White Paper

JBL Tour Sound Systems
HLA Series: System Use Guidelines

HLA SYSTEM COMPARISONS

A wide variety of professional loudspeaker systems are available in today's market. They rely on different technologies, and come in many different sizes and shapes. When any new product like HLA from JBL Professional is introduced, it is natural to seek comparisons to existing, familiar units.

JBL Professional's HLA (Horn Loaded Array) system represents an entirely new class of sound reinforcement device. As such it does not readily compare to many alternative boxed speaker systems from competitive manufacturers. HLA's high acoustical power output capabilities and pattern-controlled coverage characteristics allow fewer units to achieve superior results. Without the benefit of hands-on demonstrations and a working knowledge of HLA's performance as a system, one may initially draw misleading conclusions when comparisons are made to alternative systems.

This document is intended to offer objective technical data that will assist you in understanding the new technologies behind HLA, and to address some practical field-use applications such as power-amplifier selection, and packing the system in trucks and containers.

SYSTEM WEIGHT SAVINGS

The Model 4895 3-way unit and the Model 4897 subwoofer unit weigh significantly less than competitive devices of the same general class, while offering significantly higher acoustical output power. This chart compares the weight of HLA units to the following devices from other respected manufacturers:

Primary 3-Way Unit	**Weight**
JBL HLA 4895	230 lbs. (104.5 kg)
EAW KF-852	268 lbs. (121.8 kg)
E/V MT-4	354 lbs. (165 kg)
Subwoofer Unit	**Weight**
JBL HLA 4897	240 lbs. (109 kg)
EAW BH-852	248 lbs. (112.7 kg)
E/V MT-4B	263 lbs. (119 kg)

NEW TECHNOLOGIES

HLA Series loudspeaker systems use a suite of JBL-developed technologies that are not just unique within JBL product lines, but to sound reinforcement systems from any manufacturer. These include:

1. **DCD** (Dual Coil Drive) speaker components: New voice coil and motor assemblies have twice the thermal surface area of traditional speakers, giving higher peak output with less power compression, better heat dissipation, and a flatter impedance curve at high frequencies. All this in a package one-third the weight of a traditional speaker, with 16-ohm impedance ratings enabling more efficient use of high-powered amplifiers.

2. **Composite Magazine:** A non-wood speaker enclosure unit made of space-age material gives improved rigidity and direct cooling plus lighter overall system weights.

3. **MultiBand Waveguide™:** A triple-section horn combining low, midrange and high frequency devices in a single package with carefully engineered waveguides (precision acoustical pattern-control devices) offering wideband controlled coverage with low distortion characteristics. The bottom line: controlled dispersion, less interference with adjacent devices in an array, and better sound.

4. **Spaceframe™:** A rigid aluminum outer structure that distributes lifting stress along the entire sides, enabling pull tests of up to 25,000 lbs. with no failure or structural deformation...impossible with traditional wooden enclosures.

5. **Linear Dynamics Aperture™:** Contoured subwoofer ports that virtually eliminate high-level turbulence found in traditional subwoofers...giving an 8dB improvement at full output over standard ports. The overall subwoofer system provides 3dB greater output than conventional subwoofers, meaning only one half the number are required for equivalent acoustical output when compared to conventional units.

ANY ONE OF THESE TECHNICAL ADVANTAGES WOULD GIVE A SOUND SYSTEM A COMPETITIVE EDGE. HLA COMBINES THEM ALL.

POWER RECOMMENDATIONS: HIGH OUTPUT = FEWER AMPLIFIERS

Due to its high electrical-to-acoustical power conversion efficiencies, HLA's reduced amplifier power needs further lighten the overall system weight of an HLA-loaded truck. In fact, a small system of 8 (eight) 4895 3-way units and 4 (four) 4897 subwoofers can be powered by as few as 5 (five) high-powered professional dual-channel power amplifiers. This is nearly one-half the number of amplifiers required by some competitive, traditional loudspeaker systems to achieve the same acoustical output.

