



GENELEC® | Aural ID

System Operating Manual

The ultimate in personalised headphone monitoring

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Quick Guide



To get your personal Aural ID data

1. Install the Aural ID Creator app, and create your Genelec Community account or log in to your existing Genelec account.
2. Use the Aural ID Creator app to record and upload the material for the Aural ID plug-in.
3. Select a subscription and place your order.

Aural ID data is produced will appear on your account. This takes about two working days. Once you receive a notification that the Aural ID is completed, then:

4. Go to your Aural ID web shop account, then download and install the Aural ID plug-in. Additional information on configuring different DAWs is available in the section 'DAW Configuration Guide'.
5. Select the plug-in in a project within your DAW, open the plug-in, log onto your account and select the Aural ID Profile. Then set up channel assignments and calibrate the plug-in for your headphones.

Performing the calibration is essential for accurate monitoring using Aural ID. To calibrate the Aural ID plug-in, take the following steps:

- Step 1: Select the virtual monitor layout you use and assign the loudspeaker feeds in your DAW to the virtual monitors using the cross-switch window.
- Step 2: Select the headphone type you use – if you do not find your headphone listed, select the "Other" option in the headphone list.
- Step 3: While playing audio on your DAW, calibrate the locations and levels for each virtual monitor one at the time, and calibrate the listener direction for the whole playback system.
- Step 4: Edit the user equalizer to match the sound colour to your workflow, or to match your loudspeaker-based monitoring system.
- Step 5: Save your plug-in settings in the DAW project.
- After a few days, re-calibrate the plug-in to obtain maximum accuracy.

System Requirements

Operating System Support

The Aural ID plug-in is available for both OS X and Windows. The plug-in has been tested on Windows 10 (v.1903), OS X 10.14 (Mojave), OS X 10.15 (Catalina) and OS X 11.2 (Big Sur).

On other versions, functionality cannot be guaranteed.

Plug-in Formats

The plug-in is available in the following formats on different operating systems

- OS X: VST3, AU, Avid AAX.
- Windows: VST3, Avid AAX.

How to Work with Your Subscription

Software License

The Aural ID plug-in is a free download from the Genelec website. You subscribe using your personal Aural ID Profile. With a subscription you can use the Aural ID file for the subscription period. Monthly subscription renews and is automatically billed once a month as long as your subscription is valid.

The Aural ID Profile stores your HRTF information and also carries information about how long the subscription is valid.

An active subscription licenses you to use Aural ID. This includes:

- Calculation of your personal Aural ID HRTF.
- License to install and use the Aural ID plug-in on your DAW.
- Help and support services from Genelec.
- Continued updates to the plug-in and other services.

Need for Internet Connectivity

After installation, select your Aural ID Profile within the plug-in. Selecting your Profile loads it onto the DAW computer running the plug-in. You need an Internet connection for this.

After initial download, an Internet connection is needed at the start of the next subscription period when updates to your license information happen. The plug-in needs a connection to the Genelec Cloud in order to refresh its validity period. Choosing a longer subscription period reduces the frequency with which the plug-in must be connected to the Internet.

Changes to Your License

You can change from one license type to another. Your ongoing license period is always used up first. The change to the new subscription takes effect at the end of your current license period.

Authorization

How authorization works

Using the Aural ID plug-in to access your Aural ID data via the Genelec Cloud will download a file onto your hard drive. Your licensing information is stored in this local file along with your Aural ID data. Because of this, a separate USB licensing dongle or similar hardware key is not needed for authorization.

Each license is associated with one Aural ID Profile.

You can have several Aural ID Profiles on your account, but you will need separate licenses for each of them.

After downloading the Aural ID plug-in onto your computer, your Internet connection is no longer necessary while using the plug-in – until the end of your subscription period. At that point, an Internet connection is needed again so that your Aural ID plug-in can continue to operate.

Transferring Aural ID to an Offline Device

To use the Aural ID plug-in on a computer that is never connected to the Internet, download the Aural ID Profile onto a memory device such as a USB stick, and transport it to your offline computer. To do this, use the Plug-in Export feature and place the data onto the memory device. Install the plug-in onto your offline computer first, then use the Import feature of the plug-in to read in and activate the Profile there. At the end of the subscription period, you must download and transfer a copy of the new updated Aural ID file again to keep the offline computer working.

Using Multiple Computers

To use Aural ID on multiple computers, copy your Aural ID file to another computer following the Transfer instructions above.

Changing to a New Computer

When your computer is replaced, open your account, download and install the plug-in onto the new computer, then open your Aural ID file. Alternatively, you can use the Transfer Aural ID method.

Introduction to Monitoring with Aural ID

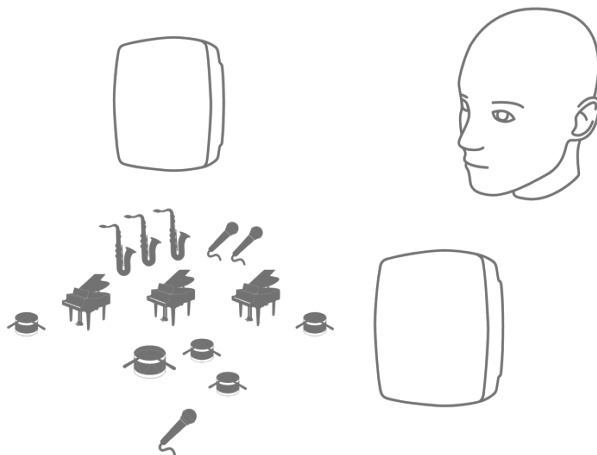
Aural ID offers you a completely personal and truthful headphone monitoring experience.

Monitoring of Audio

Mixes use virtual sound images, which are created on the sound stage between two or more loudspeakers.

When the sound presentation is created in a studio, level panning is the typical method used for placing virtual sources. For stereo or multichannel on-site recordings however, the microphone positioning tends to dictate the placement. This acoustic space presentation can be delivered using loudspeakers.

Experiences of the sound stage, virtual sound images, and acoustic space are created by exploiting the mechanisms of human directional hearing.



Loudspeaker-based monitoring enables you to work with virtual sound images to create a sound stage.

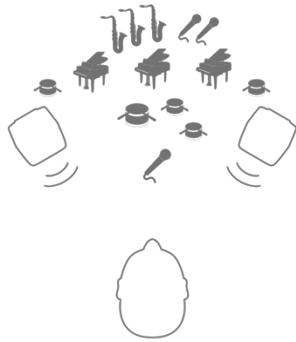
Monitoring Using Headphones

Headphones are used for monitoring the details in a mix, since they can offer excellent signal-to-noise ratio and isolation for noises, so low-level audio becomes audible. They are also used for checking that a headphone mix sounds good, since so much music these days is experienced through headphones.

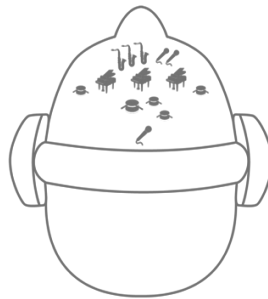
Headphones deliver sound directly into your ears. This eliminates your directional hearing, since head-related sound colour changes cannot occur. For this reason, headphone sound seems to happen 'inside' your head.

Aural ID computes how your head, external ear and upper body affect audio arriving from a given direction. This effect is called the Head-Related Transfer Function (HRTF) and is totally unique to you.

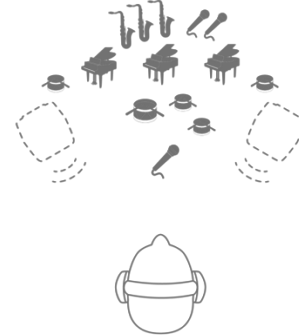
Aural ID will enhance your headphone monitoring experience, by bringing back the effects of your directional hearing. This recreates virtual sound images 'outside' your head, and enables you to hear the sound stage again, providing a sense of space and direction similar to that presented by loudspeaker-based monitoring.



Loudspeakers offer a sound stage with virtual sound sources



With standard headphone listening, virtual sound sources appear 'inside' the listener's head

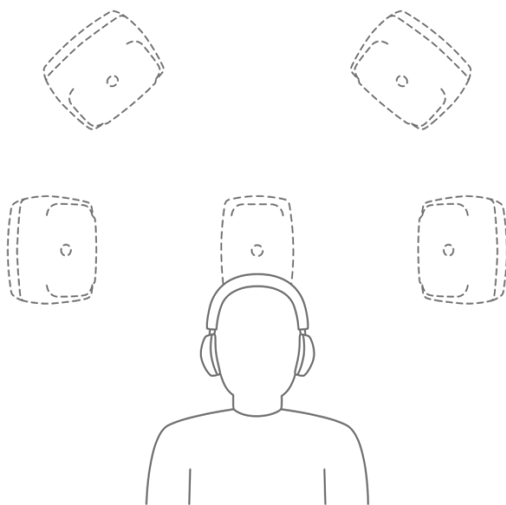


Aural ID can recreate the correct sense of imaging for headphone listening

Who Uses Aural ID?

Aural ID is aimed primarily at audio professionals working in music, film, broadcast, game audio design, and provides a headphone listening experience that presents virtual loudspeakers without the effects of room colouration, for maximum accuracy.

Aural ID enables mobility and flexibility, assisting the creative process by giving a more natural sense of imaging and enabling mix decisions than have ever been possible before using headphones. Your workflow can become more flexible, switching between using headphones and loudspeaker-based monitoring. Aural ID can also be a useful tool for remote collaboration.



Aural ID enables you to hear the sound stage similar to that delivered by loudspeaker-based monitoring.

Aural ID is Your Personal Tool

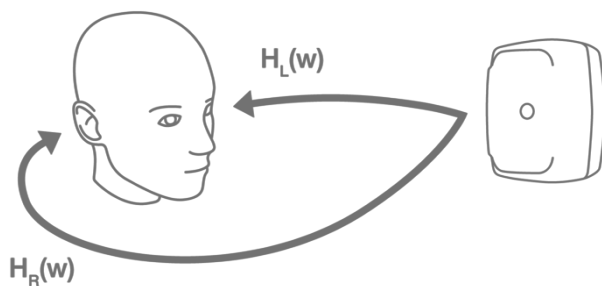
Aural ID represents your unique hearing, as embedded in your personal HRTF. This makes Aural ID your completely personal monitoring tool, avoiding the widely-used but less accurate generic HRTFs.

