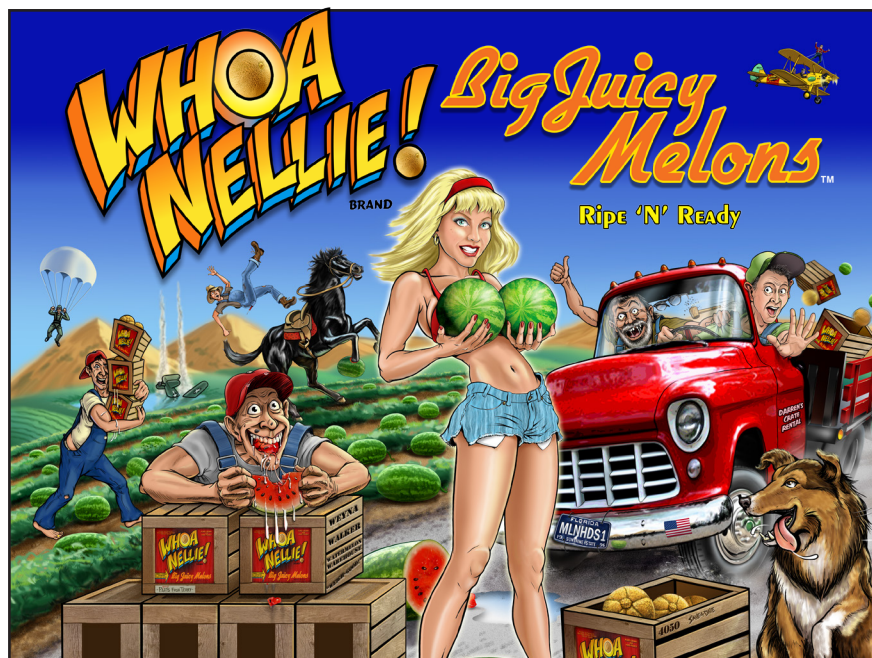# PINBALL MACHINE
SERVICE AND OPERATION MANUAL

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 light-headedness, 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.

Stern Pinball machines are assembled in Melrose Park, 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 insure it meets our quality standards.

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).

1-800-KICKERS - PARTS.SERVICE@STERNPINBALL.COM
WWW.STERNPINBALL.COM - FACEBOOK.COM/STERNPINBALL

WHOA NELLIE!
BIG JUICY MELONS™

WNBJM #500-55D7-00
MANUAL #780-50D7-00

TABLE OF CONTENTS

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.

1. GAME SETUP

1.1 FIRST-TIME SETUP INSTRUCTIONS

500-55D7-01 Whoa Nellie

> ⚠️ **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.**

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.

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 foam pieces and 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.
8. Ensure the leg levelers are fully screwed into the legs.
9. Install front legs using the bolts removed from the cabinet. Secure tightly.
10. Use a helper to carefully set the game down on the front legs.
11. Set aside the open box.
12. With the ⅝" socket wrench, loosen and remove the 2 leg bolts on each side of the rear cabinet, 4 total.
13. Using supports or two people, prop the rear of the cabinet up.
14. Ensure the rear leg levelers are screwed all the way into the legs.

TOOLS REQUIRED

- 5/8" Socket Wrench
- ⅜" Nut driver or wrench
- Utility Knife
- Diagonal Cutters
- No. 2 Phillips™ Screwdriver
- A helper
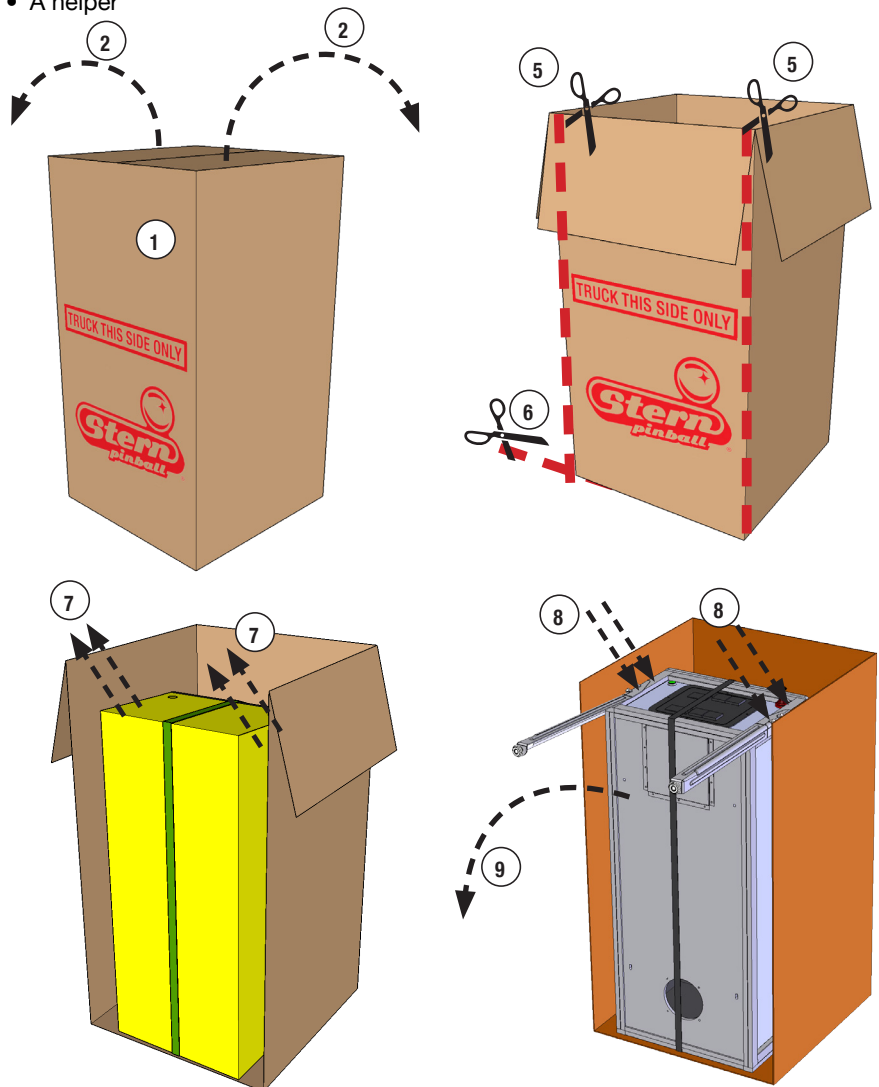
FIRST-TIME SETUP CONTINUED

15. Install the two rear legs using the 4 bolts previously removed from the cabinet.
16. Note that the backbox assembly is not attached to the game cabinet. While supporting the backbox, cut the strap holding the parts together.
17. Using a helper, set the back box and the Fruit Crate parts box on the floor.
18. Open the Fruit Crate parts box to access the assembly hardware, crate and cabinet components.
19. Locate the factory keys, either on the shooter rod or taped to the playfield glass.
20. If you will not be assembling the Fruit Crate, store the Fruit Crate parts box.
21. Using the diagonal cutters, 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
22. Using the backbox key, locate the backbox lock on top of the backbox and unlock the lock.
23. Gently remove the backglass frame assembly by lifting the backglass frame vertically and pulling away from the backbox.

24. Place the two backbox spacers on the cabinet and orient the bolt holes over the cabinet bolt holes.
25. With the helper, position the backbox with the glass removed over the spacers and align the holes.
26. Install the two 3/8-16 x 3.00" bolts in the (2) backbox holes and tighten with the ⅝" wrench.
27. Open the front coin door.
28. Reach into the game and remove the retaining clip at the rear of the cash box.
29. Remove the cash box lid by sliding it toward you.
30. Locate and remove the pinball, plumb bob, and backbox bolts from the cash box.
31. Replace the cash box lid and retaining clip for future use.
32. Store the backbox keys on the metal hook located in the coin door.
33. Reach inside the cabinet and lift the two latches, toward the back of the game.
34. Remove the front top molding.

WHOA NELLIE! MANUAL #780-50D7-00
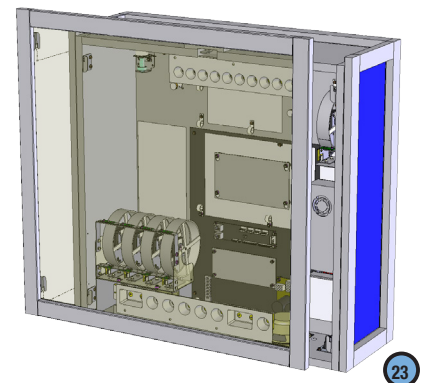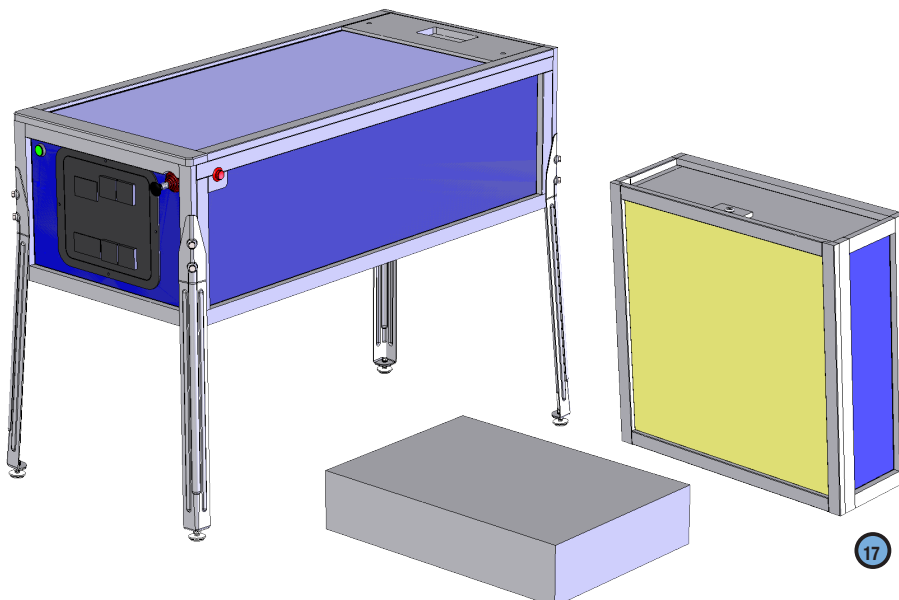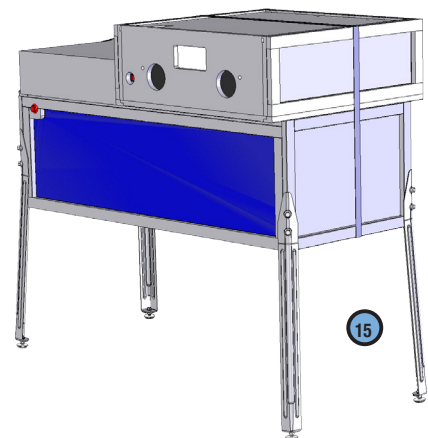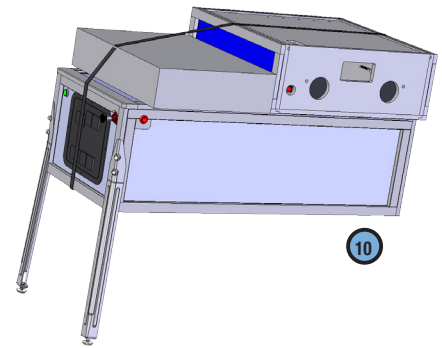
FIRST-TIME SETUP CONTINUED

35. 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.
36. 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.
37. Unlatch and raise the playfield and rest it against the backbox.
38. Grasp the lower arch between the flippers, and firmly but gently pull directly up to raise the playfield 8-12 inches.
39. While holding the playfield up, pull the playfield toward you about 1 foot.
40. Pivot the playfield vertically and rest it against the backbox.
41. Visually inspect all cabinet cables and connector terminations; ensure no wires or cables are pinched and that cable harnesses are not pulled tight.

42. Locate the plumb bob in the parts bag in the cash box
43. 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.

44. Tighten the Thumb Screw finger-tight.
45. Install the correct number of pinballs. Refer to the decal on the lock down assembly for the correct number of pinballs.
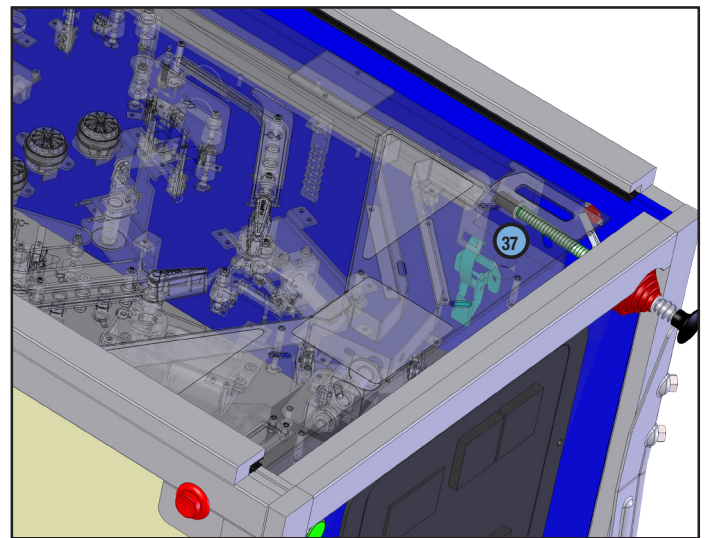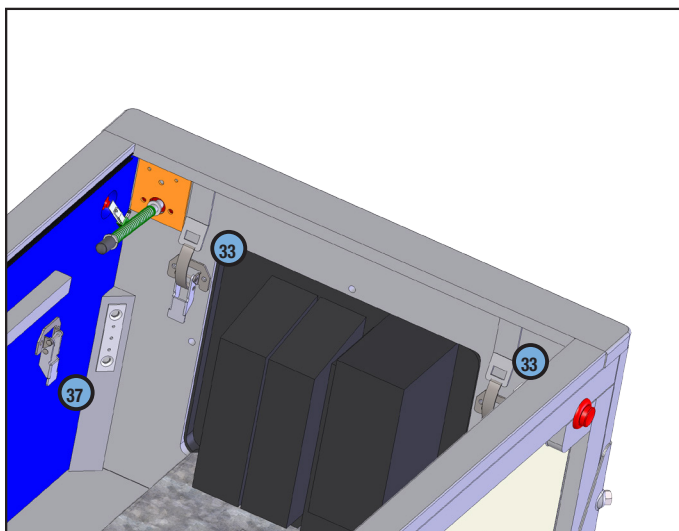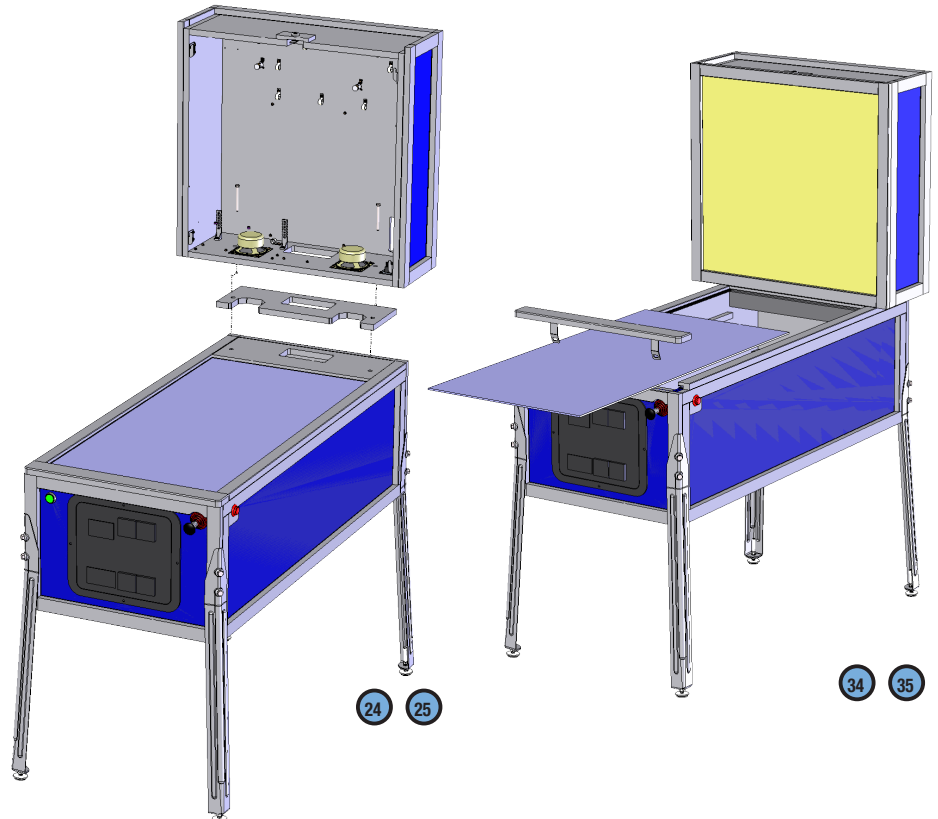
FIRST-TIME SETUP CONTINUED

OPTIONAL: ASSEMBLING WHOA NELLIE CABINET WITH FRUIT CRATE BASE

1. Open the Fruit Crate parts box and locate the Fruit Crate hardware and panels.
2. Assemble the hardware in the 7 panels. Refer to explosion diagrams 1.2-1.5 for details.
3. Using a Phillips screwdriver, hand-tighten a connecting bolt (#2) into each Fruit Crate panel hole for each of the 7 panels: End panel (x2), Side Panel (x2), Leg plates (x2), and Top Panel.
4. Connect the two leg plates with the side plates.
5. Push the pins fixed to the side panel into the hole on the leg plate and rotate the locking cam ¼ turn to lock it.
6. Connect the side panel to the parts from step 5. Do one side at a time.
7. Use the Phillips screwdriver to turn each cam ¼ turn to lock
8. Connect the Top Plate to the parts from step 6
9. Use the Phillips screwdriver to turn each cam ¼ turn to lock the remaining six connecting bolts.
10. Position the pinball machine in its desired location
11. Set the crate next to the pinball machine
12. Raise the leg leveler plates all the way up to allow the crate assembly to slide under the pinball machine.

1.2 CRATE END PANEL
511-7650-00
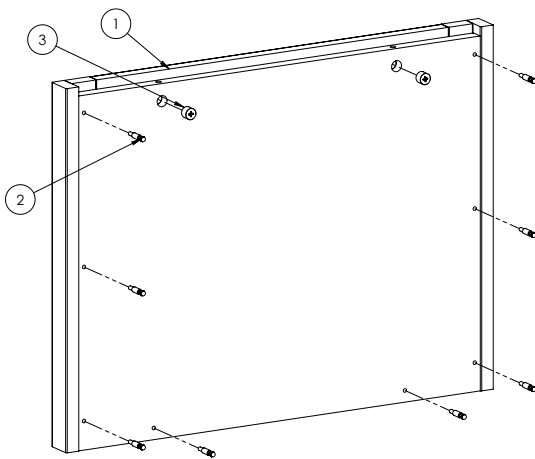
Figure 1.2.1. Crate End Panel 511-7650-00 diagram.

ID	Part Number	Description	Qty
1	511-7650-00	CRATE: END PANEL, WN	1
2	237-6297-00	CONNECTING BOLT	8
3	240-5410-00	15/16 CAM	2

Figure 1.2.2. Crate End Panel 511-7650-00 bill of materials.

1.3 CRATE SIDE PANEL
525-1014-03
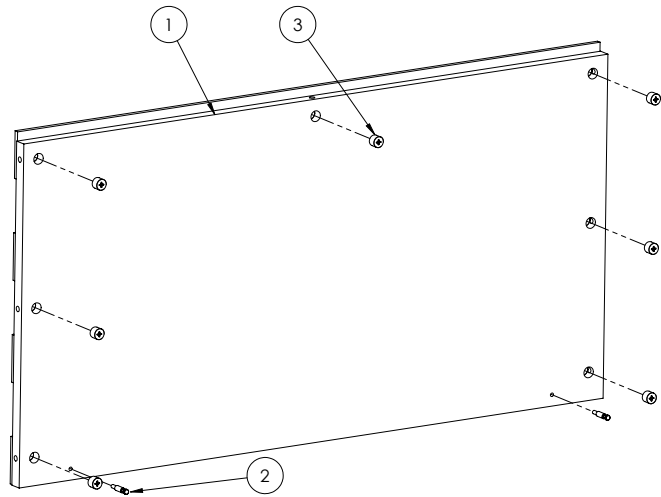
Figure 1.3.1. Crate Side Panel 525-1014-03 diagram.

ID	Part Number	Description	Qty
1	525-1014-03	CRATE: SIDE PANEL	1
2	237-6297-00	CONNECTING BOLT	2
3	240-5410-00	15/16 CAM	7

Figure 1.3.2. Crate Side Panel 525-1014-03 bill of materials.

FRUIT CRATE SETUP CONTINUED

WHOA NELLIE CRATE HARD-WARE CONTENTS

ID	Part Number	Description	Qty
1	280-5028-00	Cabinet Shock Mounts	4
2	515-0205-00	Leg Leveler Plate	4
3	500-5017-00	Leg Leveler, 3"	4
4	535-1097-00	Whoa Nellie Beer Cans	2
5	545-0653-00	Crate Spacers	2
6	231-5012-00	10-24 X 1 1/4 CB	8
7	242-5010-00	Washer #1010 13/	8
8	240-5207-00	Nut, 10-24 Washer Nut	8
9	237-6297-00	Connecting Bolt, 1.38"	26
10	240-5410-00	Cam lock	26
11	231-5545-00	Hex Bolt 5/16"-24 x 3/4"	6
12	231-5546-00	Hex Bolt 5/16"-24 x 3"	2
13	242-5077-00	Washer, 11/32"ID	8
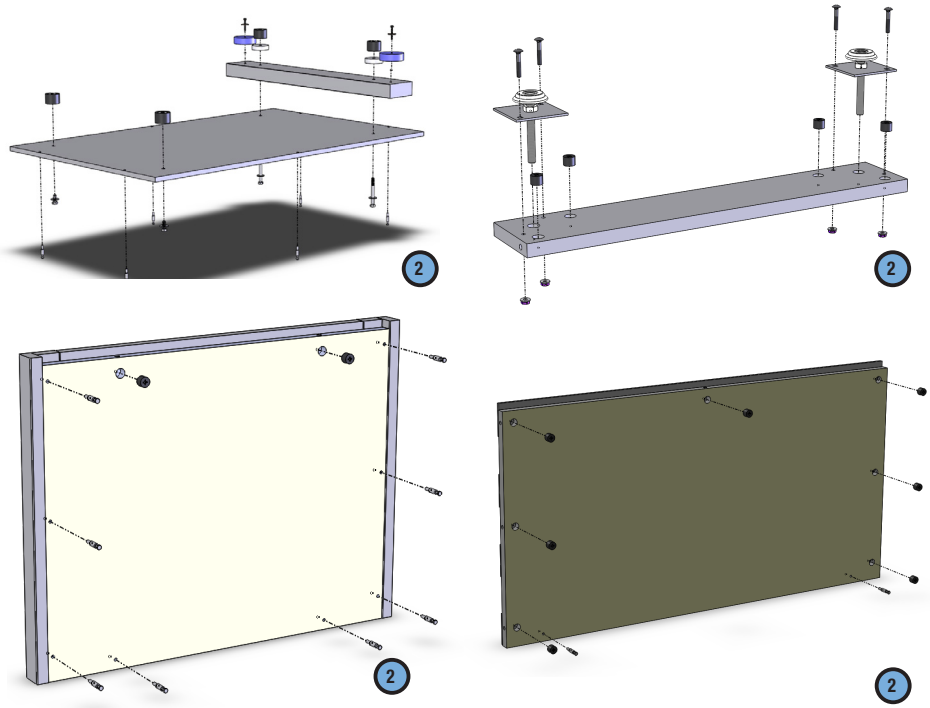
1.4   CRATE TOP PANEL
525-1014-01
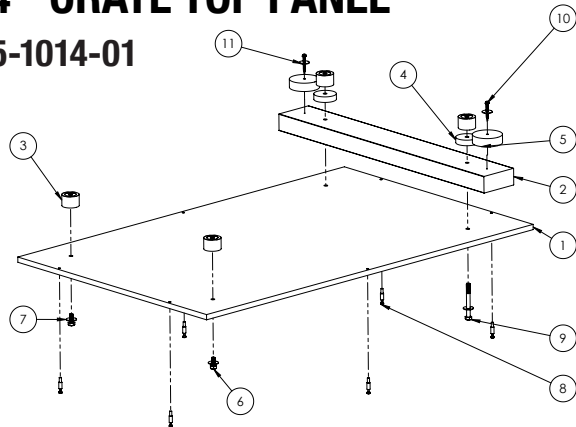
Figure 1.4.1. Crate Top Panel 525-1014-01 diagram.

ID	Part Number	Description	Qty
1	525-1014-01	CRATE: TOP PANEL	1
2	525-1019-00	CRATE: WN, 2x4	1
3	280-5028-00	MACHINE MOUNT	4
4	545-0653-00	SPACER, CRATE, WN	2
5	535-1097-00	BEER CAN: CRATE, WN	2
6	231-5545-00	HEX BOLT: 5/16"-24 x 3/4"	6
7	242-5077-00	FLAT WASHER: 5/16"	8
8	237-6297-00	CONNECTING BOLT	6
9	231-5546-00	HEX BOLT: 5/16"-24 x 3.00"	2
10	237-5969-00	#8 x 1.50" HWH	2
11	242-5059-00	3/16 I.D. X 7/8 O.D. X .045 WASHER	2

Figure 1.4.2. Crate Top Panel 525-1014-01 bill of materials.

1.5   CRATE LEG PLATE
525-1014-04
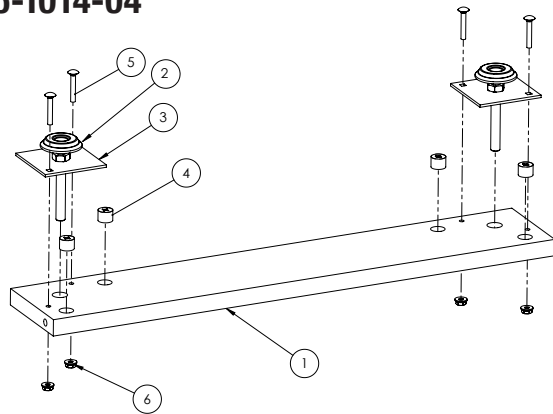
Figure 1.5.1. Crate Leg Plate 525-1014-04 diagram.

