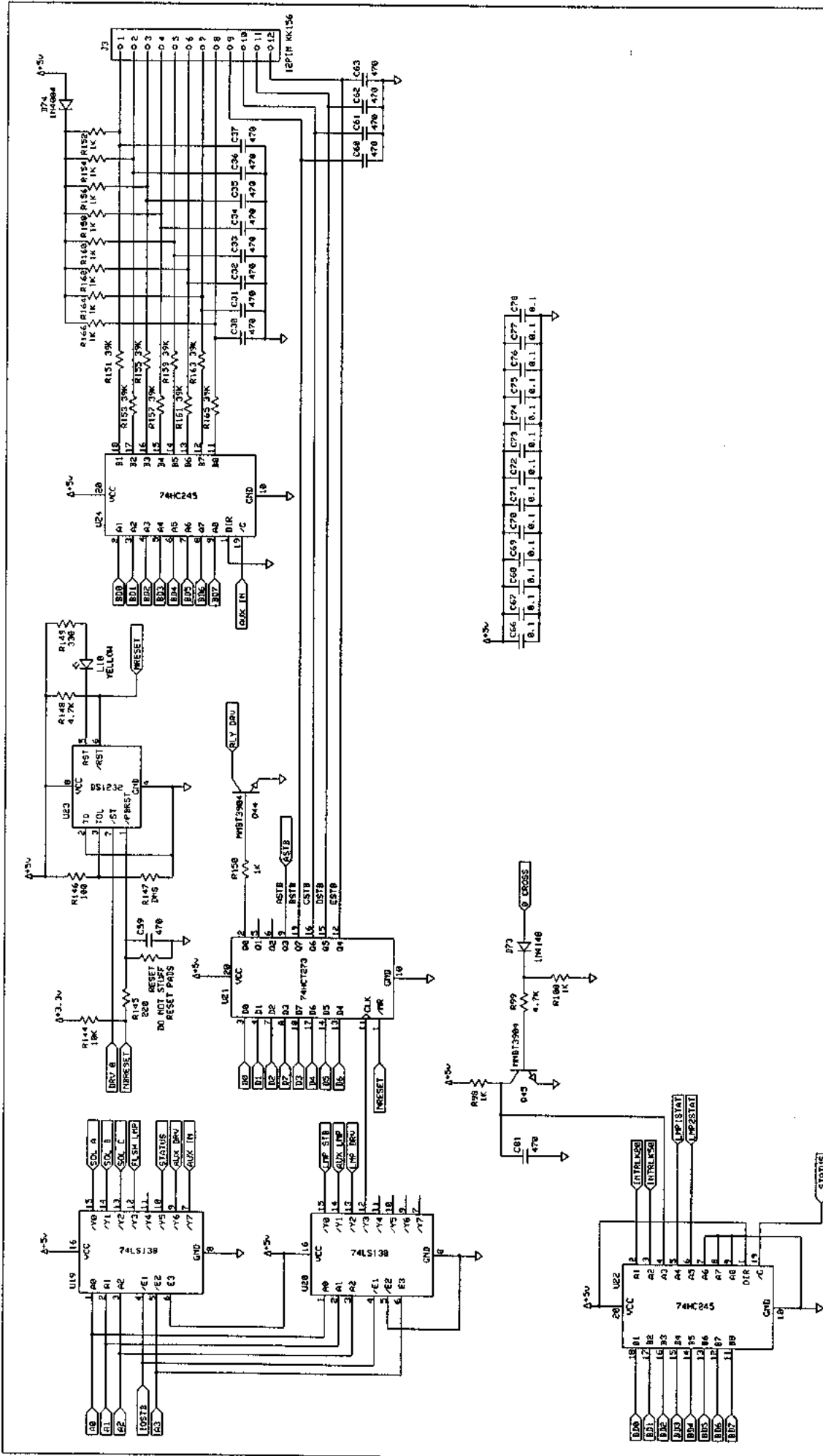




STERN PINBALL, INC.
PREMIUM I/O POWER DRIVER BOARD
 520-5317-08 Rev. D 4/05-2011
 Page 2 of 4

Y 28





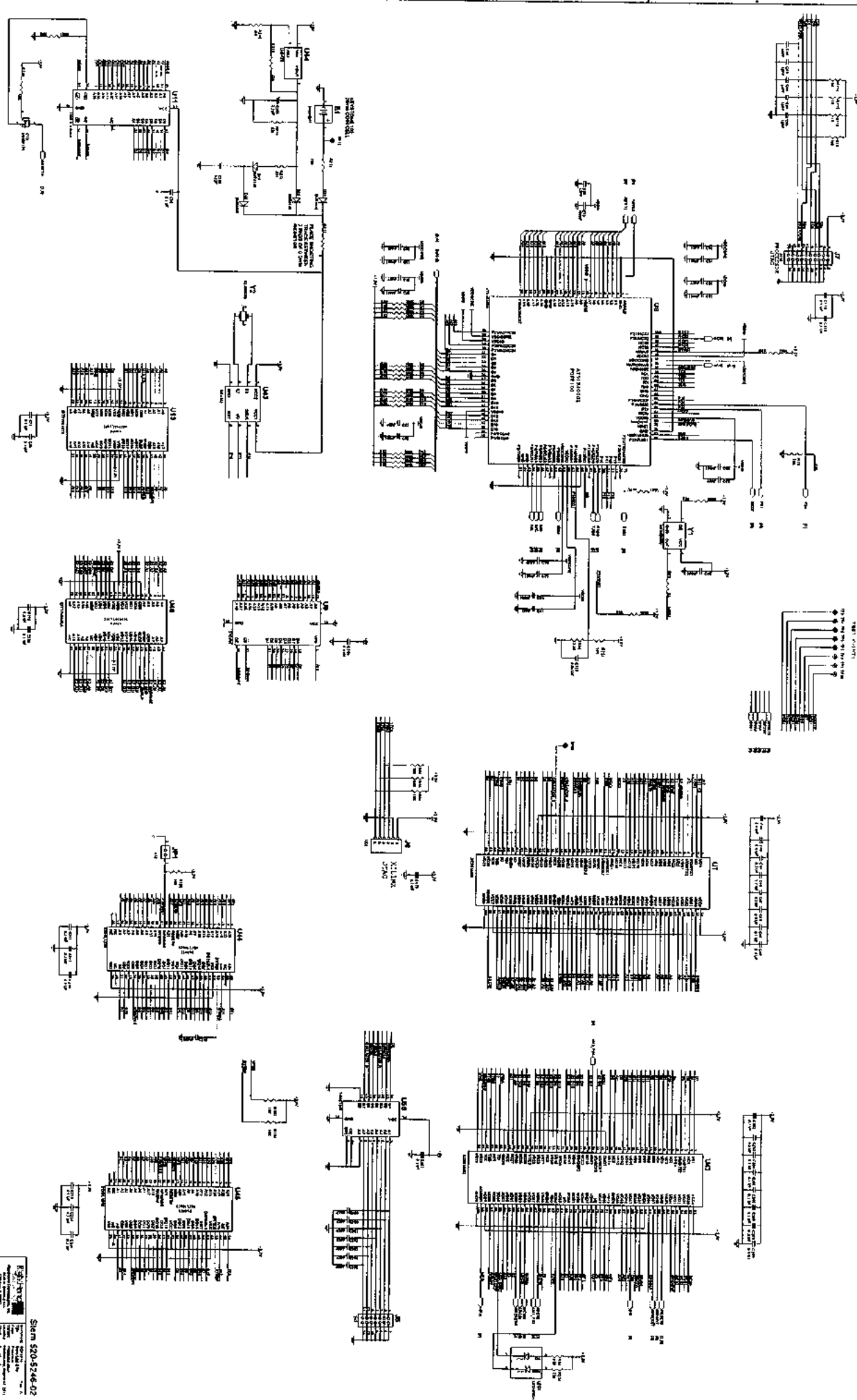
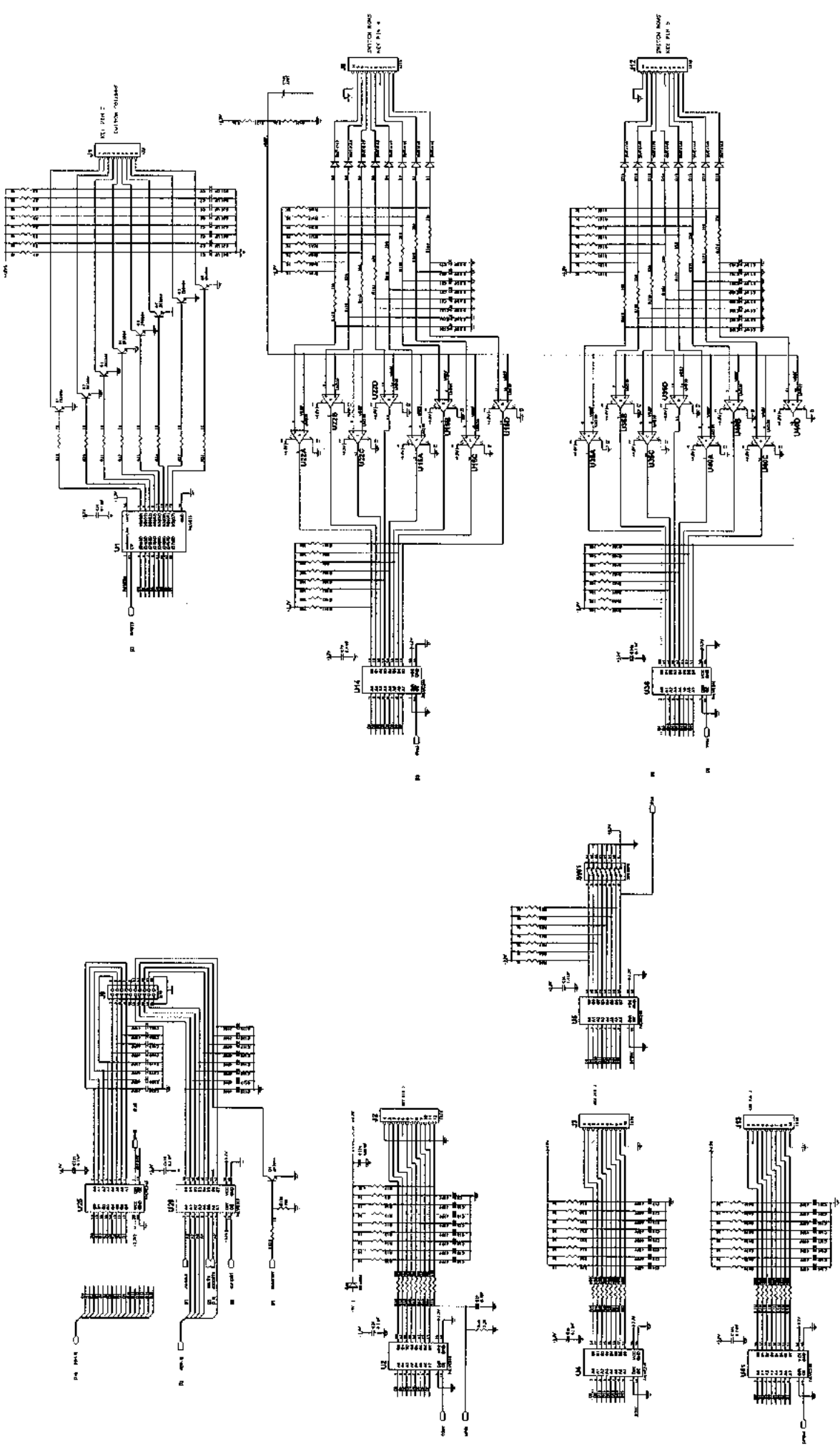


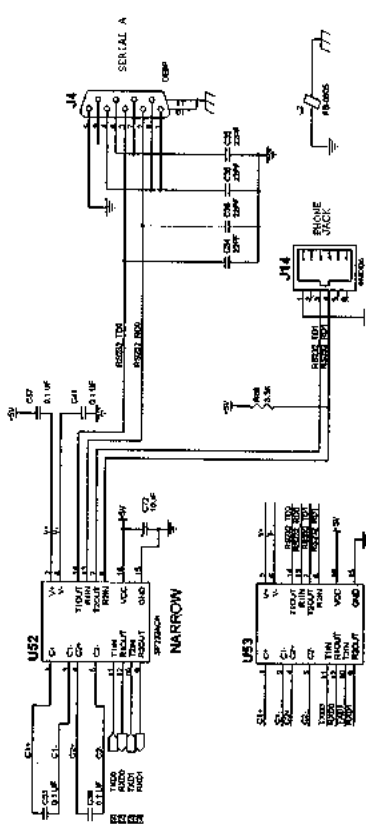
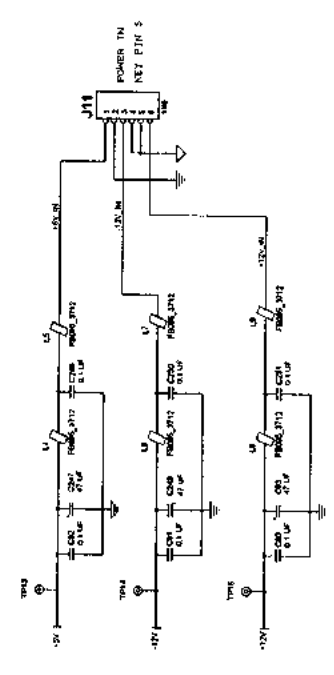
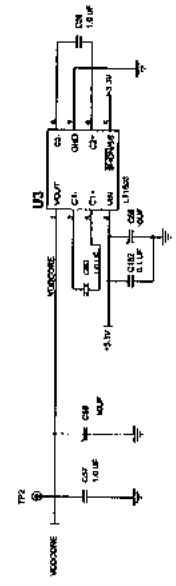
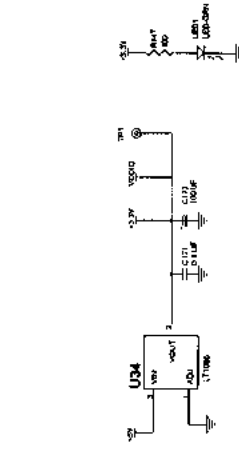
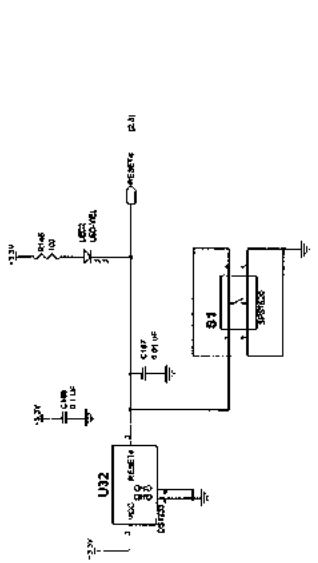
Fig. 2 - 100W, 250W

GPO : 1964 O-514-02
 PERFORMING ORGANIZATION NAME: General Dynamics Research Laboratories
 REPORT NUMBER: AD-671 649
 AUTHOR: [unclear]
 TITLE: [unclear]
 DATE: [unclear]
 PRICE: \$3.00
 Avionics Laboratory
 Fort Belvoir, Miss.
 5115-15
 34

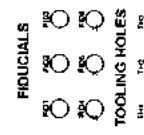
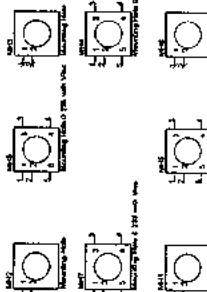
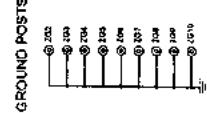
Slm 520-514-02

Stern 520-5246-02
 Revision 1
 Date 10/1/68
 Drawing No. 520-5246-02
 Part No. 520-5246-02
 Property and Control: Regulatory DMA





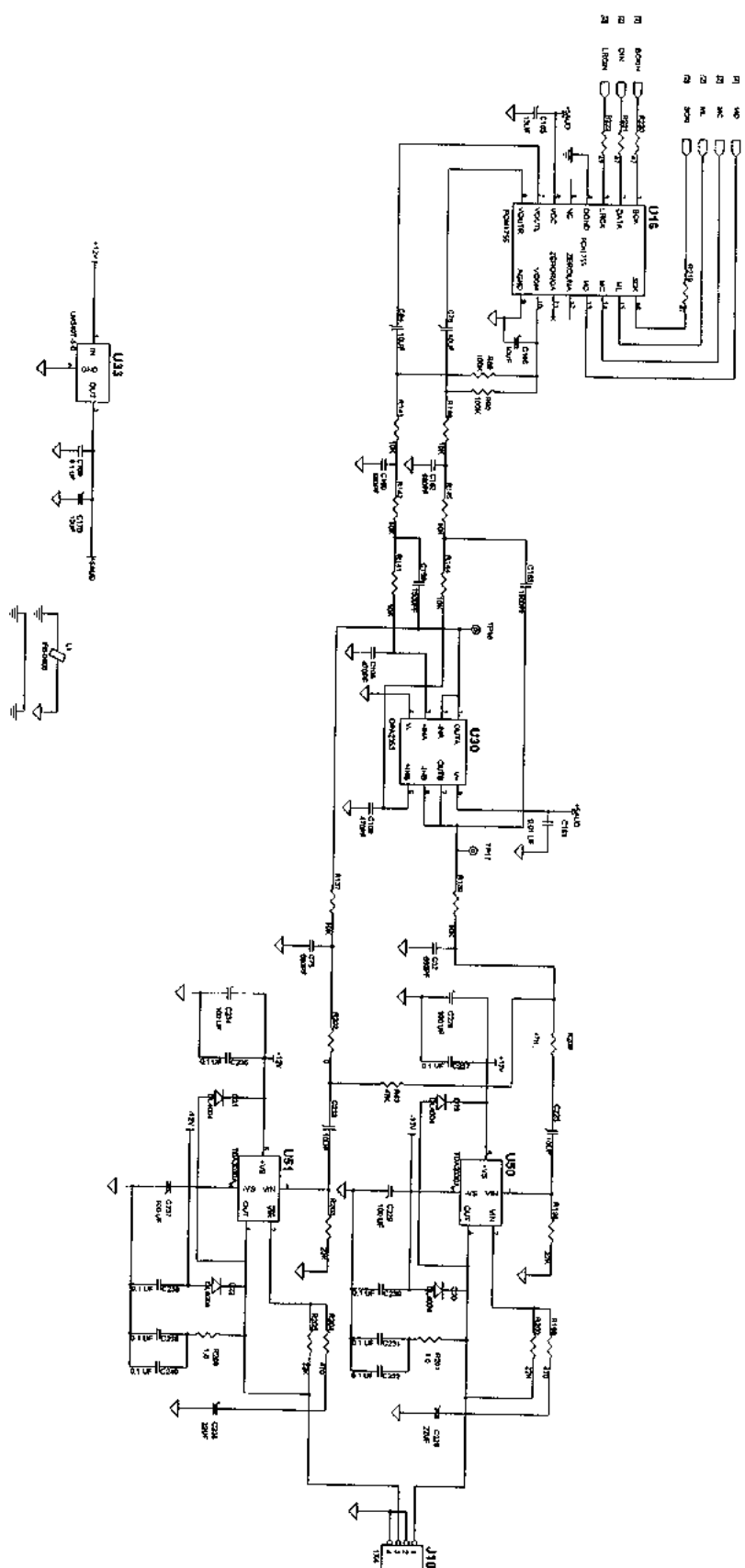
ALTERNATE FOOTPRINT



Right-hand
 Design: 021013
 Name: Serial A
 Author: [Redacted]
 Date: 08/12/2011
 Version: 1.0
 Project: [Redacted]

