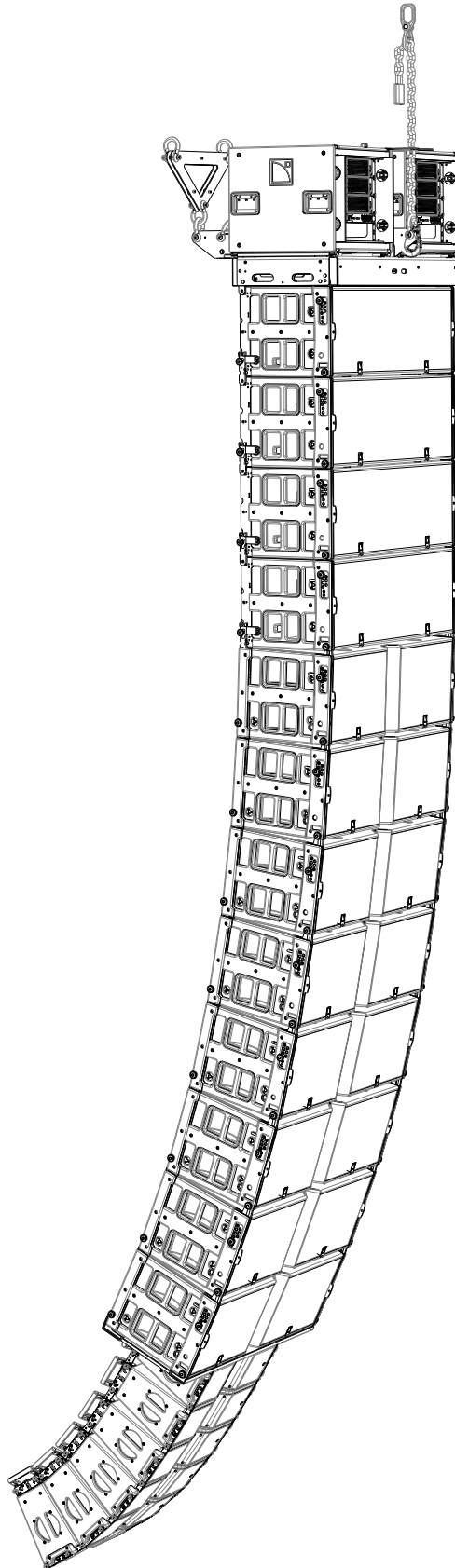


## rigging manual (EN)



**Document reference: KI\_RM\_EN\_3.1**  
**Distribution date: June 27, 2018**

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# 1 SAFETY WARNINGS


All information hereafter detailed applies for the **L-ACOUSTICS® KI-BUMP flying structure, KI-DELTA plate, KARA-DOWNKI rigging accessory, KI-CHARIOT cart, or KIBUMP-FLIGHT case** hereafter designated as “the product”.

## 1.1 Symbol description

Throughout this manual the potential risks are indicated by the following symbols:


	<p>The <b>WARNING</b> symbol indicates a potential risk of physical harm to the user or people within close proximity to the product. In addition, the product may also be damaged.</p>
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	<p>The <b>CAUTION</b> symbol notifies the user about information to prevent possible product damage.</p>
---	--


	<p>The <b>IMPORTANT</b> symbol is a notification of an important recommendation of use.</p>
---	---


## 1.2 Important safety instructions

1. Read this manual
2. Heed all safety warnings
3. Follow all instructions
4. The user should never incorporate equipment or accessories not approved by **L-ACOUSTICS®**

	<p><b>5. Personnel qualification</b> Installation and set-up should only be carried out by qualified personnel that are familiar with the rigging techniques and safety recommendations outlined in this manual. It is recommended to attend the training courses offered by <b>L-ACOUSTICS®</b> before proceeding with the installation of the system.</p>
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	<p><b>6. Personnel health and safety</b> During installation and set-up personnel should wear protective headgear and footwear at all times. Under no circumstances personnel should climb on the loudspeaker assembly.</p>
---	---

	<p><b>7. System parts and rigging inspection</b> All system components must be inspected before use, in order to detect any possible defects. Please refer to the <b>Care and maintenance</b> section of this manual as well as any other manuals pertaining to the system for a detailed description of the inspection procedure. Any part showing any sign of defect must immediately be put aside and withdrawn from use to be inspected by qualified service personnel.</p>
---	---

	<p><b>8. Additional rigging equipment</b> <b>L-ACOUSTICS®</b> is not responsible for any rigging equipment and accessories that are not manufactured by <b>L-ACOUSTICS®</b>. It is the user's responsibility to ensure that the Working Load Limit (WLL) of all additional hardware rigging accessories is greater than the total weight of the loudspeaker assembly in use.</p>
---	--



#### 9. Suspension points

It is the user's responsibility to ensure that the Working Load Limit (WLL) of the suspension points and/or chain hoists is greater than the total weight of the loudspeaker assembly in use.



#### 10. System load capacity and setup safety limits

Load capacity and setup safety limits when flying or stacking a loudspeaker assembly should be strictly followed according to the instructions outlined in this manual.

ALWAYS refer to the mechanical data and warning indications provided in SOUNDVISION software (**Mechanical Data** section) to verify the mechanical conformity of the system before installation.



#### 11. Local regulations

Some countries require higher Ultimate Strength Safety Factors and specific rigging approvals. It is the user's responsibility to ensure that any overhead suspension of L-ACOUSTICS® systems has been made in accordance with all applicable local regulations.



#### 12. Risk of falling objects

Before flying or transporting, verify that no unattached items remain on the array.



#### 13. Risk of tipping

Remove all rigging accessories before transporting an array.



#### 14. Flying a loudspeaker assembly

Always ensure that nobody is standing underneath the loudspeaker assembly when it is being raised. As the system is being raised check each individual component to make sure that it is securely fastened to the component above. Never leave the system unattended during the installation process.

As a general rule, L-ACOUSTICS® recommends the use of safety slings at all times.



#### 15. 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.



#### 16. Dynamic load

When a loudspeaker assembly is deployed in an open air environment, wind effect should be taken into account. Wind can produce dynamic stress to the rigging components and suspension points. If the wind force exceeds 6 bft (Beaufort scale) it is highly recommended to lower down and/or secure the loudspeaker assembly.



#### 17. Manual

Keep this manual in a safe place during the product lifetime. This manual forms an integral part of the product. Reselling of the product is only possible if the user manual is available. Any changes made to the product have to be documented in writing and passed on to the buyer in the event of resale.

### 1.3 EC declaration of conformity

L-ACOUSTICS®

13 rue Levacher Cintrat  
Parc de la Fontaine de Jouvence  
91462 Marcoussis Cedex  
France



States that the following products:

Flying structure, KI-BUMP  
Plate, KI-DELTA  
Rigging accessory, KARA-DOWNKI  
Cart, KI-CHARIOT  
Flight-case, KIBUMP-FLIGHT

Are in conformity with the provisions of:

Machinery Directive 2006/42/EC

Applied rules and standards<sup>1</sup>:

EN ISO 12100-1: 2004 (Mechanical Safety)  
DIN 18800 (Mechanical Structure)  
BGV-C1 (Mechanical Standard applied in Germany)

Established at Marcoussis, France

November 20<sup>th</sup>, 2009



Jacques Spillmann  
Head of Engineering & Design dept.

<sup>1</sup> General standard maximum load:

- Up to **24 KI and/or KI-SB** enclosures, **4 LA-RAK** touring racks, and **corresponding cable set** can be flown as a vertical line source array using the KI-BUMP structure.
- Up to **22 KI and/or KI-SB and 6 KARA** enclosures, **4 LA-RAK** touring racks, and **corresponding cable set** can be flown as a vertical line source array using the KI-BUMP structure and KARA-DOWNKI accessory.

BGV standard maximum load:

- Up to **18 KI and/or KI-SB** enclosures, **3 LA-RAK** touring racks, and **corresponding cable set** can be flown as a vertical line source array using the KI-BUMP structure.
- Up to **16 KI and/or KI-SB and 6 KARA** enclosures, **3 LA-RAK** touring racks, and **corresponding cable set** can be flown as a vertical line source array using the KI-BUMP structure and KARA-DOWNKI accessory.

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## 3 INTRODUCTION

### 3.1 Welcome to L-ACOUSTICS®

Thank you for purchasing the **L-ACOUSTICS® KI Reference WST® System**.

This manual contains essential information on the **L-ACOUSTICS® KI** rigging procedures. Read this manual carefully 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 the product and the content of this manual without prior notice.**

Should the product requires repair or if information about the warranty is needed, please contact an approved L-ACOUSTICS® distributor. The address of the nearest distributor is available on the L-ACOUSTICS® web site.

### 3.2 Symbol description

All along the manual, a bracketed number refers to a section. For example, [3.2] stands for the present **Symbol description** section.


### 3.3 Unpacking

Carefully open the shipping carton and check the product for any noticeable damage. Each L-ACOUSTICS® product is tested and inspected before leaving the factory and should arrive in perfect condition.

If found to be damaged, notify the shipping company or the distributor immediately. Only the consignee may initiate a claim with the carrier for damage incurred during shipping. Be sure to save the carton and packing materials for the carrier's inspection. Refer to [5] for a full description of the shipping carton contents.

### 3.4 Web links

Please check the L-ACOUSTICS® web site on a regular basis for latest document and software application updates. Table I provides links for all downloadable items mentioned in this manual.



ALWAYS refer to the latest document version.  
ALWAYS use the latest software application version.

**Table I: Links to documents and software applications**

<b>KARA User manual</b>	<a href="http://www.l-acoustics.com/kara">www.l-acoustics.com/kara</a> (user manual)
<b>KI User manual</b>	<a href="http://www.l-acoustics.com/kl">www.l-acoustics.com/kl</a> (user manual)
<b>KI-SB User manual</b>	<a href="http://www.l-acoustics.com/kl-sb">www.l-acoustics.com/kl-sb</a> (user manual)
<b>KI Rigging manual</b>	<a href="http://www.l-acoustics.com/kl">www.l-acoustics.com/kl</a> (rigging manual) <a href="http://www.l-acoustics.com/kl-sb">www.l-acoustics.com/kl-sb</a> (rigging manual)
<b>KI-LASERMOUNT Technical bulletin</b>	<a href="http://www.l-acoustics.com/download">www.l-acoustics.com/download</a> (technical publications)
<b>TECH TOOLCASE Product spec sheet</b>	<a href="http://www.l-acoustics.com/tech-toolcase">www.l-acoustics.com/tech-toolcase</a> (product spec sheet)
<b>LA-RAK User manual</b>	<a href="http://www.l-acoustics.com/la-rak">www.l-acoustics.com/la-rak</a> (user manual)
<b>SOUNDVISION Software</b>	<a href="http://www.l-acoustics.com/soundvision">www.l-acoustics.com/soundvision</a>


## 4 K1 SYSTEM

The **L-ACOUSTICS® K1-BUMP flying structure** is for vertically rigging the **K1 Line Source Array System**.


The system approach developed by L-ACOUSTICS® for K1 consists of the elements needed to fully take advantage of the possible configurations and optimize the system. The main components of the system are (see also Figure 1 and Figure 2):

<b>K1</b>	⇒ Full range active 3-way WST® enclosure
<b>K1-SB</b>	⇒ Arrayable LF enclosure for K1
<b>KARA</b>	⇒ 2-way modular WST® enclosure, downfill element
<b>K2</b>	⇒ 3-way full-range active WST enclosure, downfill element
<b>K1-BUMP</b>	⇒ Structure for flying a vertical K1/K1-SB line source array
<b>K1-DELTA</b>	⇒ Azimuth angle setting delta plate (to be used in conjunction with K1-BUMP)
<b>KARA-DOWNKI</b>	⇒ Accessory to rig KARA® as a K1-downfill array
<b>K2-LINK</b>	⇒ Rigging accessory for rear attachment of K2 below K1
<b>K1BUMP-FLIGHT</b>	⇒ Modular flight-case for up to 4 K1-BUMP flying structures
<b>K1-LASERMOUNT</b>	⇒ Laser support plate for a K1 or K1-SB enclosure (refer to the <b>K1-LASERMOUNT Technical bulletin</b> [3.4])
<b>K1-CHARIOT</b>	⇒ Cart for an array of 4 K1 and/or K1-SB enclosures
<b>K1-CHARIOTCOV</b>	⇒ Protective cover for an array of 4 K1 and/or K1-SB enclosures
<b>K1-PLA</b>	⇒ Removable front dolly board for one K1 or K1-SB enclosure
<b>K1-COV</b>	⇒ Protective cover for one K1 enclosure
<b>K1-SBCOV</b>	⇒ Protective cover for one K1-SB enclosure
<b>SB28</b>	⇒ Subwoofer enclosure
<b>KS28</b>	⇒ Flyable subwoofer 2 x 18"
<b>LA-RAK</b>	⇒ Touring rack containing three <b>LA8</b> amplified controllers
<b>LA-RAK II</b>	⇒ Touring rack containing three <b>LA12X</b> amplified controllers
<b>LA NETWORK MANAGER</b>	⇒ Remote control software for amplified controllers
<b>SOUNDVISION</b>	⇒ Acoustical and mechanical modeling software

Each system configuration should first be modeled using **L-ACOUSTICS® SOUNDVISION Software** [3.4] to verify the mechanical conformity of the system. Please refer to the **SOUNDVISION Help menu** to obtain a detailed description on software use.



**LA-RAK / LA-RAK II**  
 In this document, the LA-RAK term and illustrations refer equally to LA-RAK and LA-RAK II. These are two versions of the same product and the rigging procedures are identical.



**K2 as downfill element**  
 For rigging instructions, refer to the technical bulletin **K2 downfill for K1**:  
<http://www.l-acoustics.com/25-bulletins.html>

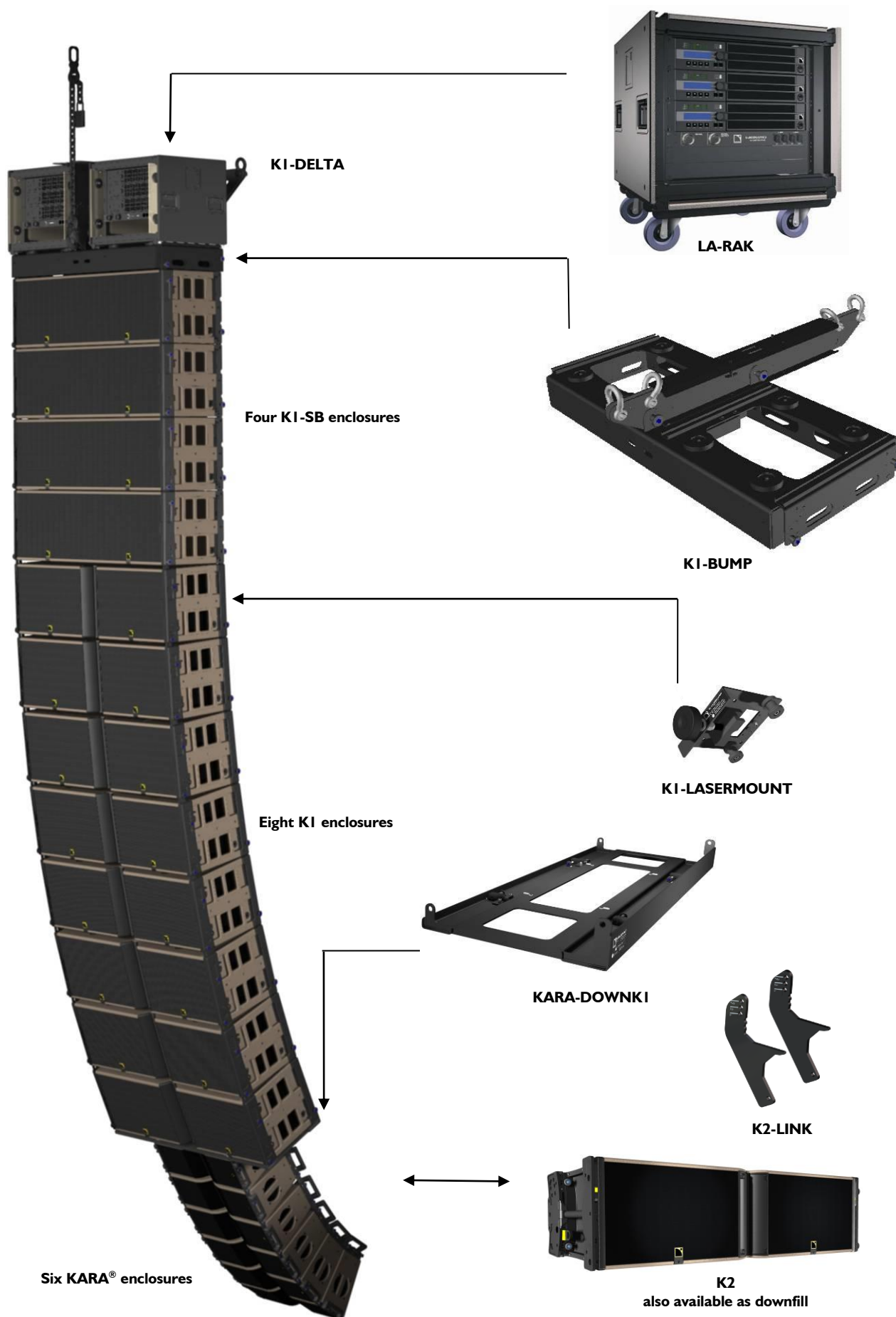


Figure I: KI system components (part I)



**KIBUMP-FLIGHT**



**LA NETWORK MANAGER**



**SOUNDVISION**



**K1-CHARIOTCOV**



**K1-COV**



**K1-SBCOV**



**K1-CHARIOT**



**K1-PLA**

**Figure 2: K1 system components (part 2)**



## 5 K1 RIGGING COMPONENTS

### 5.1 KI-BUMP flying structure, KI-DELTA plate

The **L-ACOUSTICS® KI-BUMP flying structure** and **KI-DELTA plate** have been exclusively designed to fly the **KI** and/or **KI-SB** enclosures as a variable-curvature, vertical line source array. The KI-DELTA plate is for azimuth angle setting [9.5].

The **KI-BUMP** is composed of the following elements:

- One **main frame**.
- One **central bar**.
- Four ½" **R-BLP** (round-shaped ball-locking pins).
- Two ¾" **R-BLP**.
- Two ⅜" **T-BLP** (T-shaped ball-locking pins).
- Four **shackles** fitted with 22 mm/0.87 inch-diameter bolts and safety pins, ready for two-point hang and two-point safety attachment [9.2].
- One **adjustable sling** to be used in case of climbing-hoist setup [9.3].
- One **rack stabilizer** to mount LA-RAK touring racks onto the KI-BUMP [6.1.2].

The **KI-DELTA** is composed of the following elements:

- One **delta plate**.
- Three **shackles** fitted with 22 mm/0.87 inch-diameter bolts and safety pins.

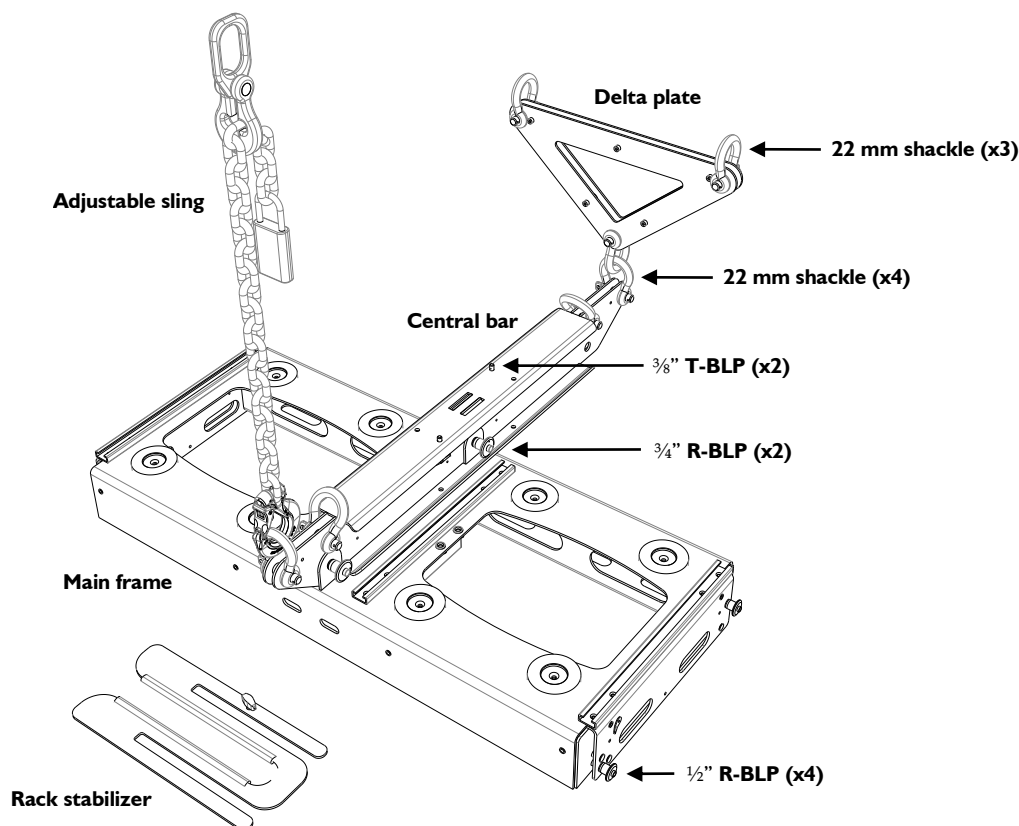


Figure 3: Equipped KI-BUMP

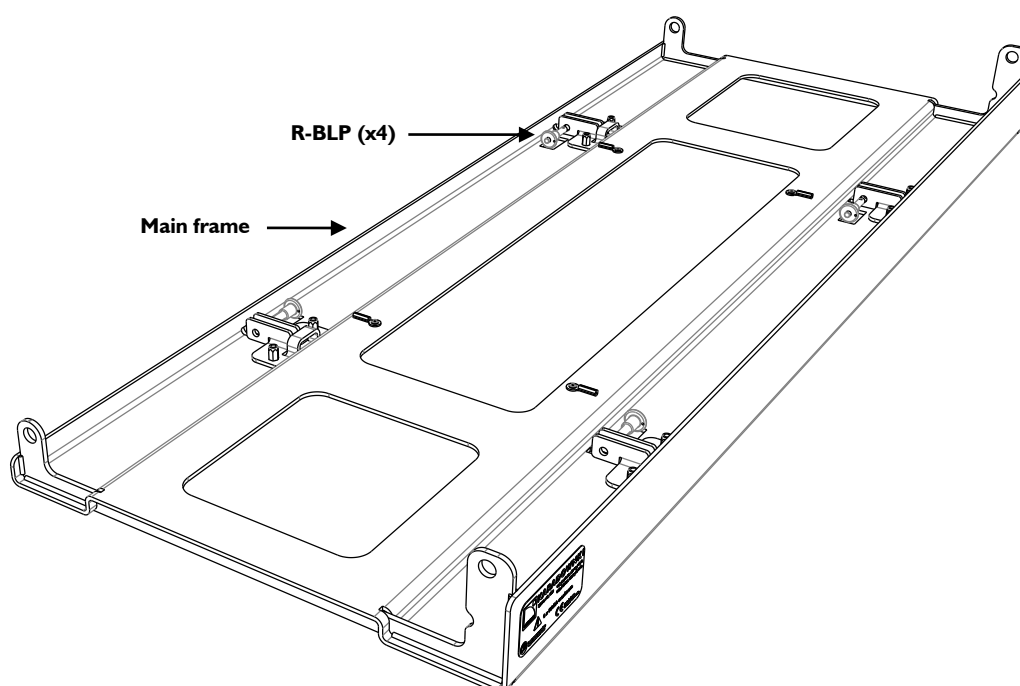
## 5.2 KARA-DOWNKI rigging accessory

---

The **L-ACOUSTICS® KARA-DOWNKI rigging accessory** has been exclusively designed to attach KARA® enclosures as a downfill array for K1.

The **KARA-DOWNKI package** is composed of the following elements:

- One **main frame**.
- Four 5/16" **R-BLP** (round-shaped ball-locking pins for KARA rigging).



**Figure 4: KARA-DOWNKI rigging accessory**

### 5.3 KIBUMP-FLIGHT case

The **L-ACOUSTICS® KIBUMP-FLIGHT case** has been exclusively designed to transport the **KI-BUMP** flying structure.

The **KIBUMP-FLIGHT** is composed of the following elements (see also Figure 5):

- One **wheeled bottom tray**.
- Two **compartments**.
- One **removable tray**.
- One **lid**.

In its default configuration (see Figure 5), the KIBUMP-FLIGHT allows transporting 2 KI-BUMP as well as additional accessories in the removable tray such as delta plates, adjustable slings, accessories for rigging dV-DOSC® or KARA® as downfill arrays, and others. The footprint is equivalent to the KI-CHARIOT's one thus facilitating truck packing.

**Note:** Both KI-BUMP can be hooked and lifted from the case using motors without any physical handling. The inner cut-outs of the compartments also allow transporting cables in place of the bottom KI-BUMP.

Its modular conception makes the KIBUMP-FLIGHT ready to accept 2 additional compartments. This maximum configuration allows transporting up to 4 KI-BUMP and the total height of the flight-case will be equivalent to the height of an array of 4 KI or KI-SB enclosures placed on a KI-CHARIOT.

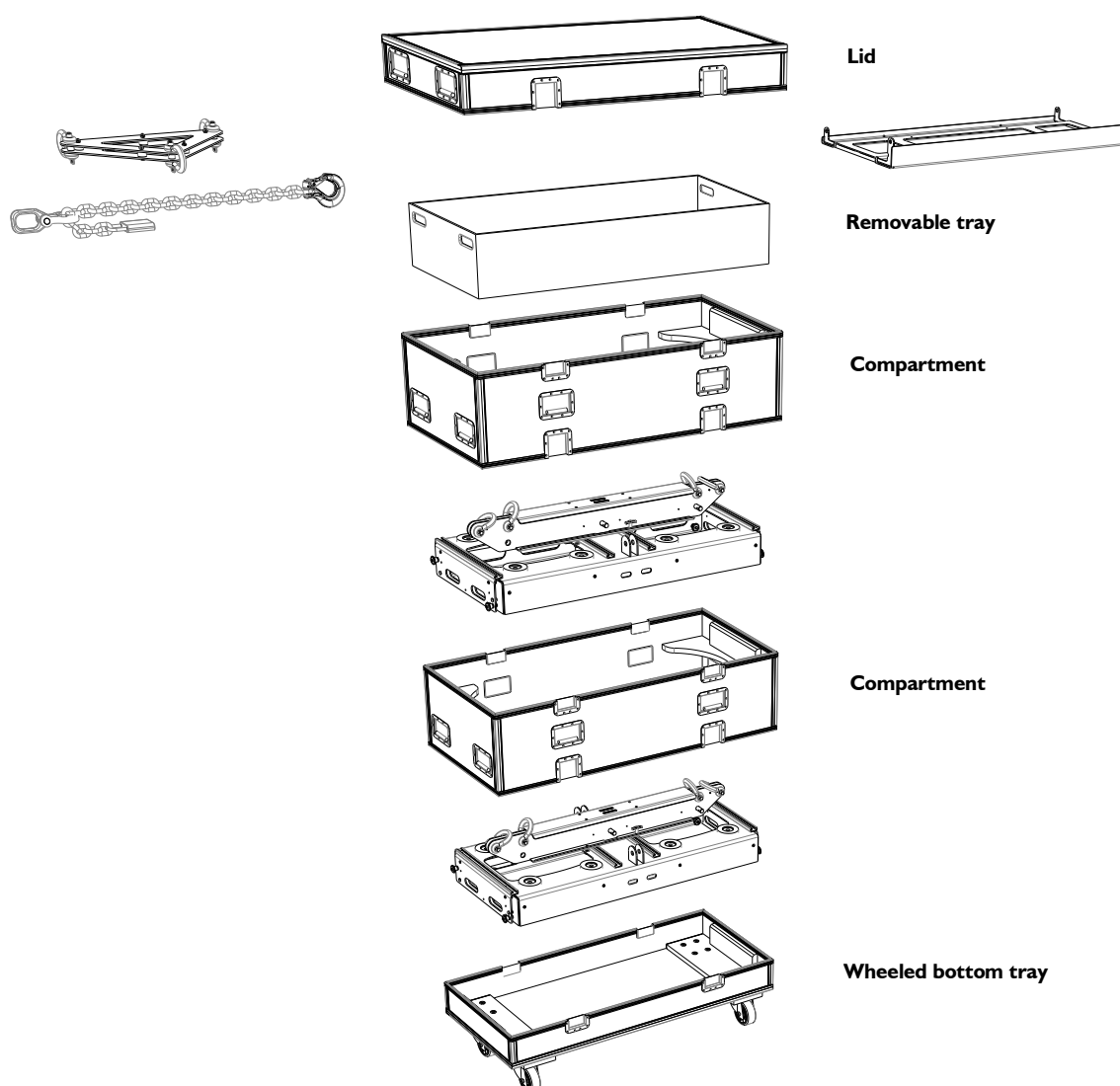


Figure 5: KIBUMP-FLIGHT

## 6 INSTALLATION

### 6.1 KI-BUMP preparation and LA-RAK rigging

#### 6.1.1 KI-BUMP preparation



All along the procedure:

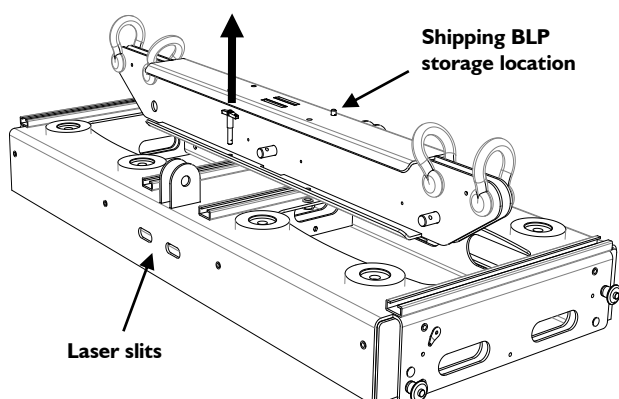
- Strictly follow the sequence of the successive steps.
- Systematically ensure that each BLP is fully inserted by pulling on it.
- Systematically ensure that each shackle anchor has screw bolt secured and safety pin inserted.

1. Place the KI-BUMP beneath the rigging points with rack rails on top and laser slits towards the front.

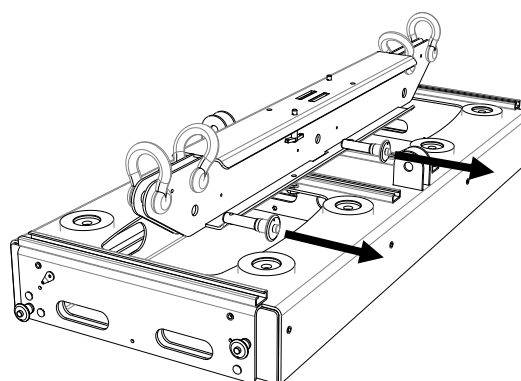
**Note:** The KI-BUMP can be transported and prepared into the KIBUMP-FLIGHT case [5.3].

