



PEQ-5B

5-BAND PARAMETRIC EQUALIZER

OWNER'S MANUAL

PEQ-5B

5-BAND PARAMETRIC EQUALIZER



Congratulations!

You have purchased one of the finest professional parametric equalizers on the market today. This unit was developed using the expertise of professional sound engineers and working musicians. You will find your new NADY AUDIO PEQ-5B has superior performance and greater flexibility than any other parametric equalizer in its price range. Please read this manual carefully to get the most out of your new unit. Thanks for selecting NADY AUDIO as your choice in parametric equalizers.

Date of Purchase _____

Dealer's Name _____

City _____

State _____ Zip _____

Model# _____

Serial # _____

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An equilateral triangle enclosing a lightning flash/arrowhead symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure which may be of sufficient magnitude to constitute a risk of electric shock.



An equilateral triangle enclosing an exclamation point is intended to alert the user to the presence of important operating and service instructions in the literature enclosed with this unit.

IMPORTANT SAFETY INSTRUCTIONS

When using electronic device, basic precautions should always be taken, including the following:

1. Read all instructions before using the product.
2. Do not use this product near water (e.g., near a bathtub, washbowl, kitchen sink, in a wet basement, or near a swimming pool, etc.).
3. This product should be used only with a cart or stand that will keep it level and stable and prevent wobbling.
4. This product, in combination with headphones or speakers, may be capable of producing sound levels that could cause permanent hearing loss. Do not operate for a long period of time at a high volume level or at a level that is uncomfortable. If you experience any hearing loss or ringing in the ears, you should consult an audiologist.
5. The product should be positioned so that proper ventilation is maintained.
6. The product should be located away from heat sources such as radiators, heat vents, or other devices (including amplifiers) that produce heat.
7. The product should be connected to a power supply only of the type described in the operating instructions or as marked on the product. Replace the fuse only with one of the specified type, size, and correct rating.
8. The power supply cord should: (1) be undamaged, (2) never share an outlet or extension cord with other devices so that the outlet's or extension cord's power rating is exceeded, and (3) never be left plugged into the outlet when not being used for a long period of time.
9. Care should be taken so that objects do not fall into, and liquids are not spilled through, the enclosure's openings.
10. The product should be serviced by qualified service personnel if:
 - A. The power supply cord or the plug has been damaged.
 - B. Objects have fallen into, or liquid has been spilled onto the product.
 - C. The product has been exposed to rain.
 - D. The product does not appear to operate normally or exhibits a marked change in performance.
 - E. The product has been dropped, or the enclosure damaged.
11. Do not attempt to service the product beyond what is described in the user-maintenance instructions. All other servicing should be referred to qualified service personnel.

PEQ-5B Parametric Equalizer

With its advanced state-of-the-art features and versatile utility, the PEQ-5B five-band parametric equalizer is a rugged work-horse, designed for long-haul reliability in the studio and live sound reinforcement applications.

- 15dB boost/cut per band
- Constant-Q, state-variable filter circuitry for precision control of tone coloration
- Parallel phase filters for minimal phase shifting
- Tunable high and low-cut filters for removing floor rumble, tape hiss, etc..
- Each band independently switchable and adjustable in bandwidth (.03 to 2 octaves wide), allowing a range of adjustment from tight notching to extreme boost/attenuation by band overlapping
- Constant-Q state variable filters for maximum filter stability
- Servo-balanced XLR and 1/4" TRS inputs and outputs
- Bypass switches on each channel with LED status indicators
- Highly accurate 12-segment LED switchable Input/Output meter
- Failsafe relay with auto-bypass during power failure
- Single rack space (1U) rugged metal housing for reliability
- IEC power cord socket for AC operation with internal shielded power supply, external fuse, and ~115V (60Hz) / ~230V (50Hz) AC select switch

INSTALLATION

To ensure years of enjoyment from your NADY AUDIO PEQ-5B Parametric Equalizer, please read and understand this manual thoroughly before using the unit.

