

Touch switch can select up to ten outputs in sequence

Control at your fingertips! With this safe, battery-operated unit, you can select any one of up to ten electrical/electronic devices by simply touching a pad the required number of times.

TOUCH SWITCHES have begun to appear everywhere . . . lifts, TV sets, cassette decks, turntables — to name only a few devices. Some are simple on/off types while others are designed to provide multiple functions. With this inexpensive unit, you can arrange to control up to ten pieces of equipment, or whatever. In addition, you can arrange to have the unit automatically 'reset'

when any one of the ten outputs is reached. This latter feature enables you to restrict the number of controlled devices attached to the outputs — by adding a suitable multi-position switch you can select where the unit resets as you wish — as well as providing an automatic 'return to start'.

The reset function provides a further advantage. When connected to the

Phil Wait

second output ('1' on the circuit diagram) the unit will act as a 'toggle'. Touching the 'count' pad once will operate output '1'. Touching it again will turn off output '1'.

The ten sequentially-selected outputs can drive various switching devices and may be interfaced directly with CMOS and TTL circuitry. As the unit is operated from a standard 9 V battery (it draws very little current), it can be completely isolated from the equipment it controls by using a switching transistor on each output to drive a relay, the contacts of which can control mains-operated equipment, interrupt high current supplies, etc. Details on interfacing are discussed later in the article.

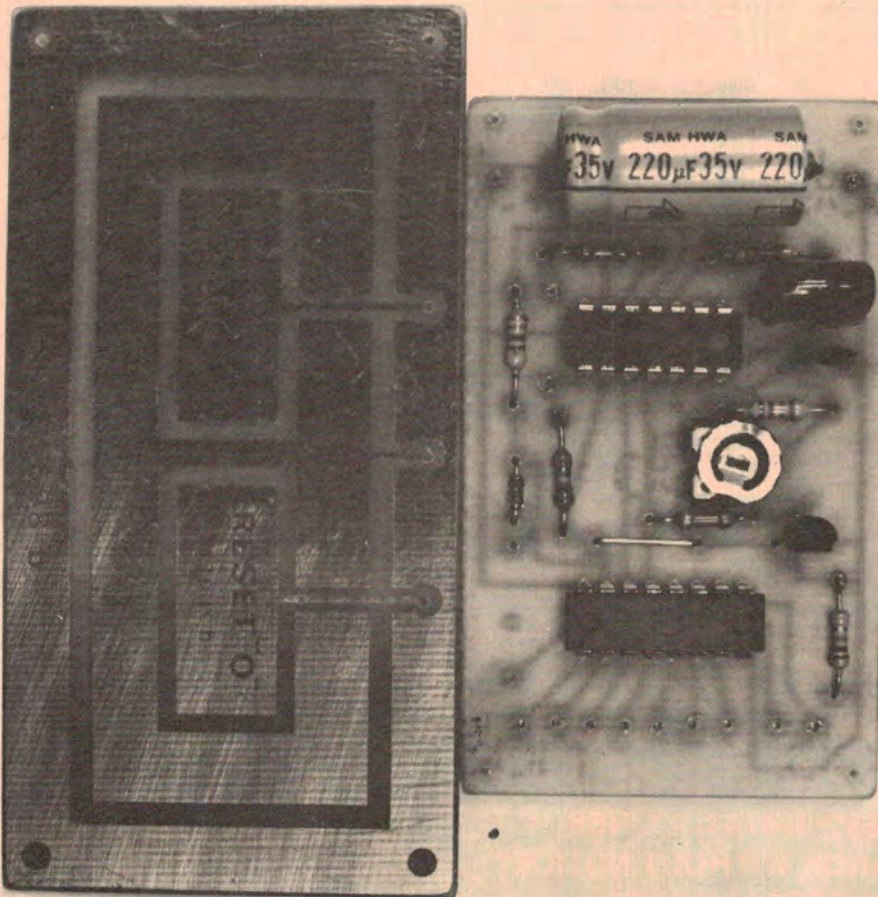
Many touch switch designs rely on the presence of an ac voltage on the body of the operator, induced from nearby mains wiring and conducted to the circuit when the pad is touched. Our circuit is designed for dc operation from a battery supply and employs the change in capacitance that occurs when the sensor pad is touched.

As the touch switch can be used in a wide variety of situations, only basic constructional details are given along with suggestions for interfacing the unit. Applications and installation details are entirely up to you, good reader!

Construction

To avoid introducing stray circuit capacitance which will affect the operation of the circuit, we strongly recommend you use the printed circuit board specified (ETI-598a).

Mount the components in any order, but be careful with the orientation of the ICs, diode and transistor. Observe the usual precautions when handling the CMOS ICs. Almost any general purpose, small-signal NPN transistor will work in this circuit, but be careful with the pin connections so that you install it



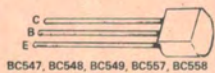
At left is our contact pc board, at right, the electronics for the touch switch. As individual requirements will differ, we have left the packaging to you.

