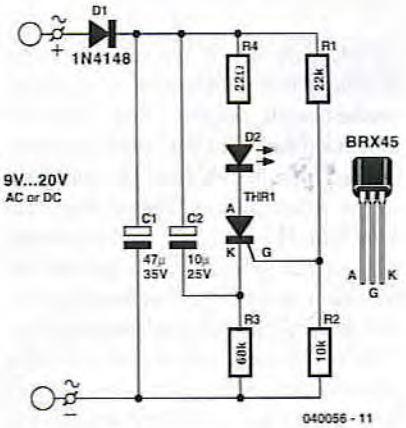
Unusual LED Blinker



Robert Edlinger

This LED blinker manages with only a few components and is dimensioned to operate from an ac supply in the range of 4–16 V (6–24 V dc). As its current consumption is less than 1 mA, it's also suitable for long-term battery-powered operation. It thus offers several advantages in various applications, compared with using the well-known 555 timer IC as an astable multivibrator. Depending on the values of the timing components, the blinking rate ranges from 1 to 1.5 Hz. Although the duration of each blink is only a few milliseconds, a high brightness level is achieved by using a relatively high LED current. There are numerous

potential applications for this circuit in model railway systems, in both stationary and moving equipment.

An small, inexpensive thyristor serves as an oscillator. Voltage divider R1/R2 holds the voltage on the gate lead (G) to approximately 20 % of the supply voltage. Capacitor C2 charges via R3. This causes the voltage on the cathode (K) to drop until it is around 0.5 V to 1 V below the gate voltage (depending on the thyristor type), at which point the gate current is sufficient to trigger the thyristor.

Capacitor C2 then discharges via the cathode-anode junction, R4 and the LED. The only purpose of R4 is to limit the LED current to a permissible value. After C2 has discharged, the cathode–anode junction is again cut off, since the resistance of R3 is so high that the sustaining current level (which is less than 5 mA for the BRX45–57 family) is not achieved. The next blink cannot occur until C2 has again charged.
The blinking rate can be adjusted over a wide range by varying the values of R3 and/or C2. The listed thyristor is recommended for use in this circuit due to its high gate current sensitivity (<0.2 mA). Practically any model railway transformer or bell transformer can be used as a power source. A half-wave rectifier and small filter capacitor are adequate for rectifying the supply voltage.
The components can be fitted to a small printed circuit board or a small piece of perforated board. The blinker can also be powered from a dc source (5–24 V). In that case, D1 provides reverse-polarity protection.

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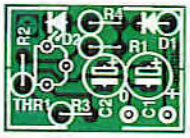
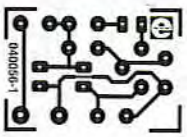




COMPONENTS LIST

Resistors:
R1 = 22kΩ
R2 = 10kΩ
R3 = 68kΩ
R4 = 22Ω

Capacitors:
C1 = 47µF 35V
C2 = 10µF 25V

Semiconductors:
D1 = 1N4148
D2 = low-current LED
THR1 = BRX45

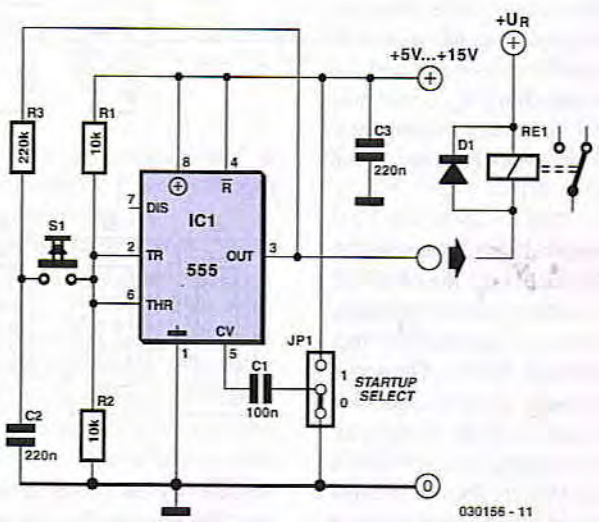
Miscellaneous:
PCB, order code 040056-1 from The PCBShop

On/Off Button

012

Ger Langezaal

It features at least once in every Small Circuits collection: the 555 timer. In this simple circuit we give the chip a little more attention than usual (refer to 'The Eternal 555' in the July/August 2004 issue). It is astonishing what can be built with a 555. Here at *Elektor Electronics* we are always infatuated with simple circuits using this IC, such as the one shown here. The 555 is used here so that a single pushbutton can operate a relay. If you press the button once, the relay is energised. When you press it again the relay turns off. In addition, it is possible to define the initial state of the relay when the power supply is switched on.
The design is, as previously mentioned, very simple. Using R1 and R2, the threshold and trigger inputs are held at half the power supply voltage. When the voltage at the threshold pin becomes greater that 2/3 of the power supply voltage, the output will go low. The output goes high when the voltage at the trigger input is less than 1/3 of the power supply voltage.
Because C2, via R3, will eventually have the same level as the output, the output will toggle whenever the pushbutton is pressed. If, for example, the output is low, the level of the trigger input will also become low and the output will go high! C1 defines the initial state of the relay when the power is applied. If the free end of C1 is connected to V_{cc}, then the output is high after power up; the output is low when C1 is connected to ground.



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