

OEM SYSTEMS COMPANY, INC.



ICBM

Integrated Custom Bass Management Systems

TECHNICAL BRIEF

OEM SYSTEMS COMPANY
(775) 355-0405 ♦ (800) 291-0561 FAX
www.oemsystems.com ♦ info@oemsystems.com

ICBM TECHNICAL BRIEF

Introduction to Integrated Custom Bass Management

Welcome to the Exciting New World of Custom Low-Bass Systems

Many factors were considered in the design and development of our new Amplifiers, Enclosures, and 8" subwoofers.

- High-performance, scalable subwoofer (1, 2, or 4)
- High degree of installation flexibility and room placement
- Fit inside common 2x4 wall construction as well as in-ceiling
- Deliver robust performance and extreme reliability
- Earn the "wife-acceptance-factor," blending with normal room design and décor
- Match the frameless esthetics of our existing line of speakers
- Provide more-than-competitive pricing versus other in-wall/in-ceiling subwoofers.

Here's a quick example of our "ICBM Poly 144" Package:



Placement Flexibility

To achieve the performance we wanted, it required that we create a totally new woofer specifically for 2x4 construction. The result is a 7.25 pound 8-inch woofer that can reliably operate in less than 4 inches of depth and provide up to 1.25" of peak-to-peak excursion.

This system scales easily from a 1-sub system to 2 or 4. Our single woofer system has sufficient output to play at moderate levels in small home theaters and provide thrilling warmth and depth. Our dual sub system, has nearly the cone area of a 12" woofer, with stunning output in medium home theaters, while our 4-sub system has the cone area of a 15" woofer, delivering a thunderous experience in larger home theaters.

The shallow 3-3/8" thick ENC-816LP enclosure is what gives these systems their extraordinary flexibility. And with the ENC-IRA8 in-room adapter, they can be used behind, beneath, and beside furniture, hiding them from view. And when used in-wall or in-ceiling, you gain a rigid structure that isolates the speaker's rear wave from adjacent rooms.

Because these sub enclosures can be installed in-wall, in-ceiling, or hidden in the room, our subs earn the highest acceptance levels from homeowners, architects, interior designers, and husbands and wives. The goal is to hear and experience realistic low-bass performance – but not see where it is coming from.



SE-80SWf
8" Frameless
Sub w/ Poly Cone



K-8SWd
8" Frameless
Sub w/ Kevlar Cone



The Amplifier

Any great subwoofer system needs to be driven well and with great control. That's why we created the Performance-Calibrated Control Panel on our P-500Xb bridgeable stereo amplifier. This unusual array of controls are lab-tuned for precision adjustment, delivering exact control of your system. Most subwoofer amplifiers are just full-range amps with a low-pass filter, volume and phase control, limiting the range of woofers they are able to drive.

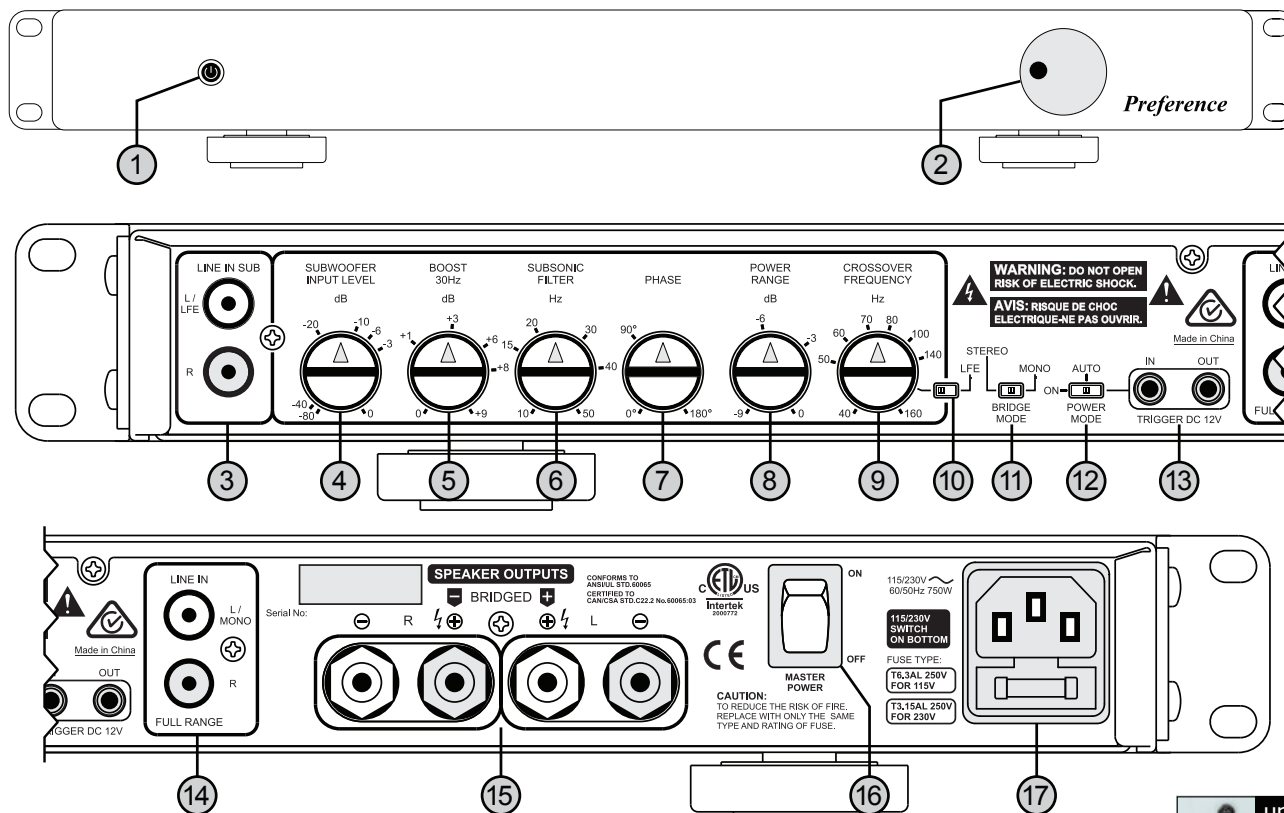
The P-500Xb bridgeable stereo amplifier, with its independent sub input and Performance-Calibrated Control Panel, has finely tuned controls to dial-in custom subs and installed speakers. With input level, subsonic filter, boost level, power level, variable phase, crossover frequency, and output level, the P-500Xb can be set up to drive nearly any design/ size subwoofer system.



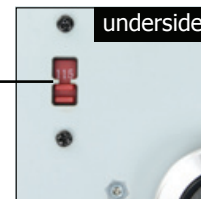
- ① Subwoofer Input Level for blending high and low frequency signal levels
- ② 30Hz Boost for maximizing low frequency output
- ③ 10Hz-50Hz Subsonic Filter to protect woofers from damage from bass content outside of the woofer's capabilities
- ④ 0-180 Degree Phase Adjustment for precise blending of the subwoofer(s) with main speakers
- ⑤ 0dB to -9dB Power Range Limiter to protect woofers from damage due to excess volume
- ⑥ 40Hz-160Hz Low-Pass Crossover Frequency to blend the subwoofer(s) with the main speakers

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Amplifier Control Details



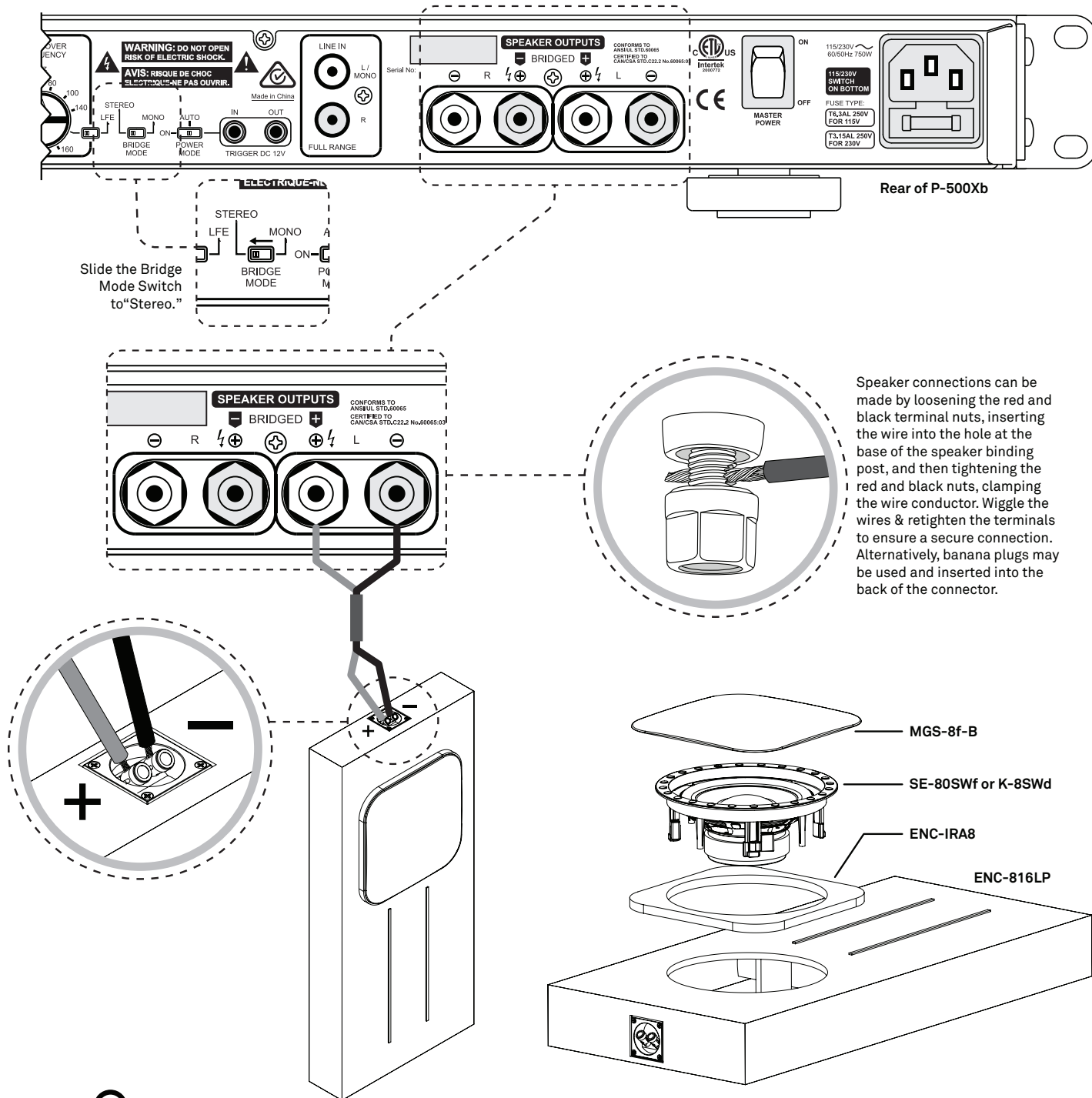
- ① **Power and Standby Mode Indicator** – Off=No Power, Blue=On, Red=Standby
- ② **Master Volume Control** – Adjusts final output level on both Sub and Full Range Inputs
- ③ **Line In Sub** – Input for the Precision-Calibrated Control Panel. 10-300Hz subwoofer frequency range
- ④ **Subwoofer Input Level** – Adjusts the input signal level. Affects engagement point of Power Range limiter.
- ⑤ **30Hz Boost** – Allows fine tuning of subwoofer(s) and adds output at the low end of the audio spectrum
- ⑥ **Subsonic Filter** – Used to reduce the output at very low frequencies; adjustable from 10Hz-50Hz
- ⑦ **Phase** – Adjusts timing of signal to blend sub(s) with satellites; 0°=Normal Phase, 180°=Reverse Phase
- ⑧ **Power Range** – Adjustment for limiting the maximum amount of signal that can pass to the subwoofer(s)
- ⑨ **Crossover Frequency** – Controls subwoofer upper cutoff frequency; variable from 40Hz-160Hz
- ⑩ **LFE Switch** – Used to bypass or engage internal crossover (low pass filter). All other controls remain active
- ⑪ **Bridge Mode Switch** – Used to select either 2-channel (stereo) or 1-channel (bridged) high power amplifier operation
- ⑫ **Power Mode Switch** – Selects how amplifier is turned on & off; ON=Front panel control, AUTO=Signal sensing, TRIGGER DC 12V=External voltage
- ⑬ **Trigger In/Out** – Input and output jacks for amplifier remote trigger voltage (3.5mm mini-plug)
- ⑭ **Line In Full Range** – Stereo input for full range operation (4Hz-30kHz); Bypasses precision-calibrated control panel
- ⑮ **Speaker Outputs** – 5-way binding posts provide connection for speakers, stereo and bridge mode
- ⑯ **Master (Main) Power Switch** – Primary power; ON=Power Enabled; OFF=Power disconnected from amplifier circuit
- ⑰ **Power Input Receptacle and Fuse Holder** – IEC 3-conductor receptacle accepts supplied IEC power cord
- ⑱ **Input Voltage Selector** – Selects input voltage range for 115V or 230V



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Setup - Single Channel Operation - 1 Subwoofer

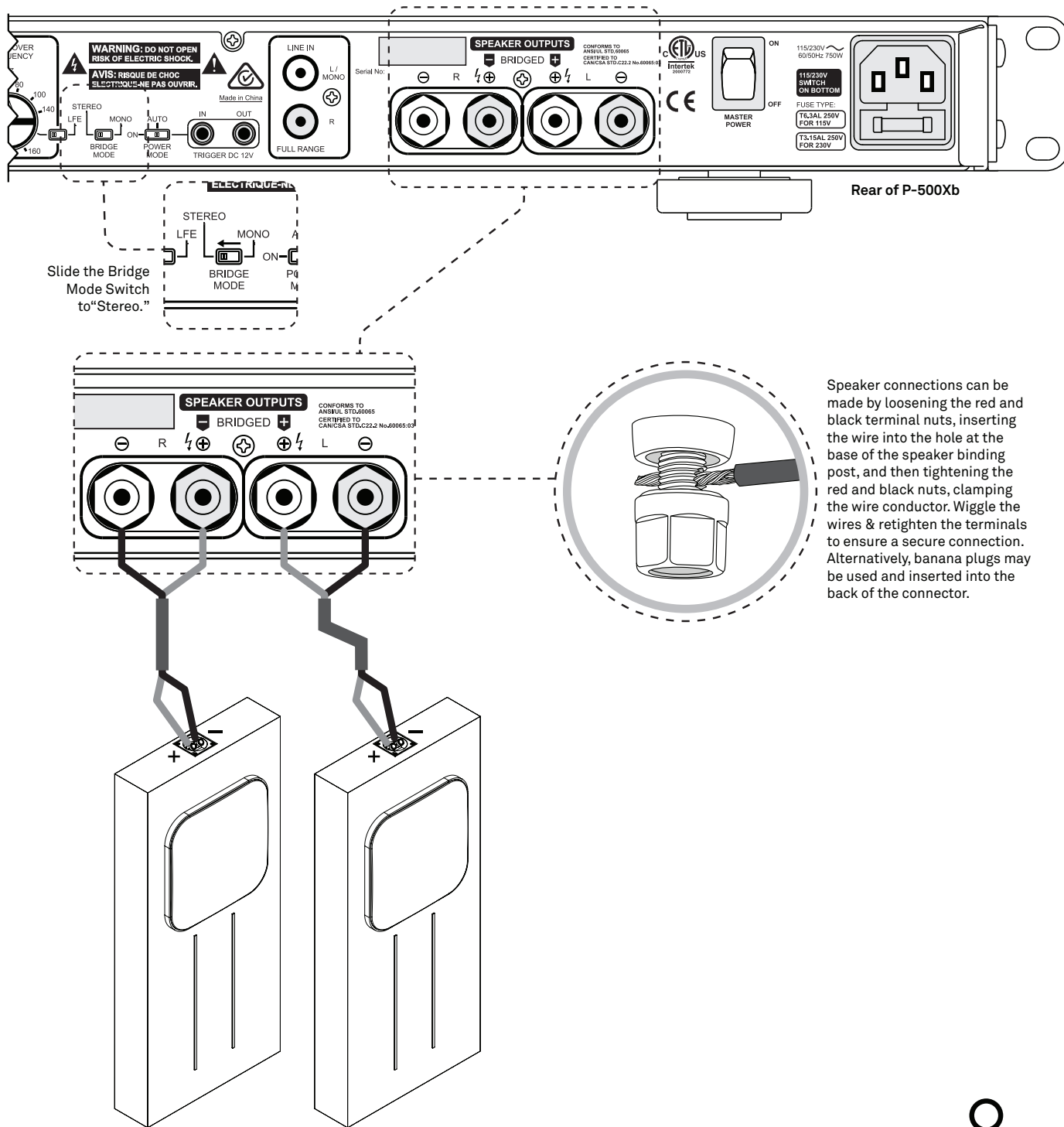
This configuration is used to drive a single subwoofer. The diagram below shows the output connections and switch-settings for this single channel operation for a single subwoofer.



