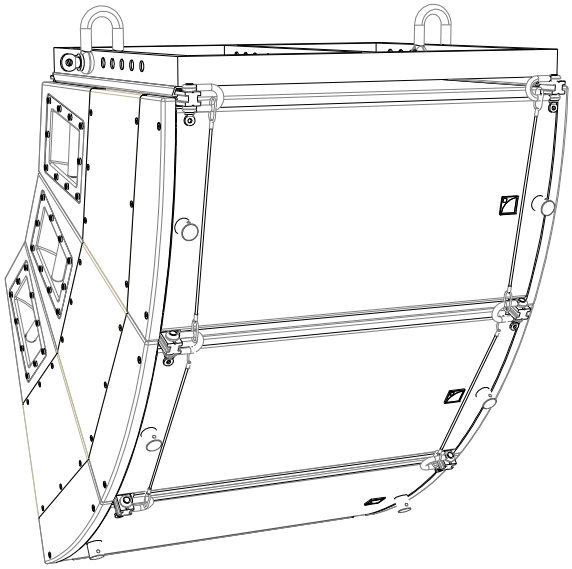
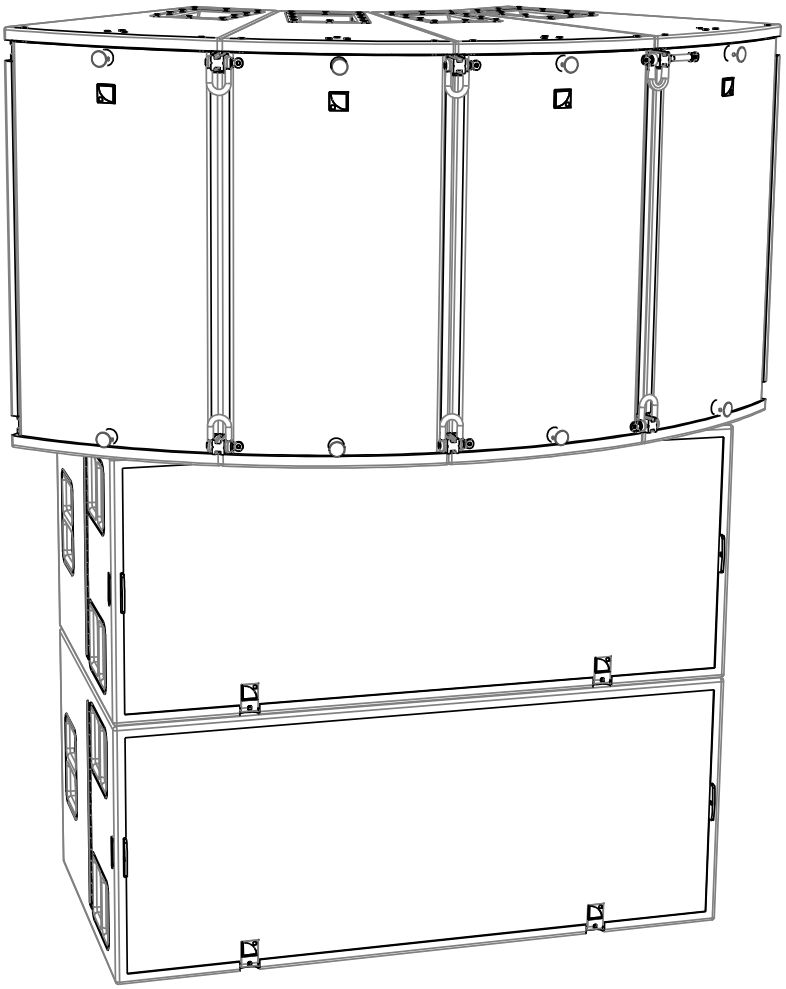
ARCS®II SYSTEM
RIGGING MANUAL
VERSION 1.1





SAFETY INSTRUCTIONS

1. **Read this manual**

2. **Heed all SAFETY INSTRUCTIONS as well as DANGER and OBLIGATION warnings**

3. **Never incorporate equipment or accessories not approved by L-ACOUSTICS®**

4. **Read all the related PRODUCT INFORMATION documents before exploiting the system**
   The **product information** document is included in the shipping carton of the related system component.

5. **Work with qualified personnel for rigging the system**
   Installation should only be carried out by qualified personnel that are familiar with the rigging techniques and safety recommendations outlined in this manual.

6. **Ensure personnel health and safety**
   During installation and set-up personnel must wear protective headgear and footwear at all times. Under no circumstances personnel is allowed to climb on a loudspeaker array.

7. **Respect the Working Load Limit (WLL) of third party equipment**
   L-ACOUSTICS® is not responsible for any rigging equipment and accessories provided by third party manufacturers. Verify that the Working Load Limit (WLL) of the suspension points, chain hoists and all additional hardware rigging accessories is respected.

8. **Respect the maximum configurations and the recommended safety level**
   For safety issue, respect the maximum configurations outlined in this manual. To check the conformity of any configuration in regards with the safety level recommended by L-ACOUSTICS®, model the system in SOUNDVISION and refer to the warnings in **Mechanical Data** section.

