EMS-156 / 159

two-way passive fullrange loudspeaker

Product User Manual
v2 November 2019

EM ACOUSTICS

LOUDSPEAKERS REDEFINED

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DECLARATION OF CONFORMITY

The products contained within this manual conform to the requirements of the EMC Directive 89/336/EEC, amended by 92/31/EEC and to the requirements of the Low Voltage Directive 73/23/EEC amended by 93/68/EEC.

EMC Emission	EN55103-1:1996
Immunity	EN55103-2:1996
Electrical Safety	EN60065:1993

RECYCLING

This product and its packaging constitute the applicable product according to the WEEE directive. Please ensure that at the end of the working life of this product, it is disposed of sensibly in accordance with local and national recycling regulations. The packaging supplied with this product is recyclable. Please retain all packaging, however if disposing of this packaging please ensure that you comply with local recycling regulations. These products also all comply to the RoHS Directive 2002/95/EC.

1.0 - Introduction

Thank you for purchasing this highly acclaimed product from EM Acoustics. The EMS-156 and EMS-159 are identical loudspeakers except for their dispersion angles – as such throughout this manual when we refer to the EMS-159, we mean either the EMS-156 or EMS-159. This product has been designed and rigorously tested to give you the utmost in sonic performance and many years of reliable, trouble-free operation. Please take the time to read this user manual thoroughly to ensure you get the best performance from your system and to ensure you set it up correctly and safely. If you have any questions or are in any doubt whatsoever about any aspect of your new product, please do not hesitate to contact us directly or your local EM Acoustics representative.

The EMS-159 is a powerful 2-way loudspeaker, intended for a wide variety of audio applications – from main theatrical loudspeakers through larger-scale corporate A/V, right up to live music reinforcement either as a stand alone product or as fills for much larger systems. The robust enclosure houses a 15" neodymium LF drive unit and a 1.4" exit HF compression drive unit coupled to a rotatable constant coverage waveguide - 90° x 60° for the EMS-159, and 60° x 40° for the EMS-156. These two drive units are linked with an extremely comprehensive passive crossover network. This means the EMS-159 exhibits flat frequency and phase responses without the need of external corrective processing.

This manual contains all the information you should need on topics of set up, amplifier connection and basic service. If you feel we have missed anything, or you have a question not covered by this manual, please visit our website www.emacoustics.co.uk and send us a message or give us a call – we're only too happy to help.

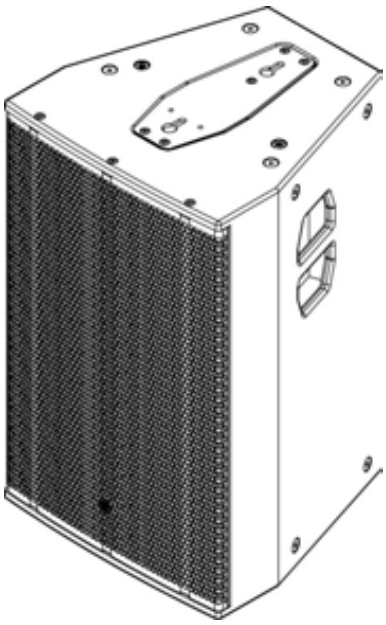
Unpacking

Please take care when unpacking your loudspeaker system. Once unpacked, please inspect each enclosure thoroughly for any transit damage and in the case of any damage please notify your carrier immediately. It is the responsibility of you, the consignee, to instigate any claim. Please retain all original packaging in case of future re-shipment.

2.0 – EMS-159/156 & Accessories

EMS-159

Compact passive loudspeaker



FEATURES & BENEFITS

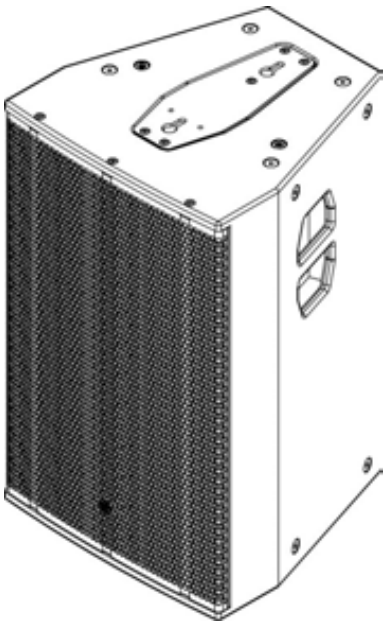
- Signature EM Acoustics "maximum headroom" design approach ensures consistency of performance regardless of SPL level.
- Quick-release "keyhole" flying plates for swift attachment of primary rigging accessories.
- Additional M10 threaded flying points for temporary and permanent installation.
- Enclosure coated with 3-step polyurethane process - ensuring the cabinets are not only weather resistant but more resilient to impact damage.
- Various rigging accessories available.
- Connections on NL4.
- Single amplifier channel required.

KEY SPECIFICATIONS

ENCLOSURE TYPE:	2-way passive, reflex loaded
DRIVE UNITS:	LF: 15" / HF: 1.4"
FREQUENCY RESPONSE:	65Hz – 20kHz +/-3dB
NOMINAL DISPERSION1:	90° x 60° rotatable
MAXIMUM SPL:	130dB continuous, 136dB peak
NOMINAL IMPEDANCE:	8 ohms
DIMENSIONS (HxWxD):	707 (27.8) x 440 (17.3) x 450 (17.7) mm/(ins)
NET/SHIPPING WEIGHT:	43/45kg (94.6/99lbs)

EMS-156

Narrow dispersion passive loudspeaker



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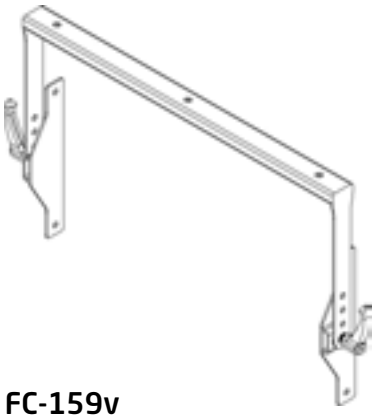
KEY SPECIFICATIONS

ENCLOSURE TYPE:	2-way passive, reflex loaded
DRIVE UNITS:	LF: 15" / HF: 1.4"
FREQUENCY RESPONSE:	65Hz – 20kHz +/-3dB
NOMINAL DISPERSION1:	60° x 40° rotatable
MAXIMUM SPL:	130dB continuous, 136dB peak
NOMINAL IMPEDANCE:	8 ohms
DIMENSIONS (HxWxD):	707 (27.8) x 440 (17.3) x 450 (17.7) mm/(ins)
NET/SHIPPING WEIGHT:	43/45kg (94.6/99lbs)

FC-159h

Horizontal flying cradle



The FC-159h is a simple and effective means of mounting the EMS-159 in both temporary and permanent applications.

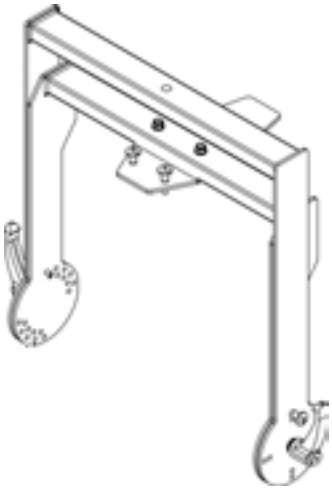
It is secured to the cabinet by means of M10 socket head bolts into the top and bottom of the loudspeaker to mount it in a landscape format. Multiple 13mm diameter holes are provided for attachment in installation or via a hook clamp or similar.

The FC-159h is designed to support one single EMS-159 loudspeaker.

Weight (including fixings) 8kg / 17.6lbs

FC-159v

Vertical flying cradle



The FC-159v is a simple and effective means of mounting the EMS-159 in both temporary and permanent applications.

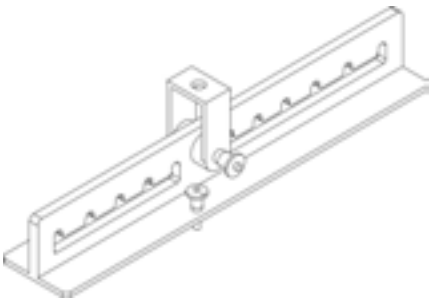
It is secured to the cabinet by means of bosses that engage into keyhole plates into the top or bottom of the loudspeaker to mount it in a portrait format. The frame is secured in place with quick-release ball-lock pins. A single 13mm diameter fixing point is provided at the top of the outer yoke for attachment either in installations or via a hook clamp or similar.

The FC-159v is designed to support one single EMS-159 loudspeaker.

Weight (including fixings) 9.5kg / 21lbs

VFA-159

Variable angle flying bracket



The VFA-159 is designed to allow the mounting of a single EMS-159 from a single point, where the angle is determined by the loudspeakers' own centre of gravity.

The mounting part can move between different locations, giving 25 degrees of uptilt or 30 degrees of downtilt in 5-degree increments.

The VFA-159 is secured to the top of the loudspeaker with the same boss/keyhole plate technique as the FC-159v.

The VFA-159 is designed to support one single EMS-129 loudspeaker.

Weight (including fixings) 3.5kg / 7.7lbs

CM-159

Column flying bracket

The CM-159 is designed to provide a means of mounting another loudspeaker directly below a flown MSE-159, in a safe and neat manner.

The CM-159 is secured to the bottom of the loudspeaker with the same boss/keyhole plate technique as the FC-159v and VFA-159, and then has a single 13mm diameter hole to bolt other loudspeaker cradles to.

The CM-159 is designed to support a load of up to 40kg.

Weight (including fixings) 2kg /4.4lbs

2.1 – Rotating the HF waveguide

The high frequency waveguide of the EMS-159 can be easily rotated to provide appropriate dispersion in both portrait and landscape formats.

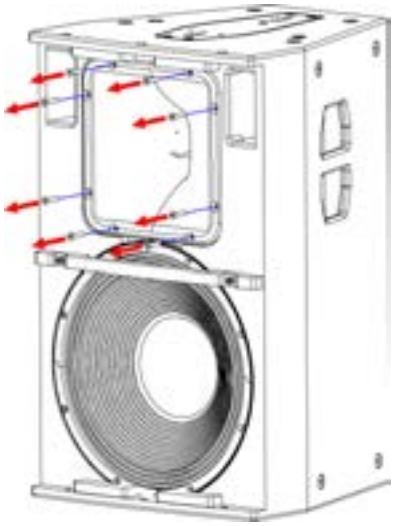
By default, the EMS-159 ships from the factory with the dispersion pattern 90° horizontal x 60° vertical when the loudspeaker is in a portrait format (60° horizontal x 40° vertical for the EMS-156).

To rotate the waveguide:

1. Follow step 1 in the servicing chapter (Chapter 7) to remove the grille.
2. Using a 4mm Allen key, remove the eight M6x40 countersunk socket head screws that secure the waveguide.
3. Lift the waveguide up from the enclosure to rotate through 90 degrees to the desired orientation - the label on the waveguide describes the orientation.
4. Once in the correct orientation, replace the M6x30 countersunk socket screws and retighten.
5. Replace the grille.

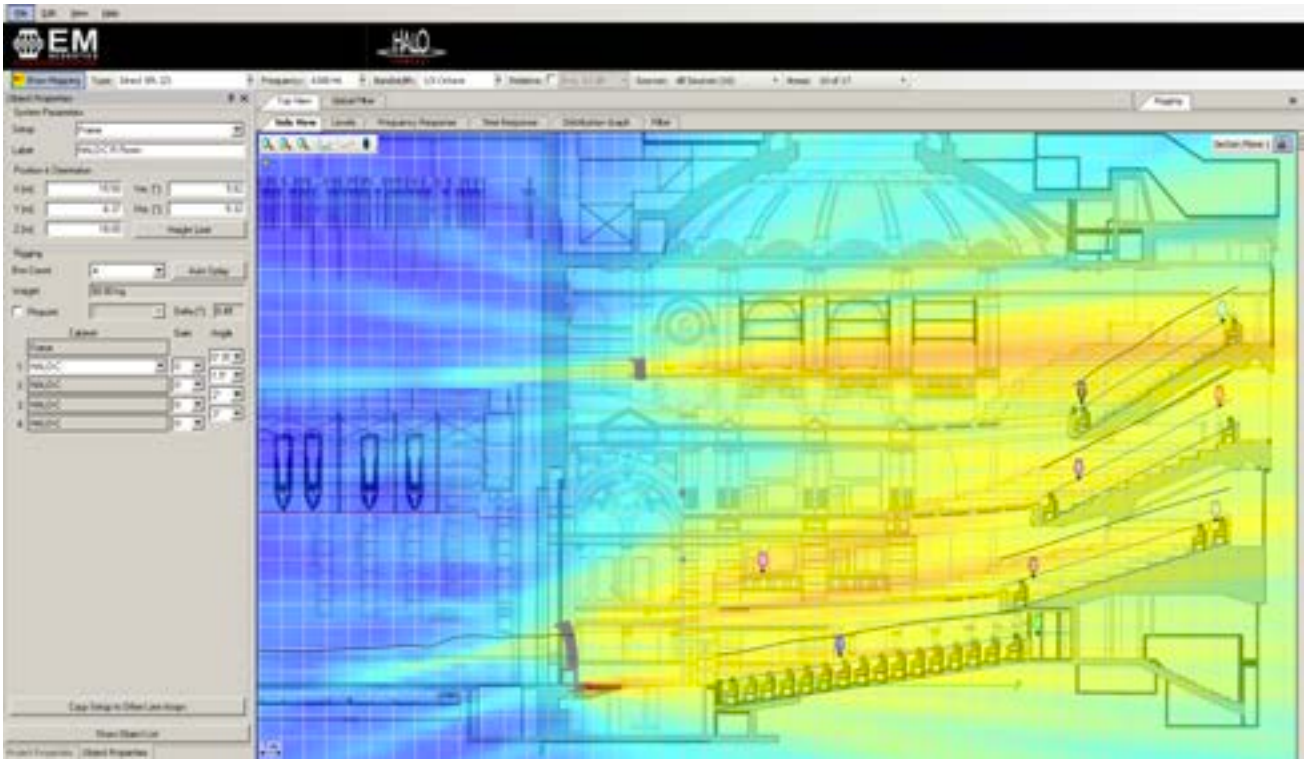
NOTE: Be careful not to over-rotate the waveguide in one particular direction to avoid over-tensioning the cables.

M6x40
countersunk socket screws



3.0 – Simulation

Ease Focus 3



For acoustic reasons it is advised that users familiarize themselves with Ease Focus 3 – this system provides the user with accurate simulations for setting up EMS-159 loudspeakers.

Ease Focus 3 can be downloaded for free from the AFMG website at http://focus.afmg.eu and is currently available as a stand-alone application for Windows (XP or Higher) only. It can also be downloaded directly from the EM Acoustics website with all the current product files embedded.

Tutorials for Ease Focus 3 are available from with the application itself.

For training on the design and implementation of EMS-159 loudspeakers including the specific use of Ease Focus 3, please contact your local distributor.

4.0 - Safety Considerations

General Considerations in use

Loudspeaker systems are potentially dangerous objects if used incorrectly. Please ensure that you read this section fully, and contact EM Acoustics or your local dealer should you be in any doubt over correct operation procedures.

Personal Injury

Never stand in the immediate vicinity of loudspeakers when in use at high level. Professional loudspeaker systems are capable of producing sound pressure levels which can cause permanent damage to human hearing. Levels in excess of 90dB can cause hearing damage if people are exposed to them over a long period of time, so care and attention must be used for both staff and audience members.

When deploying loudspeaker systems on the ground or when flown, please take careful note of the following important safety considerations:

- Only use accessories and flying hardware supplied or approved by EM Acoustics for flying or transporting loudspeaker systems. Pay close attention to specific instructions, especially those considering maximum load capabilities as detailed in the appropriate user manuals or on the legend labels on the accessories themselves.
- Ensure all additional accessories, fasteners and secondary safeties are of an appropriate size, working load limit and safety factor.
- All loudspeakers and accessories should be regularly inspected for signs of wear and tear, and any damaged parts should be replaced.
- All load bearing parts and assembly bolts on accessories should be regularly checked to ensure they are tight and not worn.

Stand Mounting

When mounting loudspeakers on a stand, please take note of the following important considerations:

- Ensure your stand height is locked off and the tripod legs are positioned so as to be stable.
- Check the weight loading of your stands before attempting to mount the loudspeaker.
- Do not stack a second loudspeaker on top of the stand-mounted one.
- Ensure cables are run so as to leave enough slack to enable neat wiring, and thus reduce the risk of the speaker being pulled over. Loose cables should be covered or taped down wherever possible to reduce trip hazards.
- If stands are being used outdoors, it may be necessary to add ballast to the base of the stand to prevent it toppling over.
- When using poles on top of subwoofer systems, please observe similar precautions.

Ground Stacking

- Ensure that the floor or stage surface can withstand the weight of the system.
- Wherever possible, avoid high stacks and use ratchet straps to secure loudspeakers together. Please also remember that vibrations from subwoofer systems can shake other loudspeakers out of place, which may present a toppling hazard. The use of ratchet straps and non-slip material is recommended to prevent this.

Rigging and Suspension

Please see Chapter 5 for further information on the detailed rigging options for your loudspeaker system.

WARNING: The overhead suspension of loudspeakers is a very serious issue with potentially lethal consequences should anything go wrong. Rigging should only be carried out by experienced personnel following safe working practice. Should you be in any doubt whatsoever, please contact your local dealer who will be able to refer you to a suitable rigging company.

To ensure the highest standards of safety, the following information on array assembly must be exactly followed and understood.

Only use EM Acoustics recommended rigging hardware and accessories, which are specifically designed for the purpose. Do not use these accessories for any other loudspeaker system – the components are specifically designed to work with this product and are not interchangeable with any other EM Acoustics loudspeaker product (unless where specifically stated) or any other loudspeaker system. The use of EM Acoustics accessories with other manufacturers' systems may compromise the safety standards and EM Acoustics is in no way liable for any loss, damage or injury caused by such practice.

Do not modify or alter the EMS-159 loudspeaker or accessories, nor use them in any way other than that described in this manual. Rigging components supplied with the EMS-159 are in no way interchangeable and should not be used as such.

The component parts of the EMS-159 and its accessories should only be assembled in the manner described in this manual, using the fasteners and fixings stated herein. The use of fasteners and methods of assembly not described in this manual may result in an unsafe assembly and as such EM Acoustics will not be responsible for any loss, damage or injury caused by such practice. Welding, drilling or any other means of modifying any part of the flying hardware or permanently fixing components to each other is strictly forbidden.

Rigging assemblies must only be assembled using the appropriate parts and fixings as described in this manual, explicitly following the assembly instructions given herein. Rigging components must only be fixed to the EMS-159 loudspeaker, using the correct cabinet location points, assembly methods and fasteners specifically described within this manual.

Walls, floors and ceilings must be capable of supporting the actual load placed upon them. The rigging hardware must be safely and securely fixed to both the loudspeaker system and the supporting structure.

Secondary Safeties

It is imperative that all loudspeakers flown in any given environment should be provided with a second, independent and properly rated safety suspension point in addition to the principle load bearing means of suspension. Steel wire ropes or steel chains of an approved construction and load rating only may be used as secondary safeties. Plastic covered steel chains may not be used as secondary safeties under any circumstances. Also ensure that all local and national laws are complied with when determining your primary and secondary suspension points.

Safety Inspections

Carefully inspect all flying system components prior to use for defects or signs of damage prior to installing or mounting your loudspeaker. If any components damaged or **you suspect them to be damaged, DO NOT USE THEM.**

Regular scheduled tests – which are much more rigorous than visual inspections – of all rigging components must also be carried out. Safety legislation, and test/inspection requirements, will vary from country to country and as such it is the user's responsibility to ensure that local regulations are adhered to. In most cases, annual independent tests & inspections carried out by a suitably approved and qualified inspector will be required.

EM Acoustics recommends detailed logbooks be kept of all inspections and load tests to ensure an accurate record is kept of the testing for each EM Acoustics rigging accessory.

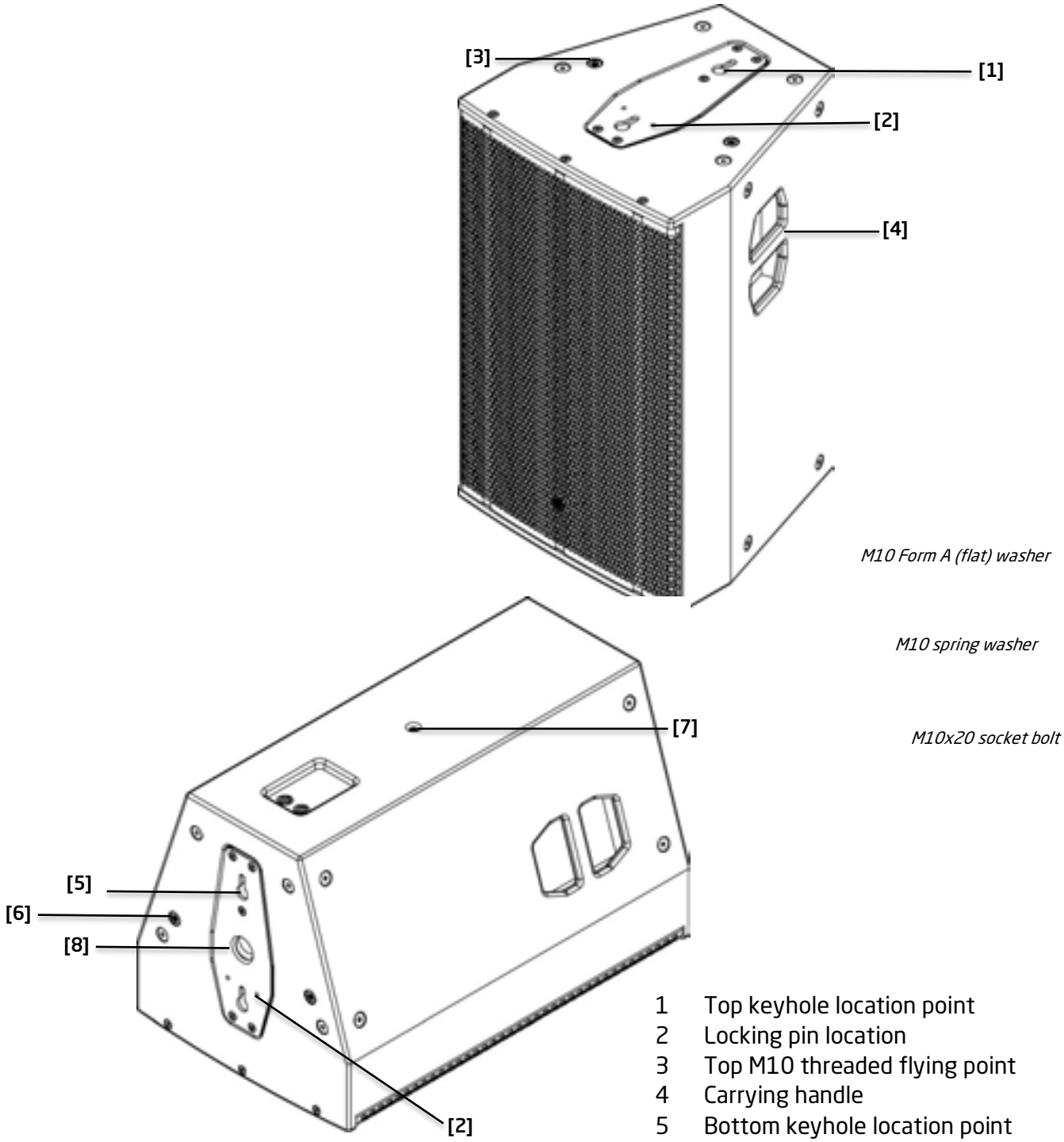
When flying any loudspeaker system, always wear protective headwear, footwear and eye protection in accordance with local regulations.

Material Damage from Magnetism

Loudspeakers produce a static magnetic field at all times – even when not in use. Certain devices are susceptible to external magnetism, and as such a safe distance should be maintained to prevent damage. It is recommended that a safe distance of 0.5m (1.5ft) is maintained from loudspeakers when stored, transported and in use, from devices such as computer hard drives, magnetic media, bank cards to remove the risk of corruption. Larger distances may be required for some older cathode ray tube displays.

5.0 – Rigging & Mounting Options

5.1 – EMS-159 Cabinet Overview



M10 Form A (flat) washer

M10 spring washer

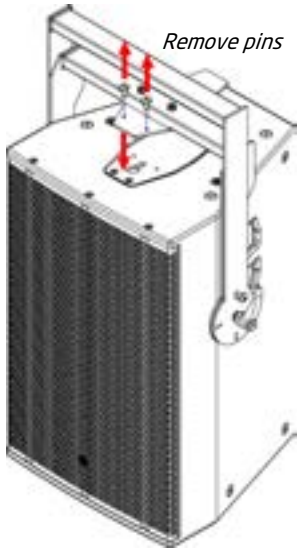
M10x20 socket bolt

1 Top keyhole location point
2 Locking pin location
3 Top M10 threaded flying point
4 Carrying handle
5 Bottom keyhole location point
6 Bottom M10 threaded flying point
7 Rear M8 safety point
8 Polemount

5.2 – Using the FC-159v

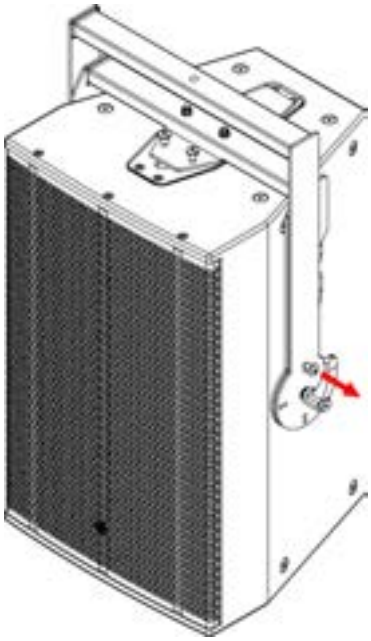
The FC-159v is intended to mount the EMS-159 vertically – either using a hook clamp or similar from above.

Firstly, assemble the mounting plate to the inner yoke as per the instructions supplied with the FC-159v.



Remove the two ball-lock pins at the front of the cradle as shown below. Align the FC-159v with the EMS-159 loudspeaker, and lower the cradle so that the bosses engage into the large opening in the keyhole shape.

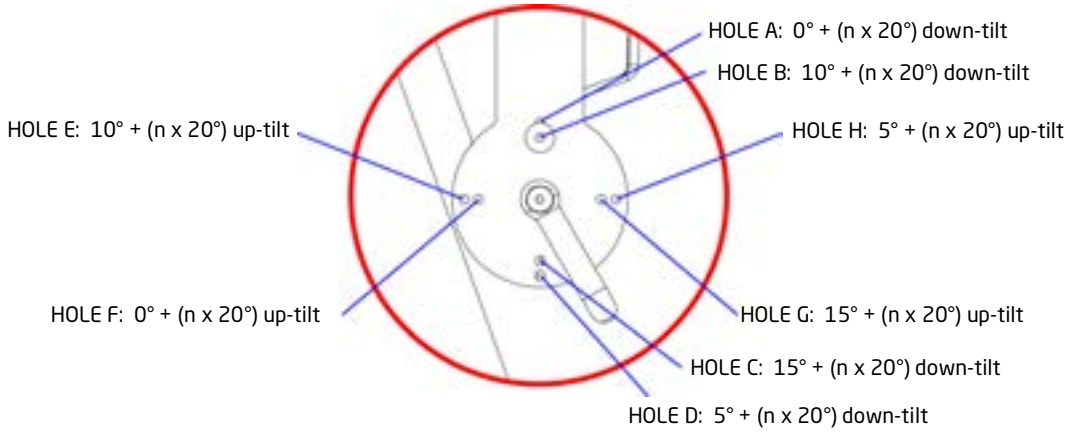
Next, slide the cradle assembly backwards as far as it will go. This will then align the two ball-lock pin holes and will allow you to engage the ball lock pins, securing the frame to the loudspeaker.



To set the angle, remove the ball-lock pins on both sides, and undo the locking handle. The loudspeaker can then be angled as desired, and the ball-lock pins reinserted to provide a secondary and easily repeatable angle setting.

5.2.1 – FC-159v Angle Setting

The holes on the pivots of the FC-159v allow quick and repeatable angle setting when in use, and the pins provide a secondary means of ensuring the angle remains set.



As the inner yoke rotates, different holes become available to secure in place. To give further explanation, holes A-D are for down-tilt angles, and holes E-H are for up-tilt angles.

Hole A is used for 0 degrees, and for multiples of 20 degrees of down-tilt onwards (0, 20, 40, 60, 80 degree down-tilt).

Hole B is used for 10 degrees, and for multiples of 20 degrees of down-tilt onwards (10, 30, 50, 70, 90 degree down-tilt).

Hole C is used for 15 degrees, and for multiples of 20 degrees of down-tilt onwards (15, 35, 55, 75 degree down-tilt).

Hole D is used for 5 degrees, and for multiples of 20 degrees of down-tilt onwards (5, 25, 45, 65, 85 degree down-tilt).

Hole E is used for 10 degrees, and for multiples of 20 degrees of up-tilt onwards (10, 30, 50, 70, 90 degree up-tilt).

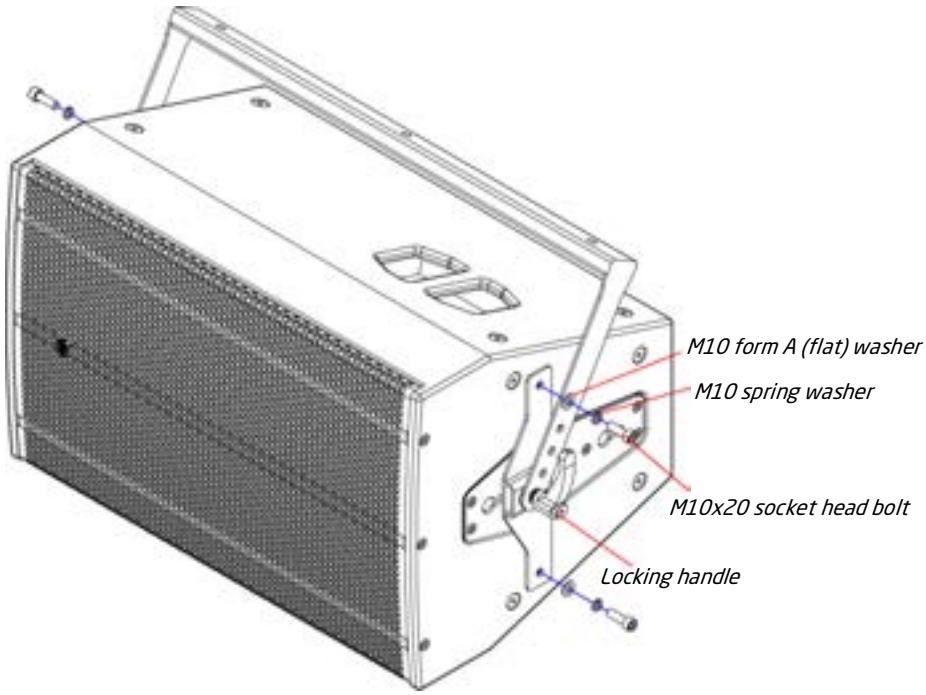
Hole F is used for 0 degrees, and for multiples of 20 degrees of up-tilt onwards (0, 20, 40, 60, 80 degree up-tilt).

Hole G is used for 15 degrees, and for multiples of 20 degrees of up-tilt onwards (15, 35, 55, 75 degree up-tilt

Hole H is used for 5 degrees, and for multiples of 20 degrees of up-tilt onwards (5, 25, 45, 65, 85 degree up-tilt).

5.3 – Using the FC-159h

The FC-159h is intended to mount the EMS-159 horizontally. To fit, lie the EMS-159 on its side and loosen the locking knobs so that the mounting plates can be rotated to allow access to the mounting bolt holes. Line the flying cradle up with the mounting holes and secure to the EMS-159 with M10x20 socket head bolts.

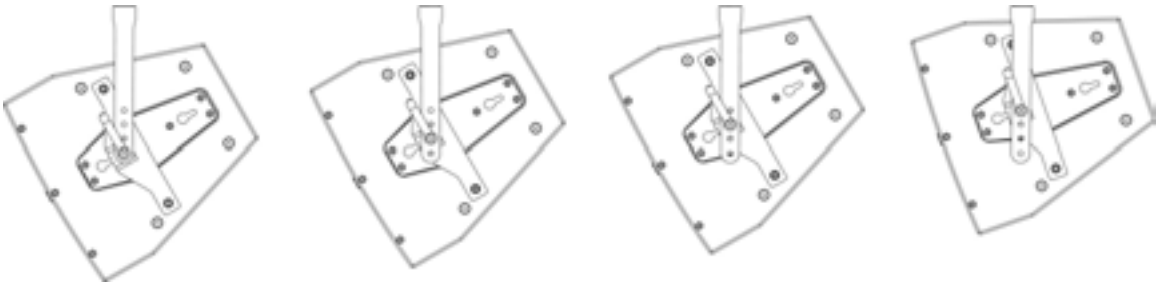


Ensure that the washers are in the correct order – form A (flat) in contact with the frame, and then the spring washer between the flat washer and the locking handle. Tighten the handles on both sides to lock the desired angle for the EMS-159.

Always ensure that a secondary safety is used when suspending any loudspeaker.

5.3.1 – Drop height adjustment on the FC-159h

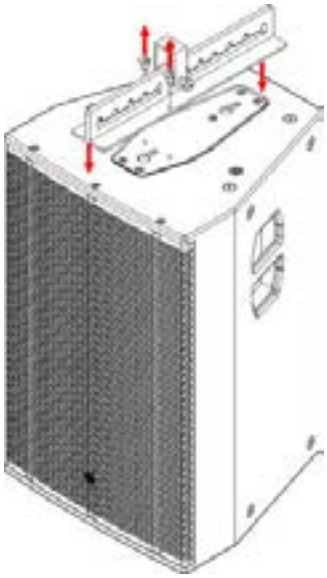
Different location holes for the mounts to pivot in are provided on the FC-159h mounting yoke. Position 1 (closest to the end of the yoke arms) allows full 360° rotation of the loudspeaker, and positions 2-4 offer a closer fit to the yoke, but with reduced rotational ability of the loudspeaker itself.



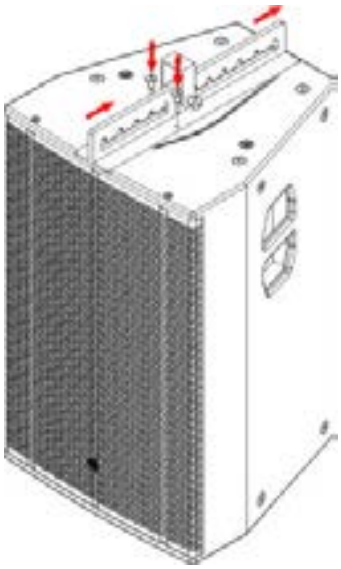
Position #1 *Position #2* *Position #3* *Position #4*

5.4 – Using the VFA-159

The VFA-159 is designed to suspend the EMS-159 from a single point, using the centre of gravity of the loudspeaker to determine the up or down tilt angles. A moveable pickup point allows setting of the angle in 5-degree increments from +25° to -30°.

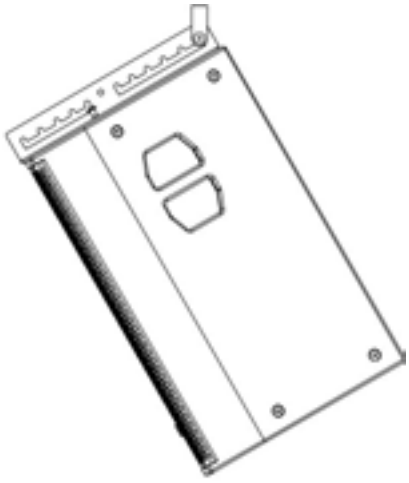


Remove the two ball lock pins from the VFA-159, and lower it into position so that the bosses engage in the large diameter opening in the keyhole plate.



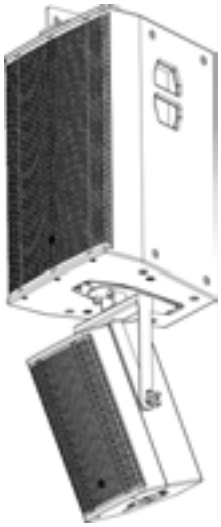
Slide the VFA-159 assembly toward the back of the EMS-159 until it will go no further – the holes should then line up to insert the ball-lock pins back in place and lock the VFA-159 to the EMS-159 loudspeaker.

Select the appropriate pickup point for your desired hanging angle. The central hole in the spine is for 0-degree flying. The track to the front is for up-tilt, and the track to the rear is for down-tilt – both in 5-degree increments. The furthest hole location forward gives +25°, and furthest location backward gives -30° of angle.



5.5 – Use with the CM-159 column mount

The CM-159 is intended to allow other loudspeakers to be swiftly and safely mounted below a flown EMS-159.



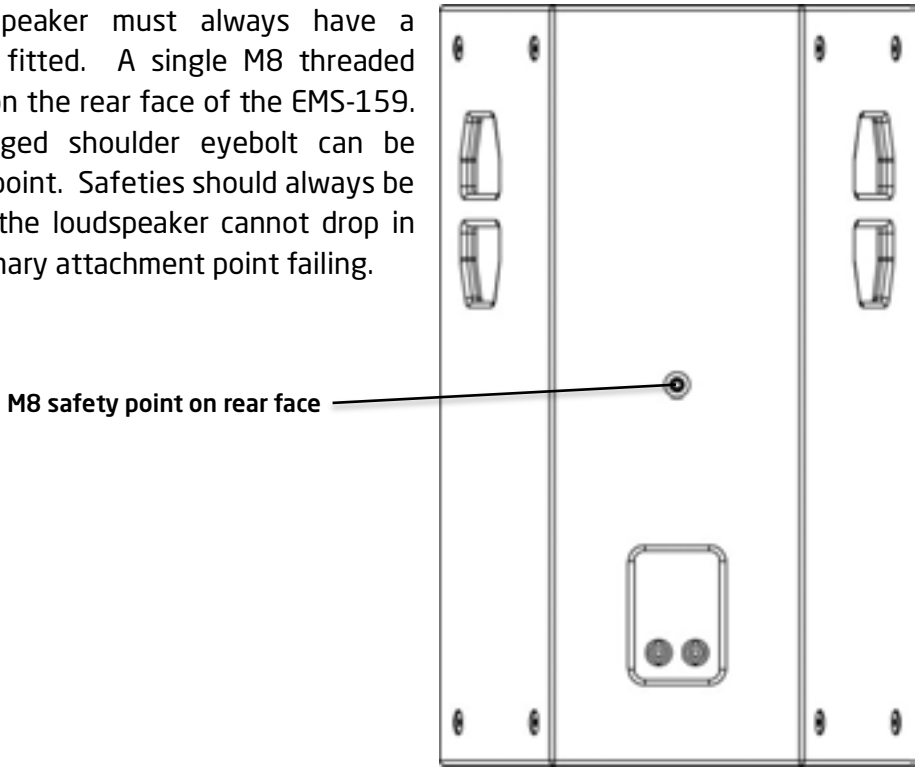
The CM-159 attaches to the underside of the EMS-159 in exactly the same way as the FC-159v or VFA-159 – removing the two locking pins, engaging the bosses and sliding to the rear of the loudspeaker, and re-engaging the pins to secure it in place.

