

# LED Blinker

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A light draws attention, and two lights draw even more attention. If they also blink or move, you can hardly miss them. This principle has long since proven its worth in the professional spheres of road and air traffic, and it can be put to good use in the private sphere of model building as well. Why shouldn't you build a model airplane with attention-getting lighting?

The simple circuit described here can cause two LEDs to blink alternately at an interval of approximately 1 second. The circuit consists of a type 4093 CMOS IC and a few peripheral components. This IC contains four NAND gates, of which only two are needed here. To avoid generating interference, the inputs of the two unused gates (IC1c and IC1d) are connected to the supply voltage line.

The operation of the circuit is quite simple. NAND gate IC1a and its associated circuitry form an oscillator. It operates at a frequency of 1 Hz and drives the second gate (IC1b), which acts as a buffer. The output of the second gate is connected to LEDs D1 and D2 via capacitors C1 and C3. When the buffer output level changes from low to high, a charging current flows through C3 and causes LED D2 to light up briefly. The capacitor is charged fairly quickly because the current is only limited by the maximum output current

of the gate. This results in a short current pulse, which causes the LED to emit a brief flash of light. The output level subsequently switches from high back to low, which causes C2 to charge quickly in the same manner, with the result that LED D1 flashes in the same way as D2. The net result is that the two LEDs blink alternately.

Capacitors C2 and C3 are discharged via diodes D3 and D4, respectively. These diodes also protect the LEDs against excessive reverse voltages.

The circuit can be operated from a battery with a voltage of 6 to 12 V, and it draws around 1 mA of current. If necessary, the current-limiting resistor R1 can be replaced by a wire link. In this case the current consumption will increase to 2 mA. If the blink interval is too long, the blinking rate can be increased by reducing the value of C1.

If you want to fit even more blinking LEDs in your model airplane, you can use the surplus gates (IC1c and IC1d) for this purpose. In this case, both inputs of each gate must be connected to point 'A' (the output of gate IC1b). Connect a network of the same type as the one shown connected to point 'A' in the schematic to the output of each of additional gates. R1 must be omitted in this case.

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