

## MANCHESTER SERIES

MV212-XV and MV212

Dual 12" Full Size Line Array Element and Variable Curvature Line Array Element for Touring and Install Applications

MV212-VT

Vertical Transporter for 4 MANCHESTER MV212 Line Array Elements

MS215

Dual 15" Vented Bandpass Subwoofer for Touring and Installation Applications

MS215-VT

Vertical Transporter for MANCHESTER MS215 Subwoofers

MAN-FG

Universal Fly Grid for MANCHESTER MV Line Array Elements and MS215 Subwoofers



### **WARNING!**

This rigging manual contains important safety information, and it must be kept in a safe place for future reference. It must be supplied with the equipment during the original sale, rental, or re-sale, and all operators and users of the equipment must be made aware that this manual is available. Please visit our website [turbosound.com](http://turbosound.com) regularly and check for any updates to this manual.

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## EN Important Safety Instructions



Terminals marked with this symbol carry electrical current of sufficient magnitude to constitute risk of electric shock.

Use only high-quality professional speaker cables with ¼" TS or twist-locking plugs pre-installed. All other installation or modification should be performed only by qualified personnel.



This symbol, wherever it appears, alerts you to the presence of uninsulated dangerous voltage inside the enclosure - voltage that may be sufficient to constitute a risk of shock.



This symbol, wherever it appears, alerts you to important operating and maintenance instructions in the accompanying literature. Please read the manual.



### Caution

To reduce the risk of electric shock, do not remove the top cover (or the rear section). No user serviceable parts inside. Refer servicing to qualified personnel.



### Caution

To reduce the risk of fire or electric shock, do not expose this appliance to rain and moisture. The apparatus shall not be exposed to dripping or splashing liquids and no objects filled with liquids, such as vases, shall be placed on the apparatus.



### Caution

These service instructions are for use by qualified service personnel only. To reduce the risk of electric shock do not perform any servicing other than that contained in the operation instructions. Repairs have to be performed by qualified service personnel.

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.

11. Use only attachments/accessories specified by the manufacturer.



12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid

injury from tip-over.

13. Unplug this apparatus during lightning storms or when unused for long periods of time.

14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

15. The apparatus shall be connected to a MAINS socket outlet with a protective earthing connection.

16. Where the MAINS plug or an appliance coupler is used as the disconnect device, the disconnect device shall remain readily operable.



17. Correct disposal of this product: This symbol indicates that this product must not be disposed of with household waste, according to the WEEE Directive (2012/19/EU) and your national law. This product

should be taken to a collection center licensed for the recycling of waste electrical and electronic equipment (EEE). The mishandling of this type of waste could have a possible negative impact on the environment and human health due to potentially hazardous substances that are generally associated with EEE. At the same time, your cooperation in the correct disposal of this product will contribute to the efficient use of natural resources. For more information about where you can take your waste equipment for recycling, please contact your local city office, or your household waste collection service.

18. Do not install in a confined space, such as a book case or similar unit.

19. Do not place naked flame sources, such as lighted candles, on the apparatus.

20. Please keep the environmental aspects of battery disposal in mind. Batteries must be disposed-of at a battery collection point.

21. This apparatus may be used in tropical and moderate climates up to 45°C.

## LEGAL DISCLAIMER

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## LIMITED WARRANTY

For the applicable warranty terms and conditions and additional information regarding Music Tribe's Limited Warranty, please see complete details online at [musictribe.com/warranty](http://musictribe.com/warranty).

# Chapter 1: Safety Information

## 1.1 Intended Use

The rigging components (MAN-FG fly grid, rigging pins, mounting links) shall only be used in conjunction with Turbosound MV212 loudspeakers and MS215 subwoofers as described in this manual.

## 1.2 Intended Use of this Manual

The instructions in this manual describe how to assemble various configurations of MV212 and MV212-XV loudspeaker cabinets, MS215 subwoofers, and the MAN-FG fly grid, in readiness for suspending or ground stacking.

These instructions shall only be used with the MV212, MV212-XV, MS215, and MAN-FG components.

The instructions do not show details of external lifting equipment and do not contain details of safe lifting procedures or installation.

Possession of these instructions and procedures does not imply authorisation for their use.

## 1.3 General Safety

The operation of your product as part of a suspended system, if installed incorrectly and improperly, can potentially expose persons to serious health risks and even death. In addition, please ensure that electrical, mechanical and acoustic considerations are discussed with qualified and certified (by local, state or national authorities) personnel prior to any installation.

Installation and setup should only be carried out by qualified and authorised personnel observing the valid local, state and other safety regulations applicable in your country. If any parts or components are missing please contact your dealer before attempting to set up the system.

It is the responsibility of the person installing the assembly to ensure that the suspension/fixing points are suitable for the intended use.

We also recommend you schedule Turbosound line array training with our sales partners and applications team.

Equipment used to connect to the Turbosound rigging system must be properly rated and must conform to the local, state and other safety regulations. Do not use Turbosound rigging with other types or brands of loudspeakers. This practice may compromise safety standards and Music Tribe Global Brands Ltd will not be responsible for damage or injury so caused. Do not modify the rigging accessories, or use them in a way other than that described in this rigging manual. Rigging components supplied as part of a complete assembly are non-interchangeable and must not be exchanged with the component parts of any other assembly.

Welding, or any other means of permanently fixing rigging components to each other or to cabinet fixing points is not allowed. Rigging components or assemblies must only be fixed to Turbosound loudspeaker cabinets using the cabinet fixing points.

Music Tribe Global Brands Ltd assumes no liability for any damage or personal injury resulting from improper use, installation or operation of the product. Regular checks must be conducted by qualified personnel to ensure that the system remains in a secure and stable condition. Make sure that, where the product is suspended, the area underneath the product is free of human traffic. Do not suspend the product in areas which can be entered or used by members of the public.

## 1.4 Loudspeaker Cabling

Attach and support the speaker cables from your amplifiers to the loudspeaker cabinets, so that no significant additional weight or lateral force is applied to the array by the input wiring.

Input cables or link cables should never be used to angle the array or used as rigging in any way.

## 1.5 Load Capacity and System Safety

The MAN-FG fly grid is designed to suspend a maximum of 16 x MV212 or 12 x MS215 on a 10:1 safety factor, and Mixed arrays of 6 x MS215 and 8 MV212 on a 10:1 safety factor. Use EASE FOCUS modeling software to predict various possible array combinations.

Manchester Series installation procedures and recommendations described in Chapters 3-5 are based on 10:1 design factor. Manchester Series enclosure counts and combinations are also given for other design factors in Chapter 10. Check local regulations in order to comply with regional design factor requirements.

Always refer to EASE FOCUS modeling software error and warning indications prior to installation.

## 1.6 Safety Inspections

Carefully inspect rigging system components and cabinets for defects or signs of damage before proceeding to assemble the array to be flown. If any parts are damaged or suspect, or if there is any doubt as to the proper functioning and safety of the items DO NOT USE THEM and withdraw them from use immediately.

Refer to Chapter 9 for information about care maintenance and disposal.

## 1.7 Secondary Safeties

All loudspeakers flown in theatres, studios or other places of work and entertainment shall, in addition to the principle load bearing means of suspension, be provided with an independent, properly rated, and securely attached secondary safety. Only steel wire ropes or steel chains of an approved construction and load rating shall be used as secondary safeties. Plastic-covered steel wire ropes are not permitted for use as secondary safeties.

The secondary safety suspension must be independent of the primary suspension points and capable of carrying the total system weight. The additional safety device must be mounted in a way that the array is caught by the safety device without any drop and swing in the event that the primary suspension fails.

## 1.8 Wind Loads

The loudspeakers must not be suspended or ground stacked in winds greater than:

**Beaufort Scale 6 bft** (39-49 km/h, 25-31 mph, 22-27 knots)

If the forecast or actual winds reach:

**Beaufort Scale 8 bft** (62-74 km/h, 39-46 mph, 34-40 knots)

- 1) Clear the area of personnel
- 2) Lower and secure the array

## 1.9 Operational Safety

The procedures require the use of two or more authorised persons.

Produce a lift plan: before any lift takes place, you must formulate a lift plan that describes the exact steps and procedures that will be carried out. The plan must be shared with all assistants and stake-holders in the lift so that each person will understand their responsibilities.

Observe all instructions given on the respective instruction labels of the rigging components and loudspeakers.

When using chain hoists make sure nobody is directly underneath or in the vicinity of the array.

During assembly pay attention to the possible risk of crushing.

Wear suitable protective clothing.

Safety Logo	Description	Safety Logo	Description	Safety Logo	Description
	Protective Headwear shall be worn		Protective Eyewear shall be worn		Protective Gloves shall be worn
	Protective Footwear shall be worn		Practice Safe Lifting		

## 1.10 Safety Notices in this manual



### WARNING

This indicates advice that if not followed, may lead to permanent injury or death.



### CAUTION

This indicates advice that if not followed, may lead to damage to the equipment.

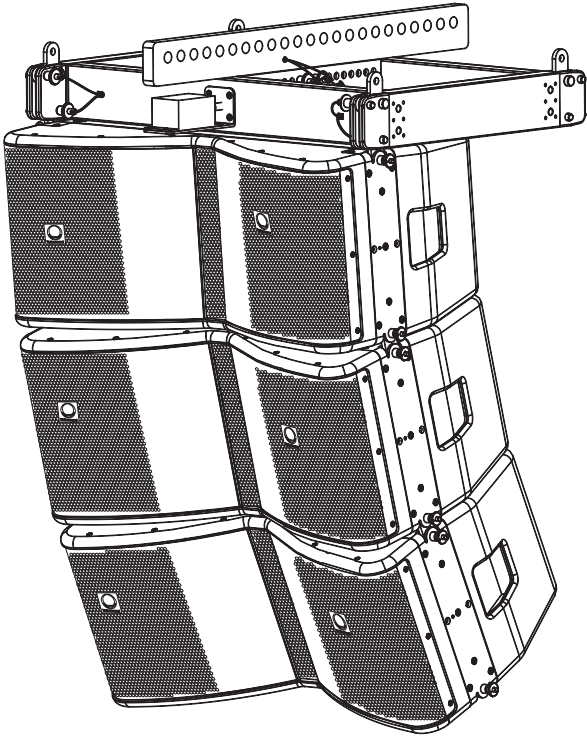
### NOTE

This indicates extra advice that may be useful when performing the procedures.

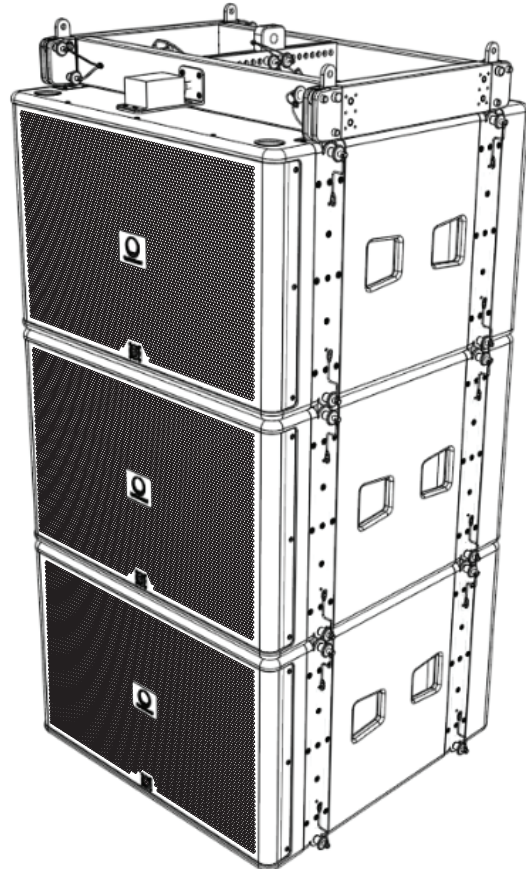
## Chapter 2: Introduction

### 2.1 Typical Configurations

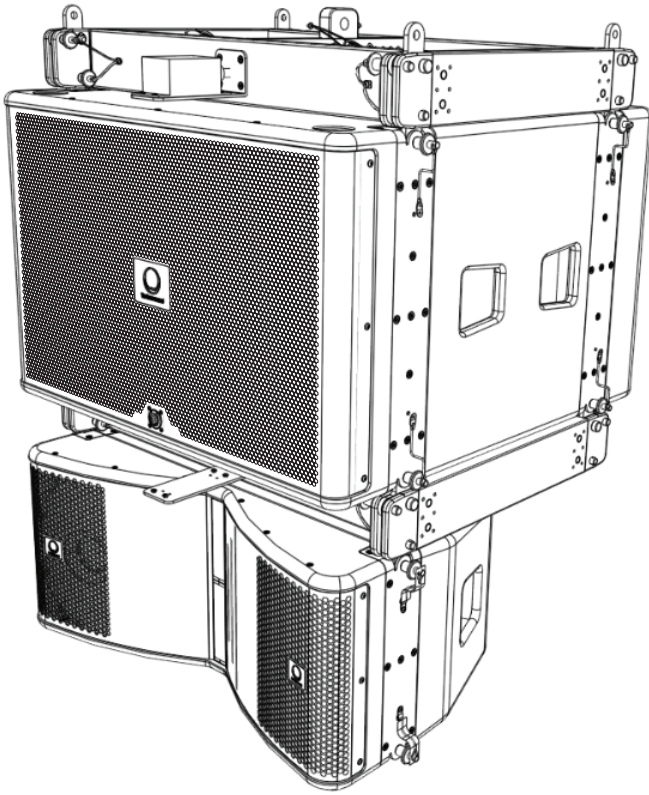
MV212 Array (See Chapter 3)



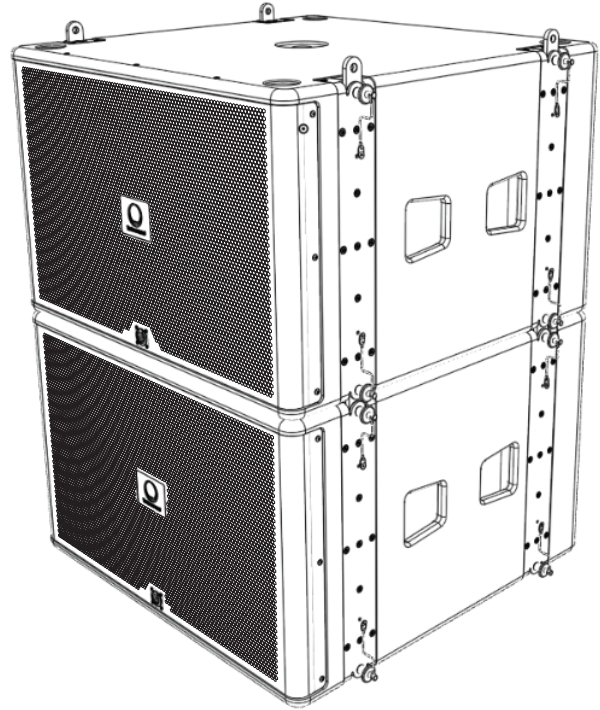
MS215 Array (See Chapter 4)



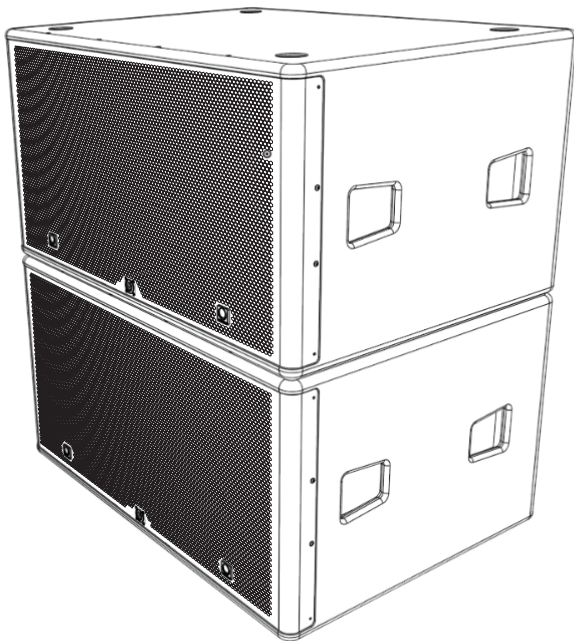
**MS215 and MV212 Mixed Array (See Chapter 5)**



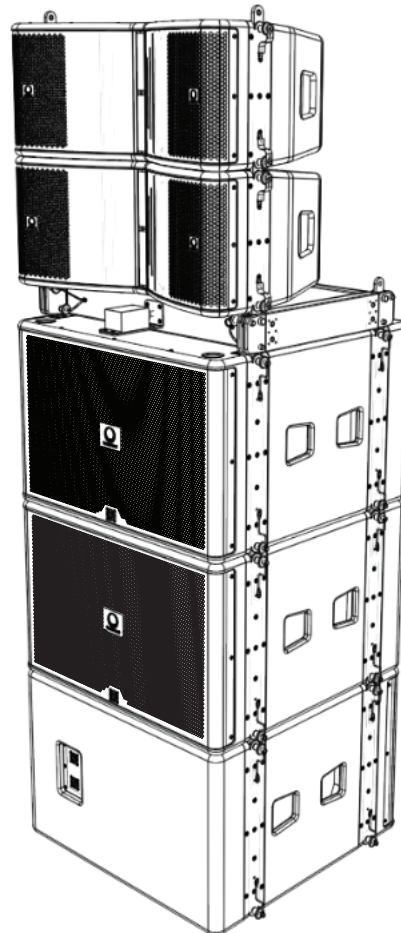
**Two MS215 Subwoofer Groundstack (See Chapter 6)**



**Two MS218 Subwoofer Groundstack (See Chapter 6)**



**MS215 and MV212 Array Groundstack (See Chapter 7)**



## 2.2 Rigging and Acoustic Simulation Software

The EASE FOCUS software allows you to configure the system for optimal performance and coverage in the venue. The software can be downloaded from <http://www.afmg.eu/index.php/products.html>

The quantity of cabinets can be varied, the angles of each cabinet can be adjusted, and the SPL coverage calculated for any configuration.

Once an optimum system has been designed using the EASE FOCUS software, the angles of each MV212 cabinet should be noted, as well as the correct suspension hole on the MAN-FG fly grid, where your bow shackle would be fitted for single-point suspension. For two-point suspension, pick point holes on the MAN-FG Tip Bar can be utilized in conjunction with front and rear chain motors to obtain the desired array site angle.

The EASE FOCUS screenshot below is for a typical MV212 configuration. Check the "RIGGING" Tab and note installation parameters such as: array weight, bottom element elevation above ground level, bottom enclosure angle.


Note the angle of each MV212 cabinet in the "Object Properties" Tab.




### WARNING

ERROR AND WARNING INDICATIONS ARE GIVEN IN THE OBJECT PROPERTIES WINDOW IF WORKING LOAD LIMITS ARE EXCEEDED AT 10:1, 7:1 OR 5:1 DESIGN FACTORS. HEED THESE WARNINGS AT ALL TIMES IN ACCORDANCE WITH LOCAL REGULATIONS.

### 2.2.1 EASE FOCUS Typical Screenshot for a MV212 Array



**Full EASE data can be downloaded from [www.turbosound.com](http://www.turbosound.com)**  
**This will allow acoustic prediction, array formation and suspension to be determined. Important safety information about WLL is also calculated by EASE Focus.**



Cabinet	Gain	Angle
1: Flown	0	0°
2: MV212	0	1°
3: MV212	0	5°
4: MV212	0	2°
5: MV212	0	3°
6: MV212	0	4°
7: MV212	0	5°
8: MV212	0	6°

MV212 Cabinet Angles

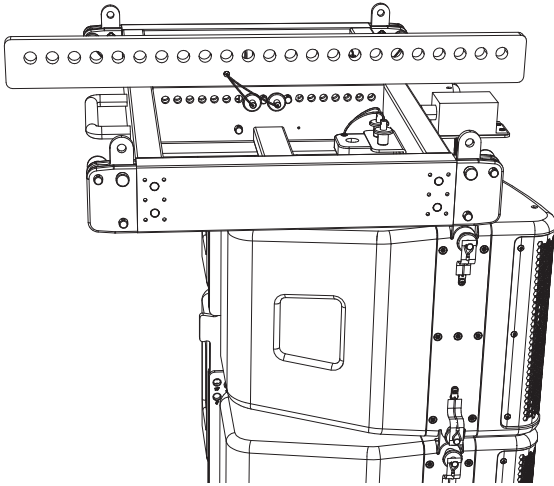
Rigging Tab Shows the layout graphically, and indicates the correct suspension pick point to choose on the fly grid.



### 2.2.2 EASE example: Array MV212 x 8, with MAN-FG Tip Bar Centered

This example uses the Tip Bar mounted in the center position of the MAN FG fly grid.