2. Put the central bar from shipping to rigging position:

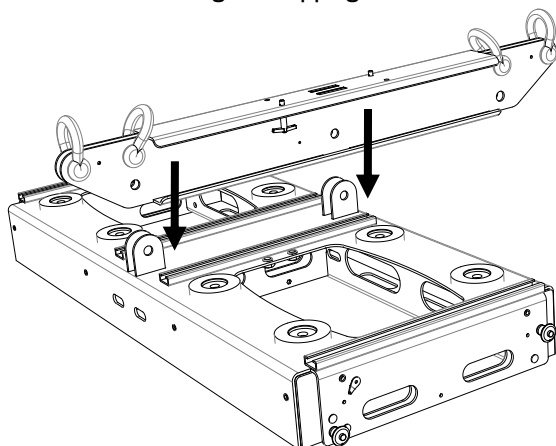
- a. Remove both shipping  $\frac{3}{8}$ " T-BLP and put them in their storage locations.
- b. Remove both rigging  $\frac{3}{4}$ " R-BLP.
- c. Lift up, rotate, and align the central bar with the KI-BUMP holes.  
**Note:** Two orientations are possible whether the front or rear overhang is required [9.4].
- d. Attach both rigging  $\frac{3}{4}$ " R-BLP to the central bar and KI-BUMP holes.



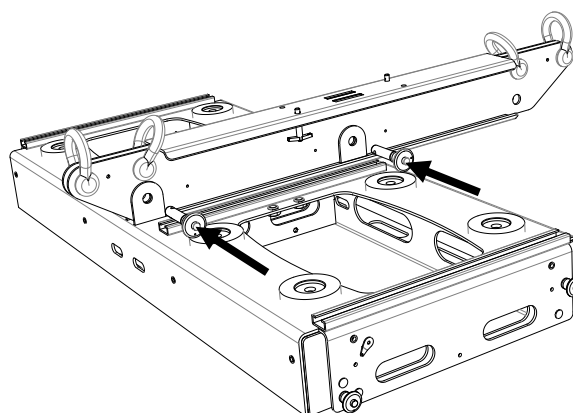
a. Removing 2 x shipping  $\frac{3}{8}$ " T-BLP



b. Removing 2 x rigging  $\frac{3}{4}$ " R-BLP



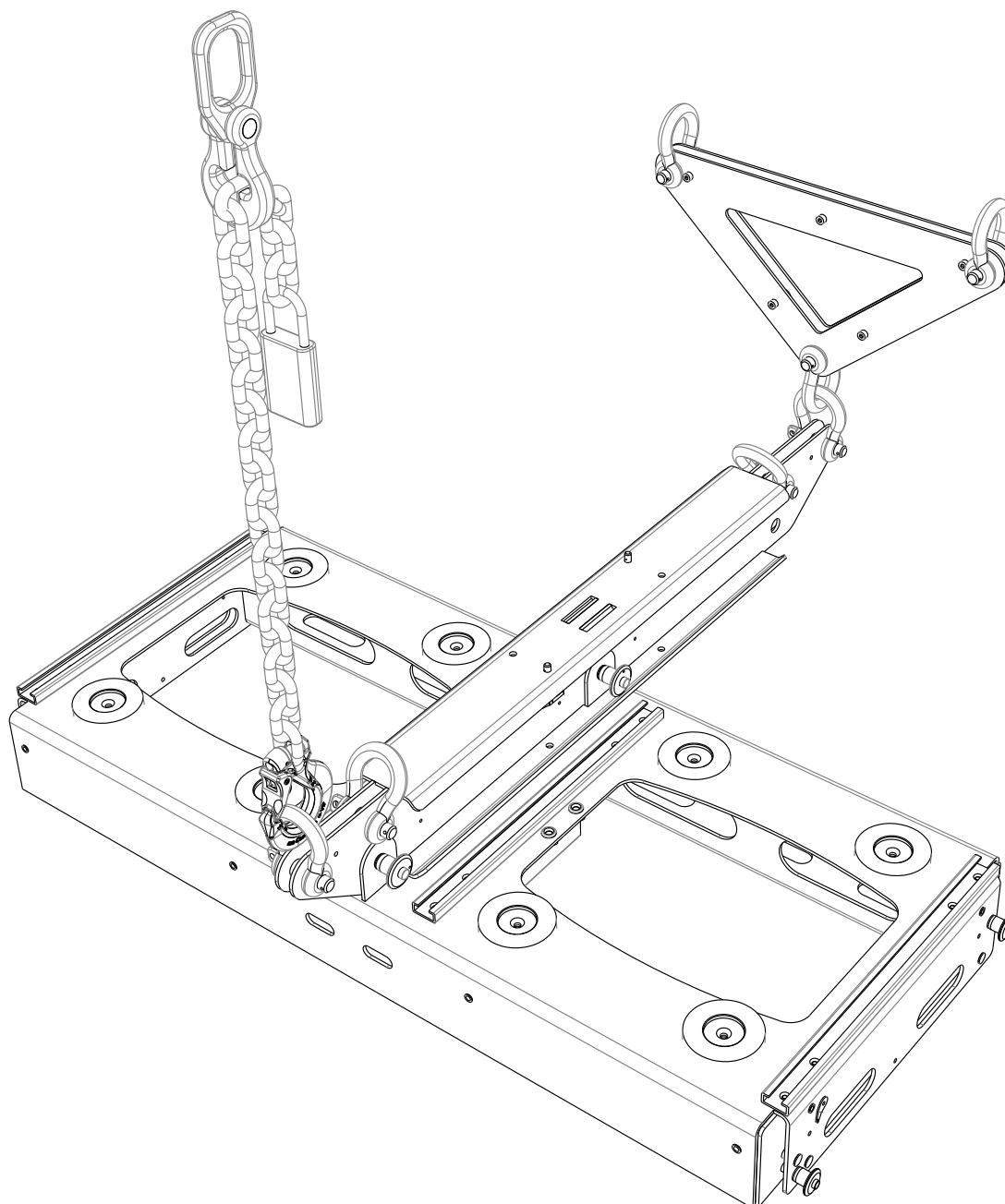
c. Central bar aligned for rear overhang



d. Attaching 2 x rigging  $\frac{3}{4}$ " R-BLP

**Figure 6: Putting central bar in rigging position**

3. Check if the four shackles are well secured to the central bar.
4. **If necessary**, attach the adjustable sling to the front external shackle [9.3].
5. **If necessary**, attach the KI-DELTA to the rear external shackle [9.5].



**Figure 7: Attaching the adjustable sling and the KI-DELTA**

### 6.1.2 LA-RAK rigging

It is possible to rig up to four LA-RAK touring racks to the K1-BUMP flying structure as it is described below. Before applying this procedure, the K1-BUMP must have been prepared as described in [6.1.1].



All along the procedure:

- Strictly follow the sequence of the successive steps.
- Systematically ensure that each BLP is fully inserted by pulling on it.



All along the procedure:

Strictly follow the sequence of the successive steps.

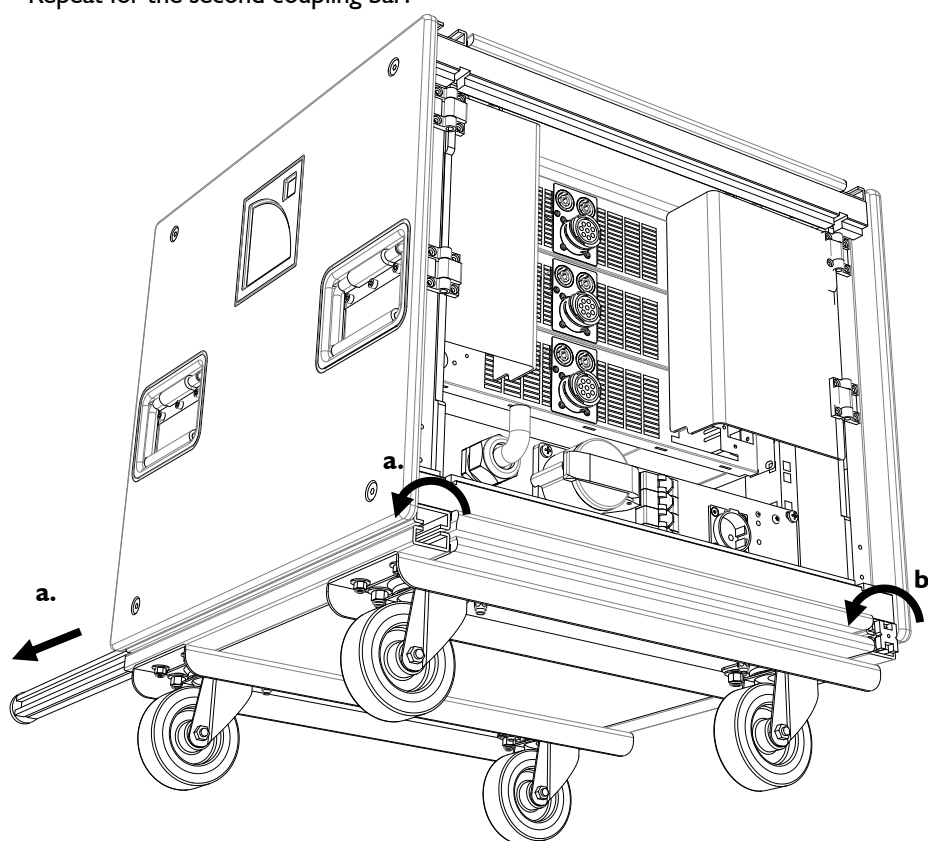
Systematically ensure that each BLP is fully inserted by pulling on it.

I. Take a first LA-RAK and remove the dolly board:



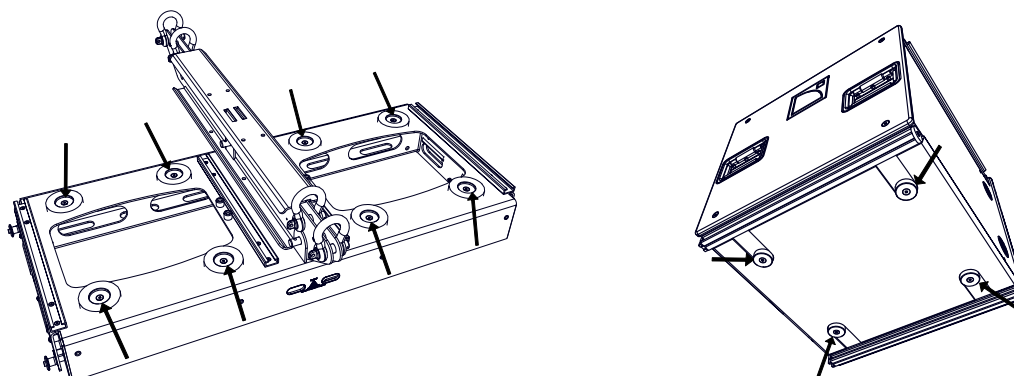
Verify the plastic spring-loaded safety is intact

- a. Turn a spring-loaded safety and slide out the coupling bar.
- b. Verify the spring-loaded safety is intact.
- c. Repeat for the second coupling bar.



**Figure 8: Removing the dolly board from an LA-RAK**

2. Verify that the studs on the bottom of the LA-RAK and the recesses on top of the KI-BUMP are not worn out.



3. Place the LA-RAK on a KI-BUMP 2-rail template.



The LA-RAK must be installed with front panel oriented towards the KI-BUMP laser slits (or rear panel towards the REAR identification plate as shown in Figure 9).

4. Secure the LA-RAK to the KI-BUMP :



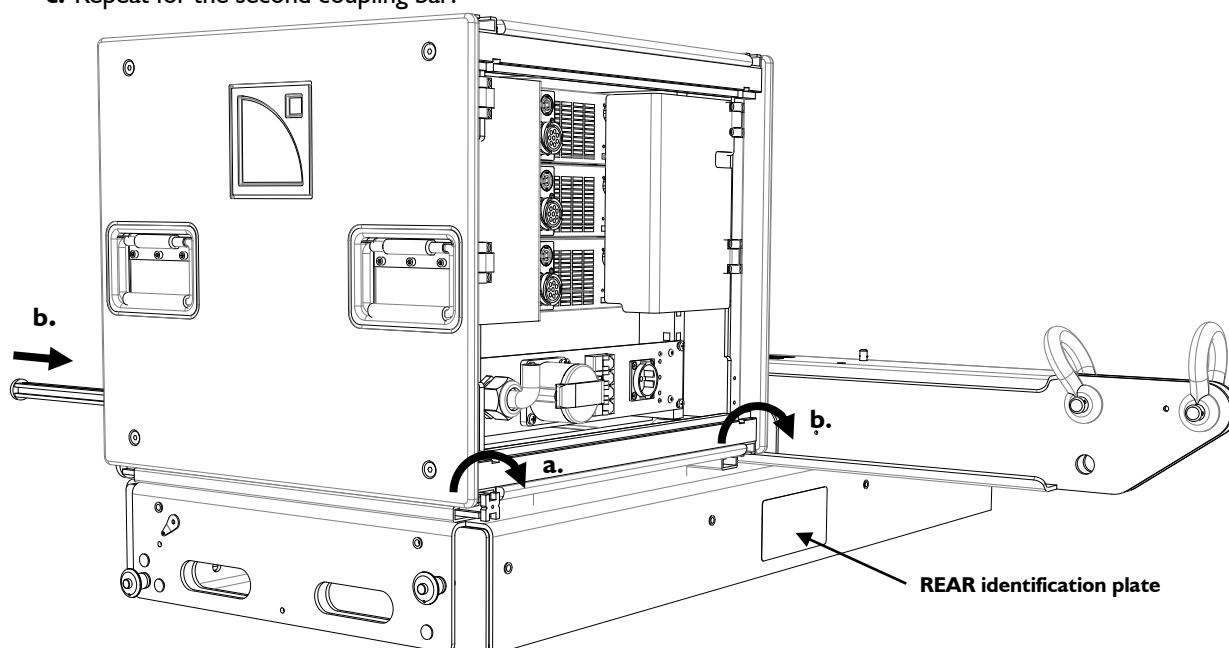
When the array is at trim height with the correct site angle, the plastic spring-loaded safety must point toward the ground.

- For a positive site angle insert coupling bars from front to back so the plastic safety ends up at the back.
- For a negative site angle insert coupling bars from back to front so the plastic safety ends up at the front.



The site angle limits with LA-RAK on top of a KI array are  $-20^{\circ}/+20^{\circ}$ .

- a. Insert the plastic spring-loaded safety in the rail.
- b. Give a quarter turn to the coupling bar and slide it along the rails until the safety locks in position (you will hear a click).
- c. Repeat for the second coupling bar.

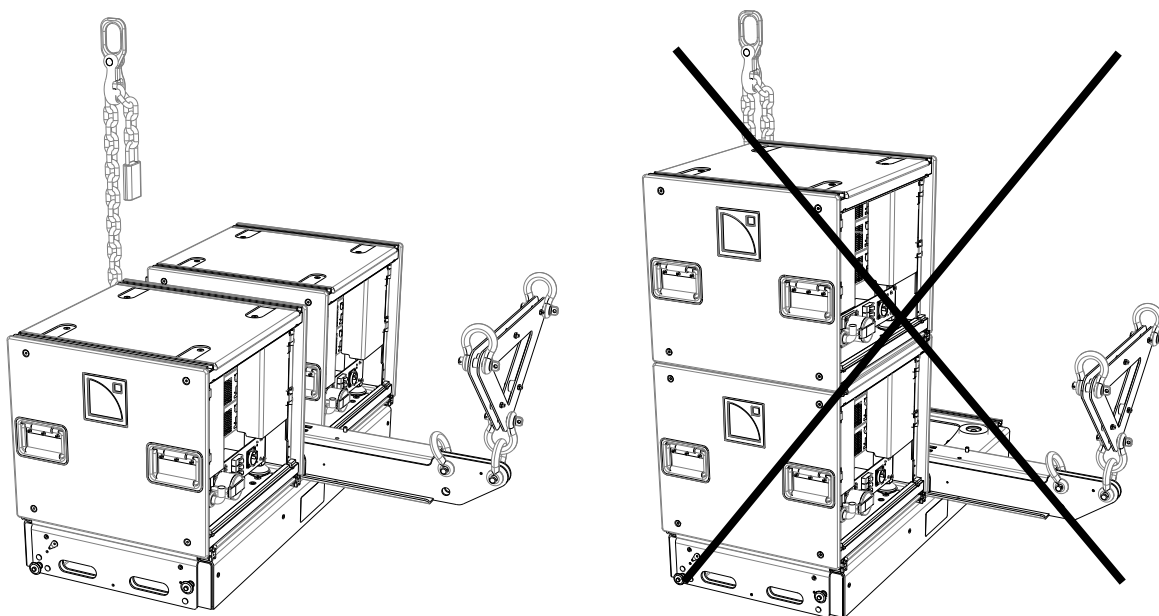


**Figure 9: Rigging a first LA-RAK to the KI-BUMP**

5. If necessary, install a second LA-RAK onto the second 2-rail template by repeating steps 1 to 4.



The LA-RAK touring racks must be arranged so as to properly balance the KI-BUMP's centre of gravity. Therefore, if only two racks are used each one must be placed directly onto the KI-BUMP (see Figure 10).



**Figure 10: Rigging a second LA-RAK to the KI-BUMP (dos and don'ts)**



6. If **necessary**, install a third and a fourth LA-RAK onto the first ones and secure each one by repeating steps 1 to 4.



The LA-RAK touring racks must be arranged so as to properly balance the centre of gravity of the KI-BUMP. Therefore, if four racks are used, they must be arranged in two dual-rack columns (see Figure 11).

A maximum of **four** LA-RAK can be rigged on top of the KI-BUMP.

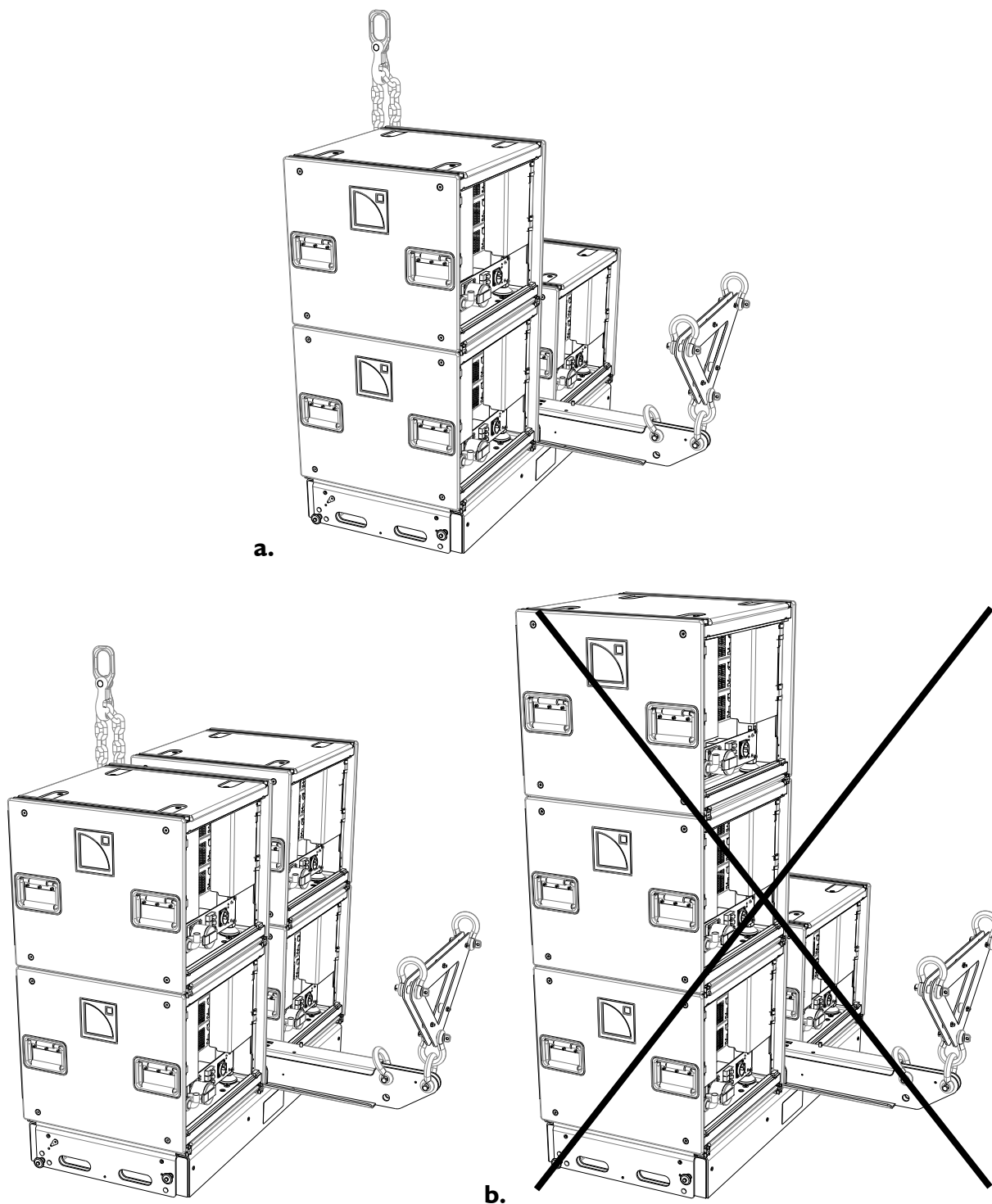
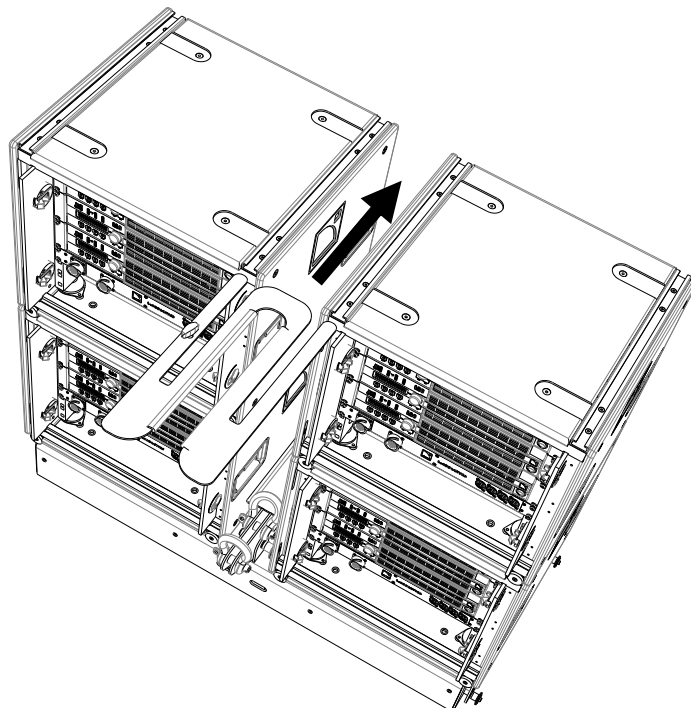


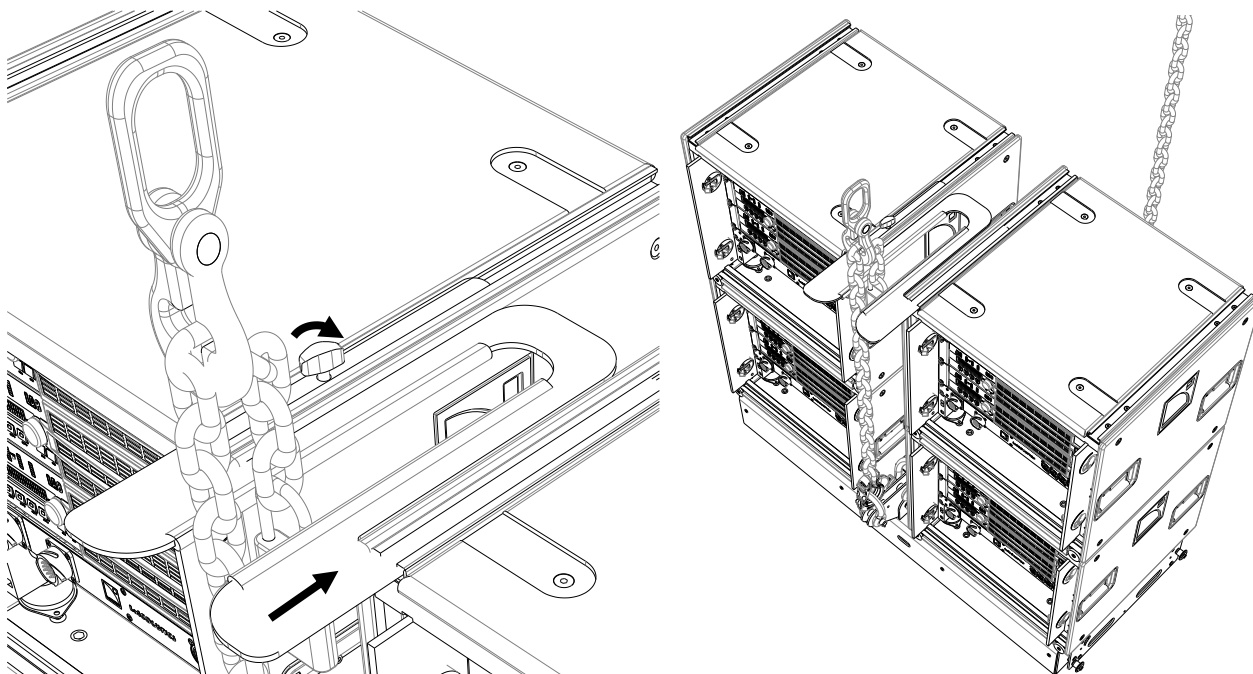
Figure 11: Rigging a third (a.) and a fourth (b.) LA-RAK to the KI-BUMP (dos and don'ts)

7. Once all LA-RAK are installed (between 1 and 4), slide the rack stabilizer along one or two LA-RAK rails until it locks (one rail for 1 or 3 LA-RAK, two rails for 2 or 4 LA-RAK).



**Figure 12: Installing the rack stabilizer (chains not represented for visibility purposes)**

8. Screw in the safety screw and place the front motor chain into the groove of the rack stabilizer<sup>1</sup>.



**Figure 13: Securing the rack stabilizer and the front motor chain**



<sup>1</sup> When the final number of LA-RAK is 1 or 3, place the front motor chain and a rubber molding **on the external side of the rack stabilizer (see Figure 14)**. This will prevent the KI-BUMP from tilting when it is flown.

The KI-BUMP will recover stability after four KI and/or KI-SB enclosures have been rigged. At this moment the front motor chain and the rubber molding **must be slid back into the groove of the rack stabilizer (see Figure 13)**.

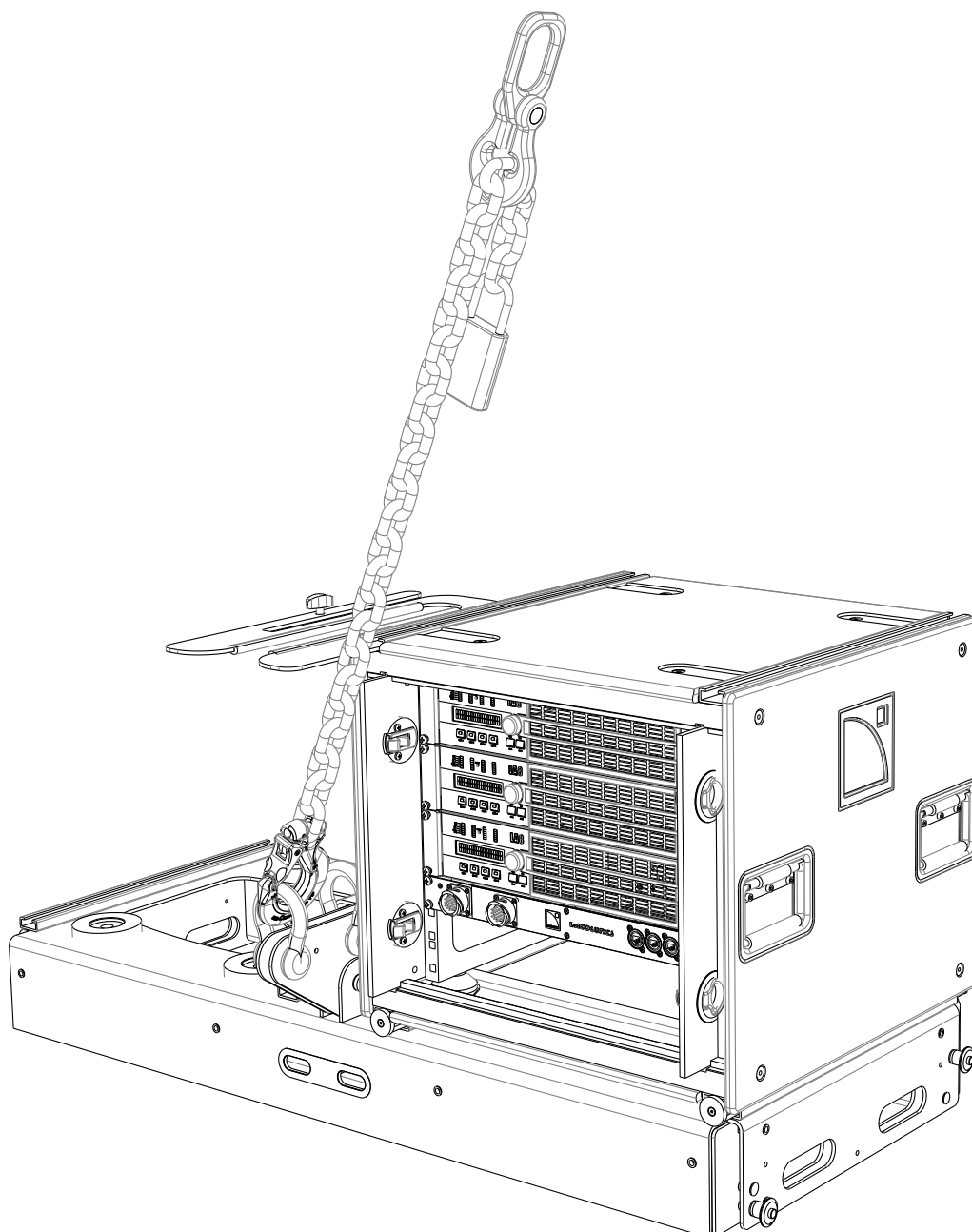


Figure 14: Front motor chain temporary position for 1 or 3 LA-RAK

## 6.2 Flying a vertical array by using the TOWER method

### 6.2.1 Modeling and safety

Any system must be modeled before installation so as to ensure acoustical and mechanical conformity. This can be done using **L-ACOUSTICS® SOUNDVISION Software** [3.4] which will assist the user to:

- Determine the number of required KI and/or KI-SB enclosures.
- Calculate the KI-BUMP site angle and inter-enclosure angles.
- Check the mechanical conformity of the system.



The KI-BUMP can nominally fly a maximum of 24 KI and/or KI-SB enclosures along with 4 LA-RAK touring racks and all loudspeaker cables (refer to the **KI, KI-SB, and LA-RAK User manuals** [3.4]). However, this maximum number can decrease in line with array curvature.