The result? Fewer speaker units and fewer amplifier racks required for a given SPL (Sound Pressure Level), resulting in a lower overall truck axle weight. For example:

HLA System Weight & Amplifier Requirements, Typical

Total # of enclosures- (8) 4895 3-way, (4) 4897 subs
Total power amplifiers- (5 dual-channel power amplifiers)*
Total speaker weight- (2,880 lbs.)
*Suggested power levels: HF (High Frequency), 150-200 watts
MF (Mid Frequency), 300-500 watts
LF (Low Frequency), 500-700 watts
Subwoofer, 600-1,000 watts

SPEAKER UNIT SIZE

The HLA enclosures are engineered for the highest possible audio performance and maximum acoustical advantage. To provide this, the high-output waveguides require specific path lengths and horn mouth areas. This includes a design goal of true, controlled-coverage response to 100Hz in the Model 4897 3-way system. This characteristic eliminates the traditional "hole" in the frequency response between the mid/high box and the subwoofer found in many other systems. The subwoofer requires the same shape and size so that it can be suspended together as part of the array if desired, and to provide the required internal working volume and port area for high output levels.

Clearance is provided within the Spaceframe to accomodate directional tilting of this aimable waveguide in the Model 4895 3-way unit. It has an engineered tilt angle of 15 degrees. This can be used to direct sound up or down depending on the cabinet's orientation. This provides optimum coverage with minimum overlap, dramatically improving speaker system intelligibility. It also sets the physical size of the frame.

POWER AMPLIFIER SUGGESTIONS, TYPICAL

The 4895 3-way unit uses 16-ohm transducers, allowing four transducers in each bandpass to be driven in parallel. The 4897 Subwoofer uses two 8-ohm transducers.

Figure 1

Bandpass	JBL	Crest	Crown	QSC
HF	600: 150W/ch., S	7001: 200W/ch., S	2400: 200W/ch., S	1.8: 160W/ch., S
MF	1200: 300W/ch., S	9001: 500W/ch., S	3600: 400W/ch., S	4.0: 400W/ch., S
LF	1200: 800W/ch., B	9001: 500W/ch., S	5000: 500W/ch., S	3.4: 850W/ch., B
SUB	750: 1000W/ch., B	9001: 1100W/ch., S	3600: 800W/ch., S	4.0: 800W/ch., S

Notes: 'S' = stereo mode. 'B' = bridged mode.

Based on a size that is optimum for these features, the HLA units are true array elements. They are not designed for use in tiny venues or in groups of 2 or 3, but in safe, large, rigid, easily-assembled hanging arrays for large-scale sound reinforcement. Clean-looking, integrated hanging arrays that assemble quickly are possible only with 'straight hangs', those setups that are visually most attractive and do not require complex rigging, extra setup time or unsafe practices.

PACKING THE HLA SYSTEM IN TRUCKS AND CONTAINERS

HLA speaker units pack well in most types of commercial transport enclosures. As with all trapezoidal (angle-sided) devices from any manufacturer, they do not pack as tightly as square boxes would. The following guidelines will be helpful:

Smaller trucks (such as 24 ft. Ryder-type rental boxes w/ 95" internal width)
HLA units pack well when units are placed alternately along one side wall in a row and in alternating pairs placed at 90 degrees to this row (see example #1). The units can be loaded with a bottom layer on wheel dollies and a top layer placed on their face or back side, with several inches of ceiling clearance. Plywood sheets between top and bottom layer are recommended when units are loaded in this manner.

Standard North American flat-floor 102" wide semi trailers
HLA units pack well when units are tight-packed in a row of three facing forward, then three facing back (see example #2). With removal of wheel dollies on the top row of speaker units, they can be packed two high with adequate clearance.

Standard North American drop-frame semi trailers (96" wide units w/ 91" internal width)
HLA units pack well when units are tight-packed in rows of three with two forward, one back per row (see example #3). Without removing wheel dollies, the units can be packed two high with several inches of clearance. There will be some loose space on one side.

Maxi-size drop-frame semi trailers (such as 102" wide units with 99.5" internal width)
HLA units pack well when units are tight-packed in a row of three facing forward, then three facing back (as shown in example #2). Alternatively, a staggered row of four (forward, back, forward, back) can enable more cabinets to be packed in somewhat less truck space (see example #4). Without removing wheel dollies, the units can be packed two high with several inches of clearance.

