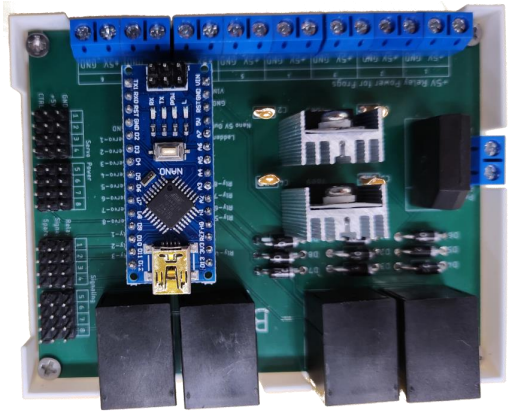


EZTronic Installation Reference Guide

HO Turnout Control Products

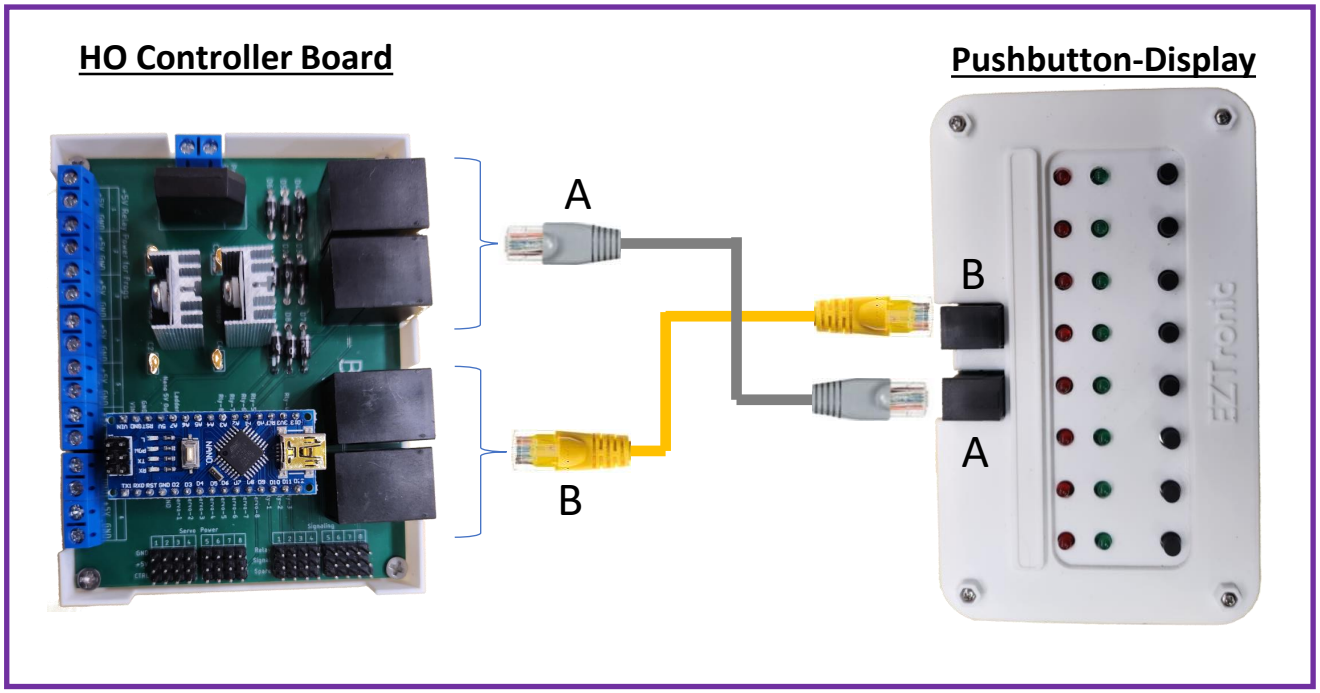
Table of Contents

Controller Wiring to Pushbutton-Display

STEP-1 Cable from A-A Plug one CAT5 wire between one of the "A" Connectors of the Controller Board (There are 2, makes no difference which one you use) to the "A" Connector of the Pushbutton Board.

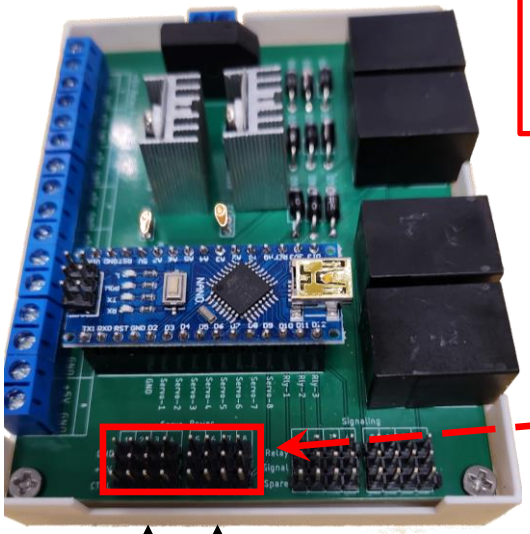
Step-2 Cable from B-B Plug the other CAT5 wire between one of the "B" Connectors of the Controller Board (There are 2, makes no difference which one you use) to the "B" Connector of the Pushbutton Board

NOTE – Color of wires provided may be different than the colors in the diagram below. Ensure that one cable is connected from A-A and the other cable is connected from B-B



Servo Wiring to HO Controller

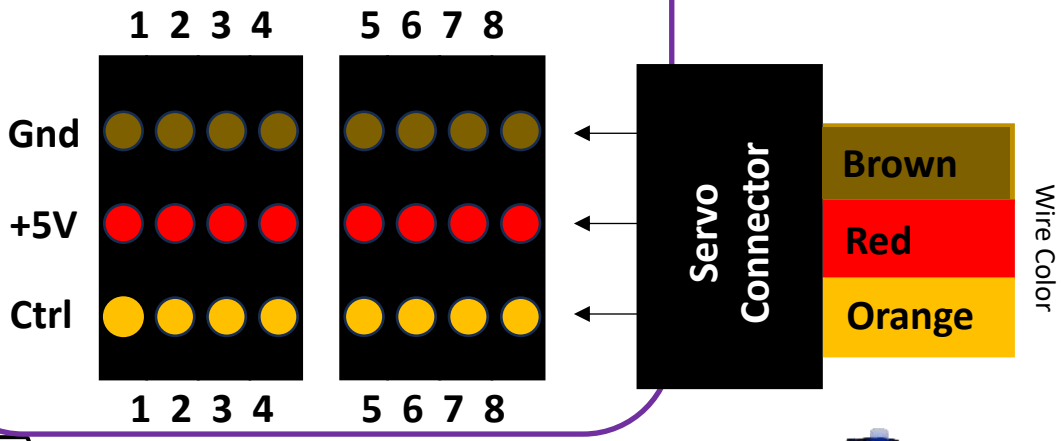
HO Turnout Controller

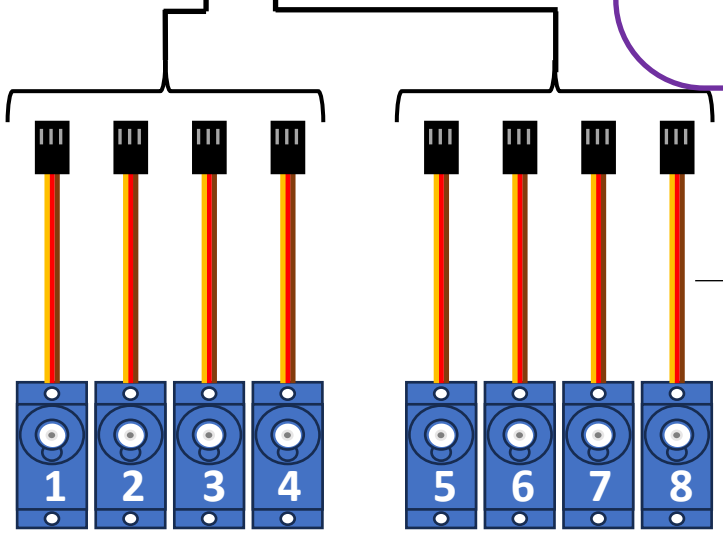


Plug-in Servo(s) to Controller

Each servo has a female connector – attach according to below diagram.

Enlarged View of Servo Connections

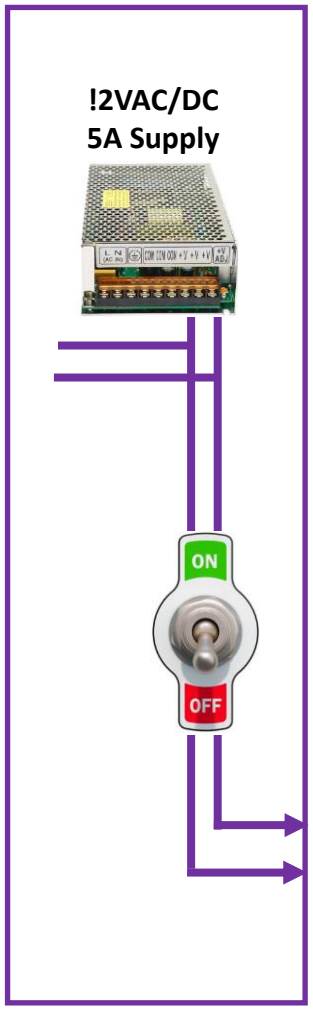




Brown – Ground wire
Red – Power wire
Orange – Control wire

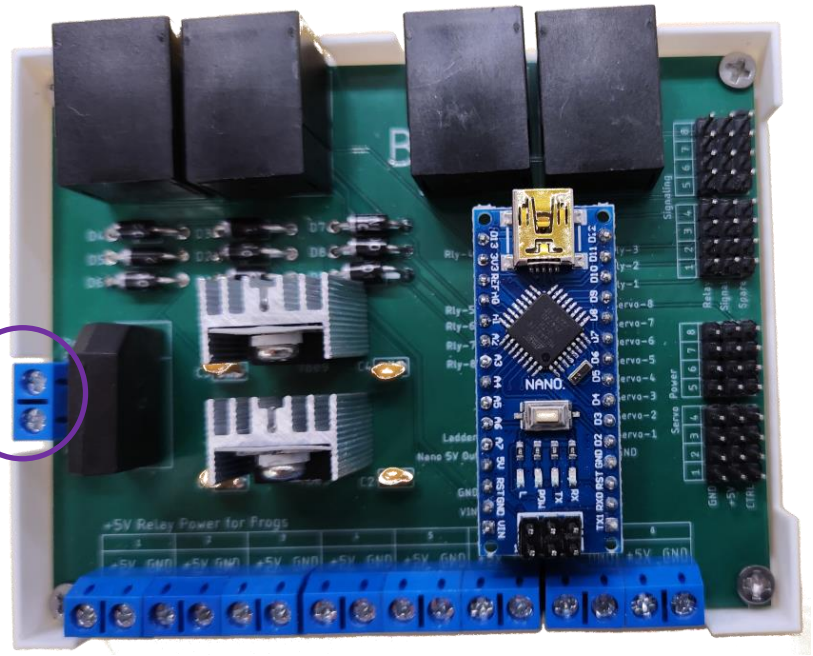
Actual Servo

Power connection to Controller



Powering the Controller Locate the power source that you are providing (12VAC/DC) and wire it to the Power Input terminals. We recommend a power supply capable of 5A. The EZTronic system is expandable up to 5 Controllers (total of 40 Turnouts) that can be run from the *same single power supply*.

NOTE - We recommend that you provide a switch to turn on/off the *power to each EZTronic Controller.* (The system provides for centering its Servos on power-up when the first button on the *Pushbutton Board* is held down for a few seconds - details in STEP-7). For now, continue onto STEP-6



HO Turnout Controller

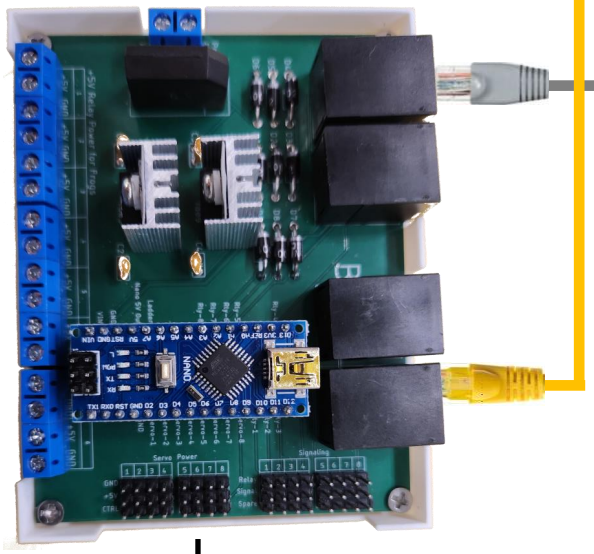
Initial Power Up

!2VAC/DC
5A Supply

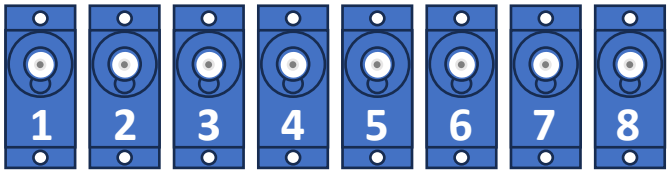
Turn ON
Switch

Initial Power Up Activate the power to the Controller. All Red LEDs will change to Green in sequence, signifying that the system has confirmed all turnouts are in their NORMAL position.

The following step will demonstrate the operation of the pushbuttons.



LEDs will individually turn from RED to GREEN indicating normal startup operation

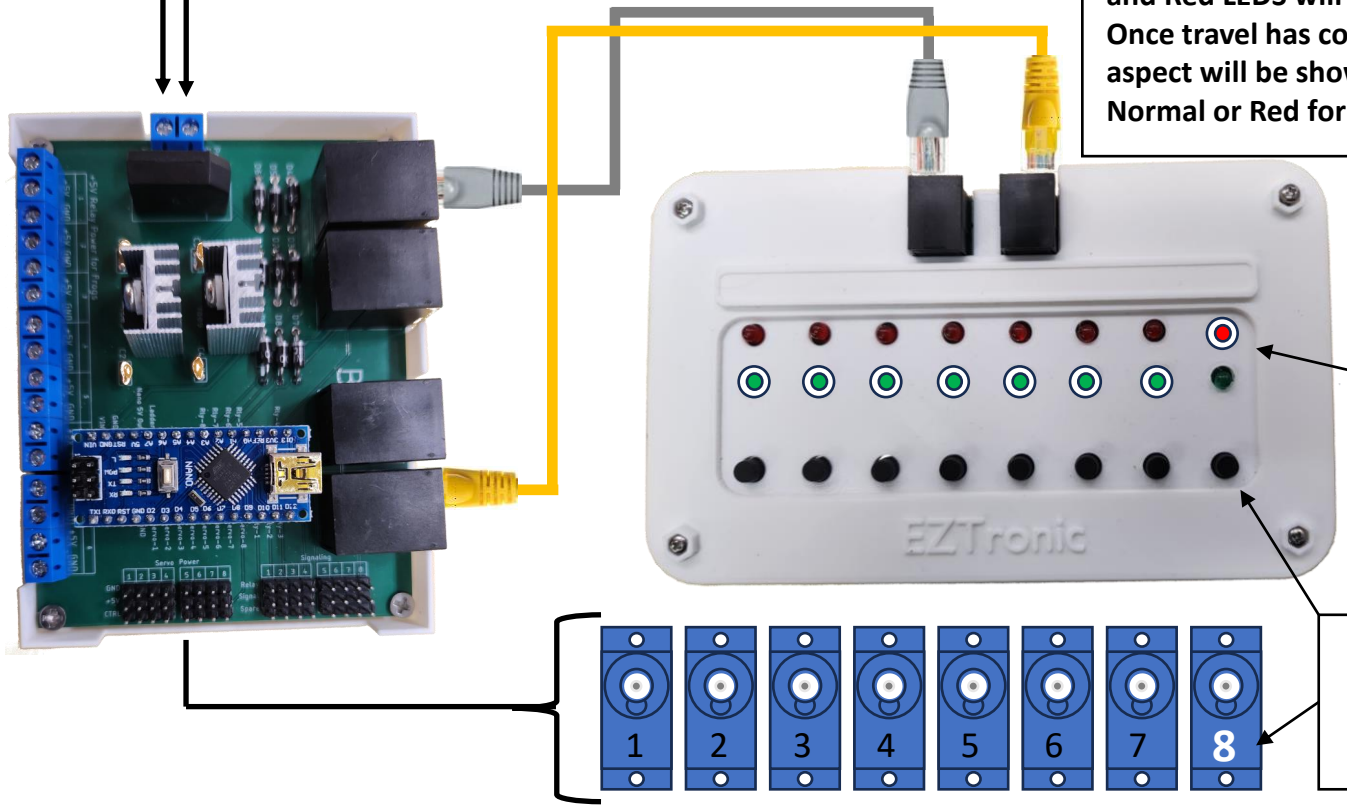


Basic System Operation

System Operation Each press of a button will change the position of the respective Servo (Example below shows Servo-8 operation in detail)

NOTE – Turn power off before moving onto the next step

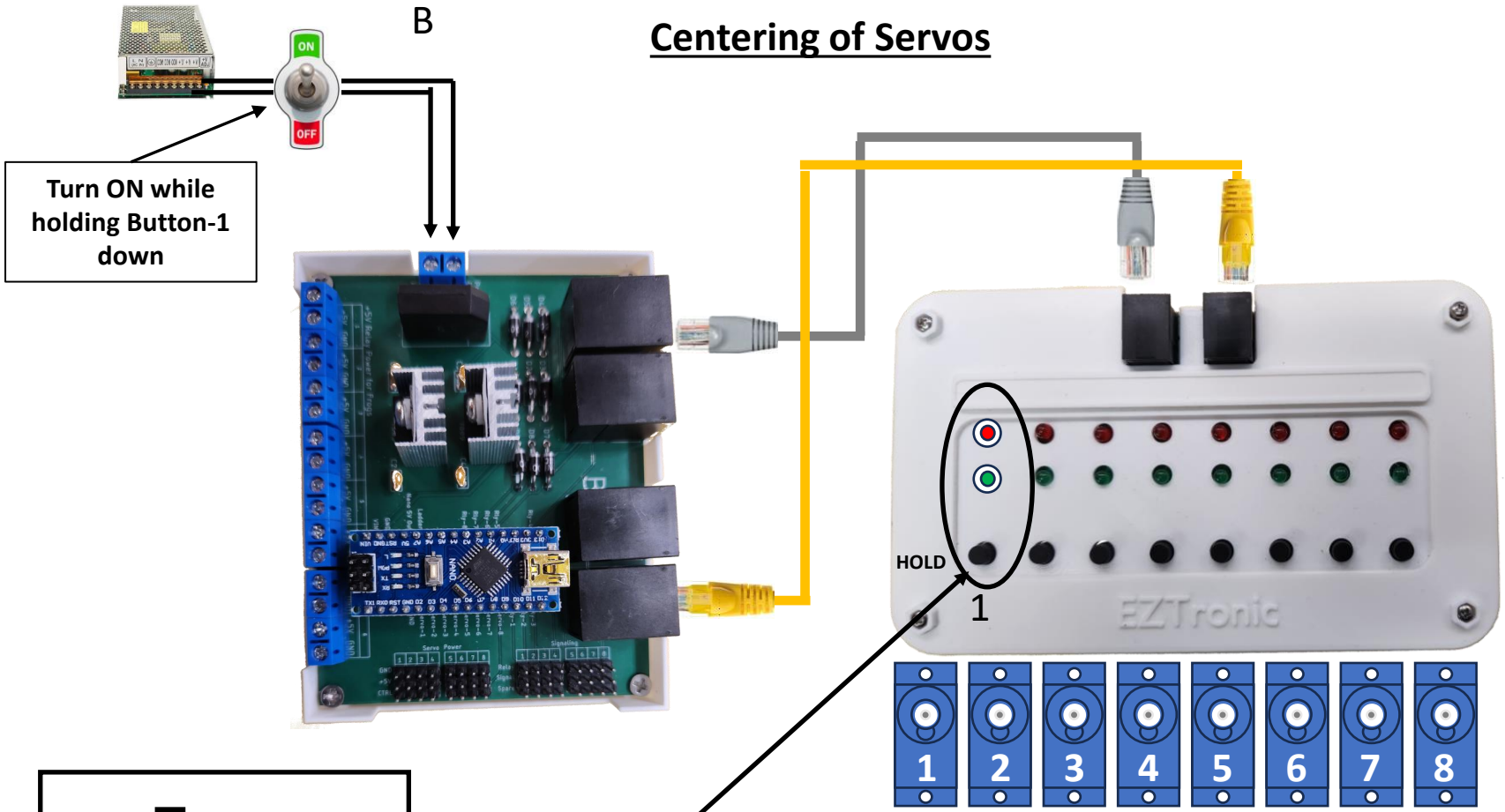
NOTE – While the turnout is moving to its position, the appropriate Green and Red LEDS will alternately blink. Once travel has completed, the correct aspect will be shown (either Green for Normal or Red for Reversed)

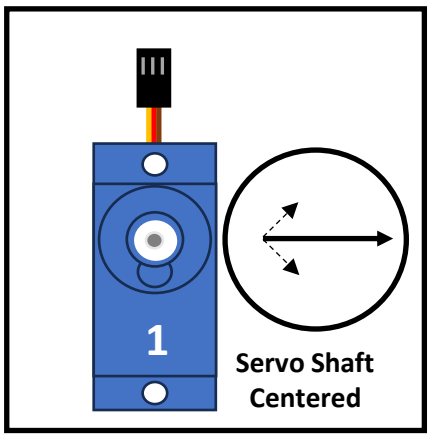


Green LED will go off and Red LED will go on

Press button-8 on Pushbutton board and Servo-8 will move.