Aural ID works slightly differently from loudspeaker monitors since in a listening room, several people can simultaneously hear the sound. Because Aural ID provides a very personal way of hearing sound, you cannot pass your headphones to your friends or colleagues and expect them to get the same presentation (unless they are identical twins with you).

Aural ID Models How You Hear

Aural ID models the way your head, external ears and upper body affect the sounds that you hear around you. Your body colours audio differently depending on the sound source direction and distance, and this effect is totally unique to every person (because we all have slightly different shapes). This effect enables you to localize sound and is called the Head-Related Transfer Function (HRTF).

This HRTF consists of two parts – Common Factor and Directional Factor. The Directional Factor creates the sense of where the audio source is. The Common Factor plays a significant part in creating your personal experience of the sound colour. When you listen to sound over headphones, the Aural ID plug-in renders audio signals so that they appear ‘outside’ your head, arriving from the correct direction and having the correct presentation of sound colour. Achieving this usually requires personal calibration.



Left and right ear Head-Related Transfer Functions (HRTFs) are captured individually by Aural ID.

Aural ID System Components

Aural ID is a complete system that supports you in acquiring and using your personal HRTF in an easy way. The Aural ID system components include:

- Aural ID | Creator – a mobile device app for capturing your personal head and external ear shape data and placing an order for Aural ID.
- Aural ID | Plug-in – a DAW plug-in for rendering multichannel audio presentations over headphones using your personal Aural ID Profile.

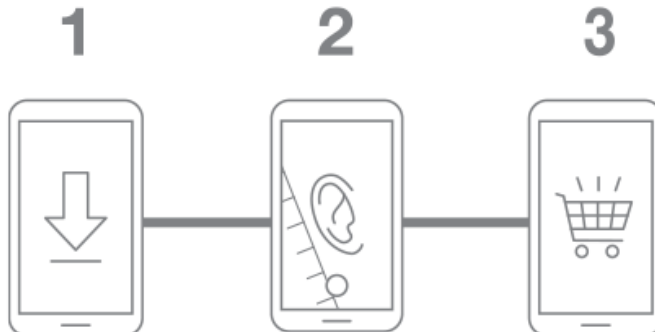
- The Aural ID Profile contains your personal HRTF data and information about your subscription. The Profile is maintained in the Genelec Cloud and is downloaded into your plug-in for use.
- The Aural ID Manager is an area of the Genelec website where you can manage your subscription.



Components of the Aural ID system: Creator and Manager enable handling of your Profile. Plug-in maintains your Profile within the Genelec Cloud and enables rendering for headphones in your DAW.

Steps to Get Your Aural ID

The Aural ID plug-in is available via a subscription. This gives you continuous access to the latest updates, future Aural ID features and immediate help desk access.



The steps to getting you personal Aural ID.

Briefly, the steps to getting your personal Aural ID up and running are:

- Install the Aural ID Creator app.
- Create your Genelec Community account, or log in to your existing account.
- Use the Aural ID Creator app to record and upload the material for the Aural ID – this includes a video and two photographs.
- Select your subscription and place your order.

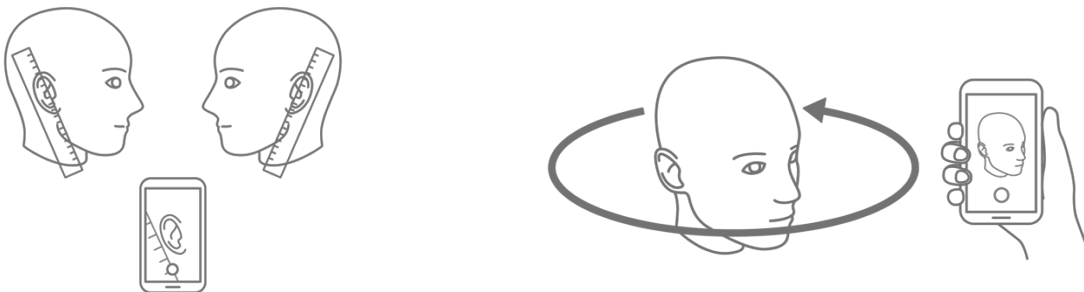
After this, Genelec will process your material to generate your Aural ID. The Aural ID will then appear on your account. This takes about two working days. Once you receive a notification that the Aural ID is completed, then:

- Go to your account and download the Aural ID plug-in.
- Install the Aural ID plug-in.
- Using the plug-in, log onto your account and select the Aural ID Profile you want to use.
- Follow the steps to calibrate your Aural ID Profile with your headphones.

The personal HRTF data can also be purchased as a SOFA file. The SOFA file format is standard and frequently supported by third-party software, but please note that SOFA file cannot be used with Aural ID plug-in, so only consider this if you plan to use other binaural processors. SOFA is a file format for storing spatially oriented acoustic data like head-related transfer functions (HRTFs) and binaural or spatial room impulse responses (BRIRs, SRIRs). SOFA is specified in standard AES69-2015 by the Audio Engineering Society (AES).

Aural ID | Creator

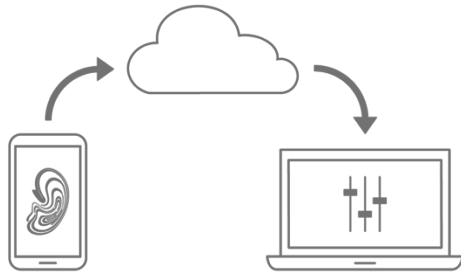
The Creator app conveniently collects the data needed to create your Aural ID data with your mobile phone. The app is available via the Apple and Android app stores. The app helps you take 360-degree video footage of yourself, and take photos of your ears. This is the key information needed to calculate your personal high-resolution HRTF.



The Aural ID Creator app collects your personal geometry and enables calculation of your Aural ID (HRTF) in the Genelec Cloud in two steps – two dimension photos of your ears, and a video around your head and shoulders.

Aural ID | Plug-in

The Aural ID Plug-in integrates your HRTF into your DAW and your work process. The Aural ID plug-in renders audio to appear in any direction and can create a virtual model of your loudspeaker layout.



Data from the Creator app is processed in the Genelec Cloud to generate your Aural ID data containing your HRTF. This HRTF is applied to audio via the Aural ID Plug-in, generating the virtual monitor layout and enabling headphone-based monitoring.

The Aural ID Plug-in installs to your Digital Audio Workstation (DAW). Using plug-in software avoids routing audio outside of the DAW, and offers a user interface integrated to the DAW working process. The plug-in is available in VST, AAX and AU formats.

Although Aural ID is a plug-in, it is not an 'effect'. It is your personal monitoring system. You cannot use Aural ID plug-in processing to 'polish' the sound of your mix. Aural ID is intended as your personal monitoring system for headphones, and should not be processed into an audio recording.

The Aural ID Plug-in creates the layout of the virtual monitors according to the channel layout you select, and assigns the input channels to the virtual monitor feeds. It also remembers the virtual monitor layout and settings, allowing a quick return to projects. You can adjust the virtual monitor locations and level alignments. You can solo and mute virtual monitors in an intuitive way, similar to working with any monitor system. The Aural ID Plug-in also offers an equalizer for sound character adjustment, to suit your personal working process.

What Headphones to Use

The Aural ID plug-in works with any high-quality professional headphones.

The Aural ID plug-in offers precise compensation of certain headphone types, via the Headphone Type selection. This accurately addresses the unique characteristics of your specific type of headphones. When a specific headphone type is selected from the library of models within the plug-in, your full HRTF provides the highest accuracy for you for both audio direction and sound colour. The full HRTF contains both the personal Common Factor (also called Common Transfer Function) and the Directional Factor (also called Directional Transfer Function) of the HRTF specific to you.

If your headphone type is not available within the plug-in as an option to select, you can always use the headphone type 'Other'. Selecting this preserves the natural sound character of your headphones while providing the best effort to deliver directional information. This option does not apply the general colouration component of your personal HRTF (called the

Common Factor or Common Transfer Function) and therefore the headphone characteristics will influence the sound more.

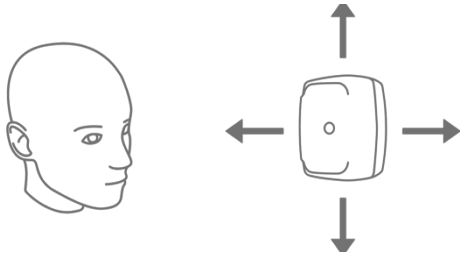
Personal Calibration of Aural ID | Plug-in

Although the Aural ID Plug-in works with any high-quality professional headphones, all headphones have a slightly different frequency response and characteristics.

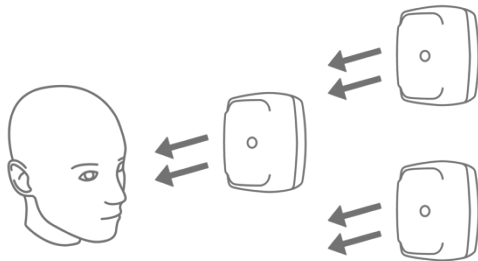
Select the headphone type you use, or select 'Other' for headphones that are not listed.

Further calibrations steps are useful to ensure accurate presentation. Briefly, the steps you should take are:

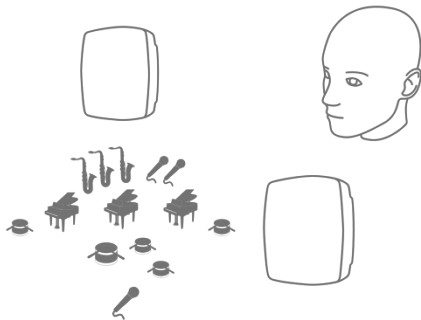
- Run a wideband test audio signal and listen to each virtual monitor in solo mode, then adjust the azimuth and elevation for each virtual monitor so that the location is correct. This depends on the combination of your HRTF details with the headphones you use.



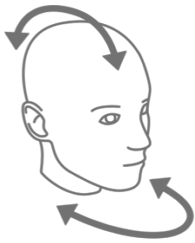
- Working between virtual monitors using 'solo' mode, adjust the level of all the monitors to be the same.



- Listen to stereo and immersive recordings familiar to you, to double check that the structure and presentation of the sound stage or space is now correct.



