# running light

This simple circuit will doubtless find any number of applications in the modern home. It can be used to bore unwanted guests, to annoy the cat, or as a conversation piece. The circuit drives 8 LEDs, 4 of which are always on and four off. The line of illuminated LEDs appears to move along as the LED at the tail of the line extinguishes and a new LED illuminates at the head of the column.

The complete circuit is shown in figure 1 and uses only two ICs and a handful of other components. The LEDs are driven by the outputs of the four latches in a 7475 quad latch IC. The Q and $\overline{Q}$ outputs all have an LED connected to them, making 8 LEDs in all. The clock inputs of the latch are driven by a two phase clock, one phase being connected to IC2a and IC2c clock inputs, and the other being connected to IC2b and IC2d clock inputs.

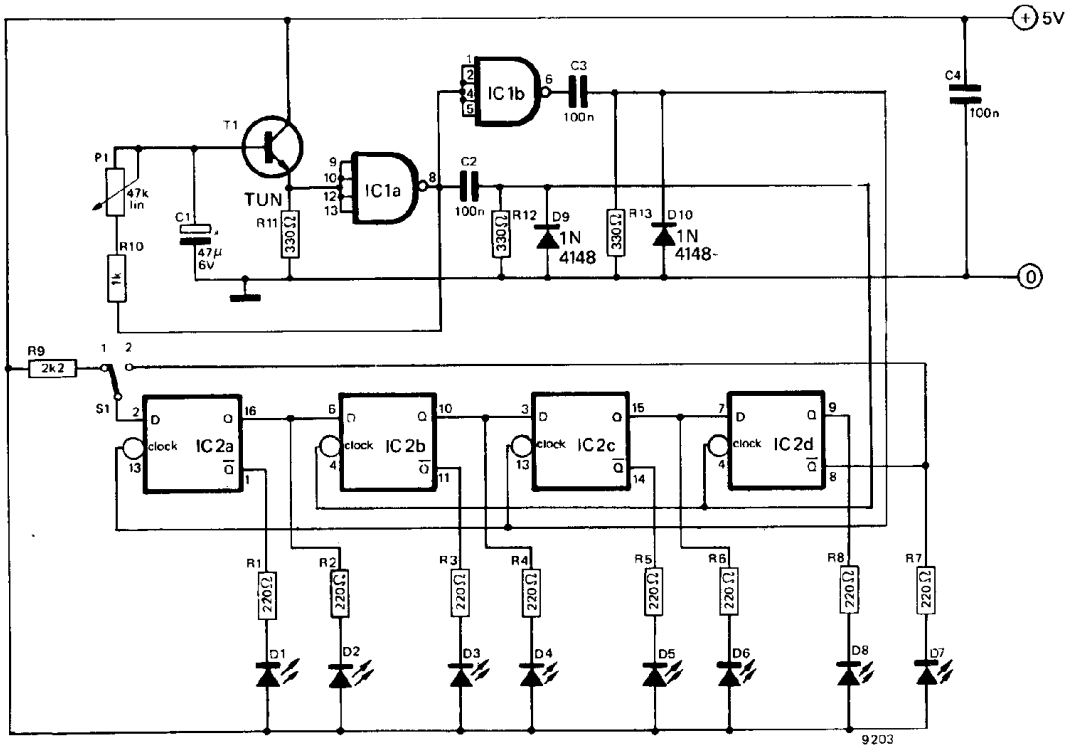
Assume that initially S1 is in position 2 and all Q outputs are high and thus all $\overline{Q}$ outputs are low. LEDs D1, D3, D5 and D7 are thus lit. On the phase one clock pulse the data on the $\overline{Q}$ output of IC2d (i.e. 0) will be transferred to the Q output of IC2a, and the data on the Q output of IC2b (i.e. 1) will be transferred to the Q output of IC2c. The Q output of IC2a will thus become 0 while the other Q outputs will remain unchanged. Thus D1 will be extinguished and D2 will light.

