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BTE 2132: Electrical Fundamentals and Circuit Analysis II Laboratory (Oscilloscope- Dual CH)

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Course Information

- Aims
    1. Describe the operation of an oscilloscope
    2. Use an oscilloscope to measure dc and ac voltages
    3. Measure period and frequency of an ac waveform
    4. Measure amplitude and peak-to-peak voltage
    5. Measure instantaneous voltage.
- Expected Outcomes
    1. Students should be able to calibrate an oscilloscope
    2. Students should be able to measure DC voltage using an oscilloscope
    3. Students should be able to measure AC voltage using oscilloscope

- References
    1. A. Robbins and W. Miller, Lab Manual to Accompany Circuit Analysis-Theory and Practice, 5th ed., DELMAR CENGAGE Learning, Fifth Edition, 2013.
    2. A. Robbins and W. Miller, Circuit Analysis-Theory and Practice, 5th ed., DELMAR CENGAGE Learning, Fifth Edition, 2013.
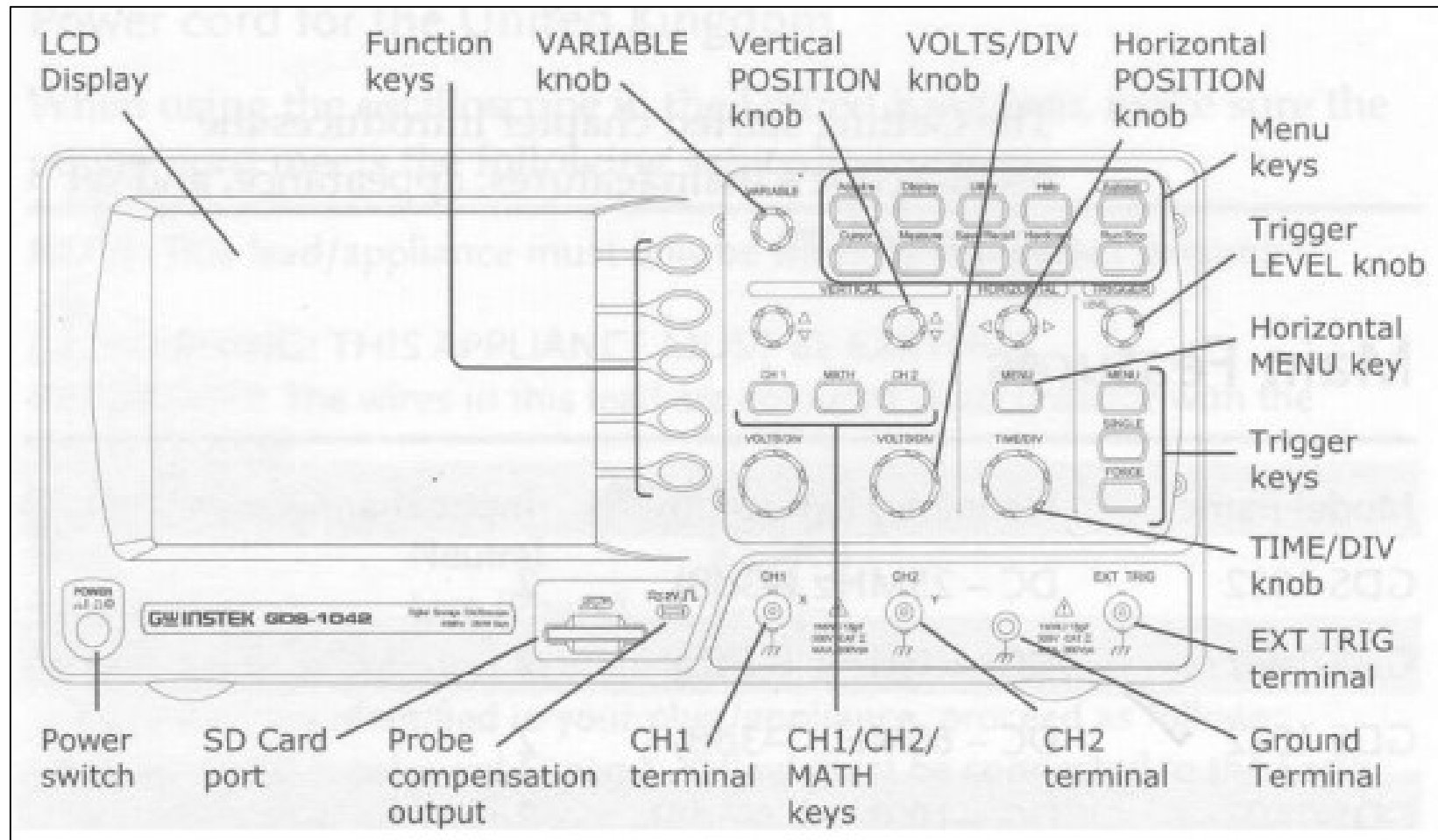
Introduction

