



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

* 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 calculates the time-arrival discrepancies*** across all of the tracks and nudges them into perfect time alignment.

From there, the algorithm will move on to analyze the phase relationship between the newly time-aligned tracks***. Complicated discrepancies are quickly identified and automatically resolved by rotating the phase of each track. This ensures that the best possible alignment is achieved across the entire frequency spectrum. Meanwhile, if after time alignment***, a particular track is determined to simply be out of polarity from the others in the group, the plug-in will apply a more traditional polarity flip in order to remove cancellations and revitalize the mix.

Most users can close the plug-in window at this point and enjoy its benefits without ever having to do anything else. For those who want to get their hands dirty making manual tweaks, you can do so with powerful and reliable visual feedback that lets you know what you've actually done and what you should be hearing.

GENERAL OPERATION

In the pages that follow, you will 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***). It 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 mics is good 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 list of all of your tracks in a single interface. From there, you'll be able to reopen the plug-in window from any of those tracks at a later time.

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 scan all of the entire song (Pro Tools, works slightly differently as you'll see in the Pro Tools instructions***) and

After the entire song has been analyzed*** and processed, you should now see your track list in the plug-in GUI*** divided into **Groups*****, based on the common acoustic information that they share. 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. See the **Groups***** section for more detailed information on how that works, later. For now, though, it's this simple: any tracks that should be time-aligned and/or phase-aligned will be grouped together.

TIME ALIGNMENT

Once the tracks are grouped, AA2 will identify commonalities between combinations of tracks within a **Group***** and slide their audio so that the maximum number of sonic “landmarks” will be perfectly synchronized across all of the tracks. Keep in mind that AA2 won't stretch or “warp” the audio in order to align it. The algorithm is just moving the entire track's audio forward or backward in time and/or applying phase adjustments.

While sliding the tracks into alignment with each other, AA2 will calculate exactly how many samples each track's audio has been nudged. The track whose signal has been nudged the least (in other words, the one whose signal has been determined to have arrived the earliest) will be

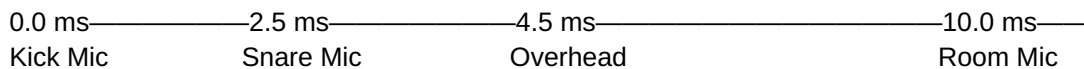
assigned a **Time Offset***** value of “0”. This track is referred to as the **Key Time Track***** as it is the basis for the other **Time Offset***** values that you’ll see displayed in the plug-in. The other tracks in the group will display a **Time Offset** of a negative value, describing how far they have each been nudged, relative to the **Key Time Track**, in order to achieve proper alignment.

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. AA2 doesn’t work like that. 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. The **Key Time Track** is merely the reference point used when calculating all of the **Time Offset** values. These numbers can be helpful for:

- Understanding the relationship of your tracks
- Confirming that the plug-in is aligning your tracks correctly
- Making creative decisions (more on that later)***

To help you to better utilize these **Time Offset** values without requiring you to do any math on your own, the plug-in offers a number of alternative views***. One option is to have the plug-in convert the sample-based values to milliseconds. It can also estimate the number of inches or centimeters that sound would travel over that duration of milliseconds. This can help to confirm that AA2 is compensating for the distance between mics, correctly.

You can also manually select the microphone that you want the plug-in to use as the **Key Time Track** and it will update the **Time Offset** values 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:



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”.

This is oversimplifying many aspects of the time algorithm, like the way that the plug-in couples the DAW’s own delay compensation with its **Time Offsets** to keep everything starting in time across the session when positive offset values are introduced, or the fact that even when using the default **Key Time Track**, it will still take time for sound to hit the mic with the “0” **Time Offset** value, and that is more math that affects all of the other Time Offsets***. The good news is that these, and countless other similar considerations, are handled automatically by AA2’s Time Alignment*** algorithm. You get to click, drag, click, then close the plug-in window and never think about all of that madness again.

PHASE ALIGNMENT

In some situations, merely sliding the audio from the different tracks into time with one another is not enough to give you the tightest phase relationship between them. You have to keep in mind that when you have a bunch of mics in a room, all pointed at different drums, amps or instruments, you’re going to wind up with mics aiming in a lot of different directions.

For example, if you have a mics on a kick drum beater and outside kick drum, in addition to being out of time, they are likely to be directly out of polarity from one another. If their timing were to be perfectly aligned and the tracks summed together, the cancellations will only be exaggerated. In a case like this, AA2 can automatically flip the polarity of one of those tracks during its alignment process. Now those two tracks should have a very strong correlation when summed (which you’ll see on the Spectral Phase Correlation Meter***).

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 them? It’s not perfectly out of polarity like the two kick drum mics. It’s more like ninety degrees out of phase from either of those mics. In these circumstances, AA2 will use its **Spectral Phase Correction algorithm***** to rotate the phase of one or more tracks in the group to produce the optimal correlation. In this case, between the Overhead, the Kick In mic, the now polarity-reversed Kick Out mic and also with the rest of the tracks in the group.

As the number of mics on a drum kit or any other instrument grows, AA2 will continue to automatically determine the best combination of timing adjustments, polarity reversals and phase rotations needed to lock each track into the tightest possible phase relationship with the whole of the group.

VISUAL PHASE ALIGNMENT METERING

While the plug-in uses numerical values to describe the timing adjustments*** that have been applied to each track, phase adjustments*** that have been performed are displayed using a colorized meter. Don't think of this meter as identifying existing problems. I know that we're used to the idea of red meters telling us that we need to fix something. Instead, be aware that these meters are indicating that there was a problem, but they are describing what steps have already been taken to solve it. If the meter displays:

- **Solid Green:** No polarity or phase adjustments have been made to the track. In this case, only timing adjustments have been made, or no adjustments at all if the **Time Offset** is displayed as "0".
- **Solid Red:** In addition to whatever timing adjustments have been made, the track has been flipped 180° out of polarity from its original state.
- **Rainbow Colored:** The plug-in has turned on the **Spectral Phase Correction** module and rotated the phase of the track to achieve the best possible phase correlation with the rest of the group. If you see a lot of bands in the rainbow, this indicates that it took more "turns" or phase rotations to get the track aligned. A great way to get your head around this is to:
 - Make sure that playback is stopped.
 - Select a track which is showing a **Rainbow Colored***** meter.
 - Find a spot where there is plenty of signal (the waveform is nice and tall) on the main **Waveform Viewer*****.
 - Toggle the plug-in's On*** button on and off.
 - As you do this, you'll see an animation of the waveform moving in time as it processes and "unprocesses" due to the **Time Correction Module**).
 - You'll also see the waveform twisting as though you're watching a 2-D rendering of a 3-D screw being driven forward or backward. This illustrates the phase rotation taking place. When it's done, you should notice that the waveform better correlates with the other waveforms in the group.

The coloring of the rainbow meter also indicates the frequency spectrum with lows on the left and highs on the right. You'll sometimes notice that portions of the meter are green or red. These portions once again indicate that either no significant phase shift has occurred (green), or that the phase of this portion of the frequency spectrum has been advanced or lagged a full 180° (red). Other colors indicate that the phase shift is somewhere between 0° and 180° (or between 180° and a full 360°).

STEP 3: Manual Adjustments

When we want you to be creative and have fun with one of our plug-ins, those intentions are usually pretty clear. Surfer EQ, for example, has more controls to play with than most users will ever find a way to use (and MIDI control to make it even more interactive!)

With our alignment plug-ins, on the other hand, we generally believe that the algorithms will produce better results than any human will, ourselves included. That being the case, we don't want you spending any more time in the plug-in GUI than you have to. Just let the plug-in handle it and go mix. There are, however, a handful of good reasons that you might want to hijack the controls and make manual adjustments. More on those here.***

AUTO-ALIGN 2 & ARA2

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.

TO USE ARA2 VST PLUG-INS WITH:

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.

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 Post. 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.

REAPER

Insert Auto-Align plug-in instances on the tracks you wish to align, as well as on the reference track. 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.