9. **Be cautious when flying a loudspeaker array**
   Always verify that no one is standing underneath the loudspeaker array when it is being raised. As the array is being raised, check each individual element to make sure that it is securely fastened to the adjacent element. Never leave the array unattended during the installation process. As a general rule, L-ACOUSTICS® recommends the use of safety slings at all times.

10. **Be cautious when ground-stacking a loudspeaker array**
    Do not stack the loudspeaker array on unstable ground or surface. If the array is stacked on a structure, platform, or stage, always check that the latter can support the total weight of the array. As a general rule, L-ACOUSTICS® recommends the use of safety straps at all times.

11. **Take into account the wind effects on dynamic load**
    When a loudspeaker assembly is deployed in an open air environment, wind can produce dynamic stress to the rigging components and suspension points. If the wind force exceeds 6 bft (Beaufort scale), lower down and/or secure the loudspeaker array.

SYMBOLS

The following symbols are used in this document:

DANGER
This symbol indicates a potential risk of harm to an individual or damage to the product. It can also notify the user about instructions that must be strictly followed to ensure safe installation or operation of the product.

OBLIGATION
This symbol notifies the user about instructions that must be strictly followed to ensure proper installation or operation of the product.

INFORMATION
This symbol notifies the user about complementary information or optional instructions.

WELCOME TO L-ACOUSTICS®

Thank you for choosing the L-ACOUSTICS® **ARCS®II SYSTEM**.

This document contains essential information on rigging the system properly and safely. Carefully read this document in order to become familiar with these procedures.

As part of a continuous evolution of techniques and standards, L-ACOUSTICS® reserves the right to change the specifications of its products and the content of its document without prior notice.

Please check the L-ACOUSTICS® web site on a regular basis to download latest updates for documents and software: www.l-acoustics.com.

CONTENTS

1 RIGGING SYSTEM

The system approach developed by L-ACOUSTICS® consists in providing packaged solutions for loudspeaker system in order to guarantee the highest and most predictable level of performance at any step: modeling, installation, and operation. An L-ACOUSTICS® loudspeaker system is the set of components available to form any loudspeaker system based on one of the full-range loudspeaker enclosure afforded by L-ACOUSTICS®. It includes enclosures, rigging accessories, loudspeaker cables, amplified controllers, and software applications.

The main components involved in the rigging process of the **ARCS®II SYSTEM** are the following:

1.1 Loudspeaker enclosures

ARCS®II	Full range 2-way active enclosure, arrayable in a constant curvature line, provided with 2 ARCOUPL bars and 4 D-shackles Ø12mm
SB28	High power subwoofer enclosure

1.2 Rigging elements

BUMP3	Bar for flying a horizontal array of 2 or 4 ARCS®II, provided with1 D-schackle Ø18mm, 2 pierced bolts, 2 nuts and 2 pins
LIFTBAR	Bar for flying a horizontal array of 1, 3, 5 or 6 ARCS®II enclosures, provided with2 D-schackle Ø18mm and 2 D-schackle Ø22mm, (to be used with 2 BUMP3)
ARCBUMP	Frame for flying a vertical array of up to 4 ARCS®II, provided with 2 ARCOUPL bars, 4 D-shackles Ø12mm, 2 D-schackle Ø18mm, 6 safety slings 42mm and 6 safety slings 155mm.

1.3 Software application

SOUNDVISION	Proprietary 3D acoustical and mechanical modeling software

1.4 Accessories

ARCSPLA	Removable front dolly board for moving the enclosure and protecting the enclosure front grill during transportation and storage
ARCSCOV	Protective cover for transportation and storage

Other ARCS®II SYSTEM components
All the other components of the system are presented in the **ARCS®II SYSTEM user manual**, document intended to describe the operating modes and the loudspeaker connection.

ARCS®II

SB28

ARCOUPL

BUMP3

ARCBUMP

ARCSPLA

SOUNDVISION

Main components involved in the rigging process of ARCS®II SYSTEM

2 MECHANICAL SAFETY

2.1 Maximum configurations

The ARCS® II rigging system has been designed to comply with BGV-C1 (2012) and EN ISO 12100-1 (2004) when flying the following arrays:

Horizontal		Vertical	
With 1 BUMP3	With 2 BUMP3 and 1 LIFTBAR	With ARCBUMP and 1 pick-up point	With ARCBUMP and 2 pick-up point
2 or 4 ARCS® II	1, 3, 5 or 6 ARCS® II	Up to 3 ARCS® II	Up to 4 ARCS® II

Mechanical safety of the shackles
The D-shackles *Ø12mm, Ø18mm* and *Ø22mm* provided by L-ACOUSTICS® have a working load limit (WLL) of respectively *630 kg, 1250 kg,* and *2000 kg* with a 6:1 safety factor. These ratings are in accordance with BGV-C1 (2012) recommendations when implementing the maximum configurations authorized by L-ACOUSTICS®.

Mechanical safety of the rigging system
Authorized configurations indicate the maximum number of enclosures which can be safely arrayed without the need for SOUNDVISION modeling. For more enclosures, model the system in SOUNDVISION and check the **Mechanical Data** section for any *stress warning* or *stability warning*.

2.2 Assessing mechanical safety

In order to assess the actual safety of any array configuration before implementation, refer to the following warnings:

Rated working load limit (WLL) is not enough
The rated WLL is an indication of the element resistance to tensile stress. For complex mechanical systems such as loudspeaker arrays, WLLs cannot be used per se to determine the maximum number of enclosures within an array or to assess the safety of a specific array configuration.

Mechanical modeling with SOUNDVISION
The working load applied to each linking point, along with the corresponding safety factor, will depend on numerous variables linked to the composition of the array (type and number of enclosures, splay angles) and the implementation of the flying or stacking structure (number and location of flying points, site angle). This cannot be determined without the complex mechanical modeling and calculation offered by SOUNDVISION.

Assessing the safety with SOUNDVISION
The overall safety factor of a specific mechanical configuration always corresponds to the lowest safety factor among all the linking points. Always model the system configuration with the SOUNDVISION software and check the Mechanical Data section to identify the weakest link and its corresponding working load. By default, a *stress warning* will appear when the mechanical safety goes below the recommended safety level.

Safety of ground-stacked arrays in SOUNDVISION
For ground-stacked arrays, a distinct *stability warning* is implemented in SOUNDVISION. It indicates a tipping hazard when the array is not secured to the ground, stage or platform. It is user responsibility to secure the array and to ignore this warning.

Consideration must be given to unusual conditions
SOUNDVISION calculations are based upon usual environmental conditions. A higher safety factor is recommended with factors such as extreme high or low temperatures, strong wind, prolonged exposition to salt water, etc. Always consult a rigging specialist to adopt safety practices adapted to such a situation.

3 SYSTEM SET-UP

Dismantling an array
Apply the associated set-up procedure in reversed order.

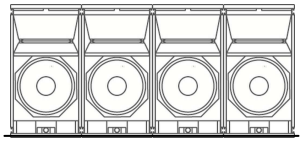
ARCS® II enclosure orientation within the array
Due to the asymmetrical coverage of the ARCS®II enclosures, their orientation within an array will determine the extended coverage direction.

Horizontal array From behind	
Connexion panel	**Coverage**
Up	40° up/ 20° down
Down	40° down / 20° up

Vertical array From behind	
Connexion panel	**Coverage**
Left	40° left / 20° right
Right	40° right / 20 ° left

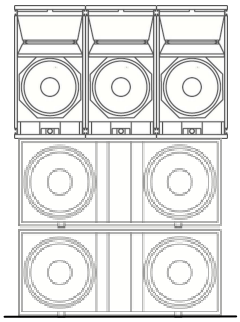
3.1 Ground-stacking

Horizontal



▶ Assemble the array
❗ Refer to PROCEDURE **A**

Horizontal stacked on SB28



▶ Stack an SB28 array

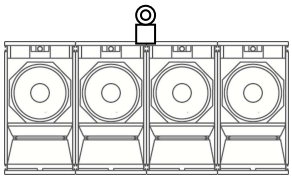
▶ Assemble the array on top of the SB28 array
❗ Refer to PROCEDURE **A**

3.2 Flying

Horizontal

▶ Assemble the array under the motor location
❗ Refer to the PROCEDURE **A**

Follow-up 1: 2 or 4 ARCS®II enclosures



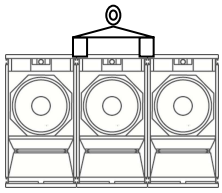
▶ Install **one BUMP3**
❗ Refer to PROCEDURE **B**

▶ Check that all the shackles are tightened securely

▶ Attach the motor hook to the **BUMP3 shackle**

▶ Raise the array

Follow-up 2: 1, 5, 3 or 6 ARCS®II enclosures



▶ Install **two BUMP3**
❗ Refer to PROCEDURE **B**

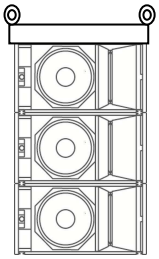
▶ Install **one LIFTBAR**
❗ Refer to PROCEDURE **C**

▶ Check that all the shackles are tightened securely

▶ Attach the motor hook to the **LIFTBAR shackle**

▶ Raise the array

Vertical



▶ Assemble the array under the motor location
❗ Refer to PROCEDURE **A**

▶ Install the **ARCBUMP**
❗ Refer to PROCEDURE **D**

▶ Check that all the shackles are tightened securely

▶ Attach the motor hook to the **ARCBUMP shackle(s)**

▶ Raise the array

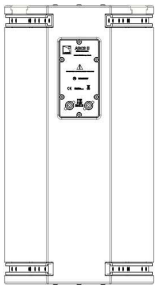
4 RIGGING PROCEDURES

A. Assembling an array with ARCOUPL bars

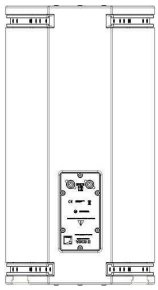
❶ Place all ARCS®II enclosures.

a. Tip the enclosures to a vertical position, side-by-side, by using the handles of the enclosures.

Specific to horizontal arrays
Place the enclosures so that the line source will provide the intended coverage pattern.



Upward coverage



Downward coverage

b. Detach the ARCSPLA dolly boards, by removing the O-ring safety pins from the ARCS II® hitching pins.

Injury hazard
Pay close attention when removing the safety pins so as not to pinch your fingers.

❷ Attach adjacent enclosures by using ARCOUPL bars.

a. Adjust the position of the ARCS® II enclosures so that the rails are aligned.

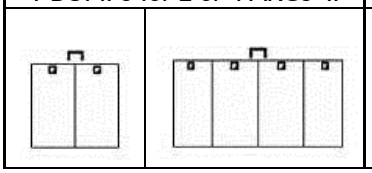
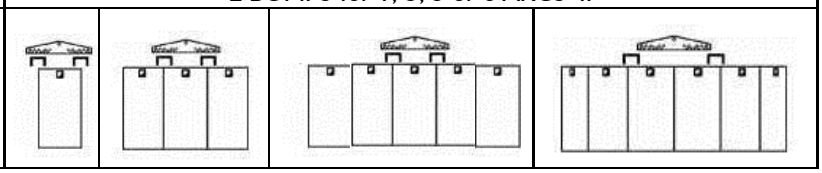
b. Remove one shackle at one end of each coupling bar.

c. Slide ARCOUPL bars into all adjacent rails, from the rear of the array (top and bottom).

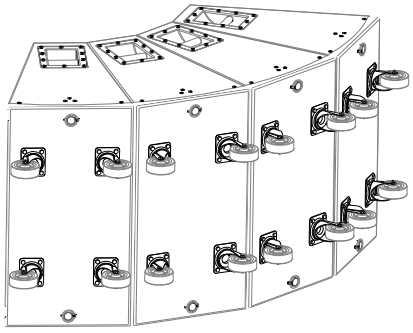
d. Secure the ARCOUPL bars, by re-attaching the shackle on the front end of the bars.

Specific to flown vertical arrays
Anticipate the securing of the vertical array. Do not lock the ARCOUPL shackles, as it will be necessary to install safety steels between all adjacent shackles.

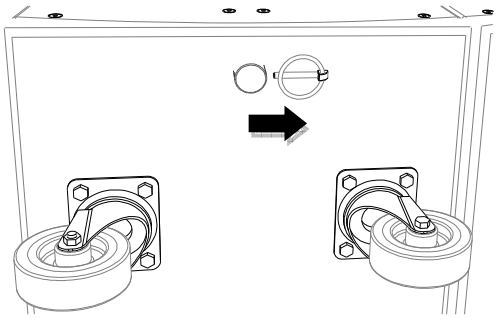
Specific to flown horizontal arrays
Anticipate the next procedure. Keep one or two free locations for the BUMP3/ARCOUPL assemblies.

Required number and position of BUMP3	
1 BUMP3 for 2 or 4 ARCS®II	2 BUMP3 for 1, 3, 5 or 6 ARCS®II
	

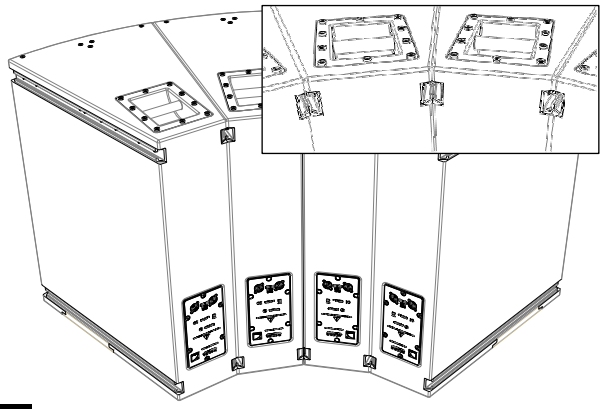
▶ **PROCEDURE A** : Assembling an enclosure array



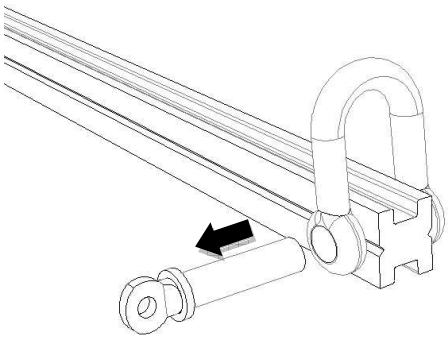
1a Enclosures placed at the rigging position



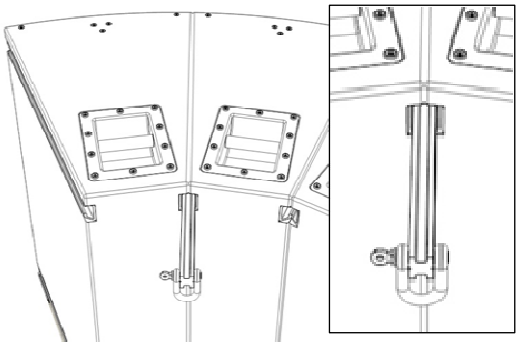
1b A safety pin being removed to detach the dolly-board



