Shore Shot Pinball Optical Sensor System

Installation Manual

Revision B

Introduction

Thank you for purchasing the Shore Shot Pinball Optical Sensor System.

This system replaces the traditional mechanical pop bumper spoon switch with a non-contact optical sensing system, providing improved reliability, reduced maintenance, and consistent operation.

Because pop bumper assemblies differ between manufacturers, this manual is organized by pop bumper architecture. Before beginning the installation, identify the pop bumper architecture used in your game and follow the corresponding installation procedure.

Please read this manual completely before beginning the installation.

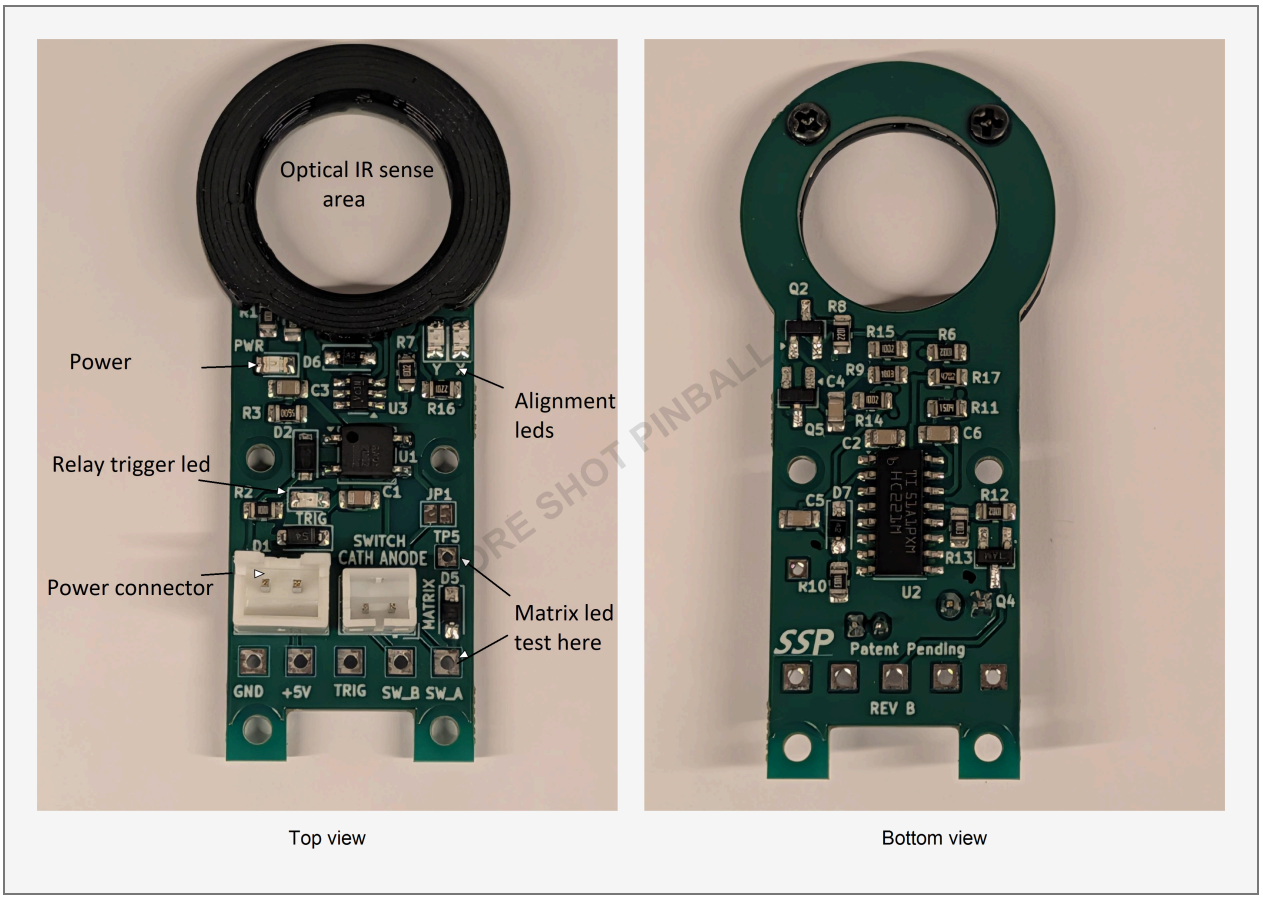


Figure 1. Optical sensor board, top and bottom views.

Tools and Materials Required

The following tools and materials are recommended for installation:

- Hand drill
- 3/32-inch drill bit (a long drill bit, approximately 12 inches, is recommended for reaching through wiring harnesses)
- Pencil, fine-tip marker, or other suitable marking tool

- Appropriate nut drivers or sockets for your game
- Phillips screwdriver
- Soldering iron
- Rosin-core solder
- Wire cutters/strippers
- Crimping tool (if using crimp connectors)
- Crimp connectors, WAGO connectors, wire nuts, or other suitable wire splice connectors
- Small piece of 120-grit sandpaper

A digital multimeter is also recommended for verifying power and troubleshooting, although it is not required for most installations.

Using This Manual

The Shore Shot Pinball Optical Sensor System is available with several mounting brackets designed for different pop bumper architectures.

Your kit includes the mounting bracket you selected for your game. This manual is organized by pop bumper architecture rather than by manufacturer, as many manufacturers use the same basic pop bumper design.

Use the guide below to locate the installation procedure for the mounting bracket included with your kit.

Architecture	Commonly found in
Standard Pop Bumper Architecture	Williams, later Stern Pinball, Jersey Jack Pinball (JJP), Chicago Gaming Company (CGC), and other machines using the standard architecture.
Data East Architecture	Data East, Sega, Spooky Pinball, Pinball Brothers, and Capcom-style installations where applicable.
Stern Electronics Solid-State Architecture	Stern Electronics, typically 1980-1985.
Bally Solid-State Architecture	Bally solid-state games, typically 1981-1985.
Iron Maiden – Newton Ball	Stern Iron Maiden, both Newton Ball mechanisms.