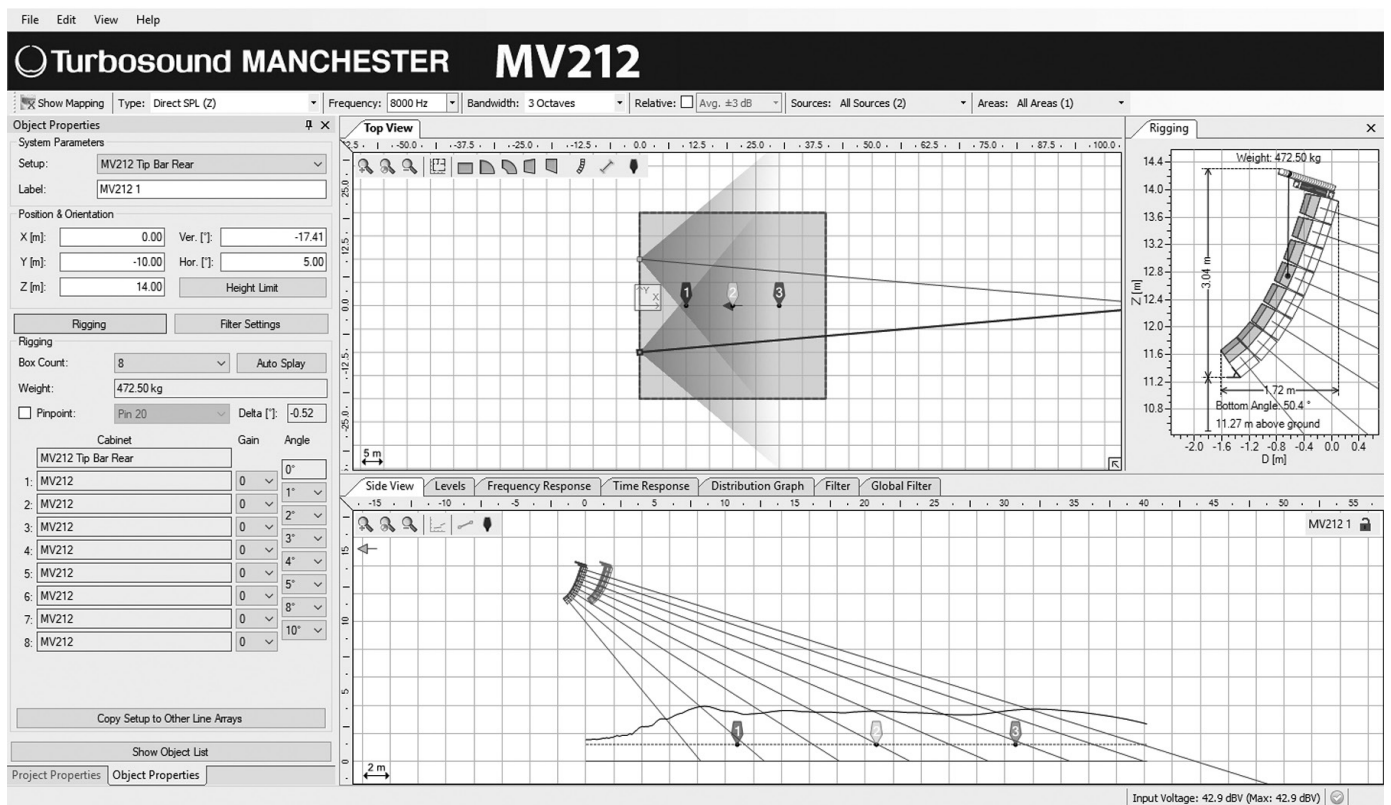
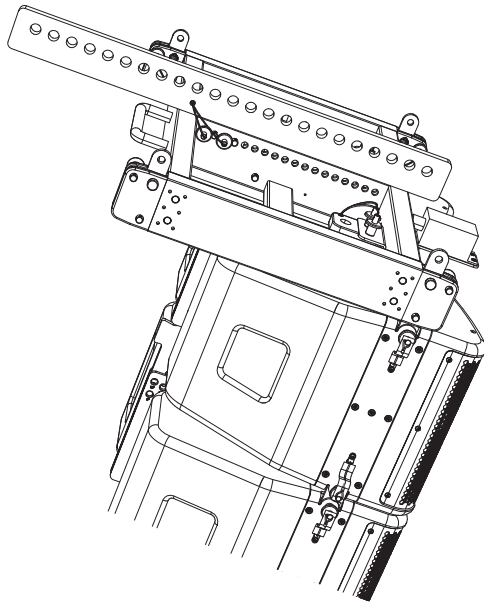
Note: for systems that do not require much variation in the tilt angle, and in systems that only require one main hoist, the single shackle plate can be used instead of the Tip Bar. All four rigging pins are used to secure the Tip Bar to the MAN-FG fly grid.



EN

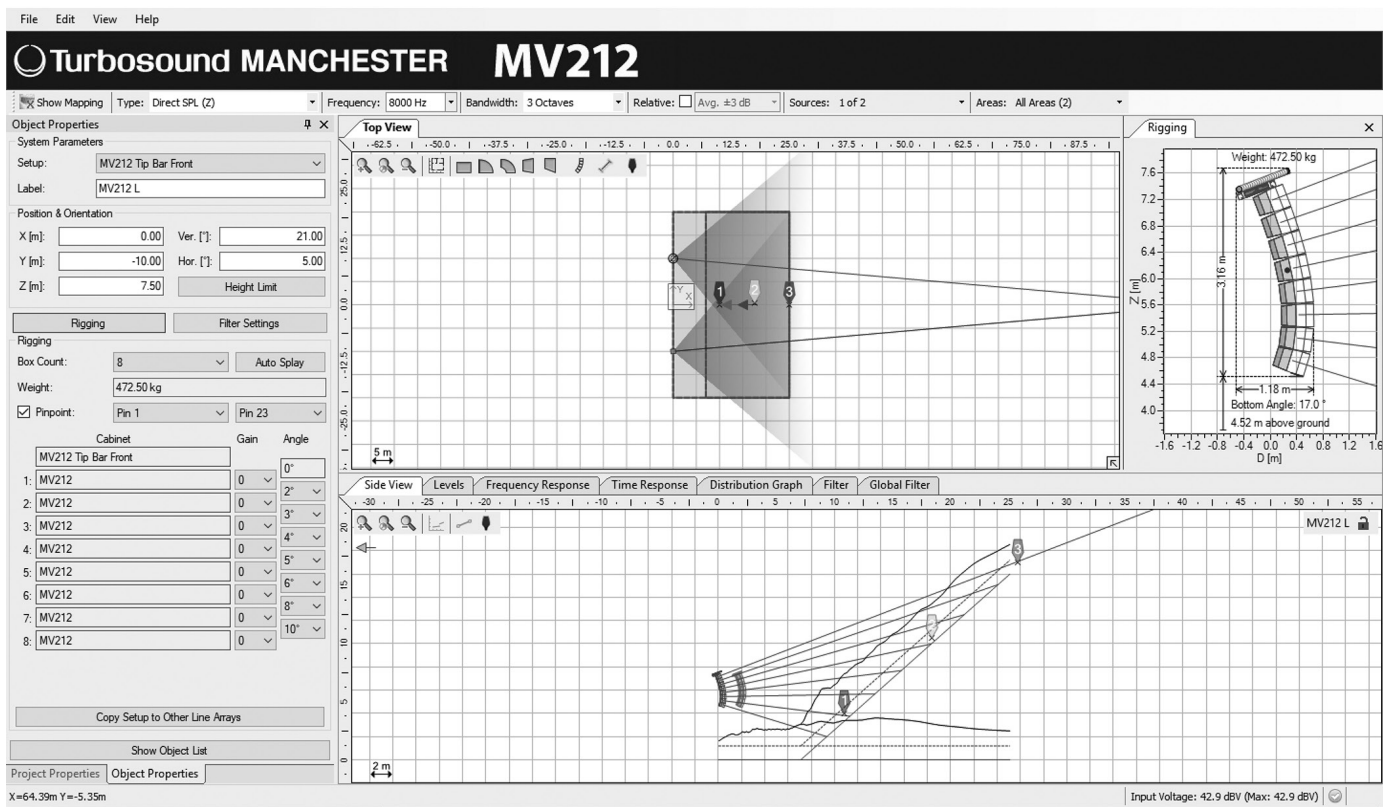
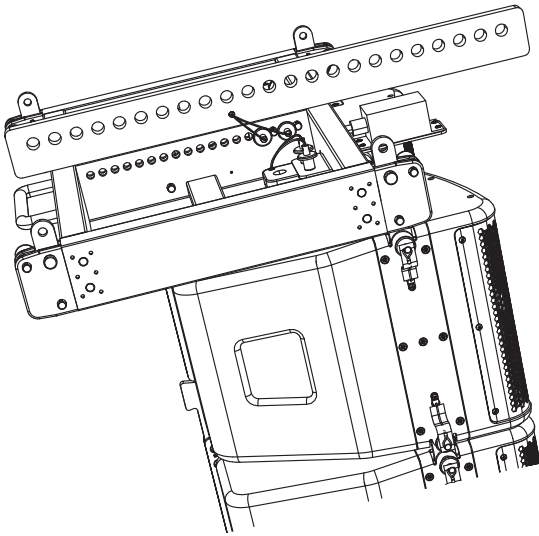
### 2.2.3 EASE example: Array MV212 x 8, with MAN-FG Tip Bar Mounted Rearwards

This example uses the Tip Bar mounted in the rear position on the MAN-FG fly grid. Using the Tip Bar in this position will make the array's Centre of Gravity force the array tilt downwards. All four rigging pins are used to secure the Tip Bar to the MAN-FG fly grid.



### 2.2.4 EASE example: Array MV212 x 8, with MAN-FG Tip Bar Mounted Forwards

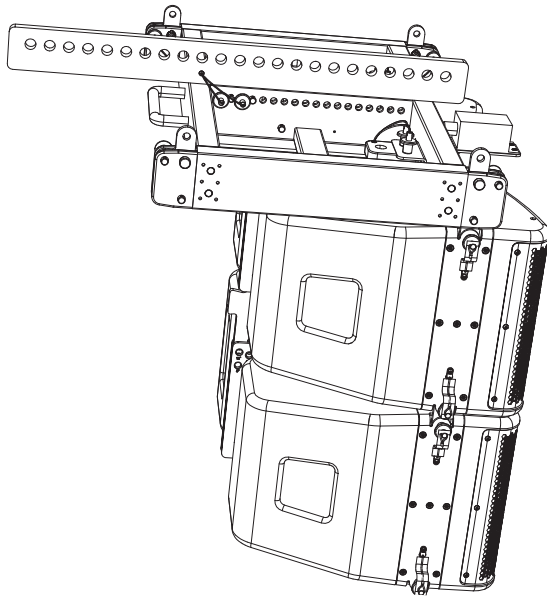
This example uses the Tip Bar mounted in the forward position on the MAN-FG fly grid. Using the Tip Bar in this position will make the array's Centre of Gravity force the array tilt upwards. All four rigging pins are used to secure the Tip Bar to the MAN-FG fly grid.



EN

### 2.2.5 EASE example: Array MV212 x 24, with MAN-FG Tip Bar Rearwards

This example uses the Tip Bar mounted in the rear position on the MAN-FG fly grid. All four rigging pins are used to secure the Tip Bar to the MAN-FG fly grid. It also shows a warning that the Working Load Limit of the MAN-FG flygrid has been exceeded (at 7:1)



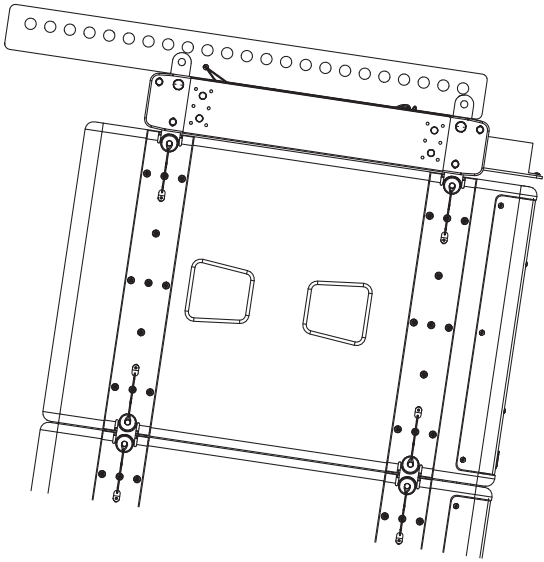
**Errors & Warnings**

- ⚠ Total weight exceeds BGVC 1 = 10:1 safety WLL = 894 kg
- ⚠ Total weight exceeds 7:1 safety WLL = 1277kg

This means the array is now at 5:1 WLL

### 2.2.6 EASE example: Mixed Array MS215 x 6, MV212 x 16, with MAN-FG Tip Bar Mounted Rearwards

This example uses the Tip Bar mounted in the rear position on the MAN-FG fly grid. All four rigging pins are used to secure the Tip Bar to the MAN-FG fly grid. It also shows a warning that the Working Load Limit of the MAN-FG flygrid has been exceeded (at 10:1)



**Errors & Warnings**  
 ⚠ Total weight exceeds BGVC 1 = 10:1 safety WLL = 1009kg

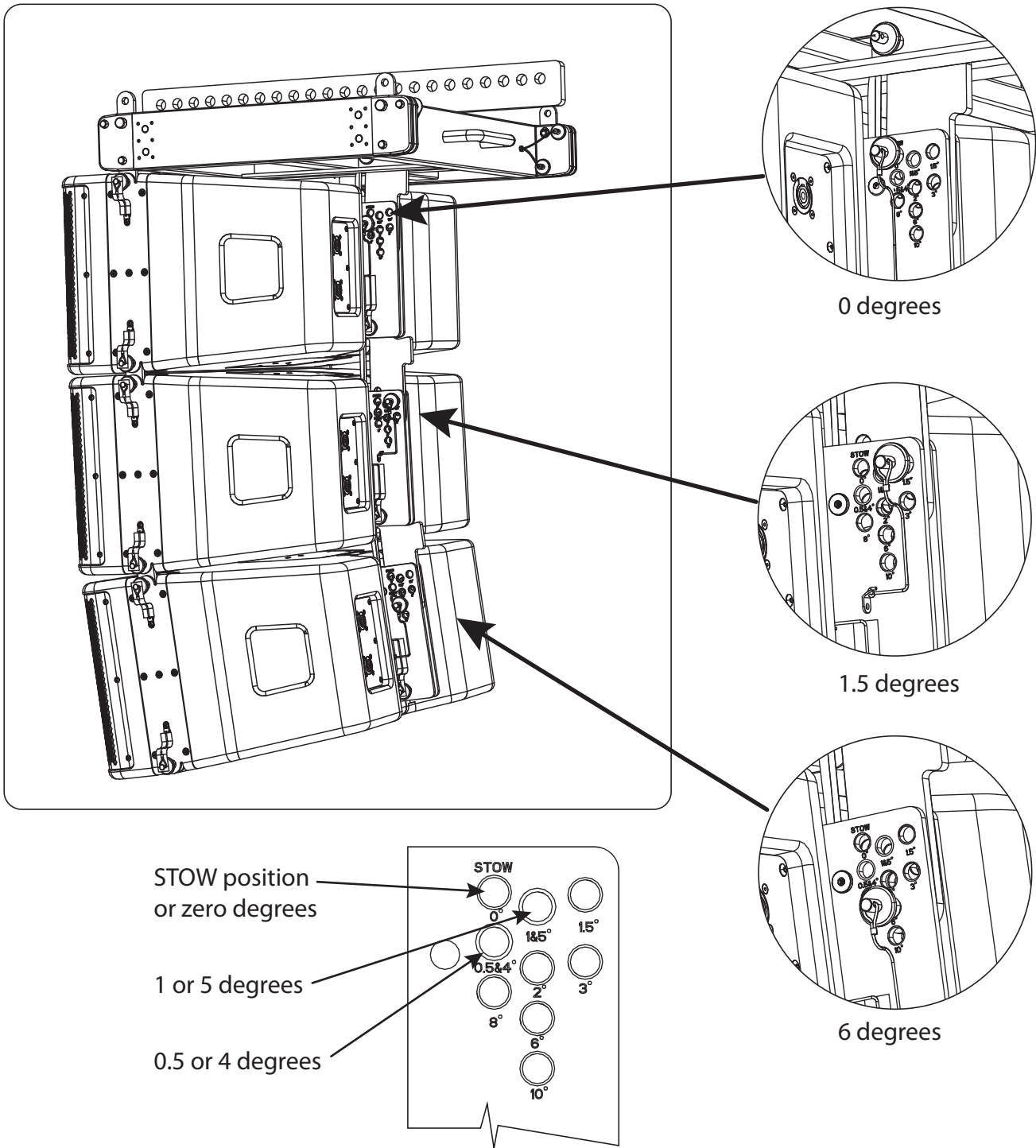
This means the array is now at 7:1 WLL

### 2.3 MV212 Cabinet Angles

The angle of each MV212 cabinet relative to the cabinet above it, is varied by inserting the quick release pin into one of the mounting holes in the rear mounting bracket. These are labeled from 0 to 10 degrees.

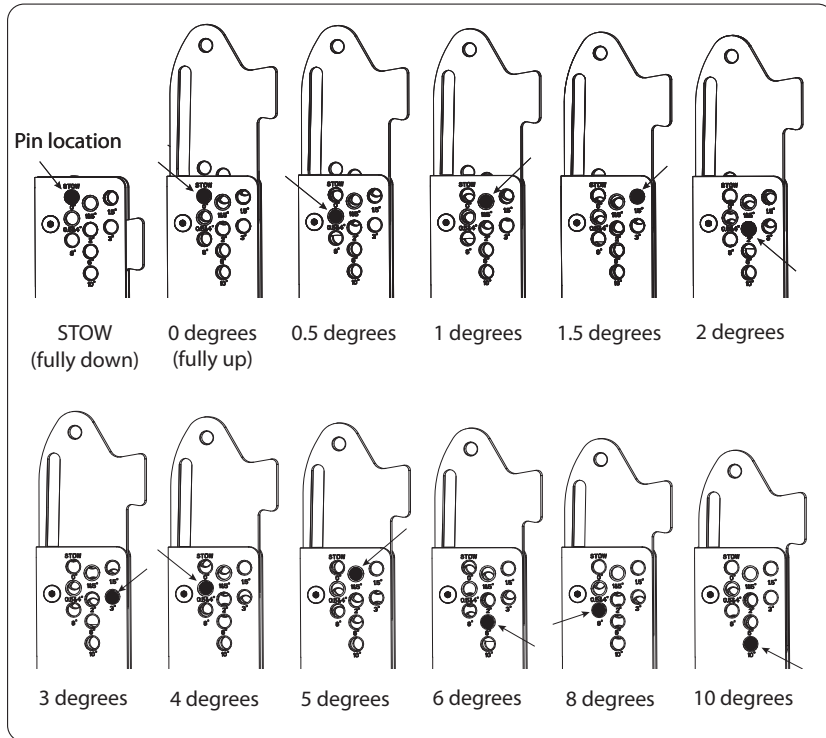
Use the "STOW" position to securely stow the sliding mount plate in the lowest position when not in use.

The Zero degrees position uses the same hole as "STOW" but is used with the sliding mount plate moved up to its highest position. (The plate is captive, and will not fall out.)



### Rigging Pin installation in the MV212 rear mounting plate

This drawing shows the pin location used to set the angle of the cabinet relative to the cabinet above (0 degrees = Parallel).



### 2.4 Tip Bar, Fly Grid, Single Shackle Plate, and Ground Stack Plate

The Tip Bar has an array of 23 top holes of 20 mm diameter, that allow shackles to be attached. Each hole is marked with a number for identification, with number 1 being at the front, and number 23 at the rear.

The Tip Bar also has 4 lower mounting holes of 12.5 mm diameter that allow the Tip Bar to be mounted to the center spine of the MAN-FG fly grid, using 4 captive quick release pins that are attached to the Tip Bar for this purpose (not shown below).

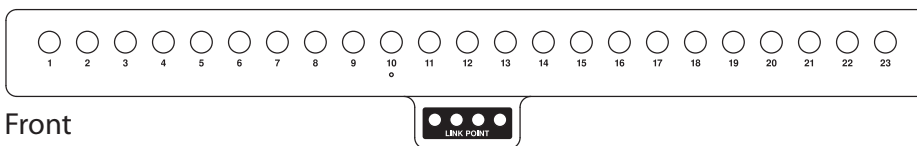
The MAN-FG fly grid center spine has 18 top holes of 12.5 mm diameter that allow the Tip Bar or the single pick point plate to be attached. Each hole is marked with a number for identification, with number 1 being at the front, and number 18 at the rear.

The MAN-FG fly grid center spine also has an "MV212 LOCK" hole (below the number 12 hole), that allows the rear top mounting plate of the MV212 cabinet to be attached for flying. One captive quick release pin is attached to the MAN-FG fly grid center spine for this purpose (not shown below).

The Ground Stack Plate has angle markings as follows: -6, -3, -1, 0, 1, 3, and 6 degrees. It fits into the MAN-FG fly grid hole marked "12" using a captive quick release pin attached to the MAN-FG fly grid for this purpose. The top hole of the ground stack plate fits into the rear lower mounting hole of the first MV212 cabinet. Choose the appropriate hole of the ground stack plate, to set the angle of the first MV212 cabinet.

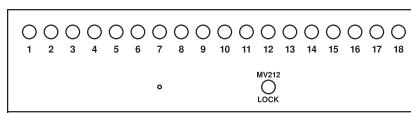
The single shackle plate may be used instead of the Tip Bar, in systems where there is no great tilt angle. It fits to the MAN-FG center spine with two captive rigging pins, attached to the single shackle plate for this purpose (not shown below).

