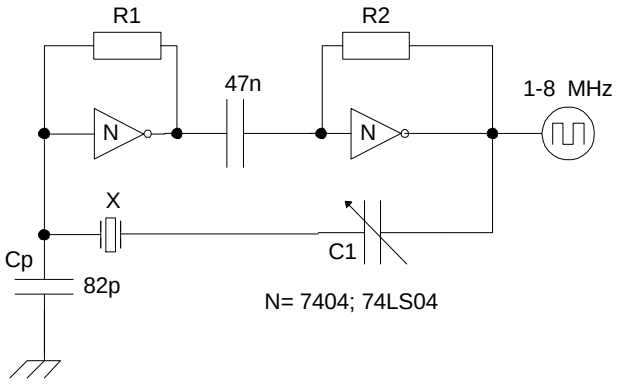
Clock oscillators

There are, basically, two categories of oscillators that are of interest to the electronics engineers: Harmonic and relaxation. The former produce sinusoidal waveforms and contains at least one active component that supplies power constantly to the passive components, whereas relaxation oscillators produce non-sinusoidal waveform, such as rectangular pulses.

An oscillator is generally an amplifier operating with positive feedback in a manner whereby an output is produced whitout any input signal. To achive the desired frequency every oscillator contains a frecuencydeterminating part, which may be an *LC* circuit, a phase-shifting *RC* network or a quartz crystal.

Requirements of a clock oscillator

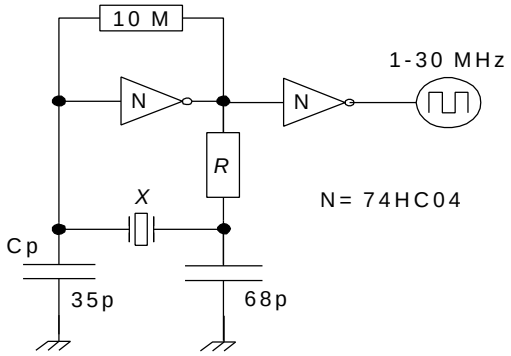
Clock oscillators must be reliable, easily reproducible and simple. An example of such an oscillator is shown in figure 1.



figur1.

This series-mode circuit suitable for operation between 1 and 8 MHz. Fine adjustment of the frequency is provided by the trimmer C_1. If the required frequency accuracy is not important the trimmer may be omitted. Capacitor C_p prevents operation on a harmonic frequency. The value of R_1 is 2k2 for operation below 2 MHz. The value of R_2 is calculated from $R_2 = 3000/fc$ where fc is in MHz.

A better oscillator using inverter gates is given in figure 2.



figur 2

It operates in parallel mode. Resistor *R* serves to limit the current through the crystal. If fine frequency adjustment is not required, C_1 may be omitted and *Cp* increadsed to 56pF. This circuit is suitable for use between 1 and 30 MHz. The value of *R* is calculated from $R = 10^4/f_c - 300$ where f_c is the crystal frequency in MHz.