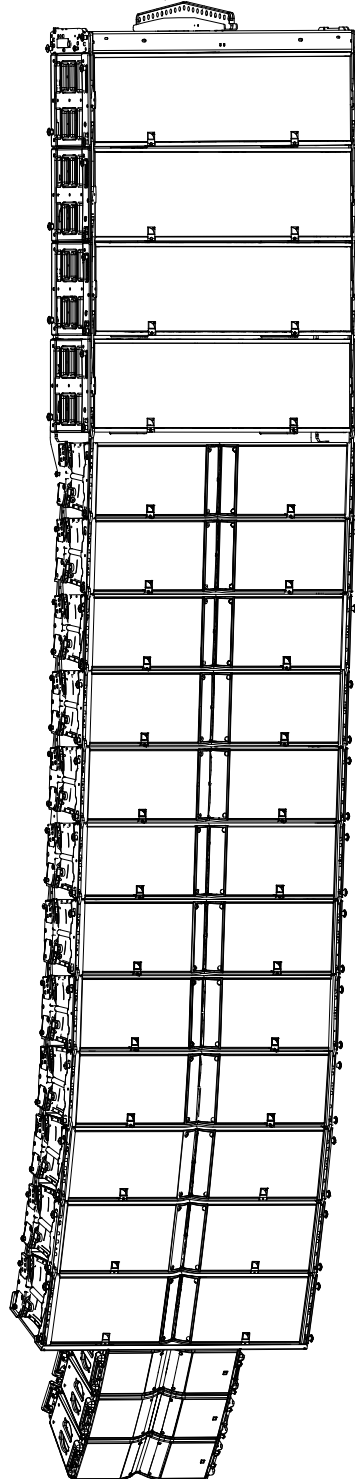


# K2



owner's manual (EN)



Document reference: K2 owner's manual (EN) version 3.0

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# Safety

## Instructions

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### **Inspect the system before any deployment.**

Perform safety related checks and inspections before any deployment.

### **Perform preventive maintenance at least once a year.**

Refer to the preventive maintenance section for a list of actions and their periodicity.

Insufficient upkeep of the product can void the warranty.

### **If any safety issue is detected during inspection, do not use the product before performing corrective maintenance.**

Check for issues. A rigging system part or fastener is missing or loose. A rigging system part exhibits: bends, breaks, broken parts, corrosion, cracks, cracks in welded joints, deformation, denting, wear, holes. A safety cue or label is missing.



### **Never incorporate equipment or accessories not approved by L-Acoustics.**

**Read all the related PRODUCT INFORMATION documents shipped with the products before exploiting the system.**



**Do not store the product on an unstable cart, stand, tripod, bracket, or table.**



### **Beware of sound levels.**

Do not stay within close proximity of loudspeakers in operation.

Loudspeaker systems are capable of producing very high sound pressure levels (SPL) which can instantaneously lead to permanent hearing damage to performers, production crew and audience members. Hearing damage can also occur at moderate level with prolonged exposure to sound.

Check the applicable laws and regulations relating to maximum sound levels and exposure times.



### **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.

### **Ensure personnel health and safety.**

During installation and set-up personnel must wear protective headgear and footwear at all times. Under no circumstances is personnel allowed to climb on a loudspeaker assembly.

### **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.

### **Respect the maximum configurations and the recommended safety precautions.**

For safety issue, respect the maximum configurations outlined in this manual. To check the conformity of any configuration in regards with the safety precautions recommended by L-Acoustics, model the system in Soundvision and refer to the warnings in Mechanical Data section.

### **Be cautious when flying a loudspeaker configuration.**

Before installing/raising the product, check each individual element to make sure that it is securely fastened to the adjacent element. Always verify that no one is standing underneath the product when it is being installed/raised. Never leave the product unattended during the installation process.

As a general rule, L-Acoustics recommends the use of secondary safety at all times.

### **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.

**Risk of falling objects**

Verify that no unattached items remain on the product or assembly.

**Risk of tipping**

Remove all rigging accessories before transporting a product or an assembly.

**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 product or the assembly.

**Intended use**

This system is intended for use by trained personnel for professional applications.

**Read the OWNER'S MANUAL before installing the system.**

Use the loudspeaker system components described in the manual and follow the operating instructions.

**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 documents without prior notice.**

Check [www.l-acoustics.com](http://www.l-acoustics.com) on a regular basis to download the latest document and software updates.

**Long term exposure to extreme conditions may damage the product.**

For more information, refer to the **Products weather protection** document, available on the website.

**Read the maintenance section of this document before servicing the product.****Contact L-Acoustics for advanced maintenance.**

Any unauthorized maintenance operation will void the product warranty.



This marking indicates that this product should not be disposed of with other household waste throughout the EU. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle it responsibly to promote the sustainable reuse of material resources. To return your used device, please use the return and collection systems or contact the retailer where the product was purchased. They can take this product for environmentally safe recycling.



# Introduction

## K2 variable curvature WST line source

---

The K2 is the full range element of a WST<sup>®</sup> line source with variable curvature and adjustable horizontal directivity. The K2 loudspeaker enclosure is based on a 3-way active design. It comprises 4 input sections: 2 LF and 1 MF at a nominal impedance of 8 ohms, and 1 HF at a nominal impedance of 16 ohms. It features two 12" speakers and four 6.5", all direct-radiating neodymium speakers mounted in a bass-reflex enclosure, and two 3" neodymium diaphragm compression drivers coupled to individual DOSC<sup>®</sup> waveguides and adjustable directivity fins. The transducers are implemented in a K-shape configuration. The cabinet is made of machined first grade Baltic birch plywood (for top, bottom and back panels) combined to die cast aluminum side panels to ensure maximum acoustical and mechanical integrity while reducing weight to the minimum. A four-point rigging system is integrated into the cabinet.

The K2 enclosure operates over the nominal frequency range of 35 Hz to 20 kHz. Its LF contour can be reinforced with the dedicated K1-SB extension and its bandwidth can be extended down to 25 Hz with the KS28 subwoofer. In the horizontal plane, the directivity is adjustable down to 300 Hz, with two symmetric settings (70° or 110°) and two asymmetric settings (90° as 35°/55° or 55°/35°).

The K2 rigging system allows vertical assembly of enclosures with various inter-element angles (up to 10°), constituting a line array with variable curvature. The combination of the coplanar symmetry and the DOSC<sup>®</sup> waveguide in the HF region ensure a perfect acoustic coupling between the elements of an array. The WST<sup>®</sup> (Wavefront Sculpture Technology) criteria are fulfilled, so that such an array can be qualified as a true line source. Any WST<sup>®</sup> line source provides a smooth tonal response and a coverage that is free of secondary lobes over the entire frequency range.

The K2 is driven and quad-amplified by the LA12X or LA4X controller with factory presets which ensure linearization, protection, and optimization for the loudspeaker system.

## How to use this manual

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The K2 owner's manual is intended for all actors involved in the system design, implementation, preventive and corrective maintenance of the K2 system. It must be used as follows:

1. Read the technical description for an overview of all system elements, their features, and their compatibilities.
  - [Electro-acoustical description](#) (p.14)
  - [Rigging system description](#) (p.20)
2. Prepare the system configuration. Consider the mechanical limits and the available acoustical configurations.
  - [Mechanical safety](#) (p.29)
  - [Loudspeaker configurations](#) (p.32)
3. Before rigging the system, perform mandatory inspections and functional checks.
  - [Inspection and preventive maintenance](#) (p.42)
4. To deploy the system, follow the step-by-step rigging instructions and refer to the cabling schemes.
  - [Rigging procedures](#) (p.63)
  - [Connection to LA amplified controllers](#) (p.129)



The [Corrective maintenance](#) (p.131) section contains the operations authorized for the end user.

Performing another operation exposes to hazardous situations.

For advanced maintenance, contact your L-Acoustics representative.

**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 [www.l-acoustics.com](http://www.l-acoustics.com) on a regular basis to download the latest document and software updates.

## Contact information


For information on advanced corrective maintenance:


- contact your Certified Provider or your L-Acoustics representative
- for Certified Providers, contact the L-Acoustics customer service: [customer.service@l-acoustics.com](mailto:customer.service@l-acoustics.com) (EMEA/APAC), [laus.service@l-acoustics.com](mailto:laus.service@l-acoustics.com) (Americas).



## Symbols

The following symbols are used in this document:

 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.

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

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

## Revision history

version number	publication date	modification
1.0	Oct. 2019	Initial version.
1.1	Jan. 2020	Minor corrections.
2.0	Mar. 2020	Added Kara II.
3.0	Sept. 2023	<ul style="list-style-type: none"> <li>• Removed LA8 and SB28.</li> <li>• Added instructions for proper use, inspection, and maintenance of adjustable fins:               <ul style="list-style-type: none"> <li>• <a href="#">K2 horizontal directivity settings</a> (p.14)</li> <li>• <a href="#">Adjustable fins check</a> (p.57)</li> <li>• <a href="#">D/R - Variable directivity fins</a> (p.138)</li> </ul> </li> <li>• Added safe and maximum limit for pullback configuration. See <a href="#">Mechanical safety</a> (p.29).</li> <li>• Added presets [KARAIIDOWNK2 70] and [KARAIIDOWNK2 90] in <a href="#">Additional downfill element</a> (p.40).</li> <li>• Changed speaker references:               <ul style="list-style-type: none"> <li>• for K2 LF: <a href="#">D/R - LF speaker</a> (p.143)</li> <li>• for K1-SB LF: <a href="#">D/R - LF speaker</a> (p.157)</li> </ul> </li> <li>• Various fixes and improvements.</li> </ul>

## System components

### Loudspeaker enclosures

K2	3-way full-range active WST enclosure
K1-SB	K1 system subwoofer 2x15"
KS28	Flyable subwoofer 2 × 18"
Kara II	2-way active WST® enclosure: 2 × 8" LF + 3" HF diaphragm

### Powering and driving system

LA4X / LA12X	Amplified controller with DSP, preset library and networking capabilities
--------------	---



Refer to the LA4X / LA12X owner's manual for operating instructions.

### Rack

LA-RAK II AVB	Touring rack containing three LA12X, LA-POWER II for power distribution, LA-PANEL II for audio and network distribution, and two LS10 for AVB distribution
---------------	--

### Cables

SP cables	SpeakON loudspeaker cables (4-point, 4 mm <sup>2</sup> gauge) Come in different sizes: SP.7 (0.7 m / 2.3 ft), SP5 (5 m / 16.4 ft), SP10 (10 m / 32.8 ft), and SP25 (25 m / 82 ft)
SP-Y1	Breakout cable for two passive enclosures (2.5 mm <sup>2</sup> gauge) 4-point speakON to 2 × 2-point speakON, provided with a CC4FP adapter
DO cables	PA-COM loudspeaker cables (8-point, 4 mm <sup>2</sup> gauge) Come in different sizes: DO.7 (0.7 m / 2.3 ft), DO.10 (10 m / 32.8 ft), and DO.25 (25 m / 82 ft)
DOSUB-LA8	Breakout cable for four passive enclosures (4 mm <sup>2</sup> gauge) 8-point PA-COM to 4 × 2-point speakON
DOFILL-LA8	Breakout cable for two 2-way active enclosures (4 mm <sup>2</sup> gauge) 8-point PA-COM to 2 × 4-point speakON
DO3WFILL	Breakout cable for one 2-way active enclosure and two passive enclosures (4 mm <sup>2</sup> gauge) 8-point PA-COM to 1 × 4-point speakON and 2 × 2-point speakON



**Information about the connection of the enclosures to the LA amplified controllers is given in this document.**

Refer to the LA4X / LA12X owner's manual for detailed instructions about the whole cabling scheme, including modulation cables and network.

### Rigging elements

K2-BUMP	Structure for flying K2 arrays (incl. 1 extension sling + 1 laser adapter)
K2-BAR	Extension bar for K2-BUMP
K2-RIGBAR	K2 rigging bar and pullback (Inc. LA-SLING2T)
K1-DELTA	Rigging accessory for rear attachment of 2 motors to K1-BUMP
K2-LINK	Rigging accessory for rear attachment of K2 below K1
KARADOWNK2	Flying bumper for rigging Kara under K2

K2-RAKMOUNT	4 mounting cradle for LA-RAK (incl. rack stabilizer)
K1-BPCHAIN	Adjustable sling for K1-BUMP or K2-BUMP
LA-SLING2T	Lifting chain (DIN EN 818-4) 2-leg , 8 mm
K2-LASERMOUNT	K2 laser support plate (compatible TEQSAS / SSE ProSight / Align Array / KSG)
K2-JACK	4 tilt adjustment screw jacks + 2 bars for chariots

### Transportation accessories

K2-CHARIOT	Chariot for 4 K2
K2-CHARIOTCOV	Protective cover for 4 K2 on CHARIOT
K-BUMPFLIGHT	Modular flight case for 2 K1-BUMP or 2 K2-BUMP

### Software applications

Soundvision	3D acoustical and mechanical modeling software
LA Network Manager	Software for remote control and monitoring of amplified controllers

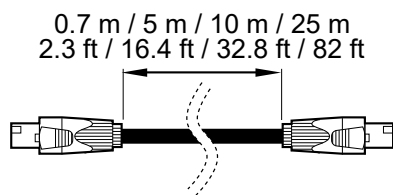


Refer to the **Soundvision** help.

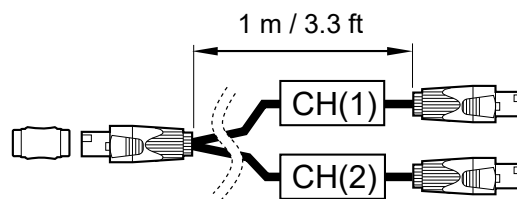
Refer to the **LA Network Manager** help.

## System component illustrations

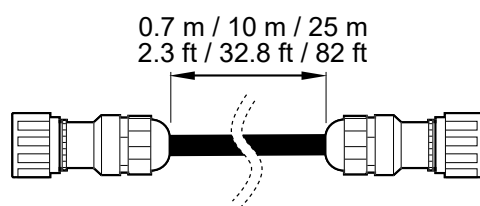
### Cables



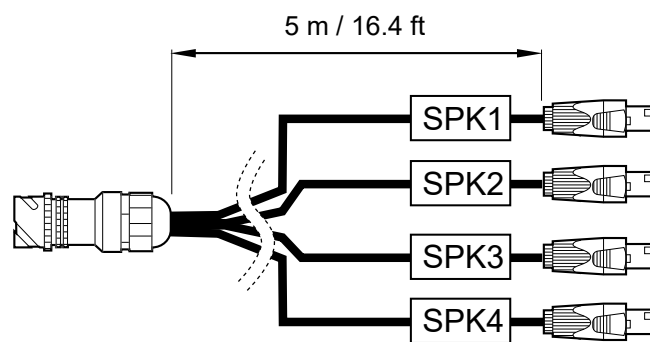
SP cables



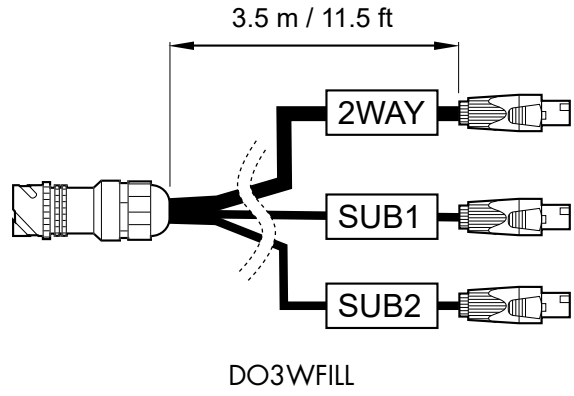
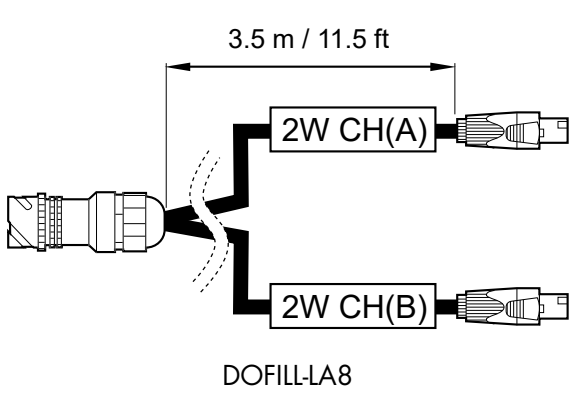
SP-Y1



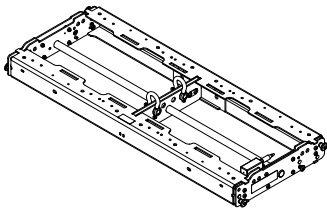
DO cables



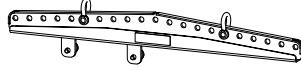
DOSUB-LA8



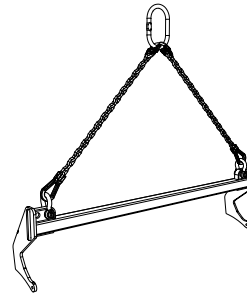
### Rigging accessories



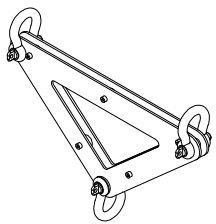
K2-BUMP



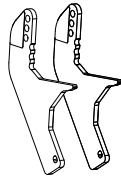
K2-BAR



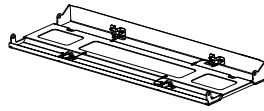
K2-RIGBAR



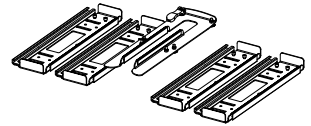
K1-DELTA



K2-LINK



KARADOWNK2



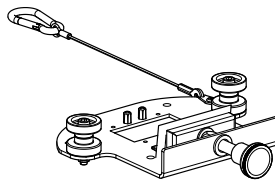
K2-RAKMOUNT



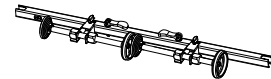
K1-BPCHAIN



LA-SLING2T

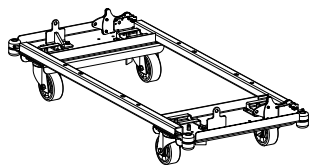


K2-LASERMOUNT

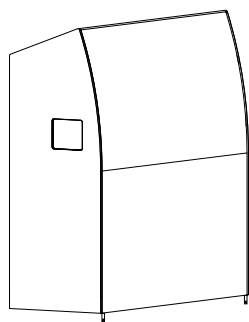


K2-JACK

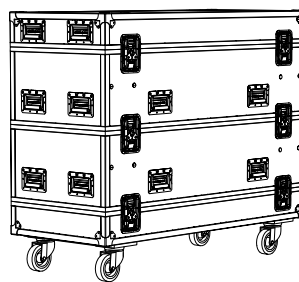
## Transportation



K2-CHARIOT



K2-CHARIOTCOV



K-BUMPFLIGHT

## Electro-acoustical description

### K2 horizontal directivity settings

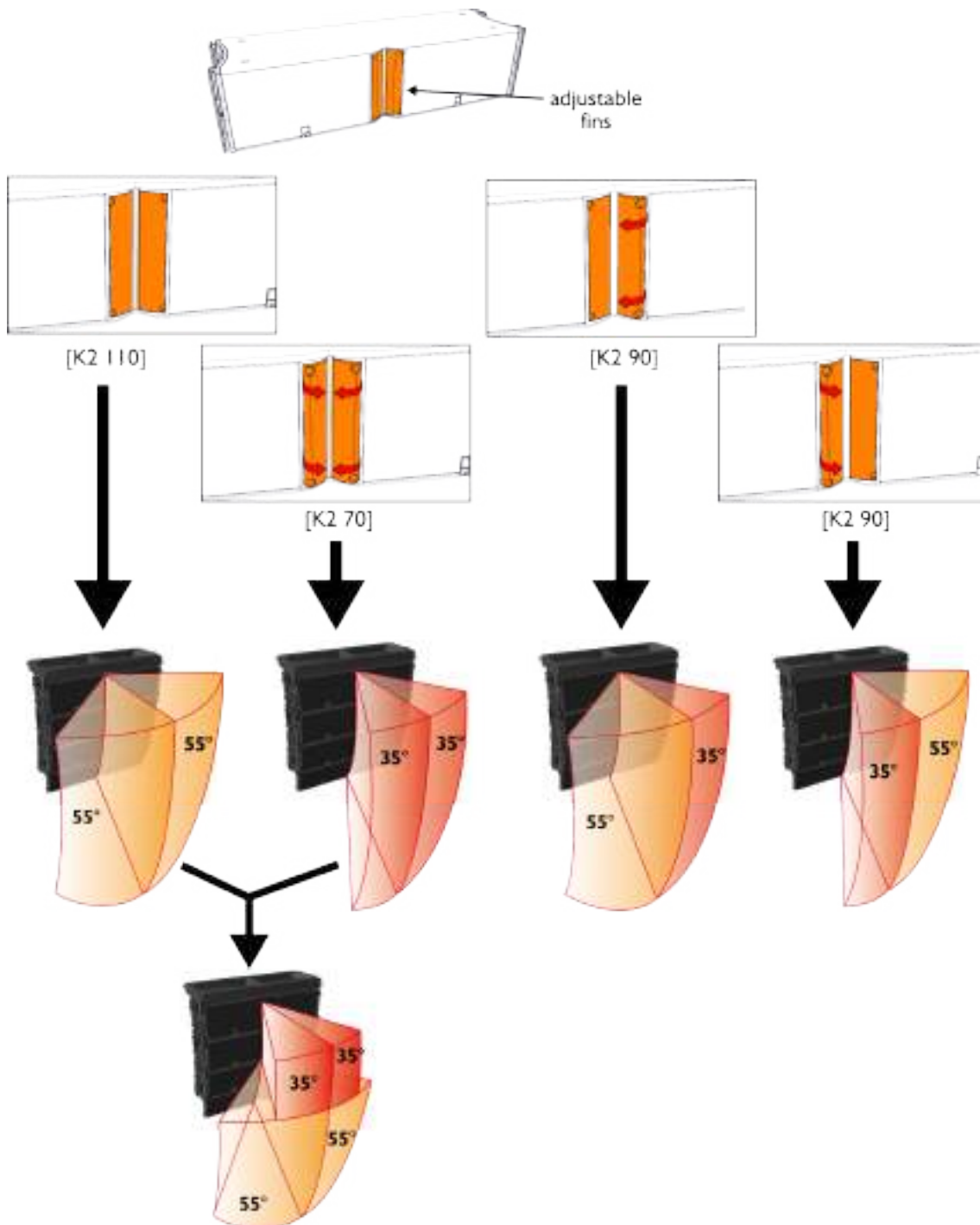
The K2 enclosure features an adjustable horizontal directivity system. Using the adjustable fins, horizontal directivity can be adjusted with four different settings: 110°/70° symmetric or 90° asymmetric (35°/55° or 55°/35°). A specific K2 preset must be used for each directivity setting.

Deploy or retract the fins to change the fin setting. To deploy, pull the fin by the notches until the stop. To retract, tap or push firmly on the fin.

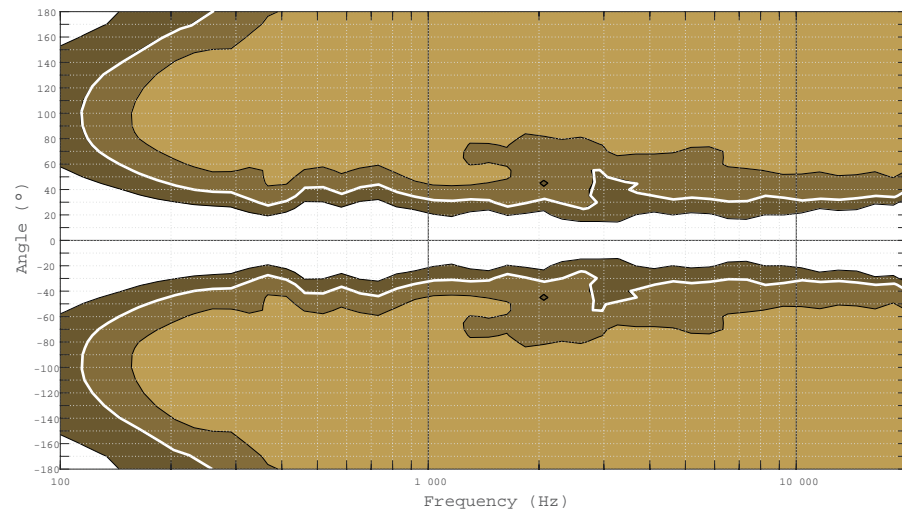
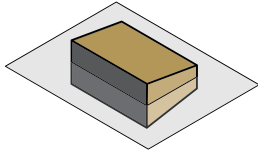
#### Risk of breaking the fin hooks

Do not use excessive force when deploying the fins.

