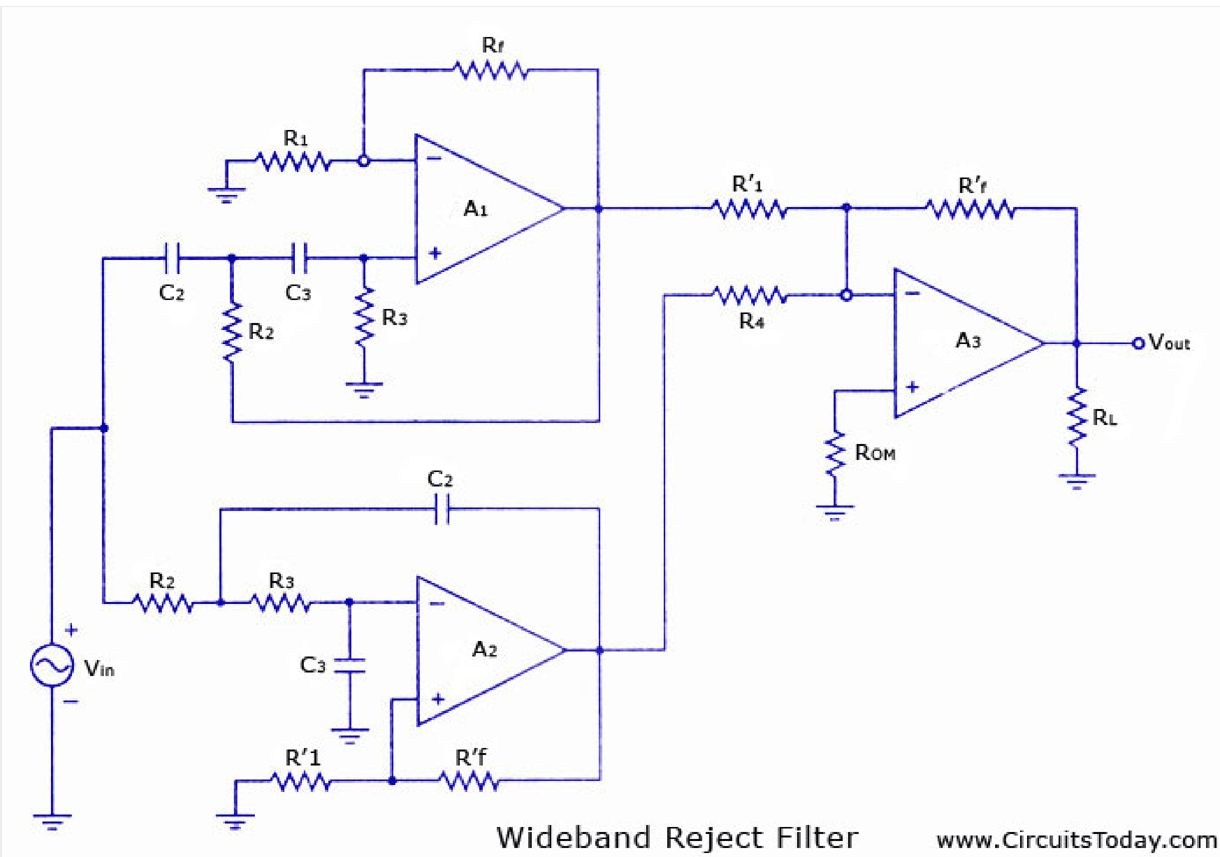
BAND STOP FILTER

The bandpass filter passes one set of frequencies while rejecting all others. The band-stop filter does just the opposite. It rejects a band of frequencies, while passing all others. This is also called a band-reject or band-elimination filter. Like bandpass filters, band-stop filters

It may also be classified as (i) wide-band and (ii) narrow band reject filters.

The narrow band reject filter is also called a notch filter. Because of its higher Q, which exceeds 10, the bandwidth of the narrow band reject filter is much smaller than that of a wide band reject filter.