1. Inspection

Your NADY AUDIO PEQ-5B was carefully packed at the factory in packaging designed to protect the units in shipment. Before installing and using your unit, carefully examine the packaging and all contents for any signs of physical damage which may have occurred in transit.

(Note: Nady Systems is not responsible for shipping damage. If the unit is damaged, do not return to us, but notify your dealer and the shipping company immediately to make a claim. Such claims must be made by the consignee in a timely manner.)

2. Rack Mounting

This model is designed for mounting in a standard 19" equipment rack or one of the many rack type portable cases available on the market. The unit fits in a standard 19" single rack (1.75"). Install the equalizer in a rack with the rack screws provided. Please allow at least an additional 4" depth for the connectors on the back panel. Route the A.C. power cord to a convenient power outlet away from audio lines. The unit may be turned on and off from the front panel power switch or a master equipment power switch. Since the unit draws a relatively small amount of current during idle, the unit may be left on continuously. The PEQ-5B does not generate an unduly large amount of heat and does not need to be specially ventilated or cooled. The unit should not be subjected, however, to high heat environments. Although the unit's chassis is shielded against radio frequency (RF) and electromagnetic interference (EMI), extremely high fields of RF and EMI should be avoided.

3. Input/Output Connections

The 1/4" TRS phone jack and XLR connector inputs and outputs can be used for balanced and unbalanced connections.

For balanced connection, wire the connectors as follows:

XLR JACK	CONNECTION
PIN 1	GROUND <small>(optional, use as shielding to prevent hum)</small>
PIN 2	HIGH (+)
PIN 3	LOW (-)

For unbalanced operation, wire the connectors as follows:

XLR JACK	CONNECTION
PIN 1	GROUND
PIN 2	HIGH (+)

1/4" TRS JACK	CONNECTION
TIP	HIGH (+)
RING	LOW (-)
SLEEVE	GROUND <small>(optional, use as shielding to prevent hum)</small>

1/4" TRS JACK	CONNECTION
TIP	HIGH (+)
SLEEVE	GROUND

CAUTION: Using more than one connector at a time for the INPUT/OUTPUT pair could unbalance balanced lines, cause phase cancellation, short a conductor to ground, or cause damage to the other equipment connected to the equalizer.

4. Power Connection

The PEQ-5B is designed for operation from 120-240 volts, 50-60 Hz AC supplies. Power requirements for electrical equipment differ from area to area. In new installations and portable sound systems, or any situation in which the AC power is in question, it is wise to confirm the voltage and select the appropriate line voltage switch before connecting the instrument to power sources.

Check to see that the unit is set to the voltage for your area by referring to the table below:

Europe (except UK): 230V, 50Hz

UK and Australia: 240V, 50Hz

USA and Canada: 120V, 60 Hz

For other areas, please check with local authorities.

If the voltage selector is not set for your area:

Confirm that the power cord is not plugged into a wall outlet. Move the voltage selector switch with a small screwdriver so that the marker is set to the voltage for your area.

5. Signal Levels

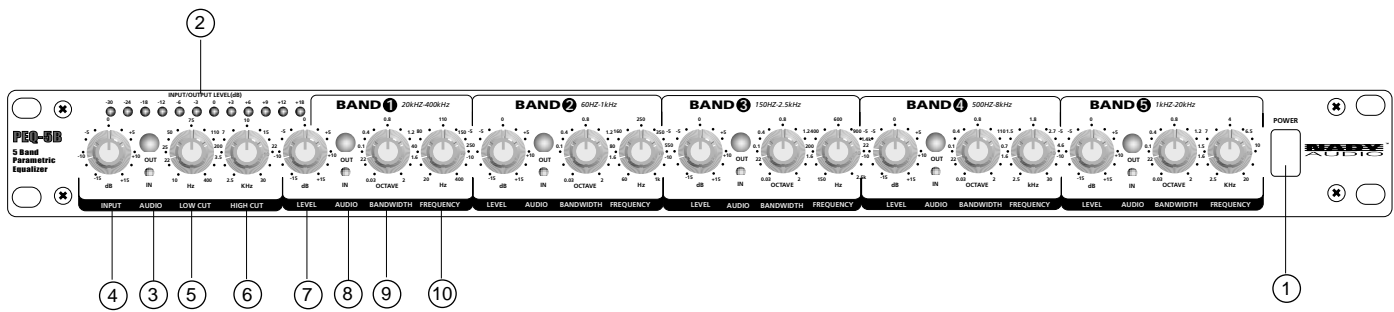
Signal levels from -21 dBu to +21 dBu are considered normal. Do not directly connect microphones into the equalizer's inputs. Microphones require a pre-amp.

