VENOM
SERVICE AND OPERATION MANUAL

WARNING

IMPORTANT HEALTH WARNING: PHOTOSENSITIVE SEIZURES - A very small percentage of people may experience a seizure when exposed to certain visual images, including flashing lights or patterns. Even people with no history of seizures of epilepsy may have an undiagnosed condition that can cause "photosensitive epileptic seizures" due to certain visual images, flashing lights or patterns. Symptoms can include lightheadedness, altered vision, eye or face twitching, jerking or shaking of arms or legs, disorientation, confusion, momentary loss of awareness, and loss of consciousness or convulsions that can lead to injury from falling down or striking nearby objects.

IMMEDIATELY STOP PLAYING AND CONSULT A DOCTOR IF YOU EXPERIENCE ANY OF THESE SYMPTOMS.

ATTENTION! IMPORTANT WARRANTY INFORMATION

The electronics system, node network architecture, mechanical devices and associated software control systems in this pinball machine are designed to work with genuine Stern Pinball accessories and devices.

Installation of non-authorized accessories, lamps, LED's, motors or other devices or modification of electro-mechanical devices may damage the system and will void your warranty.

Stern Pinball machines are assembled in Elk Grove Village, Illinois, USA. Stern Pinball has inspected each game element to ensure it meets our quality standards.

Each pinball machine has unique characteristics that make it a one-of-a-kind American made product. Each will have variations in appearance resulting from differences in the machine's particular wood parts, individual printed art and mechanical assemblies. No playfield is perfectly flat and varies depending on the season. Game play will result in playfield dimpling as the harder steel ball contacts the wood and coating; over time multiple dimples will blend to make them less noticeable. Normal plastic insert crazing (tiny stress cracks) and ghosting (small cloudy areas around insert edges) are often seen in pinball machines, due to a combination of plastic mold stress, pushing of inserts into purposely undersized holes, and heating and breaking of inserts' plastic "skin" when the playfield is sanded.

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Games configured for North America operate on 60 cycle electricity only. These games will not operate in countries with 50 cycle electricity (Europe, UK, Australia).

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1. SETUP AND MOVING

1.1 FIRST-TIME SETUP INSTRUCTIONS

Your brand new Stern Pinball Machine is carefully packed for safety and security. For your safety, exercise caution and use the correct tools and sufficient help when setting up your new game.

TOOLS REQUIRED

- 5/8" Socket Wrench
- Utility Knife
- Snips
- An Assistant

CAUTION: AT LEAST TWO (2) PEOPLE ARE REQUIRED TO MOVE AND MANEUVER THE GAME. USE PROPER MOVING EQUIPMENT AND EXTREME CARE WHILE HANDLING. STERN PINBALL MACHINES WEIGH OVER 250LBS BOXED.
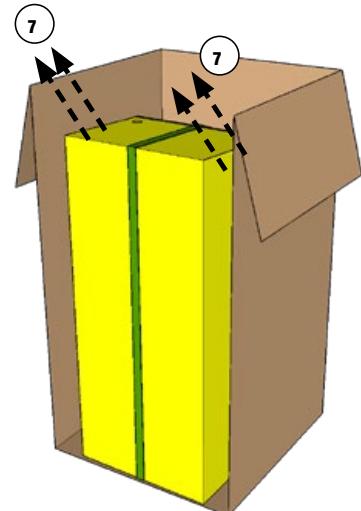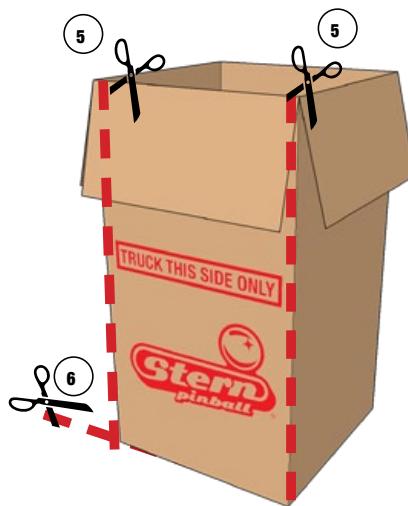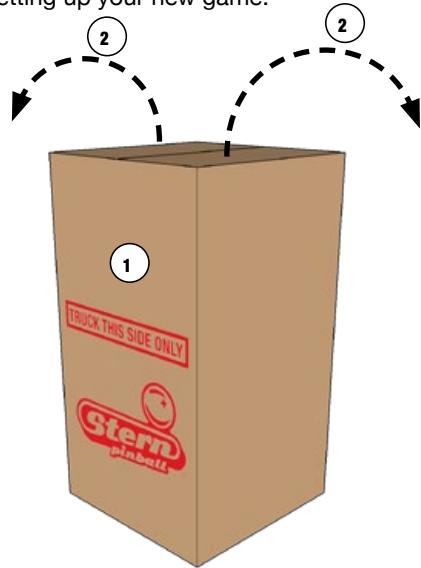
1. Locate the side labeled "TRUCK THIS SIDE ONLY". The bottom of the game faces this side.
2. Open the top box flaps by pulling hard in an upward motion on each flap. If the flaps are taped, cut the tape first, taking care to avoid the box staples.

3. Remove the four (4) foam pieces and two (2) narrow box tubes which contain the four (4) identical legs with levelers.
4. DO NOT CUT STRAPPING YET. Keep backbox secured in the down position.
5. With the utility knife, carefully cut down the left and right corners of the box.

6. Let the face fall forward and remove the entire side by carefully cutting the bottom.
7. With the game still in its folded position, use a ⅝" wrench to loosen and remove the 2 leg bolts on each side of the front cabinet. Ensure the leg levelers are screwed all the way into the legs.
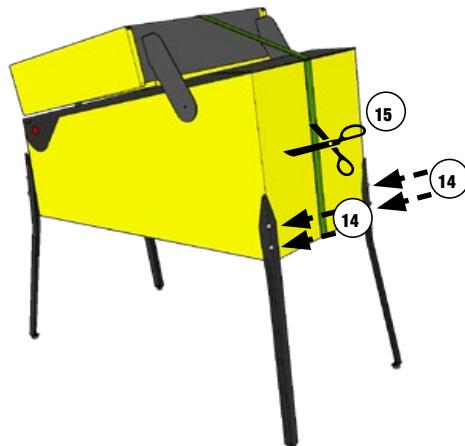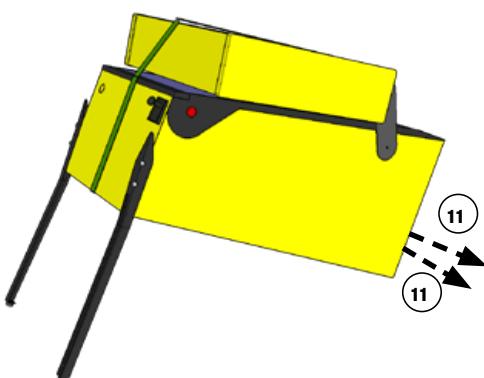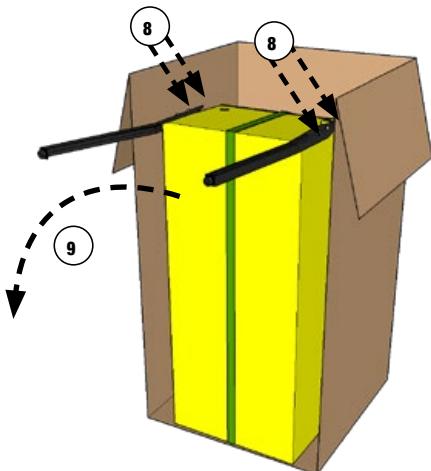
8. Install front legs using the bolts removed from the cabinet. Secure tightly.
9. Have someone help you carefully set the game down on the front legs.

10. Set aside the open box.
11. With a ⅝" socket wrench, loosen and remove the 2 leg bolts on each side of the rear cabinet, 4 total.

12. Using supports or two people, prop the rear of the cabinet up.
13. Ensure the rear leg levelers are screwed all the way into the legs.
14. Install rear legs using the 4 bolts removed from step 11.

FIRST-TIME SETUP CONTINUED

15. Cut nylon strapping and remove protective strap corner guards.
16. Locate the factory keys, either on the shooter rod or taped to the playfield glass.
17. Using snips, cut the tie-wrap securing the keys if required. One set of keys is for the front coin door, the other set of keys is for accessing components in the backbox.
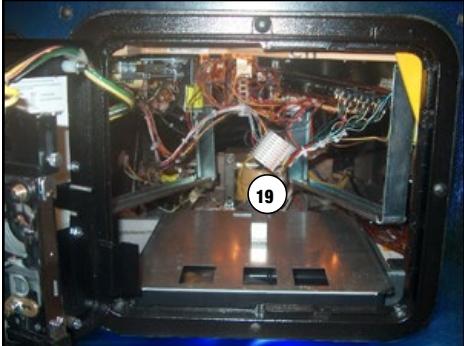
18. Open the front coin door.
19. Reach into the game and remove the retaining clip at the rear of the cash box.
20. Remove the cash box lid by sliding it toward you.
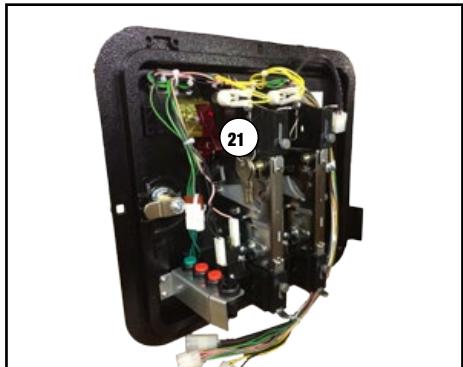
21. Store the backbox keys, if desired, on the metal hook located in the coin door.
22. Locate and remove the pinballs, plumb bob, and backbox bolts from the cash box.
23. Replace the cash box lid and retaining clip for future use.
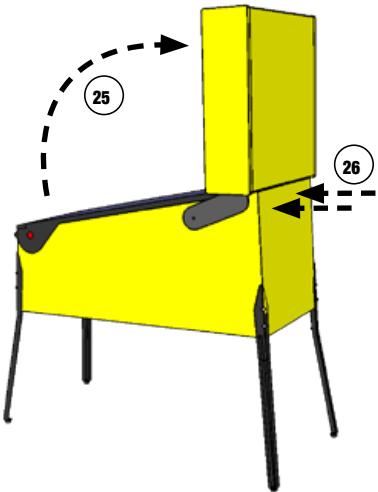
24. Locate the two (2) backbox bolts in the cash box.
25. Carefully raise backbox to upright position while ensuring that cables are not pinched.
26. Use the ⅝" wrench to Install the two (2) backbox bolts to secure the backbox as indicated on the back of the cabinet.
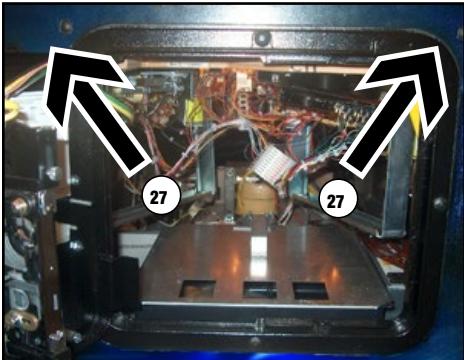
27. Reach inside the cabinet and lift the two latches located on either side of the coin door.
28. Remove the front top molding.

29. Remove the playfield glass by sliding it toward you and carefully place it in a safe location. Remove all playfield shipping tie downs, shipping blocks, and packing foam, and follow any game-specific unpacking instructions included in the playfield, if present.

CAUTION: PLAYFIELD GLASS IS MADE FROM HIGH-STRENGTH TEMPERED GLASS. TEMPERED GLASS IS SENSITIVE TO EXTREME TEMPERATURE SHIFTS AND CORNER NICKS, WHICH CAN CAUSE THE GLASS TO FAIL CATASTROPHICALLY. TAKE CARE TO STORE THE GLASS ON A SOFT, ROOM-TEMPERATURE SURFACE AND PREVENT THE CORNERS FROM BEING DAMAGED.

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Stern
pinball

FIRST-TIME SETUP CONTINUED

30. If pinballs were already installed into the lower ball trough, remove them before lifting the playfield.
31. Grasp the lower arch between the flippers, and firmly but gently pull directly up to raise the playfield 8 to 12 inches.
32. While holding the playfield up, pull the playfield toward you until the two playfield supports are over the front edge of the cabinet.
33. Rest the playfield on the front edge of the cabinet.
34. Raise the playfield and rest it against the backbox.
35. Visually inspect all cabinet cables and connector terminations; ensure no wires or cables are pinched and that cable harnesses are not pulled tight.
36. Locate the plumb bob in the parts bag in the cash box.
37. Slide plumb bob onto the hanger wire. Note: the vertical position of the plumb bob affects tilt sensitivity - higher makes the game more sensitive to tilting.
38. Tighten the thumb screw finger-tight.
39. Install the correct number of pinballs. Refer to the decal on the lock down assembly for the correct number of pinballs.

LOCATING, LEVELING, AND FINAL SETUP

1. Select a location that is indoors, out of direct sunlight, and climate controlled. Excessive moisture/humidity can cause long-term damage to your game.
2. Adjust the front or rear levelers as necessary to position the playfield level bubble, located on the front right of the playfield next to the shooter lane, to float between the two (2) black lines. This will place the playfield at the recommended 6.5° pitch. Playfield angles greater than 6.5° can be achieved by turning out the rear leg leveler(s) for increased difficulty and faster gameplay.
3. Use a pinball to roll down the center of the playfield for side-to-side leveling, or use an external bubble level, digital level, or smartphone level app.
4. Plug into a grounded outlet and check for proper operation through DIAGNOSTICS.
5. Check the coin door: With the door closed, insert coins to verify proper operation.
6. Play game: Check for satisfactory operation and adjust game volume (push the Red Buttons inside the Coin Door).
7. If desired, perform any game diagnostics, game adjustments, and pricing settings at this time.

SPIKE PINBALL SOFTWARE UPDATE INSTRUCTIONS

1. Obtain game software update file (filename ends in ".spk") from www.sternpinball.com or from authorized Stern distributor.
2. Place game software update file (".spk") in root directory of a blank FAT32-formatted USB flash drive
3. Use backbox power switch to turn off game
4. Plug in USB flash drive to CPU board USB connector (CN20 or CN21). Refer to www.sternpinball.com
5. Turn on game
6. The game will automatically begin software update
7. Select the correct .spk update file from list.
8. Press Enter on the service switches to start update
9. When the display indicates "Update Complete", turn off game
10. Remove USB flash drive from CPU board
11. Turn game on to complete the update and play pinball!
12. Detailed instructions and troubleshooting tips are available in the game manual, www.sternpinball.com and authorized Stern distributors.

POWER SWITCH

The game's power switch is located on the right-hand side underneath the backbox.
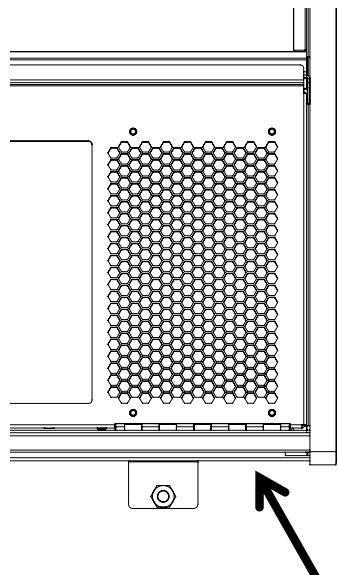
ON/OFF Switch

1.2 ADJUSTMENTS MENU

STANDARD ADJUSTMENTS

Perform the below steps to review the adjustments.

Enter the Service Menu, then enter the Standard Adjustments Menu.

Press SELECT to access the Service Menu. Press BACK to exit or escape at any time.

Press [>]. Go to the ADJ icon. Press SELECT.

Go to the S.P.I. icon. Press SELECT.

STANDARD ADJUSTMENT #1 appears with the adjustment name flashing. While the adjustment name is flashing press [<] [>] to move between adjustments.

To change the adjustment setting press SELECT. While the adjustment setting is flashing, press [<] [>] repeatedly until the desired setting appears. Press the SELECT button to "install" the change. The adjustment comment (bottom line) will indicate if the factory default setting is selected or will display INSTALLED if the change is not a factory default setting.

ID	Adjustment Name	Default Setting
1	REPLAY TYPE	AUTO
2	REPLAY PERCENTAGE	10%
3	REPLAY AWARD	CREDIT
4	REPLAY LEVELS	1
5	AUTO REPLAY START	150,000,000
6	DYNAMIC REPLAY START	150,000,000
7	REPLAY LEVEL #1	150,000,000
8	REPLAY LEVEL #2	175,000,000
9	REPLAY LEVEL #3	225,000,000
10	REPLAY LEVEL #4	350,000,000
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 13
19	MATCH PERCENTAGE	9%
20	MATCH AWARD	CREDIT
21	BALLS PER GAME	3
22	MAX PLAYERS PER GAME	4
23	TILT WARNINGS	2
24	TILT DEBOUNCE	750
25	CREDIT LIMIT	30
26	REMOVE FRACTIONAL CREDITS	AFTER 30 MINUTES IDLE
27	ALLOW HIGH SCORES	YES
28	HIGH SCORE AWARD	CREDIT
29	GRAND CHAMPION AWARDS	1
30	HIGH SCORE #1 AWARDS	0
31	HIGH SCORE #2 AWARDS	0
32	HIGH SCORE #3 AWARDS	0
33	HIGH SCORE #4 AWARDS	0
34	GRAND CHAMPION SCORE	60,000,000
35	HIGH SCORE #1	50,000,000
36	HIGH SCORE #2	40,000,000

ID	Adjustment Name	Default Setting
37	HIGH SCORE #3	30,000,000
38	HIGH SCORE #4	25,000,000
39	HSTD INITIALS	3 INITIALS
40	HSTD RESET COUNT	2000
41	FREE PLAY	YES
42	LANGUAGE	ENGLISH
43	PLAYER LANGUAGE SELECT	YES
44	CUSTOM MESSAGE	ON
45	KNOCKER VOLUME	LOW
46	START GAME ON CREDIT	OFF
47	START BUTTON BEHAVIOR	ALL LOGGED IN
48	GAME RESTART	YES
49	GAME MODE ON START	STANDARD
50	INSIDER LOGIN TIMER	30
51	INSIDER PLAY AGAIN TIMER	20
52	USE INSIDER HOME TEAM	FREE PLAY ONLY
53	ENABLE HOME TEAM IN COINPLAY	YES
54	HOME TEAM GUEST RETENTION	NEVER
55	START BUTTON ATTRACT MODE ILLUM.	BLINKING
56	ALLOW LEFT+RIGHT TO END	ALWAYS
57	BALL SAVE TIME	0:01
58	TARGET GAME TIME	1:45
59	TIMED PLUNGER	OFF
60	FLIPPER BALL LAUNCH	OFF
61	COINDOOR BALL SAVER	NO
62	COMPETITION MODE	NO
63	FAST BOOT	YES
64	Q24 OPTION	COIN METER
65	TICKET DISPENSER	NONE
66	PLAYER GAME MODE	YES
67	PLAYER COMPETITION MODE	YES
68	PLAYER CHALLENGE MODE	YES
69	PLAYER COOPERATION MODE	YES
70	DJ MIXER MODE	YES

ID	Adjustment Name	Default Setting
71	DJ MIXER PLAYLIST MODE	ORDERED PLAYBACK
72	DJ MIXER PLAYLIST REPEAT	YES
73	LOCATION ID	0
74	GAME ID	0
75	TIME FORMAT	12-HOUR
76	PRICING FORMAT	MIN W/ MONETARY SYMBOL
77	CREDIT FORMAT	ACTUAL FRACTION
78	COIN INPUT DELAY	30
79	COIN ACCEPTOR	MECHANICAL
80	LOST BALL RECOVERY	YES
81	COIN DOOR DISABLE TILT	NO
82	COIN DOOR OPEN NODE BUS POWER	YES
83	PLAY ATTRACT TUTORIAL VIDEOS	YES
84	FRONT VOLUME KNOB	HEADPHONES VOL. ONLY
85	MUTE IF HEADPHONES DETECTED	YES
86	MUTE KNOCKER IF HP DETECTED	NO
87	DISABLE Q24 KNOCK IF HP DETECTED	NO
88	GI LED BRIGHTNESS	100%
89	GI LED MAX BRIGHTNESS	255
90	INSERT LED BRIGHTNESS	100%
91	INSERT LED MAX BRIGHTNESS	255
92	FLASHER LED BRIGHTNESS	100%
93	FLASHER LED MAX BRIGHTNESS	255
94	CABINET LED BRIGHTNESS	100%
95	LCD DISPLAY BRIGHTNESS	7
96	ATTRACT MODE B.BOX BRIGHTNESS	0%
97	GAMEPLAY B.BOX BRIGHTNESS	0%
98	SERVICE MENU B.BOX BRIGHTNESS	2%

FEATURE ADJUSTMENTS

Each table has feature adjustments specific to the characteristics of that game. To access feature adjustments enter the Service Menu and then enter the Adjustments Menu.

Press SELECT to access the Service Menu. Press BACK to exit or escape at any time.

Press [>]. Go to the ADJ icon. Press SELECT.

Go to the game icon. Press SELECT.

FEATURE ADJUSTMENT #1 appears with the adjustment name flashing. With the adjustment name flashing press [<] [>] to move between adjustments. Feature adjustments are changed similarly to standard adjustments using the SELECT button to choose options and the [<] [>] buttons to cycle through available settings.

1.3 TRANSPORTING THE GAME

When transporting the game, such as in the back of a truck or with a hand truck, the game's backbox must be secured to prevent damage to the side rails.

1. SECURE THE BACKBOX

1. Ensure that the pinballs are removed from the playfield, and secure any free-moving mechanisms that may get damaged in transport

TOOLS REQUIRED

- STRAP (500LB OR GREATER)
- AN ASSISTANT
- HAND TRUCK

2. REMOVE THE LEGS AND STAND UP
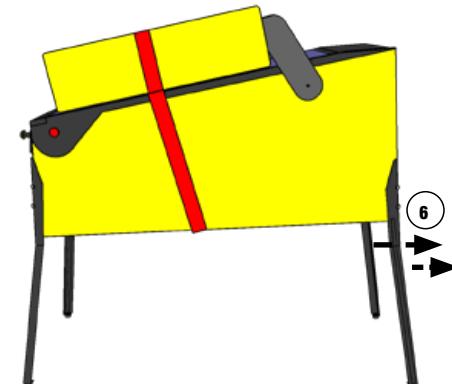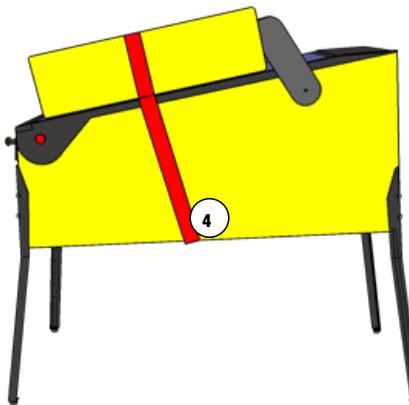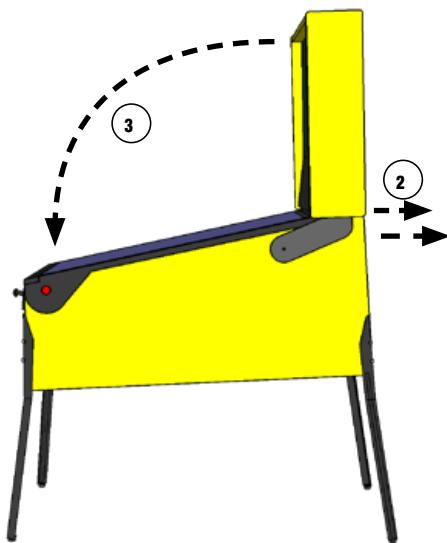
2. Remove the backbox securing bolts
3. Carefully lower the backbox onto the side rails. Use a piece of cardboard or suitable padding between the backbox and the game.

4. Securely strap the back box to the game
5. The game may be transported with the legs on. If the legs must be removed, follow the remaining steps.

6. Remove the legs, rear legs first. Use a stool or a friend to support the rear of the game.
7. Rest the rear of the game on the ground.
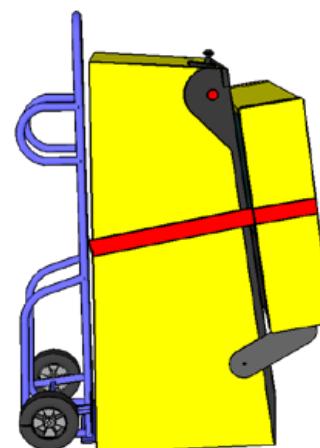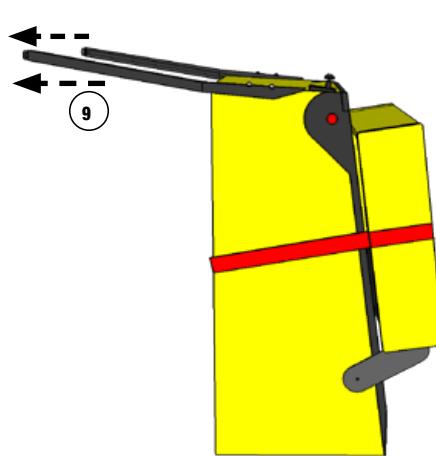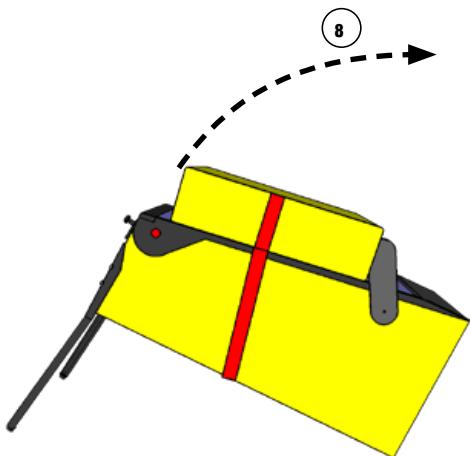
8. Stand the game up on its back.

9. Remove the front two legs.

10. Secure all loose parts and transport with a hand truck in the upright position.

1.4 MAINTENANCE

REGULAR MAINTENANCE - (MONTHLY/500 GAMES)

- Remove the playfield glass
- Enter the software diagnostics menu, start lamp test, then clean and wax the playfield.
  - While cleaning the playfield, identify and repair malfunctioning lights, loose parts, cracked plastics and worn rubber parts.
- While in diagnostics, enter the switch test (Select the "SW" Icon, then "TEST" Icon).
  - Use a pinball to actuate all switches and verify the correct switch registers with the switch test.
  - The game will play a sound to confirm the switch.
- Lift the playfield and inspect all assemblies for loose parts, broken wires or excessive wear. Look at the bottom of the cabinet for any parts that may have worked loose, then find the source.
- Check all coin door mechanisms and bill acceptor (if installed) for proper operation
- Play the game to ensure all coils and features are working
- Check the playfield to ensure it is level and set to the proper pitch using the bubble level on the right side wood rail.
- Check game audits: Replay % and Ball Time and note abnormal values which can indicate problems.
- Ensure game volume is set appropriately for the location.
- Clean both sides of the playfield glass and reinstall.
- Check and clean pinballs and replace if excessively worn or scuffed. Dirty pinballs accelerate game wear.

OVERHAUL MAINTENANCE - (5000 GAMES)

- Verify latest game software is installed
- Check flippers for excessive wear. Excessive flipper sloppiness (vertical or horizontal) or weakness indicates a flipper rebuild is required.
- Clean machine inside and out and check leg levelers for free operation.
- Visual check for loose or broken playfield and cabinet parts and repair as necessary.
- Electrical check: Plug into grounded outlet and check for proper operation through DIAGNOSTICS.
- Replace worn or dirty rubbers.
- Replace pinballs.
- Check all playfield switches with a pinball.
- Check all settings (refer to manual for factory settings).
- Check coin door: With door closed, insert coins to verify proper operation.
- Check for proper adjustment of the plumb bob tilt.
- Play game: Check for satisfactory operation.

COMMON PINBALL TOOLS

- Common nut drivers (¼", 5/16", 11/32", ⅜")
- Phillips screwdriver
- Standard Allen wrench/Hex key set
- ⅝" Socket with ratchet
- Adjustable wrench (5/8" & 9/16")
- 6" Torpedo Level (or use a pinball
- Flashlight or headlamp
- Soldering Iron (60w with flat tip), lead-free solder
- Wire cutter
- Wire stripper
- Long nose ("needle nose") pliers

1.5 MAINTENANCE KITS

Description	Part Number
Venom Playfield Plastics Kit	803-5000-U1
Venom Playfield Decals Kit	802-5000-U1
Venom Backbox Decal Left	820-76U1-01
Venom Backbox Decal Right	820-76U1-02
Venom Cabinet Decal Left	820-76U1-03
Venom Cabinet Decal Right	820-76U1-04
Venom Cabinet Decal Front	820-76U1-05
Venom Playfield, Bare	830-5100-U1
Venom Translite	830-8427-U1

1.6 COMMON PARTS

Description	Part Number
8 oz Pinball Playfield wax (Novus # 2)	675-0003-01
Standard Pinball, 1-1/16 in	260-5000-00
Flipper Rebuild Kit Left (Standard)	500-6307-10
Flipper Base Plate Kit Left	515-6617-01
Flipper Rebuild Kit Right	500-6307-00
Flipper Base Plate Kit Right	515-6617-00
Memory Card - SD 16GB	970-0140-16
Memory Card - MicroSD	970-0141-32
Wi-Fi Adapter	509-2013-00

2. SPIKE SYSTEM AND NODE GUIDE

2.1 SPIKE SYSTEM OVERVIEW

The SPIKE Pinball system is a rugged, distributed, and embedded platform custom-designed for the rigors of the pinball machine environment. SPIKE takes advantage of modern technologies to deliver an immersive pinball experience that supports modern features, reduces cabling, and increases serviceability and reliability.

A Stern Pinball machine based on the SPIKE system will have at least two nodes networked together with the SPIKE node bus, a custom industrial pinball control bus that is designed around industry standards and optimized for the pinball environment. The primary CPU node is networked to one or more input/output nodes over standard Category 5 UTP (unshielded twisted pair) ethernet cabling.

There are five primary types of nodes that are found in the game.

- CPU node (Node 0) - The primary node that controls other nodes in the system. Contains the primary game software for the system and provides SPIKE node bus power for other nodes.
- Cabinet 48V node (Node 1) - Specialized node with specific inputs and outputs for coin doors, tilt mechanisms, and other bottom-cabinet devices.
- 48V playfield node - Controls high power devices such as coils and flashers, and also supports a few switch and low-power outputs. Powered by the system 48V power supply.
- Light and switch node - High-density switch and low-power LED outputs, bus-powered from the node bus. These boards contain as many 32 switch inputs and light outputs.
- Node extensions - These sub-nodes add additional low-power input and outputs to a specific Power or I/O node and are connected with simple serial bus.

2.2 NODE BUS CABLING

The SPIKE node bus utilizes standard Ethernet-style RJ45 8-pin modular jacks, and off-the-shelf Category 5e or better ethernet cabling. The node bus is electrically different from Ethernet and does not utilize Ethernet or TCP/IP protocols or signaling standards. SPIKE nodes are not compatible with standard computer networking equipment.

CAUTION: Plugging a SPIKE Node or CPU board into a standard Ethernet port may damage one or both devices and void your warranty.

2.3 SYSTEM POWER

The SPIKE System is powered from an 48V DC power supply bus. Each SPIKE node converts this voltage to lower voltages required by the node and its specific components. A SPIKE 48V node typically controls high-power outputs such as game coil mechanisms and high-brightness LEDs. These powered nodes are supplied directly with 48V system power. SPIKE standard I/O nodes are low-power nodes that read switch inputs and output to standard-brightness LEDs. Standard I/O nodes use the node bus power, which is supplied by the main CPU node over the node bus modular jack connectors.

2.4 SPIKE NODE ADDRESSES

Each SPIKE node has a unique address ranging from 0 to 15. Not all addresses are used in all games. Nodes can be of the same part number, so the address is specified on the DIP switches on each node. When replacing a node, be certain that the correct address is set. Nodes can have 3-position and 4-position DIP switches. Refer to the appropriate table to set the address for each type of Node. The correct address for a node can be found in the SPIKE node reference section of the manual or in the game diagnostic software. Address 0 is reserved for the backbox CPU node, where the game software resides. Address 1 is reserved for the cabinet node, located inside the coin door. These two nodes do not have DIP switches as their address is not configurable.

Address	1	2	3
8	OFF	OFF	OFF
9	OFF	OFF	ON
10	OFF	ON	OFF
11	OFF	ON	ON
12	ON	OFF	OFF
13	ON	OFF	ON
14	ON	ON	OFF
15	ON	ON	ON

SPIKE node addresses for nodes with 3-position DIP switches. Addresses 0-7 are not used by SPIKE nodes with 3-position DIP switches.

