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ESCOM “Escuela Superior de Cómputo”
INGENIERÍA EN SISTEMAS
COMPUTACIONALES

Análisis Fundamental de Circuitos

Práctica 10: MANEJO DEL OSCILOSCOPIO

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Objective

The student is expected to obtain the following knowledge

- The control of the oscilloscope controls.
- Evaluate the adjustment signal for test leads of a general-purpose oscilloscope.
- Operate a generator of voltage signals in sinusoidal, square and triangular functions.
- Measure the voltage of c.d using the horizontal input or the vertical input of the oscilloscope.
- Obtain and evaluate voltage vs. voltage graphs time in basic circuits to measure amplitudes, periods and frequencies of voltage signals.
- Use the two vertical inputs of the oscilloscope for the measurement of the phase shift between two sine signals using the Y (t) mode and that of the Lissajous figures in the XY mode.

Material

- 1 Resistor 4.7 K Ω a $\frac{1}{2}$ watt.
- 2 Resistors 10K Ω a $\frac{1}{2}$ watt.
- 1 Capacitor de 0.1 μ F.
- 1 Protoboard.
- Connection wires.
- 3 oscilloscope points.

Equipment

- 1 Oscilloscope.
- 1 Functions generator.
- 1 Variable voltage source.
- 1 Multimeter.

Theoric Introduction

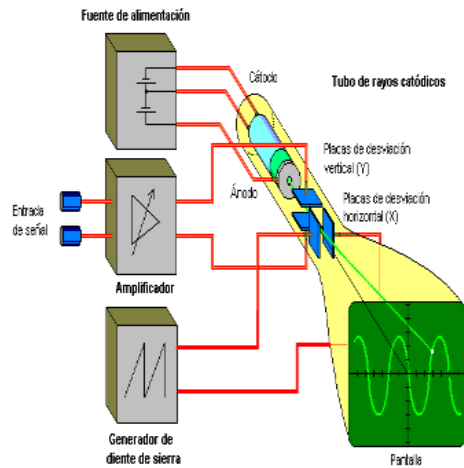
Operating principle of the oscilloscope.

The functioning of this measuring instrument is similar to that of the kinescopes of TV receivers: the electron gun (cathode) sends a beam towards a screen covered with a phosphorescent material; During its journey, the beam

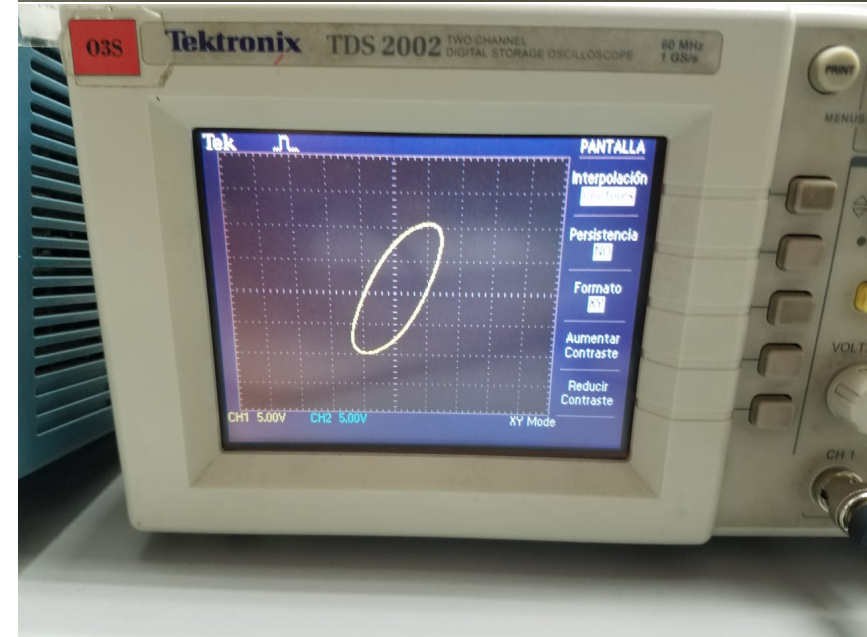
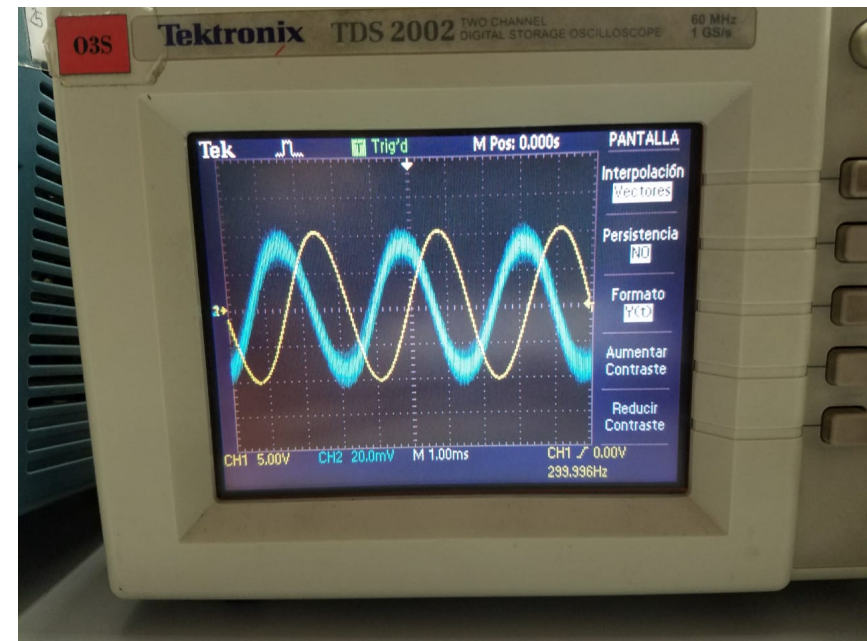
passes through stages of focus (grids) and acceleration (anodic attraction), so that striking the screen produces a bright spot, by means of properly located baffle plates, it is possible to modify the straight path of the electrons, both vertically and horizontally, thus allowing the deployment of diverse information. Allowing to observe details that by other means would be impossible to visualize.

