

# VHD

## 5.0

CONSTANT POWER  
POINT SOURCE ARRAY

Constant Power  
Point Source Array

A Bold New Advancement  
in Concert Sound



**KV**<sup>2</sup>  
*audio*<sup>TM</sup>

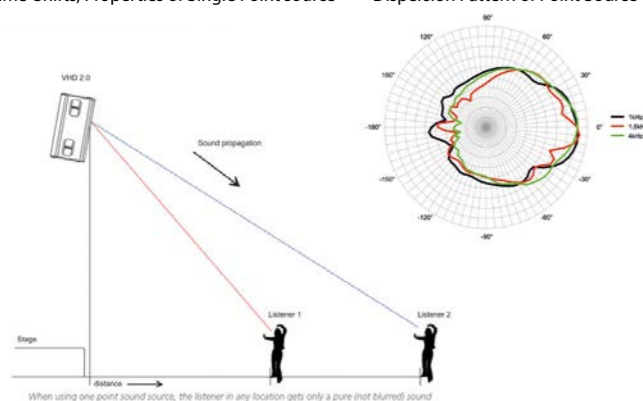
## Step Beyond the Limitations of Line Array A Bold New Advancement in Concert Sound Reinforcement

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. Up until now, our VHD2.0 Large Format Point Source System had been the company's flagship, with the capability of covering crowds in excess of 10,000 people with just one or two enclosures per side. The challenge for KV2 in building even larger point source systems 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, while maintaining the key benefits of point source technology, being minimal destructive interference in the higher frequency range and accurate impulse response.

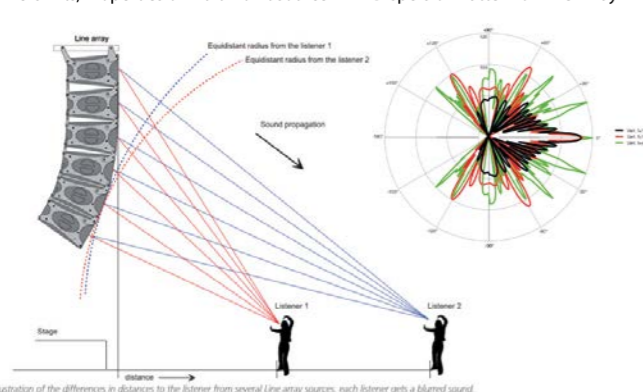
Chief Engineer George Krampera and his highly skilled team have overcome those challenges admirably with the development of KV2 Audio's new **VHD5.0 Constant Power Point Source Array**. Utilising highly advanced point source speaker design, extremely efficient power management amplifier technology and totally unique hybrid signal processing, they have created the first major advancement in large concert sound reinforcement since the development of the Line Array.

The development of the Line Array was an improvement over the composite box type systems of the eighties. Having all components in a single axis array solved certain issues in respect to the comb filtering problems in the horizontal plane but did not overcome the destructive interference occurring vertically and the loss of high frequencies through air disturbance caused by wind and audience heat. 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 rates and the simple principles of physics, which cannot be ignored.

Time-Shifts, Properties of Single Point source Dispersion Pattern of Point Source



Time-Shifts, Properties of Multi Point source Dispersion Pattern of Line Array



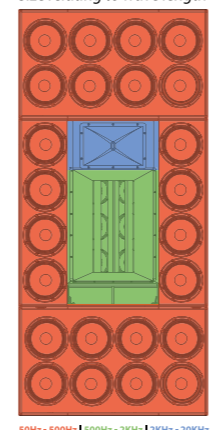
At KV2 we believe that definition equals distance and the higher the quality reproduction of the source, the better the intelligibility over distance. The theory that line arrays have less losses over distance than point source are somewhat irrelevant if the sound is not intelligible at the back of the venue. To achieve the high definition needed to

cover long distances, we have focused on developing unique hybrid processing which takes the best technologies in both analogue and digital advancing speaker design to a whole new level. For instance, the time alignment of components in our systems, a crucial aspect of achieving optimum sound quality with any speaker design, is done at 20MHz using a proprietary PDM (Pulse Density Modulation) digital process developed by KV2's engineers.

We have created efficiencies never before achieved in amplifier technology to deliver not just high headroom transient peaks, but sustainable high voltage output over time resulting in far better control and definition of bass frequencies.

**The VHD5.0 Constant Power Point Source Array** is designed so 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 sound remains the same in every seat in the house.**

Size relating to wave length



Obviously 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 limiting, it would be almost impossible to move around or transport. With VHD5.0 Constant Power Point Source Array, KV2 has focused on creating a modular system that has as little destructive interference as possible when utilising multiple components in a number of cabinets. High frequencies are carefully separated while the mid-range horns are coupled providing maximum output and coverage. VHD 8.10 Low Mid Expansion Boxes are arrayed around the mid high enclosure providing the extra headroom needed to deliver the low mids and keep the sound balanced. In essence the system is pieced together to represent one very large point source rather than placing multiple narrow dispersion speakers next to each other such as those found in Line Arrays or other Point Source Arrays.

Speaker design is certainly the aesthetic part of sound reproduction; we see and feel the physical attributes of a speaker system however the VHD5000 Amplifier/Controller is really the true engine room of the system. This unit is one of the most advanced pieces of electronic pro audio equipment on the planet. Our engineers have refined amplifier technology down to the finest degree and the results can be easily heard. With full digital control and diagnostics via a touch screen that can be viewed and operated remotely from the FOH position this amplifier is simply like no other. Due to the principles of point source and the fact that we actually use far less components to provide superior output and coverage amplifier and power requirements are also drastically reduced. This provides a win - win situation for everyone, especially in this age of sustainable ecofriendly solutions.