- Go to the listener settings and evaluate the need to 'tilt' (using the elevation adjustment) or 'turn' (using the azimuth direction adjustment) the listening direction to improve the overall presentation.



In order to match the Aural ID Plug-in presentation to your loudspeaker-based monitoring system sound and imaging, take the following steps:

- Play familiar stereo and immersive material on your loudspeaker-based monitoring setup.
- Compare these to the Aural ID presentation of the same material.
- Take time to analyse what you hear, and consider revisiting the calibration steps of the individual virtual monitors.
- Use the Equalizer function in the Aural ID Plug-in to match the overall sound character of the plug-in presentation to your loudspeaker-based system. Note that all the acoustic effects will affect the results here, and the listening room acoustics will have a great influence on your loudspeaker-based presentation, even in high quality rooms.

Detailed presentation of the calibration methods is provided in the section 'Learn More about Aural ID' in this manual.

Aural ID | Creator App in Detail

Installing the Creator App

The Aural ID Creator is a mobile application, available via Apple App Store and Google Play. Look for 'Genelec' and 'Aural ID Creator'.



App icon of the Aural ID Creator application.

Steps Required

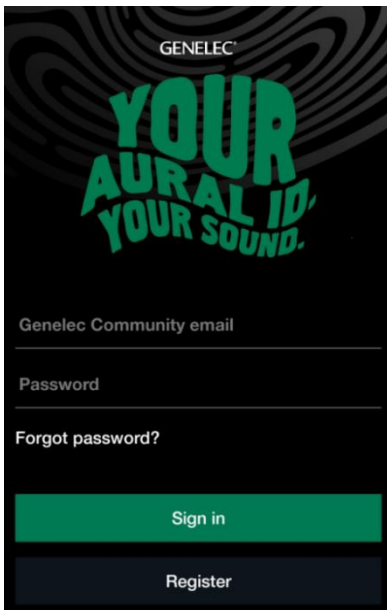
The Creator app enables you to order your personal Aural ID. The order process includes these steps:

- Create a Genelec Community user profile in the Creator app. If you already have a Genelec Community account, log in with your account credentials.
- Take photos of your left and right ears using the app. Ask a friend to help here, and follow the app instructions.
- Capture a 360-degree video of your head and shoulders, including detailed footage of both your ears. Again, ask a friend to help here, but study the demo video first and then follow app instructions.
- Upload the video and photos to the Genelec Cloud via the app.
- Select and pay for your chosen subscription using the app.

In the following sections we discuss these steps in more detail.

Creating Your Aural ID Profiles

To create your Aural ID Profile, first sign in to your Genelec Community account in the Creator app. If you don't have a Genelec Community account, you can create one directly from the Creator app (by pressing the Register button) or you can create an account by visiting <https://community.genelec.com/>



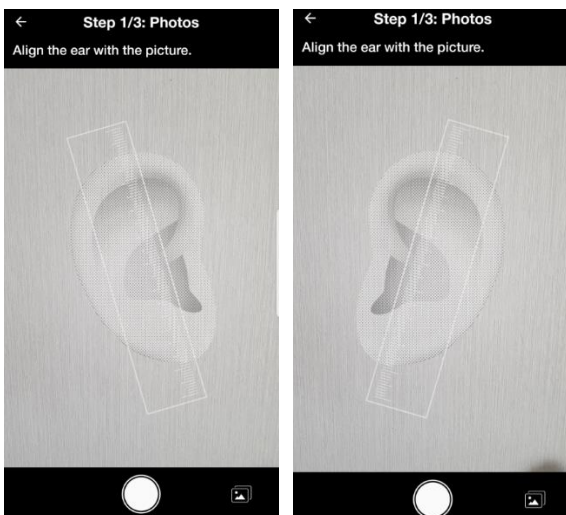
Login screen of Aural ID Creator app.

After signing in to your Genelec Community account, press “New Order” to start creating your Aural ID profile. Please note that the Aural ID profile name you choose here cannot be changed later.

Taking Photos of Your Ears

After entering the name for your Aural ID profile, take photos of both ears with a ruler placed in contact with the skin and placed either in front of, or next to, the ear. The Creator app will turn on the mobile phone camera. These photos are used to set the correct relationship between physical dimensions and audio frequencies.

A graphic overlay showing the ear can be seen in the app. Match the size of the ear to the overlay graphic image by moving the camera close to the ear. Take the photo when the ear is at the center of the camera view and matching the overlay.



Creator app screen for taking pictures of right and left ears.

If you already have these ear images in your mobile device photo gallery, there is an option in the bottom right corner of the screen to select and upload these images.



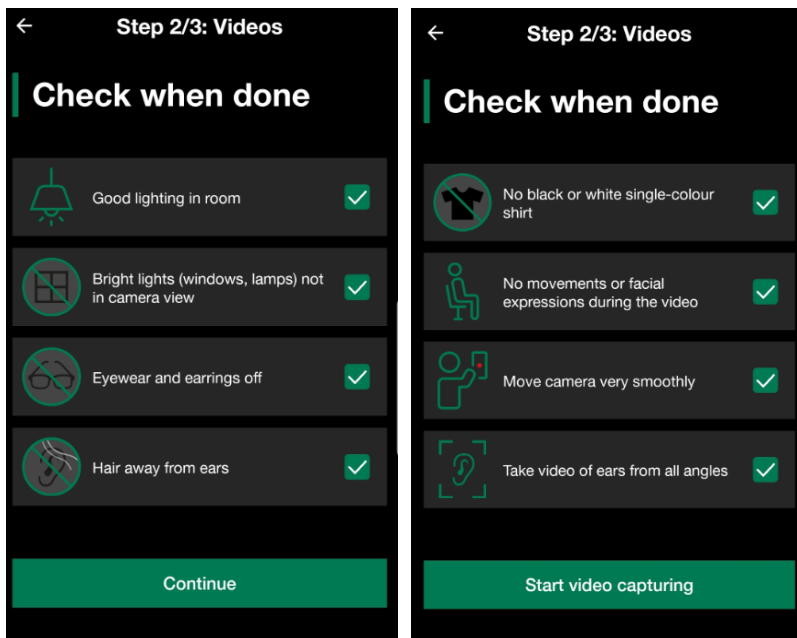
Sample photos showing the location of the ruler next to your ears.

Capturing the Video

Next, use the Creator app to collect a 360-degree video around your head.

A demo video of the capture is available inside the app. We recommend that you watch the demo video first as it demonstrates the steps required and the correct method of capturing the video.

Before starting the video capture, work through the two-page checklist to make sure you have the best chance of capturing a high-quality video. Check all the points to continue to the video capture.



Creator app checklist for video capture. The check list has two pages.

After checking all the items, the app is ready for video capture. Click 'Start video capturing'.

The Aural ID Creator app turns on the mobile device camera and light. A graphical template appears at the centre of the screen. Click the camera release button on your screen to start capturing video.

Once you start the capture, the graphic template starts to turn. Move your mobile device so that the camera image matches the template image position on the screen.

When the video capture starts, the camera starts moving to the right for the person holding the camera.

The graphical template rotates 360 degrees. Keep the person being filmed aligned with the graphical template during the video capture.

When you reach the person's ear, the template asks you to move close to the ear slowly and smoothly.

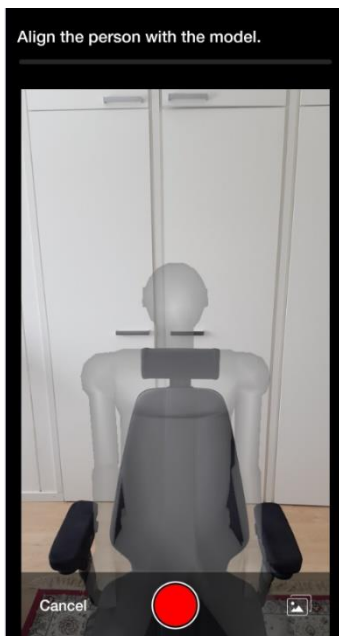
When you are close to the ear, point the camera towards the ear continuously, and move the camera smoothly so that the ear is seen from all directions – from the front, back, above and below. Do this twice. After this, keep the camera aimed at the ear, and slowly move back until the person is matched with the template again.

The template will guide you to continue moving around the person.

The other ear will be captured at close range in the same way as the first ear.

The template will then guide you to continue moving around the person.

After you have completed the full 360-degree video capture, and you arrive again in front of the person, keep the camera still and end the capture by pressing the red button on the screen.



View for capturing the video in the Creator app. Note the graphical template of the person. The template will move automatically.

The video capturing process will take about 3 minutes. A bar on top of the screen shows the planned progression of the video capture.

During the video capturing, text instructions and arrows appear on the screen to explain the next step in the process and the direction of movement or pointing of the camera.

If you have already captured this video and it is in the mobile device gallery as a file, there is an option on the bottom right corner of the screen to select a video file in the device library instead of shooting one.

Reviewing and Uploading the Photos and Video

After the video capture is completed, a summary page enables a review of the photos and the video.

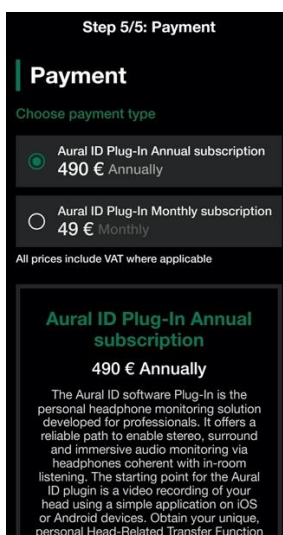
Next, press the “Confirm and Upload” button to send the photos and video to the Genelec Cloud for processing. Progress of the upload is shown. Note that uploading the video will take some time, since the video file is large.

Subscription Selection and Payment

After the upload, the app proceeds to the subscription selection and payment.

Choose the subscription. The payment is made using the PayPal service. Subscription will bill you automatically again at the start of every new payment period.

Later, you can switch between subscriptions and make other changes. When you make changes to your subscription, the changes come into effect at the end of the current subscription period.



Subscription options in the Aural ID Creator app.

Aural ID | Plug-In Installation Steps

Steps Required

The Aural ID Plug-In app enables you to use your personal Aural ID. The following steps are needed to get you up and running:

- After you receive a message from Genelec that your Aural ID is now ready for use, log in to your account via the Aural ID Manager website.
- Download and run the Aural ID Plug-In installer.
- Create a project in your DAW and insert the Aural ID Plug-In.
- Select your Aural ID in the plug-in. To do this, you need to log in to the Genelec Cloud with your credentials.
- Select the virtual monitor layout you want to use in the plug-in.
- Select the specific headphone type you use – if you do not find your headphones listed, select the 'Other' setting.
- Perform the personal calibration. Play audio on your DAW and edit the location and level for every virtual monitor individually, and calibrate the listener direction to make the complete presentation accurate.
- Edit the user equalizer to match the sound colour to your expectation, or your loudspeaker-based monitoring system.
- Save your plug-in settings within the DAW project.

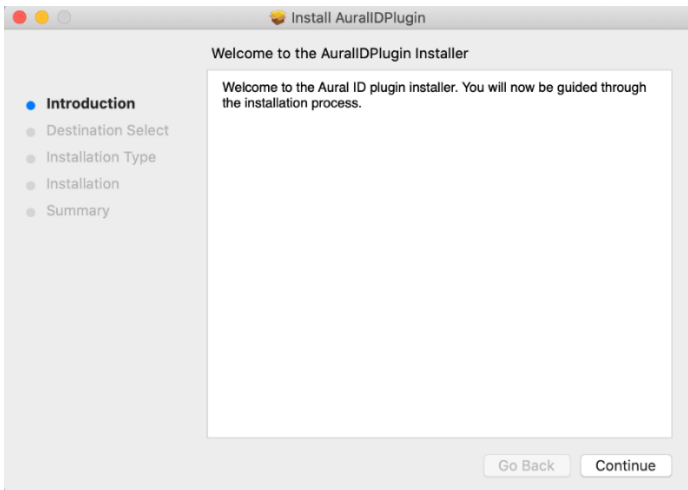
Now you are all set. After spending some days with the Aural ID Plug-In, you may want to re-calibrate the plug-in to get the maximum accuracy.

The Plug-in is a Headphone Renderer

After you receive a message from Genelec saying that your Aural ID production has been completed, download and install the Aural ID Plug-in software into your DAW. The Aural ID Plug-in can be downloaded at your account page in the Aural ID webstore. The Aural ID Plug-in enables smooth and efficient use of your Aural ID Profile for headphone rendering, and works with Genelec Cloud based Aural ID subscriptions.

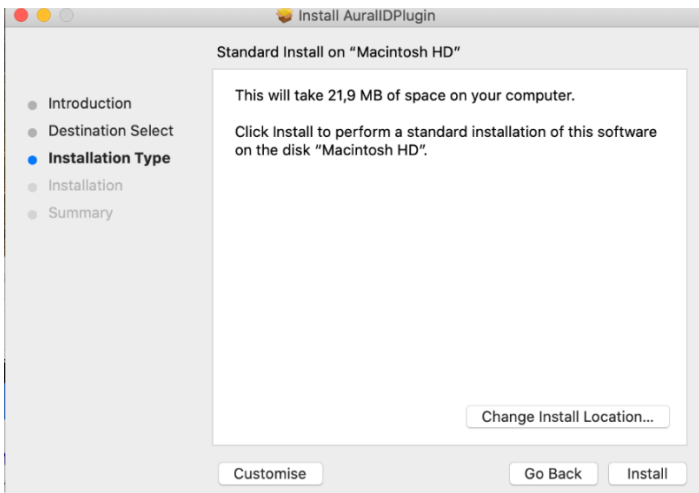
Installing on a Mac Computer

Open "AuralIDPlug-in.pkg" on your Mac, and this will open the installer window shown below.



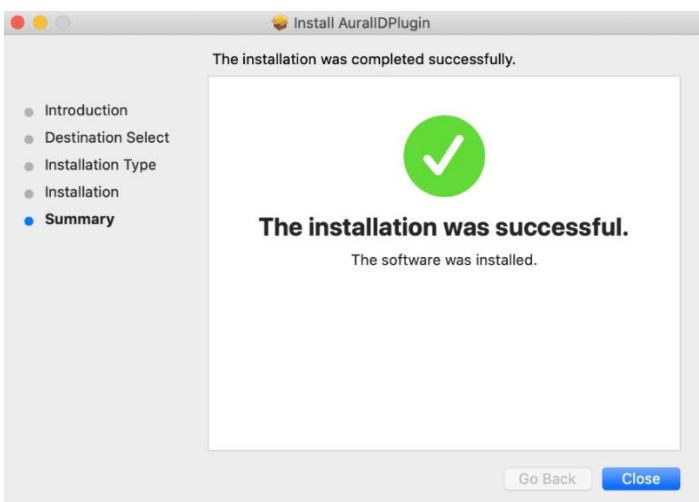
Plug-in installer opening screen.

Click Continue.



Plug-in installer select screen.

The default location for the install is recommended. Click Install to start the installation process.

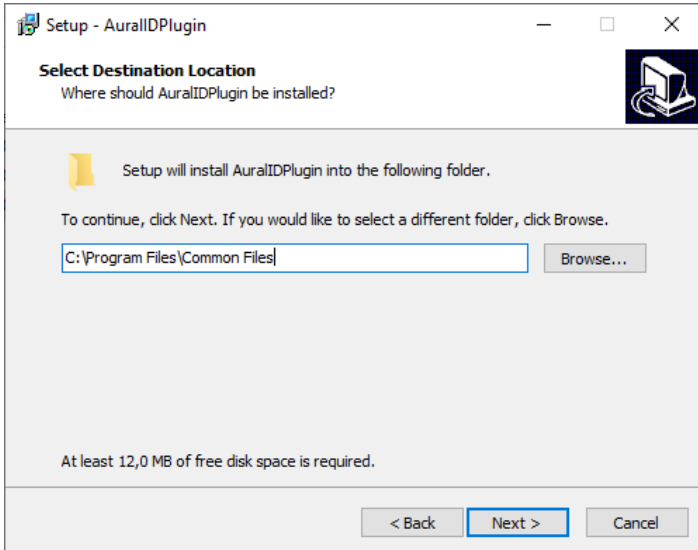


Installer success screen.

The plug-in has now been installed, and you can start using it.

Installing on a Windows Computer

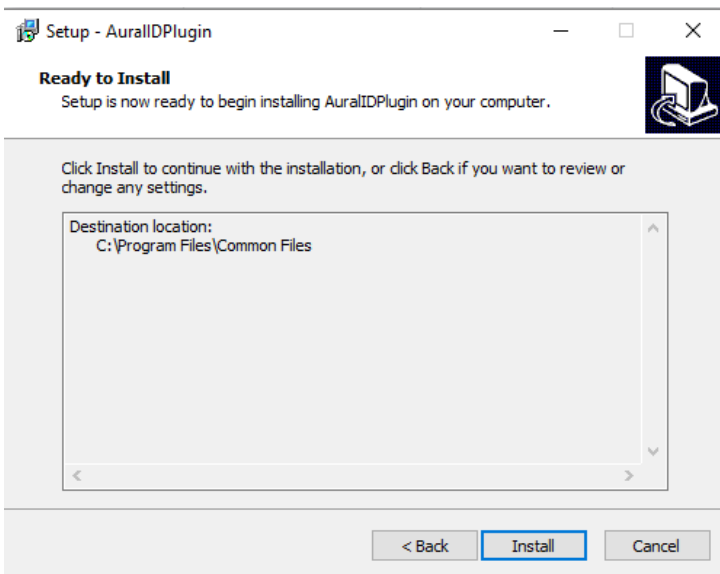
To install the plug-in on Windows, download the Aural ID plug-in installer “AuralIDPlug-in-windows-installer.exe” on your computer and run it.



Windows installer, showing the installation directory.

The suggested folder “C:\Program Files\Common Files” is the default location for plug-ins on Windows machines.

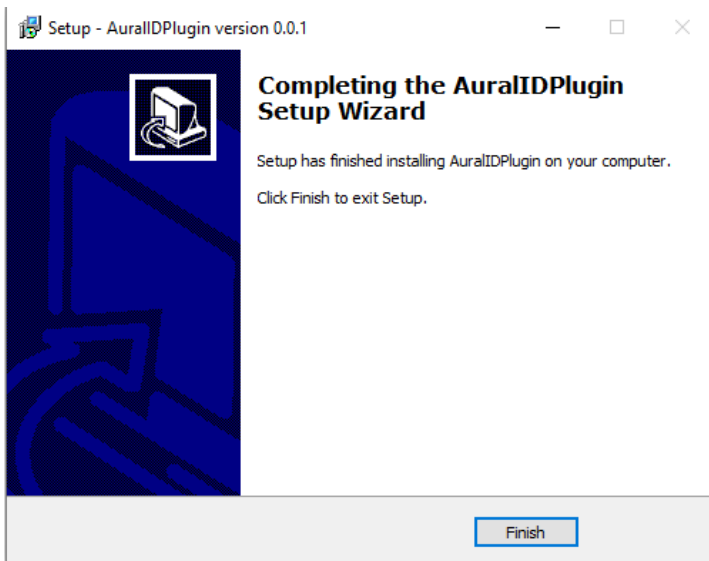
Click Next.



Windows installer ready to start the installation.

Click Install to start the installation process.

A **VST3** plug-in will be installed into the subfolder “\VST3” and the Avid AAX type **aaxplugin** will be installed to the subfolder “\Avid\Audio\Plug-Ins”. After completing the installation, you can move the plug-in to another location if you prefer.



Windows installer screen 3.

Installation is now ready, and you can start using the plug-in.

Uninstalling the Plug-in

Windows. Go to “Settings” – “Apps and Features”. There, search for the Aural ID Plug-in and click Uninstall. Follow instructions to complete uninstallation.

Mac. Locate the Plug-in install folder on your hard drive. The folders for different plug-in types are:

- **AU:** /Library/Audio/Plug-Ins/Components/
- **VST3:** /Library/Audio/Plug-Ins/VST3/
- **aaxplugin:** /Library/Application Support/Avid/Audio/Plug-Ins/

Go to this location and move the Plug-in to the Trash folder. With **aaxplugin** it's also possible to move the plug-in to “Plug-Ins(Unused)” folder.

