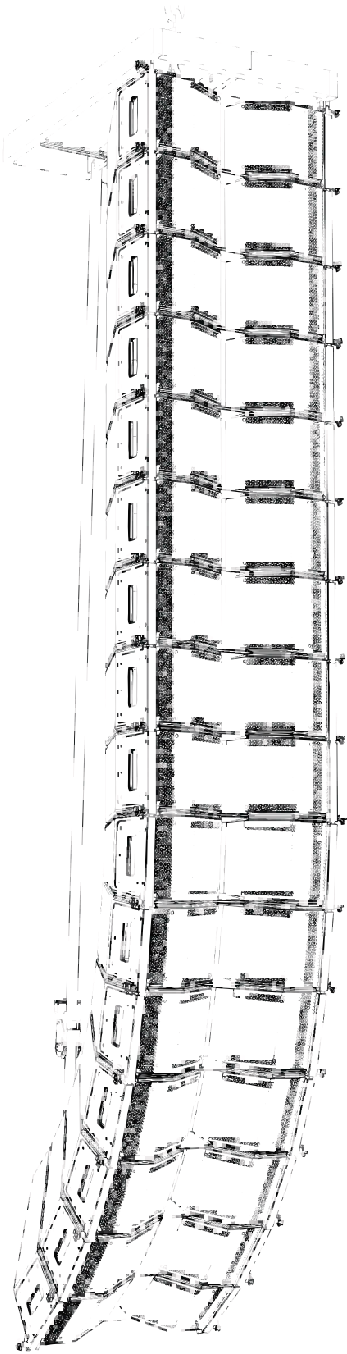




COHEDRA

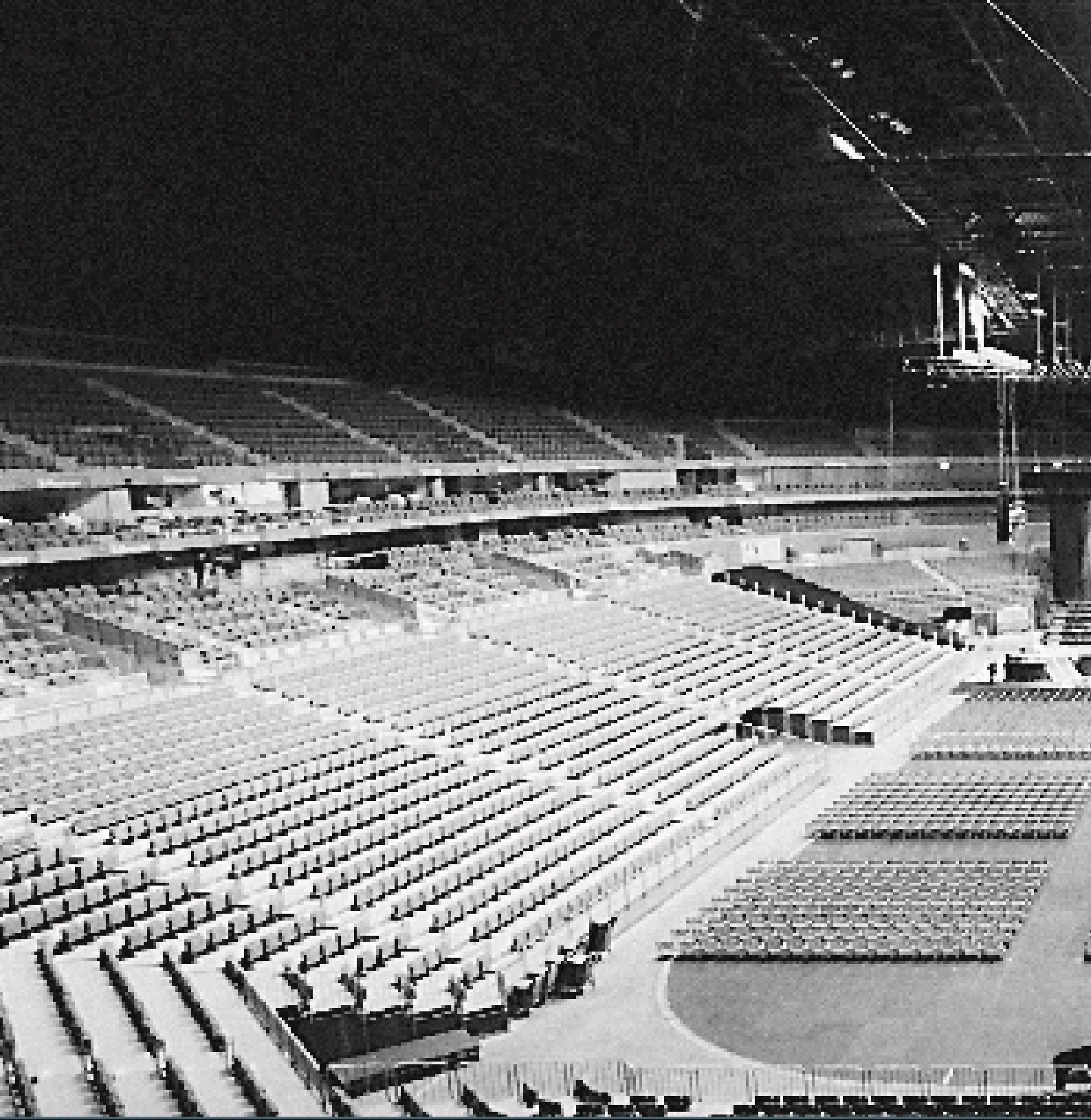
COHEDRA™



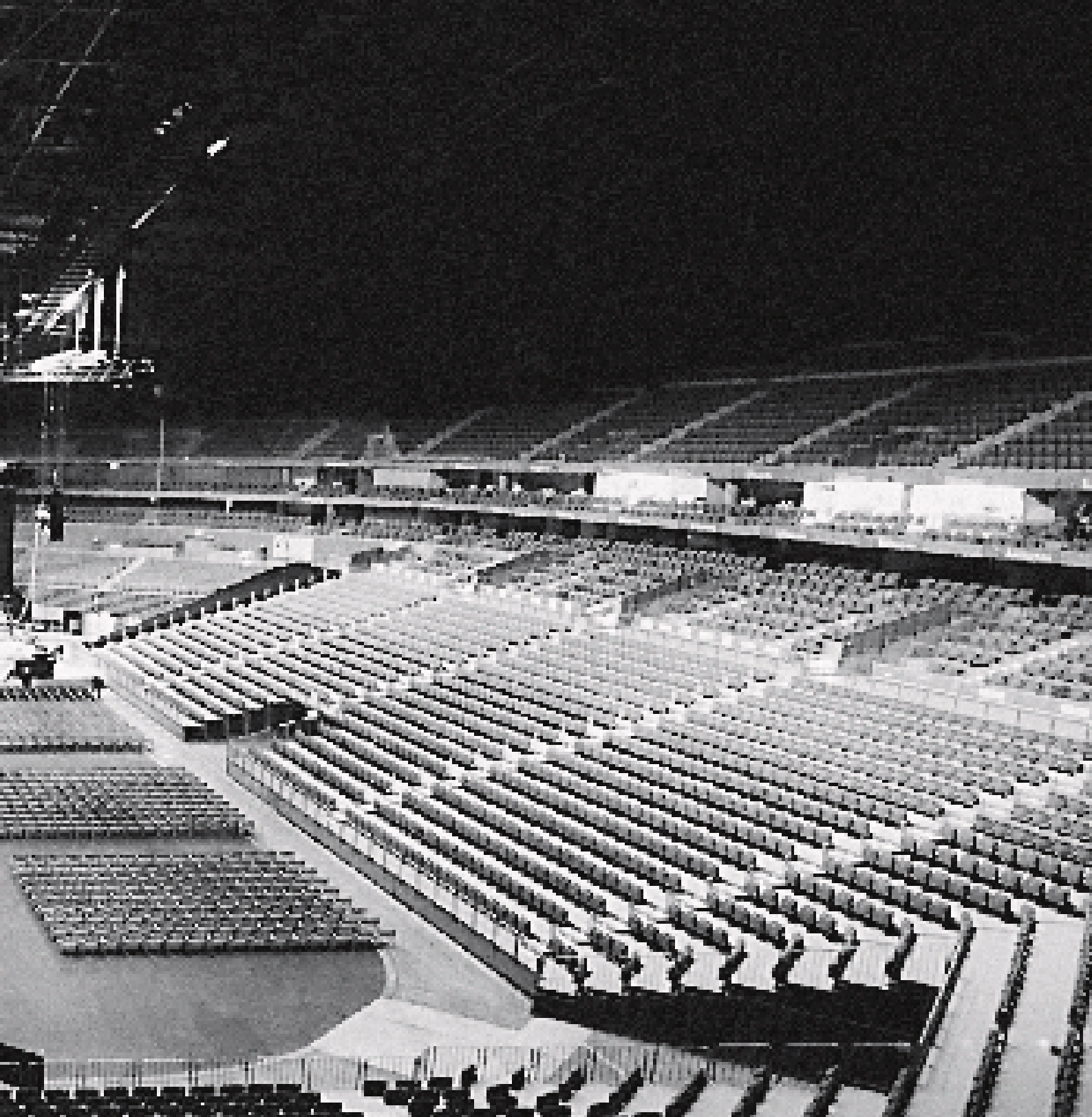
COHEDRA™ –

Coherent Dynamic Response Array™.

COHEDRA™ builds on the best of previous designs and catapults line array technology into a new dimension. Strikingly natural dynamic response over a greater distance, less wind sensitivity and trouble-free handling were at the heart of this new system's design goals. A system that sets the standard with its overall performance.



PHILOSOPHY.



**From Experience to Insight –
From Insight to Innovation.**

Over the past few years, line arrays have sparked a real revolution in the market for sound reinforcement systems. Thanks to the extended distances they can cover accurately while avoiding sonic disturbance from unwanted reflections, they represent a quantum leap in sound reinforcement technology. The first large line arrays were soon followed by more compact systems, allowing the benefits of line array technology to be brought to smaller events also.

