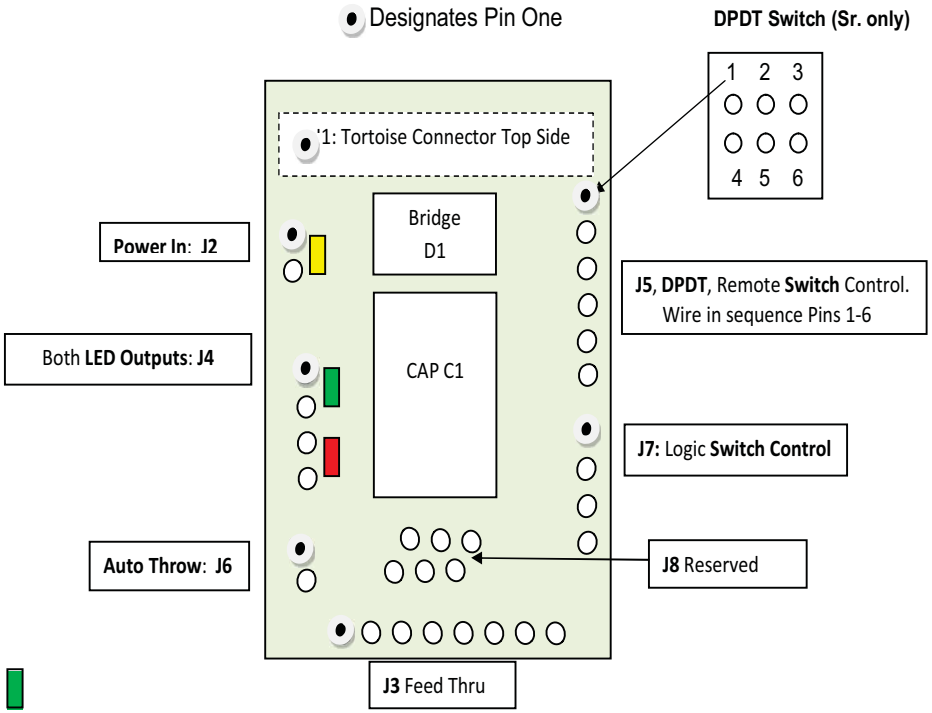
through the switch. Try the same thing from the clear direction with the points thrown. Again, the points will align when the engine hits the trigger rail. (Note: for DC layouts, the engine will need to completely occupy the trigger rail before the points move).

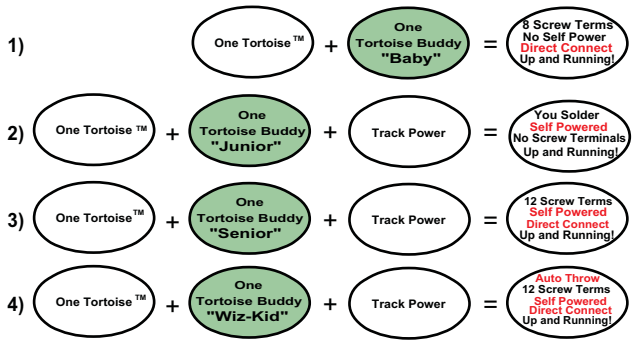
Tortoise Buddy Layout

Approx Size is approx 2"x 3" similar to as shown. Connector locations are approximately as shown. Not all Buddies have all the components shown.



Surface mount colored LEDS as shown, Green is clear, (Normal) and Red is Throw Route, (Reverse)

There are four Tortoise Buddy Options:



Direct Connect: Uses Tortoise Connector! **Self Powered:** Connects to Track to Power Tortoise!
Auto Throw: Automatically Sets Points for an Approaching Train!

Tortoise Buddy Installation Information: 10/16/13

Features:

- Compatible with DCC, DC, and AC track power systems (Sr. and Wiz-Kid)
- Powered directly from track or using dedicated AC , DC, or DCC voltage bus (Sr. and Wiz-Kid)
- Plugs directly onto Tortoise (Baby, Sr. and Wiz-Kid)
- All solid state power routing, no relays to fail (Wiz-Kid)
- All Tortoise contacts available to user with solder holes or optional screw connector (Baby, Sr. and Wiz-Kid)
- On-Board LED indicates when the Buddy is powered (Sr. and Wiz-Kid)
- On-Board LEDs indicate Tortoise position (Sr. and Wiz-Kid)
- Outputs available to directly connect LEDs (no resistor required) for panel display or signals (Sr. and Wiz-Kid)
- Connect up to 4 Tortoise to a single Buddy to lock switch positions together (e.g. double crossover)
- Control point position with a SPDT switch or dual momentary push buttons (Wiz-Kid)
- Auto-Throw will correct a misaligned switch when a train approaches against the point position (Wiz-Kid)
- Control point position with a DPDT switch (Sr.)