Stem S20-5246-02

Proprietary and Confidential - Requires NDA



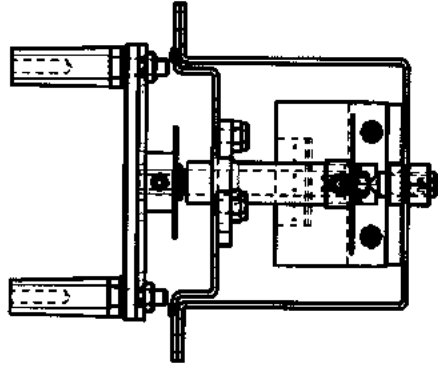
Stem 520-5246-02

Northrop
 Northrop Grumman Corporation
 2455 West 130th Avenue
 Torrance, CA 90504
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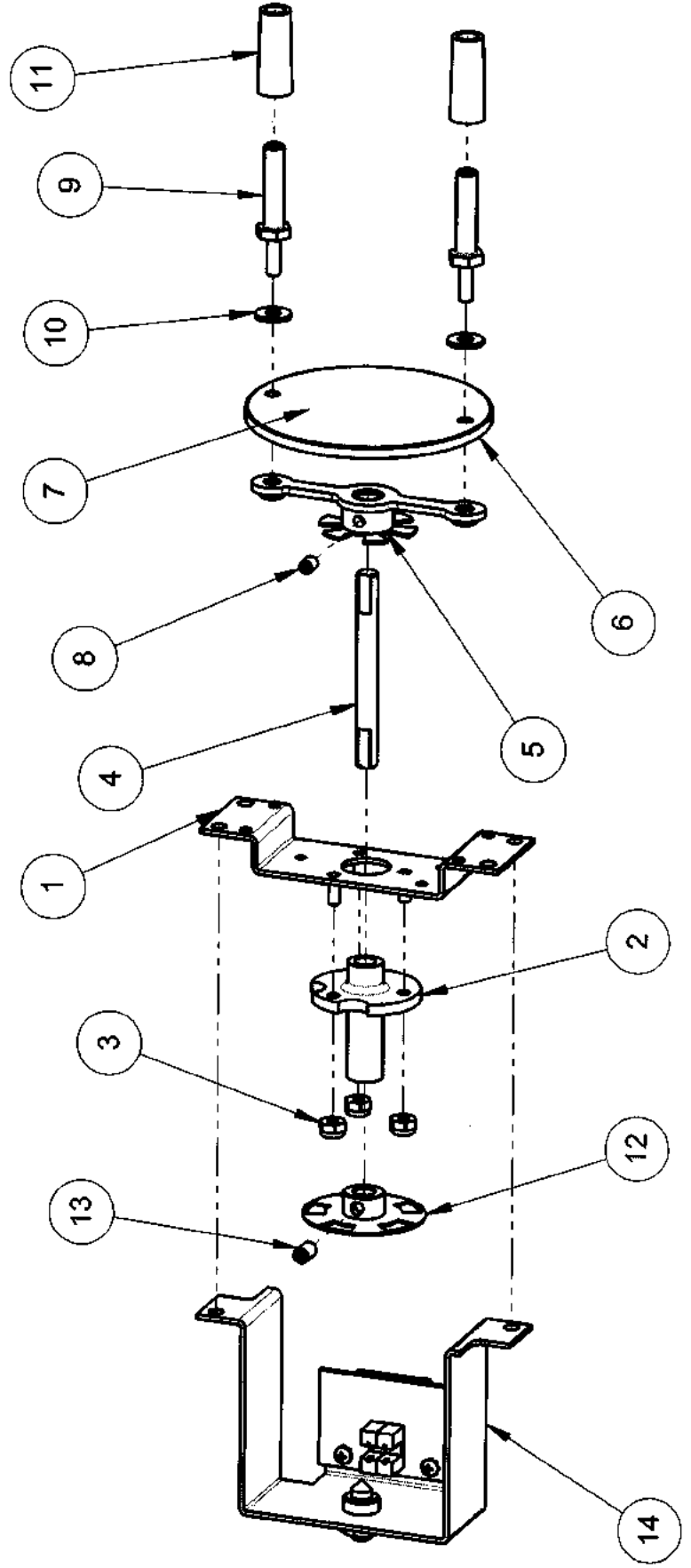
Y34

FLAT SPINNER ASSEMBLY AVENGERS PRO

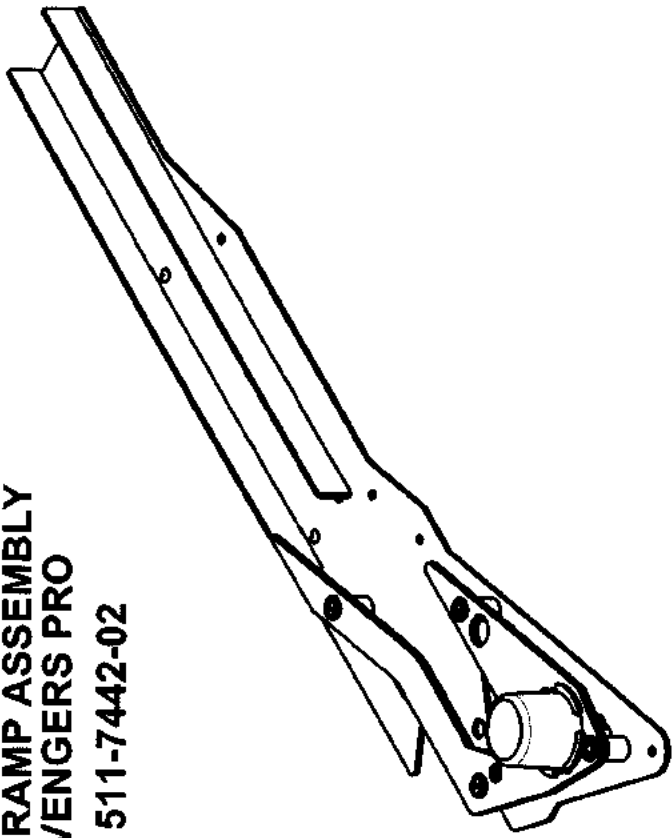
500-7272-01



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	515-1023-00	BRKT: FLAT SPINNER	1
2	545-5070-04	FLIPPER BUSHING-MODIFIED	1
3	240-5005-00	6-32 NYLON STOP NUT	3
4	530-1004-00	SHAFT, FLAT SPINNER	1
5	515-1022-00	PLATER ARM, FLAT SPINNER	1
6	830-1004-00	PLATER, FLAT SPINNER ASSY	1
7	820-7015-00	DECAL, FLAT SPINNER, PEEL	1
8	237-6130-00	SET SCREW, 8-32 X 1/4" CUP PT	1
9	530-5332-04	HEX BUMPER POST - 8-32 TAP T-NUT	2
10	242-5005-00	#8 WASHER	2
11	545-5308-00	POST - RUBBER - 3/8 O.D. X 1-1/16 - 95 A - BLACK	2
12	530-1012-00	CHOPPER WHEEL, FLAT SPINNER	1
13	237-6092-00	SET SCREW, 10-32 X 5/16, SOCKET CUP PT	1
14	511-7469-00	ASSEM, LEVEL & OPTO, FLAT SPINNER	1

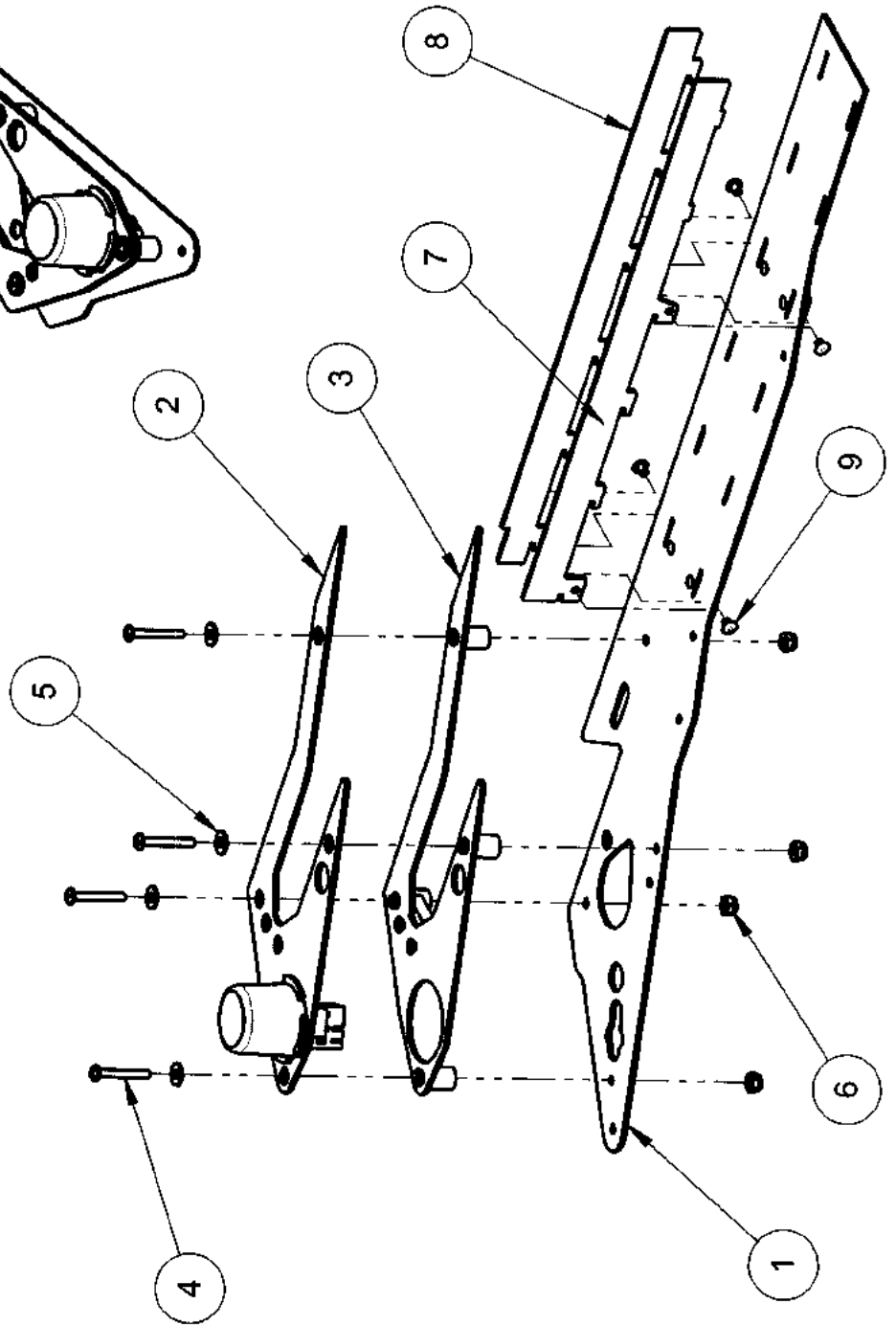


LEFT RAMP ASSEMBLY AVENGERS PRO 511-7442-02



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	510-5787-02	RIVETED ASSEMBLY #2, PEEL PRO	1
2	511-7442-22	BUTY ASSEMBLY #22, PEEL PRO	1
3	511-7442-62	BUTY ASSEMBLY #62, PEEL PRO	1
4	237-5506-00	SCREW, 6-32 X 1" PPH MS	4
5	242-5001-00	#6 WASHER	4
6	240-5005-00	6-32 NYLON STOP NUT	4
7	830-6177-32	BUTYRATE #32, PEEL PRO	1
8	830-6177-33	BUTYRATE #33, PEEL PRO	1
9	249-5025-00	POP RIVET - 1/8D X 1/8-3/16 GRIP	4
99*	511-5240-00	ASSY YELLOW GI SPOTLIGHT	1

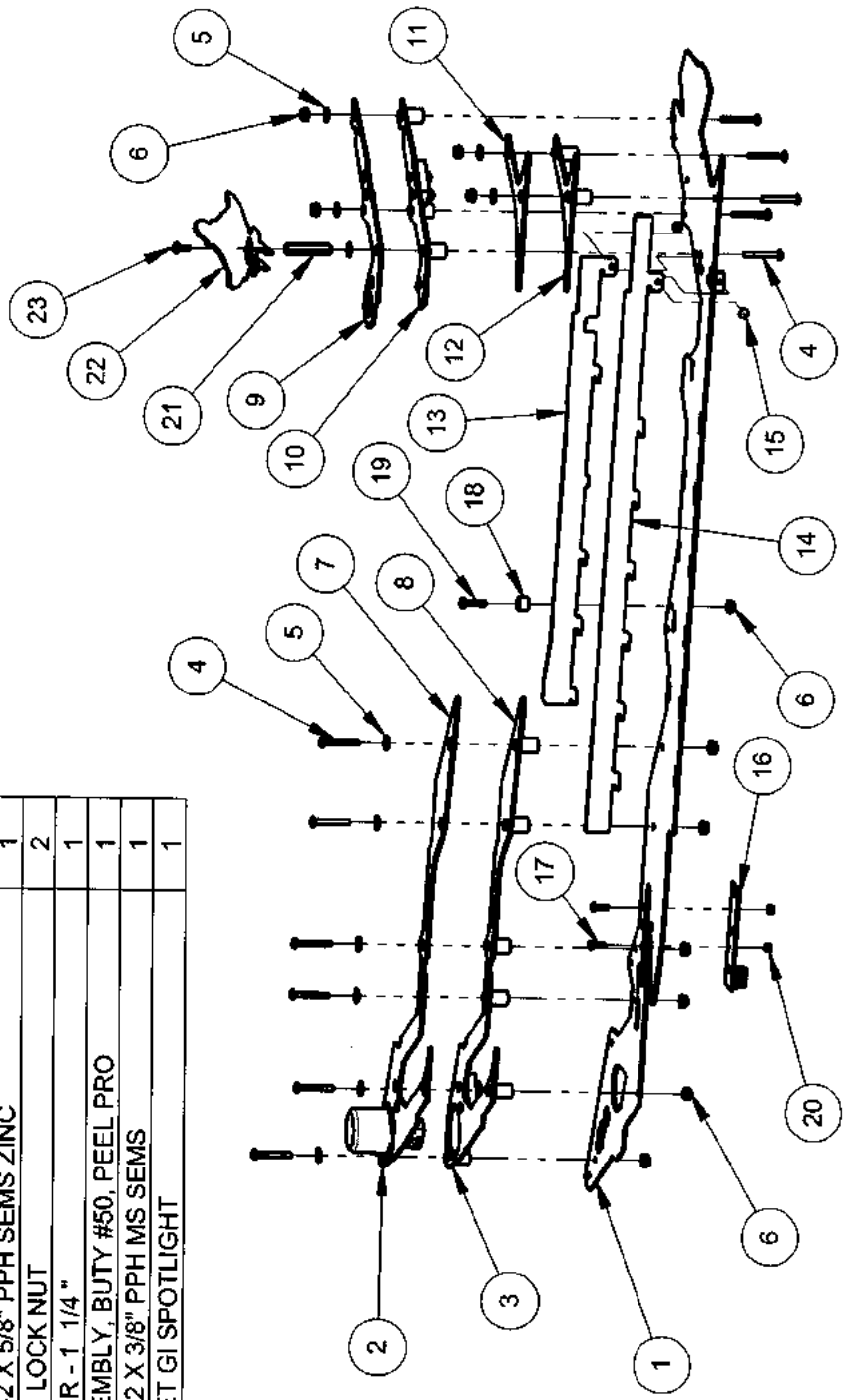
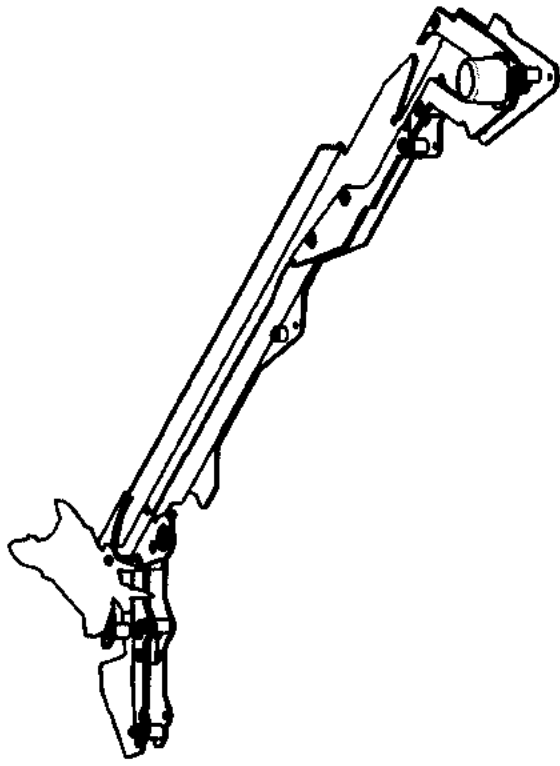
* ITEM NOT SHOWN



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	510-5787-04	RIVETED ASSEMBLY #4, PEEL PRO	1
2	511-7442-24	BUTY ASSEMBLY #24, PEEL PRO	1
3	511-7442-64	BUTY ASSEMBLY #64, PEEL PRO	1
4	237-5506-00	SCREW, 6-32 X 1" PPH MS	11
5	242-5001-00	#6 WASHER	11
6	240-5005-00	6-32 NYLON STOP NUT	11
7	830-6177-23	BUTYRATE #23, PEEL PRO	1
8	511-7442-63	BUTY ASSEMBLY #63, PEEL	1
9	830-6177-25	BUTYRATE #25, PEEL PRO	1
10	511-7442-65	BUTY ASSEMBLY #65, PEEL PRO	1
11	830-6177-26	BUTYRATE #26, PEEL PRO	1
12	511-7442-66	BUTY ASSEMBLY #66, PEEL	1
13	830-6177-27	BUTYRATE #27, PEEL PRO	1
14	830-6177-28	BUTYRATE #28, PEEL PRO	1
15	249-5025-00	POP RIVET - 1/8D X 1/8-3/16 GRIP	2
16	520-6780-01	PCB ASSY, BALL TROUGH SAM SYSTEM	1
17	237-5997-00	SCREW, 4-40 X 3/8" PPH MS BLACK	2
18	254-5000-09	NYLON SPACER - BLACK - 3/8 OD X .175 ID X 1/4"	1
19	232-5203-00	SCREW, 6-32 X 5/8" PPH SEMS ZINC	1
20	240-5303-00	4-40 NYLON LOCK NUT	2
21	254-5008-11	HEX SPACER - 1 1/4"	1
22	510-5787-50	RIVET ASSEMBLY, BUTY #50, PEEL PRO	1
23	232-5201-00	SCREW, 6-32 X 3/8" PPH MS SEMS	1
99*	511-5240-01	ASSY VIOLET GI SPOTLIGHT	1

