Audio Speakers Guide

Version 1.0

Introduction

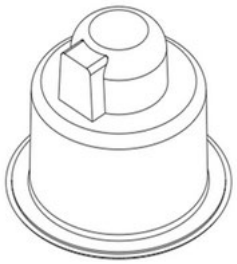
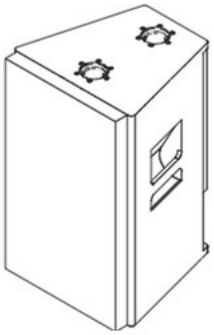
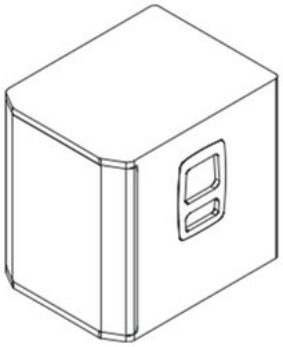
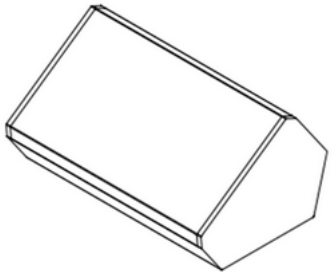
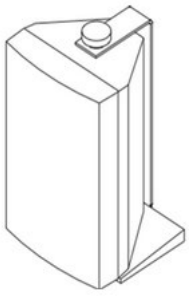
This guide provides the instruction for developing professional audio speakers/monitors for use in Vectorworks Spotlight. It is best to read completely through this guide to get a better understanding of the process before beginning. There is also a development file attached to this guide with examples of properly made symbols and all necessary support material.

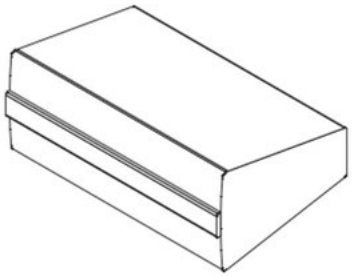
★ Please read the Vectorworks Basic Style Guide first. It will cover more common aspects that you need to consider in creating your resources, and it is a companion to this guide. The information found there should be understood before using the more specific topic guides like this.

Table of Contents

Speaker Types Covered in this Guide

This guide covers the following types of speaker symbols:

	**Ceiling Speaker** These speakers are designed to be installed in drop ceiling panels or flush mounted onto walls.
	**Floor Speakers/DJ Event Speakers** These speakers are designed to be placed on the floor or a stage.
	**Floor Subwoofers** Can be either floor standing or mounted as part of a line array of speakers.
	**Floor Wedge Stage Monitor** These are wedge shaped speakers that are angled towards the performer onstage.
	**Flying Speakers** These speakers typically mounted on a wall or hung from ceilings with special brackets. Commonly in churches, auditoriums, or retail stores.

	**Line Array Speakers & Subwoofers** These are speakers and subwoofers used as a part of a system of speakers lined together with rigging, and includes bumpers. Typically found in larger venues.

The Speaker tool has two speaker source options when inserting speakers.
"Symbol mode" uses the actual symbol's geometry when placing the symbol in the drawing, and has the most accurate appearance. That is what this guide covers: making the symbols which will typically represent manufacturer products.
There is also "Catalog mode" that uses the measurements in the speaker's record format to draw a simpler 3D box representation of the speaker. Although more simplified, this object type improves the file's performance. Accurate measurements are required to be entered in the record's dimension fields, in order for this to correctly work.

Getting Started

Before proceeding you should have basic Vectorworks knowledge on modeling and creating symbols. This includes understanding the Vectorworks Basic Style Guide.

Also consult the Vectorworks Help section on inserting speakers, here: Inserting speakers and speaker arrays

Collect source info

Start by collecting the necessary source materials. Speaker manufacturers will have this information on their website in the form of CAD files, PDF drawings, and spec sheets/brochures.

- **Manufacturer drawings** – with properly scaled dimensions that show the top, both side views, and the front are the easiest to draw from. Avoid any views that are isometric as they are no help because you cannot accurately dimension. If the manufacturer has 3D model files (e.g. DWG, STEP, etc.) files they can be used but are often very heavy and model every screw and curve.

  See also *Importing models from other CAD/BIM formats* in the Basic Guide.

- **Dimensions** – Our standard speaker record format, _ATS-SpkrModData record, will require accurate dimensions of the outer cabinet to be entered. Make sure the source

material has accurate dimensions for height, width, and depth. Wrong dimensions in these record fields can cause compounding errors. This record will be found in the included Vectorworks template with this guide.

- **Weight** – The total weight of the entire cabinet with all internal components and grill. Rigging is not included, as it is represented separately. Weight can be provided in either pounds or kilograms.
- **Wattage and Power Data** – Identify the speaker's wattage specifications (minimum, RMS, and peak/max) to assist with power planning. Ensure that at least the peak/max wattage is noted from the specification sheets.
- **Dispersion Angles** – These angles include both horizontal and vertical components, representing the sound coverage pattern. Values must be provided in the record for the symbol to function properly. Only values between 0° and 180° should be used from the manufacturer specification (cut) sheet if provided. If there is no value available, use a value of 180°.

Start a file

The library should be made using the Spotlight templates and samples supplied with this guide, which contain all the correct records, classes, colors, accessories, and textures currently in use.

Key Elements for Speakers

The speakers all share some common attributes which are described here below.

- Speakers are 3D/Hybrid symbols.
- Most speakers contain two parts: a cabinet, and also a speaker grill, modeled to make up the 3D component of the symbol.
- 2D planar geometry represents the plan view for the 2D component of the symbol
- Specific insertion and orientation of the geometry must be considered for each speaker type.
- Records use specific field and data depending on the speaker type.

More specific details on each of these will follow this section as each speaker type is covered in detail in the sections below.

3D Component - Basic Creation

The 3D component of the speaker symbol provides an accurately sized model representation of the real world object. Although it should be simplified if the device is highly detailed. Avoid drawing minute details like handles, rigging holes, or signal/power inputs as part of the 3D symbol.

The 3D is usually made of two parts, a speaker cabinet, and a speaker grill. The following will explain a typical speaker's creation which will apply similarly to the other types in the next section of this guide.

🗎 Please note: There will be more specific instruction for each of the speaker types in the next section, '3D component - Specific speakers types'.

Speaker cabinets

The 3D component of the speaker symbol must be made with Vectorworks native geometry. Using your source drawings/CAD files, trace the side and/or top views of the cabinet, with the Polyline Tool. If using source drawings, be sure it is properly scaled.

Avoid tracing rounded corners and instead make them square corners using the center of the radius. This further helps reduce file size and improves speed when rendering. Once the polygon is made, use the measurements listed from the manufacturer, to extrude it to the correct length.

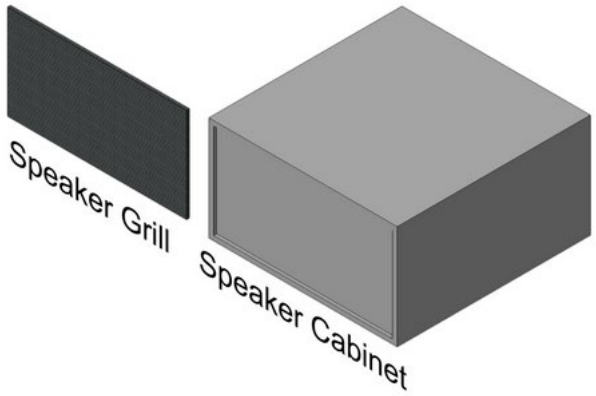
★ Once the speaker cabinet is complete, it should have the following "attributes":
* There should be single piece of geometry for the cabinet.
* Line weight of 0.05 mm applied to all the 3D geometry.
* Fill color should be set to: **Cool Gray 80%**
* The model should not have chamfers or fillets which will slow performance.
* No texture is used on the cabinet.

Speaker grills

Most speakers (except ceiling speakers) will have a grill that is either a metal screen or lightweight fabric. There will be a texture for each in the template. These will typically be either flat front grills or curved front grills. The grills will need to be modeled as a separate object and textured with one of the provided textures in the template file.

Flat front grills

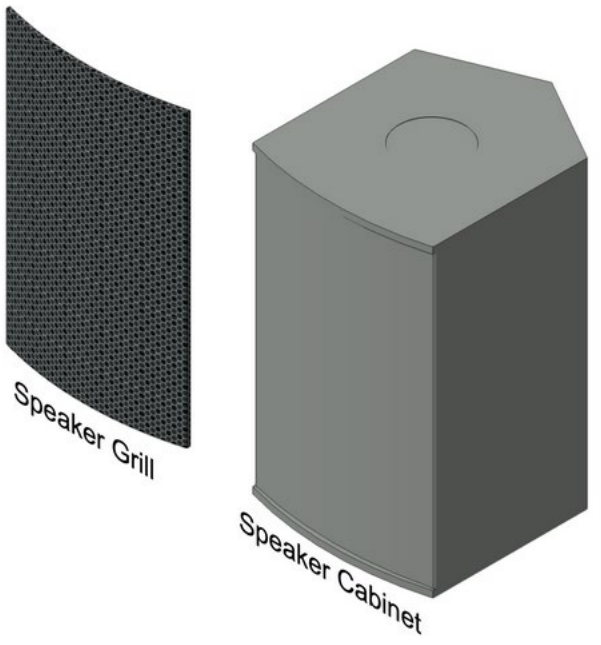
Speakers with a flat front face will need a grill added. Use the manufacturer drawings to determine the placement of the grill geometry. Unless specified, this extrude should be 12mm deep. This will keep the geometry lightweight still but also make the texture deep enough to not be transparent or pass through to other areas of the cabinet geometry.



Exploded view example of a flat faced speaker cabinet with inset grill, showing the subtracted grill area in front

Curved front grills

To make the curved grills, more effort is required. Start by using the original polyline shape from the cabinet's extrude, from the Top/Plan view. Using the polyline with the Split tool, cut the polyline to the correct width and depth based on manufacturer drawings. Once that polygon is created make sure it is closed and then extrude to the height of the grill measured from the manufacturer drawings. Apply the texture and snap the geometry to the speaker cabinet.



Speaker cabinet with a curved front showing how grill geometry should follow the curve

★ Once the speaker grill is complete, it should have the following "attributes":
* There should be single piece of geometry for the grill.
* Line weight of 0.05 mm applied to all the 3D geometry.

* Fill color should be set to: **Cool Gray 90%**
* The model should not have chamfers or fillets which will slow performance.
* Correct grill material:
  Metal grill - use the 'Audio Grill Metal RT' texture.
  Fabric grill - use the ‘Audio Grill Fabric RT’ texture.

Grill placement

The speaker grill needs to be snapped to the front of the speaker for most speaker types. The front bottom center of these combined parts will be the location of the symbol’s insertion point. Depending on the speaker type, it may be necessary to recess the grill into the face of the speaker.

Create grill recess (inset) in speaker face

If this is the case, the grill geometry will need to have a recess added. This will be done by making a Solid Subtraction from the cabinet face while the grill is partially recessed into the cabinet face. Be sure that the Solid Subtraction has the ‘Retain Subtracting Objects’ check box checked.

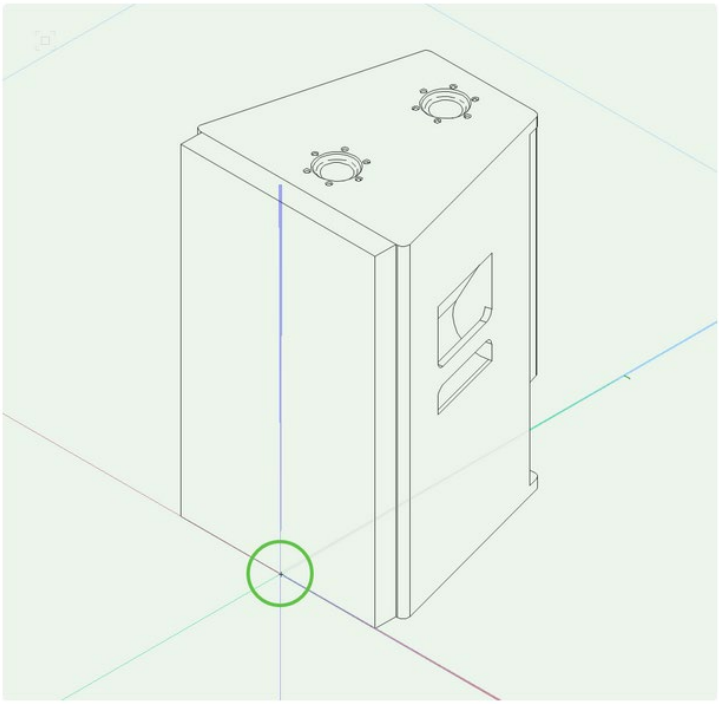
★ If the modeling using the solid addition or subtraction operations, be sure to convert that geometry to Generic Solids when finished. This does not apply to extrudes.

Standard speaker insertion and orientation

Typically, the insertion point (0,0,0) should be at the front bottom center of the overall speaker object. This point may be located on the grill or just on the speaker cabinet if no grill is needed. This is typical on most floor or stacked speakers.

Cabinets should always be oriented so that the front grill of the speaker is positioned facing down if in a Top/Plan View. That location will centered at the 0, 0,0 axis point when establishing the insertion point, and/or when editing the 3D Component after it is made into a symbol.

This will be referred to as the “*standard speaker insertion*” going forward as the speaker types are explained later in this guide.



Insertion at the front face – bottom front is on the 0,0,0 axis in the 3D component

Some of the speaker types will not use this “typical” speaker insertion. These other insertions setups will be explained later in each speaker type description.

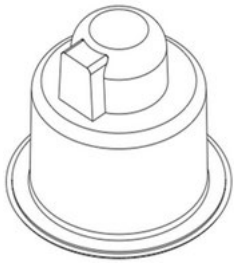
> The Speaker Tool has the ability to flip orientation of the speakers into other positions at insertion. Therefore always draw speakers facing down when viewed from the top.

3D Component - Specific Speaker Types

Now that the basic construction of the symbol is understood, there will be additional elements/characteristics that need to be considered, depending on the specific type of speaker. Each will be detailed below, keeping in mind the basic 3D component instruction that was already provided above.

I. Ceiling speakers

These speakers are designed to be installed in drop ceiling panels or flush mounted into walls. These will not be like the Basic speaker described above, since they insert into ceilings.

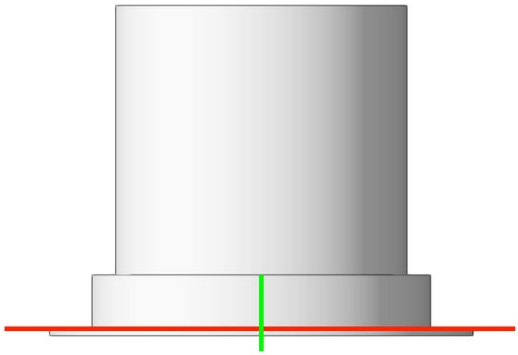


Ceiling speaker

Insertion/orientation

This does not used the “standard speaker insertion” referred to earlier. These types of speaker models are positioned so the the insertion point is at the center of the speaker geometry when in the Top standard view.

