

MAXXBASS 101

MAXXBASS 102

U S E R G U I D E



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Introduction

Thank you for purchasing the Waves MaxxBass processor unit. This guide contains important information about how to install and use the unit.

Packing List

The MaxxBass package should contain the following:

MaxxBass 101 or MaxxBass 102
16VAC Power Supply Unit
User Guide (this document)
Registration Card

If any items are missing, please contact your dealer.

Warranty

One Year limited Warranty on MaxxBass Hardware

KS.Waves Ltd. (“Waves”) warrants that the hardware contained herein shall conform in all material respects to the specifications contained in the product documentation for a period of one (1) year from the date of original purchase from Waves or its authorized resellers. In the case of a valid warranty claim, your sole and exclusive remedy and Waves’s entire liability under any theory of liability will be, at Waves’ sole discretion, to repair or replace the Product without charge or to refund the purchase price to you.

THIS WARRANTY IS IN LIEU OF ALL WARRANTIES, WHETHER ORAL OR WRITTEN, EXPRESS, IMPLIED OR STATUTORY, WAVES MAKES NO OTHER WARRANTY, EITHER EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT, PURCHASER’S SOLE AND EXCLUSIVE REMEDY UNDER THIS WARRANTY SHALL BE REPAIR OR REPLACEMENT AS SPECIFIED HEREIN.

This limited warranty, with all terms, conditions and disclaimers set forth herein, shall extend to the original purchaser and anyone who purchases the Product within the specified warranty period.

Waves does not authorize any third party, including any dealer or sales representative, to assume any liability or make any additional warranties or representation regarding this Product on behalf of Waves.

IN NO EVENT WILL WAVES BE LIABLE FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY DEFECT IN THE PRODUCT, INCLUDING LOST PROFITS, DAMAGE TO PROPERTY AND, TO THE EXTENT PERMITTED BY LAW, DAMAGE FOR PERSONAL INJURY, EVEN IF WAVES HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Some states do not allow the exclusion of implied warranties or limitations on the duration of an implied warranty, so the above limitations may not apply to you. This warrant gives you specific legal rights. You may have other rights, which vary, by state to state.

Governing Law and Severability. This agreement will be governed by the laws of Israel. In the event of a dispute arising under this Agreement, you consent to jurisdiction in the State of Israel.

Warranty Service

For warranty service, please call one of Waves' offices listed below so as to obtain a Return Authorization (RA) number. The Product, with RA number written outside the shipping box in bold letters, must be sent, transportation and insurance charges prepaid, to a Waves location (U.S. customers to TN office; all other locations to Tel Aviv, Israel). Your name, address, telephone number, copy of original sales invoice and detailed description of the problem must accompany the Product. Waves will not accept responsibility for loss or damage in transit.

The Warranty is void if the Product serial numbers have been removed from the Product or if the Product has been misused, modified, disassembled or repaired without authorization, as determined in Waves' discretion.

Trade Marks

MaxxBass is a registered trademark of K.S.Waves LTD, Israel.

Copyright

No part of MaxxBass hardware or the manual may be reproduced or distributed in any form or by any means without the prior written authorization of Waves Ltd.

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MaxxBass Overview

MaxxBass System Overview

MaxxBass can be utilized in almost any sound system to improve bass performance. The MaxxBass unit should be placed between either the mixer (for stereo) or low frequency crossover (for subwoofers) and the audio amplifier as shown in Figure 1.

MaxxBass 101 supports stereo analog inputs and outputs with terminal blocks (with +4dBu sensitivity), XLR and TRS connections. MaxxBass 102 supports stereo analog inputs and outputs with RCA connectors (with -10dBu sensitivity). The system is supplied with an external 16V AC power supply.