6. Chassis Grounding

The PEQ-5B is equipped with a rear panel Ground Screw. This is generally connected with a short piece of wire to the chassis ground shared by the other connected equipment in the rack. If, after setting up your system, the system exhibits excessive hum or buzzing, the problem may be that there is a ground incompatibility between your equalizer the other equipment in the same system. There are several combinations that can be attempted.

Note: ALWAYS TURN YOUR AMPLIFIERS DOWN BEFORE CHANGING YOUR GROUNDS AROUND.

Try different combinations of lifting ground wires or make sure all chassis are connected to earth ground, either through the A.C. power cord ground or by the front panel rack mount screws.



FRONT PANEL

The Nady PEQ-5B has five parametric filters organized in five different frequency bands. A 12-segment LED display shows the input or output level, and there is both a master low-cut and high-cut filter.

1. POWER SWITCH

To turn the unit ON or OFF, press the upper or lower portion of this button.

2. MASTER INPUT/OUTPUT LEVEL METER DISPLAY

This 12-segment LED meter is used to monitor the signal levels, so as to avoid overload distortion. The display shows the input or output level as selected by the AUDIO IN/OUT switch (INPUT is selected with the switch pressed in). The top red LED lights at a level of about +18 dB, which is about 3 dB below clipping.

(Note: Extreme boost settings in combination with a high input level can cause overload clipping. If this happens, reduce the input level as necessary with the INPUT control.)

3. MASTER AUDIO IN/OUT SWITCH WITH LED INDICATOR

This is used to enable/disable the entire equalizer section in the audio path, allowing A/B comparisons between the processed and unprocessed signals. The switch uses a relay-controlled hard-bypass function, so that if it is not pressed in or if the unit is switched off, the inputs are directly connected to the outputs. The switch also selects the input or output signal for display on the INPUT/OUTPUT LEVEL meter. The LED lights when the switch is IN.

4. MASTER INPUT CONTROL

Use this CONTROL TO DETERMINE THE INPUT LEVEL TO THE UNIT. It can be set from -15 to +15dB.

5. MASTER LOW CUT CONTROL

Use this control to adjust the lower cutoff frequency of the PEQ-5B. The high pass filter can be tuned from 10 to 400 Hz. In the 10 Hz position the signal passes unchanged.

6. MASTER HIGH CUT CONTROL

Use this control to adjust the upper cutoff frequency of the unit. The low-pass filter can be tuned from 2.5 to 30 KHz. In the 30 KHz position the signal passes unchanged.

7. BAND LEVEL CONTROLS

Use this control to determine the amount of level boost/cut for each band. The setting ranges from -15 to +15 dB.

