

LEGACY



Owners Manual For The
Whisper XD
Loudspeaker System

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Owners Record

The serial number is located on the rear of the unit. Record this number in the space provided below. Refer to this when calling your dealer regarding this product.

Model: Whisper XD

Serial No: _____

Date of purchase: _____

Thank you for selecting a Legacy Loudspeaker System. These hand-crafted instruments will provide you with many years of listening enjoyment.

The Cabinetry / Our Commitment

Handcrafted

Beneath the surface of Whisper XD's elegant exterior lies rigid MDF construction. Interlocking joinery maximizes the strength of the cabinet parts. Polyester fiberfill is selected for internal damping. A sharp rap on the enclosure will leave you with little more than bruised knuckles.

Each cabinet is impeccably finished on all exposed surfaces with select veneers. The exquisite finish is hand-rubbed several times to assure a patina at home with the most elegant decor.

Our Commitment

A great deal of forethought, love and satisfaction is instilled in each piece of Legacy workmanship. We take pride in getting to know many of our customers on a first name basis.

Your purchase of this product is backed by the renowned "Legacy Satisfaction Guarantee".



Speaker Placement

Positioning Whisper for good performance is quite a bit easier than for most speakers. Remember that whisper is actually an acoustic gun with a highly controlled directivity pattern. Corner placements are actually quite workable though not necessarily optimal. Whisper will not become “boomy” like a conventional system and it will not interact strongly with the sidewalls of your room.

Simple Guidelines:

1. You may position the Whisper speakers farther apart than most other speakers. This will help to acoustically shadow the head properly and maintain better channel separation. Experiment with what works best in your room. As a starting point you might also try the following:

Ideal Speaker spread = (0.8 to 1.2) X Distance from speaker plane to listener position

2. Toe the speakers in more than with other speakers. In most circumstances crossing speaker axes just in front of the listener’s head works best. This will broaden your sweet spot horizontally. If dispersing into an L shaped seating arrangement you might find the best results by aiming the left speaker at the right most seating position, and the right speaker at the left most seating position.

3. Hearing the most ambience in the recording and the least reflection from your room favors a listener position that is no farther from the plane of the speakers than two thirds the geometric width of your room. More simply, if the room is 16 feet wide then the sitting no farther than 12 feet will allow you to hear more of the recording and less of your room.

Hooking Up Cables

The ideal conductor would have negligible resistance, inductance and capacitance. The table below shows how a few actual speaker cables measure up.

Cable	Ω s/ft	pF/ft	μ H/ft
12 ga.	0.0033	24	0.21
14 ga.	0.0048	17	0.13
16 ga.	0.0079	16	0.18
18 ga.	0.0128	28	0.21

Capacitance is considered insignificant in each cable because its effect is well out of the audio bandwidth; inductance can be decreased (at the expense of increased capacitance) by keeping the conductor pair closely spaced.

How long would a cable have to be before inductance effects would impinge on the audio spectrum? Approximately 300 feet of 12 gauge would be required to establish a corner frequency of 20 kHz with an 8 Ohm loudspeaker. As you see, inductance is not a problem for most of us.



Hooking Up Cables

What about phase shift due to frequency dependent travel times down the speaker cable? Measurements show that 100 Hz waves will be delayed about 20 billionths of a second behind 10 kHz waves when traveling to the end of a 10 foot speaker cable. Since the cilia of the ear requires 25,000 times longer than this just to transmit phase information, phase shifting is obviously not the primary concern when considering speaker cables.

What about resistance? Finally we are getting somewhere. Resistance is the controlling factor of the amplifier/loudspeaker interface. Excessive resistance can cause major shifts of speaker crossover frequencies. The lower the impedance of the loudspeaker, the greater the effects of series resistance. A 20 foot run of 18 gauge cable can cause up to 10% deviations of crossover center frequencies. That same 20 feet can un-damp your damping factor and reduce your systems' output by one half decibel.

In summary, there are no perfect cables. The best way to approximate the ideal would be to keep loudspeaker leads as short as is practical.

Amplification

Ideally the loudspeaker would be among the first components selected when assembling a playback system. This would allow the user to choose an amplifier capable of delivering adequate amounts of current into the frequency dependent load presented by the loudspeaker. However, when upgrading a system, audiophiles may find themselves matching their new loudspeakers to their existing amplification. For this reason, extensive measures have been taken to ensure that each Legacy speaker system represents a smooth, non-reactive load to virtually any amplifier.

Often there is much confusion regarding amplification and loudness levels. It should be understood that the role of the amplifier goes beyond that of driving loudspeakers to a given sound pressure level. The amplifier should be able to CONTROL the loudspeakers across the entire music spectrum. This means that parameters such as damping factor (values greater than 60 are acceptable) and dynamic headroom should not be overlooked when comparing amplifiers.



