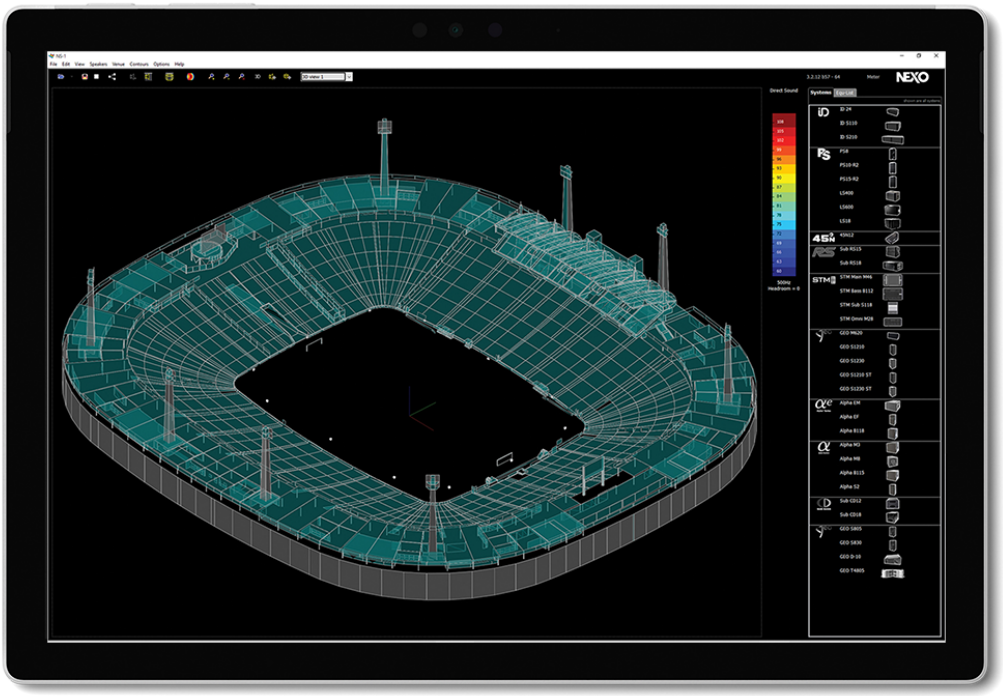
NS-1

NEXO

DP4100-02b-MG

NEXO NS-1

System Configuration Software



User Guide v3.3 for Windows

INTRODUCTION

NS-1 software is a R&D simulation tool. It processes measured speaker data with complex mathematical algorithms to predict and visualize the direct sound field in the venue. *NS-1* supports the whole range of NEXO speakers - standard cabinets, GEO-Tangent Arrays and subs. *NS-1* is designed with the intention to help setting up a venue. Its architecture of the desktop is by design kept as simple as possible helping the sound-engineer to focus on producing a balanced sound reinforcement.

GEO Tangent Arrays

Special tools assist the user in designing vertical *GEO Tangent Arrays* that provide even SPL throughout the depth of the audience. Due to the complexity of the interaction of multiple cabinets, it is simply not possible to reliably design curved vertical arrays without using the processing power of a computer to predict the optimum array structure for a given audience geometry. The design logic is far more complex than looking at a section-drawing of the venue, measuring the overall angle needed to cover the audience from the cluster location, and dividing by 5 degrees to determine the required amount number of, say, S805 cabinets.

NS-1 is an easy to use tool that allows to shape the energy leaving the cluster to fit the audience. It predicts pressure levels radiated from the system to ensure enough cabinets are provided for the application, as well as mechanical constraints for safe flown systems.

In addition, it provides mechanical information for all clusters in agreement with Structural Analysis Reports (available via the Help-menu): dimensions, weight, gravity center position, forces, moments, working load and safety factor. Geo S8, Geo 12, Geo D and Geo T Structural Analysis Reports have been validated by German Certification Organization RWTUV Systems GmbH.

Please check the NEXO Web Site periodically for upgrades at www.nexo-sa.com

Any question or bug report please contact info@nexo.fr

NEXO S.A.

WHAT'S NEW?

NS-1, 3.3.2, 06.01.2020

- Added Plus Series P8, P10, P12 and L15.
- Export individual speakers to dxf (Speakers > Export as dxf).
- Export whole scene to dxf, including speakers or not (Venue > Export Venue…).
- Updated mechanical calculations.
- Other bug fixes and improvements.

NS-1, 3.3.1, 21.01.2019

- Added GeoM12 Series.
- Updated mechanical calculations.
- Other bug fixes and improvements.

NS-1, 3.2.12, 20.03.2018

- Maintenance

NS-1, 3.2.12, 14.07.2017

- Maintenance
- White desktop schema

NS-1, 3.2.12, 23.01.2017

- Geo M10 Series
- Mechanical calculations updated

NS-1, 3.2.12, 22.09.2016

- Sub Delay Dialog (horizontal arrays)
- ID 24 Series
- Mechanical calculations updated
- Duplication updated
- Graphical editing updated

NS-1, 3.2.12, 09.07.2014

- STM M28
- Geo M6
- Updating STM mech calculations for all configurations
- Venue entry mode

NS-1, 3.2.7, 23.09.2013

- Range-Finder support
- Updating Geo S12 + LS18
- Maintenance of code-base

NS-1, 3.2.4, 10.01.2013

- Adding setups
- Updating STM line array clusters
- Mechanical calculations for STM line array clusters

NS-1, 3.2.3, 28.09.2012

- Adding STM line array cluster.
- Adding Setup support.
- Changing type of speaker at position and restoring.
- Modification of SPL-field-calculations.

NS-1, 3.1.0, 16.01.2012

- Adding stage monitor 45N12.
- Adding venue-import from 3D-CAD (such as for SketchUp, 3D-Systems, etc)
- Scaling of whole venue.
- Parallel processing of SPL-field-calculations.

NS-1, 3.0.9 b1, 20.07.2011

- Rotating PS-Horn.
- CDD for Geo S8 and S12 in single speaker configuration.
- Left and right directivity configuration on GeoD and Geo S12 fixed.
- Enhancement of venue-import (convex-shapes etc)
- Minor bugs fixed.
- Release Code abandoned.

NS-1, 3.0.8 b1, 26.10.2010

NS-1, 3.0.7 b29, 10.09.2010

- Fixed directivity.
- Venue Vertices Dialog with more than 4 points.
- Help files updated.
- Many minor bugs fixed.

NS-1, 3.0.7 b27, 30.07.2010

- Added shadow effect of obscuring venue-planes.
- Added enable/disable saving of field-calculations.
- Changed Venue/Copy as Picture to black on white.
- Changed delay value entry in milli second.
- Update Release Code dialog.
- Bug fixes

NS-1, 3.0.7 b25, 05.05.2010

- Fixed radiating lines in delay-cluster dialog.
- Fixed laser-beam pointing to the rear.
- Fixed and updated mouse selection. Now it selects the most front venue-item or speaker. Speakers are selected first.
- Some minor issues.

NS-1, 3.0.7 b24, 30.04.2010

- Fixed saving venue bug.
- Provided "Sampling distance" in Contour Dialog. If left empty the default value is used.
- Made default value for Sampling Distance dependent on total horizontal size of venue.

NS-1, 3.0.7 b22, 29.04.2010 and before

- Bug in mechanical pages fixed.

NS-1, 3.0.7 b20, 23.04.2010

- Fixed enabling Release Code menu.
- As most clients had already NS-1.exe installed this bug did not surface, because the menu-bug was present only in the recent version.
- Inversed orientation of faces in Venue Export for Ease Face files (xfc) as David suggested.
- Implemented Venue Export for Ease Face files (xfc) (see Menu Venue/Export Venue)
- Changing units fixed.
- Speaker height reference for horizontal clusters adjusted.
- Geo radiation symmetry implemented (case 47). Is now a general feature and can be controlled from database, for example excluding GeoT.
- Grid in venue-side-display in Geo clusters (case 44).
- Wmf in mech pages corrected (case 47).
- Legends of contour-calculation added.
- RS equipment list corrected.
- RS18 cluster and files added.

- … and on and on and on …

GETTING STARTED

NS-1 helps you in designing the venue acoustically. When you first start NS-1, the default project is opened. The default project includes a venue, a range of Geo Line-Arrays and simple speakers.

Click into the venue-pane and drag, in order to rotate the venue. Click the middle mouse-button or the wheel for shifting. Turning the wheel zooms in and out.

Double click on a speaker in order to open the Speaker-Dialog. The Speaker-Dialog is specific to the class of speaker. For example, the dialog for Line-Arrays provides a rich simulator for setup. Here you can adjust rig-angles and monitor the effect on a side-view of the audience. In the Speaker-Dialog Right click on the side-view graph in order to enable further calculation options.

Double click on a venue item in order to edit its position. Further tools are available in the associated menus.

NS-1 provides simulations for the venue as a whole. In order to do so, go to menu Contours and open the Contour Control Form. Select, for example, Direct Sound and press the Start button. NS-1 will calculate the sound pressure of un-muted speaker-system on the venue-plane. As this calculation is typically time consuming it is out-sourced to a sub-thread. Meanwhile you can operated NS-1. The result should be a contour layer on top of the venue. The colors of the contours represent equi-potential areas of sound pressure. The actual level can be read from the level-legend-list.

In order to delete an item of the venue, speaker or plane, you would need to select it first and then issue menu Edit/Delete. You can undo Deletion with the help of menu Edit/Undo.

Open the menu Speakers/Speaker Positions dialog in order to position all speakers, check the mute-status etc. Here you can also delete multiple speakers.

Add new speaker-systems by first selecting the Nexo-speaker in the Speaker-List and then by issuing menu Speaker/Add Speaker. Alternatively drag it directly into the venue. Note, you might need to adjust zooming in order to see the new speaker.

You can store your whole venue in a project file via menu File/Save as. By default the contour results are not stored because usually the huge amount of contour-data inflate the project file.

NS-1 provides a rich printing stage, see menu File/Printing. Note, that the preparation of printing may take some seconds.

There is more to explore in the NS-1 package. Where ever you are, the F1-key should pop-up the associated help-topic. Or, study this documentation by starting here.

DESKTOP

The main-window of *NS-1* can be arranged within the desktop of the Operating System. It can be maximized, minimized, sized and moved as any typical application-window of the OS. The main-system menu of *NS-1* can be accessed by pressing *Alt+Blank*.

The desktop of *NS-1* has four major parts: the menu, the venue-pane, lists and the dialogs.

Main Menu

The main menu lists all available functions of *NS-1*. The main-menu can be accessed with the help of the mouse and keyboard. For the latter press the *Alt*-key, which shows the short-cuts of the menu items. Then press the short-cut character and scroll down the popup-menu.

Main Menu - File

This menu organizes saving the project, printing and project annotations.

New

Start of a new project. All data are reset. The program asks whether the current project should be saved.

Open...

Opens the file dialog in order to load a previous saved project. The program asks whether the current project should be saved. The file extension is **.nexo3*.

It is also possible to import *GeoSoft2*-projects here, which would have a file extension **.nexo*.

Save

Saves all data to disk into a *NS-1* project file (**.nexo3*). If no name has been given so far, i.e. the project was not saved yet, then the file dialog opens and prompts for a file name.

Save as...

Similar to *Save* but prompts for a file name.

Annotations...

Allows for editing project related information, see Annotation Dialog

Printing...

Creating a print-out of the whole venue. See Printing Dialog.

Exit

Terminates the program. The program asks whether the current project should be saved.

(Recent files)

Is part of the speed-button for open-projects and displays a list of recently used files.

Clicking on one of the items directly opens this file.

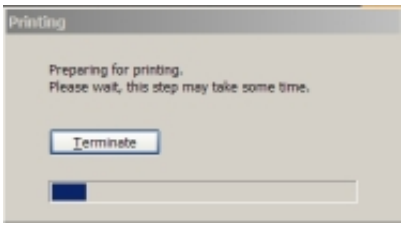
Annotation Dialog

Dialog for providing user annotation to the project. Issue menue *File/Annotations*.

Feel free to use the input fields and the text editor to the right as you see fit. *NS-1* does not make any assumtions on these data.

Printing Dialog

If you issue menu File/Print *NS-1* would start to render the venue and all speakers for print-out. This process is time consuming. It can be terminated with the help of the intermediate form as shown below.



The venue will be rendered as currently shown.

Before the actual printing takes place the *Print Preview* is opened. The dialog renders the pages as printed, gives you access to the printer-list and lets you adjust the printer settings.

Printers

List of selected printers, which are registered with your computer.

Setup

Setup opens the specific printer-setup-dialog, which is provided by the printer-manufacturer and is useful to fine-tune your print-out.

Print

Starts the printing. Usually the document is spooled to the printer-manager of the OS, where it queues for printing.

Zooming and Navigation

At the bottom of the dialog you find some buttons for magnification and navigation of the preview display.

Printing Range

List of available items to print. Documentation prints project annotations as provided in the Annotation Dialog. Equipment prints the list of speakers used in the venue. Venue prints the picture of the venue in the current view. For each speaker there are one or more dedicated pages.

Cluster Pages

Controls the output of Geo Line Arrays and speaker-clusters. Side View would include the side-view graphs as in the associated speaker-dialog. Adjustments outputs a list of Line Array angles. Mechanics prints the mechanical computations if available.

Main Menu - Edit

The Edit-menu typically comprises clipboard commands and common editing operations.

Undo

Recovers recent deletion of speaker-systems and venue-items.

Copy, Cut and Paste

...not yet available

Edit...

Opens the associated Edit Dialog according to the selected item in the venue pane.

Edit as...

Allows to edit in an alternative mode. For example, a quadrilateral venue-plane can be edited with the help of vertices or size and position.

Move...

Opens a dialog for moving a speaker-system or a venue-item, respectively. The type depends on the current selection in the venue pane.

Duplicate

Opens a dialog for duplication of the selected item, either a speaker-system or a venue-item.

Delete

Deletes selected items. If both, speakers and venue-items, are selected a dialog will open, where you can control the deletion. Deleting items can be un-done with the help of *menu Edit/Undo*.

Rename

Editing of name of selected speaker-system or venue-item.

Venue Plane Vertices Dialog

Editing a venue-item seen as a polygon where we edit its vertices. Alternatively you can specify size and position of a quadrilateral venue-item with the help of Venue Edit Quadrangle Dialog.

Toggling entry mode: Select the venue-item and issue menu *Edit/Edit As...* Note, that a one to one transformation only exists if the shape is quadrilateral.

The *Venue Plane Vertices Dialog* is the means for editing the coordinates of the corners, which span a venue-plane. It opens after selecting a venue-plane in the 3D-Pane and issuing menu *Edit/Edit* or by dbl-click on a venue-plane. It also opens after dbl-clicking on a row of the table of the Plane Positions Dialog. It also opens if you add a new venue-plane via menu *Venue/Add Polygone*.

Entering coordinates with Range-Finder For using the *RangeFinder*, see below.

Name

Name of the venue-plane.

Audience

The *Audience Type* controls how sound pressure is received by venue-planes at simulations, see at Audience Types.

New Venue Item

This creates a further new venue-plane. This feature is practical when entering multiple venue-planes and you do not want to leave the dialog. For example when entering a venue with the help of a Range-Finder.

Coordinate Table

Each venue-plane can have any number of vertices >= 3, ie the simplest shape is the triangle. For each vertex there is a row. Each row provides editing of the x-, y-, z-coordinates in meter or feet according to the current setting of units. The units can be set in the Units Dialog.

The order of the points matters. The order should be continuous so that lines from successive points do not cross any other boarder of the venue-plane.

Edit Buttons

Add

Add a new vertex at the bottom of the list.

Insert

Insert a new vertex above the selected one. The default values are the coordinates of the mid-point between the neighboring points.

Delete, Delete all

Removes the selected vertex or all vertices.

Undo

Undoes the last operation or edit. Note, after *Apply* undo is cleared.

Invert

Inverts the order of the points, which effectively inverts the normal of the plane.

Up/Down

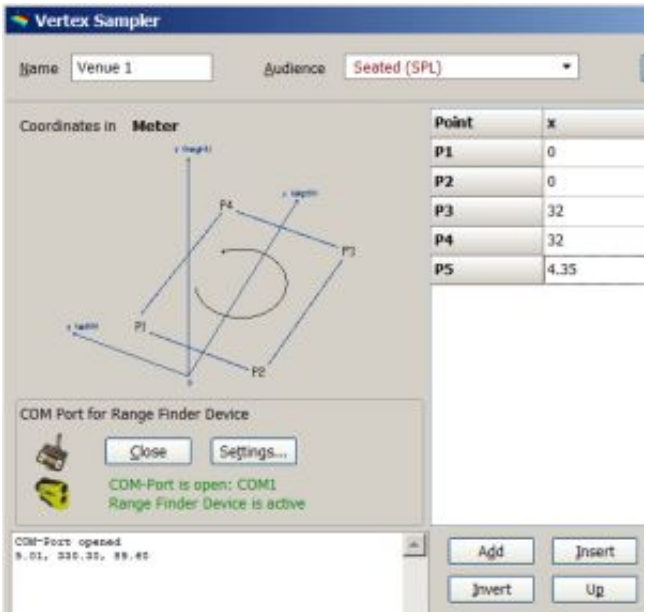
Moves the selected point up or down the list.

Apply

Submits the coordinates of the table to the selected venue-plane and triggers repainting. Undo gets cleared.

Entering coordinates with Range-Finder

Vertices can be entered directly from *TruPulse* Range-Finder device. The set-up and operation of *TruPulse* is explained here.



If you click on the fire-button of the *TruPulse* a new vertex is added and its fields filled with co-ordinate values.

The pane at the bottom-left reports raw-data and error messages.

Open / Close

The first round you need to open the COM-port, where the range-finder is attached (series-, RS232-cable). The COM-port stays open until the application is terminated.

After opening, the button will change its name to "Close", and it provides a means by manually closing the COM-port.

Settings...

Opens the Venue RangeFinder COM Settings Dialog where you need to select the correct COM-Port.

Venue Range-Finder TruPulse Setup

Venue vertices can be entered directly from a Range-Finder device with the help of the Venue Plane Vertices Dialog. This chapter explains the operation and setup of the device:

TruPulse 360 B from www.lasertech.com

The TruPulse can be wired directly via a serial-connection (RS232) to one of the COM-ports of the computer.

TruPulse settings for 3D spatial measurements

The TruPulse is operated by only three buttons: *Fire* (at the top) and *Up* and *Down* (at the side).

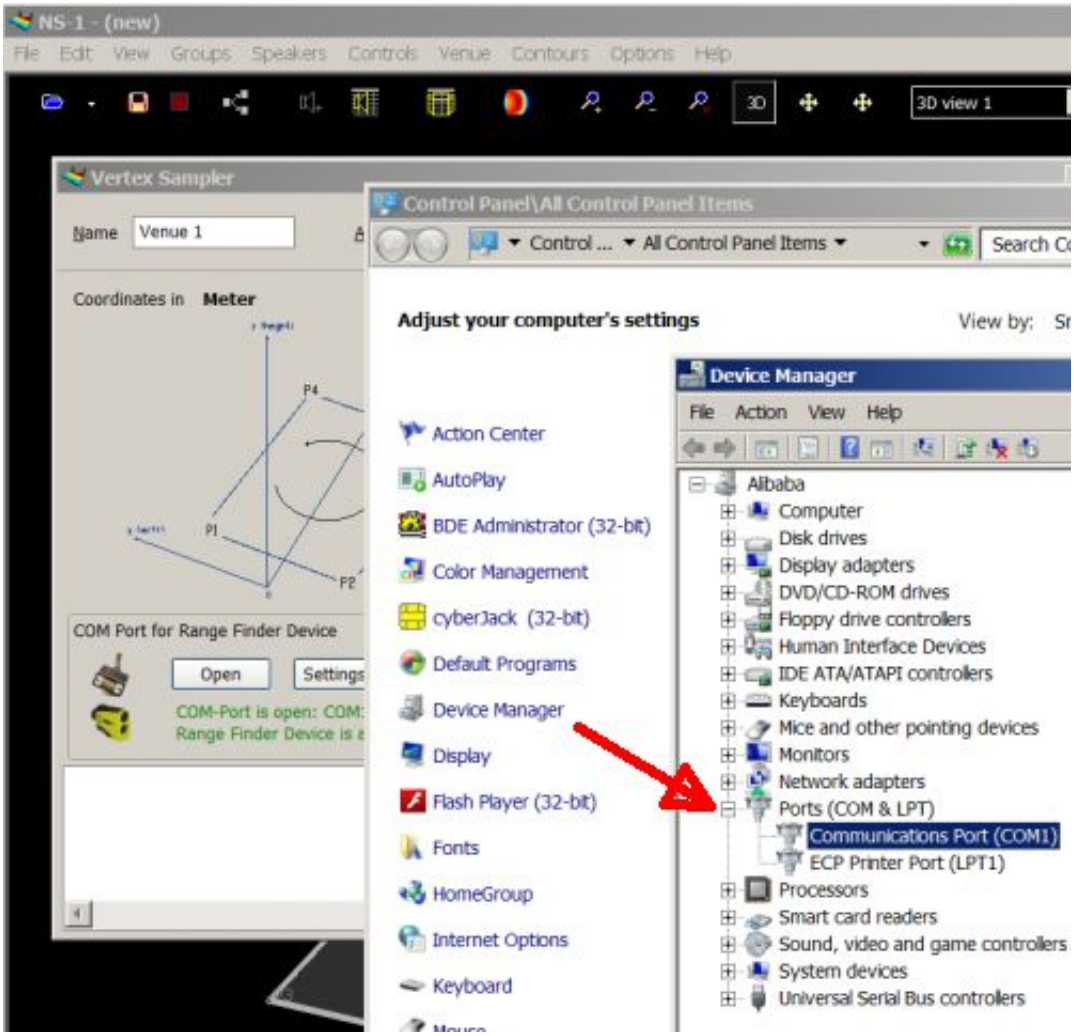
Select *Target Mode = Standard Mode* by pressing the *Up*-button for four seconds. Scroll with the help of the *Up* and *Down*-button. When found select with the *Fire*-button (Note, the other modes can be used as well, although only a single position is sent to your laptop after releasing the *Fire*-button).

For further information, see manual of the TruPulse device.

Set-up of Computer Connection

Setting up COM Port

Open *Control Panel* of your *Windows System*. Select *Device Manager*, where you should find an entry *Ports*. Select *Communication Ports (COMxxx)*. Sub-sequentially you can specify data-flow parameters of the RS232, which should be for the *TruPulse 360*:



4800 baud, 8 data-bit, 1 stop-bit, no parity

Make further sure of the name of used port (typically COM1, COM2, etc), see Venue RangeFinder COM Settings Dialog.

Venue RangeFinder COM Settings

Venue vertices can be entered directly from a Range-Finder device. This dialog specifies the COM-port number where your *TruPulse* devices is connected.

More on set-up and operation is explained at TruePulse Setup.

COM Port

Enter here the COM-Port Number where your *TruPulse* is connected to.

Testing COM

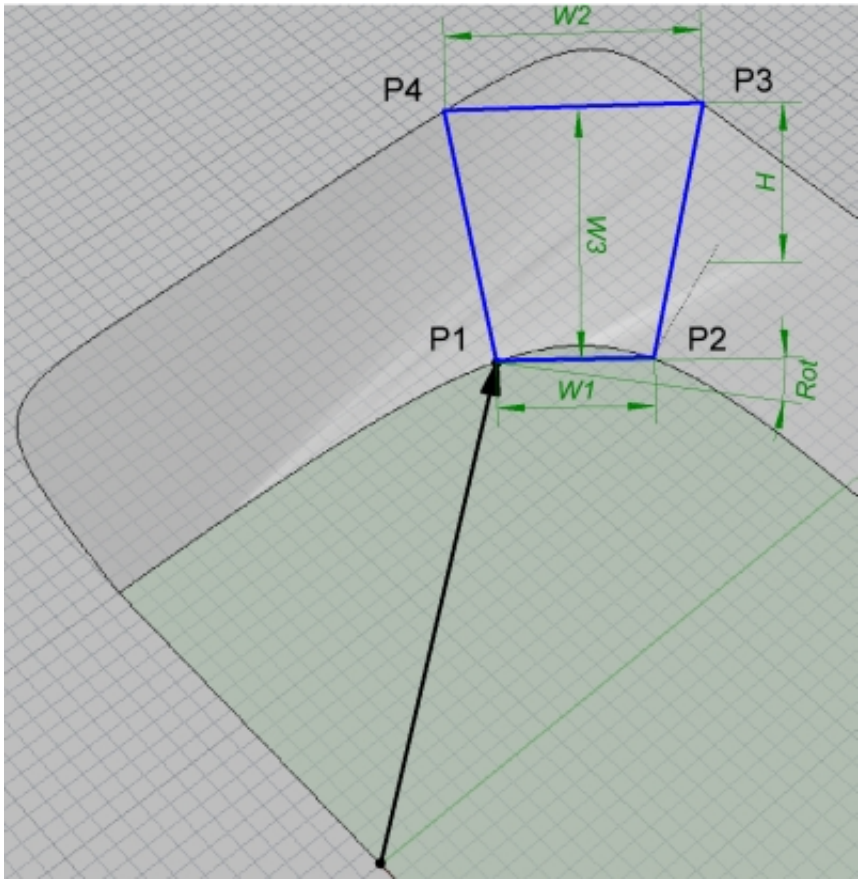
Open and *Close* enables/disables the COM connection to the Range-Finder. Error messages are reported and displayed to the hosting Venue Plane Vertices Dialog.

Venue Edit Quadrangle Dialog

Editing a venue-item seen as a quadrilateral where we edit its size and position. Alternatively you can specify the vertices of the venue-item with the help of Venue Edit Vertices Dialog.

Toggling entry mode: Select the venue-item and issue menu *Edit/Edit As...* Note, that a one to one transformation only exists if the shape is quadrilateral.

In quadrangle-input mode the range-finder is not supported.



Name

Name of the venue-plane.

Audience

The *Audience Type* controls how sound pressure is received by venue-planes at simulations, see at Audience Types.

New Venue Item

This creates a further new venue-plane. This feature is practical when entering multiple venue-planes and you do not want to leave the dialog.

Position

Anchor is the reference point from where the global position of the venue-item is measured.

x, **y** and **z** are the coordinates of the Anchor point.

Orientation

Height is the elevation of the quadrangle measured as the difference between the rear and front edge. For example, Height=0 is a flat plane and Height=Depth yields a ramp of 45°.

Rotation means the horizontal rotation about the Anchor point.

Size

Width W1 is the length of the front edge.

Width W2 is the length of the rear edge.

Depth W3 is the distance between front and rear edge along the plane.

Venue Audience Type

The *Audience Type* controls how sound pressure is received by venue-planes at simulations.

No Audience

No Audience excludes the venue-plane from simulations. This mode is good (and implicitly set) if a picture is assigned to a venue-plane, see Venue Picture Dialog.

Surface

Simulations are performed directly at the level of the venue-plane.

Seated

Simulations are targeting a virtual plane vertically offset by 1.2m.

Standing

Simulations are targeting a virtual plane vertically offset by 1.6m.

Disabled

Removes selected venue-plane from display and from simulations. A disabled venue-plane can only be enabled with the help of the Plane Positions Dialog.

Main Menu - View

3D View

Switches venue-pane into 3D-view.

Moving Items View

Switches venue-pane into Moving Mode.

Zooming

Enlarging the view of the venue. Alternatively, use the Mouse-Wheel, the Page-up-/Page-down-/Esc-keys or the speed-buttons.

Show Labels

Displays the name of the venue items and speaker-systems.

Show Intersection Lines

Displays lines on the venue, where the vertical plane of line-arrays intersect the venue-planes.

Show Coverage Areas

Geometric Coverage helps in estimating the venue-area covered by a Geo-Line Array.

Show Contours

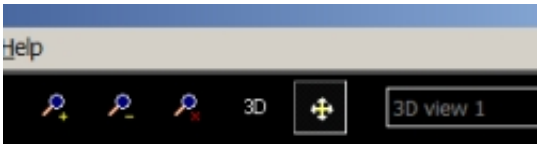
Show/hide current contours, which appear as a result of calculations on top of the venue.

Show Laser Beams

Display of rays pointing into the mounting direction of a speaker-system.

Venue Pane - Moving Mode

See also 3D-Pane.



By selecting menu *View/Moving Items View* or pressing the button, as shown above, the *Venue Pane* is switched into moving-mode.

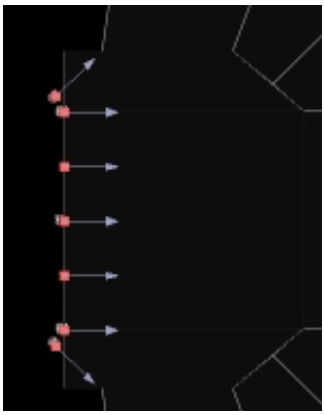
Moving-mode means that you can alter the position and horizontal orientation of speaker-systems with the help of the mouse.

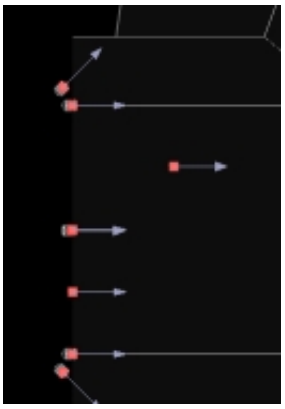
If you drag a new speaker from the Speaker List the drop position maps to position coordinates.

The venue is shown in top-view. Zooming and shifting works as described in Venue Pane. Selecting of venue-planes is disabled. It is possible to drag new speaker-system from the Speaker-List.

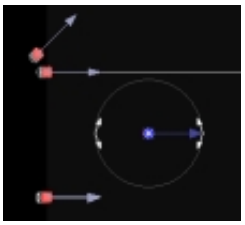
Note, if the Aero-Mode of MS-Win7 operating system is enabled then artifacts of the drawing may occur.

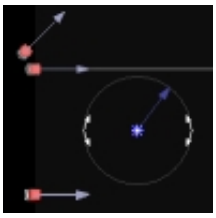
Moving



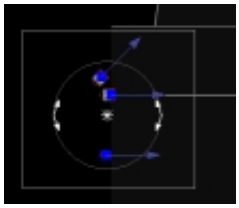


Rotation





Groups



Selection Frame Click and drag open a rectangle enveloping all speakers you want to select.

Picking On selection hold down the *CTRL-key* of the keyboard.

For moving click on the star and drag. For rotation click on the arrows and drag. Note, rotation is performed about the star.

Keyboard

Selected speakers can be moved and rotated by following keys:

```
Shifting: ALT + SHIFT + Cursor Keys
Rotation: ALT + Cursor Keys
```

Main Menu - Speakers

Add Selected Speaker

Adds a new speaker-system into the venue. The type of speaker is taken from the current selection in the speaker-list on the right hand side of the desktop.

On compound systems, such as the Geo-Array, an intermediate dialog opens, where you can select basic-details of the array configuration.

Add Selected Speaker yields the opening of the associated Speaker Edit Dialog.

Replace

You can change the prototype of the speaker in place.

Select a speaker AND select a new prototype from the list then issue menu *Speakers*/*Replace*. The new speaker system has the same position, albeit may have to be configured.

Restore

Revert a *Replaced* speaker. A dialog opens, where you can select from a history-list. All settings should be maintained.

Clearing Restore

Clears history database of all speakers. After this command restoring would not be possible any more. This function is useful for saving memory and reducing file-size.

Speaker Positions

Opens the global speaker-dialog which allows to edit positioning and electronics of all speaker-systems with the help of a table.

Main Menu - Venue

Add Quadrangle

Adds a new quadrilateral venue plane to the venue and yields the opening of the Edit Quadrangle Dialog.

Add Polygon

Adds a new venue plane to the venue and yields the opening of the Edit Vertices Dialog.

The *Edit Vertices Dialog* can be driven by a Range-Finder Device.

Alternatively you may find the function menu *Edit*/*Duplicate* useful, which creates a new venue plane by duplicating an existing plane. The Venue Duplicate Dialog helps in positioning the clone.

Toggling Polygon <> Quadrangle: Select the venue-item and issue menu *Edit*/*Edit As...* Note, that a one to one transformation only exists if the shape is quadrilateral.

Venue Positions

Opens the global Venue Items Dialog, which offers a tabular representation of all planes.

Venue Scaling

Allows scaling, shifting and rotation of the whole venue.

Open Venue

Imports a data-set with venue-planes. NS-1 supports venue-files, which were saved by menu *Save Venue* (*.xnv-files). This functions also allows for importing 3D-CAD-drawing see Open Venue Dialog.

Save Venue

Exports the venue-planes into a NS-1 venue-file, which can be loaded with the help of menu *Open Venue*.

Export Venue

Exports the venue-planes into files used by room-simulation tools. Before the file-dialog opens the Venue Export Dialog offers certain settings.

Copy as Picture

Copies the current venue-view as a picture into the clipboard. Use menu *Edit*/*Paste* of the target application in order to insert the picture into a document. The picture is rendered in JPEG-format.

Venue Picture

Allows to assign a picture to a selected venue-plane. A plane with a picture is excluded from simulation. You can clear the picture by *Clear Picture*. *Venue Picture* opens the Venue Picture Dialog, which allows selection and adjustment of the picture.

Clear Picture

Removes the picture from the selected venue-plane.

Venue Positions Dialog

This dialog provides a list of all venue-planes. Note, this dialog is non-modal, which means you have still access to the main-desktop. This dialog can be opened via menu *Venue*/*Venue Positions*.

Selection

Click on the first column in order to select a venue item. Multiple rows can be selected.

Dbl-click or *Enter*-key would open the associated Plane Vertices Dialog.

Audience

The *Audience Type* controls how sound pressure is received by venue-planes at simulations, see at Audience Types.

Picture

Reports whether a picture is assigned to the venue-item, see at chapter Insert a Picture Dialog. Note, dbl-click in this colum opens this dialog for assigning a photo etc.

Annotation

Provides the "name" of this venue-plane.

Vertices

Reports on the coordinates of the vertices of the venue-plane. The unit is either meter or feet as can be set in the Units Dialog. Note, dbl-clicking in this column will open the Plane Vertices Dialog.

Audience to All

This command will perpetuate the *Audience Type* of the selected row to all others.

Delete Item

Removes all selected venue-planes. Alternatively, press *Ctrl+Del*. Note, you can undo this operation via menu *Edit/Undo* or *Ctrl+Z*.

Selecting

Many features of NS-1 operate on the current selected item. This can be a speaker-system, a venue-item or a list-entry.

Speaker Systems

In the 3D View simply click on a speaker in order to select it. A double-click is a short-cut to open the associated edit-dialog. A double-click + ctrl-key will open the associated Moving Dialog.

In the Moving Mode View multiple speakers can be selected for moving and rotation.

Venue Items

In the 3D View a simple click on a venue-plane will select this plane. Double-clicking will open the associated edit dialog. A double-click + ctrl-key will open the associated Moving Dialog.

Speaker List

On the side of the main-desktop you find the Speaker List from where you can drag a selected item as a new speaker into the venue. Alternatively, double click on an item.

Venue Picture Dialog

Main Menu - Contours

Stop

Stops on-going calculations. The termination request may take a short while to return.

Contour Clear Data

Removes the calculation results, ie. the contours, from the venue. Alternatively, use menu *View/Show Contours*, which only hides the contour output.

Contour Include in Saving

If checked then the calculation-results form part of the project-file, which is streamed to disk on saving. Note, that a lot of data are stored, which increases the file-size and may take considerable time on loading.

This menu command is replicated in the speed-bar by a little check-box, to the right of the saving symbol.

Contour Control Form

Opens a dialog to control the calculation of contour fields, see at Contour Control Dialog.

Main Menu - Options

Meter/Feet Units...

General control of units for entering distance-values see Units Dialog.

Edit Air-Absorption...

General control of air-absorption in sound-pressure-simulations, see Air-Absorption-Dialog.

Units

This option lets you change the unit, in which distance-values are specified. The dialog is available via menu "Options/Meter/Feet Units".

Distance in Units

Meter All distance entries are expected to be in meter.

Feet All distance entries are expected to be in feet.

Do Convert

Check, if you have an existing project, and you want to continue in empirical units. After pressing OK all distance values will be converted to feet.

Uncheck, if you accidentally entered all values in the wrong unit. After pressing OK existing distance-values will be maintained. Only the unit-mode changes.

Air Absorption

This dialog allows for changing environmental parameters for damping of sound pressure due to air-absorption. Air absorption is taken into account in all sound pressure simulations. The dialog is accessible via menu *Options/Air Absorption*.

Temperature

Specify the ambient temperature of the air in degree Celsius or Fahrenheit. Default is 20°C or 68°F.

Relative Humidity

Specify here the ambient humidity of air in percentage. The default value is 35%.

Ignore Air Absorption

If checked then air-absorption is ignored during simulations.

Main Menu - Help

Context...

Opens the *NS-1* help system for the current program item.

Content...

Opens the Table of Contents of the *NS-1* help system.

Release code...

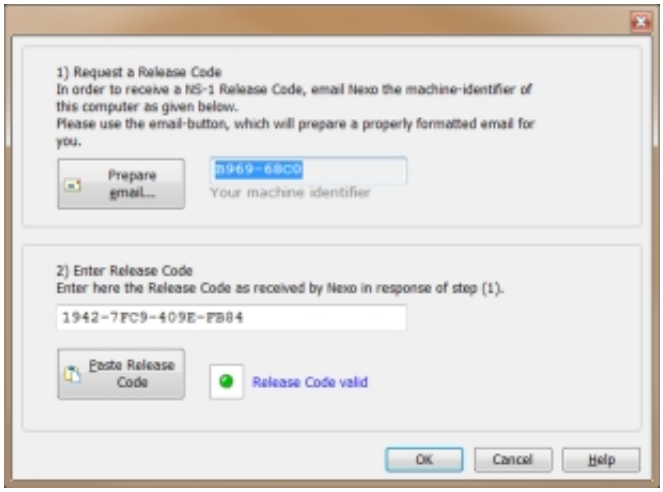
NS-1 needs a *Release Code* in order to start, see Release Code Dialog.

About...

Here you find the version number of the application, the copyright information and a link to the internet home-page of Nexo.

Release Code Dialog

NS-1 needs a Release Code to run. There are two steps for you to perform:



1. Send your machine-ID, name, company and country to NEXO.
2. Receive Release Code from NEXO and enter.

Requesting a Release Code

1. In NS-1 go to menu *Help/Release Code*.
2. Send your *Machine Identifier* to following email-address: ns-1_release_code@nexo.fr

Please use the button *Prepare Email*. It opens your default email-application, Outlook or Thunderbird etc.

You find a prepared email, subject and text. Fill out the information requested. Please maintain text and structure, so we do not have to edit your request manually.

I received the Release Code and now?

NEXO-support will return the *Release Code* by email forthwith. In NS-1 go again to menu *Help/Release Code* and enter your new Release Code into the second field and confirm by clicking on the OK-button. For convenience you may use copy/paste.

Notes

The Release Code is necessary to run *NS-1*. If no valid Release Code is available then the Notification Dialog opens at the start of *NS-1*.

The NS-1 Release Code is valid for your computer only. If you change the hardware you might need to request a new Release Code.

Release Code Note Dialog

NS-1 is protected by a Release Code, which is provided by NEXO-support. Details are given in chapter Release Code Dialog.

Equipment List

The equipment list summarizes the number of speakers used in the venue.

Copy as text to clipboard

Select an item in the list and issue menu Edit/Copy.

Printing

The equipment list is part of the print-function at menu File/Print.

Documentation

NS-1 installs technical information for certain speaker-systems.

In NS-1, select a speaker in the venue, or select a speaker in the speaker-list.

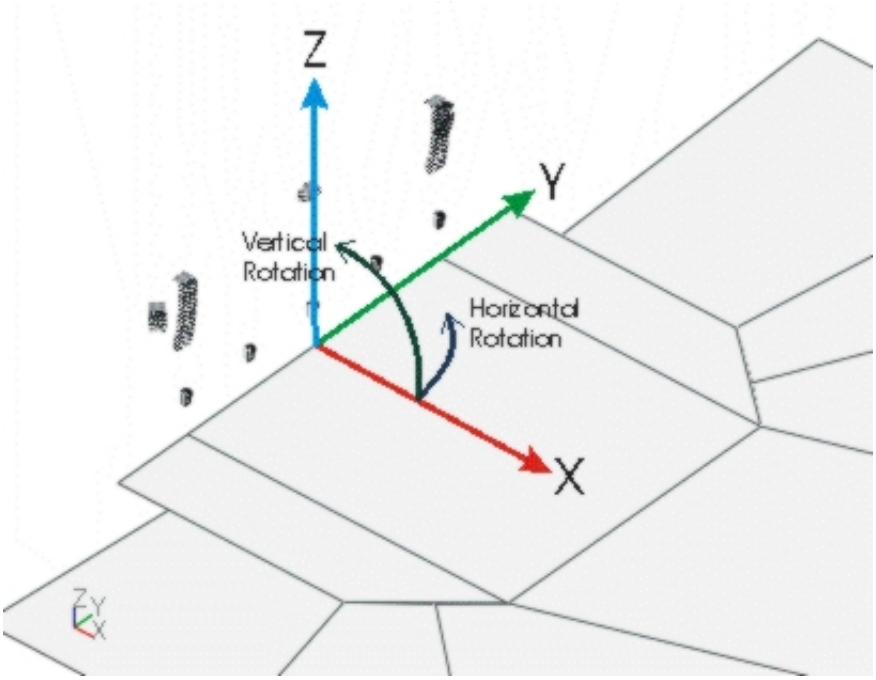
Then issue menu *Help/Speaker Manuals*, *Help/Mechanical Documentation* or *Help/TÜV Certificates*.

Alternatively, this documentation can be accessed via Windows-Start-Menu at folder *NEXO/NexoSoft*.

All documentation files are pdf-files.

SPEAKER-SYSTEMS

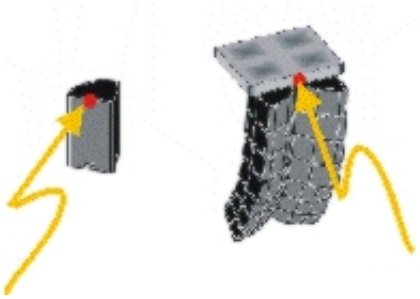
Speaker Position



Speakers are positioned by 5 coordinates

- X-axis, typically into the audience.
- Y-axis, typically along the stage.
- Z-axis, height.
- Horizontal angle.
- Vertical angle.

Note, the horizontal angle is positive on the side of the positive y-axis. The vertical angle is positive, when pointing upwards and negative when point downwards.



Mounting Point

Positioning relates to the mounting point of a speaker, which is marked with the help of a little dot, or is at the center-top of the first cabinet of a line-array.

Units

Cartesian positions are entered either in Meter or in Feet, which depends on the units-setting, which currently is active. Units can be altered in the Unit-Dialog. Rotational angles are in degree.

Speaker Position Dialog

The *Speaker Position Dialog* is a versatile platform for selecting, editing positions, electronic parameters and some settings.

The *Speaker Position Dialog* floats on the desktop, which makes it possible to leave the dialog and to start any of the desktops operations.

Selecting

If you click in one of the rows of the table then the associated speaker-system will be selected. It is possible to select multiple speakers.

Speaker System

Lets you edit the name of the speaker-system. In order to start editing click directly into the field, or issue the Enter-key. Confirm the values entered by pressing the Enter-key or moving to the next field. Abort editing with the Esc-key.

Position

The next five fields lets you edit the position of the speaker. Use the spin-buttons to increment in integer steps. Alternatively use the up/dn-keys. Cartesian positions are entered either in Meter or in Feet, which depends on the units-setting, which currently is active. Units can be altered in the Unit-Dialog. Rotational angles are in degree.

Gain

Specify *Gain* in dB in order to weigh the amplitude-contribution of a speaker in SPL calculations. *Gain* accepts only negative values. 0dB means maximum SPL.

Delay

Delay weights the SPL response in the time-domain. The specification of the delay is in milli-seconds. Positive values yield a delay of the response, whereas positive values would move the response forward in time. Since, this can be realized only by delaying the rest of the system, negative delay-values should be used with care.

Speaker Move Dialog

With the help of the *Speaker Move Dialog* you can move the selected speaker or cluster to a new position.

Name

Alter the name of the speaker-system.

Position

Shift By will move the speaker by a delta x, delta y, delta z from its original position.

Rotate will move the shifted speaker by a horizontal angle in degree. A positive angle rotates the speaker anti-clockwise about the z-axis. If Rotate also horizontal speaker angle is checked then the directional-angle of the speaker is adjusted accordingly otherwise it points into the original direction.

Apply

Applies shifting and rotation to the selected speaker.

Undo Move

Resets the position to its original position.

Speaker Duplicate Dialog

The *Speaker Duplicate Dialog* allows to quickly add a speaker or cluster to the venue. The new speaker starts as a carbon copy of the currently selected speaker.

Name

Provide a name for the new speaker-system.

Position

The duplicated speaker would need a new position.

Flip at y-axis

The new speaker appears on the other side of the stage, assuming the stage runs along the y-axis and the origin of the coordinate system is in the middle of the stage. Mathematically, the y-coordinates are inverted compared to the original position.

Flip at x-axis

Here the x-coordinates are inverted compared to the original position.

Offset Values

In this mode the new coordinates are derived from the original by an offset and/or by rotation.

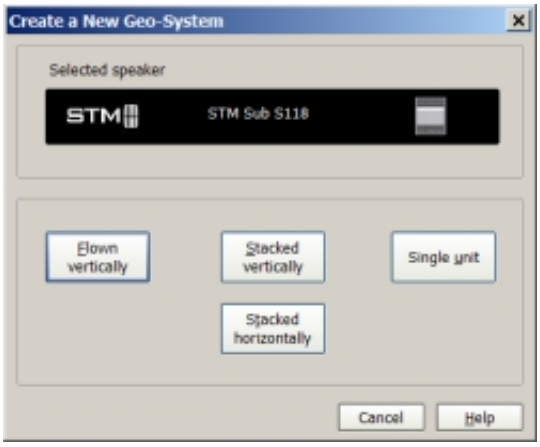
Shift By will move the new speaker by a delta x, delta y, delta z from its original position.

Rotate will move the new and shifted speaker by a horizontal angle in degree. A positive angle rotates the speaker anti-clockwise about the z-axis. If Rotate also horizontal speaker angle is checked then the directional-angle of the speaker is adjusted accordingly otherwise it points into the original direction.

OK

OK will close the dialog, will create a new speaker and will move it to the specified direction. An error is reported if the new position is already occupied by another speaker.

New GEO Dialog



This dialog opens if you are about to add a speaker, which can be configured as an array or cluster, such as a GEO system.

The type of speaker to be added is taken from the current selection in the speaker-list on the right hand side of the desktop. A new speaker can be added by dragging from the speaker list or via menu *Speakers/Add Selected Speaker*.

Configurations

Selection of the base configuration. This step cannot be changed sub-sequentially. Not all configurations may be available for the selected speaker-unit.

Flown Vertically

The speaker can be arrayed in a line-array-configuration, which typically is supported at the top with the help of a special bumper and motor. The number of speaker-units of the array and other array properties are specified in the associated speaker-dialog, which opens in the next step.

Flown Horizontally

The speaker can be clustered horizontally. The sub-sequent dialog will make available parameters, such as number of speakers and angles.

Stacked Vertically

The stacked configuration allows to place a range of speakers on top of each other up from the ground. The sub-sequent dialog will allow for input of number of units and angles.

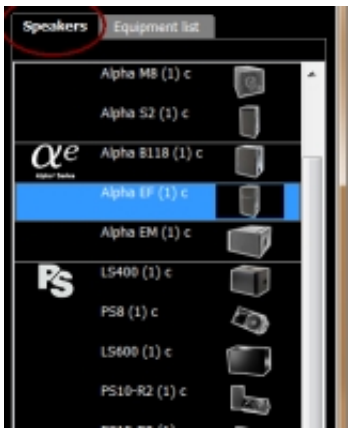
Stacked Horizontally

Subs can be arrayed on the ground together with a calculator for beam-steering. See chapter Sub Delay Dialog (horizontal arrays).

Single Unit

In this mode only a single array-unit is used.