8. BAND IN/OUT SWITCHES WITH LED INDICATORS

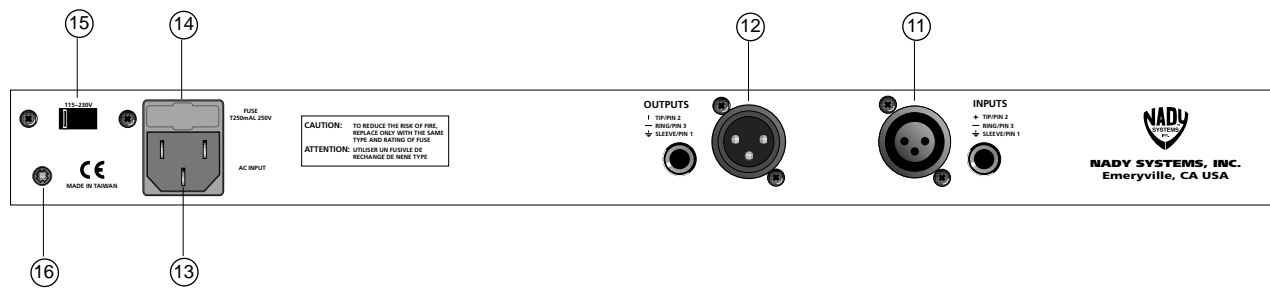
Use these switches to enable/disable specific bands in the audio path. The LED lights when the switch is IN.

9. BANDWIDTH CONTROLS

Use these controls to determine the "Q" or slope of the filter in each band. Settings range from 0.03 (Q=43) to 2 octaves (Q=0.67).

10. BAND FREQUENCY CONTROLS

Use these controls to select the filter's center frequency in each band. This can be any frequency within that band's frequency range.



REAR PANEL

11. BALANCED SIGNAL INPUT JACKS (1/4" TRS & XLR)

These 1/4" TRS (Tip/Ring/Sleeve) and XLR jacks are wired for balanced input signals (0.775V=0dBm, 15K Ohms) and signal polarity is Tip/Pin 2 = Cold (+), Ring/Pin 3 = Hot (-), and Sleeve/Pin 1 = Ground.

12. BALANCED SIGNAL OUTPUT JACK (1/4" TRS & XLR)

These 1/4" TRS and XLR jacks provide a balanced signal output (600 Ohms) and are wired with the same signal polarity as the Input Jacks above.

13. POWER CONNECTOR

The IEC cord connector is used to connect the AC power source to your power amplifier.

CAUTION: DO NOT REMOVE THE CENTER GROUNDING PIN.

14. AC FUSE HOLDERS

This fuse holder contains an AC primary fuse. When this fuse blows, replace it with the same type fuse, size and power rating (120 VAC: 250mA/250V; 230 VAC: 125mA/250V). If it continuously blows, stop replacing the fuse and refer servicing to qualified personnel.

CAUTION: After checking the AC supply voltage, be sure that the correct fuse is in the fuse holder.

15. AC VOLTAGE SELECTOR SWITCH

Before plugging in the power cord, check to see that the unit is set for the proper voltage for your area: ~115V (60Hz) or ~230V (50Hz).

16. GROUND WIRE SCREW

Connect a short ground wire from this screw to the grounding point for all connecting equipment in your rack (see also section A 6 above: Chassis Grounding).

1. Parametric and Graphic Equalizers

Parametric equalizers are extremely useful, versatile tools in both live sound and recording applications. They can enable a wide variety of tasks, from gentle contouring and audio sweetening in the studio, to room equalization and feedback notching in sound reinforcement. The most advanced form of equalization system available, the parametric equalizer allows adjustment of all three parameters required for complete control of equalization: bandwidth, frequency and amplitude boost/cut. While graphic equalizers only provide a series of adjacent bands for control of a specific frequency, parametric equalizers allow for selecting a specific frequency directly. Thus, they can be used to realize complex frequency curves with highest precision. Since the acoustic results obtained with parametric equalizers are not as predictable as those of graphic equalizers, it is necessary to work with parametric equalizers for a while to get a feeling for the functions and the results they can achieve.

2. Basic Operation of the PEQ-5B Parametric EQ

The Nady PEQ-5B provides all the advantages of both parametric equalizers and narrow-band notch filters. Its advanced design and high performance enable equalization flexibility limited only by the imagination. With a variable bandwidth ranging from 0.03 to 2 octaves, the PEQ-5B is the most flexible equalizer available. It is totally superior to graphic equalizers in all ways, and for almost all applications, from post-production in audio, video and broadcast studios to on stage use.

