

BethHarmon's Guide to Classical Editing in REAPER

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Preliminaries

First up, it is important to note that if you already own REAPER then the world of classical editing including source-destination editing (aka 3-and-4-point editing), crossfade editing and more are available at no extra cost¹ to you via freely available Lua scripts. There's no need to spend any of your hard-earned money on a classical-based app that is essentially modified REAPER install. Neither do you need Sequoia, Pyramix or SaDiE in order to make editing precise and efficient. As a classical engineer myself, I can say with certainty that what I am about to share with you covers all my recording, editing and mastering needs. Your mileage may vary and I'd love to hear from you if there are functions you feel are missing. The only downside I can see is that it might take you a little while to get everything set up but there's a real benefit to walking through step-by-step and understanding why things are set up the way they are. It also enables you to tweak to your own liking later on if you'd rather do things a little bit differently.

What you need

- REAPER (obviously)
- SWS Extension, ReaPack
- Various scripts from ReaPack
- Key map file & keyboard shortcut guide from my Github repo²

¹Obviously, it would be fantastic if you can show support to the script writers by either sending them some money or giving your time to help improve the scripts or report bugs.

²<https://github.com/ElizabethHarmon/REAPER-Classical-Editing> N.B. Before proceeding, I recommend doing a backup of your current key map. When importing my key map into your installation of REAPER some of your shortcuts will no doubt be overwritten.



Figure 1: “Ripple editing per-track”, “Item edit grouping” and “move envelope points with media items” engaged...

- Classical RPP template from my Github repo (which includes *SWS/AW: Toggle auto group newly recorded items* as a startup script³)

So, the first thing is to install REAPER from <https://www.reaper.fm/download.php>. I’ll let you figure that out yourself. Next, install SWS Extension and ReaPack from <https://www.sws-extension.org/> and <https://reapack.com/> respectively. Once that’s done, you’ll want to download the following from inside of ReaPack (scripts I consider optional are in *italics*):

- BethHarmon_Classical
(by importing my index.xml into ReaPack)
- TJF LINK Razor Edit Selection with Folders, Item Grouping Affects Behavior2(reapacktest).lua⁴
- *Source-destination edit by Paweł Łyżwa (by importing <https://ply.github.io/ReaScripts/index.xml>)*⁵
- *JS reascript API (juliansader)*
- *Various_functions (MPL)*
- *Generate CUE from project markers (MPL)*
- *RCInflator (Oxford)*

Now, you need to choose one of the key map files (I recommend the complete one if you want the full experience!). It’s worth stating here in the main text my warning about backing up your own REAPER configuration before importing mine in case you want to get back to where you were.

Things to do after installing

Main arrange window

- UNCHECK Auto-crossfade, grid lines (optional), snap⁶ buttons
- CHECK Ripple editing per-track (as opposed to ripple edit all tracks), Item edit grouping, move envelope points with media items. See figure 1

Preferences

Some of these options are essential for the scripts to work as expected. Others are just recommended.

Project > Media Item Defaults

- ENABLE Overlap and crossfade items when splitting, length: 0:00.010
- ENABLE Overlap and crossfade media when finalizing razor edits

³This is entirely optional, but it might save you a little time. In this document I go through step-by-step how to set up in any case.

⁴<https://github.com/sonictim/TJF-Scripts/raw/master/index.xml>

⁵Via *Extensions > ReaPack > Import Repositories...*

⁶We will prepare some snap settings later for adding CD markers but for now we don’t want dragging etc to be constrained.

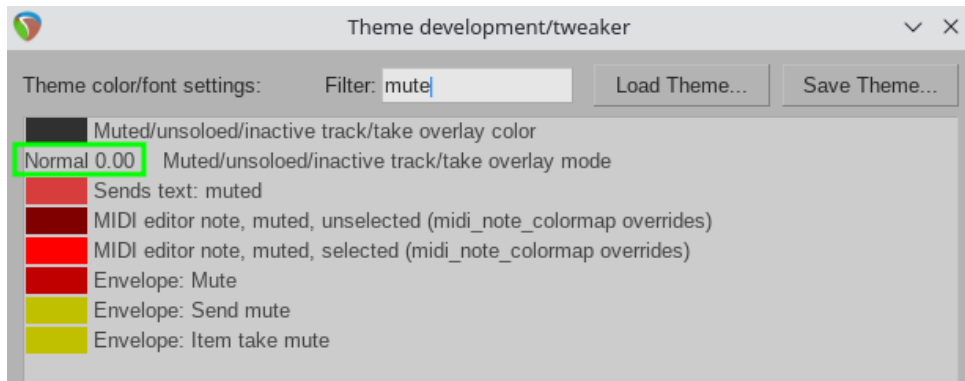


Figure 2: Setting mute overlay mode

Appearance > Media Item Positioning

- CHANGE Offset by... percent of item height to 100⁷
- CHECK Draw as opaque

Appearance > Peaks/Waveforms

- UNCHECK “Draw faint peaks in folder tracks”

Appearance > Fades/Crossfades

- ENABLE When editing crossfades with the mouse, use crossfade editor theme colors

Project Settings

- CHANGE Video > Frame rate to 75⁸
- CHANGE Render resample mode to r8brain free (highest quality, fast)

Theme Tweak

- Using the “Theme development: Show theme tweak/configuration window” action, search for “mute” and change the alpha blend to 0.00. See figure 2.

At this point it might be a good idea to Save as default project settings as well as make a classical template (if you didn’t download mine) so that you don’t have to do this setup more than once.

