



BLACKBIRD

SOUND LEVEL PREDICTION SOFTWARE V2

TLA312

TLA308

TLA306

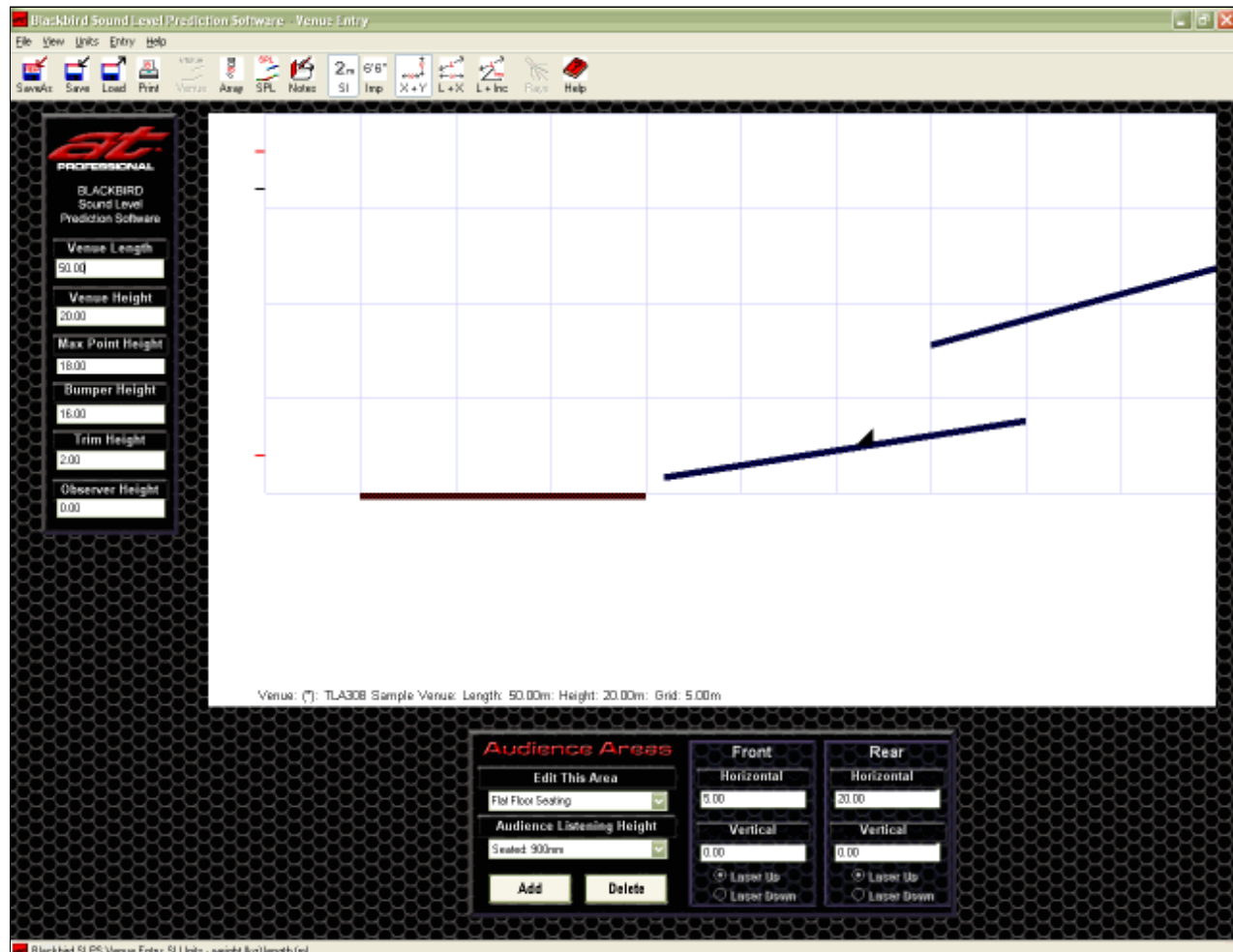
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www.atprofessional.com.au





The Blackbird SLPS Software allows accurate configuring and performance modelling of line array systems using the Acoustic Technologies Blackbird TLA Series Line Array Loudspeakers.

VENUE ENTRY SCREEN



The Venue Entry Screen allows the entry and edit of the venue's dimensions and seating areas.

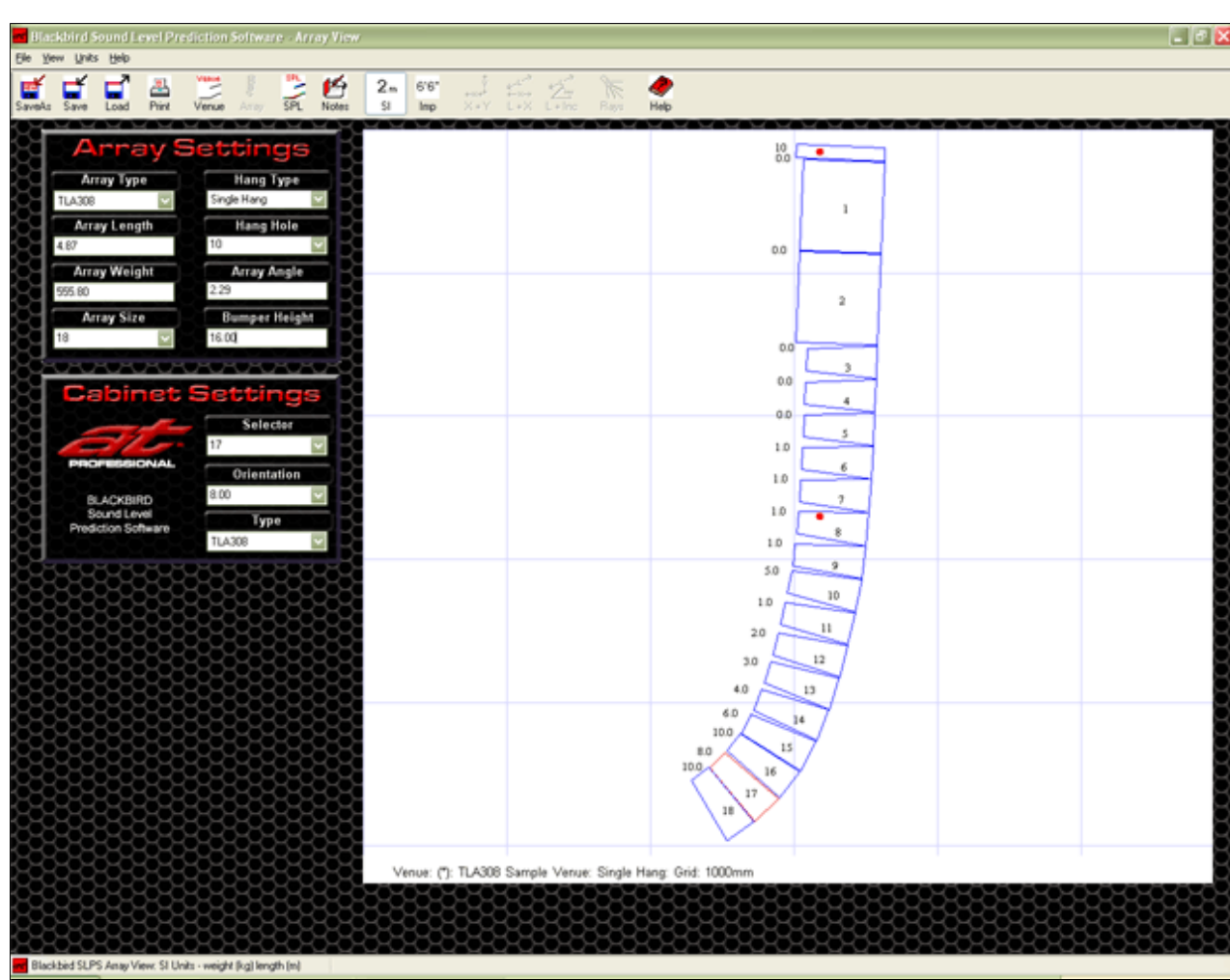
INPUT PARAMETERS

- Venue Dimensions
- Bumper, Trim and Max Point Heights
- Any number of Seating Areas using any combination of X-Y Input, Laser Distance Input and Laser + Incline
- Observer Height for Laser Input
- The Audience Listening Height for each Seating Area
- Front Of House Position
- Input in either Imperial or SI Units

OUTPUT INFORMATION

- Graphic representation of the Venue, Seating Areas and FOH Position

ARRAY VIEW SCREEN



The Array View Screen allows the entry and edit of the cabinet array and hanging frame.

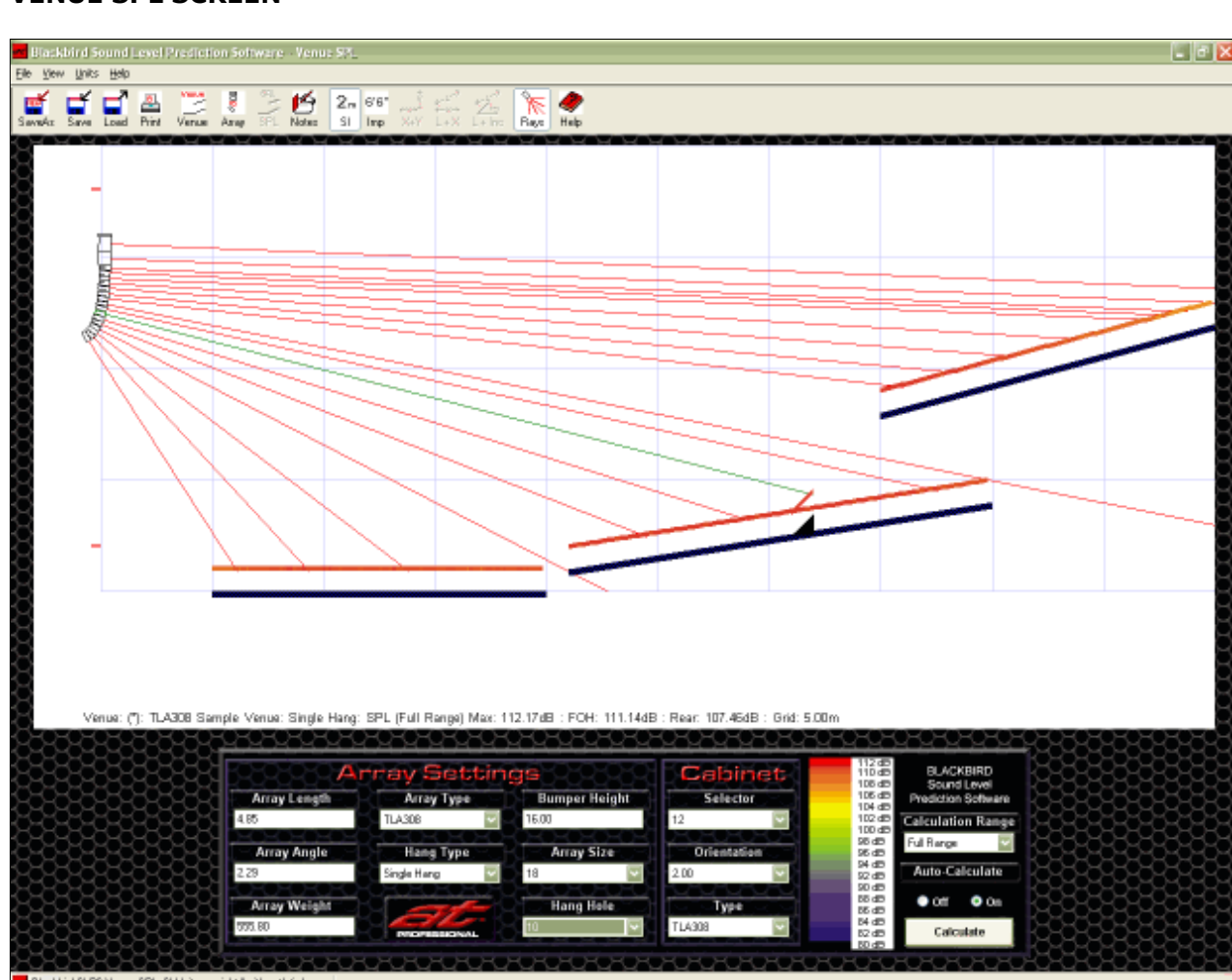
INPUT PARAMETERS

- Array Type
- Array Size
- Hang Type
- Hang Frame Hole
- Cabinet Type for each cabinet
- Inter-cabinet Orientation angle for each cabinet
- Bumper Height

OUTPUT INFORMATION

- Graphic representation of the array
- Array Length
- Array Weight
- Array Angle

VENUE SPL SCREEN



The Venue SPL Screen places the array in the venue to provide a colour calibrated heat map display of the expected SPL's at the seating areas and FOH position.

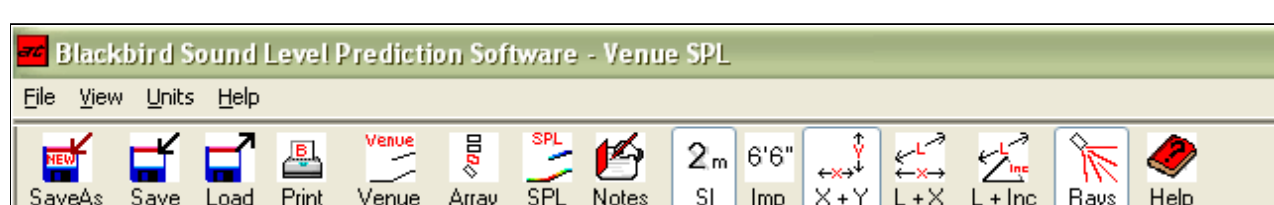
All the Array parameters, Bumper Height and Hang Hole can be adjusted from the Venue SPL Screen allowing the system to be interactively optimised to the desired coverage and SPL.

Cabinet aiming RAYS can be switched on or off as desired.

The Calculation Range of SPL can be selected.

Auto-Calculation can be switched on or off as desired.

MENU BAR and TOOL BAR



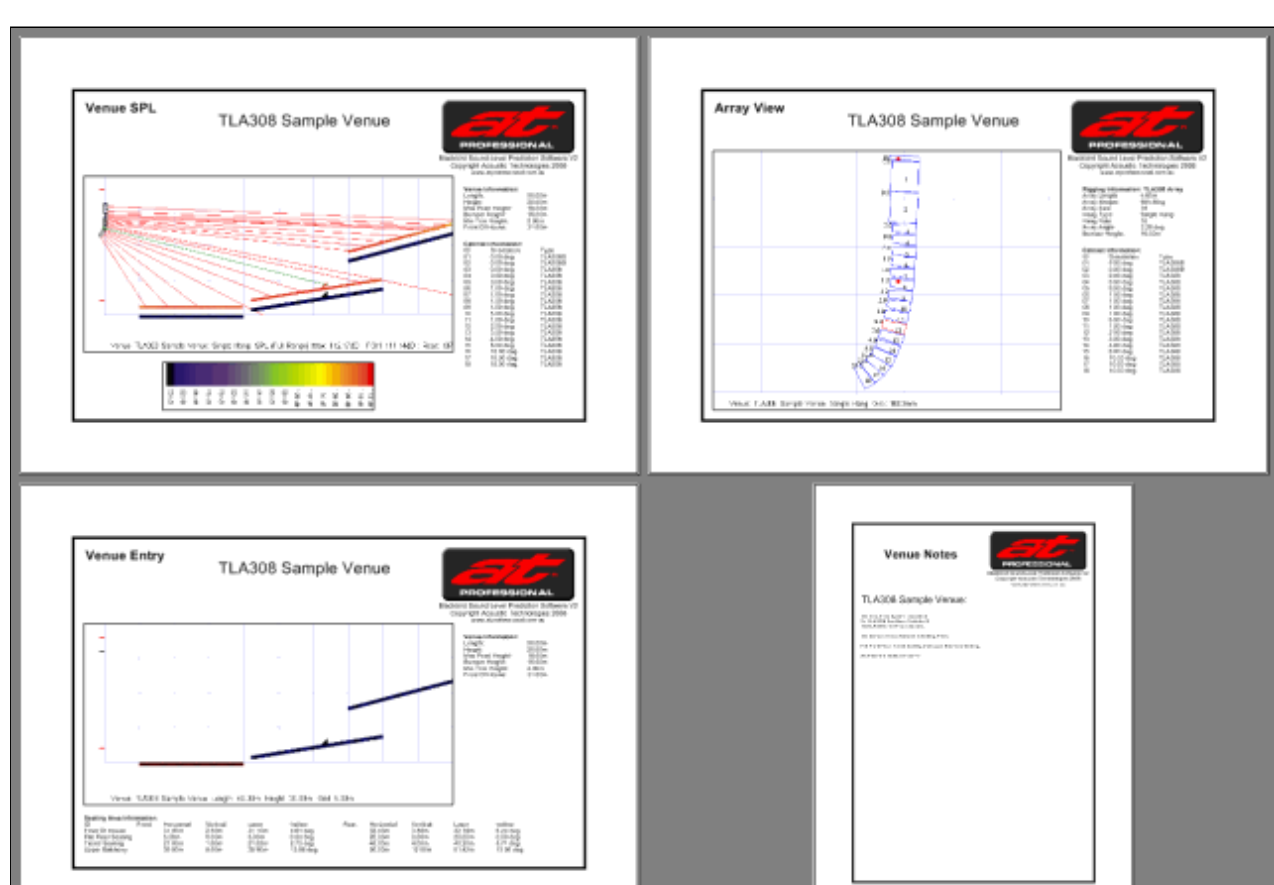
Comprehensive file handling and printer support is provided. Array and venue data files can be easily distributed and exchanged allowing a library of venues and systems to be created for future reference.

All major program functions and features are accessed from the Menu & Tool Bars.

A Notes Box, stored with the data, allows for setup notes and system documentation.

HELP Files provide a full explanation of all functions, features and program operation.

PRINTED REPORTS



All aspects of a Blackbird SLPS model can be printed for distribution and documentation purposes.

BLACKBIRD SLPS SOFTWARE

System Requirements

The Blackbird SLPS Software runs on PC style computers with the Microsoft Windows® 2000 Professional, XP Home, XP Professional or Vista operating system.

To avoid potential installation and run-time problems, ensure that the latest Service Pack (SP) for the computer's operating system has been installed. If Microsoft .Net® is not already installed, the SLPS installation program will install it as part of the installation process.

The SPL computations are numerically intensive. A fast CPU and sufficient memory greatly enhances the performance of the program.

Minimum System Requirements

- Pentium® III / 500MHz or equivalent
- 128MB RAM
- 50MB free Hard Drive space
- Video 800 x 600 Resolution / 256 Colours
- Windows® 2000 Professional, XP or Vista with latest Service Packs
- Keyboard and Mouse

Recommended System Requirements

- Pentium® IV / 2GHz or equivalent
 - 512MB RAM
 - 50MB free Hard Drive space
 - Video 1024 x 768 Resolution / 64K Colours
 - Windows® 2000 Professional, XP or Vista with latest Service Packs
 - Keyboard and Mouse
-

BLACKBIRD SLPS SOFTWARE

Installation Notes

The Blackbird SLPS software is provided as a Windows Installer package. As noted in System Requirements, the software requires a recent version of the Microsoft Windows® operating system running the .NET® runtime environment (Version 2.0).