ALWAYS refer to the mechanical data and warning indications provided in SOUNDVISION software (**Mechanical Data** section) to verify the mechanical conformity of the system before installation.

### 6.2.2 Array mounting

The TOWER method consists in building the array by successively adding 4-enclosure blocks. Each block, called TOWER, ships onto an **L-ACOUSTICS® KI-CHARIOT** cart.

The fully integrated rigging system on KI and KI-SB allows assembling the enclosures and KI-BUMP with no need for any external fastening accessory. The following procedure describes how to fly a vertical array of eight KI by using the TOWER method. By convention the first TOWER will be called TOWER#1, the second TOWER#2.



All along the procedure:

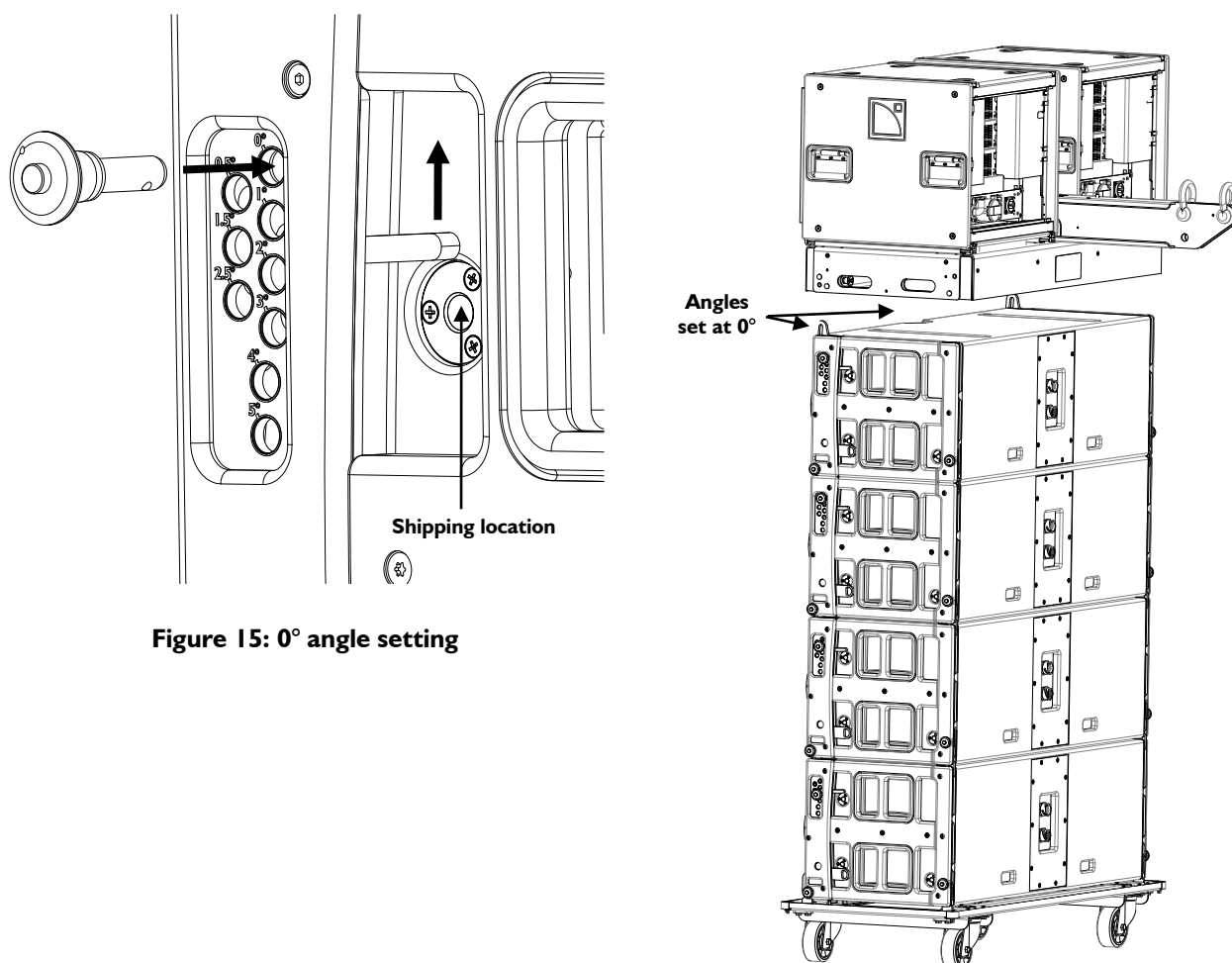
- Strictly follow the sequence of the successive steps.
- Ensure that each BLP is fully inserted by pulling on it.



- For clarity purposes the loudspeaker cabling procedure will not be described.
- The loudspeaker cables will not be represented on the figures.
- Use a strain relief to avoid mechanical stress at the connector locations due to cable weight.

1. Prepare the KI-BUMP [6.1.1] and attach the motor hooks [9.2].
2. **If necessary**, mount LA-RAK touring racks onto the KI-BUMP [6.1.2].
3. Raise the KI-BUMP in the horizontal orientation to more than 2 m/6.5 ft height.
4. Place the TOWER#1 beneath the KI-BUMP.

5. Select the 0° angle for both angle arms on top of TOWER#1: remove the R-BLP from the shipping location, hold it facing to the 0° angle hole, and slide out the angle arm until the R-BLP enters and locks.

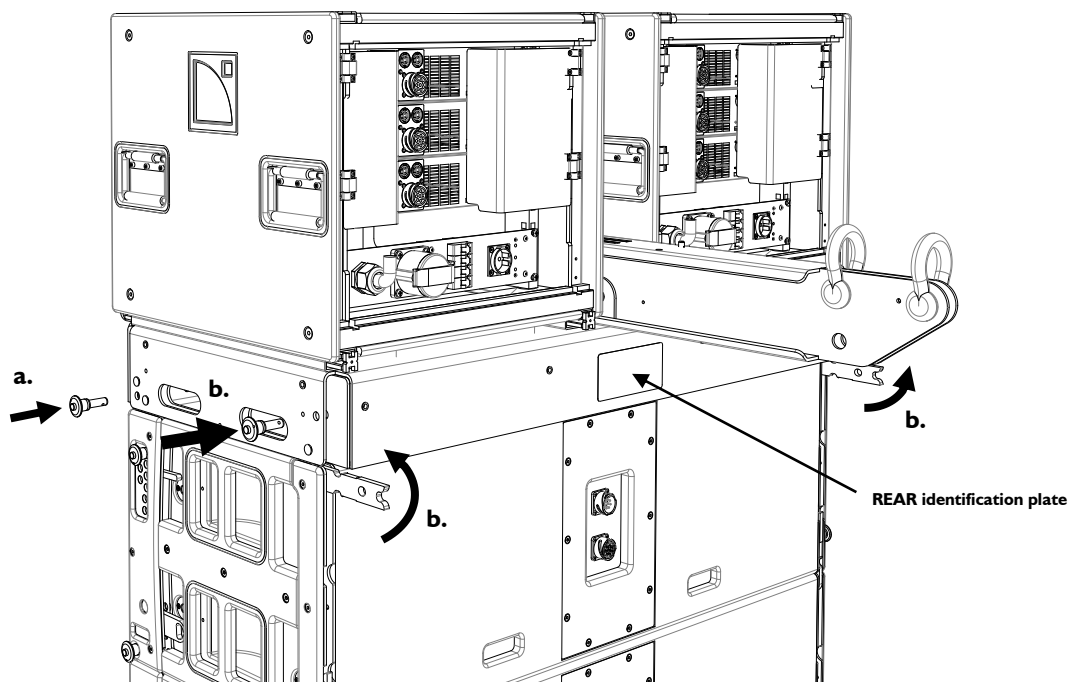


**Figure 15: 0° angle setting**

6. Attach the KI-BUMP to the TOWER#1 as described below (see also Figure 16):
  - a. Remove the four R-BLP from the KI-BUMP main frame and let them hang.
  - b. Lower the KI-BUMP so as to align the front rigging points with both angle arm oblong holes on the TOWER#1 and attach them (use two R-BLP).
  - c. Lift both rear arms out of TOWER#1 and attach them to the KI-BUMP (use two R-BLP).



The KI-BUMP must be installed with laser slits oriented towards the front of the array (or REAR identification plate towards the rear, as it is shown in Figure 16).



**Figure 16: Attaching KI-BUMP to TOWER#1 (motor hooks not represented)**

7. Verify that each enclosure of TOWER#1 is attached to the enclosure above and (if necessary) pre-select the angles as described below (see also Figure 17):
  - a. Ensure that both rear and angle arms are attached to the enclosure above.



ALWAYS check that all BLP are attached between enclosures in the TOWER.

ALWAYS check that all rear arms are attached by making sure that **NO yellow stickers** located on the rear arms are visible.

- b. Select the “variable” setting by pulling on the angle unlocking latch until a click is heard.



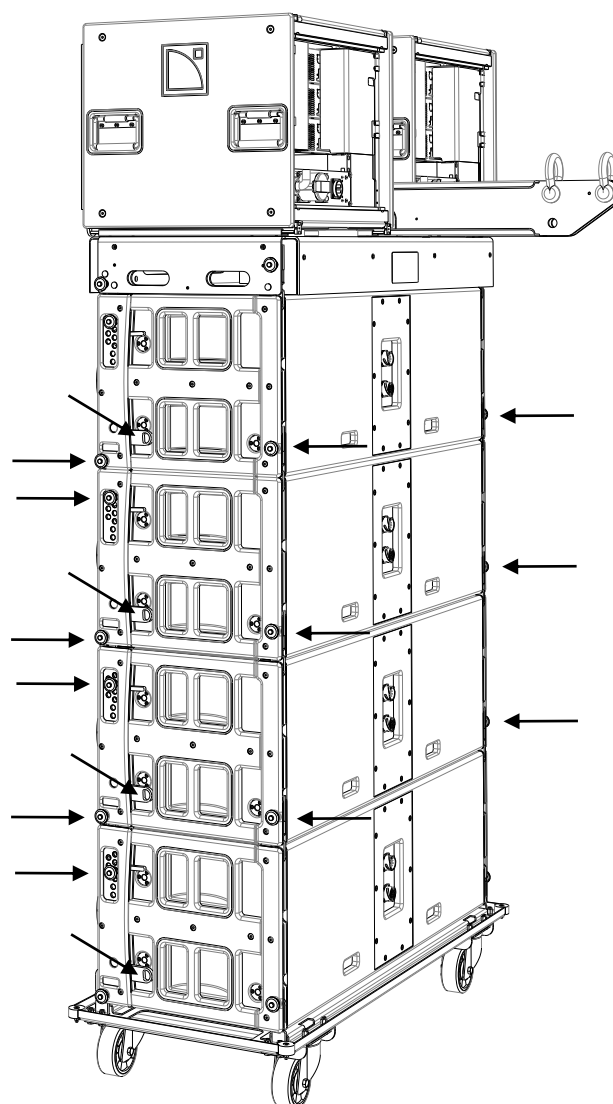
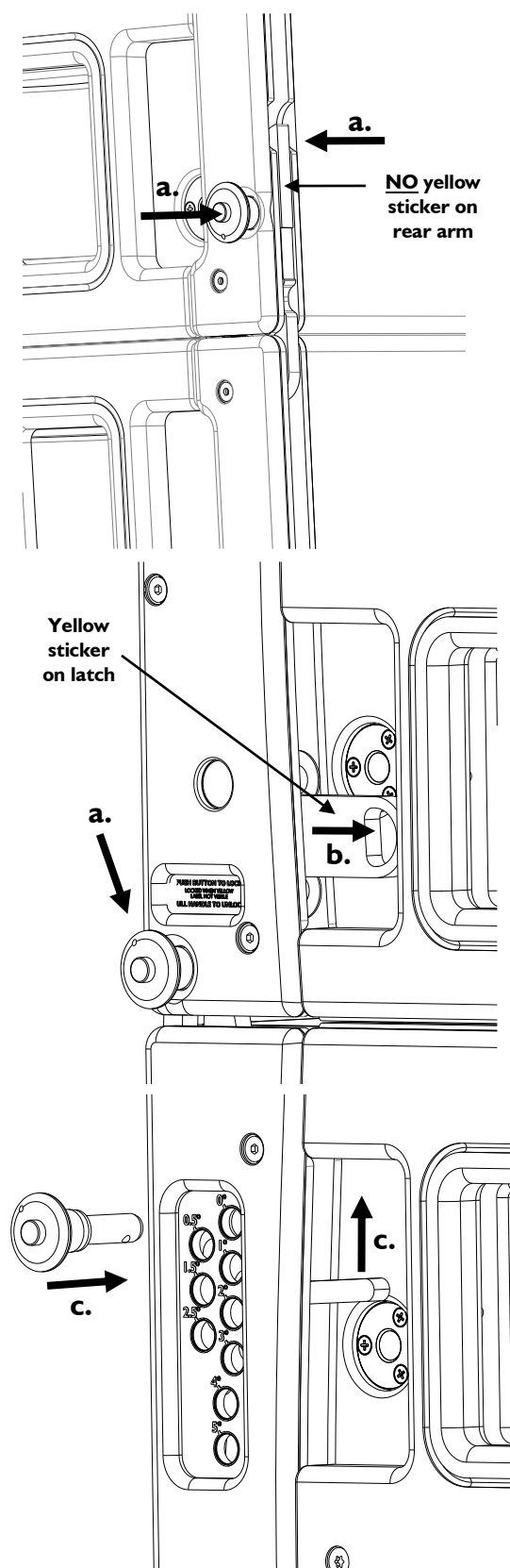
Check that the “variable” setting is selected on each latch by making sure that a yellow sticker is visible.

- c. Pre-select the desired angle: remove the R-BLP, hold it facing to the desired angle hole, and slide the angle arm until the R-BLP enters and locks.

**Note:** One interest of the TOWER method is that the inter-enclosure angles can be pre-selected beforehand.

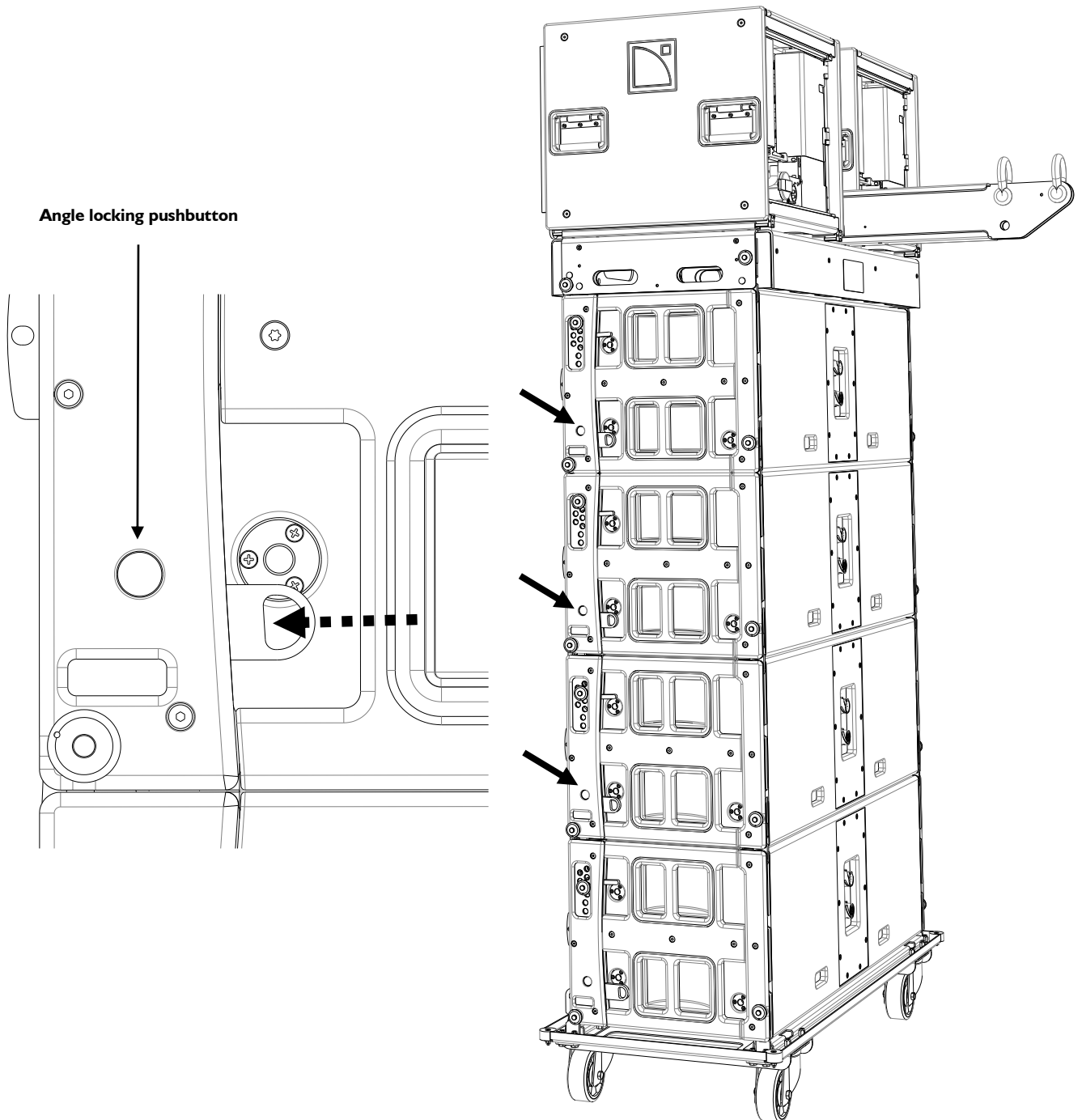


In that case the user must **strictly follow the order in which the TOWERS have been planned to be rigged.**



**Figure 17: Verifying attachment and pre-selecting the angles**

8. On both sides of each enclosure (except for the bottom one) select the “fix” setting by pressing the angle locking pushbutton.



**Figure 18: Selecting the “fix” setting**



9. Raise the TOWER#1 until the KI-CHARIOT wheels reach 0.3 m/1 ft eight.

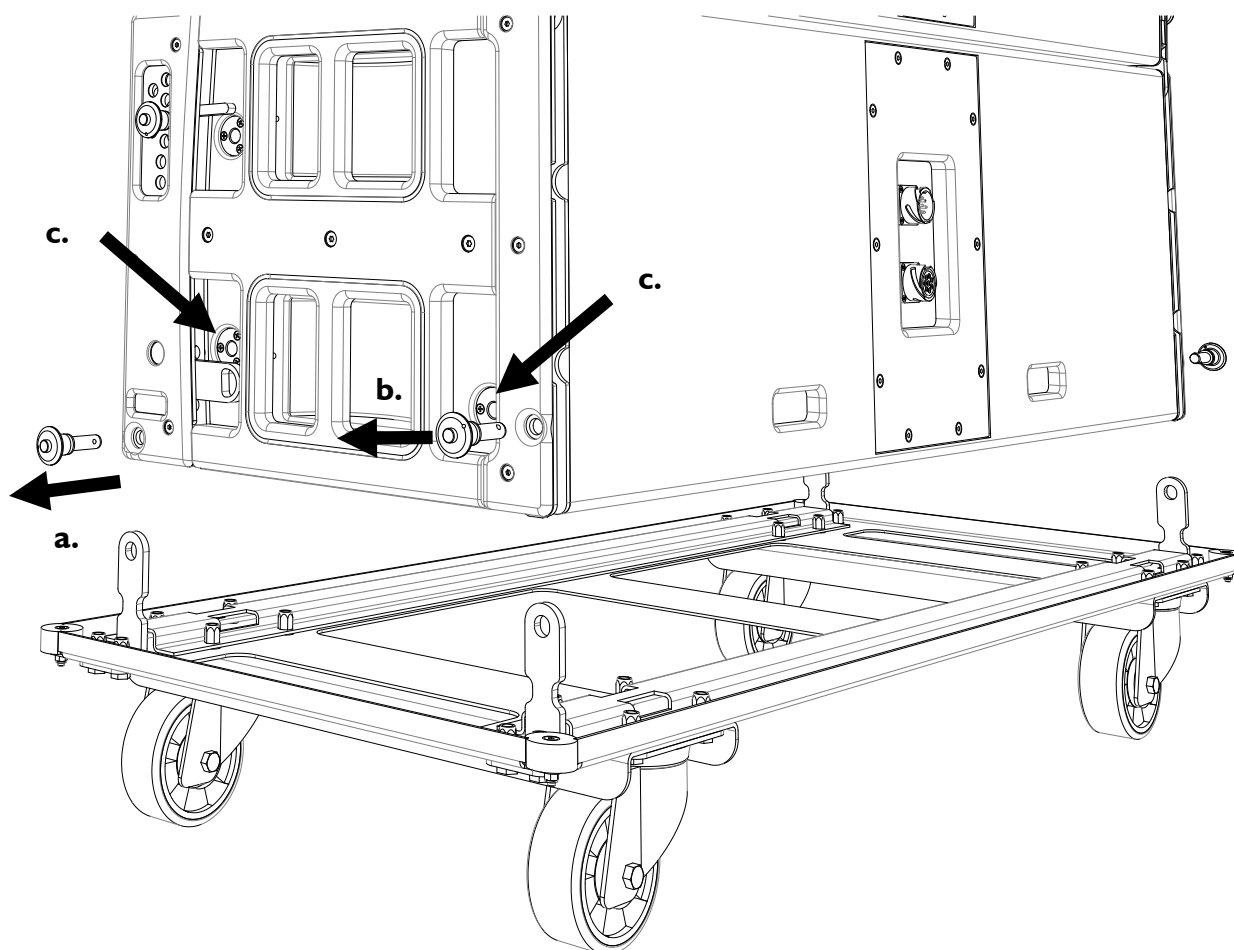
**Note:** As the array is raised all angle latches should subsequently take their locking position and a “shlack” noise should be heard.



ALWAYS check that all inter-enclosure angles have reached their locked position by making sure that **NO yellow stickers** located on the angle locking latches are visible (**except on the bottom enclosure**).

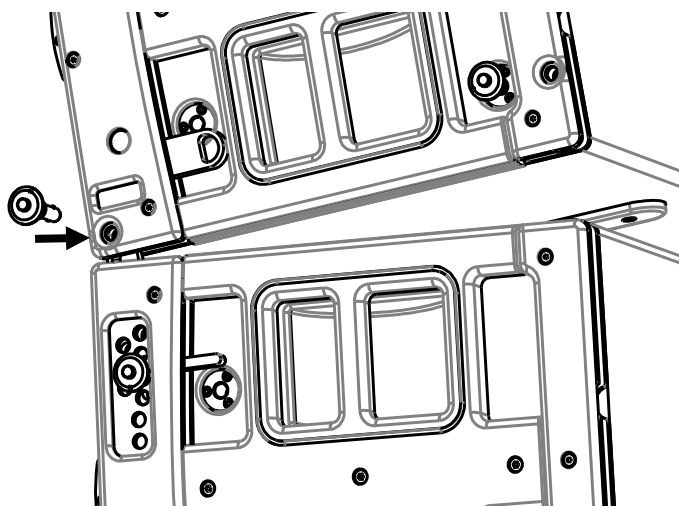
10. Remove the KI-CHARIOT from TOWER#1 as described below:

- a. Remove both front R-BLP from the bottom enclosure while holding the KI-CHARIOT.
- b. Remove both back R-BLP and remove the KI-CHARIOT.
- c. Place the four R-BLP back into their storage locations on the bottom enclosure.

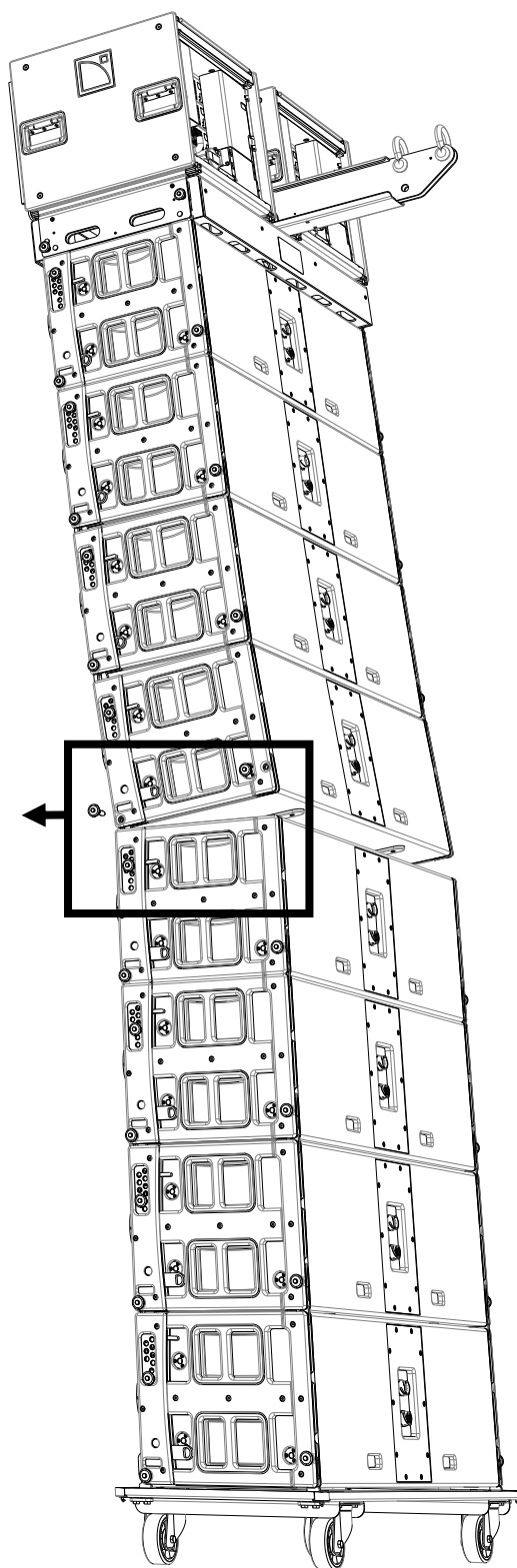


**Figure 19: Removing the KI-CHARIOT**

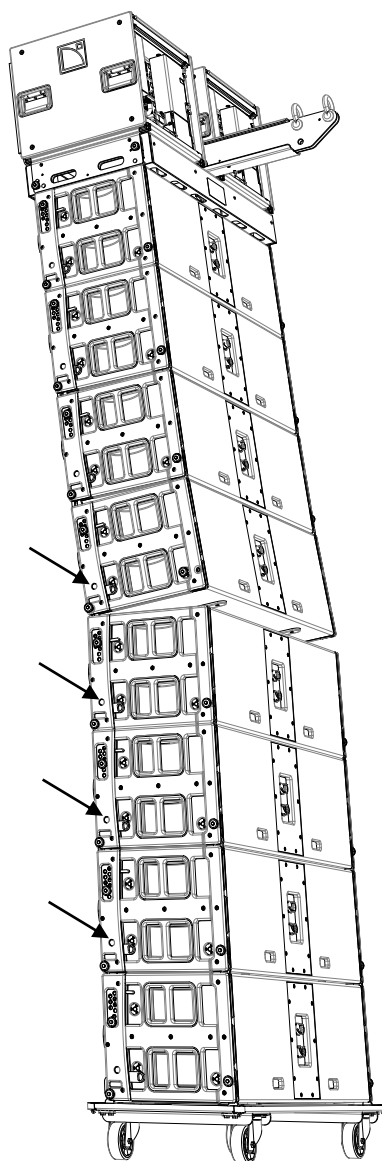
11. Raise the TOWER#1 until the bottom enclosure reaches a height of more than 2 m/6.5 ft.
12. Place the TOWER#2 beneath the TOWER#1.
13. Verify attachment and pre-select the angles for the TOWER#2 by repeating step 7. Also pre-select the angle for the top enclosure.
14. Attach the front rigging points between TOWER#1 and TOWER#2 as described below:
  - a. Lower the TOWER#1 so as to align the front rigging points with both angle arm oblong holes on TOWER#2.
  - b. Attach both points by using two R-BLP.



**Figure 20: Attaching TOWER#2 to TOWER#1  
front rigging points**



15. Select the “fix” setting on the bottom enclosure of TOWER#1 and all enclosures of TOWER#2 except on the bottom one (see step 8).



**Figure 21: Selecting the “fix” setting on TOWER#1 and TOWER#2**

16. Raise the array until the KI-CHARIOT wheels are off the ground.

**Note:** As the array is raised all angle latches should subsequently take their locking position and a “shlack” noise should be heard.



ALWAYS check that all inter-enclosure angles have reached their locked position by making sure that **NO yellow stickers** located on the angle locking latches are visible (**except on the bottom enclosure**).

17. Attach the rear rigging points between TOWER#1 and TOWER#2 as follows:

- a. Arrange the KI-CHARIOT front wheels towards interior as it is shown in Figure 22.



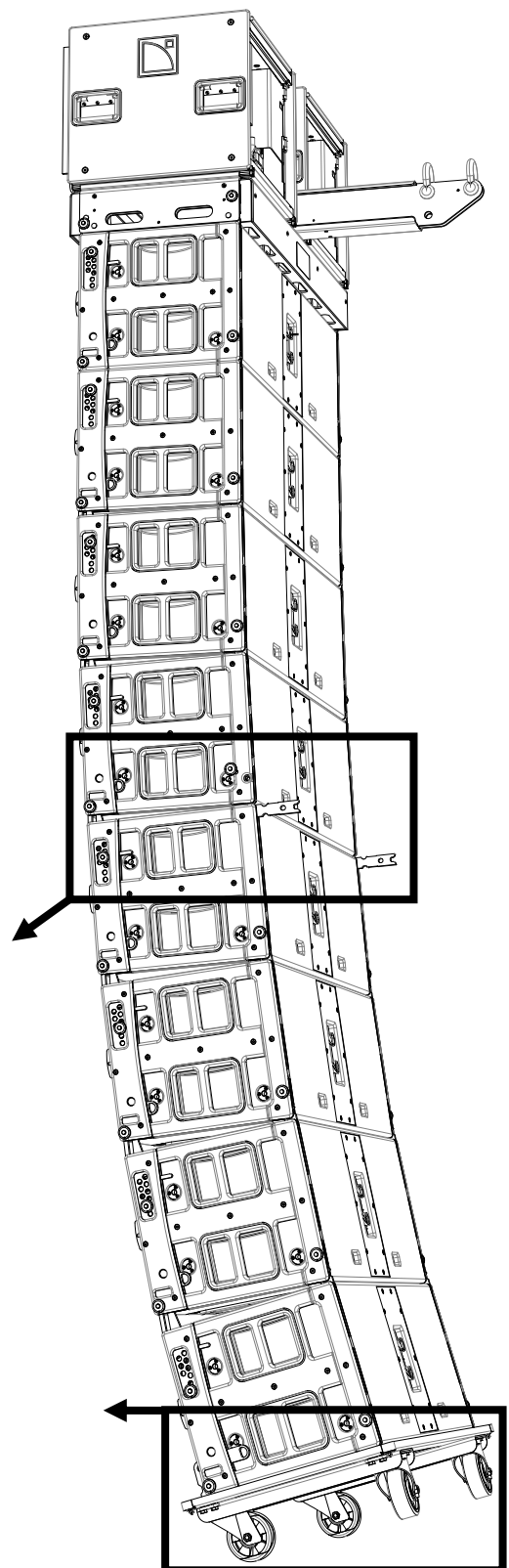
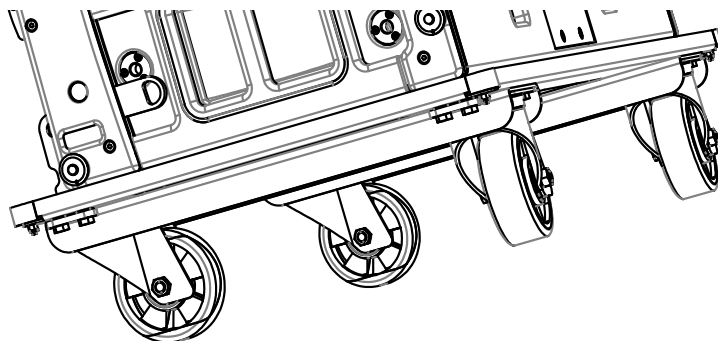
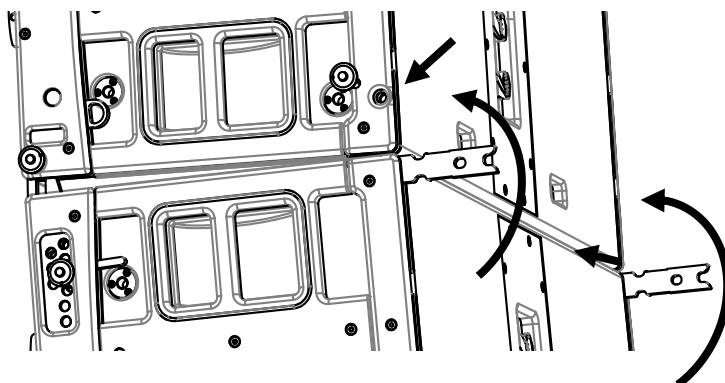
This operation will avoid instability when the wheels are in contact with the ground.

