

# Lab 36

## OPTOCOUPERS

### Goals

To study the influence of a optocoupler (galvanic separator) on the transmitted signal; To study the influence of the bias of the transoptor on the signal distortion. To broaden oscilloscope skills.

### 1 Experiment

1.1 Build the circuit of scheme 1.

1.2 Observe the shape of the input and output signals (of the optocoupler) when the circuit is powered by the rectangular wave 1kHz signal from the generator. Find the optimal bias voltage (DC bias voltage) for the optocoupler diode. Measure this voltage.

1.3 Chose the proper frequency of the rectangular voltage for rise time of the output signal to be properly measured. Measure the rise time  $t_r$  and calculate the upper cut-off frequency  $f_{-3dB}$  using the following formula:

$$f_{-3dB} = 0.35/t_r$$

1.4. Switch the generator to sinusoidal wave and measure the  $U_{out}/U_{in}$  ratio as a function of frequency. Draw the function  $U_{out}/U_{in} = U_{out}/U_{in}(f)$  and determine the cut-off frequency  $f_{-3dB}$  from this plot ( the frequency at which the ratio drops by -3dB).

1.5. Compare the obtained values of the cut-off frequency  $f_{-3dB}$ . Specify the frequency band of the optocoupler.

### 2 Background

2.1 Electroluminescence diodes.

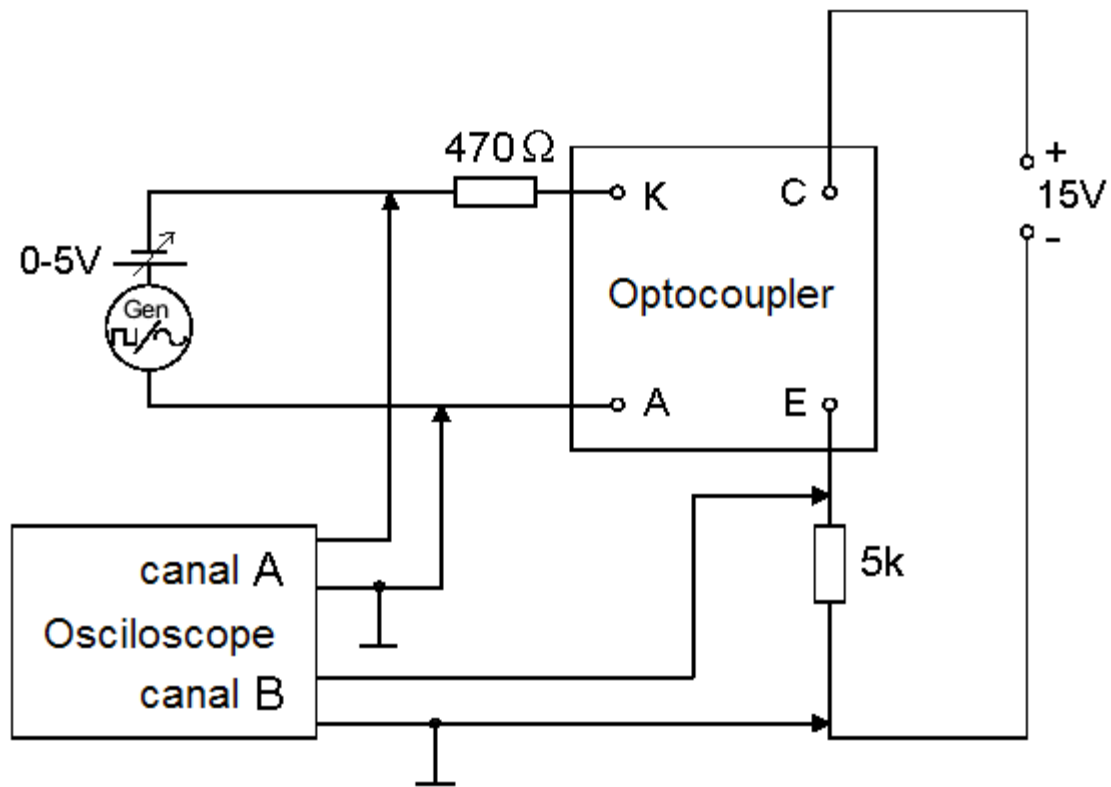
2.2 Fotodetectors.

2.3 Optoelectronic devices. Important parameters of opto-isolators.

2.4 Optocouplers, applications and operation.

2.5 Parameters of the voltage pulse.

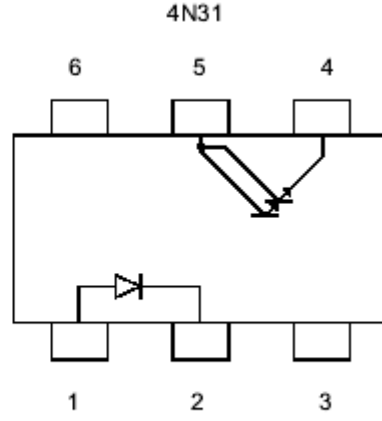
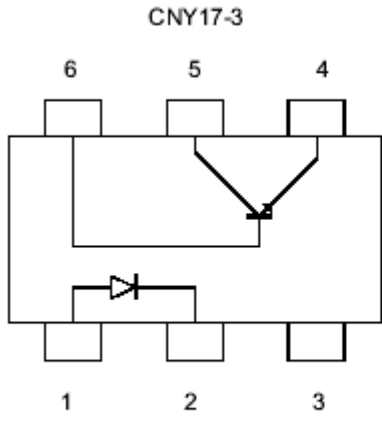
2.6 Pass frequency bands.



Scheme 1.

### Literature

- [1] L.P. Huelsman; *Basic circuit theory*.
- [2] G.R. Slone, *Tab electronics Guide to Understanding Electricity and Electronics*.
- [2] A. Pawlarczyk, *Elementy i układy optoelektryczne*.
- [3] M. Rusek, *Przewodnik po elektronice*.



# Transoptors