Before creating our own line array, we analysed the sound and technologies used in standard line arrays, and engaged users in discussions about the results of our investigations. From these efforts there emerged a clear, new vision of a compact line array for large venues that is fully in line with our philosophy of providing natural-sounding reproduction of audio events. Its name is COHEDRA™.



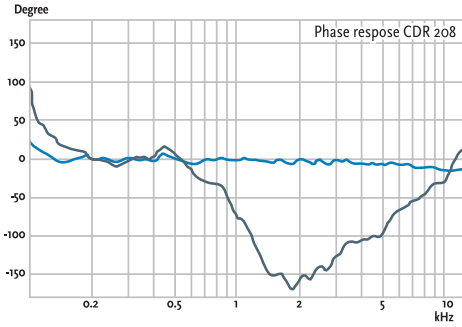
TECHNOLOGY.



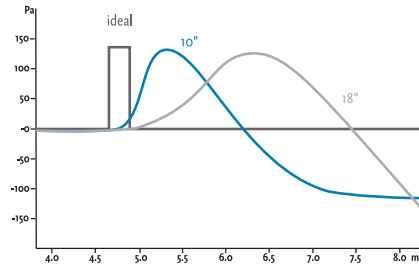
Natural response

Extended coverage

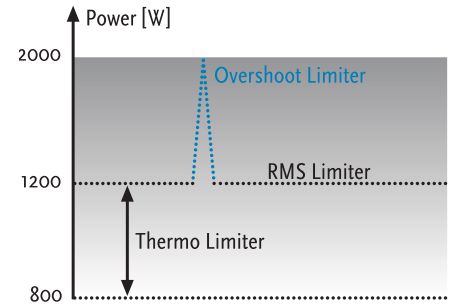
NATURAL RESPONSE



Black: without FIR filtering Blue: with DFC-FIR filtering



Impulse response of bass speakers



Overshoot Limiter

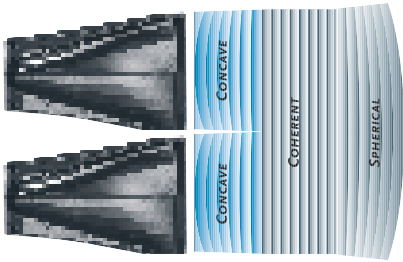
Natural sound response was one of the major design goals of COHEDRA™. This required detailed research into three parameters: phase response, impulse response and limiting.