ID	Part Number	Description	Qty
1	525-1014-04	CRATE: LEG PLATE	1
2	500-5017-00	LEG LEVELER - 3/8-16 X 3" - ZINC PLATED	2
3	515-0205-00	PLATE: LEG LEVELER	2
4	240-5410-00	262.23.373; 15/16 Minifix CAM	4
5	231-5012-00	CARRIAGE BOLT, 10-24 X 1-1/4", BLACK	4
6	240-5207-00	# 10-24 KEPS NUT	4
7	242-5010-00	#10 WASHER, .50 O.D. X .047 THK	4

Figure 1.5.2. Crate Leg Plate 525-1014-04 bill of materials.

FRUIT CRATE SETUP CONTINUED

13. Slide the crate under the game.
14. Remove the glass and raise the playfield against the backbox. While looking into the cabinet align the Fruit Crate mounts threaded holes with the cabinet floor holes.
15. Install and hand-tighten the 5/16-24 X ¾" hex bolts with flat washer into the mounts located on the crate.
16. There are two holes in the cabinet floor near the front and two slots in the cabinet floor near the real of the cabinet.
17. Once all four bolts are started, tighten them with a wrench.
18. Once the crate is lined up under the game, lower the leg levelers until the game comes into contact with the crate.
19. Remove the pinball legs from the game.
20. Remove the wood trim in the front and rear of the game with the leg bolt holes and replace with the solid trim pieces.
21. Use a Phillips screwdriver to remove screws for front trim piece. Be careful to not damage the side cabinet decal when removing and installing the screws.
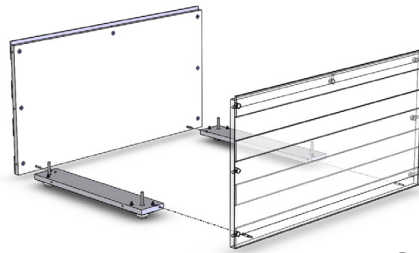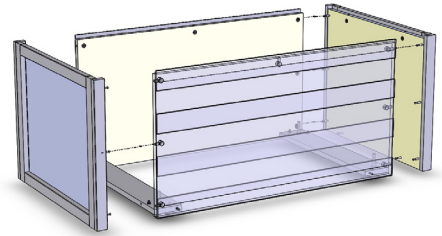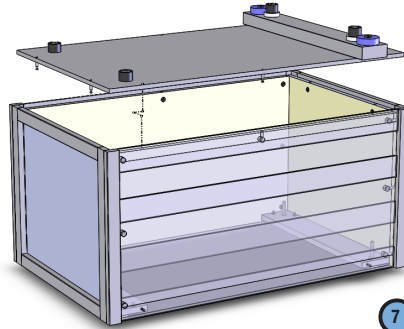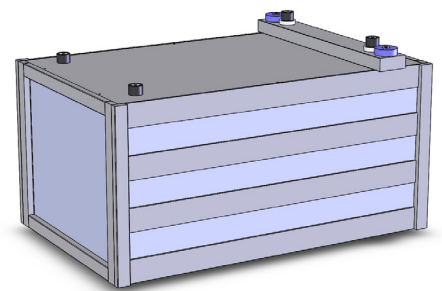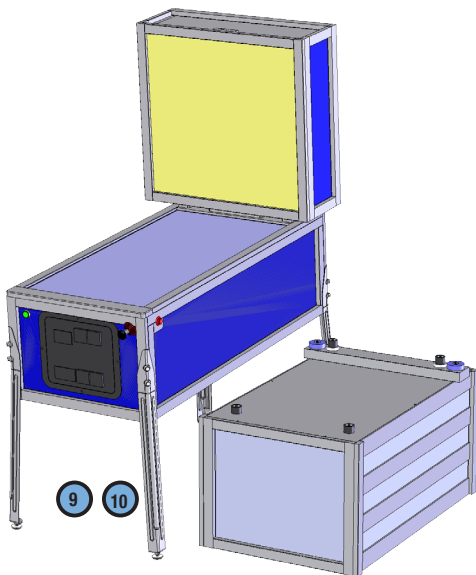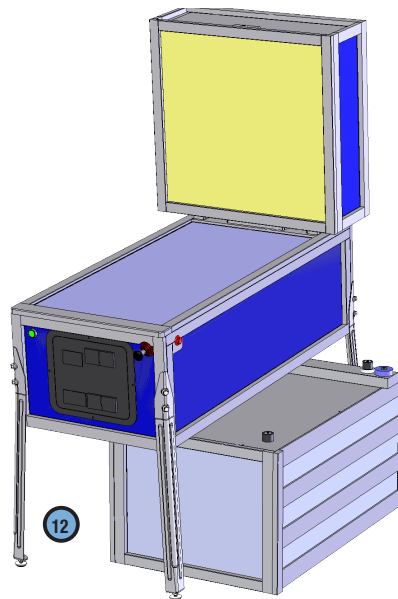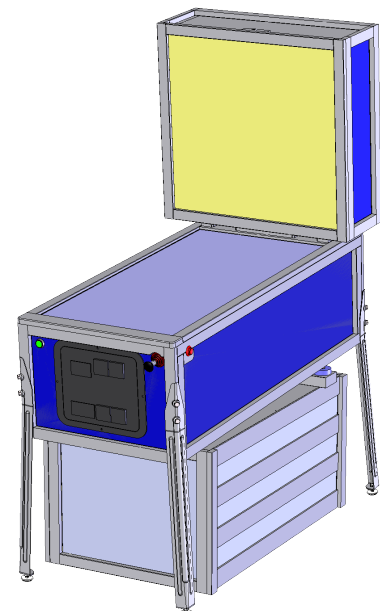
FRUIT CRATE SETUP CONTINUED

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. 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.
3. Plug into a grounded outlet and check for proper operation through DIAGNOSTICS.
4. Check the coin door: With the door closed, insert coins to verify proper operation.
5. Play game: Check for satisfactory operation and adjust game volume (push the Red Buttons inside the Coin Door).
6. If desired, perform any game diagnostics, game adjustments, and pricing settings at this time.
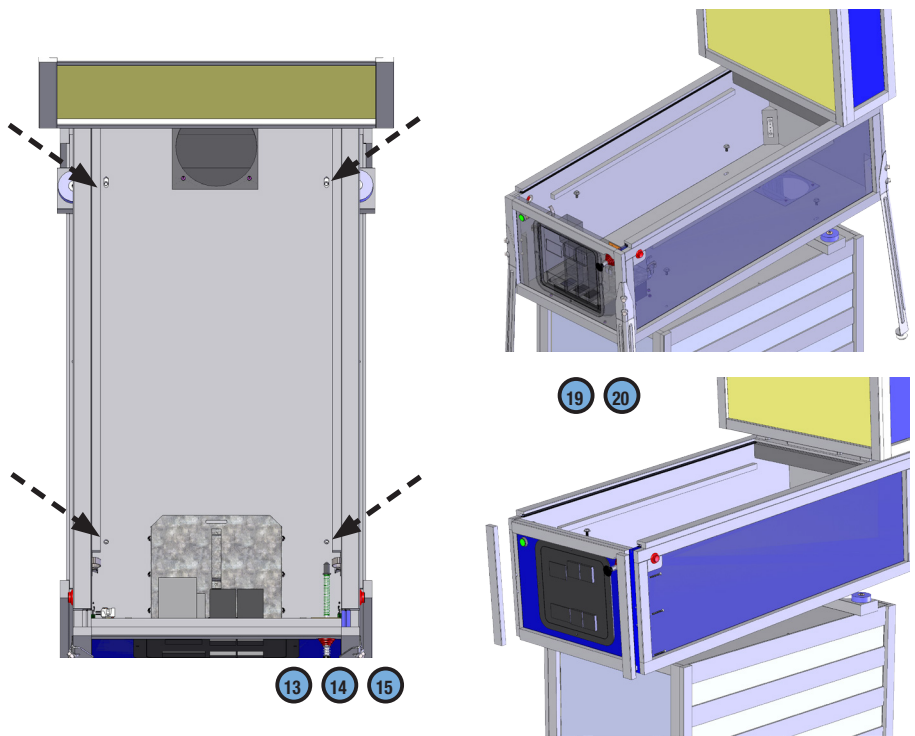
PLAYFIELD REMOVAL

The playfield is held in place by two basset clamps located on each side on the game.

7. Loosen the basset clamps by lifting them away from cabinet.
8. Lift the playfield and pull toward you.
9. Tilt up and rest the playfield against the backbox if necessary.

PLAYFIELD INSTALLATION

10. If the playfield has been completely removed, set the playfield on the wood rails in the base cabinet.
11. Ensure the cables are reconnected correctly.
12. Slide the playfield forward into the base cabinet until it stops.
13. Latch the basset clamps on each side of the base cabinet.
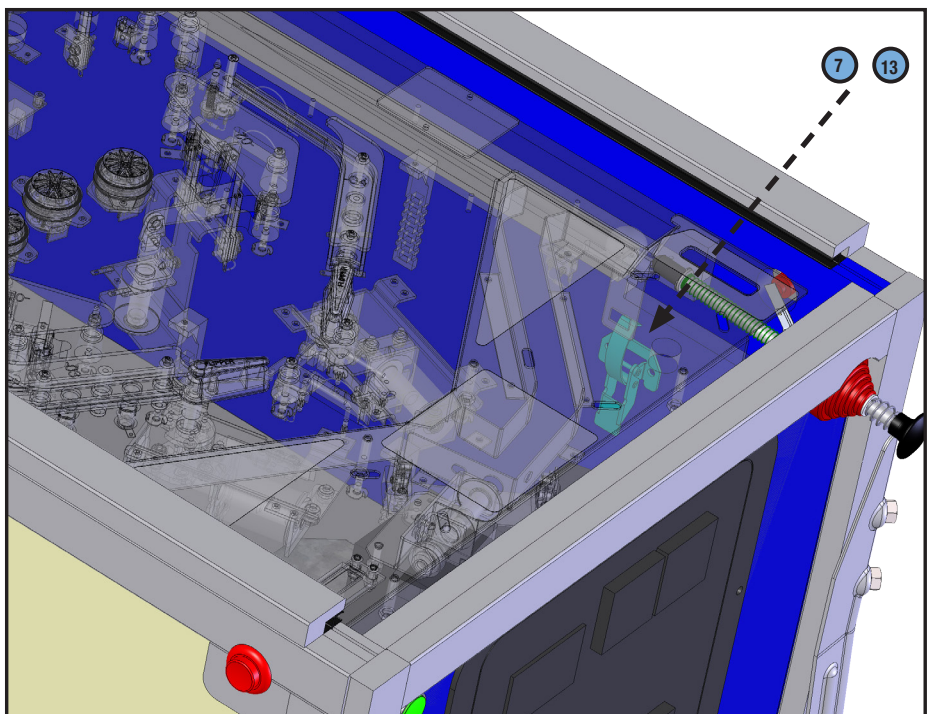
FIRST-TIME SETUP CONTINUED

1.6   USA CABLE CONNECTIONS

Making cable connection from base game to backbox

Make sure the backbox has been properly attached to the base game
Reach into the base cabinet through the large rectangular hole in the backbox and retrieve the bundle of cables. Pull the bundle into the back box

white connector cables
3 pin, 4 pin, 6 pin, 12 pin

RJ45 cable

Ribbon Cable

RJ45 cable

Ground Strap

Connect the four cables from the base cabinet to the matching cables in the backbox, these are the white connectors.
There is: a 3 pin plug, 4 pin plug, 6 pin plug, and 12 pin plug.

There are two black RJ 45 cables one gets connected to the CPU the other to the 4-coil driver circuit board.
The ribbon cable gets connected to the CPU
The ground strap to the stud as shown

Loosen 4 nuts-do not remove
Slide CPU up and off
Run ribbon cable behind CPU as shown
Place CPU back on studs
Tighten nuts
Connect ribbon connector
Note location of stripe

RJ45 cable goes here

RJ45 cable goes here

Remove nut with 11/32 driver
Connect ground strap
Replace nut
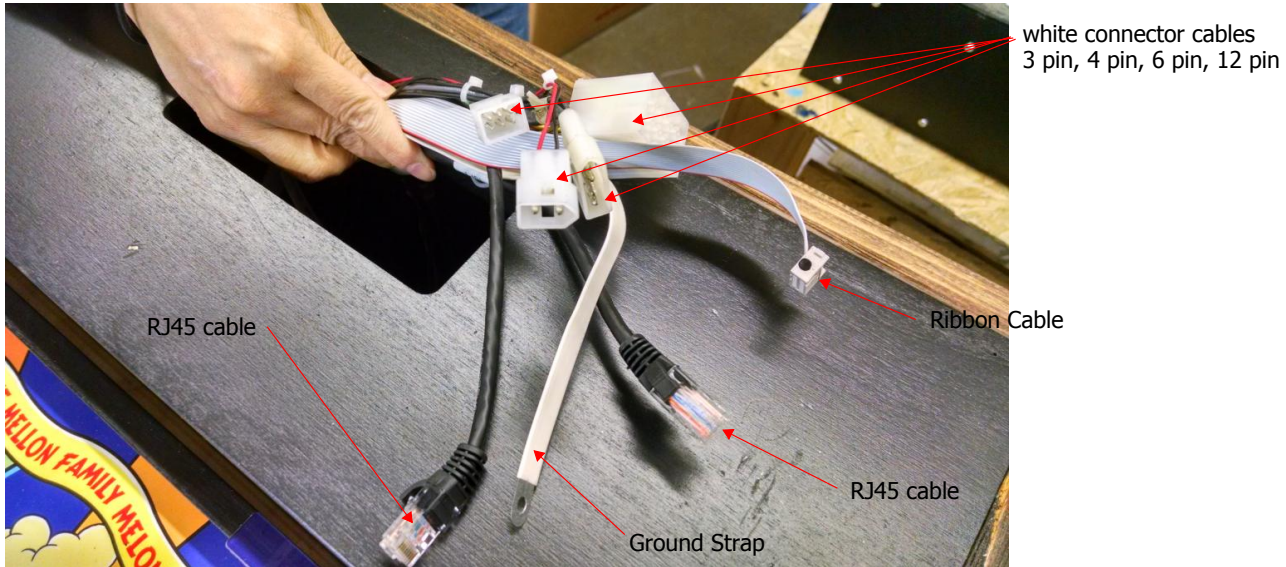
FIRST-TIME SETUP CONTINUED

1.7 INTERNATIONAL CABLE CONNECTIONS

Making cable connection from base game to backbox

Make sure the backbox has been properly attached to the base game
Reach into the base cabinet through the large rectangular hole in the backbox and retrieve the bundle of cables. Pull the bundle into the back box
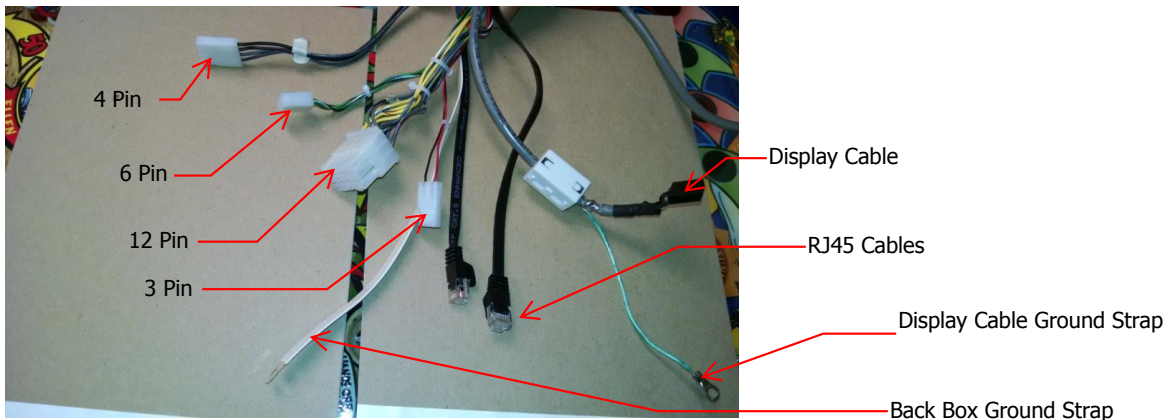
Connect the four cables from the base cabinet to the matching cables in the backbox, these are the white connectors.
There is: a 3 pin plug, 4 pin plug, 6 pin plug, and 12 pin plug.

There are two black RJ 45 cables one gets connected to the CPU the other to the 4-coil driver circuit board.
The ribbon cable gets connected to the CPU
The ground strap to the stud as shown
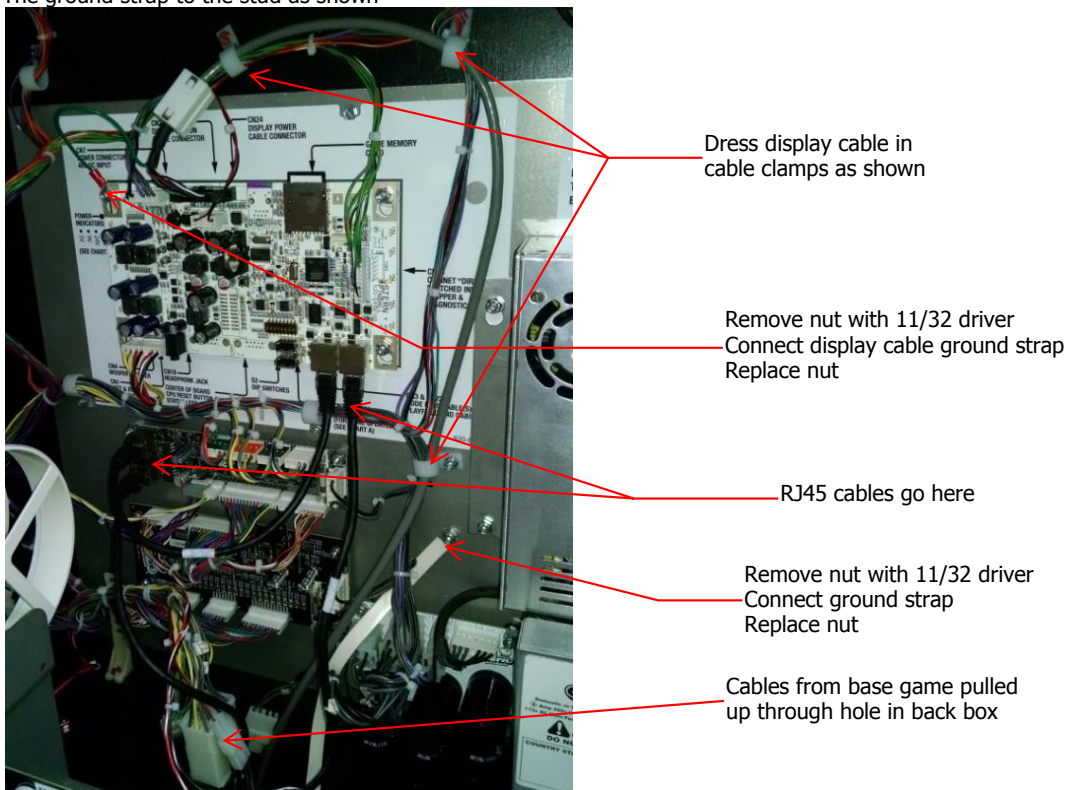
1.8   MAINTENANCE

REGULAR MAINTENANCE - EVERY MONTH, OR EVERY 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 functionality.
- 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 a game or two 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 - EVERY 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 (enter the Service Menu).
- Clean playfield.
- Replace worn or dirty rubbers.
- Replace pinballs.
- Playfield switch adjustments: 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 screw driver
- Standard Allen wrench/Hex key set
- ⅜" 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

1.9   MAINTENANCE KITS

Description	Part Number
Whoa Nellie! Big Juicy Melons Standard Pinball Location Maintenance Kit • 8 oz pinball playfield wax (Novus # 2) (675-0003-01) • Standard Pinball (260-5000-00) • Cleaning Cloth • All Playfield Rubber Rings • Spare Fuses	502-6002-D7
Whoa Nellie! Big Juicy Melons Deluxe Pinball Location Maintenance Kit • All standard kit items, plus: • Flipper rebuild kits, Left and Right (500-6307-10,-00)	502-6003-D7
Whoa Nellie! Big Juicy Melons Playfield Plastics Kit	803-5000-D7
Whoa Nellie! Big Juicy Melons Cabinet Decals Kit	802-5000-D7

1.10 COMMON MAINTENANCE 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

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 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.

COIN-DOOR SAFETY INTERLOCK

To protect the system and for user safety, power to the playfield is disabled when the front coin door is opened. 48V system power and 9V node bus power is disabled to all playfield components until the switch is closed.

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

Figure 2.4.1. 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

Figure 2.4.2. SPIKE node addresses for nodes with 4-position DIP switches. Addresses 0-7 are reserved for fixed-function nodes and do not require configuration.

2.5 SPIKE NODE PROGRAMMING

The SPIKE nodes are smart nodes that have on-board processors and run embedded code. The nodes are programmed

SPIKE SYSTEM AND NODE GUIDE CONTINUED

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.

System Protections

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.

FUSES

Nodes that have 48 V power are fused individually. Fuse voltage ratings are a safety rating and always must be higher than the circuit the fuse is protecting. Never replace a fuse with a lower voltage-rated fuse. Fuse current ratings must be replaced with the same current value. A higher current value fuse could cause catastrophic failures, and a lower-value fuse will cause premature fuse failures.

Common fuses

Fuse Rating (Amps)	Type	Part Number
3/4 A	Slow Blow MDL	200-5000-17
3 A	Slow Blow MDL	200-5000-08
4 A	Slow Blow MDL	200-5000-06
5 A	Slow Blow MDL	200-5000-01
7 A	Slow Blow MDL	200-5000-03
8 A	Slow Blow MDL	200-5000-05

CAUTION: Always replace fuses with the exact current specifications.

2.7   COMMON SPIKE NODE BOARDS

Description	Type	Part Number
SPIKE CPU Node	Node	520-6936-00
SPIKE CPU Node w/ Video Out Support (Backward compatible with -00)	Node	520-6936-10
Cabinet Node	Node	520-5319-00
48V 8-Driver Node	Node	520-6935-00
48V 4-Driver Node	Node	520-5329-00
SPIKE 32 Light and Switch Node	Node	520-5322-00
Trough Serial Opto Receiver Extension	Extension	520-5345-00

3. LIGHT, SWITCH, AND DRIVER REFERENCE

PLAYFIELD FRONT

BACKBOX

CPU NODE 0

NODE 0

NODE 11

NODE 8

NODE 9

NODE 10

Node Bus Cable (RJ45)

Serial Data Cable
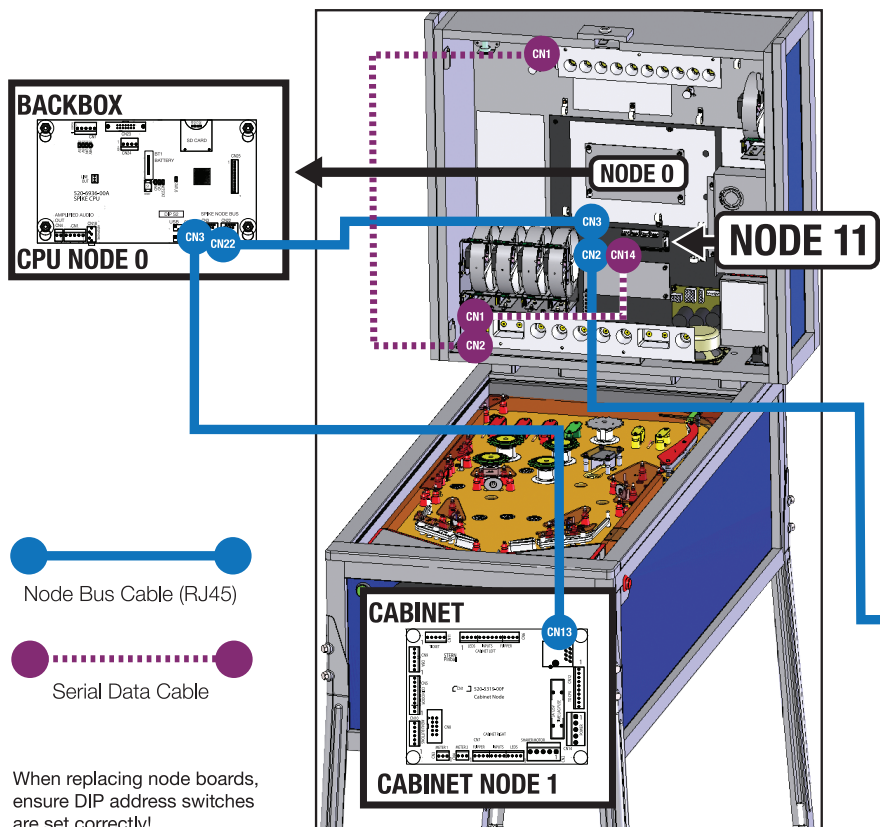
When replacing node boards,
ensure DIP address switches
are set correctly!

CABINET

CABINET NODE 1
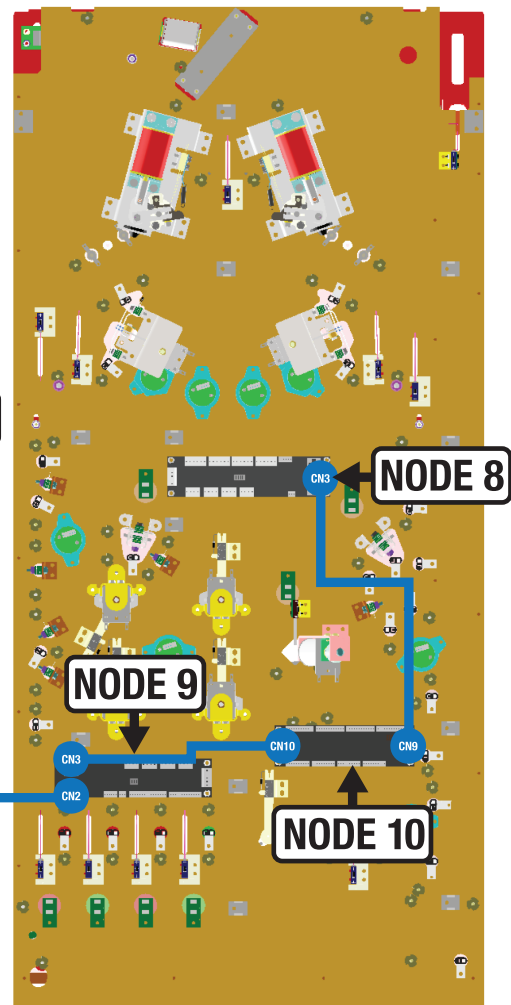
PLAYFIELD REAR

ID	DIP Address	Description	Location	Part Number
Node 0	n/a	SPIKE CPU Node	Backbox	520-6936-00
Node 1	n/a	Cabinet Node	Cabinet	520-5319-00
Node 8	OFF-OFF-OFF-OFF	Lower Playfield 48V 8-Driver Node	Lower playfield	520-6935-00
Node 9	OFF-OFF-ON	Mid Left Playfield 48V 4-Driver Node	Mid left playfield	520-5329-00
Node 10	OFF-ON-OFF	Mid Right Playfield 32 Lighting and Switch	Mid left playfield	520-5322-00
Node 11	OFF-ON-ON	Back Box 48V 4-Driver Node	Backbox	520-5329-00
11a	n/a	9 Lamp Bottom Extension	Backbox	520-6963-00
11b	n/a	10 Lamp Top Extension	Backbox	520-6962-00
	n/a	Stepper Controller Driver Board	Backbox	520-6961-00
	n/a	Power Supply	Backbox	011-5001-00
	n/a	Power Distribution Board	Backbox	520-5343-00
	n/a	Stepper Motor Opto	Backbox	520-6960-00
	n/a	Diagnostic Display	Playfield	520-6964-00

3.1 DRIVER REFERENCE

Figure 3.1.3. Backbox driverl locations.