- b. With 3 people (one manipulating the hoist controller and two on both sides of the array grabbing the bottom handles of TOWER#2), pull towards the back while lowering the array until both KI-CHARIOT front wheels touch the ground.
- c. Continue lowering the array until the TOWER#2 and TOWER#1 rear corners are in contact.



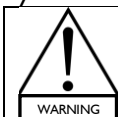
Stop lowering the array at the exact moment when both TOWER rear corners are in contact so as to avoid putting too much stress on the KI-CHARIOT wheels.

- d. Lift both rear arms out of TOWER#2 and attach them to the TOWER#1 (use two R-BLP).



**Figure 22: Attaching TOWER#2 to TOWER#1 rear rigging points**

18. Raise the array until the KI-CHARIOT wheels reach 0.3 m/1 ft eight.
19. Remove the KI-CHARIOT from TOWER#2 by repeating step 10.
20. For arrays of more than 8 enclosures repeat steps 11 to 19 until all TOWERS composing the array are flown.
21. If a KARA downfill array is intended to be rigged, attach it under the bottom KI [6.4.2].
22. Fly the array at desired trim height and adjust the site and azimuth angles [9.4-9.5].



The site angle limits with LA-RAK on top of a KI array are  $-20^{\circ}/+20^{\circ}$ .

23. Secure the KI-BUMP to the main rigging structure using two safety slings (not provided) [9.2].

### 6.2.3 **Array removal**



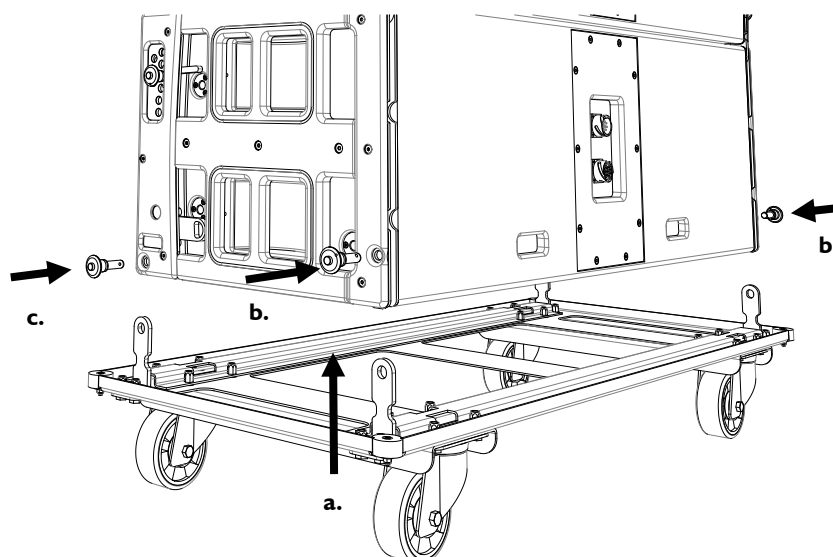
All along the disassembling procedure:

- Strictly follow the sequence of the successive steps.
- Ensure that each BLP is fully inserted by pulling on it.



For clarity purposes the loudspeaker cable removing procedure will not be described.  
The loudspeaker cables will not be represented on the figures.

1. Detach both safety slings from the KI-BUMP [9.2].
2. If a KARA downfill array has been rigged, remove it from the bottom KI [6.4.3].
3. Lower the array at 0.3 m/1 ft height.
4. Attach a KI-CHARIOT to the bottom enclosure as described below:
  - a. Align both rear rigging points between the KI-CHARIOT and the bottom enclosure.
  - b. Attach both rear rigging points (use two R-BLP).
  - c. Hold the KI-CHARIOT and attach both front rigging points (use two R-BLP).



**Figure 23: Attaching KI-CHARIOT**

Detach the **rear rigging points** between TOWER#1 and TOWER#2 as described below:

- a. Arrange both KI-CHARIOT front wheels towards interior as it is shown in Figure 24.



This operation will avoid instability when the wheels are in contact with the ground.

- b. With 3 people (one manipulating the hoist controller and two on both sides of the array grabbing the bottom handles of TOWER#2), pull backwards while lowering the array until both KI-CHARIOT front wheels touch the ground.

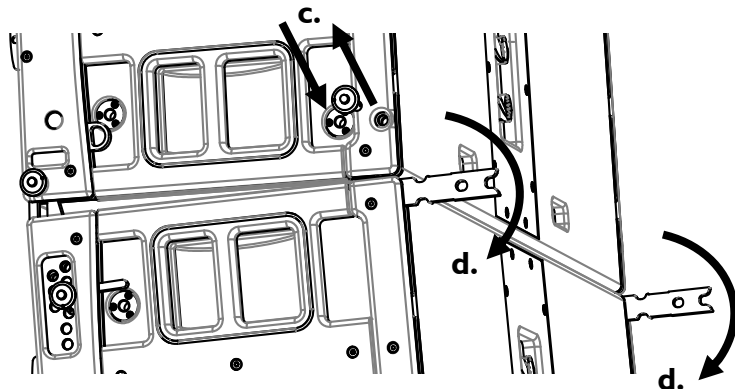


Stop lowering the array at the exact moment when both KI-CHARIOT front wheels touch the ground so as to avoid putting too much stress on the KI-CHARIOT wheels.

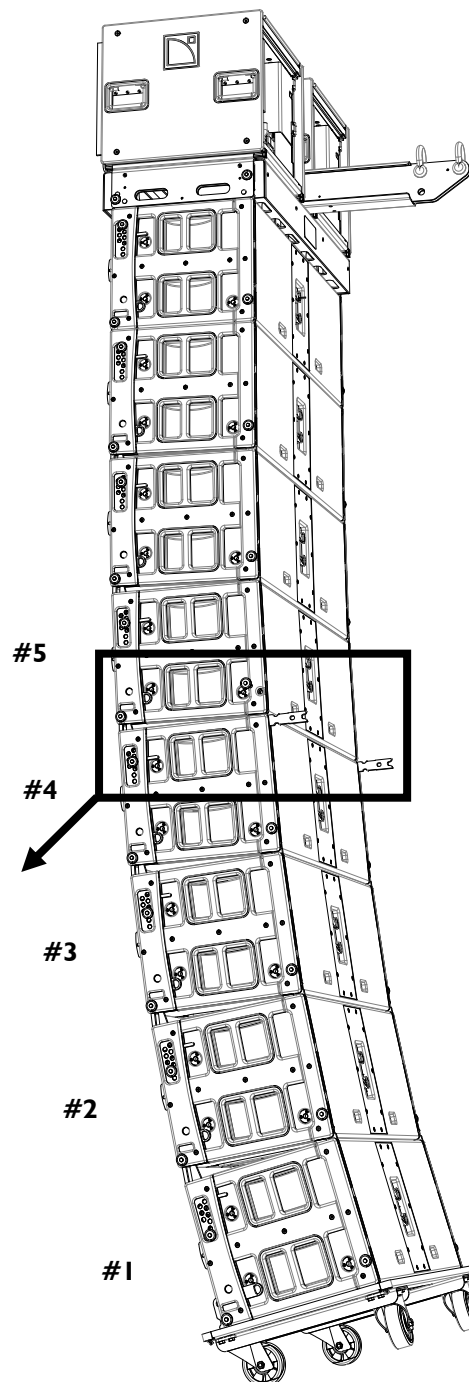
- c. Remove both rear R-BLP of enclosure#5 (see Figure 24) and put them back in their storage locations.
- d. Pull back both rear arms of enclosure#4: they should lock back into the enclosure.



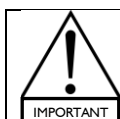
The **front rigging points** must remain attached to prevent the bottom TOWER from falling.



**Figure 24: Detaching rear rigging points**



5. With 3 people (one manipulating the hoist controller and two on both sides of TOWER#2 grabbing handles to prevent it from swinging frontward), raise the array until TOWER#2 is hinging from its front rigging points.
6. On both sides of each enclosure from #2 to #5, select the “variable” setting by pulling on the angle unlocking latch until a click is heard.



In the “variable” setting a **yellow sticker** must be visible on the angle unlocking latch.

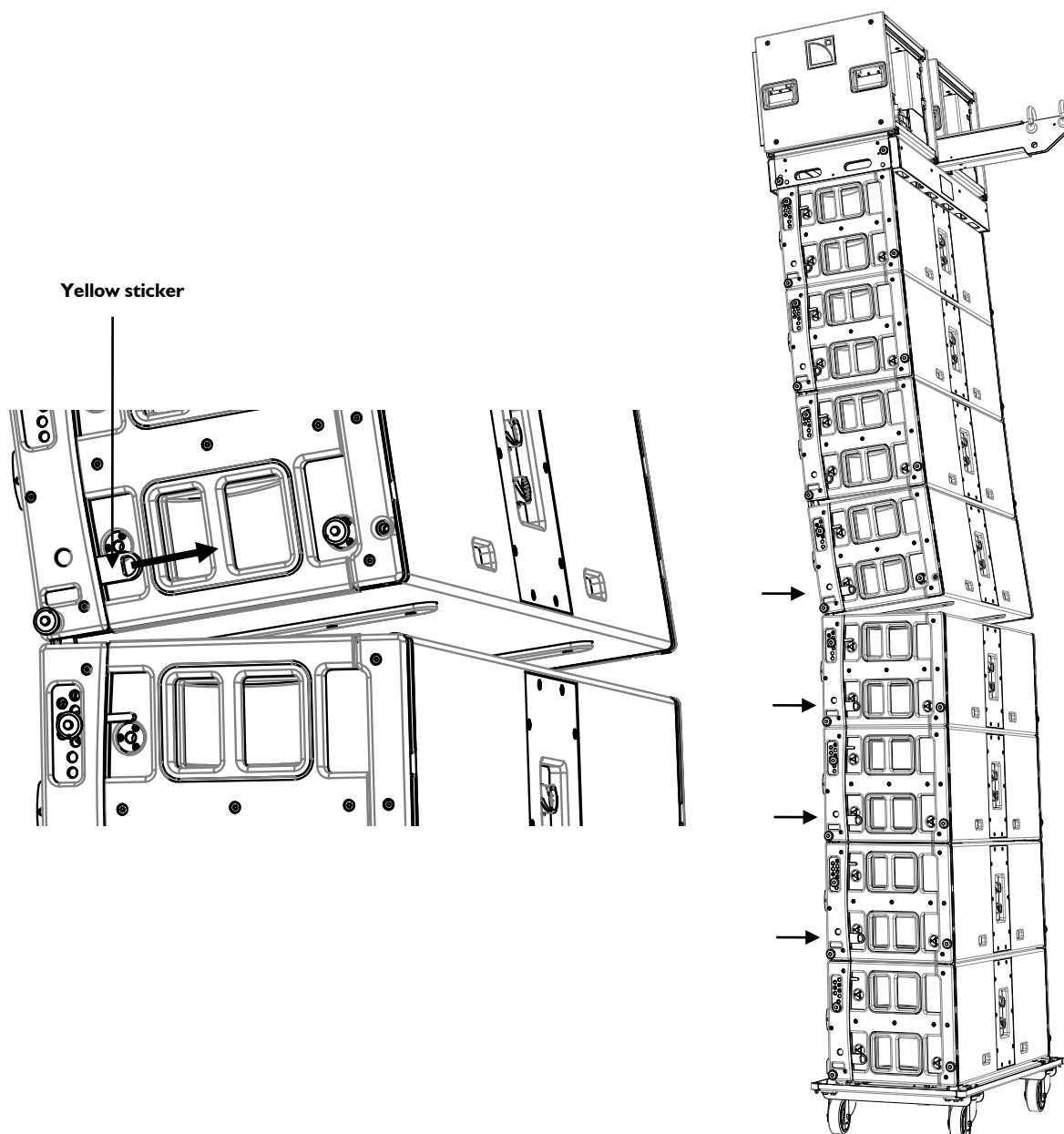
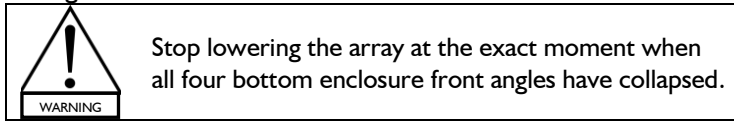
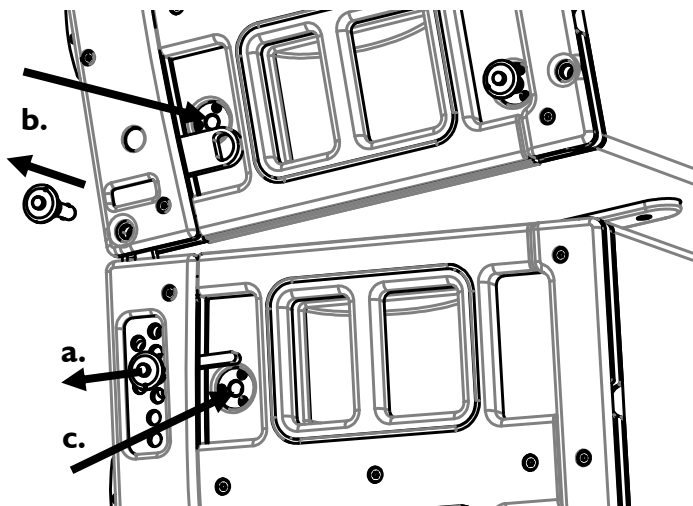


Figure 25: Selecting the “variable” setting

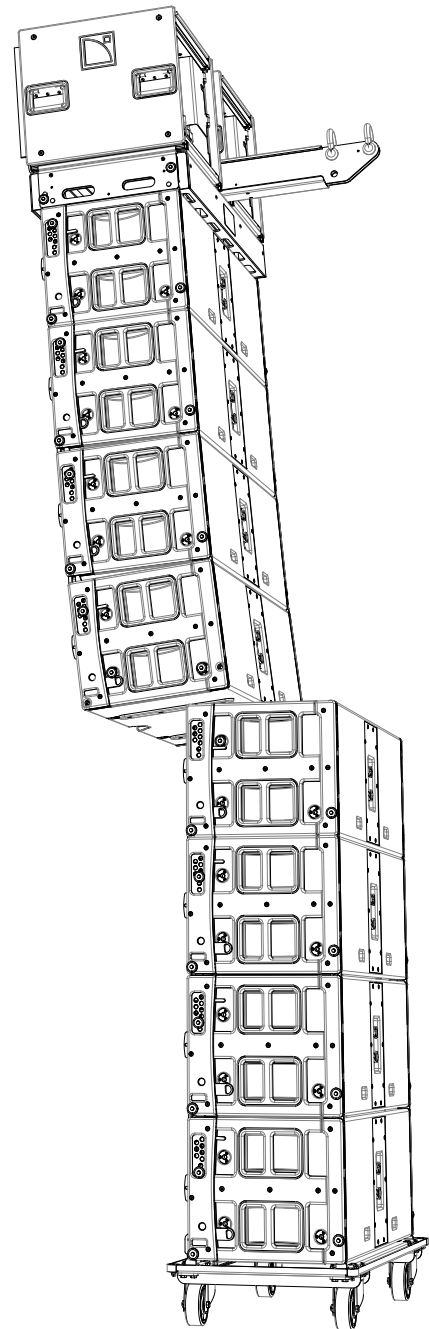
7. Lower the array until the KI-CHARIOT **four wheels** are laid on the ground.



8. Detach the **front rigging points** between enclosures #4 and #5 as described below:
- On both sides of enclosure#4, remove the **front top** R-BLP.
  - On enclosure#5, remove both **front bottom** R-BLP simultaneously (to prevent the array from twisting) and put them in their storage locations: both angle arms should automatically slide in.
  - On both sides of enclosure#4, put the front top R-BLP in its storage location: the angle arm is locked in shipping position.



**Figure 26: Detaching the front rigging points**



9. Remove TOWER#2 from the rigging location.
10. For arrays of more than 8 enclosures repeat steps 3 to 9 until all TOWERS (but TOWER#1) composing the array are derigged.
11. Lower TOWER#1 at 0.5 m/1.5 ft height and attach a KI-CHARIOT to the bottom enclosure as described in step 4.
12. On both sides of each enclosure of TOWER#1 select the “variable” setting as described in step 6.



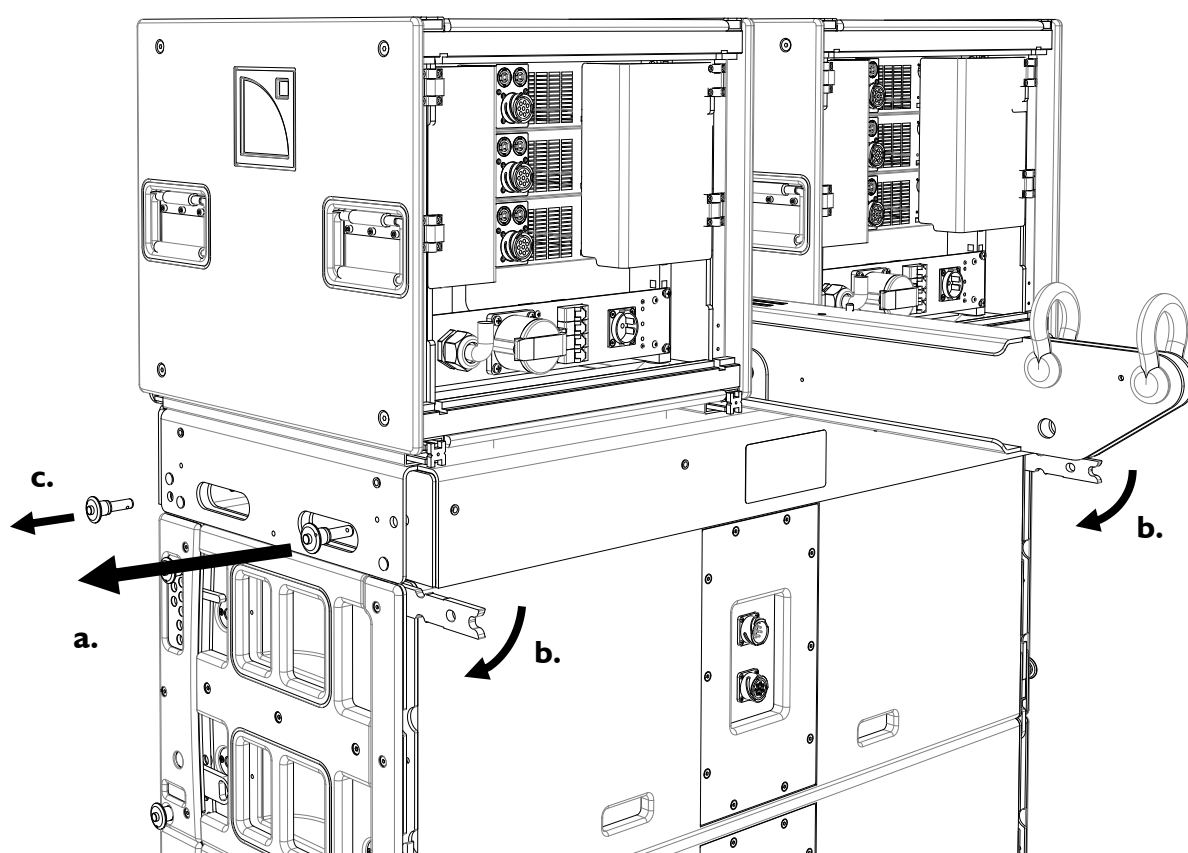
13. Lower TOWER#1 until the KI-CHARIOT **four wheels** are laid on the ground.



Stop lowering the array at the exact moment when all four bottom enclosure front angles have collapsed.

14. Detach KI-BUMP from TOWER#1 as described below:

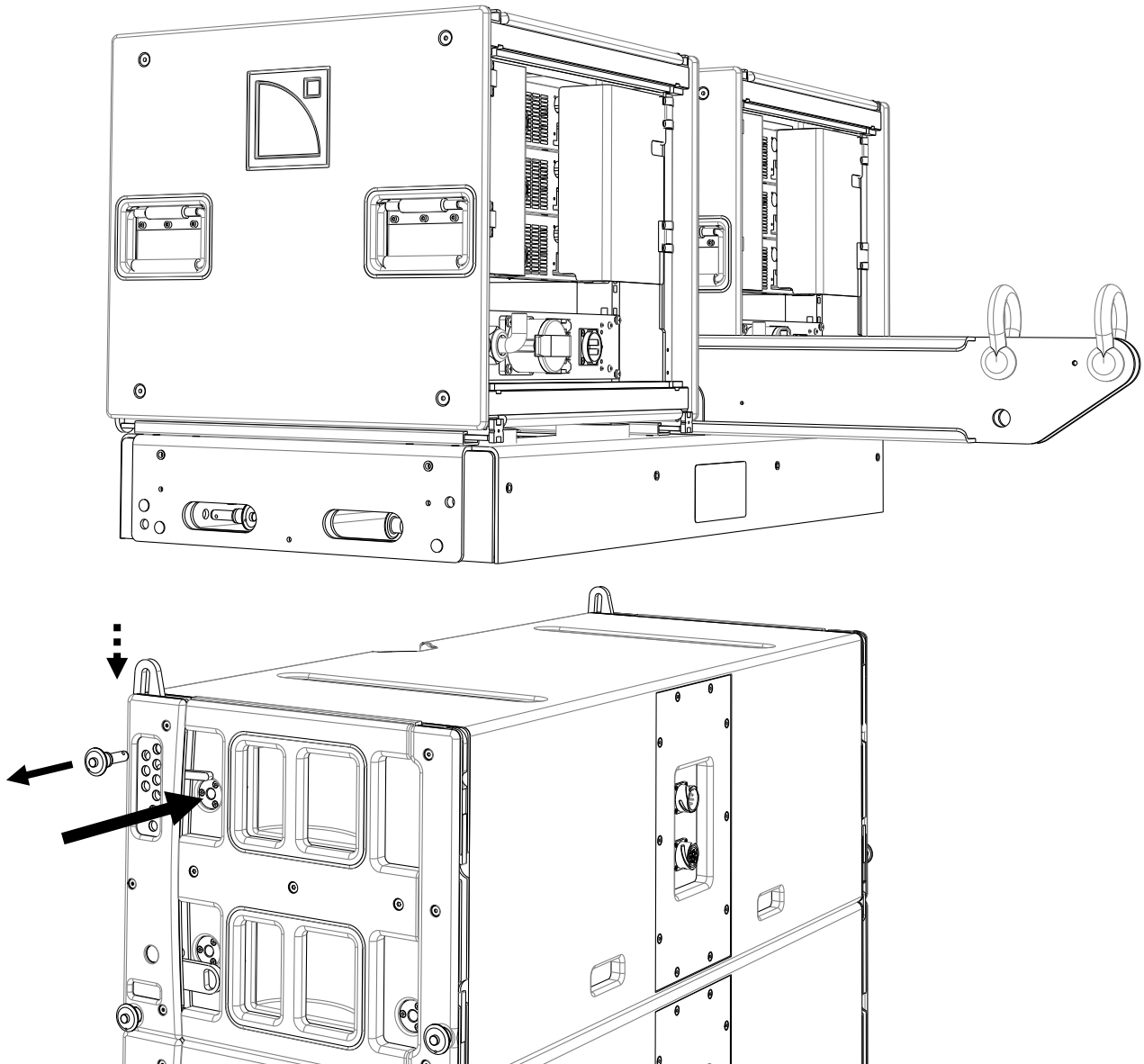
- a. Remove both rear R-BLP from KI-BUMP and let them hang.
- b. Pull back both rear arms of TOWER#1: they should lock back into the top enclosure.
- c. Remove both front R-BLP from KI-BUMP and let them hang.



**Figure 27: Separating KI-BUMP from TOWER#1**

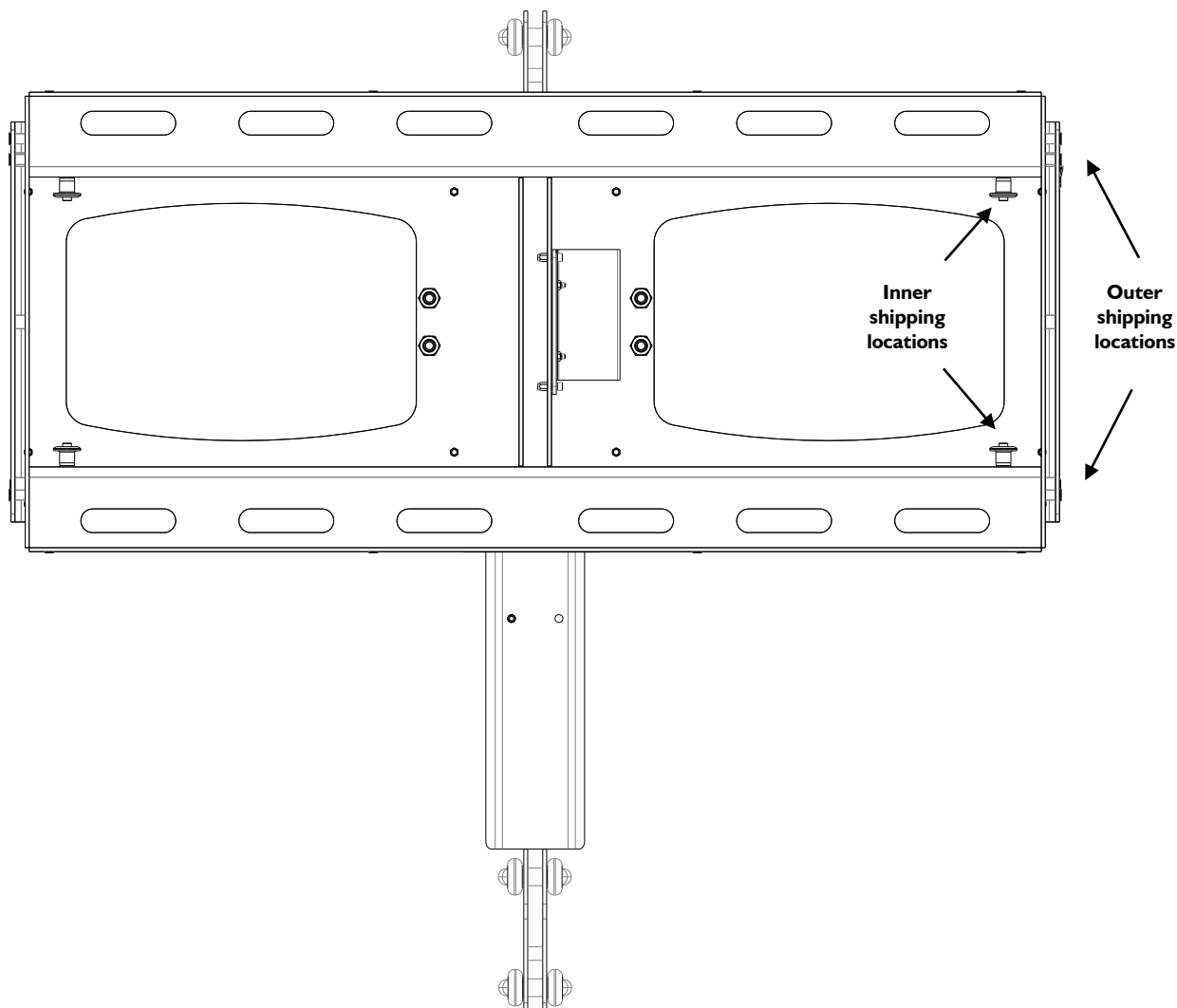
15. Slightly raise the KI-BUMP.

16. On both sides of the top enclosure remove the front top R-BLP (the angle arm should automatically slide in) and put it in its storage location (the angle arm is locked in shipping position).



**Figure 28: Preparing TOWER#1 for shipping**

17. Remove the TOWER#1 from the rigging location.
18. Insert the four R-BLP in their shipping locations on the KI-BUMP main frame.  
**Note:** These locations are located inside or outside the frame. The inner locations can help for shipping.



**Figure 29: R-BLP shipping locations on the frame**

19. Lower the KI-BUMP until it is laid on the ground.
20. **If necessary**, remove the LA-RAK touring racks by following procedure [6.1.2] in the reversed sequence.
21. Remove the motor hooks from the KI-BUMP.
22. Set the KI-BUMP in shipping configuration by following procedure [6.1.1] in the reversed sequence.

### 6.3 Flying a vertical array by using the CATERPILLAR method

#### 6.3.1 Modeling and safety

Any system must be modeled before installation so as to ensure acoustical and mechanical conformity. This can be done using **L-ACOUSTICS® SOUNDVISION Software** [3.4] which will assist the user to:

- Determine the number of required K1 and/or K1-SB enclosures.
- Calculate the K1-BUMP site angle and inter-enclosure angles.
- Check the mechanical conformity of the system.



The K1-BUMP can nominally fly a maximum of 24 K1 and/or K1-SB enclosures along with 4 LA-RAK touring racks and all loudspeaker cables (refer to the **K1, K1-SB, and LA-RAK User manuals** [3.4]). However, this maximum number can decrease in line with array curvature.

ALWAYS refer to the mechanical data and warning indications provided in SOUNDVISION software (**Mechanical Data** section) to verify the mechanical conformity of the system before installation.

#### 6.3.2 Array mounting

The CATERPILLAR method consists in building the array by adding the enclosures one by one. Each enclosure ships onto an **L-ACOUSTICS® K1-PLA** dolly board.