AUTO-ALIGN 2 & PRO TOOLS

When using Auto-Align 2 (AA2) with Pro Tools, the plug-in should be inserted on every track in the session.

PLUG-IN GUI MAP

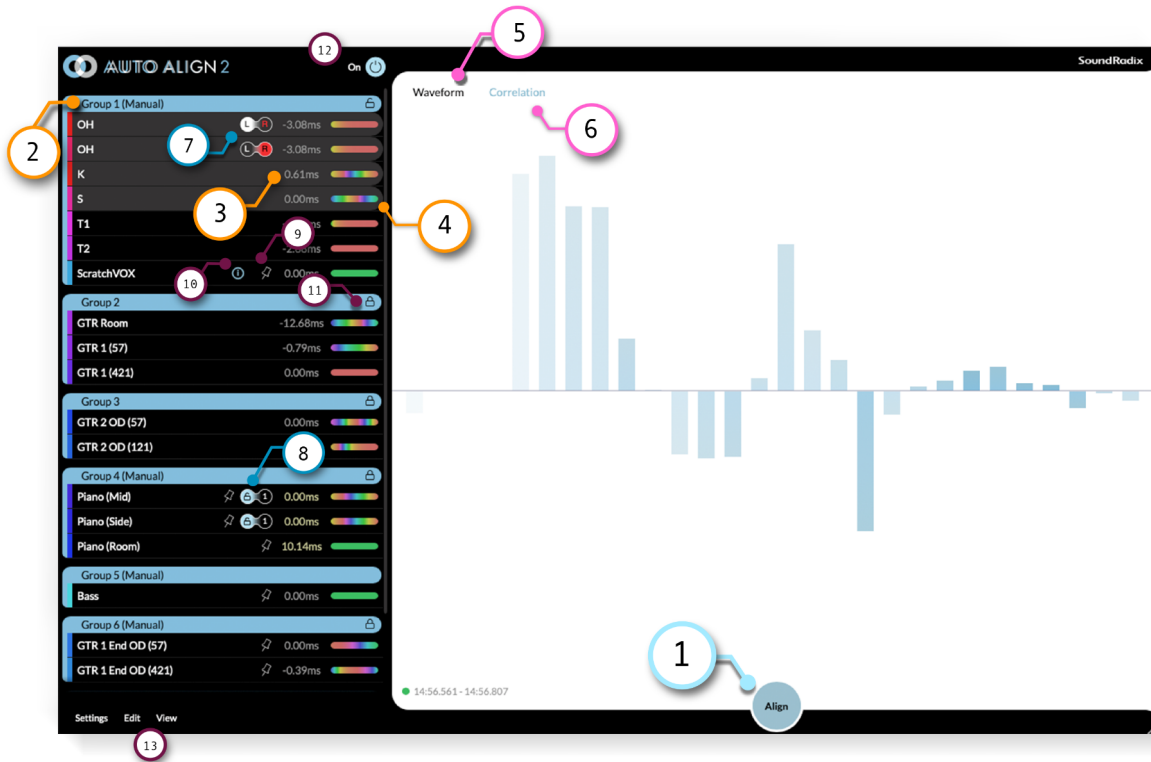


FIGURE 1A

- 1. Align:** Press this button to start the **Initial Alignment Pass*****, which will Automatically Assign*** all of the tracks into Groups*** and

GROUPS

As clips are analyzed for alignment, the plug-in's AI will identify each individual instrument that is heard in the session. The plug-in will then sort all of the tracks in the session, aggregating all of the mics that have captured each of those instruments into **Groups**. Within each group, alignment is calculated and corrected. The **Groups** are isolated from each other during processing, so the algorithm will never attempt to align tracks across **Groups** nor will it attempt to align whole **Groups** to one another. Here are some examples of **Groups** in action:

Example 1

A band is recording bed tracks of drums, bass and guitars, then performing some overdubs. A 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 in an iso booth miked with a brighter dynamic mic and a darker ribbon mic. Bass is being recorded with only a DI. After the drums are cut, the bass DI is re-amped and recorded with a single spot mic. Then the rhythm guitar is doubled with the same two-mic setup in the iso booth, while the lead guitar amp is recorded in the main live room. Lead guitar 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, baffled off in the main room. After alignment, the groups 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

Notice how the two passes of rhythm guitar are split into two groups, because despite the similar timbre, the algorithm recognizes the timing differences between the two performances and no bleed across the mics.

