

aspect series

The Turbosound Aspect series is a high performance modular loudspeaker system designed for use across a wide spectrum of sound reinforcement activities.

Aspect is easily scalable to specific acoustical and venue requirements ranging from large scale indoor or outdoor concerts to corporate events, theatre shows and nightclub applications.

The aim of any sound reinforcement system is to distribute sound evenly, with consistent frequency response and in a predictable way, across all seats of an auditorium or listening area. An optimum method of attaining this goal is through the correct application of point source arrays to create a segment of a spherical wavefront. Not only does this approach provide an exceptionally well defined and coherent acoustic source (sound appears to emanate from a single point), but it also allows for considerable flexibility when assembling arrays in both horizontal and vertical dimensions.

In practice, the dispersion characteristics of a typical sound system are less than ideal because of the tendency for conventional high frequency exponential horns to 'beam' with increasing frequency. When arraying such horns, interference between adjacent sources is inevitable due to the variable curvature of the wavefront caused by the horn's geometry, and this results in undesirable comb filtering effects. This means that all seats in an auditorium cannot normally receive the same frequency response.

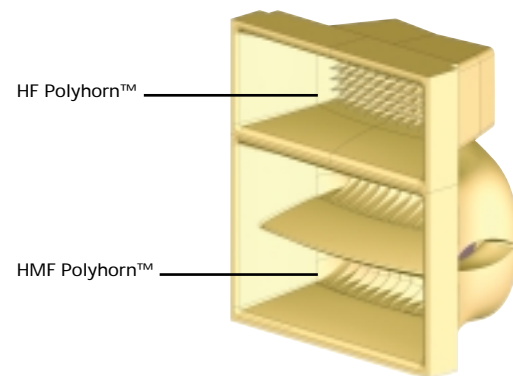
It is precisely this shortcoming that Turbosound engineers, through extensive research and the subsequent implementation of innovative and patented Polyhorn™ designs, have identified and overcome. Fundamental to these designs—and applied in both high-mid and high frequency bands—is the principle of dividing an exponential horn flare into a multiplicity of tapered waveguides. Doing so ensures that all path lengths from the diaphragm surface to horn mouth are identical, and consequently guarantees uniformity of phase of the wavefront at the horn mouth.

The Polyhorn™ design effectively locates the acoustic centre well behind the motor system, forming a virtual point source whose radius

coincides with the array curvature even though the enclosures are themselves quite shallow and are consequently easily manageable.

The Aspect series consists of purpose-designed touring and installation-specific cabinets to suit a multitude of applications. The mid-high and low frequency touring boxes share identical, and very compact, dimensions, which greatly aid trucking and handling as well as simplifying inventory requirements. Integral flying systems allow them to be flown or ground stacked for maximum flexibility of use. A trapezoidal mid/high enclosure variant has features that are optimised for ground stacking and permanent installs.

The audio frequency spectrum is divided into four frequency bands, optimised for the custom designed transducers dedicated to each band. The mid-high enclosure houses high frequency, high-mid frequency and low-mid frequency elements arranged in a vertical orientation.



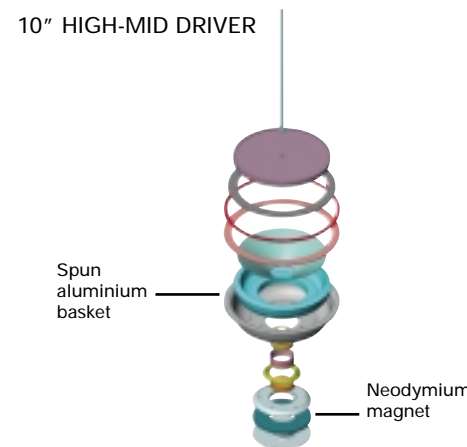
The high frequency section is dedicated to handling frequencies above 5kHz, and this is reproduced by two custom designed diaphragm assemblies loaded by a high frequency Polyhorn™ device. The proprietary driver combines highly innovative patented (and patent applied for) design features to ensure exceptional high frequency performance and long term reliability. Magnet performance is optimised through the use of a radially polarised neodymium magnet structure.

A key feature of the Polyhorn™ design is the very sharp cut-off at the edges of the coverage

pattern, which all but eliminates the comb filtering effects common to conventional horn designs.

This presents an immediate and obvious benefit in that it is now possible to predict array angles in a very intuitive fashion without having to guess at the expected destructive interference between adjacent boxes.

The patented Polyhorn™ devices create a gently curved wavefront at the horn mouth, which coincides with the optimum array curvature to provide a seamless transition to adjacent cabinets. These principles are applied to both high and high-mid frequencies, and the two horns form part of a removable square section with either 25°H x 15°V or 15°H x 25°V dispersion pattern.



Frequencies from 400Hz to 5kHz are handled by a custom designed 10" drive unit on a further Polyhorn™ optimised for mid frequencies.

Significant improvements in the individual driver's power handling, and a subsequent reduction in power compression, have also been achieved through the use of high stability, high temperature neodymium magnet structures. This simply means that more of the available amplifier watts are converted into acoustic energy and less power is wasted as heat.

The touring cabinet dimensions have been carefully chosen to allow the boxes to be optimally truck packed in the most common US and European vehicles without wasted space.

KEY SYSTEM BENEFITS

- Continuous even coverage above 1kHz, effectively giving seamless arrayability in both horizontal and vertical planes
- Intuitive 'point and shoot' directivity characteristics make it very easy to adapt flown or ground stacked clusters to widely variable venue and audience requirements
- Very high power capability means that peak SPL of up to 146dB is easily achievable from one cabinet
- Greatly improved driver thermal performance increases power handling resulting in a significant reduction in power compression
- Smaller and uniformly sized enclosures simplify handling, flying and truck packing
- Flying hardware is integral to the touring boxes but can quickly be removed for safety testing. The flying hardware also allows systems to be safely and easily ground stacked
- Flying hardware allows four touring cabinets to be pre-assembled on a wheel dolly for faster setup
- Mid-high and LF touring cabinets are identically sized to simplify truck packing
- Touring cabinets may be flown horizontally or vertically; mid-high section can be rotated through 90° to optimise the aspect ratio of the array, making the best use of venue sightlines
- Trapezoidal cabinets use removable flying hardware and hence there is no cost penalty to users of ground stacked systems.

THE POLYHORN™ ADVANTAGES

The patented Polyhorn™ designs achieve a marked improvement in transient response, which is a major contribution to intelligibility in a sound reinforcement system.

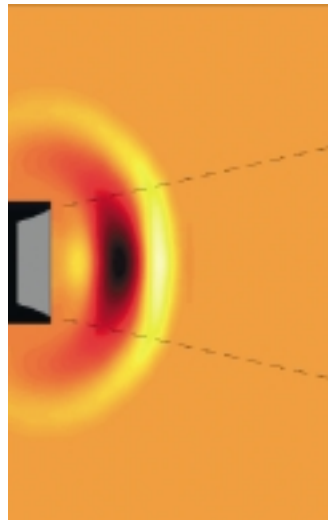


Figure 1

The wave progression plots shown here illustrate the actual result of applying a single impulse to the driver and demonstrate the uniformity of the sound wave leaving the Polyhorn™ mouth.

Conventional exponential horns suffer from two major problems: a non-coherent wavefront caused by differing path lengths at the horn mouth; and diffraction at the horn edges—which has the effect of creating additional virtual sources, further confusing the directionality of the sound source.

The Polyhorn™ design ensures that the wavefront is phase coherent by making all path lengths from diaphragm to horn mouth identical. The Polyhorn™ geometry gives a smooth curvature to the wavefront, arranged to match the array curvature.

At T=1.5ms (in figure 1) a clean positive pressure wave (white/yellow) has left the horn

mouth, followed by a corresponding negative pressure wave (dark red). Note how practically all of the energy in the positive wave is completely contained within the specific 25° horizontal directivity characteristic of the Polyhorn™, shown as dotted lines on the diagram.

As the wave progresses to T=2ms (figure 2), the wavefront has now developed a well-defined curvature whose radius matches the location of the virtual point source behind the cabinet. There is also a complete absence of edge diffraction effects from the horn edges.

At T=3.5ms the original impulse has developed a smooth, phase-coherent wavefront with no ringing or unwanted resonances. With such a

clean cut-off to the dispersion pattern edge it is easy to see how adjacent enclosures can be arrayed without destructive coupling effects, in other words with greatly reduced comb filtering.

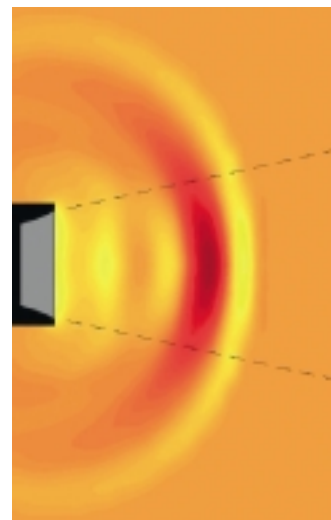


Figure 2

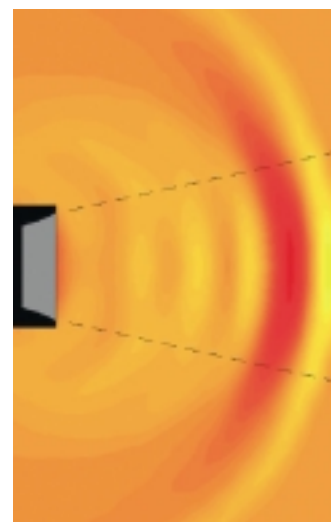
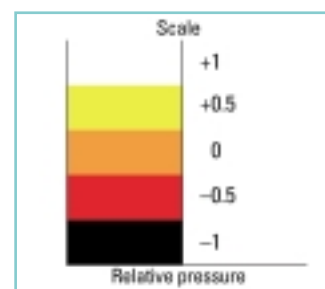
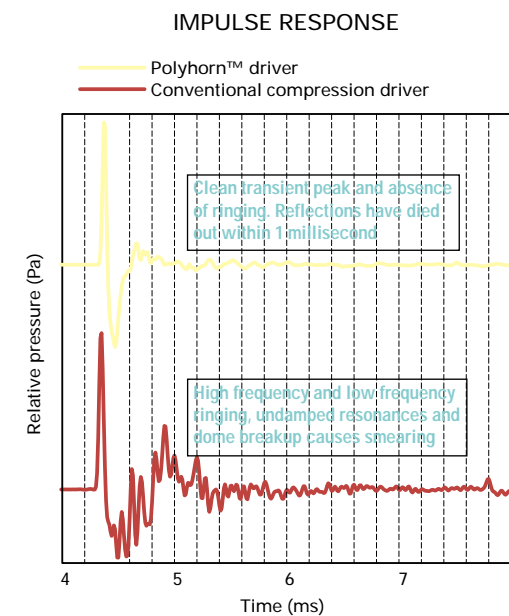


Figure 3



The impulse response diagram below illustrates the response of a Polyhorn™ design and a conventional compression driver / exponential horn to a single transient peak in the time domain.

The Polyhorn™ shows a sharp positive spike, with a quick rise time, which settles to near zero amplitude in less than 0.5 milliseconds, with virtually no ringing.



The conventional compression driver, by contrast, continues to display undamped resonances—characterised by clearly audible distortion—for as long as 2ms, and this results in a smearing of the original audio program material.

The Turbosound Polyhorns™ used in both high frequency and high-mid frequency elements produce cleaner sound, lower distortion, and can be seamlessly and intuitively arrayed.

KEY FEATURES

- Controlled dispersion pattern of 25°H x 15°V generates highly focused coverage pattern with exceptional projection capabilities
- Proprietary HF transducer employs a high stability, high temperature radial neodymium magnet structure which offers much higher efficiency, as well as vastly reduced weight
- Patented HF Polyhorn™ design generates equal level across a uniformly curved wavefront identical to that of the array profile
- Directivity over 1kHz exhibits very sharp cut-off at the edges of the pattern, and dramatically reduces out-of-band signal
- 10" high-mid frequency driver is fabricated from a single-piece spun aluminium bowl, serving as a high strength frame, heatsink, rear compression chamber and high pass filter
- 10" high-mid driver uses a high stability, high temperature neodymium magnet structure for greatly improved efficiency
- High-mid Polyhorn™ design (patent applied for) generates equal level across a uniformly curved wavefront identical to that of the array profile in the same way as the HF device
- Low-mid enclosure employs rear-facing drivers with combined heatsink/phase plug assemblies (patent applied for)
- All transducers utilise optimised symmetrical magnet gap design and high performance thermally conductive adhesives between magnet plates and heatsinks
- Revolutionary composite cone materials are used in all cone transducers
- Touring cabinet construction based around pre-bent plywood—this entirely eliminates two cabinet corners, reducing internal reflections, and greatly increasing cabinet strength. Nine-ply, 15mm beech plywood is used throughout
- Cabinet dimensions are optimised for both US and European vehicle truck pack



TA-880H

A trapezoidal tri-amped mid/high enclosure designed for ground-stacked regional touring, and for many types of fixed installations such as theatres, conference centres, exhibition halls, and sports facilities.

Containing two custom high frequency drivers on an HF Polyhorn™, a single custom 10" high-mid frequency driver on an HMF polyhorn™, and two horn loaded 10" low-mid drivers, the TA-880H covers the frequency range from 95Hz to 20kHz. Components are housed in a trapezoidal cabinet with side angles optimised for correct horizontal array performance.

A pair of Speakon NL8 connectors are provided on a recessed panel at the rear of the cabinet for input and link connections. Constructed from 15mm (5/8") birch plywood, the enclosure features ergonomically placed flush handles and recesses at the rear of the box that afford protection to the connected speaker cables, making an efficient and space-saving package. Optional stackable wheelboards clip onto the front of the cabinet and make transportation very simple. The TA-880H is finished in black textured paint or optional TurboBlue™.

trapezoidal mid/high

TA-890H

The touring mid-high enclosure is designed to be flown in point source arrays, and is applicable to regional touring up to concert touring and festival applications. The TA-890H packs an incredible 146dB peak SPL into an extremely compact and manageable format.

It houses two HF drivers on an HF Polyhorn™, a single 10" high-mid driver on an HMF Polyhorn™ and two 10" low-mid frequency drivers in a horn-loaded enclosure. The mid-high section is removable and can be rotated through 90° within the cabinet, and together with two entirely separate and independent integral flying systems this allows the touring box to be flown in a vertical or horizontal orientation depending on the cluster shape, venue size and room coverage required.

The cabinet is constructed from 15mm (5/8") beech plywood, with ergonomically placed flush handles for easy handling, and makes extensive use of pre-formed curved rear plywood sections to improve the strength to weight ratio and eliminate internal reflections. Speakon NL8s are fitted.

touring mid/high



TA-880L

This very compact 2 x 15" horn-loaded bass enclosure has an identical footprint to the TA-880H trapezoidal mid/high, and so is recommended for ground stacked regional touring applications, as well as being ideal for a wide range of permanent installs like theatres, live performance venues and nightclubs.

Although it is housed in an extremely small enclosure, the high efficiency low frequency drivers are capable of generating high definition bass energy equivalent to many double 18" configurations.

Neodymium magnet structures give the drivers very high power capability and low power compression, and also ensure that weight is kept to a minimum. The cabinet is constructed from 15mm (5/8") birch plywood, finished in black textured paint (optional TurboBlue™), with four flush handles for easy handling and two Speakon NL4MP connectors.

low frequency

TA-890L

A very compact 2 x 15" low frequency enclosure fully equipped for touring with integral flying hardware and designed to partner the TA-890H touring mid/high enclosure.