Switching to the Front standard view, the geometry should be oriented so that anything above “0” height plane will be hidden inside the ceiling above when saved in a symbol to place into a ceiling. The geometry below the “0” height plane will be visible below the ceiling.



Ceiling speaker shown from the Front standard view

Classing

Geometry should be placed on the Audio-Recessed class.

Record

After the **_ATS-SpkrModData** record format is attached, the following values need to be selected or entered into the record fields. *Please note this for when you add the record later, which is covered later in the Guide in the “Adding symbol records” section.*

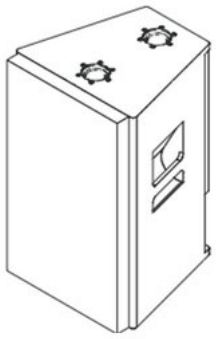
- These ceiling speaker symbols use a different block of dimensions in the record, than the other “types”. These dimensions will create a hole cut into the ceiling or wall object being modified.
- Enter Ceiling Speaker for the ‘Type’ field in the record.
- Make sure that ‘Is Ceiling Speaker’ box is checked in the record. This will make the tool use the dimensions for ceiling speakers in the record.

- Fill out the Ceiling Speaker specific fields (#10 through #12) of the record. The three fields are:
    - Ceiling Grill Diameter (use mm only)
    - Ceiling Cut Diameter (use mm only)
    - Ceiling Height (use mm only)
- See the 'Adding the symbol records' section for the rest of the fields that need to be filled out.

II. Floor speakers/DJ event speakers

These speakers are designed to be placed on the ground or floor. These are the “typical” cabinet speaker with a grill, that were described in prior section, '3D component - Basic creation', above.

The grills may be attached to the front, or may also be inset into the cabinet face, depending on the product.



Floor speaker

Insertion/orientation

Use the “standard speaker insertion” that was described in the prior section, ‘3D component - Basic creation’ at the front center.

> Note on additional mounting which does not affect the insertion point setup.
> * If the speaker is designed to be on a stand or tripod, then the speaker can be placed on one. The stand can be added using the Accessory field of the Speaker Tool, but should not be drawn in the speaker symbol itself.
> * Another mounting type is from the sides of the speaker with the use of brackets.

Classing

Assign all geometry to the Audio-PA Ground class.

Record setup

After the **_ATS-SpkrModData** record format is attached, the following values need to be selected or entered into the record fields. *Please note this for when you add the record later, which is covered later in the Guide in the "Adding symbol records" section.*

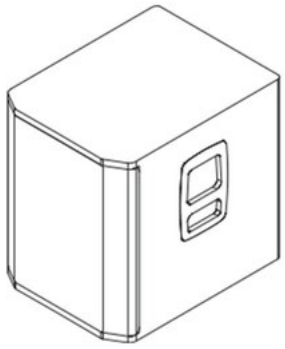
- Enter "Speaker" for the 'Type' field in the #1 row of the record.
- Properly enter the dimensions into the record. If incorrect the resulting speaker may cause an error message or make the imported speaker the wrong size.
- For the Floor/DJ Speaker - fill out fields #5 through #9, using millimeters in the record.
- See the 'Adding the symbol records' section for the rest of the fields that need to be filled out.

III. Floor subwoofers

Subwoofers for floor use are created and set up similar to a floor speaker, although there are differences to note.

- They are built the same as a typical floor cabinet speaker described in previous section of this guide on '3D component - Basic creation'.

There are also subwoofers for use in line arrays. Those are explained later, with the Line Array Speakers.



Subwoofer

Insertion/orientation

Use the "standard speaker insertion" that was described in the prior section, '3D component - Basic creation' at the front center.

Classing

Ground/floor subwoofer - Assign all geometry to the Audio-PA Ground class.

Record setup

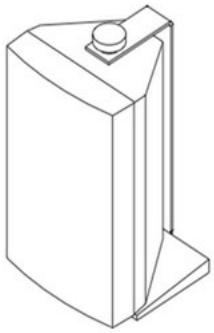
After the **_ATS-SpkrModData** record format is attached, the following values need to be selected or entered into the record fields. *Please note this for when you add the record later, which is covered later in the Guide in the "Adding symbol records" section.*

- Enter "Subwoofer" for the 'Type' field in the #1 row of the record.
- Properly enter the dimensions into the record. If incorrect the resulting speaker may cause an error message or make the imported speaker the wrong size. Use millimeters only.
- Fill out fields #5 through #9, using millimeters in the record.
- Subwoofers have specialized dispersion values that need to be added to the record for the acoustic properties of bass frequencies, which is different from the high end frequencies. Horizontal dispersion will be 180°, left and right dispersion will be 90°, and vertical dispersion will be 180°. These values need to be filled out in fields #22 through #26.
- See the 'Adding the symbol records' section for the rest of the fields that need to be filled out.

IV. Flying speakers (Not line arrays)

These speakers are designed to be mounted to a wall or hung from ceilings using special brackets They are common in churches, auditoriums, or retail stores and are a lot smaller than line array cabinet speakers.

- Flying speakers symbols are generally modeled so the longer length of the speaker runs vertically.
- After the symbol is complete, use the Object Info palette to orient the symbol either horizontally or vertically by changing its rotation.



Flying speaker with mounting bracket

- In order for this feature to work properly, the dimensions will need to be entered accurately in the _ATS-SpkrModData record. Incorrect data may cause an error message with the symbol being the wrong size.

> Note on additional mounting:
> The manufacturer will have brackets, yokes, and hanging hardware that these speakers are designed to use. They can be added using the Accessory field in the Speaker Tool. Do not draw them in the speaker symbol itself.

Insertion/orientation

These speakers will use the “standard speaker insertion” that was described in the prior section, ‘3D component - Basic creation’.

Classing

Assign all geometry to the Audio-PA Flown class.

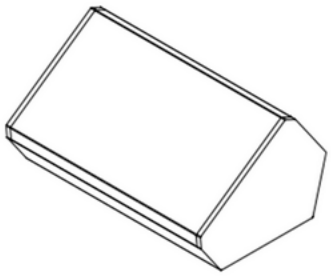
Record setup

After the **_ATS-SpkrModData** record format is attached, the following values need to be selected or entered into the record fields. *Please note this for when you add the record later, which is covered later in the Guide in the “Adding symbol records” section.*

- Enter “Speaker” for the ’Type' field in the #1 row of the record.
- Properly enter the dimensions into the record. If incorrect the resulting speaker may cause an error message or make the imported speaker the wrong size. Use millimeters only.
- See the Adding the symbol records section for the rest of the fields that need to be filled out.

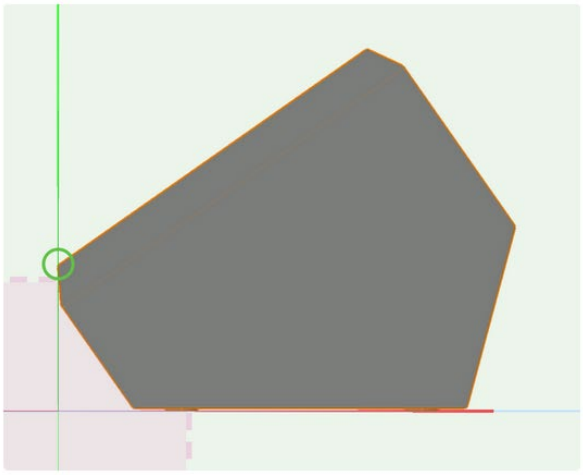
V. Floor wedge stage monitors

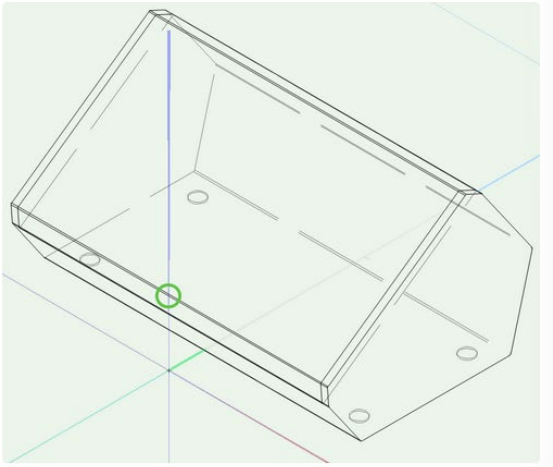
These speakers are wedge shaped when viewed from the side to angle the sound towards the performer onstage. Some models will also have the option to be used rotated. The preferred placement/orientation for this type is for the wedge to point upwards when there is this option.



