V-DOSC®

THE INCREDIBLE INNOVATION OF
WAVEFRONT SCULPTURE TECHNOLOGY®

APPLICATIONS

L-ACOUSTICS® V-DOSC® is the first full frequency line source array based on the principles of Wavefront Sculpture Technology® (WST). At the heart of V-DOSC is the internationally patented DOSC waveguide which permits fulfilment of WST criteria at high frequencies, allowing elements to couple coherently and create a single, continuous, isophasic sound source. As a result, V-DOSC is a full-spectrum coherent system, whereas conventional horn and driver assemblies interfere throughout most of their operating bandwidth. By creating a continuous radiating ribbon, V-DOSC functions as a line source array in comparison with other line arrays that do not satisfy WST criteria at high frequencies.

A turnkey V-DOSC system consists of V-DOSC elements, dedicated rigging, SB218 subwoofers, dV-DOSC fill enclosures, digital signal processors with proprietary OEM factory presets, V-DOSC amplifier racks and associated loudspeaker plus signal distribution cabling. A proprietary return snake system including panels and multicore is also available.

The 90 degree horizontal coverage and coplanar symmetry of V-DOSC provides excellent stereo imaging in left-right configurations while WST flexibility allows the designer to cover virtually any room geometry. Well-defined vertical and horizontal directivity allows accurate performance prediction with easy-to-use software tools and by using calibrated angle values, a V-DOSC array is physically configured as a variable curvature line source array to match vertical directivity to the audience. The end result is predictable coverage, exceptionally even frequency response and SPL along with the elimination of comb filtering, phasing and lobing problems associated with conventional arrays.

The unique attenuation properties of V-DOSC (3 dB reduction in SPL with doubling of distance) are obtained through cylindrical wave generation plus proper focus of the system. Nearfield extension is an associated benefit that helps maintain tonal balance with distance while extending the critical distance in a given venue. This provides improved fidelity and excellent intelligibility even under highly reverberant acoustic conditions.

As a full range 3-way system, V-DOSC can be used in corporate, classical or theatrical productions without subwoofers. For touring applications, the addition of SB218 subwoofers is recommended and V-DOSC is highly suited for sound reinforcement in theatre, arena, stadium or outdoor festival applications.

V-DOSC has revolutionized the loudspeaker industry by providing the sound engineer with an effective and versatile sound reinforcement tool. All elements of the V-DOSC system have been selected for their quality and durability and there is a strong emphasis placed on complementary technical support and training.

L-ACOUSTICS PROFESSIONAL SOUND SYSTEM

- **Active 3-way enclosure (2 x 15" LF, 4 x 7" MF, 2 x 1.4" HF)**
- **WST-based line source design**
- **Perfect coupling, predictable coverage**
- **Excellent for medium and long throw applications**
- **Coplanar symmetry (90° horizontal directivity)**
- **Adjustable vertical directivity (up to 5°)**
- **Designed for high performance touring and fixed installation**
- **Ergonomic, fast, secure rigging system**
- **OEM factory presets for approved digital processors**

SPECIFICATIONS

L-ACOUSTICS specifications are based on measurement procedures which produce unbiased results and allow for realistic performance prediction and simulations. Some of these specifications will appear very conservative when compared with other manufacturer's specifications. All measurements are conducted under free field conditions and scaled to a 1 m reference distance unless otherwise indicated.

Frequency Response

Frequency response	50 - 18k Hz (±3 dB))	(3WX HI preset)
Usable bandwidth	40 - 20k Hz (-10 dB)	

Sensitivity[1]

LF	100 dB SPL	40 - 200 Hz
MF	105 dB SPL	200 - 1.3kHz
HF	108 dB SPL	1.3 - 18 kHz

Power Rating[2] (Long Term)				**Amplification** (Recommended)	**Impedance** (Nominal)
LF	2 x 54 Vrms	2x 375 Wrms	2x1500 Wpeak	2x 750 W	2x 8 ohms
MF	69 Vrms	600 Wrms	2400 Wpeak	1200 W	8 ohms
HF	58 Vrms	200 Wrms	800 Wpeak	800 W	16 ohms