* ITEM NOT SHOWN

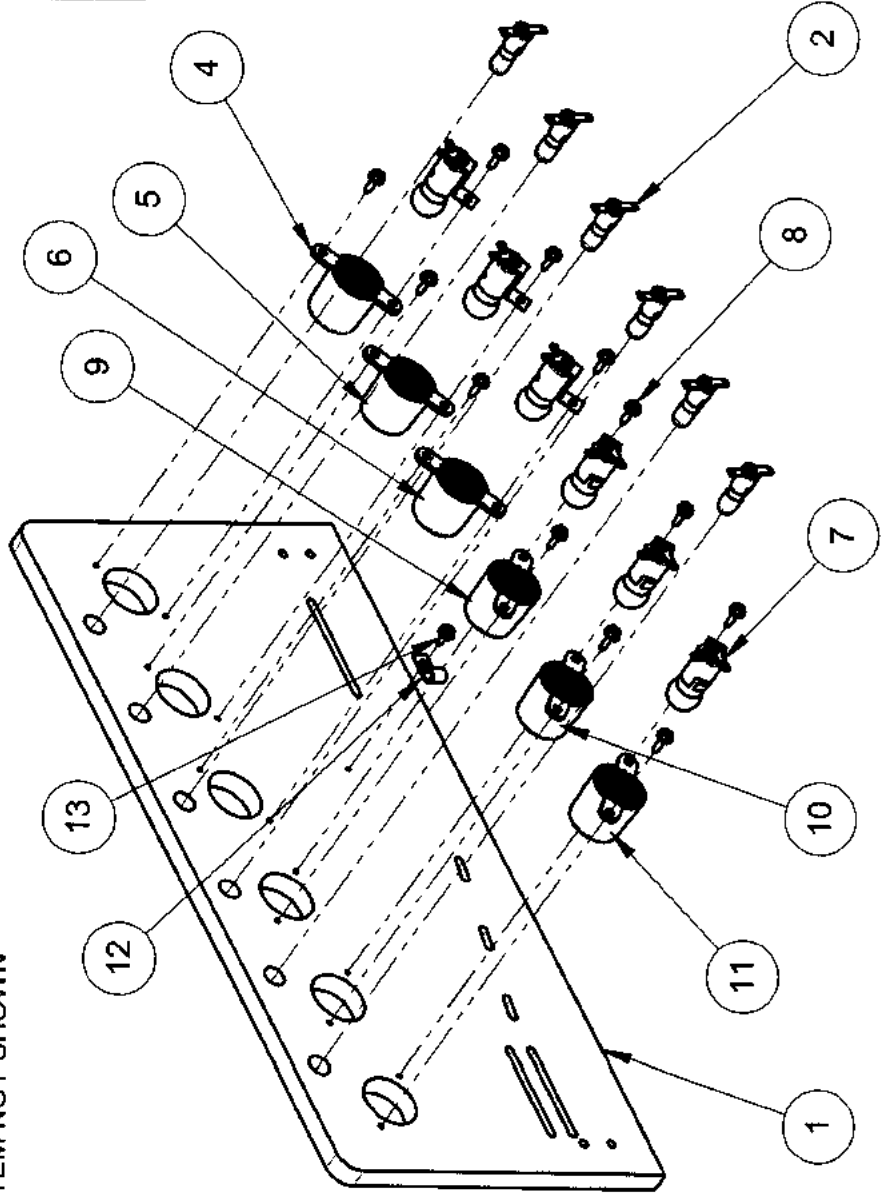
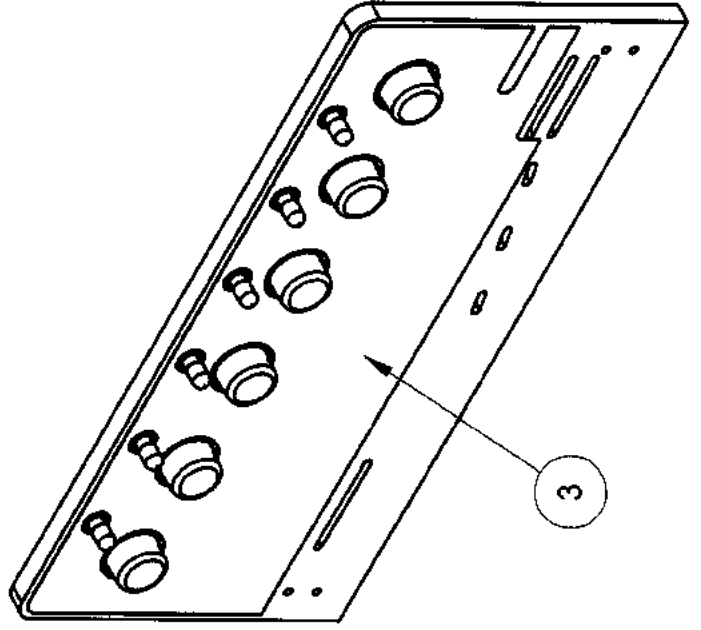
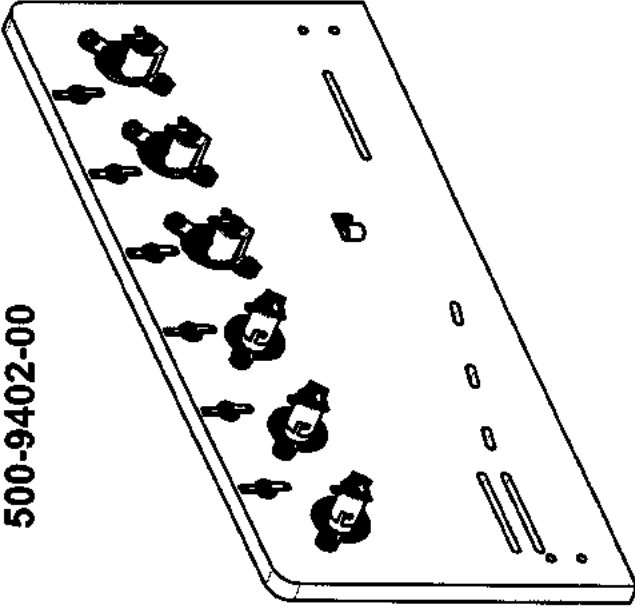
**RIGHT RAMP ASSEMBLY
AVENGERS PRO
511-7442-04**



**BACK PANEL ASSEMBLY
AVENGERS PRO
500-9402-00**

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	525-5821-00	BACK PANEL, PEEL PRO	1
2	519-5000-00-HF	SOCKET & BULB ASSY, CLEAR	6
3	820-7002-10	DECAL #10, BACK PANEL, PEEL PRO	1
4	550-5031-05	MINI MARS W/ EARS - BLUE SB	1
5	550-5031-09	MINI MARS W/ EARS - PURPLE SB	1
6	550-5031-04	MINI MARS W/ EARS - GREEN SB	1
7	519-5101-00-HF	SOCKET/#89 BULB ASSY - HEAVY FILAMENT	6
8	234-5001-02	SCREW, #6 X 1/2" HWH	12
9	550-5031-02	MINI MARS W/ EARS - RED SB	1
10	550-5031-01	MINI MARS W/ EARS - CLEAR SB	1
11	550-5031-06	MINI MARS W/ EARS - YELLOW SB	1
12	040-5000-03	1/4" CABLE CLAMP	1
13	234-5000-00	SCREW, #6 X 3/8" HWH	1
99*	036-5594-04-D3	CABLE, BACK PANEL, PEEL PRO	1

* ITEM NOT SHOWN



HOW TO UPDATE YOUR GAME CODE FOR S.A.M. SYSTEM MACHINES

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

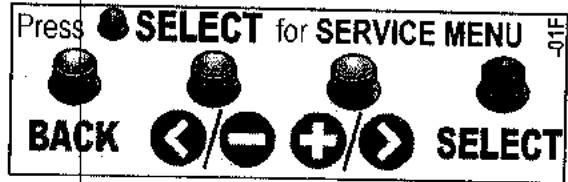
* to get the Data Storage Device with the latest Game Code copied to it, add "game title" to above part number.

STYLE, COLOR, SIZE AND MANUFACTURER SUBJECT TO CHANGE.

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

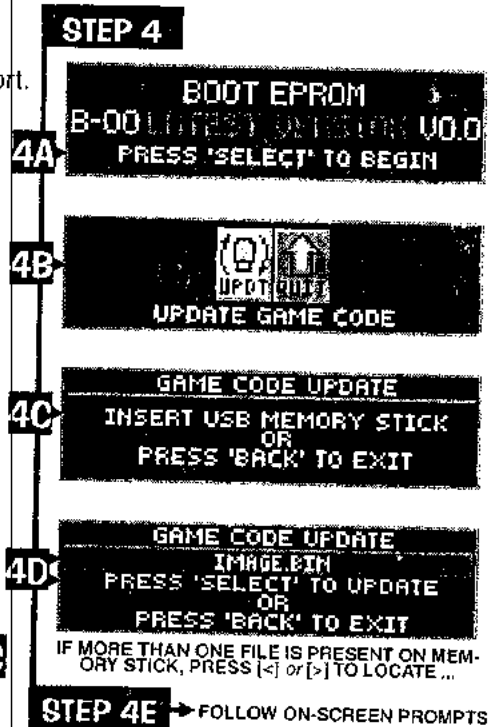
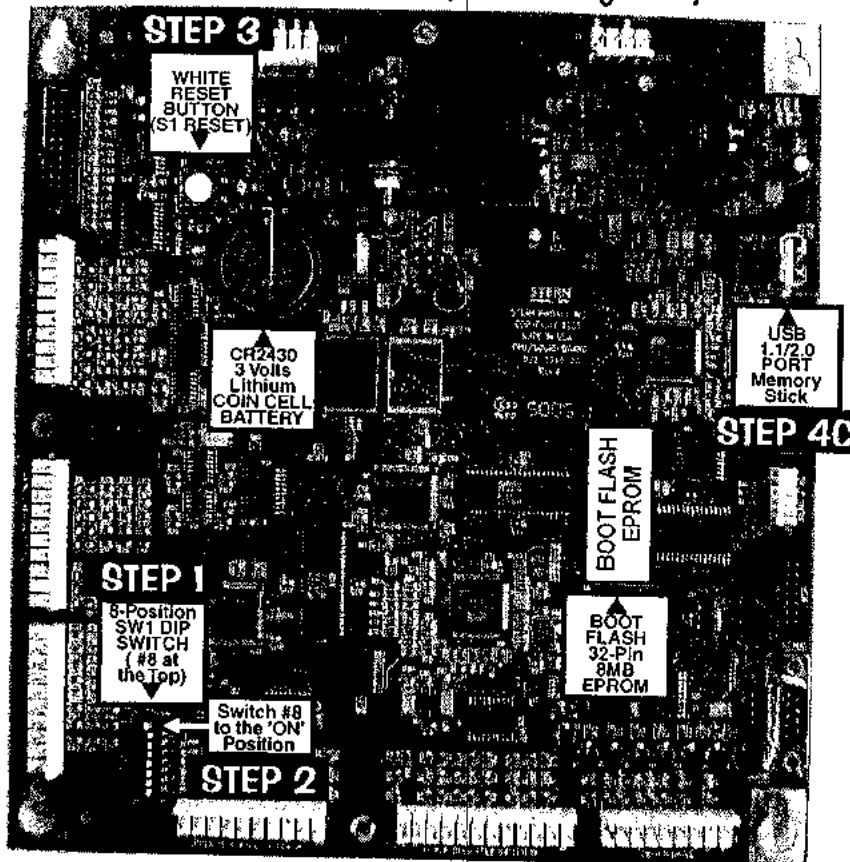
Upon power-up the display will describe the version of code installed in your game. When directed to do so (via Service Bulletin or website announcement) you will need to update your code ... with the **BOOT FLASH EPROM*** installed, here's how:

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



- **Green Button**
Press to **Escape Back** (or **Exit**).
- **Red Buttons**
Press to move **< Left , Right >**.
Press to **- Decrease** or **+ Increase** values or to change settings.
- **Black Button**
Press to **Enter Select** (or **'OK'**).

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

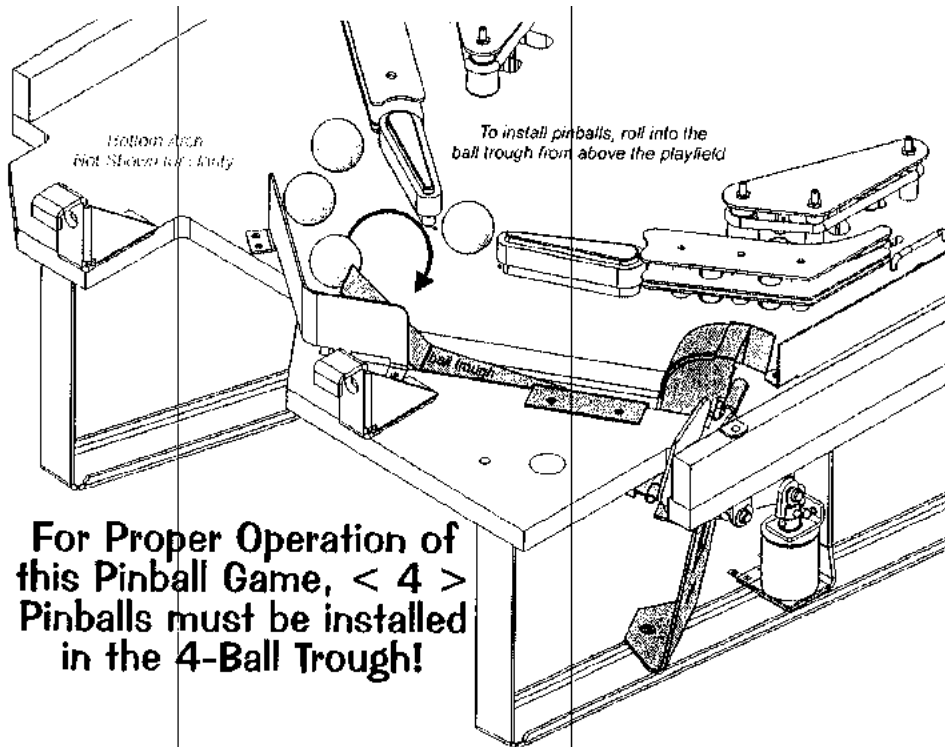


You can also retrieve your latest code from another game! From the **USB MENU** via the **UTILITIES MENU**, select the **"BKUP"** Icon instead and download to your Data Storage Device.



! Quick Tip ~ Try backing up your current code prior to installing your new code, just in case your Data Storage Device file was corrupted by a computer glitch while you were copying /

Got confused? Comments? Questions? Call Technical Support at 800-542-3877 or 708-345-7700 (Option 1).



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

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

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

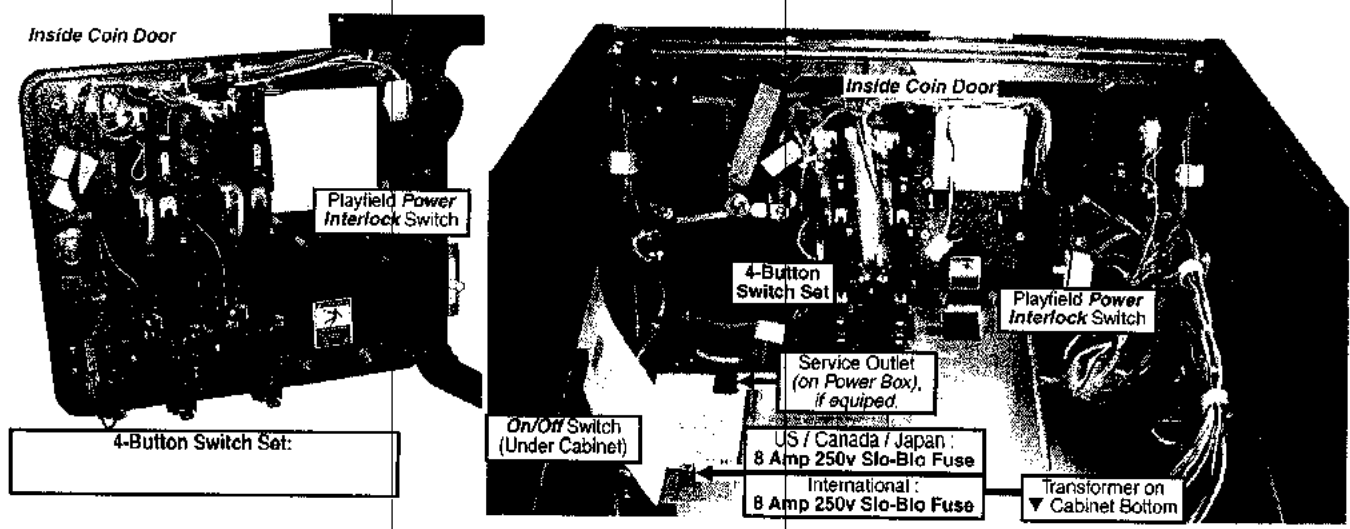
QUICK REFERENCE FUSE CHART			
BACKBOX FUSES			
I/O POWER DRIVER BOARD			
with RED LED STATUS INDICATORS (if any RED LED is OFF, check the fuse)			
F1	5A S.B.	5.7VAC- G.I. Lamps	[BROWN-WHITE-WHT-BRN]
F2	5A S.B.	5.7VAC- G.I. Lamps	[YELLOW-WHITE-YEL Circuit]
F3	5A S.B.	5.7VAC- G.I. Lamps	[GREEN-WHITE-GRN Circuit]
F4	5A S.B.	5.7VAC- G.I. Lamps	[VIOLET-WHITE-VIO Circuit]
F5	7A S.B.	50VDC Coils / Flippers	[48VAC feed to BRDG 1]
F6	3A S.B.	24VAC- Motor or Special Application	
F7	4A S.B.	50VDC Magnet(s) or Special Application	
F8	3A S.B.	50VDC Coils	
F9	8A S.B.	18VDC Control Lamps	[13VAC feed to BRDG 4]
F10	5A S.B.	20VDC Coils / Flashers	[16VAC feed to BRDG 2]
F11	4A S.B.	5VDC Logic Power	[8VAC feed to BRDG 5]
F12	5A S.B.	12VDC Audio	[19VAC feed to BRDG 3]
F13	5A S.B.	12VDC Audio	[19VAC feed to BRDG 3]

CABINET FUSES	
POWER (SERVICE OUTLET) BOX	
(Access through Coin Door inside cabinet front bottom)	
8A S.B.	110-120V Main Line US / Canada / Japan
5A S.B.	220-240V Main Line International

PLAYFIELD FUSES	
FLIPPER OR SPECIAL APPLICATION	
(Coil Fuses are located under the playfield near assembly)	
3A S.B.	50VDC R. Flipper [BLU-YEL-RED-YEL]
3A S.B.	50VDC L. Flipper [GRY-YEL-RED-YEL]
3A S.B.	50VDC Additional Flipper Coil, if used
3A S.B.	50VDC Spcl. Application Coil, if used

ALL FUSES ARE 250V S.B. (SLO-BLO)
SEE FUSE OR TABLES FOR AMP RATING
CAUTION - FOR CONTINUED PROTECTION AGAINST RISK OF FIRE, REPLACE ONLY WITH SAME TYPE FUSE WITH IDENTICAL ELECTRICAL RATING!

