

MANCHESTER SERIES

MAN210-FG

Universal Fly Grid for MANCHESTER MV210-HC Array Elements and MS121 subwoofers

MS121

Single 21" Front Loaded Subwoofer for Touring and Install Applications

MV210-HC

Full Size Dual 10" Hybrid Curve Element for Install and Touring

MS121-VT

Vertical Transporter for MANCHESTER MS121 Subwoofer elements

MV210-VT

Vertical Transporter for MANCHESTER MV210-HV array elements



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 regularly and check for any updates to this manual.

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EN Safety Instruction

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. Use only attachments/accessories specified by the manufacturer.



10. 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.



11. 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.

12. Do not install in a confined space, such as a book case or similar unit.
13. Do not place naked flame sources, such as lighted candles, on the apparatus.

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 community.musictribe.com/pages/support#warranty.

Chapter 1: Safety Information

1.1 Intended Use

The rigging components (MAN210-FG fly grid, rigging pins, mounting links) shall only be used in conjunction with Turbosound MV210-HC loudspeakers and MS121 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 MV210-HC loudspeaker cabinets, MS121 subwoofers, and the MAN210-FG fly grid, in readiness for suspending or ground stacking.

These instructions shall only be used with the MV210-HC, MS121, and MAN210-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 MAN210-FG fly grid is designed to suspend a maximum of 12 x MV210-HC or 9 x MS121 on a 10:1 safety factor, and Mixed arrays of 5 x MS121 and 8 MV210-HC on a 10:1 safety factor. Use EASE FOCUS 3 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 11. Check local regulations in order to comply with regional design factor requirements.

Always refer to EASE FOCUS 3 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 10 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.

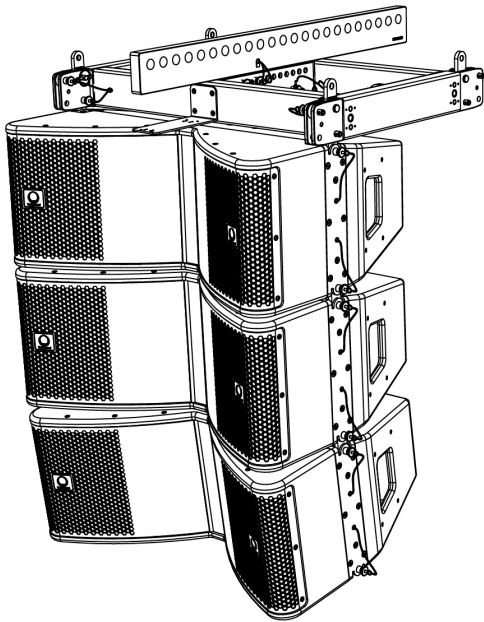
NOTE

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

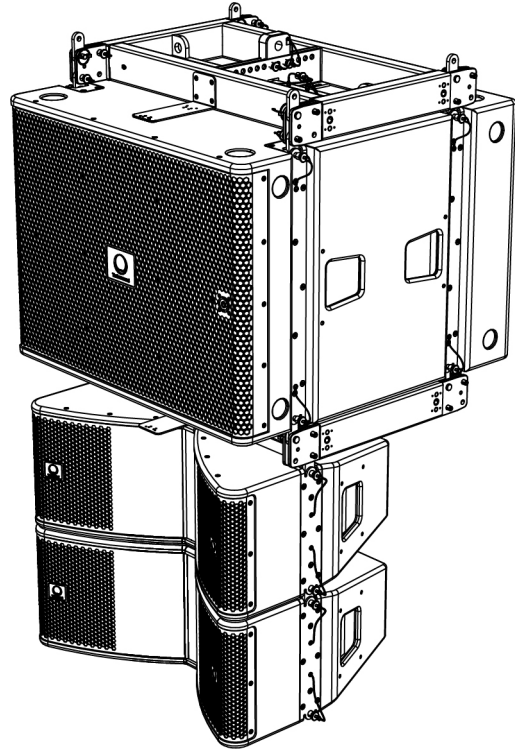
Chapter 2: Introduction

2.1 Typical Configurations

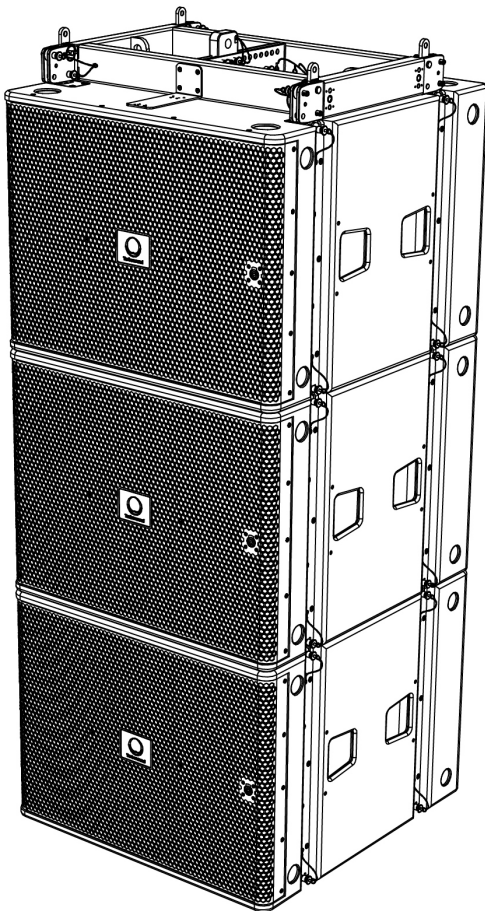
MV210-HC Array (See Chapter 3)



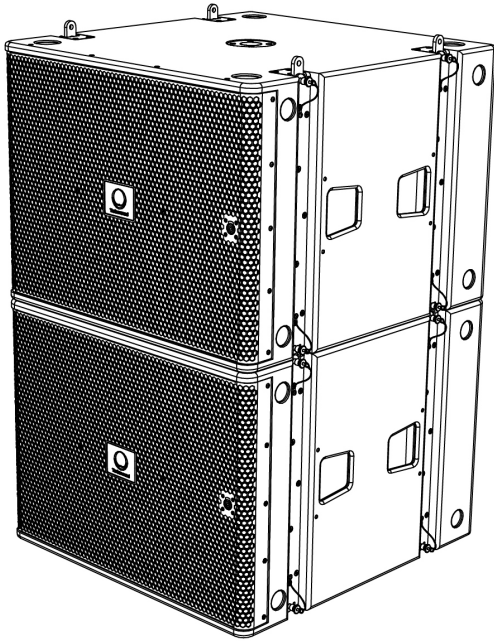
MS121 and MV210-HC Mixed Array (See Chapter 5)



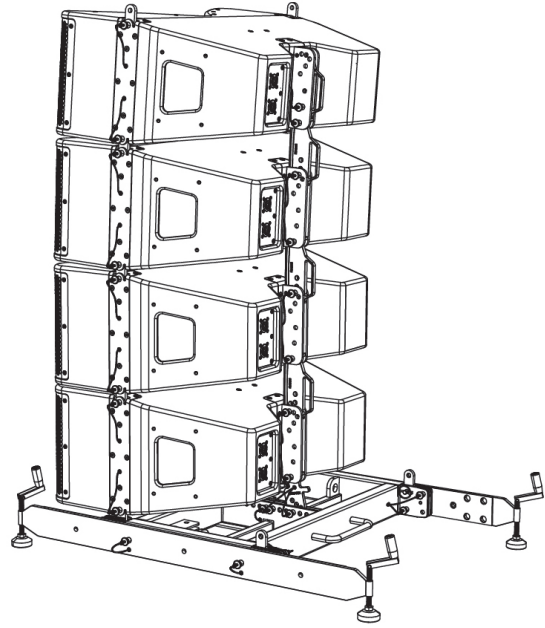
MS121 Array (See Chapter 4)



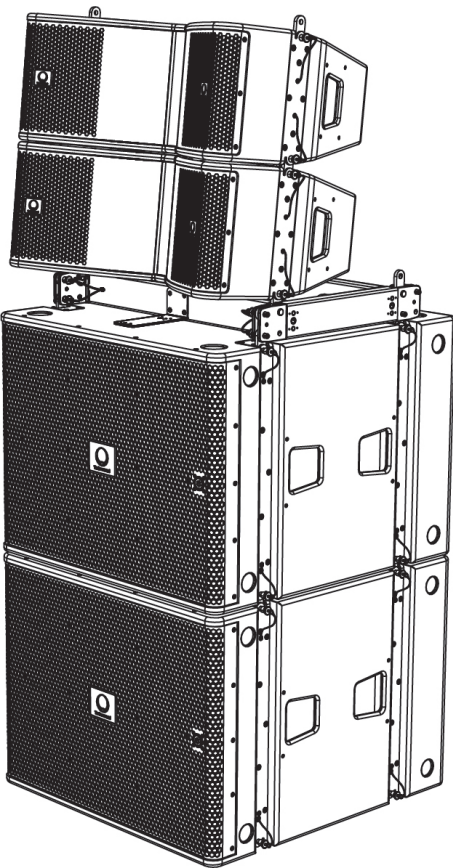
Two MS121 Subwoofer Groundstack (See Chapter 6)



MV210-HC Array Groundstack (See Chapter 8)



MS121 and MV210-HC Groundstack (See Chapter 7)



2.2 Rigging and Acoustic Simulation Software

The EASE FOCUS 3 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 3 software, the angles of each MV210-HC cabinet should be noted, as well as the correct suspension hole on the MAN210-FG fly grid, where your bow shackle would be fitted for single-point suspension. For two-point suspension, pick point holes on the MAN210-FG Tip Bar can be utilized in conjunction with front and rear chain motors to obtain the desired array site angle.

The EASE FOCUS 3 screenshot below is for a typical MV210-HC 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 MV210-HC 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 3 Typical Screenshot for a MV210-HC Array



Full EASE data can be downloaded from 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.

[8 MV210-HC EXAMPLE1.fc3] - EASE Focus 3, Version 3.1.170

File Edit View Help

Turbosound MANCHESTER
MV210-HC MS121

Show Mapping Type: Direct SPL (Z) Frequency: 6300 Hz Bandwidth: 3 Octaves Relative: Avg. ±6 dB Sources: All Sources (2) Areas: All Areas (2)

Object Properties

System Parameters

Setup: Flown Single Shackle Plate
MV210-HC PA L

Position & Orientation

X [m]: 5.00 Ver. [°]: -1.32
Y [m]: -10.00 Hor. [°]: 5.00
Z [m]: 7.00 Height Limit

Rigging Filter Settings

Rigging

Box Count: 8 Auto Splay

Weight: 316.00 kg

Pinpoint: Position Delta [°]: -0.24

5: MV210-HC 0
6: MV210-HC 4°
7: MV210-HC 7.5°
8: MV210-HC 20°

Number of Cabinets per Group: 2

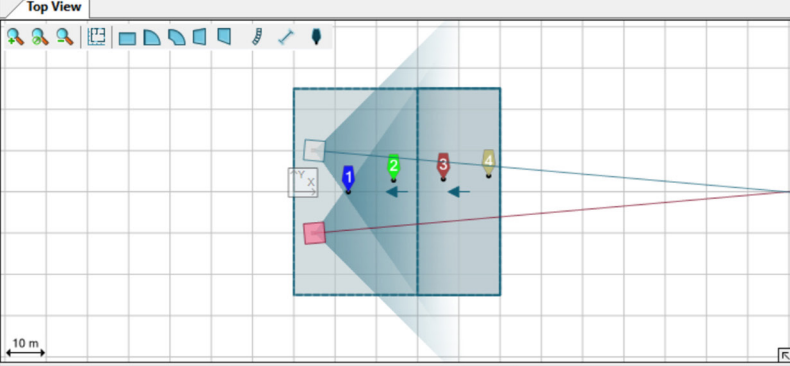
Copy Setup to Other Line Arrays

Show Object List

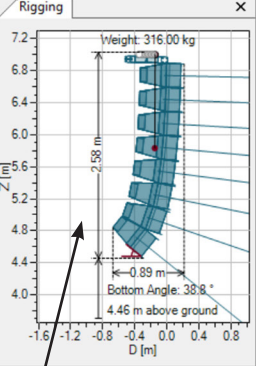
Project Properties Object Properties

X=1.20 m Y=32.52 m

Top View



Rigging



Levels Frequency Response Time Response Distribution Graph Filter Side View Global Filter

MV210-HC PA L

Input Voltage: 44.9 dBV (Max: 44.9 dBV)

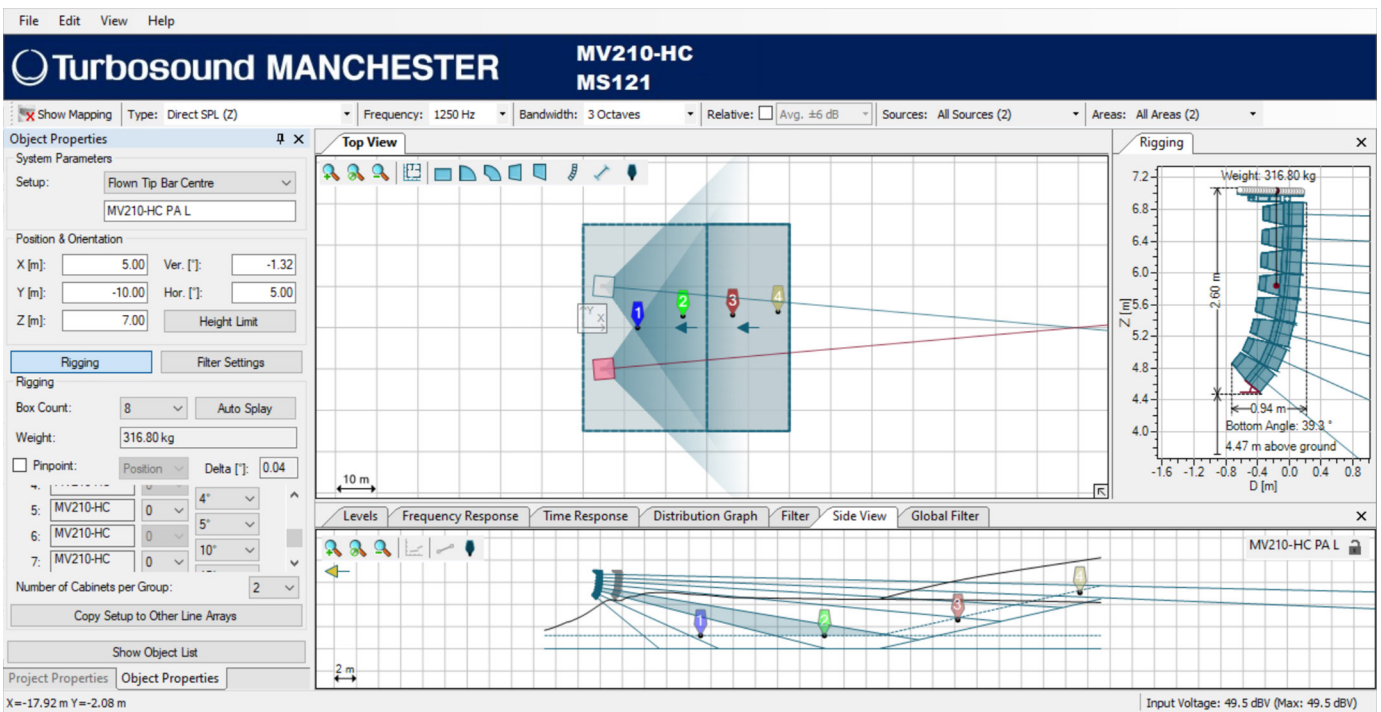
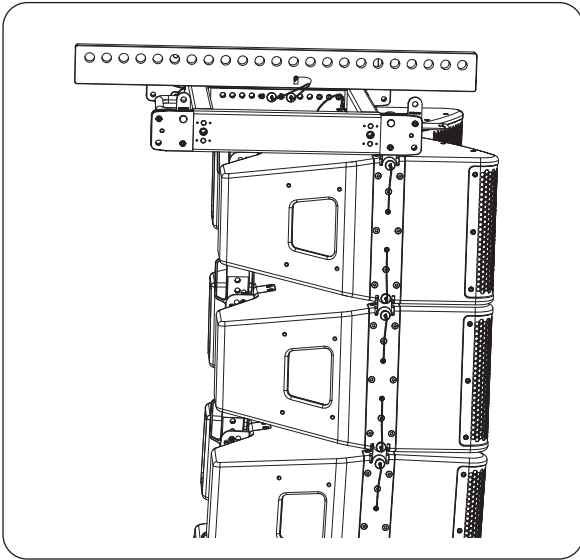
MV210-HC Cabinet Angles

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 MV210-HC x 8, with MAN210-FG Tip Bar Centered

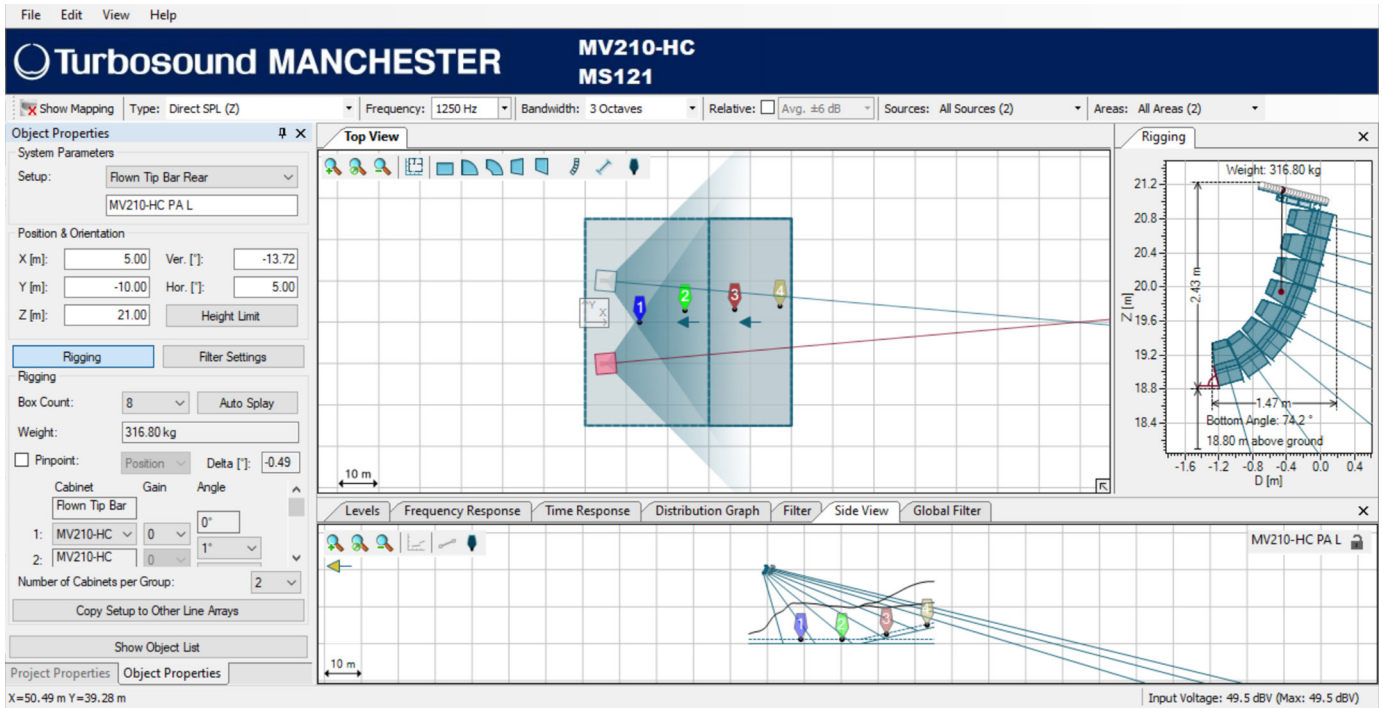
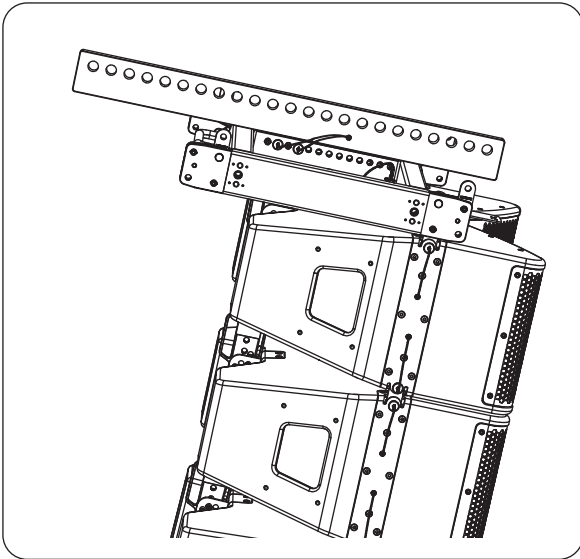
This example uses the Tip Bar mounted in the center position of the MAN FG fly grid.

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 MAN210-FG fly grid.