Centering of Servos



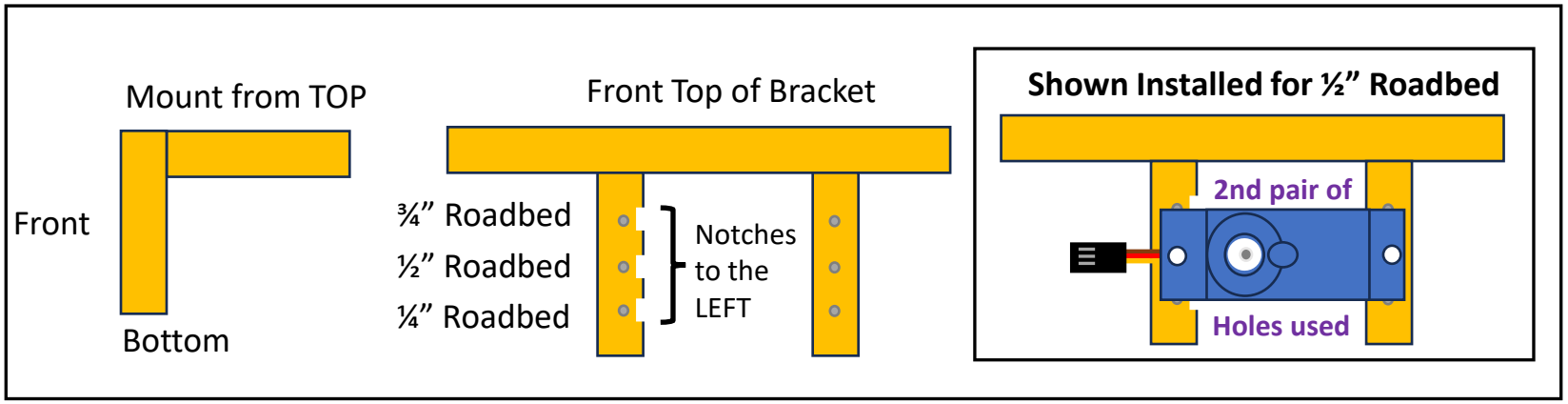


Centering Servos A) With the *power off*, *hold down Button-1 and then turn the power back on.* All Red LEDs will light. Then, starting with Servo-1 and finishing with Servo-8 (shown in detail to the left), will move its shaft to its centered position with a modest delay between each Servo. Once all servos have been centered, the #1 Green and Red LEDs will alternately blink indicating that the centering for *all Servos is complete*. The first turnout's lights will stay blinking until power is removed, or the processor has been reset. Cycle power to return the system to normal operation.

Mounting Servo to bracket

Align and Mount Servo With each Servo positioned as shown, align it in its bracket from the *TOP.* Position the Servo at the appropriate height for your roadbed using the correct alignment holes provided in the bracket. The Servo wire exits the Servo body on its left. Position the wires so they run down toward the bottom of the bracket on the inside. Notches are provided along the left edge of the bracket to allow the wires to fit in its notch comfortably. Screw the Servo to the bracket with the supplied screws. NOTE – Do NOT overtighten the servo screws as they are delicate - tighten only until snug.

Below right shows the proper position for installing the Servo when using it for a turnout that has ½" Roadbed. If the layout or location of the turnout is thicker or thinner, adjust the mounting position accordingly for best operating experience. Repeat this process for all Servos that are to be installed. When finished you should have a Servo mounted to its bracket at the correct height for its Turnout.

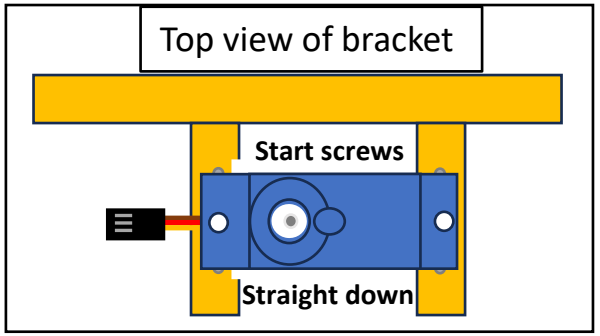


Mounting servo to bracket - Pro Tip

Installing Servo onto bracket

- Locate a LONG Phillips screwdriver for these small screws – the screws need a bit of torque to screw in tightly to the servo bracket. We use one that is 9” long overall. The extra length allows you to push down into the plastic with enough torque and help ensure you will not strip the head of the screws in the process.
- Position the servo above the bracket with the wire fitting inside its space on the left-hand side and slide downward – the servo will slip in nicely to the bracket. Do not try to install the servo from the back of the bracket as the wire will potentially get crimped up against the back edge of the bracket
- To start the screws, set them into the servo opening and let the tip of the screw just come in contact with the appropriate mounting hole of the bracket – it is best to keep a small space between the bracket and the servo when starting this process. It will help support the screw for the initial setting of the threads into the plastic of the bracket. Make sure they start straight and then continue to screw them down snugly against the top of the servo.

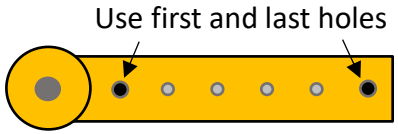
Use a long Phillips screwdriver



Fabricating servo arm with paper clip

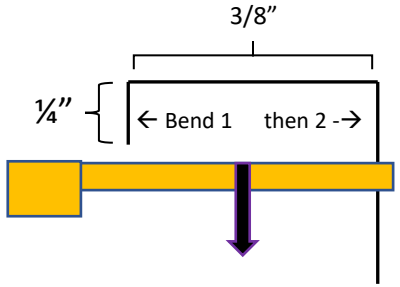
Fabricate servo arm assembly Using the straight horn and one of the provided paperclips, open the paperclip and straighten it out. Start at one end of the clip to fabricate the two bends. Then prepare the clip as shown below and prepare each Servo horn to become the fabricated arm assembly for your turnout. If you prefer to use other metal instead of the provided paperclips, keep it equal to or less than the paperclip diameter so it will fit your HO turnout throwbar or crosstie.

A. Locate horn and identify holes



Enlarge the holes by using a #50 drill bit to accommodate paperclip. Alternatively, use the sharp tip of an Exacto blade and lightly ream out the two holes from both top and bottom of the horn

B. Bend clip and push thru and flush with top of horn



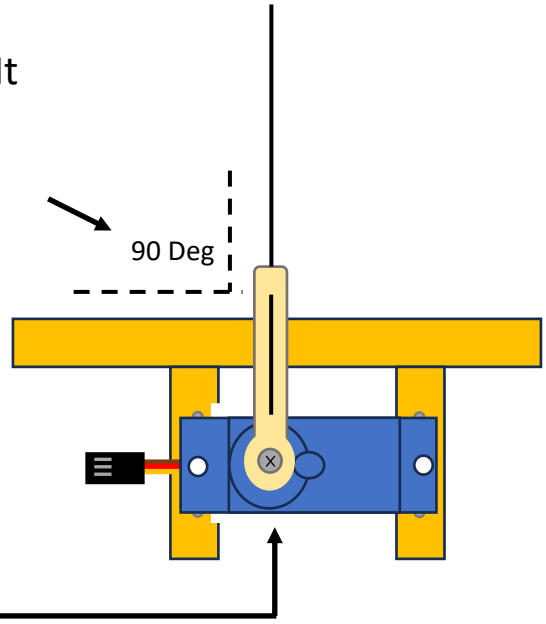
C. Bend clip ends up flush with bottom of the horn.

Preparing for installation on layout

Attach arm assembly to servo Slide the arm assembly down onto the top of the servo so that it is aiming as shown below. Sometimes the horn and gear will not be 100% centered, get it as close as possible. D*o not manually turn the servo gear during this process as the servo has already been centered for use*.

A. Align arm at 90 degrees - Slide arm assembly onto servo shaft and push it down onto the top shaft of the servo. (It may not align perfectly to 90 degrees. This is ok as you can bend the clip appropriately as we are installing it to the turnout)

B. Attach arm assembly – Push servo arm onto the top og the servo – you can secure the Servo using the supplied screw (NOTE-we do not find the need for this screw and leaving it out makes it easier to remove the servo arm if needed)