Comprising two TurboBass™ loaded dual 15" drive units in a beech plywood enclosure, the TA-890L is capable of delivering up to 138dB maximum SPL (peak) from a deceptively small box. Reverse facing drivers with high excursion voice coils improve the thermal dissipation to the ambient air.

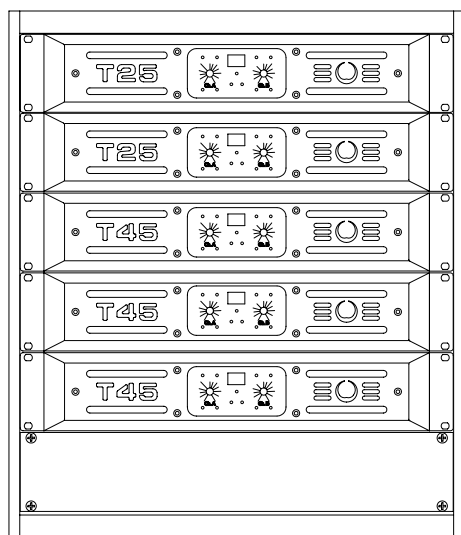
It is equipped with an integral flying system which allows it to be flown horizontally with TA-890H enclosures. In common with the mid/high cabinet, up to four cabinets can be pre-assembled on a wheel dolly to simplify load-ins and transportation. Two Speakon NL4MP connectors are provided on a rear panel.

touring low frequency



Systems Integration

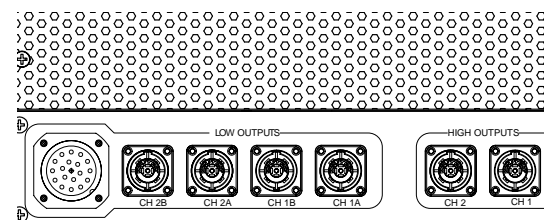
Turbosound supplies completely integrated turnkey touring sound systems, including TA-890 loudspeakers with integrated rigging hardware, amplifier racks loaded with low-weight switched mode power amplifiers, cabling, and returns systems. The integrated systems approach first of all guarantees sonic excellence and ensures compatibility between rigs anywhere in the world. Users may share or sub-rent equipment between them without worrying about issues such as gain structure or phase.



The heart of the TA-890 touring system is a very powerful and light-weight amplifier rack, superbly packaged and fully equipped for rigorous touring applications. The T-series switch-mode amplifiers are based around a strong and light 2U aluminium construction, and make use of efficient digital power supplies to provide high peak power without any low frequency 'sag'. The sophisticated limiters and power control system ensure faultless operation under the most arduous conditions.



Two model T-25 amplifiers power the high frequency and high-mid frequency bands respectively, while a T-45 is assigned to the low-mid frequencies and two further T-45 models are used for the low frequencies. The amplifier rack is considerably more versatile than a first glance would suggest. It can be configured in mono or stereo simply by moving a jumper; and the standard amplifier complement even allows five-way systems to be configured from the same rack without additional or separate amplifiers. Each rack will deliver over 18,000 watts of power into an optimal load of six high packs and eight bass cabinets.



Loudspeaker connections are divided into high frequency and low frequency sections, and are provided on the rack via 4-metre break-outs, long enough to permit ground stacking and flying in small venues, while multi-way cable extensions are available in various lengths for larger flown arrays. The LF and HF break-outs are uniquely wired so that it is impossible for drive unit damage to occur if the multi-connectors are mistakenly interchanged. Amplifier racks are supplied as a steel space frame with removable easy-access panels and a birch plywood road case equipped with heavy duty wheels.

Transportation and Handling

TA-890H high packs and TA-890L bass cabinets are both supplied with individual wheel boards, attached with quick release catches to the front of



the cabinet. When off the boxes and not in use, they are designed to be neatly stacked with minimal footprint to save space.

