

SIGNAL GENERATORS

Introduction:

Signal generator provides variety of different signals for testing various electronic circuits at low powers. The signal generator is an instrument which provides several different output waveforms including sine wave, square wave, triangular wave, pulse train and an amplitude modulated waveform.

Requirements of Laboratory Type Signal Generator:

There are different types of signal generator. But the requirements are common to all the types.

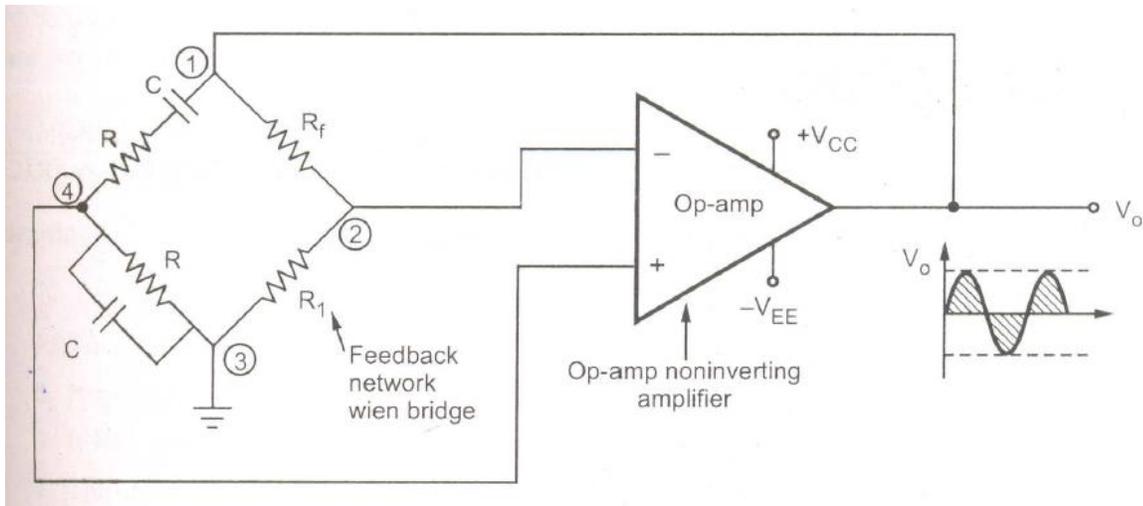
- i) The output frequency of signal generator should be very stable .
- ii) The amplitude of output signal of signal generator should be controllable from low values to relatively large values.
- iii) The amplitude of output signal must be stable. the harmonic contents in the output should be as low as possible. The output signal should be distortion free.
- v) The signal generator should provide very low spurious output; that means effect of hum, noise, jitter and modulation should be negligible.

A F oscillator:

The signal generators which provide sinusoidal waveforms in the frequency range of 20 Hz to 20 kHz are called audio frequency(A.F.) signal generator. Depending upon the load, in modern AF signal generators a provision is made to select output impedance either 50 Ω or 600 Ω . To generate audio frequency signals, in practice RC feedback oscillators are used. The most commonly used RC feedback oscillators are Wien Bridge oscillator and RC phase shift oscillator. Let us discuss both the types of oscillators in detail.

Wien Bridge Oscillator using Op-amp:

The Fig shows the Wien bridge oscillator using an op-amp.



the resistance R and capacitor C are the components of frequency sensitive arms of the bridge. The resistance R_f and R_1 form the part of the feedback path. The gain of noninverting op-amp can be adjusted using the resistance R_f and R_1 . The gain of op-amp is,

$$A = 1 + \frac{R_f}{R_1}$$

Standard signal generator:

It is extensively used in the testing of radio receivers and transmitters. This is basically a radio frequency (RF) signal generator. The standard signal generator produces known and controllable voltages.

Principle of working:

The output of the generator is amplitude modulated or frequency modulated. The frequency modulation is possible using a carrier signal from RF oscillator. The amplitude modulation can be done using internal sine wave oscillator. The modulation may be done by a sine wave, square wave, triangular wave or a pulse also. The setting on the front panel indicates the carrier frequency to be used for modulation.

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