Figure 3.1.2. Playfield top component view
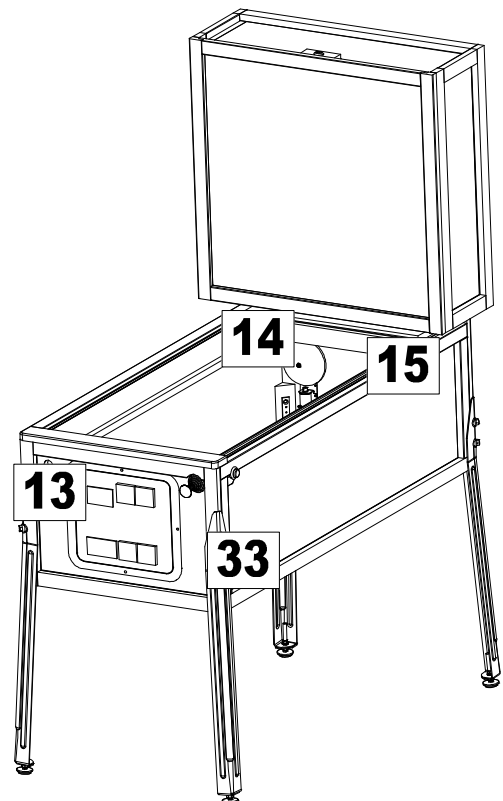
Figure 3.1.1. Cabinet driverl locations.

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DRIVER REFERENCE CONTINUED

ID	Name	Node	Node Ext	Con-nector	Ret. Pin	Ret. Wire	Volt-age	V+ Pin	V+ Color	Location	Type	Address	Part Number
1	Left Flipper	8	-	CN5	3	ORG-YEL	48V	4	GRY-ORG	Playfield	Coil - 25-1000	8-DR-0	090-5083-00-ND
2	Right Flipper	8	-	CN7	3	ORG-GRN	48V	4	GRY-ORG	Playfield	Coil - 25-1000	8-DR-1	090-5083-00-ND
3	Left Flipper Hold	8	-	CN9	3	YEL-ORG	48V	4	GRY-ORG	Playfield	Coil - 31-4000	8-DR-2	090-5083-00-ND
4	Right Flipper Hold	8	-	CN11	3	YEL-GRN	48V	4	GRY-ORG	Playfield	Coil - 31-4000	8-DR-3	090-5083-00-ND
5	Top Eject	8	-	CN6	5	ORG-WHT	48V	6	GRY-ORG	Playfield	Coil - 26-1200	8-DR-4	090-5044-ND
6	Trough	8	-	CN8	5	ORG-GRY	48V	6	GRY-ORG	Playfield	Coil - 26-1200	8-DR-5	090-5044-ND
7	Right Slingshot	8	-	CN10	5	ORG-VIO	48V	6	GRY-ORG	Playfield	Coil - 26-1200	8-DR-6	090-5044-ND
8	Left Slingshot	8	-	CN12	5	ORG-BLU	48V	6	GRY-ORG	Playfield	Coil - 26-1200	8-DR-7	090-5044-ND
9	Bot RT Pop Bumper	9	-	CN5	3	YEL-BLK	48V	4	GRY-BRN	Playfield	Coil - 26-1200	9-DR-0	090-5044-ND
10	Top RT Pop Bumper	9	-	CN7	3	YEL-BRN	48V	4	GRY-BRN	Playfield	Coil - 26-1200	9-DR-1	090-5044-ND
11	Bot LT Pop Bumper	9	-	CN9	3	BRN-ORG	48V	4	GRY-BRN	Playfield	Coil - 26-1200	9-DR-2	090-5044-ND
12	Top LT Pop Bumper	9	-	CN11	3	YEL-RED	48V	4	GRY-BRN	Playfield	Coil - 26-1200	9-DR-3	090-5044-ND
13	Bell 1 point (opt)	11	-	CN5	3	YEL-BLU	48V	4	GRY-BLK	Cabinet	Coil - 26-1200	11-DR-0	090-5044-ND
14	Bell 10 point(opt)	11	-	CN7	3	YEL-GRY	48V	4	GRY-BLK	Cabinet	Coil - 26-1200	11-DR-1	090-5044-ND
15	Bell 100 point(opt)	11	-	CN9	3	YEL-VIO	48V	4	GRY-BLK	Cabinet	Coil - 26-1200	11-DR-2	090-5044-ND
16	Free Game knocker	11	-	CN11	3	ORG-RED	48V	4	GRY-BLK	Backbox	Coil - 26-1200	11-DR-3	090-5044-ND
17	Credit Reel Enable	11	-	CN16	16	BLK-VIO	5V	1	YEL	Backbox	Motor	11-LP-15	041-5105-00
18	Credit Reel Phase 1	11	-	CN16	15	BLU-GRY	5V	1	YEL	Backbox	Motor	11-LP-14	041-5105-00
19	Credit Reel Phase 2	11	-	CN16	14	RED-GRY	5V	1	YEL	Backbox	Motor	11-LP-13	041-5105-00
20	1s Reel Enable	11	-	CN16	13	RED-VIO	5V	1	YEL	Backbox	Motor	11-LP-12	041-5105-00
21	1s Reel Phase 1	11	-	CN16	12	GRN-VIO	5V	1	YEL	Backbox	Motor	11-LP-11	041-5105-00
22	1s Reel Phase 2	11	-	CN16	11	BLU-VIO	5V	1	YEL	Backbox	Motor	11-LP-10	041-5105-00
23	10s Reel Enable	11	-	CN16	10	BLU-YEL	5V	1	YEL	Backbox	Motor	11-LP-9	041-5105-00
24	10s Reel Phase 1	11	-	CN16	9	GRN-YEL	5V	1	YEL	Backbox	Motor	11-LP-8	041-5105-00
25	10s Reel Phase 2	11	-	CN16	8	RED-YEL	5V	1	YEL	Backbox	Motor	11-LP-7	041-5105-00
26	100s Reel Enable	11	-	CN16	7	GRN-ORG	5V	1	YEL	Backbox	Motor	11-LP-6	041-5105-00
27	100s Reel Phase 1	11	-	CN16	6	BLU-ORG	5V	1	YEL	Backbox	Motor	11-LP-5	041-5105-00
28	100s Reel Phase 2	11	-	CN16	5	RED-ORG	5V	1	YEL	Backbox	Motor	11-LP-4	041-5105-00
29	1000s Reel Enable	11	-	CN16	4	BLK-WHT	5V	1	YEL	Backbox	Motor	11-LP-3	041-5105-00
30	1000s Reel Phase 1	11	-	CN16	3	GRN-BLK	5V	1	YEL	Backbox	Motor	11-LP-2	041-5105-00
31	1000s Reel Phase 2	11	-	CN16	2	BLU-BLK	5V	1	YEL	Backbox	Motor	11-LP-1	041-5105-00
33	Shaker motor(opt)	1	-	CN2	1	BLU	48V	5	RED	Cabinet	Motor	1-DR-0	041-5029-04
38	Meter 1	1	-	CN3	2	BLK	12V	1	RED	Cabinet	Digital Out	1-DR-2	500-9946-00
39	Meter 2	1	-	CN4	2	BLK	12V	1	RED	Cabinet	Digital Out	1-DR-3	500-9946-00
40	Ticket Dispenser	1	-	CN11	3		12V	1		Cabinet	Digital Out	1-DR-4	

Figure 3.2.1. Driver reference table.

3.2   LIGHTING REFERENCE

ID	Name	Node	Node Ext.	Conn.	Ret. Pin	Ret. Wire	Src. Pin	Src. Wire	Location	Type	Light Color	Address	Part Number
1	Start Button	1	-	CN6	3	YEL-BRN	1	RED	Cabinet	Feature	White	1-LP-2	112-5033-08
2	Lt Flipper (x2)	8	-	CN6	1	BRN-WHT	2	YEL	Playfield	G.I.	White	8-LP-0	112-5034-08
3	Rt Flipper (x2)	8	-	CN8	1	BRN-GRN	2	YEL	Playfield	G.I.	White	8-LP-1	112-5034-08
4	Rt Slingshot (Bot)	8	-	CN10	1	BRN-VIO	2	YEL	Playfield	G.I.	White	8-LP-2	112-5034-08
5	Lt Slingshot (Bot)	8	-	CN12	1	BRN-BLU	2	YEL	Playfield	G.I.	White	8-LP-3	112-5034-08
6	Lt Slingshot(Top)	10	-	CN4	4	ORG-BLK	2	RED	Playfield	G.I.	White	10-LP-8	112-5034-08
7	Rt Slingshot(Top)	9	-	CN16	15	YEL-WHT	1	YEL	Playfield	G.I.	White	9-LP-14	112-5034-08
8	Right GI #1	9	-	CN16	14	ORG-WHT	1	YEL	Playfield	G.I.	White	9-LP-13	112-5033-08
9	Right GI #2	9	-	CN16	13	BLU-GRN	1	YEL	Playfield	G.I.	White	9-LP-12	112-5033-08
10	Right GI #3	9	-	CN16	12	GRN	1	YEL	Playfield	G.I.	White	9-LP-11	112-5033-08

LIGHTING REFERENCE CONTINUED

Figure 3.2.3. Playfield liht locations (top view).

Figure 3.2.4. Backbox light locations.
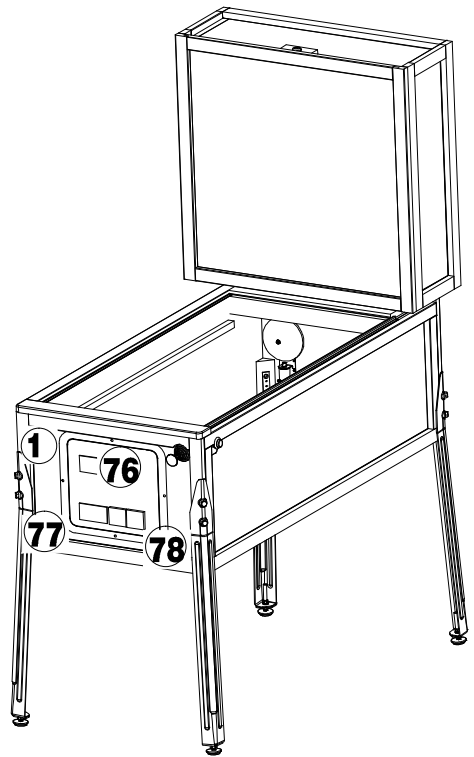
Figure 3.2.2. Cabinet light locations.

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LIGHTING REFERENCE CONTINUED

ID	Name	Node	Node Ext.	Conn.	Ret. Pin	Ret. Wire	Src. Pin	Src. Wire	Location	Type	Light Color	Address	Part Number
11	Right GI #4	9	-	CN16	11	RED-GRN	1	YEL	Playfield	G.I.	White	9-LP-10	112-5033-08
12	Right GI #5	9	-	CN16	10	BLU-YEL	1	YEL	Playfield	G.I.	White	9-LP-9	112-5033-08
13	Right GI #6	9	-	CN16	9	GRN-YEL	1	YEL	Playfield	G.I.	White	9-LP-8	112-5033-08
14	Right GI #7	9	-	CN16	8	RED-YEL	1	YEL	Playfield	G.I.	White	9-LP-7	112-5033-08
15	Right GI #8	9	-	CN16	7	BLU-ORG	1	YEL	Playfield	G.I.	White	9-LP-6	112-5033-08
16	Right GI #9	9	-	CN16	6	GRN-ORG	1	YEL	Playfield	G.I.	White	9-LP-5	112-5033-08
17	Right GI #10	9	-	CN16	5	RED-ORG	1	YEL	Playfield	G.I.	White	9-LP-4	112-5033-08
18	Right GI #11	9	-	CN16	4	BLU-BRN	1	YEL	Playfield	G.I.	White	9-LP-3	112-5033-08
19	Right GI #12	9	-	CN16	3	GRN-BRN	1	YEL	Playfield	G.I.	White	9-LP-2	112-5033-08
20	Skillshot GI 2	9	-	CN16	2	RED-BRN	1	YEL	Playfield	Feature	White	9-LP-1	112-5033-08
21	Star Rollover 1	10	-	CN2	4	YEL-BLK	2	RED	Playfield	Feature	White	10-LP-0	520-6824-0X
22	Star Rollover 2	10	-	CN2	5	YEL-BRN	2	RED	Playfield	Feature	White	10-LP-1	520-6824-0X
23	Star Rollover 3	10	-	CN2	6	YEL-RED	2	RED	Playfield	Feature	White	10-LP-2	520-6824-0X
24	Star Rollover 4	10	-	CN2	7	YEL-ORG	2	RED	Playfield	Feature	White	10-LP-3	520-6824-0X
25	Left Star	10	-	CN2	8	YEL-GRN	2	RED	Playfield	Feature	White	10-LP-4	520-6824-0X
26	Pop Bumper Star	10	-	CN2	9	YEL-BLU	3	RED	Playfield	Feature	White	10-LP-5	520-6824-0X
27	Shooter Ret. Star	10	-	CN2	10	YEL-VIO	3	RED	Playfield	Feature	White	10-LP-6	520-6824-0X
28	Top Right Star	10	-	CN2	11	YEL-GRY	3	RED	Playfield	Feature	White	10-LP-7	520-6824-0X
29	Left GI #1	10	-	CN4	5	ORG-BRN	2	RED	Playfield	G.I.	White	10-LP-9	112-5033-08
30	Left GI #2	10	-	CN4	6	ORG-RED	2	RED	Playfield	G.I.	White	10-LP-10	112-5033-08
31	Left GI #3	10	-	CN4	7	ORG-YEL	2	RED	Playfield	G.I.	White	10-LP-11	112-5033-08
32	Left GI #4	10	-	CN4	8	ORG-GRN	2	RED	Playfield	G.I.	White	10-LP-12	112-5033-08
33	Left GI #5	10	-	CN4	9	ORG-BLU	2	RED	Playfield	G.I.	White	10-LP-13	112-5033-08
34	Skillshot GI 1	10	-	CN4	10	ORG-VIO	3	RED	Playfield	Feature	White	10-LP-14	112-5033-08
35	Left GI #6	10	-	CN4	11	ORG-GRY	3	RED	Playfield	G.I.	White	10-LP-15	520-5307-00
36	Top lane #4	10	-	CN6	4	RED-VIO	2	RED	Playfield	Feature	White	10-LP-16	520-5307-00
37	Top lane #3	10	-	CN6	5	GRN-VIO	2	RED	Playfield	Feature	White	10-LP-17	520-5307-00
38	Top lane #2	10	-	CN6	6	BLU-VIO	2	RED	Playfield	Feature	White	10-LP-18	520-5307-00
39	Top lane #1 (Left)	10	-	CN6	7	RED-GRY	2	RED	Playfield	Feature	White	10-LP-19	520-5307-00
40	5 Point Bumper	10	-	CN6	8	GRN-GRY	2	RED	Playfield	Feature	White	10-LP-20	112-5024-08
41	Eject Lamp	10	-	CN6	9	BLU-GRY	3	RED	Playfield	Feature	White	10-LP-21	520-5307-00
42	Right Target	10	-	CN6	10	BLU-BRN	3	RED	Playfield	Feature	White	10-LP-22	520-5307-00
43	Left Target	10	-	CN6	11	BLU-GRN	3	RED	Playfield	Feature	White	10-LP-23	520-5307-00
44	Bot Lt Pop Bumper	10	-	CN8	4	RED-ORG	3	RED	Playfield	Feature	White	10-LP-24	520-5307-00
45	Bot Rt Pop Bumper	10	-	CN8	5	GRN-ORG	2	RED	Playfield	Feature	White	10-LP-25	520-5307-00
46	Top Lt Pop Bumper	10	-	CN8	6	BLU-ORG	2	RED	Playfield	Feature	White	10-LP-26	520-5307-00
47	Top Rt Pop Bumper	10	-	CN8	7	RED-YEL	1	RED	Playfield	Feature	White	10-LP-27	520-5307-00
48	Top Lane GI 1 (LT)	10	-	CN8	8	GRN-YEL	1	RED	Playfield	G.I.	White	10-LP-28	112-5033-08
49	Top Lane GI 2	10	-	CN8	9	BLU-YEL	1	RED	Playfield	G.I.	White	10-LP-29	112-5033-08
50	Top Lane GI 3	10	-	CN8	10	BLU-RED	1	RED	Playfield	G.I.	White	10-LP-30	112-5033-08
51	Top Lane GI 4	10	-	CN8	11	BLU-BLK	1	RED	Playfield	G.I.	White	10-LP-31	112-5033-08
52	High Score 1	11	11a	CN14	D1	-	-	-	Backbox	Feature	White	11-LP-16	520-6963-00
53	High Score 2	11	11a	CN14	D2	-	-	-	Backbox	Feature	White	11-LP-17	520-6963-00
54	Ball in Play 1	11	11a	CN14	D3	-	-	-	Backbox	Feature	White	11-LP-18	520-6963-00
55	Ball in Play 2	11	11a	CN14	D4	-	-	-	Backbox	Feature	White	11-LP-19	520-6963-00
56	Ball in Play 3	11	11a	CN14	D5	-	-	-	Backbox	Feature	White	11-LP-20	520-6963-00
57	Ball in Play 4	11	11a	CN14	D6	-	-	-	Backbox	Feature	White	11-LP-21	520-6963-00
58	Ball in Play 5	11	11a	CN14	D7	-	-	-	Backbox	Feature	White	11-LP-22	520-6963-00
59	Game Over 1	11	11a	CN14	D8	-	-	-	Backbox	Feature	White	11-LP-23	520-6963-00
60	Game Over 2	11	11a	CN14	D9	-	-	-	Backbox	Feature	White	11-LP-24	520-6963-00
61	Tilt Light	11	11a	CN14	D10	-	-	-	Backbox	Feature	White	11-LP-25	520-6963-00

SWITCH REFERENCE

Figure 3.2.7. Switch locations, playfield top view

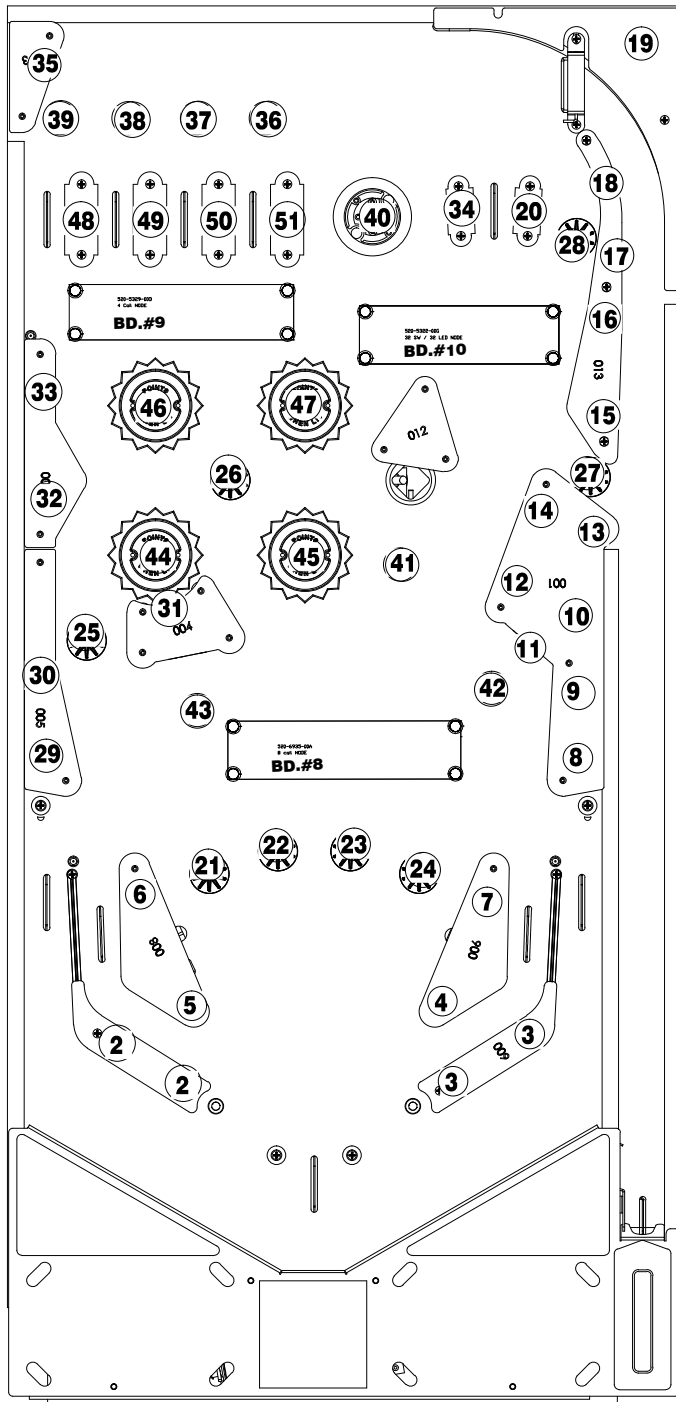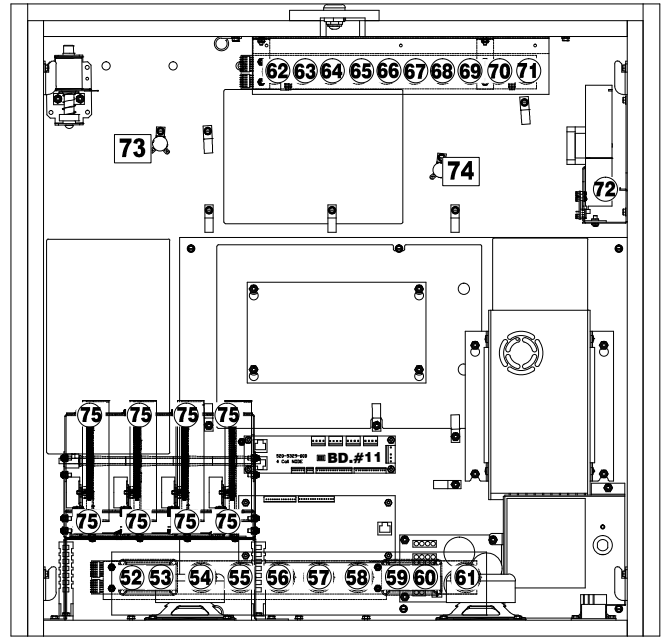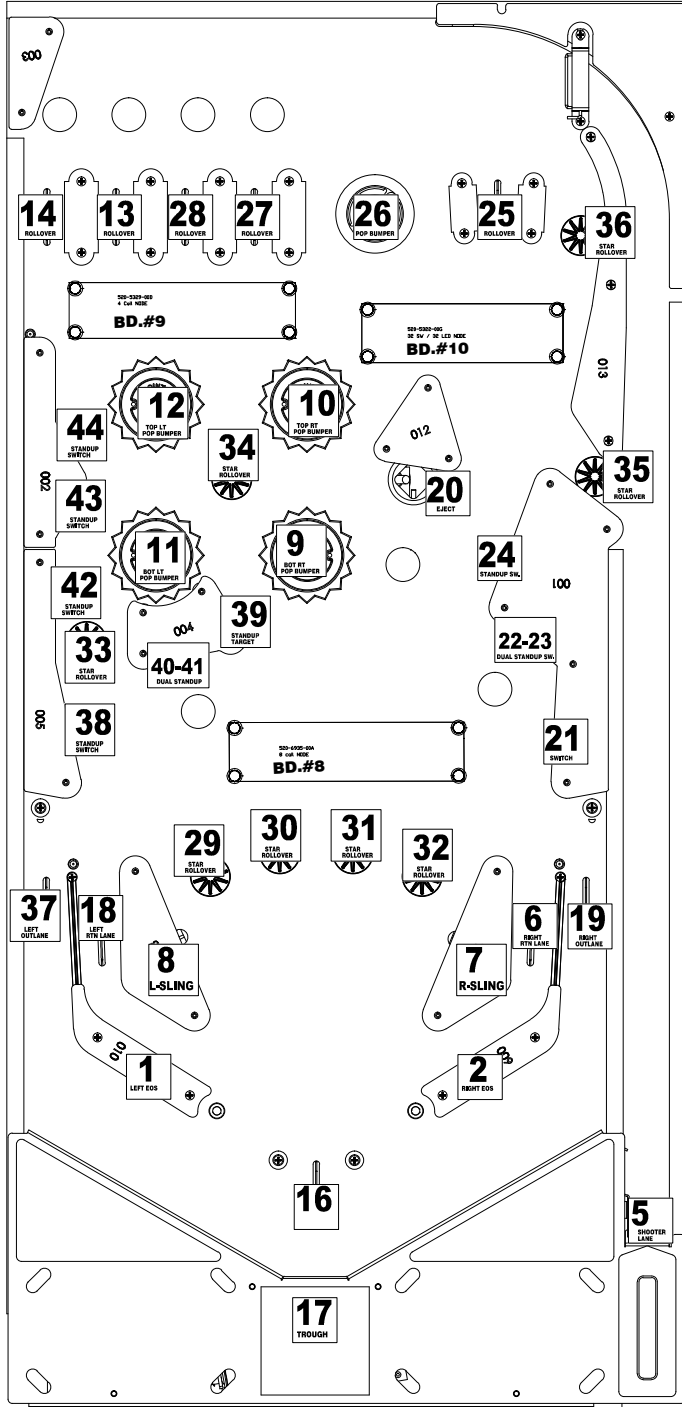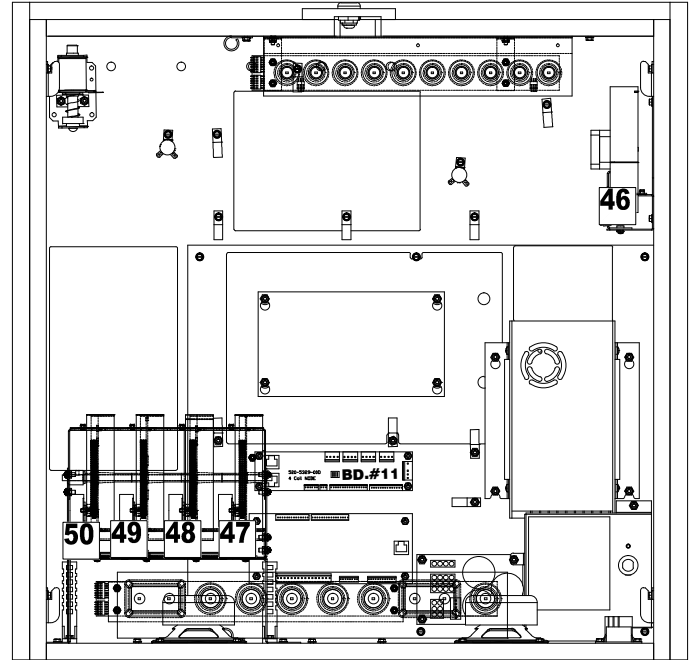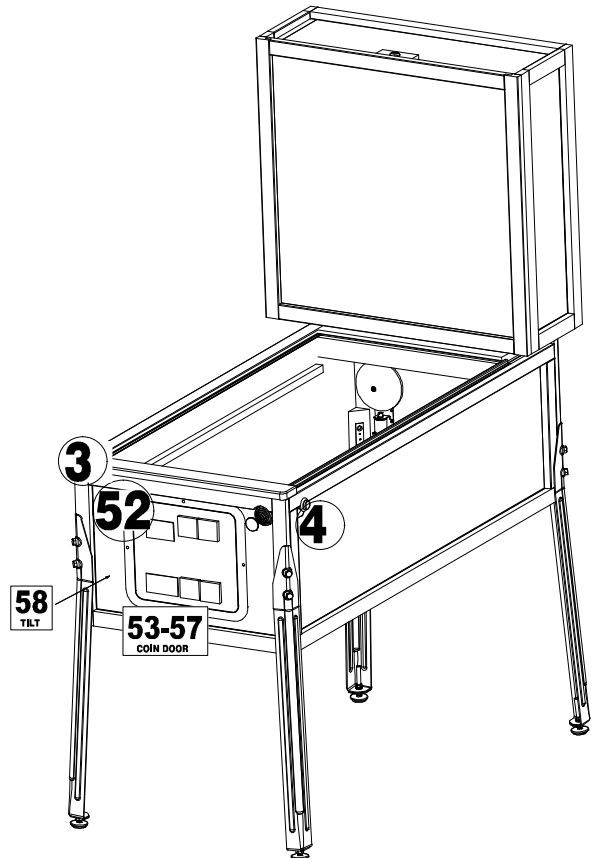Figure 3.2.6. Backbox switch locations.