Non linear phase response is one of the measurable parameters in audio systems that distort natural response, and it does so to a far greater extent than does non linear frequency response. The FIR filter technology of the HK AUDIO® Digital Field Controllers (DFC) that is used with COHEDRA™ provides comprehensive phase correction to the last detail. As a result, all frequencies reach the listener at the same time and at the correct level.

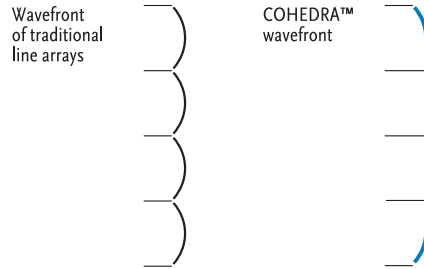
Loudspeakers and natural sound generators (e.g. instruments, voice) differ from one another in the way in which they couple with the transmission medium air. If, for instance, different drivers in an audio system have different masses to be set in motion, consider how each will respond to the initial attack of the signal; the discrepancies in mass will result in each driver reaching maximum amplitude at a different point in time. The selection of 8" and 10" loudspeakers for COHEDRA™ with their more closely matched mass coefficients reduces the possibility of this kind of "dynamic" distortion.

Systems using conventional analogue or digital controllers are not capable of recreating the entire dynamic range of natural sound sources such as short percussive tones or, even more so, the human voice. The unique overshoot limiter of the DFC will not corrupt the transient attack, so dynamic response is allowed to remain very close to the original. If, however, you specifically intend to create a compressed sound for effect, this can always be accomplished with the aid of a traditional external compressor. The DFC controller will ensure that the COHEDRA™ system will sound very natural even when it is taken to the limit.

EXTENDED COVERAGE

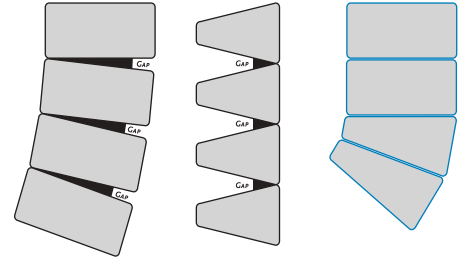


COHEDRA™ sound wave coupling



Conventional systems with side lobes

COHEDRA™



Straight units with frontal gaps

Slanted units without curvature

COHEDRA™ solution

COHEDRA™ stands out from prior line array systems by the innovative manner in which it shapes the wavefront.

As sound waves propagate through the air, they lose energy. As a coherent wave leaves the mouth of the wave transformer, it is diffracted outward at the upper edge and lower edge of the wave transformer as it strikes non-moving air molecules. The directivity then assumes the shape of a spherical wave. This distribution of energy over a greater volume of space results in a reduction of level over distance, i.e. it limits the effective reach of the system.

The COHEDRA™ AcousticLens forms a concave wave which becomes a cylindrical wave upon exiting the transformer due to the aforementioned diffraction. In the COHEDRA™ system the coherent wavefront common to line arrays occurs only upon coupling with the adjacent mid/high speaker units. The smooth wavefront extends the nearfield deeper into the audience, as the available sound pressure remains focused longer and therefore reaches farther.

Optimum sound distribution in the audience areas requires that the flown line array system be curved. When curved, gaps would occur between straight cabinets, causing side lobes and distortions. The same thing happens when trapezoidal cabinets are required to hang in a straight line. Therefore, the only sensible solution to eliminate the problem of gaps in the curve is to employ a combination of straight (CDR 208 S) and trapezoidal units (CDR 208 T). This makes optimum curvature possible without the risk of side lobes.



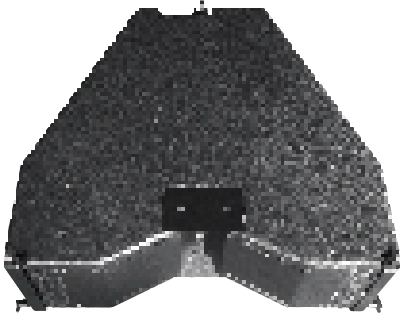
TECHNOLOGY.



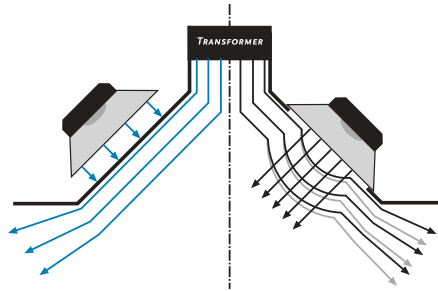
Reduced wind sensitivity

Trouble-free handling

REDUCED WIND SENSITIVITY

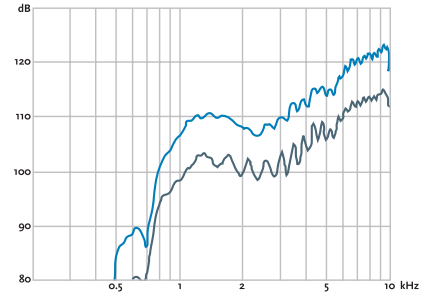


COHEDRA™ CDR 208 T



COHEDRA™

Andere



Blue: with acoustic fleece
Grey: without fleece

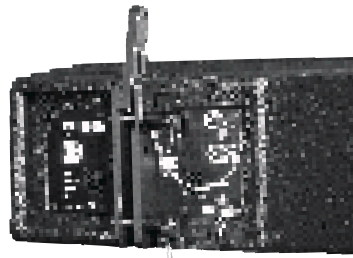
Compared to conventional sound reinforcement systems, line array systems have until now been very susceptible to wind in the high-frequency range. Combating this acoustic disturbance was one of the design goals during the development of COHEDRA™.