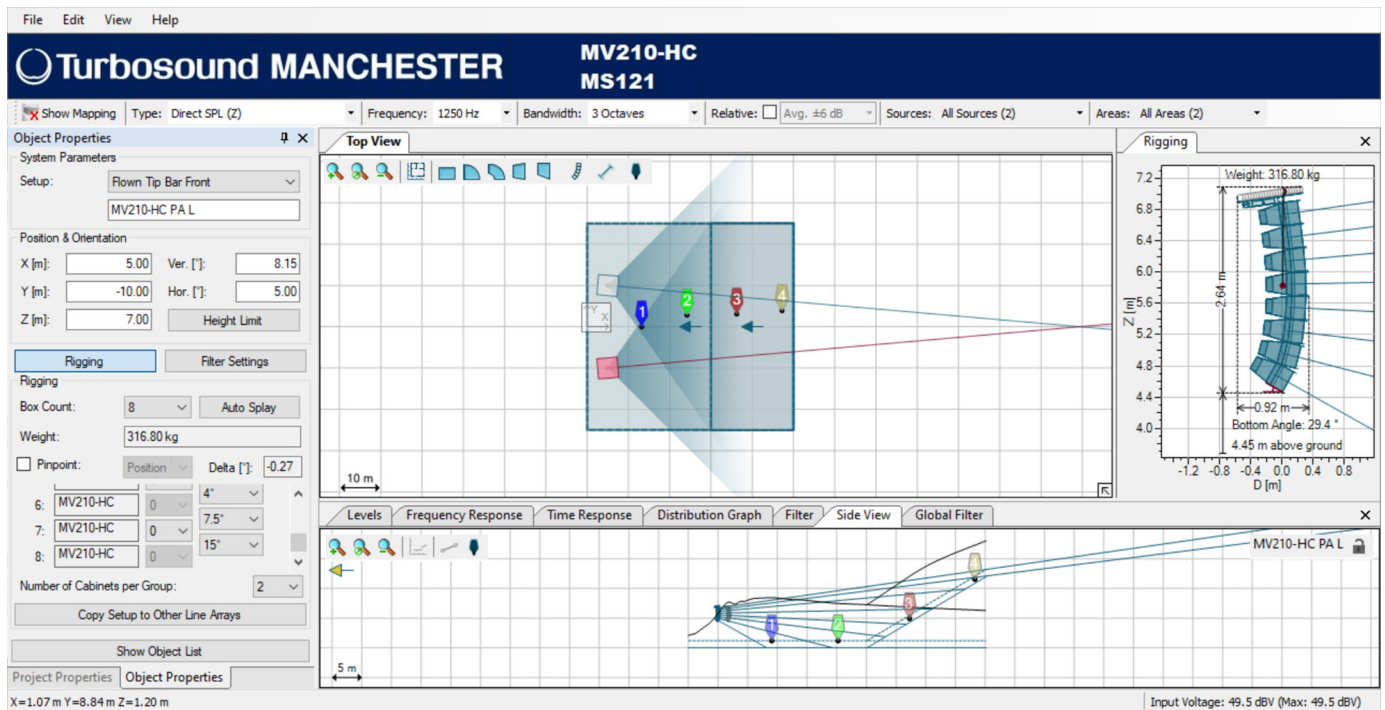
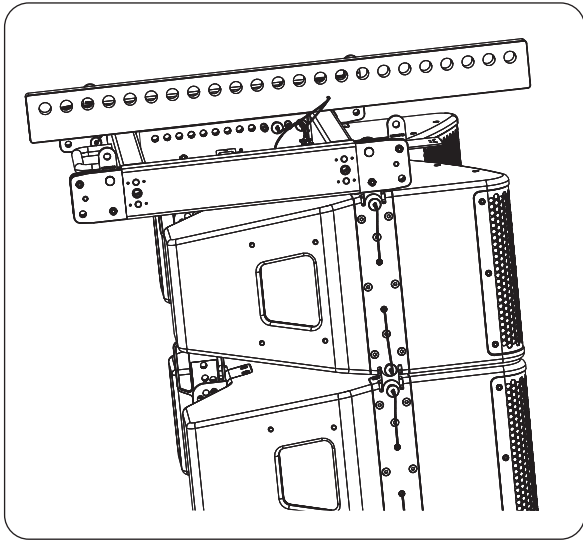
2.2.3 EASE FOCUS 3 example: Array MV210-HC x 8, with MAN210-FG Tip Bar Mounted Rearwards

This example uses the Tip Bar mounted in the rear position on the MAN210-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 MAN210-FG fly grid.



2.2.4 EASE FOCUS 3 example: Array MV210-HC x 8, with MAN210-FG Tip Bar Mounted Forwards

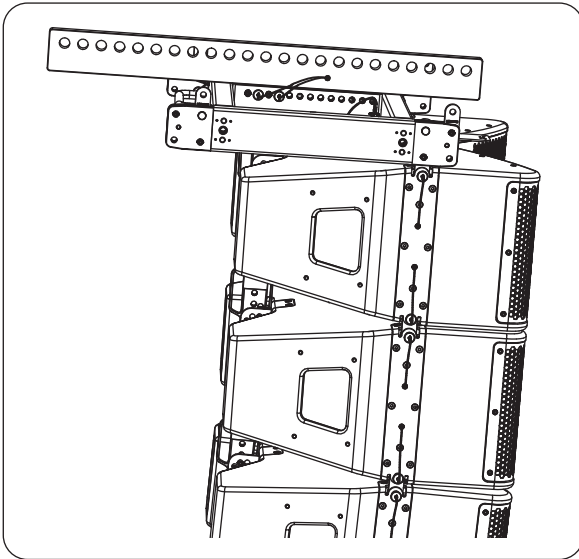
This example uses the Tip Bar mounted in the forward position on the MAN210-FG fly grid. Using the Tip Bar in this position will make the array's Centre of Gravity force the array tilt upwards. All four rigging pins are used to secure the Tip Bar to the MAN210-FG fly grid.



EN

2.2.5 EASE FOCUS 3 example: Array MV210-HC x 15, with MAN210-FG Tip Rearwards

This example uses the Tip Bar mounted in the rear position on the MAN210-FG fly grid. All four rigging pins are used to secure the Tip Bar to the MAN210-FG fly grid. It also shows a warning that the Working Load Limit of the MAN210-FG flygrid has been exceeded (at 10:1)



Turbosound MANCHESTER MV210-HC MS121

File Edit View Help

Show Mapping Type: Direct SPL (Z) Frequency: 6300 Hz Bandwidth: 3 Octaves Relative: Avg. ±6 dB Sources: All Sources (2) Areas: All Areas (2)

Object Properties

X [m]: 5.00 Ver. [°]: -4.00
 Y [m]: 10.00 Hor. [°]: -5.00
 Z [m]: 11.50 Height Limit

Rigging Filter Settings

Box Count: 15 Auto Splay
 Weight: 565.30 kg
 Pinpoint: Positix Delta [°]: -0.10
 MV210-HC 0°
 Number of Cabinets per Group: 2

Copy Setup to Other Line Arrays

Status

⚠ Attention!
 The maximum amount cabinets of only MV210-HC flow system is 26x cabinets (5:1 WLL=990kg).
 The safety amount cabinets of only MV210-HC flow system is 13x cabinets (10:1 WLL=495kg).
 The maximum weight of MV210-HC not exceed 707kg (7:1 WLL).

Project Properties Object Properties
 X=-53.82 m Y=2.60 m

Status

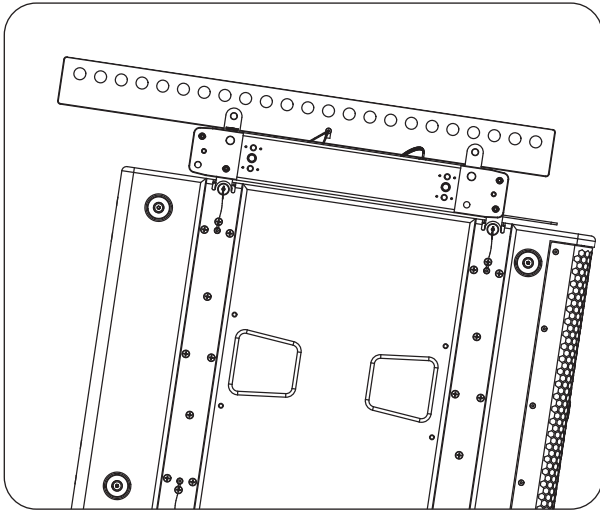
⚠ Attention!
 The maximum amount cabinets of only MV210-HC flow system is 26x cabinets (5:1 WLL=990kg).
 The safety amount cabinets of only MV210-HC flow system is 13x cabinets (10:1 WLL=495kg).
 The maximum weight of MV210-HC not exceed 707kg.(7:1 WLL).

Show Object List

This means the array is now at 7:1 WLL

2.2.6 EASE FOCUS 3 example: Mixed Array MS121 x 3, MV210-HC x 11, with MAN210-FG Tip Bar Mounted Rearwards

This example uses the Tip Bar mounted in the rear position on the MAN210-FG fly grid. All four rigging pins are used to secure the Tip Bar to the MAN210-FG fly grid. It also shows a warning that the Working Load Limit of the MAN210-FG flygrid has been exceeded (at 10:1)

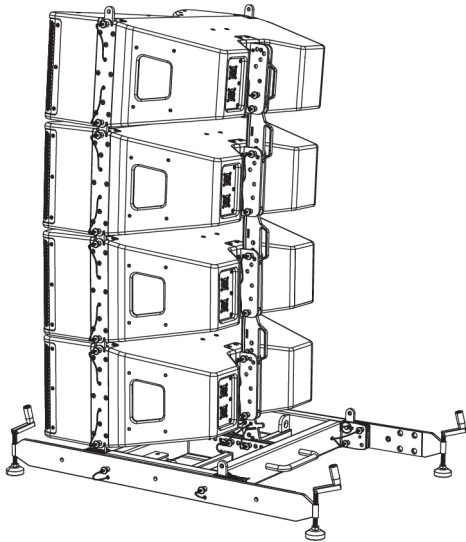


This means the array is now at 7:1 WLL

2.2.7 EASE FOCUS 3 example: Groundstack of MV210-HC x 10, with MAN210-FG and Outriggers

This example shows a groundstack of MV210-HC cabinets on the MAN210-FG fly grid with its outriggers attached.

Warning: Do not physically build the configuration shown in this EASE example, as it has more than 6 MV210-HC cabinets. The number of cabinets has been purposely chosen to be larger than the allowed maximum, in order to show the Warning that EASE FOCUS 3 will give in this situation. Heed all warnings.

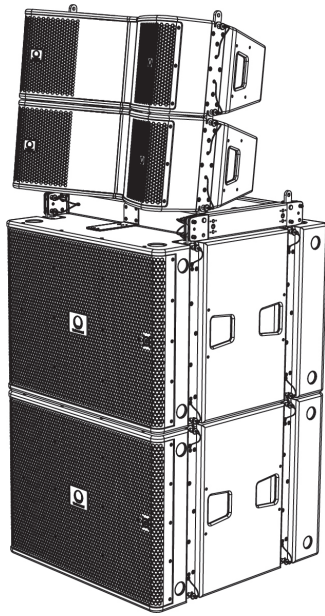


The screenshot displays the EASE FOCUS 3 software interface for a rigging simulation. The main window shows a top view of the groundstack configuration on a grid. The rigging view on the right shows a vertical stack of 10 cabinets with a height of 3.13 m and a diameter of 1.06 m. The status window at the bottom right, highlighted with a red box, displays a warning: "Attention! Not allow exceed 6x cabinets of MV210-HC." The interface also shows various settings and parameters for the simulation, including frequency, bandwidth, and relative levels.

2.2.8 EASE FOCUS 3 example: Mixed Groundstack of MS121 x 3 and MV210-HC x 7, with one MAN210-FG

This example shows a mixed groundstack of MS121 subwoofers, and MV210-HC cabinets on the MAN210-FG fly grid.

Warning: Do not physically build the configuration shown in this EASE example, as it has more than 7 cabinets total. The number of cabinets has been purposely chosen to be larger than the allowed maximum of 7 cabinets total, in order to show the Warning that EASE FOCUS 3 will give in this situation. Heed all warnings.



Status
 ⚠ Attention!
 Not allow exceed 3x cabinets of MS121.
 Not allow exceed 7x cabinets total of MV210-HC and MS121.

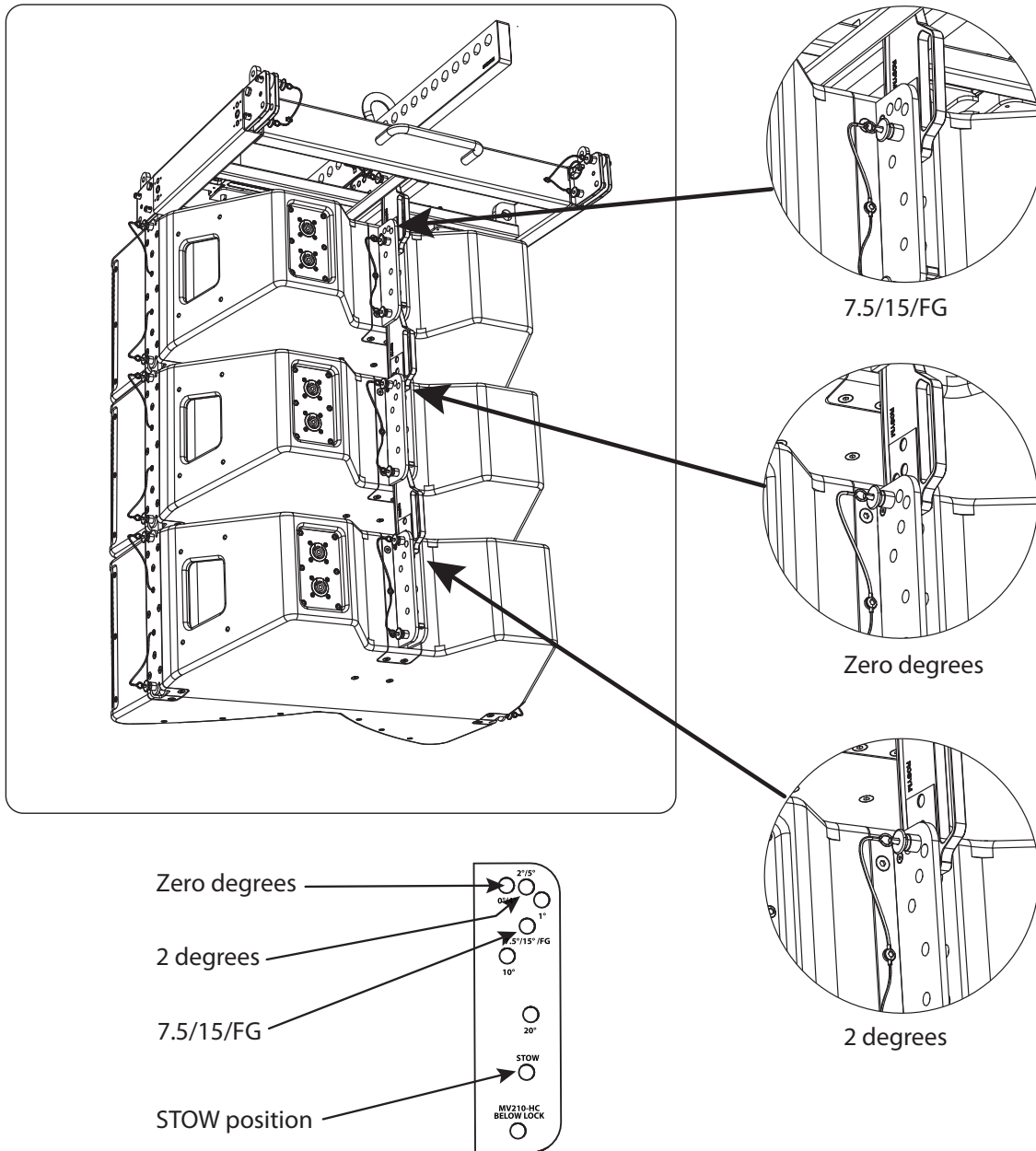
EN

2.3 MV210-HC Cabinet Angles

The angle of each MV210-HC cabinet relative to the cabinet above it, is varied by moving the sliding mount plate and inserting the quick release pin into one of the mounting holes in the rear mounting bracket. These are labeled from 0 to 20 degrees.

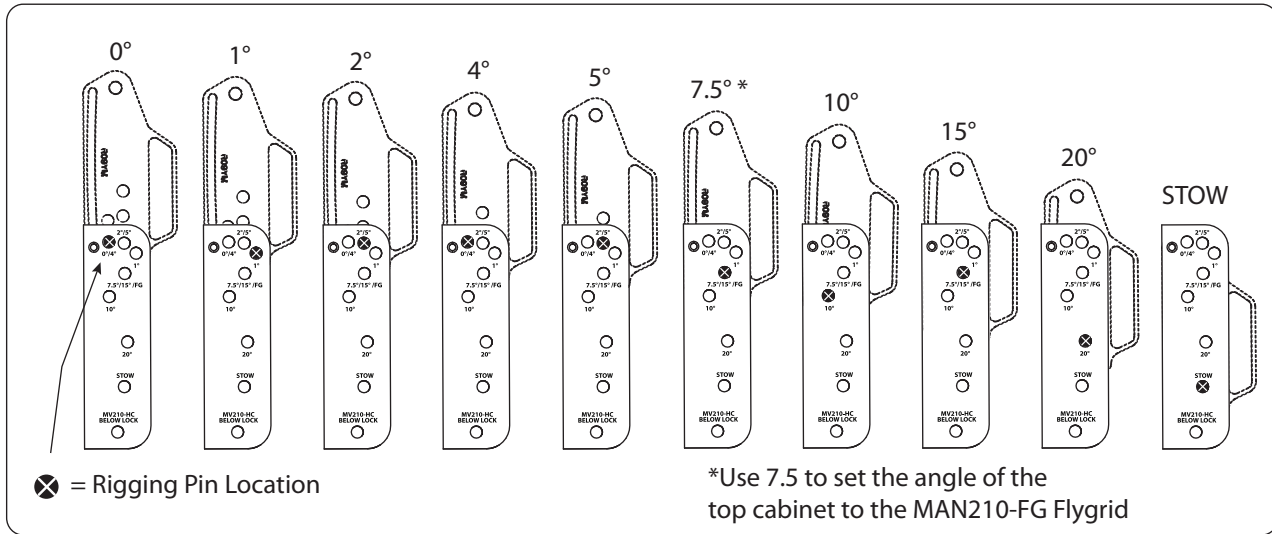
Use the "STOW" position to securely stow the sliding mount plate in the lowest position when not in use.

Note that in an array attached to a MAN210-FG Flygrid, set the top cabinet in the array to be parallel to the MAN210-FG flygrid, by inserting a rigging pin in the 7.5 degree position; it is also marked FG.



2.4 Rigging Pin installation in the MV210-HC rear mounting plate

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



2.5 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.

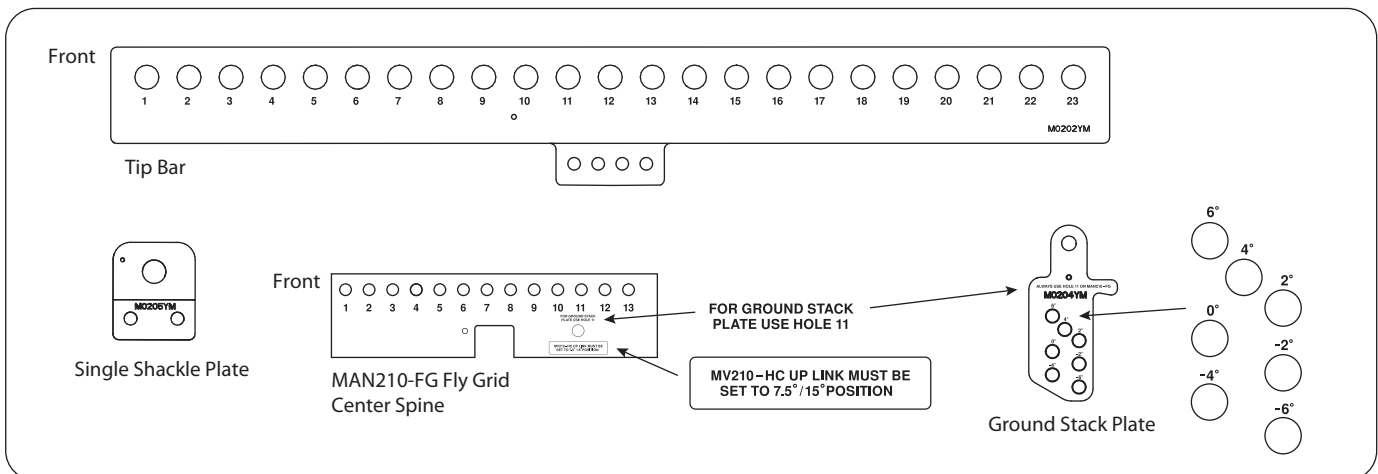
The Tip Bar also has 4 lower mounting holes of 12.5 mm diameter that allow the Tip Bar to be mounted to the center spine of the MAN210-FG fly grid, using 4 captive quick release pins that are attached to the Tip Bar for this purpose (not shown below).

The MAN210-FG fly grid center spine has 13 top holes of 12.5 mm diameter that allow the Tip Bar or the single shackle plate to be attached. Each hole is marked with a number for identification, with number 1 being at the front, and number 13 at the rear.

The MAN210-FG fly grid center spine also has an "MV210-HC LOCK" hole (below the number 11 hole), that allows the rear top mounting plate of the MV210-HC cabinet to be attached for flying. One captive quick release pin is attached to the MAN210-FG fly grid center spine for this purpose (not shown below).

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 MAN210-FG center spine with two captive rigging pins, attached to the single shackle plate for this purpose (not shown below).

The Ground Stack Plate has angle markings as follows: -6, -4, -2, 0, 2, 4, and 6 degrees. It fits into the MAN210-FG fly grid hole marked "11" using a captive quick release pin attached to the MAN210-FG fly grid for this purpose. The top hole of the ground stack plate fits into the rear lower mounting hole of the first MV210-HC cabinet of the ground stack. Choose the appropriate hole of the ground stack plate and secure it to hole 11 of the fly grid with the quick release pin, to set the angle of the first MV210-HC cabinet.



EN

2.6 Weights

Item	Quantity	Weight (kg)	Weight (lbs)
MAN210-FG with Tip Bar and pick points	1	32.8	72.3
MV210-HC	1	35.5	78.3
MS121	1	87.5	192.9

2.7 MAN210-FG Fly Grid Working Load Limit (WLL)

Item	WLL (kg)	WLL (lbs)	DESIGN FACTOR
3 Point Suspension (for MV210-HC)	495	1091.3	10:1
4 Point Suspension (for MS121)	821	1810	10:1

2.8 MAN210-FG Fly Grid Safety Warning Labels

The diagram shows the MAN210-FG fly grid with two safety warning labels and a Turbosound logo label. The labels are as follows:

Warning Label 1:

⚠ CHECK ARRAY SIZE AND LOADING CONDITIONS ACCORDING TO THE MANUAL AND MODELING SOFTWARE.