Tip Bar



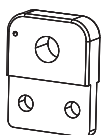
Front

Center Spine

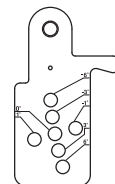


Front

Single Shackle Plate



Ground Stack Plate



Front

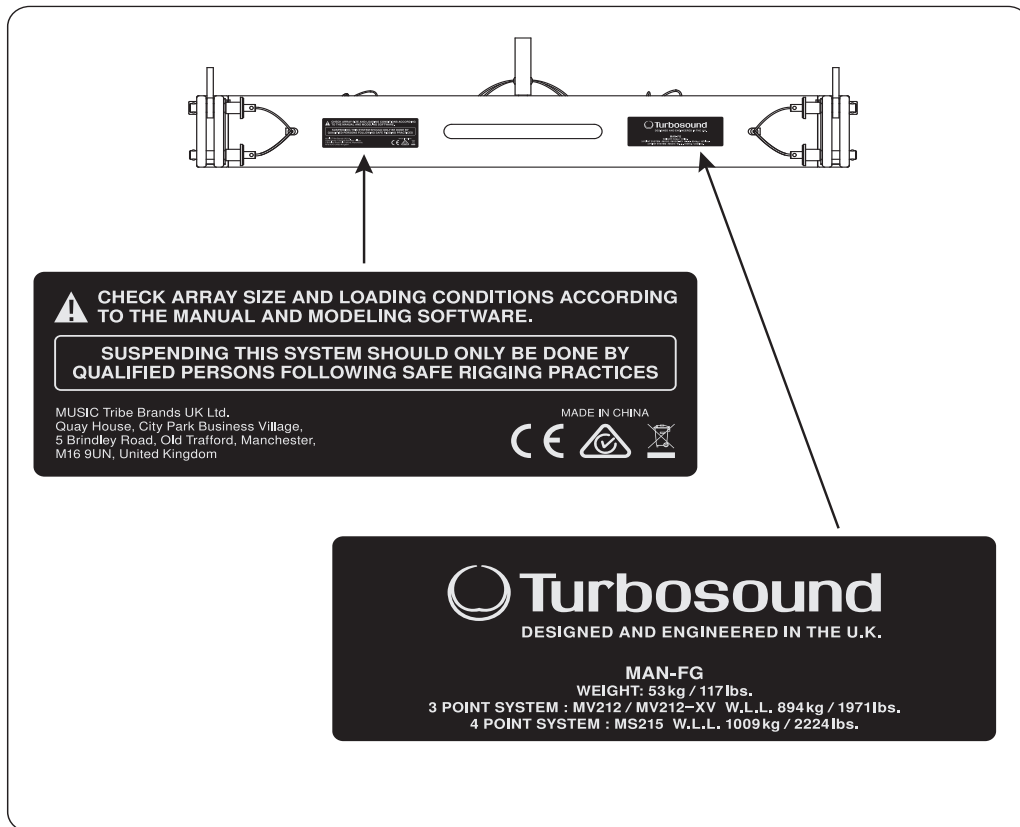
## 2.5 Weights

Item	Quantity	Weight (kg)	Weight (lbs)
MAN-FG with Tip Bar	1	53	116.9
MV212	1	53	116.9
MV212-XV	1	50	110.2
MS215	1	83	183
MS218	1	97	213.9

## 2.6 MAN-FG Fly Grid Working Load Limit (WLL)

Item	WLL (kg)	WLL (lbs)	DESIGN FACTOR
3 Point Suspension (for MV212 and MV212-XV)	894	1971	10:1
4 Point Suspension (for MS215)	1009	2224	10:1

## 2.7 MAN-FG Fly Grid Safety Warning Labels



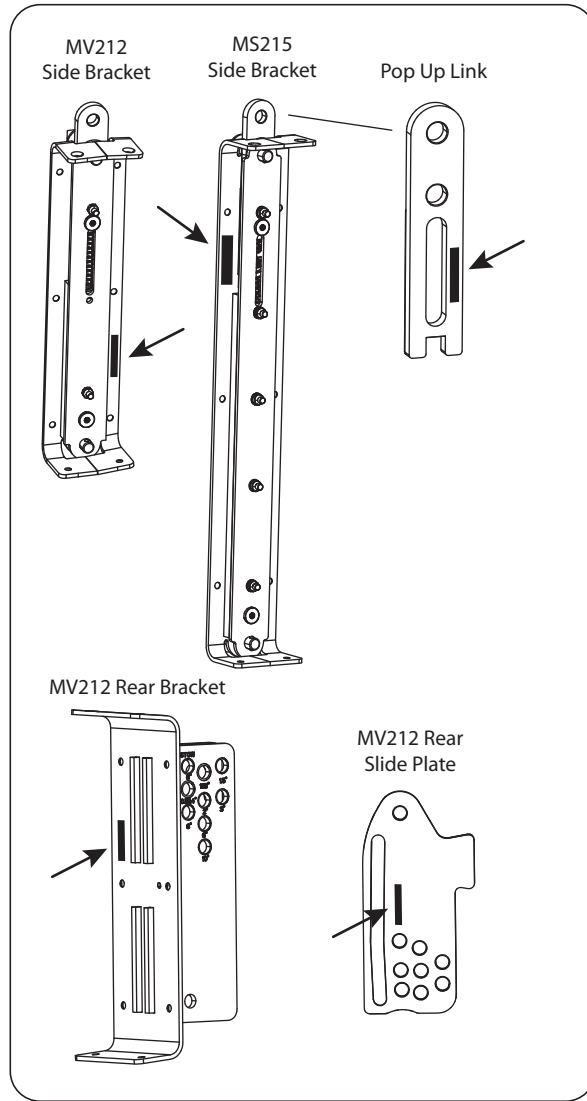
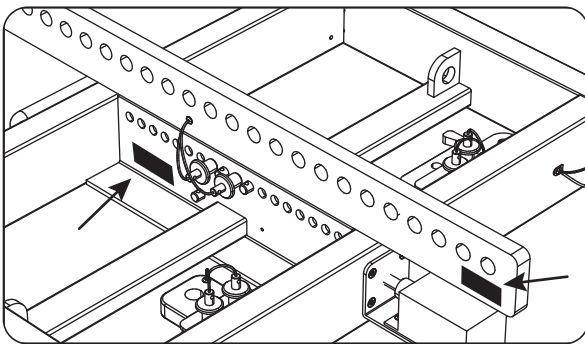
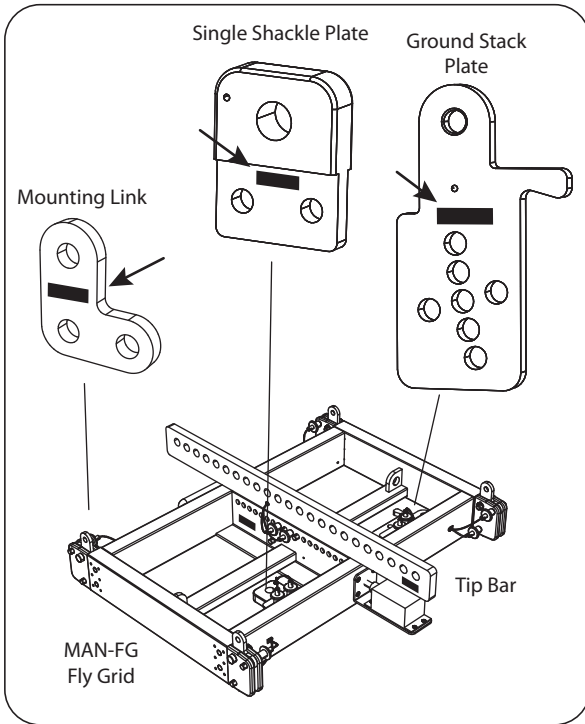


## 2.8 Rigging Component Traceability Markings

Each component of the rigging system is marked with a number that allows it to be identified for traceability purposes. The illustrations below show the locations of the traceability markings on the various components.

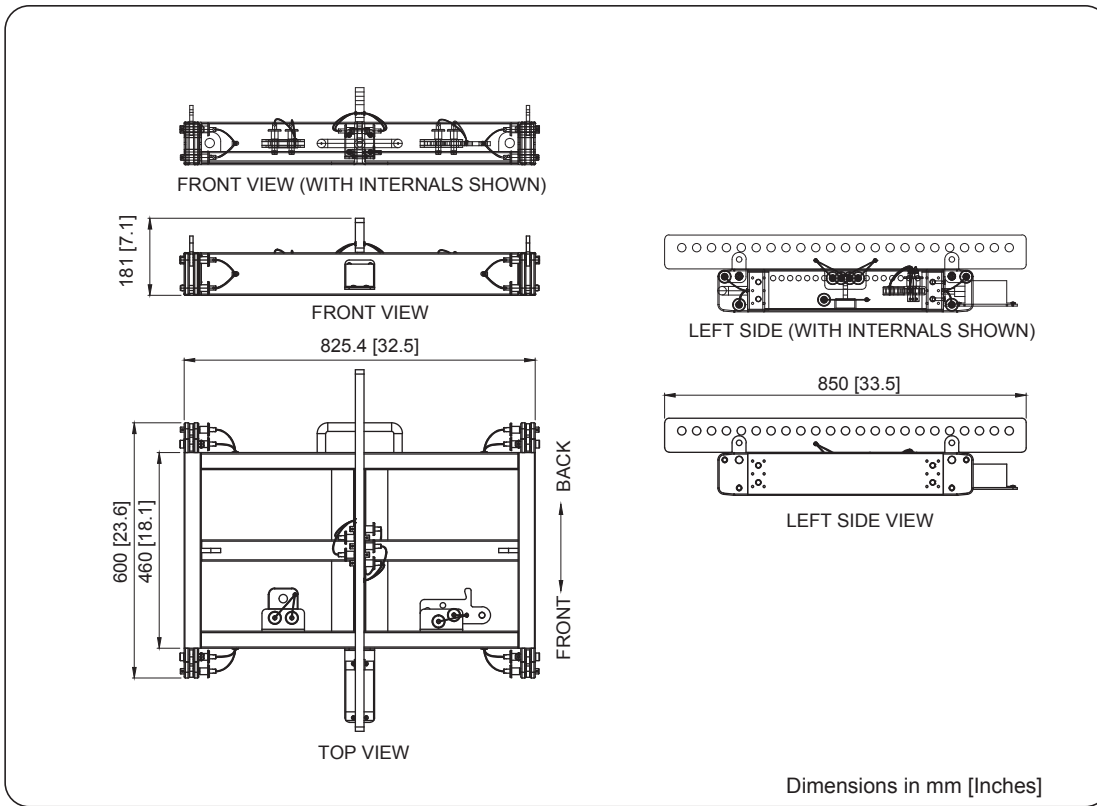
Note: These are not part numbers for ordering spare parts.

### Rigging Component Traceability Markings



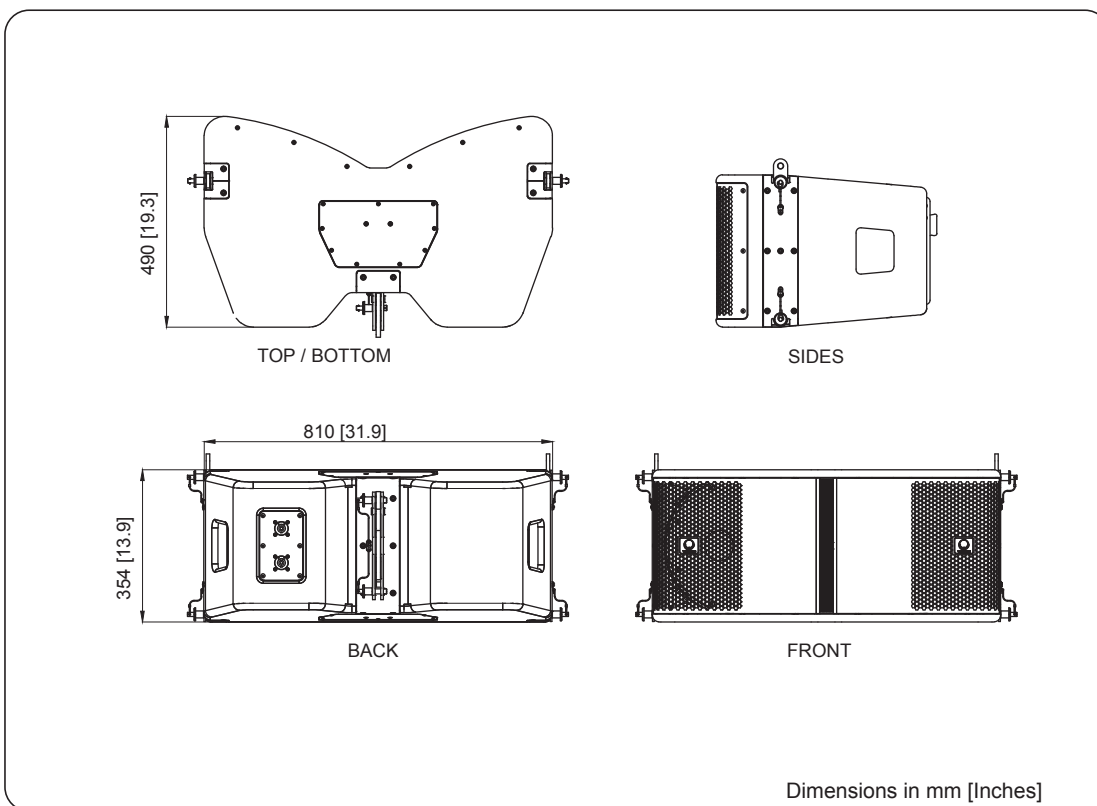
## 2.9 MAN-FG Fly Grid Dimensions

See Chapter 9 for information regarding inspection, care, and maintenance.



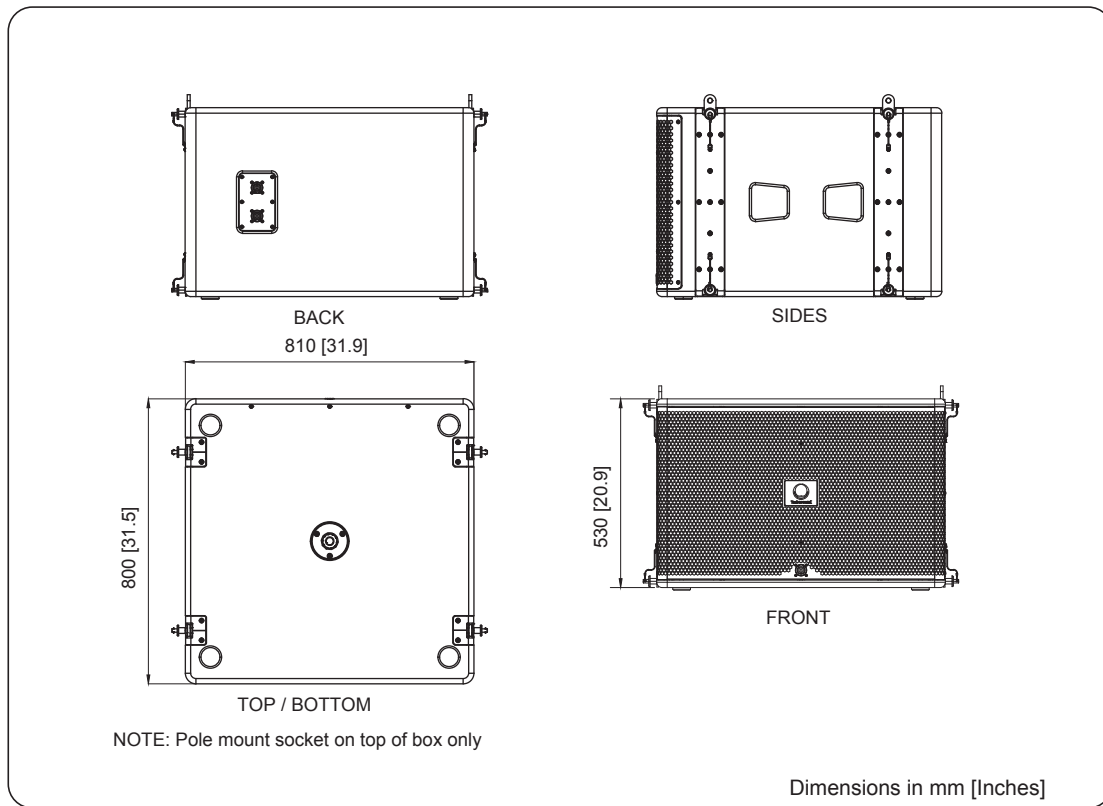
## 2.10 MV212 Cabinet Dimensions

See Chapter 9 for information regarding inspection, care, and maintenance.



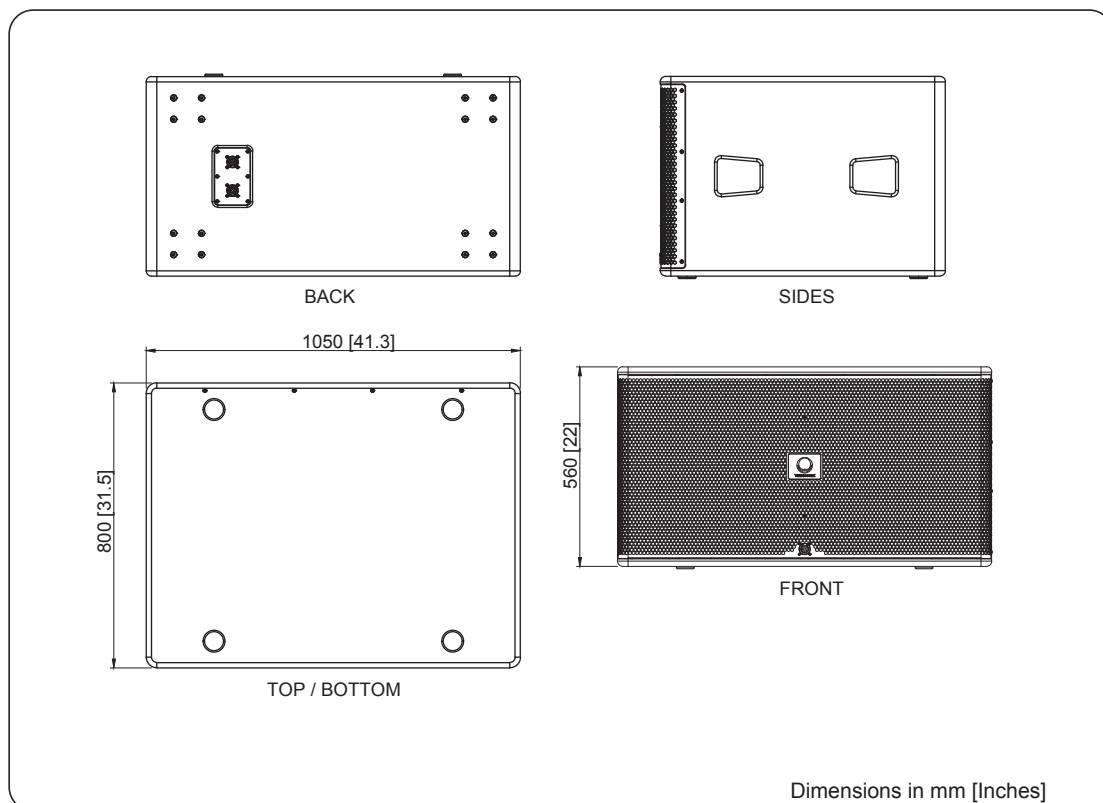
## 2.11 MS215 Subwoofer Dimensions

See Chapter 9 for information regarding inspection, care, and maintenance.



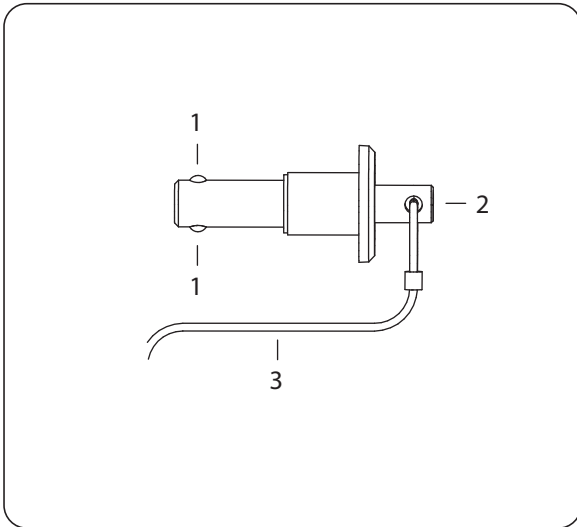
## 2.12 MS218 Subwoofer Dimensions

See Chapter 9 for information regarding inspection, care, and maintenance.



## 2.13 Rigging Pins

See Chapter 9 for information regarding inspection, care, and maintenance.



These quick release pins are the fundamental mechanical fastener for the assembly of the MAN-FG fly grid, MV212 cabinet, and the MS215 subwoofer.

1. **Spring Balls** – These are locking devices that prevent the pin from pulling out once it has been inserted.
2. **Spring Release** – Press this button in and the spring balls (1) will unlock and allow the pin to be inserted into the mounting holes and links. Release this button and the spring balls will lock and prevent the pin from pulling back out.
3. **Lanyard** – These prevent the pins from being easily lost.



### WARNING

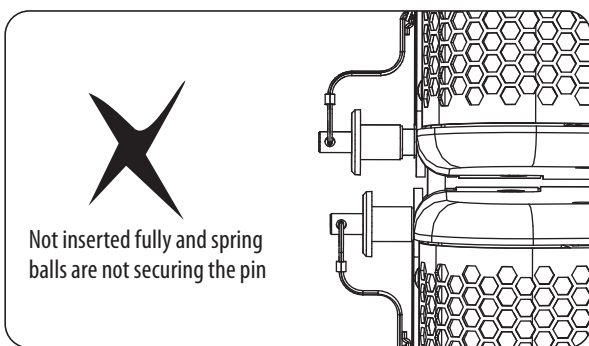
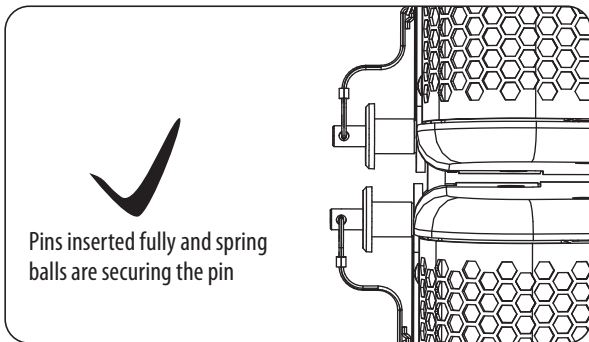
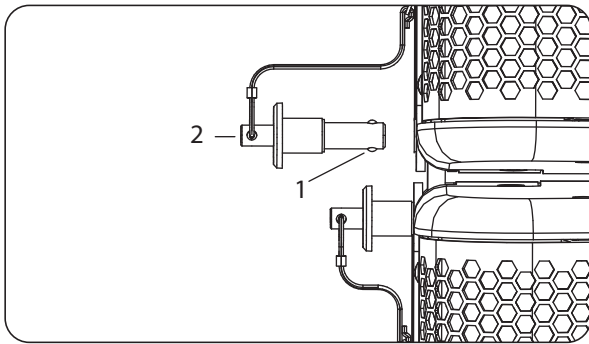
BEFORE EVERY USE, INSPECT ALL PINS FOR DAMAGE, AND VERIFY THE CORRECT OPERATION OF THE SPRING LOCKING MECHANISM. DO NOT USE ANY PINS THAT SHOW SIGNS OF DAMAGE. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.



### WARNING

BEFORE EVERY USE, MAKE SURE THAT ALL PINS ARE CLEAN AND FREE FROM DIRT AND DEBRIS THAT MAY INTERFERE WITH THE CORRECT OPERATION OF THE SPRING LOCKING MECHANISM. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

### 2.13.1 Rigging Pin Installation



#### Pin Installation

The following example shows how to use a quick release pin to join two MV212 cabinets together. This just shows one pin as an example, but all pins must be installed. Exact details of the connections for various configurations are given in the various chapters of this manual.

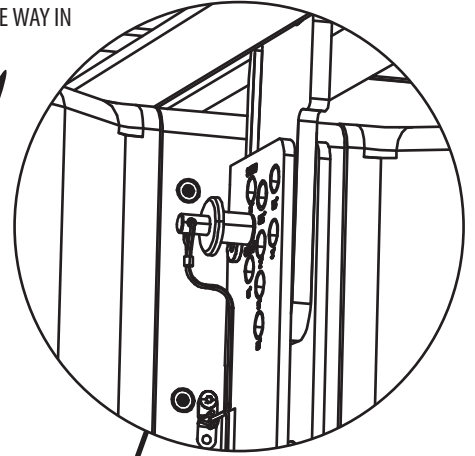
1. Support the weight of the components to be joined.
2. Pull out the lower pin of the top MV212 cabinet.
3. Align the top mounting link of the lower MV212 cabinet with the mounting slot in the upper cabinet. Align the holes so the pin can pass through and join them together.
4. Press the button (2) at the end of the pin, and insert the pin in as far as it will go. The spring balls(1) will retract while the button is being held, allowing the pin to pass through the holes.
5. Release the button (2) when the pin is fully inserted.
6. Check the pin is correctly inserted as far as it will go, and check that the components being connected have been correctly captured together by the pin.
7. With the weight of the components still supported, and without pressing the button (2), try to pull on the pin sharply, to check it is secured in position by the spring ball locking mechanism.