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Setup - Dual Channel Operation - 2 Subwoofers

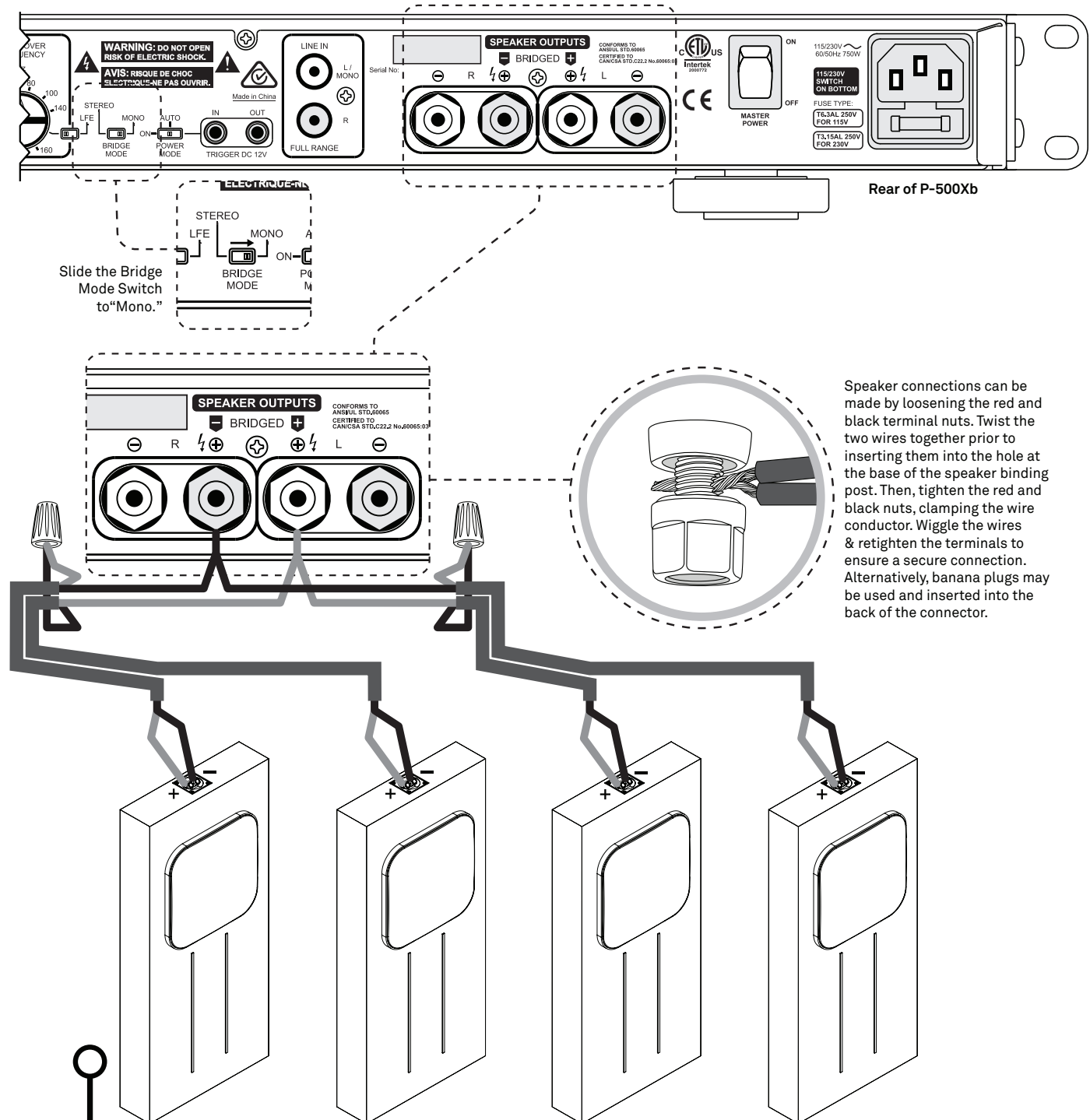
This configuration is used to drive two subwoofers or one subwoofer with dual inputs. The diagram below shows the output connections and switch-settings for dual channel operation.



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Setup - Single Channel Operation - 4 Subwoofers

The P-500Xb amplifier can be bridged to operate as a single channel amplifier. Bridge mode is useful for many high-power applications, such as, 2-channel stereo (using two amplifiers, one per channel) and for driving large subwoofers or multiple subwoofers. The diagram below shows the output connections and switch-settings for driving four subwoofers in single channel operation.



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Setup - Dual Channel Operation - Full Range Stereo