GSP : 0.4 kg / 0.88 lbs
 SSP : 0.8 kg / 1.76 lbs
 TIP BAR : 11.2 kg / 24.69 lbs
 MAN210-FG : 20.4 kg / 44.97 lbs

Warning Label 2:

SUSPENDING THIS SYSTEM SHOULD ONLY BE DONE BY QUALIFIED PERSONS FOLLOWING SAFE RIGGING PRACTICES

型号 : MAN210-FG 铁制吊架
 制造商 : Music Tribe Commercial MY Sdn. Bhd. 中国制造
 MADE IN CHINA

Music Tribe Brands DK A/S, Gammel Strand 44 DK-1202 København K, Denmark
 Music Tribe Brands UK Ltd, 6 Lloyds Avenue Unit 4CL London EC3N 3AX, United Kingdom
 UK CA CE

Turbosound Label:

Turbosound

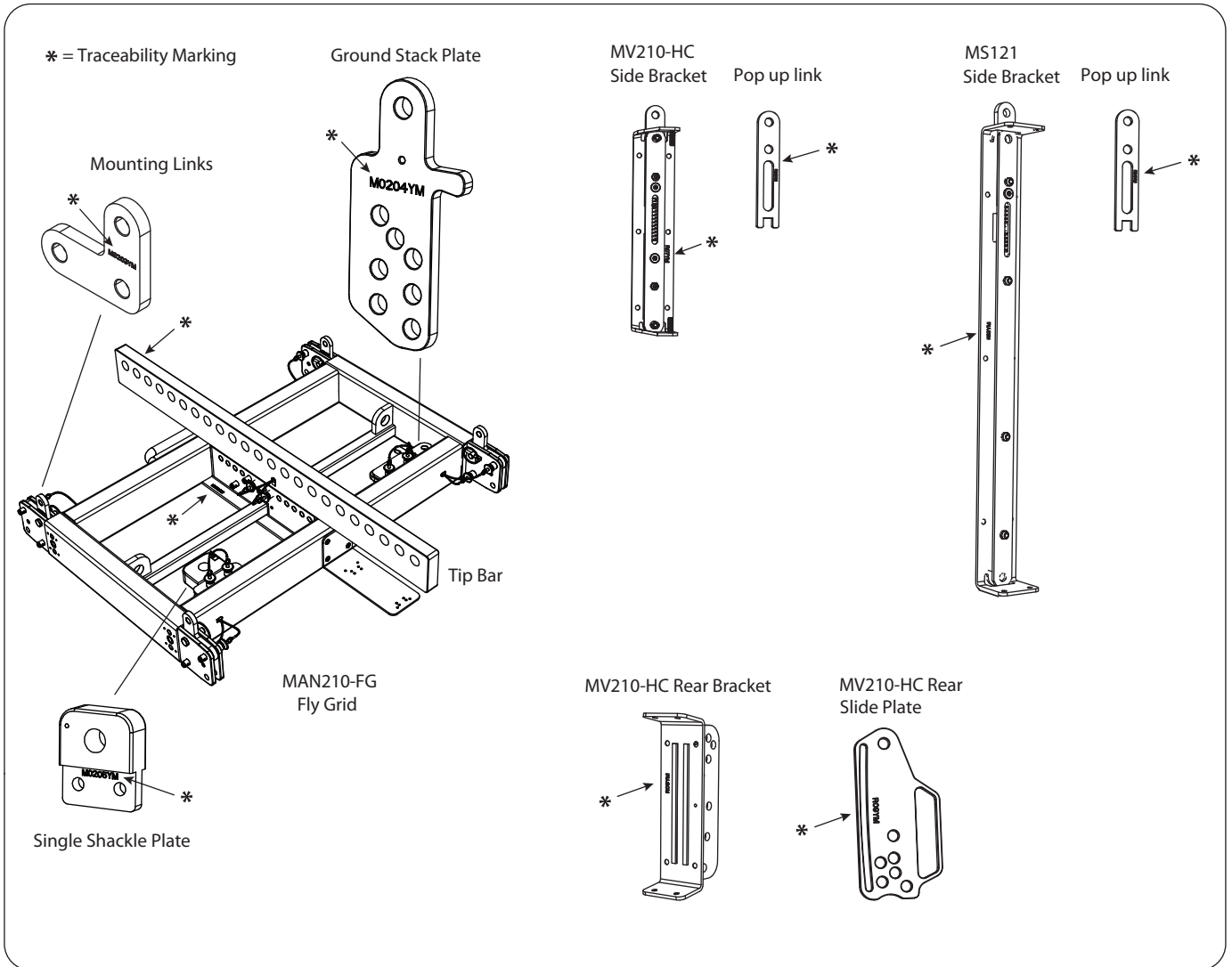
MAN210-FG
 WEIGHT : 32.8 kg / 72.3 lbs.
 3 POINT SYSTEM : MV210-HC W.L.L. 495 kg / 1091.3 lbs.
 4 POINT SYSTEM : MS121 W.L.L. 821 kg / 1810 lbs.

2.9 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.

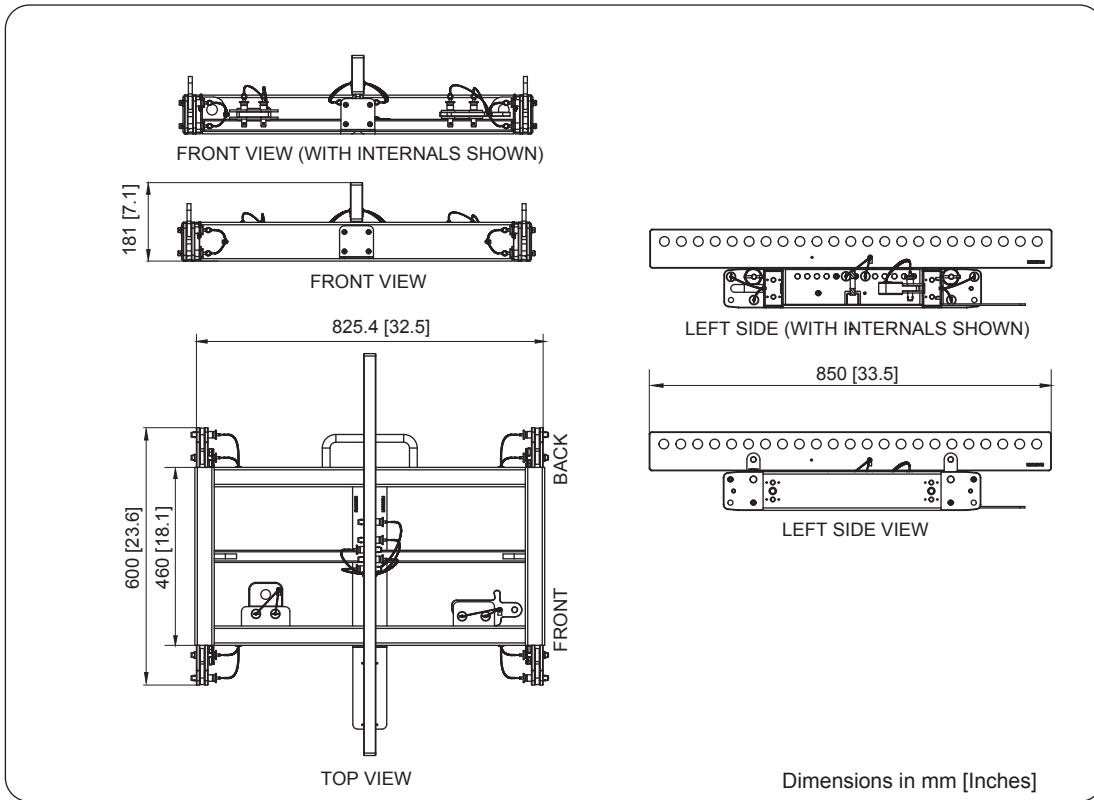
Note: These are not part numbers for ordering spare parts.

Rigging Component Traceability Markings



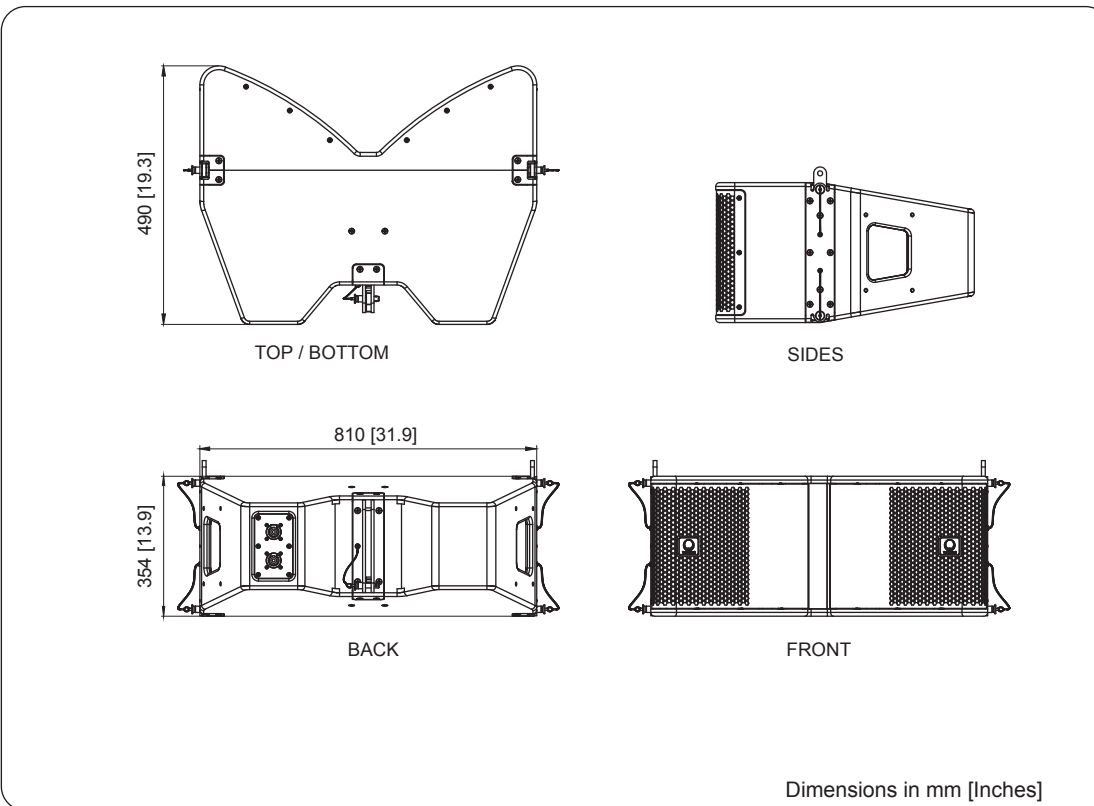
2.10 MAN210-FG Fly Grid Dimensions

See Chapter 10 for information regarding inspection, care, and maintenance.



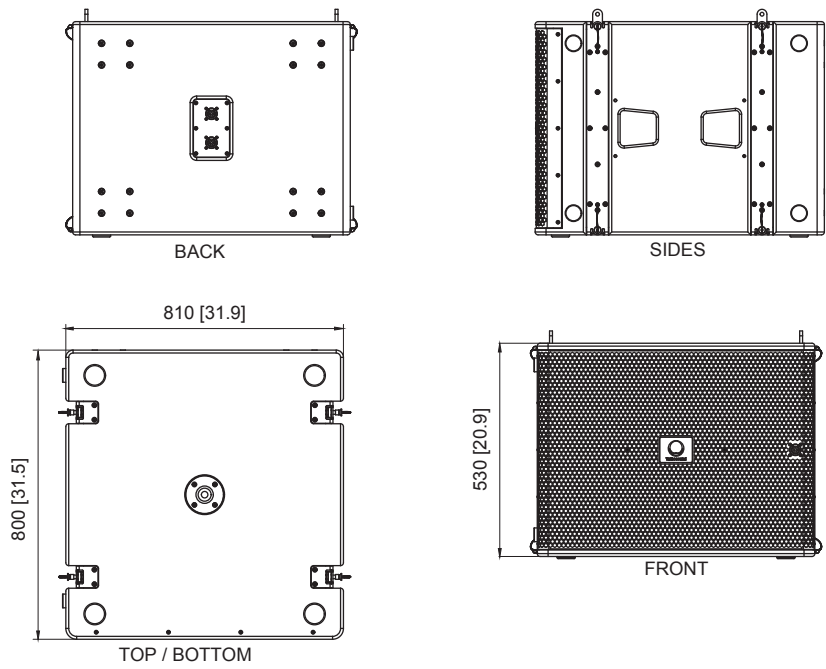
2.11 MV210-HC Cabinet Dimensions

See Chapter 10 for information regarding inspection, care, and maintenance.



2.12 MS121 Subwoofer Dimensions

See Chapter 10 for information regarding inspection, care, and maintenance.

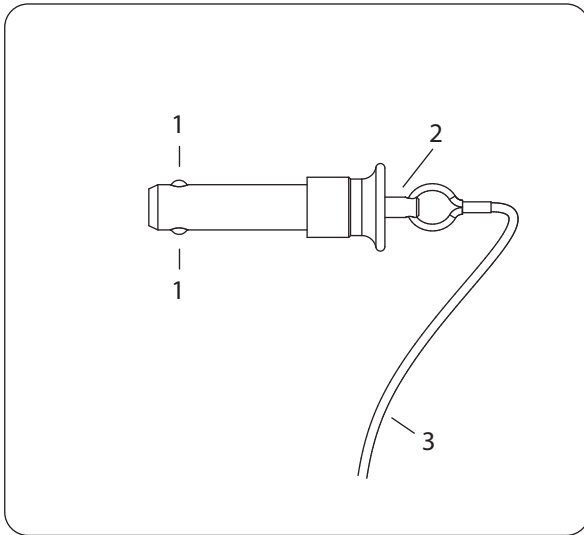


NOTE: Pole mount socket on top of box only

Dimensions in mm [Inches]

2.13 Rigging Pins

See Chapter 10 for information regarding inspection, care, and maintenance.



These quick release pins are the fundamental mechanical fastener for the assembly of the MAN210-FG fly grid, MV210-HC cabinet, and the MS121 subwoofer.

Note: The terms 'pin,' 'rigging pin' and 'quick release pin' are used interchangeably in this manual.

1. **Spring Balls** – These are locking devices that prevent the rigging 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 rigging pin to be inserted into the mounting holes and links. Release this button and the spring balls will lock and prevent the rigging pin from pulling back out.
3. **Lanyard** – These prevent the pins from being easily lost.



WARNING

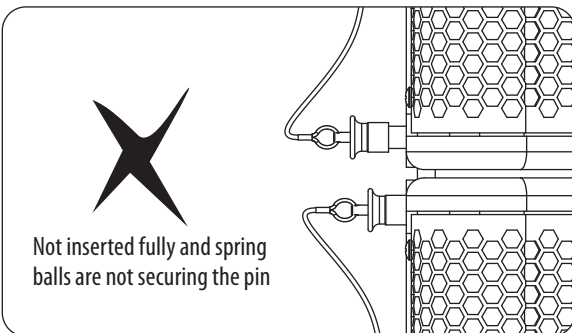
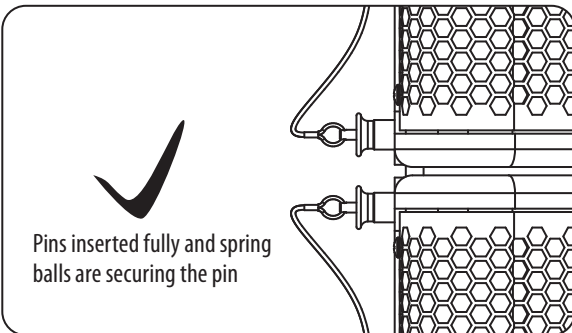
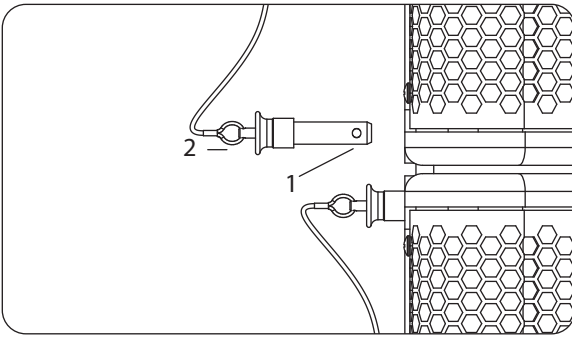
BEFORE EVERY USE, INSPECT ALL PINS FOR DAMAGE, AND VERIFY THE CORRECT OPERATION OF THE SPRING LOCKING MECHANISM. DO NOT USE ANY PINS THAT SHOW SIGNS OF DAMAGE. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.



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 MV210-HC 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.

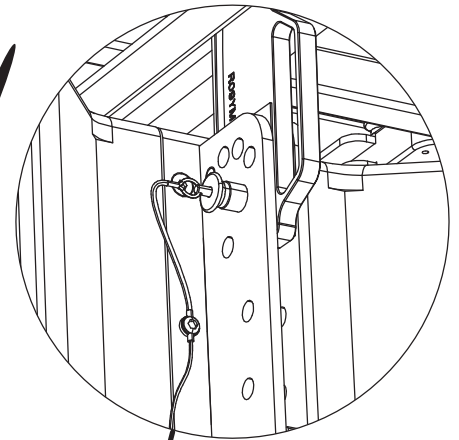
1. Support the weight of the components to be joined.
2. Pull out the lower pin of the top MV210-HC cabinet.
3. Align the top mounting link of the lower MV210-HC cabinet with the mounting slot in the upper cabinet. Align the holes so the pin can pass through and join them together.
4. Press the button (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

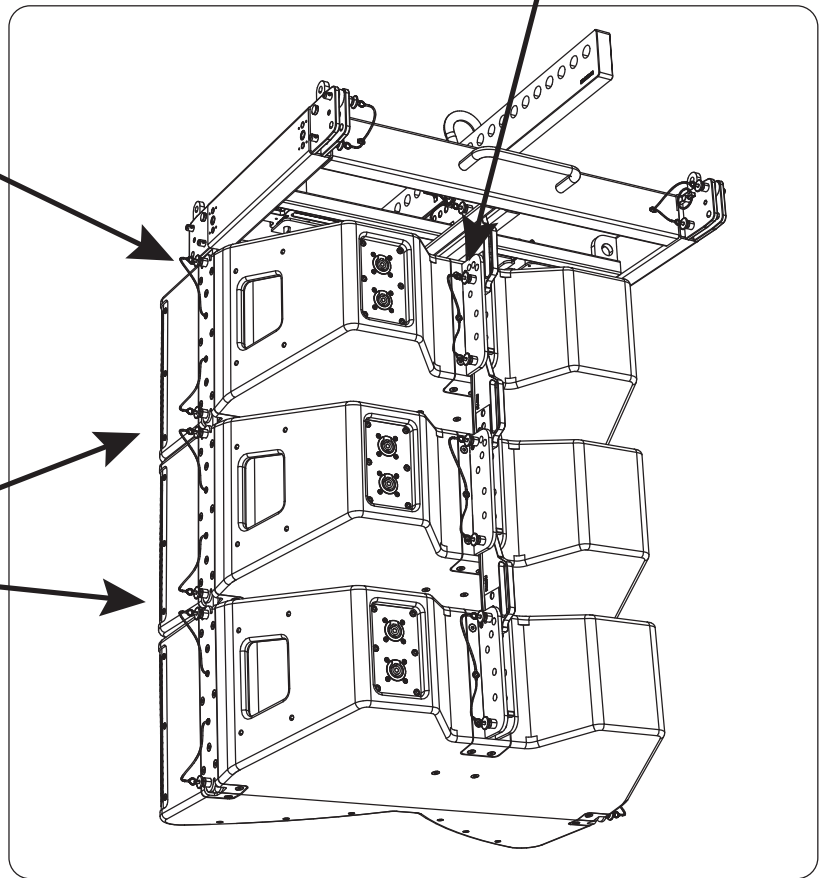
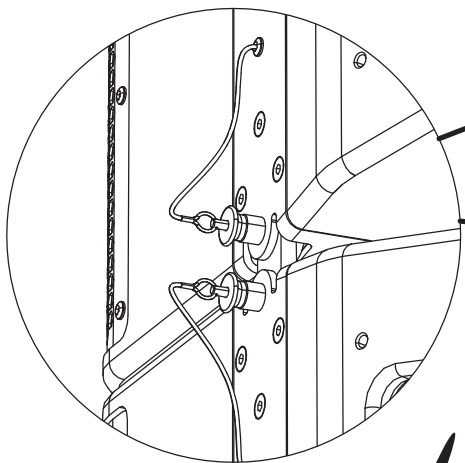
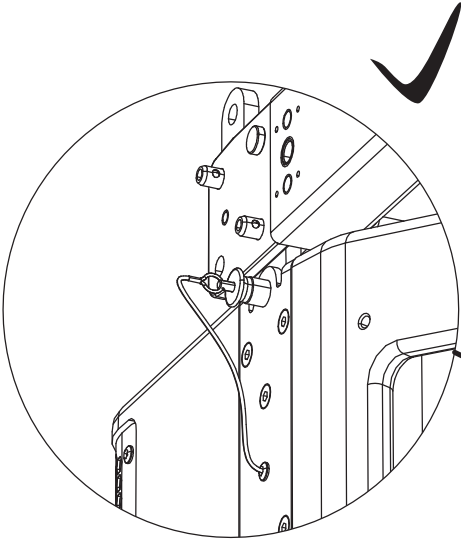
1. Support the weight of the components to be disconnected.
2. Press the button (2) and pull out the pins joining the components together.
3. Carefully separate the components.

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

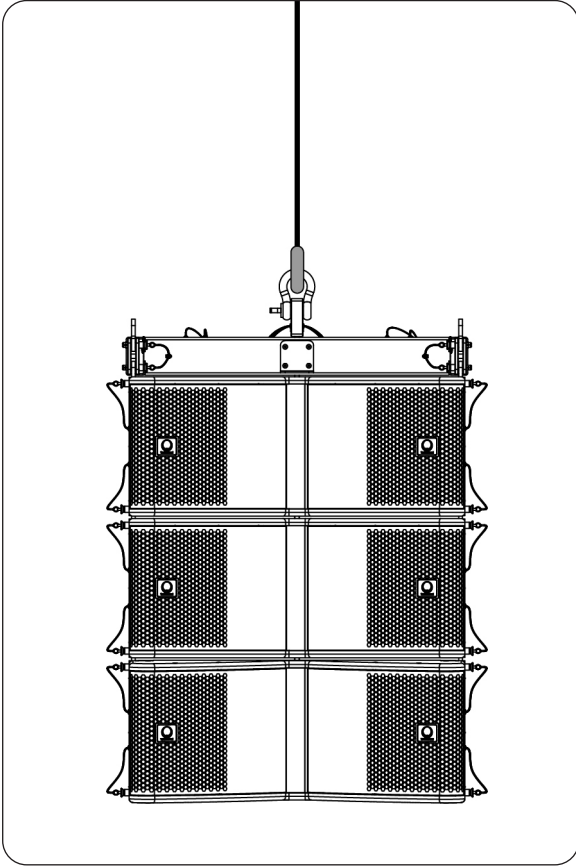


WARNING

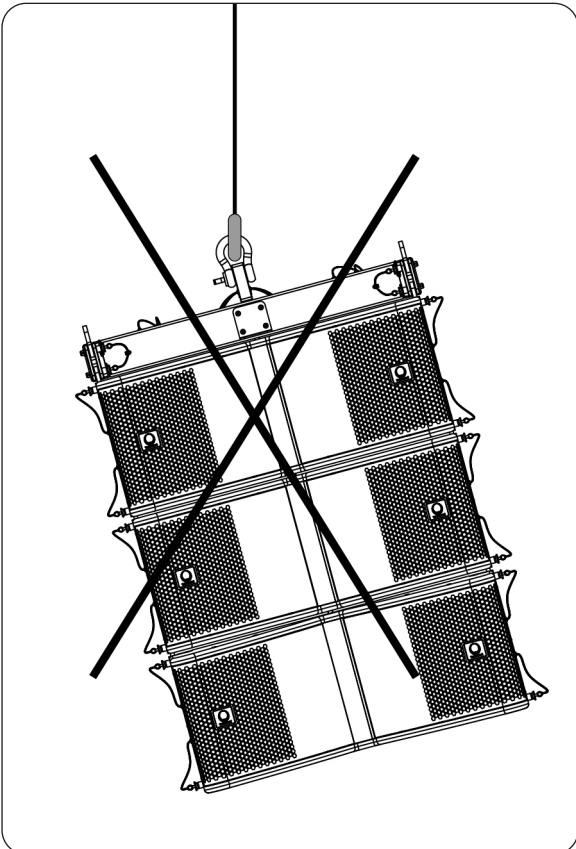
VERIFY THAT EACH PIN IS CORRECTLY INSERTED, AND THAT EACH PIN CANNOT BE PULLED OUT WITHOUT PRESSING THE RELEASE BUTTON FIRST. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

2.14 Vertical Orientation

CORRECT INSTALLATION



INCORRECT INSTALLATION



Vertical Orientation Only!