A true Constant Directivity horn in front of the AcousticLens of COHEDRA™ not only provides a tight coverage pattern, it also ensures a more precise coupling of high frequencies with the air. This precise guiding of the high frequency waves reduces dramatically the wind sensitivity typically associated with line array systems.

When the high-frequency waves emanating from the HF driver meet up with the high energy coming from the midrange speakers, this can negatively affect the high-frequency sound waves (Doppler effects). The 8" mid-range speakers of COHEDRA™ are located on either side of the HF horn, housed in compression chambers that vent above and below the surface of the CD horn. In fact, the CD horn almost entirely masks the membranes of these speakers. This arrangement prevents undesirable interaction between midrange and high-frequency waves from occurring, thus allowing the frequencies projected from the HF horn to remain stable and less susceptible to wind interference.

In the transition from the AcousticLens to the CD horn there occurs a rather abrupt change in acoustic impedance. A special acoustic fleece is used at this point to ensure that the speed change is adapted to the greater sound field air more smoothly. Without this fleece, strong high-range reflections would occur at the throat of the horn, causing irregular amplitude development within the frequency range of 1000–5000 Hz, the range at which human hearing is most sensitive. As a result, the reduced turbulence and the more stable transition of sound energy into the horn further help to reduce wind sensitivity.

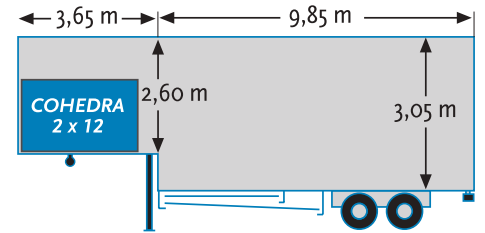
TROUBLE-FREE HANDLING



COHEDRA™ Rigging Hardware

The extremely compact dimensions and the stage-hand-friendly weight of only 30 kg per mid/high unit make it possible for COHEDRA™ to be handled by only two persons. Set-up can easily be accomplished inside a minimum area, namely the system's own "footprint."

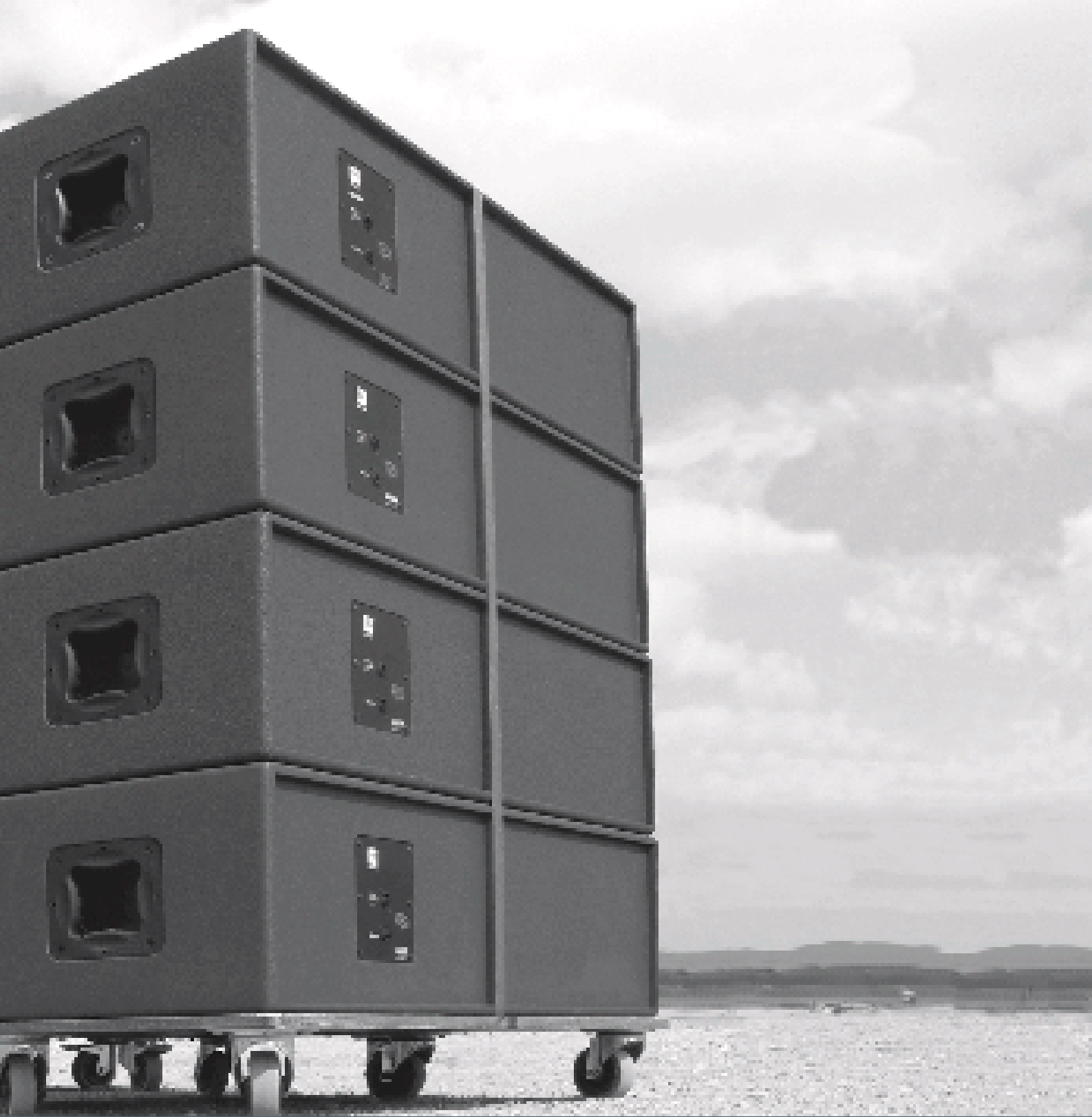
COHEDRA™ rigging hardware has been designed to keep set-up times to a minimum. A 2 x 12 array consisting of twelve mid/high units and twelve subs per side is routinely ready for action in under an hour. Adjusting the curvature of a line array that is already flying is an easy "in-flight" manoeuvre.