The flying cradle of the loudspeaker to be flown underneath can then be bolted to the mounting bracket on the CM-159.

The under-flown loudspeaker must still have an independent safety, secured to the structure it is being flown from.

5.6 – Safety Point

Any flown loudspeaker must always have a secondary safety fitted. A single M8 threaded point is provided on the rear face of the EMS-159. A simple M8 forged shoulder eyebolt can be screwed into this point. Safeties should always be arranged so that the loudspeaker cannot drop in the event of a primary attachment point failing.



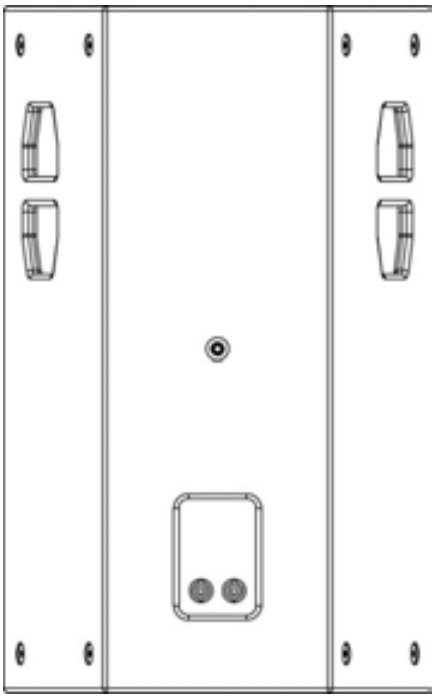
6.0 – Powering the System

The EMS-159 can be powered from any amplifier & DSP combinations with the relevant high & low pass filter, and limiter settings. However, due to the self-contained nature of the package, the use of DQ Series advanced system amplifiers is highly recommended. The use of DQ Series amplifiers provides a neat and flexible system that will encompass all requirements for the system to function correctly, as well as providing user control for room EQ and system alignment.

6.1 - Amplifier and Processing Requirements

6.1.1 - Connections

The EMS-159 requires only a single amplifier channel. Inputs to the EMS-159 enclosure are on Neutrik SpeakON NL4 as illustrated below.



Two-core cable should be used for connecting EMS-159 loudspeakers, and the connections are as follows:

SpeakON connection	1+	1-	2+	2-
Drive unit connection	LF +	LF -	Link Through	Link Through

6.1.3 – Amplifier Requirements

The EMS-159 is a highly efficient loudspeaker, however appropriate available power is critical to ensure full system headroom. It is good practice to ensure that your amplifier can deliver at least double the RMS power handling of the loudspeaker to ensure full headroom, and as such the amplifier requirement is:

Product	RMS Power Handling	Recommended Min. Amplifier Power
EMS-159	750W @ 8 ohms	1500W @ 8 ohms

A loudspeaker is far more likely to be damaged by an under-powered amplifier working too hard, than an over-powered amplifier working well within its limits.

All of the DQ Series advanced system amplifiers can be used to power the EMS-159.

The following table shows the maximum number of EMS-159 that can be connected per channel on the various different amplifiers:

Amplifier	Max EMS-159 per channel
DQ6	1
DQ10	2
DQ20	3

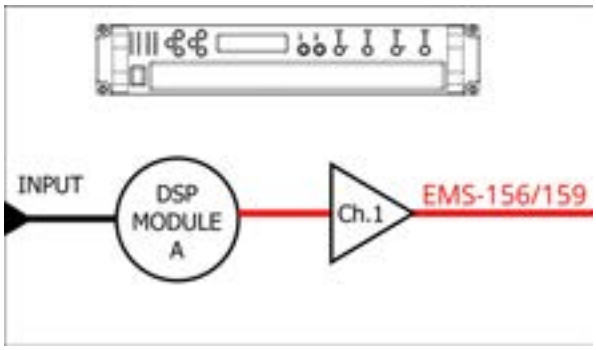
6.1.4 – Processing Requirements

Whilst the EMS-159 is a passive loudspeaker and therefore requires no corrective processing, in all but the lowest SPL applications it does require an active high pass filter and appropriate limiter settings to avoid damage. If not using DQ Series amplifiers, or the DSC48 Digital System Controller, then a suitable DSP system must be used in conjunction with your EMS-159 to prevent damage to the loudspeaker. Check the EM Acoustics website for the most up-to-date DSP settings for the EMS-159.

6.2 - Presets and Settings

6.2.1 – Standard EMS-159 Preset

When used with a DQ Series amplifier EMS-159 loudspeakers require only a single amplifier channel, and as such the preset recalled will only require one output from your DQ Series amplifier.



6.2.2 - Geometric Delay

Appropriate delay will need to be applied to account for physical location differences between different elements of your system – for example time-aligning subwoofers to the main system. The use of SMAART or similar can make this task a great deal simpler and faster.

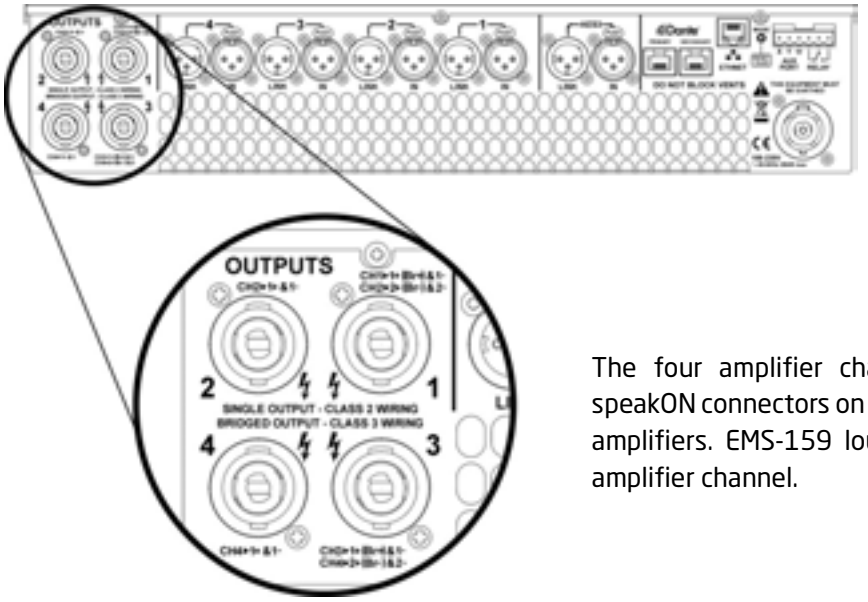
6.2.3 - Applying EQ

The presets are intended to be a starting point for your system and will almost certainly require tuning on-site dependent on room characteristics, the rest of your system design and the system voicing you are aiming for. The EMS-159 is designed with a significant amount of system headroom, so applying EQ is perfectly acceptable within sensible limits.

6.3 - Use with the DQ Series Advanced System Amplifiers

The EMS-159 will perform best when using DQ Series advanced system amplifiers, as not only are they state-of-the-art amplifiers, but the onboard DSP provides appropriate high/low pass filter settings and limiters to get the best from your subwoofers. Please refer to the DQ Series User Manual for detailed information on using the amplifiers and the System Engineer software.

6.3.1 - Connections



The four amplifier channels appear on four speakON connectors on the rear of the DQ Series amplifiers. EMS-159 loudspeakers require one amplifier channel.

6.3.2 - Preset Recall

The EMS-159 preset is pre-installed on the DQ amplifiers, and as such can be used following the normal preset recall procedure. The presets available are:

EMS-159.full Standard EMS-159 preset

EMS-156.full Standard EMS-156 preset

As mentioned above, these presets are intended to be a starting point and additional work may be required depending on the venue, the style of content and the end result you are looking for.

