

Optical smoke detector

This smoke detector circuit is based on a standard photo-interrupter as used in many computer printers. It contains an infrared LED facing a phototransistor across an air gap.

In this circuit, the collector of the phototransistor (PS1) is connected to +12V via a 2.2k Ω resistor and trimpot VR1. The collector also

drives the non-inverting input (pin 3) of op amp IC1 which functions as a comparator.

Normally, the output from the infrared LED shines across the gap and turns on the phototransistor which pulls pin 3 of IC1 low. As a result, the comparator's output at pin 1 will be low and transistor Q1 will be off.

If enough smoke passes through the gap, the infrared LED's output will be blocked and pin 3 of IC1 will go high and so Q1 will be turned on. This will trigger a monostable timer based on 555 timer IC2 and this will sound the piezo buzzer for a time determined by the $100k\Omega$ resistor and 100μ F capacitor at pins 6 & 7. Trimpot VR1 is used as a sensitivity control.

A suitable photo-interrupter can be obtained from Jaycar (Cat. ZD-1901).

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