The COHEDRA™ transport system combines fast handling and maximum protection. Four CDR 208 mid/high units or two CDR 210 F flying subs are stored in a case with an acrylic viewing window for easy identification. Standard CDR 210 bass units on their dollies are easy to roll about, accelerating setup in different acoustic environments. All of the transport cases conform to Eurotruck dimensions, effectively saving space. A complete 2 x 12 COHEDRA™ line array in cases on wheels only takes up the "dancefloor" of a trailer.

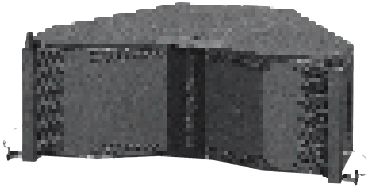


COMPONENTS.



Loudspeakers & Accessories

LOUDSPEAKERS



CDR 208 S/T

2x 8"/1.4" line-array mid/high unit with 80° horizontal coverage pattern. Natural dynamic response and extended throw thanks to patent-applied-for COHEDRA™ AcousticLens, CD-horn design, and compression chambers for the midrange drivers. Fully integrated rigging hardware with quick-release pins. Two versions of cabinet housings CDR 208 S and T are offered so that curvature can be optimised and sidelobes minimised. Integrated 800 Hz passive crossover.



CDR 210 Sub

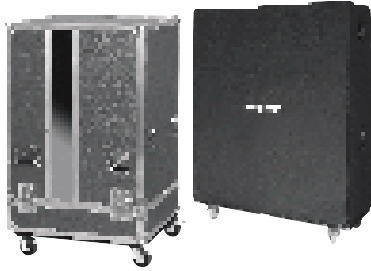
Direct-radiating 2x 10" subwoofer with outstanding impulse response for generating powerful, articulate and natural bass. Courtesy of its compact design, the CDR 210 Sub offers tremendous flexibility in arraying subwoofers in either left-right clusters, quad blocks or sub arrays. The loudspeaker cones are treated with a special coating that protects them from dirt and moisture. Protective covers large enough for four CDR 210 units are available as an option.



CDR 210 F

Direct radiating 2x 10" subwoofer for flown configurations. Based on the acoustic engineering of the CDR 210 Sub, this subwoofer features the same shape as the CDR 208 S/T mid/high units and can be flown using the same rigging hardware. The trapezoidal cabinet housing (top and bottom slanted at angles of 2.25° each) allows for a curvature of a flown sub-array with up to twenty CDR 210 F units. CDR 210 F subwoofers can be attached to the rigging frame on top of the mid/high units or form separate bass arrays. In addition, they serve as a base for COHEDRA™ mid/high units with a COHEDRA™ ground stacking frame.

ACCESSORIES

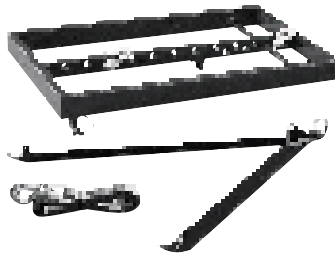


Mid/High Case

A specially designed case serves to transport four CDR 208 S/T mid/high units or two CDR 210 F subwoofers. The bottom panel of the case can be adjusted to an angle of 0° or 9°. This enables you to combine the S and T model units as required. An acrylic viewing window is included for easy identification of the contents. Equipment management using barcodes and scanners can be performed without opening the cases.

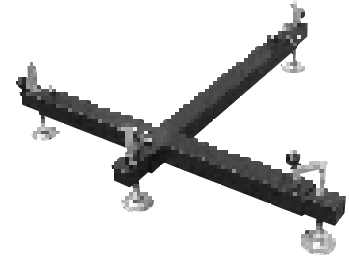
Bass Dolly

The bass dolly conveniently holds four CDR 210 subwoofers, stacked and secured with the included lashing strap. Since the quad blocks roll easily, the overall bass can be adjusted acoustically at the base of stage quickly, and then easily locked in place.



Rigging Hardware

The COHEDRA™ rigging gear, which is safety certified by German TÜV and according to the BGV C1 safety standard, consists of upper and lower frames designed to fly up to twenty-four CDR 208 S/T mid/high units and/or CDR 210 F (flying bass units). The upper frame provides a total of 10 pick points for attaching motors and determining the angle of the entire array. The upper and lower frames are connected by means of lashing straps, chain hoists or motors, allowing you to adjust the array to achieve the exact curvature required. In order to prevent the system from rotating (e.g. under the influence of strong winds), the bottom frame features eyelets for anchoring the system to the ground or to truss towers. A special heavy-duty rigging frame for configurations of over 24 units is available upon request. A flightcase that fits a complete Rigging Hardware Set (two upper and two lower frames, etc.) is available in Eurotruck-compatible dimensions.



Ground Stacking Frame

The COHEDRA™ ground stacking frame serves as a base for stacked mid/high arrays or fullrange stacks consisting of CDR 210 F subwoofers and CDR 208 S/T mid/high units. It is equipped with four extendible, height adjustable feet. This lets you adjust the stack to suit the underlying surface. In addition, the feet are infinitely variable, allowing you to tilt the entire stack forward or back to align the system to the audience.

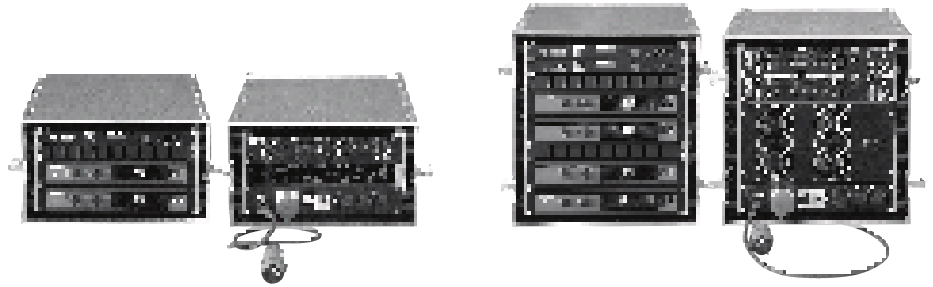


COMPONENTS.



