ST-215 Subwoofer

Product User Manual
v2 November 2019

EM ACOUSTICS

LOUDSPEAKERS REDEFINED

Contents

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 the ST-215 subwoofer from EM Acoustics. 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 ST-215 is a compact, high-powered subwoofer, intended for a wide variety of low frequency applications. The ST-215 is at home in permanent installations, although with its rugged construction and flying system it is optimised for touring use. Two state of the art neodymium 15" drive units provide effortless low frequency extension and overall SPL capability within a rugged enclosure, and full flying hardware is included. Various accessories are available to help you get the best out of this product – from flying and stacking to transport and storage.

This manual contains all the information you should need on topics of set up, amplifier connection, flying & stacking 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

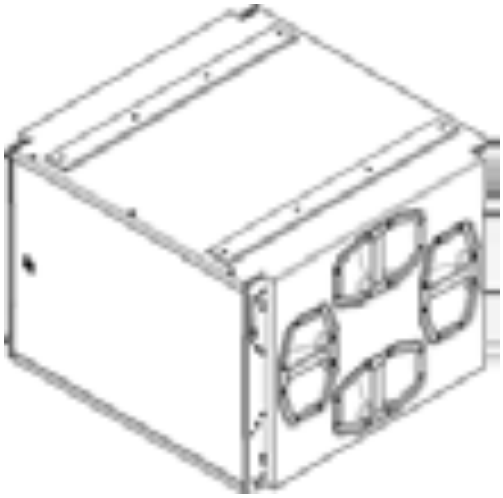
Please take care when unpacking your loudspeaker system. Once unpacked, please inspect each enclosure thoroughly for any transit damage and in the case of any damage please notify your carrier immediately. It is the responsibility of you, the consignee, to instigate any claim. Please retain all original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

2.0 – ST-215 & Accessories

The ST-215 subwoofer has a range of accessories available for flying, stacking and transport in different configurations.

ST-215

Medium format touring subwoofer



FEATURES & BENEFITS

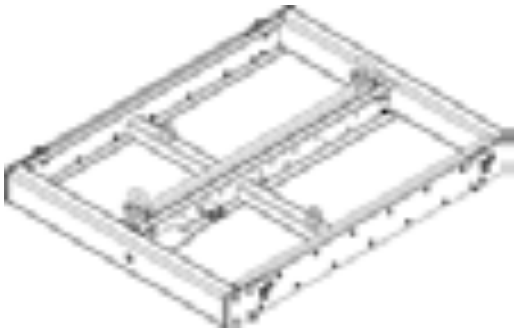
- Signature EM Acoustics "maximum headroom" design approach ensures consistency of performance regardless of SPL level.
- Intuitive, simple 4-point flying system, assembled from ultra-high tensile strength steel.
- Flying and stacking system allows assembly of cardioid arrays.
- Enclosure coated with 3-step polyurethane process - ensuring the cabinets are not only weather resistant but more resilient to impact damage.
- Various features and accessories for easy moving & handling.
- Single amplifier channel required.

KEY SPECIFICATIONS

ENCLOSURE TYPE:	Medium format flyable reflex subwoofer
DRIVE UNITS:	2 x 15" neodymium LF drive units
FREQUENCY RESPONSE:	40Hz - 150Hz +/-3dB
NOMINAL DISPERSION1:	omniirectional
MAXIMUM SPL:	133dB continuous, 139 dB peak
NOMINAL IMPEDANCE:	4 ohms
DIMENSIONS (HxWxD):	550 (21.7) x 772 (30.4) x 752 (29.6) mm/(ins)
NET/SHIPPING WEIGHT:	73/77kg (161/169lbs)

FG-HALO-B

Master Flying Grid



The FG-HALO-B is the master flying grid for the both the ST-215 the HALO-B system and provides a means of safely and swiftly flying arrays of ST-215 subwoofers. Up to 9 ST-215 subwoofers can be safely flown in any configuration with a safety factor of 10:1. The FG-HALO-B is supplied with two pickup links to use as suspension points - it is strongly recommended that arrays larger than four subwoofers use two lifting points for control and ease of use.

The FG-HALO-B can also be used as a means of ground stacking HALO-B on top of ST-215 subwoofers.

The FG-HALO-B is supplied with four 2t WLL bow shackles.

Weight (without shackles) 32.5kg / 71.5lbs
Weight (including supplied shackles) 33.9kg / 74.6lbs

GS-HALO-B

Ground Stack Plate

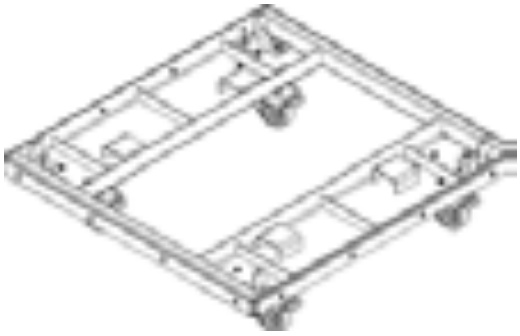
The GS-HALO-B is a simple plate designed for ground stacking small HALO-B arrays on stages, or larger arrays on top of ST-215 subwoofers. M8 locking knobs secure the GS-HALO-B to the ST-215 for neat arrays of up to 6 HALO-B elements. The GS-HALO-B can also be used as a neat base plate when using HALO-B as a front-fill enclosure.

In installation applications, the GS-HALO-B can be used to mount pairs or single elements from ceilings if required.

Weight 10.8kg / 23.8lbs

WC-T215

Transit Wheelcart



Designed to safely transport columns of up to three ST-215 subwoofers ready to fly, the WC-T215 is a steel frame construction wheelcart that allows the ST-215 to lock securely to it.

Subwoofers can be assembled in cardioid arrays as well as front-facing, and the WC-T215 is sized to fit three-wide across a standard width truck.

Four individually braked castors and protective polymer bumpers complete the touring package.

Weight 26.7kg / 58.7lbs

Padded transit covers

Three padded transit cover options are available for the ST-215:

TC-T215 single subwoofer cover, designed to protect individual units when fitted with the optional castor set.

TC-T215-2 dual subwoofer cover, designed to protect pairs of ST-215 subwoofers when on the WC-T215 wheelcart.

TC-T215-3 triple subwoofer cover, designed to protect three ST-215 subwoofers when on the WC-T215 wheelcart.

Castor Set

For single subwoofer transport, tour-grade castors can be fitted to the rear of the enclosure to allow the ST-215 to be easily moved around.

CHAIN-HALO-B

Extension Lift Chain

The CHAIN-HALO-B assembly is intended to go between a motor and the FG-HALO-B or CG-HALO-B pickup link. It is a variable length chain, intended to give extra vertical clearance to accommodate motor lift chain bags. It has a SWL of 760kg and an effective maximum working length of 1000mm.

Weight 1.7kg / 3.6lbs

SAFETY-HALO-B

Chainset

The SAFETY-HALO-B assembly is a 2-leg bridle chain assembly, intended to connect the two safety points on the FG-HALO-B or CG-HALO-B to a single point for application of a secondary safety. It has an effective working length of 510mm and the following SWL:

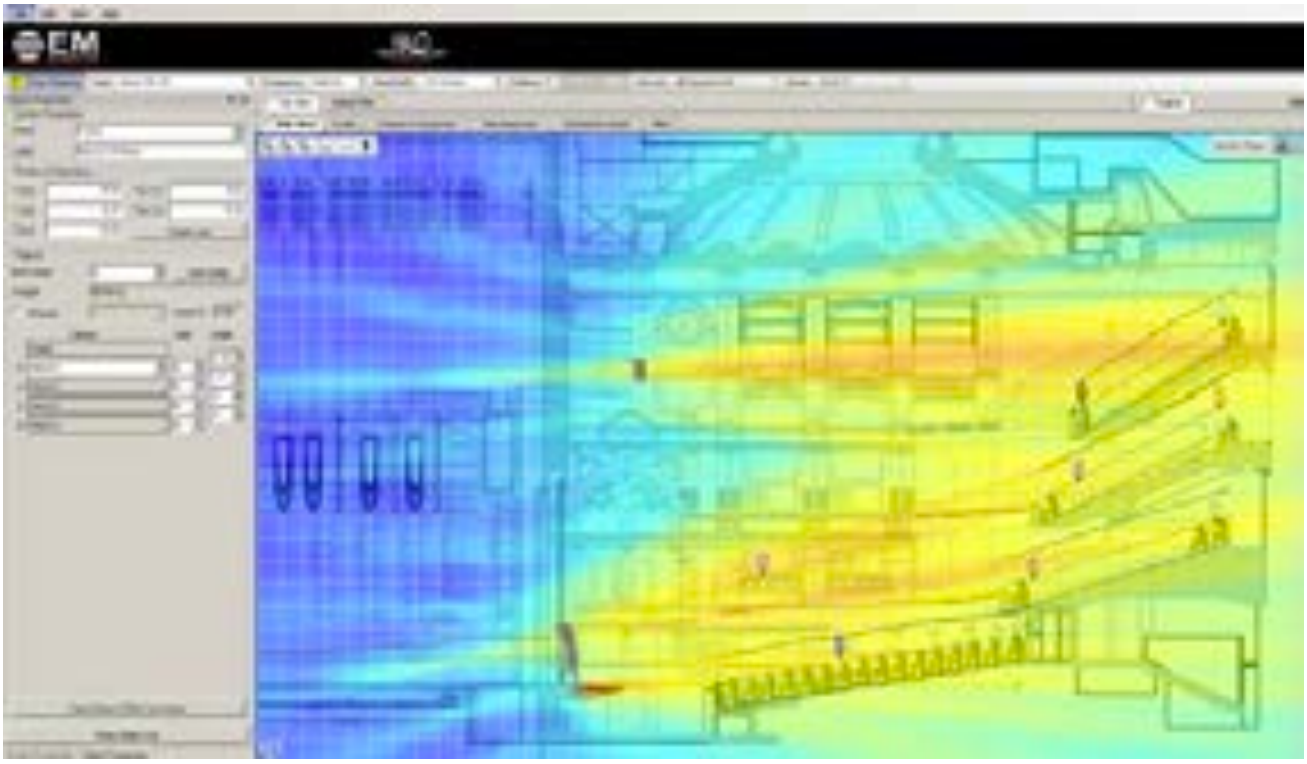
2 tonne 0-45 degrees
1.4 tonne 45-60 degrees

The angle between the chain legs must not exceed 60 degrees.

Weight 1.6kg / 3.5lbs

3.0 – Simulation

Ease Focus 3



For safety and acoustic reasons, it is advised that users familiarize themselves with Ease Focus 3. Along with providing the user with accurate simulations for setting up ST-215 subwoofers, it also provides importing safety information with regards to load limits.

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 ST-215 subwoofers including the specific use of Ease Focus 3, please contact your local distributor.

4.0 - Safety Considerations

System Overview

The flying system for the ST-215 has been specifically designed to be flexible, intuitive and reliable. Please read this section of the user manual **extremely carefully** as the rigging of loudspeakers is a very serious matter with potentially fatal consequences should anything go wrong. If you are in **ANY DOUBT WHATSOEVER**, contact a reputable rigging company or your local EM Acoustics representative.

IMPORTANT SAFETY CONSIDERATIONS

The ST-215 rigging system has been designed and constructed to a very high standard of safety, and tested to demanding specifications. 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 ST-215 flying hardware for any other loudspeaker system – the components are specifically designed to work with the ST-215 product and are not interchangeable with any other EM Acoustics loudspeaker product or any other loudspeaker system unless clearly specified. The use of ST-215 flying hardware 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 ST-215 hardware or accessories, nor use them in any way other than that described in this manual. Rigging components supplied as part of the ST-215 system are in no way interchangeable and should not be used as such.

The component parts of the ST-215 rigging assembly 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 EM Acoustics ST-215 subwoofers, 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 assembling a HALO Arena array. 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.

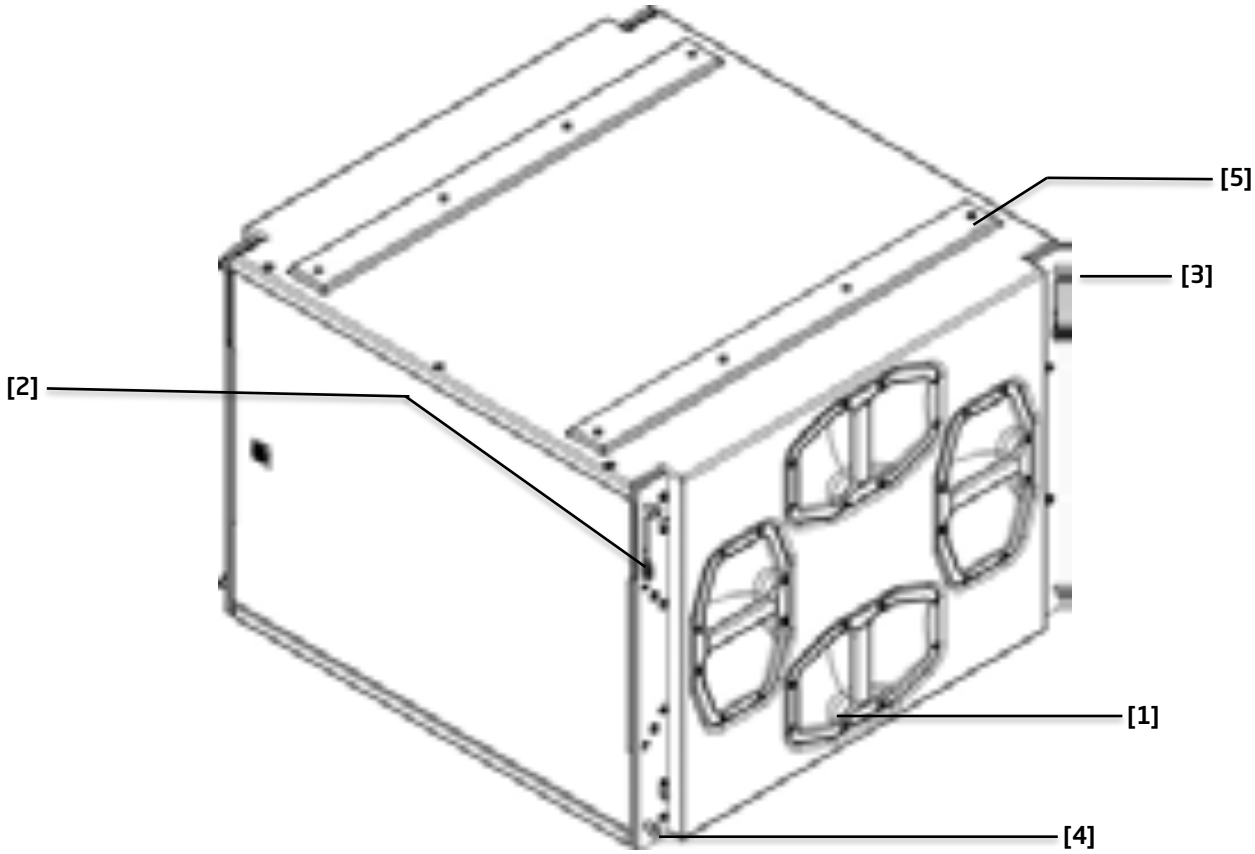
EM Acoustics recommends detailed logbooks be kept of all inspections and load tests to ensure an accurate record is kept of the testing for each EM Acoustics rigging accessory.

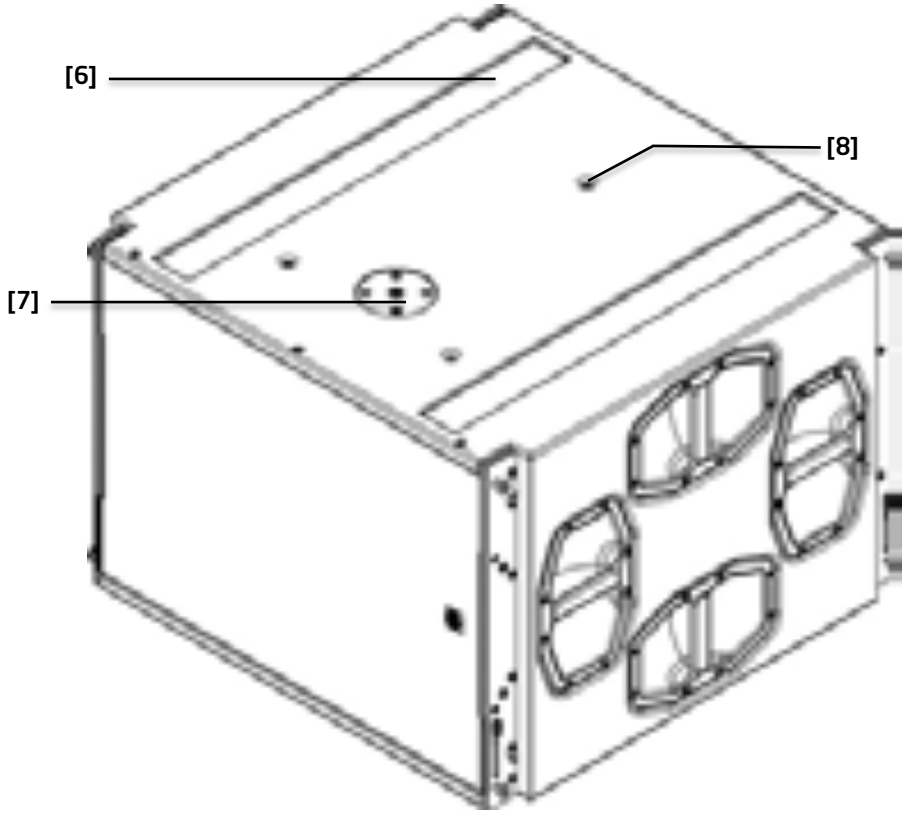
When flying any loudspeaker system, always wear protective headwear, footwear and eye protection in accordance with local regulations.

The rigging of a flown loudspeaker system may be dangerous if not undertaken by a suitably experienced and qualified rigger. Installation & fixing of all hanging points should only be carried out by a professional rigger in accordance with local legislation as well as the rules of the venue. The house rigger and/or venue manager must always be consulted.

5.0 - Rigging System Overview

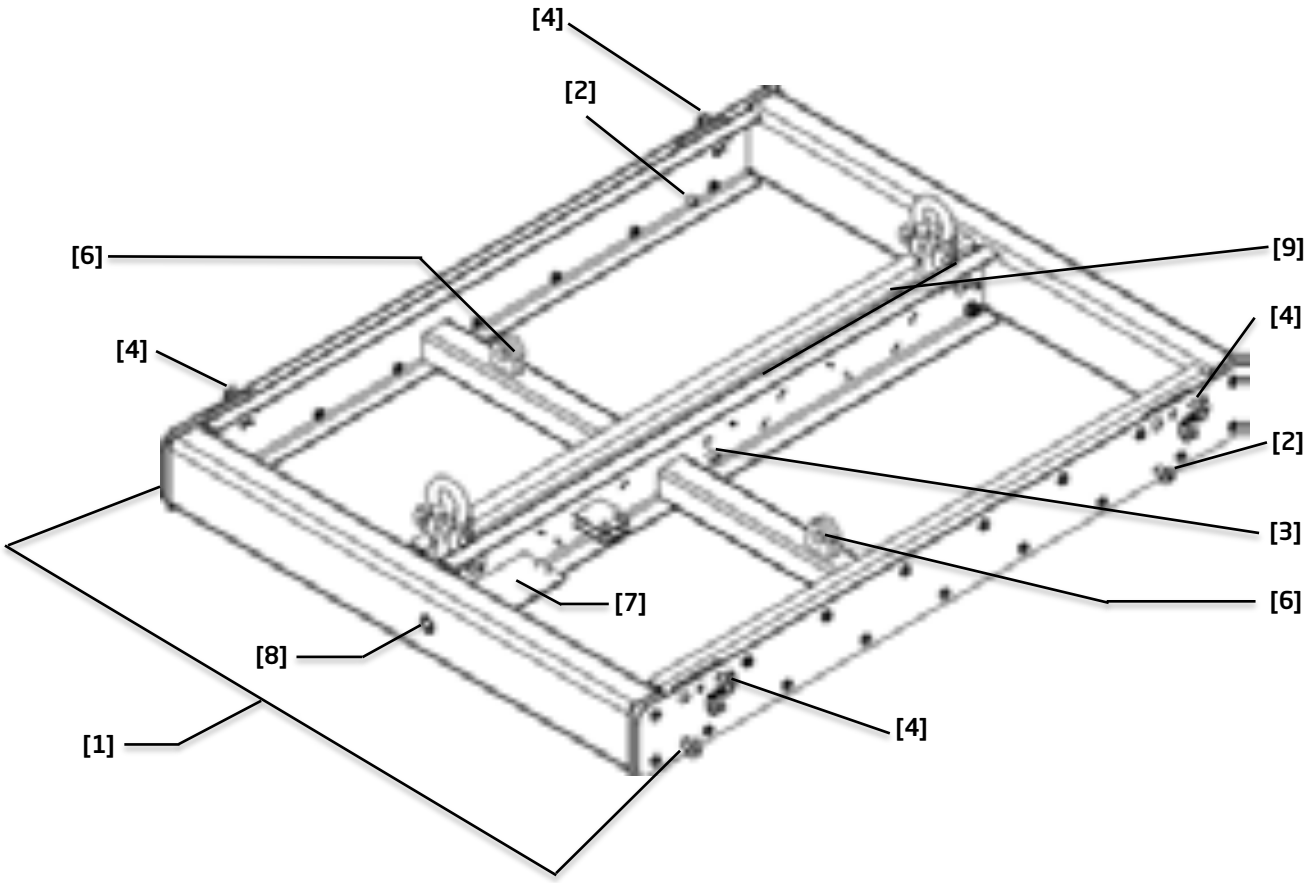
5.1 - ST-215 Cabinet Hardware Overview

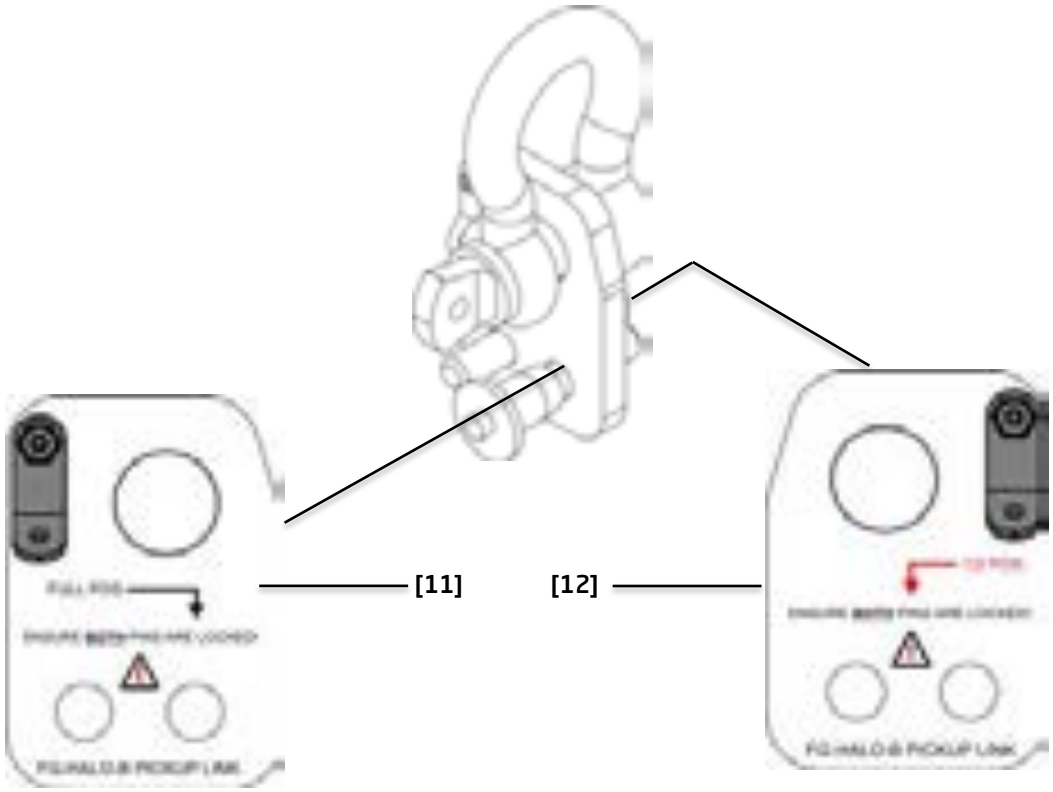




1 Lifting & Carrying Handle
2 Rigging Link (retracted)
3 Rigging Link Lock Pin
4 Enclosure Link Pin
5 Floor Runner
6 Stacking Recess
7 M20 Threaded Polemount
8 M8 Threaded Fitting

5.2 - FG-HALO-B





[1] – Front Link Attachment Point

This clevis forms the area where HALO-B or ST-215 enclosure front links should be engaged. A 0.313" ball-lock pin secures each link in place.

