User Manual for Align-IT

STUDIO 427 AUDIO

This is the user manual for Align-IT.
Align-IT is a property of Studio 427 Audio, copyright 2023.

For more information about our products, please visit studio427audio.com

All trademarks cited in this document are the property of their respective owners, hence, cannot be associated with Studio 427 Audio by any means

BOTTOM PARAMETERS

Analyser Mode

SPECTRUM

BOTTOM PARAMETERS

Settings

Help

Welcome

Welcome to Align-IT!

Thank you for choosing Studio 427 Audio.
Here you will find the information necessary for measuring the delay times of your speakers, and optimise your venue.

What is Align-IT?

Align-IT is a measurement tool that will compute the delay of your different speakers regarding to a reference. These delays can then be reported to the PA processors accordingly.

It is as simple as connecting a microphone, record the different speakers, and wait for Align-IT to compute the resulting delays.

Align-IT also provides a complete frequency spectrum analyser, with collections to memorise your system responses.

There are many tools on the market for achieving the calibration of a venue. Although, most of the time you only want a quick and affordalble solution for a simple calculation of the delays and a spectogram visualisation. Align-IT is made for you in the situations where time and simplicity are key factors.

What Align-IT proposes:

- Record and compute delay times between speakers.
- Spectral visualisation.
- 3 types of noise generated to adapt to any environment *(outdoor venue, reverberating hall, etc...)*.
- Compensation of the temperature between the time of measurement and during the show.
- Filter low frequency noises when recording.
- Adapts to lighter CPU via Selection length and Precision controls for faster computation when needed.
- Unit customisation Metric/Imperial and Celsius/Fahrenheit.
- Export the result as Screenshot *(.png)*, Text *(.txt)*, or comma separated file *(.csv)* so you have multiple ways to bring the results with you.

- No need for specific calibration microphone, any reference you have at hand will do for delay computation

Accurate spectrum analysis still requires an adapted microphone

Authorising

In order to unlock Align-IT, you first need to activate the license for your computer using the **S427 Control Center** application, and download the license file.
For more information about unlocking and licenses, visit our online FAQ

Internet requirements

Internet is only required to activate the license through the S427 Control Center.
Except for running a DEMO license, Align-IT does not require a permanent internet connection.
In order to use the embedded User Manual, Align-IT needs to download it at least once, then for future updates if relevant
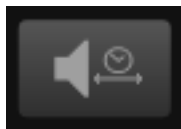
Interface
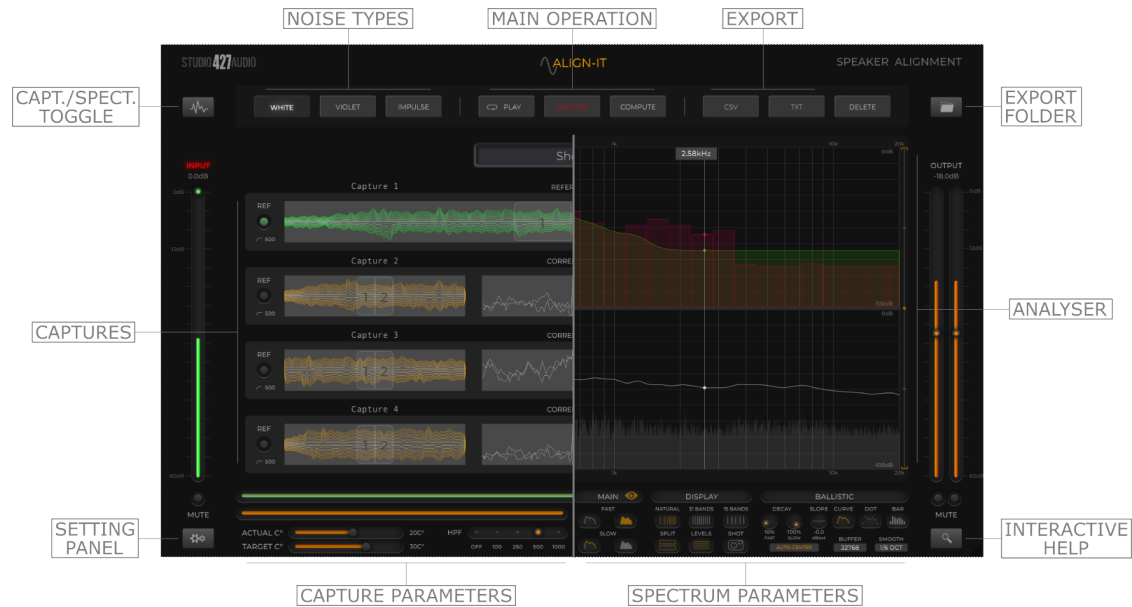
Input & Output levels