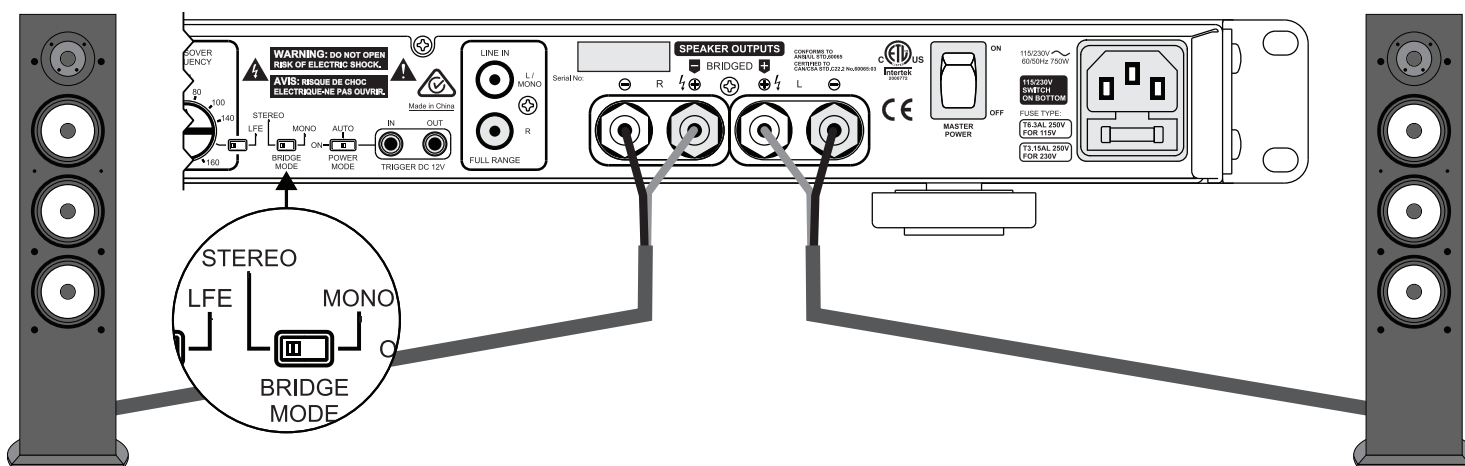
The P-500Xb has two sets of inputs, LINE IN FULL RANGE and LINE IN SUB.

Using the Full Range inputs, the P-500Xb is a superb choice for high performance two-channel listening. The amp delivers robust, serious power yet runs cool. In stereo it delivers 90W into 2 channels at 8 ohms, 150W at 4 ohms.

The P-500Xb is also a terrific power source when run full range bridged in mono - yielding 1 x 300W @ 8 ohms or 1 x 500W @ 4 ohms.

When using the "FULL RANGE" inputs located in the middle of the rear panel, the signal path bypasses the Precision-Calibrated Control Panel.

The P-500Xb, in stereo, is the perfect choice to drive two separate audio channels into two separate speakers or a speaker with dual inputs. The diagram below shows the output connections and switch-settings for 2-channel operation. Ensure the "Bridge Mode" switch is set to "STEREO".



The P-500Xb is also an excellent workhorse of an amp for multi-room or whole-house audio systems. There is no better way to drive a robust whole-house audio system. The P-500Xb is happy driving a series of speakers at a 4 ohm load and they take minimum rack-room at just 1 U high. The fact they run cool also helps several P-500Xb's live happily on top of each other in the rack.

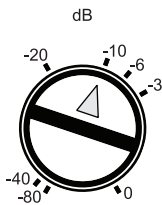
Also, the 12-volt input trigger is functional whether the amp is in mono or stereo mode, as is the auto-on function. So the P-500Xb is a great choice for full range, multi-range applications. And for those installations in other countries, the amp easily switches from 110V operation to 220V.

There is not a more versatile, dependable, 1U tall high-performance amp in the market today.

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Setup - Suggested Control Panel Settings

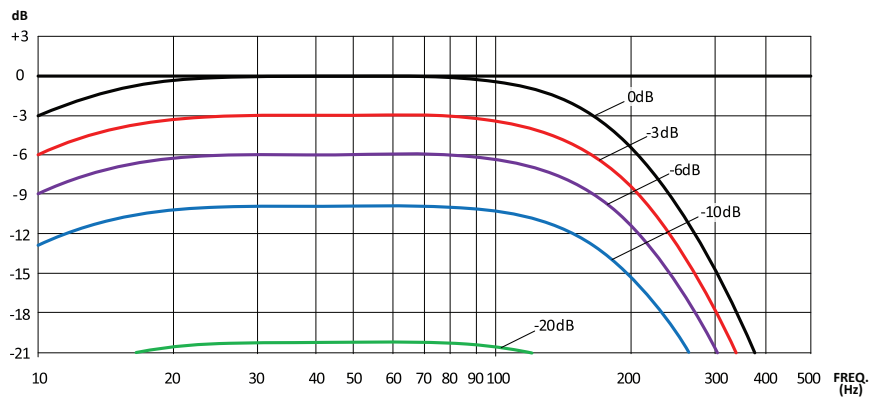
Subwoofer Input Level



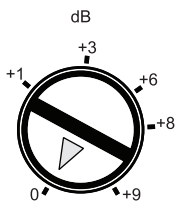
If you drive the amp with the LFE or sub-out of a home theater system, setting the Subwoofer Input Level between -20 and -10dB gives enough control range so the amp can reach its full output. With the system live, adjust the level to balance the bass with the other speakers. If using auto room-correction (ARC), the -20 to -10dB position may be adjusted as required by the ARC.

If you drive the amp with the L & R line level out from a stereo receiver, start with the Subwoofer Input Level at minimum position (-80dB). After the other controls are set, play music and increase the Subwoofer Input Level until there is sufficient bass to blend well with the main speakers.

NOTE: For sub applications only, increase or decrease amplifier output via the Subwoofer Input Level. Leave the front panel Master Volume Control at or near maximum position, using it only for small adjustments in subwoofer output.

