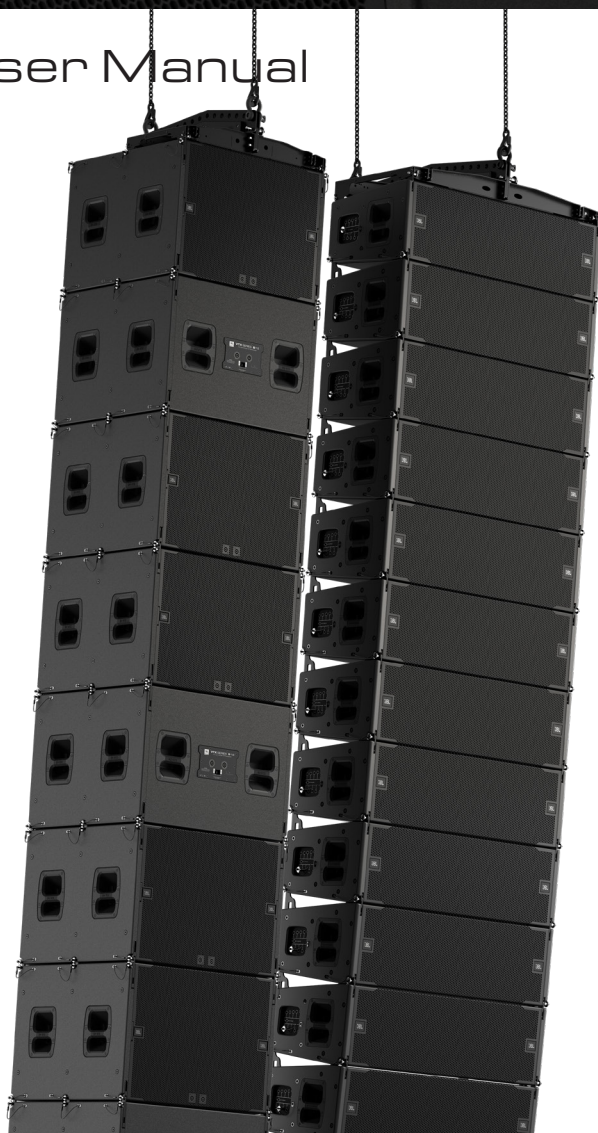


The JBL logo is displayed in white on a red square background. It features the letters 'JBL' in a bold, sans-serif font, with a stylized 'J' that has a vertical bar on its left side.

PROFESSIONAL

VTX SERIES
SYSTEM SOLUTIONS

VTX B18 | User Manual



GENERAL INFORMATION

VTX B18 - User Manual

Document Number: 1000337285

Version: C - EN

Distribution Date: January 25, 2021

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JBL PROFESSIONAL

8500 Balboa Blvd

Northridge, CA 91329

USA

Thank you for purchasing JBL VTX Series products



In more than 75 years of JBL innovations, the VTX Series stands apart as a milestone in the practical application of creative engineering. VTX products herald the next generation in line array loudspeaker systems: a new era in performance, system integration and user friendliness. VTX products draw on multiple JBL patents in driver, waveguide, and suspension technology, as well as custom amplification, DSP, control, and system management designs created in collaboration with HARMAN Professional sister companies.

VTX loudspeakers marry custom transducer design and in-house manufacture, breakthrough technologies, and a comprehensive system approach to deliver a premium experience for all who come into contact with it, from the FOH mixing engineer to the systems engineer, rigger, road crew, warehouse manager, and, of course, the audience. Designed for operators of portable and fixed systems alike, the VTX Series features JBL's legendary sound quality coupled with expert support and advanced tools that enable optimal specification, configuration, and operation of VTX systems in any venue, anywhere in the world. The VTX Series delivers a comprehensive solution: the finest sound quality available, plus efficient and intuitive setup, tuning, networking, and control.

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1 - DECLARATION OF CONFORMITY

BRAND: JBL Professional

FAMILY NAME: VTX A8/B18 loudspeaker and suspension accessories

MODEL NAMES:

- **VTX B18**
- **VTX B18 VT**
- **VTX B18 ACC**
- **VTX A8 AF**
- **VTX A8 AF EB**
- **VTX A8 SB**
- **VTX A8 MF**
- **VTX RC500**

We, HARMAN International, declare under our sole responsibility that the product, to which this declaration relates, is in conformity with the following standards:

STANDARD	DESCRIPTION	TEST AGENCY
2006/42/EC MACHINERY DIRECTIVE	Applies to machinery and lays down essential health and safety requirements ISO12100	Tested at JBL Professional
2014/35/EC LOW VOLTAGE DIRECTIVE	Applies to loudspeaker and lays down essential health and safety requirements. EN60065	Tested at JBL Professional



Frank Lacelle

Compliance Manager - Harman International

2 - SAFETY

2.1 SAFETY INSTRUCTIONS

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not expose the product to direct rain or sea spray.
6. Clean only with a dry cloth.
7. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus that produce heat.
8. Only use attachments/accessories specified by the manufacturer.
9. Use only with a cart, stand, tripod, bracket, or table specified by the manufacturer or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
10. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as if liquid has been spilled or objects have fallen into the apparatus, or if the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
11. Contact JBL Professional for advanced servicing issues.
12. **CAUTION - DO NOT PERFORM ANY SERVICING UNLESS YOU ARE QUALIFIED TO DO SO.**
13. Prolonged exposure to excessive SPL can cause hearing damage. The loudspeaker is easily capable of generating sound pressure levels (SPL) sufficient to cause permanent hearing damage to performers, production crew, and audience members. Caution should be taken to avoid prolonged exposure to SPL in excess of 90 dB.
14. Read the System Rigging Manual before installation and use of the product.

2.2 GENERAL HARDWARE INFORMATION

Any hardware used in an overhead suspension application must be load rated for the intended use. Generally, this type of hardware is available from rigging supply houses, industrial supply catalogs, and specialized rigging distributors. Local hardware stores do not usually stock these products. Compliant hardware will be referenced with a working load limit (WLL) and a traceability code.

2.3 ATTACHMENT TO STRUCTURES

A licensed Professional Engineer must approve the placement and method of attachment to the structure prior to the installation of any overhead object. The following performance standards should be provided to the Professional Engineer for design purposes: Uniform Building Code as applicable, Municipal Building Code as applicable, and Seismic Code as applicable. The installation of the hardware and method of attachment must be carried out in the manner specified by the Professional Engineer. Improper installation may result in damage, injury, or death.

2.4 IMPORTANT SAFETY WARNING

The information in this section has been assembled from recognized engineering data and is intended for informational purposes only. None of the information in this section should be used without first obtaining competent advice with respect to applicability to a given circumstance. None of the information presented herein is intended as a representation or warranty on the part of JBL. Anyone making use of this information assumes all liability arising from such use.

All information presented herein is based upon materials and practices common to North America and may not directly apply to other countries because of differing material dimensions, specifications, and/or local regulations. Users in other countries should consult with appropriate engineering and regulatory authorities for specific guidelines.

Correct use of all included hardware is required for secure system suspension. Careful calculations should always be performed to ensure that all components are used within their working load limits before the array is suspended. Never exceed the maximum recommended load ratings.

Before suspending any speaker system, always inspect all components (enclosure, rigging frames, pins, eyebolts, track fittings, etc.) for cracks, deformations, corrosion, or missing/loose/damaged parts that could reduce strength and safety of the array. Do not suspend the speaker until the proper corrective action has been taken. Use only load-rated hardware when suspending JBL suspendable loudspeaker models.

2.5 ARE YOU NEW TO RIGGING?

If you are new to rigging, you should:

- Know the rules for safe rigging.
- Attend a safe rigging seminar.
- Meet and establish a relationship with a licensed mechanical or structural engineer. Get in the habit of asking them questions instead of assuming their answers. Learn from what they tell you.
- Research and understand the codes, practices and requirements of the venues where you intend to operate your sound system.

2.6 INSPECTION AND MAINTENANCE

Suspension systems are comprised of mechanical devices and, as such, require regular inspection and routine maintenance to ensure proper functionality. Before suspending or pole mounting any speaker system, always inspect all components (enclosure, suspension frames or brackets, pins, eyebolts, etc.) for cracks, deformations, corrosion, or missing/loose/damaged parts that could reduce strength and safety of the array. Do not suspend or pole mount a speaker until the proper corrective action has been taken.

Installed systems should be inspected at least once a year. The inspection must include a visual survey of all corners and load-bearing surfaces for signs of cracking, water damage, delamination, or any other condition that may decrease the strength of the loudspeaker enclosure.

Accessory suspension hardware provided with or for VTX systems must be inspected for fatigue at least once a year or as required by local ordinance. The inspection must include a visual survey of the material for signs of corrosion, bending, or any other condition that may decrease the strength of the fastener. Additionally, any eyebolts must be checked for possible spin-out of the enclosure.

For all other hardware and fittings, refer to the hardware manufacturer's inspection and maintenance guidelines for process.

JBL is not responsible for the application of its products for any purpose or the misuse of this information for any purpose. Furthermore, JBL is not responsible for the abuse of its products caused by avoiding compliance with inspection and maintenance procedures or any other abuse.

Prior to suspending the system, an expert, trained and experienced in suspending speaker systems, should inspect all parts and components.

2.7 SYMBOLS

The following symbols are used in this document:



CAUTION: This symbol gives notice of a potential risk of harm to the individual or the equipment. Instruction marked with this symbol must be strictly followed.



TIP: This symbol gives notice of helpful, relevant information about the topic.

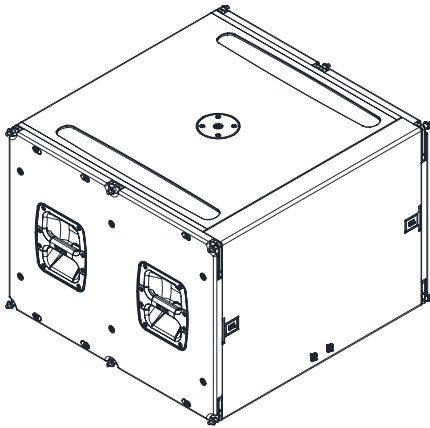


INSTRUCTIONS: This symbol gives notice of instructions that must be followed for proper installation and use of the product.

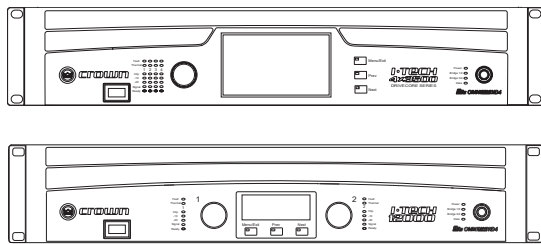


TOOLS REQUIRED: This symbol gives notice of tools that must be used for proper installation and use of the product.

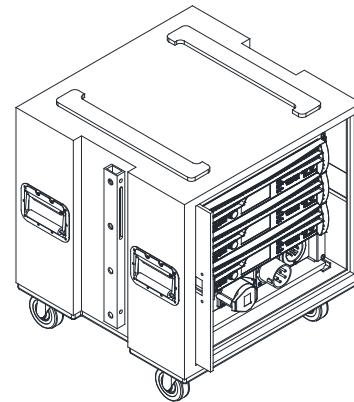
3 - SYSTEM COMPONENTS



VTX B18



Crown I-Tech HD Amplifiers

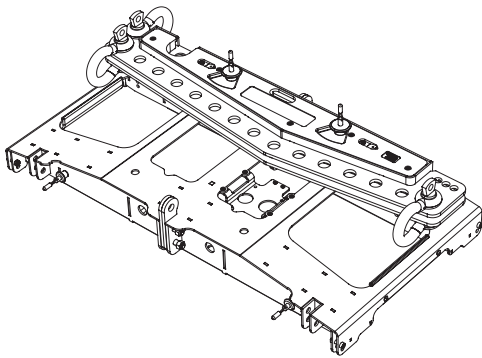


Crown V-Rack

4 - COMPATIBLE ACCESSORIES

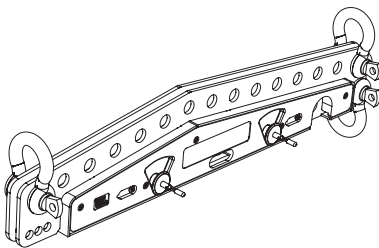
The accessories listed below are compatible with the VTX B18. For more detailed information about the B18 accessories refer to the VTX B18 Rigging manuals found at www.JBLpro.com.

4.1 VTX A8 AF - ARRAY FRAME



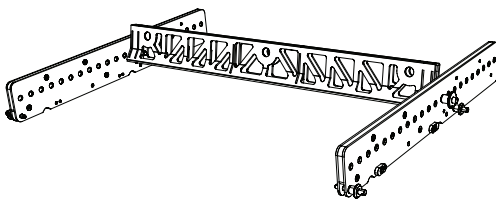
- Compatible with VTX A8 and VTX B18
- Maximum Limit: (24) VTX A8 / (13) VTX B18
- 0.5 degree pick-point resolution
- Built-in storage position for extension bar
- Includes (1) VTX A8 AF EB extension bar
- Support for third-party laser inclinometers
- Compatible shackle size: 5/8 in

4.2 VTX A8 AFEB - ARRAY FRAME EXTENSION BAR



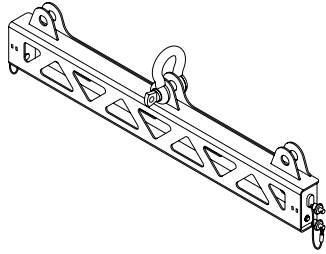
- Extension Bar for use with VTX A8 AF
- Single, front-to-back or side-by-side pick point options
- Includes (3) shackles and mounting brackets
- Compatible shackle size: 5/8 in

4.3 VTX A8 MF - MINI FRAME



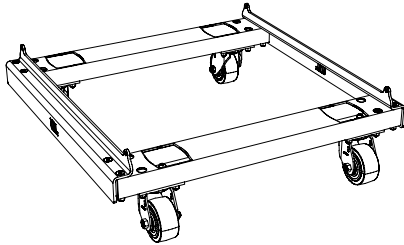
- Compatible with VTX A8 and VTX B18
- Maximum Limit: (10) VTX A8 / (4) VTX B18
- Single-point and side-by-side pick-point options
- Three-part collapsible design
- Compatible shackle size: 1/2 in

4.4 VTX A8 SB - SUSPENSION BAR



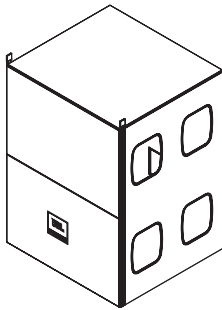
- Compatible with VTX A8 and VTX B18
- Maximum Limit: (24) VTX A8 / (16) VTX B18
- Used for pull-back applications
- Shackle Size: 5/8 in

4.5 VTX B18 VT - VERTICAL TRANSPORTER



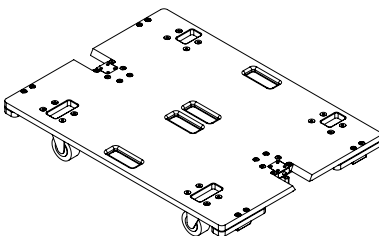
- Vertical transport cart for two to four VTX B18 subwoofers
- Truck-friendly dimensions
- Built-in stacking features for easy storage
- Lightweight design
- Heavy-duty casters

4.6 VTX B18 VT CVR - SOFT COVER



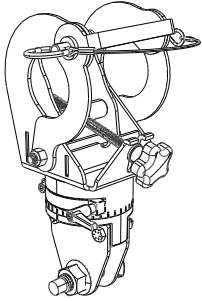
- Heavy-duty soft cover for VTX B18 enclosures
- Covers (2) or (3) VTX B18 enclosures
- Includes input-panel flaps for testing purposes
- Clear see-through pocket for shipping label
- Handle cutouts for easy transportation
- Heavy-duty industrial-grade zippers

4.7 VTX B18 ACC - ACCESSORY COVER AND CASTERBOARD



- Front face dolly and cover for VTX B18
- Cover includes handle cutouts and rear panel access flap
- Tour grade casters
- Stackable for convenient storage
- Rotating release/lock cam mechanisms for secure attachment to B18 enclosures

4.8 VTX RC500 - ROTATING CLAMP



- Universal truss/pipe clamp adapter
- Working Load Limit: 500 kg (1,100 lbs)
- Adjustable clamping mechanism
- Pipe range: 1 – 2.0 in
- Includes bearing for smooth 360° rotation
- 10-degree rotation marks for horizontal array aiming

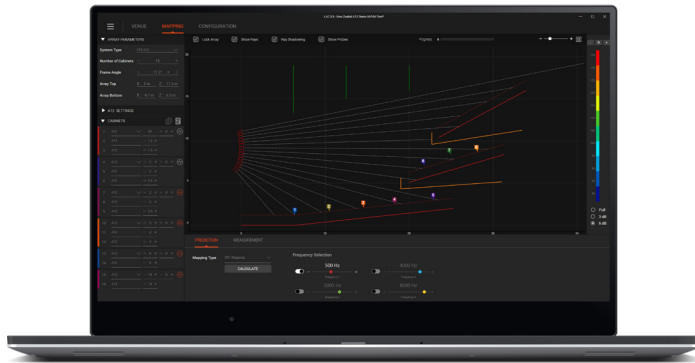


TIP: For B18-specific accessories refer to the VTX B18 User and Rigging manuals found at www.JBLpro.com.



CAUTION: Always use components and accessories specified and approved by JBL Professional. When a cart is used, use caution when moving the cart to avoid injury from tip-over.

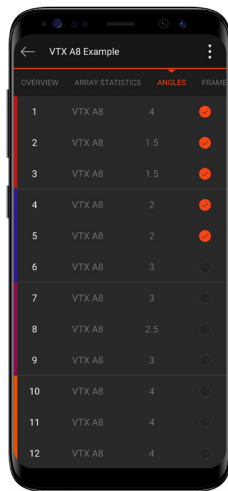
5 - SOFTWARE



5.1 LINE ARRAY CALCULATOR 3™

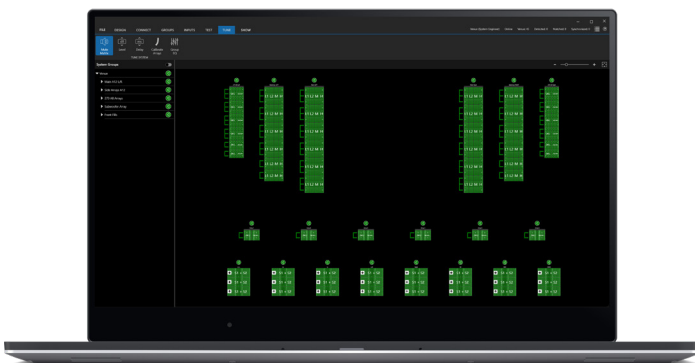
LAC is simulation software for designing and predicting VTX Series systems. LAC predicts the acoustical performance of line array systems, as well as flown and ground-stacked subwoofer arrays. Subwoofer delay values can be generated for electronic delay steering (EDS) using the built-in coverage calculator. LAC also performs mechanical validation of rigging hardware, calculates weight limits, and generates safety warnings.

www.jblpro.com/lac3



5.2 ARRAY LINK™

Array Link is a mobile companion app that works in conjunction with LAC software to assist in deployment of VTX Series systems. Array Link uses a QR code system to transfer all mechanical array information from the main LAC application to a mobile phone. All relevant rigging and mechanical options are presented in an easy-to-understand layout. The application is compatible with iOS® and Android™ and can be obtained from their respective app stores.



5.3 PERFORMANCE MANAGER™

Performance Manager is a configuration and control application for networked audio systems. Performance Manager's user interface guides system designers through the complete system design, configuration, and control processes. A dedicated show mode provides all monitoring and control functions needed to deliver a complete picture of the system's performance in real time.

www.jblpro.com/performancemanager

6 - OVERVIEW

The VTX B18 is JBL Professional's next-generation single 18-inch subwoofer, designed to complement VTX full-range sound reinforcement systems. The VTX B18 features the 2288H 18-inch woofer, engineered for improved linearity, increased sensitivity and extra-long excursion. The 2288H is based on JBL's dual voice coil, dual-gap Differential Drive[®], technology, which delivers better heat dissipation,



lower power compression and wider dynamic range than conventional single-coil designs. The B18 incorporates JBL's patented Slip Stream[™] double-flared exponential low-frequency port design to improve airflow and reduce audible turbulence, even at maximum excursion. The B18 shares the industrial design of the JBL's VTX A-Series products and has the same width and suspension hardware as the VTX A8, allowing the two products to be used together in a variety of flown or ground-stacked configurations. The VTX B18 can be deployed in omni-directional or cardioid configurations, in arrays of up to 16 enclosures.

TRANSDUCER DESIGN

The VTX B18 features JBL's first new 18-inch high-performance woofer design in a decade, engineered from the ground up to deliver transparent, linear bass response down to 28 Hz. The 18-inch driver leverages JBL's patented fourth-generation Differential Drive technology to deliver maximum efficiency and power handling in a light, compact design.

VTX A8 COMPATIBILITY

The B18 rigging system is compatible with the VTX A8 rigging system, allowing B18 subwoofers to be suspended above an A8 array. The VTX B18 rigging system allows for omnidirectional or cardioid configurations in small and large-scale flown or ground-stacked arrays. All VTX A8 suspension accessories are compatible and arrays of up to 16 enclosures can be created.

CONTROLLABLE COVERAGE

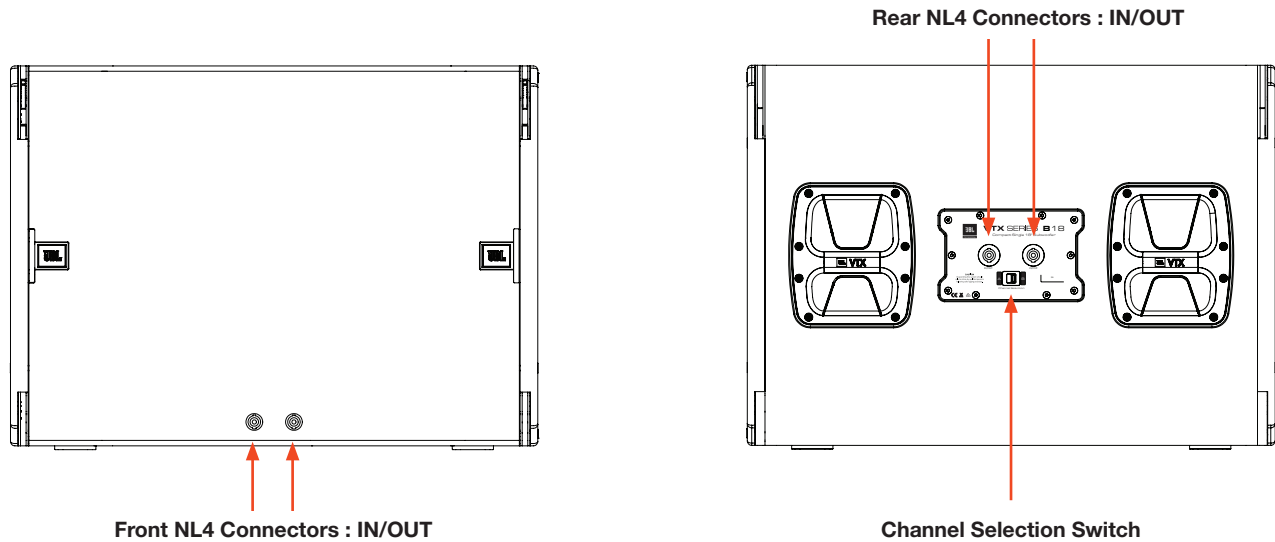
The VTX B18 can be used in omni-directional or cardioid configurations simply by selecting the appropriate speaker preset and cabinet orientation. Speaker connectors are available on both the front and back, streamlining cable management in either configuration. A switch on the rear input panel allows for selecting between channel 1 or 2 of the NL4 cable, minimizing cable requirements.

VTX BUILD QUALITY

The VTX B18 adopts the VTX A-Series' signature full-face grille design, which minimizes exposed components and protects the loudspeaker from extreme conditions.

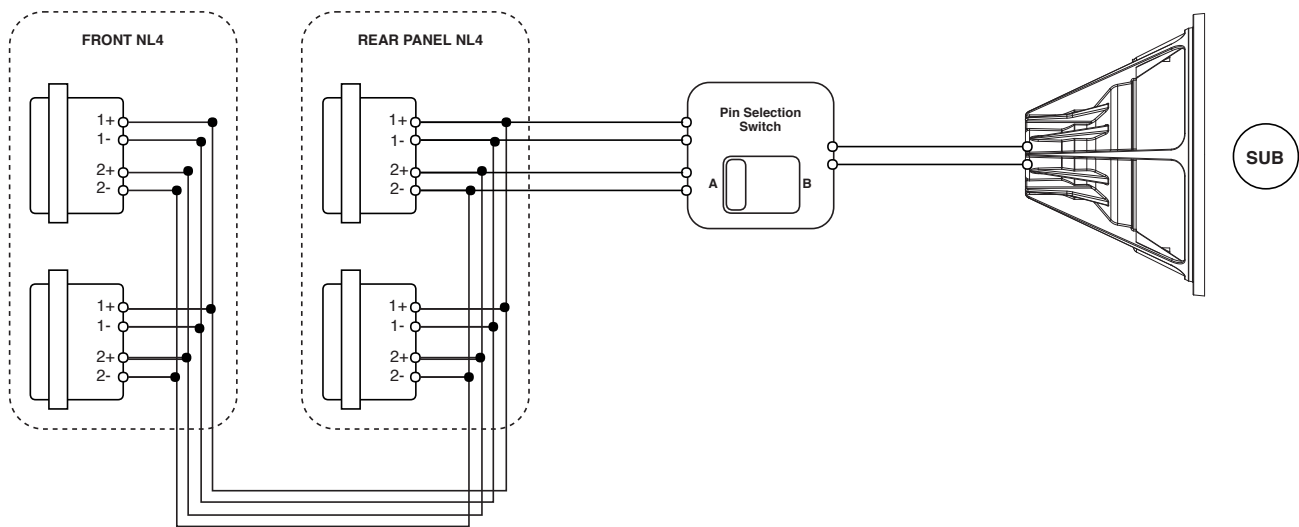
7 - CONNECTIONS

The VTX B18 is equipped with four Neutrik NL4 SpeakON connectors, two at the rear for the cabinet and two at the front grill. All four NL4 connectors are wired in parallel and can be used interchangeably. The NL4 connectors at the front of the B18 are typically used when B18s are setup in a cardioid configuration, when some of the enclosures are pointed backwards. All NL4 connectors are installed upside down so that the NL4 locking pin position can be seen from under the array.



A channel selection switch is available at the rear of the B18 that allows for selecting between Pins 1 and 2 of the NL4 connector/cable. The switch is wired after the four NL4 connectors and affects all connections equally.

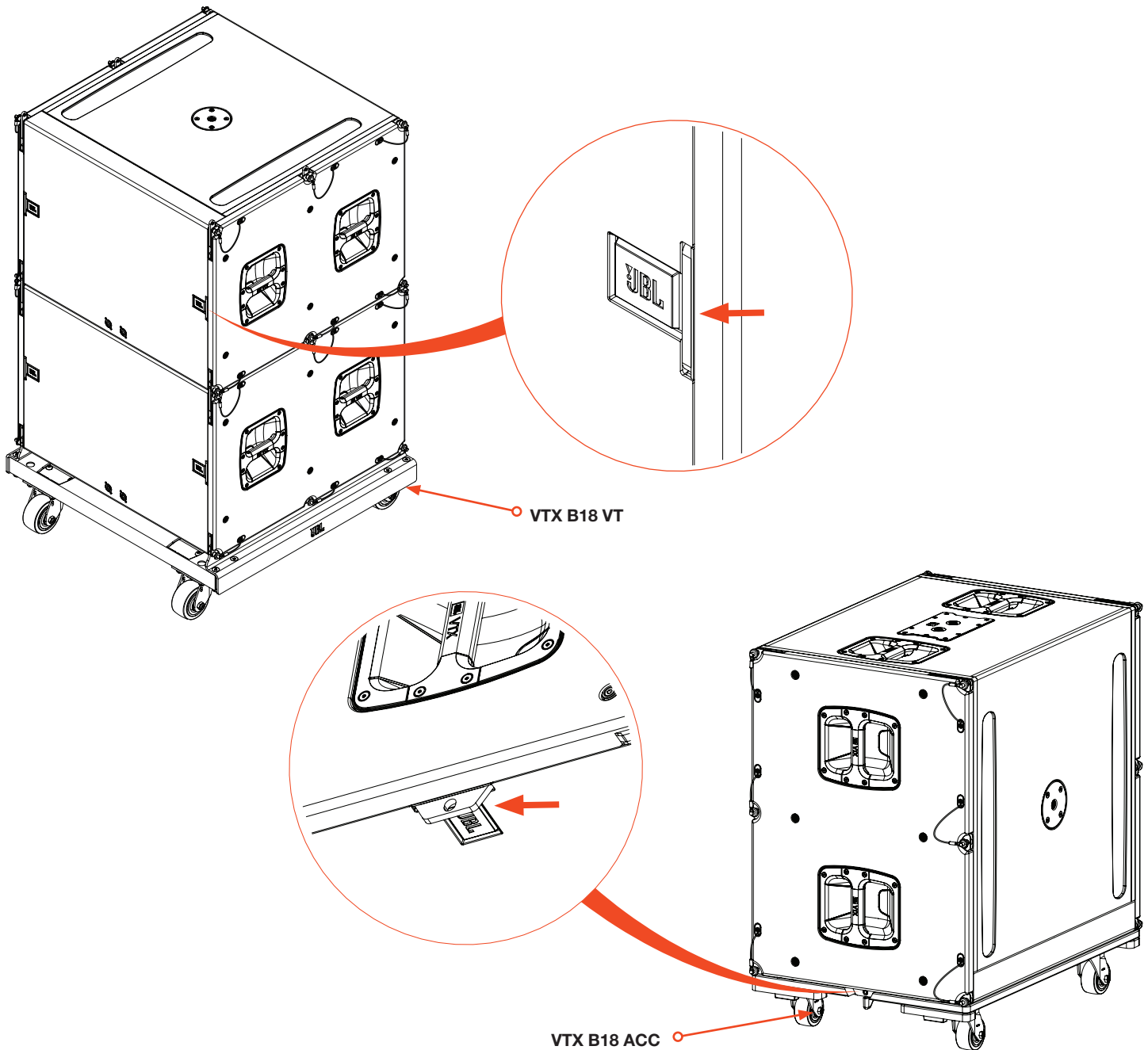
7.1 INTERNAL WIRING



CAUTION: Always use high-quality insulated speaker cables made by reputable manufacturers. Keep cable length as short as possible with sufficient gauge for the application.