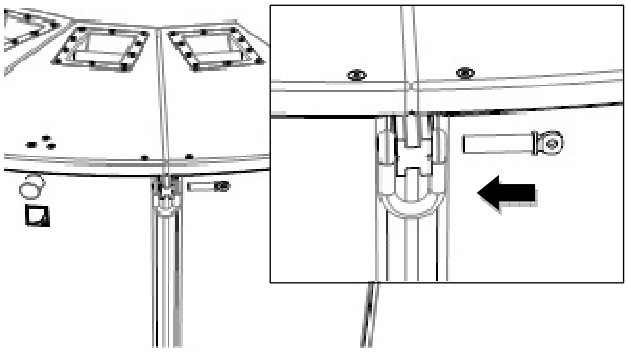
2a Adjacent rigging rails aligned



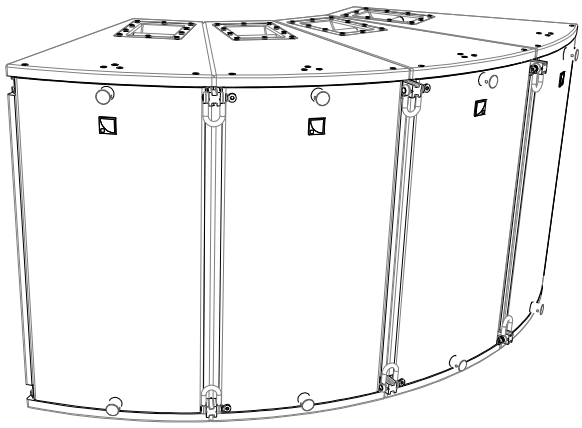
2b The front shackle being removed from an ARCOUPL bar



2c An ARCOUPL bar being slid from the rear of the array



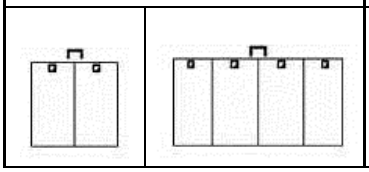
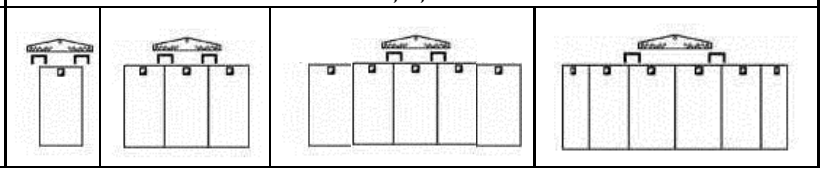
2d An ARCOUPL bar being secured (schackle Ø12mm)



END The ARCS®II assembly ready for the next procedure

B. Installing the BUMP3 rigging bar(s)

Required number and position of BUMP3

1 BUMP3 for 2 or 4 ARCS®II	2 BUMP3 for 1, 3, 5 or 6 ARCS®II
	

Preparing the BUMP3/ARCOUPL assemblies
For this procedure, the BUMP3/ARCOUPL assemblies must have been prepared. Refer to PROCEDURE **E.**

❶ Attach each of the required BUMP3/ARCOUPL assemblies.

a. Remove the bolt/nut/pin assembly on the front end of each BUMP3/ARCOUPL assembly.

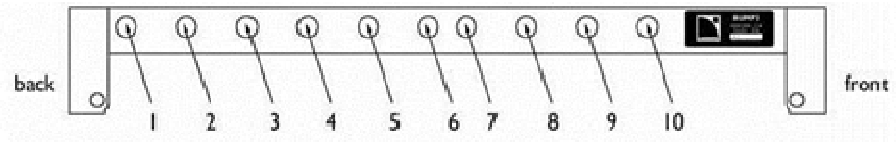
Orientation reference for the BUMP3
When installing the BUMP3, the serial number (SN) plate must be oriented towards the front of the array.

b. Slide each of the BUMP3/ARCOUPL assemblies into their respective location, (ie. into the free top adjacent rails on the pre-assembled array), from the rear of the array.

c. Secure the front end of each BUMP3/ARCOUPL assembly, by reinstalling the bolt, the nut and the cotter pin.

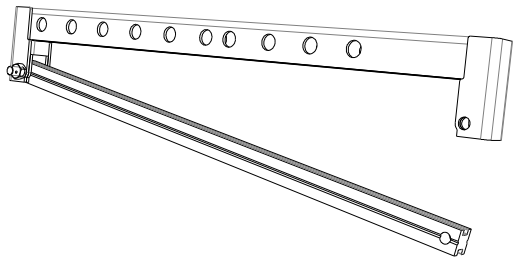
❷ Attach a shackle on each BUMP3.

Rigging hole on which securing the shackle
Refer to **SOUNDVISION** modeling to identify the BUMP3 hole that corresponds to the desired tilt angle

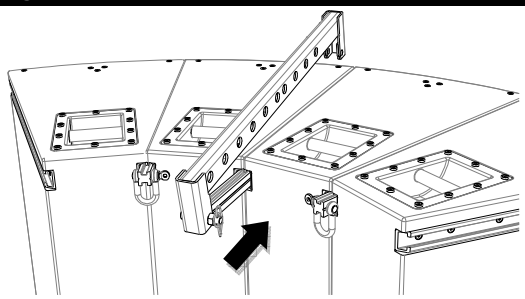


About site angle
As many variables can affect the actual site angle, it is recommended to use an inclinometer.

