Electronics and hand on training

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Introduction:

Almost every physicist-experiment requires particularly, engineer working with physical equipment who needs a basic understanding of electronics, e.g. for connection circuits and control elements design.

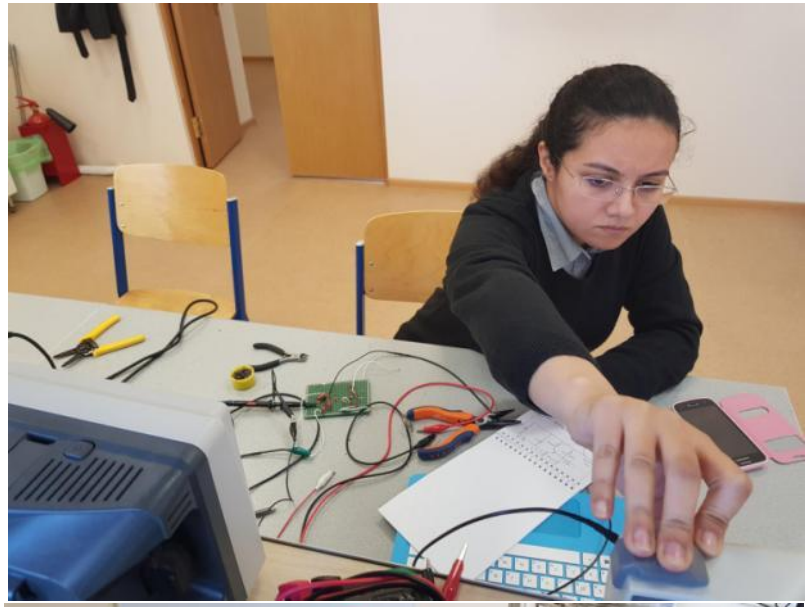
Description:

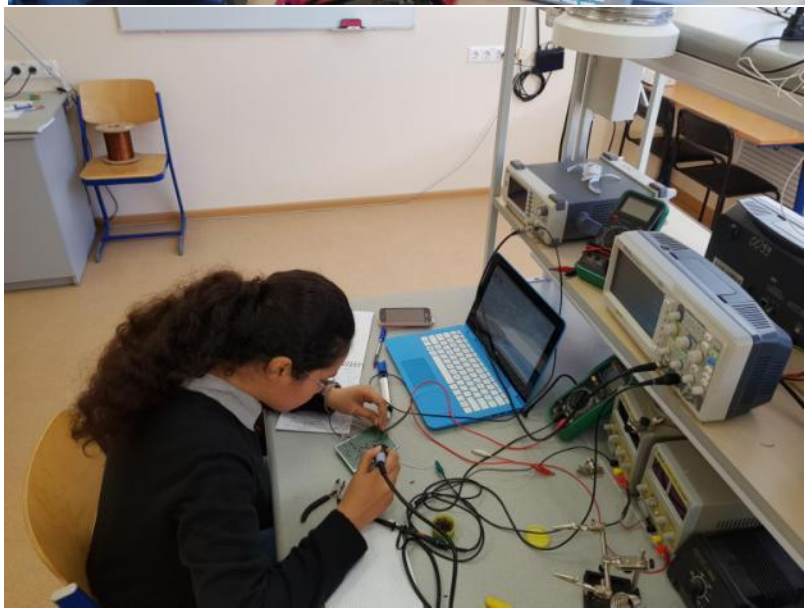
The practice is nominally divided into:

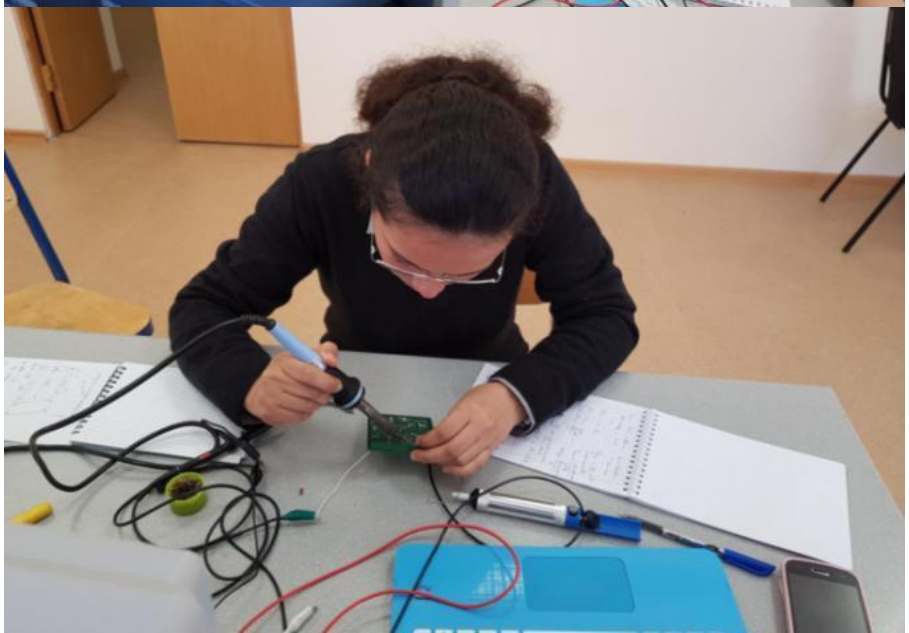
1- Basics part

2- Advanced part

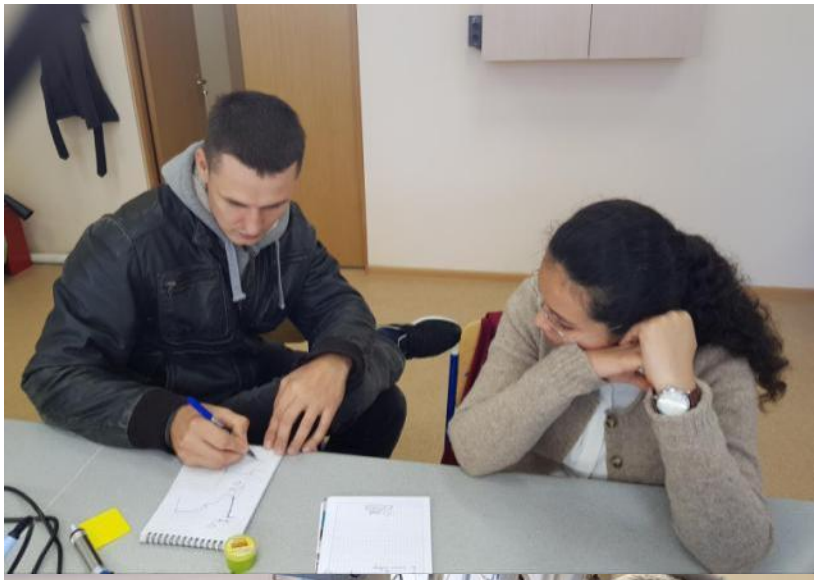
1-Basic (b) Part aims to acquire skills like