Nominal Directivity (-6dB)[3]

Horizontal	symmetrical	90°
Vertical	defined by the array	

System Output[4]	**Continuous SPL (flat array)**	**Continuous SPL (maximum curvature array)**
One enclosure	134 dB	134 dB
Two enclosures	140 dB	139 dB 5° vertical coverage
Four enclosures	146 dB	143 dB 15° vertical coverage

Components

LF 2 x 15" weather-resistant loudspeaker (3" voice coil, bass-reflex loaded)
LF 4 x 7" weather-resistant loudspeaker (kevlar cone body, bass-reflex loaded)
HF 2 x 1.4" compression driver mounted on patented DOSC waveguide

[1] Sensitivity is the average SPL measured over the component's rated bandwidth

[2] Power rating displays the long term RMS power handling capacity using pink noise with a 6 dB crest factor over the component's rated bandwidth

[3] Directivity is averaged over the 1-10 kHz range

[4] System Output gives the unweighted SPL output of the system referenced to 1 m, including preset equalization and band leveling adjustment as measured under freefield conditions using the 3W LO preset

Enclosure

• Width	1300 mm	51.2 in
• Height	434 mm	17.1 in
• Depth	565 mm	22.2 in
• Weight (net)	108 kg	238.1 lbs
• Shipping weight	122 kg	269 lbs
• Shipping dims	1340 x 480 x 600 mm	
	52.8 x 18.9 x 23.6 in	

- Connectors : 2x 8-pin CA-COM
- Material : 15 mm, 30 mm Baltic birch plywood
- Finish : Maroon-gray™
- Grill : Black epoxy perforated steel with acoustically-transparent foam
- Rigging : Integrated flying hardware and handles

Additional Equipment

- OEM factory presets for approved digital processors
- L-ACOUSTICS SB218 subwoofer
- L-ACOUSTICS LA48a power amplifier

ARCHITECT SPECIFICATIONS

The enclosure shall be an active, 3-way loudspeaker containing two direct radiating, bass reflex-loaded 15-inch low frequency transducers, four bass reflex-loaded 7-inch midrange frequency transducers that are mounted in a V-shaped configuration and two 1.4" exit, titanium diaphragm compression drivers that are coupled to individual, vertically-aligned waveguides. As a full range system, the frequency response shall be 50 Hz to 18 kHz with less than ± 3 dB variation and the usable bandwidth shall be 40 Hz to 20 kHz (-10 dB).

The waveguide employed in the loudspeaker shall generate a flat, isophasic wavefront for the high frequency section. When vertically arrayed, multiple loudspeakers shall function according to the principles of Wavefront Sculpture Technology whereby the separation between acoustic centers of individual sound sources shall be less than the size of half the wavelength at the highest frequency of their operating bandwidth or the sum of the individual areas of the isophasic radiating elements shall be greater than 80 percent of the target radiating area. Components shall be configured in a coplanar symmetric arrangement and provide 90-degree horizontal coverage (-6 dB points) independent of the number of vertically arrayed elements.

Crossover points shall be 200 Hz between low and midrange sections and 1.3 kHz between midrange and high sections with 24 dB per octave Linkwitz-Riley characteristics. Long term power handling shall be 2 x 375 Wrms, 600 Wrms and 200 Wrms for low, midrange and high sections, respectively. Low frequency transducers shall be powered individually at a nominal 8-ohm impedance, midrange frequency transducers shall be connected in series/parallel at a nominal 8-ohm impedance and high frequency transducers shall be connected in series at a nominal 16-ohm impedance. Connection to the loudspeaker shall be made via two parallel 8-pin connectors.