Power & Control

POWER-RACKS



The COHEDRA™ Engine

The PR 8 and PR 16 Power Racks with their interior shock-mounting and Eurotruck-compatible dimensions are built for heavy-duty road use.

The VX 2400 power amplifiers together with the Digital Field Controllers, dedicated filter sets and the PB 5 Patchbays form an inseparable whole—the standardised engine that drives the entire COHEDRA™ system. This high-level integration and standardisation guarantees COHEDRA™ users worldwide the best possible sound quality and absolute compatibility within the COHEDRA™ User Network.

COHEDRA™ PR 8

Power-Rack for 8 COHEDRA™ cabinets:

- CDR 208 and/or CDR 210 (F)
- 1 Shock-mount rack, 6U with 100 mm blue wheels
- 1 DFC—Digital Field Controller
- 2 VX 2400 power amps
- 1 PB 5 Patch Bay
- 1 PS 32 Power Supply

COHEDRA™ PR 16

Power-Rack for 16 COHEDRA™ cabinets:

- CDR 208 and/or CDR 210 (F)
- 1 Shock-mount rack, 12U with 100 mm blue wheels
- 2 DFC—Digital Field Controllers
- 4 VX 2400 power amps
- 2 PB 5 Patch Bay
- 1 PS 32 Power Supply
- 1 FU 4 Fan Unit

CONTROLLING & POWER



DFC

With the help of the Digital Field Controller, COHEDRA™ can be operated virtually as an active three-way sound reinforcement system. The DFC splits the full-range input signal into three frequency bands—low, mid and high. Filter sets with parameters for capturing frequency and phase correction data as well as limiter settings are stored for each individual band. After processing, the DFC blends the middle and high frequency bands to create a composite output signal for the mid/high units. Armed with this output and the bass output, the DFC delivers the signals needed to drive the system in bi-amp mode. With its specialized software and matching PC interface, this comprehensive controller enables the operator to manage a complex sound reinforcement system by means of an intuitive interface.



VX 2400

In addition to its impressive test-bench specs, the VX 2400 high-performance power amplifier offers superb sonic qualities like natural highs and articulate bass with a lightning-fast transient attack. The total output level of the amp amounts to an astonishing 4000 watts with a crest factor of 18 dB. These abundant power reserves (i.e. headroom), in concert with the natural-sounding DFC overshoot limiters and the speakers themselves, make it possible to reproduce sonic events with truly dynamic authenticity.



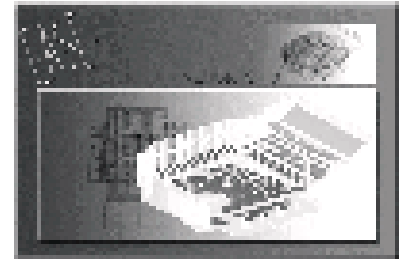
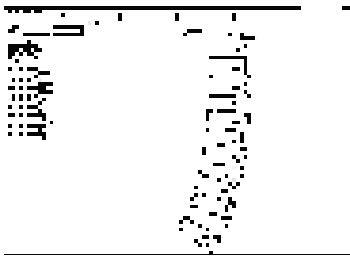
PB 5

Re-configuring without the hassles of re-cabling. The PB 5 is the interface that connects all the COHEDRA™ components together. It provides connections for analogue and digital signal inputs as well as four speaker outputs that can connect to four single NL 4 Speakon connectors or to NL 8 multi-outs. The mid/high signal or subwoofer signal can be assigned to any individual power-amp channel (cabinet pair) by means of selector switches. This flexibility allows you to set up any number of different rack configurations quickly and easily. At the loudspeakers, the signal is routed with special splitters.



***SOFTWARE &
APPLICATIONS.***

CAPS – COHEDRA™ Acoustic Prediction Software



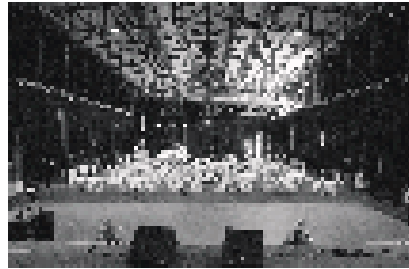
The CAPS software enables two-dimensional simulation of the projection behaviour of COHEDRA™ mid/high arrays in a specific venue. It allows rapid virtual construction of venues in side view featuring up to three audience areas.

The Rigging menu captures data parameters for weight, centre of gravity and overall height of an array configuration. It also calculates the angles between the individual CDR 208 mid/high units. You can simulate up to thirty-two CDR 208 cabinets.

Creative work with CAPS software is carried out in the Setup menu. The curvature angles and the resulting sound projection data are computed and displayed. The software calculates delay times and sound pressure for different audience positions. This allows for reliable prediction of obtainable SPL values (Peak/Continuous/A-weighted) as well as precise analysis in 1/3-octave steps and two-dimensional mapping with practical optimising functions for SPL and cabinet configuration.

If you need a more detailed simulation, you can use the venue calculation software EASE (version 4.0 or higher) from Software Design Ahnert GmbH with the special EASE-DLL for COHEDRA™. This package allows you to perform calculations for complex COHEDRA™ or install sound projects in three dimensions.