#### Pin Removal

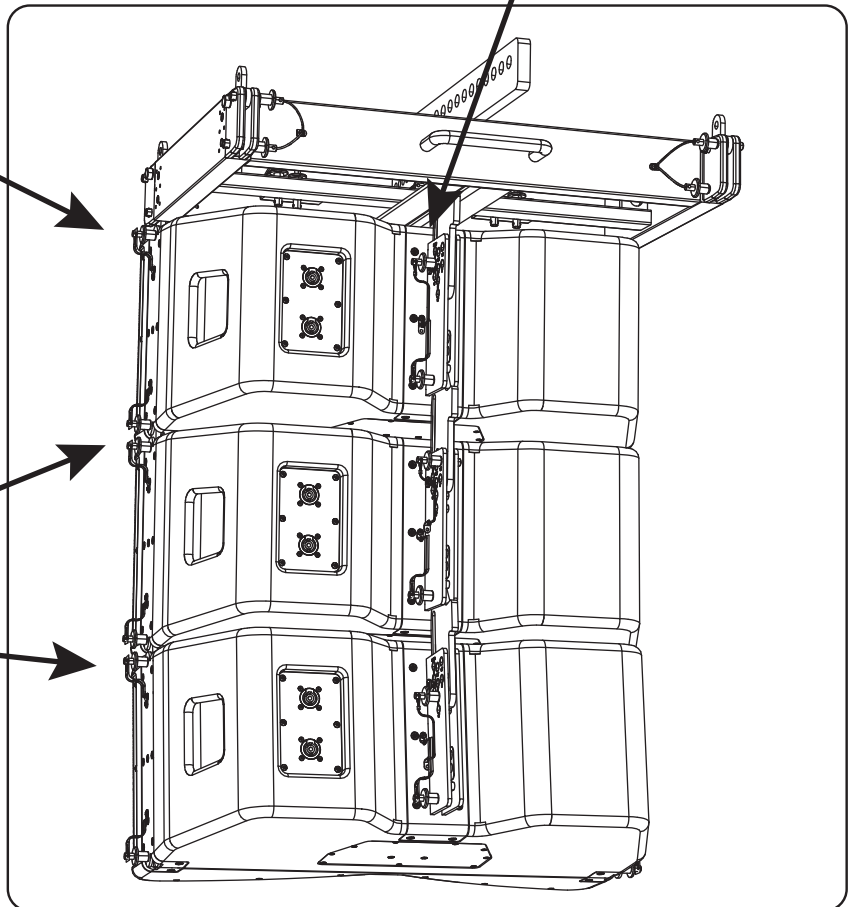
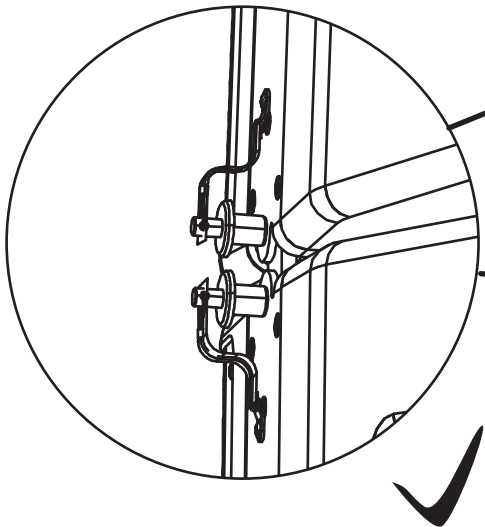
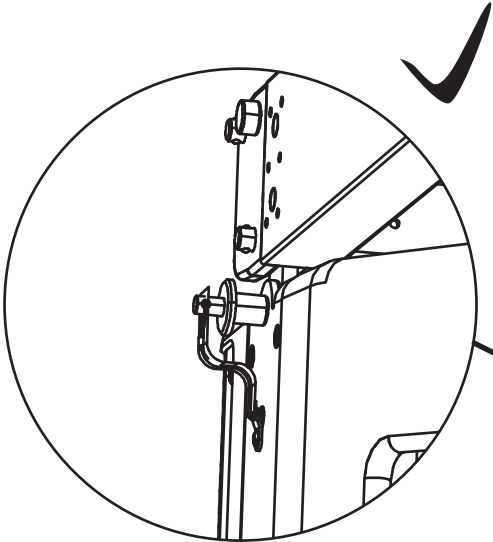
1. Support the weight of the components to be disconnected.
2. Press the button (2) and pull out the pins joining the components together.
3. Carefully separate the components.

### 2.13.2 Typical Locations where Rigging Pins are used

PINS CORRECTLY INSERTED, ALL THE WAY IN



PINS CORRECTLY INSERTED, ALL THE WAY IN



PINS CORRECTLY INSERTED, ALL THE WAY IN

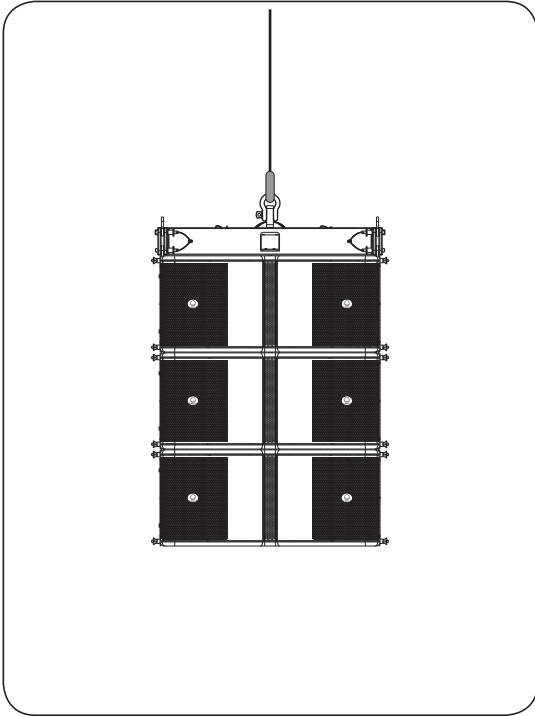


#### WARNING

VERIFY THAT EACH PIN IS CORRECTLY INSERTED, AND THAT EACH PIN CANNOT BE PULLED OUT WITHOUT PRESSING THE RELEASE BUTTON FIRST. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

## 2.14 Vertical Orientation

### CORRECT INSTALLATION



### Vertical Orientation Only!

The mechanical design of the MV212 cabinet, MS215 subwoofer, and the MAN-FG fly grid uses links and quick release pins to assemble the various components. The mechanical strength comes from the cabinet's metal side pieces and the pins, and not through the wooden cabinets. The cabinets are supported vertically below each other, and vertically below the fly grid.

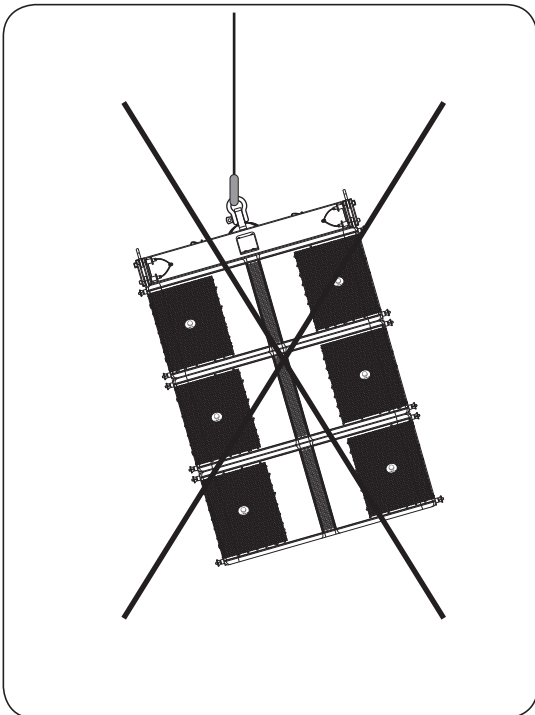
EN



### WARNING

THE ASSEMBLY MUST BE ORIENTED SO THAT THE SIDES OF THE CABINETS AND SUBWOOFER ARE ALWAYS KEPT IN THE VERTICAL PLANE. FAILURE TO DO THIS MAY CAUSE STRAIN AND FAILURE OF THE MECHANICAL STRUCTURE, LEADING TO POSSIBLE PERMANENT INJURY OR DEATH.

### INCORRECT INSTALLATION



### WARNING

THIS ILLUSTRATION SHOWS AN INCORRECT INSTALLATION, WHERE THE SIDES OF THE CABINETS ARE NOT IN THE VERTICAL PLANE. THIS MAY CAUSE STRAIN AND FAILURE OF THE MECHANICAL STRUCTURE, LEADING TO POSSIBLE PERMANENT INJURY OR DEATH.

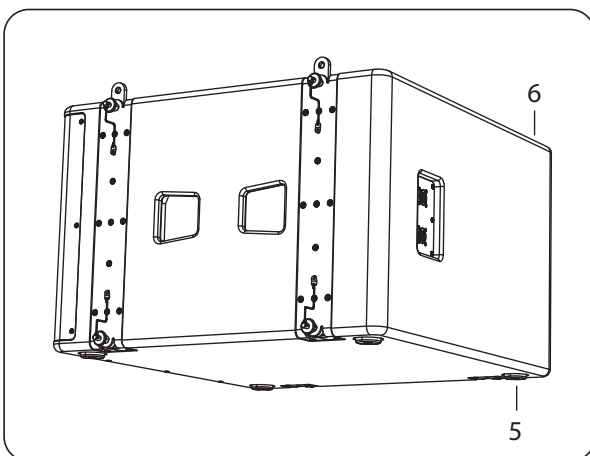
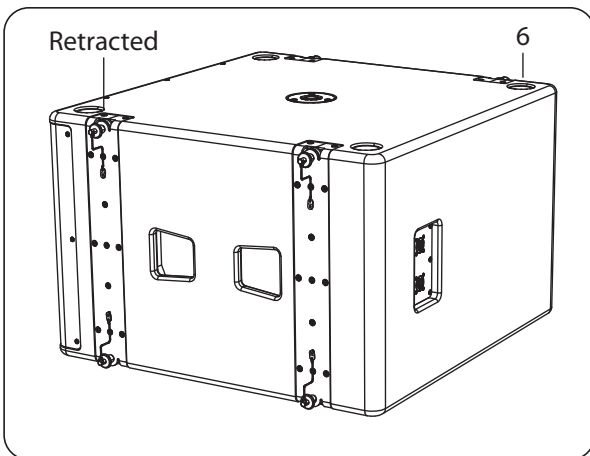
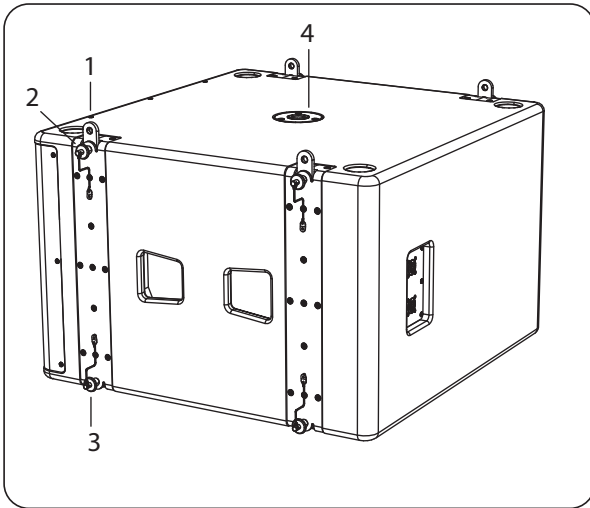


### WARNING

THE MV212 CABINETS, MS215 SUBWOOFERS, AND MAN-FG FLY GRID SHALL NOT BE CLIMBED UPON. THIS MAY CAUSE STRAIN AND FAILURE OF THE MECHANICAL STRUCTURE, LEADING TO POSSIBLE PERMANENT INJURY OR DEATH.

## EN 2.15 MS215 Subwoofer Mounting Components

### Mounting Links Out



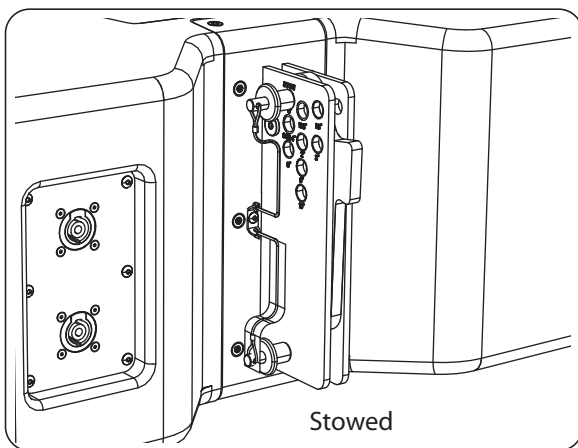
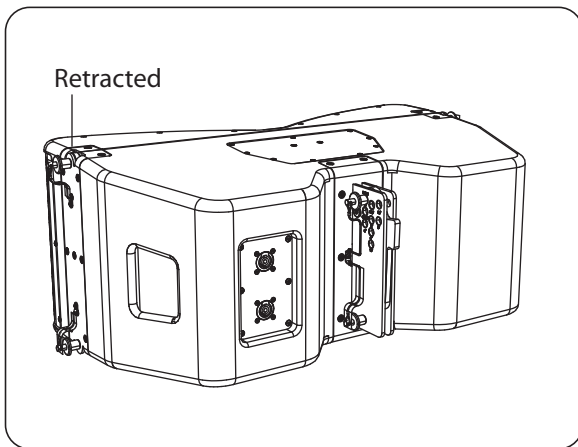
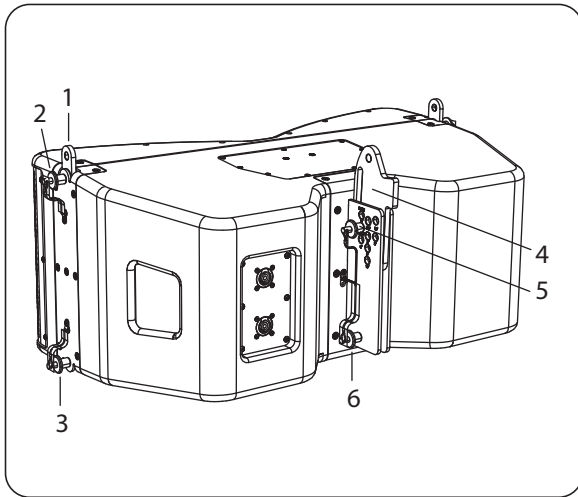
The MS215 subwoofer has four retractable mounting links at the top (1), and four corresponding mounting holes at the bottom (3). These mounting components allow the subwoofer to be attached to the MAN-FG fly grid, or attached to other MS215 subwoofers.

MS215 subwoofers may also be attached to each other in rear-firing or forward-firing orientations. A front speaker input is provided to simplify the connections to rear-firing subwoofers.

1. **Top Mounting Links** – These captive mounting links are spring-loaded, and may be set in the up or down position. These fit into the corresponding slots in an MS215 subwoofer above, or to a MAN-FG fly grid. To set in the up position, pull out the pin (2) and the link (1) will spring up. Secure in the up position by reinserting the pin. To retract, pull out the pin, press downwards on the link, and secure in the down position with the pin.
2. **Top Pins** – Secures the mounting links in the up or down position.
3. **Bottom Pins** – Secures the subwoofer to the top mounting links of another MS215 or a MAN-FG fly grid below it.
4. **Pole Mount** – This M20 (3/4" / 20 mm thread) pole mount socket is provided to support satellite speaker configurations.
5. **Feet** – Four feet are provided on each subwoofer.
6. **Feet Recesses** – These help align the subwoofers when fitted one on top of another, in addition to securing them together with the links (1) and pins (2) and (3).



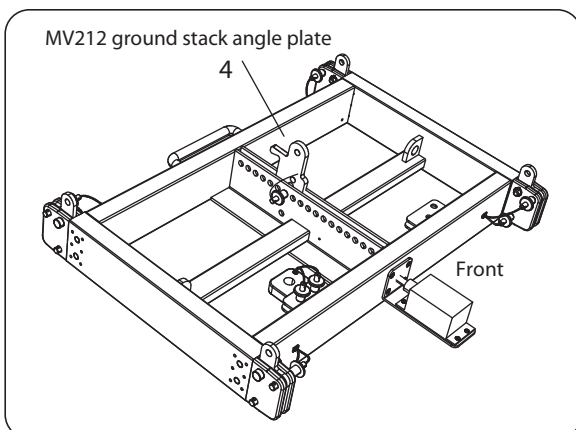
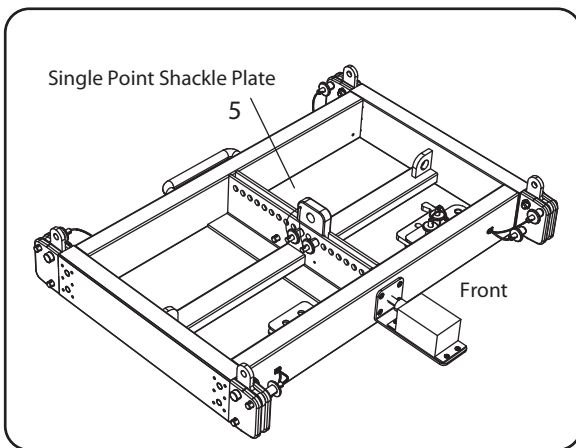
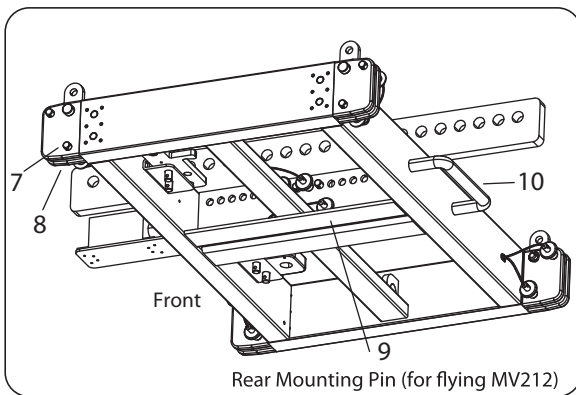
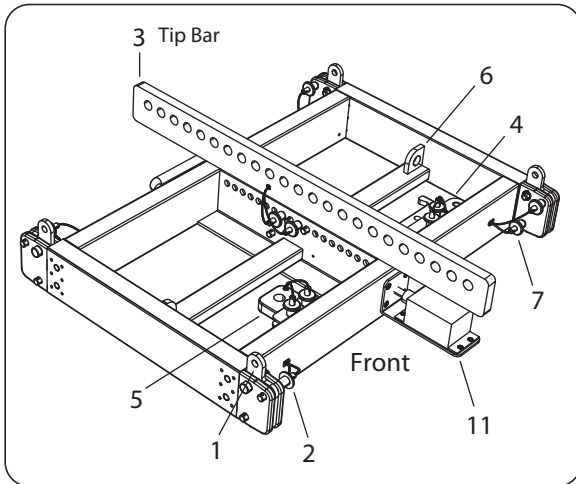
## 2.16 MV212 Cabinet Mounting Components



The MV212 cabinet has two retractable mounting links (1) at the top, and an adjustable rear link (4) that allows setting of the inter-cabinet angle. There are two corresponding front slots at the bottom, and one at the rear, with securing pins. These mounting components allow the MV212 cabinets to be connected together, attached to the MAN-FG fly grid, and MS215 subwoofer with a MAN-FG fly grid.

1. **Top Mounting Links** – These captive mounting links are spring-loaded, and may be set in the up or down position. The mounting links fit into the bottom slots of a MV212 above, or to a MAN-FG fly grid. To set in the up position, pull out the pin (2) and the link will spring up. Secure in the up position by reinserting the pin. To retract, pull out the pin, press downwards on the link, and secure in the down position with the pin (2).
2. **Top Pins** – Secures the mounting links in the up or down position.
3. **Bottom Pins** – Secures the cabinet to the top mounting links of another MV212 or a MAN-FG fly grid below it (when ground stacking).
4. **Rear Mounting Plate** – This captive sliding plate attaches to the rear mounting point of the cabinet above, or to the MAN-FG fly grid. The angle of the cabinet can be adjusted by connecting the rear pin (5) into one of the nine different holes.
5. **Rear Pin** – This pin secures the rear mounting plate (4) in position. The angle of the cabinet can be adjusted by connecting the pin into one of the nine different holes, each marked with the angle.
6. **Bottom Rear Pin** – This pin connects the top hole of the rear mounting plate (4) of the cabinet below, or to the rear ground stack plate of the MAN-FG fly grid (when ground stacking).

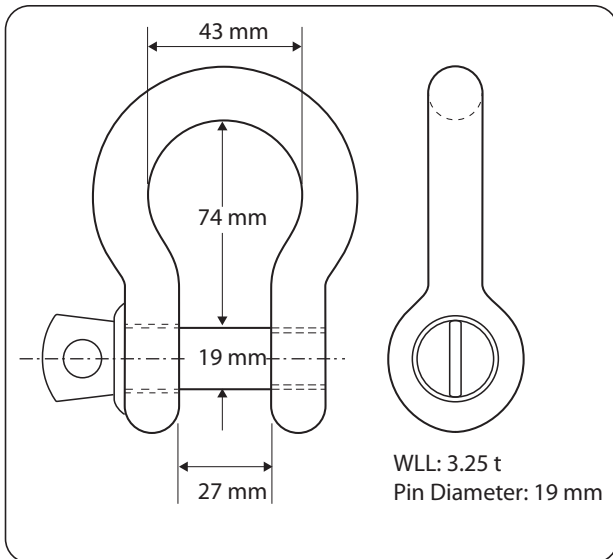
## 2.17 MAN-FG Fly Grid Mounting Components



The MAN-FG fly grid shall only be used with MV212 cabinets and MS215 subwoofers. It is not designed to work with any other cabinets.

