



## TBV BERLIN SERIES

### **TBV118L**

18" Front Loaded Subwoofer for Touring, Portable and Installation Applications

### **TBV123**

Arrayable 2 Way 12" Constant Curvature Loudspeaker with Dendritic Waveguide for Touring, Portable and Installation Applications

### **TBV118L-AN**

18" Powered Subwoofer with KLARK TEKNIK DSP Technology and ULTRANET Networking

### **TBV123-AN**

Arrayable 2 Way 12" Constant Curvature Loudspeaker with Dendritic Waveguide, KLARK TEKNIK DSP Technology and ULTRANET Networking

### **TBV123-FB**

Fly Bar for TBV BERLIN Series speakers for Flown or Ground Stacked Arrays

## Rigging Manual



### **⚠ WARNING!**

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

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## EN Important Safety Instructions



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

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



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



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



### Caution

To reduce the risk of electric shock, do not remove the top cover (or the rear section).

No user serviceable parts inside. Refer servicing to qualified personnel.



### Caution

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



### Caution

These service instructions are for use by qualified service personnel only.

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

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

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

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

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



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

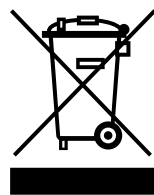
injury from tip-over.

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

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

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

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



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

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

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

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

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

21. Use this apparatus in tropical and/or moderate climates.

## LEGAL DISCLAIMER

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## LIMITED WARRANTY

For the applicable warranty terms and conditions and additional information regarding MUSIC Group's Limited Warranty, please see complete details online at [music-group.com/warranty](http://music-group.com/warranty).

# Chapter 1: Safety Information

## 1.1 Intended Use

The rigging components (TBV123-FB flybar, rigging pins, mounting links) shall only be used in conjunction with TURBOSOUND TBV123, TBV123-AN loudspeakers and TBV118L and TBV118L-AN subwoofers as described in this manual.

NOTE: Throughout this manual, and unless otherwise noted, the term "TBV123" refers to the TBV123 passive loudspeaker or the TBV123-AN powered loudspeaker. These speakers share identical cabinet dimensions and rigging points. The term "TBV118L" refers to the TBV118L passive subwoofer, or the TBV118L-AN powered subwoofer. These subwoofers share identical cabinet dimensions and rigging points.

## 1.2 Intended Use of this Manual

The instructions in this manual describe how to assemble various configurations of TBV123 loudspeaker cabinets, TBV118L subwoofers, and the TBV123-FB flybar, in readiness for suspending or ground stacking.

These instructions shall only be used with the TURBOSOUND TBV123, TBV123-AN, TBV118L, TBV118L-AN, and TBV123-FB 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 Group 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 Group 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 TBV123-FB flybar is designed to suspend a maximum of 4 TBV123 loudspeaker cabinets, or 2 TBV118L subwoofers, or a mixed array of 1 TBV118L subwoofer with 2 TBV123 loudspeaker cabinets. The speakers may be flown with any vertical splay angle configuration and from any of the pick points. This corresponds to a Working Load Limit (WLL) of 100 kg with a design factor of 10:1.

TBV installation procedures and recommendations described in Chapters 3-5 are based on 10:1 design factor. TBV enclosure counts and combinations are also given for 5:1 and 7:1 design factors in Chapter 13. Check local regulations in order to comply with regional design factor requirements. Always refer to EASE FOCUS II 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 12 for information about care maintenance and disposal.

## 1.7 Secondary Safeties

All loudspeakers flown in theatres, studios or other places of work and entertainment, in addition to the principle load bearing means of suspension, shall 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.

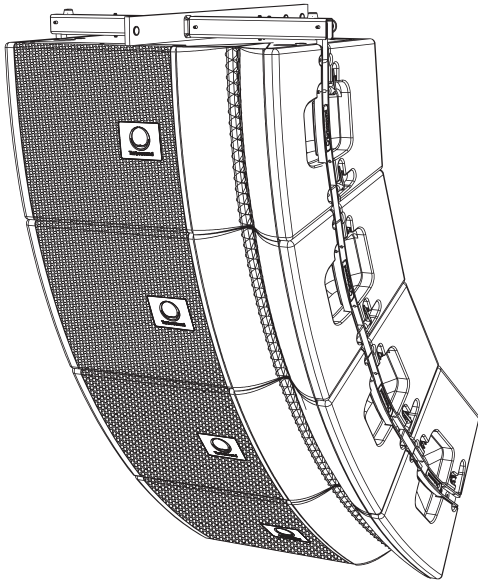
### NOTE

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

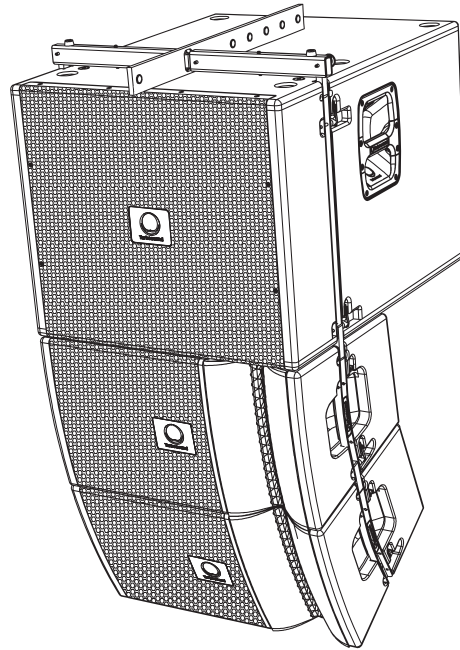
## Chapter 2: Introduction

### 2.1 Typical Configurations

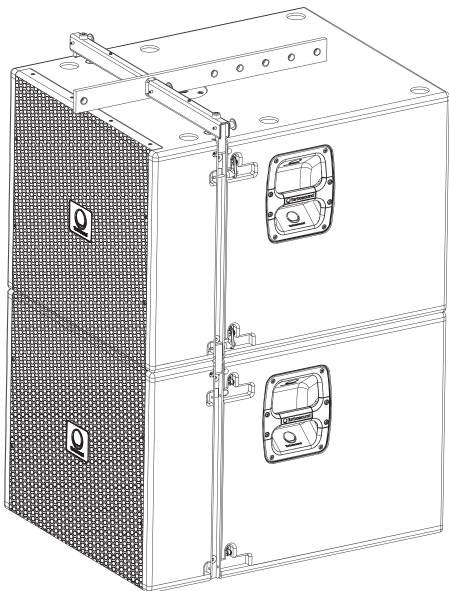
**TBV123 Array (See Chapter 3)**



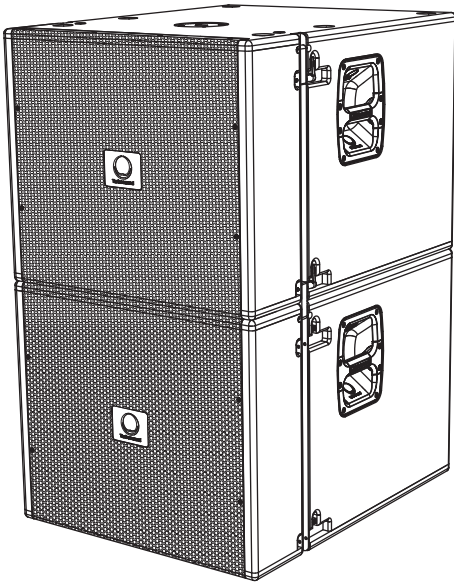
**TBV118L and TBV123 Array (See Chapter 5)**



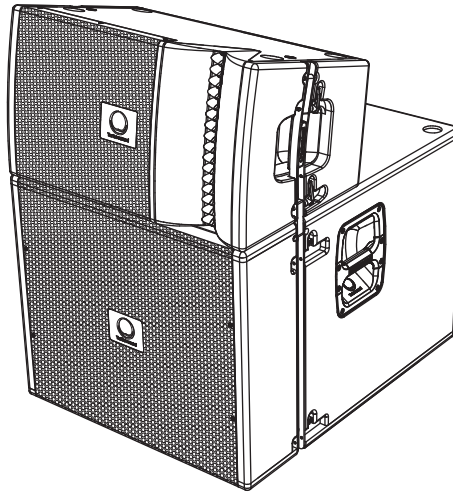
**TBV118L Array (See Chapter 4)**



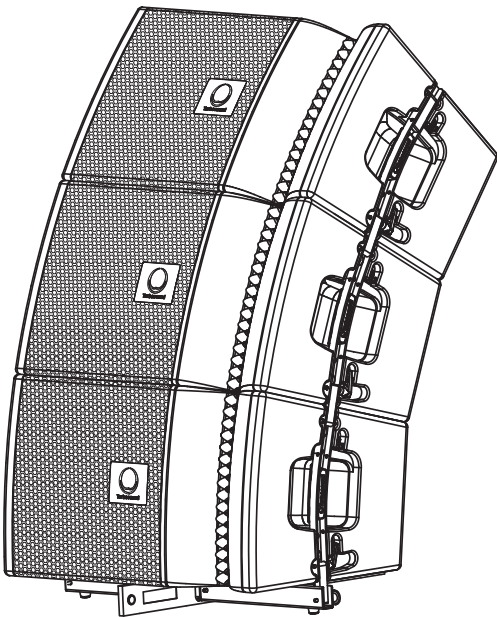
**TBV118L Subwoofer Ground Stack (See Chapter 6)**



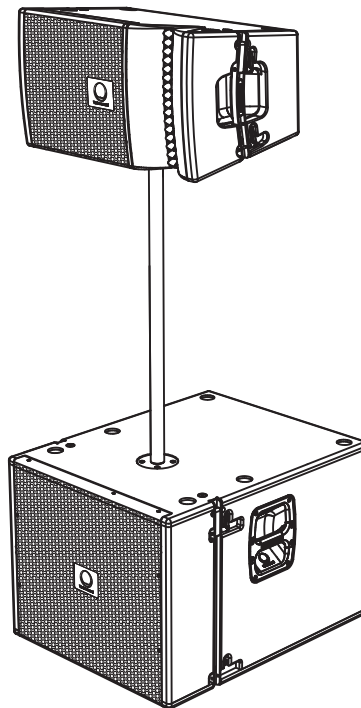
**TBV118L and TBV123 Array Ground Stack (See Chapter 7)**



**TBV123 Array Ground Stack (See Chapter 8)**



**TBV118L and TBV123 Array Pole Mount (See Chapter 9)**

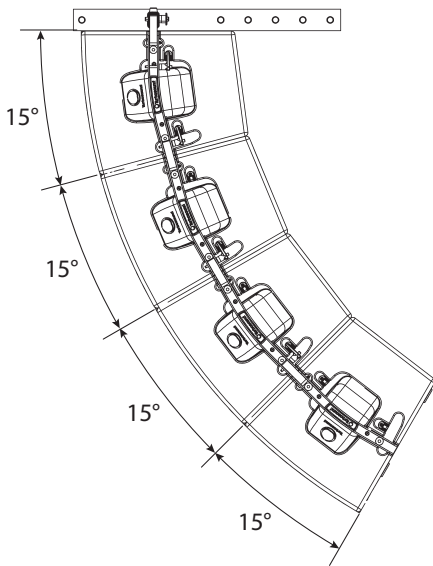


## 2.2 Rigging and Acoustic Simulation Software

The EASE FOCUS II 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>

Further information about the TBV models is available from [www.turbosound.com](http://www.turbosound.com)



The TBV123 is a constant curvature line array, and the inter-cabinet angle is fixed at 15 degrees.

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

Once an optimum system has been designed using the EASE FOCUS II software, the correct suspension hole on the TBV123-FB flybar should be noted, where your bow shackle would be fitted for single-point suspension. For two-point suspension, pick point holes #1 and #6 can be utilized in conjunction with front and rear chain motors to obtain the desired array site angle.

The EASE FOCUS II screenshot below is for a typical TBV123 configuration. Check the "RIGGING" Tab and note installation parameters such as: array weight, bottom element elevation above ground level, bottom enclosure angle.

### **⚠ 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.

### EASE FOCUS II Typical Screenshot for a TBV123/TBV118 Mixed Array

The screenshot displays the EASE FOCUS II software interface. The main window shows a 3D rigging view of a TBV123/TBV118 mixed array. The array is suspended from a flybar, and the software indicates a weight of 83.50 kg and a bottom angle of 38.0 degrees. The array is positioned 8.83 m above ground level. The software also shows the array's position and orientation in a 3D coordinate system (X, Y, Z) and provides a detailed view of the array's geometry and suspension points.

The interface includes a menu bar (File, Edit, View, Help) and a toolbar. The main window is divided into several panels:

- Object Properties:** System Parameters (Setup: Flown, Label: BERLIN), Position & Orientation (X [m]: -59.26, Y [m]: 14.24, Z [m]: 10.00), Rigging (Box Count: 3, Weight: 83.50 kg, Pinpoint: Pin 2), and Cabinet settings (Gain, Angle).
- Top View:** A 2D projection of the array and its suspension points.
- Rigging:** A detailed 3D view of the array and its suspension points, showing the weight and bottom angle.
- Side View:** A 2D projection of the array and its suspension points.
- Levels:** A view of the array's position relative to the ground level.
- Frequency Response:** A graph showing the array's frequency response.
- Distribution Graph:** A graph showing the array's distribution of sound.

The software also displays the input voltage (41.0 dBV) and the maximum input voltage (41.0 dBV).

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

## 2.3 Weights

Item	Quantity	Weight (kg)	Weight (lbs)
TBV123	1	22.0	48.5
	2	44.0	97.0
	3	66.0	145.5
	4	88.0	194.0
	5	110.0	242.5
	6	132.0	291.0

Item	Quantity	Weight (kg)	Weight (lbs)
TBV118L	1	37.0	81.6
	2	74.0	163.1
	3	111.0	244.7
	4	148.0	326.3
	5	185.0	407.9

Item	Quantity	Weight (kg)	Weight (lbs)
TBV123-AN	1	23.0	50.7
	2	46.0	101.4
	3	69.0	152.1
	4	92.0	202.8
	5	115.0	253.5
	6	138.0	304.2

Item	Quantity	Weight (kg)	Weight (lbs)
TBV118L-AN	1	38.5	84.9
	2	77.0	169.8
	3	115.5	254.6
	4	154.0	339.5
	5	192.5	424.4

Item	Quantity	Weight (kg)	Weight (lbs)
TBV123-FB	1	5.2	11.4

## 2.4 TBV123-FB Flybar Working Load Limit (WLL)

Item	WLL (kg)	WLL (lbs)
TBV123-FB	100	220.5

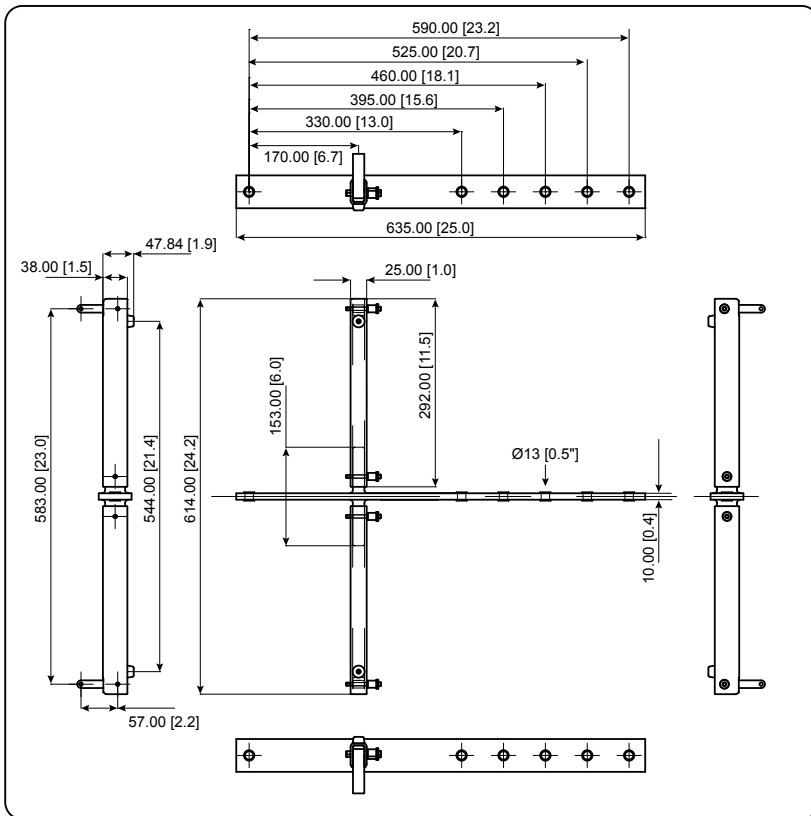
## 2.5 TBV123-FB Flybar Safety Warning Label





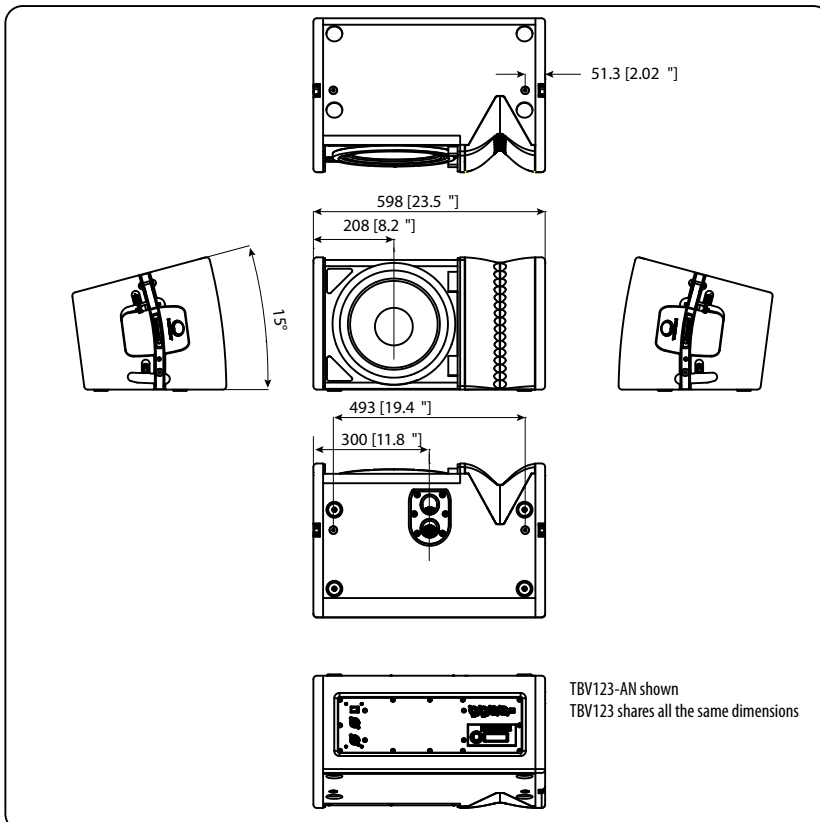
## 2.6 TBV123-FB Flybar Dimensions

See Chapter 12 for information regarding inspection, care, and maintenance.