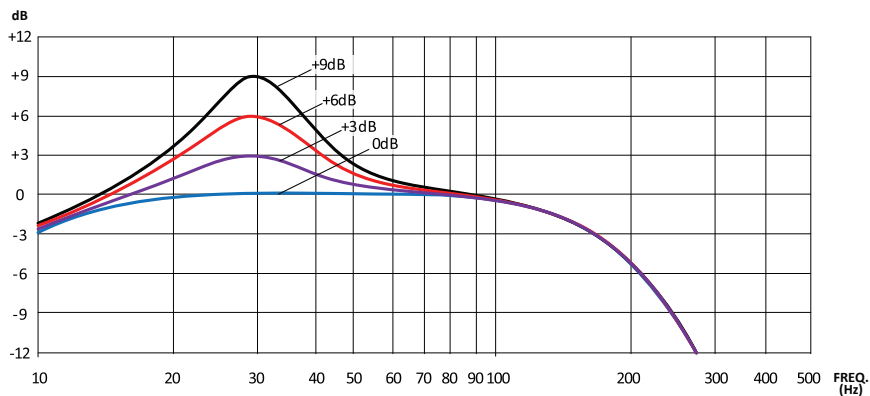


Boost 30Hz



Set this control to 0dB to start with. Then experiment with the control once your system is active. This setting will add low frequency emphasis. Boost is usually required for sealed subwoofers of nearly any size. This enables low frequency extension similar to vented systems. Vented systems often don't require boost, except in small amounts dictated by room acoustics or with specific designs. Check with the subwoofer's manufacturer for system requirements.

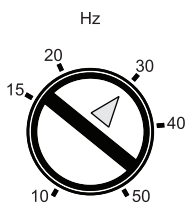
NOTE: 30 Hz boost can add a lot of demand to smaller woofers. Check the woofer cone for excessive excursion and listen for strained output at high listening levels.



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Setup - Suggested Control Panel Settings (continued)

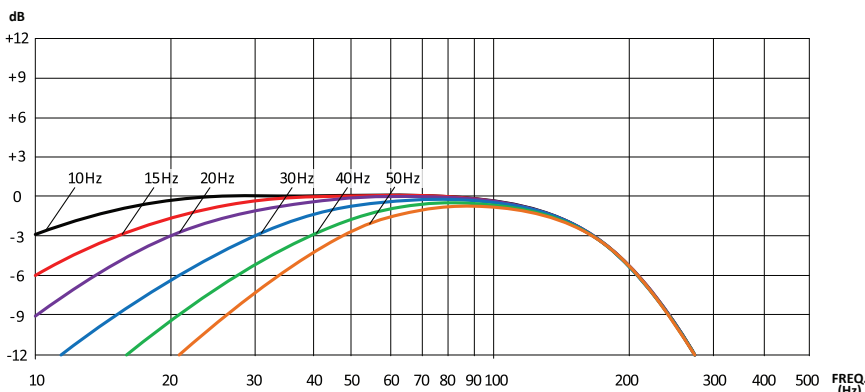
Subsonic Filter



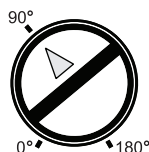
Some subwoofers should not be required to reproduce the lowest bass frequencies, either because of the application or because they are unable to reproduce such frequencies without damage. The Subsonic Filter reduces the amplifier's lower frequency output, preserving power for reproducible frequencies. It also protects subs from damage, especially in systems where the woofer's excursion becomes very large below the system tuning frequency. If you know the vented system tuning frequency, set this control to a value at or just below this.

For most sealed woofers, this control can be set between 10Hz and 30Hz, except where the woofers are small and the enclosure is large. In these cases, a higher frequency setting (40Hz) may be required. When using a woofer in a wall or ceiling without additional back-box, considered them as a large box.

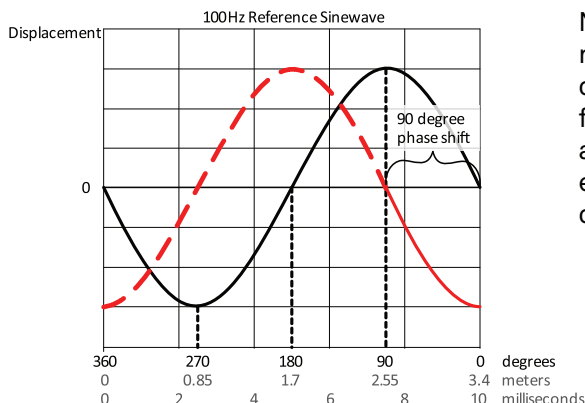
NOTE: If the sub seems physically strained at high output when reproducing low frequencies, increase the subsonic cutoff frequency or reduce the Power Range.



Phase



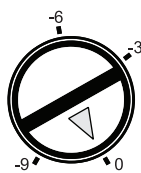
Start the Phase Control at 0 degrees and use music with a range of bass content. Rotate the Phase Control across its range, listening carefully to upper and middle bass frequencies, (where the woofer crosses over to the main speakers). Listen for the bass level to increase and decrease slightly. Set the control where the bass sounds most defined and coherent. When in a home theater system, where room-correction DSP is used, set to 0 degrees. The DSP should determine the optimal phase response for the subwoofer.



Note: Phase Control effects are less noticeable than most of the other controls. Be patient, take time to become familiar with your system's sound before adjusting phase. It is easier to hear the effects of phase after some hours of careful listening.

Setup - Suggested Control Panel Settings (continued)