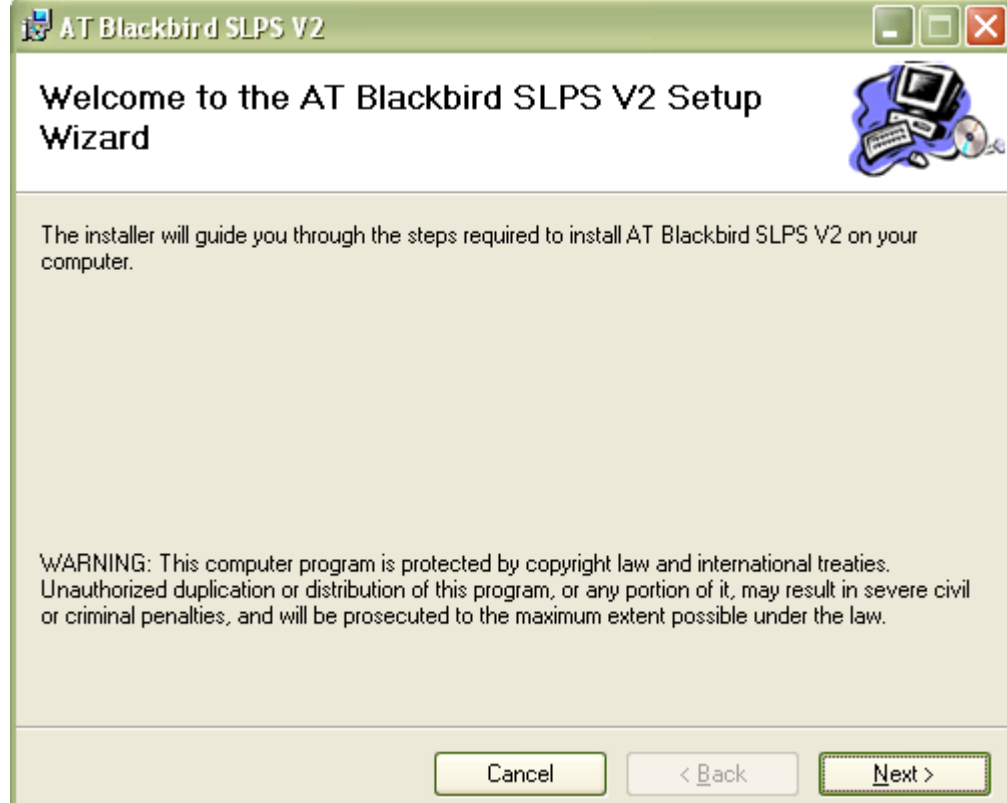
The installer is provided as the **Blackbird Application Only** (excluding the Microsoft .NET runtime version 2.0) - approx. 3.9MB available for download from the Acoustic Technologies Website pages. To register as a user, please see Contact & Support for the web address. The installer contains the core application, help files, an example venue file and any necessary fonts.

Installation is guided by the Windows Installer service, available on all Windows systems since Windows 2000. Installation is not permitted if an existing version of the system is installed on the target machine. Details on how to remove a previous installation using the Windows Add/Remove Programs facility are given below.

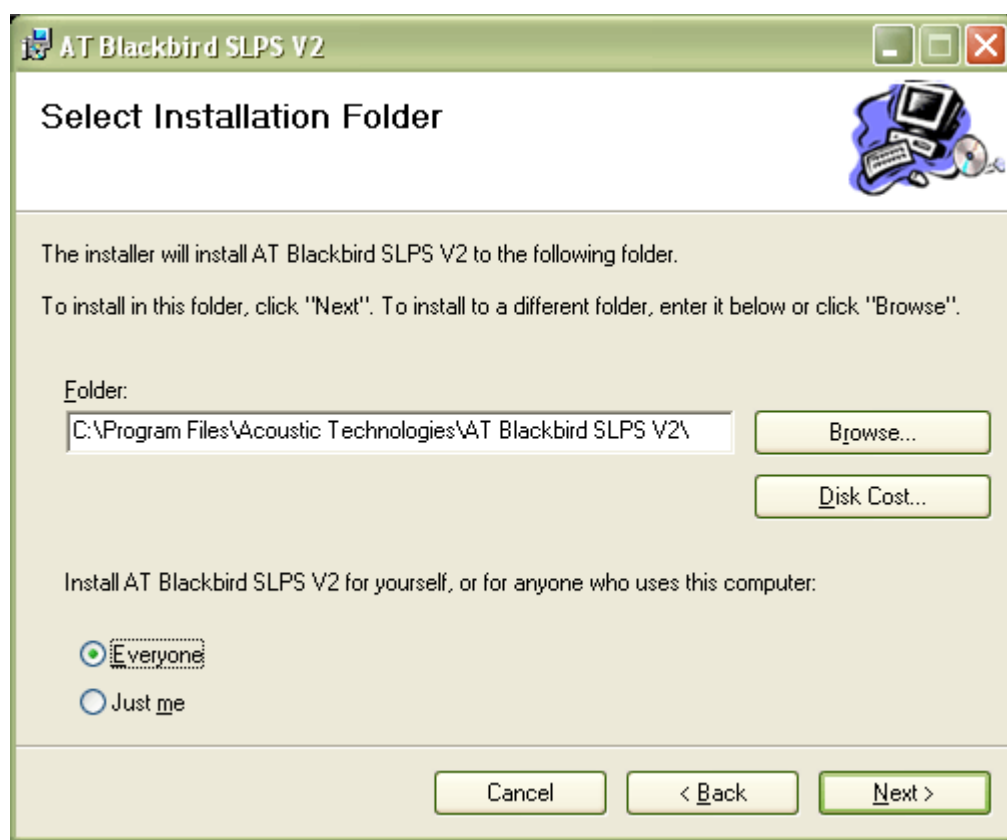
The **Blackbird Application-Only Installer** is intended for the technically aware user. The program checks for the presence of an appropriate version of the .NET runtime, and directs the user to the Microsoft site if none is found. Installation of the runtime is the responsibility of the user, but is usually straightforward.

Sample Setup

Double clicking on either the **Blackbird Installer.msi** installer package or on the **Setup.exe** application will initiate the installation process. The user is then guided through the steps by the installer dialogs and prompted to select the program location and whether the program is to be available for all users of the system. In most cases, accepting the defaults and clicking the **[Next>]** button will give good results.

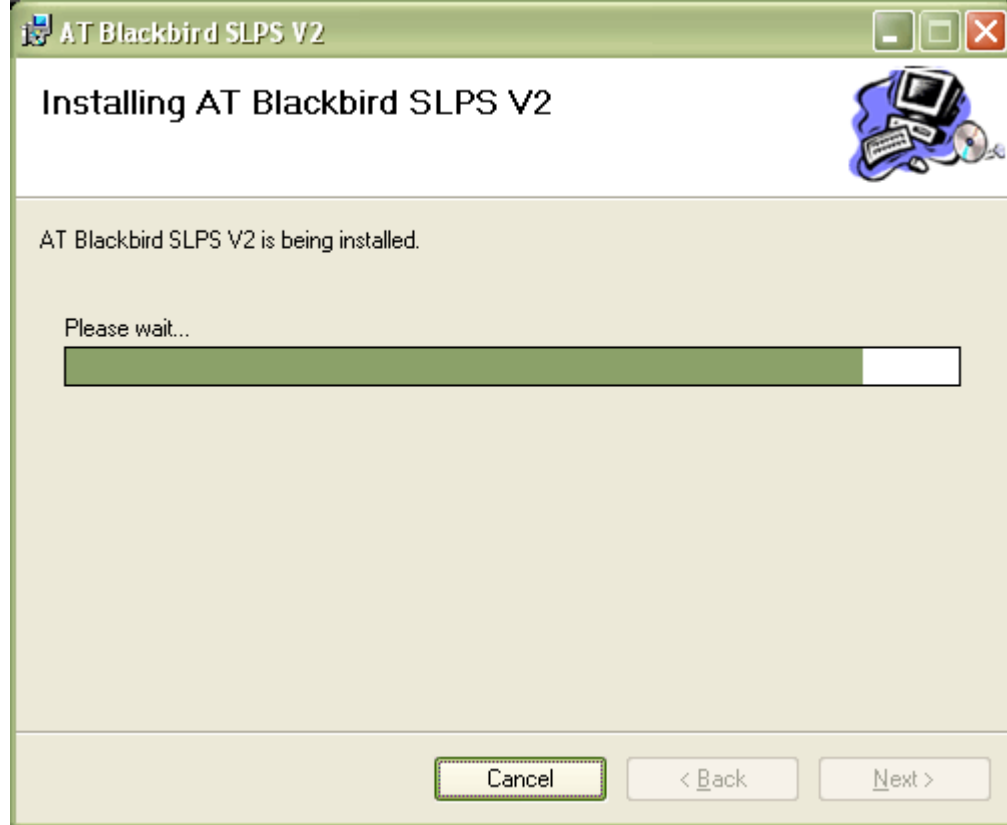


The process begins with the welcome dialog, which shows the copyright message and provides elementary guidance on the installation:



The next step in the process allows the selection of the location of the installation and whether the Blackbird system is to be usable by all users of the host computer. By default, the "Just me" radio button is checked.

Following a confirmation dialog (not shown), installation proceeds and is monitored using a standard progress bar:



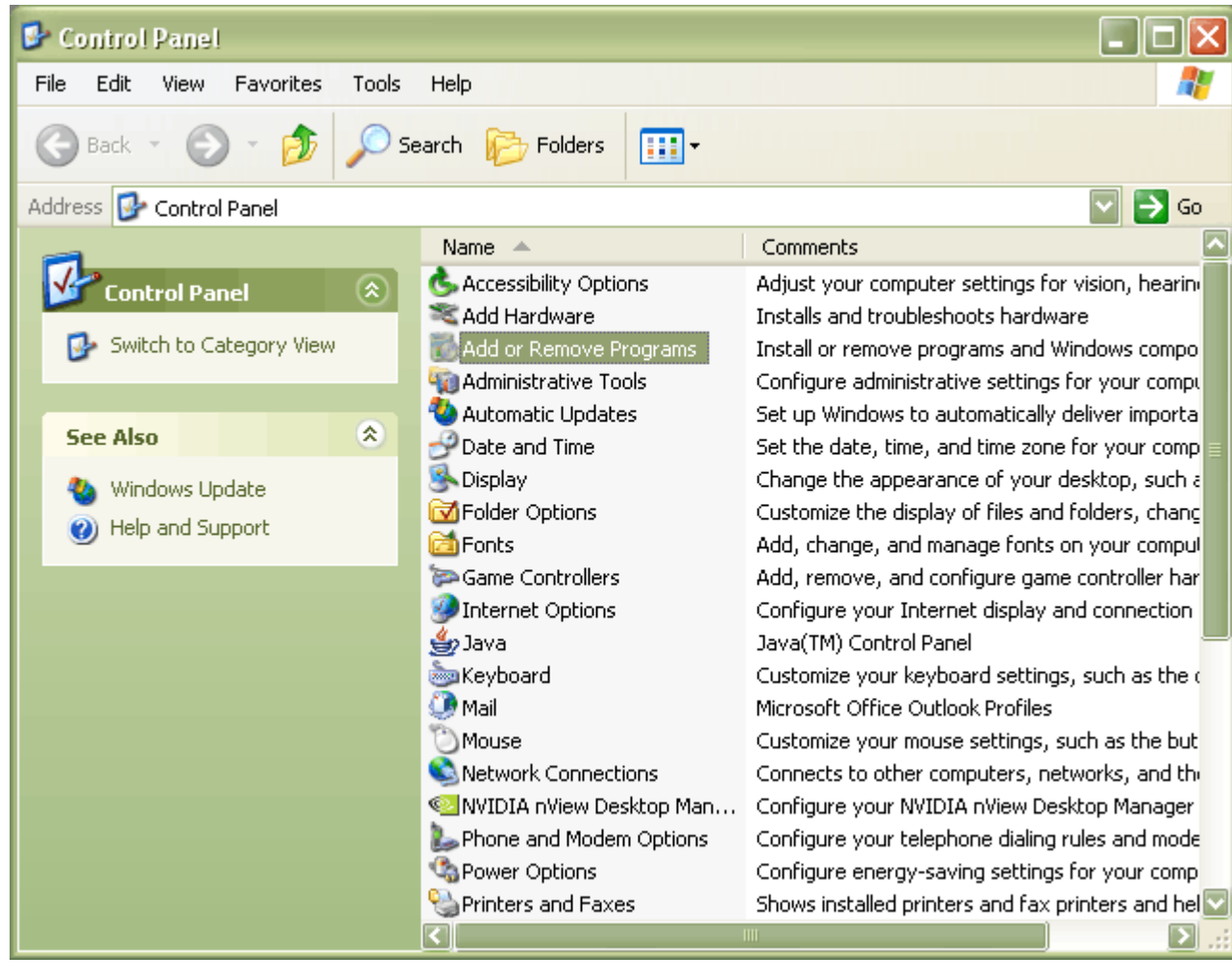
Finally, the installation completes and the user terminates the process by closing an information dialog.

Upon successful completion of the installation, the Blackbird system is available from the Start>All Programs menu and from a shortcut on the user's desktop.

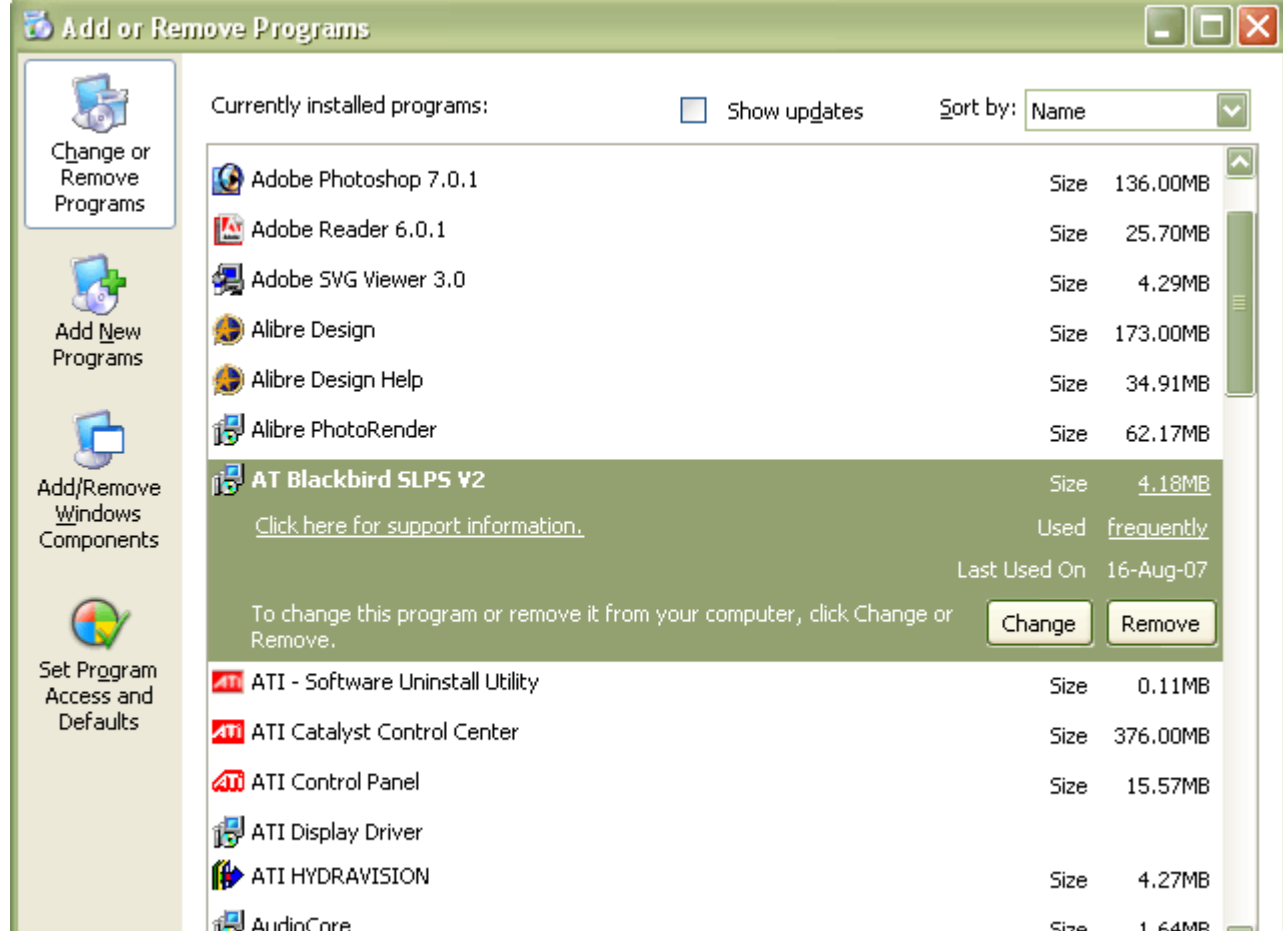
Removing a Previous Installation

IMPORTANT NOTE: Uninstalling a previous version of the Blackbird SLPS software will remove the application, fonts, and the example venue data file. While this process should not normally affect other stored data, Acoustic Technologies *strongly* recommends that you backup all data files prior to installation or repair of a new version of the software.

If a previous version of Blackbird exists on the system, the installation will terminate and it will be necessary to remove the existing software. This may be accomplished by using the add/remove programs feature accessible from Start>Control Panel.



