

Electronics

Opamps as signal adders

Problem 1.- For a control application of a mineral drying furnace, we require the following transfer function:

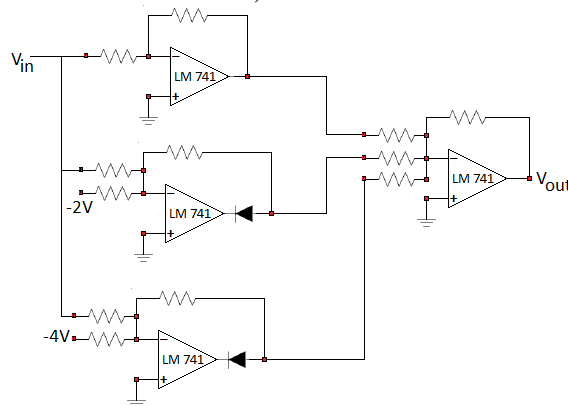
$$V_{out} = V_{in} + (V_{in} - 2)S(V_{in} - 2) + (V_{in} - 4)S(V_{in} - 4)$$

Where the function “S” is defined as

$$S(x) = \begin{cases} 0 & x < 0 \\ 1 & x \geq 0 \end{cases}$$

Design an analog circuit that provides this signal.

Solution: A possible solution is shown below, where all resistors are 10kohm.



Two and four volts are subtracted to the input signal. The diodes only allow negative values to go through. Finally, the signals are added and inverted again to restore their polarity.

Problem 2.- An audio signal is taken from two redundant channels in which channel 1 has a signal amplitude of 300mV and signal to noise ratio of 40dB, while channel 2 has an amplitude of 400mV but S/N of only 34dB. Design an adder and amplifier to mix the signals to the 1V level with the optimal signal to noise ratio possible.