8 - TRANSPORTATION OPTIONS

There are two transportation options for the B18. One is the vertical transporter cart (VTX B18 VT) which allows for vertically transporting up to four B18 subwoofers. When stacked in blocks of two, three or four, B18 cabinets can be configured in either front-firing or cardioid mode (the CVR soft cover can cover stacks of two or three B18s). The VTX B18 VT CVR, a reinforced protective cover, is available to cover and protect the subwoofers during transportation. The other option is to use the VTX B18 ACC accessory kit, which includes a front face dolly for a single B18 and a protective cover. The VT option is ideal for large scale touring situations where large format trucks are used and maximum deployment efficiency is needed.



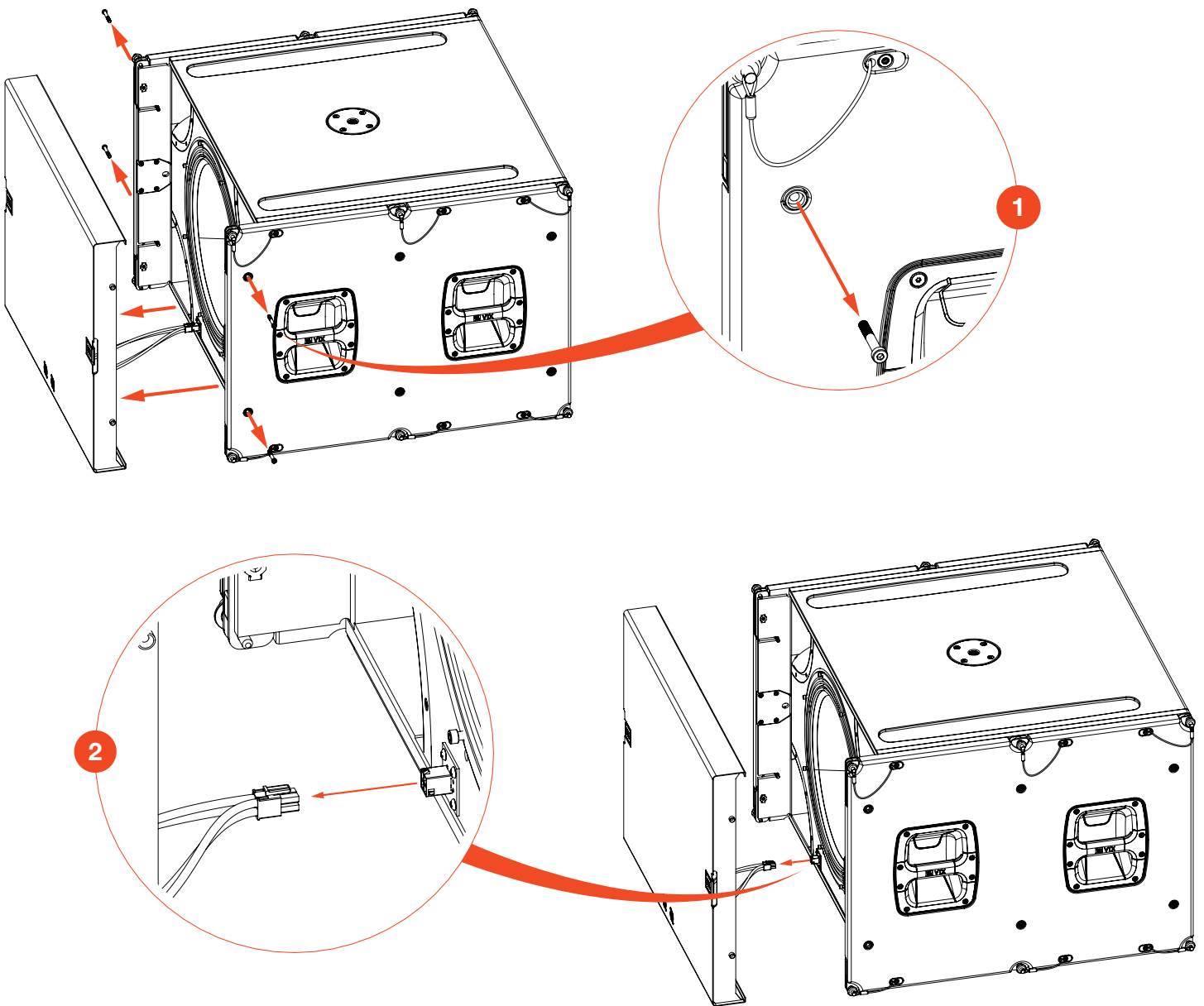
TIP: For additional information on how to use and deploy the ACC and Vertical Transporter refer to the **VTX B18 Rigging Manual** that can be downloaded from www.jblpro.com.

8.1 ROTATING THE DOLLY TABS - FOR USE WITH THE ACC DOLLY

There are two dolly tabs available at the front of the B18 that are used to secure the front face ACC dolly board to the B18. The tabs are retractable and ship from the factory oriented towards the inside of the B18. This orientation is ideal when B18s are used with the vertical transport cart, in which case the tabs are not needed. When the B18 is used with front face dolly boards the tabs are rotated, so that the dolly board can be attached to the subwoofer.

STEPS:

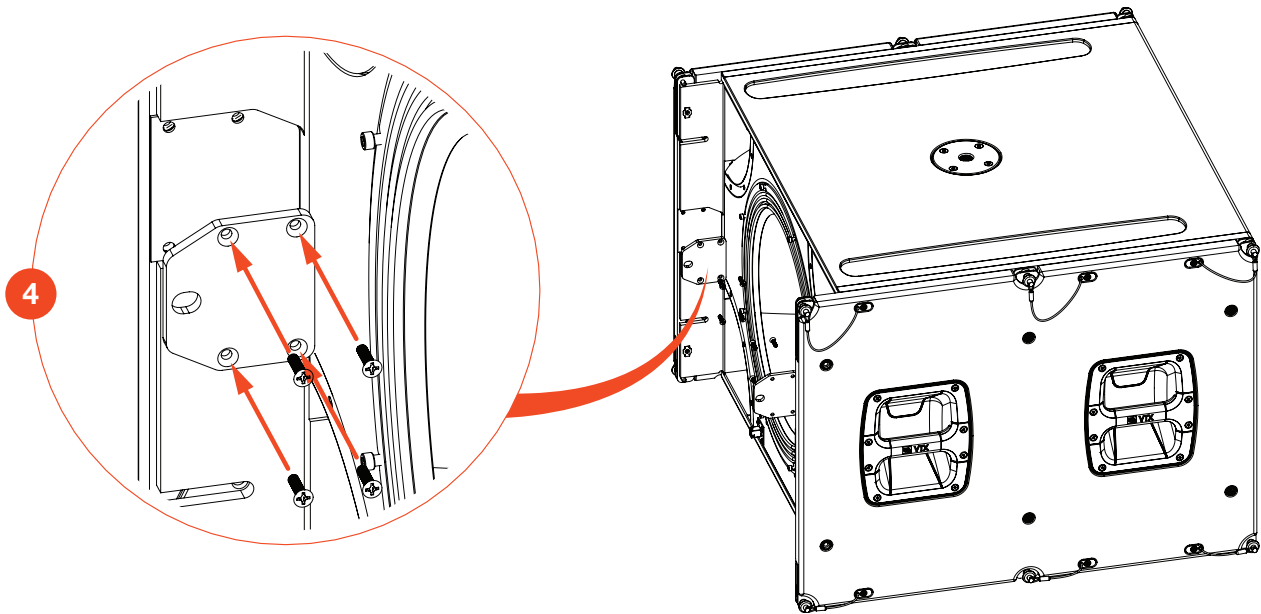
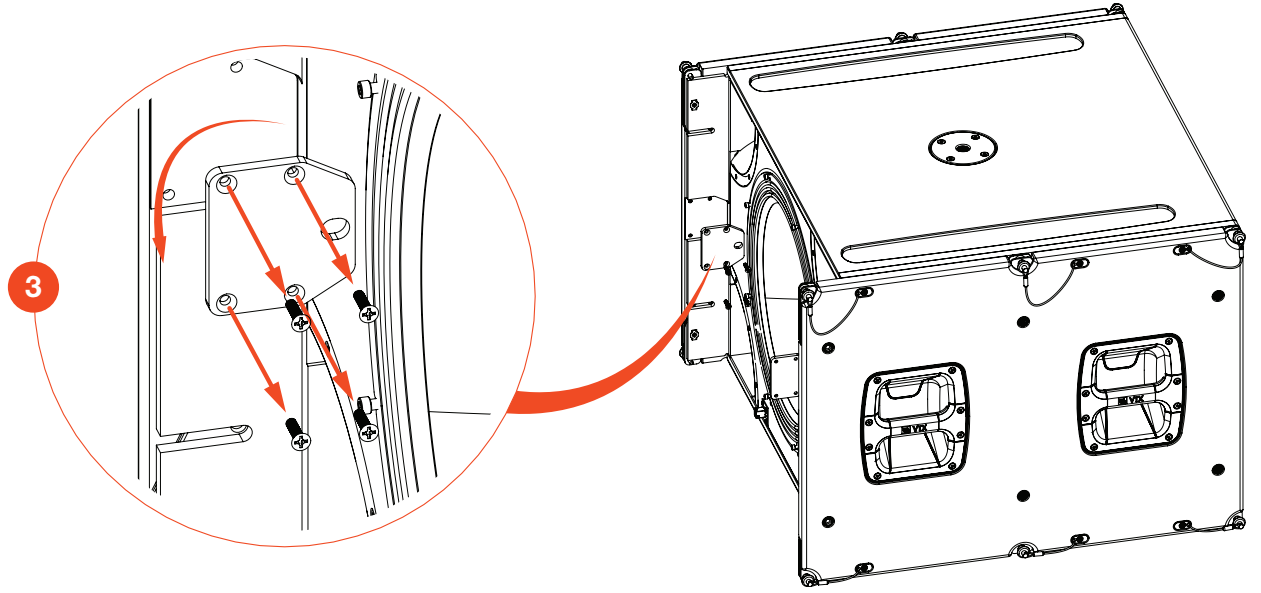
- 1 Remove the four M6 HEX screws holding the grill onto the B18.
- 2 Carefully disconnect the Molex™ connector which is used to connect the two front NL4 connectors to the B18.



TOOLS REQUIRED: A 4 mm HEX key is required to remove the four M6 screws holding the grill on the B18. A Phillips #2 screwdriver is required for removing the four Phillips screws holding the bracket.

STEPS:

- 3 Remove the four Phillips screws holding each bracket, reverse the orientation of the brackets and reinstall the Phillips screws
- 4 Reconnect the Molex™ connector and secure the grill



TOOLS REQUIRED: A 4 mm HEX key is required to remove the four M6 screws holding the grill on the B18. A Phillips #2 screwdriver is required for removing the four Phillips screws holding the bracket.

9 - VTX B18 PRESET LIBRARY

The VTX B18 preset library includes 60 and 80 Hz operating modes along with cardioid presets for rear-facing subwoofer enclosures. VTX presets are exclusively developed for Crown I-Tech HD amplifiers and come bundled with JBL HiQnet® Performance Manager control software. Audio Architect™ presets are also available and can be downloaded from www.jblpro.com. See below for a detailed description of the B18's operating modes and processing options, and refer to the Preset Library setup sheets for preset descriptions, memory locations and output channel assignments.

9.1 VTX B18 PRESET MODES AND OPTIONS

VTX B18 60: The 60 Hz preset mode extends the upper frequency response of the B18 to 60 Hz. The B18 60 preset is normally used when VTX full-range cabinets (like the A8 or A12) are used in full-range mode and minimal overlap between the subwoofers and full-range cabinets is desirable.

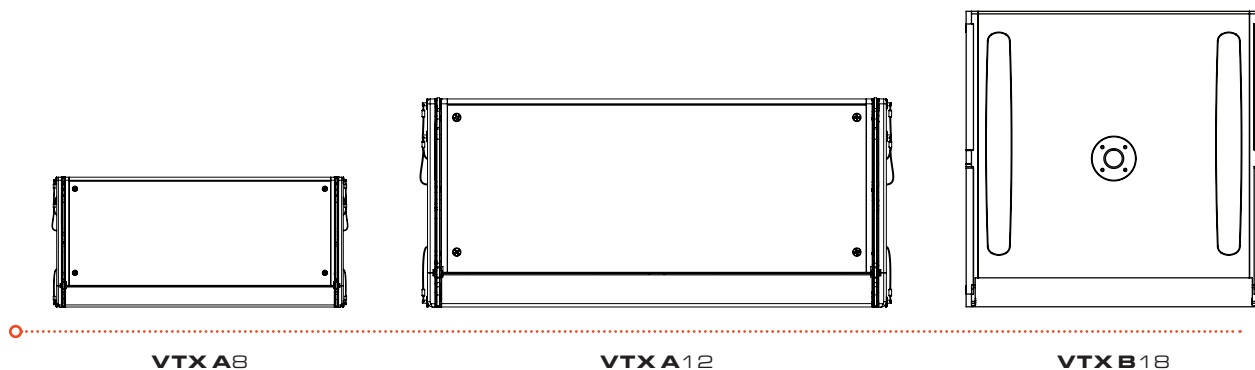
VTX B18 60 REAR: The 60 Hz rear preset was designed to work in conjunction with the standard B18 60 preset and is used to drive rear-facing B18 cabinets in cardioid configurations.

VTX B18 80: The 80 Hz preset mode extends the upper frequency response of the B18 to 80 Hz. The 80 Hz preset is normally used when VTX full-range cabinets (like the VTX A8 or A12) are set to 80 Hz, or when additional overlap between the full-range and subwoofer cabinets is desirable.

VTX B18 80 REAR: The 80 Hz rear preset was designed to be work in conjunction with the standard B18 80 preset and is used for rear-facing B18 cabinets in cardioid configurations.

9.2 TIME ALIGNMENT

The VTX B18 presets provide proper system summation with companion VTX full-range cabinets (all models) under physically coupled configurations (stacked or suspended) and when used with corresponding 60 Hz or 80 Hz presets. This pre-alignment is done at the factory, allowing any VTX subwoofer to be used with any VTX loudspeaker without needing specific subwoofer presets for each system and configuration. Additional time alignment delay should be added, as necessary, to account for physical path length differences between suspended full-range arrays and ground-stacked VTX subwoofers.



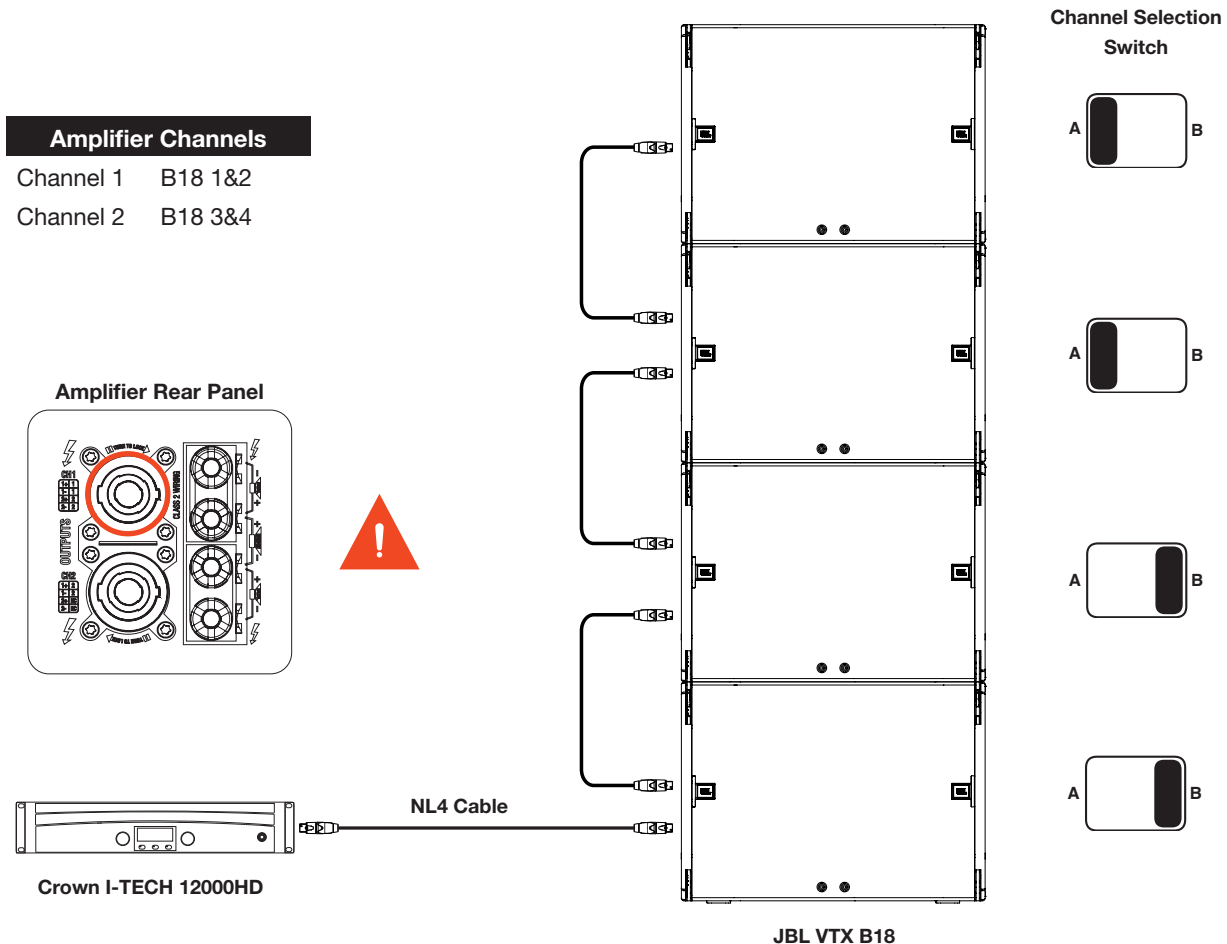
10 - SYSTEM AMPLIFICATION & WIRING

Like all other VTX systems, the VTX B18 subwoofer is powered exclusively by Crown I-Tech HD amplifiers, providing optimum performance and consistency around the world. All B18 processing is performed using the I-Tech HD's internal processing, so no other external DSP is required. The Crown amplifiers include a user-adjustable input section for room correction equalization, array size compensation, and circuit adjustments.

Standard JBL presets are available for both the Crown I-Tech 4x3500HD and Crown I-Tech 12000HD. The most up-to-date presets are available for download from www.jblpro.com website and are always bundled in the latest version of JBL's Performance Manager control software.

10.1 B18 USING CROWN I-TECH 12000HD

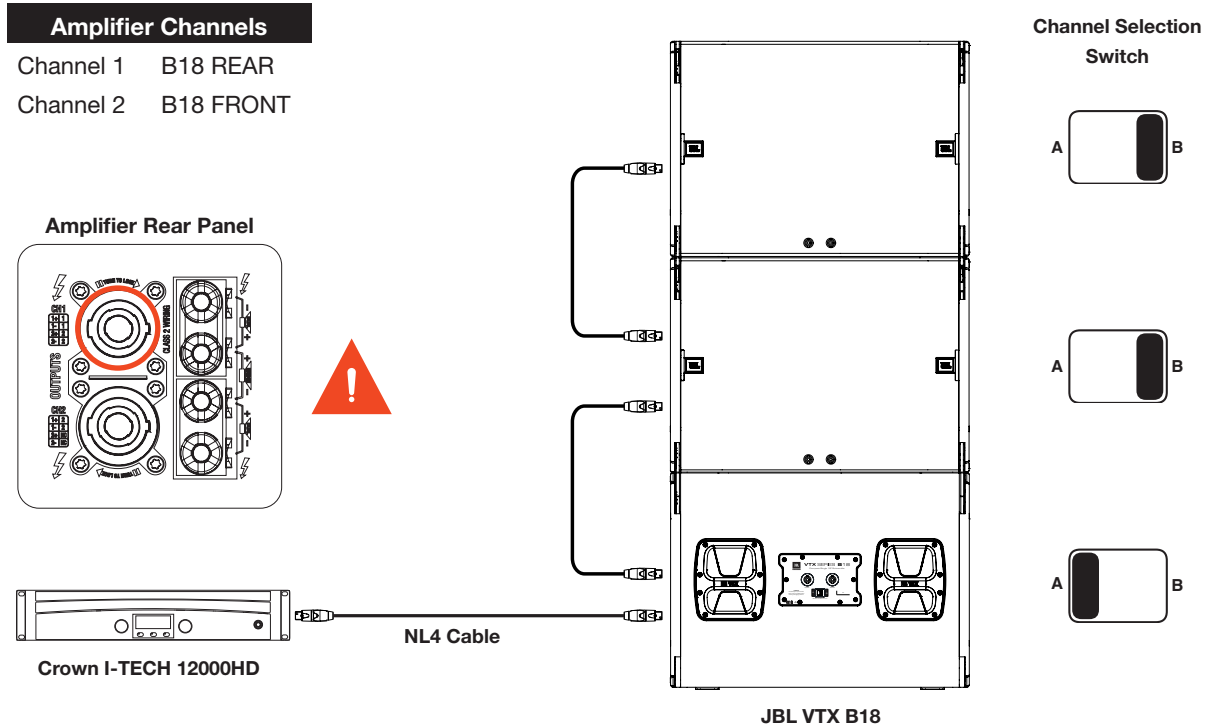
When using Crown I-Tech 12000HD amplifiers, up to four VTX B18 (two per channel) subwoofers can be powered by each amplifier. Based on B18 component resource requirements, this allows for optimum power-to-transducer ratio without compromising the maximum SPL capabilities of the system. The example below illustrates how to connect four VTX B18 cabinets to a two-channel I-Tech HD amplifier using standard four-conductor NL4 cables. One NL4 cable is used to connect the amplifier to the first B18 cabinet and then standard four-conductor NL4 jumpers are used to connect all the cabinets together. The channel selection switch at the back of each B18 is used to assign each cabinet to the appropriate amplifier channel. Two B18s are set to A (channel 1, pin 1) and two B18s are set to B (channel 2, pin 2).



CAUTION: In this configuration, only the Channel 1 NL4 connector can be used on the I-Tech 12000HD amplifier. The Channel 1 NL4 connector is wired to both Channel 1 and Channel 2, where Channel 2 connects only to Channel 2.

10.2 B18 USING CROWN I-TECH 12000HD (CARDIOID)

Cardioid configurations can be created using Crown I-Tech 12000HD amplifiers. In this case, any one of the amplifier channels can be set for cardioid using JBL Performance Manager software. Up to two forward-facing or two rear-facing B18s can be used per amplifier channel. When four-conductor NL4 cables are used, the B18 channel selection switch can be used to select which cabinet is driven by the cardioid channel. In the example below a 2:1 cardioid block of B18s is shown and powered by a single NL4 cable. In this configuration, the front grille NL4 connectors are used for wiring the rear facing B18 subwoofers.



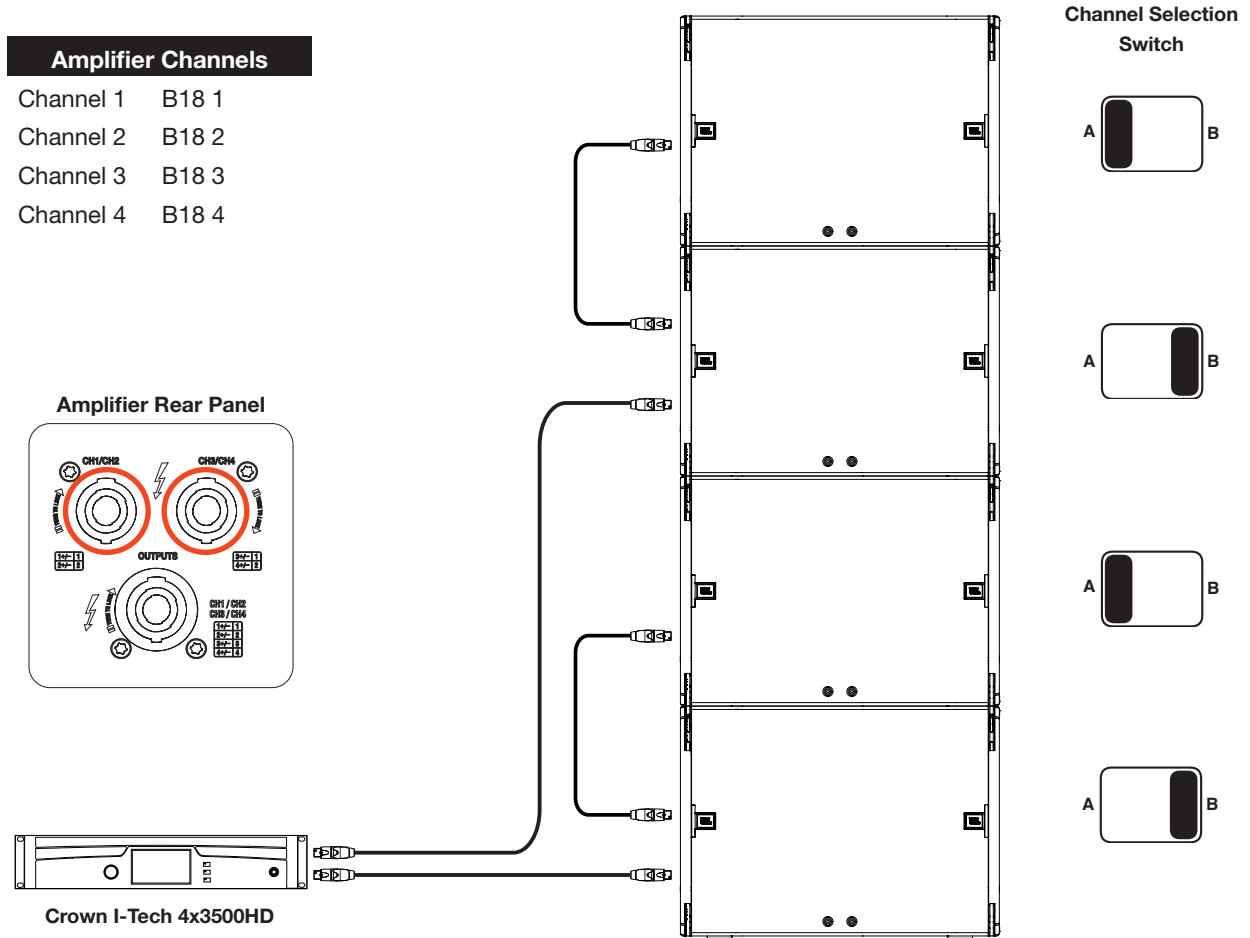
CAUTION: In this configuration, only the Channel 1 NL4 connector can be used on the I-Tech 12000HD amplifier. The Channel 1 NL4 connector is wired to both Channel 1 and Channel 2, where Channel 2 connects only to Channel 2.



TIP: Other channel assignments can be implemented when using the two-channel Crown I-Tech HD amplifiers. Use Performance Manager to assign speaker presets.