Classical Workflows

Creating Folder tracks

Horizontal Recording/Editing

For horizontal recording and editing, create a single folder with your various channels (main pair, aux pair, spots etc). you don’t have to do any more setup because essentially you already have one mixer set for all the various takes. With vertical recording/editing we need to be a bit more creative.

⁷In REAPER versions prior to 6.54, these options don’t exist. Instead, under *Appearances*, you need to change *Maximum number of lanes, when showing overlapping items* to 2

⁸The number of frames per second for red-book CDs.

Vertical Recording/Editing

A typical scenario: You have vertically recorded, or vertically prepared, multiple takes of a concerto movement with 10 channels. You realize half-way through editing that you want the soloist's microphone to be brought up in volume a little and also panned slightly more to the right to match the position in the main stereo pair. Under normal circumstances moving one pan knob or fader would only affect that one channel. The ideal situation would be that changing a value on one channel would affect every other take in the same way, making comparing source material uniform in volume and panning.

For vertical recording and editing, create a single folder in a similar fashion and afterwards run the *BethHarmon_Create source groups (vertical)* script. Easy! The script creates 6 source groups based off the destination/master folder, links the volume and panning and hides everything in the mixer save for the first folder group. In other words, you can simultaneously control volume and panning across all takes. If you need more than the 6 source groups, simply create them on the fly with the *duplicate folder (no items)* script.

The manual way: basically, you create your master folder set open group parameters (Ctrl+G) and set both volume/pan "lead" and "follow" in the group parameters with a different group for every track of the folder. When you use my *duplicate folder (no items)* script, it carries over the same parameters. Then, if you wish you can hide all but the first set of mixer channels using the track manager. This all doesn't take more than a minute to set up and you can always create a template project.

Recording

I don't have too much to say here other than suggest that you follow the various guides already out there on the internet. Hopefully you are already familiar with how to set up your equipment⁹, set audio device settings, record arm and the like. If not, take some time now as it will really pay off in the long run. Some quick tips: record into 24-bit WAV files (the default) and aim for -12dB or so peaks¹⁰ versus trying to get as close to 0dB as you can. Document your takes either using the built-in REAPER project notes or SWS Notes which can be attached to items, tracks, markers etc. I personally prefer item notes on the main microphone pair. It's a very useful tool to have docked at the bottom of the screen.

I engage *SWS/AW: Toggle auto group newly recorded items* to save time especially if using a vertical take system. It's probably quite obvious but toggling on this action automatically groups tracks that are recorded at the same time.

I include a "duplicate folder (no items)" script which can be added to the track right-click menu for a quick way to add more empty folders (and their children) from your first recording set (in case you enjoy vertical take management (see below under Editing). My personal preference is to either to just run the recorder for the whole session or stop and start for each new take but continuing in a linear fashion along the timeline. However, if you want to record takes vertically in preparation for editing that way, I've included a handy "classical take record" script. Position your play cursor, click on a folder track then press the shortcut (numpad ./Del) to record and press the same again to stop. Click on the next folder to quickly record another take at the same point in the timeline! Note that the tracks shown in the mixer are filtered based on which tracks are currently recording.

I always make some dedicated time post-recording to get a lay of the land, tidy up the digital notes I took during the session and perform a backup on an external drive as soon as possible.¹¹

Editing

Marking the edits

This is best done using a physical, photocopied¹² score by the conductor or lead musician. I advocate for a "T" system¹³ where a large T is inserted into the score at the intended edit point. Either side of the T stem, and

⁹For live concerts (i.e. critical one take), I actually prefer to use a SoundDevices MixPre II unit.

¹⁰You can record a lot lower and still be above the 16-bit noise floor but this isn't the document to go into it in detail.

¹¹Note that with REAPER it is also possible to record to a second drive as an invisible backup while on location.

¹²Or printed public domain score where possible.

¹³As described by Frank Lockwood at <https://www.lockwoodars.com/>



Figure 3: Identifying edit locations on a score

under the crossbar, the outgoing and incoming take numbers are written. A wavy crossbar indicates some leeway for where the edit point can be placed. Further notes can be attached underneath the T such as directions for tightening the gap etc. See figure 3.

Introduction to the various editing workflows

Here we talk about the meat and potatoes of the classical editing workflows. Workflows (plural) because I have included different approaches to suit as many tastes as possible within the confines of the REAPER application. I will explain each in detail after this brief introduction. I personally have always enjoyed doing my S/D editing within the one project window but if you use Paweł Łyżwa's (ply) scripts you shuttle back and forth between two project tabs: one for your source material and one for your destination material. In the single-window workflow you have multiple ways of proceeding. First you have all your takes lined up in a row horizontally and you place your source in and out markers, destination in and out markers then press a keyboard shortcut to achieve your 4-point edit. The second way is to set up your takes vertically and then either use the same marker system to make your edits or use razor edits (my preferred method when working vertically). Whichever option you choose, you will then end up in the crossfade editor view which uses a custom two-lane view with classical crossfade script to make precise edits really easy in REAPER. I don't often use the fade editor dialog that comes with REAPER even though I make it appear as part of the script.

Preparing your recorded takes for classical editing

Whichever method you end up choosing you need to prepare your takes in an appropriate way. I strongly recommend using folder tracks for everything (especially given the vertical workflows rely on the presence of such folders). The folder track itself should hold the first of the audio files which for me is invariably the main microphone pair (stereo). When child tracks are hidden, this gives the engineer the ability to edit multi-microphone recordings as if it were a simple stereo track.

