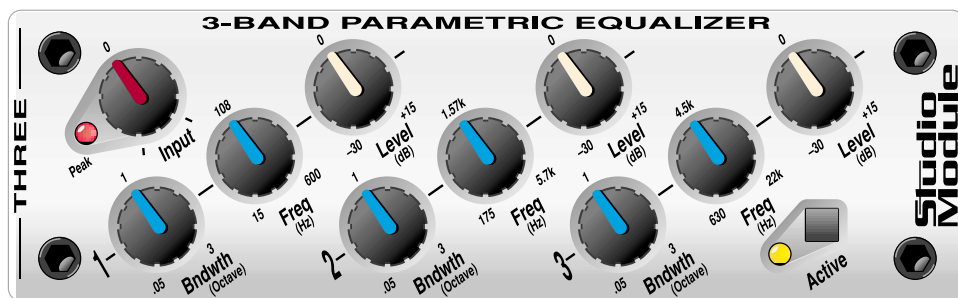


User's Guide
for the
CRATE PRO AUDIO

SM3-PE

Studio Module

3-Band Parametric Equalizer





SM3-PE 3-Band Parametric Equalizer

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ATTENTION		CAUTION		VORSICHT
RISQUE D'ELECTROCUTION NE PAS OUVRIR		RISK OF ELECTRIC SHOCK DO NOT OPEN		ELEKTRISCHE SCHLAGEGFAHR NICHT OFFENEN
ATTENTION: POUR REDUIRE D'ELECTROCUTION NE PAS ENLEVER LE COUVERCLE. AUCUNE PIECE INTERNE N'EST REPRABLE PAR L'UTILISATEUR. POUR TOUTE REPARATION, S'ADRESSER A UN TECHNICIEN QUALIFIE.		CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.		VORSICHT: ZUR MINIMIERUNG ELEKTRISCHER SCHLAGEGFAHR NICHT DEN DECKEL ABENHMEN. INTERNE TEILE KÖNNEN NICHT VOM BENUTZER GEWARTET WERDEN. DIE WARTUNG IS QUALIFIZIERTEM WARTUNGSPERSONAL ZU ÜBERLASSEN.
THIS EQUIPMENT HAS BEEN DESIGNED AND ENGINEERED TO PROVIDE SAFE AND RELIABLE OPERATION. IN ORDER TO PROLONG THE LIFE OF THE UNIT AND PREVENT ACCIDENTAL DAMAGES OR INJURY, PLEASE FOLLOW THESE PRECAUTIONARY GUIDELINES:				
CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT OPEN CHASSIS.				
WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE.				
WARNING: AVOID PROLONGED EXPOSURE OF THE EQUIPMENT TO EXTREME HEAT.				
CAUTION: NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.				
EXPLANATION OF GRAPHICAL SYMBOLS:				
 = "DANGEROUS VOLTAGE" "DANGER HAUTE TENSION" "GEFAHLICHE SPANNUNG"	 = "IT IS NECESSARY FOR THE USER TO REFER TO THE INSTRUCTION MANUAL" "REFERREZ-VOUS AU MANUAL D'UTILISATION" "UNBEDINGT IN DER BEDIENUNGSANLEITUNG NACHSCHLAGEN"			



SM3-PE 3-Band Parametric Equalizer

Introduction:

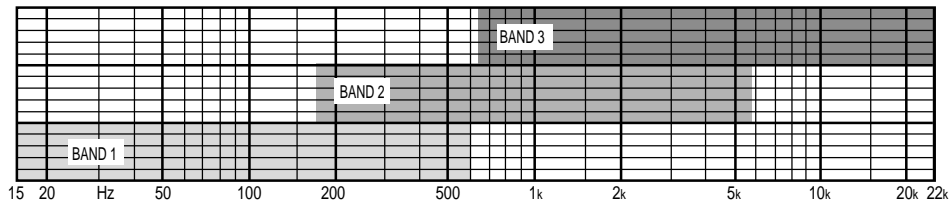
Thank you for selecting the Crate SM3-PE three band parametric equalizer. This compact device has been designed with the audio professional in mind, providing accuracy, quality, ease of use and straight-forward design. Each of the three bands has its own Bandwidth, Frequency and Level controls, allowing complete and precise control over the entire audio spectrum.