## 2.7 TBV123 Cabinet Dimensions

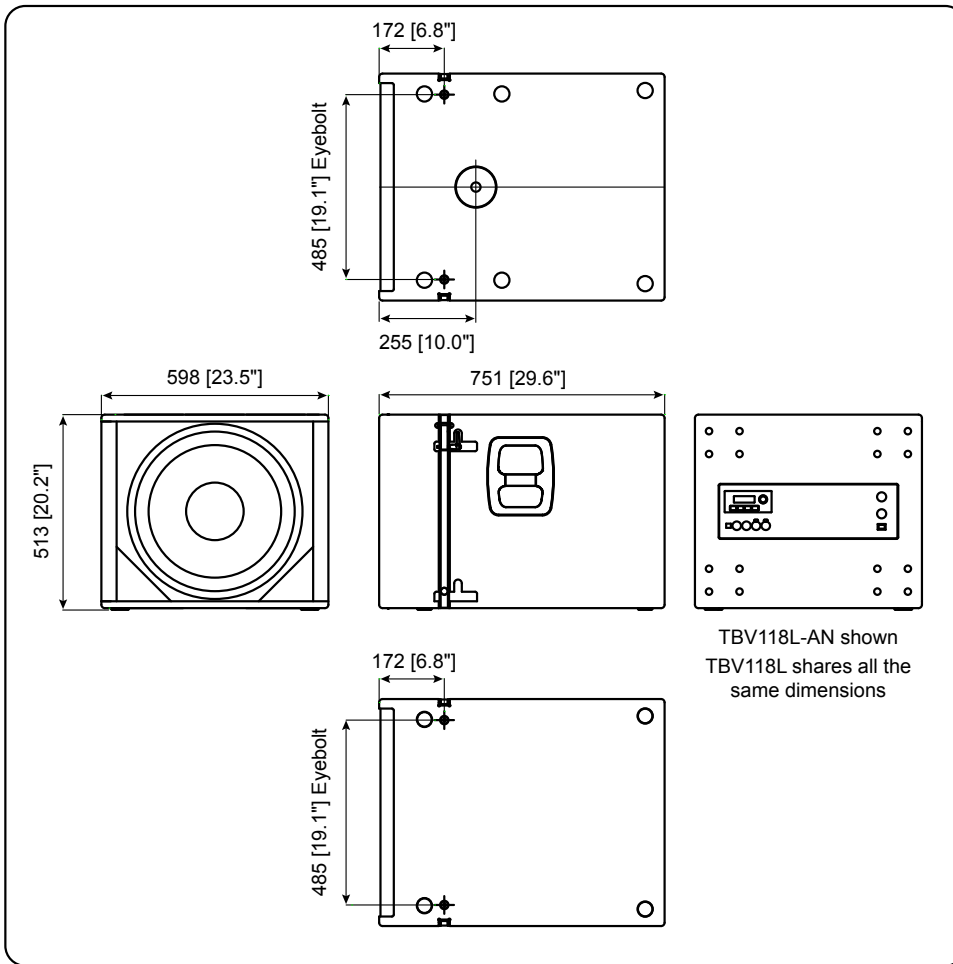
See Chapter 12 for information regarding inspection, care, and maintenance.





## 2.8 TBV118L Subwoofer Dimensions

See Chapter 12 for information regarding inspection, care, and maintenance.

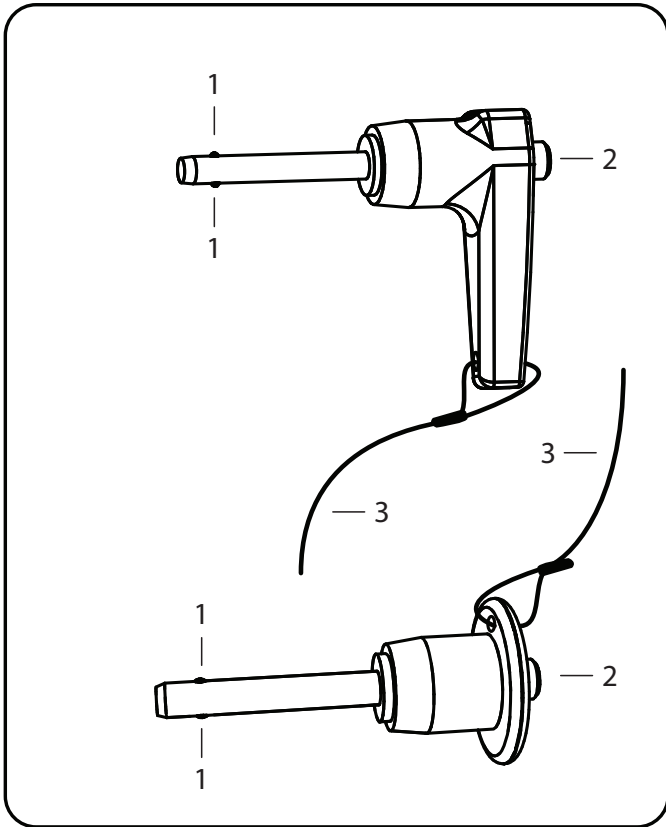


## 2.9 Rigging Pins

See Chapter 12 for information regarding inspection, care, and maintenance.

These pins are the fundamental mechanical fastener for the assembly of the TBV123-FB flybar, TBV123 cabinet, and the TBV118L subwoofer.

The rigging pins for the cabinets and subwoofer have an "L" shape. The pins used for assembling the TBV123-FB flybar are straight, and should only be used for the flybar connections.



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



### WARNING

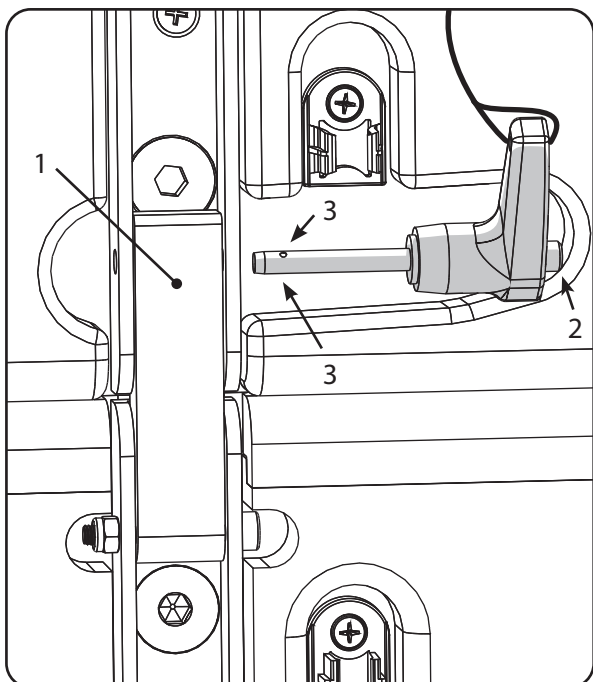
BEFORE EVERY USE, INSPECT ALL PINS FOR DAMAGE, AND VERIFY THE CORRECT OPERATION OF THE SPRING LOCKING MECHANISM. DO NOT USE ANY PINS THAT SHOW SIGNS OF DAMAGE. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.



### WARNING

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

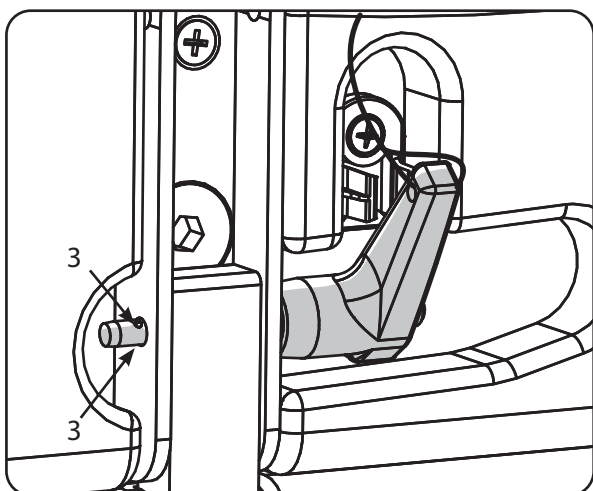
## 2.9.1 Rigging Pin Installation



### Pin Installation

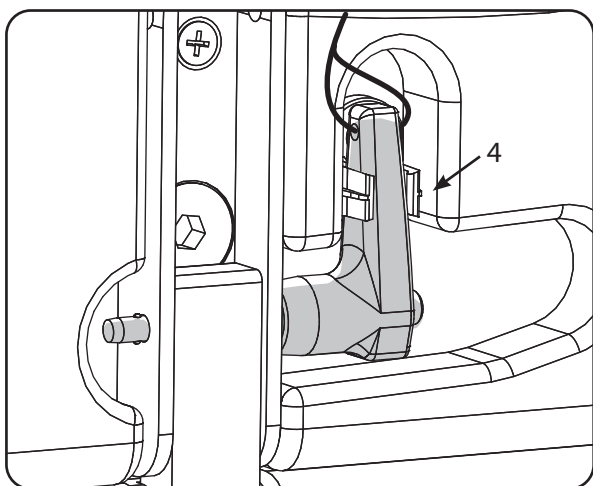
The following example shows how to use the rigging pins to join two TBV123 cabinets together. Exact details are given in later chapters of this manual.

1. Support the weight of the cabinets to be joined.
2. Align the top mounting link (1) of the lower TBV123 cabinet with the corresponding mounting holes in the upper TBV123 cabinet. Align the link with the mounting holes so the pin can pass through and join them together.
3. Press the button (2) at the end of the pin, and insert the pin in as far as it will go. The spring balls (3) will retract while the button is being held, allowing the pin to pass through the holes.
4. Release the button (2) when the pin is fully inserted.
5. Check the pin is correctly inserted as far as it will go, and that both spring balls (3) are visible. Check that the components being connected have been correctly captured together by the pin.
6. 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.
7. Rotate the arm of the pin until it is captured by the spring clip (4). This makes the pin extra secure, and will also prevent the pins from vibrating and rattling when the speaker is in use.
8. Repeat the pin installation for the other side of the cabinets.

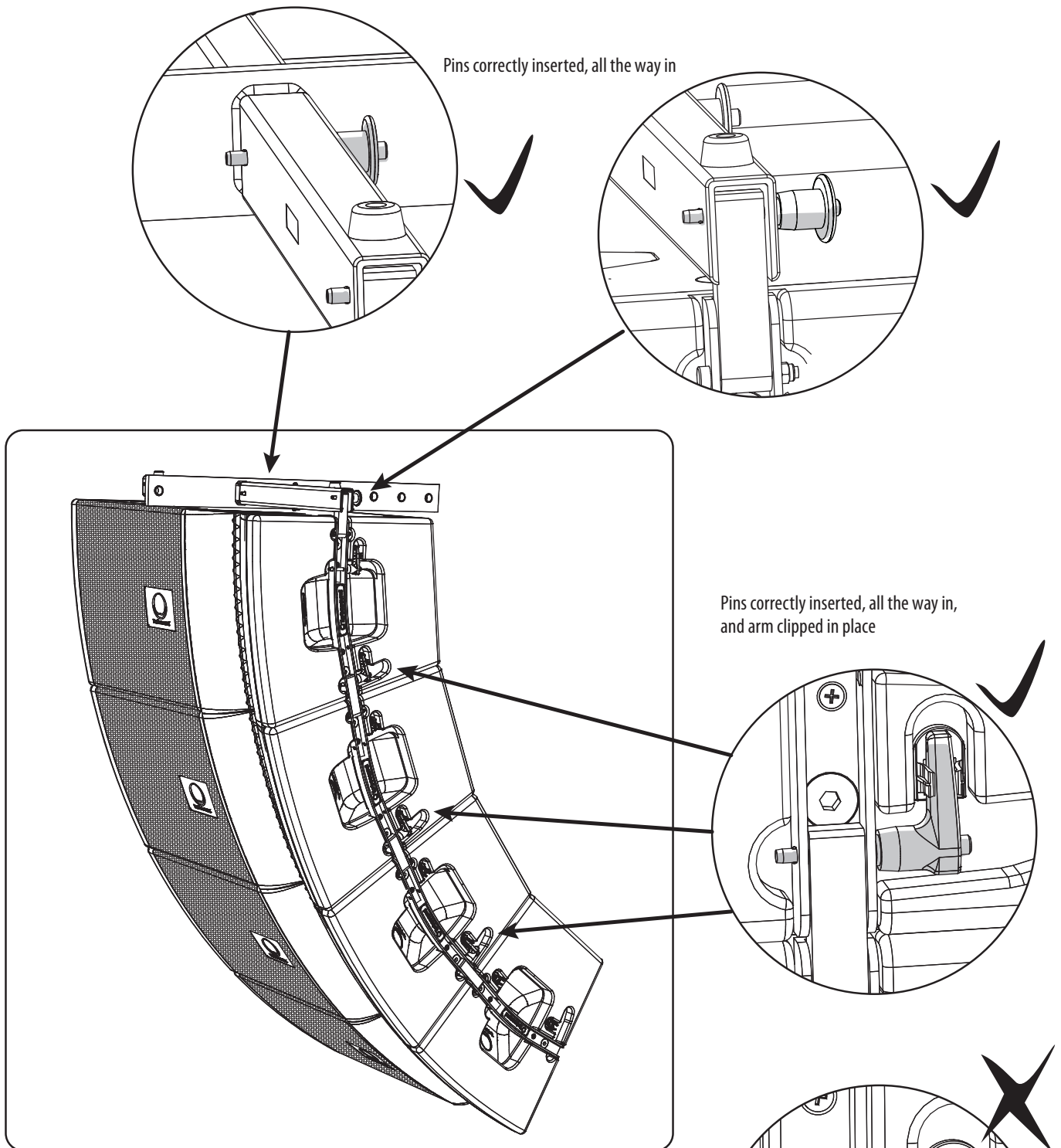


### Pin Removal

1. Support the weight of the components to be disconnected.
2. Rotate the arm of the pin until it is released by the spring clip (4).
3. Press the button (2) and pull out the pin joining the components together.
4. Do this for both sides of the cabinet.
5. Carefully separate the cabinets.



## 2.9.2 Typical Locations where Rigging Pins are used



### **⚠ WARNING**

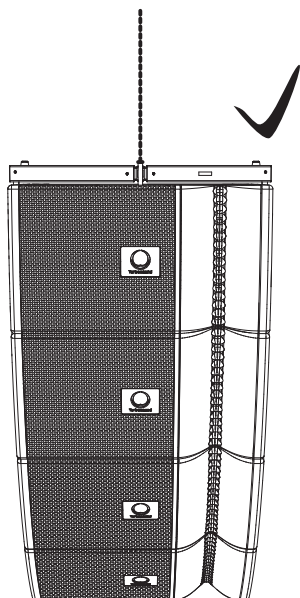
VERIFY THAT EACH PIN IS CORRECTLY INSERTED, AND THAT EACH PIN CANNOT BE PULLED OUT WITHOUT PRESSING THE RELEASE BUTTON FIRST. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

Pins incorrectly inserted (Not inserted fully, spring balls are not visible, and arm not clipped in place)

**GAP !**

## 2.10 Vertical Orientation

CORRECT INSTALLATION



### Vertical Orientation Only!

The mechanical design of the TBV123 cabinet, TBV118L subwoofer, and the TBV123-FB flybar uses mounting links and rigging 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 flybar.

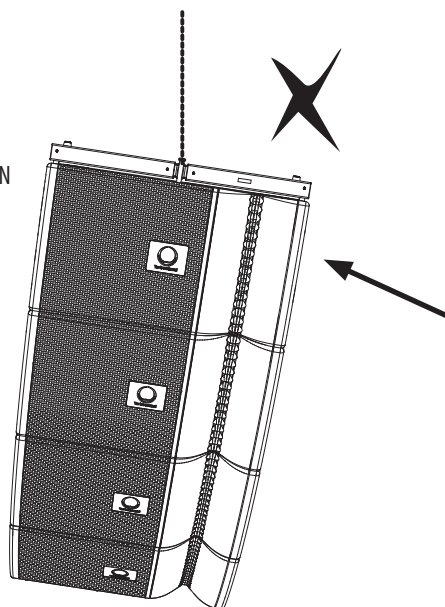
#### WARNING

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

THE TBV123 CABINETS, TBV118L SUBWOOFERS, AND TBV123-FB FLYBAR SHALL NOT BE CLIMBED UPON. THIS MAY CAUSE STRAIN AND FAILURE OF THE MECHANICAL STRUCTURE, LEADING TO POSSIBLE PERMANENT INJURY OR DEATH.