Example 2:

A jazz trio with a vocalist records live without overdubs. The drums, grand piano and double bass are all in one room with minimal isolation. A Blumlein pair sits in the middle of the room capturing the whole trio. Additionally, the bass and piano each have pickups being recorded, and each also has a single spot mic. The drums have their own close cardioid mono overhead and spot mics on the kick and snare. The singer is performing in a windowed iso booth with strong separation. In this case, the result would more likely be:

Group 1: Blumlein L/R, Bass Pickup, Bass Spot Mic, Piano Pickup, Piano Spot Mic, Drum OH, Snare, Kick

Group 2: Vocal Mic

In this scenario, because the trio shares the Blumlein pair and there is considerable bleed between mics in the room, it is important for all of the mics to combine additively. For this reason, the phase needs to be aligned correctly between them. However, in this case, the relative distances between the instruments, their spot mics and the room mics needs to be maintained to some degree. Negating all of that and perfectly time-aligning the tracks would sound wrong. In this case, after the plug-in performs its automatic alignment, some manual adjustments will help dial in the proper sound.

MANUAL OPERATIONS

MANUAL ADJUSTMENTS

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,

MANUAL GROUPING

If you feed AA2 enough information to properly analyze*** the tracks, it is extremely likely that all of the tracks that contain traces of one another will be assigned to the appropriate groups and aligned together. Even if the grouping doesn't entirely make sense on an intellectual level, if the plug-in "hears" them bleeding into one another, your mix will probably benefit from them being aligned, so you should have nothing to worry about. Close the plug-in and mix. Only dwell on it and take action if:

- **A track is definitely in the wrong group or ungrouped.** If a guitar room mic isn't grouped with that amp's close mics, for example, maybe the guitarist's shoegaze effects chain was just more than the algorithm could handle. In this case, feel free to manually*** move that mic into the group with the other mics on that amp. That said, if AA2 didn't automatically recognize the correlation, those mics' might not even be interacting on a level that would benefit from alignment anyway.

Likewise if a track is erroneously placed in a group, like the Bass DI winds up in the drum group for some reason, feel free to manually remove it, but give it a listen first. Maybe AA2 recognized some benefit in the way that it is adding to the kick drum after alignment. If it sounds better, leave it alone. If not send it to its own New Manual Group*** or if there is a bass amp in another group, move it to that group.

- **You want to split a group to use a different Key Time Track*** for certain elements.** Imagine a scenario where basic tracking happens at a house with poor separation between rooms. A scratch vocal mic winds up between two rooms, picking up considerable drum bleed from one room and significant guitar bleed from another. Because of this, the scratch vocal mic ties both rooms together in AA2, and as a result, all of the drums and guitars wind up in the same group. While the phase correlation may work as both of those rooms are tied together, the musical timing between the drums and guitars could wind up "feeling" wrong.

In this case the scratch vocal has been or will be replaced with an overdub, so it will be muted in the final mix. Pulling the guitars into a New Manual Group*** while keeping the drums in the original group would allow you to set the Key Time Track to a mic inside of each of those rooms, giving you more control over the musical timing.

CREATIVE KEY TIME ADJUSTMENT

We touched on manually selecting Key Time Track to tighten musical timing***, let's dig a little deeper into how/why to use that feature.

Going back to our number line example, you can think of the Key Time Track*** as kind of the "center" of a group's timing. Everything is pushed forward or pulled back to that point. You could also think of it as the "anchor" where that group is essentially aligned to the song's musical timing grid.

Let's say the Kick Mic is the Key Time*** Track for Group 1, your drum group, and a Guitar Amp Dynamic Mic is the Key Time Track*** for Group 2, which contains guitar spot and room mics. With both of those being close mics, the front edge of a kick