User Manual

SoundRadix

break free.

SYSTEM REQUIREMENTS

MAC:

- 64bit Intel Core CPU or Apple silicon chip
- 8 GB RAM or higher
- macOS 10.9 or higher
- iLok License Manager 5.4 or newer

WINDOWS:

- 64bit Intel Core CPU or greater
- 8 GB RAM or higher
- Windows 10 or higher
- iLok License Manager 5.4 or newer

PLUG-IN FORMATS:

- AAX
- Audio Unit
- VST3
- ARA2 on supported hosts

MINIMUM SUPPORTED HOSTS:

- Pro Tools 11
- Logic Pro X 10.7
- Cubase/Nuendo 11*
- REAPER 6
- Studio One 4.5
- Ableton Live 10

* ARA2 compatible with Cubase/Nuendo 12.0.60 or newer

INSTALLATION & AUTHORIZATION:

To use Auto-Align 2, you'll need a free iLok account and the iLok License Manager application. An iLok USB device is not required to use Auto-Align 2.

To create an iLok account and download the iLok License Manager, please visit https://www.ilok.com/.

DOWNLOAD AND ACTIVATE

- Log-in to your User Area at https://www.soundradix.com/users/
- Enter your license redeem code in the "New License Activation" box, then click "Redeem."
- Enter your iLok Account User ID and email address, then click "Redeem."

Auto-Align 2 will now appear in the "Product Downloads" section of your SoundRadix account.

The license will be deposited in your iLok account and you'll find it in the "Available" tab of the iLok License Manager app. From there, it can be used to authorize the plug-in one of two ways:

iLok USB Device:

Pros:

- If you work on multiple machines, it allows you to easily migrate licenses from one machine to another.
- For freelancers who travel to different studios, you can have an assistant engineer install the plug-in before you arrive, but you don't have to provide them with your login credentials to authorize the software. You just bring the key with you.
- When upgrading machines, there is no need to deactivate licenses.

Cons:

- Requires the "dongle" to be connected in order to use the software, which requires an available USB port.
- An iLok USB Device can be lost or stolen.

Host Drive Authorization:

Pros:

- Free (doesn't require the purchase of an iLok USB device).
- Opens up a USB slot, or in the case of many modern laptops which don't have USB slots, prevents the need for USB adapters or hubs.
- Perfect solution for those using a single computer.

Cons

- A single license must be deactivated on one machine in order to be activated on another. This requires returning the license to your account's "license cloud" through the iLok License Manager.
- When traveling to different studios, an additional step is required upon your arrival.
- Authorizations can be compromised in the event of a hard drive or machine failure.

It is important to note that regardless of which method is used, a single license can only be used on one machine at a time. If you wish to use Auto-Align 2 on multiple workstations simultaneously, additional licenses must be purchased. Also worth noting, if an Auto-Align 2 license is activated on a host drive, it can later be transferred to an iLok USB device associated with the same iLok account at no charge.

INSTALLATION:

Download and install the Auto-Align 2 installer. Run the application and follow its on-screen instructions. Please note that you may need administrator permissions and password to install Auto-Align 2. When the installation is complete, quit the installer.

Prior to the first DAW launch after installation, your Auto-Align 2 license can be activated to your host drive or iLok USB device through the iLok License Manager. If this has not been done, you will be prompted to activate the plug-in during your DAW's startup sequence. You will need to enter your iLok Account credentials, so please have them handy when using this authorization method.

PLUG-IN OVERVIEW

The Problem

When recording any instrument in the studio with more than one mic or DI, it's practically inevitable that sound will hit some combination of those mics out of time from one another. As much as we might try to measure and place our mics perfectly, sometimes taste, physics and other realities can get in the way. Did you measure the drum overheads from the snare center? Or from the kick drum beater? The outside of the kick drum? Somehow, all three? Do you actually like the sound at that placement, or has alignment become the only thing that matters? Or another example, what about a room mic and a spot mic? They can't be a room mic and spot mic if they are the exact same distance from the instrument.

So we compromise, trust our ears and do what sounds best in the moment. But when it's time to mix, and those mics are combined, the time-arrival discrepancies and the comb-filtering that comes with them can lead to frequency cancellations and a loss of transient response. This leaves our mix sounding thin, muddy or some other flavor of wrong.

Manually correcting these timing errors first requires identifying which tracks should even have a positive phase correlation in the first place. Unfortunately, as we find ourselves remotely mixing sessions from artists, producers and engineers, the dissolution of naming conventions makes identifying tracks increasingly chaotic. Could there really be six mics on one guitar amp? Is it a doubled guitar part, with a DI and two mics on each pass? Three separate guitars? There is a lot of track soloing and head-scratching to even get through that step.

Then we move on to nudging waveforms and A-Bing polarity flips in an effort to minimize cancellation and bring back the lows and the punch. When it's all said and done, it's hard to be confident that we really nailed it without making anything worse.

The Solution

With a few clicks, Auto-Align 2 (AA2) is off and running, analyzing the mic bleed and harmonic structure of each track to identify those tracks that were recorded in a shared space, during the same take. These related elements are automatically packaged into Groups and within each Group, the plug-in eliminates time-arrival discrepancies between the tracks and nudges them all into perfect time alignment.

From there, the algorithm will move on to analyzing the phase relationship between the newly time-aligned tracks. Complicated discrepancies are quickly identified and automatically resolved by SoundRadix's proprietary Spectral Phase Optimization Stage, while simpler problems are effectively eliminated using more traditional polarity reversals.

The best part is that all of this is designed to be as automatic as possible. The idea is that you simply turn it on, confirm that everything turned out like it was supposed to and then put it away so that it can work in the background.

But of course, for those of you who need to tinker with the way the plug-in is aligning your tracks, we've taken care of you too. Manual adjustments let you customize the way that your tracks interact with each other, while still keeping them tightly locked together in phase.

GENERAL OPERATION

In the sections that follow, you'll see instructions regarding how to implement Auto-Align 2 (AA2) within a variety of DAWs. You'll see a GUI Map, detailed descriptions of the plug-in's functions and explanations on how to use them. First, though, let's address what the plug-in is actually meant to be doing in the most general sense. What is it expecting from you, and what should you be anticipating in return?

STEP 1: Tell The Plug-In What to Align

The most important thing here is to keep it simple. Do less, let the plug-in do the work. Just select your tracks, all of your tracks, and load the plug-in (how this is done is specific to each DAW, so more on that here). AA2 will identify and organize everything on its own. We also recommend that you apply AA2 processing before doing any editing. The more data on the track that the algorithm has to work with, the better. Bleed on the tom tracks is a good thing at this point. Don't try to impress the plug-in by showing it cleaned up, perfect tracks.

Once you've selected all of your tracks and instantiated the plug-in across them, you should see a Track List containing all of those tracks in one unified GUI. From there, opening any plug-in instance will display that same unified GUI, allowing you to control the plug-ins effects across all of the session's tracks.

STEP 2: Press "Align"

Upon pressing the Align button in the middle of the plug-in interface, the processor will perform its **Initial Alignment Pass**. In this stage, the plug-in will analyze all of the tracks through the entire duration of the song and sort them into Groups. These Automatic Groups are created based on the common acoustic information that they share. For example, multiple mics on a single instrument should definitely be grouped together, but all of the mics from any particular room will likely be grouped together as well. For now, though, it's this simple: any tracks that should be time-aligned and/or phase-aligned together will now be listed as part of the same Group.

(For more details on how Groups work, see the Groups of this manual.)

TIME ALIGNMENT

Once the tracks are grouped, AA2 will identify commonalities between combinations of tracks within a Group. The plug-in's Time Alignment algorithm will slide their audio backward or forward in time until it consistently finds that sonic "landmarks" are perfectly synchronizing across all of the tracks in the Group. Keep in mind that AA2 won't stretch or "warp" the audio in order to align it. The Time Alignment algorithm simply applies Time Offsets to the playback of each track, allowing them to play tightly in sync. The value of each track's Time Offset is displayed in the plug-in GUI.

(For more details on Time Offsets, see the Time Offset section of this manual.)

PHASE ALIGNMENT

In many situations, merely sliding the audio from all of the tracks in a Group into time with one another is not enough to produce the tightest phase relationship between them. Whenever you have a roomful of mics pointed at different drums, amps or instruments, you wind up with mics aiming in many different directions.

For example, if you have mics on a kick drum beater and outside kick drum, in addition to being out of time with one another, they are likely to be directly out of polarity as well. If their timing were to be *perfectly* aligned and the tracks summed together, the cancellations would only be exaggerated. AA2 can automatically correct cases like these by reversing the polarity of one of the tracks during Phase Alignment. Now those two tracks should have a very strong correlation when summed together.

But what about the mono drum overhead that's pointed straight down from above the kit, perpendicular to the pickup axis of those two kick drum mics? What happens when its timing is aligned with those two? It's not perfectly out of polarity like the two kick drum mics were, relative to one another. It's more like ninety degrees out of phase from either of those mics. In these circumstances, AA2 will use its Spectral Phase Optimization Stage**,** whose all-pass filters can rotate problematic frequencies from each track into phase with all of the other tracks in the Group.

Even in Groups with large numbers of tracks, AA2 will continue to automatically determine the best combination of Time Offsets, polarity reversals and phase rotations needed to lock each track into the tightest possible phase relationship with the whole of the Group.

(For more details on the Phase Alignment algorithm, see the Phase Alignment section of this manual.)

STEP 3: Manual Adjustments (If Necessary)

For most users, if you got through Step 2, your tracks are now aligned and there is nothing more that you have to do. The plug-in will keep running in the background, so now it's time to go mix. Auto-Align 2 was never meant to be incredibly interactive. Instead, it was meant to be kind of a "set it and forget" type of thing.

That said, it could be noted that the alignments that are applied when using all of AA2's automatic settings are designed to be as tight as possible, providing the cleanest overall sound with punchy transients and the fullest frequency response. This sound is ideal for pop music, rock, R&B, country, metal, anything that should sound really "produced". Meanwhile, more acoustic styles like folk, jazz, classical, bluegrass might demand mixes that "breathe" a little more. There should be space in the mix. If that is the sound that you're looking for when using AA2, the plug-in's manual settings will allow you to add some of that character into your mix.

(For more details, see Manual Key Time Track and Manual Adjustments in the Time Offsets section.)

TO USE AUTO-ALIGN WITH:

CAPTURE WORKFLOW (E.G. PRO TOOLS)

Insert Auto-Align 2 plug-in instances in the first insert slot of each of the audio tracks that you wish to align. When you open any instance of the plug-in, all tracks that have Auto-Align inserted on them will appear in a single plug-in instance. Press Align to begin the Initial Alignment Pass, at which point the plug-in will display a “Waiting for playback…” message. It is recommended that you play the entire song to let AA2 learn all of the information on all of the tracks.

ARA2-ENABLED WORKFLOW

ARA2 or Audio Random Access (2nd Generation) is a protocol that allows an unprecedented level of real-time communication between a host DAW and a third-party plug-in. In the case of Auto-Align 2 (AAP2), the ARA2 protocol allows the DAW to send audio from numerous clips across multiple tracks to the plug-in. There, AAP2 can apply its processing while ARA2 is then used to apply the plug-in-based changes to the audio in the original clips. This method provides the benefits of clip-by-clip, rendered processing while still maintaining the flexibility of an online insert and its ability to be continually adjusted.

ARA2 allows DAWs to store changes in an “audio modification file” while the plug-in is running. This way, changes can easily be reversed or modified, even at a later date. That said, because of the fluid nature of ARA2 processing, it can also be more volatile than the rendered processing. If, for example, the plug-in is accidentally removed before the effects are committed, any work done within the plug-in GUI could be permanently lost. Likewise, if the project is opened on another workstation that doesn’t have the plug-in, or you share a project with someone else who does not have AAP2, the alignments will not be available. For that reason, if the desired alignment is achieved, it is wise to “print” the effects of ARA2 instances of AAP2 to avoid potential data loss.

LOGIC PRO X & REAPER

To align your audio tracks, insert Auto-Align 2 plug-in instances on each track you wish to align. Once you open any instance of the plug-in, all tracks with Auto-Align inserted will appear in a single instance. To begin the Initial Alignment Pass, press the Align button.

(In Logic Pro X, you might need to initiate playback momentarily for the Groups List to be updated)

NUENDO/CUBASE

Select the clips that you wish to align. On the Info Line, under “Extension”, there should be a drop-down menu of ARA2-enabled plug-ins. Select Auto-Align from that list. A nested instance of the plug-in should open in the Editor pane. Press Align to begin the Initial Alignment Pass

STUDIO ONE

Select the clips that you wish to align. From the “Effects” tab in the Browser, find the Sound Radix folder and locate Auto-Align 2. To run the plug-in in ARA2 mode, Option+Drag the plug-in onto one

of the selected clips. A nested instance of the plug-in should open in the Editor pane. Press Align to begin the Initial Alignment Pass

PLUG-IN GUI MAP

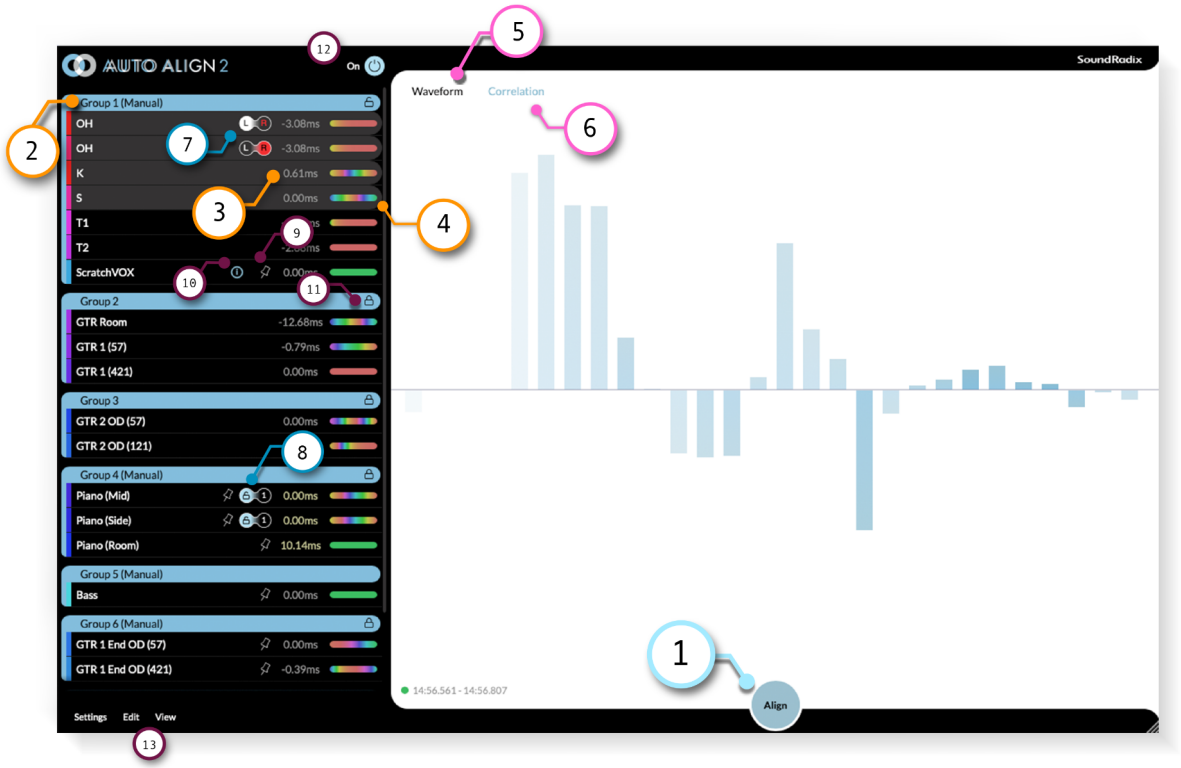

FIGURE 1A

1. **Align:** Pressing this button starts the Initial Alignment Pass, which automatically aggregates all of the selected tracks into Groups and aligns all of the tracks within each Group. After the Initial Alignment Pass, subsequent presses of this button will perform Alignment Updates.

    - **Alignment Update:** Every track that is part of a Group that is not Locked will be re-analyzed and their alignment will be updated if necessary. You should run Alignment Updates if:

        - Additional tracks have been added to the session / Auto-Align 2 has been inserted on additional tracks
        - Tracks are moved to a different Group using Manual Grouping.
        - Track Mode or Track Link settings have been changed.
        - Effects have been rendered on a track's clips or plug-ins have been inserted prior to Auto-Align 2 in the plug-in effects chain.

        (Note: Any process that alters the phase or timing of a track's audio could potentially affect that track's alignment within the Group)

2. **Groups List:** Displays all of the Groups that are active in the session.
    - **Automatic Group**: A Group that was created by AA2 during its Initial Alignment Pass and has had no tracks manually added or removed.
    - **Manual Group**: Any Group with “(Manual)” in its name is either an Automatic Group that has been altered (tracks have been manually added or removed) since the Initial Alignment Pass, or it is a New Manual Group that has been created from scratch by the user.

    (For more details, see the Groups section of the manual)
3. **Time Offset:** Displays the number of increments (in samples, milliseconds, centimeters or inches) that the track’s audio is being advanced or lagged in order to achieve proper Time Alignment with the other tracks in the Group.

    (Note: The units used here can be selected from the View Menu in the Menu Bar.)
4. **Multi-Colored Phase Meter:** Visually describes Phase-Alignment corrections being applied to the track.

    (For more details, see the Phase Alignment section of the manual)
5. **Visualizer - Waveform Mode:** Toggles the VIsualizer to Waveform Mode.

    (For more details, see the Visualizer section of the manual)
6. **Visualizer - Spectral Phase Optimization Mode:** Toggles the Visualizer to Spectral Phase Optimization Mode

    (For more details, see the Visualizer section of the manual)
7. **Track Link - Stereo Link Set:** Stereo Link is active on this pair of tracks.
    - The filled “L” and “R” circles indicate which of the channels are the “Left” and “Right”.

    (For more details on Stereo Link Sets, see the Time Offsets section.)
8. **Track Link - Phase Lock Set:** This track is part of a Phase Lock Set. As multiple Phase Lock Sets can exist, each one is numbered in its icon to make it easy to identify which set any Phase Locked track belongs to.

    (For more details on Phase Lock Sets, see the Time Offsets section.)
9. **Manual Group Track:** The Automatic Group assignment that was assigned to this track during the Initial Alignment Pass has been overridden and this track has been manually added to its current Group.

    (Note: You can restore this track’s Automatic Group assignment at any time from the Edit Menu)
10. **Invalid Alignment:** AA2 is not able to align this track for one of the following reasons:
    - During the Initial Alignment Pass, the portion of this track that was analyzed was silent or did not contain enough information to be properly analyzed.

- This track was moved to a different Group using Manual Grouping, and an Alignment Update has not yet been performed.
- The Track Mode or Track Link settings of this track have changed and an Alignment Update has not yet been performed.

11. **Group Lock:** Locks the alignment of all of the tracks in a Group so that they will not be affected by Alignment Updates.

12. **Power Button:** Bypasses all alignments across all tracks without disabling the Visualizer. This allows A-B comparisons of bypassed and unbypassed states to be aided by the Waveform and Spectral Phase Optimization meters.

13. **Menu Bar:** Provides access to global settings and functions which work across all plug-in instances, as well as specific settings for selected tracks:

    - **Settings:**
        - **Reset All Alignments:** Removes any Manual Adjustments that have been applied to the Time Offsets which were automatically introduced during the Initial Alignment Pass

          (Note: Naturally, this will impact tracks even if their Group is Locked, as all Groups that contain tracks with Manual Adjustments have been Locked automatically.)
        - **Stop Capture:** Halts a capture that is in progress.
        - **Clear Existing Capture:** Deletes the current Capture Files so that they will not be referenced for future Alignment Updates. Instead, a new capture will be required when the next Alignment Update is performed.

          (Note: Clearing the Capture FIles only applies to future Alignment Updates and will not impact any existing alignments. As a result, tracks in Locked groups will not be affected by this operation.)
        - **Show Captures Folder:** Opens the folder where the cache of Capture Files is stored.
    - **Edit Menu:** (Can also be accessed by right-clicking a track in the Groups list)
        - **Track Operations:**
            - **Set as key time:** Overrides the automatically-assigned Key Time Track and makes the selected track the Key Time Track for the Group.
        - **[Manual] Adjustments:** Increases or decreases the Time Offset value of the selected track until its audio reaches another position of significant Time Alignment with the rest of the tracks in the Group. The Phase Alignment of the selected track is also updated to achieve the best possible phase correlation with the other tracks in the Group with this new Time Offset being applied.
            - **Prev:** “Nudges” the audio from the selected track earlier in the timeline by decreasing its Time Offset value.
            - **Next:** “Nudges” the audio from the selected track later in the timeline by increasing its Time Offset value.

- **Revert Adjustments:** Clears the selected track's manual adjustment and restores the automatic Time Offset value that was assigned during the Initial Alignment Pass.

  (For more details on Manual Adjustments, see the Time Offsets section)

- **Tracks/Channels Setup:**
  - **Track Mode:**
    - **Mono:** Indicates a track that is mono in the host DAW.
    - **Multi-Channel (default):** The default setting for a track that is stereo or wider in the host DAW. The relative time and phase relationship of the track's channels will not be altered during alignment, allowing them to maintain their stereophonic imaging. A single Time Offset value is applied to the whole track and any Phase Alignment will be applied to all channels identically.
    - **Multi-Mono:** Unlinks the channels of a track that is stereo or wider in the host DAW, allowing its channel to be independently aligned to one another and to the rest of the channels in the Group.
  - **Track Links:**
    - **None (Default):** The track's alignment is not linked to any other track in the Group.
    - **Stereo Link:** Can be applied after selecting any two tracks as long as neither is part of a Group that is Locked. This operation designates the selected tracks as a Stereo Link Set.
    - **Phase Lock:** Can be applied after selecting any two or more tracks as long as none of them are part of a Group that is Locked. This operation designates the selected tracks as a Phase Lock Set.