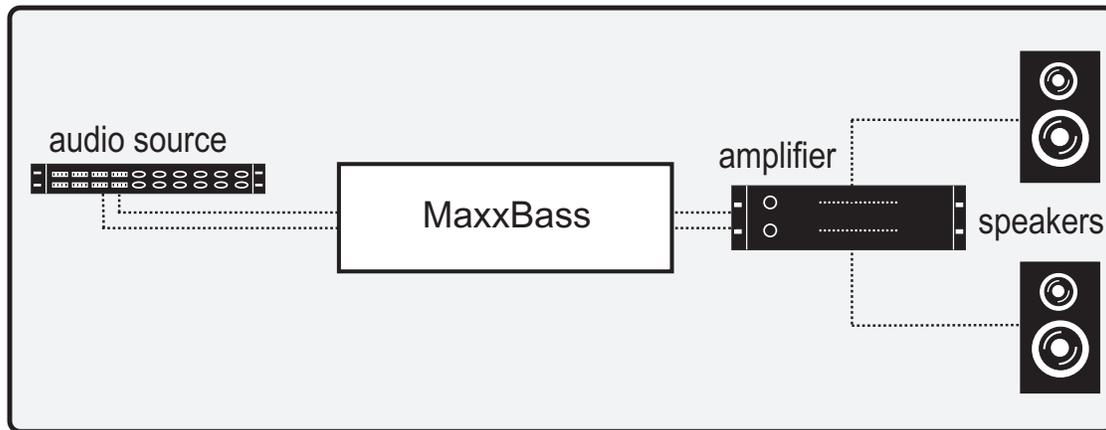


Figure 1. Audio System Using MaxxBass

Both the MaxxBass 101 and MaxxBass 102 have only a few simple controls and indicators on their front panel. Set the input level and Frequency controls to fit your specific speaker system and then gradually turn up the Intensity control to achieve the desired balance of generated low frequencies.

MaxxBass Technology

Waves patented MaxxBass[®] psycho-acoustic bass extension technology is a unique solution to common bass frequency limitations due to cost, size and power consumption. Inserting a MaxxBass unit into the audio system will result in better bass without exceeding speaker driver excursion limits, changing speakers or amplifiers, and without increased power consumption.

Previously, to improve bass response required upgrading speakers, amplifiers and resetting equalizers. MaxxBass breaks through the bass reproduction barrier by delivering deeper, richer bass without changing amplifiers and speakers in both new and existing sound applications including:

- Restaurants
- Retail Stores
- Clubs
- DJ/Bands
- Portable PA
- House of Worship
- Sound reinforcement

MaxxBass extends the perceived bass response of a speaker by up to one and a half octaves below the speaker's cutoff. This is achieved by utilizing the psycho-acoustic effect of the missing fundamental. MaxxBass process generates higher harmonics from the low fundamental frequencies below the (set) MaxxBass Frequency, and adds them back into the signal. Additionally, MaxxBass process removes energy below the (set) MaxxBass Frequency from the input signal, thus reducing peak power and speaker excursions requirements.

Front Panel Features

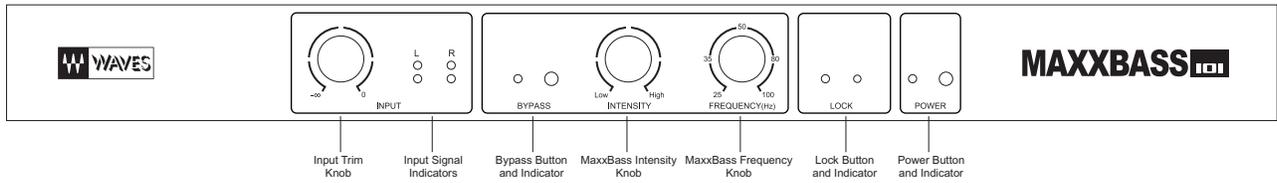


Figure 2. MaxxBass 101 Front Panel

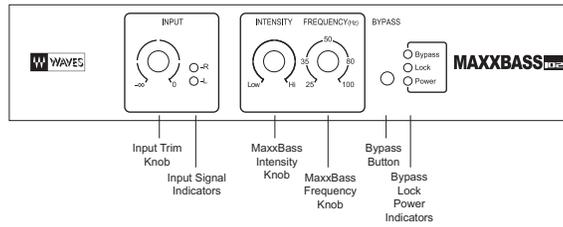


Figure 3. MaxxBass 102 Front Panel

Both MaxxBass systems have a simple control interface requiring only a few control knobs and indicator LEDs. Front panel LEDs indicate left and right signal presence, bypass, lock and power status. The system provides three rotary control knobs. These are for Input Trim, MaxxBass Frequency and MaxxBass Intensity as shown in Figure 2 and 3.

