THE VANDERSTEEN MODEL 2W SERIES SUBWOOFER SYSTEM

To accurately reproduce sound , an audio system must cover the entire audible frequency range. It must reach the highest harmonics and the lowest fundamentals. It must convey the delicacy of a brushed triangle as well as the authority of timpani drums.

Size, price and design considerations often compromise the deep bass response of full-range loudspeakers. They lack the bass extension and intensity to correctly duplicate the low frequencies that form the critical foundation of sound. They sacrifice deep bass detail in exchange for mid-bass or midrange performance.

Vandersteen Model 2W series subwoofers augment the deep bass response of your present speakers. They provide the power, dynamics and low frequency detail required for superlative reproduction of music and film. They assume the responsibility for deep bass reproduction, improving the mid-bass and midrange response of your system.

The 2W subwoofer series benefits from our years of experience designing and building loudspeakers of unparalleled value and performance. It couples advanced materials, construction and design with innovative technology in a system that is always true to the emotion and content of the original sonic source.

The 2W series is completely upgradable. As future improvements in technology and/or materials enhance the subwoofers' capabilities, cost-effective updates will be available to upgrade existing units to the latest components, performance and specifications.

The System

The subtlety of a plucked bass, the complex harmonics of an organ and the incredible power of modern movie sound effects are all beyond the reach of many speaker systems. Even subwoofers rarely excel at all three, their designers choosing to compromise one in exchange for proficiency at another. Vandersteen Audio refused to compromise. The original Model 2W spent five years in the prototype stage being tested, evaluated, measured and revised before its introduction in 1984. Equal exhaustive attention was paid to the new technology of the 2Wq and V2W.

Vandersteen 2W series subwoofers use three active eight-inch drivers rather than a single large woofer. The three eight inch drivers equal the cone area of a fourteen inch woofer, but with a much higher motor-to-cone-area ratio. The high ratio improves pitch definition and insures stable frequency and phase responses throughout and beyond the drivers' operating range. This allows more crossover design flexibility since a steep-slope, high-order crossover is not necessary when the drivers perform well several octaves past the crossover frequency.

The drivers are downward firing in a front slot-loaded configuration to provide superb bass detail, impact and dynamics while minimizing any potential midrange interference. Each of the drivers uses a heavy duty 1 1/2 inch, four layer voice coil engineered to withstand high temperatures. Each voice coil is within a massive 40 oz, high gauss magnet structure for increased control and efficiency. Critically damped, long fiber cones with environmentally stable butyl rubber surrounds are used for excellent rigidity and linearity.

The drivers are connected to a built-in 300 watt amplifier with advanced feed-forward error correction. This powerful amplifier provides the benefits of bi-amplification to the system without the additional expense and complexity of an additional separate amplifier.

The cabinets of 2W series subwoofers are constructed of MDF, (Medium Density Fiberboard), a wood product far more dense and acoustically inert than particle board. FFT analysis and listening tests refined both the shape of the enclosure and the placement of the internal braces. The entire structure is carefully designed to minimize cabinet resonances that could affect the system's performance.

Feed-Forward Error Correction

Many subwoofers use a negative feedback or servo control type of error correction which samples the output of the subwoofer amplifier or the movement of the driver and makes comparisons to the original input. When a deviation is detected, a correction signal is generated to counter the error. A shortcoming of these systems is that an error must actually occur before the correction process can begin. The negative feedback and non-linearities of the correction create their own audible distortions that compromise the performance of the subwoofer. The 2W series uses Feed-forward Error Correction, (FFEC), which eliminates errors before they begin. Extensive spectrum, FFT and dynamic analysis of the 2W detected the errors that would occur during normal use. The inverse of these errors was then designed into the integral amplifier to eliminate the errors before they could occur. Errors resulting from coupling, loading, driver phase and frequency non-linearities and thermodynamic box loss are all eliminated by FFEC.

Dedicated Models

Two versions of the 2W subwoofer are available, each engineered and optimized for specific situations. The 2Wq receives its input from the power amplifier and is designed to maintain maximum sonic continuity between the subwoofers and main speakers in all music and home theater systems where a crossover can be inserted between the preamplifier/processor and the main power amplifier. The V2W accepts line-level inputs exclusively and is designed for home theater systems with integrated processor/amplifier units where the bass is handled by a line-level subwoofer channel.

The 2W subwoofer series is compatible with a wide range of main speakers from Vandersteen and other manufacturers. Large main speakers with accurate frequency and phase response extending at least an octave below the crossover point will provide optimum blending and linearity through the crossover region. *(Basic filter theory dictates that the main speakers must have predictable response at least an octave below the crossover point to insure seamless blending and linearity with the subwoofers.)* Smaller, limited-range main speakers will benefit from the 2W series' superior pitch definition and lack of midrange interference which provide better integration and system coherence than is possible with a conventional subwoofer.