Address	1	2	3	4
8	OFF	OFF	OFF	OFF
9	OFF	OFF	ON	OFF
10	OFF	ON	OFF	OFF
11	OFF	ON	ON	OFF
12	ON	OFF	OFF	OFF
13	ON	OFF	ON	OFF
14	ON	ON	OFF	OFF
15	ON	ON	ON	OFF

SPIKE node addresses for nodes with 4-position DIP switches. Addresses 0-7 are reserved for fixed-function nodes and do not require configuration.

SPIKE SYSTEM AND NODE GUIDE CONTINUED

2.5 SPIKE NODE PROGRAMMING

The SPIKE nodes are smart nodes that have on-board processors and run embedded code. The nodes are programmed automatically by the CPU node whenever software updates are installed to the CPU. When replacing a node, the CPU node will detect and update the node to the latest software with no user intervention. Always replace nodes with the power to the game turned OFF.

2.6 SPIKE SYSTEM TERMINOLOGY

MULTI GENERAL ILLUMINATION LIGHTING

General Illumination Lighting is two or more lights powered by one control source. These are often a number of LEDs connected in parallel and the system controls these as one large LED. A missing LED will not affect these circuits, however a shorted LED can cause the entire string of LEDs to turn off.

SINGLE LIGHTS

Single lights and LEDs are direct-controlled from SPIKE node boards. A common power source is grounded by individual transistors to turn individual LEDs on and off. Groups of LEDs, usually by node connector, share a common power source, so if a group of LEDs is out, check the wiring for the power source.

FLASHERS

SPIKE games treat flashers the same as single LEDs that draw more power. Flashers are controlled from the same circuits that power regular lights.

DRIVERS

A driver is a circuit that controls a high power-device such as a coil, magnet, or motor. Each device has a common 48V power source that is then connected to ground by a dedicated control transistor. Each driver is protected against shorting, static electricity, and over-current conditions. Take caution as 48V is always present on a device even when it is not energized.

OPTOS

Certain types of optical switches ("optos") require external signal conditioning. For these optos, they will interface to a SPIKE node via an opto signal conditioning board. Other optical switches connect directly to the Spike node board.

CAUTION: Unless explicitly directed by an Authorized Stern Repair technician, perform ALL work on your pinball machine with the power disabled!

INPUT/OUTPUT PROTECTIONS

SPIKE features built-in short-circuit, static electricity, and other protections to maximize reliability. If an LED, coil or other device shorts, it will be disabled but will not shut down the entire system in most circumstances. Groups of LEDs, coils, and switches often share common power supplies or other circuits, so it is possible that a bad device will affect the group of related devices and require removal or repair to fix the group. The system diagnostics will inform the technician of shorted or otherwise malfunctioning devices whenever possible. While the system is protected against permanent damage, it is strongly recommended to repair or replace these bad components as soon as possible to minimize downtime and maximize game earnings.

2.7 COMMON SPIKE NODE BOARDS

Description	Type	Part Number
SPIKE CPU Node	Node	509-1003-01
Cabinet Node	Node	520-6967-72
Playfield 48V Core-Driver Node	Node	520-7017-72 520-1057-00
Trough Serial Opto Receiver Extension	Extension	520-8516-00

3. LIGHT, SWITCH, AND DRIVER REFERENCE

Node Bus Cable (RJ45)
604-5004-08-XX

Serial Data Cable
036-8054-XX

When replacing node boards, ensure DIP address switches are set correctly!
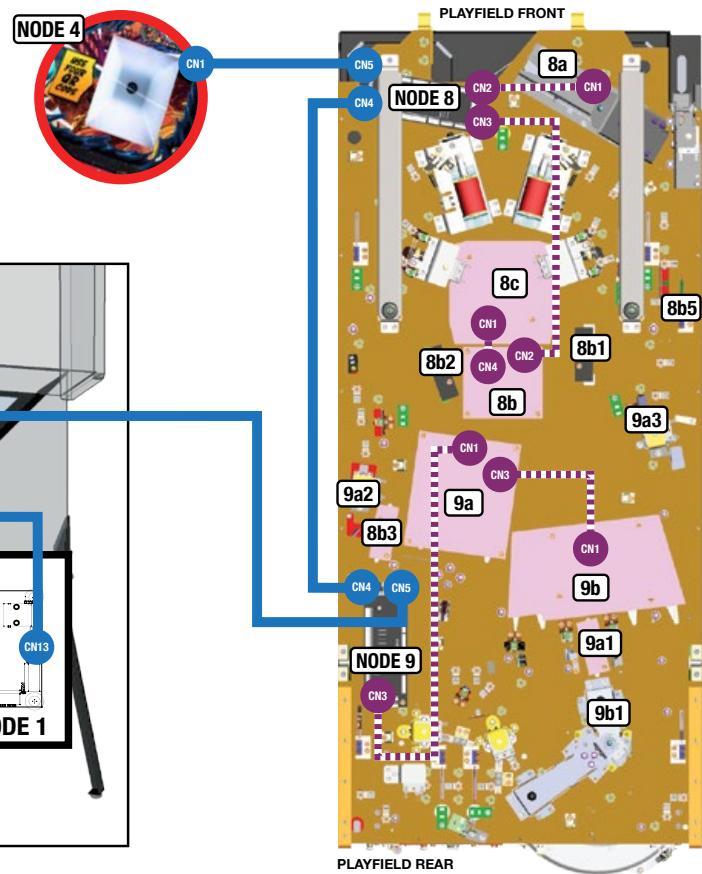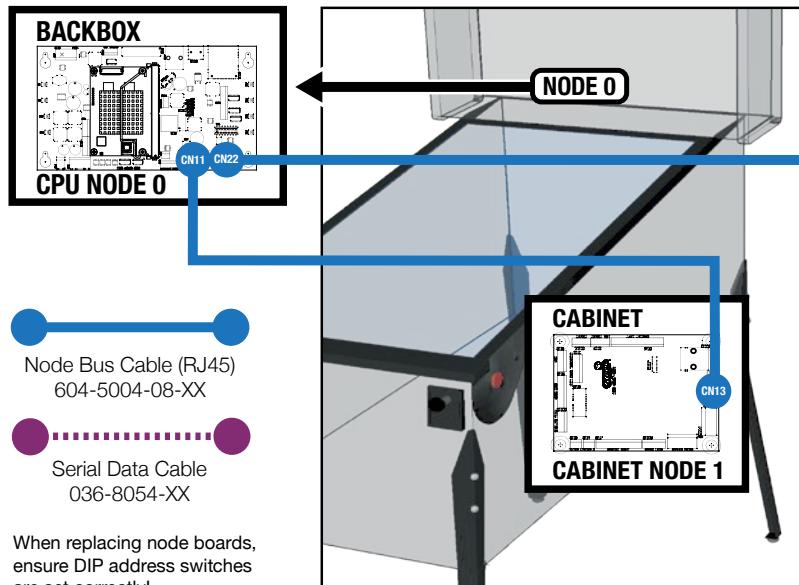
3.1 SPIKE NODE BOARDS

ID	DIP Address	Description	Location	Part Number
Node 0	n/a	SPIKE 2 CPU Node	Backbox	509-1003-01
Node 1	n/a	Cabinet Node	Cabinet	520-6967-72
Node 4	n/a	QR Reader Node	Bottom Arch	500-1010-00
Node 8	OFF-OFF-OFF-OFF	Core - Driver Node (Playfield)	Lower Playfield	520-1057-00 / 520-7017-72
8a	n/a	Trough Serial Opto Receiver Extension	Playfield	520-8516-00
8b	n/a	PCB Center Mid	Playfield	520-8576-00
8b1	n/a	PCB 3LED	Playfield	520-7011-00
8b2	n/a	PCB 3LED	Playfield	520-7011-00
8b3	n/a	PCB 2LED	Playfield	520-8580-00
8b5	n/a	PCB Billboard	Playfield (Top of Playfield)	520-8582-00
8c	n/a	PCB Center Lower	Playfield	520-8575-00
Node 9	OFF-OFF-ON-OFF	Core - Driver Node (Playfield)	Playfield	520-1057-00 / 520-7017-72
9a	n/a	PCB Center Left	Playfield	520-8577-00
9a1	n/a	PCB 2LED	Playfield	520-8580-00
9a2	n/a	PCB 3LED	Playfield (Top of Playfield)	520-8581-00
9a3	n/a	PCB 3LED	Playfield (Top of Playfield)	520-8581-00
9b	n/a	PCB Right Upper	Playfield	520-8579-00
9b1	n/a	PCB Host Sign	Playfield (Top of Playfield)	520-8583-00
Node 12	ON-OFF-OFF-OFF	Core - Driver Node (Topper Optional)	Topper	520-1057-00 / 520-7017-72

3.2 DRIVER REFERENCE

ID	Name	Node	Connector	Ret. Pin	Ret. Wire	Voltage	V+ Pin	V+ Color	Location	Type	Address	Part Number
1	Trough	8	CN8	7	ORG GRY	48V	1-4	GRY ORG	Playfield	Coil - 27-1500	8-DR-1	090-5004-ND
2	Auto Plunger	8	CN8	9	ORG WHT	48V	1-4	GRY ORG	Playfield	Coil - 23-800	8-DR-4	090-5001-ND
3	Left Flipper	8	CN8	6	ORG YEL	48V	1-4	GRY ORG	Playfield	Coil - 22-1080	8-DR-5	090-5032-ND
4	Right Flipper	8	CN8	5	ORG GRN	48V	1-4	GRY ORG	Playfield	Coil - 22-1080	8-DR-0	090-5032-ND
5	Left Slingshot	8	CN8	11	ORG BLU	48V	1-4	GRY ORG	Playfield	Coil - 26-1200	8-DR-3	090-5044-ND
6	Right Slingshot	8	CN8	10	ORG VIO	48V	1-4	GRY ORG	Playfield	Coil - 26-1200	8-DR-2	090-5044-ND
7	Shaker Motor	1	CN16	1	BLU	48V	5	RED	Cabinet	Motor	1-DR-0	041-5029-04
8	Left Lock	8	CN7	3	YEL BLK	48V	1	GRY ORG	Playfield	Coil - 26-1200	8-DR-6	090-5044-ND
9												
10	Right Lock	8	CN7	2	YEL RED	48V	1	GRY ORG	Playfield	Coil - 26-1200	8-DR-8	090-5044-ND
11	Left Pop Bumper	9	CN8	10	ORG BLK	48V	1-4	GRY BRN	Playfield	Coil - 26-1200	9-DR-2	090-5044-ND
12	Right Pop Bumper	9	CN8	11	ORG BRN	48V	1-4	GRY BRN	Playfield	Coil - 26-1200	9-DR-3	090-5044-ND
13												
14												
15	Carnage	9	CN7	2	YEL ORG	48V	1	GRY BRN	Playfield	Coil - 26-1200	9-DR-8	090-5044-ND
16	Top Post	9	CN7	4	YEL BLU	48V	1	GRY BRN	Playfield	Coil - 26-1200	9-DR-7	090-5044-ND
17												
18												
19	VUK	9	CN8	9	ORG RED	48V	1-4	GRY BRN	Playfield	Coil - 23-800	9-DR-4	090-5001-ND
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												
31												
32												
33	Coin Meter	1	CN3	2	BLK	12V	1	RED	Cabinet	Digital Out	1-DR-2	500-9946-00
34	Ticket Meter	1	CN4	2	BLK	12V	1	RED	Cabinet	Digital Out	1-DR-3	500-9946-00
35	Ticket Dispenser	1	CN11	3		12V	1		Cabinet	Digital Out	1-DR-4	

DRIVER REFERENCE CONTINUED
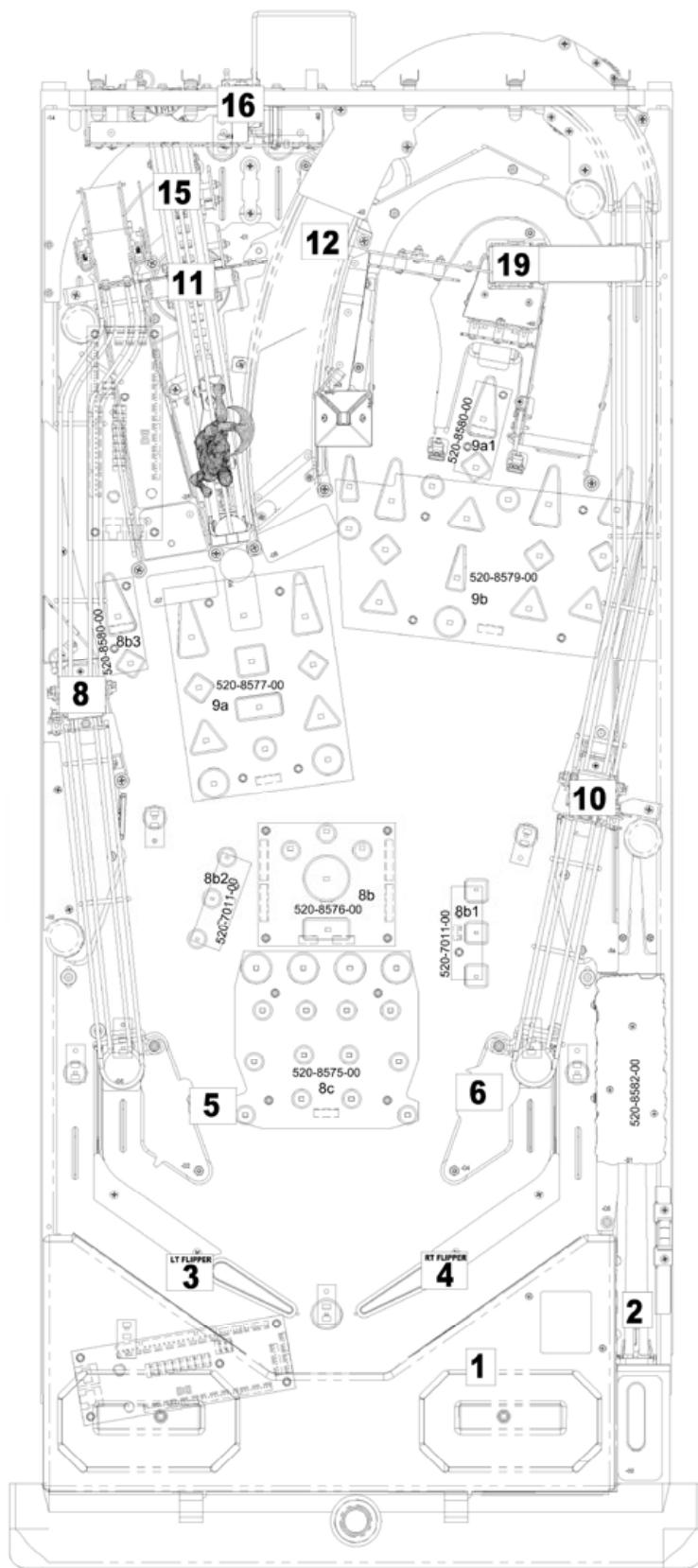
Figure 3.2.1. Playfield driver locations (top view).

3.3 SWITCH REFERENCE

ID	Name	Node	Node Ext	Conn.	Input Pin	Input Wire	GND Pin	Ground Wire	Location	Type	Address	Part Number
1	Left Outlane	8	-	CN11	4	LGN RED	11/12	BLK ORG	Playfield	Rollover	8-SW-17	500-9935-04
2	Left Return Lane	8	-	CN11	5	LGN ORG	11/12	BLK ORG	Playfield	Rollover	8-SW-18	500-9935-04
3												
4												
5	Right Return Lane	8	-	CN11	6	LGN YEL	11/12	BLK ORG	Playfield	Rollover	8-SW-19	500-9935-04
6	Right Outlane	8	-	CN11	7	LGN BLU	11/12	BLK ORG	Playfield	Rollover	8-SW-20	500-9935-04
7	Left Slingshot	8	-	CN10	4	GRY BLU	8	BLK GRN	Playfield	Leaf	8-SW-30	180-5231-00
8	Right Slingshot	8	-	CN10	3	GRY VIO	8	BLK GRN	Playfield	Leaf	8-SW-29	180-5231-00
9	Left Flipper Button	8	-	CN9	4	GRY BRN	7	BLK GRN	Cabinet	Leaf	8-SW-25	180-5160-01
10	Right Flipper Button	8	-	CN9	3	GRY RED	7	BLK GRN	Cabinet	Leaf	8-SW-24	180-5160-01
11	Left Flipper EOS	8	-	CN10	6	GRY YEL	9	BLK GRN	Playfield	Leaf	8-SW-16	180-5149-00
12	Right Flipper EOS	8	-	CN10	5	GRY GRN	9	BLK GRN	Playfield	Leaf	8-SW-31	180-5149-00
13												
14												
15	Trough 6	8	8a	CN14	-		-		Playfield	Opto	8-SW-32	520-5344-00 tx 520-8516-00 rx
16	Trough 5	8	8a	CN14	-		-		Playfield	Opto	8-SW-33	520-5344-00 tx 520-8516-00 rx
17	Trough 4	8	8a	CN14	-		-		Playfield	Opto	8-SW-34	520-5344-00 tx 520-8516-00 rx
18	Trough 3	8	8a	CN14	-		-		Playfield	Opto	8-SW-35	520-5344-00 tx 520-8516-00 rx
19	Trough 2	8	8a	CN14	-		-		Playfield	Opto	8-SW-36	520-5344-00 tx 520-8516-00 rx
20	Trough 1	8	8a	CN14	-		-		Playfield	Opto	8-SW-37	520-5344-00 tx 520-8516-00 rx
21	Trough Jam	8	8a	CN14	-		-		Playfield	Opto	8-SW-38	520-5344-00 tx 520-8516-00 rx
22	Shooter Lane	8	-	CN10	2	GRY WHT	7	BLK GRN	Playfield	Micro	8-SW-28	180-5157-01
23												
24												
25	Upper Shooter Lane	8	-	CN11	8	LGN VIO	11/12	BLK ORG	Playfield	Rollover	8-SW-21	500-9935-04
26												
27												
28	Left Target	8	-	CN12	2	WHT BRN	10	BLK RED	Playfield	Leaf, Target	8-SW-8	515-9784-00-00
29												
30												
31												
32	Left Lock 1 Opto	8	-	CN12	5	WHT YEL	10	BLK RED	Playfield	Opto	8-SW-11	520-5377-00 tx 520-5378-00 rx
33	Left Lock 2 Opto	8	-	CN12	6	WHT GRN	10	BLK RED	Playfield	Opto	8-SW-12	520-5377-00 tx 520-5378-00 rx
34	Left Lock 3 Opto	8	-	CN12	7	WHT BLU	10	BLK RED	Playfield	Opto	8-SW-13	520-5377-00 tx 520-5378-00 rx
35												
36												
37												
38												
39	Right Target	8	-	CN11	9	LGN GRY	11/12	BLK ORG	Playfield	Leaf, Target	8-SW-22	515-9784-00-00
40												
41												
42	Right Lock 1 Opto	8	-	CN13	5	PNK GRN	10	BLK BRN	Playfield	Opto	8-SW-3	520-5377-00 tx 520-5378-00 rx

SWITCH REFERENCE CONTINUED

ID	Name	Node	Node Ext	Conn.	Input Pin	Input Wire	GND Pin	Ground Wire	Location	Type	Address	Part Number
43	Right Lock 2 Opto	8	-	CN13	6	PNK BLU	10	BLK BRN	Playfield	Opto	8-SW-4	520-5377-00 tx 520-5378-00 rx
44	Right Lock 3 Opto	8	-	CN13	7	PNK VIO	10	BLK BRN	Playfield	Opto	8-SW-5	520-5377-00 tx 520-5378-00 rx
45												
46												
47												
48												
49												
50												
51	Left Orbit	9	-	CN9	6	LGN VIO	7/8	BLK BLU	Playfield	Rollover	9-SW-27	500-9935-04
52	Top Post Opto	9	-	CN11	4	TAN ORG	11/12	BLK GRY	Playfield	Opto	9-SW-17	515-0215-00 tx 515-0215-01 rx
53	Top Lane-Left	9	-	CN10	4	GRY RED	7/8/9	BLK BLU	Playfield	Rollover	9-SW-30	500-9935-04
54	Top Lane-Right	9	-	CN10	5	GRY ORG	7/8/9	BLK BLU	Playfield	Rollover	9-SW-31	500-9935-04
55	Right Orbit	9	-	CN12	4	WHT ORG	10	BLK WHT	Playfield	Rollover	9-SW-10	500-9935-03
56												
57	Left Pop Bumper	9	-	CN10	2	GRY BLK	7/8/9	BLK BLU	Playfield	Leaf	9-SW-28	180-5232-00
58	Right Pop Bumper	9	-	CN10	3	GRY BRN	7/8/9	BLK BLU	Playfield	Leaf	9-SW-29	180-5232-00
59	10 Pt Sw	9	-	CN9	3	LGN ORG	7/8	BLK BLU	Playfield	Leaf	9-SW-24	180-5231-00
60	Left Loop Enter Opto	9	-	CN12	8	WHT VIO	10	BLK WHT	Playfield	Opto	9-SW-14	515-0215-00 tx 511-5815-01 rx
61												
62	Bell Tower Target	9	-	CN10	6	GRY YEL	7/8/9	BLK BLU	Playfield	Leaf, Target	9-SW-16	515-9783-00-00
63	Left Mini Target	9	-	CN12	5	WHT YEL	10	BLK WHT	Playfield	Leaf, Target	9-SW-11	515-9785-00-00
64	Right Mini Target	9	-	CN12	6	WHT GRN	10	BLK WHT	Playfield	Leaf, Target	9-SW-12	515-9785-00-00
65												
66												
67												
68	Left Ramp Made	9	-	CN9	4	LGN YEL	7/8	BLK BLU	Playfield	Opto	9-SW-25	515-0215-00 tx 511-5815-01 rx
69												
70	Center Ramp Made	9	-	CN11	6	TAN GRN	11/12	BLK GRY	Playfield	Opto	9-SW-19	515-0215-00 tx 515-0215-01 rx
71												
72	Carnage Ball Home	9	-	CN13	2	PNK RED	10	BLK BRN	Playfield	Micro	9-SW-0	180-5010-02
73	Carnage 50% Opto	9	-	CN13	3	PNK ORG	10	BLK BRN	Playfield	Opto	9-SW-1	520-8541-00
74	Carnage 75% Opto	9	-	CN13	4	PNK YEL	10	BLK BRN	Playfield	Opto	9-SW-2	520-8541-00
75	Carnage Away	9	-	CN13	5	PNK GRN	10	BLK BRN	Playfield	Micro	9-SW-3	180-5010-02
76	Scoop Made Opto	9	-	CN13	6	PNK BLU	10	BLK BRN	Playfield	Opto	9-SW-4	515-0223-00 tx 515-0223-01 rx
77												
78												
79	VUK Opto	9	-	CN13	7	PNK VIO	10	BLK BRN	Playfield	Opto	9-SW-5	515-0223-00 tx 515-0223-01 rx
80												
81	Subway Left Opto	9	-	CN13	9	PNK WHT	10	BLK BRN	Playfield	Opto	9-SW-7	515-0223-00 tx 515-0223-01 rx
82												
83												
84												
85												
86												

SWITCH REFERENCE CONTINUED

ID	Name	Node	Node Ext	Conn.	Input Pin	Input Wire	GND Pin	Ground Wire	Location	Type	Address	Part Number
87												
88												
89												
90	Right Loop Entrance	9	-	CN12	9	WHT GRY	10	BLK WHT	Playfield	Micro	9-SW-15	180-5010-04
91												
92												
93												
94												
95												
96												
97												
98												
99												
100	Lockdown Button	1	-	CN7	8	TAN WHT	5	BLK WHT	Cabinet	Leaf	1-SW-2	180-5218-00
101												
102												
103	Start Button	1	-	CN6	10	GRY	5	BLK WHT	Cabinet	Micro	1-SW-11	500-1060-44-LED
104	Tournament Start Button	1	-	CN6	9	GRY WHT	5	BLK WHT	Cabinet	Micro	1-SW-12	500-6587-06-TL
105												
106	Left Coin	1	-	CN5	9	PNK BRN	3	BLK	Cabinet	Micro	1-SW-16	
107	Right Coin	1	-	CN5	7	PNK ORG	3	BLK	Cabinet	Micro	1-SW-18	
108	Center Coin	1	-	CN5	8	PNK RED	3	BLK	Cabinet	Micro	1-SW-17	
109	Fourth Coin	1	-	CN5	6		-		Cabinet	-	1-SW-19	
110	Fifth Coin	1	-	CN5	5		-		Cabinet	-	1-SW-20	
111	Tilt Pendulum	1	-	CN6	7	WHT	5	BLK WHT	Cabinet	Plumb Bob	1-SW-14	516-0007-00
112	Sixth Coin	1	-	CN9	5		-		Cabinet	-	1-SW-21	
113	Ticket Notch	1	-	CN11	5		-		Cabinet	-	1-SW-8	
114	Slam Tilt	1	-	CN5	4	LGN RED	3	BLK	Cabinet	-	1-SW-22	
115												
C1	DIP 1	0	-	-	-		-		CPU Node		0-SW-0	-
C2	DIP 2	0	-	-	-		-		CPU Node		0-SW-1	-
C3	DIP 3	0	-	-	-		-		CPU Node		0-SW-2	-
C4	DIP 4	0	-	-	-		-		CPU Node		0-SW-3	-
C5	DIP 5	0	-	-	-		-		CPU Node		0-SW-4	-
C6	DIP 6	0	-	-	-		-		CPU Node		0-SW-5	-
C7	DIP 7	0	-	-	-		-		CPU Node		0-SW-6	-
C8	DIP 8	0	-	-	-		-		CPU Node		0-SW-7	-
C9	Service Select	0	-	CN25	4	LGN GRY	6	BLK	Coin Door		0-SW-8	515-1963-00
C10	Service Plus	0	-	CN25	3	LGN VIO	6	BLK	Coin Door		0-SW-9	515-1963-00
C11	Service Minus	0	-	CN25	2	LGN BLU	6	BLK	Coin Door		0-SW-10	515-1963-00
C12	Service Back	0	-	CN25	1	LGN BLK	6	BLK	Coin Door		0-SW-11	515-1963-00
C17	Headphone Detect	0	-	-	-	-	-	-	Coin Door		0-SW-16	-
C18	Headphone Kit Cable Detect	0	-	CN3	5	BLK	4	BLK	CPU Node		0-SW-17	-
C19	Volume Encoder 1	0	-	CN3	6	WHT	1	DRAIN	CPU Node		0-SW-18	-
C20	Volume Encoder 2	0	-	CN3	7	GRN	1	DRAIN	CPU Node		0-SW-19	-
C24	Coin Door Interlock	0	-	CN4	1	GRY	4	GRY RED	Backbox		0-SW-23	

SWITCH REFERENCE CONTINUED
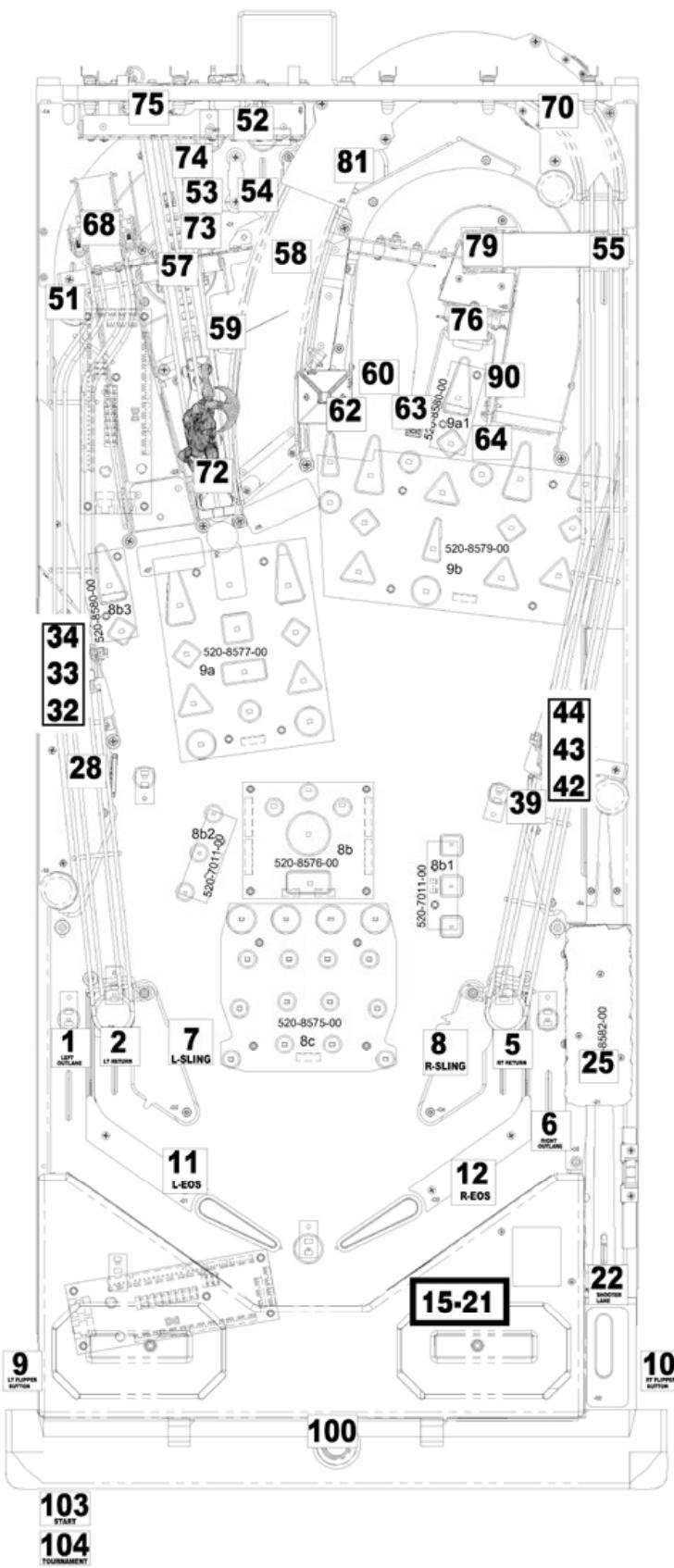
Figure 3.3.1. Playfield switch locations (top view).