The mechanical design of the MV210-HC cabinet, MS121 subwoofer, and the MAN210-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.



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.



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.

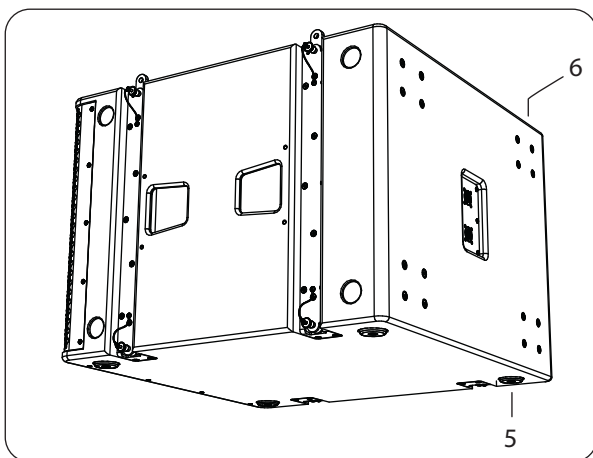
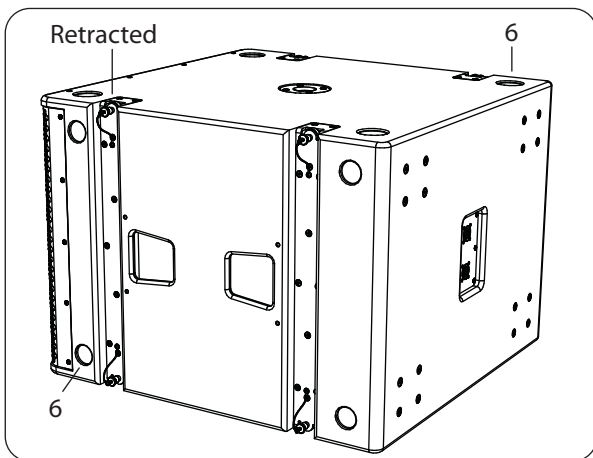
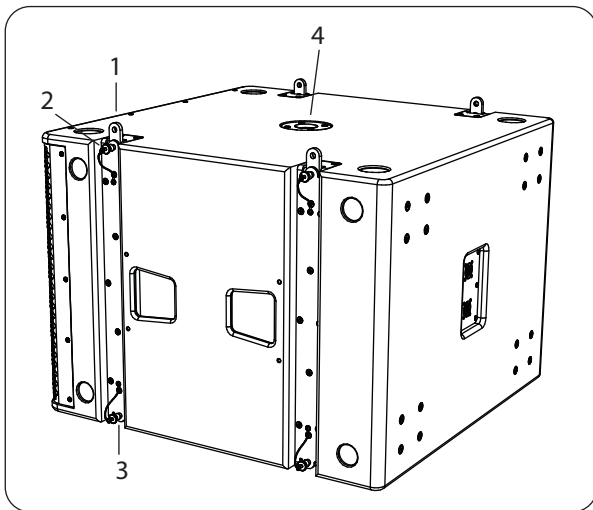


WARNING

THE MV210-HC CABINETS, MS121 SUBWOOFERS, AND MAN210-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 MS121 Subwoofer Mounting Components

Mounting Links Out

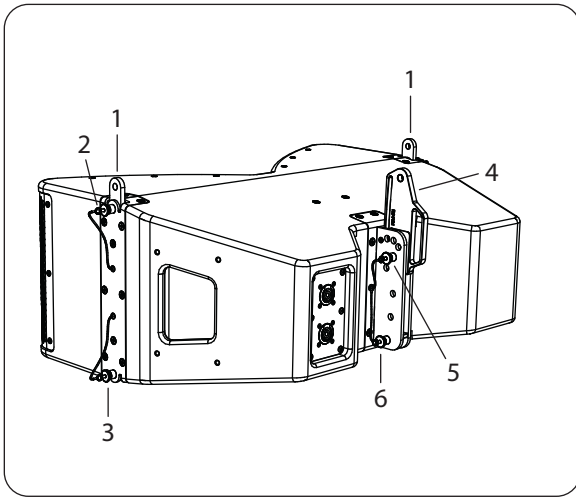


The MS121 subwoofer has four retractable mounting links at the top (1), and four corresponding mounting holes at the bottom (3). These mounting components allow the subwoofer to be attached to the MAN210-FG fly grid, or attached to other MS121 subwoofers.

MS121 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.

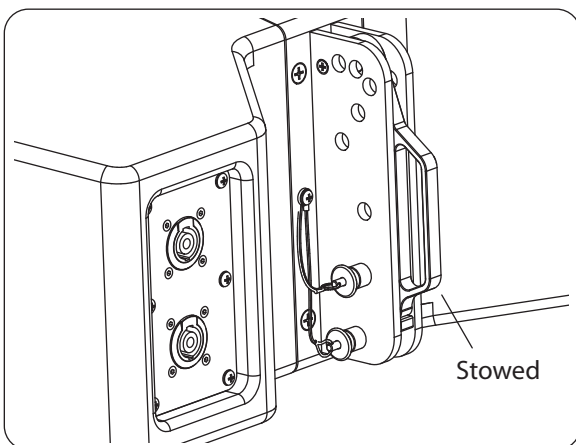
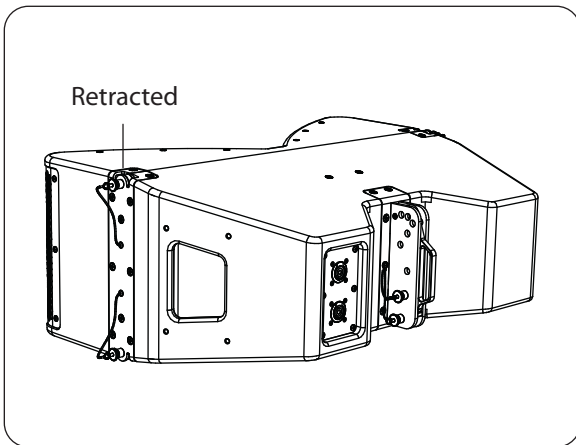
1. **Top Mounting Links** – These captive mounting links are spring-loaded, and may be set in the up or down position. These fit into the corresponding slots in an MS121 subwoofer above, or to a MAN210-FG fly grid. To set in the up position, slowly pull out the pin (2) and the link (1) will spring up. 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 MS121 or a MAN210-FG fly grid below it.
4. **Pole Mount** – This pole mount socket is provided to support satellite speaker configurations, such as pole-mounting a Turbosound MC12-P speaker. We recommend using poles which are 35 mm diameter, with a threaded end M20 (3/4" / 20 mm thread).
5. **Feet** – Eight feet are provided on each subwoofer, four on the bottom, and four on one side.
6. **Feet Recesses** – These help align the subwoofers when fitted one on top of another. If the subwoofers are mounted in the normal (horizontal) orientation, they should still be secured together with the links (1) and pins (2) and (3).

2.16 MV210-HC Cabinet Mounting Components

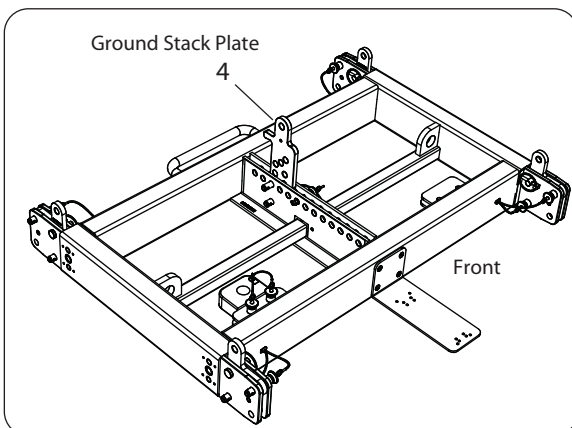
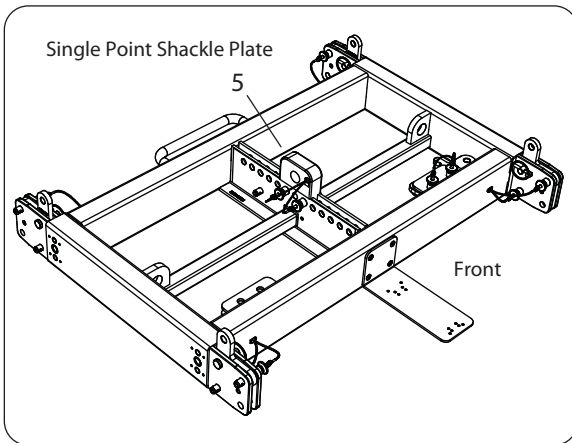
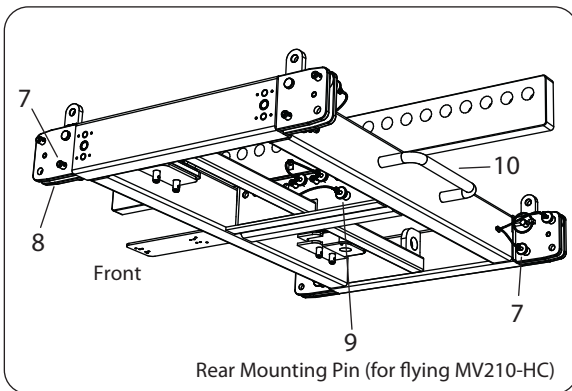
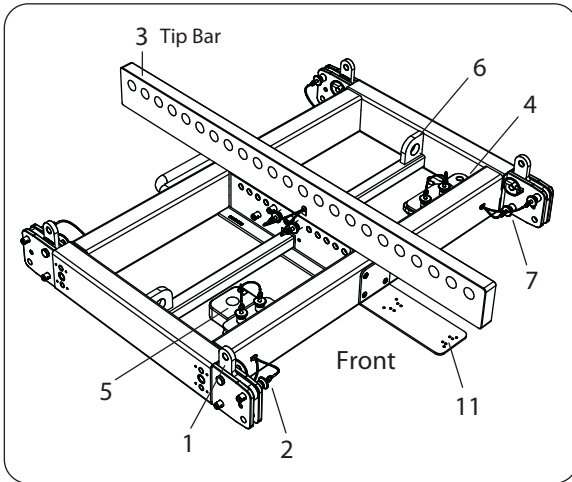


The MV210-HC cabinet has two retractable mounting links (1) at the top, and an adjustable rear mounting plate (4) that allows setting of the inter-cabinet angle. There are two corresponding front slots at the bottom, and one at the rear, with securing pins. These mounting components allow the MV210-HC cabinets to be connected together, attached to the MAN210-FG fly grid, and connected to an MS121 subwoofer with a MAN210-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 MV210-HC above, or to a MAN210-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 MV210-HC or a MAN210-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 MAN210-FG fly grid. The inter-cabinet angle can be adjusted by connecting the rear pin (5) into one of the different holes, which are marked from 20 degrees to zero degrees; the lowest hole is marked STOW, used for stowing the plate when it is not in use.
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 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 MAN210-FG fly grid (when ground stacking).



EN 2.17 MAN210-FG Fly Grid Mounting Components

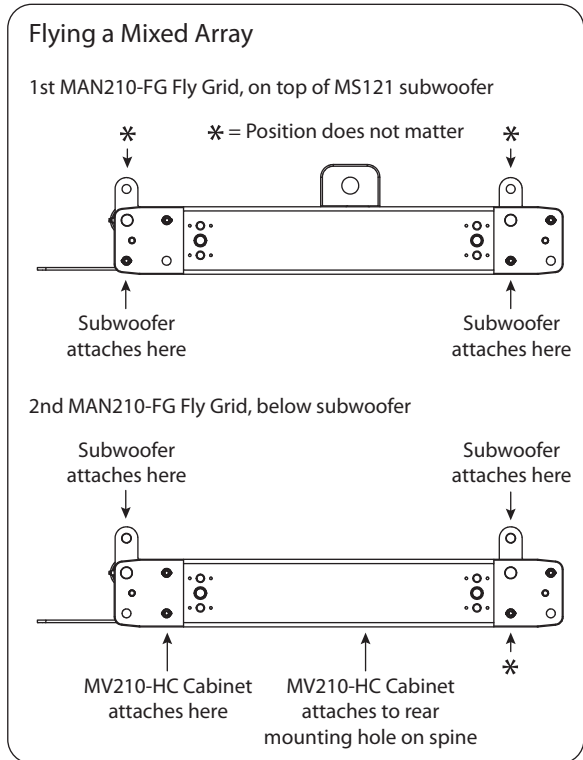
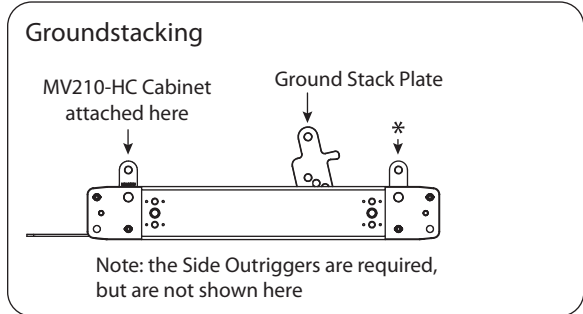
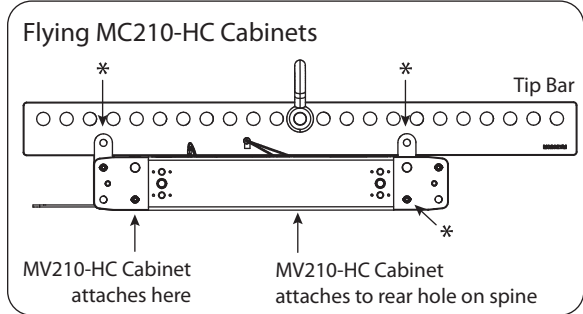
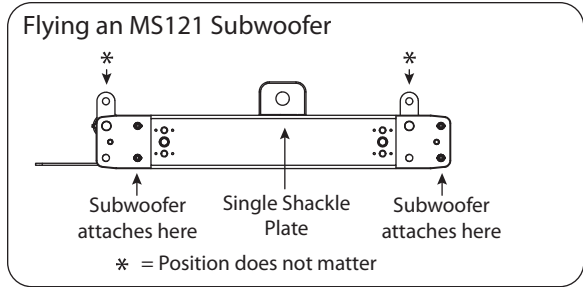


The MAN210-FG fly grid shall only be used with MV210-HC cabinets and MS121 subwoofers. It is not designed to work with any other cabinets.

- Mounting Links** – These L-shaped links connect the fly grid to the bottom mounting slots of an MV210-HC cabinet for groundstacking, or to the bottom slots of an MS121 subwoofer in a mixed flown array. The connections are secured using the lower pins of the MV210-HC cabinet or MS121 subwoofer. The L-shaped links are held in place by clevis pins and rigging pins, and they may be removed and fitted either forward or back, depending on the configuration.
- Upper Rigging Pins and Clevis pins** – These are used to secure the mounting links (1) in place. The clevis pins shall always be fitted in the center 'elbow' hole of the L-shaped links.
- 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 3 software to determine the correct pick points for each configuration. The bar is fitted to the fly grid spine using four quick release pins, and all must be securely fitted and inspected before flying.
- Ground Stack Angle Plate** – For attaching the fly grid to the rear lower mounting point of an MV210-HC for ground stacking. The plate is attached to the fly grid spine, after the Tip bar (3) is removed. The angle of the first MV210-HC cabinet is set by choosing a hole on the plate and securing it with the rigging pin in hole 11 of the fly grid spine. See groundstacking chapters 7 and 8 for more details.
- 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 3 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.
- Mounting Links** – These welded links have 22 mm diameter holes that are used to secure secondary safeties to the fly grid.
- Lower pins** – These pins secure the fly grid to the top mounting links of the MV210-HC cabinet or MS121 subwoofer. Use all 4 when securing an MS121 subwoofer. Use the front 2 pins and rear pin (9) when securing an MV210-HC cabinet.
- Mounting Slots** – The top mounting links of the MV210-HC cabinet or MS121 subwoofer fit into these slots and are secured together with the pins (7).
- Rear Pin** – This pin is used to secure an MV210-HC rear mounting plate when flying an MV210-HC or MV210-HC array.
- Handle** – The fly grid is fitted with a carrying handle.
- Front Bracket** – This laser bracket is used for precise aiming of the array using user-supplied industry standard inclinometer devices.

MAN210-FG Configurations

The versatile MAN210-FG fly grid can be configured for various flown or groundstack arrays, as shown below. The top links may be fitted in 2 orientations, and the lower rigging pins have two options also.



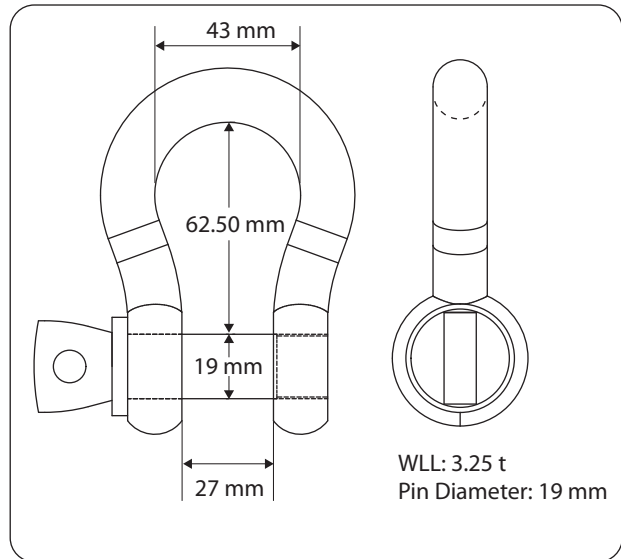
Recommended Bow Shackles

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 MAN210-FG fly grid.

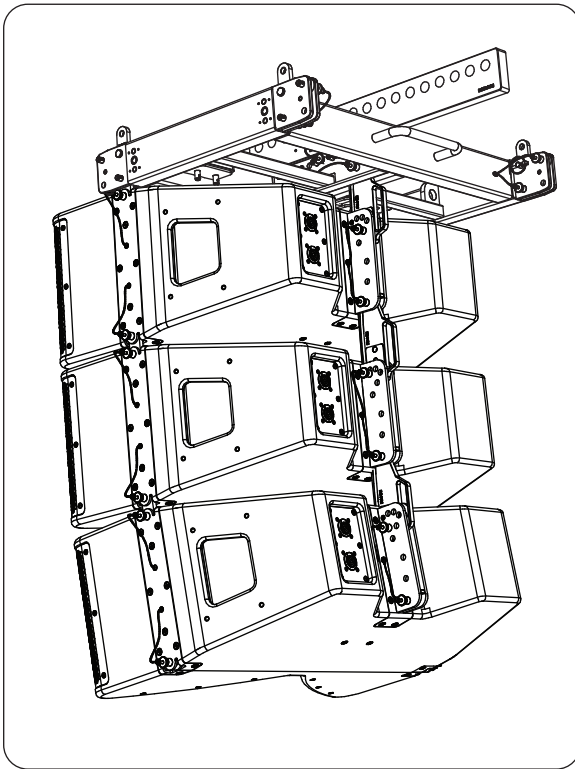
WARNING: THE BOW SHACKLE MUST BE RATED AT 3.25 TONNES.

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 MV210-HC Array on a MAN210-FG Fly Grid



The following procedure shows how to build an array of MV210-HC 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 MAN210-FG fly grid that attaches to your lifting system.

The top MV210-HC cabinet connects to two front mounting points on the fly grid, and one rear mounting point.

There are 9 holes on the rear sliding mounting plate of the MV210-HC that allow the cabinet angle to be selected from 0 to 20 degrees.



WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 13 MV210-HC CABINETS FOR ONE MAN210-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
MAN210-FG Fly Grid	1
MV210-HC Cabinet	13 (maximum at 10:1 Safety Factor)

3.0.2 Preparation

Use the EASE FOCUS 3 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 MV210-HC cabinet to achieve optimum coverage.

3.0.3 Location

Move the first MV210-HC cabinet so it is sitting upright on a safe flat surface, directly below the suspension point.

