

CHRISTMAS LIGHTS FLASHER



With Christmas looming on the horizon Paul Stenning makes his Christmas tree lights flash in unusual ways

Christmas just wouldn't be Christmas if your favourite electronics magazine didn't publish a hi-tech gadget for flashing your tree lights! This year we present a straight-forward fixed pattern flasher for three sets of lights. However this is not your usual 1 - 2 - 3 chasing pattern, this unit has six steps, 1 - 1+2 - 2 - 2+3 - 3 - 3+1, and then repeated. If the three sets of lights are mixed on the tree, it is not that easy to see the pattern! On the prototype, the speed was fixed to about three steps per second, but it would be a simple matter to put a control pot on the front panel to set the mood if required.

The triac outputs are driven from zero-crossing opto isolators, which virtually eliminate radio interference. The triacs are hard driven, making the outputs suitable for driving inductive loads such as the modern low voltage transformer driven Christmas lights. The outputs can drive loads of up to 3 Amps (or possibly even more if the PCB tracks are reinforced), making the unit suitable for driving higher powered outdoor lights.

Please Note: THIS PROJECT OPERATES FROM THE MAINS. MAINS VOLTAGE IS POTENTIALLY LETHAL. DO NOT CONSTRUCT IT UNLESS YOU ARE CERTAIN OF YOUR ABILITY TO DO SO SAFELY.

How it Works

The complete circuit diagram is shown in figure *. The low voltage section of the circuit is powered by a small mains transformer. Although this is slightly more expensive than a mains derived circuit using a dropper resistor or capacitor, it is more

reliable, cooler running than a resistor and easier to build.

IC1 (NE555) is the main oscillator. If a variable speed is required, R2 can be replaced with a 22K pot and a 1K0 resistor in series. The output drives the clock input of IC2 (4017), a decimal counter. Outputs Q1 to Q5 if IC2 go high in turn, on a clock pulse. When Q6 goes high, the device resets itself due to this line being linked to the Reset pin. The outputs are decoded into the desired pattern by the three OR gates in IC3.

The outputs of IC3 drive transistors TR1, TR3 and TR5, which in turn operate the LED's within the opto-isolators (IC4, IC5 and IC6) and the front panel LED's (D1, D2 and D3).

The MOC3041 opto-isolators contain full zero crossing circuitry, and a triac output stage. They are ideally suited to driving triacs in this manner, since they do all the hard work for you! The LED current for guaranteed operation is 15mA max. Other devices in this useful family include the MOC3040 which needs a 30mA input (it is slightly cheaper), and the MOC3020 which does not have the zero crossing circuit.

The triacs used in the prototype were BT137 types, however most TO220 packaged triacs should be suitable, including C206M, C225M, C226M, BT138, BT139, BTA08-600B etc. If you are likely to be driving inductive loads (or you are not sure) use 600V devices, otherwise a 400V devices are suitable.

The outputs are individually fused. The F-500mA fuses are suitable for normal indoor light sets, but a higher value may be needed for outdoor light sets. Do not use anti-surge fuses (T type, eg T-500mA) since these will not adequately protect the triacs.

Construction

The circuit is constructed on a single sided PCB which is available from the author - see Buylines for details. Construction is straightforward, and requires little comment from me. SK1 to

In use

Because of the somewhat delicate nature of Christmas lights, I would strongly recommend the use of a RCD or earth leakage circuit breaker (the type intended for power tools) - particularly if children are about.

To reduce the risk of fire (due to hot lamps coming into contact with decorations or wrapping paper), the lights should be switched off at night and when no-one is around. There's no point in wasting the electricity anyway!

Do not be tempted to compromise on the safety of your wiring, just because it will only be used for a few weeks. If you must use terminal block connectors to extend cables, cover them in a generous quantity of insulation tape.

Do not use indoor lights outside, purchase a proper set of outdoor lights.

The above precautions apply whether or not this flasher unit is being used. Statistics show that the number of accidents in the home increase around Christmas time. Please don't be a statistic.

May I wish you all an enjoyable Christmas, and a peaceful new year.