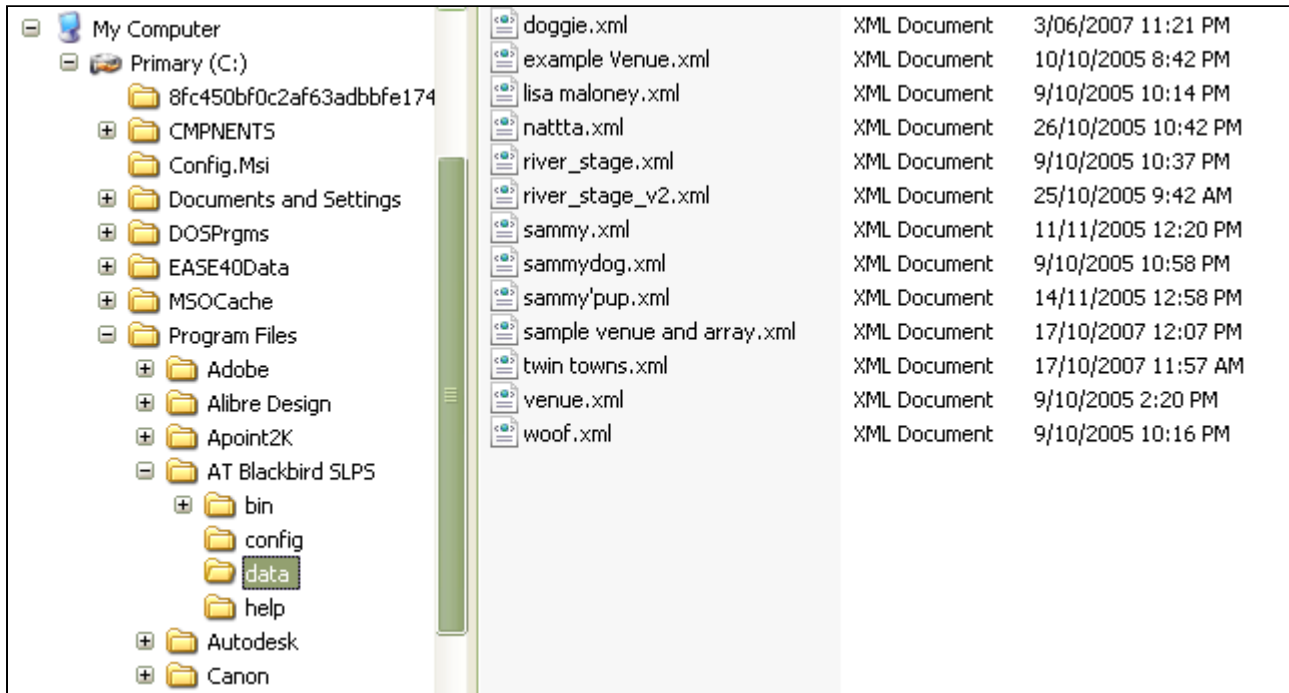
Once the highlighted option is selected, it is necessary to scroll through the list of available programs to find Blackbird SLPS:



At this point, the previous installation may be uninstalled by clicking the **[Remove]** button at the right of the entry. Upon completion of this process, installation of the new version may continue as normal.

BLACKBIRD SLPS SOFTWARE

Data File Type and Location



c:\Program Files\AT Blackbird SLPS\data

Blackbird SLPS Data Files are standard <XML> files storing the array, venue and notes information. By default SLPS Data Files are stored in the Directory Path shown above.

The File Menu Save, Save As and Load dialogue boxes allow the selection of any location on your system (including networked drives).

Blackbird SLPS program users can freely exchange the <XML> data files by email, USB drive etc. ALL the array, venue and notes information is stored in the data file.

Hint: Regularly backup all SLPS Data Files so that they can be quickly restored in the event of a computer failure.

BLACKBIRD SLPS SOFTWARE

Contact & Support

The Blackbird SLPS software is distributed by download from the Acoustic Technologies Website or by a distribution CD which is available on request.

If any difficulties are encountered during installation or running the Blackbird SLPS software please do not hesitate to contact Acoustic Technologies for assistance.

Download and User Registration Website Address

www.atprofessional.com.au/blackbird/slps.html

Email Support Address:

slps.support@atprofessional.com.au

Acoustic Technologies Website Address:

www.atprofessional.com.au

Acoustic Technologies Phone and Fax:

Phone: (617) 3376-4122

Fax: (617) 3376-5793

Acoustic Technologies Street Address:

Acoustic Technologies

8-10 Staple Street

Seventeen Mile Rocks, Queensland, 4073 Australia

Acoustic Technologies Mail Address:

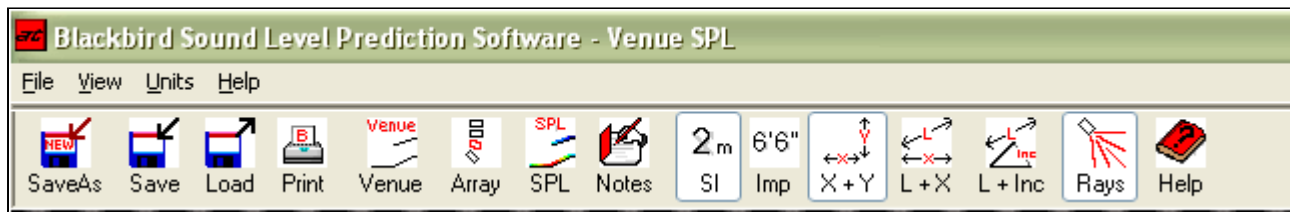
Acoustic Technologies

PO Box 107

Sumner Park, Queensland, 4074 Australia

BLACKBIRD SLPS SOFTWARE

Menu Bar and Tool Bar



The Blackbird SLPS Menu Bar allows all functions of the program to be accessed.

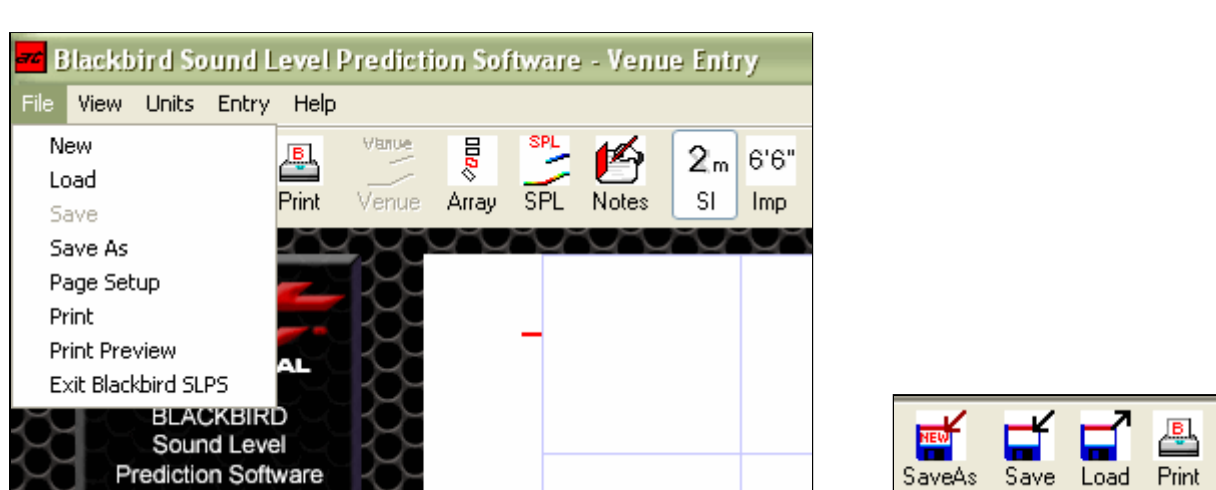
The Tool Bar, located directly below the Menu Bar, provides buttons for all the major functions of the program and provides additional buttons for changing between entry methods, units and display options.

Detailed Help is provided for the following program functions.

- The **Files Menu** and Tool Bar Buttons
 - The **View Menu** and Tool Bar Buttons
 - The **Units Menu** and Tool Bar Buttons
 - The **Help Menu** and Tool Bar Buttons
 - The **Venue Entry Method** Tool Bar Buttons
 - The **Cabinet Rays** Tool Bar Button
-

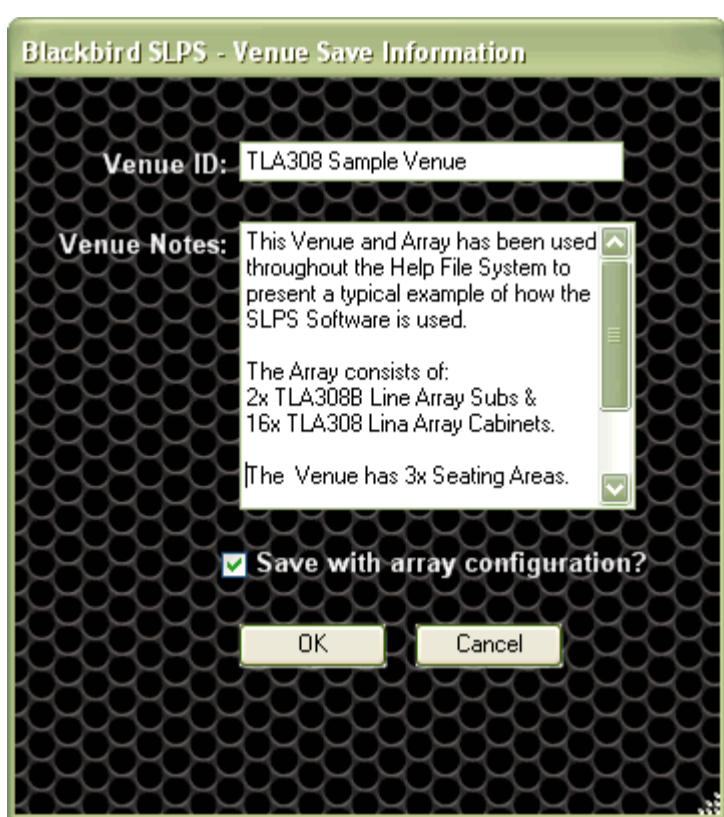
BLACKBIRD SLPS SOFTWARE

File Menu and Tool Bar Buttons



File Menu and Tool Bar Buttons

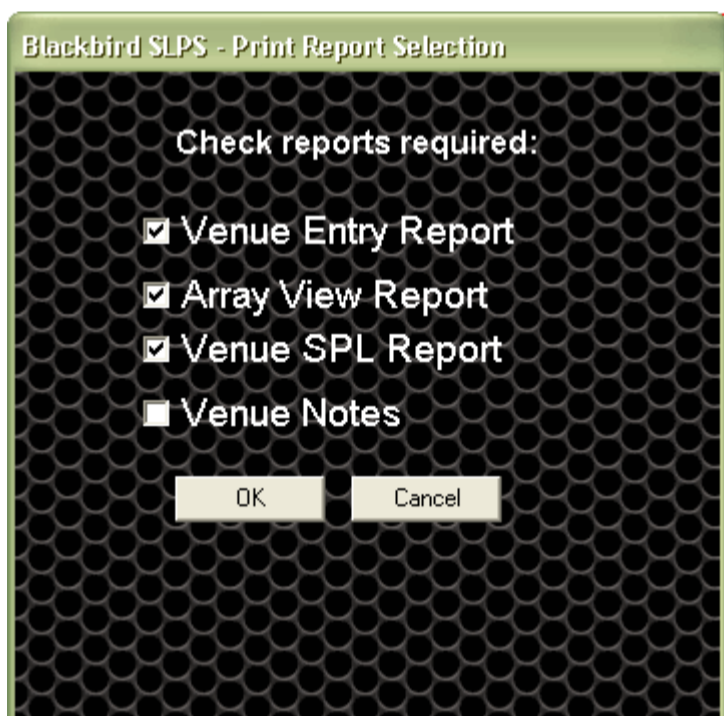
- **New**
Selecting File>New initializes the program with default values for the Array, Venue and Notes. A warning dialogue box is activated if the current SLPS model has not been saved.
- **Load**
Selecting File>Load or clicking the Tool Bar Load Button allows a previously saved SLPS model to be loaded. Standard Windows dialogue boxes are used throughout.
- **Save**
Selecting File>Save or clicking the Tool Bar Save Button allows an SLPS model, which has already been saved, to be re-saved with the same filename. If no edits have occurred since the last file save, the Menu Selection and Tool Bar Button will be "grayed out".
- **Save As**
Selecting File>Save As or clicking the Tool Bar Save As Button allows an SLPS model which has not been previously saved to be saved to a file. Selecting Save As opens the **Venue Save Information Dialogue Box**.



- **Venue ID**
The Venue ID field is used as the name of the venue in the main screens. The Venue ID is also used as the default filename for the save. A short descriptive entry is ideal.
Note: Illegal filename characters cannot be used within the Venue ID. Suggested characters are A-Z, a-z, 0-9, _ (underscore), - (hyphen or dash)
- **Venue Notes**
The Notes field allows notes and comments to be stored with the SLPS model.
- **Save with array configuration checkbox**
If the checkbox is 'ticked' the Array information is saved along with the Venue and Notes information. The checkbox is 'ticked' by default so that all information is saved.

If the checkbox is 'un-ticked' the Array configuration information is NOT saved along with the Venue and Notes information. This allows Venue File Libraries to be created and distributed without the array configurations.
- **[OK] Button**
Clicking the OK Button continues the file Save As function with standard Windows dialogue boxes used throughout.
- **[Cancel Button]**
Clicking the Cancel Button cancels the file Save As function.

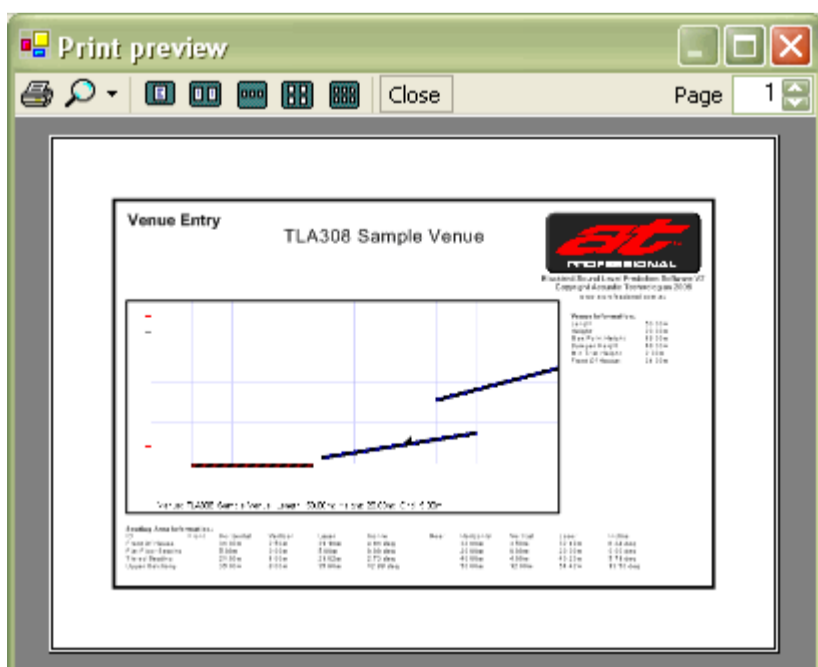
- **Page Setup**
Selecting File>Page Setup provides a standard Windows Dialogue Box allowing various aspects of the Printer and Page Setup to be altered.
- **Print**
Selecting File>Print opens a **Print Report Selection Dialogue Box**.



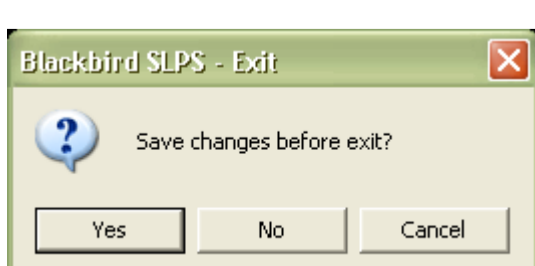
- **Report Checkboxes**
The Print Report Selection Dialogue Box allows the selection of the reports to be printed. Tick the Checkboxes for the required reports.
- **[OK] Button**
Clicking the OK Button continues the Print function with standard Windows Print Dialogue Boxes used throughout.
- **[Cancel] Button**
Clicking the Cancel Button cancels the Print function.

- **Print Tool Bar Button**
Clicking the Print Tool Bar Button opens a standard Windows Print Dialogue Box. The reports printed are the current screen (Venue Entry, Array View or Venue SPL) and the Notes page.
- **Print Preview**
Selecting File>Print Preview opens the Print Report Selection Dialogue Box as discussed as above.

When the **[OK] Button** is clicked a **Print Preview Dialogue Box** is opened which allows the reports to be previewed and printed.

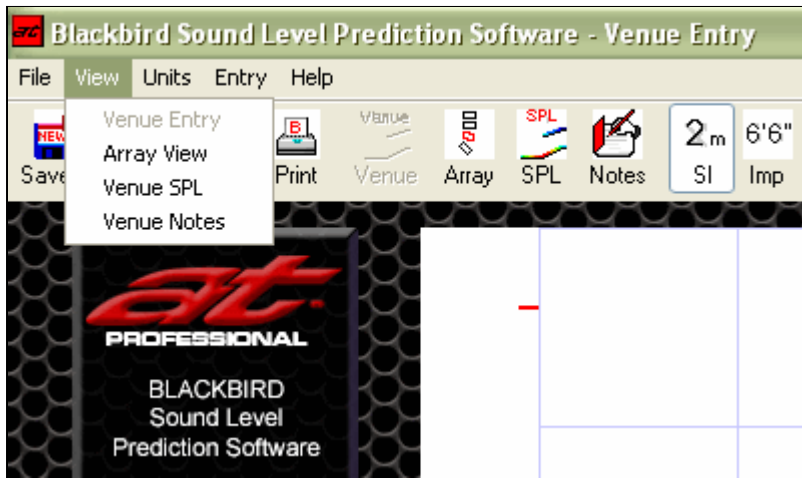


- **Exit Blackbird SLPS**
Selecting File>Exit Blackbird SLPS closes the program. If there are unsaved changes to the SLPS model, a **Blackbird SLPS - Exit Dialogue Box** allows the file to be saved before exit or for the Exit to be cancelled.



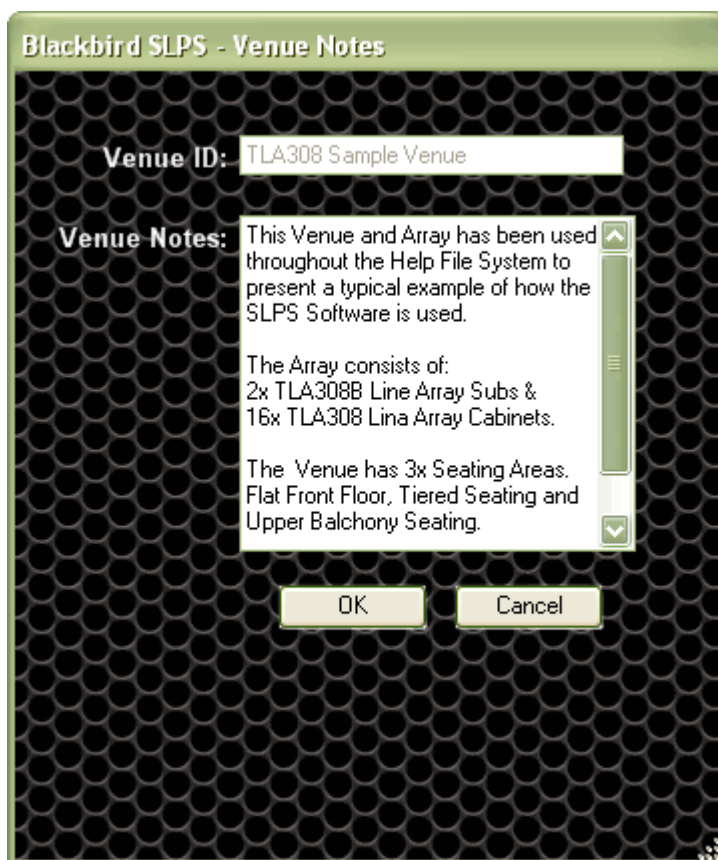
BLACKBIRD SLPS SOFTWARE

View Menu and Tool Bar Buttons



View Menu and Tool Bar Buttons

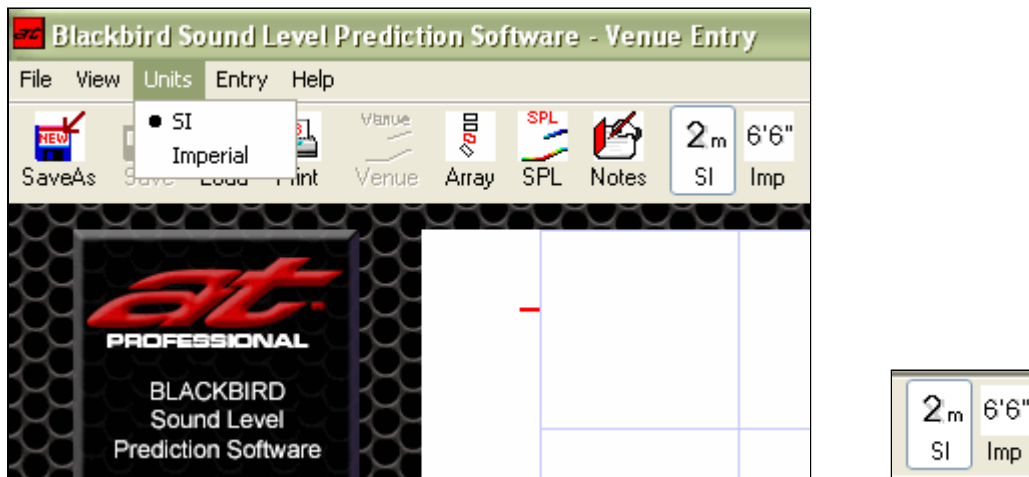
- **Venue Entry**
Selecting View>Venue Entry or clicking the Venue Tool Bar Button selects the Venue Entry screen.
- **Array View**
Selecting View>Array View or clicking the Array Tool Bar Button selects the Array View screen.
- **Venue SPL**
Selecting View>Venue SPL or clicking the SPL Tool Bar Button selects the Venue SPL screen.
- **Venue Notes**
Selecting View>Venue Notes or clicking the Notes Tool Bar Button opens the **Venue Notes Dialogue Box**.