Figure 3.2.5. Cabinet switch locations.

LIGHTING REFERENCE CONTINUED

ID	Name	Node	Node Ext.	Conn.	Ret. Pin	Ret. Wire	Src. Pin	Src. Wire	Location	Type	Light Color	Address	Part Number
62	Match 0 Left	11	11b	CN14	D1	-	-	-	Backbox	Feature	White	11-LP-32	520-6962-00
63	Match 1	11	11b	CN14	D2	-	-	-	Backbox	Feature	White	11-LP-33	520-6962-00
64	Match 2	11	11b	CN14	D3	-	-	-	Backbox	Feature	White	11-LP-34	520-6962-00
65	Match 3	11	11b	CN14	D4	-	-	-	Backbox	Feature	White	11-LP-35	520-6962-00
66	Match 4	11	11b	CN14	D5	-	-	-	Backbox	Feature	White	11-LP-36	520-6962-00
67	Match 5	11	11b	CN14	D6	-	-	-	Backbox	Feature	White	11-LP-37	520-6962-00
68	Match 6	11	11b	CN14	D7	-	-	-	Backbox	Feature	White	11-LP-38	520-6962-00
69	Match 7	11	11b	CN14	D8	-	-	-	Backbox	Feature	White	11-LP-39	520-6962-v
70	Match 8	11	11b	CN14	D9	-	-	-	Backbox	Feature	White	11-LP-40	520-6962-00
71	Match 9	11	11b	CN14	D10	-	-	-	Backbox	Feature	White	11-LP-41	520-6962-00
72	Credit reel	11	11b	CN3	3	ORG-GRN	1	RED	Backbox	G.I.	White	11-LP-42	520-5307-00
73	Flasher left	11	11b	CN4	2	ORG-RED	1	RED	Backbox	Flash	White	11-LP-44	113-5045-08
74	Flasher Right	11	11b	CN4	3	ORG-YEL	1	RED	Backbox	Flash	White	11-LP-43	113-5045-08
75	GI Reels (x8)	11	-	CN13	1	WHT-BLK	3	YEL	Backbox	G.I.	White	11-LP-0	520-5307-00
76	Coin Door GI (x2)	1	-	CN5	2	YEL	1	YEL-WHT	Coin Door	G.I.	White	1-LP-1	112-5033-08
77	Cabinet Left	1	-	CN6	2	YEL-RED	1	RED	Cabinet	Feature	White	1-LP-3	520-5307-00
78	Cabinet Right	1	-	CN6	4	YEL-ORG	1	RED	Cabinet	Feature	White	1-LP-6	520-5307-00

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 Flipper EOS	8	-	CN5	2	GRY-YEL	1	BLK-GRN	Playfield	Leaf	8-SW-0	180-5149-00
2	Right Flipper EOS	8	-	CN7	2	GRY-GRN	1	BLK-GRN	Playfield	Leaf	8-SW-1	180-5149-00
3	Left Flipper	8	-	CN9	2	GRY-BRN	1	BLK-GRN	Cabinet	Leaf	8-SW-2	180-5164-01
4	Right Flipper	8	-	CN11	2	GRY-RED	1	BLK-GRN	Cabinet	Leaf	8-SW-3	180-5164-01
5	Shooter Lane	8	-	CN6	4	GRY-WHT	3	BLK-GRN	Playfield	Rollover	8-SW-4	180-5157-00
6	Right Return lane	8	-	CN8	4	LGN-BLK	3	BLK-GRN	Playfield	Rollover	8-SW-5	500-9935-03
7	Right Slingshot	8	-	CN7	4	GRY-VIO	3	BLK-GRN	Playfield	Leaf	8-SW-6	180-5231-00
8	Left Slingshot	8	-	CN12	4	GRY-BLU	3	BLK-GRN	Playfield	Leaf	8-SW-7	180-5231-00
9	Bot RT Pop bumper	9	-	CN5	2	TAN-BLK	1	BLK-BRN	Playfield	Leaf	9-SW-0	180-5232-00
10	Top RT Pop bumper	9	-	CN7	2	TAN-GRY	1	BLK-BRN	Playfield	Leaf	9-SW-1	180-5232-00
11	Bot LT Pop bumper	9	-	CN9	2	TAN-ORG	1	BLK-BRN	Playfield	Leaf	9-SW-2	180-5232-00
12	Top LT Pop bumper	9	-	CN11	2	TAN-RED	1	BLK-BRN	Playfield	Leaf	9-SW-3	180-5232-00
13	Top Lane 2	10		CN7	2	TAN-BLK	10	BLK-BRN	Playfield	Rollover	10-SW-0	500-9935-04
14	Top Lane 1 (left)	10	-	CN7	3	TAN-RED	10	BLK-BRN	Playfield	Rollover	10-SW-1	500-9935-04
16	Center Drain	10	-	CN7	4	TAN-ORG	10	BLK-BRN	Playfield	Rollover	10-SW-2	500-9935-04
17	Trough Opto	10	-	CN7	5	TAN-YEL	10	BLK-BRN	Playfield	Opto	10-SW-3	515-0215-00 tx 515-0215-01 rx
18	Left Return Lane	10	-	CN7	6	TAN-GRN	10	BLK-BRN	Playfield	Rollover	10-SW-4	500-9935-04
19	Right Outlane	10	-	CN7	7	TAN-BLU	10	BLK-BRN	Playfield	Rollover	10-SW-5	500-9935-04
20	Top Eject	10	-	CN7	8	TAN-VIO	10	BLK-BRN	Playfield	Micro	10-SW-6	180-5186-01
21	Bot Rt Standup 1pt	10	-	CN5	2	LGN-BLK	10	BLK-GRY	Playfield	Leaf	10-SW-8	180-5231-00
22	Right target outer	10	-	CN5	3	LGN-BRN	10	BLK-GRY	Playfield	Leaf	10-SW-9	511-7581-00
23	Right target inner	10	-	CN5	4	LGN-RED	10	BLK-GRY	Playfield	Leaf	10-SW-10	511-7581-00
24	Top Rt Standup 1pt	10	-	CN5	5	LGN-ORG	10	BLK-GRY	Playfield	Leaf	10-SW-11	180-5231-00
25	Skill Shot	10	-	CN5	6	LGN-YEL	10	BLK-GRY	Playfield	Rollover	10-SW-12	500-9935-04
26	Top Pop Single	10	-	CN5	7	LGN-BLU	10	BLK-GRY	Playfield	Leaf	10-SW-13	180-5232-00
27	Top Lane 4	10	-	CN5	8	LGN-VIO	10	BLK-GRY	Playfield	Rollover	10-SW-14	500-9935-04
28	Top Lane 3	10	-	CN5	9	LGN-GRY	10	BLK-GRY	Playfield	Rollover	10-SW-15	500-9935-04
29	Star Rollover 1 LT	10	-	CN3	2	PNK-BLK	10	BLK-VIO	Playfield	Opto	10-SW-16	520-6824-0x

SWITCH REFERENCE CONTINUED

ID	Name	Node	Node Ext	Conn.	Input Pin	Input Wire	GND Pin	Ground Wire	Location	Type	Address	Part Number
30	Star Rollover 2	10	-	CN3	3	PNK-BRN	10	BLK-VIO	Playfield	Opto	10-SW-17	520-6824-0x
31	Star Rollover 3	10	-	CN3	4	PNK-RED	10	BLK-VIO	Playfield	Opto	10-SW-18	520-6824-0x
32	Star Rollover 4 RT	10	-	CN3	5	PNK-ORG	10	BLK-VIO	Playfield	Opto	10-SW-19	520-6824-0x
33	Star Rollover Left	10	-	CN3	6	PNK-YEL	10	BLK-VIO	Playfield	Opto	10-SW-20	520-6824-0x
34	Star Rollover Pops	10	-	CN3	7	PNK-GRN	10	BLK-VIO	Playfield	Opto	10-SW-21	520-6824-0x
35	Star Rollover Rtn	10	-	CN3	8	PNK-BLU	10	BLK-VIO	Playfield	Opto	10-SW-22	520-6824-0x
36	Star Rollovr Top RT	10	-	CN3	9	PNK-VIO	10	BLK-VIO	Playfield	Opto	10-SW-23	520-6824-0x
37	Left Outlane	10	-	CN1	2	WHT-BLK	10	BLK-RED	Playfield	Leaf	10-SW-24	500-9935-03
38	Lt Standup 1pt #1	10	-	CN1	3	WHT-BRN	10	BLK-RED	Playfield	Leaf	10-SW-25	180-5231-00
39	Lt Standup 1pt #5	10	-	CN1	4	WHT-RED	10	BLK-RED	Playfield	Leaf	10-SW-26	180-5231-00
40	Left Target Outer	10	-	CN1	5	WHT-ORG	10	BLK-RED	Playfield	Leaf	10-SW-27	511-7581-00
41	Left Target Inner	10	-	CN1	6	WHT-YEL	10	BLK-RED	Playfield	Leaf	10-SW-28	511-7581-00
42	Lt Standup 1pt #2	10	-	CN1	7	WHT-GRN	10	BLK-RED	Playfield	Leaf	10-SW-29	180-5231-00
43	Lt Standup 1pt #3	10	-	CN1	8	WHT-BLU	10	BLK-RED	Playfield	Leaf	10-SW-30	180-5231-00
44	Lt Standup 1pt #4	10	-	CN1	9	WHT-VIO	10	BLK-RED	Playfield	Leaf	10-SW-31	180-5231-00
46	Credit Reel Home	11	-	CN15	6	TAN-WHT	14	BLK	Backbox	Opto	11-SW-8	520-6960-00
47	1s Reel Home	11	-	CN15	5	TAN-VIO	14	BLK	Backbox	Opto	11-SW-7	520-6960-00
48	10s Reel Home	11	-	CN15	4	TAN-YEL	14	BLK	Backbox	Opto	11-SW-6	520-6960-00
49	100s Reel Home	11	-	CN15	3	TAN-ORG	14	BLK	Backbox	Opto	11-SW-5	520-6960-00
50	1000s Reel Home	11	-	CN15	2	TAN-BLK	14	BLK	Backbox	Opto	11-SW-4	520-6960-00
52	Start Button	1		CN6	10	GRY	5	BLK-WHT	Cabinet	Micro	1-SW-11	180-5174-00
53	Left Coin	1	-	CN5	9	PNK-BRN	3	BLK	Cabinet	Micro	1-SW-16	
54	Right Coin	1	-	CN5	8	PNK-RED	3	BLK	Cabinet	Micro	1-SW-18	
55	Center Coin	1	-	CN5	7	PNK-ORG	3	BLK	Cabinet	Micro	1-SW-17	
56	Fourth Coin	1	-	CN5	6	-	-	-	Cabinet	-	1-SW-19	
57	Fifth Coin	1	-	CN5	5	-	-	-	Cabinet	-	1-SW-20	
58	Tilt Pendulum	1	-	CN6	5	WHT	7	BLK-WHT	Cabinet	Plumb Bob	1-SW-14	
59	Ticket Notch	1	-	CN11	5	-	-	-	Cabinet	-	1-SW-8	
60	Slam Tilt	1	-	CN5	4	LGN-RED	3	BLK	Cabinet	-	1-SW-21	
C1	DIP 1	0	-	-	-	-	-	-	CPU Node		0-SW-0	-
C2	DIP 2	0	-	-	-	-	-	-	CPU Node		0-SW-2	-
C3	DIP 3	0	-	-	-	-	-	-	CPU Node		0-SW-3	-
C4	DIP 4	0	-	-	-	-	-	-	CPU Node		0-SW-4	-
C5	DIP 5	0	-	-	-	-	-	-	CPU Node		0-SW-5	-
C6	DIP 6	0	-	-	-	-	-	-	CPU Node		0-SW-6	-
C7	DIP 7	0	-	-	-	-	-	-	CPU Node		0-SW-7	-
C8	DIP 8	0	-	-	-	-	-	-	CPU Node		0-SW-8	-
C9	Service Select	0	-	CN25	4	LGN-GRY	6	BLK	Coin Door		0-SW-9	180-5192-04
C10	Service Plus	0	-	CN25	3	LGN-VIO	6	BLK	Coin Door		0-SW-10	180-5192-02
C11	Service Minus	0	-	CN25	2	LGN-BLU	6	BLK	Coin Door		0-SW-11	180-5192-02
C12	Service Back	0	-	CN25	1	LGN-BLK	6	BLK	Coin Door		0-SW-12	180-5192-00
C16	Power Interlock	0	-	CN7	4	GRY	5	GRY-RED	Cabinet	Interlock	0-SW-16	180-5136-00

4. ELECTRONIC PINOUTS AND SCHEMATICS

4.1 SPIKE CPU NODE 0

520-6936-00

AUDIO PINOUTS

ID	Type	Pin	Description	Minimum Impedance	Max Power (RMS)
CN18	TRS 3.5mm Headphone Jack	Tip	Headphone Left	8 Ohms	200mW
		Ring	Headphone Right	8 Ohms	200mW
		Sleeve	Audio Ground	-	-
CN1	.156" 5-pin Header	1	Speaker Right Ground (-)	4 Ohms	-
		2	Speaker Right (+)	4 Ohms	20W
		3	n/c	-	-
		4	Speaker Left Ground (-)	4 Ohms	-
		5	Speaker Left (+)	4 Ohms	20W
CN4	.156" 2-pin Header	1	Woofer Ground (-)	8 Ohms	-
		2	Woofer Out (+)	8 Ohms	40W
CN27	.100" 3-pin header	1	Line Out Left (+)	600 Ohms	-
		2	Line Out Ground	-	-
		3	Line Out Right (-)	600 Ohms	-

Figure 3.3.3. Audio Pinouts

CONNECTORS

ID	Connector Type	Description
CN1	5-Pin .156" Header	Backbox 2-channel amplified speaker out
CN3	RJ45	SPIKE node bus - to cabinet node N1
CN4	2-Pin .156"	Cabinet 1-channel amplified speaker out
CN7	5-Pin .156" Header	48V supply from main power supply
CN18	3.5mm Stereo TRS jack	Headphone Jack
CN20	USB	USB connector - for software updates, audit dumps, and expansion modules
CN21	USB	USB connector - for software updates, audit dumps, and expansion modules
CN22	RJ45	SPIKE node bus - to playfield node, N8
CN23	14-Pin .100" Header	Dot matrix display connector
CN24	4-Pin .156" Header	5V DC and ground out to the LED display
CN25	12-Pin .100" Header	Dedicated switch inputs - service, volume switches

COMPONENTS

ID	Name
S1	Reset Switch
S2	DIP Switches
SD CARD	For system SD card. Note: only to be removed if instructed to by Stern Service.
BT1	CR232 3V Lithium battery for game clock between power cycles
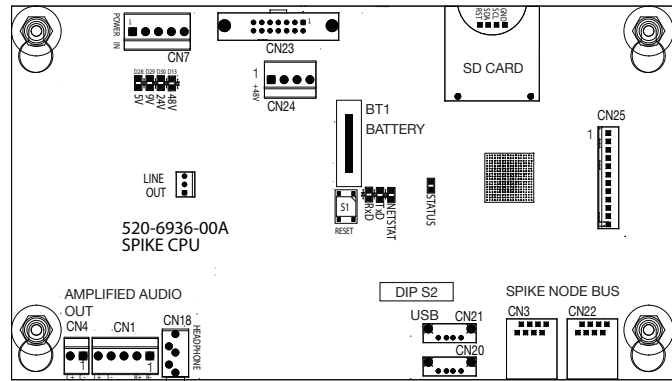
Figure 3.3.1. SPIKE CPU Node connector detail.

COUNTRY CODES (DIP S2)

Country	DIP S2							
	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
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 3.3.2. Country code DIP switch settings.

SPIKE CPU NODE 0 CONTINUED

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.
24V	+24V Audio Power	Red	ON: Audio power supply is good, OFF: Audio power supply off, call tech support.
9V	+9V Node Bus Power	Red	ON: Node bus power supply is good, OFF: Node bus power supply bad, call tech support.
5V		Red	ON: Logic power supply is good. OFF: Logic power supply bad, call tech support.
TxD	Node bus transmit	Red	Node bus transmit activity
RxD	Node bus receive	Red	Node bus receive activity
Sta-tus	System status	Red	Constant double blink - game software running
Net-stat	Network status	Red	Communication bridge activity

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-2	-
C3	DIP 3	-	-	-	-	-	CPU Node		0-SW-3	-
C4	DIP 4	-	-	-	-	-	CPU Node		0-SW-4	-
C5	DIP 5	-	-	-	-	-	CPU Node		0-SW-5	-
C6	DIP 6	-	-	-	-	-	CPU Node		0-SW-6	-
C7	DIP 7	-	-	-	-	-	CPU Node		0-SW-7	-
C8	DIP 8	-	-	-	-	-	CPU Node		0-SW-8	-
C9	Service Select	CN25	4	LGN-GRY	6	BLK	Coin Door		0-SW-9	180-5192-04
C10	Service Plus	CN25	3	LGN-VIO	6	BLK	Coin Door		0-SW-10	180-5192-02
C11	Service Minus	CN25	2	LGN-BLU	6	BLK	Coin Door		0-SW-11	180-5192-02
C12	Service Back	CN25	1	LGN-BLK	6	BLK	Coin Door		0-SW-12	180-5192-00
C16	Playfield Power Interlock	CN7	4	GRY	5	GRY-RED	Cabinet	Interlock	0-SW-16	180-5136-00

COIN DOOR SERVICE SWITCH WIRING
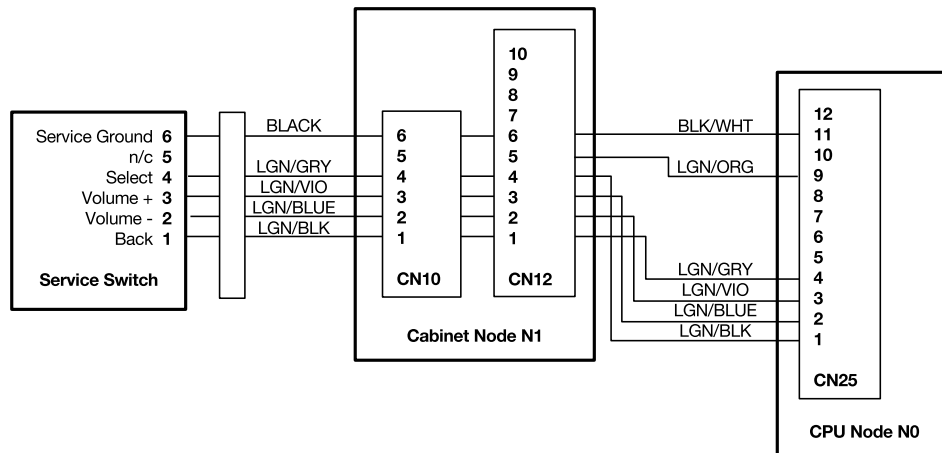
Figure 4.1.1. Service switch wiring. Note that the Cabient Node must be present and CN10 and CN12 connected for the Coin Door Service Switches to function correctly.

4.2   CABINET NODE 1

520-5319-00

ID	Type	Pin	Description	Wire Color
CN2	.156" 5-Pin Header Shaker Motor	1	Shaker Motor (-)	BLU
		2	Shaker Motor (-)	-
		3	Shaker Motor (+)	-
		4	Key	-
		5	Shaker Motor (+)	RED
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	YEL/ORG
		5	Ground	BLK/WHT
		6	Spare Left	-
		7	Tilt Input	WHT
		8	Door Open	-
		9	Start 2 Switch	-
		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	-
		2	Plunge 2 LED	-
		3	Plunge 1 LED	-
		4	Spare LED 2	-
		5	Ground	-
		6	Spare Right In	-
		7	Plunge 2 Switch	-
		8	Plunge 1 Switch	-
		9	N/C	
		10	N/C	
		11	N/C	
		12	N/C	
CN9	.100" 6-Pin Header Dollar Bill Acceptor	1	Coin Enable/DBA Inhibit (-)	-
		2	Coin Enable/DBA Inhibit (+)	-
		3	Key	
		4	DBA 12V	-
		5	Coin 6 / DBA Credit	-
		6	Ground	-
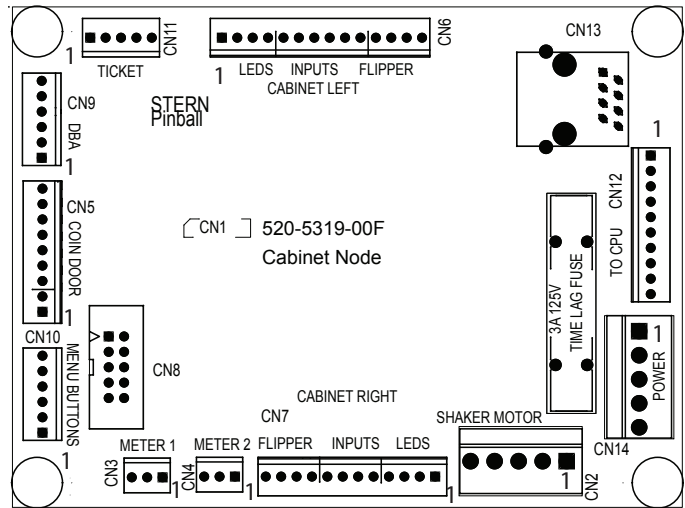
Figure 4.2.1. Cabinet node connector diagram 520-5319-00

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	
		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)	GRN/BLK
		2	Service Down (To CPU)	GRN/BLU
		3	Service Up (To CPU)	GRN/VIO
		4	Service Select (To CPU)	GRN/GRY
		5	Power Present	GRN/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	-
		3	N/C	-
		4	N/C	-
		5	48VDC In	GRY-YEL
			*Varies by country model	

Figure 4.2.2. Cabinet node pinout 520-5319-00

WHOA NELLIE! MANUAL #780-50D7-00

4.3 LOWER PLAYFIELD 48V 8-DRIVER PINOUT NODE 8

520-6935-00

Figure 4.3.1. Lower playfield 48V 8-driver node (Node 8) playfield connector detail.