Speaker List



The Speaker-List is the starting point for adding a new speaker-system to the venue.

The Speaker-List is located on the desktop to the right. It contains all NEXO speakers ordered by the series.

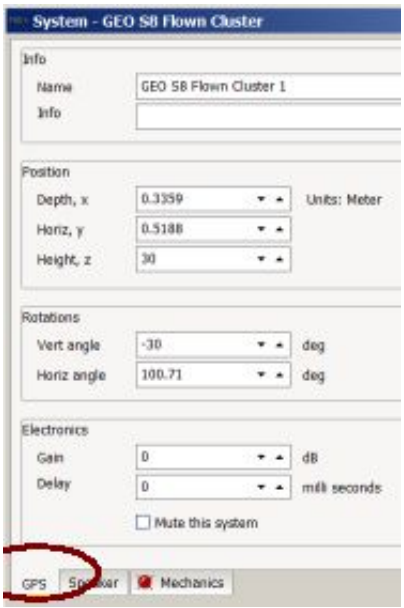
In order to add a new speaker to the venue, first select the speaker in the Speaker-List and then issue menu *Speakers/Add Selected Speaker*. Alternatively you may drag the speaker into the venue. If the venue-pane is in Moving Mode, then coordinates of the dropping point are taken into account.

Note, initially the speaker is given a default height, which might yield the speaker out of view. Just use zoom-out to re-focus.

On adding a new speaker the Speaker Dialog opens, where you can specify the position and speaker-settings.

On adding a new Geo-speaker the New Geo Dialog opens where you can select the basic configuration.

Speaker Base Dialog



The *Speaker Base Dialog* is common to all speaker-dialogs and forms the first page, called "GPS".

A *Speaker Dialog* opens on first selecting a speaker in the Venue, and then issue menu *Edit*/*Edit...*. Alternatively, dbl-click on the speaker or use righ-click-menu.

Note, on dialogs, which calculate the side-view response, positioning data will get active after switching to the *Speaker*- or *Mechanics*-Tab.

Info

Provide a *Name* to this speaker at your choice. The *Name* will be reported on selection, in the Speaker Positioning Dialog and on print-outs.

Info allows to attach a string of any information to this speaker.

Position

Provide the global position of the speaker or of the cluster as described in chapter Speaker Position.

Rotations

Provide the rotation of the speaker or cluster as described in chapter Speaker Position.

Electronics

Provide *Gain*, *Delay* and *Mute* as described in chapter Speaker Electronics.

Speaker Electronics

Electronic specifications, such as *Gain* and *Delay* can be provided in the associated Speaker Dialogs or in the Speaker Position Dialog.

Mute

Excludes the speaker or cluster from calculations.

Gain

Gain is the amplitude in dB. Only negative values can be specified, which effectively is the attenuation below maximum SPL of the speaker. For example

0dB = max SPL

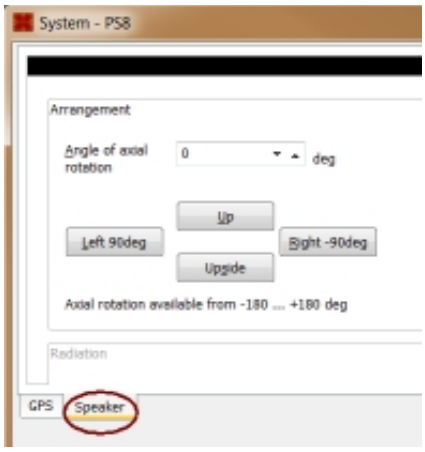
-6dB = 1/2 pressure of max SPL

...

Delay

Delay is specified in milli-seconds and inserts an ideal time-delay in the signal-path to the speaker.

Speaker Single Dialog



The *Speaker Single Dialog* is part of the *Speaker Dialog* and edits axial arrangement.

A *Speaker Dialog* opens on first selecting a speaker in the Venue, and then issue menu *Edit/Edit...*. Alternatively, dbl-click on the speaker or use righ-click-menu.

Arrangement

Angle of Axial Rotation

Angle in degree of axial rotation about the on-axis-ray. Use right hand thumb-up rule to find out about the positive rotation. The hand grasps the on-axis-ray and the thumb points outwards.

Buttons

The buttons are for convenience to write *Angle of Axial Rotation*.

Setup

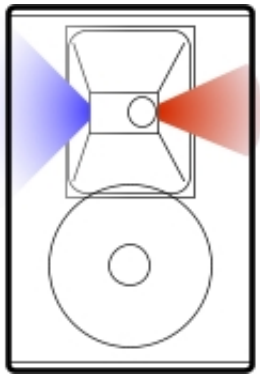
Select a NXAMP setup, which should be used for this speaker.

Asymmetrical Horn Orientation

In this case the horn performs an asymmetrical horizontal coverage. The directivity is such that the radiation-beam is narrow at the top and broad at the bottom (note, that if the radiation is wide then the horn-gap is narrow and vice versa).

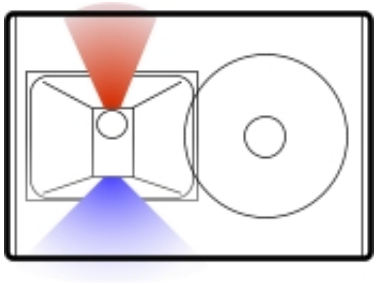
As the cabinet allows for rotating the HF-horn, so does NS-1 allow for specification.

The specification of the HF-horn orientation assumes that the cabinet is placed vertical.

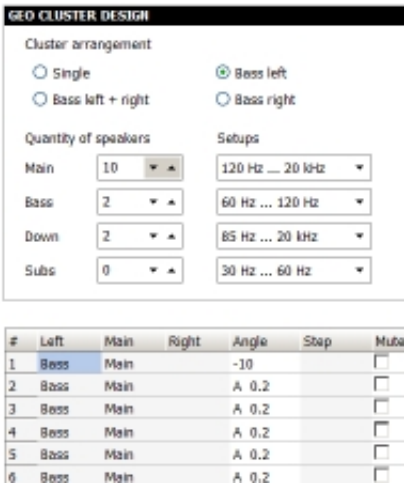


You may want to use a PS8 horizontally but with the HF-horn beaming narrow in the upper space.

First rotate the HF-horn to the right.



Speaker Geo Acoustics Dialog



The *Speaker Geo Acoustic Dialog* is part of the *Speaker Dialog* and edits settings, which affect the radiation-pattern of Geo-Line-Arrays.

A *Speaker Dialog* opens on first selecting a speaker in the Venue, and then issue menu *Edit/Edit...*. Alternatively, dbl-click on the speaker or use righ-click-menu.

The *Speaker Geo Acoustic Dialog* is a simulator, which lets you investigate the sound pressure response and distribution on part of the venue. The various graphs help in adjusting the curvature of the Geo-system, and offer various views for investigation.

The *Speaker Geo Acoustic Dialog* is divided into the input-part to the left, and into the output-part to the right. The output is updated automatically after changes. For the

output-part, see chapter Side-View-Graphs.

Geo Array Design

Specify here line-array design parameter. On each change of values the simulator updates the output graphs on the right hand side and mechanical calculations as well, if available

Quantity of Speakers

Number of speaker-units forming the line-array.

As GEO-line-arrays can be build from a mix of certain speakers there are three entry fields, which meaning depends on the cluster-prototype. As you increase the number of speakers so is the list of rig-angles below.

The maximum number of speaker-units is restricted.

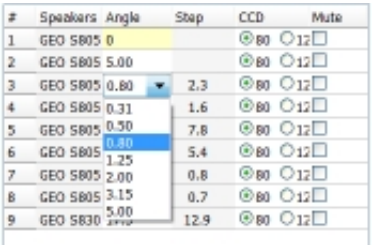
Increasing the number of speakers will insert new units below the selected unit in the angle-list.

Decreasing the number of speakers will remove units at the selection in the angle-list.

Setup

Select a NXAMP setup, which should be used for this speaker.

Angle-List



The table at the bottom left controls the curvature of the line-array by means of rig-angles. Each row describes a speaker-unit of the line-array. For a flown-configuration the first row belongs to the top-cabinet, which is mounted to the bumper. For a stacked-configuration the first row belongs to the bottom cabinet, again the one, which is mounted to the bumper.

Selection, Moving The very left column of the table is the running index of the speaker-unit. You can use this column to comfortably select a speaker-unit. A selected speaker-unit renders its ray bold in the Side-View-Graphs. If the prototype of the line-array allows mixed configuration then you can use *Ctrl+Up* and *Ctrl+Down* in order to change the order of the cabinets. Alternatively, drag with the mouse to the new position.

Speaker column lists the prototype of the speaker unit. You cannot select the speaker-type here. Instead increase or decrease the quantity of speakers at the top-left of the dialog.

Angle column controls the curvature of the line-array by selecting rig-angles from drop-down-lists. The given angles correspond to the available angles of the speaker-unit. Angles are between two cabinets. The first cabinet is fixed to the bumper.

The first row-angle is not a rig-angle but a repetition of the vertical position angle as described in chapter Speaker Positions and identical *Rotations/Vert Angle* on the

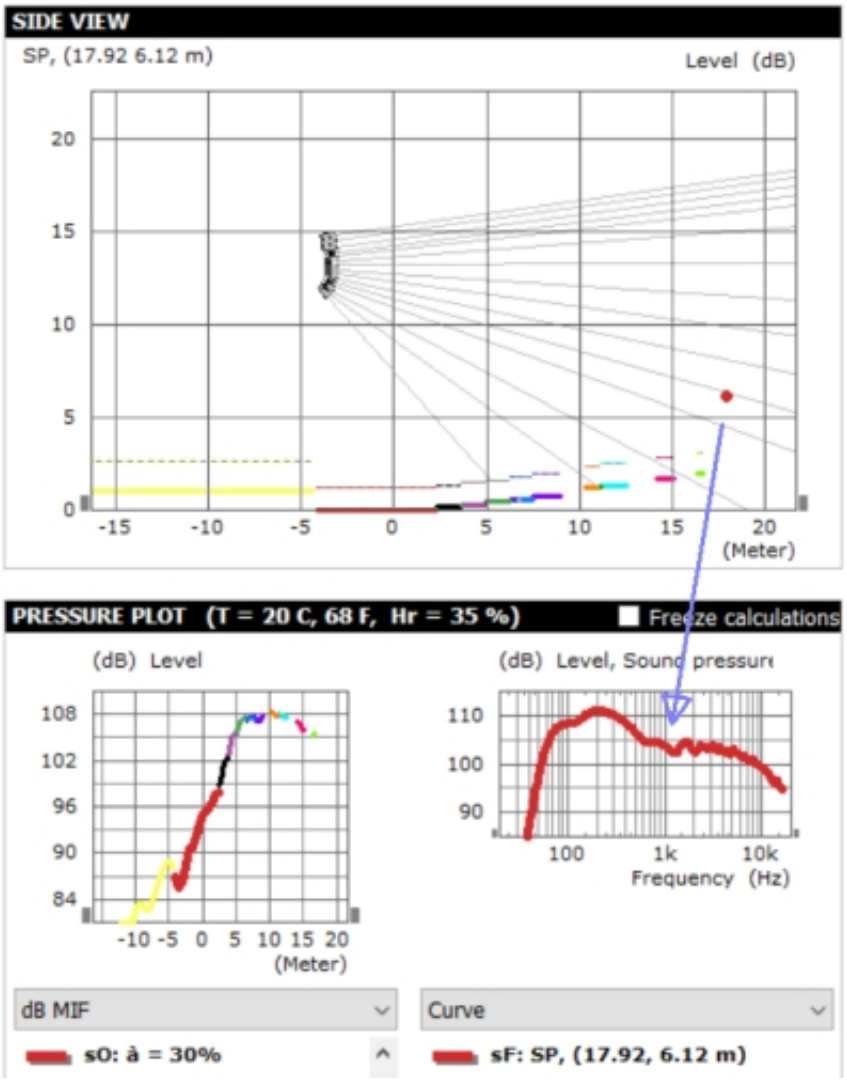
General Position Page.

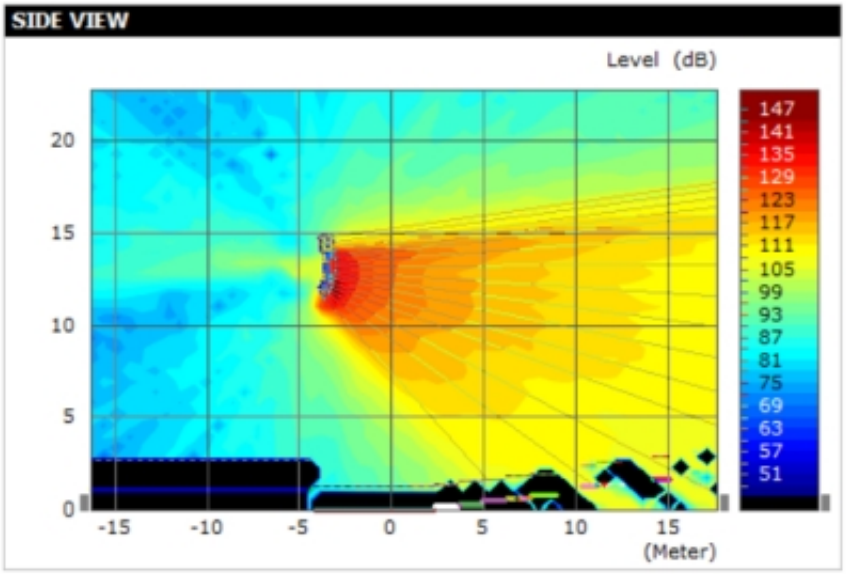
Step column reports on the distance between two rays as indicated in the Side-View-Graphs.

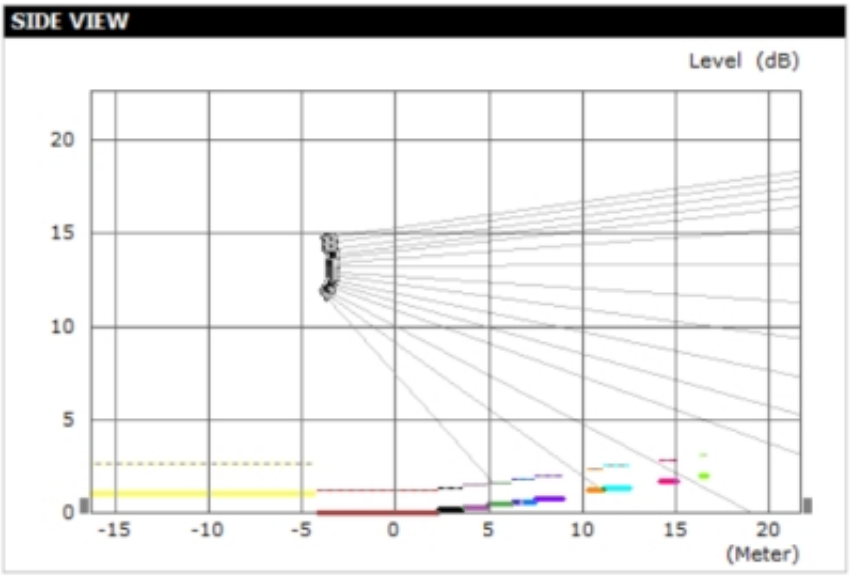
CCD column reports on horizontal coverage as designed. Some prototype speakers allow to use a horn-plug-in, which broadens the horizontal coverage. If you use such a device then you would need to select it accordingly.

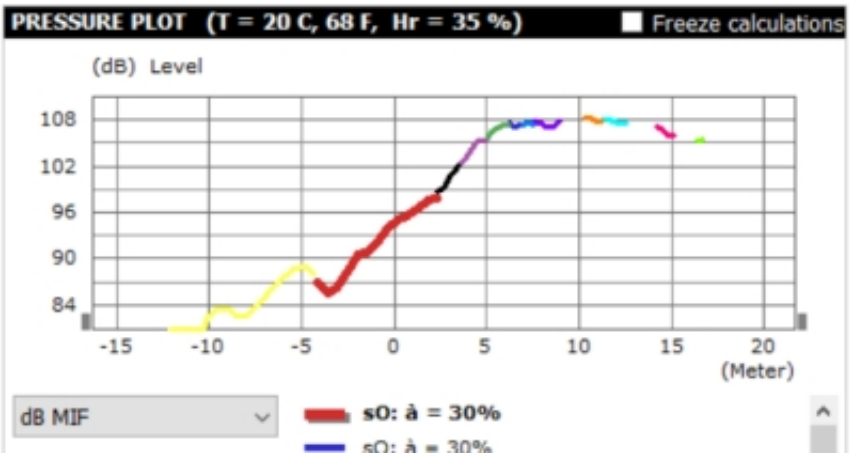
Mute lets you disable individual speaker-units.