On the phase two clock pulse the 0 on the Q output of IC2a will be transferred to the Q output of IC2b, and a new 0 will be transferred from the $\overline{Q}$ output of IC2d to the Q output of IC2a. D4 will thus light and D3 will be extinguished. D2 will, of course, remain lit.

This process will continue until all the even numbered LEDs are lit and the odd ones are extinguished. The $\overline{Q}$ output of IC2d is now 1, so on the next phase one clock pulse a 1 will appear on the Q output of IC2a. This will go on until all the Q outputs are 1 again, when the cycle will repeat.

If S1 is set in position 1, a logic 1 will

1




IC1= 7413
IC2= 7475

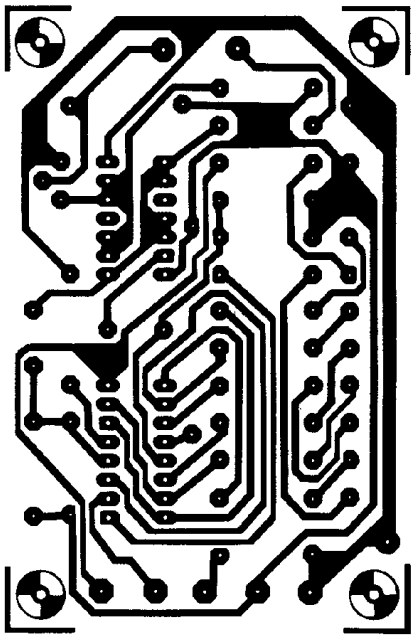
2

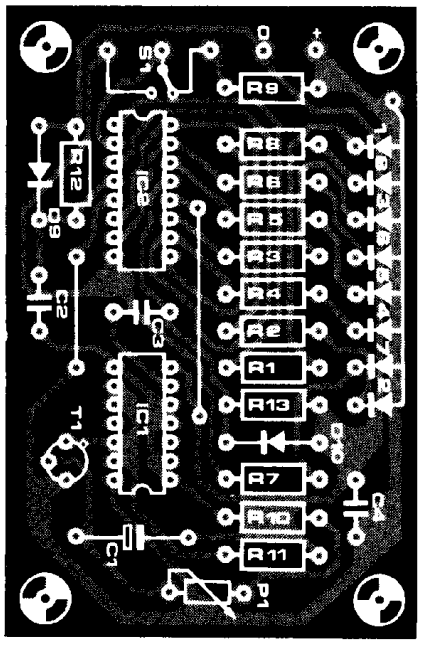
**Parts List**

Resistors:
R1 to R8 = 220 Ω
R9 = 2k2
R10 = 1 k
R11 to R13 = 330 Ω
P1 = 47 k lin pot.

Capacitors:
C1 = 47 µ 6 V
C2 to C4 = 100 n

Semiconductors:
T1 = TUN
IC1 = 7413
IC2 = 7475
D1 to D8 = LED e.g. TIL209 or similar
D9 and D10 = 1N4148






be present at the input of the first flip-flop, regardless of the output state of the fourth flip-flop. By manipulating this switch, various patterns can be set up; if the switch is then set (and left) in position 2 the pattern will be 'clocked round the loop'.

The two phase clock is generated using a 7413 Schmitt trigger. IC1a is connected as an oscillator, with T1 acting as a buffer to increase the input resistance seen by C1. The positive-going edges of the IC1a output waveform are differentiated by C2 and R12 to give short positive going spikes which are used as the phase two clock pulses. The output of IC1a is inverted by IC1b to give a positive-going edge on the negative edge of the IC1a output. This output is differentiated by C3 and R13 to give the phase one clock pulses.