3.0.4 Measured Weights

Item	Quantity	Weight	
MAN210-FG with Tip Bar	1	32.8 kg	72.3 lbs
MV210-HC	1	35.5 kg	78.3 lbs

3.0.5 MAN210-FG Fly Grid WLL (10:1 Safety Factor)

Item	Working Load Limit (WLL) 3 Point Suspension	
MAN210-FG	495 kg	1091.3 lbs



Protective Headwear shall be worn



Protective Footwear shall be worn



Protective Gloves shall be worn

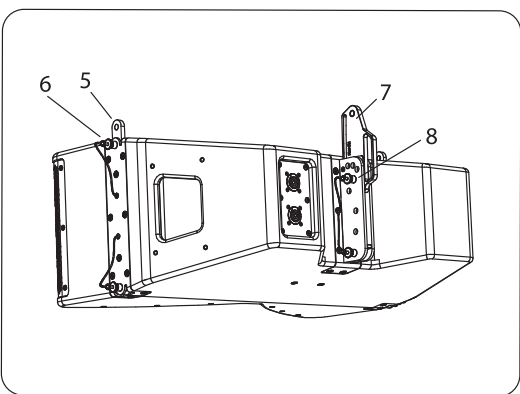
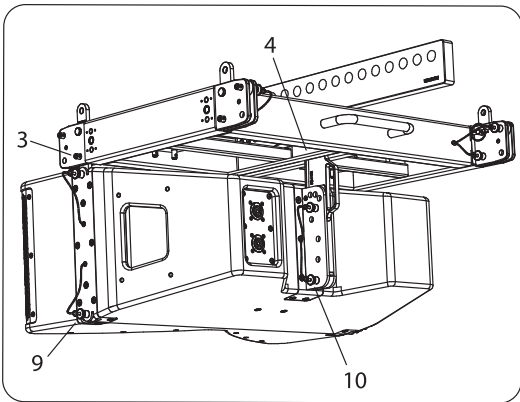
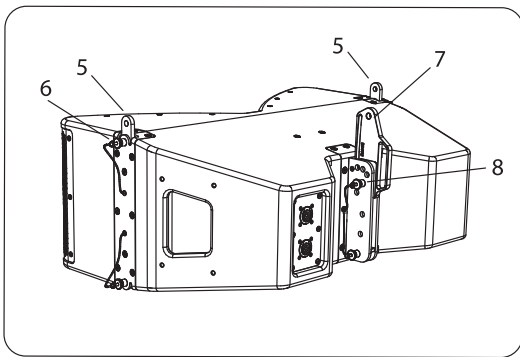
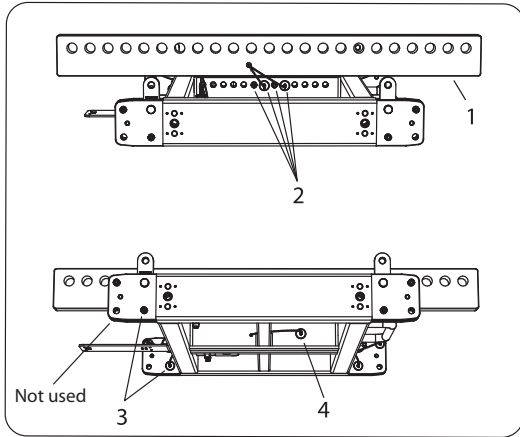


Protective Eyewear shall be worn



Practice Safe Lifting

Procedure 3.1 Connecting MV210-HC Cabinets to the MAN210-FG



1. Install the Tip Bar (1) onto the MAN210-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 MAN210-FG by removing the 2 front rigging pins (3) and the rear rigging pin (4).
4. Prepare all the MV210-HC 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 MV210-HC rear pin (8) and slide the rear mounting plate (7) up. Reinsert the rear pin (8) of the first cabinet into the hole marked '7.5/15/FG' to secure the plate.
5. Carefully lift the MAN210-FG fly grid on top of the first MV210-HC cabinet and align the front links (5) of the cabinet with the fly grid holes where the pins (3) were located. Note: the fly grid front holes are not used, but the next set. Reinsert the front pins (3) to secure the links (5) of the cabinet to the fly grid.

Take care not to trap your fingers between components.



6. Support the rear of the fly grid and align the top hole of the MV210-HC rear mounting plate (7) with the rear hole in the fly grid spine. 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 3 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 MV210-HC cabinet's front lower pins (9) and rear pin (10).
9. Prepare the next MV210-HC 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.

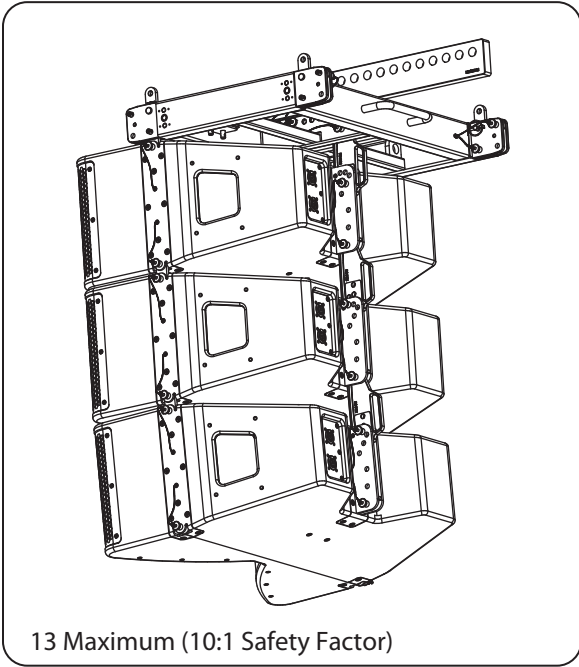
Take care not to trap your fingers between components.



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 20 degrees. Choose the correct hole that corresponds to the angle recommended by EASE FOCUS 3 software for this cabinet.

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





12. The addition of other MV210-HC cabinets is performed by repeating steps 8 through 11 for each additional cabinet.



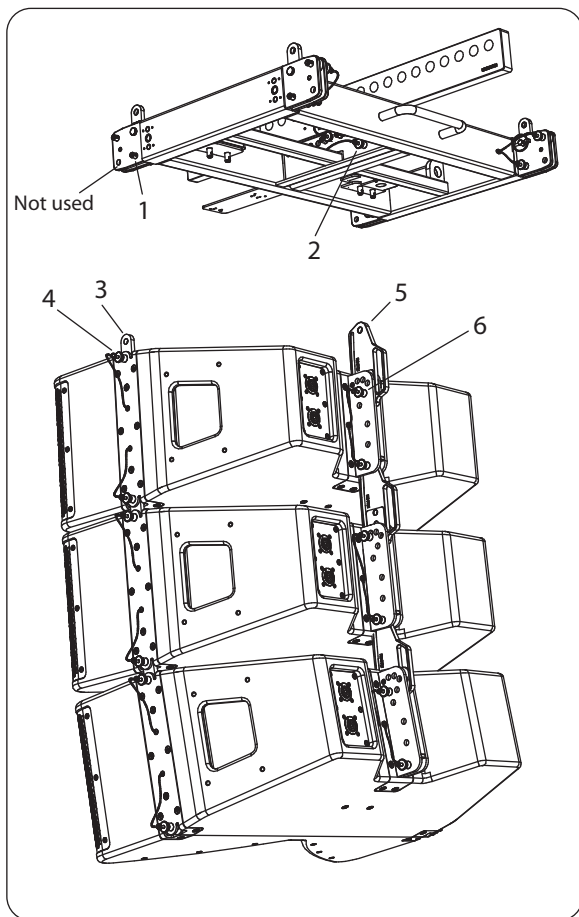
WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 13 MV210-HC CABINETS FOR ONE MAN210-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 MV210-HC Cabinets to the MAN210-FG Fly Grid



Groups of MV210-HC cabinets can be pre-assembled using Procedure 3.1, steps 8 to 11, and then connected to the MAN210-FG fly grid as an assembled group just prior to flying.

The MV210-HC cabinets connect to each other using the front mounting links (3), and the rear mounting plate (5).

1. Prepare the MAN210-FG fly grid by installing the Tip Bar with its 4 pins, and by removing the MAN210-FG 2 front pins (1) and the rear pin (2).
2. Prepare the top MV210-HC 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 MV210-HC rear pin (6) and slide the rear mounting plate (5) up. Insert the rear pin (6) in the hole marked '7.5/15/FG' to secure the plate.
3. Carefully lift the MAN210-FG fly grid onto the top MV210-HC cabinet and align the front links (3) of the cabinet with the fly grid holes where the pins (1) were located. Note: the fly grid front holes are not used, but the next set. 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 MV210-HC rear plate (5). Insert the fly grid rear pin (2) to secure the plate to the fly grid.

Note: The '7.5/15/FG' hole is selected to attach the top MV210-HC cabinet to the MAN210-FG, in order to set the angle of the top cabinet parallel to the fly grid. This allows the MAN210-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 MAN210-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 13 MV210-HC CABINETS FOR ONE MAN210-FG FLY GRID. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

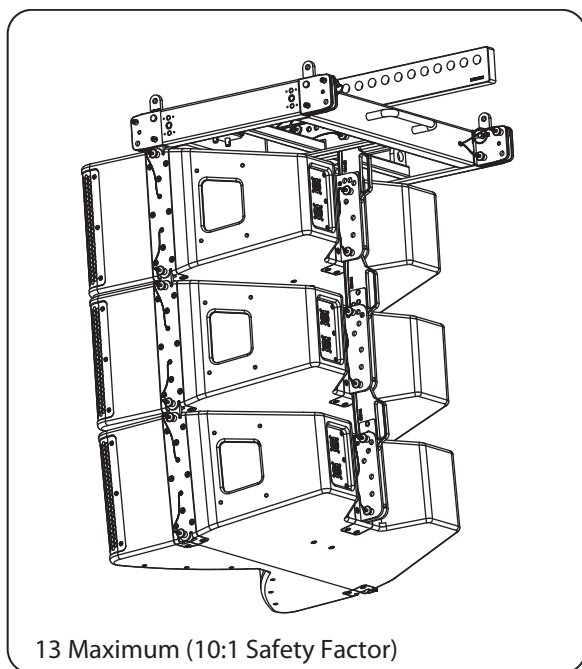


WARNING

DO NOT FLY THE PRE-ASSEMBLED GROUPS OF MV210-HC CABINETS WITHOUT THE MAN210-FG FLY GRID. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

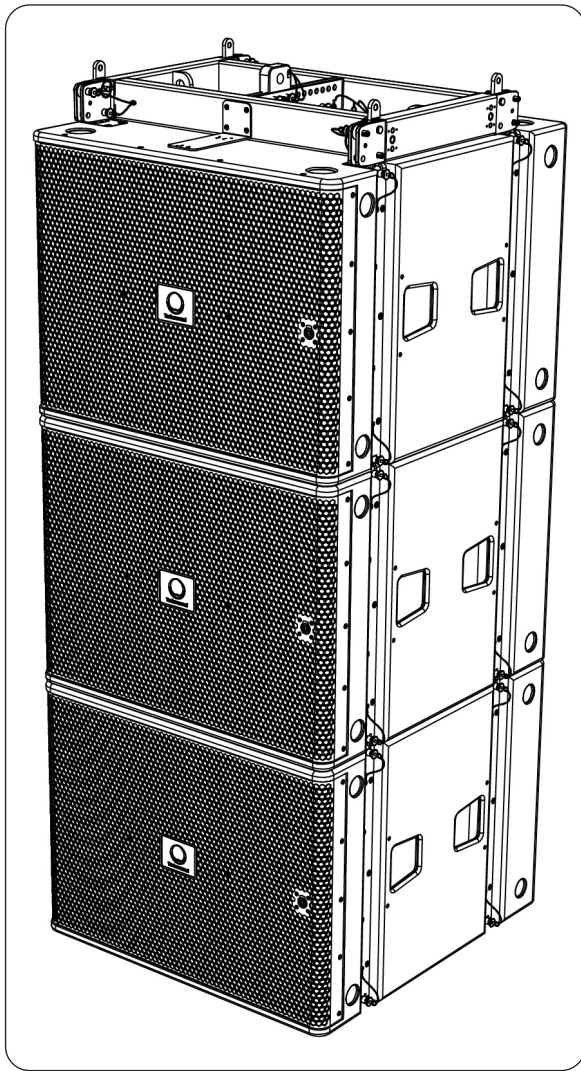
NOTE

Disassembly is the reverse of assembly.



13 Maximum (10:1 Safety Factor)

Chapter 4: Assembling MS121 Subwoofers on a MAN210-FG Fly Grid



4.0.5 MAN210-FG Fly Grid WLL (10:1 Safety Factor)

Item	Working Load Limit (WLL) 4 Point Suspension	
MAN210-FG	821 kg	1810 lbs

The following procedure describes how to assemble a MS121 subwoofer to the MAN210-FG fly grid.

The MAN210-FG fly grid is attached to the top of the MS121 subwoofer, using the subwoofer's 4 mounting links, and four lower rigging pins of the MAN210-FG fly grid.



WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 9 MS121 SUBWOOFERS FOR ONE MAN210-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.



Protective Headwear shall be worn



Protective Footwear shall be worn



Protective Gloves shall be worn



Protective Eyewear shall be worn



Practice Safe Lifting

4.0.1 Required Components

Item	Quantity
MAN210-FG Fly Grid	1
MS121 Subwoofer	9 (max)

4.0.2 Preparation

Use the EASE FOCUS 3 software application to design your system to suit the venue. This will calculate which fly grid mounting hole to attach your bow shackle.

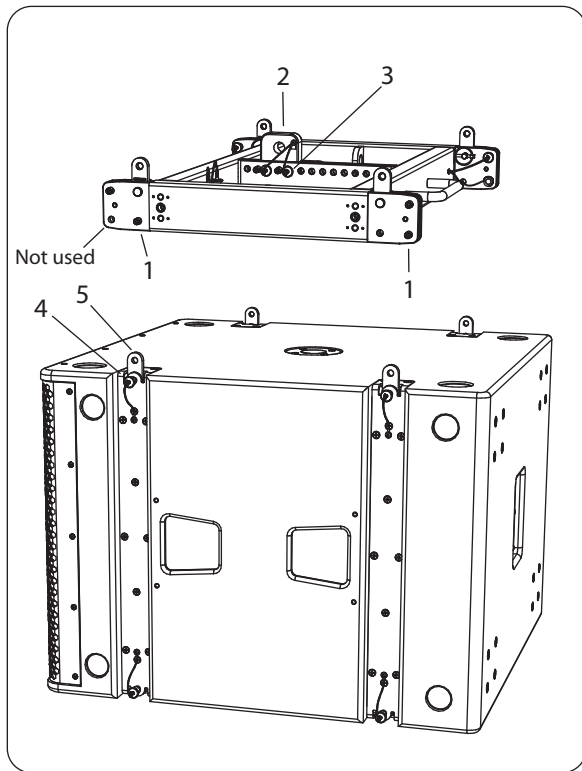
4.0.3 Location

Move the first MS121 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	
MAN210-FG	1	32.8 kg	72.3 lbs
MS121	1	87.5 kg	192.9 lbs

Procedure 4.1 Connecting MS121 Subwoofers to the MAN210-FG Fly Grid



1. Prepare the MAN210-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 3 software.
2. Prepare the MS121 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 MAN210-FG fly grid on top of the MS121 subwoofer and align the fly grid's lower mounting holes (in position 1) with the top links (5) of the subwoofer. Insert the fly grid's pins (1) to secure the fly grid to the subwoofer's top links (5).

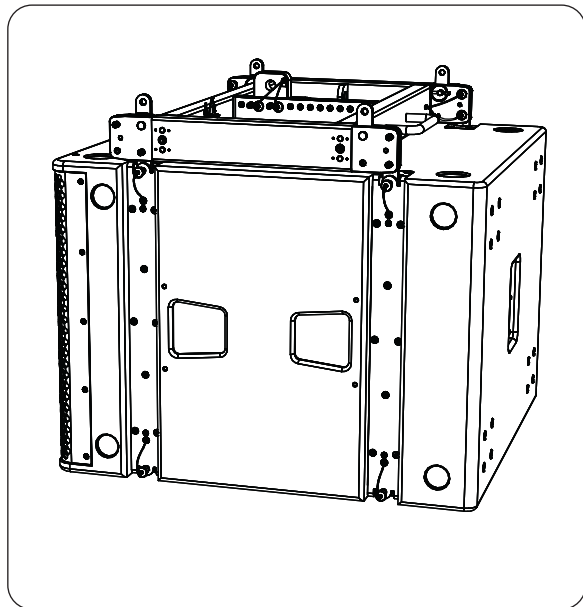
Take care not to trap your fingers between components.

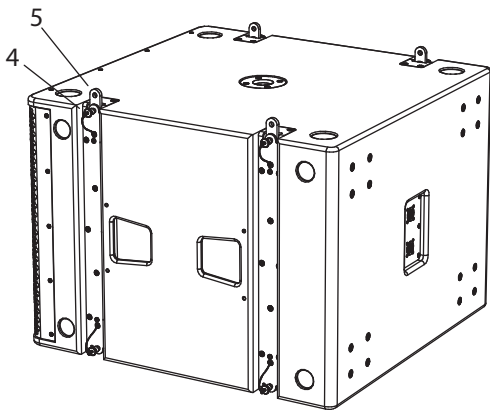
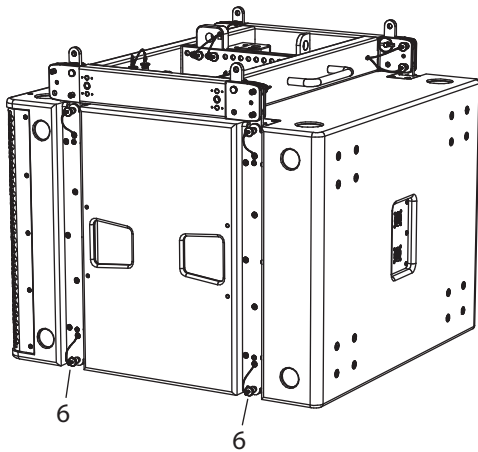


Double check that all pins are correctly inserted, before proceeding further.



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 MS121 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 MS121 subwoofers and the MAN210-FG fly grid are securely connected together.



10. The addition of one more MS121 subwoofer is performed by repeating steps 6 through 9.

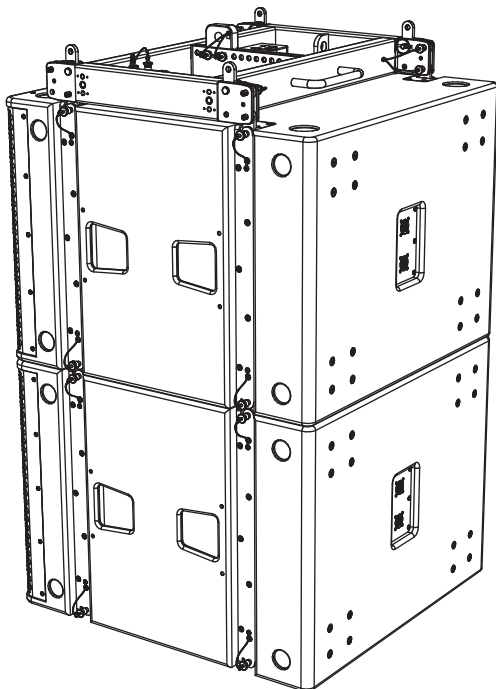


WARNING

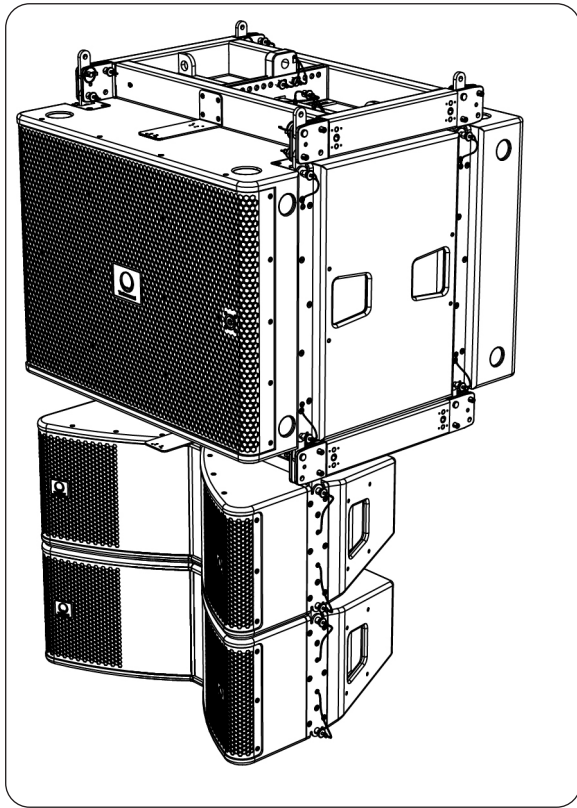
DO NOT EXCEED A TOTAL QUANTITY OF 9 MS121 SUBWOOFERS FOR ONE MAN210-FG FLY GRID. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

NOTE

Disassembly is the reverse of assembly.



Chapter 5: Assembling an MV210-HC Array with a MS121 Subwoofer



The following procedure describes how to assemble a mixed array consisting of one MS121 subwoofer and MV210-HC cabinets below it.

One MAN210-FG fly grid is attached to the top of the MS121 subwoofer, using components supplied with the MAN210-FG fly grid. The Tip Bar may be used or the single shackle plate.

A second MAN210-FG fly grid is attached to the bottom of the lowest MS121 subwoofer, using components supplied with the MAN210-FG fly grid.



WARNING

VARIOUS MIXTURES OF MV210-HC CABINETS AND MS121 SUBWOOFERS CAN BE CONFIGURED BUT DO NOT EXCEED A TOTAL WEIGHT OF 821 KG.