[2] – Rear Link Attachment Point

This clevis forms the area where ST-215 subwoofer rear links should be engaged. A 0.313" ball-lock pin secures each link in place.

[3] – Splay Link Attachment Point

This location is only used for flying HALO-B enclosures – please refer to the HALO-B user manual for full details.

[4] – Sub Link Attachment Point

When attaching an FG-HALO-B between ST-215 subwoofers and HALO-B enclosures, four rotating links at the top of the grid in each corner engage into the bottom of the subwoofer.

[5] – Cable Pick

The retractable cable pick gives a location to safely secure the array cables at the back of the FG-HALO-B grid. It can be stowed away when not being used.

[6] – Safety Points

A secondary safety must always be used on flown arrays. Both safety points should be connected to avoid the array swinging in the event of a primary lift failure. The SAFETY-HALO-B 2-leg bridle is designed for this purpose.

[7] – Inclinometer Mounting Point

A range of laser inclinometers can be fitted to the FG-HALO-B including TEQSAS devices. An aperture is provided in the front beam for the laser to pass through.

[8] – Inclinometer Laser Aperture

Opening in the front grid load member for the inclinometer laser beam to pass through.

[9] – Pickup Link Location Holes

Holes are numbered 1 to 39, the appropriate locations are determined by your EASE Focus simulation. Links must be secured with the two 0.375" ball-lock pins attached.

[10] – Pickup Links (Stowed)

Stow locations for the two pickup links when the FG-HALO-B is being used for ground stack, or being stored or transported.

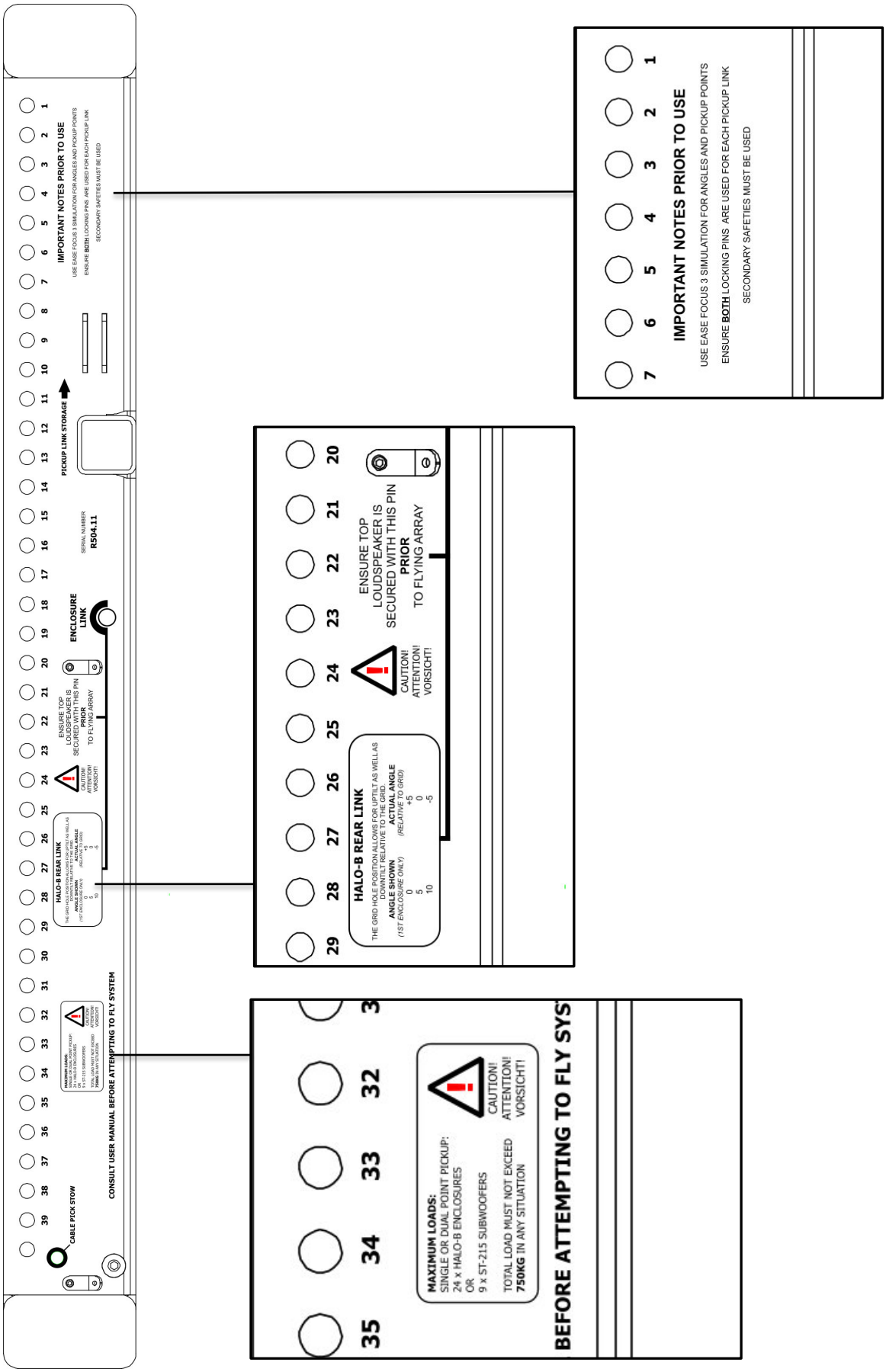
[11] – Pickup Links (Full Position)

When using a single pick point, reference Ease Focus 3 for the pick point for the desired angle. For a full position, line up the white arrow with the number on the spine

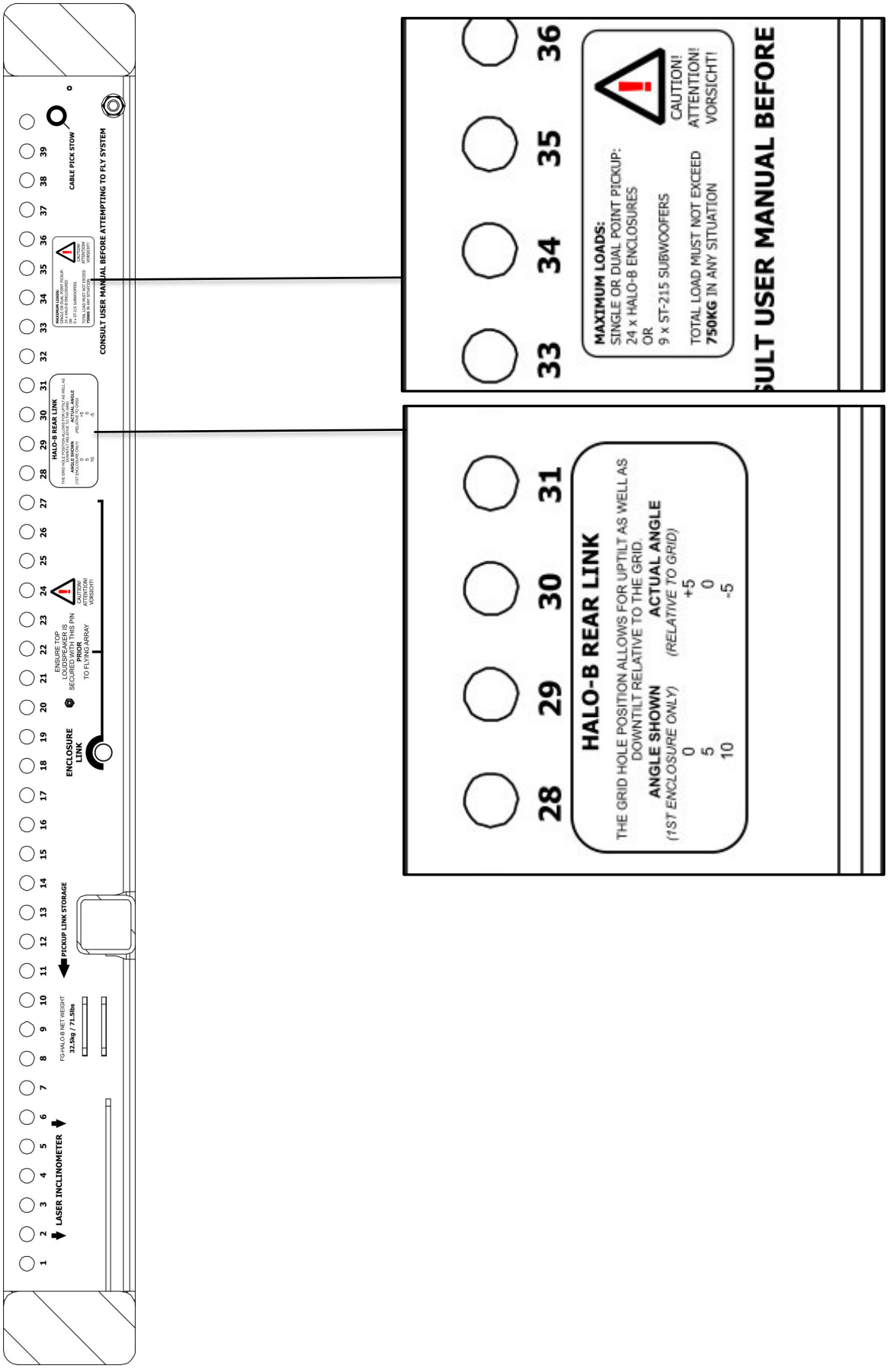
[12] – Pickup Links (Half Position)

When using a single pick point, reference Ease Focus 3 for the pick point for the desired angle. For a half position, line up the red arrow between the appropriate numbers on the spine

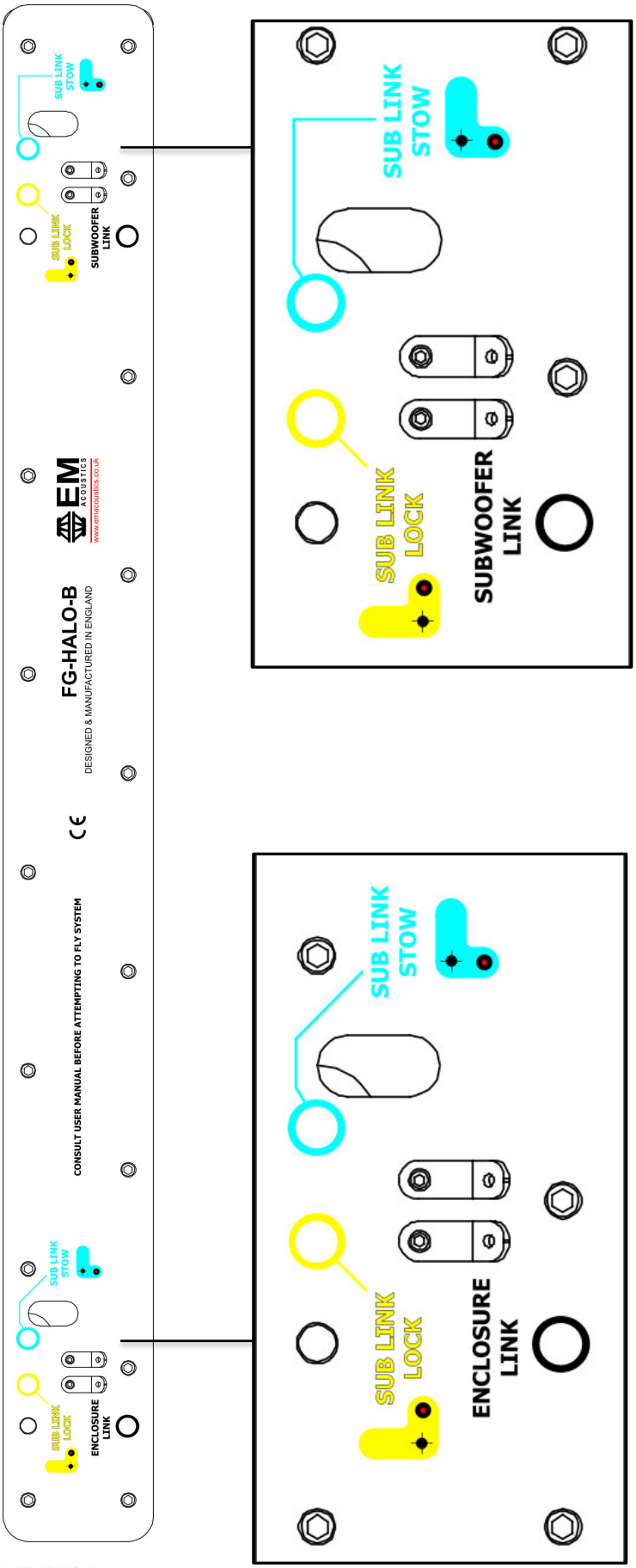
FG-HALO-B Instruction Label – Spine, Left side



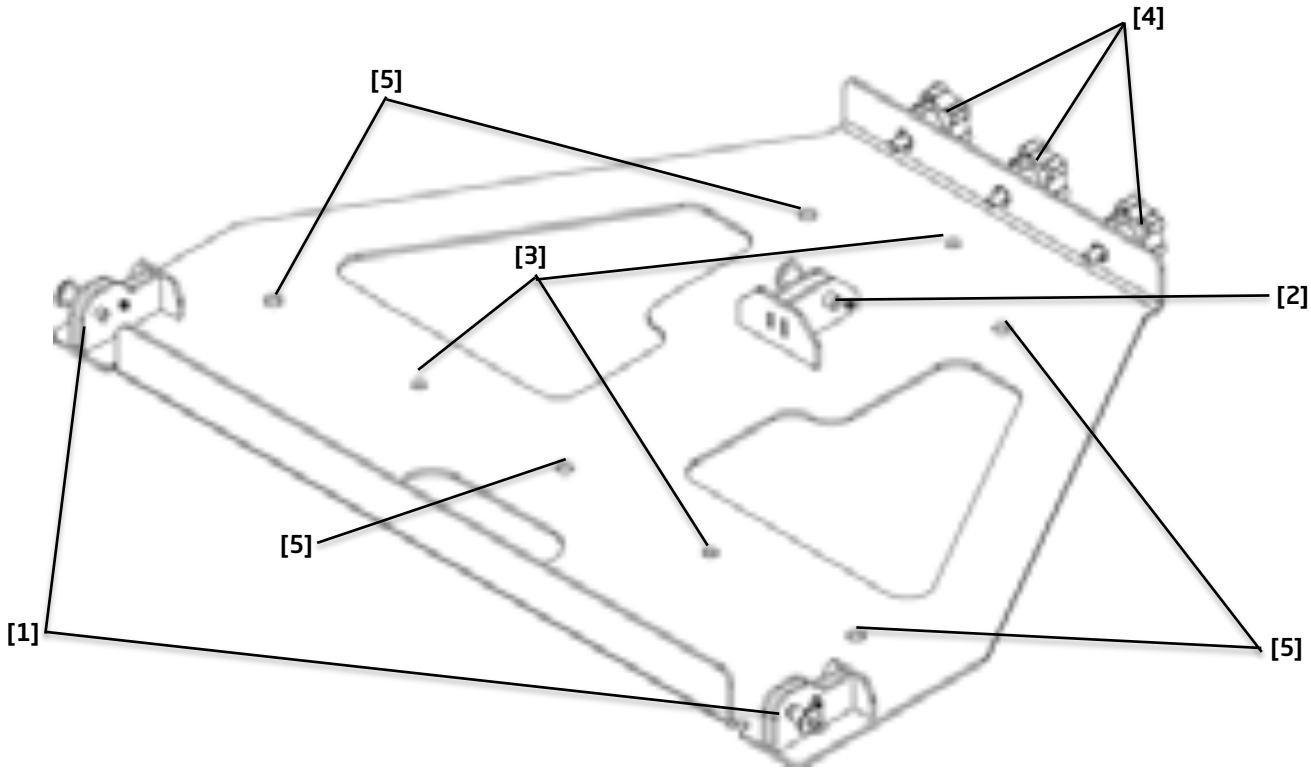
FG-HALO-B Instruction Label – Spine, Right side



FG-HALO-B Instruction Label – Side



5.6 - GS-HALO-B



[1] – Front Link Attachment Point

This clevis forms the area where HALO-B enclosure front links should be engaged. A 0.313" ball-lock pin secures each link in place.

[2] – Splay Link Attachment Point

The splay link of the first HALO-B enclosure should engage in this slot in the spine. Pay attention to the label details with regards the indicated angle compared to actual angle for the first element in the array.

[3] – ST-215 Attachment Point

Three M8 clearance holes are provided in the GS-HALO-B surface to secure it to an ST-215 subwoofer in ground stack use. Use the three supplied M8 lobe knobs.

[4] – M8 lobe knob

Three M8 lobe knobs to secure to an ST-215. These knobs are stowed in the captive threaded bushes at the rear of the GS-HALO-B.

[5] – Installation Points

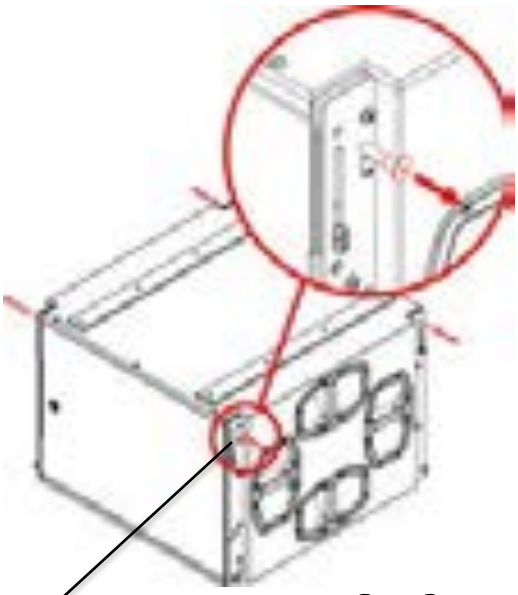
For permanent installation of HALO-B enclosures, five 11mm diameter mounting holes are provided in the GS-HALO-B surface.