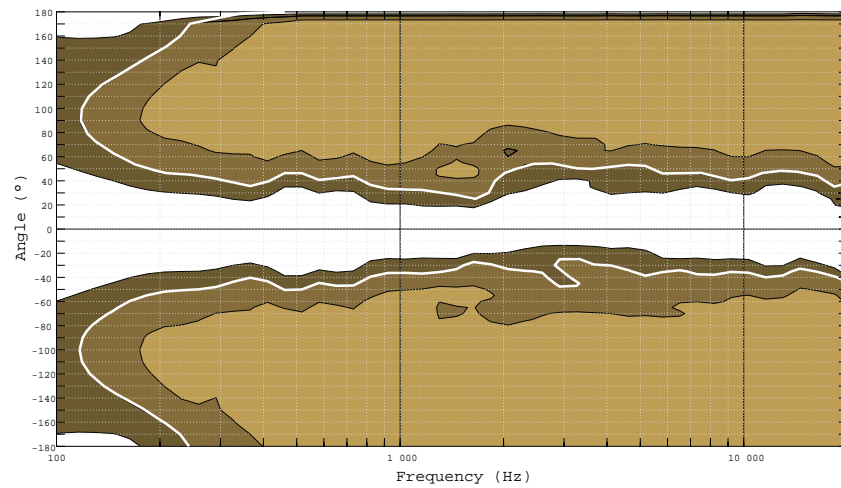
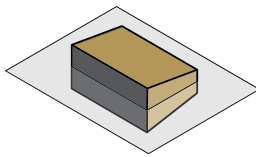
Within a line source, different directivity settings can be combined to improve the coverage of the audience geometry.



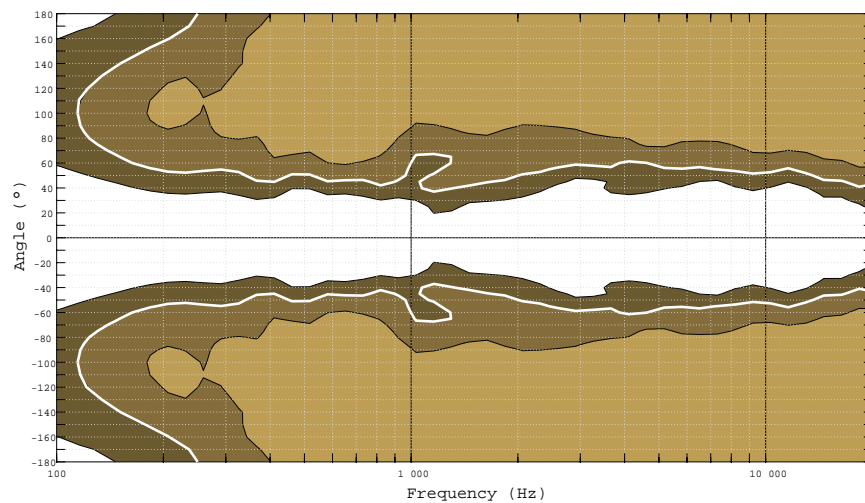
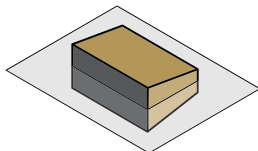
## K2 directivity



Dispersion angle diagram of a K2 array with 70° fins setting, using lines of equal sound pressure at -3 dB, -6 dB, -12 dB.



Dispersion angle diagram of a K2 array with 90° fins setting, using lines of equal sound pressure at -3 dB, -6 dB, -12 dB.



Dispersion angle diagram of a K2 array with 110° fins setting, using lines of equal sound pressure at -3 dB, -6 dB, -12 dB.

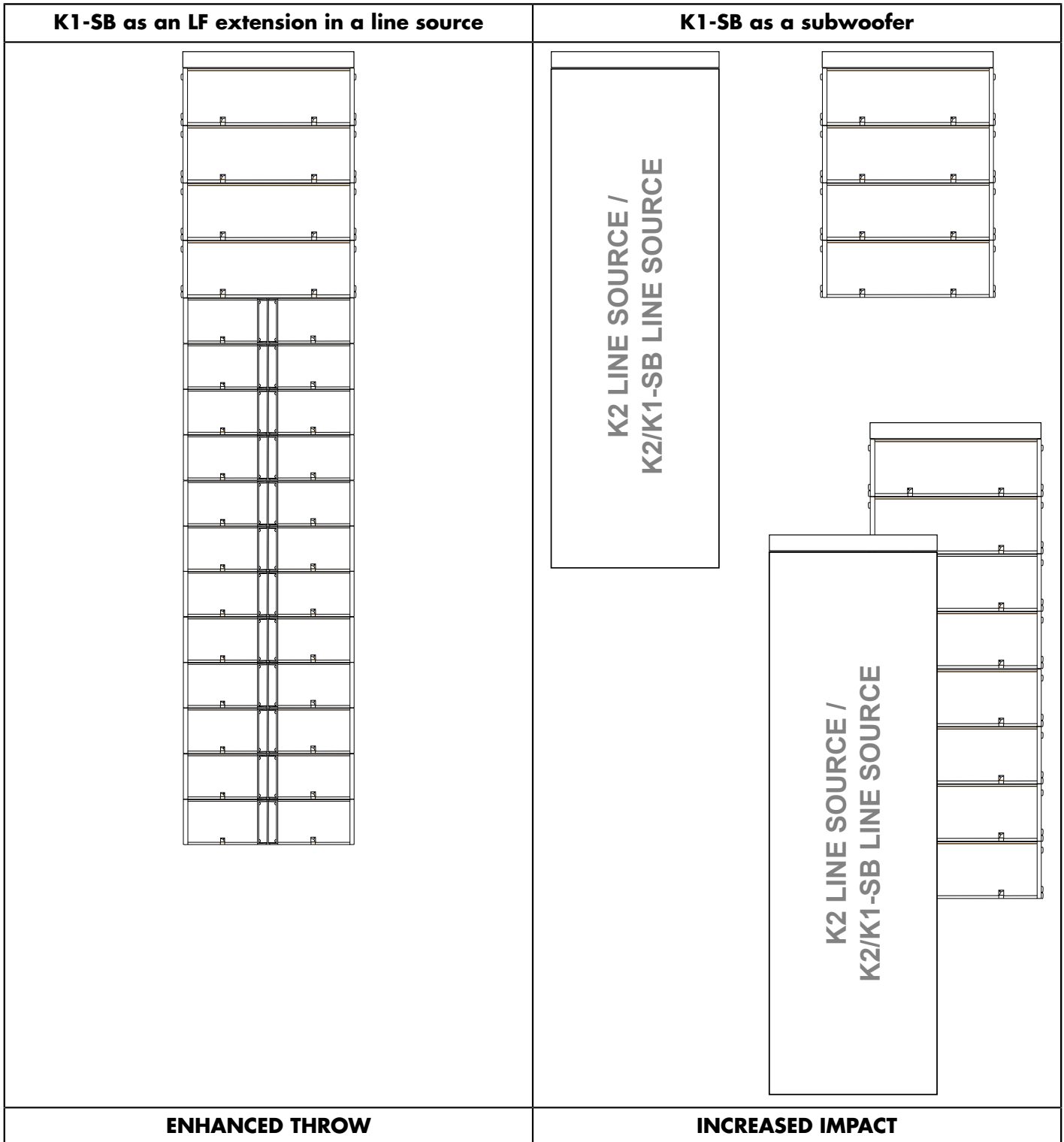
## K1-SB applications

There are two distinct applications for K1-SB in a K2 system:

- As an LF extension in a line source for enhanced throw, using the [K1SB\_X K2] preset with K2.
- As a subwoofer for increased impact, using the [K1SB\_60] preset.



Both applications of K1-SB can be combined in the same configuration.





## Preset description

### [K2 70] [K2 90] [K2 110]

loudspeaker elements	outputs	channels	routing	gain	delay	polarity	mute
left LF	OUT 1	LF	IN A	0 dB	0 ms	+	ON
right LF	OUT 2	LF					ON
MF	OUT 3	MF					ON
HF	OUT 4	HF					ON

### [KARAIIDOWNK2] [KARAIIDOWNK2 70] [KARAIIDOWNK2 90]

loudspeaker elements	outputs	channels	routing	gain	delay	polarity	mute
LF	OUT 1	LF	IN A	0 dB	0 ms	+	ON
HF	OUT 2	HF					ON
LF	OUT 3	LF	IN A	0 dB	0 ms	+	ON
HF	OUT 4	HF					ON

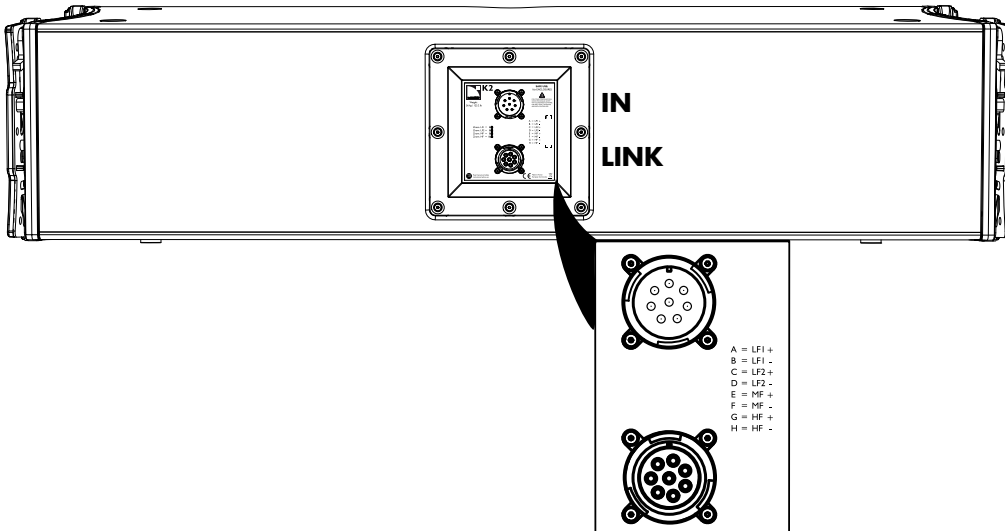
### [K1SB\_60] [K1SB\_X K2] [KS28\_60]

outputs	channels	routing	gain	delay	polarity	mute
OUT 1	SB	IN A	0 dB	0 ms	+	ON
OUT 2	SB	IN A	0 dB	0 ms	+	ON
OUT 3	SB	IN A	0 dB	0 ms	+	ON
OUT 4	SB	IN A	0 dB	0 ms	+	ON

### [KS28\_60\_C]

loudspeaker elements	outputs	channels	routing	gain	delay	polarity	mute
SR	OUT 1	SR	IN A	0 dB	0 ms	+	ON
SB	OUT 2	SB					ON
SB	OUT 3	SB					ON
SB	OUT 4	SB					ON

## Connectors



K2

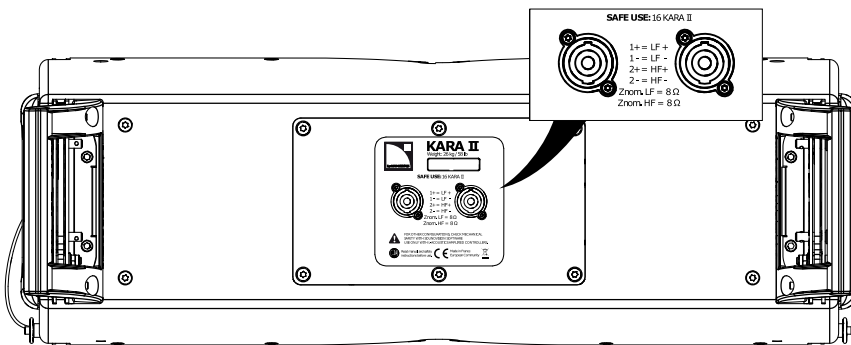
2 × 8-point PA-COM

### Internal pinout for L-Acoustics 3-way active enclosures

PA-COM points	A/B	C/D	E/F	G/H
Transducer connectors	left LF	right LF	MF	HF



SpeakON connectors can be used interchangeably as IN or LINK connector.

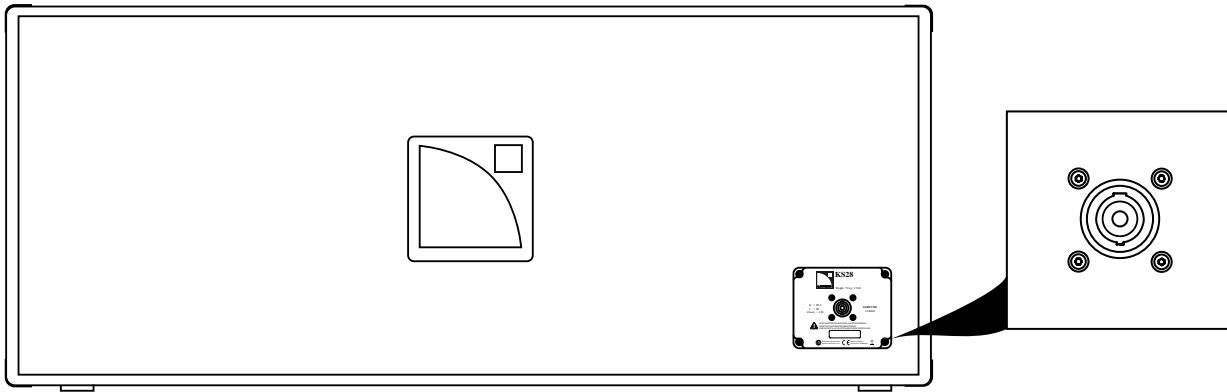


Kara II

2 × 4-point speakON

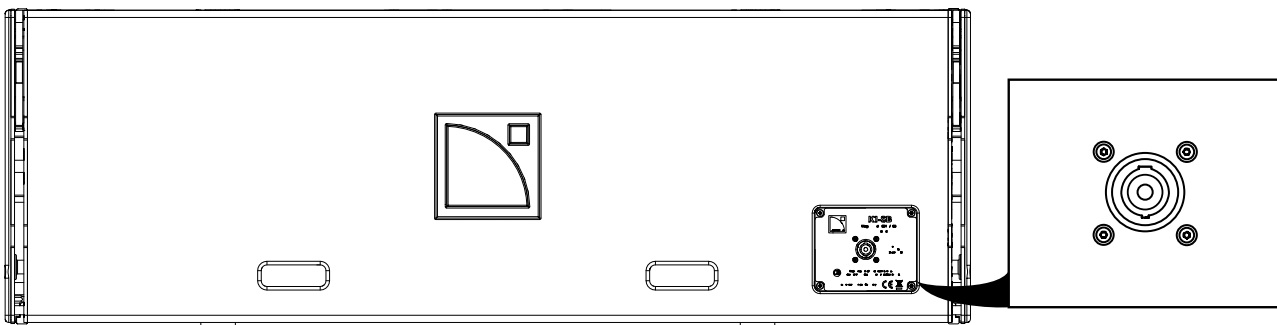
### Internal pinout for L-Acoustics 2-way active enclosures

SpeakON points	1 +	1 -	2 +	2 -
Transducer connectors	LF +	LF -	HF +	HF -



KS28

1 × 4-point speakON



K1-SB

1 × 4-point speakON

### Internal pinout for L-Acoustics subwoofers

SpeakON points	1 +	1 -	2 +	2 -
Transducer connectors	LF +	LF -	Not linked	Not linked

## Rigging system description

### Elements for enclosure rigging

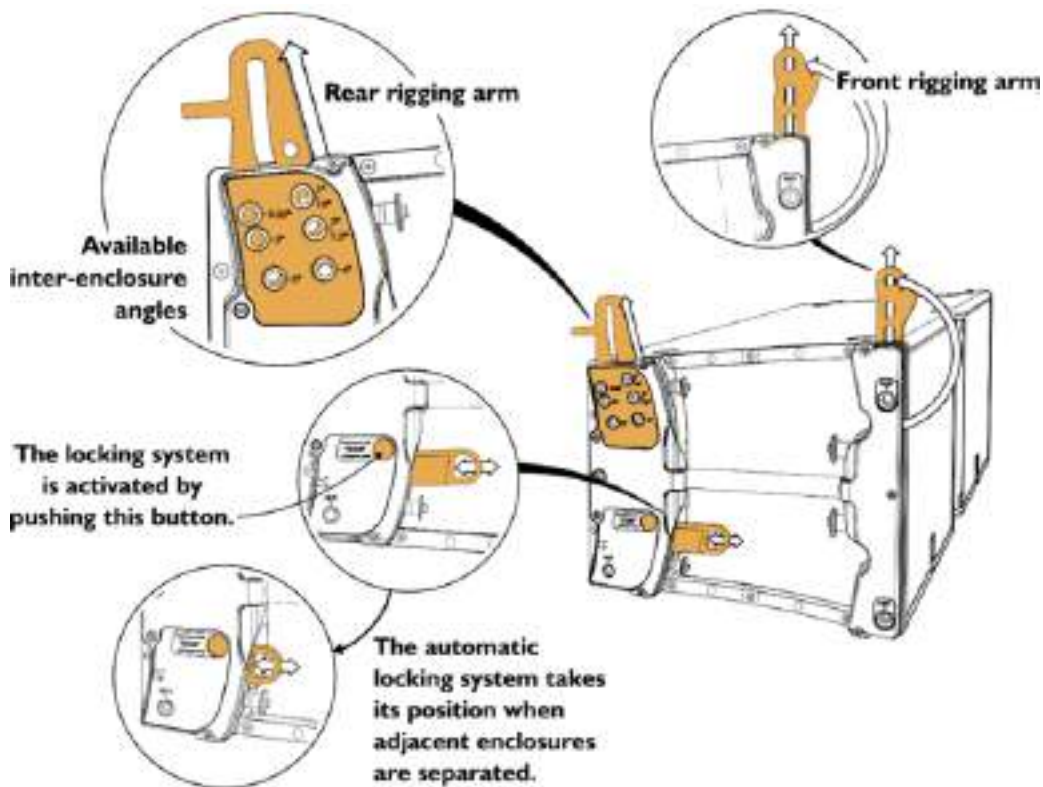
---

#### K2

On both sides, K2 integrates two arms to connect another element of the rigging system, such as an enclosure or to a flying frame.

- At the front, a rotating arm provides a fixed point around which the enclosure can freely rotate until its connection at the rear.
- At the rear, a sliding arm enables the inter-element angle setting and the inter-element rear connection.

The angles between adjacent enclosures are secured by an automatic system that is activated in advance and locks itself during the stacking and lifting procedures.



## Elements for storage and transportation

### K2-CHARIOT

K2-CHARIOT is designed for the transportation and storage of blocks of four K2 enclosures.

During transportation the blocks must have an inter-enclosure angle of  $10^\circ$  to avoid any separation of the enclosures. This angle must be set using the enclosure rear rigging arm pin. The automatic locking system must remain unloaded.

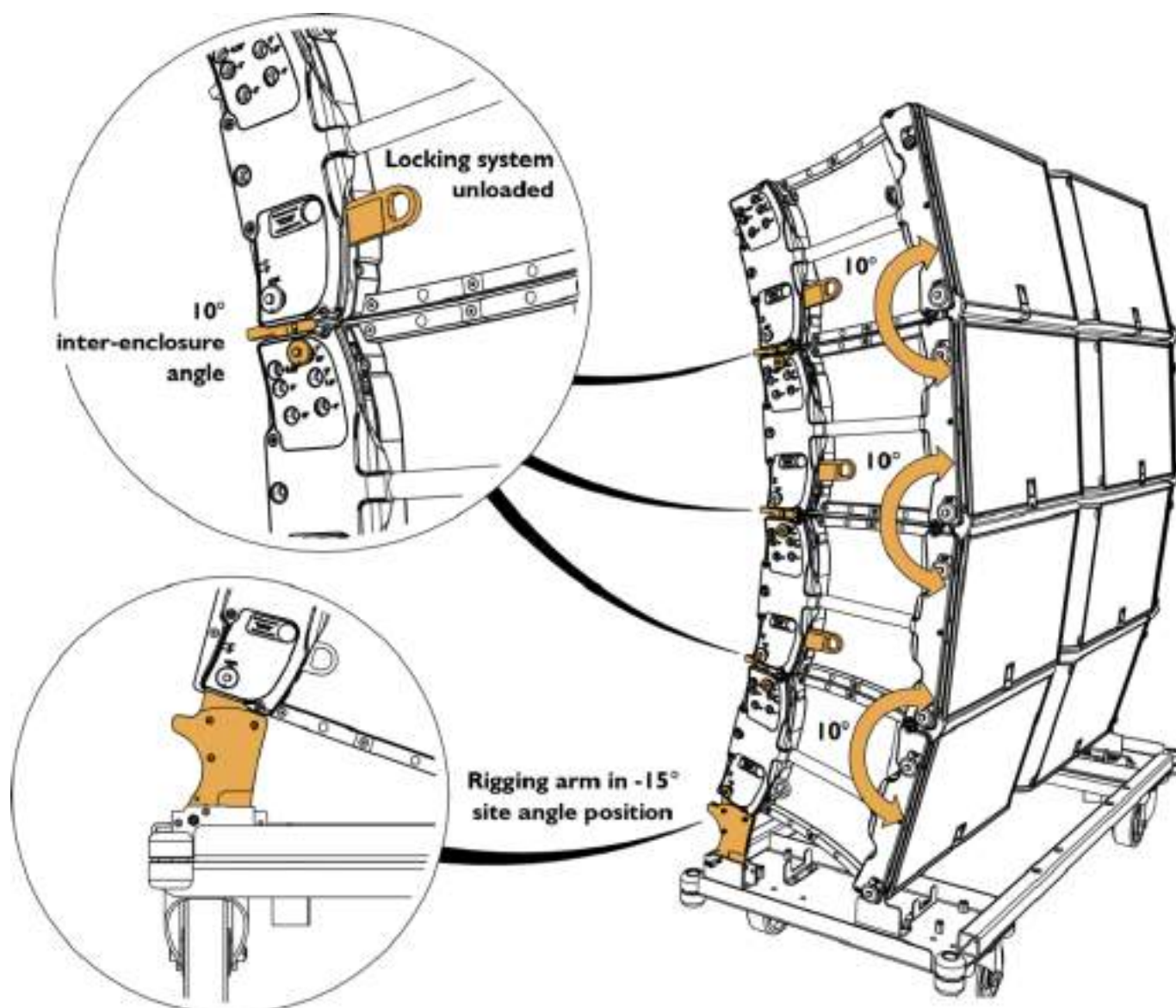
The K2-CHARIOT rear rigging arm must be at its  $-15^\circ$  site angle position.

#### **Tipping hazard**

If the enclosures are not pinned at  $10^\circ$ , they can separate at the back and cause the stack to tip over.

#### **Risk of severe injury**

Remove all enclosures before performing any maintenance operation on K2-CHARIOT.