      (For more details on Stereo Link Sets and Phase Lock Sets, see the Time Offsets section)
  - **Groups Menu:**
    - **Locking:** By default, Alignment Updates will affect every track in the session. Group Locking provides an option to exclude certain Groups from update passes. This not only protects tracks from inadvertent realignment, but it also makes Alignment Updates more efficient as not every track needs to be re-analyzed.
      - Locked: Tracks in this Group will not be analyzed and their alignment will not be altered when Alignment Updates are performed across the session.
      - Unlocked: Tracks in this Group will be analyzed and their alignment will be altered, if necessary, when Alignment Updates are performed across the session.

- **Manual Groups:** Provides options to remove a track from its existing Group and place it in a different one:
  - **New Manual Group:** Creates a new Manual Group from scratch and adds the selected track to it.
  - **Existing Group:** Displays a list of the available Groups that a track can be added to. Any Group that is currently Locked will be “grayed out” in the list.

  (For more details on Manual Groups, see the Groups section)
- **Automatic Group:** If this menu item is checked, this indicates that the selected track is still part of the Automatic Group that it was assigned to during the Initial Alignment Pass. If this item is unchecked, clicking it will return the selected track to its original Group.

- **View Menu:** Chooses the units that are used to display Time Offset values.
  - **View Offset As:**
    - **Samples**
    - **Milliseconds**
    - **Centimeters**
    - **Inches**

GROUPS

As clips are analyzed during the Initial Alignment Pass, the plug-in's AI will identify tracks that contain similar timbal and/or acoustic information. Tracks with "similar timbral information" here could be exemplified by a recording of a miked guitar amplifier, and a DI capturing that same performance. Tracks with "similar acoustic information" is generally referring to tracks containing similar bleed, as their mics were simultaneously recording different instruments in a single tracking room. The plug-in will use these cues to automatically sort all of the tracks in the session, aggregating the tracks with related signals into Automatic Groups. Within each Group, alignment is calculated and corrected. The Groups are completely isolated from one another during processing, so the algorithm will never attempt to align tracks across Groups, nor will it attempt to align any of the whole Groups to one another. Here are some examples of Automatic Groups that might result from common tracking scenarios:

EXAMPLE 1

A band is recording bed tracks of drums, bass and guitars, then performing some overdubs. The full drum kit is recorded with a pair of overheads, a pair of room mics, and spot mics on the kick, snare, and each of the three toms. The rhythm guitar amp is placed in an iso booth and miked with two mics: a brighter dynamic mic and a darker ribbon mic. When tracking the full band, bass is only captured with a DI.

After the basic tracks are cut, the bass DI is re-amped in the live room and recorded with a single spot mic. Then the rhythm guitar is doubled with an overdubbed performance using the same two-mic setup in the iso booth. Next, lead guitar is recorded with an amp placed in the main live room. The lead guitar amp uses two spot mics like the rhythm guitar, but also adds a stereo pair of room mics. Finally, vocals are overdubbed with a single mic placed in the iso booth.

After the Initial Alignment Pass, the Automatic Groups generated by AA2 should look like this:

Group 1: Drum OH L/R, Drum Room L/R, Kick, Snare, Tom 1, Tom 2, Tom 3
Group 2: Bass DI, Bass Amp Mic
Group 3: Rhythm Guitar Dark Mic (Pass 1), Rhythm Guitar Bright Mic (Pass 1)
Group 4: Rhythm Guitar Dark Mic (Pass 2), Rhythm Guitar Bright Mic (Pass 2)
Group 5: Lead Guitar Room L/R, Lead Guitar Dark Mic, Lead Guitar Bright Mic
Ungrouped: Vocal Mic

In this case, all of the drum tracks will contain a considerable amount of bleed that initially be used to identify that they were recorded in the same space, but will eventually contribute to their alignment calculations. Similarly, all of the mics recording each individual guitar performance will be grouped together due to the identifiable similarities in their sound. Notice how the two passes of rhythm guitar are split into different Groups. Despite their similar timbre, the performance-related timing differences and lack of any bleed across the takes disqualifies them from Automatic Grouping. Meanwhile, despite the Bass DI and Bass Amp Mic being recorded at different times, the tight relationship between their timbre and timing flag them as tracks that require alignment.

Lastly, the Vocal track contains no bleed or any other information that can be associated with any other track, so it remains ungrouped and will only be affected by plug-in delay compensation. In many sessions, a number of tracks that were overdubbed with single mics, DI's or software instruments will fill up the "Ungrouped" list.

EXAMPLE 2:

A jazz trio accompanied by a vocalist records live without overdubs. Drums, piano and double bass are all in one room with minimal isolation. A Blumlein pair sits in the middle of the room, capturing all three pieces of the trio. Both the bass and piano have piezo pickups that are being recorded directly, while each is additionally miked with a single spot mic per instrument. The drums have their own mono overhead and spot mics capture the kick and snare. The singer is performing in an adjoined, windowed iso booth that is well isolated from the rest of the Group.

In this case, the Automatic Groups generated during the Initial Alignment Pass should be:

Group 1: Blumlein Pair, Bass Pickup, Bass Spot Mic, Piano Pickup, Piano Spot Mic, Drum OH, Kick Mic, Snare Mic

Ungrouped: Vocal Mic

In this scenario, once again, the isolated vocal mic has no correlation to any other track in the session, so it will remain ungrouped. Because the Blumlein pair is capturing all of the other instruments in the trio, all of their individual mics need to be aligned to it and thus to one another. Similarly, the piezo pickups on the bass and piano need to be aligned with their corresponding instrument's spot mic, so despite having insignificant drum bleed in their recordings, they will still be aligned with the drum kit as a byproduct of their spot mics being aligned with the drum kit.