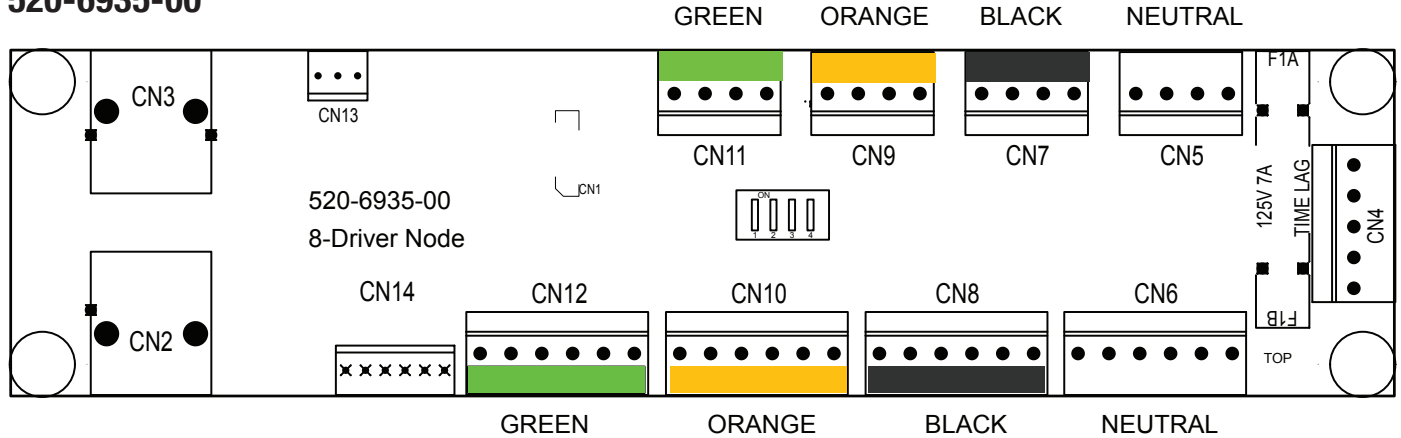| ID	Type	Pin	Description	Wire Color
SW1	Address DIP	-	Node 8 - OFF-OFF-OFF-OFF	
CN2	RJ45	-	SPIKE Node Bus	n/a
CN3	RJ45	-	SPIKE Node Bus	Multi
CN4	.156" 5-Pin Header Node Power	1	Ground	BLK
		2	Key	n/c
		3	N/C	n/c
		4	N/C	n/c
		5	48VDC In	GRY
CN5	.156" 4-Pin Header (White)	1	Switch Ground	BLK-GRN
		2	8-SW-0 Switch Return	GRY-YEL
		3	8-DR-0 Driver Return	ORG-YEL
		4	48V Driver Power	GRY-ORG
CN6	.156 6-Pin Header (White)	1	8-LP-0 Light Return	BRN-WHT
		2	LED V+	YEL
		3	Switch Ground	BLK-GRN
		4	8-SW-4 Switch Return	GRY-WHT
		5	8-DR-4 Driver Return	ORG-WHT
		6	48V Driver Power	GRY-ORG
CN7	.156" 4-Pin Header (Black)	1	Switch Ground	BLK-GRN
		2	8-SW-1 Switch	GRY-GRN
		3	8-DR-1 Driver Return	ORG-GRN
		4	48V Driver Power	GRY-ORG
CN8	.156 6-Pin Header (Black)	1	8-LP-1 Light Return	BRN-GRN
		2	LED V+	YEL
		3	Switch Ground	BLK-GRN
		4	8-SW-5	LGN-BLK
		5	8-DR-5 Driver Return	ORG-GRY
		6	48V Driver Power	GRY-ORG
CN9	.156" 4-Pin Header (Orange)	1	Switch Ground	BLK-GRN
		2	8-SW-2 Switch	GRY-BRN
		3	8-DR-2 Driver Return	YEL-ORG
		4	48V Driver Power	n/c

ID	Type	Pin	Description	Wire Color
CN10	.156" 6-Pin Header (Orange)	1	8-LP-2 Light Return	BRN-VIO
		2	LED V+	YEL
		3	Switch Ground	BLK-GRN
		4	8-SW-6 Switch Return	GRY-VIO
		5	8-DR-6 Driver Return	ORG-VIO
		6	48V Driver Power	GRY-ORG
CN11	.156" 4-Pin Header (Green)	1	Switch Ground	BLK-GRN
		2	8-SW-3 Switch	GRY-RED
		3	8-DR-3 Driver Return	YEL-GRN
		4	48V Driver Power	n/c
CN12	.156" 6-Pin Header (Green)	1	8-LP-3 Light Return	BRN-BLU
		2	LED V+	YEL
		3	Switch Ground	BLK-GRN
		4	8-SW-7 Switch Return	GRY-BLU
		5	8-DR-7 Driver Return	ORG-BLU
		6	48V Driver Power	GRY-ORG
CN13	.100" 3-Pin Header	1	8-LP-4 GI Return (1A Max)	n/c
		2	GI Ground	n/c
		3	LED V+	n/c
CN14	.100" 6-Pin Header, Node Extension Bus	1	Ground	n/c
		2	DIN	n/c
		3	DOUT	n/c
		4	SCK	n/c
		5	RCK	n/c
		6	V+	n/c
F1	Fuse	-	7A SB, 125V	n/a
	* Refer to Light, Switch, and Driver Node Reference for Wire Colors			

Figure 4.3.2. Lower playfield 48V 8-driver node (Node 8) pinout 520-6935-00.

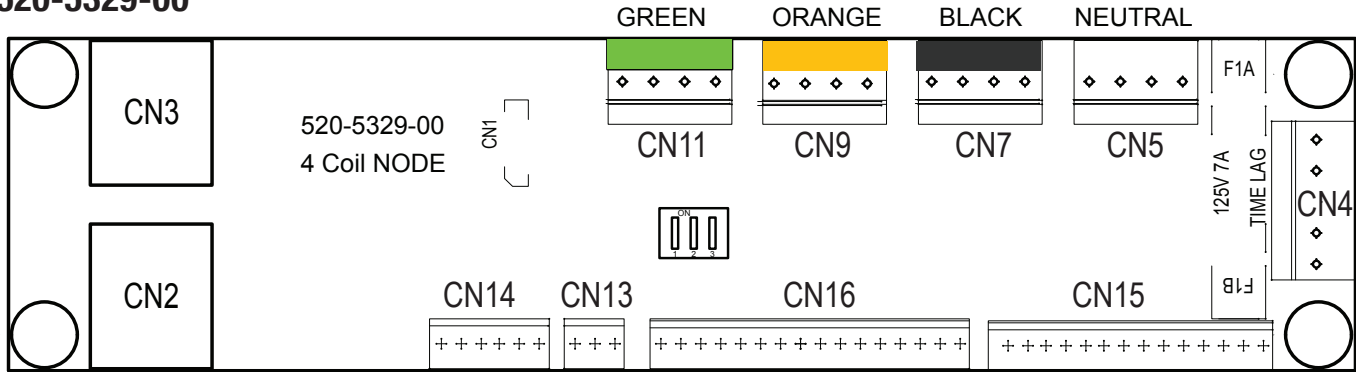# 4.4 MID1 PLAYFIELD 4-DRIVER 48V NODE 9 PINOUT

520-5329-00

Figure 4.4.1. Mid 1 Playfield 4-Driver 48V Node 9 connector detail.

ID	Type	Pin	Description	Wire Color
SW1	Address DIP	-	Node 9 - OFF-OFF-ON	
CN1	-	-	Not Used	n/a
CN2	RJ45	-	SPIKE Node Bus	Multi
CN3	RJ45	-	SPIKE Node Bus	Multi
CN4	.156" 5-Pin Header Node Power	1	Ground	BLK
		2	Key	n/c
		3	N/C	n/c
		4	N/C	n/c
		5	48VDC In	GRY
CN5	.156" 4-Pin Header (White)	1	Switch Ground	BLK-BRN
		2	9-SW-0 Switch Return	TAN-BLK
		3	9-DR-0 Driver Return	YEL-BLK
		4	48V Driver Power	GRY-BRN
CN7	.156" 4-Pin Header (Black)	1	Switch Ground	BLK-BRN
		2	9-SW-1 Switch Return	TAN-WHT
		3	9-DR-1 Driver Return	YEL-BRN
		4	48V Driver Power	GRY-BRN
CN9	.156" 4-Pin Header (Orange)	1	Switch Ground	BLK-BRN
		2	9-SW-2 Switch Return	TAN-ORG
		3	9-DR-2 Driver Return	BRN-ORG
		4	48V Driver Power	GRY-BRN
CN11	.156" 4-Pin Header (Green)	1	Switch Ground	BLK-BRN
		2	9-SW-3 Switch Return	TAN-RED
		3	9-DR-3 Driver Return	YEL-RED
		4	48V Driver Power	GRY-BRN
CN13	.100" 3-Pin Header	1	9-LP-0 GI Return (1A Max)	n/c
		2	GI Ground	n/c
		3	LED V+	n/c
CN14	.100" 6-Pin Header	1	Ground	n/c
		2	DIN	n/c
		3	DOUT	n/c
		4	SCK	n/c
		5	RCK	n/c
		6	V+	n/c

ID	Type	Pin	Description	Wire Color
CN15	.100" 14-Pin Header	1	+5V	n/c
		2	9-SW-4 Switch Return	n/c
		3	9-SW-5 Switch Return	n/c
		4	9-SW-6 Switch Return	n/c
		5	9-SW-7 Switch Return	n/c
		6	9-SW-8 Switch Return	n/c
		7	9-SW-9 Switch Return	n/c
		8	9-SW-10 Switch Return	n/c
		9	9-SW-11 Switch Return	n/c
		10	9-SW-12 Switch Return	n/c
		11	9-SW-13 Switch Return	n/c
		12	9-SW-14 Switch Return	n/c
		13	9-SW-15 Switch Return	n/c
		14	Switch Ground	n/c
CN16	.100" 16-Pin Header	1	+6V	YEL
		2	9-LP-1 Light Return	RED-BRN
		3	9-LP-2 Light Return	GRN-BRN
		4	9-LP-3 Light Return	BLU-BRN
		5	9-LP-4 Light Return	RED-ORG
		6	9-LP-5 Light Return	GRN-ORG
		7	9-LP-6 Light Return	BLU-ORG
		8	9-LP-7 Light Return	RED-YEL
		9	9-LP-8 Light Return	GRN-YEL
		10	9-LP-9 Light Return	BLU-YEL
		11	9-LP-10 Light Return	RED-GRN
		12	9-LP-11 Light Return	GRN
		13	9-LP-12 Light Return	BLU-GRN
		14	9-LP-13 Light Return	ORG-WHT
		15	9-LP-14 Light Return	YEL-WHT
		16	9-LP-15 Light Return	n/c
F1	Fuse		7A SB, 125V	n/a

Figure 4.4.2. Mid 1 Playfield 4-Driver 48V Node 9 pinout.

4.5   NODE 10 MID PLAYFIELD PINOUT 520-5322-00
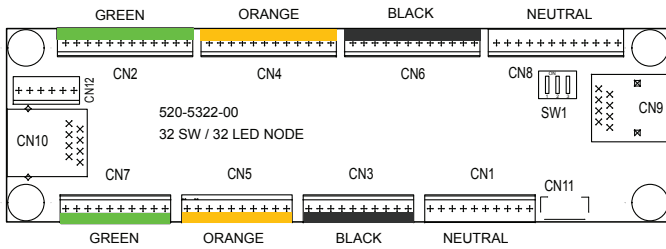
Figure 4.5.1. Node 10 Mid Playfield Connectors 520-5322-00

ID	Type	Pin	Description	Wire Color
SW1	Address DIP		Node 10- OFF-ON-OFF	-
CN1	.100" 10-Pin Header (White)	1	+5V	n/c
		2	11-SW-24 Switch Return	WHT-BLK
		3	11-SW-25 Switch Return	WHT-BRN
		4	11-SW-26 Switch Return	WHT-RED
		5	11-SW-27 Switch Return	WHT-ORG
		6	11-SW-28 Switch Return	WHT-YEL
		7	11-SW-29 Switch Return	WHT-GRN
		8	11-SW-30 Switch Return	WHT-BLU
		9	11-SW-31 Switch Return	WHT-VIO
		10	Switch Ground	BLK-RED
CN2	.100" 12-Pin Header (Green)	1	+8V	n/c
		2	+5V	RED
		3	+5V	RED
		4	11-LP-0 Light Return	YEL-BLK
		5	11-LP-1 Light Return	YEL-BRN
		6	11-LP-2 Light Return	YEL-RED
		7	11-LP-3 Light Return	YEL-ORG
		8	11-LP-4 Light Return	YEL-GRN
		9	11-LP-5 Light Return	YEL-BLU
		10	11-LP-6 Light Return	YEL-VIO
		11	11-LP-7 Light Return	YEL-GRY
		12	Ground	n/c
CN3	.100" 10-Pin Header (Black)	1	+5V	n/c
		2	11-SW-16 Switch Return	PNK-BLK
		3	11-SW-17 Switch Return	PNK-BRN
		4	11-SW-18 Switch Return	PNK-RED
		5	11-SW-19 Switch Return	PNK-ORG
		6	11-SW-20 Switch Return	PNK-YEL
		7	11-SW-21 Switch Return	PNK-GRN
		8	11-SW-22 Switch Return	PNK-BLU
		9	11-SW-23 Switch Return	PNK-VIO
		10	Switch Ground	BLK-VIO
CN4	.100" 12-Pin Header (Orange)	1	+8V	n/c
		2	+5V	RED
		3	+5V	RED
		4	11-LP-8 Light Return	ORG-BLK
		5	11-LP-9 Light Return	ORG-BRN
		6	11-LP-10 Light Return	ORG-RED
		7	11-LP-11 Light Return	ORG-YEL
		8	11-LP-12 Light Return	ORG-GRN
		9	11-LP-13 Light Return	ORG-BLU
		10	11-LP-14 Light Return	ORG-VIO
		11	11-LP-15 Light Return	ORG-GRY
		12	Ground	n/c

ID	Type	Pin	Description	Wire Color
CN5	.100" 10-Pin Header (Orange)	1	+5V	n/c
		2	11-SW-8 Switch Return	LGN-BLK
		3	11-SW-9 Switch Return	LGN-BRN
		4	11-SW-10 Switch Return	LGN-RED
		5	11-SW-11 Switch Return	LGN-ORG
		6	11-SW-12 Switch Return	LGN-YEL
		7	11-SW-13 Switch Return	LGN-BLU
		8	11-SW-14 Switch Return	LGN-VIO
		9	11-SW-15 Switch Return	LGN-GRY
		10	Switch Ground	BLK-GRY
CN6	.100" 12-Pin Header (Black)	1	+8V	n/c
		2	+5V	RED
		3	+5V	RED
		4	11-LP-16 Light Return	RED-VIO
		5	11-LP-17 Light Return	GRN-VIO
		6	11-LP-18 Light Return	BLU-VIO
		7	11-LP-19 Light Return	RED-GRY
		8	11-LP-20 Light Return	GRN-GRY
		9	11-LP-21 Light Return	BLU-GRY
		10	11-LP-22 Light Return	BLU-BRN
		11	11-LP-23 Light Return	BLU-GRN
		12	Ground	n/c
CN7	.100" 10-Pin Header (Green)	1	+5V	RED
		2	11-SW-0 Switch Return	TAN-BLK
		3	11-SW-1 Switch Return	TAN-RED
		4	11-SW-2 Switch Return	TAN-ORG
		5	11-SW-3 Switch Return	TAN-YEL
		6	11-SW-4 Switch Return	TAN-GRN
		7	11-SW-5 Switch Return	TAN-BLU
		8	11-SW-6 Switch Return	TAN-VIO
		9	11-SW-7 Switch Return	n/c
		10	Switch Ground	BLK-BRN
CN8	.100" 12-Pin Header (White)	1	+8V	n/c
		2	+5V	RED
		3	+5V	RED
		4	11-LP-24 Light Return	RED-ORG
		5	11-LP-25 Light Return	GRN-ORG
		6	11-LP-26 Light Return	BLU-ORG
		7	11-LP-27 Light Return	RED-YEL
		8	11-LP-28 Light Return	GRN-YEL
		9	11-LP-29 Light Return	BLU-YEL
		10	11-LP-30 Light Return	BLU-RED
		11	11-LP-31 Light Return	BLU-BLK
		12	Ground	n/c
CN9	RJ45	-	SPIKE Node Bus	Multi
CN10	RJ45	-	SPIKE Node Bus	Multi
CN11	-	-	Not Used	n/c
CN12	.100" 6-Pin Header, Node Extension Bus	1	Ground	*
		2	DIN	*
		3	DOUT	*
		4	SCK	*
		5	RCK	*
		6	V+	*

Figure 4.5.2. Node 10 Mid Playfield Pinout 520-5322-00

4.6   NODE 11 BACKBOX 4-DRIVER 48V PINOUT
520-5329-00
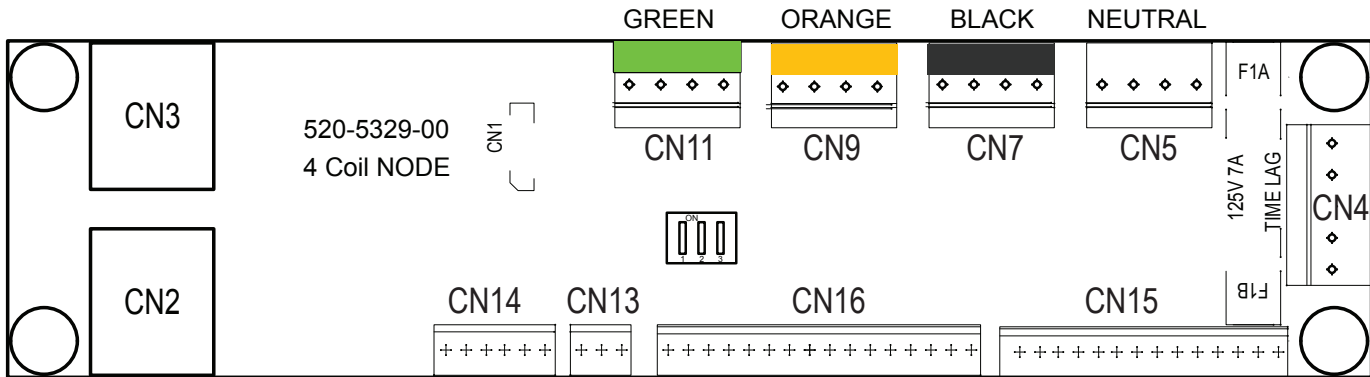
Figure 4.6.1. Node 11 Backbox 4-Driver 48V Connectors 520-5329-00

ID	Type	Pin	Description	Wire Color
SW1	Address DIP		Node 11 - OFF-ON-ON	
CN1	-	-	Not Used	n/a
CN2	RJ45	-	SPIKE Node Bus	Multi
CN3	RJ45	-	SPIKE Node Bus	Multi
CN4	.156" 5-Pin Header Node Power	1	Ground	BLK
		2	Key	n/c
		3	N/C	n/c
		4	N/C	n/c
		5	48VDC In	GRY
CN5	.156" 4-Pin Header (White)	1	Switch Ground	n/c
		2	10-SW-0 Switch Return	n/c
		3	10-DR-0 Driver Return	YEL-BLU
		4	48V Driver Power	GRY-BLK
CN7	.156" 4-Pin Header (Black)	1	Switch Ground	n/c
		2	10-SW-1 Switch Return	n/c
		3	10-DR-1 Driver Return	YEL-GRY
		4	48V Driver Power	GRY-BLK
CN9	.156" 4-Pin Header (Orange)	1	Switch Ground	n/c
		2	10-SW-2 Switch Return	n/c
		3	10-DR-2 Driver Return	YEL-VIO
		4	48V Driver Power	GRY-BLK
CN11	.156" 4-Pin Header (Green)	1	Switch Ground	n/c
		2	10-SW-3 Switch Return	n/c
		3	10-DR-3 Driver Return	ORG-RED
		4	48V Driver Power	GRY-BLK
CN13	.100" 3-Pin Header	1	10-LP-0 GI Return (1A Max)	WHT-BLK
		2	GI Ground	n/c
		3	LED V+	YEL
CN14	.100" 6-Pin Header	1	Ground	BLK
		2	DIN	VIO-BLK
		3	DOUT	VIO-BRN
		4	SCK	VIO-RED
		5	RCK	VIO-ORG
		6	V+	RED

ID	Type	Pin	Description	Wire Color
CN15	.100" 14-Pin Header	1	+5V	RED
		2	10-SW-4 Switch Return	TAN-BLK
		3	10-SW-5 Switch Return	TAN-ORG
		4	10-SW-6 Switch Return	TAN-YEL
		5	10-SW-7 Switch Return	TAN-VIO
		6	10-SW-8 Switch Return	TAN-WHT
		7	10-SW-9 Switch Return	WHT-RED
		8	10-SW-10 Switch Return	n/c
		9	10-SW-11 Switch Return	n/c
		10	10-SW-12 Switch Return	n/c
		11	10-SW-13 Switch Return	n/c
		12	10-SW-14 Switch Return	n/c
		13	10-SW-15 Switch Return	n/c
		14	Switch Ground	BLK
CN16	.100" 16-Pin Header	1	+6V	YEL
		2	10-LP-1 Light Return	BLU-BLK
		3	10-LP-2 Light Return	GRN-BLK
		4	10-LP-3 Light Return	BLK-WHT
		5	10-LP-4 Light Return	RED-ORG
		6	10-LP-5 Light Return	BLU-ORG
		7	10-LP-6 Light Return	GRN-ORG
		8	10-LP-7 Light Return	RED-YEL
		9	10-LP-8 Light Return	GRN-YEL
		10	10-LP-9 Light Return	BLU-YEL
		11	10-LP-10 Light Return	BLU-VIO
		12	10-LP-11 Light Return	GRN-VIO
		13	10-LP-12 Light Return	RED-VIO
		14	10-LP-13 Light Return	RED-GRY
		15	10-LP-14 Light Return	BLU-GRY
		16	10-LP-15 Light Return	BLK-VIO
F1	Fuse		7A SB, 125V	n/a
	* Refer to Light, Switch, and Driver Node Reference for Wire Colors			

Figure 4.6.2. Node 11 Backbox 4-Driver 48V Pinout 520-5329-00
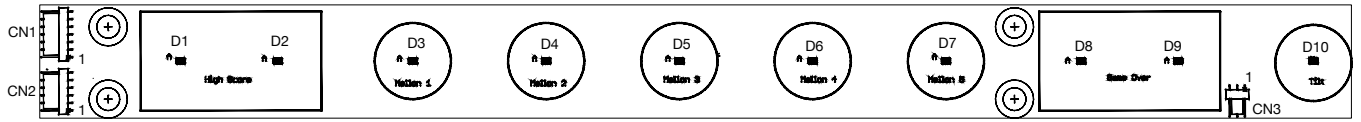
4.7 9-LAMP BOTTOM EXTENSION 11A PINOUT

520-6963-00

Figure 4.6.3. 9-lamp Bottom Extension 11a connectors 520-6963-00

ID	Type	Pin	Description	Wire Color
CN1	.100" 7-Pin Header, Node Extension Bus	1	Ground	BLK
		2	MISO	VIO-BLK
		3	MISI	VIO-BRN
		4	SCK	VIO-RED
		5	RCK	VIO-ORG
		6	n/c	n/c
		7	V+	RED

ID	Type	Pin	Description	Wire Color
CN2	.100" 6-Pin Header, Node Extension Bus	1	Ground	BLK
		2	MISO	VIO-BLK
		3	MISI	VIO-BRN
		4	SCK	VIO-RED
		5	RCK	VIO-ORG
		6	V+	RED
CN3	.100" 3-Pin Header	1	LED1	n/c
		2	Ground	n/c
		3	V+	n/c

Figure 4.7.1. 9-lamp Bottom Extension 11a pinout 520-6963-00

4.8 10-LAMP TOP EXTENSION 11B PINOUT
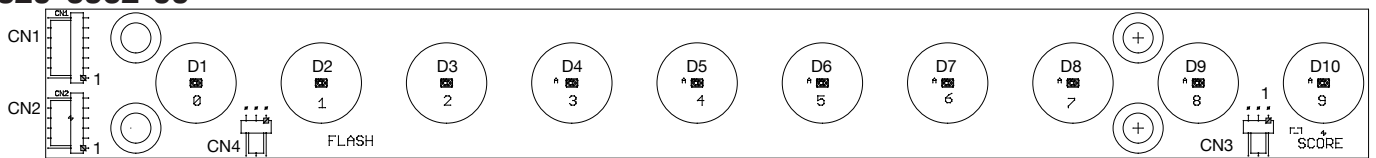
520-6962-00

Figure 4.8.2. 10-lamp Top Extension 11b connectors 520-6962-00

ID	Type	Pin	Description	Wire Color
CN1	.100" 7-Pin Header, Node Extension Bus	1	Ground	BLK
		2	MISO	VIO-BLK
		3	MISI	VIO-BRN
		4	SCK	VIO-RED
		5	RCK	VIO-ORG
		6	n/c	n/c
		7	V+	RED

ID	Type	Pin	Description	Wire Color
CN2	.100" 6-Pin Header, Node Extension Bus	1	Ground	n/c
		2	MISO	n/c
		3	MISI	n/c
		4	SCK	n/c
		5	RCK	n/c
		6	V+	n/c
CN3	.100" 3-Pin Header	1	V+	RED
		2	Ground	n/c
		3	Score LED	ORG-GRN
CN4	.100" 3-Pin Header	1	V+	RED
		2	LED1	ORG-RED
		3	LED2	ORG-YEL

Figure 4.8.1. 10-lamp Top Extension 11b Pinout 520-6962-00

4.9 STEPPER MOTOR OPTO

520-6961-00

ID	Type	Pin	Description	Wire Color
CN2	Molex 4pin KK100	1	5V	Red
		2	Key	n/c
		3	Signal	Tan
		4	Ground	Black

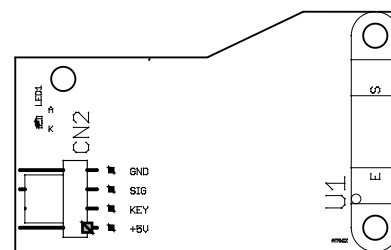Figure 4.9.2. Stepper Motor Opto 520-6961-00 pinout.

