# Experiment: Transconductance amplifier

## 1. Objectives

- Special operating amplifier properties – transconductance amplifier;
- Data sheet reading.
- Fast prototyping technology using superstrip prototyping board

## 2. Components and instrumentation.

- NE5517 integrated circuit (equivalent of LM13600/LM13700),
- superstrip prototyping board (Fig.1),
- laboratory stand (oscilloscope, millimeter, DDS generator, voltage regulator).

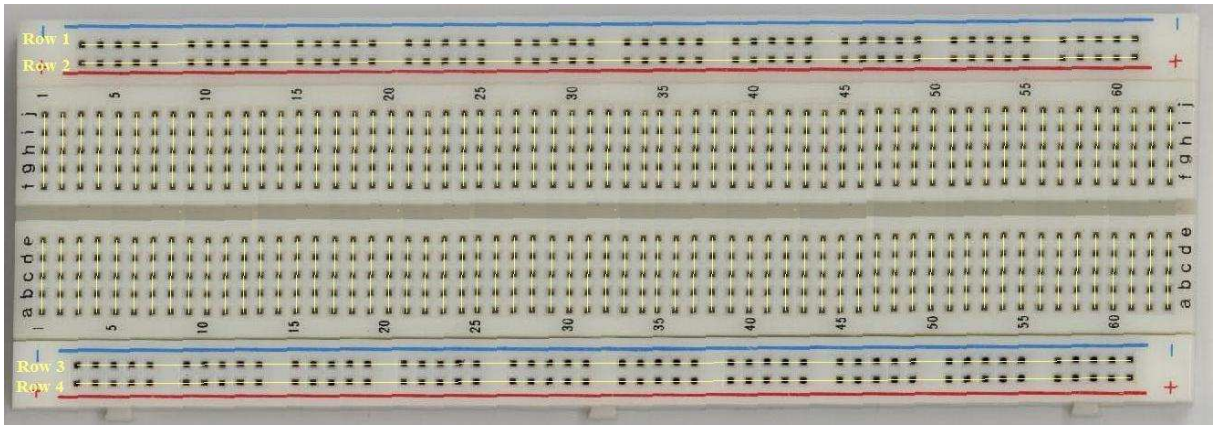


Fig.1 Yellow lines show connected holes.

## 3. Preparation.

The estimated time to prepare for classes is 3 to 6 hours.

### *3.1. Reading*

[1] Lecture notes ("Measurement circuits and systems" and "Front-end circuits"),
[2] W. Tietze, Ch. Schenk, Electronic circuits – Handbook for Design and Applications, Springer, 2008. Chapters 5.3 to 23.6
[3] Data sheets of NE5517 and LM13600.

### *3.2. Problems*

1. Name different types of OP-AMP (Chapter 5 of [2]) ?
2. What is the essence of transconductance amplifier ?
3. What are the applications for transconductance amplifier ?

### *3.3. Detailed preparation*

From data sheet [3,4], choose one of application of transconductance amplifier: Voltage controlled amplifier.

1. Amplitude modulator
2. Voltage controlled low-pass filter
3. Voltage controlled oscillator
4. Any other application taken from data sheet or other sources (consult with tutor).

**Sketch in Your “laboratory copybook”, a diagram of prototyping board connections for chosen circuit.**

## 4. Contest of rapport

According to chosen circuit:

1. Voltage controlled amplifier:
   Gain vs. frequency graph (gain in dB, logarithmic frequency axis) for three different control currents; in one case graph of phase vs. frequency.
2. Amplitude modulator:
   Oscilloscope screen shot of modulated signal for sine, triangle and square modulating signals and screen shots of FFT analysis for the three above cases.
3. Voltage controlled low-pass filter:
   Gain vs. frequency graph (gain in dB, logarithmic frequency axis) for three different control currents; in one case graph of phase vs. frequency.
4. Voltage controlled oscillator:
   Graph of frequency vs. controlled signal; oscilloscope screen shot of output signal.

## 5. Appendixes: