

The Flashlight TFS-780 System is a fully integrated long throw sound reinforcement system in an extremely compact and manageable form. It is supplied as a system package comprising loudspeaker enclosures; amplifier racks; a system controller and all the requisite cables and connectors. This combination of components is configured as the ideal "building block" for the creation of spherical arrays, providing a formidable system for large arena use. The Flashlight system is easily capable of delivering full range (30 - 20kHz), very low distortion, coherent sound in the biggest indoor or outdoor venues.

The TFS-780H uses very narrow dispersion pattern components. These are further developments of Turbosound's Proportional Directivity™ in a very high-Q enclosure and enables seamless coverage over a massive area with anything from 1/2 to 1/4 the number of conventional enclosures, depending on the distance from the array. In reality this also means that many applications that would normally require distributed delays will no longer need them.

The loudspeakers are divided into two uniformly sized enclosures: the TFS-780L and the TFS-780H. The TFS-780L covers the low frequencies in the range 30 - 150Hz and contains a 21" loudspeaker with a 6" voice coil, loaded with a TurboBass™ device. The TFS-780H consists of two specially developed long-throw TurboMid™ devices, and a high-Q 25mm (1") waveguide horn. The larger TurboMid™ device is driven by a very powerful 12"



loudspeaker and covers the frequency range between 150Hz and 1k3Hz. The smaller TurboMid™ device is fitted with an intensively developed 6.5" cone loudspeaker covering the frequency range between 1k3Hz and 8kHz. This combination of TurboMid™ devices represents an unprecedented step in the use of cone-type transducers up to 8kHz, resulting in increased reliability and power handling and a startling improvement in acoustic clarity and detail over any compression driver working in the same band. This leaves the remaining frequencies (8kHz - 20kHz) to be easily handled by a custom 1" (25mm) compression driver.

All the units in the TFS-780H are correctly time-aligned within the system controller, which is pre-set during manufacture. In addition, user-controllable time alignment adjustment compensates for the physical displacement of the bass devices with respect to the mid-high enclosures. The combination of the amplifier power, coupled with very high efficiency drivers equates to considerable sound pressure levels being achieved with exceptional clarity.

The control system comprises a digital crossover with factory-loaded crossover programs, high performance limiters, electronically balanced inputs and outputs and an auto-switching power supply.

The power amplifiers are designed specifically for use with the Flashlight system. They are capable of delivering the high power level demands that the loudspeaker system is capable of converting into acoustic energy. The amplifiers are supplied in a 19" rack unit in groups of four, complete with all the necessary wiring and multi-pin connectors.

To take full advantage of such a highly tuned system, with such accurately defined dispersion characteristics, Turbosound's engineers have developed a safe, flexible and ingeniously simple flying and lifting system. This allows the creation of clusters and arrays with full control of the angular inclinations between adjacent enclosures to suit a variety of requirements.

FEATURES

Total system optimisation

Negligible harmonic distortion

Proportional directivity

APPLICATIONS

Stadium and arena installation

Touring and festivals

DIMENSIONS (HxWxD)	825mm x 574mm x 773mm (32.5" x 22.6" x 30.4")
NET WEIGHT	87kg (191 lbs)
COMPONENTS	1 x 12" (305mm) LMF driver, 1 x 6.5" (165mm) HMF driver, 1 x 1" (25mm) HF compression driver
FREQUENCY RESPONSE¹	150Hz – 20kHz ±4dB
NOMINAL DISPERSION²	25°H x 25°V @ -6dB points
POWER HANDLING	LMF: 250 watts r.m.s., 500 watts program, 625 watts peak HMF: 100 watts r.m.s., 200 watts program, 250 watts peak HF: 25 watts r.m.s., 50 watts program, 65 watts peak
SENSITIVITY³	LMF: 107dB, 1 watt @ 1metre; HMF: 111dB, 1 watt @ 1metre; HF: 110dB, 1 watt @ 1 metre
MAXIMUM SPL	136dB continuous ⁴ , 142dB peak ⁵
CROSSOVER	Active LMF/HMF: 1k3Hz, 24dB/octave, Linkwitz-Riley HMF/HF: 8kHz, 24dB/octave, Linkwitz-Riley
NOMINAL IMPEDANCE	LMF: 8 ohms, HMF: 16 ohms, HF: 16 ohms
CONSTRUCTION	18mm (3/4") birch plywood throughout; rebated, screwed and glued. Finished in TurboBlue™ semi-matt textured paint. Eight recessed carrying handles. Detachable wheel board
GRILLE	Cloth/expanded metal
CONNECTORS	(2) 6-pin EP6 wired; pin1 LMF-; pin2 LMF+; pin3 HMF-; pin4 HMF+; pin5 HF-; pin6 HF+
OPTIONS	Flying System – refer to the "Flying and Lifting" section
SPARES AND ACCESSORIES	LS-1203 1 x 12" (305mm) LMF loudspeaker LS-6501 1 x 6.5" (165mm) HMF loudspeaker CD-103 1 x 1" (25mm) HF compression driver RC-1203 Recone kit for LS-1203 RD-6501 Recone kit for LS-6501 RD-103 Replacement diaphragm for CD-103 MG-780 Replacement cloth/expanded metal grille PX-780 Internal passive HF filter W-3 Heavy duty wheel

Notes

¹Measured on axis

²Average over stated bandwidth

³Average over stated bandwidth

⁴Unweighted diode-clipped pink noise. Measured in a half space environment.

⁵Verified by subjective listening tests of familiar program material, before the onset of perceived signal degradation.