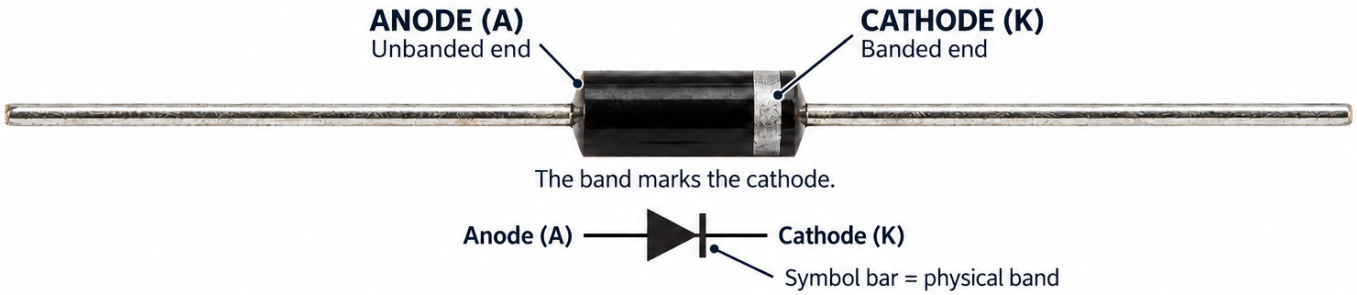
Note: Later Stern Pinball machines generally use the Standard Pop Bumper Architecture.

Diodes and Switch Wiring

Use this reference to identify the diode and its wire connections on the original spoon switch. Power-supply and installation instructions continue on the next page.

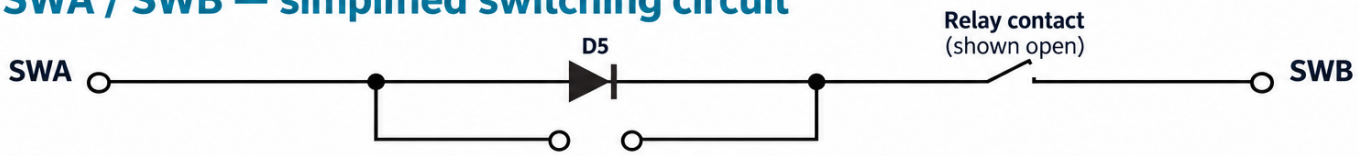
Recognizing a diode

A diode acts like a one-way gate for electric current. It allows current to flow mainly in one direction and blocks it in the other. The band marks the cathode (K), so its orientation matters.



The band marks the cathode.

SWA / SWB — simplified switching circuit



JP1 open: diode in circuit.
JP1 bridged: diode bypassed.

Check the original spoon switch

Some spoon switches have a diode attached. Before disconnecting any wires, take a clear photo and identify which wire connects to the diode's banded end (cathode) and which connects to its unbanded end (anode). Use the wiring instructions for your game to match those connections to SWA and SWB and select the correct jumper setting. **Do not rely on wire color alone**.

Diode appearance is illustrative. Relay contact represents solid-state switching.

Power Requirements

The Shore Shot Pinball Optical Sensor System requires a regulated 5VDC power source. The Power Distribution Board accepts 5VDC and distributes it to each sensor board through the supplied JST-XH cables.

Before beginning the installation, determine where your 5V power source will come from and how you intend to route power to the Power Distribution Board. Some machines provide convenient access to 5V power, while others may require additional planning.

An optional USB power cable with a JST-XH connector is available and is the simplest method of powering the system.

USB Power Source

Many modern pinball machines include one or more USB ports. If a spare USB port is available, simply connect the optional USB power cable to the port and route the cable to the Power Distribution Board.

If all USB ports are already in use, a USB Y-adapter may be used to provide an additional connection point.

Direct Connection to the Machine's 5V Supply

Some machines provide convenient access to the regulated 5V supply through the power supply board or auxiliary connectors.

A 5V pigtail adapter is available for installations where direct connection to the machine's power supply is preferred.

Before using this method, verify that the connection point provides regulated 5VDC and that the machine's power supply has sufficient capacity for the additional load.

Dedicated 5V Power Supply

Another option is to install a small dedicated 5V power supply inside the machine.

This method eliminates any load on the machine's existing power supply but requires connection to the machine's AC line voltage.

> **WARNING:** This method involves working with hazardous voltages. Always unplug the machine before performing any wiring and only attempt this installation if you are familiar with electrical safety practices.

Regardless of the power source selected, verify that 5VDC is present at the Power Distribution Board before proceeding with sensor board installation.

General Wiring

The switch output is connected using the JST-XP connector located on the sensor board.

If your machine uses a switch matrix diode, verify that the Anode and Cathode wires are connected to the corresponding terminals marked on the sensor board.

The board is marked "Anode" and "Cathode" to assist with proper diode orientation. Incorrect wiring may prevent the switch from operating correctly.

The board is shipped configured for switch matrix operation. In this configuration, JP1 should remain open (not jumpered).

If your game does not use a switch matrix diode, install the JP1 jumper as shown in the diagram.

Connections may be made using crimp connectors, solder joints, WAGO connectors, wire nuts, or other suitable wiring methods appropriate for your installation.

After wiring is complete, verify correct switch operation before reassembling the machine.

Power Distribution Board Installation

The Power Distribution Board may be mounted in either a horizontal or vertical orientation depending on the available space inside the cabinet. Select a location that provides easy access to the connectors and allows the wiring to be routed neatly without interfering with moving components or normal service access.



Figure 2. Power distribution board (PDB), shown in top view and vertical mounting view.

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1. Determine where the Power Distribution Board will be mounted. The board should be located as centrally as possible to the pop bumpers being serviced.
2. Each kit includes multiple JST-XH cable lengths. Select the cable length that best suits the distance between the Power Distribution Board and each sensor board to keep wiring neat and organized.
3. Do not permanently install the 5V power cable at this time. It will be used temporarily during the sensor board installation to power, test, and align each sensor board. Once all sensor boards have been installed and verified, permanently route and secure the power cable.
4. Mount the Power Distribution Board using the supplied snap-in standoffs and mounting screws.
    - This is the standard mounting configuration.
    - If the optional vertical mount is required due to space restrictions, attach the Power Distribution Board to the vertical mount before installation.
5. Position the board in its intended location and mark the mounting holes.
6. Drill the first mounting hole approximately 1/4 inch deep using a 3/32-inch drill bit.

> **WARNING:** Do not drill through the playfield.

7. Install the first screw. Rotate the board as needed to align the second mounting hole, then mark, drill, and install the second screw.

A long drill bit can be helpful when reaching through existing wiring harnesses.

8. Connect the appropriate JST-XH cable(s) from the Power Distribution Board to each sensor board as they are installed and aligned.

With the Power Distribution Board installed, proceed to the installation instructions for your game's pop bumper architecture.

Standard Pop Bumper Architecture Installation

Standard pop bumpers require installation of the supplied sensor board mount. This section applies to standard pop bumper architectures where the sensor board mount is positioned and fastened to the underside of the playfield.

The Visual Alignment Method described below is intended for this standard mount installation and is recommended for nearly all standard-mount applications. It uses the Optical Alignment Disc to center the sensor board around the pop bumper skirt before the mounting holes are drilled.

