

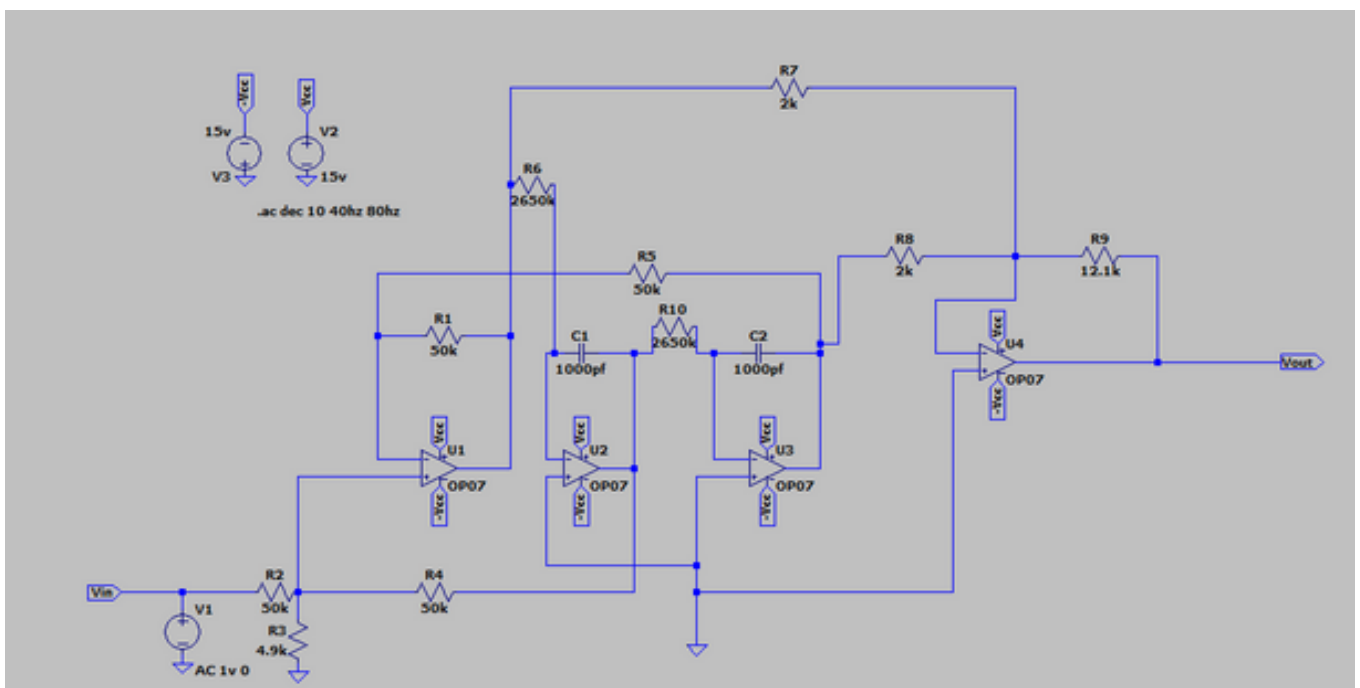
UAF42 Universal Active Filter -Based 60 Hz Notch Filter

Problem Statement:

At 60 Hz, power-line interference often affects biological and electrical systems. This can severely lower signal quality in sensitive areas like medical equipment (like ECGs), audio processing, and systems for precise measurement. Normal filtering methods can't get rid of this narrowband interference without changing the frequencies of signals next to it. Because of this, we need an exactly tuned notch filter that can get rid of 60 Hz noise while keeping the useful signal intact. The hard part is making a filter that can control frequency and quality factor (Q) separately, isn't too sensitive to changes in components, and works consistently. The UAF42 - Universal Active Filter integrated filter IC's state-variable architecture provides a workable answer by letting low-pass, high-pass, and band-pass responses happen at the same time. You can meet these needs with a 60 Hz notch filter if you set up the external parts correctly and use the secondary operational amplifier.