INCORRECT INSTALLATION

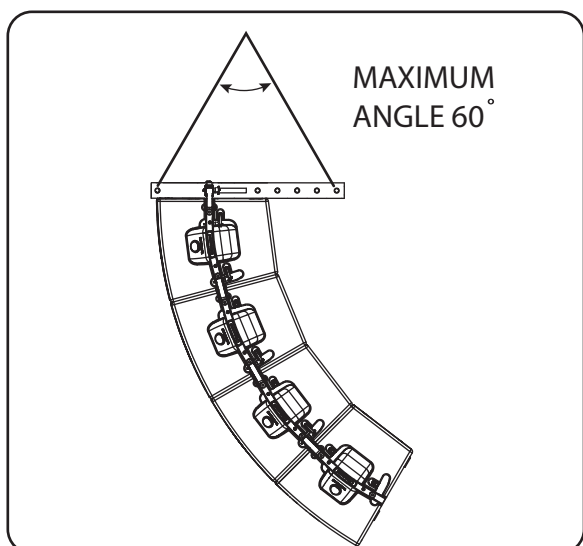


#### WARNING

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

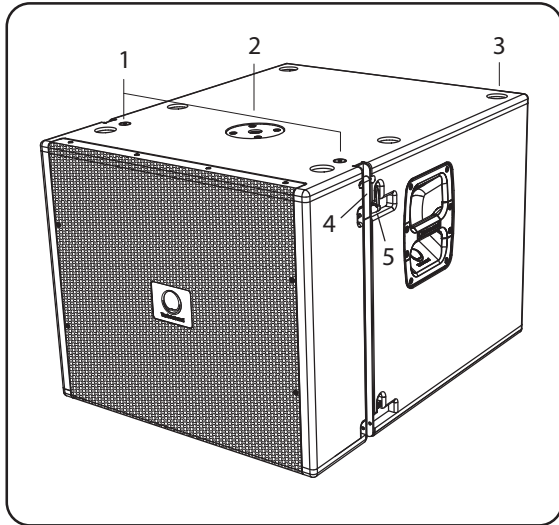
#### WARNING

DO NOT EXCEED A MAXIMUM 2-LEG BRIDLE HITCH ANGLE OF 60 DEGREES. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.



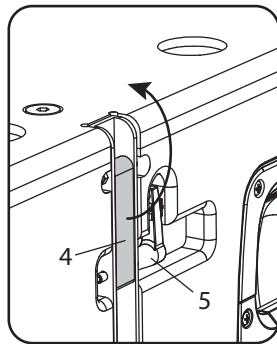
## 2.11 TBV118L Subwoofer Mounting Components

### Mounting Links Down

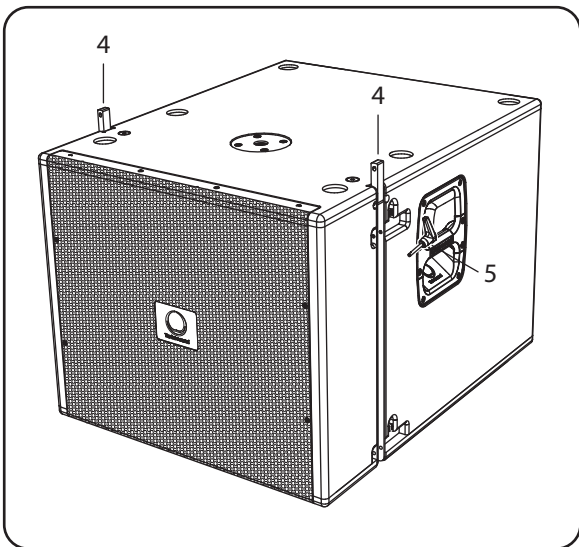


The TBV118L subwoofer has two retractable mounting links at the top (4), that allow it to be attached to a TBV123-FB flybar, or to another TBV118L subwoofer, or to a TBV123 cabinet. Eyebolt holes and a pole mount hole are also present.

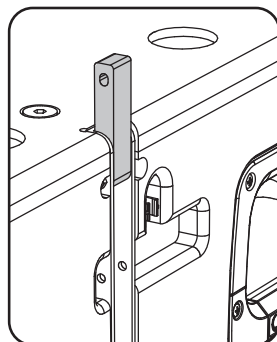
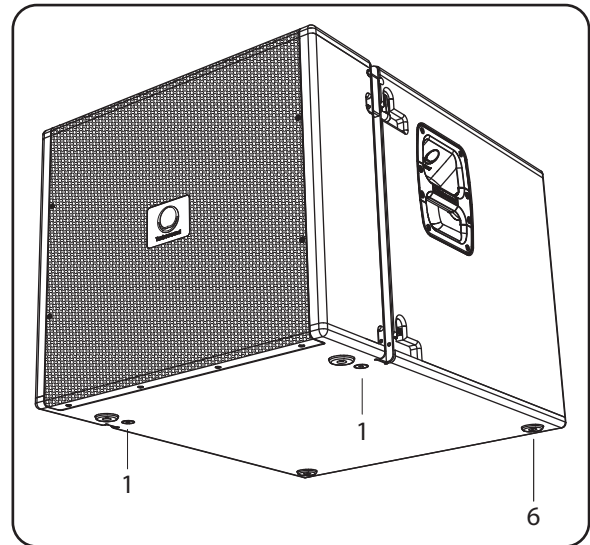
1. **Eyebolt locations** – 4 threaded holes (2 top, 2 bottom) allow eyebolts to be fitted for flying the subwoofer without the TBV123-FB flybar.
2. **Pole Mount** – This M20 threaded hole is for the optional pole mounts, and allows up to 2 TBV123 cabinets to be pole mounted above the subwoofer.
3. **Recesses** – These shallow recesses are designed to fit the feet of another TBV118L subwoofer above, or another TLX123 cabinet.
4. **Mounting Links** – These mounting links are used to secure the TBV118L subwoofer to a TBV123-FB flybar, or to another TBV118L, or a TBV123 cabinet in ground stacked mode only (do not suspend TBV118L enclosures underneath TBV123). They rotate about a captive pivot bolt.
5. **Pins** – If the mounting links (4) are in the down position, then the rigging pins are used to secure them. If the mounting links are used in the up position, the pins can be used to secure another TBV118L subwoofer or TBV123 cabinet above. A lanyard is connected to prevent the loss of the pins.
6. **Feet** – The TBV118L subwoofer has 4 feet for resting on the ground, stage, or on top of another TBV118L subwoofer.



### Mounting Links Up



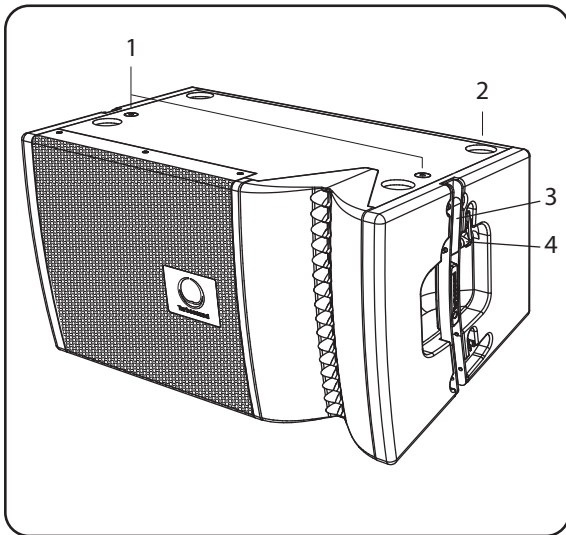
### Bottom View





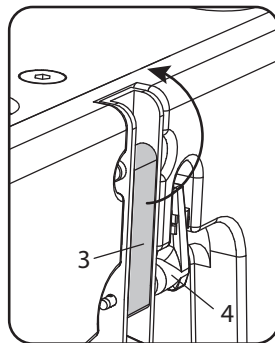
## 2.12 TBV123 Cabinet Mounting Components

### Mounting Links Down

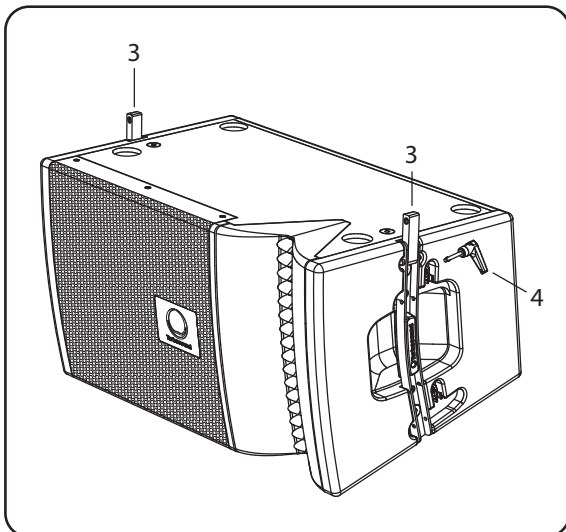


The TBV123 cabinet has two retractable mounting links at the top (3), that allow it to be attached to a TBV123-FB flybar, to another TBV123 cabinet, or to a TBV118L subwoofer. Eyebolt holes and pole mount holes are also present.

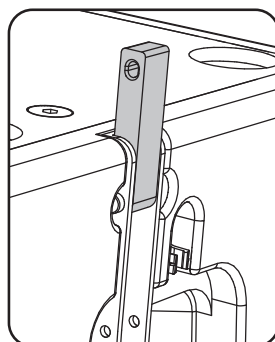
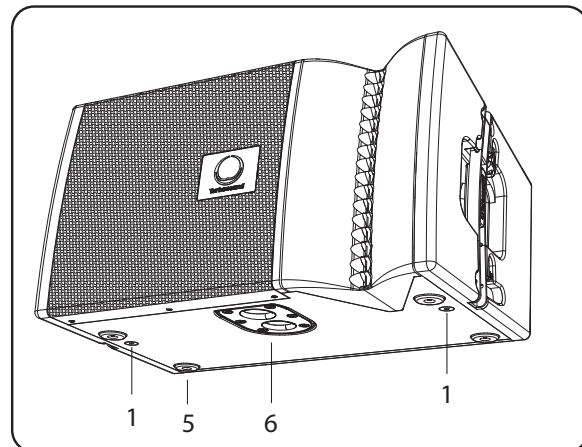
1. **Eyebolt locations** – 4 threaded holes (2 top, 2 bottom) allow eyebolts to be fitted for flying the TBV123 cabinet without the TBV123-FB flybar.
2. **Recesses** – These shallow recesses are designed to fit the feet of another TBV123 cabinet above it.
3. **Mounting Links** – These mounting links are used to secure the TBV123 cabinet to a TBV123-FB flybar, or another TBV123 cabinet or a TBV118L subwoofer. They rotate about a captive pivot bolt.
4. **Pins** – If the mounting links (3) are in the down position, then the rigging pins are used to secure them. If the mounting links are used in the up position, the pins can be used to secure another TBV123 cabinet or TBV118L subwoofer above. A lanyard is connected to prevent the loss of the pins.
5. **Feet** – The TBV123 cabinet has 4 feet for resting on top of another TBV123 cabinet or TBV118L subwoofer.
6. **Pole Mount Holes** – These 35 mm holes underneath are for the optional pole mounts, and allow the cabinet to be pole mounted above a TBV118L subwoofer. The front hole allows the TBV123 cabinet to tilt down compared to the second hole.



### Mounting Links Up

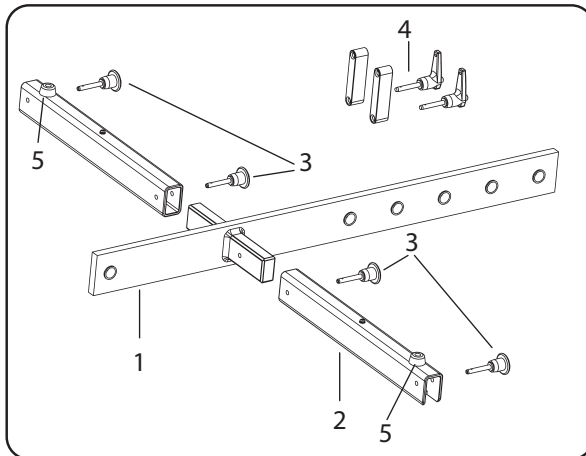


### Bottom View

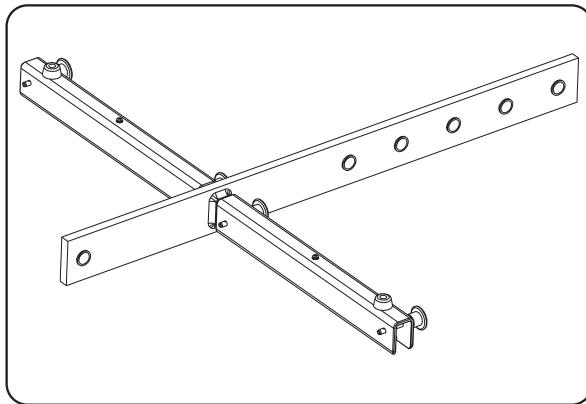


## 2.13 TBV123-FB Flybar Mounting Components

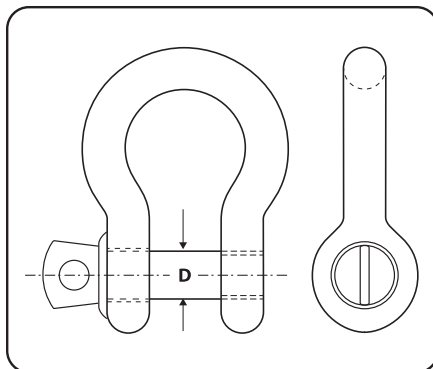
### Flybar Unassembled



### Flybar Assembled



### Typical Bow Shackle



The TBV123-FB flybar shall only be used with TBV123 cabinets and TBV118L subwoofers. Before use, it must be assembled by securing the arms to the main bar using the supplied rigging pins.

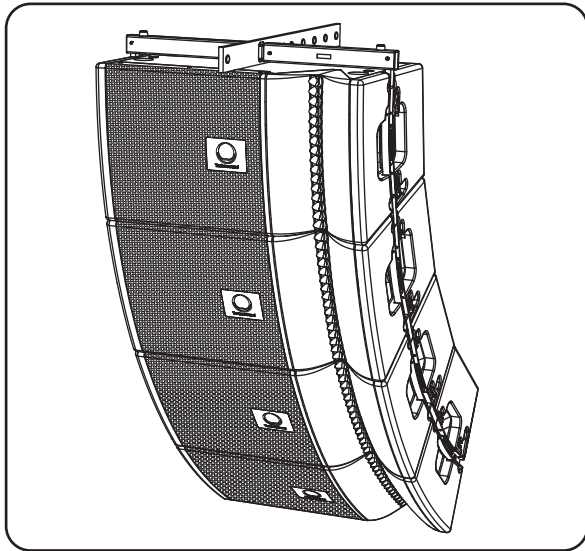
- 1. Main Bar** – The main bar has six suspension pick points including one at the front. These 13 mm diameter holes are used to attach a bow shackle or similar lifting equipment for flying the assembly. Use the EASE FOCUS II software to determine the correct fly point for each configuration. The main bar is only used with the arms (2) attached.
- 2. Arms** – These connect to the main bar (1) using two supplied rigging pins (3). Note: The main bar is supplied with a rubber U-gasket to protect loudspeaker enclosures suspended below the TBV123-FB. Always attach arms so that the rubber U-gasket is oriented downwards.
- 3. Rigging Pins** – These rigging pins are used to secure arms (2) to the main bar (1) and TBV123 or TBV118L mount links to the arms (2).
- 4. Mounting Links and Pins** – These extra components are supplied so that the TBV123 cabinets can be suspended under TBV123-FB or TBV118L subwoofers in inverted orientation for mirror image LR configurations. Keep these components in a safe and dry place if not used.
- 5. Feet** – These are used when the TBV123-FB Flybar is inverted and used to support a ground stack configuration.

Suspend the array by attaching one or more bow shackles or similar lifting devices with a pin diameter (D) to fit the 13 mm diameter suspension pick point. Typically, manufacturers of bow shackles provide suitable devices with pin diameters between 11 mm and 19 mm, and with work loads between 1 tonnes and 3.25 tonnes. If third-party shackles are used, they must be of the correct size and correct WLL, and must be supplied and specified by an authorised person.

### WARNING

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.

## Chapter 3: Assembling a TBV123 Array on a TBV123-FB Flybar



The following procedure shows how to build an array of TBV123 cabinets by adding them one at a time, up to a maximum of 4.

Alternatively, the cabinets can be pre-assembled into a group of 4, and then connected to the flybar at a later time.

The system is flown using a TBV123-FB flybar that attaches to your lifting system.

The top TBV123 cabinet connects to two mounting points on the flybar. Each TBV123 cabinet connects to the cabinet above using the integral mounting points and rigging pins. No tools are required.



### WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 4 TBV123 CABINETS FOR 1 TBV123-FB FLYBAR. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

### 3.0.1 Required Components

Item	Quantity
TBV123-FB Flybar	1
TBV123 Cabinet	4 (maximum)

### 3.0.2 Preparation

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

### 3.0.3 Location

Move the first TBV123 cabinet so it is sitting upright on a safe flat surface, directly below the suspension point.

### 3.0.4 Measured Weights

Please see Section 2.3 Weights on Page 9, and refer to EASE Focus Rigging Parameters when designing your system.