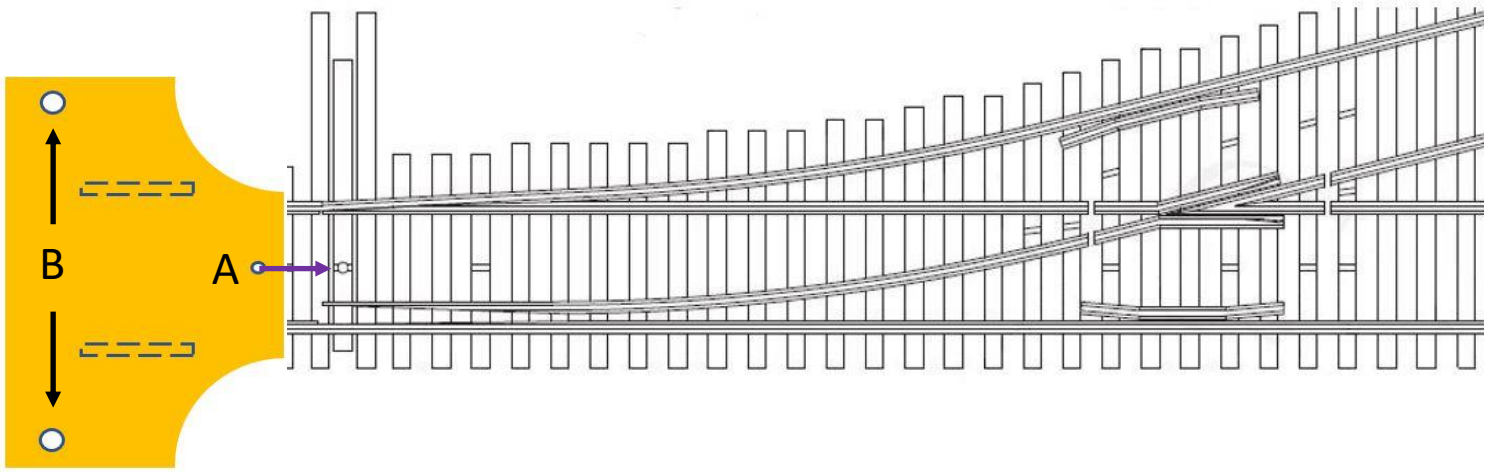


Alignment Bracket – Left Hand Turnout

Alignment of bracket for *Left-Hand* Turnout Shown below is the position of the template for a left-hand turnout. The template sits over the track to locate the center of the throwbar as well as the two locations for screw holes which will be used to attach the bracket to the layout location.
(For mounting options other than center of track throwbar, see Step-13)

A. Locate template over switch, drill center hole Lay template on track at location shown, it fits over the track and provides the location to drill all holes. Position the small front hole over the center of the throwbar. If you have not drilled a hole under the throwbar, do so now. Provide a ½" hole to allow proper horizontal movement

B. Mark and drill bracket mounting holes With the center hole aligned over the center of the ½" opening under the throwbar, mark and drill the 2 mounting holes for the bracket. Use a #27 drill bit to make these holes. NOTE – the brackets are designed to accept #6/32 screws or bolts. Purchase the length of bolt applicable for your layout.

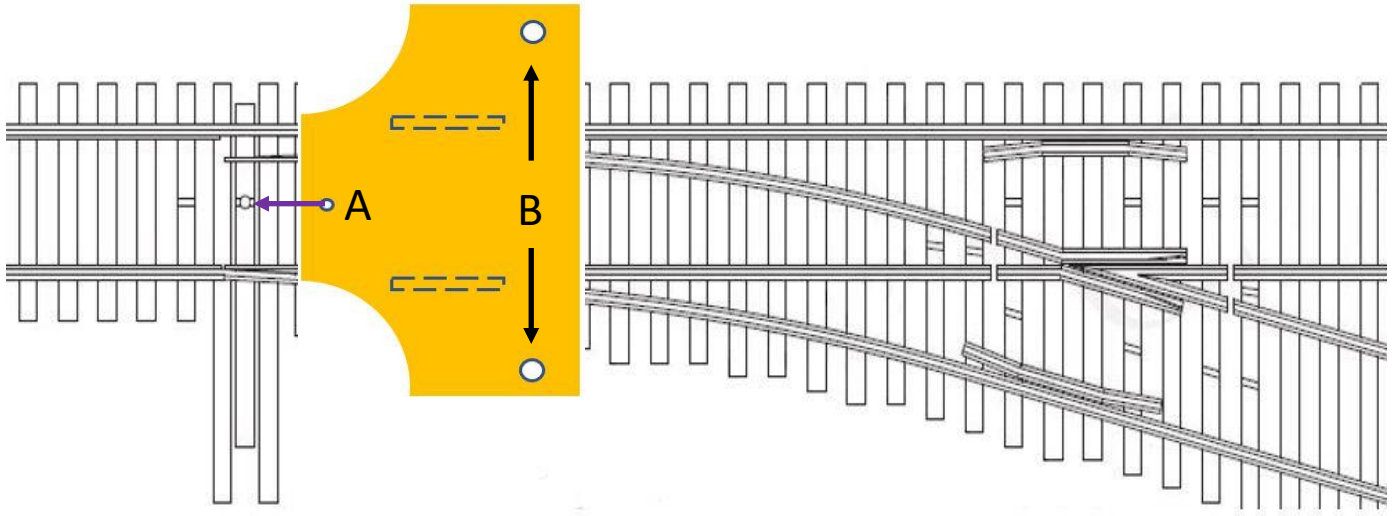


Alignment Bracket – Right Hand Turnout

Alignment of bracket for *Right-Hand* Turnout Shown below is the position of the template for a Right-hand turnout. The template sits over the track to locate the center of the throwbar as well as the two locations for screw holes which will be used to attach the bracket to the layout location.
(For mounting options other than center of track throwbar, see Step-13)

A. Locate template over switch, drill center hole Lay template on track at location shown, it fits over the track and provides the location to drill all holes. Position the small front hole over the center of the throwbar. If you have not drilled a hole under the throwbar, do so now. Provide a ½" hole to allow proper horizontal movement

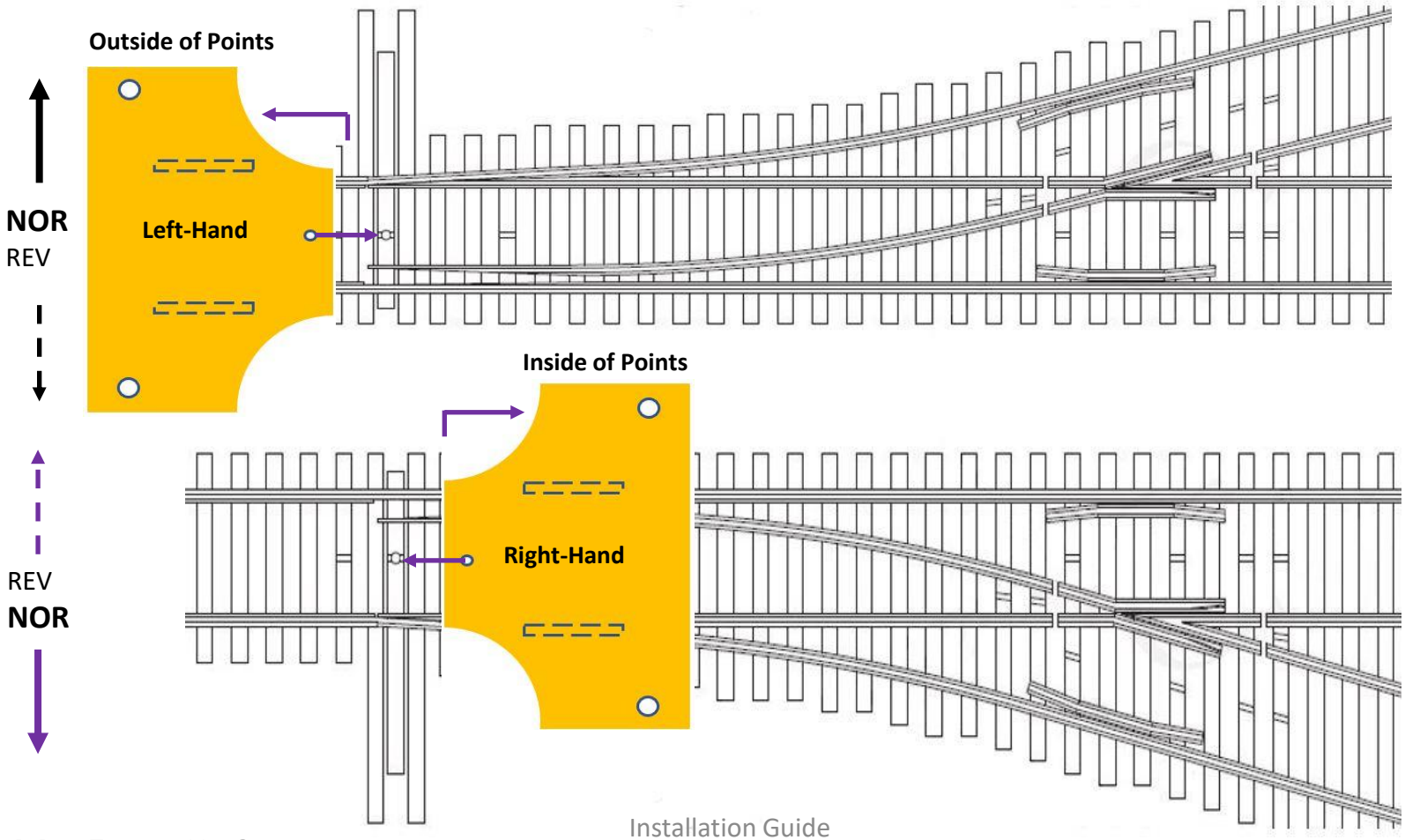
B. Mark and drill bracket mounting holes With the center hole aligned over the center of the ½" opening under the throwbar, mark and drill the 2 mounting holes for the bracket. Use a #27 drill bit to make these holes. NOTE – the brackets are designed to accept #6/32 screws or bolts. Purchase the length of bolt applicable for your layout.