WARNING

THIS ARRAY SHALL ONLY BE MADE WITH THE MS121 SUBWOOFER ON TOP, AND THE MV210-HC CABINETS BELOW, AND WITH TWO MAN210-FG FLY GRIDS. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

5.0.4 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

5.0.1 Required Components

Item	Quantity
MAN210-FG Fly Grid	2
MS121 Subwoofer	1
MV210-HC Cabinet	1

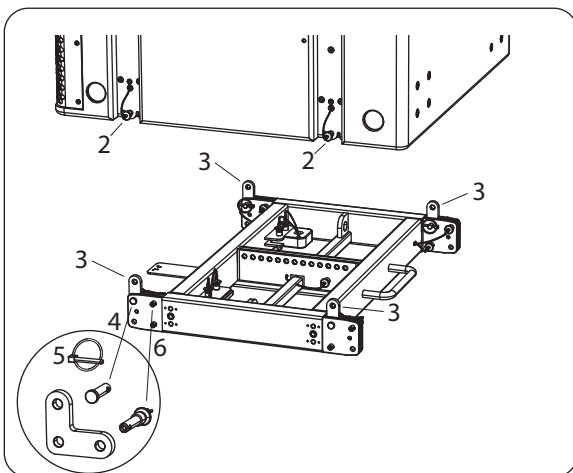
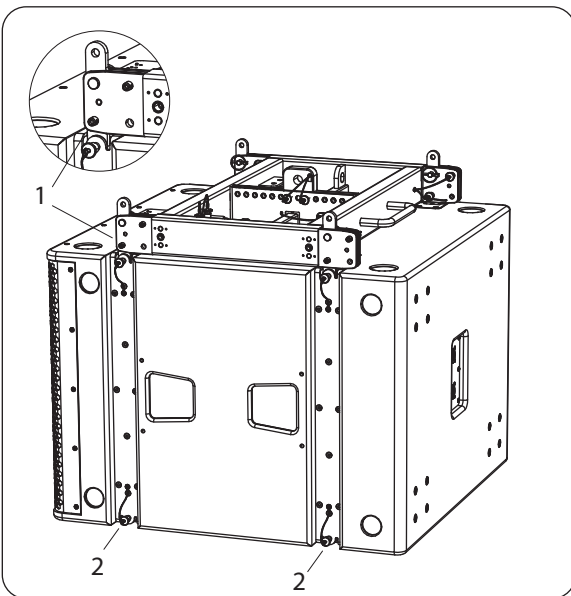
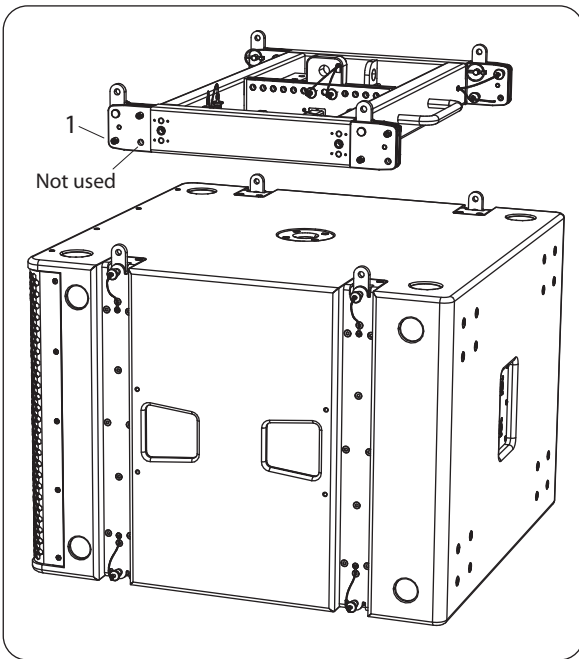
5.0.2 Measured Weights

Item	Quantity	Weight	
MAN210-FG with tip bar	1	32.8 kg	72.3 lbs
MAN210-FG	1	21.6 kg	47.6 lbs
MV210-HC	1	35.5 kg	78.3 lbs
MS121	1	87.5 kg	192.9 lbs

5.0.3 MAN210-FG Fly Grid WLL (10:1 Safety Factor)

Item	Working Load Limit (WLL) 4 Point Suspension	
MAN210-FG	821 kg	1810 lbs

Procedure 5.1 - Attaching the MAN210-FG fly grids to the MS121 Subwoofer



1. Perform the previous procedure in **Chapter 4**: Procedure 4.1 steps 1 to 3, to attach the MAN210-FG fly grid to the MS121 subwoofer.

Note: There is one important difference: Use rigging pins (1) in the forward holes of the MAN210-FG fly grid to connect to the top links of the subwoofer. This position will move the fly grid rearwards on the subwoofer.

Procedure	Description of Work	Check
4.1 step 1 to step 3	Attaching the MS121 Subwoofer to the MAN210-FG Fly Grid	

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



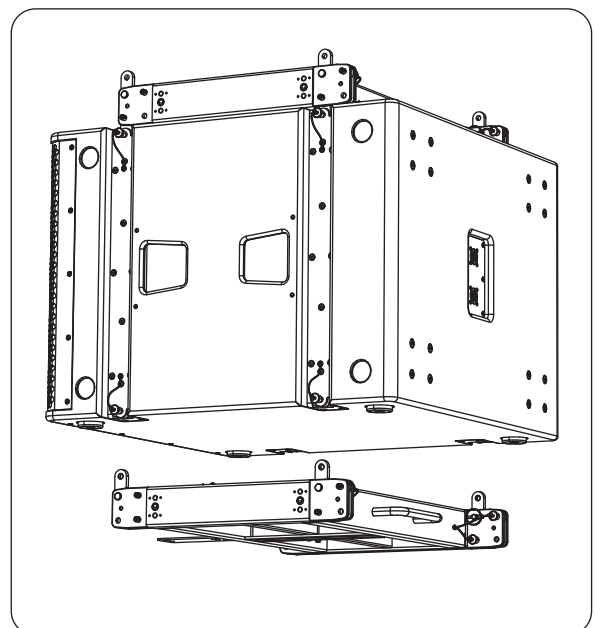
2. Attach a bow shackle or other lifting equipment securely to the single shackle plate (or Tip Bar) of the MAN210-FG fly grid, then attach the hook and chain. Carefully raise the fly grid/subwoofer assembly to a reasonable working height to allow attachment of the second MAN210-FG fly grid.
3. Prepare the subwoofer by pulling out the 4 lower rigging pins (2).
4. Prepare the second MAN210-FG fly grid by making sure that the L-shaped links (3) are in the forward position. (This position is important for the lower fly grid, but not the upper fly grid). Make sure that the clevis pins (4) are in the 'corner' hole of the L-shaped links, and that their securing pins (5) are correctly in position. Secure the rear holes of each L-shaped link with rigging pins (6). If fitted to the second fly grid, 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.

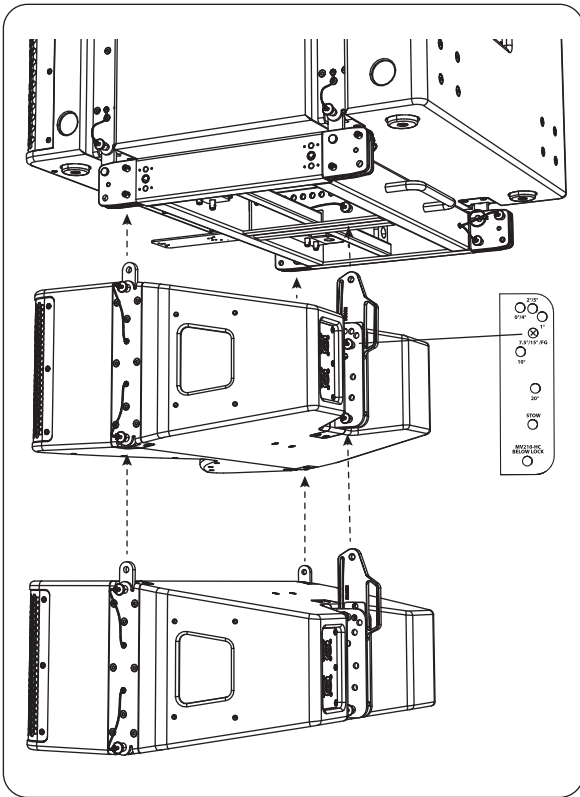


6. Insert the subwoofer's 4 lower pins (2) to secure the fly grid to the subwoofer.

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



Procedure 5.2 - Attaching the MV210-HC Cabinets to the MS121 Subwoofer



1. Perform the previous procedure in **Chapter 3: Procedure 3.1** steps 3 to 12, to attach MV210-HC cabinets to the lower MAN210-FG fly grid.

Note: Set the angle of the first cabinet to be horizontal, by inserting the rear rigging pin in the sliding angle plate '7.5/15/FG' hole.

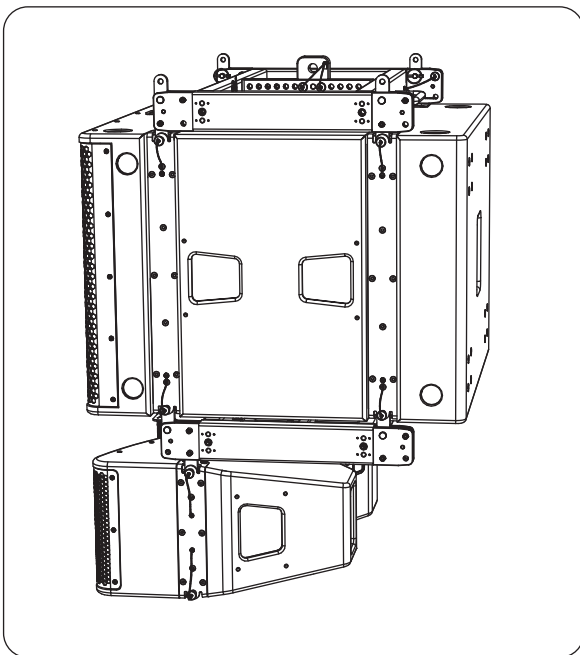
Procedure	Description of Work	Check
3.1 step 3 to step 12	Connecting MV210-HC cabinets to the MAN210-FG fly grid	

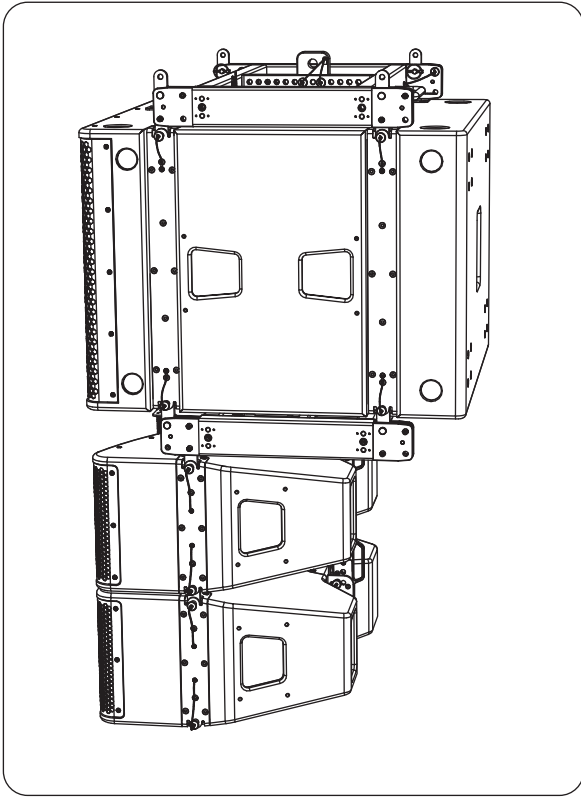
Double check all pins are correctly inserted, and that the MV210-HC cabinets are securely attached to the MAN210-FG fly grid.



2. Add further MV210-HC cabinets below the first MV210-HC cabinet, in a similar way.
3. Alternatively, a previously-assembled group of MV210-HC cabinets can be assembled to the lower MAN210-FG fly grid. See **Chapter 3, Procedure 3.2: Adding a group of MV210-HC Cabinets to the MAN210-FG Fly Grid.**

Procedure	Description of Work	Check
3.2	Adding a group of MV210-HC cabinets to the MAN210-FG fly grid	





WARNING

VARIOUS MIXTURES OF MV210-HC CABINETS AND MS121 SUBWOOFERS CAN BE CONFIGURED BUT DO NOT EXCEED A TOTAL WEIGHT OF 821 KG.



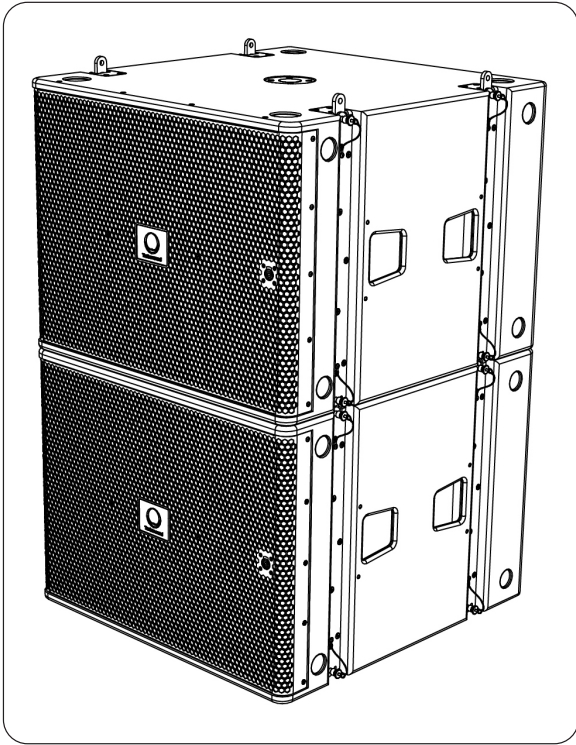
WARNING

THIS ARRAY SHALL ONLY BE MADE WITH THE MS121 SUBWOOFER ON TOP, AND THE MV210-HC CABINETS BELOW, AND WITH TWO MAN210-FC FLY GRIDS. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

NOTE

Disassembly is the reverse of assembly

Chapter 6: Groundstack of two MS121 Subwoofers



The following procedure describes how to assemble a groundstack with two MS121 subwoofers.

The MS121 subwoofers are attached using the 4 pop-up mounting links of the lower subwoofer.



WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 3 MS121 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
MS121 Subwoofer	3 (maximum)

6.0.2 Location

The MS121 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
MS121	1	87.5 kg 192.9 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

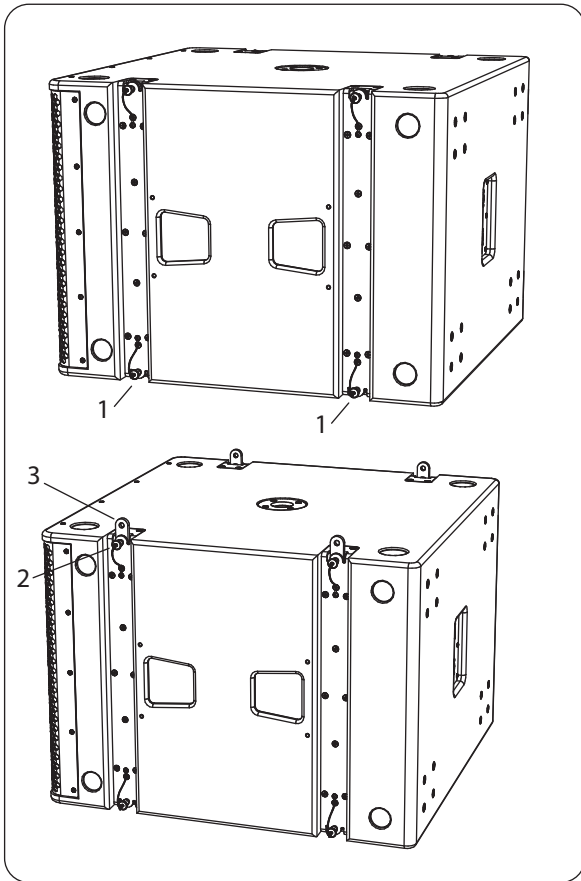


Protective Eyewear shall be worn



Practice Safe Lifting

Procedure 6.1 - Assembling two MS121 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 complete 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 MS121 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 MS121 subwoofers can also be installed rear-facing. A front-mounted input on each MS121 can be used to make the speaker wiring connections easier and neater.

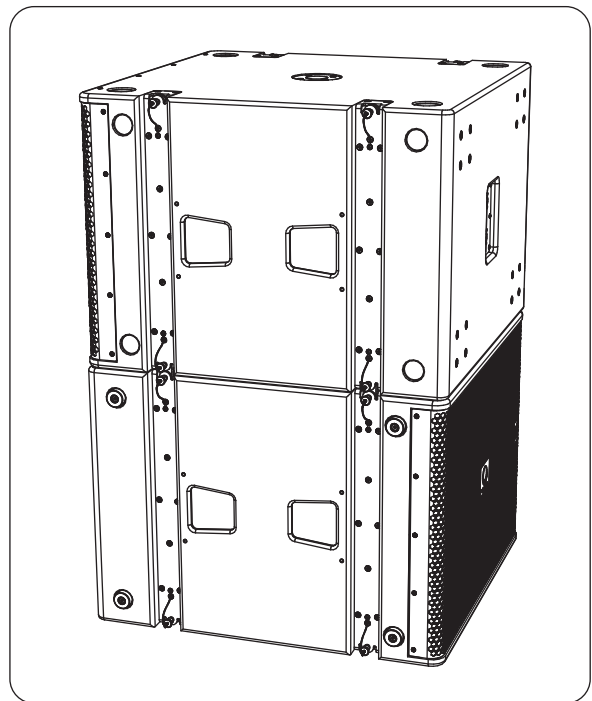
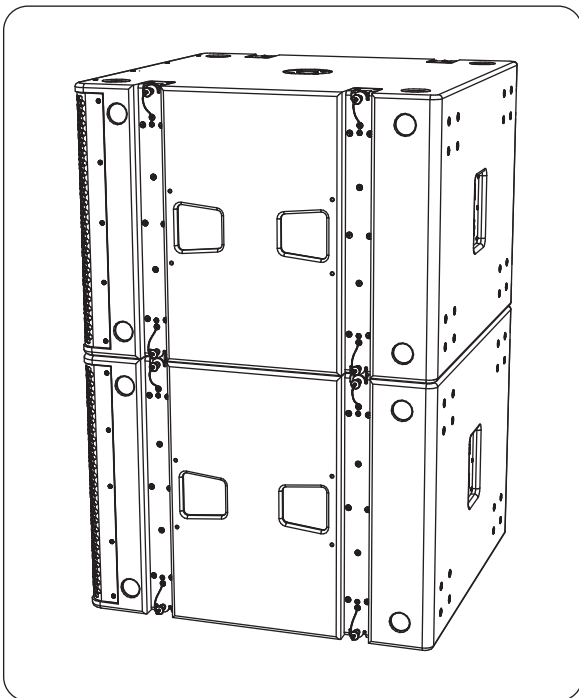


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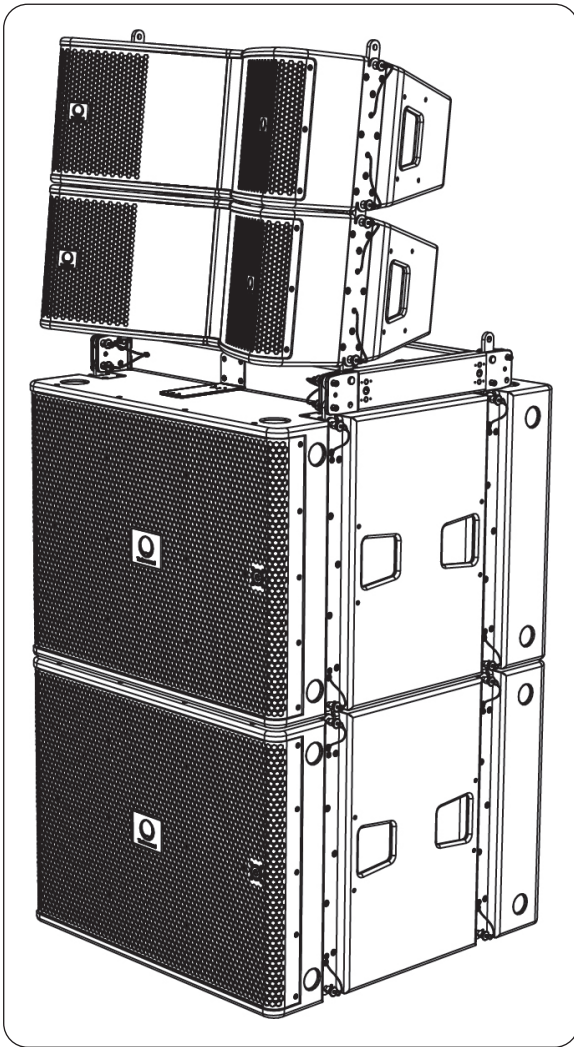
DO NOT EXCEED A TOTAL QUANTITY OF 3 MS121 SUBWOOFERS FOR THIS GROUNDSTACK CONFIGURATION. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

NOTE

Disassembly is the reverse of assembly.



Chapter 7: Groundstack MS121 Subwoofers and an MV210-HC Array



The following procedure describes how to assemble a groundstack with two MS121 subwoofers as a base, with an MV210-FG fly grid, and two MV210-HC cabinets on top.



WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 7 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.

7.0.4 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.

7.0.1 Required Components

Item	Quantity
MAN210-FG Fly Grid	1
MS121 Subwoofer	2
MV210-HC Cabinet	2

7.0.2 Location

The MS121 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	
MAN210-FG no tip bar	1	21.6 kg	47.6 lbs
MV210-HC	1	35.5 kg	78.3 lbs
MS121	1	87.5 kg	192.9 lbs



Protective Headwear shall be worn



Protective Footwear shall be worn



Protective Gloves shall be worn

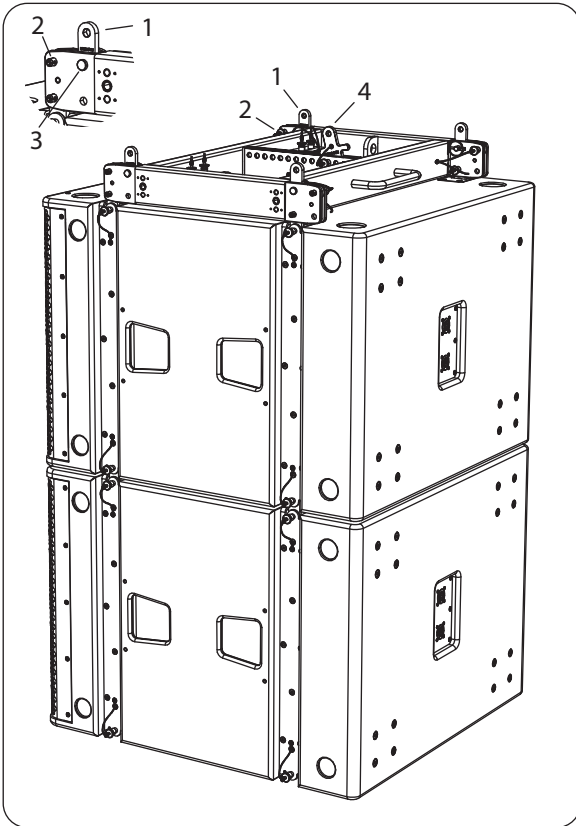


Protective Eyewear shall be worn



Practice Safe Lifting

Procedure 7.1 - Attaching the MAN210-FG fly grid to the MS121 Subwoofer stack



1. Perform the previous procedure in **Chapter 6** to join two MS121 subwoofers as a groundstack.

Procedure	Description of Work	Check
6.1	Assemble two MS121 Subwoofers	

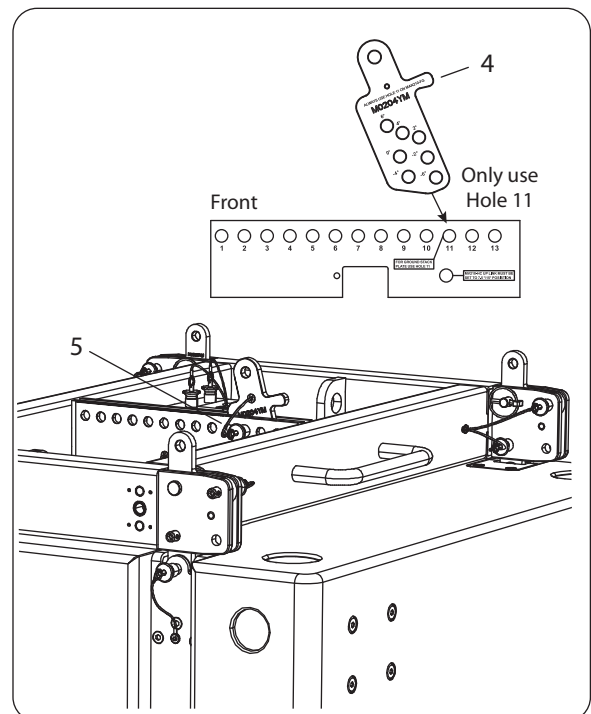
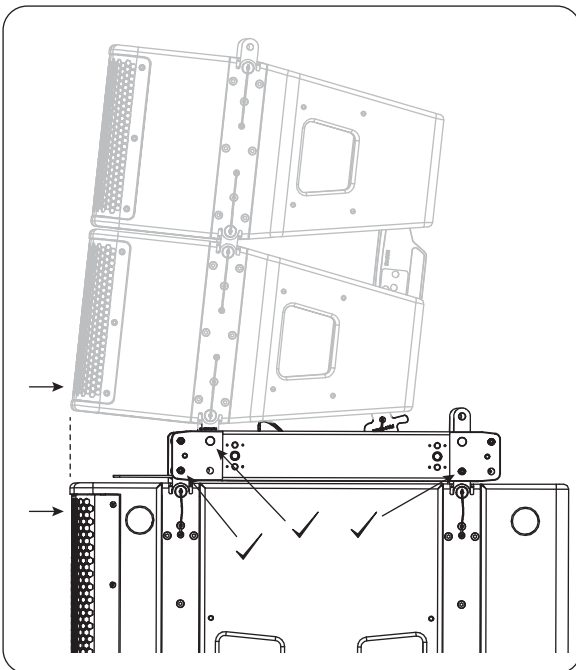
2. Perform the previous procedure in **Chapter 5** to attach the MAN210-FG fly grid to the top of an MS121 subwoofer.

