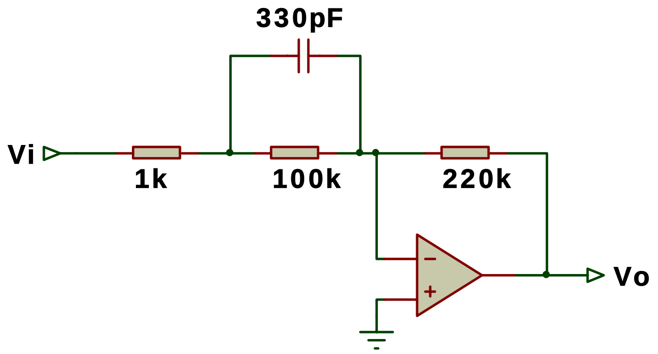
The Bass Boost and Treble Boost Filters

In this section, we shall look at 2 filters which have different gains for the bass and treble frequencies.

If the bass frequencies have a larger gain than the treble frequencies, then the filter is a BASS BOOST one. If the treble frequencies experience higher gain than the bass frequencies, the filter is a TREBLE BOOST one.

The Treble Boost Filter

Consider:



Let us now analyse this circuit and deduce the frequency response of the filter.

- At low frequencies (bass frequencies) the capacitor acts like an open switch so has no effect on the input resistance – this is then approximately 100k. So the gain at bass frequency is:

$$G_{bass} = \frac{220k}{100k} = 2.2$$

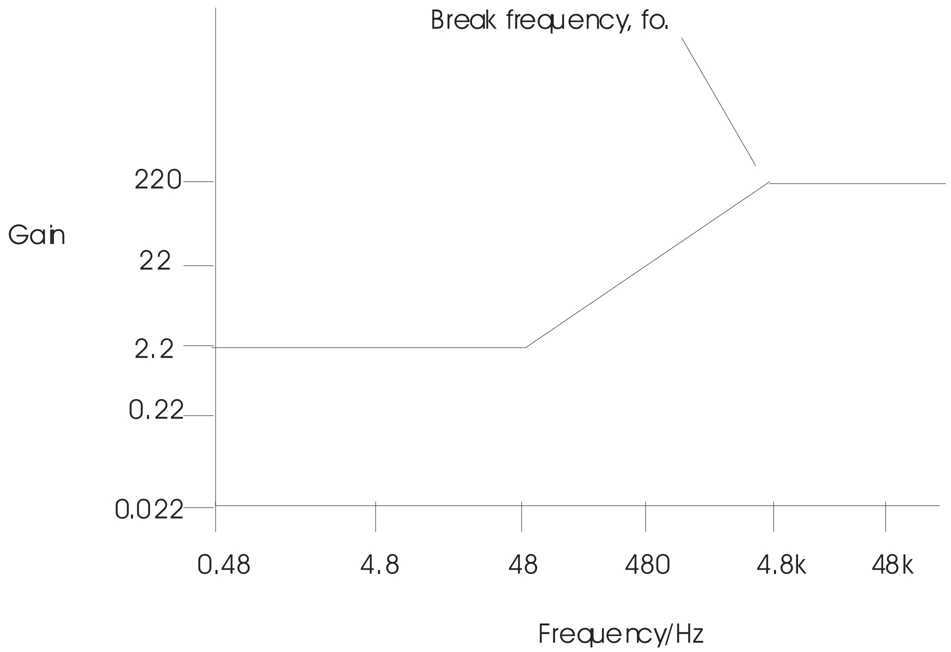
- At treble frequencies, the capacitor acts as a closed switch and shorts out the effect of the 100k resistor on the input side. Thus, the input resistance at treble frequencies is approximately 1k and the gain at treble frequencies is:

$$G_{treble} = \frac{220k}{1k}$$
$$= 220$$

- The break frequency, fo, is given by:

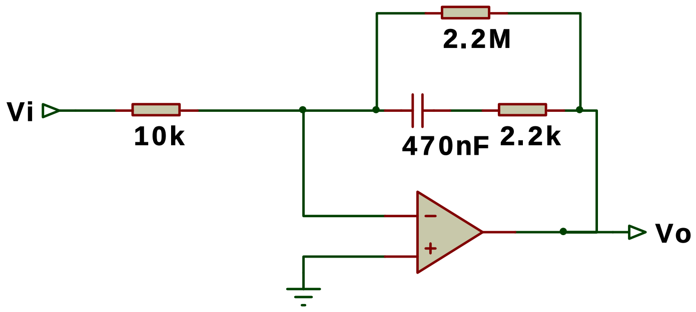
$$fo = \frac{1}{2\pi \bullet 330x10^{-12} \bullet 100x10^{3}}$$
$$= 4.8kHz$$

and this enables us to sketch the frequency response of the treble boost filter circuit above:



The Bass Boost Filter

Consider the following circuit:



- At bass frequencies, the capacitor acts like an open switch so the 2.2k resistor has no effect on the feedback circuit – the gain at bass frequencies is approximately:

$$G_{bass} = \frac{2.2M}{10k}$$
$$= 220$$

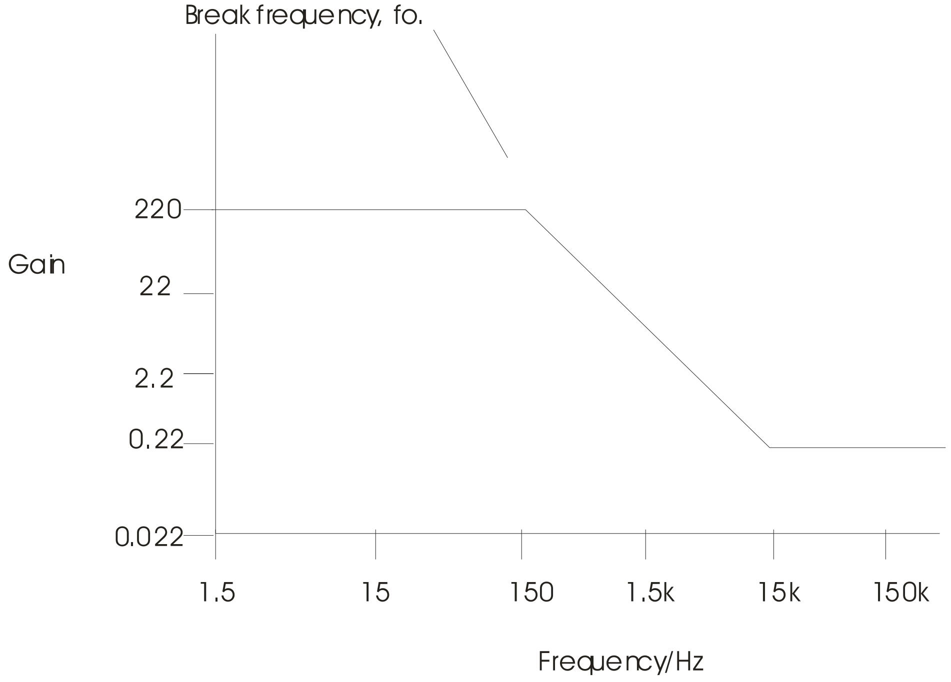
- At treble frequencies, the capacitor shorts out (becomes zero resistance) and the resistance of the feedback circuit is now about 2.2k. So the gain at high frequencies is approximately:

$$G_{treble} = \frac{2.2k}{10k}$$
$$= 0.22$$

- The break frequency is now:

$$fo = \frac{1}{2\pi \bullet 470nF \bullet 2.2k}$$
$$= 150Hz$$

This enables us to construct the frequency response of the bass boost filter above:


Break frequency, fo.
Gain
220
22
2.2
0.22
0.022
1.5
15
150
1.5k
15k
150k
Frequency/Hz