An alternate Reference-Mark Alignment Method is also provided for situations where the Optical Alignment Disc cannot be used, access is limited, or the installer prefers to establish the sensor board position using reference marks.

For Data East / Sega / Spooky / Pinball Bros / Capcom and Early Stern style mounts, follow the dedicated installation sections for those mounting systems instead.

Sensor Board Installation

1. Remove the existing spoon switch from the playfield.
    - Desolder the switch wires.
    - If your game uses a switch matrix diode, note the diode orientation and wire placement before removal.
2. The sensor board mount is normally installed in front of the pop bumper coil bracket, although it may be angled slightly if necessary to clear nearby playfield components.

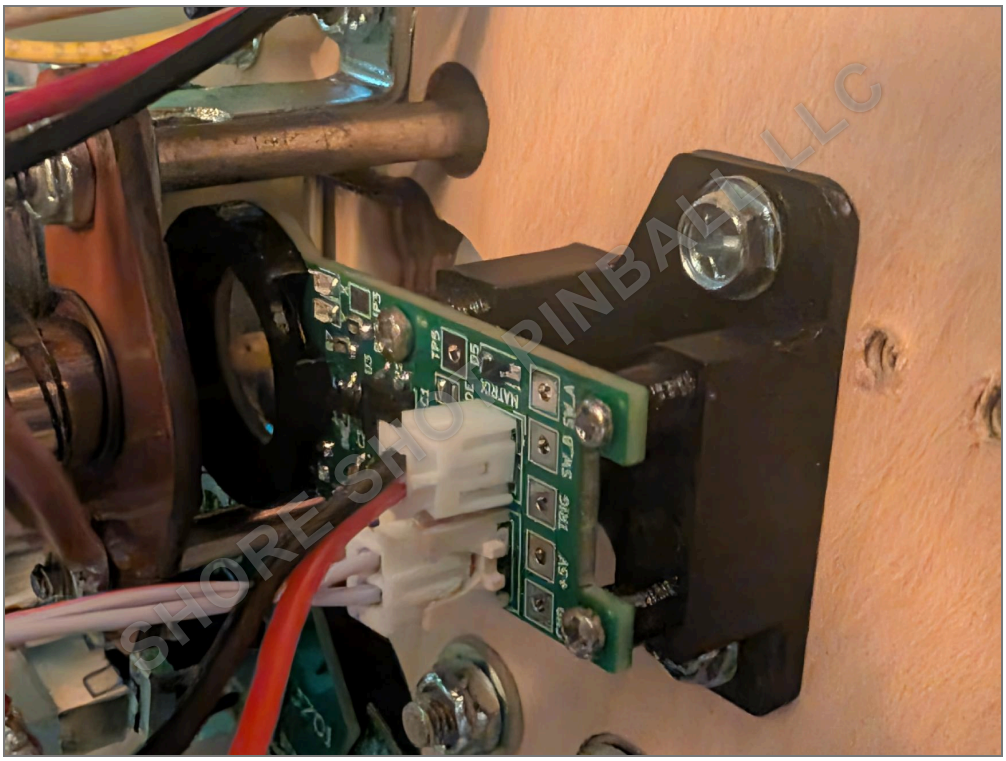


Figure 3 - Standard Architecture sensor board mount installed in front of the pop bumper coil bracket. Jersey Jack Pinball Dialed In!

3. Ensure the mounting area is flat and free of debris, torn wood fibers, or remnants from the previous switch installation. If necessary, lightly sand the area with 120-grit sandpaper.
4. Connect the appropriate JST-XH cable from the Power Distribution Board to the sensor board.
5. Temporarily connect the 5V power cable to the Power Distribution Board and verify that the green power LED on the sensor board is illuminated. A USB wall adapter plugged into the machine's service outlet is a convenient temporary power source during installation and alignment.

At this point, proceed with the recommended Visual Alignment Method or, if necessary, use the alternate Reference-Mark Alignment Method.

Visual Alignment Method (Recommended)

This is the simplest and fastest installation method and is recommended for most applications.

Optical Sensor Alignment Video

1. Remove the pop ring nuts and the coil bracket mounting nuts. Swing the coil bracket out of the way to provide a clear view of the skirt stem during alignment.

Alternate method: If removing or repositioning the pop bumper coil bracket is not practical due to limited access or other obstructions, the Optical Alignment Disc may be slid into position between the coil bracket and the sensor board after the board has been positioned over the skirt stem. Although this method eliminates the need to move the coil bracket, visibility of the Optical Alignment Disc and shade opening is reduced, making accurate visual alignment more difficult. Whenever practical, removing or repositioning the coil bracket is the recommended method.

2. Place the sensor board over the skirt stem and position the mount using the supplied Optical Alignment Disc, as shown in Figure 4.

