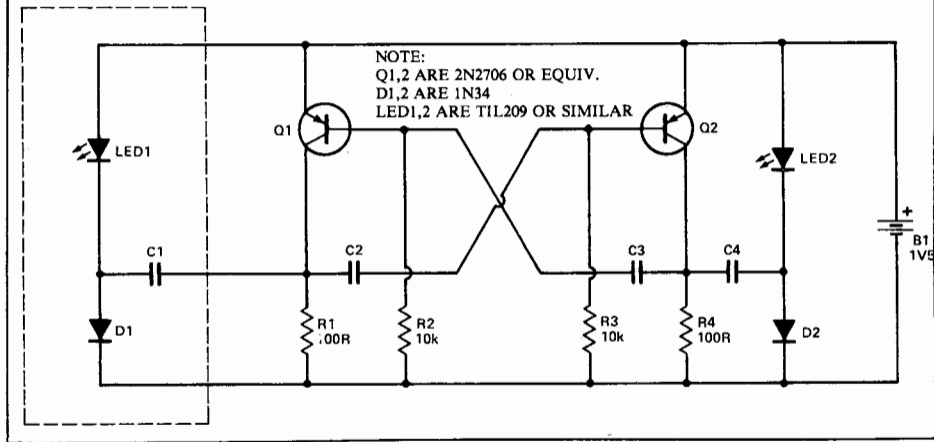


### Running LEDs From A 1V5 Battery

Andrew Marshall

Most LEDs require operating potentials of between 1V6 and 2 V, but the circuit shown here enables light emitting diodes to operate from a 1V5 battery. The circuit uses a 'voltage doubler' and an astable multivibrator. Germanium transistors and diodes are used, as these have a smaller forward voltage drop across p-n junctions than comparable silicon devices. (This is to increase the output voltage and enable the circuit to operate at lower input voltages.)

To operate the circuit to make the LEDs appear on continuously C1 and C2 should be chosen to be 47nF, and C3 and C4 to be 10uF. To make the LEDs flash



alternately, C1 and C2 should be about 1000uF. To operate only one LED omit the circuitry within the dotted box.

Although TIL 209s are indicated in the circuit diagram, other LEDs may be used.