Wedge stage monitor

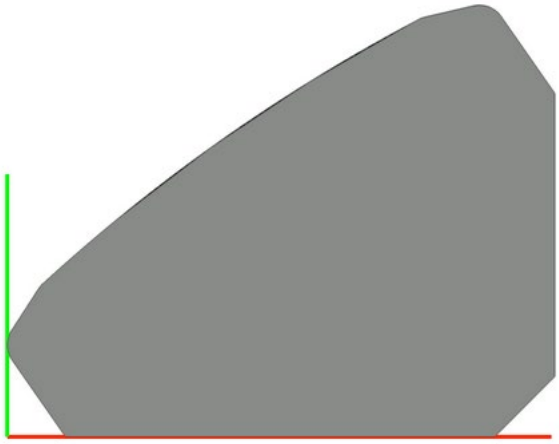
- Some stage monitors may be more difficult to create because they may have a curved front face with a grill that is inset into the cabinet face.
- If there are feet molded into the cabinet make sure to model them so that the overall dimensions from the source information match with the model's geometry.
- The center front most part of the speaker, is aligned with the insertion point. While the lowest point of the base will be aligned at the "0" height of the Design Layer's plane. If there are feet (which is typical), the bottom of the feet should aligned on the "0" height plane of the Design Layer.





***On the left**: Right view showing the 0,0,0 insertion point aligned with the front most point of the speaker. The base is aligned with the "0" height of the layer.*

***On the right**: The same speaker is shown in Right Isometric view.*



Floor monitor wedge but with a curved front showing insertion location

Insertion/orientation

The Speaker monitor wedge above is shown in relation to the insertion point (0,0,0) where the red and green lines intersect. The model will be placed so the the middle front most part of the model is aligned on the 0, 0, 0 axis point.

Classing

Assign all geometry to the Audio-Monitors class.

Record setup

After the **_ATS-SpkrModData** record format is attached, the following values need to be selected or entered into the record fields. *Please note this for when you add the record later, which is covered later in the Guide in the "Adding symbol records" section.*

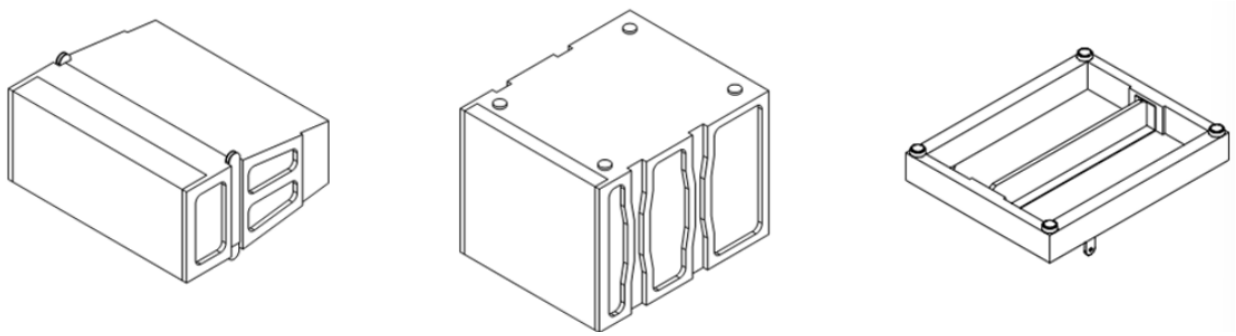
- Enter "Monitor" for the 'Type' field in the record.
- Properly enter the dimensions into the record. If incorrect the resulting speaker may cause an error message or make the imported speaker the wrong size. Use millimeters only.
- See the 'Adding the symbol records' section for the rest of the fields that need to be filled out.

VI. Line arrays - speakers & subwoofers

The 'Speaker Array Tool' combines bumpers, line array speakers, and subwoofers into an assembled system. In order for the tool to correctly assemble the line array system, it must follow unique insertion point rules. These insertion points will be based on the rigging connection location. Each brand will be different for this setup – refer to the manufacturer's CAD drawings and documentation.

Note: See the guide on making the bumpers that are part of the rigging for Line Array speakers.

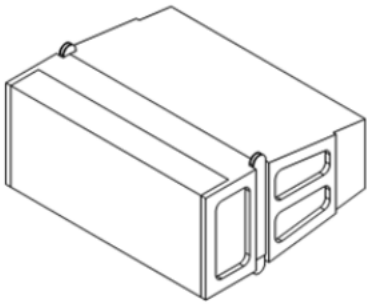
For more information see the Vectorworks Help: Speaker Arrays



Line Array speaker, Line Array subwoofer, and Line Array bumper

Line array speakers

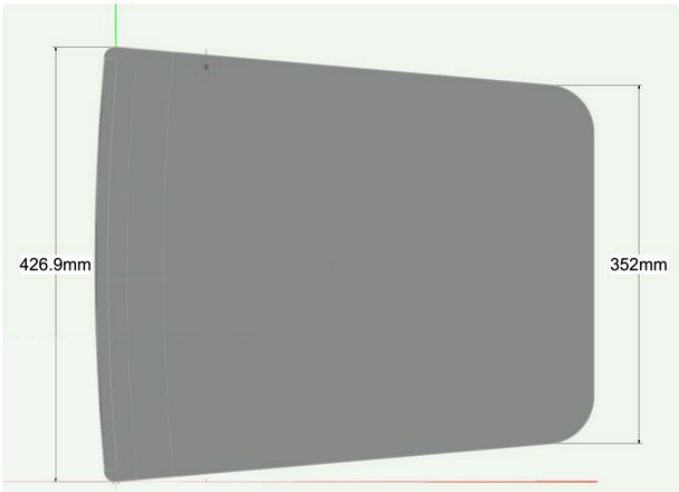
When modeling the array speakers, the model may have its bottom base parallel to horizontal plan. Or it may taper as it angles back.



Tapered line array speaker

If it does taper, it often needs to be aligned so the centerline is parallel to the horizontal axis plane, like in this example below shown from its side. This is so it can be made to pivot properly in the Speaker Array Tool.

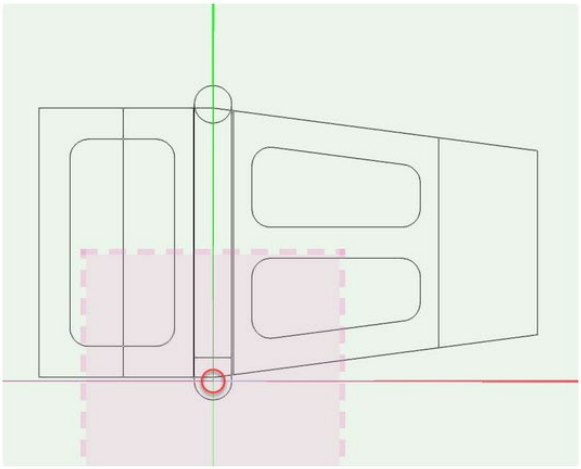
In this example the line array cabinet is in the shape of a trapezoid with the back shorter than the front, make sure to correctly enter these values in the record.

