

Overview of the MPA575 Equalizer Function

The MPA575 Microphone Signal Processor includes a reference quality microphone pre-amplifier, an equalizer and a compressor. This application note introduces the powerful features of the equalizer function. The equalizer is designed to realize maximum utility using the simplest possible user interface.

The MPA575's unique equalizer (EQ) has a combined low and high frequency control that allows broad tone adjustments with a single control knob. A separate High Pass Filter (HPF) is also provided to shape the low frequency response. Together, these two controls can be used to provide a wide range of tone adjustments, from subtle broadband shaping to more pronounced frequency control. The equalizer controls are highlighted in the figure below.



Equalizer

- See-Saw High / Low EQ
- Variable Frequency Low Cut

Figure 1: MPA575 Front Panel Layout

The following plot shows the EQ control with the knob adjusted to the fully clockwise and counterclockwise positions. For reference, the frequency response with the control in the center position is also shown.

As the control knob is adjusted away from the center position, one portion of the spectrum is boosted while the other portion is cut. This allows for better loudness control and avoids excessive amplitude peaking for the same amount of subjective frequency emphasis.

For the cases where strong emphasis is desired, this EQ has the capability, realizing as much as +12dB low frequency boost and +16dB high frequency boost. To maintain natural balance, the portion of the spectrum that is de-emphasized is designed for -6dB shelving. The “pivot” frequency of the equalizer is 1.2 kHz.

Both the EQ and HPF are hardwire bypassed when ‘Out’.

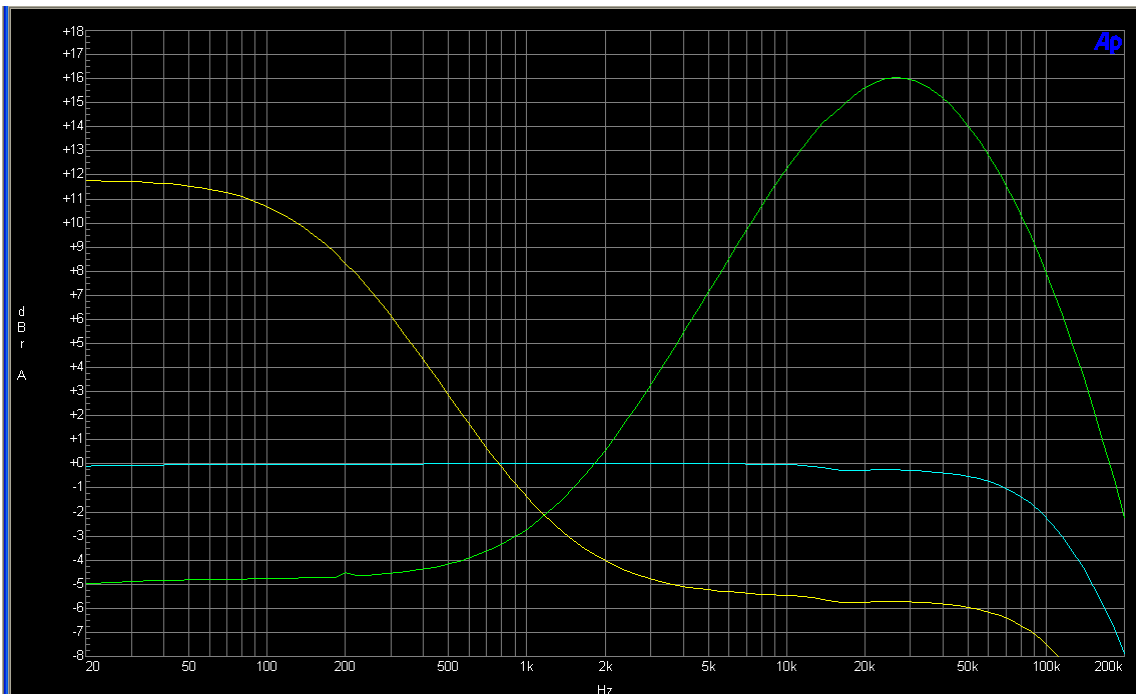


Figure 2: Maximum Low and High Frequency Boost

The following plot shows the response with the EQ pot varied in increments between minimum and maximum.