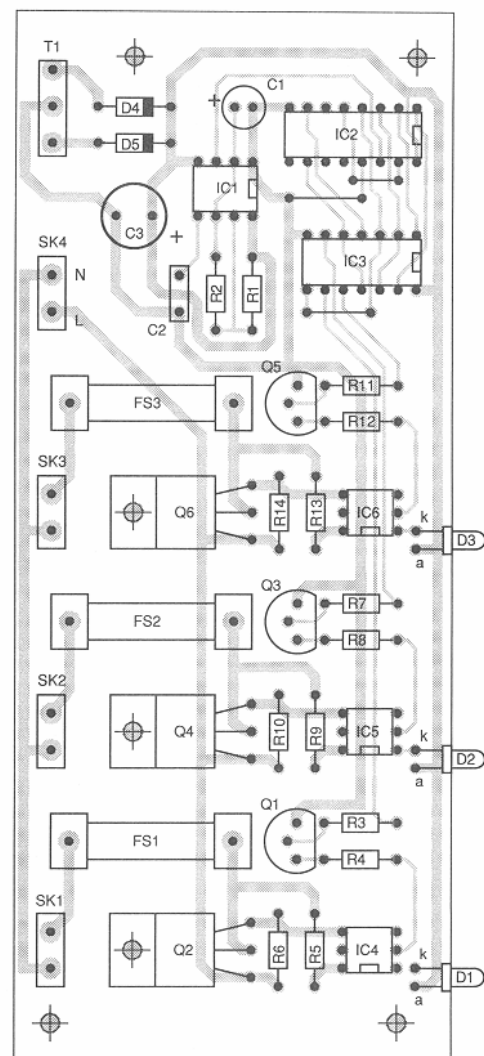
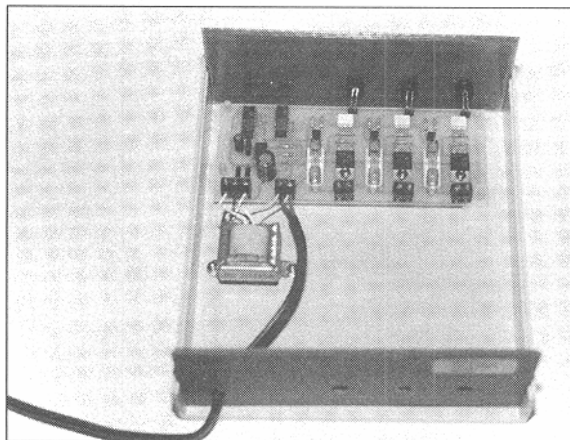


Fig.2. Component overlay for Christmas lights flasher

PARTS LIST

Resistors (all 0.25W, 5% or better)

R1,2	10K
R3,7,11	22K
R4,8,12	470R
R5,9,13	100R
R6,10,14	270R

Capacitors

C1	10uF 16V radial elect
C2	10nF Ceramic disk
C3	220uF 16V radial elect

Semiconductors

IC1	NE555
IC2	4017
IC3	4075
IC4,5,6	MOC3041
TR1,3,5	BC548
TR2,4,6	BT137 (see text)
D1	Yellow LED
D2	Green LED
D3	Red LED
D4,5	1N4001
SK1,2,3,4	2 way 0.2" PCB terminals
X1	3 way 0.2" PCB terminal
FU1,2,3	20mm PCB fuseholders with F-500mA fuses
X1	6-0-6V 100mA (wire ended)

The plastic case used for the prototype is made by Bafbox, and is available from RS/Electromail, stock no 506-788.

BUYLINES

The PCB is available from the author at the following address:-

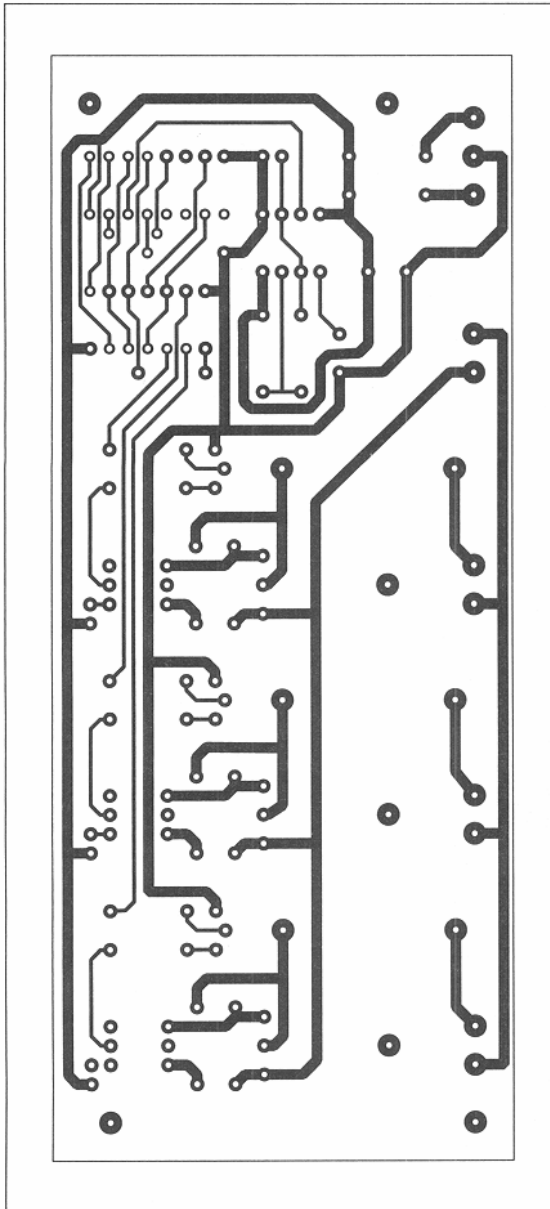
Paul Stenning, [REDACTED]

The price is £8.50. Postage and packing (per order) is £1.50 in the UK, and £2.50 elsewhere. Please make cheques payable to "Paul Stenning". If ordering from abroad please note that payments must be in Pounds Sterling, and cheques must be drawn on a British bank.