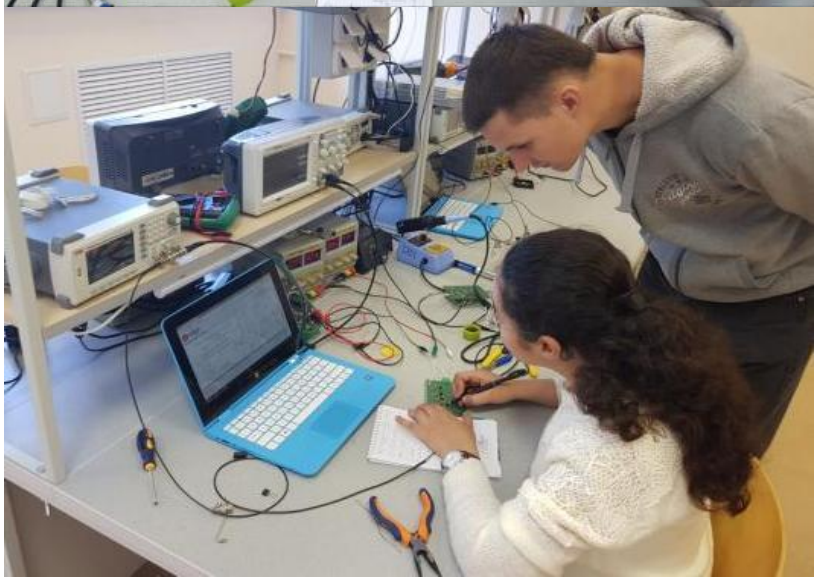


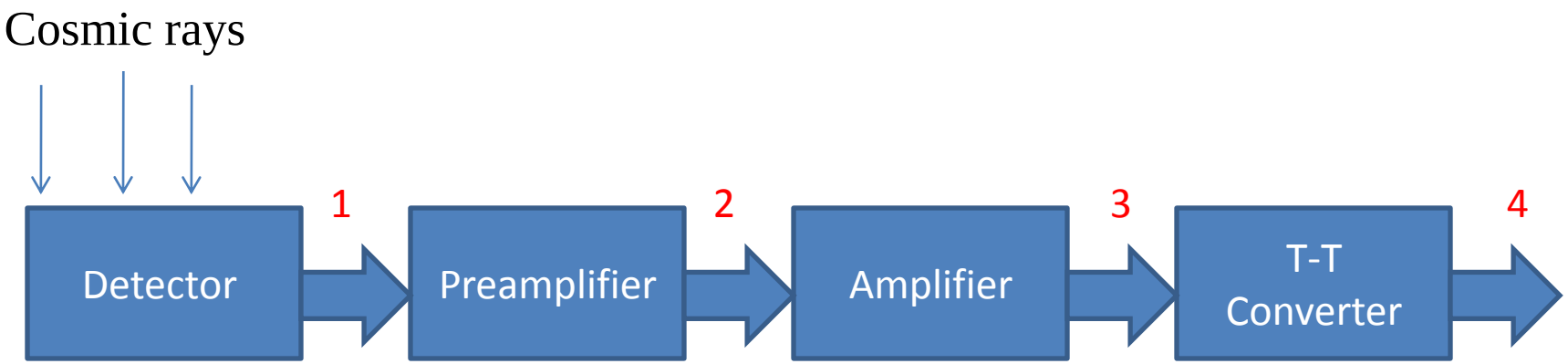




2- Advanced (a) part: aims to calculate and assembling circuits used for coupling between instruments depending on specifications of experiments.







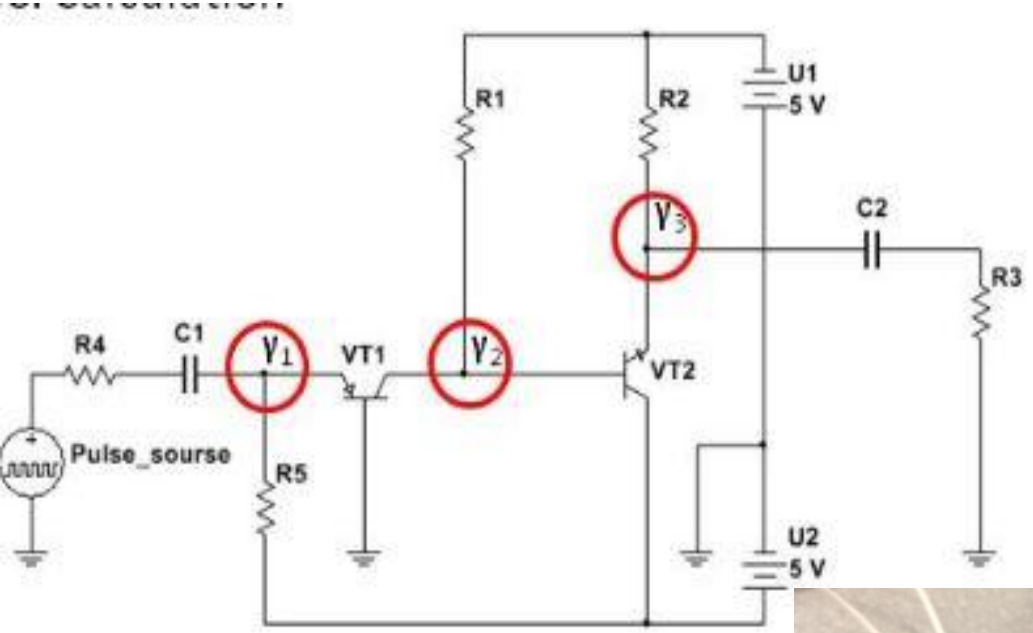
1-Signal with very low energy.