Beyond that, though, due to the considerable bleed from drums into the bass and piano mics, and from the piano into the drum and bass mics, all of the tracks would greatly benefit from alignment even if the Blumlein pair didn't exist. In this case, that would be possible, but only because all of these tracks are part of the same Group. While it might be comforting to see all of the mics from each instrument broken out into separate Groups as we saw in the first example, this would completely negate the plug-in's ability to work like it's supposed to in this case.

For this reason, we urge you to lean toward accepting the Automatic Group assignments and trust that they were created in order to produce the best results, even if the grouping isn't completely intuitive in every case. Feel free to group your tracks however you like within the host DAW, but those Groups don't need to be and often shouldn't be reflected within the AA2 architecture. Automatic Grouping should only be overridden if there is a very good reason to do so.

MANUAL GROUPS

After the Initial Alignment Pass, the Automatic Groups that are generated are Unlocked by default. As long as they remain Unlocked, they can be modified from their original state by adding or removing tracks. Any Group that has had tracks manually added or removed is now referred to as a Manual Group and "(Manual)" will be added to its name in the Groups LIst.

It cannot be stressed enough that Manual Grouping should never be used for merely cosmetic reasons. Don't use it to "neaten up your Groups List" or to "get things a little more organized." Groups in AA2 exist specifically for the purpose of informing the Time Alignment and Phase Alignment algorithms which tracks they are supposed to be aligning. If you add or remove tracks from the Automatic Groups by using Manual Grouping, there is a high risk that you will break the functionality of the alignment algorithms.

For that reason, we recommend avoiding Manual Grouping unless it is absolutely necessary. What would make it absolutely necessary? Typically, it's going to be that something strange happened, and AA2 couldn't figure it out. Something like the singer's scratch vocal mic is picking up bleed from their guitar amp, but it's also picking up bleed from their cranked headphones which are blasting out the drums which were previously recorded in this session. Because AA2 hears those drums, as well as the guitar and the singer's voice all combined in that scratch vocal mic, all of the drum tracks, the mics and DI from that guitar, as well as the scratch vocal all wind up in one giant Group.

In this case, there is no meaningful timbral or acoustic relationship between the drum mics and the guitar mics. The only thing that is tying them together is the tinny drum bleed in that scratch vocal mic and considering that information from that mic is contributing to the actual drum kit's alignment in the session, the session's timing could potentially be quite strange. This is a case where moving the guitar mics and scratch vocal to a new Manual Group could definitely improve the overall sound of the session.

To do this, simply click on the first guitar track in the Groups List, and shift-click the last one. With all of the guitar tracks selected, you can now right-click and choose Manual Group and either select an existing group to add them to, or choose New Manual Group to build a Group from scratch and place them in it. Now all of the guitar mics and the scratch vocal mic (which contains significant guitar bleed) will all be aligned to one another, but will no longer be aligned to the drum mics.

TIME OFFSETS

During the Initial Alignment Pass, after all of the tracks are sorted into Groups, the Time Alignment algorithm needs to pull all of the tracks in each Group into time with one another. To do this, the Time Alignment algorithm needs to choose a single track that represents “correct” timing and then ensure that all of the tracks in the Groups are in perfect time with that track, and thus in time with one another. This “anchor” track is called the **Key Time Track** and by default, the track whose audio is determined to be arriving the earliest is designated as the Key Time Track.

In the Group List, you’ll see that this track is assigned a Time Offset value of “0” and all of the other tracks in the Groups will display a Time Offset of a negative value, as they have been pulled backward in time, in order for their signals to align with the Key Time Track. It is important to note, however, that the tracks in a Group aren’t simply being aligned to the Key Time Track.

For those familiar with **Auto-Align Post 2**, you might be inclined to equate the Key Time Track to the “Reference Track” in that plug-in, but that isn’t exactly an accurate description. Each individual channel in **Auto-Align Post 2** is independently aligned to the Reference Track and only to the Reference Track. Instead, in AA2, every track in the Group is the “Reference Track" and its algorithm uses a dense analysis of all of the common information that they share to compare them back and forth to one another and ensure that their time and phase are perfectly aligned. However, Key Time Track does serve as the central point that determines where the product of all of that analysis will land relative to the DAW’s timeline.

Theoretically, the Time Offset values should reflect the distance between microphones during tracking as the offsets are essentially removing the time arrival delays introduced by those distances. To make it easier to confirm that the Time Offsets are serving that purpose without requiring you to do any math on your own, the plug-in offers a number of alternative Views for displaying the Time Offsets. One option is to have the plug-in convert the sample-based values to milliseconds. Alternatively, the plug-in can display the number of inches or centimeters that sound would travel over that duration of milliseconds. This can make it easy to quickly determine whether an accurate alignment is being applied.

MANUAL KEY TIME TRACK

While the Time Alignment algorithm automatically designates the track whose signal arrives the earliest as the Key Time Track, any track in the group can instead be manually selected as the Key Time Track. Upon selecting a new Key Time Track, all of the Time Offset values will automatically update accordingly. When using a manually-selected Key Time Track, please note that you may now see positive Time Offset values. Why?

Picture the original positions of the audio on a number line. For example, let's say that the Kick Drum Mic is the Key Time Track, and for the sake of easy math, we'll say that a kick drum strike hits the Kick Drum Mic instantaneously, so we'll plot the kick mic at "0 ms" on the number line. That same kick hit arrives at the snare drum mic 2.5 ms later than the kick mic, a drum overhead 4.5 ms later than the kick mic and a room mic 10 ms after the kick mic:

0.0 ms——————2.5 ms——————4.5 ms————————————10.0 ms——

Kick Mic Snare Mic Overhead Room Mic

After aligning these tracks together, the plug-in will indicate that the kick mic has been moved 0ms. In order to be perfectly aligned with the Kick Mic, the Snare Mic has been moved backwards in time by 2.5 ms. Here, the plug-in will display a Time Offset value of "-2.5 ms". Similarly, the Overhead will display a Time Offset of "-4.5 ms" and the Room Mic has been offset by "-10 ms".

