07 Operational Amplifier

Use op amp to realize the expression below, U1, U2 and U3 are input voltage, and make sure U1, U2 and U3 are variable.

$$U_o = 3u_1 - 7u_2 + 5u_3$$

A Report By

Kibria Golam
ID: 2019380163

- ***Use op amp to realize the expression below, U1, U2 and U3 are input voltage, and make sure U1, U2 and U3 are variable.***

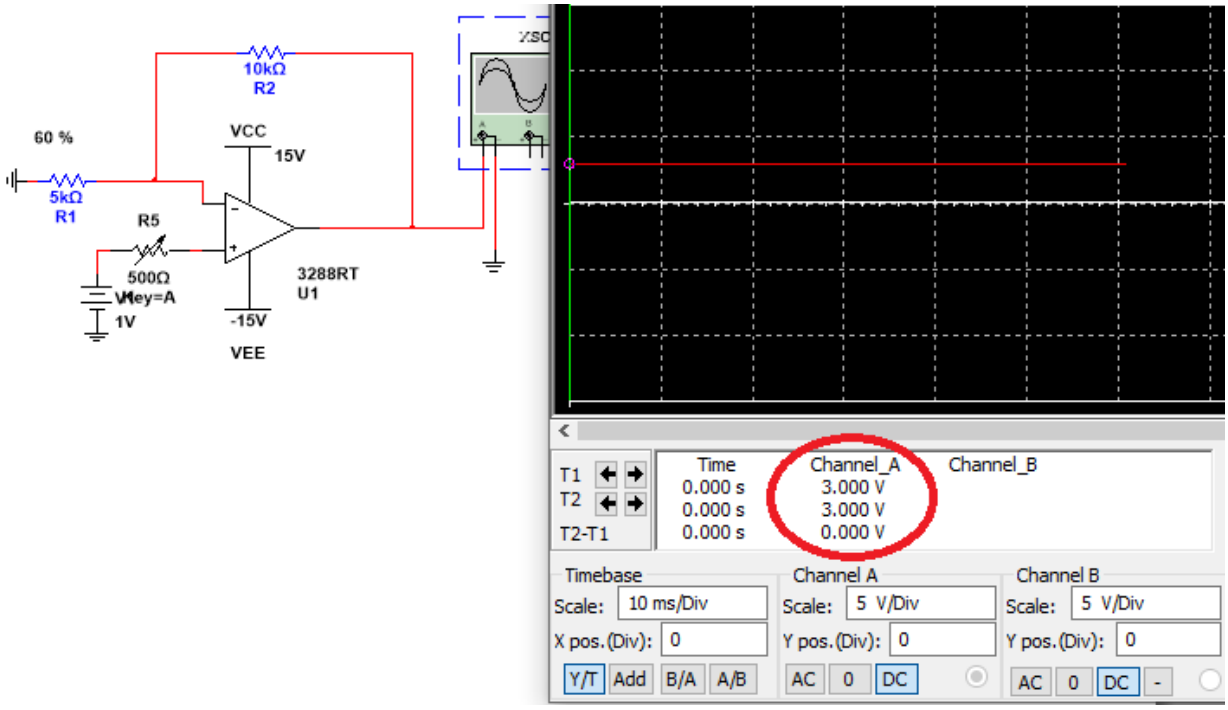
Uo = 3u1-7u2+5u3

To create the expression $U_o = 3u_1-7u_2+5u_3$ using op amp, I have created the whole thing by 3 separate op amp.