2-The same signal with higher power which is consistent to the next step.

3- Amplified signal with the same form and duration.

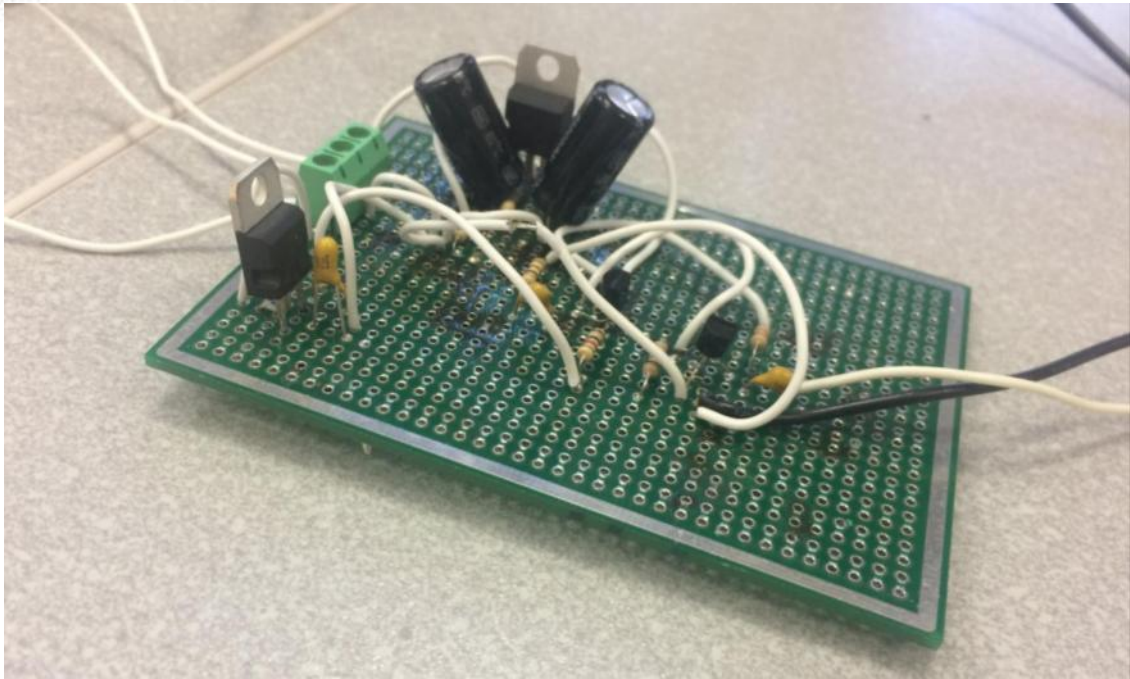
4- Signal with higher duration.

Preamplifier on CBC and CCC:



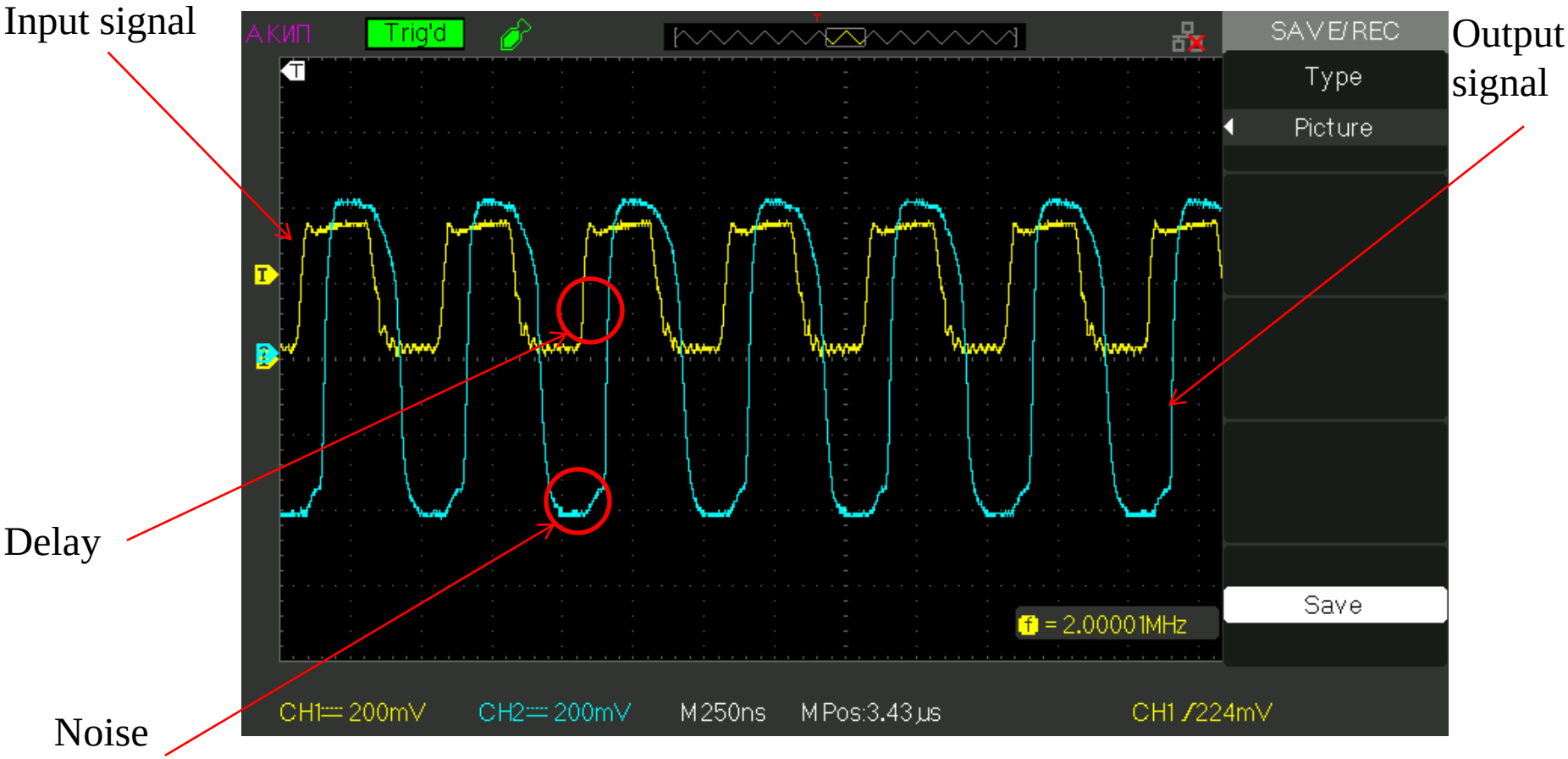
1- Adding voltage stabilizer to keep supply volt at 5V.

