

Debounce Hand-Operated Rocker, Toggle, and Slider Switches

Introduction

As shown in Figure 1, the position of the actuator on the rocker and toggle type switches is diametrically opposed to the position of their A and B pins. For example, when the actuator is placed in the right-hand position (POS 2 in the sketch), the pin electrically connected to the COM pin is on the left-hand side (PIN A in the sketch), and vice versa. This easily manufactured mechanism is utilized by all the popular rocker and toggle switch manufacturers.

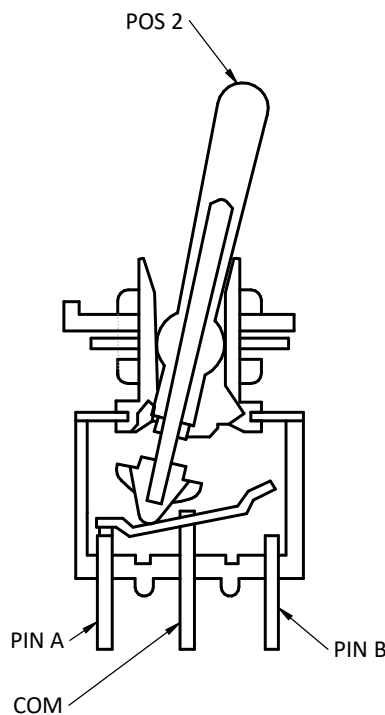


Figure 1. Toggle switch Actuator/contact relationships.

Switch actuators may be latched (maintained) or momentary (spring returned on release). The following designations are used to delineate the maintained or momentary operations:

Two-Pin, Two Position (A simple on/off switch)

- ON-OFF: Latched-Latched.
- (ON)-OFF: Momentary-Latched (Push-to-make. The parenthesized (ON) designation indicates momentary ON operation with spring return upon release).
- ON-(OFF): Latched-Momentary (Push-to-break. The parenthesized (OFF) designation indicates momentary OFF operation with spring return on release).

Three-Pin, Two Position (Changeover switch. Controls a different device in each position)

- ON-ON: Latched-Latched.
- (ON)-ON: Momentary-Latched
- ON-(ON): Latched-Momentary

Three-Pin, Three Position (Center off position)

- ON-OFF-ON: Latched-Off-Latched
- (ON)-OFF-ON: Momentary-Off-Latched
- ON-OFF-(ON): Latched-Off-Momentary
- (ON)-OFF-(ON): Momentary-Off- Momentary

Note that, since the ON versus (ON) and OFF versus (OFF) characteristics of a switch have no relation to the debouncing of that switch, the remainder of this document will use only the ON and OFF designations for brevity.