Power Range



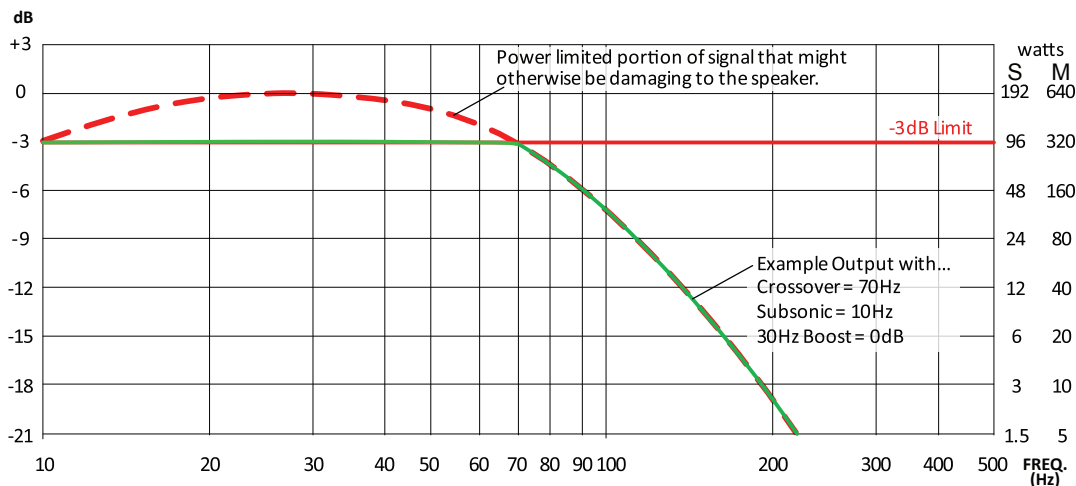
The Power Range control limits the amount of power going to the subwoofer. It produces no audible effect at normal listening levels, and only a slight change in bass character at peak volume levels. Limiters, as they are commonly known, are used in virtually every powered subwoofer made. They are internal devices that are preset by the manufacturer to provide safe operating levels for the subwoofer and to mitigate distortion at high output levels.

The position of this control can be set by determining the maximum amount of power that your woofer(s) can handle and adjusting the control so that the output of the amplifier matches this maximum.

NOTE: Each 3dB decrease yields 50% reduction in output power. Shown here are the peak amplifier outputs at different settings for 4 and 8 ohm speakers.

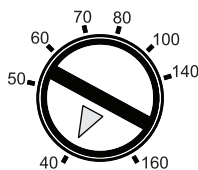
Power Range	Stereo		Mono (Bridged)	
	4-ohm Peak Power	8-ohm Peak Power	4-ohm Peak Power	8-ohm Peak Power
0dB	180W	120W	700W	440W
-3dB	90W	60W	350W	220W
-6dB	45W	30W	175W	110W
-9dB	22.5W	15W	87.5W	55W

The diagram below shows the effect of setting the Power Range to -3dB. The power levels shown at the right are approximate for stereo and mono (bridged) operation.



Setup - Suggested Control Panel Settings (continued)

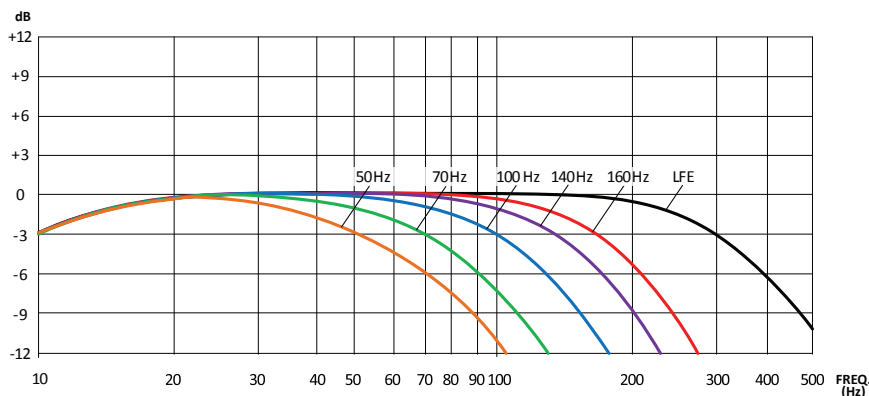
Crossover Frequency



And LFE Switch

The Crossover Frequency control sets the upper cut-off to the subwoofer between 40Hz to 160Hz with a 12dB/octave roll-off.

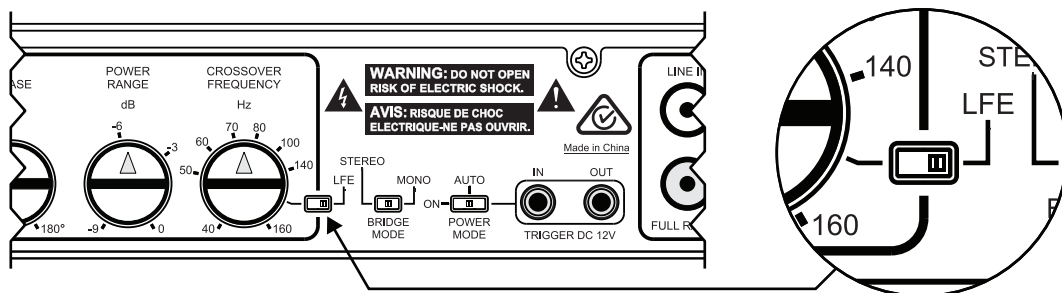
If you drive the amp from the L and R line-level outputs of your system, (not from the LFE or Subwoofer output), then set the LFE switch to the left, toward the Crossover Frequency control. Set the Crossover Frequency near the lower operating limit of the main speakers or at a desirable cut-off frequency, usually between 60Hz - 80Hz. It is rare to use a cut-off frequency above 100Hz unless the main speakers are very small.



Adjust the Input Level and the Crossover controls (up or down) until the bass sounds full, extended, and natural. Use multiple musical pieces to test the system while fine tuning the controls. Tip: If it sounds like your subwoofer is always producing the same bass note with different recordings, the bass level may be adjusted too high.

NOTE: If driving the amp from your system's LFE or Subwoofer output, set the Crossover Bypass switch to the "LFE" position, and the P-500Xb will pass signals up to 300Hz to the subwoofer. The cut-off frequency will then be set internally in the home theater system.

Alternatively, if your receiver or processor uses a 12dB per octave roll-off, the LFE Switch may be set to the left to engage the crossover. This combines the P-500Xb crossover with your receiver's for a steeper 24dB per octave roll-off. For this application, the crossover frequency of the P-500Xb should be set at or a little above the crossover frequency of the receiver or processor.