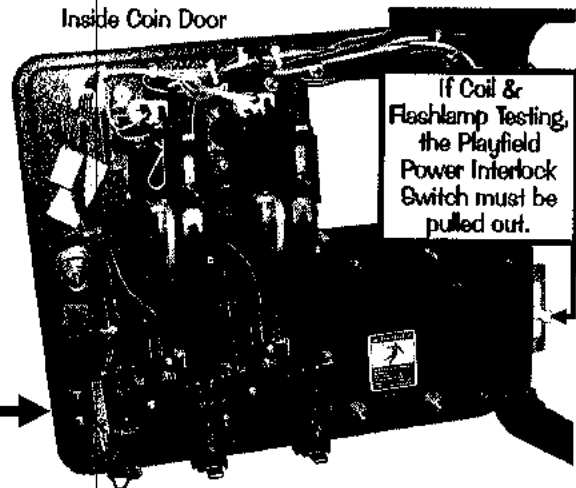
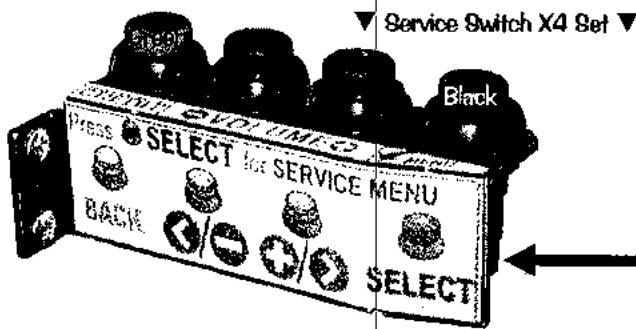
Stem Pinball®, Inc. ©2008 820-6384-00 Rev C



Service Switch X4 Set Access & Use

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

Inside Coin Door



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

Pushing the **GREEN** BUTTON first.

◀ Function 1: SERVICE CREDITS MENU

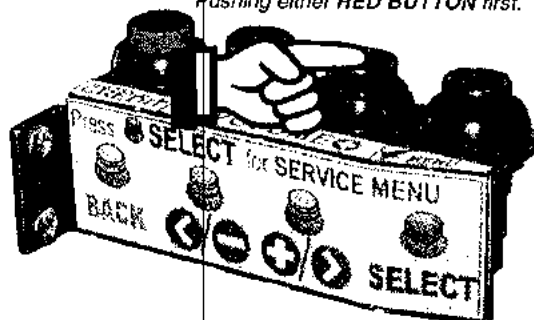
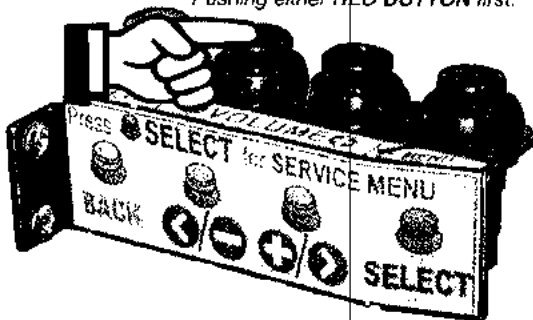
Pushing the Green [**SERVICE CREDIT**] Button first, adds a **Service Credit** per push (will not affect your audits as "paid" credits). This is useful for the technician to test games in regular play without affecting the game audits. Each depression adds 1 credit; up to 50 credits can be applied. Standard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

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

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

Pushing either **RED** BUTTON first.

Pushing either **RED** BUTTON first.



▲ Function 2: VOLUME MENU ▲

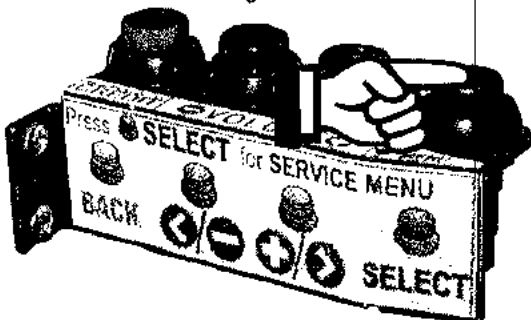
Pushing either of the Red [**VOLUME**] Buttons first, enters the **VOLUME MENU**. While in this Mode, to **DECREASE** the volume, hold down or depress the 1st Red [**</-**] Button until desired the volume is achieved; to **INCREASE** the volume, hold down or depress the 2nd Red [**+ / >**] Button until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

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

Pushing the **BLACK** BUTTON first.

◀ Function 3: SERVICE MENU

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



DIAGNOSTIC AIDS

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

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

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

**OPERATOR ALERT!
AUTO PLUNGER
DEVICE MALFUNCTION**

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

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

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

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

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

CPU DIP SWITCH SETTINGS

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

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
USA	ON								
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Australia	ON	▲	▲	▲	▲				
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Austria	ON	▲							
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Belgium	ON	▲							
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Canada 1	ON	▲	▲						
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Canada 2	ON	▲	▲	▲					
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Croatia	ON	▲	▲	▲	▲				
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Denmark	ON	▲							
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Finland	ON	▲	▲						
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
France	ON	▲	▲	▲					
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Germany	ON	▲	▲						
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Greece	ON	▲	▲	▲					
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Italy	ON				▲				
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Japan	ON	▲	▲	▲	▲				
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Lithuania	ON	▲	▲	▲	▲				
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Middle East	ON	▲	▲	▲	▲				
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Netherlands	ON		▲						
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
New Zealand	ON					▲			
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Norway	ON	▲	▲	▲					
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Portugal	ON	▲							
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Russia	ON	▲	▲	▲	▲	▲			
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
So. Africa	ON			▲	▲				
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Spain	ON	▲	▲	▲	▲				
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Sweden	ON	▲	▲	▲					
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Switzerland	ON			▲	▲				
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
Taiwan	ON			▲	▲				
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU COUNTRY SETTING:	Pos.	1	2	3	4	5	6	7	8
UK	ON	▲	▲	▲	▲				
	OFF	▼	▼	▼	▼	▼	▼	▼	▼
CPU/SND PCB SETTING:	Pos.	1	2	3	4	5	6	7	8
UPDATE CODE	ON								▲
	OFF	▼	▼	▼	▼	▼	▼	▼	▼

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

Service Menu Introduction

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

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



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

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



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

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

DIAG: GO TO DIAGNOSTICS MENU

AUD: GO TO AUDITS MENU

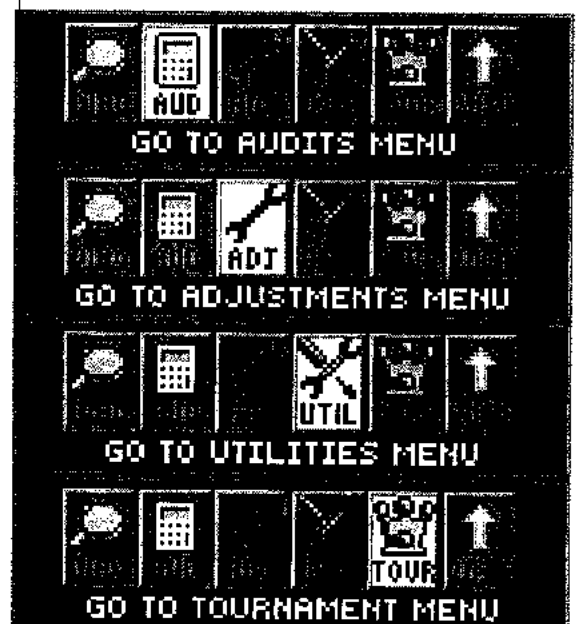
ADJ: GO TO ADJUSTMENTS MENU

UTIL: GO TO UTILITIES MENU
(INSTALLS, CUSTOM MSG., CUSTOM PRICING,
SET TIME, RESET & USB)

TOUR: GO TO TOURNAMENT MENU (START TOURNAMENT,
VIEW TOURNAMENT DATA, SIGN MESSAGES)

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

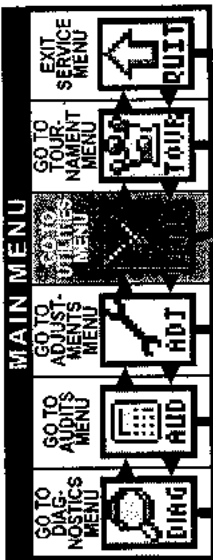
Use both the manual and the display to help customize,
troubleshoot and/or diagnose faults, if any.



This page is intentionally blank.

Pinball Service Menu Icon Tree

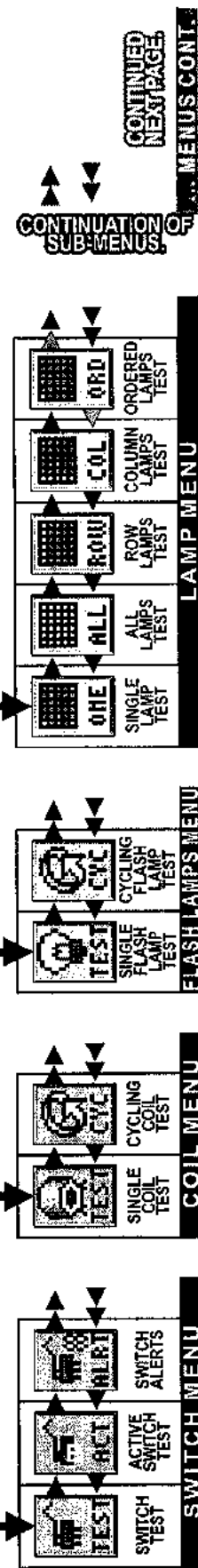
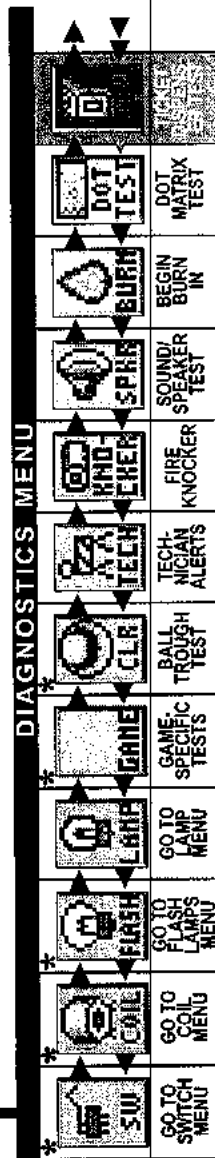
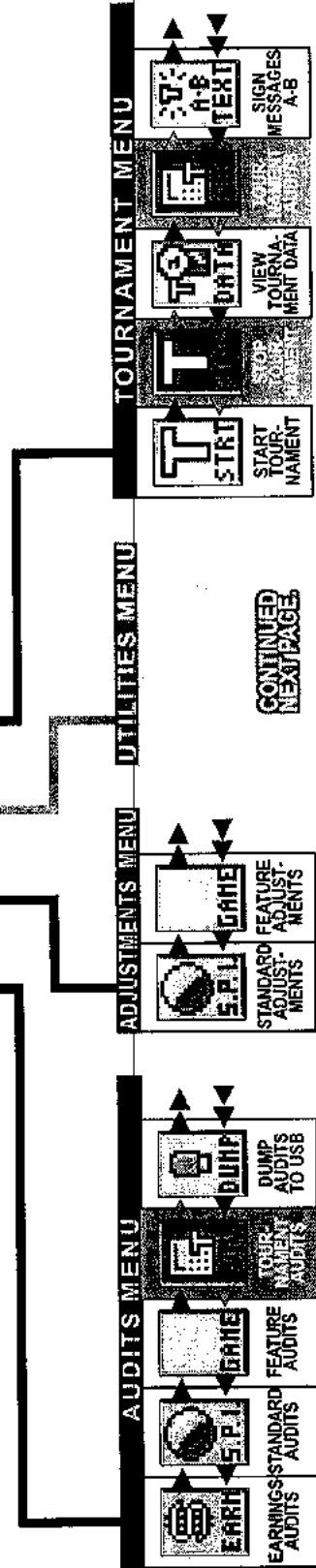
These non-selectable icons appear in the selected Menu only when there are MORE icons to the LEFT or to the RIGHT available for selection.



50V / 20U DISEMBLED
CLOSE COIN DOOR OF FULL INTERLOCK SWITCH TO RESTORE POWER.

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

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

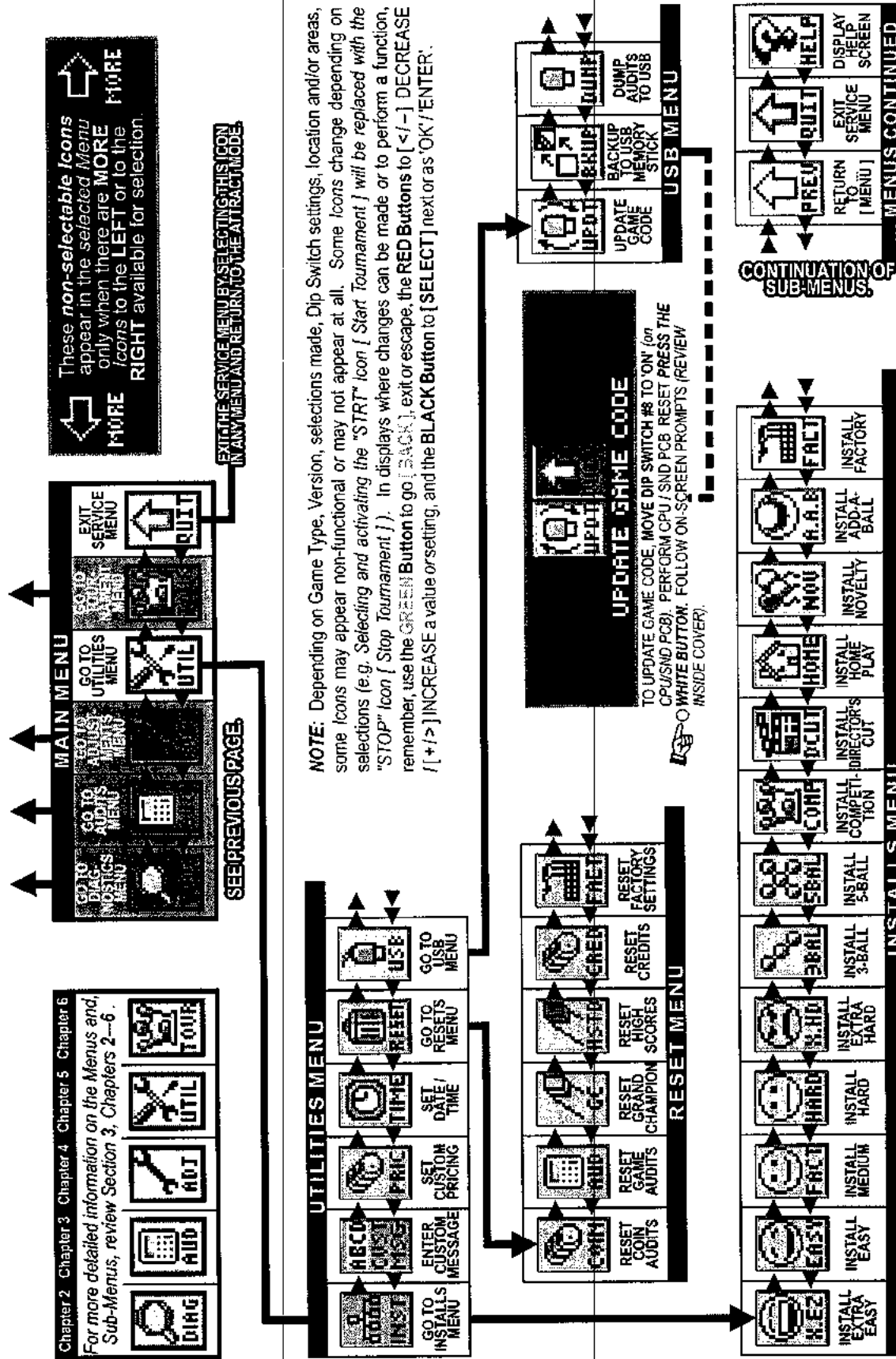


CONTINUATION OF SUB-MENUS

CONTINUED NEXT PAGE

... MENUS CONT.

Pinball Service Menu Icon Tree Continued

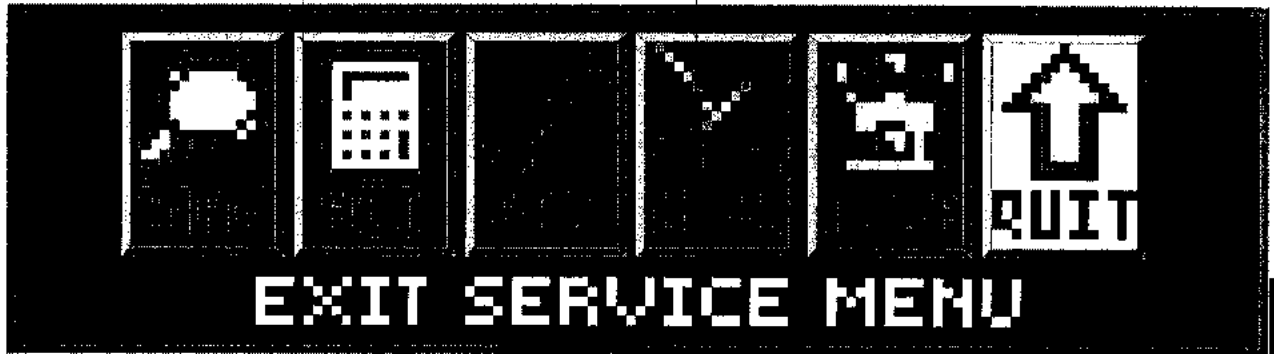


Note: Press [SELECT] to install; Press [BACK] to cancel. After selection of any of the install icons, the request is installed and returns to the Install Menu. The last icon activated before exiting this menu will supersede any previous icon selected in the group.