#### TBV123-FB Flybar Working Load Limit (WLL)

Item	Working Load Limit (WLL)	
TBV123-FB	100 kg	220.5 lbs

### 3.0.5 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

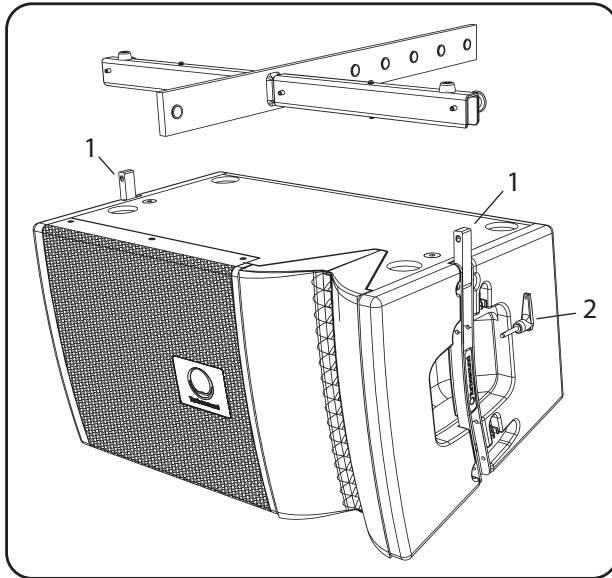


Protective Eyewear shall be worn



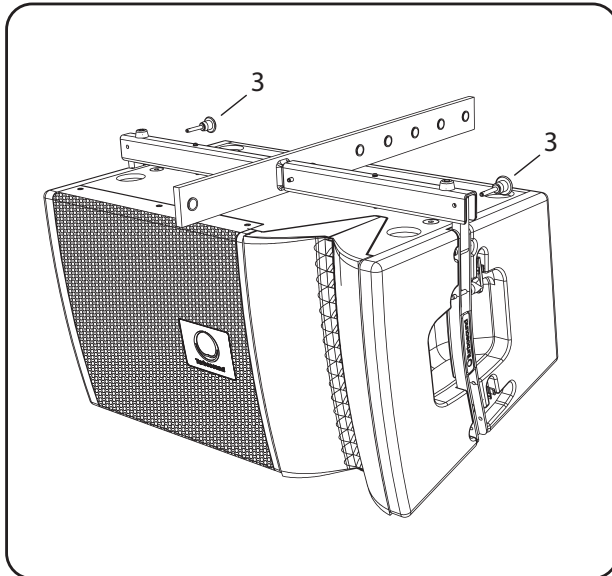
Practice Safe Lifting

### Procedure 3.1 Attaching a TBV123 Cabinet to the TBV123-FB Flybar

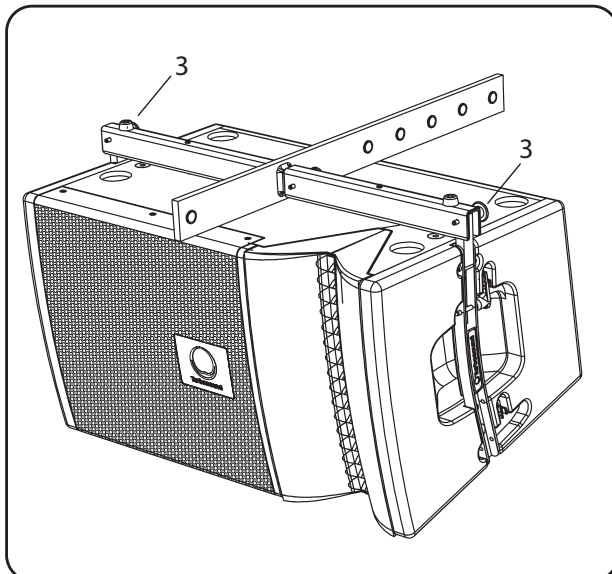
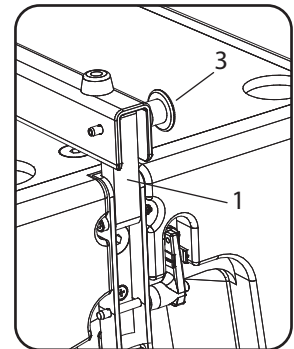
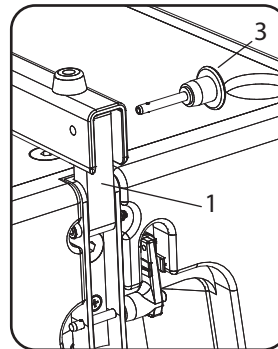


1. Assemble the flybar as shown on page 18.
2. Remove the rigging pins (2) from the TBV123 cabinet and lift up the 2 mounting links (1). Place the rigging pins back into their storage positions.
3. Lift the assembled TBV123-FB flybar into position above the prepared TBV123 cabinet.

Take care not to trap your fingers between components.



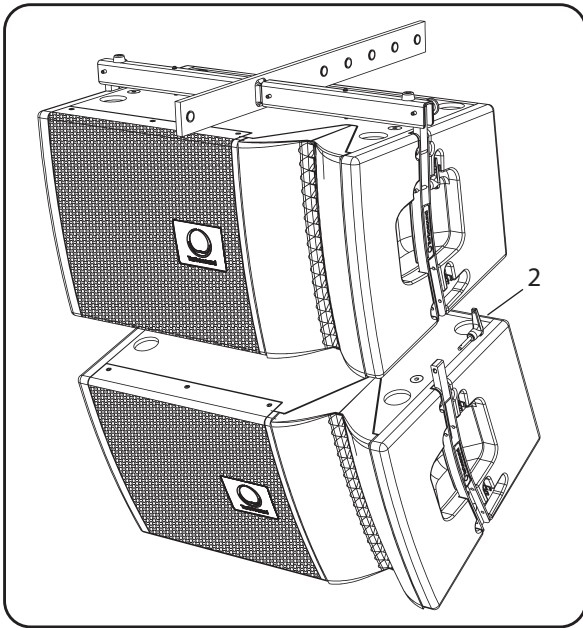
4. Remove the captive rigging pins (3) on the TBV123-FB.
5. Align the holes in the ends of the flybar arms with the corresponding holes in the TBV123 cabinet's mounting links (1). Insert the flybar's 2 rigging pins (3) to secure the mounting links and the flybar together.



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

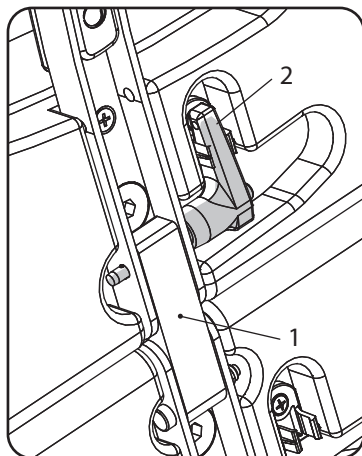


## Procedure 3.2 Attaching further TBV123 Cabinets



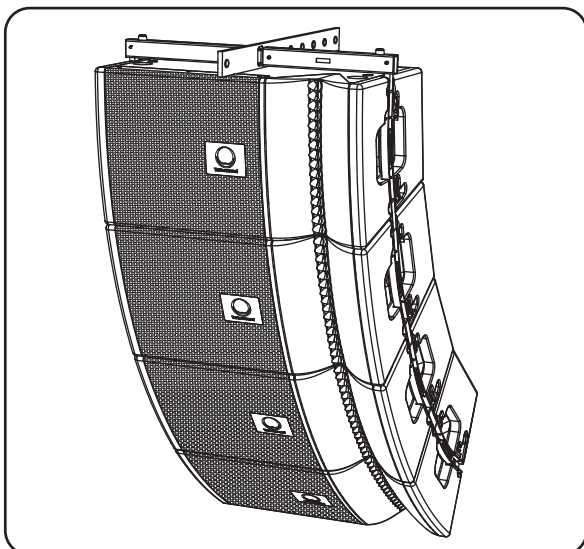
1. Prepare the next TBV123 cabinet, by lifting the mounting links (1) to the upwards position. The rigging pins (2) will be used to secure this cabinet to the TBV123 cabinet above.
2. Attach the bow shackle or other lifting equipment securely to the flybar mounting hole recommended by the EASE FOCUS II software, then attach the hook and chain.
3. Carefully position the flybar and cabinet assembly until it is on top of the lower cabinet. The feet of the top cabinet should fit into the recesses on the top surface of the lower cabinet.

Take care not to trap your fingers between components.



4. Adjust the position of the mounting links (1) of the lower cabinet to align with the mounting holes of the top cabinet. Fully insert the rigging pins (2) and rotate their arms until they are held in place by the clips. This will secure the rigging pins and also prevent them from rattling from audio vibrations during operation.

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



5. The addition of other TBV123 cabinets is performed by repeating steps 3 and 4 for each additional cabinet.

### **WARNING**

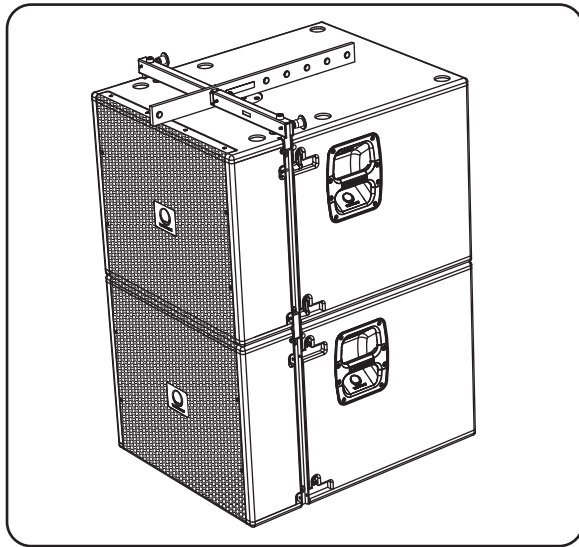
DO NOT EXCEED A TOTAL QUANTITY OF 4 TBV123 CABINETS FOR 1 TBV123-FB FLYBAR. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

### **NOTE**

Disassembly is the reverse of assembly.



## Chapter 4: Assembling a TBV118L Array on a TBV123-FB Flybar



The following procedure shows how to build an array of TBV118L subwoofers by adding them one at a time, up to a maximum of 2.

The system is flown using a TBV123-FB flybar that attaches to your lifting system.

The top TBV118L subwoofer connects to two mounting points on the flybar. Each TBV118L subwoofer connects to the subwoofer above using the integral mounting points and rigging pins. No tools are required.

### **WARNING**

DO NOT EXCEED A TOTAL QUANTITY OF 2 TBV118L SUBWOOFERS FOR 1 TBV123-FB FLYBAR. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

### 4.0.1 Required Components

Item	Quantity
TBV123-FB Flybar	1
TBV118L Subwoofer	2 (maximum)

### 4.0.2 Preparation

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

### 4.0.3 Location

Move the first TBV118L subwoofer cabinet so it is sitting upright on a safe flat surface, directly below the suspension point.

### 4.0.4 Measured Weights

Please see Section 2.3 Weights on Page 9, and refer to EASE Focus Rigging Parameters when designing your system.

### TBV123-FB Flybar Working Load Limit (WLL)

Item	Working Load Limit (WLL)	
TBV123-FB	100 kg	220.5 lbs

### 4.0.5 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



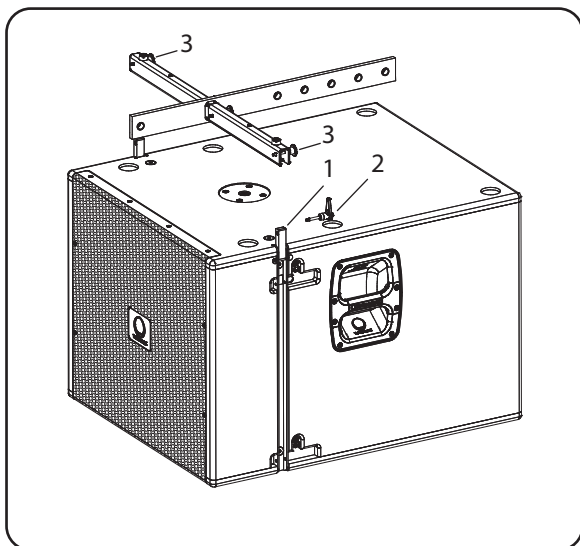
Protective Eyewear shall be worn



Practice Safe Lifting



## Procedure 4.1 Assembling a TBV118L Array on a TBV123-FB Flybar

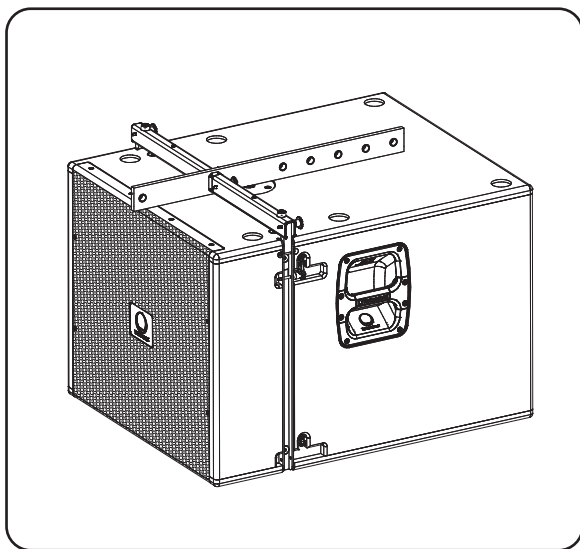


1. Prepare the TBV118L subwoofer, by removing the rigging pins (2) and lifting the mounting links (1) to the upwards position.
2. Lift the assembled TBV123-FB flybar into position above the prepared TBV118L subwoofer.

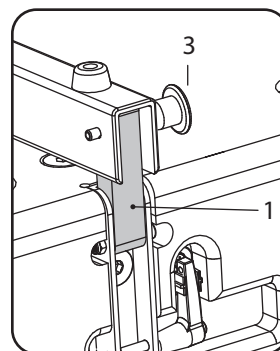
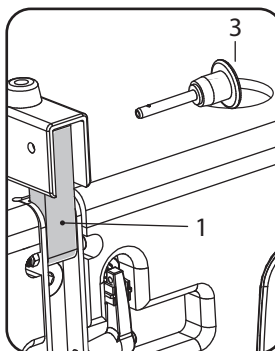
Take care not to trap your fingers between components.



3. Remove the captive rigging pins (3) on the TBV123-FB and place the TBV118L rigging pins (2) back in their storage position on the top enclosure.



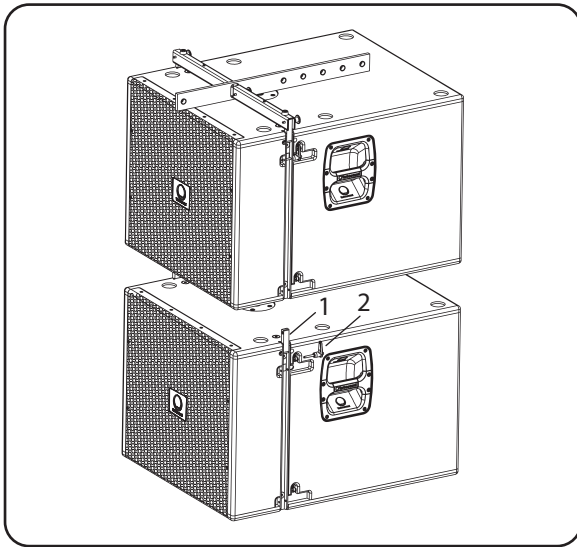
4. Align the holes in the ends of the flybar arms with the corresponding holes in the TBV118L subwoofer's mounting links (1). Insert the two, captive flybar rigging pins (3) to secure the mounting links and the flybar together.



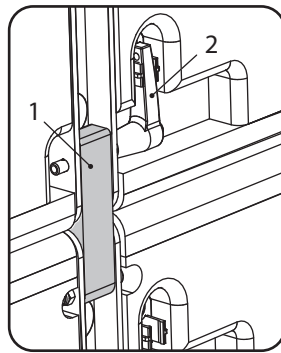
Double check that both pins are correctly inserted, before proceeding further.



## Procedure 4.1 continued



5. If you are flying just one TBV118L subwoofer, then this completes the assembly procedure. To add another TBV118L subwoofer, continue with the procedure steps below.
6. Attach the bow shackle or other lifting equipment securely to the flybar mounting hole recommended by the EASE FOCUS II software, then attach the hook and chain.
7. Prepare the next TBV118L subwoofer, by removing the rigging pins (2) and lifting the mounting links (1) to the upwards position.



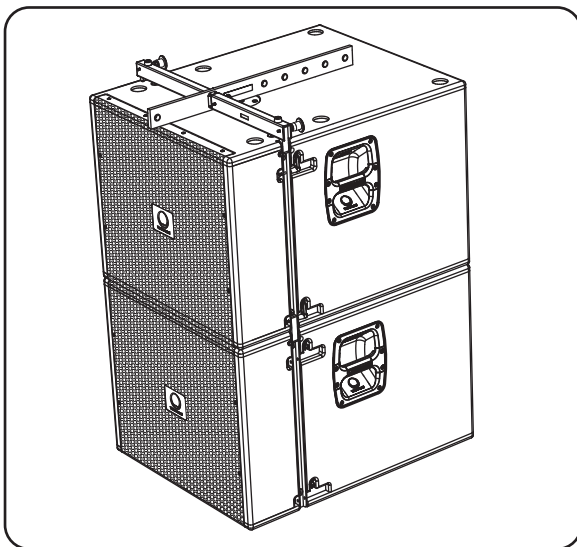
8. Carefully position the flybar/first subwoofer assembly until it is on top of the prepared lower subwoofer (with its mounting links (1) up). The feet of the top subwoofer should fit into the recesses on top of the lower subwoofer.

Take care not to trap your fingers between components.



9. Adjust the position of the mounting links (1) of the lower subwoofer to align with the lower mounting holes of the upper subwoofer. Fully insert the rigging pins (2) and rotate the arms until they are held in place by the clips. This will further secure the rigging pins and also prevent them from rattling from audio vibrations during operation.

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



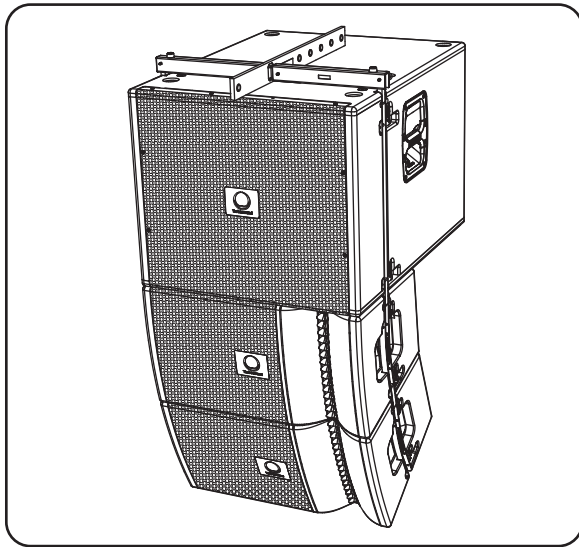
### **WARNING**

DO NOT EXCEED A TOTAL QUANTITY OF 2 TBV118L SUBWOOFERS FOR 1 TBV123-FB FLYBAR. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

### **NOTE**

Disassembly is the reverse of assembly.

## Chapter 5: Assembling a Mixed Array on a TBV123-FB Flybar



The following procedure shows how to build a mixed array of one TBV118L subwoofer and 2 TBV123 cabinets.

