

Experiment no.8

§ Operational amplifier §

8.1 Objective:

The object of this experiment is to learn how to use and design the **Operational amplifier (op_amp)**.

8.2 Theory:

The op- amp is one of the basic building blocks of linear design. In its classic form it consists of two input terminals, one of which inverts the phase of the signal, the other preserves the phase, and an output terminal. The standard symbol for the op -amp is given in Figure below. This ignores the power supply terminals, which are obviously required for operation.

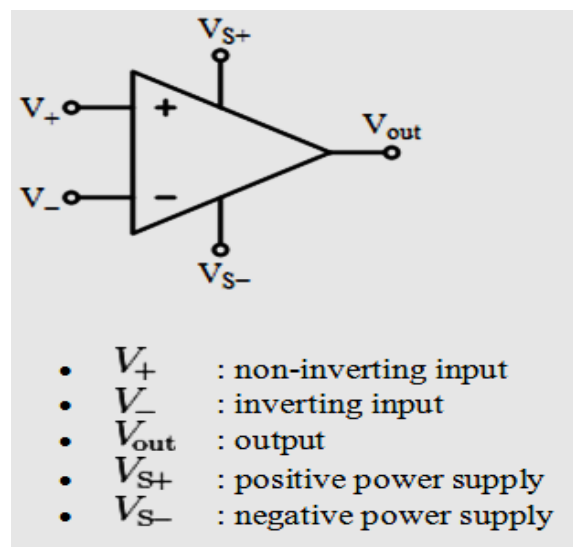


Figure (1)

The name (op-am) is the standard abbreviation for operational amplifier. This name comes from the early days of amplifier design, when the op amp was used in analog computers. When the basic amplifier was used with a few external components, various mathematical operations” could be performed. One of the primary uses of analog computers was during WWII, 741 IC, one of the most popularly used op-amp IC.

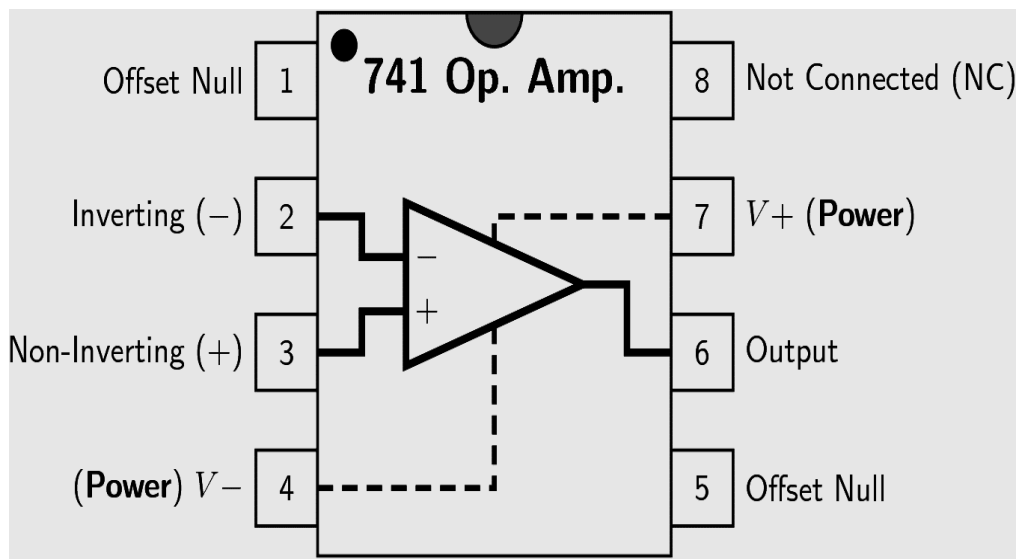


Figure (2)

The inverting amplifier is so called because the input is connected to the inverting terminal of the op amp. The name also gives away the form of the output. The output of an inverting amplifier is 180° out of phase of the input, thus the output is inverted. The common inverting amplifier is shown in Figure below. The analysis transfer function:

$$A_v = \frac{V_{out}}{V_{in}} = -\frac{R_F}{R_{in}}$$

8.3 Procedure:

1. Enter specific (input voltage) (2V) from the power supply device and draw input waveform (Sin wave) by using Oscilloscope.
2. Connect the circuit shown in the figure (3).

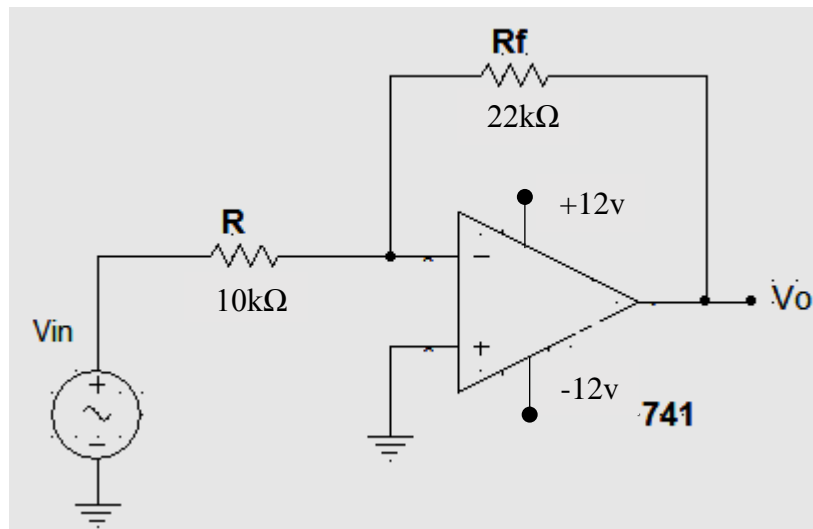


Figure (3)

3. Connect the first terminal of **OSC** to the output terminal of op-amp and second terminal of **OSC** to the ground.
4. Turn on the circuit and Draw output waveform (sin wave) by using Oscilloscope. (Must be 4v opposite of in/p waveform)

8.4 Discussion:

1. What is the op-amp? In addition, what is the symbol of it?
2. What is the inverter op-amp. And why it called inverter?
3. Calculate the average voltage (A_v) of inverter Op-amp?