Amplification

How much power will your new speakers need? That ultimately depends on your listening environment and musical tastes. As little as five watts per channel should drive them to a level satisfactory for background music. A typical 45 watt per channel receiver may fill a room with the compressed mid-band energy of "heavy metal," but seem to lack weight or control with classical recordings. Some audiophiles feel that 200 watts per channel is the bare minimum to avoid audible clipping distortion when reproducing music at "live" playback levels. Your Legacy speakers are designed to take advantage of "high-powered" amplifiers, so don't be afraid to put them through their paces.

How much is too much power? Rarely is a drive unit damaged by large doses of music power. More often than not the villain is amplifier clipping distortion. Even through decades of refinement, loudspeakers are still notoriously inefficient transducers, requiring huge amounts of power to recreate the impact of the live performance. Typically less than 1% of electrical power is converted into acoustic output. (For example, an omnidirectional transducer with an anechoic sensitivity of 90 dB @ 1w/1m has a full space efficiency of only 0.63%)

Amplification

When an amplifier is unable to fulfill your loudspeakers demands, a damaging harmonic spike may be leaked to the high frequency drivers.



Another important point regarding loudness is that the dB scale is a logarithmic one. This means that a 150 Watt amplifier will potentially sound only twice as loud as a 15 Watt amplifier. If all of this discussion of power and loudness seems a bit abstract, consider the example below.

The average acoustical power developed by a person speaking in a conversational tone corresponds to a mere 0.00001 Watts. The power that would be developed by the entire population of the city of New York speaking at once would barely illuminate a single 100 Watt light bulb.

Speaker Connections

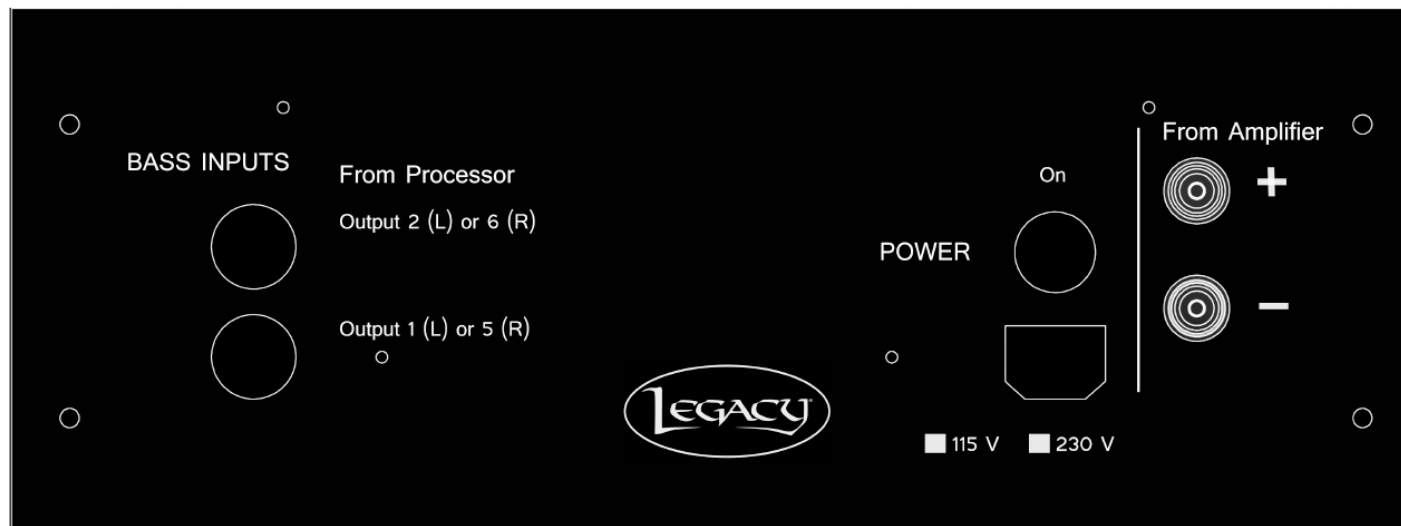
The Terminal Plate

At the rear of each of your loudspeakers you will find a terminal plate housing one pair of binding posts and two XLR Connectors.

Hook the high level speaker inputs from the main amplifier to the pair of binding post. Be sure that you observe polarity when making the connections. The positive (+) terminal of the amplifier should be connected to the positive terminal of the loudspeaker. The negative (-) terminal of the amplifier should be connected to the negative terminal of the loudspeaker.

The Upper XLR input is fed directly from the processor output (Output #2 for the Left Speaker, Output #6 for the Right Speaker)

The Lower XLR input is also fed directly from the processor output (Output #1 for the Left Speaker, Output #5 for the Right Speaker)



Speaker Connections

Xilica XD Cable Connections

From

Left channel of preamp output
USE Y ADAPTER

Right channel of preamp output
USE Y ADAPTER

Processor Output 1

Processor Output 2

Processor Output 3

Processor Output 5

Processor Output 6

Processor Output 7

To

Processor Input 1 & Processor Input 3

Processor Input 2 & Processor Input 4

Left Legacy Whisper *Back* 15" Drivers (Bottom XLR)

Left Legacy Whisper *Front* 15" Drivers (Top XLR)

Left Channel of Customer Provided Amplifier Feeds to
Left Legacy Whisper

Right Legacy Whisper *Back* 15" Drivers (Bottom XLR)

Right Legacy Whisper *Front* 15" Drivers (Top XLR)

Right Channel of Customer Provided Amplifier Feeds
to Right Legacy Whisper

Installer Calibration Instructions

Be sure to feed left input to both 1,3 and right input to both 2,4 with XLR splitter cable off preamp

Step 1:

- start with everything muted
- un-mute input 1
- un-mute output 1 and verify the **rear left woofers** are all playing.

