

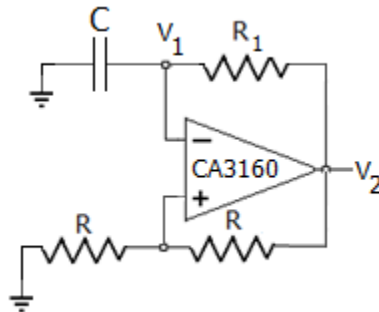
Electronics

Oscillator with one opamp

Problem 1.- To characterize a speaker, a signal is injected and the output is measured. Design an oscillator that generates a signal with controllable frequency between 1kHz and 10kHz for the input of an audio amplifier.

The ideal case would be a sinusoidal, but a simple design with a saw-tooth wave (or quasi saw-tooth) is enough in this case.

Solution: We can use the relaxation oscillator shown below:



If we choose $R=10k\Omega$, the value of R_1C has to be:

$$T = 2.2R_1C = \begin{cases} f = 1kHz \rightarrow T = 0.001s \rightarrow R_1C = 4.54 \times 10^{-4} F\Omega \\ f = 10kHz \rightarrow T = 0.0001s \rightarrow R_1C = 4.54 \times 10^{-5} F\Omega \end{cases}$$

This range can be obtained using $C = 45nF$ and a potentiometer $R_1=10k\Omega$.

The output from V_2 is a square wave, but you can use the V_1 output, which is quasi saw-tooth.

To couple this output to the amplifier we can use a voltage follower:

