SNS COLLEGE OF TECHNOLOGY

Coimbatore-35

An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

FUNCTION GENERATOR

DEFINITION

A function generator is a signal source that has the capability of producing different types of waveforms as its output signal. The most common output waveforms are sine-waves, triangular waves, square waves, and sawtooth waves. The frequencies of such waveforms may be adjusted from a fraction of a hertz to several hundred kHz.

WORKING PRINCIPLE

1.**Oscillator Circuit**: Function generators utilize an oscillator circuit as their core component. - This circuit generates the primary waveform (sine, square, triangle, etc.) based on the user's selection.

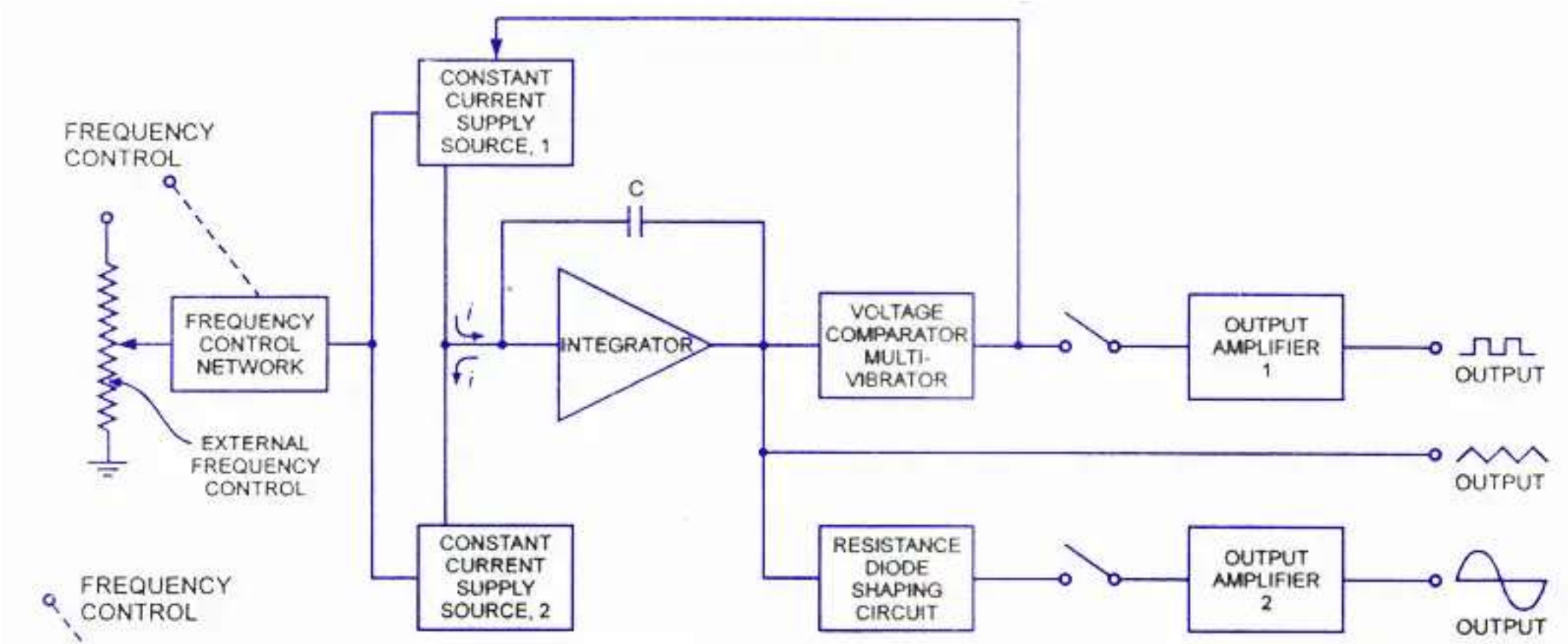
2.**Waveform Selection**: Users can choose different types of waveforms through selection switches or controls on the function generator. - Common waveform types include sine, square, triangle, sawtooth, and pulse.

3.**Frequency Control**: Function generators allow users to adjust the frequency of the generated waveform. - Frequency can typically be adjusted within a specific range, providing a wide variety of frequencies for testing purposes.

4.**Amplitude Adjustment**: The amplitude of the waveform (voltage level) can be controlled to suit the requirements of the application or experiment.This adjustment ensures compatibility with various devices or circuits being tested.

5.**Modulation Features**: Some function generators offer modulation capabilities such as amplitude modulation (AM), frequency modulation (FM), or pulse width modulation (PWM).These features enable the generation of more complex waveforms or simulate specific modulation techniques used in communication systems.

6.**Output Impedance and Protection**: Function generators usually have a defined output impedance to match typical loads and prevent damage to connected devices. - Output protection mechanisms ensure the safety of both the generator and connected equipment.



Block Diagram of Function Generator

EXPLANATION OF BLOCK DIAGRAM

The block diagram of a function generator is given in the figure. In this instrument, the frequency is controlled by varying the magnitude of the current that drives the integrator. This instrument provides different types of waveforms (such as sinusoidal, triangular and square waves) as its output signal with a frequency range of 0.01 Hz to 100 kHz. The frequency controlled voltage regulates two current supply sources. Current supply source 1 supplies a constant current to the integrator whose output voltage rises linearly with time. An **increase or decrease in the current** increases or reduces the slope of the output voltage and thus controls the frequency. The voltage comparator multivibrator changes state at a **predetermined maximum level**, of the integrator output voltage. **This change cuts-off the current supply from supply source 1 and switches to the supply source 2**. The current supply source 2 supplies a reverse current to the integrator so that its output drops linearly with time. When the output attains a predetermined level, the voltage comparator again changes state and switches on to the current supply source. The output of the integrator is a triangular wave whose **frequency depends on the current supplied** by the constant current supply sources. The comparator output provides a square wave of the same frequency as output. The resistance diode network changes the slope of the triangular wave as its amplitude changes and produces a sinusoidal wave with less than 1% distortion.

APPLICATIONS OF FUNCTION GENERATOR

There are extensive uses of a function generator across multiple domains and those are:

IN SEMICONDUCTOR DOMAIN

- Used for testing DC power supply
- For testing the delay margin
- Analyze the audio DAC
- To test clock frequency functional range of digital circuits

IN MEDICAL DOMAIN

- Used for testing medical ultrasound devices, pacemakers, implantable medical equipment, and other detector circuits
- In radiofrequency domain
- Function generators are used for calculating the BPF frequency response
- Used in EMC radio observations
- Utilized in operational testing of RFID receiver integrated circuits
- Measures pulsed noise figures

IN AUTOMOTIVE DOMAIN

- Employed for testing and optimization of engine controlling units

ADVANTAGE

1. Different waveform upto mhz freq.
2. Can be generated it can be used to generate square, sine, triangular and sawtooth waveforms calibration is internal.

DISADVANTAGE

1. They are usually not suitable for applications that need low distortion or stable frequency signals.