In order to achieve maximum performance from your SM3-PE and to better understand its applications, please read this user's guide prior to its use.

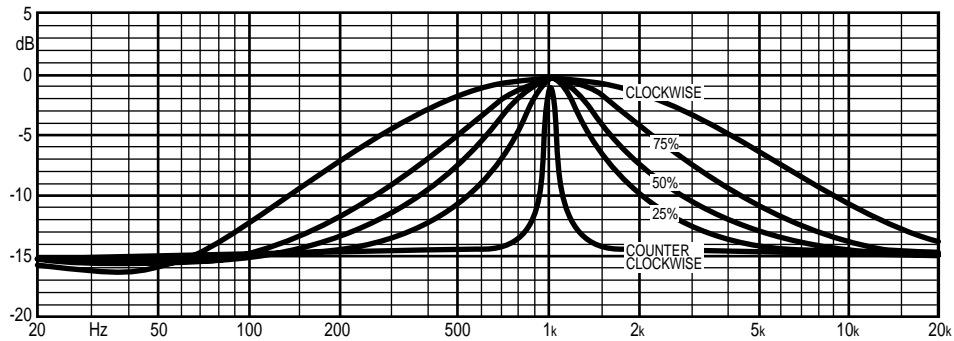
And "Thank You" from



Frequency Range Per Band:



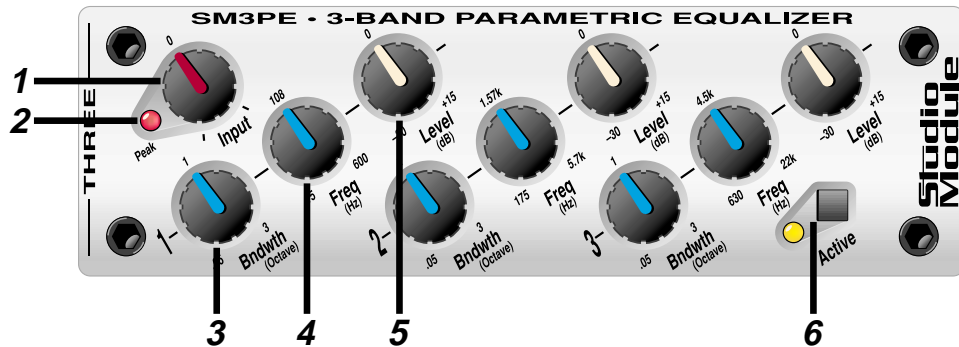
Typical Bandwidth Curves:





SM3-PE 3-Band Parametric Equalizer

Features - The Front Panel:



1. Input Level Control: Allows adjustment of the level of the signal going into the unit. For best signal to noise ratio, adjust this control until the Peak LED (#2) flashes on strong signal peaks. The center detent position is “unity gain.”

2. Peak LED: Lights when the input signal is within 6dB of clipping.

3. Bandwidth: Allows adjustment of the width of the band of frequencies affected by the unit. In the extreme counter clockwise position, the bandwidth is .05 octaves; the center detent is 1 octave and the extreme clockwise position is 3 octaves.

4. Frequency: Allows adjustment of the center frequency of the band affected by the unit. Band #1 is adjustable between 15Hz and 600Hz; band #2 between 175Hz and 5.7kHz and band #3 between 630Hz and 22kHz.

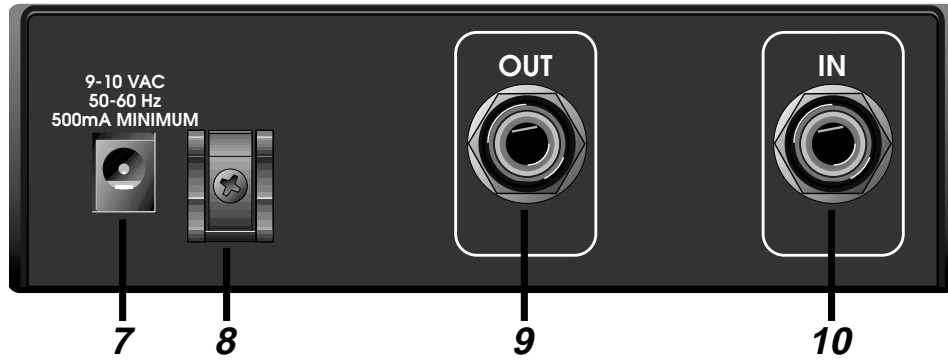
5. Level: Allows adjustment of the amount of boost or cut applied to the affected band of frequencies. The extreme counter clockwise position is 30dB of cut; the center detent is flat (unity gain – no cut or boost) and the extreme clockwise position is 15dB of boost.