- **Venue ID**
The Venue ID field is greyed out because it is used by File>Save As as a default filename.
- **Venue Notes**
The Notes field allows notes and comments to be stored with the SLPS model.
- **[OK] Button**
Clicking the OK Button updates the notes and closes the Venue Notes Dialogue Box.
- **[Cancel Button]**
Clicking the Cancel Button closes the Venue Notes Dialogue Box and discards any changes made to the notes.

BLACKBIRD SLPS SOFTWARE

Units Menu and Tool Bar Buttons



Units Menu and Tool Bar Buttons

- **SI Units**

Selecting Units>SI or clicking the SI Tool Bar Button selects the use of System Internationale (SI) units.

Weights are in Kilograms (Kg's)
Lengths are in Metres (Mtrs)

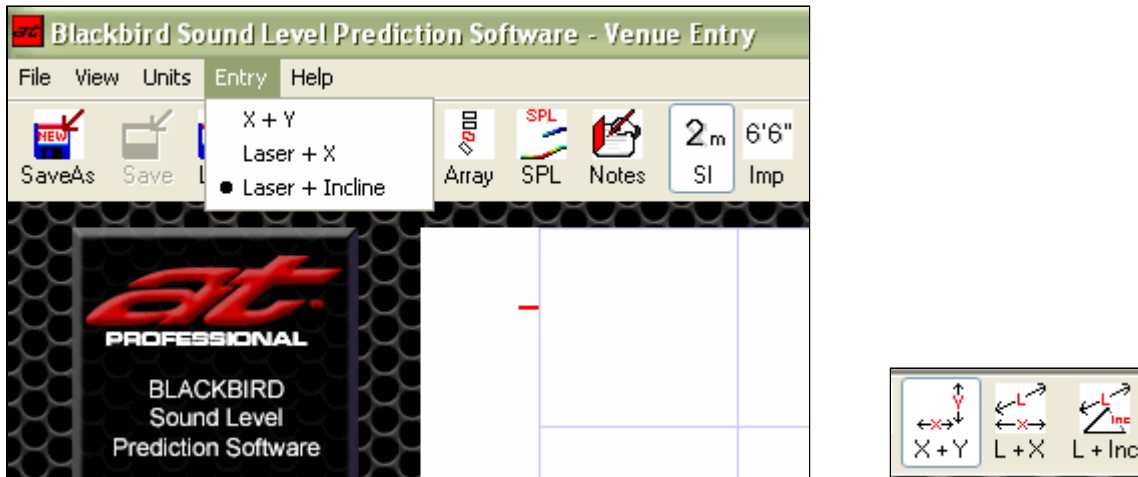
- **Imperial Units**

Selecting Units>Imperial or clicking the Imperial Tool Bar Button selects the use of Imperial units.

Weights are in Pounds (Lb's)
Lengths are in Feet (' or Ft)

BLACKBIRD SLPS SOFTWARE

Venue Entry Method Tool Bar Buttons



Venue Entry Menu and Tool Bar Buttons

The Venue Entry Menu is only available when the Venue Entry screen is selected.

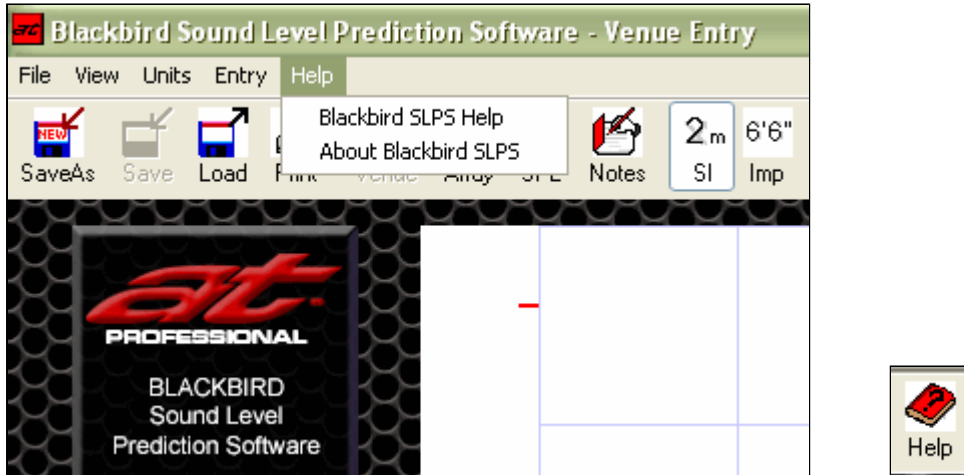
The Tool Bar Buttons are only available when the Venue Entry screen is selected and are "grayed out" for the other screens.

- Clicking the **X-Y** Tool Bar Button or selecting [X + Y] from the Entry Menu selects the X-Y Method for entering Seating Areas.
- Clicking the **L+X** Tool Bar Button or selecting [Laser + X] from the Entry Menu selects the Laser + X Method for entering Seating Areas.
- Clicking the **L+Inc** Tool Bar Button or selecting [Laser + Incline] from the Entry Menu selects the Laser + Incline Method for entering Seating Areas.

Refer to the [Venue Entry Screen Help](#) for detailed explanations of the seating area entry methods.

BLACKBIRD SLPS SOFTWARE

Help Menu and Tool Bar Button



Help Menu and Tool Bar Buttons

- Selecting Help>Blackbird Help or clicking the Help Tool Bar Button opens the Help Files.
 - Selecting Help>About Blackbird opens a credits, copyright and version number dialogue box. Click the [OK] Button to close the dialogue box.
-

BLACKBIRD SLPS SOFTWARE

Cabinet Rays Tool Bar Button



Cabinet Rays Tool Bar Button

The cabinet **Rays Button** provides an on-screen visual representation of the on-axis aiming point of the cabinets.

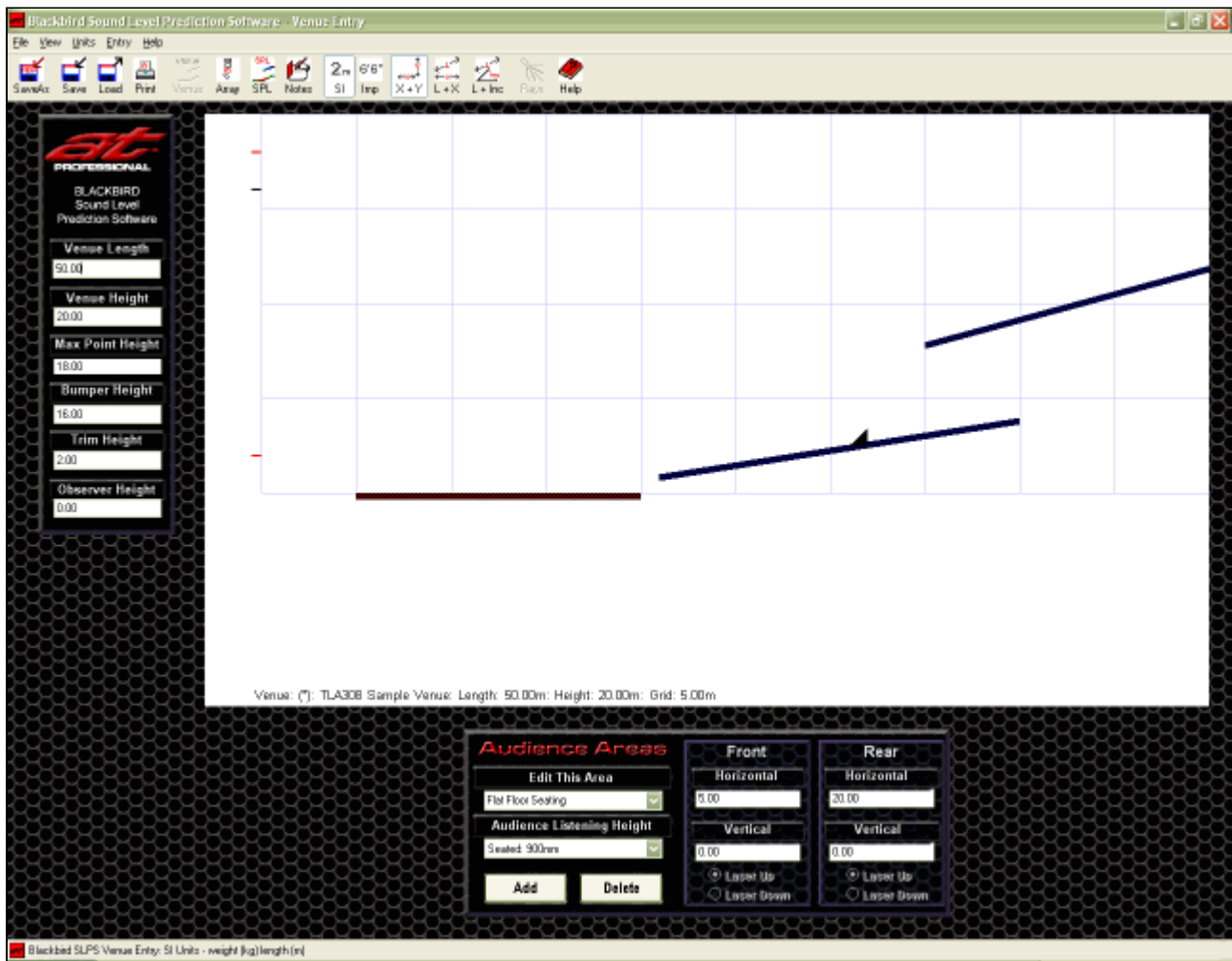
Click the **Rays Button** to switch Rays On, click it a second time to switch Rays Off.

*Note: The outermost cabinet's Rays are always ON showing the Seating Areas that are on-axis to the array.
The Ray for the Selected Cabinet is always ON in a different highlight colour, showing where in the Seating Area is on-axis to this cabinet.*

The Rays Button is only available for the Venue SPL screen and is "grayed out" for the other screens.

VENUE ENTRY SCREEN

Overview



The **Venue Entry Screen** allows the entry and edit of the overall dimensions of the venue, hanging height information, the placement and dimensions of the seating areas and the position of Front Of House (FOH).

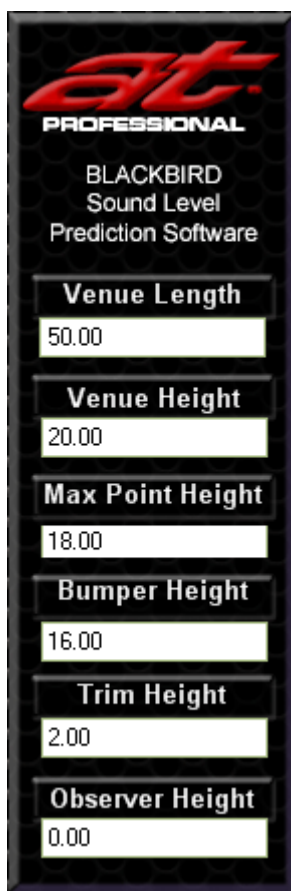
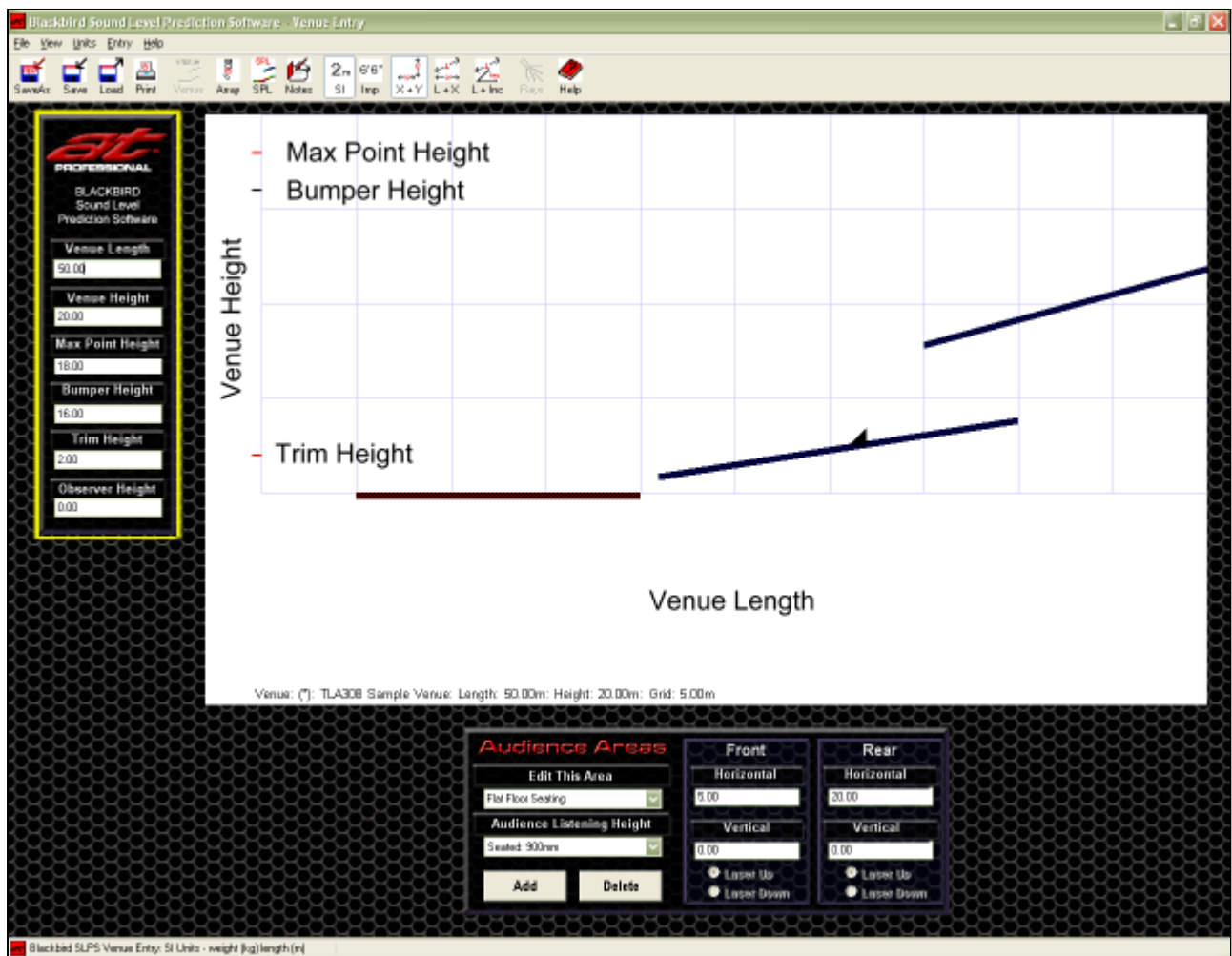
An accurate visual representation of the venue is displayed during entry and edit.

The Venue Entry screen provides two panels for the entry and edit of the venue.

- The **Venue Dimensions Panel** located to the left of the main display area.
- The **Venue Seating Areas Panel** located beneath the main display area.

VENUE ENTRY SCREEN

Venue Dimensions Panel



The **Venue Dimensions Panel** allows the entry and edit of the overall Length and Height of the venue as well as setting the Max Point Height, initial Bumper Height, Trim Height and Observer Height for Laser Input.

Venue Length

Venue Length is the overall length of the venue.

Venue Height

Venue Height is the overall height of the venue.

Max Point Height

Max Point Height is the maximum height allowed for the top of the array which will normally be the maximum height available for hanging the array.

Bumper Height

Bumper Height is the initial point for the top of the array which must be less than or equal to the Max Point Height. This can be also adjusted in the SPL screen but can also be set here to allow a starting height for the array.

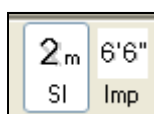
Trim Height

Trim Height is the lowest allowable point for the bottom of the array, which can be set to allow for lighting angles etc.

Observer Height

Observer Height is the height above the floor from which laser distance and incline measurements are taken.

Note: It is recommended that the Observer Height be input prior to entering any Laser Distances or Inclines in the Venue Seating Areas Panel.