## Elements for ground stacking

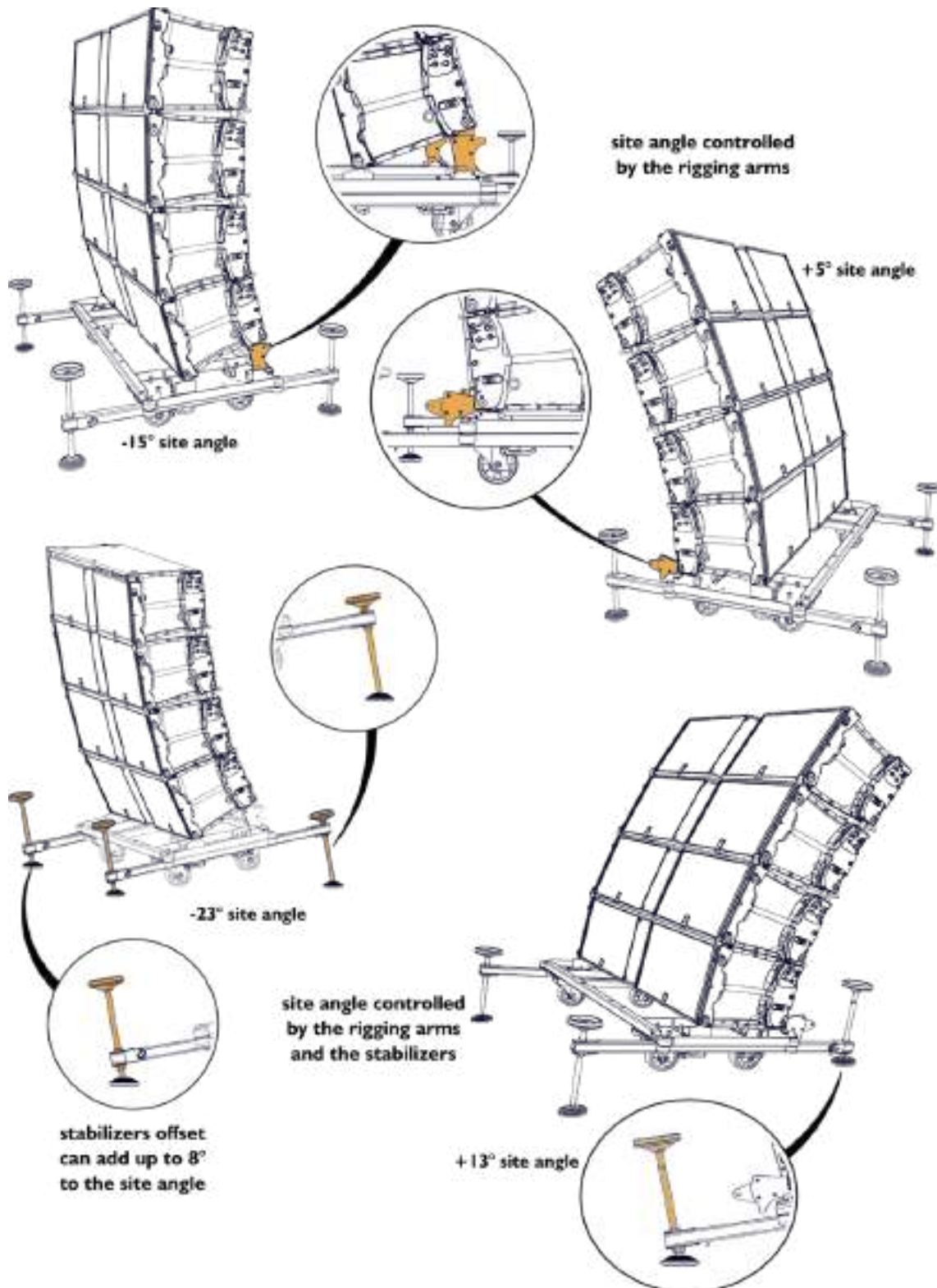
### K2-CHARIOT with K2-JACK

The K2-CHARIOT, combined with two K2-JACK stabilizers, is used as a stacking platform for K2 enclosures.

#### **Tipping hazard**

Always install the K2-JACK before:

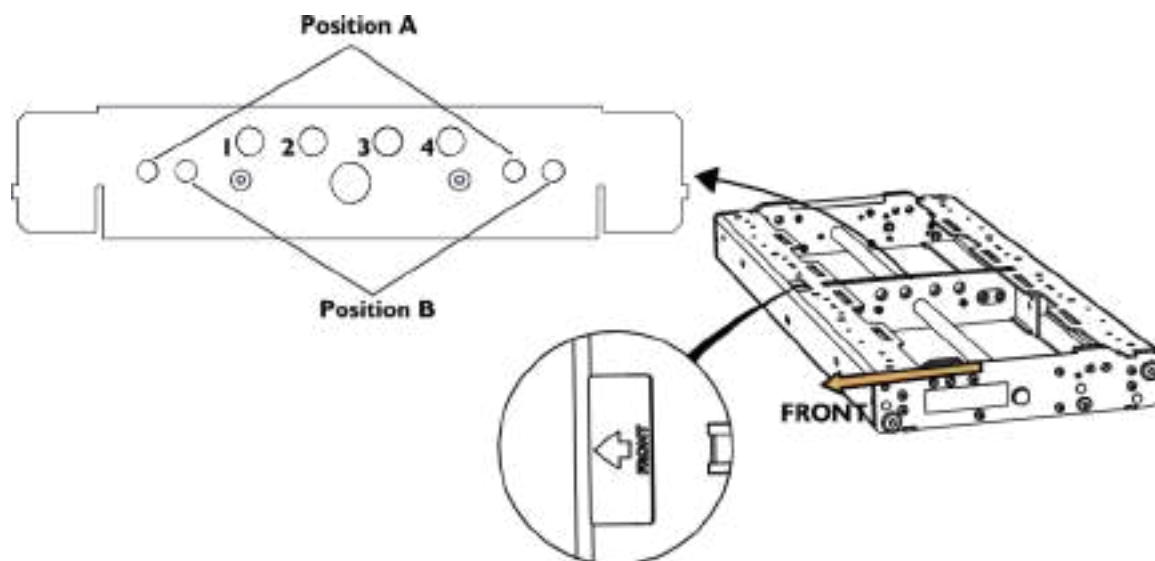
- setting the inter-enclosure angles
- changing the position of the K2-CHARIOT rear rigging arms



## Elements for flying

### K2-BUMP

K2-BUMP is designed for flying line arrays of K2, K1 or K1-SB. 4 holes are available on the central bar of the K2-BUMP. Refer to your Soundvision model to know which holes to use.



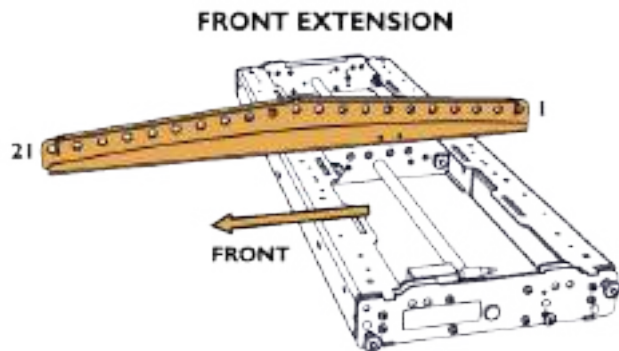
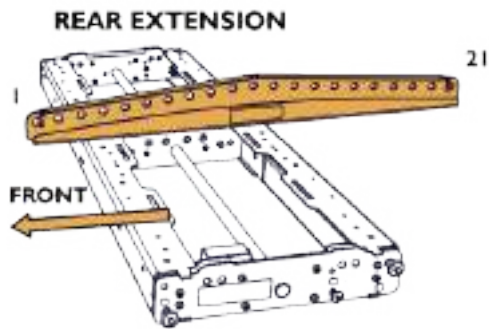
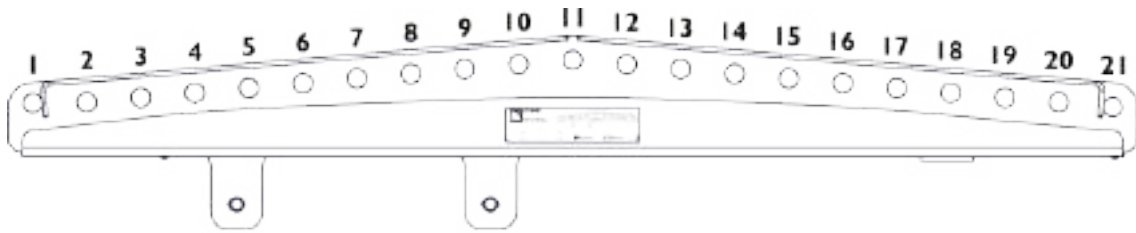
With K1-SB and a single motor the hole n°2 provides a 0° site angle.



## K2-BAR to K2-BUMP

By adding a K2-BAR to the K2-BUMP, the site angle range can be increased. 21 holes are available on the K2-BAR which can be attached to the K2-BUMP as a rear or a front extension and in position A or B, thus offering a total of 84 discrete positions for pick-up points.

The rear extension is suited to downwards and front extension to upwards site angles.



Standard: One K2-BAR attached in the center of K2-BUMP



Alternative: Two K2-BAR attached on the sides

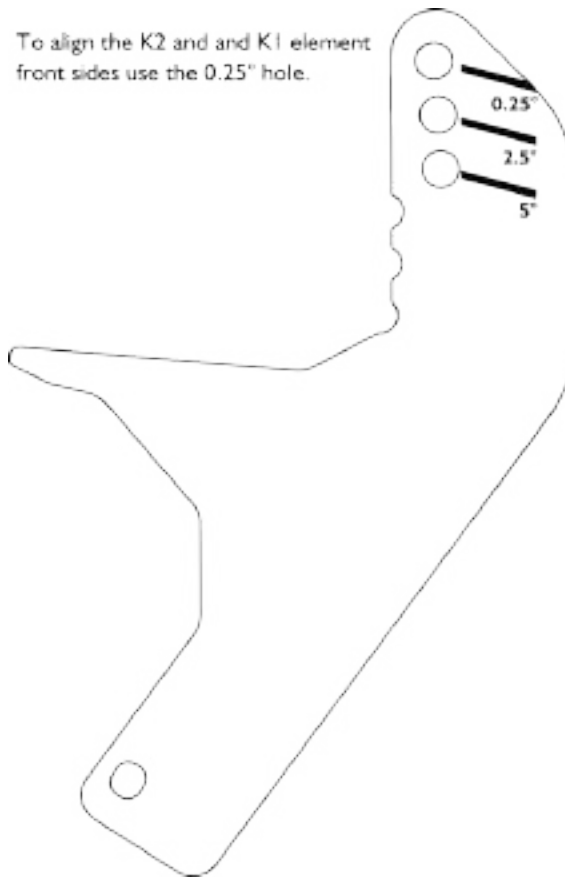


## K2-LINK

The K2-LINK is designed as an interface between the K1 and K2 rigging systems.

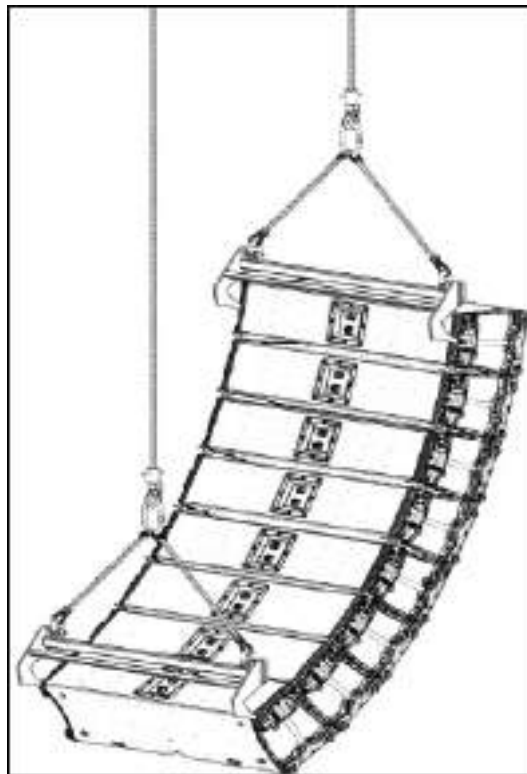
It is used to hang K2 under K1, K1-SB or K1-BUMP.

It provides three holes and therefore three angles between the top K2 enclosure and the bottom K1 element: 0.25°, 2.5° and 5°.



## K2-RIGBAR

The K2-RIGBAR can be used to implement a pullback either with K2-BUMP / K2-BAR or another K2-RIGBAR. It must be used with the LA-SLING2T.



The K2-RIGBAR can also be used as the main lifting point, thus providing a lighter solution for flying K2 enclosures with one lifting point.



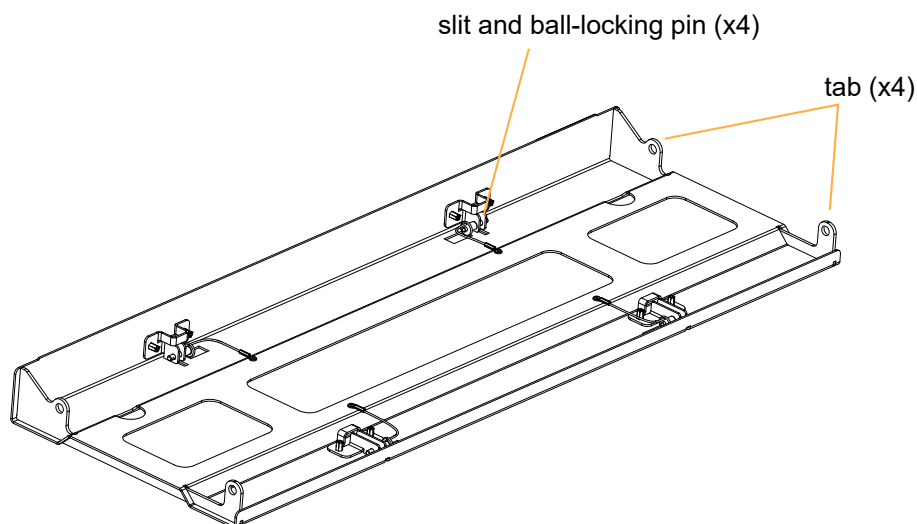
**i** Refer to [N - Using a K2-RIGBAR to implement a pullback](#) (p.122) for more information on how to implement a pullback.

## KARADOWNK2

KARADOWNK2 is a rigging interface for Kara II under a K2 array.

The four tabs on the top are compatible with the K2 rigging system.

The four slits fitted with ball-locking pins accommodate the Kara II rigging arms.

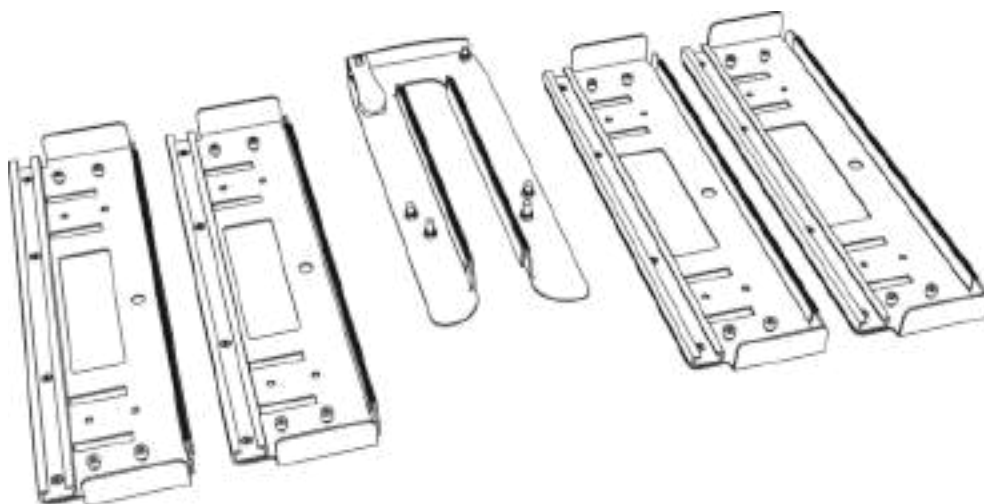


## Elements for LA-RAK/LA-RAK II rigging

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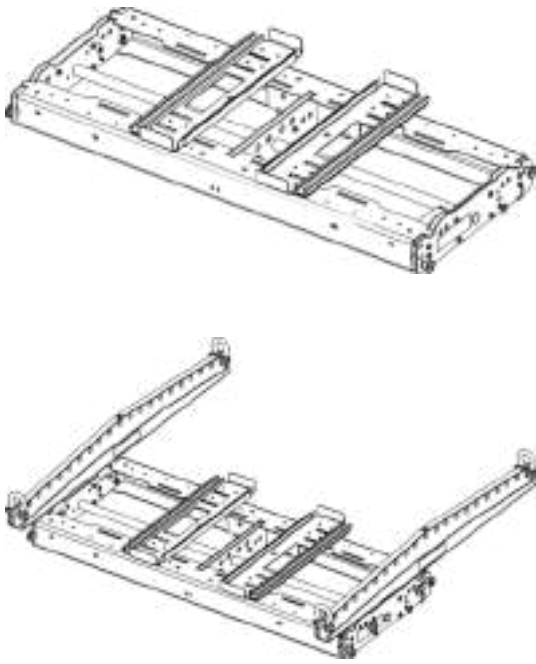
### K2-RAKMOUNT

The K2-RAKMOUNT is designed to stack one or two LA-RAK/LA-RAK II on top of a flown array. It is composed of four rails and a stabilizer.

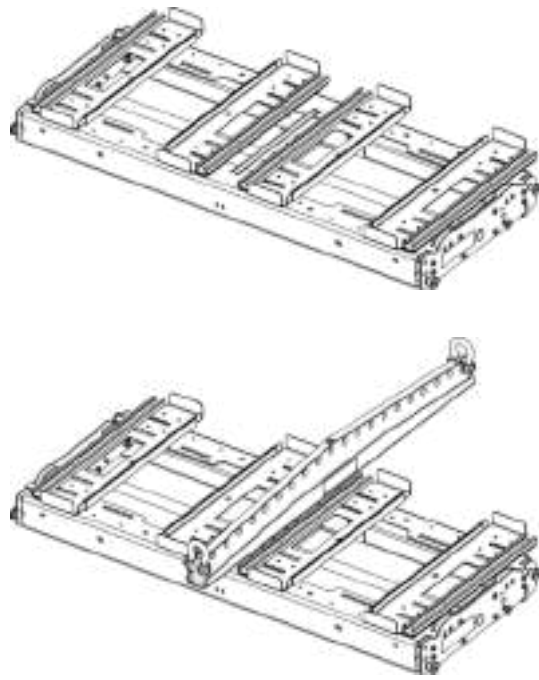


The rails are screwed on the K2-BUMP. Their number and position depend on the number of racks. The K2-RAKMOUNT must be used along with either one or two K2-BAR.

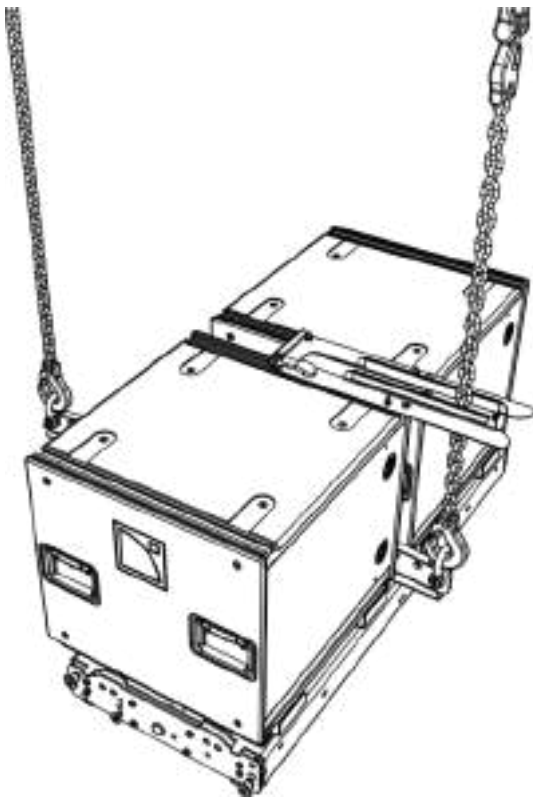
**1 LA-RAK/LA-RAK II : 2 rails : 2 K2-BAR**



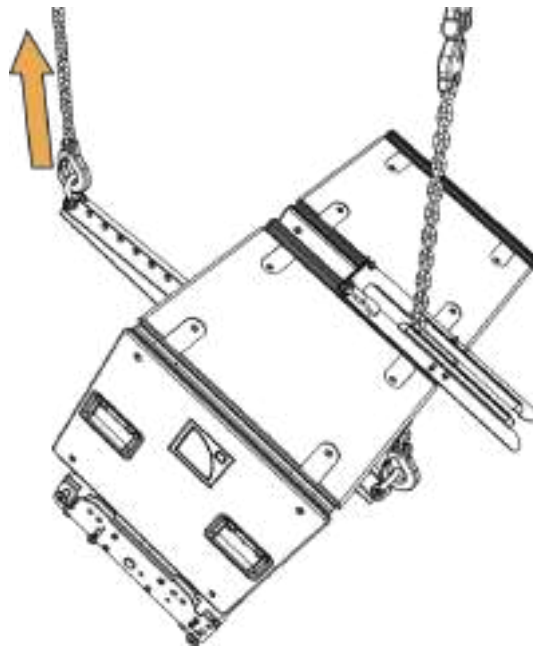
**2 LA-RAK/LA-RAK II : 4 rails : 1 K2-BAR**



When two racks are mounted side by side, the stabilizer is used to prevent the assembly from tipping or toppling over. The stabilizer traps one of the chains used to lift the assembly.



0° site angle



30° positive site angle

# Mechanical safety

## Flown configurations

The K2 rigging system complies with 2006/42/EC: Machinery Directive. It has been designed following the guidelines of BGV-C1.


2006/42/EC: Machinery Directive specifies a safety factor of 4 against the rupture. The flown deployments described in this manual achieve a safety factor of **4 or more**.

Refer to Soundvision for the safety factor of a specific deployment.

The **safe limit** gives the maximum number of elements for which the safety factor is compliant with the 2006/42/EC: Machinery Directive, within the use defined in this manual and regardless of the other deployment parameters (site angles, inter-element angles, etc.).

The **maximum limit** gives the maximum number of elements for which the safety factor can be compliant with the 2006/42/EC: Machinery Directive, when the other deployment parameters provide the best mechanical conditions.

For mixed arrays refer to your Soundvision model.

 **Always refer to Soundvision for the safety factor of a mixed array.**  
When flying a K2 array with a Kara II downfill, the mechanical safety of all system elements must be considered. The indicated maximum limit applies to the K2 only.

 **Do not implement a pullback on a K2 array with a Kara II downfill.**

## K2

configuration	rigging accessory	safe limit	maximum limit
flown	K2-BUMP	16	24
	K2-BUMP + K2-BAR	14 K2 + 2 LA-RAK	24 K2 + 2 LA-RAK
		12 K1-SB + 1 LA-RAK	16 K1-SB + 2 LA-RAK
	K2-LINK under K1-BUMP	16	24
	K2-RIGBAR	12	12
flown with a pullback	K2-BUMP + K2-BAR or K2-RIGBAR + K2-RIGBAR	12	16
flown with downfill	KARADOWNK2	6 Kara II	

## K1-SB

configuration	rigging accessory	safe limit	max limit
flown	K1-BUMP	18	24

## KS28

configuration	rigging accessory	maximum / safe limit
flown	KS28-BUMP	16

## Other configurations

For other configurations, respect the recommended maximum limit for optimal stability.

### K2

<b>configuration</b>	<b>rigging accessory</b>	<b>safe limit</b>	<b>maximum limit</b>
ground-stacked	K2-BUMP	4	6
stacked	K2-CHARIOT with K2-JACK	4	6

### KS28

<b>Configuration</b>	<b>Rigging accessory</b>	<b>Maximum limit</b>
ground-stacked	no rigging accessory	4
stacked upright	no rigging accessory	2
stacked on chariot	KS28-CHARIOT	4

## Assessing mechanical safety

---



### **Mechanical safety of the rigging system**

Before any installation, always model the system in Soundvision and check the **Mechanical Data** section for any stress warning or stability warning.

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.

### **Maximum pullback angle**

If a pullback accessory is available, the pullback angle must not exceed a 90° negative site angle.

### **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 beyond 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 the user's responsibility to secure the array and to ignore the warning.

### **Additional safety for flown arrays**

When flying an array, use available holes to implement a secondary safety.

### **Considerations must be given to unusual conditions**

Soundvision calculations are based on 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.

# Loudspeaker configurations

## K2 line source

Deployed as a line source, the system operates over the nominal bandwidth of the K2 enclosure, with an adjustable horizontal directivity.

Two configurations are possible:

- K2 line source
- K2/K1-SB line source: enhanced LF throw

The [K2 70], [K2 90] and [K2 110] presets allow for a reference frequency response in long throw applications. Each preset is dedicated to a horizontal directivity setting.



### Risk of breaking the fin hooks

Do not use excessive force when deploying the fins.

By providing the K1-SB with the same frequency response as the K2 low section, the [K1SB\_X K2] preset allows the K1-SB enclosure to be used as an LF line source element, increasing the length of the sub-low line source.

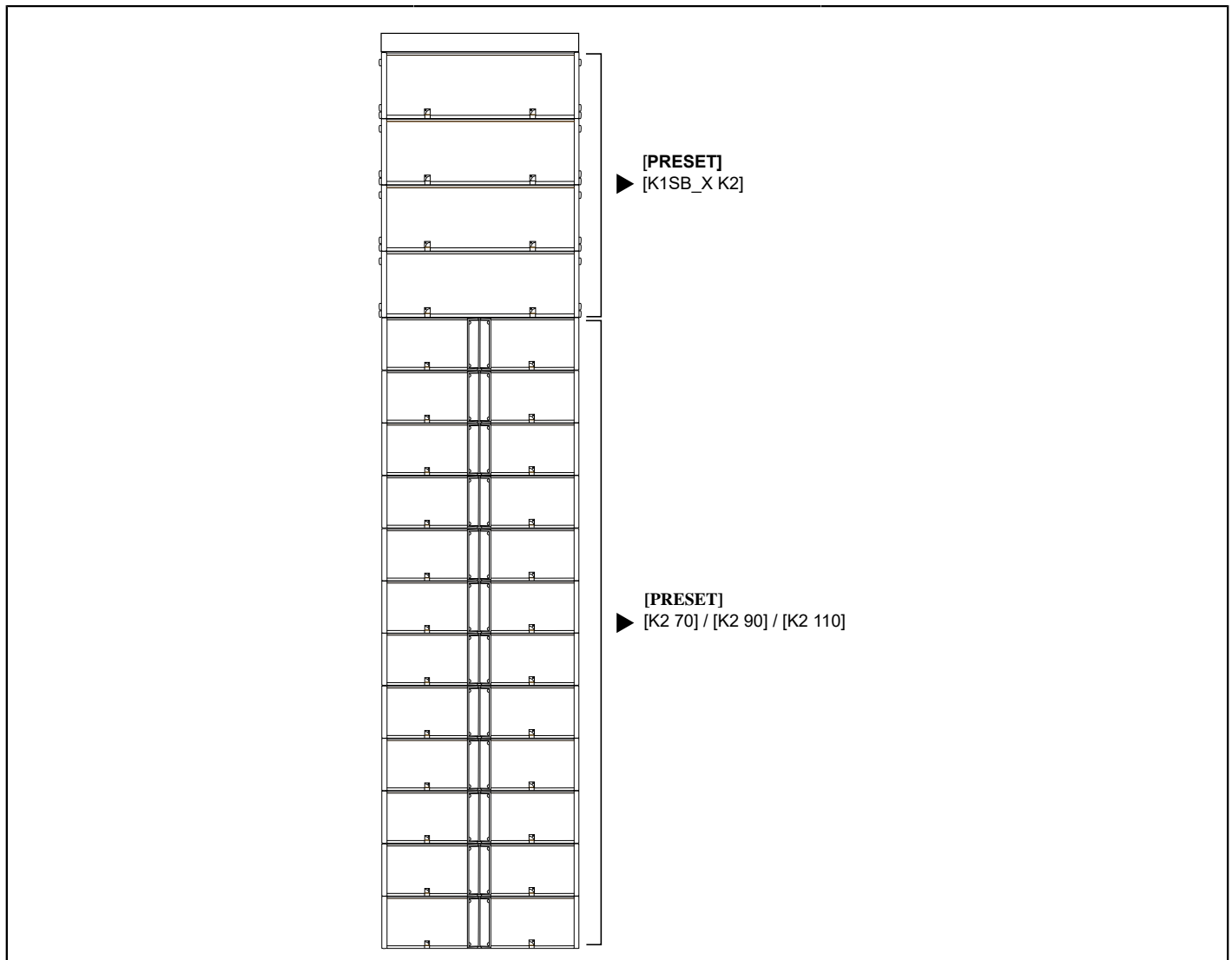
### Amplified controllers compatibility

	LA4X	LA12X
K2	✓	✓
K1-SB	-	✓

### Standalone K2 line source

Enclosure	K2
Preset	[K2 70] [K2 90] [K2 110]
Frequency range (-10 dB)	35 Hz - 20 kHz



**K2/K1-SB line source**

Enclosure	K2	K1-SB
Preset	[K2 70] [K2 90] [K2 110]	[K1SB_X K2]
Frequency range (-10 dB)	35 Hz - 20 kHz	
Recommended ratio	3 K2 : 1 K1-SB	
Minimum line length	12 K2 + 4 K1-SB	

**!** When using [K2 70], [K2 90], or [K2 110] with [K1SB\_X K2], do not add any delay value between the K2 and K1-SB elements of a same line source.

## Additional subwoofer system

---

A K2 line source or a K2/K1-SB line source can be deployed with additional subwoofer enclosures to provide increased sub-low resources to demanding applications.

Two subwoofer systems are available:

- K1-SB for increased LF contour
- KS28 for infra extension

The recommended ratio is 3 K2 for 2 subwoofers, whether using K1-SB subwoofers only, KS28 subwoofers only, or a combination of both.

The [K1SB\_60] and [KS28\_60] presets provide the subwoofers with an upper frequency limit at 60 Hz for an optimal frequency coupling with the line source.

### Amplified controllers compatibility

	<b>LA4X</b>	<b>LA12X</b>
K2	✓	✓
K1-SB	-	✓
KS28	-	✓

## K1-SB

The K1-SB provides an extension of the bandwidth in the low end, down to 30 Hz. Depending on the deployment, LF rejection can be produced.

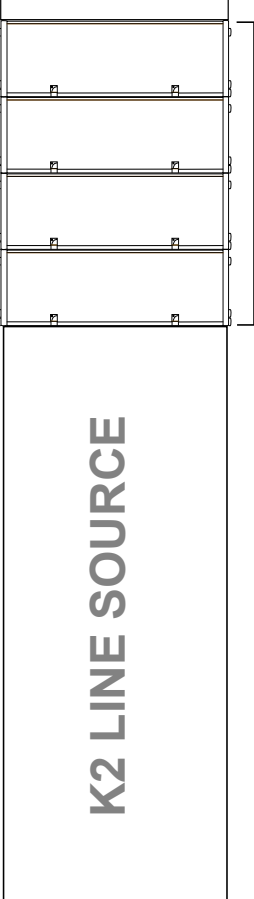
Three deployments are available in this configuration:

- K1-SB on top of the K2 line source
- K1-SB beside the K2 or K2/K1-SB line source : side LF rejection (polarized)
- K1-SB behind the K2 or K2/K1-SB line source : rear LF rejection (cardioid)

### Pre-alignment delays

presets	pre-alignment delay values and polarity settings	
[K2] + [K1SB_X K2]	K2 = 0 ms <input data-bbox="965 548 1013 604" type="button" value="+"/>	K1-SB = 0 ms <input data-bbox="1444 548 1492 604" type="button" value="+"/>
[K2] + [K1SB_60]	K2 = 6 ms <input data-bbox="965 638 1013 694" type="button" value="+"/>	K1-SB = 0 ms <input data-bbox="1444 638 1492 694" type="button" value="+"/>

### Line source with K1-SB on top

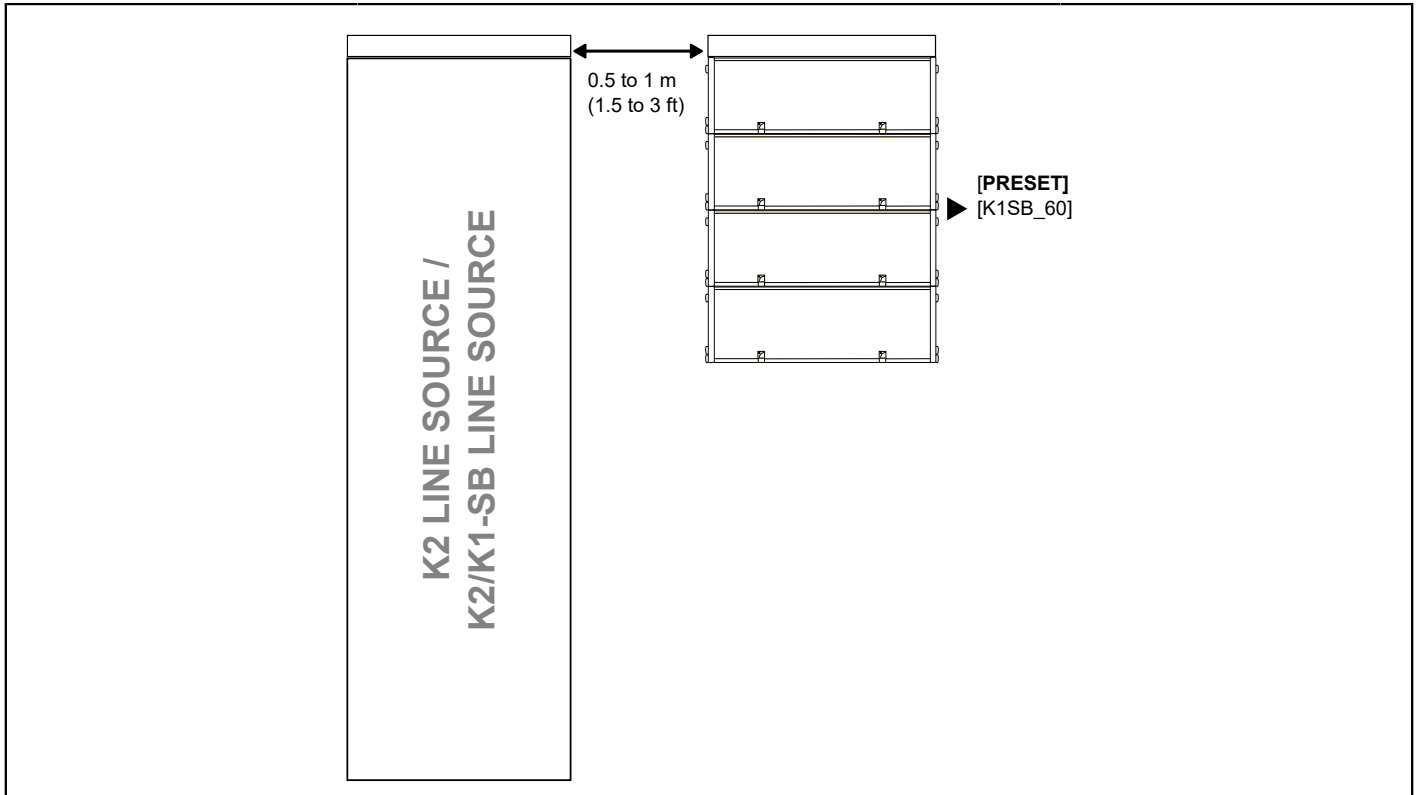
		
Enclosure	K2	K1-SB as subwoofer
Preset	[K2 70][K2 90][K2 110]	[K1SB_60]
Frequency range (-10 dB)	30 Hz - 20 kHz	
Recommended ratio	3 K2 : 2 subwoofers	
Maximum number line length	12 K2 + 8 K1-SB	



#### Delay values

Do not forget to add the pre-alignment and geometric delays depending on the configuration.

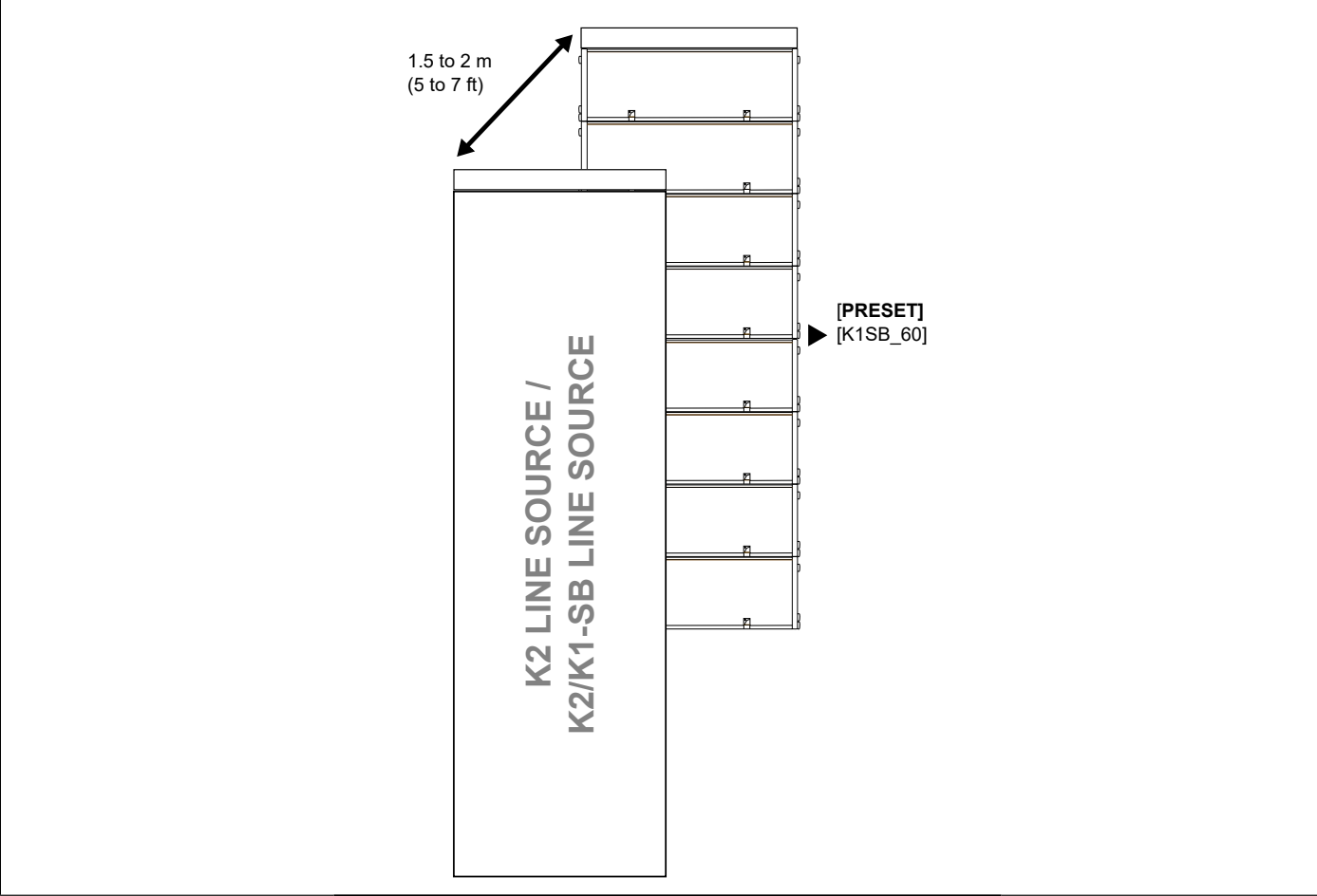
### Line source with K1-SB beside



Enclosure	K2	K1-SB in line source	K1-SB as subwoofer
Preset	[K2 70][K2 90][K2 110]	[K1SB_X K2]	[K1SB_60]
Frequency range (-10 dB)	30 Hz - 20 kHz		
Recommended ratio	3 K2 : 2 subwoofers		
Recommended spacing between side panels	Between 0.5 m (1.5 ft) and 1 m (3 ft)		

- ! Delay values**  
Do not forget to add the pre-alignment and geometric delays depending on the configuration.
- !** When using [K2 70], [K2 90], or [K2 110] with [K1SB\_X K2], do not add any delay value between the K2 and K1-SB elements of a same line source.

## Line source with K1-SB behind



Enclosure	K2	K1-SB in line source	K1-SB as subwoofer
Preset	[K2 70][K2 90][K2 110]	[K1SB_X K2]	[K1SB_60]
Frequency range (-10 dB)	30 Hz - 20 kHz		
Recommended ratio	3 K2 : 2 subwoofers		
Recommended spacing between front faces	Between 1.5 m (5 ft) and 2 m (7 ft)		

### ! Delay values

Do not forget to add the pre-alignment and geometric delays depending on the configuration.

! When using [K2 70], [K2 90], or [K2 110] with [K1SB\_X K2], do not add any delay value between the K2 and K1-SB elements of a same line source.

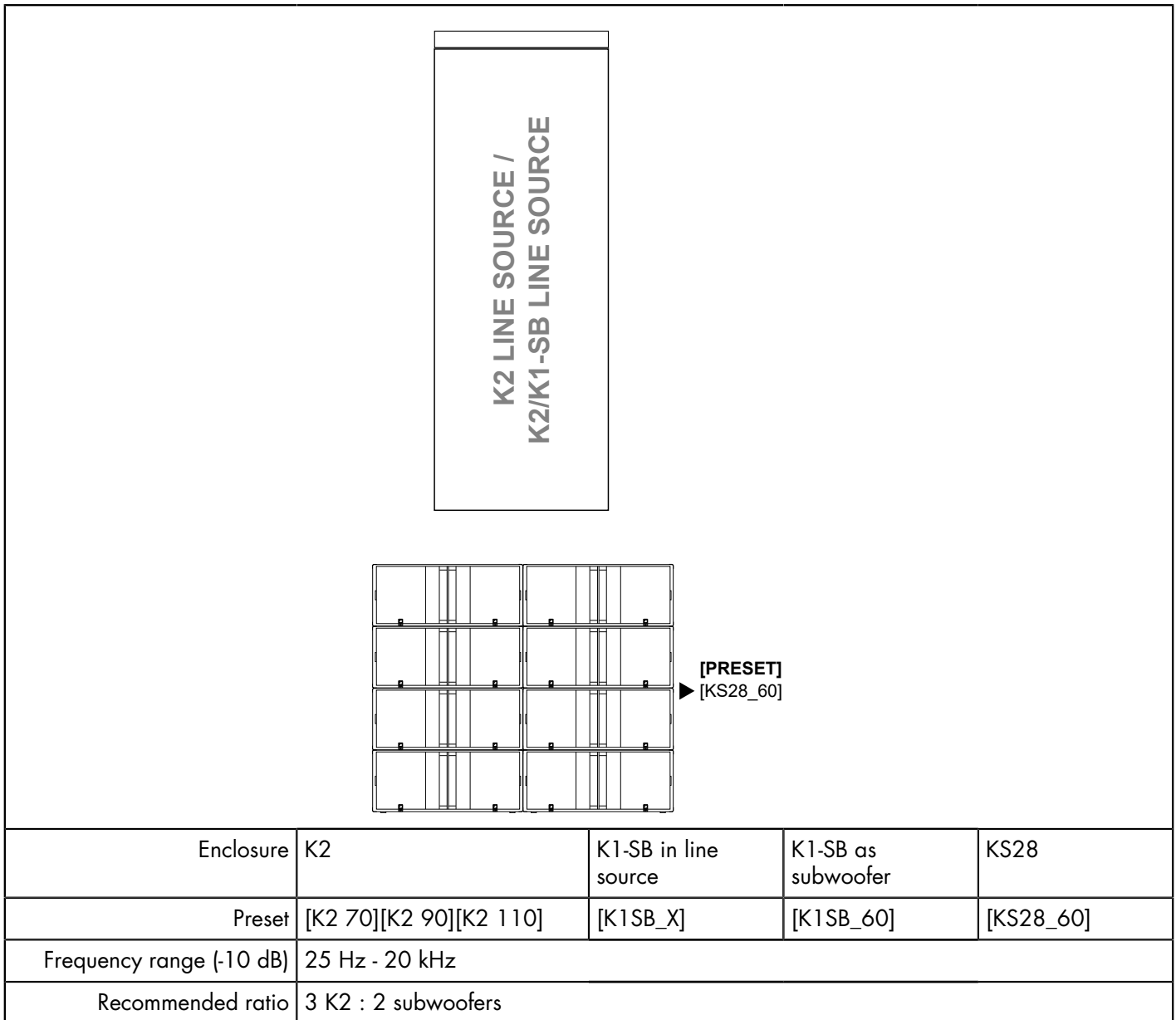
### Geometric delays

1.5 m (5 ft)	Line source = 4.5 ms
2 m (7 ft)	Line source = 6 ms

## KS28

The KS28 provides an extension of the bandwidth in the low end, down to 25 Hz.

### Line source with KS28



- ! Grouping subwoofers**  
Place the subwoofer enclosures side by side. If not possible, the maximum distance between two adjacent acoustic centers must be 2.8 m (9.2 ft) or 1.7 m (5.6 ft) if the upper frequency limit of the subwoofer system is at 60 Hz or 100 Hz, respectively.
- ! Use [xxxx\_xx\_C] or [xxxx\_xx\_Cx] on a reversed subwoofer in a cardioid configuration**  
The cardioid configuration consists in reversing 1 element in an array of 4 subwoofers.  
Refer to the subwoofer owner's manual and to the **Cardioid configurations** technical bulletin.
- ! Delay values**  
Do not forget to add the pre-alignment and geometric delays depending on the configuration.
- ! When using [K2 70], [K2 90], or [K2 110] with [K1SB\_X K2], do not add any delay value between the K2 and K1-SB elements of a same line source.**

**Pre-alignment delays****K2 + KS28**

presets	pre-alignment delay values and polarity settings			
[K2] + [KS28_60]	K2 = 0.5 ms	<input type="checkbox"/>	KS28 = 0 ms	<input type="checkbox"/>
[K2] + [KS28_60_C]	K2 = 6 ms	<input type="checkbox"/>	KS28 = 0 ms	<input type="checkbox"/>
[K2] + [KS28_60_Cx]	K2 = 4 ms	<input type="checkbox"/>	KS28 = 0 ms	<input type="checkbox"/>

**K2 + K1-SB + KS28**

presets	pre-alignment delay values and polarity settings					
[K2] + [K1SB_X K2] + [KS28_60]	K2 = 0 ms	<input type="checkbox"/>	K1-SB = 0 ms	<input type="checkbox"/>	KS28 = 0 ms	<input type="checkbox"/>
[K2] + [K1SB_X K2] + [KS28_60_C]	K2 = 5.5 ms	<input type="checkbox"/>	K1-SB = 5.5 ms	<input type="checkbox"/>	KS28 = 0 ms	<input type="checkbox"/>
[K2] + [K1SB_X K2] + [KS28_60_Cx]	K2 = 3.5 ms	<input type="checkbox"/>	K1-SB = 3.5 ms	<input type="checkbox"/>	KS28 = 0 ms	<input type="checkbox"/>
[K2] + [K1SB_60] + [KS28_60]	K2 = 6 ms	<input type="checkbox"/>	K1-SB = 0 ms	<input type="checkbox"/>	KS28 = 6 ms	<input type="checkbox"/>
[K2] + [K1SB_60] + [KS28_60_C]	K2 = 6 ms	<input type="checkbox"/>	K1-SB = 0 ms	<input type="checkbox"/>	KS28 = 0.5 ms	<input type="checkbox"/>
[K2] + [K1SB_60] + [KS28_60_Cx]	K2 = 6 ms	<input type="checkbox"/>	K1-SB = 0 ms	<input type="checkbox"/>	KS28 = 4 ms	<input type="checkbox"/>

## Additional downfill element

All K2 system configurations can be combined with an additional Kara II line source downfill system. This allows an extension of the vertical coverage to the closer audience.

### Kara II

The [KARAIIDOWNK2 70], [KARAIIDOWNK2 90], and [KARAIIDOWNK2] presets feature specific settings to optimize the acoustic coupling between the Kara II and K2 line sources. Each preset is dedicated to a horizontal directivity setting.



The [KARAIIDOWNK2] preset is optimized for a **110°** fins setting on Kara II.



#### Fins settings for downfill

In most venues, the 110° fins settings must be used for downfills.

In case there is a raised area in front of the scene, such as a catwalk, the 70° or 90° settings can be used to divert SPL from this area.