6.0 – System Setup

6.1 – Preparing ST-215 subwoofers for flying or stacking

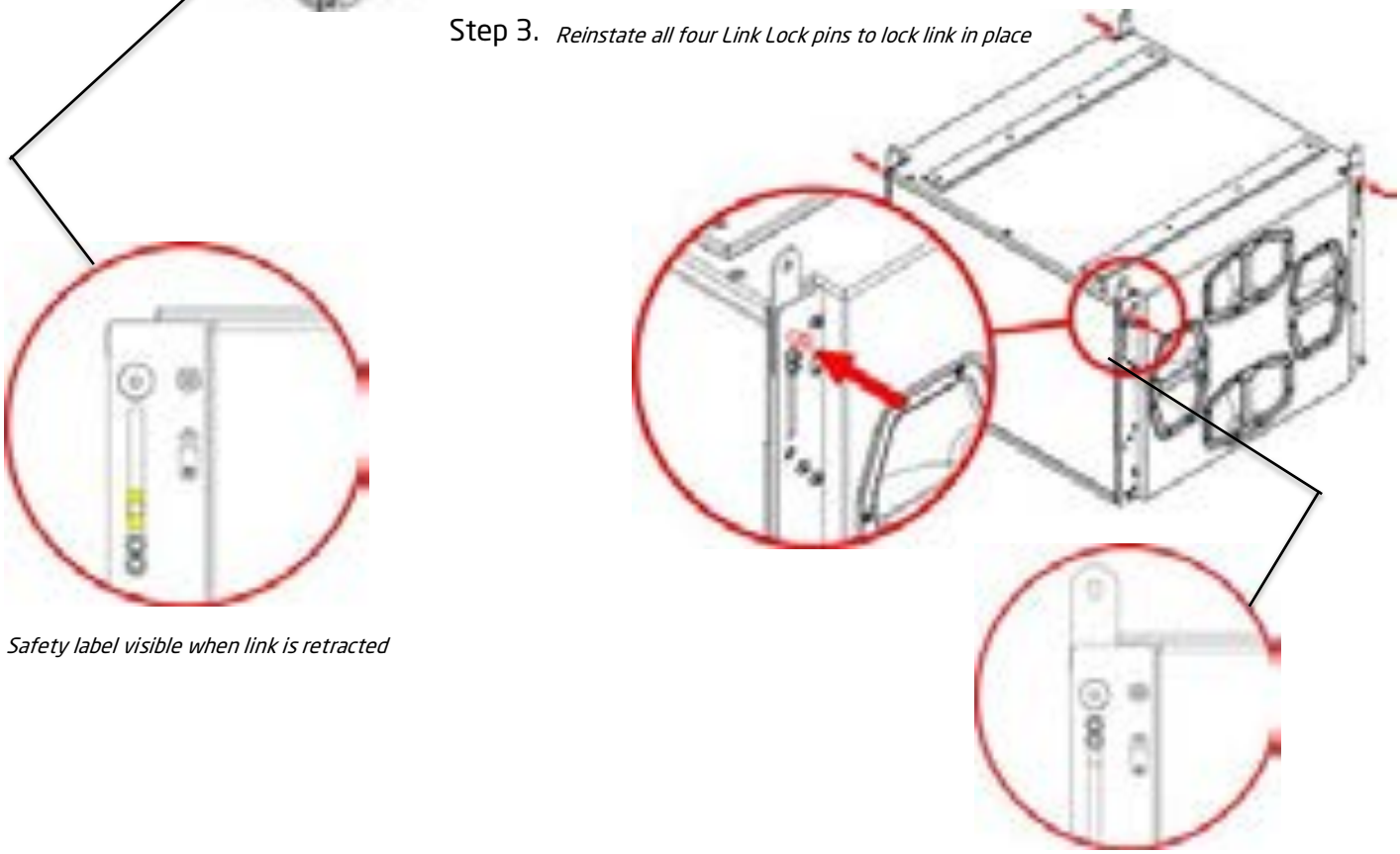
6.1.1 – Extending the rigging links

Step 1. *Remove the Link Lock pin from the top of each rigging assembly*



Step 2. *Extend all four rigging links*

Step 3. *Reinstate all four Link Lock pins to lock link in place*

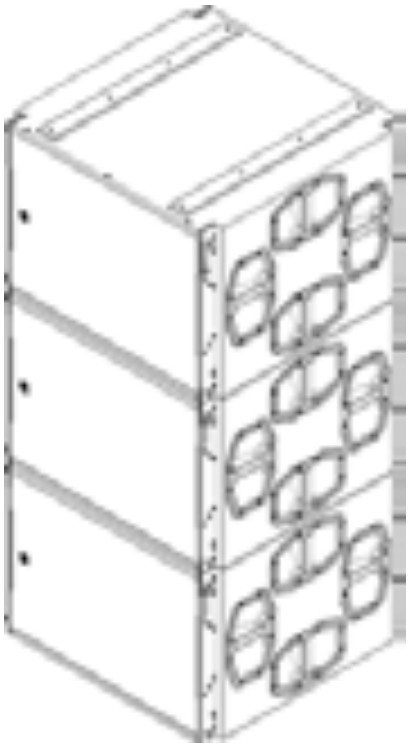


Safety label visible when link is retracted

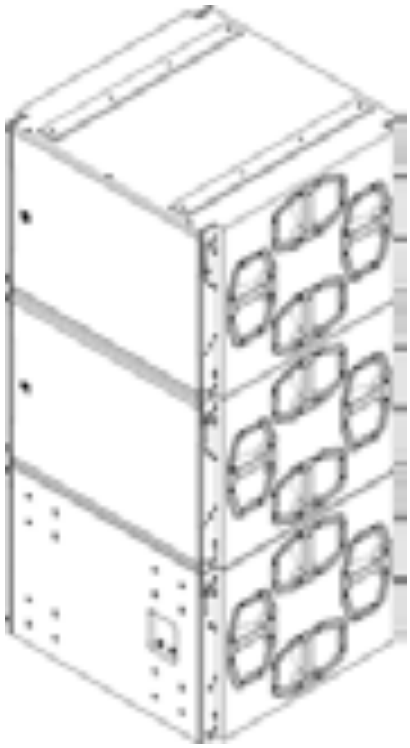
Safety label hidden when link is correctly extended

6.1.2 – Cardioid Use

The ST-215 rigging locations are symmetrical front-to-back, so subwoofers can be reversed to create cardioid arrays. Simply assemble the subwoofer stack or flown column as normal but reverse every third subwoofer. The rigging hardware can and should be engaged as normal.



Standard subwoofer column
All subwoofers forward



Cardioid subwoofer column
One subwoofer in three reversed

For guidance on correct cabling for cardioid subwoofer arrays, see Chapter 7 of this manual.

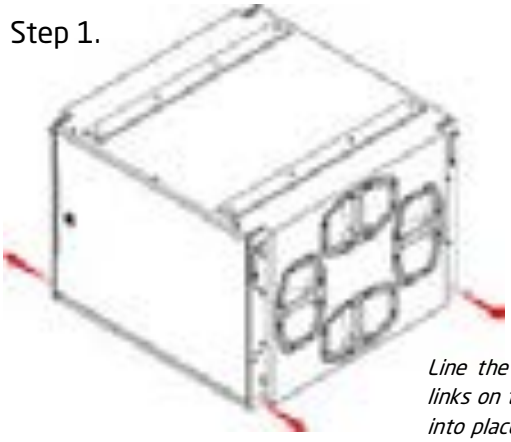
IMPORTANT NOTE:

If flying a cardioid column of subwoofers and suspending from a single point on the FG-HALO-B flying grid, consult EASE Focus 3 for the most suitable pickup point to use to ensure the column hangs straight.

For all sections of this manual describing flying or stacking ST-215 subwoofers, the procedure is identical when assembling cardioid subwoofer arrays.

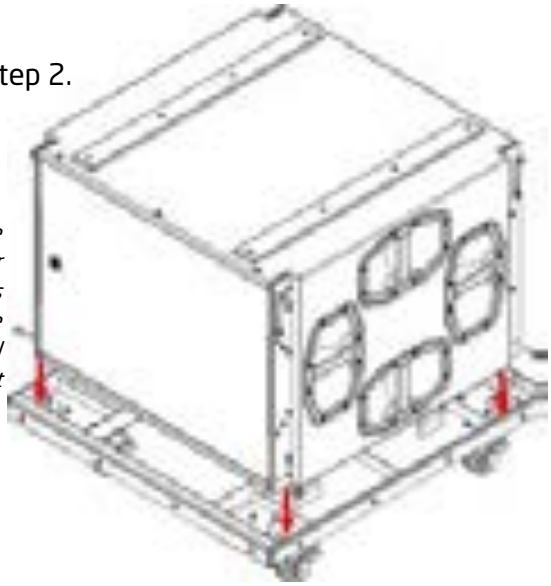
6.1.3 – Using the WC-T215 transit wheelcart

Step 1.



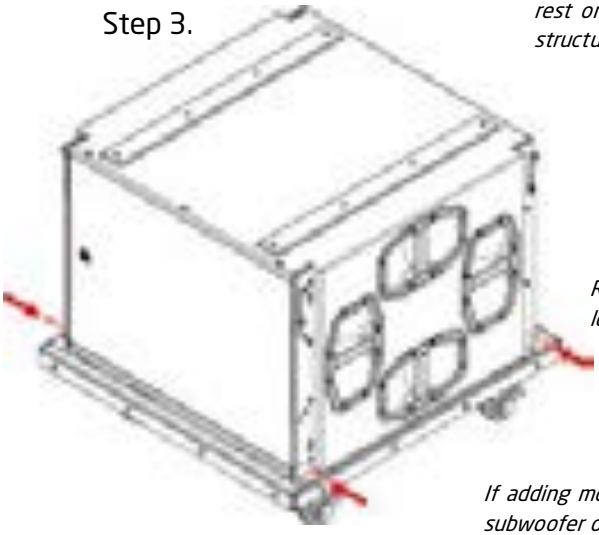
Keeping the subwoofer the right way up, remove the enclosure link pins from the bottom of each rigging assembly.

Step 2.



Line the subwoofer up over the links on the wheelcart, and lower into place ensuring that the links engage into the clevises on the subwoofer. The subwoofer will rest on the supports in the cart structure.

Step 3.

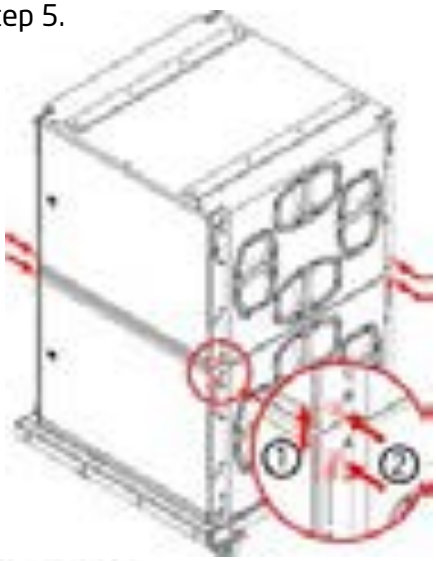


Reinstate the enclosure link pins into all four corners of the cart to lock the subwoofer to the wheelcart.

Step 4.

If adding more subwoofers, simply stack the next subwoofer on top of the first one. Ensure that the protective runners on the lower sub have engaged in the recesses in the upper one – this helps to ensure the subwoofer is correctly located. Remove the Link Lock pins on the lower subwoofer, and the Enclosure Link pins on the upper subwoofer.

Step 5.



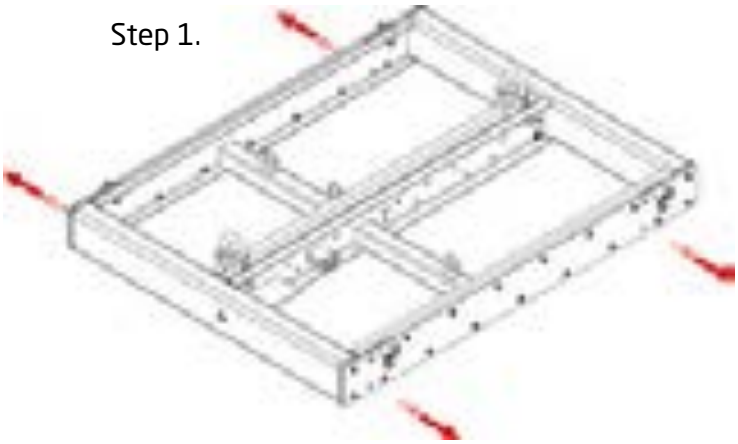
On each rigging assembly, slide the link into the extended position (step 1) and then reinstate both the Enclosure Link pin, and the Link Lock pin (step 2). This ensures the second subwoofer is securely locked to the first one and the cart is stable.

This process can be repeated to add a third subwoofer to the cart if required.

6.2 – Flying ST-215 subwoofers

6.2.1 – Flying ST-215 subwoofers alone

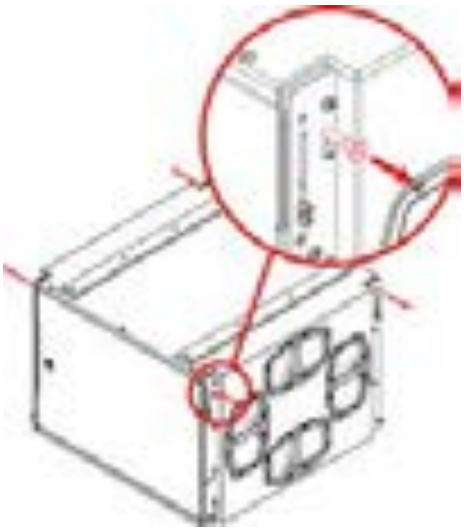
Step 1.



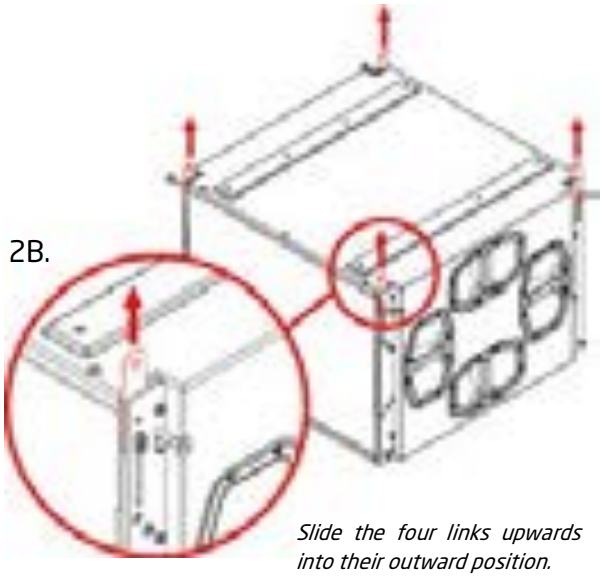
Prepare the FG-HALO-B by positioning the pickup links in their appropriate positions according to your EASE Focus 3 simulation, and removing the Front Link Attachment pins and the Subwoofer Link Attachment pins.

Step 2A.

Prepare the first ST-215 subwoofer. Leave the subwoofer the correct way up (floor runners upwards). Remove the link pins on all four corners.

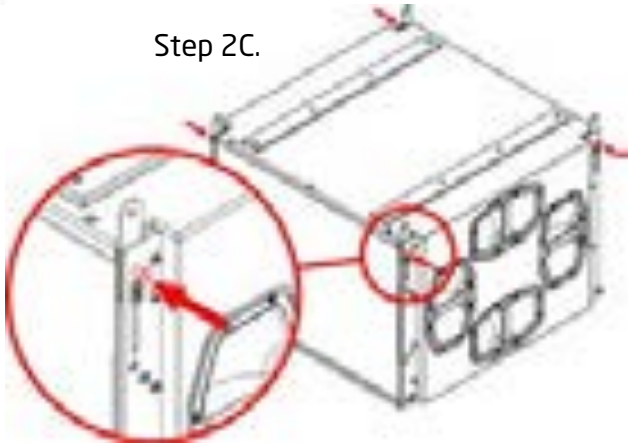


Step 2B.



Slide the four links upwards into their outward position.

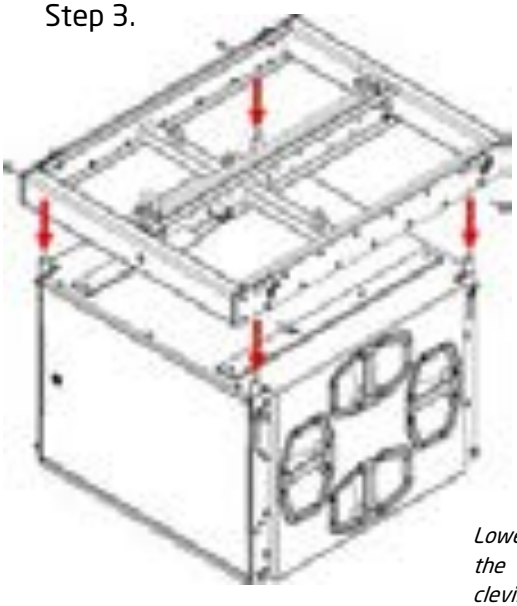
Step 2C.



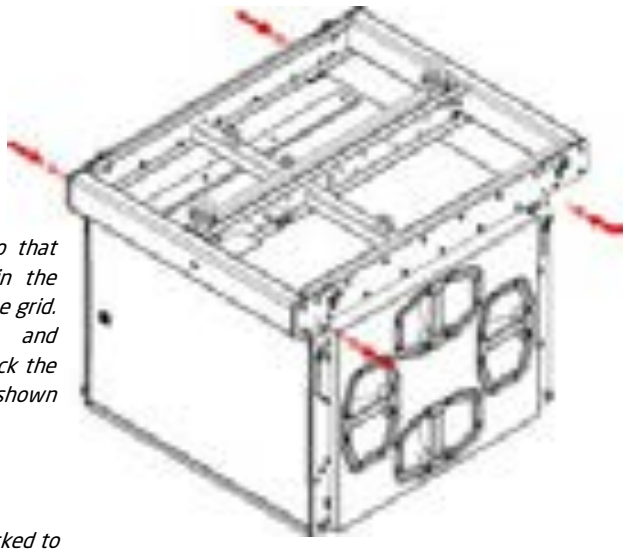
Replace the four link pins in their corresponding pin holes, locking the four links extended.

Your ST-215 is now ready to be flown.

Step 3.

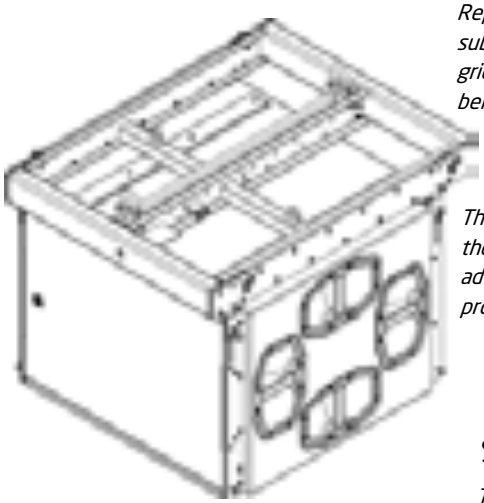


Position the FG-HALO-B above the extended links, ready to lower and engage.

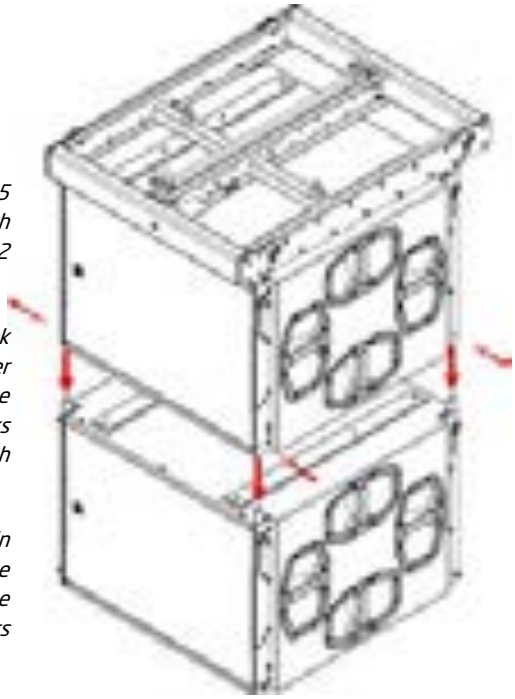


Step 4.

Lower the FG-HALO-B so that the four links engage in the clevis in each corner of the grid. Replace the enclosure and subwoofer link pins to lock the grid to the subwoofer as shown below.



The FG-HALO-B is low locked to the subwoofer. If you are not adding any further subwoofers, proceed to step 6 overleaf.

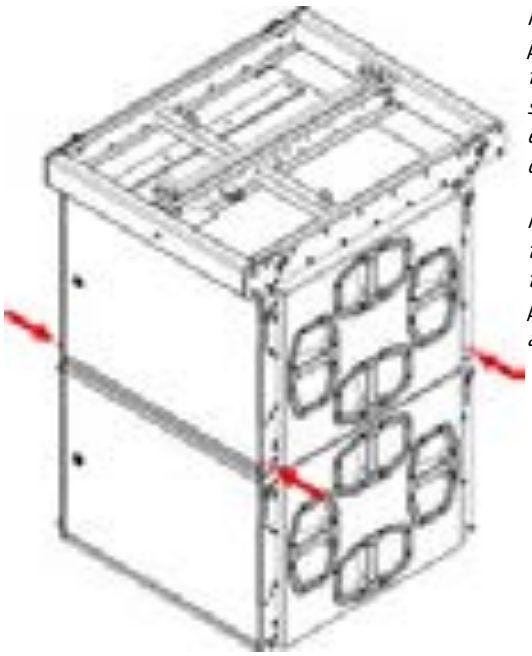


Step 5.

To add additional ST-215 subwoofers, prepare them with their links extended as in step 2 above.

Remove the lower enclosure link pins on the first ST-215 and lower the first subwoofer on top of the second, ensuring that the links engage in the clevises in each corner of the subwoofer.

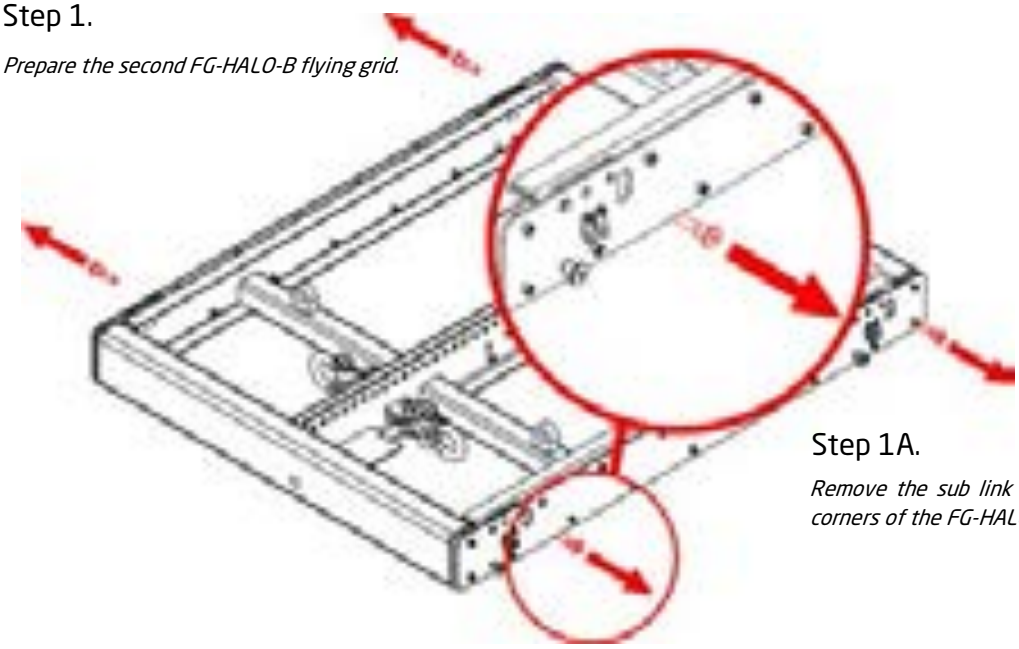
Replace the enclosure link pins in the first subwoofer, locking the two together. Repeat the procedure to add more subwoofers as necessary.



