Constant Power Point Source Array

VHD5.0

KV2 audio™

A Bold New Advancement in Concert Sound Reinforcement

KV2 Audio's philosophy has always been to embrace the principles of point source speaker system design to provide optimum sound quality and coverage for applications and audiences of all sizes. The challenge for KV2 in building a large point source system for audiences of 50,000 people plus, was to reproduce the low mid energy that certain line arrays provide, though the summing of multiple drivers whilst maintaining the key benefits of point source technology. These benefits include minimal destructive interference in the higher frequency range, accurate impulse response and superior sound.

Utilising highly advanced point source speaker design, extremely efficient power management amplifier technology and totally unique hybrid signal processing, KV2 has created the first major advancement in large scale concert sound reinforcement since the development of the Line Array. The VHD5.0 Constant Power Point Source System is a true feat of engineering.

Over five years in development it brings the benefits of point source technology to large-scale concert sound reinforcement. The system delivers audio over large areas with clarity and definition simply not achievable from the digitally processed line arrays that are so commonly used today.

Time-Shifts, Properties of Multi Point source

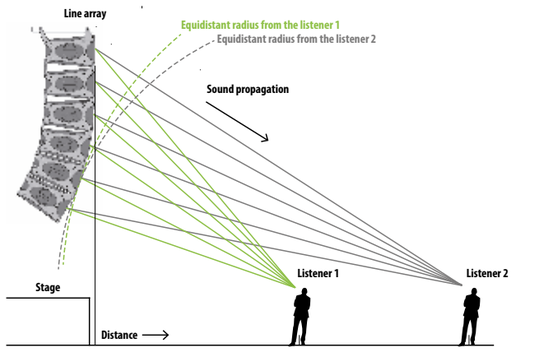
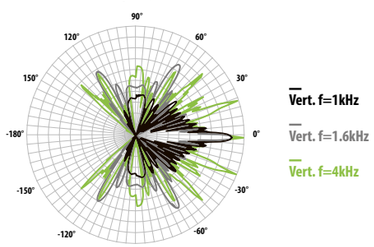


Illustration of the differences in distances to the listener from several Line array sources, each listener gents a blurred sound.

Ver. Polarplots, 6 dB/div



Vert. f=1kHz

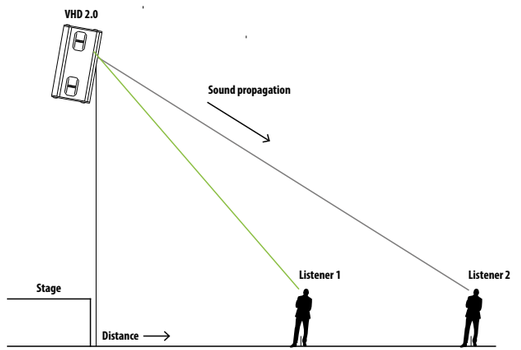
Vert. f=1.6kHz

Vert. f=4kHz

For some time now line arrays have been predominantly used for large concert sound systems. Having all components in a single axis array has solved certain issues in respect to comb filtering problems in the horizontal plane, but destructive interference still occurs from the multiple HF horns mounted vertically. The loss of high frequencies and cancellations through air disturbance caused by audience heat and wind is another major issue. Manufacturers have attempted to correct these problems in numerous ways both through acoustic design and DSP, however the end result has been further reductions in resolution, due to the limitations of digital sampling and the simple principles of physics that cannot be ignored.

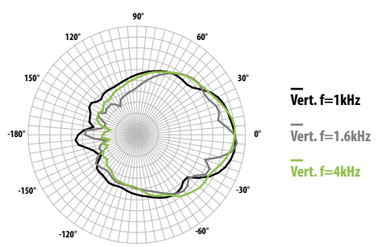
At KV2 we believe that definition equals distance and the higher the reproduction quality of the source, the better theintelligibility over distance. The theory that line arrays have less losses over distance than point source is not only incorrect, but somewhat irrelevant if the sound is not intelligible at the back of the venue anyway. To achieve the high definition needed to cover long distances we have focused on developing unique hybrid processing, which takes the very best available technologies in both the analogue and digital domains, advancing system design to a whole new level. The end result is ultimate resolution, Very High Definition sound, impulse accuracy and phase coherent audio arriving at the listening position, even over long distance.

Time-Shifts, Properties of Single Point source



When using one point sound source, the listener in any location gets only a pure (not blurred) sound.