Location of Aural ID Data in Your Computer

The file containing your Aural ID and licence data has the extension **.aid**. Your Aural ID data is downloaded into your computer and stored into the following location:

- **Windows:** C:\Users*yourusername*\Documents\Genelec\AuralID\
- **Mac:** /Library/Application Support/Genelec

Aural ID | Plug-in Function Reference

Signal Flow

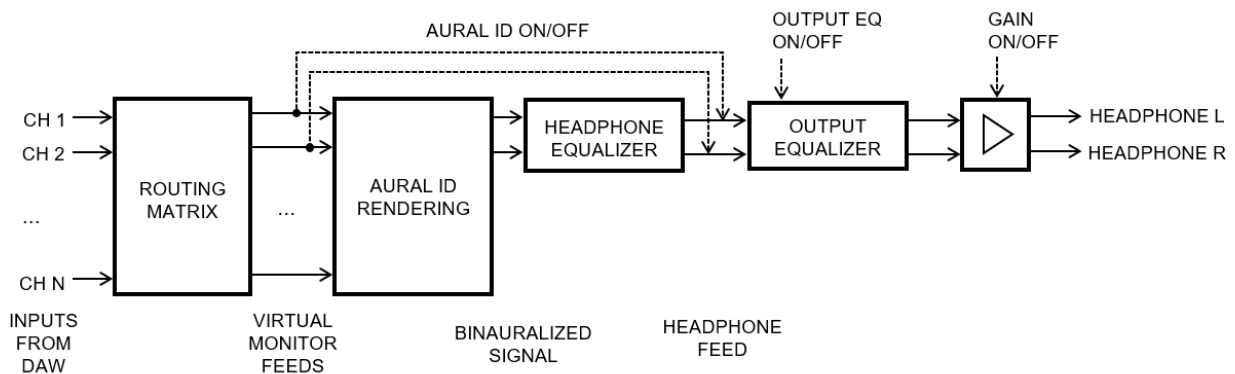
The plug-in accepts audio channels from your DAW. The channels are mapped to virtual monitors in the Routing Matrix. You select the virtual monitor set in the Channel Format drop-down.

Aural ID rendering applies your personal HRTF to create the virtual monitors. Virtual monitors can be calibrated using the plug-in controls. When Aural ID rendering is bypassed, the first two channels provide the headphone output.

The headphone equalizer can compensate for those headphone types that are integrated into the plug-in's library. Using the known headphone types, your HRTF determines the virtual monitor locations and sound colour. When a headphone type is not in the plug-in's library, the directional HRTF component is extracted and applied to generate the virtual monitors. The headphone itself then determines the sound character.

The output sound colour can be further equalized with a six-band parametric equalizer to suit your workflow, or to match for example a loudspeaker-based monitoring system.

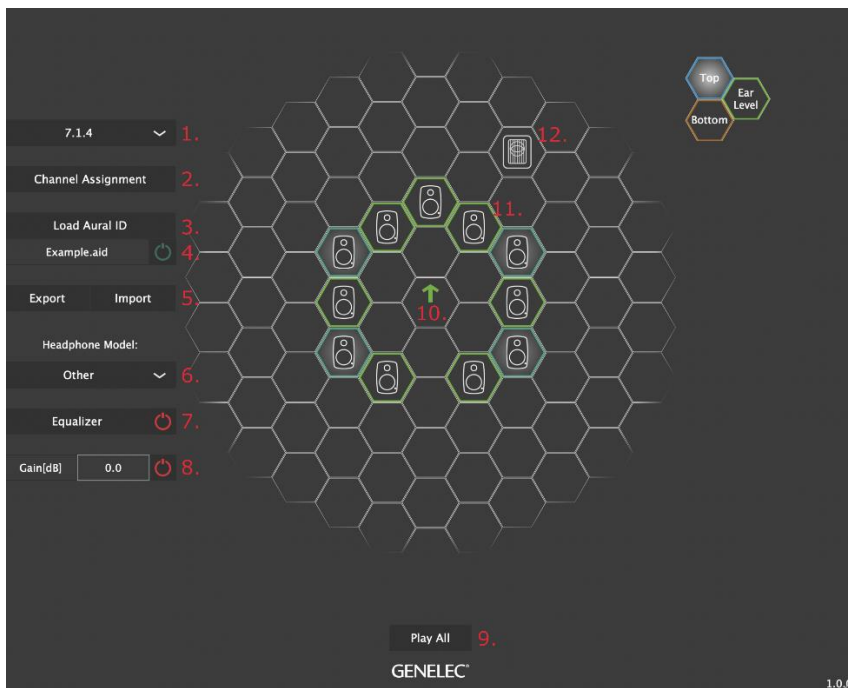
The gain adjustment helps level matching, to enable transitioning between headphone monitoring and loudspeaker-based monitoring.



Aural ID Plug-in signal flow.

Main View

In the following section, the controls in the plug-in graphical user interface are described in detail.



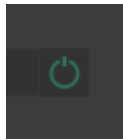
Aural ID Plug-in main view.

The main page of the Aural ID Plug-in contains the following functionalities. These will be explained in more detail later in this document.

1. Channel format – shows the selected channel mapping.
2. Channel assignment button – adjusts the mapping of DAW channels to the virtual monitors.
3. Load Aural ID button – loads your Aural ID Profile into the plug-in.
4. Aural ID file name and on/off toggle switch.
5. Aural ID import and export buttons.
6. Headphone model selector.
7. Listener equalizer and on/off toggle switch.
8. Output gain control and on/off toggle switch.
9. Remove all mutes and solos
10. Listener orientation adjustments.
11. Virtual speaker adjustments
12. LFE-channel adjustments

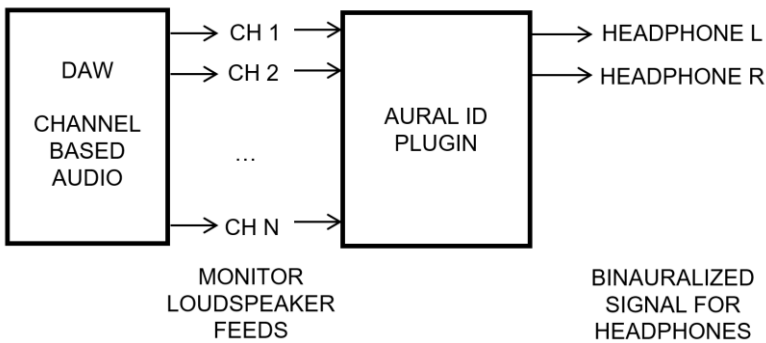
On/Off toggle switches

The main window has power switch icons. The switch icon is colour coded – the green colour indicates the switch is 'on' and the red colour indicates the switch is 'off'. Click on the switch icon to operate it.



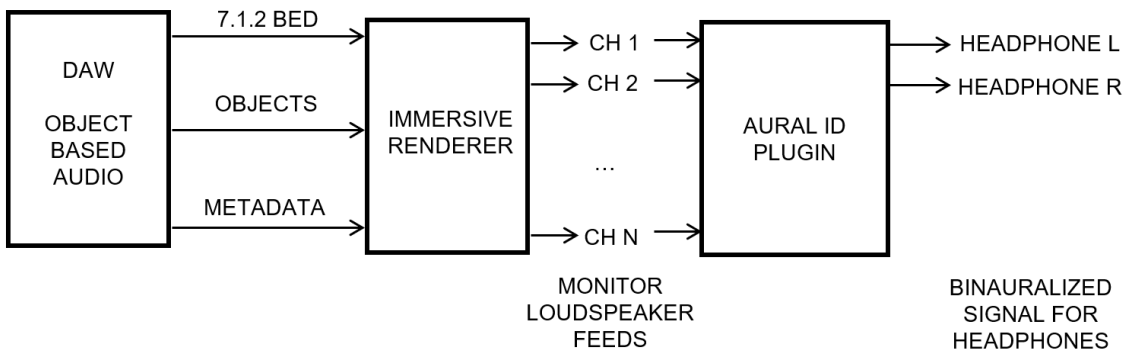
Channel Assignment

When you mix in DAW to directly create feed for monitoring loudspeaker, the Aural ID Plug-in inputs these monitoring loudspeaker feed channels and outputs a two-channel signal for headphone monitoring. This production method is called channel-based audio, and this is the typical approach for stereo productions and any surround or immersive productions that do not use object-based audio.



Using Aural ID Plug-in with a production generating the reproduction system loudspeaker feed signals.

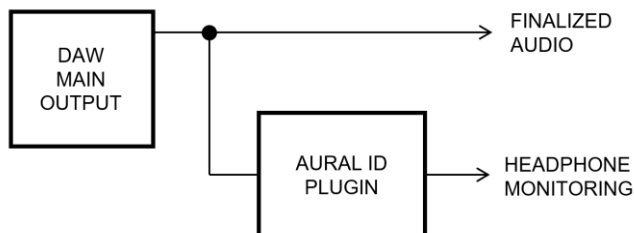
When you mix object-based audio in your DAW, you have a channel-based audio bed, a large number of sound objects, and metadata to place, adjust, and move the sound objects around the listener. With these productions, you use a renderer software that takes the objects with metadata and the audio bed and combines these to generate the monitoring loudspeaker feeds according to the loudspeaker layout selected in the renderer. Aural ID Plug-in inputs the monitoring loudspeaker feeds from the renderer and outputs a two-channel signal for headphone monitoring.



Using Aural ID Plug-in with an object-based audio production, generating the reproduction system loudspeaker feed signals in a renderer software from the sound objects in the DAW.

Location of Plug-in in the DAW signal chain

The location where you set the plugin in the DAW signal flow is the location where you have the complete audio presentation you want to monitor.



Aural ID Plug-in location in the DAW signal processing relative to the finalized audio output.

When you install the plug-in in the main output chain, you typically also have other functions in this chain, such as limiters and other processing functions. You want to hear all these effects correctly. Place the plug-in at the last point, after all processing functions.