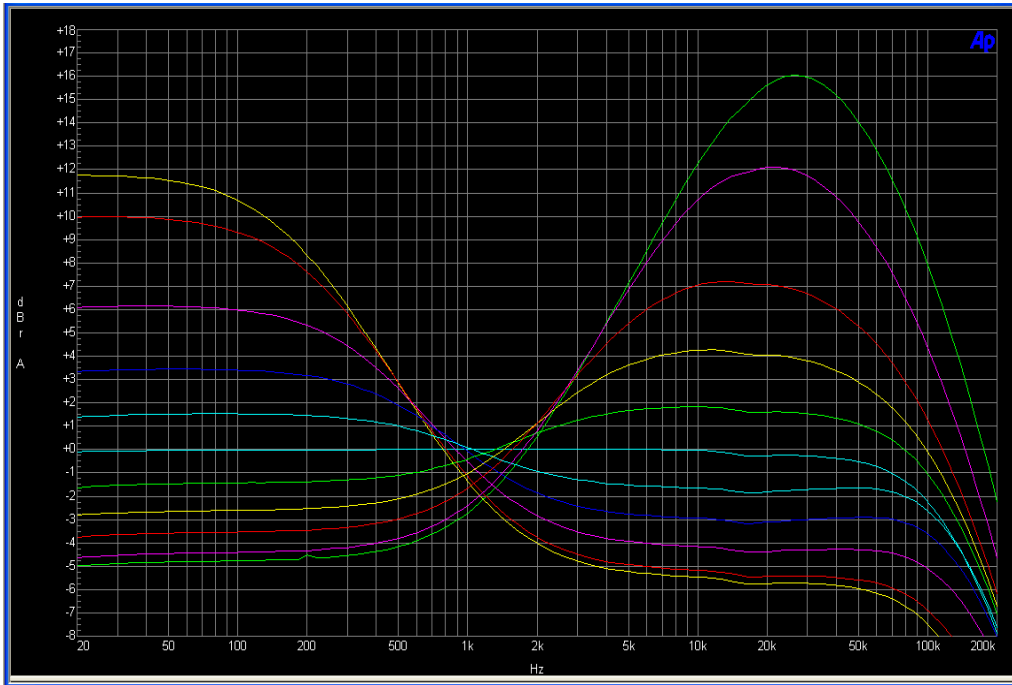


Figure 3: EQ with Incremental Pot Adjustment Positions

The High Pass Filter (HPF) control has a -3 dB cutoff frequency that is can be continuously varied between 30 Hz and 400 Hz as shown in the plot below.

