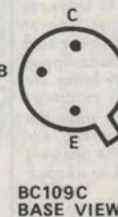
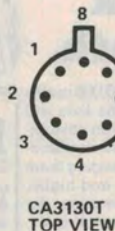
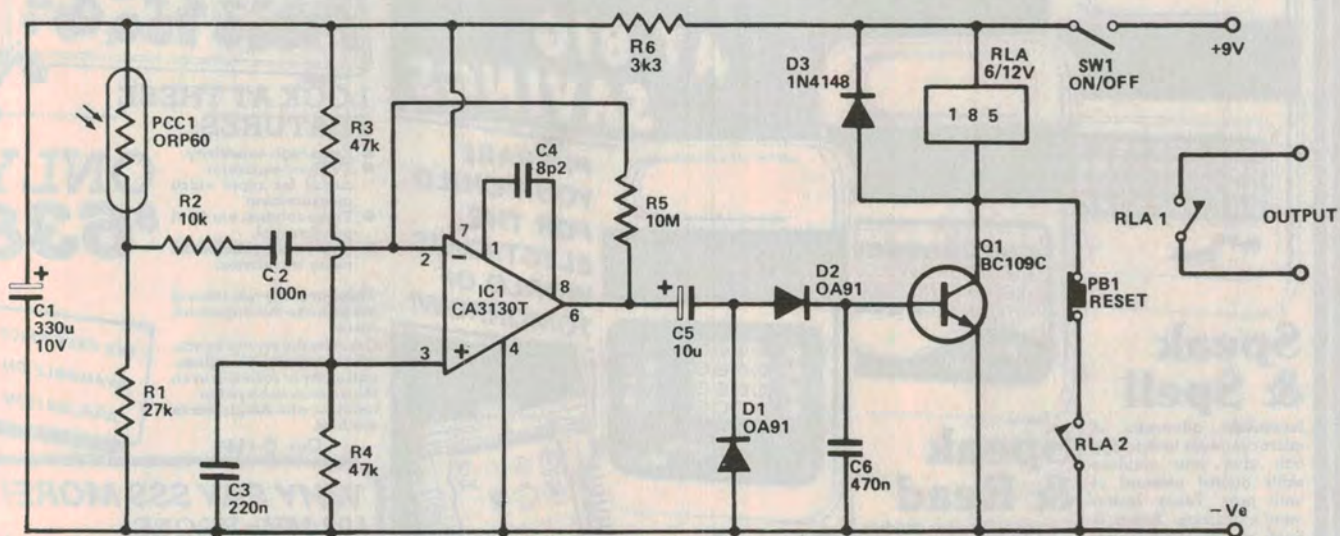


'Photocell' switch is activated by change in light level



THIS SIMPLE light-activated switch can be employed in intruder alarm systems, or in certain other applications where a proximity detector is required. It is not a light-operated switch of the type which responds to some particular ambient light level, but instead it responds to rapid changes in light level. It will, for example, trigger if a torch is shone on or near the photocell, or if someone passing in front of the unit casts a shadow onto the photocell. The unit is unaffected by natural, slow changes in light level.

The photocell used in the unit is a cadmium sulphide photo-resistor (PCC1) and together with R1 this forms a potential divider connected between the supply lines. The voltage at the junction of R1 and PCC1 depends upon the resistance of PCC1, which in turn depends on the light level to which this component is subjected.

IC1 is an operational amplifier which is used here in the inverting mode. R2 and R5 form a negative feedback network which sets the voltage gain of the

circuit; a high degree of gain is required in order to give the unit good sensitivity. The gain of the amplifier is approximately equal to R5 divided by R2, or about 1000 times (60 dB).

The output from PCC1 and R1 is coupled to the input of the amplifier, but C2 provides blocking here so that the output from these components is of no consequence. However, rapid changes in the output voltage from the photocell circuit will be passed to the input of the amplifier, and will appear greatly boosted at the output.

The output from IC1 is coupled by C5 to a voltage-doubler rectifier circuit consisting of D1, D2, and C6. When the unit is activated, the positive bias produced across C6 is sufficient to bias Q1 into conduction, so that it energises the relay coil which forms its collector load.

RLA2 then closes and maintains the supply to the relay coil, so that once triggered, the circuit latches in the on state. The alarm or other controlled equipment is operated by RLA1.

SW2 can be used to break the supply to the relay, and thus reset the circuit. SW1 is merely the on/off switch. C4 is the compensation capacitor for IC1 and D3 is the normal protective diode. Maximum supply current is about 50 mA with the relay operated.

When constructing the unit, make sure that the input components of IC1 (PCC1, R1, R2 and C2) are kept physically separate from the output components (C5, D1, D2 etc) to avoid instability problems. If the unit is too sensitive for your application, reduce the value of R5 to decrease the sensitivity.