1. **Mounting Links** – These retractable links connect the fly grid to the bottom mounting slots of an MV212 cabinet or MS215 subwoofer. The connections are secured using the lower pins of the MV212 cabinet or MS215 subwoofer.
2. **Rigging Pins** – These are used to secure the mounting links (1) in the up or down positions.
3. **Tip Bar** – This has 23 20 mm diameter holes that are used to attach bow shackles or similar lifting equipment for suspending the assembly. Use the EASE FOCUS software to determine the correct pick points for each configuration. The bar is fitted to the fly grid using four quick release pins, and all must be securely fitted and inspected before flying.
4. **Ground Stack Angle Plate** – For attaching the fly grid to the rear lower mounting point of an MV212 for ground stacking. The plate is attached to the fly grid with two pins, after the Tip bar (3) is removed. The MV212 has one pin for attaching the top hole of this plate to the rear mounting hole of the MV212.
5. **Single Point Shackle Plate** – This has one 20 mm diameter hole that is used to attach a bow shackle or similar lifting equipment for suspending the assembly. Use the EASE FOCUS software to determine the correct pick point for each configuration. The shackle plate is fitted to the fly grid using two quick release pins, after the Tip bar (3) is removed.
6. **Mounting Links** – These welded links have 22 mm diameter holes that are used to secure secondary safeties to the fly grid.
7. **Lower pins** – These pins secure the fly grid to the top mounting links of the MV212 cabinet or MS215 subwoofer. Use all 4 when securing an MS215 subwoofer. Use the front 2 pins and rear pin (9) when securing an MV212 cabinet.
8. **Mounting Slots** – The top mounting links of the MV212 cabinet or MS215 subwoofer fit into these slots and are secured together with the pins (7).
9. **Rear Pin** – This pin is used to secure an MV212 rear mounting plate when flying an MV212 or MV212 array.
10. **Handle** – The fly grid is fitted with a carrying handle.
11. **Front Bracket** – This laser bracket is used for precise aiming of the array using user-supplied industry standard inclinometer devices.

## Recommended Bow Shackles



Suspend the array by attaching one or more bow shackles or similar lifting devices with a pin diameter to fit the 20 mm suspension pick points on the Tip Bar or the single shackle plate of the MAN-FG fly grid.

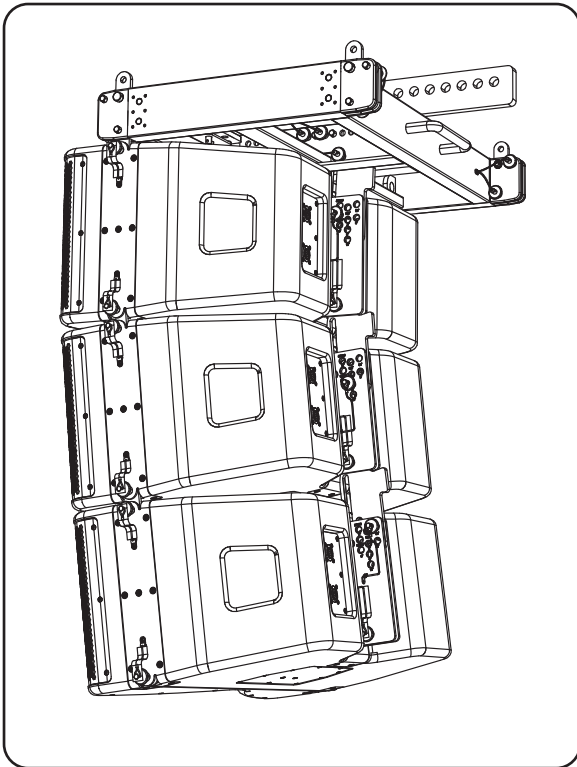
WARNING: THE BOW SHACKLE MUST BE RATED AT 3.25 TONNES.



Installation and setup should only be carried out by qualified and authorized personnel observing the valid national Rules for the Prevention of Accidents (RPA). Refer to Chapter 1 for more details.

One example of a manufacture of suitable bow shackles is a Netherlands company called Van Beest who manufacture top quality certified shackles.

## Chapter 3: Assembling an MV212 Array on a MAN-FG Fly Grid



The following procedure shows how to build an array of MV212 cabinets by adding them one at a time.

Alternatively, cabinets can be pre-assembled into groups of four, and then connected to the fly grid at a later time. This method is shown in procedure 3.2.

The system is suspended using a MAN-FG fly grid that attaches to your lifting system.

The top MV212 cabinet connects to two front mounting points on the fly grid, and one rear mounting point.

There are 9 rear mounting holes on the back of the MV212 that allow the cabinet angle to be selected from 0 to 10 degrees.



### WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 16 MV212 CABINETS FOR ONE MAN-FG FLY GRID. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

### 3.0.6 Personnel

The following procedures shall be undertaken by experienced, certified, qualified, and authorised personnel only. The procedures require the use of three or more authorised persons.

### 3.0.1 Required Components

Item	Quantity
MAN-FG Fly Grid	1
MV212 Cabinet	16 (maximum at 10:1 Safety Factor)

### 3.0.2 Preparation

Use the EASE FOCUS software application to design your system to suit the venue. This will calculate which fly grid mounting hole to attach your bow shackle, and at which angle to set each MV212 cabinet to achieve optimum coverage.

### 3.0.3 Location

Move the first MV212 cabinet so it is sitting upright on a safe flat surface, directly below the suspension point.

### 3.0.4 Measured Weights

Item	Quantity	Weight	
MAN-FG with Tip Bar	1	53 kg	116.9 lbs
MV212	1	53 kg	116.9 lbs
MV212-XV	1	50 kg	110.2 lbs

### 3.0.5 MAN-FG Fly Grid WLL (10:1 Safety Factor)

Item	Working Load Limit (WLL) 3 Point Suspension	
MAN-FG	894 kg	1971 lbs



Protective Headwear shall be worn



Protective Footwear shall be worn



Protective Gloves shall be worn

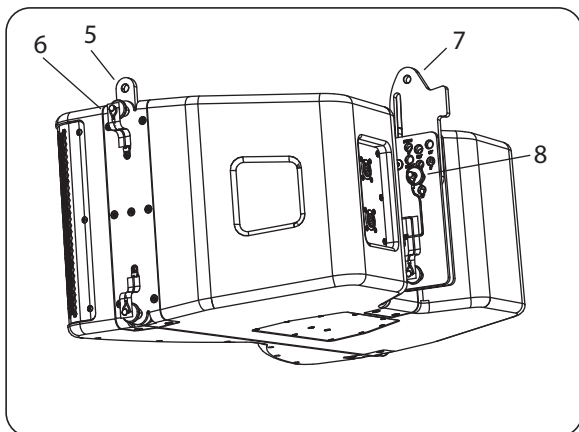
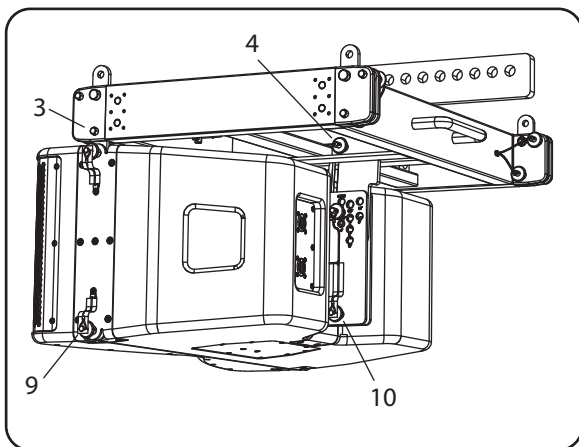
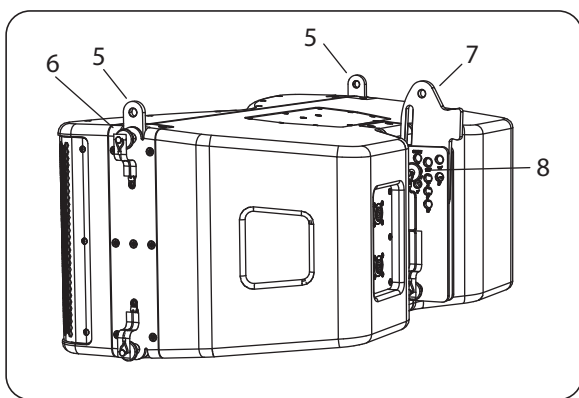
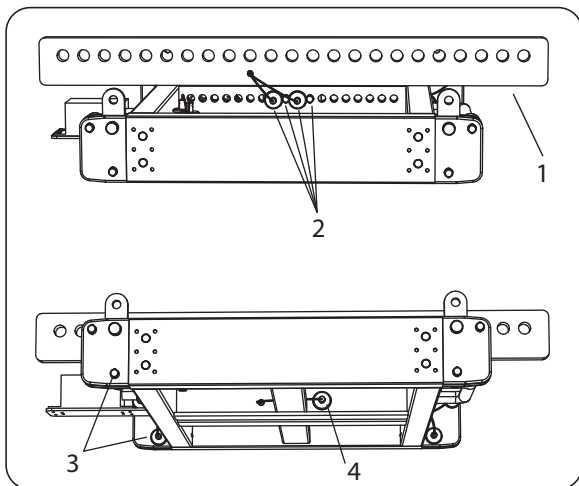


Protective Eyewear shall be worn



Practice Safe Lifting

## Procedure 3.1 Connecting MV212 Cabinets to the MAN-FG



1. Install the Tip Bar (1) onto the MAN-FG fly grid and secure using the 4 rigging pins (2).
2. Double check that all pins are correctly inserted, before proceeding further.
3. Prepare the MAN-FG by removing the 2 front rigging pins (3) and the rear rigging pin (4).
4. Prepare all the MV212 cabinets, by pulling out the front rigging pins (6), so the spring-loaded top links (5) will move to the up position. Reinsert the pins (6) to secure the links in the up position. Remove the MV212 rear pin (8) and slide the rear mounting plate (7) up. Reinsert the rear pin (8) in a suitable hole to secure the plate.
5. Carefully lift the MAN-FG fly grid on top of the first MV212 cabinet and align the fly grid's front lower mounting holes with the cabinet's top mounting links (5). Insert the fly grid's front pins (3) to secure the mounting links (5) to the fly grid.

Take care not to trap your fingers between components.



6. Support the rear of the fly grid and align the hole of the MV212 rear mounting plate (7) with the rear hole in the fly grid. Reinsert the rear pin (4) to secure the plate to the fly grid.

Double check that all pins are correctly inserted, before proceeding further.



7. Attach the bow shackles or other lifting equipment securely to the Tip Bar mounting hole recommended by the EASE FOCUS software, then attach the hook and chain. Carefully raise the fly grid/cabinet assembly to a reasonable working height to allow attaching the next cabinet.
8. Remove the MV212 cabinet front lower pins (9) and rear pin (10).
9. Prepare the next MV212 cabinet, as described in step 4.
10. Carefully lower the fly grid/cabinet assembly until the top links (5) of the lower cabinet fit into the corresponding slots in the bottom of the top cabinet. Insert the front two pins (9) of the top cabinet, to secure the links (5) in the slots.

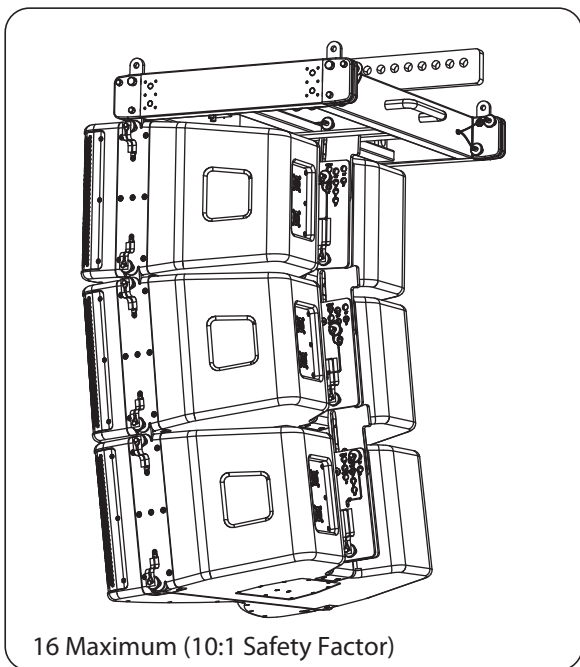
Take care not to trap your fingers between components.



11. Support the rear of the lower cabinet and align the hole of its rear mounting plate (7) with the rear hole in the top cabinet. Insert the rear pin (10) to secure the plate to the cabinet. The holes for pin 8 are marked with the angle from 0 to 10 degrees. Choose the correct hole that corresponds to the angle recommended by EASE FOCUS software for this cabinet.

Double check that all pins are correctly inserted, before proceeding further.





12. The addition of other MV212 cabinets is performed by repeating steps 8 through 11 for each additional cabinet.



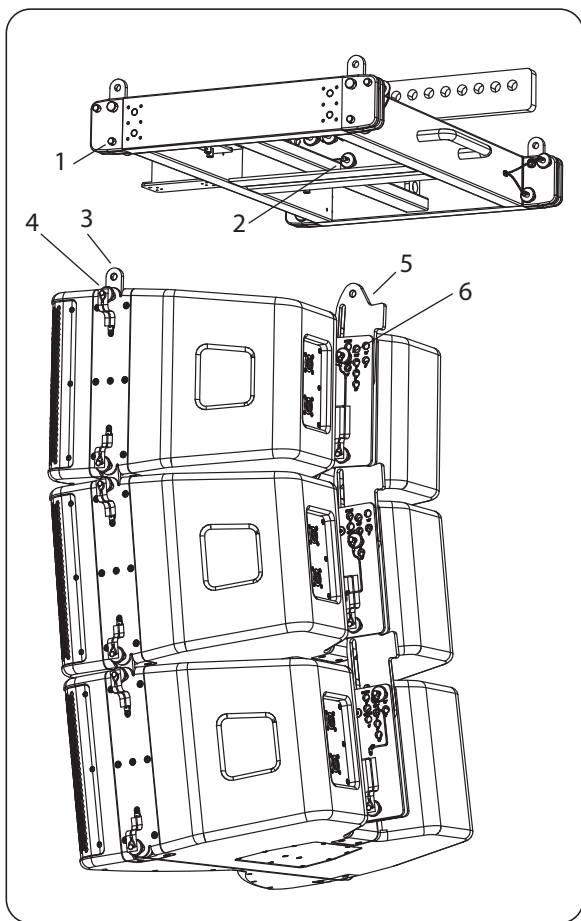
**WARNING**

DO NOT EXCEED A TOTAL QUANTITY OF 16 MV212 CABINETS FOR ONE MAN-FG FLY GRID. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

**NOTE**

Disassembly is the reverse of assembly.

## Procedure 3.2: Adding a group of MV212 Cabinets to the MAN-FG Fly Grid



Groups of MV212 cabinets can be pre-assembled using Procedure 3.1, steps 8 to 11, and then connected to the MAN-FG fly grid as an assembled group just prior to flying.

The MV212 cabinets connect to each other using the front mounting links (3), and the rear mounting plate (5).

1. Prepare the MAN-FG fly grid by installing the Tip Bar with its 4 pins, and by removing the MAN-FG 2 front pins (1) and the rear pin (2).
2. Prepare the top MV212 cabinet of the group, by pulling out the front rigging pins (4), so the spring-loaded top links (3) will move to the up position. Reinsert the pins (4) to secure the links in the up position. Remove the MV212 rear pin (6) and slide the rear mounting plate (5) up. Insert the rear pin (6) in a suitable hole to secure the plate.
3. Carefully lift the MAN-FG fly grid onto the top MV212 cabinet and align the fly grid's front slots with the front links (3) of the cabinet. Reinsert the front pins (1) to secure the links (3) of the cabinet to the fly grid.

Take care not to trap your fingers between components.



4. Support the rear of the fly grid and align the fly grid's rear mounting hole with the top hole in the MV212 rear plate (5). Insert the fly grid rear pin (2) to secure the plate to the fly grid.
5. The angle of the cabinet can be selected by moving the rear plate up or down and inserting the pin (6) into one of the holes marked with the angle from 0 to 10 degrees. Choose the correct hole that corresponds to the angle recommended by EASE FOCUS software for the first MV212 cabinet.

**Note:** normally the 0 degree hole is selected to attach the top MV212 enclosure to the MAN-FG, in order to set the angle of the top element parallel to the fly grid. This allows the MAN-FG to serve as a visual reference for checking array focus on the audience area, that is, if you can see the top of the MAN-FG then you are outside the vertical coverage pattern of the array. The angles of the other cabinets can be adjusted by supporting the cabinet weight and moving the rear plates (5) of the various cabinets and inserting the pins (6) into the desired angle holes.

Double check that all pins are correctly inserted.



### WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 16 MV212 CABINETS FOR ONE MAN-FG FLY GRID. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

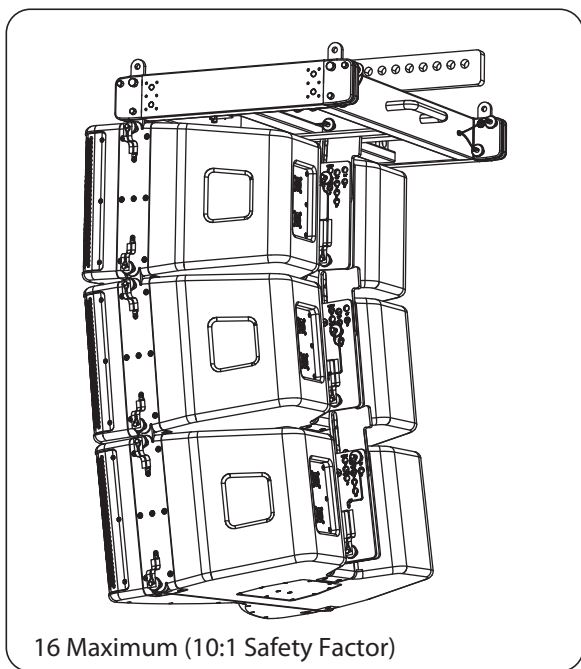


### WARNING

DO NOT FLY THE PRE-ASSEMBLED GROUPS OF MV212 CABINETS WITHOUT THE MAN-FG FLY GRID. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

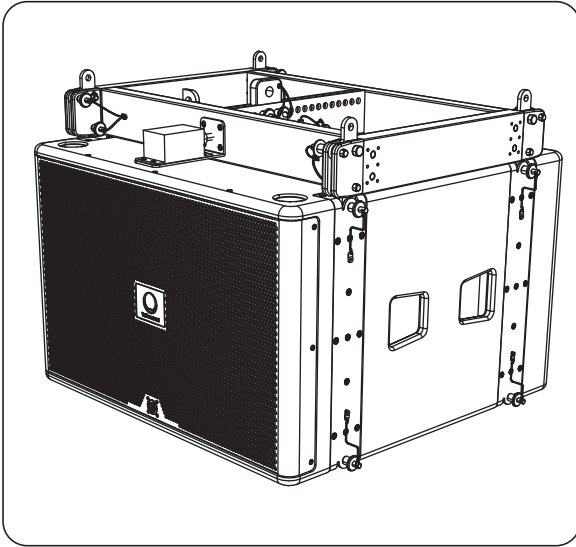
### NOTE

Disassembly is the reverse of assembly.



16 Maximum (10:1 Safety Factor)

## Chapter 4: Assembling MS215 Subwoofers on a MAN-FG Fly Grid



The following procedure describes how to assemble a MS215 subwoofer to the MAN-FG fly grid.

The MAN-FG fly grid is attached to the top of the MS215 subwoofer, using the subwoofer's 4 mounting links, and four lower rigging pins of the MAN-FG fly grid.



### WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 12 MS215 SUBWOOFERS FOR ONE MAN-FG FLY GRID. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

### 4.0.6 Personnel

The following procedures shall be undertaken by experienced, certified, qualified, and authorised personnel only. The procedures require the use of three or more authorised persons.

### 4.0.1 Required Components

Item	Quantity
MAN-FG Fly Grid	1
MS215 Subwoofer	12 (max)

### 4.0.2 Preparation

Use the EASE FOCUS software application to design your system to suit the venue. This will calculate which fly grid mounting hole to attach your bow shackle.

### 4.0.3 Location

Move the first MS215 subwoofer so it is sitting upright on a safe flat surface, directly below the suspension point.

### 4.0.4 Measured Weights

Measured Weights			
Item	Quantity	Weight	
MAN-FG	1	53 kg	116.9 lbs
MS215	1	83 kg	183 lbs

### 4.0.5 MAN-FG Fly Grid WLL (10:1 Safety Factor)

Item	Working Load Limit (WLL) 4 Point Suspension	
MAN-FG	1009 kg	2224 lbs



Protective Headwear shall be worn



Protective Footwear shall be worn



Protective Gloves shall be worn



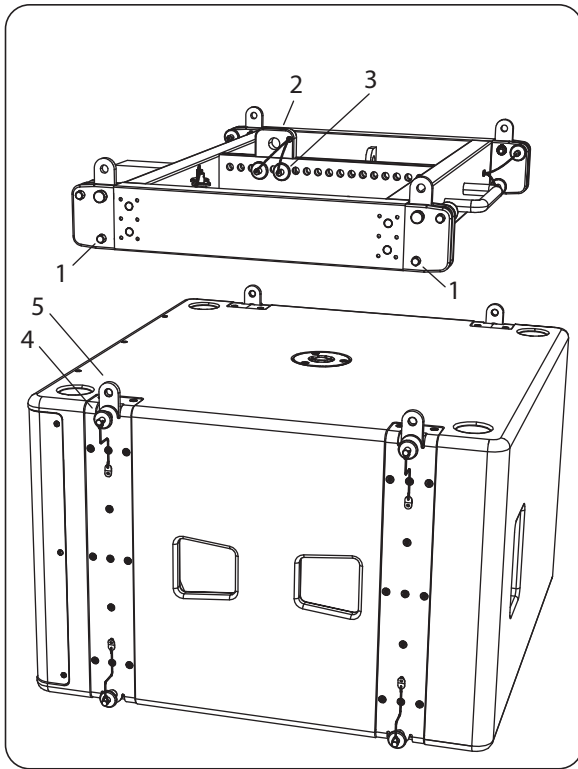
Protective Eyewear shall be worn



Practice Safe Lifting



## Procedure 4.1 Connecting MS215 Subwoofers to the MAN-FG Fly Grid



1. Prepare the MAN-FG fly grid by pulling out the 4 lower rigging pins (1). Attach the single shackle plate (2) using its 2 rigging pins (3), to the fly grid mounting position recommended by the EASE FOCUS software.
2. Prepare the MS215 subwoofer by pulling out its 4 top pins (4) so the top links (5) spring up. Reinsert the top pins (4) to secure the links in the up position.

Double check that all pins are correctly inserted, before proceeding further.