825mm x 574mm x 773mm (32.5" x 22.6" x 30.4")	DIMENSIONS (HxWxD)
90 kg (198 lbs)	NET WEIGHT
1 x 21" (533mm) LF driver on a TurboBass™ device	COMPONENTS
50Hz – 150Hz ±4dB	FREQUENCY RESPONSE¹
600 watts r.m.s., 1200 watts program, 1500 watts peak	POWER HANDLING
101dB 1 watt @ 1metre	SENSITIVITY²
131dB continuous ³ , 136dB peak ⁴	MAXIMUM SPL
8 ohms	NOMINAL IMPEDANCE
18mm (3/4" birch plywood throughout; rebated, screwed and glued. Finished in TurboBlue™ semi-matt textured pain. Four recessed carrying handles	CONSTRUCTION
Cloth/expanded metal	GRILLE
(2) XLR-3 wired: pin 1-; pin 2+	CONNECTORS
Flying System – refer to the "Flying and Lifting" section	OPTIONS
LS-2101 1 x 21" (533mm) LF loudspeaker	SPARES AND ACCESSORIES
RC-2101 Recone kit for LS-2101	
MG-780 Replacement cloth/expanded metal grille	
W-3 Heavy duty wheel	

Notes

¹Measured on axis

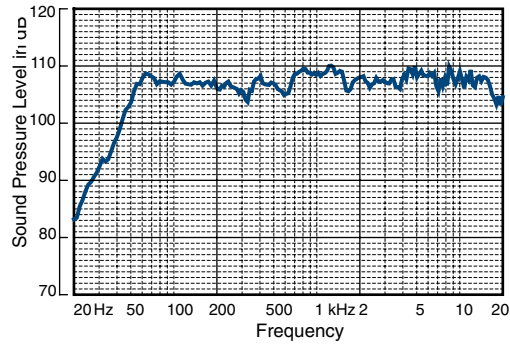
²Average over stated bandwidth

³Unweighted diode-clipped pink noise. Measured in a half space environment.

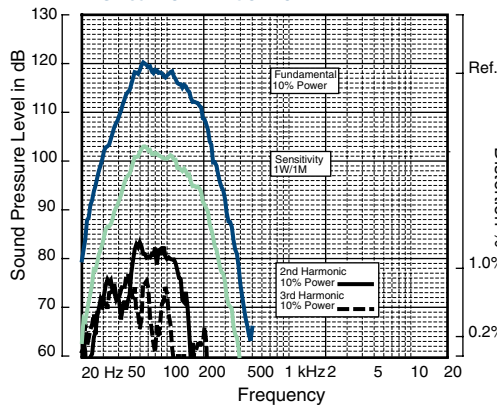
⁴Verified by subjective listening tests of familiar program material, before the onset of perceived signal degradation

FREQUENCY RESPONSE

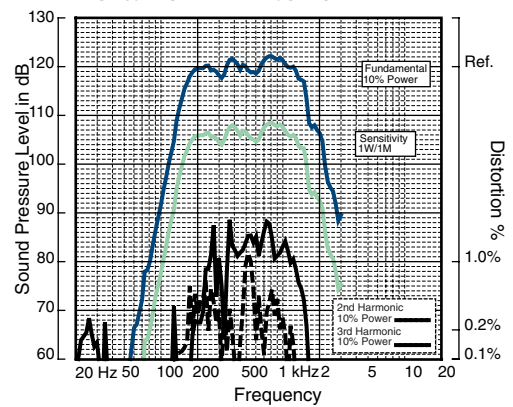
SYSTEM



TFS-780L LOW FREQUENCY

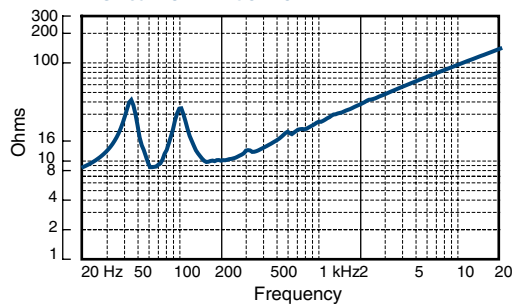


TFS-780H LOW-MID FREQUENCY

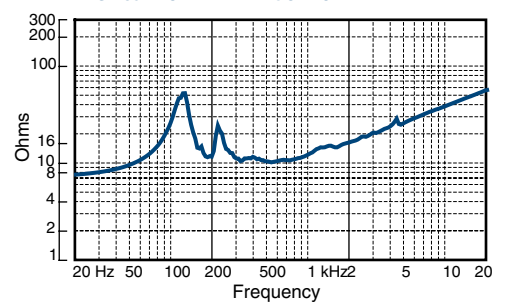


IMPEDANCE

TFS-780L LOW FREQUENCY



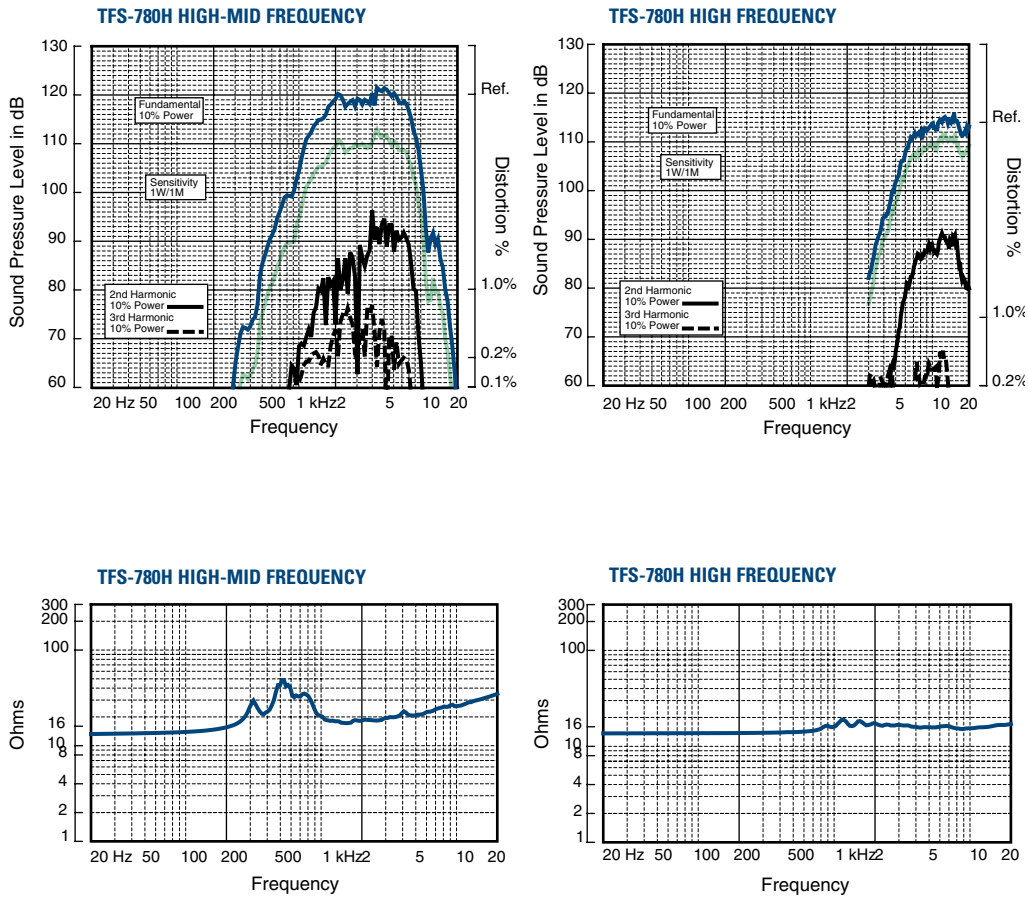
TFS-780H LOW-MID FREQUENCY



NOTES ON MEASUREMENT CONDITIONS

Impedance A common method, constant current circuit was use to measure the impedance. **Frequency Response** The frequency response shown was obtained by feeding a swept sine wave through the system in a half-space environment. The position of the microphone was vertically on-axis, horizontally in-line with the MF/HF section at a distance of 3 metres, then scaled to represent 1 metre. **2nd & 3rd Harmonic Distortion** Distortion measurements were obtained using an Audio Precision harmonic distortion analysis system and comply with AES recommendations for enclosure measurement (AES Paper reference: ANSI S4-26-1984). **Data Conversion** All graphs were digitally generated using the APEX custom software system, designed to translate data derived from Brüel & Kjæl and Audio Precision "System One" test equipment into AutoCAD™. This program enables graphical information to be plotted to an accuracy of more than four decimal places.

FREQUENCY RESPONSE

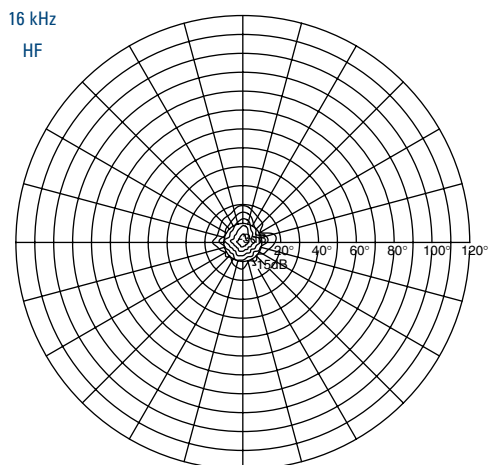
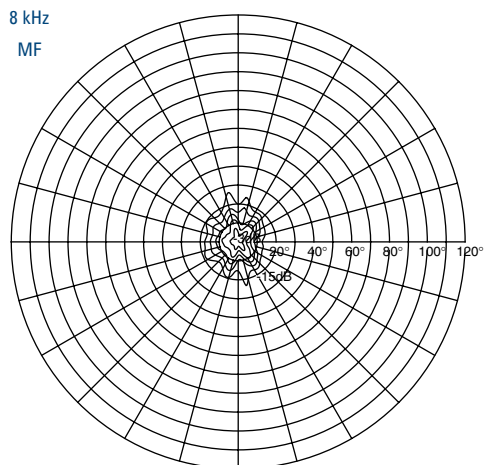
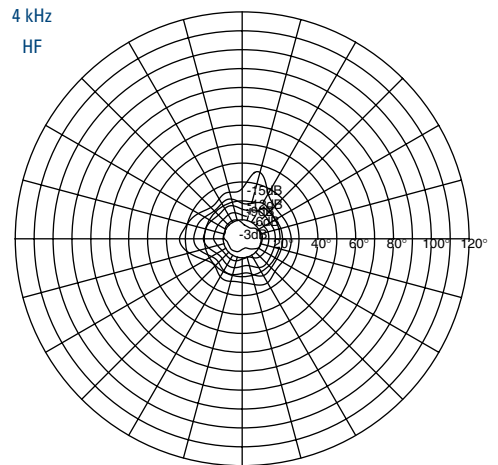
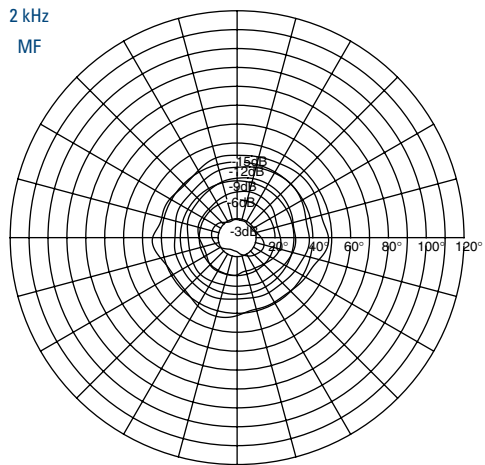
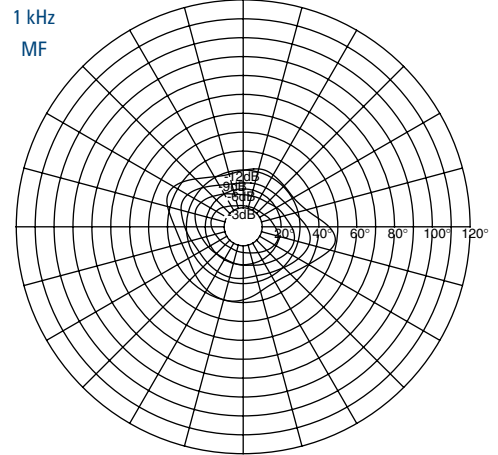
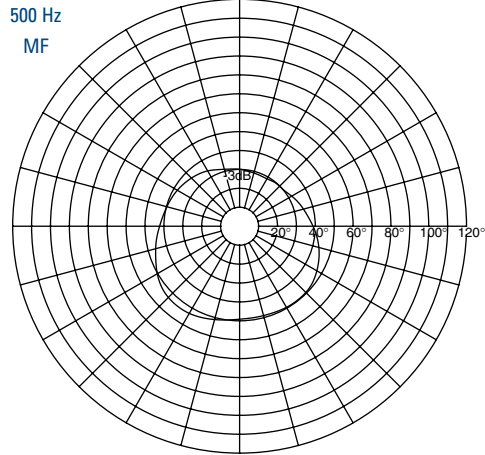


IMPEDANCE

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NOTES ON MEASUREMENT CONDITIONS

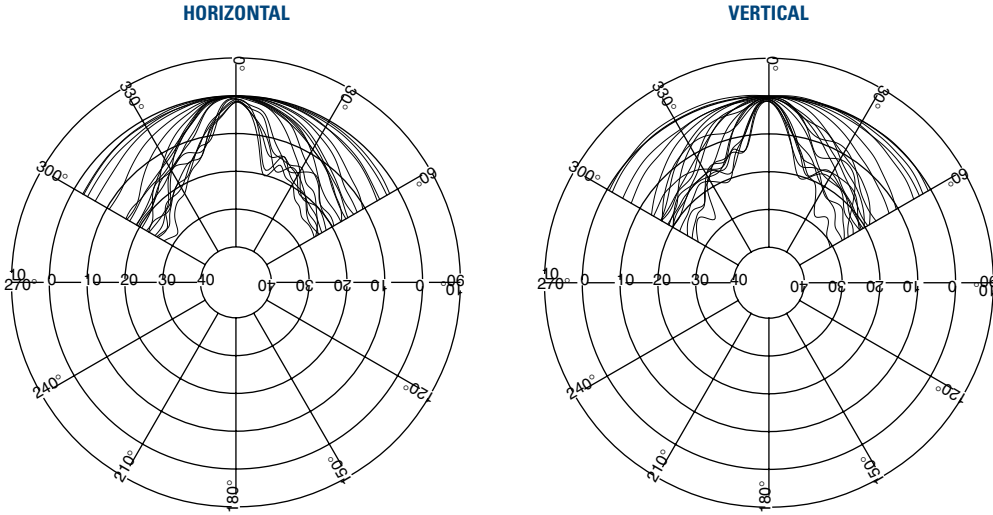
DIRECTIVITY ISOBARS



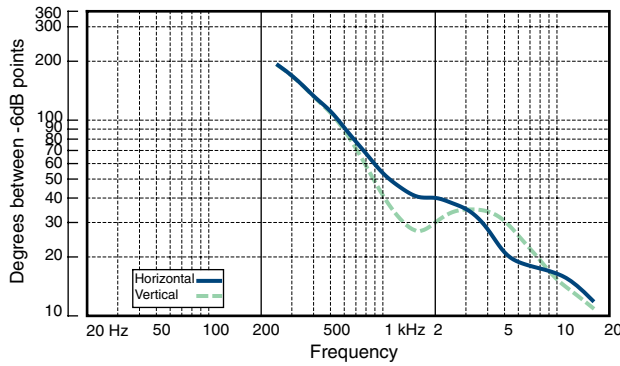
**TURBOSOUND
ISOBAR DATA**

The spherical co-ordinate isobar data was computed from points taken from longitude and latitude polar measurements around the enclosure at 10° increments. Larger scale drawings are available; please consult your dealer. All isobar information was gathered by Turbosound Research & Development, England.

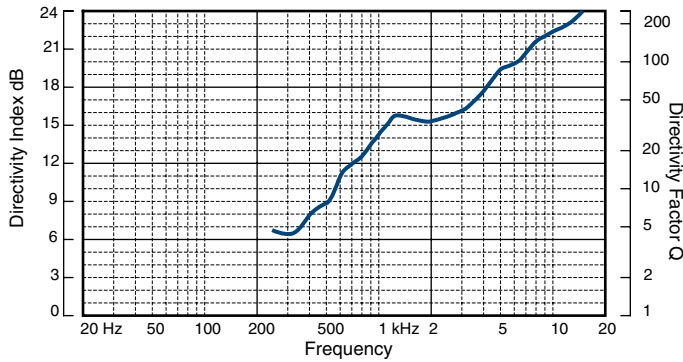
DIRECTIVITY ISOBARS



BEAMWIDTH



DIRECTIVITY

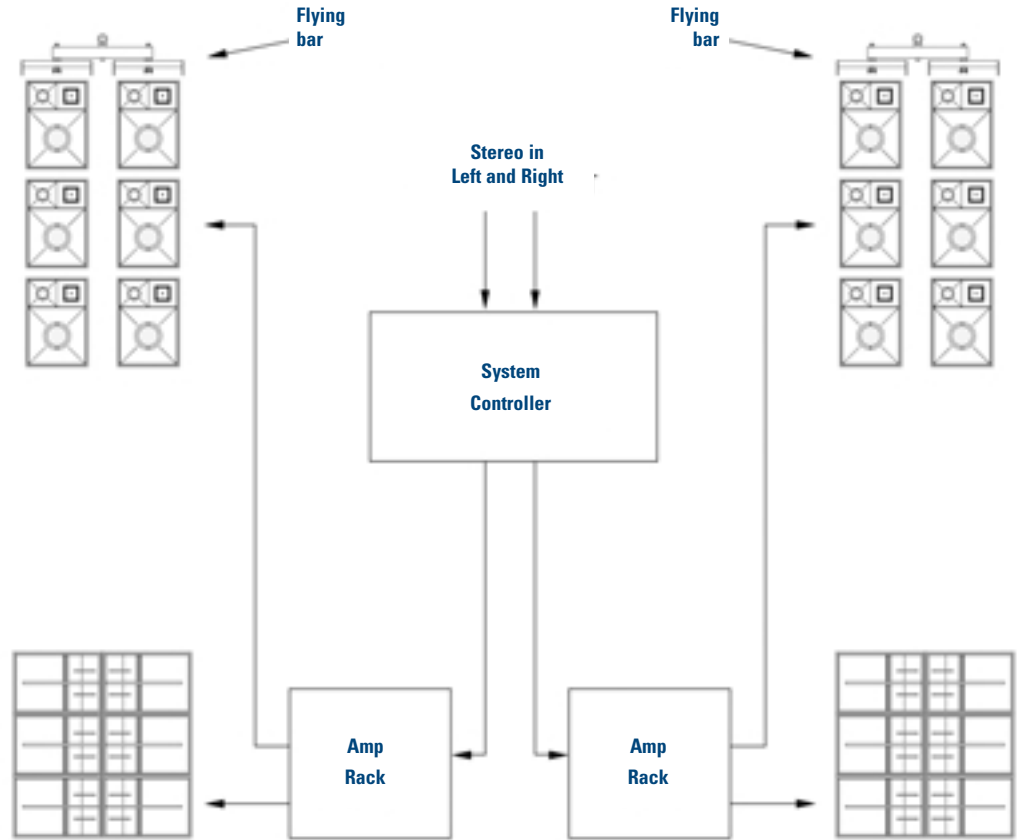


All the polar measurements were taken using Audio Precision and MLSSA test equipment, with a microphone placed at a distance of 4 metres from the rotational axis of the loudspeaker enclosure under test. This method reduces the effect that the interaction between the MF and HF has on the measurements. For clarity, the polar information is displayed with progressively thinner lines from 250Hz to 16kHz in third octave steps. The beam-width plots were computed from the third octave polars. The enclosures were measured in a half space environment. All polar information was gathered by Turbosound Research & Development, England. All graphs are digitally generated using the APEX custom software system, designed to translate data derived from Brüel & Kjær and Audio Precision "System One" test equipment into AutoCAD™. This program enables graphical information to be plotted to an accuracy of more than four decimal places.

NOTES ON MEASUREMENT CONDITIONS

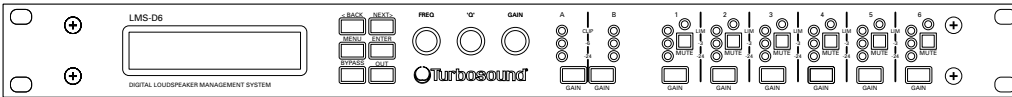
**SYSTEM MANAGEMENT
OVERVIEW**

A dedicated series of components provides amplification, system management and control for the Flashlight loudspeaker enclosures. The system accepts line level input signals, and takes care of all aspects of signal conditioning up to the loudspeaker input connectors.

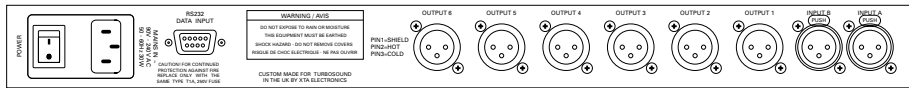


The LMS-D6 digital loudspeaker management system consists of two inputs and six outputs configured for control of all the signal, phase and time parameters required to operate the loudspeaker enclosures effectively. It comprises 24dB per octave Linkwitz-Riley crossovers, high performance limiters, variable delays, electronically balanced inputs and outputs, and a switching power supply that automatically adjusts to mains input voltages between 90 volts and 260 volts. It is supplied as a 1U high unit and has adjustable controls for time compensation when the TFS-780L bass enclosures are displaced relative to the TFS-780H mid-high enclosures. Two LMS-D6 controllers are required for a Flashlight system. No other signal conditioning or processing is necessary and the unit is supplied factory aligned, tested and ready for use.

SYSTEM MANAGEMENT



LMS-D6 FLASHLIGHT SYSTEM CONTROLLER



LMS-D6 TECHNICAL SPECIFICATIONS

44mm x 482mm x 300mm (1.75" x 19" x 11.8")
3.5 kg (7.5 lbs)
2 inputs, 6 outputs
±0.5dB, 20Hz - 20kHz
>110dB, 20Hz - 20kHz Unwtd.
<0.02% @ 1kHz, + 18dBu
10k ohms, electronically balanced
AC Mains 50/60Hz, 60V or 250V ±15%
<20 watts
(2) XLR 3 - 31 (3 pin female XLR type)
adjustable +15dB to -40dB in 0.1dB steps
Electronically balanced
(6) XLR 3 - 32 (3 pin male XLR type)
+20Bm into 600 ohms

DIMENSIONS (HxWxD)

NET WEIGHT

CROSSOVER TYPE

FREQUENCY RESPONSE

DYNAMIC RANGE

DISTORTION (THD)

INPUTS

POWER SUPPLY

POWER CONSUMPTION

INPUT CONNECTORS

INPUT GAIN

OUTPUTS

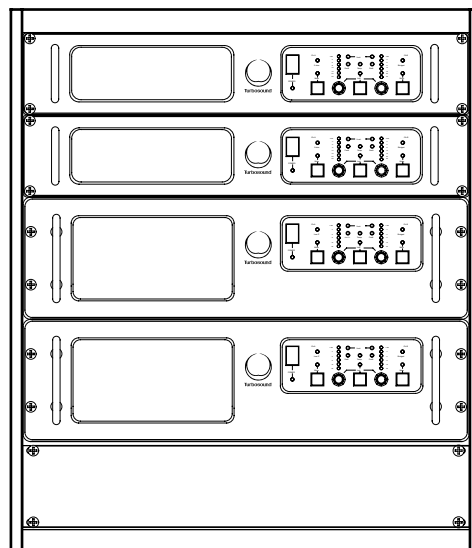
OUTPUT CONNECTORS

MAXIMUM OUTPUT LEVEL

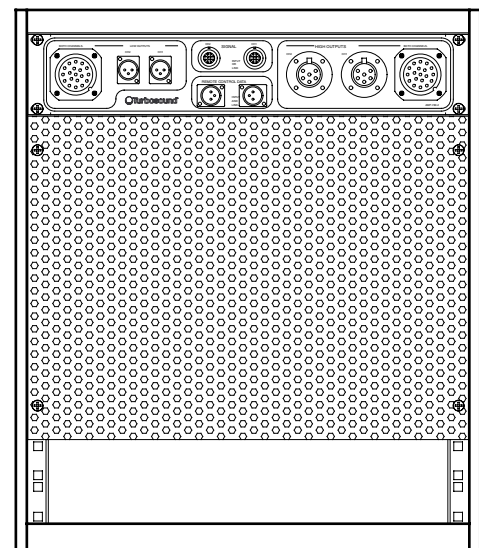
**SYSTEM
AMPLIFICATION RACK**

The Turbosound Flashlight System has been designed in conjunction with state-of-the-art power amplifiers. Four power amplifiers are supplied, housed in a 12U, steel spaceframe equipment rack. The standard configuration is: 2 x TMC-750 amplifiers (for high and high-mid), and 2 x TMC-1250 amplifiers (for low-mid and low). The power amplifiers occupy 10U of the total space available, 2U being devoted to incoming AC power distribution and multi-way signal and speaker connections. Removal of a bridging plug at the rear of the connector panel allows the rack to be used in two channel (stereo) mode. Remote control cards are fitted to each amplifier, enabling digital remote control and monitoring of Flashlight systems. The mains connection panel comprises a 'Wago' mains distribution block, mounted on a fully enclosed steel panel, with a captive cable fitted with a 'C-form' heavy duty mains connector. The system can be configured for either a single or three phase star supply. This will suit the majority of contemporary connection methods for both 110/120 volt and 220/240 volt mains.