The system is flown using a TBV123-FB flybar that attaches to your lifting system.

The TBV118L subwoofer connects to the mounting points on the flybar. The top TBV123 cabinet connects to the subwoofer above using the integral mounting points and rigging pins. No tools are required.

**⚠ WARNING**

DO NOT EXCEED A TOTAL QUANTITY OF 1 TBV118L SUBWOOFER AND 2 TBV123 CABINETS FOR 1 TBV123-FB FLYBAR. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

**⚠ WARNING**

THIS ARRAY SHALL ONLY BE MADE WITH THE TBV118L SUBWOOFER ON TOP, AND THE TBV123 CABINETS BELOW. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

### 5.0.1 Required Components

Item	Quantity
TBV123-FB Flybar	1
TBV118L Subwoofer	1 (maximum)
TBV123 Cabinet	2 (maximum)

### 5.0.2 Preparation

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

### 5.0.3 Location

Move the TBV118L subwoofer cabinet so it is sitting upright on a safe flat surface, directly below the suspension point.

### 5.0.4 Measured Weights

Please see Section 2.3 Weights on Page 9, and refer to EASE Focus Rigging Parameters when designing your system.

### TBV123-FB Flybar Working Load Limit (WLL)

Item	Working Load Limit (WLL)	
TBV123-FB	100 kg	220.5 lbs

### 5.0.5 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

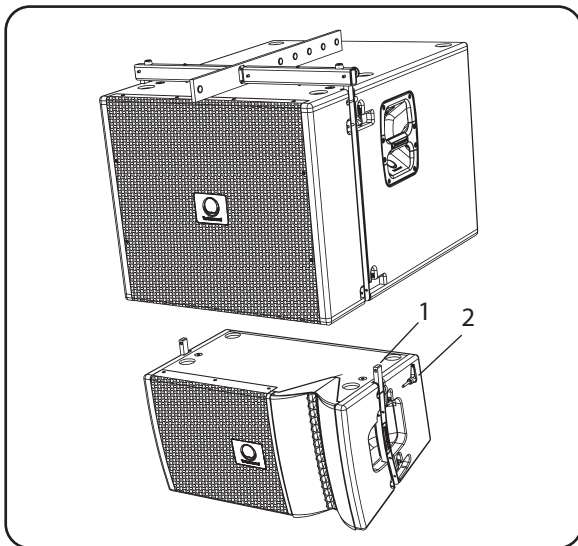


Protective Eyewear shall be worn



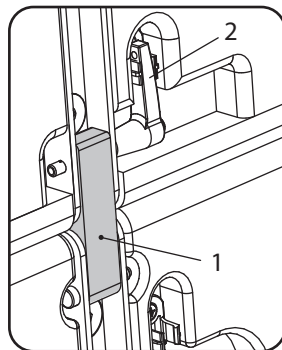
Practice Safe Lifting

## Procedure 5.1 Assembling a Mixed Array on a TBV123-FB Flybar



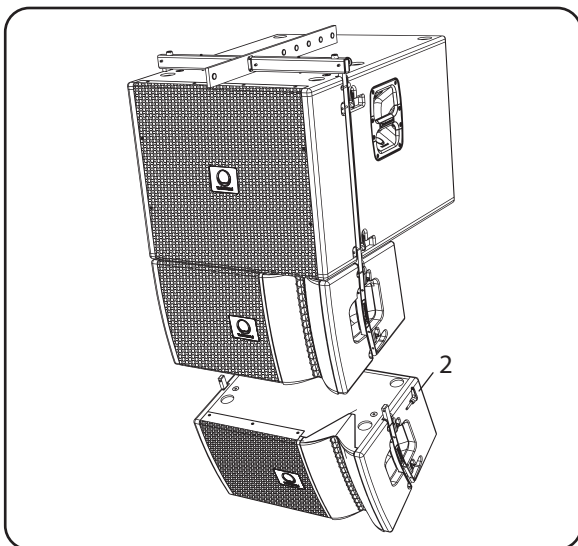
1. Assemble the TBV123-FB flybar and a TBV118L subwoofer as shown in procedure 4.1.
2. Attach the bow shackle or other lifting equipment securely to the flybar mounting hole recommended by the EASE FOCUS II software, then attach the hook and chain.
3. Carefully position the flybar/first subwoofer assembly until it is on top of the prepared TBV123 cabinet (with its mounting links (1) up). The front feet of the subwoofer should fit into the recesses on the top surface of the TBV123 cabinet.

Take care not to trap your fingers between components.



4. Adjust the position of the mounting links (1) of the TBV123 cabinet to align with the lower mounting holes of the subwoofer. Fully insert the rigging pins (2) and rotate the arms until they are held in place by the clips. This will further secure the rigging pins and also prevent them from rattling from audio vibrations during operation.

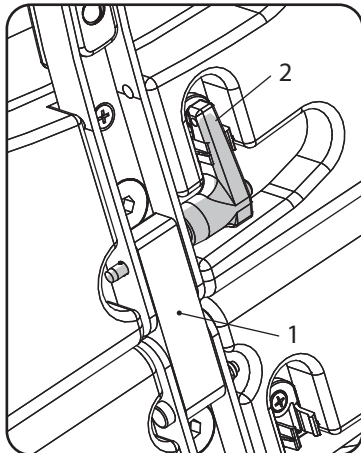
Double check that all pins are correctly inserted, before proceeding further.



5. If you are only adding one TBV123 cabinet, then this completes the procedure.
6. Carefully hoist and position the flybar/subwoofer/cabinet assembly until it is on top of the prepared lower TBV123 cabinet (mounting links (1) up). The feet of the upper TBV123 cabinet should fit into the recesses on top of the lower cabinet.

Take care not to trap your fingers between components.



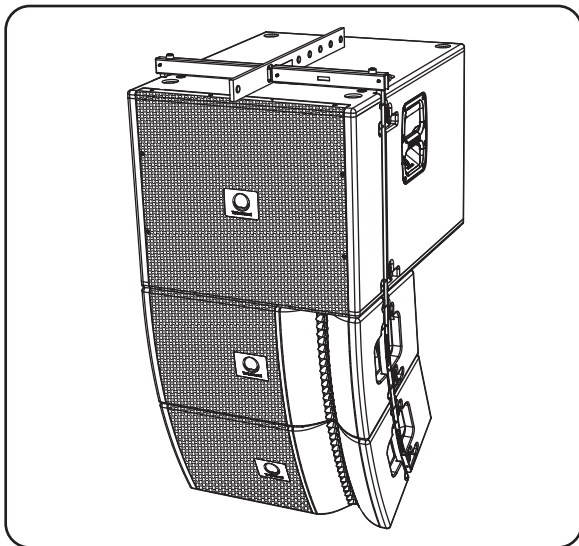


7. Adjust the position of the mounting links (1) of the TBV123 cabinet to align with the lower mounting holes of the upper TBV123 cabinet. Fully insert the rigging pins (2) and rotate the arms until they are held in place by the clips. This will further secure the rigging pins and also prevent them from rattling from audio vibrations during operation.

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



8. This completes the mixed array assembly procedure.



**! WARNING**

DO NOT EXCEED A TOTAL QUANTITY OF 1 TBV118L SUBWOOFER AND 2 TBV123 CABINETS FOR 1 TBV123-FB FLYBAR. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

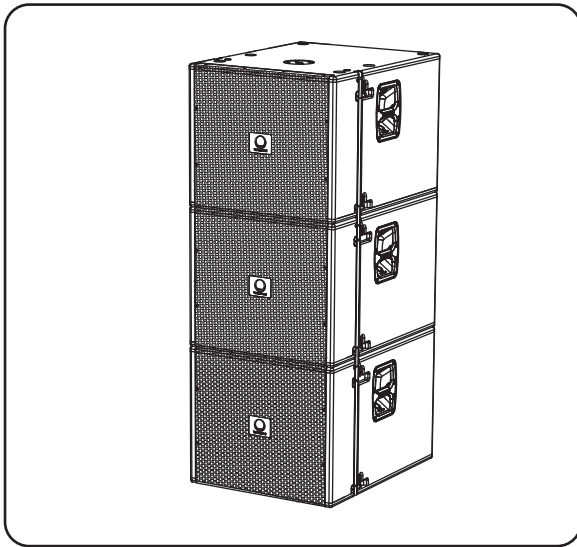
**! WARNING**

THIS ARRAY SHALL ONLY BE MADE WITH THE TBV118L SUBWOOFER ON TOP, AND THE TBV123 CABINETS BELOW. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

**NOTE**

Disassembly is the reverse of assembly.

## Chapter 6: Assembling a TBV118L Ground Stack



The following procedure shows how to build a ground stack of TBV118L subwoofers by adding them one at a time, up to a maximum of 3.

Each TBV118L subwoofer connects to the subwoofer above using the integral mounting points and rigging pins. No tools are required.

### **WARNING**

DO NOT EXCEED A TOTAL QUANTITY OF 3 TBV118L SUBWOOFERS FOR THIS GROUND STACK CONFIGURATION. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

### 6.0.5 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.

### 6.0.1 Required Components

Item	Quantity
TBV118L Subwoofer	3 (maximum)

### 6.0.2 Preparation

Use the EASE FOCUS II software application to design your system to suit the venue. This will calculate the coverage of the ground stack.

### 6.0.3 Location

The TBV118L subwoofers should be located on a flat, horizontal, and dry surface, capable of supporting the weight of the complete assembly.

### 6.0.4 Measured Weights

Please see Section 2.3 Weights on Page 9, and refer to EASE Focus Rigging Parameters when designing your system.



Protective Headwear shall be worn



Protective Footwear shall be worn



Protective Gloves shall be worn



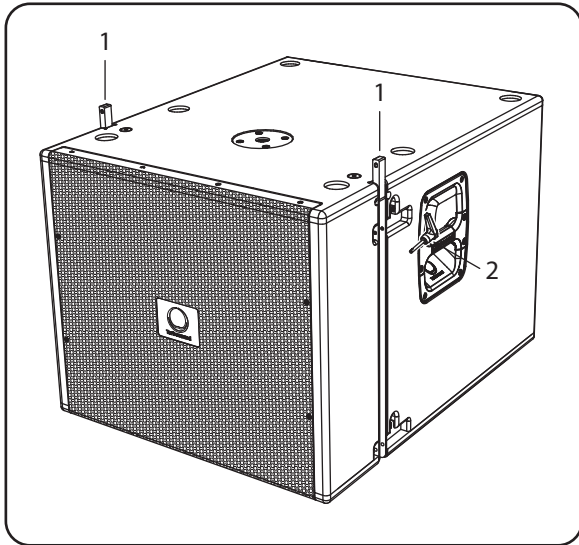
Protective Eyewear shall be worn



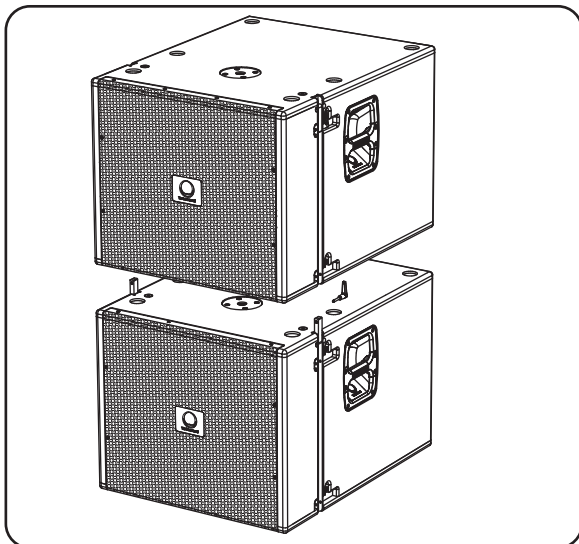
Practice Safe Lifting



## Procedure 6.1 Assembling a TBV118L Ground Stack

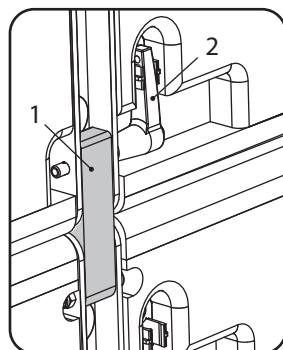


1. Prepare the first TBV118L subwoofer, by lifting the mounting links (1) to the upwards position. The rigging pins (2) will be used to secure this subwoofer to the subwoofer to be added on top.



2. Carefully position the next TBV118L subwoofer until it is on top of the prepared lower subwoofer. The feet of the top subwoofer should fit into the recesses on the top surface of the lower subwoofer.

Take care not to trap your fingers between components.

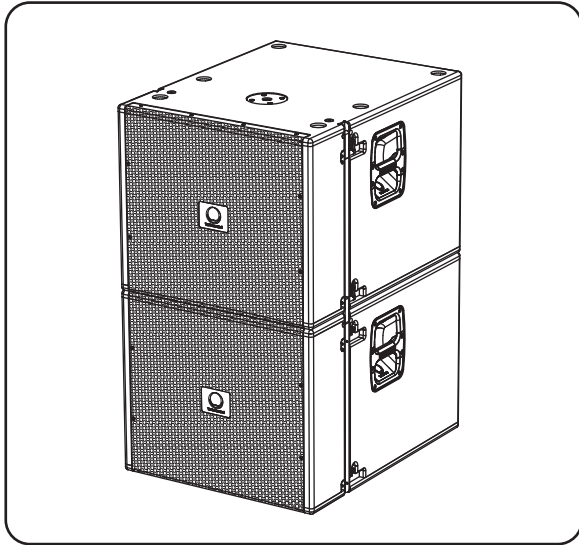


3. Adjust the position of the mounting links (1) of the lower subwoofer to align with the lower mounting holes of the upper subwoofer. Fully insert the rigging pins (2) and rotate the arms until they are held in place by the clips. This will further secure the rigging pins and also prevent them from rattling from audio vibrations during operation.

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

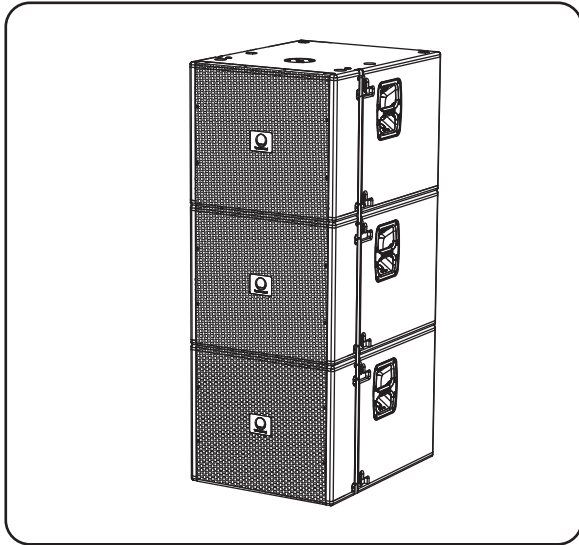


## Procedure 6.1 continued



4. The addition of other TBV118L subwoofers is performed by repeating steps 1, 2 and 3 for each additional subwoofer.

5. Make sure that the assembly is securely tied down with guy wires to prevent tipping.



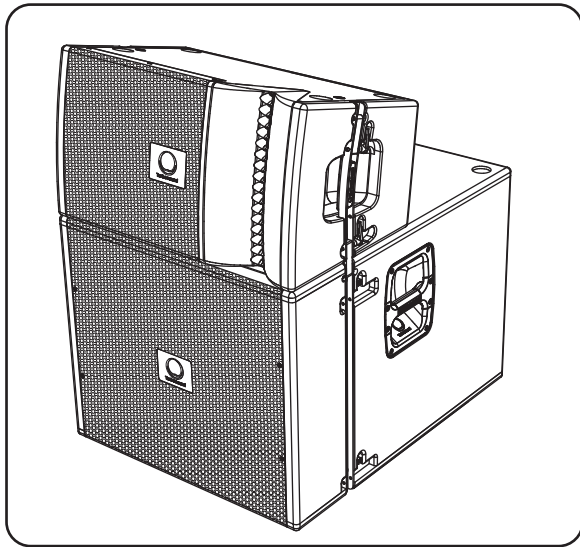
 **WARNING**

DO NOT EXCEED A TOTAL QUANTITY OF 3 TBV118L SUBWOOFERS FOR THIS GROUND STACK CONFIGURATION. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

**NOTE**

Disassembly is the reverse of assembly.

# Chapter 7: Assembling a TBV118L Subwoofer and TBV123 Ground Stack



The following procedure describes how to assemble a ground stack with a TBV118L subwoofer as a base and one or two TBV123 cabinets on top.

The TBV123 cabinet connects to the TBV118L subwoofer using the integral mounting points and rigging pins. No tools are required.

**⚠ WARNING**

DO NOT EXCEED A TOTAL QUANTITY OF 2 TBV118L SUBWOOFER AND 3 TBV123 CABINETS FOR THIS GROUND STACK CONFIGURATION. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

### 7.0.5 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
TBV118L Cabinet	2 (maximum)
TBV123 Cabinet	3 (maximum)

### 7.0.2 Preparation

Use the EASE FOCUS II software application to design your system to suit the venue. This will calculate the coverage of the ground stack.

### 7.0.3 Location

The TBV118L subwoofer should be located on a flat, horizontal, and dry surface, capable of supporting the weight of the complete assembly.

### 7.0.4 Measured Weights

Please see Section 2.3 Weights on Page 9, and refer to EASE Focus Rigging Parameters when designing your system.