3.4 LIGHT REFERENCE

ID	Name	Node	Node Ext.	Conn.	Ret. Pin	Ret. Wire	Src. Pin	Src. Wire	Location	Type	Light Color	Address	Part Number
1	Coin Enable	1	-	CN8	6	BLK GRY	2	GRY RED	Coin Door	Digital Out		1-LP-0	
2	Start Button	1	-	CN6	3	YEL BRN	1	RED	Cabinet	Feature	White	1-LP-2	113-5071-00
3	Tournament Start	1	-	CN6	2	YEL RED	1	RED	Cabinet	Feature	White	1-LP-3	112-5031-01
4	Lockdown Button-R	1	-	CN7	2	RED WHT	1	RED	Cabinet	Feature	RGB	1-LP-5	520-5333-00
5	Lockdown Button-G	1	-	CN7	3	GRN WHT	1	RED	Cabinet	Feature	RGB	1-LP-4	520-5333-00
6	Lockdown Button-B	1	-	CN7	4	BLU WHT	1	RED	Cabinet	Feature	RGB	1-LP-7	520-5333-00
7													
8													
9													
10													
11	Left Outlane	8	b	CN1	5	BRN RED	1/2/3/4	RED	Playfield	Feature	White	8-LP-8	520-5307-00
12	Left Return Lane	8	b	CN1	6	BRN ORG	1/2/3/4	RED	Playfield	Feature	White	8-LP-9	520-5307-00
13	Right Return Lane	8	b	CN1	7	BRN YEL	1/2/3/4	RED	Playfield	Feature	White	8-LP-10	520-5307-00
14	Right Outlane	8	b	CN1	8	BRN BLU	1/2/3/4	RED	Playfield	Feature	White	8-LP-11	520-5307-00
15	Shoot Again	8	-	CN14	4	BRN RED	7/8	YEL	Playfield	Feature	White	8-LP-5	520-5307-00
16													
17													
18	Riot-R	8	c	LED1	-	-	-	-	Playfield	Feature	RGB	8-LP-48	520-8575-00
19	Riot-G	8	c	LED1	-	-	-	-	Playfield	Feature	RGB	8-LP-49	520-8575-00
20	Riot-B	8	c	LED1	-	-	-	-	Playfield	Feature	RGB	8-LP-50	520-8575-00
21													
22	Riot 1-R	8	c	LED2	-	-	-	-	Playfield	Feature	RGB	8-LP-51	520-8575-00
23	Riot 1-G	8	c	LED2	-	-	-	-	Playfield	Feature	RGB	8-LP-52	520-8575-00
24	Riot 1-B	8	c	LED2	-	-	-	-	Playfield	Feature	RGB	8-LP-53	520-8575-00
25													
26	Riot 2-R	8	c	LED3	-	-	-	-	Playfield	Feature	RGB	8-LP-54	520-8575-00
27	Riot 2-G	8	c	LED3	-	-	-	-	Playfield	Feature	RGB	8-LP-55	520-8575-00
28	Riot 2-B	8	c	LED3	-	-	-	-	Playfield	Feature	RGB	8-LP-56	520-8575-00
29													
30	Riot 3-R	8	c	LED4	-	-	-	-	Playfield	Feature	RGB	8-LP-57	520-8575-00
31	Riot 3-G	8	c	LED4	-	-	-	-	Playfield	Feature	RGB	8-LP-58	520-8575-00
32	Riot 3-B	8	c	LED4	-	-	-	-	Playfield	Feature	RGB	8-LP-59	520-8575-00
33													
34	Agony-R	8	c	LED5	-	-	-	-	Playfield	Feature	RGB	8-LP-60	520-8575-00
35	Agony-G	8	c	LED5	-	-	-	-	Playfield	Feature	RGB	8-LP-61	520-8575-00
36	Agony-B	8	c	LED5	-	-	-	-	Playfield	Feature	RGB	8-LP-62	520-8575-00
37													
38	Agony 1-R	8	c	LED6	-	-	-	-	Playfield	Feature	RGB	8-LP-63	520-8575-00
39	Agony 1-G	8	c	LED6	-	-	-	-	Playfield	Feature	RGB	8-LP-64	520-8575-00
40	Agony 1-B	8	c	LED6	-	-	-	-	Playfield	Feature	RGB	8-LP-65	520-8575-00
41													
42	Agony 2-R	8	c	LED7	-	-	-	-	Playfield	Feature	RGB	8-LP-66	520-8575-00
43	Agony 2-G	8	c	LED7	-	-	-	-	Playfield	Feature	RGB	8-LP-67	520-8575-00
44	Agony 2-B	8	c	LED7	-	-	-	-	Playfield	Feature	RGB	8-LP-68	520-8575-00
45													
46	Agony 3-R	8	c	LED8	-	-	-	-	Playfield	Feature	RGB	8-LP-69	520-8575-00
47	Agony 3-G	8	c	LED8	-	-	-	-	Playfield	Feature	RGB	8-LP-70	520-8575-00
48	Agony 3-B	8	c	LED8	-	-	-	-	Playfield	Feature	RGB	8-LP-71	520-8575-00
49													
50	Phage-R	8	c	LED12	-	-	-	-	Playfield	Feature	RGB	8-LP-81	520-8575-00
51	Phage-G	8	c	LED12	-	-	-	-	Playfield	Feature	RGB	8-LP-82	520-8575-00

LIGHT REFERENCE CONTINUED

ID	Name	Node	Node Ext.	Conn.	Ret. Pin	Ret. Wire	Src. Pin	Src. Wire	Location	Type	Light Color	Address	Part Number
52	Phage-B	8	c	LED12	-	-	-	-	Playfield	Feature	RGB	8-LP-83	520-8575-00
53													
54	Phage 1-R	8	c	LED11	-	-	-	-	Playfield	Feature	RGB	8-LP-78	520-8575-00
55	Phage 1-G	8	c	LED11	-	-	-	-	Playfield	Feature	RGB	8-LP-79	520-8575-00
56	Phage 1-B	8	c	LED11	-	-	-	-	Playfield	Feature	RGB	8-LP-80	520-8575-00
57													
58	Phage 2-R	8	c	LED10	-	-	-	-	Playfield	Feature	RGB	8-LP-75	520-8575-00
59	Phage 2-G	8	c	LED10	-	-	-	-	Playfield	Feature	RGB	8-LP-76	520-8575-00
60	Phage 2-B	8	c	LED10	-	-	-	-	Playfield	Feature	RGB	8-LP-77	520-8575-00
61													
62	Phage 3-R	8	c	LED9	-	-	-	-	Playfield	Feature	RGB	8-LP-72	520-8575-00
63	Phage 3-G	8	c	LED9	-	-	-	-	Playfield	Feature	RGB	8-LP-73	520-8575-00
64	Phage 3-B	8	c	LED9	-	-	-	-	Playfield	Feature	RGB	8-LP-74	520-8575-00
65													
66	Lasher-R	8	c	LED13	-	-	-	-	Playfield	Feature	RGB	8-LP-84	520-8575-00
67	Lasher-G	8	c	LED13	-	-	-	-	Playfield	Feature	RGB	8-LP-85	520-8575-00
68	Lasher-B	8	c	LED13	-	-	-	-	Playfield	Feature	RGB	8-LP-86	520-8575-00
69													
70	Lasher 1-R	8	c	LED14	-	-	-	-	Playfield	Feature	RGB	8-LP-87	520-8575-00
71	Lasher 1-G	8	c	LED14	-	-	-	-	Playfield	Feature	RGB	8-LP-88	520-8575-00
72	Lasher 1-B	8	c	LED14	-	-	-	-	Playfield	Feature	RGB	8-LP-89	520-8575-00
73													
74	Lasher 2-R	8	c	LED15	-	-	-	-	Playfield	Feature	RGB	8-LP-90	520-8575-00
75	Lasher 2-G	8	c	LED15	-	-	-	-	Playfield	Feature	RGB	8-LP-91	520-8575-00
76	Lasher 2-B	8	c	LED15	-	-	-	-	Playfield	Feature	RGB	8-LP-92	520-8575-00
77													
78	Lasher 3-R	8	c	LED16	-	-	-	-	Playfield	Feature	RGB	8-LP-93	520-8575-00
79	Lasher 3-G	8	c	LED16	-	-	-	-	Playfield	Feature	RGB	8-LP-94	520-8575-00
80	Lasher 3-B	8	c	LED16	-	-	-	-	Playfield	Feature	RGB	8-LP-95	520-8575-00
81													
82													
83	Team Up 1	8	b	CN3	6	RED ORG	1/2/3/4/5	RED	Playfield	Feature	White	8-LP-16	520-7011-00
84	Team Up 2	8	b	CN3	7	RED YEL	1/2/3/4/5	RED	Playfield	Feature	White	8-LP-17	520-7011-00
85	Team Up 3	8	b	CN3	8	RED GRN	1/2/3/4/5	RED	Playfield	Feature	White	8-LP-18	520-7011-00
86													
87													
88	Venomized 1	8	b	LED21	-	-	-	-	Playfield	Feature	White	8-LP-32	520-8576-00
89	Venomized 2	8	b	LED19	-	-	-	-	Playfield	Feature	White	8-LP-30	520-8576-00
90	Venomized 3	8	b	LED20	-	-	-	-	Playfield	Feature	White	8-LP-31	520-8576-00
91	Knull-R	8	b	LED18	-	-	-	-	Playfield	Feature	RGB	8-LP-27	520-8576-00
92	Knull-G	8	b	LED18	-	-	-	-	Playfield	Feature	RGB	8-LP-28	520-8576-00
93	Knull-B	8	b	LED18	-	-	-	-	Playfield	Feature	RGB	8-LP-29	520-8576-00
94	Grendel-R	8	b	LED17	-	-	-	-	Playfield	Feature	RGB	8-LP-24	520-8576-00
95	Grendel-G	8	b	LED17	-	-	-	-	Playfield	Feature	RGB	8-LP-25	520-8576-00
96	Grendel-B	8	b	LED17	-	-	-	-	Playfield	Feature	RGB	8-LP-26	520-8576-00
97													
98													
99	1X	8	b	CN1	9	BRN GRN	1/2/3/4	RED	Playfield	Feature	White	8-LP-12	520-7011-00
100	2X	8	b	CN1	10	BRN VIO	1/2/3/4	RED	Playfield	Feature	White	8-LP-13	520-7011-00
101	4X	8	b	CN1	11	BRN GRY	1/2/3/4	RED	Playfield	Feature	White	8-LP-14	520-7011-00
102													

LIGHT REFERENCE CONTINUED

ID	Name	Node	Node Ext.	Conn.	Ret. Pin	Ret. Wire	Src. Pin	Src. Wire	Location	Type	Light Color	Address	Part Number
103													
104	Left Target	8	b	CN3	9	RED BLU	1/2/3/4/5	RED	Playfield	Feature	White	8-LP-19	520-5307-00
105	Right Target	8	b	CN1	12	BRN WHT	1/2/3/4	RED	Playfield	Feature	White	8-LP-15	520-5307-00
106													
107													
108	Left Orbit-R	8	b	CN3	10	RED BRN	1/2/3/4/5	RED	Playfield	Feature	RGB	8-LP-20	520-8580-00
109	Left Orbit-G	8	b	CN3	11	GRN BRN	1/2/3/4/5	RED	Playfield	Feature	RGB	8-LP-21	520-8580-00
110	Left Orbit-B	8	b	CN3	12	BLU BRN	1/2/3/4/5	RED	Playfield	Feature	RGB	8-LP-22	520-8580-00
111	Left Orbit Web	8	b	CN3	13	RED WHT	1/2/3/4/5	RED	Playfield	Feature	White	8-LP-23	520-8580-00
112													
113													
114	Left Ramp-R	9	a	LED25	-	-	-	-	Playfield	Feature	RGB	9-LP-40	520-8577-00
115	Left Ramp-G	9	a	LED25	-	-	-	-	Playfield	Feature	RGB	9-LP-41	520-8577-00
116	Left Ramp-B	9	a	LED25	-	-	-	-	Playfield	Feature	RGB	9-LP-42	520-8577-00
117	Left Ramp Web	9	a	LED26	-	-	-	-	Playfield	Feature	White	9-LP-43	520-8577-00
118	Left Ramp Lock-R	9	a	LED27	-	-	-	-	Playfield	Feature	RGB	9-LP-44	520-8577-00
119	Left Ramp Lock-G	9	a	LED27	-	-	-	-	Playfield	Feature	RGB	9-LP-45	520-8577-00
120	Left Ramp Lock-B	9	a	LED27	-	-	-	-	Playfield	Feature	RGB	9-LP-46	520-8577-00
121	Chamge Host	9	a	LED28	-	-	-	-	Playfield	Feature	White	9-LP-47	520-8577-00
122													
123													
124	Carnage 1-R	9	a	LED16	-	-	-	-	Playfield	Feature	RGB	9-LP-29	520-8577-00
125	Carnage 1-G	9	a	LED16	-	-	-	-	Playfield	Feature	RGB	9-LP-30	520-8577-00
126	Carnage 1-B	9	a	LED16	-	-	-	-	Playfield	Feature	RGB	9-LP-31	520-8577-00
127	Carnage 2	9	a	LED5	-	-	-	-	Playfield	Feature	White	9-LP-16	520-8577-00
128	Carnage 3	9	a	LED1	-	-	-	-	Playfield	Feature	White	9-LP-8	520-8577-00
129	Carnage Inf	9	a	LED2	-	-	-	-	Playfield	Feature	White	9-LP-9	520-8577-00
130													
131													
132	Center Ramp-R	9	a	LED7	-	-	-	-	Playfield	Feature	RGB	9-LP-18	520-8577-00
133	Center Ramp-G	9	a	LED7	-	-	-	-	Playfield	Feature	RGB	9-LP-19	520-8577-00
134	Center Ramp-B	9	a	LED7	-	-	-	-	Playfield	Feature	RGB	9-LP-20	520-8577-00
135	Center Ramp Web	9	a	LED6	-	-	-	-	Playfield	Feature	White	9-LP-17	520-8577-00
136	Center Ramp Lock-R	9	a	LED4	-	-	-	-	Playfield	Feature	RGB	9-LP-13	520-8577-00
137	Center Ramp Lock-G	9	a	LED4	-	-	-	-	Playfield	Feature	RGB	9-LP-14	520-8577-00
138	Center Ramp Lock-B	9	a	LED4	-	-	-	-	Playfield	Feature	RGB	9-LP-15	520-8577-00
139	Start-R	9	a	LED3	-	-	-	-	Playfield	Feature	RGB	9-LP-10	520-8577-00
140	Start-G	9	a	LED3	-	-	-	-	Playfield	Feature	RGB	9-LP-11	520-8577-00
141	Start-B	9	a	LED3	-	-	-	-	Playfield	Feature	RGB	9-LP-12	520-8577-00
142													
143													
144	Bell Tower-R	9	b	LED16	-	-	-	-	Playfield	Feature	RGB	9-LP-77	520-8579-00
145	Bell Tower-G	9	b	LED16	-	-	-	-	Playfield	Feature	RGB	9-LP-78	520-8579-00
146	Bell Tower-B	9	b	LED16	-	-	-	-	Playfield	Feature	RGB	9-LP-79	520-8579-00
147	Bell Tower INF	9	b	LED4	-	-	-	-	Playfield	Feature	White	9-LP-51	520-8579-00
148													
149													
150	Left Loop-R	9	b	LED15	-	-	-	-	Playfield	Feature	RGB	9-LP-74	520-8579-00
151	Left Loop-G	9	b	LED15	-	-	-	-	Playfield	Feature	RGB	9-LP-75	520-8579-00
152	Left Loop-B	9	b	LED15	-	-	-	-	Playfield	Feature	RGB	9-LP-76	520-8579-00
153	Left Loop Web	9	b	LED5	-	-	-	-	Playfield	Feature	White	9-LP-52	520-8579-00

LIGHT REFERENCE CONTINUED

ID	Name	Node	Node Ext.	Conn.	Ret. Pin	Ret. Wire	Src. Pin	Src. Wire	Location	Type	Light Color	Address	Part Number
154	Left Loop Lock-R	9	b	LED14	-	-	-	-	Playfield	Feature	RGB	9-LP-71	520-8579-00
155	Left Loop Lock-G	9	b	LED14	-	-	-	-	Playfield	Feature	RGB	9-LP-72	520-8579-00
156	Left Loop Lock-B	9	b	LED14	-	-	-	-	Playfield	Feature	RGB	9-LP-73	520-8579-00
157													
158													
159	Mini Target Left	9	b	LED2	-	-	-	-	Playfield	Feature	White	9-LP-49	520-8579-00
160	Mini Target Right	9	b	LED3	-	-	-	-	Playfield	Feature	White	9-LP-50	520-8579-00
161													
162													
163	Scoop-R	9	a	CN2	5	RED VIO	1/2/3/4	RED	Playfield	Feature	RGB	9-LP-21	520-8580-00
164	Scoop-G	9	a	CN2	6	GRN VIO	1/2/3/4	RED	Playfield	Feature	RGB	9-LP-22	520-8580-00
165	Scoop-B	9	a	CN2	7	BLU VIO	1/2/3/4	RED	Playfield	Feature	RGB	9-LP-23	520-8580-00
166	Scoop Web	9	a	CN2	8	ORG YEL	1/2/3/4	RED	Playfield	Feature	White	9-LP-24	520-8580-00
167	Scoop Lock-R	9	b	LED13	-	-	-	-	Playfield	Feature	RGB	9-LP-68	520-8579-00
168	Scoop Lock-G	9	b	LED13	-	-	-	-	Playfield	Feature	RGB	9-LP-69	520-8579-00
169	Scoop Lock-B	9	b	LED13	-	-	-	-	Playfield	Feature	RGB	9-LP-70	520-8579-00
170	Mystery	9	b	LED6	-	-	-	-	Playfield	Feature	White	9-LP-53	520-8579-00
171	Extra Ball	9	b	LED7	-	-	-	-	Playfield	Feature	White	9-LP-54	520-8579-00
172													
173													
174	Right Loop-R	9	b	LED9	-	-	-	-	Playfield	Feature	RGB	9-LP-56	520-8579-00
175	Right Loop-G	9	b	LED9	-	-	-	-	Playfield	Feature	RGB	9-LP-57	520-8579-00
176	Right Loop-B	9	b	LED9	-	-	-	-	Playfield	Feature	RGB	9-LP-58	520-8579-00
177	Right Loop Web	9	b	LED8	-	-	-	-	Playfield	Feature	White	9-LP-55	520-8579-00
178	Right Loop Lock-R	9	b	LED12	-	-	-	-	Playfield	Feature	RGB	9-LP-65	520-8579-00
179	Right Loop Lock-G	9	b	LED12	-	-	-	-	Playfield	Feature	RGB	9-LP-66	520-8579-00
180	Right Loop Lock-B	9	b	LED12	-	-	-	-	Playfield	Feature	RGB	9-LP-67	520-8579-00
181													
182													
183	Right Orbit-R	9	b	LED10	-	-	-	-	Playfield	Feature	RGB	9-LP-59	520-8579-00
184	Right Orbit-G	9	b	LED10	-	-	-	-	Playfield	Feature	RGB	9-LP-60	520-8579-00
185	Right Orbit-B	9	b	LED10	-	-	-	-	Playfield	Feature	RGB	9-LP-61	520-8579-00
186	Right Orbit Web	9	b	LED1	-	-	-	-	Playfield	Feature	White	9-LP-48	520-8579-00
187	Right Orbit Lock-R	9	b	LED11	-	-	-	-	Playfield	Feature	RGB	9-LP-62	520-8579-00
188	Right Orbit Lock-G	9	b	LED11	-	-	-	-	Playfield	Feature	RGB	9-LP-63	520-8579-00
189	Right Orbit Lock-B	9	b	LED11	-	-	-	-	Playfield	Feature	RGB	9-LP-64	520-8579-00
190													
191													
192													
193													
194													
195													
196													
197													
198													
199													
200													
201	Top Lane Left (2x)	9	a	CN2	9	ORG RED	1/2/3/4	RED	Playfield	Feature	White	9-LP-25	520-5307-00 520-7000-00(Back Pnl)

LIGHT REFERENCE CONTINUED

ID	Name	Node	Node Ext.	Conn.	Ret. Pin	Ret. Wire	Src. Pin	Src. Wire	Location	Type	Light Color	Address	Part Number
202	Top Lane Right (2x)	9	a	CN2	10	ORG BRN	1/2/3/4	RED	Playfield	Feature	White	9-LP-26	520-5307-00 520-7000-00(Back Pnl)
203	Ravencroft 1 (2x)	9	a	CN2	11	YEL BRN	1/2/3/4	RED	Playfield	Feature	Red	9-LP-27	112-5034-02F
204	Ravencroft 2	9	a	CN2	12	YEL RED	1/2/3/4	RED	Playfield	Feature	White	9-LP-28	112-5034-08F
205													
206													
207	Host BB 1	8	b	CN6	5	YEL BRN	1/2/3/4	RED	Playfield	Feature	White	8-LP-40	520-8582-00
208	Host BB 2	8	b	CN6	6	YEL RED	1/2/3/4	RED	Playfield	Feature	White	8-LP-41	520-8582-00
209	Host BB 3	8	b	CN6	7	YEL ORG	1/2/3/4	RED	Playfield	Feature	White	8-LP-42	520-8582-00
210	Host BB 4	8	b	CN6	8	YEL GRN	1/2/3/4	RED	Playfield	Feature	White	8-LP-43	520-8582-00
211	Host BB 5	8	b	CN6	9	YEL BLU	1/2/3/4	RED	Playfield	Feature	White	8-LP-44	520-8582-00
212	Host BB 6	8	b	CN6	10	YEL VIO	1/2/3/4	RED	Playfield	Feature	White	8-LP-45	520-8582-00
213	Host BB 7	8	b	CN6	11	YEL GRY	1/2/3/4	RED	Playfield	Feature	White	8-LP-46	520-8582-00
214													
215													
216	Left BB Lock 1	9	a	CN4	5	ORG GRN	1/2/3/4	RED	Playfield	Feature	White	9-LP-32	520-8581-00
217	Left BB Lock 2	9	a	CN4	6	ORG BLU	1/2/3/4	RED	Playfield	Feature	White	9-LP-33	520-8581-00
218	Left BB Lock 3	9	a	CN4	7	ORG VIO	1/2/3/4	RED	Playfield	Feature	White	9-LP-34	520-8581-00
219													
220													
221	Right BB Lock 1	9	a	CN4	8	ORG GRY	1/2/3/4	RED	Playfield	Feature	White	9-LP-35	520-8581-00
222	Right BB Lock 2	9	a	CN4	9	ORG WHT	1/2/3/4	RED	Playfield	Feature	White	9-LP-36	520-8581-00
223	Right BB Lock 3	9	a	CN4	10	ORG BLK	1/2/3/4	RED	Playfield	Feature	White	9-LP-37	520-8581-00
224													
225													
226	Scoop BB Mystery 1	9	b	CN3	4	RED BRN	1/2/3	RED	Playfield	Feature	White	9-LP-80	520-8583-00
227	Scoop BB Mystery 2	9	b	CN3	5	RED ORG	1/2/3	RED	Playfield	Feature	White	9-LP-81	520-8583-00
228	Scoop BB Mystery 3	9	b	CN3	6	RED YEL	1/2/3	RED	Playfield	Feature	White	9-LP-82	520-8583-00
229	Scoop BB Mystery 4	9	b	CN3	7	RED GRN	1/2/3	RED	Playfield	Feature	White	9-LP-83	520-8583-00
230	Scoop BB Mystery 5	9	b	CN3	8	RED BLU	1/2/3	RED	Playfield	Feature	White	9-LP-84	520-8583-00
231	Scoop BB Battle 1	9	b	CN3	9	RED VIO	1/2/3	RED	Playfield	Feature	White	9-LP-85	520-8583-00
232	Scoop BB Battle 2	9	b	CN3	10	RED GRY	1/2/3	RED	Playfield	Feature	White	9-LP-86	520-8583-00
233	Scoop BB Battle 3	9	b	CN3	11	RED WHT	1/2/3	RED	Playfield	Feature	White	9-LP-87	520-8583-00
234													
235													
236													
237													
238													
239													
240													
241													
242													
243													
244													
245	Coin Door GI	1	-	CN5	2	YEL	1	YEL-WHT	Coin Door	G.I.	White	1-LP-1	112-5033-08
246	Left GI-1 (x5)	8	-	CN15	5	WHT BLK	1	YEL BLK	Playfield	G.I.	White	8-LP-0	112-5034-08F 520-7000-00(Bot.Arch)
247	Left GI-RED (x7)	8	-	CN15	6	RED BLK	2	YEL RED	Playfield	G.I.	Red	8-LP-1	112-5034-02F
248	Left GI-2 (x5)	8	-	CN15	7	BLU BLK	3	YEL BLU	Playfield	G.I.	White	8-LP-2	112-5034-08F

LIGHT REFERENCE CONTINUED

ID	Name	Node	Node Ext.	Conn.	Ret. Pin	Ret. Wire	Src. Pin	Src. Wire	Location	Type	Light Color	Address	Part Number
249	Right GI-1 (x6)	9	-	CN15	5	WHT BLK	1	YEL BLK	Playfield	G.I.	White	9-LP-0	112-5034-08F 520-7000-00(Bot.Arch)
250	Right GI-RED (x6)	9	-	CN15	6	RED BLK	2	YEL RED	Playfield/ Backpanel	G.I.	Red	9-LP-1	112-5034-02F
251	Right GI-2/Backpanel (x3)	9	-	CN15	7	BLU BLK	3	YEL BLU	Playfield/ Backpanel	G.I.	White	9-LP-2	112-5034-08F
252													
253													
254													
255	Lower Left Flash	8	-	CN14	6	BRN	7/8	YEL	Playfield	Flash	White	8-LP-3	520-7000-00
256	Lower Right Flash	8	-	CN14	5	BRN BLK	7/8	YEL	Playfield	Flash	White	8-LP-4	520-7000-00
257	Doppelganger Flash	9	-	CN14	2	BRN WHT	7/8	YEL	Playfield	Flash	White	9-LP-7	520-7000-00
258	Left Pop Flash	9	-	CN14	6	BRN BLK	7/8	YEL	Playfield	Flash	White	9-LP-3	520-8059-00
259	Right Pop Flash	9	-	CN14	5	BRN	7/8	YEL	Playfield	Flash	White	9-LP-4	520-8059-00
260	Up Left Flash	9	-	CN14	4	BRN VIO	7/8	YEL	Playfield	Flash	White	9-LP-5	520-7000-00
261	Up Right Flash	9	-	CN14	3	BRN GRY	7/8	YEL	Playfield	Flash	White	9-LP-6	520-7000-00
262	Ravencroft Flash-WHT	9	a	CN4	11	YEL WHT	1/2/3/4	RED	Playfield	Flash	White	9-LP-38	520-7000-00
263	Ravencroft Flash-RED	9	a	CN4	12	YEL VIO	1/2/3/4	RED	Playfield	Flash	Red	9-LP-39	520-8457-00
264													
265													
266													
267													
268													
269													
270													

LIGHT REFERENCE CONTINUED

Figure 3.4.1. Playfield light locations (top view).

4.   ELECTRONIC PINOUTS AND SCHEMATICS
4.1   SPIKE-2 CPU NODE 0
509-1003-01
DIRECT SWITCH MAPPING (CN25)

The coin-door diagnostic switches are connected directly to the CPU node via the Cabinet Node. Note that both the CPU and Cabinet nodes are required for diagnostic switch operation.

ID	Name	Conn.	Input Pin	Input Wire	GND Pin	Ground Wire	Location	Type	Address	Part Number
C1	DIP 1	-	-	-	-	-	CPU Node		0-SW-0	-
C2	DIP 2	-	-	-	-	-	CPU Node		0-SW-1	-
C3	DIP 3	-	-	-	-	-	CPU Node		0-SW-2	-
C4	DIP 4	-	-	-	-	-	CPU Node		0-SW-3	-
C5	DIP 5	-	-	-	-	-	CPU Node		0-SW-4	-
C6	DIP 6	-	-	-	-	-	CPU Node		0-SW-5	-
C7	DIP 7	-	-	-	-	-	CPU Node		0-SW-6	-
C8	DIP 8	-	-	-	-	-	CPU Node		0-SW-7	-
C9	Service Select	CN25	1	LGN-GRY	11	BLK-WHT	Coin Door		0-SW-9	180-5192-04
C10	Service Plus	CN25	2	LGN-VIO	11	BLK-WHT	Coin Door		0-SW-10	180-5192-02
C11	Service Minus	CN25	3	LGN-BLU	11	BLK-WHT	Coin Door		0-SW-11	180-5192-02
C12	Service Back	CN25	4	LGN-BLK	11	BLK-WHT	Coin Door		0-SW-12	180-5192-00

CONNECTORS

ID	Connector Type	Description
CN1	5-Pin .156" Header	Backbox 2-channel amplified speaker out
CN2	3-Pin .100" Header	Console Port
CN3	7-Pin .100" Header	Headphone connector
CN4	2-Pin .156"	Cabinet 1-channel amplified speaker out
CN5	7-Pin .100" Header	Line In/Out
CN6	34 Pin 2.00mm Header	LCD display connector
CN7	5-Pin .156" Header	48V supply from main power supply
CN8	6-Pin .100" Header	SPI Serial
CN9	USB	USB connector - for software updates, audit dumps, and expansion modules
CN9	USB	USB connector - for software updates, audit dumps, and expansion modules
CN10	HDMI	HDMI Out
CN11	RJ45	SPIKE node bus - to cabinet node N1
CN12	RJ45	SPIKE node bus - To Topper accessory Kit
CN13	SD CARD	SD Card connector
CN14	5-Pin .100" Header	LCD Backlight
CN15	3-Pin .100" Header	Backbox Light
CN16	4-Pin .100" Header	3.3v / 5v / 12v
CN17	ETHERNET	ETHERNET connector
CN21	SATA Header	SATA connector
CN22	RJ45	SPIKE node bus - to playfield node
CN25	12-Pin .100" Header	Dedicated switch inputs - service, volume switches

COMPONENTS

ID	Name
S1	DIP Switches
S2	Reset Switch
SD CARD (CN13)	For system SD card. Note: only to be removed if instructed to by Stern Service.
BT1	BR1225 3V Lithium battery for game clock between power cycles

STATUS LEDS

LED ID	Name	Color	Description
48V	+48V Supply In	Red	ON: Main system power is connected. OFF: No 48V system power. Check power supply connections, cables, and fuses.
3.3V	+3.3V Logic	Red	ON: Logic power supply is good. OFF: Logic power supply bad, call tech support.
5V	+5V Logic	Red	ON: Logic power supply is good. OFF: Logic power supply bad, call tech support.
12V	+12V Backbox Illumination	Red	ON: Back box LED power good. OFF: Backbox LED power bad, call tech support.
VA	+30V Audio	Red	ON: Audio power supply is good. OFF: Audio power supply off, call tech support.
VNB	+9V Node Bus	Red	Power for the Node bus. ON: Power for node bus good. OFF: Power to node bus not detected, call tech support.
5V (CPU)	+5V Logic	Red	ON: Logic power supply is good. OFF: Logic power supply bad, call tech support.
SDIO ACT	Not Used	Red	Should remain unlit as it is not currently used.
STATUS	CPU Heartbeat, System Status	Red	Double blink ~1/2 second: Good, Processor running. OFF: Processor not running, call tech support.
µSD ACT	Activity indicator for micro SD Card	Red	Should blink rapidly when reading or writing to micro SD card.
D23	Netbridge Status	Red	Should blink once every ~1/2 second.

SPIKE-2 CPU NODE 0 CONTINUED

AUDIO PINOUTS

ID	Type	Pin	Description	Minimum Impedance	Max Power (RMS)	Wire Color
CN1	.156" 5-pin Header	1	Speaker Right Ground (-)	4 Ohms	-	BLK-WHT
		2	Speaker Right (+)	4 Ohms	20W	RED-WHT
		3	n/c	-	-	
		4	Speaker Left Ground (-)	4 Ohms	-	BLK-RED
		5	Speaker Left (+)	4 Ohms	20W	RED-BLK
CN3	.100" 7-pin Header	1	n/c	-	-	
		2	L-HP	16 Ohms	15 mW	
		3	R-HP	16 Ohms	15 mW	
		4	n/c	-	-	
		5	Headphone Detect	-	-	
		6	Headphone vol +	-	-	
		7	Headphone vol -	-	-	
CN4	.156" 2-pin Header	1	Woofer Ground (-)	8 Ohms	-	YEL-BLK
		2	Woofer Out (+)	8 Ohms	40W	YEL-WHT
CN5	.100" 7-pin Header	1	n/c	-	-	
		2	L-IN	30K Ohms	0.6VRMS	
		3	R-IN	30K Ohms	0.6VRMS	
		4	n/c	-	-	
		5	L-OUT	10K Ohms	1.5V	
		6	R-OUT	10K Ohms	1.5V	
		7	Woofer Line Out	10K Ohms	1.5V	

COUNTRY CODES (DIP S2)

|	DIP S2							
Country	1	2	3	4	5	6	7	8
USA	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Austria	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Australia	ON	OFF	ON	ON	OFF	OFF	OFF	OFF
Belgium	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
Canada 1	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
Canada 2	OFF	ON	OFF	ON	ON	OFF	OFF	OFF
China	OFF	OFF	ON	ON	ON	OFF	OFF	OFF
Croatia	OFF	ON	ON	OFF	ON	OFF	OFF	OFF
Denmark	ON	OFF	OFF	ON	OFF	OFF	OFF	OFF
Finland	ON	OFF	ON	OFF	OFF	OFF	OFF	OFF
France	OFF	ON	ON	OFF	OFF	OFF	OFF	OFF
Germany	ON	ON	ON	OFF	OFF	OFF	OFF	OFF
Greece	ON	ON	ON	ON	OFF	OFF	OFF	OFF
Italy	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF
Japan	ON	OFF	ON	OFF	ON	OFF	OFF	OFF
Middle East	ON	ON	ON	OFF	ON	OFF	OFF	OFF
Netherlands	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
New Zealand	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
Norway	OFF	ON	OFF	ON	OFF	OFF	OFF	OFF
Portugal	ON	OFF	OFF	OFF	OFF	ON	OFF	OFF
Russia	ON	OFF	OFF	ON	ON	OFF	OFF	OFF
S. Africa	OFF	OFF	ON	OFF	ON	OFF	OFF	OFF
Spain	OFF	ON	OFF	OFF	ON	OFF	OFF	OFF
Sweden	ON	ON	OFF	ON	OFF	OFF	OFF	OFF
Switzerland	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF
Taiwan	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF
United Kingdom	OFF	ON	ON	ON	OFF	OFF	OFF	OFF
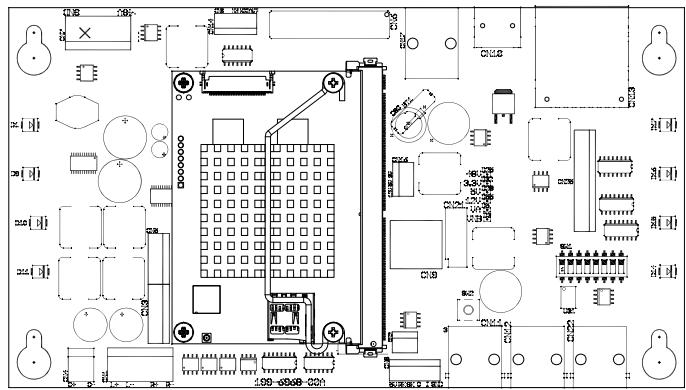
Figure 4.1.1. SPIKE 2 CPU Node connector detail.