Installation Directions:

Power Connections:

Determine your power source. It can be DC, AC, or DCC, for the Sr. or Wiz-Kid, or 12 volts DC for the Baby. For the Sr. or Wiz-Kid simply connect the two power source wires to J2-1 and J2-2. They can be connected either way, the Buddy doesn't care. In most cases, the easiest power source is the nearby track bus. With most DC and AC voltage control systems, the Sr. or the Wiz-Kid will get enough voltage from the track before you can detect any train movement, but check this out with your system. If there is not enough track voltage at low speeds to operate the Buddy (actually the Buddy will work, but the Tortoise may not get enough voltage) or if you want to operate switches when the track voltage is 0, then you will need to provide a separate power source. Note, however, that if you plan to use Auto-Throw, then the Buddy MUST be connected to the same track voltage as the switch that it is controlling. If you are not using Auto-Throw, all of your Buddies can operate from a single common power source if you aren't using the track.

Control Connections SPDT (Wiz-Kid only):

If you are using a SPDT (single pole double throw) switch to control the points, connect the common center pin to J7-3. Now connect one remaining contact to J7-2 and the remaining contact to J7-4. The

Tortoise will now follow the position of your SPDT switch. Note that for the same position of the Tortoise, the points could be Clear or Throw depending on the switch and how it is installed. Connecting J7-4 to J7-3 will place the Tortoise control arm to the right when viewed as installed on the layout (i.e. base up). This is also the position that the Buddy will place the points when you turn on the layout. You will need to decide if this is Clear or Throw. If you get it wrong, just flip the SPDT switch 180 degrees. DO NOT common together wiring from different Buddies as this can cause a short. Also if the Wiz-Kid is powered down in the Throw position, when re-applying power it will cycle first to the clear position, then to the throw position.

Control Connections Push Buttons (Wiz-Kid only):
If you are using push buttons, use momentary normally open (N.O.) ones. Connect one between J7-1 and J7-2 and the other between J7-3 and J7-4. If you want to use just three wires, connect one terminal from each button together and follow the SPDT instructions. The common between the two buttons goes to J7-3. Note that for the same position of the Tortoise, the points could be Clear or Throw depending on the switch and how it is installed. Pushing the button connected to J7-4 will move the Tortoise control arm to the right as viewed when the Tortoise is install (i.e. base up). This is also the position that the Buddy will place the points when you turn on the layout. You will need to decide if this is Clear or Throw. If you get it wrong, just flip the position of the two push buttons on their mounting point. DO NOT common together wiring from different Buddies as this can cause a short.

Control Connections DPDT (Sr. only)
Follow the diagram on page 4 to correctly hook up the poles of a DPDT switch to the Buddy. SPDT or Push Buttons will not work with the Sr.

LEDs (Sr. and Wiz-Kid only):
The Buddy is designed to directly drive external LEDs that can be used for position display at a control point or to operate signals on the layout that indicate point position. The LED connected with its positive lead to J4-4 and its negative lead to J4-3 will light when the Tortoise control arm is to the right when viewed as installed on your layout (base up). You will need to decide which color to use for this LED depending on your switch installation. The remaining LED has its positive lead connected to J4-2 and its negative lead connected to J4-1. The two negative LED connections can be tied together and both connected to J4-3 to limit wire runs to three wires. DO NOT common together wiring from different Buddies as this can cause a short.

Tortoise Contacts (Baby only):
All of the contacts on the Buddy Baby connector are brought to J3-1 to 8. The pin numbers on J3 match the contact pin numbers on the Tortoise. If you are connecting multiple Tortoises together in a gang, you connect J3-1 to pin 1 of the following Tortoise and J3-8 to pin 8 of the following Tortoise. In this configuration, the two Tortoises will match each other's position. If you want a following Tortoise to reverse the position of the Buddy Tortoise, simple wire pins 1 and 8 opposite to the above directions. Simply mount and align your Tortoise, then slip the pre-wired Baby onto the contacts on the Tortoise, using the wiring instructions from Circuitron.