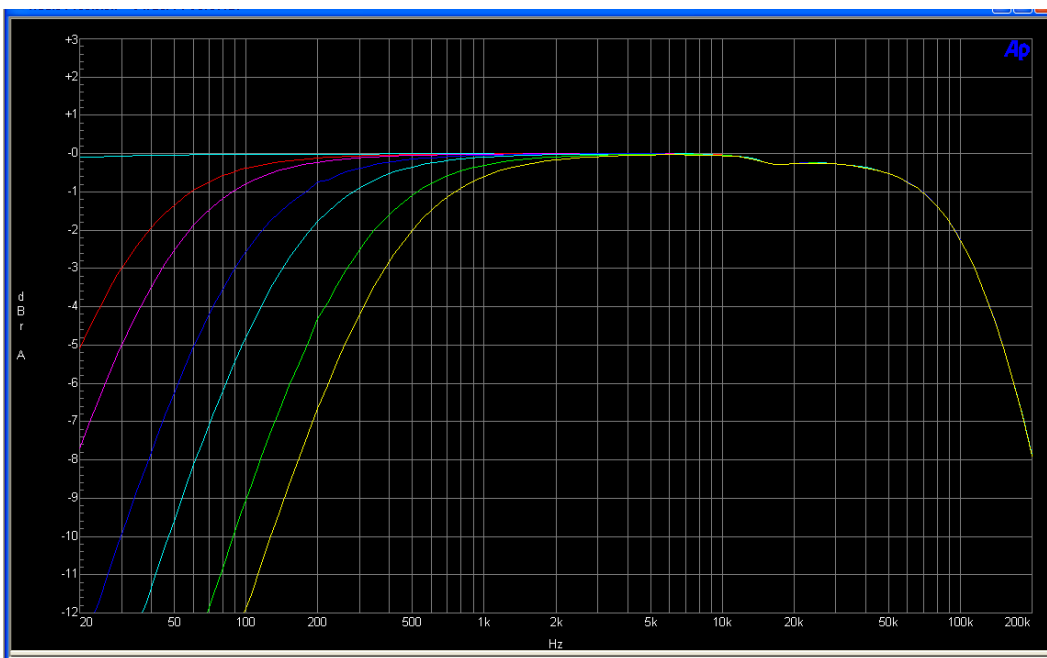


Figure 4: EQ with Incremental Pot Adjustment Positions

When the EQ and HPF are used in conjunction, the spectrum can be sculpted to realize various frequency emphasis and/or de-emphasis curves, as shown in the following series of plots.