COIN DOOR SERVICE SWITCH WIRING
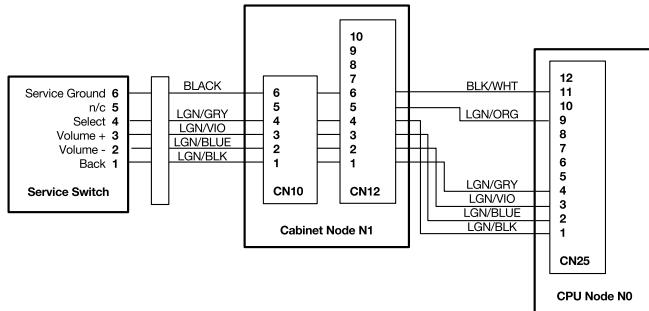
Figure 4.1.2. Service switch wiring. Note that the Cabinet Node must be present and CN10 and CN12 connected for the Coin Door Service Switches to function correctly.

USA & INTERNATIONAL (NON-EURO) STANDARD PRICING SELECT TABLE

CPU/SOUND PCB DIP SWITCH SW1 SETTING

COUNTRY SETTING OPTION(S)

HIGHLIGHTED = Factory Default

HIGHLIGHTED = Not Shown on Coin Card

USA

Pos. 1 2 3 4 5 6 7 8 — Default Highlighted
ON ▼▼▼▼▼▼▼▼

- USA 1
- USA 2
- USA 3
- USA 4
- USA 5
- USA 6
- USA 7
- USA 8
- USA 9
- USA 10
- USA 11
- USA 12
- USA 13

COIN MECHANISMS (SWITCHES)
COINS THRU ... SLOT:

LEFT	CENTER	RIGHT	4TH
0.25	1.00	0.25	

PRICING SCHEME
Number of Plays (Credits) for Price Amount Shown
See "Appendix J" for Coin Cards Examples & Info!

Requires SPI Coin Card(s) Part Number

USD // UNITED STATES DOLLAR // [$]

LEFT	CENTER	RIGHT	4TH	Part Number
1/0.25				755-5400-01-Y
1/0.50	2/0.75	3/1.00		755-5400-02-Y
1/0.50	For USA 6 and USA 7 use: 755-5400-02-Y			755-5400-02-Y
1/0.50	USA 6 Note: If player uses X4 25¢ quarters = 2 plays. However, $1 bill = 3 plays!			755-5400-02-Y
1/0.50 2/1.00	3/1.50	5/2.00		755-5400-00-Y
1/0.50	2 /'4 X 25¢'	3 /$ 1.00 Bill		◄ Used to promote the Bill Validator.
1/0.50 2/1.00	4/1.50	6/2.00		755-5400-00-Y
1/0.50	3/1.00			755-5400-07-Y
1/1.00				755-5400-11-Y
1/0.75	2/1.50	3/2.00		
1/1.00	3/2.00			
1/0.25	2/0.50	3/0.75	5/1.00	
1/1.00	2/2.00	3/3.00	4/4.00	7/5.00

AUSTRALIA

Pos. 1 2 3 4 5 6 7 8 — Default Highlighted
ON ▲ ▲▲
OFF ▼ ▼▼▼

- AUSTRALIA 1
- AUSTRALIA 2
- AUSTRALIA 3
- AUSTRALIA 4
- AUSTRALIA 5
- AUSTRALIA 6

LEFT	CENTER	RIGHT
0.20	1.00	2.00

AUD // AUSTRALIAN DOLLARS // [$AUS]

LEFT	CENTER	RIGHT	Part Number
1/1.00	3/2.00		755-5406-00-Y (1 Side)
1/1.00			
1/2.00			
1/2.00	2/4.00	3/5.00	
1/3.00	2/5.00	3/8.00 5/10.00	
1/2.00	2/3.00		

CANADA

Pos. 1 2 3 4 5 6 7 8 — Default Highlighted
ON ▲▲
OFF ▼▼▼▼▼

- CANADA 1 [25¢ door]

ON ▲ ▲▲
OFF ▼ ▼

- CANADA 2 [dollar door]

LEFT	CENTER	RIGHT	4TH
0.25	0.25	1.00	2.00
1.00		2.00	

CAD // CANADIAN DOLLARS // [$CAN]

LEFT	CENTER	RIGHT	Part Number
1/0.50	2/0.75	3/1.00	755-5400-00-Y -01-Y or -02-Y
1/1.00	3/2.00		755-5400-10-Y

CROATIA

Pos. 1 2 3 4 5 6 7 8 — Default Highlighted
ON ▲▲ ▲
OFF ▼ ▼▼▼

- CROATIA

LEFT	CENTER	RIGHT
1	2	5

HRK // CROATIAN KUNA // [kuna]

LEFT	CENTER	Part Number
1/3	2/5	755-5410-00-Y (2-Sided)

DENMARK

Pos. 1 2 3 4 5 6 7 8 — Default Highlighted
ON ▲ ▲
OFF ▼▼ ▼▼▼

- DENMARK 1
- DENMARK 2

LEFT	CENTER	RIGHT	4TH
1	5	10	20

DKK // DANISH KRONER // [Kr]

LEFT	CENTER					Part Number
1/3	2/5					755-5402-00-Y (2-Sided)
1/2	2/4	3/5	4/7	5/9	7/10	

JAPAN

Pos. 1 2 3 4 5 6 7 8 — Default Highlighted
ON ▲ ▲ ▲
OFF ▼ ▼ ▼▼

- JAPAN 1
- JAPAN 2

LEFT	CENTER
100	100

JPY // JAPANESE YEN // [¥]

LEFT	CENTER	Part Number
1/100		755-5408-01-Y (2-Sided)
1/100	3/200	

MIDDLE EAST

Pos. 1 2 3 4 5 6 7 8 — Default Highlighted
ON ▲▲▲ ▲
OFF ▼ ▼▼▼

- MIDDLE EAST

LEFT	CENTER
token	token

TOKEN // Middle East currency used to buy token // [TOKEN]

LEFT	Part Number
1/1	755-5400-06-Y (use Side 1)

NEW ZEALAND

Pos. 1 2 3 4 5 6 7 8 — Default Highlighted
ON ▲
OFF ▼▼▼▼ ▼▼▼

- NEW ZEALAND 1
- NEW ZEALAND 2

LEFT	CENTER
1	2

NZD // NEW ZEALAND DOLLAR // [$NZD]

LEFT	CENTER	Part Number
1/1		755-5406-00-Y (Side 2)
1/1	3/2	

NORWAY

Pos. 1 2 3 4 5 6 7 8 — Default Highlighted
ON ▲ ▲
OFF ▼ ▼ ▼▼▼

- NORWAY 1
- NORWAY 2
- NORWAY 3
- NORWAY 4
- NORWAY 5
- NORWAY 6
- NORWAY 7
- NORWAY 8

6 7 8 5 1 4 2/3.00

LEFT	CENTER	RIGHT
10	5	20

NOK // NORWEGIAN KRONE // [Kr]

LEFT	CENTER	Part Number
1/10		755-5403-01-Y or -02-Y / (2-Sided)
1/10	3/20	
1/20		755-5403-03-Y (2-Sided)
1/20	3/40	
1/10		
1/10	3/20	
1/20		
1/20	3/40	

RUSSIA

Pos. 1 2 3 4 5 6 7 8 — Default Highlighted
ON ▲ ▲▲
OFF ▼▼▼ ▼▼▼

▼ LEFT SWITCH CAN BE WIRED TO BILL ACCEPTOR ▼

- RUSSIA

LEFT	CENTER	RIGHT
10	5	1

RUB // RUSSIAN RUBLE // [Ruble]

LEFT	Part Number
1/5	755-5411-00-Y (2-Sided)

SO. AFRICA

Pos. 1 2 3 4 5 6 7 8 — Default Highlighted
ON ▲ ▲
OFF ▼▼ ▼ ▼▼▼

- SO. AFRICA 1
- SO. AFRICA 2

LEFT	CENTER	RIGHT	4TH
0.50	1.00	1.00	1.00

ZAR // SOUTH AFRICAN RAND // [R]

LEFT	CENTER	Part Number
1/2.00		755-5409-01-Y (2-Sided)
1/3.00	2/5.00	

SWEDEN

Pos. 1 2 3 4 5 6 7 8 — Default Highlighted
ON ▲▲ ▲
OFF ▼ ▼▼▼▼

- SWEDEN 1
- SWEDEN 2

LEFT	CENTER	RIGHT
1	5	10

SEK // SWEDISH KRONOR // [kr]

LEFT	CENTER	RIGHT	Part Number
1/10	2/15	3/20	755-5404-00-Y (2-Sided)
1/5			

SWITZERLAND

Pos. 1 2 3 4 5 6 7 8 — Default Highlighted
ON ▲▲
OFF ▼▼ ▼▼▼

- SWITZERLAND 1
- SWITZERLAND 2

LEFT	CENTER	RIGHT
1	2	5

CHF // SWISS FRANCS // [Sƒ]

LEFT	CENTER				Part Number
1/1	2/2	3/3	4/4	6/5	755-5405-00-Y (2-Sided)
1/1	3/2	5/3	7/4	9/5	

TAIWAN

Pos. 1 2 3 4 5 6 7 8 — Default Highlighted
ON ▲▲
OFF ▼▼▼ ▼▼▼

- TAIWAN

LEFT	CENTER
10	10

TWD // TAIWANESE DOLLAR // [TWD]

LEFT	Part Number
1/10	755-5412-00-Y (use Side 1)

UK

Pos. 1 2 3 4 5 6 7 8 — Default Highlighted
ON ▲▲▲
OFF ▼ ▼▼▼

- UK 1
- UK 2
- UK 3
- UK 4
- UK 5
- UK 6

▼ 5TH COIN SLOT NOT AVAILABLE WITH CUSTOM PRICING ▼

LEFT	CENTER	RIGHT	4TH	5TH
0.10	0.50	1.00	0.20	2£ ▲ Coin Only

GPB // UNITED KINGDOM POUNDS // [£]

LEFT	CENTER	RIGHT	4TH	Part Number
3/1.00	7/2.00			755-5407-00-Y
4/1.00				755-5407-01-Y*
1/0.50	2/1.00	3/1.50	5/2.00	755-5407-01
1/0.30	2/0.60	3/0.90	4/1.00	755-5407-01-Y*
1/1.00	3/2.00			755-5407-01
3/2.00				755-5407-01-Y*

*use blank side

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

EURO SUMMARY & INTERNATIONAL (EURO) STANDARD PRICING SELECT TABLE

CPU/SOUND PCB DIP SWITCH SW1 SETTING	COUNTRY SETTING OPTION(S)	COIN MECHANISMS (SWITCHES) — COINS THRU ... SLOT:				PRICING SCHEME — Number of Plays (Credits) for Price Amount Shown — See "Appendix J" for Coin Cards Examples & Info!				Requires SPI Coin Card(s) Part Number
		LEFT	CENTER	RIGHT	4TH	EUR // EUROPEAN UNION EUROS // [€]				
Pos. 1 2 3 4 5 6 7 8 — ON: S E E B E L O W — OFF: S E T T I N G S — Default Highlighted	Euro 1					1/0.50				755-5401-01-Y
Euro 1-12 are alternate settings for countries using the Euro.	Euro 2					1/0.50	2/1.00	3/1.50	5/2.00	755-5401-02-Y
	Euro 3					1/0.50		3/1.00		755-5401-03-Y
	Euro 4					1/0.50	2/1.00	3/1.50	6/2.00	755-5401-04-Y
	Euro 5					1/0.50	3/1.00	4/1.50	7/2.00	755-5401-05-Y
HIGHLIGHTED = Factory Default	Euro 6	0.50	1.00	2.00	optional 0.20	2/0.50				755-5401-06-Y
	Euro 7					1/1.00	2/2.00	3/3.00	5/4.00	755-5401-07-Y
HIGHLIGHTED = Not Shown on Coin Card	Euro 8				optional	1/1.00		3/2.00		755-5401-08-Y
	Euro 9					1/1.00		2/1.50	3/2.00	755-5401-09-Y
	Euro 10					1/1.00		3/2.00	7/3.00	755-5401-10-Y
	Euro 11					1/1.00		4/2.00		755-5401-11-Y
	Euro 12					2/1.00	4/2.00	6/3.00	9/4.00	755-5401-12-Y

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

Pos. / DIP Switch	COUNTRY	LEFT	CENTER	RIGHT	4TH	EUR // EUROPEAN UNION EUROS // [€]			Part Number
Pos. 1 2 3 4 5 6 7 8 — Default Highlighted	AUSTRIA — Euro 9	0.50	1.00	2.00		1/1.00	2/1.50	3/2.00	755-5401-09-Y
Pos. 1 2 3 4 5 6 7 8 — Default Highlighted	BELGIUM — Euro 1	0.50	1.00	2.00		1/0.50			755-5401-01-Y
Pos. 1 2 3 4 5 6 7 8 — Default Highlighted	FINLAND — Euro 8	0.50	1.00	2.00		1/1.00	3/2.00		755-5401-08-Y
Pos. 1 2 3 4 5 6 7 8 — Default Highlighted	FRANCE — Euro 10	0.50	1.00	2.00		1/1.00	3/2.00	7/3.00	755-5401-10-Y
Pos. 1 2 3 4 5 6 7 8 — Default Highlighted	GERMANY 1	0.50	1.00	2.00		1/0.50			755-5401-01-Y
	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
Pos. 1 2 3 4 5 6 7 8 — Default Highlighted	GREECE — Euro 8	0.50	1.00	2.00		1/1.00	3/2.00		755-5401-08-Y
Pos. 1 2 3 4 5 6 7 8 — Default Highlighted	ITALY 1	0.50		0.50		1/0.50			755-5401-01-Y
	ITALY 2					1/1.00	3/2.00		755-5401-08-Y
Pos. 1 2 3 4 5 6 7 8 — Default Highlighted	NETHERLANDS — Euro 3	0.50	1.00	2.00		1/0.50	3/1.00		755-5401-03-Y
Pos. 1 2 3 4 5 6 7 8 — Default Highlighted	PORTUGAL	0.50		0.50		1/0.50			755-5401-01-Y
Pos. 1 2 3 4 5 6 7 8 — Default Highlighted	SPAIN — Euro 8	0.50	1.00	2.00		1/1.00	3/2.00		755-5401-08-Y

HIGHLIGHTED = Factory Default   HIGHLIGHTED = Not Shown on Coin Card

MARVEL © MARVEL

Stern pinball

4.2 CABINET NODE 1

520-6967-72

ID	Type	Pin	Description	Wire Color
CN1	.100" 8-Pin Header Universal Card Link	1	12V	-
		2	Coin 1	-
		3	Meter 1	-
		4	N/C	-
		5	Notch	-
		6	Coin Enable	-
		7	Ticket Enable	-
		8	Ground	-
CN2	.100" 5-Pin Header Low Ticket	1	Ground	-
		2	Ticket Low sw.	-
		3	Key	-
		4	Ticket Low	-
		5	5V Out	-
CN3	.100" 3-Pin Header Meter 1	1	Meter 12V (+)	RED
		2	Meter (-)	BLK
		3	N/C	-
CN4	.100" 3-Pin Header Meter 2	1	Meter 12V (+)	RED
		2	Meter (-)	BLK
		3	N/C	-
CN5	.100" 9-Pin Header	1	5V Out	YEL/WHT
		2	Coin LED Out	YEL
		3	Ground	BLK
		4	Slam Tilt In	LGN/RED
		5	Coin 5	PNK/GRN*
		6	Coin 4	PNK/YEL*
		7	Coin 3	PNK/ORN*
		8	Coin 2	PNK/RED*
		9	Coin 1	PNK/BRN*
CN6	.100" 14-Pin Header Cabinet Left	1	5V LED Power	RED
		2	Start 2 LED	YEL-RED
		3	Start 1 LED	YEL-BRN
		4	Spare LED	-
		5	Ground	BLK-WHT
		6	Spare Left	-
		7	Tilt Input	WHT
		8	Door Open	-
		9	Start 2 Switch	GRY-WHT
		10	Start 1 Switch	GRY
		11	N/C	-
		12	N/C	-
		13	N/C	-
		14	N/C	-
CN7	.100" 12-Pin Header Cabinet Right	1	5V LED Power	RED
		2	Plunge 2 LED	RED-WHT
		3	Plunge 1 LED	GRN-WHT
		4	Spare LED 2	BLU-WHT
		5	Ground	BLK-WHT
		6	Spare Right In	-
		7	Plunge 2 Switch	-
		8	Plunge 1 Switch	-
		9	N/C	-
		10	N/C	-
		11	N/C	-
		12	N/C	-
CN8	.100" 10-Pin Header Dual Row Electronic Coin Mech	1	Ground	-
		2	12V	-
		3	Coin 5	-
		4	Coin 6	-
		5	N/C	-
		6	Coin Enable/Inhibit (+)	-
		7	Coin 1	-
		8	Coin 2	-
		9	Coin 3	-
		10	Coin 4	-
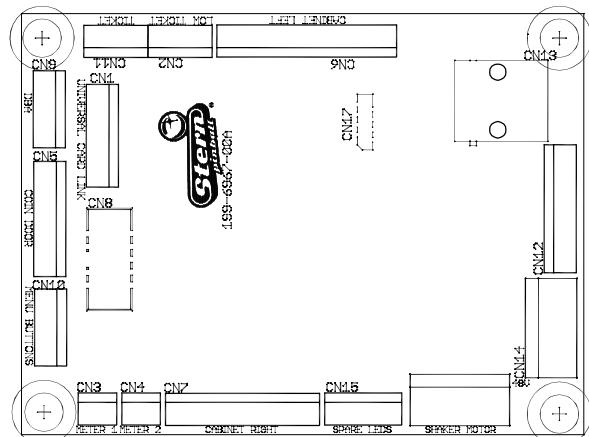
CN9	.100" 6-Pin Header Dollar Bill Acceptor	1	Coin Enable/DBA Inhibit (-)	BLK
		2	Coin Enable/DBA Inhibit (+)	-
		3	Key	Key
		4	DBA 12V	ORG
		5	Coin 6 / DBA Credit	-
		6	Ground	BLK-ORG
CN10	.100" 6-Pin Header Service Switch In	1	Service Back (To Coindoor)	LGN-BLK
		2	Service Down (To Coindoor)	LGN-BLU
		3	Service Up (To Coindoor)	LGN-VIO
		4	Service Select (To Coindoor)	LGN-GRY
		5	Key	Key
		6	Service Ground (To Coindoor)	BLK
CN11	.100" 5-Pin Header Ticket Dispenser	1	12V	RED
		2	N/C	-
		3	Ticket Dispenser Enable	WHT
		4	Ground	BLK
		5	Ticket Dispenser Notch	BLU
CN12	.100" 10-Pin Header CPU Direct Switches	1	Service Back (To CPU)	LGN-BLK
		2	Service Down (To CPU)	LGN-BLU
		3	Service Up (To CPU)	LGN-VIO
		4	Service Select (To CPU)	LGN-GRY
		5	Power Present	LGN-ORG
		6	Service Ground (To CPU)	BLK-WHT
		7	N/C	-
		8	N/C	-
		9	N/C	-
		10	N/C	-
CN14	.156" 5-Pin Header Power Input	1	Ground	BLK
		2	Key	Key
		3	N/C	-
		4	N/C	-
		5	48VDC In	GRY-YEL
CN15	.100" 6-Pin Header Spare LED's	1	5V LED Power	-
		2	Key	Key
		3	Spare LED 3	-
		4	Spare LED 4	-
		5	Spare LED 5	-
		6	Spare LED 6	-
CN16	.156" 5-Pin Header Shaker Motor	1	Shaker Motor (-)	BLU
		2	Shaker Motor (-)	-
		3	Shaker Motor (+)	-
		4	Key	Key
		5	Shaker Motor (+)	RED
			*Varies by country model	

4.3 LOWER PLAYFIELD 48V DRIVER PINOUT NODE 8
520-7017-72 / 520-1057-00
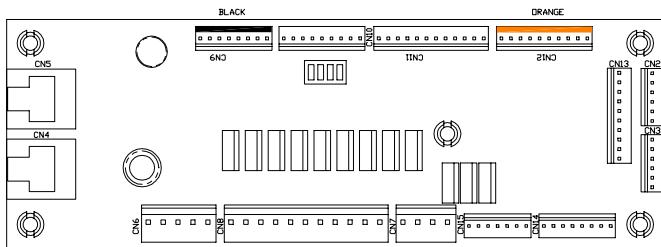
ID	Type	Pin	Description	Wire Color
SW1	Address DIP	-	Node 8 - OFF-OFF-OFF-OFF	-
CN4	RJ45	-	SPIKE Node Bus	Multi
CN5	RJ45	-	SPIKE Node Bus	Multi
CN6	.156" 5-Pin Header Node Power	1	Ground	BLK
		2	Key	Key
		3	N/C	-
		4	N/C	-
		5	48VDC In	GRY
CN7	.156" 4-Pin Header (White)	1	48V Driver Power	GRY-ORG
		2	8-DR-8 Driver Return	YEL-RED
		3	8-DR-6 Driver Return	YEL-BLK
		4	8-DR-7 Driver Return	-
CN8	.156 11-Pin Header (White)	1	48V Driver Power	GRY-ORG
		2	48V Driver Power	GRY-ORG
		3	48V Driver Power	GRY-ORG
		4	48V Driver Power	GRY-ORG
		5	8-DR-0 Driver Return	ORG-GRN
		6	8-DR-5 Driver Return	ORG-YEL
		7	8-DR-1 Driver Return	ORG-GRY
		8	8-DR-8 Driver Return	-
		9	8-DR-4 Driver Return	ORG-WHT
		10	8-DR-2 Driver Return	ORG-VIO
		11	8-DR-3 Driver Return	ORG-BLU
CN9	.100" 8-Pin Header (Black)	1	V+	-
		2	V+	-
		3	8-SW-24 Switch	GRY-RED
		4	8-SW-25 Switch	GRY-BRN
		5	8-SW-26 Switch	-
		6	8-SW-27 Switch	-
		7	Ground	BLK-GRN
		8	Ground	-
CN10	.100" 9-Pin Header	1	V+	-
		2	8-SW-28 Switch	GRY-WHT
		3	8-SW-29 Switch	GRY-VIO
		4	8-SW-30 Switch	GRY-BLU
		5	8-SW-31 Switch	GRY-GRN
		6	8-SW-16 Switch	GRY-YEL
		7	Ground	BLK-GRN
		8	Ground	BLK-GRN
		9	Ground	BLK-GRN

ID	Type	Pin	Description	Wire Color
CN11	.100" 12-Pin Header	1	V+	-
		2	8-SW-26 Switch	-
		3	8-SW-27 Switch	-
		4	8-SW-17 Switch	LGN-RED
		5	8-SW-18 Switch	LGN-ORG
		6	8-SW-19 Switch	LGN-YEL
		7	8-SW-20 Switch	LGN-BLU
		8	8-SW-21 Switch	LGN-VIO
		9	8-SW-22 Switch	LGN-GRY
		10	8-SW-23 Switch	-
		11	Ground	BLK-ORG
		12	Ground	BLK-ORG
CN12	.100" 10-Pin Header (Orange)	1	V+	RED
		2	8-SW-8 Switch	WHT-BRN
		3	8-SW-9 Switch	-
		4	8-SW-10 Switch	-
		5	8-SW-11 Switch	WHT-YEL
		6	8-SW-12 Switch	WHT-GRN
		7	8-SW-13 Switch	WHT-BLU
		8	8-SW-14 Switch	-
		9	8-SW-15 Switch	-
		10	Ground	BLK-RED
CN13	.100" 10-Pin Header	1	V+	RED
		2	8-SW-0 Switch	-
		3	8-SW-1 Switch	-
		4	8-SW-2 Switch	-
		5	8-SW-3 Switch	PNK-GRN
		6	8-SW-4 Switch	PNK-BLU
		7	8-SW-5 Switch	PNK-VIO
		8	8-SW-6 Switch	-
		9	8-SW-7 Switch	-
		10	Ground	BLK-BRN
CN14	.100" 8-Pin Header	1	Ground	-
		2	8-LP-7 Driver Return	-
		3	8-LP-6 Driver Return	-
		4	8-LP-5 Driver Return	BRN-RED
		5	8-LP-4 Driver Return	BRN
		6	8-LP-3 Driver Return	BRN-BLK
		7	LED V+	YEL
		8	LED V+	YEL
CN15	.100" 7-Pin Header	1	LED V+	YEL-BLK
		2	LED V+	YEL-RED
		3	LED V+	YEL-BLU
		4	-	-
		5	8-LP-0 GI Return	WHT-BLK
		6	8-LP-1 GI Return	RED-BLK
		7	8-LP-2 GI Return	BLU-BLK
CN2	.100" 6-Pin Header, Node Extension Bus	1	Ground	BLK
		2	DIN	VIO-BLK
		3	DOUT	VIO-BRN
		4	SCK	VIO-RED
		5	RCK	VIO-ORG
		6	V+	RED
CN3	.100" 6-Pin Header, Node Extension Bus	1	Ground	BLK
		2	DIN	VIO-BLK
		3	DOUT	VIO-BRN
		4	SCK	VIO-RED
		5	RCK	VIO-ORG
		6	V+	RED

4.4 MID UPPER PLAYFIELD 48V DRIVER PINOUT NODE 9

520-7017-72 / 520-1057-00
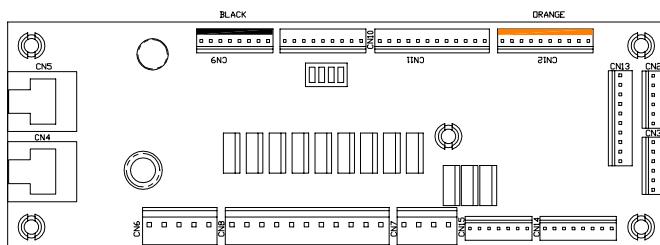
ID	Type	Pin	Description	Wire Color
SW1	Address DIP	-	Node 9 - OFF-OFF-ON-OFF	-
CN4	RJ45	-	SPIKE Node Bus	Multi
CN5	RJ45	-	SPIKE Node Bus	Multi
CN6	.156" 5-Pin Header Node Power	1	Ground	BLK
		2	Key	Key
		3	N/C	-
		4	N/C	-
		5	48VDC In	GRY
CN7	.156" 4-Pin Header (White)	1	48V Driver Power	GRY-BRN
		2	9-DR-8 Driver Return	YEL-ORG
		3	9-DR-6 Driver Return	-
		4	9-DR-7 Driver Return	YEL-BLU
CN8	.156 11-Pin Header (White)	1	48V Driver Power	GRY-BRN
		2	48V Driver Power	GRY-BRN
		3	48V Driver Power	GRY-BRN
		4	48V Driver Power	-
		5	9-DR-0 Driver Return	-
		6	9-DR-5 Driver Return	-
		7	9-DR-1 Driver Return	-
		8	9-DR-8 Driver Return	-
		9	9-DR-4 Driver Return	ORG-RED
		10	9-DR-2 Driver Return	ORG-BLK
		11	9-DR-3 Driver Return	ORG-BRN
CN9	.100" 8-Pin Header (Black)	1	V+	RED
		2	V+	-
		3	9-SW-24 Switch	LGN-ORG
		4	9-SW-25 Switch	LGN-YEL
		5	9-SW-26 Switch	-
		6	9-SW-27 Switch	LGN-VIO
		7	Ground	BLK-BLU
		8	Ground	-
CN10	.100" 9-Pin Header	1	V+	-
		2	9-SW-28 Switch	GRY-BLK
		3	9-SW-29 Switch	GRY-BRN
		4	9-SW-30 Switch	GRY-RED
		5	9-SW-31 Switch	GRY-ORG
		6	9-SW-16 Switch	GRY-YEL
		7	Ground	BLK-BLU
		8	Ground	BLK-BLU
		9	Ground	BLK-BLU

ID	Type	Pin	Description	Wire Color
CN11	.100" 12-Pin Header	1	V+	RED
		2	9-SW-26 Switch	-
		3	9-SW-27 Switch	-
		4	9-SW-17 Switch	TAN-ORG
		5	9-SW-18 Switch	-
		6	9-SW-19 Switch	TAN-GRN
		7	9-SW-20 Switch	-
		8	9-SW-21 Switch	-
		9	9-SW-22 Switch	-
		10	9-SW-23 Switch	-
		11	Ground	BLK-GRY
		12	Ground	-
CN12	.100" 10-Pin Header (Orange)	1	V+	RED
		2	9-SW-8 Switch	-
		3	9-SW-9 Switch	-
		4	9-SW-10 Switch	WHT-ORG
		5	9-SW-11 Switch	WHT-YEL
		6	9-SW-12 Switch	WHT-GRN
		7	9-SW-13 Switch	-
		8	9-SW-14 Switch	WHT-VIO
		9	9-SW-15 Switch	WHT-GRY
		10	Ground	BLK-WHT
CN13	.100" 10-Pin Header	1	V+	RED
		2	9-SW-0 Switch	PNK-RED
		3	9-SW-1 Switch	PNK-ORG
		4	9-SW-2 Switch	PNK-YEL
		5	9-SW-3 Switch	PNK-GRN
		6	9-SW-4 Switch	PNK-BLU
		7	9-SW-5 Switch	PNK-VIO
		8	9-SW-6 Switch	-
		9	9-SW-7 Switch	PNK-WHT
		10	Ground	BLK-BRN
CN14	.100" 8-Pin Header	1	Ground	-
		2	9-LP-7 Driver Return	BRN-WHT
		3	9-LP-6 Driver Return	BRN-GRY
		4	9-LP-5 Driver Return	BRN-VIO
		5	9-LP-4 Driver Return	BRN
		6	9-LP-3 Driver Return	BRN-BLK
		7	LED V+	YEL
		8	LED V+	YEL
CN15	.100" 7-Pin Header	1	LED V+	YEL-BLK
		2	LED V+	YEL-RED
		3	LED V+	YEL-BLU
		4	-	-
		5	9-LP-0 GI Return	WHT-BLK
		6	9-LP-1 GI Return	RED-BLK
		7	9-LP-2 GI Return	BLU-BLK
CN2	.100" 6-Pin Header, Node Extension Bus	1	Ground	-
		2	DIN	-
		3	DOUT	-
		4	SCK	-
		5	RCK	-
		6	V+	-
CN3	.100" 6-Pin Header, Node Extension Bus	1	Ground	BLK
		2	DIN	VIO-BLK
		3	DOUT	VIO-BRN
		4	SCK	VIO-RED
		5	RCK	VIO-ORG
		6	V+	RED

4.5 CENTER MID LED BOARD 8B
520-8576-00

520-8576-00

ID	Type	Pin	Description	Wire Color
CN1	.100" 12-Pin Header	1	+5 VDC	RED
		2	+5 VDC	RED
		3	+5 VDC	-
		4	+5 VDC	-
		5	LED 1	BRN-RED
		6	LED 2	BRN-ORG
		7	LED 3	BRN-YEL
		8	LED 4	BRN-BLU
		9	LED 5	BRN-GRN
		10	LED 6	BRN-VIO
		11	LED 7	BRN-GRY
		12	LED 8	BRN-WHT
CN2	.100" 7-Pin Header	1	Ground	BLK
		2	MISO Output Data	VIO-BLK
		3	MOSI Input Data	VIO-BRN
		4	SCK Serial Clock	VIO-RED
		5	RCK Register Clock	VIO-ORG
		6	NC	-
		7	+5 VDC IN	RED

ID	Type	Pin	Description	Wire Color
CN3	.100" 13-Pin Header	1	+5 VDC	RED
		2	+5 VDC	RED
		3	+5 VDC	-
		4	+5 VDC	-
		5	+5 VDC	-
		6	LED 9	RED-ORG
		7	LED 10	RED-YEL
		8	LED 11	RED-GRN
		9	LED 12	RED-BLU
		10	LED 13	RED-BRN
		11	LED 14	GRN-BRN
		12	LED 15	BLU-BRN
		13	LED 16	RED-WHT
CN4	.100" 6-Pin Header	1	Ground	BLK
		2	MISO Output Data	VIO-BLK
		3	MOSI Input Data	VIO-BRN
		4	SCK Serial Clock	VIO-RED
		5	RCK Register Clock	VIO-ORG
		6	V+	RED
CN5	.100" 13-Pin Header	1	+5 VDC	-
		2	+5 VDC	-
		3	+5 VDC	-
		4	+5 VDC	-
		5	LED 28	-
		6	LED 27	-
		7	LED 26	-
		8	LED 25	-
		9	LED 24	-
		10	LED 23	-
		11	LED 22	-
		12	GND	-
		13	GND	-
CN6	.100" 12-Pin Header	1	+5 VDC	RED
		2	+5 VDC	-
		3	+5 VDC	-
		4	+5 VDC	-
		5	LED 36	YEL-BRN
		6	LED 35	YEL-RED
		7	LED 34	YEL-ORG
		8	LED 33	YEL-GRN
		9	LED 32	YEL-BLU
		10	LED 31	YEL-VIO
		11	LED 30	YEL-GRY
		12	LED 29	-