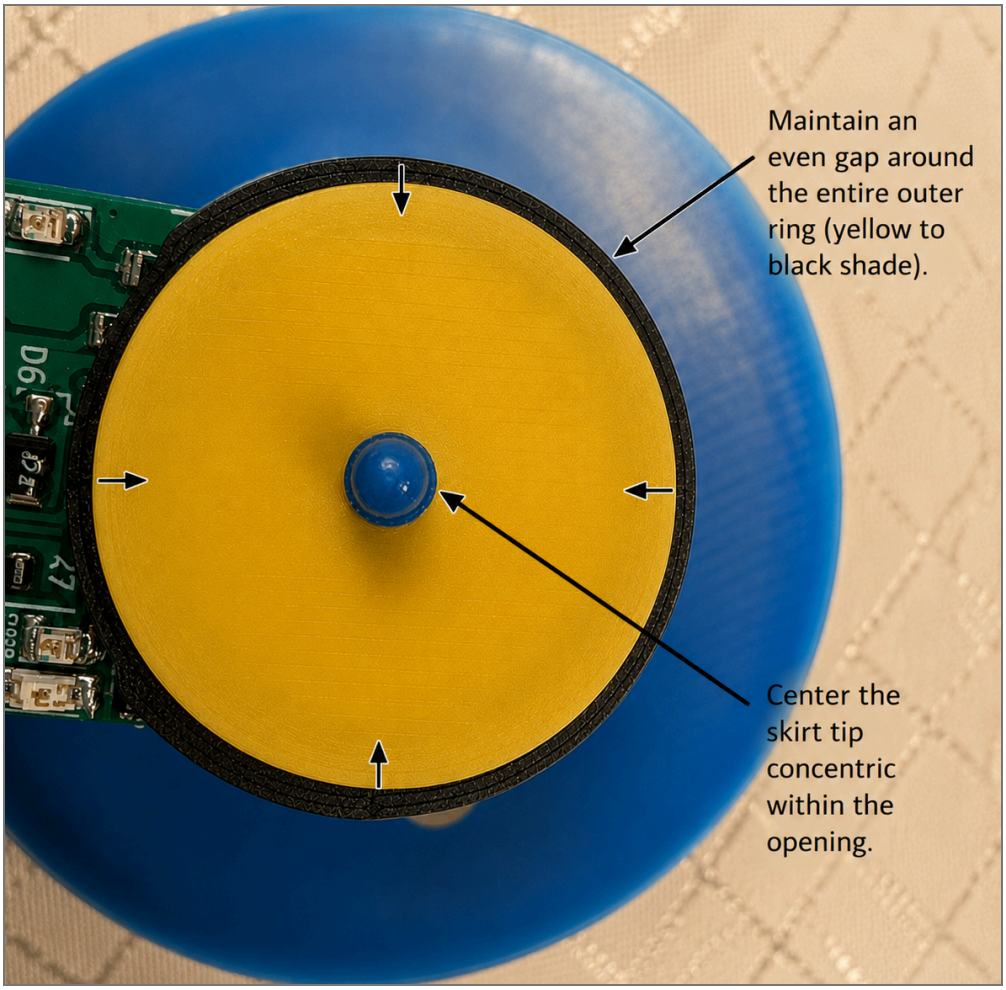


Figure 4 - Visual alignment reference. Maintain an even gap around the outer ring while centering the skirt tip within the opening.

3. Looking directly down at the Optical Alignment Disc, adjust the sensor board until the gap between the yellow outer ring and the black shade is even around the entire perimeter. Use the skirt tip as a secondary visual reference to confirm that it is centered. Refer to Figure 4.
4. Use the first mounting hole as a guide and drill the first hole **IN THE CENTER** of the mounting hole.
5. Install the first mounting screw and tighten it only enough to hold the mount in position.

6. Recheck the visual alignment after installing the first mounting screw, then remove the Optical Alignment Disc.
7. With the sensor powered, gently move the skirt while watching the sensor LEDs. Check movement **SIDE-TO-SIDE** and **FRONT-TO-BACK**.
8. The trigger point should be approximately equal in both directions side-to-side and approximately equal in both directions front-to-back.
9. If one direction triggers noticeably sooner than the opposite direction, slightly reposition the mount until the response is centered.
10. Once alignment is correct, use the second mounting hole as a guide and drill the second hole **IN THE CENTER** of the mounting hole.
11. Install the second mounting screw.
12. Tighten both mounting screws **SNUG ONLY — DO NOT OVERTIGHTEN**.
13. Perform a final **SIDE-TO-SIDE** and **FRONT-TO-BACK** LED check after tightening. Confirm that the trigger points remain approximately equal in each direction.
14. Move the skirt through its full range of motion in all directions to verify that it moves freely without contacting the shade.
15. Reinstall the coil bracket and secure the coil bracket mounting nuts and pop ring nuts.

Reference-Mark Alignment Method (Alternate)

The Reference-Mark Alignment Method may be used when the Optical Alignment Disc cannot be used or when an installer prefers to establish alignment using reference marks.

This method uses the sensor board's alignment LEDs to identify the X-axis and Y-axis center positions by marking the points where each LED changes state and locating the midpoint between those marks.

Although this method provides accurate results, it is more time-consuming than the recommended Visual Alignment Method and requires careful positioning of the sensor board throughout the alignment process.

1. Position the sensor board over the skirt stem and visually center it as closely as possible.
2. Establish the Y-axis center position by sliding the sensor board in a straight line until the Y-axis alignment LED changes state. Mark both transition points and locate their midpoint.
3. Repeat the process to establish the X-axis center position.

> **IMPORTANT:** Throughout this procedure, keep the sensor board aligned with its intended mounting orientation. Slide the board only in straight lines parallel to the desired mounting position. Do not rotate or pivot the board while establishing the reference marks.

4. Position the sensor board using the intersection of the X-axis and Y-axis center marks.
5. Install the first mounting screw. Tighten the screw until snug. Verify the alignment using the alignment LEDs and make any necessary adjustments.
6. Mark and drill the second mounting hole. Install the second mounting screw and tighten both mounting screws evenly until the board is securely fastened to the playfield. Do not overtighten.

7. Verify that both alignment LEDs remain illuminated with the skirt at rest and that the LEDs respond approximately equally as the skirt is moved through its full range of motion in all directions.

> **Note:** The Optical Alignment Disc is a reusable installation tool intended only for sensor board alignment. Remove it after installation is complete and retain it for future service.

Under normal operation, both alignment LEDs should be illuminated when the skirt is in its resting position. As the skirt moves away from its centered position, the corresponding alignment LED should turn off.

Verify that the amount of skirt movement before each alignment LED turns off is approximately equal in all directions. Minor differences are acceptable, but the skirt should not be positioned near the edge of either sensing beam while at rest, as this can result in inconsistent switch operation or occasional double activations.

Data East Architecture Installation

These manufacturers use a common pop bumper architecture that allows the sensor board mount to be installed without drilling the playfield. This is the quickest and simplest installation method.



Figure 5 - Data East Architecture sensor board mount. Side view.

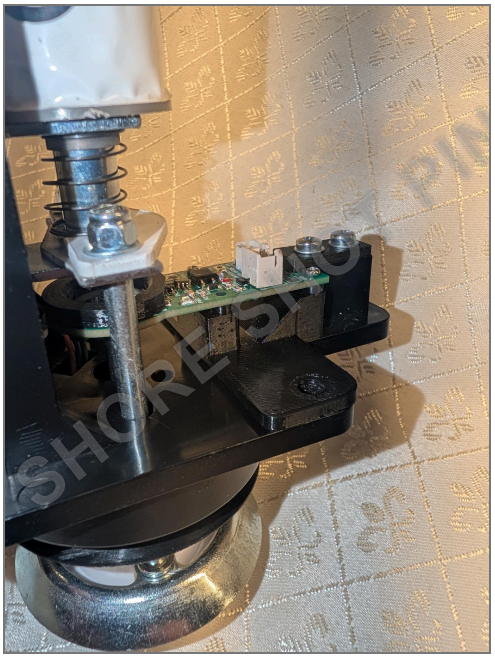


Figure 6 - Data East Architecture sensor board mount. Front three-quarter view.

Pre-Installation Check

Before installing the sensor board mount, verify that the pop bumper body is seated fully and evenly against the mounting frame. There should be no visible gap between the body and the frame. Correct any gap before continuing, as an improperly seated body can affect skirt position and sensor alignment.