3. Carefully lift the MAN-FG fly grid on top of the MS215 subwoofer and align the fly grid's lower mounting slots with the top links (5) of the subwoofer. Insert the fly grid's 4 pins (1) to secure the fly grid to the subwoofer's top links (5).

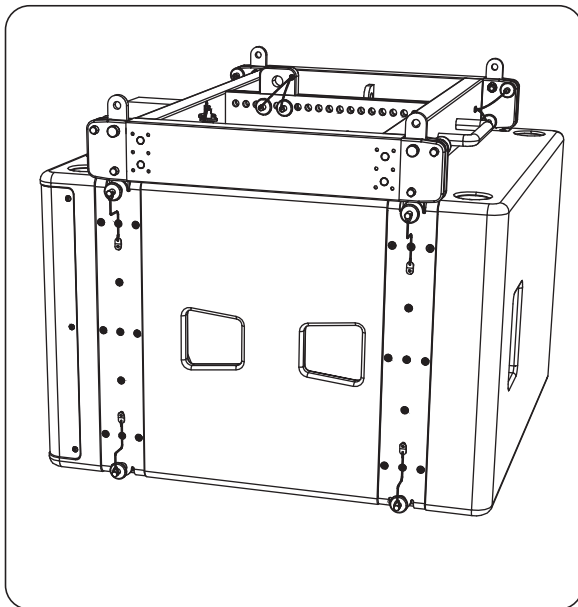
Take care not to trap your fingers between components.

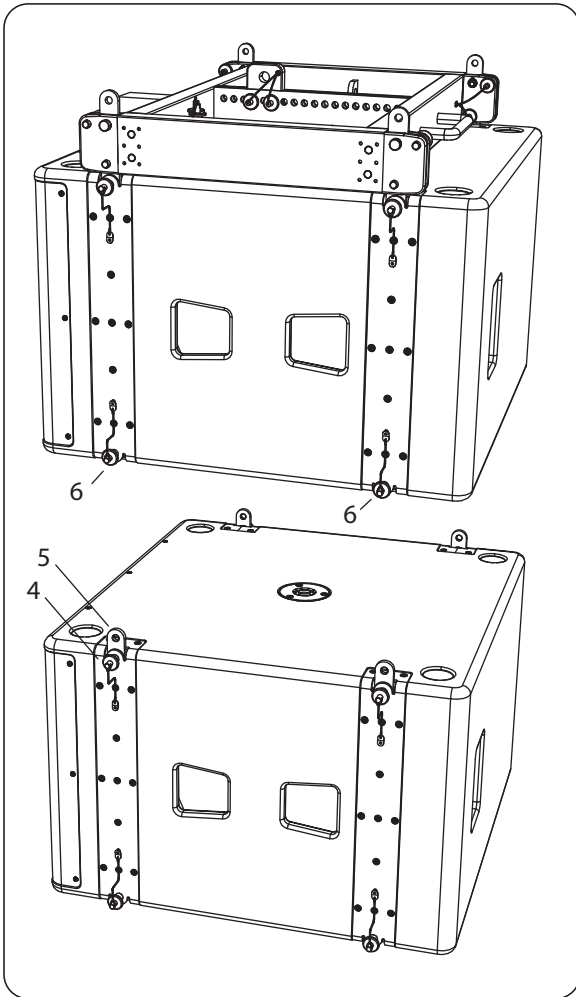


Double check that all pins are correctly inserted, before proceeding further.



4. To attach a second subwoofer, first attach a bow shackle or other lifting equipment to the fly grid shackle plate (2), then attach the hook and chain. Carefully raise the fly grid/subwoofer assembly to a reasonable working height to allow attachment of the lower subwoofer.
5. Move the lower MS215 subwoofer to a position directly below the top subwoofer. Make sure it is resting on a flat steady surface.





6. Prepare the upper subwoofer by removing its 4 lower pins (6).
7. Prepare the lower subwoofer by pulling out its 4 top pins (4) so the top links (5) spring up. Reinsert the top pins (4) to secure the links in the up position.
8. Carefully lower the upper subwoofer and fly grid assembly onto the lower subwoofer, and align the lower subwoofer's top links (5) with the corresponding slots in the bottom of the upper subwoofer.

Take care not to trap your fingers between components.



9. Insert the upper subwoofer's 4 lower pins (6) to secure the subwoofers together.

Double check all the connections to make sure that the MS215 subwoofers and the MAN-FG fly grid are securely connected together.



10. The addition of one more MS215 subwoofer is performed by repeating steps 6 through 9.

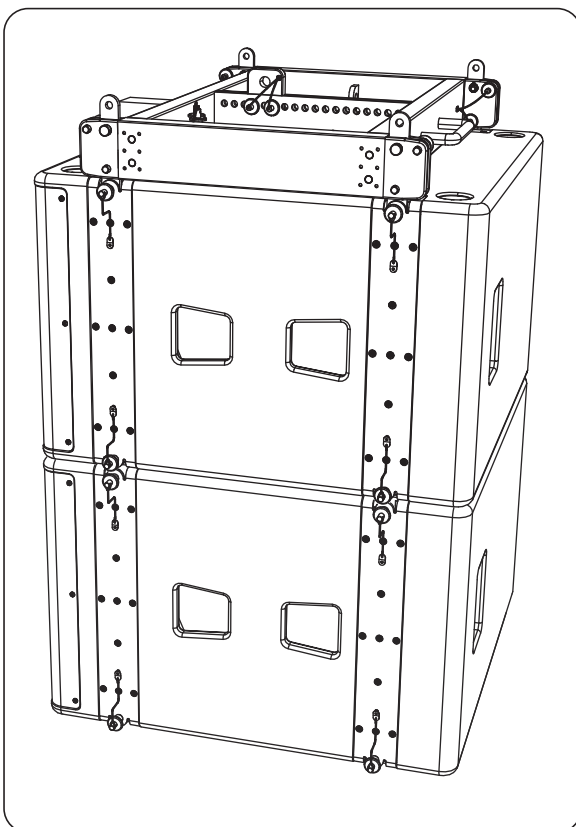


#### WARNING

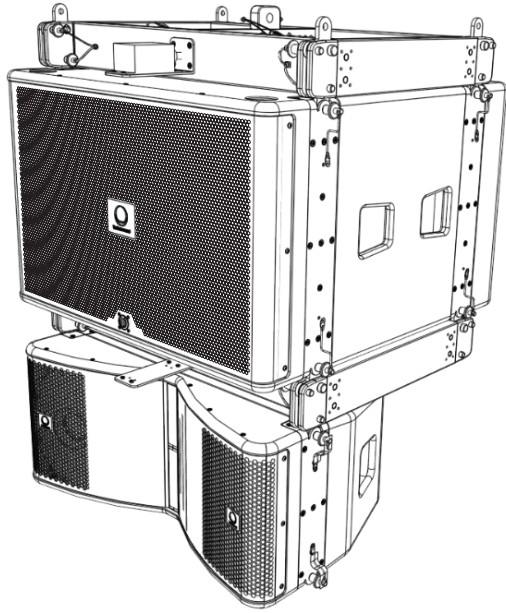
DO NOT EXCEED A TOTAL QUANTITY OF 12 MS215 SUBWOOFERS FOR ONE MAN-FG FLY GRID. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

#### NOTE

Disassembly is the reverse of assembly.



## Chapter 5: Assembling an MV212 Array with a MS215 Subwoofer



The following procedure describes how to assemble a mixed array consisting of one MS215 subwoofer and MV212 cabinets below it.

One MAN-FG fly grid is attached to the top of the MS215 subwoofer, using components supplied with the MAN-FG fly grid.

A second MAN-FG fly grid is attached to the bottom of the lowest MS215 subwoofer, using components supplied with the MAN-FG fly grid.



### WARNING

VARIOUS MIXTURES OF MV212 CABINETS AND MS215 SUBWOOFERS CAN BE CONFIGURED BUT DO NOT EXCEED A TOTAL WEIGHT OF 1009 KG.



### WARNING

THIS ARRAY SHALL ONLY BE MADE WITH THE MS215 SUBWOOFER ON TOP, AND THE MV212 CABINETS BELOW. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

### 5.0.1 Required Components

Item	Quantity
MAN-FG Fly Grid	2
MS215 Subwoofer	1
MV212 Cabinet	1

### 5.0.2 Measured Weights

Item	Quantity	Weight	
MAN-FG	1	53 kg	116.9 lbs
MV212	1	53 kg	116.9 lbs
MS215	1	83 kg	183 lbs

### 5.0.3 MAN-FG Fly Grid WLL (10:1 Safety Factor)

Item	Working Load Limit (WLL) 4 Point Suspension	
MAN-FG	1009 kg	2224 lbs



Protective Headwear shall be worn



Protective Footwear shall be worn



Protective Gloves shall be worn



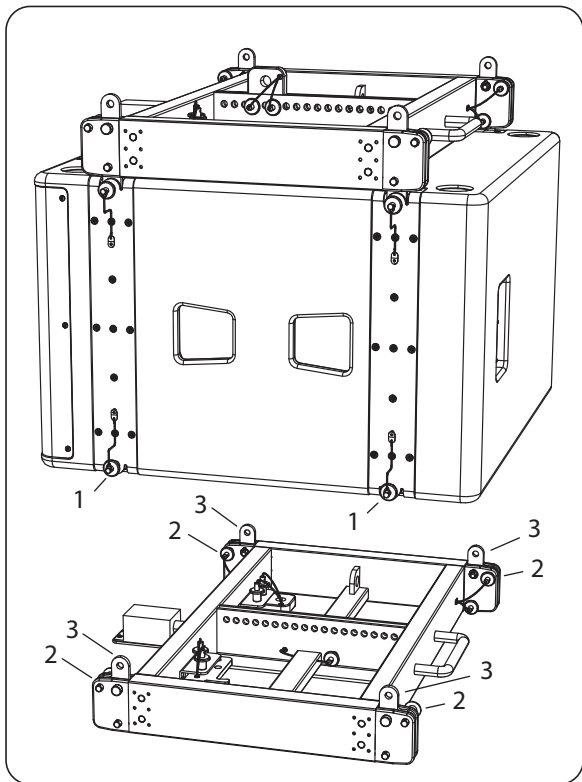
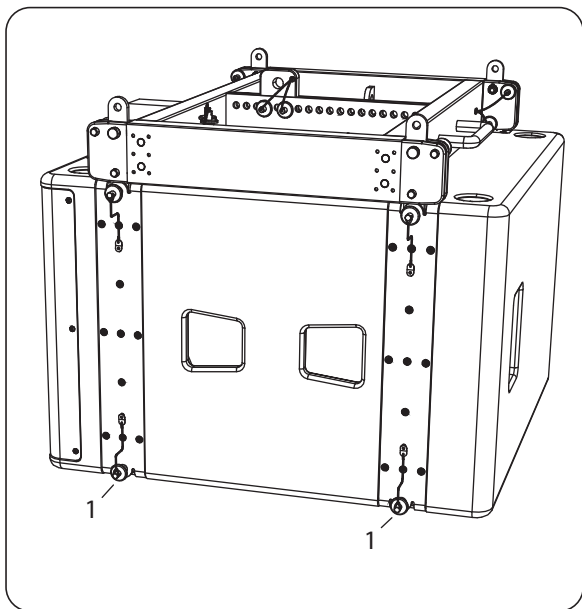
Protective Eyewear shall be worn



Practice Safe Lifting

EN

## Procedure 5.1 - Attaching the MAN-FG fly grids to the MS215 Subwoofer



1. Perform the previous procedure in **Chapter 4**: Procedure 4.1 steps 1 to 3, to attach the MAN-FG fly grid to the MS215 subwoofer.

Procedure	Description of Work	Check
4.1 step 1 to step 3	Attaching the MS215 Subwoofer to the MAN-FG Fly Grid	

Double check all pins are correctly inserted, and that the fly grid is securely attached to the subwoofer.



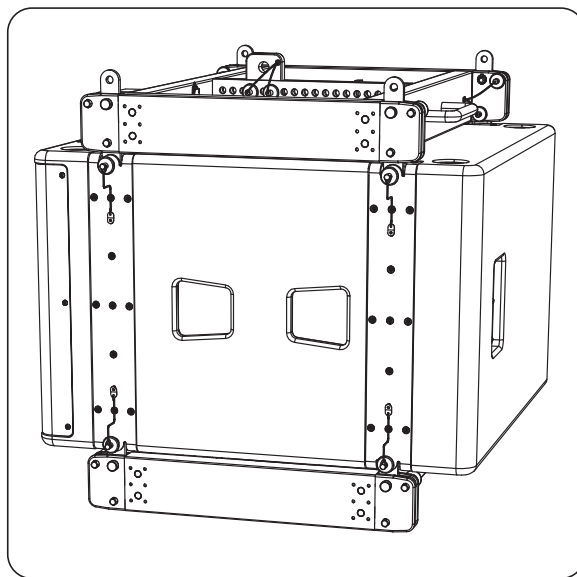
2. Attach a bow shackle or other lifting equipment securely to the single shackle plate of the MAN-FG fly grid, then attach the hook and chain. Carefully raise the fly grid/subwoofer assembly to a reasonable working height to allow attachment of the second MAN-FG fly grid.
3. Prepare the subwoofer by pulling out the 4 lower rigging pins (1).
4. Prepare the second MAN-FG fly grid by pulling out the 4 top rigging pins (2), and moving the 4 top links (3) to the up position. Secure the links in the up position by fully inserting the pins (2). Remove the single shackle plate and secure it in the stowed position with its 2 pins.
5. Carefully align the top links (3) of the fly grid assembly with the corresponding mounting positions on the bottom of the subwoofer, and then hold the fly grid in place.

Take care not to trap your fingers between components.

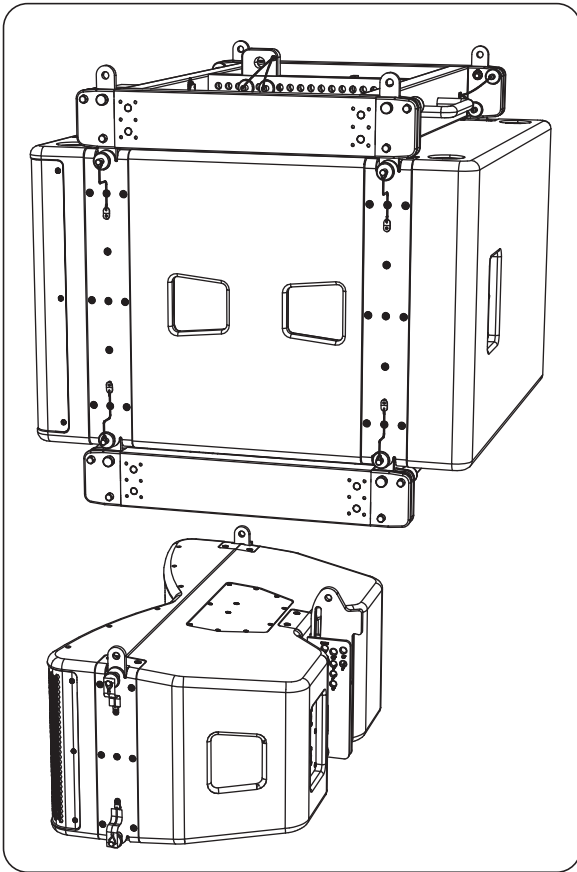


6. Insert the subwoofer's 4 lower pins (1) to secure the fly grid to subwoofer.

Double check all pins are correctly inserted, and that the fly grid is securely attached to the subwoofer.



## Procedure 5.2 - Attaching the MV212 Cabinets to the MS215 Subwoofer



1. Perform the previous procedure in **Chapter 3: Procedure 3.1** steps 3 to 12, to attach MV212 cabinets to the lower MAN-FG fly grid.

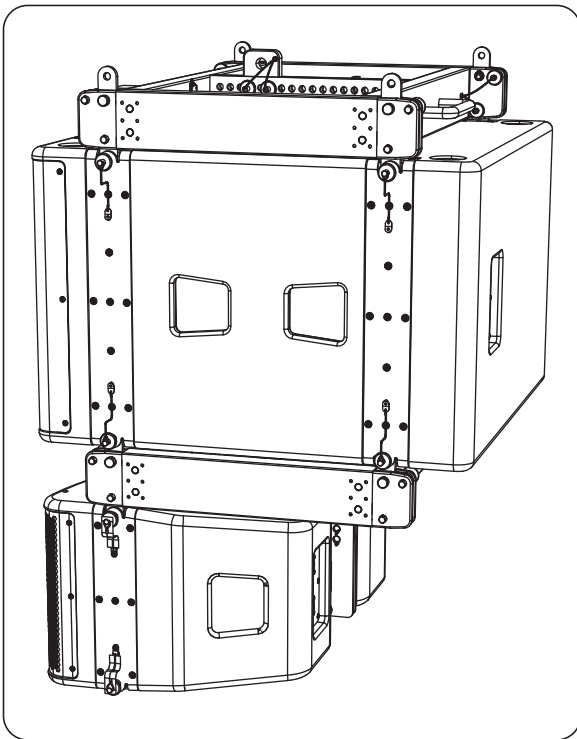
Procedure	Description of Work	Check
3.1 step 3 to step 12	Connecting MV212 cabinets to the MAN-FG fly grid	

Double check all pins are correctly inserted, and that the MV212 cabinets are securely attached to the MAN-FG fly grid.

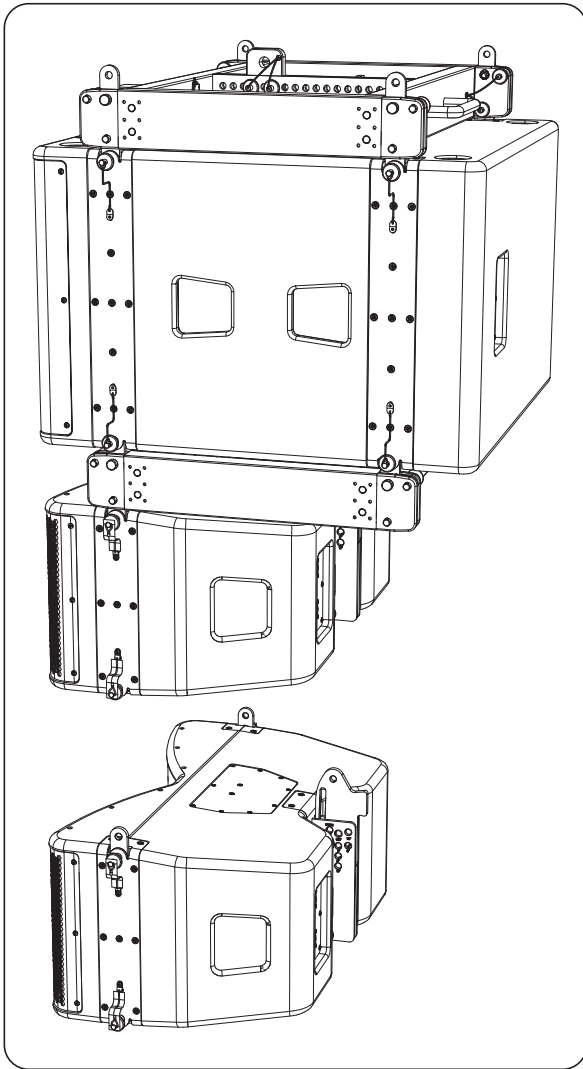


2. Add further MV212 cabinets below the first MV212 cabinet, in a similar way.
3. Alternatively, a previously-assembled group of MV212 cabinets can be assembled to the lower MAN-FG fly grid. See **Chapter 3, Procedure 3.2: Adding a group of MV212 Cabinets to the MAN-FG Fly Grid.**

Procedure	Description of Work	Check
3.2	Adding a group of MV212 cabinets to the MAN-FG fly grid	



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**WARNING**

VARIOUS MIXTURES OF MV212 CABINETS AND MS215 SUBWOOFERS CAN BE CONFIGURED BUT DO NOT EXCEED A TOTAL WEIGHT OF 1009 KG.

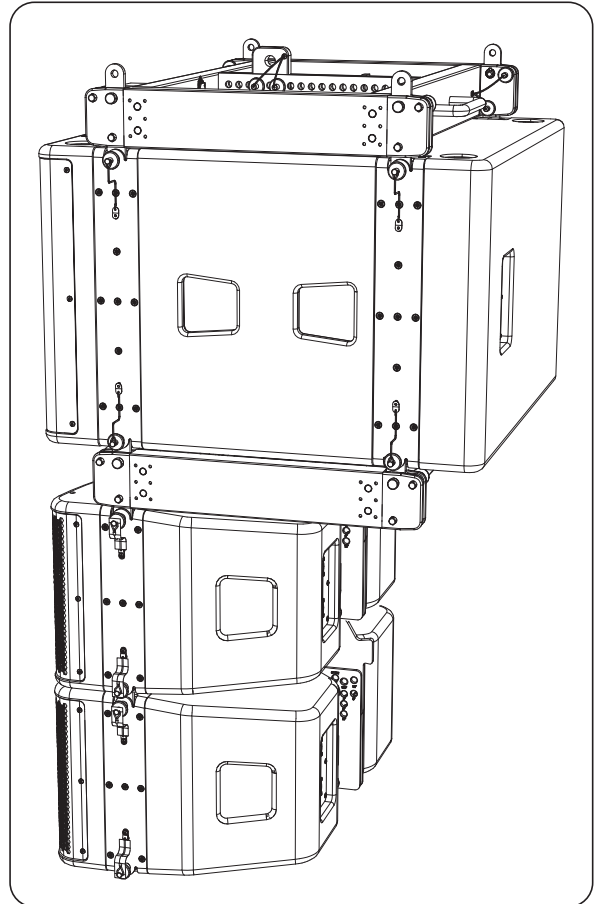


**WARNING**

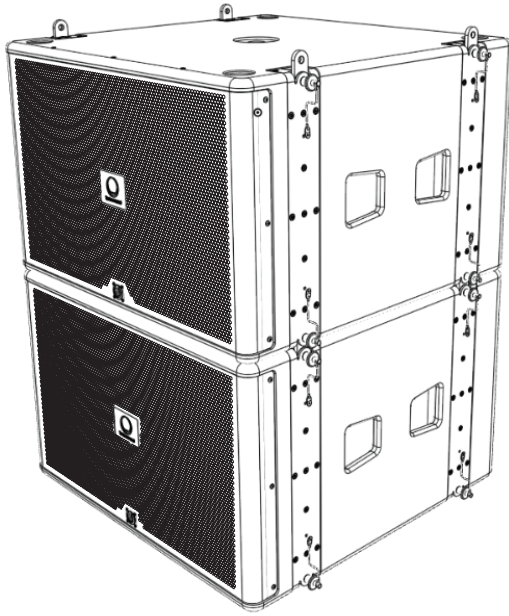
THIS ARRAY SHALL ONLY BE MADE WITH THE MS215 SUBWOOFER ON TOP, AND THE MV212 CABINETS BELOW. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

**NOTE**

Disassembly is the reverse of assembly



## Chapter 6: Groundstack of two MS215 Subwoofers



The following procedure describes how to assemble a groundstack with two MS215 subwoofers.