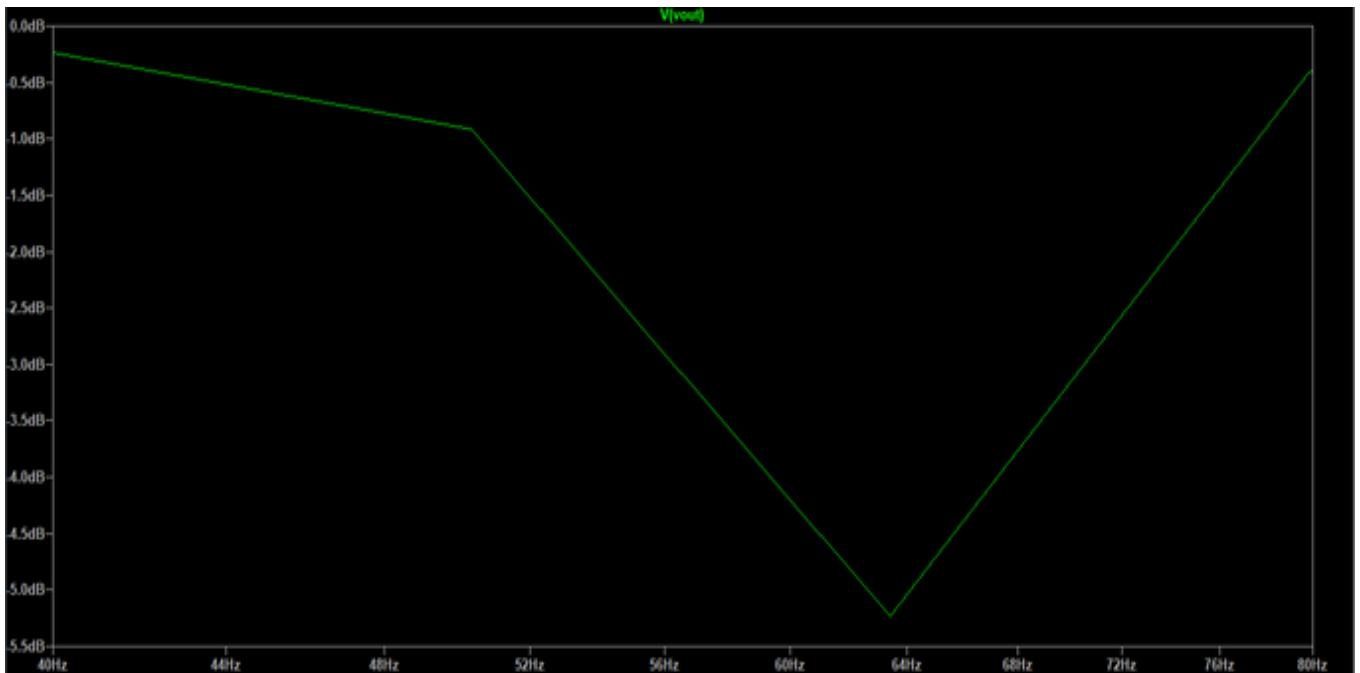
A notch filter is easily realized with the UAF42 and six external resistors. The UAF42 configured into a 60Hz notch filter. The auxiliary operational amplifier is used to sum both the high-pass and low pass outputs. At $f = f_{\text{NOTCH}}$, both of these outputs times their respective gain at the summing circuit are equal in magnitude but 180° out of phase. Hence, the output goes to zero.

Circuit Diagram :



UAF42 Configured as a 60Hz Notch Filter.

Results :



Cut-off frequency of Notch Filter,

$$F = 60\text{Hz}$$

Source/Reference(s) :

1. DESIGN A 60Hz NOTCH FILTER WITH THE UAF42 by Johnnie Molina, (602) 746-7592