6. Active Switch and LED: The unit will only affect the signal when this switch is in – the adjacent LED will light when active. This is useful when comparing the processed signal (switch in) to the original signal (switch out).



SM3-PE 3-Band Parametric Equalizer

Features - The Rear Panel:



- 7. **Power Supply Jack:** Plug the small metal barrel connector of the AC power adapter here.
- 8. **Cord Cinch:** Use this clip to secure the cable of the power pack to the chassis of the SM3-PE.
- 9. **Output Jack:** This balanced 1/4" jack* carries the output signal from the SM3-PE to its destination.
- 10. **Input Jack:** This balanced 1/4" jack* receives the input signal into the SM3-PE.

Note: Refer to pages 6 – 9 for hookup information.

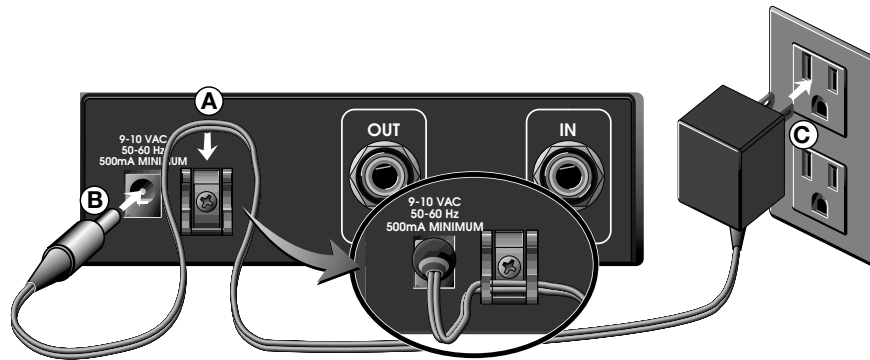
*tip = signal +, ring = signal -, sleeve = ground



SM3-PE 3-Band Parametric Equalizer

Applications:

Connecting the AC Power Adapter



- A) Slide the power adapter cable into the cord cinch as shown above, leaving a few inches of cable between the cinch and the cable's small metal barrel connector.
- B) Plug the barrel connector into the power supply jack.
- C) After all other connections are made, plug the power pack into a suitable source of AC line voltage. (See the sticker on the power adapter for voltage requirements.)

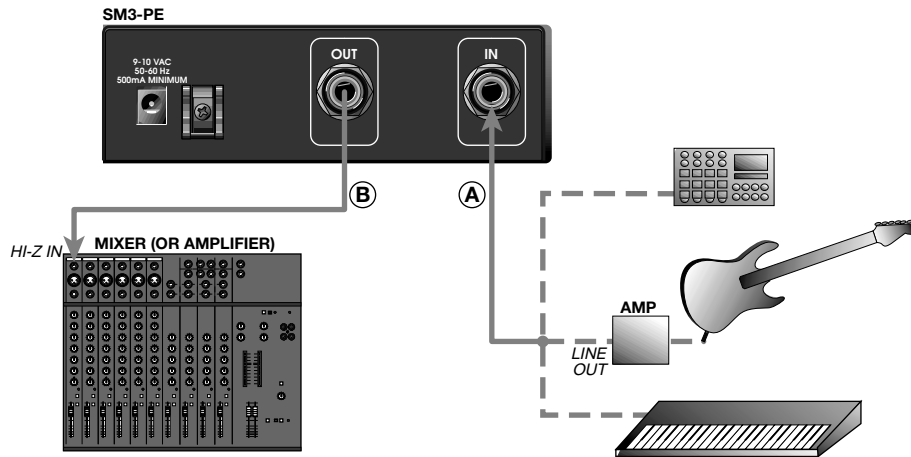
NOTE: Since the SM3-PE is "always on" when the power pack is plugged in to a live outlet, it is advised that you unplug the power pack (or turn off the AC source) when not using the unit for extended time periods.