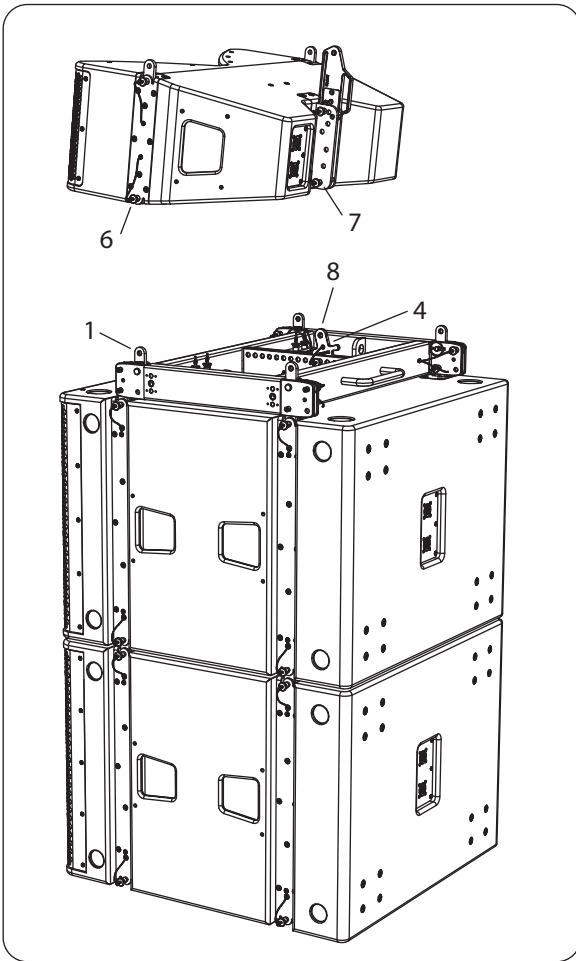
Procedure	Description of Work	Check
5.1	Attaching an MAN210-FG fly grid to an MS121 subwoofer	

Double check all pins are correctly inserted, and that the MAN210-FG fly grid is securely attached.



3. Make sure that the MAN210-FG fly grid is in the position as shown on top of the subwoofer, using rigging pins in the forward holes of the fly grid to connect to the top links of the subwoofer. This position will move the fly grid rearwards on the subwoofer. (If it is in the forward position, then the front grilles of the MV210-HC cabinets will be forward of the subwoofer grilles.)
4. Make sure that the front L-shaped Links (1) are as shown, not in the front position, and that they are secured with the rigging pins (2) and Clevis pins (3).
5. If the single shackle plate has been used, remove it and attach it to the stowage position in the MAN210-FG fly grid, using its own rigging pins.
6. Pull out the ground stack plate (4) from the MAN210-FG fly grid stowage location, and attach it to hole 11 of the center spine of the MAN210-FG fly grid, using one of the attached rigging pins (5). Only hole 11 should be used. The plate holes are marked with the following angles: -6, -4, -2, 0, 2, 4, and 6 degrees. Choose the angle that you want to set the first MV210-HC cabinet from horizontal.





7. Prepare the first MV210-HC cabinet, by pulling out the front lower rigging pins (6), and the rear lower rigging pin (7).
8. Carefully lift the MV210-HC cabinet until its lower front mounting slots fit over the 2 front links (1) of the MAN210-FG fly grid. Reinsert the front pins (6) to secure the MAN210-FG fly grid links (1) to the MV210-HC.

Take care not to trap your fingers between components.

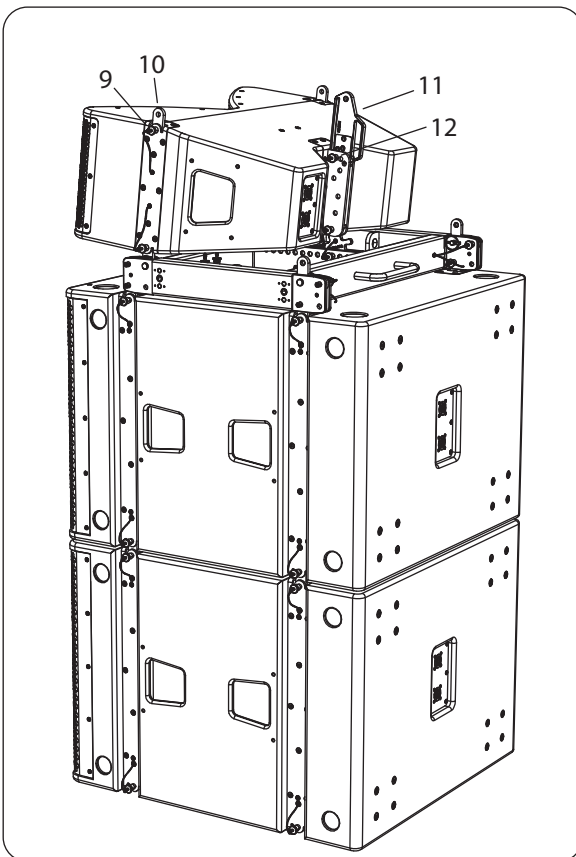


9. Align the MV210-HC cabinet's rear lower mounting hole with the top hole (8) in the ground stack plate (4). Reinsert the rear pin (7) to secure the rear of the MV210-HC to the ground stack plate.

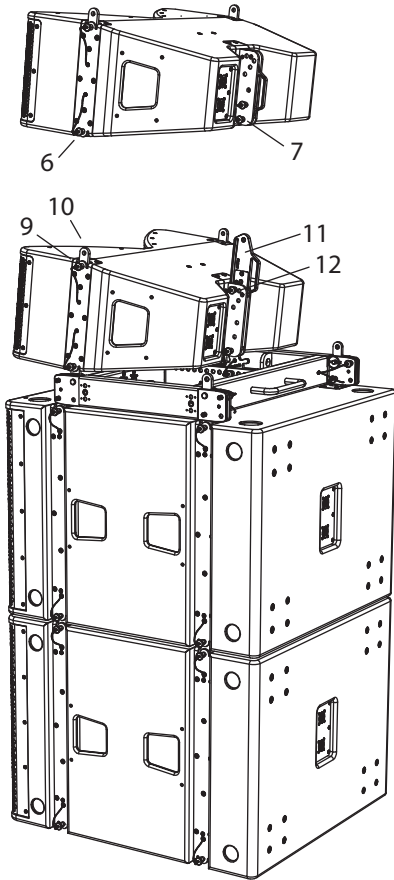
Double check that all pins are correctly inserted, before proceeding further.



10. Prepare the MV210-HC for the next MV210-HC 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.
11. Pull out the rear upper rigging pin (12), and slide the MV210-HC'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 MV210-HC.



Procedure 7.1 - continued



12. Prepare the next MV210-HC cabinet, by pulling out the front lower rigging pins (6), and the rear lower rigging pin (7).
13. Carefully lift the MV210-HC cabinet until its lower front mounting slots fit over the links (10) of the lower MV210-HC. Reinsert the front pins (6) to secure the links (10) to the upper MV210-HC.

Take care not to trap your fingers between components.



14. Align the upper MV210-HC cabinet's rear lower mounting hole with the top hole in the lower MV210-HC's rear mounting plate (11). Reinsert the rear pin (7) to secure the rear of the upper MV210-HC to the rear mounting plate of the lower MV210-HC.

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



15. The addition of other MV210-HC cabinets is performed by repeating procedure steps 12 through 14 for each additional cabinet.

Double check all the connections to make sure that the MS121 subwoofer and MV210-HC cabinets are all securely connected together.

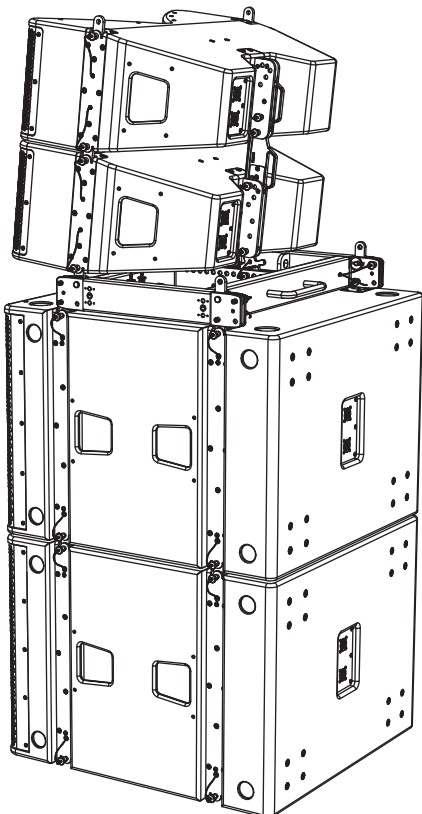


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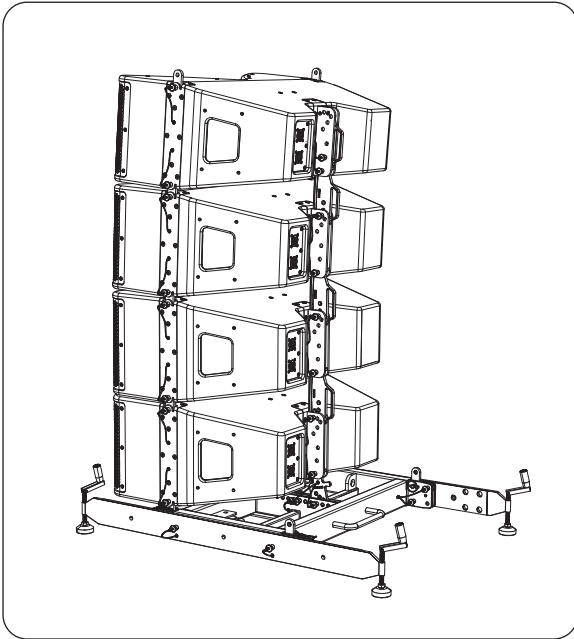
DO NOT EXCEED A TOTAL QUANTITY OF 7 CABINETS FOR THIS GROUNDSTACK CONFIGURATION. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

NOTE

Disassembly is the reverse of assembly.



Chapter 8: Groundstack MV210-HC Array



The following procedure describes how to assemble a groundstack with a MAN210-FG fly grid and its outriggers as a base, and an array of MV210-HC cabinets on top.



WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 6 x MV210-HC CABINETS FOR THIS GROUNDSTACK CONFIGURATION. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.



WARNING

ALWAYS USE THE TWO OUTRIGGERS CONNECTED TO THE MV210-FG FLY GRID WHEN GROUNDSTACKING AN ARRAY OF MV210-HC CABINETS.



WARNING

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

8.0.1 Required Components

Item	Quantity
MAN210-FG Fly Grid	1
MV210-HC Cabinet	6 maximum

8.0.2 Location

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

8.0.3 Measured Weights

Item	Quantity	Weight	
MAN210-FG	1	32.8 kg	72.3 lbs
MV210-HC	1	35.5 kg	78.3 lbs

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

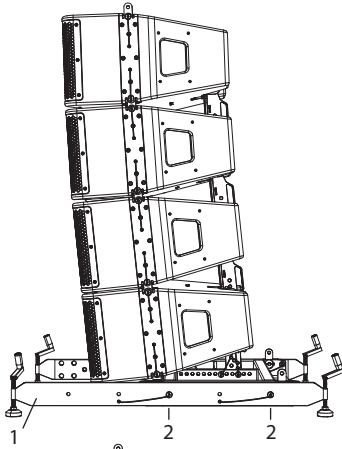


Practice Safe Lifting

Procedure 8.1 - Groundstacking an MV210-HC Array

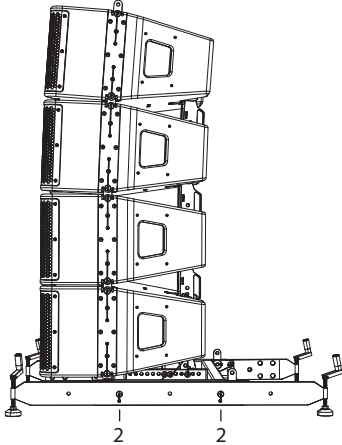
Array Tilted
Down

Outriggers
Forward



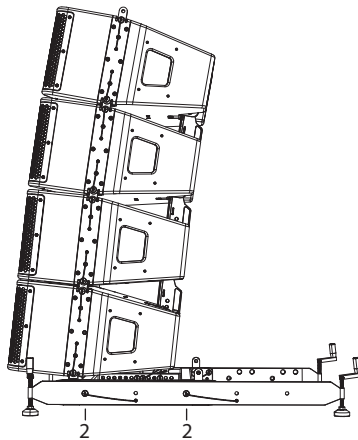
Array Not
Tilted

Outriggers
Centered



Array Tilted
Back

Outriggers
Rearward



- Two outriggers (1) shall be connected to the sides of the MAN210-FG fly grid when an MV210-HC Array is groundstacked.

The outriggers (1) can be fitted in three different positions, depending on the configuration of the MC210-HC Array, as shown. Two rigging pins (2) are used on each outrigger to connect it to the MAN210-FG fly grid.

If the array is tilted forwards, then the outriggers should be fitted in the forward position.

If the array is vertical, then the outriggers should be fitted in the center position.

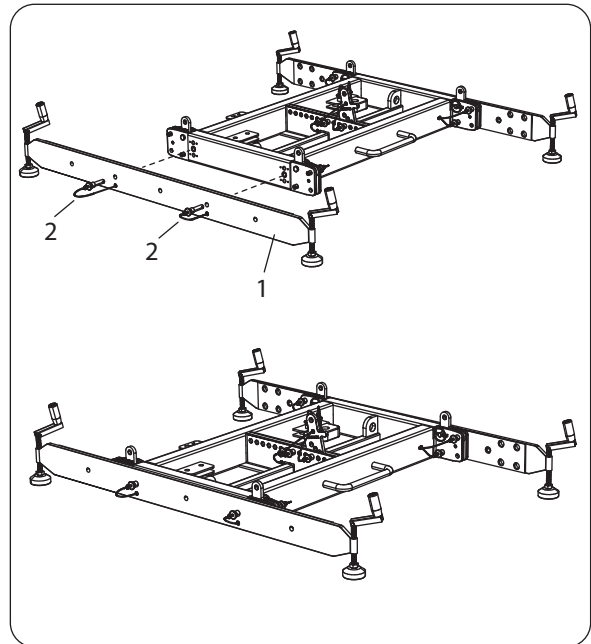
If the array is tilted backwards, then the outriggers should be fitted in the rearward position.

- Position the outriggers in the desired position next to the sides of the MAN210-FG flygrid. Insert the rigging pins (2) to secure each outrigger.

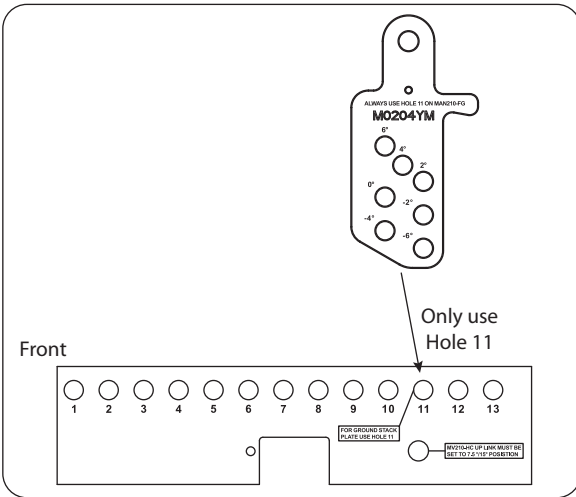
Double check all pins are correctly inserted, and that the both outriggers are securely attached to the MAN210-FG fly grid.



- The groundstack should be assembled on a flat, horizontal, and dry surface, capable of supporting the weight of the complete assembly.



Procedure 8.1 - continued

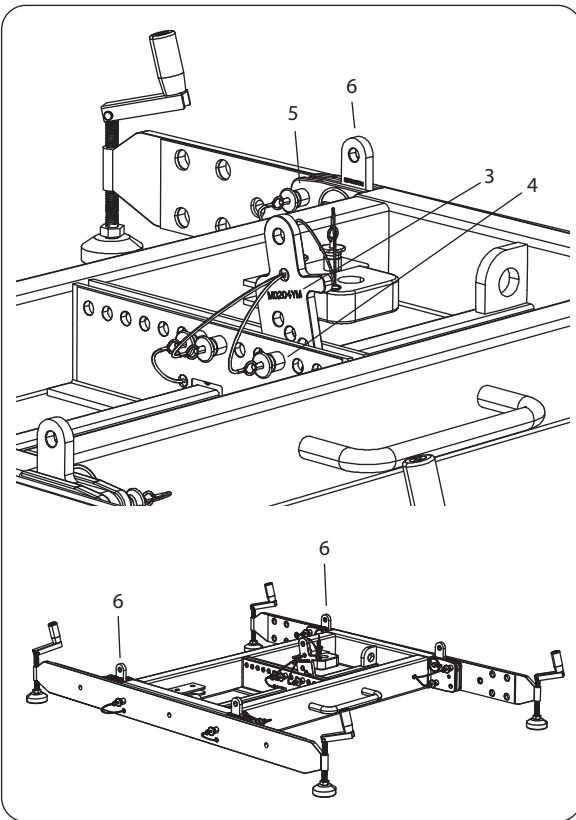


- Pull out the ground stack plate (3) from the MAN210-FG fly grid stowage location, and attach it to the center spine of the MAN210-FG fly grid, using one of the attached rigging pins (4). The plate holes are marked with the following angles: -6, -4, -2, 0, 2, 4, and 6 degrees. Choose the angle that you want to set the first MV210-HC cabinet from horizontal. Secure the ground stack plate with a rigging pin in hole 11 of the MAN210-FG Spine. Only hole 11 should be used for this purpose.

Double check all pins are correctly inserted, and the ground stack plate is securely attached to the MAN210-FG fly grid.

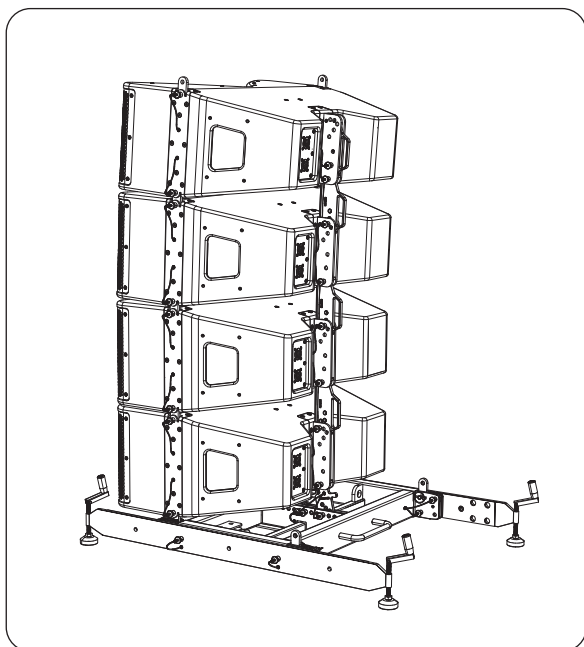
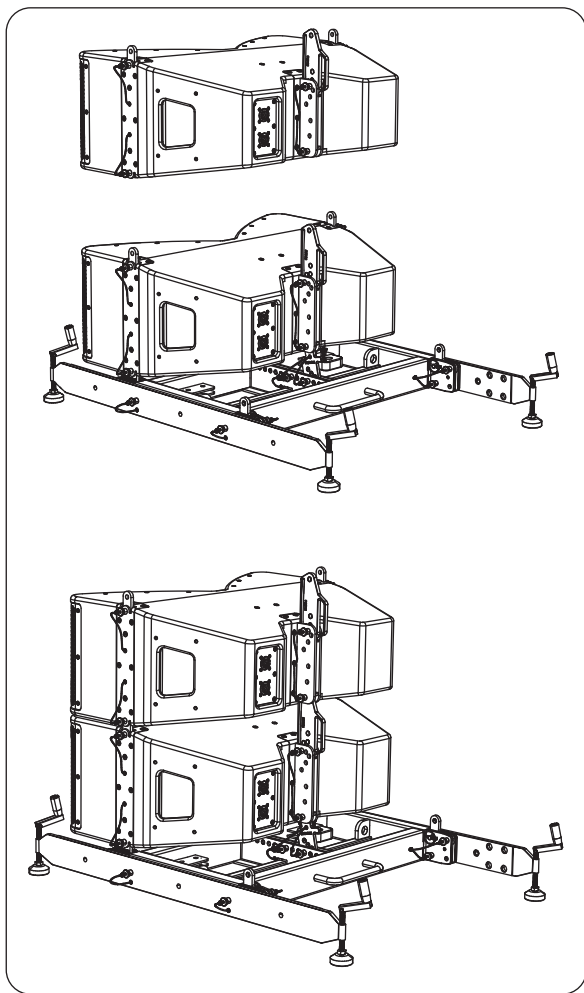


- Make sure that the front L-shaped Links (6) are as shown, not in the front position, and that they are secured with the rigging pins (5) and Clevis pins.
- The rear top mounting links can be used as tie-down points.