An oscilloscope is a very useful piece of electronic test equipment. Mostly everyone has seen an oscilloscope in use, in the form of a heart-rate monitor (electrocardiogram) of the type seen in doctor's offices and hospitals. Oscilloscope is used mainly in AC circuits but it is also useful for other measurements in DC circuits or other applications.
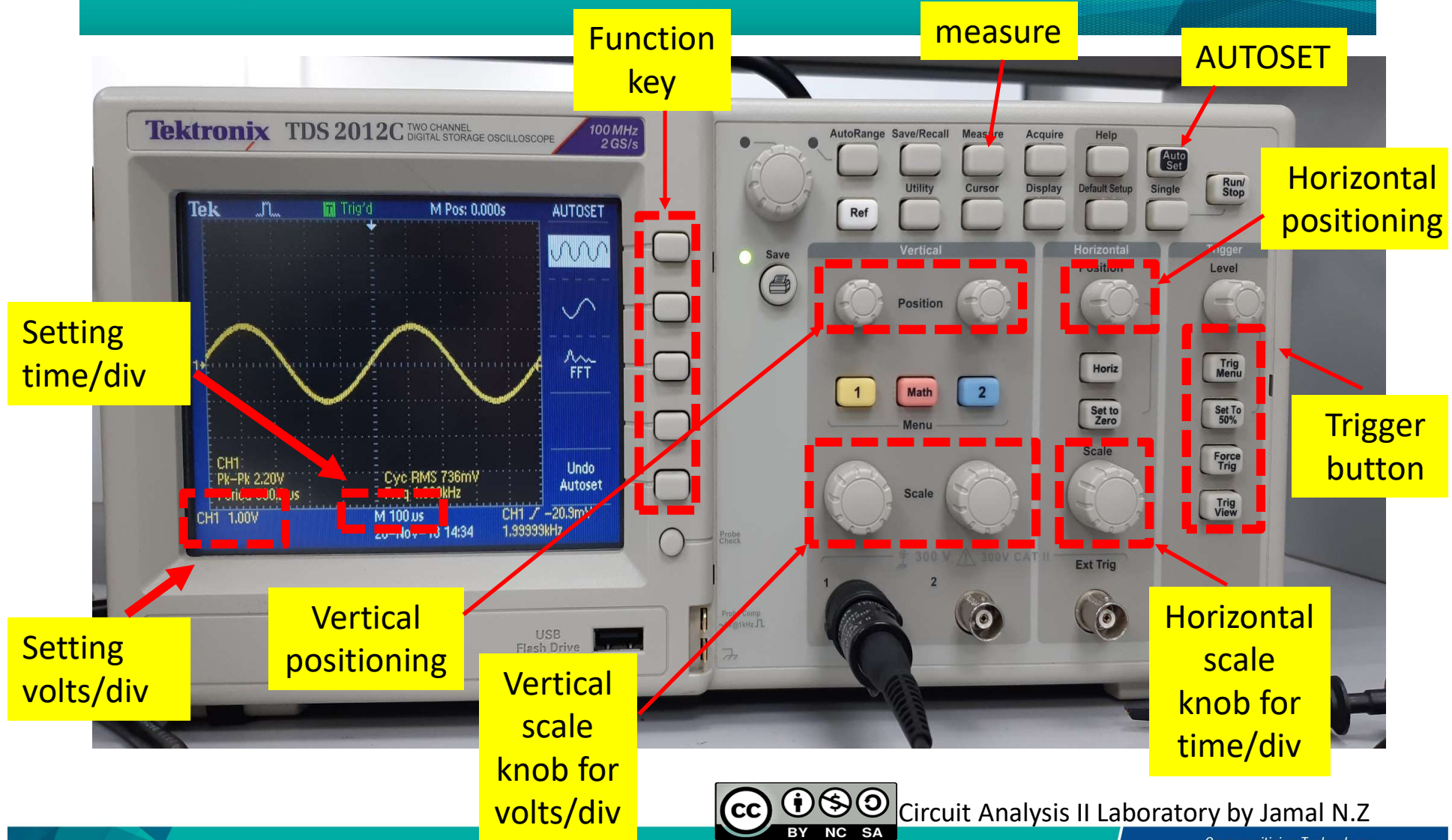
