

## Op-amp toggle

This is a design for a push-on, push-off type switch, based around an op-amp flipflop. It should work for any general purpose op-amp like the 741. Its operation is as follows:

Initially, the output is low and positive feedback via resistors R3 and R4 keeps it low. Capacitor C2 charges fully to its negative voltage after about 0.25s.

If pushbutton PB1 is activated, then C2's negative voltage appears at the inverting terminal (pin 2) of the op-amp. This voltage is lower than the voltage at the non-inverting input (pin 3), so the output at pin 6 goes high.

Normally, this would result in oscillation if the button were kept pressed; however, this is prevented by resistor R1, which reduces the circuit gain below unity while the button is depressed.

After PB1 is released, capacitor C2 charges to a positive voltage, and the circuit is then ready to be 'flipped' back to its low state by a second press of PB1. But this flipping cannot happen until after a 0.25s delay, which means that

the circuit is immune to switch bounce and contact noise.

The initial polarity of the output is governed by capacitor C1. Connecting this high (as shown in the schematic) causes an initial low; connecting it instead to the negative rail will cause the initial output to be high. The ground point should be taken from a potential divider as shown; if it is grounded otherwise then the start-up polarity can be unpredictable.

As mentioned before, resistor R1 prevents oscillation. If it is removed, then the circuit will become an astable multivibrator with its frequency governed by resistor R2 and capacitor C2.

This may be useful in some instances. The output may be used to drive a small load directly, or an electronic switch for signal control.

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