The fully integrated rigging system on K1 and K1-SB allows assembling the enclosures and K1-BUMP with no need for any external fastening accessory. The following procedure describes how to fly a vertical array of eight K1 by using the CATERPILLAR method.



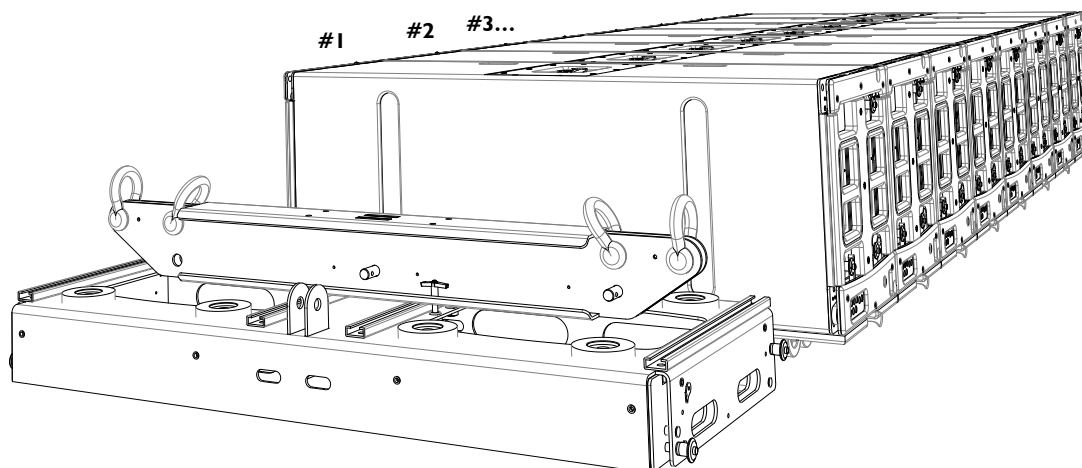
All along the procedure:

- Strictly follow the sequence of the successive steps.
- Ensure that each BLP is fully inserted.
- Have 3 people working (one operating the hoist controller and one on each side of the array) while raising or lowering the array so as to prevent it from swinging.



- For clarity purposes the loudspeaker cabling procedure will not be described.
- The loudspeaker cables will not be represented on the figures.
- Use a strain relief to avoid mechanical stress at the connector locations due to cable weight.

- I. Line up the K1-BUMP and all enclosures at the rigging location.

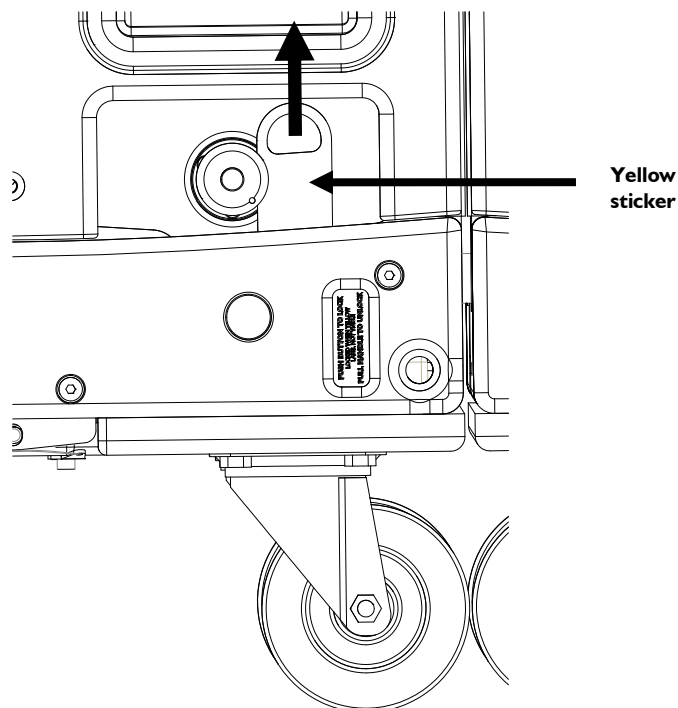


**Figure 30: Lining up K1-BUMP and enclosures**

2. On both sides of each enclosure ensure that the “variable” setting is selected by pulling on the angle unlocking latch.

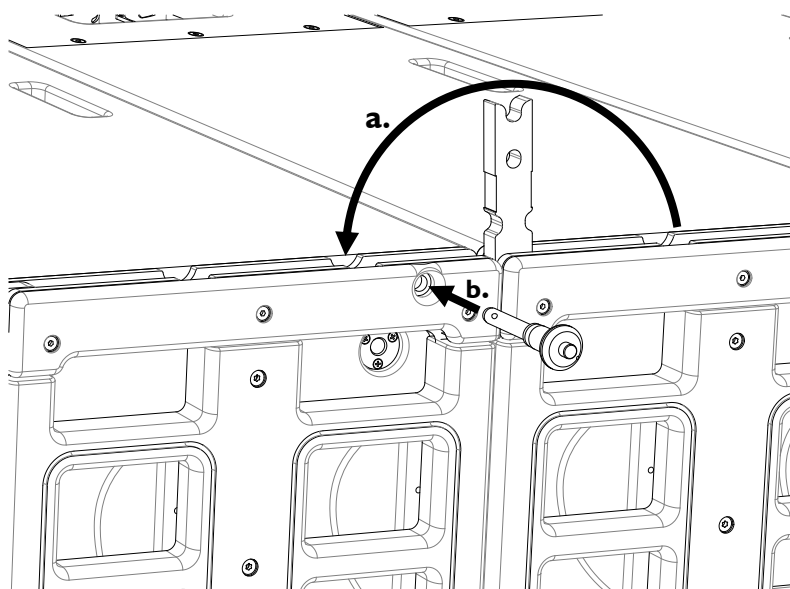


In the “variable” setting a **yellow sticker** must be visible on the angle unlocking latch.



**Figure 31: Setting the “variable” position**

3. On both sides of each enclosure (except for enclosure#1), lift out the rear arm and attach it to the adjacent enclosure (use two R-BLP).



**Figure 32: Attaching the rear rigging points**

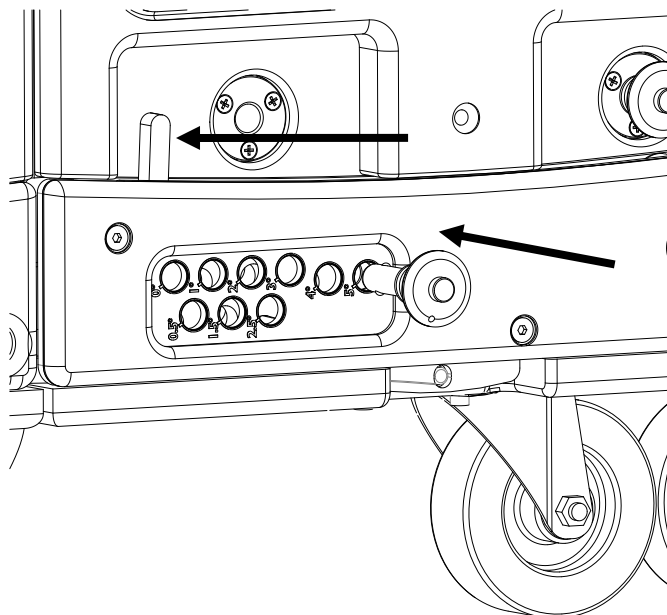
4. On both sides of each enclosure, pre-select the angle: hold a R-BLP facing to the desired angle hole, slide out the angle arm until the R-BLP enters and locks (see Figure 33).

**Note:** Select the 0° angle for the enclosure#1 (to align with the KI-BUMP site angle).

5. Prepare the KI-BUMP [6.1.1] and attach the motor hooks [9.2].

6. **If necessary**, install LA-RAK touring racks on the KI-BUMP [6.1.2].

7. Raise the KI-BUMP in the horizontal orientation to more than 0.7 m/2.3 ft height.

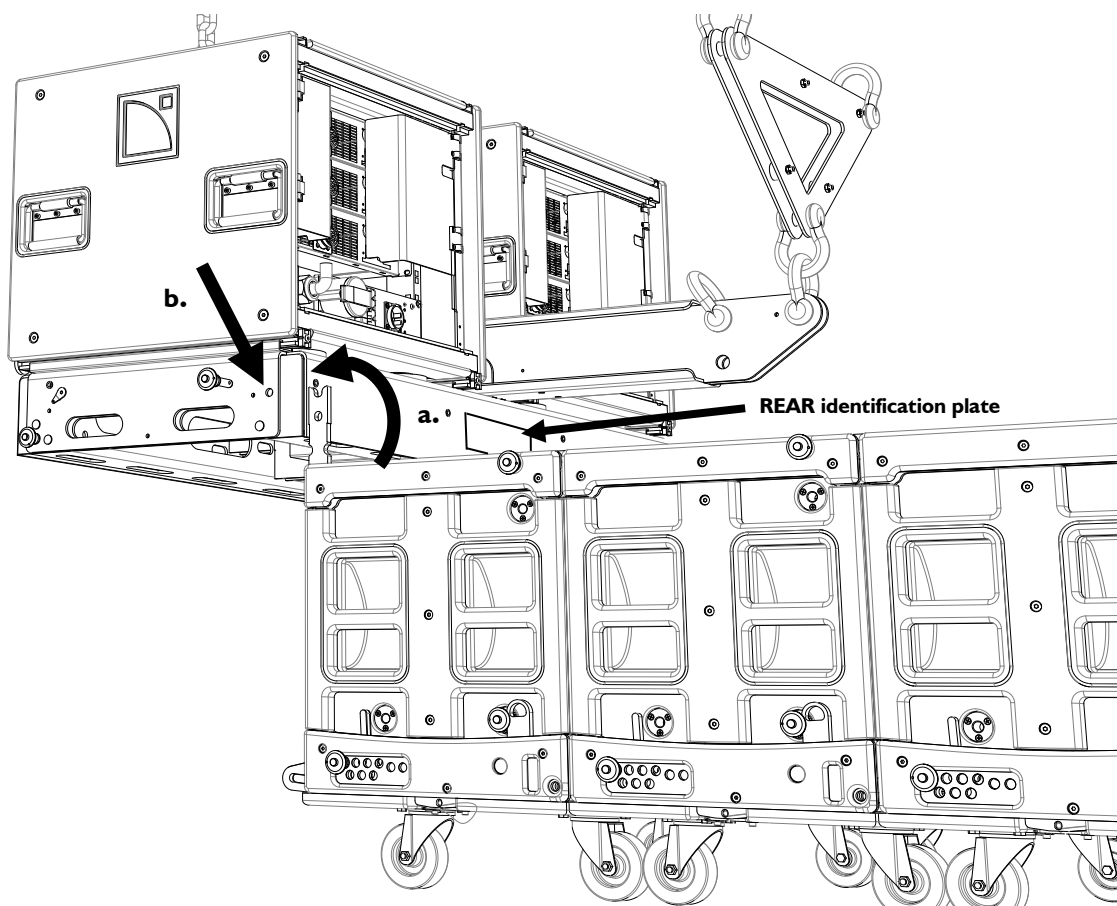


**Figure 33: Pre-selecting the angles (5° example)**

8. On the enclosure#1, lift out both rear arms and attach them to the KI-BUMP rear rigging points (use two R-BLP).

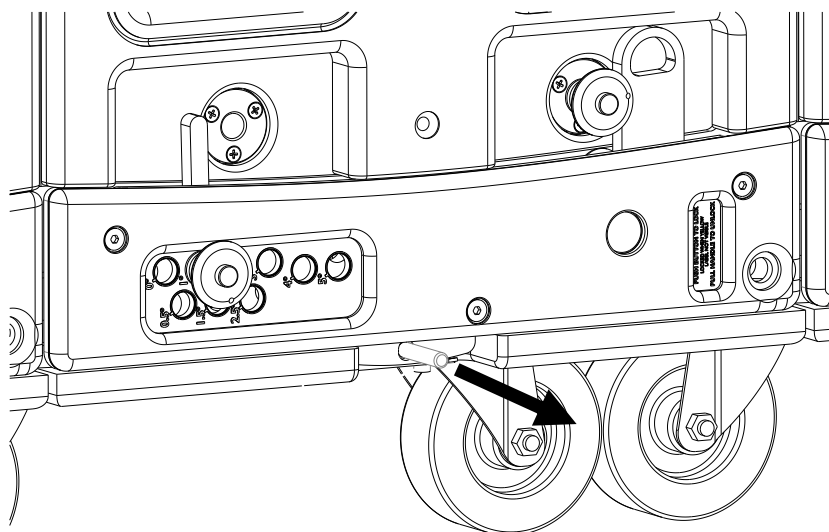


The KI-BUMP must be installed with laser slits oriented towards the front of the array (or REAR identification plate towards the rear, as it is shown in Figure 34).



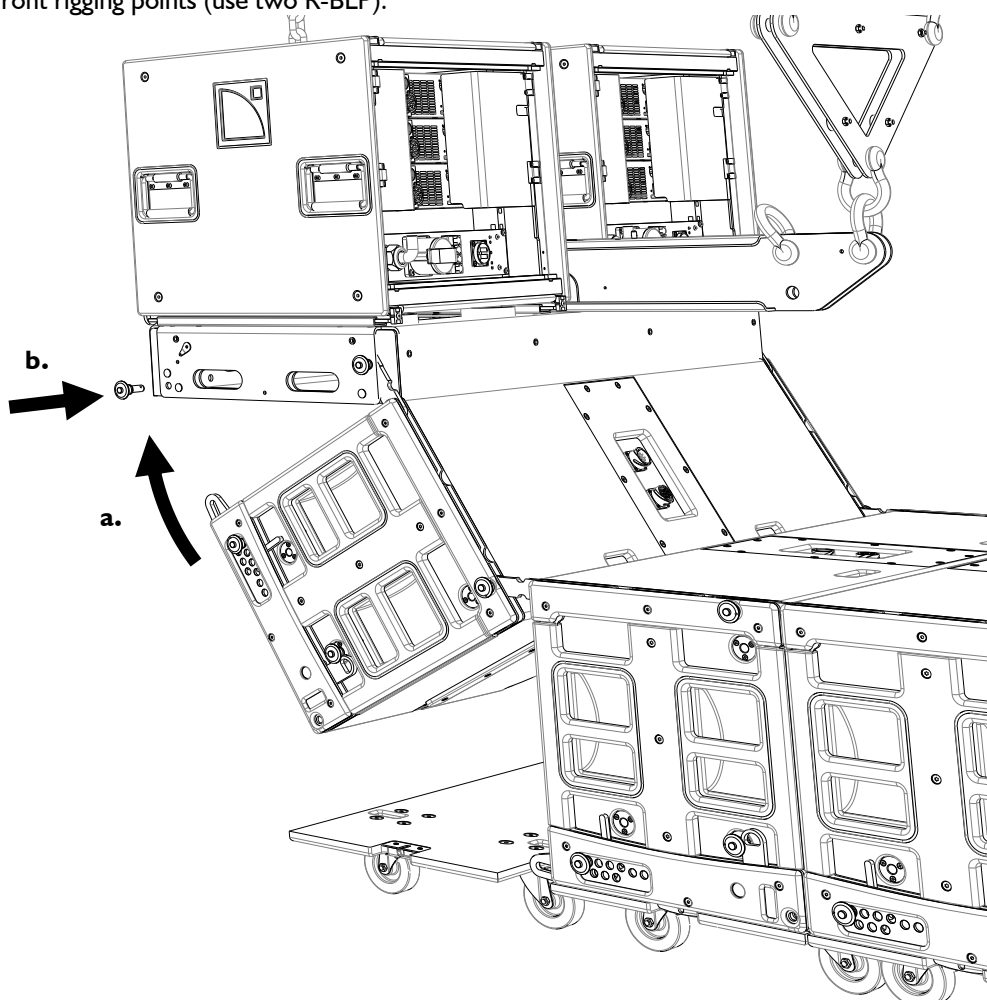
**Figure 34: Attaching enclosure#1 to KI-BUMP rear rigging points**

9. Remove both S-BLP (straight ball-locking pin) from each KI-PLA by pulling on the lanyards.



**Figure 35: Removing S-BLP from KI-PLA**

10. Raise the array until the enclosure#1 is flown, KI-BUMP in the horizontal position (the KI-PLA should separate from enclosure#1).
11. With 2 people (one on each side) lift the front of enclosure#1 and attach both angle arm oblong holes to the KI-BUMP front rigging points (use two R-BLP).



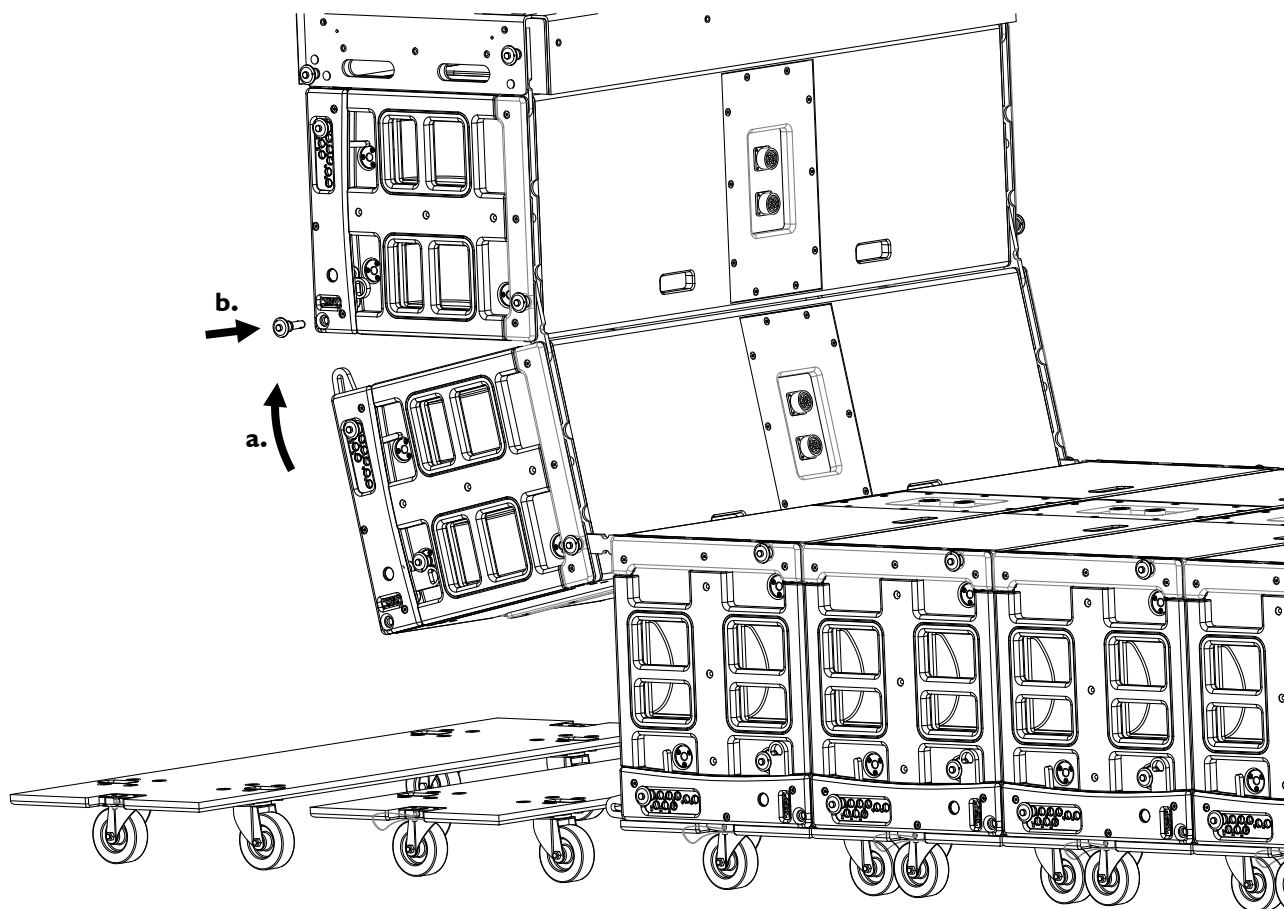
**Figure 36: Attaching front rigging points between enclosure#1 and KI-BUMP**

12. Raise the array until enclosure#2 is flown (the K1-PLA should separate from enclosure#2).



Have on person holding the last enclosure to prevent array rough movements.

13. With 2 people (one on each side) lift the front of enclosure#2 and attach both angle arm oblong holes to the enclosure#1 front rigging points (use two R-BLP).



**Figure 37: Attaching front rigging points between enclosures #1 and #2**



14. On both sides of enclosure #1, select the “fix” setting by pressing the angle locking pushbutton.

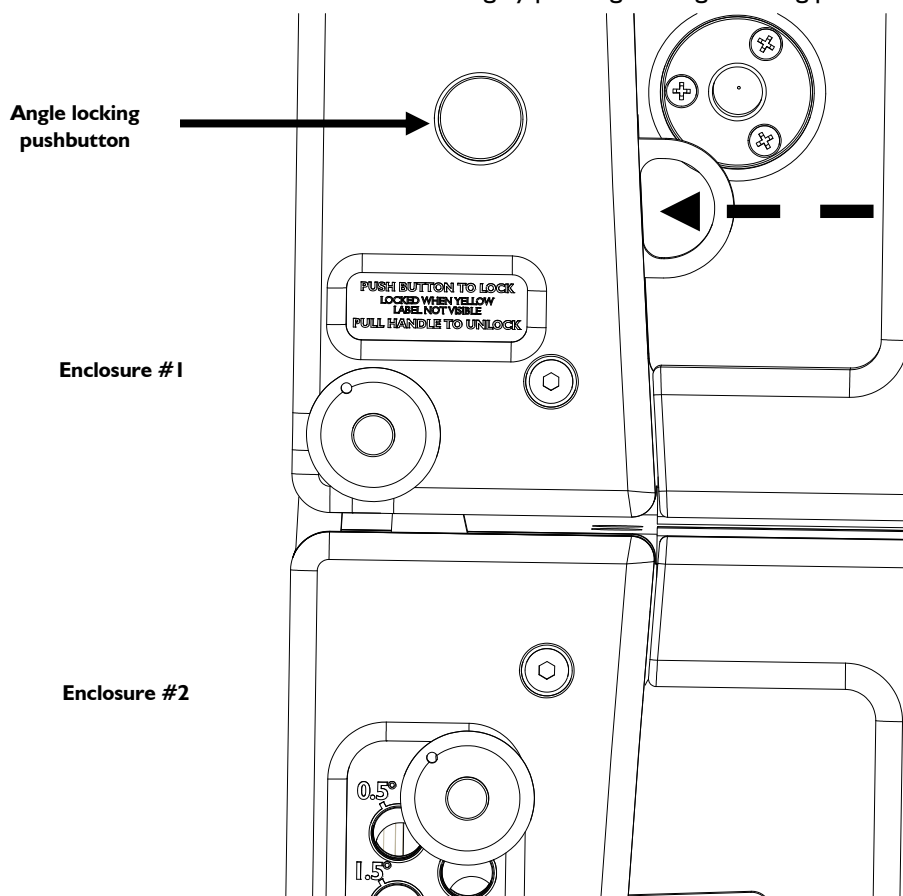


Figure 38: Selecting the “fix” setting

15. Repeat steps 12 to 14 until all enclosures composing the array are flown.
16. If a KARA downfill array is intended to be rigged, attach it under the bottom KI [6.4.2].
17. Fly the array at desired trim height and adjust the site and azimuth angles [9.4-9.5].



Check that **NO yellow stickers** are visible on the angle locking latches and on the rear angle arms (to ensure that the inter-enclosure angles and rear attachments are locked).

18. Secure the KI-BUMP to the main rigging structure using two safety slings (not provided) [9.2].

### 6.3.3 Array removal



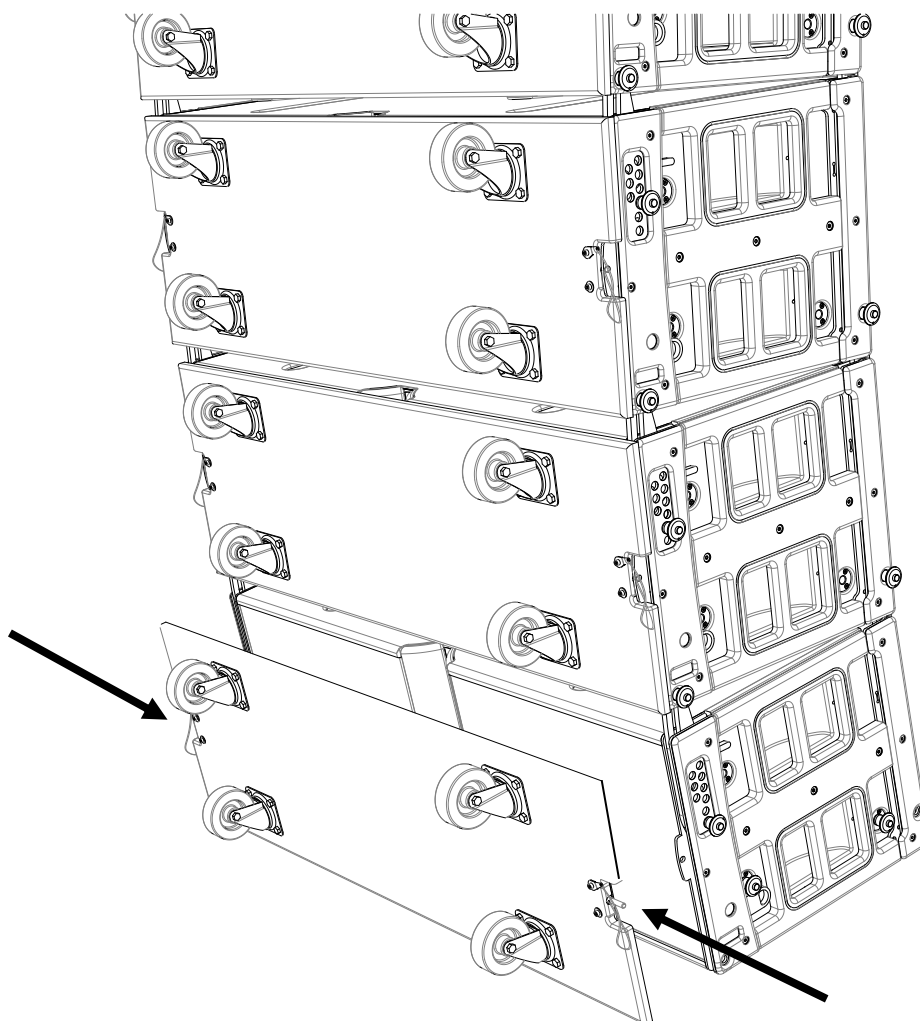
All along the disassembling procedure:

- Strictly follow the sequence of the successive steps.
- Ensure that each BLP is fully inserted by pulling on it.
- Have 3 people working (one operating the hoist controller and one on each side of the array) while raising or lowering the array so as to prevent it from swinging.



For clarity purposes the loudspeaker cable removing procedure will not be described.  
The loudspeaker cables will not be represented on the figures.

1. Detach both safety slings from the KI-BUMP [9.2].
2. If a KARA downfill array has been rigged, remove it from the bottom KI [6.4.3].
3. Take down the array until the bottom enclosure is reaching 0.3 m/1 ft height.
4. Attach a KI-PLA to the first four bottom enclosures (insert both S-BLP on each KI-PLA).

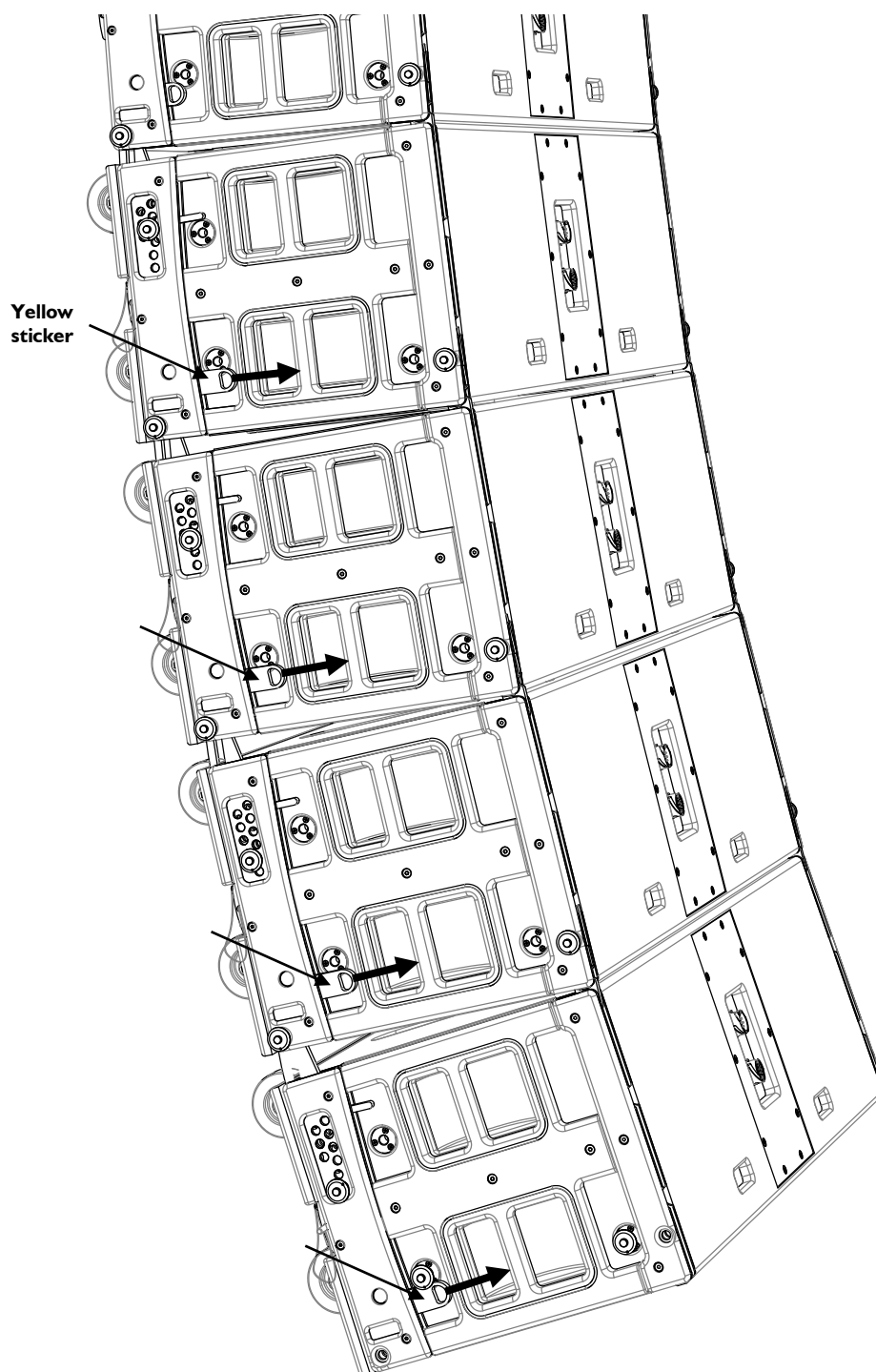


**Figure 39: Attaching KI-PLA on the four bottom enclosures**

5. On both sides of the first four enclosures, select the “variable” setting by pulling on the angle unlocking latch until a click is heard.