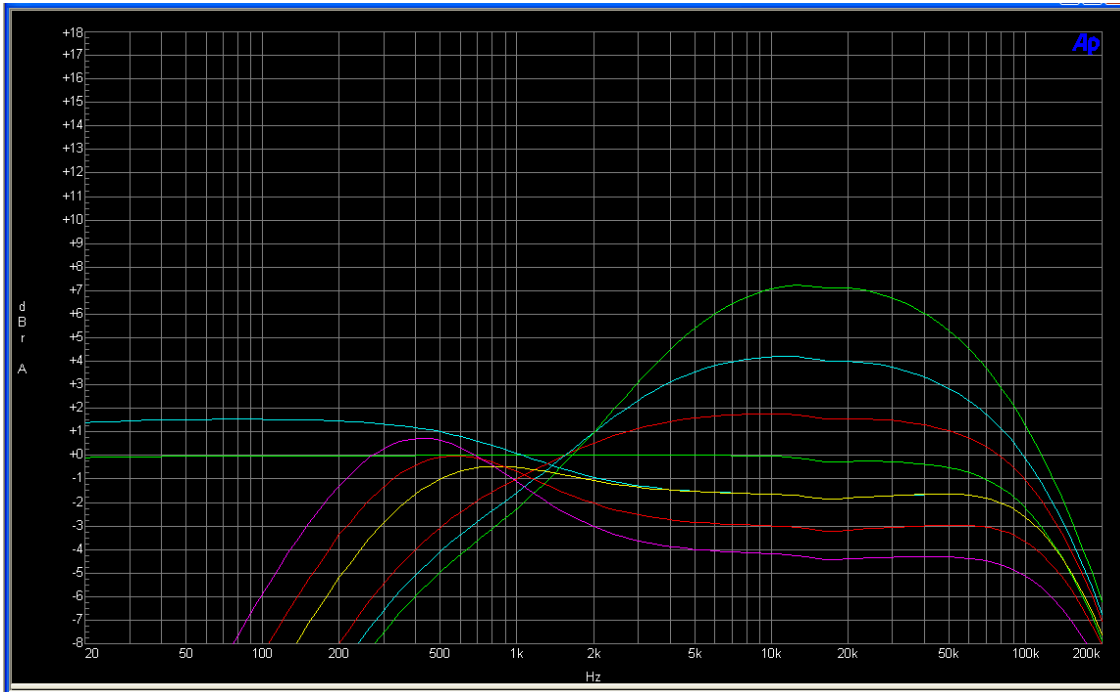


Figure 5: EQ and HPF On, HPF Frequency = 400Hz, EQ swept Over a Small Range

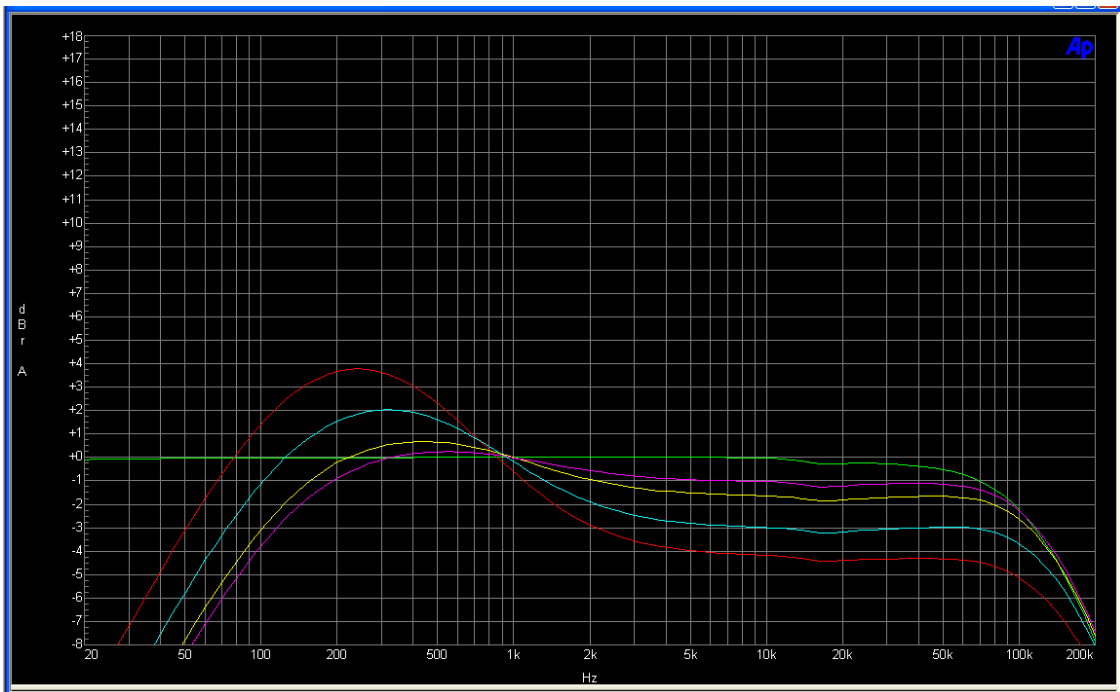


Figure 6: EQ and HPF On, HPF Frequency = 150Hz, EQ swept Over a Small Range