Standard European drop-frame lorry trailers (96" wide units w/ 91" internal width)
HLA units pack well when units are tight-packed in rows of three with two forward, one back per row (see example #3). Without removing wheel dollies, the units can be packed two high with several inches of clearance. Plywood sheets can be used between layers.

Maxi-size European drop-frame lorry trailers (96" internal width)
HLA units pack well when units are placed alternately along one side wall in a row and in alternating pairs placed at 90 degrees to this row (see example #1). Without removing wheel dollies, the units can be packed two high with clearance. Plywood sheets can be used between layers.

Sea containers (standard High Cube with 92.5" internal width)
HLA units pack well when units are tight-packed in rows of three with two forward, one back per row (as in example #3). Additionally, HLA units can be stacked on the main deck two high when the wheel dollies are removed.

SUMMARY

JBL Professional's new HLA Series 4895 and 4897 system components...

** Are based on solid new technologies from JBL.*

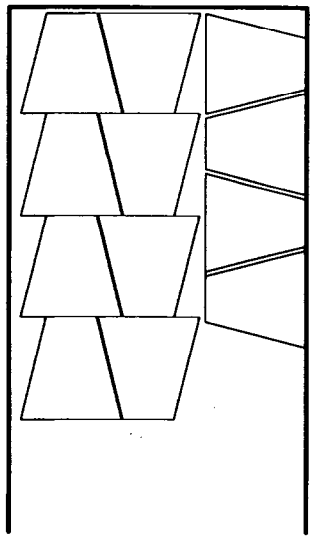
** Are sized to provide optimal acoustical performance when combined into arrays.*

** Offer significant, practical weight-saving advantages.*

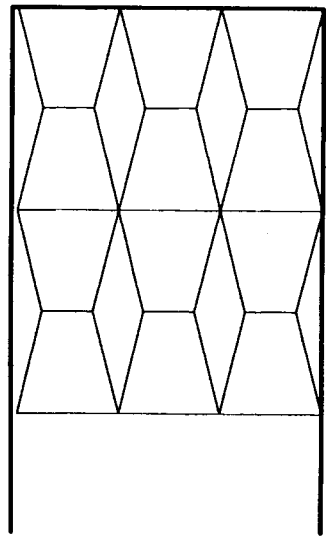
** Offer superior output power characteristics.*

** Allow the creation of clean, 'straight-hung' arrays.*

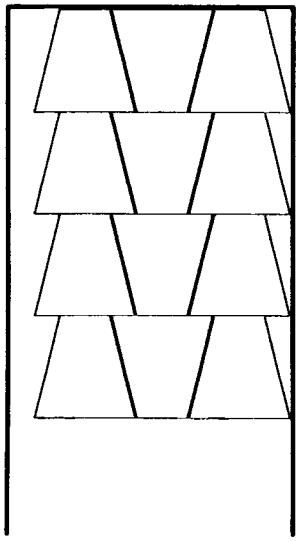
Example #1 :
Smaller 'bobtail' trucks with 95" internal width (typical)



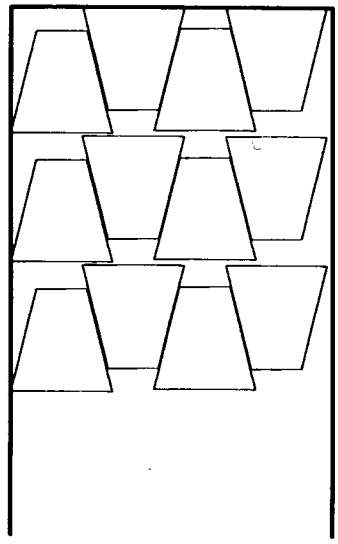
Example #2 :
Standard North American drop-frame and flat-floor freight trailers: 100" interior width



Example #3 :
Standard European & North American drop-frame trailers with 91" internal width



Example #4 :
Maxi-size drop-frame trailers (European & North American) with 99.5" internal width



Typical truck and container packing schemes: scale is approximate

JBL Professional
8500 Balboa Boulevard, P.O. Box 2200
Northridge, California 91329 U.S.A.
A Harman International Company

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