Ver. Polarplots, 6 dB/div



Vert. f=1kHz

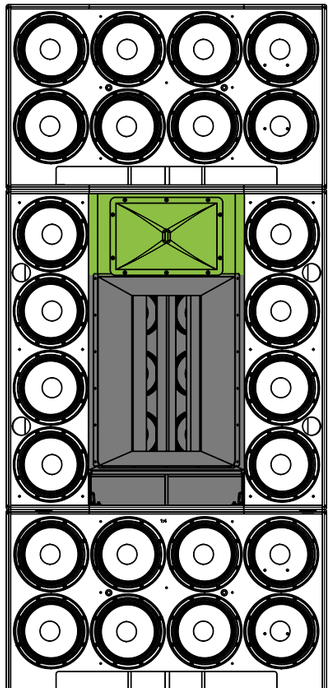
Vert. f=1.6kHz

Vert. f=4kHz

45Hz - 400Hz

400Hz - 2kHz

2kHz - 20kHz



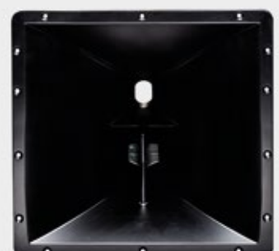
To cover very large crowds you need a large system capable of delivering high SPL, running multiple components. To do this, as one large point source enclosure is somewhat difficult as it would be almost impossible to move around or transport.

With the VHD5.0 Constant Power Point Source Array, KV2 has focused on creating a modular system that has minimal destructive interference while utilising multiple components in a small number of cabinets. VHD 8.10 Low Mid Expansion Boxes are arrayed around the VHD5.0 Mid High Enclosure providing the extra headroom needed to deliver the low mids, keeping the sound balanced.

In essence the system is pieced together to represent one very large point source, each part of the system is proportional in size to the frequency wavelengths it reproduces. The radiated power of each bandwidth therefore remains consistent and balanced in relevance to the overall frequency response. This ensures the same sound is delivered to every seat in the house.

The high frequency horn in the VHD5.0 combines three 3" NVPD (Nitrate Vapour Particle Deposition) Titanium Drivers on a special manifold horn with summing wave-guide. Delivering incredible output with extremely low distortion, this unique horn assembly provides crystal clear highs over distance with much higher resistance to air disturbances.

High Frequenzy Horn



VHD5.0 – Mid High Module

The VHD5.0 is a three-way enclosure handling low mids, mids and highs over a frequency range from 45Hz through to 20kHz. It incorporates eight front-loaded ten inch low mid drivers, six horn-loaded eight inch mid range drivers and three 3" NVPD (Nitrate Vapour Particle Deposition) Titanium compression drivers on a custom designed, manifold horn assembly with summing waveguide. With the capacity to run full range down to 45Hz the VHD5.0 is usually crossed over at 70Hz to the VHD4.21 Active Sub Bass Modules.

Both the VHD5.0 and VHD8.10 cabinets incorporate very simple to use integrated fly ware that links cabinets together quickly and easily. A complete system (4 VHD5.0's and 12 VHD8.10's) can be flown by two people in less than two hours.

VHD8.10 – Low Mid Expansion Modules

When multiple low mid drivers are arrayed on a single axis they sum providing a considerable increase in the amount of low mid energy present and available in the 200Hz to 500Hz range. A lot more energy is needed in this area than in the higher frequency ranges so this summing effect helps deliver headroom in the system and keeps the overall sound balanced.

To provide the required energy in the low mid, needed to cover very large audiences KV2 developed the VHD8.10 Low Mid Expansion Box. This enclosure carries a further 8 front-loaded ten inch speakers and 3 of these cabinets are added to each VHD5. 0. This provides a total of 32 ten inch speakers giving the extra headroom needed in the low mid band and extended projection of these frequencies over distance.

VHD4.21 Active Bass Module

The VHD4.21 Active Bass Module consists of two purpose designed Very High Definition enclosures, one active and one passive, each containing two custom designed 21“ woofers. A Low Q design has been applied to attain the optimum speaker loading, enabling a high sensitivity of 109dB 1w/1 m. Running at close to 100% efficiency on any voltage from 160 to 270 Volts, the amplifier for the VHD4.21 is a revolution in electronic engineering, utilising a huge bank of capacitors as a power store.

This unique and innovative new power management system enables the onboard amplifier to deliver peak output levels of 14 kW, whilst operating at a modest constant power consumption of 3.5 kW from a 16 A circuit. The VHD4.21 Active Module represents proven KV2 Subwoofer Amplifer technology that has been consistently improved over the last decade to provide maximum control over the movement of large mass speakers. The end result is a fast, dynamic, Very High Definition subwoofer, truly capable of reproducing the articulation in a bass guitar, whilst also extending down to 28Hz.

VHD5000 Amplifier Controller & VHD5000S Slave Amplifier

The VHD5000 amplifier controller contains two Class AB amplifiers totalling 900Watts for the high frequencies and a 1200Watt Class H amplifier for the mids. It also controls the VHD5000S which houses two 2500-watt Class G amplifers that power low mids in the system. Outputs from the VHD5000 also feed KV2 SL3000 Amplifiers, driving SL412 cabinets for Downfill and Groundfill applications.

The VHD 5000 incorporates state of the art hybrid processing via discrete ultra fast analog circuitry and our proprietary 20MHz PDM technology for all required filtering and time alignment. A front panel touch screen allows easy muting and level adjustment of the frequency bands and full adjustment of the digital delay lines and other parameters on board. Control can also be done remotely via Ethernet or Wi Fi.

