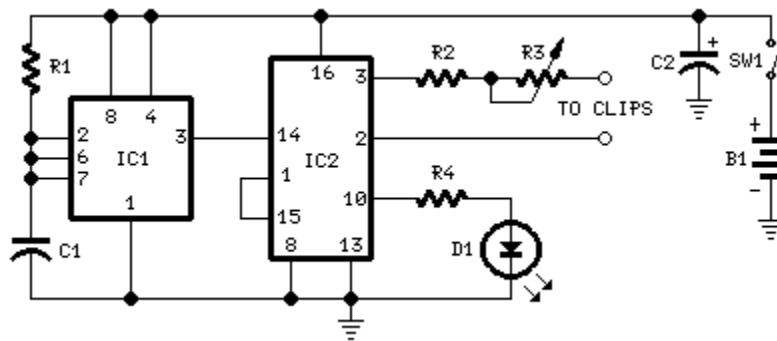


# Cranial Electrotherapy Stimulator

Current generated flows through clips placed on the earlobes  
Output current adjustable from 80 to 600 microAmperes

## Circuit diagram:



## Parts:

R1 \_\_\_\_\_ 1M5    1/4W Resistor  
R2 \_\_\_\_\_ 15K    1/4W Resistor  
R3 \_\_\_\_\_ 100K    Linear Potentiometer  
R4 \_\_\_\_\_ 2K2    1/4W Resistor

C1 \_\_\_\_\_ 330nF    63V Polyester Capacitor  
C2 \_\_\_\_\_ 100µF    25V Electrolytic Capacitor

D1 \_\_\_\_\_ 3mm.    Red LED

IC1 \_\_\_\_\_ 7555    or TS555CN CMOS Timer IC  
IC2 \_\_\_\_\_ 4017    Decade counter with 10 decoded outputs IC

SW1 \_\_\_\_\_ SPST    Slider Switch

B1 \_\_\_\_\_ 9V    PP3 Battery

Clip for PP3 Battery

Two Earclips with wires (see notes)

## Device purpose:

Owing to the recent launching in Europe of Cranial Electrotherapy Stimulation (CES) portable sets, we have been "Electronically Stimulated" in designing a similar circuit for the sake of Hobbyists. CES is the most popular technique for electrically boosting brain power, and has long been prescribed by doctors, mainly in the USA, for therapeutic reasons, including the treatment of anxiety, depression, insomnia, and chemical dependency. CES units generate an adjustable current (80 to 600 microAmperes) that flows through clips placed on the earlobes. The waveform of this device is a 400 milliseconds positive pulse followed by a negative one of the same duration, then a pause of 1.2 seconds. The main frequency is 0.5 Hz, i.e. a double pulse every 2 seconds. Some people report that this kind of minute specialized electrical impulses contributes to achieve a relaxed state that leaves the mind alert.

**Obviously we can't claim or prove any therapeutic effectiveness for this device**, but if you are interested in trying it, the circuit is so cheap and so simple to build that an attempt can be made with quite no harm.

## Circuit operation:

IC1 forms a narrow pulse, 2.5Hz oscillator feeding IC2. This chip generates the various timings for the output pulses. Output is taken at pins 2 & 3 to easily obtain negative going pulses also. Current output is limited to 600 $\mu$ A by R2 and can be regulated from 80 to 600 $\mu$ A by means of R3. The LED flashes every 2 seconds signaling proper operation and can also be used for setting purposes. It can be omitted together with R4, greatly increasing battery life.

## Notes:

- | In order to obtain a more precise frequency setting take R1=1M2 and add a 500K trimmer in series with it.
- | In this case use a frequency meter to read 2.5Hz at pin 3 of IC1, or an oscilloscope to read 400msec pulses at pins 2, 3 or 10, adjusting the added trimmer.
- | A simpler setting can be made adjusting the trimmer to count exactly a LED flash every 2 seconds.
- | Earclips can be made with little plastic clips and cementing the end of the wire in a position suited to make good contact with earlobes.
- | Ultra-simple earclips can be made using a thin copper foil with rounded corners 4 cm. long and 1.5 cm. wide, soldering the wire end in the center, and then folding the foil in two parts holding the earlobes.
- | To ensure a better current transfer, this kind of devices usually has felt pads moistened with a conducting solution interposed between clips and skin.
- | Commercial sets have frequently a built-in timer. Timing sessions last generally 20 minutes to 1 hour. For this purpose you can use the [Timed Beeper](#) the [Bedside Lamp Timer](#) or the [Jogging Timer](#) circuits available on this Website, adjusting the timing components to suit your needs.

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