2- Using LPF to cut noise from power supply.



Preamplifier on CBC and CCC:

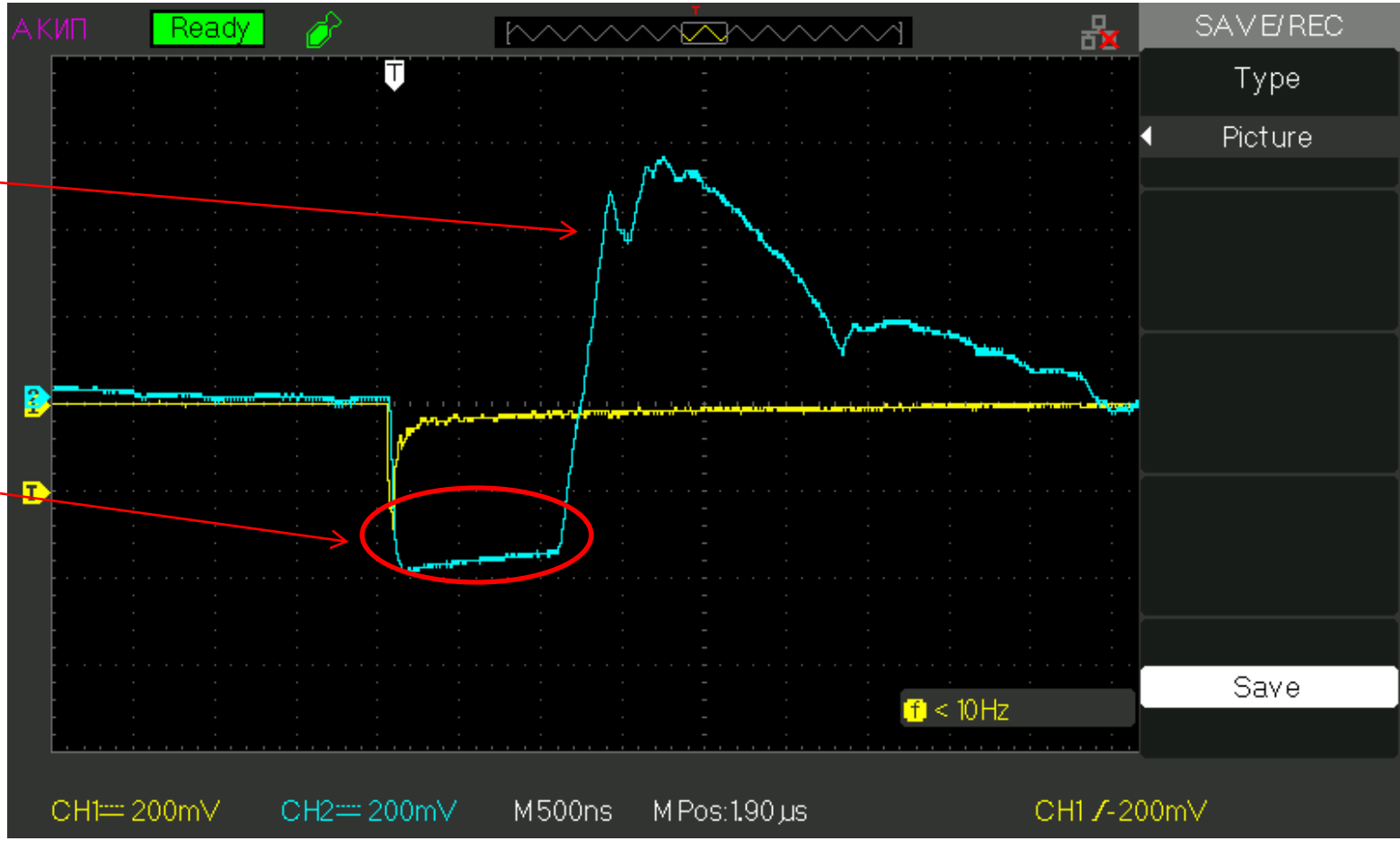
1- Testing circuit using signal from wave generator