In the “variable” setting a **yellow sticker** must be visible on the angle unlocking latch.



**Figure 40: Selecting the “variable” setting**

6. Land the first four bottom enclosures as described below:

- a. With 2 people (one on each side) lift the front of the bottom enclosure.
- b. Pull both **front bottom** R-BLP of the enclosure (or bumper) above and put them back in their storage locations.
- c. Lift the front part of the bottom enclosure until it has reached a stable hanging position.



The rear rigging points must remain attached to prevent the bottom enclosure from falling.

- d. Have two people pulling back the bottom enclosure while lowering the array until the **four** K1-PLA wheels are laid on the ground.

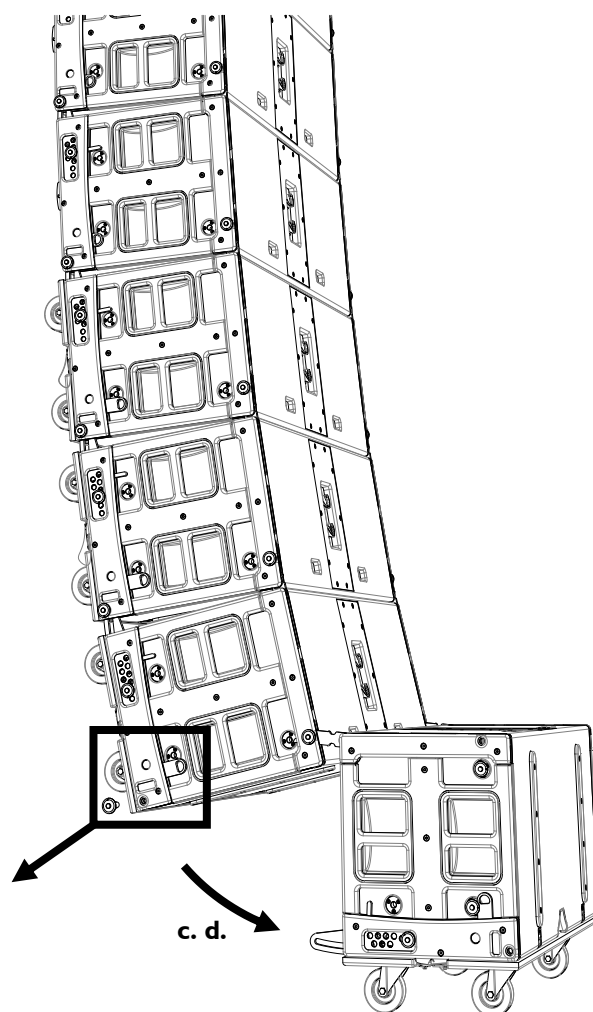
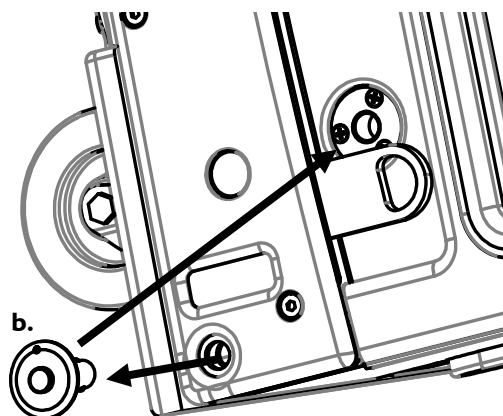


Have one person pulling back the bottom enclosure at all time while the array is been lowered.

- e. Repeat steps a. to d. three times again.

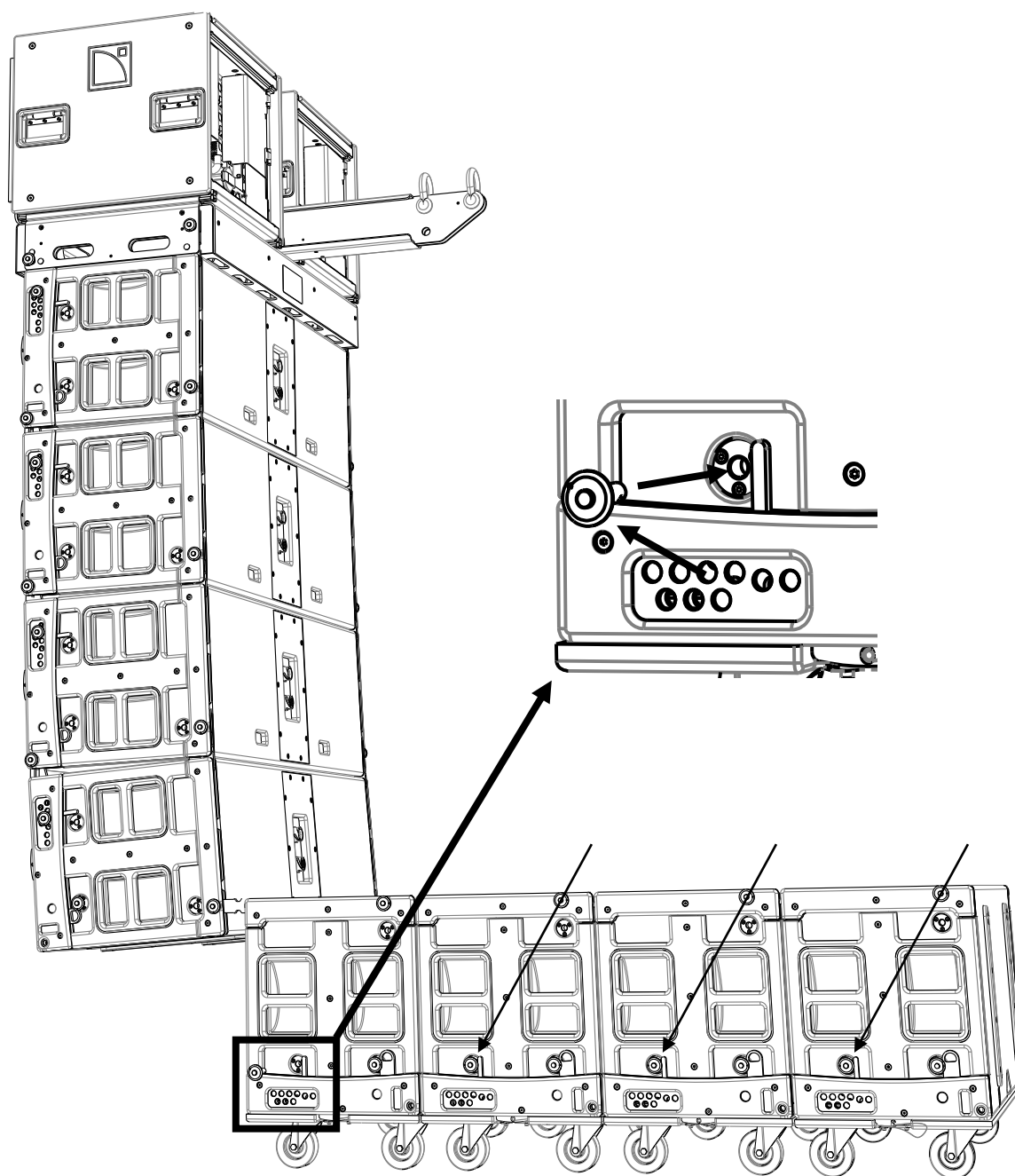


Have one person pulling back the first landed enclosure at all time while the array is been lowered.



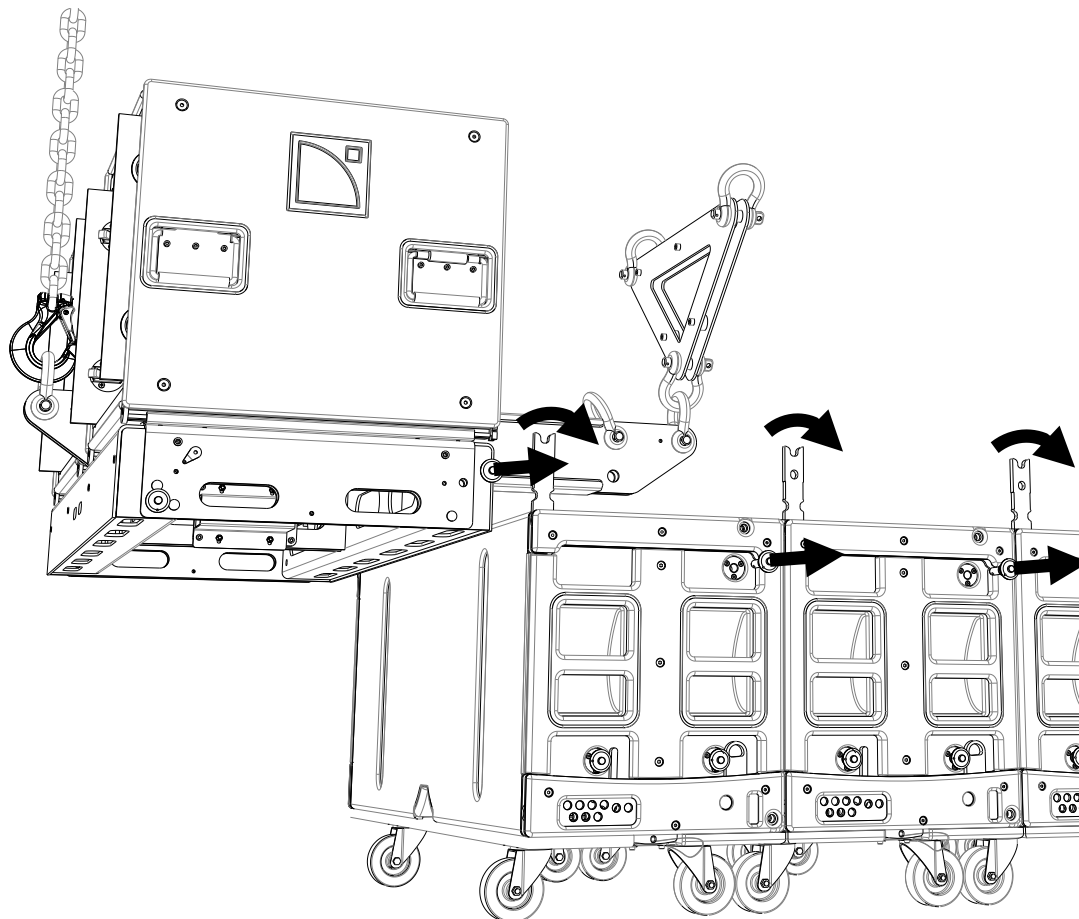
**Figure 4I: Detaching the front rigging points**

7. On both sides of the four landed enclosures, remove the angle R-BLP, slide in the angle arm, and put the R-BLP into its storage location: the angle arm is locked in shipping position.



**Figure 42: Putting the angle arm in shipping position**

8. Repeat steps 4 to 7 until all enclosures composing the array are on the ground.
9. Remove all rear R-BLP between KI-BUMP and all enclosures (and put them in their shipping locations) and pull back the rear arms (they should lock back into the enclosures and a yellow sticker should be visible on each one).



**Figure 43: Detaching rear rigging points between all enclosures (including KI-BUMP)**

10. Lower the KI-BUMP until it is laid on the ground.
11. **If necessary**, remove the LA-RAK touring racks from the KI-BUMP by following procedure [6.1.2] in the reversed sequence.
12. Remove the motor hooks from the KI-BUMP.
13. Set the KI-BUMP in shipping configuration by following procedure [6.1.1] in the reversed sequence.

## 6.4 Rigging a KARA downfill array to the KI array

### 6.4.1 Modeling and safety

Any system must be modeled before installation so as to ensure acoustical and mechanical conformity. This can be done using **L-ACOUSTICS® SOUNDVISION Software** [3.4] which will assist the user to:

- Determine the number of required KARA enclosures.
- Calculate the array site angle and the inter-enclosure angles.
- Check the mechanical conformity of the system.



The KARA-DOWNKI can nominally fly a maximum of 6 KARA enclosures under a KI array along with all loudspeaker cables (refer to the **KARA User manual** [3.4]). However, this maximum number can decrease in line with array curvature.

ALWAYS refer to the mechanical data and warning indications provided in SOUNDVISION Software (**Mechanical Data** section) to verify the mechanical conformity of the system before installation.

The KARA and KARA-DOWNKI fully integrated rigging systems allow assembling the array with no need for any external accessory. The following procedure describes how to mount a vertical array of six KARA under a KI array by successively adding two 3-KARA arrays, called ARRAY#1 and ARRAY#2 in the order of appearance. The second procedure describes how to remove the array.

### 6.4.2 Array mounting



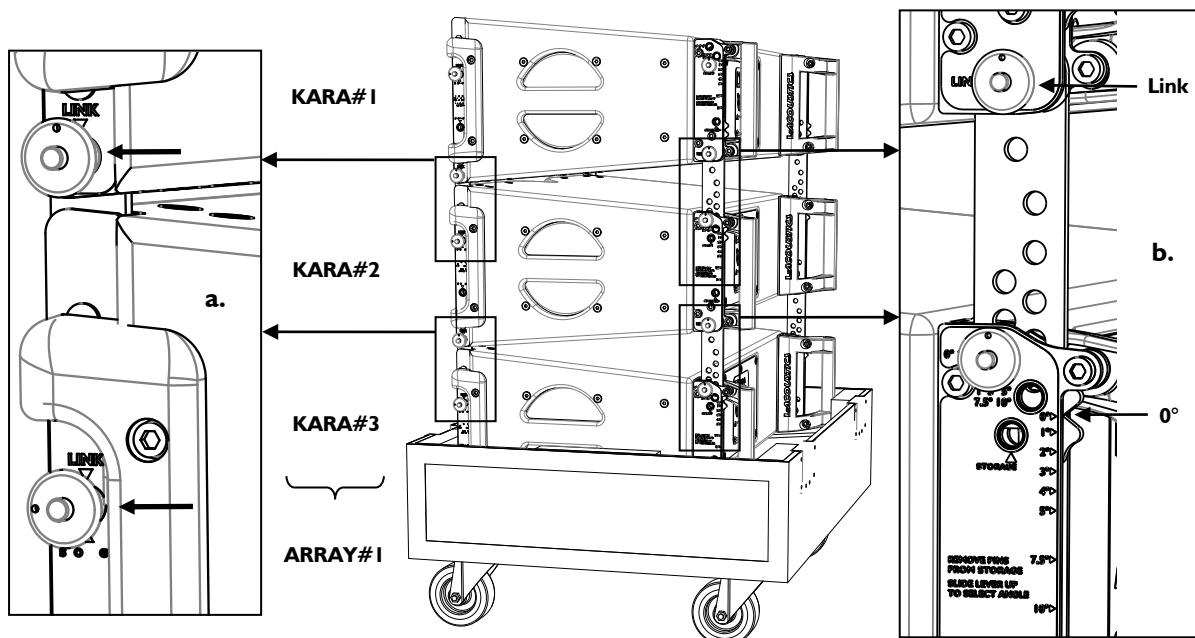
All along the procedure:  
STRICTLY follow the sequence of the successive steps.  
SYSTEMATICALLY ensure that each BLP is fully inserted.



For clarity purposes the loudspeaker cabling procedure will not be described.  
The loudspeaker cables will not be represented on the figures.  
Use a strain relief to avoid mechanical stress at the connector locations due to cable weight.

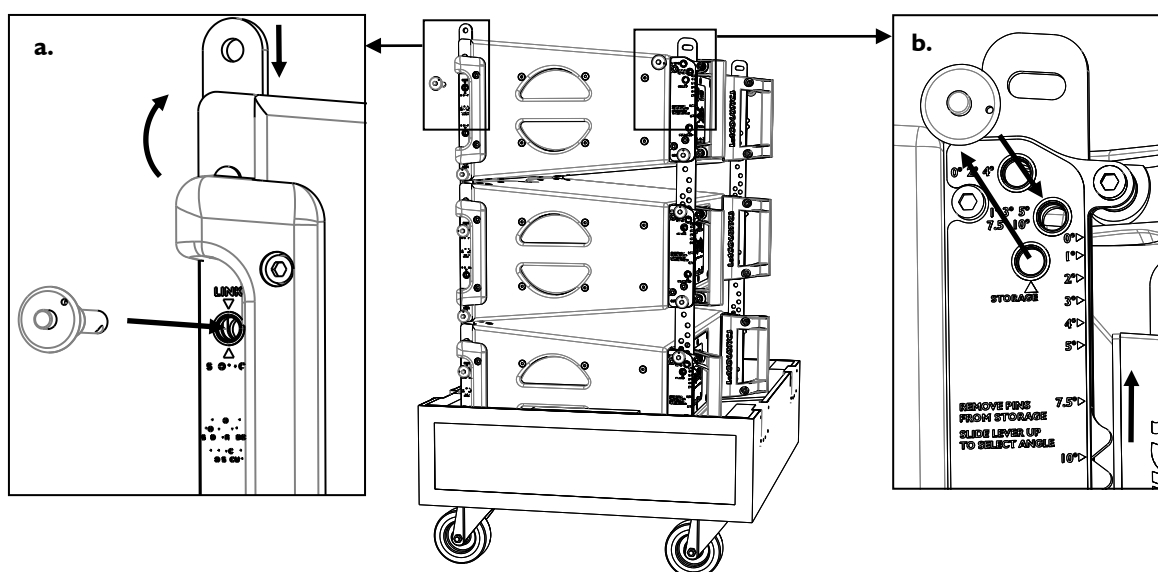
1. Place a full KARA flight-case at the rigging location and remove the lid. Direct the front face of the 3-KARA array towards the audience. In the following, the array will be designated as ARRAY#1 and the enclosures as KARA#1 to KARA#3 from top to bottom (see Figure 44).

2. Check the inter-enclosure connections in ARRAY#1 (repeat for each side):
  - a. For both front connecting points, verify that the front arm is open and locked to 2 KARA by 2 R-BLP inserted in **yellow link holes**.
  - b. For both rear connecting points, verify that the angle arm cursor is aligned with the **0°** angle value and locked to 2 KARA by 2 R-BLP, the upper one inserted into a **yellow link hole** and the bottom one inserted into angle hole **0°/2°/4°**.



**Figure 44: Inter-enclosure connection check for ARRAY#1**

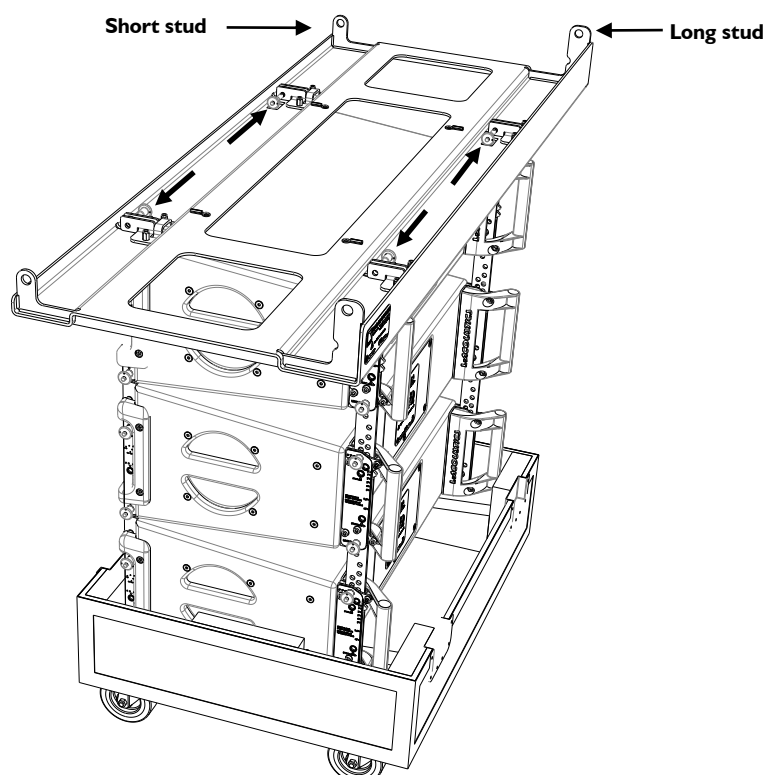
3. On KARA#1, take the 4 arms out as follows (repeat for each side):
  - a. Remove the front top R-BLP from storage position, rotate the front arm up, slide it down, and secure by re-inserting the R-BLP into the **yellow link hole**.
  - b. Remove the rear top R-BLP, slide the angle arm so as to align the cursor with angle value **7.5°** or **10°**, and secure by re-inserting the R-BLP into angle hole **1°/3°/5°/7.5°/10°**.



**Figure 45: Setting the KARA#1 arms**

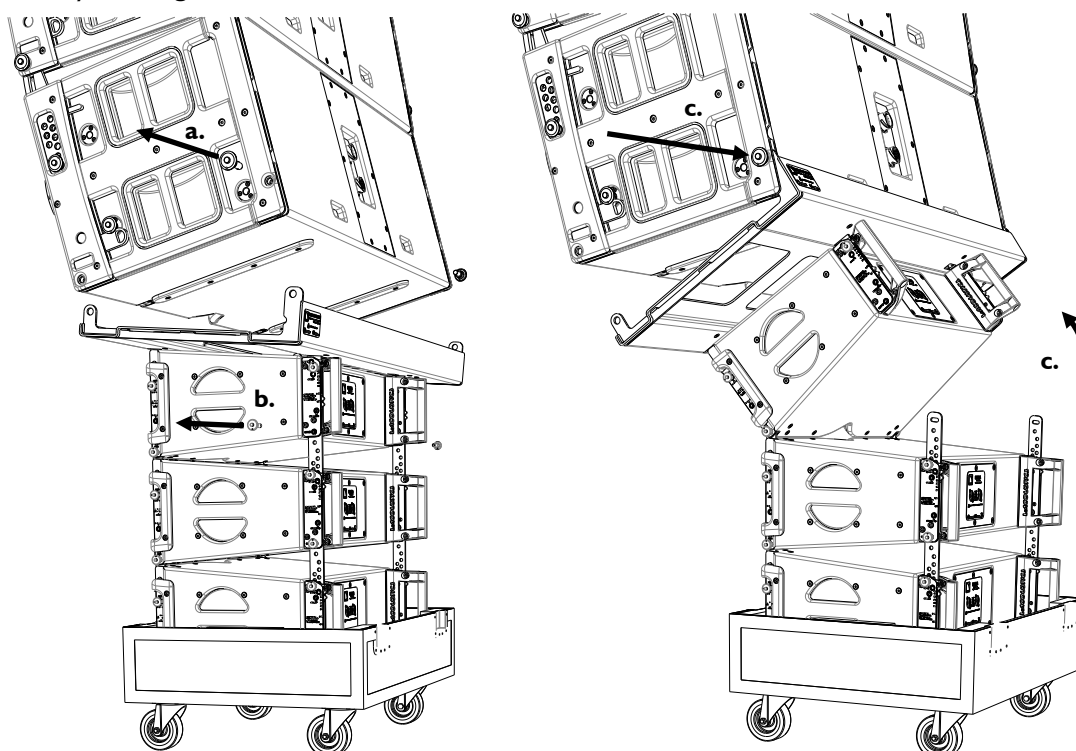


4. Attach a KARA-DOWNKI on top of ARRAY#1 as follows:
  - a. Remove the 4 R-BLP from the KARA-DOWNKI.
  - b. Place the KARA-DOWNKI above ARRAY#1 with studs oriented upwards and long ones at the back.
  - c. Lower the KARA-DOWNKI so that the KARA#1 rigging arms pass through the 4 slits and secure by re-inserting the 4 R-BLP.



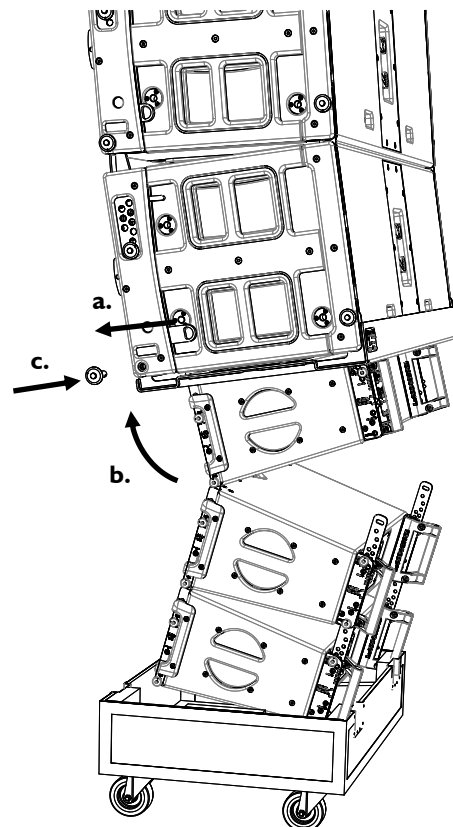
**Figure 46: Connecting KARA-DOWNKI to ARRAY#1**

5. Raise the KI array slightly higher than the KARA-DOWNKI and place ARRAY#1 beneath it.
6. Connect the **rear** rigging points between the KI and the KARA-DOWNKI as follows:
  - a. Remove both rear R-BLP from the bottom KI and let them hang.
  - b. Remove both rear **link** R-BLP between KARA#1 and KARA#2.
  - c. Rotate KARA#1 upwards so as to align the rear rigging points between KARA-DOWNKI and KI, and attach them by inserting both rear R-BLP on the KI.



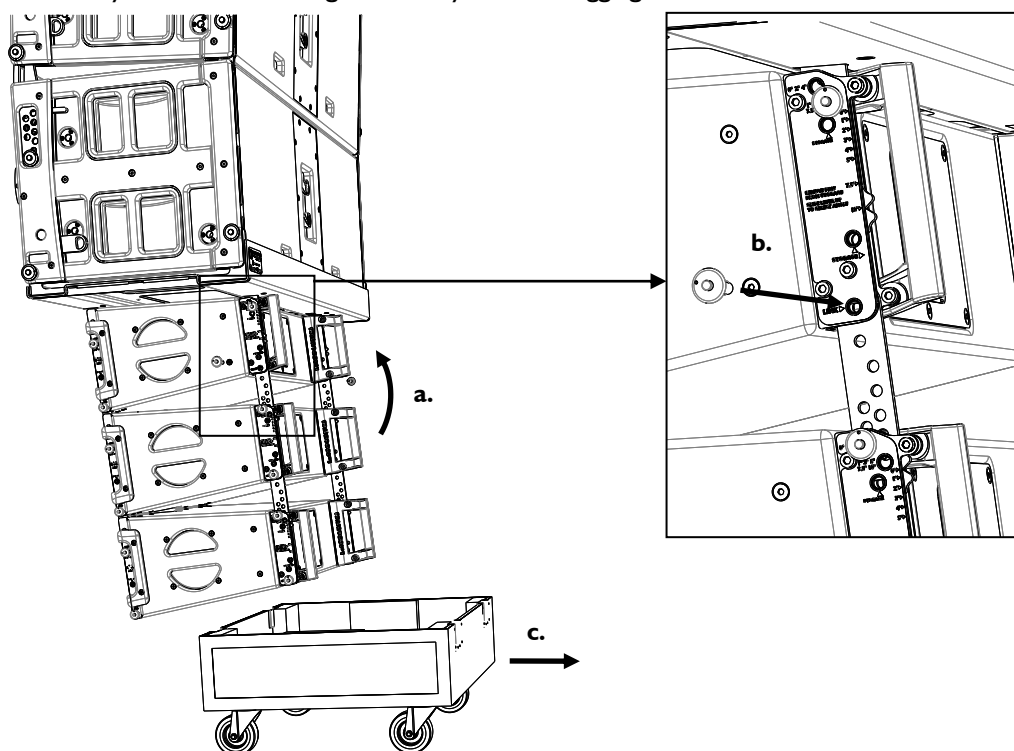
**Figure 47: Rear rigging point connection between ARRAY#1 and KI**

7. With 2 people working simultaneously on each side of the array, connect the **front** rigging points between KARA-DOWNKI and KI as follows:
  - a. Remove the front bottom R-BLP from the bottom KI.
  - b. Rotate the KARA-DOWNKI upwards so as to align the front rigging point with the KI.
  - c. Connect the front rigging point by re-inserting the front bottom R-BLP on the KI.



**Figure 48: Front rigging point connection between KARA-DOWNKI and KI**

8. With 2 people working simultaneously on each side of ARRAY#1, connect the rear rigging points between KARA#1 and KARA#2 & 3 as follows:
  - a. Grab the back handle of KARA#2 and rotate KARA#2 & 3 upwards so as to align the rear rigging point between KARA#2 and KARA#1.
  - b. Attach the rear bottom link R-BLP on KARA#1.
  - c. Raise the array and remove the flight-case tray from the rigging location.



**Figure 49: Rear rigging point connection between KARA#2 and KARA#1**

9. Raise the array to a height for which the angle arms of ARRAY#1 are comfortably reachable.
10. With 2 people working simultaneously on each side of ARRAY#1, set the inter-enclosure angles as follows:
  - a. While grabbing the back handle of KARA#3, remove the rear top R-BLP from KARA#2.
  - b. Rotate KARA#2 so as to align the cursor of the angle arm with the desired angle value.
  - c. Secure by re-inserting the R-BLP into the corresponding angle hole ( $0^{\circ}/2^{\circ}/4^{\circ}$  or  $1^{\circ}/3^{\circ}/5^{\circ}/7.5^{\circ}/10^{\circ}$ ).
  - d. Repeat for KARA#3.

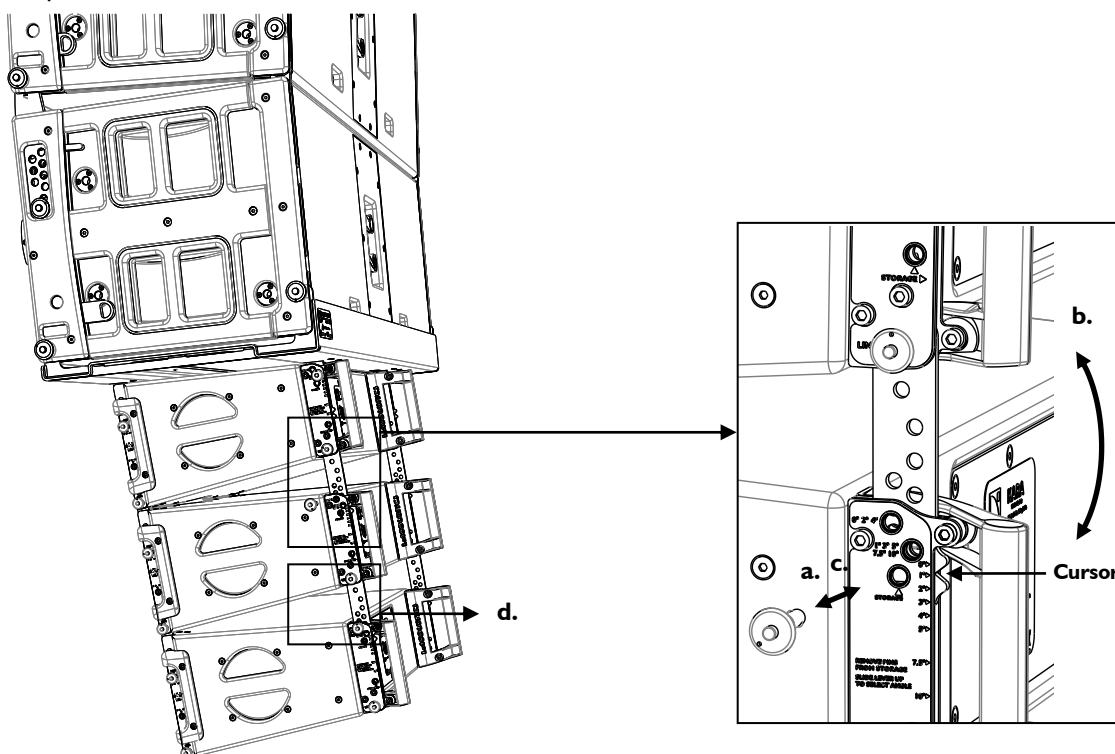


Figure 50: ARRAY#1 inter-enclosure angle setting

11. Place another full KARA flight-case at the rigging location and remove the lid. Direct the front face of the 3-KARA array towards the audience. In the following, the array will be designated as ARRAY#2 and the enclosures as KARA#4 to KARA#6 from top to bottom.
12. Check the inter-enclosure connections in ARRAY#2 by applying step 2.

