

Lab nr 02

Use of the oscilloscope

Goals:

The goal is to study how an oscilloscope is constructed and how to use the controls. The student should become familiar with the basic operation of the scope and with some of the advantages and limitations of its use. This experiment will help student gain familiarity with one of the most important, useful and most widely used instruments in any lab, the oscilloscope.

I Procedure

1. Identify four systems (four groups of knobs and switches) – the vertical system, horizontal system, trigger system, and display system for both: the analog and digital (PT 1200) oscilloscopes. Connect 1V signal from generator to channel 1 INPUT Y connector. Investigate the effect of the basic controls, including the intensity, focus, illumination, position, time/div, V/div, coupling, trigger and level knobs.
2. Attach audio generator to the channel 1 input directly and measure the signal amplitude. Then attach the generator via $1M\Omega$ and measure the signal amplitude. Basing on this two results calculate the value of the oscilloscope input impedance. Repeat the experiment for two different sensitivity ranges of the scope.
3. Measure the minimal and the maximal frequency of the sinusoidal signal from the not calibrated generator NCG by using: a) frequency meter, b) calibrated generator and observation of the Lissajous curves.
4. Reshape the rectangular signal by using: a) RC integrating circuit, b) RC differential circuit. For both cases measure the time constant and compare it with the calculated ones.
5. Testing half-wave and full-wave rectifiers.
 - a) take the oscillograms and measure the voltages at the chosen points (suggested by TA) of the half-wave rectifier.
 - b) take the oscillograms and measure the voltages at the chosen points (suggested by TA) of the full-wave rectifier.

Background

1. RLC circuits.
2. Four-terminal network theory.
3. Rectifier circuits, Vacuum diode, semiconductor diode.
4. Construction and operation of the analog and digital oscilloscopes.

Literature

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- [4] J. Henel *Lampy elektronowe*.
- [5] Z. Karkowski *Miernictwo elektroniczne*.
- [6] M. Łapiński *Miernictwo tele- i radiotechniczne*. (str. 84-107)
- [7] R.A. Penfold *How to Use Oscilloscopes and Other Test Equipment*
- [8] S. Prentiss *The Complete book of Oscilloscope*