In order to make load-ins really efficient in a familiar venue, cabinets can be stacked four-up on a wheeled dolly in the horizontal mode—with the 'A' system flying hardware already pre-configured—and simply rolled out of a truck straight onto the loading dock or stage. This means that blocks of four cabinets can be prepared in the warehouse with the required vertical angles.



Flown Systems

The Aspect flying hardware is specifically designed to take advantage of the precise directivity characteristics as well as allowing simple adjustment of vertical angles.



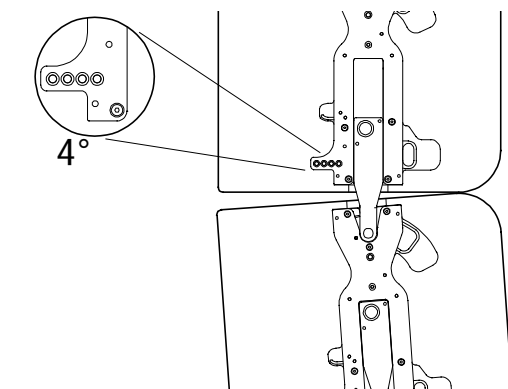
This means that arrays can very easily be optimised to suit the coverage requirements of any situation. Two separate and independent flying systems have been designed for the touring Aspect enclosures and this permits a great deal of

flexibility when putting together sound systems in widely differing venues and outdoor audience spaces. Both systems are integral to the box, are very simple to use, and can be removed for safety testing if required.

The horizontal, or 'A', flying system is extremely intuitive in use, and allows a single operator to fly a column of loudspeakers in under five minutes, without tools or separate flying accessories. Cabinets are simply wheeled in to the venue and lifted one row at a time after choosing one of four possible vertical angles. Alternatively, cabinets can be stacked and pre-configured on four-up wheel dollies to save time. The system provides clear visual indication of both swing latch engagement and inter-cabinet angle, making it easy to see at a glance when the cluster is safe and ready to lift.



Aspect flying systems are designed to enable the building of compact and unobtrusive point-source clusters. While boxes will in the majority of cases be flown in a horizontal orientation in order to optimise venue sightlines, it is also possible to fly cabinets in the vertical mode using the 'B' flying integral to the long sides of the cabinet.



aspect series

Ground-stacked Systems

Where it is not practical to fly the PA on a regular basis, a cost-effective alternative is presented by the trapezoidal TA-880 version of the Aspect mid-high. Although it houses the same components as the flown touring cabinet, the angled sides ensure repeatable and accurate coverage for ground stacking.



Transportation is equally easy, with a detachable wheelboard which also stacks neatly off-stage. This makes it highly effective—together with the very compact partner TA-880L bass cabinet—in regional concert touring and corporate applications, for which a system of six mid-highs and eight low frequency cabinets will provide sufficient SPL and very high quality sound coverage of up to 3,000 people.



And because of the true 25° horizontal dispersion pattern of the cabinet—as opposed to a ‘nominal’ 35° or more offered by many competitors—it is possible to cover a room properly with fewer cabinets than expected. For example, a 3-wide ground stack of trapezoidal Aspect cabinets will provide a genuine 75° of seamless horizontal dispersion with very little spill outside of the target coverage area.



Fixed Installations

Trapezoidal Aspect mid-high enclosures are the ideal choice for a wide range of permanent installs encompassing live performance venues, theatres, nightclubs and discos. The precise dispersion pattern makes it very easy to achieve excellent coverage of a room and to deliver high definition sound into audience areas with minimum overspill. A key feature of the TA-880 systems is the very cost-effective external flying hardware that enables tight-packed clusters to be designed and flown with minimal sightline obstruction.

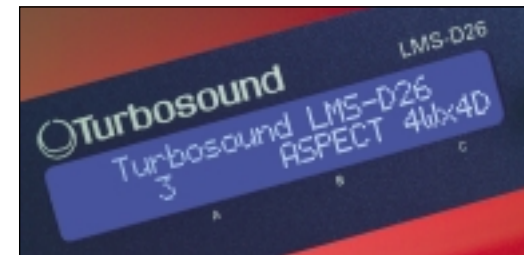
The flying system consists of removable steel swords which pass through slots in the box, secured with lynch pins, forming modular arrays



to suit the required coverage. With the available choice of flybars—two-wide and three-wide fixed angle bars—it is possible to cater for any eventuality and to achieve excellent performance in any venue.