Importance of Alignment Bracket Orientation

Why the different mounting locations for Left-Hand and Right-Hand Turnouts?

The system has been designed such that each servo will move the same direction when commanded for an operation. You therefore need to orient one of the turnouts opposite to the other such that the resultant movement will be correct for either NORMAL or REVERSED operation.

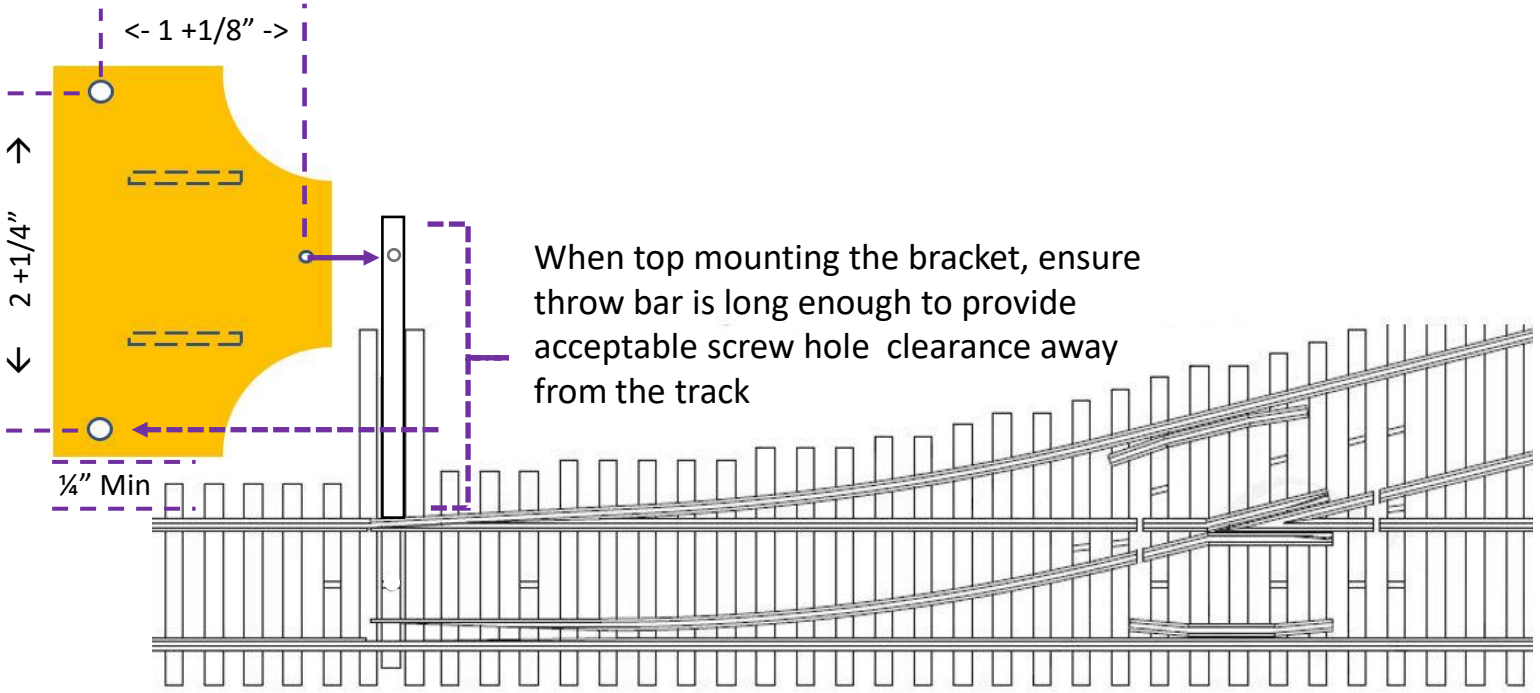


Side mounting Installation

Alignment of bracket on side of turnout Shown below is an example of mounting the switch machine such that the throwbar hole location is outside of the track center All dimensions and clearances are the same if you choose to locate the bracket on the other side of the switch (throwbar on other side of track)

Locate Bracket away from or outside of switch center Below are the critical elements and dimensions for alternative mounting of the servo bracket assembly. What is important *when top mounting is to leave at least ¼" of space from the edge of the track for the closest mounting hole*.

For installations where all holes are drilled from the underside and not coming through the top, you may use the template to ensure proper spacing but not be concerned about the minimum distance from the track.



Relay Installation – preparation of turnout

EZTronic solution for powering frogs

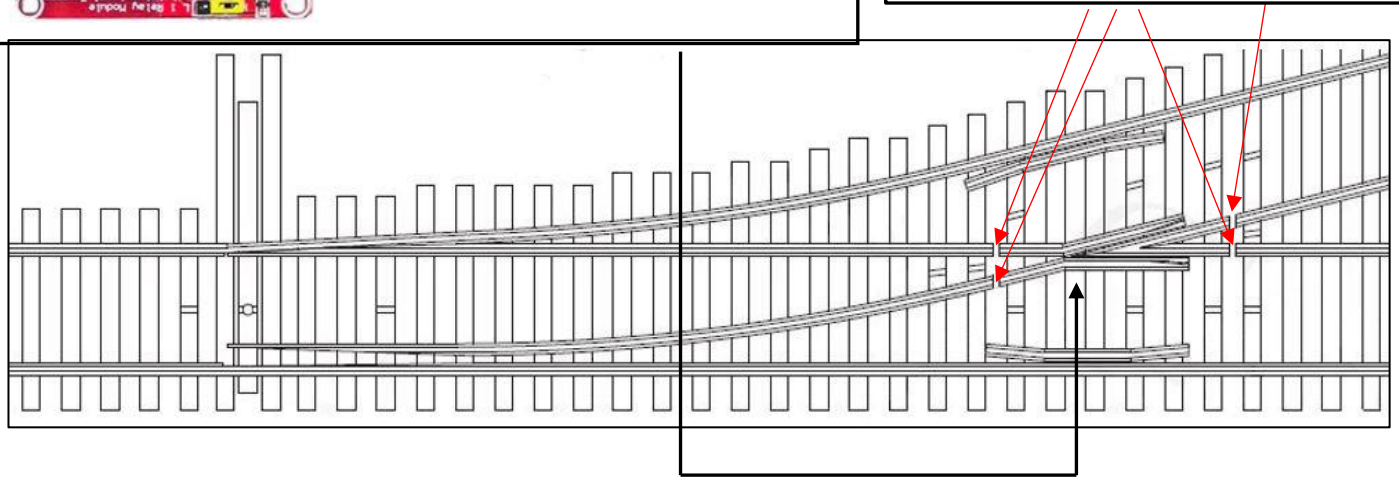
For maximum consistency of train operation over a switch, modelers are moving to switches with metal frogs that are powered but that are isolated from the adjacent trackwork. An ideal powering solution is one that not only powers the frog but automatically handles polarity when the switch is changed from NORMAL to REVERSE. We provide a Relay solution which comes complete with its own integrated servo/relay mounting bracket. This Integrated Bracket mounts *both the Servo and the Relay with the identical spacing for installation on your layout to our standard bracket*. You can use the same mounting holes and screws as you already did if you are upgrading the turnout to a metal frog design.