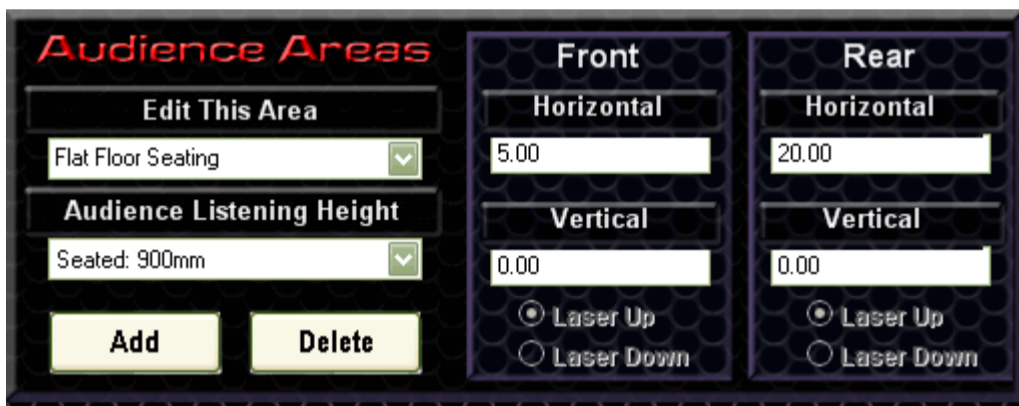
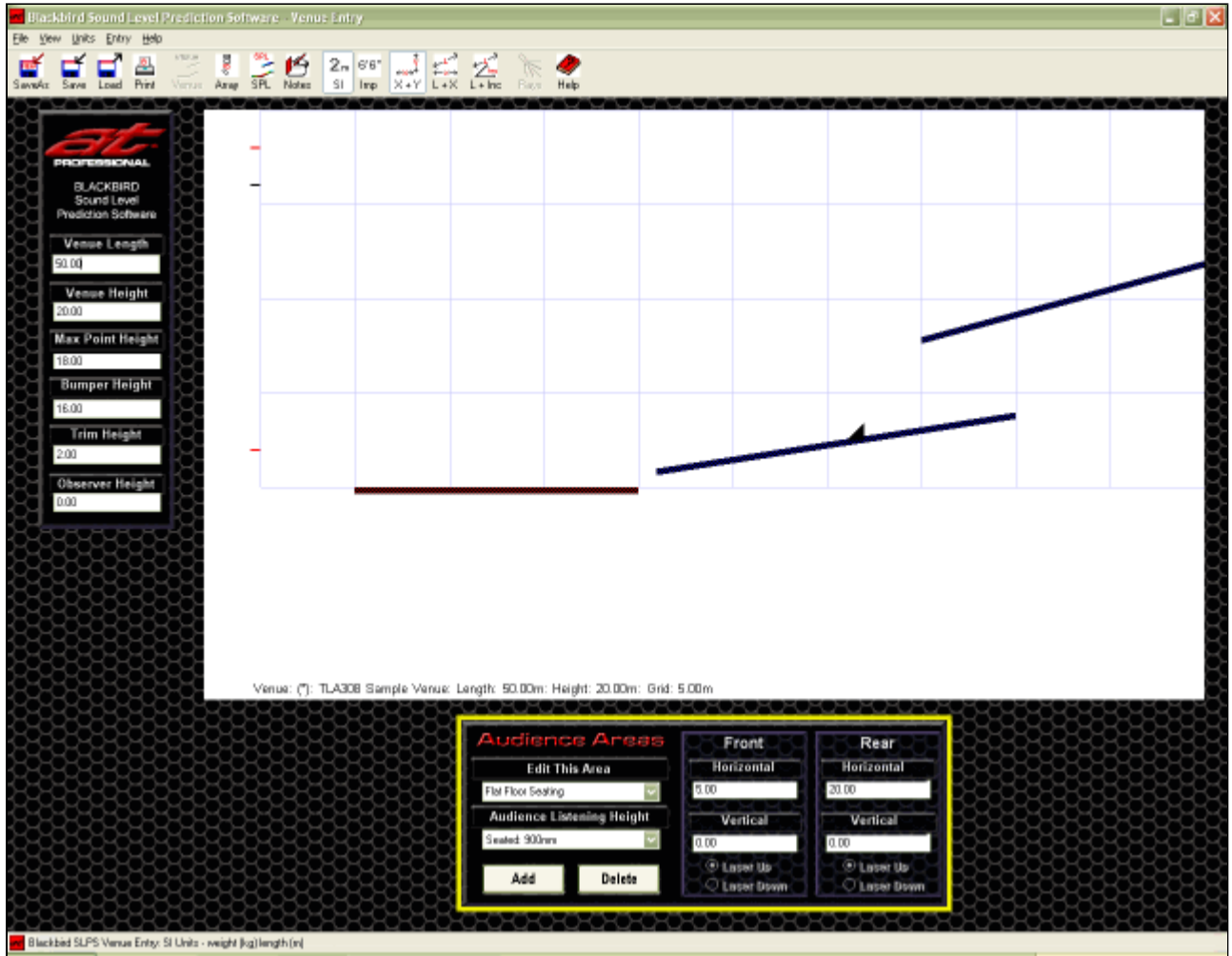


Input Units

Dimensions can be entered in Imperial (Feet) or SI (Metres) Units of measurement. Use the Tool Bar Buttons to freely switch between Unit Systems.

VENUE ENTRY SCREEN

Seating Areas Panel



The **Venue Seating Areas Panel** allows seating areas to be added and positioned within the venue.

Adding Seating Areas

Additional Seating Areas can be added by clicking the **[Add]** button. The name of the new Seating Area is initially named Seating Area N.

Naming Seating Areas

The name of a Seating Area can be changed by clicking in the **[Edit This Area]** drop-down menu and overtyping the existing name.

Deleting Seating Areas

To delete a Seating Area, select it using the **[Edit This Area]** drop-down menu and then click the **[Delete]** button.

Note: There must always be at least one Seating Area.

Editing Seating Areas - Selecting the area to edit

To edit the dimensions and audience listening height of a Seating Area, select the desired area in the **[Edit This Area]** drop-down menu. The selected Seating Area is highlighted in the display area to confirm the area that is currently being edited.

Audience Listening Height

A Seating Area is entered at floor level. There are 3 Audience Listening Heights available, selected via the Audience Listening Height drop down menu.

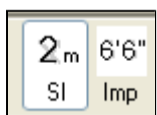
- Seated 900mm (35")
- Middle 1500mm (59")
- Standing 1800mm (71")

Front Of House Position (FOH)

To edit the Front Of House Position, select Front Of House in the **[Edit This]** drop-down menu.

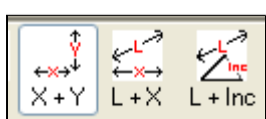
Note 1: The Front Of House cannot be deleted.

Note 2: Only the FOH's Front Location is available for entry and edit. The Rear Location is automatically generated by the program.



Input Units

Dimensions can be entered in Imperial (Feet) or SI (Metres) Units of measurement. Use the Tool Bar Buttons to switch freely between Unit Systems.



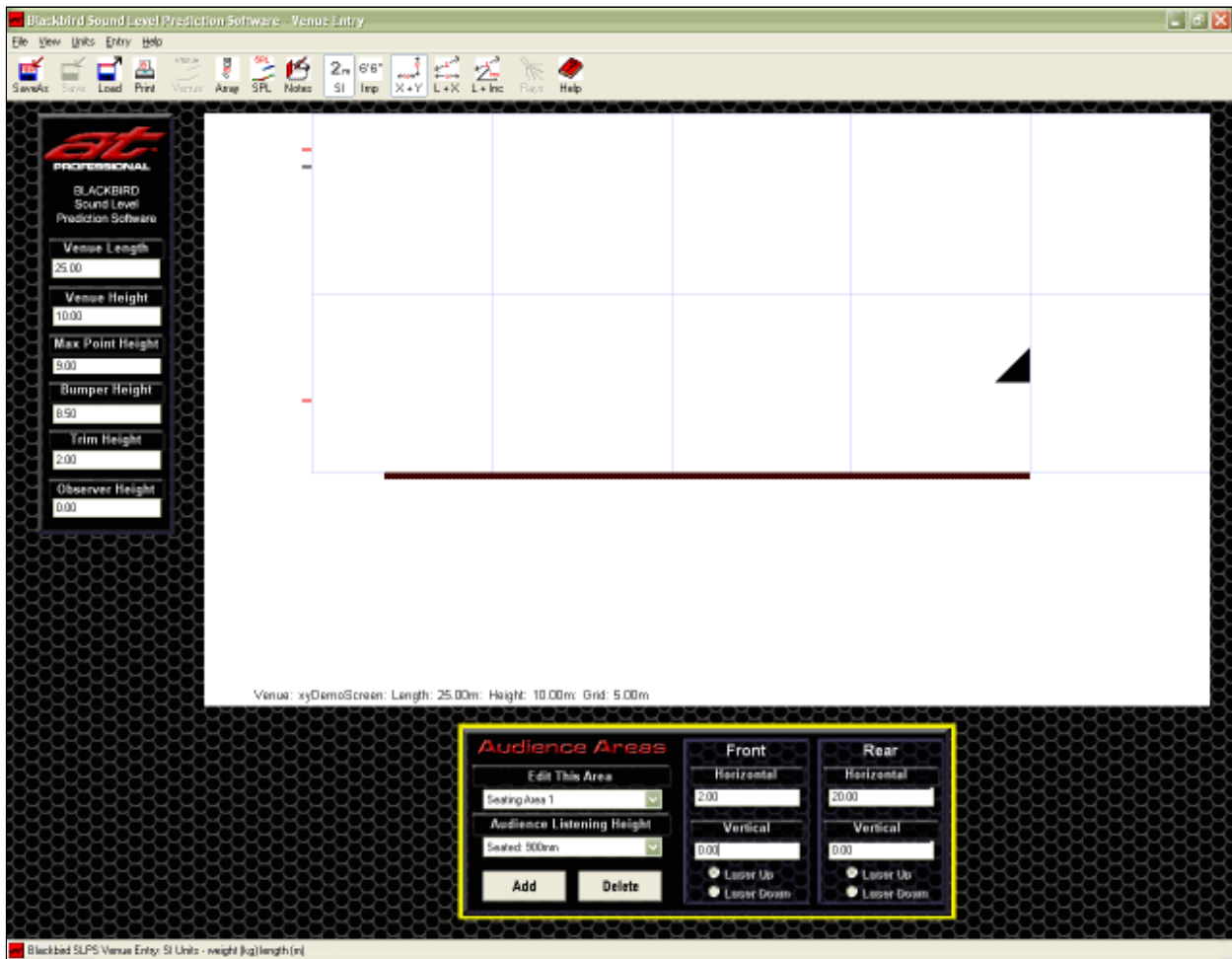
Editing Methods

There are three different entry and edit methods for the seating areas.

- **X + Y**
- **Laser + X**
- **Laser + Incline**

VENUE ENTRY SCREEN

X+Y Input Method for Seating Areas



X+Y Input Method

This is the best method for inputting from plans.

X (Horizontal) and **Y** (vertical) co-ordinates for the Front and Rear of the Seating Areas are taken directly from the plans.

The Point of Origin (0,0) is taken as Floor Level directly below the Pick Point.

EXAMPLE VENUE

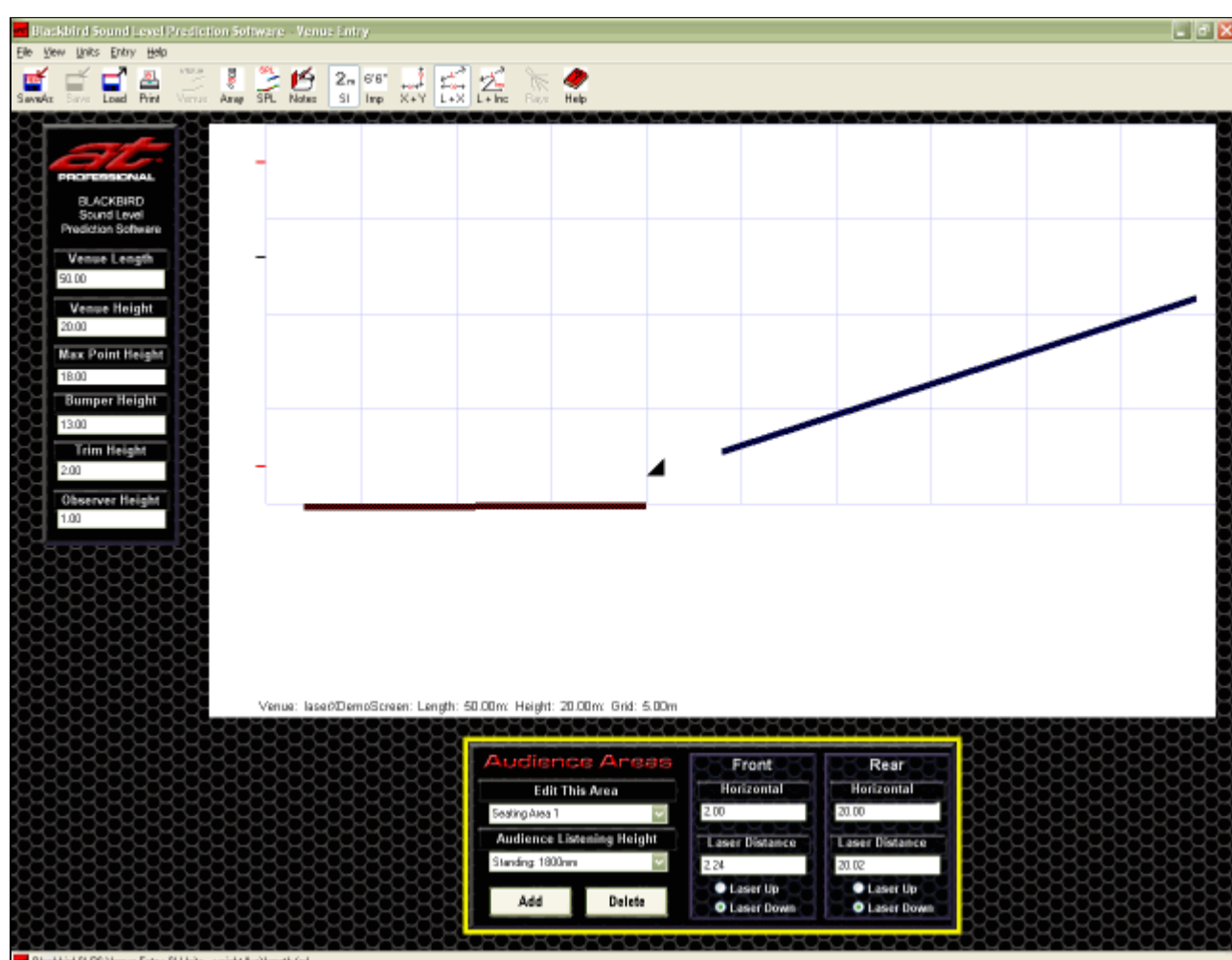
The venue's plans show a flat Seating Area with the front 2.0 metres from the (0,0) Point and the rear at 20.0 metres. The seat is not elevated relative to the Point of Origin

- 2.0 metres is entered into **[Front Horizontal]**. (See illustration above)
0.0 metres is entered into **[Front Vertical]**.
- 20.0 metres is entered into **[Rear Horizontal]**.
0.0 metres is entered into **[Rear Vertical]**.
- Seated: 900mm is selected as the **[Audience Listening Height]** using the drop down menu.

Note: The Laser Up & Laser Down Buttons are grayed out because they are not used for X+Y Input Method.

VENUE SEATING AREA DIMENSIONS

Laser + X Input Method for Seating Areas



Laser + X Input Method

This method is used when the lengths of the Seating Areas in **X** (Horizontal) are known (or are easily measured) and a **Laser Rangefinder** is being used to measure the distance from the Observer's Position to the Front and Rear of each Seating Area.

The Observer's Position is taken as being directly below the Pick Point with the Laser Rangefinder at the height entered to the Observer Height input box.

Note: It is recommended that the Observer Height be input prior to entering any Laser Distances in the Venue Seating Areas Panel. This ensures that the Seating Areas are correctly shown as they are entered.

EXAMPLE VENUE

The Venue has 2 seating areas. There is a floor plan available that shows horizontal distances for the seating areas. A hand-held laser rangefinder is available to measure distances.

- The Laser Rangefinder is held 1.00 metre from the floor, directly below the Pick Point. 1.00 metre is entered into **[Observer Height]**

SEATING AREA #1 appears to be flat.

- This area is directly in front of the stage and has no seats fitted. Standing: 1800mm is selected as the **[Audience Listening Height]** using the drop down menu.
- Using the Laser Rangefinder, a distance measurement is made from the Observer's Position to the front of Seating Area #1. The measured distance is 2.24 metres. Another distance measurement is made to the rear of Seating Area #1. The measured distance is 20.02 metres.

2.24 metres is entered into **[Front Laser Distance]**.
20.02 metres is entered into **[Rear Laser Distance]**.

- For both laser measurements the Laser Rangefinder was pointed down. The **[Laser Down Button]** is selected for both the Front and Rear measurements.
- It is known (from the Venue's Floor Plan) that from the Observer's Position, for Seating Area #1 the front **X** (Horizontal) is 2.0 metres and that the rear **X** (Horizontal) is 20.0 metres. .
2.0 metres is entered into **[Front Horizontal]**.
20.0 metres is entered into **[Rear Horizontal]**.

SEATING AREA #2 is above and behind Seating Area #1.

- The **[Add]** button is pushed to create a new seating area. The new Seating Area could be renamed by clicking in the **[Edit This Area]** drop-down menu and overtyping the default name Seating Area 2.
- This area has normal theatre seats. Seated: 900mm is selected as the **[Audience Listening Height]** using the drop down menu.
- Using a Laser Rangefinder, a distance measurement is made from the Observer's Position to the front of Seating Area #2. The measured distance is 24.08 metres. Another distance measurement is made to the rear of Seating Area #2. The measured distance is 50.01 metres.
24.08 metres is entered into **[Front Laser Distance]**.
50.01 metres is entered into **[Rear Laser Distance]**.
- For both laser measurements the Laser Rangefinder was pointed up. The **[Laser Up Button]** is selected for both the Front and Rear measurements.
- It is known (from the Venue's Floor Plan) that from the Observer's Position, for Seating Area #2 the front **X** (Horizontal) is 24.0 metres from the Observer's Position and and that the rear **X** (Horizontal) is 49.0 metres.
24.0 metres is entered into **[Front Horizontal]**.
49.0 metres is entered into **[Rear Horizontal]**.