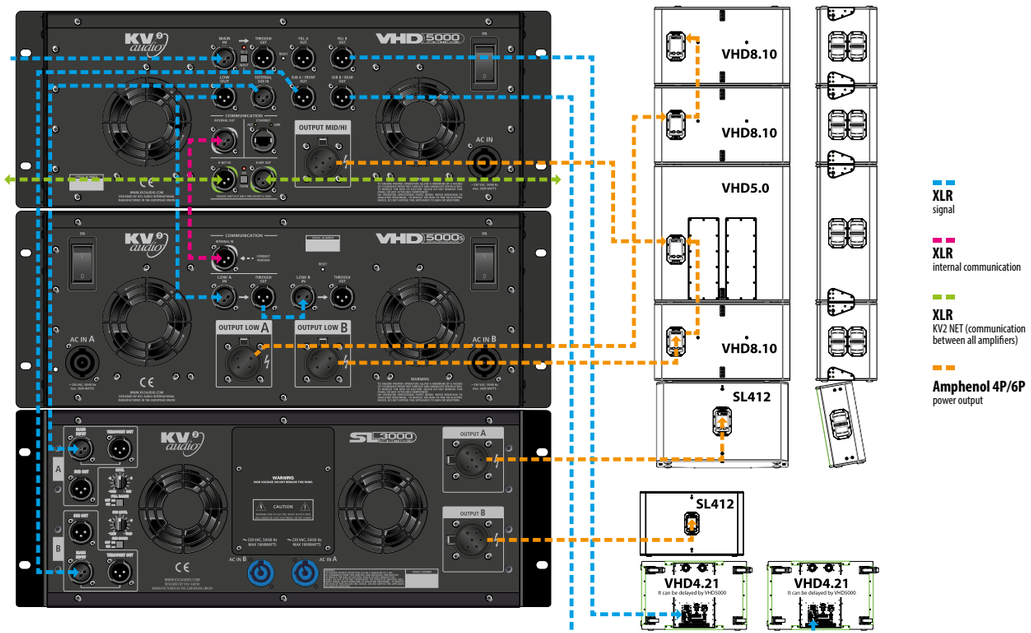
The VHD5000 is fully networkable allowing viewing and adjustment of all amplifiers and slaves from the one remote location. Onboard two 96kHz PCM delays are available to adjust the position of the subs or for creating cardoid sub patterns while two Very High Definition 20MHz PDM delays allow movement of the main system without the loss of resolution experienced when using much lower sampling rates.

A harmonics restoration circuit is also built in and fully controllable from the touch screen. This adds back in harmonics lost through a digital sampling process earlier in the audio chain, such as losses caused by the internal processing of digital mixers. Full diagnostics show a number of parameters including impendance sensing, providing information in respect of any potential problems with the system's components.

VHD5.0 Logistics

VHD5.0 system is easily transportable using dedicated wheel carts and protected with heavy duty padded cover.

Wiring schematic



Technical Specifications

System Acoustic Performance (VHD5.0 & VHD8.10)

Max SPL Long-term	147dB
Max SPL Peak	150dB
-3dB Response	45Hz - 20kHz
-10dB Response	45Hz - 22kHz
Full Range mode -3dB Response	50Hz - 20kHz
Crossover Point	70Hz, 400Hz, 2.0kHz

High Frequency Section

Acoustic Design	Horn Loaded
High Horn Coverage Horizontal / Vertical	80° x 30°
High Frequency Amplifier Requirement	VHD5000
Throat Exit Diameter / Diaphragm Size	3x 1.4" / 3.0"
Diaphragm Material	Nitride Titanium
Magnet Type	Neodymium

Mid Range Section

Acoustic Design	Horn Loaded
High Horn Coverage Horizontal / Vertical	80° x 30°
High Frequency Amplifier Requirement	VHD5000
Throat Exit Diameter / Diaphragm Size	6x 8" / 3.0" / Trans Coil
Diaphragm Material	Epoxy Reinforced Cellulose
Magnet Type	Neodymium

Mid-Bass Section

Acoustic Design	Front Loaded
Mid-bass Amplifier Requirement	VHD5000 + VHD5000S
Woofer Size	32x10"
Diaphragm Material	Epoxy Reinforced Cellulose
Magnet Type	Neodymium/Ferrite

Ultra Low Frequency Section (VHD4.21)

Max SPL Long-term	147dB
Max SPL Peak	150dB
-3dB Response	34Hz - 180Hz
-10dB Response	28Hz - 240Hz
Crossover Point	70Hz
Acoustic Design	Bandpass with low port losses
Subwoofer Amplifier Requirement	Active system
Woofer Size	4x 21" / 5.3"
Diaphragm Material	Epoxy Reinforced Cellulose
Magnet Type	Neodymium Advanced Ventilated

Notes

Constant Power
Point Source
Array

VHD5.0

Watch our product videos on YouTube.
www.youtube.com/c/KV2Audiocom