

### 3-stage dimmer for mountain bike light

Riding a mountain bike on a forest trail after dark requires a strong source of light, lest a tree branch, rock, hole or other obstacle appears without warning. The usual bike light employs a helmet-mounted 50W halogen lamp powered from a 12V 4Ah sealed lead-acid battery in a backpack. However, full brightness isn't required all the time so this circuit provides three brightness levels and a very low off-state current.

The 4040 binary counter IC1 is incremented each time switch S1 is pressed. As IC1 is clocked, its outputs control the amount of current fed into a simple astable multivibrator oscillator made up of gates IC2a & IC2b. This enables oscillation but also controls the duty cycle of the oscillator.

The oscillator output controls Mosfet Q1 to drive the lamp.

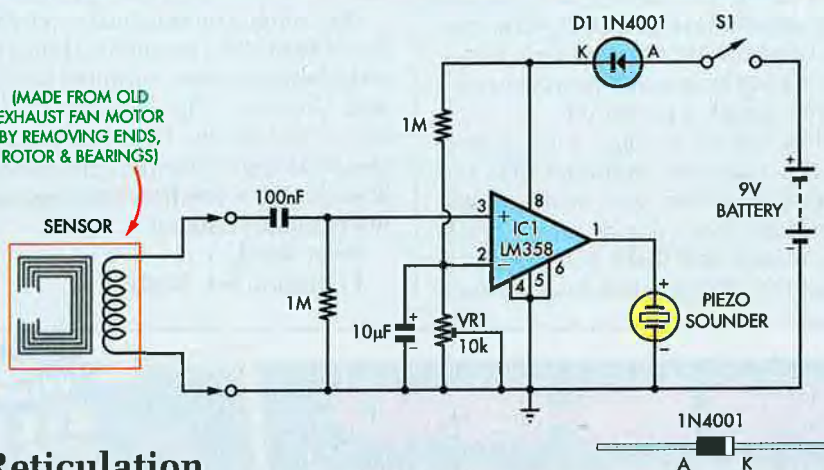
On power-up, all counter outputs are low and pin 9 goes high to feed current via diode D1 and the 68kΩ resistor to pin 1 of IC2a. This

provides an oscillator duty cycle of about 33%. On the second count, pins 9 & 7 are high and the oscillator duty cycle is increased to around 50%. On the third count, the output of IC2c activates to stop the oscillator in the high state, resulting in a 100% duty cycle. The above four states repeat on subsequent counts. The lamp brightness is directly related to the oscillator duty cycle.

The Mosfet should remain cool at all brightness levels.

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(MADE FROM OLD EXHAUST FAN MOTOR BY REMOVING ENDS, ROTOR & BEARINGS)



### Reticulation valve locator

This circuit was developed to locate domestic 24VAC reticulation solenoids. The valves are housed

in plastic enclosures but over time had become buried under lawn or ground cover.

As shown, the circuit uses one half of an LM358 dual op amp (IC1) as a non-inverting comparator. It monitors the output from a sensor made from the field winding and laminated iron core of an old exhaust fan motor. The sensor picks up the magnetic field from the solenoids when they are energised with 24V AC.

Trimpot VR1 (10kΩ) is used as a sensitivity control.

The sensor was attached to a short length of broom handle and is used with a sweeping motion, similar to that used with a conventional metal locator. It was successful in locating energised valves buried to 300mm below the soil surface.

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