In keeping with this environmentally friendly stance, KV2 has developed one of the most efficient amplifiers available to generate the large amounts of power needed to deliver the sub bass frequencies. Running at close to 100% efficiency on any voltage from 160 volts to 270 Volts, the active amplifier for the VHD4.21 Sub Bass Module is an outstanding piece of electronic engineering. Utilising a huge bank of Capacitors this amplifier has the capacity to provide a continual power delivery of 6Kw while achieving peaks in excess of 12Kw.

KV2's new flagship VHD5.0 Constant Power Point Source System is a true feat of engineering. Over three years in development it provides a true advancement in Large Scale Concert Sound Reinforcement. It provides sound quality over large areas with clarity and definition simply not achievable from the digitally processed line arrays that are so commonly used.

*Leave the limitations of Line Arrays behind; your audiences will love you for it!*

# VHD5.0 MID HIGH MODULE

The VHD5.0 is a three-way enclosure handling low mids, mids and highs over a frequency range from 50Hz through to 20KHz. It incorporates eight front-loaded ten inch low mid drivers, six horn loaded eight inch mid range drivers and two beryllium compression drivers on a custom designed dual horn with summing waveguide. The VHD 5.0 covers the frequency range from 50Hz to 20KHz but is usually crossed over at 70Hz to the VHD4.21 Sub Bass Modules.

Both the VHD5.0 and VHD8.10 cabinets incorporate very simple to use fly ware that links cabinets together quickly and easily. A complete system (4 VHD5.0s and 8 VHD8.10s) can be flown by two people in less than hour, which provides a massive saving in both time labour, compared to large format concert line arrays.





## VHD8.10 LOW MID EXPANSION MODULE

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. This is one thing line arrays do well. Secondly 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 range needed to cover very large audiences KV2 developed the VHD8.10 Low Mid Expansion Box. This enclosure carries a further eight front-loaded ten inch speakers and two of these are added to each VHD5.0. This provides when arrayed with the VHD5.0 a total of twenty-four 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 and specified horn-loaded enclosures, one Active and one Passive, with each enclosure containing two specific custom designed 21" woofers. The Low Q design has been applied to attain the optimum speaker loading, enabling a high sensitivity of 109dB 1w/1m.

The unique and innovative new power management system design enables the Active Power Amplifier to deliver peak output levels of 13kW, whilst operating at modest constant consumption of 3.5kW from a 15A circuit.

An impressive maximum 320V supplied (limited) peak to peak at 100A from the VHD4.21 Active Module represents a bullet-proof technology that has been consistently improved and developed over 12 years of active operation in real life applications and provides maximum control over movement of the large mass of the speaker.



## VHD 5000 AMPLIFIER CONTROLLER - HYBRID PROCESSING

The heart of the VHD5.0 Constant Power Point Source System is the VHD5000 amplifier controller. Containing a 400-watt Class A/B amplifier for the highs, 1.2Kw Class H amplifier for the mids and a 2.5Kw Class G amplifier for the low mids. Full protection is integrated into the electronics as is all required filtering and time alignment of all components. The VHD 5000 incorporates state of the art hybrid processing via discrete analog circuitry and our proprietary 20MHz PDM digital delay lines for all required filtering and time alignment. Four delay lines are available on board for moving either the subs or main system in time and creating cardioid sub patterns.

The VHD5000 has full digital control via a front panel touch screen but also remotely via Ethernet or Wi Fi. This means the FOH Engineer can quickly and easily make slight adjustments to the overall system on the fly while also viewing all of the amplifiers working parameters. All VHD5000s are full networkable allowing viewing and adjustment of all amplifiers from the one remote location.

The control screen allows easy muting and level adjustment of the various frequency bands and full adjustment of the digital delay lines on board. There are two 96Khz PCM delays for making adjustments to the position of the subs and creating cardioid sub patterns. Two 20 MHz PDM delays, currently only available through KV2, allow movement of the main system without the loss of resolution in the sound 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 harmonics lost through the normal PCM digital sampling process such as that found in digital mixers. Full diagnostics show a number of parameters including impedance sensing, providing information in respect to any potential problems with the system's components.

The VHD5000 Amplifier/Controller is a true feat of electronic engineering and provides in a four-unit rack space incredibly powerful processing along with state of the art amplification.

## Preliminary System Specifications

### System Acoustic Performance

Max SPL Long-term	146dB
Max SPL Peak	149dB
-3dB Response	50Hz to 20kHz
-10dB Response	45Hz to 22kHz
Full Range mode -3dB Response	50Hz to 20kHz
Crossover Point	70Hz, 450Hz, 2.2kHz

### 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	2x 1.4" / 4.0"
Diaphragm Material	Beryllium
Magnet Type	Neodymium

### Mid Range Section

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

### Mid-Bass Section

Acoustic Design	Front Loaded
Mid-bass Amplifier Requirement	VHD5000 + ESP2000
Woofer Size	24x10"
Diaphragm Material	Epoxy Reinforced Cellulose
Magnet Type	Neodymium

### VHD4.21 - Ultra Low Frequency Section

Max SPL Long-term	146dB
Max SPL Peak	149dB
-3dB Response	34Hz to 180Hz
-10dB Response	28Hz to 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 with Carbon Fiber and Double Surround
Magnet Type	Neodymium Advanced Ventilated

The future of sound.  
Made perfectly clear.



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