Exit Service Menu

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



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



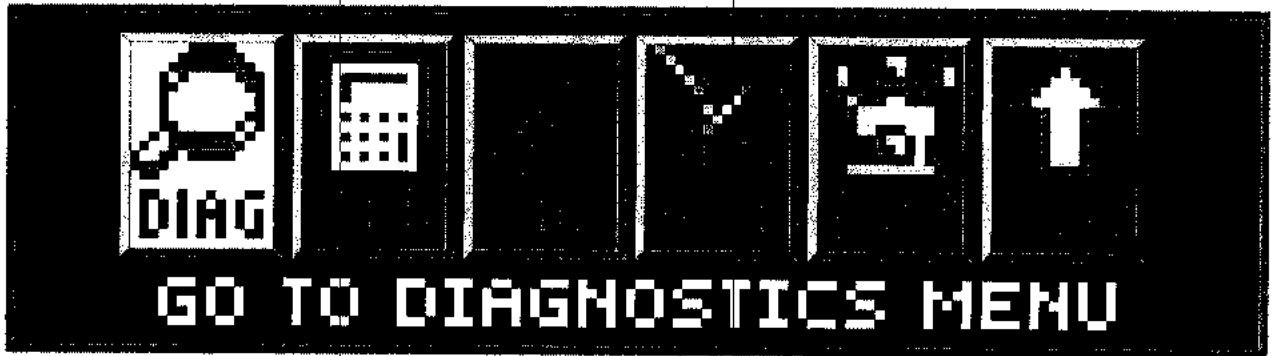
Service Menu Intro.

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

Problem / Solution Table

PROBLEM	SOLUTION
Will not enter the SERVICE MENU after depressing the Black [SELECT] Button .	<ul style="list-style-type: none"> • Check the Service Switches [GREEN, RED (x2) & BLACK Buttons] for loose connections or bad ground. • Check the associated wiring harness to/from the CPU/Sound Board, Connector J13. • Check CPU/Sound Board for possible failure.
All Service Buttons [. . . . Buttons] appear nonfunctional.	<ul style="list-style-type: none"> • Check the Service Switches wiring harness for poor or no connection and/or broken wires.
The Green 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 Switches wiring harness for poor or no connection and/or broken wires.
The Display "blanks out."	<ul style="list-style-type: none"> • Check the Dot Matrix Display for loose wiring harness for poor or no connection and/or broken wires. • Check F1 (3/4A Fuse) on the Display Power Supply Board. <i>Refer to the Yellow Pages (SCHEMATICS & TROUBLESHOOTING).</i>
Icons "scroll" along continuously in the MAIN MENU .	<ul style="list-style-type: none"> • Check for a stuck switch on either of the Red Buttons.
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. <i>Refer to the Diagnostics Section (GO TO DIAGNOSTICS MENU, Switch Test).</i>
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 <i>only</i> in Diagnostic's Switch & Active Switch Tests (see previous Problem).
Some <i>Icons</i> appear non-functional in the MENU or missing.	<ul style="list-style-type: none"> • Some functionality of the Service Menu may not have been completed during development. If exists, it should only be a non-critical function, such as the "HELP" <i>Icon</i>, which will explain the usage of icons. When completed, a software update will correct the problem. Software updates are announced via Service Bulletins (if critical) and on our website http://www.stempinball.com/GAME-code.shtml; view the Game Code Library Message Board Marquee or click Previous Messages for past announcements.
In COIL TEST MENU , the coils and flashlamps <i>do not</i> fire after pressing the Black [SELECT] Button .	<ul style="list-style-type: none"> • Ensure the POWER INTERLOCK SWITCH is <i>pulled out</i> (see the start of this Chapter).
In the SERVICE MENU , the volume cannot be adjusted with either of the Red Buttons .	<ul style="list-style-type: none"> • The Volume adjustment can only be made when in the Attract Mode (see the start of this Chapter).
In the 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 SERVICE MENU, and re-enter. If the problem persists, call Technical Support for additional help.

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



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

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

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

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



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

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



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

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

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



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

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



Go To Switch Menu

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

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



Switch Test

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

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



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



Active Switch Test

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



Switch Alerts

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

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



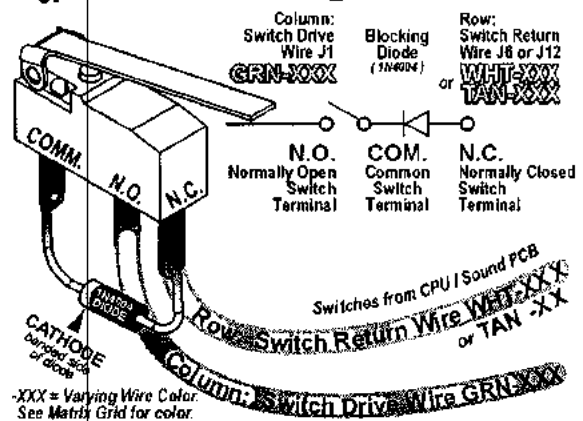
D-24 position is highlighted and accompanied by a short audible tone when pressed.



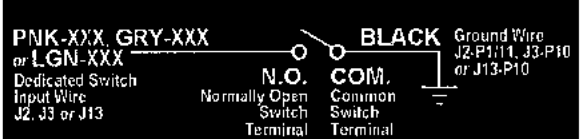
After pressing the switch (to make it close), the display will indicate the test switch number.



Typical Switch Wiring & Schematic



Dedicated Switch Schematic



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



Diagnosics

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

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
	IC-U22A	IC-U22B	IC-U22C	IC-U22D	IC-U16A	IC-U16B	IC-U16C	IC-U16D	IC-U36A	IC-U36B	IC-U36C	IC-U36D	IC-U40A	IC-U40B	IC-U40C	IC-U40D
	RETURNA	RETURNA	RETURNA	RETURNA	RETURNA	RETURNA	RETURNA	RETURNA	RETURNA	RETURNA	RETURNA	RETURNA	RETURNA	RETURNA	RETURNA	RETURNA
	WHT-BRN	WHT-BRN	WHT-BRN	WHT-BRN	WHT-BRN	WHT-BRN	WHT-BRN	WHT-BRN	WHT-BRN	WHT-BRN	WHT-BRN	WHT-BRN	WHT-BRN	WHT-BRN	WHT-BRN	WHT-BRN
	J6-P8	J6-P8	J6-P8	J6-P8	J6-P8	J6-P8	J6-P8	J6-P8	J6-P8	J6-P8	J6-P8	J6-P8	J6-P8	J6-P8	J6-P8	J6-P8
	S.W. #1	S.W. #2	S.W. #3	S.W. #4	S.W. #5	S.W. #6	S.W. #7	S.W. #8	S.W. #9	S.W. #10	S.W. #11	S.W. #12	S.W. #13	S.W. #14	S.W. #15	S.W. #16
01	(T)HOR	T(H)OR	TH(O)R	TH(O)R												
DRIVE ▶	515-7588-05	515-7588-05	515-7588-05	515-7588-05	515-7588-05	515-7588-05	515-7588-05	515-7588-05	515-7588-05	515-7588-05	515-7588-05	515-7588-05	515-7588-05	515-7588-05	515-7588-05	515-7588-05
GRN-BRN	J11-P1	J11-P1	J11-P1	J11-P1	J11-P1	J11-P1	J11-P1	J11-P1	J11-P1	J11-P1	J11-P1	J11-P1	J11-P1	J11-P1	J11-P1	J11-P1
02																
DRIVE ▶	180-5119-02	180-5119-02	180-5119-02	180-5119-02	180-5119-02	180-5119-02	180-5119-02	180-5119-02	180-5119-02	180-5119-02	180-5119-02	180-5119-02	180-5119-02	180-5119-02	180-5119-02	180-5119-02
GRN-RED	J11-P3	J11-P3	J11-P3	J11-P3	J11-P3	J11-P3	J11-P3	J11-P3	J11-P3	J11-P3	J11-P3	J11-P3	J11-P3	J11-P3	J11-P3	J11-P3
03																
DRIVE ▶	180-5087-00	180-5087-00	180-5087-00	180-5087-00	180-5087-00	180-5087-00	180-5087-00	180-5087-00	180-5087-00	180-5087-00	180-5087-00	180-5087-00	180-5087-00	180-5087-00	180-5087-00	180-5087-00
GRN-GRG	J11-P4	J11-P4	J11-P4	J11-P4	J11-P4	J11-P4	J11-P4	J11-P4	J11-P4	J11-P4	J11-P4	J11-P4	J11-P4	J11-P4	J11-P4	J11-P4
04																
DRIVE ▶	520-4790-01	520-4790-01	520-4790-01	520-4790-01	520-4790-01	520-4790-01	520-4790-01	520-4790-01	520-4790-01	520-4790-01	520-4790-01	520-4790-01	520-4790-01	520-4790-01	520-4790-01	520-4790-01
GRN-YEL	J11-P5	J11-P5	J11-P5	J11-P5	J11-P5	J11-P5	J11-P5	J11-P5	J11-P5	J11-P5	J11-P5	J11-P5	J11-P5	J11-P5	J11-P5	J11-P5

▲ FOR MORE ABOUT CODE ON TERMINAL STRIPS, SEE SECTION 5, CHAPTER 2, PAGES 104-105.

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

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

	IC-U4	IC-U4	IC-U4	IC-U4	IC-U4	IC-U4	IC-U4	IC-U4	IC-U4	IC-U4	IC-U4	IC-U4	IC-U4	IC-U4	IC-U4	IC-U4
	S.W. D-1	S.W. D-2	S.W. D-3	S.W. D-4	S.W. D-5	S.W. D-6	S.W. D-7	S.W. D-8	S.W. D-9	S.W. D-10	S.W. D-11	S.W. D-12	S.W. D-13	S.W. D-14	S.W. D-15	S.W. D-16
	LEFT COIN SLOT	CENTER COIN SLOT	RIGHT COIN SLOT	FIFTH COIN SLOT	IF USED											
	180-5204-00	180-5204-00	180-5204-00	180-5204-00	180-5204-00	180-5204-00	180-5204-00	180-5204-00	180-5204-00	180-5204-00	180-5204-00	180-5204-00	180-5204-00	180-5204-00	180-5204-00	180-5204-00
CPU/SND Board	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6

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

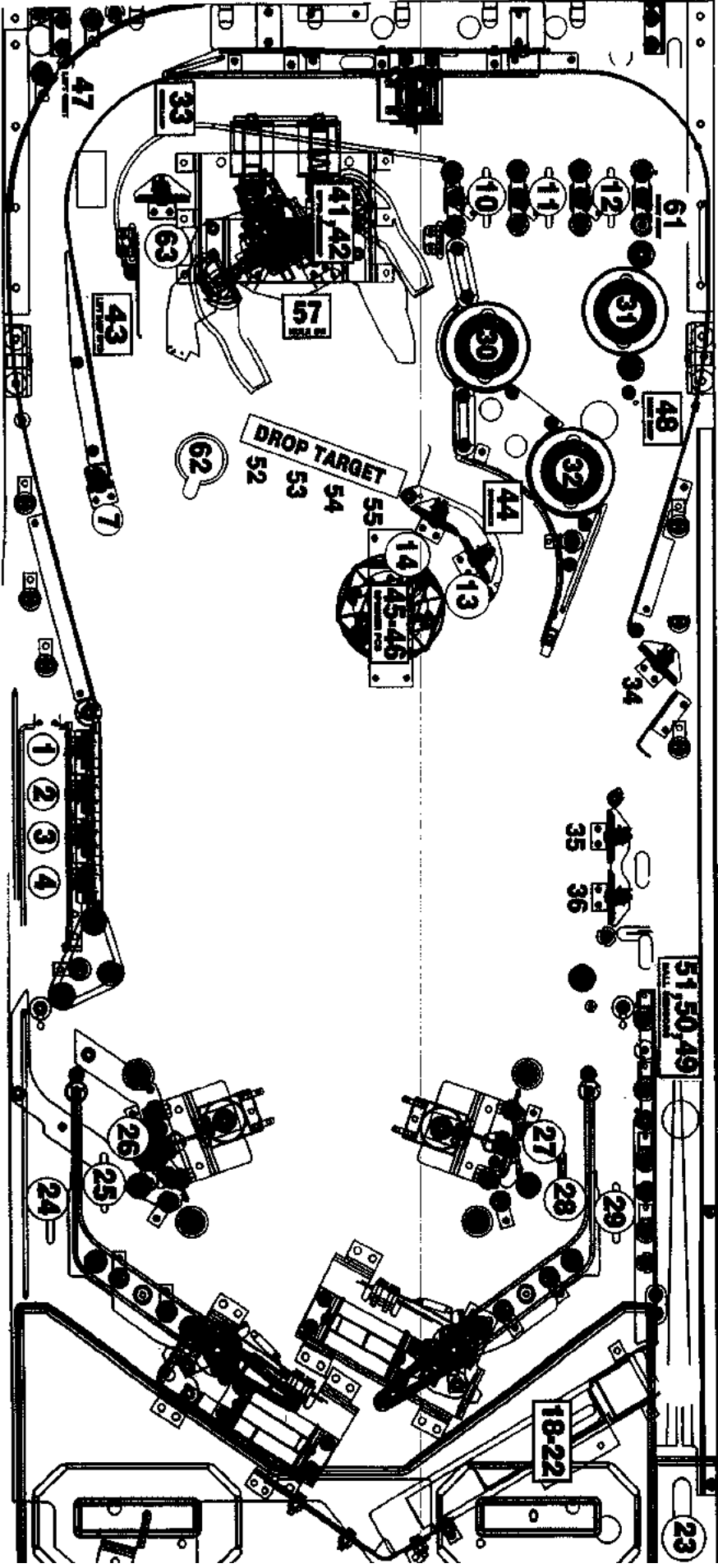
	IC-41	IC-41	IC-41	IC-41	IC-41	IC-41	IC-41	IC-41	IC-41	IC-41	IC-41	IC-41	IC-41	IC-41	IC-41	IC-41
	S.W. D-17	S.W. D-18	S.W. D-19	S.W. D-20	S.W. D-21	S.W. D-22	S.W. D-23	S.W. D-24	S.W. D-25	S.W. D-26	S.W. D-27	S.W. D-28	S.W. D-29	S.W. D-30	S.W. D-31	S.W. D-32
	TILT PENDULUM CABINET	SLAM TILT	TICKET NOTCH	BACK (GREEN)	MINUS (RED)	PLUS (RED)	SELECT (BLACK)									
	180-5204-00	180-5182-04	180-5182-02	180-5182-04	180-5182-02	180-5182-02	180-5182-00									
CPU/SND Board	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6	J11-P6

DIAG
GO TO DIAGNOSTICS MENU

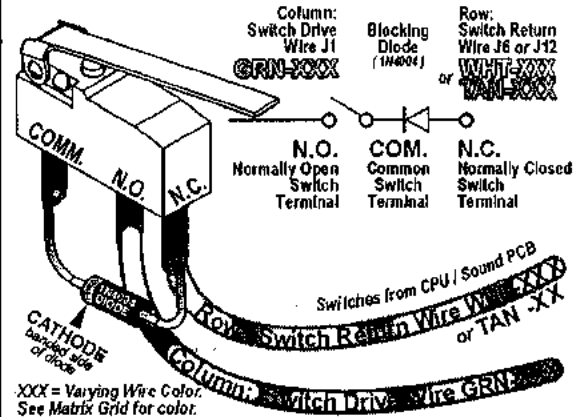
SW
GO TO SWITCH MENU

TEST
SWITCH TEST

SWITCH MENU: SWITCH, ACTIVE, SINGLE & SERVICE



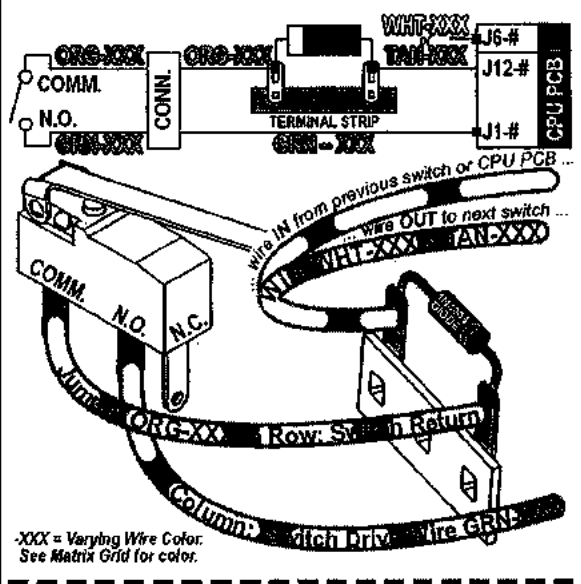
Typical Switch Wiring & Schematic



Dedicated Switch Schematic



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





Go To Coil Menu

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

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



Single Coil Test

To initiate, from the **COIL MENU**, select the "TEST" *Icon*. Ensure the **Power Interlock Switch** is pulled out if testing with the Coin Door open. Upon entering **Single Coil Test**, you will notice the #1 coil is shown. The Dot Matrix Display will indicate the coil or flash lamp name, coil (solenoid) or flash lamp number and the Coil or Flash Lamp Power Line / Drive Transistor Control Line wire colors. To determine the "Pin-Outs" from the I/O Power Driver Board, the Coil Voltage Gauge-Turns (e.g. 23-800) or lamp type (e.g. #89 or #906 Bulb), view the Coils Detailed Chart Table at the beginning of this manual or for more on troubleshooting and diagnosing, see the Yellow Pages (Schematics & Wiring).