For multiple project tab or single-window horizontal approaches, you can use the *Prepare Takes* scripts (horizontal or vertical, depending on workflow). Place your edit cursor just before the first set (it's good to leave a little bit of space at the start of your project) and press the shortcut (my own preference is T)¹⁴. Every set of items comprising a take has changed colour and is now grouped. See figure 4.

¹⁴From now on, you can assume that all shortcuts mentioned are all the ones included in my key map.

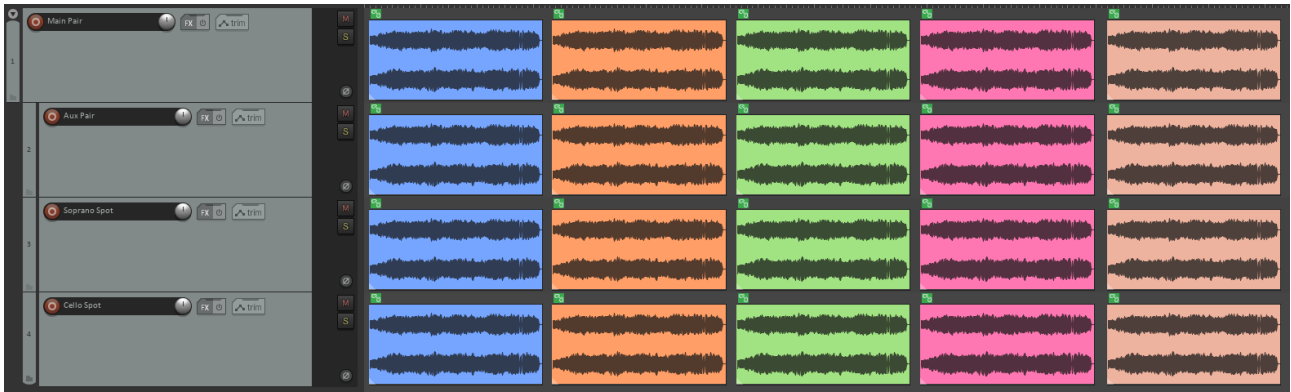


Figure 4: Five takes of a single movement (with tracks comprised of main pair, aux pair, vocal spot and cello spot) given random colours and grouped

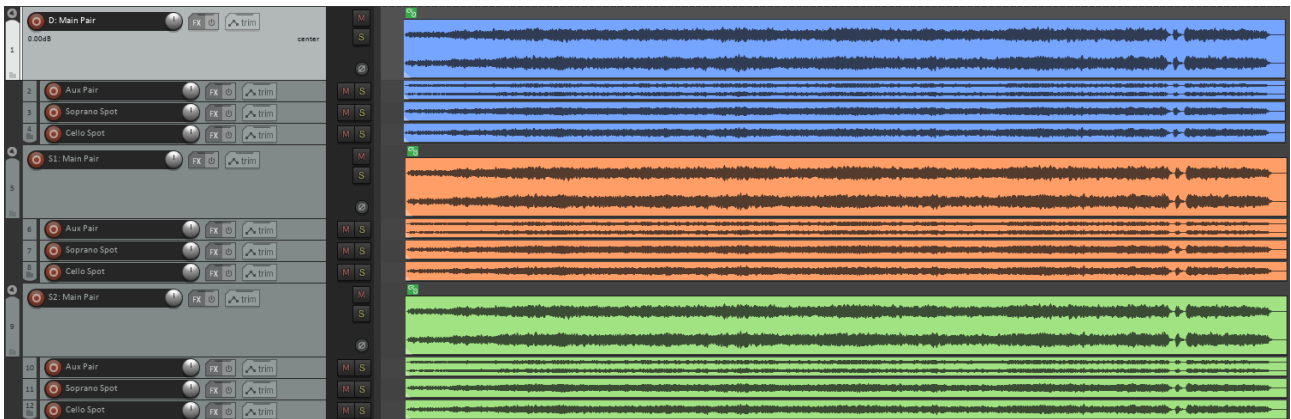


Figure 5: Prepared vertical takes of a single piece after running the *Prepare Takes (vertical)* script

For vertical classical editing of any kind, it's either a one- or two-step process depending on how you captured the audio in REAPER. If you recorded all in a horizontal row, just use the same T shortcut and then drag all your takes until they are vertically aligned on their own tracks. Essentially, what you are looking for is your master tracks having your best overall takes of each piece/movement horizontally with all the corresponding takes underneath as vertically aligned as is achievable (allowing for tempo variations) to make finding alternative takes as simple as possible.

In the situation where you recorded by duplicating tracks and exclusive soloed just the record-armed tracks, you can use the *BethHarmon_Prepave Takes (vertical)* script. Super simple! See figures 5 and 6.

That's it! So, with that introduction and preparation done, let's dive into each option in more detail.

Two project tab S/D editing using the ply scripts¹⁵

For a video of it in action see <https://www.youtube.com/watch?v=tpULzVtsdUI>. It's a bit torturous with all the repeated listening to the same music but you at least get a sense. I work a lot quicker than this in general and I feel that the custom crossfade editor makes the tweaking of cuts FAR more efficient than using the built-in crossfade editor.

In order to use the ply source-destination scripts you first use the *ply_Source-Destination* setup script (F10) which creates the second project tab. You can also run the configuration script (F9) which is included but I don't think I ever needed to. You make your source and destination in-out points using simple time selections ([and]) and then run the edit action (NumPad 5). I also include a shortcut for switching tabs (NumPad +).

¹⁵For a detailed guide on how to install ply scripts see here: <https://urosbaric.com/updated-scripts-for-3-4-point-editing-in-reaper-6>

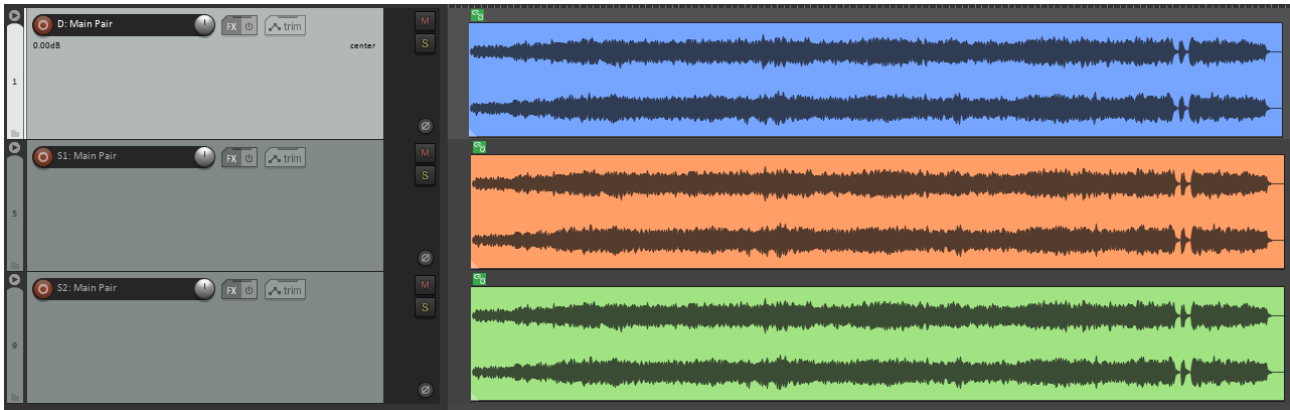


Figure 6: The same project with hidden (super-collapsed) child tracks.

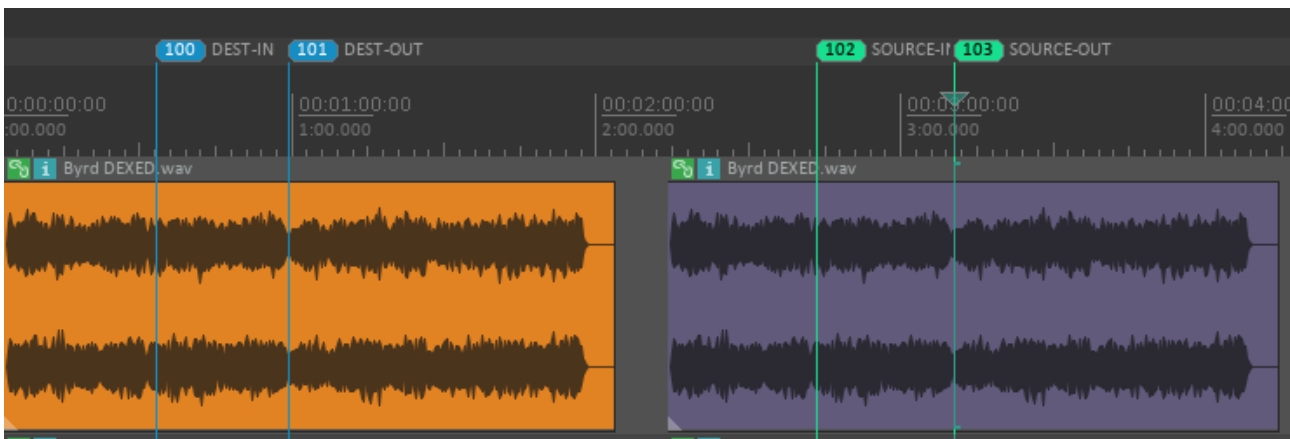


Figure 7: The source and destination markers in action

Single-window S/D editing (horizontal)

As mentioned earlier, this is my own favourite method. You set your in-out points using special coloured labelled markers I created with Ctrl+Home and Ctrl+End (Destination) and Shift+Home and Shift+End (Source). See figure 7. Simply press Insert key to make the 4-point edit. You'll also notice that because you prepared the various takes with colors (and grouping), it is really easy to see which takes compose your final edited tracks. It's worth pointing out that my S/D and classical crossfade scripts place the default short 10ms crossfade immediately before the entry and exit points of the pasted audio. In practice this means that if you visually set a marker (or edit cursor in the case of the classical crossfade function) immediately before a transient, said transient will sound post-crossfade which is what we generally desire. Often, given this important detail, I don't even need to visit the crossfade editor view.

A note on listening to takes

For horizontal editing, you should use the usual transport shortcuts (spacebar to start and stop playback, for example). For vertical editing, it is highly recommended to use the Audition (A) script to quickly solo only the folder (or track) you are interested in hearing. Note that similar to the *Classical Take Record* function, the tracks shown in the mixer are filtered based on what is being auditioned.