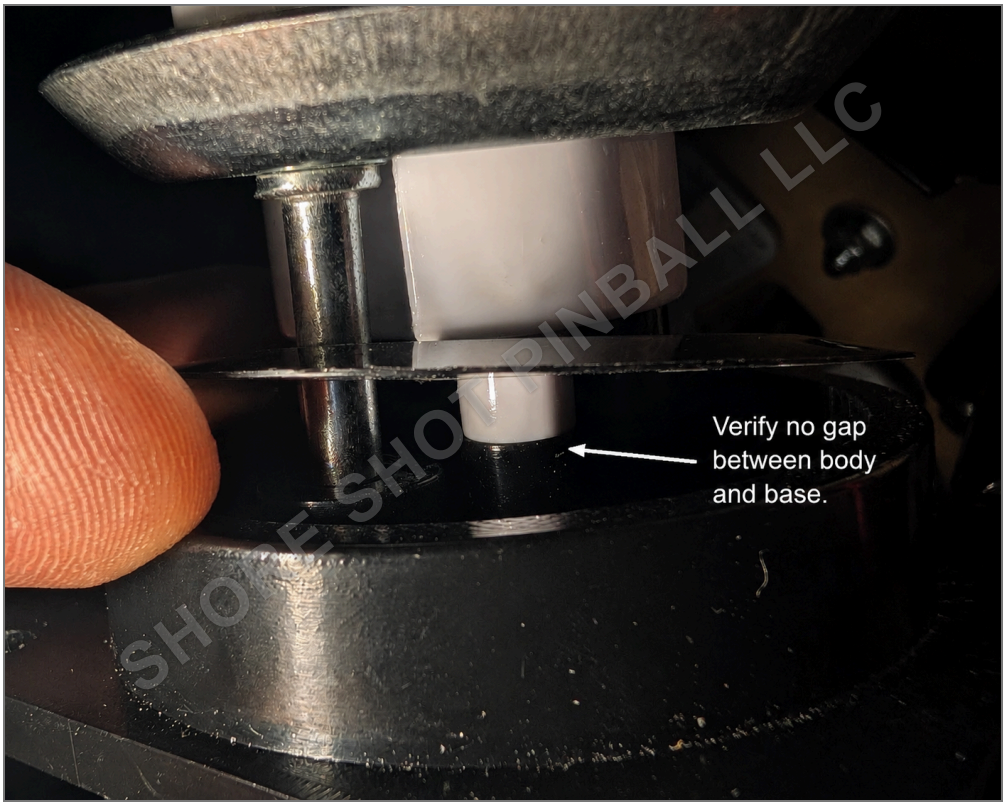


Figure 7 - Verify that the pop bumper body is seated fully against the mounting frame with no visible gap.

1. Remove the two pop bumper body mounting screws nearest the original spoon switch along with the two machine screws securing the spoon switch assembly. These four screws will be reused to secure the new sensor board mount.
2. Remove the original spoon switch and disconnect the switch wires, noting the diode orientation if your game uses a switch matrix diode.
3. Connect the switch wires to the supplied JST-XP pigtail, observing the correct Anode and Cathode orientation marked on the sensor board.

Connections may be made using crimp connectors, solder joints, WAGO connectors, wire nuts, or other suitable wiring methods appropriate for your installation.

4. Attach the sensor board to the supplied mounting bracket.

The board clamp has a small lip on one end. Install the clamp with the lip facing toward the sensor board as shown in Figure 8.

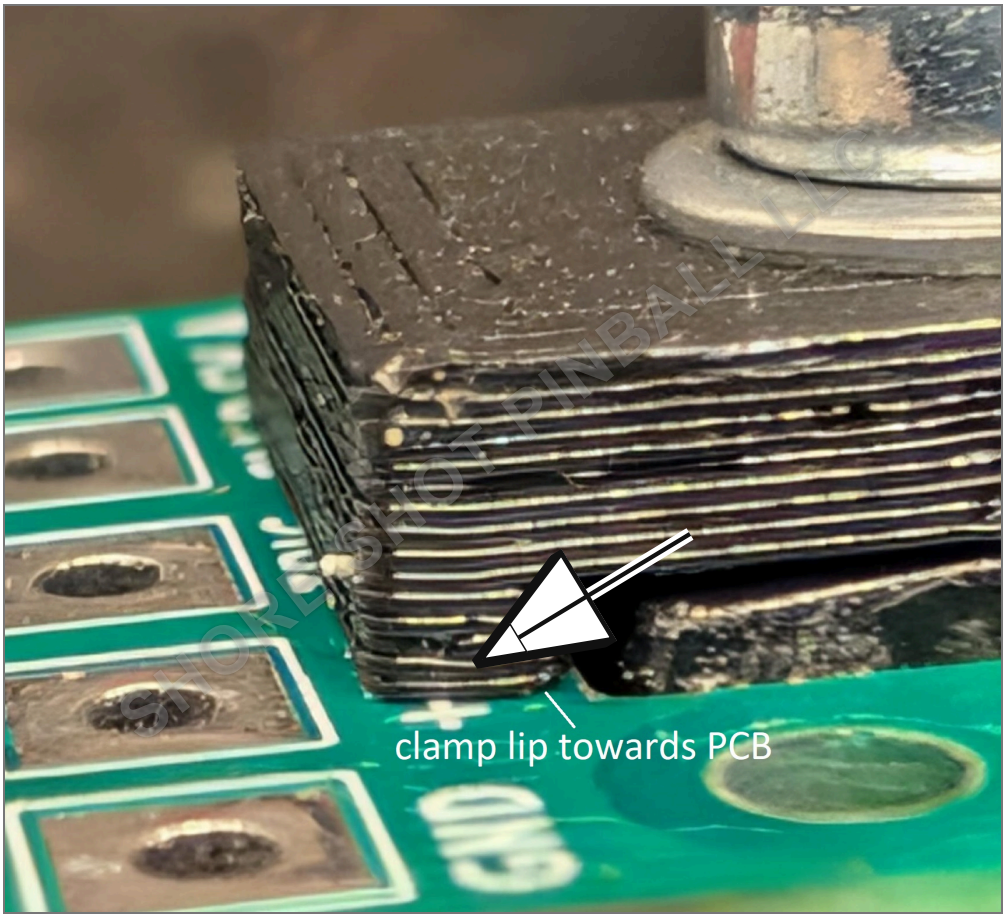


Figure 8 - Install the clamp with the lip facing toward the PCB.