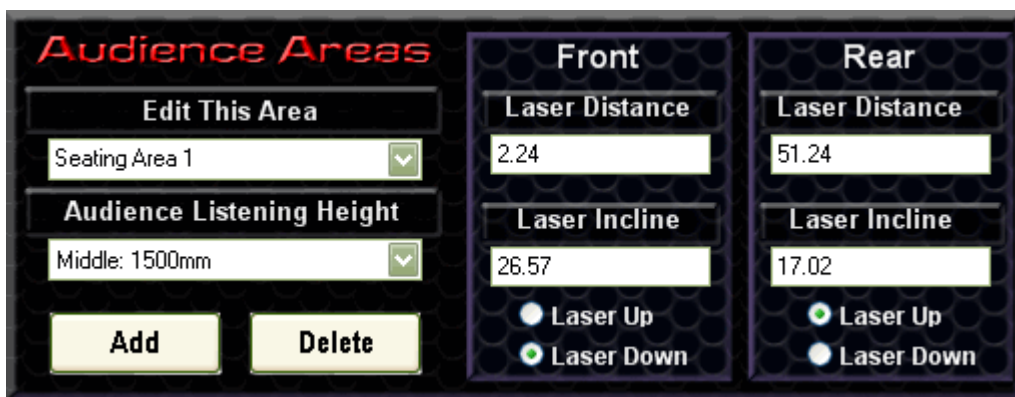
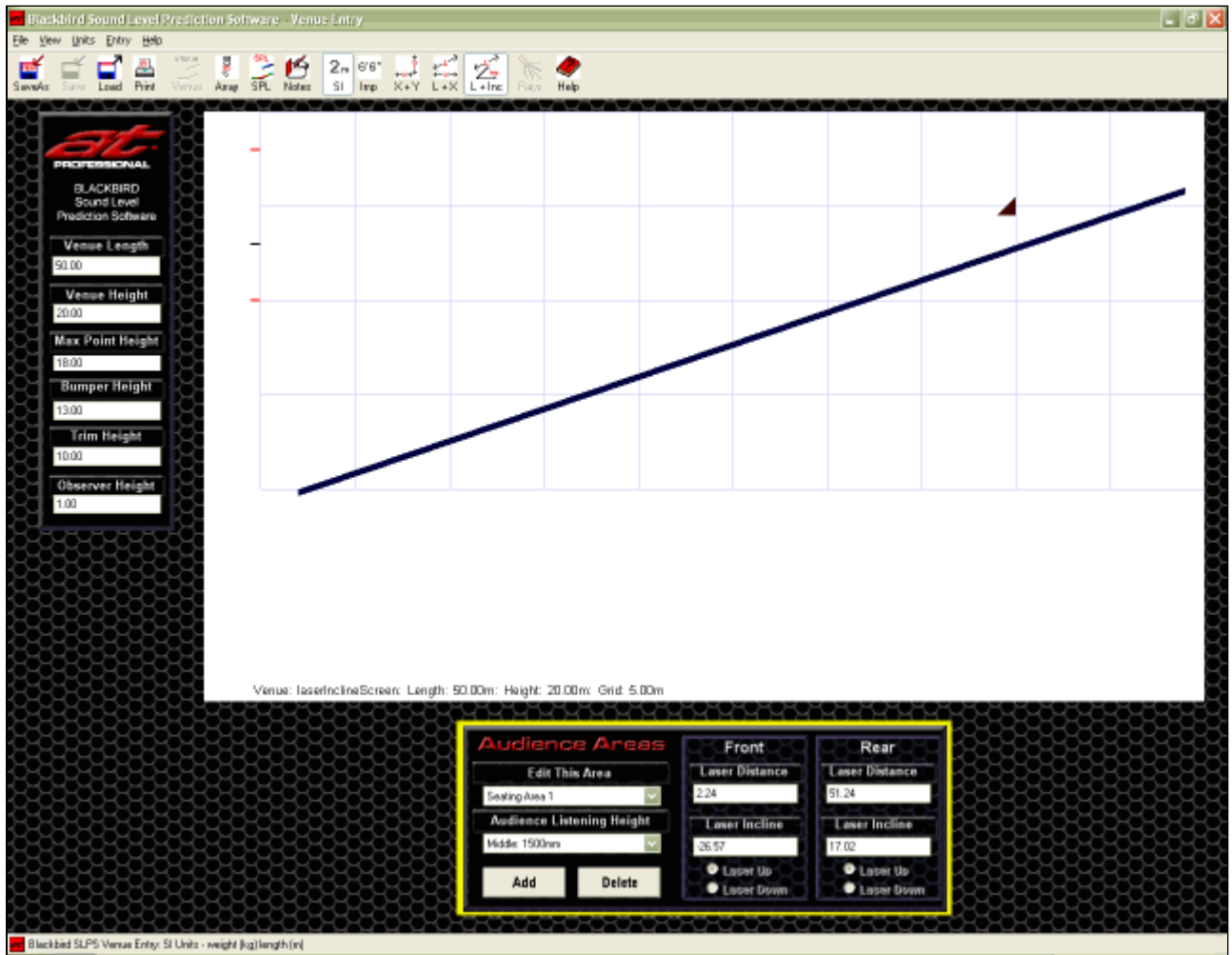
The X+Y Input Method button is selected. The Audience Seating Areas Panel shows the the front of Seating Area #2 approximately 3 metres from the floor and the rear of Seating Area #2 is at approximately 11.0 metres. This is visually confirmed as reasonable.

NOTE: Selecting an alternative Input Method button shows that the program has automatically calculated the various heights and distances. This feature allows switching between Input Methods either to check measurements or to use a different Input Method. The program will automatically calculate the other dimensions and update them when switching between Input Methods.

FRONT OF HOUSE is positioned interactively to be slightly above the rear of Seating Area #1.

VENUE SEATING AREA DIMENSIONS

Laser + Incline Input Method for Seating Areas



Laser + Incline Input Method

This method is used when a **Laser Inclinometer** is available.

From the Observer's Position, Laser Distance and Incline Angle measurements are made to the front and rear of each Seating Area.

The Observer's Position is taken as being directly below the Pick Point with the Laser Rangefinder at the height entered to the Observer Height input box.

Note: It is recommended that the Observer Height be input prior to entering any Laser Distances in the Venue Seating Areas Panel. This ensures that the Seating Areas are correctly shown as they are entered.

EXAMPLE VENUE

The Venue is an outdoor performance space with one continual slope from the stage area to the rear of the seating. No plans or measurements are available.

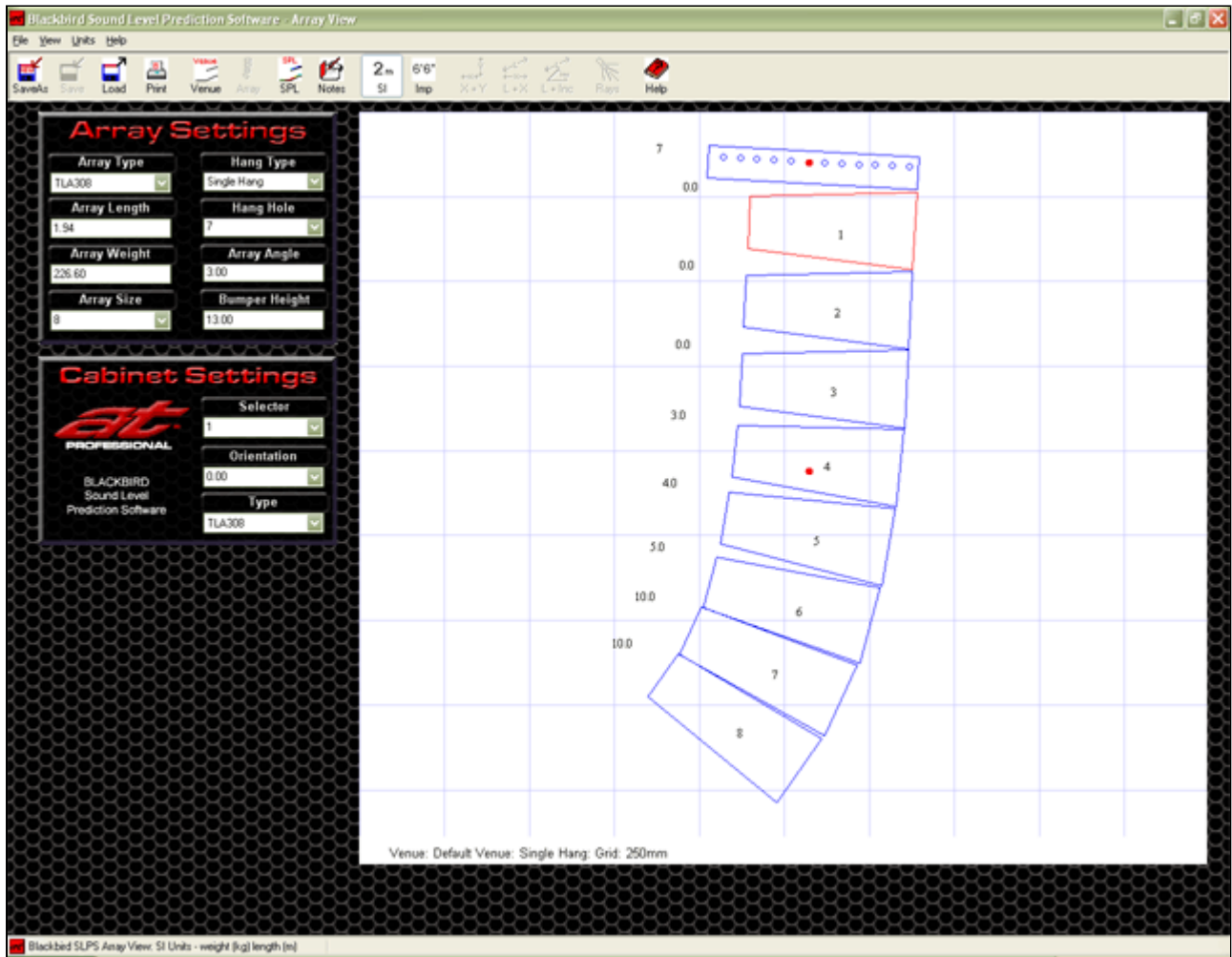
- This is an outdoor venue and has no seats fitted.
Middle: 1500mm is selected as the **[Audience Listening Height]** using the drop down menu to best approximate a mixed seated and standing audience.
- The Laser Inclinometer is held 1.00 metre from the ground, directly below the Pick Point. 1.00 metre is entered into **[Observer Height]**
- Using the Laser Inclinometer, distance and incline measurements are made from the Observer's Position to the front of the Seating Area. The measured distance is 2.24 metres at an incline of 26.57° with the Laser Inclinometer pointed down.
2.24 metres is entered into **[Front Laser Distance]**. (See illustration above)
26.57 is entered into **[Front Laser Incline]** and the **[Laser Down]** Button is selected.
- Distance and incline measurements are made from the Observer's Position to the rear of the Seating Area. The measured distance is 51.24 metres at an incline of 17.02° with the Laser Inclinometer pointed up.
51.24 metres is entered into **[Rear Laser Distance]**.
17.02 is entered into **[Rear Laser Incline]** and the **[Laser Up]** Button is selected.

FRONT OF HOUSE is positioned interactively to be toward the rear of the Seating Area.

The X+Y Input Method button is selected and it is shown that the height at the rear of the Seating Area is 16.0 metres. This allows the estimate of a reasonable value for Pick Height.

ARRAY VIEW SCREEN

Overview



The **Array View Screen** is used to rapidly configure the array by adjusting the Cabinet Settings for cabinet Type and inter-cabinet angular Orientation.

The Array Settings for the overall hang of the array are configured by adjusting Array Type, Array Size, Hang Type, Hang Hole, Bumper Height / Ground Height and Array Angle.

As the array is configured, an accurate visual representation of the array is provided along with information regarding the array's height and weight.

The default array for a new venue is an 8 cabinet system of the most recently used Line Array Cabinets, with the inter-cabinet angles set to a moderate 'J' curve, using a Single Hang Type. (See illustration above).

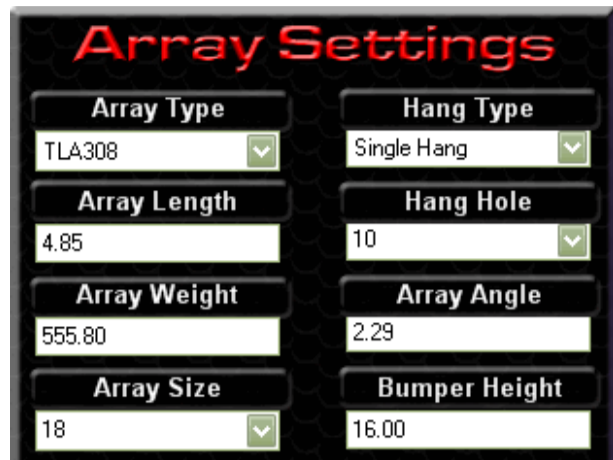
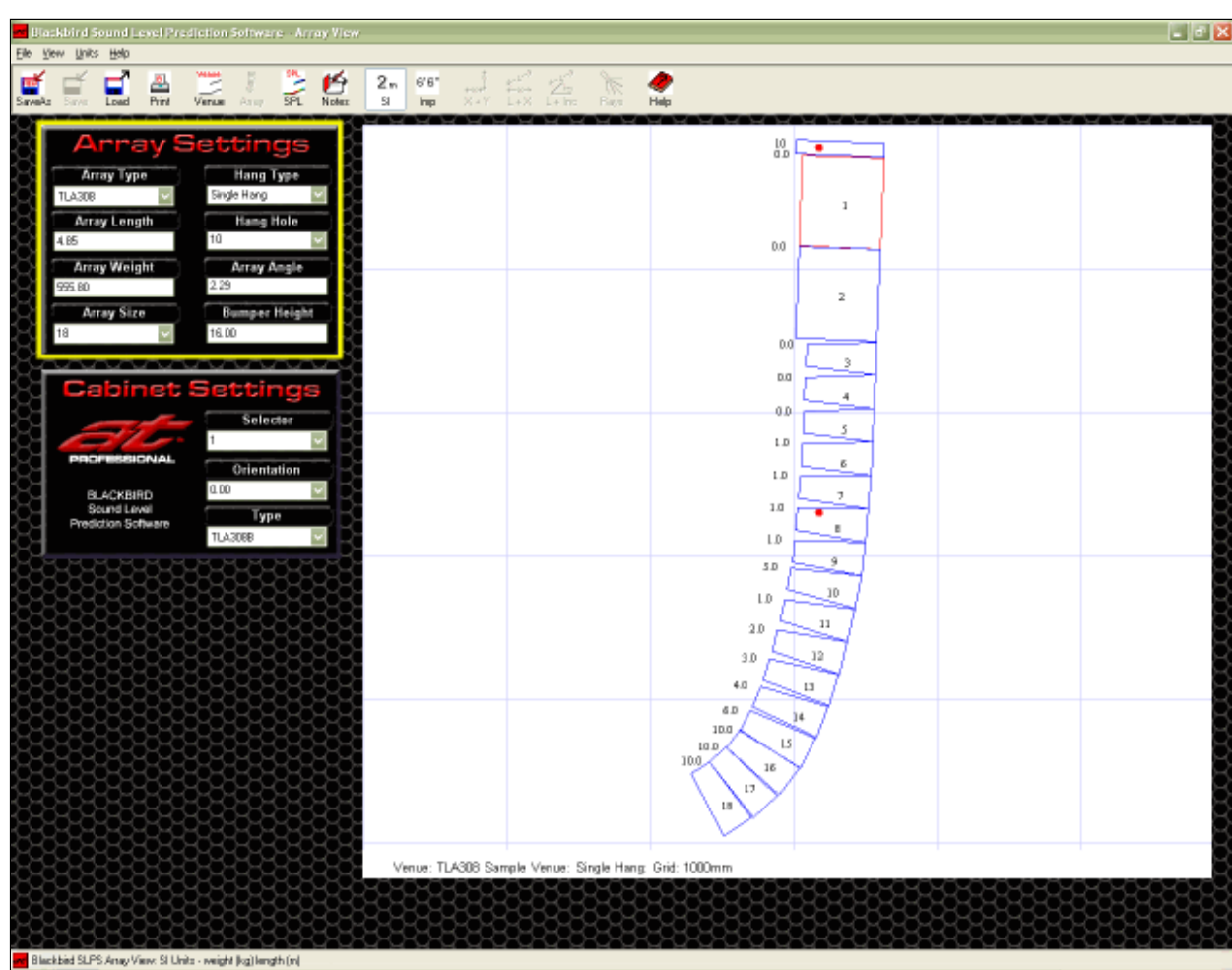
When the program is started the default Array Type is the TLA312 Line Array System.

The Array View screen provides two panels for the entry and edit of array settings.

- The **Array Settings Panel** located to the top left of the main display area.
- The **Cabinet Settings Panel** located to the lower left of the main display area.

ARRAY VIEW SCREEN

Array Settings Panel



The Array Settings Panel allows the entry and edit of Array Type, Array Size, Hang Type, Hang Hole, Bumper/Ground Height and for Tie Back or Dual Hang Modes, the Array Angle. In addition the Array Settings panel provides calculated values for Array Length, Array Weight and Array Angle as the array is configured.

Array Length

Array Length is a calculated field, displaying the length of the array from the highest point to the lowest point in the vertical plane.

Array Weight

Array Weight is a calculated field to aid with weight management, displaying the calculated dead weight of the entire array, including the Hang Frame. This weight does *not* include any chains or rigging systems and cabling. It is the responsibility of the rigger to account for these weights in their safety margins.

Array Type

The Array Type drop-down menu allows the selection of the Blackbird Line Array System to be modelled.

Array Size

The Array Size drop-down menu allows the selection of the number of cabinets in the array. The array can be from 1 to the maximum number of cabinets permitted for selected array type. * See Note Below

When the number of cabinets in an array is increased, additional cabinets are added to the bottom of the array and set to an inter-cabinet angular Orientation of 0.0° degrees.

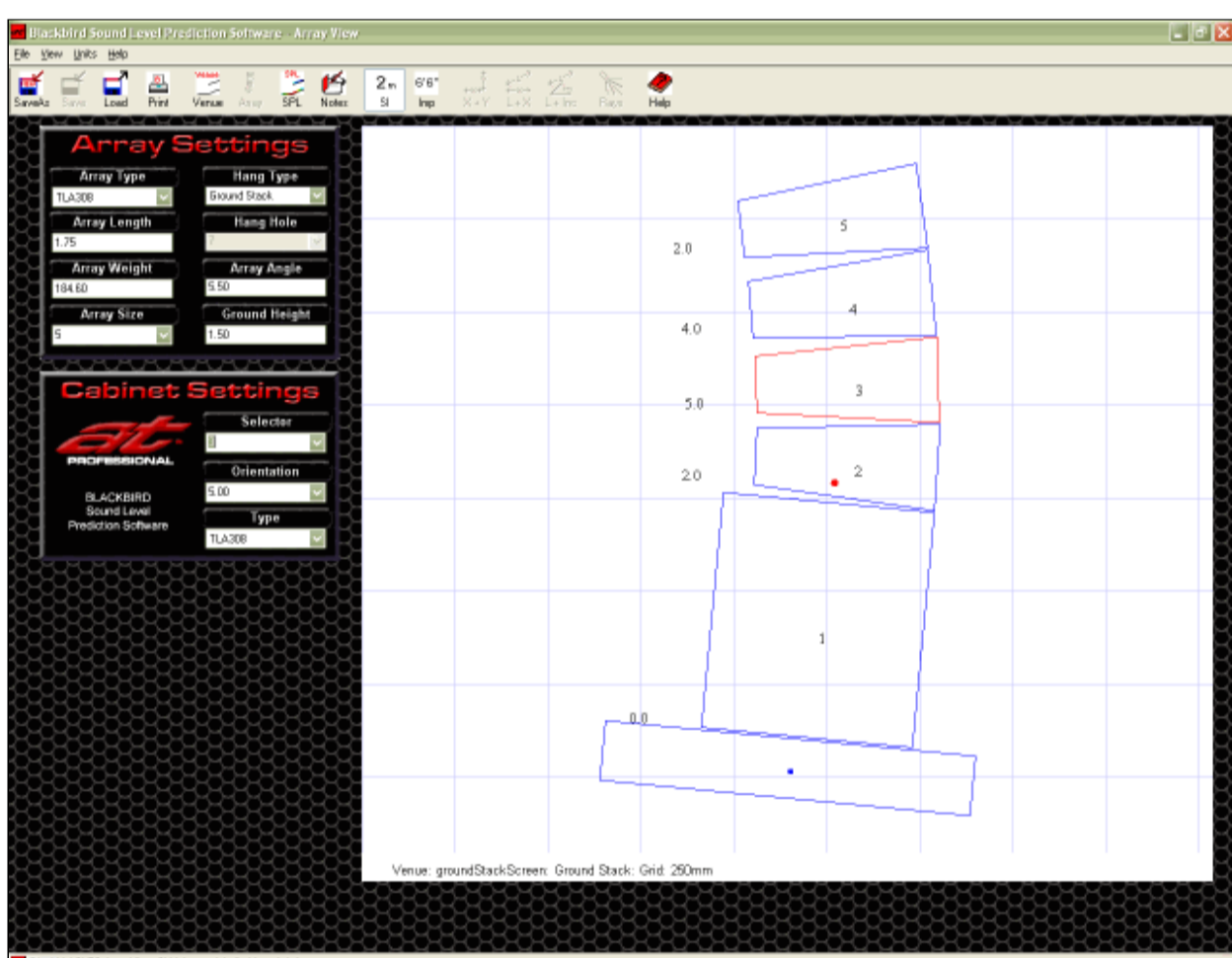
When the number of cabinets in an array is decreased, cabinets are removed from the bottom of the array.