6.2.2 - Flying HALO-B underneath ST-215 subwoofers

Step 1.

Prepare the second FG-HALO-B flying grid.

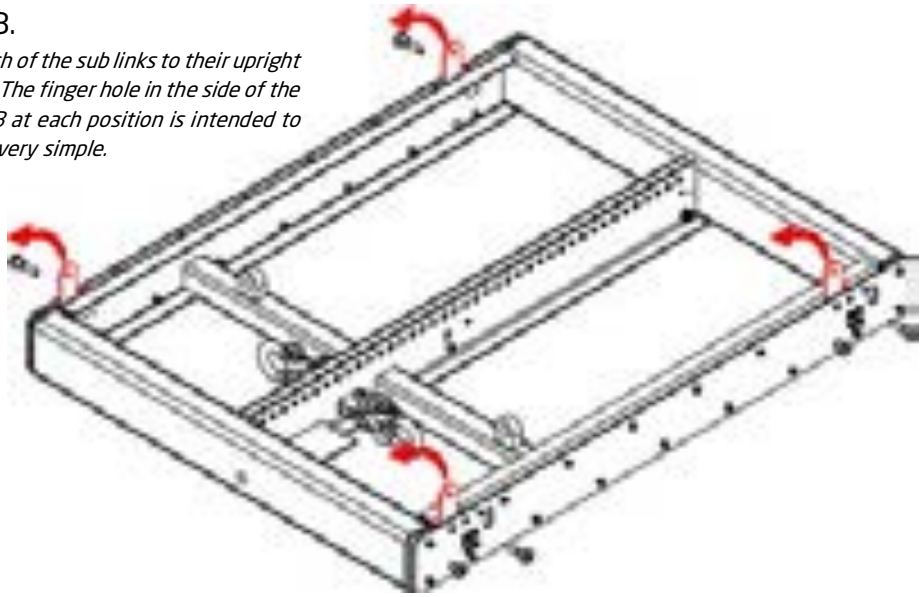


Step 1A.

Remove the sub link lock pins in all four corners of the FG-HALO-B.

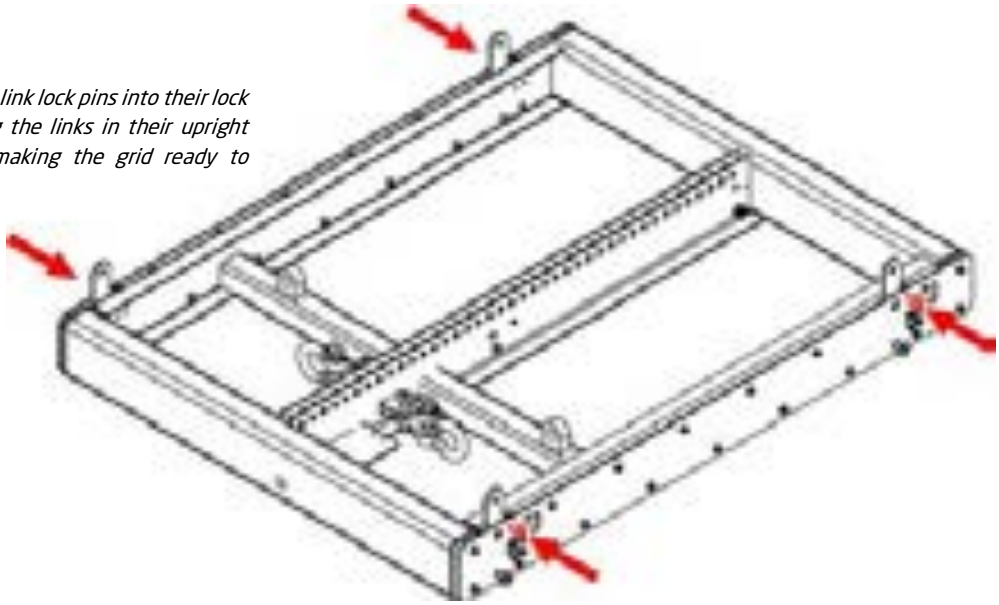
Step 1B.

Rotate each of the sub links to their upright positions. The finger hole in the side of the FG-HALO-B at each position is intended to make this very simple.

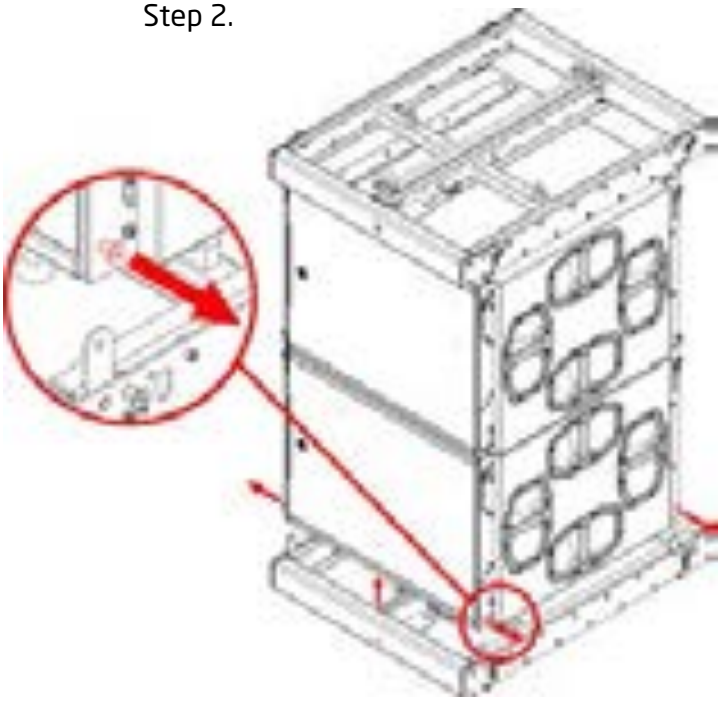


Step 1C.

Replace the sub link lock pins into their lock positions, fixing the links in their upright positions and making the grid ready to attach.

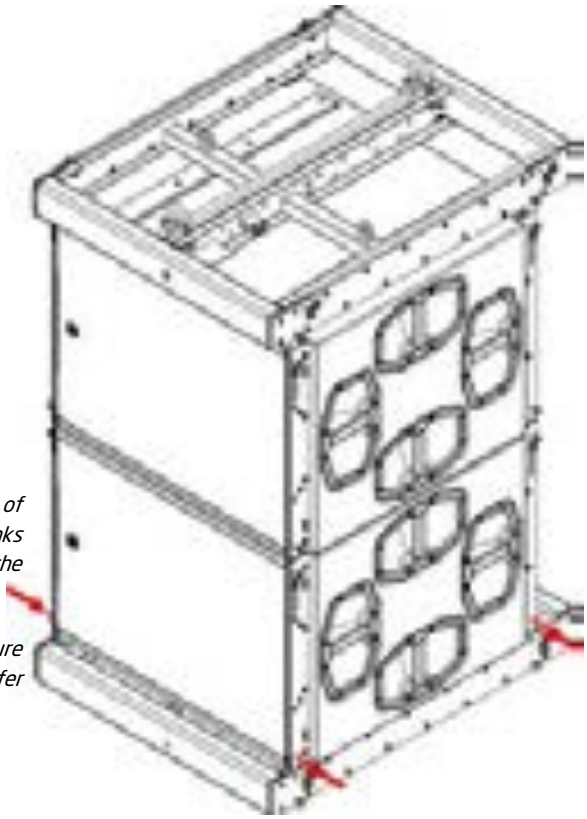


Step 2.



Position the second FG-HALO-B underneath the flown subwoofer column.

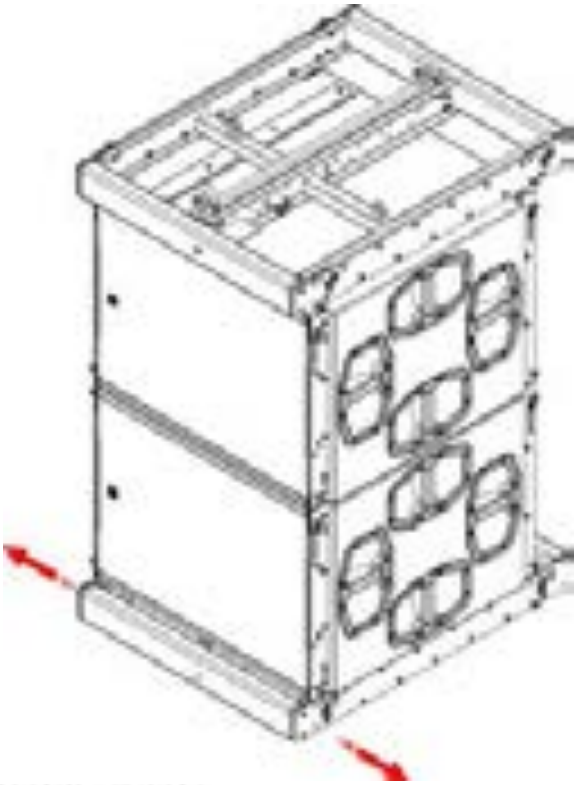
Remove the lower enclosure link pins on all four corners of the bottom subwoofer.



Step 3.

Lift the second FG-HALO-B up to the bottom of the ST-215, ensuring that the four sub links engage into the clevises in the bottom of the subwoofer.

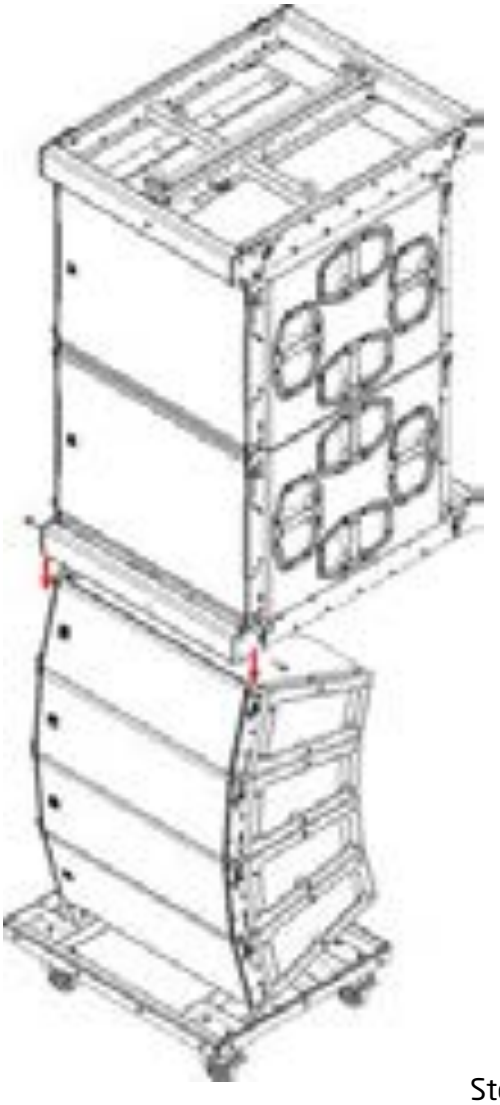
Replace the four enclosure link pins to secure the FG-HALO-B to the bottom of the subwoofer column.



Step 4.

Remove the front enclosure link pins, ready to attach the HALO-B enclosures.

Also, remove the splay link attachment pin in the FG-HALO-B spine.



Step 5.

Prepare your first cart of HALO-B enclosures as detailed in the HALO-B user manual.

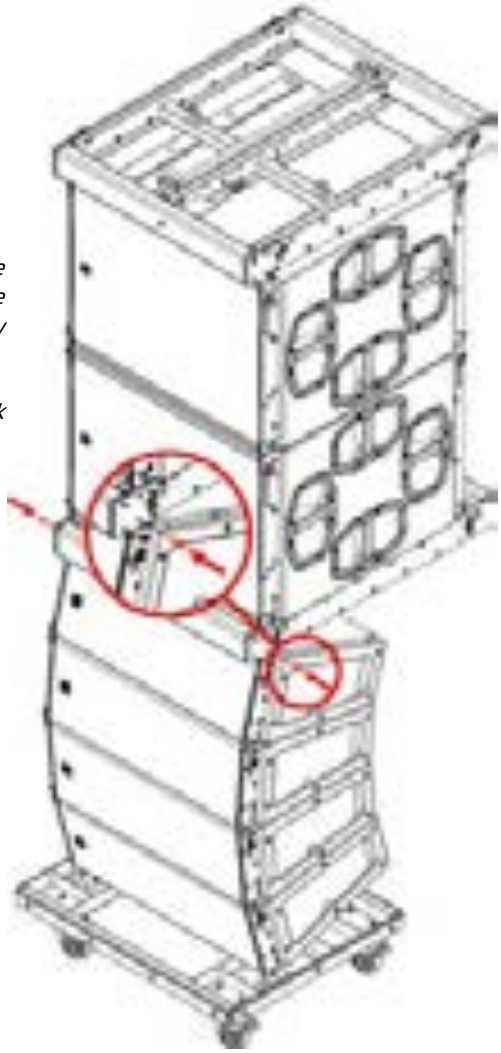
Position this cart of HALO-B underneath your flown ST-215 column.

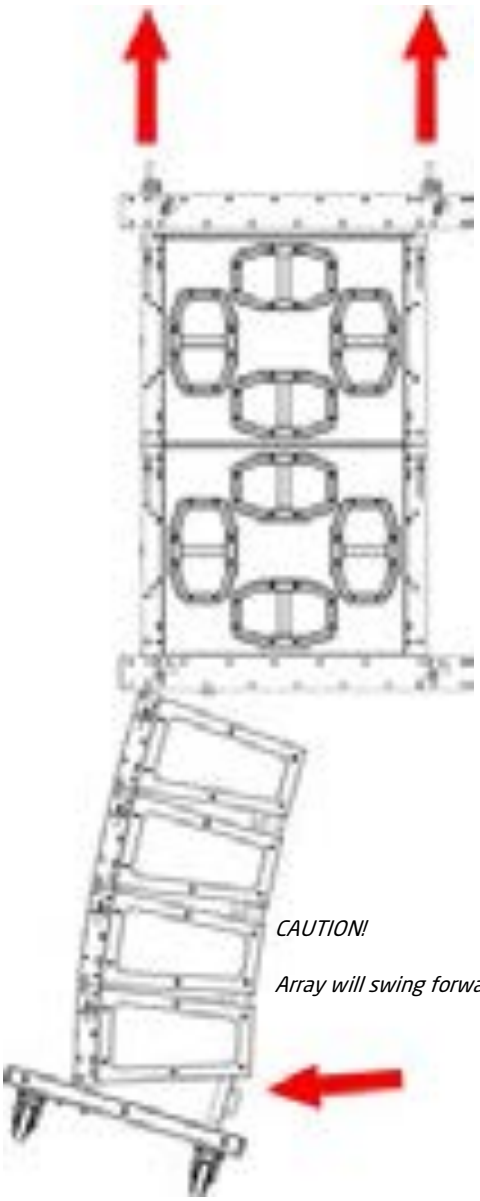
Lower the subwoofer column toward the HALO-B enclosures.

Step 6.

Ensuring the HALO-B front links engage in the FG-HALO-B clevis, secure the HALO-B cart to the FG-HALO-B by replacing the pins.

Do not attempt to connect the splay link of the HALO-B enclosures yet.





Step 7.

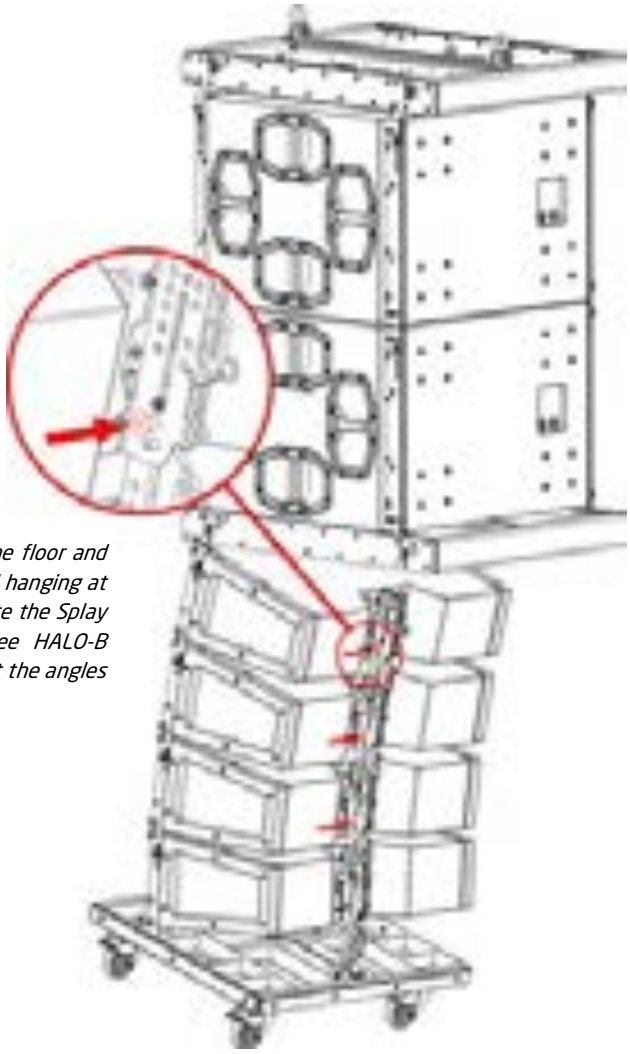
Lift the array until the WC-HALO-B is clear of the floor.

As the HALO-B enclosures leave the floor, the angles at the rear will open to the settings you have determined.

Take care as the HALO-B elements will tend to swing forward as they leave the ground.

CAUTION!

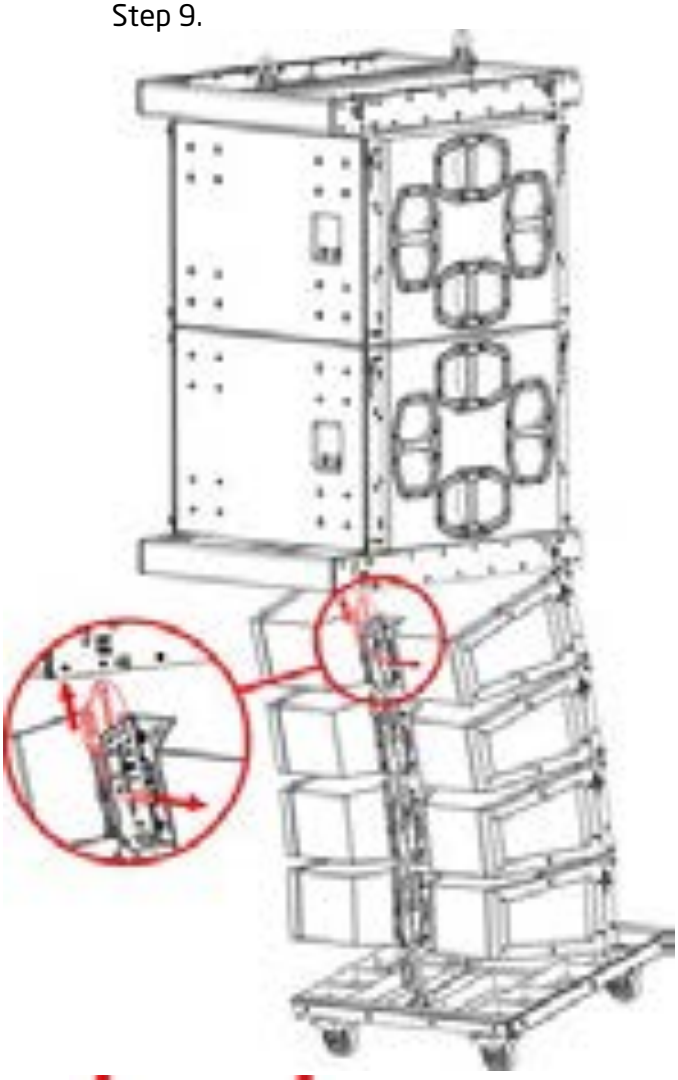
Array will swing forward.



Step 8.

Once the array is clear of the floor and the HALO-B elements are all hanging at their desired angles, reinstate the Splay Lock pins on the top three HALO-B enclosures - this will prevent the angles closing.

Step 9.

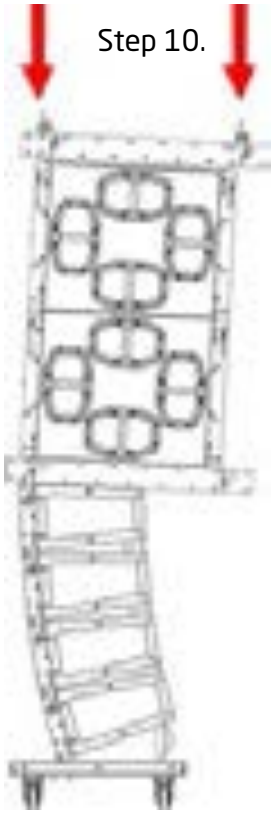


Keeping the array hanging, remove the Angle Set pin from its stow location on the first HALO-B element.

Extend the Splay Link to the desired angle - paying attention to the legend on the FG-HALO-B spine with regards indicated angle compared to actual angle.