The level of the input can be tamed if the input level is too hot. The Output level is set by default to hit -18dB.
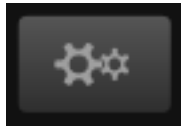
Navigation buttons

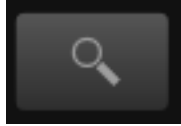There are 4 Navigation buttons in the corners of the interface:

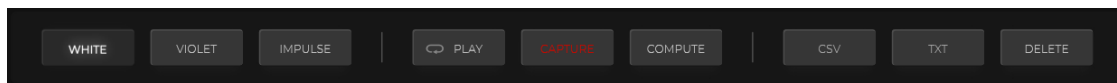 Spectrum/Capture Toggle.

 Open Export Folder.
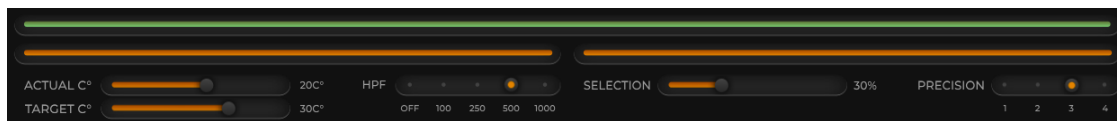
 Settings Panel.

 Help Panel.

Top menu

This is where you can control and perform the CAPTURES

Bottom Parameters

CAPTURE parameters

In CAPTURE mode, allows you to set:

- The ACTUAL & TARGET temperature
- The HPF
- The SELECTION length
- The PRECISION
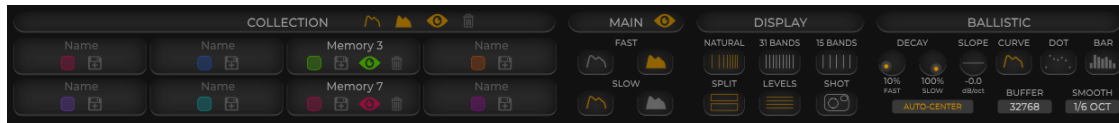
In Analyser mode, allows you to set:

- The COLLECTION memories
- The MAIN curve (for FAST & SLOW curves)
- The DISPLAY (frequency scale, gain lines, split view, etc...)
- The BALLISTIC (how the analyser reacts)

The main window

The main window handles the different captures in CAPTURE mode and the spectrum graph in ANALYSER mode

Top Menu

Selecting the noise type

Align-IT offers 3 types of noises to CAPTURE your speakers.

- **WHITE** noise
- **VIOLET** noise
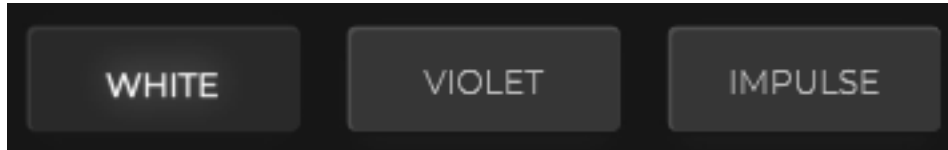- **IMPULSE** noise

WHITE noise

The most common and versatile type of noise to make your CAPTURES. In general environments, the WHITE noise should work the best. Although with reverberating venues, it can sometimes lead to too many phase issues and wrong results. If you encounter non accurate results, you can try first to raise the High Pass Filter (HPF) before recording. If this is not enough, consider using the VIOLET or IMPULSE types.

VIOLET noise

The VIOLET noise type contains far less low energy compared to WHITE noise, hence produces less phases issues in highly reverberating environments.

IMPULSE noise

The WHITE noise and VIOLET noise should cover all your needs in most cases. Although in some situations, like noisy environment, falling back to IMPULSES can give great results. IMPULSE CAPTURES generally require a longer SELECTION to COMPUTE.