A digital oscilloscope measures a waveform by taking a sample of the waveform during a period called sampling time. By displaying the samples after signal processing, the accurate waveform can be viewed on the screen. The digital oscilloscope also stores the samples in its memory. This feature enables us to save the waveform and measure other characteristics of the waveform later.
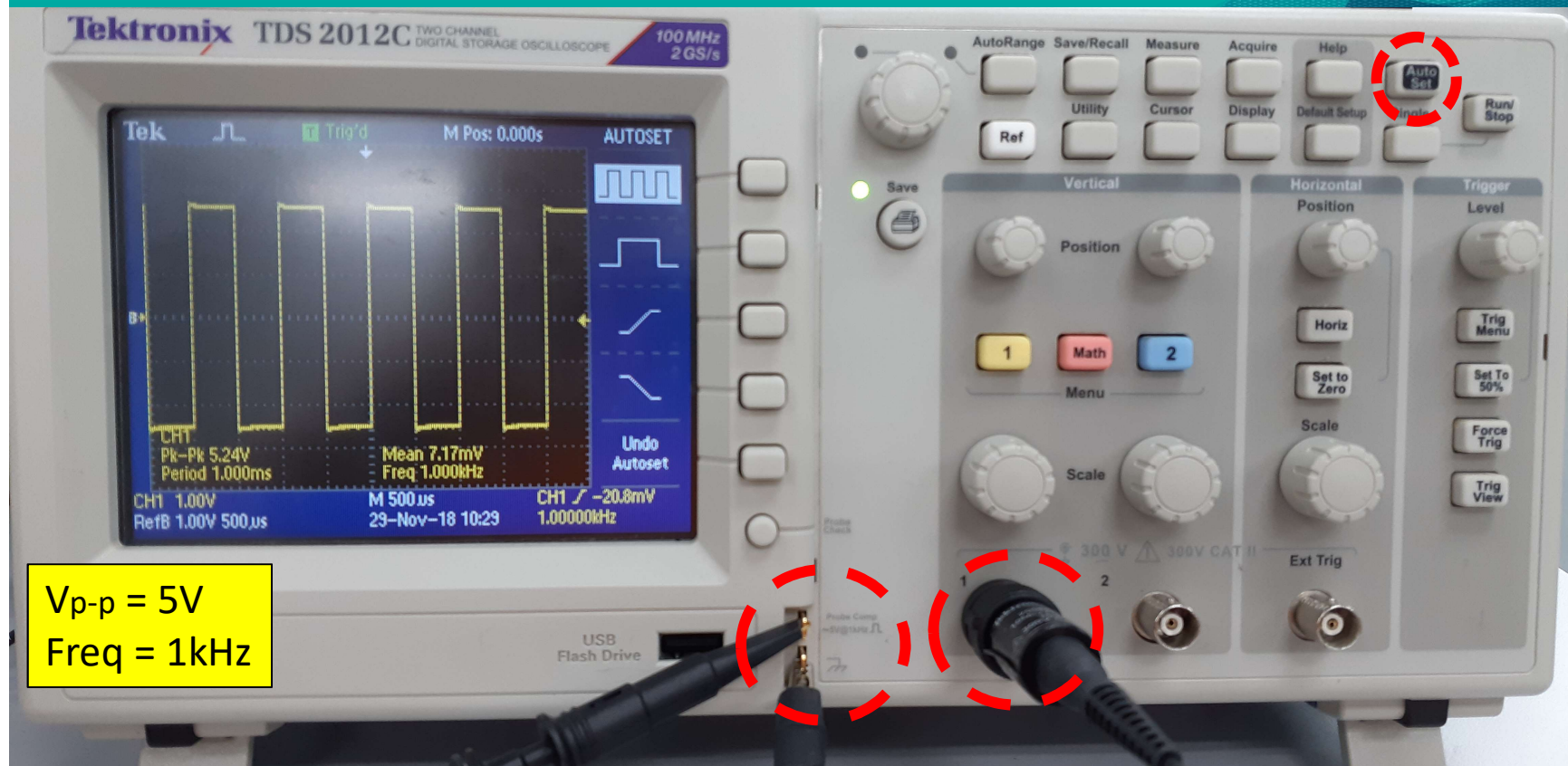
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Oscilloscope – front view (dual CH)