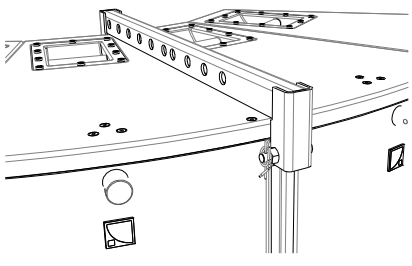
▶ PROCEDURE B : Installing the BUMP3



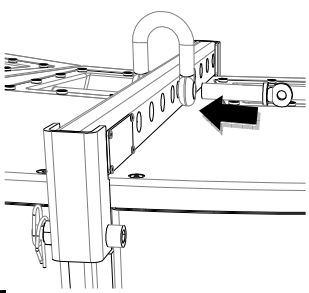
❶a The bolt/nut/pin assembly removed at the front end of a BUMP3/ARCOUPL assembly



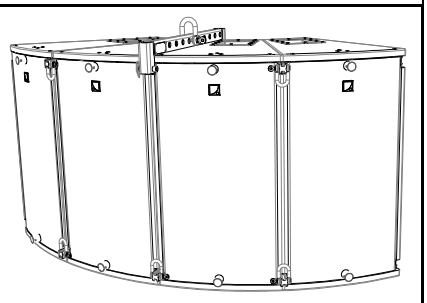
❶b A BUMP3/ARCOUPL assembly being slid



❶c The front end of a BUMP3/ARCOUPL assembly secured



❷ A shackle (Ø18mm) being secured on the BUMP3



END A 4-ARCS®II horizontal array ready to be flown

C. Installing the LIFTBAR rigging bar

❶ Attach the LIFTBAR to both BUMP3.

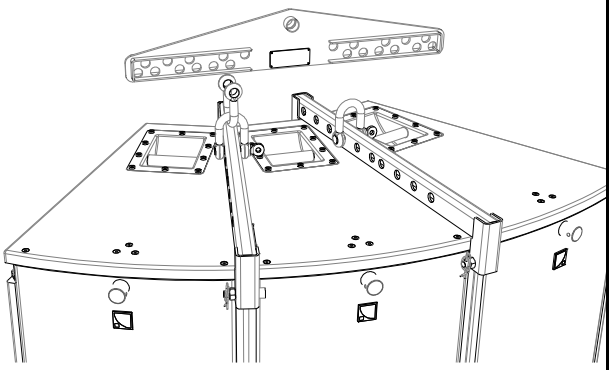
a. Pass the U-shape of one of the Ø18mm shackles through the shackle attached to one of the BUMP3.

b. Secure the new shackle to the LIFTBAR, by locking its pin through the LIFTBAR hole previously identified.

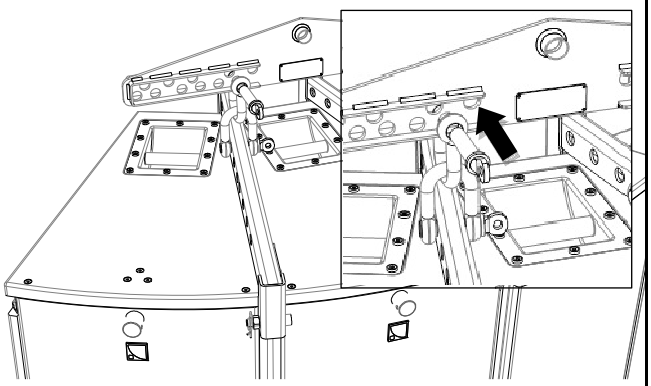
c. Repeat this step on the other side of the LIFTBAR for the other BUMP3.

❷ Attach the Ø22mm shackle to the top hole on the LIFTBAR.

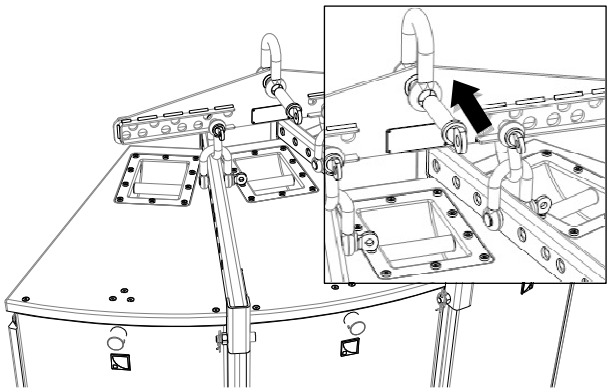
▶ PROCEDURE C : Installing the LIFTBAR



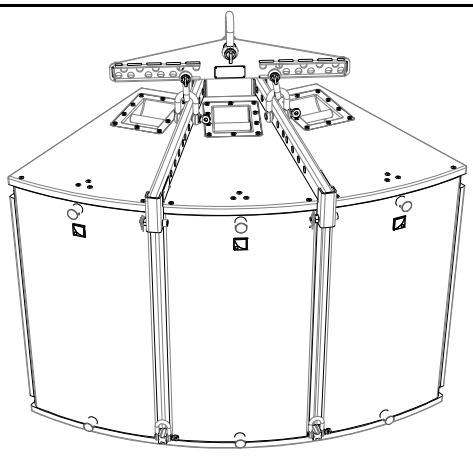
❶a The U-shape of a shackle (Ø18mm) passed through one of the BUMP3 shackle.



❶b The shackle being secured.



❷ The LIFTBAR attached to the assembly.
A shackle (Ø22mm) being secured on the LIFTBAR



END A 3 ARCS®II horizontal array ready to be flown

D. Installing the ARCBUMP flying frame

Identify the enclosure to be attached to the ARCBUMP
When attaching the ARCBUMP, the assembly is horizontal. The ARCBUMP is attached to one of the enclosure at the end of the assembly, depending both on intended coverage and the enclosures' orientation.