If instead, the Overhead is selected as the Key Time Track, imagine that the relative values on the number also line changing accordingly:

-4.5 ms—————— -2.0 ms——————0.0 ms————————————5.5 ms——

Kick Mic Snare Mic Overhead Room Mic

And likewise, the Time Offset values will be updated relative to the new Key Time Track. So, for example, the Kick Mic will now display a positive "4.5 ms" Time Offset, because in order to be aligned with the Overhead track, the Kick Mic would have to be advanced 4.5 ms in time. The Room Mic will still display a negative Time Offset value, but now would only have to be pulled back 5.5 ms to be aligned with the Overhead, so its Time Offset value will be "-5.5 ms".

While selecting an alternate Key Time Track alters the Time Offset value of each of the tracks in a Group, it doesn't actually impact the relative timing of those tracks to one another. As previously mentioned, the tracks in a Group aren't merely aligned to the Key Time Track. Instead, each track is aligned to every other track within the Group and the totality of that alignment is aligned to the Key Time Track. That being the case, though, changing the Key Time Track will impact the way that the entire Group sounds in the context of the session.

In this example, the fully aligned drum group was previously anchored to the kick drum's original position in the DAW timeline. Now, this whole Group's combined signal will play 4.5 ms later, centered around the original position of the overheads in the timeline. This shift could potentially give the drums a looser, more "laid back" feel relative to the rest of the tracks in the session.

MANUAL ADJUSTMENTS

Changing the Key Time Track maintains the timing within a Group but offsets the point at which that Groups audio will align with the rest of the session. By contrast, Manual Adjustments to the Time Offsets perform a similar function but instead do it within a Group. Using these settings, the point at which a particular track is anchored to the rest of the tracks in the Group can be shifted, while tight phase coherency with the Group is still maintained.

Let's revisit our Group Example 2, the jazz trio with close mics, piezo pickups and a distant Blumlein pair. In that case, with all of the bleed going on, cancellations could be very problematic so having a tight phase alignment imparted by the plug-in could really clear things up in the mix. That said, if all of the spot mics are pulled into perfect time alignment with the Blumlein pair, things could feel very crowded, like all of the instruments are right on top of each other. In this case, we might want to keep the default alignment for all of the close mics, but then push the Blumlein pair back in time a little, more representative of its original distance from the close mics. But the trick is that we'd still want to maintain the tight phase alignment across the whole Group.

To accomplish this, during the Initial Alignment Pass, the Time Alignment and Phase Alignment algorithms work together to identify a number of points where each track has a strong correlation with the other tracks in the Group. The strongest of these points should typically result from simply removing the delay related to the distance between a given track's microphone and the Key Time Track's mic. By default, AA2 will usually align the track using the Time Offset value that corresponds to that distance for the tightest combination of both time and phase alignment. However a number of other correlation points have already been identified and can be accessed without the need to run an Alignment Update.

At these additional points, the timing between the selected track and the rest of the group will be looser than it was at the original alignment, but they are points where the plug-in was still able to produce a very strong phase alignment throughout the Group. At each correlation point, you'll notice that, in addition to the Time Offset value being adjusted, the Multi-Colored Phase Meter updates as well. Some points might use Spectral Phase Optimization, while others turn to polarity reversals or no phase adjustments at all. All of that is calculated automatically while you just worry about finding the alignment position that evokes the sense of acoustic space that you're looking to cultivate.

To apply these Manual Adjustments, Simply open the Edit Menu, which can be accessed from the Menu Bar or by right-clicking a track in the Groups List. Here you'll see the Adjustment buttons. Each time the Next button is pressed, the Track's Time Offset will increase, advancing the track's alignment to the next predetermined correlation point. Likewise, pressing Prev will reduce the Time Offset value (sometimes deep into negative values), sliding the track's alignment earlier in time relative to the other tracks in the Group.

When Manual Adjustments are applied on a track, its Group will automatically be Locked to prevent future Alignment Updates from inadvertently reverting those changes. The Group cannot be Unlocked unless those Manual Adjustments are removed.)

CHANNEL LINKING

Sometimes certain tracks have a special relationship with one another that needs to be maintained, even as they are aligned to the rest of a Group. To accommodate this, two channel-linking modes are available to tie sets of tracks together within a Group.

- **Stereo Link Sets:** A pair of tracks that have been designated as a Stereo Link Set will behave like a Multi-Channel Track. They will be analyzed in stereo when Alignment Updates are performed and their relative time and phase will be preserved. The pair will be assigned a single Time Offset and any Phase Alignment will be applied identically to both channels.

- **Phase Lock Sets:** A set of tracks that have a unique time and/or phase relationship that needs to be preserved during alignment (like a Mid/Side pair, for example). These tracks are not, however, intended to be analyzed or aligned as a stereo pair. Instead, their signals are summed and the result is used to determine their alignment against the rest of the Group. The Phase Lock Set will be assigned a single Time Offset value and any Phase Alignment will be applied identically to all channels.

PHASE ALIGNMENT MODULE

When performing its Initial Alignment Pass, the Phase Alignment algorithm's AI will automatically audition different processes that could potentially achieve the best possible phase correlation between a particular track and the others in the Group. The process that produces the strongest correlation in the greatest number of frequency bands is automatically applied. For certain tracks, a simple **Polarity Reversal** will prove to be the most effective solution, so that is how those tracks will be processed. Other tracks might see the greatest benefit when applying the Spectral Phase Optimization Stage.