2- Signal from real cosmic ray detector

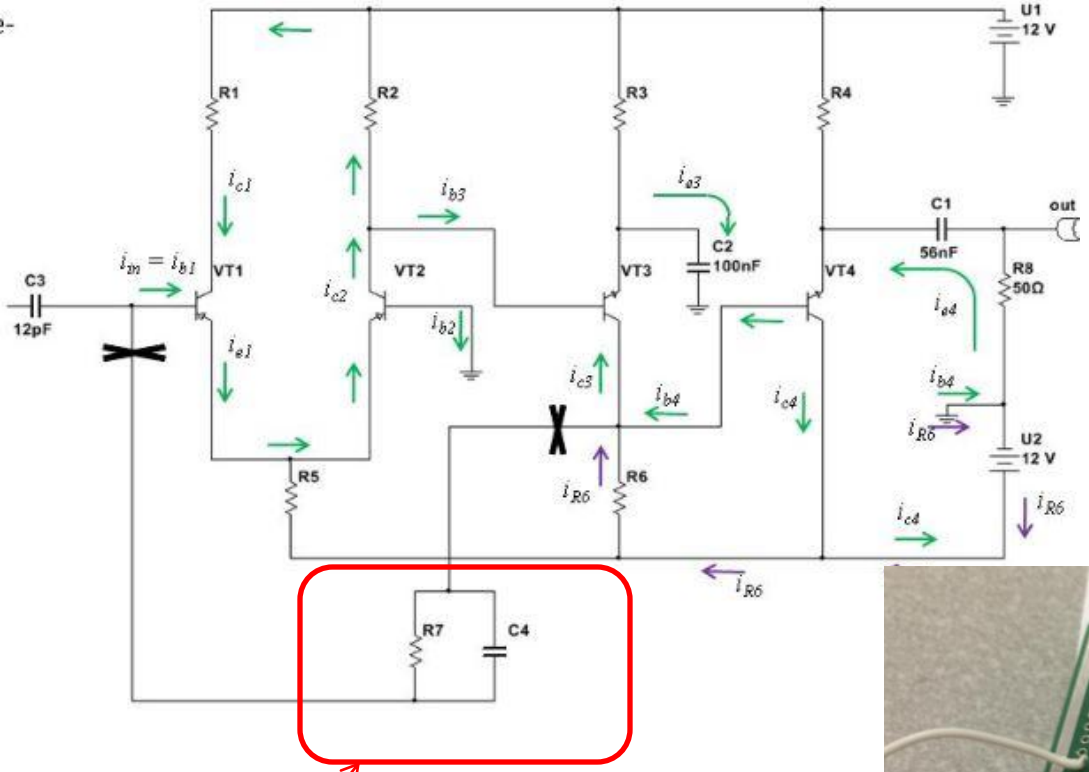
Positive distortion

High duration



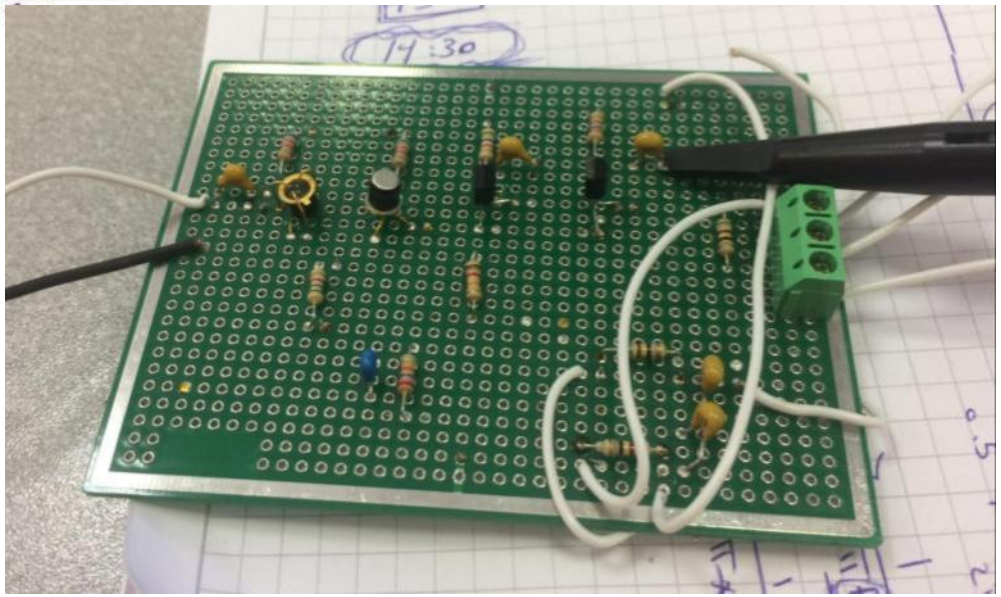
Vin=300 mv
Vout= 400 mv
Gain = 1.33

Charge-Sensitive amplifier based on DA, CE and CC.



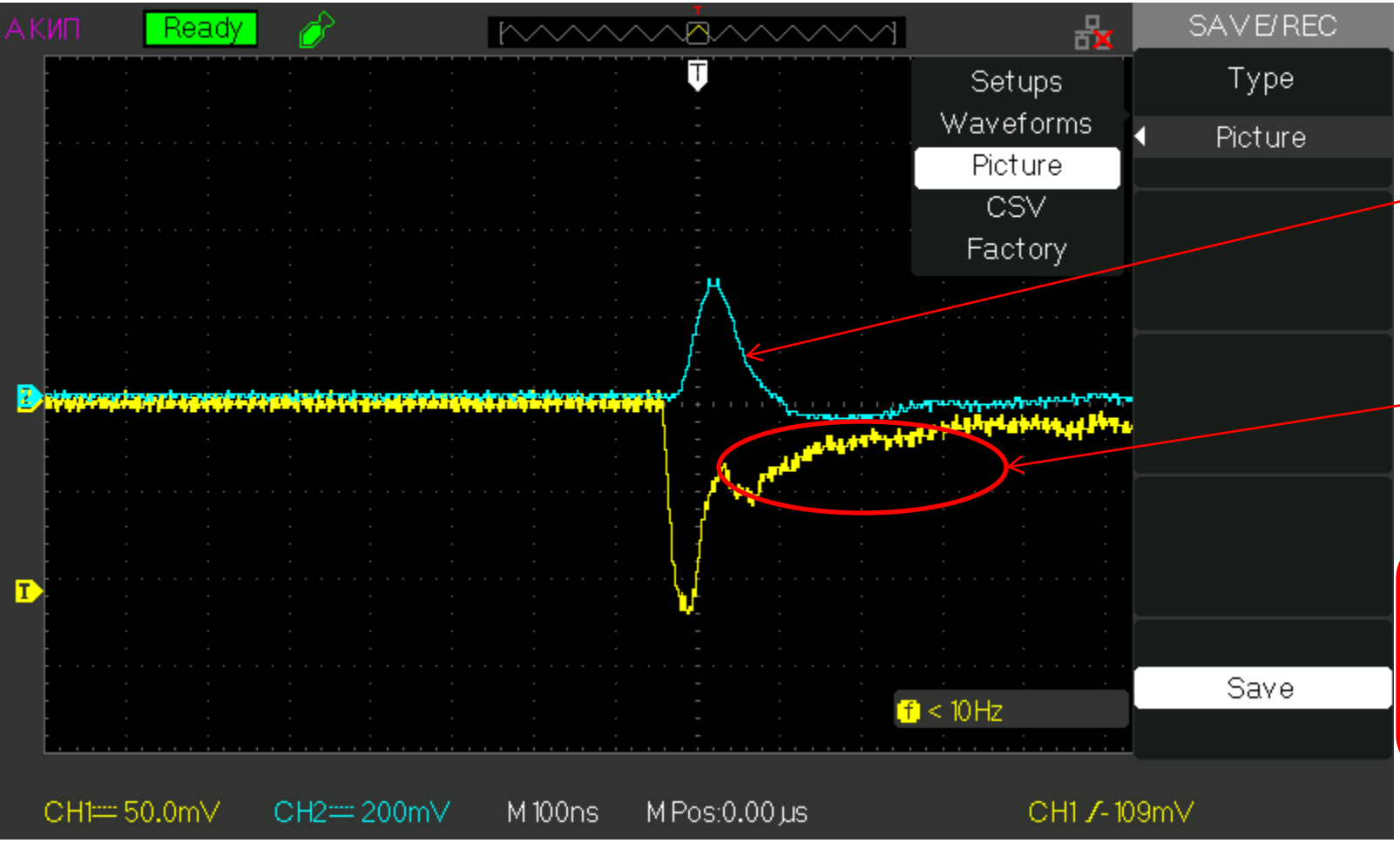
1-O/P gain can be increased by increasing capacitance at input.