Protective Headwear shall be worn



Protective Footwear shall be worn



Protective Gloves shall be worn

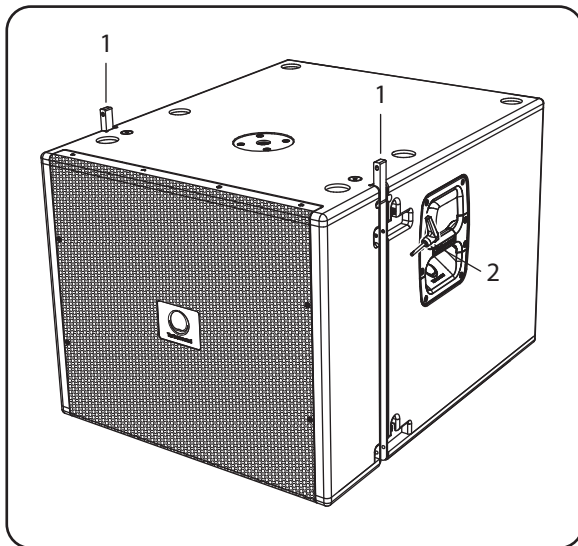


Protective Eyewear shall be worn

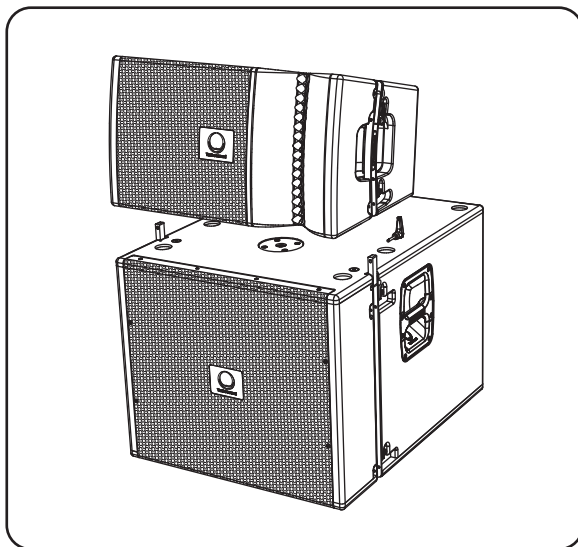


Practice Safe Lifting

## Procedure 7.1 - Assembling a TBV118L Subwoofer and TBV123 Ground Stack

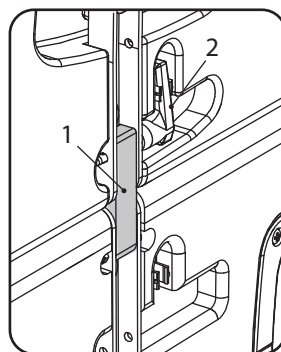


1. Prepare the TBV118L subwoofer, by lifting the mounting links (1) to the upwards position. The rigging pins (2) will be used to secure this subwoofer to the TBV123 cabinet on top.



2. Carefully position the TBV123 cabinet until it is on top of the prepared lower subwoofer. The feet of the TBV123 cabinet should fit into the recesses on the top surface of the TBV118L subwoofer.

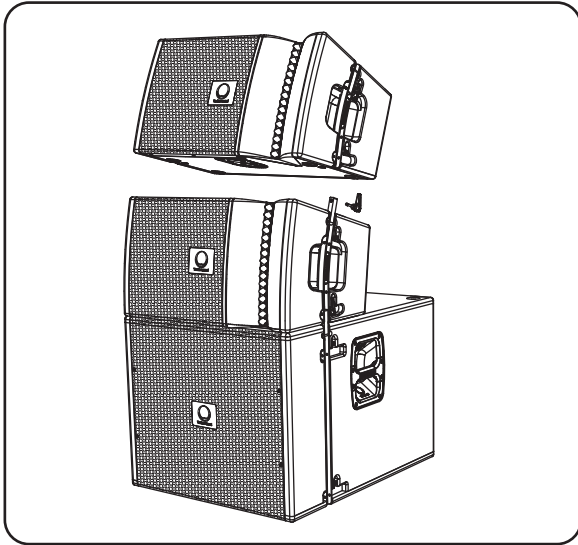
Take care not to trap your fingers between components.



3. Adjust the position of the mounting links (1) of the TBV118L subwoofer to align with the lower mounting holes of the TBV123 cabinet. Fully insert the rigging pins (2) and rotate the arms until they are held in place by the clips. This will further secure the rigging pins and also prevent them from rattling from audio vibrations during operation.

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





4. A second TBV123 cabinet can be added to the ground stack. Lower it onto the first TBV123 cabinet and make sure its feet fit into the recesses on the top surface of the first TBV123 cabinet. Attach it to the mounting links of the first TBV123 cabinet, and secure with the rigging pins in the same way as shown in step 3.

Take care not to trap your fingers between components.



Double check that all pins are correctly inserted.



**! WARNING**

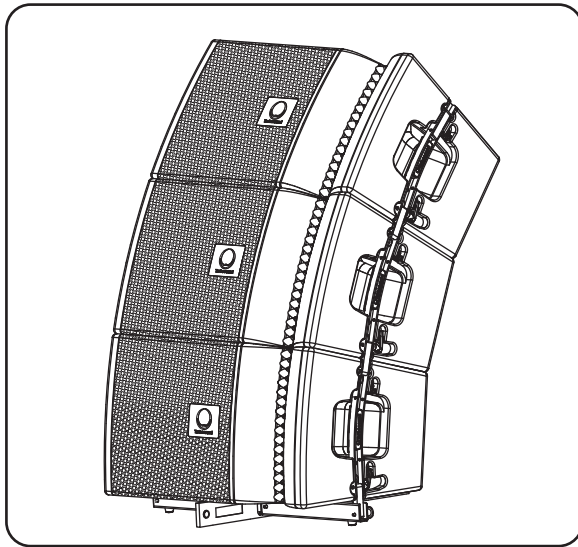
DO NOT EXCEED A TOTAL QUANTITY OF 2 TBV118L SUBWOOFER AND 3 TBV123 CABINETS FOR THIS GROUND STACK CONFIGURATION. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

**NOTE**

Disassembly is the reverse of assembly.



## Chapter 8: Assembling a TBV123 Array Ground Stack



The following procedure describes how to assemble a ground stack with TBV123 cabinets mounted on a TBV123-FB flybar as a base.

The TBV123 cabinets connect to each other and the TBV123-FB flybar using the integral mounting points and rigging pins. No tools are required.

The purpose of the TBV123-FB flybar is to add stability and prevent the ground stack from tipping backwards. Its main bar extends out behind the ground stack.

**! WARNING**

DO NOT EXCEED A TOTAL QUANTITY OF 3 TBV123 CABINETS FOR THIS GROUND STACK CONFIGURATION. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

**! WARNING**

ALWAYS GROUND STACK THE TBV123 CABINETS WITH THE TBV123-FB FLYBAR TO PREVENT TIPPING.

### 8.0.1 Required Components

Item	Quantity
TBV123-FB Flybar	1
TBV123 Cabinet	3 (maximum)

### 8.0.2 Preparation

Use the EASE FOCUS II software application to design your system to suit the venue. This will calculate the coverage of the ground stack.

### 8.0.3 Location

The TBV123 array ground stack should be located on a flat, horizontal, and dry surface, capable of supporting the weight of the complete assembly.

### 8.0.4 Measured Weights

Please see Section 2.3 Weights on Page 9, and refer to EASE Focus Rigging Parameters when designing your system.

### 8.0.5 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

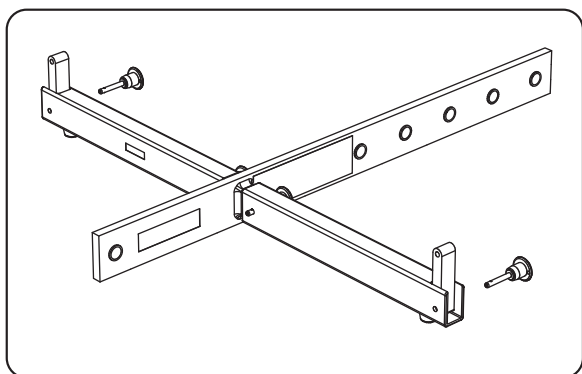


Protective Eyewear shall be worn



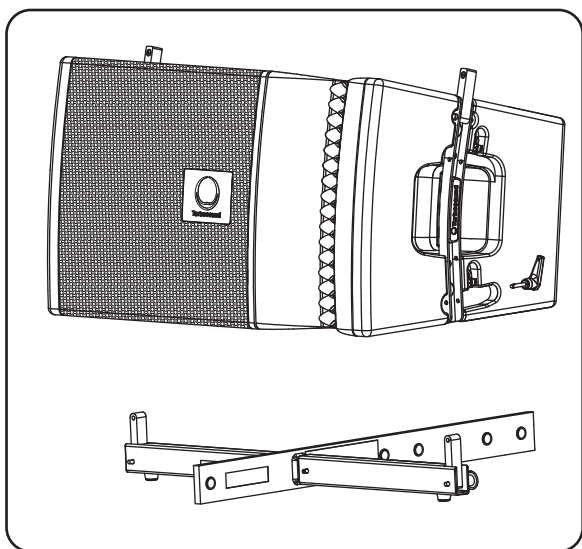
Practice Safe Lifting

## Procedure 8.1 - Assembling a TBV123 Array Ground Stack



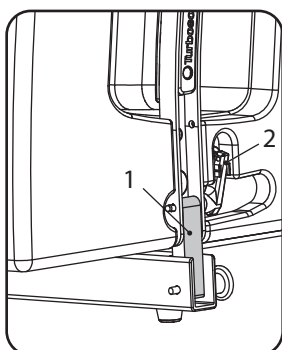
1. Prepare the TBV123-FB flybar by adding the extra mounting links (supplied with the flybar) to the end of each arm. Lift the mounting links to the upwards position.

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



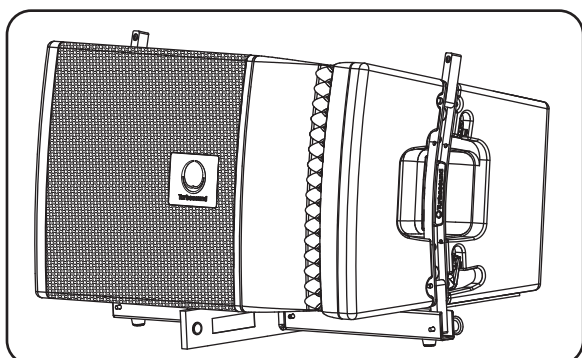
2. Carefully position the TBV123 cabinet until it is on top of the prepared TBV123-FB flybar. Remove the rigging pins from the top of the TBV123 cabinet; these will be used to join the cabinet to the flybar.

Take care not to trap your fingers between components.

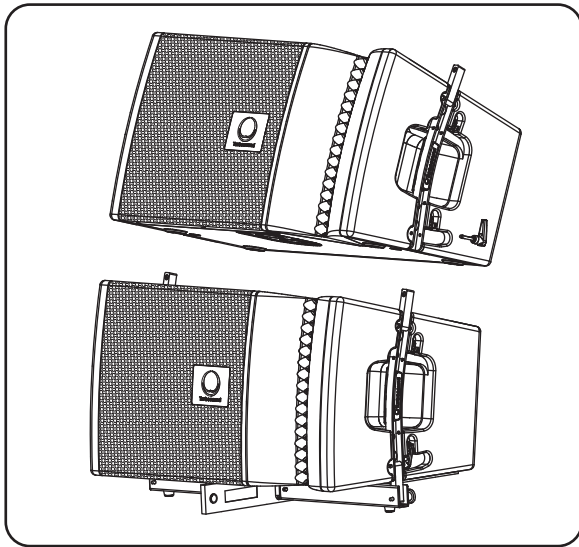


3. Adjust the position of the mounting links (1) of the TBV123-FB flybar to align with the lower mounting holes of the TBV123 cabinet. Fully insert the rigging pins (2) and rotate the arms until they are held in place by the clips. This will further secure the rigging pins and also prevent them from rattling from audio vibrations during operation.

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



## Procedure 8.1 continued

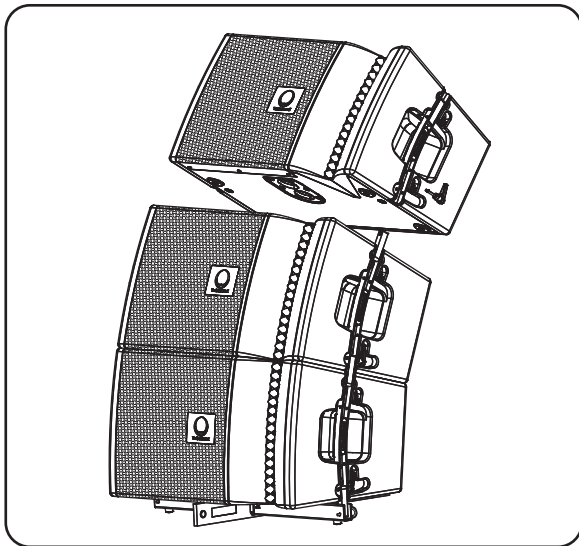


4. Lower the second TBV123 cabinet onto the first TBV123 cabinet and make sure its feet fit into the recesses on the top surface of the first TBV123 cabinet. Attach it to the mounting links of the first TBV123 cabinet, and secure with the rigging pins in the same way as shown in step 3.

Take care not to trap your fingers between components.



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



5. A third cabinet can be added in the same way.

Make sure that the final assembly is securely tied down with guy wires to prevent tipping. (The top cabinet's unused mounting links can be used to attach the guy wires.)

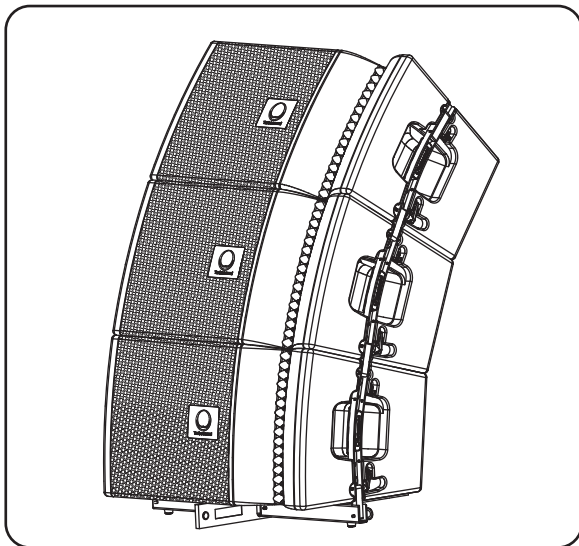


### **WARNING**

DO NOT EXCEED A TOTAL QUANTITY OF 3 TBV123 CABINETS FOR THIS GROUND STACK CONFIGURATION. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

### **WARNING**

ALWAYS GROUND STACK THE TBV123 CABINETS WITH THE TBV123-FB FLYBAR TO PREVENT TIPPING.



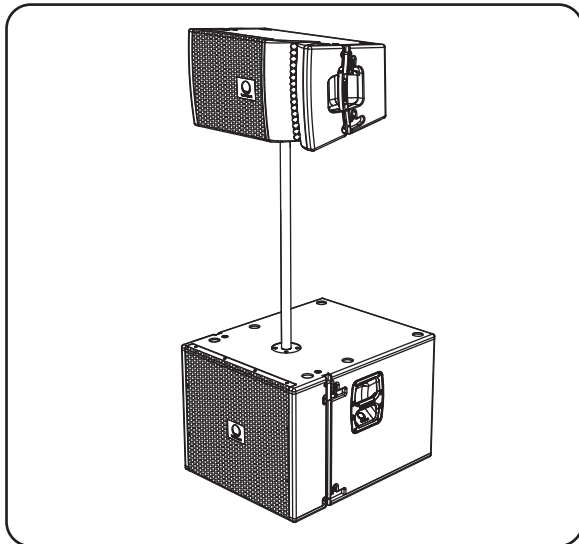
### **NOTE**

Disassembly is the reverse of assembly.

### **NOTE**

The TBV123 cabinet ground stack can also be assembled inverted on the flybar. In this case, the lowest TBV123 cabinet uses its own mounting links and rigging pins to attach to the flybar. This will create a mirror-image groundstack to complement the ground stack described above.

## Chapter 9: Pole Mounting a TBV123 Cabinet on a TBV118L Subwoofer



The following procedure describes how to pole mount a TBV123 cabinet onto a TBV118L Subwoofer.

The subwoofer has a top panel M20 thread mount receptacle that can accept an optional distance rod accessory and the TBV123 has two pole mount receptacles underneath that allow it to be mounted at two different angles for best coverage.

The M20 distance rods are available in three different lengths: 60, 90, and 120 cm.

A second TBV123 cabinet may be added on top of the first cabinet and secured using the integral mounting links and rigging pins. No tools are required.

**⚠ WARNING**

DO NOT EXCEED A TOTAL QUANTITY OF 2 TVB123 AND 2 TBV118L CABINETS FOR THIS GROUND STACK CONFIGURATION. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

### 9.0.1 Required Components

Item	Quantity
TBV118L Subwoofer	2 (maximum)
TBV123 Cabinet	2 (maximum)

Item	Length
TPole 60	60 cm
TPole 90	90 cm
TPole 120	120 cm

### 9.0.2 Location

The TBV118L subwoofer should be located on a flat, horizontal, and dry surface, capable of supporting the weight of the complete assembly.

### 9.0.3 Measured Weights

Please see Section 2.3 Weights on Page 9, and refer to EASE Focus Rigging Parameters when designing your system.

**⚠ WARNING**

FOR GROUND STACKED CONFIGURATIONS OF 2 TBV123 CABINETS PLUS 1 OR 2 TBV118L SUBWOOFERS, THE STACKED SYSTEM MUST BE SECURED TO THE STACKING PLATFORM USING RATCHET STRAPS OR GUY WIRES. 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.