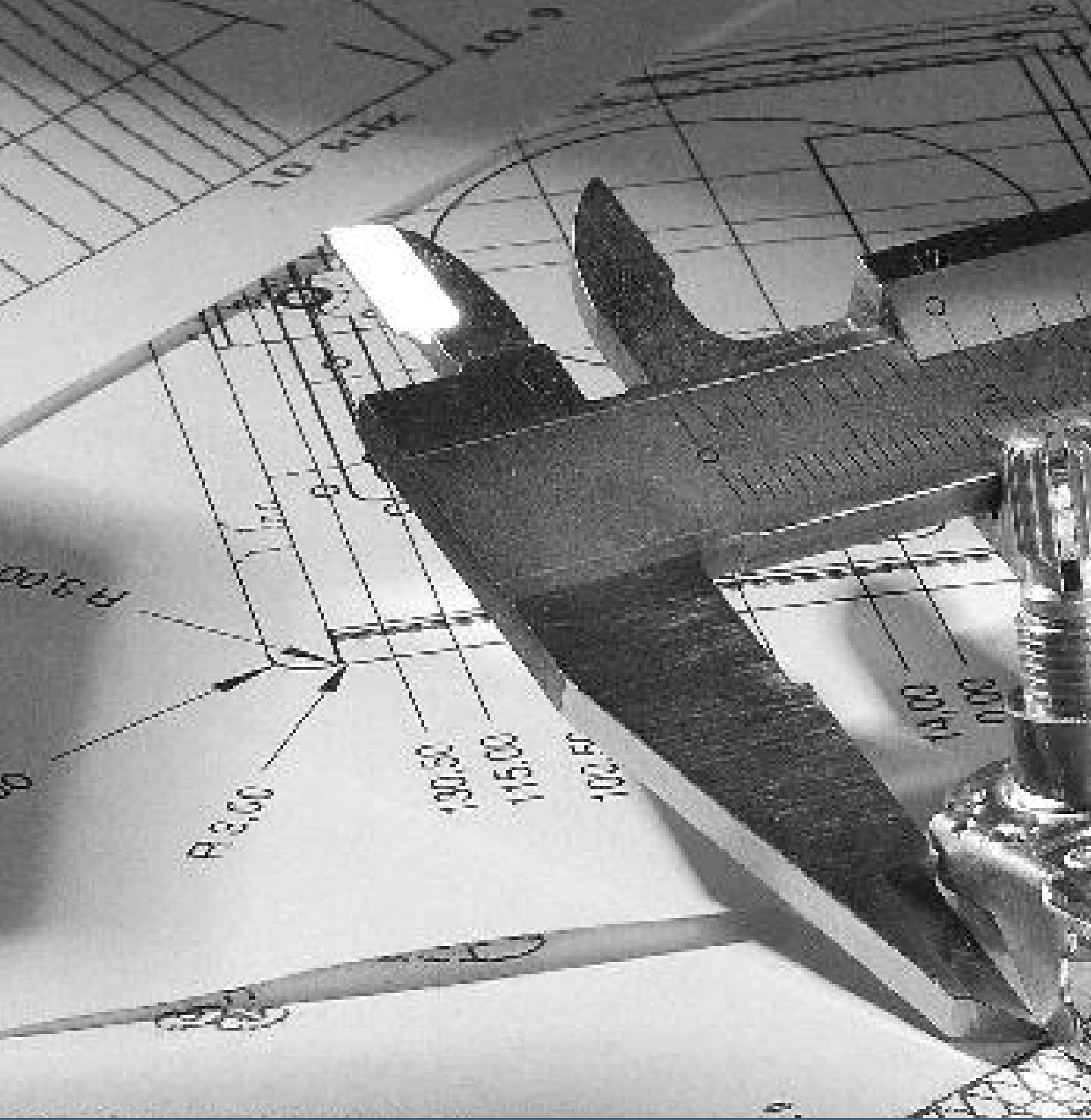
APPLICATIONS



COHEDRA™ excels not just sonically, but also in its flexibility and scalability. Four CDR 208 units form the smallest acoustic building block of the line array. For smaller events with elevated acoustic demands this core block can replace an entire conventional sound reinforcement system, but with greater precision and natural response.

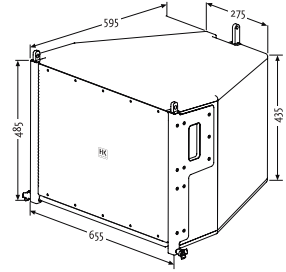
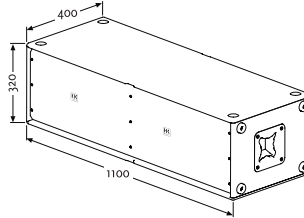
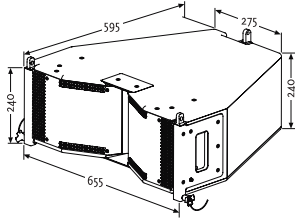
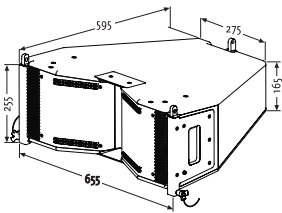
It is often underestimated just how valuable line arrays are in venues with bad acoustics (e.g. excessive reverberation times). Corporate events and other situations place a premium on speech intelligibility, and here is where a COHEDRA™ line array shines. If long enough, this system with its tightly controlled coverage pattern and the extended reach of its nearfield will prevent serious ceiling reflections and the acoustic disturbances they cause, and will project the sound farther towards the back of the venue with audibly minimised losses in SPL. The result is an even spread of volume and substantially increased intelligibility.

The audience at open air rock and pop concerts expects a high-quality and high-volume musical experience at every seat in the stadium. This is another case in which COHEDRA™ is rather impressive for its extraordinary ability to project a considerable distance. Front row sound pressure is bearable and even the last person in the audience can enjoy the full musical experience.



***SPECIFICATIONS &
TRAINING.***

SPECIFICATIONS



Technical Data

CDR 208 S/T

CDR 210 Sub

CDR 210 F Sub

Nominal power:	500 W RMS, 1000 W prog.	600 W RMS, 1200 W prog.	600 W RMS, 1200 W prog.
Frequency range +/- 3dB:	88 Hz – 16 kHz	47 Hz – fx104 dB	47 Hz – fx
SPL 1W @ 1m*:	108 dB	104 dB	104 dB
max. SPL @ 1m*:	139 dB @ 10% THD ***	139 dB @ 10% THD**	139 dB @ 10% THD**
Nominal impedance:	8 ohms	8 ohms	8 ohms
Speakers:	2 x 8" Neodymium	2 x 10" bass reflex	2 x 10" bass reflex
High-frequency driver:	1,4" Neodymium	-	-
Horn:	80° CD horn	-	-
Crossover frequency:	800 Hz, 12db/octave	Controlled by DFC filter set	Controlled by DFC filter set
Connections:	2 x Speakon NL 4	2 x Speakon NL 4	2 x Speakon NL 4
Cabinet construction:	15/19 mm (3/4") 13-ply birch plywood	19 mm (3/4") 13-ply birch plywood	15/19 mm (3/4") 13-ply birch plywood
Cabinet finish:	Acrylic enamel, black	Acrylic enamel, black	Acrylic enamel, black
Protective grille:	Heavy-duty metal grille	Metal grille	Metal grille
Rigging hardware:	Fully integrated rigging hardware	-	Fully integrated rigging hardware
Weight:	30 kg (66 lbs)	32 kg (70,4 lbs)	41 kg (88 lbs)
Dimensions (WxHxD):	65 x 25,5 x 60 cm (CDR 208T) 65 x 24 x 60 cm (CDR 208S) 25-5/8" x 10-1/16" x 23-5/8"	110 x 32 x 40 cm 43-1/8" x 12-1/4" x 15-5/16"	65,5 x 48,2 x 59,4 cm 25-3/4" x 19" x 23-3/8"