Step 2

- mute output 1
- un-mute output 2 and verify only the **front left woofers** are all playing

Step 3

- mute output 2
- un-mute output 3 and verify the mids and tweeters are all playing

Step 4

- un-mute output 2, the acoustic energy should **increase** as it sums with output 3
- un-mute output 1, the signal should **increase** in deep bass primarily

Now do same for right channel

Step 5

- start with everything muted
- un-mute input 2
- un-mute output 5 and verify the **rear right woofers** are all playing.

Step 6

- mute output 5
- un-mute output 6 and verify only the **front right woofers** are all playing

Step 7

- mute output 6
- un-mute output 7 and verify the mids and tweeters are all playing

Step 8

- un-mute output 6, the acoustic energy should **increase** as it sums with output 7
- un-mute output 5, the signal should **increase** in deep bass primarily

Step 9

- Un-mute inputs 1,2
- Un-mute outputs 1,5, the low bass should sum up
- Un-mute outputs 2,3,6,7 bass should be solid and not sound phasey

Step 10

Adjust path length to speakers until equidistant. Adjust balance on inputs 1 and 2 until image is centered

Step 11

EQ the left speaker with pink noise using the parametrics on Input 1, followed by graphic filters if needed.

Step 12

EQ the right speaker with pink noise using the parametrics on Input 2, followed by graphic filters if needed.

Step 13

Voicing each speaker:

We are looking for a curve that is flat with the following exceptions.

- a gentle 1.5 dB depression from 1kHz to 3kHz,
- a 2 dB rise at 20kHz ramping from 5kHz gently upward.

With customer's approval apply a sharp electrical roll-off below 32 Hz. (Nothing but mechanical junk down there in 99% of recordings).

Step 14

With both speakers playing music in mono, adjust L, R input levels until perfectly centered. If there is a 2dB difference that is ok, then *the room is just that asymmetric in power response.*

Step 15

Unmute inputs 3,4 to activate stereo low frequency correction

Step 16

Final voicing: Listen to the full spectrum. Any adjustments should be made carefully on each side to retain balance.

Whisper Wave Launch Processor

The high definition Digital Wavelaunch Processor hosts a LEGACY custom algorithm which automatically loads when the processor is powered on. Factory settings are 'plug and play', and do not require a computer to utilize. Connections between the preamp, power amplifier, and speakers should be as shown on previous page.

Programs

- 1 Whspr Normal standard settings for flat response
- 2 Bass Plus (increases bass, +2 dB)
- 3 Bass Minus (shelves bass, -2 dB)

Selecting the Program

1. Press the MENU left arrow
2. Scroll through the programs using the job wheel
3. Press enter to select the program of choice
4. Press enter again to confirm selection. The program will now load.

Users are welcome to load the included software and learn to make individual adjustments as desired. However it is recommended that any changes be saved as Program 6 or higher to avoid overwriting the factory settings.



Whisper Wave Launch Processor

Downloading and Installing the XConsole software

Downloading

From Included CD

Your Wave Launch Processor will come with a CD or USB drive containing the XConsole software. Insert the CD and find the install file. Move/Save the install file to your computer.

From Xilica Website

- Go to www.xilica.com
- Click on the "Downloads" tab at the top of the screen
- Click "XConsole" on the Left and then Click "Software"
- Click "XConsole software" to start the download
- Save and Extract the installation file on your computer

Installing

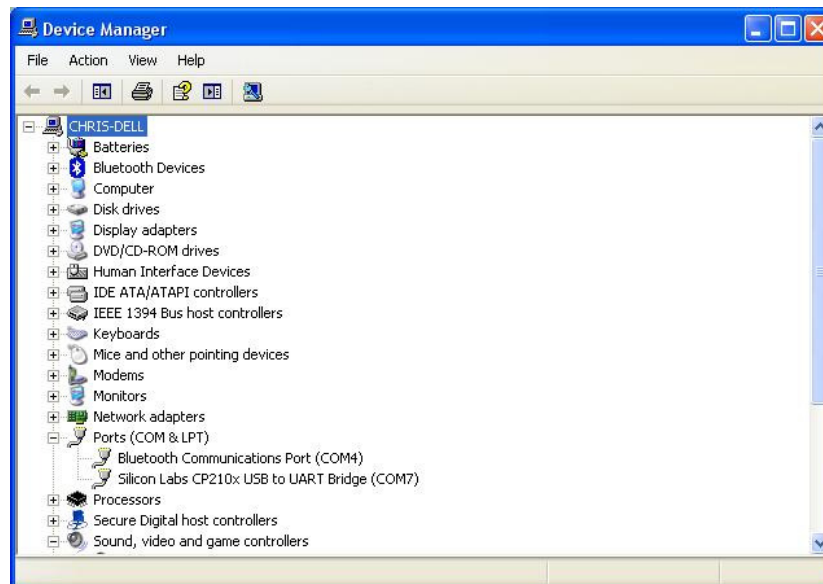
- Double click on the install file and follow the on– screen instructions to install the software.