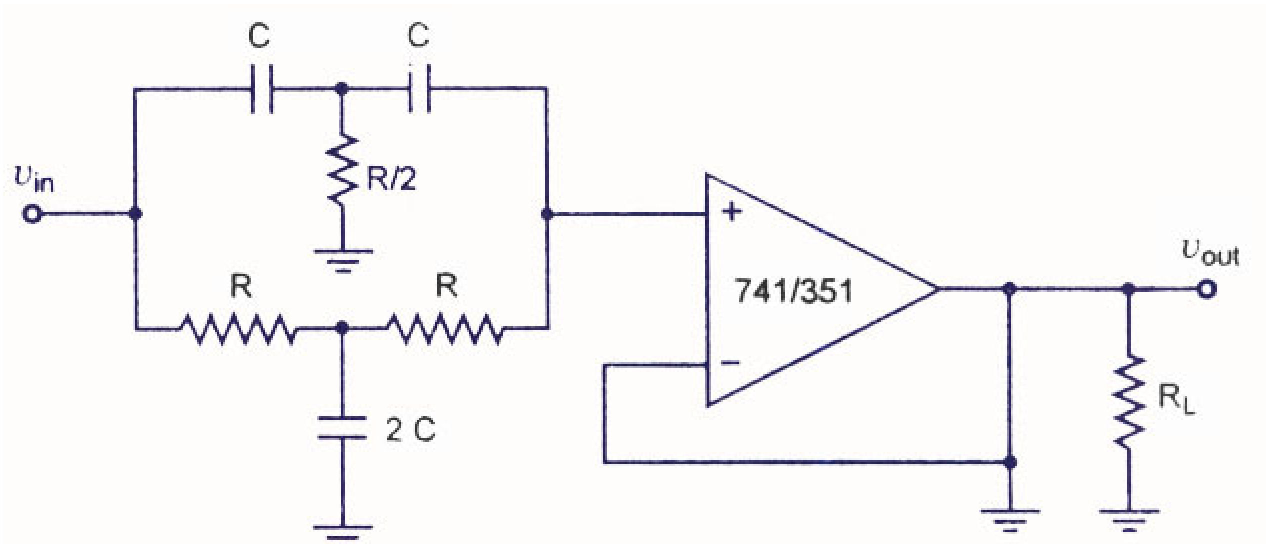
Wide Band-Stop (or Reject) Filter.



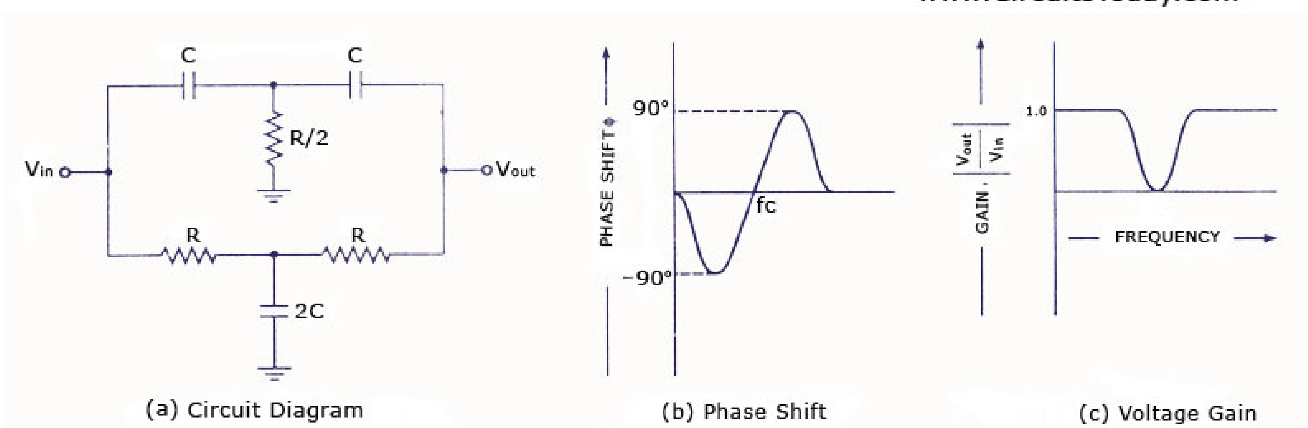
Wide band stop filter

A wide band-stop filter using a low-pass filter, a high-pass filter and a summing amplifier is shown in figure. For a proper band reject response, the low cut-off frequency f_L of high-pass filter must be larger than the high cut-off frequency f_H of the low-pass filter. In addition, the passband gain of both the high-pass and low-pass sections must be equal.