Main Controls
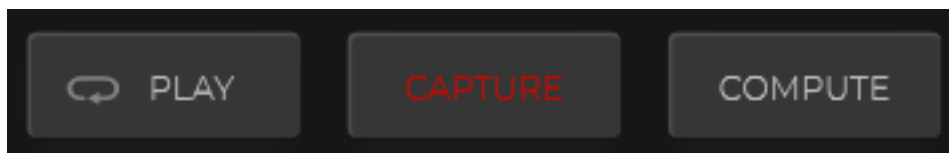
PLAY

The PLAY button allows you to play the currently selected noise type to optimise your levels before recording the CAPTURES. As the noise is only 1sec length, you might want to PLAY in LOOP by clicking the LOOP symbol on the left of the PLAY button.

The loop is noticeable when playing, this is totally normal as Align-IT requires a perfectly correlated noise for its operations. In ANALYSER mode, the noise that is playing isn't the same as in CAPTURE mode.

CAPTURE

This triggers the CAPTURE of the speaker you routed the signal to for one second. CAPTURE as many speakers as you need, including the reference one. Be sure you have adjusted the HPF before recording the CAPTURES so they all have the same HPF.

COMPUTE

Once all the speakers have CAPTURED, this triggers the COMPUTATION of all the delays. Select the reference REF and start COMPUTING the DELAYS.

If the results are not consistent enough, consider adusting the SELECTION length and PRECISION, in the lower panel (for more information, see the Lower Panel section).

Be sure you have adjusted the ACTUAL temperature prior to starting COMPUTATION.

Export Data
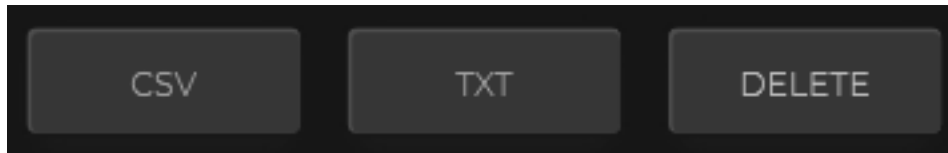
CSV & TXT

Once the DELAYS have been COMPUTED, you can export the results as .csv and .txt files so it is easier to bring the results to the processors if needed. To open the FOLDER that contains all the exports, click the FOLDER button on the far right of the menu.

For less confusion, you can name the SHOW and the individual CAPTURES.

DELETE

This will DELETE all the current CAPTURES.

This is undoable and all CAPTURES and COMPUTED DELAYS will be lost

Capture Mode

CAPTURE MODE

In order to compute the delays between your different speakers, you need to CAPTURE at least two speakers and select one of them as reference **REF**. There is no real difference between selecting the first or the second CAPTURE, except the delay sign will be opposite (the delay sign can be set in the SETTINGS to fit your workflow).

All following CAPTURES will be COMPUTED against the REF. If you want to compare non-REF speakers between them, select ONE of them as REF and re-COMPUTE the delays.

CAPTURES

This is where the CAPTURES are showing. Each time you record a new CAPTURE, a new row is added.

REF selector

Allows you to select which CAPTURE should be your reference.

HPF indicator

Indicates the HPF value this CAPTURE has been recorded with. When COMPUTING, if a CAPTURE does not have the same HPF as the REF does, the indicator will warn you.

Just a simplified representation of the CAPTURE's signal.

SELECTION length visualisation

The two SELECTIONS 1 & 2 are represented with variable rectangle length, meaning only these parts of the signals will be compared between two CAPTURES.

- • REF SELECTION 1 will be COMPUTED against other CAPTURES SELECTION 1
- • REF SELECTION 2 will be COMPUTED against other CAPTURES SELECTION 2

This allows Align-IT to COMPUTE twice the same signals, but two different portions of them. This way you can be certain the DELAY results are consistent and trustable.

CORRELATION

This is a visual representation of the CORRELATION curve after COMPUTATION. A nice CORRELATION curve should have a low noise on both sides and a clear peak in the middle. It indicates the correlation that as been COMPUTED is strong, thanks to good CAPTURES. A noisy CORRELATION is a result of noisy or phasy CAPTURES, due to high reverberation, misplacement of the microphone, low signal to noise ratio, low HPF, unadapted noise type, a too short SELECTION length, a too low PRECISION setting, etc…

It is a good thing to keep an eye and learn how a strong correlation looks like.

DELAY result section

This is where the DELAY results that have been computed are showing. The DELAY result is expressed in SAMPLES, DISTANCE, and DELAY (ms).