Audio connections are made with the superb 12 pin Lemo video-type multi-connectors for line level inputs, and 19 pin 20A screw lock multi-connectors to carry the high level output signals. The rack is supplied with two 4 metre fan-outs; one multi-way to XLR for TFS-780L enclosures, and one multi-way to EP6 for TFS-780H enclosures. A 2.5 metre Lemo to Lemo signal cable is supplied with each rack for interconnection; custom stage return systems can be supplied to specific customer requirements. Socapex 19 way 2.5mm multi-core speaker extensions are optionally available in 12.5 metre or 25 metre lengths for flown speaker enclosures. Two 3-pin XLR connectors are provided for remote control input and link. The complete equipment rack is identical to previous BSS-equipped racks and is housed in a heavy duty road case with wheels and snap-back handles. CE certified racks are available for those countries where certification is required.



FRONT



REAR

**AMP-780.2
SPECIFICATIONS**

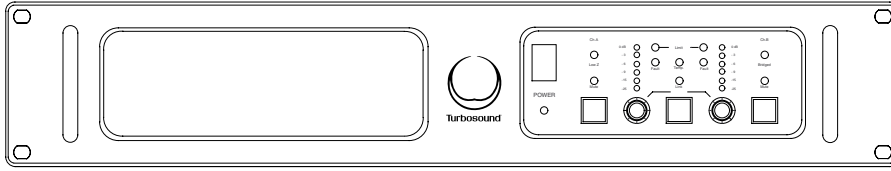
DIMENSIONS (HXWXD) (IN ROAD CASE) 800mm x 570mm x 820mm (31.5" x 22.4" x 33.3")

NET WEIGHT 196 kg (431 lbs)

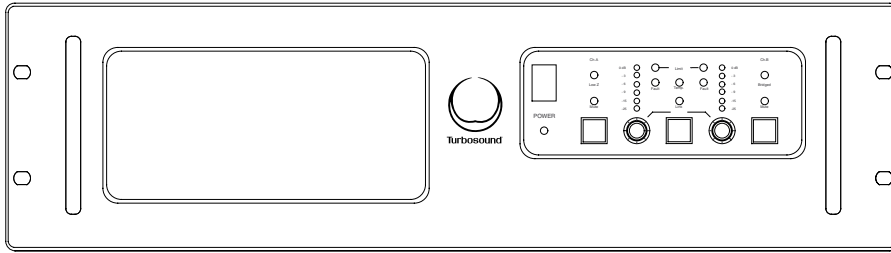
DIMENSIONS (HXWXD) (EXCL. ROAD CASE) 590mm x 512mm x 693mm (23.2" x 20.2" x 27.3")

NET WEIGHT 152kg (334 lbs)

POWER AMPLIFIERS



TMC-750



TMC-1250

TMC-750
DIMENSIONS (HxWxD)

88mm x 480mm x 410mm (3.5" x 19" x 16")

NET WEIGHT

22 kg (48.4 lbs)

POWER OUTPUT

Into 8 ohms: 425w/channel; Into 4 ohms: 750w/channel; Into 2 ohms: 750w/channel

CMRR

>90dB, 20Hz - 20kHz

CROSSTALK

Unmeasurable

NOISE

<-105dB relative to full output

DISTORTION

>0.1%, 20 - 20kHz at any level below clip. Typically 0.01%

POWER REQUIREMENTS

230V AC @ 10A max. or 120V AC @ 20A max

TMC-1250
DIMENSIONS (HxWxD)

130mm x 480mm x 460mm (5.1" x 19" x 18.1")

NET WEIGHT

32 kg (70.4 lbs)

POWER OUTPUT

Into 4 ohms: 1250w/channel; Into 2 ohms: 1800w/channel

CMRR

>80dB, 20Hz - 2kHz

CROSSTALK

Unmeasurable

NOISE

<-105dB relative to full output

DISTORTION

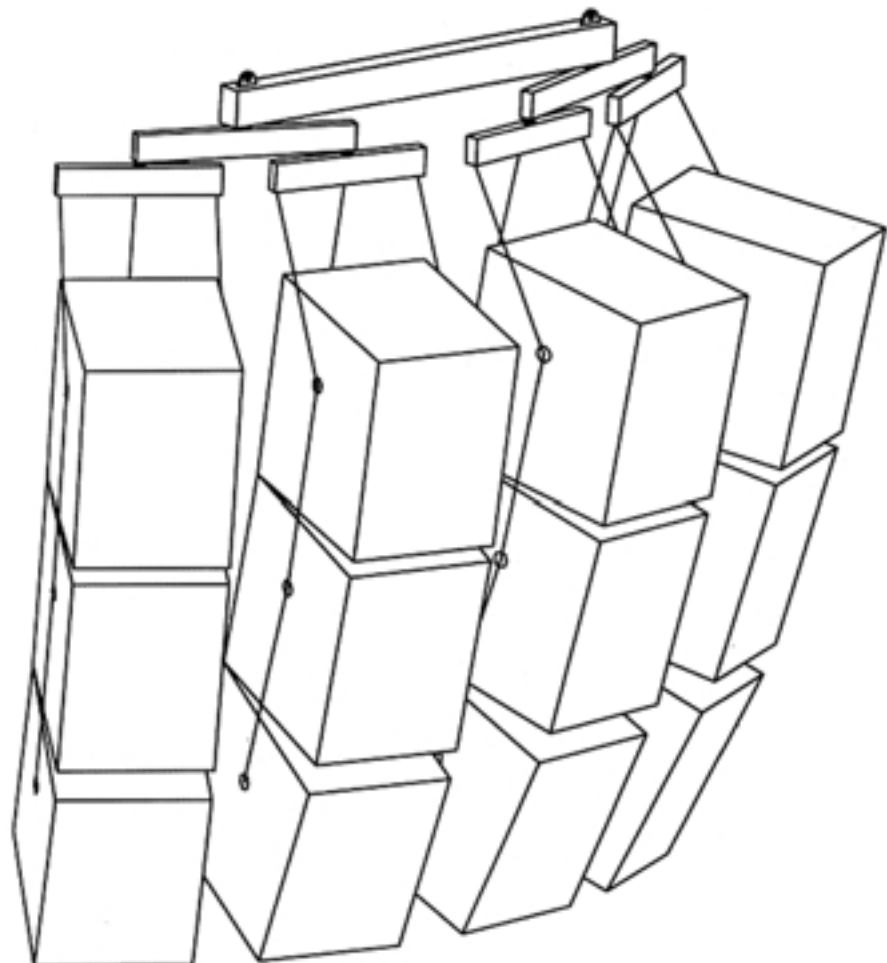
>0.3%, 20 - 20kHz at any level below clip