Rear panel Features

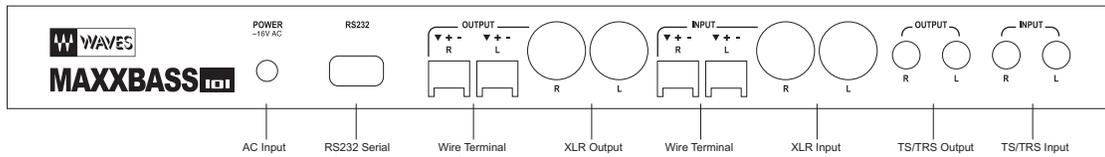


Figure 4. MaxxBass 101 Rear Panel

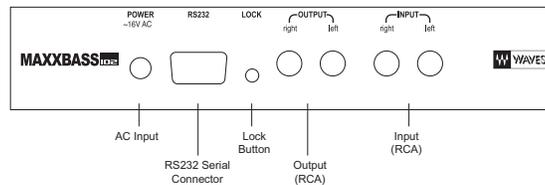


Figure 5. MaxxBass 102 Rear Panel

MaxxBass includes stereo analog inputs and outputs designed for easy connection to most audio systems. The MaxxBass 101 supports stereo input and output with terminal block, XLR and TRS connections (+4dBu sensitivity), as shown in Figure 4. The MaxxBass 102 supports unbalanced RCA connector at -10dBu sensitivity as shown in Figure 5.

Both MaxxBass 101 and MaxxBass 102 support an RS232 serial connector on their rear panel for future updates.

External Power Supply

Both MaxxBass systems are provided with an external 16V AC power supply. Different power supplies are provided to customers in different regions of the world as shown in Table 1.

Table 1. MaxxBass Included Power Supply

Geographic Region	Input Voltage	Output Voltage
Americas	110V AC	16V AC
Europe	220V AC	16V AC
Japan	100V AC	16V AC

Setting MaxxBass Controls

The MaxxBass systems have only a few simple controls, but establishing the proper setting is critical to achieving the desired system performance. The description included explains the operation and provides some recommendations. It is required that a few minutes of listening tests are performed to insure that the controls are set for optimum performance.

Step 1: Setting input level

Input Trim Knob

Input level should be set first. As a rule of thumb, set the input for MaxxBass 101 so that the clipping indicators light occasionally. MaxxBass 102 input level should be set so that its signal presence indicators light up.

The Input Trim knob only attenuates the signal and does not apply gain to it - unity gain, or 1:1 input calibration, is set when the knob is turned fully clockwise.

Step 2: Setting the MaxxBass effect

Frequency Knob

MaxxBass Frequency knob should be tuned to the specific speaker system at hand. Both MaxxBass 101 and MaxxBass 102 support Frequency settings in the range of 25 to 100 Hz. As a thumb rule it is recommended to set MaxxBass Frequency to about 70-90% of the speaker cutoff. For speakers with very high cutoff of above 120Hz MaxxBass Frequency should be set at 100Hz.

As explained in the “MaxxBass Technology” section, MaxxBass removes energy residing below the (set) MaxxBass Frequency from the input signal. Thus, if MaxxBass Frequency is set too high above the speaker’s cutoff it might degrade the speaker’s response in that frequency area. It is generally best, when tuning MaxxBass Frequency, to start low and gradually raise the setting until the desired effect is achieved.

Table 2. Initial MaxxBass Frequency Recommendation

Product	Speaker Cutoff	MaxxBass Frequency
Large subwoofers	25-40 Hz	25-30 Hz
Small monitors	70-80 Hz	50-60 Hz
Ceiling mount speakers	80-100Hz	60-80 Hz

Intensity Knob

The MaxxBass Intensity knob should also be tuned to the specific speaker system under evaluation. MaxxBass Intensity control goes from Low (counter-clockwise) to High (clockwise) on the MaxxBass systems. This knob control affects the amount of the MaxxBass effect. The Intensity knob should initially be set to the Low position and slowly raised until the optimum level of bass is achieved.