EN

Procedure 8.1 - continued



7. Perform the previous procedures shown in **Chapter 7** to attach the MV210-HC cabinets to the MAN210-FG fly grid.

Procedure	Description of Work	Check
7.1 Step 7 onwards	Attaching the MV210-HC cabinets to the top of the MAN210-FG fly grid	

Double check all pins are correctly inserted, and that the MV210-HC cabinets are securely attached to each other, and to the MAN210-FG fly grid.



Take care not to trap your fingers between components.



8. The groundstack should be located on a flat, horizontal, and dry surface, capable of supporting the weight of the complete assembly. When the assembly is complete, check that the MAN210-HC fly grid is truly horizontal, by adjusting the levelling screws at the end of each outrigger. The assembly should be steady, without rocking.



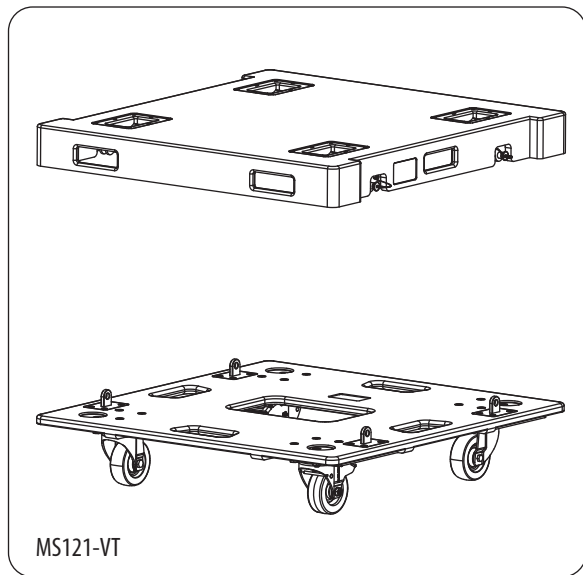
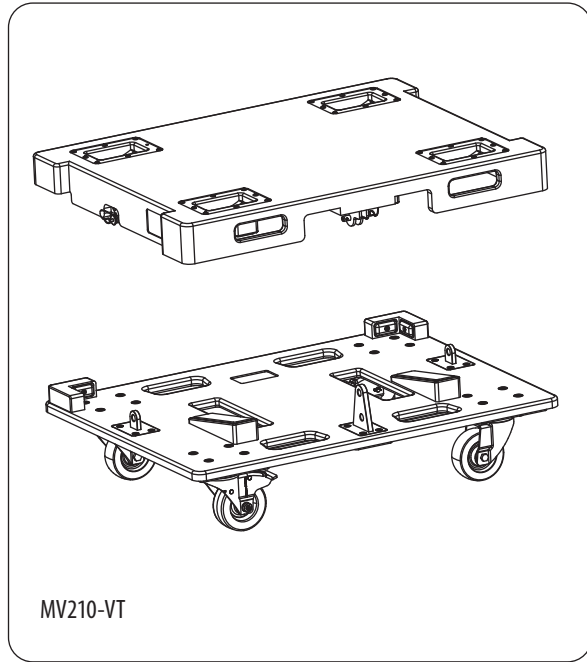
WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 6 MV210-HC CABINETS FOR THIS GROUNDSTACK CONFIGURATION. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

NOTE

Disassembly is the reverse of assembly.

Chapter 9: MV210-VT and MS121-VT Vertical Transporters



9.0.3 Measured Weights

Item	Quantity	Weight	
MS121 -VT	1	31.6 kg	69.7 lbs
MV210-VT	1	24.7 kg	54.5 lbs

The MS121-VT allows a stack of up to 3 MS121 subwoofers to be transported and stored securely, and moved into position for flying.

The MV210-VT allows a stack of up to 4 MV210-HC cabinets to be transported and stored securely, and moved into position for flying.

The MS121 subwoofers are assembled onto the MS121-VT and are secured using quick release pins.

The MV210-HC cabinets are assembled onto the MV210-VT and are secured using quick release pins.

The following procedures describes how to assemble the MS121 subwoofers onto the MS121-VT, and the MV210-HC cabinets onto the MV210-VT.



WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 4 MV210-HC CABINETS FOR EACH MV210-VT. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.



WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 3 MS121 CABINETS FOR EACH MS121-VT. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

9.0.4 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.

9.0.1 Required Components

Item	Quantity
MS121 -VT	1
MS121	3 (maximum)
MV210-VT	1
MV210-HC	4 (maximum)

9.0.2 Location

The MS121-VT and MV210-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.



Protective Headwear shall be worn



Protective Footwear shall be worn



Protective Gloves shall be worn

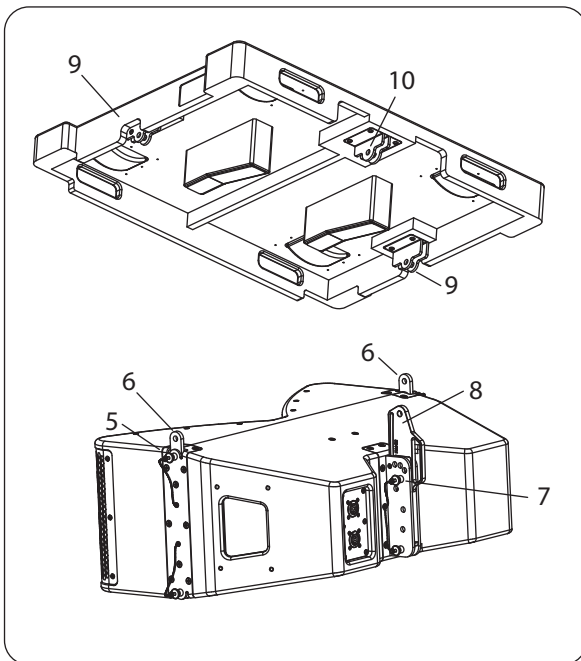
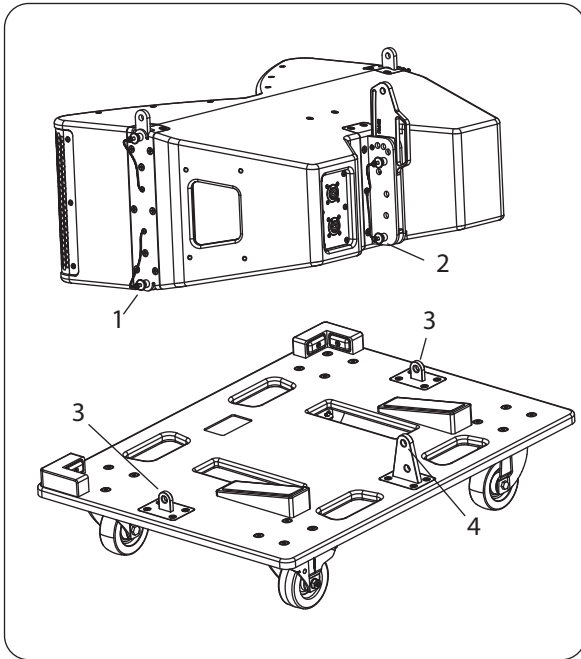


Protective Eyewear shall be worn



Practice Safe Lifting

9. 1 Attaching MV210-HC cabinets to the MV210-VT



1. Prepare the first MV210-HC cabinet, by pulling out the front lower rigging pins (1), and the rear lower rigging pin (2).
2. Carefully lift the MV210-HC cabinet until its lower front mounting slots fit over the 2 front mounting links (3) of the MV210-VT. Reinsert the front pins (1) to secure the MV210-VT mounting links (3) to the MV210-HC.

Take care not to trap your fingers between components.



3. Align the MV210-HC cabinet's rear lower mounting hole with the top hole in the MV210-VT rear mounting link (4). Reinsert the rear pin (2) to secure the rear of the MV210-HC to the MV210-VT rear mounting link.

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



4. A maximum of three more MV210-HC cabinets can be added to the first, using the same procedure as shown in the section on ground stacking.

Make sure the angles are set at zero degrees as indicated by the angle markings on the rear mounting plate of each MV210-HC. The top cabinet's rear mounting plate is set to 7.5 degrees



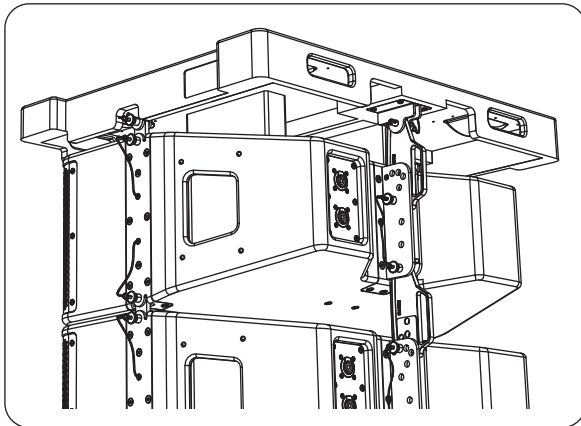
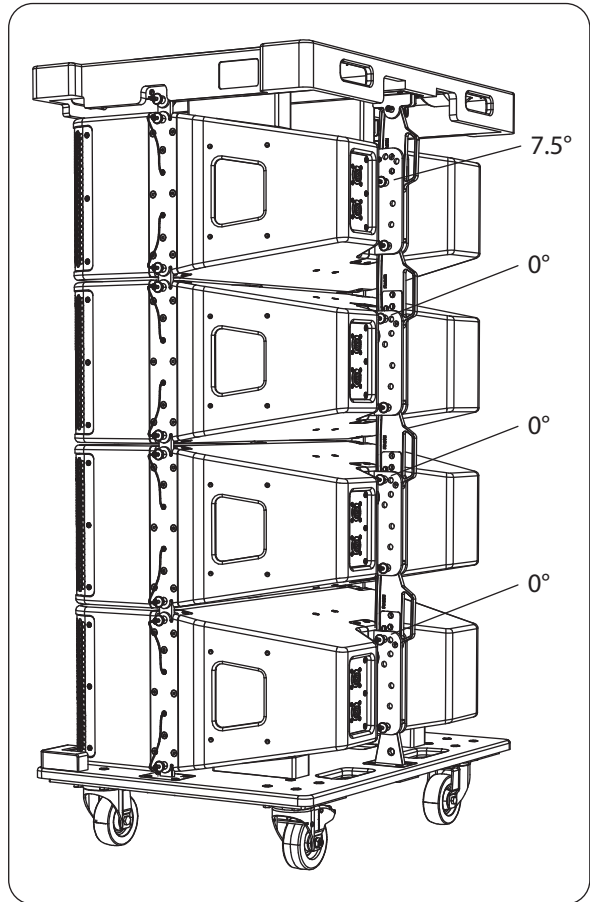
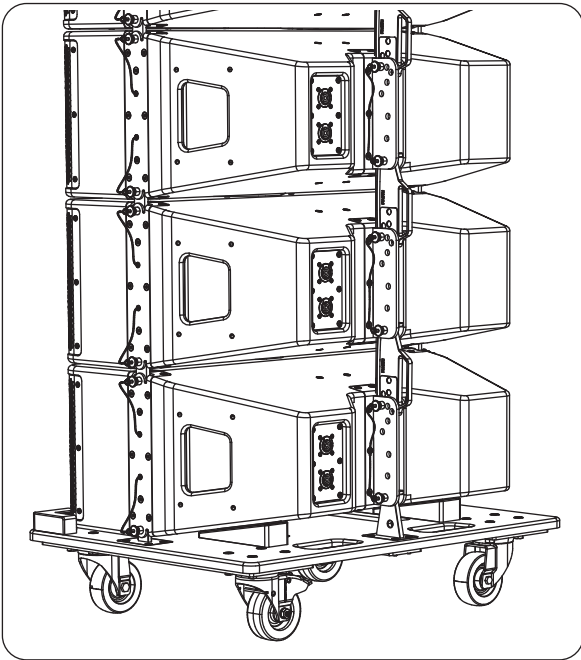
5. When the last cabinet has been added, the top lid of the MV210-VT can be added as follows, to protect the cabinets.
6. Prepare the top MV210-HC cabinet for attaching the top lid of the MV210-VT, by pulling out the 2 front upper rigging pins (5). The spring-loaded top links (6) will move to the up 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 MV210-HC's rear mounting plate (8) upwards and reinsert the rigging pin (7) into the 7.5/15/FG hole.
8. Pull out the rigging pins (9 and 10) from the top lid of the MV210-VT.
9. Lower the top lid onto the top of the upper MV210-HC cabinet and carefully align it so the mounting positions in the top lid fit over the MV210-HC 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.

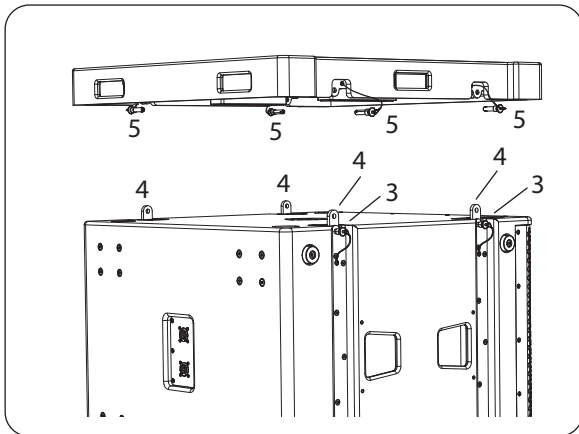
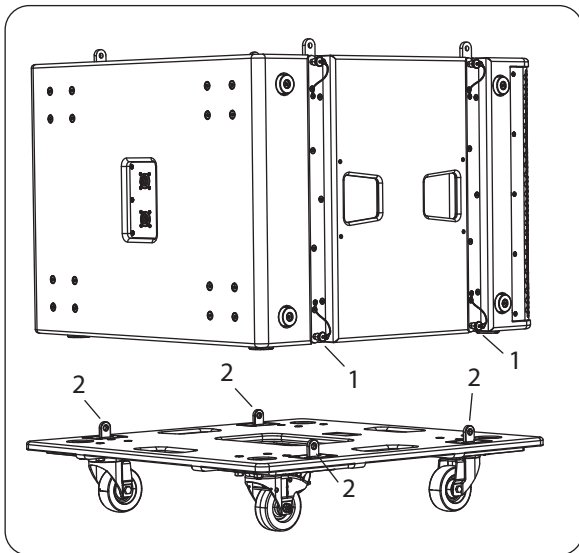


WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 4 MV210-HC CABINETS FOR EACH MV210-VT. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.



9.2 Attaching MS121 subwoofers to the MS121-VT



1. Prepare the first MS121 subwoofer, by pulling out the 4 lower rigging pins (1).
2. Carefully lift the MS121 subwoofer until its mounting slots fit over the 4 mounting links (2) of the MS121-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.



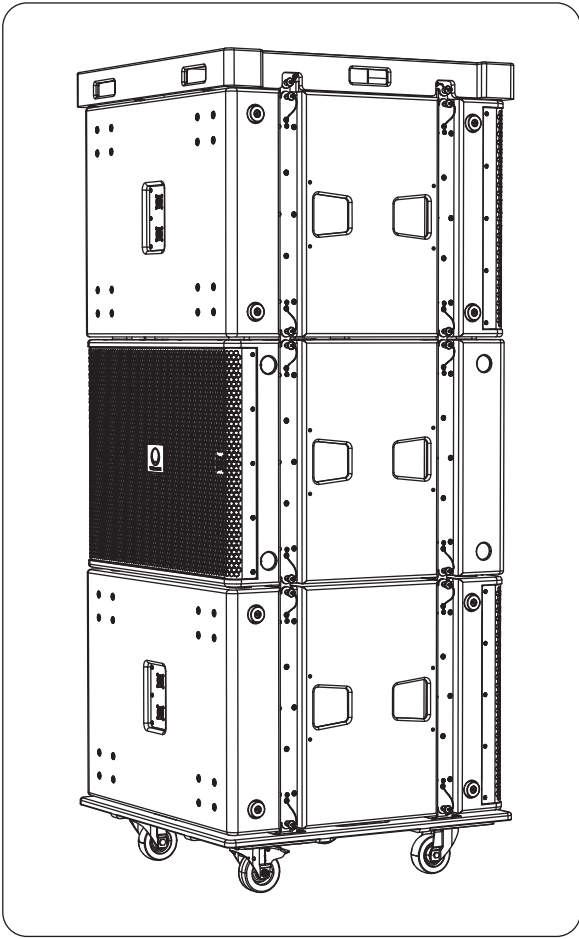
3. Other MS121 subwoofers can be added on top of the first subwoofer, using the same procedure as shown in the section on ground stacking.
4. When the last subwoofer has been added, the top lid of the MS121-VT can be added as follows, to protect the subwoofers.
5. Prepare the top MS121 subwoofer by pulling 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 MS121-VT.
7. Lower the top lid onto the top of the upper MS121 subwoofer and carefully align it so the mounting positions in the top lid fit over the MS121 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 MS121 SUBWOOFERS FOR EACH MS121-VT. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.



Chapter 10: 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 11: Enclosure quantities and combinations for MAN210-FG fly grid suspension at 10:1, 7:1, and 5:1 design factors

Maximum allowed MV210-HC and MS121 enclosure quantities and combinations for suspension using MAN210-FG Fly Bar at 10:1, 7:1 and 5:1 design factors.

MAN210-FG Working Load Limit W.L.L

Suspension	W.L.L with a 10:1 Safety Factor
3 Point System : MV210-HC	496 kg / 1091.3 lbs
4 Point System : MS121	821 kg / 1810 lbs

Measured Weights

Item	Measured Weight
MV210-HC	35.5 kg
MS121	87.5 kg
MAN210-FG with Tip Bar	32.8 kg

MV210-HC Arrays

Safety Factor	Qty	MV210-HC Weights kg	Total Weight with Fly Grid kg	Description
10 to 1	1	35.5		
10 to 1	2	71		
10 to 1	3	106.5		
10 to 1	4	142		
10 to 1	5	177.5		
10 to 1	6	213		
10 to 1	7	248.5		
10 to 1	8	284		
10 to 1	9	319.5		
10 to 1	10	355		
10 to 1	11	390.5		
10 to 1	12	426		
10 to 1	13	461.5	494.3	Maximum quantity at 10:1
7 to 1	14	497		
7 to 1	15	532.5		
7 to 1	16	568		
7 to 1	17	603.5		
7 to 1	18	639	671.8	Maximum quantity at 7:1
5 to 1	19	674.5		
5 to 1	20	710		
5 to 1	21	745.5		
5 to 1	22	781		
5 to 1	23	816.5		
5 to 1	24	852		
5 to 1	25	887.5		
5 to 1	26	923	955.8	Maximum quantity at 5:1

MS121 Arrays

Safety Factor	Qty	MS121 Weights kg	Total Weight kg	Description
10 to 1	1	87.5		
10 to 1	2	175		
10 to 1	3	262.5		
10 to 1	4	350		
10 to 1	5	437.5		
10 to 1	6	525		
10 to 1	7	612.5		
10 to 1	8	700		
10 to 1	9	787.5	820.3	Maximum quantity at 10:1
7 to 1	10	875		
7 to 1	11	962.5		
7 to 1	12	1,050		
7 to 1	13	1,137.5	1170.3	Maximum quantity at 7:1
5 to 1	14	1,225		
5 to 1	15	1,312.5		
5 to 1	16	1,400		
5 to 1	17	1,487.5		
5 to 1	18	1,575	1610.5	Maximum quantity at 5:1

Mixed Array Examples

Example A: 12 x MV210-HC and 3 x MS121 and 2 x MAN210-FG

Safety Factor = 10:1

Suspension	W.L.L with a 10:1 Safety Factor
4 Point System : MS121 and Mixed Arrays	821 kg / 1810 lbs

Qty of MV210-HC	MV210-HC Weights kg	Qty of MS121	MS121 Weights kg	Top Fly Grid Weight kg	Lower Fly Grid Weight kg
1	35.5	1	87.5	32.8	21.6
2	71	2	175	Includes Tip Bar, and the stowed ground stack plate and single shackle plate	Includes the stowed ground stack plate and single shackle plate
3	106.5	3	262.5		
4	142				
5	177.5				
6	213				
7	248.5				
8	284				
9	319.5				
10	355				
11	390.5				
12	426				

$$\text{TOTAL WEIGHT} = 426 + 262.5 + 32.8 + 21.6 = 742.9 \text{ kg}$$

Note: 2nd MAN210-FG Fly Grid must be included in total weight load on 1st MAN210-FG

Example B: 6 x MV210-HC and 6 x MS121 and 2 x MAN210-FG**Safety Factor = 10:1**

Suspension	W.L.L with a 10:1 Safety Factor
4 Point System : MS121 and Mixed Arrays	821 kg / 1810 lbs

Qty of MV210-HC	MV210-HC Weights kg	Qty of MS121	MS121 Weights kg	Top Fly Grid Weight kg	Lower Fly Grid Weight kg
1	35.5	1	87.5	32.8	21.6
2	71	2	175	Includes Tip Bar, and the stowed ground stack plate and single shackle plate	Includes the stowed ground stack plate and single shackle plate
3	106.5	3	262.5		
4	142	4	350		
5	177.5	5	437.5		
6	213	6	525		

TOTAL WEIGHT = 213 + 525 + 32.8 + 21.6 = 792.4 kg

Note: 2nd MAN210-FG Fly Grid must be included in total weight load on 1st MAN210-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 Commercial MY Sdn. Bhd.

Music Tribe Commercial MY Sdn. Bhd.
1-17-02, Suntech @ Penang Cybercity 1-12-01,
Lintang Mayang Pasir 3, 11950 Bayan Baru,
Pulau Pinang, Malaysia

Do hereby declare that the following components:

MV210-HC (and variants) Loudspeaker Cabinets
MS121 Subwoofer Cabinets
MAN210-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:

何枫华

Elly He
(Senior Engineer)

Date: 2023-02-06

Music Tribe Commercial MY Sdn. Bhd.
1-17-02, Suntech @ Penang Cybercity 1-12-01,
Lintang Mayang Pasir 3, 11950 Bayan Baru,
Pulau Pinang, Malaysia



Hereby, Music Tribe declares that this product is in compliance with Directive 2011/65/EU and Amendment 2015/863/EU, Directive 2012/19/EU, Regulation 519/2012 REACH SVHC and Directive 1907/2006/EC, and this passive product is not applicable to EMC Directive 2014/30/EU, LV Directive 2014/35/EU.

Full text of EU DoC is available at <https://community.musictribe.com/>

EU Representative: Music Tribe Brands DK A/S
Address: Gammel Strand 44, DK-1202 København K, Denmark

UK Representative: Music Tribe Brands UK Ltd.
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