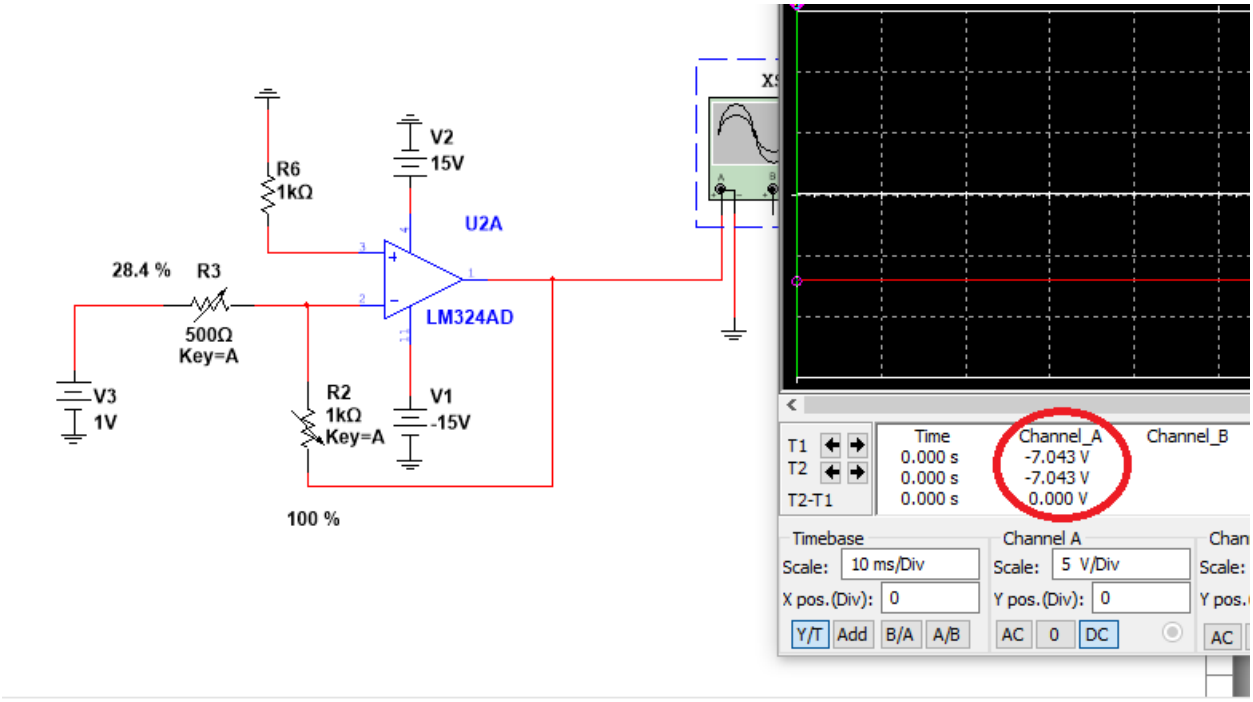
First, I created 3 circuits with a gain of 2, 7, 5 respectively. For the gain $3u_1$ and $5u_3$, I used non inverting op amp and for the $-7u_2$ part, I used inverting op amp to generate inverse voltage. And finally, I used a non-inverting op amp with a gain of 1 to sum up $3u_1$, $-7u_2$ and $5u_3$ to produce the final output, $U_o = 3u1-7u2+5u.$

Steps:

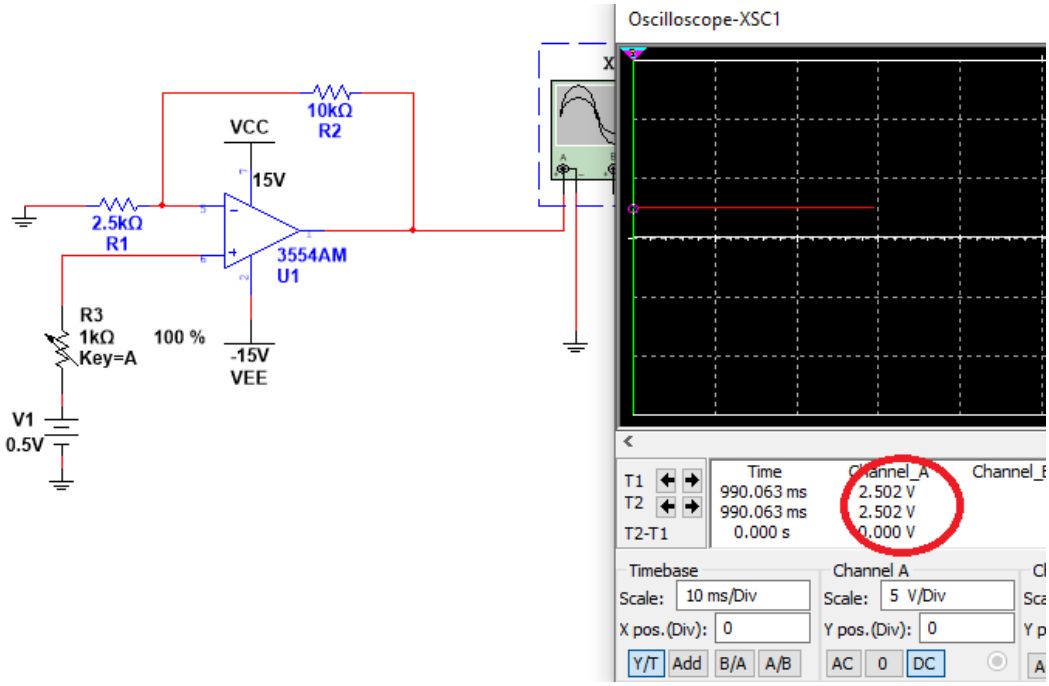
To generate $3u_1$: The source voltage is u_1=1V. Thus, the output of the circuit below is $3u_1$= 3V1 = 3 x 1V = 3V.