Front view of dual CH

Function key

measure

AUTOSET

Horizontal positioning

Setting time/div

Trigger button

Setting volts/div

Vertical positioning

Vertical scale knob for volts/div

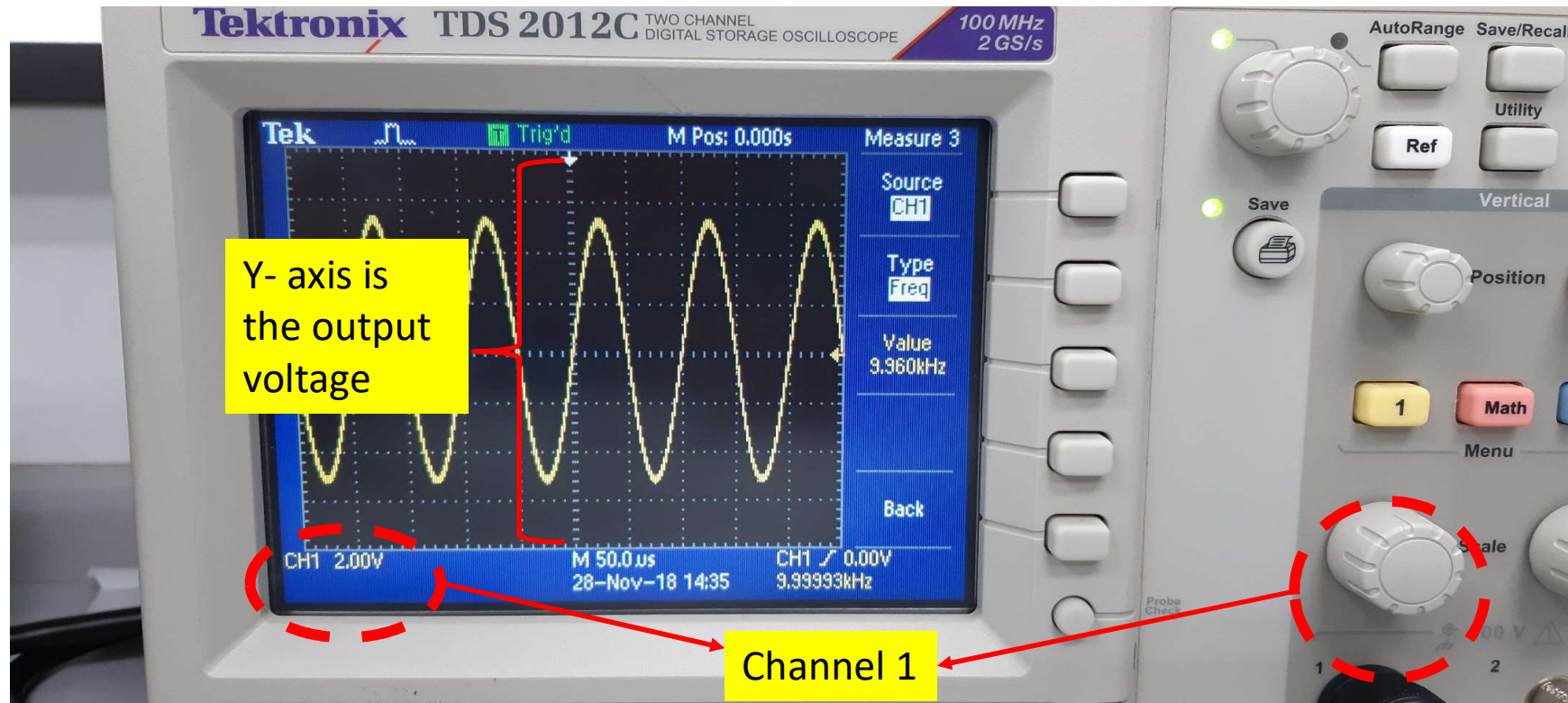Horizontal scale knob for time/div

How to calibrate an oscilloscope

Vp-p = 5V
Freq = 1kHz

✓ Connect the probe to either CH1 or CH2.
✓ Connect the end probe as above highlighted picture. Make sure ground probe is connected to ground of oscilloscope.
