

# KIT 10. TOUCH SWITCH/PLATE

This Kit combines a Touch Switch and a Touch Plate all together in the same Kit. In the Touch Switch two leads must be shorted together by your finger touching them. In the Touch Plate only one plate needs to be touched. The Touch Switch only needs a battery to activate it but the Touch Plate requires a mains power supply.

A Relay rated at 12A/250VAC is included with the Kit so that you may use to switch a light. To use the relay you must use a 12V supply taken from a mains power supply. Get the Data Sheet from [http://www.kitsrus.com/pdf/rwh\\_relay.pdf](http://www.kitsrus.com/pdf/rwh_relay.pdf)

**NOTE:** we do not recommend that you use of the Relay to switch mains power supply since the tracks on the PCB are not big or thick enough. If you must then connect the mains wires direct to the pins of the relay & secure them. Do not use the PCB tracks to conduct mains current.

The kit is constructed on a single-sided printed circuit board (PCB). Protel Autotrax was used to design it.

## CIRCUIT DESCRIPTION

The main part of the circuit are the two NAND gates of the (1)4011 Integrated Circuit which are connected as a flip-flop. Pins 9 and 13 are the ON and OFF contacts. The two gates are connected to the positive rail by the two 10M resistors. Shorting one of the gates with the ground rail by touching it (this is equivalent to connecting about 50K between the gate and ground) FLIPs the output to that state. Shorting out the other contact FLOPs it back.

The output of the flip-flop drives a transistor connected as a switch. It switches an LED and a relay. The relay is rated to switch 240V. Connecting the two 1K resistors connects the other two NAND gates of the IC into the flip-flop and makes it much more sensitive to touch. The touch plate may in fact work with only the first two gates connected. But it will be much more sensitive with all four gates connected as a flip-flop. The touch switch works by capacitive pickup of the mains hum. When the contact is touched body capacitance picking up general

RF in the air is enough to short the plate to ground. Because the touch plate uses mains hum as it method of shorting the gate to ground a mains connected power supply must be used to supply power to the switch. **A battery will not work.**

## ASSEMBLY INSTRUCTIONS

Add the components lowest height ones first. Follow the overlay on the PCB. Connect the two PCB's with the 3 wire cable strands provided.

## WHAT TO DO IF IT DOES NOT WORK

Poor soldering is the most likely reason. Check all solder joints carefully under a good light. Next check that all components are in their correct position on the PCB. Thirdly, follow the track with a voltmeter to check the potential differences at various parts of the circuit. Check that the IC is in the correct way. Check no pins are bent up. Are the transistors in the correct way.

## WHAT TO LEARN FROM THIS KIT

The kit introduces the (1)4011 integrated circuit. Go through the connections of the IC to determine the LOW/HIGH levels as the OFF and ON plates are touched. Notice how connecting the 2 1K resistors increases the sensitivity of the circuit. You can download the 4011 data sheet from <http://www.kitsrus.com/pdf/4011.pdf>

### COMPONENTS

1K resistor 5% 1/4W brown black red	3
10M resistor 5% 1/4W brown black blue	2
1N4004 diode	1
12V relay Goodsky RWH-SH-112D	1
IC (1)4011 IC	1
14 pin IC socket	1
Hookup wire	4"
5mm LED	1
Kit 10 PCBs	2
battery snap	1
BC557	1