POWER REQUIREMENTS

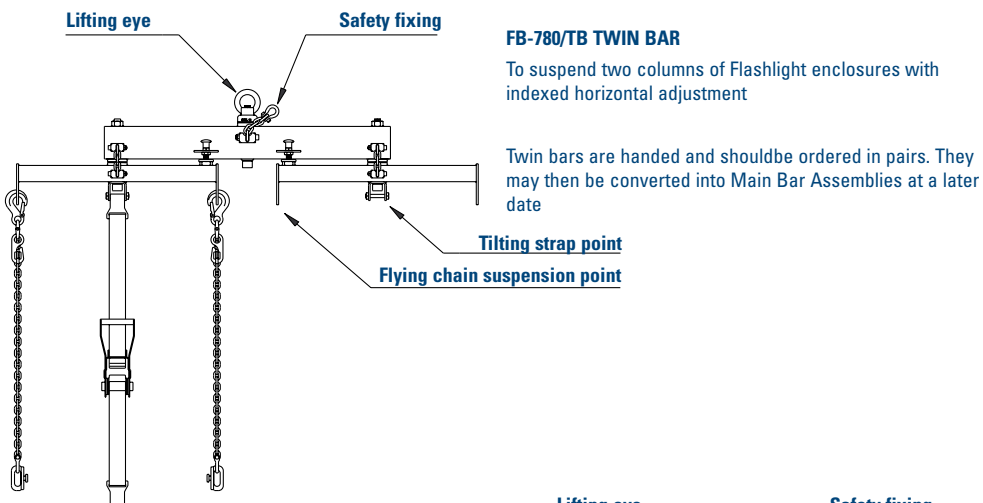
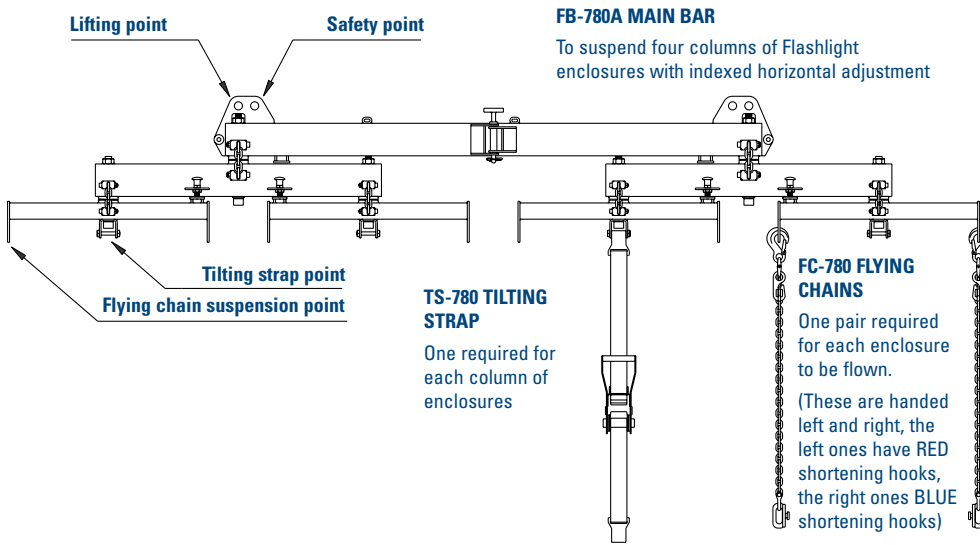
230V AC @ 20A max. or 120V AC @ 35A max

**FLYING AND LIFTING
 HARDWARE**

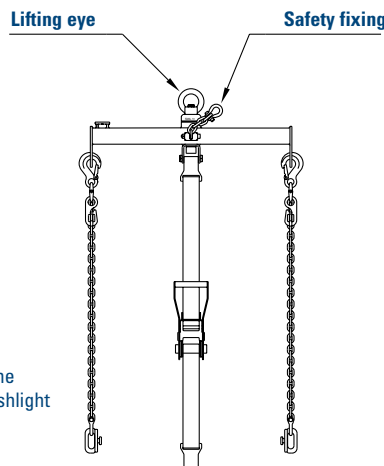
The Flashlight System may be supplied with a purpose designed lifting system which allows a wide range of adjustment to the horizontal and vertical angles between adjacent enclosures. The overall inclination between of each vertical column is also adjustable. Thus arrays can easily be achieved to suit a multitude of coverage requirements and allow the user to take advantage of the Proportional Directivity™ characteristics of the TFS-780H enclosures. Sound radiating from adjacent enclosures will successfully blend over a wide range of included angles, resulting in the ability to tailor not only the overall coverage, but also desired SPL at a distance. Most of the above adjustments may be made while the system is in the air and, because of the ingenious design of the flying hardware, the system will always remain in perfect physical balance. Horizontal adjustment is in 5° increments from 0° (transit position) to 30°, by swivel, locked by a spring loaded pin. Vertical adjustment between enclosures is from approximately 2° to 20° using the shortening hooks fitted to every enclosure's suspension chains. Vertical inclination of each column is continuously adjustable over an arc of approximately 45°; this will ultimately depend on the number of enclosures in a column, and is achieved with a ratchet strap. It is envisaged that this function may be motorised, and remote controlled to compensate for changes in atmospheric conditions. The TFS-780H and TFS-780L both fly with the same vertical orientation; in many situations it may be desirable to stack the low frequency enclosures on their sides.