Note: When the LFE mode is engaged, all other controls on the P-500Xb remain active and will still function as indicated.

Quotes From Some of Our Happy Installers

(kept private, of course)

“The shallow enclosure is a great idea... a real help for any installer. Some customers want great bass in their home theater, but won't allow typical free-standing subs due to wife, designer, builder or husband. This 3 3/8" shallow sub tucks neatly into standard 2 x 4 walls, or in ceilings, or even under couches or chairs. Great bass anywhere - problem solved.”

“The room had real bass problems with standing waves causing nulls and peaks. By positioning the 4 ENC-816LP enclosures around the room, (they fit anywhere), we created seamless bass performance that was deep, rich, warm and musical - everywhere. What a great solution!”

“My customer wanted to add the thrilling low bass to their modest theater. The wife said, 'NO big sub in my den!' The ENC-816LP was the perfect solution. I put the Poly 111 into the system and placed the ENC under the couch, where the husband sits. The whole room had great bass and the husband loved the effect of the sub under where he sat. What a creative, useful solution.”



The brackets for the ENC-816LP enable a simple, quick, secure installation in any 2" x 4" or larger construction, requiring just 3-3/8" depth.



The slender ENC-816LP opens the door to many more locations for subwoofers. This enclosure went into the wall above the corner fireplace. Installing multiple subs creates smoother bass throughout the area - reducing peaks & nulls.



Here is another ENC-816LP tucked in the corner of a room. Corners are an ideal location for getting more bass output. The white cutout template tells the drywall installer where to cut out the sheetrock and protects debris and material from getting in the enclosure during construction.



Installation is easy: Install 4 mounting screws into the studs at defined locations, screw the 4 brackets to the ends of the enclosure, hook the terminal end of the enclosure to one set of mounting screws, connect the wire, swing the enclosure into place and tighten the mounting screws. Done!



Available Accessories

A number of compatible accessories for the ENC-816LP expand its range of applications. These accessories include:

- **ENC-IRA8** - in-room adapter for free-standing use
- **MGS-8f-B** pre-painted black square grilles to match enclosure
- **ENC-LB** extended length brackets for special mounting considerations
- A selection of plugs and wall jack plates to optimize any installation and finish

For more information visit:
www.oemsystems.com



ENC-IRA8
In-Room Adapter



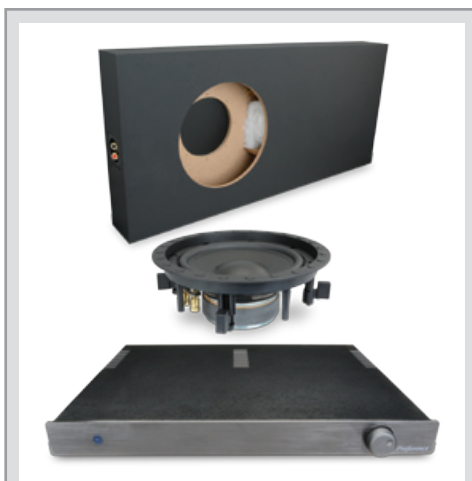
ENC-LB
Long Brackets for Wider Joist Spacing



MGS-8f-B
8" Frameless Square Grille - Black

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Packages



ICBM-P1

- (1) P-500Xb Amplifier
- (1) ENC-816LP Enclosure
- (1) SE-80SWf Subwoofer



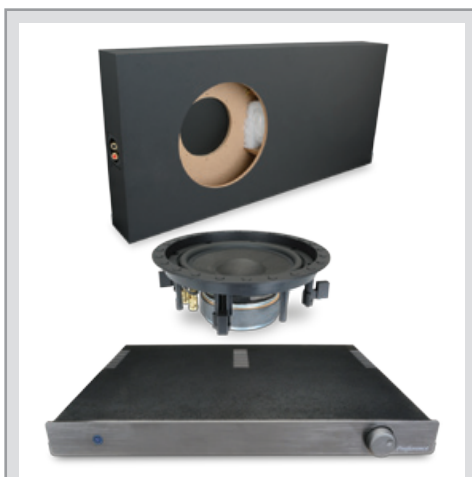
ICBM-P2

- (1) P-500Xb Amplifier
- (2) ENC-816LP Enclosures
- (2) SE-80SWf Subwoofers



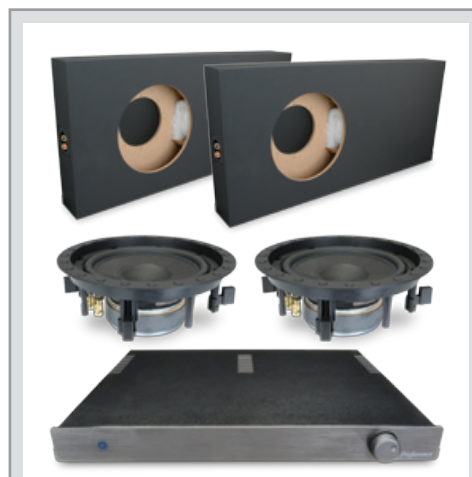
ICBM-P4

- (1) P-500Xb Amplifier
- (4) ENC-816LP Enclosures
- (4) SE-80SWf Subwoofers



ICBM-K1

- (1) P-500Xb Amplifier
- (1) ENC-816LP Enclosure
- (1) K-8SWd Subwoofer



ICBM-K2

- (1) P-500Xb Amplifier
- (2) ENC-816LP Enclosures
- (2) K-8SWd Subwoofers



ICBM-K4

- (1) P-500Xb Amplifier
- (4) ENC-816LP Enclosures
- (4) K-8SWd Subwoofers