Stemcell 2.x

User Guide & Workshop Manual

Stemcell 2.0.7
20240904

Contents

1. An Introduction to Stemcell

Stemcell is a powerful set of tools designed for cleaning up surround stems prior to recording or monitoring.

It supports channel widths from mono to 9.16 and on each channel features fully independent HPF/LPF filters, limiter, spectral ducker, gain trims and LFE redirect controls.

It's intended as the final stage in a signal path, giving you the ability to clean up unwanted top or bottom end, catch any "overs", bass-manage signal to and from the LFE, and massage the signal after downmixing with Spanner.

2. Global Controls

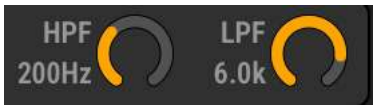
At the top of the UI, you will find the global controls, which affect all channels equally.

The REDIR control is a global gain adjustment for any signal which is being redirected to or from the LFE channel. See the Redirect section for a better description of this feature.

The rest of this section is dedicated to the Spectral Ducker, explained in detail in the Spectral Duck section.

The ATK and RLS controls globally affect the response time of the spectral ducker. These are actually better thought of as "dip rate" and "return rate", so are displayed as percentages rather than pretending to match specific millisecond time values.

The HPF and LPF determine the range of frequencies in which the ducker will operate. Reducing this range will improve performance and allow you to target just specific problem frequencies.



The Sidechain view provides a visualisation of sidechain signal being used (if any) and the response-time and filter settings being applied. The filter values can be controlled here as well.

3. Per-Channel Controls

Each channel has completely independent control parameters, but rather than presenting you with a baffling array of knobs, Stemcell uses a single set of multi-purpose controls which update depending on which channels you have selected. When selecting one or more channels from the graphical displays, these controls will update to display and control just the chosen channels.

When a single channel is selected, you'll see the controls coloured to match the channel in focus. When multiple channels are selected, you'll see the controls switch to colours reflecting their roles, alerting you that you're controlling multiple channels.

If all the selected channels have the same value for a given parameter, the relevant control will

display that value. If the selected channels have different values, you'll see a default value displayed, or in the case of a checkbox, an intermediate state.

Changing any control will set the same value for all selected channels.

FILTERS:
The HPF and LPF controls set the frequency and slope of these filters. Note that when REDIRECT mode is engaged, the Slope controls are disabled as a fixed 24dB/oct slope is enforced. See the Redirect section for a description of this feature.

PEAK LIMIT:
Enables and sets the threshold of the peak limiter. Disabling can reduce CPU usage.

SPEC DUCK:
Enables and controls the Spectral Duck processor. SENS controls how aggressively the ducker responds to the sidechain signal. More SENS results in deeper cuts. DEPTH controls the maximum cut amount for any frequency. Disabling can reduce CPU usage.

REDIRECT:
Enables redirection to/from the LFE, and offers additional gain for the redirected signal. See the Redirect section for a description of this feature.

MUTE/SOLO:
Completely mutes a channel (or other channels) including signal redirected to it. Useful for problem solving a stem. The UI will update to show which channels are currently muted.

LISTEN:
Attempts to present you with approximately the signal being removed from a channel. The UI will update to show if a channel is in LISTEN mode, by colouring the filter paths red.

4. Channel Views

The Channel Views are intended to give a visual representation of what is happening for each channel, and for some controls, the ability to set values. It is a multi-purpose display showing:

Signal level (sample peak with reasonably fast ballistics) as the blue bar left to right.

Filter curves for HPF and LPF plus "handles" to allow grabbing and setting these values. Note that when multiple channels are selected, all will be controlled.

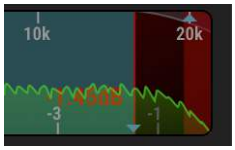
Spectrum analyser (post filtering, ducking) in the colour of the channel.

Spectral Duck realtime effect strength across the frequency spectrum is shown in orange.

Gain trim as the green vertical line left and right of the centre.

Limiter threshold as the red vertical line.

Limiter gain reduction as the solid red bar from right to left.

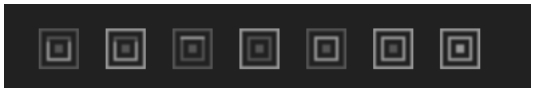


The main controls section will apply to whichever channels are currently "selected".

You can select a channel by clicking on the main view or on the selection button, using shift and command (win: CTRL) modifiers to select a range or add/remove a channel from the existing selection. The selection buttons also allow click-and-drag to quickly select a range of channels.