NoBounce™ Technology Eliminates Switch Bounce

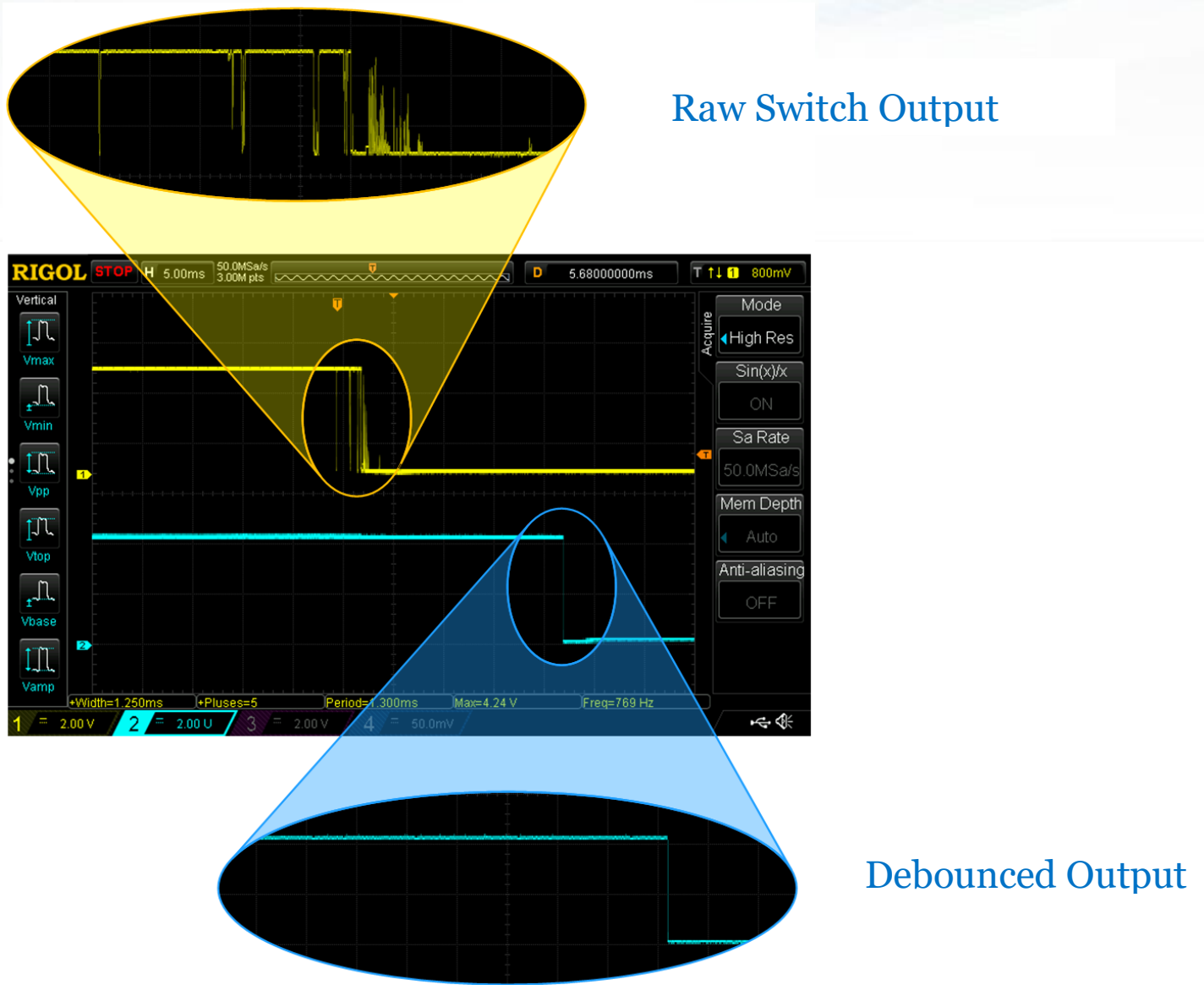


Figure 2. NoBounce Technology Eliminates Switch Bounce

NoBounce Technology generates a clean debounced output 20 ms after the last switch bounce.

2-Pin, 2-Position Rocker/Toggle Switches

2-pin, 2-position rocker and toggle switches are the simplest configuration in the category. In this case, simply connect one of the switch's pins to GND and the other to a channel input of the [LogiSwitch LS18](#) debounce chip.