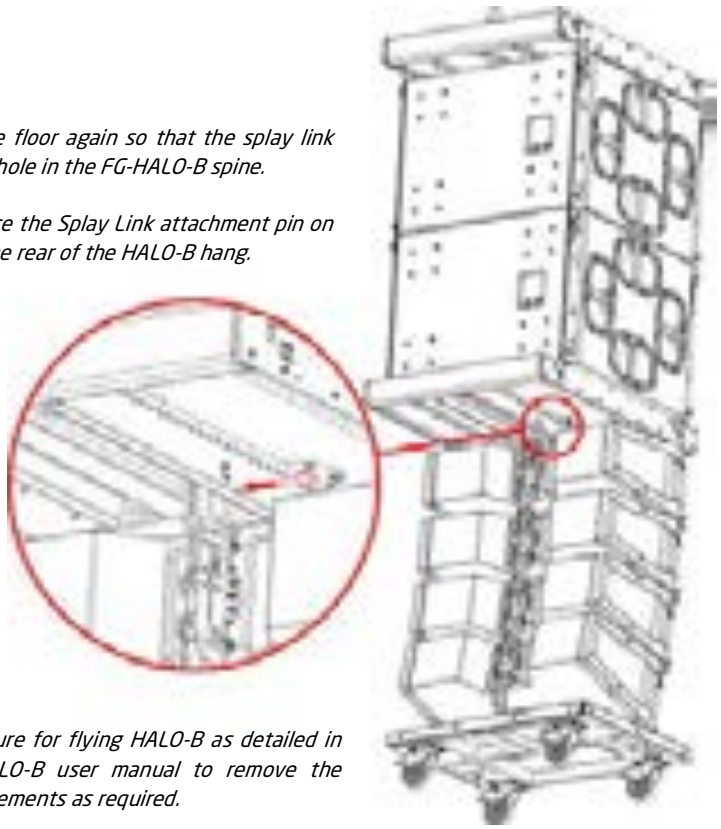
Reinstate the Angle Set pin at the desired location to set the angle.

Step 10.



Land the array back on the floor again so that the splay link moves toward the location hole in the FG-HALO-B spine.

Once it is in position, replace the Splay Link attachment pin on the FG-HALO-B to secure the rear of the HALO-B hang.

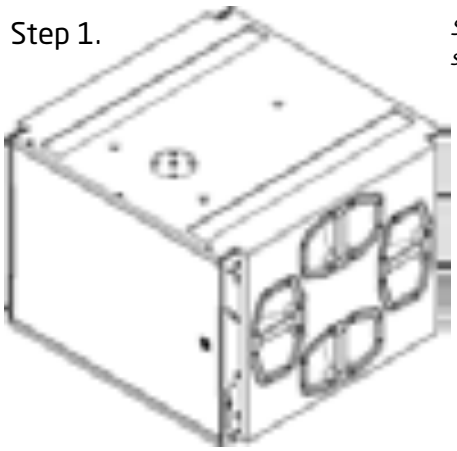


Continue with the procedure for flying HALO-B as detailed in section 6.2.2 of the HALO-B user manual to remove the wheelcart and add more elements as required.

6.3 – Ground Stacking ST-215 subwoofers

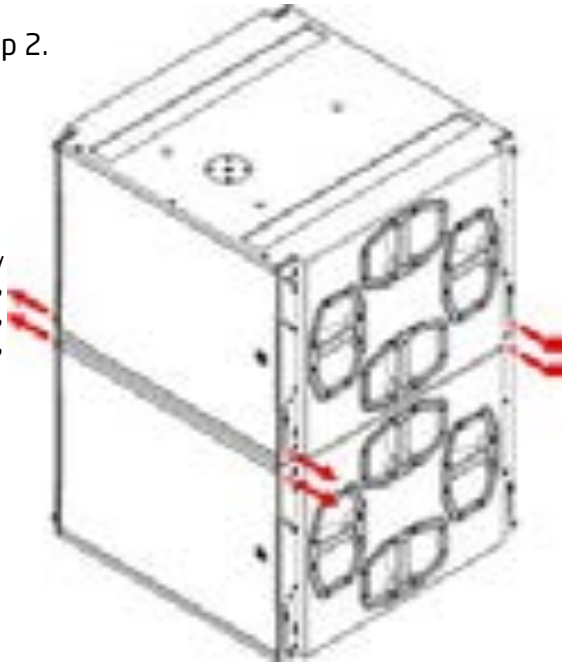
6.3.1 – Using ST-215 subwoofers alone

Step 1.



ST-215 subwoofers should be inverted for ground stacking – so that the subwoofer sits on its runners, and the polemount is visible.

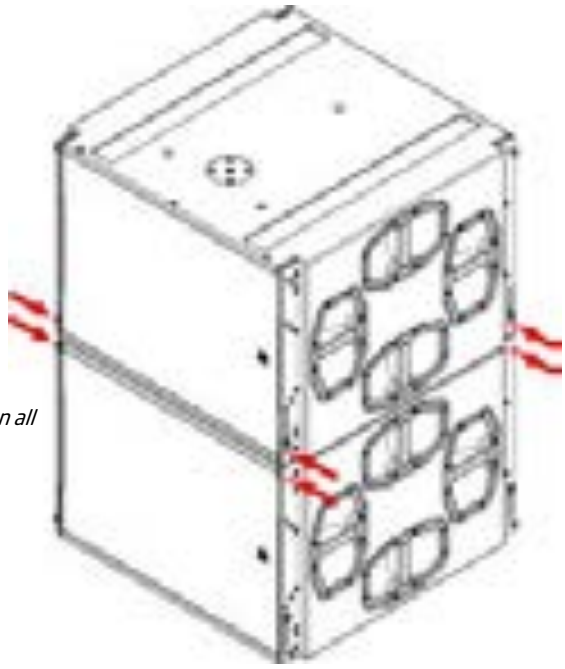
Step 2.



If ground stacking more than one ST-215, invert the second subwoofer and sit it on top of the first, so its runners sit into the recesses on the first subwoofer cabinet. Then, remove both the Enclosure Link and Link Lock pins on all four rigging hardware assemblies.

Step 3.

When both pins are removed, the four Enclosure Links will drop down under gravity into the clevises on the subwoofer below.



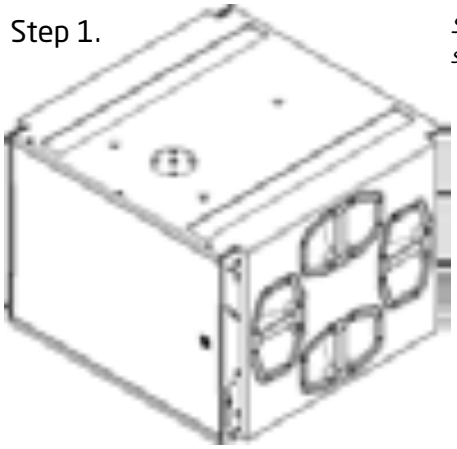
Step 4.

Reinstate both the Enclosure Link and Link Lock pins on all four corners to lock the subwoofers together.

Repeat this process if adding more subwoofers.

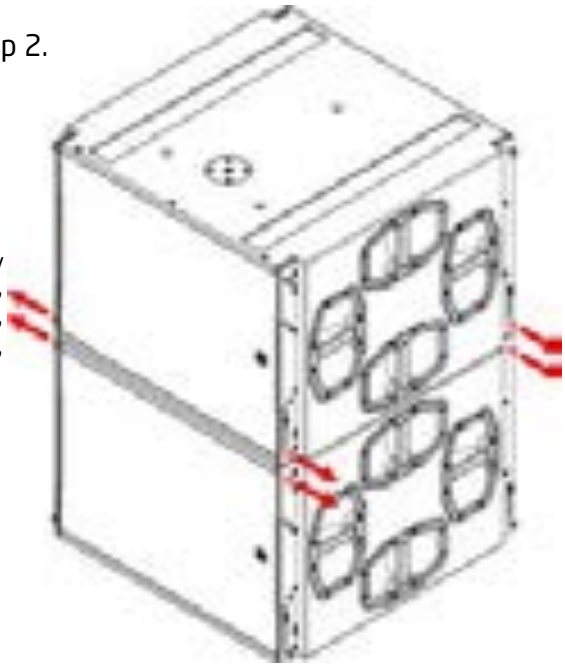
6.3.2 - Ground Stacking with HALO-B & FG-HALO-B

Step 1.



ST-215 subwoofers should be inverted for ground stacking - so that the subwoofer sits on its runners, and the polemount is visible.

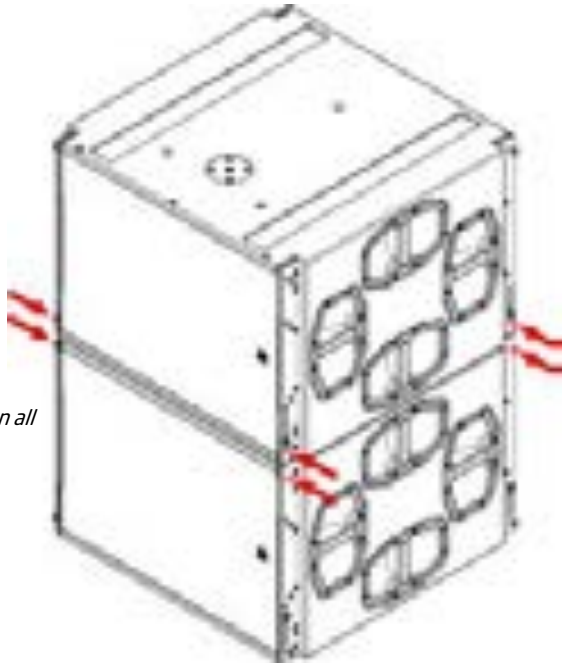
Step 2.



If ground stacking more than one ST-215, invert the second subwoofer and sit it on top of the first, so its runners sit into the recesses on the first subwoofer cabinet. Then, remove both the Enclosure Link and Link Lock pins on all four rigging hardware assemblies.

Step 3.

When both pins are removed, the four Enclosure Links will drop down under gravity into the clevises on the subwoofer below.

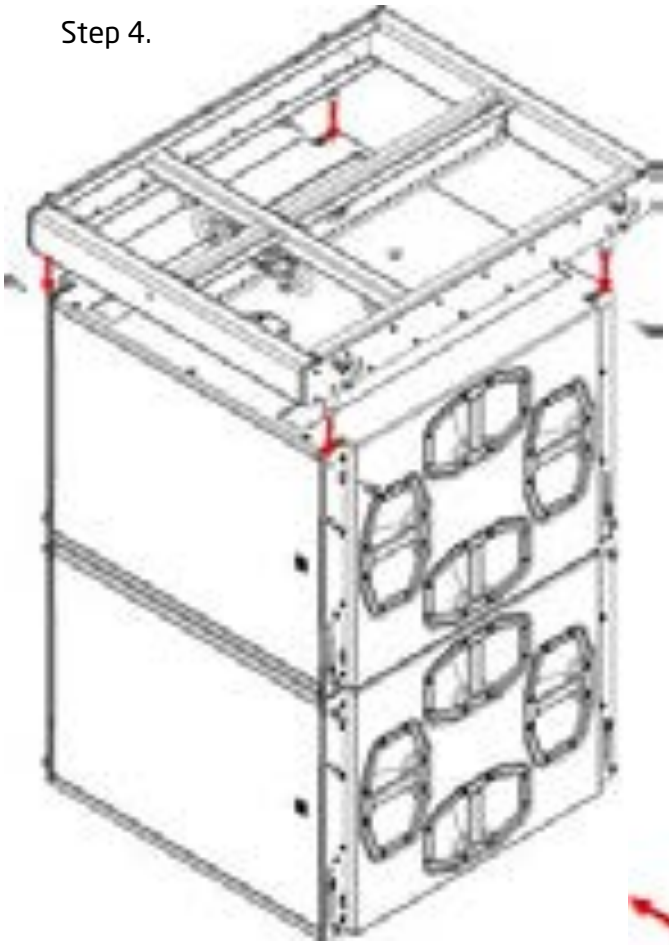


Step 4.

Reinstate both the Enclosure Link and Link Lock pins on all four corners to lock the subwoofers together.

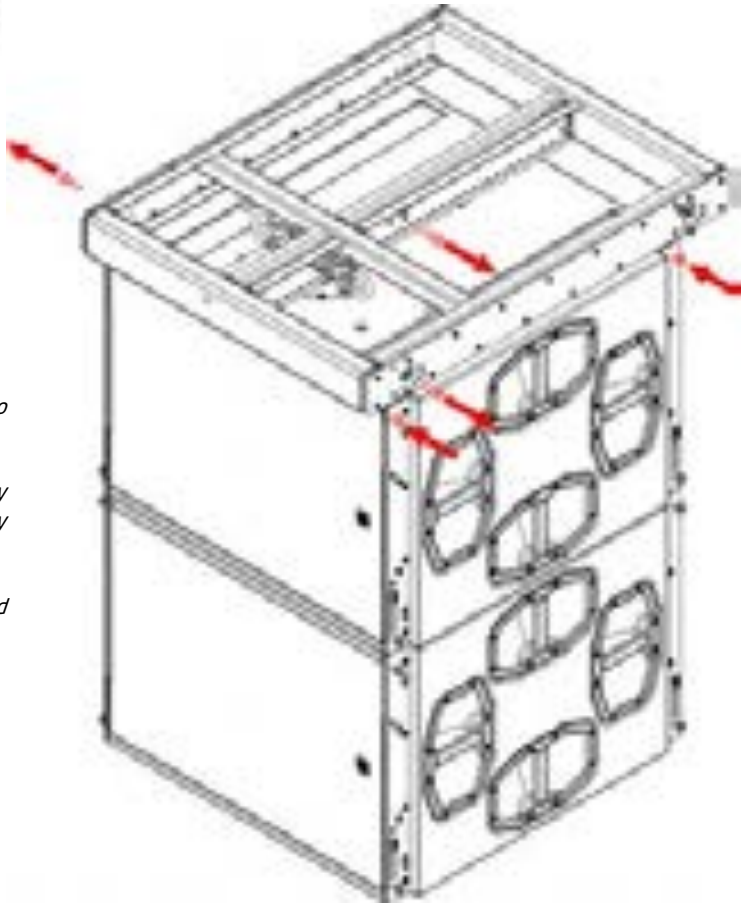
Repeat this process if adding more subwoofers.

Step 4.



Prepare an FG-HALO-B as described in Section 6.3 step 6 above, rotating the sub links into their use positions and then inverting the FG-HALO-B.

Lower the FG-HALO-B into position so that each of the sub links engage in the clevis in each corner of the ST-215.

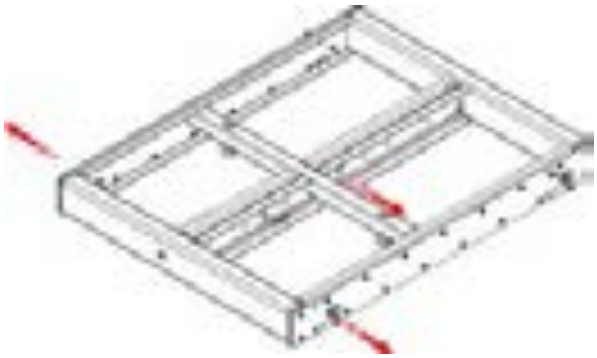


Step 5.

Replace the Enclosure Link pins on all four corners to lock the FG-HALO-B to the ST-215.

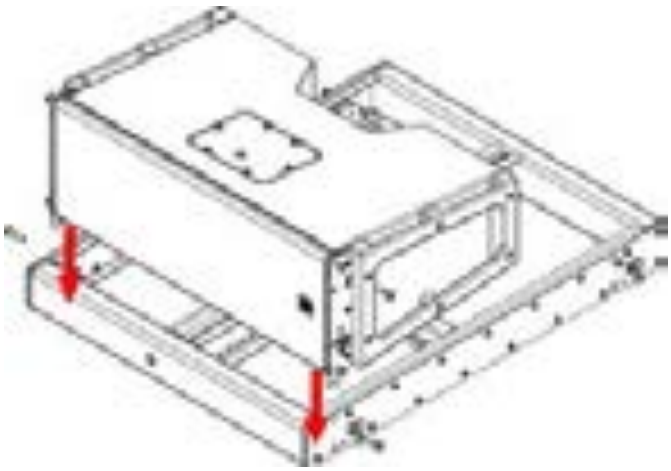
Remove the front Enclosure Link pins, and the Splay Link pin on the spine, from the FG-HALO-B so it is ready to receive HALO-B enclosures.

HALO-B enclosures can now be added to the ground stack as described in Section 6.4.1 above.



Step 6.

Prepare the FG-HALO-B by inverting it and removing the Front Link Attachment pins and the Splay Link Attachment pin.

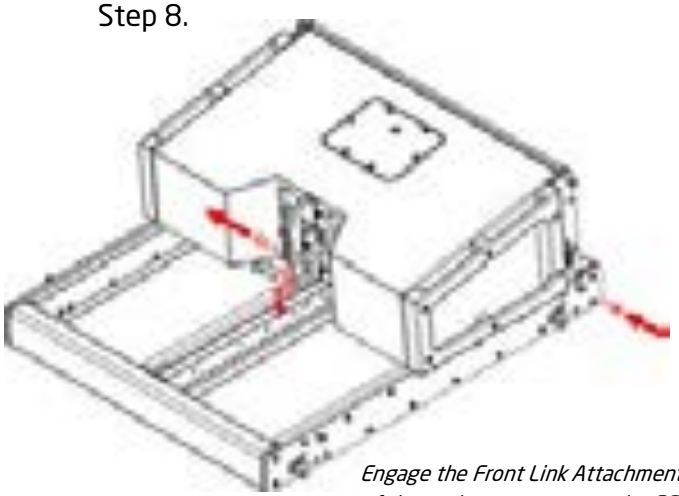


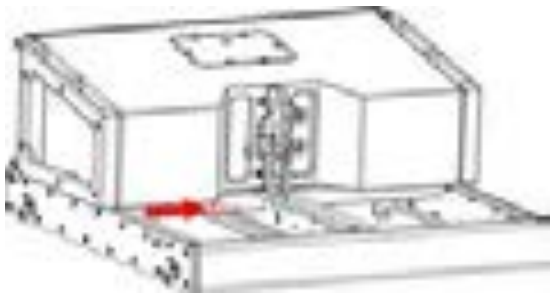
Step 7.

Prepare the first HALO-B enclosure by extending the front rigging links as described in 6.1.1 above.

Invert the HALO-B and lower it into position so that the front links engage in their receptacles on the FG-HALO-B.

Step 8.

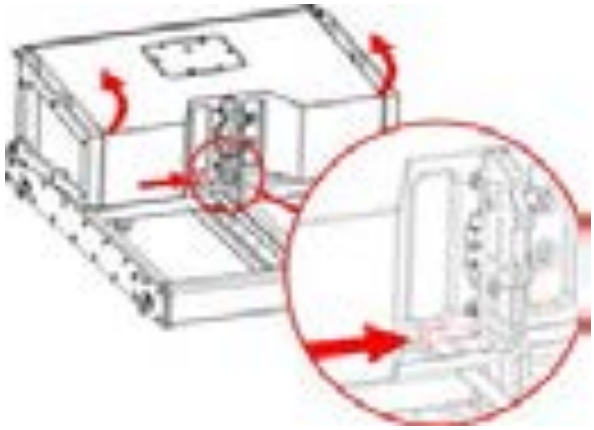




Engage the Front Link Attachment pins to secure the HALO-B to the FG-HALO-B and then lower the rear of the enclosure to rest on the FG-HALO-B spine.

Remove the Angle Set pin from the rear of the HALO-B, which will allow the splay link to drop down into the spine slot under gravity. There is a metal stop welded to the spine which prevents the link from falling too far. Re-insert the Splay Link Attachment pin into the spine of the FG-HALO-A to secure the enclosure to the grid.

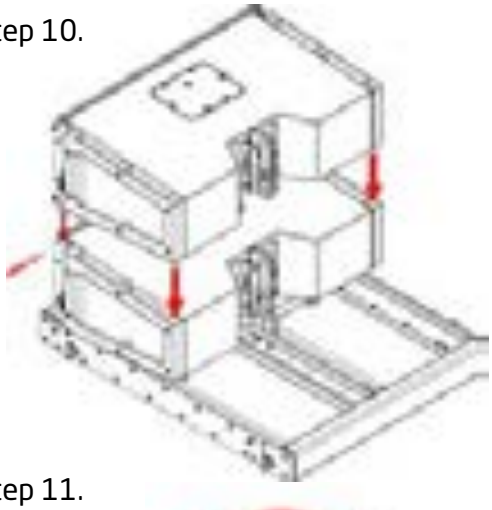
Step 9.



Lift the rear of the HALO-B enclosure to allow the splay link to move within the splay rigging assembly. Select the appropriate angle as determined by your EASE Focus simulation, and insert the Angle Set pin into the appropriate hole.

Pay close attention to the label on the FG-HALO-B which illustrates the difference between indicated angle and achieved angle on the FG-HALO-B.

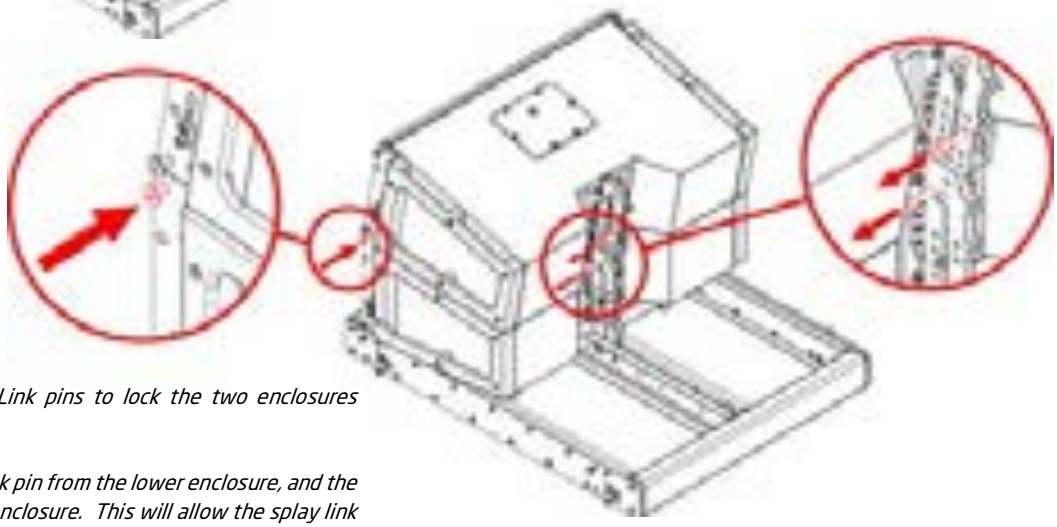
Step 10.



Remove the Front Enclosure Link pins from the attached HALO-B enclosure.

Prepare a second HALO-B enclosure as described in 6.1.1 above. Invert the enclosure and lower it into place on the first.

Step 11.