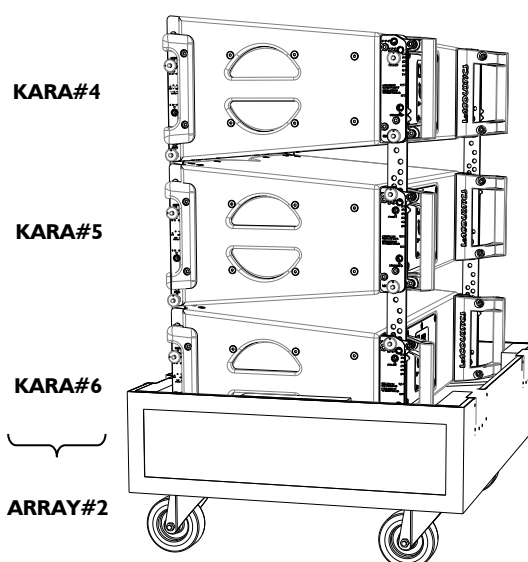
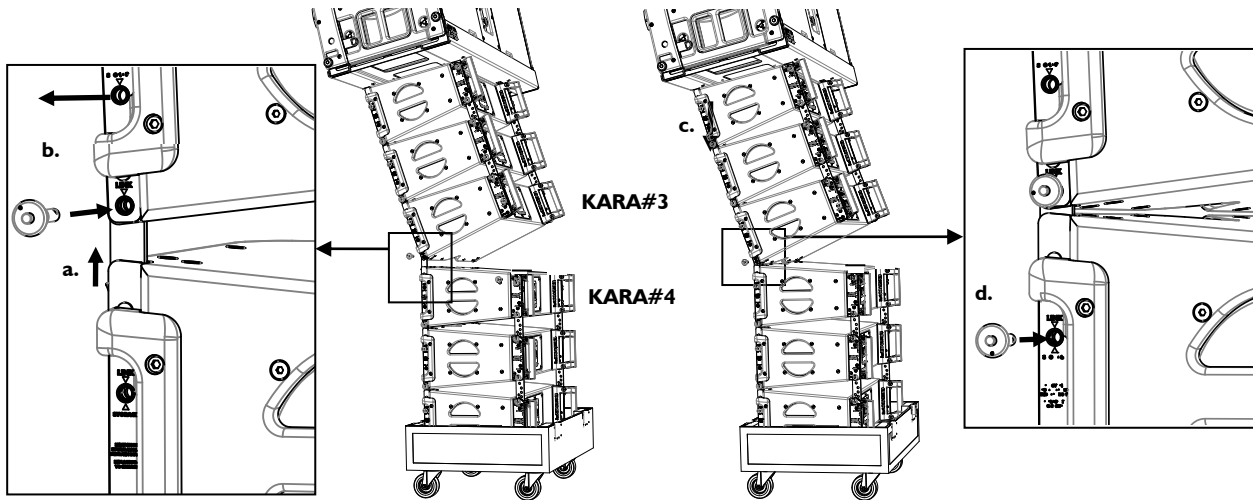


Figure 51: Inter-enclosure connection check for ARRAY#2

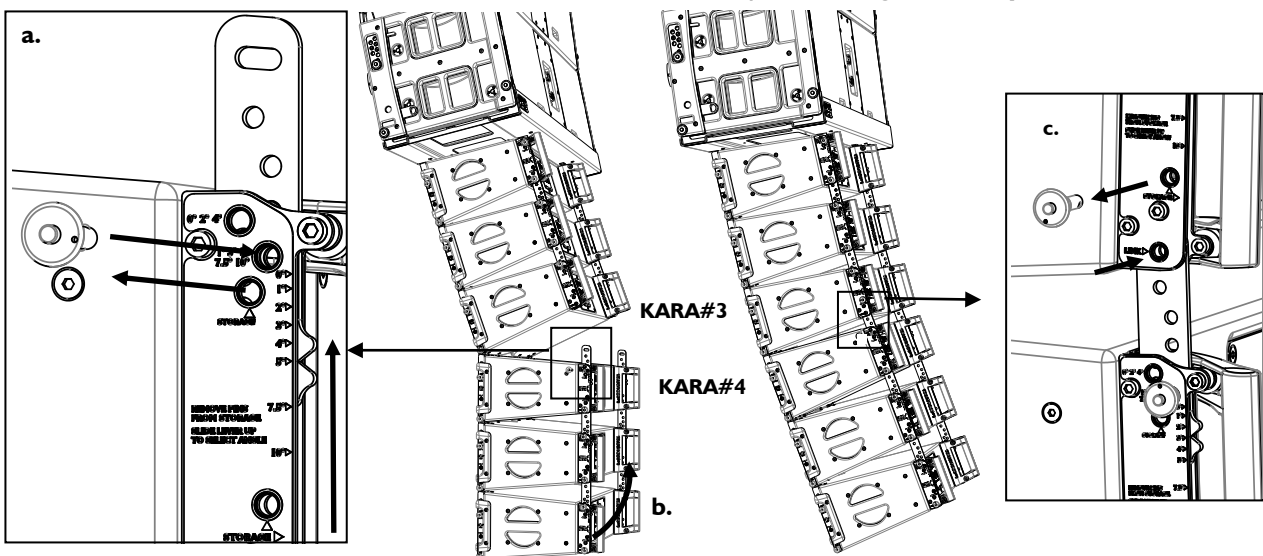
13. On KARA#4, take both **front** arms out as follows (repeat for each one): remove the front top R-BLP, rotate the front arm up, and slide it down. Do **not** re-insert the R-BLP.
14. Raise ARRAY#1 slightly higher than the front arms of ARRAY#2 and place ARRAY#2 beneath ARRAY#1.

15. Connect both **front** rigging points between ARRAY#1 and ARRAY#2 as follows:
- Slide both KARA#4 front arms up and align them with the KARA#3 bottom front rigging points.
  - On KARA#3, remove both front bottom R-BLP from the storage holes and secure by re-inserting them into the bottom **yellow link holes**.
  - Take the array down until KARA#3 and KARA#4 front corners are in contact (the front arms must remain vertical).
  - Secure the front arms on KARA#4 by inserting both top R-BLP into the top **yellow link holes**.



**Figure 52: Front rigging point connection between ARRAY#2 and ARRAY#1**


16. Raise the array to a height for which the angle arms of ARRAY#2 are comfortably reachable.
17. With 2 people working simultaneously on each side of the array, connect both **rear** rigging points between ARRAY#1 and ARRAY#2 as follows:
- Remove the KARA#4 rear top R-BLP from storage position, slide the angle arm so as to align the cursor with the desired angle value, and secure by re-inserting the R-BLP into the corresponding angle hole (**0°/2°/4°** or **1°/3°/5°/7.5°/10°**).
  - While grabbing the back handle of KARA#6, rotate ARRAY#2 so as to align the KARA#3 and KARA#4 rear rigging points.
  - Remove the rear bottom R-BLP from KARA#3 and secure by re-inserting it into the **yellow link hole**.




**Figure 53: Rear rigging point connection between ARRAY#2 and ARRAY#1**

18. Set the inter-enclosure angles in ARRAY#2 by applying step 10.

### 6.4.3 Array removal



All along the procedure:  
STRICTLY follow the sequence of the successive steps.  
SYSTEMATICALLY ensure that each BLP is fully inserted.



For clarity purposes the loudspeaker cable removal procedure will not be described.  
The loudspeaker cables will not be represented on the figures.

1. Lower the array to a height for which the angle arms of ARRAY#2 are comfortably reachable.
2. With 2 people working simultaneously on each side of ARRAY#2, set the inter-enclosure angles to 0° as follows:
  - a. While grabbing the back handle of KARA#6, remove the rear top R-BLP of KARA#6.
  - b. Rotate KARA#6 so as to align the cursor of the angle arm with the 0° angle value.
  - c. Secure by re-inserting the R-BLP into angle hole 0°/2°/4°.
  - d. Repeat for KARA#5.

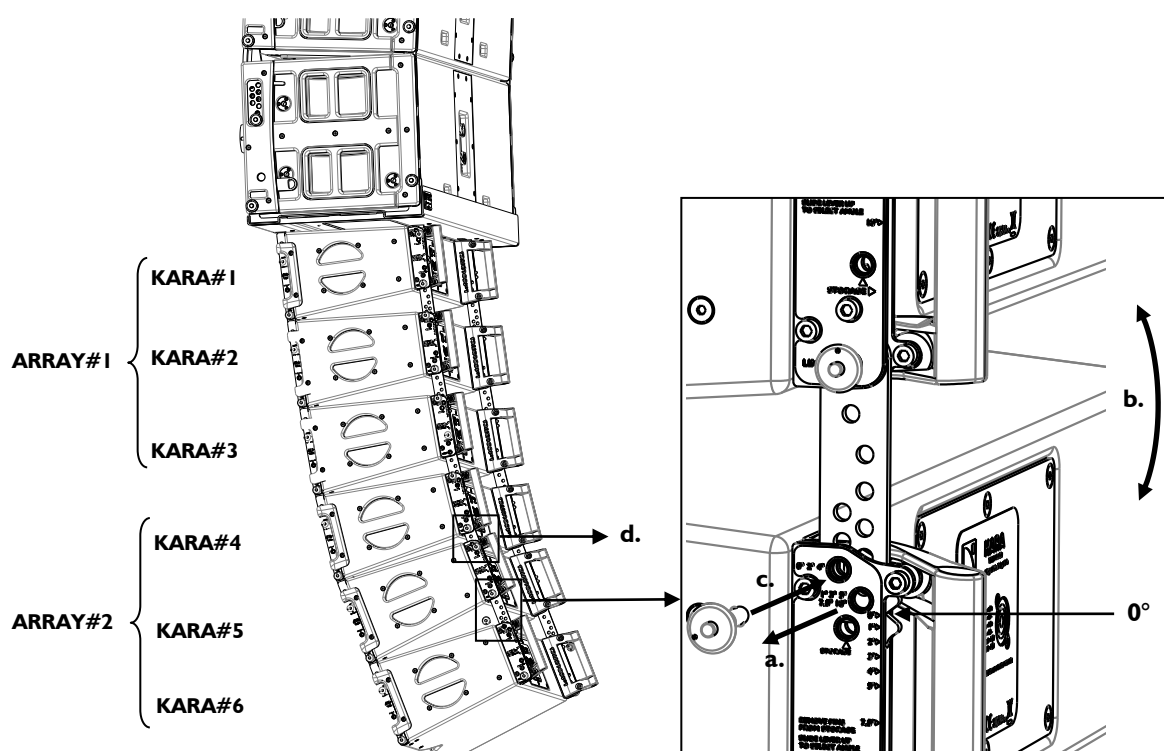
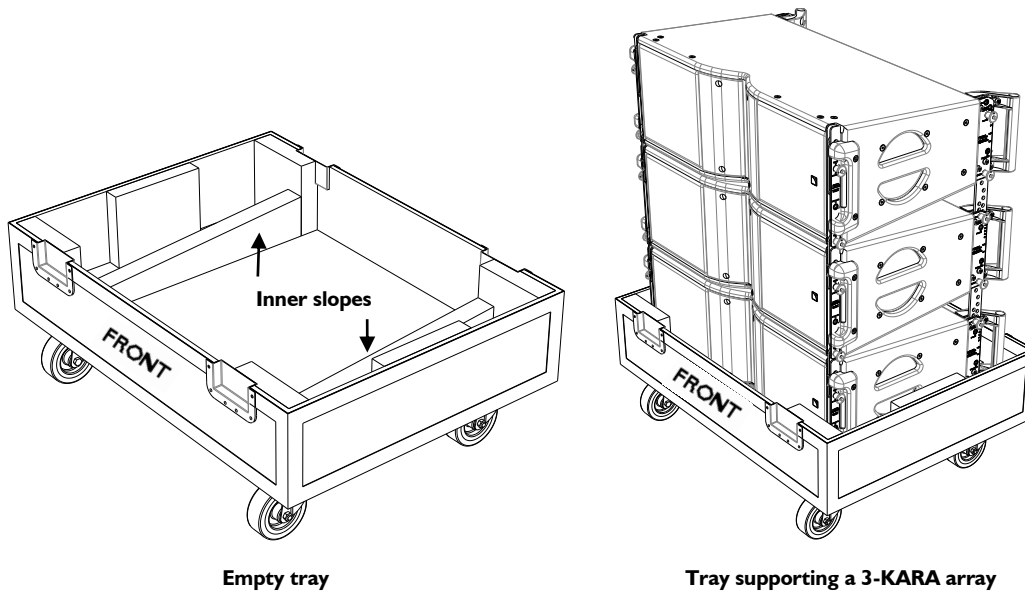


Figure 54: ARRAY#2 inter-enclosure angle setting

3. Place an empty KARA flight-case at the rigging location, remove the lid, and place the tray beneath ARRAY#2.

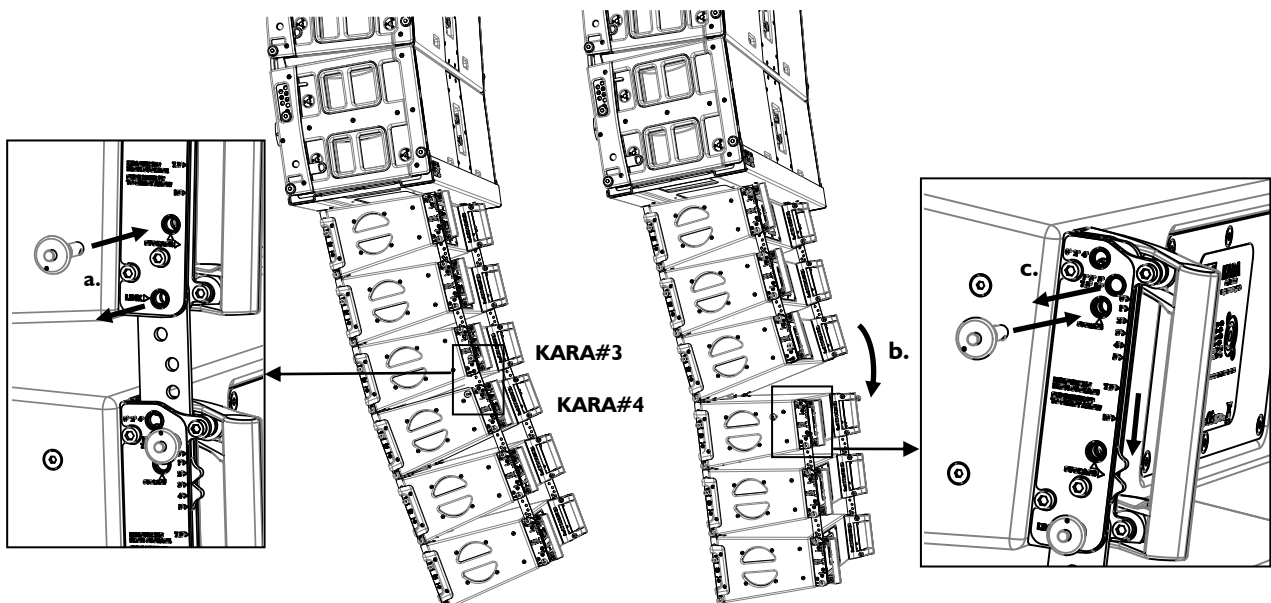


Pay attention to the tray position: both inner slopes must be inclined upwards from front to rear (see Figure 55).



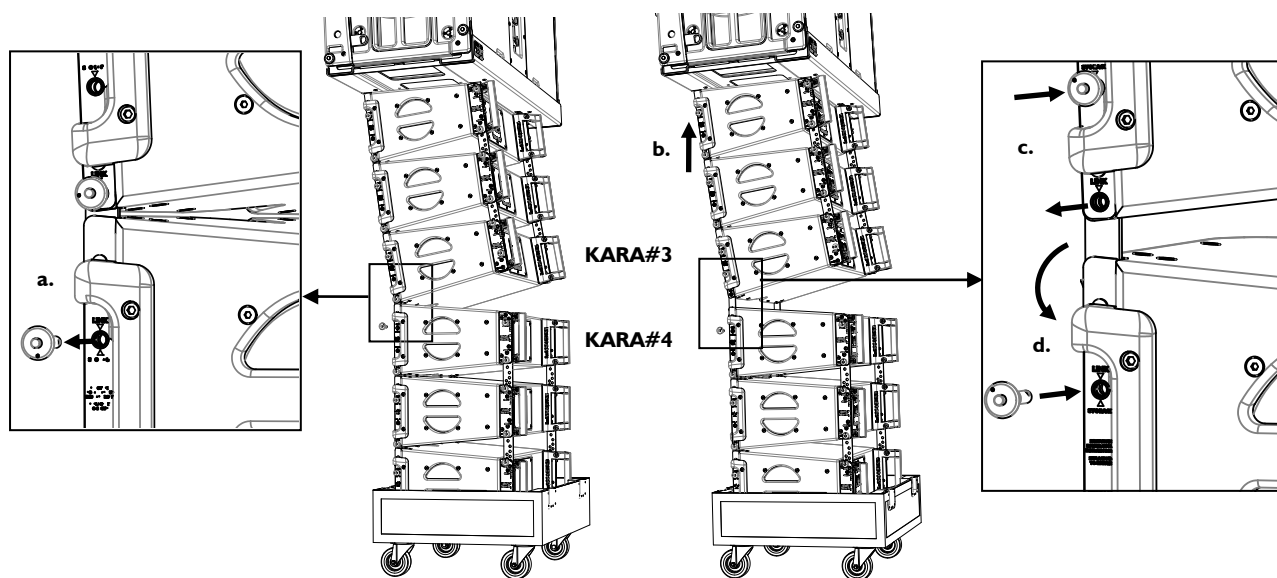
**Figure 55: Recommended flight-case for KARA**

4. Lower the array slightly higher than the tray.
5. With 2 people working simultaneously on each side of the array, disconnect both **rear** rigging points between ARRAY#1 and ARRAY#2 as follows:
  - a. While grabbing the back handle of KARA#5, remove the rear bottom **link** R-BLP from KARA#3 and re-insert it into the bottom **storage** hole.
  - b. Rotate ARRAY#2 downwards and place the rear corners into the tray while still suspended from the front connecting points.
  - c. Remove the rear top angle R-BLP from KARA#4, slide the angle arm so as to align the cursor with the **storage** position, and re-insert the R-BLP into the top **storage** hole.



**Figure 56: Rear rigging point disconnection between ARRAY#2 and ARRAY#1**

6. Lower the array until ARRAY#2 is totally placed in the tray and the front rigging points between ARRAY#2 and ARRAY#1 are in contact.
7. Disconnect the **front** rigging points between ARRAY#1 and ARRAY#2 as follows:
  - a. Remove both KARA#4 front top link R-BLP.
  - b. Slightly raise ARRAY#1.
  - c. Remove both KARA#3 front bottom link R-BLP, and re-insert them into the bottom **storage** holes.
  - d. Rotate both KARA#4 front arms down and re-insert both R-BLP into the top **storage** holes.



**Figure 57: Front rigging point disconnection between ARRAY#2 and ARRAY#1**

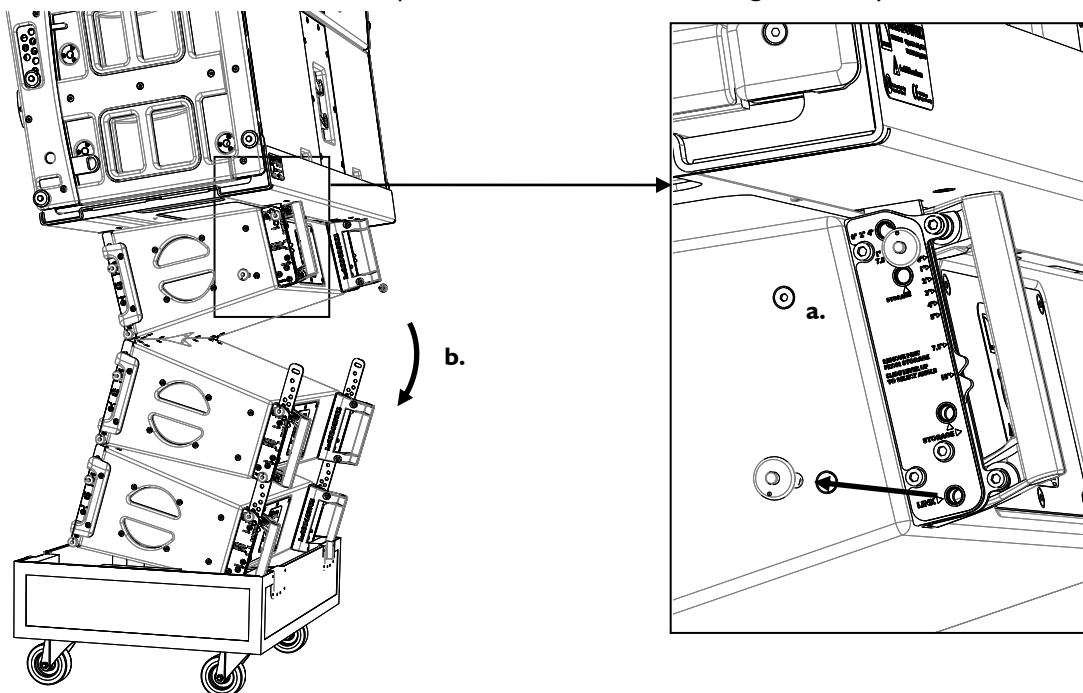
8. Push ARRAY#2 away from the rigging location and put the flight-case lid on.
9. Lower the array to a height for which the angle arms of ARRAY#1 are comfortably reachable and set the angles to 0° by applying step 2.
10. Place another empty KARA flight-case at the rigging location, remove the lid, and place the tray beneath ARRAY#1.



Pay attention to the tray position: both inner slopes must be inclined upwards from front to rear (see Figure 55).

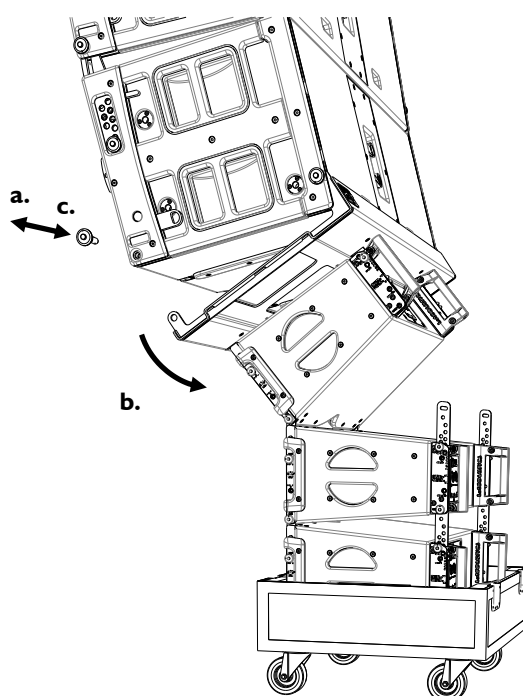
11. Lower the array slightly higher than the tray.

12. With 2 people working simultaneously on each side of ARRAY#1, disconnect the rear rigging points between KARA#1 and KARA#2 & 3 as follows:
- Grab the back handle of KARA#2 and remove the rear bottom **link** R-BLP from KARA#1.
  - Rotate KARA#2 & 3 downwards and place the rear corners into the flight-case tray.



**Figure 58: Rear rigging point disconnection between KARA#2 and KARA#1**

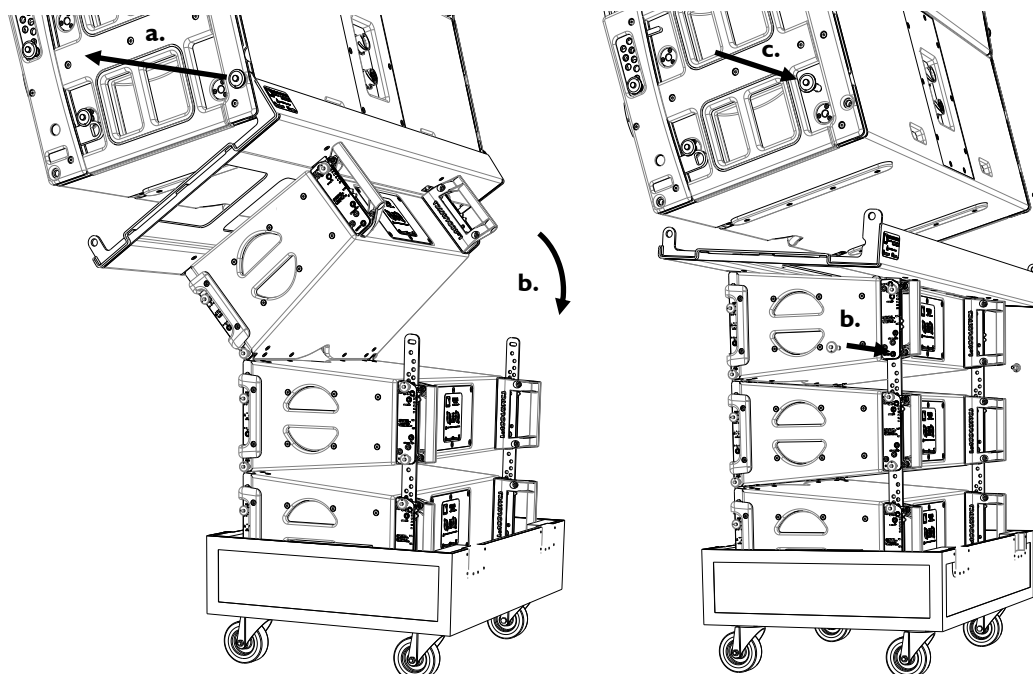
13. With 2 people working simultaneously on each side of the array, disconnect the **front** rigging points between the KARA-DOWNKI and the KI as follows:
- Grab the front of the KARA-DOWNKI and remove the front bottom R-BLP from the bottom KI.
  - Rotate the KARA-DOWNKI downwards until the KARA#3 front corners are installed into the flight-case tray.
  - Re-insert the front bottom R-BLP on the KI.



**Figure 59: Front rigging point disconnection between KARA-DOWNKI and KI**

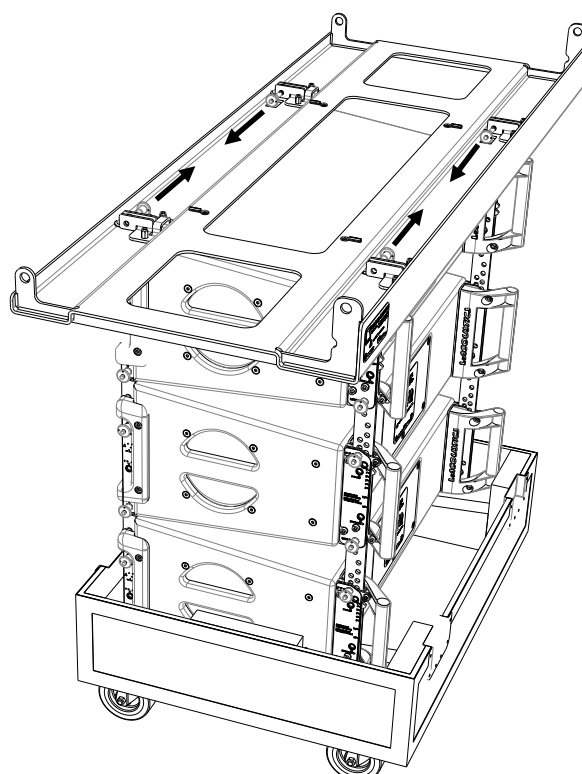


14. Disconnect the **rear** rigging points between the KARA-DOWNKI and the KI as follows:
  - a. Hold KARA#1 and remove both rear R-BLP from the bottom KI.
  - b. Rotate KARA#1 downwards so as to align the rear rigging points between KARA#1 and KARA#2, and insert both rear bottom **link** R-BLP on KARA#1.
  - c. Re-insert both rear R-BLP on the KI.



**Figure 60: Rear rigging point disconnection between KARA-DOWNKI and KI**

15. Remove ARRAY#1 from under the KI array.
16. Remove the KARA-DOWNKI from ARRAY#1 as follows:
  - a. Remove the 4 R-BLP from the KARA-DOWNKI.
  - b. Lift the KARA-DOWNKI up and remove it from ARRAY#1.
  - c. Re-insert the 4 R-BLP on the KARA-DOWNKI.



**Figure 61: Removing KARA-DOWNKI from ARRAY#1**

17. Set ARRAY#1 for transport as follows:

- a. On each side of KARA#1, remove the front top **link** R-BLP, slide the front arm up, rotate down, and secure by re-inserting the R-BLP into the top **storage** hole.
- b. On each side of KARA#1, remove the rear top **angle** R-BLP, slide the angle arm so as to align the cursor with the **storage** position, and secure by re-inserting the R-BLP into the top **storage** hole.
- c. Put the flight-case lid on.