Project 598

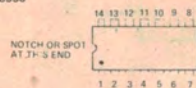
supply does not exceed 15 V. A 220R resistor in series with the supply lead to the touch switch should be used to decouple the unit. The electrolytic, C3, should effectively 'stop' supply rail transients.

When using a relay to switch the controlled equipment make sure it is rated for 240 Vac operation if switching mains-operated equipment, and has a suitable current carrying capacity. Take care when wiring mains leads to relay contacts to ensure that no shorts occur and that the wires to the relay coil(s) are kept well away from mains wiring. We cannot stress this too much as we'd like to have you reading ETI for many years to come!

COMPONENT PINOUTS



BC547, BC548, BC549, BC557, BC558



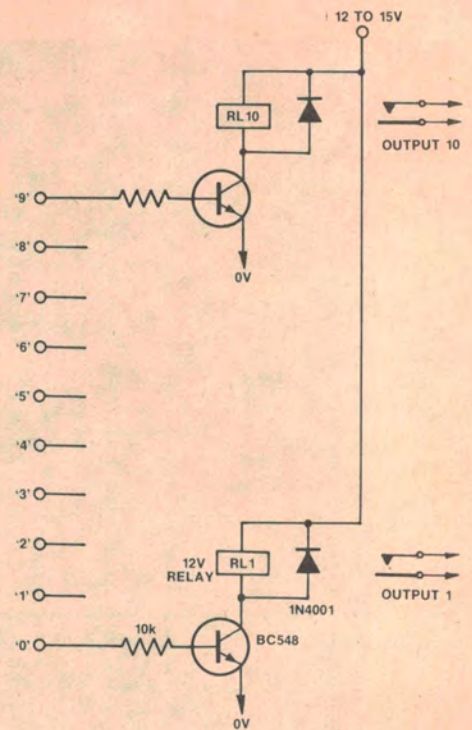
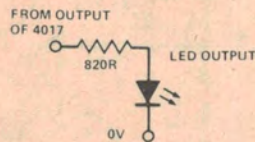
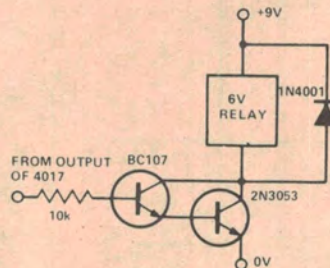
NOTCH OR SPOT AT 3RD END



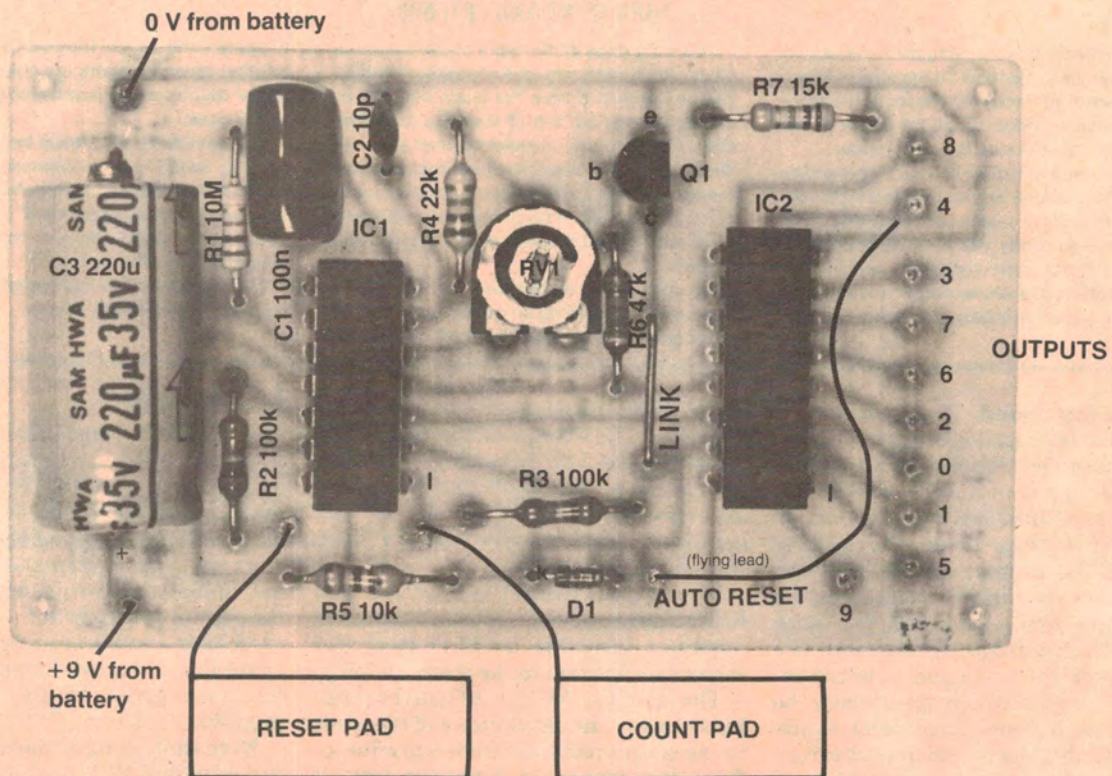
DIODE ORIENTATION

Under no circumstances should you attempt to drive an SCR or triac circuit directly from a touch switch output to control mains current. Opto-couplers are just about the safest way if you must do this.