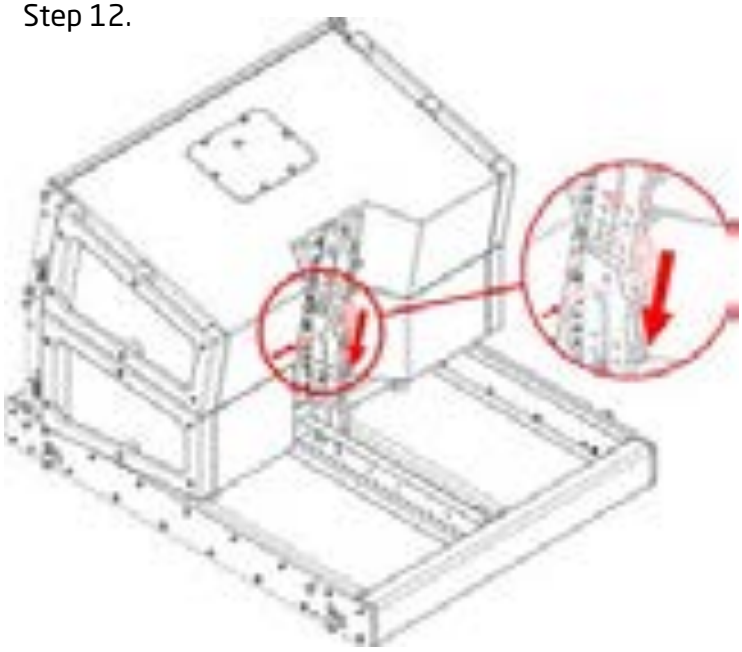


Replace the Front Enclosure Link pins to lock the two enclosures together.

Remove the Rear Enclosure Link pin from the lower enclosure, and the Angle Set pin from the upper enclosure. This will allow the splay link to drop under gravity into the enclosure link receptacle on the lower enclosure.

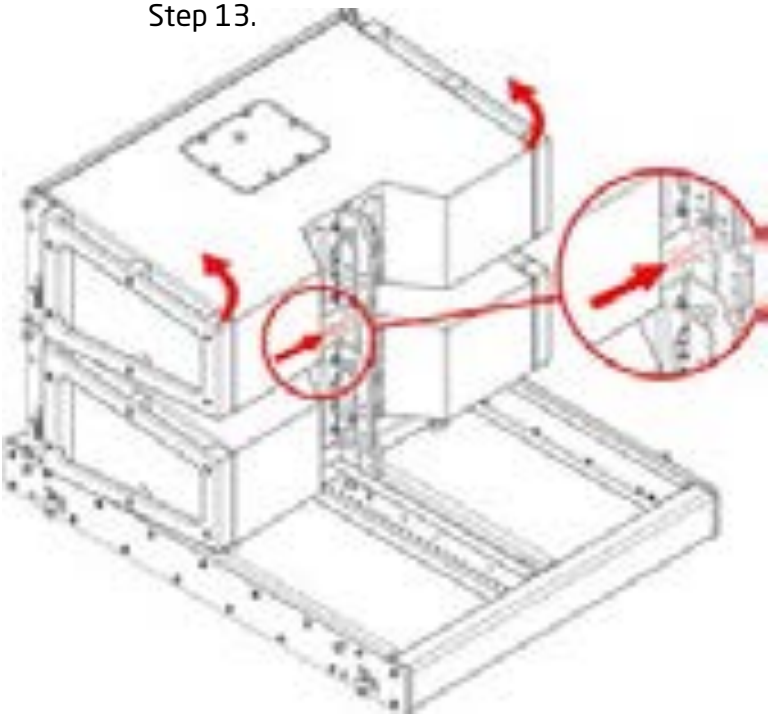
It will rest on the splay lock pin of the lower enclosure, preventing it from falling too far.

Step 12.



Insert the Rear Enclosure Link pin which will join the two enclosures together.

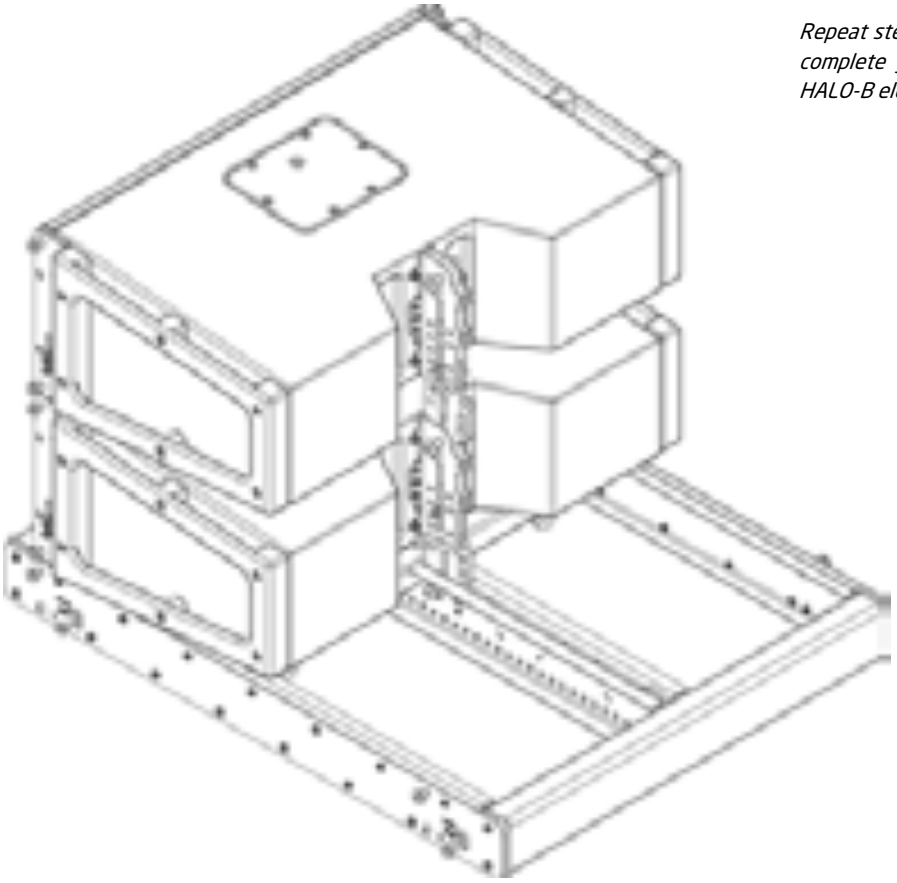
Step 13.



Lift the rear of the upper enclosure, allowing the splay link to move within the splay rigging assembly.

Select the desired angle from your EASE Focus simulation and insert the Angle Set pin into the corresponding location hole.

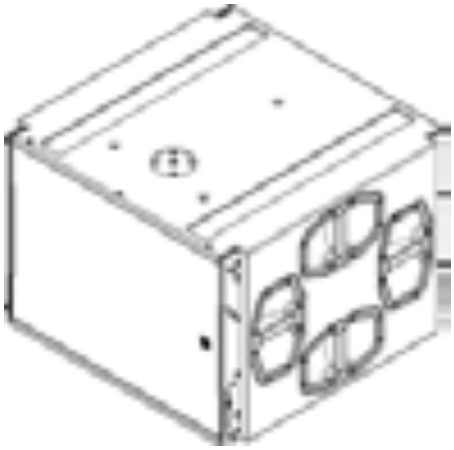
Step 14.



Repeat steps 10-13 with further HALO-B enclosures to complete your ground stack, up to a maximum of 8 HALO-B elements.

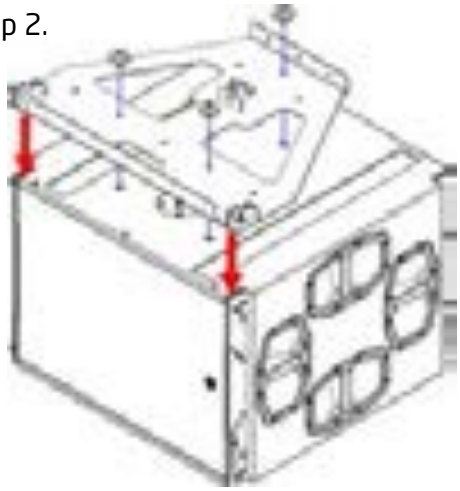
6.3.3 – Ground Stacking with HALO-B & GS-HALO-B

Step 1.



Prepare the ST-215 subwoofer by inverting so it sits on its floor runners. If more than one subwoofer is being used, lock them together using the flying system as described in Section 6.4.3 above.

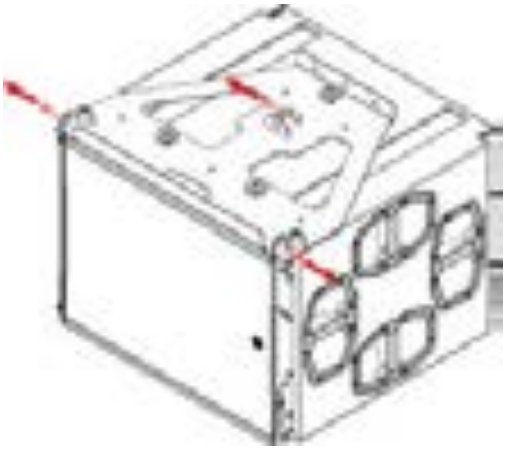
Step 2.



Position the GS-HALO-B on top of the ST-215, so that the three M8 clearance mounting holes line up with the M8 threaded fittings in the top of the ST-215.

Remove the M8 lobe knobs from the storage bosses on the GS-HALO-B, and use them to secure the GS-HALO-B tightly to the top of the ST-215.

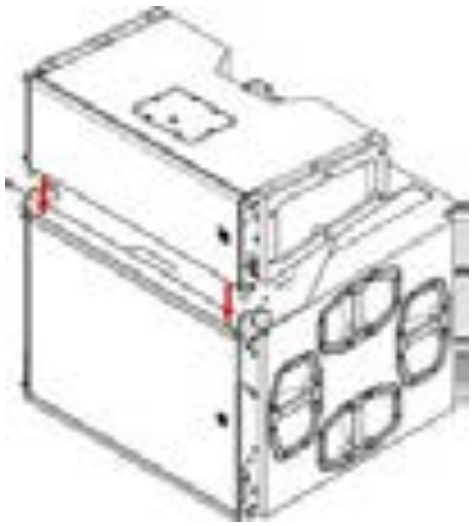
Step 3.



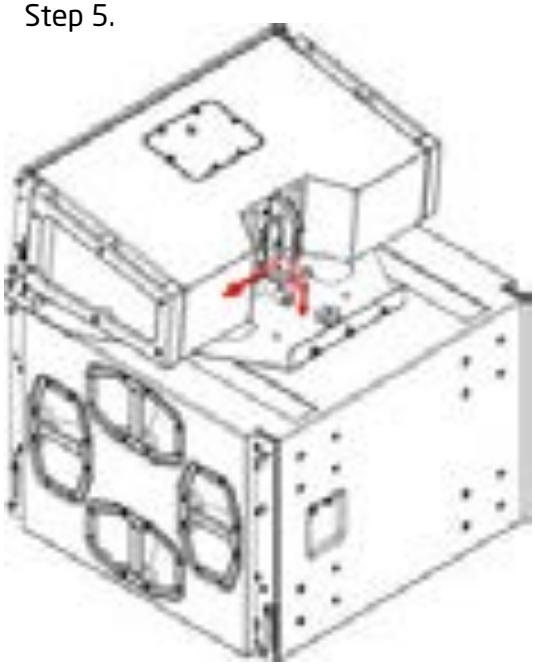
Remove the front Enclosure Link pins, and the central rear Splay Link pin.

Step 4.

Prepare the first HALO-B enclosure as described in the previous sections – extend the front rigging links, invert the enclosure and position so that the front rigging links engage into the clevises on either side of the GS-HALO-B.



Step 5.

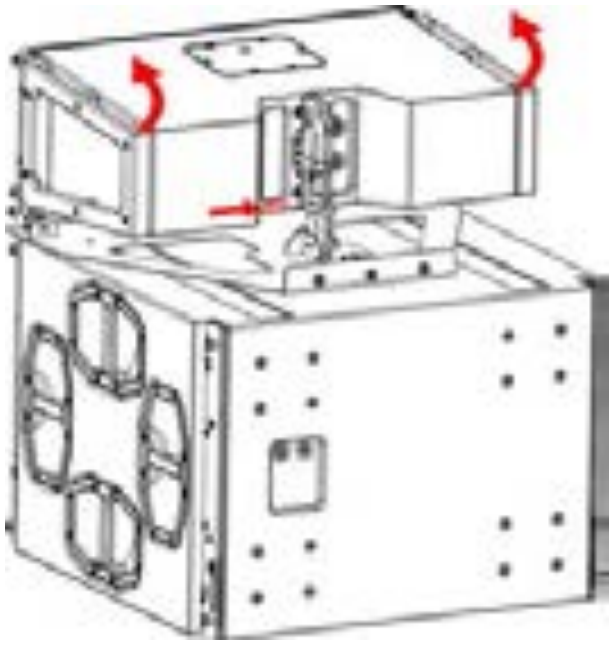


Remove the Angle Set pin from the rear rigging assembly - the Splay Link will drop down under gravity. Ensure it engages in the central clevis, where there is a stop to prevent it travelling too far.

Reinstate the Splay Link pin on the GS-HALO-B to secure the Splay Link to the plate.

Step 6.

Lift the rear of the HALO-B to arrive at the correct angle according to your EASE Focus 3 simulation, and then reinstate the Angle Set pin to lock the angle in place.



Step 7.

Repeat steps 4-6 above to build the ground stack, up to a maximum of 6 HALO-B elements on two subwoofers, or four elements on three subwoofers.

FOR ANY GROUND STACK SYSTEM, ENSURE THE STACK IS ON LEVEL, STABLE GROUND AND CANNOT TOPPLE OVER. IF IN DOUBT, SECURE THE STACK USING RATCHET STRAPS OR SIMILAR TO ENSURE THERE IS NO RISK TO ANY PERSON NEAR THE ARRAY.

6.4 Using the CHAIN-HALO-B lifting chain

Self-climbing motors have chain bags, which hang below the motor and can foul the correct position of the HALO-B flying grid. The CHAIN-HALO-B is a 1m effective length lifting chain with a SWL of 760kg which is intended to sit between the motor hook and the FG-HALO-B pickup link. The CHAIN-HALO-B has a chain hook included so that the chain length can be adjusted as necessary.

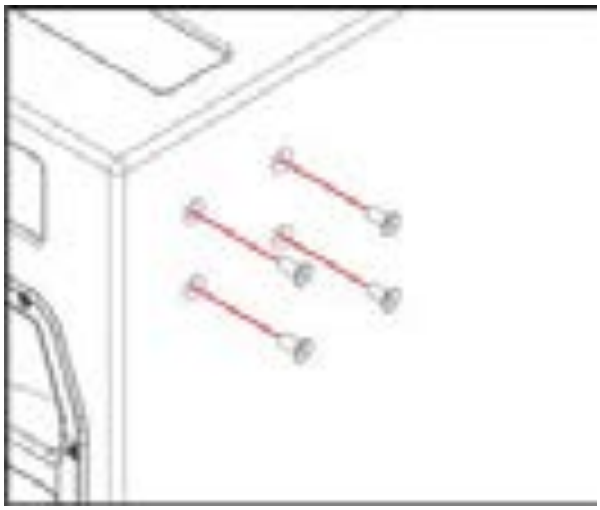
Using the CHAIN-HALO-B allows you to create sufficient space below the motor for the chain bag to sit safely.

6.5 - Fitting castors

The ST-215 can be fitted with an optional set of four tour-grade castors for ease of movement as single subwoofers. The carton should contain:

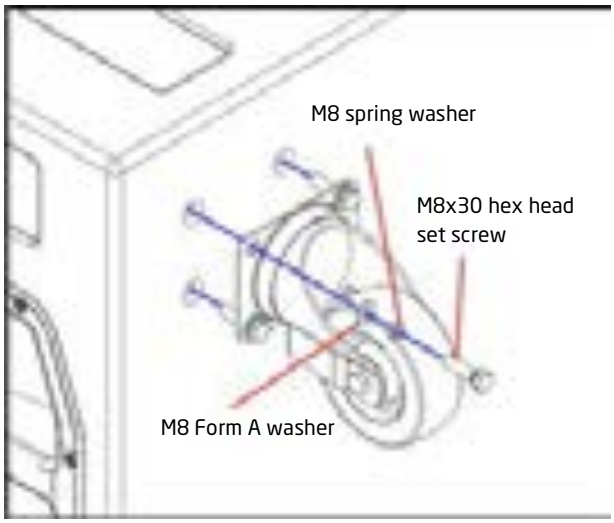
4pcs 32 x 100mm heavy duty castor
17pcs M8 x 30 hex head set screw
17pcs M8 Form A (flat) washer
17pcs M8 spring washer

Step 1.



Using a 5mm Allen key, remove the 16 M8 x 20 countersunk socket machine screws on the rear panel. Ensure that all the threaded fittings inside the cabinet are still intact and the threads are clear before proceeding.

Step 2.



Fit each castor to the rear of the cabinet, ensuring all four bolts are started in their threads before tightening completely. The Form A (flat) washer should be in contact with the castor frame, and the spring washer should be between the flat washer and the bolt head.

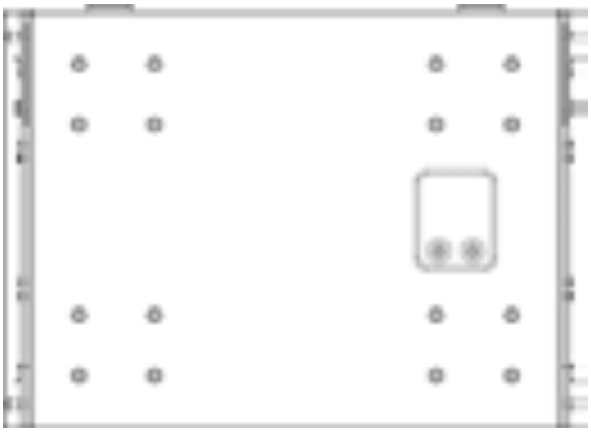
7.0 – Powering the System

The ST-215 subwoofer can be powered from any amplifier 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.

7.1 - Amplifier and Processing Requirements

7.1.1 - Connections

The ST-215 requires only a single amplifier channel. Inputs to the ST-215 enclosure are on Neutrik SpeakON NL4 as illustrated below.



Two-core cable should be used for connecting ST-215 subwoofers, and the connections are as follows:

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

The 2+/2- connections are linked through, so using a 4-core cable these can be used as a pass-through to other loudspeakers.

7.1.2 - Connector Options

The ST-215 is supplied as standard with NL4TMP connectors, which form an IP54 rated connection when used with the STX series of SpeakON cable connectors. For more demanding environments, ST-215s can be supplied with other options by special order – please contact EM Acoustics to discuss your requirement.

7.1.3 – Amplifier Requirements

The ST-215 is a very powerful subwoofer, making use of some of the most advanced drive units available in the industry today. 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
ST-215	2000W @ 4 ohms	4000W @ 4 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 ST-215, however the DQ6 and DQ10 are lower power models and as such will not provide maximum power for the subwoofer.

The following table shows the maximum number of ST-215 that can be connected per channel on the various different amplifiers:

Amplifier	Max ST-215 per channel
DQ6	1*
DQ10	1*
DQ20	2

* - The DQ6 and DQ10 do not provide sufficient power for maximum headroom for the ST-215 and as such should only be used in lower SPL environments.

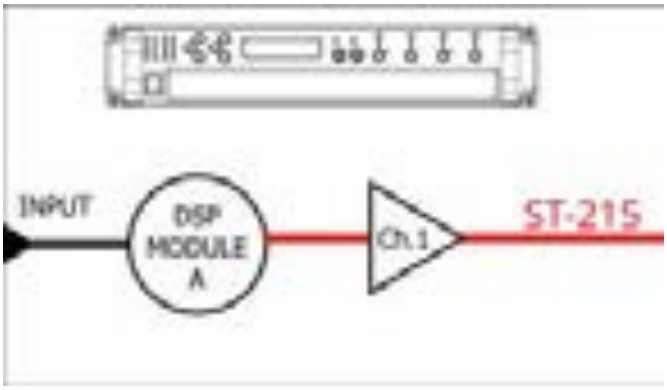
7.1.4 – Processing Requirements

The ST-215 requires active high and low pass filters, and appropriate limiter settings. If not using DQ Series amplifiers, or the DSC48 Digital System Controller, then a suitable DSP system must be used in conjunction with your ST-215 to prevent damage to the subwoofer. Check the EM Acoustics website for the most up-to-date DSP settings for the ST-215.

7.2 - Presets and Settings

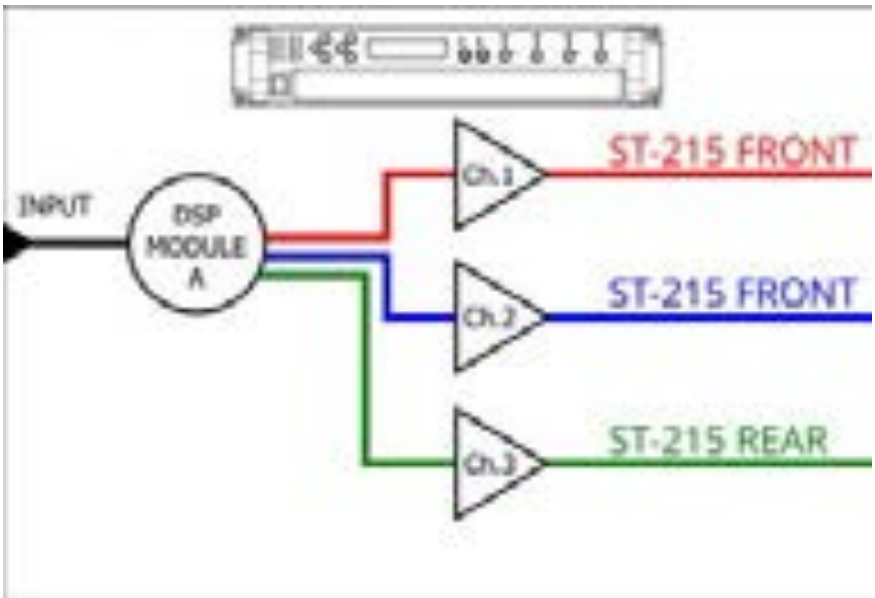
7.2.1 – Standard ST-215 Preset

ST-215 subwoofers require only a single amplifier channel, and as such the preset recalled will only require one output from your DQ Series amplifier.