Each of the PEQ-5B's 5 bands can be adjusted from extremely narrow to broadband. Its additional low and high-cut filters have a slope of 6 dB/octave and can be varied over a wide frequency range and enable control of the entire frequency response for your specific application. With all this equalization available, it is easy to modify the entire spectrum of the signal being processed at once. The added filters allow both high and low broadband corrections, while the parametric filters process hum, feedback, and other narrow frequency band problems.

The PEQ-5B utilizes Constant -Q filters which prevent the parameters frequency, bandwidth and amplitude from affecting each other. Such independence allows more clearly defined and repeatable filter settings. When several filters are used simultaneously, the resulting overall filter curve can be calculated by adding/subtracting the single band-specific filter curves.

Conventional parametric equalizers typically employ series filters, which can introduce noticeable phase shifts and delays. The advanced-design PEQ-5B features parallel filters, which are a marked improvement and provide optimized audio free of such undesirable artifacts. Parallel filter design thus allows for more "musicality" in the audio processing. It should be noted, however, that while extreme boost/cut of frequencies can be realized by overlapping the frequencies of individual bands, this technique must be exercised with care when using the PEQ-5B so that the "musicality" of the final sound image is retained.

The PEQ-5B enables both notching/peaking and rolling-off frequency bands. Notching and peaking refer to specific attenuation or boosting respectively of single frequencies or bands. Peaking is achieved by band-pass filters and notching by notch filters. Although similar in concept, these two filter types achieve the exact opposite effect. Rolling off is done by either high or low pass filters. In the PEQ-5B, these filters have a slope of 6 dB/octave and can be varied within a wide frequency range.

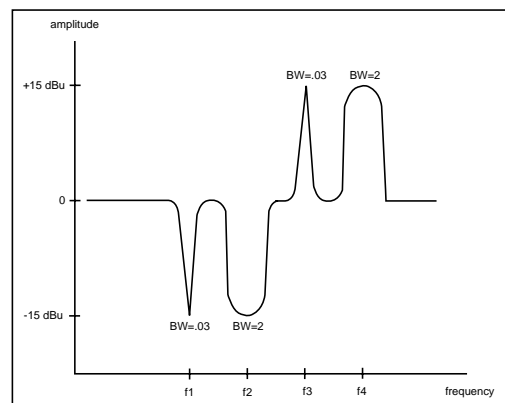


Fig. 1: Narrow (BW=.03) and Wide (BW=2) notch (f1, f2) and peak (f3, f4) filters

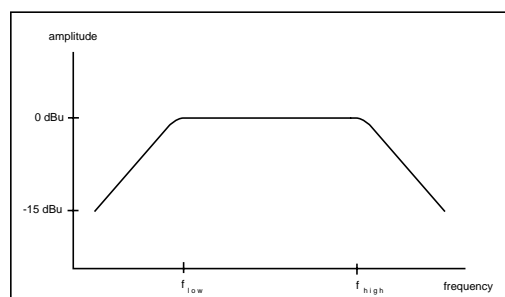


Fig. 2: Roll-off function

1. Typical Uses

The PEQ-5B allows creative audio processing previously not possible with graphic or less advanced parametric equalizers by enabling the user to set all filter parameters (center frequency, bandwidth and amplitude) in five separate bands. These bands cover the entire 20 Hz to 20 KHz audio range and the frequency ranges of the individual bands overlap, allowing two bands to be set to one center frequency for added boost/cut capability. The PEQ-5B can be used both by itself or in conjunction with conventional graphic 31 or 15 band equalizers. In live sound situations, for example, the graphic EQ can be used for the rough mix and the PEQ-5B can be used to help fine tune the overall sound.