The Kara II enclosure is driven by the LA4X / LA12X amplified controller.


Enclosure	K2	K1-SB in line source	Kara II
Preset	[K2 70] [K2 90] [K2 110]	[K1SB_X K2]	[KARAIIDOWNK2 70] [KARAIIDOWNK2 90] [KARAIIDOWNK2]
Frequency range (-10 dB)	35 Hz - 20 kHz		
Kara II array	Up to 6 Kara II enclosures		



Do not add any delay between the K2 and Kara II elements of a mixed line source.



 When using [K2 70], [K2 90], or [K2 110] with [K1SB\_X K2], do not add any delay value between the K2 and K1-SB elements of a same line source.

 **Using the Kara II system**  
Refer to the **Kara II owner's manual** for the operating modes of Kara II as a main system.

# Inspection and preventive maintenance

## How to do preventive maintenance

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Inspect the system before any deployment and after any corrective maintenance operation.

Perform preventive maintenance at least once a year.

### Rigging and hardware

Perform the [Rigging part inspection](#) (p.43) on each rigging part.

Use the [Mechanical system overview](#) (p.43) to identify critical parts of the system and apply the specific checks described in the [Inspection references](#) (p.49).

Do the [Rigging check](#) (p.54) and [Adjustable fins check](#) (p.57).

If any parts are damaged, contact your L-Acoustics representative for further instructions.

### Acoustics

Perform the [Enclosure check](#) (p.59).

Perform the [Listening test](#) (p.61) to detect any degradation in sound quality.

If necessary, refer to the [Corrective maintenance](#) (p.131) section for speaker repair kits and maintenance instructions.

## Rigging part inspection

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### About this task

For critical rigging parts, use the [Inspection references](#) (p.49) for comparison and specific manipulations.

The term "rigging part" comprises:

- lifting accessories such as clamps and shackles
- rigging accessories such as rigging frames, rigging interfaces, and brackets
- fasteners used for assembling two products together such as ball-locking pins, rigging axes, and safety pins
- rigging elements integrated in the product such as rigging arms and rails
- transportation accessories

This inspection procedure covers only L-Acoustics products. To inspect other products that are part of the lifting chain, refer to the manufacturer's instructions.

### Prerequisite

Perform the inspection in a well-lit environment.

### Procedure

1. Check that the rigging part is present.
2. If applicable, disassemble the rigging part from the enclosure or the rigging accessory.

Check that the tethers are intact and safely secured.

3. Inspect the part from every side.

Compare with the **reference pictures**.

Check for:

- corrosion
- wear and cracks
- bends and dents
- holes
- missing safety cues
- missing identification labels
- missing or loose fasteners



#### Replacing screws

If a screw is loose, remove and replace it.

Always use the new screws provided in the repair kit.

If no new screw is available, add blue threadlocker before reusing the screw.

Do not apply more than the indicated torque.

4. Check the **geometry** of the part to identify critical deformations.

Place the rigging part on a flat surface or hold a level against it.

5. Check the **moving parts**.

Make sure that the mechanism engages correctly.

### What to do next



If a problem is detected, perform the authorized maintenance operations or contact your L-Acoustics representative.

## Mechanical system overview

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Critical parts of the lifting chains are highlighted.



The  indicates a visual inspection. The  indicates a functional check.



**!** Perform the [Rigging part inspection](#) (p.43) on critical parts.  
For each part, refer to the [Inspection references](#) (p.49).

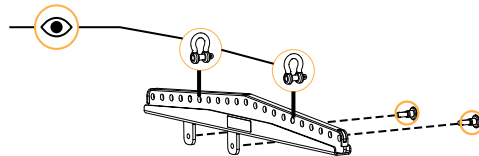
**!** **Replacing screws**

If a screw is loose, remove and replace it.  
Always use the new screws provided in the repair kit.  
If no new screw is available, add blue threadlocker before reusing the screw.  
Do not apply more than the indicated torque.

**K2 mixed array with K2-BAR, K2-BUMP, K1-SB, and K2-LINK**

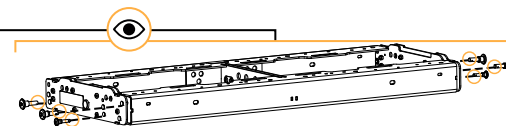
Refer to [Inspection references](#) (p.49).

[Shackles](#) (p.52)



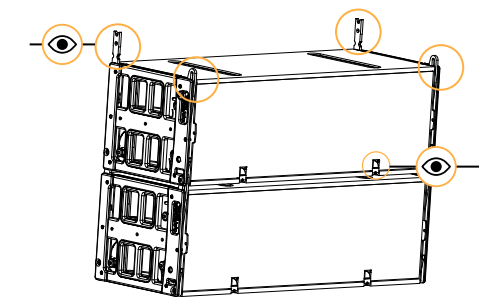
[Ball-locking pins](#) (p.49)

[Ball-locking pins](#) (p.49)

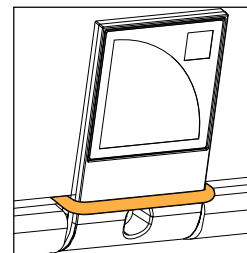


Rear and front rigging arms rotate correctly

[Ball-locking pins](#) (p.49)

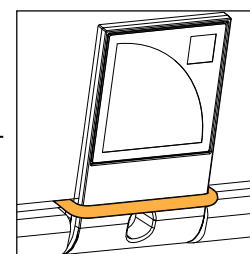
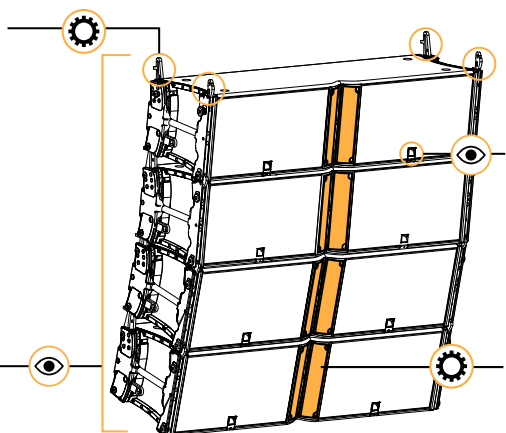


[Grill safety](#) (p.53)



[Ball-locking pins](#) (p.49)

[Rigging check](#) (p.54)



[Grill safety](#) (p.53)

[Ball-locking pins](#) (p.49)

[Adjustable fins check](#) (p.57)

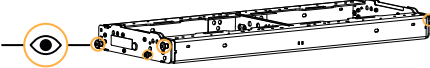
# K2 array with K2-BUMP and KARADOWNK2

Refer to [Inspection references](#) (p.49).

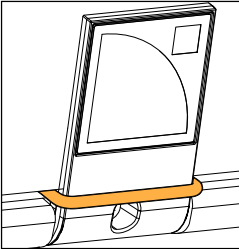
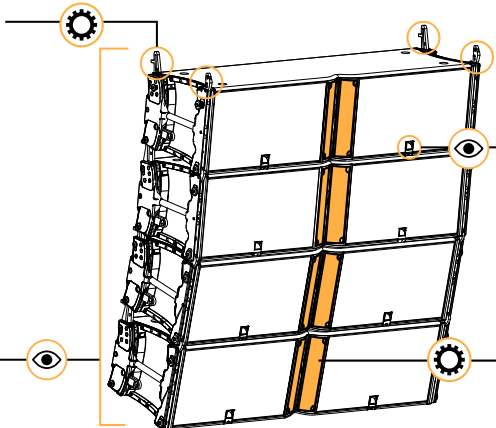


Shackles (p.52)

Ball-locking pins (p.49)



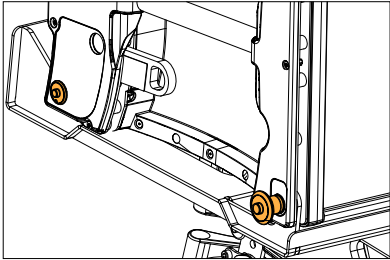
Rigging check (p.54)



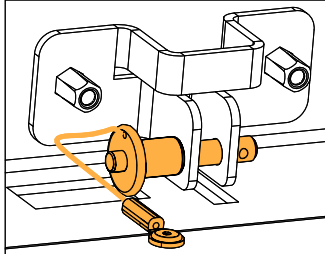
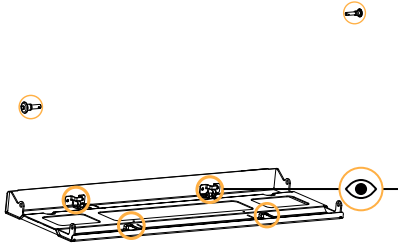
Grill safety (p.53)

Ball-locking pins (p.49)

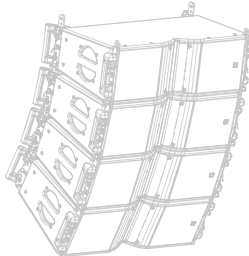
Adjustable fins check (p.57)



Ball-locking pins (p.49)



Refer to the **Kara II owner's manual**.



## K2 array with K2-CHARIOT and K2-JACK

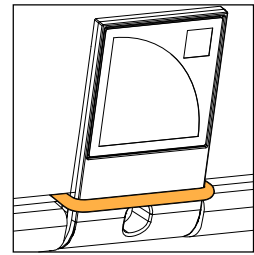
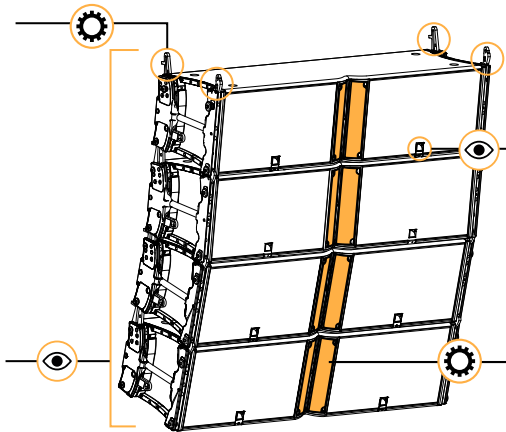
Refer to [Inspection references](#) (p.49).

[Rigging check](#) (p.54)

[Ball-locking pins](#) (p.49)

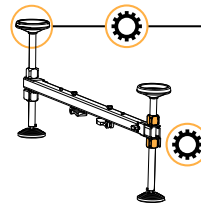
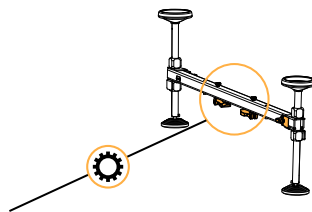
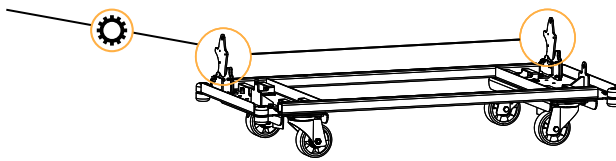
rear rigging arms rotate correctly

the locking handles can be tightened and loosened by hand



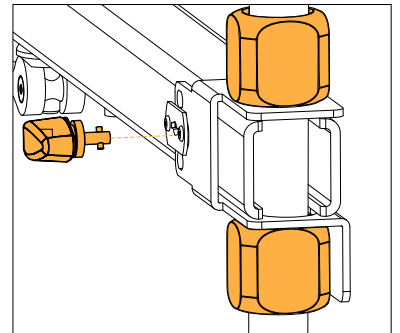
[Grill safety](#) (p.53)

[Adjustable fins check](#) (p.57)



turn the hand wheels:  
the central part is raised  
(clockwise) or lowered  
(counter-clockwise)

check the integrity of the  
quarter-turn locking system

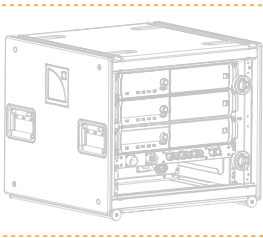
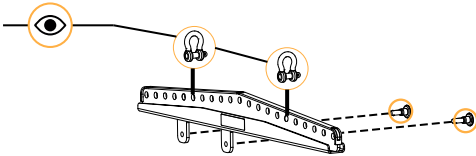


# K2 array with K2-BAR, K2-RAKMOUNT, and K2-BUMP

Refer to [Inspection references](#) (p.49).

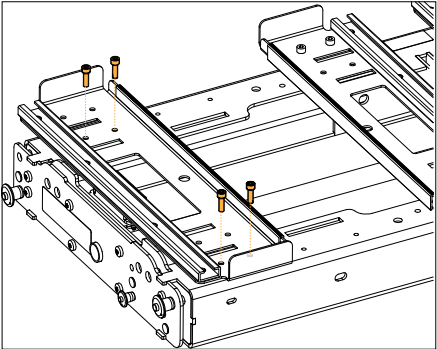


Shackles (p.52)

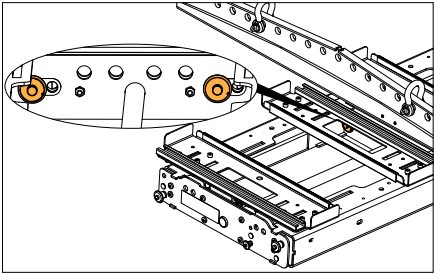
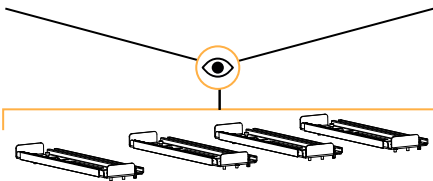


Refer to the **LA-RAK II documentation** for more information.

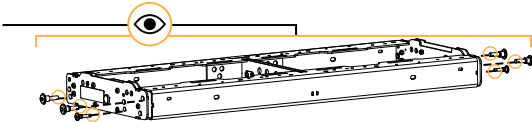
screws are tightened



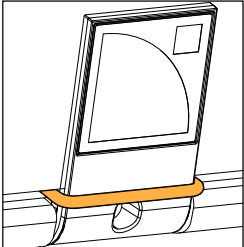
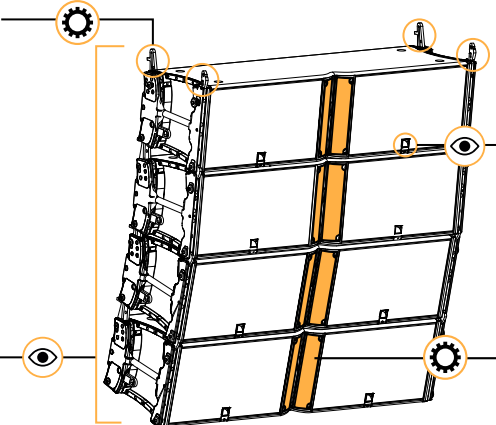
Ball-locking pins (p.49)



Ball-locking pins (p.49)



Rigging check (p.54)

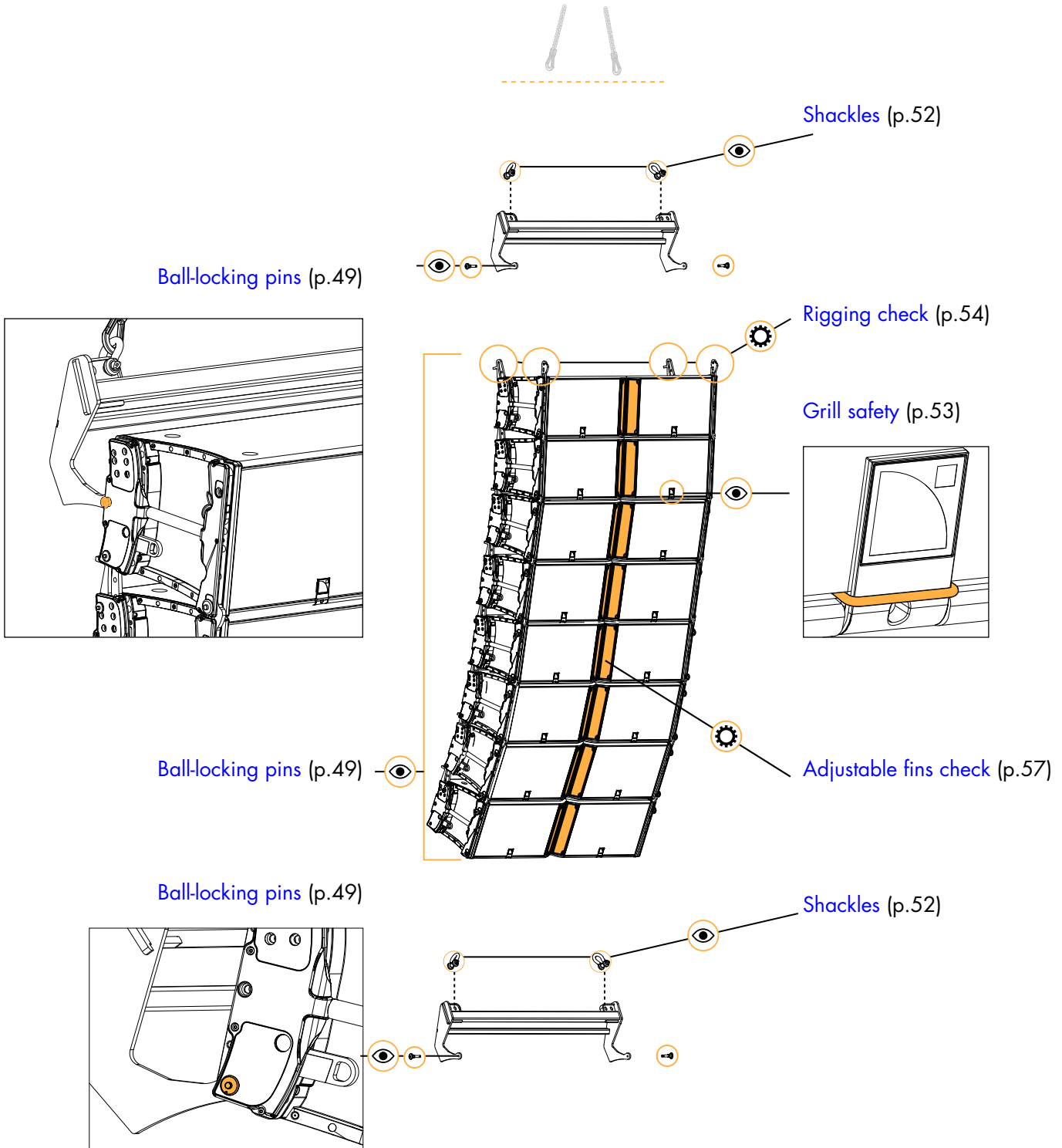


Grill safety (p.53)

Ball-locking pins (p.49)

Adjustable fins check (p.57)

## K2 array with K2-RIGBAR as pullback

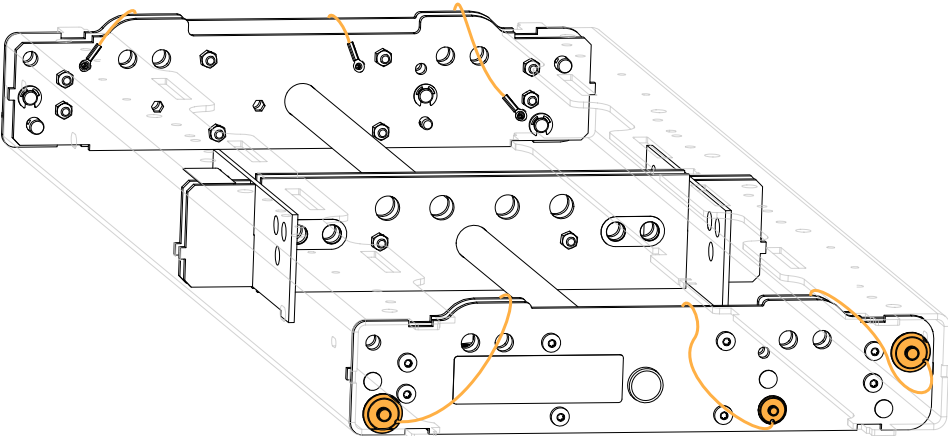




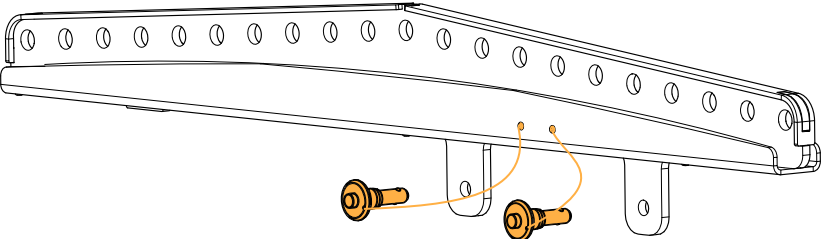
# Inspection references

## Ball-locking pins

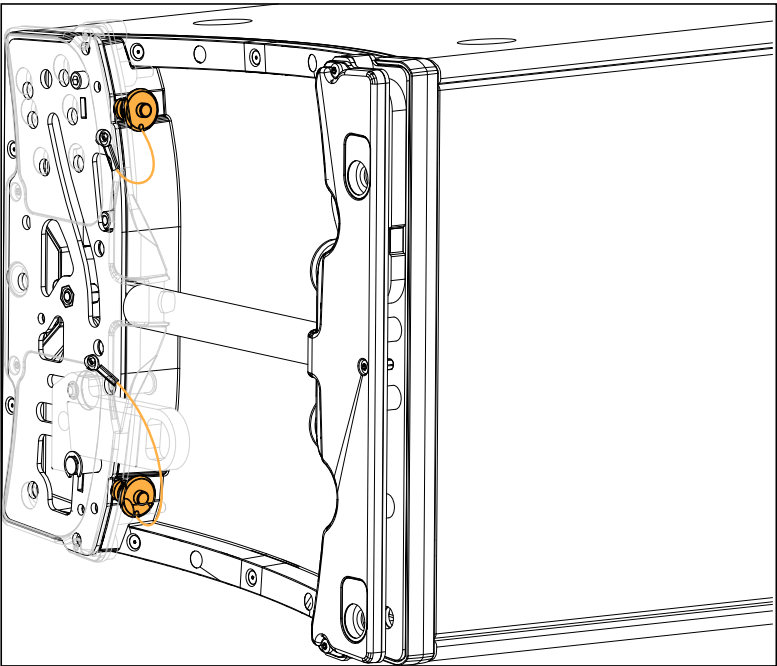
### Reference pictures



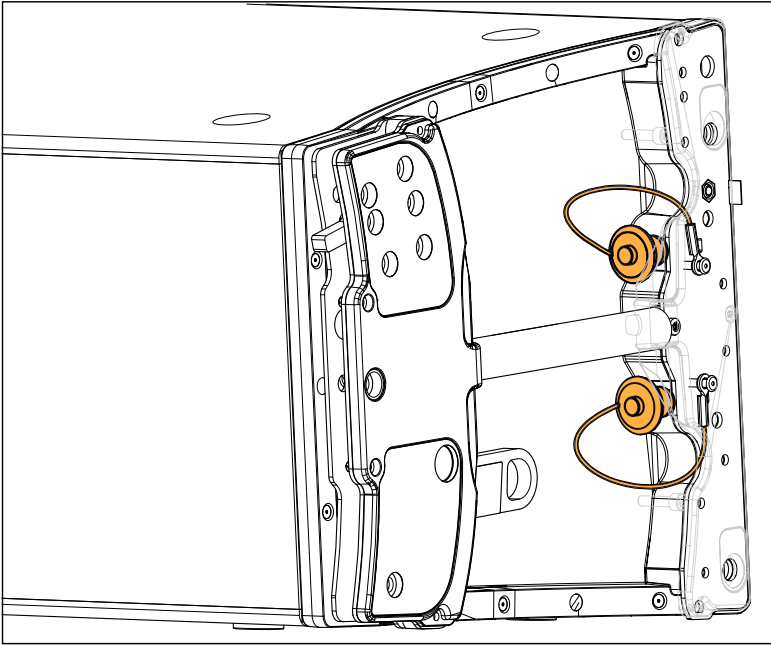
tether (K2-BUMP)



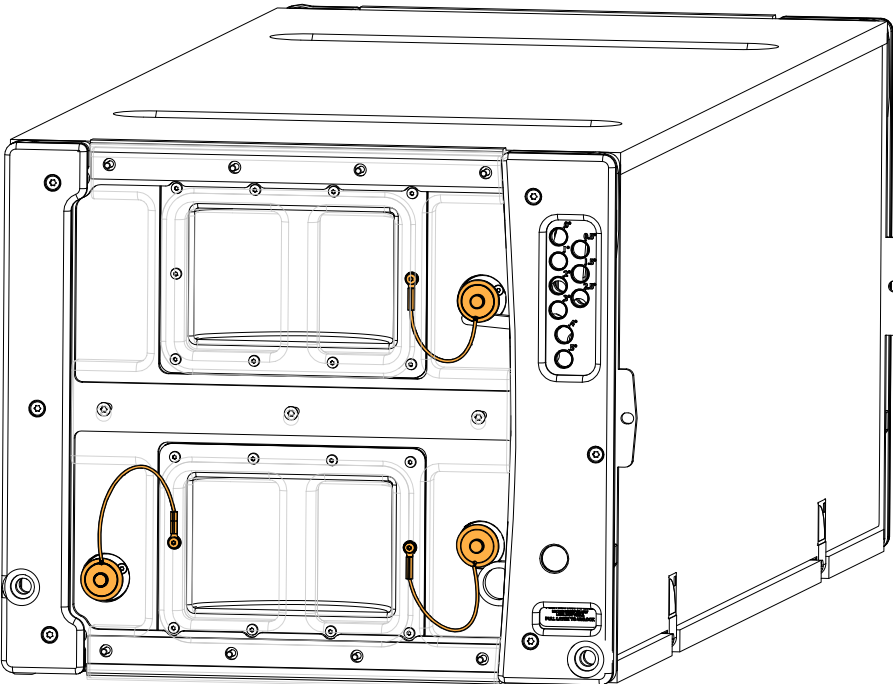
tether (K2-BAR)



tether (K2)



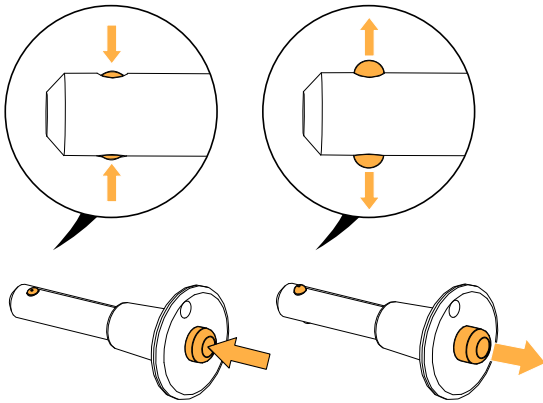
tether (K2)



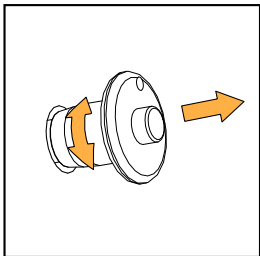
tether (K1-SB)

## Moving parts

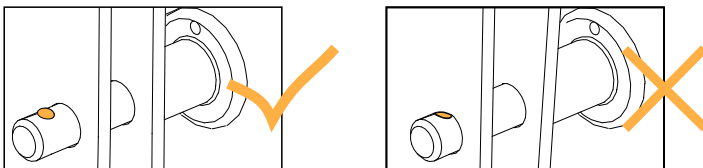
1. Press the push button. The ball-locking mechanism is retracted.
2. Release the button. The ball-locking mechanism is activated.