From here on in, it's all up to you. Good luck and have fun!



Suggested interfacing circuits for controlling dc or ac operated equipment, etc. Relay sensitivity will determine whether or not you'll need a Darlington circuit for relay operation, as at left. DO NOT drive a Triac or SCR directly if it controls mains-operated equipment.



sequential touch switch

CD4017BM/CD4017BC Decade Counter/Divider with 10 Decoded Outputs

general description

The CD4017BM/CD4017BC is a 5-stage divide-by-10 Johnson counter with 10 decoded outputs and a carry out bit.

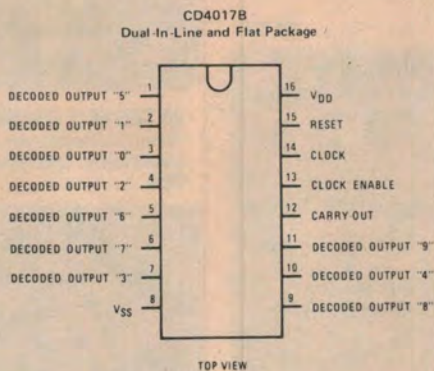
These counters are cleared to their zero count by a logical "1" on their reset line. These counters are advanced on the positive edge of the clock signal when the clock enable signal is in the logical "0" state.

The configuration of the CD4017BM/CD4017BC permits medium speed operation and assures a hazard free counting sequence. The 10 decoded outputs are normally in the logical "0" state and go to the logical "1" state only at their respective time slot. Each decoded output remains high for 1 full clock cycle. The carry-out signal completes a full cycle for every 10 clock input cycles and is used as a ripple carry signal to any succeeding stages.

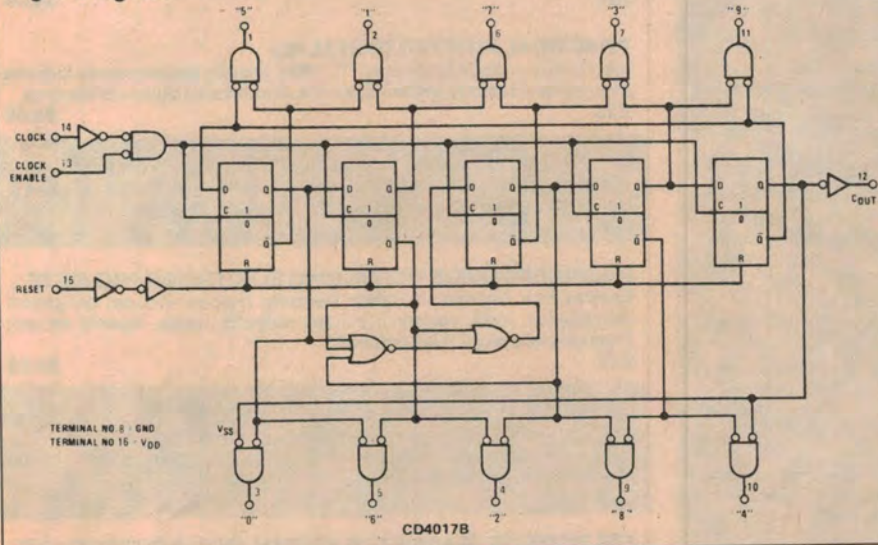
features

- Wide supply voltage range 3.0V to 15V
- High noise immunity 0.45 V_{DD} typ
- Low power fan out of 2 driving 74L or 1 driving 74LS
- Medium speed operation 5.0 MHz typ with 10V V_{DD}
- Low power
- Fully static operation

connection diagram



logic diagram



PARTS LIST - ETI 598

- Resistors** all 1/2W, 5%
- R1 10M
- R2,3 100k
- R4 22k
- R5 10k
- R6 47k
- R7 15k
- RV1 220k miniature flat mounting trimpot
- Capacitors**
- C1 100n greencap
- C2 10p ceramic
- C3 220u, 16V axial lead electrolytic
- Semiconductors**
- Q1 BC547, BC107 or similar

- D1 1N4148, 1N914 or similar
- IC1 4093B
- IC2 4017B

Miscellaneous

ETI-598A and ETI-598B pc boards; hookup wire; interfacing components (see text).

Price estimate

We estimate that the cost of purchasing all the components for this project will be in the range:

\$9 - \$11

(excluding interface items)

Note that this is an estimate only and not a recommended price. A variety of factors may affect the actual price of a project, whether bought as separate components or made up as a kit.

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