7.2.2 – Cardioid Array Preset

The ST-215 can be used to create cardioid arrays by ensuring that one in three ST-215 subwoofers are physically reversed, and the appropriate ST-215 Cardioid preset is loaded into the amplifier. This preset requires three amplifier channels, and with a DQ20 amplifier can power up to two ST-215 subwoofers per amplifier channel.



7.2.2 - FIR Latency

FIR processing, like any digital processing system introduces latency due to the processing time. The latency imposed by the FIR processing is **4 milliseconds**, and this should be taken into account when determining geometric delays based on your system configuration.

7.2.3 - 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.

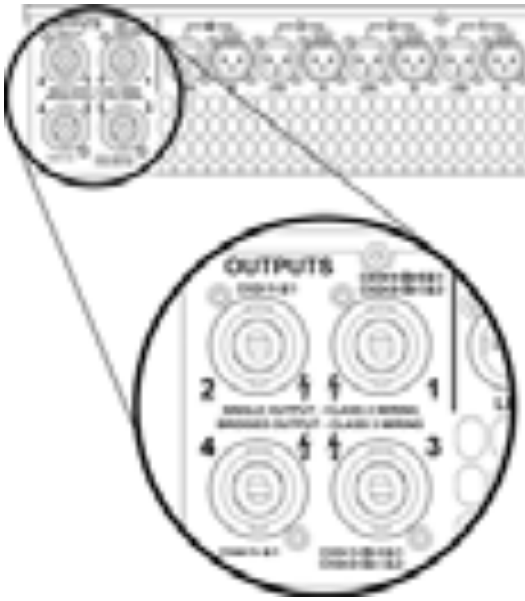
7.2.4 - Applying EQ

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 ST-215 is designed with a significant amount of system headroom, so applying EQ is perfectly acceptable.

7.3 - Use with the DQ Series Advanced System Amplifiers

The ST-215 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.

7.3.1 - Connections



The four amplifier channels appear on four speakON connectors on the rear of the DQ Series amplifiers. ST-215 subwoofers require one amplifier channel.

7.3.2 - Preset Recall

The family of ST-215 presets are pre-installed on the DQ amplifiers, and as such they can be used following the normal preset recall procedure. The presets available are:

ST-215.Sub	Standard ST-215 subwoofer preset
ST-215.Card	Cardioid Array ST-215 subwoofer 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.

7.4 - System Connectivity

7.4.1 - Cable Length and Specification

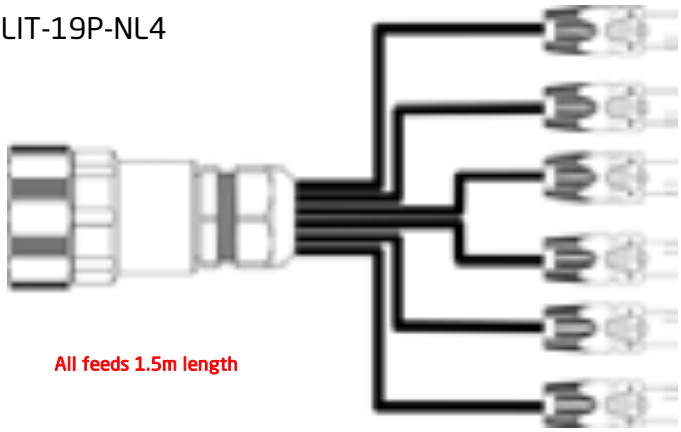
All cables add to the system impedance, and as such careful selection is required depending on your amplifier setup and overall system impedance. Cables with a cross sectional area of less than 2.5mm² should not be used. Recommended maximum cable lengths are given below:

Conductor Area	Maximum Recommended Cable Length		
	2 ohms	4 ohms	8 ohms
2.5mm² (14 AWG)	15m	30m	60m
4.0mm² (12 AWG)	20m	40m	80m
6.0mm² (10 AWG)	30m	60m	120m

7.4.2 - Available Cable Accessories

There are a number of bespoke cable assemblies which can be supplied by EM Acoustics to ensure correct wiring for your system, both using DQ Series amplifiers alone and also using the DQRack touring solution.

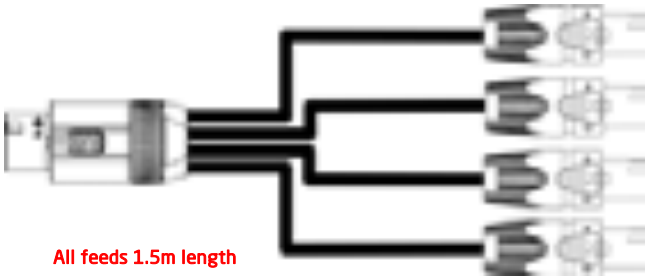
SPLIT-19P-NL4



19-pole pin	Feed & Connection
1	Feed 1, 1+
2	Feed 1, 1-
3	Feed 2, 1+
4	Feed 2, 1-
5	Feed 3, 1+
6	Feed 3, 1-
7	Feed 4, 1+
8	Feed 4, 1-
9	Feed 5, 1+
10	Feed 5, 1-
11	Feed 6, 1+
12	Feed 6, 1-
13-19	No connection

Intended for use with 19-pole circular connectors such as Socapex, the SPLIT-19P-NL4 assembly gives six 2-core cable sends, on NL4 connectors, with 1.5m of cable for each feed. This assembly is intended for use at the loudspeaker end of the cable run.

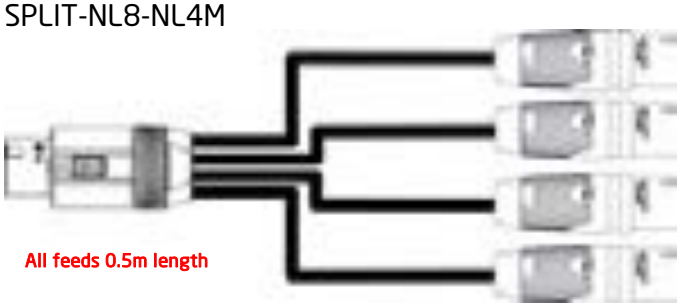
SPLIT-NL8-NL4F



NL8 pin	Feed & Connection
1+	Feed 1, 1+
1-	Feed 1, 1-
2-	Feed 2, 1+
2-	Feed 2, 1-
3+	Feed 3, 1+
3-	Feed 3, 1-
4+	Feed 4, 1+
4-	Feed 4, 1-

Intended as a cable assembly to split from NL8 cables to standard NL4 connections, this assembly provides four 2-core feeds on 1.5m metre cables. This assembly is intended for the loudspeaker end of the cable run.

SPLIT-NL8-NL4M

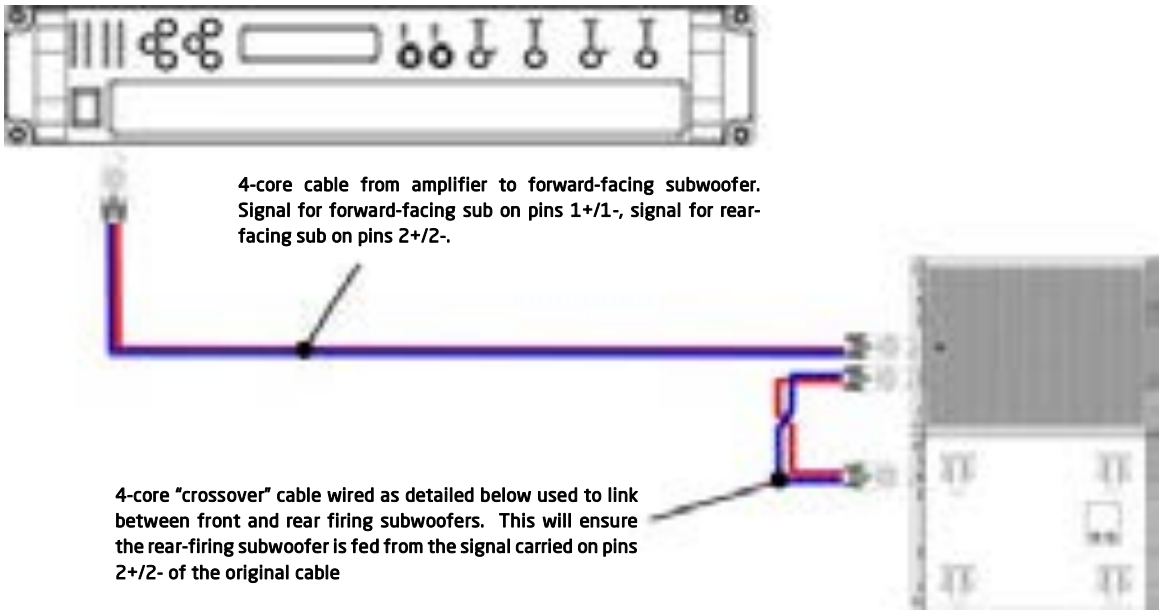


NL8 pin	Feed & Connection
1+	Feed 1, 1+
1-	Feed 1, 1-
2-	Feed 2, 1+
2-	Feed 2, 1-
3+	Feed 3, 1+
3-	Feed 3, 1-
4+	Feed 4, 1+
4-	Feed 4, 1-

Intended to split NL8 connections into four 2-core feeds, SPLIT-NL8-NL4M gives four 2-core cable sends, on male NL4 sockets. This assembly is intended for use at the amplifier end of the cable run.

7.4.3 – 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.

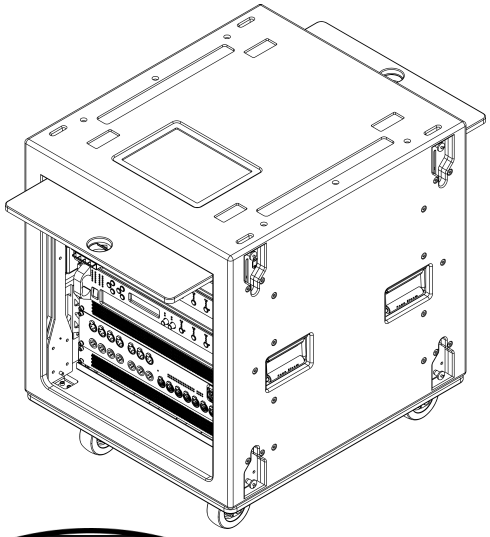


Crossover cable specifications

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

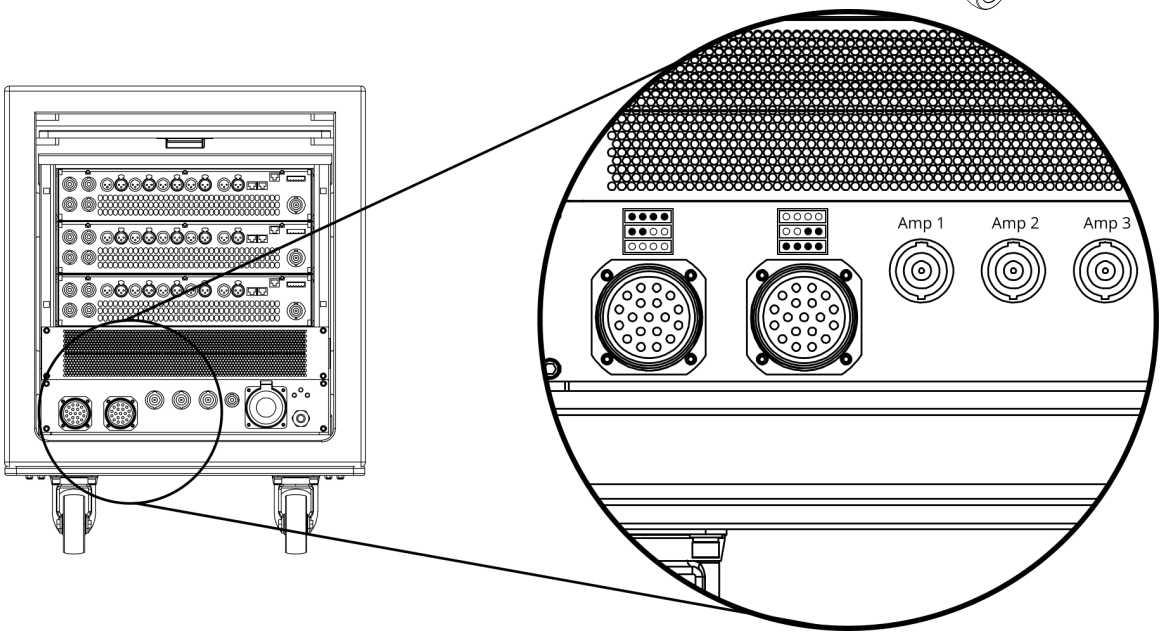
7.5 - Use with the DQRack

7.5.1 - DQRack Overview



The DQRack is EM Acoustics' flagship touring amplification and control solution. 12 channels of premium quality Class D amplification with full onboard DSP and Dante connectivity, packaged with a bespoke I/O solution for signal, data, loudspeaker outputs and mains power. The DQRack is the optimum solution for touring environments and provides an optimum turnkey solution.

The DQRack has two loudspeaker output options, depending on your chosen cabling method.



Each of the two 19-pole connectors delivers 6 channels of amplifier power, as identified from the legend on the output panel.

The 19-pole connectors are wired in parallel to the three NL8 connectors, each of which delivers the four outputs from each amplifier.

Detailed below are some examples of how you can use the DQRack to power a system appropriately in a touring environment, and the various accessories and other parts that would be required.

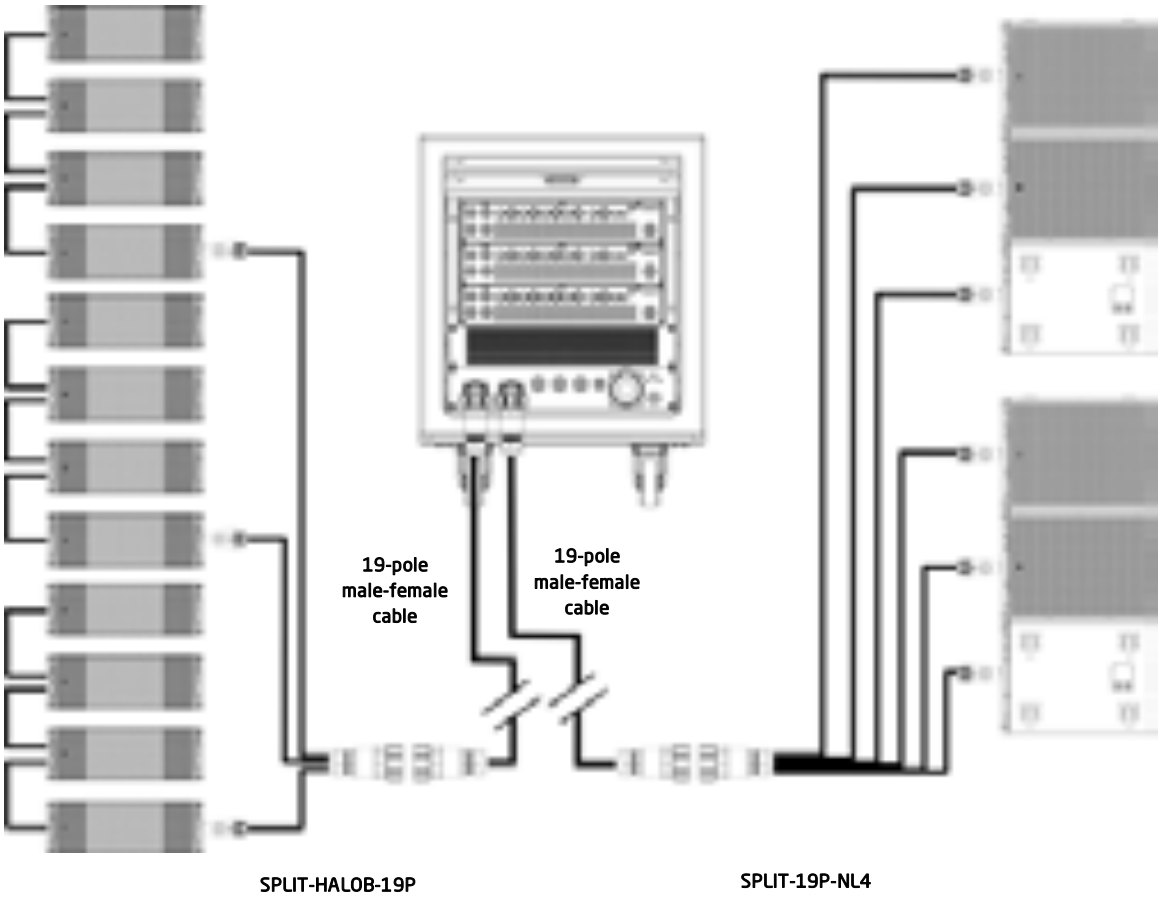
7.5.2 - System Examples with the DQRack

Given below are two examples of possible ways ST-215 subwoofers can be used with a DQRack. There are of course many possible combinations, depending on the application and the equipment available – so these two examples are by no means comprehensive.

The example below illustrates the use of a DQRack in a large system environment. Such a system could, for example, be one half of a larger stereo loudspeaker system. One 19-pole output is used to drive the HALO-B system, and the other drives the six ST-215 subwoofers in a cardioid array.

Parts required:

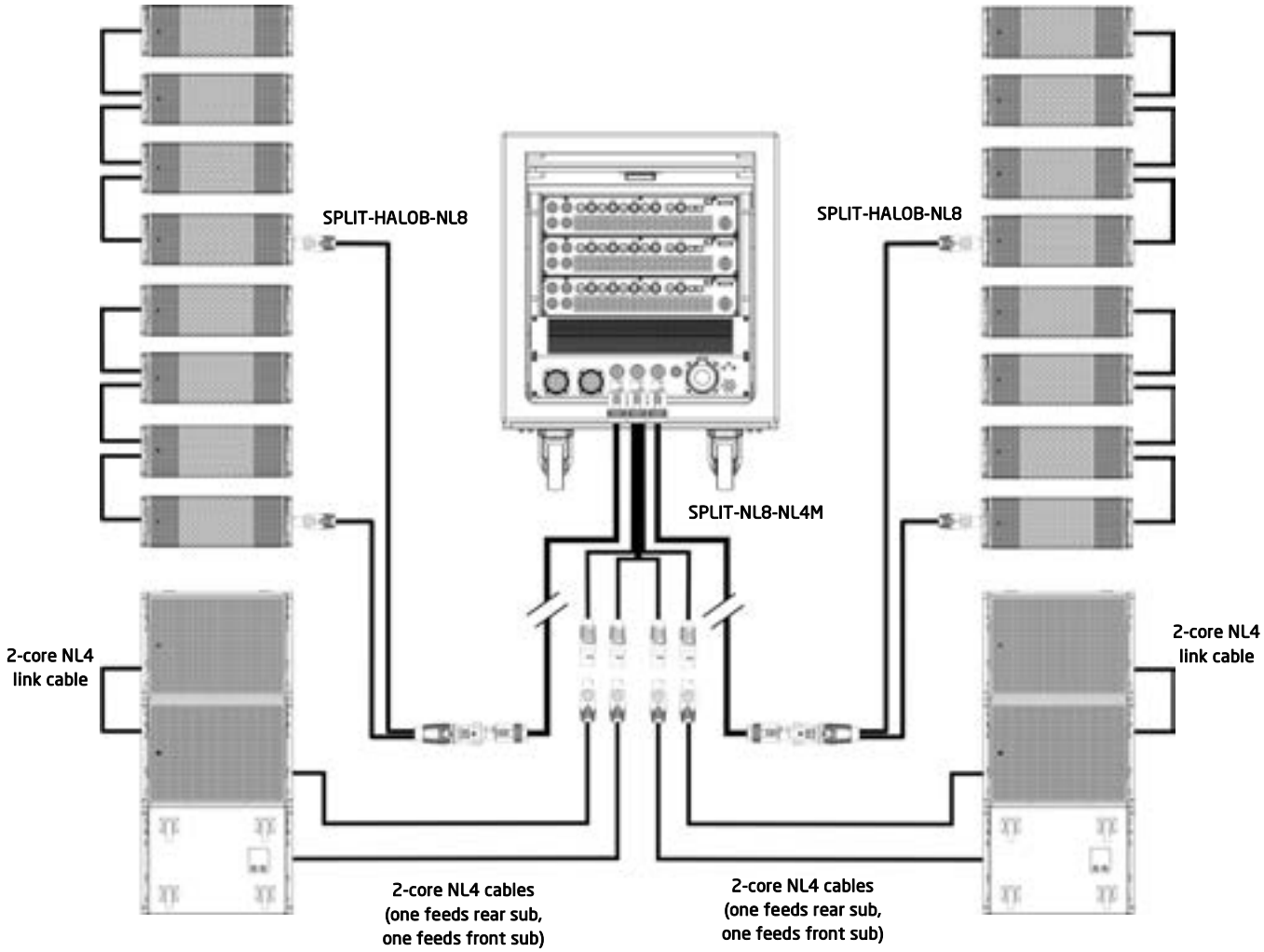
12 x HALO-B enclosure
6 x ST-215 subwoofer
1 x DQRack
1 x SPLIT-HALOB-19P
1 x SPLIT-19P-NL4
2 x male-female 19-pole connector cables (16 cores minimum) of suitable length
9 x NL4-NL4 (4-core cable) link cables – optimum length 0.5m



The system example below illustrates a smaller stereo HALO-B/ST-215 system being driven off one DQRack. Using the NL8 amplifier outputs, one output is used to feed each of the left/right HALO-B hangs, and the last output is used for subwoofers. Again, a cardioid array has been created, with the two front-firing subwoofers running in parallel on each side.