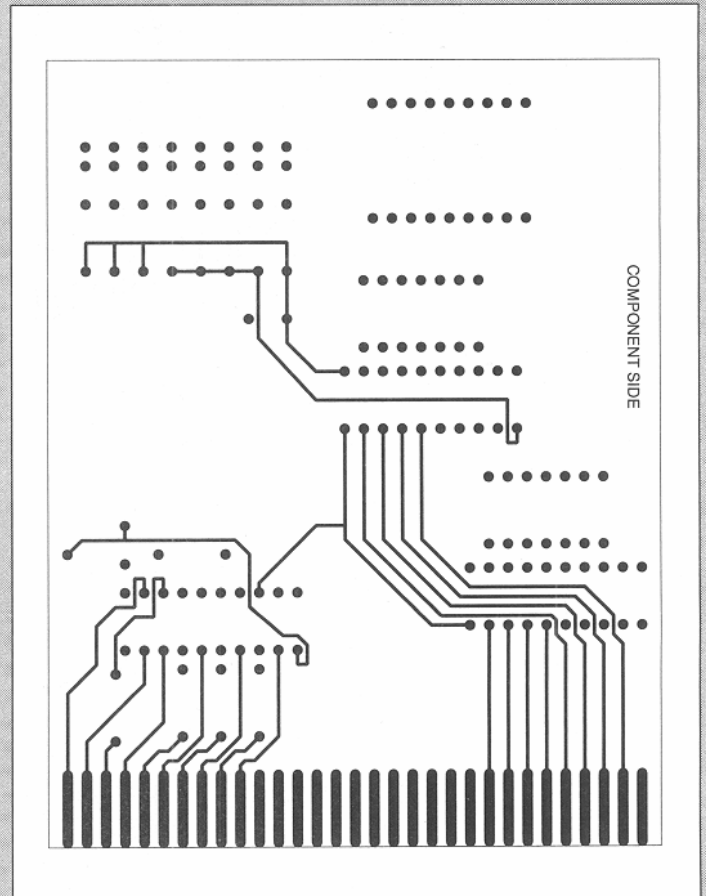
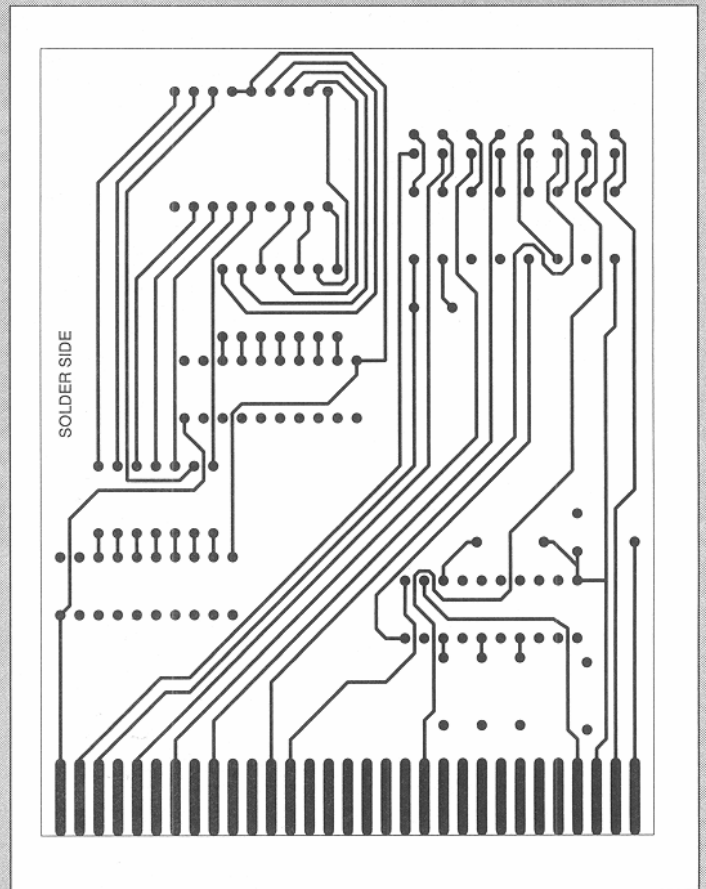
The author will order the PCB's from his supplier in small batches when a sufficient number have been ordered. Delivery may therefore be up to a month or possibly longer, depending on demand. Cheques will not be cashed until one week before dispatch.

Since this project is seasonal, the author will do his utmost to send you your boards in time. Please help him to help you, by ordering early. If your order is received by 19th November 1994, he will dispatch your board before 5th December 1994. Orders received after this date may not be completed until after Christmas.

This offer is valid until 31st March 1995. After this date, please write for details.



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**Corrections To Foils For Last Month's
Post Card Project**