4.6 3-LED BOARD 8B1
520-7011-00
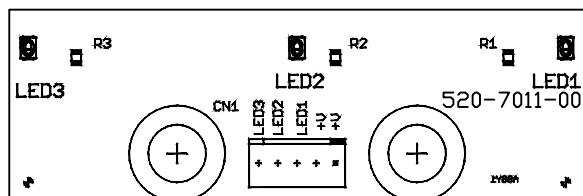
ID	Type	Pin	Description	Wire Color
CN1	.100" 5-Pin Header	1	5V	RED
		2	5V	-
		3	LP-1 Light Return	BRN-GRN
		4	LP-2 Light Return	BRN-VIO
		5	LP-3 Light Return	BRN-GRY

4.7 3-LED BOARD 8B2
520-7011-00
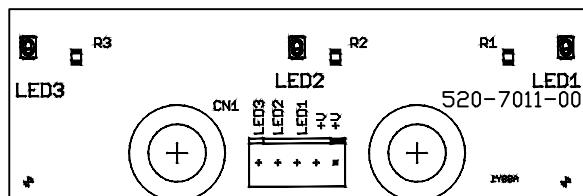
ID	Type	Pin	Description	Wire Color
CN1	.100" 5-Pin Header	1	5V	RED
		2	5V	-
		3	LP-1 Light Return	RED-GRN
		4	LP-2 Light Return	RED-YEL
		5	LP-3 Light Return	RED-ORG

4.8 2-LED BOARD 8B3
520-8580-00
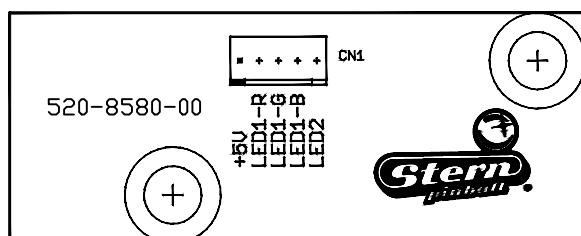
ID	Type	Pin	Description	Wire Color
CN1	.100" 5-Pin Header	1	5V	RED
		2	LED1-R	RED-BRN
		3	LED1-G	GRN-BRN
		4	LED1-B	BLU-BRN
		5	LED2	RED-WHT

4.9 BILLBOARD LED BOARD 8B5
520-8582-00
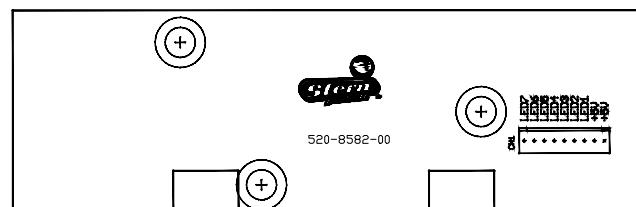
ID	Type	Pin	Description	Wire Color
CN1	.100" 9-Pin Header	1	+5 VDC	RED
		2	+5 VDC	-
		3	LED 1	YEL-BRN
		4	LED 2	YEL-RED
		5	LED 3	YEL-ORG
		6	LED 4	YEL-GRN
		7	LED 5	YEL-VIO
		8	LED 6	YEL-GRY
		9	LED 7	YEL-BLU

4.10 CENTER LOWER LED BOARD 8C
520-8575-00

ID	Type	Pin	Description	Wire Color
CN1	.100" 7-Pin Header	1	Ground	BLK
		2	MISO Output Data	VIO-BLK
		3	MOSI Input Data	VIO-BRN
		4	SCK Serial Clock	VIO-RED
		5	RCK Register Clock	VIO-ORG
		6	NC	-
		7	+5 VDC IN	RED
CN3	.100" 6-Pin Header	1	Ground	-
		2	MISO Output Data	-
		3	MOSI Input Data	-
		4	SCK Serial Clock	-
		5	RCK Register Clock	-
		6	V+	-

4.11 CENTER LEFT LED BOARD 9A
520-8577-00

ID	Type	Pin	Description	Wire Color
CN1	.100" 7-Pin Header	1	Ground	BLK
		2	MISO Output Data	VIO-BLK
		3	MOSI Input Data	VIO-BRN
		4	SCK Serial Clock	VIO-RED
		5	RCK Register Clock	VIO-ORG
		6	NC	-
		7	+5 VDC IN	RED
CN2	.100" 12-Pin Header	1	+5 VDC	RED
		2	+5 VDC	RED
		3	+5 VDC	-
		4	+5 VDC	-
		5	LED 8	RED-VIO
		6	LED 9	GRN-VIO
		7	LED 10	BLU-VIO
		8	LED 11	ORG-YEL
		9	LED 12	ORG-RED
		10	LED 13	ORG-BRN
		11	LED 14	YEL-BRN
		12	LED 15	YEL-RED
CN3	.100" 6-Pin Header	1	Ground	BLK
		2	MISO Output Data	VIO-BLK
		3	MOSI Input Data	VIO-BRN
		4	SCK Serial Clock	VIO-RED
		5	RCK Register Clock	VIO-ORG
		6	V+	RED
CN4	.100" 13-Pin Header	1	+5 VDC	RED
		2	+5 VDC	RED
		3	+5 VDC	-
		4	+5 VDC	-
		5	LED 17	ORG-GRN
		6	LED 18	ORG-BLU
		7	LED 19	ORG-VIO
		8	LED 20	ORG-GRY
		9	LED 21	ORG-WHT
		10	LED 22	ORG-BLK
		11	LED 23	YEL-WHT
		12	LED 24	YEL-VIO
		13	GND	-

4.12 2-LED BOARD 9A1
520-8580-00
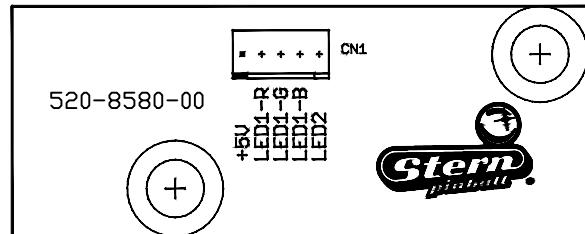
ID	Type	Pin	Description	Wire Color
CN1	.100" 5-Pin Header	1	5V	RED
		2	LED1-R	RED-VIO
		3	LED1-G	GRN-VIO
		4	LED1-B	BLU-VIO
		5	LED2	ORG-YEL

4.13 3-LED BOARD 9A2
520-8581-00
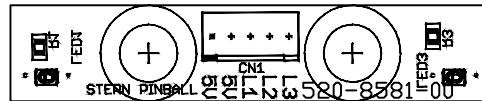
ID	Type	Pin	Description	Wire Color
CN1	.100" 5-Pin Header	1	5V	RED
		2	5V	-
		3	LP-1 Light Return	ORG-VIO
		4	LP-2 Light Return	ORG-BLU
		5	LP-3 Light Return	ORG-GRN

4.14 3-LED BOARD 9A3
520-8581-00
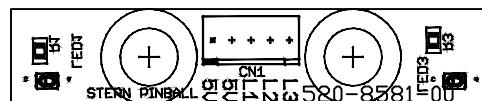
ID	Type	Pin	Description	Wire Color
CN1	.100" 5-Pin Header	1	5V	RED
		2	5V	-
		3	LP-1 Light Return	ORG-GRY
		4	LP-2 Light Return	ORG-WHT
		5	LP-3 Light Return	ORG-BLK

4.15 RIGHT UPPER LED BOARD 9B
520-8579-00

ID	Type	Pin	Description	Wire Color
CN1	.100" 7-Pin Header	1	Ground	BLK
		2	MISO Output Data	VIO-BLK
		3	MOSI Input Data	VIO-BRN
		4	SCK Serial Clock	VIO-RED
		5	RCK Register Clock	VIO-ORG
		6	NC	-
		7	+5 VDC IN	RED
CN2	.100" 6-Pin Header	1	Ground	-
		2	MISO Output Data	-
		3	MOSI Input Data	-
		4	SCK Serial Clock	-
		5	RCK Register Clock	-
		6	V+	-
CN3	.100" 12-Pin Header	1	+5 VDC	RED
		2	+5 VDC	-
		3	+5 VDC	-
		4	LED 17	RED-BRN
		5	LED 18	RED-ORG
		6	LED 19	RED-YEL
		7	LED 20	RED-GRN
		8	LED 21	RED-BLU
		9	LED 22	RED-VIO
		10	LED 23	RED-GRY
		11	LED 24	RED=WHT
		12	GND	-

4.16 HOST SIGN LED BOARD 9B1
520-8583-00

ID	Type	Pin	Description	Wire Color
CN1	.100" 10-Pin Header	1	+5 VDC	RED
		2	+5 VDC	-
		3	LED 1	RED-ORG
		4	LED 2	RED-BLU
		5	LED 3	RED-YEL
		6	LED 4	RED-BRN
		7	LED 5	RED-GRN
		8	LED 6	RED-GRY
		9	LED 7	RED-WHT
		10	LED 8	RED-VIO

4.17 TROUGH SERIAL OPTO RECEIVER 8A
520-8516-00
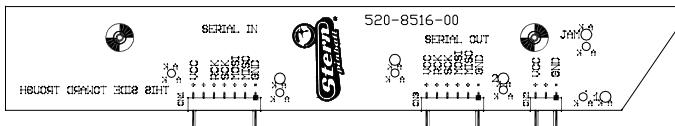
4.19 MAIN POWER SUPPLY
011-5003-00

ID	Type	Pin	Description	Wire Color
CN1	.100" 7-Pin Header	1	Ground	BLK
		2	MISO Output Data	VIO-BLK
		3	MOSI Input Data	VIO-BRN
		4	SCK Serial Clock	VIO-RED
		5	RCK Register Clock	VIO-ORG
		6	N/C	-
		7	+5 VDC IN	RED
CN2	.100" 3-Pin Header	1	Ground	BLK
		2	N/C	-
		3	+5 VDC IN	RED
CN3	.100" 6-Pin Header	1	Ground	-
		2	MISO Output Data	-
		3	MOSI Input Data	-
		4	SCK Serial Clock	-
		5	RCK Register Clock	-
		6	V+	-
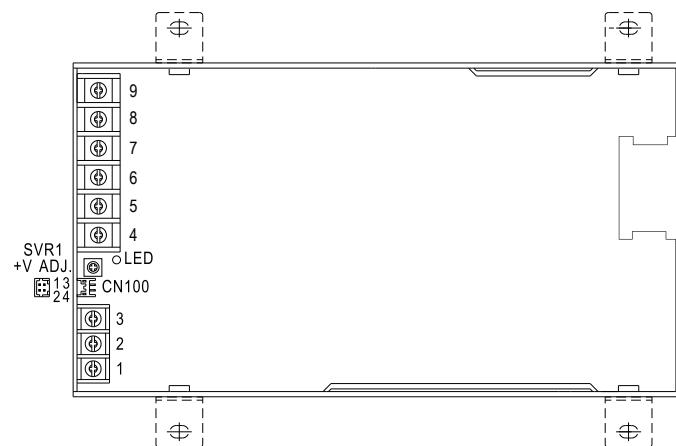
ID	Type	Pin	Description	Wire Color
CN1	Screw Terminal	1	AC Line Hot In	BLK
		2	AC Line Neutral In	WHT
		3	Earth Ground In	GRN
		4	DC Ground	BLK
		5	DC Ground	BLK
		6	DC Ground	BLK
		7	+48 V System Power	GRY
		8	+48 V System Power	GRY
		9	+48 V System Power	GRY

4.18 TROUGH SERIAL OPTO TRANSMITTER
520-5344-00
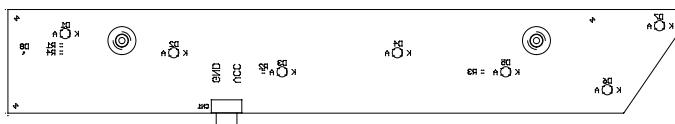
ID	Type	Pin	Description	Wire Color
CN1	.100" 3-Pin Header	1	Ground	BLK
		2	N/C	-
		3	+5 VDC IN	RED

4.20 POWER DISTRIBUTION BOARD

520-8096-00
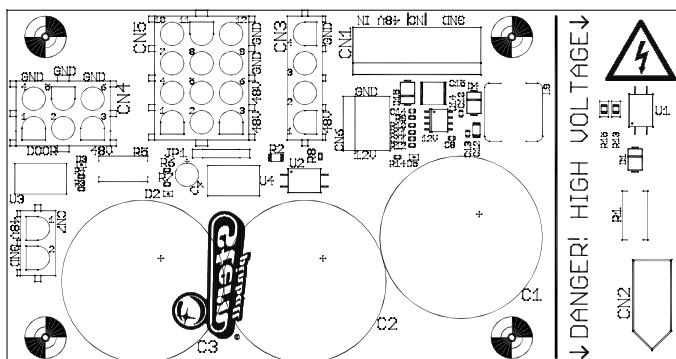
ID	Type	Pin	Description	Wire Color
CN1	.156 in 7-Pin Housing Plug: 045-5259-07 Pin: 055-5331-00 Key: 060-5013-00	1	+48 VDC IN	GRY
		2	+48 VDC IN	GRY
		3	+48 VDC IN	GRY
		4	Key (n/c)	-
		5	Ground	BLK
		6	Ground	BLK
		7	Ground	BLK
CN2	.093 in 3-Pos Plug Plug: 045-5003-03 Pin: 055-5013-09	1	Line In (100-240 VAC)	BLK
		2	Neutral	WHT
		3	Earth Ground	GRN
CN3	0.084 in 4-Pos Plug Plug: 045-5200-04 Pin: 055-5033-08	1	+48 VDC to CPU Node	GRY
		2	Door Interlock Switch Status	GRY/RED
		3	Line Voltage Status	VIO
		4	Ground	BLK
CN4	0.084 in 6-Pos Plug Plug: 045-5200-06 Pin: 055-5033-08	1	Door Interlock Switch +48V	GRY
		2	Door Interlock Switch +48V	-
		3	Switched 48V Out (to Node 1)	GRY/YEL
		4	Door Interlock Return Ground	GRY/RED
		5	Door Interlock Return Ground	-
		6	Ground (to Node 1)	BLK
CN5	0.084 in 12-Pos Plug Plug: 045-5200-12 Pin: 055-5033-08	1	Switched 48V Node Power	GRY
		2	Switched 48V Node Power	GRY
		3	Switched 48V Node Power	GRY
		4	Switched 48V Node Power	GRY
		5	Switched 48V Node Power	GRY
		6	Switched 48V Node Power	GRY
		7	Node Ground	BLK
		8	Node Ground	BLK
		9	Node Ground	BLK
		10	Node Ground	BLK
		11	Node Ground	BLK
		12	Node Ground	BLK
CN6	.156 in 3-Pos Plug: 045-5259-03 Pin:055-5331-00 (18awg)	1	Ground	-
		2	Ground	-
		3	+12VDC	-
CN7	.084 2-Pos Plug: 045-5200-02 Pin:055-5033-08	1	+48 VDC to Topper Node	GRY
		2	Ground	BLK

4.21 POWER PLUG WIRING

NORTH AMERICA
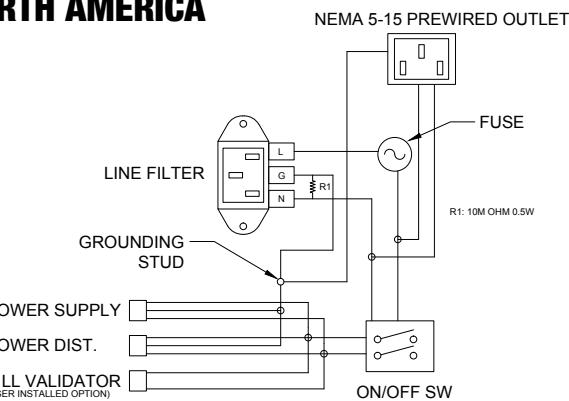
INTERNATIONAL
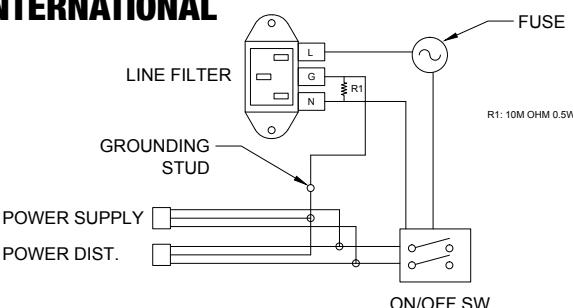
LINE CORDS

Part Number	Description
034-6012-00	Line Cord, 3m, 5-15P USA
034-6012-01	Line Cord, 3m, CEE77P EUROPE
034-6012-02	Line Cord, 3m, BS1363P United Kingdom
034-6012-03	Line Cord, 3m, AS-NZS4417P Australia
034-6012-04	Line Cord, 3m, CEI23-16P Italy
034-6012-05	Line Cord, 3m, SEV1011P Switzerland
034-6012-06	Line Cord, 3m, JIS8303P Japan
034-6012-07	Line Cord, 3m, SI32P Israel
034-6012-08	Line Cord, 3m, BS546P S Africa, India
034-6012-09	Line Cord, 3m, IS6538P S. India

LINE FUSES

Line Voltage (Region)	Fuse Current	Type	Part Number
120V (North America)	8 A	Slow Blow 30G	200-5000-05
220/240v (Europe, Australia, UK)	5 A	Slow Blow 5 x 20mm	200-5003-00

5. PARTS REFERENCE
5.1 PLAYFIELD RUBBER PARTS
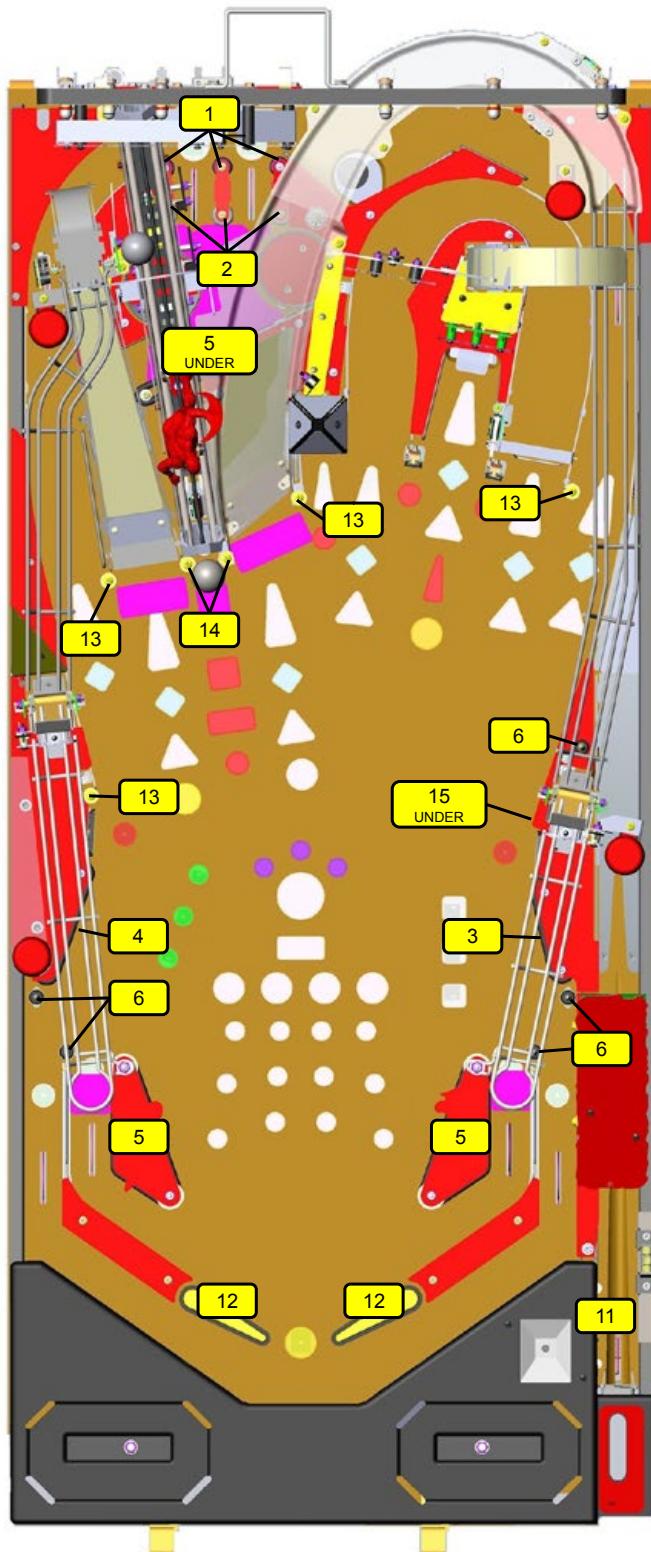
Figure 5.1.1. Rubber o-ring part locations

RUBBER O-RINGS

ID	Qty	Size (ID)	Size (OD)	Durometer	Color	Part Number
1	3	3/16"		50	Black	545-5348-01
2	3	5/16"		50	Black	545-5348-02
3	1	1-1/4"		50	Black	545-5348-06
4	1	1-1/2"		50	Black	545-5348-07
5	3	2-1/2"		50	Black	545-5348-09
6	5		7/16"	50	Black	545-5348-17

Figure 5.1.2. Rubber o-ring part numbers and usage. ID: Inner Diameter, OD: Outer Diameter, Durometer: Higher number is firmer, less bounce, and more durable.

ID	Qty	Description	Color	Part Number
11	1	Plunger Tip	Black	545-5276-00
12	2	Flipper Rubber	Black	545-5277-00
13	4	Post Sleeve	Black	545-5308-00
14	2	Post Sleeve	Red	545-5308-22
15	1	Bumper Pad	Black	626-5057-01
16	2	Bumper Pad (Sub assemblies)	Black	545-5105-00
17	4	Bumper Pad (Flippers)	Black	545-5428-00

Figure 5.1.3. Other rubber part numbers and usage

5.2 RUBBER SIZE CHART
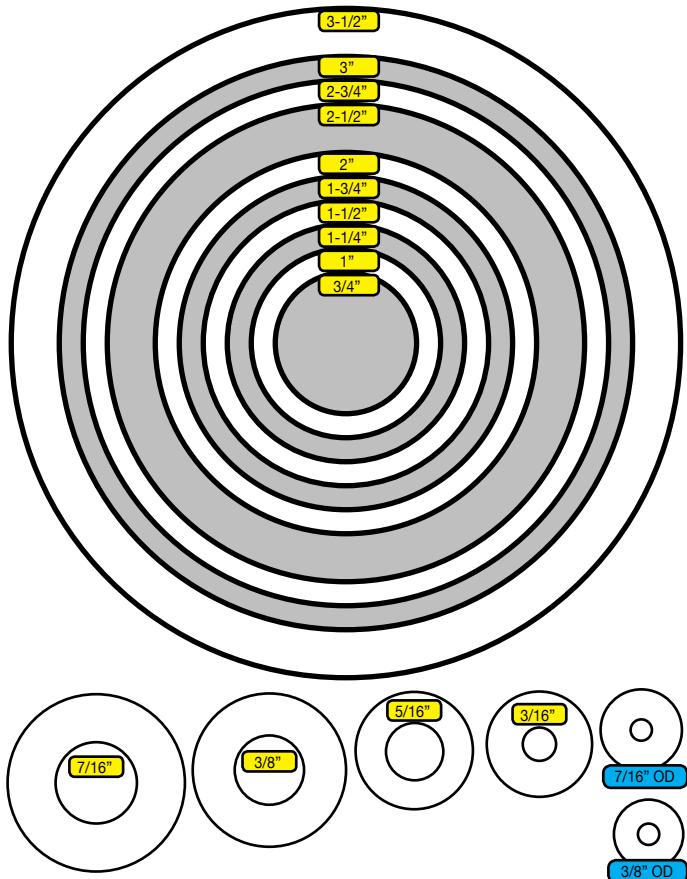
Figure 5.2.1. Rubber ring inner diameter sizing tool. Hold ring up to chart and read largest size on inside of ring. Dimensions are Inner Diameter (ID) unless otherwise noted as Outer Diameter (OD).

5.3 PLAYFIELD ASSEMBLIES, TOP

Figure 5.3.1. Major playfield assemblies, Top locations.
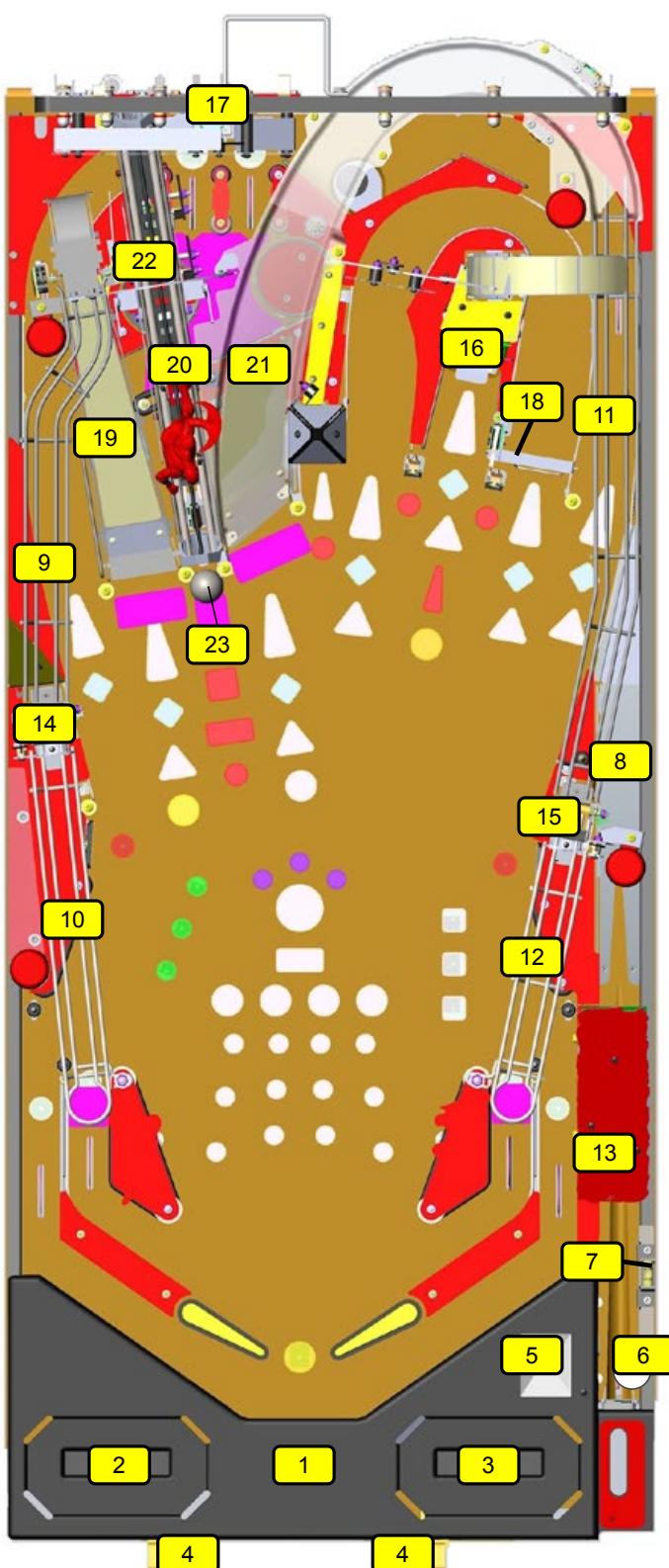
ID	Part Number	Description	Qty
1	500-2505-U1	Bottom Arch Assembly	1
2	755-51U2-XX	Instructions Card	1
3	755-7669-00	SPI Card	1
4	535-8385-00	Welded Hanger Bracket	1
5	509-2020-00	QR Reader	1
6	260-5000-00	Pinballs	7
7	500-6815-00	Bubble Level Assembly	1
8	535-8145-01	Shooter Lane Ramp	1
9	515-2472-06	Upper Left Wire Ramp, Pro	1
	237-6197-00P	Screw, 4-40 X 3/16 PFH U/C 18-8 SS - Attaches Ramp to Ball Lock Base	1
10	515-2472-00	Lower Left Wire Ramp	1
11	515-2472-04	Center Ramp Exit Wire Ramp	1
	237-6197-00P	Screw, 4-40 X 3/16 PFH U/C 18-8 SS - Attaches Ramp to Ball Lock Base	1
12	515-2472-01	Lower Right Wire Ramp	1
13	511-5966-21	Billboard Plastic Assembly (Contains LED Board 8b5)	1
14	511-3063-00	Left Ball Lock Cover (Contains LED Board 9a2)	1
	237-5884-00	Screw, 4-40 X 3/16" - Attaches Ball Lock Cover to Base	4ea
15	511-3064-00	Right Ball Lock Cover (Contains LED Board 9a3)	1
	237-5884-00	Screw, 4-40 X 3/16" - Attaches Ball Lock Cover to Base	4ea
16	511-5966-26	Host Sign Plastic Assembly (Contains LED Board 9b1)	1
17	500-9988-00	Top Post Pin Mech Assembly	1
18	511-5326-01	Ball Guide with Gate Assembly, Pro	1
19	511-7304-00	Left Ramp Assembly	1
20	500-2661-00	CARNAGE Ratchet Assembly	1
21	500-1199-00	Center Ramp Assembly	1
22	510-5805-18	Riveted Plastic -18	1
23	515-1935-00	Newton Ball	1

5.4 PLAYFIELD ASSEMBLIES, BOTTOM

ID	Part Number	Description	Qty
1	520-7017-72 520-1057-00	Core Node Driver Board	2
2	520-8576-00	LED Board - 8b	1
3	520-7011-00	LED Board - 8b1, 8b2	2
4	520-8580-00	LED Board - 8b3, 9a1	2
5	520-8575-00	LED Board - 8c	1
6	520-8577-00	LED Board - 9a	1
7	520-8579-00	LED Board - 9b	1
8	511-5965-18	Top Post Opto Receiver Assy	1
9	511-5313-00	Ball Lock Base	2
10	511-2032-00	Ratchet Coil Assembly	1
	266-5020-01	Conical Compression Spring	1
11	511-5314-01	Pro VUK Trough Assembly	1
12	511-5329-00	VUK Coil Bracket Assembly	1
13	511-7621-00	Support Rail Assembly	2
14	500-5329-03	Pivot Bracket Assembly	2
15	535-5988-01	Edge Slide Bracket	2
16	535-2288-00	Backpanel Handle	1

Figure 5.4.1. Major playfield assemblies, Bottom locations.