Whisper Wave Launch Processor

The XD processor will allow you to make adjustments to your system from a laptop computer from your listener position.

Connecting Your Computer with the Xilica Processor

- Connecting will require a long USB Device cable. These can be found at most electronic or big box stores. It is the same cable that a USB printer would use. This 16 ft cable is available at Radio Shack.
<http://www.radioshack.com/product/index.jsp?productId=3584358&filterName=Length&filterValue=16-20+ft>.
- Once the cable is connected, start the XConsole software. It will ask "Do you want to connect to the device?", answer "No" for now.
- You now must access the Windows Device Manager. This processes can vary depending on the version of Windows in use, but typically it is found in the Control Panel. Then click on "System." On the tabs across the top, click "Hardware" and then "Device Manager" This will bring up a list, find "Ports (COM & LPT)" and click the plus (+) next to it. You should then find a device called "Silicon Labs CP210x USB to UART Bridge" with a COM number listed next to it. This number will change on all computers, but take note of this number.



Whisper Wave Launch Processor

- Go back to the XConsole software. At the top of the screen click "Setup" then "Port Connections" This bring up a new dialog box. Select the COM port number you obtained from the device manger and click "OK." The software will warn you that you must restart the software for your changes to take effect.
- Restart the XConsole software. This time, when it asked "Do you want to connect to the device?", answer "Yes".
- You should now be connected to the device and ready to use.

Room Equalization

Before making adjustments with your processor, a basic understanding of parametric and graphic equalization is needed.

Parametric filters allow you to control the three primary parameters of a useful band-pass filter. These parameters are [amplitude](#) (boost or cut), [center frequency](#) (pitch) and [bandwidth](#) (tonal range). Bandwidth is typically labeled "Q" on the unit, which stands for [Q factor](#). The amplitude of each band can be controlled, and the center frequency can be shifted, and widened or narrowed.

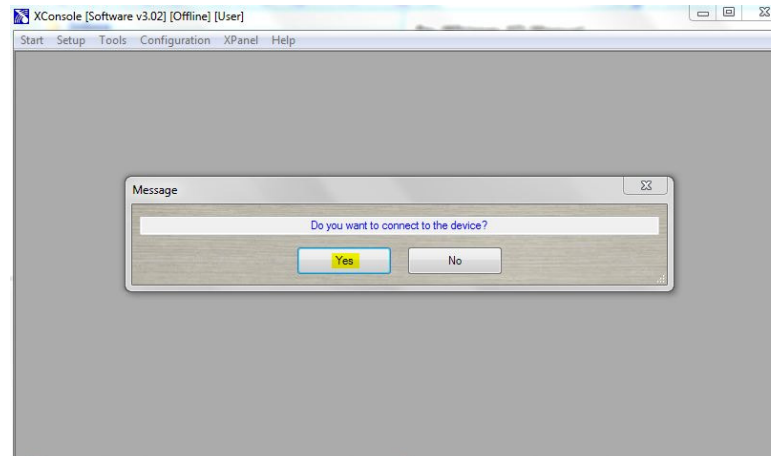
Simpler graphic filters are fixed in frequency and bandwidth, so the music spectrum is divided into uniform third-octave spacings.

Whisper Wave Launch Processor

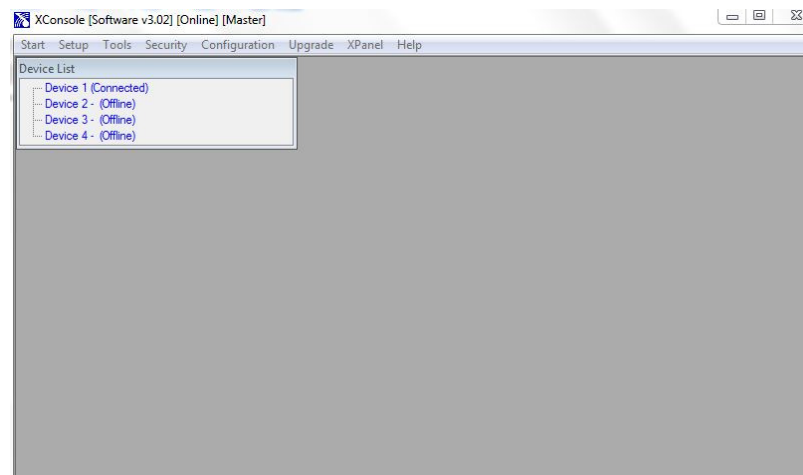
Making Adjustments with Wavelaunch Processor

After installing the included software, connect the processor to the computer via a USB cable.