2-using LPF to cut noise from power supply.



Tuning feed back circuit for input synchronization.

Charge-Sensitive amplifier based on DA, CE and CC.

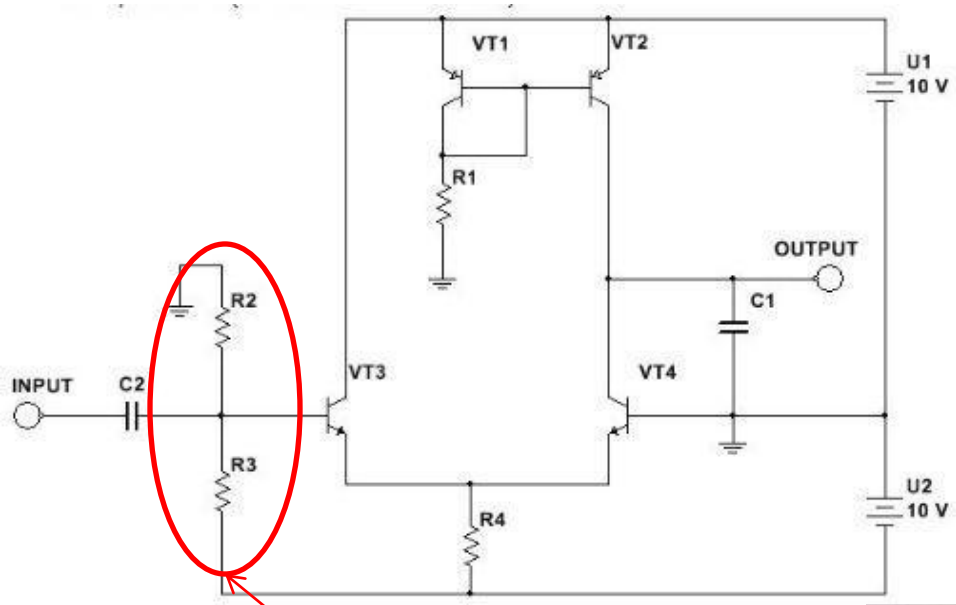


Undistorted and synchronized O/P signal

I/P signal with noise

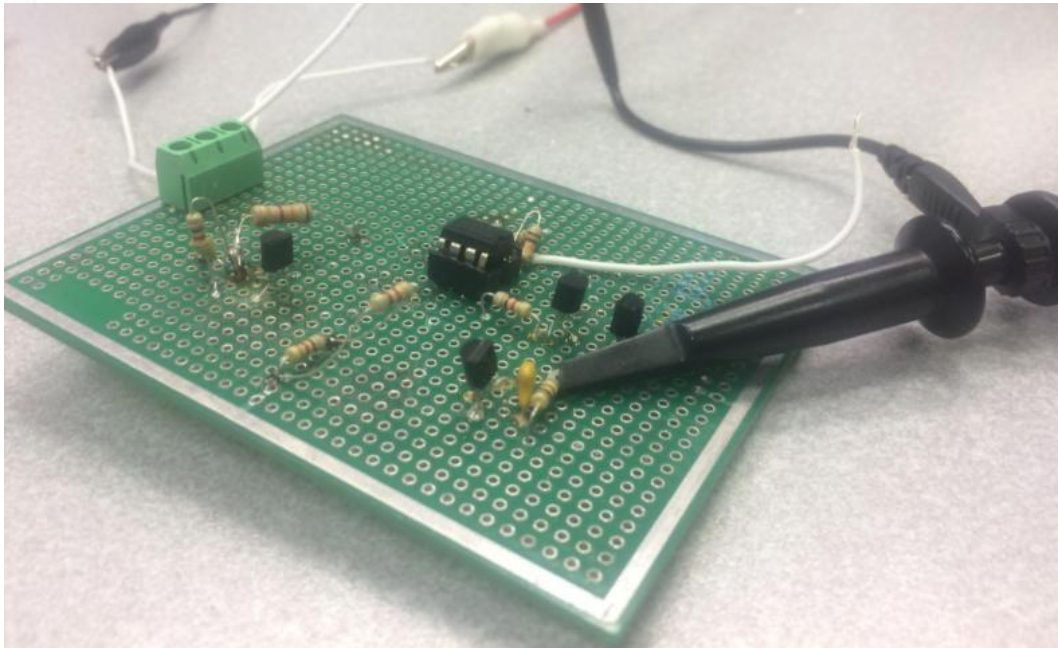
Vin=110 mv
Vout= 240 mv
Gain = 2.18

T-T Converter circuit:

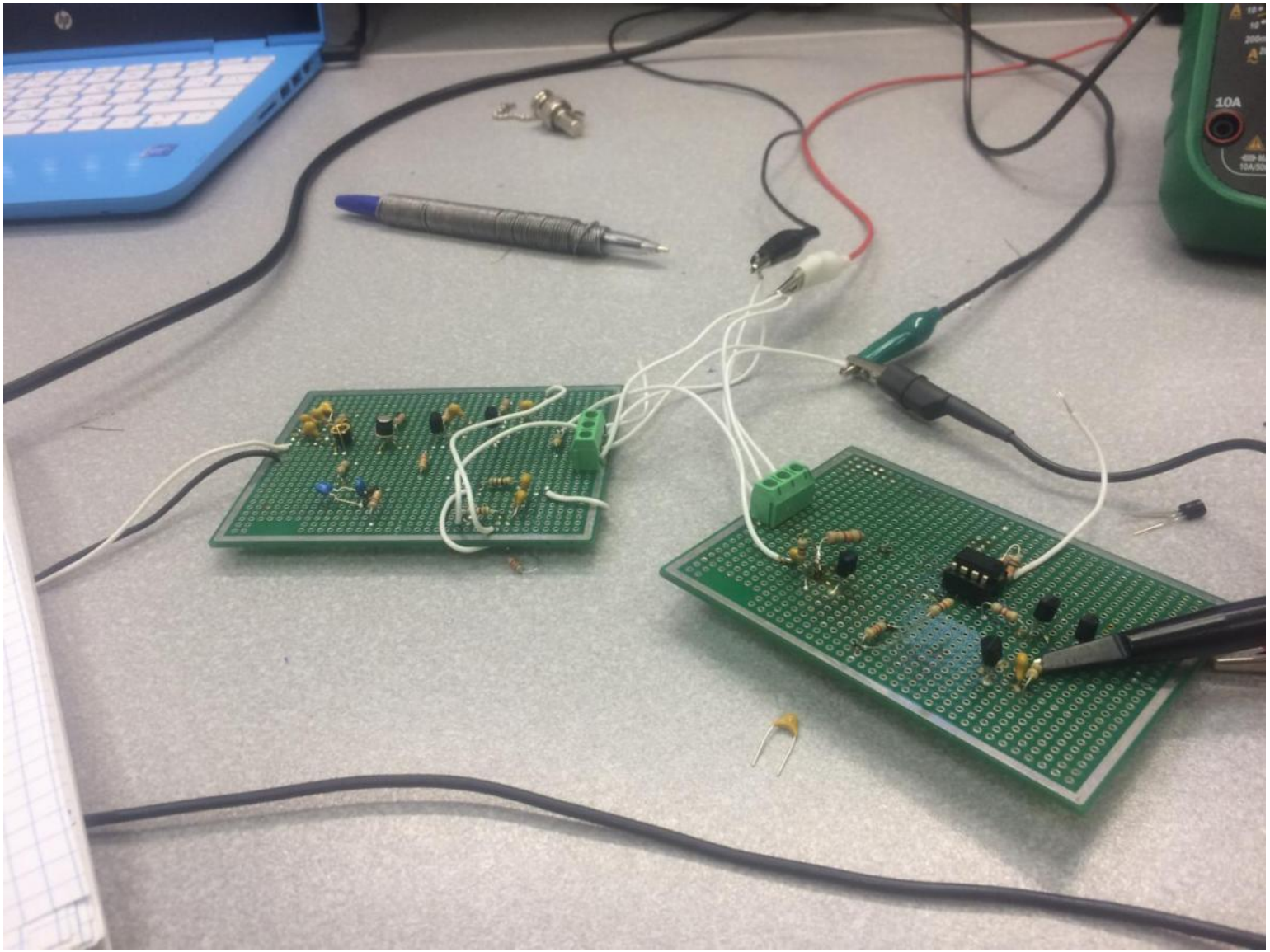


1- This circuit acts like a timer which keep the signal for long time.
2- Time gain can be increased by tuning R1 for charging time and (R1,R4) for discharging time.

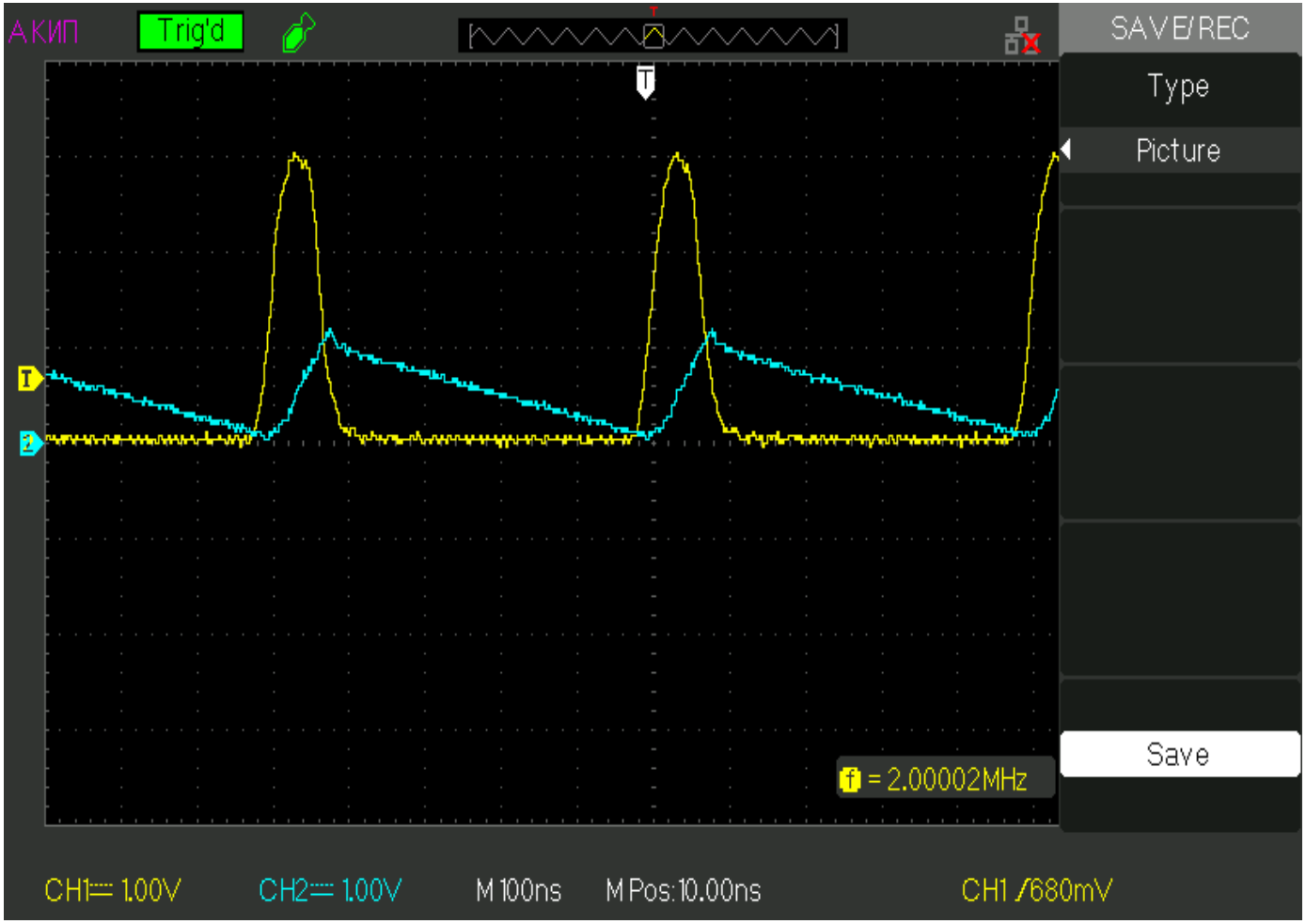
1-Voltage divider (R2and R3) that set the threshold level of this circuit.