5.5 BACKBOX PARTS
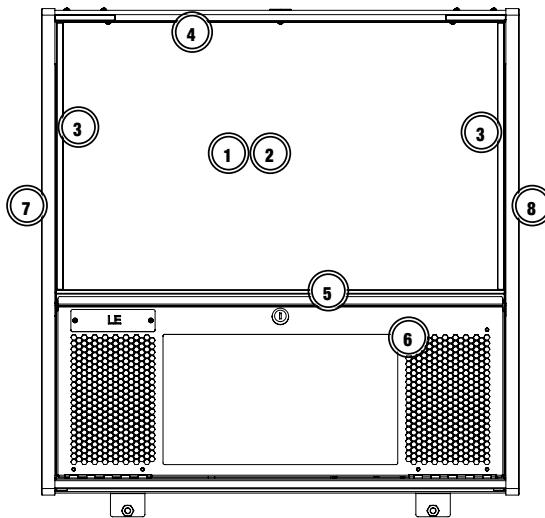
Figure 5.5.1. Backbox external assemblies and components
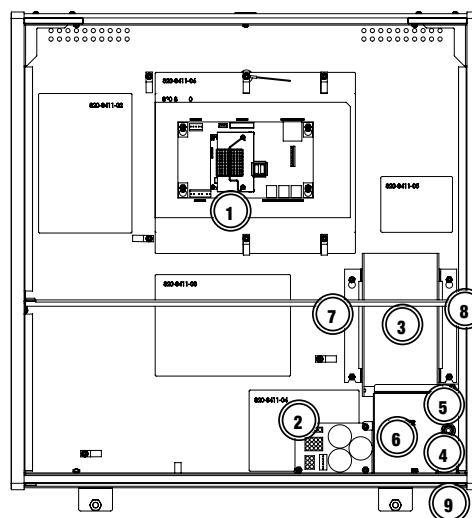
Figure 5.5.2. Backbox internal assemblies and components

EXTERNAL

ID	Part Number	Description	Qty
1	660-5052-00	Backglass	1
2	830-8427-U1	Translite Art	1
3	545-5018-17	Plastic Extrusion 15-.450"	2
4	545-5018-15	Glass Channel 26"	1
5	545-6313-01	Glass Lift Channel 26"	1
6	500-9996-00	LCD Speaker Panel Assembly	1
7	820-76U1-01	Left Backbox Decal	1
8	820-76U1-02	Right Backbox Decal	1

INTERNAL

ID	Part Number	Description	Qty
1	509-1003-01	CPU Node Board	1
2	520-8096-00	Power Distribution Board	1
3	011-5003-00	Power Supply 48V/500W	1
4	515-9769-00	Utility Outlet (USA)	1
5	205-5001-00	Fuse Holder - Screw In	1
	200-5000-05	8A SB Fuse	1
6	535-1130-00	Cover AC	1
7	535-1129-00	Power Supply Bracket	1
8	535-1129-01	Power Supply Bracket	1
9	180-5001-03	Power Switch	1

5.6 SPEAKER PANEL PARTS

500-9996-00

ID	Part Number	Description	Qty
1	031-5004-02	Speaker	2
2	116-0023-00	1366 x 768 Display LCD Panel	1
3	237-6188-01	Screw, M3x0.5 X 6MM PPH Sems Zinc	4
4	237-6307-06	6-32 X 3/8" Torx Stainless Steel Screw	2
5	240-5005-00	6-32 Nylon Stop Nut	12
6	242-5001-00	#6 Washer	16
7	355-5168-00-00	Nut: Lock w/ Cam	1
8	515-9842-00	Speaker Panel - LCD	1
9	515-9843-00	Speaker Plate	2
10	515-9845-00	Hinge, Speaker Panel, LCD	2
11	545-9877-00	LCD Window	1
12	545-9877-01	Spacer, Small - LCD Speaker Panel	4
13	626-5109-00	Speaker Foam - LCD Panel	2
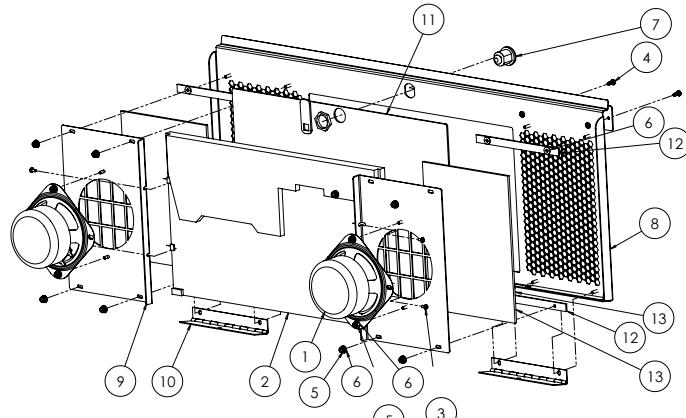
5.7 CABINET PARTS
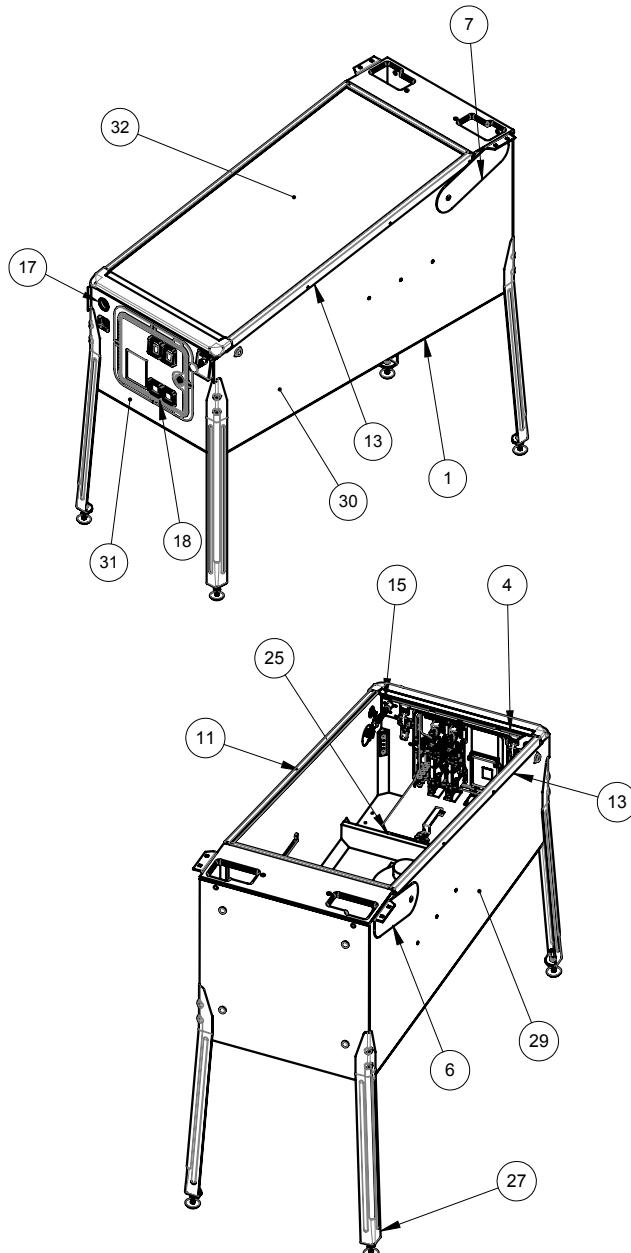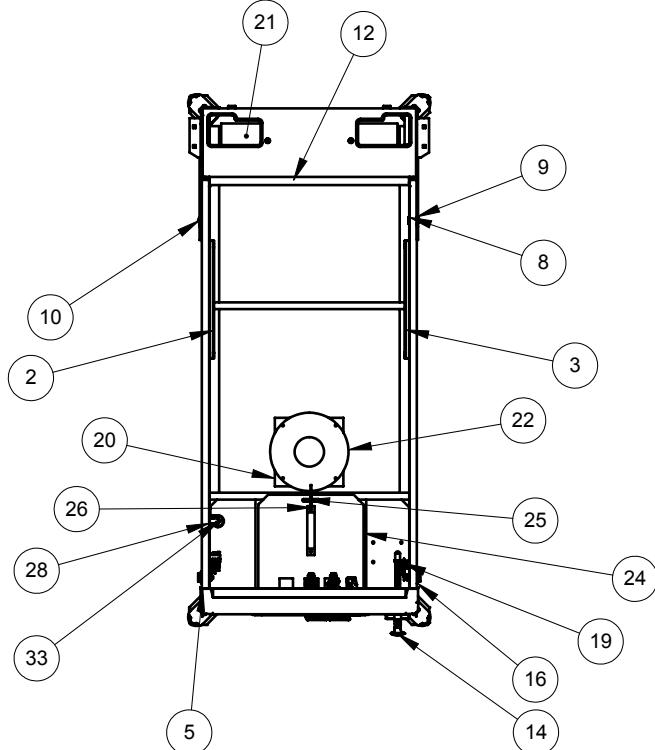
ID	Part Number	Description	Qty
1	525-6026-01	Cabinet Assembly, Single Button	1
2	535-5989-00	Slide & Pivot Bracket - Left Side	1
3	535-5990-00	Slide & Pivot Bracket - Right Side	1
4	535-2051-00	Cabinet Playfield Support Bracket	1
5	500-2440-00	Front Molding Assembly - Wrinkle Black	1
6	535-7999-00	Pivot Hinge, Left - Wrinkle Black	1
7	535-7999-01	Pivot Hinge, Right - Wrinkle Black	1
8	254-5042-00	Spacer Nut, Hex, 1/2"OD, 1/4-20	2
9	242-5084-00	Washer, 1/2" I.D., 3/16" THK	2
10	231-5072-00	1/4-20 X 1/2" Carriage Bolt	2
11	545-5017-00	Plastic Channel	2
12	545-5038-00	Glass Rear Extrusion	1
13	535-7297-02	Side Armor - Wrinkle Black	2
14	500-2604-07	Ball Shooter Assembly	1
15	535-5027-01	Plunger Support Plate, Notched	1
16	500-1169-38	Flipper Button Assembly (White)	2
17	500-1060-44-LED	Start Button	1
18	501-5018-173	Coin Door 2-Chute No Emboss	1
19	180-5160-01	Flipper Switch, Single	2
20	545-5072-03	Grill - Speaker / Vent	1
21	545-5072-02	Grill - Speaker / Vent	1
22	031-5007-01	Speaker, Cabinet 8" Round, 4 ohm	1

23	545-5090-00	Cash Box - Plastic	1
24	535-5013-03	Cash Box Cover	1
25	535-7562-00	Cash Box Lock Bracket Wire	1
26	535-7772-00	Hair Pin Clip	1
27	500-5921-50	Leg Assembly - Wrinkle Black	4
28	516-0007-00	Tilt Assembly	1
	535-5029-00	Tilt Plumb Bob	1
29	820-76U1-03	Decal, Cabinet Left, Venom Pro	1
30	820-76U1-04	Decal, Cabinet Right, Venom Pro	1
31	820-76U1-05	Decal, Cabinet Front, Venom Pro	1
32	660-5001-00	Playfield Glass	1
33	520-6967-72	Cabinet Node Board	1
	820-76U1-XX	Cabinet Decal Replacement Set, Speaker Panel Decal Not Included	

5.8   BALL SHOOTER ASSEMBLY
500-2604-07
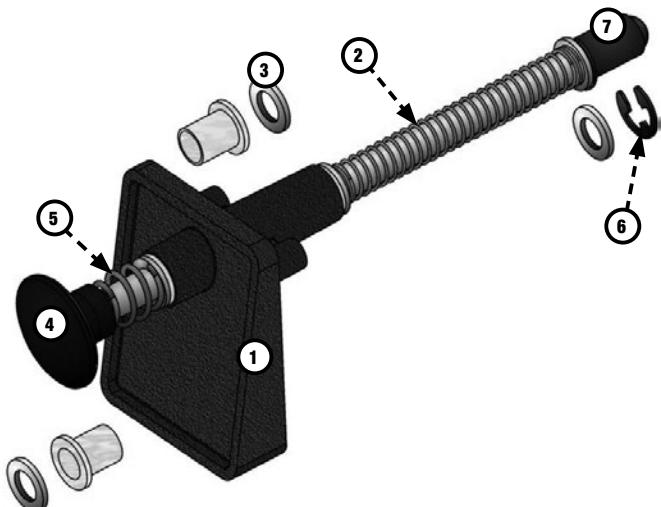
ID	Part Number	Description	Qty
1	535-5067-02	HOUSING ASSEMBLY	1
2	266-5001-07	COMPRESSED SPRING (LONG) - ORANGE	1
3	242-5014-00	WASHER 3/8 ID X 5/8 OD X 1/16"	3
4	515-6557-00	ROD ASSEMBLY	1
5	266-5010-00	COMPRESSED SPRING (SHORT)	1
6	270-5012-00	RETAINING RING, 3/8"	1
7	545-5276-00	RUBBER TIP	1

5.9   AUTO LAUNCH ASSEMBLY
500-9818-02
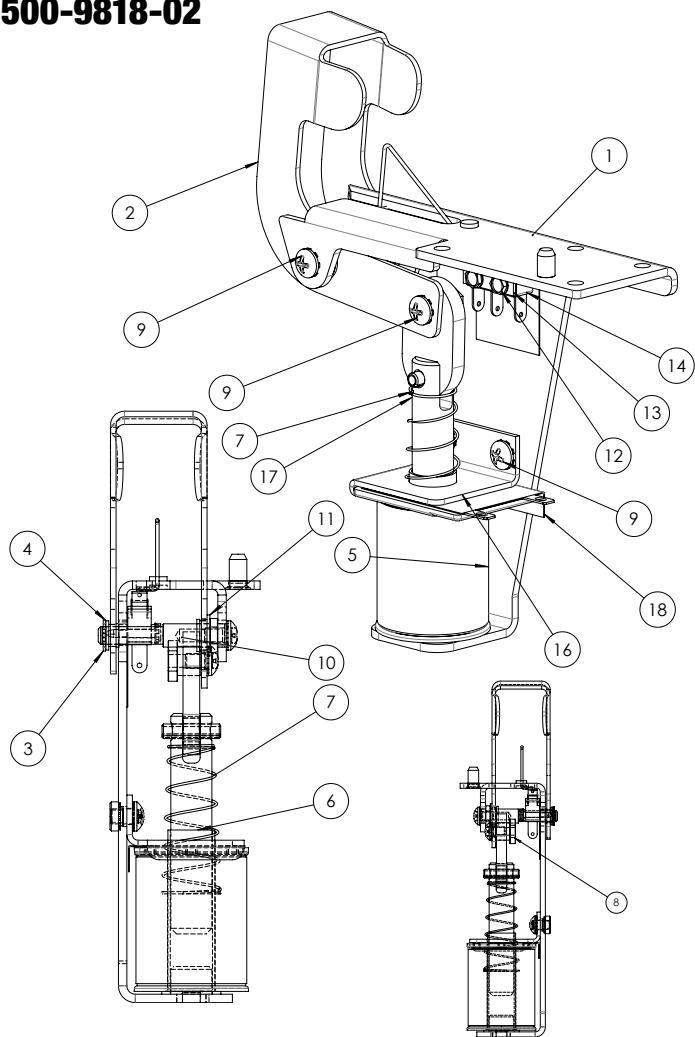
ID	Part Number	Description	Qty
1	515-9689-01	MAIN BRKT: AUTO-PLUNGER	1
2	535-0728-00	KICKER ARM, AUTO-PLUNGER	1
3	270-5001-00	RETAINING E-RING, 3/16" SHAFT OD	1
4	545-5352-00	NYLINER, 3/16" SHAFT	1
5	090-5001-ND	COIL - 23-800, NO DIODE	1
6	545-5411-00	COIL SLEEVE	1
7	266-5020-00	COMPRESSION SPRING-CONICAL	1
8	530-7834-00	PIN: KICKER ARM, AUTO-PLUNGER	1
9	232-5300-00	SCREW, 8-32 X 1/4" PPH SEMS	4
10	530-7835-00	PIVOT, AUTO-PLUNGER	1
11	545-5423-00	NYLINER, 1/4" SHAFT, 4L1-FF	1
12	237-5937-02	SCREW, 2-56 X 1/2" HWH MS	2
13	535-6539-00	SWITCH BODY PROTECT PLATE	1
14	180-5157-01	SHOOTER SWITCH - SHORT ARM	1
15	545-6268-00	FISCHE PAPER	1
16	535-0762-00	COIL BRACKET-AUTOPLUNGER	1
17	515-6304-03	PLUNGER / LINK ASSEMBLY	1
18	545-0762-00	FISCHE PAPER: AUTO-LAUNCHER	1

5.10 BALL TROUGH ASSEMBLY
500-9820-01

ID	Part Number	Description	Qty
1	515-7811-00	MAIN BRKT. BALL TROUGH	1
2	515-7812-00	COIL BRACKET, BALL TROUGH	1
3	237-5975-04	SCREW, 8-32 X 1/4" HWH SWAGE SERR	2
4	266-5020-00	COMPRESSION SPRING-CONICAL	1
5	535-5203-03	COIL RETAINING BRACKET	1
6	545-5076-01	COIL SLEEVE	1
7	240-5102-00	8-32 NYLON LOCK NUT	4
8	545-5105-00	RUBBER BUMPER	1
9	515-7309-01	PLUNGER ASSEMBLY	1
10	237-5909-00	SCREW, 4-40 X 1/4" PPH SEMS	4
11	520-5344-00	TROUGH BOARD #1 - ILED TRANSMITTER	1
12	520-8516-00	TROUGH BOARD #2 - RECEIVER	1
13	090-5004-ND	COIL 27-1500 - NO DIODE	1
98*	605-5006-00	SHRINK TUBING 1/8"	.42 FT.
99*	036-5611-11-F5	CABLE TROUGH OPTOS	1

5.11 SLINGSHOT ASSEMBLY
500-9920-01

ID	Part Number	Description	Qty
1	515-5339-01	SLINGSHOT BRACKET ASSEMBLY	1
2	090-5044-ND	COIL 26-1200 - NO DIODE	1
3	545-5031-00	COIL SLEEVE	1
4	535-5203-03	COIL RETAINER BRACKET	1
5	232-5301-00	8-32 X 3/8 PPH MS EXT SEMS ZC	2
6	180-5231-00	SWITCH SLING SHOT 2 LUG CENTER	2
7	535-5045-00	SWITCH PLATE	2
8	237-5976-04	6-32 X 5/8 SLOT SER HWH SW	4
9	515-5340-01	ARM & TIP ASSEMBLY	1
10	270-5002-00	RETAINING RING - 1/4 DIA	2
11	515-5338-00	PLUNGER & LINK ASSEMBLY	1
12	266-5020-00	COMP SPRING CONICAL	1
13	036-5604-00	4" GENERIC JUMPER	2

5.12 FLIPPER ASSEMBLY, LEFT
500-6543-12-ND
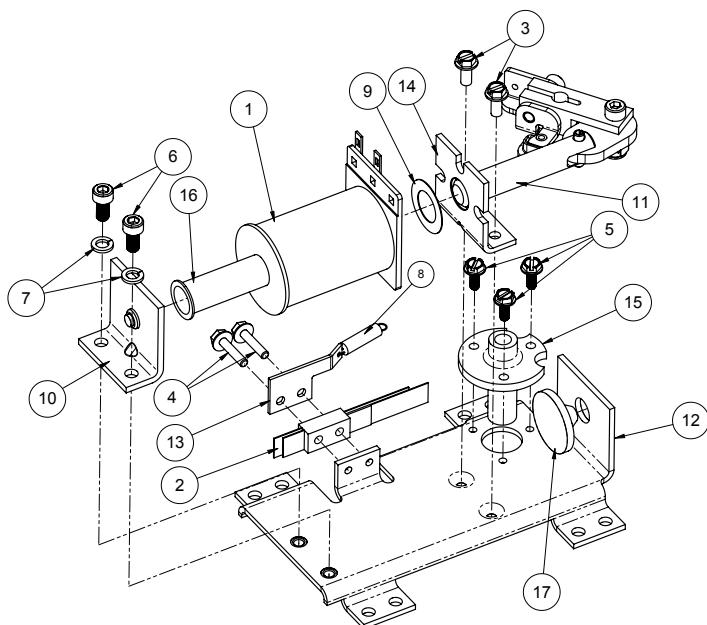
5.13 FLIPPER ASSEMBLY, RIGHT
500-6543-02-ND

ID	Part Number	Description	Qty
1	090-5032-ND	FLIPPER COIL	1
2	180-5149-00	SWITCH, END-OF-STROKE	1
3	237-5975-00	SCREW, 8-32 X 3/8" HWH SWAGE ZN	2
4	237-5976-04	SCREW, 6-32 X 5/8" HWH SWAGE	2
5	237-6388-00	SCREW, 6-32 X 3/8", SLOTTED HWH, TYPE F	3
6	237-6389-00	SCREW, 10-32 X 3/8", SHC	2
7	244-5003-00	#10 LOCK WASHER, SPLIT	2
8	265-5035-00	EXTENSION SPRING	1
9	269-5002-00	SPRING WASHER	1
10	515-6308-01	COIL STOP ASSEMBLY	1
11	515-7203-01	PLUNGER / CRANK ASSEMBLY	1
12	535-7275-01	FLIPPER BASE PLATE, LEFT	1
13	535-7354-01	SWITCH PLATE / SPRING RTN BRKT	1
14	535-7356-00	COIL BRACKET	1
15	545-5070-00	FLIPPER BUSHING	1
16	545-5388-00	COIL SLEEVE	1
17	545-5428-00	RUBBER BUMPER	1

ID	Part Number	Description	Qty
1	090-5032-ND	FLIPPER COIL	1
2	180-5149-00	SWITCH, END-OF-STROKE	1
3	237-5975-00	SCREW, 8-32 X 3/8" HWH SWAGE ZN	2
4	237-5976-04	SCREW, 6-32 X 5/8" HWH SWAGE	2
5	237-6388-00	SCREW, 6-32 X 3/8", SLOTTED HWH, TYPE F	3
6	237-6389-00	SCREW, 10-32 X 3/8", SHC	2
7	244-5003-00	#10 LOCK WASHER, SPLIT	2
8	265-5035-00	EXTENSION SPRING	1
9	269-5002-00	SPRING WASHER	1
10	515-6308-01	COIL STOP ASSEMBLY	1
11	515-7203-00	PLUNGER / CRANK ASSEMBLY	1
12	535-7275-00	FLIPPER BASE PLATE, RIGHT	1
13	535-7354-00	SWITCH PLATE / SPRING RTN BRKT	1
14	535-7356-00	COIL BRACKET	1
15	545-5070-00	FLIPPER BUSHING	1
16	545-5388-00	COIL SLEEVE	1
17	545-5428-00	RUBBER BUMPER	1

5.14 POP BUMPER ASSEMBLY
516-6784-XX
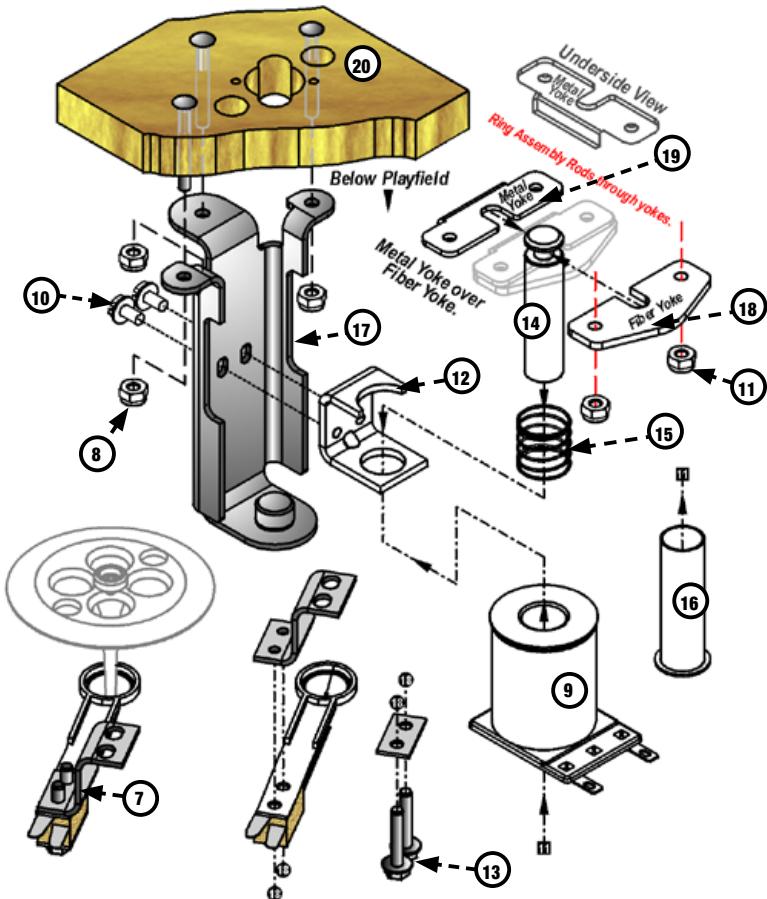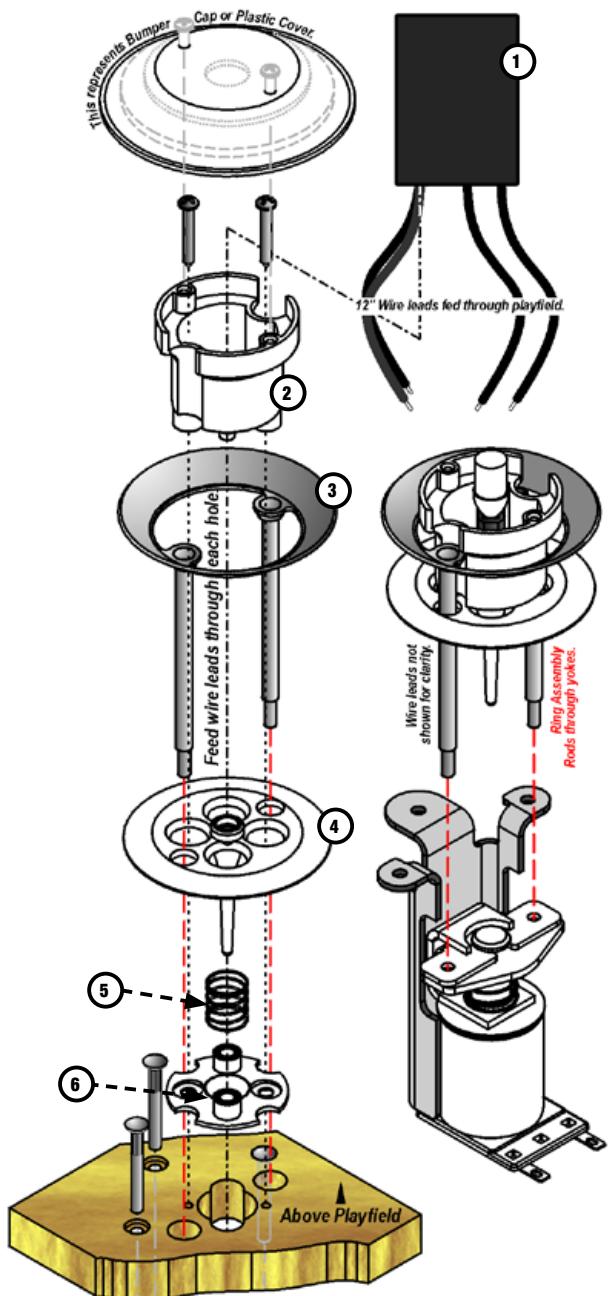
Part Number	Description	Qty
515-6459-01L	BUMPER/RING TOP ASSY, W/ LED 1	1
515-6459-04-ND	BUMPER BOTTOM ASSY, NO DIODE	1

ID	Part Number	Description	Qty
7	500-9934-01	POP BUMPER SWITCH ASSY-2 - LUG-LEFT	1
8	240-5005-00	6-32 NYLON STOP NUT	3
9	090-5044-ND	COIL - 26-1200	1
10	237-5976-01	#6-32 X 1/4" SHWH SWAGE ZN	2
11	240-5005-00	#6-32 NYLON STOP NUT	2
12	535-7347-00	METAL YOKE STOP	1
13	234-5101-00	* 8 X 1/2 SLT	6
14	530-5348-00	PLUNGER, POP BUMPER	1
15	266-5047-00	COMPRESSION SPRING, POP BUMPER	1
16	545-5031-00	COIL SLEEVE	1
17	515-5939-00	COIL BRACKET POP BUMPER ASSY	1
18	545-5609-00	FIBER YOKE	1
19	535-7346-00	METAL YOKE	1
20	237-5957-00	#6-32 x 1-3/16" SPIRAL FIN SHANK SCREW	3

ID	Part Number	Description	Qty
1	520-5307-03	POP BUMPER LED MODULE	1
2	545-5197-00	BUMPER BODY	1
3	515-5085-00	RING AND ROD ASSY	1
4	545-5607-00	BUMPER SKIRT	1
5	266-5048-00	BUMPER SKIRT COMP SPRING	1
6	545-5195-00	BUMPER BASE	1

5.15 BOTTOM ARCH ASSEMBLY
500-2512-XX
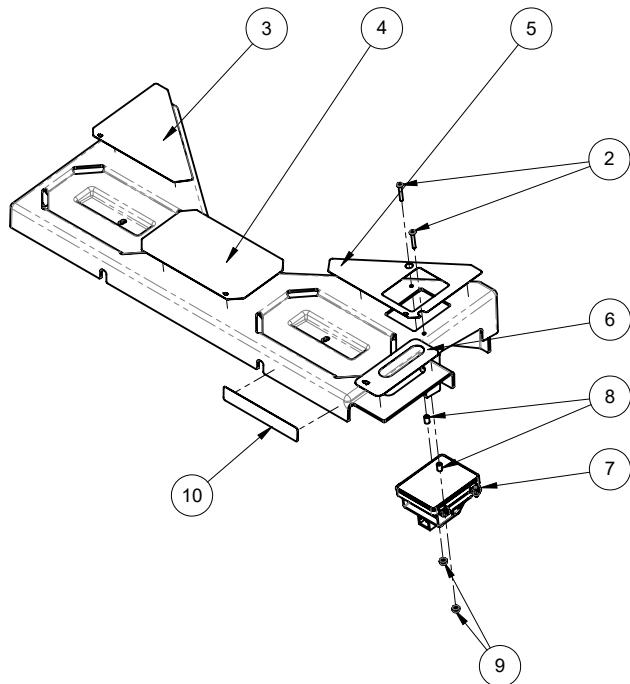
5.16 BALL LOCK BASE ASSEMBLY
511-5313-00
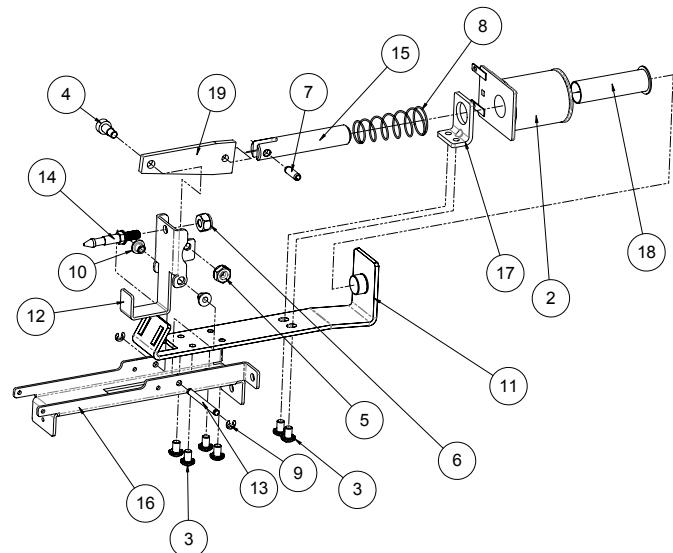
ID	Part Number	Description	Qty
1	545-1238-00	BOTTOM ARCH, PLASTIC, QR READY, W/ FLASHER HOLES	1
2	237-5887-01	SCREW, 4-40 X 3/4" PPH MS BLACK	2
3	820-96XX-01	PLASTIC ARCH DECAL SET -01	1
4	820-96XX-02	PLASTIC ARCH DECAL SET -02	1
5	820-96XX-03	PLASTIC ARCH DECAL SET -03	1
6	820-96XX-04	PLASTIC ARCH DECAL SET -04	1
7	509-2020-00	QR SCANNER M306 ASSEMBLY	1
8	254-5090-04	PLASTIC SPACER #4 SCREW, 3/16" OD - 9/32" LENGTH	2
9	240-5303-00	4-40 NYLON LOCK NUT	2
10	820-5422-00	WARNING DECAL, BOTTOM ARCH, QR READER	1

ID	Part Number	Description	Qty
1	000-0632-00	LOCTITE THREAD LOCK 243 "BLUE MED STR"	AR
2	090-5044-ND	COIL 26-1200 - NO DIODE	1
3	232-5300-00	SCREW, 8-32 X 1/4" PPH SEMS	6
4	237-6192-00	8-32 X 3/16 X 1/4 SHOULDER SCREW	1
5	240-5104-00	8-32 KEPS NUT	1
6	240-5203-00	10-32 NYLON LOCK NUT	1
7	251-5015-00	SPRING PIN 5/32D X 1/2"	1
8	266-5020-01	COMPRESSION SPRING-CONICAL	1
9	270-5000-00	RETAINING E-RING, 1/8" SHAFT OD	2
10	280-5042-00	FLANGED BUSHING, 1/8" ID	2
11	515-2474-00	LOCK COIL BRACKET: VENOM	1
12	515-2475-00	LOCK GATE	1
13	530-1032-17	PIVOT PIN .125" DIA - 1.188" LENGTH	1
14	530-5005-01	MINI-POST (MACHINE THREAD)	1
15	530-5349-01	FLIPPER PLUNGER	1
16	535-2696-02	LOCK PLATE: VENOM	1
17	535-5203-03	COIL RETAINING BRACKET	1
18	545-5411-00	COIL SLEEVE	1
19	546-5008-00	LOCK LINKAGE	1

