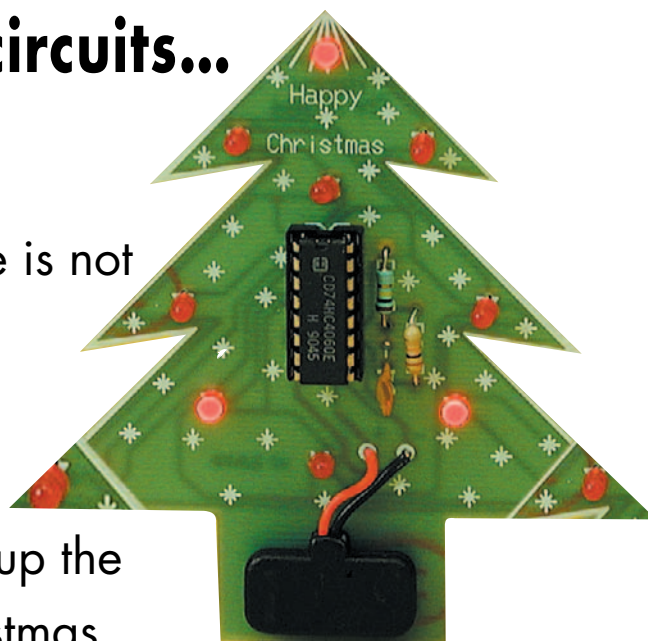**kitchen table**

LED CHRISTMAS TREE

Plus additional seasonal circuits...

This flashing LED mini Christmas tree is not only dead simple to build but the design is also repeatable and very reliable in operation. In fact an ideal last-minute project to brighten up the house or office in the run-up to Christmas.

It can sometimes be satisfying for the electronics enthusiast to build something that adds a personal touch to a special occasion. The mini Christmas tree design described here fits the bill and should strike a suitably festive note. This particular flashing Christmas decoration cannot be purchased ready made but needs instead to be assembled. The circuit design is just about as bullet-proof as is possible using a PCB, battery and just a few components. It is aimed at the less experienced constructor.

Those of you who would like to try their hand at alternative seasonal projects may be interested in some additional circuits that have been made available for free download this month from the *Elektor Electronics* website at www.elektor-electronics.co.uk (see editor's footnote at the end of this article).

So simple

The circuit for the Christmas tree project is ideal for the complete electronics novice. The same circuit was used for various flashing ornaments that were built from kits of parts at our *Elektor Electronics* exhibition stand recently. Even five-year olds were seen successfully assembling and soldering the parts together to produce working kits in less than 30 minutes!

The circuit in **Figure 1** is about as simple as it gets. A single IC, two resistors, one capacitor and eleven LEDs comprise the total circuit. LEDs were used here because they consume less power than filament lamps and are also far more reliable.

The circuit will run for 48 hours on end from a fresh 9-V alkaline battery, so a single battery should last you through the whole Christmas week if it is only used in the evening.

The IC is a CMOS 4060 oscillator/divider with ten outputs. The oscillator operating frequency depends on the values of C1, R1 and R2 and should be approximately 2 Hz with the component values given.

The outputs Q3 to Q9 and Q11 to Q13 switch at the oscillator frequency.

The LEDs are wired so that it looks like they are switching in a random manner but if you study the LEDs a bit more closely you will notice that there are always three LEDs lit at any one time.

Soldering

The PCB layout shown in **Figure 2** is already cut into a Christmas tree shape. Component placement and soldering should not present too much of a problem so long as you study the layout closely. It is important to fit the LEDs the correct way round (remember, the shorter or **c**ut lead is the **c**athode). An IC socket is used to fit IC1 to the PCB. Ensure that the socket is the correct way round before it is soldered to the PCB and that the IC is correctly orientated before it is pushed into the socket (a 'pip' on the package always indicates pin 1).

Once all the components have been fitted solder the battery clip leads to the PCB. The red lead is soldered to the positive (+) pad and the black lead to
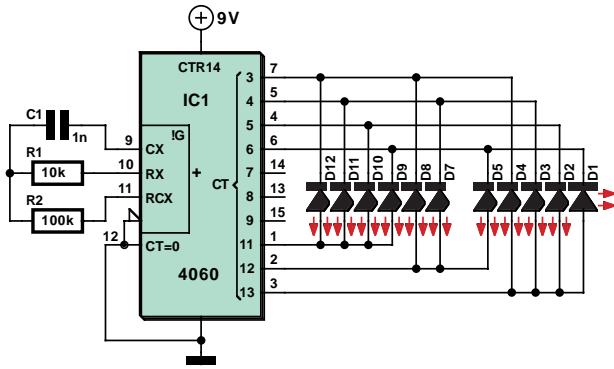
Figure 1.The LED Christmas tree circuit really has been tried and tested a thousand times!

the negative (–) pad. The battery clip contacts are pushed through the two holes at the foot of the tree so that the battery can be fitted to the other side and acts as a stand for the tree. If everything has gone to plan the LEDs should start to twinkle once the battery is connected.
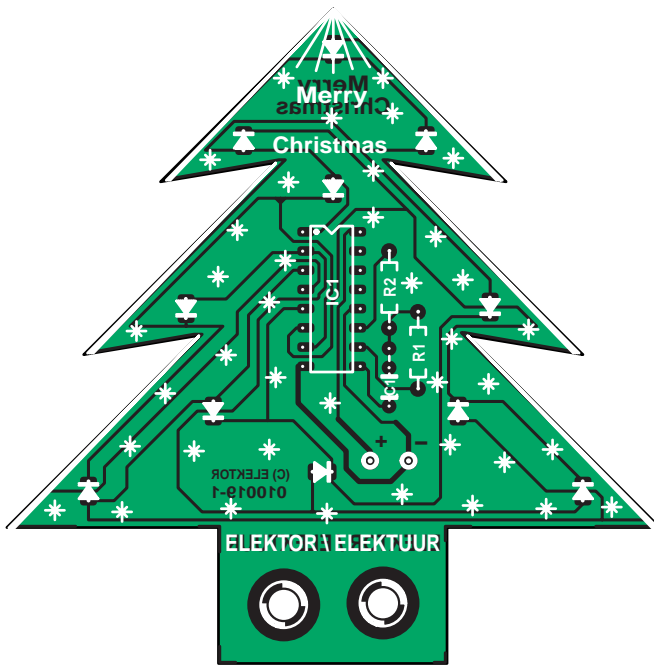
Merry Christmas!

Figure 2. The mini Christmas tree component placement.

COMPONENTS LIST

Resistors:
R1 = 10k_ (black-brown-orange)
R2 = 100k_ (black-brown-yellow)

Capacitor:
C1 = 1nF

Semiconductors:
D1-D12 = LED, low current (all colours possible except white)
IC1 = 4060

Miscellaneous:
16-way DIL socket for IC1
9-V (PP3/6F22) battery with clip

Kit of PCB & parts, order code
010019-91