Charge sensitive amplifier +T-T Converter

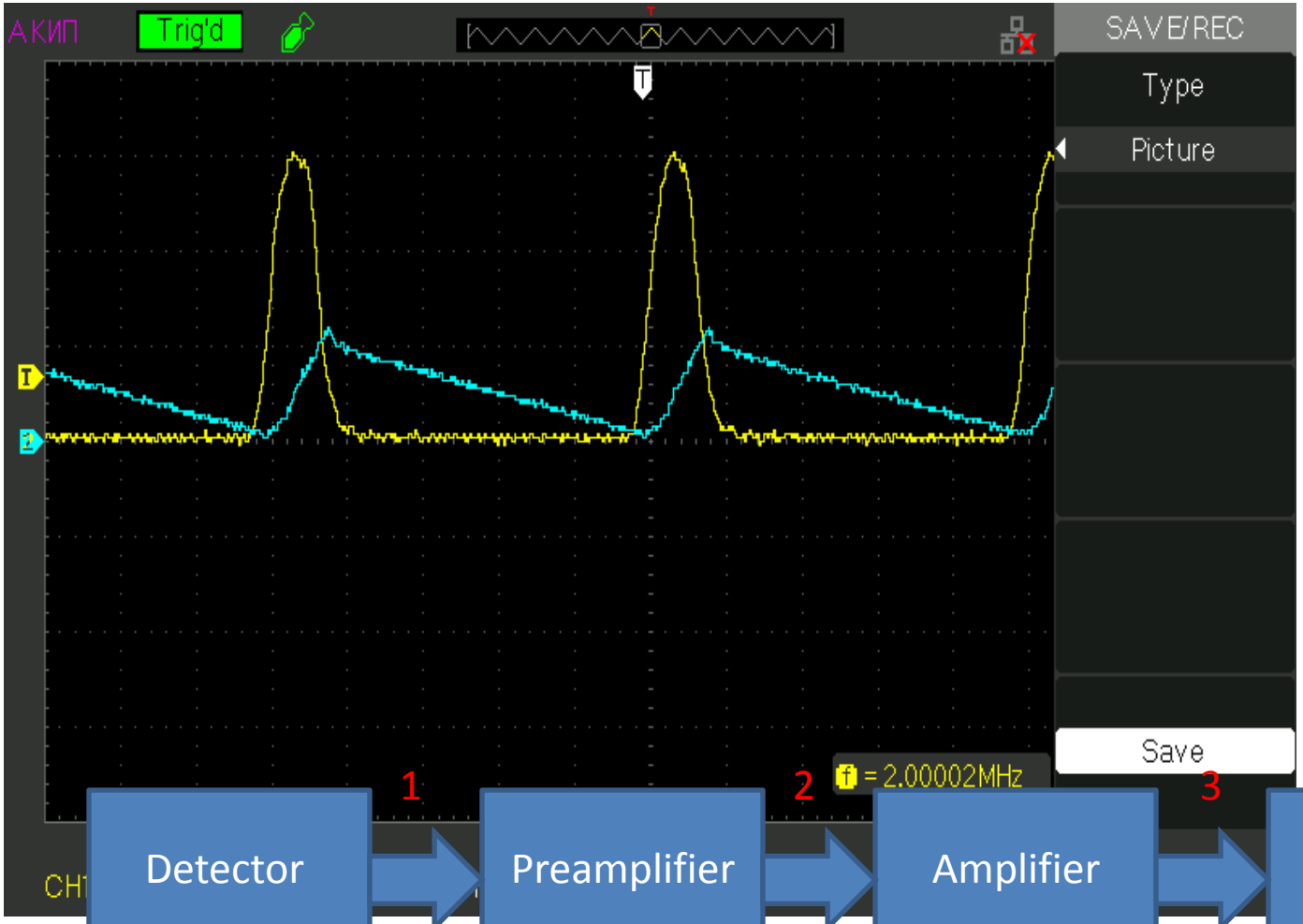


4- Signal after time to time converter circuit



Tin= 110 n sec
Tout= 500 n sec
Time gain 4.45

4- Signal after time to time converter circuit



Tin= 110 n sec
Tout= 500 n sec
Time gain 4.45

1 Detector → 2 Preamplifier → 3 Amplifier → 4 T-T Converter

Conclusion:

1- Calculating and assembling different electronic circuits such as filters, preamplifiers and amplifiers.

2- Check the performance and sensitivity of different preamplifiers with different configurations.

3- Learn how to couple instruments for different scientific tasks.


Thank
you