Feng Chia University

Electrical Engineering Fundamentals II Lab

Laboratory 8

OPAmp-Summer and Difference Amplifiers

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I. Introduction

a. To observe the behavior of Op Amp in summer and difference amplifiers

II. Materials

a. Power supply

b. Digital Multimeter

c. Function generator

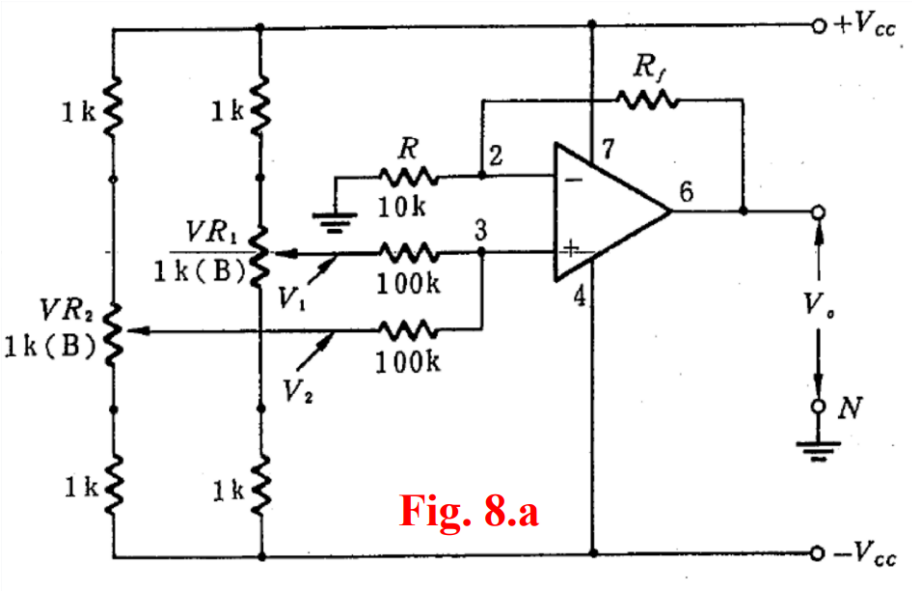
d. Devices

OPAmp: μA741

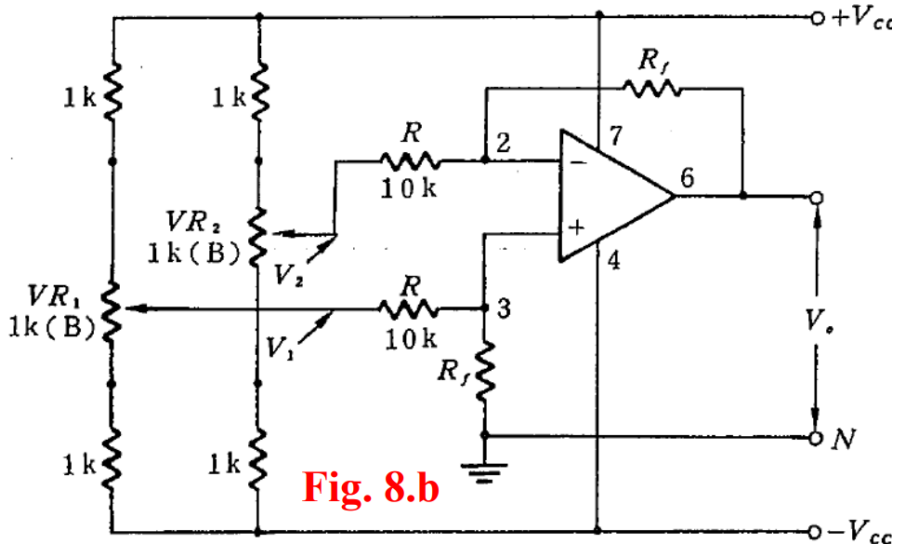
Resistors: R = 1kΩ×4, 2kΩ×2, 30kΩ×1, 10kΩ×4, 20kΩ×2, 100kΩ×2

Variable Resistor: 5 kΩ×2

III. Circuit diagram



▲ Figure 1. Circuit of Experiment 8.a The Summer Amplifier



▲ Figure 2. Circuit of Experiment 8.b The Difference Amplifier

IV. Methods

Using Digital Multimeter to observe voltage.

V. Experiments data

a. Experiment 8.a The Summer Amplifier

Table 1: Measurement of output voltages V_O with summer amplifiers

V_1		-2 V			0 V	1 V	-2 V			
V_2		2 V	1 V	0 V	1 V	1 V	1 V	0 V	-1 V	-2 V
R_f= 30kΩ	V_O	-0.0256 V	-2.0284 V	-4.0072 V	1.9716 V	3.9926 V	6.0675 V	3.9514 V	2.0247 V	0.0394 V
	Gain		2.0284 V	2.0036 V	1.9716 V	1.9963 V	2.0225 V	1.9757 V	2.0247 V	
R_f= 10kΩ	V_O	-0.0136 V	-1.0151 V	-2.0101 V	1.0011 V	1.9946 V	3.0384 V	1.9862 V	1.0151 V	0.0293 V
	Gain		1.0151 V	1.0051 V	1.0011 V	0.9973 V	1.0128 V	0.9931 V	1.0151 V	

b. Experiment 8.b The Difference Amplifier

Table 2: Measurement of output voltages V_O with difference amplifiers and R_f=20kΩ

V_1		2 V					1 V	0 V	-1 V
V_2		2 V	1 V	0 V	-0.5 V	-1 V	2 V	2 V	1 V
R_f= 20kΩ	V_O	-0.0474 V	2.1296 V	4.0524 V	5.1556 V	6.0052 V	-1.9346 V	-3.9692 V	-4.1584 V
	Gain		2.1296 V	2.0262 V	2.0622 V	2.0017 V	1.9346 V	1.9846 V	2.0792 V

Table 3: Measurement of output voltages V_O with difference amplifiers and R_f=30kΩ

V_1		2 V					1 V	0 V	-1 V
V_2		2 V	1 V	0 V	-1 V	-2 V	2 V		
R_f= 30kΩ	V_O	0.0351 V	1.0788 V	2.0524 V	3.0424 V	4.0756 V	-0.9806 V	-2.0115 V	-2.9441 V
	Gain		1.0788 V	1.0262 V	1.0141 V	1.0189 V	0.9806 V	1.0058 V	0.9814 V

VI. Results

None

VII. Discussion

The V_o and gain of Op Amp with summer and difference amplifiers will vary with the resistors.

VIII. Conclusion

From the experimental data above, the operational amplifiers work in an ideal situation.