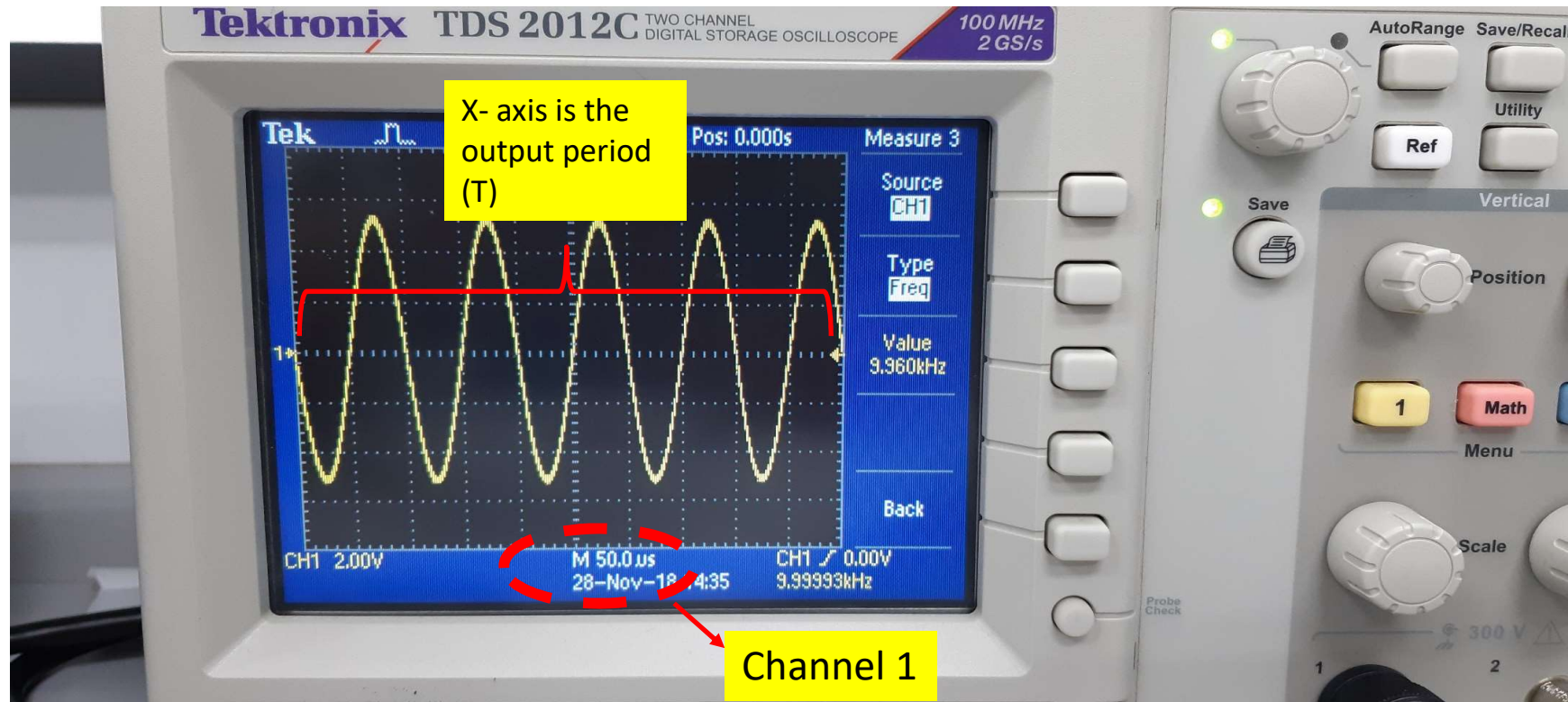✓ Then press AUTOSET for the best setting.

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How to set volts/div

✓ Turn the vertical scale knob left or right on the CH1 to adjust the setting on volts/div and you can observe that the y-axis waveform will be changed .

✓ Otherwise you may use AUTOSET for the best setting.