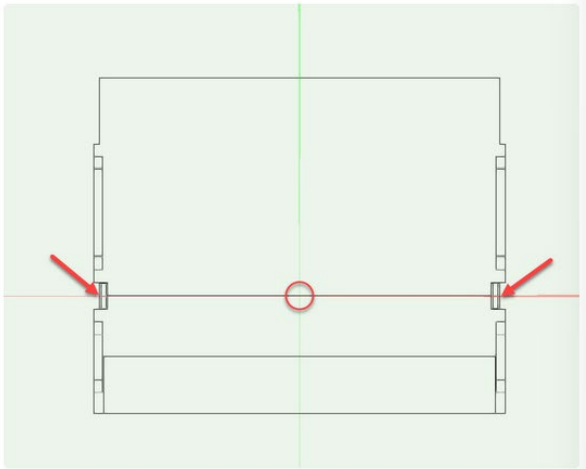


Tapered speaker with face perpendicular to the horizontal plane

The difference between the front of the cabinet and rear of cabinet will need to be noted. This is important to accurately document in the record for the Speaker Array Tool to make the catalog (created from the record dimensions) version of the symbol.

In this next example, the front part of the the speaker is parallel with the horizonal plane due to its shape, and is not tapering entirely from back to front like the example above. This example is placed more forward of the 0,0,0 axis. This is because the mounting point on the two sides of this speaker is where the red circle is shown in the side view, and that needs be in line with the insertion point when making this symbol.





***On the left**: Speaker side view showing insertion, aligned with mounting points.*

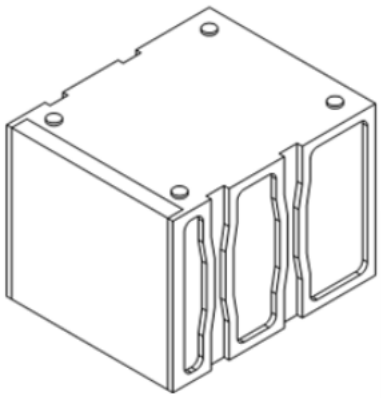
***On the right**: Speaker top view showing insertion, aligned with mounting points (arrows).*

From the top view you can more clearly see the two mounting points that line up with the center insertion point.

In order to know the mounting points, the manufacturer's specifications will need to be acquired and checked, since this can vary based on different manufacturer's designs.

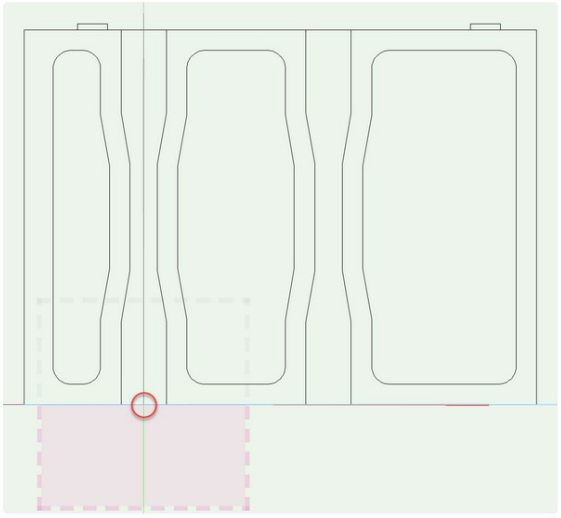
Line array subwoofers

Subwoofers used in arrays are similar to the array speaker, but with some differences.



Line array subwoofer

- Array subwoofers also connect to line arrays using the Speaker Array Tool.
- The line array subwoofer symbol insertion point needs to be set up in specific ways for proper placement. You will need to look at the other line array cabinets from the same product line that can be used with the subwoofer, and set the rigging points up the same way as specified by the manufacturer.



Subwoofer side view showing insertion at 0,0,0

Insertion/orientation

Although described above, it is important to reiterate that the insertion will be similar for both the array speaker, and array subwoofer, since they mount in the same system.

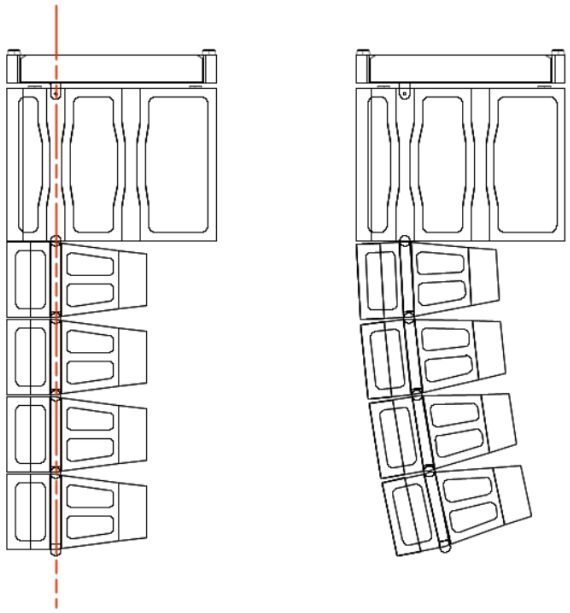
These line array speakers also interact with bumpers (explained separately), as well as with other rigging objects. Unlike the floor speakers, with an insertion at the front center bottom, their insertion location will often be set back (offset) from the front center, with an intersecting axis in line from where the side mounts are specified.

Test the speaker's use in an array

After completion of a speaker, be sure to test the rigging placement using the Speaker Array Tool with some other speakers. Below is an example of a speaker array viewed from the side. At the top is the bumper, with a subwoofer below, and four of the same speakers below.

Note on the left image, how the rigging mounting points on all align before any angle numbers are added to “Angle Relative to Preceding” in the Speaker array object. The red line shows how they all align vertically at their mounting points.

The right speaker array, is shown with angle values having been added to pivot each speaker in relation to its connecting speaker.



Speaker array before and after adding angle values

★ It is important to test the speaker array symbols with their corresponding bumper symbols using the Speaker Array tool after completion. This testing will spot compounding errors with bad insertion points and incorrect dimension data in the record. All related array objects must be included in this testing.

Classing

- Line array speaker - assign all geometry to the Audio-PA Flown class.
- Line array subwoofer -same, assign all geometry to the Audio-PA Flown class.

Record setup

Record for the Array Speaker

After the **_ATS-SpkrModData** record format is attached, the following values need to be selected or entered into the record fields. *Please note this for when you add the record later, which is covered later in the Guide in the "Adding symbol records" section.*

- Enter "Line Array" for the 'Type' field in the record.
- Properly enter the dimensions into the record. If incorrect the resulting speaker may cause an error message or make the imported speaker the wrong size. Use millimeters only.
- Enter the front height dimension in field #6 of the record.
- Enter the back height dimension in field #8 of the record.
- Check "on" field #13 to turn on the Tilt Ref Front option.
- See the 'Adding the symbol records' section below for the rest of the fields that need to be filled out.

