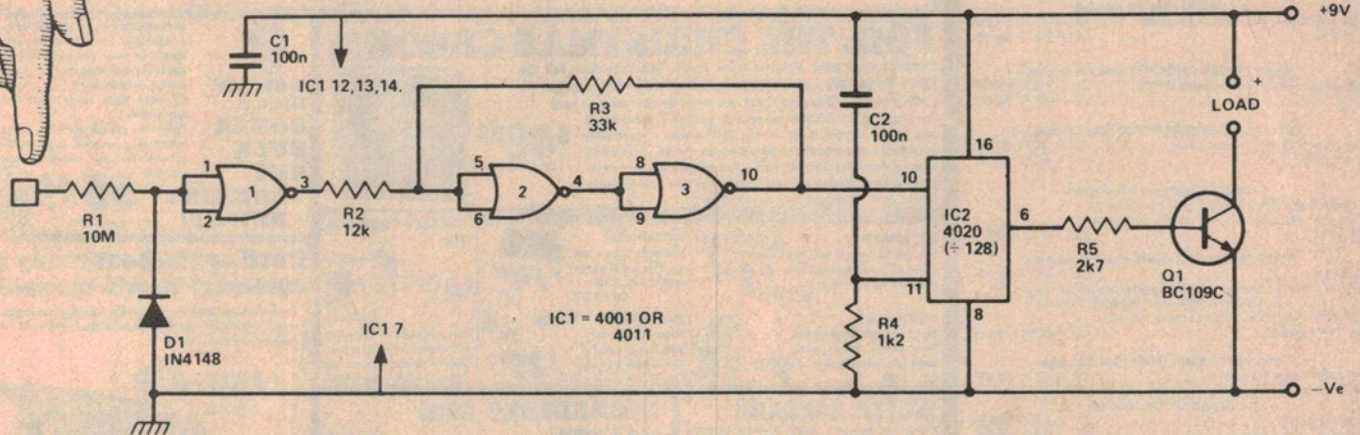


## Touch switch



THIS TOUCH SWITCH is designed to provide on/off switching for 9 V battery operated equipment having a current consumption of up to 100 mA. It has a single touch contact which is briefly touched in order to change from on to off or vice versa. The circuit is operated by stray pick-up of mains hum which is coupled to the input of Gate 1 (which, like the other three gates employed in the unit, is connected to act as an inverter) via R1 when the input contact is touched.

As IC1 is a CMOS device it has a very high input impedance, and the input signal will be capable of switching the Gate 1 input from one logic state to the other. The input impedance of the circuit is so high that the reverse resistance of D1 is used to tie the input to earth under quiescent conditions, so as to prevent spurious operation. Resistor R1 acts as a low pass filter in conjunction with the input capacitance of the circuit, and this attenuates high frequency noise which may be present on the 50 Hz mains signal.

The output from Gate 1 still contains significant noise products, and also has a rise time which is inadequate to drive the final stage of the circuit. This is overcome by a trigger circuit using Gates 2 and 3. Resistor R3 tends to hold Gate 2 input in the same state as Gate 3 output, resisting any change in logic state caused by Gate 1 output due to the coupling through R2. This resistance to change is termed 'hysteresis'. Resistor R2 has a lower value than R3, and so

Gate 1 can operate the trigger circuit if its output signal is of adequate amplitude. The 50 Hz signal will be strong enough, but the noise spikes will not and are thus eliminated from the output of the trigger.

Once the output of the trigger does start to change state, the coupling through R3 provides a triggering action which ensures a rapid change.

IC2 is a 14 stage binary counter and Q1 is driven from the output of the seventh stage via a current limit resistor, R5. The C-R network consisting of C2 and R4 provides a positive reset pulse to the counter at switch on so that the outputs are all low and Q1 is switched off.

The controlled equipment forms the load for Q1 and obviously receives no significant power. If the touch contact is operated, a 50 Hz signal is fed to IC2 and the seventh stage output changes state every 64 pulses. As this output goes high and low the load is switched on and off. In practice the contact is touched just until the unit switches to the desired state (which one tends to do automatically).

The unit consumes only about one microamp in the "off" mode and

approximately 3 mA in the "on" state.

A suitable relay may be used as the load, its contacts may then be used to control mains-operated equipment.

SHORT CIRCUITS is a feature that lies somewhere between Ideas for Experimenters and complete Projects. Generally, the items published in Short Circuits will involve tried circuits that have not necessarily been fully developed, but fairly complete details are included as a guide to readers. Unfortunately, owing to the nature of these items, we cannot give further details other than what is provided in the article. Contributions for Short Circuits are always welcome.

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