Launch the XConsole software.



When asked if you want to connect to the device, click yes.



In the Device List, click on the device that is connected. This will launch the program that is currently on the processor.

Whisper Wave Launch Processor

In the Device List, click on the device that is connected. This will launch the program that is currently on the processor.



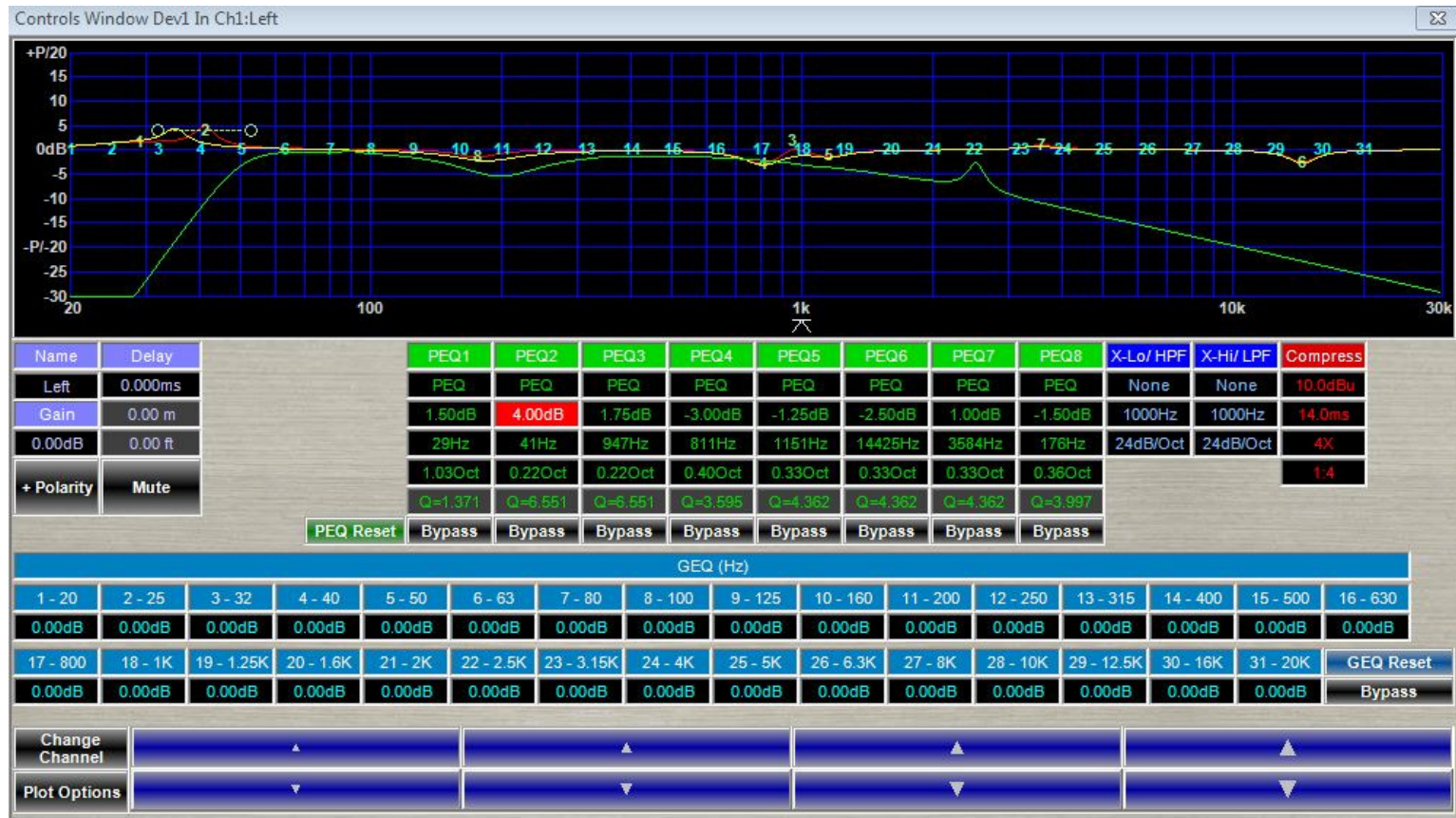
Adjustments to the processor can be made to "Input 1: Left" and "Input 2: Right". Clicking on "In 1: Left" opens the controls for the Left speaker.



In this window, you are presented with 31 channels of graphic EQ and 8 channels of parametric EQ.