Single-window S/D editing (vertical)

You will have already prepared the audio as discussed above for vertical editing. In this setup, you will use the same source-destination shortcuts as for the single-window horizontal takes workflow (Ctrl/Shift + Home/End) other than for the actual edit you should use the *BethHarmon_S-D Edit (vertical)* script instead while the first track of the desired source group is selected. This is really important as it is the only way for the script to know which source group you want to cut and paste into the destination tracks. Assign this to your own shortcut (or overwrite my regular one) if you'll be using that most of the time.


```

no_meter_rec1b1 1
tcp_heights 0 25 50 64 ; supercollapsed, collapsed, small(norecarm), recarm size
tcp_folderindent 0

```

Figure 8: Supercollapsed value should be set to 0 in rtconfig.txt

The downside to this workflow is that the source and destination markers can get in each other’s way visually if the takes aren’t somewhat staggered but the process still works as expected.

Using Folder tracks and hidden children

Using the shortcuts D (display children) and E (ensconce children) you can work with multi-microphone recordings with ease. See figure 6. Please note that this involves setting tcp_height supercollapsed value to 0 in rtconfig.txt inside the theme zip. See figure 8. For information on how to unpack the theme see <https://youtu.be/4MD5IcVG14I?t=347>.

For your convenience, on my repo I include the default REAPER v6 theme but with this change as well as the mute overlay alpha set to 0.00 (Classical.ReaperThemeZip).

Because the tracks supercollapse state is set to 0 height versus actually hiding them via the track manager, the S/D scripts continue to work as expected (because they rely on selecting the rest of the items in the group). There is also a function to duplicate folders (and their child tracks) for either recording new takes or organizing your editing environment post-recording.

Reminder: In order for this to visually look appealing, please uncheck “Draw faint peaks in folder tracks” under Appearance > Peaks/Waveforms.

Single-window S/D editing (vertical using razor edits)

Because of the potential for visual overlap of markers, I much prefer the REAPER razor edit functionality for vertical take work. It works a lot like the process shown in this Pyramix video:

<https://www.youtube.com/watch?v=wQXwnvITQCQ>

While Pyramix also has additional source-destination marker workflows, I couldn’t help but feel that for professional ensembles that manage a high degree of tempo regularity between takes, this method can be extremely efficient. This isn’t the document to introduce REAPER razor edits as there are plenty of resources online if you do a simple search but here we are only concerning ourselves with creation of the razor area across all our pairs and spot mics (REAPER’s default shortcut is the rather uninspiring Alt+Right drag) but thankfully it can become the default editing mode by running the action Swap arrange view... or selecting it under Preferences > Editing Behavior > Mouse Modifiers > Context: Arrange View (pewh!). It’s probably worth having a shortcut set up, to be honest.

Enhanced razor editing with hidden children (see “Using Folder tracks and hidden children” above)

For an almost perfect classical razor editing experience, install “TJF LINK Razor Edit Selection with Folders, Item Grouping Affects Behavior2(reapacktest).lua” from ReaPack¹⁶. Once run, it continues in the background automatically extending any razor area to include all children (even when “hidden”). For your convenience, I include this to run as part of the *BethHarmon_Create source groups (vertical)* script.

NOTE: I highly recommend turning off ripple-per-track mode while razor editing so that you don’t mess up alignment of your master track items and associated crossfades¹⁷.

¹⁶First, you need to import <https://github.com/sonictim/TJF-Scripts/raw/master/index.xml>

¹⁷As of writing the first version of this guide, I have put in a feature request that razor edits might occur while being able to ignore the ripple mode.

