



Semi-Switchless Switch

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Designed to alleviate the persistent use of a wall light switch, this circuit could also be of use in households with elderly or disabled members. The circuit turns on the light when anyone enters the room (which must have a single entrance), counts the number of people entering or leaving, then turns off the light again when the room is empty.

The phototransistors each give a positive-going long pulse when the light to them is blocked; they should be about 5 to 10 cm apart, so that both beams are cut for much of the period of time it takes someone to enter. These pulses are amplified by Q1 and 2 and IC1a and b.

The figure opposite shows the timing of these signals; only in the final section, where the pulse from PQ2 has gone low again, do the conditions for the increment pulse to reach IC5 occur, which is when Q from IC3a and the output from IC1a are both high and the output from IC1b is low.

IC5 is an up/down counter seven-segment driver which counts the number of entries and exits from the room. IC1e and 1C6a detect a zero on the display. The latch formed around IC4b and c ensures that the light will only come on if there is no light falling on the ambient light detector, PQ3, but will then stay on until the room is vacated. The remaining circuitry for driv-

ing the triac via an opto-triac is quite straightforward.

SW2 is an auto/manual switch; SW3 is the reset switch, which should be used at switch-on and whenever the house-hold children set about trying to confuse the unit.

A suggested method of construction is shown in the diagram. Standard three conductor power cable can be used to link the unit to the existing switch-plate (the cable carrying live, neutral and triac return) but note that the unit should be powered from a separate supply, and that it must be grounded to be safe. A metal box can be used to house all the phototransistors and the circuit board and transformer; the beam sensors will need light-shielding tubes (sawn-off felt tip pens could be used or something similar) which can be directed at a single light-source fitted on the opposite side of the door frame.

The ambient light sensor may need to be mounted separately, as the box may have to be mounted outside the room, depending on the direction that the door opens. The ambient light detector must be arranged so that it picks up light from only the room being monitored.

An alternative to visible light beams would be to use modulated infra-red beams, but this involves extra complexity, which is why visible light was chosen.

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