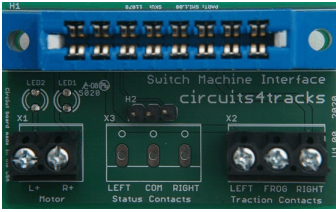


# Switch Machine Interface

The Switch Machine Interface (SMI) provides an easy-to-wire interface to a Tortoise Switch Machine by Circuitron. It converts the card-edge connections of the Tortoise to separate connections for its motor, and each of the SPDT contacts.



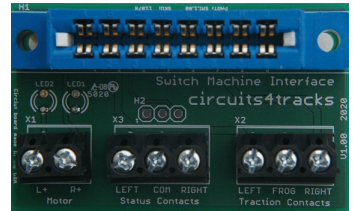
**Figure 1: With Header Status**

The SMI is designed to be reversible. This means that regardless of the orientation it is plugged into the Tortoise, the connections remain the same.

LEDs, mounted on the bottom for easy viewing, are provided in line with the motor power to provide an at-a-glance indication of the position of the switch machine when working under the layout, provided continuous power is applied to the motor.

As shown in Figure 1 and Figure 2, terminals for the motor are together on one terminal block, and each set of SPDT contacts have their own three terminals, with the common connection of each in the centre. There are two options for the contacts intended for position status:

- 3-pin header, see Figure 1
- 3-position terminal block, see Figure 2



**Figure 2: With Terminal Block Status**

## Position Nomenclature

Normal and Reverse or Left and Right? How is position described?

For turnout position, the terms Normal and Reverse are usually used, though there are exceptions. These terms better serve turnout operation than using terms such as Straight and Diverging, which can be ambiguous in the case of equilateral (wye) turnouts and curved turnouts. While Right and Left make sense for turnout positions, using Normal and Reverse better represent how a turnout supports railway operations. This is because most turnouts have a position that is used most of the time, which makes calling it the Normal position a practical choice. Leaving the other, less used position to be called Reverse.

Despite using Normal and Reverse for the turnout itself, when it comes to switch machines, it is common to refer to the positions as Left and Right. Whether Left is Normal or Right is Normal depends on two factors: the orientation of the switch machine to the turnout, and which position of the points is Normal and which is Reverse. What is displayed on a screen or line display board as Normal or Reverse has been translated from the switch machine's Left and Right, either in hardware or in software.

For the purpose of labelling the SMI, Left and Right are defined by the position of the throw wire when viewed from the side it is located. Figure 3 shows the throw wire in the Left position, and Figure 4 shows it in the Right position.



**Figure 3: Left**



**Figure 4: Right**

## Wiring Terminals

The terminal block for the motor power has the labels **L+** and **R+**, as shown in Figure 5. When the voltage applied is positive on the **L+** terminal and negative on the **R+** terminal, the motor will drive to the Left position, and LED1 will be illuminated. When the voltage applied is positive on the **R+** terminal and negative on the **L+** terminal, the motor will drive to the Right position, and LED2 will be illuminated.



Figure 5: Motor Terminal Block

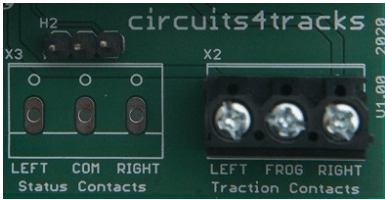


Figure 6: SPDT Contact Labels

Both sets of contact terminals have the labels **LEFT** to indicate it is connected to the centre terminal when the switch machine is in the Left position and **RIGHT** to indicate it is connected to the centre terminal when the switch machine is in the Right position. See Figure 6.

The common terminal on the SPDT contacts is labelled **COM** for the status contacts, and **FROG** for the traction power contacts. This naming is based on using the traction contacts to provide power to an electrified frog on the turnout, but your use of the terminals may vary from this practice. See Figure 6.

## Why Designate the SPDT Contacts?

Circuitron rates both of the SPDT contacts equally. According to their product documentation, both can carry 4 Amps when not switching, and can carry 1 Amp when switching.

That said, the second SPDT contact (pins 5, 6, and 7) has a small part of its common connection that uses a smaller trace on the circuit board. This trace meets the specifications, but when switching power to the frog of a turnout, where an improperly driven train will cause a short circuit, it makes better sense to use the more robust trace of the first SPDT contact (pins 2, 3, and 4). For most modellers, this may never be an issue, but we are aware of an O scale modeller burning out Tortoise contacts when the second set were used for frog power, but not when the first set is used.

With that in mind, our SMI designates the first set for "Traction" (track power), and the second set for "Status" (signalling system input). Feel free to use the contacts as your needs require, following the limitations described in Circuitron's documentation.

## Warranty

An assembled and tested Switch Machine Interface warranted against manufacturing defects for a period of 1 year from date of purchase. As the circumstances under which this interface is installed cannot be controlled, failure of the detector card due to installation problems cannot be warranted. This includes misuse, miswiring, operation involving excessive current, or short circuits. If the Switch Machine Interface fails for non-warranted reasons, it can be replaced with no questions asked for the cost of \$8 plus shipping (this fee subject to change).

Send an email to [circuits@daxack.ca](mailto:circuits@daxack.ca) for information on warranty or non-warranty replacement.

*This document is available in PDF format on our website.*