SM3-PE 3-Band Parametric Equalizer

Applications:

Connecting In-Line with Signal Source



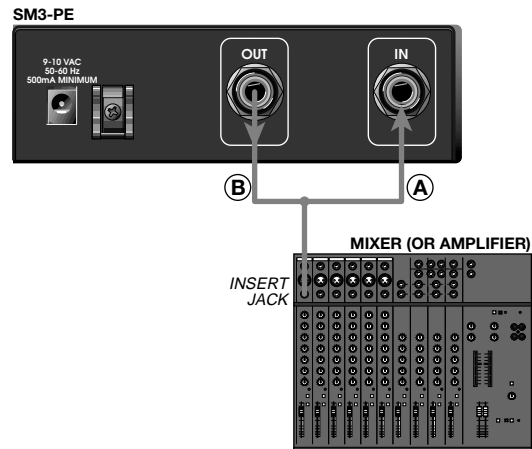
- A) Connect source **Out** to SM3-PE **In** jack
- B) Connect SM3-PE **Out** to mixer/amplifier **Input** jack



SM3-PE 3-Band Parametric Equalizer

Applications:

Connecting to an Insert Jack



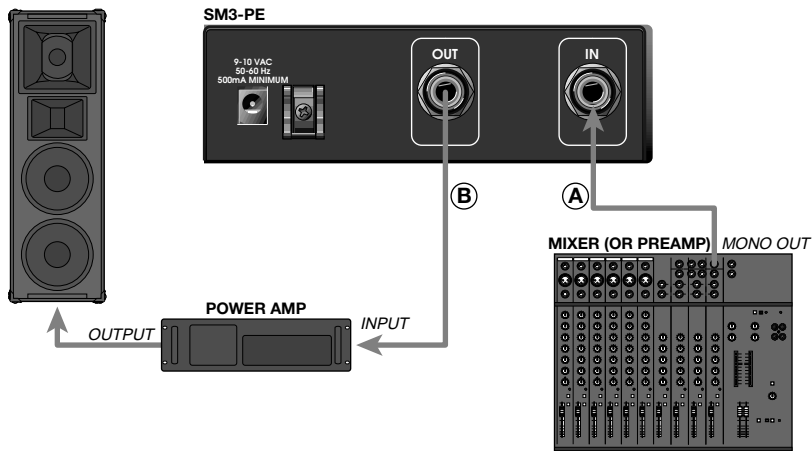
- A) Connect mixer/amplifier **Insert Send** to SM3-PE **In** jack (use proper Y-adapters/cables and see mixer/amplifier's manual to determine correlation of Send and Return with ring and tip)
- B) Connect SM3-PE **Out** to mixer/amplifier **Insert Return**



SM3-PE 3-Band Parametric Equalizer

Applications:

Connecting In-Line Between a Mixer and Amplifier



A) Connect mixer/preamp **Out** to SM3-PE **In** jack

B) Connect SM3-PE **Out** to power amplifier **In** jack

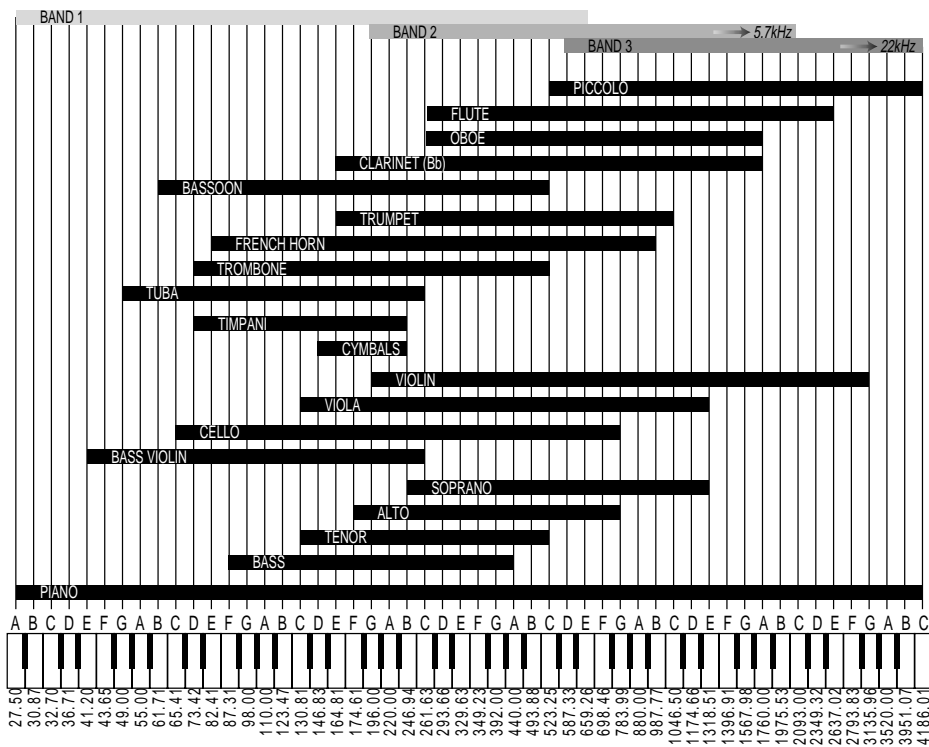


SM3-PE 3-Band Parametric Equalizer

Applications:

Tips on Using an Equalizer

Mixing and equalizing music requires a skillful ear and some practical knowledge of the different tonal characteristics of each instrument. Listed below are some common instruments and voices and their characteristics as compared to a conventional 88-note piano keyboard.



Examining the chart, we see that the piano has about the widest frequency range among those instruments shown. Others may be synthesizers and organs but we chose the piano for ease in comparison. Next, we will break down the equalizer bands into six distinct ranges and briefly explain their tonal characteristics.



SM3-PE 3-Band Parametric Equalizer

Applications:

Bass Range (20Hz-125Hz)

Unlike most other instruments, pianos, organs, harps, and synthesizers contain some fundamentals in the 20Hz-40Hz range. The 40Hz-120Hz range has a greater audible effect on “low bass”. The electric bass guitar and the acoustic bass both have fundamentals in this region (The “E” string on an electric bass is 41.2Hz). This region provides much of the low end “punch” in bass instruments and drums.

Mid-Bass Range (125Hz-250Hz)

The “fullness” of the mix will be determined in this region, either adding a “thicker” or “fatter” characteristic or making it “thin” or “weak”. The guitar and bass both contain fundamentals in this range along with the male or tenor voice. This region also provides the apparent “loudness” of a mix, especially around 160Hz.

Low-Mid Range (250Hz-500Hz)

This range tends to add a harsh “muddy” sound when boosted, particularly around 300Hz to 500Hz. This region is best left alone or even reduced slightly for a more appealing tonal quality.

Mid Range (500Hz-4kHz)

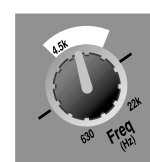
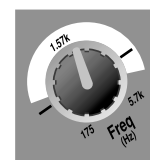
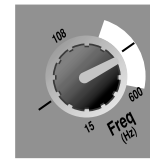
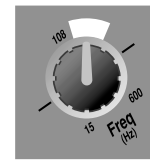
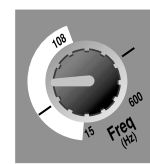
This is the range at which the human ear is most sensitive. Very small changes in this area can produce a dramatic effect. This region is most commonly reduced in amplitude to produce a rich sound with more emphasis on low bass and upper high end regions. When equalizing individual instruments in a mix, this range becomes very important to bring them to the “front” of the mix, cutting through the rest of the instruments.

Upper-Mid Range (4kHz-8kHz)

This region is the “presence” range which can determine whether the mix or instrument is “harsh” and “piercing” or “distant” and “muffled”. This range will also help voices and other instruments cut through a mix when boosted. When high frequency “feedback” occurs, this region is one of the most critical in eliminating it.

High Range (8kHz-20kHz)

High end, as it is usually perceived, is actually below 12kHz, however, the 10kHz to 16kHz range is very useful to enhance vocals and wind instruments to bring out “breath” sounds that can give them distinction and clarity. Cymbals on drums can also be more cutting and clear in this region. The range of 16kHz to 20kHz can be used to compensate for off-axis high frequency deficiencies of horns and tweeters.





