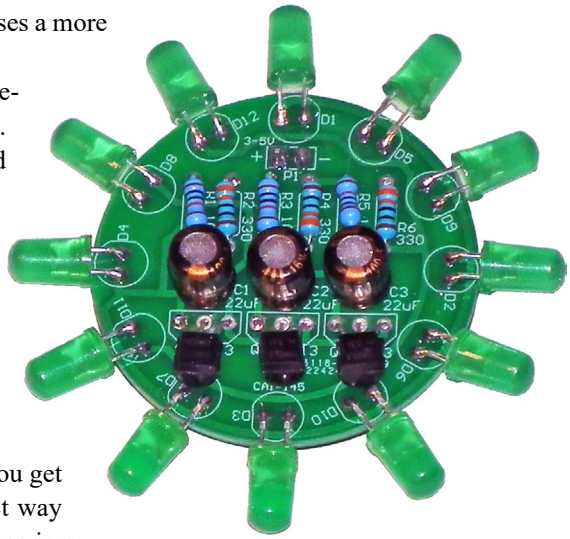
Build a simple rotating flasher

This simple kit flashes 12 LEDs in a rotary sequence without the need for ICs of any type.



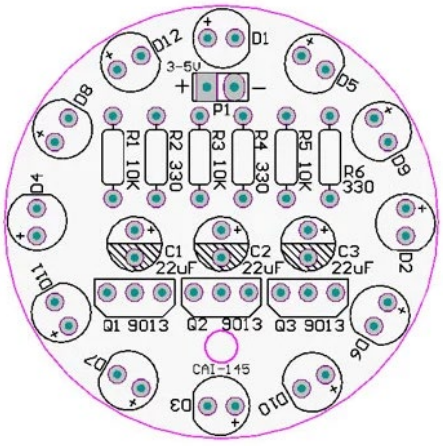
Most LED flasher circuits use one or more ICs to flash the LEDs, but this kit uses a more fundamental circuit, the relaxation oscillator.

It works by charging and discharging three capacitors (C1 to C3) via 10k resistors (R1, R3, R5), which are interconnected between three NPN transistors. These transistors turn 12 LEDs on and off in sequence, with the LEDs grouped in parallel groups of four, with those LEDs from each group equispaced around the edge of the PCB. Current is limited through the LEDs by resistors R2, R4 and R6.

The end result is a rotating effect that looks like it would need ICs to produce, but doesn't. The main advantage of using this system is that it is very low cost, simple and reliable, and is not affected by electrical noise like ICs can be.

Building the kit is simple, just place the components in their respective places on the PCB, which is clearly marked for each device. Just make sure you get the polarised components—the LEDs, capacitors and transistors—the correct way around. Solder all components into place (use a temperature controlled soldering iron or soldering station—uncontrolled irons can get hot enough to damage electronic components).

Once built, apply power and you should be greeted with a nice rotating animation display. If not, check your work and look for faulty solder joins or bridged solder pads.



The circuit board is labelled for easy placement of the components—just watch the orientation of the caps, LEDs and transistors!

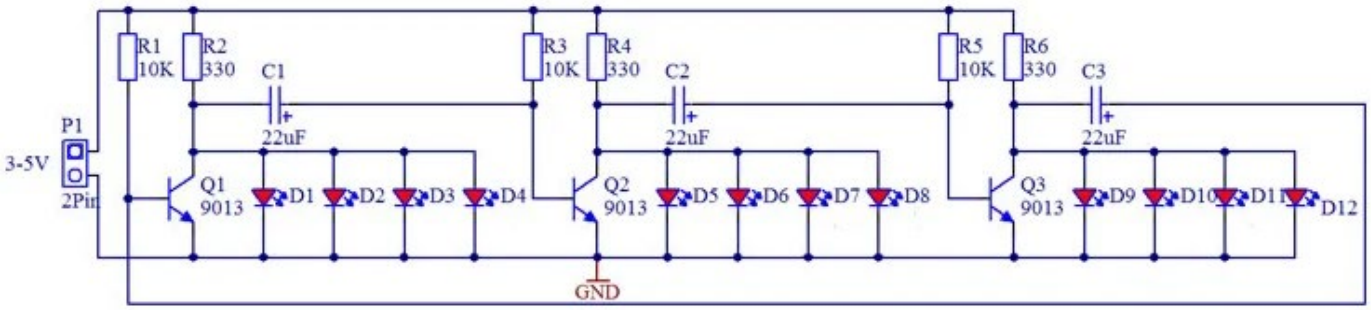
Options

Note that, as supplied to us, the kit uses 22uF capacitors. We found when testing the kit that the flash sequence was way too fast. After trying different resistor values for the 10k resistors, we found that the kit did not operate reliably. However, leaving the resistors as supplied and changing the 22uF caps to 100uF high grade units transformed the kit, giving it a sensible flash rate and good brightness.

So, we supply both the original 22uF caps and the much better 100uF units in each kit. **We highly recommend using the 100uF capacitors!**

Also, you can mount the LEDs either pointing upwards from the board, or do as we did for the test unit and bend them at right angles so they point off the edge of the PCB. You could even mount the LEDs off the PCB altogether, connecting back to the PCB by wires.

While the kit schematic recommends powering the kit from 3 to 5V DC, with the capacitor upgrade we were able to power the kit from voltages up to 12V reliably. At 9V it works great, with good brightness and a sensible flash rate.



The circuit schematic for the kit. Note the paralleled groups of LEDs.