It is worthwhile to elaborate on how MaxxBass Intensity control works, as shown in Figure 6.

Figure 6.A illustrates the generated harmonics series at low Intensity setting, Figure 6.B illustrates a high Intensity setting. “F” is the original source frequency, f_1 and higher are the generated MaxxBass harmonics. As MaxxBass Intensity is raised, the relative (to the original source frequency) level of harmonics increases and their decay rate becomes slower - more MaxxBass effect is “mixed” into the signal in a complex fashion.

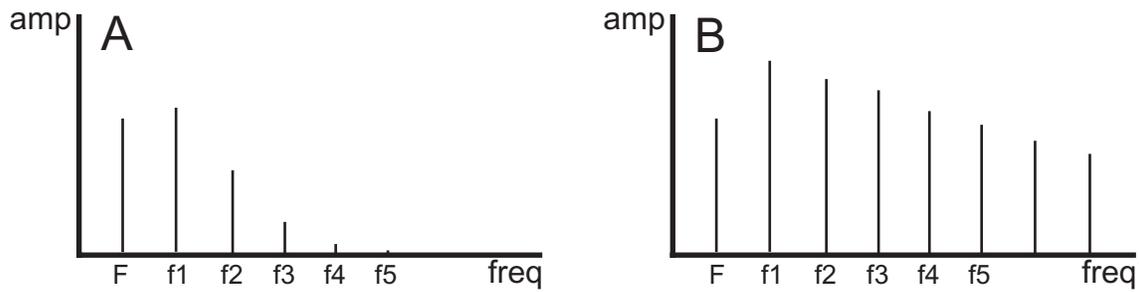


Figure 6. Harmonics series at low and high Intensity settings

Step 3: Verifying the settings and Locking

Bypass

The front of both MaxxBass systems includes a Bypass button. When the Bypass button is pressed, the MaxxBass unit turns off the MaxxBass processing. MaxxBass will attenuate the audio signal while in bypass by the setting on the input trim control. When in Bypass the Bypass LED will light.

Use the Bypass button to flip the MaxxBass effect on and off. Listen carefully to make sure that MaxxBass unit is properly tuned to your system. Perform listening tests on the specific acoustic system to fine tune both frequency and intensity for the optimum bass response. Frequency sweeps can be used, as well as a variety of source materials.

Lock

Once you are satisfied with MaxxBass parameter settings for input level, frequency and intensity, you can use the system's Lock button to preserve your setting. Press this button by inserting a pin. The Lock LED lights up to indicate the unit is locked. When the MaxxBass is locked, the Frequency and Intensity knobs are disabled to eliminate accidental changes to the setup.

MaxxBass 101 provides the Lock control on its front panel, MaxxBass 102 on its rear panel.

NOTE: The Lock button does not disable the Input trim control.

Application Examples

Small Speaker Systems

MaxxBass significantly enhances audio systems with small speakers such as PA in restaurants and retail as shown in Figure 7. These systems, equipped with small or ceiling mount speakers, will be dramatically enhanced by allowing listeners to enjoy the deep bass tones in music without adding a subwoofer. It will eliminate system distortion caused by trying to push the PA to deliver frequencies its speakers cannot reproduce.

Figure 7 shows two MaxxBass units, one affecting “area one”, the other “area two”. This architecture is designed to accommodate different speaker types (with different speaker cutoff) in the two areas.