5. Position the mounting bracket over the two pop bumper body mounting tabs, carefully guiding the sensor board over the skirt stem. Once properly seated, the mount will be retained by both the pop bumper body mounting screws and the spoon switch machine screws.
6. Reinstall the two pop bumper body mounting screws followed by the two spoon switch machine screws. Tighten all four screws evenly until the mounting bracket is securely fastened. Do not overtighten.
7. Connect the JST-XH power cable from the Power Distribution Board and temporarily apply power.
8. Verify that the green power LED is illuminated.
9. Perform a final operational check by moving the skirt through its full range of motion in all directions. Verify that the skirt moves freely without contacting the shade. With the skirt at rest, both alignment LEDs should be illuminated. As the skirt moves away from center, the corresponding alignment LED should turn off. Minor differences in the LED transition points are acceptable and should not affect normal operation.
10. Permanently route and secure the JST-XH cable before reinstalling any remaining pop bumper hardware.

Stern Electronics Solid-State Architecture Installation

Stern Electronics solid-state games use the same basic pop bumper architecture as the Data East, Sega, Spooky, and Pinball Brothers designs. Follow the Data East Architecture installation procedure with the exceptions listed below.

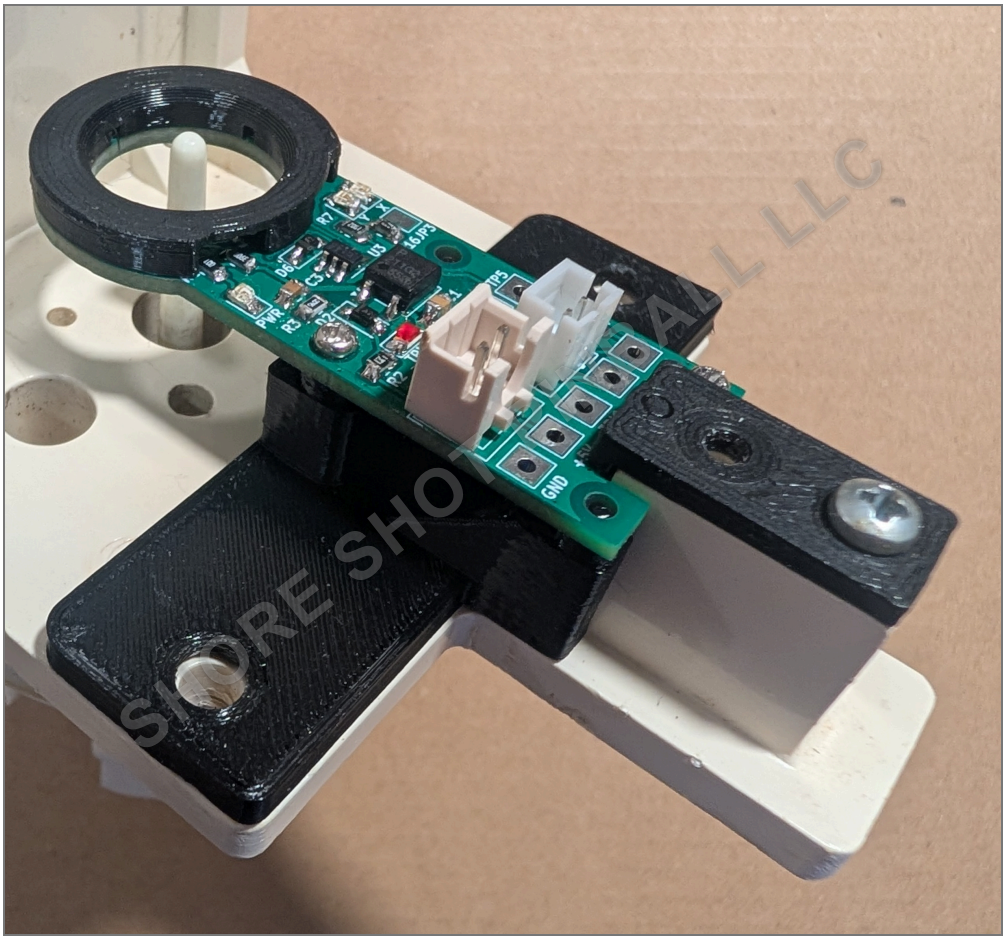


Figure 9 - Stern Electronics Solid-State Architecture sensor board mount. Front three-quarter view.

- The original Stern Electronics mounting screws are typically too long for this installation and should not be reused.
- Select shorter screws that provide adequate thread engagement without bottoming out in the pop bumper body. Verify proper screw length before final assembly.
- The Optical Alignment Disc is not supplied with this architecture because it is not required.

Bally Solid-State Architecture Installation

The Bally Architecture mounting bracket is designed to self-align with the pop bumper body. Once properly seated, no sensor board alignment is normally required.

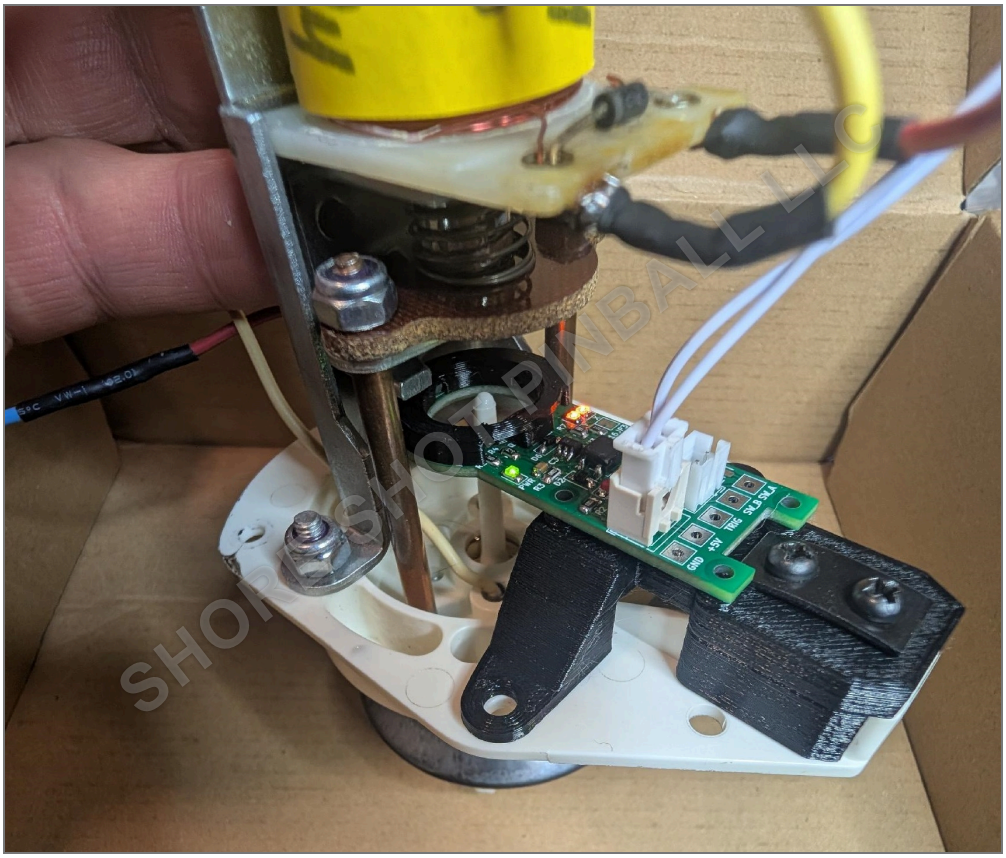


Figure 10 - Bally Architecture sensor board mount. Front three-quarter view.

