



Linear Turnout Drive

Installation Guide

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A turnout drive that places no stress on the points and allows operation through several inches of scenery! A small drive box mounts below the points, a shaft passes through the scenery to the base, where a drive mechanism controls the rotation via Servo, DC Motor, or manual actuator.

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Introduction

There are many “flexible wire” drive systems that control turnout operation. While they are generally reliable and easy to install, they have a few significant drawbacks:

1. They cannot drive through more than 1-2 inches of scenery above the bottom attachment plate.
2. Embedding them into the scenery creates a maintenance challenge, requiring removal of track and scenery to repair or replace the drive.
3. They are expensive!

The RR Craftsman Linear Turnout Control solves these challenges by separating the point control and the drive mechanism.

1. Steel drive rods are available in lengths up to 400mm, providing 14-inches of drive measured from the bottom of the layout to the top of the roadbed.
2. The point Linear Control Box measures roughly $\frac{5}{8}$ ” square by $\frac{1}{4}$ ” thick, allowing it to reside completely in the roadbed between the ties. There are no electrical or mechanical components that require adjustment or maintenance.
3. The actuator drive can utilize low-cost servos, small DC motors, or even a manual linkage. Two SPDT micro-switches allow power routing and positional reporting.
4. All mechanical adjustments and electrical connections are made below the layout base.
5. An installation tool ensures correct alignment of the point drive box and drive shaft hole.
6. The solution is cost-effective, with an MSRP under \$10 for a complete kit with servo, micro switches, and mounting hardware.

Parts

Take a moment to familiarize yourself with the parts. A few minutes now can save time later during the assembly!

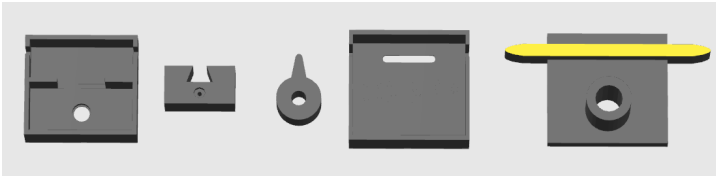


Figure 1- Point Drive Parts

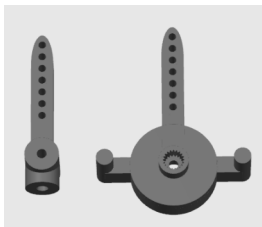
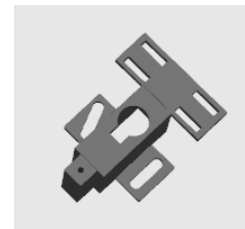
Figure 1 shows the Point Drive parts in the kit, except for the steel rod and actuator pin. Left to right:

- Point Drive base
- Point Drive Slide
- Point Drive Rotary Actuator
- Point Drive Assembly Cover
- Point Drive Installation Jig

Actuators

The actuator mounts below the layout, screwed to a wood base. The mount encloses a 9G servo, supports the drive shaft, and has mounts for two micro-switches.

The control arms (left) complete the actuator assembly. The single arm is secured to the shaft while the multi-arm shaft is secured to the servo, linking the drive arm and driving the micro-switches.



The arms can be positioned on either side of the actuator mount as space requires. These arms are linked by a steel rod with a central angle to provide some cushioning to the drive action.

Optional Parts

The point drive assembly has a hole in both sides of the Drive Slide cored for a 0.020 wire. This can be used to animate switch stand indicators. The wire should be set to the desired length, then secured in the appropriate side of the Drive Slide with a drop of CA.

RR Craftsman expects to release models of various switch stands with operational flags in the future.

Construction

Before starting, ensure that you have the proper tools and materials:

- Razor Knife (both X-Acto type and large box cutter blade)
- Drill Bit: 1/8" by 6" long (or longer as needed by your scenery depth).
- Pliers & wire cutters
- Sharpie marker
- 1.3mm hex driver
- Masking Tape (hold parts in place)
- Plastic Cement
- Medium CA with toothpick or other fine applicator
- Lubricating grease (plastic safe)

Preparation

Start by placing the turnout into the desired location. Find the centerline of the point throw-bar and mark BOTH sides of the roadbed, using pencil (or stick pins into the side of the roadbed). Mark the roadbed along the inside rail - this will be used to align the template. Remove the turnout and set it aside.