10.3 B18 USING I-TECH 4X3500HD

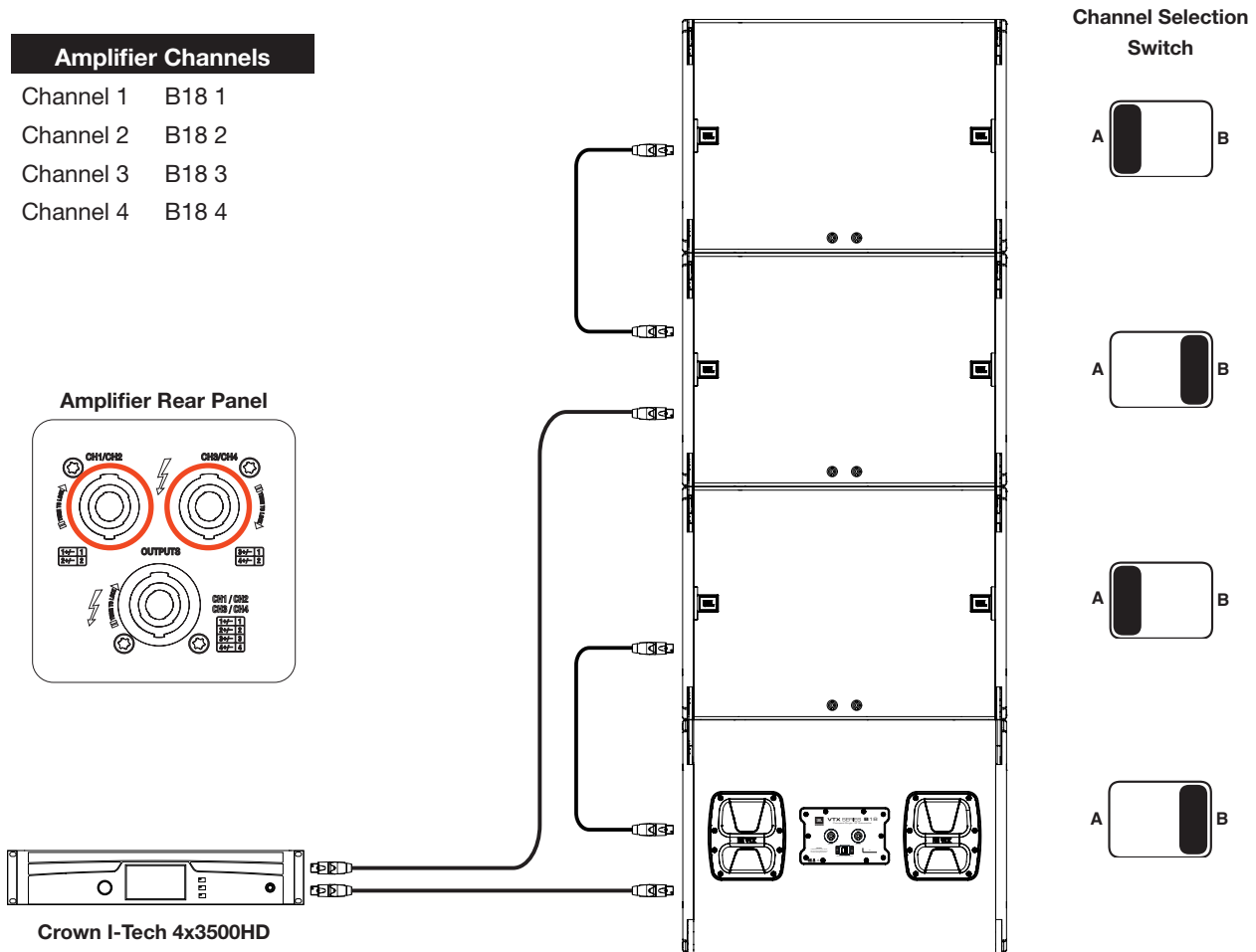
When using Crown I-Tech 4x3500HD amplifiers, up to four VTX B18 (one per circuit) subwoofers can be powered per amplifier. Based on the B18 component resource requirements, this allows for optimum power-to-transducer ratio without compromising the maximum SPL capabilities of the system. The example below illustrates how to connect four VTX B18 cabinets to a four-channel I-Tech HD amplifier using standard four-conductor NL4 cables. The channel selection switch at the back of each B18 is used to assign each cabinet to the appropriate amplifier channel.



CAUTION: Make sure the total number of VTX B18 enclosures per circuit/amplifier does not exceed the maximum number recommended.

10.4 B18 USING I-TECH 4X3500HD (CARDIOID)

Cardioid configurations can be created using Crown I-Tech 4x3500HD amplifiers. In this case, anyone of the amplifier channels can be set for cardioid using Performance Manager. Each amplifier channel is driving a single B18 enclosure and the channel selection switch at the back of the B18s can be used to assign B18 cabinets to the cardioid channels. In this configuration, the front grill NL4 connectors are used for wiring the rear-facing B18 subwoofers.



CAUTION: Make sure the total number of VTX B18 enclosures per circuit/amplifier does not exceed the maximum number recommended.

10.5 CROWN V-RACK

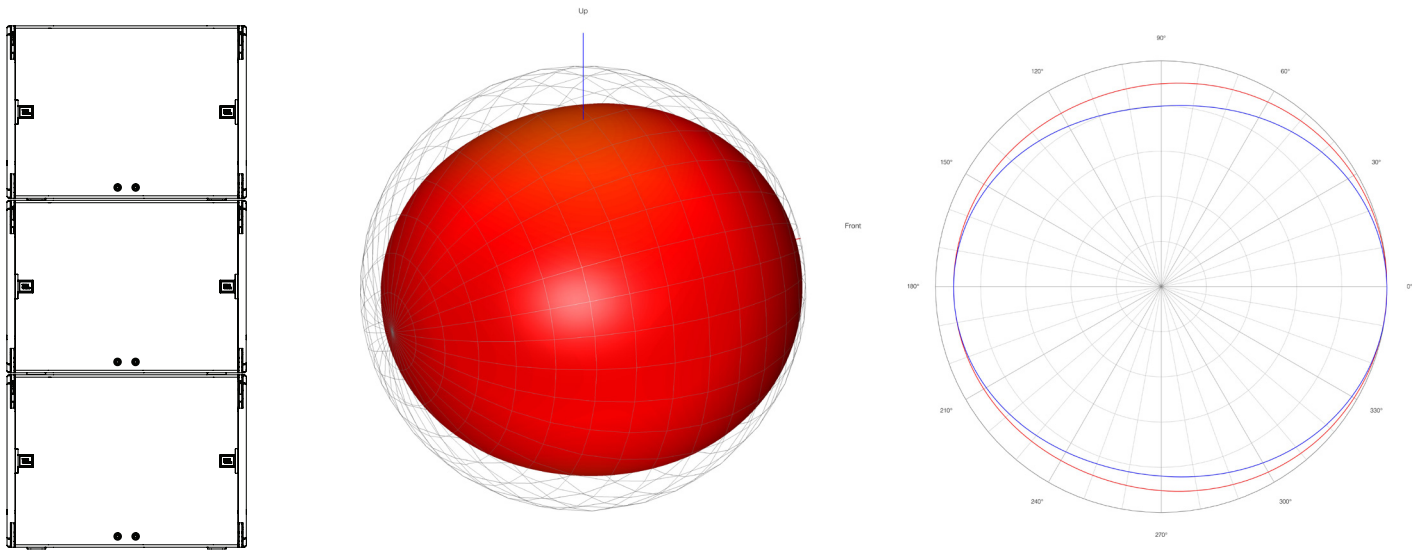
VTX series systems are compatible with the Crown V-Rack 12000HD and Crown V-Rack 4x3500HD touring racks. The number of supported cabinets per amplifier and wiring options remain the same as the Crown I-Tech examples illustrated in this document. For more information on Crown V-Rack products, refer to the **V-Rack User Manuals** and documentation.

11 - CARDIOID CONFIGURATIONS

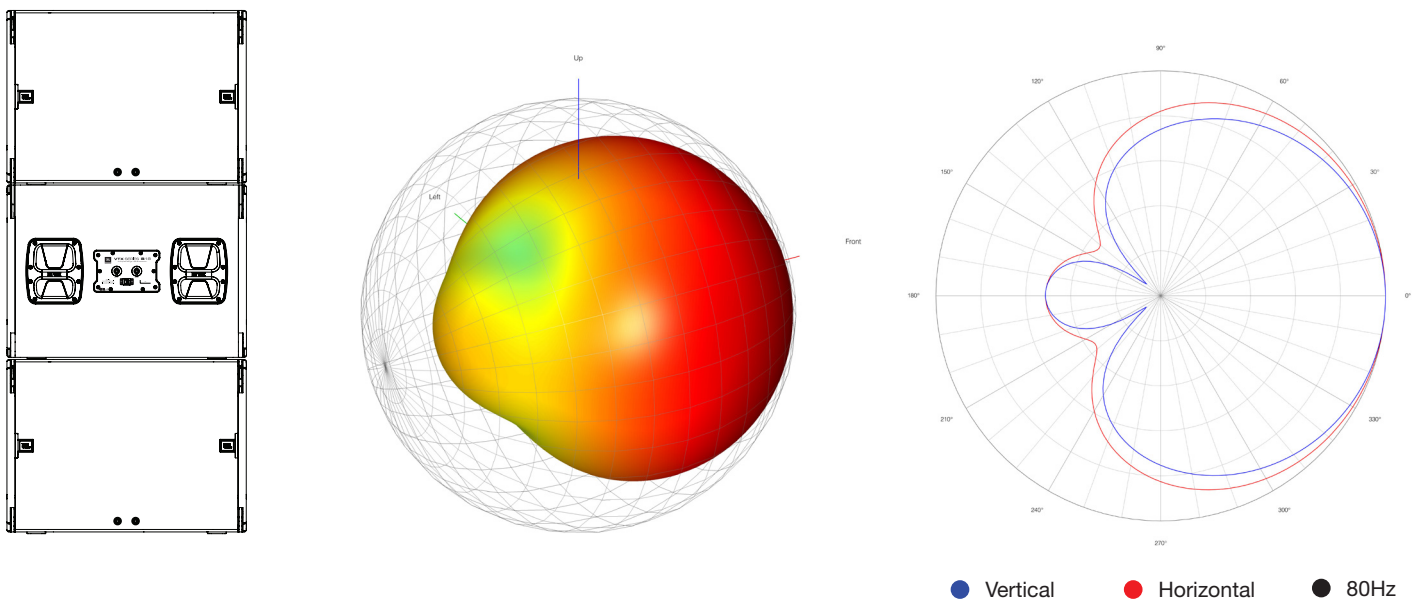
The directivity of a subwoofer is understood to be omnidirectional, meaning energy is produced equally in all directions. In reality, most subwoofers do exhibit some front-to-back directivity (about 1-3 dB, depending on the frequency) but not enough to have any meaningful impact. In some cases, the omnidirectional nature of subwoofers is desirable, but in other situations, more controlled (directional) coverage is appropriate. The most common use for directional subwoofer arrays is to reduce the amount of low-frequency energy on-stage. Two other typical uses are to avoid putting excessive low-frequency energy into a room or to control noise pollution in outdoor concerts situated near residential areas.

A single VTX B18 cabinet radiates omnidirectionally, but cardioid coverage can be achieved by a B18 array in which the physical orientation of some cabinets is reversed and an appropriate amplifier preset selected.

Example 1 : Three VTX B18s in omni-directional mode (forward facing)



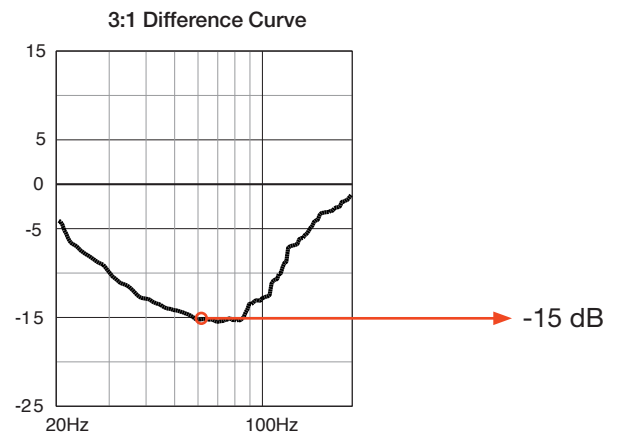
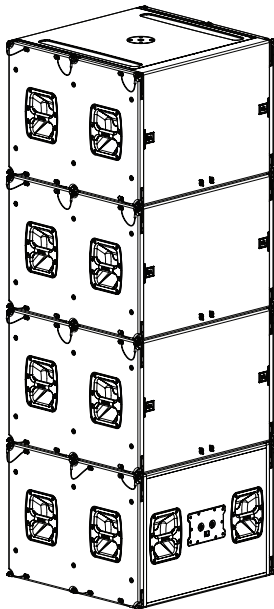
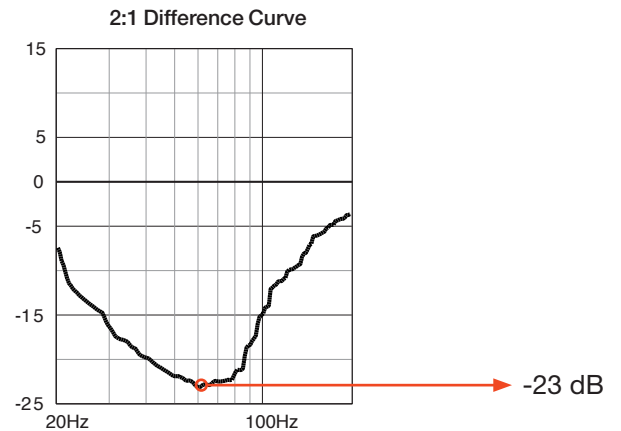
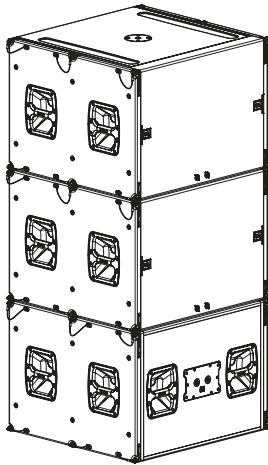
Example 2 : Three VTX B18s in cardioid mode (front-rear-front)



11.1 GROUND STACKED CARDIOID CONFIGURATIONS

B18 subwoofers can be used in a variety of ground-stacked cardioid configurations, depending on available space and the number of cabinets. The main difference between these configurations is the front to back subwoofer ratio. A ratio of 1:1 indicates that there is one rear-facing subwoofer for every front-facing subwoofer, while a 3:1 ratio utilizes one rear-facing B18 for every three front-facing B18s. All configurations use the same cardioid amplifier preset (i.e. VTX B18 80 REAR), which means that the amount of rear rejection is controlled by the front-to-back ratio. Lower ratios produce greater rejection, higher ratios yield less rejection.

