THRIFTY FLASHING LED

028

The adjustable flashing rate and low off-state current drain make this circuit eminently suitable for use as an on-off indicator where battery power is at a premium, or as a fake car alarm.

Transistors T1 and T2 form a relaxation oscillator whose frequency may be set between 1 Hz and 10 Hz by P1.

The LED has an on-time of about 5 ms, so that it may draw a relatively high current to produce intense flashes.

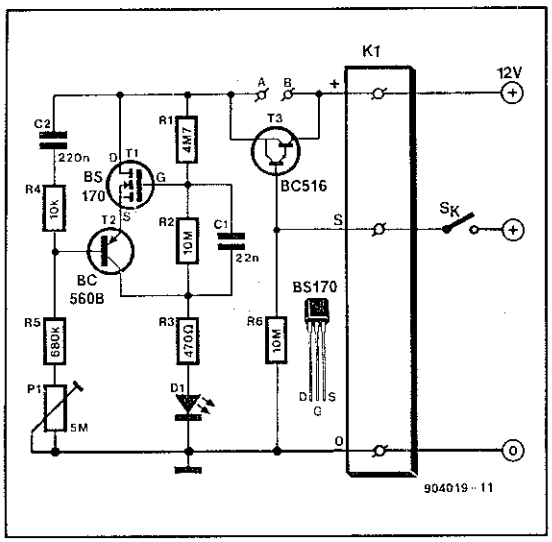
Because of the low duty factor, 0.005 at 1 Hz and 0.05 at 10 Hz, the average current drawn by the circuit is between 0.1 mA and 1 mA at a supply voltage of 12 V. This compares favourably with special high efficiency flashing LEDs that typically require an average current of 2 mA, depending on their series resistor.

The circuit may be operated from supply voltages between 6 V and 25 V.

Resistor R6 and transistor T3 should be omitted, and a wire link fitted between 'A' and 'B', if the circuit is used as an 'on' indicator.

In the fake car alarm application, T3 is switched off when the contact key, Sk, is closed. The oscillator then draws a current of not more than 2 µA and the LED does not flash. When Sk is opened, T3 draws base current via R6, starts to conduct and actuates the oscillator. ■

(J. Ruffell)



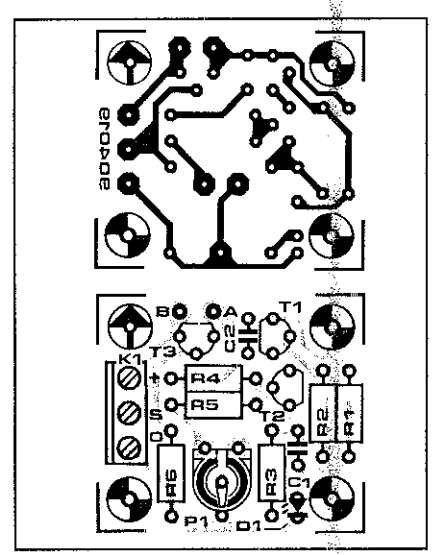
PARTS LIST

Resistors:
R1 = 4M7
R2 = 10 M
R3 = 470 Ω
R4 = 10 k
R5 = 680 k
P1 = 5 M, preset pot meter

Capacitors:
C1 = 22 n
C2 = 220 n

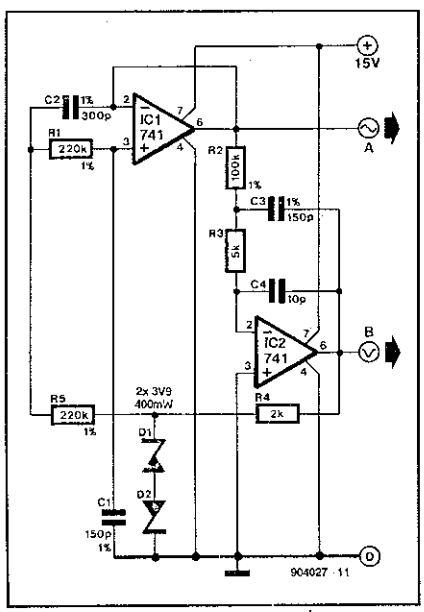
Semiconductors
D1 = LED, 5 mm, red
T1 = BS170
T2 = BC560B
T3 = BC516

Miscellaneous: K1 = 3-way PCB terminal block



STABLE SINE WAVE OSCILLATOR

029



Sine wave oscillators normally generate near-perfect sine waves, but the stability of their output signal is often not very good. The circuit presented here is aimed at improving the stability.

The improvement is brought about by limiting the fed-back output signal by two series-connected zener diodes, D1 and D2.

The oscillator proper consists of two sections: IC1, R1, R5, C1 and C2 form a second-order low-pass filter, while IC2 is connected as an integrator.

The sinusoidal output signal of IC2 becomes trapezoidal after the limiting action and is then applied to the low-pass section. This means that the amplitude of the fed-back signal is constant, so that the peak value of the sine wave output of the oscillator is also constant.

The circuit provides two sine wave outputs at A and B respectively that are mutually 90° out of phase. The waveform at output B is slightly purer than that at A.

The third harmonic is about 40 dB down on the fundamental.

With values as shown, the circuit generates a signal at a frequency of 3.3 kHz with a peak-to-peak value of 11 V. The frequency may be altered by changing the values of C1, C2 and C3 proportionally.

The circuit draws a current of 3 mA at a supply voltage of 15 V. ■

(National Semiconductor application)