6.4 - System Connectivity

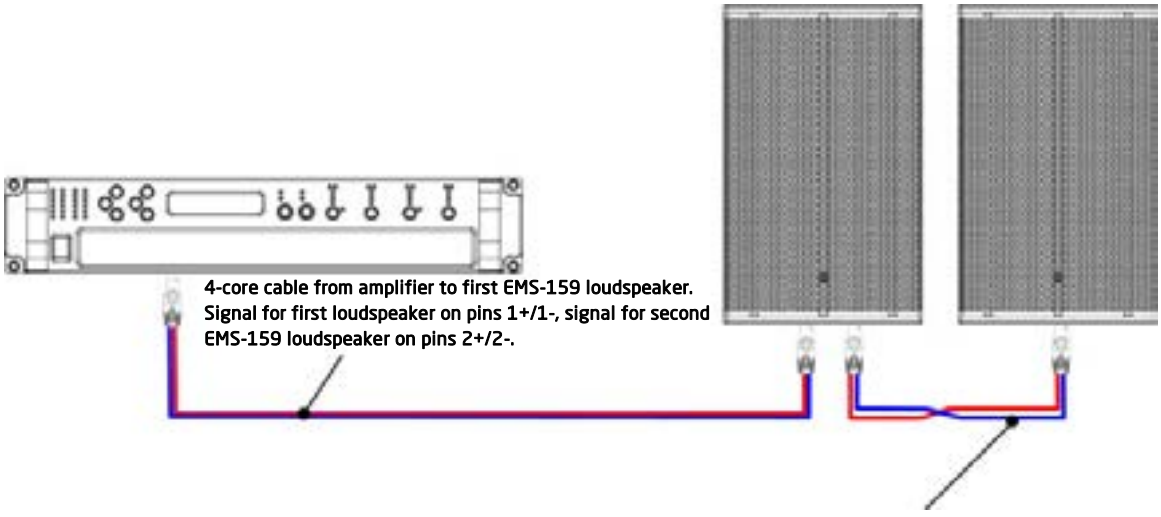
6.4.1 - Cable Length and Specification

All cables add to the system impedance, and as such careful selection is required depending on your amplifier setup and overall system impedance. Cables with a cross sectional area of less than 2.5mm^2 should not be used. Recommended maximum cable lengths are given below:

Conductor Area	Maximum Recommended Cable Length		
	2 ohms	4 ohms	8 ohms
2.5mm^2 (14 AWG)	15m	30m	60m
4.0mm^2 (12 AWG)	20m	40m	80m
6.0mm^2 (10 AWG)	30m	60m	120m

6.4.2 – Crossover Cable Use

The use of a pin-swap or "crossover" cable can allow for neater cable solutions when sending different amplifier signals to the same location. Because pins 2+/2- are linked through inside all EM Acoustics loudspeakers, using a 4-core cable to one loudspeaker (carrying two different signals) allows a crossover cable to be used to link out of the first loudspeaker into another, thereby feeding it from a separate signal.



Crossover cable specifications

Connector A Pin	Connector B Pin
1+	2+
1-	2-
2+	1+
2-	1-

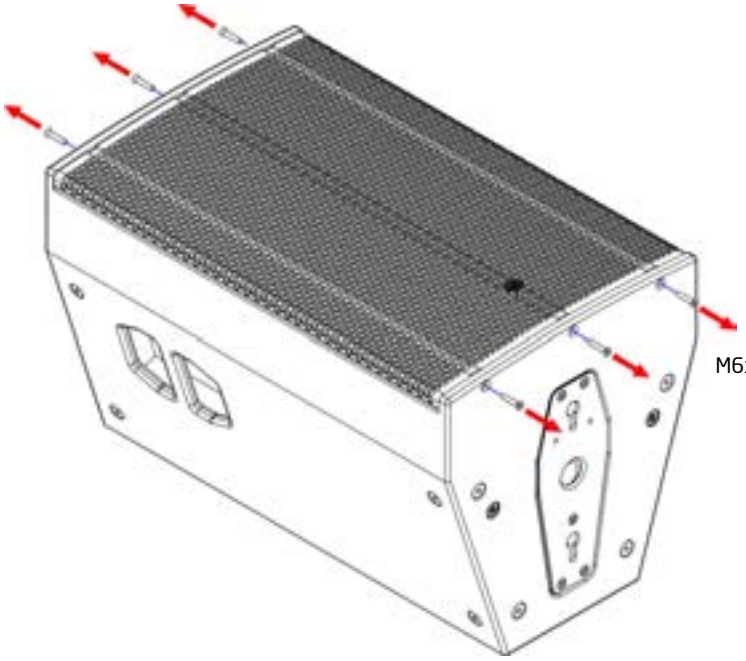
7.0 – Servicing Information

All EMS-159 components can be removed for service purposes if required, using the minimum of tools.

7.1 – EMS-159: Removing the grille

TOOLS REQUIRED: 4mm Allen key

1. Lie the enclosure on its' back and remove the three M6x30 countersunk socket screws from each end using a 4mm Allen key, and then lift the grille clear of the cabinet.

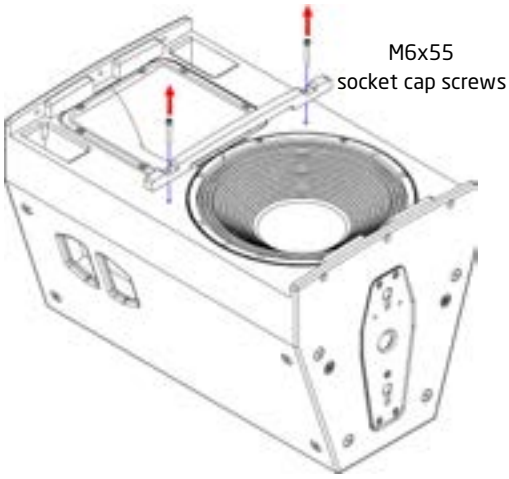


2. To replace the grille, position the grille on the front of the EMS-159 and ensure the threaded fittings on the grille are lined up with the mounting holes – gentle pressure may be required. Replace all of the M6x30 countersunk socket screws and ensure they are all are started in their threads before beginning to tighten. Ensure they are all tightened evenly so that the grille sits straight and does not rattle. Be careful not to over-tighten as this will distort the grille.

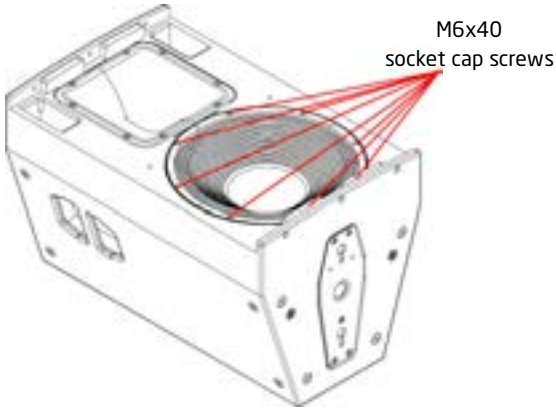
7.2 – EMS-159: Removing the LF drive unit

TOOLS REQUIRED: 5mm Allen key

1. Complete step 7.1 above to remove the grille.
2. Using a 5mm Allen key, remove the two M6x55 socket cap screws that secure the brace in front of the drive unit. Ensure that you collect both the spring washers and the flat washers as well as the machine screws. Lift the brace clear of the cabinet.



3. Using a 5mm Allen key, remove the eight M6x40 socket cap screws that secure the LF drive unit. Ensure that you collect the spring washers as well as the machine screws.



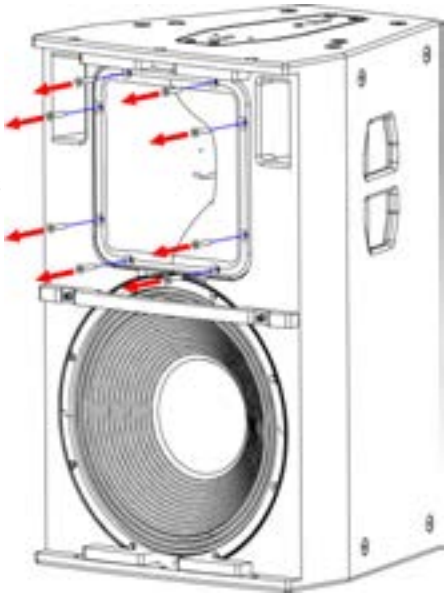
4. Lift the drive unit clear of the mounting hole and disconnect the cables – note the polarity for reconnection (brown to LF positive, blue to LF negative).
5. To replace the drive unit, ensure the 15" gasket is intact and complete – replace if necessary. Reconnect the cables to the drive unit (note the polarity detailed above) and then sit the drive unit into its mounting location, ensuring that the mounting holes line up.
6. Replace the M6x40 socket cap machine screws with their spring washers and ensure all machine screws are started in their threads before tightening. Tighten opposing bolts, working around the drive unit until all bolts are appropriately tightened. Be careful not to overtighten as this will distort the drive unit chassis.
7. Replace the support brace.
8. Replace the grille as described above.

7.3 – EMS-159: Removing the HF drive unit

1. Complete step 7.1 above to remove the grille.

2. Using a 4mm Allen key, remove the eight M6x40 countersunk socket screws that secure the waveguide.

M6x40
countersunk socket screws



3. Lift the drive unit clear of the baffle and disconnect the cables – note the polarity for reconnection (white to positive, yellow to negative).

4. To replace the drive unit, ensure the gasket is intact and complete – replace if necessary. Reconnect the cables to the drive unit (note the polarity detailed above) and then sit the drive unit into its mounting hole, ensuring that the holes line up.

5. Replace the M6x40 countersunk socket machine screws and ensure all machine screws are started in their threads before tightening. Tighten opposing bolts, working around the drive unit until all bolts are appropriately tightened. Be careful not to overtighten as this will distort the drive unit chassis.