Whisper Wave Launch Processor

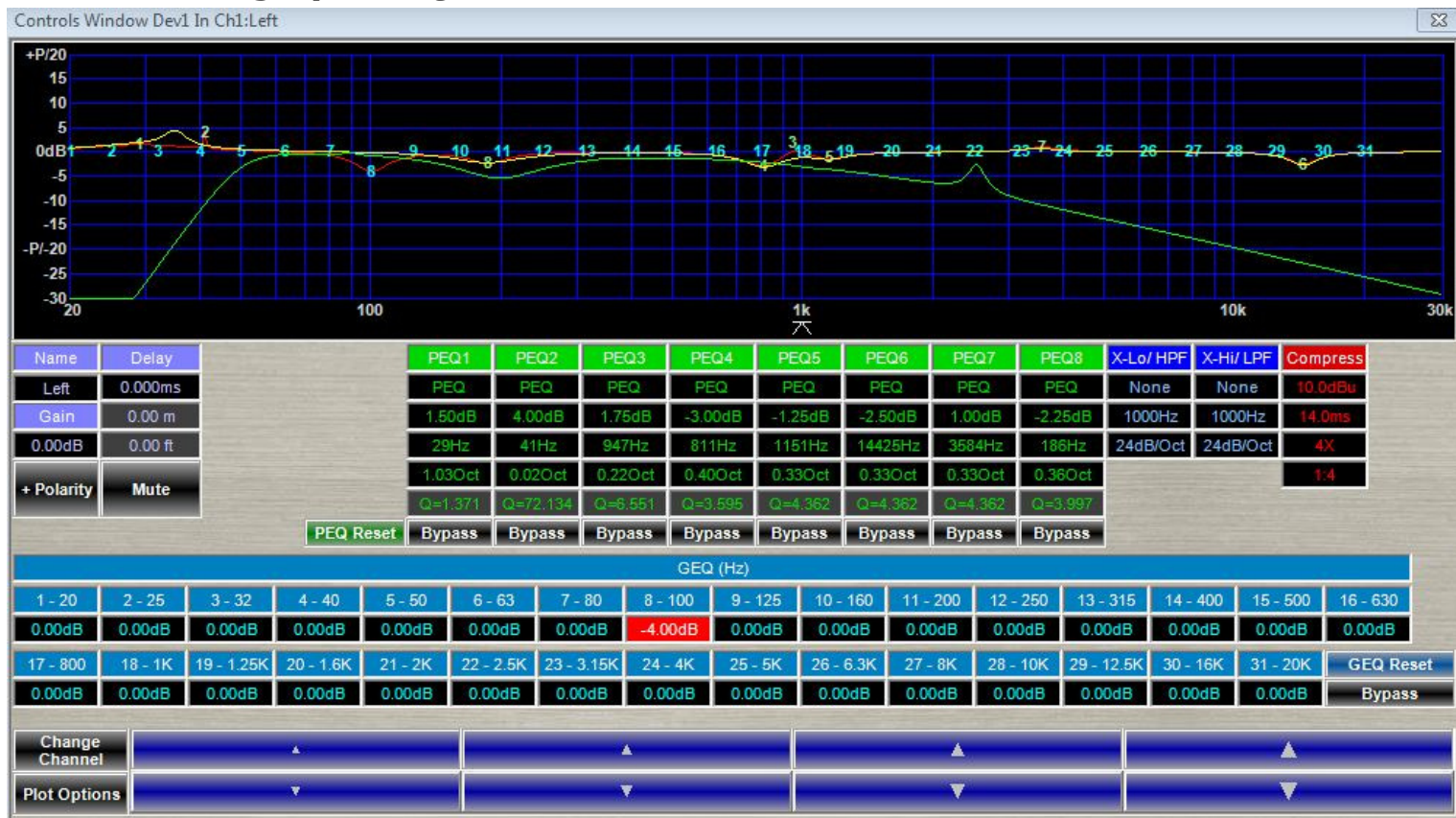
Making a boost with the parametric EQ



In this example, we have selected Parametric EQ 2 (PEQ2) by clicking in its box, which will turn red to indicate your selection. Once highlighted, locate the blue boxes with up and down arrows, at the bottom of the interface. These arrows are used to increase or decrease the gain, frequency and Q of the selected parametric EQ. This column shows a 4.00 dB boost at 41 Hz with a Q of 6.551. A larger Q affects a narrow range of frequencies, while a smaller Q affects a broader range of frequencies. We can adjust gain, frequency and Q by clicking in the corresponding box. Once highlighted, locate the blue boxes with up and down arrows, at the bottom of the interface. These arrows are used to increase or decrease the gain, frequency and Q settings.

Whisper Wave Launch Processor

Making a cut with the graphic EQ



In this example, we have selected Graphic EQ 8 by clicking in its box which will turn red to indicate your selection. Once highlighted, locate the blue boxes with up and down arrows, at the bottom of the interface. These arrows are used to increase or decrease the gain of the selected graphic EQ. This column shows a 4.00 dB cut at 100 Hz. Only gain is adjustable in the graphic EQ section because graphic equalizers have a fixed frequency and Q.

After adjusting the left speaker, you may close the window, and click "Input 2: Right" to make adjustments to the right speaker.

Whisper Wave Launch Processor

Adjusting using the EQ plot

Adjustments made to both the parametric and graphic EQ are reflected in the graph occupying the upper portion of the screen. You can select them by clicking on their number, and dragging up to boost, and down to cut. Dragging to the left decreases the frequency, while dragging to the right increases the frequency.