Record for the Array Subwoofer

After the **_ATS-SpkrModData** record format is attached, the following values need to be selected or entered into the record fields. *Please note this for when you add the record later, which is covered later in the Guide in the "Adding symbol records" section.*

- Enter "Subwoofer" for the 'Type' field in the #1 row of the record.
- Properly enter the dimensions into the record. If incorrect the resulting speaker may cause an error message or make the imported speaker the wrong size. Use millimeters only.
- Fill out fields #5 through #9, using millimeters in the record.
- Subwoofers have specialized dispersion values that need to be added to the record for the acoustic properties of bass frequencies, which is different from the high end frequencies. Horizontal dispersion will be 180°, left and right dispersion will be 90°, and vertical dispersion will be 180°. These values need to be filled out in fields #22 through #26.
- Check "on" field #13 to turn on the Tilt Ref Front option.
- See the 'Adding the symbol records' section for the rest of the fields that need to be filled out.

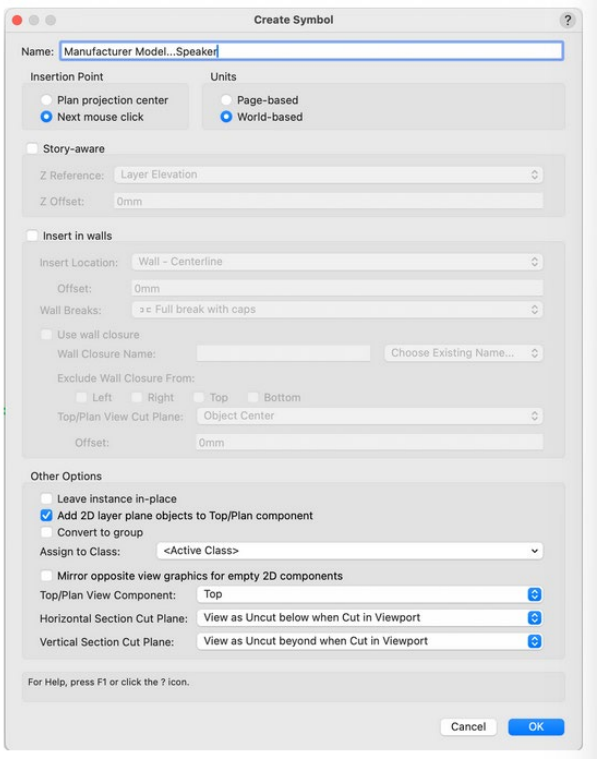
Create the Speaker Symbol

Once all of the 3D components have been modeled and the specific speaker type's attributes are applied as described in the specific speaker type sections above, it should be turned into a symbol.

- Select the model.
- Use the 'Modify>Create Symbol' menu command in Vectorworks.
- Name the symbol appropriately.

In the Create Symbol dialog box, make the following settings:

- Name: Choose an appropriate name (naming conventions covered at the end of this guide).
- There is no container class for audio symbols. Set this to 'Active Class'.
- Horizontal Section Cut Plane: Set to 'Uncut Below'.
- Vertical Section Cut Plane: Set to 'Uncut Beyond'
- Story Aware: Uncheck this option
- Insert in Walls: Generally unchecked, except for Ceiling Speakers (check for proper functionality).



Modify > Create Symbol dialog box

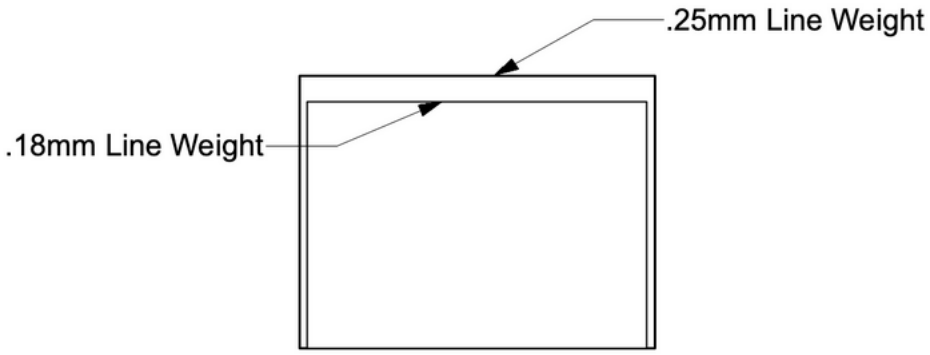
After applying these settings, locate the newly created symbol and select 'Edit 2D Components' to create the 2D/Planar geometry.

Creating the 2D Geometry

The 2D component of the symbol should be a very simple outline with as few internal lines as possible. There should also be no text as the symbols should be different enough to differentiate from each other.

Refer back to the Speaker Types section above to know the correct class to assign to the geometry for the speaker you are making.

The external line weight should be .25mm and any internal lines should be a line weight of .18mm.



2D line weights for speakers

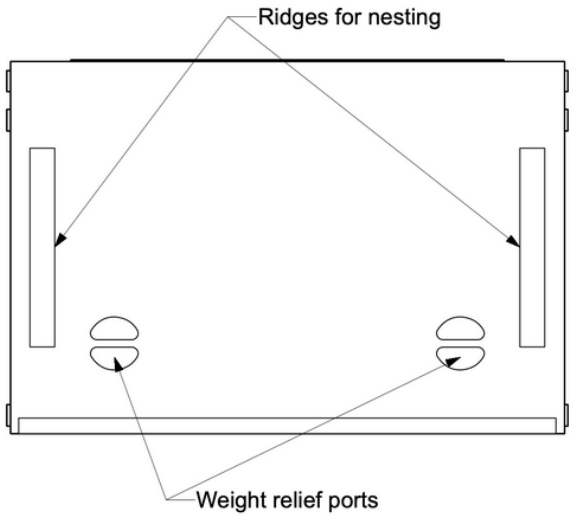
Manufacturers will typically use the same cabinet with different internal components to create different models. In these cases, the geometry will be the same, but a text identifier should be applied to differentiate. For the text identifier, use the Arial Font and convert it to polylines, placing on the same class as the rest of the geometry.

Be sure that the cabinet and grill geometry are properly placed together and that the 3D component is properly placed at the insertion point.

In the 2D component of the symbol make sure that the 3D component is visible using the Edit Component Palette. This will allow easier tracing of 3D geometry.

Using the Polyline tool trace the outer shape of the speaker cabinet and make sure the resulting shape is a closed polyline with a solid fill and class appropriately.

Sometimes the top of the speaker will have recesses or depressions used for nesting like models and weight relief. These should be drawn as part of the 2D to show the features and provide more methods to differentiate the speaker objects. Line weight should be .18mm and classes identical to the rest of the geometry in the symbol.



2D internal speaker linework

Text

Although not typically used, if there needs to be text to distinguish between models with identical geometry, use a Polyline in place of text, but be sure it is based on the Arial font.

Once the 2D component is complete, it is time to attach the records to the overall symbol.