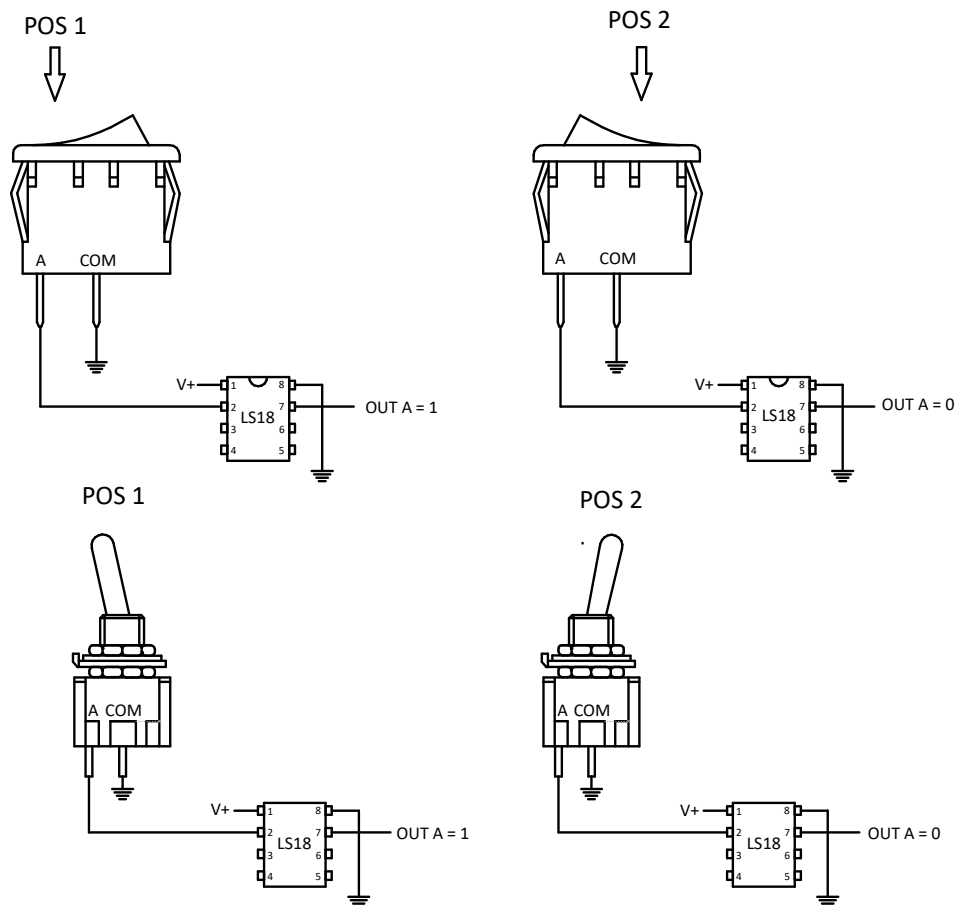


Figure 3. 2-pin, 2-position OFF-ON Rocker and Toggle Switches.

Figure 3 shows only a single channel (one switch) of the LS18 being employed. The LS18 supports 3-channels (the LS19 supports 6-channels, and the LS20 supports 9-channels).

Observe that no pull-up resistors are required on the LS18's input(s) and output(s) because this functionality is implemented inside the device.

In the case of an LS18 debounce chip, the output be at the same level as the input (1 on the input = 1 on the output; 0 on the input = 0 on the output). However, the output will trail the input by 20ms after the switch's final bounce. This delay is insignificant in the case of the hand-operated switch usage models being considered here.

By comparison, in the case of an LS118 debounce chip, the output will be at the opposite level to the input (1 on the input = 0 on the output; 0 on the input = 1 on the output). Also, the output will respond to a transition on the input almost immediately ($< 1 \text{ us}$).

The LS18 chip provides powerful glitch filtering (see the [LS18 datasheet](#) for more details). By comparison, the LS118 is not recommended for electrically noisy environments but it does provide a single-wire handshake capability (see the [LS118 datasheet for more details](#)).

3-Pin, 2-Position Rocker/Toggle Switches

As shown in Figure 4, 3-Pin, 2-Position switches come only in the ON-ON configuration; that is, these devices do not have an OFF position.

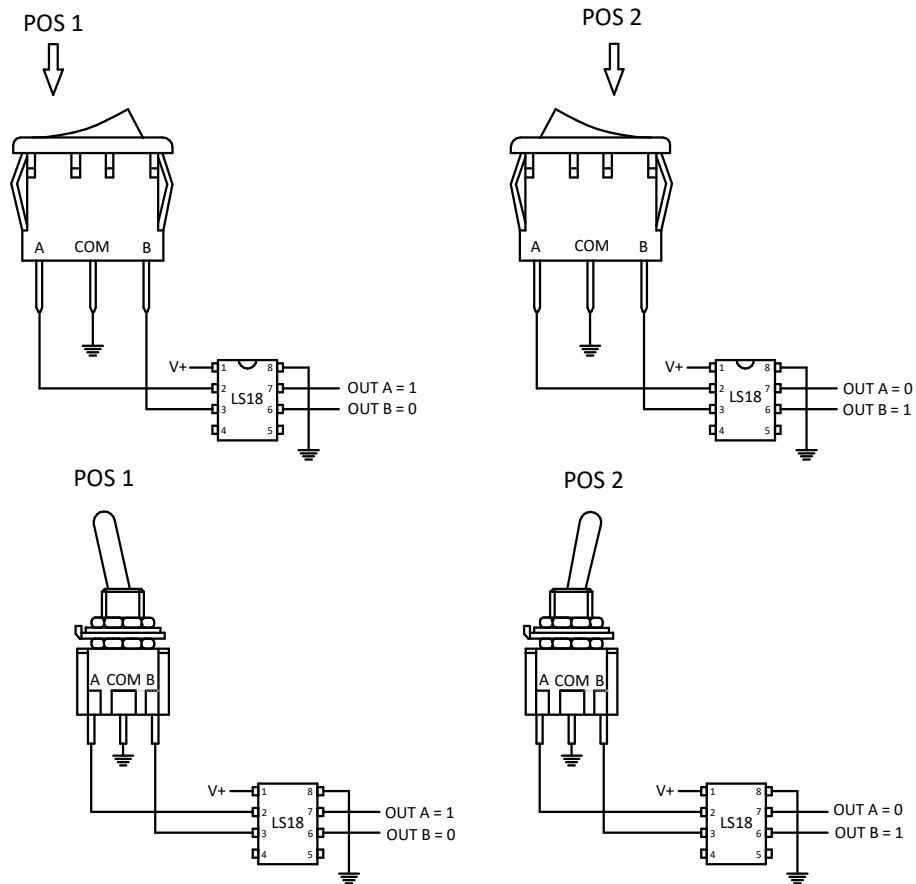


Figure 4. 3-pin, 2-position ON-ON rocker and toggle switches.

3-Pin, 3-Position Rocker/Toggle Switches

Figure 5 shows the suggested way to connect 3-pin, 3-position rocker and toggle switches using an LS18 chip to debounce the outputs.

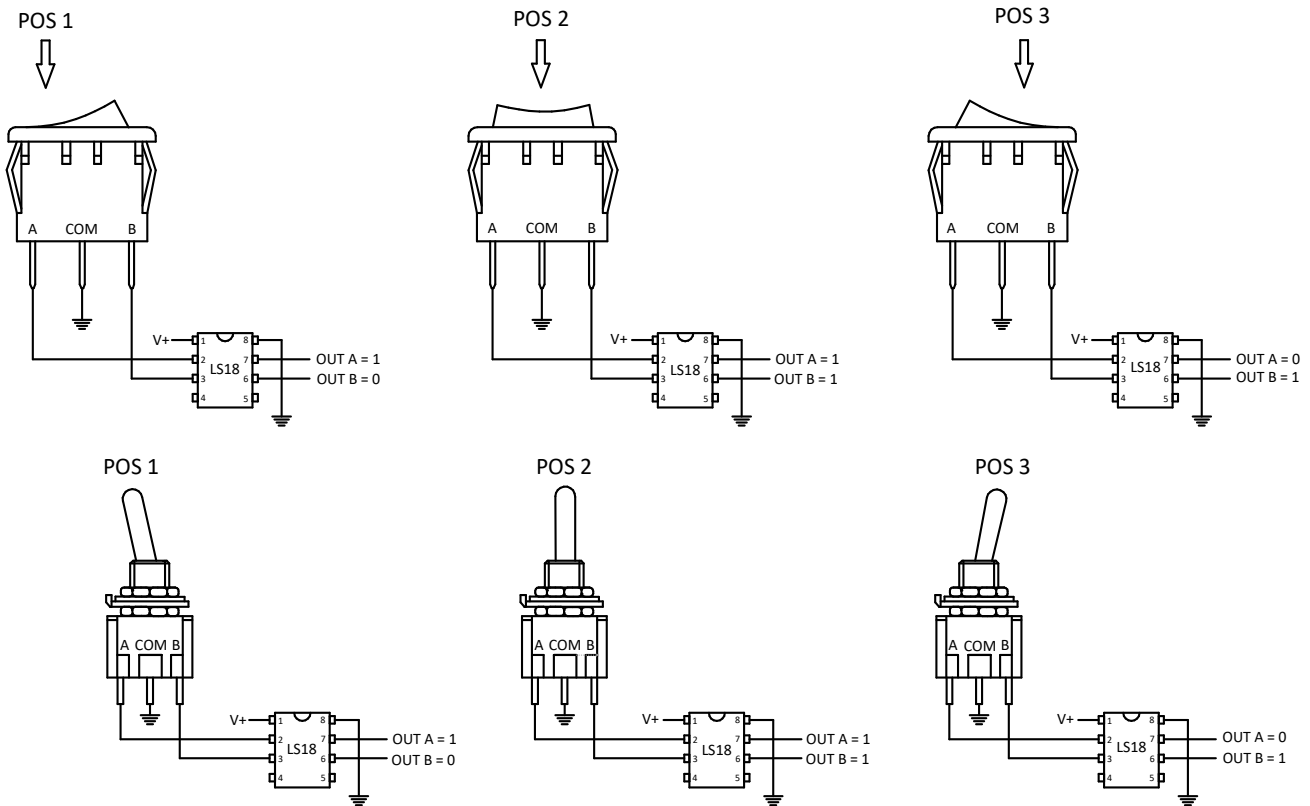


Figure 5. 3-pin, 3-position ON-OFF-ON (or ON-ON-ON) rocker and toggle switches.

These devices are typically used to reflect an ON-OFF-ON mode of operation. However, since the A and B signals can represent three distinct states (10, 11, 01), these devices may be used to implement ON-ON-ON applications where an OFF function is not needed.

3-Pin, 2-Position Slide Switches

As shown in Figure 6, the slide switch actuator-to-active-pin orientation is opposite to the rocker/slide switch actuator-to-active pin orientation. In the case of slide switches, the active pin is on the same side as the actuator.

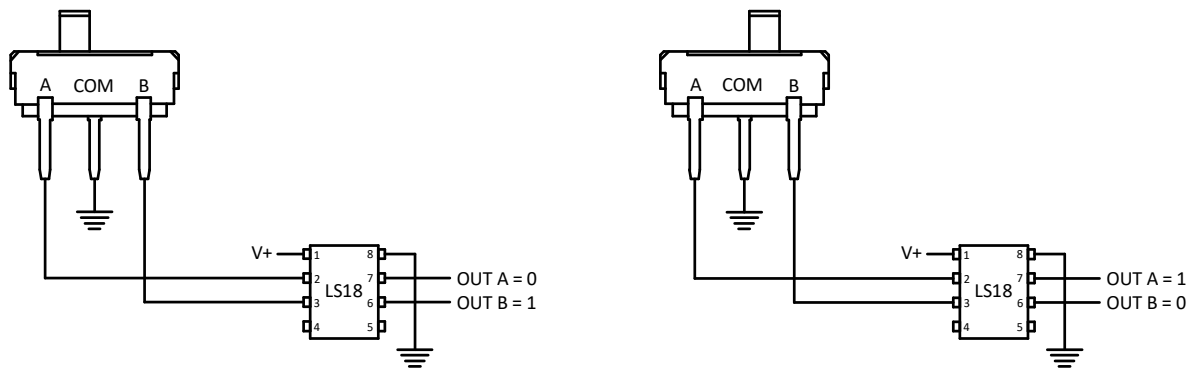


Figure 6. 3-pin, 2-position slide switch.