From behind		
Intended coverage	**Connection panel**	**Enclosure for ARCBUMP**
40° left / 20° right	Up	Right end
	Down	Left end
40° right / 20° left	Up	Left end
	Down	Right end

❶ Attach the ARCBUMP to the enclosure intended to be at the top of the array, by using two ARCOUPL bars:

a. Unlock and remove both shackles from the two coupling bars;

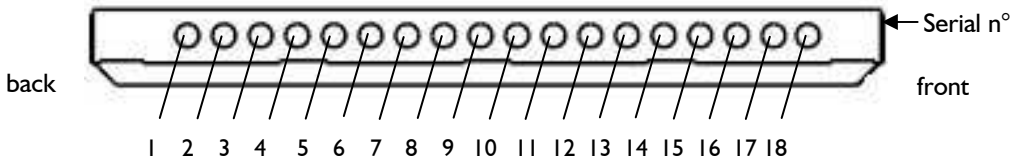
b. Adjust the position of the ARCS®II and the ARCBUMP so that the rails are aligned and slide the ARCOUPL bars into the adjacent rails (top and bottom).

❷ Secure the whole ARCS®II assembly by installing the Ø12mm shackles on both ends of all the ARCOUPL bars, with a safety sling attached between all the adjacent shackles (except for the bottom enclosure). If some shackles are already attached to the bars, remove them and reinstall them with safety slings.

❸ Install the two Ø18mm shackles on the ARCBUMP frame:

a. Secure a shackle to the identified hole on both side of the ARCBUMP frame;

Rigging hole on which securing the shackle
Refer to **SOUNDVISION** modeling to identify the hole that corresponds to the desired tilt angle.

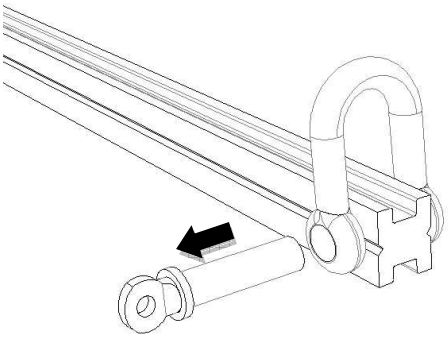


About site angle
As many variables can affect the actual site angle, it is recommended to use an inclinometer.

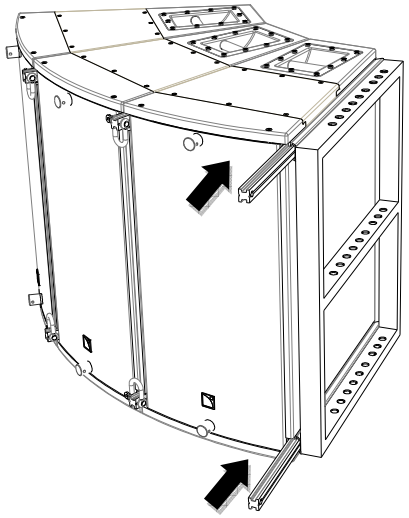
b. Compensate for the offset center of gravity when achieving the bridled suspension.

Single suspension point for 1 to 3 ARCS® II
When flying 1 to 3 ARCS®II, single point suspension is authorized. In that case, attach a Ø18mm shackle to the center bar of the ARCBUMP frame. However, please note that the offset center of gravity will not be compensated for.

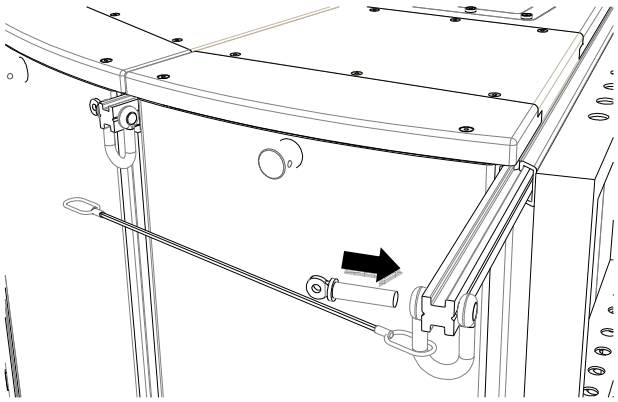
▶ **PROCEDURE D**: Installing the ARCBUMP



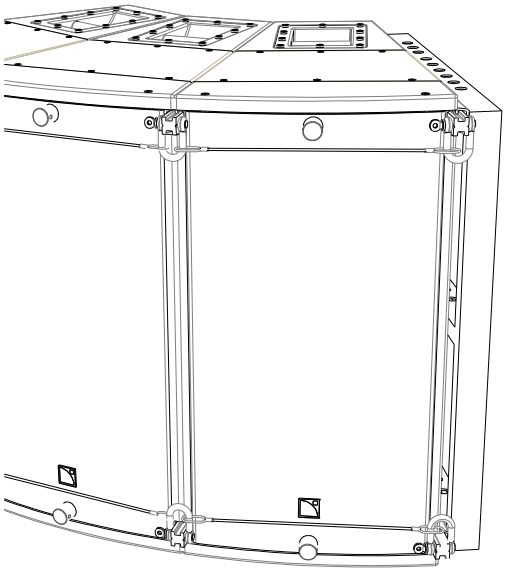
1a A shackle is being removed from an ARCOUPL bar