SM3-PE 3-Band Parametric Equalizer

Applications:

Room Equalization

Any sound system, whether it be a home stereo, a large sound reinforcement system, or recording studio monitors, will vary in its perceived reproduction depending on its environment; its room. When sound enters the room, some frequencies are reflected by parts of the room and some are absorbed in varying degrees. This results in an uneven sound field. If speakers are placed in room corners or against walls, a large increase in the lower frequencies will occur. Some speakers are designed to use this increase to flatten their response; others, such as near field monitors and P.A. speakers, are design to be flat in a free air environment (that is, having no external boundaries). These speakers when placed in the wrong environment will produce an increased low frequency response. This is one of the ways an equalizer will be beneficial to the balance of your system. Another way is simply to correct variances with the speaker enclosures themselves.

By using a spectrum analyzer or Real Time Analyzer (RTA) and any of the new Crate Pro Audio equalizers, a flat response can be obtained with precision and accuracy. This also may be achieved by ear, though not with the same accuracy, using a favorite recording (preferably acoustic material) that is familiar to you. Good Luck!

Another means of achieving a flat response with your system is called "Feedback Tuning" or "Ringing the Room". This method requires an omni-directional microphone with a very flat response to be placed in the listening area and connected to your system in an unequalized channel of your mixer. With your parametric or graphic EQ set flat, slowly turn the gain of your microphone up until a frequency starts to ring (**WARNING:** Be careful not the let this ring excessively or speaker damage may occur.) Reduce the EQ band that makes the ringing stop. Pull only a few dB, not all the way. Increase the system gain again, and another frequency will begin to feed back. Reduce the corresponding band again. Repeat this procedure three or four times only. After that, go to any bands you have not yet changed and bring up their levels until another frequency begins to feedback, then reduce that frequency until the feedback just stops. Continue this throughout the remainder of the controls you did not originally touch. This method takes a lot of practice and patience and will get the response of your system electronically flat to your room. Additional equalizing may be required from this point; the next section will explain.



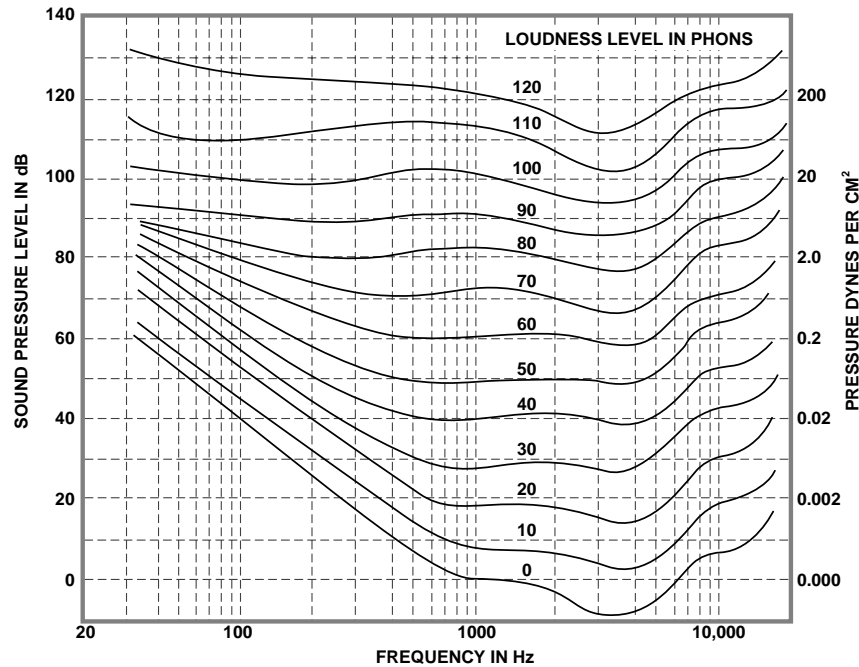
SM3-PE 3-Band Parametric Equalizer

Applications:

Fletcher-Munson Equal Loudness Contours

The human ear does not hear all frequencies equally. For example, we hear less bass notes at lower levels than we do at high levels. To compensate for this, additional EQ may be necessary to create a pleasing overall sound, even after a room has been EQ'd. A "preferred curve" is actually a series of boosting and cutting at various frequencies, depending on the overall performance level, so the ear perceives all frequencies at the same level. These curves are known as the Fletcher-Munson Equal Loudness Contours (see the chart below). Notice that the amount of boosting changes with overall listening levels, since the ear hears lower frequencies better as the volume level increases.