5.17 BALL LOCK COVER ASSEMBLY, LEFT

511-3063-00

ID	Part Number	Description	Qty
1	237-5887-01	SCREW, 4-40 X 3/4" PPH MS BLACK	2
2	240-5303-00	4-40 NYLON LOCK NUT	6
3	254-5090-03	PLASTIC SPACER #4 SCREW, 3/16" OD - 1/8" LENGTH	4
4	535-2696-03	BALL LOCK COVER	1
5	535-2846-00	LEFT LOCK BB BRACKET: VENOM	1
6	520-5377-00	3 OPTO EMITTER PCA	1
7	520-5378-00	3 OPTO RECEIVER PCB	1
8	520-8581-00	LOCK 3 LED: VENOM	1
9	830-1159-23	PLASTIC: VENOM -23	1
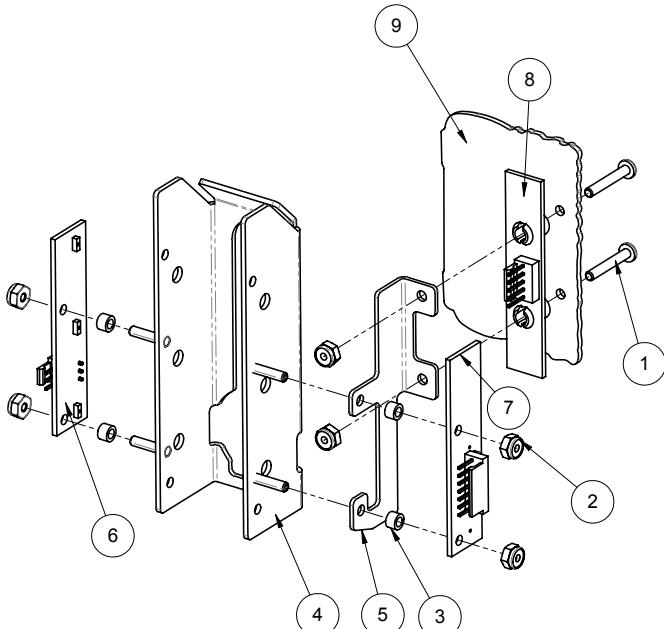
5.18 BALL LOCK COVER ASSEMBLY, RIGHT

511-3064-00

ID	Part Number	Description	Qty
1	232-5202-00	SCREW, 6-32 X 1/2" PPH MS SEMS	1
2	237-5887-01	SCREW, 4-40 X 3/4" PPH MS BLACK	2
3	240-5005-00	6-32 NYLON STOP NUT	1
4	240-5303-00	4-40 NYLON LOCK NUT	6
5	254-5090-03	PLASTIC SPACER #4 SCREW, 3/16" OD - 1/8" LENGTH	4
6	520-5377-00	3 OPTO EMITTER PCA	1
7	520-5378-00	3 OPTO RECEIVER PCB	1
8	511-0016-00	SINGLE FLASH LED BOARD W/ CABLE	1
9	520-8581-00	LOCK 3 LED: VENOM	1
10	535-2696-03	BALL LOCK COVER	1
11	535-2847-00	RIGHT LOCK BB BRACKET: VENOM	1
12	550-5031-02	MINI MARS W/ EARS - RED SB	1
13	830-1159-22	PLASTIC: VENOM -22	1
14	830-8549-81	PLASTIC: VENOM -81	1
15	040-5001-00	BLACK CABLE TIE	1

5.19 RATCHET MECH ASSEMBLY
500-2661-00
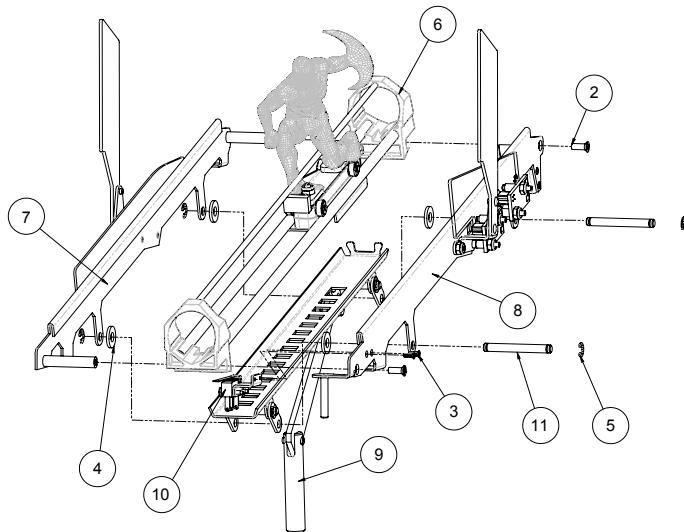
ID	Part Number	Description	Qty
1	000-0632-00	LOCTITE THREAD LOCK 243 "BLUE MED STR"	AR
2	237-5871-00	SCREW, 6-32 X 3/8" PFH 82° U/C ZINC	2
3	237-6366-00	SCREW, 2-56 x 1/4" PFH MS	2
4	242-5003-00	#10 FLAT WASHER - 1/2" O.D. X .062 THICK	4
5	270-5001-00	RETAINING E-RING, 3/16" SHAFT OD	4
6	511-2482-01	RATCHET RAIL ASSEMBLY	1
7	511-2482-02	RATCHET LEFT PLATE ASSEMBLY	1
8	511-2482-03	RATCHET RIGHT PLATE ASSEMBLY	1
9	511-2482-04	RATCHET BOTTOM PLATE ASSEMBLY	1
10	511-2482-05	RATCHET HOME SWITCH ASSEMBLY	1
11	530-7812-02	PIVOT PIN-.188 DIA.	2

5.20 CARNAGE CARRIER ASSEMBLY
511-2482-00
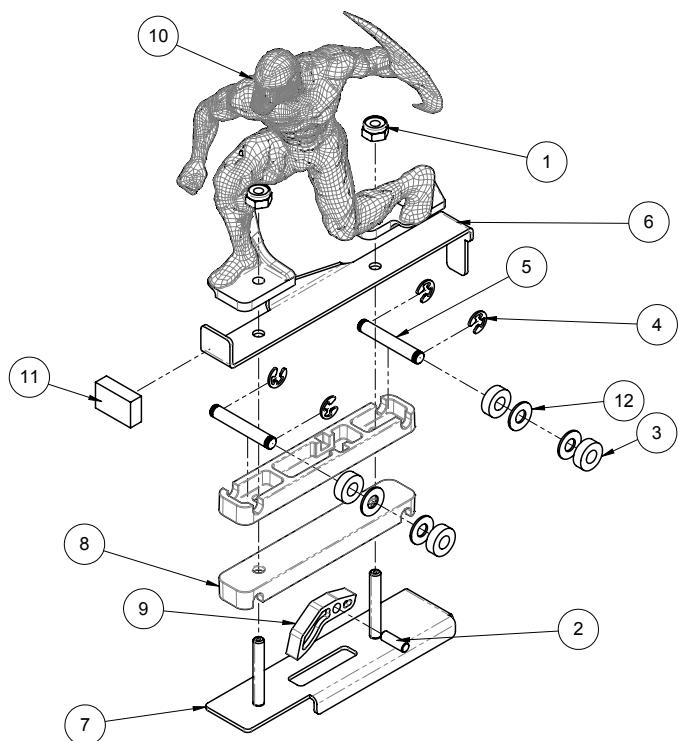
ID	Part Number	Description	Qty
1	240-5005-00	6-32 NYLON STOP NUT	2
2	251-5048-00	.125 DOWEL PIN .375 LG.	1
3	254-5000-19	NYLON SPACER - BLACK - 3/8 OD X .175 ID X 1/8"	4
4	270-5021-15	RETAINING RING, 5/32", 5133-15	4
5	530-2739-00	RATCHET AXLE: VENOM	2
6	535-2821-00	CARRIAGE TOP PLATE: VENOM	1
7	535-2871-00	CARRIAGE BOTTOM PLATE: VENOM	1
8	544-1319-00	RATCHET SLED: VENOM	2
9	544-1329-00	RATCHET PAWL: VENOM	1
10	545-6853-00	CARNAGE	1
11	626-5078-00	3/16" FOAM PAD	1
12	242-5082-00	11/64" ID X 3/8" OD X .031 FIBER WASHER	4

5.21 RATCHET COIL ASSEMBLY
511-2032-00

ID	Part Number	Description	Qty
1	000-0632-00	LOCTITE THREAD LOCK 243 "BLUE MED STR"	AR
2	090-5044-ND	COIL 26-1200 - NO DIODE	1
3	232-5300-00	SCREW, 8-32 X 1/4" PPH SEMS	2
4	515-2199-00	DOWN POST BRKT ASM	1
5	535-5203-03	COIL RETAINING BRACKET	1
6	545-5411-00	COIL SLEEVE	1
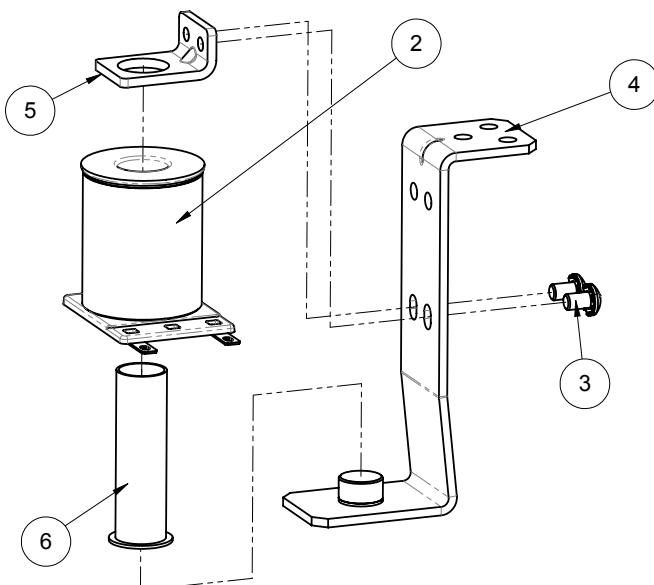
5.22 RATCHET RAIL ASSEMBLY
511-2482-01

ID	Part Number	Description	Qty
1	544-1318-00	RATCHET, END CAP: VENOM	2
2	530-2733-00	CARNAGE, BOTTOM RAIL: VENOM	2
3	530-2734-00	RATCHET TOP RAIL: VENOM	1
4	511-2482-00	CARNAGE CARRIER ASSEMBLY	1

5.23 RATCHET LEFT PLATE ASSEMBLY
511-2482-02
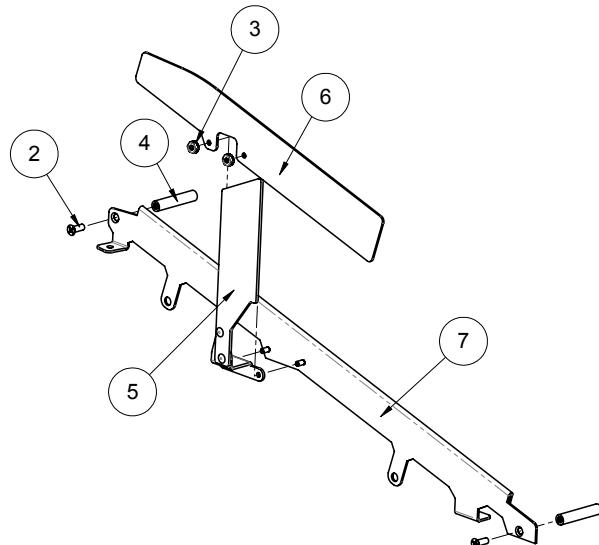
ID	Part Number	Description	Qty
1	000-0632-00	LOCTITE THREAD LOCK 243 "BLUE MED STR"	AR
2	237-5871-00	SCREW, 6-32 X 3/8" PFH 82° U/C ZINC	2
3	240-5318-00	4-40 KEPS NUT	2
4	254-5423-00	STANDOFF 6-32 X 1/4 OD X 1.25 L	2
5	510-5805-19	PLASTIC RIVETED ASM: VENOM -19	1
6	535-2693-41	BALL GUIDE: VENOM -41	1
7	535-2730-00	RATCHET - LEFT PLATE: VENOM	1

5.24 RATCHET RIGHT PLATE ASSEMBLY
511-2482-03
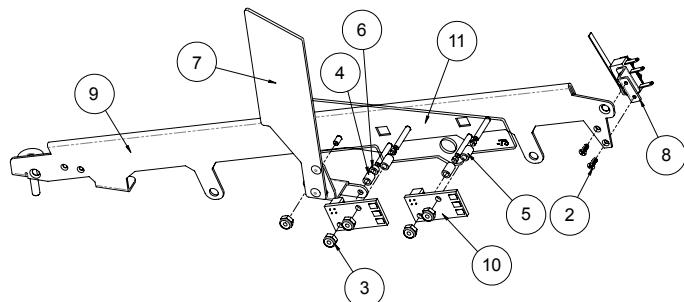
ID	Part Number	Description	Qty
1	000-0632-00	LOCTITE THREAD LOCK 243 "BLUE MED STR"	AR
2	237-6366-00	2-56 x 1/4" PFH MS	2
3	240-5303-00	4-40 NYLON LOCK NUT	5
4	254-5090-05	PLASTIC SPACER #4 SCREW, 3/16" OD - 7/32" LENGTH	1
5	254-5090-07	PLASTIC SPACER #4 SCREW, 3/16" OD - 19/64" LENGTH	3
6	254-5090-08	PLASTIC SPACER #4 SCREW, 3/16" OD - 3/32" LENGTH	1
7	510-5805-20	PLASTIC RIVETED ASM: VENOM -20	1
8	511-2482-06	RATCHET AWAY SWITCH ASSEMBLY	1
9	515-2731-00	RATCHET - RIGHT PLATE: VENOM	1
10	520-8541-00	SPINNER REFLECTICE OPTIC PCA	2
11	830-1159-73	PLASTIC: VENOM -73	1

5.25 RATCHET BOTTOM PLATE ASSEMBLY

511-2482-04
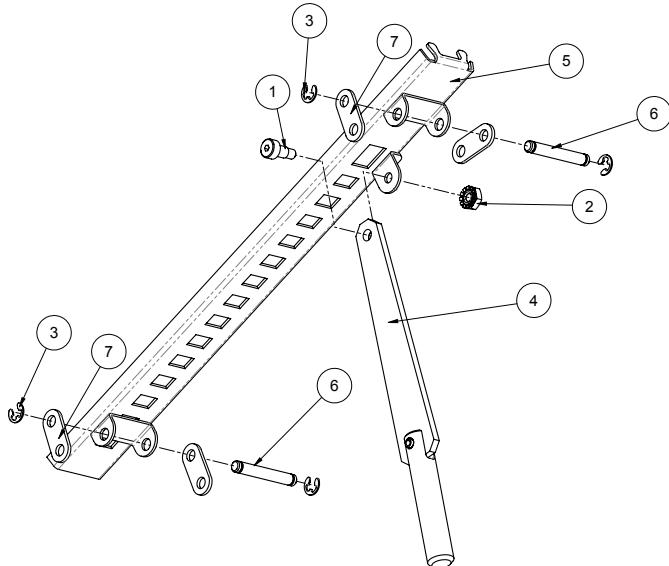
ID	Part Number	Description	Qty
1	237-6192-00	8-32 X 3/16 X 1/4 SHOULDER SCREW	1
2	240-5104-00	8-32 KEPS NUT	1
3	270-5001-00	RETAINING E-RING, 3/16" SHAFT OD	4
4	511-2482-07	RATCHET COIL LINK ASSEMBLY	1
5	515-2732-00	RATCHET RAIL: VENOM	1
6	530-7812-19	PIVOT PIN-.188 DIA.	2
7	535-2736-00	RATCHET LINKAGE: VENOM	4

5.26 RATCHET HOME SWITCH ASSEMBLY

511-2482-05
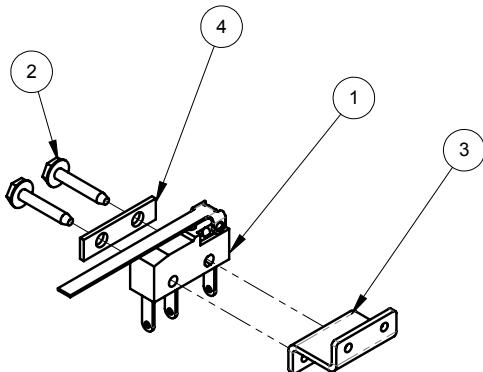
ID	Part Number	Description	Qty
1	180-5010-02	MICRO-SWITCH	1
2	237-5937-02	SCREW, 2-56 X 1/2" HWH MS	2
3	535-2735-00	RATCHET SWITCH BRACKET: VENOM	1
4	535-6539-00	SWITCH BODY PROTECT PLATE	1

5.27 RATCHET AWAY SWITCH ASSEMBLY

511-2482-06
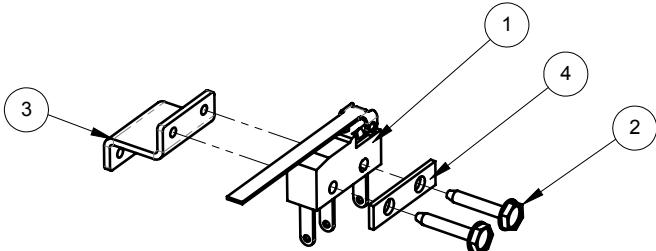
ID	Part Number	Description	Qty
1	180-5010-02	MICRO-SWITCH	1
2	237-5937-02	SCREW, 2-56 X 1/2" HWH MS	2
3	535-2735-00	RATCHET SWITCH BRACKET: VENOM	1
4	535-6539-00	SWITCH BODY PROTECT PLATE	1

5.28 RATCHET COIL LINK SWITCH ASSEMBLY

511-2482-07
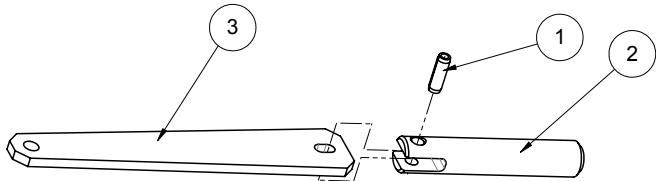
ID	Part Number	Description	Qty
1	251-5015-00	SPRING PIN 5/32D X 1/2"	1
2	530-5349-01	FLIPPER PLUNGER	1
3	546-2737-00	RATCHET COIL LINK: VENOM	1

MARVEL
© MARVEL

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5.29 BELL TOWER ASSEMBLY
511-2027-01

ID	Part Number	Description	Qty
1	000-0632-00	LOCTITE THREAD LOCK 243 "BLUE MED STR"	AR
2	040-5001-02	CABLE TIE, BLACK	1
3	237-5909-00	SCREW, 4-40 X 1/4" PPH SEMS	1
4	237-6331-00	SCREW, 4-40 X 1/4" PPH MS BLACK	6
5	237-6350-00	SCREW, 4-40 X 5/16" PPH SEMS BLACK	2
6	240-5303-00	4-40 NYLON LOCK NUT	2
7	254-5090-02	PLASTIC SPACER #4 SCREW, 3/16" OD - 1/4" LENGTH	2
8	515-0215-00	LONG RANGE OPTO EMITTER ASSEMBLY	1
9	520-7000-00	SINGLE FLASH LED BOARD	1
10	520-8457-00	PCB, SINGLE FLOOD LED - RED	1
11	535-2693-33	BELL TOWER FRONT LEFT	1
12	535-2693-34	BELL TOWER BACK RIGHT	1
13	535-2693-35	BELL TOWER ROOF	1
14	535-2875-00	TOWER BOTTOM, VENOM	1
15	535-8883-00	OPTO BRKT, TOWER: VENOM	1
16	820-5471-34A	DECAL: VENOM -34A	1
17	820-5471-34B	DECAL: VENOM -34B	1
18	820-5471-35A	DECAL: VENOM -35A	1
19	820-5471-35B	DECAL: VENOM -35B	1
20	820-5471-36A	DECAL: VENOM -36A	1
21	820-5471-36B	DECAL: VENOM -36B	1
22	820-5471-36C	DECAL: VENOM -36C	1
23	820-5471-36D	DECAL: VENOM -36D	1
24	887-5002-00	BELL TOWER BELL	1

5.30 BALL GUIDE WITH GATE ASSEMBLY
511-5326-01
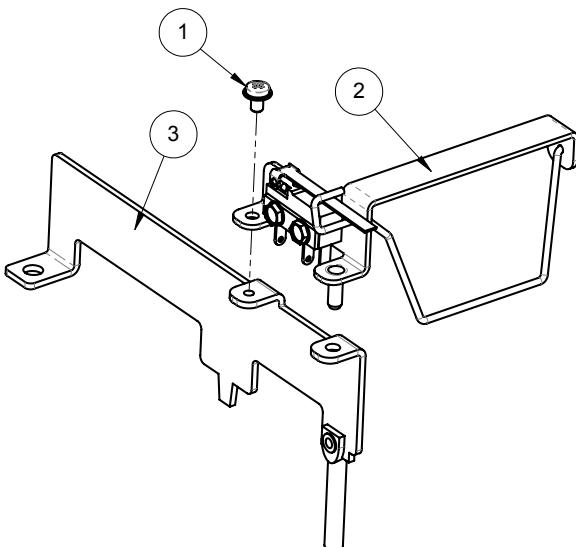
ID	Part Number	Description	Qty
1	237-5884-00	SCREW, 4-40 X 3/16" PPH SEMS	1
2	511-5325-00	ROLLUNDER GATE ASSEMBLY: VENOM	1
3	535-2693-25	BALL GUIDE: VENOM -25	1

5.31 ROLLUNDER GATE ASSEMBLY
511-5325-00
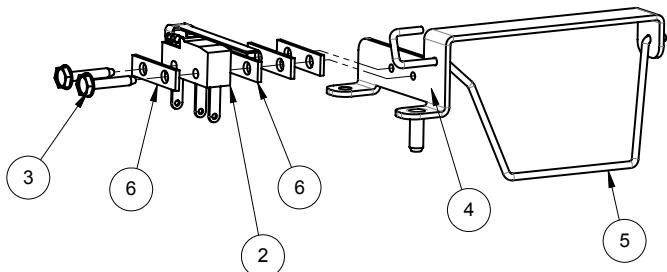
ID	Part Number	Description	Qty
1	180-5010-04	MICRO-SWITCH	1
2	511-0015-00	MICRO-SWITCH WITH CABLE ATTACHED	1
3	237-5937-02	SCREW, 2-56 X 1/2" HWH MS	2
4	535-2843-00	BRACKET, ROLLUNDER GATE TOP REAR SWITCH	1
5	535-2844-00	WIRE, ROLLUNDER GATE: VENOM	1
6	535-6539-00	SWITCH BODY PROTECT PLATE	4

5.32 TOP POST ASSEMBLY
500-9988-00

ID	Part Number	Description	Qty
1	000-0632-00	LOCTITE THREAD LOCK 243 "BLUE MED STR"	AR
2	000-5093-00	LOCTITE THREAD LOCK 425 "DARK BLUE CYANOACRYLATE"	AR
3	511-0014-00	COIL 26-1200 WITH CABLE ATTACHED	1
4	232-5300-00	SCREW, 8-32 X 1/4" PPH SEMS	3
5	232-5303-00	SCREW, #8-32 X 5/8" PPH MS SEMS	1
6	232-5401-00	SCREW, 10-32 X 3/8 PPH SEMS	1
7	237-5997-01	4-40 X 1/2 PPH BLACK OXIDE	2
8	240-5102-00	8-32 NYLON LOCK NUT	1
9	254-5000-19	NYLON SPACER - BLACK - 3/8 OD X .175 ID X 1/8"	1
10	266-5020-00	COMPRESSION SPRING-CONICAL	1
11	511-8866-00	PLUNGER, PIN MECH	1
12	515-0215-00	LONG RANGE OPTO EMITTER ASSEMBLY	1
13	515-8866-03	1.155" Length with #10-32 Tap	1
14	535-2813-00	PLATE, PIN MECH	1
15	535-5203-03	COIL RETAINING BRACKET	2
16	545-5076-01	COIL SLEEVE	1

5.33 TOP POST OPTO RECEIVER ASSEMBLY
511-5965-18
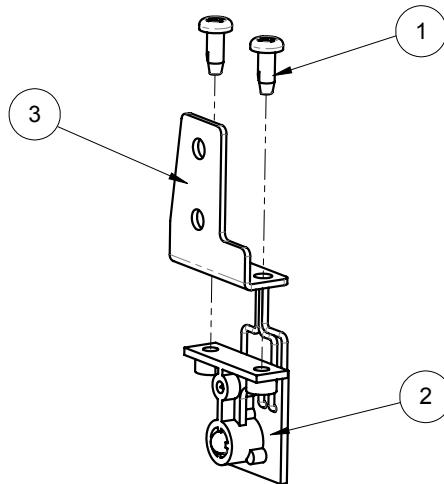
ID	Part Number	Description	Qty
1	237-5880-00	SCREW, #6 X 3/8 PPH T-25	2
2	515-0215-01	LONG RANGE OPTO RECEIVER ASSEMBLY	1
3	535-2693-18	BALL GUIDE: VENOM -18	1

5.34 PIN MECH PLUNGER ASSEMBLY
511-8866-00
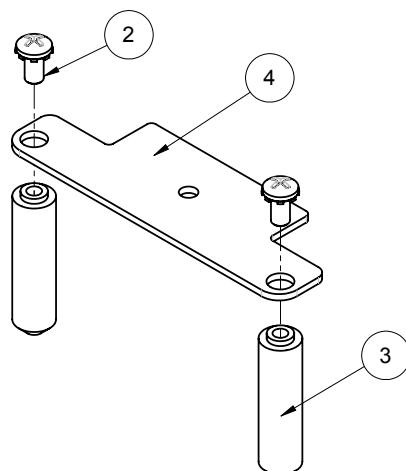
ID	Part Number	Description	Qty
1	000-5093-00	LOCTITE THREAD LOCK 425 "DARK BLUE CYANOACRYLATE"	AR
2	232-5401-00	SCREW, 10-32 X 3/8 PPH SEMS	2
3	530-8051-00	PIN, PIN MECH	2
4	535-2814-00	PIN LINK	1

5.35 VUK TROUGH ASSEMBLY
511-5314-01
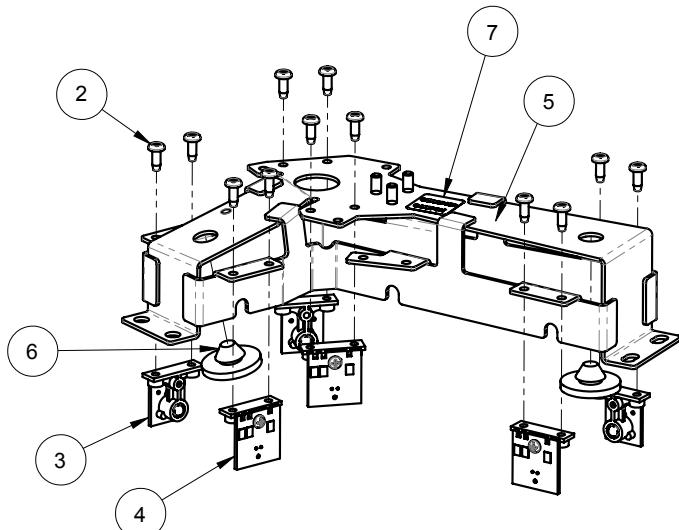
ID	Part Number	Description	Qty
1	000-0632-00	LOCTITE THREAD LOCK 243 "BLUE MED STR"	AR
2	237-5880-00	SCREW, #6 X 3/8 PPH T-25	12
3	515-0223-00	LONG RANGE OPTO EMITTER ASSEMBLY	3
4	515-0223-01	LONG RANGE OPTO RECEIVER ASSEMBLY	3
5	515-2473-00	VUK TROUGH: VENOM	1
6	545-5428-00	RUBBER BUMPER	2
7	820-7954-00	VENOM TROUGH LABEL	1

5.36 VUK COIL BRACKET ASSEMBLY
511-5329-00
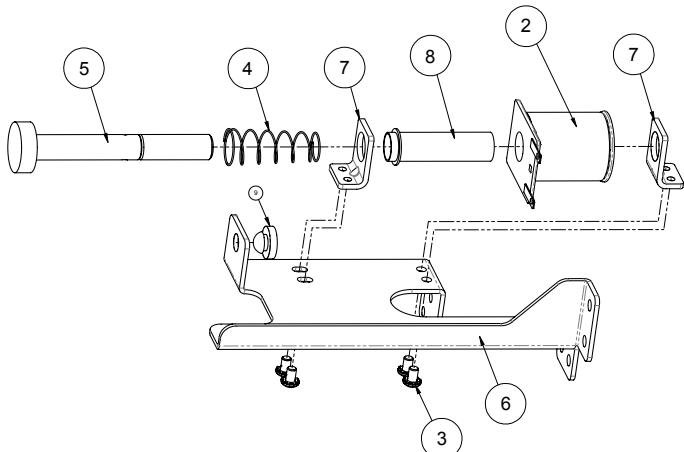
ID	Part Number	Description	Qty
1	000-0632-00	LOCTITE THREAD LOCK 243 "BLUE MED STR"	AR
2	090-5001-ND	090-5001-ND	1
3	232-5300-00	SCREW, 8-32 X 1/4" PPH SEMS	4
4	266-5020-00	COMPRESSION SPRING-CONICAL	1
5	515-5941-01	SOLID PLUNGER ASSEMBLY (WIDE)	1
6	535-4066-00	COIL BRACKET: VENOM VUK	1
7	535-5203-03	COIL RETAINING BRACKET	2
8	545-5076-01	COIL SLEEVE	1
9	545-5105-00	RUBBER BUMPER	1

5.37 VUK HOOD ASSEMBLY
511-2044-00
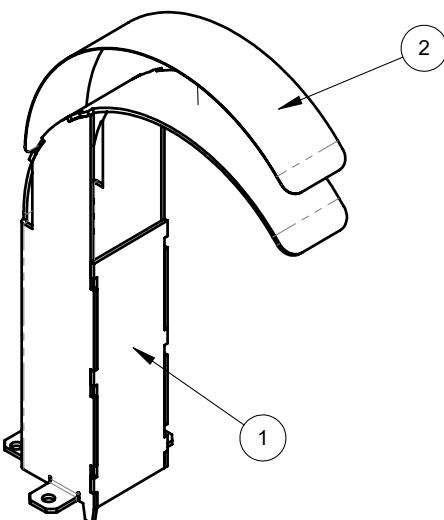
ID	Part Number	Description	Qty
1	515-2478-00	VUK HOOD: VENOM	1
2	820-5471-24	DECAL: VENOM -24	1

5.38 PLASTIC 06 ASSEMBLY
511-5966-06

ID	Part Number	Description	Qty
1	232-5202-00	SCREW, 6-32 X 1/2" PPH MS SEMS	1
2	237-5516-00	SCREW, 6-32 X 1-5/8" PPH	1
3	237-5871-01	SCREW, 6-32 X 1/4" PFH 82-DEG U/C ZINC	2
4	237-6331-00	SCREW, 4-40 X 1/4" PPH MS BLACK	1
5	237-6378-00	#6-32 X 3/8 PAN PHILLIPS w/DOUBLE SEMS	1
6	240-5005-00	6-32 NYLON STOP NUT	1
7	242-5001-00	#6 WASHER	4
8	242-5080-00	.137 I.D. X .25 O.D. X .010 THICK WHITE TEFLON WASHER	1
9	254-5000-05	NYLON SPACER - BLACK - 3/8 OD X .175 ID X 1-1/4"	1
10	254-5008-06	HEX SPACER - 1"	2
11	520-7000-00	SINGLE FLASH LED BOARD	1
12	535-1305-01	BRACKET - PLASTIC MTG - 110°	1
13	550-5031-02	MINI MARS W/ EARS - RED SB	1
14	830-1159-06	PLASTIC: VENOM -06	1
15	830-1159-10	PLASTIC: VENOM -10	1
16	830-1159-41	PLASTIC: VENOM -41	1
17	830-8549-80	PLASTIC: VENOM -80	1

5.39 PLASTIC 16 ASSEMBLY
511-5966-16

ID	Part Number	Description	Qty
1	237-5505-00	SCREW, 6-32 X 7/8" PPH MS	1
2	237-5510-00	SCREW, 6-32 X 1-1/2" PPH MS	1
3	240-5005-00	6-32 NYLON STOP NUT	2
4	242-5001-00	#6 WASHER	2
5	254-5000-01	NYLON SPACER - BLACK - 3/8 OD X .175 ID X 1/2"	2
6	254-5000-14	NYLON SPACER - BLACK - 3/8 OD X .175 ID X 5/8"	1
7	830-1159-16	PLASTIC: VENOM -16	1
8	830-1159-58	PLASTIC: VENOM -58	1