Place the template onto the roadbed with the guides aligned with the throw-bar marks and the side aligned to the rail mark. You can place the Point Drive Assembly so the box is either ahead of or behind the points. This changes the location of the drive shaft to accommodate benchwork framing. It's helpful to tape this tool in place for the next step!

Carefully insert the drill bit into the hole in the template and drill through the roadbed, scenery, and layout base.

**If you do not have a plywood base, we recommend gluing a small plywood plate to the foam to provide a secure anchor for the drive assembly.*

Remove the tape without moving the template, then mark around all of the sides. Use the razor knife to cut the roadbed away and allow the Point Drive Assembly to fully fit in the opening.

Point Drive Assembly

The Point Drive Slide has two different sides. Locate the side with the larger hole facing up. Using pliers, grip the steel pin and force it into the hole - this is a tight fit! Work slowly, a mm at a time until the point begins to emerge from the other side. Use the servo arm to support the slide and push the pin until it extends far enough to grip it with pliers. You can then flip it around and pull the pin until the head fully seats inside the recess. The head must not extend above the surface of the slide! You can apply a drop of CA to the pin head, but this is not required.

Using your Sharpie, place a mark the same diameter as the marker point on the very end of the steel shaft - this should represent about half of the depth it will be inserted into the Rotary Actuator

Place the Rotary Actuator onto your work surface, align the 2mm steel shaft into the hole (sometimes helps to slightly chamfer the end of the shaft) and tap it gently until the mark you made just disappears. There

should still be a gap on the other side. Place a drop of CA on the shaft and tap the shaft to fully seat it into the Rotary Actuator and set it aside until the CA has cured.

Point Drive Installation

- Place the Point Drive Base into the square hole in the roadbed, ensuring that the hole aligns with the 1/8" hole drilled earlier. Apply a very small amount of grease to the bottom plate.
- Put a dab of grease on each SHORT SIDE of the Slide and the top around the pin, then place the Point Drive Slide into the center of the slide slot in the base with the pin pointing up. Placing grease here will seal the side and top openings and prevent any ballast glue from entering later.
- Slide the shaft through the hole and align the Rotary Actuator tab into the slot in the Slide.
- Install the cover, allowing the pin to pass through the slot. We recommend securing the cover by placing a drop of cement in the center of the front and rear sides of the base and then install the cover. This will secure the parts together without glue entering the drive assembly. Allow to dry.
- Place the turnout into position, slipping the center throw-bar hole over the pin. Use pins or tacks to hold the turnout to the roadbed and rotate the shaft from below the layout to ensure that the full range of motion is available to drive the points to both directions. Turnouts that have tension springs (Peco, Walthers) should have them removed before trying to drive the points.

Actuator Assembly

Slide the 9G servo into the actuator mount - it only fits one way. Make sure the wires fit in the notch. Mount the micro switches. These should have pigtails pre-soldered to them. One should connect to each rail, with the common connector routing to the frog power connector.

Working from under the layout, slide the actuator over the steel shaft. It does not matter which way the actuator is oriented, so align it to make it easy to access the wires and micro-switches. Secure the actuator mount with 2 screws.

Connect the servo to your controller (or a servo test tool) and drive it to the home/zero position.

Attach the servo arm to the servo shaft and secure it with the screw included with the servo. The arm should be positioned 90-degrees to the side of the drive shaft.

Slide the drive shaft arm onto the drive shaft, keeping it parallel to the servo shaft and aligned vertically. Wrap a flag of tape around the shaft to maintain the correct height. From the top, set the points equidistant from both rails, then tighten the 1.3mm set screw on the drive shaft arm.

Using heavy duty wire cutters (not your rail nippers!), trim the pin so it sits about 1/16" above the throw-bar actuator hole.

Insert the steel drive link, inserting the ends from the top-side of the arms. The different holes allow for fine adjustment the throw length. Use the center set of holes to start. Holes closer to the shaft increase the throw!

Operational Testing

It is important not to over-drive the servo! The alignment is defined during installation at the zero point. This allows the servo to be driven left or right of center to effect closure.

Start with a 10-degree rotation and watch the points. You want the points to close with just enough tension to hold the points in position. Adjust the rotation amount until the desired point pressure is obtained.

Notes

The Point Drive mechanism can be preassembled and dropped into the hole in the roadbed once the process is understood.

Once the first turnout is installed and the drive angle is determined, that angle can be used for the starting point of other turnouts.