Figure 4.9.1. Stepper Motor Opto 520-6961-00 connectors.
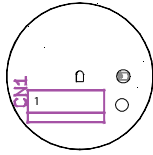
4.11 STAR ROLLOVER RGB

520-6824-0X

Figure 4.11.1. Star Rollover RGB 520-6824-0X connector

ID	Type	Pin	Description	Wire Color
Star Rollover 1				
CN1	.100" 6-Pin Header	1	Ground	BLK-VIO
		2	Switch Out	PNK-BLK
		3	Blue	n/c
		4	Green	n/c
		5	Red	YEL-BLK
		6	5V	RED
Star Rollover 2				
CN1	.100" 6-Pin Header	1	Ground	BLK-VIO
		2	Switch Out	PNK-BRN
		3	Blue	n/c
		4	Green	YEL-BRN
		5	Red	n/c
		6	5V	RED
Star Rollover 3				
CN1	.100" 6-Pin Header	1	Ground	BLK-VIO
		2	Switch Out	PNK-RED
		3	Blue	n/c
		4	Green	n/c
		5	Red	YEL-RED
		6	5V	RED
Star Rollover 4				
CN1	.100" 6-Pin Header	1	Ground	BLK-VIO
		2	Switch Out	PNK-ORG
		3	Blue	n/c
		4	Green	YEL-ORG
		5	Red	n/c
		6	5V	RED

ID	Type	Pin	Description	Wire Color
Top Right Star				
CN1	.100" 6-Pin Header	1	Ground	BLK-VIO
		2	Switch Out	PNK-VIO
		3	Blue	n/c
		4	Green	n/c
		5	Red	YEL-GRY
		6	5V	RED
Shooter ret Star				
CN1	.100" 6-Pin Header	1	Ground	BLK-VIO
		2	Switch Out	PNK-BLU
		3	Blue	n/c
		4	Green	YEL-VIO
		5	Red	n/c
		6	5V	RED
Pop Bumper Star				
CN1	.100" 6-Pin Header	1	Ground	BLK-VIO
		2	Switch Out	PINK-GRN
		3	Blue	n/c
		4	Green	n/c
		5	Red	YEL-BLU
		6	5V	RED
Left star				
CN1	.100" 6-Pin Header	1	Ground	BLK-VIO
		2	Switch Out	PNK-YEL
		3	Blue	n/c
		4	Green	YEL-GRN
		5	Red	n/c
		6	5V	RED

Figure 4.11.2. Star Rollover RGB 520-6824-0X Pinouts

4.10 MAIN POWER SUPPLY

011-5001-00

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
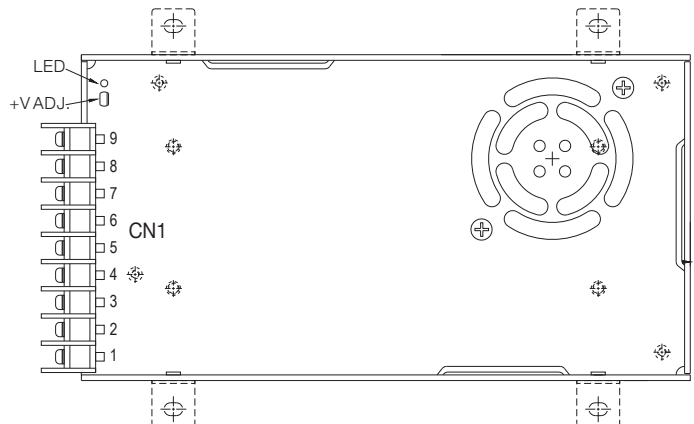
4.13 STEPPER MOTOR CONTROLLER

520-6961-00

ID	Type	Pin	Description	Wire Color
CN1	.156" 5-Pin Header Node Power	1	Ground	BLK
		2	Key	n/c
		3	N/C	n/c
		4	N/C	n/c
		5	48VDC In	GRY
CN2	.100" 16-Pin Header	1	+6V	YEL
		2	LED1/M1 P0	BLU-BLK
		3	LED2/M1 P1	GRN-BLK
		4	LED3/M1 EN	BLK-WHT
		5	LED4/M2 P0	RED-ORG
		6	LED5/M2 P1	BLU-ORG
		7	LED6/M2 EN	GRN-ORG
		8	LED7/M3 P0	RED-YEL
		9	LED8/M3 P1	GRN-YEL
		10	LED9/M3 EN	BLU-YEL
		11	LED10/M4 P0	BLU-VIO
		12	LED11/M4 P1	GRN-VIO
		13	LED12/M4 EN	RED-VIO
		14	LED13/M5 P0	RED-GRY
		15	LED14/M5 P1	BLU-GRY
		16	LED15/M5 EN	BLK-VIO
CN3	.100" 12-Pin Header	1	M1 P1 positive	RED-BLK
		2	M1 P1 negative	BLU-BLK
		3	M1 P2 positive	GRN-BLK
		4	M1 P2 negative	BLK-WHT
		5	M2 P1 positive	RED-ORG
		6	M2 P1 negative	BLU-ORG
		7	M2 P2 positive	GRN-ORG
		8	M2 P2 negative	BLK-ORG
		9	M3 P1 positive	RED-YEL
		10	M3 P1 negative	BLU-YEL
		11	M3 P2 positive	GRN-YEL
		12	M3 P2 negative	BLK-YEL
CN4	.100" 8-Pin Header	1	M4 P1 positive	RED-VIO
		2	M4 P1 negative	BLU-VIO
		3	M4 P2 positive	GRN-VIO
		4	M4 P2 negative	BLK-VIO
		5	M5 P1 positive	RED-GRY
		6	M5 P1 negative	BLU-GRY
		7	M5 P2 positive	GRN-GRY
		8	M5 P2 negative	BLK-GRY
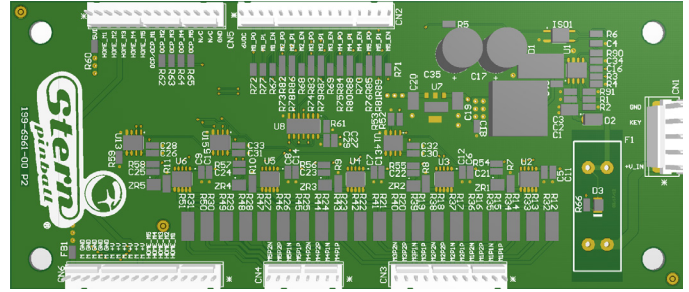
Figure 4.13.1. Stepper motor controller 520-6961-00 connectors.

ID	Type	Pin	Description	Wire Color
CN5	.100" 14-Pin Header	1	+5V	RED
		2	Home M1 out	TAN-BLK
		3	Home M2 out	TAN-ORG
		4	Home M3 out	TAN-YEL
		5	Home M4 out	TAN-VIO
		6	Home M5 out	TAN-WHT
		7	M1 OCP/OCP out	WHT-RED
		8	M2 OCP out	n/c
		9	M3 OCP out	n/c
		10	M4 OCP out	n/c
		11	M5 OCP out	n/c
		12	n/c	n/c
		13	n/c	n/c
		14	Ground	BLK
CN6	.100" 16-Pin Header	1	Home M1 in	TAN-BLK
		2	Home M2 in	TAN-ORG
		3	Home M3 in	TAN-YEL
		4	Home M4 in	TAN-VIO
		5	Home M5 in	TAN-WHT
		6	Key	n/c
		7	Home +V	RED
		8	Home +V	RED
		9	Home +V	RED
		10	Home +V	RED
		11	Home +V	RED
		12	Home GND	BLK
		13	Home GND	BLK
		14	Home GND	BLK
		15	Home GND	BLK
		16	Home GND	BLK
F1	Fuse	-	7A SB, 125V	n/a

Figure 4.13.2. Stepper motor controller 520-6961-00 pinout.

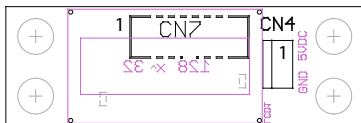# 4.12 MINI DIAGNOSTICS DISPLAY

520-6964-00
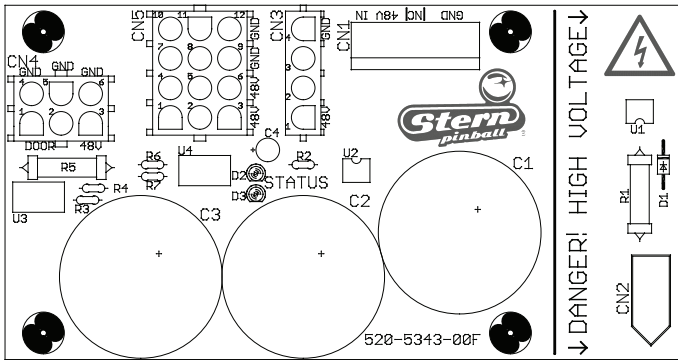

Figure 4.12.1. Stepper Motor Opto 520-6961-00 connector.

ID	Type	Pin	Description	Wire Color
CN4	Power	1	Display Power +5V	Red
		4	Display Ground	Black
CN7	14-Pin Ribbon 11 ft 036-8045-132	-	Display Data (Red = Pin 1)	Ribbon

Figure 4.12.2. Stepper Motor Opto 520-6961-00 pinout.

4.14 POWER DISTRIBUTION BOARD
520-5343-00

PINOUT

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	GRY
		3	Switched 48V Out (to Node 1)	GRY/YEL
		4	Door Interlock Return Ground	GRY/RED
		5	Door Interlock Return Ground	GRY/RED
		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

Figure 4.14.1. Power Distribution Board 520-5343-00 pinout

4.15 POWER PLUG WIRING

CAUTION

TO MAINTAIN SAFETY, GROUND WIRE FROM LINE FILTER IS TO BE MOUNTED FIRST ON GROUNDING STUD AND SECURED WITH NUT. ALL OTHER GROUNDS MAY THEN BE ATTACHED TO GROUNDING STUD.

REPLACE ALL FUSES WITH CORRECT CURRENT RATINGS!

NORTH AMERICA
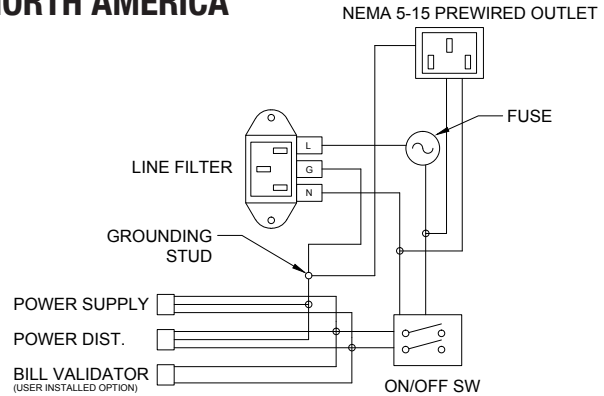
INTERNATIONAL
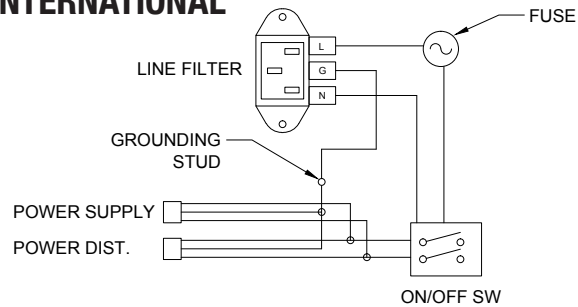
LINE CORDS

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 MDL	200-5000-05
220/240v (Europe, Australia, UK)	5 A	Slow Blow MDL	200-5000-01

Figure 4.15.1. Standard fuses for line connections, 120V and 240V
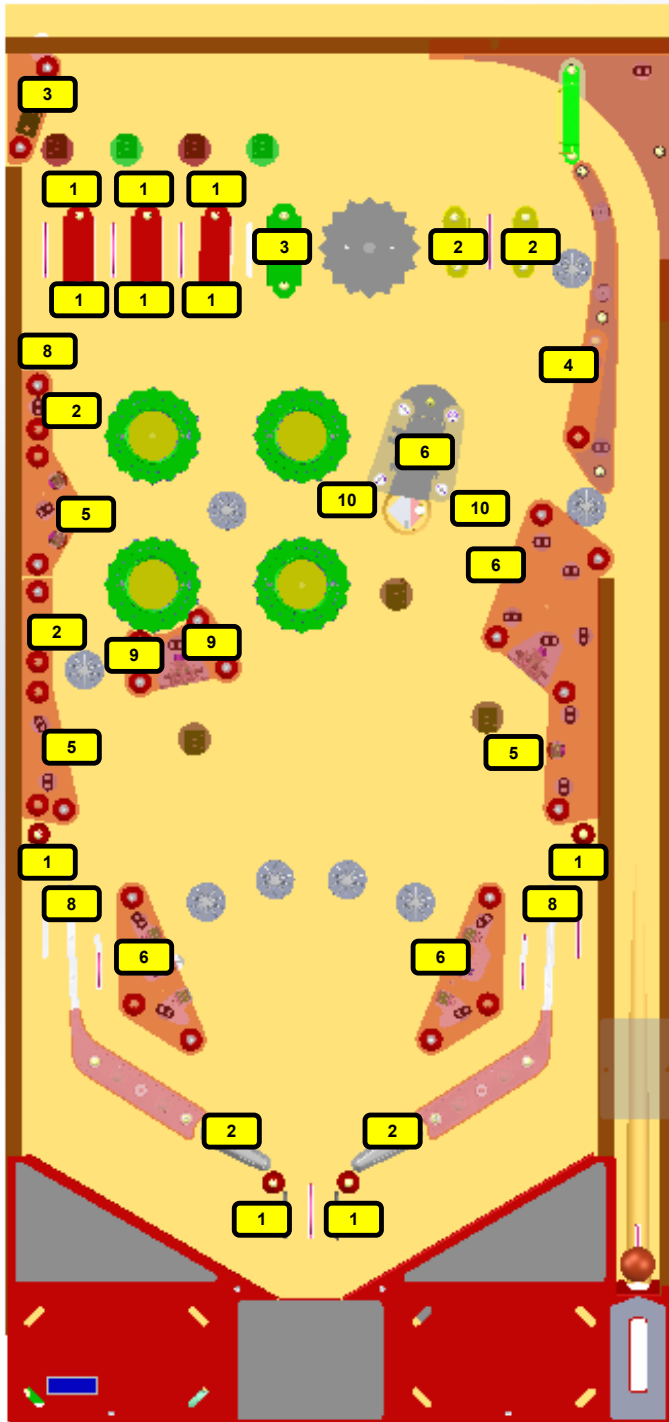
5. PARTS REFERENCE

5.1 PLAYFIELD RUBBER PARTS

Figure 5.1.3. Rubber o-ring part locations

RUBBER O-RINGS

ID	Qty	Description (ID/OD)	Durometer	Color	Part Number
1	10	5/16" ID	40	White	545-5348-52
2	6	1" ID	40	White	545-5348-55
3	2	1-1/4" ID	40	White	545-5348-56
4	1	1-1/2" ID	40	White	545-5348-57
5	3	2" ID	40	White	545-5348-58
6	4	2-1/2" ID	40	White	545-5348-59
8	3	7/16" OD	40	White	545-5348-67
9	2	1" ID	50	Black	545-5348-05
10	2	3/16" ID	50	Black	545-5348-01

Figure 5.1.1. Rubber o-ring part numbers and usage. ID: Inner Diamter, OD: Outer Diameter, Durometer: Higher number is firmer, less bounce, and more durable.

ID	Qty	Description	Color	Part Number
9	1	Plunger Tip	Black	545-5276-00
10	2	Bumper Pad (Located on Flipper and other assemblies under playfield)	Black	545-5105-00

Figure 5.1.4. Other rubber part numbers and usage

5.2 RUBBER SIZE CHART
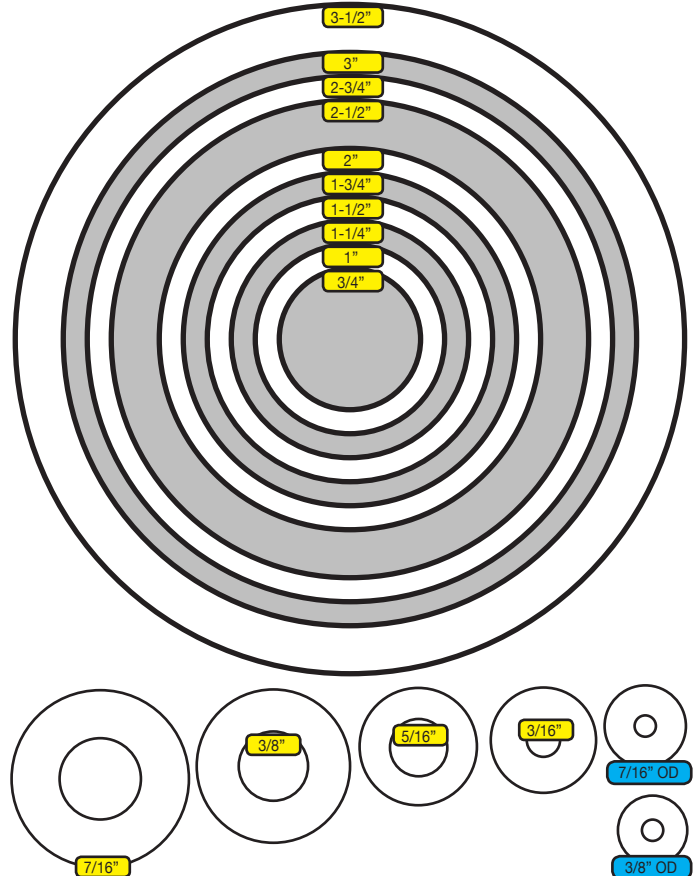
Figure 5.1.2. Rubber ring inner diameter sizing tool. Hold ring up to chart and read largest size on inside of ring. Dimensions are Inner Diameter (ID) unless otherwise noted as Outer Diamter (OD).

5.3 PLAYFIELD ASSEMBLIES, TOP
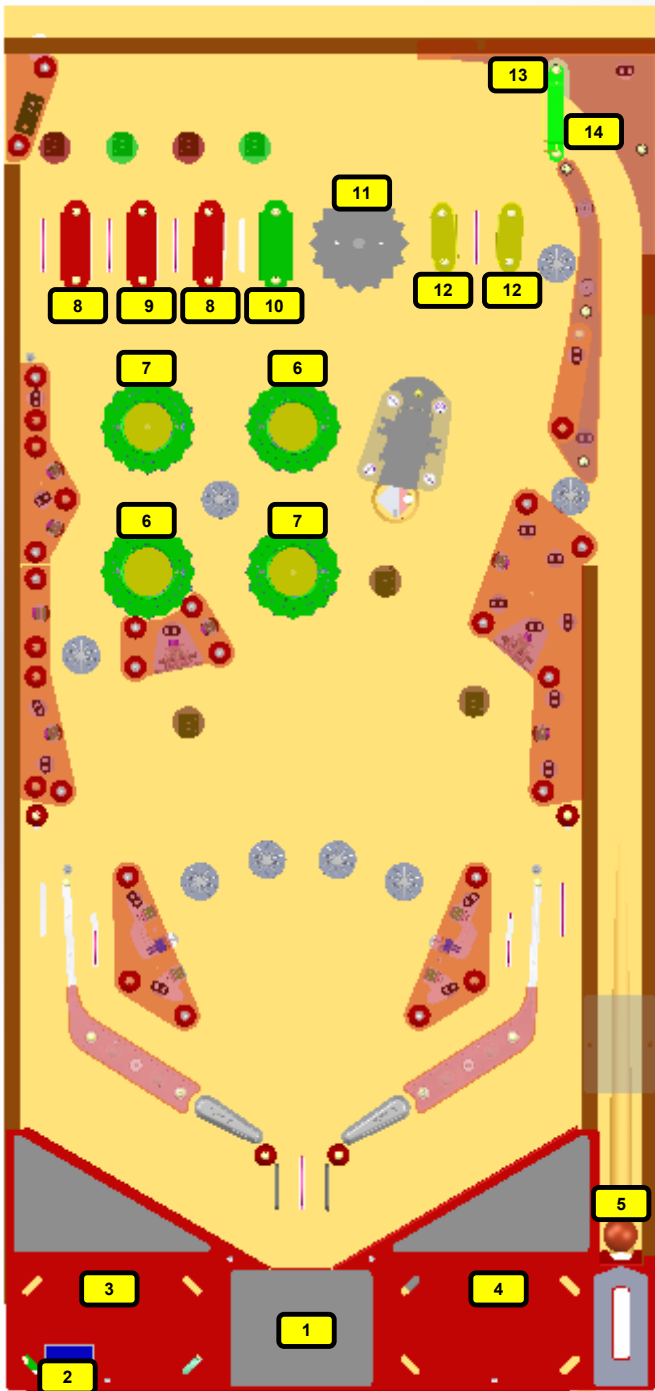
Figure 5.3.1. Major playfield assemblies, Top locations.

ID	Part Number	Description	Qty
1	535-0790-00	ARCH (RED)	1
2	520-6964-00	DISPLAY	1
3	820-8384-00	INSTRUCTION CARD	1
4	755-5420-12-Y	COIN CARD	1
5	260-5000-00	PINBALL (STEEL) 1-1/16"	1
6	545-0651-04	DAISY POP CAP (GREEN)	2
7	545-0651-02	DAISY POP CAP (RED)	2
8	550-5102-02	LANE HOOD (RED)	2
9	550-5102-04	LANE HOOD (GREEN)	1
10	550-5103-04	LANE HOOD (GREEN)	1
11	516-0033-88	POP TOP ASSY. W/ LED	1
12	550-5035-13	LANE HOOD (TRANSLUCENT YELLOW)	2
13	535-5269-02	ONE WAY GATE BRACKET	1
14	535-5307-07	WIRE FORM GATE	1

Figure 5.3.2. Major playfield assemblies, Top locations.

5.4 PLAYFIELD ASSEMBLIES, BOTTOM

ID	Part Number	Description	Qty
1	500-7286-00	TROUGH COIL ASSY	1
2	511-7647--00	LONG RANGE OPTO ASSY	1
3	500-6543-84-ND	LEFT FLIPPER ASSY	1
4	500-6543-85-ND	RIGHT FLIPPER ASSY	1
5	500-9920-01-D7	SLINGSHOT ASSY	2
6	511-7544-XX	RGB STAR ROLLOVER ASSY	8
7	520-6935-00	48V 8- DRIVER NODE BD.	1
8	511-7581-00	BULLSEYE TARGET ASSY	2
9	515-6459-04-ND	POP BUMPER (BOTTOM) ASSY	4
10	500-6511-03-ND	30 DEGREE EJECT ASSY	1
11	520-5322-00	32 SW / 32 LED NODE BD.	1
12	520-5329-00	48V 4- DRIVER NODE BD.	1

Figure 5.4.2. Major playfield assemblies, Bottom.

Figure 5.4.1. Major playfield assemblies, Bottom locations.

5.5 BACKBOX PARTS
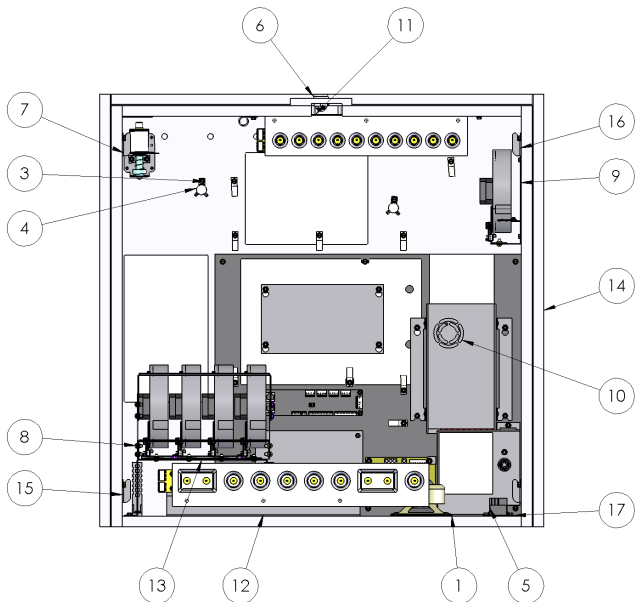
ID	Part Number	Description	Qty
1	031-5004-02	SPEAKER	2
3	077-5106-00	2-LUG STAND-UP REV. MOUNT SHORT SOCKET	2
4	113-5034-08	LAMP - #89: WHITE LED	2
5	180-5001-03	POWER SWITCH	1
6	355-5168-00	BB LOCK	1
7	511-1027-00	KNOCKER ASSY, WN	1
8	511-7614-00	4 BANK, REEL ASSEMBLY, WN	1
9	511-7615-00	REEL MECH ASSY, WN	1
10	511-7628-00	CPU ASSEMBLY, WN	1
11	511-7644-00	LAMP ASSEMBLY, TOP, WN, BB	1
12	511-7645-00	LAMP ASSY: BOTTOM, WN, BB	1
13	515-1055-00	REEL MECH MTG BRKT	1
14	525-1013-00	BACK BOX ASSEMBLY: WHOA NELLIE	1
15	535-1108-00	CORNER BRKT, BOTTOM, GLASS ASSY	2
16	535-1108-01	CORNER BRKT, BOTTOM, GLASS ASSY	2
17	535-8318-00	CABINET ON/OFF SWITCH PLATE	1
27	511-7631-00	GLASS FRAME, BB, WN	1

5.6 CABINET DECALS
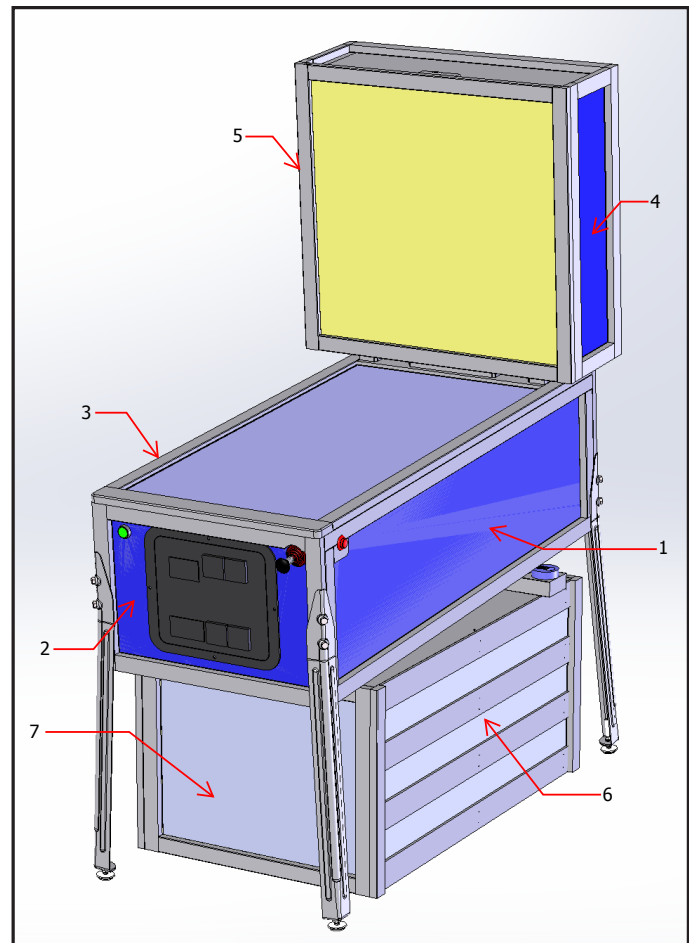
ID	Part Number	Description	Qty
1	820-66D7-04	Decal Cabinet - Right	1
2	820-66D7-05	Decal Cabinet - Front	1
3	820-66D7-03	Decal Cabinet - Left	1
4	820-66D7-07	Decal Backbox - Right	1
5	820-66D7-06	Decal Backbox - Left	1
6	820-66D7-13	Decal Crate - Side	2
7	820-66D7-12	Decal Crate - End Panel	2