After having achieved an electronically flat response from your speakers in the room, use the Fletcher-Munson chart to adjust the contour according to the sound pressure level of the performance. These curves are intended to be used as guidelines and starting points. Experimentation is always necessary to find your own "preferred" sound, since such a sound is as much subjective as it is science.





SM3-PE 3-Band Parametric Equalizer

Applications:

Feedback Control

Feedback can be a major problem in live sound reproduction and causes a lot of headaches. Feedback occurs when an outgoing signal finds its way back into the system via a microphone or a guitar pickup and gets re-amplified. The speaker is the transmitter and the microphone or pickup is the receiver. The best and most effective way to eliminate feedback is to remove the transmitter from the receiver or vice versa.

If this is not possible, then an equalizer with narrow bandwidth filters, such as the SM3-PE, is a most effective alternative. To find the frequency at which the feedback is occurring, select the band (1, 2, or 3) you feel contains the problem and set the Level control to maximum "cut". Set the Bandwidth control to the 9:00 position. Slowly sweep the Frequency control until you find the point at which the feedback stops. If this doesn't help, reset the band to its nominal settings and repeat this procedure with the next band. Once you have isolated the feedback frequency, reduce the Bandwidth control to full counter clockwise position, readjusting the frequency control as needed to ensure that the filter remains centered on the offending frequency. Then slowly increase the Level until just before feedback occurs. You have successfully eliminated your feedback problem without losing overall level or sacrificing frequency response.



SM3-PE 3-Band Parametric Equalizer

Applications:

Creative or Enhancement Equalization

The parametric equalizer can also be a creative tool. The SM3-PE can be used on individual instruments, vocals, signal processors, and recording equipment to shape or mold them to the exact sound you want. With vocals, very high frequencies around 10kHz to 20kHz can be boosted to help separate syllables for greater clarity and distinction. The vocal range is from about 150Hz up to 4kHz. When speech intelligibility is your main concern, isolating this region is critical with emphasis at the upper end, around 4kHz, especially in a highly reverberant environment.

This is an area where the Bandwidth control can be used to maximum effectiveness. Input a signal into the unit, cut or boost one of the bands and rotate the Bandwidth control back and forth to get a feel for what it does to the sound. This is a control that will take some ear training to get the most out of it, but generally thinner bandwidths are more noticeable in the mix than wider ones. If you need your EQ-ing to sound more natural and transparent a wider bandwidth is usually necessary. For feedback elimination or more radical EQ effects a thinner bandwidth may be necessary.

Using your equalizer with a digital reverb gives you the ability to change the characteristics of the "room" or "hall" you've selected, offering greater versatility.

Your equalizer can also be used to make a "de-esser". A "de-esser" is what it sounds like, a clever way to control "S's" in speech or any vocal performance, especially in your effects processors. This will require a compressor with a trigger input. You must first split your vocal send into two output signals. The first vocal signal is simply sent to the input of the compressor. The second vocal signal is sent to the input of your equalizer. The output of the equalizer is sent to the "trigger" input of your compressor. The output of your compressor is sent back to a channel on your mixer. The de-esser is made by boosting 6.3kHz by +15dB and then adjusting the compressor threshold until the desired effect is reached, that is, when an "S" is pronounced then the signal will be reduced. Some other adjustments can also be made on your compressor with the "attack time", "decay time" and the "compression ratio" to enhance the effect.



SM3-PE 3-Band Parametric Equalizer

Technical Specifications:

Frequency Response	<5Hz – 70kHz	
Maximum Input Level	28dBm	
Maximum Output Level	20dBm	
Gain	Bypassed	0dB
	Active	0dB
Signal to Noise Ratio	95dB	
Input Level Control	Provides input level adjustment from -∞dB to +4dB Center detent = unity gain	
Bandwidth Control	.05 – 3 octaves	
Frequency Control	Band 1	15Hz – 600Hz
	Band 2	175Hz – 5.7kHz
	Band 3	630Hz – 22kHz
Level Control	+15dB/-30dB	
Active Switch	Unit is activated when switch is depressed, LED lit	
Power Supply Requirements	9-10 VAC, 500mA	
Size and Weight	1.6" H x 5.6" W x 5.5" D; 1.5 lbs (without power adapter)	

Specifications subject to change without notice.

**Studio
Module**



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