Cycling Coil Test

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



Go To Flash Lamps Menu

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

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



Single Flash Lamp Test

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

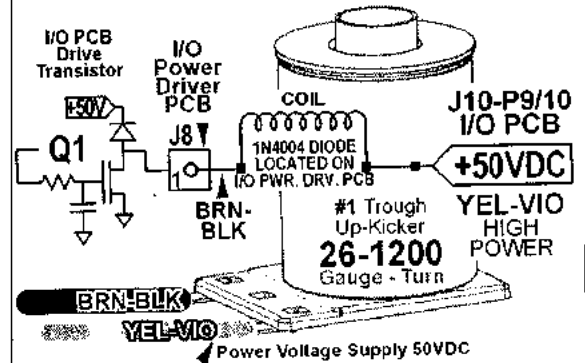


Cycling Flash Lamp Test

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

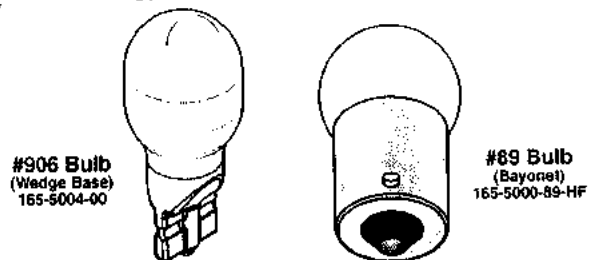
COIL TEST
TROUGH UP-KICKER
#1
YEL-VIO BRN-BLK

Typical Coil Wiring & Schematic



FLASH LAMP TEST
FLASH: NAME OF FLASHER
#25
ORIG BLK-BRN

Bulb Types used for Flash Lamps



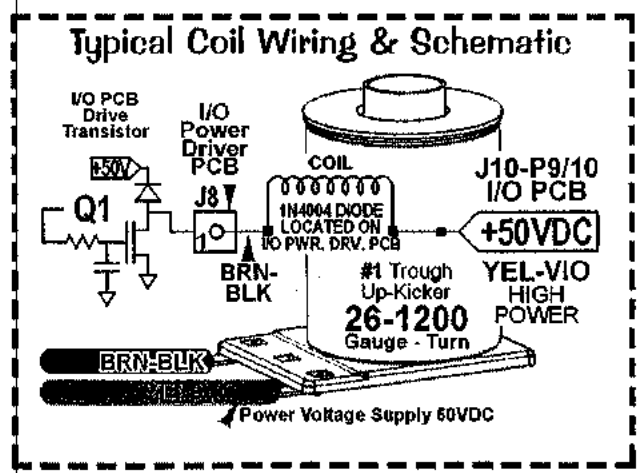
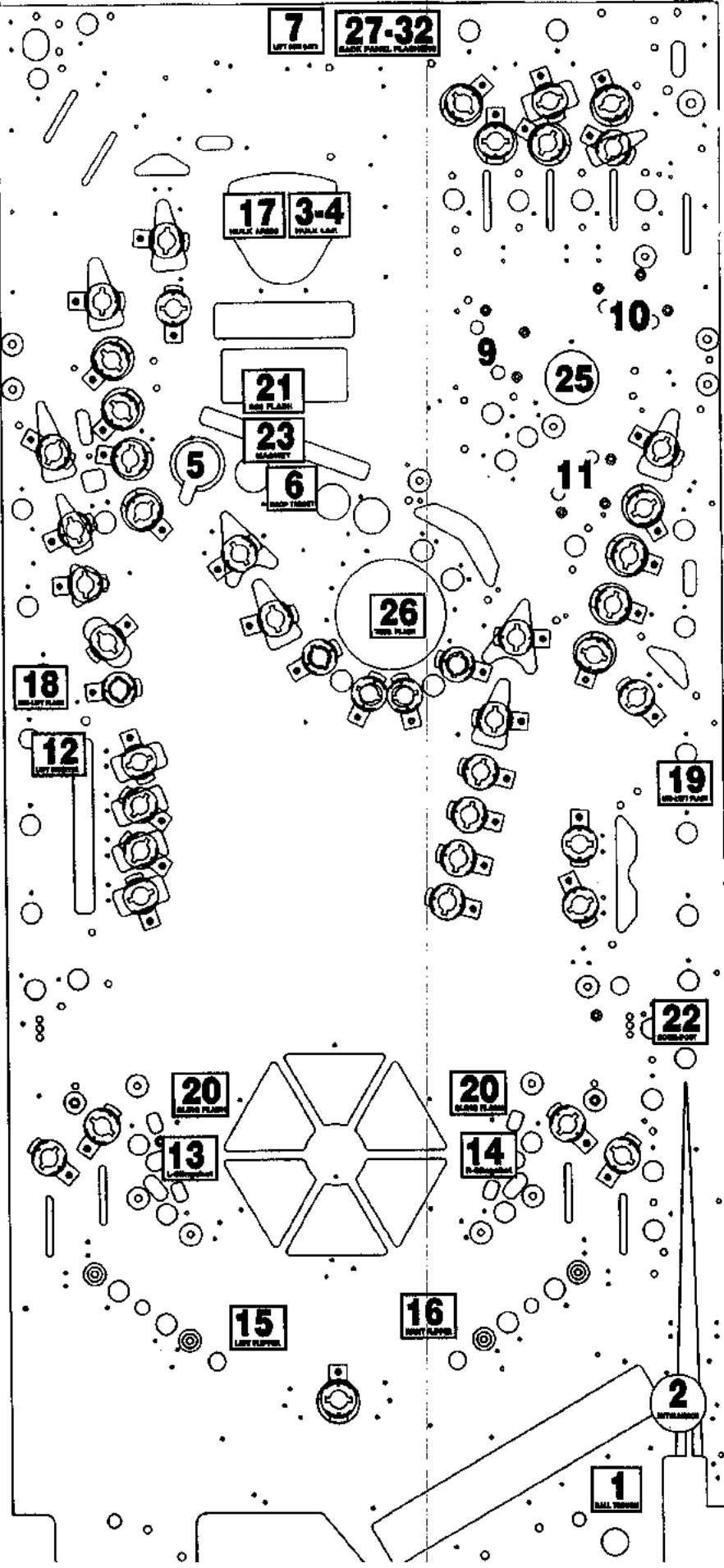
COILS DETAILED CHART TABLE

High Current Coils Group 1			Drive Transistor Output PCB	Power Line Color	Power Line Connection	Power Voltage	Drive Transistor Control Line Color	D.T. Control Line Connect	Coil GA-Turn or Bulb Type
#1	TROUGH UP-KICKER	Q1	▲ I/O Power Driver ▼	YEL-VIO	J10-P9/10	50VDC	BRN-BLK	J8-P1	28-1200 090-5044-ND
#2	AUTO LAUNCH	Q2		YEL-VIO	J10-P9/10	50VDC	BRN-RED	J8-P3	24-840 090-5038-ND
#3	HULK COUNTER CLOCKWISE	Q3		YEL-VIO	J10-P9/10	50VDC	BRN-ORG	J8-P4	23-800 090-5001-ND
#4	HULK CLOCKWISE	Q4		YEL-VIO	J10-PP/10	50VDC	BRN-YEL	J8-P5	23-800 090-5001-ND
#5	HULK EJECT	Q5		YEL-VIO	J10-P9/10	50VDC	BRN-GRN	J8-P6	28-1200 090-5044-ND
#6	CENTER 4-BANK DROP RESET	Q6		YEL-VIO	J10-P9/10	50VDC	BRN-BLU	J8-P7	25-1240 090-5034-ND
#7	ORBIT CONTROL GATE (LEFT)	Q7		YEL-VIO	J10-P9/10	50VDC	BRN-VIO	J8-P8	32-1250 090-5080-0-ND
#8	SHAKER MOTOR (OPTIONAL)	Q8		RED-WHT	J17-P7	16VAC	BRN-GRY	J8-P9	502-5027-00
High Current Coils Group 2			Drive Transistor Output PCB	Power Line Color	Power Line Connection	Power Voltage	Drive Transistor Control Line Color	D.T. Control Line Connect	Coil GA-Turn or Bulb Type
#9	LEFT POP BUMPER	Q9	▲ I/O Power Driver ▼	YEL-VIO	J10-P9/10	50VDC	BLU-BRN	J9-P1	28-1200 090-5044-ND
#10	RIGHT POP BUMPER	Q10		YEL-VIO	J10-P9/10	50VDC	BLU-RED	J9-P2	28-1200 090-5044-ND
#11	BOTTOM POP BUMPER	Q11		YEL-VIO	J10-P9/10	50VDC	BLU-ORG	J9-P4	28-1200 090-5044-ND
#12	RAMP CONTROL GATE (LEFT)	Q12		YEL-VIO	J10-P9/10	50VDC	BLU-YEL	J9-P5	515-8598-00 -ND
#13	LEFT SLINGSHOT	Q13		YEL-VIO	J10-P9/10	50VDC	BLU-GRN	J9-P6	28-1200 090-5044-ND
#14	RIGHT SLINGSHOT	Q14		YEL-VIO	J10-P9/10	50VDC	BLU-BLU	J9-P7	28-1200 090-5044-ND
#15	LEFT FLIPPER (50V RED/YEL)	Q15		GRY-YEL-3A Fuse-RED-YEL	J10-P6/7	50VDC	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	50VDC	ORG-VIO	J9-P9	22-1080 090-5032-ND
Low Current Coils Group 1			Drive Transistor Output PCB	Power Line Color	Power Line Connection	Power Voltage	Drive Transistor Control Line Color	D.T. Control Line Connect	Coil GA-Turn or Bulb Type
#17	HULK ARMS (Step-Up Dr. Bd.)	Q17	▲ I/O Power Driver ▼	BRN	J7-P1	20VDC	VIO-BRN	J7-P2	24-840 090-5038 -ND #89 BULB 165-5000-89
#18	FLASH: LEFT SIDE	Q18		ORG	J6-P10	20VDC	VIO-RED	J7-P3	#89 BULB 165-5000-89
#19	FLASH: RIGHT SIDE	Q19		ORG	J6-P10	20VDC	VIO-ORG	J7-P4	#89 BULB 165-5000-89
#20	FLASH: SLINGSHOT (X2)	Q20		ORG	J6-P10	20VDC	VIO-WHT	J7-P6	#906 BULB 165-5004-00
#21	FLASH: HULK	Q21		ORG	J6-P10	20VDC	VIO-GRN	J7-P7	#808 BULB 165-5004-00
#22	LOKI LOCKUP (Step-Up Dr. Bd.)	Q22		BRN	J7-P1	20VDC	VIO-BLU	J7-P8	28-1200 090-5044-ND
#23	HULK MAGNET (Step-Up Dr. Bd.)	Q23		VIO-YEL	J10-P8	50VDC	VIO-BLK	J7-P9	22-850 090-5078-00
#24	OPTIONAL (e.g. COIN METER)	Q24		RED	J16-P4-8	5VDC	VIO-GRY	J7-P10	COIN METER
Low Current Coils Group 2			Drive Transistor Output PCB	Power Line Color	Power Line Connection	Power Voltage	Drive Transistor Control Line Color	D.T. Control Line Connect	Coil GA-Turn or Bulb Type
#25	FLASH: POP BUMPER	Q25	▲ I/O Power Driver ▼	ORG	J6-P10	20VDC	BLK-BRN	J6-P1	#89 BULB 165-5000-89
#26	FLASH: TESSERACT	Q26		ORG	J6-P10	20VDC	BLK-RED	J6-P2	#906 BULB 165-5004-00
#27	FLASH: BACKPANEL (LEFT)	Q27		ORG	J6-P10	20VDC	BLK-ORG	J6-P3	#89 BULB 165-5000-89
#28	FLASH: BACKPANEL # 2	Q28		ORG	J6-P10	20VDC	BLK-YEL	J6-P4	#89 BULB 165-5000-89
#29	FLASH: BACKPANEL # 3	Q29		ORG	J6-P10	20VDC	BLK-GRN	J6-P5	#89 BULB 165-5000-89
#30	FLASH: BACKPANEL # 4	Q30		ORG	J6-P10	20VDC	BLK-BLU	J6-P6	#89 BULB 165-5000-89
#31	FLASH: BACKPANEL # 5	Q31		ORG	J6-P10	20VDC	BLK-VIO	J6-P7	#89 BULB 165-5000-89
#32	FLASH: BACKPANEL (RIGHT)	Q32		ORG	J6-P10	20VDC	BLK-GRY	J6-P8	#89 BULB 165-5000-89

DIAG
GO TO DIAGNOSTICS MENU

COIL
GO TO COIL MENU

TEST
SINGLE COIL TEST
COIL MENU: SINGLE COIL & CYCLING COIL





Go To Lamp Menu



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

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

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



Single Lamp Test

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

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

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



All Lamps Test

To initiate, from the **LAMP MENU**, select the "ALL" *Icon*. Upon entering **All Lamps Test**, you will notice the Dot Matrix Display is flashing **ALL LAMPS ON** and the lamps on the playfield will be lit, alternating between the rows in the Lamp Matrix Grid. The Dot Matrix Display will light up (*highlight*) all of the *dots* in the on-screen matrix.

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



Row Lamps Test

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

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

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



Column Lamps Test

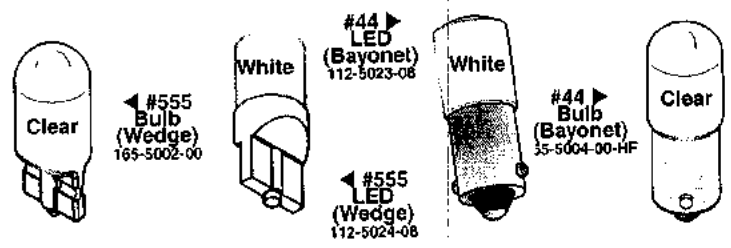
To initiate, from the **LAMP MENU**, select the "COL" *Icon*. As each lamp column is selected, the lamps in the column will light on the playfield as well as the Dot Matrix Display.

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

Diagnostics



Bulb Types used for Control Lamps



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

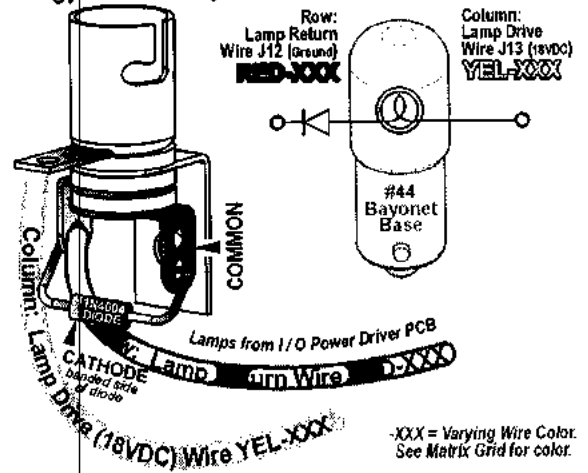


Ordered Lamps Test

To initiate, from the **LAMP MENU**, select the "ORD" *Icon*.

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

Typical Lamp Wiring & Schematic



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

Game-Specific Tests

GAME

To initiate, from the **DIAGNOSTICS MENU**, select the "GAME" Icon. Ensure the Power Interlock Switch is pulled out when testing with the Coin Door open. This Menu is provided to allow the technician a simple method of testing game specific coils and/or switches, if required. If used, select the Icon (and Sub-Menu Icons, if any) and follow on-screen prompts.



Ball Trough Test

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



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

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



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



Technician Alerts

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



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

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

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

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

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

TECHNICIAN ALERT - (0/0)
NO TECHNICIAN ALERTS
PRESS 'BACK' TO EXIT

Diagnosics

Technician Alerts continued on the next page.



Technician Alerts continued from previous page.

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



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

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

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

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

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



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

Diagnostics



Knocker Test

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

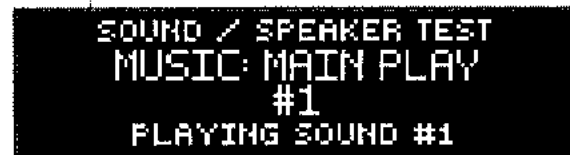
FACTOID: The knocker got it's name from the 'original knocker' (20th century pinball games), which used a coil and when energized (fired), the plunger would strike a wood panel inside the cabinet.



Sound / Speaker Test

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

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



Speaker Phase Testing

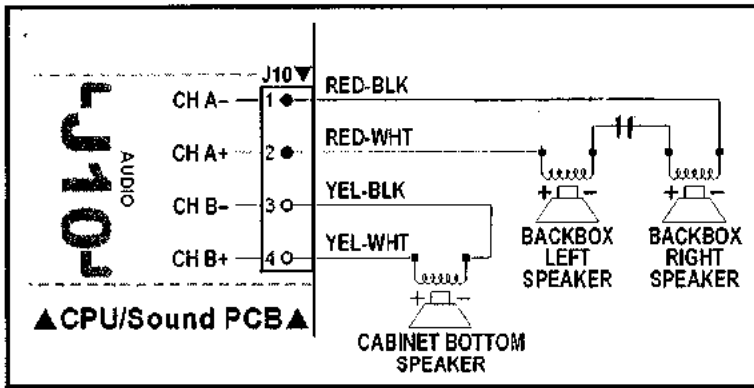
Connections to each of speakers are polarized and each must be connected appropriately for the best quality sound. If one speaker has the positive and negative connections reversed with respect to the other one, bass frequencies will not be produced properly and the overall sound quality will be poor.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

Speaker Phase Testing cont. next page.



Speaker Phase Testing continued from previous page.

If the sound is not balanced or doesn't sound correct, check the speaker wiring.



1. Check each speaker for polarity markings. If the speakers have polarity markings, verify that the Backbox Speaker's **RED-BLK** Wires and the Cabinet Speaker **YEL-BLK** Wire(s) are connected to the negative (-) terminal.

2. Disconnect the speaker output Connector **J10 (AUDIO)** from the CPU / Sound PCB (in the Backbox) and connect a 1.5-volt battery across each speaker pair one at a time while observing the speakers.

3. Make sure the positive (+) battery terminal is connected to the positive lead [J10, Pin-2, CH A+] (**RED-WHT**) or [J10, Pin-4, CH B+] cone movement; proper connections are

(**YEL-WHT**) each time. As the connection is made, check speaker indicated by outward movement.



Begin Burn-In

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

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



Dot Matrix Test

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

Test 1

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

Test 2

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

Test 3

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

Test 4

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

Test 5

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

Test 1

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



Ticket Dispenser Test

To initiate, from the **DIAGNOSTICS MENU**, select the "TIX" *Icon*. This Menu (*Icon*) will only appear if **Standard Adjustment 56, Ticket Dispenser**, is set to **YES** (Default = **NO***). ***Note:** Some games shipped from the factory with a unique Dip Switch Setting will default to **YES**. To view and/or change your setting, see Adjustments Section (**GO TO ADJUSTMENTS MENU**). Please remember, if you install an optional Ticket Dispenser, and your default setting is "NO," you will have to reset it back to "YES" if a **Factory Reset** is performed.

After selecting this *Icon*, the **Ticket Dispenser Test** will start. With the Ticket Dispenser properly installed, manually feed your tickets into the dispenser. The dispenser will activate and pull in the first ticket. Press the **Black [SELECT] Button** (which energizes Coil #35, Aux 3: Switched Ground) to advance a ticket. Feeding your Tickets into the dispenser works because Coil #33, Aux 1: Ticket Advance (**Enable**) is always 'energized'. With a Ticket Meter installed, as one Ticket Passes through the Ticket Dispenser, one 'click' is fired to the Meter (Coil #34, Aux 2: Ticket Meter) for each ticket passing through. Dedicated Switch **D-19, Ticket Notch**, will also be indicated on-screen (*in combination with a audible sound*) as "closing" as the notch between the tickets passes through. In this test you can clear ticket jams and check and/or clear tickets in Escrow, if necessary. To return to the **DIAGNOSTICS MENU**, press the **Green [BACK] Button**.