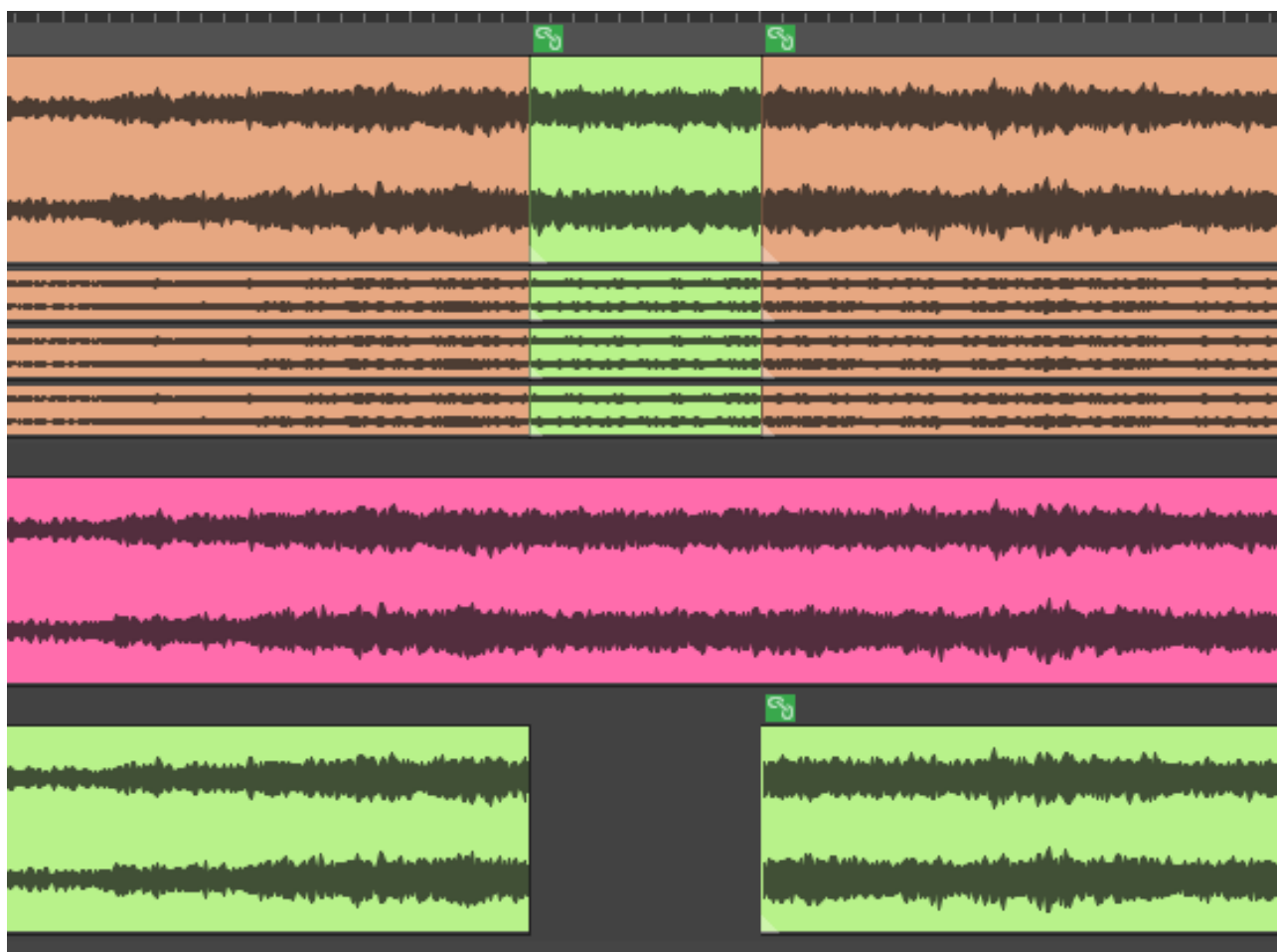


Figure 9: Razor editing with vertically aligned takes using "hidden" child tracks in the sources

OK, so now you have your area selected, simply left drag to move it on top of your destination track(s). You can control drag if you prefer to just copy. Notice that if you set up razor edit preferences as I recommended above, the finalized edits will include crossfades either side and trim material that was previously underneath. It's a carbon copy of the above Pyramix workflow. See figure 9.

Now that you've made your precise edits using S/D workflow or razor editing (no worries if it's a bit rough!), it's time to turn back on the ripple-per-track mode and check things through with a good listen and the help of the crossfade editor view.

Crossfade Editor Mode (F)

While REAPER includes an excellent crossfade editor, it does not reach the same levels as the ones in specialist classical DAWs such as Sequoia and Pyramix. This is mainly due to the inability to see the continued waveforms of the items beyond the crossfade they enter and likewise the previous waveforms of the items that exit the crossfade¹⁸. The ability to visually align transients and then position the crossfade just before it is absolutely critical (and fun when you have the tools to do it!). So, beyond the standard REAPER crossfade editor what have I provided? Press F and you are moved into crossfade editor mode. Here, the first track is given full vertical zoom, the two-lanes for overlapping items is enabled and the fade editor toolbox appears (I personally position it to hover over the middle of my mixer. Press F again and you exit that mode. If for some reason you accidentally close just the fade toolbox etc I provide two shortcuts to help get you back to the correct view (F5 and F6 which toggles the zoomed-in first track and two-lane view, respectively. If you just press the shortcut you are supposed to (F), you won't have any issues.

So, now you are in the crossfade editor mode, you can click on the left item¹⁹ of an overlap (crossfaded or otherwise) and press Z to automatically extend the waveform view of each item. Essentially, it increases the overlap so you can spot and align the transient you want. My own preferred method of getting the perfect crossfade is to locate the transient I want on the left item, place the edit cursor just before it, then drag my right item so that the two transients align. Then I press X (classical crossfade) and I'm done! The crossfade happens at the location of the edit cursor (well, just before it as explained above). See figure 10. I love this method so much that I don't miss Sequoia or Pyramix any more. Here it is in ordered list form:

1. Increase overlap (by Z shortcut or manually dragging out edges of each item)
2. Find transient in left item that you want be edit point
3. Place edit cursor just before it
4. Drag right item to align transients
5. Press X (classical crossfade)

In reality, this process can be just a few seconds to achieve the perfect edit. In the unlikely event you need to undo, either use the standard Ctrl+Z combination or simply extend the overlapping item edges again then create a new classical crossfade.

NOTE: You can also forego the Z shortcut and just manually drag out the item edges as much as you like. Given we grouped the tracks as part of the preparation, you'll notice when you drag one edge it drags every other track in the group too.

There are a couple of benefits of having the fade editor dialog in view. You can shuttle between crossfades using the next and previous buttons. You can also audition the fade with the crossfade editor play button which limits the start and end of playback (and can be looped if you want to tweak with the built-in crossfade editor controls. Once you have your perfectly edited master track(s), you can leave the fade editor mode by pressing the F shortcut again.

¹⁸If that made no sense and because a picture is worth a thousand words see: <https://tinyurl.com/2nh7sxp>. While not the best quality image, you can see the greyed out (non-sounding) waveforms either side of the crossfade.

¹⁹Essential for the script to function properly.

