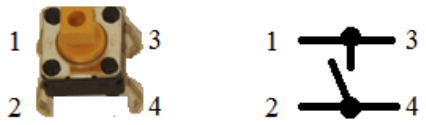

This is a B3F tactile switch. For this switch, pins 1 and 3 are always connected. Pins 2 and 4 are also always connected. If the switch is pressed, pins 1 and 2 are shorted together. If the switch is not pressed, pins 1 and 2 are not connected, open circuit.

Input/output devices are critical components of an embedded system. The first input device we will study is the **switch**. It allows the human to input binary information into the computer. Typically we define the asserted state, or logic true, when the switch is pressed. Contact switches can also be used in machines to detect mechanical contact (e.g., two parts touching, paper present in the printer, or wheels on the ground etc.) A single pole single throw (SPST) switch has two connections. The switches are shown as little open circles in Figure 8.2. In a normally open switch (NO), the resistance between the connections is infinite (over 100 MΩ on the B3F tactile switch) if the switch is not pressed. The resistance is zero (under 0.1 Ω on the B3F tactile switch) if the switch is pressed. To convert the infinite/zero resistance into a digital signal, we can use a pull-down resistor to ground or a pull-up resistor to +3.3V as shown in Figure 8.2. Notice that 10 kΩ is 100,000 times larger than the on-resistance of the switch and 10,000 times smaller than its off-resistance. Another way to choose the pull-down or pull-up resistor is to consider the input current of the microcontroller input pin. The current into the microcontroller will be less than 2μA (shown as I_{IL} and I_{IH} in the data sheet). So, if the current into microcontroller is 2μA, then the voltage drop across the 10 kΩ resistor will be 0.02 V, which is negligibly small. With a pull-down resistor, the digital signal will be low if the switch is not pressed and high if the switch is pressed (right Figure 8.2). This is defined as **positive logic** because the asserted state is a logic high. Conversely, with a pull-up resistor, the digital signal will be high if the switch is not pressed and low if the switch is pressed (middle of Figure 8.2). This is defined as **negative logic** because the asserted state is a logic low.

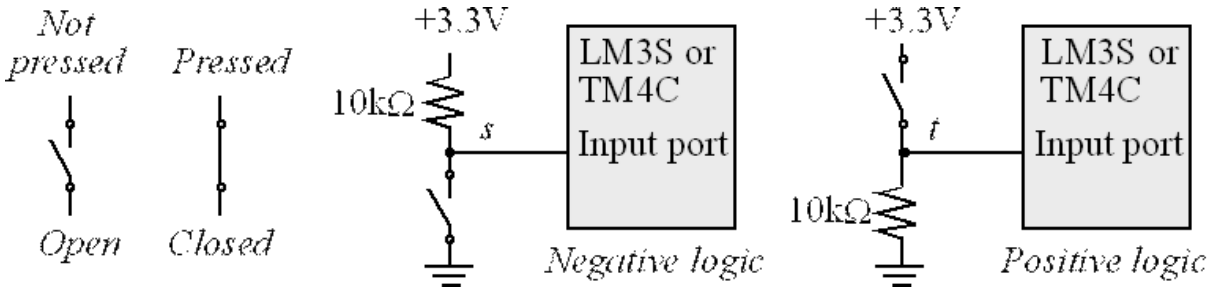

Figure 8.2. Single Pole Single Throw (SPST) Switch interface.

Help