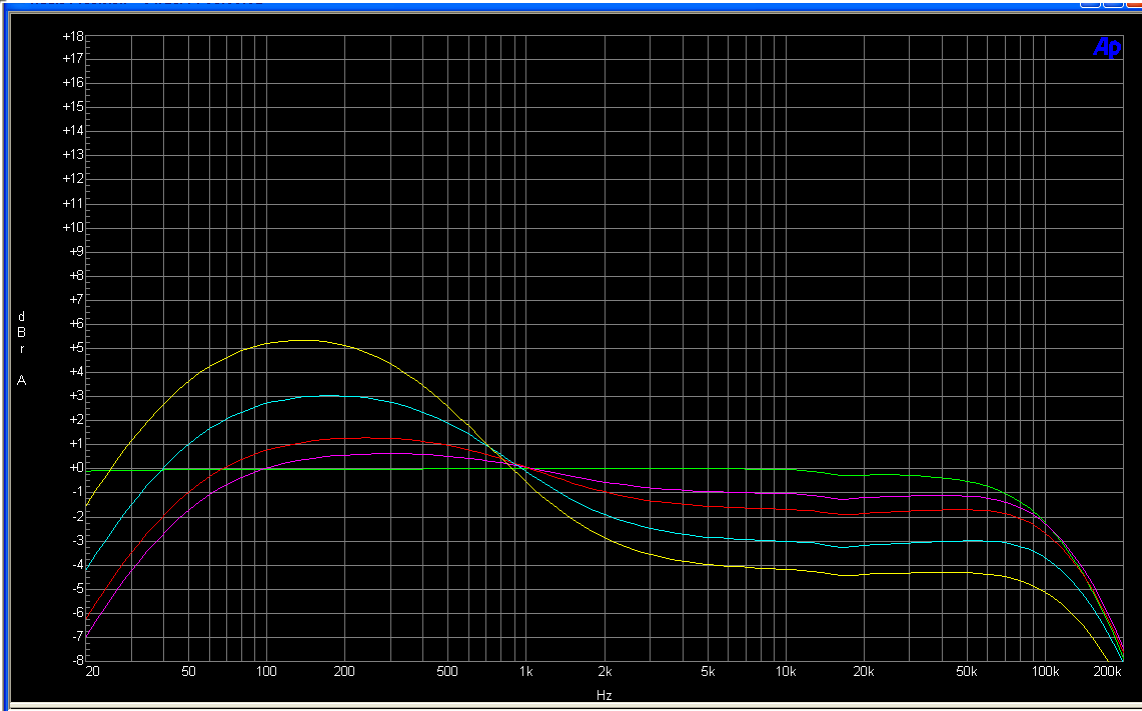


Figure 7: EQ and HPF On, HPF Frequency = 45Hz, EQ swept Over a Small Range

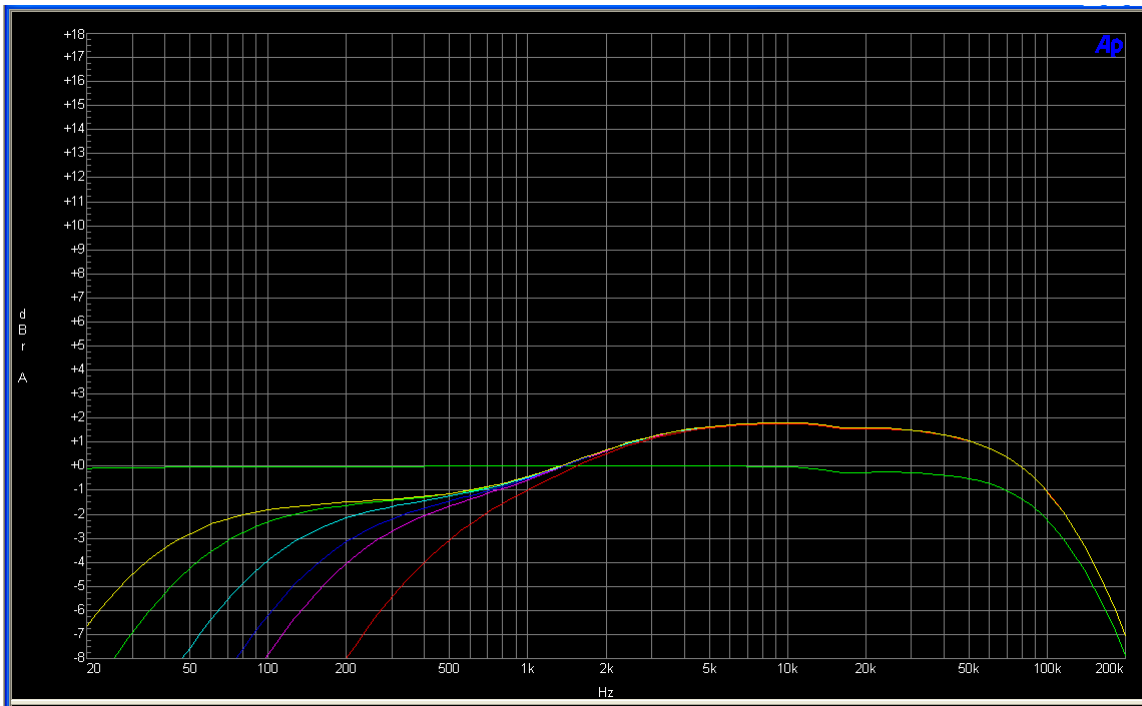


Figure 8: EQ and HPF On, Slight High Frequency Boost, HPF Swept Thru Various Values