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5.40 PLASTIC 21 ASSEMBLY
511-5966-21
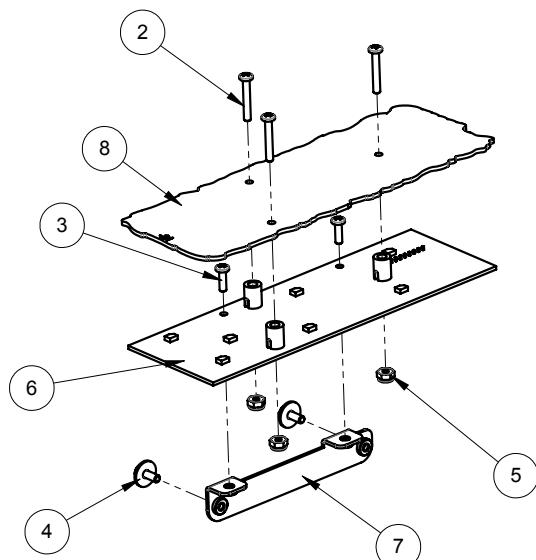
ID	Part Number	Description	Qty
1	000-0632-00	LOCTITE THREAD LOCK 243 "BLUE MED STR"	AR
2	237-5887-01	SCREW, 4-40 X 3/4" PPH MS BLACK	3
3	237-5997-00	SCREW, 4-40 X 3/8" PPH MS BLACK	2
4	237-6378-00	#6-32 X 3/8 PAN PHILLIPS w/DOUBLE SEMS	2
5	240-5303-00	4-40 NYLON LOCK NUT	3
6	520-8582-00	BILL BOARD PCA: VENOM	1
7	535-2693-23	BALL GUIDE: VENOM -23	1
8	830-1159-21	PLASTIC: VENOM -21	1

5.41 PLASTIC 26 ASSEMBLY
511-5966-26
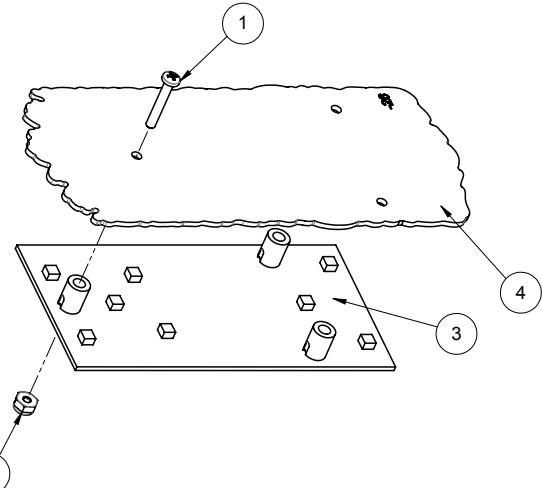
ID	Part Number	Description	Qty
1	237-5887-01	SCREW, 4-40 X 3/4" PPH MS BLACK	1
2	240-5303-00	4-40 NYLON LOCK NUT	1
3	520-8583-00	HOST SIGN PCA: VENOM	1
4	830-1159-26	PLASTIC: VENOM -26	1

5.42 PLASTIC 51 ASSEMBLY
511-5966-51
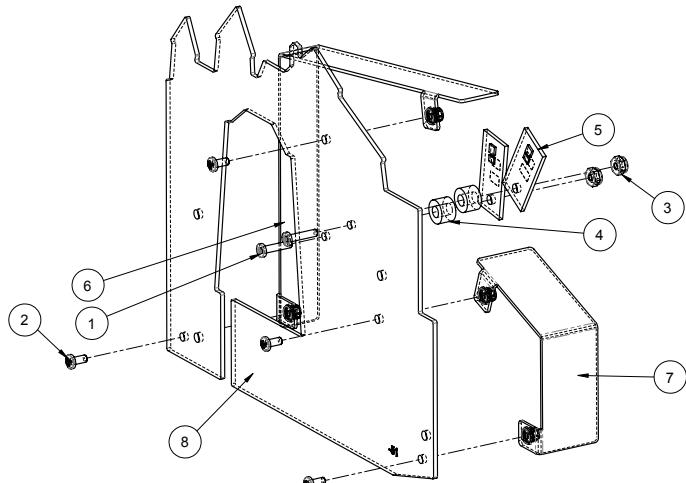
ID	Part Number	Description	Qty
1	237-5816-01	SCREW, 4-40 X 1/2" PPH BLACK	2
2	237-6331-00	SCREW, 4-40 X 1/4" PPH MS BLACK	4
3	240-5303-00	4-40 NYLON LOCK NUT	2
4	254-5000-09	NYLON SPACER - BLACK - 3/8 OD X .175 ID X 1/4"	2
5	520-7000-00	SINGLE FLASH LED BOARD	2
6	535-2693-38	BALL GUIDE: VENOM -38	1
7	535-2693-39	BALL GUIDE: VENOM -39	1
8	830-1159-51	PLASTICS: VENOM -51	1

5.43 PLASTIC 54 ASSEMBLY
511-5966-54
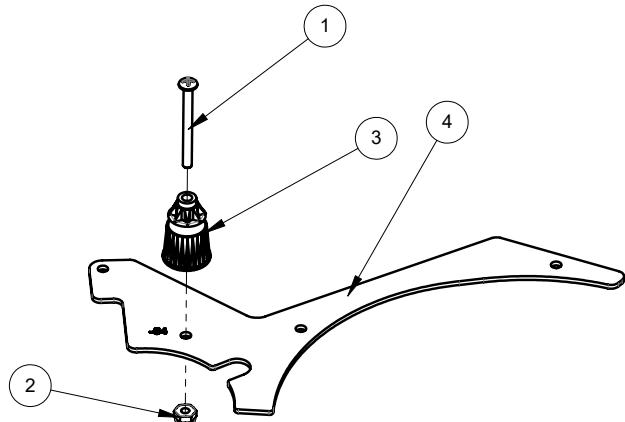
ID	Part Number	Description	Qty
1	237-5510-00	SCREW, 6-32 X 1-1/2" PPH MS	1
2	240-5005-00	6-32 NYLON STOP NUT	1
3	550-5034-01	GROOVED JEWEL PLASTIC POST, CLEAR	1
4	830-1164-54	PLASTIC: VENOM -54	1

5.44 PLASTIC 56 ASSEMBLY
511-5966-56
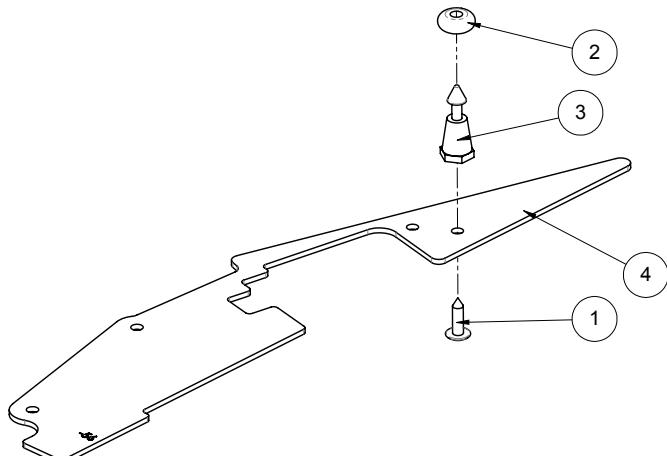
ID	Part Number	Description	Qty
1	237-5809-00	SCREW, #6 X 1/2" PTH A	1
2	545-5348-17	7/16 O.D. RUBBER RING - BLACK	1
3	550-5052-01	MINI POST - CLEAR	1
4	830-1164-56	PLASTIC: VENOM -08	1

5.45 PLASTIC 68 ASSEMBLY
511-5966-68
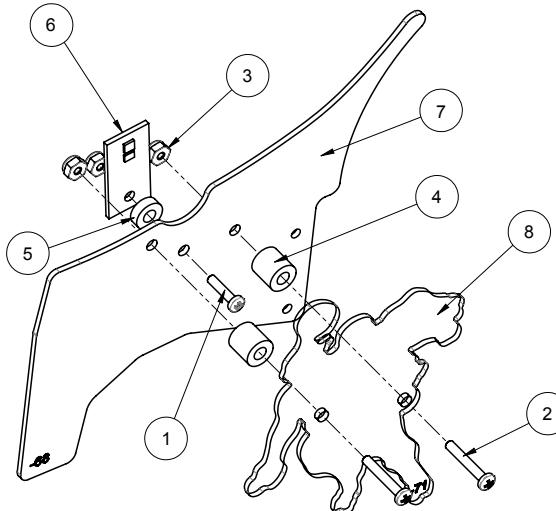
ID	Part Number	Description	Qty
1	237-5816-01	SCREW, 4-40 X 1/2" PPH BLACK	1
2	237-5887-01	SCREW, 4-40 X 3/4" PPH MS BLACK	2
3	240-5303-00	4-40 NYLON LOCK NUT	3
4	254-5000-12	NYLON SPACER - BLACK - 3/8 OD X .175 ID X 3/8"	2
5	254-5000-19	NYLON SPACER - BLACK - 3/8 OD X .175 ID X 1/8"	1
6	511-0016-00	SINGLE FLASH LED BOARD WITH CABLE	1
7	830-1164-68	PLASTIC: VENOM -68	1
8	830-1164-71	PLASTIC: VENOM -71	1

5.46 PLASTIC 69 ASSEMBLY
511-5966-69
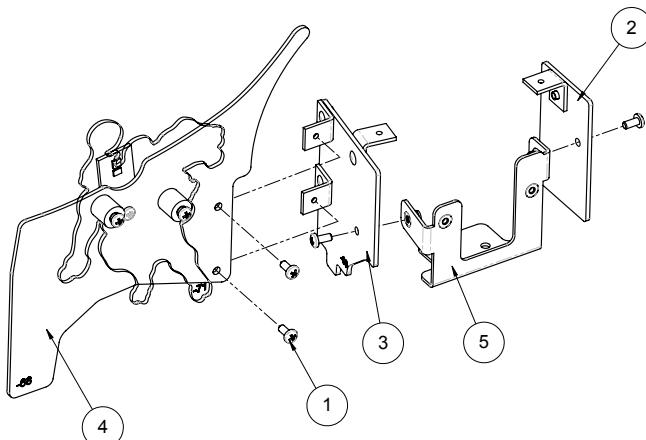
ID	Part Number	Description	Qty
1	237-6331-00	SCREW, 4-40 X 1/4" PPH MS BLACK	4
2	510-5805-59	PLASTIC RIVETED ASSM: VENOM -59	1
3	510-5805-69	PLASTIC RIVETED ASSM: VENOM -69	1
4	511-5966-68	PLASTIC ASSEMBLY: VENOM -68	1
5	535-2693-24	BALL GUIDE: VENOM -24	1

VENOM PRO MANUAL 500-55U1-01

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5.47 LEFT LOOP OPTO RECEIVER ASSEMBLY
511-2026-00
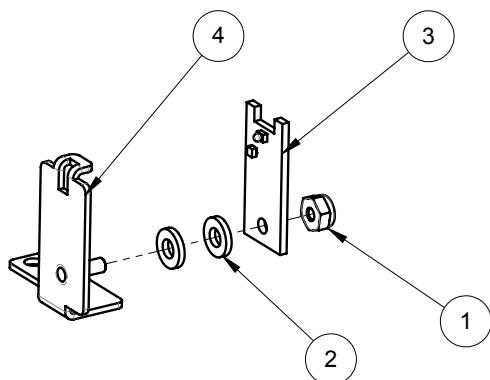
ID	Part Number	Description	Qty
1	240-5303-00	4-40 NYLON LOCK NUT	1
2	242-5079-00	WASHER, .150 I.D. X .312 O.D. X .050 THICK	2
3	520-8116-00	PCB, IR OPTO RECEIVER, ANTI-ROTATION	1
4	535-2693-17	OPTO BRKT - BIG SLOT	1

5.48 BALL GUIDE 10 ASSEMBLY
511-5965-10
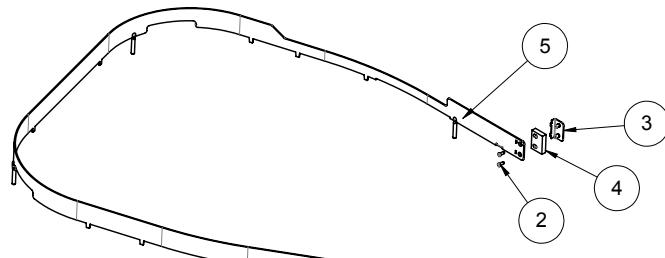
ID	Part Number	Description	Qty
1	000-0698-00	LOCTITE THREAD LOCK 222 "PURPLE LOW STR"	AR
2	237-6151-00	SCREW, 4-40 X 5/16" PFH U/C MS	2
3	535-1355-00	RIGHT RAMP EDGE PROTECTOR PRO	1
4	626-5057-01	GUIDE BUMPER	1
5	535-2693-10	BALL GUIDE: VENOM -10	1

5.49 BALL GUIDE 22 ASSEMBLY
511-5965-22
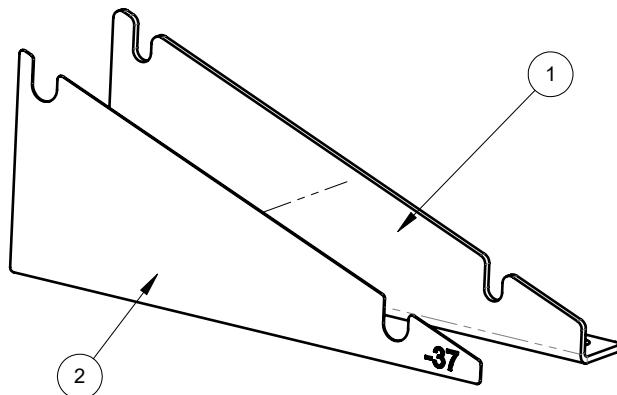
ID	Part Number	Description	Qty
1	535-2693-22	BALL GUIDE: VENOM -22	1
2	820-5471-37	DECAL: VENOM -37	1

5.50 LEFT RAMP ASSEMBLY
511-7304-00

ID	Part Number	Description	Qty
1	000-0632-00	LOCTITE THREAD LOCK 243 "BLUE MED STR"	1
2	232-5202-00	SCREW, 6-32 X 1/2" PPH MS SEMS	2
3	237-5909-00	SCREW, 4-40 X 1/4" PPH SEMS	4
4	240-5005-00	6-32 NYLON STOP NUT	2
5	510-5806-00	LEFT RAMP RIVETED ASSEMBLY: VENOM	1
6	511-3220-00	LEFT RAMP LEFT OPTO ASM: VENOM	1
7	511-3220-01	LEFT RAMP RIGHT OPTO ASM: VENOM	1
8	520-7000-00	SINGLE FLASH LED BOARD	1
9	535-2693-37	BALL GUIDE: VENOM -37	1
10	550-5031-02	MINI MARS W/ EARS - RED SB	1
11	820-5471-28	DECAL: VENOM -28	1
12	830-8549-83	PLASTIC: VENOM -83	1

5.51 LEFT RAMP OPTO ASSEMBLY, LEFT
511-3220-00
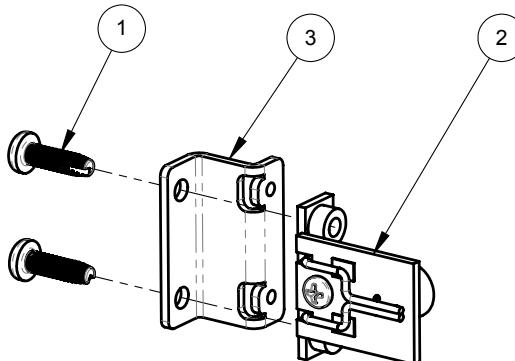
ID	Part Number	Description	Qty
1	237-5880-02	SCREW, #6 X 1/2 PPH T-25	2
2	515-0215-00	LONG RANGE OPTO EMITTER AS-SEMBLY	1
3	535-2693-40	BALL GUIDE: VENOM -40	1

5.52 LEFT RAMP OPTO ASSEMBLY, RIGHT
511-3220-01
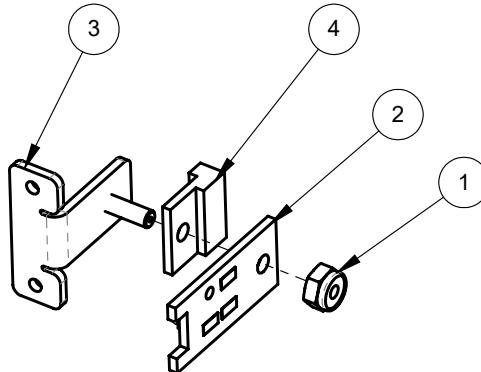
ID	Part Number	Description	Qty
1	240-5303-00	4-40 NYLON LOCK NUT	1
2	511-5815-01	ASSEMBLY, MINI-OPTO RECEIVER & CABLE	1
3	535-2693-42	BALL GUIDE: VENOM -42	1
4	545-2746-00	OPTO SPACER	1

5.53 CENTER RAMP ASSEMBLY
500-1199-00
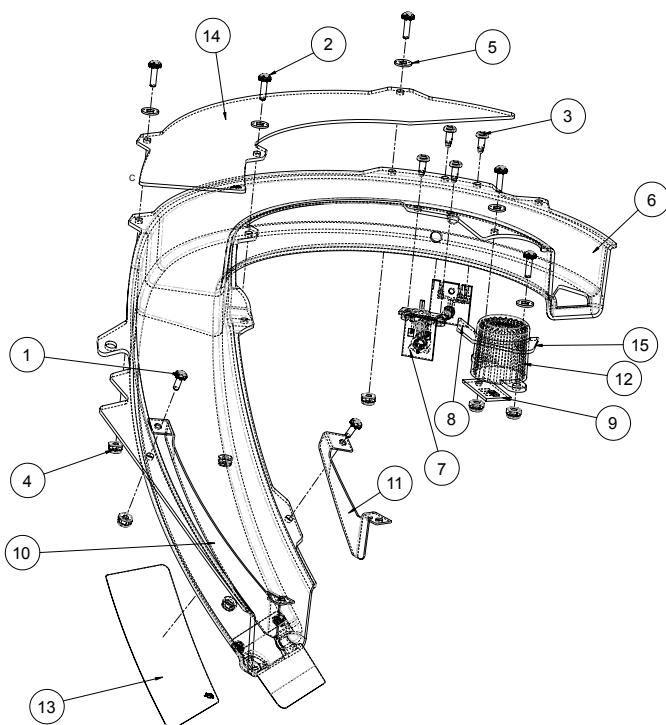
5.54 BACK PANEL ASSEMBLY
500-2605-01
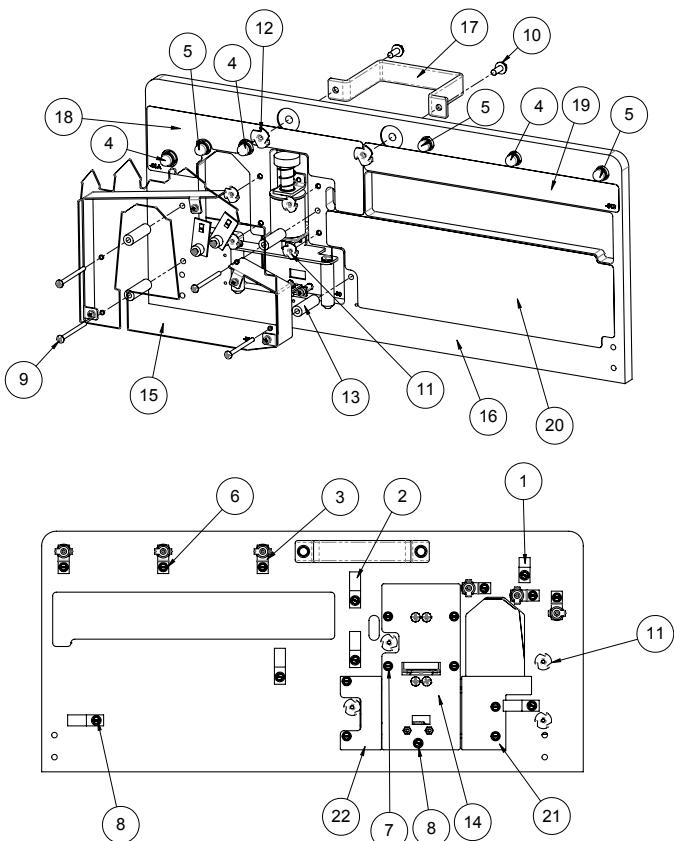
ID	Part Number	Description	Qty
1	232-5201-00	SCREW, 6-32 X 3/8" PPH MS SEMS	2
2	232-5202-00	SCREW, 6-32 X 1/2" PPH MS SEMS	5
3	237-5880-00	SCREW, #6 X 3/8 PPH T-25	4
4	240-5005-00	6-32 NYLON STOP NUT	7
5	242-5001-00	#6 WASHER	5
6	510-1046-00	RIVETED ASSY, CENTER RAMP: VENOM	1
7	515-0215-00	LONG RANGE OPTO EMITTER ASSEMBLY	1
8	515-0215-01	LONG RANGE OPTO RECEIVER ASSEMBLY	1
9	511-0016-00	SINGLE FLASH LED BOARD WITH CABLE	1
10	535-2693-13	RAMP PROTECTOR, CENTER RAMP, LEFT	1
11	535-2693-14	RAMP PROTECTOR, CENTER RAMP, RIGHT	1
12	550-5031-02	MINI MARS W/ EARS - RED SB	1
13	820-5479-29	UNDERRAMP DECAL: VENOM -29	1
14	830-1166-42	PLASTIC: VENOM -42	1
15	830-8549-82	PLASTIC: VENOM -82	1

ID	Part Number	Description	Qty
1	040-5000-03	1/4" CABLE CLAMP	1
2	040-5000-06	1/2" CABLE CLAMP	5
3	077-5223-00	SOCKET, 2-LUG VERTICAL, SHORT	6
4	112-5034-02F	RED, FROSTED	3
5	112-5034-08F	DOUBLE LED, BAYONET BASE	3
6	234-5000-00	SCREW, #6 X 3/8" HWH	10
7	237-5976-04	SCREW, 6-32 X 5/8" HWH SWAGE, SERRATED	4
8	234-5101-00	SCREW, #8 X 1/2" SLT HWH AB ZINC	7
9	237-5511-01	SCREW, 6-32 X 1-3/4" PPH MS BLACK	4
10	237-5995-00	SCREW, 10-32 X 1/2" HWH SERR MS ZI	2
11	240-5002-00	6-32 T-NUT	8
12	240-5204-00	#10-32 T-NUT	2
13	254-5000-05	NYLON SPACER - BLACK - 3/8 OD X .175 ID X 1-1/4"	4
14	500-9988-00	TOP POST ASSEMBLY	1
15	511-5966-51	PLASTIC ASSEMBLY: VENOM -51	1
16	525-5929-01	BACK PANEL: VENOM PRO	1
17	535-2288-00	HANDLE, BACKPANEL	1
18	820-5471-31A	DECAL: VENOM -31A	1
19	820-5471-31B	DECAL: VENOM -31B	1
20	820-5471-32	DECAL: VENOM -32	1
21	830-1159-29	PLASTIC: VENOM -29	1
22	830-1159-30	PLASTIC: VENOM -30	1

6. SPECIFICATIONS

500-55U1-01

SPECIFICATIONS, MECHANICAL, GAME SETUP

Specification	Imperial	Metric
Weight	210 lbs	96 kg
Max dimensions, leg levelers extended (h, w, d)	78 x 27.75 x 57 in	198 x 70.5 x 145 cm
Minimum game dimensions (h, w, d)	76 x 27.75 x 57 in	193 x 70.5 x 145 cm
Minimum room dimensions per game (h, w, d)	80 x 36 x 84 in	203 x 91 cm x 214 cm

- (h, w, d) = height, width, depth.

SPECIFICATIONS, MECHANICAL, BOXED

Specification	Imperial	Metric
Weight, boxed (without pallet)	230 lbs	105 kg
Box dimensions (h, w, d)	56.5 x 31 x 31 in	144 x 79 x 79 cm
Minimum dimensions (h, w, d)	76 x 26 x 57 in	193 x 66 x 145 cm

- (h, w, d) = height, width, depth.

SPECIFICATIONS, ELECTRICAL

Specification	North America - 120VAC	International - 240VAC
Line Voltage, Nominal	120 VAC	240 VAC
Line Voltage Range	90 VAC - 250 VAC	90 VAC - 250 VAC
Line Frequency *	60 Hz	50 Hz, 60 Hz
Line Power, Current - attract mode	70 W, 0.6 A @ 120 VAC	70 W, 0.3 A @ 240 VAC
Line Power, Current - nominal	360 W, 3 A @ 120 VAC	360 W, 1.5 A @ 240 VAC
Line Power, Current - peak, <100 ms	540 W, 4.5 A @ 120 VAC	540 W, 2.25 A @ 240 VAC

* NOTE: Games designed for 60hz operation (e.g. North America games) will not function correctly on 50hz power and vice versa.

WARNING: Overloading electrical supply circuits is dangerous. Do not overload circuits. To calculate the maximum number of games for a circuit, check circuit amperage rating and divide by the game Nominal Line Power Current rating for your line voltage. For example, a 15A 120V household circuit, 15/3 A (nominal current) = 5 games maximum.

SPECIFICATIONS, ENVIRONMENT

	Minimum	Maximum
Temperature, Operating	32 °F / 0 °C	104°F / 40 °C
Temperature, Storage	32 °F / 0 °C	104°F / 40 °C
Relative Humidity, Operating	5%	95% non-condensing
Relative Humidity, Storage	5%	95% non-condensing

- (a) "The appliance has to be placed in a horizontal position."
- (b) If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified person in order to avoid hazard.

6.1 GAME DIMENSIONS
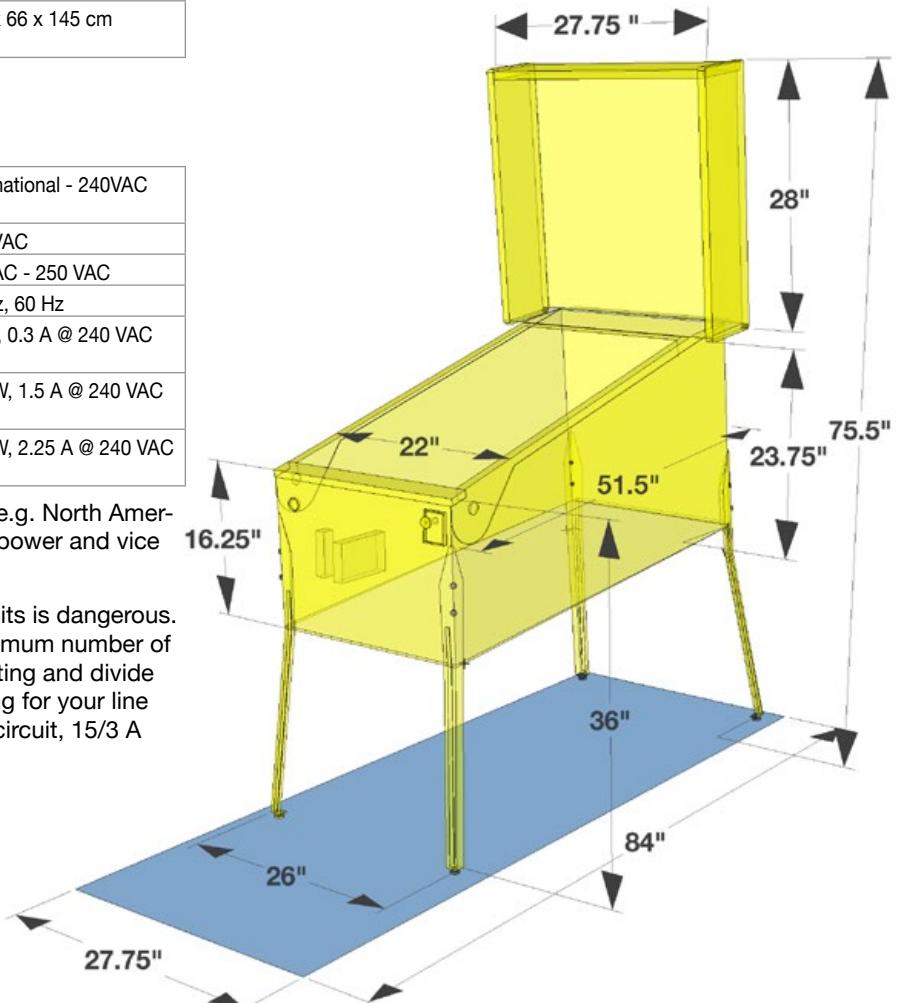
6.2 WARRANTY

500-55U1-01

Stern Pinball machines are assembled in Elk Grove Village, Illinois, USA; each pinball machine has unique characteristics that make it a one-of-a-kind American-made product. Each machine will have variations in appearance resulting from differences in the machine's particular wood parts, individual silk screened art and mechanical assemblies. Stern Pinball has inspected each game element to ensure it meets stringent quality and playability standards.

STERN PINBALL INC LIMITED WARRANTY

Stern Pinball Inc ('SELLER') warrants only to the initial purchaser of its products that the items listed below are free from defects in material and workmanship under normal use and service for the warranty period specified:

- Printed circuit boards (game logic): 2 months
- Dot Matrix / LCD Display: 9 months

No other parts of seller's product are warranted.

Warranty periods are effective from the initial date of shipment from seller to its authorized distributors.

Seller's sole liability shall be, at its option, to repair or replace products which are returned to seller during the warranty periods specified, provided:

1. Seller is notified promptly upon discovery by purchaser that stated products are defective.
2. Such products are properly packaged and then returned freight prepaid, to seller's plant.

This warranty does not apply to any parts damaged during shipment and/or due to improper handling, or due to improper installation or usage, or alteration. In no event shall the seller be liable for any anticipated profits, loss of profits, loss of use, accidental or consequential damages, or any other losses incurred by the customer in connection with the purchase of a Stern Pinball Inc Product.

WARRANTY DISCLAIMER

Except as specifically provided in a written contract between seller and purchaser, there are no other warranties, express or implied, including any implied warranties of merchantability or fitness for a particular purpose.

This Game Service Manual and all other documents relating to this product, playfield components, features, rules, programming, and operation are subject to change without notice (Service Bulletins, if applicable, available through official Stern Pinball website).

ATTENTION!
IMPORTANT WARRANTY INFORMATION

The electronics system, node network architecture, mechanical devices and associated software control systems in this pinball machine are designed to work with genuine Stern Pinball accessories and devices.

Installation of non-authorized accessories, lamps, LED's, motors or other devices or modification of electro-mechanical devices may damage the system and will void your warranty.

6.3 WARNINGS, COMPLIANCE, AND LEGAL NOTICES

PHOTOSENSITIVE SEIZURES HEALTH WARNING

A very small percentage of people may experience a seizure when exposed to certain visual images, including flashing lights or patterns. Even people with no history of seizures of epilepsy may have an undiagnosed condition that can cause "photosensitive epileptic seizures" due to certain visual images, flashing lights or patterns. Symptoms can include lightheadedness, altered vision, eye or face twitching, jerking or shaking of arms or legs, disorientation, confusion, momentary loss of awareness, and loss of consciousness or convulsions that can lead to injury from falling down or striking nearby objects.

IMMEDIATELY STOP PLAYING AND CONSULT A DOCTOR IF YOU EXPERIENCE ANY OF THESE SYMPTOMS.

PARTS SUBSTITUTIONS

For safety and reliability, substitute parts and equipment modifications are not recommended and may void any and all warranties. Use of Non-Stern Pinball Inc Parts or Modifications of game circuitry may adversely affect game play or game safety. Transport pinball machines with hinged backbox in the down position only! Always take great care when servicing any game. Always ready the service manual before replacing or servicing components. Substitutions of parts or equipment modifications may void FCC type acceptance.

Always disconnect the line voltage before servicing. Some parts may remain energized when unplugged. Take great caution when servicing any electrical components.

PERCHLORATE MATERIAL - Special handling may apply.
See www.dtsc.ca.gov/hazardouswaste/perchlorate

FCC CLASS A SUBPART J COMPLIANCE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

RF INTERFERENCE NOTICE

The cable harness placements, ground strap routing, and other shielding have been designed to keep RF radiation and conduction within levels accepted by FCC rules. To maintain these levels, factory harness position, shielding, and ground straps must be installed in their factory locations should they become disconnected during maintenance.

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d.   "Authorized Update" means an update to the Stern Pinball Software distributed by Stern Pinball or otherwise made available by Stern Pinball, including for download on its website.

e.   "Unauthorized Content" means all content, including but not limited to graphics, images, music, vocals and voices, that does not comprise Authorized Content or an Authorized Update.

f.   "Unauthorized Software" means any software (including but not limited to firmware) not pre-installed by Stern Pinball on a Stern Pinball Machine or that does not comprise Authorized Content or Authorized Update.

g.   "You" means the purchaser or current owner of a Stern Pinball Machine.

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   ii.   **You will not use or install any Unauthorized Content or Unauthorized Software. Use of Unauthorized Content or Unauthorized Software may result in your Stern Pinball Machine ceasing to work permanently and/or losing access to Stern Pinball's online game network, either immediately or after a later installed Authorized Update.**

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