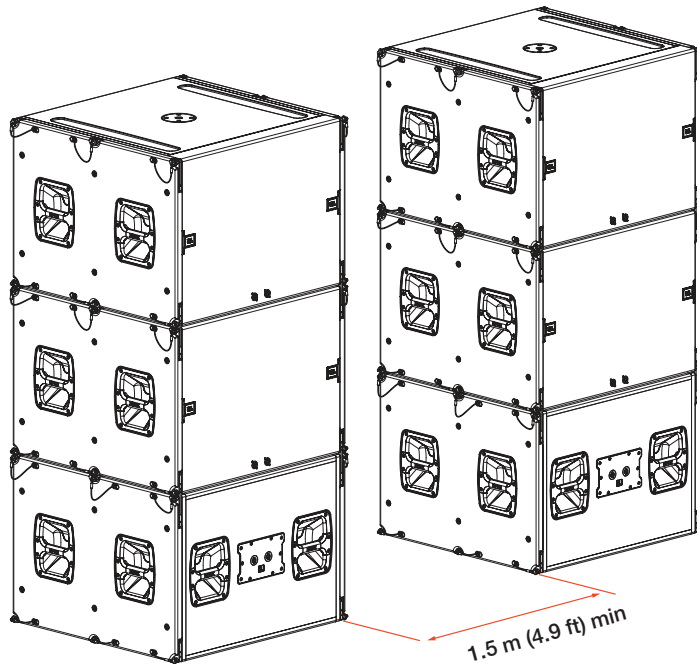
Below are illustrations of front-to-back level difference curves for the two most common B18 cardioid configurations: 2:1 and 3:1. The 2:1 ratio produces a full 23dB of rejection at 50 Hz, the lowest point in its curve, while a 3:1 ratio produces a maximum of only 15dB of rejection. Either configuration can offer excellent results, the characteristics of which depend on whether two-channel or four-channel amplifiers are used and the quantity of available subwoofers. **A 1:1 ratio generally should be avoided.**



CAUTION: The level of the rear-facing subwoofers is carefully selected to allow B18 cardioid arrays to reach MAX SPL without dynamically compromising low-frequency directivity. Do not adjust this level.

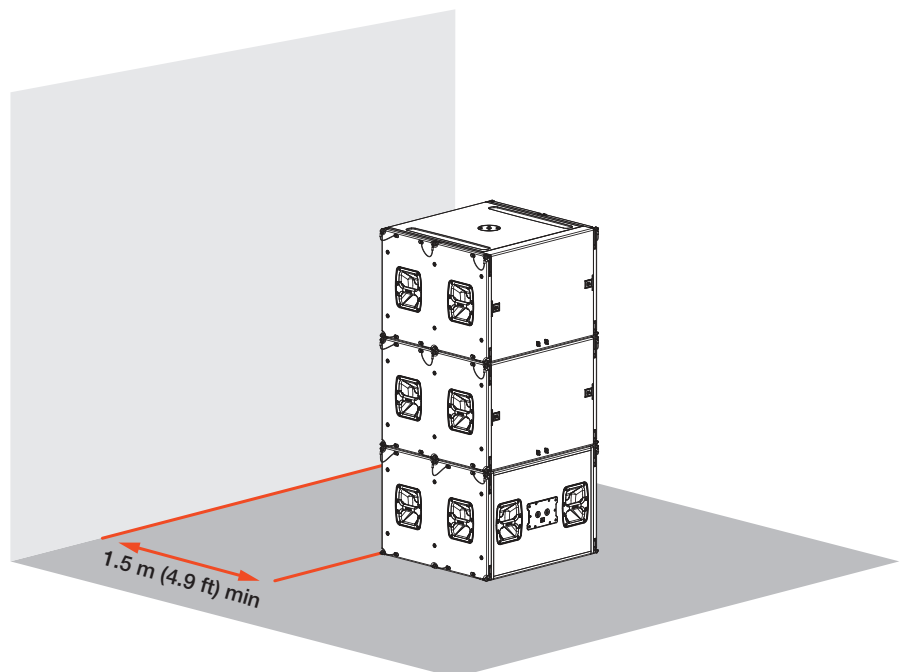
11.2 MINIMUM SPACE BETWEEN CARDIOD STACKS

When creating large subwoofer arrays using cardioid blocks of B18 subwoofers, some space should be allowed between the stacks to maximize rejection directly behind the array. Allow a minimum distance of 1.5 meters (4.9 feet) between stacks.



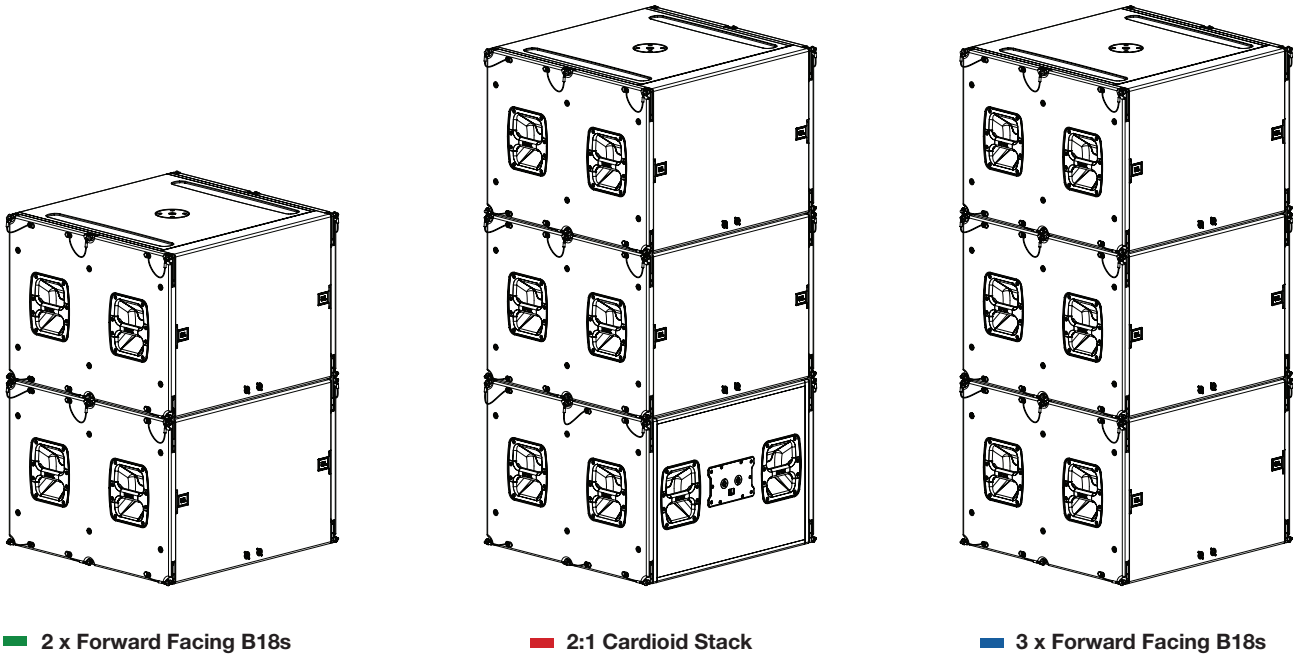
11.3 MINIMUM SPACE FROM A WALL

When cardioid subwoofer stacks are placed in front of a solid structure like a concrete wall or solid stage, a minimum of 1.5 meters (4.9 ft) should be provided behind the array to allow the cardioid effect to develop.



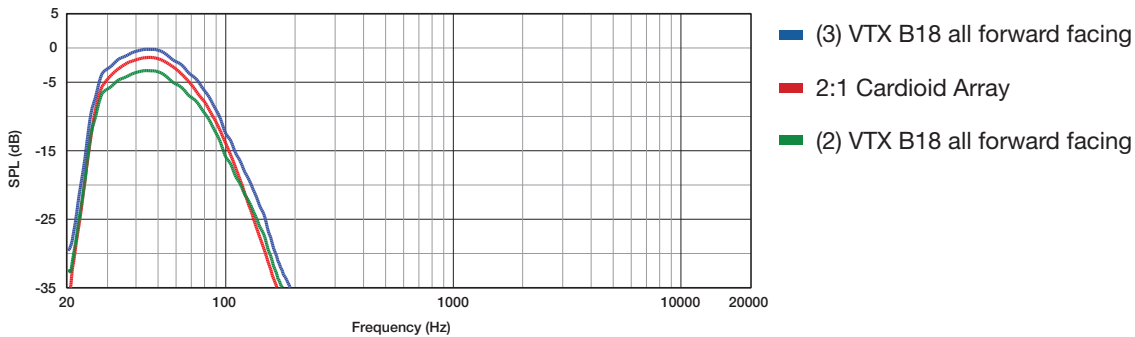
11.4 CARDIOID VERSUS OMNI - SPL DIFFERENCES

Cardioid stacks are not lossy. Using the proper JBL preset, rear-facing subwoofers not only reject sound at the back of an array they also contribute positively to the sound pressure at the front of the array, though not as much as an array in which all subwoofers face forward.



The curves below compare the performance of the three examples illustrated above. The 2:1 cardioid stack produces marginally less SPL than the all-forward stack of three cabinets (about 1 dB), but significantly more SPL than the stack of two forward-facing cabinets. This shows that cardioid arrays actually redirect energy from their rear to their front.

B18 SPL: Cardioid versus all-forward (measurements taken at 10 meters)



TIP: The point of maximum rejection of a cardioid stack is about 3 meters (9.8 ft) behind the array.

12 - FLOWN CARDIOID CONFIGURATIONS

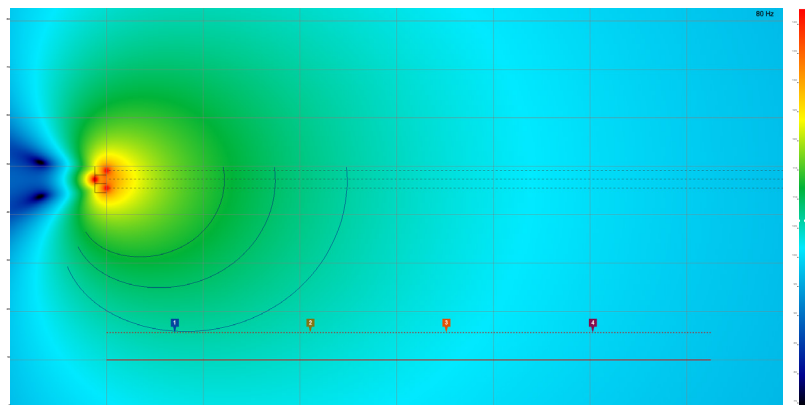
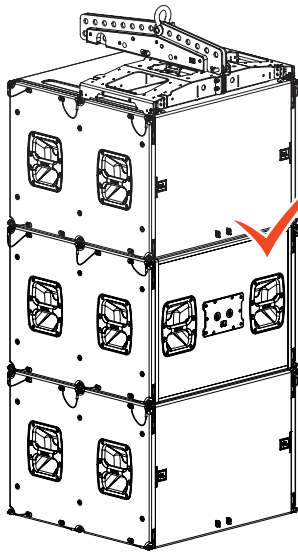
B18 subwoofers can be suspended in cardioid configurations using VTX A8 suspension accessories like the VTX A8 AF Array Frame, the VTX A8 MF Mini Frame or the VTX A8 SB Suspension Bar. This chapter outlines best practices for using the B18 in flown cardioid configurations.

12.1 ARRAY CONFIGURATIONS

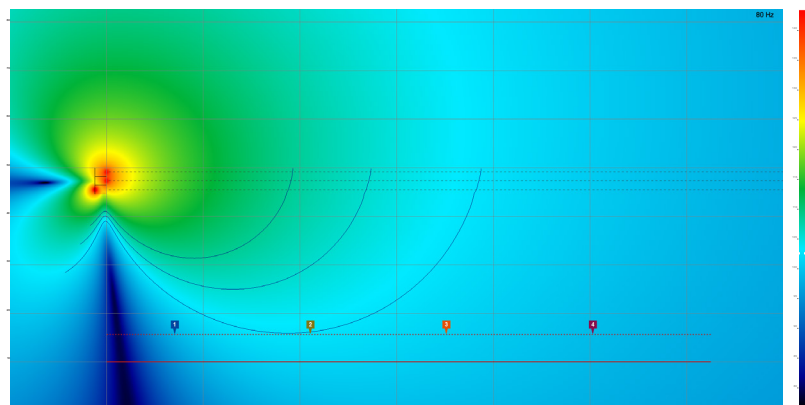
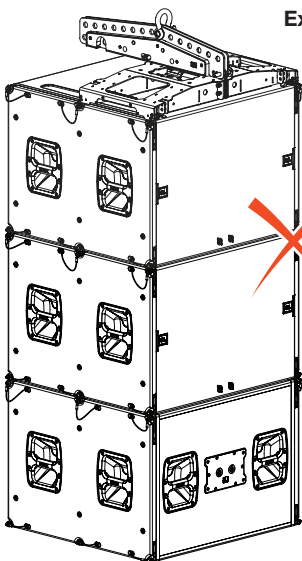
When used in flown cardioid configurations, B18s should be used in blocks of three or four, and when possible, in arrangements that are symmetric, top to bottom. Symmetry ensures that the pattern produced by the array is axially symmetric with the physical array, allowing for more predictable aiming and coverage. Non-symmetric arrangements can be created, but should always be modeled in LAC-3 first to ensure that the none of the audience sits in the array's cancellation areas.

The example below contrasts the standard cardioid coverage of an F-R-F array with that of a potentially problematic F-F-R array. The SPL maps show that the F-F-R array, with a rear-facing subwoofer at the bottom, tilts the front coverage upwards and places a rejection zone where audience areas can fall within it.

