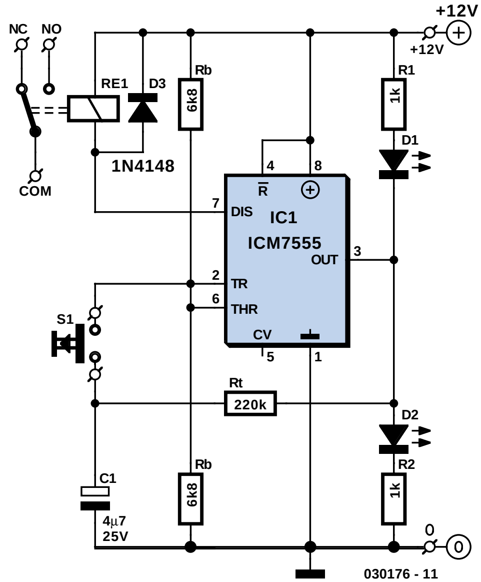
Push Off / Push On

Trevor Skeggs



The ubiquitous 555 has yet another airing with this bistable using a simple pushbutton to provide a push-on, push-off action. It uses the same principle of the stored charge in a capacitor taking a Schmitt trigger through its dead-band as previously published as 'Pushbutton Switch' (038) in the *Small Circuits* collection of 2002.

Whereas the Schmitt trigger in that reference was made from discrete components, the in-built dead-band arising from the two comparators, resistor chain and bistable within the 555 is used instead.

The circuit demonstrates a stand-by switch, the state of which is indicated by illumination of either an orange or red LED, exclusively driven by the bipolar output of pin 3.

Open-collector output (pin 7) pulls-in a 100-mA relay to drive the application circuit; obviously if an ON status LED is provided elsewhere, then the relay, two LEDs and two resistors can be omitted, with pin 3 being used to drive the application circuit, either directly or via a transistor. The original NE555 (non-CMOS) can source or sink 200 mA from / into pin 3.

Component values are not critical; the 'dead-band' at input pins 2 and 6 is between 1/3 and 2/3 of the supply voltage. When the pushbutton is open-circuit, the input is clamped within this zone (at half the supply voltage) by two equal-value resistors, Rb. To prevent the circuit powering-up into an unknown condition, a power-up reset may be applied with a resistor from supply to pin 4 and capacitor to ground.

A capacitor and high-value resistor (Rt) provide a memory of the output state just prior to pushing the button and creates a dead time, during which button contact bounce will not cause any further change.

When the button is pressed, the stored charge is sufficient to flip the output to the opposite state before the charge is dissipated and clamped back into the neutral zone by resistors Rb.

A minimum of 0.1 µF will work, but it is safer to allow for button contact-bounce or hand tremble; 10 µF with 220 kΩ gives approximately a 2-second response.

(030176-1)