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CIRCLE NO. 41 ON FREE INFORMATION CARD

BUILD A TOUCH-CONTROLLED SOLID-STATE SWITCH

Low-cost device can be used for TTL or MOS

BY KEN RAICH

THE touch-controlled switch is a solid-state circuit that can be built for less money than the cost of many of the traditional pushbutton switches. The circuit utilizes the high input impedance of a CMOS gate. Most CMOS gates will work but the 4049 hex inverter was chosen because of its high output current. (It can drive two TTL loads.)

Circuit Operation. Sixty-hertz power, which is present almost everywhere, is transmitted by the body (fingertip) to a small touchplate. Since the bare end of a wire has enough surface area to function as a touch plate, a plate of any convenient size can be attached to the wire.

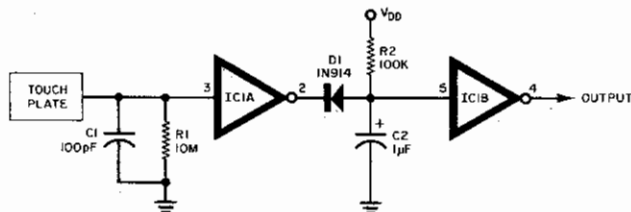
If the plate is not being touched, *R1* pulls the input of *IC1A* low causing a high to appear at the output of *IC1A*. This reverse-biases *D1* and allows *C2* to remain charged at V_{DD} . Then *IC1B* senses V_{DD} at its input causing a low to appear at the output of *IC1B*.

When the plate is being touched, a 60-Hz square wave ranging in amplitude from V_{DD} to ground appears at the output of *IC1A*. During the time that the output of *IC1A* is low, *D1*

becomes forward-biased and allows *C2* to discharge through *D1*. While *C2* is discharging, the input of *IC1B* goes to ground causing a high to appear at the output of *IC1B*. During the time that the output of *IC1A* is high, *D1* will again reverse-bias and *C2* will start to recharge through *R2*, keeping a low at the input of *IC1B*. Therefore, while the plate is being touched, the output of *IC1B* is always high. Capacitor *C1* acts as a filter to eliminate frequencies above 60 Hz, which may also be transmitted by the body.

For circuits which require only a momentary low, such as the snooze alarm of a clock chip, the second stage of this touch switch can be entirely eliminated and the output of *IC1A* can be directly connected to the snooze alarm input of the clock chip. Supply voltages may range from 3 to 15 V making this touch switch practical for anything from TTL to MOS.

Make sure all unused input pins of the 4049 (pins 7, 9, 11, & 14) are connected to V_{DD} or V_{SS} . An open input pin will cause that gate to oscillate and draw a great deal of current from the power supply. ◇



PARTS LIST

- | | |
|-----------------------|-----------------------------------|
| IC1—4049 hex inverter | C2—1- μ F, tantalum capacitor |
| D1—1N914 diode | R1—10-M Ω resistor |
| C1—100-pF capacitor | R2—100-k Ω resistor |