Protective Headwear shall be worn



Protective Footwear shall be worn



Protective Gloves shall be worn

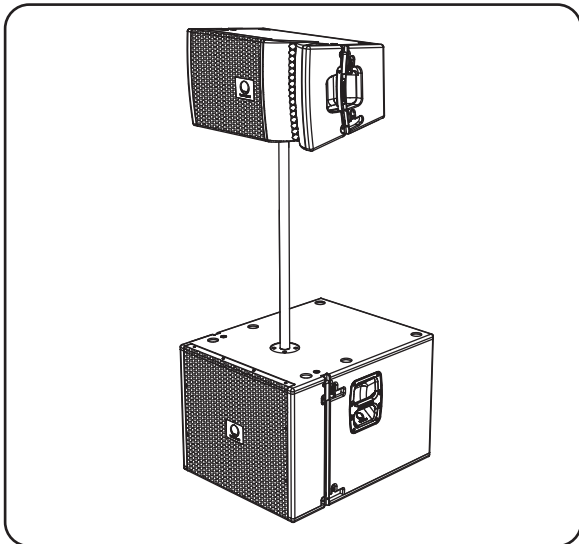


Protective Eyewear shall be worn



Practice Safe Lifting

## Procedure 9.1 - Pole mounting a TBV123 cabinet on a TBV118L subwoofer

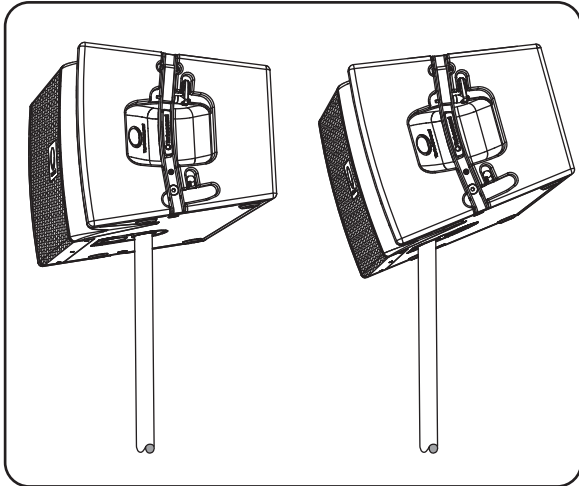


1. Screw the pole into the top of the TBV118L subwoofer using the M20 threaded attachment, and make sure it is tight and secure.
2. Carefully position the TBV123 cabinet until one of its mounting holes fits over the top of the pole, then lower it fully down onto the pole.
3. There are two holes to choose from; the front hole allows the TBV123 cabinet to tilt down.

Double check that the assembly is secure on the TBV118L subwoofer, and that the TBV123 cabinet is fully mounted all the way onto the pole.



4. A maximum of 2 TBV123 cabinets can be pole mounted.



### **WARNING**

DO NOT EXCEED A TOTAL QUANTITY OF 2 TBV123 and 1 or 2 TBV118L CABINETS FOR THIS GROUND STACK CONFIGURATION. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

5. If a second TBV123 cabinet is used, double check that all pins are correctly inserted, and that the 2 TBV123 cabinets are securely connected together before fitting them onto the pole.

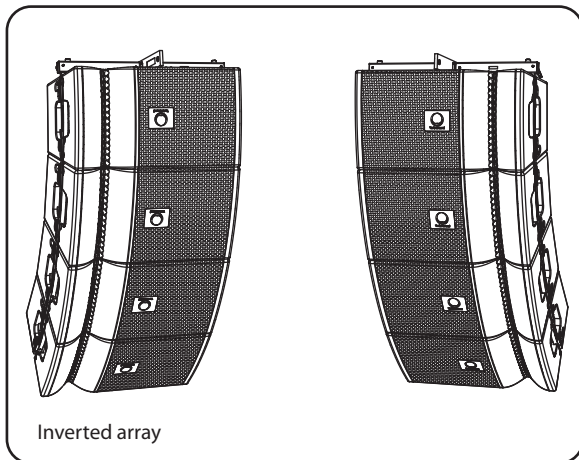
For most applications, the forward socket of the dual angle TBV123 pole socket should be used. This will tilt the lower of the two speakers 15° down to provide coverage for the near listeners while the upper speaker will face straight out to cover more distant audience members. As a visual coverage check, listeners should not be able to see the bottom or top surfaces of the two-speaker array.

### **WARNING**

FOR GROUND STACKED CONFIGURATIONS OF 2 TBV123 CABINETS PLUS 1 OR 2 TBV118L SUBWOOFERS, THE STACKED SYSTEM MUST BE SECURED TO THE STACKING PLATFORM USING RATCHET STRAPS OR GUY WIRES. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

6. Disassembly is the reverse of assembly.

# Chapter 10: Assembling an Inverted TBV123 Array



The TBV123 cabinets may be mounted inverted on the TBV123-FB flybar to create a mirror-image to complement TBV123 cabinets in their normal orientation. For example, a normal array on the right would have its high-frequency drivers away from the stage; an inverted array on the left would also have its high-frequency drivers away from the stage

The following procedure shows how to build an array of inverted TBV123 cabinets by adding them one at a time, up to a maximum of 4.

The system is flown using a TBV123-FB flybar that attaches to your lifting system.

The top TBV123 cabinet connects to 2 mounting points on the flybar, using the 2 extra mounting links and rigging pins supplied with the flybar. Each TBV123 cabinet connects to the cabinet above using the integral mounting points and rigging pins. No tools are required.

## 10.0.1 Required Components

Item	Quantity
TBV123-FB Flybar	1 (maximum)
TBV123 Cabinet	4 (maximum)

## 10.0.2 Location

Move the first TBV123 cabinet so it is sitting upright on a safe flat surface, directly below the suspension point.

## 10.0.3 Measured Weights

Please see Section 2.3 Weights on Page 9, and refer to EASE Focus Rigging Parameters when designing your system.

## TBV123-FB Flybar Working Load Limit (WLL)

Item	Working Load Limit (WLL)	
TBV123-FB	100 kg	220.5 lbs

## WARNING

DO NOT EXCEED A TOTAL QUANTITY OF 4 TBV123 CABINETS FOR 1 TBV123-FB FLYBAR. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

## 10.0.4 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



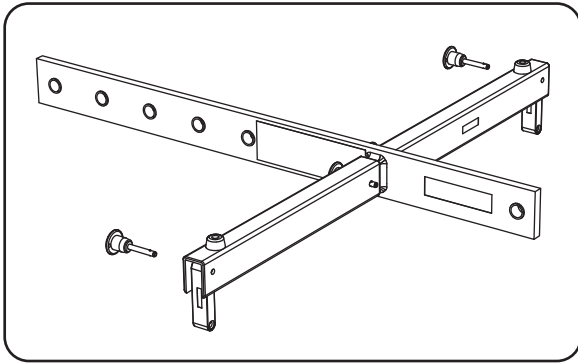
Protective Eyewear shall be worn



Practice Safe Lifting

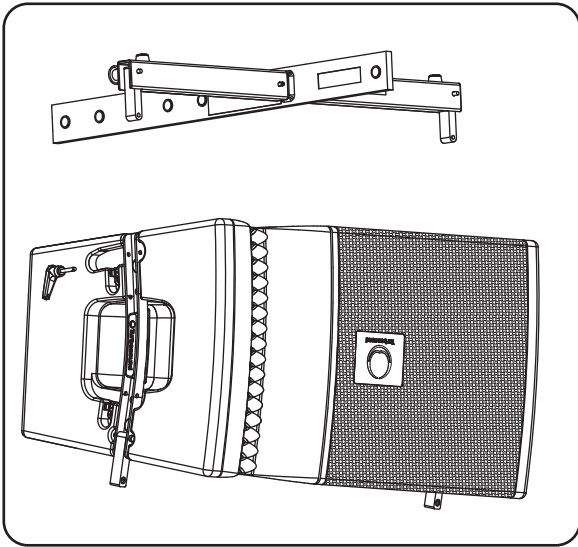


## Procedure 10.1 - Assembling an Inverted TBV123 Array



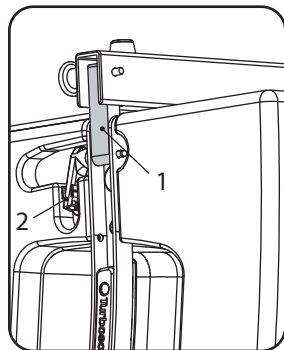
1. Prepare the TBV123-FB flybar by adding the extra mounting links (supplied with the flybar) to the end of each arm.

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



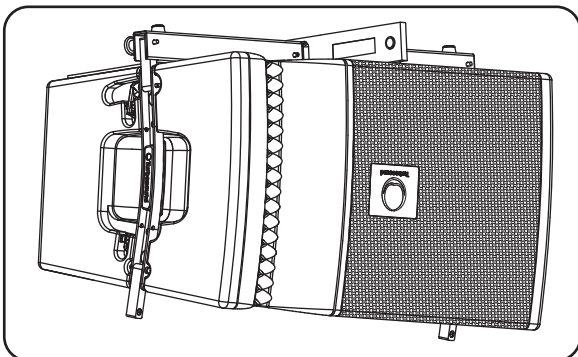
2. Invert the first TBV123 cabinet and remove its rigging pins so the mounting links drop down. Carefully position the TBV123-FB flybar until it is on top of the inverted TBV123 cabinet.

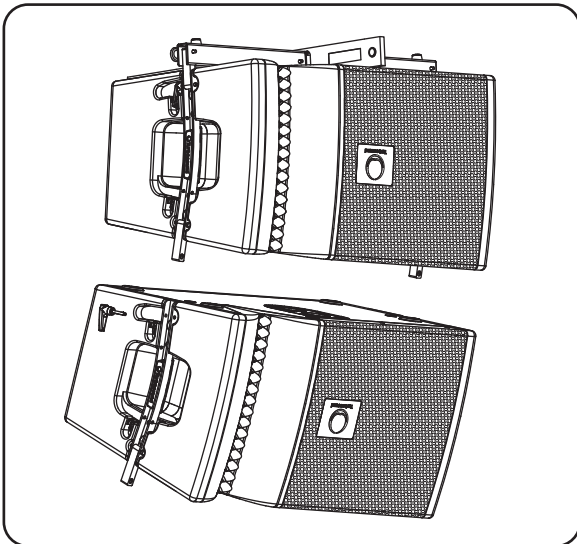
Take care not to trap your fingers between components.



3. Adjust the position of the mounting links (1) of the TBV123-FB flybar to align with the top mounting holes of the TBV123 cabinet. Fully insert the rigging pins (2) and rotate the arms until they are held in place by the clips. This will further secure the rigging pins and also prevent them from rattling from audio vibrations during operation.

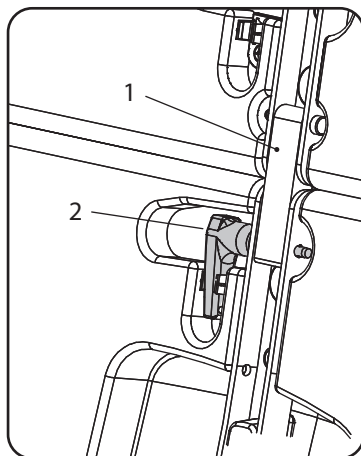
Double check that all pins are correctly inserted, before proceeding further.





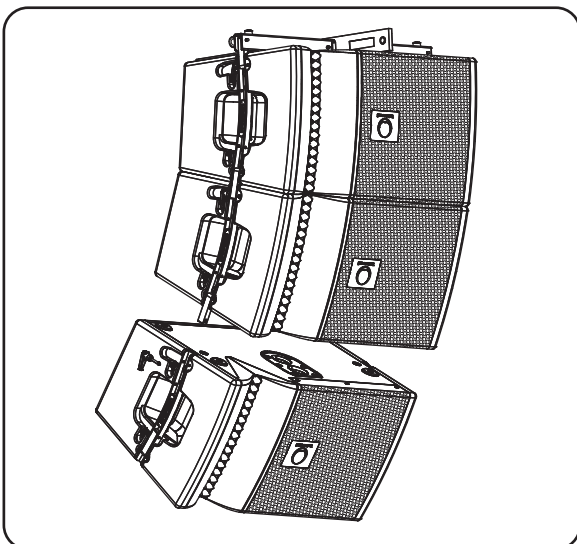
4. Attach the bow shackle or other lifting equipment securely to the flybar mounting hole recommended by the EASE FOCUS II software, then attach the hook and chain.
5. Prepare the next TBV123 cabinet, by removing the rigging pins (2) so the mounting links drop down.
6. Carefully hoist and position the flybar and cabinet assembly until it is on top of the lower cabinet. The feet of the lower cabinet should fit into the recesses on the bottom of the top cabinet.

Take care not to trap your fingers between components.



7. Adjust the position of the mounting links (1) of the upper cabinet to align with the mounting holes of the lower cabinet. Fully insert the rigging pins (2) and rotate their arms until they are held in place by the clips. This will secure the rigging pins and also prevent them from rattling from audio vibrations during operation.

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



8. The addition of other TBV123 cabinets is performed by repeating steps 5, 6, and 7 for each additional cabinet (upto a maximum total of 4). Mount links for the bottom TBV123 cabinet can be secured using the spare L-rigging pins that are supplied with the TBV123-FB.

**! WARNING**

DO NOT EXCEED A TOTAL QUANTITY OF 4 TBV123 CABINETS FOR 1 TBV123-FB FLYBAR. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

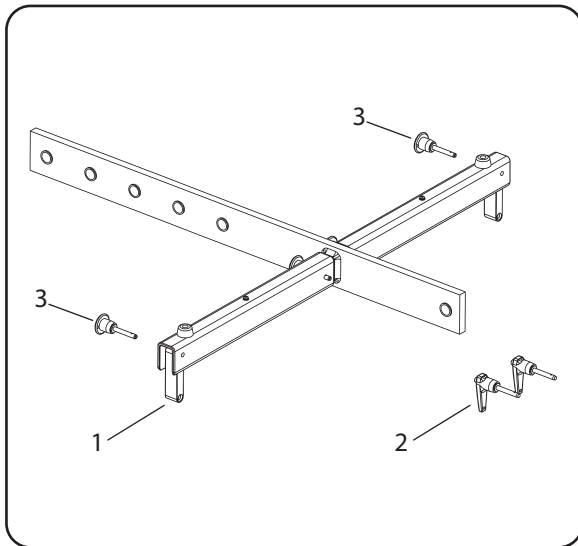
**! WARNING**

ALWAYS USE A TBV123-FB FLYBAR WHEN FLYING AN ARRAY. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

**NOTE**

Disassembly is the reverse of assembly.

## 10.2 Assembling an Inverted Mixed Array



An inverted mixed array can be assembled by attaching an inverted TBV118L cabinet to the TBV123-FB flybar, using the extra mounting links (1) supplied with the flybar. Inverted TBV123 cabinets can then be attached to the lower side of the inverted TBV118L cabinet.

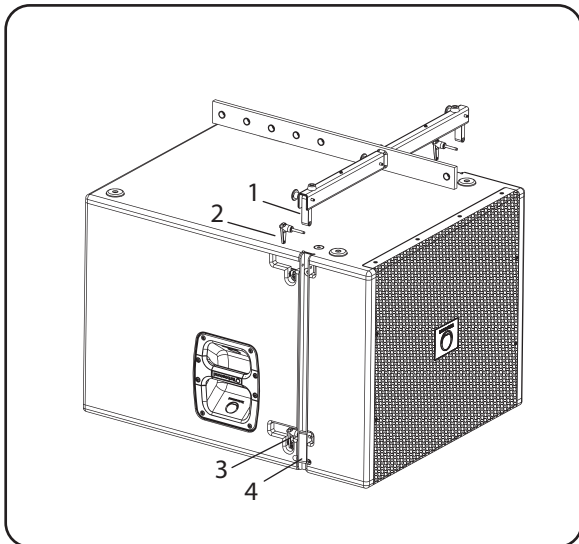
1. Prepare the TBV123-FB flybar by adding the extra mounting links (1) (supplied with the flybar) to the end of each arm, and secure with the rigging pins (3).

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



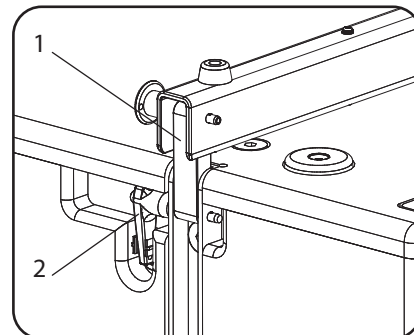
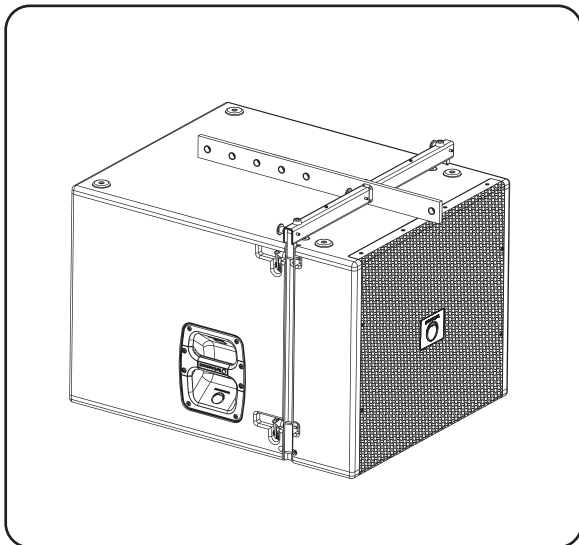
2. Invert the first TBV118L cabinet and carefully position the TBV123-FB flybar until it is on top of the inverted TBV118L cabinet.

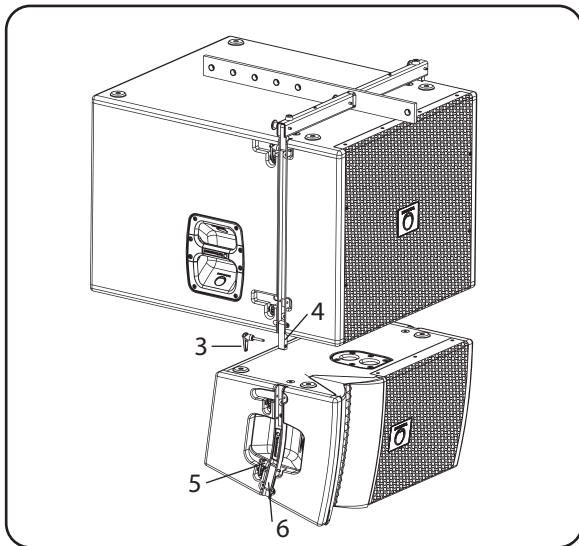
Take care not to trap your fingers between components.



3. Adjust the position of the mounting links (1) of the TBV123-FB flybar to align with the top mounting holes of the TBV118L cabinet. Fully insert the rigging pins (2) and rotate the arms until they are held in place by the clips. This will further secure the rigging pins and also prevent them from rattling from audio vibrations during operation.