Recommendations

Boosts greater than 6 dB can result in ringing, driver overload, or mechanical buzzing.

Boosting and cutting with a smaller Q will affect a broad range of frequencies, and can be helpful for brightening an otherwise dull recording.

Boosting and cutting with a large Q will affect a narrow range of frequencies, and is useful for making precise adjustments.

For the Ambitious: Technical measurements

We highly recommend free measurement software, Room EQ Wizard. This software allows you to measure the in room response of your system. While we obviously cannot provide the technical support for this software, all one needs is a calibrated microphone and a soundcard with microphone preamp and you are off and running.

<http://www.hometheatershack.com/roomeq/>

Designer's Notes (From Bill Dudleston)

The ideal speaker would stop and start on cue regardless of the combinations of frequency and level. It would have the same radiation pattern throughout the spectrum. It would sound as true to the last voice in a large choir as it would a soloist and never overload.

Back to reality. For a given size diaphragm the displacement requirements for uniform output increase by a factor of four for each octave dropped (frequency halving). Unfortunately distortion is proportional to displacement. Meanwhile transient integrity (waveform tracking ability) is reduced as diaphragm displacement requirements increase with the sound pressure level.

A single panel speaker with a thin diaphragm will beam at high frequencies, exhibit traveling waves across its surface, reflect at the clamped edges, have limited excursion and behave inefficiently at lower frequencies. While they can also be sensitive to rear wall placement, the lack of upper bass coloration is appealing, lending an 'open' quality to the sound.

Mount instead a woofer and a tweeter in a cabinet and you have the issue of polar tilt with comb filtering (alternating constructive and destructive interference in the region of overlap). This is due to the asymmetry and lack of an acoustic center. Even if the crossover provides an in-phase relationship to the seated listener, it cannot be in-phase relative to its many reflection paths. The tweeter radiates broadly at the crossover frequency while the woofer is beaming narrowly in comparison. Additionally, if you decrease the resonant frequency of the woofer to provide deeper bass, the efficiency drops with the tracing speed.

But what if the drivers were arranged symmetrically? And the resonant woofer enclosure eliminated? And the bass drivers were replaced with four, larger, low mass diaphragms? And these low mass diaphragms were given several milliseconds of a head start to keep pace with the higher frequency section? And the speaker had virtually the same acoustic radiation pattern at all frequencies? And the system was immune to early sidewall reflections? And multiple listeners could share in the sweet spot? And the frequency response could be tailored to the room and negate the effects of the furniture? And a nice guy was willing to show us at your house and tune them for you? *(They are a total of six factory trained technicians in the U.S. that travel to **Whisper XD** setups if requested. They are based in Los Angeles, Orlando, Chicago, New York and here in Springfield.)*

The Whisper XD design radically increases piston area in the forward plane extending bandwidth, sensitivity, and frequency range. Because the design is open air, the system is virtually free of enclosure resonance and room limitations. Whisper XD's differential alignment is analogous to a dual element microphone. Audio pioneer, Harry Olson, suggested a loudspeaker design (2nd order differential to be exact) that might be built which could operate with one diaphragm directly behind the other. Signals from the two baffles are combined acoustically with time compensation to steer the low frequency wave -launch forward, while creating a progressively reduced acoustic output to the sides until reaching a null at 90 degree off axis. This eliminates boundary interactions from sidewalls, ceiling and floor. The gradient acoustical pressure reaching the listener at each ear contains far less room noise, allowing the brain to lock in on the natural ambience in the recording.

The sweet spot is much wider with the Whisper XD design, allowing the listener to move outside the left speaker and still hear a balance with the right speaker, and vice versa. Our manual recommends a strong toe-in, to cast the strongest acoustic shadow across the face. It explains that the imprint of the shadow of the nose into the opposite ear is the other portion of the stereo signal that is usually washed out by excessive room reflections with conventional speakers.

Designer's Notes (From Bill Dudleston)

The name Whisper was derived after a conversation with Bob Carver over 15 years ago. He had suggested that speakers with a solid stereo center image rarely conveyed image size and a broad, deep soundstage. And that sounds should extend both forward and back in the mix, as they do on the live stage. Carver commented we haven't succeeded fully as designer's until we can virtually portray the warm breath of a female whispering softly in one's left ear. Wow. That really stayed with me, and taught me to listen in the baseline information of a recording. I realized soon after that to imprint the acoustic shadow across the face we would need to reduce the early sidewall reflections that were washing it out.

At best, the emotional response of the listener is tied to that of the musician. Musically we rely on dynamics, timbre, tempo, tonal color, texture, etc... With loudspeakers we have merely amplitude vs. time to portray. *That's it.* With stereo we add dimension. What I am saying is that the role of a loudspeaker is very simple in theory, but in practice the dynamics and timbre are usually audibly compromised. Distortions are added, causing each speaker system to sound different than another. Room effects mask ambience in the recording. Whisper is about getting closer to the music as intended by the performer. I want the participant to listen between the notes, to anticipate and feel the peaks and valleys and hopefully, forget they are listening to a pair of speakers.