3. Insert the pin in each storage and rigging hole. Pull and rotate the pin. The pin must remain inside the hole.



If the pin is inserted in two plates, the ball must pass through both plates and lock the pin in place.



If the check fails, **immediately withdraw the product from use and contact L-Acoustics.**

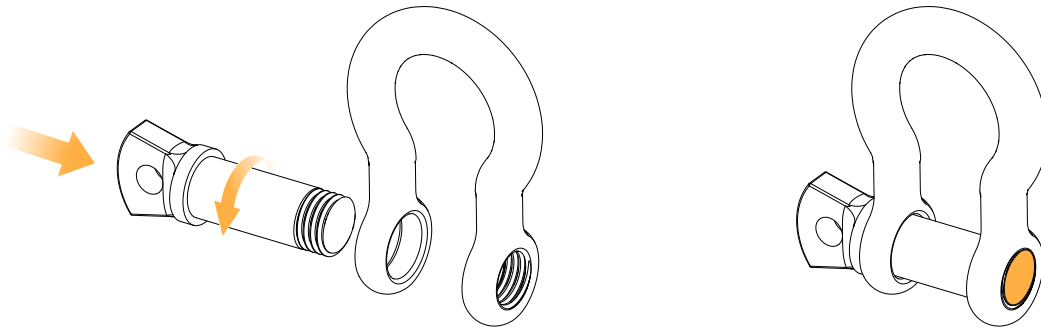
## Related tasks

[Rigging part inspection](#) (p.43)

## Shackles

### Moving parts

Drive the shackle axis in its lodging. Make sure that the end is flush with the shackle.



### Related tasks

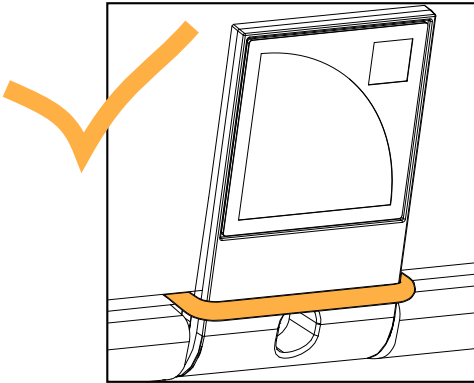
[Rigging part inspection](#) (p.43)

## Grill safety

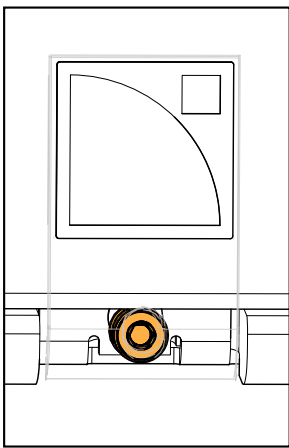
### Moving parts

Visually inspect the grill safety.

Make sure that the O-rings are not damaged.

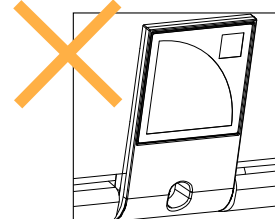
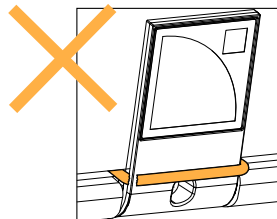
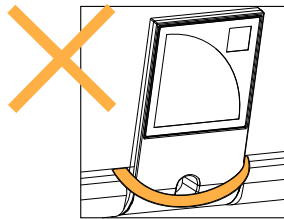
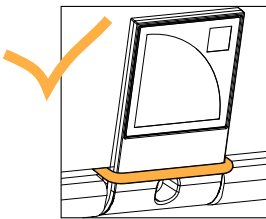


Make sure that the screw is tightened.



Pull on the O-rings:

- Make sure they do not break.
- Make sure they are not loose.



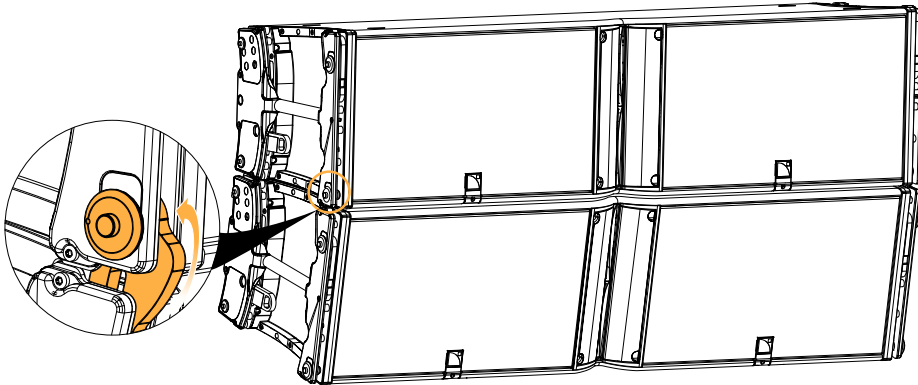
If the O-rings are damaged or missing, refer to the **D/R - Grill (p.134)** to replace them.

## Mechanical checks

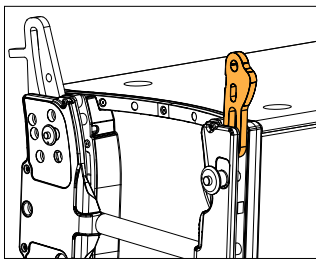
### Rigging check

#### Procedure

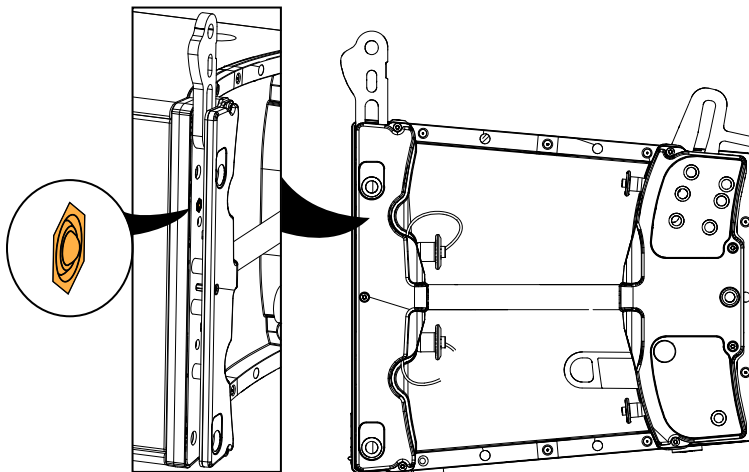
1. Position one K2 on the first one.
2. Secure the front rigging arms at the LINK holes.



- The front rigging arms can be deployed with some resistance, and rotate correctly.

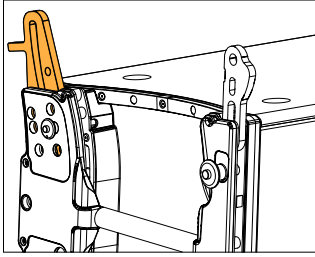


- The ball-type plunger protrudes out the rigging system.

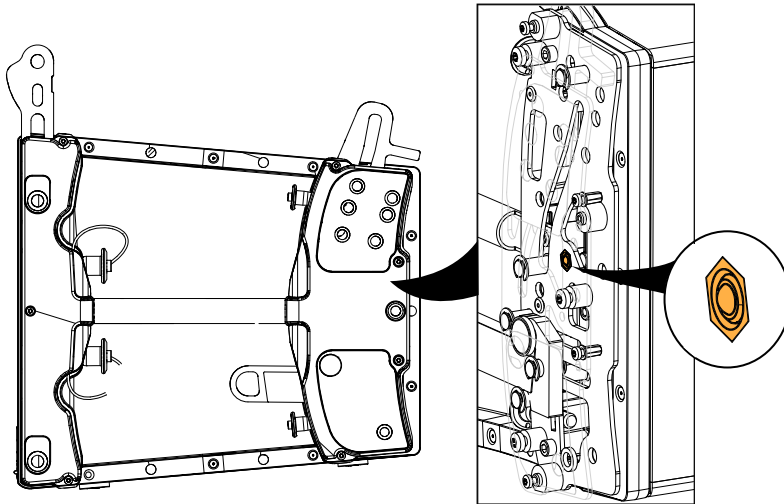


**3.** Secure the rear rigging arms at the LINK holes.

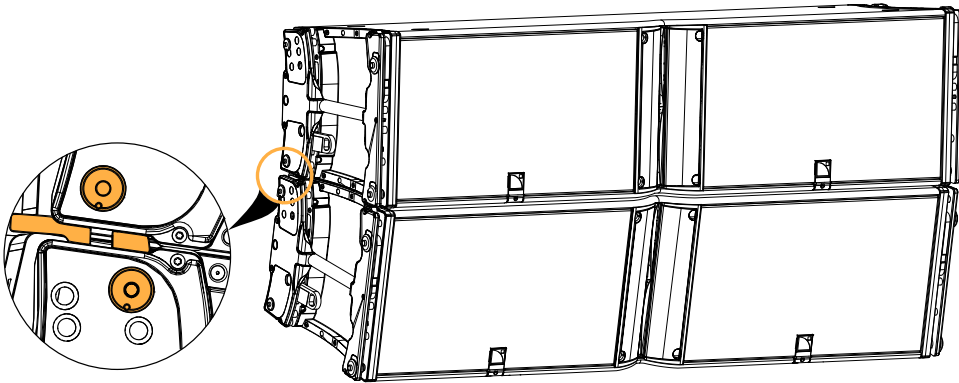
- The rear rigging arms can be deployed with some resistance, and slide correctly.



- The ball-type plunger protrudes out the rigging system.

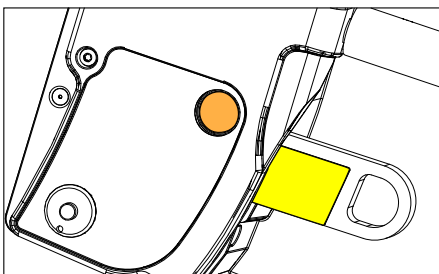


**4.** Secure the rear rigging arms at one of the inter-enclosure holes.



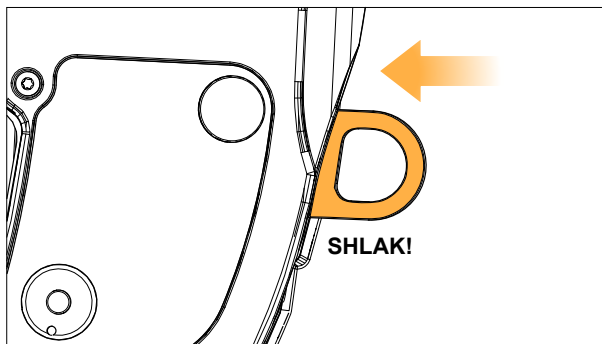
**5.** Press the button to activate the automatic locking system.

- The latch slightly retracts when the button is pushed (yellow label visible).

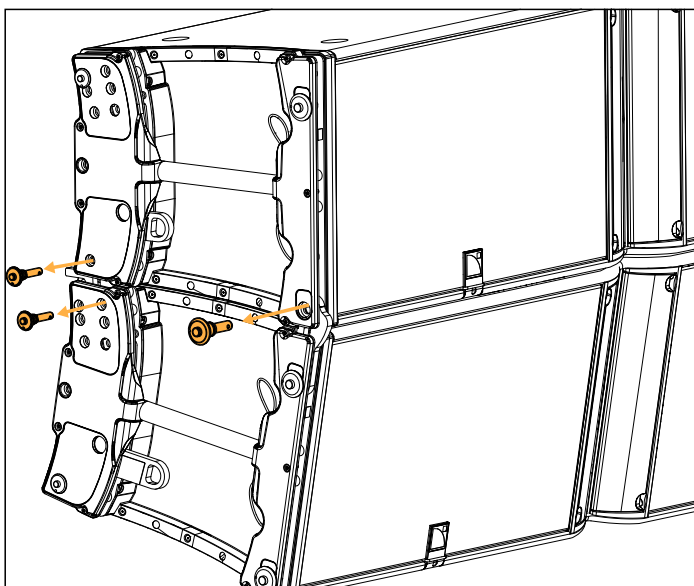


**6.** Hold and lift the array to lock the inter-enclosure angles.

- The two enclosures remain attached.
- The automatic locking system button locks and the latches engage (no yellow label visible).



**7.** Disassemble the two enclosures.



**Risk of trapping fingers**

When disassembling the enclosures, hold the top one by the handles.

**8.** Repeat the procedure with the other enclosures.



## Adjustable fins check

### Prerequisite

Disassemble the array and place K2 on a flat surface.

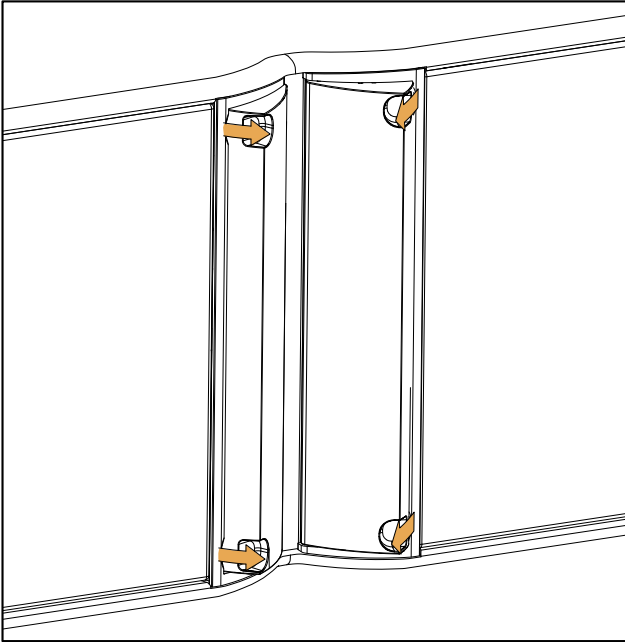
### Procedure



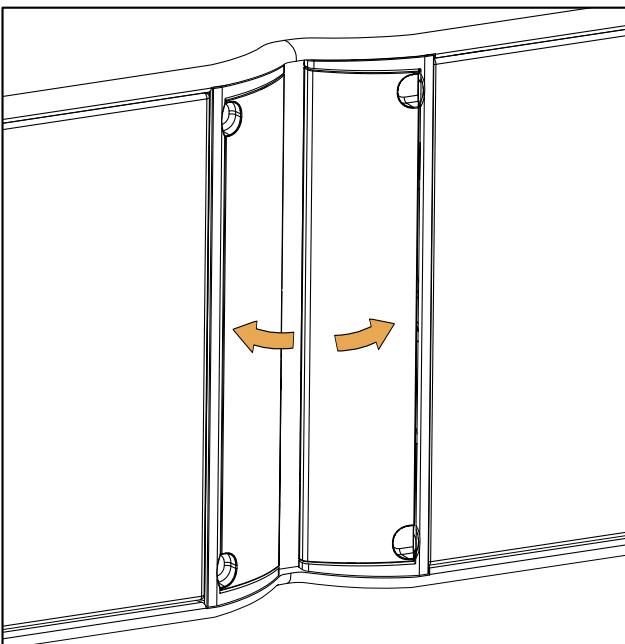
#### Risk of breaking the fin hooks

Do not use excessive force when deploying the fins.

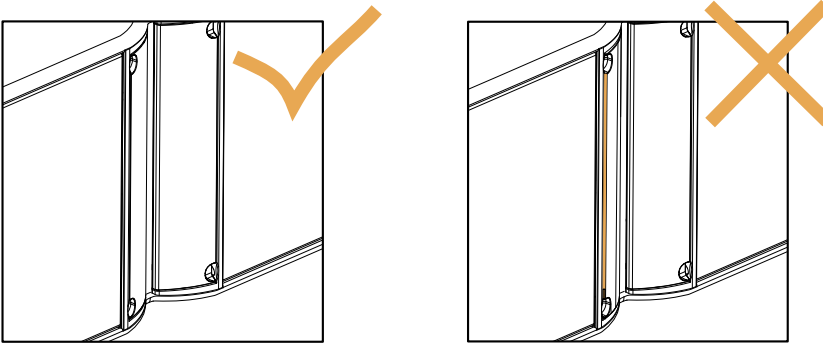
1. Deploy both fins by pulling them by the notches until the stop.



- The fins can be deployed without applying excessive force.
  - The inside of the fins and the hooks are not visible.
2. Apply light pressure on the fins.
    - The fins remain deployed under light pressure.
  3. Retract the fins by pushing firmly or tapping on them.



- The fins can be retracted without applying excessive force.
- The fins remain fully retracted, and the side of the fins is not visible.



4. Repeat the procedure with the other enclosures.
5. When rigging and flying K2, check that the fins do not move because of gravity or wind pressure.

**What to do next**

Fins that do not pass the check must be replaced. Contact your L-Acoustics representative for repair instructions.


## Acoustical check

---

### Enclosure check

-  **This feature is available on:**  
 LA4X  
 LA12X

ENCLOSURE CHECK measures impedance at the reference frequencies for the connected loudspeaker family. The measured impedance is compared to the expected range allowing for fast detection of loudspeakers presenting circuit continuity issues.

-  The results can be used for preliminary diagnosis but cannot replace a comprehensive quality control.

### Prerequisite

-  **ENCLOSURE CHECK measurements can only be reliable if the following requirements are met:**

Environment and temperature:

- Ambient temperature must be comprised between 0 °C / 32 °F and 40 °C / 104 °F. Ideal temperature is 20 °C / 68 °F.
- Enclosures must be at room temperature. If warm from a recent high level use or recently moved from a cold environment, let the loudspeakers reach room temperature before starting.

Enclosures:

- Enclosures must be included in the embedded factory preset library.
- Enclosures must be in nominal operating conditions:
  - Remove covers or dollies obstructing the loudspeakers or the vents.
  - Check for obvious physical damage or air leak: visually inspect the grill, gasket, cabinet, and connector plate for loose, missing or damaged parts.

Connection:

- Use only 10 m / 30 ft 4 mm<sup>2</sup> / AWG 11 speaker cables.
- Do not connect enclosures in parallel.

Amplified controllers:

- LA4X must run at least firmware version 1.1.0.
- LA4X load sensors must be calibrated. Refer to the **Load Sensor Calibration Tool** technical bulletin for more information.
- LA4X must warm up for at least 10 minutes after power up. Do not power off, reboot or switch to standby mode to avoid resetting the countdown.
- Load a preset corresponding to the connected loudspeaker's family. Presets from the user memories may be used on condition they are made of presets supported in the embedded factory preset library.

### Procedure

1. Power up the amplified controller. Let LA4X warm up for at least 10 minutes.
2. Connect the loudspeaker enclosures to the amplified controller.
3. Load a preset from or built from the embedded library corresponding to the connected loudspeaker family.
4. On the amplified controller, use the encoder wheel to select **MONITORING & INFO**. Press the OK key or the encoder wheel to validate.
5. Use the encoder wheel to select **ENCLOSURE CHECK**.



#### **Beware of sound levels.**

Although the sound pressure levels generated for the ENCLOSURE CHECK are moderate, do not stay within close proximity of the loudspeakers and consider wearing ear protection.

6. Press the OK key or the encoder wheel to launch the ENCLOSURE CHECK.

The amplified controller generates short sinusoidal signals simultaneously for each connected output.

The amplified controller displays the results for each output.

**7.** Depending on the displayed results, follow the instructions in the table.

<b>result</b>	<b>interpretation</b>	<b>instructions</b>
OK	measured impedance is within expected range	enclosure is in working order electrically
?	unsupported preset family	only supported enclosures should be tested
NC	Not Connected	if cables are connected: <b>a.</b> inspect the cables and connections <b>b.</b> go to step 8 (p.60)
NOK	measured impedance is not within expected range	<b>a.</b> check that all the prerequisites are met, in particular that the loaded preset corresponds to the connected speaker's family <b>b.</b> inspect the cables and connections <b>c.</b> go to step 8 (p.60)
UNDEF	measured impedance is undefined	

**8.** Under NC, NOK and UNDEF results, press and hold the corresponding OUT key.

The amplified controller displays:

- the tested frequencies,
- information on the measured impedance:
  - OPEN for open circuit (found in NC results),
  - SHORT for short circuit (found in NOK results), or
  - a percentage of variation from the expected range (found in NOK and UNDEF results)
- the number of operational transducers out of the total



Low variations from the expected range are acceptable: displayed percentage can be different from 0 and all transducers considered operational.

## Listening test

enclosure	preset	usable bandwidth
K2	[K2 70]	35 Hz - 20 kHz
K1-SB	[K1 SB_60]	30 Hz - 80 Hz

### Procedure

1. Load the preset on an LA4X / LA12X amplified controller.
2. Connect a sinus generator to the amplified controller.



#### Risk of hearing damage

Set a low sound level to start and use ear protection to adjust before testing.

3. Scan the bandwidth focusing on the usable range.  
The sound should remain pure and free of unwanted noise.

### Troubleshooting for LF speakers

One or more LF speaker produces distorted, buzzing, rubbing, clicking, muffled or weak sound.