5.7   CABINET PARTS 1
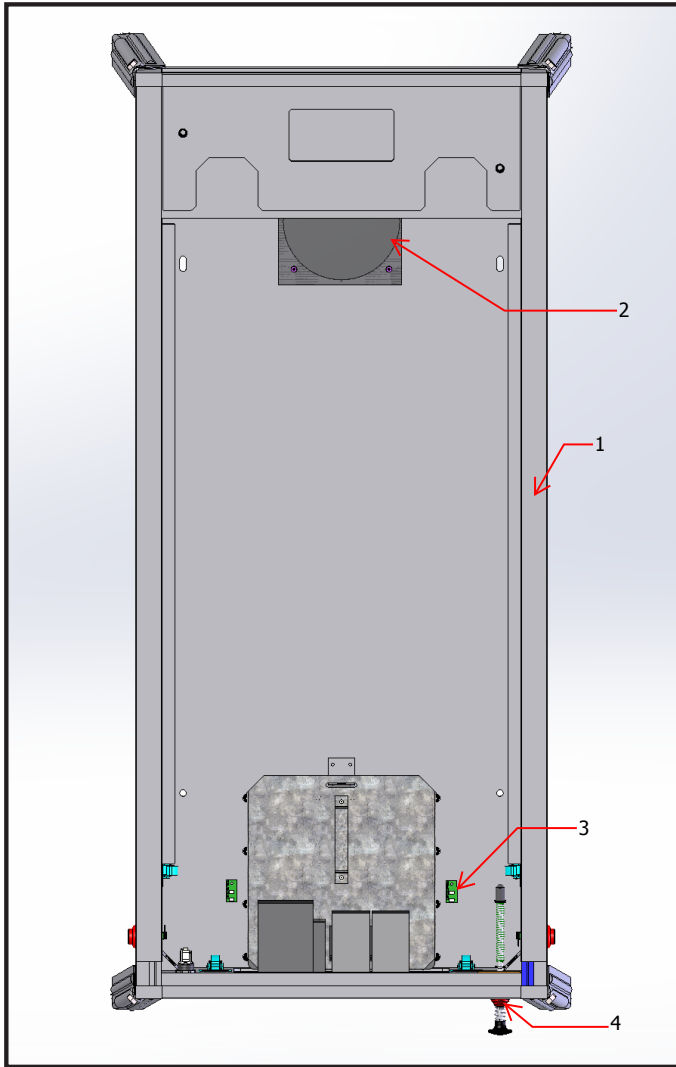
ID	Part Number	Description	Qty
1	525-1010-00	Cabinet	1
2	031-5007-01	Speaker 8" Round, 4 OHM	1
3	520-5307-00	LED Board - White	2
4	500-7286-00	Bee Hive Plunger	1

5.8   CABINET PARTS 2
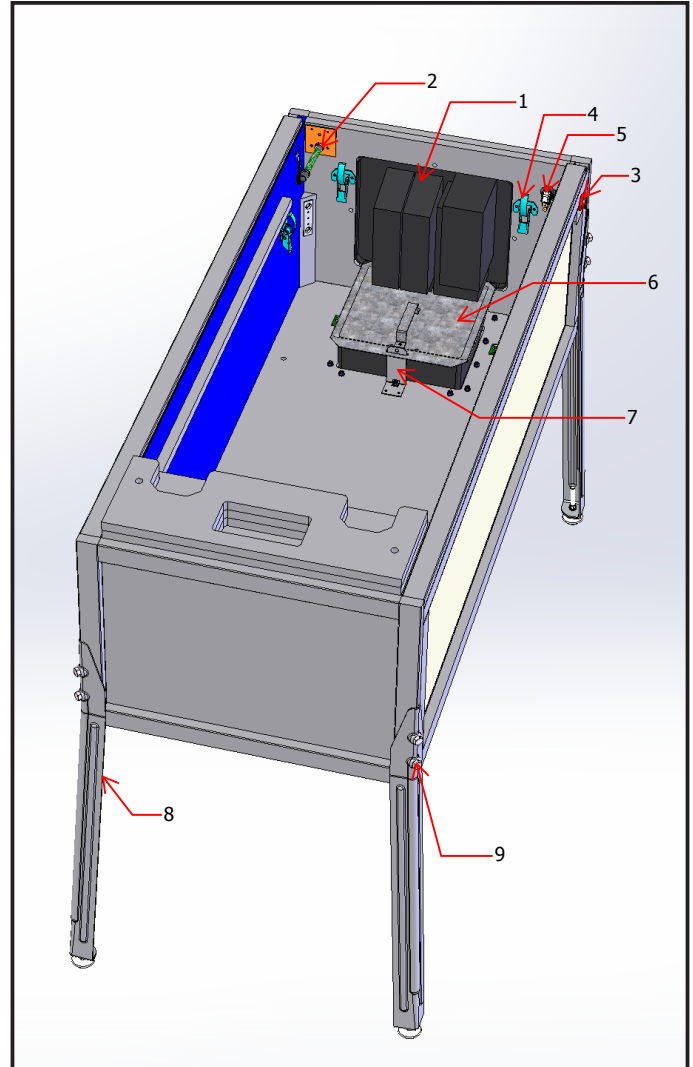
ID	Part Number	Description	Qty
1	501-5018-173	Coin Door Assembly (USA)	1
	501-5018-700	Coin Door C120/SR3, Europe	1
	501-5018-704	Coin Door, Australia	1
	501-5018-711	Coin Door, Canada	1
	501-5018-706	Coin Door, Italy	1
2	180-5160-00	Flipper Switch	2
3	500-5024-02	Flipper Button, Long	2
4	355-5038-00	Basset Clamp - Lock Bar / Playfield	4
5	500-6388-44	Start Button	1
6	545-5090-00	Cash Box - Plastic	1
	535-5013-03	Cash Box - Cover	1
	535-7772-00	Hair Pin Clip	1
7	535-1204-00	Cash Box-Locking Tab	1
8	500-5921-XX	Leg Assembly	4
9	231-5001-03	Leg Bolt	8

5.9 BACKBOX ELECTRONICS
511-7628-00
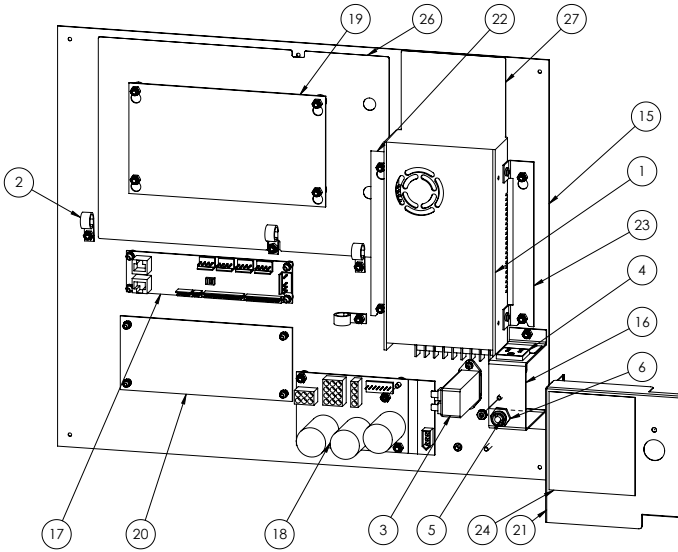
Figure 5.9.1. Backbox electronics explosion.

ID	Part Number	Description	Qty
1	011-5001-00	SWITCHING POWER SUPPLY, 48VDC, 320W	1
2	040-5000-06	1/2" CABLE CLAMP	5
3	150-5015-00	EMI FILTER: 06SEEG3V	1
4	180-5008-01	SERVICE OUTLET-US	1
5	200-5000-05	FUSE, 8 AMP S/B 250V	1
6	205-5001-00	FUSE HOLDER, SCREW IN, 3453LF7	1
7	232-5301-01	# 8-32 X 3/8" PPH MS SEMS SCREW - BLACK	1
8	237-5813-00	SCREW, 4-40 X 1/2" PPH SEMS	2
9	237-6296-06	M4 x 6mm PAN PHILL	4
10	240-5005-00	6-32 NYLOK STOP NUT	8
11	240-5102-00	8-32 NYLON LOCK NUT	26
12	240-5104-00	8-32 KEPS NUT	1
13	240-5318-00	4-40 KEPS NUT	2
14	254-5000-19	NYLON SPACER - BLACK - 3/8 OD X .175 ID X 1/8"	8
15	515-0206-00	CPU PLATE, WN	1
16	515-9769-00	MTG BRKT: FUSE & OUTLET, SPIKE BACKBOX	1
17	520-5329-00	PCB: MOTOR DRIVER	1
18	520-5343-00	PCB: POWER DISTRIBUTION BD, SPIKE	1
19	520-6936-00	CPU	1
20	520-6961-00	PCB: MOTOR DRIVER, WN	1
21	535-0772-00	AC COVER, SPIKE BACKBOX	1
22	535-0879-00	MTG BRKT: 48V POWER SUPPLY	1
23	535-0879-01	MTG BRKT: 48V POWER SUPPLY	1
24	820-8351-00	LABEL: FUSE & WARNING	1
25	820-8352-00	LABEL: AC OUTLET	1
26	820-8373-01	DECAL: BACKBOX	1
27	820-8373-05	DECAL: BACK BOX	1

Figure 5.9.2. Backbox electronics bill of materials.
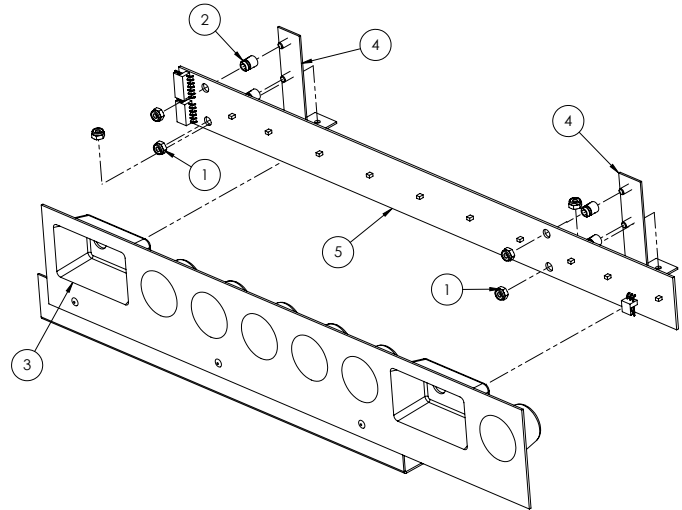
5.10 BACKBOX LED BOTTOM ASSY
511-7645-00

Figure 5.10.1. Backbox LED Bottom Assy 511-7645-00 explosion.

ID	Part Number	Description	Qty
1	240-5005-00	6-32 NYLOK STOP NUT	6
2	254-5007-02	1/4" SELF RETAINING SPACER	4
3	510-7531-00	RIVET: BOTTOM LIGHT CUPS, WN	1
4	515-1053-00	PCB, MTG, BRKT #2	2
5	520-6963-00	PCB: LAMP BRD, BOTTOM, WN	1

Figure 5.10.2. Backbox LED Bottom Assy 511-7645-00 bill of materials.
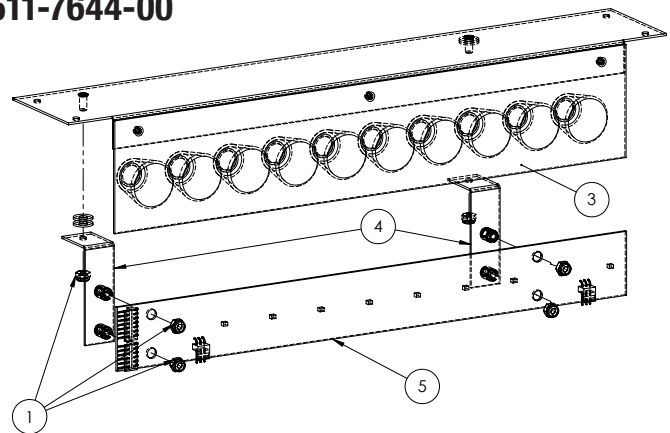
5.11 BACKBOX LED TOP ASSY
511-7644-00

Figure 5.11.1. Backbox LED Top Assy 511-7644-00 explosion.

ID	Part Number	Description	Qty
1	240-5005-00	6-32 NYLOK STOP NUT	6
2	254-5007-02	1/4" SELF RETAINING SPACER	4
3	510-7530-00	RIVET: UPPER LIGHT CUPS, WN	1
4	515-1052-00	PCB MTG BRKT #1	2
5	520-6962-00	PCB: LAMP BRD, SCORE, WN	1
6	242-5005-00	#8 WASHER	4

Figure 5.11.2. Backbox LED Top Assy 511-7644-00 bill of materials.
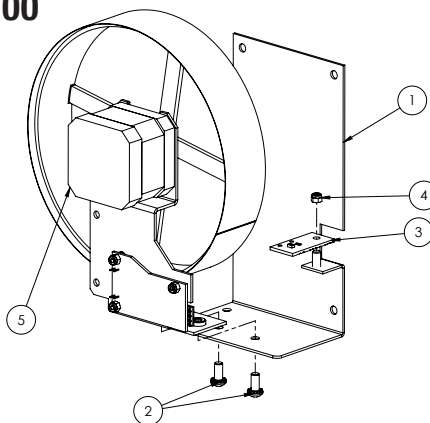
5.12 SCORE REEL ASSY
511-7614-00
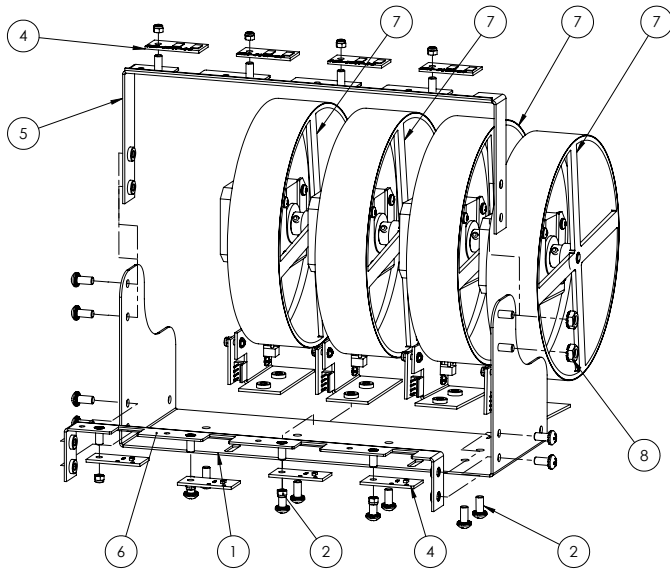
ID	Part Number	Description	Qty
1	515-0200-00	BRKT: 4 BANK REEL	1
2	232-5301-00	SCREW, 8-32 X 3/8" PPH SEMS	14
3	240-5303-00	4-40 NYLON LOCK NUT	8
4	520-5307-00	WHITE LED BOARD	8
5	515-1057-00	LAMP BRKT, REEL MECH	1
6	515-0207-00	LAMP BRKT, REEL MECH #2	1
7	511-7648-00	REEL ASSY - SCORE	4
8	240-5104-00	8-32 KEPS NUT	2

Figure 5.14.2. Score Reel Assy 511-7648-00 bill of materials.

5.14 CREDIT REEL ASSY
511-7615-00

ID	Part Number	Description	Qty
1	515-1049-00	BRKT: REEL MECH, WN	1
2	232-5301-00	SCREW, 8-32 X 3/8" PPH SEMS	2
3	520-5307-00	WHITE LED BOARD	1
4	240-5303-00	4-40 NYLON LOCK NUT	1
5	511-7648-01	REEL ASSY - CREDIT	1

Figure 5.14.3. Credit Reel Assy 511-7615-00 bill of materials.

5.13 SCORE REEL ASSY
511-7648-00
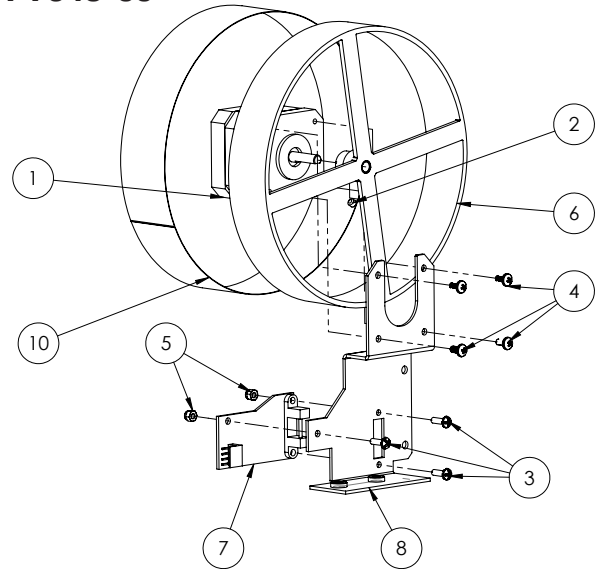
ID	Part Number	Description	Qty
1	041-5105-00	UNIPOLAR STEPPER MOTOR	1
2	237-5838-03	SET SCREW 6-32 X 1/8"	1
3	237-5909-01	SCREW, 4-40 X 3/8" PPH SEMS	3
4	237-6188-01	M3 x 6mm PPH	4
5	240-5303-00	4-40 NYLON LOCK NUT	3
6	515-9819-00	REEL ASSEMBLY, WN	1
7	520-6960-00	PCB: OPTO SENSOR, REEL	1
8	535-1131-00	REEL MOTOR BRKT	1
9	820-8382-00	DECAL: SCORE	1
10	820-8382-01	DECAL: CREDITS REEL	1

Figure 5.14.1. Score Reel Assy 511-7648-00 bill of materials.
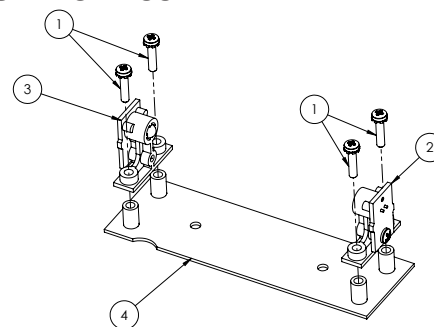
5.15 LONG RANGE OPTO ASSY
511-7647-00

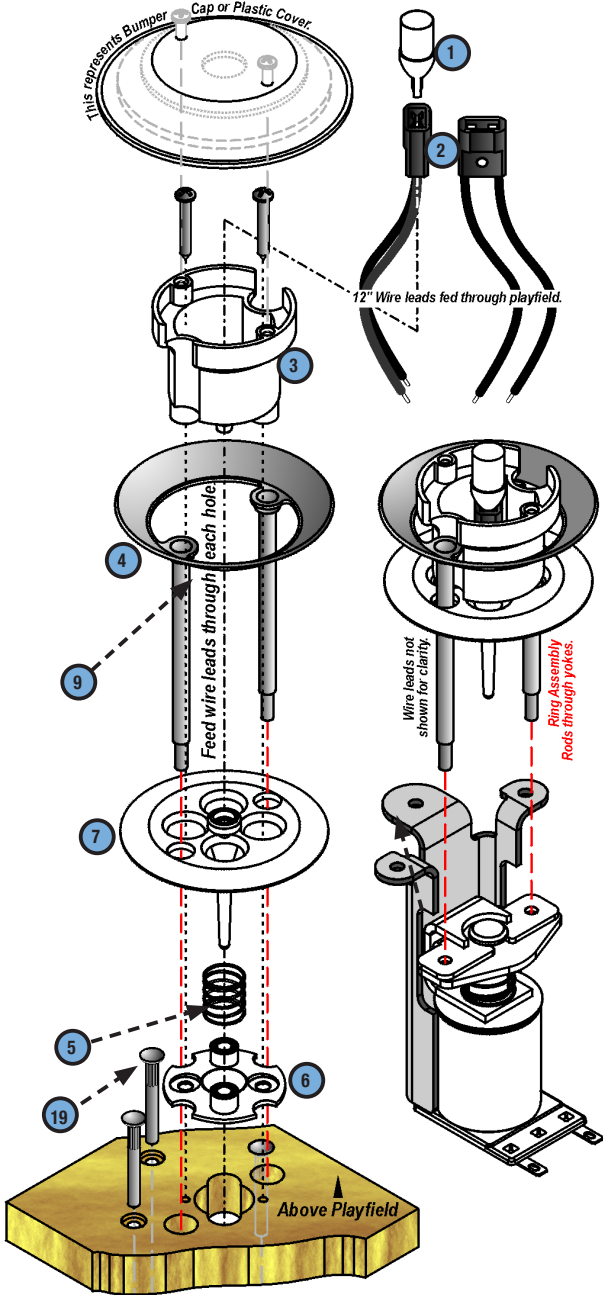Figure 5.15.1. Long Range Opto Assy 511-7647-00 explosion.

ID	Part Number	Description	Qty
1	237-5813-00	SCREW, 4-40 X 1/2" PPH SEMS	4
2	500-0215-00	LR OPTO EMITTER ASSEMBLY	1
3	500-0215-01	LR OPTO RECIEVER ASSEMBLY	1
4	515-0199-00	BRKT: TROUGH WIDE OPTO	1

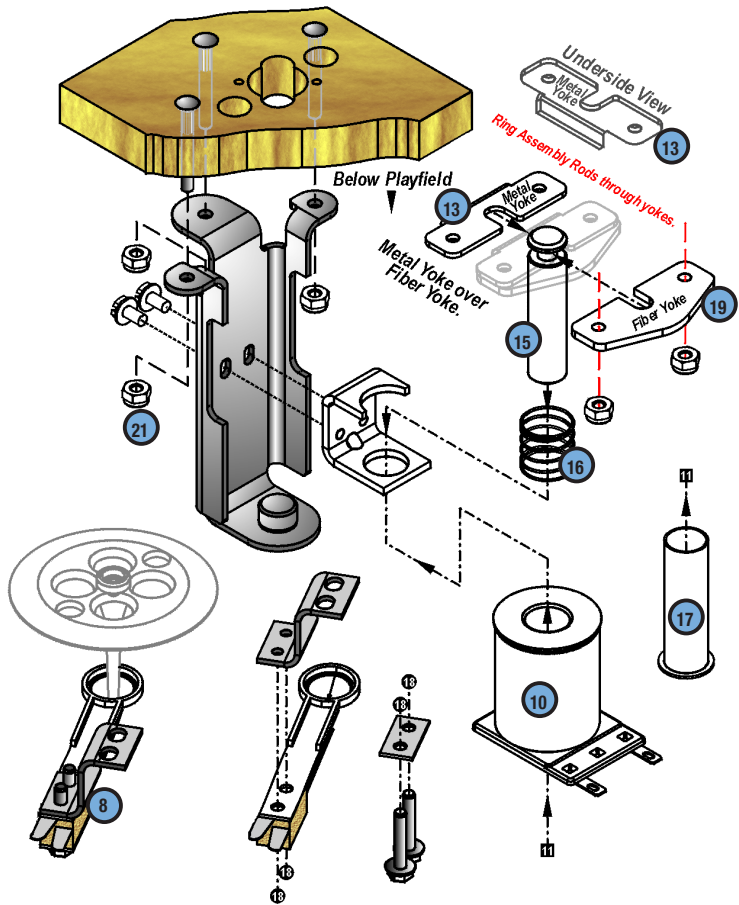Figure 5.15.2. Long Range Opto Assy 511-7647-00 bill of materials.

5.16 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

Figure 5.16.2. 516-6784-XX Pop bumper assy major subassemblies.

ID	Part Number	Description	Qty
8	500-9934-01	POP BUMPER SWITCH ASSY-2 - LUG-LEFT	1
9	240-5005-00	6-32 NYLON STOP NUT	1
10	090-5044-ND	COIL - 26-1200	1
11	237-5976-01	#6-32 X 1/4" SHWH SWAGE ZN	2
12	240-5005-00	#6-32 NYLON STOP NUT	9
13	535-7347-00	METAL YOKE STOP	1
14	234-5101-00	* 8 X 1/2 SLT	6
15	530-5348-00	PLUNGER, POP BUMPER	1
16	266-5047-00	COMPRESSION SPRING, POP BUMPER	1
17	545-5031-00	COIL SLEEVE	1
18	515-5939-00	COIL BRACKET POP BUMPER ASSY	1
19	545-5609-00	FIBER YOKE	1
20	535-7346-00	METAL YOKE	1
21	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
3	545-5197-00	BUMPER BODY	1
4	515-5085-00	RING AND ROD ASSY	1
5	266-5048-00	BUMPER SKIRT COMP SPRING	1
6	545-5195-00	BUMPER BASE	1
7	545-5607-00	BUMPER SKIRT	1

Figure 5.16.1. 515-6459-WN Pop bumper assy top bill of materials

Figure 5.16.3. 515-6549-04-ND Pop bumper bottom bill of materials

5.18 FLIPPER ASSY, LEFT CLASSIC
500-6543-84-ND

5.17 FLIPPER ASSY, RIGHT CLASSIC
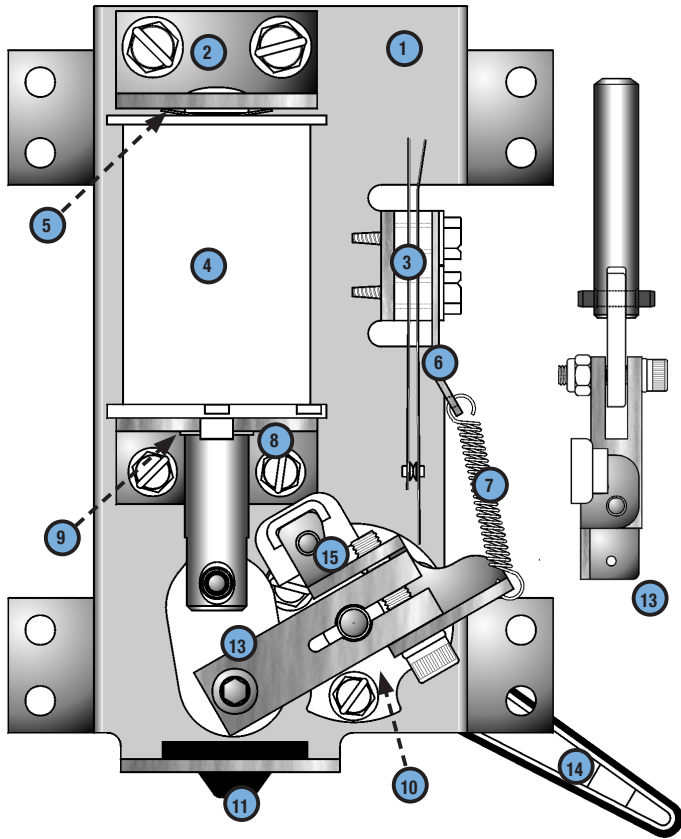## 500-6543-85-ND

Figure 5.18.1. Flipper Assy, Left Classic 500-6543-84-ND diagram.

Figure 5.17.1. Flipper Assy, Right Classic 500-6543-85-ND diagram.