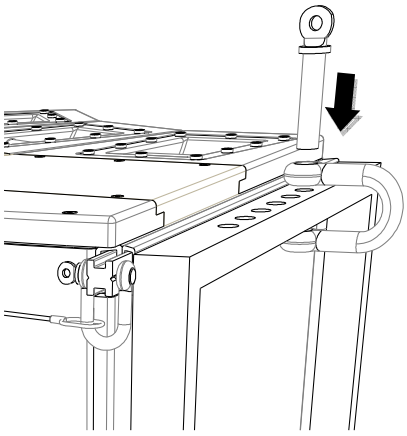
1b The ARCOUPL bars are being slid in the rigging rails



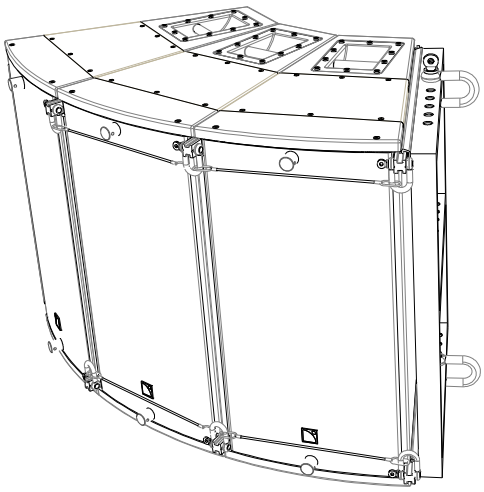
A shackle (Ø12mm) being reinstalled along with a safety sling



2 The array secured with safety steels front and back)



3 A shackle (Ø18mm) being secured on the ARCBUMP



END A 3-ARCS®II vertical array ready to be flown (2-point)

E. Preparing the BUMP3/ARCOUPL assembly

i It is highly recommended to pre-assemble the BUMP3 structure with one of the spare ARCOUPL bars available with the ARCS®II system, and to store this BUMP3/ARCOUPL assembly as it is. It will avoid unnecessary repetitive steps in the rigging process of an ARCS® II assembly.

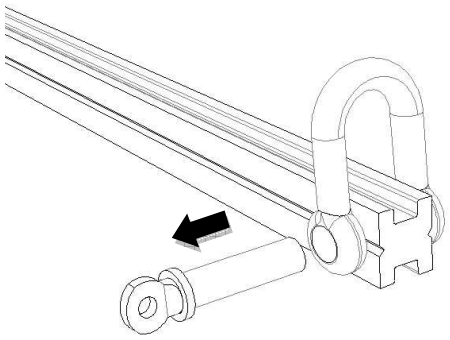
❶ Remove both shackles from one ARCOUPL bar.

❷ Align the holes of the ARCOUPL bar with the BUMP3.

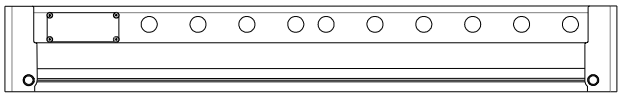
❸ Secure both ends of the BUMP3/ ARCOUPL assembly.

- **a.** Drive a pierced bolt into the holes at one of the bar end
- **b.** Drive the pierced nut
- **c.** Secure with a cotter pin.
- **d.** Repeat at the other end

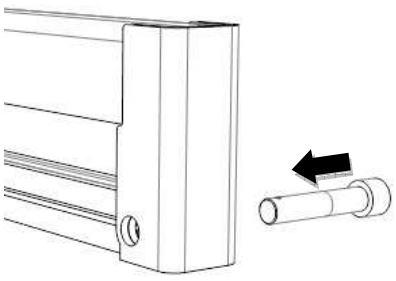
▶ **PROCEDURE E**: Preparing the BUMP3/ARCOUPL assembly



❶ A shackle being removed from an ARCOUPL bar

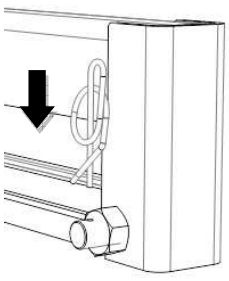


❷ The bar holes aligned with the BUMP3

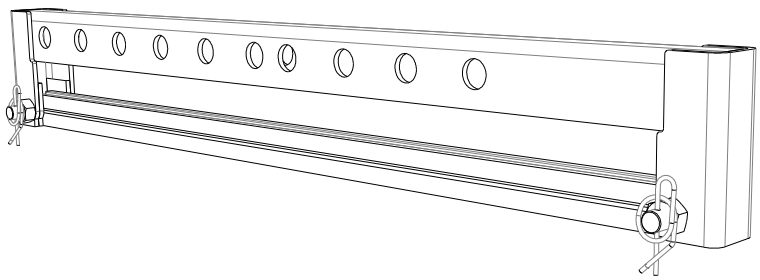


❸a The bolt being driven

❸b The nut being driven



❸c The assembly being secured with a pin



END The BUMP3/ARCOUPL assembly ready

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