THE 2Wq

Unique Adjustable Q

In subwoofer engineering terms, system Q is the product of a complex mathematical equation derived from driver, electrical and enclosure parameters. In practical terms, it relates to the character of the bass response. A low Q subwoofer sounds highly damped and very tight. A high Q subwoofer produces a warm loose bass with more energy in the most audible bass range. The trick has always been to try to find the subwoofer with the Q that best matched your listening room and personal tastes.

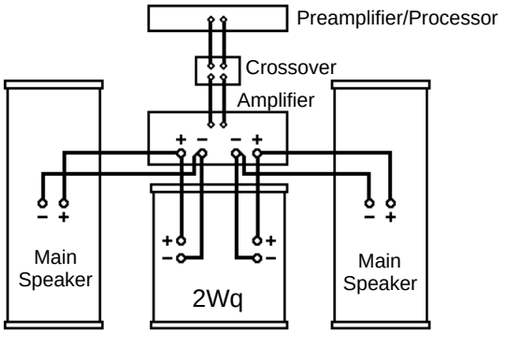
The 2Wq is the first subwoofer to feature adjustable Q. A bass contour control on the rear panel allows you to set the system Q anywhere from .5 *(Slightly overdamped, ie. tight jazz sound)* to 1.2 *(Significantly underdamped, ie. typical mass-market home theater sound)* Somewhere in this wide range, you will find the perfect sonic complement for your room and taste.

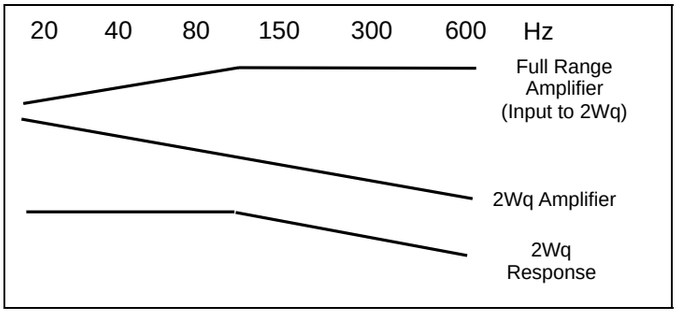
Operation And System Integration

Conventional powered subwoofers receive their input signal directly from their crossover before the main amplifier. The sonic signature of the main amplifier that is an important part of the sound you hear from the full-range speakers is missing from the subwoofer. This causes blending and integration problems as the sonic characteristics of the system are different above and below the subwoofer crossover point. This deterioration of system coherence is why conventional subwoofers have never been totally accepted as part of ultra high-performance audio systems.

The 2Wq uses a unique, innovative connection method that reduces the current demands on the main amplifier, but leaves the main amplifier in the signal path to the subwoofer. The system realizes the benefits of bi-amplification with absolute sonic continuity as the main amplifier's characteristics that are evident through the full-range speakers are maintained to the deepest bass, but with the power and control of the 2Wq's internal 300 watt amplifier.

The crossover of the 2Wq is divided into separate low pass and high pass sections. Like conventional subwoofers, the high-pass portion of the 2Wq's crossover is inserted into the signal path just before the main power amplifier to roll-off the low frequency response of the main amplifier and speakers. The critical difference is that the 2Wq does not take its input from its crossover, but samples the output from the main amplifier that is driving the main speakers. To compensate for the low frequency roll-off induced by the crossover, the response of the 2Wq's amplifier is contoured to restore the low frequencies to the proper level. The 2Wq's input impedance is high enough that it has no effect on the output of the main amplifier.





Since the high-pass portion of the crossover is inserted between the preamplifier and power amplifier, you must be able to separate the preamplifier and power amplifier sections of a receiver or integrated amp for it to be compatible with the 2Wq. In all systems, the input impedance of the main amplifier must be known in order to properly set the 2Wq's high-pass crossover. The low pass crossover is integrated with the 2Wq's amplifier and does not require adjustment. Both sections of the crossover are transient perfect, 6dB per octave designs.

A variable single-ended crossover is included with each 2Wq subwoofer. Optional fixed value crossovers are available both in single-ended and balanced configurations to match any main amplifier.

The output level of the 2Wq can be adjusted to match speakers with an efficiency rating of between 82dB and 100dB. Wires and banana plugs to connect the output of your full-range amplifier to the input of the 2Wq are included with each subwoofer.

Mono Or Stereo Bass

There are significant advantages to using two subwoofers. Modern sources such as CDs, Laser Discs, DVDs and Video Tapes maintain full stereo separation to below 20Hz. Summing the channels into a single subwoofer reduces or cancels all the low frequency information containing phase differences between the channels. Stereo subwoofers reproduce all of the bass information complete with the phase differences that help provide the imaging and location clues we use to place people and things at distinct points in the sound field. Stereo subwoofers also improve linearity on mono as well as stereo sources by coupling the bass to the room at two points and lend themselves to natural placement near the corners where the low frequency room gain is often desirable.