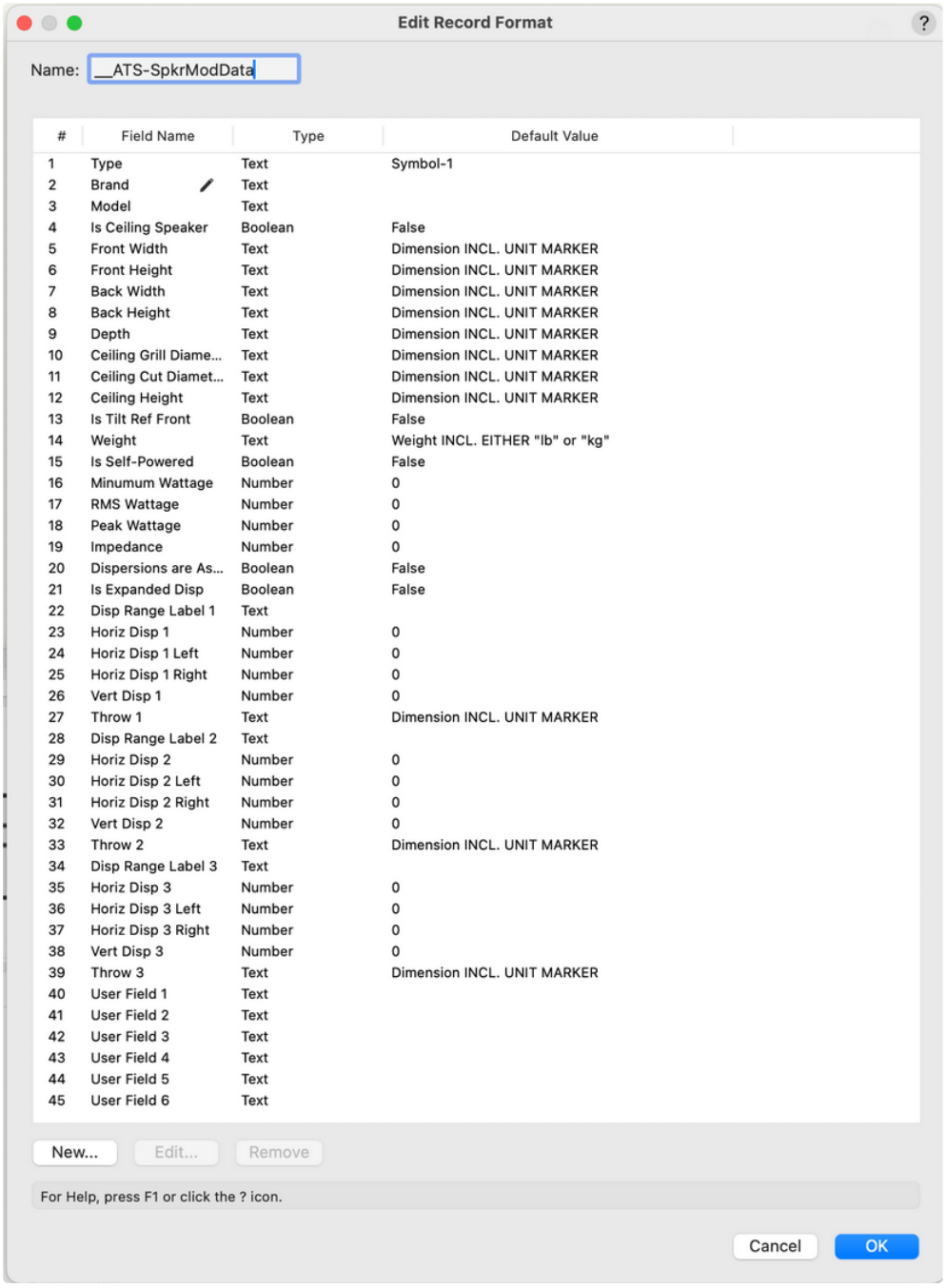
Adding Symbol Record Formats

There are two record formats that need to be attached to the symbol in order to complete the symbols. These are both provided in the template.

Speaker record format: _ATS-SpkrModData

This is the speaker record shown in the Edit Record Format dialog to show its fields that need to be considered. This will be covered in more detail later in the guide.

All speakers share the same record **_ATS_SpkrModData**, which must be accurately filled out.



_ATS-SpkrModData Record

Fill this out completely and as accurately as possible with manufacturer's supplied information. Use the appropriate units when entering the values and add unit mark as specified in the table below.

★ Please refer back to the ‘3D component - Specific speakers types’ section above, and check what the record requirements are for the speaker type that is having the record attached.

It is important to make sure the dimensions are accurate as well as the dispersion angles. Incorrect data in these fields will cause errors during reporting and data export. The format and necessary units are shown below.

Field and values for the Speaker record

Field	Applies to	Value Criteria
Type	All types	Pick the speaker type: Speaker, Line Array, Subwoofer, Monitor, Ceiling
Brand	All types	Manufacturer name
Model	All types	Speaker model from manufacturer specs
Is Ceiling Speaker (check box)	Ceiling only	Turn on if ceiling speaker, if not keep unchecked
Front Width	All, except ceiling	Width of the front of the speaker. This must be entered in mm units with the value.
Front Height	All, except ceiling	Height of the front of the speaker. Measure from Z=0 regardless of whether or not there is geometry at Z=0 point. This must be entered in mm units with the value.
Back Width	All, except ceiling	Width of the rear of the speaker from Top/Plan view. This may be a different value than the front. This must be entered in mm units with the value.
Back Height	All, except ceiling	Height of the rear of the speaker from a Right or Left view. Measure from the bottom of the geometry to the top of the geometry as wedge shaped line arrays will not have geometry on the Z=0 plane. This must be entered in mm units with the value.

Depth	All, except ceiling	Distance from the front to the back of the speaker when viewed from the Top/Plan view or a side view. This is a flat plane measurement and not an angled distance if the speaker is shorter in the back than front. This must be entered in mm units with the value.
Ceiling Grill Diameter	Ceiling only	Max diameter of the front of the ceiling speaker. If the ‘Is Ceiling Speaker' button is left unchecked enter a value of 0. This must be entered in mm units with the value.
Ceiling Cut Diameter	Ceiling only	The diameter of the hole that needs to be cut into the ceiling for the speaker components to reside above the ceiling plane. This is on the manufacturer spec sheet. If the ‘Is Ceiling Speaker' button is unchecked enter a value of 0. This must be entered in mm units with the value.
Ceiling Height	Ceiling only	The distance needed above the ceiling for the speaker components to have clearance to function. This is on the manufacturer spec sheet. If the ‘Is Ceiling Speaker' button is unchecked enter a value of 0. This must be entered in mm units with the value.
Is Tilt Ref Front (Radio Button)	All, except ceiling	Turn on if the tilt axis originates at the front of the speaker(insertion point). Most of the time this will be true. The code will use this point to automatically tilt the geometry when this is changed in the OIP.
Weight	All types	The weight of the speaker without any rigging elements. This can be in pounds or kilograms, just add appropriate units (lb or kg)
Is Self-Powered (Radio Button)	All types	Turn on if the speaker has an internal power supply. If the speaker must be connected to an amplifier leave unchecked.
Minimum Wattage	All types	Minimum wattage the speaker needs in standby. Located on the spec sheet. Value is a number with no units.
RMS Wattage	All types	Wattage needed to emit sound at lowest capable frequency. Value is a number with no units.

Peak Wattage	All types	Max wattage the speaker can output. Value is a number with no units.
Impedance	All types	This value is located on the spec sheet and is a number with no units.
Dispersions Are Asymmetrical (Radio Button)	All types	If the horizontal dispersion is symmetrical across the speaker center line keep this turned off, if the dispersion is asymmetrical turn this on.
Is Expanded Disp (Radio Button)	All types	This is for expanding the notes and ranges of the dispersion data to use the 2nd and 3rd sets of options in the record. Keep this off if you are only using the first set of Dispersion. In most cases this will be turned off.
Disp Range Label 1	All types	Label as “OVERALL” unless the spec sheet has a different value.
Horiz Disp 1	All types	The full horizontal spread in degrees of the sound dispersion, must be a number between 0-180 with no units. This is the added value of Left and Right Dispersion.
Horiz Disp 1 Left	All types	The left portion of the horizontal dispersion in degrees. Must be a number between 0-90 with no units.
Horiz Disp 1 Right	All types	The right portion of the horizontal dispersion in degrees. Must be a number between 0-90 with no units.
Vert Disp 1	All types	The full vertical spread in degrees of the sound dispersion, must be a number between 0-180 with no units.
Throw 1	All types	The throw distance of the dispersion lines when displayed on the drawing. Can be in feet or meters, just make sure to have appropriate units. Default value used is 100 ft.
Disp Range Label 2	All types	Only used if ‘Is Expanded Disp’ is checked and will be disabled if not checked. If used enter information such as frequency range, or crossover point.