Speaker Side-View Graphs









Side-View Graphs are part of the speaker dialogs of Geo-Line-Arrays and Sub-Delay-Arrays.

Side-View Graphs display the beaming and sound pressure response of the line-array onto part of the venue. The targeted part of the venue is a cut through the venue as seen by the speaker.

On SPL calculations Air Absorption is taken into account, unless stated otherwise. However, for distances superior to 80 meters (~260 feet), temperature, wind and hygrometry gradients do not allow to make any reliable acoustic prediction. As a test-signal IEC268 filtered Pink Noise (similar spectral content to music) is assumed. All predictions are simple direct-sound calculations, which ignore reflections from the venue-planes, ie the simulation does not take in to account any room contribution (floor reflection, reverberation), nor mutual cluster contribution. Consequently, all dB values are default values that might increase by 3dB to 6dB.

Side View Graph

The *Side View Graph* at the top right displays the side-view of the venue plane as illuminated by the front-direction of the speaker-system. The dashed line is at *Audience Level* as specified at the associated venue-plane.

For Geo-Line-Arrays the rays indicate the on-axis radiation of each cabinet. The distance between two rays at the venue-plane is reported in the *Angle List*.

For Sub-Delay-Arrays the rays show the radiation direction due to the specified delay.

Ranging

The range is calculated automatically and the plot maintains an isotropic grid. For manual edit dbl-click or issue *Edit Range*. *x-min* and *x-max* specify the floor-coordinate. If *Shift* is checked then the two entry-fields are coupled. *Auto* re-calculates *x-min* and *x-max*. *Aspect Ratio* allows to distort the display.

Pressure Plot

The graph at the bottom-left displays the SPL along the cut of the venue-plane. Each curve belongs to a cut-line on a venue-plane at *Audience Level*. Note, because of triangulization there can be multiple curves for one venue-plane.

The abscissa is the path along the cut-line on the venue-plane in meter or feet. The ordinate is the sound pressure in dB at the venue.

The *Pressure Plot* helps investigating the sound-variations into the venue. Several settings are available:

dB MIF stands for dB "Make It Flat", for proper array curvature definition, this curve has to fit within 3dB on the Audience Area. Please note that Air Absorption is not taken into account on the dB MIF curve.

dBA integrated from 63Hz to 16kHz, A-weighted.

dB Peak integrated from 300Hz to 3000Hz with a 6dB Peak Factor.

SPL integrated from 63Hz to 16kHz, no weighting.

SPL for individual octave bands.

Sound Pressure Field

Issue *Show SPL-contour* in the right-click-menu of the *Side View Graph* and *NS-1* will display the side-view SPL field in form of contours. The maximum SPL is adjusted automatically but the range is fixed. The field-calculation is updated automatically whenever relevant inputs are changed.

Disable the field-calculation by un-checking *Show SPL-contour*.

Sound Pressure Spectrum

You can place "microphones" into the side view in order to display the sound pressure response at this point.

Use the right-click menu of the *Side-View-Graph* in order to control the Pressure Spectrum and its points.

Show Spectrum displays a frequency response graph at the bottom right of the dialog. Hide Spectrum removes the graph. New Point adds a "microphone". Coordinates can be specified in the Sound Pressure Point Dialog. Edit Point lets you alter the coordinates of the selected microphone. Delete Point removes the selected microphone.

Sound Pressure Points (microphones) are selected with the mouse. They can be moved with the help of the mouse, or its coordinates can be entered via right-click-menu *Edit Point* and the Sound Pressure Point Dialog.

After changing a Sound Pressure Point or other relevant inputs the frequency response graph is updated automatically.

The frequency response graph can display the SPL as a continues curve or integrated over ISO-frequency bars.

Sound Pressure Point Dialog

This feature belongs to speaker dialogs of Geo-Line-Arrays and Sub-Delay-Arrays. On page *Speaker* right click on the *Side View Graph*. In the popup-menu select *New Point* or *Edit Point* and the *Sound Pressure Point Dialog* opens.

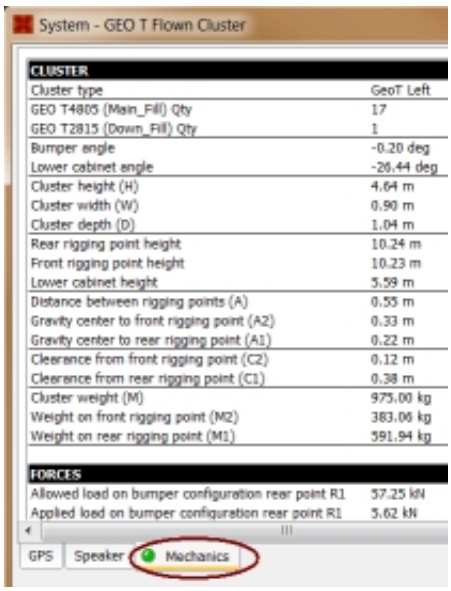
Position

Side-view coordinates of the pressure point. Units are either Meter or Feet depending on the global Units Settings.

Horizontal Value is the horizontal distance from the origin of the venue.

Vertical Value is the height measured from the origin of the venue.

Speaker Geo Mechanics Dialog



The *Speaker Geo Mechanics Dialog* is part of the *Speaker Dialog* and available for flown Geo-Line-Arrays.

A *Speaker Dialog* opens on first selecting a speaker in the Venue, and then issue menu *Edit/Edit...*. Alternatively, dbl-click on the speaker or use righ-click-menu.

The *Speaker Geo Mechanics Dialog* provides mechanical information for all flown Line-Arrays in agreement with Structural Analysis Reports. There is also available *Structural Analysis Reports* validated by German certification organization *RWTUV Systems GmbH* (see menu Help).

Although there are particularities for the GEO-and STM-Systems the report-page is similar for all of them.

Input

Wind-Settings are common for all speaker-types.

Mechanical calculations are available for

STM Cluster	GEO M6	GEO S8
STM M28 Only	GEO D	GEO T
STM S118	GEO S12	

Output

Red entries mean **overload**!

Cluster reports the over-all dimensions and weights.

Forces lists *allowed* and *applied* forces.

Angle sequence lists the specified rig-angles, where the first entry is the global vertical angle.

Working Load should be below 100%, which includes the safety factor. The Working Load is based on the ratio of all applied moments and forces to their limit and is determined by the component, which is the closest to its limits.

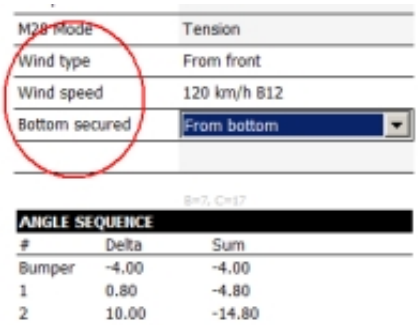
Safety Factor reports the actual Safety Factor. If it is smaller than at 100% Working Load then operation is not allowed. It is rendered red.

Cautions please read carefully. Red entries mean overload.

Picture sketches a prototype but not necessary the same number of speaker-units. Note, on overload, the picture is replaced by textual output in print-outs.

Speaker Geo Mechanics - Wind

Wind



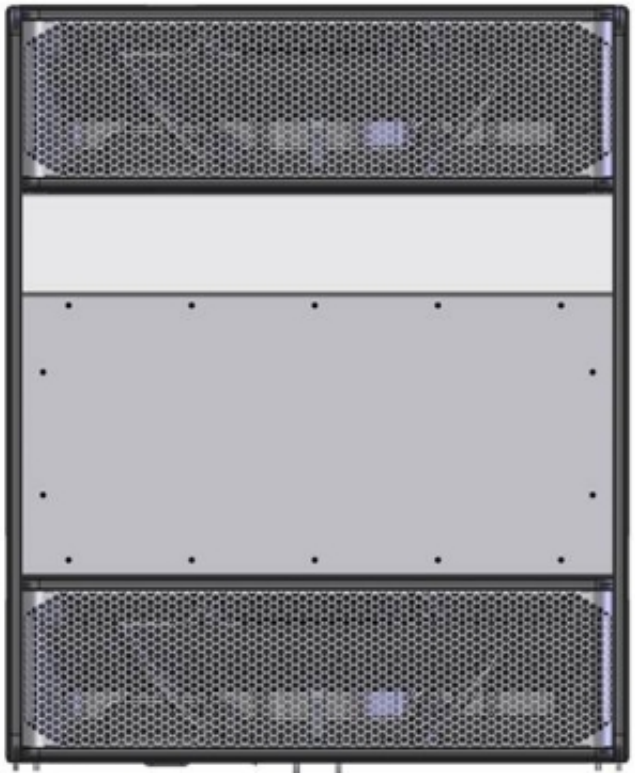
Wind, rain, ice and snow puts a strain on the rigging system in form of increased loads, shear and rotations.

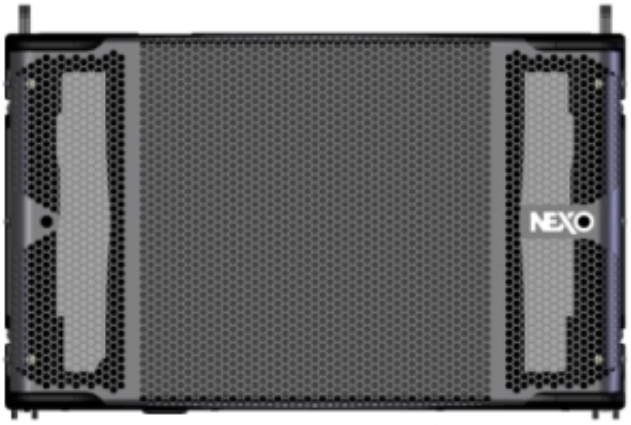
NS-1 provides a very approximate mechanical calculation of forces caused by wind from front or rear, respectively. Select from the list the strength of the wind.

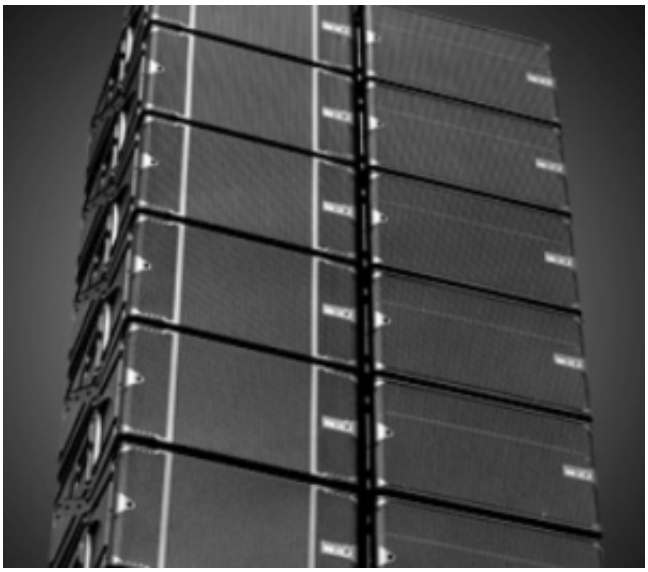
If the line-array is secured at the bottom then it acts like a sail and additional forces will be induced.

Speaker Rigging Modes - STM

STM System







Turing Configurations

STM - Chain Lever Hoist - Single Motor

STM - Chain Lever Hoist - Two Motors

STM - Compression Chain - Two Motors

Fixed Installation

STM - Fixed Installation - Two Motors

Down Fill Only

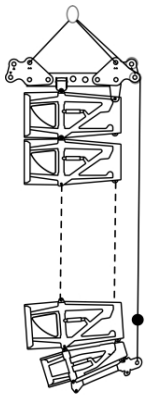
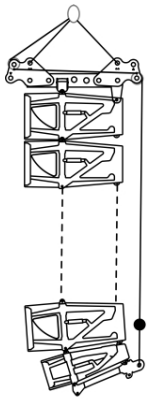
M28 Single Array (touring and fixed installation)

Steerable Sub Array

S118 (touring and fixed installation)

STM - Chain Lever Hoist - Single Motor

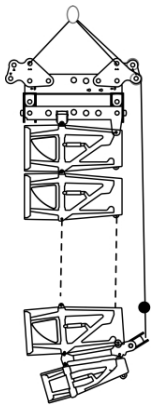
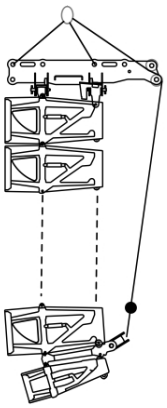
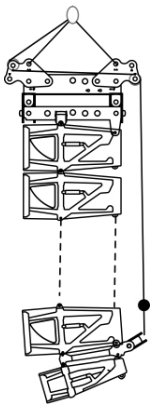
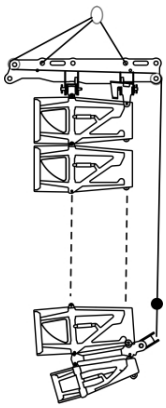
Single Column

Rigging Points	One Motor	
Bumper Top	No Kbeam	No Kbeam
M28 Mode	Compression	Compression
Chain Lever Hoist	750/1500	750/1500
Bridle Fix Leg	Front	Rear
		
	11a	12a

Dual Column

Bass left or right

Rigging Points	One Motor			
Bumper Top	No Kbeam	LWB	No Kbeam	LWB

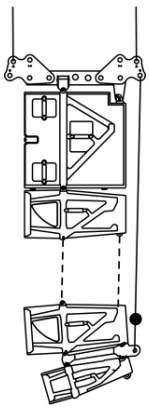
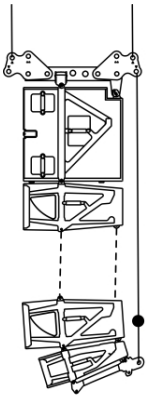
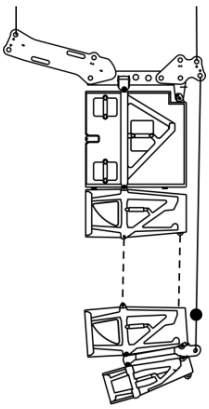
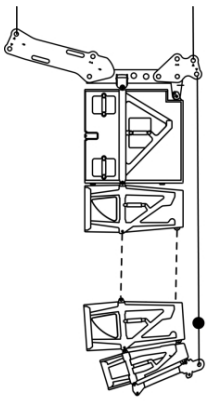
M28 Mode	Tension	Tension	Tension	Tension
Chain Lever Hoist	750/1500	750/1500	750/1500	750/1500
Bridle Fix Leg	Front	Front	Rear	Rear
				
	21a	21b	22a	22b

Triple Column

Not available in mode *Chain Lever Hoist - Single Motor*.