Ultimate Multi-Channel

A pair of 2Wq subwoofers is the premier configuration for high-quality multi-channel systems where the processor can be programed to redirect the LFE information to the main speakers. In addition to the benefits of stereo bass, disabling the processor's LFE output often improves the system's midrange clarity and articulation. For the ultimate system, additional 2Wqs can be added to the surround channels.

THE 2Wq

Dedicated to Home Theater

The V2W version of the 2W is optimized for multi-channel systems that cannot accept an external crossover between the preamp/processor and the power amplifier. The processor's subwoofer output is connected directly to the V2W's line level input.

The V2W incorporates a unique crossover that interfaces with the electrical characteristics of the processor and the acoustical characteristics of the main speakers to realize an effective 24dB per octave positive-phase crossover. To insure compatibility with any main speakers, the V2W has an inverted as well as a normal phase input. The phase of each input is adjustable over a +or- 90 degree range for true 360 degree phase capability. to fine tune the transition from the main speakers to the subwoofer.

Since a single V2W will often be called upon to provide the low frequency power and impact for an entire home theater system, the V2W adds a front-firing 12-inch passive radiator to the 2W series' standard trio of 8-inch woofers. The additional output capability assures adequate headroom in any situation while the accompanying increase in inherent system Q puts it at the optimum value for high-quality home theater. The V2W's sensitivity control allows its level to be set independently so the subwoofer output level on a digital processor can be left near the top of its range where the processor will maintain maximum bit resolution and signal to noise ratio.

In a beyond outlandish home theater system, a V2W can be used for the LFE channel while a quartet or more of 2Wqs effortlessly handle the low frequencies for the main and surround channels. This will provide the ultimate bass experience as the special effects shake not only the foundation, but the very earth below it.

Specifications

2Wq

DRIVERS:
(3) 8" critically damped, long fiber cones with butyl rubber surrounds. 1.5 inch, 4 layer voice coils in 40 oz. magnet structures.

CROSSOVER:
6dB per octave at 80Hz. Requires an external high-pass crossover between the preamplifier and power amplifier matched to the input impedance of the power amplifier.

AMPLIFIER:
300 watt with no current limiting. Input impedance more than 100,000 ohms. Uses 10 watts at idle.

CONTROLS:
Adjustable sensitivity to match main speakers with efficiencies between 82dB and 100dB.
System Q adjustable from .5 to 1.2.

INPUTS:
(2) pair of banana jacks accept high-level output from the main amplifier.

SYSTEM:
Second order, slot loaded. Pulse overshoot less than 1/2 cycle.
-3dB at 20Hz and 80Hz.

PHYSICAL:
18.5" high x 18" wide x 17" deep. 91 pounds gross. 80 pounds net.

V2W

DRIVERS:
(3) 8" critically damped, long fiber cones with butyl rubber surrounds. 1.5 inch, 4 layer voice coils in 40 oz. magnet structures. (1) 12" coupled-mass passive radiator.

CROSSOVER:
Electrical: 12dB per octave at 150Hz.

AMPLIFIER:
300 watt with no current limiting. Input impedance more than 100,000 ohms. Uses 10 watts at idle.

CONTROLS:
Adjustable sensitivity to maximize processor resolution and signal to noise. Variable phase control to match any main speakers. +or- 90 degree adjustment of each input provides 360 degree phase capability.

INPUTS:
(2) RCA jacks, (1) normal (1) phase inverted, accept Subwoofer or LFE channel output from a multi-channel processor.

SYSTEM:
Third order (QB_3) passive radiator.
-3dB at 20Hz. Upper frequency limit processor dependent.

PHYSICAL:
18.5" high x 18" wide x 17" deep. 91 pounds gross. 80 pounds net.

Commitment

Vandersteen Audio was founded in 1977 with the commitment to offer the finest music reproduction products. Company goals of value, reliability and customer support lead us to develop new innovative products and improve existing ones. There will always be a high degree of pride, love, and personal satisfaction involved in each piece before it leaves our facilities.

Each 2W subwoofer undergoes numerous tests prior to leaving the factory. Each driver, crossover and amplifier is tested for proper performance. The completed speaker is high-power sweep tested for structural integrity, and FFT analyzed for correct response and performance. This intense commitment to product quality and reliability is unsurpassed in the audio industry.

Natural Coherence

Every aspect of the 2W series, from the dedicated features, to the innovative internal amplifier, to the use of feed-forward error correction, enhances the seamless blending between the main speakers and the subwoofer. Ultimately, a subwoofer should never sound like a subwoofer. It should integrate so well with the main speakers that it is indistinguishable in the system. It should never call attention to itself. The bass should simply be more detailed, extended and powerful; the sound more open, transparent and articulate. This consistency of sound, a natural coherence, is essential to long term listening enjoyment.

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