A printed circuit board and component layout for the walking light are given in figure 2. The LEDs need not be mounted direct on the board but can be arranged in a ring, square or other pleasing arrangement if so desired. A 5 V stabilised supply such as the TV Tennis power supply may be used to power the circuit (EPS 9218a). ◀

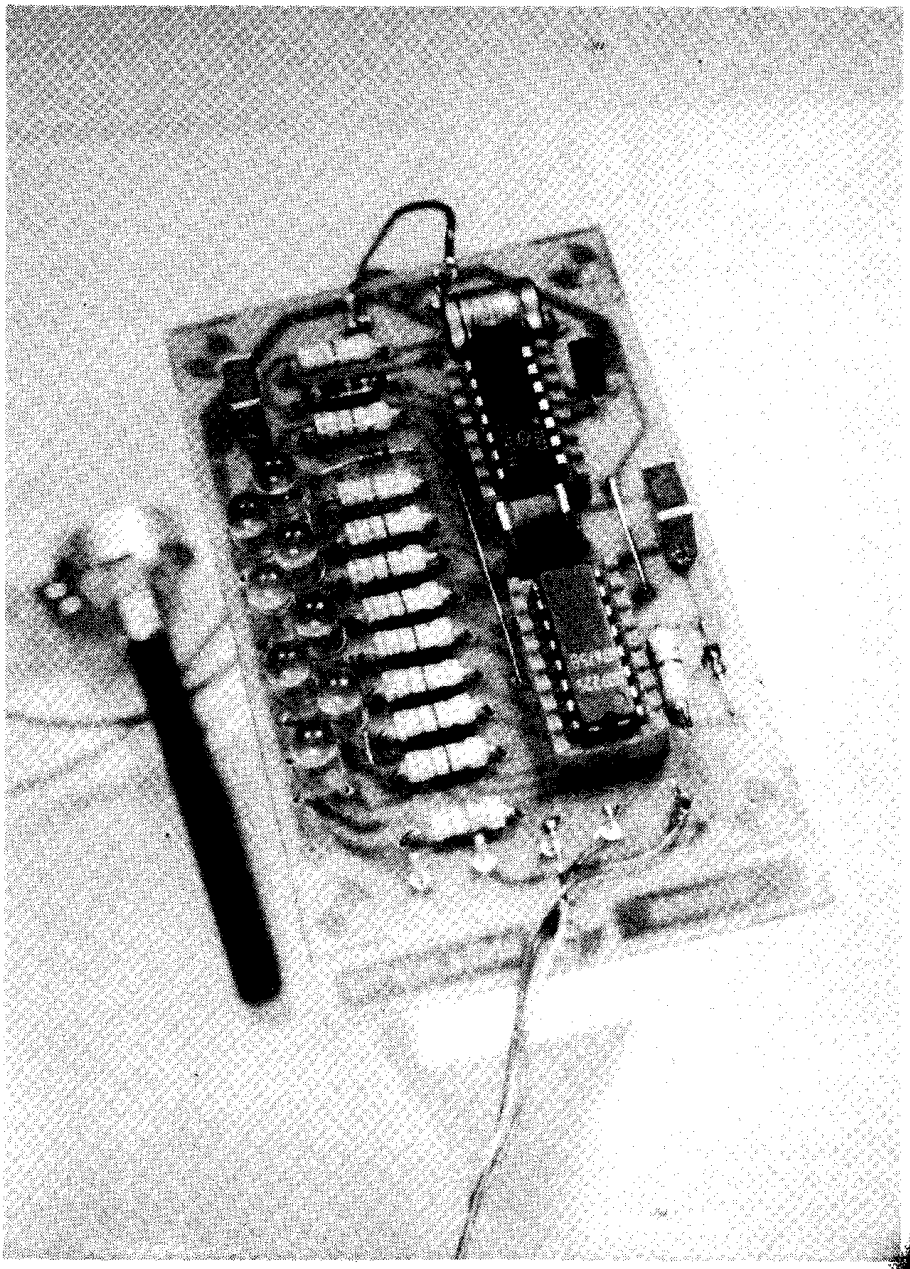


**Figure 1. Circuit of the Running Light.**

**Figure 2. Printed circuit board and component layout for the Running Light. (EPS 9203)**