

DIY Kit 10. TOUCH SWITCH/PLATE

INTRODUCTION

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 3A/240V is included with the Kit so that you may use to switch a light or other mains appliance. To use the relay you must use a 12V supply taken from a mains power supply.

NOTE: the use of the Relay to switch mains power supply with this project **MUST** use the correct boxes and connectors to protect you and anyone else who uses the Kit.

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

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 again.

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 its 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

Assembly is straight forward and components may be added to the PCB in any order.

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.

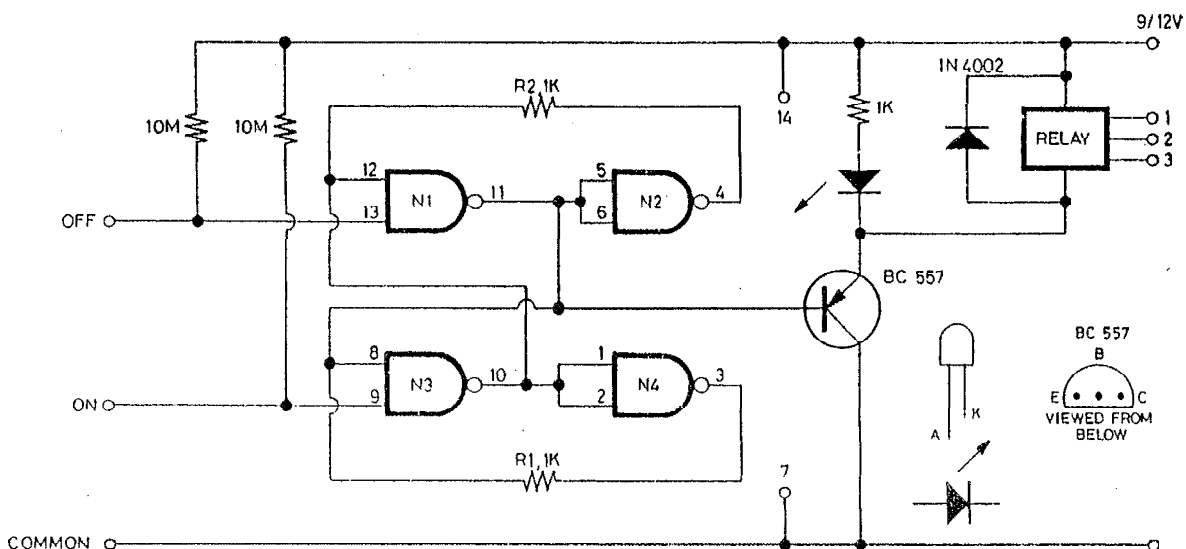
Check that the IC is in the correct way. Check no pins are bent up. Are the transistors in the correct way.

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.

COMPONENT LISTING

1K resistor (brown, black, red)	3
10M resistor (brown, black, blue)	2
1N4002 diode	1
12V relay 240V/3A	1
IC (1)4011	1
14 pin IC socket	1
Hookup wire	
5mm LED	1
Kit 10 PCBs	2
battery snap	1
BC557	1



N1...4 = 1/4 4011