OPERATIONAL AMPLIFIER – SUBTRACTOR

A subtractor is an electronic circuit that subtracts one voltage from another. Op-amps can be used to implement subtractors by using the negative feedback principle.

Aim

To study the working of OP AMP as a subtractor.

Apparatus

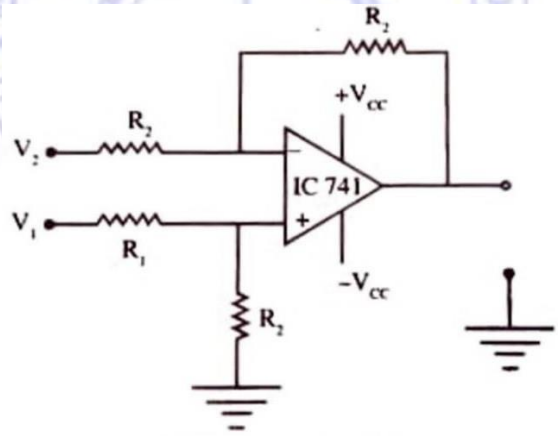
IC 741 with dual power supply, de source variable in steps, VTVM etc.

Theory

The subtractor circuit gives an output which is the difference of two inputs. The circuit diagram is shown in figure 1.

From the figure the output voltage is

$$V_0 = \frac{V_1}{R_1} R_2 - \frac{V_2}{R_1} R_2 = \frac{R_2}{R_1} (V_1 - V_2)$$



Subtractor circuit diagram

Observations and tabulations

Trial No.	R_1 (Ω)	R_2 (Ω)	V_1 (Volt)	V_2 (Volt)	Calculated oupput voltage $V_o = \frac{R_2}{R_1}(V_1 - V_2)$ (Volt)	Observed output voltage (Volt)
1 2 3 ⋮ ⋮ ⋮						

Procedure

Make the connections as shown in figure I. Here the inputs V_1 and V_2 to be applied to inverting (-) and non inverting terminal (+) are through equal resistances. i.e., both are R_1 Feed back is given through R_2.The (+) terminal is grounded through R_2 since V_2 is connected to inverting terminal, it is negative (opposite polarity) at the output. Hence the voltage to be subtracted connect it to inverting terminal. Apply different voltages V_1 and V_2 and note down the output V_o.

Result

It has been concluded from the observation that since the observed output is nearly equal to calculated value, the circuit works as a subtractor.

References

Experimental Physics – II, For Fifth & Sixth Semester, BSc Degree Programme, Dr.P. Sethumadhavan, Prof. K.C. Abraham, Prof. Meppayil Narayanan, Prof. Philipson C Philip, **Manjusha Publications**

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