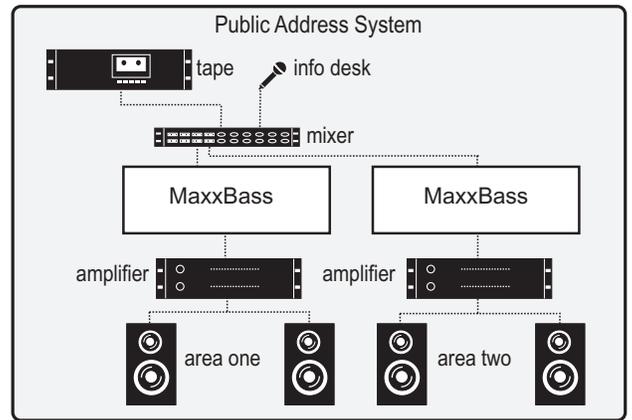


Figure 7. PA Application

Clubs, DJ, Band Systems

MaxxBass can be utilized on both main and monitor speakers for live sound applications as shown in Figure 8. On the main speakers with subwoofers, MaxxBass delivers a deeper bass sensation without over-driving the subwoofer. Connect MaxxBass between the system's crossover unit low (frequency) output and the subwoofer amplifier. When connecting to a subwoofer, connect the crossover's low frequency output to MaxxBass' left and right inputs and use one of MaxxBass' outputs to the subwoofer's amplifier. A main speaker system not including a subwoofer can achieve the sound of a subwoofer by using MaxxBass.

On-stage monitors normally use smaller speakers, either in side-field or personal monitoring setups. Use MaxxBass to enhance the on-stage monitoring system to allow it to deliver a fuller, deeper, and thus less harsh sound.

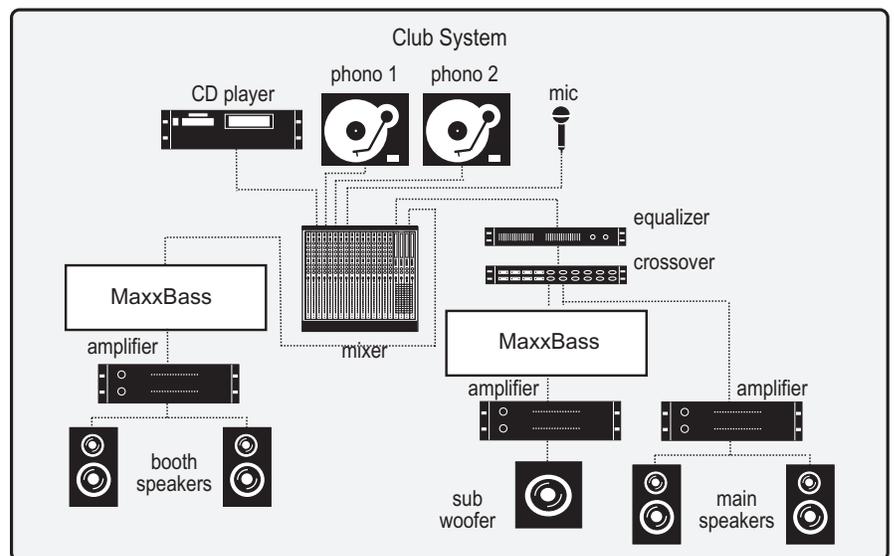


Figure 8. Club Application

Sound Reinforcement - Subwoofer Arrays

Large scale subwoofer arrays with full range bass also benefit from MaxxBass to increase the bass and richness. This can allow a reduction in the number of amplifiers and subwoofers to reach the desired bass level.

As shown in Figure 9, connect MaxxBass between the crossover and the subwoofer amplifier on the subwoofer path. Using MaxxBass on the subwoofer path allows a reduction in the number of amplifiers and subwoofers, and power consumption to reach the desired bass level. When connected to the subwoofer path, tune MaxxBass according to the subwoofer's cutoff. Connect the crossover's low frequency output to MaxxBass' left and right inputs and use one of MaxxBass' outputs for the subwoofer amplifier's input.