#### Possible causes

- The screws are not tightened with the appropriate torque.
- There is an air leak in the gasket.
- There is dust on the cone.
- The cone is damaged.
- The surround is torn or delaminated.
- The voice coil or the spider is damaged.

### Procedure

1. Perform the speaker disassembly procedure.
2. Visually inspect the cables and the connectors.
3. Visually inspect the speaker cone, the voice coil and the spider.

If any damage is visible, replace the speaker.

4. Carefully clean the speaker with a dry cloth.
5. Perform the reassembly procedure.  
Replace the speaker gasket and the screws.  
Apply the recommended torque.

6. Repeat the listening test.

If the problem persists, replace the speaker.

### Troubleshooting for HF drivers

One or more HF driver produces high-frequency harmonic distortions, strange vibrations or weak sound.

#### Possible causes

- There are foreign particles on the air gap.
- The diaphragm is not centered correctly.
- The screws used for reassembly are too loose.
- The diaphragm is damaged.

### Procedure

1. Perform the diaphragm disassembly procedure.
2. Visually inspect the diaphragm and the voice coil.

If any damage is visible, replace the diaphragm.

- 3.** Clean the air gap thoroughly.  
Use double-face adhesive tape to remove any particles.
- 4.** Perform the diaphragm reassembly procedure.  
Apply the recommended torque.
- 5.** Repeat the listening test.  
If the problem persists, replace the driver.

# Rigging procedures

## System setup

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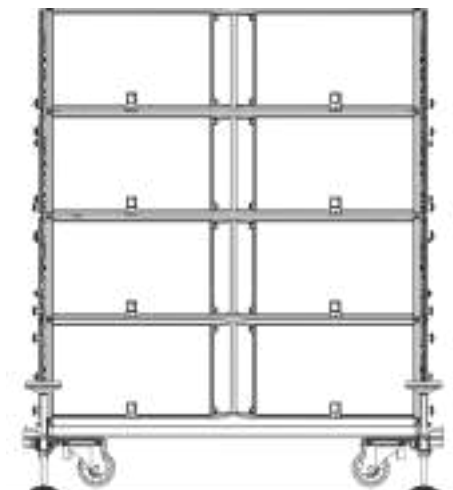
### Ground stacking

#### K2 enclosures on K2-CHARIOT and K2-JACK



#### Final check

After the setup, always verify no yellow labels are visible on the front and on both sides of the array.



#### Procedure

1. Place a block of four K2 enclosures at the final position.
2. Preset the inter-enclosures angles.
3. Attach the K2-JACK stabilizers to the K2-CHARIOT.
4. If needed, add one or two K2 enclosures to the stack.
5. Preset the inter-enclosure angles for the additional enclosures.
6. Push the topmost enclosure forward until all the automatic locks are in place and verify that there is no yellow label visible.
7. If necessary, change the position of the K2-CHARIOT rear rigging arm.
8. If necessary, fine-tune the site angle of the stack by adjusting the height of the stabilizers feet.

#### References

- [A - Preparing a block of 4 K2 \(p.71\).](#)
- [B - Preset the inter-enclosure angles \(p.75\)](#)
- [C - Attaching K2-JACK stabilizers to K2-CHARIOT \(p.77\).](#)
- [A - Preparing a block of 4 K2 \(p.71\).](#)
- [B - Preset the inter-enclosure angles \(p.75\)](#)
- [D - Changing the position of the K2-CHARIOT rear rigging arm \(p.82\)](#)
- [E - Adjusting the K2-CHARIOT site angle \(p.85\)](#)

## K2 enclosures on K1-SB



### Procedure

1. Stack as many K1-SB enclosures as necessary.
2. Position and attach a K2-BUMP on the K1-SB stack.
3. Position and attach an upside down K2 on the K2-BUMP and add as many K2 enclosures on top of the first one.

### References

#### K1 rigging manual

[L - Attaching K1 or K1-SB under K2-BUMP](#)  
(p.115)

[C - Attaching K2-JACK stabilizers to K2-CHARIOT](#) (p.77)



## Flying



### Final check

After the setup, always verify no yellow labels are visible on the front and on both sides of the array.

### At least one motor for each K2-BAR

When using two K2-BAR, do not implement a bridle between the bars.

### Nobody behind the array when lifting enclosures

To avoid collisions caused by the swinging motion, do not stand behind the array when lifting the enclosures.

### Safe maximum of 12 K2 enclosures in a pullback configuration

Up to 12 K2.

### Space between pullback rigging points

The space between the two lifting points used for this configuration must be aligned with the array pickup points. The deployment load-bearing lines must be parallel to each other.



### Before setup, choose a flying option

Refer to SOUNDVISION modeling and to the elements for flying in [Rigging system description](#) (p.20).

### To implement a pullback with a K2-BAR:

in **front extension** attach the shackle to **hole #1**.

in **rear extension** attach the shackle to **hole #21**.

## K2 enclosures under K2-BUMP



## Procedure

1. Prepare all the blocks of 4 K2 necessary to build the array.
2. Preset the inter-enclosures angles.
3. Place and open a K-BUMPFLIGHT under the motor.
4. If necessary, attach one or two K2-BAR to the K2-BUMP.
5. If necessary, stack one or two LA-RAK / LA-RAK II on the K2-BUMP.
  - Place K2-BUMP to the ground.
  - Stack the LA-RAK / LA-RAK II on the K2-BUMP.
  - Raise the K2-BUMP.
6. Prepare the pickup points.
7. Lift the assembly so you can position a block of four K2 under it.
8. Attach the block of four K2 to the K2-BUMP.
9. Lift the assembly so you can position a block of four K2 under it.



Verify that no yellow label is visible on both sides of the array.

10. Attach the block of four K2 enclosures to the bottom of the array.



Verify that the rear rigging arms are secured by pins and that no yellow label is visible on the front.

11. Repeat the two previous steps until the array is complete.
12. If necessary, implement a pullback with K2-RIGBAR.
13. Raise the array to its final trim height.
14. Adjust site and azimuth angles.

## References

[A - Preparing a block of 4 K2 \(p.71\)](#)

[B - Preset the inter-enclosure angles \(p.75\)](#)

[G - Attaching K2-BAR to K2-BUMP \(p.91\)](#)

[M - Mounting LA-RAK/LA-RAK II on K2-BUMP \(p.117\)](#)

Refer to **Soundvision** for the number and position of the shackles.

[H - Attaching a block of four K2 under K2-BUMP \(p.94\)](#)

[J - Attaching a block of four K2 under K2 \(p.102\)](#)

[N - Using a K2-RIGBAR to implement a pullback \(p.122\)](#)

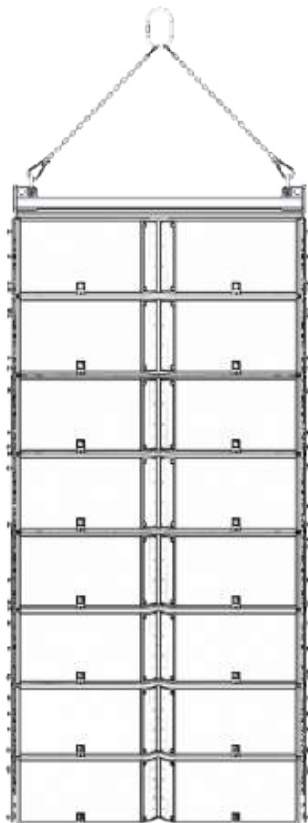
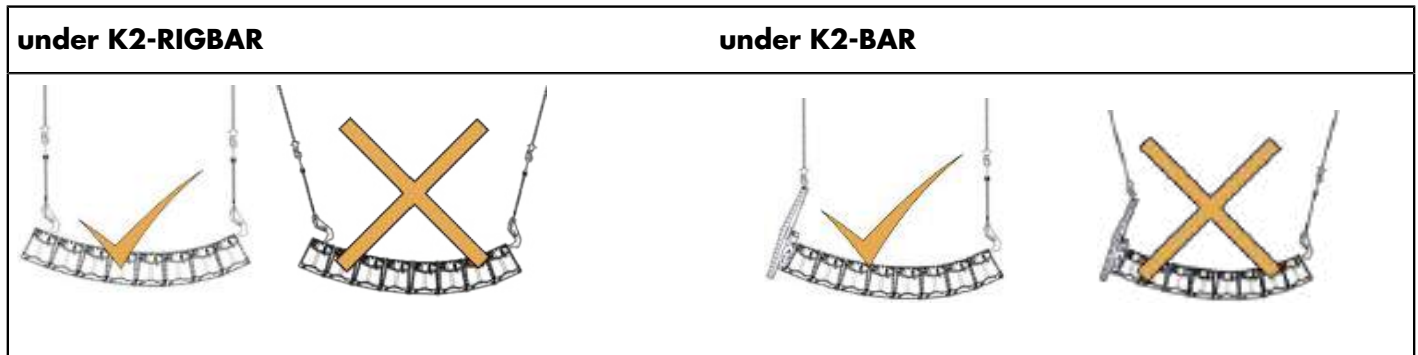
## K2 enclosures under K2-RIGBAR

### Final check

After the setup, always verify no yellow labels are visible on the front and on both sides of the array.


### Space between pullback rigging points

The space between the two lifting points used for this configuration must be aligned with the array pickup points.  
The deployment load-bearing lines must be parallel to each other.



### Procedure

1. Prepare all the blocks of 4 K2 necessary to build the array.
2. Preset the inter-enclosures angles.
3. Attach the K2-RIGBAR on the block of four K2.
4. Lift the array so you can position another block of four K2 under it.

 Verify that no yellow label is visible on both sides of the array.

### References

[A - Preparing a block of 4 K2 \(p.71\)](#)

[B - Preset the inter-enclosure angles \(p.75\)](#)

[I - Attaching a block of four K2 under K2-RIGBAR \(p.99\)](#)

## Procedure

5. Position and attach a block of four K2 enclosures under the array.



Verify that the rigging arms at the back are secured by pins and that no yellow label is visible on the front.

6. Repeat the two previous steps until the array is complete.

7. If necessary, implement a pullback with K2-RIGBAR.

8. Raise the array to its final trim height.

## References

[J - Attaching a block of four K2 under K2 \(p.102\)](#)

[N - Using a K2-RIGBAR to implement a pullback \(p.122\)](#)

## K2 enclosures under K1 elements



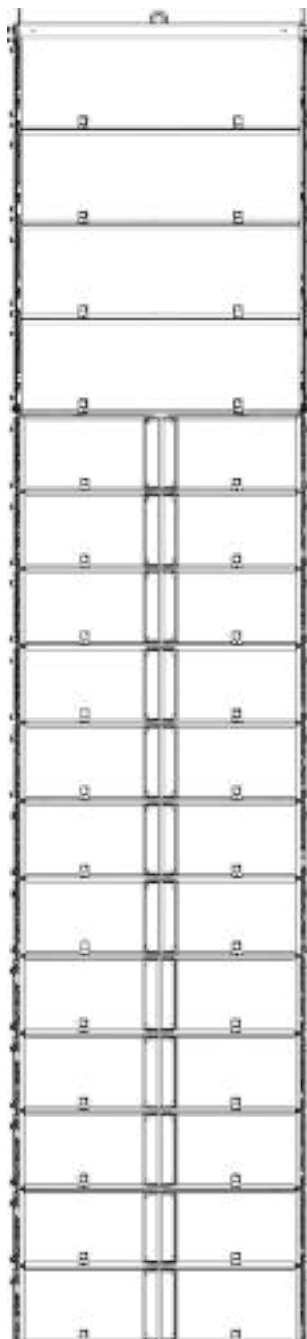
### Final check

After the setup, always verify no yellow labels are visible on the front and on both sides of the array. When using two K2-BAR, do not implement a bridle between the bars. Always use at least two motors.



### Before setup, choose a flying option

Refer to Soundvision modeling and to the elements for ground-stacking in [Rigging system description](#) (p.20).



## K1-SB array setup

### Procedure

1. Refer to your Soundvision model to define which frame to use.
2. If you are using the K1-BUMP, refer to the **K1 rigging manual** to set up the K1-SB part of the array.
3. If you are using the K2-BUMP, place an open K-BUMPFLIGHT under the motor.
4. If necessary, attach one or two K2-BAR to the K2-BUMP.
5. If necessary, stack one or two LA-RAK / LA-RAK II on the K2-BUMP.
  - Place K2-BUMP to the ground.
  - Stack the LA-RAK / LA-RAK II on the K2-BUMP.
  - Raise the K2-BUMP.
6. Prepare the pickup points.
7. Lift the assembly so you can position a block of K1-SB under it.
8. Attach the K1-SB block to the K2-BUMP.
9. Repeat the last two steps until the K1-SB array is complete.

## K2 array setup

### Procedure

1. Prepare all the blocks of 4 K2 necessary to build the array.
2. Preset the inter-enclosures angles.

## K1-SB and K2 arrays connection

### Procedure

1. Lift the K1-SB array so you can position a block of four K2 under it.
2. Using two K2-LINK interfaces, attach the block of K2 under the K1-SB array.



Verify that the rear rigging arms are secured by pins and that no yellow label is visible on the front.

3. Lift the array so you can position a block of four K2 under it.



Verify that no yellow label is visible on both sides of the array.

4. Attach the block of four K2 to the bottom enclosure of the array.



Verify that the rear rigging arms are secured by pins and that no yellow label is visible on the front.

5. Repeat the last two steps until the array is complete.
6. Raise the array to its final trim height.
7. Adjust site and azimuth angles.

### References

[G - Attaching K2-BAR to K2-BUMP \(p.91\)](#)

[M - Mounting LA-RAK/LA-RAK II on K2-BUMP \(p.117\)](#)

Refer to **Soundvision** for the number and position of the shackles.

[L - Attaching K1 or K1-SB under K2-BUMP \(p.115\)](#)

### References

[A - Preparing a block of 4 K2 \(p.71\)](#)

[B - Preset the inter-enclosure angles \(p.75\)](#)

### References

[K - Attaching a block of four K2 under a K1 system element \(p.108\)](#)

[J - Attaching a block of four K2 under K2 \(p.102\)](#)

## Subset procedures

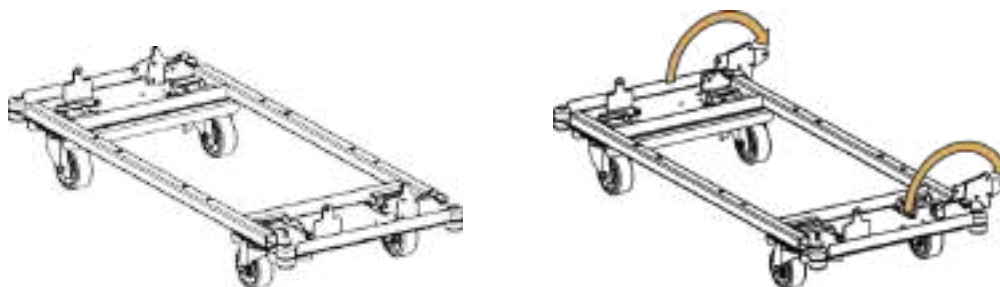
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### A - Preparing a block of 4 K2

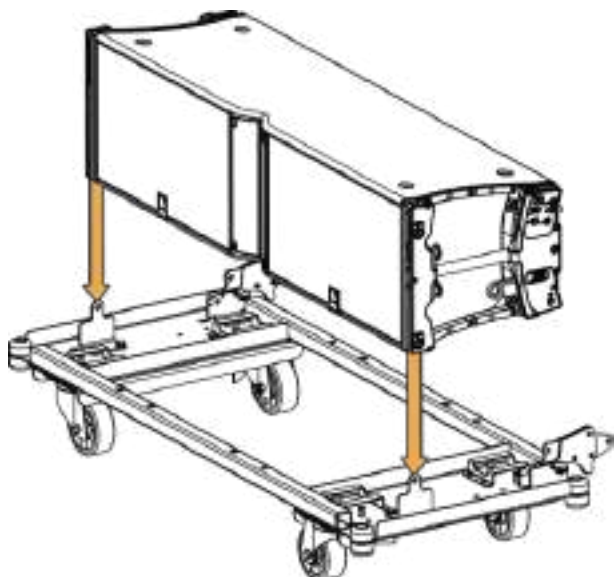
<b>min number of operators</b>	2
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#### Procedure

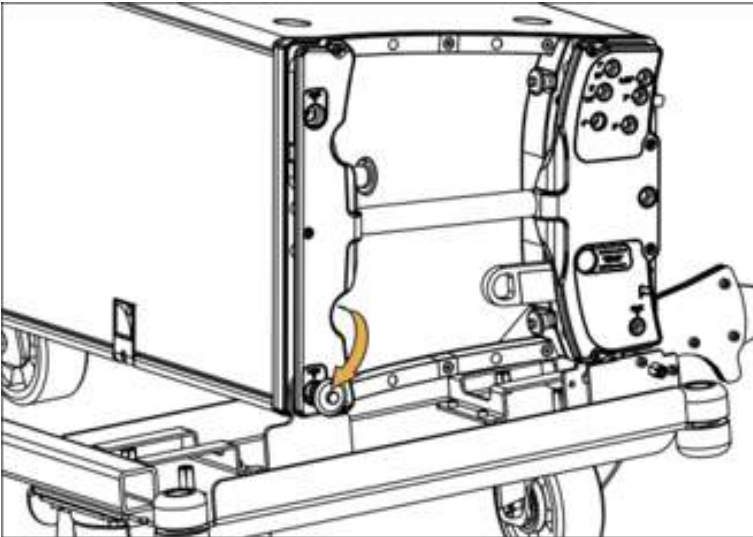
1. Attach K2 on K2-CHARIOT.  
Fully rotate the rear rigging arms of K2-CHARIOT and attach a first K2.



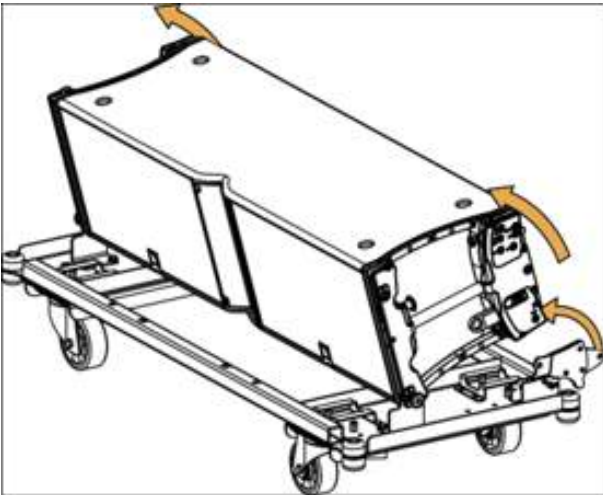
2. Position K2 on the K2-CHARIOT dolly.



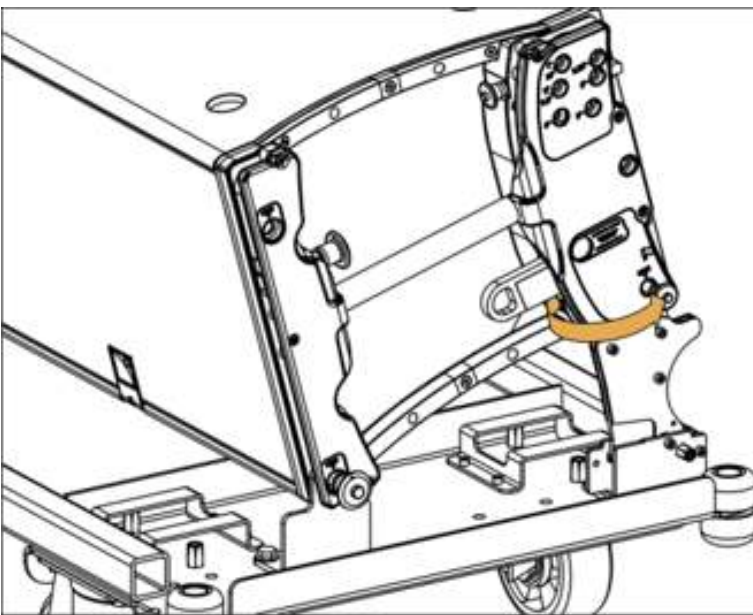
3. Secure the enclosure at the front using the LINK hole.



4. Lift the rear of the enclosure and rotate the dolly rear rigging arm in its upward position.

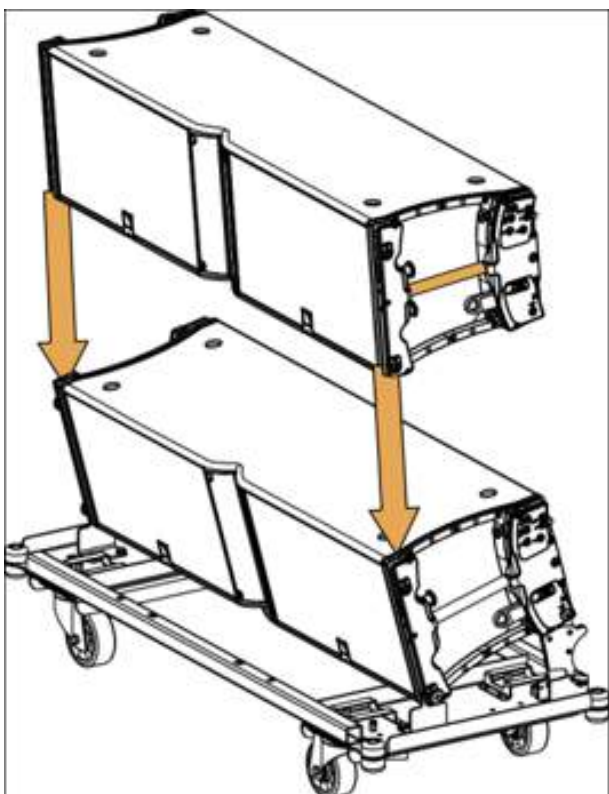


5. Secure the enclosure using the LINK hole.



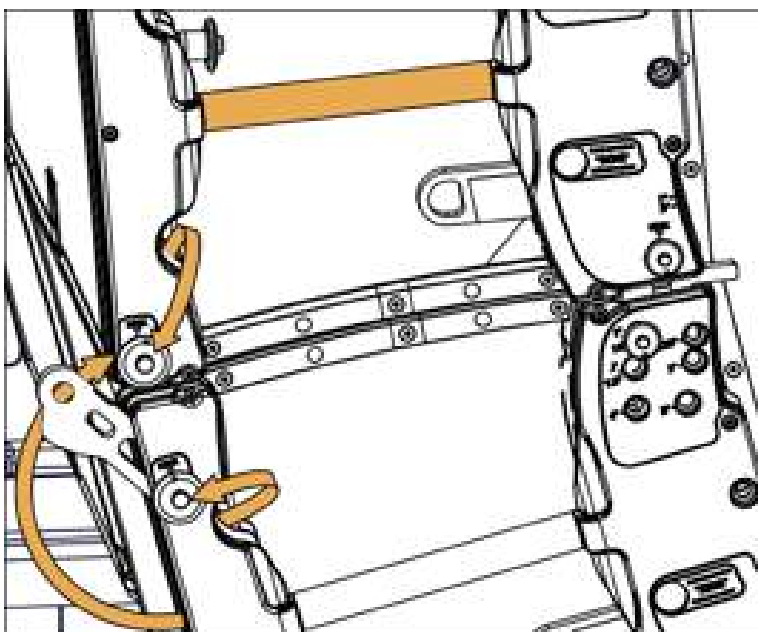


6. Position another K2 on the first one.

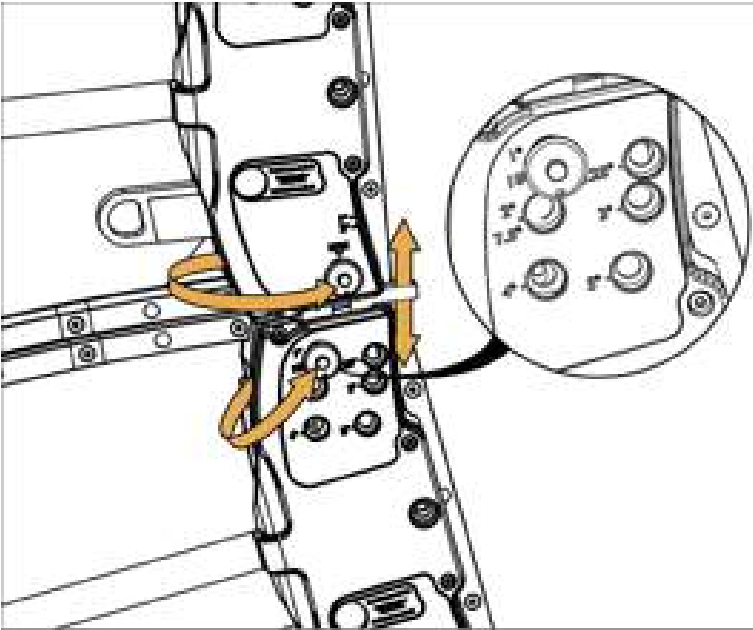


**!** Keep holding the enclosure with the handles until the front rigging arm is secured.

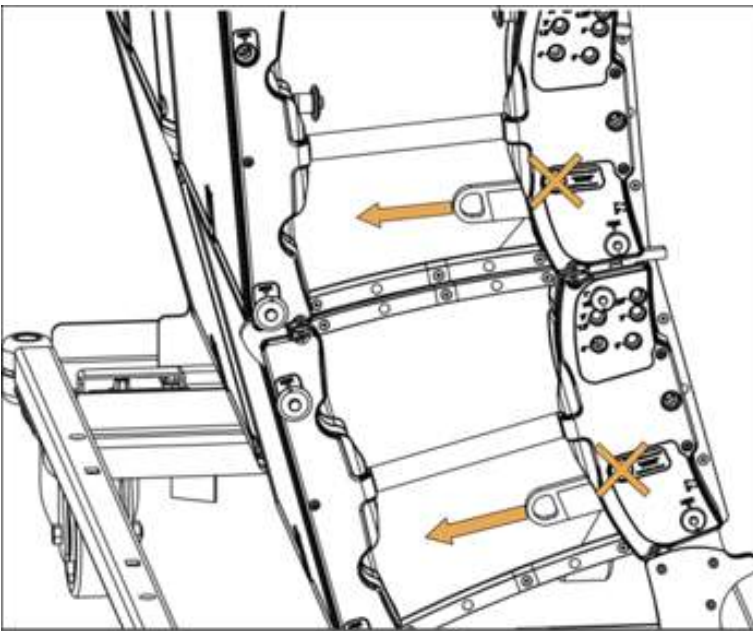
7. While holding the handle, rotate the front rigging arm and secure it with both LINK pins.