STM - Chain Lever Hoist - Two Motors

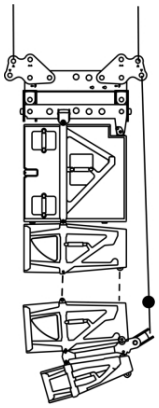
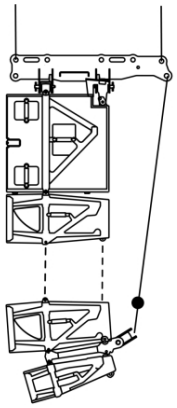
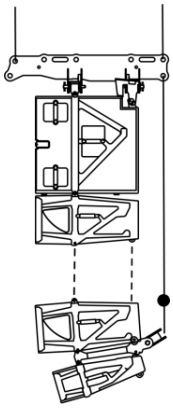
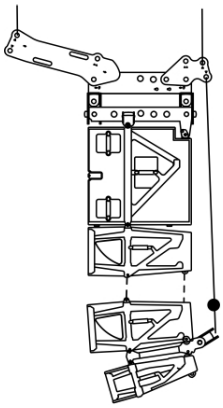
Single Column

Rigging Points	Two Motors			
Bumper Top	No Kbeam	No Kbeam	Kbeam Front	Kbeam Front
M28 Mode	Tension	Compression	Tension	Compression
Chain Lever Hoist	750/1500	750/1500	750/1500	750/1500
				

	13a	13b	16a	16b

Dual Column

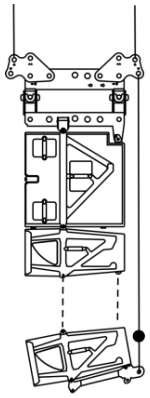
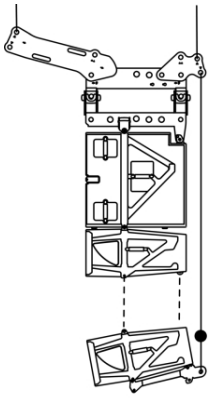
Bass left or right

Rigging Points	Two Motors			
Bumper Top	No Kbeam	LWB Rear	LWB Front	Kbeam Front
M28 Mode	Tension	Tension	Tension	Tension
Chain Lever Hoist	750/1500	750/1500	750/1500	750/1500
				
	23a	23b	23c	26a

Triple Column

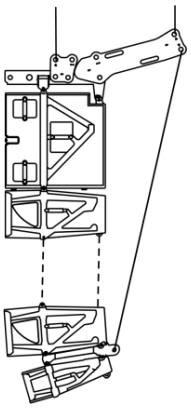
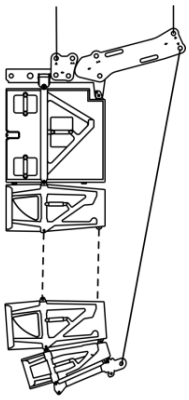
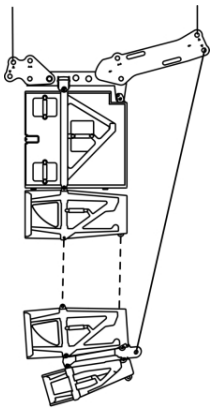
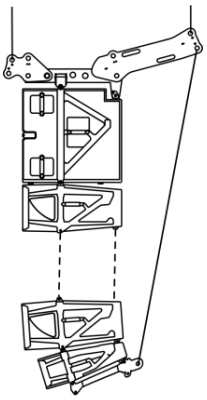
No M28 allowed in triple column mode

Rigging Points	Two Motors	
Bumper Top	No Kbeam	Kbeam Front
Chain Lever Hoist	750/1500	750/1500

		
	33a	36a

STM - Compression Chain - Two Motors

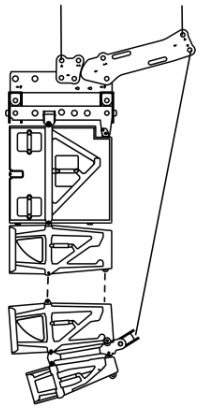
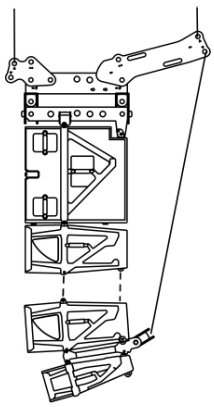
Single Column

Rigging Points	Two Motors			
Bumper Top	Kbeam+Mlink	Kbeam+Mlink	Kbeam+Ptilt	Kbeam+Ptilt
M28 Mode	Tension	Compression	Tension	Compression
Compression Chain	1500/3000	1500/3000	1500/3000	1500/3000
				
	14a	14b	15a	15b

Dual Column

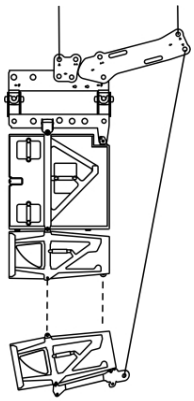
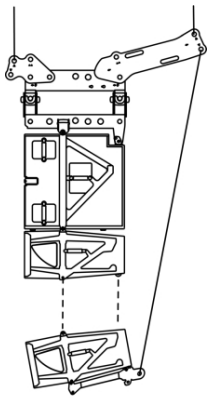
Bass left or right

Rigging Points	Two Motors	
Bumper Top	Kbeam+MLink	Kbeam+Ptilt

M28 Mode	Tension	Tension
Compression Chain	1500/3000	1500/3000
		
	24a	25a

Triple Column

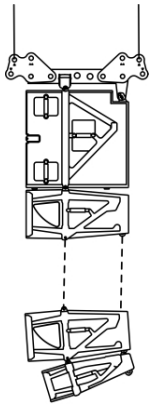
No M28 allowed in triple column mode

Rigging Points	Two Motors	
Bumper Top	Kbeam+MLink	Kbeam+Ptilt
Compression Chain	1500/3000	1500/3000
		
	34a	35a

STM - Fixed Installation - Two Motors

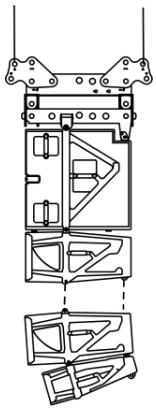
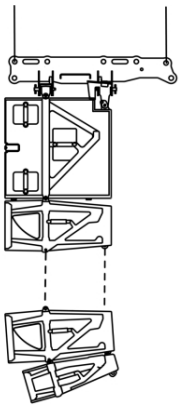
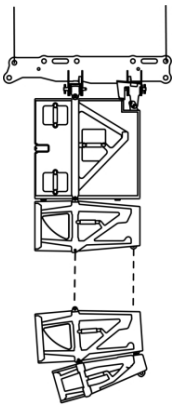
Single Column

Rigging Points	Two Motors

Bumper Top	No Kbeam
M28 Mode	Tension
	
	17a

Dual Column

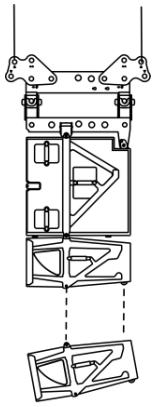
Bass left or right

Rigging Points	Two Motors		
Bumper Top	No Kbeam	LWB Rear	LWB Front
M28 Mode	Tension	Tension	Tension
			
	27a	27b	27c

Triple Column

No M28 allowed in triple column mode

Rigging Points	Two Motors
Bumper Top	No Kbeam

M28 Mode	Tension
	
	37a

Speaker Rigging Modes - STM M28

STM M28 System

M28 Only configurations can be flown as a single column only.

Configurations in this chapter:

Chain Lever Hoist - Single Motor

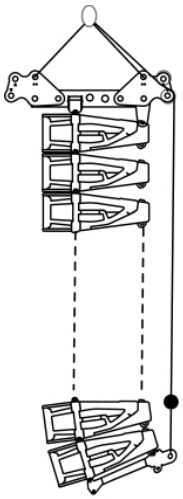
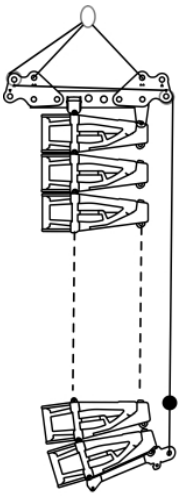
Chain Lever Hoist - Two Motors

Compression Chain - Two Motors

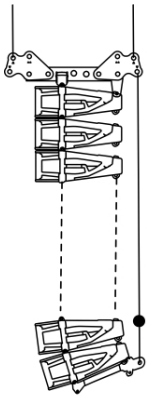
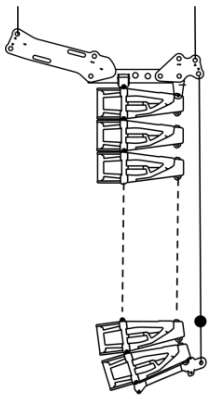
Fixed Installation - Two Motors

Chain Lever Hoist - Single Motor

Rigging Points	One Motor	
Bridle Fix Leg	Front	Rear
Chain Lever Hoist	750/1500	750/1500

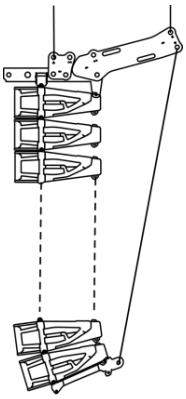
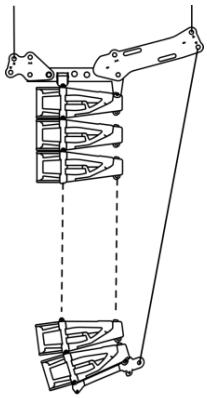
		
	11	12

Chain Lever Hoist - Two Motors

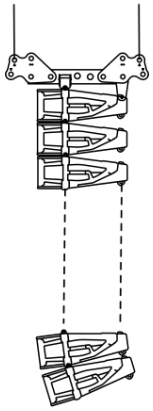
Rigging Points	Two Motors	
Bumper Top	No Kbeam	Kbeam Front
Chain Lever Hoist	750/1500	750/1500
		
	13	16

Compression Chain - Two Motors

Rigging Points	Two Motors	
Bumper Top	Kbeam+MLink	Kbeam+Ptilt
Compression Chain	1500/3000	1500/3000

		
	14	15

Fixed Installation - Two Motors

Rigging Points	Two Motors
Bumper Top	No Kbeam
	
	17

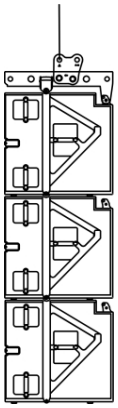
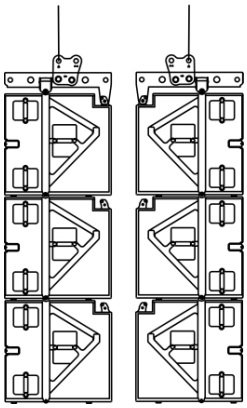
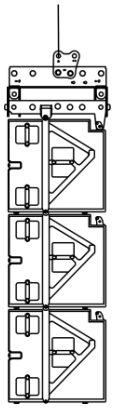
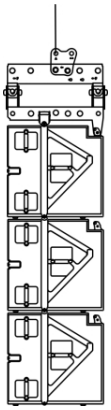
Speaker Rigging Modes - STM S118

STM S118 System

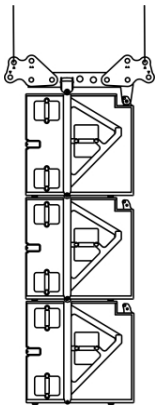
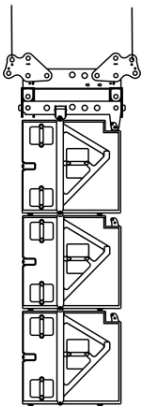
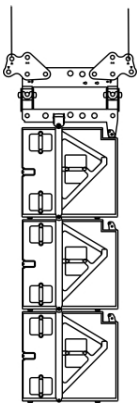
The STM S118 System is a vertical flown line-array for sub frequency range. There is no mechanical bending of the array but steering of directivity is achieved by controlled electronic delay of individual speakers. See chapter Sub Delay Dialog.

Chain Lever Hoist - Single Motor

Rigging Points	One Motor			

Configuration	Omni Single Column	Cardio Back to Back	Omni Double Column or Cardio Side to Side	Omni Triple Column
				
	18a	18c	28a	38a

Fixed Installation - Two Motors

Rigging Points	Two Motors		
Configuration	Omni Single Column	Omni Double Column or Cardio Side to Side	Omni Triple Column
			
	18b	28b	38b

Speaker Rigging Modes - Geo M6

Geo M6 System

		
One Rigging Point		
Bumper Only	Extension Bar Front	Extension Bar Rear
		
Two Rigging Points		
Bumper Only	Extension Bar Front	Extension Bar Rear

One Rigging Point

NS-1 calculates the next best pivot hole indicated by field *Rigging Point Position*. This may not fulfill specified vertical angle. The actual angle and the difference to the specified is reported at field *Actual Bumper Angle* and *Bumper Angle Error*.

Two Rigging Points

The chains of the two motors are attached to the first and last holes.

Speaker Rigging Modes - Geo 8

Geo S8 System

Rigging Mode

Bumper Only (GeoS8 without CD12)

Extension Bar rear (GeoS8 without CD12)

Extension Bar front (GeoS8 without CD12)

CD12 Link Bar (GeoS8 with CD12 Only)

Qty sub CD12

Specify the number of CD12 sub-units, which are combined with the Geo8-line-array-

cluster. Note, this entry is only used for the mechanical calculations, ie the CD12 units are not added to the venue.

Speaker Rigging Modes - Geo D

Geo D System

Rigging top

Note, rigging-modes depend on configuration. Selectable.

1 Motor + EXBar1 GEO Bridle + GEOD bumper + Short Extension Bar + Wheel (only for GEO D10 clusters, ie without Geo D-Subs).

2 Motors + EXBar1 GEOD bumper + Short Extension Bar (only for GEO D10 clusters, ie without Geo D-Subs).

2 Motors + EXBar2 GEOD bumper + Long Extension Bar (for GEO D10 and GEO D-Sub clusters).

2 Motors + EXBar2 + ExBar4 GEOD bumper + Long Extension Bar (for GEO D10 and GEO D-Sub clusters).

Rigging bottom

Note, rigging-modes depend on configuration. Automatic.

Bottom-Bumper GEO D10 bottom bumper (only for GEO D10 or combined GEO D10 /

GEO D-Sub clusters).

Bumper + ExBar3 GEO D-Sub bottom bumper (only for GEO D-Sub clusters).

Front Leg Bridle

For *One Motor* mountings enter the length of the bridle in cm or in Inch depending on the current settings of units, see Unit Dialog.

Chain Lever Hoist

Select type of the hoist.

Leva 750 for up to 7.5 kN compression force.

Leva 1500 from 7.5 kN to 15 kN compression force.

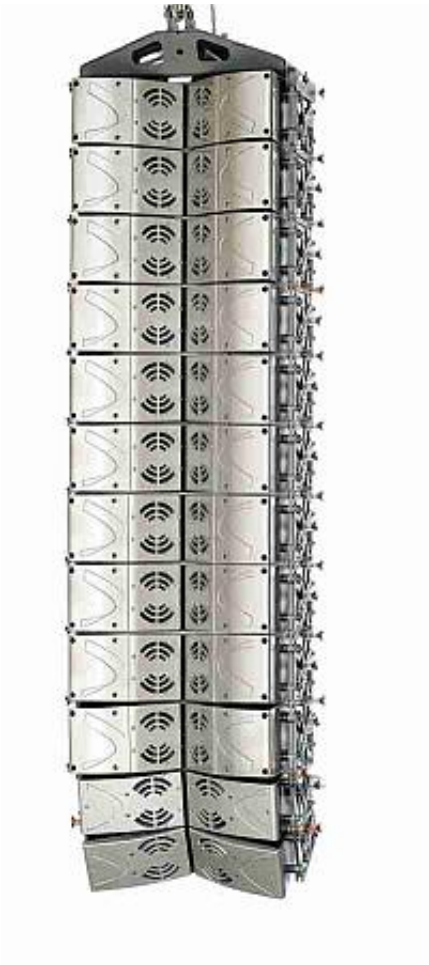
Note, if 1 motor is used then LEVA750 is mandatory.

Cluster Secured

Note, if 1 motor is used then securing bottom of cluster is mandatory. See chapter Wind-Settings.

Speaker Rigging Modes - Geo T

Geo T System



Rigging Mode

Bumper Only (Tension Mode).

Bumper + Half Kelping Beam (Tension mode), which allows greater distance between rigging points.

Compression Mode + 20° Kelping Beam.

Compression Mode + Half Kelping Beam.

Speaker Rigging Modes - Geo 12

Geo S12 System

Two Motors

Rear rigging point gives the bumper rear hole position (must be #-17).

Front rigging point gives the bumper front hole position (must be #17).

One motor

Rigging point position When using one motor, gives the bumper hole position to achieve required bumper angle (turns red if gravity center is off hole range, turns orange when 5% to the limit). Actual bumper angle reports the actual vertical position angle due to the automatically selected hole. Bumper angle error reports the difference between the vertical angle due to automatically selected hole and the specified vertical angle.