The MS215 subwoofers are attached using the 4 pop up mounting links of the lower subwoofer.



### WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 3 MS215 SUBWOOFERS FOR THIS GROUNDSTACK CONFIGURATION. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.



### WARNING

WHERE POSSIBLE ALWAYS SECURE THE GROUND-STACKED SPEAKERS TO THE STACKING SURFACE WITH ADDITIONAL FIXINGS SUCH AS RATCHET STRAPS.

### 6.0.1 Required Components

Item	Quantity
MS215 Subwoofer	3 (maximum)

### 6.0.2 Location

The MS215 subwoofers should be located on a flat, horizontal, and dry surface, capable of supporting the weight of the complete assembly.

### 6.0.3 Measured Weight

Item	Quantity	Weight	
MS215	1	83 kg	183 lbs

### 6.0.4 Personnel

The following procedures shall be undertaken by experienced, certified, qualified, and authorised personnel only. The procedures require the use of three or more authorised persons.



Protective Headwear shall be worn



Protective Footwear shall be worn



Protective Gloves shall be worn

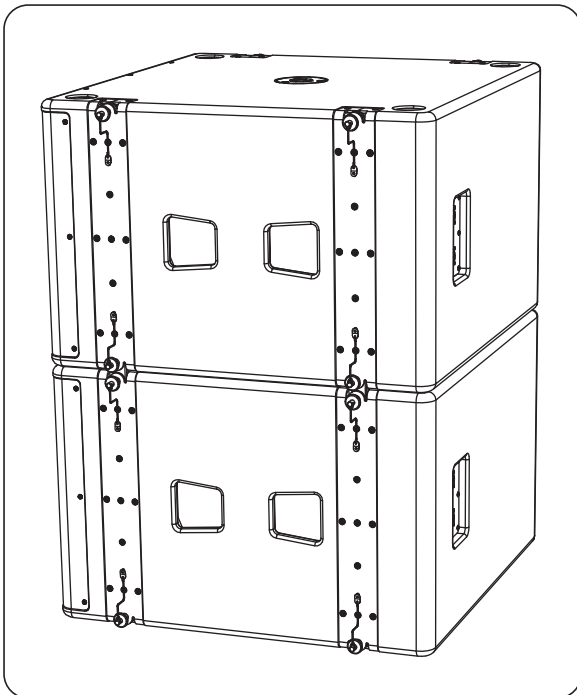
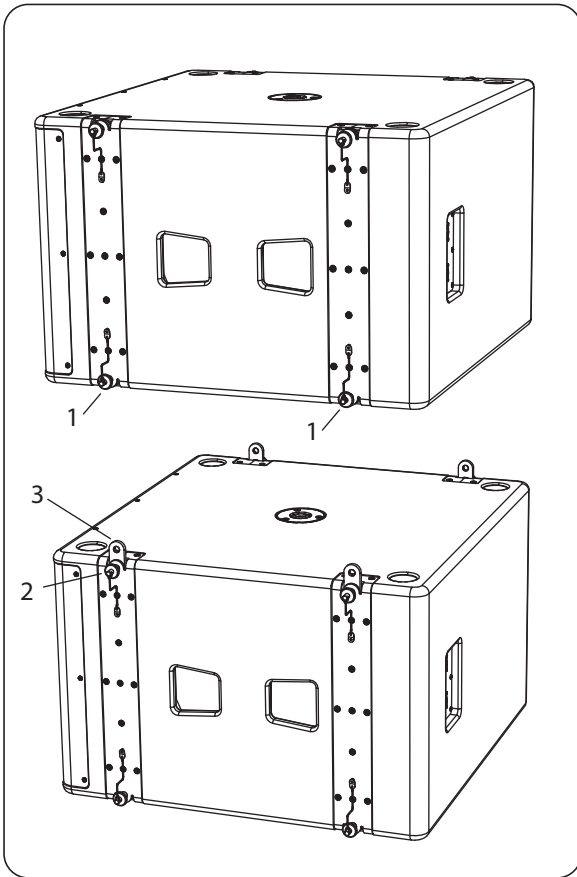


Protective Eyewear shall be worn



Practice Safe Lifting

## Procedure 6.1 - Assembling two MS215 Subwoofers



1. Prior to stacking, ensure that the lower subwoofer is mounted on a flat, dry, and solid horizontal surface, capable of safely bearing the weight of the assembly.
2. Pull out the lower subwoofer's 4 upper pins (2), and the spring-loaded mounting links (3) will move to the up position. Reinsert the pins (2) to secure the links (3) in the up position.
3. Pull out the upper subwoofer's 4 lower pins (1). With the help of one or more assistants, carefully lift and add the upper subwoofer on top of the lower subwoofer, and align the lower subwoofer's links (3) in the corresponding slots in the bottom of the upper subwoofer.

Take care not to trap your fingers between components.



4. Reinsert the upper subwoofer's rigging pins (1) to secure the top links (3) of the lower subwoofer to the upper subwoofer.

Double check all the connections to make sure that the MS215 subwoofers are securely connected together.



5. The upper subwoofer's top links (3) can also be secured in the up position with the rigging pins (2). These links can then be used as tie-down points for the ground stack assembly to prevent tipping.
6. The MS215 subwoofers can also be installed rear-facing. A front-mounted input on each MS215 can be used to make the speaker wiring connections easier and neater.

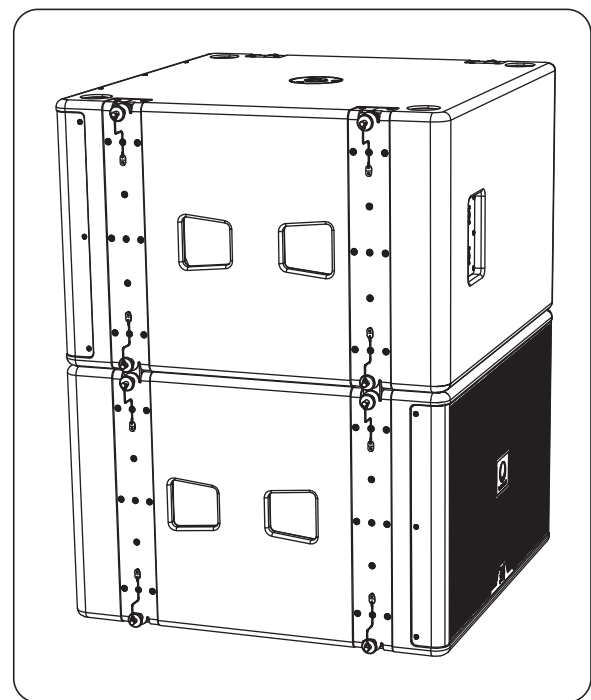


### WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 3 MS215 SUBWOOFERS FOR THIS GROUNDSTACK CONFIGURATION. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

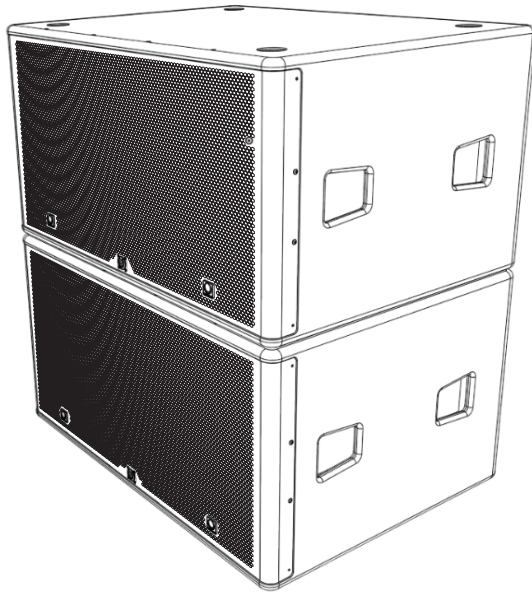
### NOTE

Disassembly is the reverse of assembly.





## Procedure 6.2 - Assembling two MS218 Subwoofers



The following procedure describes how to assemble a groundstack with two MS218 subwoofers.

1. Prior to stacking, ensure that the lower subwoofer is mounted on a flat, dry, and solid horizontal surface, capable of safely bearing the weight of the assembly.
2. With the help of assistants, carefully lift the second MS218 subwoofer on top of the lower subwoofer. Make sure that the feet of the top subwoofer fit into the corresponding recesses on top of the lower subwoofer.

Take care not to trap your fingers between components.



3. The MS218 subwoofers can also be installed rear-facing. A front-mounted input on each MS218 can be used to make the speaker wiring connections easier and neater.
4. The MS218 subwoofer groundstack must be carefully and securely tied down to prevent tipping.



### WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 3 MS218 SUBWOOFERS FOR THIS GROUNDSTACK CONFIGURATION. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.



### WARNING

WHERE POSSIBLE ALWAYS SECURE THE GROUND-STACKED SPEAKERS TO THE STACKING SURFACE WITH ADDITIONAL FIXINGS SUCH AS RATCHET STRAPS.

### NOTE

Disassembly is the reverse of assembly.

### 6.2.1 Required Components

Item	Quantity
MS218 Subwoofer	3 (maximum)

### 6.2.2 Location

The MS218 subwoofers should be located on a flat, horizontal, and dry surface, capable of supporting the weight of the complete assembly.

### 6.2.3 Measured Weight

Item	Quantity	Weight
MS218	1	97 kg 214 lbs

### 6.2.4 Personnel

The following procedures shall be undertaken by experienced, certified, qualified, and authorised personnel only. The procedures require the use of three or more authorised persons.



Protective Headwear shall be worn



Protective Footwear shall be worn



Protective Gloves shall be worn

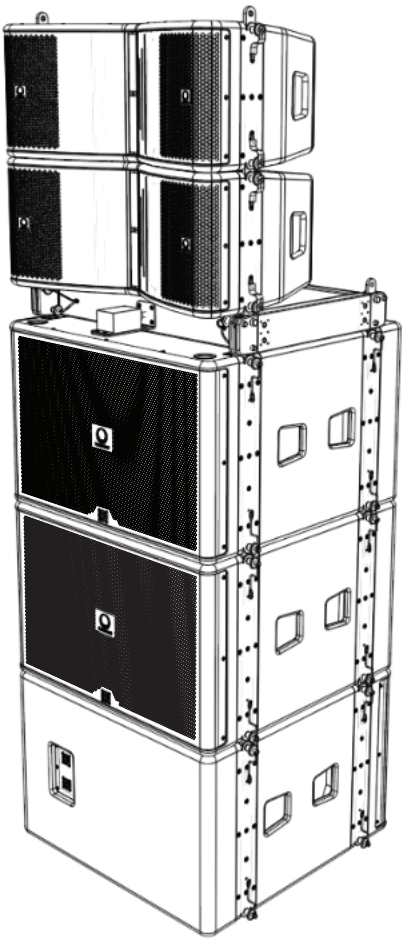


Protective Eyewear shall be worn



Practice Safe Lifting

## Chapter 7: Groundstack MS215 Subwoofer and MV212 Array



The following procedure describes how to assemble a groundstack with a MS215 subwoofer as a base, and an array of four MV212 cabinets on top.



### WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 6 x MV212 CABINETS FOR THIS GROUNDSTACK CONFIGURATION. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.



### WARNING

WHERE POSSIBLE ALWAYS SECURE THE GROUND-STACKED SPEAKERS TO THE STACKING SURFACE WITH ADDITIONAL FIXINGS SUCH AS RATCHET STRAPS.

### 7.0.1 Required Components

Item	Quantity
MS215 Subwoofer	3 X MS215
MV212 Cabinet	6 X MV212

### 7.0.2 Location

The MS215 subwoofer should be located on a flat, horizontal, and dry surface, capable of supporting the weight of the complete assembly.

### 7.0.3 Measured Weights

Item	Quantity	Weight	
MAN-FG	1	53 kg	116.9 lbs
MV212	1	53 kg	116.9 lbs
MS215	1	83 kg	183 lbs

### 7.0.4 Personnel

The following procedures shall be undertaken by experienced, certified, qualified, and authorised personnel only. The procedures require the use of three or more authorised persons.



Protective Headwear shall be worn



Protective Footwear shall be worn



Protective Gloves shall be worn

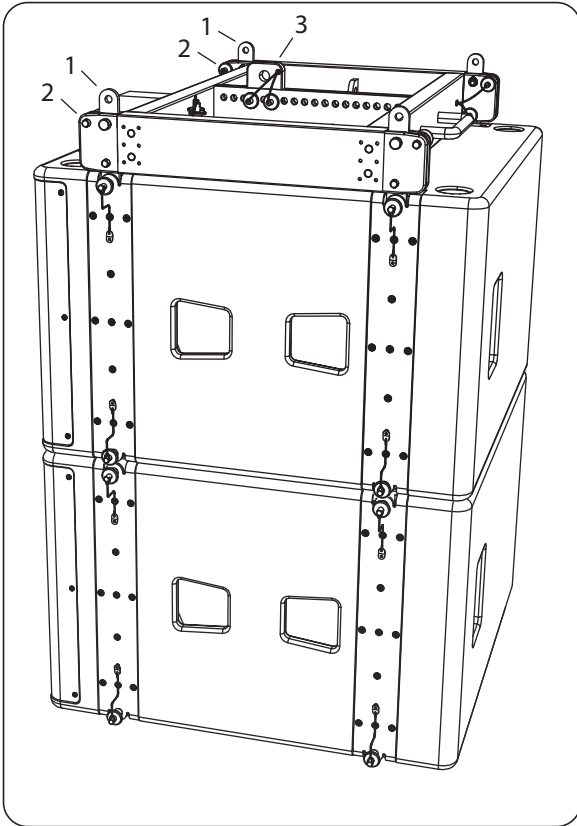


Protective Eyewear shall be worn



Practice Safe Lifting

## Procedure 7.1 - Attaching the MAN-FG fly grid to the MS215 Subwoofer stack



1. Perform the previous procedures in **Chapter 4** to attach the MAN-FG fly grid to the MS215 subwoofer(s).

Procedure	Description of Work	Check
4.1	Attaching the MS215 Subwoofer to the MAN-FG fly grid	

Double check all pins are correctly inserted, and that the MAN-FG fly grid is securely attached.



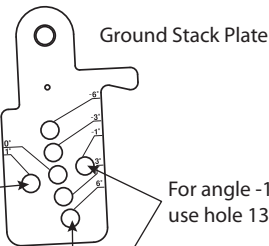
2. Pull out the upper rigging pins (2) in the MAN-FG fly grid and move the links (1) in the up position. Reinsert the pins (2) to secure the links (1) in the up position. The rear top mounting links (1) in the up position can be used as tie-down points.
3. Remove the Single Pick Point (3) and attach it to its stowage position in the MAN-FG fly grid, using its own rigging pins.
4. Pull out the ground stack plate (4) and attach it to the center spine of the MAN-FG fly grid, using one of the attached rigging pins (5). The plate holes are marked with the angles from -6 to +6 degrees. Choose the angle that you want to set the first MV212 cabinet from horizontal.

For holes marked 6, 3, 0, -3, and -6 degrees, use Hole 12 on the center spine.

For the hole marked 1 degree, use Hole 11.

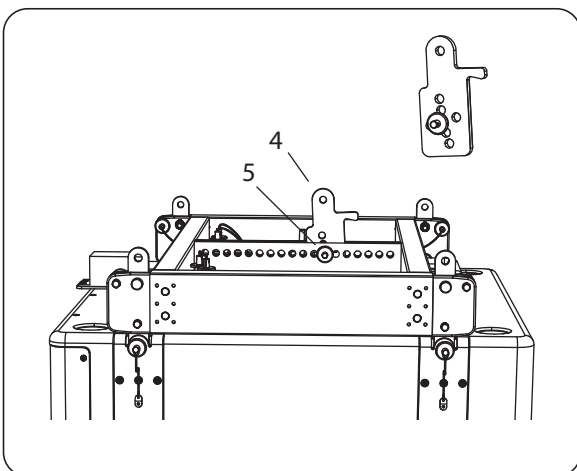
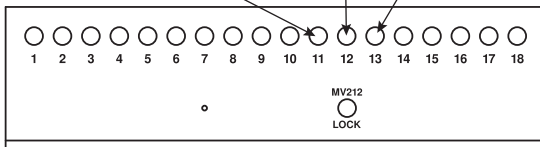
For the hole marked -1 degree, use Hole 13.

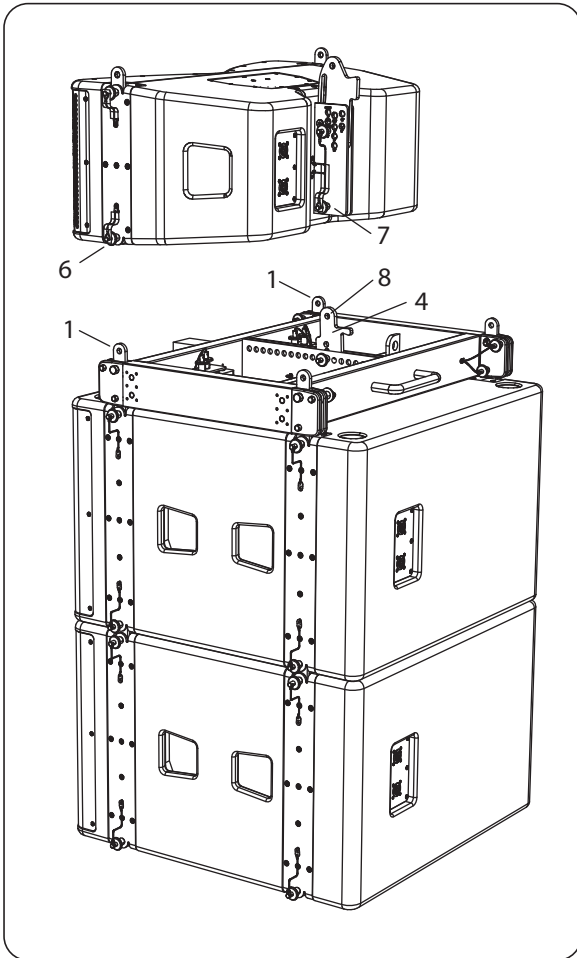
For angle holes marked -6°, -3°, 0°, 3°, and 6°, secure the Ground Stack Plate with a rigging pin in hole 12 of the MAN-FG Spine



For angle 1° use hole 11

For angle -1° use hole 13





5. Prepare the first MV212 cabinet, by pulling out the front lower rigging pins (6), and the rear lower rigging pin (7).
6. Carefully lift the MV212 cabinet until its lower front mounting slots fit over the 2 front links (1) of the MAN-FG fly grid. Reinsert the front pins (6) to secure the MAN-FG fly grid links (1) to the MV212.

Take care not to trap your fingers between components.

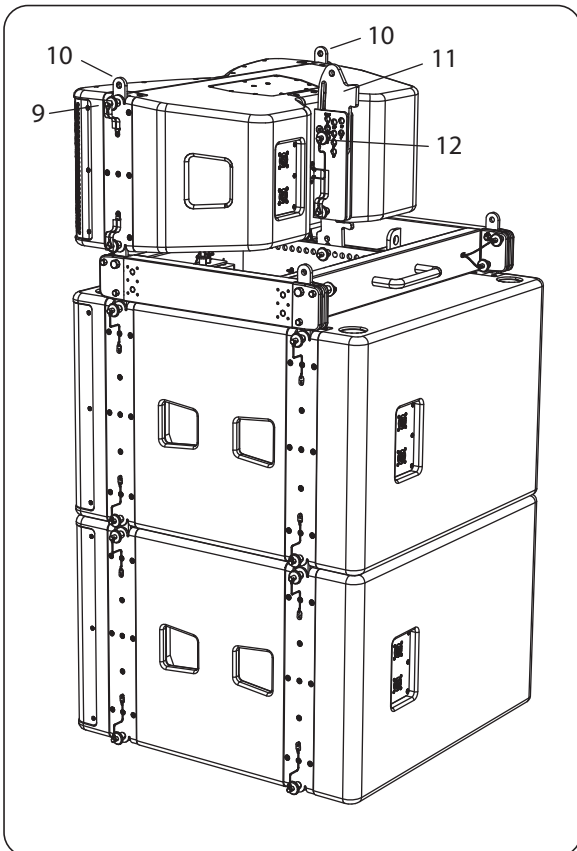


7. Align the MV212 cabinet's rear lower mounting hole with the top hole (8) in the ground stack plate (4). Reinsert the rear pin (7) to secure the rear of the MV212 to the ground stack plate.

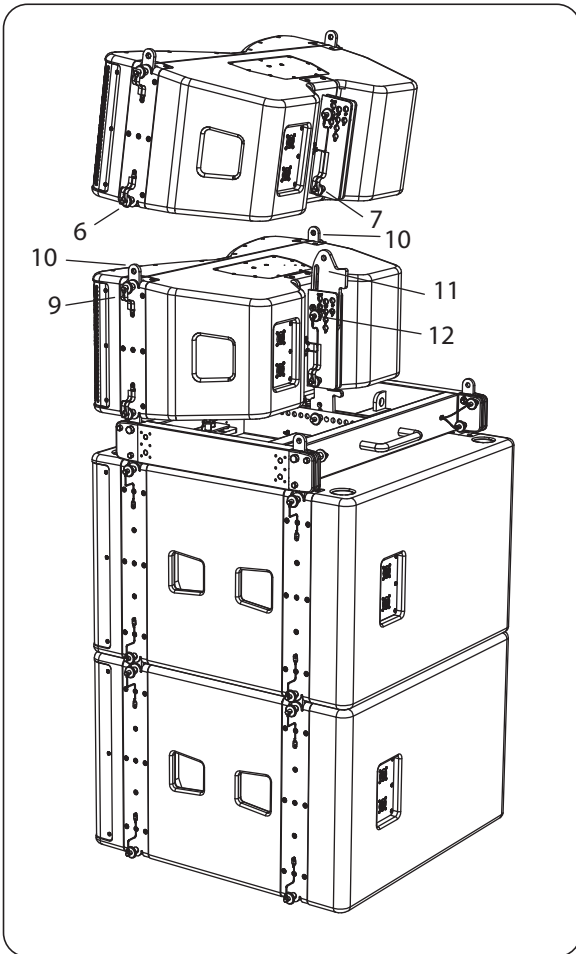
Double check that all pins are correctly inserted, before proceeding further.