The enclosure shall have rectangular shape. Dimensions shall be 130 cm (51.2-in) wide, 43.4 cm (17.1-in) high, 56.5 cm (22.2-in) deep. Enclosure weight shall be 108 kg (238.1 lbs). Cabinet construction shall consist of 15 mm (0.59-in), 30 mm (1.18-in) Baltic birch plywood with internal steel bracing and joints that are sealed, screwed and rabbeted. The finish shall be maroon-gray, high-resilient paint. The front of the enclosure shall be protected by a black epoxy-coated, 1.5 mm (0.06-in) thick steel grille that is covered with 10 mm (0.4-in) thick acoustically-transparent open cell foam.

Loudspeaker enclosures shall be installed using a dedicated rigging bumper and rigging accessories. The enclosure shall have two recessed flytrack sections mounted on both sides and two rear-mounted rigging components that allow up to 16 enclosures to be assembled in a vertical column with variable angles between enclosures up to a maximum of 5.5 degrees at 0.75 degree angular resolution.

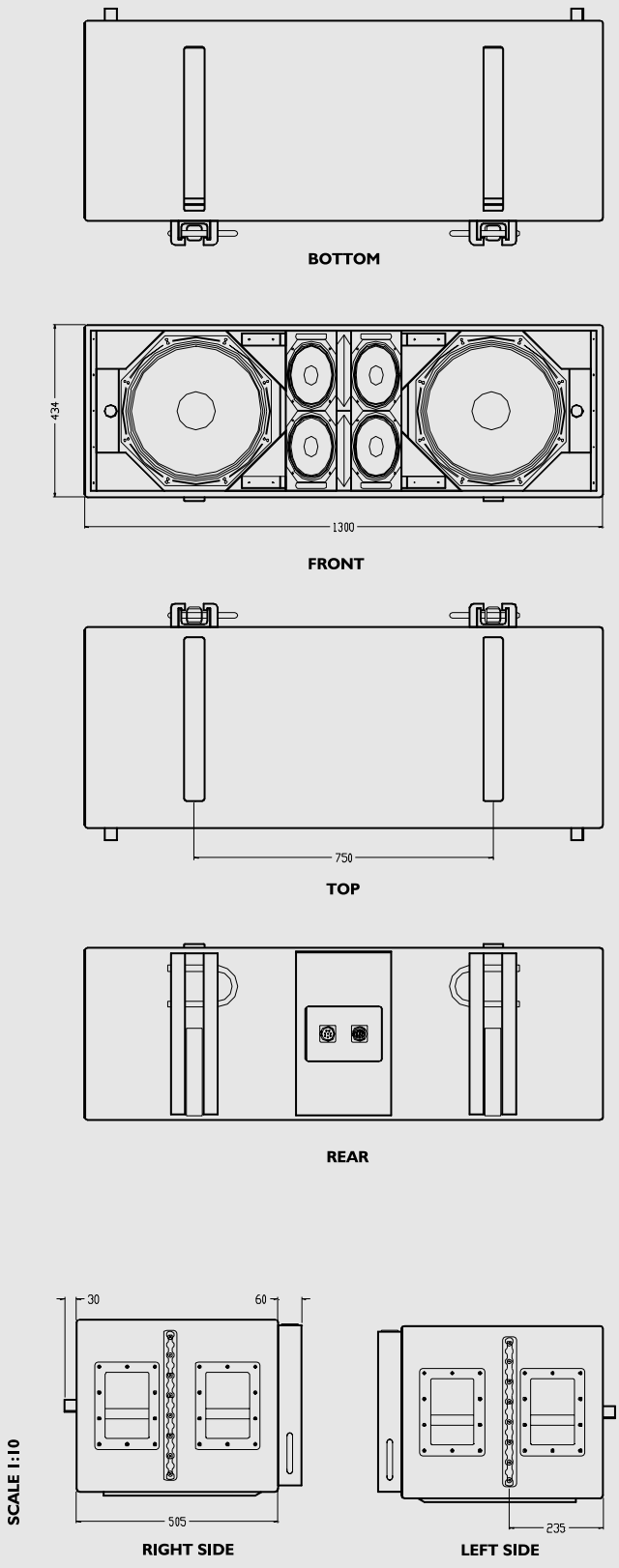
The loudspeaker shall be used with an approved digital processor with OEM factory presets for active 3-way or 4-way operation in conjunction with additional subwoofer enclosures.