System control

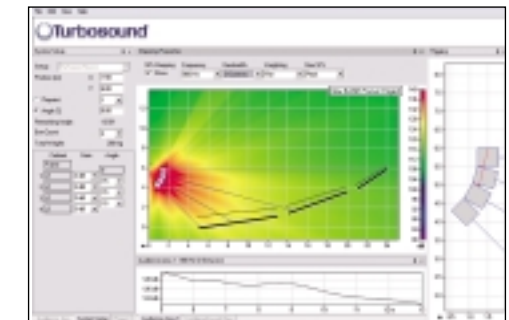
The LMS-D series of loudspeaker management systems are more than just electronic crossovers. They provide full digital alignment of all drive units within the Aspect enclosures to ensure coherent acoustic output. System parameters such as crossover frequencies, limiter settings and equalisation are called up from factory pre-set menus, ensuring consistent performance every time. XLR Inputs and outputs are electronically balanced to provide effective isolation, eliminating hum loops. Precise matching of the limiters to the Aspect T-series amplifiers further contributes to high reliability under the adverse conditions often encountered in concert touring.



Software Solutions

The Turbosound Aspect system is remarkably intuitive in use, and requires an absolute minimum of theoretical calculations in order to achieve optimal coverage, due to its ‘point and shoot’ nature. When faced with awkwardly shaped rooms, or unplanned situations such as unsold auditorium seats, the Aspect system’s flexibility really comes into its own.

However, a computer simulation of what to expect in a room you have never worked in before can be very useful, saving time in the selection and number of cabinets required, and in eliminating uncertainty when configuring the sound system. Turbosound’s software package makes it very easy to obtain an accurate representation of the included coverage and sound pressure level anywhere in the room.



aspect series



Technical Specifications

	TA-880H	TA-880L	TA-890H	TA-890L
Dimensions (h x w x d)	1025 x 477 x 463 40.3" x 18.8" x 18.3"	795 x 477 x 574 31.3" x 18.8" x 22.6"	795 x 477 x 574 31.3" x 18.8" x 22.6"	795 x 477 x 574 31.3" x 18.8" x 22.6"
Net weight (kg/lbs)	59/130	50/110	76/167	68/150
Frequency range (±4dB)	95Hz - 20kHz	45Hz - 250Hz	95Hz - 20kHz	45Hz - 250Hz
Array angle	25°H x 15°V	n/a	25°H x 15°V	n/a
Power handling (rms)	LMF: 500 watts HMF: 200 watts HF: 100watts	1100 watts	LMF: 500 watts HMF: 200 watts HF: 100watts	1100 watts
Sensitivity (1w@1m)	LMF: 108dB HMF: 114dB HF: 111dB	101dB	LMF: 107dB HMF: 114dB HF: 111dB	101dB
Maximum SPL (dB) (cont/peak)	140/146	132/138	140/146	132/138
Crossover bands	LMF: 101Hz - 405Hz HMF: 405Hz - 4kHz HF: 5k99Hz - 20kHz	30Hz - 101Hz	LMF: 101Hz - 405Hz HMF: 405Hz - 4kHz HF: 5k99Hz - 20kHz	30Hz - 101Hz
Nominal impedance	LMF: 8 ohms HMF: 16 ohms HF: 12 ohms	8 ohms	LMF: 8 ohms HMF: 16 ohms HF: 12 ohms	8 ohms
Construction	15mm (5/8") birch plywood	15mm (5/8") birch plywood	15mm (5/8") beech plywood	15mm (5/8") beech plywood
Connectors	Speakon NL8MP	Speakon NL4MP	Speakon NL8MP	Speakon NL4MP
Options	Enclosures are available in black semi-matt textured paint; or TurboBlue™ textured paint			



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