ID	Part Number	Description	Qty
1	515-6617-01	FLIPPER BASE PLATE LEFT KIT W/ BRACKET MOUNT HARDWARE	1
2	515-6308-01	COIL STOP BRACKET	1
3	180-5149-00	SWITCH - END OF STROKE N/C	1
4	090-5083-03-ND	COIL-DUAL WINDING	1
5	269-5002-00	SPRING WASHER	1
6	535-7354-00	SWITCH RETURN SPRING BRACKET	1
7	265-5035-00	SPRING FLIPPER RETURN	1
8	535-7356-00	COIL SUPPORT BRACKET	1
9	545-5388-00	COIL SLEEVE, FLIPPER	1
10	545-5070-00	FLIPPER BAT BUSHING	1
11	545-5428-00	FLIPPER BUMPER PAD	1
12	237-6144-00	SET SCREW #10-32 x 3/4" SOCKET	1
13	515-7203-01	PLUNGER/CRANK ASSEMBLY, LEFT	1
14	500-7287-00	FLIPPER BAT AND SHAFT (500-6553-83-ND)*	1
15	515-7257-01	SWITCH ACTUATOR (LEFT) SUB-ASSY.	1
	500-6307-10	FLIPPER REBUILD KIT, LEFT	
		* Refer to game rubber chart for flipper rubber color and part number.	

Figure 5.18.2. Flipper Assy, Left Classic 500-6543-84-ND bill of materials.

ID	Part Number	Description	Qty
1	515-6617-00	FLIPPER BASE PLATE RIGHT KIT W/ BRACKET MOUNTING HARDWARE	1
2	515-6308-01	COIL STOP BRACKET	1
3	180-5149-00	SWITCH - END OF STROKE N/C	1
4	090-5083-03-ND	COIL-DUAL WINDING	1
5	269-5002-00	SPRING WASHER	1
6	535-7354-00	SWITCH RETURN SPRING BRACKET	1
7	265-5035-00	SPRING FLIPPER RETURN	1
8	535-7356-00	COIL SUPPORT BRACKET	1
9	545-5388-00	COIL SLEEVE, FLIPPER	1
10	545-5070-00	FLIPPER BAT BUSHING	1
11	545-5428-00	FLIPPER BUMPER PAD	1
12	237-6144-00	SET SCREW #10-32 x 3/4" SOCKET	1
13	515-7203-00	PLUNGER/CRANK ASSEMBLY	1
14	500-7287-01	FLIPPER BAT AND SHAFT*	1
15	515-7257-00	SWITCH ACTUATOR (RIGHT) SUB-ASSY.	1
	500-6307-00	FLIPPER REBUILD KIT, RIGHT	
		* Refer to game rubber chart for flipper rubber color and part number.	

Figure 5.17.2. Flipper Assy, Right Classic 500-6543-85-ND bill of materials.
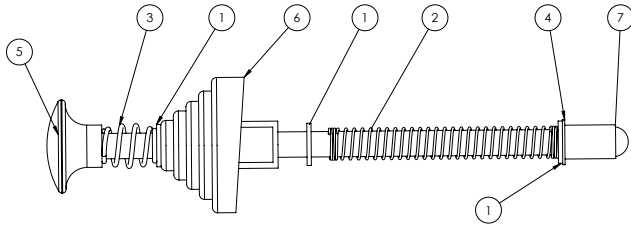
5.19 BEEHIVE BALL SHOOTER ASSY
500-7286-00

Figure 5.22.3. Beehive Ball Shooter Assy 500-7286-00 diagram.

ID	Part Number	Description	Qty
1	242-5014-00	WASHER, 3/8" ID X 5/8" OD X 1/16" THK	3
2	266-5001-04	BALL SHOOTER SPRING	1
3	266-5010-00	COMPRESSION SPRING, SHORT PLUNGER	1
4	270-5012-00	RETAINING RING, 3/8 DIA. SHAFT	1
5	515-6557-00	SHOOTER ROD ASSEMBLY	1
6	545-0902-02	BEEHIVE - RED	1
7	545-5276-00	PLUNGER TIP	1

Figure 5.19.1. Beehive Ball Shooter Assy 500-7286-00 bill of materials.

5.21 BULLSEYE TARGET
511-7581-00
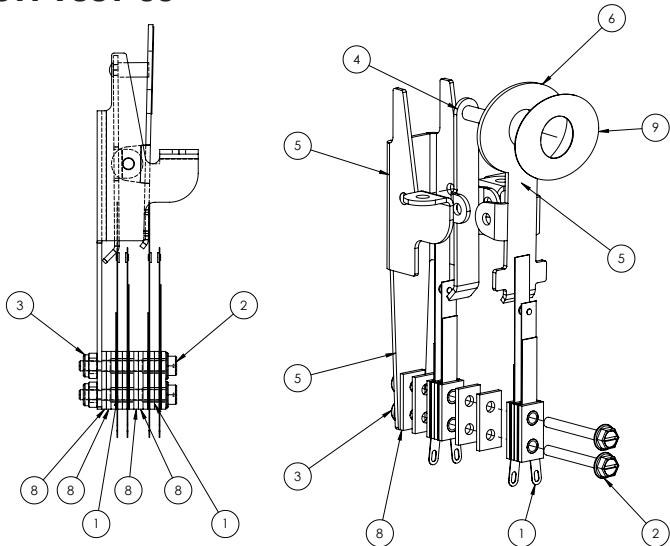
Figure 5.21.1. Bullseye Target 511-7581-00 diagram.

ID	Part Number	Description	Qty
1	180-5231-00	SLING SHOT SWITCH - STANDARD LUGS	2
2	237-5976-07	# 6-32 X 1 1/8" HWH SER SCREW BLACK	2
3	240-5005-00	6-32 NYLOK STOP NUT	2
4	515-0212-00	BULLSEYE INNER BRKT	1
5	535-1123-00	BULLSEYE MTG BRKT	1
6	535-1124-00	BULLSEYE OUTTER BRKT	1
7	535-1125-00	PIVOT, BULLSEYE TARGET	1
8	535-5045-00	SWITCH PLATE	4
9	820-1003-00	DECAL: WN -00	1

Figure 5.21.2. Bullseye Target 511-7581-00 bill of materials.

5.20 TROUGH COIL ASSY
500-7286-00
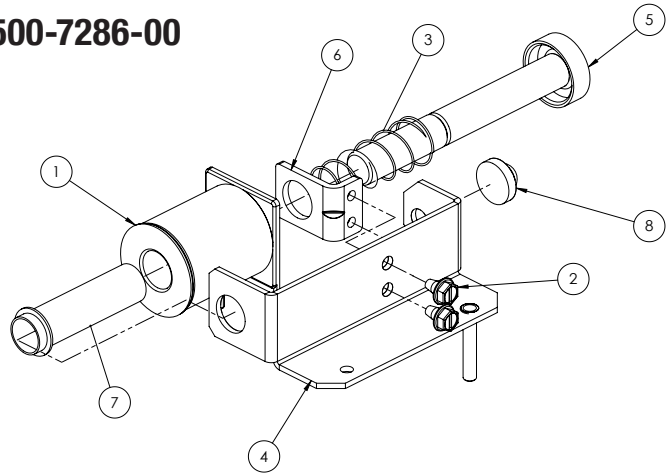
ID	Part Number	Description	Qty
1	090-5044-ND	COIL 26-1200 - NO DIODE	1
2	237-5975-04	SCREW, 8-32 X 1/4 HWH SWAGE SERR	2
3	266-5020-00	COMPRESSION SPRING-CONICAL	1
4	515-1021-01	COIL BRKT, BT, WN	1
5	515-7309-01	PLUNGER ASSEMBLY	1
6	535-5203-03	COIL RETAINING BRACKET	1
7	545-5076-01	COIL SLEEVE	1
8	545-5105-00	RUBBER BUMPER	1

Figure 5.20.1. Trough Coil Assy 500-7286-00 bill of materials.
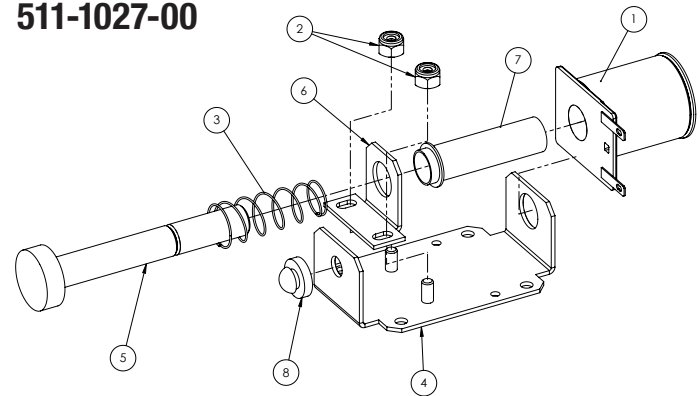
5.22 KNOCKER ASSY
511-1027-00

Figure 5.22.1. Knocker Assy 511-1027-00 explosion.

ID	Part Number	Description	Qty
1	090-5044-ND	COIL 26-1200 - NO DIODE	1
2	240-5102-00	8-32 NYLON LOCK NUT	2
3	266-5020-00	COMPRESSION SPRING-CONICAL	1
4	515-0202-00	BRKT: KNOCKER	1
5	515-7318-00	PLUNGER ASSEMBLY	1
6	535-1016-00	BRKT: COIL	1
7	545-5076-01	COIL SLEEVE	1
8	545-5105-00	RUBBER BUMPER	1

Figure 5.22.2. Knocker assy 511-1027-00 bill of materials.
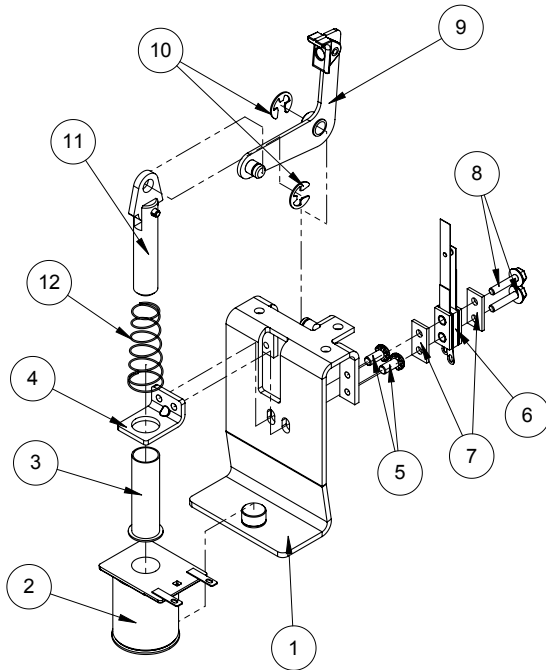
5.23 SLING SHOT ASSEMBLIES

500-9920-01-D7
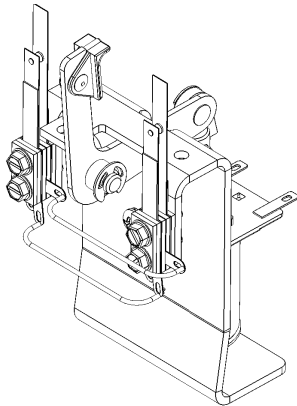

Figure 5.23.1. Sling shot core assembly explosion.

Figure 5.23.2. 500-9920-01-D7 sling shot assembly.

ID	Part Number	Description	Qty
1	515-5339-01-D7	SLING SHOT BRKT ASSY WHOA NELLIE	1
2	090-5044-ND	COIL - 26-1200, NO DIODE	1
3	545-5031-00	COIL SLEEVE	1
4	535-5203-03	COIL RETAINING BRACKET	1
5	232-5301-00	SCREW, 8-32 X 3/8" PPH SEMS	2
6	180-5231-00	SLING SHOT SWITCH - 2 LUG - STANDARD LUGS	1
7	535-5045-00	SWITCH PLATE	2
8	237-5976-04	SCREW, 6-32 X 5/8" HWH SWAGE	2
9	515-5340-01	ARM & TIP ASSY	1
10	270-5002-00	RETAINING RING - 1/4"	2
11	515-5338-00	PLUNGER & LINK ASSEMBLY	1
12	266-5020-00	COMPRESSION SPRING-CONICAL	1

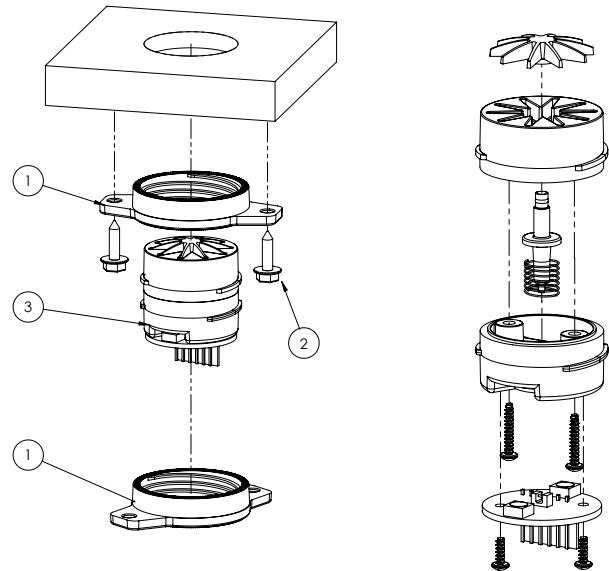Figure 5.23.3. Sling shot 500-9924-00, -01 bill of materials.

5.24 STAR ROLLOVER

520-6824-0X

5.25 STAR ROLLOVER SWITCH

511-7544-XX

520-6824-0X   511-7544-XX

520-6824-0X

ID	Part Number	Description	Qty
1	545-0895-00	NUT: STAR ROLLOVER - 2 FLANGES	2
2	234-5001-02	SCREW, #6 X 1/2" HWH	2
3	511-7544-XX	STAR ROLLOVER	1

Figure 5.25.1. Star rollover assembly bill of materials.

511-7544-XX

ID	Part Number	Description	Qty
1	237-6312-04	PPH #2-28 x 1/4" PLASTIC CUTTING	2
2	237-6312-08	PPH #2-28 X 1/2" PLASTIC CUTTING	2
3	265-5076-00	SPRING: STAR ROLLOVER	1
4	520-6824-1X	WHITE LED: SAM SYSTEM	1
5	545-0896-00	BOTTOM: STAR ROLLOVER	1
6	545-0897-01	TOP: STAR ROLLOVER	1
7	545-0897-02	PIN: STAR ROLLOVER	1
8	545-0897-03	STAR: STAR ROLLOVER	1

Figure 5.25.2. Star rollover switch assembly bill of materials.

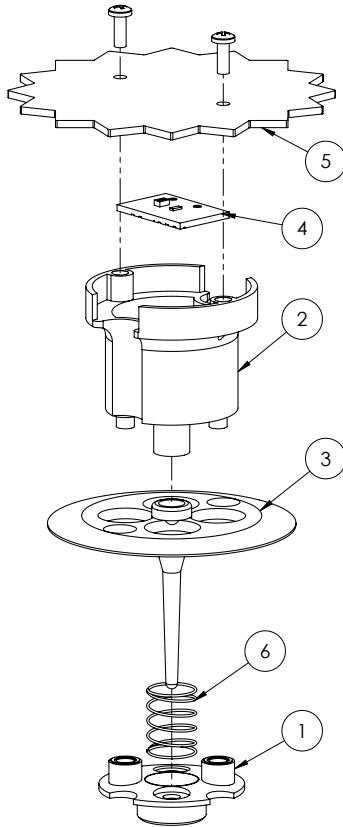# 5.26 BUMPER ASSEMBLY
516-0033-88

Figure 5.27.1. Bumper Assembly 516-0033-88 diagram.

ID	Part Number	Description	Qty
1	545-5195-00	BUMPER BASE	1
2	545-5197-00	BUMPER BODY	1
3	545-5607-00	BUMPER SKIRT	1
4	520-5307-03	WHITE LED BOARD, POP	1
5	830-7020-18C	PF PLASTIC, WN	1
6	266-5048-00	COMPRESSION SPRING, POP BUMPER BODY	1

Figure 5.27.4. Bumper Assembly 516-0033-88 bill of materials.
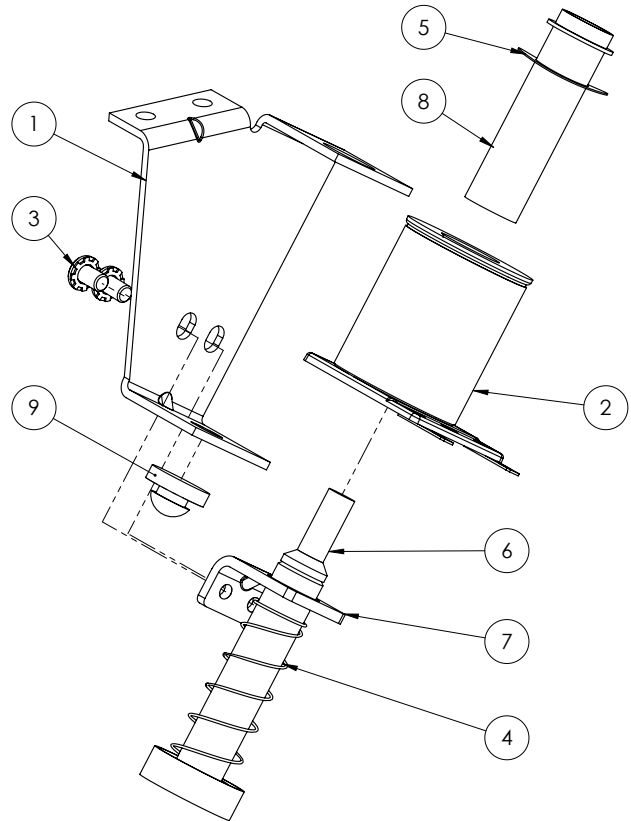
5.27 30-DEGREE EJECT
500-6511-03-ND

Figure 5.27.2. 30-Degree Eject 500-6511-03-ND diagram.

ID	Part Number	Description	Qty
1	535-8932-03	BRACKET - 30° EJECT - R	1
2	090-5044-ND	COIL 26-1200 - NO DIODE	1
3	232-5300-00	SCREW, 8-32 X 1/4" PPH SEMS	2
4	266-5020-00	COMPRESSION SPRING-CONICAL	1
5	269-5002-00	SPRING WASHER	1
6	515-7197-00	30° EJECT PLUNGER ASSEMBLY	1
7	535-5203-03	COIL RETAINING BRACKET	1
8	545-5076-01	COIL SLEEVE	1
9	545-5105-00	RUBBER BUMPER	1

Figure 5.27.3. 30-Degree Eject 500-6511-03-ND bill of materials.

5.28 CRATE END PANEL
511-7650-00
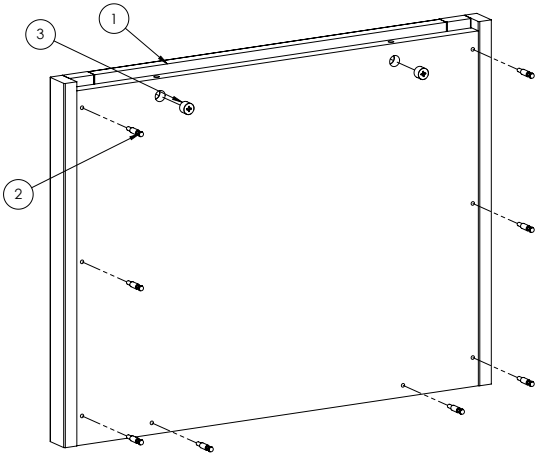

Figure 5.28.1. Crate End Panel 511-7650-00 diagram.

ID	Part Number	Description	Qty
1	511-7650-00	CRATE: END PANEL, WN	1
2	237-6297-00	CONNECTING BOLT	8
3	240-5410-00	15/16 CAM	2

Figure 5.28.2. Crate End Panel 511-7650-00 bill of materials.
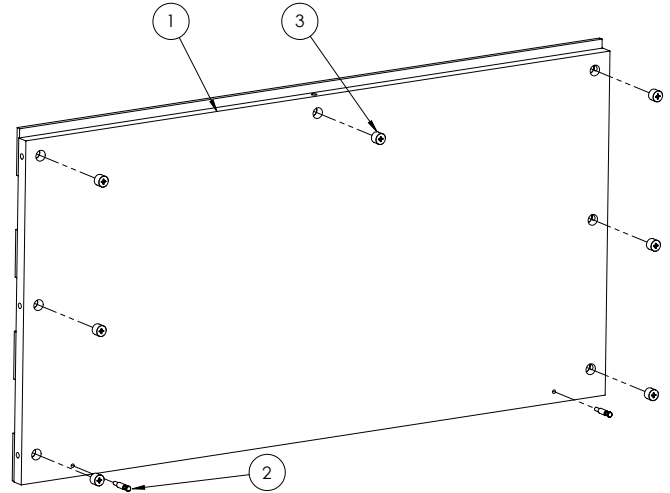
5.29 CRATE SIDE PANEL
525-1014-03

Figure 5.29.1. Crate Side Panel 525-1014-03 diagram.

ID	Part Number	Description	Qty
1	525-1014-03	CRATE: SIDE PANEL	1
2	237-6297-00	CONNECTING BOLT	2
3	240-5410-00	15/16 CAM	7

Figure 5.29.2. Crate Side Panel 525-1014-03 bill of materials.
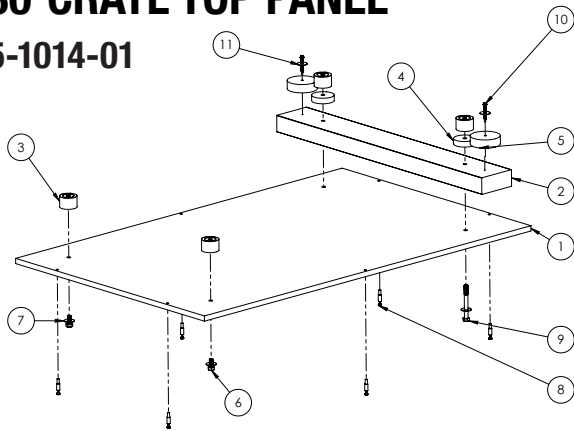
5.30 CRATE TOP PANEL
525-1014-01

Figure 5.30.1. Crate Top Panel 525-1014-01 diagram.

ID	Part Number	Description	Qty
1	525-1014-01	CRATE: TOP PANEL	1
2	525-1019-00	CRATE: WN, 2x4	1
3	280-5028-00	MACHINE MOUNT	4
4	545-0653-00	SPACER, CRATE, WN	2
5	535-1097-00	BEER CAN: CRATE, WN	2
6	231-5545-00	HEX BOLT: 5/16"-24 x 3/4"	6
7	242-5077-00	FLAT WASHER: 5/16"	8
8	237-6297-00	CONNECTING BOLT	6
9	231-5546-00	HEX BOLT: 5/16"-24 x 3.00"	2
10	237-5969-00	#8 x 1.50" HWH	2
11	242-5059-00	3/16 I.D. X 7/8 O.D. X .045 WASHER	2

Figure 5.30.2. Crate Top Panel 525-1014-01 bill of materials.
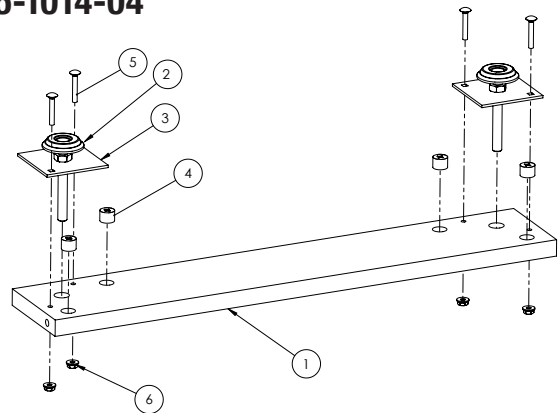
5.31 CRATE LEG PLATE
525-1014-04

Figure 5.31.1. Crate Leg Plate 525-1014-04 diagram.

ID	Part Number	Description	Qty
1	525-1014-04	CRATE: LEG PLATE	1
2	500-5017-00	LEG LEVELER - 3/8-16 X 3" - ZINC PLATED	2
3	515-0205-00	PLATE: LEG LEVELER	2
4	240-5410-00	262.23.373; 15/16 Minifix CAM	4
5	231-5012-00	CARRIAGE BOLT, 10-24 X 1-1/4", BLACK	4
6	240-5207-00	# 10-24 KEPS NUT	4
7	242-5010-00	#10 WASHER, .50 O.D. X .047 THK	4

Figure 5.31.2. Crate Leg Plate 525-1014-04 bill of materials.

6. SPECIFICATIONS

500-55D7-01

SPECIFICATIONS, MECHANICAL, GAME SETUP

Specification	Imperial	Metric
Weight	210 lbs	96 kg
Max dimensions, leg levelers extended (h, w, d)	72 x 29 x 58 in	183 x 74 x 147 cm
Minimum game dimensions (h, w, d)	70 x 29 x 58 in	178 x 74 x 147 cm
Minimum room dimensions per game (h, w, d)	74 x	? 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)	in	? 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 - nominal	360 W @ 120 VAC	360 W 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) "This appliance is not to be cleaned by a Water Jet."
- (i) "Do not locate this appliance in an area where a Water Jet is used."
- (ii) "Do not clean this appliance with a Water Jet."
- (b) If the supply cord is damaged, it must be replaced in order to avoid a hazard.

7. WARRANTY

Stern Pinball machines are assembled in Melrose Park, 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 insure 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 Display boards: 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.

7.1 WARNINGS, COMPLIANCE, AND LEGAL NOTICES

500-55D7-01 Whoa Nellie Big Juicy Melons

For safety and reliability, substitute parts and equipment modifications are not recommended (and may void any warranties).

Use of non-Stern® Pinball Inc. parts or modifications of game circuitry, may adversely affect game play, or may cause injuries. Transport pinball games with hinged backbox in the down position only! Always take great care when servicing any game. Always read 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 still hold current when unplugged.

WARNING

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a class a computing device pursuant to SUBPART J OF PART 15 OF FCC RULES, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

RF INTERFERENCE NOTICE: Cable harness placements and ground strap routing on this game have been designed to keep RF radiation and conduction within levels accepted by the FCC rules. To maintain these levels, reposition harnesses and reconnect ground straps to their original placements, if they become disconnected during maintenance.

"The appliance has to be placed in a horizontal position."

"This appliance is not to be cleaned by a Water Jet."

603335-7.12.1 (i) "Do not locate this appliance in an area where a Water Jet is used." (ii) "Do not clean this appliance with a Water Jet." 60335-7.12.5 (b) If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.

IEC 60825-1 2ND EDITION AND WAS ISSUED IN 2007

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