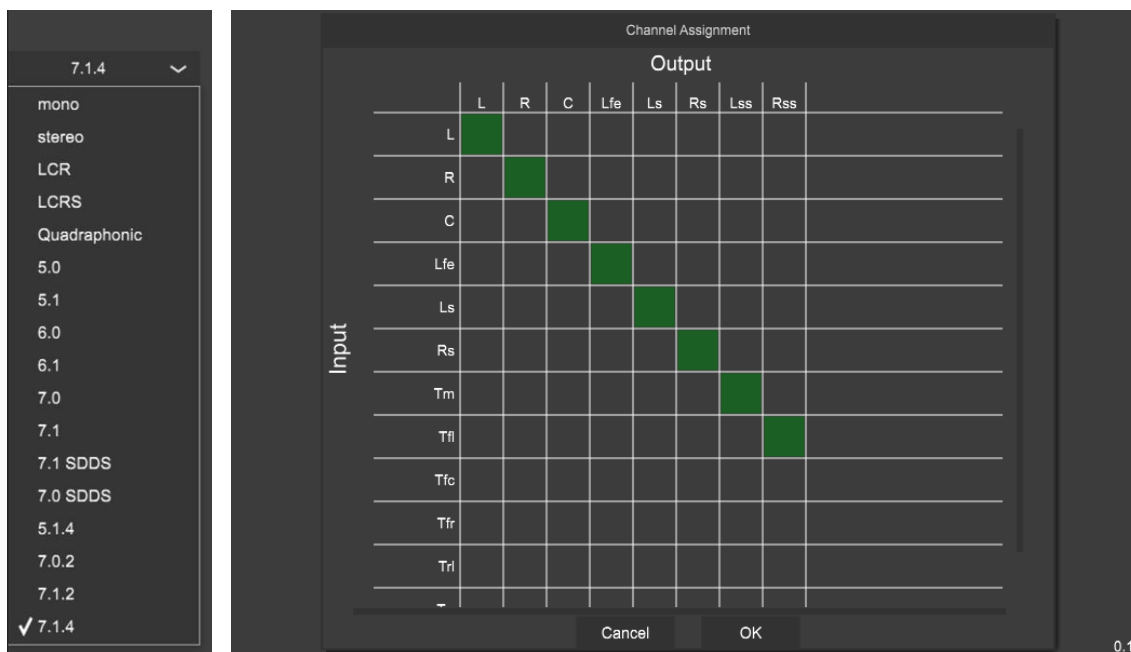
You may choose not to have the plug-in set on the main output because your main output is typically the result of your work that you will deliver as your product. Remember that the Aural ID plug-in is not an effect but a monitoring tool. Because of this, you may want to arrange the plug-in as a side-chain such that your main output remains not affected by the Aural ID plug-in output.

Virtual Monitor Layout

The plug-in cannot know the monitor layout needed just looking at the DAW channels as there can be any number of tracks in your project. The channel format of the monitoring system is selected in the monitor layout drop-down, with options from mono to 7.1.4 immersive layout. The channel assignment offers a list of popular monitor layouts.

In case you have an object-based production and you use a renderer software, select the monitoring layout option that matches the speaker layout option you have set in the renderer. In some cases, you may need additional software to pipe renderer output channels to the plug-in inputs.

Please note that some audio output is available in the plug-in even when the channel format is not correct. However, then some channels may not be audible and the rendering of the virtual monitors is not as you expect. Ensure you select the correct monitor layout that matches your DAW project.



Aural ID Plug-in channel assignment views – channel system selector (left) and audio routing (right).

The ‘channel assignment’ button opens the audio routing window.

On the left side of the routing table, we see the input channels of the DAW track where the plug-in has been assigned. The names you see in the left column depend on the DAW.

The top row shows the virtual monitors created by the plug-in. The channel system drop-down selection sets the number of the virtual monitors visible on the ‘output’ line, at the top.

During channel assignment, route the input channels to the monitoring loudspeakers feeds. You route audio by highlighting an intersection of the input and output (shown by a green mark). This stage simply establishes the connection – the signal gain is not yet set. Here, you ensure that each loudspeaker feed is routed to a virtual monitor location it should use – for instance, the left loudspeaker feed is routed to the left virtual monitor, and so on.

Check that your channel assignments are correct. Solo each loudspeaker feed in your DAW or in your immersive renderer, and observe on your headphones that the correct virtual monitor is playing.

Note that selecting a virtual monitor layout also assigns the directions of these virtual monitors to default values. During calibration you can adjust the virtual monitors azimuth and elevation to be subjectively correct for your loudspeaker layout.

If you need a monitor layout that is not included in the set of available virtual monitor layouts, you can edit the layout definition file to create your own layout and add it as a new selection. The virtual monitor layout options are defined in file ‘channel_setups.json’ which is located in the user documents folder under the path ‘Genelec/AuralID’. Modifications to this file

become available after you restart the plug-in. When you edit the JSON file, please make a backup copy first to avoid any possibility of losing the original file.

Load Aural ID

This section allows you to select the Aural ID data that you use for rendering the virtual monitors. Load Aural ID button opens the load window. The “Load from web” button opens a screen from which a login to the Genelec Cloud is required.

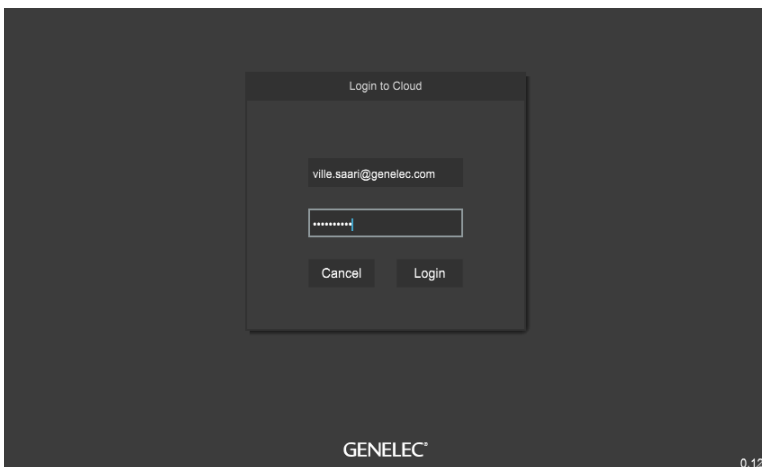


Aural ID load controls.

If you do not have your Aural ID, you can enter your order here to obtain it.

Click the ‘Create Aural ID’ button. You will need the Aural ID Creator mobile app and a little help from your friend to complete this step. The app can be downloaded from the app store for either iOS and Android phones. Look for “Genelec” and “Aural ID”.

If you already have your Aural ID but you have not started using yet, click the ‘Load from web’ button. This contacts your account in the Genelec Cloud and moves your Aural ID into your computer.



Genelec Cloud login view.

Login to your Genelec Cloud account.

After logging in, select the Aural ID Profile you want to download. Once selected, click “Download Aural ID”.

The plug-in now downloads your Aural ID data into your computer. The Aural ID is immediately active and is also stored on your hard drive.

In the future, you can use the “Load local file” button to start using your Aural ID file, so you do not have to visit the Genelec Cloud every time you start the plug-in.



Select and download Aural ID view.

Aural ID Rendering Signal Flow and On/Off Switch

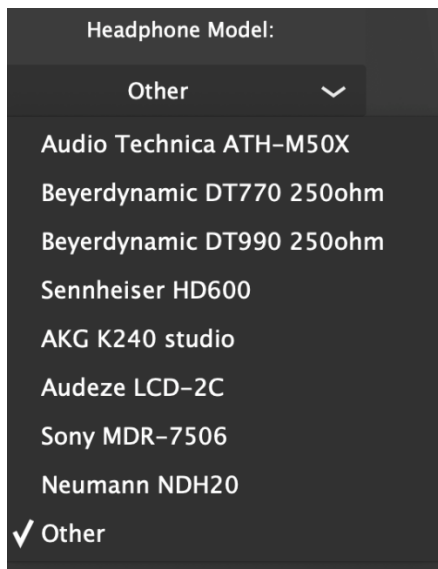
Next to the Aural ID file name, you will find the on/off switch icon to toggle the HRTF rendering on and off.

When you turn off the Aural ID, rendering is bypassed. The matrix routing and output equalizer are applied. In this mode the first two input channels provide the output to the headphone. The remaining input channels are not audible.

When you turn on the Aural ID, the plug-in processes all the incoming channels according to the channel assignments and generates the virtual monitors locations as defined by your calibration or the virtual monitor layout selection. See the sections on ‘Virtual monitor layout’ and ‘Virtual monitor calibration’ for more details.

Headphone Selection

This section allows you to select the headphone type that you use for monitoring.



Headphone selection.

Headphone Model in Drop-Down Menu

Selecting a headphone model in the drop-down menu uses the Genelec factory calibration available for a selection of professional monitoring headphone models.

Visit the section 'Calibrating the Virtual Monitors' after selecting the headphone. Since there are individual differences between listeners and small variations in different units of the same headphone model, calibration should always be performed after selecting the headphone model to optimize the locations of all the virtual monitors, listener head direction and overall sound character.

Headphone Model 'Other'

Use the option 'Other' when you cannot find your headphone in the library of available headphone types. Then, the headphones you use will create the sound colour. The headphone characteristics may not exactly match your hearing, so when using this option, calibrate the locations of all the virtual monitors, listener head direction and the overall sound character.

Equalizer and On/Off Control for Equalizer

The 'Equalizer' button opens the user equalizer window. The equalizer can be used for several purposes:

- Calibrating for the headphone/user interaction.
- Making the virtual sound character match the loudspeaker-based monitoring system.
- Achieving the sound character that is familiar to the user, and helps accuracy of monitoring.

The equalizer applies the same sound colour change to all the virtual monitors.



Equalizer view showing parametric controls and import of GLM loudspeaker-based monitoring system room response.

The equalizer offers six parametric filters. These can be controlled using the parameter values or by adjusting the filter graph itself. Three different filter types are available: *Peaking filter*, *High shelf filter* or *Low shelf filter*.

Following controls are available in the filter graph:

- *To adjust the frequency:* Drag the filter marker left or right
- *To adjust the gain:* Drag the filter marker up or down
- *To adjust the Q value:* Right click the marker, hold the right mouse button down and move the mouse up or down.
- *To turn a filter on or off:* Double-click on the filter marker.

You can also adjust each filter using the parameter field under the graphic. You can use the plus and minus buttons, or you can write a specific value into the numeric field. The fields are:

- Drop-down selection of the filter type.
- Numeric fields: centre frequency, gain and Q-value.



Parametric filter controls.

Close the EQ window by clicking 'OK' to save your edits. Click on the 'Cancel' button to discard your edits.