*Half space

*** gemessen mit 4 x CDR 208 S

**measured with 4 x CDR 210 Sub

**measured with 4 x CDR 210 F Sub

Technical Data

VX 2400

Class:	H
Continuous power @ 8 ohms:	750 W x 2
Continuous power @ 4 ohms:	1200 W x 2
Continuous power bridged:	2400 W @ 8 ohms
Peak power @ 8 ohms:	1200 W x 2
Peak power @ 4 ohms:	2150 W x 2
Peak power bridged:	4.350 W @ 8 ohms
Frequency response (+/- 1dB):	20 - 20.000 Hz
Signal-to-noise ratio:	-106 dB
THD - 20 Hz - 20 kHz:	< 0.1% @ 4 Ohm
Input impedance, bal./unbal.:	20.000/10.000 Ohm
Input sensitivity:	1,4 Vrms
Input gain (dB):	39 dB
Stereo / Mono / Bridge:	S/M/B
Protection:	DC, Load, Thermal
Limiter:	Peak
Cooling:	int. fan, front to back
Inputs:	2 x XLR, 2 x 1/4" Jack, (un)balanced
Outputs:	2 x Speakon® NL 4, 2 x Binding Post
Power consumption:	1130 W typ / 1800 W max
2-ohm / 4-ohm mode:	4 Ohm min. load
Dimensions (WxHxD):	48,3 x 8,9 x 43,9 cm 19" x 3-1/2" x 17-3/10"
Weight:	19,8 kg (43,5 lb)

Technical Data

DFC

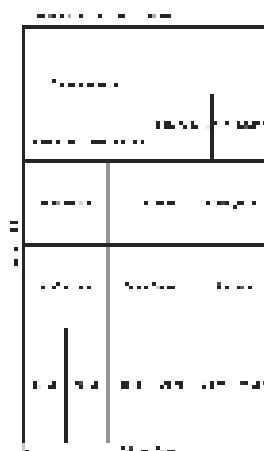
Analog input:	3-pin XLR f
Digital input:	3-pin XLR f
Data format:	AES-EBU
Sampling rate:	44,1 kHz
Input level (nom./max.):	0 dBV / + 24 dBV
Output level (max.):	+ 10 dBV
Output impedance:	47 ohms
Outputs:	LF-Out, 3-pin XLR m MF-Out, 3-pin XLR m HF-Out, 3-pin XLR m
Frequency response:	10 Hz - 20 kHz (±2 dB)
Dynamic range:	-128 dB (unweighted)
Resolution A/D converter:	24 Bit
Resolution D/A converter:	20 Bit
Weight:	3 kg (6.6 lb)
Dimensions (WxHxD):	48,2 x 4,4 x 22,7 cm 19" x 1-3/4" x 9"

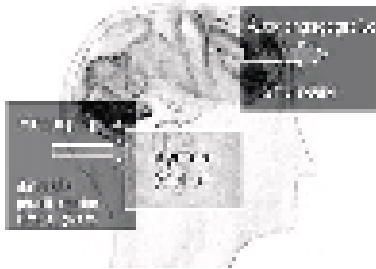
SYSTEM SUGGESTION

COHEDRA™ standard system consisting of:

- 12 x CDR 208 S
- 12 x CDR 208 T
- 24 x CDR 210 Sub
- 2 x PR 16
- 2 x PR 8
- 1 x Rigging Hardware Set

The required loading space (all cases on wheels) is:
240 x 376 cm with a weight of approx. 2,200 kg

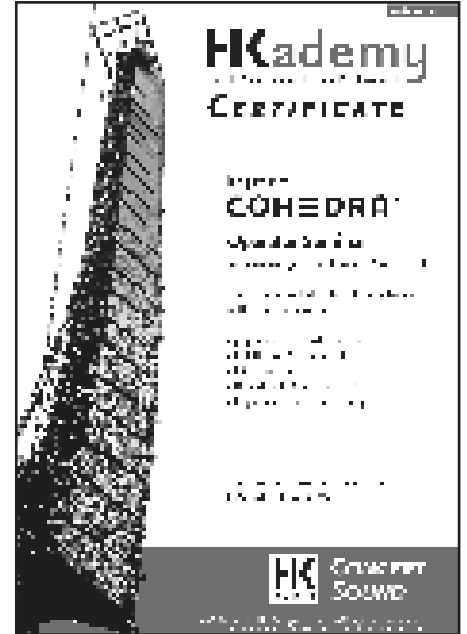




It takes optimum configuration and operation of the line array to achieve nothing less than the COHEDRA™ experience. At HKademy, therefore, sound engineers receive all the intensive training necessary to become highly skilled COHEDRA™ operators. In addition to immersion in the theoretical aspects of the system, attendees are schooled thoroughly in the operation and service of the system, as well as hands-on practical rigging exercises. Since the output of line array systems is very responsive to small changes or to set-up errors, we train COHEDRA™ operators to hear and resolve these errors by means of acoustic exercises.

The three-day seminar includes the following topics:

- Acoustical and Music-Psychological Fundamentals
- Components and their Proper Application
- Performance Calculations with CAPS Software
- Digital Field Controllers in Action
- Rigging according to TÜV and BGV-C1 Safety Specifications





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