Horiz Disp 2	All types	Only used if ‘Is Expanded Disp’ is checked and will be disabled if not checked.
Horiz Disp 2 Left	All types	Only used if ‘Is Expanded Disp’ is checked and will be disabled if not checked.
Horiz Disp 2 Right	All types	Only used if ‘Is Expanded Disp’ is checked and will be disabled if not checked.
Vert Disp 2	All types	Only used if ‘Is Expanded Disp’ is checked and will be disabled if not checked.
Throw 2	All types	Only used if ‘Is Expanded Disp’ is checked and will be disabled if not checked.
Disp Range Label 3	All types	Only used if ‘Is Expanded Disp’ is checked and will be disabled if not checked. If used enter information such as frequency range, or crossover point.
Horiz Disp 3	All types	Only used if ‘Is Expanded Disp’ is checked and will be disabled if not checked.
Horiz Disp 3 Left	All types	Only used if ‘Is Expanded Disp’ is checked and will be disabled if not checked.
Horiz Disp 3 Right	All types	Only used if ‘Is Expanded Disp’ is checked and will be disabled if not checked.
Vert Disp 3	All types	Only used if ‘Is Expanded Disp’ is checked and will be disabled if not checked.
Throw 3	All types	Only used if ‘Is Expanded Disp’ is checked and will be disabled if not checked.
User Field 1		Leave blank – User field
User Field 2		Leave blank – User field
User Field 3		Leave blank – User field

User Field 4		Leave blank – User field
User Field 5		Leave blank – User field
User Field 6		Initials of developer (used for troubleshooting)

Equipment record format: EntEquipUniversal

This is used for inventory and equipment tracking purposes. It allows users to keep track of what equipment has been used vs. what is in their inventory. The record is applied to every Spotlight symbol and the fields are populated. As the record is used by all Spotlight symbols the device type varies. For Audio symbols enter the type of speaker in the Device Type field.

Field	Value Criteria
Short Name	Model Name
Symbol Name	Manufacturer-Model Name
Location	Leave Blank (User will edit)
Position	Leave Blank (User will edit)
Unit Number	Leave Blank (User will edit)
Notes	Leave Blank (User will edit)
Device Type	Choose from: Line Array, Ceiling Speaker, Monitor, Subwoofer, or Speaker (Will be the same value as the Type field in the _ATS-SpkrModData record.
MVR-ID	Leave Blank (User will edit)

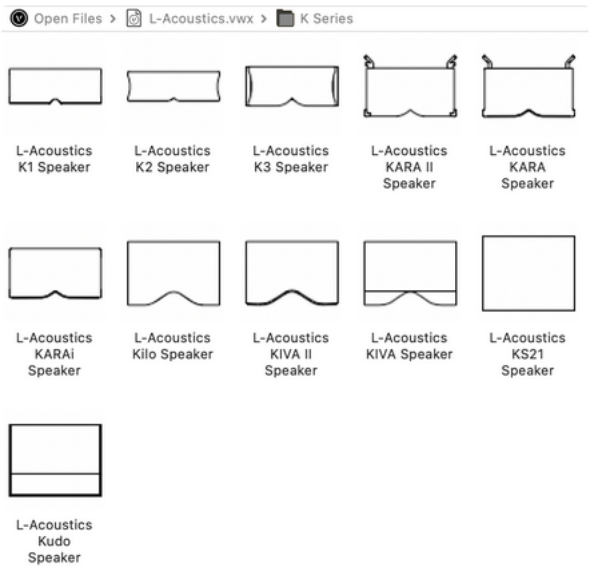
Completing the Library

The *Finishing the Library* section of the Basic Style Guide should be referred to in conjunction with the following:

Resource names

The symbol names should use the following structure for its nomenclature. In the example below the company L-Acoustics is being shown but each company will be unique.

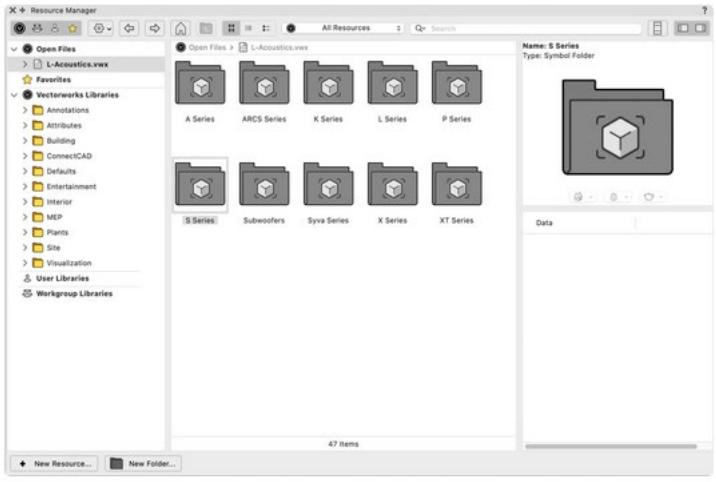
Manufacturer	Name or Model Number	Type
L-Acoustics	KIVA II	Speaker



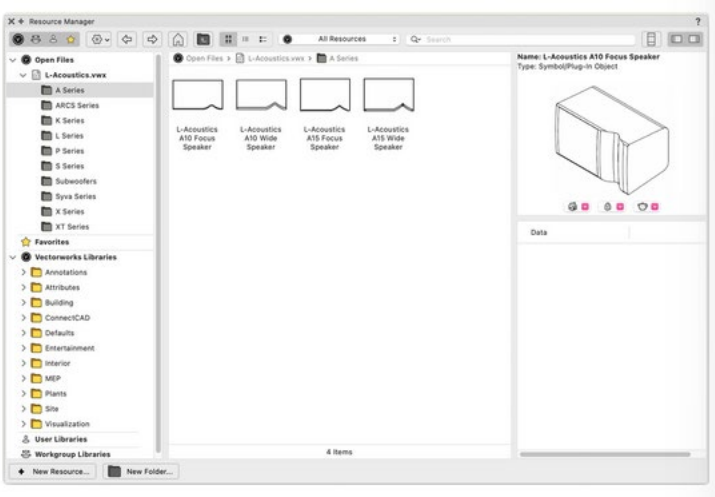
Speaker symbol names in the Manufacturer > Model > Speaker format

Resource arrangement in the Resource Manager (RM)

If the speakers are a part of product lines containing different models in a series it is important to organize the symbols in a folder for ease of locating. The folder should be named after the series and contain all of the models from the series. Use the product manufacturer web pages and documentation to help lay out the series names and accompanying models.



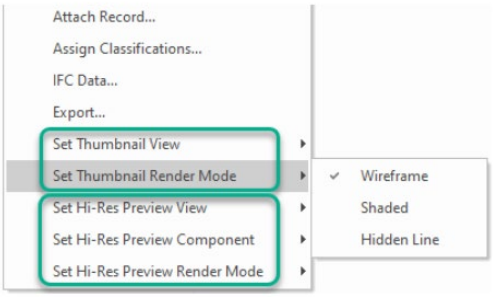
Speaker series organized in folders from the manufacturer L-Acoustics. Folder names match the product lines from website and online catalog.



L-Acoustics A series speakers placed inside the A Series folder, and named according to the manufacturer's online catalog.

Setting the views of the resources

Set up the proper views in the Resource Manager.



The symbol thumbnails should be:

- Set Thumbnail View to: Top/Plan
- Set Thumbnail Render Mode to: Wireframe

The High Res Preview (aka “Large Preview”) should be:

- Set High Res Preview View to: Right Isometric
- Set High Res Preview Render Mode to: Hidden Line.