1. Remove the pop bumper cap and the two switch stack mounting screws. Lift the switch stack from the pop bumper body and set it aside. The switch stack will remain attached by the lamp wires and switch matrix wires.
2. Inspect the supplied mounting bracket for any remaining 3D-print support fragments. Remove any fragments found before continuing with the installation.
3. Before disconnecting any wires, determine how you intend to reconnect the original pop bumper lamp wires. These wires are typically soldered directly to the original switch stack and will require a new connection point after the switch is removed.

The lamp wires may be solder-spliced into the existing wiring or connected using crimp connectors, WAGO connectors, wire nuts, or another suitable connector to simplify future service.

4. Remove the four screws securing the complete pop bumper assembly to the playfield and carefully lift the assembly from the machine.
5. Unsolder the switch matrix wires from the original switch stack, noting the orientation of the switch matrix diode. Record which wire is connected to the diode's Cathode (striped end) and Anode (non-striped end).
6. Connect the switch matrix wires to the supplied JST-XP pigtail, observing the correct Anode and Cathode orientation marked on the sensor board.

Connections may be made using crimp connectors, solder joints, WAGO connectors, wire nuts, or other suitable wiring methods appropriate for your installation.

7. Unsolder the pop bumper lamp wires from the original switch stack and reconnect them using your preferred wiring method.
8. Attach the sensor board to the supplied mounting bracket using the provided M2 mounting screws.
9. Position the threaded switch stack backing plate beneath the pop bumper body.
10. Install one supplied 5-40 x 5/8-inch machine screw through the sensor board mount and into the threaded backing plate. Install the second screw and reinstall the original spring plate washer, if equipped.
11. Tighten both screws only enough to allow the sensor board mount to seat fully against the pop bumper body.
12. Reinstall the complete pop bumper assembly into the playfield and install the four pop bumper mounting screws.
13. Connect the JST-XH power cable from the Power Distribution Board and temporarily apply power.
14. Verify that the green power LED is illuminated.
15. Snug the sensor board mounting screws, then snug the four pop bumper mounting screws.
16. Perform a final operational check by moving the skirt through its full range of motion in all directions. Verify that the skirt moves freely without contacting the shade. With the skirt at rest, both alignment LEDs should be illuminated. As the skirt moves away from center, the corresponding alignment LED should turn off. Minor differences in the LED transition points are acceptable and should not affect normal operation.
17. Permanently connect the selected 5V power source to the Power Distribution Board, route all wiring away from moving components, and secure the wiring with zip ties or other suitable cable restraints before completing reassembly.

Iron Maiden – Newton Ball Installation

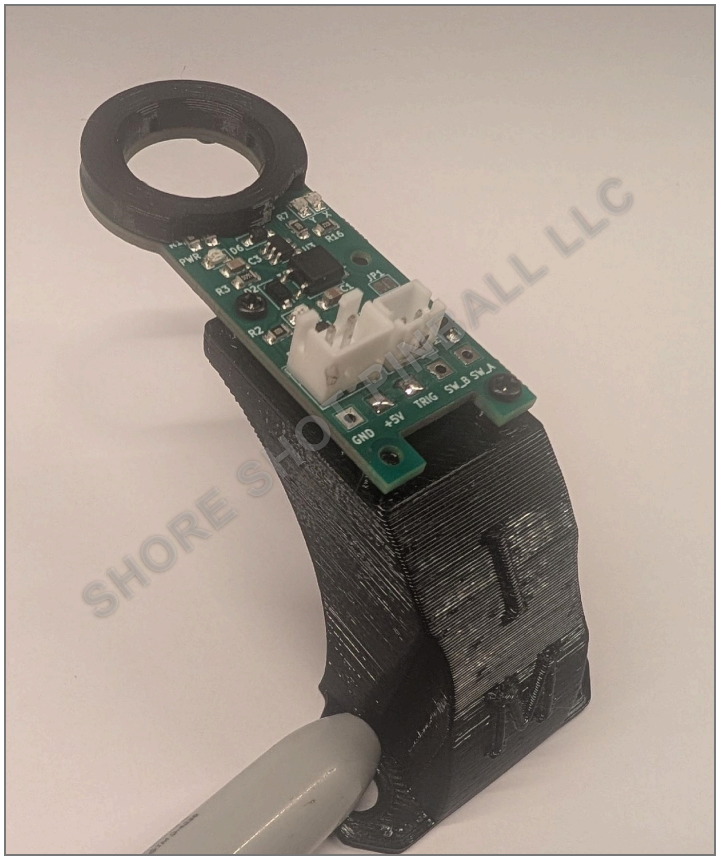


Figure 11 - Optical sensor board on the custom Iron Maiden mount. Close/solder JP1 before installing the assembly.

Introduction

This installation adapts the optical sensor system to the two Newton Ball mechanisms used in Stern Iron Maiden. The standard optical sensor boards are used with custom Iron Maiden mounts and replacement sensor activation tips.

Before Installation

Before mounting the sensor boards, **close/solder jumper JP1 on each sensor board**.



Figure 12 - Close/solder the two JP1 pads.

Remove the existing spoon-switch mounts from both Newton Ball mechanisms. Save the original mounting screws, as they will be reused to secure the new sensor mounts.

Inspect the mounting area and lightly sand or clean the surface if necessary so that the new mounts can sit flat.

Also inspect the pivot insert in each Newton Ball mechanism for wear. This insert can become elongated from repeated impacts, allowing the mechanism and activation tip to return off-center. If an insert shows significant wear or elongation, replace it before installing and aligning the optical sensors.



Figure 13 - Inspect the pivot insert opening for wear or elongation that can allow the activation tip to return off-center; replace a significantly worn insert before alignment.