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How to set time/div

X- axis is the output period (T)

Channel 1

✓ Turn the horizontal scale knob left or right on the CH1 to adjust the setting on time/div and you can observe that the x-axis waveform will be changed .
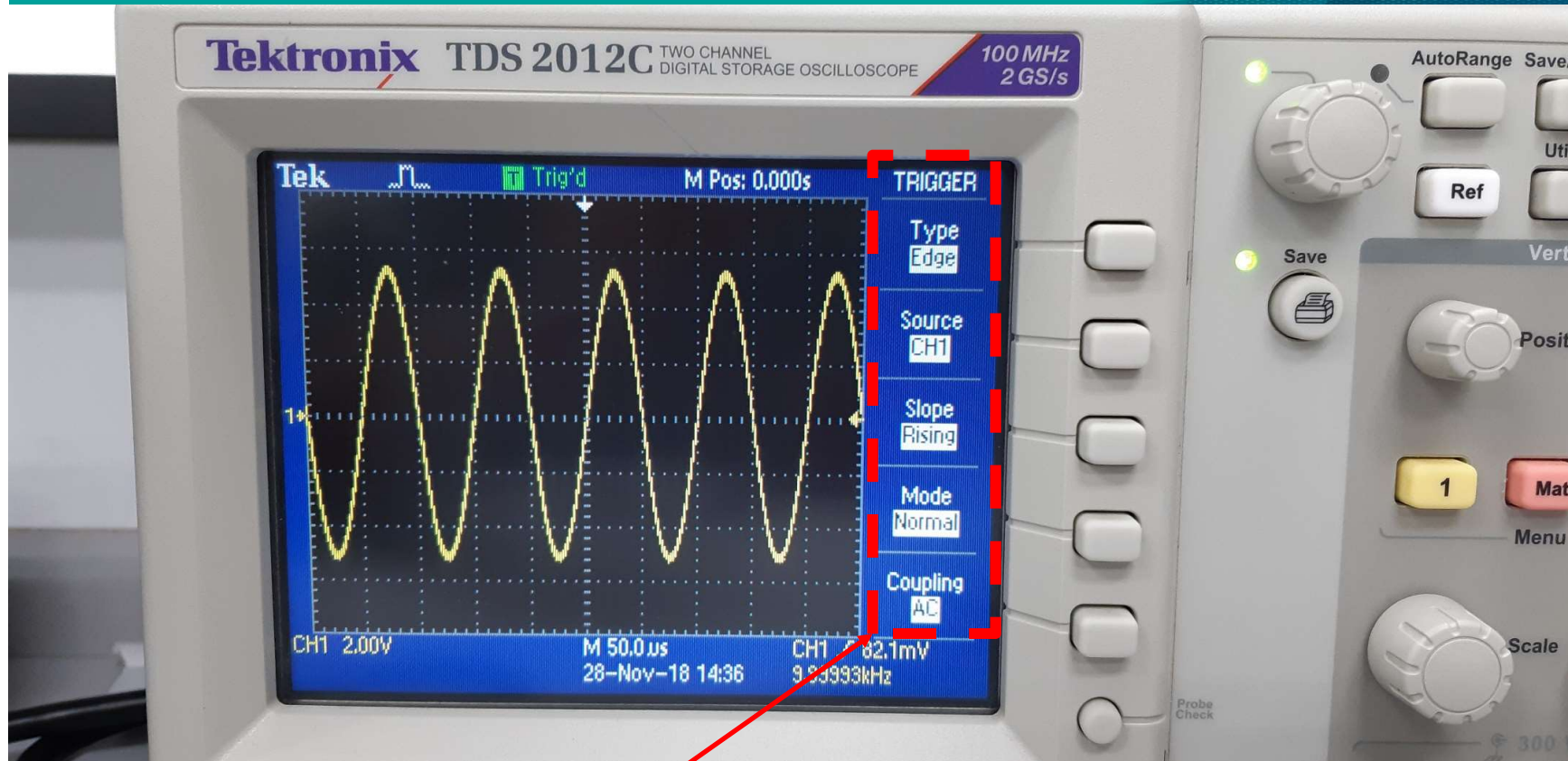✓ Otherwise you may use AUTOSET for the best setting.