**FLYING AND LIFTING
HARDWARE**



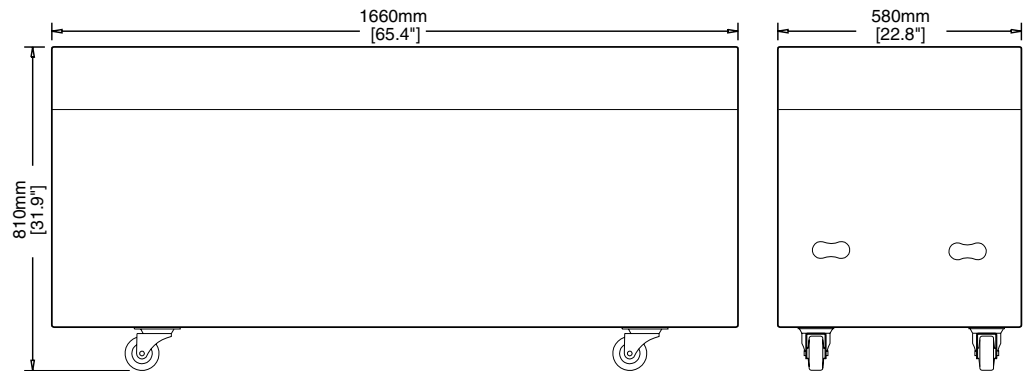
SINGLE BAR
To suspend one column of Flashlight



FT-780 FLY BAR TRUNK

A purpose designed fly bar trunk is optionally available, which is used to house and transport a single FB-780A main fly bar assembly reliably and safely. Space is also provided for stowing flying chain assemblies and tilt straps within compartments in the trunk, thereby allowing all the hardware necessary to fly a 4-wide Flashlight cluster to be transported in a single road case. The FT-780 is supplied complete with heavy duty wheels and recessed handles, and is finished in TurboBlue™ semi-matt paint.

DIMENSIONS



RT-8WAY & RT-16 WAY RETURNS SYSTEMS

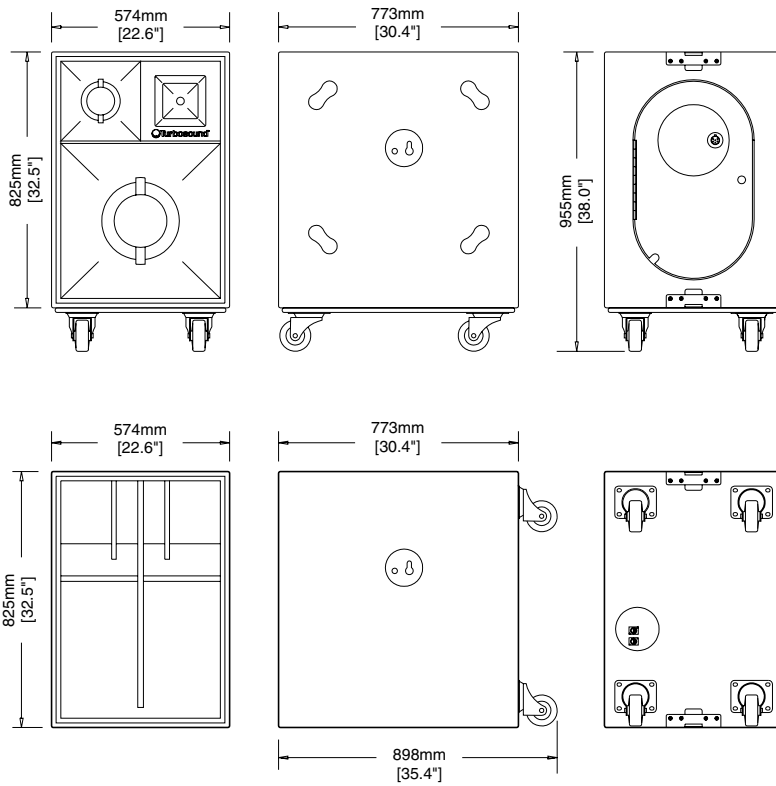
The Flashlight System may also be supplied with a custom returns cabling system to facilitate fast and reliable set-up and connections between system controller and amplifier racks, available in either 8-way or 16-way returns systems.

The RT-8WAY comprises to channels of 4-way signal connections, and consists of 100 metres of high quality signal returns cable with lemo connectors, two 25 metre cross-stage lemo cables and an XLR break-out panel, all housed in a rugged road case. The RT-16WAY comprises four channels of 4-way signal connections, a 100 metre lemo return cable, four 25 metre cross-stage lemo cables and an XLR break-out panel in a road case. The XLR break-out panel connects the LMS-700 controller (normally located at the main mix position) outputs to the multi-way lemo cable which feeds audio signal to the on-stage amplifier racks.



TFS-780H

DIMENSIONS



**ARCHITECTURAL
& ENGINEER'S
SPECIFICATIONS**

The loudspeaker system shall be of the quad-amped, four-way active type comprising: two loudspeaker enclosures loaded with patented TurboMid™ and TurboBass™ devices, high power stereo power amplifiers mounted in a 19" equipment rack sleeve and a system controller. All necessary system cables and connectors shall be included in the system. Performance specifications of a typical production unit shall meet or exceed the following:- Frequency response, measured with a swept sine wave input shall be flat within ±4dB from 50Hz to 20kHz. Dispersion, at -6dB points, shall average 25°H x 25°V. Total power handling shall be 975 watts r.m.s., 1950 watts program, 2450 watts peak. Sensitivity measured with 1 watt input at 1 metre distance on axis, mean averaged between 1kHz – 18kHz shall be 111dB. Maximum SPL (peak), measured with music program shall be 142dB. System component dimensions shall be as follows:-

TFS-780H: 825mmH x 574mmW x 773mmD (32.5" x 22.6" x 30.4")

TFS-780L: 825mmH x 574mmW x 773mmD (32.5" x 22.6" x 30.4")

AMP-780.2: 800mmH x 570mmW x 820mmD (31.5" x 22.4" x 32.3")

LMS-D6: 44mmH x 482mmW x 300mmD (1.75" x 19" x 11.8")

Total enclosure volume shall not exceed 0.366 cu. metres (12.9 cu ft) for the TFS-780H and TFS-780L. The loudspeaker system shall be the Turbosound Flashlight System. No other system shall be acceptable unless the above combined performance specifications are equalled or exceeded. Flying and installation hardware shall be available comprising a range of load-certified components.