The loudspeaker system shall be the L-ACOUSTICS V-DOSC.

The subwoofer system shall be the L-ACOUSTICS SB218.

ACCESSORIES

DOSCOVx2:	2 x protective covers for V-DOSC element
V-CABLE:	8 conductor loudspeaker cable: 7 m (DO7), 25 m (DO25) or 0.7 m (DO.7) lengths
BUMP2:	Flying / stacking bumper including accessories
BUMPDELTA:	Used in conjunction with 2 rear motors to adjust the horizontal pan of a flown V-DOSC array
BUMPxx:	Angle straps (BUMP24=0.75°/5.5°, BUMP251=1.3°, BUMP25=2°, BUMP26=3°, BUMP27=4°)
SPACxx:	Spacer blocks for use with angle straps.(SPAC251=1.3°; SPAC25=2°; SPAC26=3°; SPAC27=4°; SPAC28 =5.5°)
RK124a:	Turnkey amplifier rack for 4 L-ACOUSTICS LA48a amplifiers. Includes PADO4a, power distribution panel
RK122a:	Turnkey amplifier rack for 2 L-ACOUSTICS LA48a amplifiers. Includes PADO2a, power distribution panel
PADO4a:	Amp panel for 4 amplifier per rack configurations
PADO2a:	Amp panel for 2 amplifier per rack configurations
CO24:	Control output panel for signal distribution from FOH drive rack (24 channels)
MD24:	Multi distro panel for signal distribution to amplifier racks
CO6:	Control distro panel for standalone applications (6 ch.)
MC28100:	28 pair multiconductor snake for use with CO24, MD24 (100 m length)
DOM2, DOM30:	6 pair signal modulation cable, 2 m length (DOM2) or 30 m length (DOM30)
LINK-EXTEND:	male/male adapter for use with DOM2, DOM30
LINK-BREAKOUT:	6 pair breakout to male XLR (DOMM)
LINK-BREAKOUT:	6 pair breakout to female XLR (DOMF)
CHARIOT:	Transport accessory for 2 x BUMP2 plus accessories, BUMPxx angle straps, 2 x SB218 rigging bars



V-DOSC®

SYSTEM ACCESSORIES

AMP RACK RKI22a

DOSCOVx2

AMP PANEL PADO2a

AMP PANEL PADO4a

AMP RACK RKI24a

CHARIOT

CONTROL OUTPUT CO6

RKI24a
(equiped with 4 x LA48a)

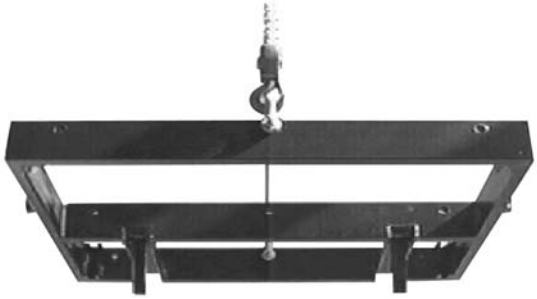
BUMPDELTA

CONTROL OUTPUT CO24

MULTI DISTRO MD24

ANGLE STRAPS

SPACER



BUMPER2

WAVEFRONT SCULPTURE TECHNOLOGY®

The first task of sound engineers and audio consultants is to design sound reinforcement systems for a predefined audience area. As measuring techniques advance and speaker systems perform better, requirements in terms of clarity, coherence, sound pressure level and consistency are increasing while at the same time the size of the audience area is growing.

