

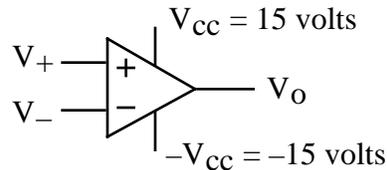
# ECE 207L - CONTROLLED SOURCES - LAB 4 CONTROLLED VOLTAGE SOURCES

FALL 2003

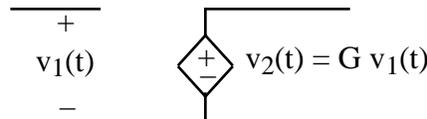
A.P. FELZER

## OBJECTIVE

The objective of this lab is to make use of op amps - integrated circuits made from transistors - as follows



to build voltage controlled voltage sources of the form



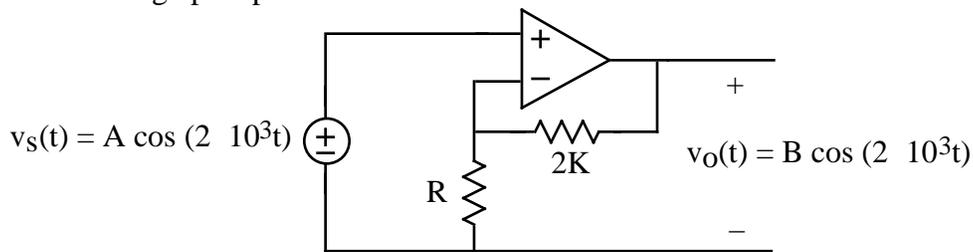
Note that it's not the objective of this class to study the inner workings of op amps. Their inner workings are studied in the electronics classes.

## PRELAB

Find and draw the pinout diagram for a 741 op amp - there's a copy in the lab manual

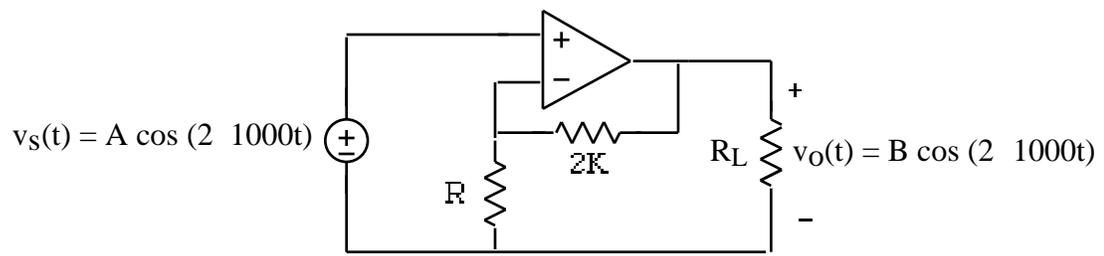
## LAB

1. Given the following op amp circuit



PARTNER 1:  $R = 2K$       PARTNER 2:  $R = 4.7K$

- a. Redraw the op amp circuit to show the connection of the  $\pm V_{CC}$  power supplies. Also write in the op amp pin numbers.
- b. Measure your resistor values. Compare with nominal values.
- c. Find and sketch  $v_O(t)$  for inputs  $v_S(t)$  with magnitudes  $A = 0, 1, 2, 3, 4, 5$ . Make sure to lay out your circuit on your proto board to look exactly like your circuit diagram.
- d. Make use of your results in part (c) to plot  $B$  as a function of  $A$ .
- e. Make use of your result in part (d) to find  $v_O(t)$  as a function of  $v_S(t)$ .
- f. Make use of your result in part (e) to draw the controlled source being implemented by this circuit.
- g. Verify that your circuit is in fact operating like a controlled voltage source - that its voltage  $v_O(t)$  is pretty much unaffected by the values of load resistors  $R_L$  as follows



PARTNER 1:  $R = 2K$     PARTNER 2:  $R = 4.7K$

as long as  $R_L \geq 1K$ .