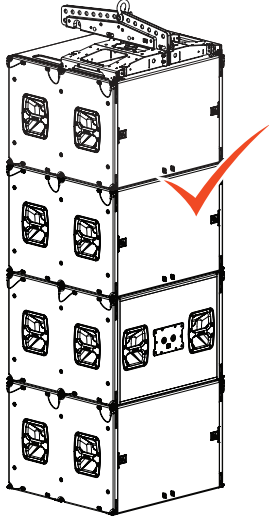
Example 1: (3) VTX B18 symmetrically arranged (front-rear-front)



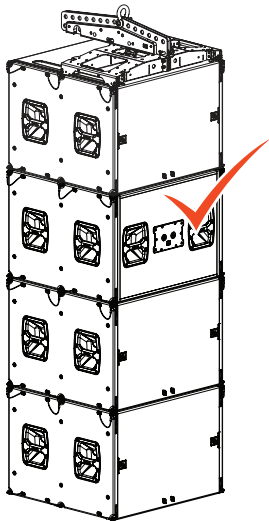
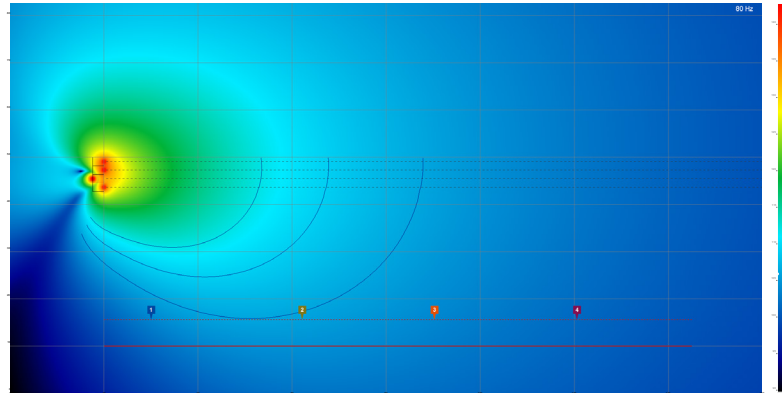
Example 2: (3) VTX B18 in an asymmetric configuration (front-front-rear)



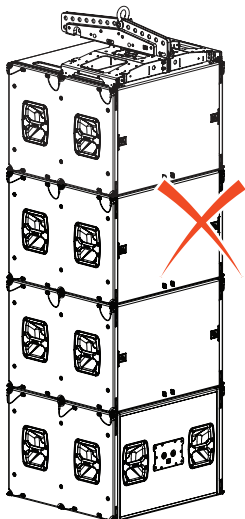
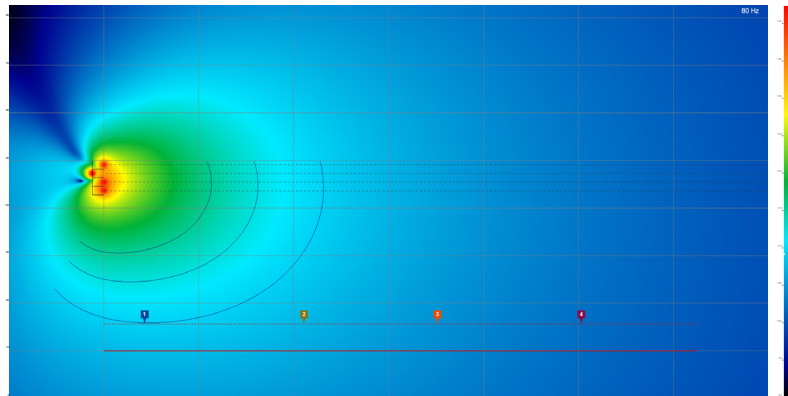
In some cases, non-symmetric arrays have to be used, especially when the arrays are arranged in blocks of four cabinets each. In these cases, the coverage produced is always biased towards one direction, but strategic selection of placement can help shape the coverage to the specific need. As can be seen in the examples below, placing a rear-facing subwoofer at the bottom of an array is the least effective. Rear-facing subwoofers can be placed at the top of an array to keep energy off the ceiling.



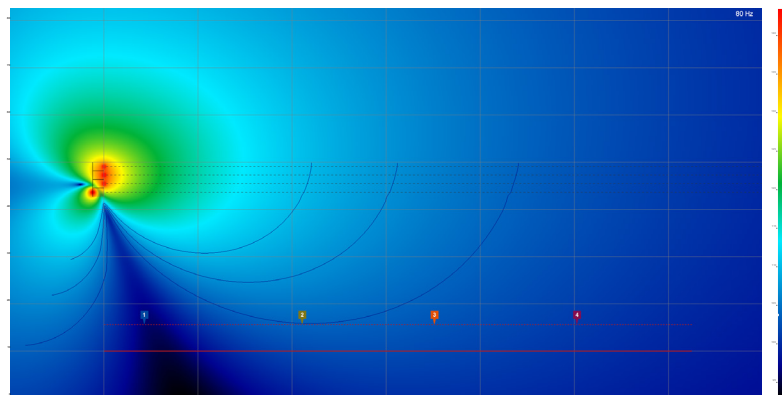
Example 3: Block of four B18s (F-F-R-F) 80 Hz



Example 4: Block of four B18s (F-F-F-F) 80 Hz



Example 5: Block of four B18s (F-F-F-R) 80 Hz

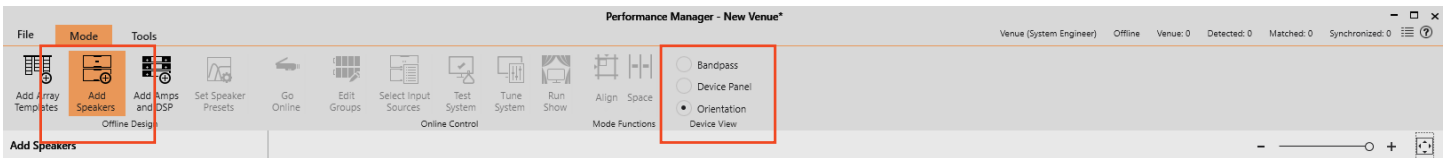


13 - CARDIOID PRESETS IN PERFORMANCE MANAGER

Performance Manager can be used to select the appropriate factory preset for any subwoofer configuration. Using Performance Manager, cardioid presets can be freely selected on a per amplifier channel basis to match the required configuration and layout.

STEPS:

- 1 Choose Add Speakers under the Mode menu and drag the needed quantity of B18s to the venue display.
- 2 Set Device View to “Orientation.”
- 3 Click the “R” (REAR) button to reverse orientation, or the “F” (FRONT) button to restore normal orientation.
- 4 Set Device View back to “Bandpass.”



Performance Manager chooses the factory preset appropriate to the selected orientation and assigns it to the amplifier channel driving the selected B18. When B18s are grouped on one amplifier channel, a single F/R switch is presented for the group. Performance Manager can import cardioid arrays created in Line Array Calculator 3 software, retaining all relevant parameters.



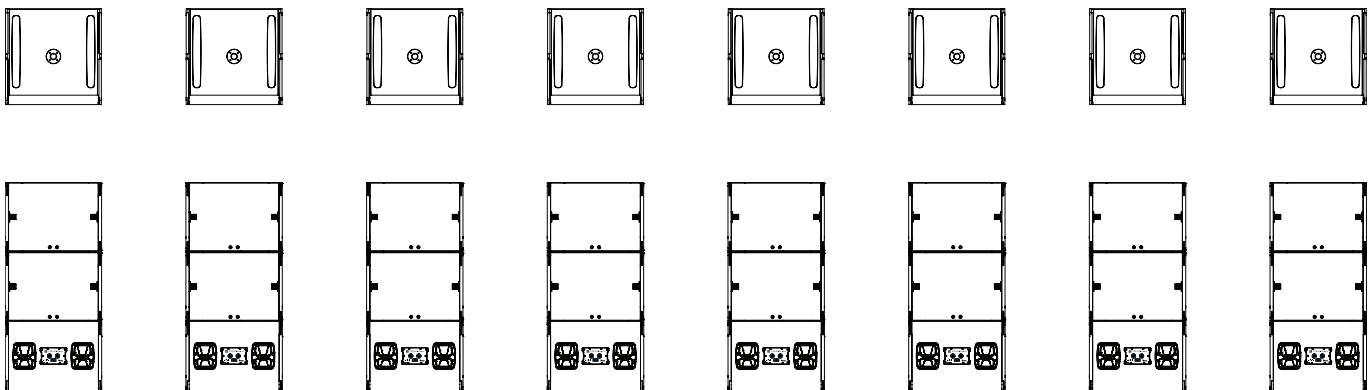
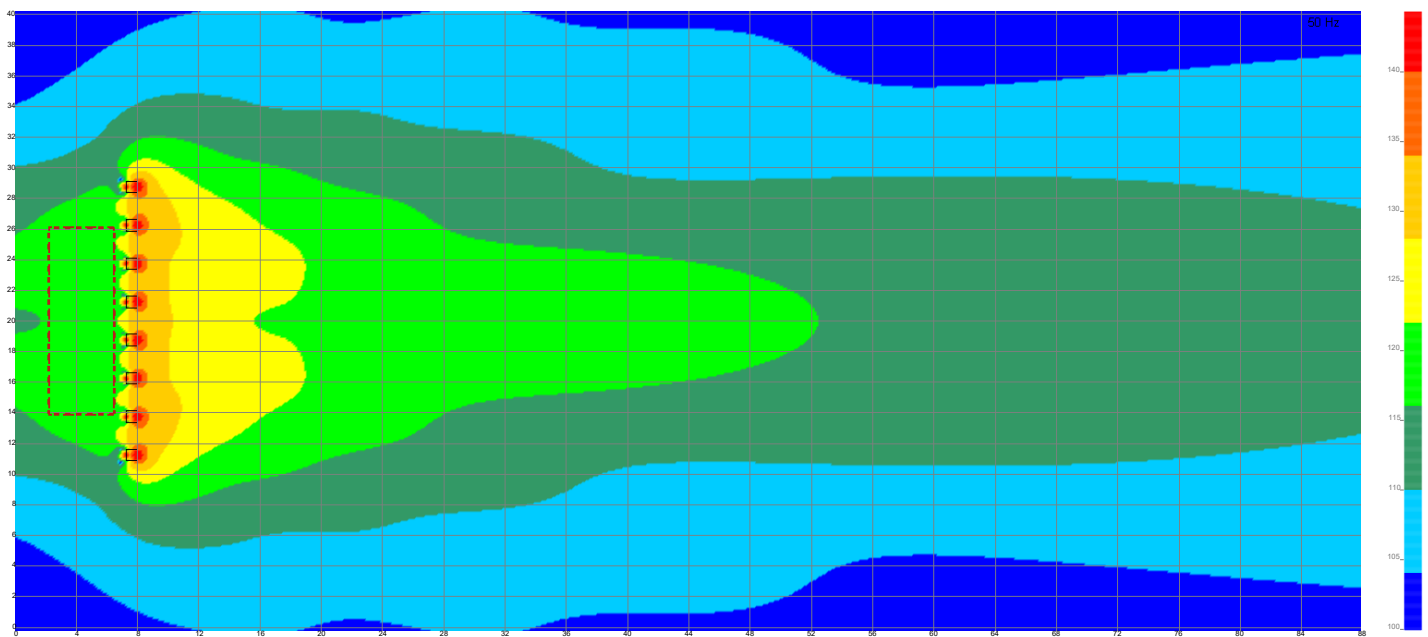
TIP: The latest versions of Performance Manager and Line Array Calculator can be downloaded from www.jblpro.com directly or by choosing the Check for Updates command in the File menu.

13 - ELECTRONIC DELAY STEERING (EDS)

The longer a loudspeaker array is, the narrower the coverage it provides. When a large horizontal subwoofer array is used, its overall size can negatively impact its coverage. Electronic Delay Steering (EDS) is a technique used to electronically widen the coverage pattern of a subwoofer array into a virtual arc by applying a specific, precalculated delay value, based on the radius of the arc, to each subwoofer enclosure. EDS-enhanced cardioid subwoofer arrays provide even horizontal coverage with 15–25 dB of broadband SPL rejection behind the array.

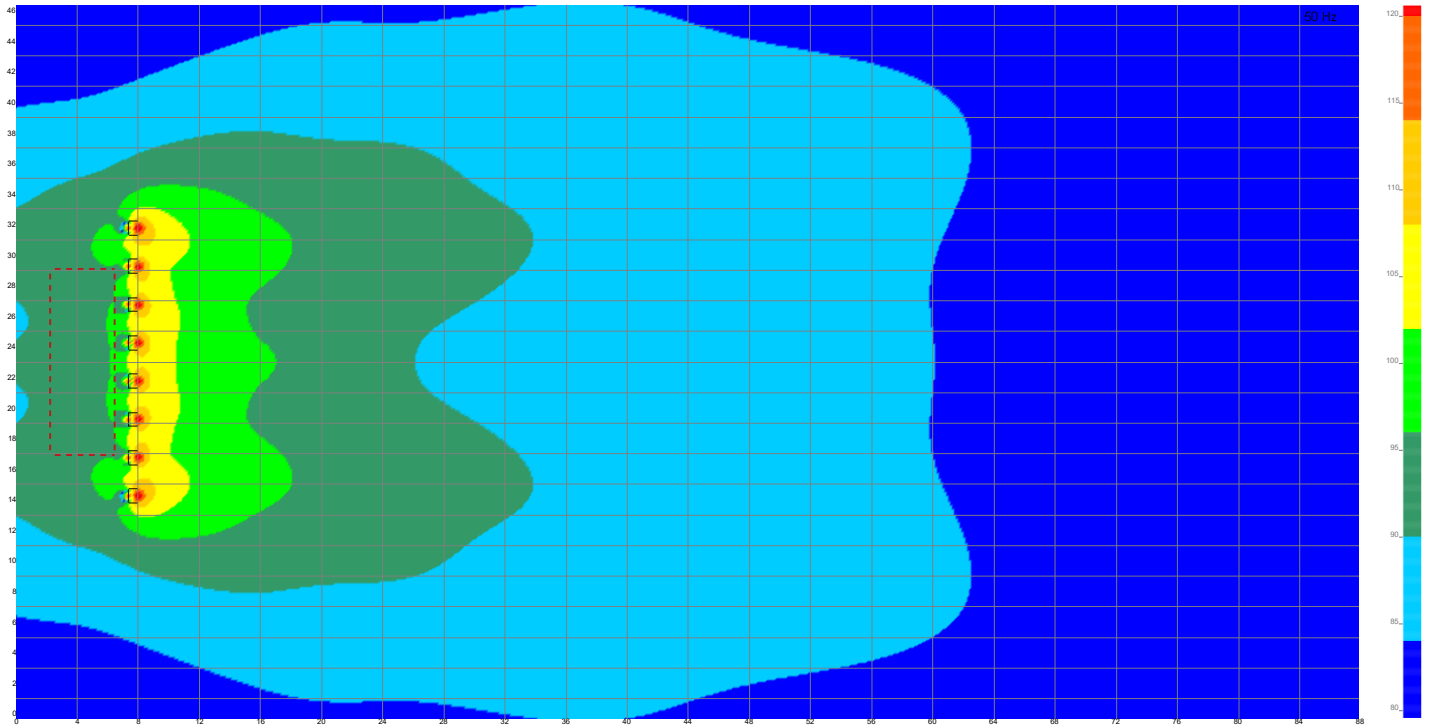
13.1 EDS EXAMPLE - NO DELAYS

The figure below shows the unaltered coverage of a horizontally distributed array of B18 subwoofers. Each cluster consists of three B18 enclosures, with the bottom B18 facing backwards to create a 2:1 cardioid configuration. The center-to-center spacing of the array is calculated at 2.5 m (8.2 ft), making the total length of the array across all cabinets 18.3 m (60 ft) from the array’s leftmost cabinet edge to its rightmost edge. The large size of the array increases its directivity, reducing coverage in the center of the venue. The SPL Mapping below, generated in LAC-3, demonstrates the array’s coverage at 50 Hz.

