# **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).

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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:

- 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.
- 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: