A1

Owner's Manual

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Introduction

Dear customer,

Congratulations on your purchase of the A1 microphone preamplifier and de-esser and welcome to the family of Weiss equipment owners! On the following pages I will introduce you to the A1 microphone preamplifier and de-esser.

I wish you a long-lasting relationship with your A1.

Yours sincerely,
Daniel Weiss

President, Weiss Engineering LTD.

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Chapter 1

A1 Overview

The A1 is an API® 500 series module which contains four audio signal processing blocks:

- Microphone preamplifier
- High-pass filter
- De-esser
- Level control and output line driver

Figure 1.1 further illustrates the overall structure of the A1 and some details of the four signal processing blocks. The A1 has several front-panel controls (fig. 1.2) which allow precise parameter setting for the signal processing blocks:

- Microphone preamplifier gain rotary switch
- +48 V phantom power switch
- 24 dB pad switch
- High-pass filter frequency and bypass switch
- De-esser frequency potentiometer
- De-esser bandwidth potentiometer
- De-esser threshold potentiometer
- De-esser bypass and listen switches
- Output level potentiometer
- Polarity switch

Eight additional DIP switches are accessible when the module is not fitted to an API® series 500 rack. These allow further control of the static and dynamic

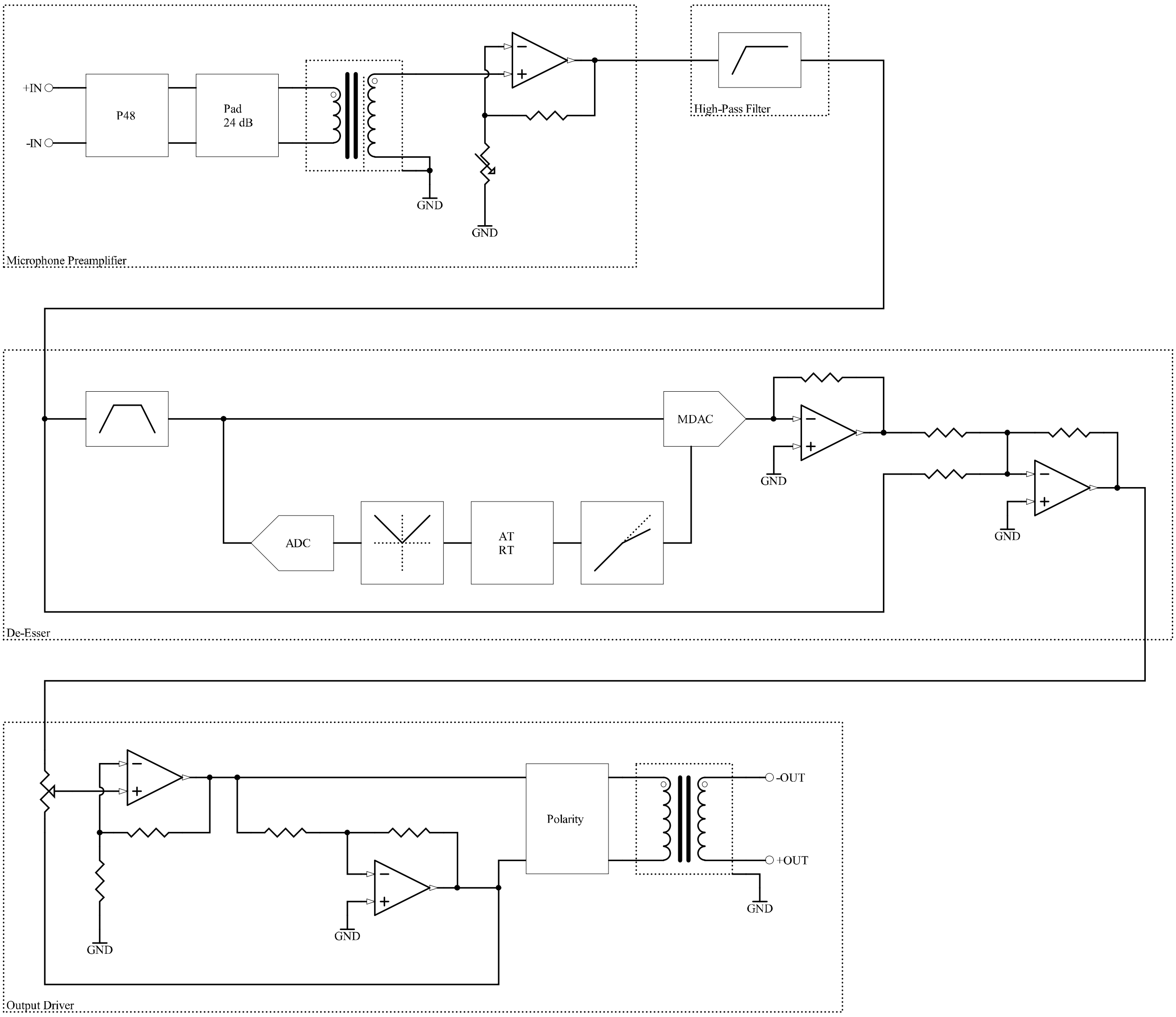

Figure 1.1: A1 block diagram.

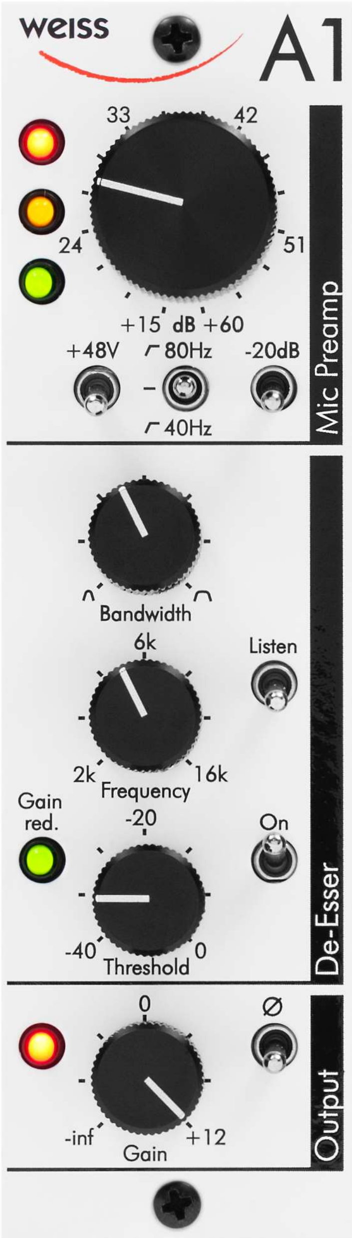

Figure 1.2: A1 front panel.

de-esser parameters. Five light-emitting diodes (LEDs) indicate both audio level and de-esser action.

The chapters 2–5 of this manual introduce the function of these controls and indicators. Chapter 6 concludes this manual with the presentation of the technical data.

Chapter 2

The **A1** Microphone Preamplifier

The microphone preamplifier of the A1 uses a high-quality input transformer followed by a discrete class A amplifier with variable gain. The so-called current feedback architecture of the amplifier ensures that bandwidth and distortion is excellent even at high gain settings. Both the input transformer and the amplifier are optimized such that very low noise is achieved with a wide range of sources and at any gain setting.

2.1 Gain Switch

The A1 features a rotary switch to precisely set the gain of the microphone preamplifier. Without pad (see section 2.3), the overall gain of the preamplifier ranges from +15 dB to +60 dB with gain steps of 3 dB.

2.2 Phantom Power

The +48 V switch applies phantom power to the connected microphone.

Please check your microphone's instruction manual whether it requires phantom power; do not apply phantom power to dynamic and ribbon microphones, as well as microphones with dedicated power supply, to avoid potential damage. Consider disabling phantom power with the corresponding DIP switch (see section 4.4) as a precaution.

2.3 Pad

The pad switch engages a 24 dB attenuator ahead of the microphone input transformer. This alters the overall gain of the microphone preamplifier to the range of −9 dB to +36 dB and allows connection of line-level sources.

2.4 Input Level Indicators

Three light-emitting diodes (LEDs) allow monitoring of the input signal level; a green LED indicates *signal present* (corresponding to −19 dBu); the amber LED lights if a nominal signal level of about +1 dBu is reached, and the red LED indicates that the signal level is near the clipping level (at or above +18 dBu). The signal present and nominal operating level indicators use average detecting and are sensed at the output of the high-pass filter. The overload LED is peak detecting and senses at any amplifier output node of the microphone preamplifier, high-pass filter and de-esser. Thus any internal overload will be sensed.

Chapter 3

The A1 High-Pass Filter

The high-pass filter of the A1 uses a precision active design. The filter follows a 2nd order Butterworth response.

3.1 Frequency

The frequency switch allows setting of the cut-off −3 dB frequency of the high-pass filter to either 40 Hz or 80 Hz. In the center position of the switch the high-pass filter is set to 5 Hz and thus has essentially no audible effect on the signal path.

Chapter 4

The A1 De-Esser

The heart of the A1 is the de-esser signal processing block. It is used to remove excess sibilance; main application will be for vocal recordings, however any other signal which is rich in high-frequency content will possibly benefit from the use of this de-esser.

The de-esser of the A1 is an advanced mixed signal design; while the direct audio signal path is fully analogue, the side chain (which controls the actual de-esser action) is digital. A so-called multiplying DA-converter serves as actual gain control element. The side chain is processed at a sample rate of 500 kHz and has very low latency.

4.1 Frequency

The frequency potentiometer adjusts the center frequency of the frequency range where the de-esser attenuates excess high-frequency signal energy. The control range is about 2–16 kHz.

4.2 Bandwidth

The bandwidth potentiometer controls the width of the frequency range where the de-esser acts. A wider bandwidth yields an increased de-esser effect.

4.3 Threshold

The threshold potentiometer adjust the level threshold above which the de-esser starts attenuating the frequency range as set by the frequency and bandwidth potentiometers. A higher threshold results in less de-esser activity.

		Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8
Ratio	1:1.5	up	up	up					
	1:1.75	up	up	down					
	1:2	up	down	up					
	1:3	*up*	*down*	*down*					
	1:4	down	up	up					
	1:6	down	up	down					
	1:10	down	down	up					
	1:∞	down	down	down					
Attack Time	100 μs				up	up			
	400 μs				*up*	*down*			
	1.6 ms				down	up			
	6.4 ms				down	down			
Release Time	15 ms						up	up	
	30 ms						*up*	*down*	
	60 ms						down	up	
	120 ms						down	down	
Phantom Power	disabled								up
	enabled								*down*

Table 4.1: DIP switch parameter presets. Factory settings are in italic.

4.4 Further Parameters by DIP switches

On the lower side of the A1 case (fig. 4.1) there are eight DIP switches which give further preset control to various parameters of the de-esser side chain. In particular these are ratio, attack time, release time and phantom power. Table 4.1 describes the presets in detail.

Figure 4.1: A1 bottom view with DIP switches.

4.5 Listen

The listen switch allows you to listen to just the signal portion which is subtracted from the audio material. This is very helpful particularly to set the frequency and bandwidth of the de-esser.

4.6 Bypass

The bypass switch disables the de-esser; with bypass engaged the de-esser is fully removed from the analogue signal path, and the digital side-chain is disabled.

4.7 Stereo Linking

The de-essers of two A1 units may be operated in an interconnected fashion for stereo setups. In this mode, the units are linked such that both channels always apply the same gain reduction.[1]

In order to link two A1 units, connect them with the enclosed pin header. Insert the header side with the shorter pins (marked with a white dot) in the slot at the top side of the unit (marked with a white dot). Gently push until the header firmly sits. Then connect the other A1 by carefully mating the pin header with the sockets at the bottom. To mechanically join the two units use the two sheet metal couplers.

Typically one should ensure that the two de-essers are set to the same set of parameters if used with stereo linking.

4.8 Parameter Setting Strategy

The de-esser of the A1 has many parameters to set which can interact with each other; thus it may be challenging to find the right parameter settings. Outlined below is a strategy to quickly dial in the various controls for best result.

- Set the threshold potentiometer to the lowest threshold value (i.e. fully counterclockwise).
- Engage the listen switch and adjust the frequency and bandwidth potentiometers such that you only hear the signal content which should be removed (or at least reduced) by the de-esser.
- Now disable the listen switch and increase the threshold to the highest value where the processing is still strong enough to achieve the desired effect.
- If necessary fine-tune the parameters.

[1] More specifically, the higher gain reduction of both side-chains is applied to both channels.

Chapter 5

The A1 Output Driver

The output line driver of the A1 features a transformer balanced design with high output level and output current capability. It also includes a continuous level control and polarity switch.

5.1 Level

The level control potentiometer has a control range from $-\infty$ dB to $+12$ dB. In the 12 o'clock position the output driver is set to unity gain (i.e. 0 dB).

5.2 Polarity

The polarity switch of the A1 output line driver allows swapping the signal polarity; its use may be helpful to correct acoustical problems and miswired cables.

5.3 Overload Indicator

A red light-emitting diode (LED) indicates that the output driver amplifiers are operated near their clipping level (at or above $+24$ dBu). This overload detector is peak sensing.

Chapter 6

A1 Technical Data

6.1 General Data

Table 6.1 lists general technical data such as gain ranges, in- and output impedances and current consumption

Input gain range, pad off	+15 dB to +60 dB, 3 dB steps
Pad attenuation	24 dB
Output gain range	$-\infty$ dB to +12 dB, continuous
Maximum input level, minimum input gain, pad on	+29.7 dBu (for THD+N ≤ -80 dB)
Maximum output level, 100 kΩ load	+27.0 dBu (for THD+N ≤ -80 dB)
Input impedance at 1 kHz, pad off	8.4 kΩ
Input impedance at 1 kHz, pad on	2.8 kΩ
Output impedance at 1 kHz	290 Ω
Current consumption ±16 V supply	$\leq$ 150 mA
Current consumption +48 V supply	$\leq$ 15 mA

Table 6.1: General technical data.

6.2 Equivalent Input Noise

The microphone preamplifier of the A1 has been optimized for very low equivalent input noise over a wide gain range. Figure 6.1 shows typical performance. Measurement bandwidth is 22 Hz–22 kHz and source impedance 150 Ω. Measured with both pad and de-esser switched off, and output gain set to 0 dB. Note that the EIN is within 3 dB of the theoretical minimum of −130.4 dBu (given by the thermal noise of the source impedance) for gain settings as low as 33 dB. Typical microphone preamplifiers achieve such excellent noise performance only at the highest gain settings, which are infrequently used in practical recording work.

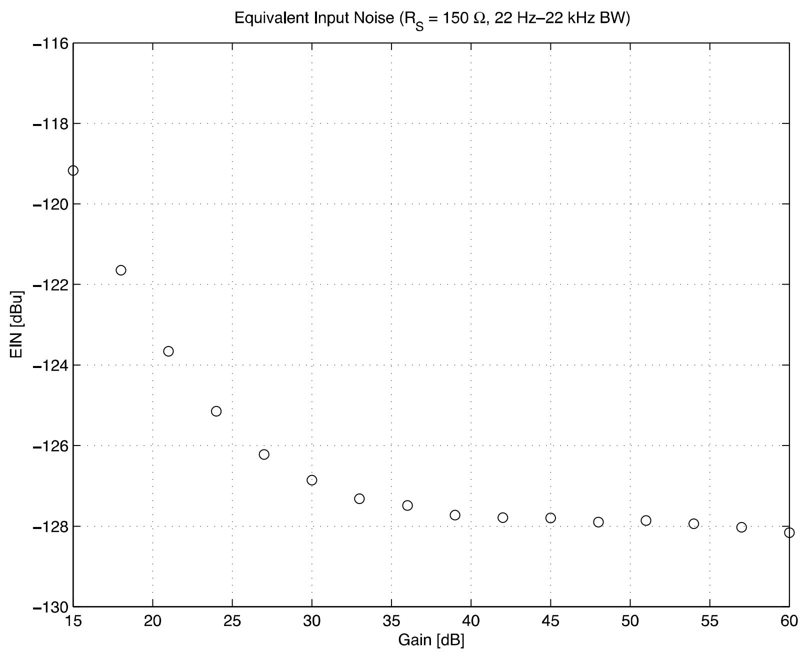

Figure 6.1: Equivalent input noise for a 150 Ω source impedance.

6.3 Total Harmonic Distortion and Noise

The total harmonic distortion and noise performance of the A1 is shown in figure 6.2. Measurement conditions are as follows:

- Gain set to 0 dB (24 dB Pad in, preamplifier gain +24 dB, output gain 0 dB, de-esser bypassed);
- Level +4 dBu;
- Source impedance 150 Ω;
- Measurement bandwidth 80 kHz.

The rising distortion contribution at low frequencies is a result of the use of in- and output transformers.

6.4 High-Pass Filter

The frequency response of the high-pass filter (set to either 40 Hz, 80 Hz or off) is depicted in figure 6.3. Note that with the high-pass filter set to off, the bandwidth extends well below the audio frequency range.

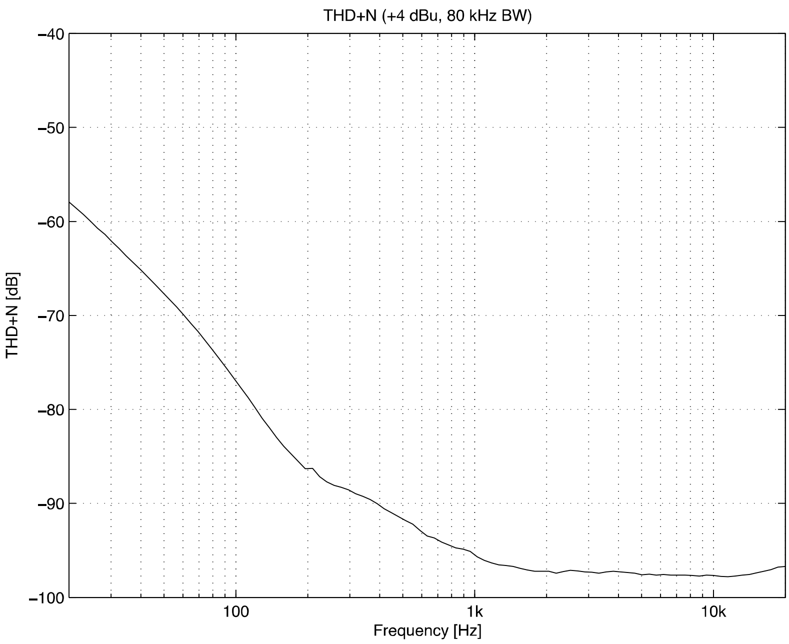

Figure 6.2: THD+N at +4 dBu and in a 80 kHz measurement bandwidth.

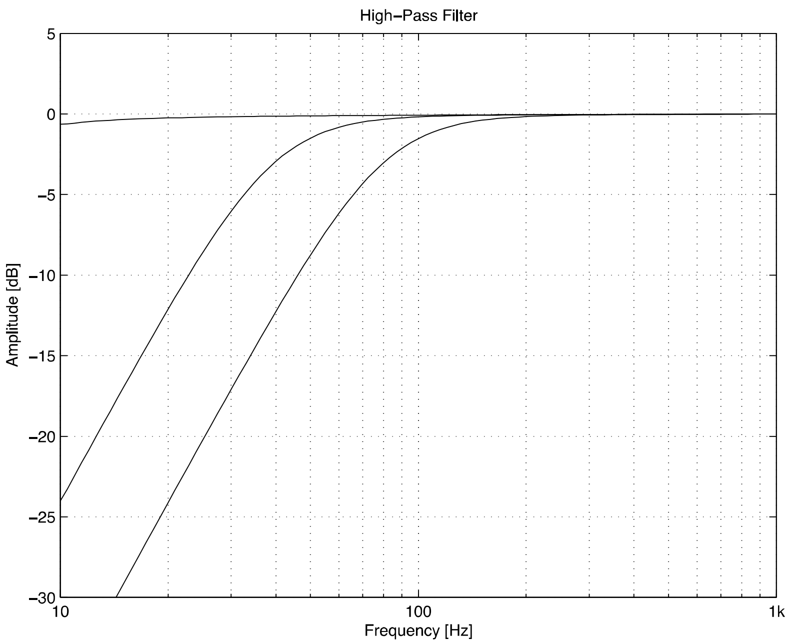

Figure 6.3: High-pass filter frequency response.

6.5 De-Esser

The influence of the various de-esser parameters are illustrated in the following graphs. Figure 6.4 shows the resulting frequency response at 0 dB, 3 dB, 6 dB, 9 db and 12 dB gain reduction, for a center frequency of 3 kHz and a medium bandwidth setting. Figure 6.5 depicts the effect of the frequency potentiometer, for a center frequency of 3 kHz and a medium bandwidth setting. The influence of the bandwidth setting is shown in figure 6.5, with the center frequency set to 3 kHz and the gain reduction adjusted to 9 dB.

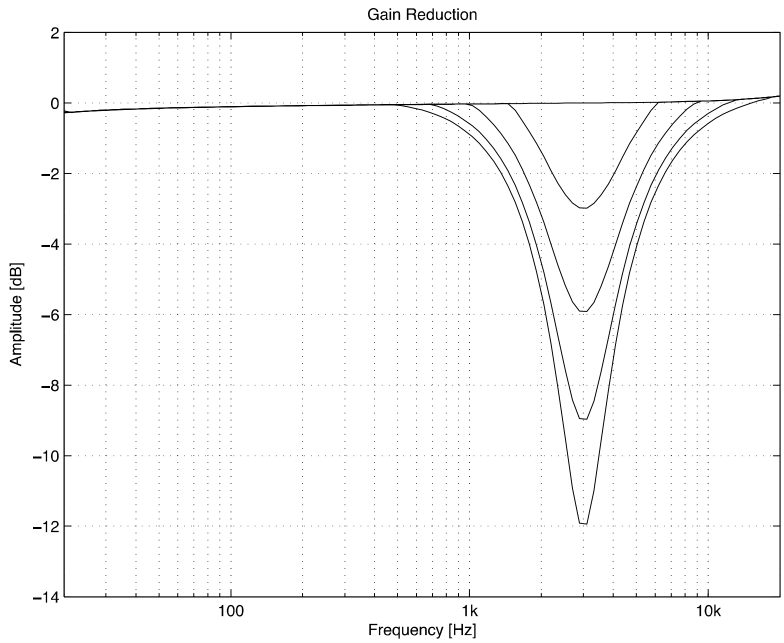

Figure 6.4: De-esser frequency response at various gain reductions.

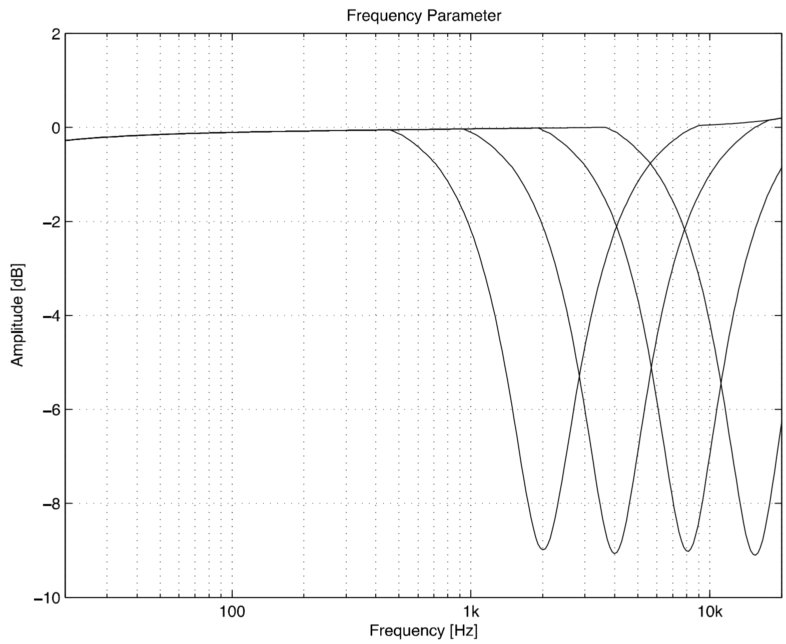

Figure 6.5: Frequency parameter.

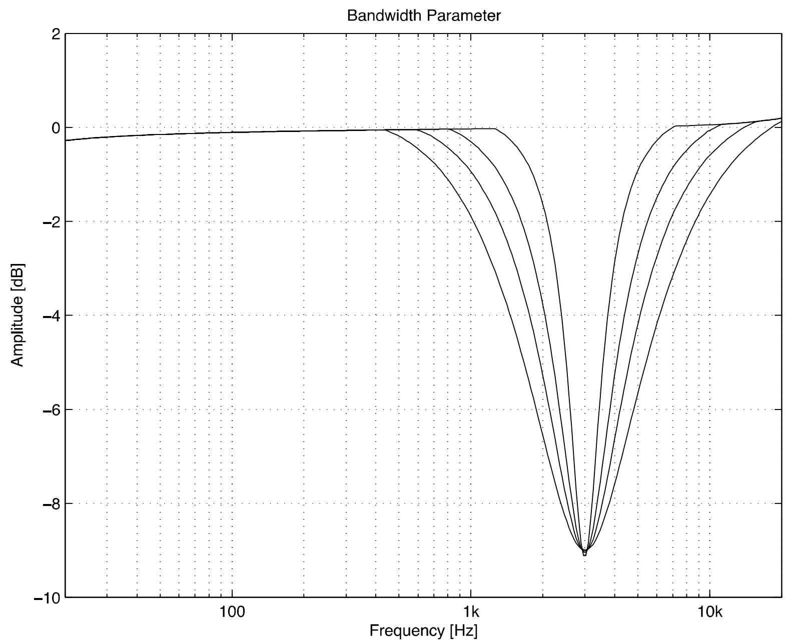

Figure 6.6: Bandwidth parameter.

Appendix A

Contact

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