Fixed rigid (no LBRK)

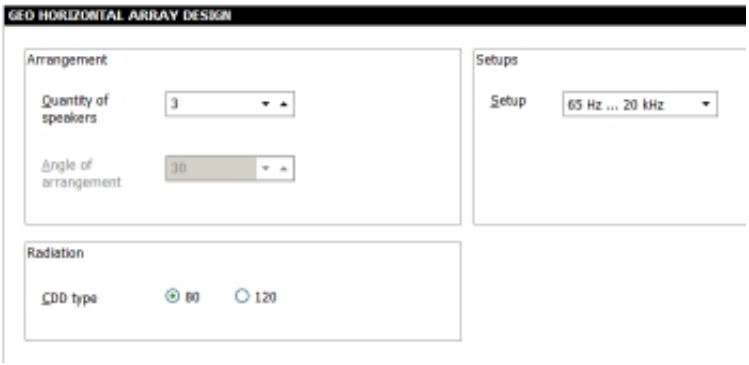
This setting is used for fixed installations only.

Bumper to 1st cabinet the special bumper allows for 10 vertical angles between the bumper and the first cabinet. Bumper to 1st cabinet direction There are 5 positive and 5 negative angles. Positive tilt the cluster upwards. Bumper angle reports on the total vertical angle of the cluster.

Fixed cable (with LBRK)

This setting is used for fixed installations only.

Speaker Geo Horizontal Dialog



The *Speaker Geo Horizontal Dialog* is part of the *Speaker Dialog* and lets you arrange speaker-units horizontally on an arc.

A *Speaker Dialog* opens on first selecting a speaker in the Venue, and then issue menu *Edit/Edit...*. Alternatively, dbl-click on the speaker or use righ-click-menu.

Arrangement

Quantity of Speakers

Provide the number of speakers of the horizontal array. For even number of speakers the mounting reference point is between the speakers at the top. For odd number of speakers the mounting point is at the center-top of the speaker in the middle.

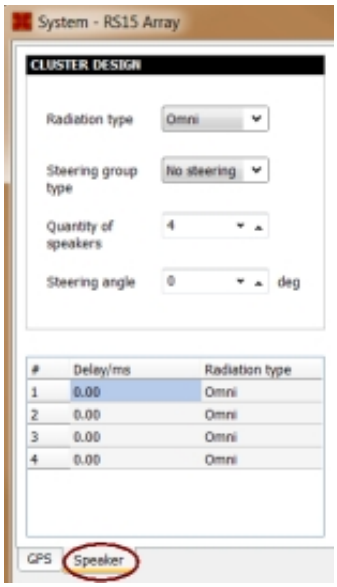
Angle of Arrangement

Horizontal spread angle of cabinets. The angle measures between the on-axis of two neighboring speaker-units. Note, for some configurations the angle is fixed.

Setup

Select a NXAMP setup, which should be used for this speaker.

Speaker Sub Delay Dialog



The *Speaker Sub Delay Dialog* is part of the *Speaker Dialog* and edits settings, which affect the radiation-pattern of Sub-Arrays.

A *Speaker Dialog* opens on first selecting a speaker in the Venue, and then issue menu *Edit/Edit...*. Alternatively, dbl-click on the speaker or use righ-click-menu.

The *Speaker Sub Delay Dialog* is a simulator, which lets you investigate the sound pressure response and distribution on part of the venue. The various graphs help in adjusting the delay of the sub-array, and offer various views for investigation.

The *Speaker Sub Delay Dialog* is divided into the input-part to the left, and into the output-part to the right. The output is updated automatically after changes. For the output-part, see chapter Side-View-Graphs.

Sub-Array Design

Specify here sub-array design parameter. On each change of values the simulator updates the output graphs on the right hand side.

Steering

Sub-Arrays are steered with the help of electronic delay. Mechanically a *Sub-Array* is stacked vertically without a curvature. The amount of delay will be calculated by NS-1 and depends on the *Steering Angle*.

Radiation Type selects the horizontal coverage of the bass-bins.

Steering Group allows to group bass-units for the vertical steering as they may be driven by a common amplifier. No Steering means no delay, and the value of *Steering Angle* is ignored. Individually means that each speaker-unit is delayed individually, which means also that each speaker-units needs to be driven via its own electronics. Grouped by x allows to take into account that neighboring speaker-units are connected to a common amplifier.

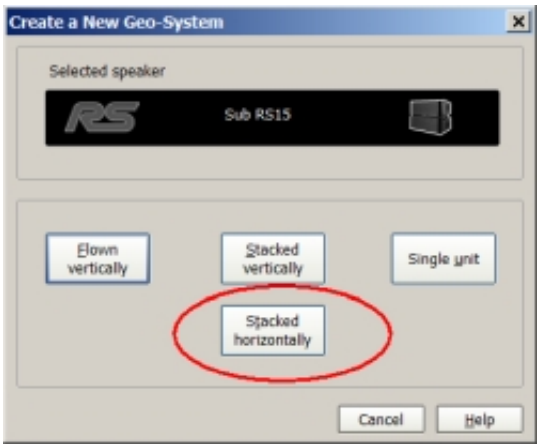
Quantity of Speakers gives the stack-size in number of speaker-units. The maximum quantity is restricted.

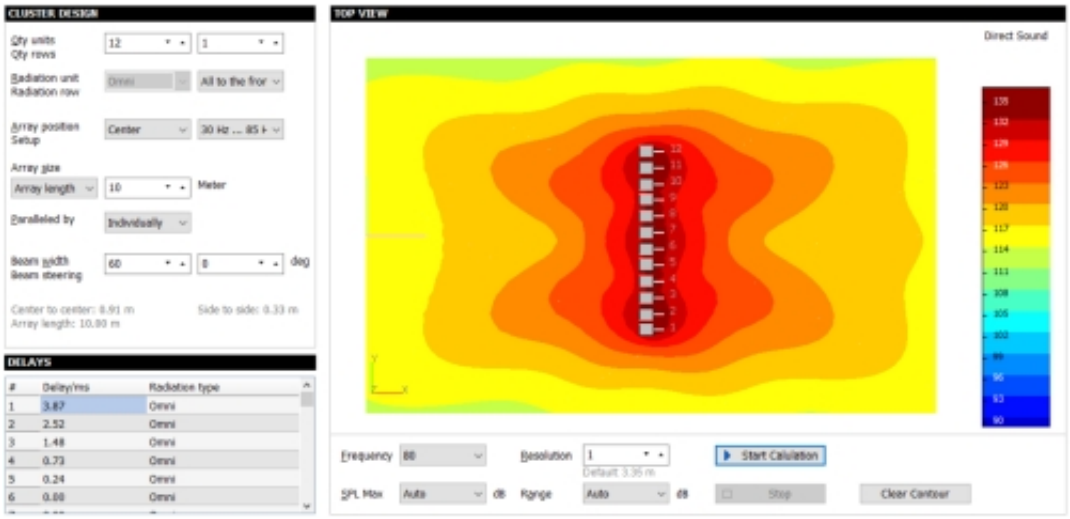
Steering Angle is the main controlling parameter of the sub-delay-array. The *Steering Angle* controls the vertical direction of the main-beam of sound pressure. Negative values point the beam downwards, positive upwards.

Delay List

The *Delay-List* reports the amount of electronic delay for each speaker-unit. For negative *Steering Angles* (downwards) the unit with zero-delay is at the top of the cluster, otherwise at the bottom. If *Steering Group Type = Grouped by x* then bass-units share a delay-value.

Speaker Geo Horizontal Subs Dialog





This user input-dialog lets you control the beam-steering of sub-array, which are arranged horizontally.

This kind of arrangement is invoked by selecting *Stacked Horizontally* at creating a new sub-speaker via menu *Speakers/Add selected speaker...*.

If you want to edit the horizontal line-array, first select the array in the Venue, and then issue menu *Edit/Edit...*. Alternatively, dbl-click on the speaker or use righ-click-menu.

Horizontal Sub-Arrays are steered with the help of electronic delay. Mechanically (or spatially) it is assumed all speakers are arranged without a curvature. The amount of delay will be calculated by NS-1 and depends on the *Steering Angle* and the *Beam Width*.

Dialog

Press the ENTER-key or click on button *Start Calculation* for updating the plot on the right hand side.

Click on button *Stop* in order to terminate a calculation.

Array Parameter

Qty units gives the array-size in number of speaker-units of each row.

Qty rows specifies the number of rows, which are assumed to be stacked.

Cardio FR-BA *All to the front* radiates to the front. *All to the back* cabinet mounted reverse so it radiates to the rear. Cardio delay is assumed to be applied.

Directivity selects the coverage of the individual bass-bin. (This selection is disabled if there is *Cardio FR-BA*).

Array position marks the origin of the position of the arrangement.

Array Size allows to enter the dimension of the array in various ways: *Array Length* is the distance from the very left to the very right speaker-center. *Center to Center* is the distance between two individual speakers. *Side to Side* allows you to specify the dimension with the help of the space between individual cabinets.

Paralleled By allows to group bass-units for the vertical steering as they may be driven by a common amplifier. *Individually* means that each speaker-unit is delayed individually, which means also that each speaker-units needs to be driven via its own electronics. Grouped by x allows to take into account that neighboring speaker-units are connected to a common amplifier.

Beam Width creates a set of delay-values, which opens or narrows the acoustic main-beam.

Beam Steering this angle controls the horizontal direction of the main-beam of sound pressure.

Delay List

The *Delay-List* reports the amount of electronic delay for each speaker-unit. If *Paralleled By* = *Grouped by x* then bass-units share a delay-value.

Plot Parameter

Frequency at which the arrangement is to be calculated. Note, that with increasing frequency the wavelength gets shorter. If the wavelength is smaller than the distance between the speakers then the prediction is out-of-range. Also make sure parameter *Resolution* is properly adjusted in order to avoid undersampling of the display.

Resolution actually expects the *Sampling Distance*, which controls the spatial density of the calculation-points in the venue. If left empty NS-1 uses a default value, which derives from the size of the venue, which is 0.1*max dimension, but larger than 3m. A low value of *Resolution* yields high resolution output, but calculation time may be high.

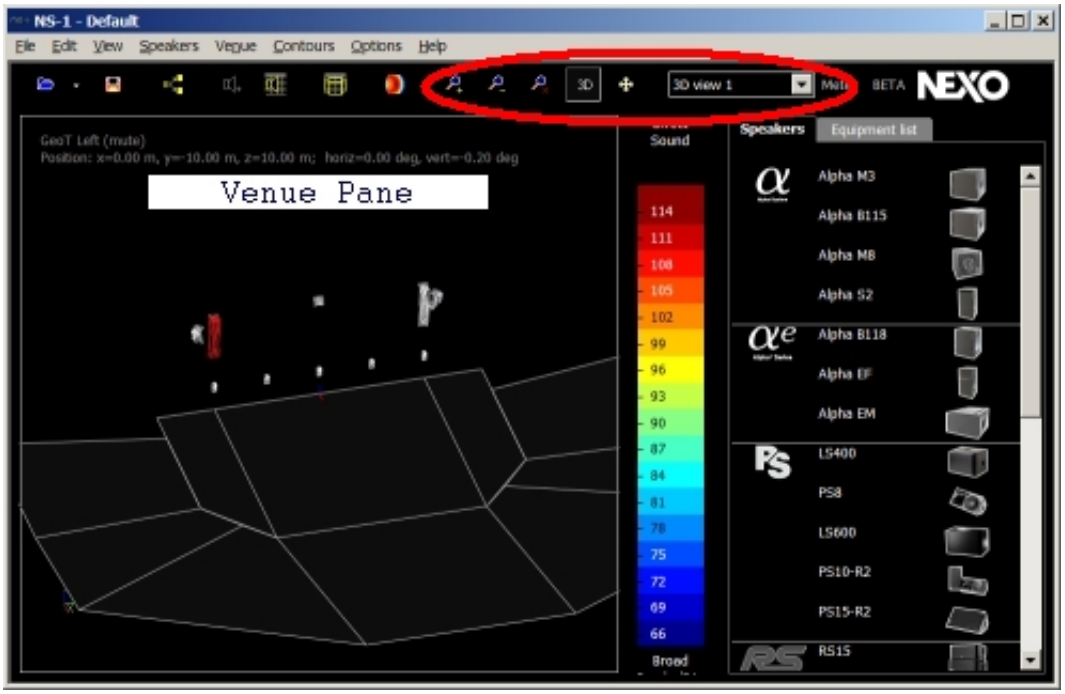
SPL Max and Range: *Auto Range* will yield a SPL range based on the calculated data. Otherwise, the range will be enforced to the selected range.

Start Calculation and Stop. These buttons start and terminate the calculation. Alternatively press ENTER-key to start.

VENUE

Venue Pane 3D View

See also Move-Pane.



The *Venue Pane* displays the speaker-systems and venue-items. The *Venue Pane* is highly interactive and is typically controlled with the help of the mouse.

Selection

For editing, duplication or deletion you need to select an item by clicking on its graphical representation. A selected speaker-system is rendered red. A selected venue-item shows a bold outline. A selected item displays its legend at the top-left of the desktop.

Editing

For opening the Speaker Dialog, Venue Vertices Dialog or Venue Quadrangle Dialog first select the item and then issue menu *Edit/Edit*. Alternatively, dbl-click the item. Menu *Edit/Edit as...* lets you toggle between entry modes for quadrilateral venue-items.

Deletion

Select a speaker or venue plane and issue menu *Edit/Delete*. Alternatively, press *Ctrl+Del*.

Deletion can be undone by menu *Edit/Undo* or press *Ctrl+Z*.

New Speaker

For adding a new speaker see chapter Speaker List.

New Venue Item

Issue menu *Venue/New Polygon* which opens the Venue Plane Vertex Dialog.

Issue menu *Venue/New Quadrangle* which opens the Venue Plane Quadrangle Dialog.

Simulation

The venue-pane renders field-results of simulations as described in chapter Simulations.

Note, side-view simulations (as in GeoSoft2) are part of the Speaker Dialogs.

Venue Move Vertices Dialog

With the help of the *Venue Move Vertices Dialog* you can move the selected venue-plane to a new position.

Name

Name of the venue-plane.

Audience

The *Audience Type* controls how sound pressure is received by venue-planes at simulations, see at Audience Types.

Position

Shift By will move the venue-plane by a delta x, delta y, delta z from its original position.

Rotate horizontally about origin will move the global position of the shifted venue-plane by a horizontal angle in degree. A positive angle rotates the venue-plane anti-clockwise about the z-axis.

Rotate Locally rotates the venue-plane about its center-point. *Horiz* rotates about the z-axis, ie in the horizontal plane, *Vert x* rotates about the x-axis and *Vert y* about the y-axis.

Apply

Applies shifting and rotation to the selected venue-plane.

Undo Move

Resets the position to its original position.

Venue Duplicate Dialog

The *Venue Duplicate Dialog* allows to quickly add a venue-plane to the venue. The new venue-plane starts as a carbon copy of the currently selected venue-plane.

Name

Name of the venue-plane.

Audience

The *Audience Type* controls how sound pressure is received by venue-planes at simulations, see at Audience Types.

Position

The duplicated venue-plane would need a new position.

Flip at y-axis

The new venue-plane appears on the other side of the stage, assuming the stage runs along the y-axis and the origin of the coordinate system is in the middle of the stage. Mathematically, the y-coordinates are inverted compared to the original position.

Flip at x-axis

Here the x-coordinates are inverted compared to the original position.

Offset Values

In this mode the new coordinates are derived from the original by an offset and/or by rotation.

Shift By will move the new venue-plane by a delta x, delta y, delta z from its original position.

Rotate horizontally about origin will move the global position of the shifted venue-plane by a horizontal angle in degree. A positive angle rotates the venue-plane anti-clockwise about the z-axis.

OK

OK will close the dialog, will create a new venue-plane and will move it to the specified direction. An error is reported if the new position is already occupied by another venue-plane.

Venue Scaling Dialog

The *Venue Scaling Dialog* allows to scale and move the whole venue.

Rotate horizontally about the origin

Provide an angle in degree in order to rotate the venue about the z-axis.

Shift By

Provide delta x-, y-, and z-values in order to move the whole venue.

Scaling

Shrink or enlarge the whole venue.

Apply

Applies the new scaling to the whole venue.

Reset

Disables the scaling.

Venue Open Dialog

The menu command *Venue/Open Venue* lets you open the venue without altering the

speaker systems.

The extension of NS1-venue-files, which have been saved with command *Venue/Save venue*:

– Nexo venue files (*.nxv)

Alternatively, venues can also be imported from

– Collada - 3D-CAD (*.dae)
– EASE - Audience/Face (*.xar, *.xfc)
– 3D Systems - 3D-CAD (*.stl)

Note, Sketchup exports COLLADA (*.dae). Unfortunately Sketchup 2015 has a modified geometry notation, which NS1 cannot render properly. Currently, we recommend to use Sketchup version 2014 or older in connection with NS1.

Note, large venues can be time consuming to import. You can press CANCEL-Key for termination.

Please check whether the import-file has the correct scaling. You may use, Venue/Scaling in order to shrink, expand, rotate or shift the whole venue after import.

Venue Save Dialog

The menu command *Venue/Save Venue* lets you save the venue without the speaker systems. The file-format is fixed and can be opened only with NS-1, command *Venue/Open venue*.

The extension of NS1-venue-files is *.nxv.

Alternatively, the venue can also be exported into several other file-formats with the help of command *Venue/Export venue*.

Venue Export Dialog

Allows to export the venue-planes to be exported into a variety of non NS-1 formats, for example for room-modelers, such as Ease or Catt.

Adversely, if you want to save the venue for later use, issue menu Venue Save Venue.

Only Active Venue Planes

If checked only venue-planes, which are enabled for simulations are taken into account, see Audience Types.

Venue Copy As Picture

The menu command *Venue/Copy as Picture* makes a snapshot of the venue as displayed and copies it as a bitmap into the clipboard. The format is jpg.

As a next step paste the picture in any target application such as your word-processor.

SIMULATIONS

Simulation Contour Dialog

This dialog opens if menu *Contours/Contour Control Form* has been issued. It is the starting point for simulations of the whole venue.

The main program can still be accessed, whilst this dialog is open. For example, you can simultaneously open the Speaker Position Dialog for muting/un-muting individual speakers.

As calculation run in a sub-thread the application can still be operated during simulation.

Analysis

Select here the type of analysis you want NS-1 to perform. Currently available are:

1. Direct Sound
2. Time Coherency

Shadowing

The *Direct Sound* analysis mimics diffraction effects, in a way that venue-planes, which are in the radiation-path produce a shadow. The result looks reasonable but has nothing do do with real diffraction, which would need more input and calculation time. If switched off all venue-planes are acoustically transparent.

Frequency

Frequency Bands

For *Direct Sound* a frequency integration is performed within the specified ISO-frequency-band. For *Time Coherency* the frequency is used as a single value.

Broadband

The output is sum-total of all ISO-frequency bands, which run from 31.5Hz to 16kHz. The result should be equivalent to the reading on your SPL-Meter for *Pink Noise IEC268* signal, which has a crest-factor of 6dB.

Z (flat) means no weighting. *dB-A*, *dB-B* and *dB-C* include aural weighing curves after IEC 651.

Please note: The sound pressure levels displayed by the NS-1 software are solely for information purpose. They have no contractual value and cannot, in any event, engage any responsibility of NEXO SA, of its affiliates or of the members of its network.

Width

In mode *Frequency Band* analysis specify the band-width of integration. *Single frequency* means that no integration is performed and the plot displays the response at this particular frequency. *1/3 Octave Band* and *1/1 Octave Band* mean that we integrate over a frequency band.

Density

In mode *Broad Band* analysis specify the density of integration. *1 Point/Octave* means

that we calculate the response at each octave ISO-frequency. *3 Points/Octave* has 3 times more points and *6 Points/Octave* accordingly.

Resolution

The field *Resolution* actually expects the *Sampling Distance*. *Sampling Distance* controls the spatial density of the calculation-points in the venue. If left empty NS-1 uses a default value, which derives from the size of the venue, which is 0.1*max dimension, but larger than 3m.

Sampling Distance makes sure that the distance between the distribution of calculation points is everywhere less then *Sampling Distance*.

A low value of *Sampling Distance* yields high resolution output, but calculation time is high. Note, that calculation time increases squared.

SPL Scale

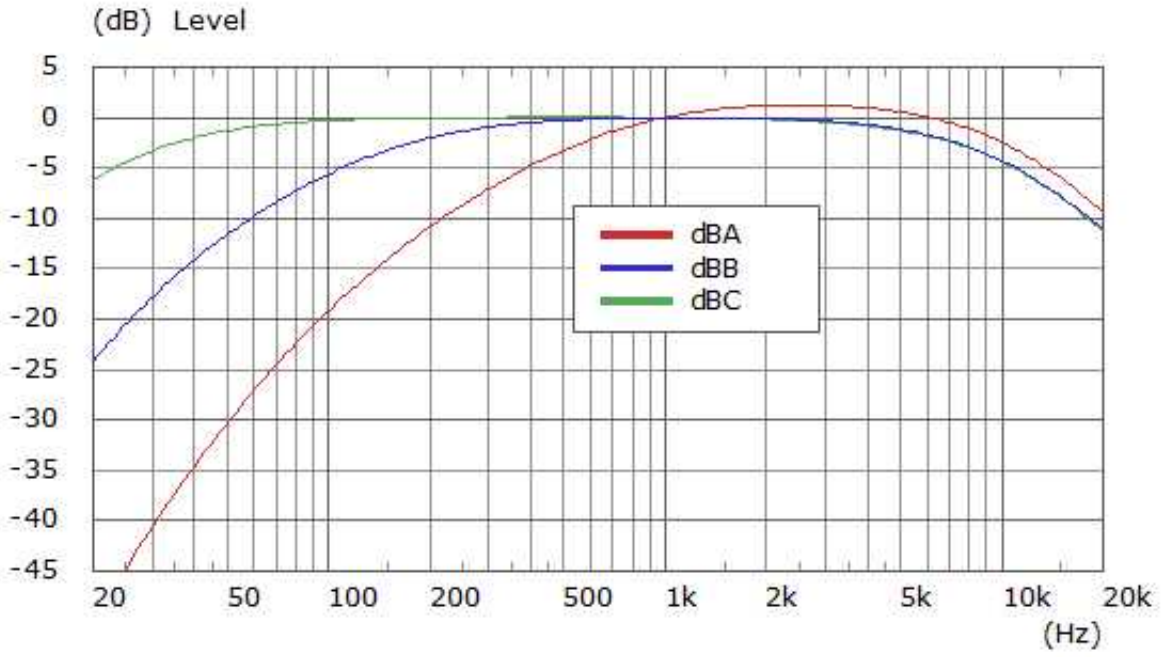
Auto Range will yield a SPL range based on the calculated data. Otherwise, the range will be enforced to the selected range.

Slow - Fast Meter

This meter gives a rough indication about the expected calculation time.

Simulation with dB-A, dB-B and dB-C Weighing

dB-A, *dB-B* and *dB-C* are aural weighing-factors for the sound pressure response after IEC 651.

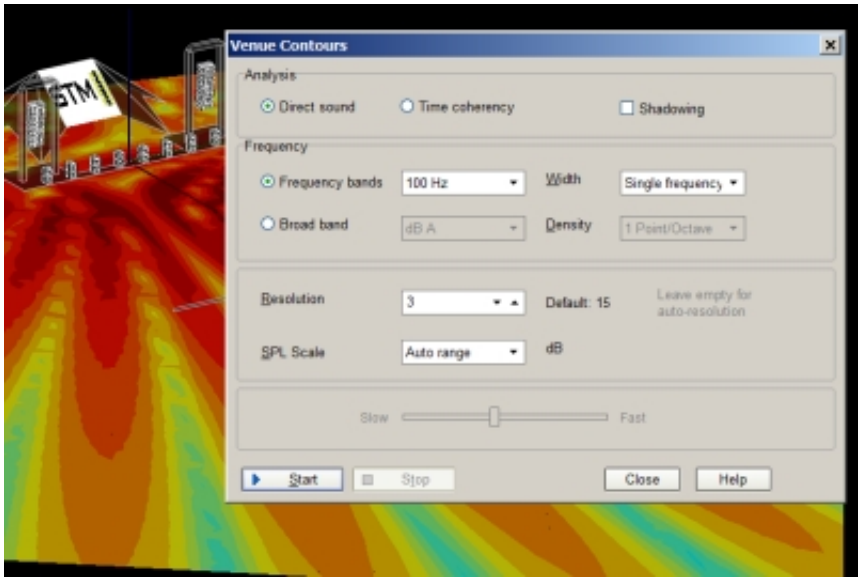


Simulation Contour SPL

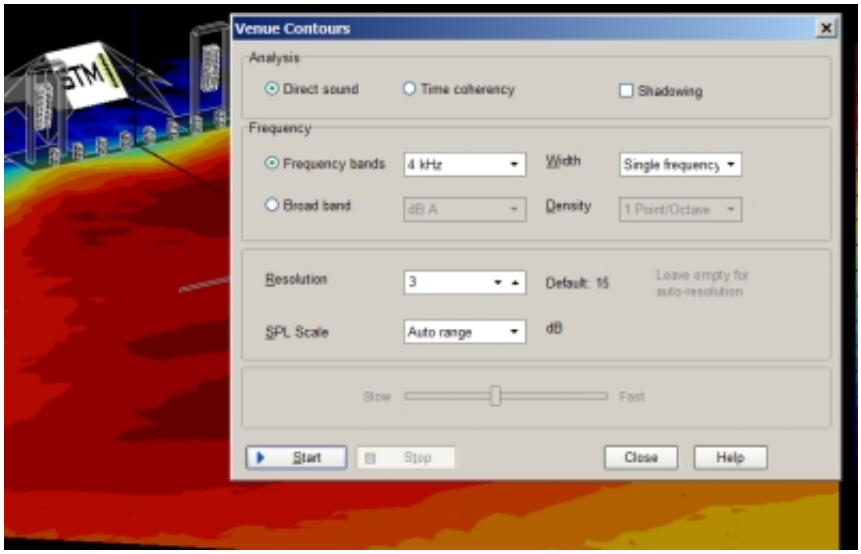
This simulation calculates the sound pressure level field on the venue on Audience Level. The simulation is controlled with the help of the Simulation Contour Dialog.

At its heart, *Contour SPL* calculates the direct pressure from the speakers to a point on the venue-surface. Reflection- and diffraction-effects are not taken into account (direct

sound). Hence, the field shows only the response of the speakers at the venue-surface. Albeit highly simplified, the direct sound gives a valuable information about the sound distribution to expected.



At low frequencies a complex integration is performed, which yields interference patterns.



At high frequencies a RMS-integration is performed, which shows the uncorrelated radiation.

The transition between sum of all complex pressures to sum of all pressure-amplitudes is done automatically. The transition frequency is deduced from the wave-length. RMS-integration is switched-on if the wave-length is shorter than the *Sampling Distance*.

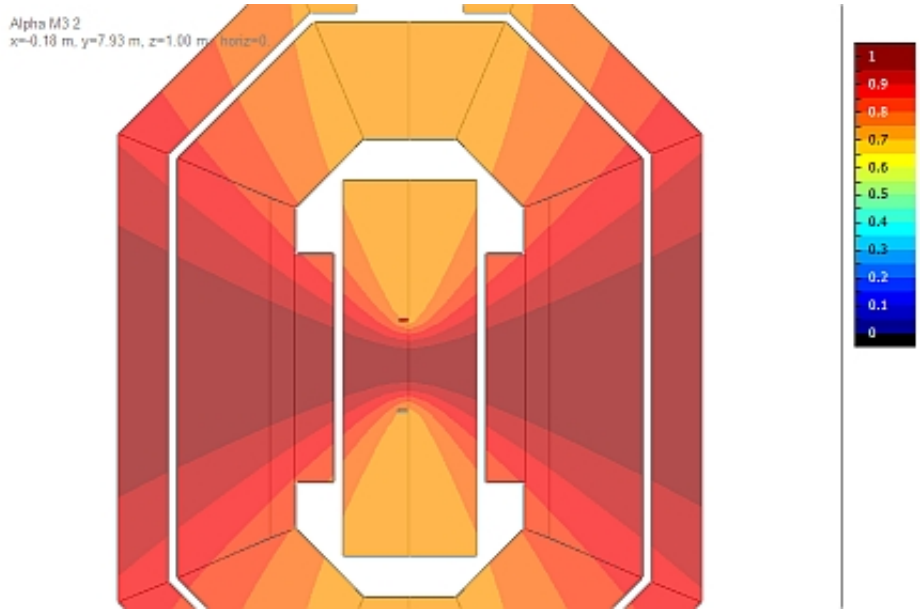
Why transition? At HF the wave-length is very short (30cm @ 1kHz). This means the field would exhibit a fine-grid interference pattern. Most of this distribution would level out to zero if spatially smoothed. Because of this and because the fine-grid interference patterns do not give useful information, and because it is time-consuming to calculate, it is better to work at HF with "power"-distribution as an approximation.

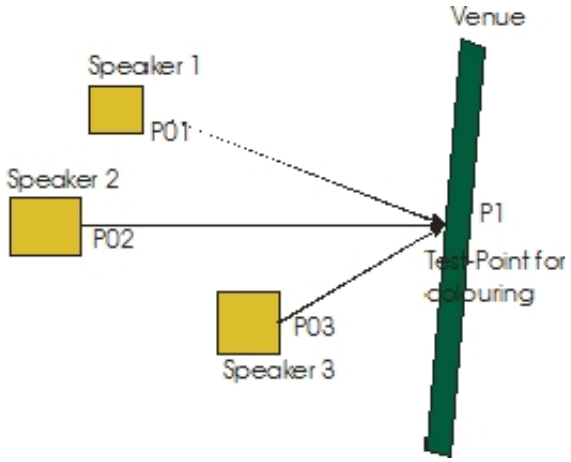
NS-1 performs also frequency integration as explained in Simulation Contour Dialog.

Simulation Time Coherance

The *Simulation Time Coherance* contours the venue due to a sound pressure arrival time measure. The simulation is controlled with the help of the Simulation Contour Dialog.

The plot indicates the quality of time arrivals of all speaker-systems. "Red" (Q=1) means good time alignment and "Blue" (Q=0) means bad time alignment. The plot gives only a rough indication. *Time coherency main* measures at high frequency and *Time coherency subs to main* at low frequencies.





The pressure contribution is taken into account as well. The argument for the measure of quality is calculated with the help of the mixing formula:

$y = SUM(p_i^2 \cdot |dx_i|)/SUM(p_i^2)$

The index runs through all non-mute systems. p_i is the sound pressure amplitude of each system at venue-point P1. p_i is normalized to the pressure of the system performing the largest pressure contribution at venue-point P1. dx_i is the normalized distance of each system to venue-point P1.

$dx_i = (|P1 - P0_i| - |P1 - P0_{max}|)/x_\tau$

with

$x_\tau = c \cdot \tau(f)$

$\tau(f)$ is a heuristic gauge-value. c is the speed of sound.

x_τ is the equivalent distance of the time arrival measure.

$|P1 - P0_{max}|$ is the distance between the venue-point P1 and the system with maximum pressure at P1.

$|P1 - P0_i|$ are the distances between the venue-point P1 and all other systems.

In the next step we have to map y to the quality measure, which should give Q=1 if y=0 and Q=0 if y >= 1. This can be achieved with the help of:

$Q = 1/2 \cdot (1 + \cos(\pi \cdot y))$ for $y = 0...1$

$Q = 0$ for $y >= 1$

Geometrical Coverage

If menu *View/Show Geometric Coverage* is switch on, NS-1 will display the coverage of a selected Geo-Line Array system.

Geometric Coverage helps in estimating the venue-area covered by a Geo-Line Array. This calculation is based on geometrical calculations of the radiation beam of the Geo-System. Hence, it is very quick. The Geometric Coverage provides the means for quickly assessing the targeted venue-area.

You can show/hide *Geometric Coverage* with the help of menu *View/Show Coverage Areas*.

Individual Coverage can be controlled with the help of the Speaker Position Dialog.

Bug reporting: technical@nexo.fr. Thanks for your cooperation!

NEXO SA cannot be held responsible for damages caused by improper use of the devices, this software and its manual.

The screenshots shown in this document may vary with the considered language and version.

NEXO SA
PARC D'ACTIVITE DE LA DAME JEANNE
F-60128 PLAILLY

Phone: +33 3 44 99 00 70
Fax: +33 3 44 99 00 30

Email: info@nexo.fr
Web site: www.nexo-sa.com