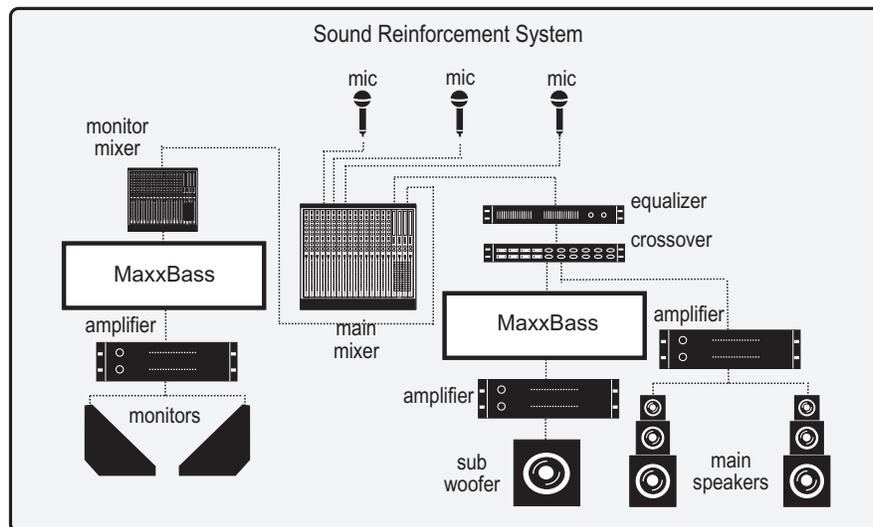


Figure 9. Sound Reinforcement

Specifications

Technical Specifications

	MaxxBass 101	MaxxBass 102
Input:		
Type	XLR - Active balanced; Pin 2 hot Wire Terminal - Active balanced 1/4 TRS - Active balanced/unbalanced	RCA
Impedance	10k Ω	10k Ω
Max Level	+22dBu	+9dBu
Gain Range	-Inf - 1:1 ratio	-Inf - 1:1 ratio
Output:		
Type	XLR - Active balanced; Pin 2 hot Wire Terminal - Active balanced 1/4 TRS - Active balanced/unbalanced	RCA
Impedance	60 Ω	10k Ω
Max Level	+22dBu @ 600 Ω	+9dBu
Freq Response (bypass)	20Hz-20kHz +0.2/-0.4dB	20Hz-20kHz +0.2/-0.4dB
THD + Noise:		
Effect Bypassed	-90dBAw	-90dBAw
Effect Enabled	-72dBAw	-72dBAw
Signal to Noise Ratio:		
Effect Bypassed	-96dBAw	-96dBAw
Effect Enabled	-85dBAw (Fc = 50Hz)	-85dBAw (Fc = 50Hz)
Unit:		
Physical Size	4.4 x 48.4 x 8.2 cm	4.4 x 21.5 x 6.5 cm
PSU (external)	CE 16VAC	CE 16VAC
Misc:		
User Controls	Input Level, MaxxBass Frequency, MaxxBass Intensity, Bypass, Lock	Input Level, MaxxBass Frequency, MaxxBass Intensity, Bypass, Lock
MaxxBass Freq Range	25-100Hz	25-100Hz

Architectural Specifications

Architectural Specifications for MaxxBass 101

The psycho-acoustic bass extension system shall be a two-channel unit with controls for Input Trim, (effect) Frequency, and (effect) Intensity. Front panel LEDs shall provide indication of signal presence, independently for left and right channels, Bypass, Lock, and Power (on).

The front panel shall provide a lock button, which disables the Frequency and Intensity front panel functions, effectively locking in the current settings. A bypass button shall be provided to switch OFF the bass enhancement system. Each input shall feature a terminal block, XLR, and TRS connectors balanced or unbalanced (in 2 hot), at +4dBu sensitivity. Each output shall feature a terminal block, XLR, and TRS connectors, balanced or unbalanced (out 2 hot), at +4dBu sensitivity.

The unit shall be capable of operation by means of an external 16v AC power supply. The unit shall occupy one rack space.

The bass enhancement unit shall be a Waves Model MaxxBass 101.

Architectural Specifications for MaxxBass 102

The psycho-acoustic bass extension system shall be a two-channel unit with controls for Input Trim, (effect) Frequency, and (effect) Intensity. Front panel LEDs shall provide indication of signal presence, independently for left and right channels, Bypass, Lock, and Power (on).

The rear panel shall provide a lock button, which disables the Frequency and Intensity front panel functions, effectively locking in the current settings. A bypass button shall be provided to switch OFF the bass enhancement system. Each input shall feature a RCA connector at -10dBu sensitivity. Each output shall feature a RCA connector at -10dBu sensitivity.

The unit shall be capable of operation by means of an external 16v AC power supply. The unit shall occupy one half rack space.

The bass enhancement unit shall be a Waves Model MaxxBass 102.



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