Power for the frog and associated control signals to switch the signal are already available from the base Controller board. All you need to do is wire up the Relay assembly.

Relay Board

- isolation of up to 10A
- Automatic control of frog
- Power provided from Controller

Gaps cut in all 4 locations to “isolate” the frog. EZTronic Controller automatically provides proper polarity to this isolated frog through the Relay



Relay Installation into Enhanced Bracket

Installing Servo and Relay in Integrated Bracket Shown below is an example of mounting both the Servo as well as the Relay in the provided Integrated Bracket. The Integrated Bracket is 100% compatible with the hole locations and sizes of the original Servo-only bracket.

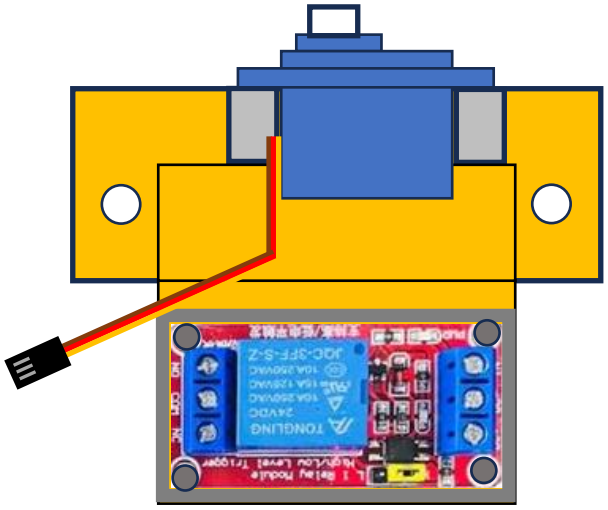
EZTronic Integrated Mounting Bracket

For maximum flexibility and backward compatibility, we provide this integrate bracket when you order our Relay Kit. The Relay Kit comes with:

- Opto-isolated Relay board that can handle up to 10A
- Four mounting screws for mounting the relay
- New Integrated Bracket that holds both Relay and Servo
- EZTronic mounting template

This assures that whether you buy our system initially with support for metal frogs or not, you can simply add this kit when appropriate, The Integrated Bracket uses the same template for installation, thus assuring identical alignment.

If retrofitting, simply unscrew the existing bracket and servo from your layout, move the Servo to the new Integrated Bracket and then screw the Relay into the integrated case. Reinstall this new Integrated Bracket in the same location using the same mounting hardware.

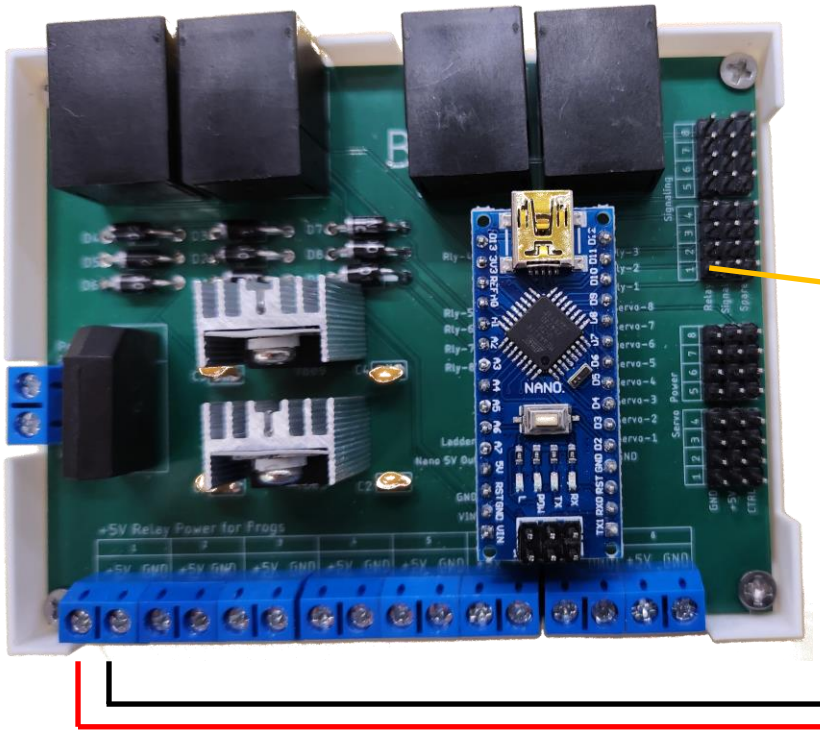


Enhanced Bracket shown in "Under the-table" view looking up at the underside of your surface or table

Relay Wiring to HO Turnout Controller

Wiring Relay Module to Controller Follow wiring diagram below when installing our optional Relay Kit. The Controller provides all power and proper signals to automatically control the polarity of signal going to the frog. Diagram depicts installing for Turnout-1. (See next page for details on wiring the track to the Relay)

Controller

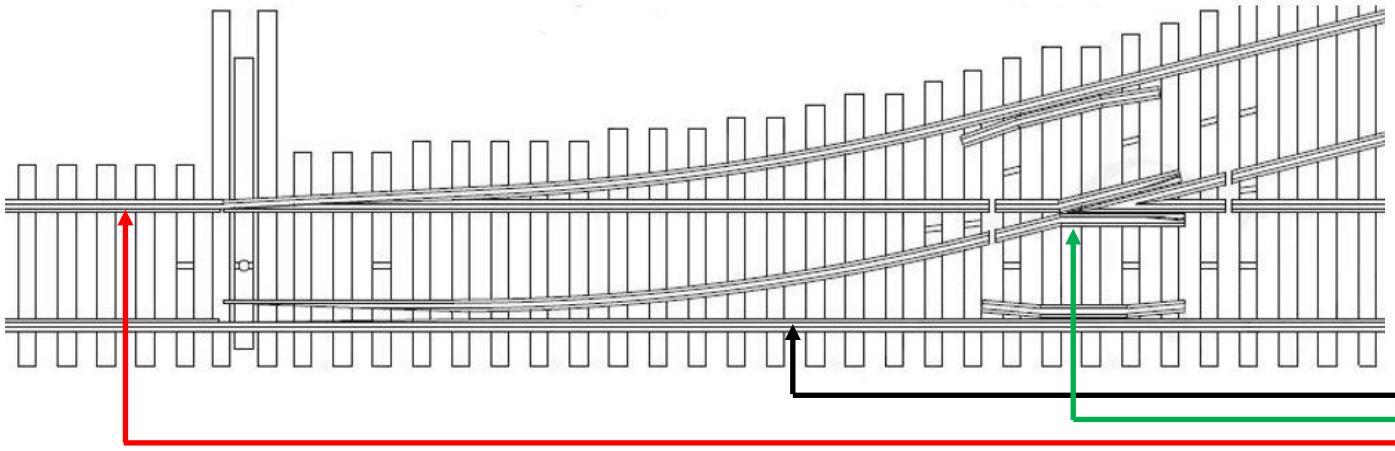


See Next Page for how to wire these 3 connections

Relay

Wiring Relay to track

Follow wiring diagram below when installing our optional Relay Kit to your track.