Installation Positioning:

When the ***Tortoise Buddy*** is plugged into the Tortoise there may be too much clearance from side to side between the Tortoise Connector and the ***Tortoise Buddy*** plug. Shims such as a flat toothpick can be added or

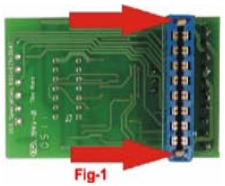


Fig-1

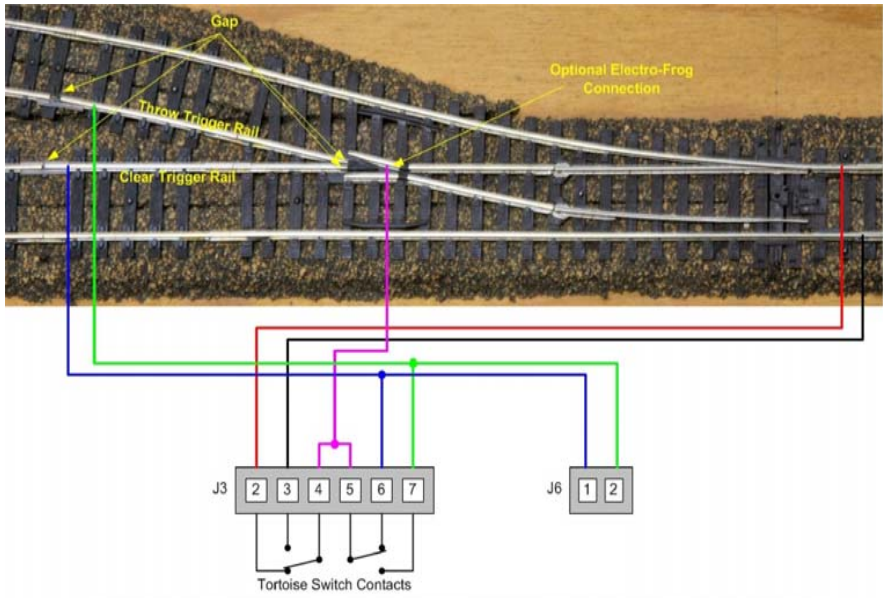
you can visually align the contacts. In any case, ensure that the contacts on the ***Tortoise Buddy*** connector align with the contact surfaces of the Tortoise connector. The figure above right shows how to add shims to the Hare connector to reduce the amount of play when the Hare is mated to the Tortoise.

Contacts from the Tortoise (Sr. and Wiz-Kid)

The switch contacts in The Tortoise are brought out to connector J3- 2 to 7 on the **Tortoise Buddy.** If you want access to these contacts for your own secondary functions, you can solder the wires directly to the printed wiring board, (Wiz-Kid) or the screw connector on the Sr.. The diagram on page 4 shows the relationship between connections and the Tortoise connector numbers. On the Sr. and Wiz-Kid, contacts J3-1 and J3-8 match the power input connections from J2- 1 and 2.

Auto Throw (Wiz-Kid only):

Auto-Throw will automatically align the points to the incoming train direction preventing an accident (and a short circuit) in the event that your switchman has messed up his job. First, you need to make trigger rails. These are lengths of isolated rail in each of the two frog rails (Clear and Throw). In most cases, they can be any convenient length. If you are operating a DC controlled layout, the trigger rail in the Clear direction from the frog must be longer than your longest engine. Now use the Tortoise contacts to route power to these isolated rail sections. **Note: If you are not powering the frog of the turnout as shown in the below diagram, a jumper wire still must go from J3-4 to J3-5, or the auto throw function will not work.** When the points are clear, the Clear frog trigger rail should be powered and the Throw frog trigger rail should be open circuit. Moving the points to throw, the Throw trigger rail should be powered and the Clear trigger rail should be open. Get this working first and run an engine through in all directions to make sure your power routing is correct. Now connect the Clear trigger rail to J6-1 and the Throw trigger rail to J6-2 Set the points clear and run an engine in on the throw direction. When the engine hits the trigger rail, the points should move to align with the engine and the engine should then continue



Wiring shown is for the Tortoise control arm next to contact 8 of the Tortoise when the switch points are in the Clear direction. If the switch installation results in the Tortoise control arm next to contact 1 of the Tortoise when the points are in the Clear direction, then reverse connections J3-2 and J3-3 and reverse connections J3-6 and J3-7.