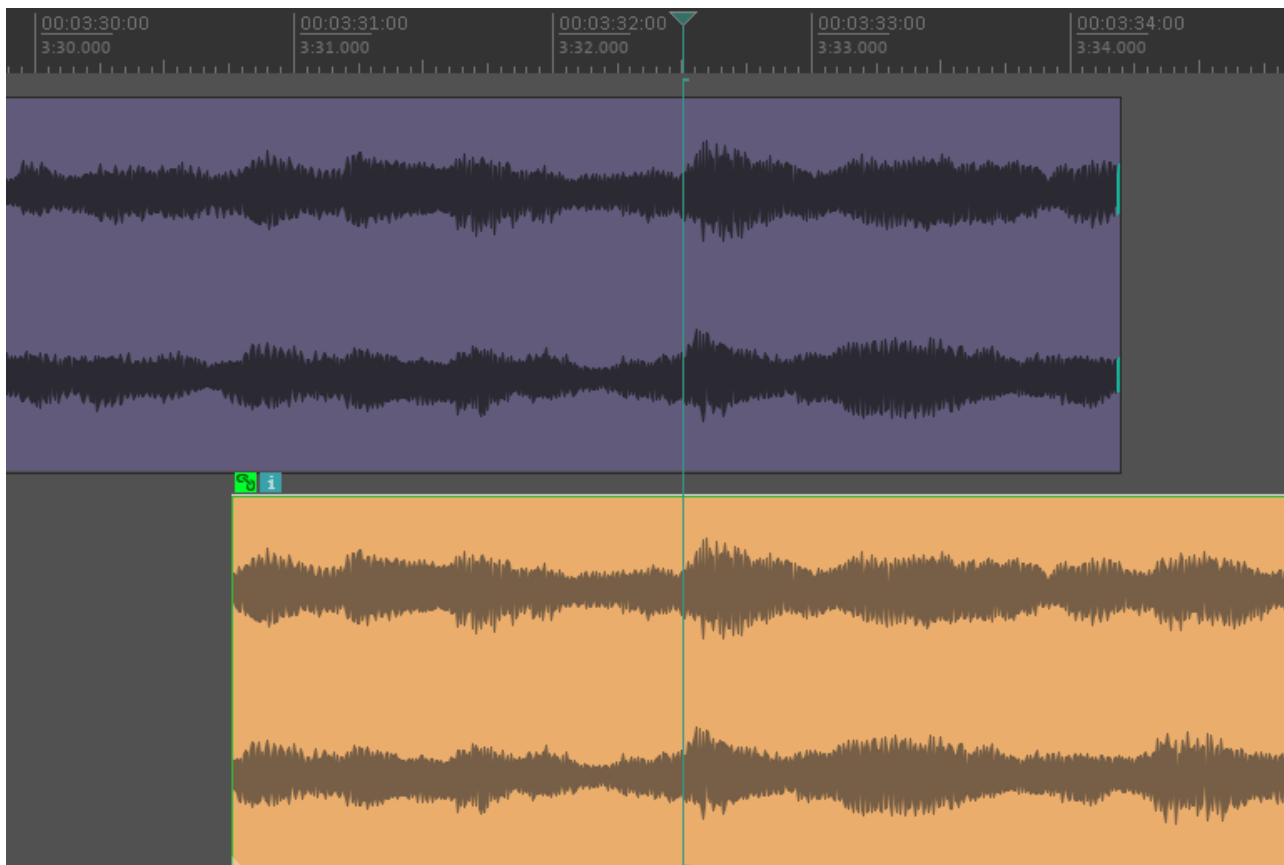


Figure 10: Part of the crossfade window showing two overlapping items, transients aligned, with the edit cursor at the desired crossfade location just before pressing X shortcut

Other Editing Tips

In my key map, I include all sorts of useful shortcuts to use during editing. In vertical editing workflows, the Audition (via shortcut A) is brilliant for listening to various takes before applying a razor or S/D edit. I can shuttle between items with Q and W, shuttle between markers with , and . (the same keys with < and > on them on my UK keyboard), S for splitting a long recorded session into takes, ‘ (back tick) for zooming out to the whole project both horizontally and vertically etc. There are plenty more for the mastering end of things so I encourage you to explore. There’s no rocket science but simply reasonable single-key shortcuts for scripts and actions that are already in REAPER, SWS, or available via ReaPack.

Mastering

This has the potential to be a long section but I don’t want it to detract from the main event: the S/D or razor editing workflows. A few pointers are in order though. In order to have CD markers that snap to CD frames, now is a great time to enable snapping (to frame). I add the CD/DDP markers (if not already present), create regions from the markers by double-clicking in the ruler between markers then pressing # (create region from time selection). In a typical classical album this takes no time at all but I wish there was a “create regions from markers” instead of the current SWS “Convert regions from markers”. In any case, you can then use the project regions in the render dialog or use the SWS autorender tool. For those who insist on the absolute best resampling the world has to offer, export your WAV+CUE at highest resolution at 32-bit float and use a program like Saracon or FinalCD to get down to 44.1k/16-bit before generating the rest of your files in EZ CD Audio Converter (Windows), Fre:ac (all platforms) or similar²⁰. Alternatively, you can bring a long converted 44.1/32-bit float WAV back into a cloned project not forgetting to change the sample rate of the project to match. A lot of engineers use standard TPDF dither but you can always bring your favourite 3rd-party plugin to the party (as long as it is the final plugin on your master chain and your master fader remains at unity).

²⁰I’ve heard it’s best to generate all your lossy files from the 44.1/16-bit in order to maintain some quality control over the process.



Figure 11: RCInflator in all its generic jsfx glory

I used to use the MPL function to export CUE files so I could use an external resampler (such as Saracon, RX, SoX etc) to get to 44.1/16-bit for published files and then create my DDP via a 3rd-party tool such as the DDP Mastering Tools by Andreas Ruge²¹. Now that r8brain free has been introduced as the best quality resampler available in REAPER (I highly recommend double-checking that it is selected when resampling at render time) I feel I can do everything, including DDP²² creation, without leaving my favourite DAW.