8. Prepare the lower MV212 for the next MV212 cabinet, by pulling out the 2 front upper rigging pins (9). The spring-loaded top links (10) will move to the up position. Reinsert the pins (9) to secure the links in the up position.
9. Pull out the rear upper rigging pin (12), and slide the MV212's rear mounting plate (11) upwards and reinsert the rigging pin (12) into one of the available holes. Each hole is marked with an angle; choose the hole which matches the angle you want to set the next MV212.



## Procedure 7.1 - continued



10. Prepare the next MV212 cabinet, by pulling out the front lower rigging pins (6), and the rear lower rigging pin (7). (See step 5.)
11. Carefully lift the MV212 cabinet until its lower front mounting slots fit over the links (10) of the lower MV212. Reinsert the front pins (6) to secure the links (10) to the lower MV212.

Take care not to trap your fingers between components.



12. Align the upper MV212 cabinet's rear lower mounting hole with the top hole in the lower MV212's rear mounting plate (11). Reinsert the rear pin (7) to secure the rear of the upper MV212 to the rear mounting plate of the lower MV212.

Double check that all pins are correctly inserted, before proceeding further.



13. The addition of other MV212 cabinets is performed by repeating procedure steps 8 through 12 for each additional cabinet.

Double check all the connections to make sure that the MS215 subwoofer and MV212 cabinets are all securely connected together.

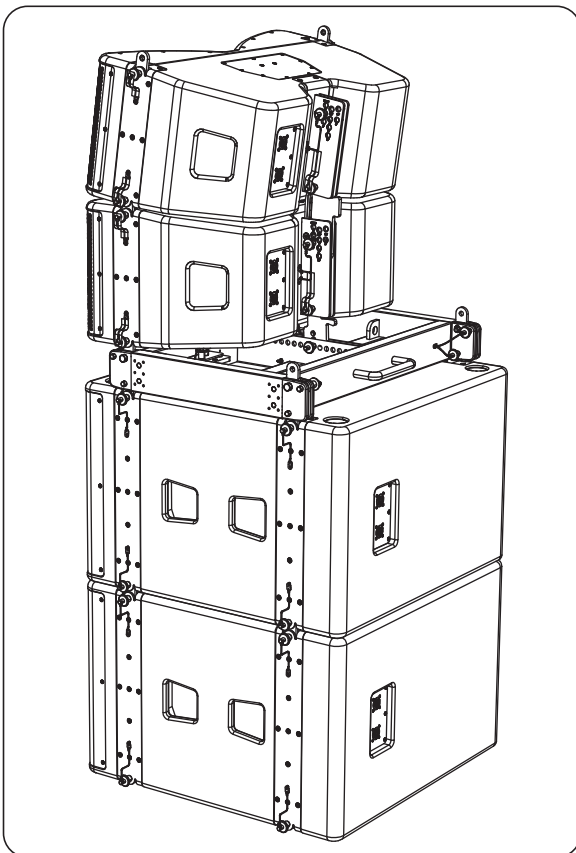


### WARNING

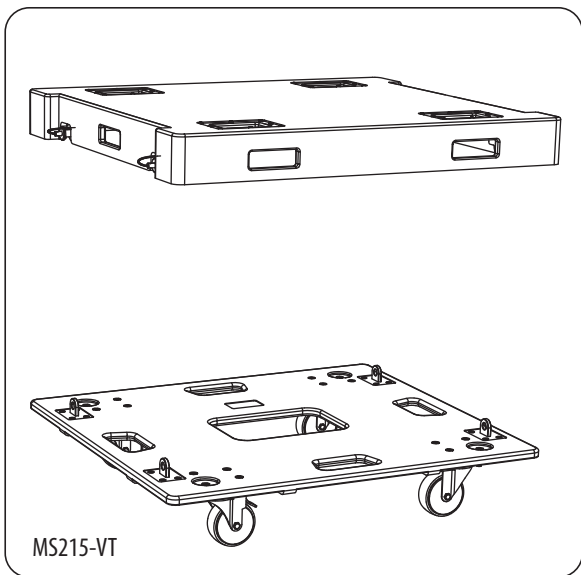
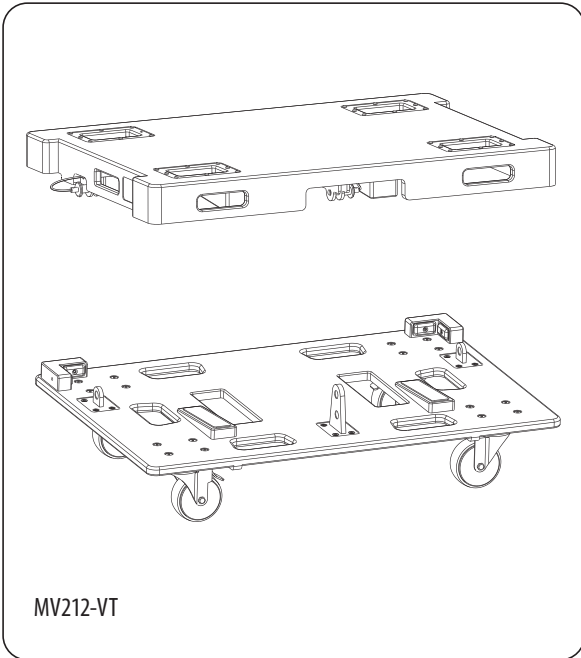
DO NOT EXCEED A TOTAL QUANTITY OF 6 MV212 CABINETS FOR THIS GROUNDSTACK CONFIGURATION. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

### NOTE

Disassembly is the reverse of assembly.



## Chapter 8: MV212-VT and MS215-VT Vertical Transporters



### 8.0.1 Required Components

Item	Quantity
MS215 -VT	1
MS215	3 (maximum)
MV212-VT	1
MV212	4 (maximum)

### 8.0.2 Location

The MS215-VT and MV212-VT vertical transports should be located on a flat, horizontal, and dry surface, capable of supporting the weight of the complete assembly. The wheels should be locked during the addition of cabinets.

### 8.0.3 Measured Weights

Item	Quantity	Weight
MS215 -VT	1	31.6 kg 69.7 lbs
MV212-VT	1	24.7 kg 54.5 lbs

The MS215-VT allows a stack of up to 3 MS215 subwoofers to be transported and stored securely, and moved into position for flying.

The MV212-VT allows a stack of up to 4 MV212 cabinets to be transported and stored securely, and moved into position for flying.

The MS215 subwoofers are assembled onto the MS215-VT and are secured using quick release pins.

The MV212 cabinets are assembled onto the MV212-VT and are secured using quick release pins.

The following procedures describes how to assemble the MS215 subwoofers onto the MS215-VT, and the MV212 cabinets onto the MV212-VT.



#### WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 4 MV212 CABINETS FOR EACH MV212-VT. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.



#### WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 3 MS215 CABINETS FOR EACH MS215-VT. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

### 8.0.4 Personnel

The following procedures shall be undertaken by experienced, certified, qualified, and authorised personnel only. The procedures require the use of three or more authorised persons.



Protective Headwear shall be worn



Protective Footwear shall be worn



Protective Gloves shall be worn

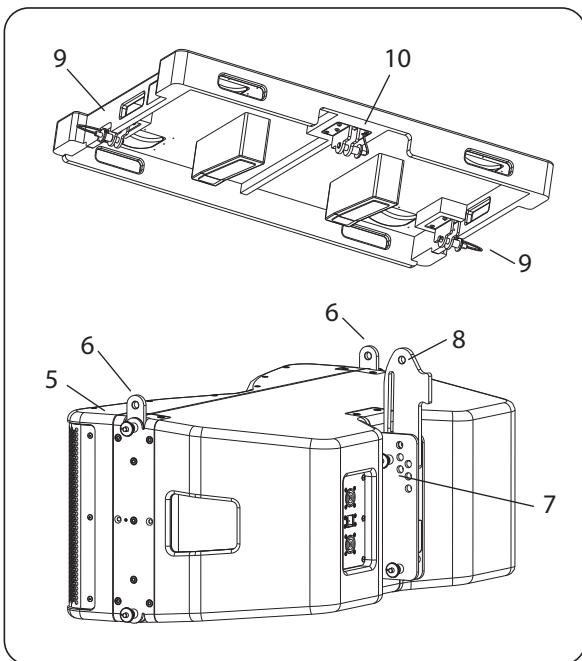
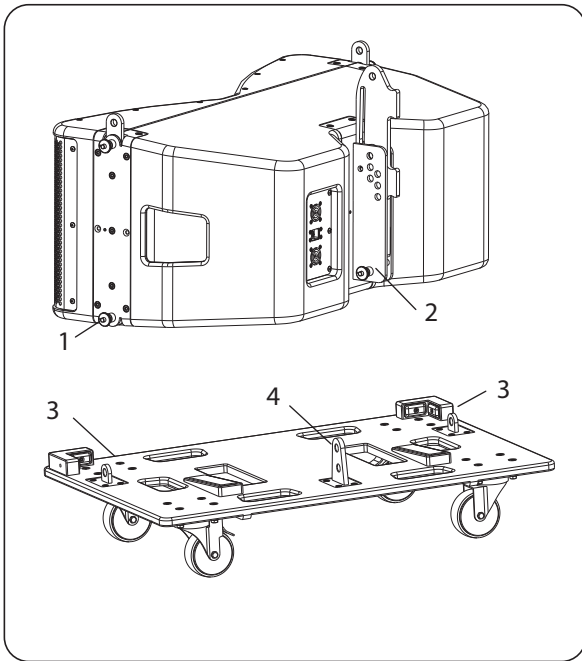


Protective Eyewear shall be worn



Practice Safe Lifting

## 8. 1 Attaching MV212 cabinets to the MV212-VT



1. Prepare the first MV212 cabinet, by pulling out the front lower rigging pins (1), and the rear lower rigging pin (2).
2. Carefully lift the MV212 cabinet until its lower front mounting slots fit over the 2 front mounting links (3) of the MV212-VT. Reinsert the front pins (1) to secure the MV212-VT mounting links (3) to the MV212.

Take care not to trap your fingers between components.



3. Align the MV212 cabinet's rear lower mounting hole with the top hole in the MV212-VT rear mounting link (4). Reinsert the rear pin (2) to secure the rear of the MV212 to the MV212-VT rear mounting link.

Double check that all pins are correctly inserted, before proceeding further.



4. Other MV212 cabinets can be added to the first cabinet, using the same procedure as shown in the section on ground stacking.

Make sure the angles are all set at zero degrees as indicated by the angle markings on the rear mounting plate of each MV212.



5. When the last cabinet has been added, the top lid of the MV212-VT can be added as follows, to protect the cabinets.
6. Prepare the top MV212 cabinet for attaching the top lid of the MV212-VT, by pulling out the 2 front upper rigging pins (5). The spring-loaded top links (6) will move to the up position. Reinsert the pins (5) to secure the links (6) in the up position.
7. Pull out the rear upper rigging pin (7), and slide the MV212's rear mounting plate (8) upwards and reinsert the rigging pin (7) into the zero degrees hole.
8. Pull out the rigging pins (9 and 10) from the top lid of the MV212-VT.
9. Lower the top lid onto the top of the upper MV212 cabinet and carefully align it so the mounting positions in the top lid fit over the MV212 top links (6) and the rear mounting plate (8).
10. Reinsert the front pins (9) to secure the front links (6) to the top lid. Reinsert the rear pin (10) to secure the rear mounting plate (8) to the top lid.

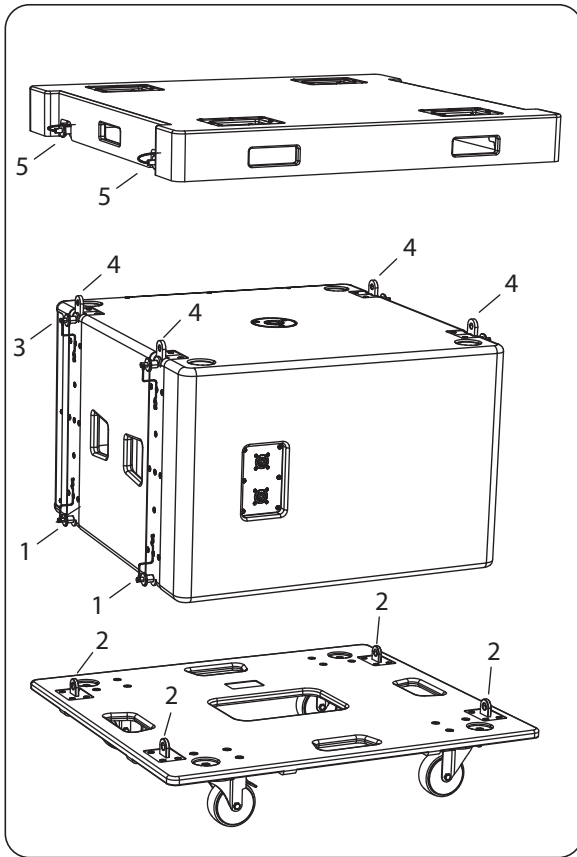
Double check that all pins are correctly inserted.



### WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 4 MV212 CABINETS FOR EACH MV212-VT. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

## 8. 2 Attaching MS215 subwoofers to the MS215-VT



1. Prepare the first MS215 subwoofer, by pulling out the 4 lower rigging pins (1).
2. Carefully lift the MS215 subwoofer until its mounting slots fit over the 4 mounting links (2) of the MS215-VT. Reinsert the pins (1) to secure the subwoofer cabinet to the mounting links (2).

Take care not to trap your fingers between components.



Double check that all pins are correctly inserted, before proceeding further.



3. Other MS215 subwoofers can be added on top of the first subwoofer, using the same procedure as shown in the section on ground stacking.
4. When the last subwoofer has been added, the top lid of the MS215-VT can be added as follows, to protect the subwoofers.
5. Prepare the top MS215 subwoofer by pulling out the 4 upper rigging pins (3). The spring-loaded top links (4) will move to the up position. Reinsert the pins (3) to secure the links (4) in the up position.
6. Pull out the 4 rigging pins (5) from the top lid of the MS215-VT.
7. Lower the top lid onto the top of the upper MS215 subwoofer and carefully align it so the mounting positions in the top lid fit over the MS215 top links (4).
8. Reinsert the pins (5) to secure the top lid to the subwoofer.

Double check that all pins are correctly inserted.



### WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 3 MS215 SUBWOOFERS FOR EACH MV212-VT. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.



## Chapter 9: Safety Inspection



The following notes must be read and followed before suspending the systems or ground stacking:

### Cabinets

Inspect all cabinets carefully and make sure that all surfaces are clean, in good condition, and free from cracks, corrosion, or any other defects that may weaken the assembly. Check for any missing screws, rigging pins, pop up links, mounting links, or pivot pins.

All cabinets must be clean and dry, and free from any debris that might cause incorrect or faulty operation.

Check that all mounting holes are clean and in good condition, and will accept the rigging pins correctly.

### Fly Grid

Inspect the fly grid carefully and make sure it is in good condition and free from cracks, corrosion, or any other defects that may weaken the assembly. Check for any missing rigging pins, or mounting links.

Check that all mounting holes are clean and in good condition, and will accept the rigging pins correctly.

### Rigging Pins

Inspect all rigging pins carefully and make sure they are in good condition and free from cracks, corrosion, or any other defects that may weaken them.

Check that the retaining ball bearings are present and operate correctly.

Check that all rigging pins and connecting mounting links are correctly and fully inserted.

### Mounting Links

Inspect all pop up links, mounting links and pivot pins carefully and make sure they are in good condition and free from cracks, corrosion, or any other defects that may weaken them.

Check that the retaining pivot pins are present and operate correctly to retain the mounting links.

### Care and Maintenance

In addition to regular inspections, make sure that all equipment is kept clean and dry by careful brushing and wiping down with a clean dry cloth. Light use of lubrication such as WD40 may be applied to the rigging pins and mounting holes.

All equipment must be stored in a clean and dry state to prevent corrosion.

### Transportation

Use only recommended road cases to transport the loudspeakers and components.

### Regularly Scheduled Inspections



In addition to the visual inspection of all rigging components, regular, more rigorous test and inspection of rigging components must also be carried out. Safety legislation and test and inspection requirements will vary from country to country. In most cases, semi-annual or annual independent test and inspection by a suitably approved and qualified inspector will be required. Users must ensure compliance with all applicable safety requirements. Turbosound recommends regular safety inspections, and further recommends that a logbook be kept detailing the test and inspection history of each Turbosound rigging accessory. Always wear protective head-wear, footwear and eye protection in accordance with local regulations. Anyone involved in suspending ANY sound system should take note of the following advice:

The rigging of a suspended sound system may be dangerous unless undertaken by qualified personnel with the required experience and certification to perform the necessary tasks. Fixing of hanging points in a roof should always be carried out by a professional rigger and in accordance with the local rules of the venue. The house rigger and/or building manager must always be consulted.

## Chapter 10: Enclosure quantities and combinations for MAN-FG fly grid suspension at 10:1, 7:1, and 5:1 design factors

Maximum allowed MV212 and MS215 enclosure quantities and combinations for suspension using MAN-FG Fly Bar at 10:1, 7:1 and 5:1 design factors.

### MAN-FG Working Load Limit W.L.L

Suspension	W.L.L with a 10:1 Safety Factor
3 Point System : MV212 / MV212-XV	Attaching the MS215 Subwoofer to the MAN-FG fly grid
4 Point System : MS215	1009 kg / 2224 lbs

### Measured Weights

Item	Measured Weight
MV212	53 kg
MV212-XV	50 kg
MS215	83 kg
MAN-FG with Tip Bar	53 kg

### MV212 Arrays

Safety Factor	Qty	MV212 Weights kg	Description
10 to 1	1	53	
10 to 1	2	106	
10 to 1	3	159	
10 to 1	4	212	
10 to 1	5	265	
10 to 1	6	318	
10 to 1	7	371	
10 to 1	8	424	
10 to 1	9	477	
10 to 1	10	530	
10 to 1	11	583	
10 to 1	12	636	
10 to 1	13	689	
10 to 1	14	742	
10 to 1	15	795	
10 to 1	16	848	Maximum quantity at 10:1
7 to 1	17	901	
7 to 1	18	954	
7 to 1	19	1007	
7 to 1	20	1060	
7 to 1	21	1113	
7 to 1	22	1166	Maximum quantity at 7:1
5 to 1	23	1219	
5 to 1	24	1272	Maximum quantity at 5:1

**MS215 Arrays**

Safety Factor	Qty	MS215 Weights kg	Description
10 to 1	1	83	
10 to 1	2	166	
10 to 1	3	249	
10 to 1	4	332	
10 to 1	5	415	
10 to 1	6	498	
10 to 1	7	581	
10 to 1	8	664	
10 to 1	9	747	
10 to 1	10	830	
10 to 1	11	913	
10 to 1	12	996	Maximum quantity at 10:1
7 to 1	13	1079	
7 to 1	14	1162	
7 to 1	15	1245	
7 to 1	16	1328	
7 to 1	17	1411	
7 to 1	18	1494	Maximum quantity at 7:1

**Mixed Array Examples****Example A: 8 x MV212 and 6 x MS215****Safety Factor = 10:1**

Qty of MV212	MV212 Weights kg	Qty of MS215	MS215 Weights kg
1	106	1	83
2	159	2	166
3	212	3	249
4	265	4	332
5	318	5	415
6	371	6	498
7	424		
8	477		
TOTAL WEIGHT = 975 kg			

Note: 2nd MAN-FG Fly Grid must be included in total weight load on 1st MAN-FG

**Example B: 12 x MV212 and 3 x MS215****Safety Factor = 10:1**

Qty of MV212	MV212 Weights kg	Qty of MS215	MS215 Weights kg
1	106	1	83
2	159	2	166
3	212	3	249
4	265		
5	318		
6	371		
7	424		
8	477		
9	530		
10	583		
11	636		
12	689		
TOTAL 938 kg			

Note: 2nd MAN-FG Fly Grid must be included in total weight load on 1st MAN-FG

**Example C: 12 x MV212 and 6 x MS215****Safety Factor = 7:1**

Qty of MV212	MV212 Weights kg	Qty of MS215	MS215 Weights kg
1	106	1	83
2	159	2	166
3	212	3	249
4	265	4	332
5	318	5	415
6	371	6	498
7	424		
8	477		
9	530		
10	583		
11	636		
12	689		
TOTAL 1,187 kg			

Note: 2nd MAN-FG Fly Grid must be included in total weight load on 1st MAN-FG

Local Regulatory Compliance: The design factor and Working Load Limit (WLL) ratings of the Manchester Series suspension system are intended to be in compliance with all known regulatory statutes. Recommendations throughout this manual are based on a 10:1 design factor, however there are variations internationally in the regulations and practices applying to suspension of sound systems in public places and 7:1 or 5:1 design factors may be acceptable. IN ALL CASES, IT IS THE RESPONSIBILITY OF THE USER TO MAKE CERTAIN THAT ANY Turbosound LOUDSPEAKER SYSTEM IS SUSPENDED IN ACCORDANCE WITH ALL APPLICABLE NATIONAL/ FEDERAL, STATE/PROVINCIAL, AND LOCAL REGULATIONS.

# Manufacturer's Declaration

We, Music Tribe Global Brands Ltd.

Music Tribe Global Brands Ltd.  
26th Floor, Centuria Medical Makati Century City  
Makati City, Manila 1200, PH

Do hereby declare that the following components:

MV212 (and variants) Loudspeaker Cabinets  
MS215 Subwoofer Cabinets  
MAN-FG Fly Grid  
Tip Bar, Single Point Shackle Plate, Ground Stack Plate

are in compliance with the relevant fundamental safety and health criteria of the applicable EC Directive(s).

This declaration is void if unauthorised modifications are made to the equipment.

## National standards and technical specifications applied:

### DIN EN ISO 12100

Safety of machinery - General principles for design - Risk assessment and risk reduction

### BGV C1 (superseded by DGUV reg 17)

Accident-prevention regulation, "Staging and Production Facilities for the Entertainment Industry"

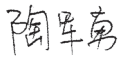
### ANSI E1.8 2018

Entertainment Technology—Loudspeaker Enclosures Intended for Overhead Suspension—Classification, Manufacture and Structural Testing

### 2006/42/EC

Machinery Directive

## The person responsible for making this declaration:



Jun Yong. Tao  
(Senior Engineer)

Date: 2019-10-23

Music Tribe Global Brands Ltd.  
26th Floor, Centuria Medical Makati Century City  
Makati City, Manila 1200, PH