Photo courtesy of @stratman

Install the Replacement Activation Tips

1. Remove the existing metal hex pointer from each Newton Ball mechanism.
2. Apply a small amount of thread locker to the threads of the supplied replacement sensor activation tip and install it in place of the original metal hex piece.
3. Tighten the replacement tip **HAND-TIGHT ONLY**. Do not use tools and do not overtighten.
4. Repeat for the second Newton Ball mechanism.

Mount and Align the Optical Sensors

Optical Sensor Alignment Video

1. Position the first sensor mount beneath the Newton Ball mechanism and use the supplied alignment disc to establish the initial position of the sensor.
2. With the mount correctly positioned, use the first mounting hole as a guide and drill the first hole **IN THE CENTER** of the mounting hole.
3. Install the original mounting screw and tighten it only enough to hold the mount in position.
4. Remove the alignment disc.
5. With the sensor powered, gently move the Newton Ball skirt while watching the sensor LEDs. Check movement **SIDE-TO-SIDE** and **FRONT-TO-BACK**.
6. The trigger point should be approximately equal in both directions side-to-side and approximately equal in both directions front-to-back.

7. If one direction triggers noticeably sooner than the opposite direction, slightly reposition the mount until the response is centered.
8. Once alignment is correct, use the second mounting hole as a guide and drill the second hole **IN THE CENTER** of the mounting hole.
9. Install the second original mounting screw.
10. Tighten both mounting screws **SNUG ONLY — DO NOT OVERTIGHTEN**.
11. Perform another LED alignment check by moving the skirt **SIDE-TO-SIDE** and **FRONT-TO-BACK**. Confirm that the trigger points remain approximately equal in each direction after the mount has been secured.
12. Repeat the complete mounting and alignment procedure for the second Newton Ball mechanism.

Switch and Power Connections

1. Connect the supplied switch pigtails to the sensor boards and make the switch connections to the machine as appropriate.
2. Connect the sensor-board power cables to the Power Distribution Board.
3. Power the Power Distribution Board using the supplied USB power cable connected to the available USB power source in the machine.
4. Before applying power, verify that all connectors are fully seated and correctly oriented.

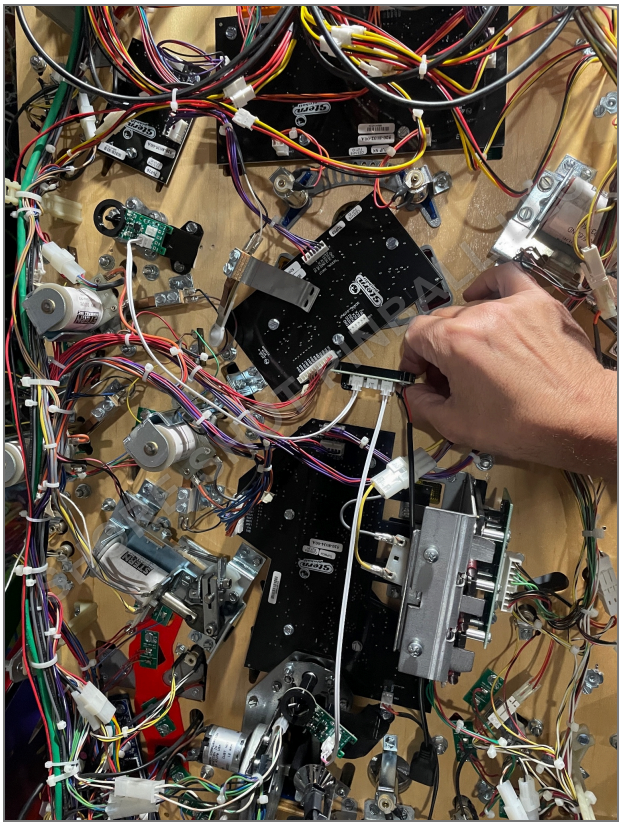


Figure 14 - Overall view of the two Newton Ball sensor installations and their power cables. The PDB is shown near the center of the pictured installation; this is not a required mounting location.

Photo courtesy of @stratman

Final Check

After installation, operate each Newton Ball by hand and verify that:

- The mechanism moves freely and returns naturally to center.
- The replacement activation tip does not contact or bind against the sensor assembly.
- Sensor response is approximately equal side-to-side and front-to-back.
- Both Newton Ball switch inputs register correctly with the machine.
- The sensor mounts and activation tips remain secure.

After verifying operation by hand, test both Newton Balls during normal gameplay.

Troubleshooting

The sensor board includes three visual indicators that can be used to diagnose most installation issues.

The green LED indicates that the sensor board has 5V power.

The blue alignment LEDs indicate that the optical beams are clear. Under normal operation, both blue LEDs should be illuminated when the pop bumper skirt is resting in its centered position. Moving the skirt should cause one or both blue LEDs to turn off as the optical beam is interrupted.

The red LED indicates that the sensor board has generated a switch output pulse. The red LED should flash briefly when the skirt is moved far enough to interrupt either optical beam.

If the green power LED does not turn on

Check the 5V power connection from the Power Distribution Board. Verify that the JST-XH cable is fully seated and that 5V and GND are connected correctly.

If one or both blue alignment LEDs are off while the skirt is at rest

Check the sensor board alignment. The skirt may be sitting too close to one optical beam, the board may not be centered, or the shade opening may be partially blocked. Recheck the board position using the alignment method for your mounting style.

If the blue alignment LEDs are on at rest but do not change when the skirt is moved

Verify that the skirt is moving freely and far enough to interrupt the optical beams. Also check that the sensor board is not mounted too high, too low, or too far from the skirt stem.

If the red trigger LED does not flash when the skirt is moved

First watch the blue alignment LEDs. At least one blue LED should turn off as the skirt moves. If the blue LEDs do not change, correct the optical alignment first.

If the red trigger LED flashes but the game does not register a switch hit

Check the switch wiring. Verify that the JST-XP pigtail is connected to the original switch wires and that the Anode and Cathode connections match the game's switch matrix diode orientation.

If the game registers the switch as constantly closed

Disconnect the sensor board from the game switch wiring and recheck the wiring. Look for reversed diode orientation, a shorted connection, or an incorrectly installed matrix diode jumper.

If the pop bumper double-triggers or seems overly sensitive

Recheck the mechanical alignment. The skirt should not rest near the edge of either optical beam. Also check that the pop bumper body is tight, the skirt moves freely, and the sensor board mount is secure.

If the board works on the bench but not in the game

Confirm that the game is providing a valid switch circuit and that the switch wires are connected to the correct Anode and Cathode terminals. Some games require the matrix diode or solder jumper to be installed in the correct orientation.

If multiple sensor boards do not power on

Check the Power Distribution Board input power first. Verify the 5V supply, the input cable, and the Power Distribution Board connections before troubleshooting individual sensor boards.