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





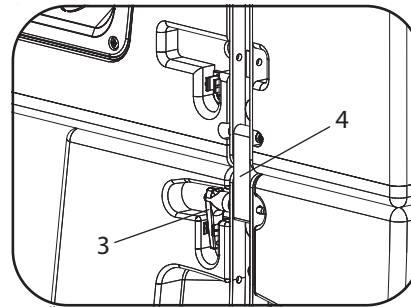
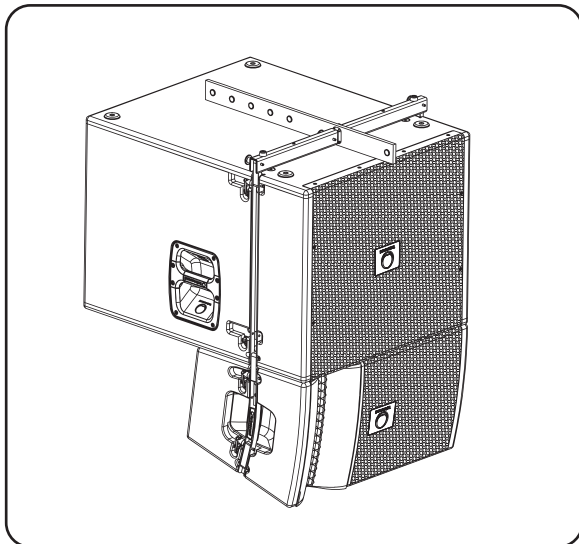
4. Attach the bow shackle or other lifting equipment securely to the flybar mounting hole recommended by the EASE FOCUS II software, then attach the hook and chain.
5. Prepare the inverted TBV123 cabinet. Carefully hoist and position the flybar and cabinet assembly until it is on top of the TBV123 cabinet. The feet of the TBV123 cabinet should fit into the recesses on the bottom of the TBV118L cabinet.

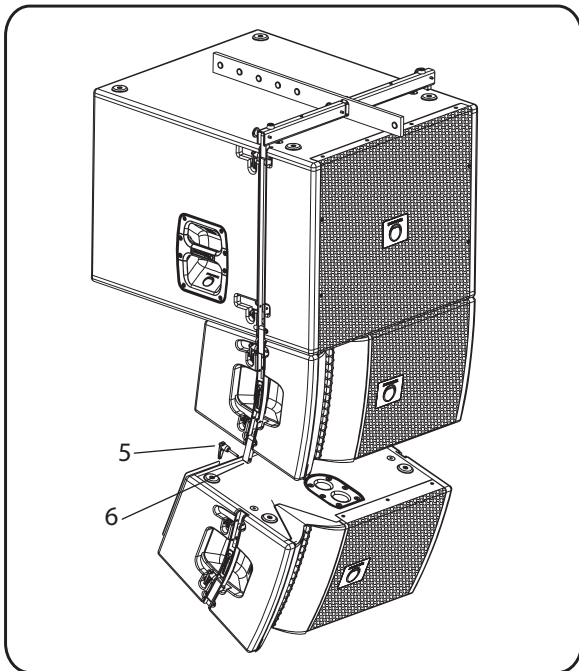
Take care not to trap your fingers between components.



6. Remove TBV118L rigging pins(3) so the mounting links (4) drop down. Adjust the position of the mounting links (4) of the TBV118L cabinet to align with the mounting holes of the TBV123 cabinet. Fully insert the rigging pins (3) and rotate their arms until they are held in place by the clips. This will secure the rigging pins and also prevent them from rattling from audio vibrations during operation.

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





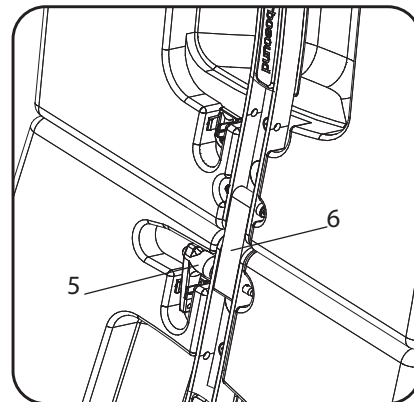
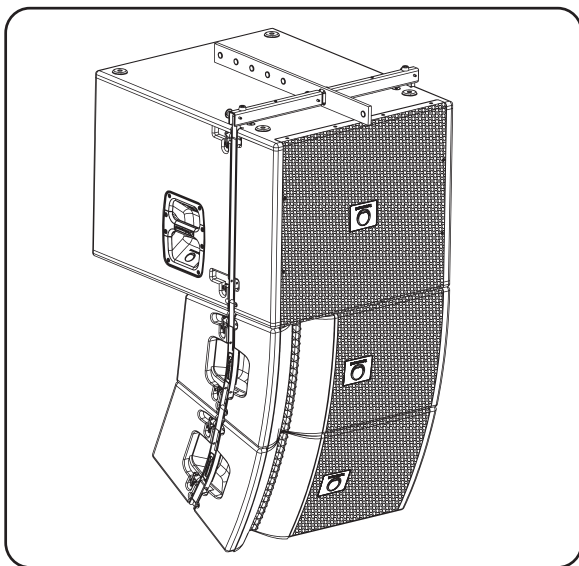
7. If you are only adding one inverted TBV123 cabinet, then this completes the procedure.
8. Carefully hoist and position the flybar/subwoofer/cabinet assembly until it is on top of the prepared lower TBV123 cabinet. The feet of the upper TBV123 cabinet should fit into the recesses on top of the lower cabinet.

Take care not to trap your fingers between components.



9. Remove upper TBV123 rigging pins(5) so the mounting links (6) drop down. Adjust the position of the mounting links (6) of the TBV123 cabinet to align with the mounting holes of the lower cabinet. Fully insert the rigging pins (5) and rotate their arms until they are held in place by the clips. This will secure the rigging pins and also prevent them from rattling from audio vibrations during operation.

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



10. This completes the mixed array assembly procedure.

**! WARNING**

DO NOT EXCEED A TOTAL QUANTITY OF 1 TBV118L SUBWOOFER FOR 2 TBV123 CABINETS FOR 1 TBV123-FB FLYBAR. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

**! WARNING**

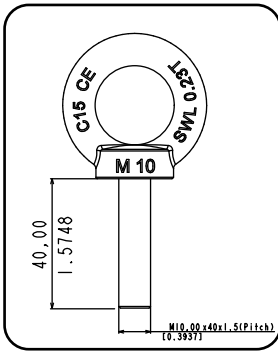
THIS ARRAY SHALL ONLY BE MADE WITH THE TBV118L SUBWOOFER ON TOP, AND THE TBV123 CABINETS BELOW. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

**NOTE**

Disassembly is the reverse of assembly.



# Chapter 11: Using Eyebolts



The various arrays shown in this manual may be flown using 2 eyebolts instead of the TBV123-FB flybar.

The recommended eyebolt is M10, with a thread greater than 18 mm, and a working load limit adequate for the size of the specific array to be suspended.

Third party eyebolts must be specified and supplied by authorised, qualified personnel.

The system is flown with 2 two eyebolts securely attached to the threaded holes in the top surface of the uppermost TBV123 cabinet or TBV118L subwoofer.

Two threaded holes are also provided on the bottom surface. These can be used with eyebolts for tether points, or for flying the systems inverted.

## 11.0.1 Required Components

Item	Quantity
M10 x 40 mm	2 (minimum)
TBV123	As required
TBV118L	As required

## 11.0.2 Measured Weights

Item	Quantity	Weight
TBV118L	1	37.0 kg / 81.6 lbs
TBV123	1	22.0 kg / 48.5 lbs
TBV118L-AN	1	38.5 kg / 84.9 lbs
TBV123-AN	1	23.0 kg / 50.7 lbs

## 11.0.3 Maximum Quantities

Maximum allowed quantities and system weights for 10:1, 7:1 and 5:1 design factors. Ensure that eyebolts are specified with sufficient WLL to support the system weight at the desired design factor. It is recommended to check local regulations regarding design factor requirements in order to comply with regional codes.

10:1 Design Factor Eyebolt Suspension - Passive Or Powered				
TBV118L-AN	3	2	1	0
TBV123-AN	0	2	3	4
<b>System</b>	115.5 kg	123.0 kg	107.5 kg	92.0 kg
<b>Weight</b>	254.6 lbs	271.2 lbs	237.0 lbs	202.8 lbs

7:1 Design Factor Eyebolt Suspension - Passive Or Powered						
TBV118L-AN	5	4	3	2	1	0
TBV123-AN	0	2	3	5	6	6
<b>System</b>	192.5 kg	200.0 kg	184.5 kg	192.0 kg	176.5 kg	138.0 kg
<b>Weight</b>	424.4 lbs	440.9 lbs	406.7 lbs	423.3 lbs	389.1 lbs	304.2 lbs

5:1 Design Factor Eyebolt Suspension - Passive Or Powered							
TBV118L-AN	6	5	4	3	2	1	0
TBV123-AN	0	1	3	4	5	6	7
<b>System</b>	231.0 kg	215.5 kg	223.0 kg	207.5 kg	192.0 kg	176.5 kg	161.0 kg
<b>Weight</b>	509.3 lbs	475.1 lbs	491.6 lbs	457.5 lbs	423.3 lbs	389.1 lbs	354.9 lbs

### WARNING

DO NOT EXCEED THE QUANTITY OF TBV118L SUBWOOFERS OR TBV123 CABINETS SHOWN IN 11.0.3 THE TABLE OF MAXIMUM QUANTITIES. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

### 

DO NOT EXCEED A MAXIMUM 2-LEG BRIDLE HITCH ANGLE OF 60 DEGREES FOR SINGLE POINT SUSPENSION CONFIGURATIONS. FAILURE TO FOLLOW INSTRUCTIONS MAY CAUSE PERMANENT INJURY OR DEATH.

## 11.0.4 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

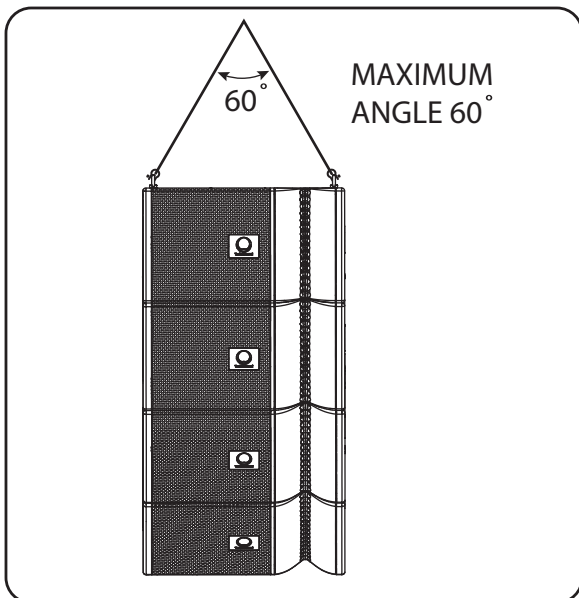
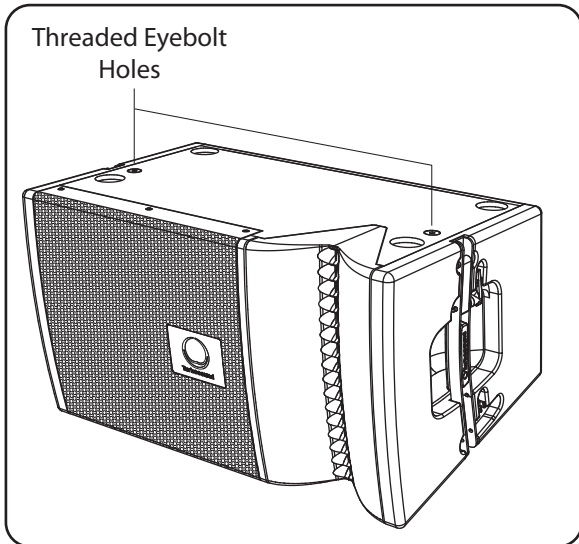
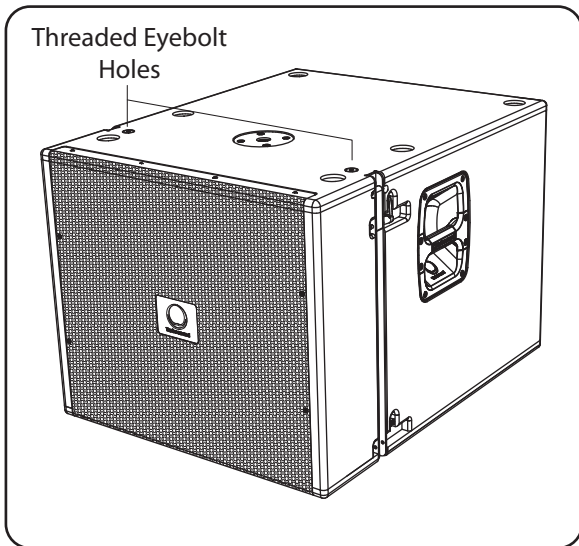


Protective Eyewear shall be worn




Practice Safe Lifting






The TBV123 cabinets and TBV118L cabinets may be flown individually, or assembled into the arrays shown in this manual.


1. If flying individually, the top 2 eyebolts are used for suspension, and the lower 2 eyebolts can be used for positioning or flying inverted.
2. If flying in an array, follow all the instructions and safety warnings in the preceding chapters to assemble the TBV123 cabinets and/or TBV118L subwoofer cabinets together using the integral mounting links and rigging pins.


3. In a mixed array, the TBV123 cabinets shall always be flown below the TBV118L subwoofer. 

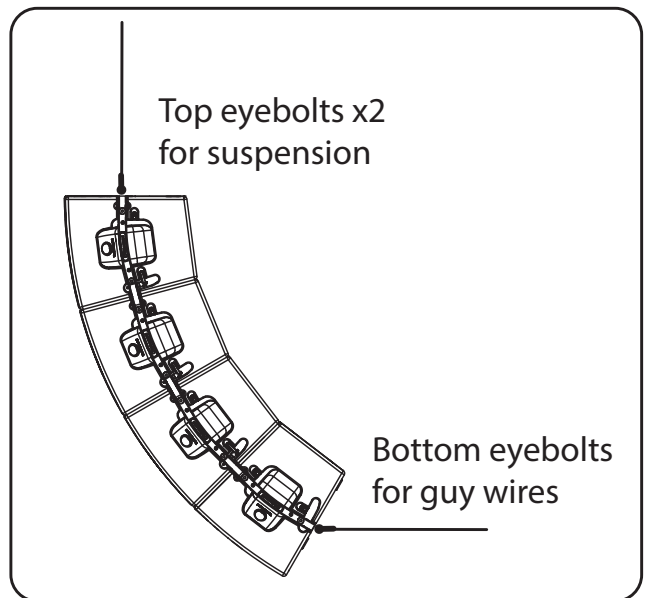
4. Double check that all rigging pins are correctly inserted, and that the arrays are correctly and securely assembled before proceeding further. 

5. Apply thread lock (Loctite Blue 242 or equivalent) to eyebolts then securely screw into the top threaded eyebolt holes of the uppermost TBV123 cabinet or TBV118L subwoofer.

6. 2 threaded holes are also provided on the bottom surface. Eyebolts can be fitted in these locations, and can be used for tether points, or for flying the systems inverted.

7. Secondary safety connections shall always be used. 

8. Do not exceed a maximum angle of 60 degrees for 2-leg bridle hitch suspension. Failure to follow instructions may cause permanent injury or death. 



## Chapter 12: 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, mounting links, pivot pins, or their nuts.

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.

### Flybar

Inspect the flybar 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 mounting links and their pivot pins and nuts 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.

Check that all nuts are present, installed correctly, and retain the pivot pins of the mounting links correctly.

### 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 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 13: TBV Enclosure Quantities and Combinations for TBV123-FB Flybar Suspension at 10:1, 7:1, 5:1 Design Factors

Maximum allowed TBV enclosure quantities and combinations for suspension using TBV123-FB Fly Bar at 10:1, 7:1 and 5:1 design factors.

### 10:1 DESIGN FACTOR TBV123-FB FLY BAR SUSPENSION - ACTIVE OR PASSIVE

TBV118L-AN	2	1	0
TBV123-AN	0	2	4
<b>System</b>	82.2 kg	89.7 kg	97.2 kg
<b>Weight</b>	181.2 lbs	197.8 lbs	214.3 lbs

### 7:1 DESIGN FACTOR TBV123-FB FLY BAR SUSPENSION - ACTIVE OR PASSIVE

TBV118L-AN	3	3	2	1	0
TBV123-AN	0	1	2	4	6
<b>System</b>	120.7 kg	143.7 kg	128.2 kg	135.7 kg	143.2 kg
<b>Weight</b>	266.1 lbs	316.8 lbs	282.6 lbs	299.2 lbs	315.7 lbs

### 5:1 DESIGN FACTOR TBV123-FB FLY BAR SUSPENSION - ACTIVE OR PASSIVE

TBV118L-AN	5	4	3	2	1	0
TBV123-AN	0	1	3	5	5	6
<b>System</b>	197.7 kg	182.2 kg	189.7 kg	197.2 kg	158.7 kg	143.2 kg
<b>Weight</b>	435.8 lbs	401.7 lbs	418.2 lbs	434.7 lbs	349.9 lbs	315.7 lbs

Local Regulatory Compliance: The design factor and Working Load Limit (WLL) ratings of the TBV 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 Group Manufacturing PH Ltd.

MUSIC Group Manufacturing PH Ltd.  
17A Brunswick Street  
Hamilton HM 10  
Bermuda

Do hereby declare that the following components:

TBV123 and TBV123-AN Loudspeaker Cabinets  
TBV118L and TBV118L-AN Subwoofer Cabinets  
TBV123-FB Flybar

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

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

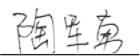
### ANSI E1.8 - 2012

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

### 2006/42/EC

Machinery Directive

## The person responsible for making this declaration:



Jun Yong. Tao  
(COMP team Senior Engineer)

Date: 2016-11-21

MUSIC Group Manufacturing PH Ltd.  
17A Brunswick Street  
Hamilton HM 10  
Bermuda