↑ CHOOSE EARNINGS or STANDARD AUDITS

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

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

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

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

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

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

Audit Number
Audit Name
Audit Result

EARNINGS AUDIT #1
TOTAL PAID CREDITS
0

EARNINGS AUDITS [#1 - #13] ▼

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

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

STANDARD AUDITS [#1 - #59] ▼

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

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

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

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

STANDARD ADJUSTMENTS [#1 - #63] ▼

Nr.	STANDARD ADJUSTMENT NAME	USA DEFAULT	YOUR SETTING	Nr.	STANDARD ADJUSTMENT NAME	USA DEFAULT	YOUR SETTING
1	REPLAY TYPE	AUTO		32	HIGH SCORE #1	,000,000	
2	‡ REPLAY PERCENTAGE	10%		33	HIGH SCORE #2	,000,000	
3	‡ REPLAY AWARD	CREDIT		34	HIGH SCORE #3	,000,000	
4	‡ REPLAY LEVELS	1		35	HIGH SCORE #4	,000,000	
5	‡ AUTO REPLAY START	,000,000		36	HSTD INITIALS	3 INITIALS	
6	‡ DYNAMIC REPLAY START	,000,000		37	HSTD RESET COUNT	2000	
7	‡ REPLAY LEVEL #1	,000,000		38	FREE PLAY	NO	
8	‡ REPLAY LEVEL #2	,000,000		39	LANGUAGE	ENGLISH	
9	‡ REPLAY LEVEL #3	,000,000		40	PLAYER LANGUAGE SELECT	YES	
10	‡ REPLAY LEVEL #4	,000,000		41	CUSTOM MESSAGE	ON	
11	‡ REPLAY BOOST	YES		42	FLASH LAMP POWER	NORMAL	
12	SPECIAL LIMIT	1		43	COIL PULSE POWER	NORMAL	
13	‡ SPECIAL PERCENTAGE	10%		44	KNOCKER VOLUME	NORMAL	
14	SPECIAL AWARD	CREDIT		45	GAME RESTART	YES	
15	FREE GAME LIMIT	5		46	BILL VALIDATOR	NO	
16	EXTRA BALL LIMIT	5		47	MUSIC VOLUME	1	
17	‡ EXTRA BALL PERCENTAGE	25%		48	BALL SAVE TIME	0:05	
18	GAME PRICING	USA 10		49	TIMED PLUNGER	OFF	
19	MATCH PERCENTAGE	9%		50	FLIPPER BALL LAUNCH	OFF	
20	MATCH AWARD	CREDIT		51	COINDOOR BALL SAVER	NO	
21	BALLS PER GAME	3		52	COMPETITION MODE	NO	
22	TILT WARNINGS	2		53	CONSOLATION BALL	YES	
23	CREDIT LIMIT	30		54	FAST BOOT	YES	
24	ALLOW HIGH SCORES	YES		55	Q24 OPTION	COIN METER	
25	HIGH SCORE AWARD	CREDIT		56	TICKET DISPENSER	NO	
26	GRAND CHAMPION AWARDS	1		57	PLAYER COMPETITION	YES	
27	HIGH SCORE #1 AWARDS	1		58	TEAM SCORES	NO	
28	HIGH SCORE #2 AWARDS	0		59	LOCATION ID	0	
29	HIGH SCORE #3 AWARDS	0		60	GAME ID	0	
30	HIGH SCORE #4 AWARDS	0		61	TIME FORMAT	12-HOUR	
31	GRAND CHAMPION SCORE	,000,000		62	COIN INPUT DELAY	30	
				63	LOST BALL RECOVERY	YES	

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



GAME Feature Adjustments [#1 - #+]

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

>>> **FACTORY RESET or CODE UPDATE NOTE:** Don't forget, any changes you make to your adjustments will revert back to the Factory Default settings if you perform a Factory Reset or update your Game Code. See Utilities Section (**GO TO RESETS MENU** and **GO TO USB MENU**).

View the Coils Detailed Chart Menu to see if this game is Shaker Motor Enabled. If it is, set the options in the Feature Adjustment as seen below. (typically the last one).

SHAKER MOTOR (OPTIONAL): Set to **NONE, MINIMAL USE, MODERATE USE** or **MAXIMAL USE**.
 Factory Default = **MODERATE USE**. Set to any of the varying "... USES" if an Optional Shaker Motor Kit (SPI Part Number 502-5027-00) was installed correctly in this pinball machine. See the assembly (kit) on the last page of Blue Pages (Major Assemblies). Also see Shaker Motor Coil (Q8) in the Coils Detailed Chart Table at the beginning of this Service Game Manual or the beginning of the Yellow Pages.

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

COUNTRY SETTING OPTION(S)		COIN MECHANISMS (SWITCHES) COINS THRU ... SLOT:				PRICING SCHEME		Requires SPI Coin Card(s) Part Number		
Pos.	1 2 3 4 5 6 7 8	LEFT	CENTER	RIGHT	4TH	Number of Plays (Coins) / Cost Price (Amount) See Appendix J for Coin Card examples & info.				
USA 1		0.25	1.00	0.25	[]	USD // UNITED STATES DOLLAR // (\$)				
ON	▲▲▲▲▲▲▲▲					1/0.25	2/0.75	3/1.00	755-5400-01-Y	
OFF	▼▼▼▼▼▼▼▼					1/0.50	2/1.00	3/1.50	755-5400-03-Y	
USA 2						1/0.50	2/1.00	3/1.50	755-5400-02-Y	
USA 3						1/0.50	2/1.00	3/1.50	755-5400-02-Y	
USA 4						1/0.50	2/1.00	3/1.50	755-5400-02-Y	
USA 5						1/0.50	2/1.00	3/1.50	755-5400-02-Y	
USA 6						1/0.50	2/1.00	3/1.50	755-5400-02-Y	
USA 7						1/0.50	2/1.00	3/1.50	755-5400-02-Y	
USA 8						1/0.50	2/1.00	3/1.50	755-5400-02-Y	
USA 9		1/0.50	2/1.00	3/1.50	755-5400-02-Y					
USA 10		1/0.75	2/1.50	3/2.00	755-5400-11-Y					
USA 11		1/1.00	2/2.00	3/3.00	755-5400-00-Y					
AUSTRALIA 1		0.20	1.00	2.00	[]	AUD // AUSTRALIAN DOLLARS // (\$AUS)				
ON	▲▲▲▲▲▲▲▲					1/1.00	3/2.00	755-5406-00-Y		
OFF	▼▼▼▼▼▼▼▼					1/1.00	3/2.00	(1 Side)		
AUSTRALIA 2						1/2.00	3/4.00	5/10.00		
AUSTRALIA 3						1/2.00	2/4.00	3/5.00		
AUSTRALIA 4		1/3.00	2/5.00	3/8.00						
AUSTRALIA 5		1/2.00	2/3.00	3/5.00						
AUSTRALIA 6		1/2.00	2/3.00	3/5.00						
CANADA 1 [25¢ door]		0.25	0.25	1.00	2.00	CAD // CANADIAN DOLLARS // (\$CAN)				
ON	▲▲▲▲▲▲▲▲					1/0.50	2/0.75	3/1.00	755-5400-00-Y	
OFF	▼▼▼▼▼▼▼▼	1.00	2.00	3.00	755-5400-10-Y					
CANADA 2 [dollar door]		1.00	2.00	3.00	4.00					
CROATIA		1	2	5	[]	HRK // CROATIAN KUNA // (Kuna)				
ON	▲▲▲▲▲▲▲▲	1/3	2/5			755-5410-00-Y				
OFF	▼▼▼▼▼▼▼▼					(2-Sided)				
DENMARK 1		1	5	10	20	DKK // DANISH KRONER // (Kr)				
ON	▲▲▲▲▲▲▲▲					1/3	2/5	755-5402-00-Y		
OFF	▼▼▼▼▼▼▼▼	1/2	2/4	3/5	4/7	5/9	7/10	(2-Sided)		
JAPAN 1		100	100	[]	[]	JPY // JAPANESE YEN // (¥)				
ON	▲▲▲▲▲▲▲▲					1/100	3/200	755-5408-01-Y		
OFF	▼▼▼▼▼▼▼▼	1/100	3/200	(2-Sided)						
JAPAN 2		100	200	300	400					
LITHUANIA		1	2	5	[]	LTL // LITHUANIA LITAI // (Lt)				
ON	▲▲▲▲▲▲▲▲	1/2				755-5416-00-Y				
OFF	▼▼▼▼▼▼▼▼					(1 Side)				
MIDDLE EAST		token	token	token	[]	TOKEN // Middle East currency used to buy token // (TOKEN)				
ON	▲▲▲▲▲▲▲▲	1/1				755-5416-00-Y				
OFF	▼▼▼▼▼▼▼▼					(use Side 1)				
NEW ZEALAND 1		1	2	[]	[]	NZD // NEW ZEALAND DOLLAR // (\$NZD)				
ON	▲▲▲▲▲▲▲▲					1/1	3/2	755-5400-00-Y		
OFF	▼▼▼▼▼▼▼▼	1/1	3/2	(Side 2)						
NEW ZEALAND 2		1	2	3	4					
NORWAY 1		10	5	20	[]	NOK // NORWEGIAN KRONE // (Kr)				
ON	▲▲▲▲▲▲▲▲					1/10	3/20	755-5403-01-Y or		
OFF	▼▼▼▼▼▼▼▼					1/10	3/20	-02-Y (2-Sided)		
NORWAY 2						1/20	3/40	755-5403-03-Y		
NORWAY 3		1/20	3/40	4/80		(2-Sided)				
NORWAY 4		1/10	3/20	4/40						
NORWAY 5		1/10	3/20	4/40						
NORWAY 6		1/20	3/40	4/80						
NORWAY 7		1/20	3/40	4/80						
NORWAY		1/20	3/40	4/80						
RUSSIA		10	5	1	[]	RUB // RUSSIAN RUBLE // (Ruble)				
ON	▲▲▲▲▲▲▲▲	1/5				755-5411-00-Y				
OFF	▼▼▼▼▼▼▼▼					(2-Sided)				
SO. AFRICA 1		0.50	1.00	2.00	5.00	ZAR // SOUTH AFRICAN RAND // (R)				
ON	▲▲▲▲▲▲▲▲					1/2.00	3/5.00	755-5409-01-Y		
OFF	▼▼▼▼▼▼▼▼	1/3.00	2/5.00	(2-Sided)						
SO. AFRICA 2		1/3.00	2/5.00	3/10.00						
SWEDEN 1		1	5	10	[]	SEK // SWEDISH KRONOR // (Kr)				
ON	▲▲▲▲▲▲▲▲					1/10	2/15	3/20	755-5404-00-Y	
OFF	▼▼▼▼▼▼▼▼	1/5				(2-Sided)				
SWEDEN 2		1	5	10	15					
SWITZERLAND 1		1	2	5	[]	CHF // SWISS FRANCS // (Sfr)				
ON	▲▲▲▲▲▲▲▲					1/1	2/2	3/3	4/4	6/5
OFF	▼▼▼▼▼▼▼▼	1/1	3/2	4/3	5/2	9/5	(2-Sided)			
SWITZERLAND 2		1	2	3	4					
TAIWAN		10	10	[]	[]	TWD // TAIWANESE DOLLAR // (TWD)				
ON	▲▲▲▲▲▲▲▲	1/10				755-5412-00-Y				
OFF	▼▼▼▼▼▼▼▼					(use Side 1)				
UK 1		0.10	0.50	1.00	0.20	2£	GBP // UNITED KINGDOM POUNDS // (£)			
ON	▲▲▲▲▲▲▲▲						3/1.00	7/2.00	755-5407-00-Y	
OFF	▼▼▼▼▼▼▼▼						4/1.00		755-5407-01-Y	
UK 2							1/0.50	2/1.00	5/2.00	755-5407-01
UK 3							1/0.30	2/0.50	4/1.00	755-5407-01-Y
UK 4							1/1.00	3/2.00		755-5407-01
UK 5		3/2.00			755-5407-01-Y					
UK 6		1/2.00	3/4.00	5/10.00						

Adjustments



Game Pricing

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

CPU/SOUND/ROB DIP SWITCHES/SETTINGS		COUNTRY SETTING OPTION(S)	COIN MECHANISMS (SWITCHES) COINS THRU ... SLOT:				PRICING SCHEME	Requires SPI Coin Cards/ Part Number					
Pos.	1 2 3 4 5 6 7 8	Default Highlighted	LEFT	CENTER	RIGHT	4TH	Number of Plays (Credits) / Price Amount Shown See "Appendix J" for Coin Cards Example & Info!						
ON	SEEBELOW	Euro 1	0.50	1.00	2.00	0.20	optional	EUR // EUROPEAN UNION EUROS // (€)					
OFF	SETTINGS	Euro 2							1/0.50	2/1.00	3/1.50	5/2.00	755-5401-01-Y
		Euro 3							1/0.50	2/1.00	3/1.50	6/2.00	755-5401-02-Y
		Euro 4							1/0.50	3/1.00	4/1.50	7/2.00	755-5401-03-Y
		Euro 5							2/0.50				755-5401-04-Y
		Euro 6							1/1.00	2/2.00	3/3.00	5/4.00	755-5401-05-Y
		Euro 7							1/1.00	3/2.00			755-5401-06-Y
		Euro 8							1/1.00	2/1.50	3/2.00		755-5401-07-Y
		Euro 9							1/1.00	3/2.00	7/3.00		755-5401-08-Y
		Euro 10							1/1.00	4/2.00			755-5401-09-Y
		Euro 11							2/1.00	4/2.00	6/3.00	9/4.00	755-5401-10-Y
		Euro 12											755-5401-12-Y

Euro 1-12 are alternate settings for countries using the Euro.

HIGHLIGHTED
= Factory Default

HIGHLIGHTED
= Not Shown on Coin Card

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

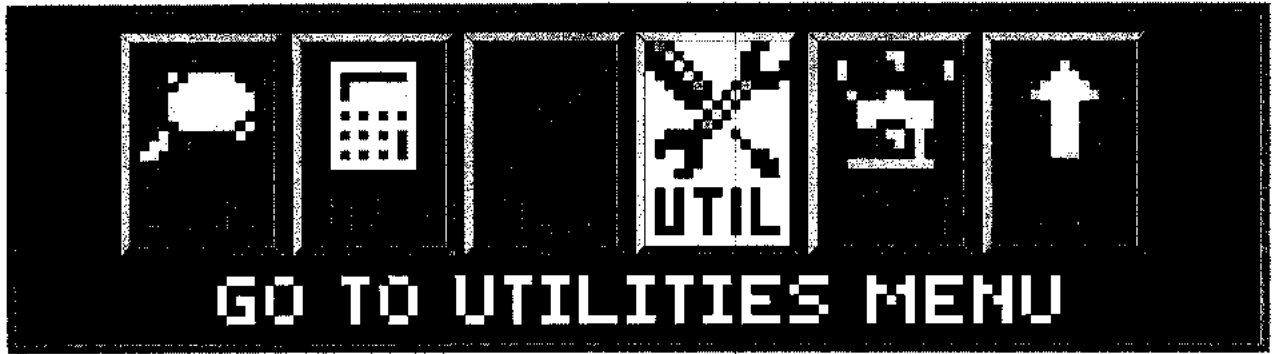
Pos.	1 2 3 4 5 6 7 8	Default Highlighted	COIN MECHANISMS (SWITCHES)				PRICING SCHEME	Requires SPI Coin Cards/ Part Number	
ON	OFF		LEFT	CENTER	RIGHT	4TH	Number of Plays (Credits) / Price Amount Shown See "Appendix J" for Coin Cards Example & Info!		
ON	▲	AUSTRIA Euro 9	0.50	1.00	2.00		1/1.00 2/1.50 3/2.00	755-5401-09-Y	
OFF	▼	BELGIUM Euro 1	0.50	1.00	2.00		1/0.50	755-5401-01-Y	
ON	▲	FINLAND Euro 8	0.50	1.00	2.00		1/1.00 3/2.00	755-5401-08-Y	
OFF	▼	FRANCE Euro 10	0.50	1.00	2.00		1/1.00 3/2.00 7/3.00	755-5401-10-Y	
ON	▲	GERMANY 1	0.50	1.00	2.00		1/0.50	755-5401-01-Y	
OFF	▼	GERMANY 2					1/0.50 2/1.00 3/1.50 5/2.00		755-5401-02-Y
		GERMANY 3					1/0.50 2/1.00 3/1.50 6/2.00		755-5401-04-Y
ON	▲	GREECE Euro 8	0.50	1.00	2.00		1/1.00 3/2.00	755-5401-08-Y	
OFF	▼	ITALY 1	0.50		0.50		1/0.50	755-5401-01-Y	
OFF	▼	ITALY 2					1/1.00 3/2.00		755-5401-08-Y
ON	▲	NETHERLANDS Euro 3	0.50	1.00	2.00		1/0.50 3/1.00	755-5401-03-Y	
OFF	▼	PORTUGAL Euro 1	0.50		0.50		1/0.50	755-5401-01-Y	
ON	▲	SPAIN Euro 8	0.50	1.00	2.00		1/1.00 3/2.00	755-5401-08-Y	

Adjustments

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

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

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



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

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

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



Go To Installs Menu

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

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

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

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

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

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

Install Extra Easy

To initiate, from the **INSTALLS MENU**, select the "X.EZ" *Icon*. The **Dot Matrix Display** will indicate the **INSTALL EXTRA EASY**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Difficulty** level.

Installs Menu continued on the next page.

Installs Menu continued from previous page.



Install Easy

To initiate, from the **INSTALLS MENU**, select the "EASY" *Icon*. The Dot Matrix Display will indicate the **INSTALL EASY**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Difficulty** level.



Install Medium (Normal or Factory Settings)

To initiate, from the **INSTALLS MENU**, select the "FACT" *Icon*. The Dot Matrix Display will indicate the **INSTALL MEDIUM**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Difficulty** level.



Install Hard

To initiate, from the **INSTALLS MENU**, select the "HARD" *Icon*. The Dot Matrix Display will indicate the **INSTALL HARD**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Difficulty** level.



Install Extra Hard

To initiate, from the **INSTALLS MENU**, select the "X.HD" *Icon*. The Dot Matrix Display will indicate the **INSTALL EXTRA HARD**. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Difficulty** level.



