

# Build a simple relaxation oscillator

So you want a simple kit that makes some nice flashing lights, but you are tired of LEDs driven by chips or transistors? Well, this kit uses coloured neon lamps both as the light source and the active components of the oscillator itself.

Relaxation oscillators are a common circuit, and were used heavily before quartz crystals were readily available. Neon-based relaxation oscillators are simple, robust and cheap, but they do have the drawback that they need a relatively high DC voltage to operate.

## Powering the kit

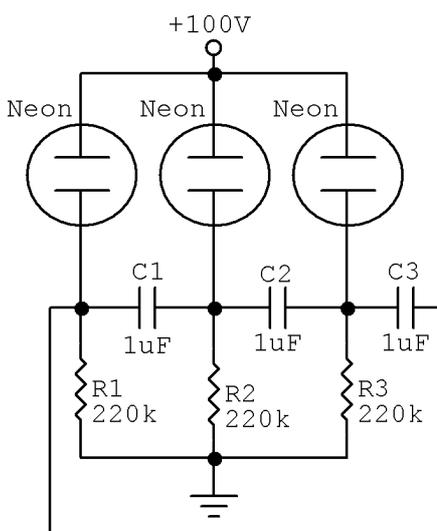
This kit is designed to run from a voltage of between 90 and 150 volts. You can supply this in many ways, but you must always make sure that any high voltage supply is isolated from earth to reduce the likelihood of electric shocks.

The LEDsales neon/nixie power supply kit can provide a suitable voltage from a 9-12 volt DC plugpack, and it is the recommended power supply for this kit.

The recommended supply voltage is 100 volts. As voltage increases, the speed of the oscillations, and therefore the neon flashing, will increase. At 150 volts it can be quite fast and any voltage over this is pointless.

## The circuit

As can be seen from the circuit dia-



The circuit of the oscillator—as can be seen, there isn't much to it. The basic oscillator block can be extended to as many stages as you wish, but once you exceed three neons, the flash sequence will be pretty much random.

gram, there is very little to the circuit. Each neon has its own resistor to limit the current through the lamp, and between each neon/resistor pair is a 1µF, 160 volt bipolar transistor. And that's it!

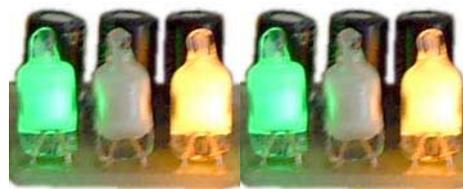
## Building and testing it

To build the kit, just solder the components into their appropriate positions on the PCB and you're done. All of the components are non-polarised, so there is no need to worry about orientation. Obviously, you want the wire openings on the terminal block to face the rear of the board...

If you are making just a single three-neon module, then you must connect the pads on the board as shown below. If you forget to connect these, the kit will still run but you won't get a continuous chase pattern, the neons will flash in a more random manner.

If you are connecting more than one module, there are two ways they can be connected. You can run each module independently, or you can have them all interacting. When they run independently, they each find their own chase direction and speed. When they are interacting, they will flash in a pretty much random manner. Try both methods and see which you prefer.

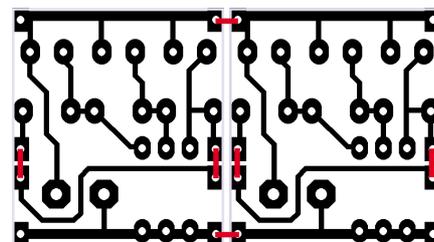
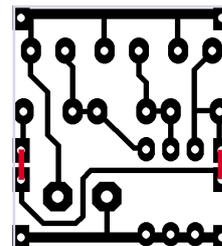
Incidentally, the holes in the linking pads are there so that you can use wire links between the modules for added strength, rather than just using solder bridges. This also allows you to put half a millimetre or so separation between the boards so that there is no chance of them interacting when they are wire to run independ-



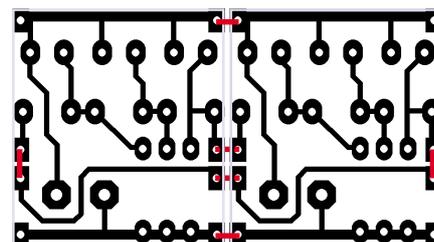
ently. Also, you only need to fit the terminal block to one of the boards...

Once you have built the kit, connect it to a 100 volt DC power source and the neons should start flashing. It doesn't matter which way you connect the kit to the power source—swap the polarity and it still works. Each board will draw around a milliamp or so, depending on the input voltage. This allows you to run at least 10 boards from one LEDsales neon/nixie power supply.

If you are just building one kit, then connect the pads as shown.



Multiple boards can be wired together in two ways. Obviously, all of the V+ and Ground rails must be connected. If you want each group of three neons to run independently in a chaser pattern, then wire them as above, making sure that each board stays independent.



If you want all of the neons to interact, wire the boards this way. The end result will be fast firing random sequences.

## Warning

This kit uses voltages up to 150 volts, which is enough to give a nasty shock, or even prove fatal for some people. Always exercise caution when working on this kit, especially around the high voltage supply.

If you are not comfortable working with these voltages, then find the help of someone who has experience and understands the necessary safety requirements. LEDsales cannot be held responsible for injuries or damage sustained by people, animals or property in the assembly and use of this kit.