The DELAY in millisecond is showing the delay values for both the ACTUAL temperature, and the TARGET temperature as set in the lower panel.
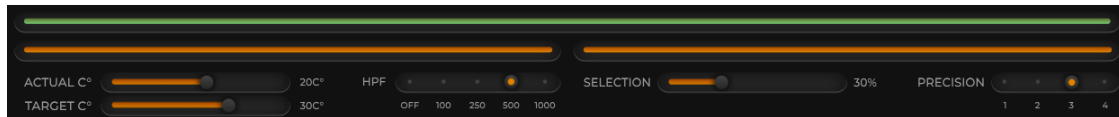
A nice and trustable result shows in green.

If a capture shows to many differences in the correlation of SELECTION 1 & 2 against the REF, the DELAY result will appear in orange, meaning it cannot be trusted.

Simply DELETE this CAPTURE.

This is undoable and the DELETED CAPTURE will be lost.

BOTTOM PARAMETERS

High Pass Filter (HPF)

The HPF allows you to cut the lowest energy, and roll back the phase issues that often come with it. Since Align-IT performs a phase comparison between two signals, it is not recommanded to let the room or venue interfere with the phase. In reverberated environment, consider setting the HPF to a higher value.

Filters introduce phase rotations. Because Align-IT compares the phase between two CAPTURES, you want their respective HPF settings to be the same. If a CAPTURE does not have the HPF setting than the REF, the HPF indicator of this CAPTURE will lit up to orange colour, meaning that the resulting DELAY might not be trustable althought the DELAY indicators (which indicates a difference between SELECTION 1 & 2) are green. Changing the HPF value when CAPTURES have been made will throw a warning to DELETE the previous CAPTURES.

SELECTION length

Align-IT COMPUTES two different parts of the same CAPTURES in order to compare the results internally and tell if the resulting delays are trustable or not (green or orange indicators). The default SELECTION length is set to 30%, which should be enough most of the time. To put more chances on your side in difficult environments, you can freely adjust the SELECTION length to a higher value and re-COMPUTE. Note in this case the COMPUTATION time can increase considerably.

PRECISION

Align-IT can COMPUTE with a sample accuracy when set to the highest value 4. Although this is not always required and a PRECISION of 2-3 is generally largely enough and won't change much the delay results (1 sample @ 48kHz => 0.02ms/7mm).

The PRECISION setting can lead to a longer COMPUTATION time, especially when used with a longer SELECTION.

Temperatures

The speed of sound is essentially affected with the temperature. Since the calibration of a system generally occurs a long time before the show, the temperatures can change, and so will do the delay between speakers. For the best accuracy, set the ACTUAL temperature when you record the CAPTURES. Then adjust the TARGET temperature to the temperature that is expected during the show. You can see the DELAY at TARGET temperature (Targ C°) change in real time as you adjust the value. This means you can keep the last COMPUTED delays to hand and adjust the TARGET temperature as you go during the day/night, and report the new DELAYS to the processors as you wish.

Do not change the ATUAL temperature as the temperature changes during the show, or the DELAY at TARGET temperature will not be accurate anymore. ACTUAL temperature has to be the temperature at the time the CAPTURES have been recorded