8. Slide the rear rigging arm and secure it with both pins, in the LINK and 10° holes.



9. Make sure the automatic locking system button is unloaded.  
If the button has been pressed, pull to disengage the latch.

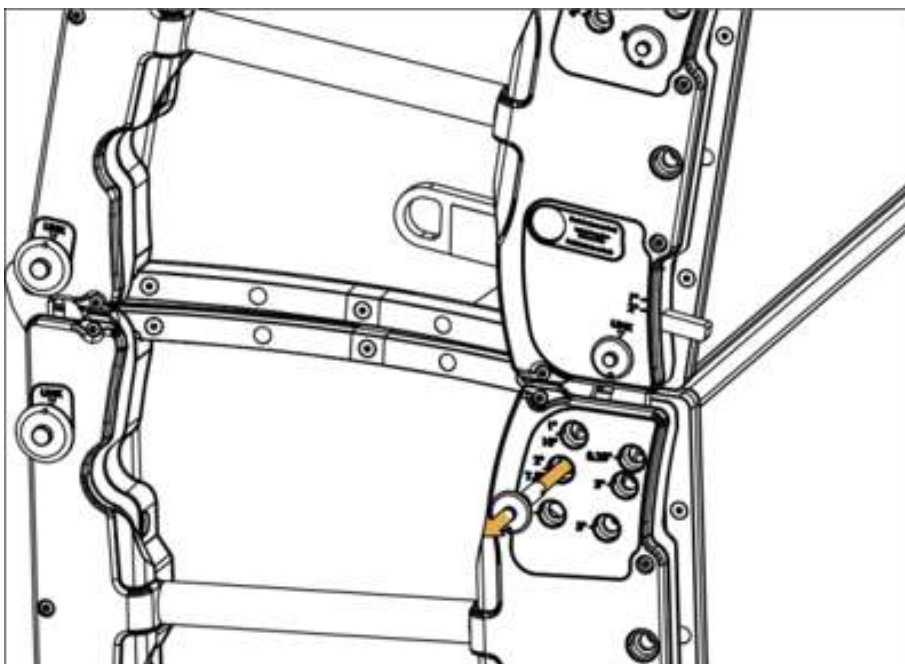


10. Repeat steps 1 (p.71) to 6 (p.73) until the block of four is complete.

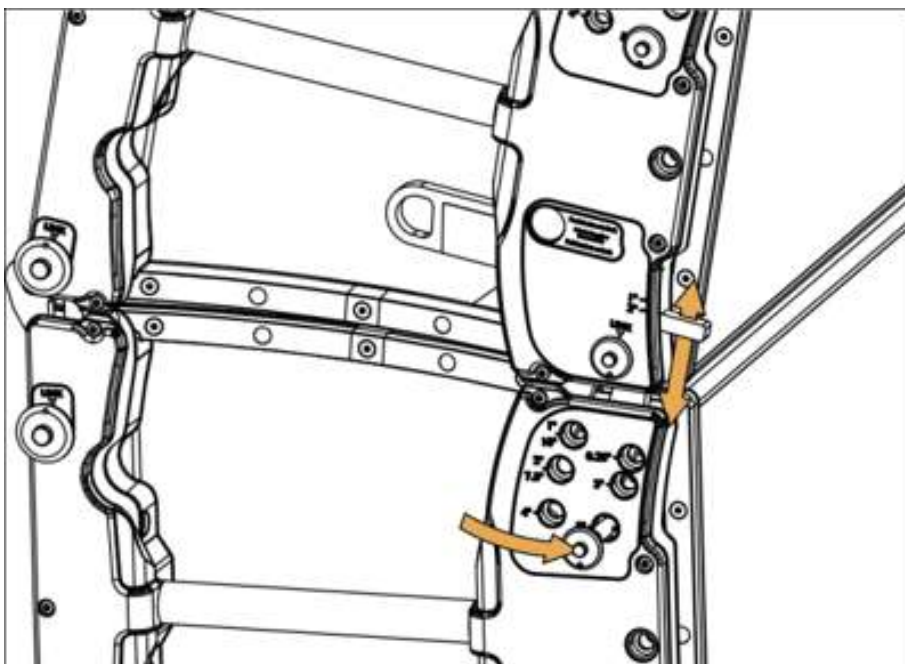
## B - Preset the inter-enclosure angles

### Procedure

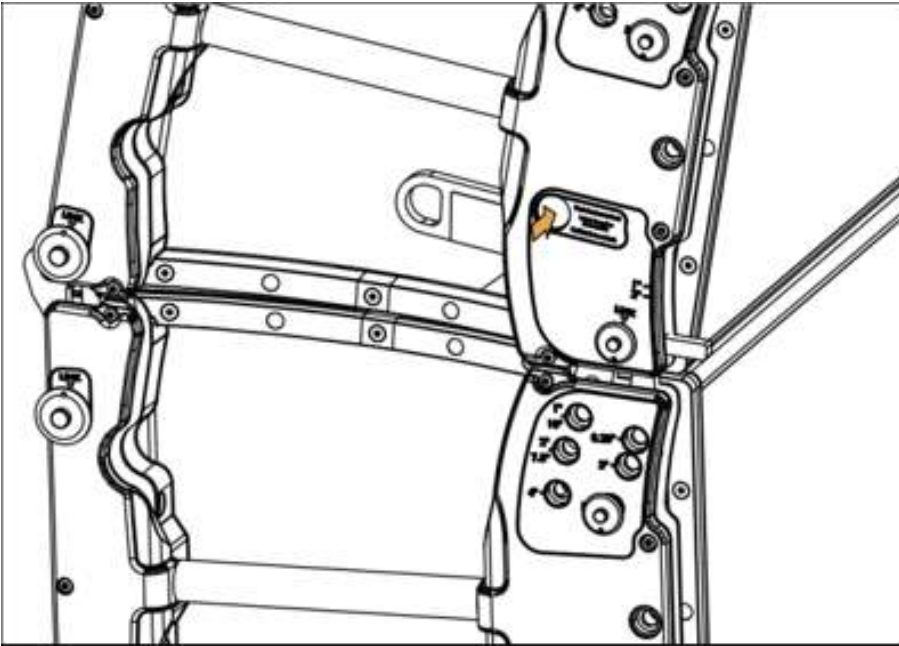
1. On both sides, remove the pin from its current angle hole.



2. Position the pin at the chosen angle hole and slide the rigging arm until the pin goes in.



3. Press the lock button to lock the inter-enclosure angle.



## C - Attaching K2-JACK stabilizers to K2-CHARIOT



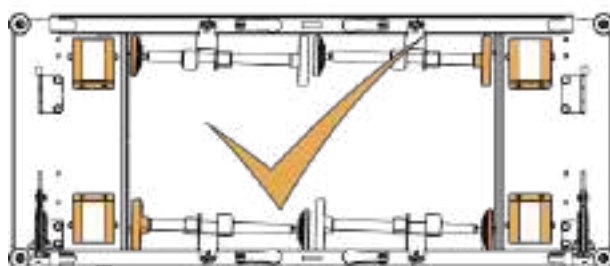
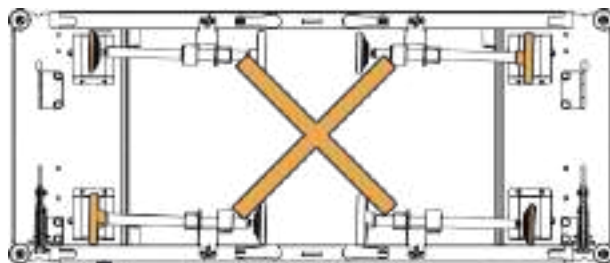
### **K2-JACK stabilizers storage position on K2-CHARIOT**

K2-JACK stabilizers can be attached to K2-CHARIOT during storage.

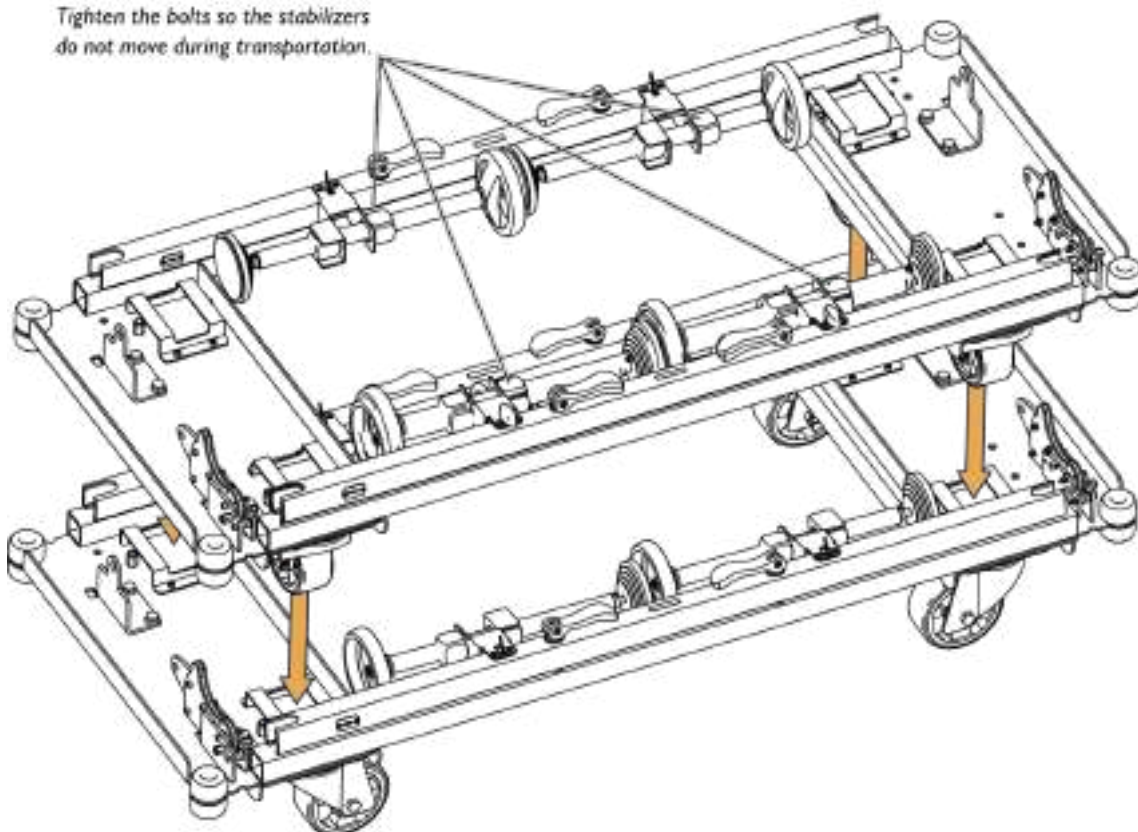


The K2-JACK stabilizers must not overlap on the wheel stops.

They would prevent efficient stacking of K2-CHARIOT in storage.



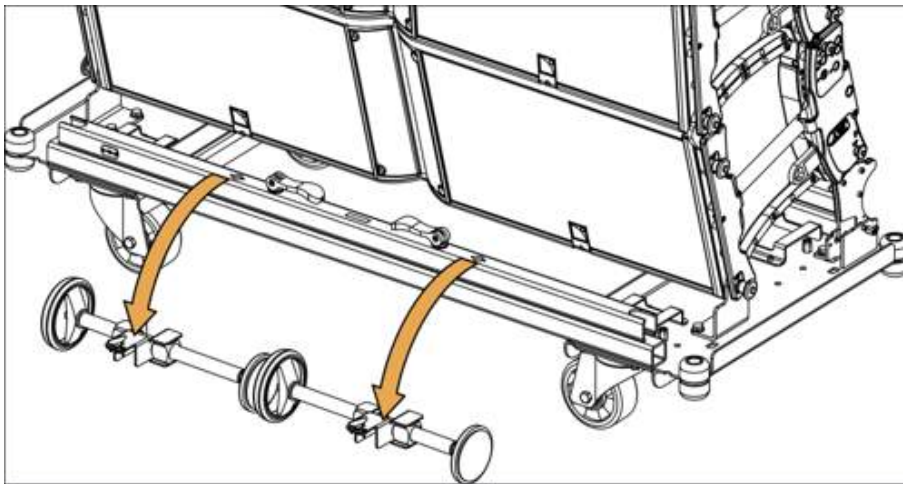
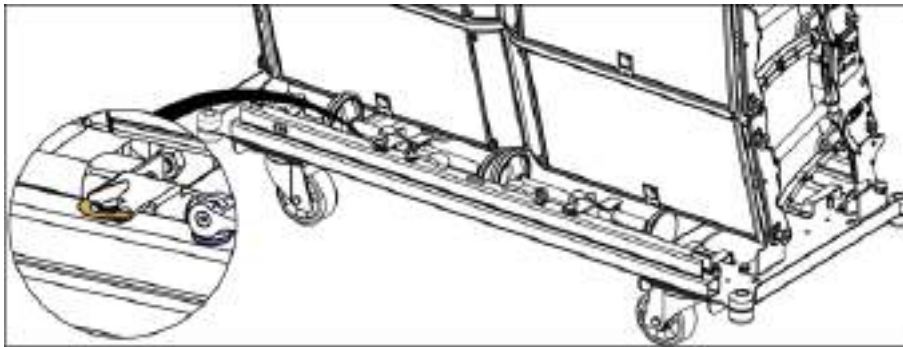
Tighten the bolts so the stabilizers do not move during transportation.



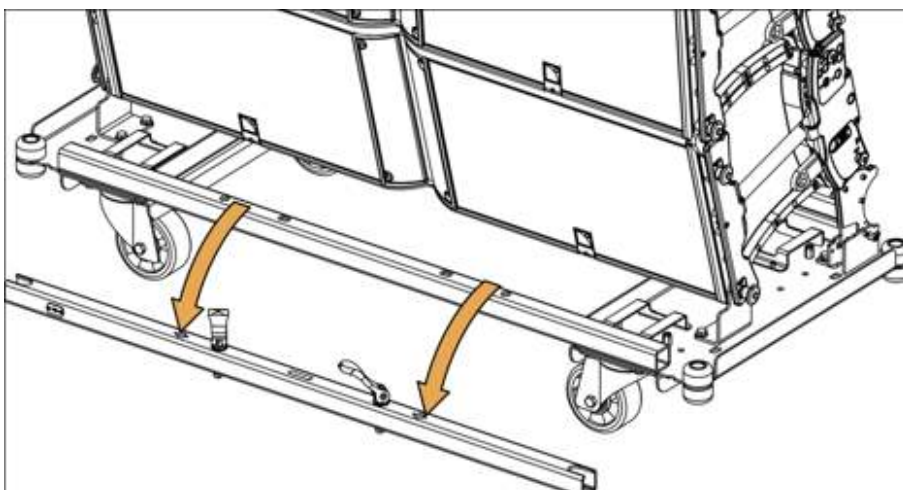
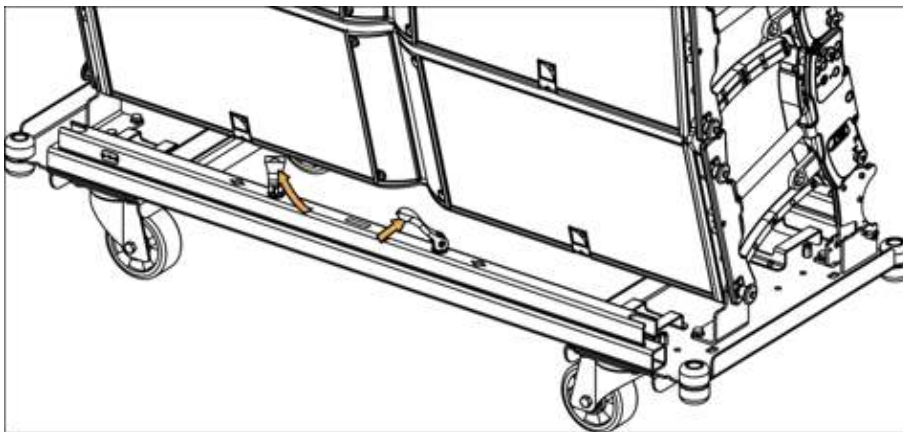


## Procedure

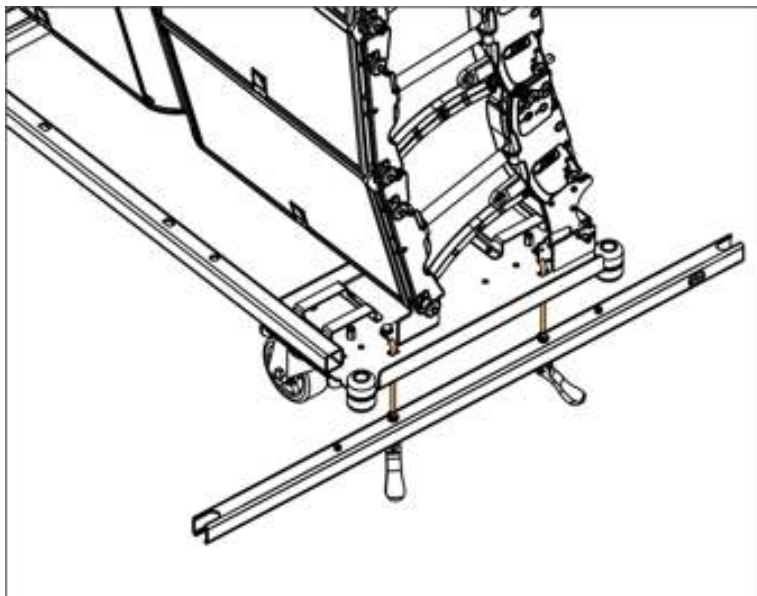
1. Remove the two K2-JACK from the K2-CHARIOT:
  - a) Remove the stabilizers from each bar.



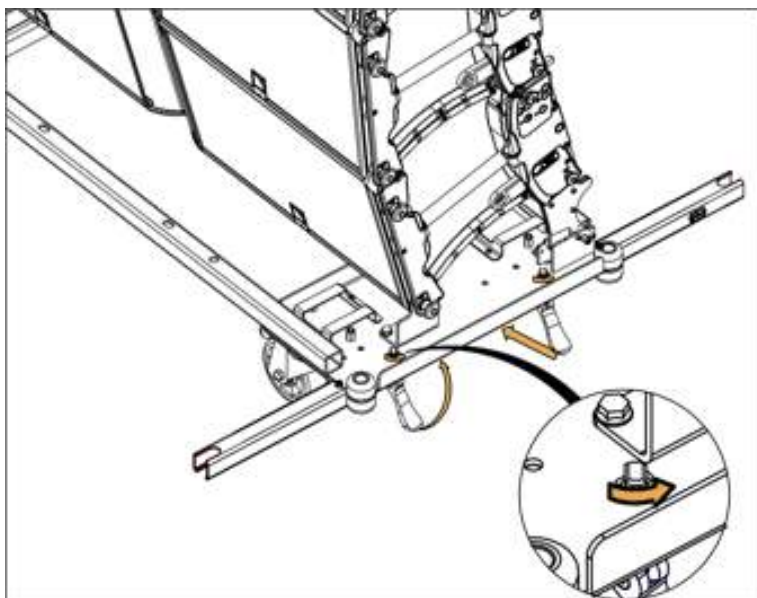
- b) Remove the bar from the K2-CHARIOT.



2. Attach the K2-JACK to the K2-CHARIOT:
  - a) Insert the K2-JACK studs through the K2-CHARIOT.



- b) Raise and turn the K2-JACK handles to secure the locking system.



**i** **Dust**

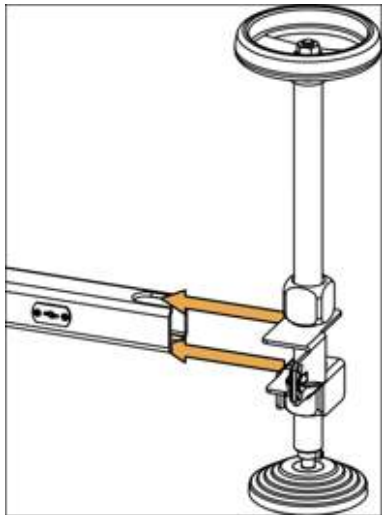
During the K2-JACK stabilizers first use dust will come off the threaded rod. It is expected and does not indicate a malfunction.

3. Prepare the K2-JACK stabilizers.

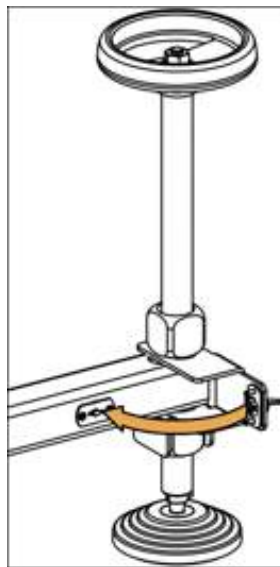
Rotate the threaded rod counter-clockwise so the central part of the stabilizer is closest to the base.



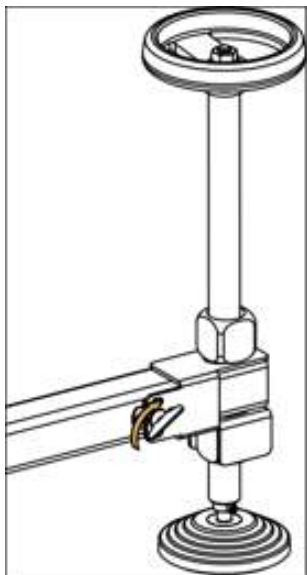
**4.** Attach the stabilizers to the bar.



Insert the feet in the guides at both ends of the bar.



Pivot the feet so they come in contact with the bar.



Lock the feet in position by giving a quarter-turn to the locking system.