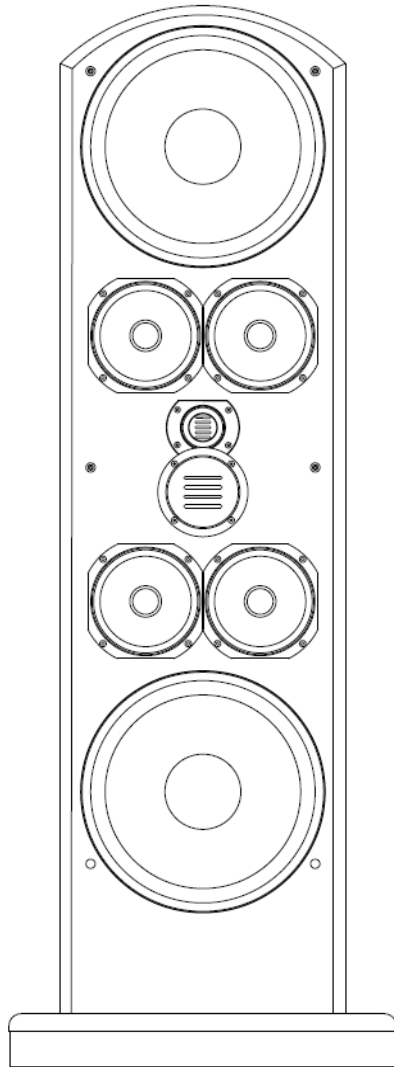
All drivers used in Legacy speakers are custom designed in house for our exact requirements. We then select fabricators based on the type of driver. We work with material suppliers from Florence, Munich, Ontario, and several cities in North America. Much of the rare earth elements are from Russia. Cast frames are from foundries in Southeast Asia.

Because of its versatility, Whisper is used in mastering suites, rooms as large as 50' x 30', and as small as 10' x 10'. We usually recommend a spread that is comparable to the listener distance from the speakers.

The **Wavelaunch XD** Processor utilizes a 24 bit DAC with extraordinary specifications and can synchronize up to 4 additional channels of output. Once a customer has experienced first-hand the degree of refinement in the frequency response and time alignment calibrations, there is no doubt regarding its benefits. When I chose this processor I literally chained five units in a row to evaluate its performance (learned this trick from Bob Stuart at Meridian). It outperformed a unit of our own manufacture and three other units in a blind session.

Here's the key to Whispers sensitivity: We start with very efficient neodymium based ribbons with dual magnetic poles. The upper tweeter has a pleated diaphragm that squeezes air 4 times more efficiently than a conventional diaphragm. The four midranges each have a sensitivity of 95 dB, so they can reach in excess of 130 dB together if needed (*hint: a gunshot sounds like a gunshot*). The woofers are the tricky part. The drivers each have a sensitivity of 92 dB. The four woofer alignment results in 98 dB. Frequency shaping is applied including a trim of 3 dB in the midbass and a 6 dB boost between 20 and 40Hz to linearize the response. The two internal 500 watt power modules per speaker are the industry proven ICE modules from Denmark (*They are the most reliable amplifiers I have utilized to date*).

Specifications



System Type:	11 drivers, 4 way
Tweeters	1" dual pole neo ribbon, folded Kapton diaphragm 3" dual pole neo ribbon, vapor deposited kapton diaphragm
Midrange:	4 x 7" Rohacell reinforced Silver Graphite, cast frame
Bass Drivers:	4 X 15" cabon/pulp composite 12" Aura Bass steering (Rear Facing)
Low Frequency Alignment:	2nd Order Differential
Frequency Response:	22Hz – 30 kHz includes 24 bit processor
Impedance:	4 Ohms
Sensitivity:	94.5 dB
Recommended Amplification:	10 - 300 Watts includes 2 X 500 Watt Amps
Crossover Frequency:	300, 3K, 10K
Dimensions (H x W x D):	63" X 17" X 13"
Weight:	25 210 pounds each

CE Declaration of Conformity

Legacy Audio

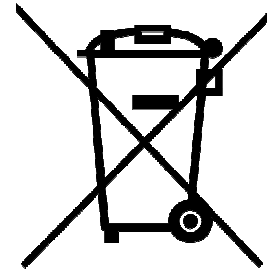
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Springfield, IL 62702 USA
800-283-4644

States that this product is in conformity with the with the essential requirements and other relevant provisions of:

Low Voltage Directive 2006/95/EC
EMC Directive 2004/108/EC



WEEE Compliance



Product Disposal—
Certain international, national and/or local laws and/or regulations may apply regarding the disposal of this product. For further detailed information, please contact the retailer where you purchased this product or the Legacy Audio Distributor in your country. A listing of Legacy Audio Distributors can be found on the Legacy Audio website www.legacyaudio.com or by contacting Legacy Audio at: 3023 E. Sangamon Ave., Springfield, IL 62702, USA—Phone: +1 217 544-3178.

Notes:



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