To generate -7u$_2$: The source voltage is u_2= V3 = 1V. Thus, the output of the circuit below is -7u2= -7 x V3= -7x1 = -7V.

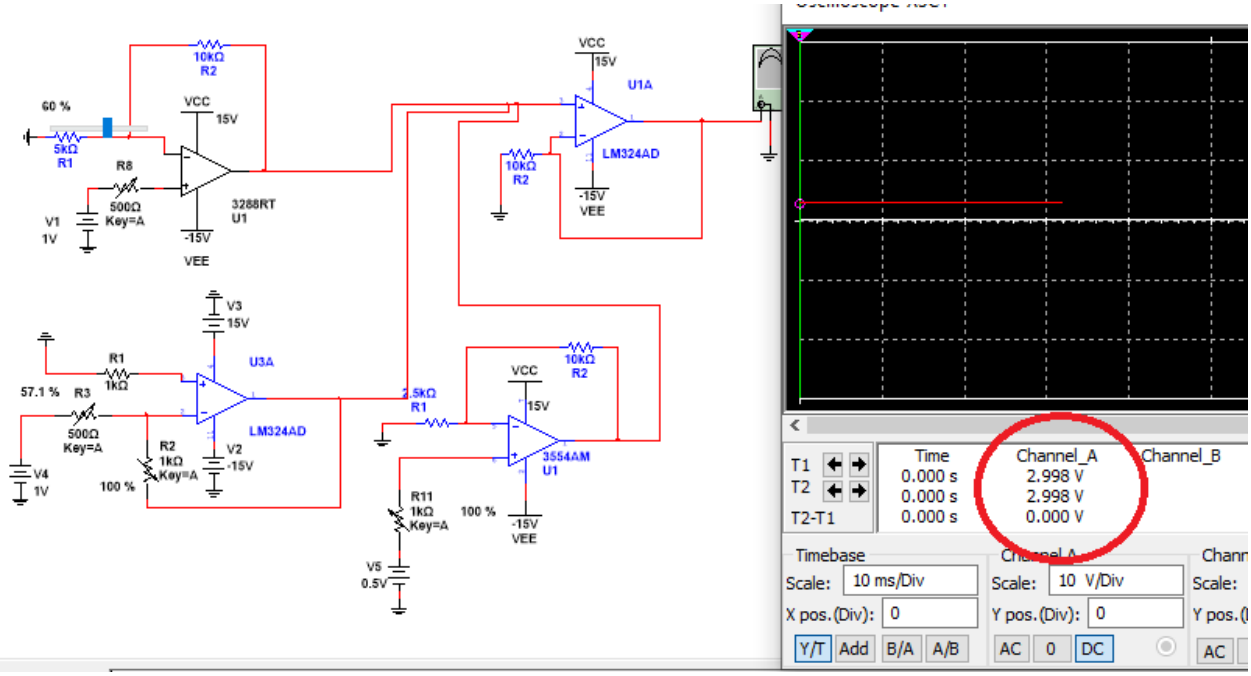


To generate $5u_3$: The source voltage is u_3=0.5 V. Thus, the output of the circuit below is $5u_1$= 5V1= 5 x 0.5 =2.5 V.



And Finally, to generate U_0:

By summing up 3u1, -7u2 and 5u3, the final output, U_o = 3u1-7u2+5u = 3V – 7V + 2.5V ≈ 3V.



Appendix:

It was possible to do the whole circuit using a single op amp chip which contains 4 separate op amp inside. But I realized the thing after creating the whole circuit and thought to go on with this.