Parts required:

16 x HALO-B enclosure
6 x ST-215 subwoofer
1 x DQRack
2 x SPLIT-HALOB-NL8
1 x SPLIT-NL8-NL4M
2 x NL8-NL8 cables of suitable length
2 x NL4-NL4 (2-core minimum cable) cables of suitable length
12 x NL4-NL4 (4-core cable) link cables – optimum length 0.5m
2 x NL4-NL4 (2-core minimum cable) link cables – optimum length 1.0m



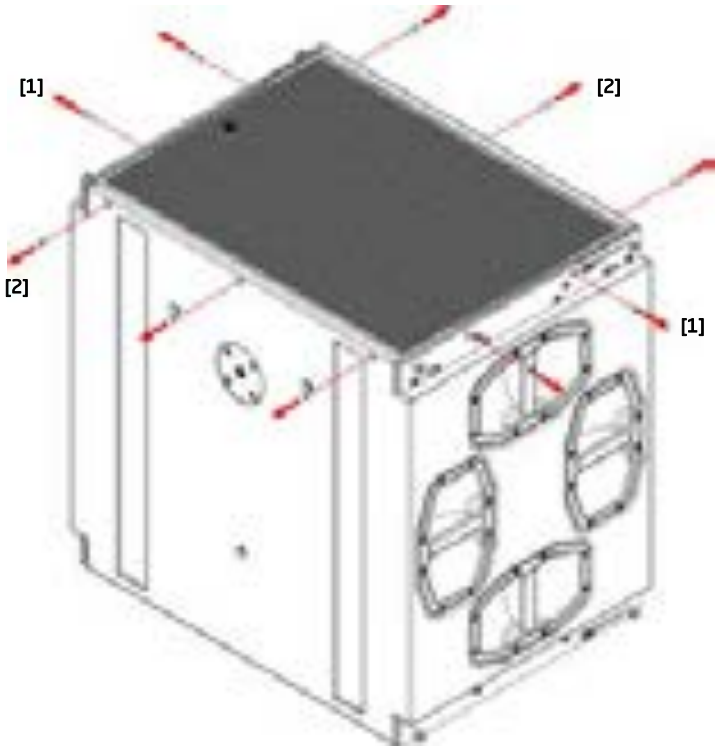
8.0 – Servicing Information

All ST-215 components can be removed for service purposes if required, using the minimum of tools.

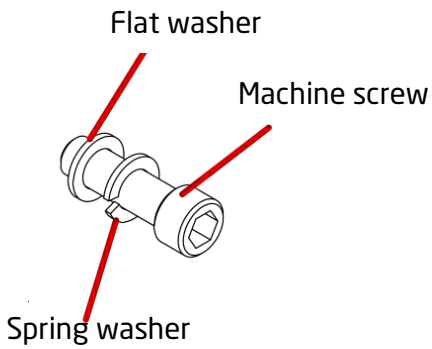
8.1 – ST-215: Removing the grille

TOOLS REQUIRED: 4mm & 5mm Allen key

1. Lie the enclosure on its' back and remove the two M6x20 socket cap screws [1] in each short end of the grille using a 5mm Allen key. Ensure to collect the washers (flat and spring) from the screw recess. Then, using a 4mm Allen key remove the three M6 x 30 countersunk socket bolts [2] from each long edge of the grille, and then lift the grille clear of the cabinet.



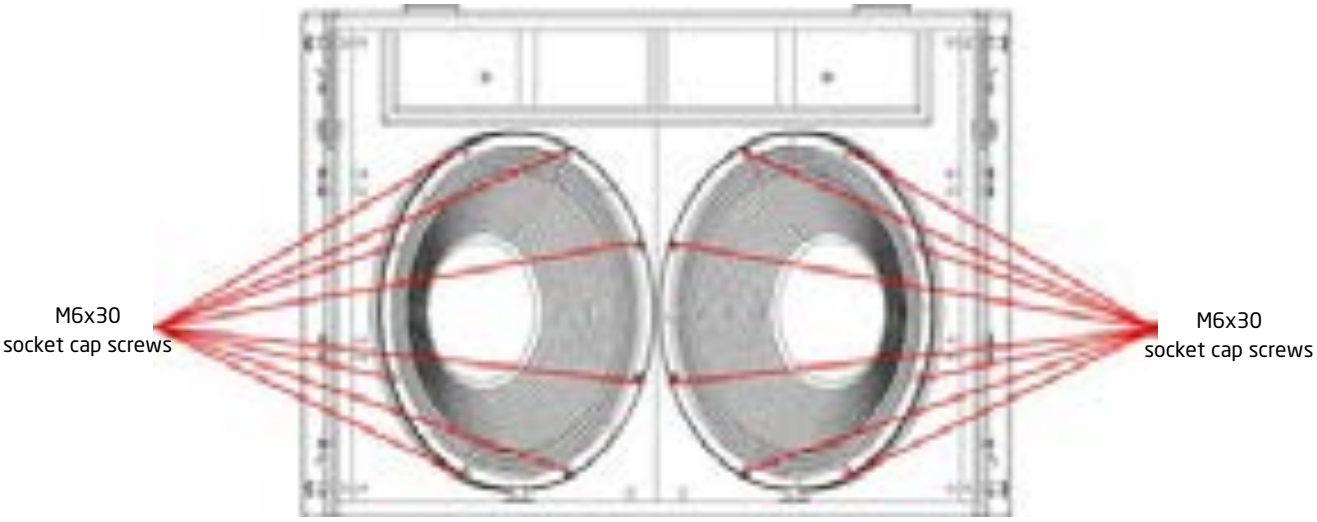
2. To replace the grille, position the grille on the front of the ST-215 (logo badge should be on the left of the enclosure when in a flown configuration) and ensure the threaded fittings on the grille are lined up with the mounting holes. Replace each of the four M6x20 socket cap screws (with their washers – the spring washer should be sandwiched between the flat washer and the bolt head) and the six M6x30 countersunk bolts and ensure all machine screws are started in their threads before beginning to tighten. Ensure they are all tightened evenly so that the grille sits straight and flat and does not rattle.



8.2 – ST-215: Removing the drive units

TOOLS REQUIRED: 5mm Allen key

1. Complete step 8.1 above to remove the grille.
2. Using a 5mm Allen key, remove the eight M6x30 socket cap screws that secure the drive units. Ensure that you remove the spring washers from the recesses as well as the machine screws.

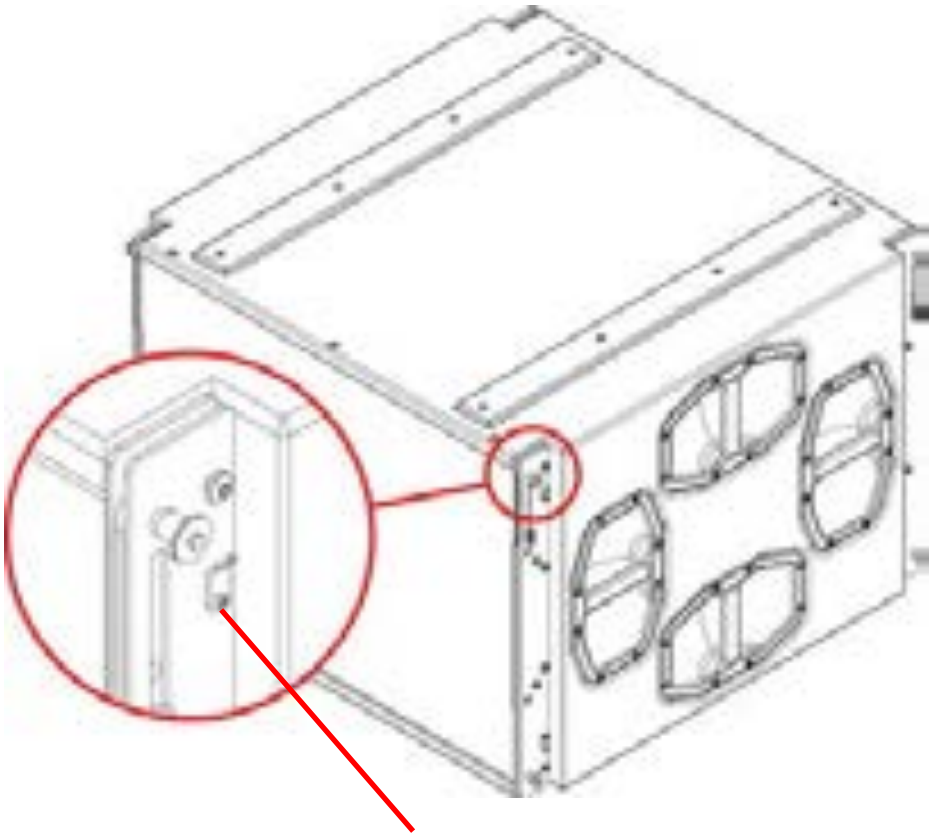


3. Lift the drive unit clear of the mounting hole and disconnect the two cables – note the polarity for reconnection (red to positive, black to negative).
4. To replace the drive unit, first sit a fresh gasket around the drive unit hole, ensuring that the holes line up with the cabinet mounting holes. Reconnect the cables to the drive unit (note the red cable goes to the positive (red) terminal, and the black cable goes to the negative (black) terminal on the drive unit) and then sit the drive unit into its mounting location, ensuring that the mounting holes line up.
5. Replace the M6x30 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.
6. Replace the grille as described above.

8.3 – ST-215: Replacing a Rigging flying pin

TOOLS REQUIRED: 2.5mm Allen key

1. All the rigging flying pins are held in place by M3 socket cap machine screws, with captive Nyloc nuts within the assembly. As such, they can be easily removed and replaced in the field. Using a 2.5mm Allen key, undo the machine screw to remove it.



2. To replace, simply reverse the procedure and tighten the machine screw appropriately.

Appendix A – Technical Specifications

ST-215 medium format flyable subwoofer

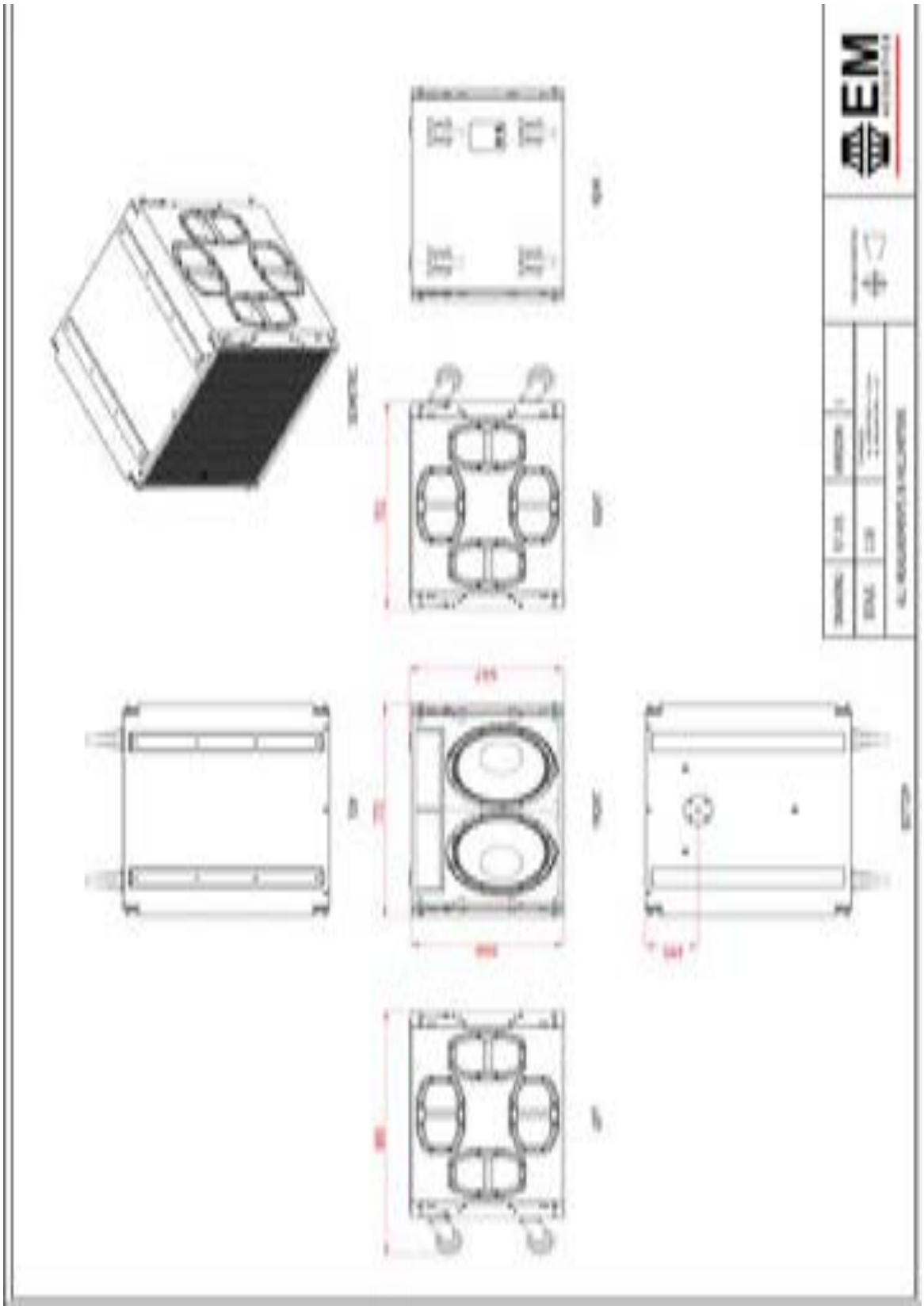
Dimensions (HxWxD) :	550 x 772 x 752mm (21.7" x 30.4" x 29.6")
Net/Shipping Weight:	73kg/77kg (160.6/169.4lbs)
Frequency Response (+/- 3dB)[1]:	40Hz – 150Hz
Dispersion[3]:	Omnidirectional
Drive Units:	2 x 4" (102mm) voice coil 15" (381mm) neodymium LF drive unit
Power Handling:	LF: 2000W RMS, 4000W program
Maximum SPL:	133dB continuous, 139dB peak
Nominal Impedance:	4 ohms
Crossover:	External active
Enclosures per amp channel:	DQ6: 1* DQ10: 1* DQ20: 2
Connectors:	2 x Neutrik SpeakON™ NLT4MP
Enclosure:	18mm (3/4") multi-laminate birch plywood, rebated, screwed and glued. Finished in polyurethane textured finish
Rigging & Hardware:	4-point system, ultra-high tensile steel. Rated to 9 elements at 10:1 safety factor. 8 flush handles, M20 threaded polemeount adapter, touring runners & stacking recesses. 3 x M8 threaded fittings.
Grille:	Mesh-backed perforated stainless steel
Options:	Colours/extended weather protection
Accessories:	Tour-grade castor set FG-HALO-B master flying grid GS-HALO-B ground stacking adapter frame WC-T215 enclosure transit wheelcart TC-T215 single enclosure padded transit cover TC-T215-2 dual enclosure padded transit cover TC-T215-3 triple enclosure padded transit cover

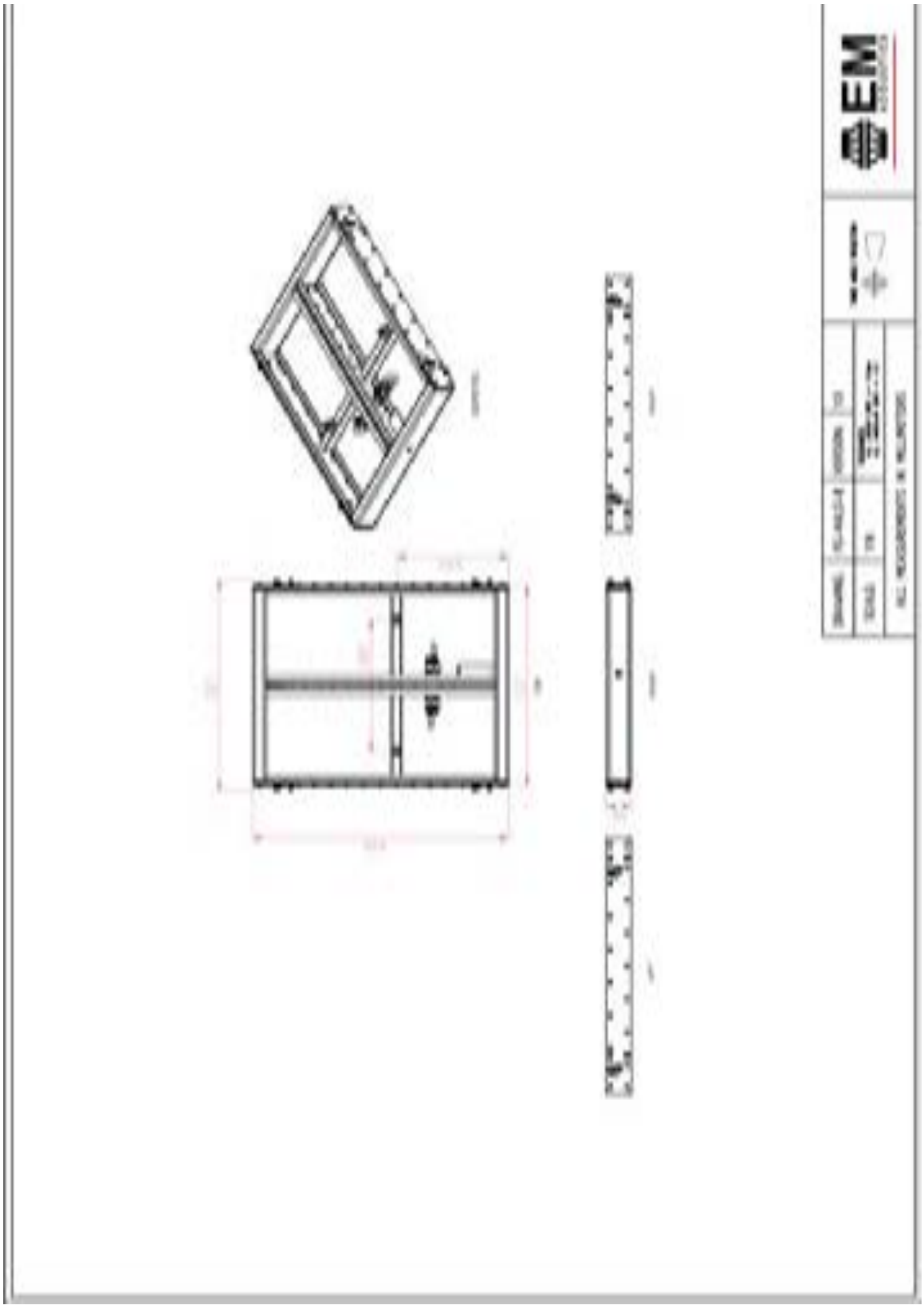
* - The DQ6 and DQ10 do not provide sufficient power for maximum headroom for the ST-215 and as such should only be used in lower SPL environments.

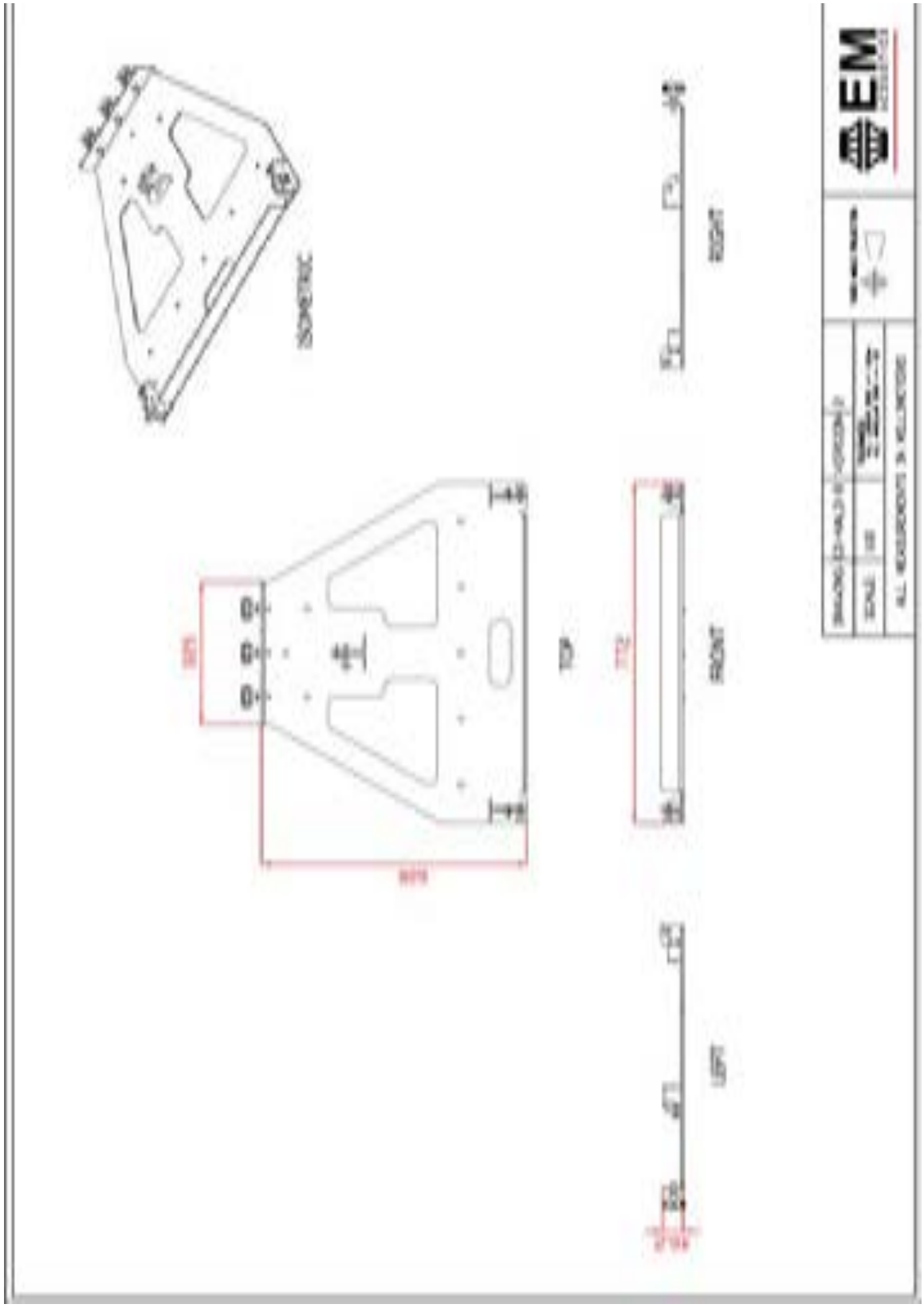
Notes on measurement conditions:

[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







Appendix C – Spare Parts List

Order Code	Description
01A031	DU-1508 replacement 8 ohm 15" LF drive unit
04A051	RFG-S215 replacement grille/fabric for ST-215
05A097	PIN-0.3125/0.625 ball-lock flying pin – all rigging

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.