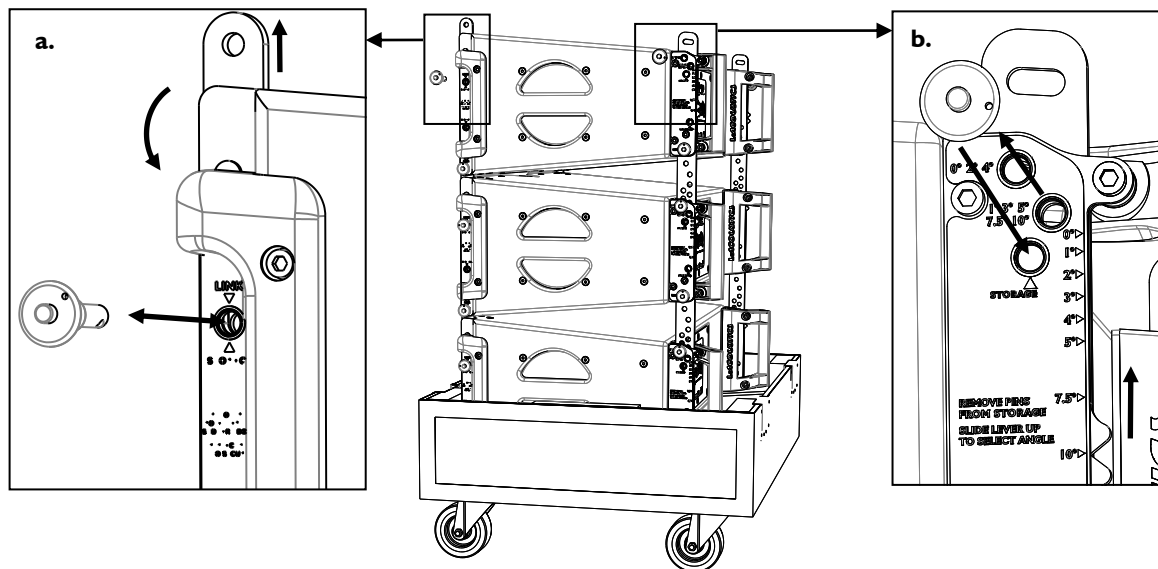


Figure 62: Setting ARRAY#1 for transport


## 7 CARE AND MAINTENANCE

### 7.1 Maintenance information

The KI system assembling components are the following:


- KI-BUMP flying structure, adjustable sling, shackles, safety pins, and BLP.
- KI-DELTA plate, shackles and safety pins.
- KARA-DOWNKI rigging accessory and BLP.
- KI-CHARIOT cart.
- KI-PLA cart and BLP.
- KIBUMP-FLIGHT case.
- Rear arms, angle arms, BLP, and rigging points on the KI and KI-SB enclosures.

If these components are used as it is described in this manual they will remain fully operational over the enclosures' life. However, it is necessary to regularly check the following points in order to guaranty the system durability.




The KI-BUMP, KI-DELTA, KARA-DOWNKI, KI-CHARIOT, KI-PLA, and KIBUMP-FLIGHT as well as the adjustable sling, shackles, safety pins, and BLPs should not show any sign of deformation, fissure, or corrosion.

Any component incorporating a part showing signs of defect must immediately be replaced [7.2].



The metal components of the KI and KI-SB enclosures should not show any signs of deformation, fissure, or corrosion. They must be securely fixed to the enclosure.

Any enclosure incorporating a part showing signs of defect must immediately be put aside and withdrawn from use to be inspected by qualified service personnel.




Ensure that each BLP on the KI, KI-SB, KI-BUMP, KARA-DOWNKI, and KI-PLA operates normally by moving its mechanism and checking that it automatically returns to nominal position.

Verify the screwing mechanism on each shackle. Ensure that the safety pin is present and that it locks correctly.

### 7.2 Replacement kits

The replacement kits (KR) available for the customer are listed in Table 2.



Service and repair work for any other part must be carried out by an L-ACOUSTICS® authorized representative. Otherwise, the customer may be exposed to dangerous situations and the warranty will no longer apply.

**Table 2: Replacement kits**

Reference	Description	Reference	Description
	<b>KI-BUMP</b>		<b>KI-DELTA</b>
KR CAKIBPCHA	One adjustable sling	KR CAMAN22L	Set of four 22 mm shackles with safety pins
KR CPPOIG01	Set of four rubber handles		<b>KARA-DOWNKI</b>
KR MCKIBPU	One equipped rack stabilizer	KR PIN62I	Set of ten 5/16" R-BLP with fixing material
KR PINI63	Set of six 1/2" R-BLP		<b>KI-PLA</b>
KR PINI83	Set of two 3/4" R-BLP	KR CAPLATPIN	Set of ten S-BLP
KR PIN665	Set of ten 3/8" T-BLP with fixing material		<b>KI-CHARIOTCOV</b>
KR PINELKIBP	Set of 10 setting shackles for the adjustable sling	KR ZIPPER	Set of 3 zippers
KR CAMAN22L	Set of four 22 mm shackles with safety pins		

## 8 SPECIFICATIONS

<b>Reference</b>	<b>K1-BUMP</b>
<b>Dimensions (L x H x D)</b>	1327 x 351.3 x 1266 mm / 52.2 x 13.8 x 49.8 inch

**TOP**

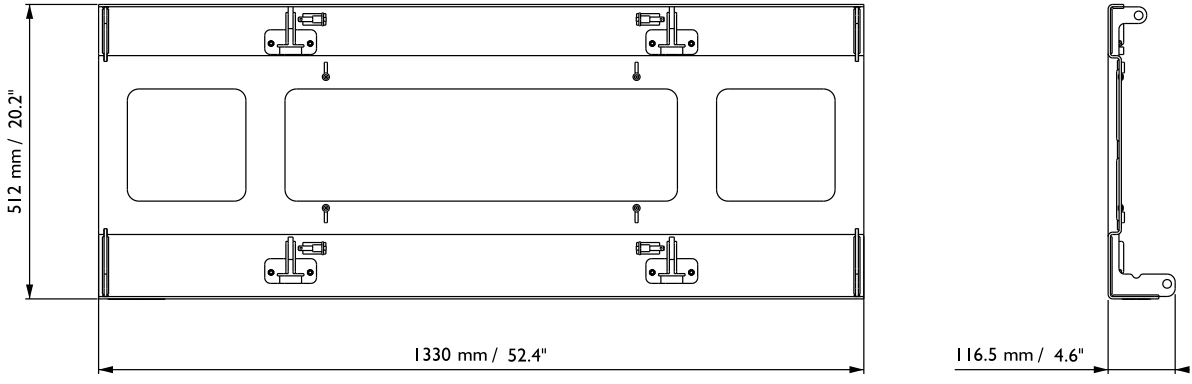
**FRONT**

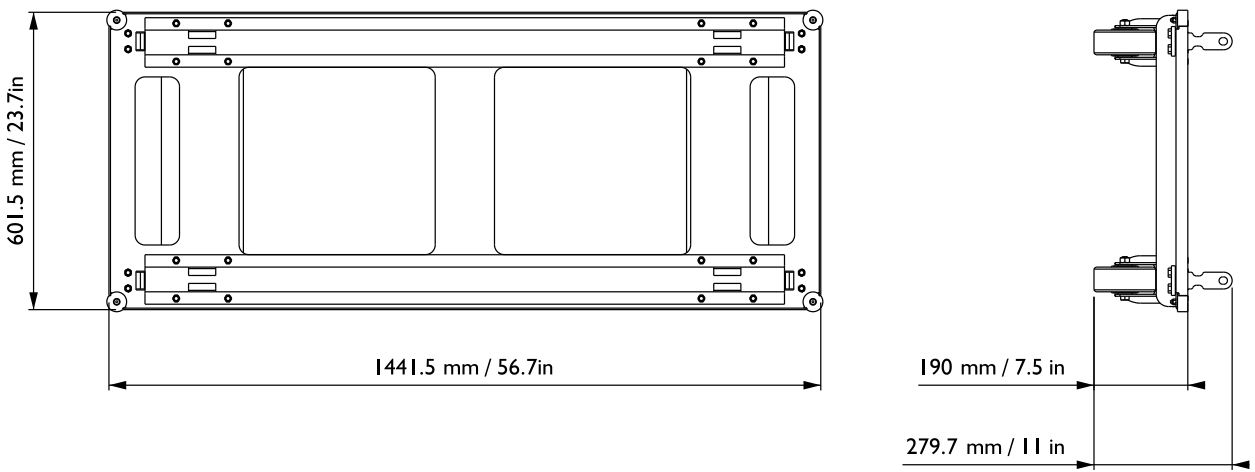
<b>Weight</b>	98 kg / 216 lbs
<b>Setup safety limits <sup>2</sup></b>	Maximum of 24 K1 and/or K1-SB enclosures per K1-BUMP.
<b>Material</b>	Polyester powder-coated high-grade steel.
<b>Included accessories</b>	One adjustable sling, one rack stabilizer, four shackles, eight BLP.
<b>Not included accessory</b>	K1-DELTA plate (6.5 kg / 14.3 lbs) with three shackles.

<sup>1</sup> The M6 notation refers to the European standard (see applicable external documentation).

<sup>2</sup> Installation safety limits are specified in SOUNDVISION Software which is designed to help with L-ACOUSTICS® product implementation.

<b>Reference</b>	<b>KARA-DOWNKI</b>
<b>Dimensions (L x H x D)</b>	1330 x 116.5 x 512 mm / 52.4 x 4.6 x 20.2 inch
 <p>The drawing shows a front view of the KARA-DOWNKI enclosure with a height of 512 mm / 20.2" and a width of 1330 mm / 52.4". It features three internal compartments. A side view shows a depth of 116.5 mm / 4.6".</p>	
<b>Weight</b>	21 kg / 46 lbs
<b>Setup safety limits <sup>1</sup></b>	Maximum of 6 KARA® enclosures per KARA-DOWNKI.
<b>Material</b>	Polyester powder-coated steel.

<sup>1</sup> Installation safety limits are specified in SOUNDVISION Software which is designed to help with L-ACOUSTICS® product implementation.

<b>Reference</b>	<b>KI-CHARIOT</b>
<b>Dimensions (L x H x D)</b>	1441.5 x 279.7 x 601.5 mm / 56.7 x 11 x 23.7 inch
 <p>The drawing shows a front view of the KI-CHARIOT enclosure with a height of 601.5 mm / 23.7in and a width of 1441.5 mm / 56.7in. It features four internal compartments. A side view shows a depth of 190 mm / 7.5 in and a total height of 279.7 mm / 11 in.</p>	
<b>Weight</b>	45 kg / 99 lbs
<b>Setup safety limits <sup>1</sup></b>	Maximum of 4 KI and/or KI-SB enclosures per KI-CHARIOT.
<b>Material</b>	Polyester powder-coated steel.

<sup>1</sup> Installation safety limits are specified in SOUNDVISION Software which is designed to help with L-ACOUSTICS® product implementation.

## 9 APPENDIX

### 9.1 Inclinometer sensor mounting

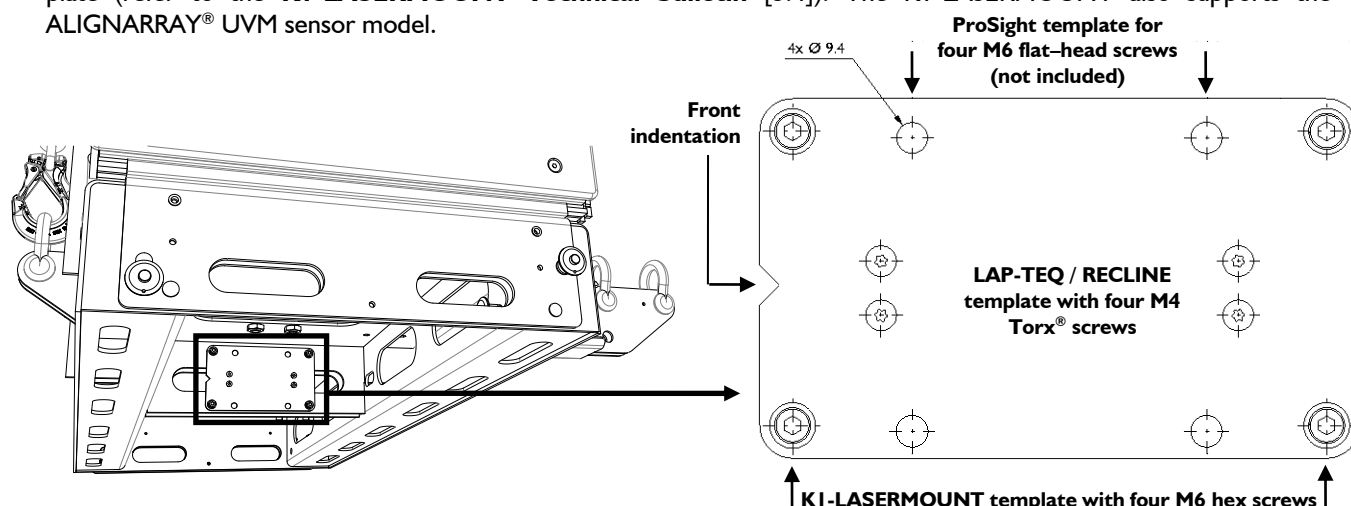
A support plate has been integrated inside the KI-BUMP main frame for remote inclinometer sensor mounting (see Figure 63). Four sensor models are supported: TEQSAS® LAP-TEQ PLUS (part of the L-ACOUSTICS® TECH TOOLCASE, refer to the **TECH TOOLCASE Product spec sheet** [3.4]), TEQSAS® LAP-TEQ (legacy model), KSG® RECLINE Compact and SSE® ProSight.



#### LAP-TEQ / LAP-TEQ PLUS sensor and display compatibility

The legacy LAP-TEQ sensors are compatible with the new TEQSAS® LAP-TEQ PLUS displays. Conversely, the new sensors are **not** compatible with the legacy displays.

**Note:** It is also possible to mount the sensors to the side face of a KI/KI-SB enclosure using the KI-LASERMOUNT plate (refer to the **KI-LASERMOUNT Technical bulletin** [3.4]). The KI-LASERMOUNT also supports the ALIGNARRAY® UVM sensor model.



**Figure 63: Inclinometer mounting plate inside KI-BUMP**

#### LAP-TEQ / RECLINE mounting procedure

Not included material: XLR cable, T20 Torx® key, medium-strength thread-locker (KR LOCKBLUE).

1. Remove the four M4 Torx® screws (T20) from the LAP-TEQ / RECLINE template (Figure 63).
2. Put a drop of thread-locker in the 4 threaded inserts.
3. Install the sensor horizontally with laser lens oriented forwards.
4. Screw in the four M4 Torx® screws (T20).
5. Connect the XLR cable to the sensor.
6. Calibrate the inclinometer and laser by following the manufacturer recommendations.

#### ProSight mounting procedure

Not included material: XLR 6 cable, 5 mm hex key, four M6 flat-head bolts and adapted keys, medium-strength thread-locker (KR LOCKBLUE).

1. Remove the support plate from the KI-BUMP by removing the four M6 hex screws (hex 5 mm).
2. Put a drop of thread-locker in the 4 nuts (unless using self-locking nuts).
3. Install the ProSight sensor horizontally with laser lens oriented forwards.
4. Screw in the 4 M6 flat-head screw/nut assemblies.
5. Put a drop of thread-locker in the 4 threaded inserts of the M6 hex screws.
6. Put the support plate back in place on the KI-BUMP and screw in the four M6 hex screws (hex 5 mm).
7. Connect the XLR 6 cable to the sensor.
8. Calibrate the inclinometer and laser by following the manufacturer recommendations.

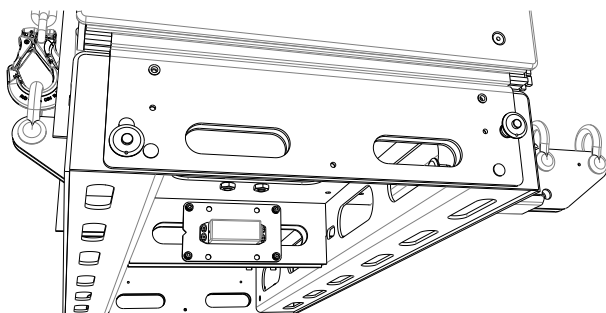


Figure 64: LAP-TEQ mounted to KI-BUMP

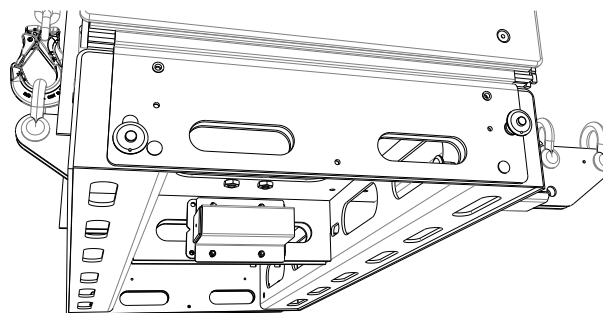


Figure 65: ProSight mounted to KI-BUMP

## 9.2 Rigging and safety requirements

Two-point unbridled hang must be performed off the central bar using both KI-BUMP external shackles with a spacing of 1.2 m/4 ft. At the same time, both internal shackles act as safety points (see Figure 66).

The rack stabilizer must be used when LA-RAK touring racks are mounted on the KI-BUMP (see Figure 67 and [6.1.2]).



Up to **24 KI and/or KI-SB** enclosures, **4 LA-RAK** touring racks, and **corresponding cable set** can be flown as a vertical line source array using the KI-BUMP flying structure.

ALWAYS secure a flow array using two safety slings.

ALWAYS refer to the mechanical data and warning indications provided in SOUNDVISION software (**Mechanical Data** section) to verify the mechanical conformity of the system before installation.

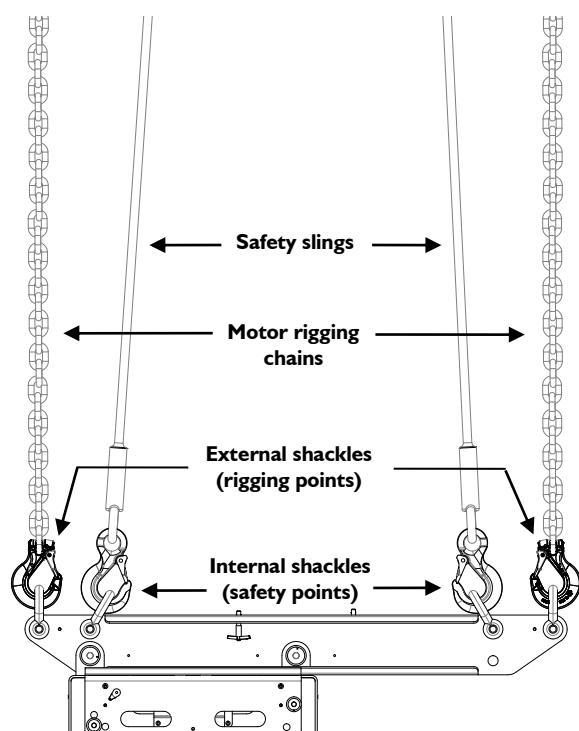


Figure 66: KI-BUMP's rigging and safety points

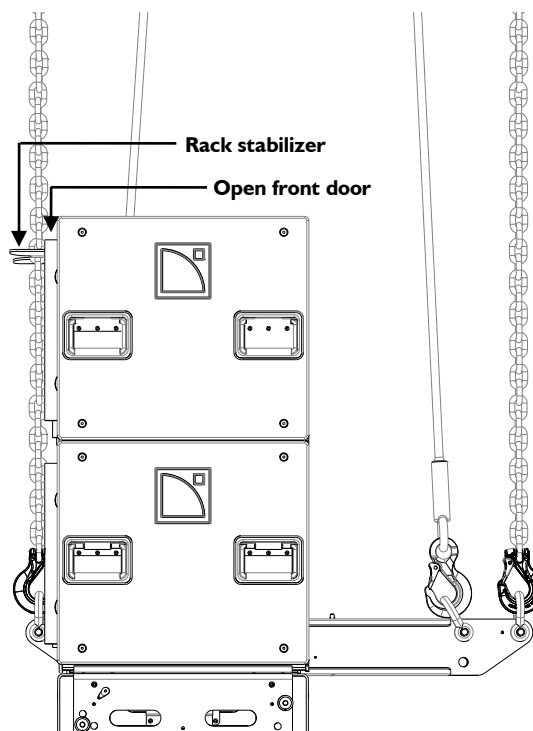
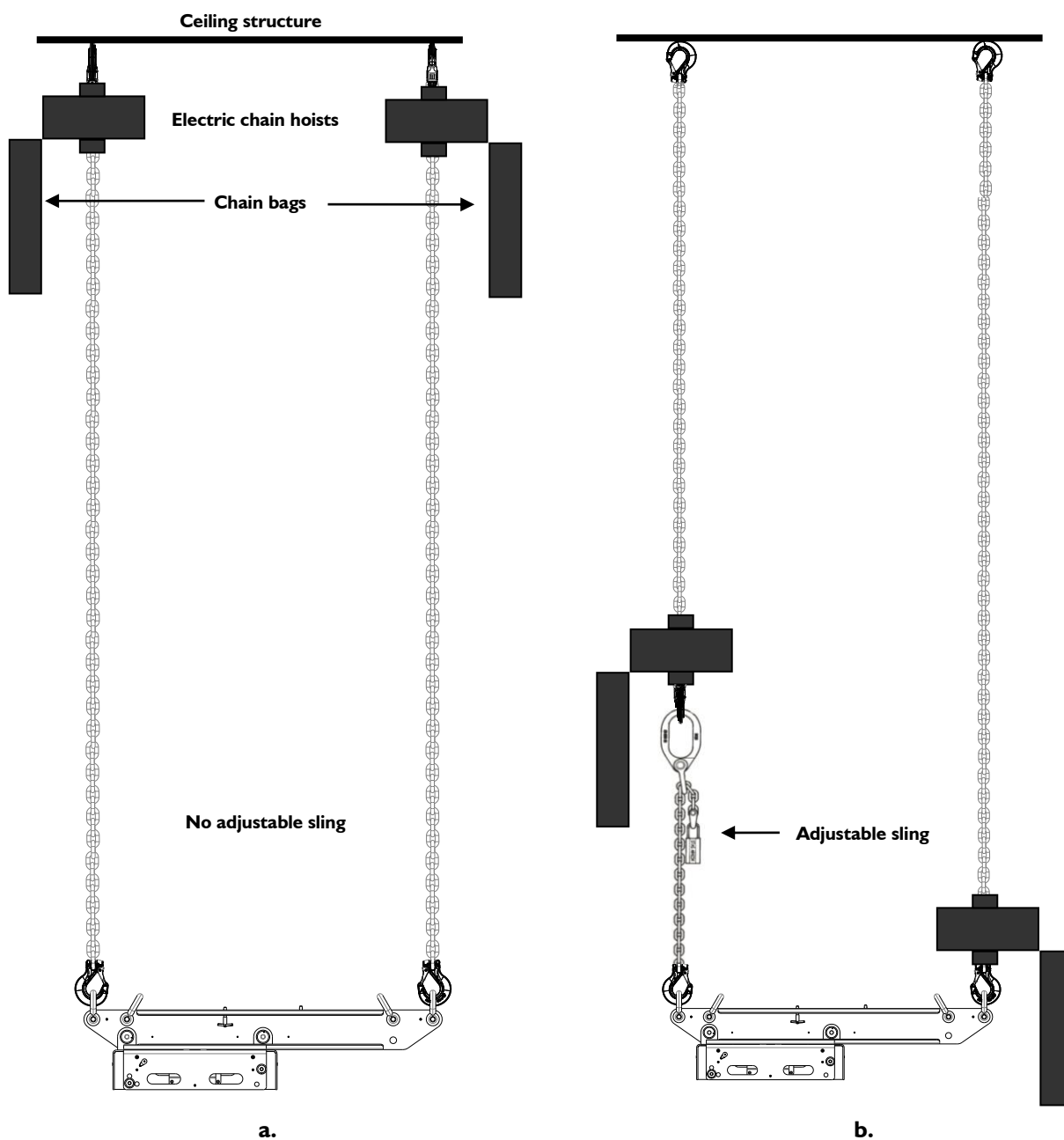


Figure 67: Flying KI-BUMP with LA-RAK

### 9.3 Standard or climbing hoist setup

The **adjustable sling** provided with the KI-BUMP must be used in case of **climbing-hoist setup** in order to prevent the chain bag to lie in front of the enclosures located on top of the array.

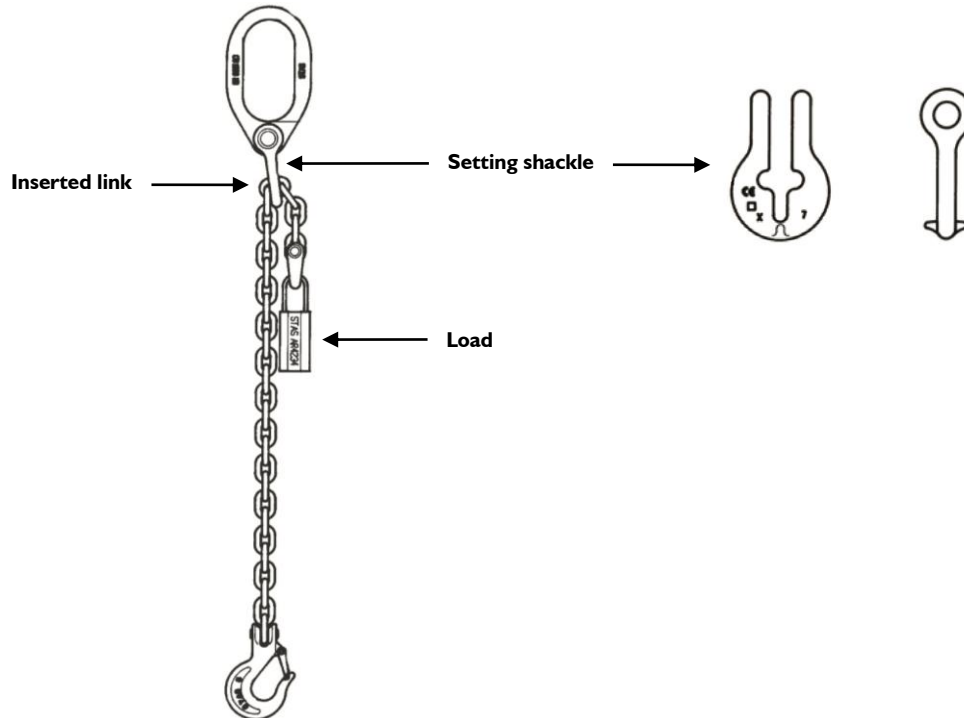


**Figure 68: (a) Standard and (b) climbing-hoist setups**



### Sling length setting procedure

1. Free the inserted link from the setting shackle by pulling it up.
2. Slide the chain through the setting shackle so as to select the desired length.
3. Insert the appropriate link into the setting shackle and let the load hang.



**Figure 69: Sling length setting**

## 9.4 Site angle setting



The site angle limits with LA-RAK on top of a K1 array are  $-20^\circ/+20^\circ$ .

The array site angle depends on the relative heights between the K1-BUMP's front and rear hang points (motor chain lengths) and central bar configuration (front or rear overhang).

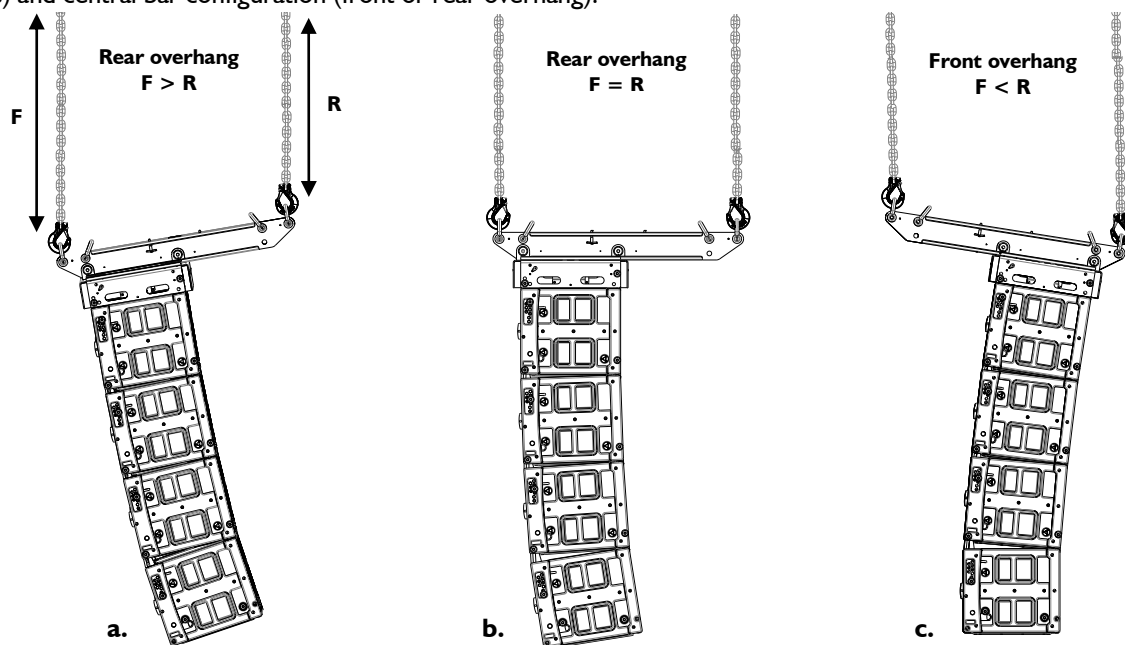


Figure 70: Examples of site angle settings: (a) negative, (b) null, and (c) positive

## 9.5 Azimuth angle setting

Array azimuth angle setting needs the addition of the K1-DELTA and two rear motors. The recommended spacing between the suspension points on the ceiling structure is a minimum of 1 m/3.3 ft. Variations from  $-10^\circ$  to  $+10^\circ$  are performed by setting the relative heights between both rear rigging points.

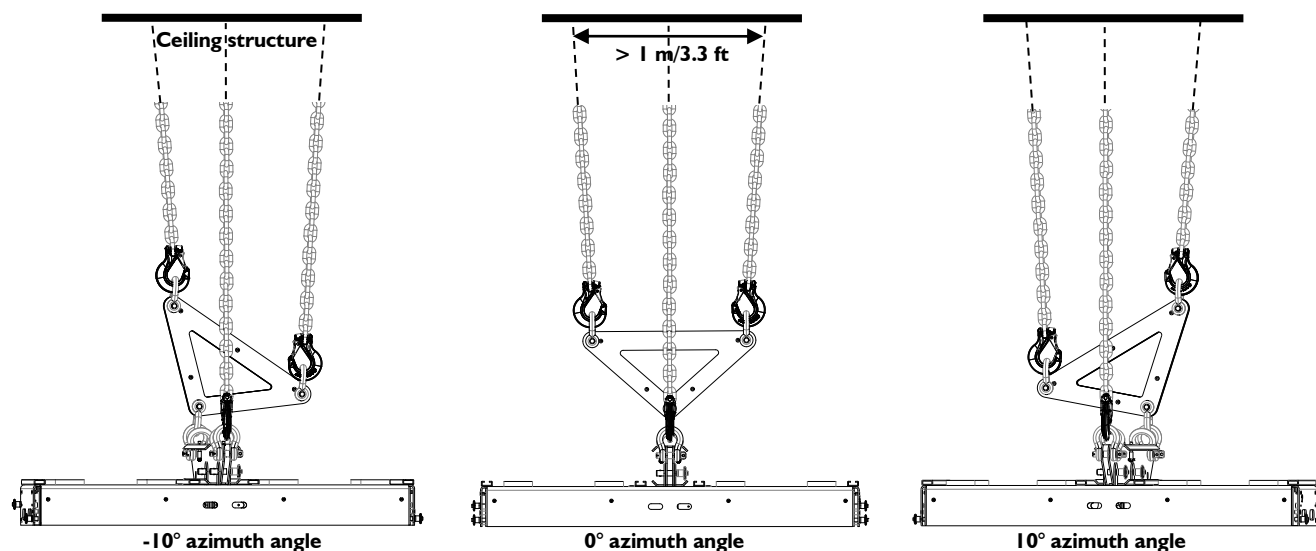


Figure 71: Setting the azimuth angle using K1-DELTA and two rear motors (front views)



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