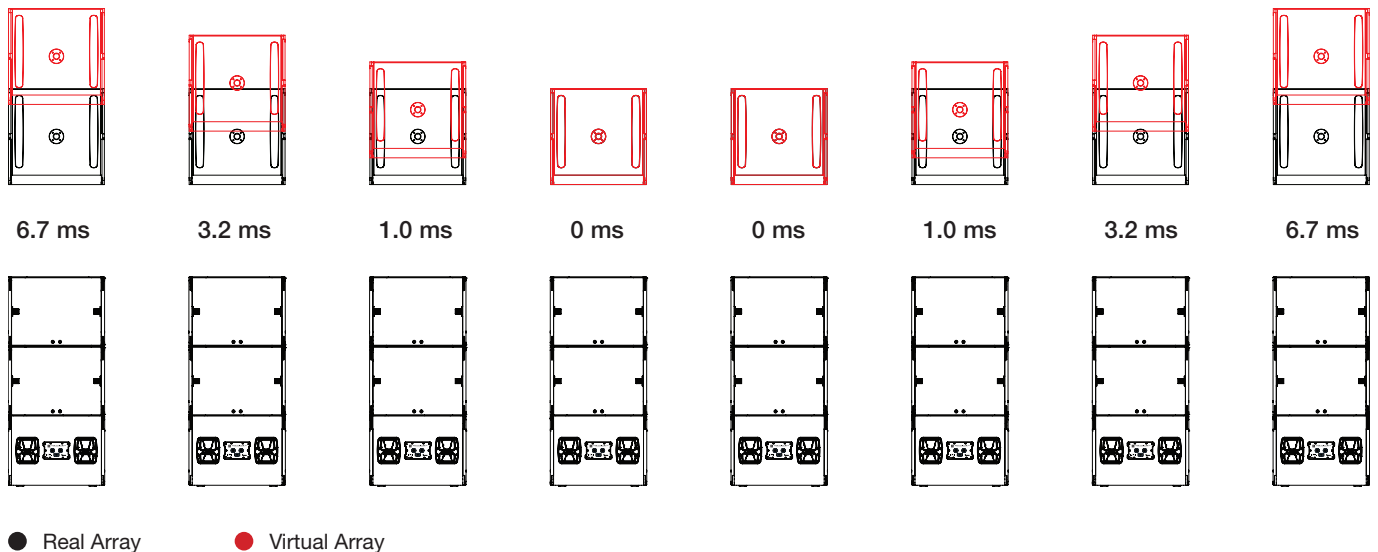


13.2 EDS EXAMPLE - WITH DELAYS

The delay calculation function of LAC-3 can generate delay values for each B18 cluster that electronically “curve” the array to a pre-determined angle that “opens” its coverage wider. Delay values generated by LAC-3 for an opening angle of 60 degrees produce array coverage as shown in the SPL map below. As can be seen, the widened coverage reaches more parts of the venue.



The illustration below shows the delay values generated by LAC (for a 60° angle) and the “virtually” arced array based on the delays. Delay values for different coverage angles and cluster spacing can be generated in LAC-3. Care should be taken not to steer an array so strongly that it significantly reduces energy at on-axis positions.



14. TESTING VTX B18

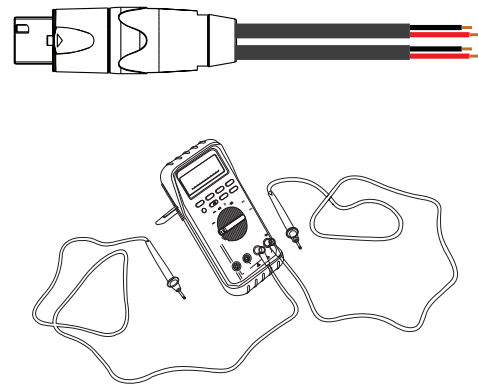
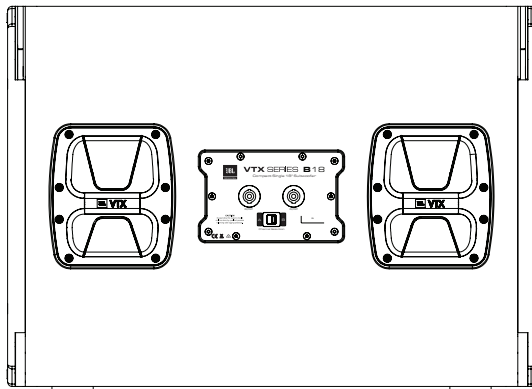
Speakers need to be periodically checked and maintained in order to assure long-term performance and reliability, and the VTX B18 is no exception. While the system is designed for the utmost reliability, it is important to confirm that the system is operating within specified tolerances to ensure optimal performance for years to come. Below are two methods that can be used to check and verify proper transducer performance in a VTX B18 system.

14.1 USING A DMM (DIGITAL MULTIMETER)

This method is best suited for when the speaker system is in the shop. A DCR (DC resistance) test with a multimeter can give a very accurate reading of how many transducers are properly wired together and operating within their standard tolerances. This test is appropriate for individual boxes, not groups.

With the B18 speaker unplugged from any amplifiers, set a DMM to the resistance (Ω) setting and place the probes across the Pin1+/- and Pin 2+/- leads. Record the values indicated on the DMM for each pair of leads and refer to the chart below to either confirm correct readings or investigate out-of-tolerance DCR readings.

	B18	
	DCR	Tolerance
B18 functioning	4.5 Ω	+/- 0.5 Ω
Driver shorted	0.2 Ω	-



Notes:

- The DCR numbers listed above assume cold (room temperature) transducers. If measurements are taken right after use, when the transducers are warm, the values will vary from those given above. For best results, test the speakers cold.
- The DCR value of a transducer gives an accurate representation of its electrical state. Mechanical defects are not characterized by this test. Refer to the VTX B18 Service Manual for instructions on diagnosing mechanical problems by performing a rub and-buzz test using a sine wave generator.

14.2 USING PERFORMANCE MANAGER

When in the field, the **Test System Mode** in Performance Manager can be used to test an A8/B18 system. This test method is quick and especially useful for determining whether all speaker cables, including cabinet-to-cabinet NL jumpers, are properly functioning.

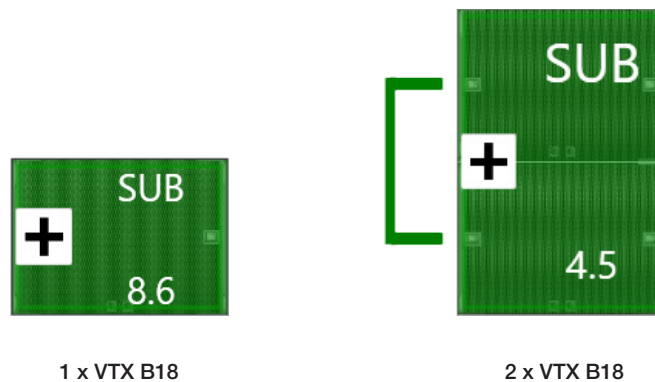
To perform the test, Performance Manager uses the I-Tech HD's built-in noise generator in conjunction with the amplifier's current draw and voltage sensing capabilities to generate a nominal load impedance reading for each amplifier output channel. Since broadband pink noise is used as the test stimulus, the returned value is considered to be an impedance value, and it will differ from the DC resistance values given earlier in this document.

STEPS:

- Make sure Performance Manager is online and connected to the devices.
- Navigate to the Test System Mode and make sure all the speakers are muted,
- Switch the Noise Generator to the ON position and change the level to a value between -30 dB and -10 dB. Values lower than -30 dB may not be sufficient to trigger a reading.
- Unmute the speaker or a bandpass to start the measurement. The measured value is displayed on the speaker icons.

14.3 PERFORMANCE MANAGER READINGS

Below are the expected impedance values for circuits of B18 cabinets. The measurements below were taken at room temperature with a cable length of 25 m (82 ft). Acceptable tolerance is +/- 0.5 Ω .



Variances in temperature, cable length, wire gauge, and usage, make the measurements recorded by Performance Manager more susceptible to drift. However, environmental variations like temperature are common across all similar circuits of a system. More important than the individual component values is consistency across similar circuits. For example, all two-box circuits for an array should measure similarly. If one circuit differs by several ohms, there is likely something wrong with that specific circuit.

15 - SPECIFICATIONS

15.1 VTX B18

SYSTEM

Frequency Range (-10 dB) : 28 Hz - 80 Hz (Preset: VTX B18 80)

Coverage Pattern Options¹ : Omni-directional or Cardioid

System Input Power Rating² : 1300 W Continuous (IEC/100 hour)

Maximum Peak Output³ : 135 dB (Preset: VTX B18 80)

System Amplification : Crown I-Tech 12000HD
Crown I-Tech 4x3500HD

Required Amplifier Channels : 1

Number of Cabinets per Amplifier

IT-12000HD : (4) VTX B18

IT-4x3500HD : (4) VTX B18

System Impedance⁴ : 8 ohms

TRANSDUCERS

Low Frequency : (1) JBL 2288H, 18 in diameter, dual 4 in diameter voice coil, neodymium Differential Drive

ENCLOSURE

Construction : 24 mm 18-ply and 18 mm 13-ply Finnish birch plywood, Black DuraFlex™ finish, six integral recessed handles

IP Rating⁵ : IP55 (IEC 60529)

Suspension : High-grade steel with anti-corrosion coating, captive suspension plates, quick-release pins, spring-loaded mechanism

Grill : Powder-coated 1.5mm (16-gauge) hex-perforated steel with acoustically transparent black cloth backing

Connectors

Type : (4) Neutrik® speakON® NL4

Pin Assignments : Selectable between Pins 1 ± and Pins 2 ±

Dimensions (H x W x D) : 552 mm x 761 mm x 737 mm
21.7 in x 29.9 in x 29 in

Net Weight : 68 kg (150 lbs)

Footnotes:

1: Based on speaker preset selection and cabinet orientation/configuration.

2: IEC Standard: IEC shaped noise with 6 dB crest factor based on nominal impedance and a duration of 100 hours. Continuous is defined as 2x RMS.

3: Peak, unweighted SPL, measured under half-space conditions at 1 meter using broadband pink noise with a 12 dB crest factor and specified preset.

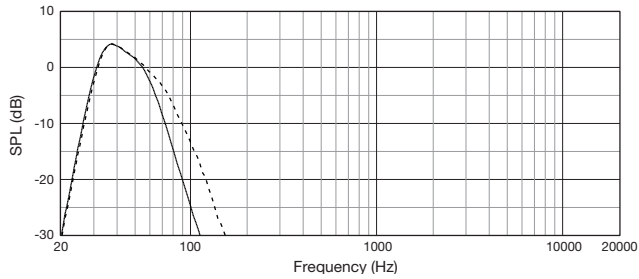
4: Nominal impedance within the stated frequency range of the product. Minimum impedance is 5.6 Ω at 150 Hz.

5: Front face at 0 degree or greater down angle to allow the cabinet to drain water. Suspension components fully weather rated for indoor or covered outdoor conditions where humidity is nominally under 50% and not local to bodies of corrosive materials.

JBL continually engages in research related to product improvement. Some materials, production methods and design refinements are introduced into existing products without notice as a routine expression of that philosophy. For this reason, any current JBL product may differ in some respect from its published description, but will always equal or exceed the original design specifications unless otherwise stated.

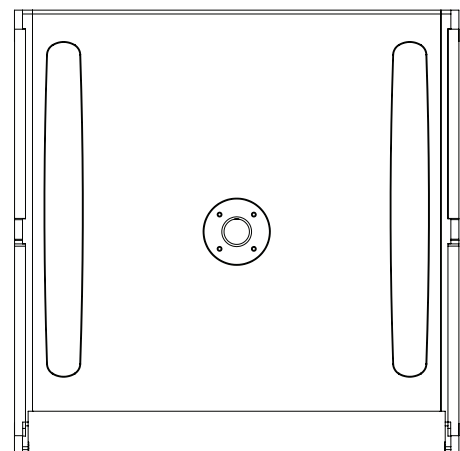
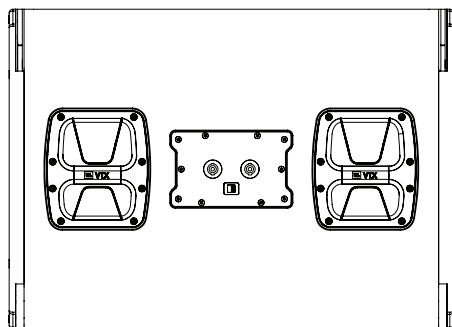
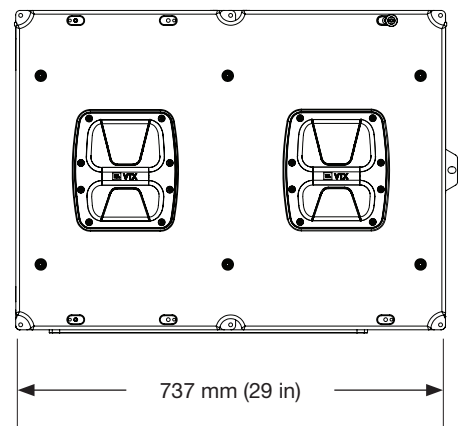
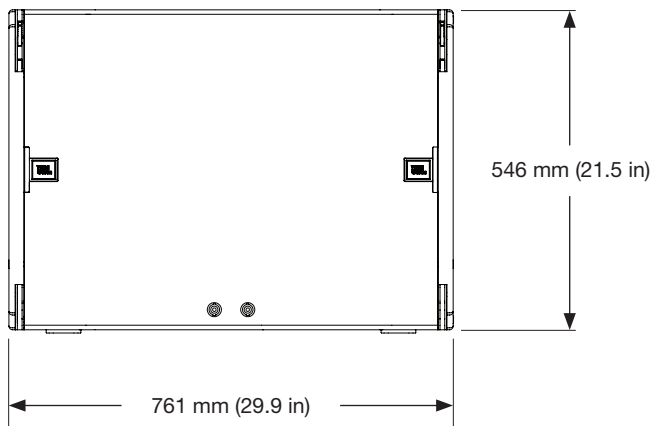
16 - ACOUSTIC MEASUREMENTS

FREQUENCY RESPONSE



— VTX B18 60 - - - VTX B18 80

17 - DIMENSIONS



18 - CONTACT INFORMATION

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