Analyser Mode
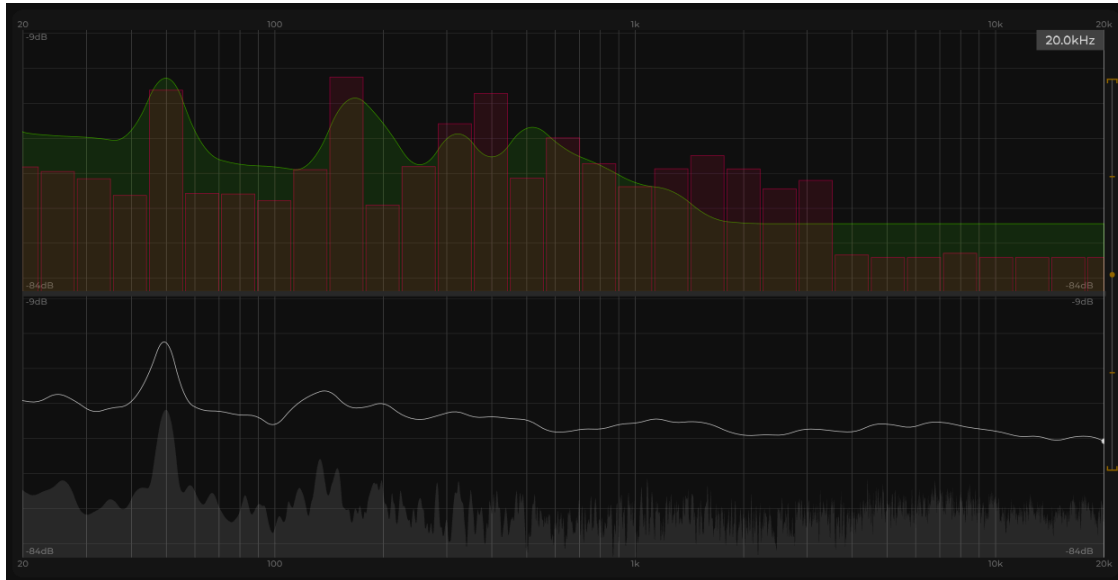
SPECTRUM

The spectrum window shows you the main FAST and SLOW curves as well as the COLLECTION memories. The window can be set in full view or split view. On the right, the RANGE Slider allows you to zoom vertically and move the spectrum. Screenshots of the spectrums can be exported to the export folder location

The SLOW curve can be customised (smooth, slope, dots/bargraph) using the BALLISTIC parameters.

BOTTOM PARAMETERS

COLLECTION
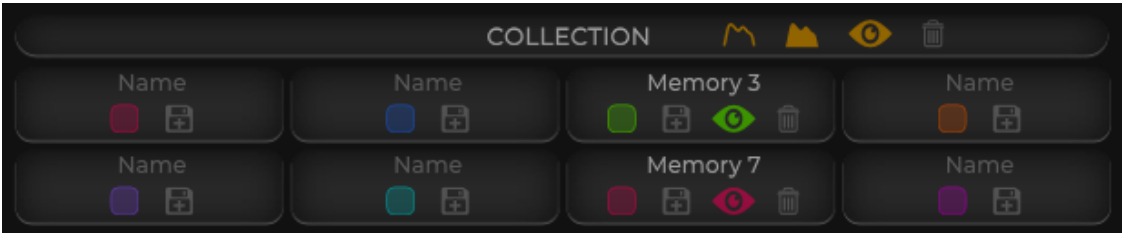
In the COLLECTION, you can store up to 8 SLOW curves that will be recalled next time until you delete them.

MAIN

Allows you to display the FAST and the SLOW spectrum.

Allows you to set the frequency style and gain lines, toggle between split and full view, and export screenshots.

The freqeuncy style are:

- **NATURAL** (logarithmic)
- **31 BANDS** (represent the most common 31 bands equalisers)
- **15 BANDS** (represent the most common 15 bands equalisers)

The 31 BANDS might not align with the curve when it is set to 1/3 OCTAVE smoothing. This is perfectly normal since the chosen bands for equalisers are rounded to the closest frequencies, while a real third octave analyser like Align-IT sets the spectrum frequencies using a strict mathematical function.

BALLISTIC

DECAY

Sets the speed of the FAST and the SLOW spectrums

AUTOCENTER

Keeps the SLOW curve always in the middle of the sreen

For SLOW curve only

BUFFER

Sets the buffer size for both the FAST and the SLOW spectrums.

- Smaller buffers give a more reacting visualisation
- Larger buffers give more details in the low end

When using a small buffer size, be careful to what you see in the low end. This might not translate the reality well.

SLOPE

Tilts the SLOW spectrum if you want to tune the venue to a specific frequency response, or want a flat visualisation of the material during the show.

For SLOW curve only

CURVE/DOT/BAR

Sets the SLOW spectrum type when SMOOTH is set to something else than OFF.

For SLOW curve only

SMOOTH

OFF: None of the above parameters are affecting the spectrum (except DECAY, AUTOCENTER and BUFFER).

1/12th to OCATVE: Apply a smoothing to the SLOW spectrum curve.

For SLOW curve only

Settings

Allows you to set the audio interface preferences and the interface experience.

AUDIO

The usual audio interface settings

INTERFACE

DELAY SIGN

Depending on your point of view, you might want to see the computed delay differences as POSITIVE or NEGATIVE values.

This has no impact on the results whatsoever, it is just a visualisation help.

REMEMBER SETTINGS

Sets the size of the interface.

You can also set the size by dragging the bottom-right corner.

EXPORT FOLDER

The location the .csv, .txt, and screenshots are saved to.

REMEMBER SETTINGS

Align-IT can remember its last state at next start, or not.

RESTORE FACTORY SETTINGS

Restores Align-IT initial factory state

Help

In HELP mode, hover any highlighted area to get more information. You can also open the embedded user manual (the user manual can also be opened from the SETTINGS).

In order to download the User Manual for the first time or to update it, an internet connection is required