6. Replace the grille as described above.

Appendix A – Technical Specifications

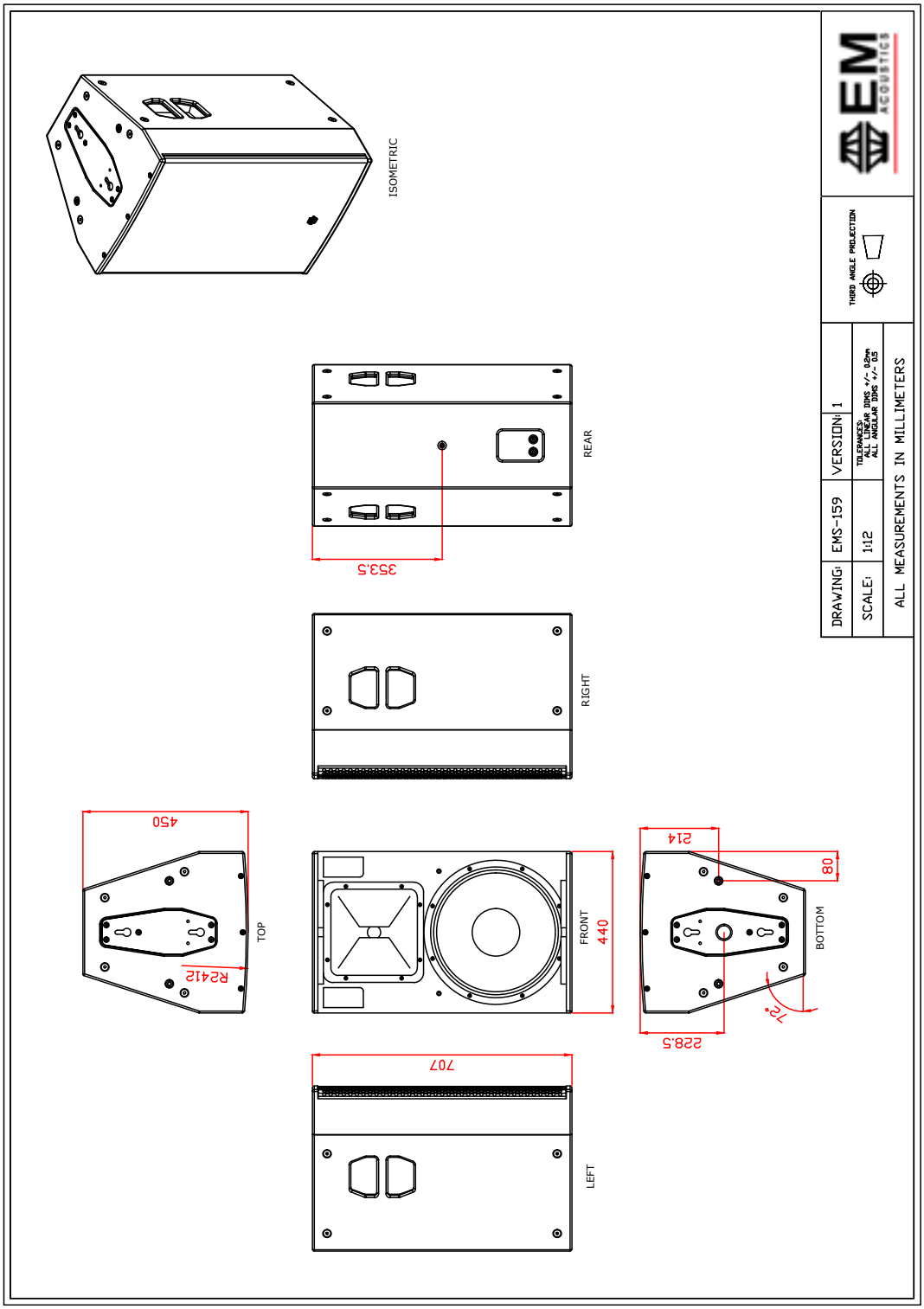
EMS-156/EMS-159 passive fullrange loudspeaker

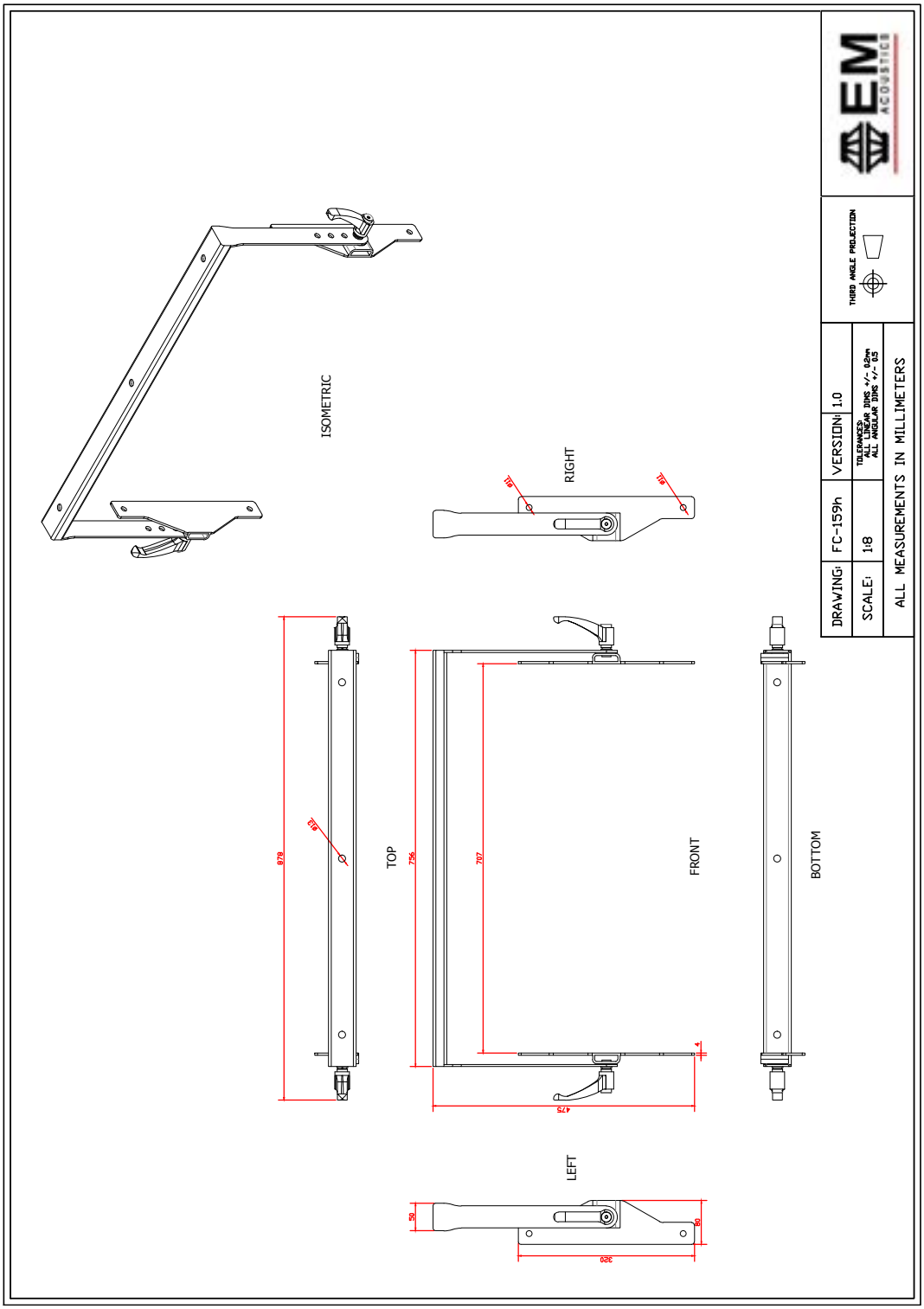
Dimensions (HxWxD):	707 x 440 x 450mm (27.8" x 17.3" x 17.7")
Net/Shipping Weight:	43/45kg (94.6/99lbs)
Frequency Response (+/- 3dB)[1]:	65Hz – 20kHz
Dispersion[3]:	60° x 40° (EMS-156), rotatable 90° x 60° (EMS-159), rotatable
Drive Units:	15" (381mm) neodymium LF drive unit 1.4" (36mm) exit neodymium HF compression drive unit
Power Handling:	LF: 750W RMS, 1500W program
Maximum SPL:	130dB continuous, 136dB peak
Nominal Impedance:	8 ohms
Crossover:	Asymmetric internal passive
Enclosures per amp channel:	DQ6: 1 DQ10: 2 DQ20: 3
Connectors:	2 x Neutrik SpeakON™ NL4
Enclosure:	15mm (5/8") multi-laminate birch plywood, rebated, screwed and glued. Finished in impact and weather-resistant polyurethane or white textured paint
Rigging & Hardware:	Keyhole plate quick-release rigging system 4 x M10 threaded mounting points (2 top/2 bottom) 1 x M8 threaded mounting point on rear 2 x flush handles, 1 x 35mm pole mount socket
Grille:	Hex punched steel backed with acoustically transparent fabric
Options:	Colours/Weather Protection
Accessories:	FC-159v vertical flying cradle FC-159h horizontal flying cradle VFA-159 variable angle flying bracket CM-159 column mount