*Note: The maximum number of cabinets in an array is determined by the safe working loads of the flying hardware and hang frame. Under **NO** circumstances should the safe working loads be exceeded.*

Hang Type

There are 4 hang modes available, selected via the Hang Type drop-down menu.

- Single Hang Mode**
 In Single Hang Mode the array is hung from one point on the Hang Frame, selected via the Hang Hole drop-down menu.
 In Single Hang Mode the Array Angle field is a display box only, displaying the calculated array angle.
- Dual Hang Mode**
 In Dual Hang Mode the front and rear holes (#1 & #17) of the Hang Frame are used to suspend the array from dual winches so that a constantly variable angle can be achieved.
 In Dual Hang Mode the Array Angle field allows direct entry and edit of the array angle. The entered Array Angle is checked to see that it can be achieved for the array as it is currently configured.
 If the input Array Angle is not able to be achieved, the Array Angle will reset to the previous angle and an Error Dialogue reports the angles that can be achieved without using Tie Back Mode.
- Tie Back Mode**
 In Tie Back Mode the Array Angle field allows direct entry and edit of the array angle within a range of ±90°. No checks or assumptions are made as to how the array angle can be achieved, but it does allow the SPL response to be calculated for the desired array angle.



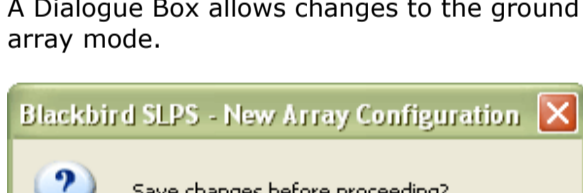
- Ground Stack Mode**
 In Ground Stack Mode the Hang Frame is placed on the ground with the cabinets arrayed above the frame.

Changing to Ground Stack Mode creates a new array with default values.

A Dialogue Box allows changes to the flown array to be saved prior to entering Ground Stack Mode.

Exiting Ground Stack Mode creates a new flown array with default values.

A Dialogue Box allows changes to the ground stacked array to be saved prior to entering a flown array mode.



- Click [Yes] to save the array configuration prior to entering or exiting Ground Stack Mode.
- Click [No] to discard the array configuration prior to entering or exiting Ground Stack Mode.
- Click [Cancel] to not enter or exit Ground Stack Mode.

Hang Hole

The Hang Hole drop-down menu is only active in Single Hang Mode, allowing the selection of the Hang Hole to be used on the Hanging Frame.

The holes are numbered, with hole #1 being the front hole of the frame.

In the graphical display window the selected Hang Hole # is displayed by a "red dot" on the Hanging Frame and the Hang Hole number is displayed beside the frame.

The Centre Of Gravity of the entire array is shown by a second "red dot" directly below the selected Hang Hole.

Array Angle

The Array Angle field allows the entry, edit and display of the angle of the front of the array *at the top cabinet*.

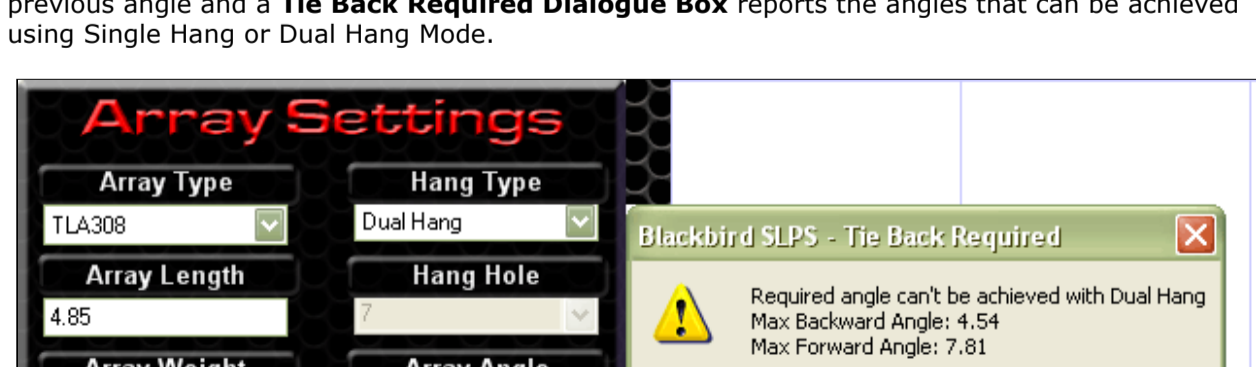
0.0° is when the front of the array is vertical

Positive angles are when the front of the array is facing downward.

Negative angles are when the front of the array is facing upward.

The Array Angle field behaviour depends upon the selected Hang Type.

- Single Hang Mode**
 In Single Hang Mode the Array Angle is calculated and displayed in the Array Angle field.
- Dual Hang Mode**
 In Dual Hang Mode the Array Angle field allows direct entry and edit of the array angle. The entered Array Angle is checked to see that it can be achieved for the array as it is currently configured. If the input Array Angle is not able to be achieved, the Array Angle will reset to the previous angle and a **Tie Back Required Dialogue Box** reports the angles that can be achieved using Single Hang or Dual Hang Mode.



Click the [OK] Button to close the Tie Back Required Dialogue Box

- Tie Back Mode**
 In Tie Back Mode the Array Angle field allows direct entry and edit of the array angle within a range of ±90°. No checks or assumptions are made as to how the array angle can be achieved, but it does allow the SPL response to be calculated for the desired array angle.

- Ground Stack Mode**
 In Ground Stack Mode the Array Angle field allows the Hang Frame to be inclined by up to 7.5° to aim the array in a downward direction. Angles greater than 7.5° are not recommended due to stability and safety considerations.

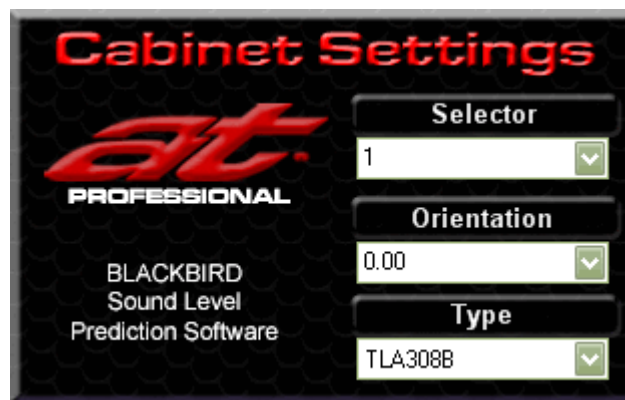
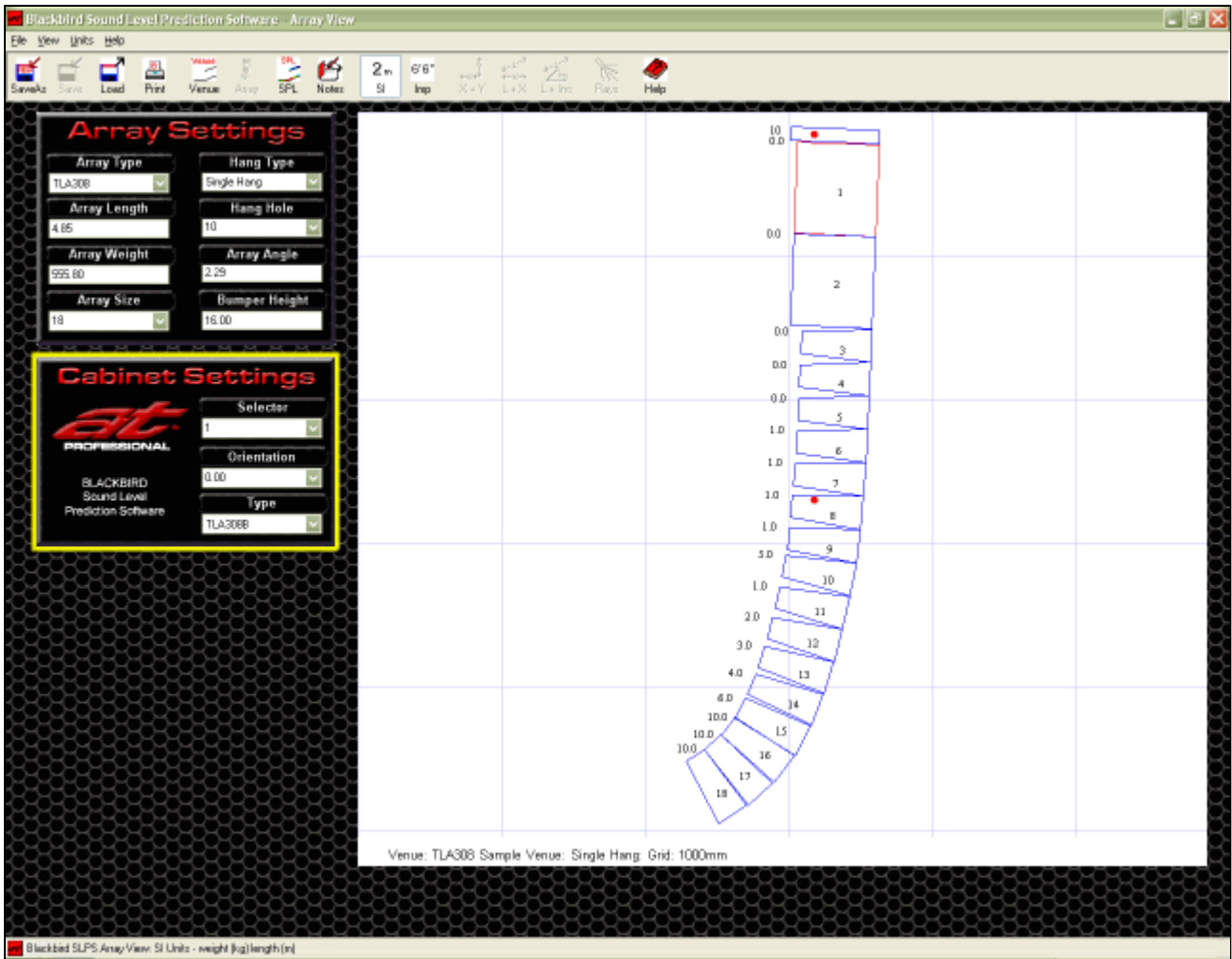
Bumper Height / Ground Height

Bumper Height is for flown arrays and is the initial point for the top of the array. This can be adjusted in the SPL screen but can also be set here to allow a starting height for the top of the array.

Ground Height is for ground stacked arrays and is the initial height for the bottom of the array. This can be adjusted in the SPL screen but can also be set here to allow a starting height for the bottom of the array.

ARRAY VIEW SCREEN

Cabinet Settings Panel



The **Cabinet Settings Panel** allows the entry and edit of the Cabinet Type and Cabinet Orientation of the individual cabinets in the array.

Selector

The Selector drop-down menu allows the selection of a cabinet for editing. The selected cabinet is highlighted with a red outline in the graphical display window.

Orientation

The Orientation drop-down menu allows selection of the inter-cabinet angle between the selected cabinet and the cabinet above. In the graphical display window the selected Orientation is displayed numerically beside the cabinet.

Note: Angular Orientation is dependant upon the array type, cabinet type and the flying hardware. The Orientation drop-down menu only allows achievable angles to be selected.

Type

The cabinet Type drop-down menu allows selection of the type of cabinet.

Note: The program only displays cabinet types which are permissible for the selected location in the array, determined by the design load limits and hardware constraints for the array type being modelled.

ARRAY VIEW SCREEN

Array Hints

A scroll wheel equipped mouse can greatly improve the ease and speed of entry and edit when using the Array View screen.

Scrolling the Selector Field

Click in the main input field of the Selector Box.

Use the mouse's scroll wheel to quickly scroll through each cabinet in the array.

Note: The graphical display window immediately updates the selected cabinet.

Scrolling the Orientation Field

Click in the main input field of the Orientation Box.

Use the mouse's scroll wheel to quickly scroll through all available cabinet Orientations for the selected cabinet.

Note that the graphical display window immediately updates the cabinet Orientation for the selected cabinet and updates the visual representation of the array.

Scrolling the Hang Hole Field in Single Hang Mode

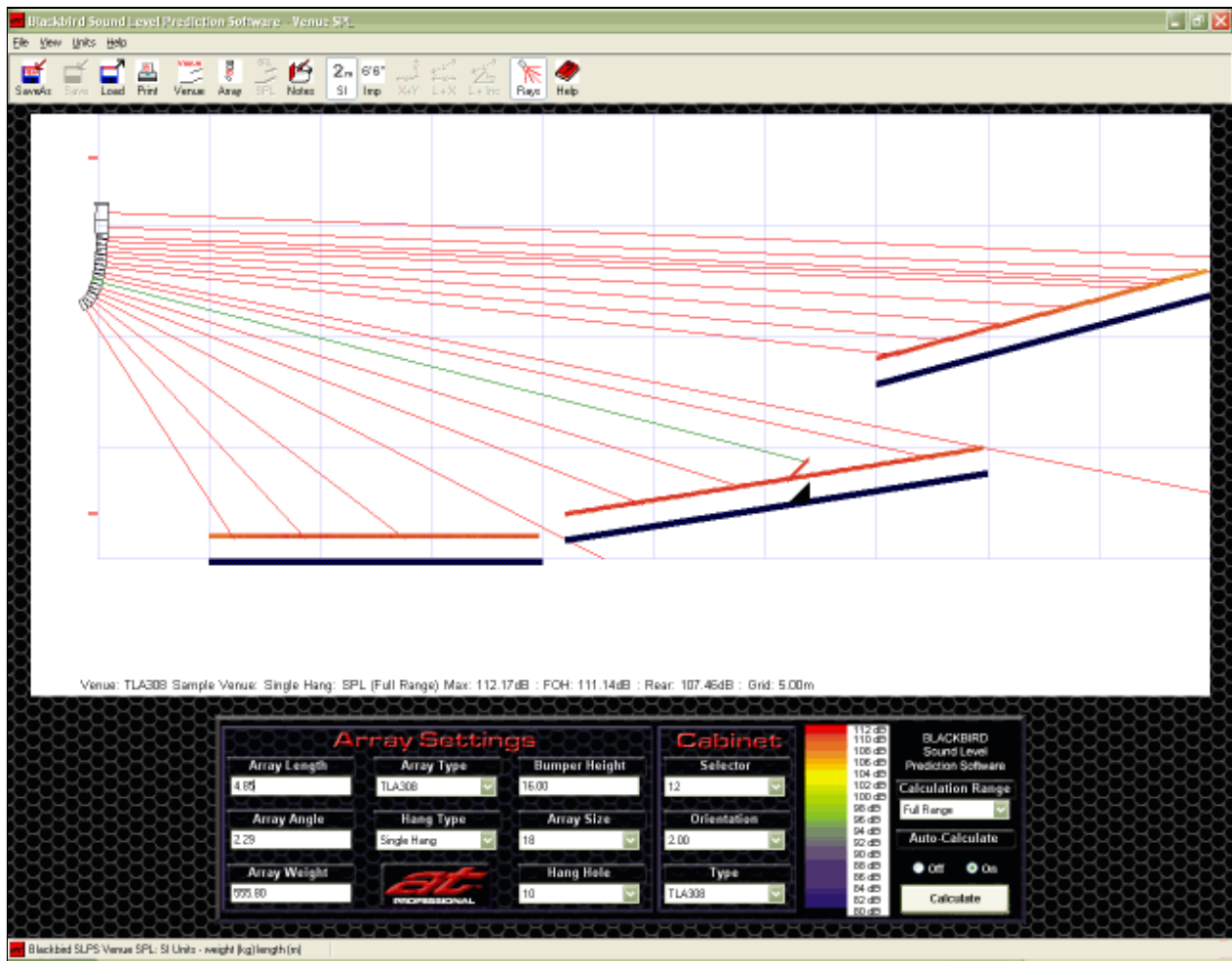
Click in the main input field of the Hang Hole Box.

Use the mouse's scroll wheel to quickly scroll through all available Hang Holes.

Note: The graphical display window immediately updates the visual representation of the array.

VENUE SPL SCREEN

Overview



The **Venue SPL Screen** performs the modelling and SPL calculations for the Blackbird SLPS software.

The primary display area depicts an accurate visual representation of the Array hanging in the Venue with an SPL Heat Map overlaid on the Seating Areas.

An information panel showing Array Information, Array Settings, Cabinet Settings, the Heat Map and Calculation controls is located beneath the primary display area.

This panel also allows the direct entry and edit of many of the values entered on the Array View screen and the Venue Entry screen, allowing the system SPL to be interactively fine-tuned to the venue.

Detailed Help is available for each area of the information panel.

- The **Array Settings Panel** allows the entry and edit of array settings and provides information about the array.
- The **Cabinet Settings Panel** allows the entry and edit of cabinet settings.
- The **Heat Map & Calculations Panel** shows the Heat Map to dB Graduations and controls SPL Calculations.



Cabinet Rays

The cabinet **Rays Button** provides an on-screen visual representation of the on-axis aiming point of the cabinets.

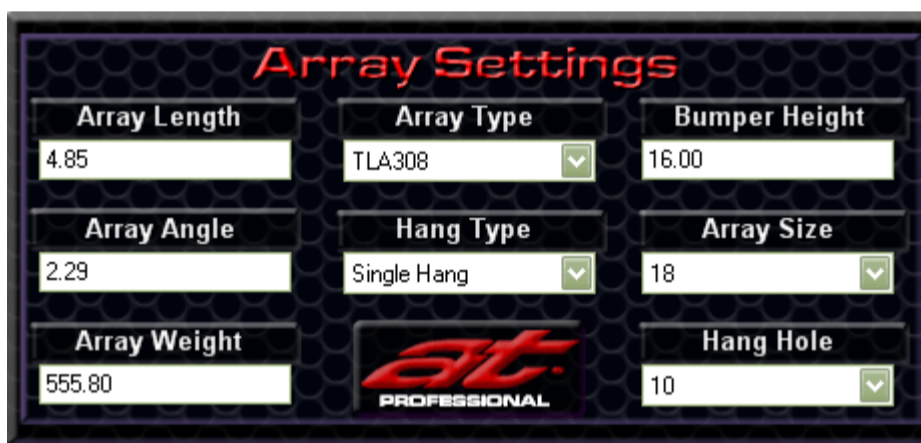
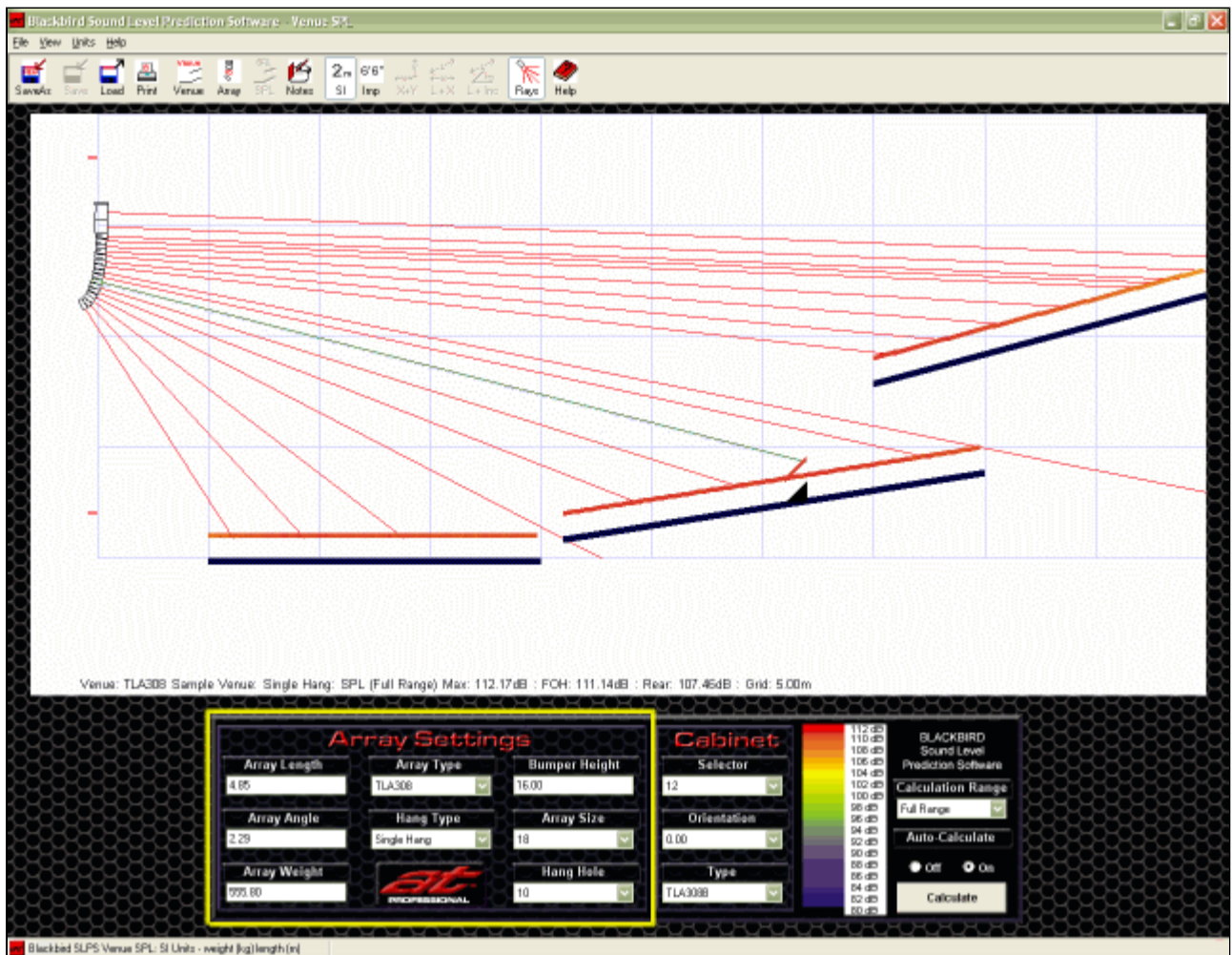
Click the **Rays Button** to switch Rays On, click it a second time to switch Rays Off.

Note: The outermost cabinet's Rays are always ON showing the Seating Areas that are on-axis to the array. The Ray for the Selected Cabinet is always ON in a different highlight colour, showing where in the Seating Area is on-axis to this cabinet.

The Rays Button is only available for the Venue SPL screen and is "grayed out" for the other screens.

VENUE SPL SCREEN

Array Settings Panel



The **Array Settings Panel** allows direct entry and edit of Array Type, Hang Type, Bumper Height, Array Size, and Hang Hole without selecting the Array View screen. Editing any of the Array Settings forces a recalculation of the SPL Heat Map allowing the array to be interactively fine-tuned to the venue.

Note : Due to the recalculation of the SPL Heat Map after each edit, if there are many changes to be made to the array, switch Auto Calculation OFF, make the desired changes and then switch Auto Calculation back ON.

Alternatively: Use the Array View screen to make the changes and then come back to the Venue SPL screen for final fine-tuning.

Array Type

The Array Type drop-down menu allows the selection of the Blackbird Line Array System to be modelled.

Refer to the **Array Settings Screen** for additional description of the Array Type.

Hang Type

There are 4 hang modes available, selected via the Hang Type drop-down menu.

Refer to the **Array Settings Screen** for additional description of the Hang Type.

Bumper Height / Ground Height

Bumper Height is for flown arrays and is the initial point for the top of the array.

Ground Height is for ground stacked arrays and is the initial height for the bottom of the array.

Refer to the **Array Settings Screen** for additional description of Bumper Height / Ground Height.

Array Size

The Array Size drop-down menu allows the selection of the number of cabinets in the array.

Refer to the **Array Settings Screen** for additional description of the Array Size.

Hang Hole

The Hang Hole allows the selection of the Hang Hole to be used on the Hanging Frame.

Refer to the **Array Settings Screen** for additional description of the Hang Hole.

Array Length

Array Length is a calculated field, displaying the length of the array.

Refer to the **Array Settings Screen** for additional description of the Array Length.

Array Angle

The Array Angle field allows the entry, edit and display of the angle of the front of the array at the top cabinet.

Refer to the **Array Settings Screen** for additional description of the Array Angle.

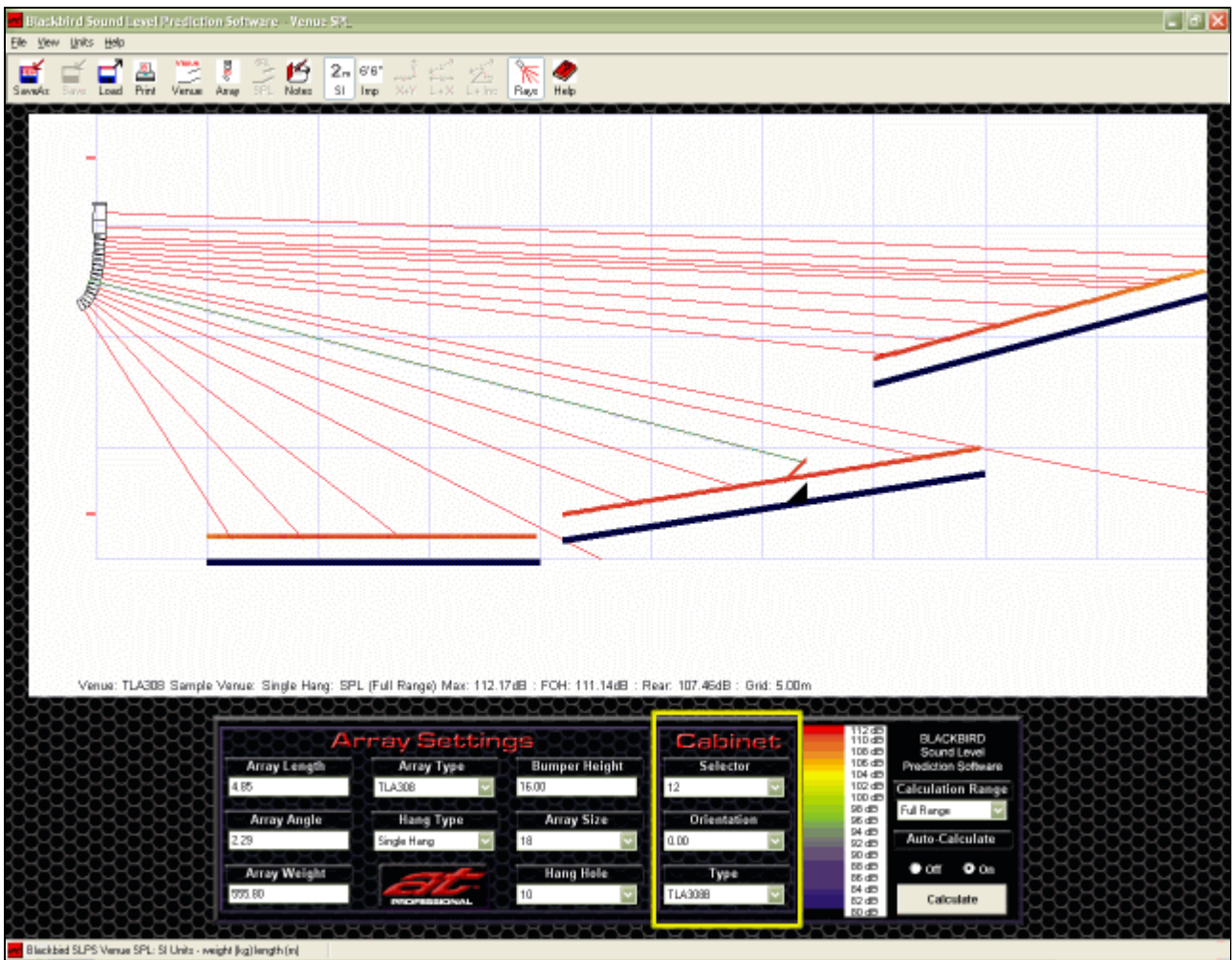
Array Weight

Array Weight is a calculated field to aid with weight management

Refer to the **Array Settings Screen** for additional description of the Array Weight.

VENUE SPL SCREEN

Cabinet Settings Panel



The **Cabinet Settings Panel** allows direct entry and edit of the Cabinet Type and Cabinet Orientation of the individual cabinets in the array without selecting the Array View screen. Editing any of the Cabinet Settings forces a recalculation of the SPL Heat Map allowing the array to be interactively fine-tuned to the venue.

Note : Due to the recalculation of the SPL Heat Map after each edit, if there are many changes to be made to the array, switch Auto Calculation OFF, make the desired changes and then switch Auto Calculation back ON.

Alternatively: Use the Array View screen to make the changes and then come back to the Venue SPL screen for final fine-tuning.

Selector

The Selector drop-down menu allows the selection of a cabinet for editing. Refer to the **Array Cabinet Settings Screen** for additional description of the Array Type.

Orientation

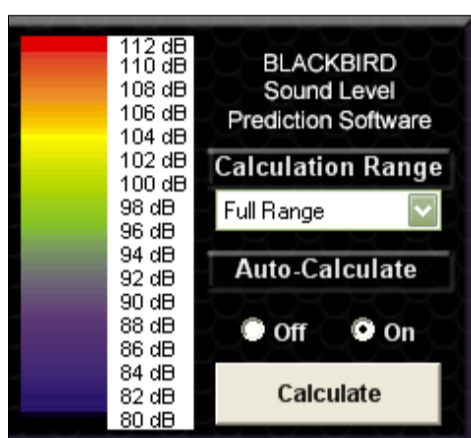
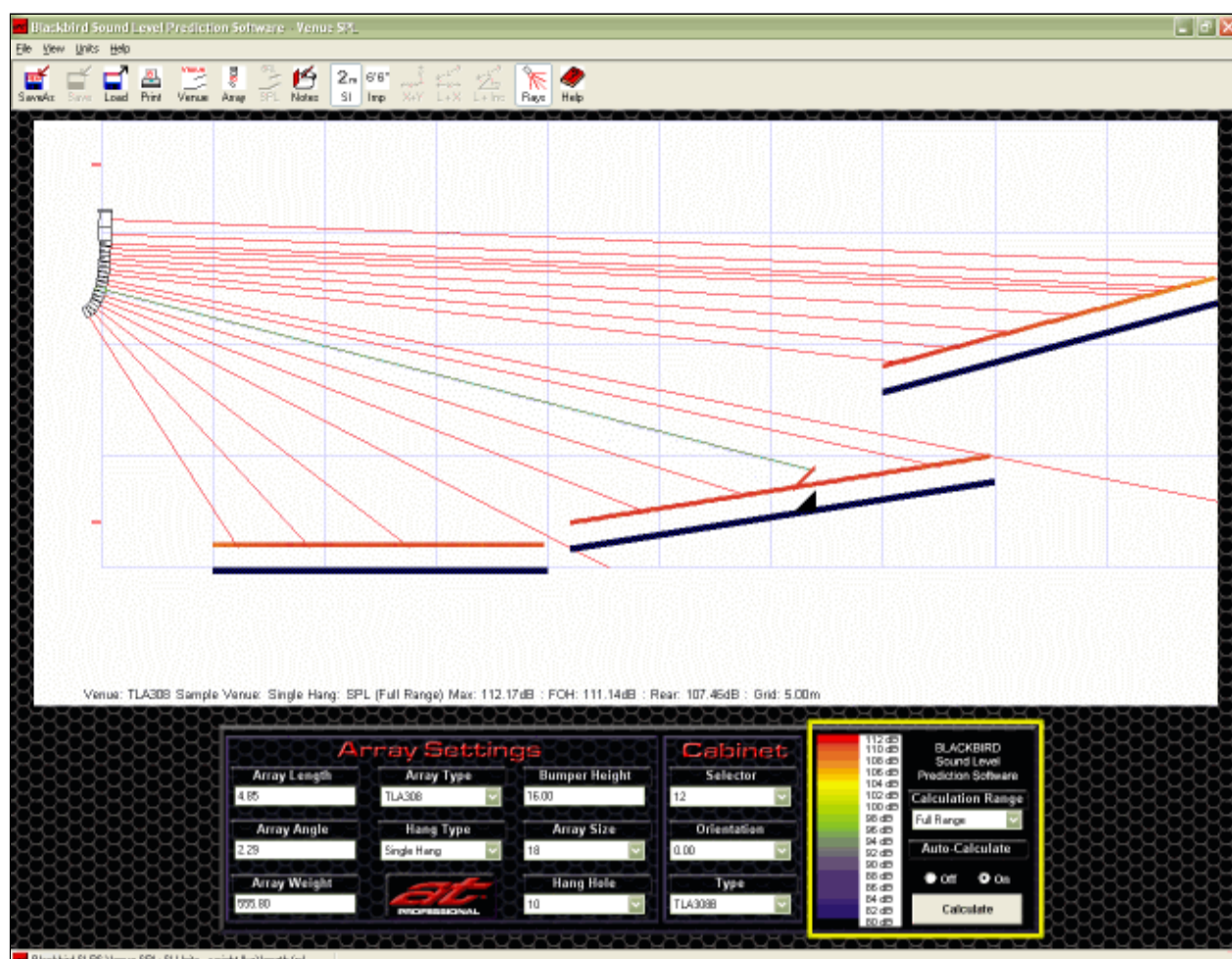
The Orientation drop-down menu allows selection of the inter-cabinet angle between the selected cabinet and the cabinet *above*. Refer to the **Array Cabinet Settings Screen** for additional description of the Array Type.

Type

The cabinet Type drop-down menu allows selection of the type of cabinet. Refer to the **Array Cabinet Settings Screen** for additional description of the Array Type.

VENUE SPL SCREEN

SPL Heat Map Panel & Calculations



Calculation Range & Heat Map Display

The Calculation Range drop-down menu allows the selection of the range of frequencies to be used for the Heat Map SPL calculations.

The Heat Map colour calibration chart displays the colour coding corresponding to the predicted SPL in 3dB steps.

- **Full Range**

The Full Range Calculation Range predicts the SPL response from 100Hz to 16kHz.

The Heat Map displays the predicted SPL as a colour coded Heat Map overlaid on the Seating Areas and FOH position, automatically calibrated to show the highest absolute SPL achieved within the venue with the colour primary red. The Heat Map colour calibration chart is shown with 3dB graduations, allowing easy determination of SPL's throughout the venue.

- **500Hz-3,200Hz**

The 500Hz-3,200Hz Calculation Range predicts the SPL response from 500Hz to 3,200Hz corresponding to the human vocal range and is crucial to system intelligibility.

The Heat Map displays the predicted SPL as a colour coded Heat Map overlaid on the Seating Areas and FOH position, automatically calibrated to show the highest relative SPL within the venue as as 0dB, with the colour primary red. The Heat Map colour calibration chart is shown with 3dB graduations, allowing easy determination of relative SPL's throughout the venue.

- **1kHz-10kHz**

The 1kHz-10kHz Calculation Range predicts the SPL response from 1kHz to 10kHz corresponding to the high frequency response of the system.

The Heat Map displays the predicted SPL as a colour coded Heat Map overlaid on the Seating Areas and FOH position, automatically calibrated to show the highest relative SPL within the venue as as 0dB, with the colour primary red. The Heat Map colour calibration chart is shown with 3dB graduations, allowing easy determination of relative SPL's throughout the venue.

Auto-Calculate

Calculating the Heat Map and the SPL at the seating areas is numerically intensive with program run times being heavily dependant upon the complexity of the venue, the size of the array and the computer platform upon which the software is being run. On modern computers, typical calculation times are a few seconds up to half a minute for highly complex rooms with large arrays.

Auto-Calculate provides control over when the SPL calculations are performed.

- **Auto-Calculate On**

When the Auto-Calculate On Button is selected the SPL is re-calculated and the Heat Map updated when any Array Setting or Cabinet Setting is altered.

- **Auto-Calculate Off**

When the Auto-Calculate Off Button is selected the SPL is not calculated when an Array Setting or Cabinet Setting is altered or upon entering the Venue SPL Screen.

If an Array Setting or Cabinet Setting is altered the Heat Map is no longer displayed on the Seating Areas indicating that the predicted SPL has not been re-calculated.

Calculate Button

Clicking the Calculate Button forces re-calculation of the SPL and display of the Heat Map.

This allows the program to be used in a quick and interactive manner by switching off Auto-Calculate, altering several Array and Cabinet Settings and then clicking the Calculate Button to re-calculate the SPL and update the Heat Map.

Heat Map Calculation Method and Considerations

The SPL calculations are made from the first principals of acoustics, taking into account the power handling, frequency response and vertical polar patterns of the selected cabinet types at 1/3rd Octave intervals across the selected Calculation Range.

The SPL calculations are performed using the maximum continuous power rating for the cabinet types in the array.

Calculations are performed for a *single array*. In most "real world" situations two or more arrays will be used within the venue. The maximum SPL's actually achievable will be 6dB higher for every doubling of the number of arrays.

Note that the predicted SPL's should be taken as a highly accurate prediction of the *relative levels* through out the venue. The actual SPL's achieved depends to a great extent on system tuning and drive levels, program material, room acoustics, feedback threshold, environmental noise considerations and many other factors too numerous to model.

No attempt is made to take room acoustics into consideration, only direct SPL is modelled. Likewise no attempt is made to accurately model a seating area which is "shaded" by another.