Install 3-Ball or 5-Ball

To initiate, from the **INSTALLS MENU**, select either the "3BAL" or "5BAL" *Icons*. The Dot Matrix Display will indicate the **INSTALL 3-BALL** or **5-BALL** depending on choice. Follow the on-screen prompts to perform the **Install**. Set the **Game Play Type** to 3 Balls per game

(Factory Default is 3 Balls per game, not including extra balls earned by the player, if any).



Install Competition

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



Install Director's Cut

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



Install Home Play

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



Install Novelty

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

***** This setting is recommended where local laws restrict certain game features. *****

Set the **Game Play Type** to "Restricted" Rules. *Programming varies and is subject to change.*



Install Add-A-Ball

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

***** This setting is recommended where local laws restrict certain game features. *****

Set the **Game Play Type** to "Restricted" Rules. *Programming varies and is subject to change.*



Install Factory

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



ABCD Enter Custom Message



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

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



PRIC Set Custom Pricing



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

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

REMINDER In these menus:

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

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

IF EXAMPLE CUSTOM PRICING SETTING DESIRED IS :

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

THEN YOU WILL NEED TO PERFORM THE FOLLOWING :

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



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



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



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



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



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



Press [**</-**] once or press [**+ / >**] eleven times until **INSTALL** appears.

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



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

Utilities



Set Date / Time

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



Go To Resets Menu

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



Reset Coin Audits

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



Reset Game Audits

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



Reset Grand Champion (Score)

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



Reset High Scores

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



Reset Credits

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



Reset Factory Settings

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



Go To USB Menu

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



Update Game Code

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



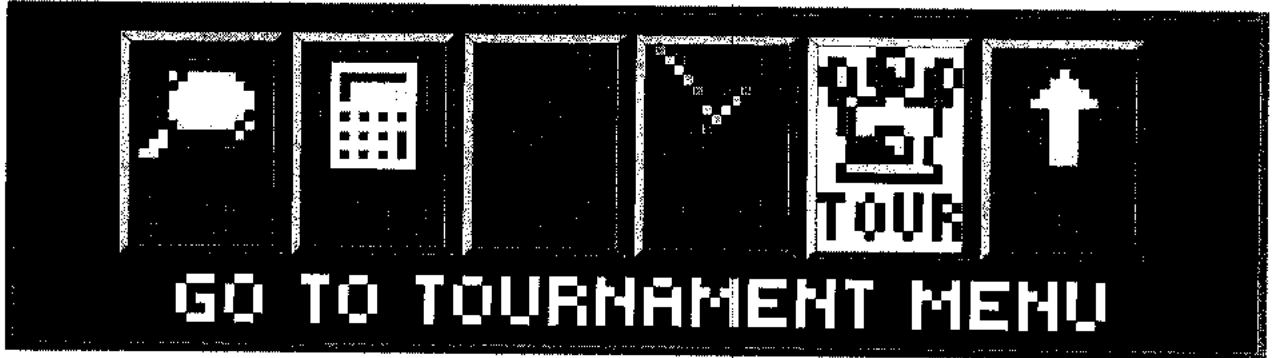
Dump Audits to USB

To initiate, from the **USB MENU**, select the "DUMP" *Icon*. Follow the on-screen prompts to perform a **Data Dump** (download). **Note:** *If Icon is not present, access via the Audits Menu, see the Audits Section.*



Backup to USB Memory Stick

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



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

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

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



T Start Tournament

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

QUICK START :

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

CUSTOM START :

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

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

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

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

- Select the **AWARD TYPE** (**CASH, POINTS, PRIZE, TICKETS** or **NONE**). Select **CASH** for the displays to represent the Prize Pool amount (*based on Jackpot Base and Max.*) in **\$Dollars**. Select **POINTS** for the display to represent the Prize Pool amount in **Points**. Select **PRIZE**, if applicable. Select **TICKET** for the display to represent the Prize Pool amount in **Tickets**. Select **NONE NOT TO** represent anything.

Custom Start continued on the next page.

Tournament

POWER REQUIREMENTS



This game *must* be connected to a properly grounded outlet to reduce shock hazard and insure proper game operation. See the Yellow Pages (Schematics & Wiring), for transformer connections required for Normal, High, and Low Line conditions.



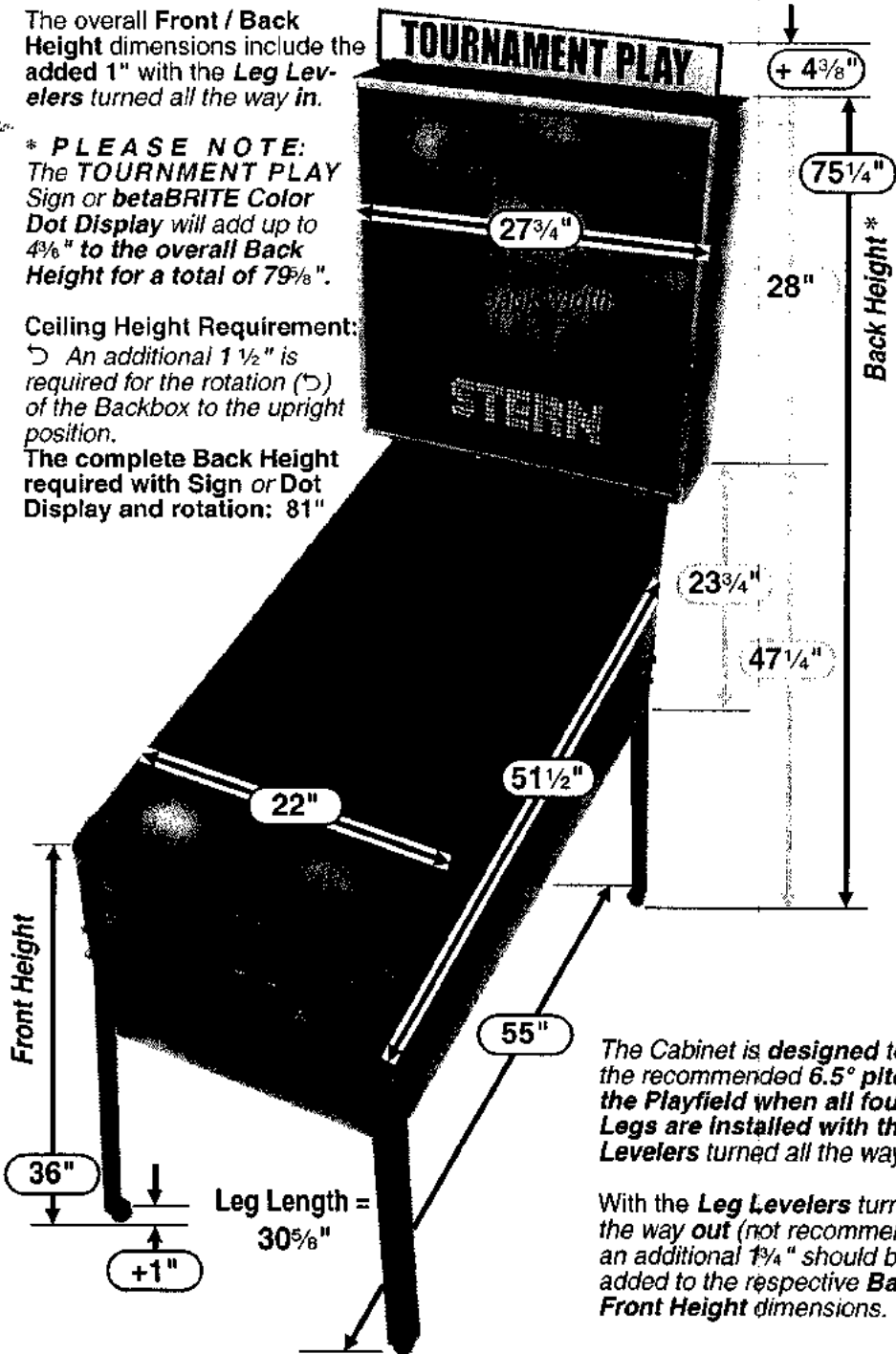
Normal Line: 120V AC - 125V AC @ 60Hz		
Domestic use an 8AMP 250v Slo-Blo Fuse.	AVG OPERATION CURRENT: 2.8AMP WATTAGE: 329w	MAX OPERATION CURRENT: 8AMP WATTAGE: 940w
	High Line: 210V AC - 240V AC @ 50Hz	
Export use 2x 5AMP 250v Slo-Blo Fuses. (*England & Hong Kong use an 8AMP 250v S/B Fuse.)	AVG OPERATION 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

GAME DIMENSIONS

The overall Front / Back Height dimensions include the added 1" with the Leg Levelers turned all the way in.

*** PLEASE NOTE:**
 The TOURNAMENT PLAY Sign or betaBRITE Color Dot Display will add up to 4 3/8" to the overall Back Height for a total of 79 1/4".

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



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

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



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

Read & follow the next page on 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

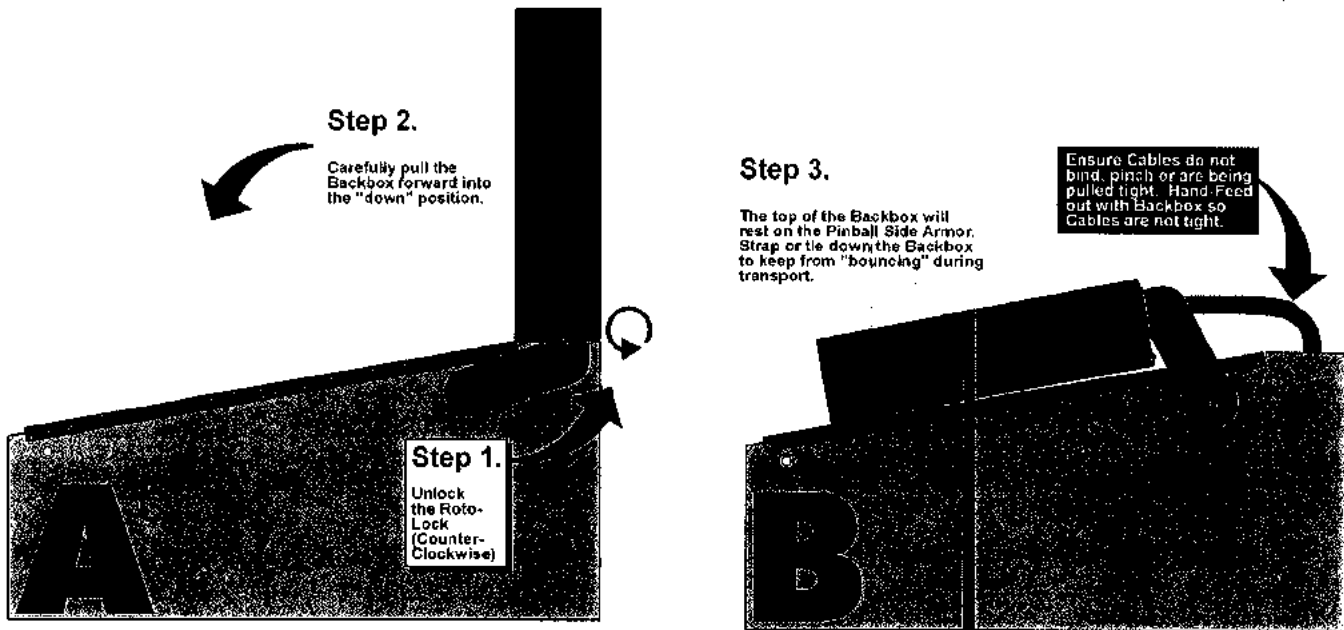
Height 56" Width 31"
 Depth 31"
 Approx. Unboxed Weight: 260lbs. (+/- 10)
 Boxed Weight: Wt. 290lbs. (+/- 15)

CAUTION

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

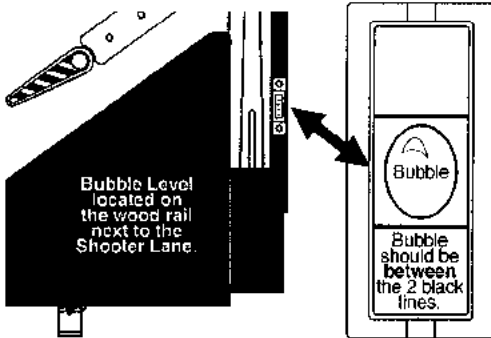
How to Secure the Backbox for Transporting

For more Backbox details & part numbers, see the Pink Pages (*Parts Identification & Location, Backbox ...*).



Leg Leveler Adjustment

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



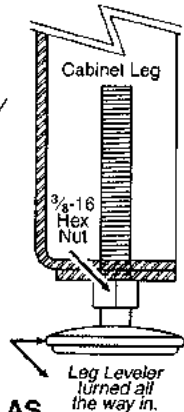
Start adjustment with the leg levelers turned all the way in.

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

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

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

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



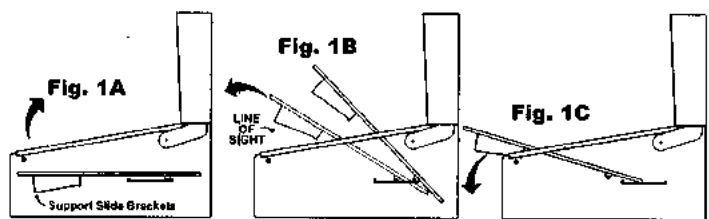
Note: For custom adjustment greater than >6.5° can be achieved by turning out the rear leg leveler(s), however, it is not recommended.

Easy Access Service System - 2 Positions

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

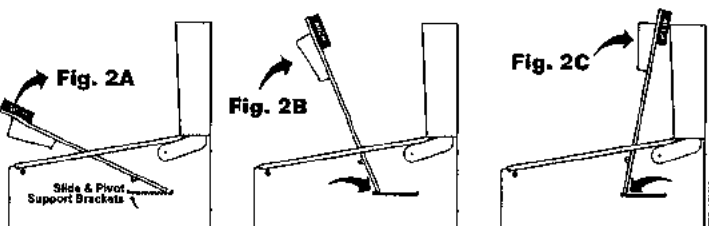
Position 1

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

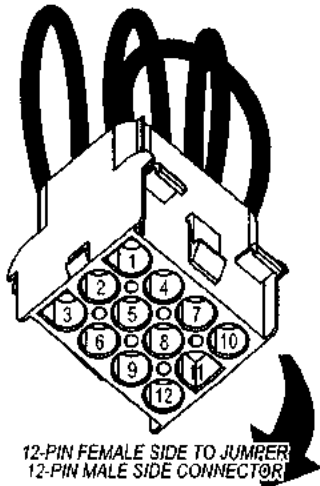


Position 2

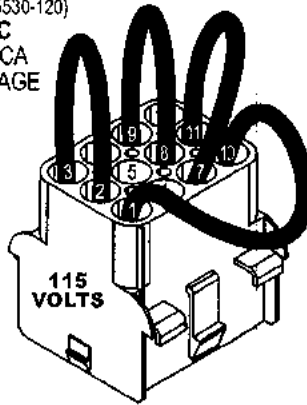
With the playfield at rest, hold the sides & pull toward the front of the cabinet (approx. 6" to 8"), until resistance is felt from **Edge Slide Brackets** stopping against the **Slide & Pivot Support Brackets** located on either side of the cabinet (Fig. 2A). At this time, swivel the playfield toward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



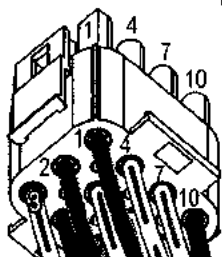
Cabinet Universal Voltage Jumper Plugs (for use with Universal AC Cable, 036-5530-00 ONLY)



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

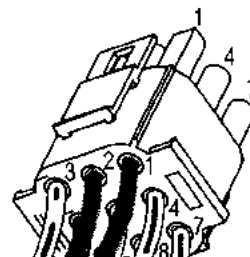


9-PIN MALE SIDE TO TRANSFORMER
9-PIN FEMALE SIDE CONN.

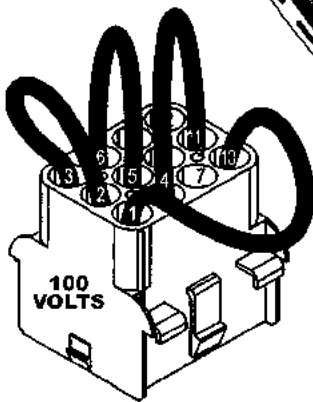


12-PIN F/M CONN.
BACK VIEW ▲

- 1 BLK
- 2 BLK
- 3 WHT-BLK
- 4 WHT-BRN
- 5 WHT-BRN
- 6 BRN (or YEL-WHT)
- 7 WHT-ORG
- 8 WHT-ORG
- 9 ORG
- 10 BLK
- 11 WHT
- 12 N/U



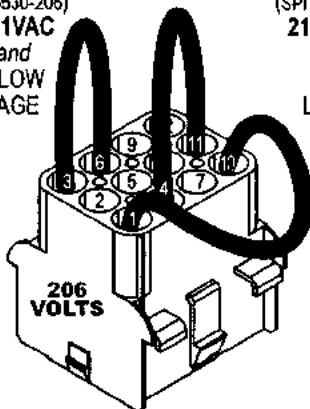
9-PIN F/M CONN.
▲ BACK VIEW



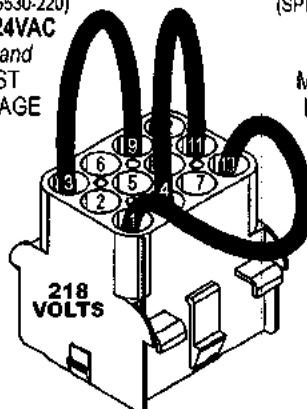
◀ JUMPER PLUG
(SPI PART #036-5530-100)
98VAC - 109VAC
JAPAN or
N. AMERICA LOW
LINE VOLTAGE

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

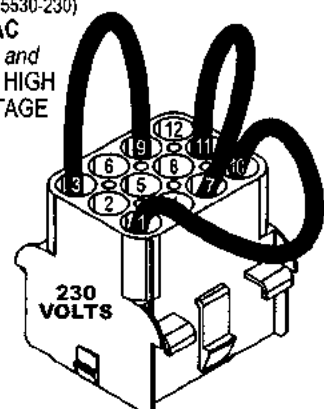
JUMPER PLUG ▼
(SPI PART #036-5530-206)
200VAC - 211VAC
EUROPE and
MID. EAST LOW
LINE VOLTAGE



JUMPER PLUG ▼
(SPI PART #036-5530-220)
212VAC - 224VAC
EUROPE and
MID. EAST
LINE VOLTAGE



JUMPER PLUG ▼
(SPI PART #036-5530-230)
225+VAC
EUROPE and
MID. EAST HIGH
LINE VOLTAGE



Cabinet and Coin
Door Wiring