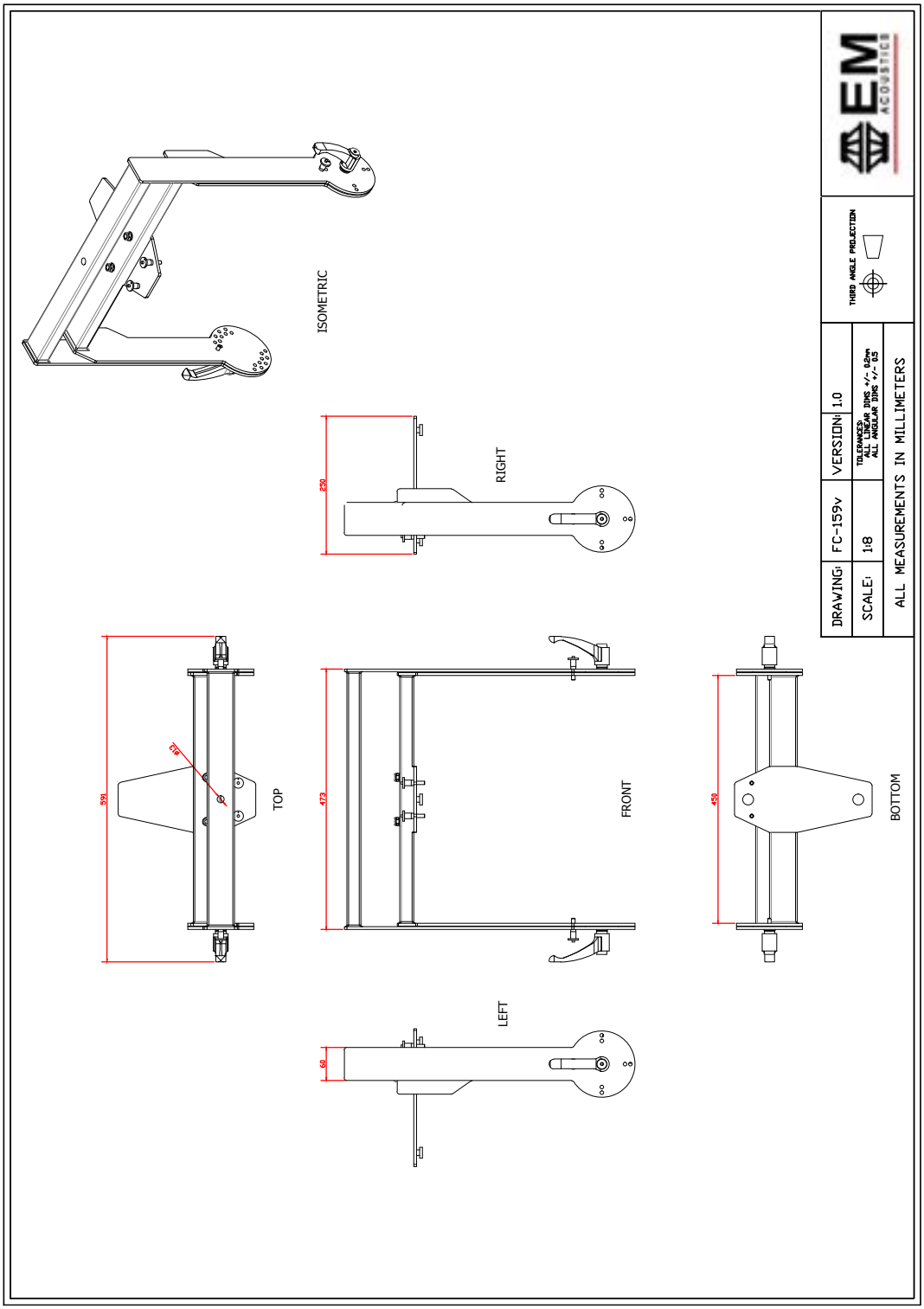
Notes on measurement conditions:

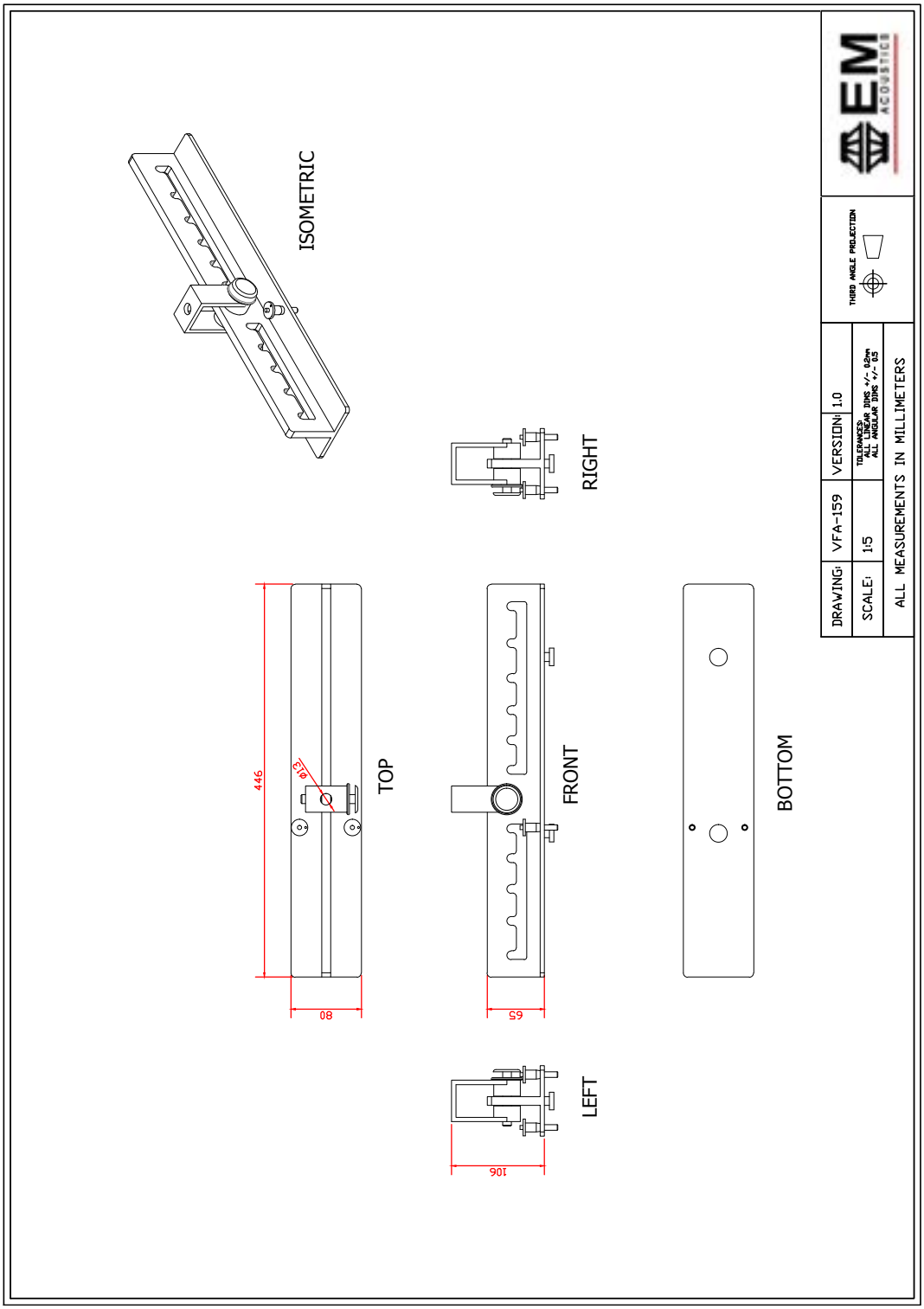
[1]Measured on-axis at 2m in an anechoic environment and referenced to 1m. [2]Measured in half-space at 2m with 4W sine wave input and referenced to 1m. [3]Nominal dispersion, measured in an anechoic environment and averaged over stated bandwidth. [4]Calculated and verified by subjective listening test of familiar program material.

Appendix B – Technical Drawings




ISOMETRIC
RIGHT
TOP
FRONT
BOTTOM
LEFT
THIRD ANGLE PROJECTION
DRAWING: FC-159h
VERSION: 1.0
SCALE: 1:8
TOLERANCES: ALL LINEAR DIMS +/- 0.2mm ALL ANGULAR DIMS +/- 0.5
ALL MEASUREMENTS IN MILLIMETERS


ISOMETRIC
RIGHT
250
TOP
591
FRONT
473
BOTTOM
459
LEFT
60
THIRD ANGLE PROJECTION
DRAWING: FC-159v
VERSION: 1.0
SCALE: 1:8
TOLERANCES:
ALL LINEAR DIMS +/- 0.2mm
ALL ANGULAR DIMS +/- 0.5
ALL MEASUREMENTS IN MILLIMETERS


ISOMETRIC
RIGHT
TOP
FRONT
BOTTOM
LEFT
446
ø13
80
65
106
DRAWING: VFA-159
SCALE: 1:5
VERSION: 1.0
TOLERANCES: ALL LINEAR DIMS +/- 0.2mm ALL ANGULAR DIMS +/- 0.5
THIRD ANGLE PROJECTION
ALL MEASUREMENTS IN MILLIMETERS

Appendix C – Spare Parts List

Order Code	Description
01A021	DU-1505 replacement 15" neodymium LF drive unit
01B014	CDU-1404 replacement 1.4" neodymium HF compression drive unit
04A064	RFG-159 replacement grille/fabric for EMS-159
07A034	PX-156 replacement passive crossover assembly for EMS-156
07A035	PX-159 replacement passive crossover assembly for EMS-159

Appendix D – Warranty Information

Limited Warranty

This EM Acoustics loudspeaker product is warranted to the original end-user purchaser and all subsequent owners for a period of **five (5) years** from the original date of purchase.

Warranty Coverage

This warranty covers defects in materials and workmanship. It does not include:

- Damage or failure caused by accident, misuse, neglect, abuse or modification by any person other than an authorised EM Acoustics representative.
- Damage or failure caused by operating the loudspeaker product contrary to the instructions contained within this manual.
- Damage caused during shipment.
- Claims based on any misrepresentation by the seller.
- Products which contain anything other than the original components (or EM Acoustics factory supplied spare parts).
- Products on which the serial number has been removed, altered or defaced.

Returning your EM Acoustics loudspeaker

Should your EM Acoustics loudspeaker develop a fault, please return it (freight prepaid) in its original packaging, along with proof of purchase to your local dealer or to:

EM Acoustics (Returns Department), Building 19.11, Dunsfold Park, Cranleigh, Surrey, GU6 8TB, UK

including a description of the suspected fault. Serial numbers must be quoted in all correspondence relating to the claim. EM Acoustics or its representatives are in no way liable for any loss or damage in transit, and hence it is recommended that the sender insure the shipment. EM Acoustics will pay for return freight should the repair be covered under warranty.

EM Acoustics' liability is to the replacement or repair (at our discretion) of any defective components, and as such are not liable for any incidental and consequential damages including (without limitation) injury to persons, damage to property or loss of use.

This warranty is exclusive and no other warranty is expressed or implied. This warranty is also in addition to – and in no way detracts from – your statutory rights as a consumer.