You will hopefully notice I have included various shortcuts for creating regions (single or multiple) from items and time selection. Also worth noting is that you can still do some (or all!) of your source-destination editing with your track markers in place as the S/D markers have IDs far higher than any classical CD would have and are automatically deleted after a successful edit. As long as you have your ripple-per-track mode engaged, all your existing marker placements and carefully crafted edits will remain intact.

Not necessarily obvious to new REAPER users are the special =START and =END markers (make your markers in the usual way and label them accordingly) that constrain the length of the project. Rather than rely on extended silence at the end of items or time selections, the =END marker is a great way to ensure you have the exact amount of lead-out you want at the end of the disc. Positioning both special markers is great way to generate files for multi-disc releases without having to rely on multiple projects.

In terms of loudness, I personally aim for about -18 LUFS Integrated for my classical albums though it can be as high as -16 LUFS and as low as -20 LUFS. The new loudness jsfx meter in REAPER along with the normalization of loudness and true-peak limiting in the render dialog are priceless. It's another reason I couldn't go back to the big classical DAWs at this point.

Under prerequisites, I included the optional RCInflator²³ (See figure 11) which is a clone of the Sonnox Inflator that I had a hand in bringing into this world with its current capabilities of being able to null test, almost perfectly, against the Sonnox version²⁴. I have a soft spot for it on a master but, again, there are plenty of guides on how best to use it in production.

Closing thoughts

I hope you enjoy the ability to do serious classical editing on REAPER and that my efforts go some way to making things better, easier and more efficient. If you find any oddities with the scripts, please add your thoughts to the dedicated thread on the forums and/or create an issue on my Github repo located at <https://github.com/ElizabethHarmon/REAPER-Classical-Editing>. I'm happy to hear about potential improvements/additions and now that I've gotten my feet wet with some very basic Lua scripting, I hope do more in that direction.

²¹<http://ddp.andreasruge.de/>

²²At least in 2022, people, me included, still seem to find value in having a physical classical disc to hand with accompanying booklet and beautiful artwork.

²³I was the OP on the thread <https://forum.cockos.com/showthread.php?t=256286> as well as producing various files to aid in the nulling of the two plugins. I also matched the default values and ranges to those of the Sonnox but otherwise had no hand in the actual coding of the plugin.

²⁴To the tune of differences down at -144dB or something similar.

Thanks

I am appreciative of the collective contributions of the REAPER community with regards the early source-destination actions (Pelleke, in particular), to Bachstudies for his original one-window S/D edit function, “classical” crossfade and other associated classical “helpers”, to ply for the most up-to-date two-tab S/D editing workflow, MPL, X-Raym, me2beats, sonictim, RCJacH, Sai’ke and many more whose skills provided the rest of the scripts described in this guide. Finally, many thanks to Justin and Schwa for such an amazingly versatile DAW.

Appendix A: Essential Reading

- David Miles Huber, Robert E. Runstein. *Modern recording techniques*. Taylor & Francis Ltd., Nov. 2017.
- Haigh, Caroline, John Dunkerley, and Mark Rogers. *Classical recording*. Taylor & Francis Ltd, Oct. 2020.
- Katz, Bob. *Mastering audio*. Taylor & Francis Ltd., Sept. 2014.
- King, Richard. *Recording orchestra and other classical music ensembles*. Taylor & Francis Ltd, Dec. 2016.
- Toft, Robert. *Recording classical music*. New York, NY: Routledge, 2020.

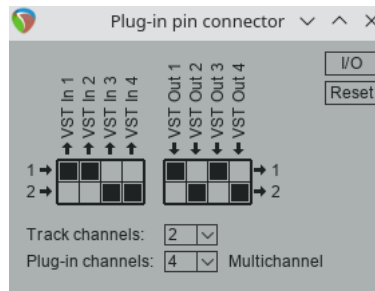


Figure 12: Correct pin setup for true stereo in ReaVerb

Appendix B: Recommended cross-platform free mastering-grade plugins for classical work

First step: Reaplug, with particular mention of *ReaLimit* which I consider the best free transparent limiter available.

EQ:

- ReEQ <https://forum.cockos.com/showthread.php?t=213501>. Also comes with ReSpectrum that is an excellent analyzer.

Compression:

- fircomp v1 <https://jonvaudio.com/fircomp/>.
- Squeezer <https://github.com/mzuther/Squeezer>.
- x42-compressor <https://x42-plugins.com/x42/x42-compressor>.

Limiter:

- x42-limiter <https://x42-plugins.com/x42/x42-limiter>. This is also a very fine transparent limiter, perfect for classical audio duties.

Reverb:

- Tukan Studio's Lexikan (original not v2) (import his repo into ReaPack). Brilliant if you love the Lexicon sound.
- Dragonfly Reverb <https://michaelwillis.github.io/dragonfly-reverb/>. Used as a subtle tail enhancer on acoustic recordings this works quite well.
- For adding reverb to a very dry recording, you might try ReaVerb coupled with the Bricasti impulses. Note, that to take advantage of the true stereo nature of the impulses you need to configure ReaVerb accordingly. See figure 12.
- To be totally honest, algorithmic reverb is the only category where I still might feel the need to reach for a paid option.

Restoration:

- Bertom Denoiser <https://www.bertomaudio.com/>
- DeBess (airwindows) <https://www.airwindows.com/airwindows-starter-kit-2022/>

Metering:

- JS Loudness Meter Peak/RMS/LUFS (Cockos) (included with REAPER).