
MANDATORY EXPERIMENTS

Experiment 1

How can the legs of a diode be determined using a multi-meter which has no diode test feature?

Experiment 2

How can a current flow be measured using a multimeter whose current measurement section is burnt out? How about voltage measurement using a multimeter whose voltage measurement section is not working?

Experiment 3

Household electrical voltages are typically quoted as 220 V in Iran. However, these values do not represent the peak ac voltage. Rather, they represent what is known as the root mean square of the voltage, defined as

$$V_{rms} = \sqrt{\frac{1}{T} \int_0^T V_m^2 \cos^2(\omega t) dt}$$

where $T = \frac{1}{f}$ is the period of the waveform, V_m is the peak voltage, and $\omega = 2\pi f$ is the waveform angular frequency, where $f = 50$ Hz in Iran.

(a) Perform the indicated integration, and show that for a sinusoidal voltage $V_{rms} = \frac{V_m}{\sqrt{2}}$.

(b) Compute the peak voltage corresponding to the rms voltage 220 V.

(c) What does the display of a multimeter show if the household electrical voltage is measured in DC voltage mode?

Experiment 4

The DT9208 multimeter is used to measure a 5 V DC voltage. The catalog of the multimeter is available online.

(a) Calculate the measurement accuracy if the voltage is measured using the 20 V range.

(b) Calculate the measurement accuracy if the voltage is measured using the 200 V range.

(c) Calculate the measurement accuracy if the voltage is measured using the 1000 V range.

Experiment 5

The typical structural block diagram of an analog function generator is shown in Fig. 1. Explain how a sawtooth periodic signal can be generated using this structure?

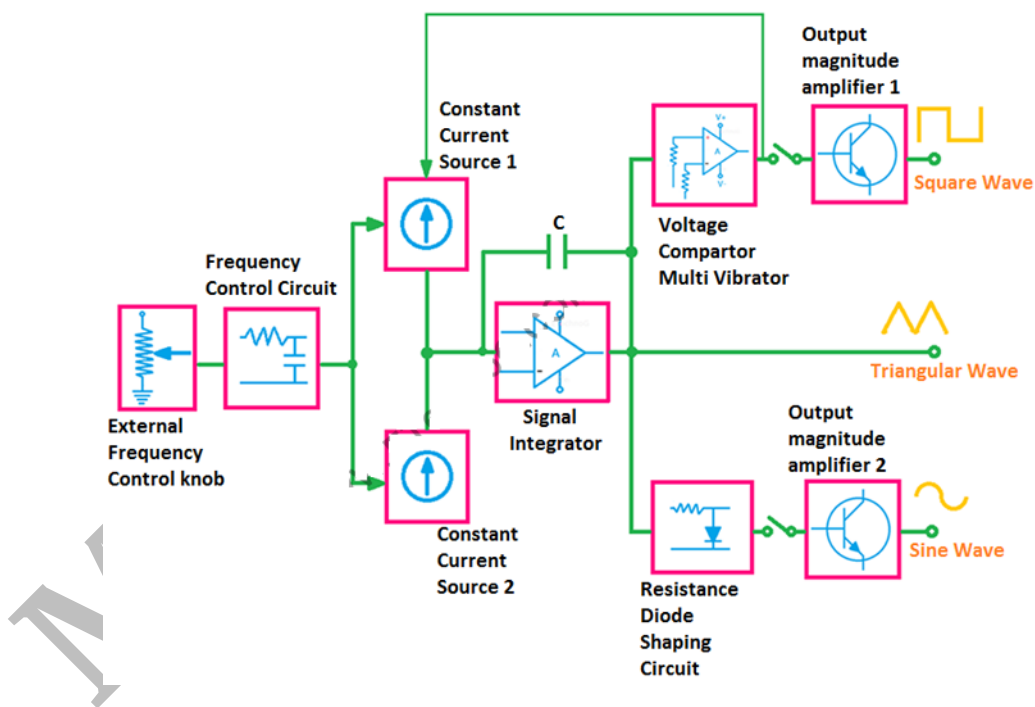


Figure 1: Block diagram of an analog function generator.

BONUS EXPERIMENTS

Experiment 6

What is the thermoelectric effect? How does it allow to measure the temperature using a multimeter?

Experiment 7

What is the piezoelectric effect? How can it be used to measure the applied mechanical stress?

Experiment 8

Return your answers by filling the \LaTeX template of the manual.

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