EL 351 - Linear Integrated Circuits Laboratory

Continuously Adjustable Noninverting/Inverting Amplifier Circuit

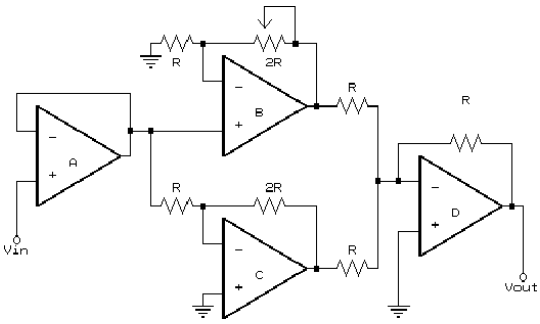
By: Walter Banzhaf
University of Hartford
Ward College of Technology
USA

Equipment:

- Agilent 54622A Deep-Memory Oscilloscope
- Agilent E3631A Triple-Output DC power supply
- Agilent 33120A Function Generator
- Agilent 34401A Digital Multimeter

Introduction:

Electronic Design magazine (E.D.) is a bi-weekly publication that contains many wonderful ideas for analog circuit designers (the ads aren't bad either!). In the "Ideas For Design" section of the January 7, 1993 E.D. the article "One Pot Adjusts Polarity, Gain", by Mike McNatt, appeared and is the basis of this laboratory experience. McNatt wrote "By adjusting one potentiometer, this circuit's output can be varied from a positive-going version of the input signal, smoothly through zero output, and then to a negative-going version of the input." See the schematic diagram, slightly modified from the original, below:



Procedure:

Explain How The Circuit Works

1. Study the schematic diagram. Cogitate. In your own words write a simple, but clear and complete, explanation of how the circuit functions. Be sure to reference the four separate op-amps, and their purpose.

Design The Circuit

2. Prepare a detailed schematic diagram, with part values. You will have to base your decisions for resistor values based on the resistance of your potentiometer. Also be aware that not all resistors shown as "R" have to have the same value. For example, the 3 resistors connected to the inverting input of op-amp "D" don't have to be the same value as the resistors connected to the inverting input of op-amps "B" and "C". The input buffer is needed only to buffer the signal input. Your function generator has a low output impedance (likely 50 Ω), and needs no buffering whatsoever.
3. Build the circuit. Make appropriate tests to ensure that the circuit does what it is supposed to do. Of course, carefully document what you do, including recordings of oscilloscope traces. Sine, triangle and pulse waveforms make good test signals.

Oral Report: The day you turn in your lab report, you will make an oral report to the entire lab class.

Guidelines:

a) 10 minutes **maximum** time for presentation.
b) Handout(s) and/or overhead projector must be used to augment your presentation.
c) Start by explaining how the circuit works, and then discuss your reasons for doing the changes that were part of your redesign, and present your test results.

Your oral report grade will count as 25% of your grade for this laboratory experiment.