Narrow Band-Stop Filter.



Circuit Diagram
Twin T active notch filter
www.CircuitsToday.com



Twin T Notch Passive Filter
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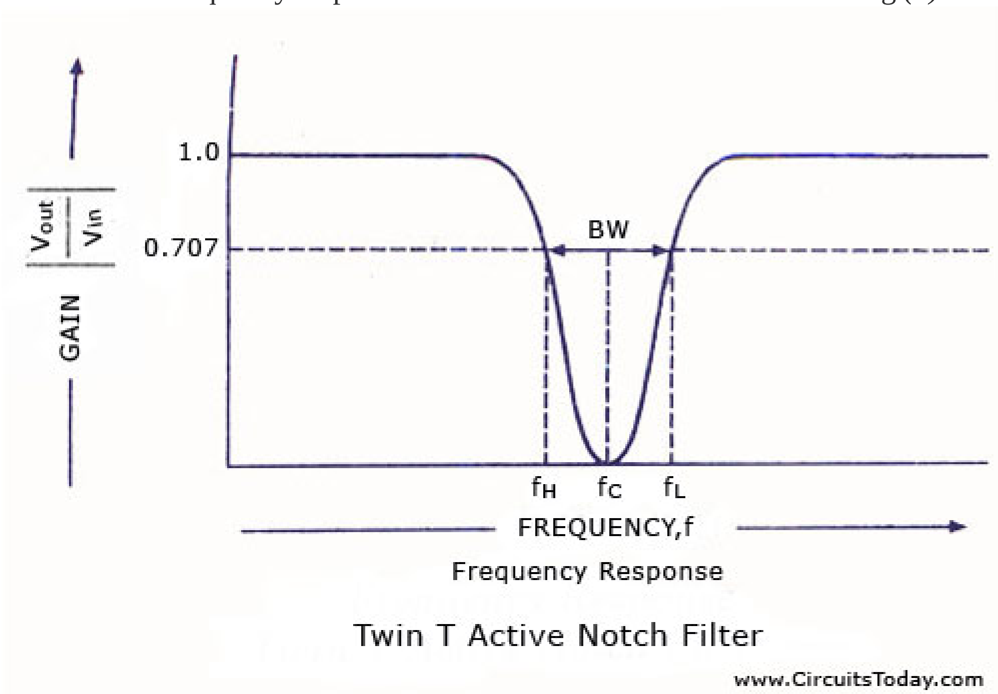
This is also called a notch filter. It is commonly used for attenuation of a single frequency such as 60 Hz power line frequency hum. The most widely used notch filter is the twin-T network illustrated in fig. (a). This is a passive filter composed of two T-shaped networks. One T-network is made up of two resistors and a capacitor, while the other is made of two capacitors and a resistor.One drawback *of* above notch filter (passive twin-T network) is that it has relatively low figure of merit

Q. However, Q of the network can be increased significantly if it is used with the voltage follower, as illustrated in fig. (a). Here the output of the voltage follower is supplied back to the junction of R/2 and 2 C. The frequency response of the active notch filter is shown in fig *(b).*



Notch filters are most commonly used in communications and biomedical instruments for eliminating the undesired frequencies.

A mathematical analysis of this circuit shows that it acts as a lead-lag circuit with a phase angle, shown in fig. (b). Again, there is a frequency f_c at which the phase shift is equal to 0°. In fig. (c), the voltage gain is equal to 1 at low and high frequencies. In between, there is a frequency f_c at which voltage gain drops to zero. Thus such a filter notches out, or blocks frequencies near f_c. The frequency at which maximum attenuation occurs is called the notch-out frequency given by

$f_n = F_c = 2\prod RC$

Notice that two upper capacitors are C while the capacitor in the centre of the network is 2 C. Similarly, the two lower resistors are R but the resistor in the centre of the network is 1/2 R. This relationship must always be maintained.

Source : http://www.circuitstoday.com/band-stop-filter