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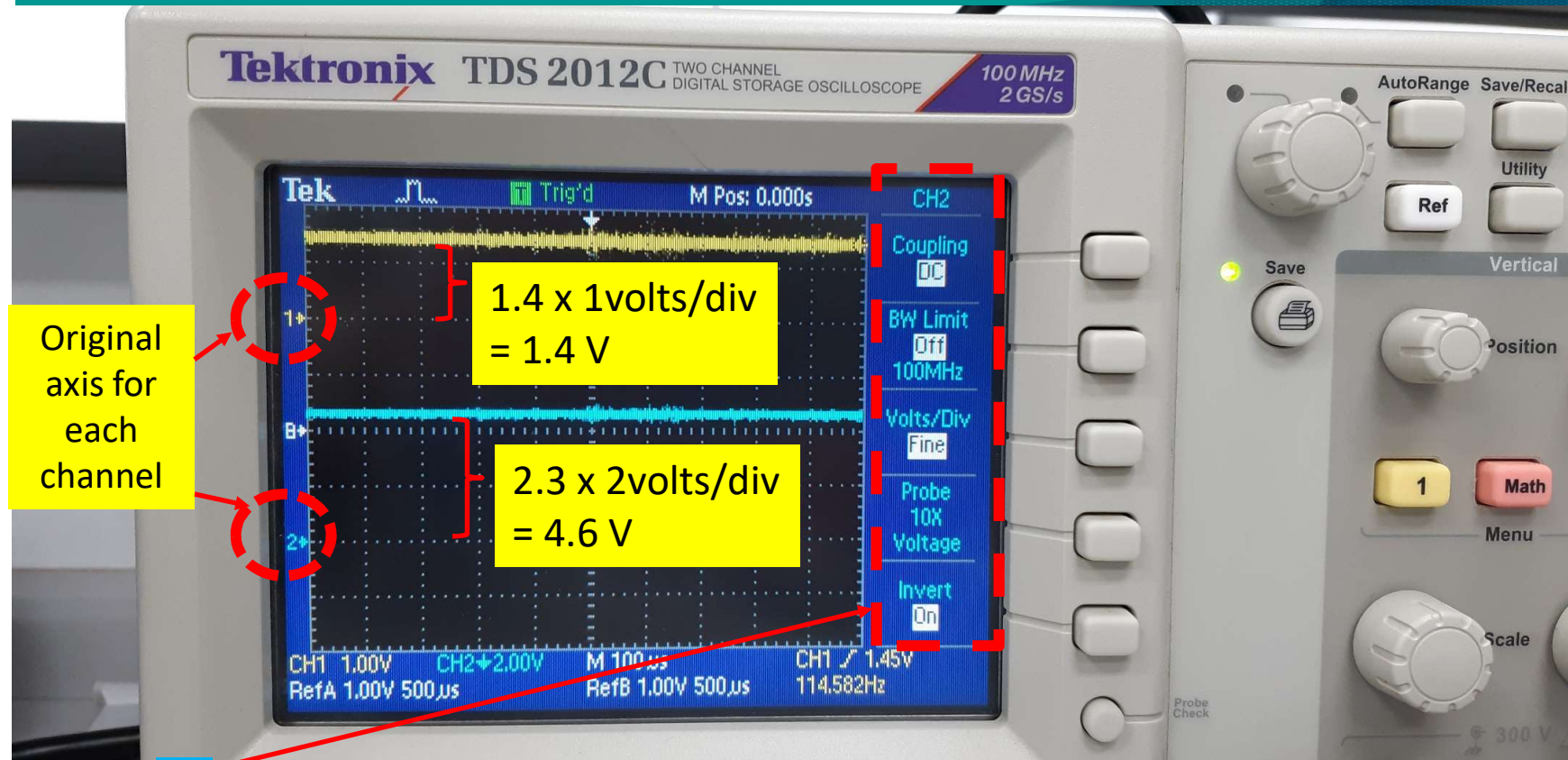
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How to use trigger button

- ✓ Press trigger button, the highlighted menu will be appeared.
- ✓ You may change the coupling AC/DC, source CH, slope and etc. accordingly.