Red – Power coming to this rail is tied to NC screw of the Relay
Black – Power coming to this rail is tied to the NO screw of the Relay
Green – The Frog is wired to the COM screw

(NOTE – if you hand make your turnout, make sure that the frog is totally isolated from any and all tracks prior to powering. The frog has to be totally isolated for proper operation to occur)

Frequently Asked Questions-1

Q: I have not yet made the switch over to metal frogs but may over time. What is the most economical way to purchase your product without buying all 8 relays in the Enhanced Kit?

A: Purchase the number and type of Servo Kits you need now. If you are not yet using metal frogs, just purchase Basic Servo Kits and when ready for a metal turnout, move over to our Enhanced Servo Kit for metal frogs. (Note - You will not have to move mounting location holes if you are upgrading a turnout rom Basic to Enhanced bracket in support of a metal frog)

Q: Why do you believe that your solution for powering frogs is a better alternative to products that near instantaneously simply switch to the correct polarity voltage for the frog on the fly?

A: These type of solutions are always looking for a short circuit, and when sensed, quickly switch voltage on the frog over to the other polarity. Sometimes, this can interfere with DCC systems that may be providing their own short circuit protection in a similar fashion. This can result in a temporary shut down of a section or the entire layout. Our solution assures that there is never a short circuit environment to deal with and therefore cannot be the source of potential problems with the design of DCC short circuit approaches by DCC Controller manufacturers

Frequently Asked Questions-2

Q: The cables provided in your kits are short. If I wish to mount the Controller further away from the Pushbutton Board, what type of cables should I buy?

A: Purchase CAT5 or CAT6 cables that are data cables designed as straight through, NOT reversed. These are very common cables and are available on-line or in most electronics stores or departments. (Also see Frequently Asked Questions-5 for a diagram on how you can make your own cables if you want to)

Q: I am not that familiar with power supplies and specifications. Can you recommend what to buy?

A: Although we specify using a 12VAC or DC power supply capable of providing 5A, we are not implying that 5A of power is needed for a typical system. If you have an existing 12V power supply of 2A or 3A, you can use it with out kit. If you expand to multiple Turnout Kits, you should consider a larger supply if and when needed. If you are just beginning to use our products, we would recommend you purchasing a 5A 12VDC or AC supply as it can handle expansion up to 5 Controllers and 40 turnouts.

If you are uncomfortable or unfamiliar with selecting a power supply, consult either a licensed electrician or a knowledgeable person. EZTronic cannot be responsible for the selection of which specific power supply you may select.

Frequently Asked Questions-3

Q: I see that the controller and pushbutton cases are 3D printed in white plastic. Is it OK to paint the cases and if so, any recommendations you might have for doing so?

A: We have selected a very good, supple, yet strong PLA plastic for our brackets and cases. We intentionally chose a plastic with a relatively dull finish. The reason is that a dull finish does the best job in keeping reflections of any slight imperfections from being as noticeable to the eye. It also will adhere to paints better than a shinier plastic finish.

We recommend that if you wish to paint our cases, take some 180 or 220 grit sandpaper and lightly sand the surfaces. Use light coats of paint and our recommendation is to stay with a dull finish. Our experiences have shown that our plastic looks very rich when done in this type of finish. You should always consider a light primer coat before applying your chosen finish color. For most colors, a light gray primer works well. Always make sure you wear protection and do all painting in a well-ventilated environment.

As far as brand of paint, we leave it up to you however almost any general-purpose spray paint will likely work just fine. We have tried paint for woods and metals as well as plastics and the ones we tried did adhere well to our plastic.

Frequently Asked Questions-4

Q: What happens to your system if power goes down? Will it recall the location of each turnout and return the turnouts to the same position on the layout they were in at the time of the power failure?

A: No, our system returns all turnouts to their normal (non-diverged) position upon power up. This is our intentional design approach. Your pushbutton indicator will go through power up and show all green LEDs lit, indicating normal position for all turnouts.

Background: In discussing this with various modelers, their overwhelming preference was to have the turnouts *default to a known position*. Whether removing power normally, (end of an operating session), or a person just finished tunning trains for the day and shut the layout down, the majority of people desired the system to come up in a known/defaulted state as opposed to trying to return to a previous state at a future time and not recalling which turnouts were diverged and which were normal..

Q: Your documentation indicates that CAT5/CAT6 cables can be used as long as they are straight pass through. Is this the most common connection methodology for CAt5/CAT6 cables and how might I go about making my own cables for use with your product on my layout?

A: There are a number of color schemes shown for wiring a connector for straight through connections and it is the most common type of cable. (See the last page of this manual for details on wiring your own CAT5 cables)

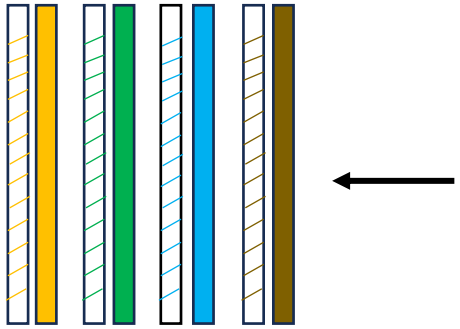
Frequently Asked Questions-5

Q: I notice a raised area on your Pushbutton controller. It looks like it could be used for labeling of the turnouts. Is this correct?

A: Yes, this is correct. The raised area above the row of Red LEDs was specifically designed to allow ¼" high labels to fit. Therefore, a convenient way to mark your turnouts might be from a ¼" label maker from a suitable store.

Preparing your own CAT5 Wires

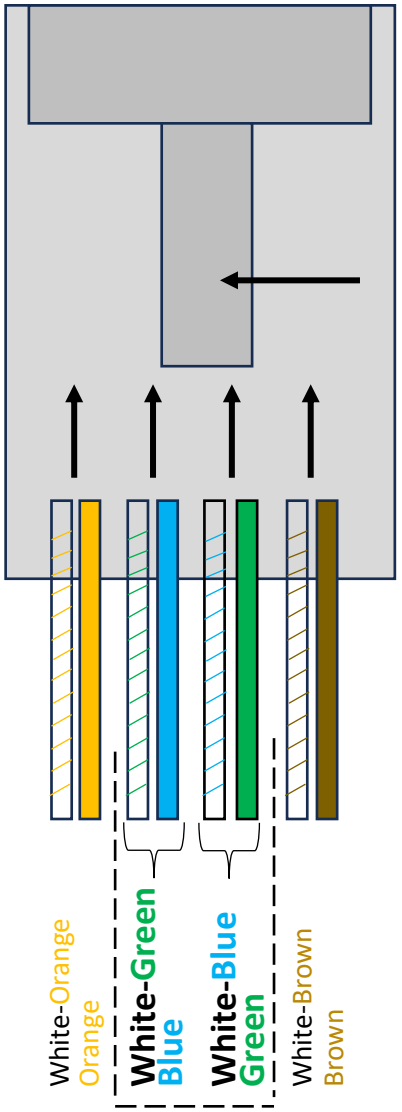
From Box or Roll



Straight Through Wiring Diagram

CAT5 or CAT6 cable consists of 4 pairs of twisted wires:

- White Orange, Orange
- White Green, Green
- White Blue, Blue
- White Brown, Brown



Tab Up for both ends of cable

1. Untwist the pairs so you have all 8 wires straightened out flat and then align them as shown on the right.
2. Insert them and crimp as shown – do the same exact thing for other end of the cable*

*NOTE – White-Green is paired with Blue and White-Blue is paired with Green while White-Orange stays with Orange and White-Brown stays with Brown