When using **Spectral Phase Optimization**, the algorithm will identify specific frequency bands within the track's audio that are out of phase from the rest of the Group. All-pass filters are then applied to those frequency bands allowing them to be rotated into proper alignment. In general, all-pass filters aren't known to increase gain or noticeably color the sound of tracks, but in some cases they can affect the way that the signal will interact with dynamics processors. To minimize that possibility, AAP2 uses targeted phase shifts that only affect the specific frequencies that were determined to be out of phase from the rest of the Group. Because of this, the processing is remarkably transparent, causing minimal side effects while still being extremely effective.

MULTI-COLORED PHASE METER

While the plug-in uses numerical values to describe the Time Offsets being applied to each track, any Phase Alignment being applied is displayed using a colorized meter. Don't think of this meter as identifying existing problems. Our instincts have been conditioned to see red meters as an indication that we need to fix something. By contrast, a track's Multi-Colored Phase Meter indicates where problems were identified, but also describes the Phase Alignment process being employed to solve them:

- **Solid Green:** No polarity or phase alterations are needed to align this track's phase with the rest of the Group. In this case, only the Time Alignment algorithm is being employed, or no correction at all if the Time Offset is displayed as "0".
- **Solid Red:** In addition to any Time Offsets used, a 180˚ polarity reversal has been applied to the track.
- **Multi-Colored:** The plug-in has activated the Spectral Phase Optimization Stage on this track in order to achieve the best possible phase correlation between itself and the rest of the tracks in the Group. Frequencies where cancellations would occur are identified and all-pass filters are engaged to rotate those frequencies into phase with the rest of the Group's tracks.

  In this case, the Multi-Colored Phase Meter displays a range of frequencies, with lows on the left and highs on the right. Any portion of the meter that is green, indicates a frequency range that has not been subjected to any phase rotation. Red portions indicate that a full 180˚ phase rotation has been applied at that frequency range. Other colors indicate phase shifts between 0˚ and 180˚, or between 180˚ and a full 360˚
- **Absolute Phase:** At times, you'll notice an absence of Solid Green meters and that even the Key Time Track is displaying a Solid Red meter. This is because AA2's Phase Alignment

module enforces Absolute Phase, meaning that it will recreate the phase of the soundwave that was produced by the instrument in the studio as accurately as possible.

Ideally, when sound pressure hits a microphone, the first transient pushing the capsule will be translated into positive voltage and captured as a waveform with an upward trajectory in your DAW. During playback, that signal will be transduced back into a positive voltage which will first “push” the speaker’s driver, then draw it back inward with the downward phase of the waveform, and continue this back-and-forth motion to simulate the compressions and rarefactions that were originally produced by the instrument.

In some cases, the polarity of a signal is reversed somewhere in the signal chain. When the resulting information is fed to a speaker, instead of the first transient pushing the driver outward, it will be pulled back inward, and when it should have been drawing inward, it will now snap back outward. This could result in transients being perceived to have less impact or punch by the listener. When AA2 analyzes for Absolute Phase, it will detect waveforms that have been inverted and correct their polarity before aligning them with the other tracks in the Group. This will ensure that the fully-aligned group will be reproduced with the most powerful transient response.

VISUALIZER

Auto-Align 2’s Multi-Colored Phase Meters are great for taking a quick glance at the phase shifts being applied to the tracks in a Group, especially while dialing in Manual Adjustments to the Time Offsets. When you’re looking for more robust visual feedback when A-Bing settings or troubleshooting a problem, the plug-in’s Visualizer will help you direct your ears to the appropriate places in the frequency spectrum. Two different modes can be toggled from the main plug-in GUI, right above the Visualizer:

WAVEFORM MODE

Displays real-time scrolling waveforms depicting all of the tracks in a group overlaid on top of one another. The waveforms displayed have a low opacity, allowing you to see through them to the other tracks’ waveforms. The track that is selected in the Groups List is highly opaque, making it stand out in front in the Visualizer. A joystick-style zoom control found in the bottom-right corner of the Visualizer allows you to zoom in or out, horizontally and vertically.

While the waveforms scroll continuously during playback, they are paused and held when playback stops. If the plug-in is bypassed and unbypassed using the Power Button in the Main GUI, you’ll see the Visualizer reflect the alignment of the tracks before and after processing.

SPECTRAL PHASE OPTIMIZATION MODE

Visualizes the selected track’s phase correlation against the rest of its Group. This correlation is displayed as a bar-graph-style chart where each bar represents a frequency band. Each band’s bar behaves similarly to a mixing console’s phase correlation meter. In that case, the needle moves left, right or center to indicate negative correlation, positive correlation or neutral correlation, respectively. On AA2’s Visualizer, the bars swing downward to indicate frequencies that would

cancel between the selected track and the rest of the Group. Upward-extending bars indicate frequencies that would add, while a missing bar indicates a frequency band where the selected track shares no significant phase relationship with the rest of the Group.

KNOWN ISSUES

- Logic: After the Initial Alignment Pass or Alignment Updates, you may need to initiate playback momentarily in order to update the Groups List.
- Logic: ARA is currently not natively supported on Apple silicon devices. To enable ARA support, ensure you’re running Logic in Rosetta mode."
- Pro Tools: We recommend users to use the "Import Session Data" feature in Pro Tools to load a saved state of Auto-Align 2. As Auto-Align 2 is an interconnect multi-track plugin, it internally stores the settings for all the tracks.
- Pro Tools: The multi-mono functionality in the plugin menu has been removed. By default, the AAX Multi-mono mode in Pro Tools is set to 'linked', which causes an issue where the AAX instance forces the same settings for the linked channels. To address this issue, we have eliminated the Multi-mono mode from the plugin menu. Instead, please use the multi-mono functionality built into Auto-Align 2.

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