One of the PEQ-5B's most useful capabilities is notching out troublesome frequencies caused by feedback in live mixing, for example, or hum or appliance noises in recording applications. When such problems require extra cut than can be achieved by a single filter, simply adjust two filters to the same center frequency and bandwidth. Setting both LEVEL controls then to the left stop position doubles the amount of notching. Similarly you can also achieve doubled boosting (peaking) when needed, by adjusting both LEVEL controls to the right stop position.

(Notes:

- a. *Since all narrow-band filters produce a slight phase shift and thus time delay of the signal, care must be taken with extremely narrow and high gain settings to avoid annoying "ringing" sounds. Always set all filters not in use to mid-travel position or switch them off to minimize such effects.*
- b. *To avoid damaging connected equipment and cause undesirable effects such as distortion or feedback, always start with all controls set to mid-travel position and all IN/OUT switches OUT.)*

Troublesome frequencies that are to be notched out can be identified by ear (although that requires some trial and error and a bit of patience, or more effectively by the use of an audio spectrum analyzer. Resonance frequencies can then be quickly identified, enabling quick tuning of the required filters on the PEQ-5B.

(Note: If feedback notching is the only task you have planned for the PEQ-5B, you should consider also the Nady FS-4N Feedback Suppressor, which features 4 notching bands and a built-in audio spectrum analyzer for the quickest, most effective feedback suppression possible.)

If a spectrum analyzer is not available to help identify troublesome frequencies, it is most effective to do so by actually raising the gain in the narrow-band filter at first to make them heard, and then simply eliminating the undesirable frequencies by subsequently lowering the level.

The PEQ-5B can also be used for a wide variety of other applications other than narrow-band notching. For example: to simulate speaker crossover networks, or simple tone circuits, or even for drastic modifications such as "telephone voice". Since broad band frequency corrections are the most common type of equalization in live sound applications, the PEQ-5B can be easily utilized for this purpose by 2 or 3 broad-band parametric filters in combination with the low and high-cut filters to achieve the required overall frequency equalization. Then the remaining 2 or 3 bands can be used to eliminate feedback and correct room resonances. The PEQ-5B can also be useful to help compensate for problems of poor microphone positioning and/or increased intelligibility. Room acoustics can also be corrected for poor speaker placement dictated by other than pure acoustic considerations.

Once all the equalization has been adjusted as required by the application, the INPUT control is used to set the overall level of the PEQ-5B's processed signal. The signal can be raised or lowered as desired. Use the IN/OUT switch for a direct A/B comparison as a guide for proper level adjustment.

2. Use in Sound Reinforcement

In typical live sound applications, EQ's are used to increase the overall volume or "punch" of the sound (while eliminating feedback), enhance the natural "musicality" of the mix, and improve the intelligibility of speech. Understanding that there are always compromises that must be made, care must be taken so that the overall effect of the equalization is an improvement, not deterioration, of the overall sound. Sometimes, hard decisions must be made between priorities for achieving the desired result. For example, it may not be possible to have a natural sound and acoustic power or speech intelligibility at the same time.

Although pink noise or swept sine waves are often the best way to identify problems of room acoustics and system deficiencies (especially in the critical range of 2 to 4 KHz), the ear can also be used with great effect, especially if care is taken to train it to serve as a sound evaluation diagnostic tool. Start by playing music or speech program material without equalization, and add it slowly so you can gauge the effects on the sound you can hear from the different settings. Ultimately, there is no substitute for experience in utilizing the PEQ-5B to its fullest potential.

Often, you will find that room acoustics problems must be dealt with at the source, as they cannot be fixed as effectively by using an equalizer. To check out room acoustics most accurately, use either a pink noise or swept sine wave generator and a real-time analyzer (RTAS) with a calibrated microphone and verify that the measured frequency response, at various points in the room, are all about the same. If they are not, then you may need to make corrections to your setup, check system and speaker phasing, etc., to minimize the variations you are measuring. This can also be done with a trained ear but requires very careful concentration and considerable ear training for most effectiveness. Once you have made all the improvements you can to your basic setup, you can fine tune the system with the PEQ-5B.