Import Filters from GLM

The 'Import from GLM' button imports monitoring loudspeaker system frequency responses from Genelec GLM calibration software. This can be useful to guide you in setting the equalizer so that you can achieve a consistent sound character between your virtual monitoring system and your in-room Genelec Smart Active Monitoring setup.

The plug-in opens the default GLM setup folder location and lists all the available setups there. Clicking on the file name reveals a drop-down menu where you can select the system calibration that you want to use.

Click on the 'Select' button to select one or more monitor loudspeaker responses that you want to be combined and shown on the EQ window. Check the monitors that you want included (this can be all of them if required). When you check more than one, the combined response of all the monitors is calculated and shown.

After making the selection, click 'Import'.

The imported frequency response appears as a dotted line in the EQ. The 'Show room response' button activates and allows you to show or hide the monitoring loudspeaker response.

Output Gain Control

This enables the gain of the plug-in output to be calibrated. The range is from -100 dB to +10 dB.

This control can be useful in matching the output level between your headphone-based virtual monitors and your loudspeaker-based monitoring system, assuming the same DAW monitoring level setting.

Import and Export – Moving Aural ID Profile

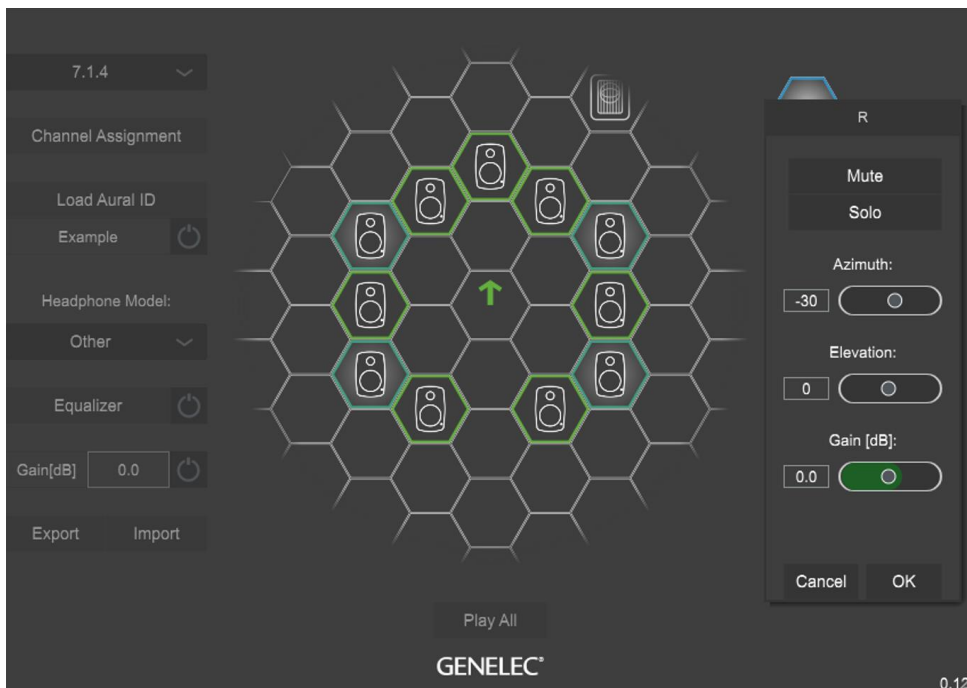
The Import and Export buttons allow you to move your Aural ID Profile.

The Export button exports the Aural ID Profile into a selected folder. This can be for example a USB stick used for transferring the Profile to another computer. You could also back up your Profile this way.

The Import button reads all the Aural ID Profile files from the selected folder to a location where the plug-in can find them. This enables you to read in and start using Aural ID Profiles on another computer.

LFE Channel Controls

This provides settings for handling the LFE channel (when one is included) within the currently selected monitor layout.



LFE channel calibration settings.

You can mute and solo the LFE output and adjust its gain.

The LFE channel content does not get processed through the Aural ID filters. It is distributed evenly to the left and right earphone output channels. This resembles the typical behaviour of a subwoofer handling LFE in a monitoring room.

Mute and Solo Keyboard Shortcuts for Virtual Monitors

There are keyboard shortcuts to mute and solo virtual monitors:

- 'shift-click' mutes a virtual monitor
- 'control-click' solos a virtual monitor

These keyboard shortcuts enable quick activation of mute or solo on several virtual monitors – for example when you want to selectively listen to a certain set of monitors working together.

Calibrating the Virtual Monitors

Your headphones interact with your personal hearing, and this modifies how you hear the direction and colour of sound in the Aural ID rendering. The virtual monitor locations may require calibration to the headphones you use. This calibration can be performed individually for every virtual monitor.

Each virtual monitor has the following calibration controls:

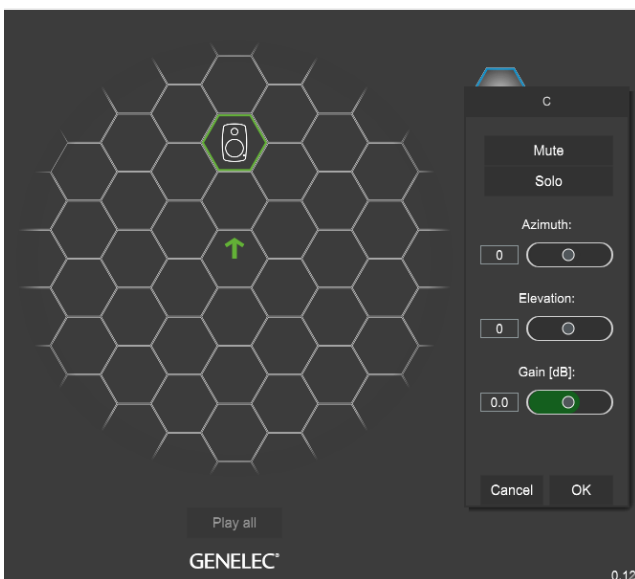
- **Azimuth control** adjusts the position of the virtual monitor on the horizontal plane, left to right. Setting 0 places the virtual monitor at the front. Positive values move the monitor to the left. The -90 setting is directly to the right and +90 setting directly to the left, and

both +180 and -180 settings place the monitor at the back. The values of the monitor location are given in degrees.

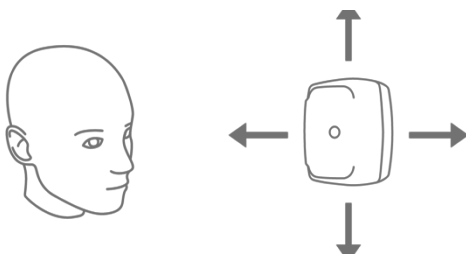
- **Elevation control** adjusts the position of the virtual monitor in the vertical direction. Positive values increase the height. The adjustment range is +90 directly above to -90 directly below. The values of the monitor location are given in degrees.
- **Gain control** adjusts the level of the virtual monitor.
- **Mute button** mutes the virtual monitor.
- **Solo button** plays only this virtual monitor. However, applying 'solo' to several virtual monitors is possible and then only the soloed monitors will play.

Note that when you are adjusting the virtual monitor with the control window open, the controls on your main window are disabled. After you accept or cancel the setting for the virtual monitor and the window closes, the controls on the main window become active again.

Virtual monitors are presented as loudspeaker icons in hexagons. The colour on the edges of the hexagon indicates the elevation setting of the loudspeaker. When you click on a virtual monitor, the setting window opens as shown below.



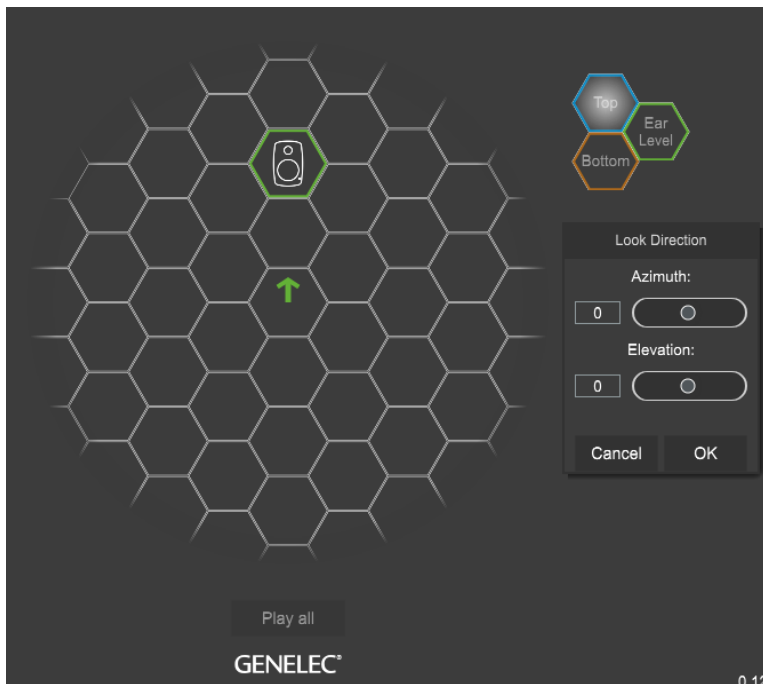
Virtual monitor settings view, showing the monitor azimuth, elevation and gain adjustments.



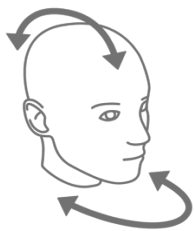
Each virtual monitor can be adjusted up and down (elevation) and left to right (azimuth).

Calibrating Listener Look Direction

The listener is represented by an orientation arrow in the middle of the virtual monitor set.



The listener orientation control is in the middle of the monitor set.



Listener orientation controls adjust listener direction in azimuth (head turn) and elevation (head tilt).

By clicking the listener icon in the middle of the grid you open the settings for the look direction. The default look direction is straight ahead (zero azimuth and zero elevation).

You can adjust the azimuth and elevation to rotate and tilt the complete monitoring layout, thereby calibrating the correct virtual monitor layout orientation. This setting depends on your personal listening preference and how your headphones interact with your hearing.

When you adjust the azimuth, you will see the look direction arrow rotate. When you adjust the elevation, you will see the colour of the arrow change. Positive elevation values (i.e. when looking upwards) are indicated with a shift towards a blue colour. Negative elevation values (i.e. when looking downwards) are indicated with a shift towards a brown colour.

Note that when you are adjusting the virtual monitor with the control window open, the controls on your main window are disabled. After you accept or cancel the setting for the virtual monitor and the window closes, the controls on the main window become active again.