This inevitably leads to an increase in the number of loudspeakers. A common practice is to configure many loudspeakers in arrays or clusters in order to achieve the required SPL. The result for most sound reinforcement systems is that the sound waves radiated by individual loudspeakers do not couple properly and interfere uncontrollably. This creates non-uniform coverage, inconsistency in frequency response, poor intelligibility and reduced overall sonic quality. The chaotic sound fields created by these interfering sound sources also wastes acoustic energy, thus requiring more total power than a single, coherent source in achieving the same desired SPL.

As an illustration of this principle, imagine throwing some pebbles in a pool of water. If one pebble is thrown into the water, circular waves will expand concentrically from the point where it entered. If a handful of pebbles are thrown into the water, we can observe the equivalent of a chaotic wavefield. If we throw in a single larger stone, having total size and weight equal to the handful of pebbles, then we again see circular waves as in the case of the single pebble - only now with a larger amplitude.

A Single Sound Source From Many Speakers

This leads to the thinking behind the development of Wavefront Sculpture Technology® (WST). If we can construct a single sound source emanating from many speakers (which can then be separated for ease of handling and transport), then we have achieved the goal of providing a totally coherent, predictable wavefield.

Line arrays have been regarded as the best approach to serve the diverse requirements of covering large audience fields. However, until now it has not been possible to make a line array operate properly because of:

1) the interference produced by multiple sound sources radiating over the same coverage area, and

2) an inability to achieve proper line array coupling in the high-frequency range.

The initial specification of the research and development program was the design of a single acoustic source that is completely modular and adjustable. In 1988, an early L-ACOUSTICS system called "Incremental" proved the project's feasibility. Based on this experimental concept, Professor Marcel Urban and Dr. Christian Heil began theoretical research and presented their findings at the 92nd AES Convention in Vienna in 1992 (Preprint # 3269). The theory that was developed defines the acoustic coupling conditions for successfully arraying individual sound sources - including wavelength, the shape of each source, their surface areas and their relative separation.

Briefly, the coupling conditions can be summarized as follows:

An assembly of individual sound sources arrayed following a regular step distance on a planar or curved continuous surface is equivalent to a single sound source having the same dimensions as the total assembly if one or both of the following two conditions are fulfilled :

1) Frequency : The step distance (distance between the acoustic centers of individual sources) is smaller than half the wavelength over the operating bandwidth.

2) Shape : The wavefronts generated by individual sources are planar and together fill at least 80 percent of the total radiating surface area.

Additional WST Criteria were presented in the AES preprint entitled "Wavefront Sculpture Technology" (111th Convention, NYC, Sept 2001, preprint # 5488). The first two WST Criteria were re-derived based on an intuitive approach using Fresnel analysis and in addition it was shown that:

3) The deviation from a flat wavefront must be less than l/4 wavelength at the highest operating frequency (this corresponds to less than 5 mm curvature at 16 kHz)

4) For curved arrays, enclosure tilt angles should vary in inverse proportion to the listener distance (geometrically this is equivalent to shaping variable curvature arrays to provide equal spacing of individual element impact zones)

5) Limits exist concerning the vertical size of each enclosure, the minimum listener distance and the relative tilt angles that are allowed between enclosures.

L-ACOUSTICS defines the practical implications of these criteria as Wavefront Sculpture Technology (WST). WST dictates the design constraints for achieving a single sound source with respect to speaker component arrangement at lower frequencies. By loading the high-frequency drivers with the patented L-ACOUSTICS "DOSC" waveguide it is possible to meet the second WST condition at higher frequencies. By satisfying WST criteria over the entire audio bandwidth, the engineer or designer is provided with a "single" loudspeaker with well-defined coverage and wavefront shape, thus allowing the geometrical distribution of energy to be precisely installed to match the geometry of the audience seating area.

L-ACOUSTICS V-DOSC®, ARCS® and dV-DOSC™ are true arrayable systems. V-DOSC and dV-DOSC are designed for large audiences and long-throw applications while ARCS is suitable for medium-throw needs. All use the heart of Wavefront Sculpture Technology - the patented DOSC Waveguide - to achieve remarkable results.

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