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How to set CH input

Original axis for each channel

1.4 x 1volts/div = 1.4 V

2.3 x 2volts/div = 4.6 V

✓ Press **2** button for CH2 or **1** for CH1 ,the highlighted menu will be appeared.
✓ You may invert the waveform, change the coupling type and probe setting accordingly.
✓ Note that yellow waveform is for CH1 and blue waveform is for CH2

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How to use MATH button
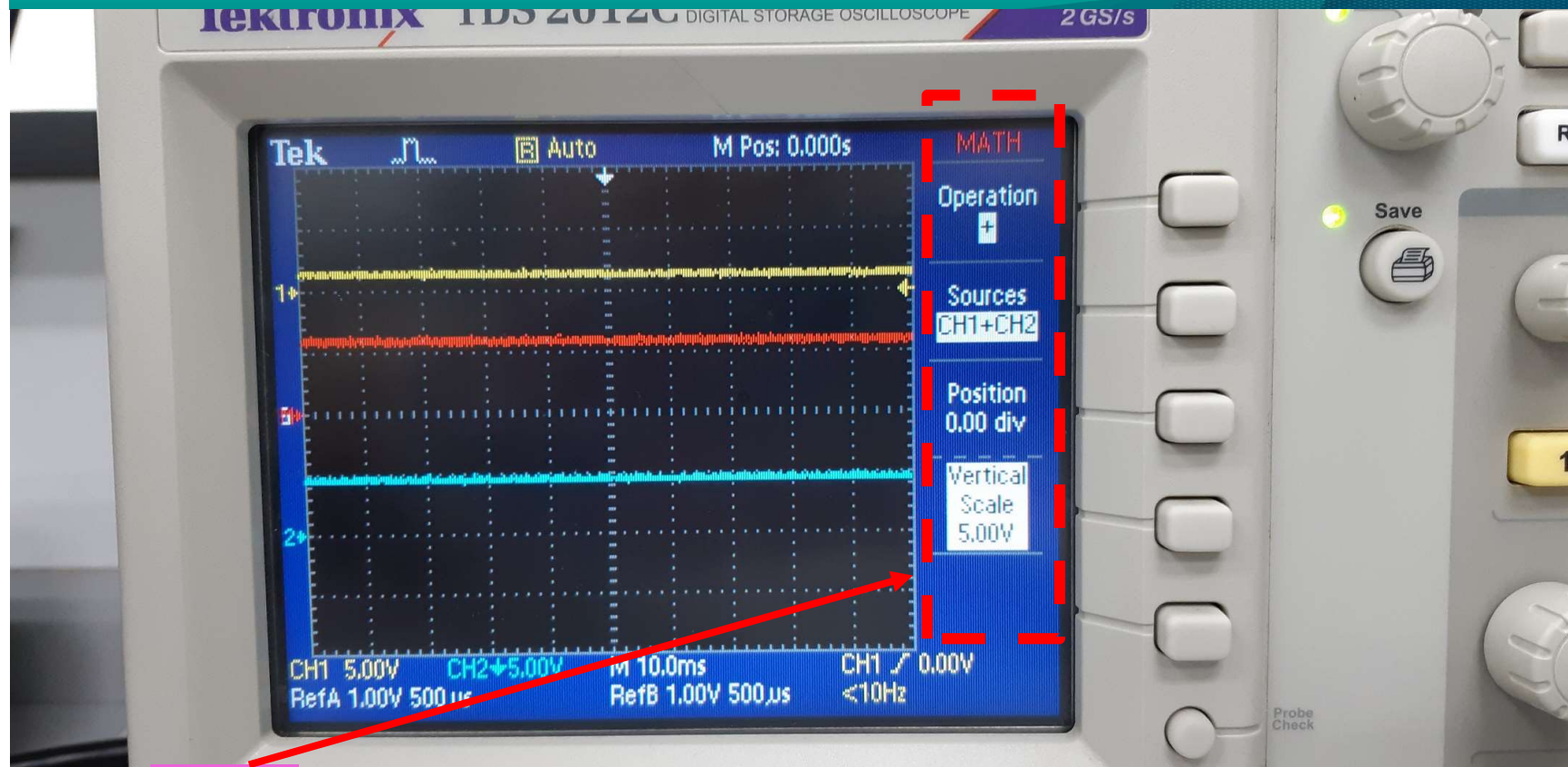
- ✓ Press **MATH** button, the highlighted menu will be appeared.
- ✓ You may change the mathematical operation accordingly.
- ✓ Red waveform is the result.

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References

Recommended References:

i. A. Robbins and W. Miller, Lab Manual to Accompany Circuit Analysis-Theory and Practice, 5th ed., DELMAR CENGAGE Learning, Fifth Edition, 2013.

ii. A. Robbins and W. Miller, Circuit Analysis-Theory and Practice, 5th ed., DELMAR CENGAGE Learning, Fifth Edition, 2013.

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