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# **SonicStudio 5**

## **Extended Mixing Desk**

### **(SS-201)**

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SonicStudio 5, Extended Mixing Desk (SS-201)

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## Extended Mixing Desk

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## Extended Mixing Desk

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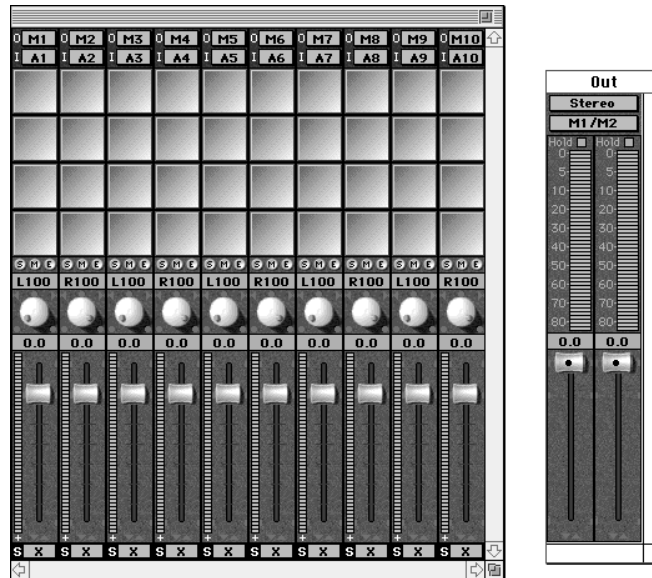
The standard SonicStudio™ Mixing Desk includes two filter sections per channel. These may be assigned as Shelving (High or Low) or Parametric (Presence) filter types.

The Mixing Desk expansion adds two additional filter sections for each channel (a total of four per channel), and an extensive selection of filter types, including high-order Presence filters, precision Notch filters, and dynamics processing such as Compression and Limiting.

Gain and filter settings can be automated using both static (snapshot) and dynamic memory. Mixing automation may be locked to external time codes.

## Extended Mixing Desk

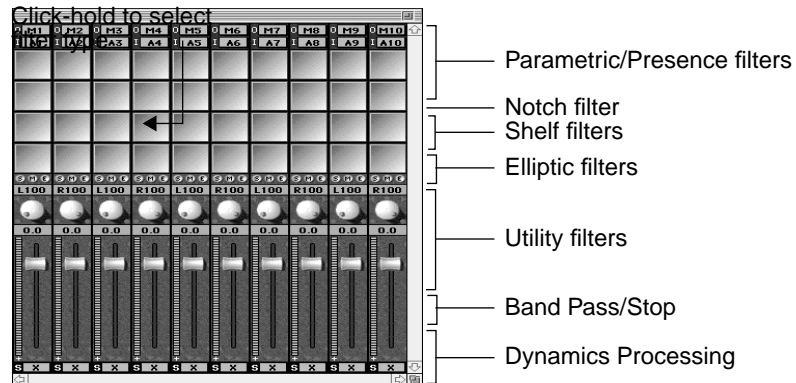
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The Mixing Desk controls the relative levels of input signals, regulates and monitors output level, and equalizes audio with selectable real-time filters. The number of channel sections varies with system configuration, with four channels in the basic single-board configuration.

## Filters and Dynamics Processing

The Mixing Desk provides up to four signal processing sections for each channel strip, with 20 distinct types of high-resolution digital filters and dynamics processing available.



When you double-click on one of the filter tiles above the channel faders, it opens a window to select and set that filter. Click-hold on the indicated triangle to pull down a menu of available filter types.

Once a filter has been selected, the appropriate parameters will come up next to the adjustment knobs. Clicking on a knob and dragging left or right will change the value. Use the nudge buttons for incremental steps, or hold down the shift key for higher resolution adjustments with the mouse.

See the Mixing Desk in SonicStudio *Reference Manual* for more information on selecting, grouping and adjusting filters.

## Limits on High Order Filters

Many of the digital filters on SonicStudio are available in forms that consume more processing power than the simple form of the same filter. For these filter types you can define the slope of the filter by setting the *order* of the filter using the rotary filter adjust.

Filters are implemented via a shared resource of filter sections or dynamics processor on each processing Strip. Because higher-order filters consume more processing, the system can run out of available filter sections for a given channel strip.

When this occurs, the system will produce an audible warning from the Macintosh's internal speaker, and will set that filter to the highest order it can support with the processing power that is not already allocated. The screen graphics, however, will still show the filter as the user selected it.

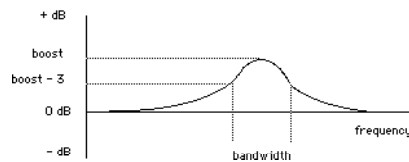
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## Filter Types

### Parametric (Presence) Filter

The parametric (presence) filter boosts or attenuates a particular region of the audio spectrum.

Frequency response of a Presence filter



There are three parameters that define the response of the filter:

#### Freq (Center Frequency)

Center Frequency is the mid-point of the band affected. The Parametric filter's center frequency may be selected over a range of 1.0 Hz to 22.050 kHz.

#### Q (Filter Q)

The Parametric filter supports Q settings from 0.1 to 100. Q may be translated to bandwidth in Hertz using the formula:  $BW = \text{Freq}/Q$ .

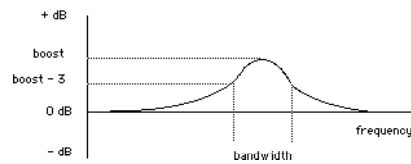
#### Boost (Boost/Cut)

Boost indicates the amount of gain or attenuation that will be applied at the Center Frequency. The Parametric filter is capable of supplying boost or cut of up to  $\pm 24$  dB.

## Extended Parametric Filters (Ext Parametric 2, 3, 4)

The three Extended Parametric filters provide flatter response in the boost/cut region, in a region centered on the given frequency. The order, denoted by the digit after the filter name, determines the slope of the transitions.

Frequency response of a Presence filter



The first-order filter has a slope in its transition regions of 6 dB per octave. The slope increases by 6 dB/octave for each increment of 1.

### Freq (Center Frequency)

The Center Frequency is the mid-point of the band affected. The Parametric filter's center frequency may be selected over a range of 1.0 Hz to 22.050 kHz.

### Q (Filter Q)

The Parametric filter supports Q settings from 0.1 to 100. Q may be translated to bandwidth in Hertz using the formula:  $BW = \text{Freq}/Q$ .

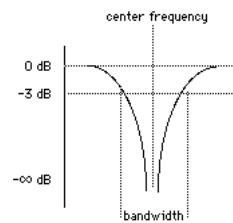
### Boost (Boost/Cut)

Boost indicates the amount of gain or attenuation that will be applied at the Center Frequency. The Parametric filter is capable of supplying boost or cut of up to  $\pm 24$  dB.

## Notch Filter

The Notch filter has a gain at the center frequency of minus infinity, effectively eliminating all signal at that frequency.

Frequency response of a Notch filter



Specifying a notch filter requires only two parameters: center frequency and Q. The gain at the center frequency of a notch filter is fixed at  $-\infty$  dB, so that the center frequency is eliminated completely.

### Freq (Center Frequency)

The range of the Notch filter's center frequency is the same as for other filters on SonicStudio, from 1 Hz to 22.050 kHz.

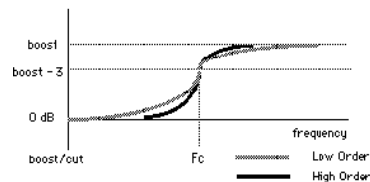
### Q (Bandwidth)

The default setting for the Q of a notch filter is the maximum value of 100. (The minimum value is 0.1) This implies a bandwidth equal to the center frequency divided by 100. (Bandwidth = Center Frequency/Q). Note that the scaling of Q is adjusted to allow easy specification of very high values.

## Shelving Filters (Low Shelf, High Shelf)

Shelving filters apply a fixed boost or cut to all frequencies beyond the cutoff frequency.

Frequency response of High and Low Order Shelving filters



Shelf filters have three variable parameters:

### Freq (Cutoff Frequency)

Cutoff Frequency is the point where the signal is boosted or cut by 3 dB, or by 1/2 the specific boost/cut (if less than 3 dB).

### Boost (Boost/Cut)

Boost or Cut applies to signal above or below the cutoff frequency. The range of boost or cut is  $\pm 24$  dB.

### Order (Sharpness)

The filter order, and integer values from 1 to 4, controls the slope of the response curve. The first-order filter has a slope of 6 dB per octave. The slope increases by 6 dB per octave for each increment of 1 to the filter's order. Higher values of Order consume larger amounts of SonicStudio's signal-processing power.

## High Pass and Low Pass Filters

There are two types of elliptic filters, high pass and low pass. An elliptic filter operates in three separate regions: the “passband” where the signal is minimally altered; the “stopband” where the signal is attenuated; and the “transition band” separating the two.

A high pass or low pass filter has a gain of 1.0 (less the pass ripple) below in the passband, falls off smoothly in the transition region, and sharply attenuates signal in the stopband.

### Freq (Cutoff Frequency)

The Cutoff Frequency is the frequency at which signal level is reduced by 3 decibels. The range of cutoff frequencies for both high- and low-pass filters is from 1 Hz to 22.05 kHz.

### Order (Sharpness)

The order parameter controls the steepness of the transition from stopband to passband. The transition band drops off by roughly 6 dB per octave for each unit increase in order. An increase in filter order increases the processing resources consumed. Also, the higher the order, the greater the chance the filter will produce audible ringing at the cutoff frequency.

## Utility Filters

The SonicStudio Extended Mixing Desk includes several types of utility filters for functions such as DC removal, pre- and de-emphasis for Compact Disc, and the application or removal of the RIAA curve for vinyl records.

These filters have no variable parameters. They are simply on or off.

### No DC

The No DC filter is a simple DC reject filter. The No DC filter provides 1 dB of cut at 34 Hz and 3 dB of cut at 18 Hz.

### Emphasis and De-Emphasis

The Emphasis filter is a 15/50 microsecond curve, as defined as an option for Compact Disc masters. The De-Emphasis filter provides for removal of this high-frequency boost from material that is previously emphasized.

### DC/De-Emphasis

No DC/De-Emphasis combines this with a filter to remove the F1 (EIAJ digital audio adapter) 15/50 microseconds emphasis curve.

### RIAA and De-RIAA

SonicStudio supports RIAA and De-RIAA filters. The RIAA filter imposes the standard RIAA characteristic normally applied, in LP mastering, at the input to a disk cutting lathe. The De-RIAA filter removes the effect of a RIAA filter.

## Band Pass and Band Stop Filters

Band Pass and Band Stop are like putting a high pass and a low pass filter together. Band Pass allows only certain frequencies to be admitted and rejects all others that are out of the range. Band Stop eliminates a certain range of frequencies and passes all the rest. In each of these, the stopband ripple is the amount of attenuation applied.

### Freq (Cutoff Frequency)

Cutoff Frequency in the Shelving filters is the point where the affected signal is boosted or cut by 3 dB, or by 1/2 the specific boost/cut, whichever is less. The High Shelf and Low Shelf filters have a range of 1 Hz to 22.050 kHz for the cutoff frequency.

### Q (Filter Q)

The Q ( $F_q/BW$ ) defines the bandwidth of the region to be Stopped or Passed over a limited range.

### Order (Sharpness)

The order parameter controls the steepness of the transition from stopband to passband. The transition band drops off by roughly 6 dB per octave for each unit increase in order. An increase in filter order increases the processing resources consumed. Also, the higher the order, the greater the chance the filter will produce audible ringing at the cutoff frequency.

## Dynamics Processing

Like the filters, the dynamics processor is a digital realization of a common signal processor. However, the dynamics processor does not have the familiar ratio, threshold and gain makeup controls seen on analog comp/limiters.

### Threshold

This knob sets the threshold below which the signal receives positive or negative gain. The number shown is expressed in decibels.

### Gain

This knob provides either positive gain (boost) or negative gain (cut) in decibels. Positive gain produces compression and negative gain provides expansion. A positive or negative gain setting of 6 dB equates to a 2:1 or 1:2 ratio. A ratio of 3:1 would roughly equate to a gain setting of +18 dB.

### Time Constant

This knob sets both attack and release times in seconds. The number shown in the Parameter Panel is the release time. The attack time is always 1/5 of the lumped release time. The lumped release time is the release time setting plus the 46 msec. (2048 sample) look ahead delay.

There are three forms of the Compressor/Expander. These vary the slope of gain versus input amplitude. Compressor Soft has the gentlest slope with “soft knees.” Compressor Hard, is a very abrupt step change. The middle selection, Compressor Medium, is between the two.

## Applications for Dynamics Processing

### CompSoft

For gentle compression, select Compressor Soft. Set the gain at +4 dB, the time constant at 200 msec. and the threshold at -40 dB.

### CompMed

For limiting, select Compressor Medium. Set the gain at +6 dB, the time constant at 20 msec. and the threshold at -12 dB.

### CompHrd (Gate)

Set Boost/Cut to -18 dB, Time Constant to 0.069, and Threshold to approximately -50 dB. Adjust threshold and gain until the gating is effective.

## Extended Desk Automation

Automation in the Extended Mixing Desk operates exactly as in the basic system (described in the Installation/Reference and Operations manuals). The only difference is that in the Extended Mixing Desk, the selection and settings of the filters and dynamics processing are stored and recalled, as well as level, pan, and mute.

## Summary

The SS-201 Extended Mixing Desk offers a wide selection of equalization and dynamics processing filters, including Presence and Notch filters, Compression and Limiting. All filter settings can be automated.

## Extended Mixing Desk

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