DEFINITION, USE AND TYPES OF OSCILLOSCOPE

An oscilloscope is an electronic measuring instrument for the graphic representation of electrical signals that can vary over time. It is widely used in signal electronics, often together with a spectrum analyzer. It presents the values of the electrical signals in the form of coordinates in a screen, in which normally the X axis (horizontal) represents times and the Y axis (vertical) represents tensions. The image thus obtained is called an oscillogram. They usually include another entry, called "Z axis" or "Wehnelt cylinder" that controls the brightness of the beam, allowing to highlight or extinguish some segments of the trace. The oscilloscopes, classified according to their internal operation, can be both analog and digital, the result being identical in either case, in theory.



Graphs



Experimental progress

Energize the oscilloscope and locate the calibration test terminal on the dial of the oscilloscope. Connect said terminal to channel 1 using the oscilloscope cable, then select the trigger source (it must be CH1). Adjust the voltage amplitude and time base controls to a scale that allows you to properly view a complete cycle of the calibration test signal. Select the triangular signal of 5Vpp at a frequency of 10KHz. Connect it to the input of channel 1 of the oscilloscope, select the coupling position to GND and verify that the trace crosses in the center of the graticule.

Questionary

1. Explain the operation of the Oscilloscope.
 - i. It is an electronic visualization instrument for the graphic representation of electrical signals that can vary over time. It presents the values of the electrical signals in the form of coordinates in a screen, in which normally the X axis (horizontal) represents times and the Y axis (vertical) represents tensions.
2. What is the function of a function generator?
 - i. It is an electronic laboratory device that generates periodic or non-periodic signal patterns, both analogue and digital.
3. What are the Lissajous graphs for?
 - i. The Lissajous figures are used to determine the frequency and relative phase between two sinusoidal oscillations. Nothing to do with resistance.
4. What are the operating modes Y(t) and XY used for?
 - i. As a representative system, an analog oscilloscope is a tracer x, and where the coordinate of the point on the screen corresponds to the amplitude of the signal that is represented, and the abscissa or is proportional to the time interval from a reference point
5. What do you mean by coupling in D.C.
 - i. The AC coupling consists of using a capacitor to filter the DC component of an AC signal.
6. What is an OFFSET signal?
 - i. The offset of an alternating signal can be defined as the level of continuous that adds to an alternating signal. Thus, if the signal is centered at the origin, it is said that the offset level is 0. If it is displaced

upwards, the offset is positive, whereas if it is displaced downwards, it will be negative.

7. What does it mean if a signal is out of phase?
 - i. Offset between two waves is the difference between its two phases. Usually, this phase difference is measured at the same instant for the two waves, but not always in the same place in space.

Inferences

The use of oscilloscope is very useful to know the behavior of some type of signal and about this to be able to handle and know how the function behaves in a certain moment, since the oscilloscope does not have as only function to represent graphs in cartesian axes but also that function is associated with time so it is easy to determine when it changes faster or in some cases are not very significant change

Bibliography

- 1) https://www.equiposylaboratorio.com/sitio/contenidos_mo.php?it=1484