(Note: Although equalizers are the most important accessories in your audio system, and can often deliver amazing results in improving the overall punch and sound quality of your system, they cannot work miracles. Ultimately the rest of your system and setup must also operate at top efficiency for the PEQ-5B to be most effective.)

3. Inserting the PEQ-5B in the Signal Path

The PEQ-5B can be inserted in the signal path at different points, depending on the setup and application of your system. For example, it can be inserted in the line inserts of your mixer, sub-group inserts, effects paths, or between signal processors and mixer or power amps, and so on.

(Note: In the event of a power supply disconnection or failure, a relay built into the PEQ-5B automatically silently bypasses the unit. This relay also prevents bothersome "thumps" when first turning on the unit.)

For use with more complex systems, such as complex sound reinforcement applications with speakers located in varying acoustic environments and utilizing delay line units for run-time difference compensation, it is recommended that you consult with experienced audio sound technicians or read more extensive written material on this subject, as it is beyond the scope of this manual to provide more than introductory information on the use of the PEQ-5B.

SPECIFICATIONS

AUDIO INPUT

CONNECTORS:	Servo-balanced input 1/4" TRS and XLR jacks
NOMINAL SENSITIVITY:	0.775 (0dBm)
IMPEDANCE:	50 K Ω balanced
MAX. INPUT LEVEL:	+21 dBu balanced

AUDIO OUTPUT

CONNECTORS:	Servo-balanced output 1/4" TRS and XLR jacks
NOMINAL LEVEL:	0.775 (0 dBm)
MAX. OUTPUT LEVEL:	+21 dBu balanced
IMPEDANCE:	60 Ω Balanced
FREQUENCY RESPONSE:	16Hz~30KHz, < \pm 3.0 dB
SIGNAL-TO-NOISE RATIO:	> 96 dB w/ABP filter
T.H.D.:	< 0.004%, @ +4 dBu, 1 KHz, Gain 1
LOW-CUT FILTER:	10 Hz to 400 Hz, variable, 6 dB/octave
HIGH-CUT FILTER:	2.5 KHz to 30 KHz, variable, 6 dB/octave

PARAMETRIC FILTERS

TYPE:	State-variable parametric filter
LEVEL:	-15 dB to +15 dB, variable
FREQUENCY RANGE:	
Band 1:	20-400 Hz
Band 2:	60 Hz-1 KHz
Band 3:	150 Hz to 2.5 KHz
Band 4:	500 Hz to 8 KHz
Band 5:	1 KHz to 20 KHz
FUNCTION SWITCHES:	Master Audio In/Out, Band In/Out (for each band), 115/230 VAC power select

INDICATORS:

INPUT/OUTPUT LEVEL:	
12-segment LED display:	-30/-24/-18/-12/-6/3/0/+3/+6/+9/+12/+18 dB
FUNCTION SWITCH:	LED Indicator for every switch, IN=LED on

POWER CONSUMPTION:	7 Watts
POWER SOURCE:	AC: 120V/230V, 50/60 Hz (voltage selectable)
FUSE REQUIREMENTS:	120 VAC: 250 mA / 250V (slow-blow); 230 VAC: 125 mA / 250V (slow-blow)
POWER CONNECTOR:	standard IEC receptacle
DIMENSIONS:	19" X 1.75" X 7.25" (483 X 44 X 184 mm), 1U rack height
WEIGHT:	6.6 lbs (3.0 Kg)

Note: For improvement purposes, specifications, design and appearance are subject to change without prior notice.

SERVICE FOR YOUR NADY AUDIO PRODUCT

(U.S.) Should your NADY AUDIO product require service, please contact the Nady Service Department via telephone at (510) 652-2411 or E-mail at service@nadywireless.com.

(International) For service, please contact the NADY AUDIO distributor in your country through the dealer from whom you purchased this product.

DO NOT ATTEMPT TO SERVICE THIS UNIT
YOURSELF AS IT CAN BE DANGEROUS
AND ALSO WILL VOID THE WARRANTY.



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