Legend

The legend identifies the colour coding of the ear height layer and the top layer virtual monitors. You can also find the plug-in version number in the bottom right corner of the main screen.

Learn More

Monitoring of Audio

When audio is recorded, edited and mixed, the result is typically monitored using loudspeakers, but increasingly with headphones too. Monitoring using loudspeakers is usually preferred because audio presentations can traditionally only be designed reliably using loudspeaker reproduction. Loudspeakers work together and they also interact with the room, to create the experience of acoustic space and auditory images appearing in the presentation.

Mixes frequently use virtual sound images. These are created on the sound stage between two or more loudspeakers. When sound presentation is designed in a studio, level panning is the typical method used for placing virtual sources. With on-site stereo or multichannel recording, the microphone technique and placement will dictate the acoustics of space. This acoustic space presentation can be delivered using loudspeakers.

Experiences of sound stage, virtual sound images, and acoustic space are created by exploiting the mechanisms of human directional hearing. When we are listening to a loudspeaker, sound radiated by loudspeakers is reflected by the walls and surfaces in the room and arrives at the listener with a slight delay, and from different directions. This reflected sound is called 'early reflections'. Early reflections contribute to experiencing both a sensation of space and a sense of distance from the loudspeakers.

Two ears hear the same sounds but of course slightly differently. The brain automatically combines these inputs, and this enhances the sense of direction of sound. We also spontaneously turn our head slightly while we try and locate sound. This enables us to understand how sound changes when the head turns, and this partly unconscious process greatly enhances our ability to localize sound.

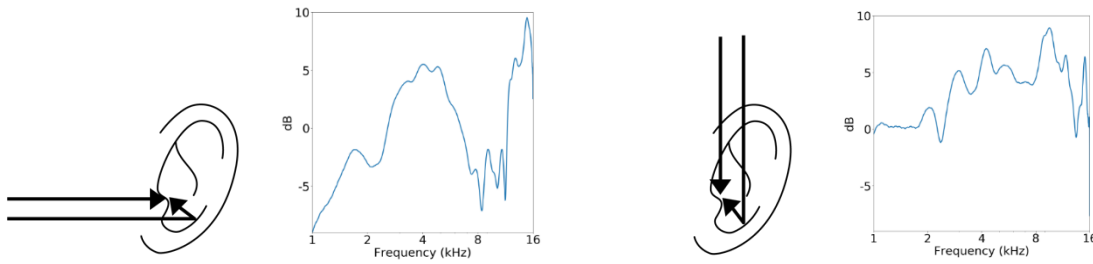
Mechanisms for Localization of Sound

We localize sound using:

- Head-Related Transfer Function (HRTF) – sound colour changes and interaural time delay depend on the direction of sound arrival and frequency, and this describes your personal effect on the sound colour.
- Interaural Time Difference (ITD) – this is part of the HRTF.
- Interaural Level Difference (ILD) – this is a part of the HRTF.
- Head movements.

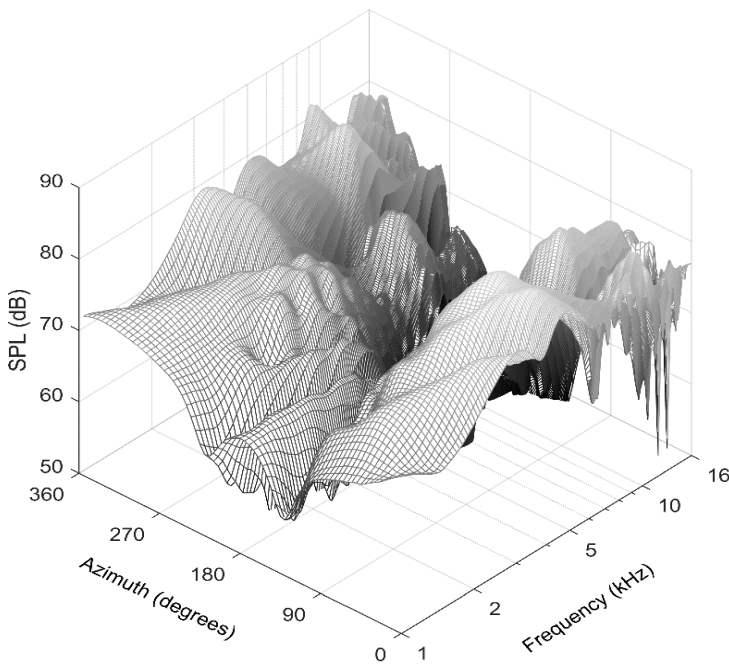
The localization of sound for humans is traditionally explained using the concepts of the ITD and ILD. ILD is suggested to be the main localization mechanism above the frequency at which the human head becomes a

significant shadow for sound (above 1500 Hz), with the ITD dominating below those frequencies. However, both of these are part of a more elaborate description of the directional hearing mechanism, that of the HRTF.



Examples of HRTF magnitude responses for audio arriving from the front (left) and from above (right).

The example above shows the direction-dependent filtering of the HRTF in the external ear, with sound arriving from the left and sound arriving from above. Our brain automatically decodes the sound colouration created by the external ear to establish the direction of arrival of the audio.



Example of the HRTF magnitude response as a function of azimuth angle at one ear.

To give you some examples of what the HRTF is doing to sound, let's look at the direction-dependent level variations.

The example above shows the direction-dependent level variations for the left ear located at about 80 degrees azimuth, seen on the horizontal plane for a sound source going around the head. The 'straight ahead' direction is at zero degrees (and 360 degrees), straight back is at 180 degrees, and with increasing angle value rotation happens to left. In the figure you see the frequency-dependent level at the ear when the audio is arriving from different directions on the horizontal plane. Although you can see the heavy

filtering that happens because of your external ears, head, and torso, in real life, you will not hear these changes in sound colour but instead you understand that sound arrives in a certain direction.

Directional and Common Transfer Functions

The HRTF for a person has two components. One of these will change depending on the direction of audio, and one remains the same irrespective of the direction of audio.

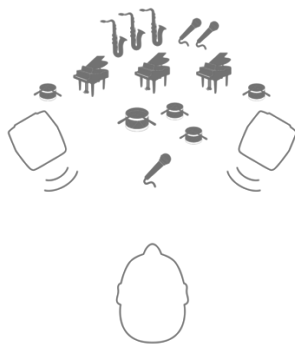
The directional part of the full HRTF is called the Directional Transfer Function. This direction-dependent part of the HRTF is created by your head and body diffracting and reflecting audio differently depending on the audio direction. This also creates the differences between the left and right ears, including the effects of the ITD and ILD.

The nondirectional part of the full HRTF is called the Common Transfer Function. This part exists because your head and body affect the sound field and this causes a change in the sound colour that you hear. This change is personal and specific to you.

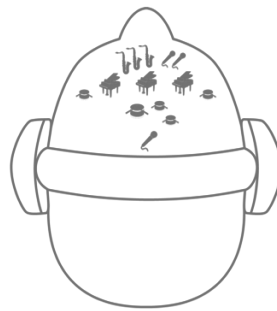
Headphone Monitoring

Headphones are typically used to monitor smaller details in a mix because they can offer excellent signal-to-noise ratio and isolation from in-room background noises, so low-level audio becomes more clearly audible. They are also used for checking that a headphone mix sounds good, since so much music these days is experienced through headphones.

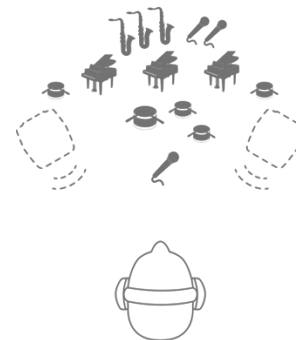
When headphones are placed over the ears (or inside the ears), the sound is directly delivered into your ears. Then, head-related sound colour changes cannot occur. Also, the headphones on your head always remain at the same location, so it is no longer possible to use head movements to help with sound source location. These are the reasons why conventional headphone sound seems to happen 'inside' an earphone listener's head.



Loudspeakers offer a sound stage with virtual sound sources.



With standard headphone listening, virtual sound sources appear 'inside' the listener's head.



Aural ID can recreate the correct sense of imaging for headphone listening.

Personal Calibration of the Aural ID Plug-in

Once the information to localize sound, described by the HRTF, is reintroduced by signal processing, the sound recovers its correct direction of arrival – and no longer seems to be happening inside your head.

Your Aural ID interacts with the headphone frequency response. Although Aural ID is precise, headphones are built to create an illusion of neutral audio when audio material recorded using the standard stereo loudspeaker setup is used. While the low frequency details of the headphone frequency response will mainly affect the sound colour presentation, the frequency response details in the midrange frequencies will interact with your HRTF.

The Aural ID Plug-in comes with compensations for certain headphone types. Ideally, this will significantly reduce the interaction with the HRTF. However, the way the headphones sit on your head will also modify the headphone frequency response, as the external ear shape and size differs between individuals.

When you are using headphone models not listed in the Aural ID plug-in library, select the option 'Other'. The plug-in will then work with the sound colour compensation built into your headphones to implement the directional cues as well as possible, while the headphones determine the sound colour.

With both of these modes, you should perform further personal calibration, and the plug-in offers very good tools for this.

- Each virtual monitor location is adjusted in azimuth and elevation – this ensures that the structure of the virtual monitor system is correct for you with the headphones that you are using.
- Listener orientation is adjusted in azimuth and elevation – this setting depends on the way you experience the monitoring system orientation.
- Each virtual monitor level can be adjusted – this ensures that the level panning will work correctly.
- Complete system sound character is adjusted with the plug-in equalizer function – this can help match the sound presented by the Aural ID Plug-in to your workflow or to the sound of your listening room.

Advice in the process of calibration includes:

- Use familiar audio material, including male and female voice.
- Use enough time and re-evaluate – it may be useful to re-evaluate the calibration over several days to gain a deep understanding of

the mapping between loudspeaker-based monitoring and Aural ID monitoring.

- Study one virtual monitor at the time (for location, distance colour) and also the total system (for sound stage and sound space).
- Compare the virtual presentation of Aural ID to your reference, for example your loudspeaker-based monitoring system.

Please note that a well-executed calibration process can increase your monitoring accuracy, and the efficiency in your daily monitoring tasks.