When a channel is selected, its selection button lights up.

A set of buttons is also offered to apply selection to commonly used groups of channels. E.g. "All channels", "All minus LFE", "All Surrounds"



5. Spectral Duck

The Spectral Duck is a unique processor which allows the gentle ducking of frequencies which might mask or clash with some other "more important" signal. While extreme creative effects can be achieved, Spectral Duck is most useful when applied in small doses, imperceptibly making space in your mix without fundamentally changing it.

The best use case, and its raison-d'être, is to duck the FX and Music stems around the Dialog. Rather than aggressively ducking these stems using a normal dynamics processor, Stemcell allows you to duck just the frequencies active in the sidechain (dialog) signal, and to control the extent to which this ducking occurs.

Continuing our example above, we would insert Stemcell on our FX stem master or aux track, then the dialog signal would be sent to a bus which we choose as the sidechain in our FX Stemcell.

The sidechain signal is displayed in the DUCKER SIDECHAIN view at the top of the UI, showing signal level to aid problem solving any routing issues.

To apply Spectral Ducking to a channel, select it and enable the SPEC DUCK checkbox.

SENS controls the sensitivity of the processor, effectively magnifying the depth of cuts. 33% is the default.

DEPTH controls the maximum cut that may be applied to any one frequency.

By balancing these 2 controls against each other you can achieve ducking which is effective enough without worrying about extreme dips which might become obvious or unpleasant.

The realtime ducker action is shown in each channel as the inverted orange spectrum analyser. The dashed orange line indicates the enabled and sensitivity values for this channel.

The Spectral Duck module features a set of global controls which apply to all channels.

The ATK and RLS controls globally affect the response time of the spectral ducker. These are actually better thought of as "dip rate" and "return rate", so are displayed as percentages rather than pretending to match specific millisecond time values. If you're finding the ducking is too obvious, try playing with these parameters, potentially even speeding up the attack so that the transition occurs under the incoming transient signal.

The HPF and LPF determine the range of frequencies in which the ducker will operate. Reducing this range will improve performance and allow you to target just specific problem frequencies. Note that the spectral shape applied when ducking is smoothed in various ways, so these HPF/LPF values are not hard limits, nor are they traditional filters over the sidechain. It's special. And secret.

When enabled, a light orange dashed line is drawn in the UI

Note that in LISTEN mode, the spectral duck effect is only an approximation of the signal being removed.

6. Redirect

Redirect mode takes the low-frequency signal removed from a channel and sends it to the LFE, or conversely, the high-frequency signal from the LFE can be redirected into the Left and Right channels.

The purpose is primarily to create a powerful bass-management system for monitoring purposes, but it can also be applied in other situations such as downmixing, or IMAX reformatting.

FILTER DESIGN:
The redirect filters use a fixed slope -24dB/oct Linkwitz-Riley design, of the kind commonly used in speaker crossovers. Any other choice of filters or slope would result in a bump or dip at the crossover frequency, so when REDIRECT is engaged for a channel, the slope parameter is ignored, and disabled in the GUI. Note that the OFF state of the slope parameter is also ignored.

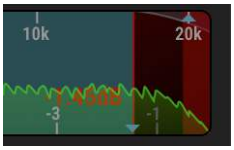
GAIN STRUCTURE:
In most surround-sound monitoring formats, the LFE is aligned to roughly +10dB with respect to the main speaker channels. Often referred to as "10dB in-band gain", the intention is to provide sufficient headroom within the digital realm for the extremely low frequencies used in the LFE channel.

Stemcell's REDIRECT feature automatically accounts for this by using a permanent -10dB when redirecting from mains to LFE, and +10dB when going the other way. In the case of LFE -> Mains, the redirected signal is sent to Left and Right channels, and according to the standard sine-cos pan-law, the result is +7dB to each channel.

GAIN TRIMS:
Given the unpredictability of low frequencies, it may be that you need some control over the level of this redirected signal. Stemcell offers 2 additional, automatable stages of gain: one on each channel, and a master gain stage.

7. Limiter

The peak limiter in Stemcell is intended as a safety feature, offering transparent, uncoloured, digital "true peak" limiting, with a minimum of latency.



Gain reduction resulting from the limiter is displayed as a red bar growing from right to left.

DESIGN:
The limiter uses carefully chosen fixed parameters (other than threshold) and is designed to be as fast as possible without allowing distortion on moderately low frequencies. The limiter on the LFE is set up differently to better control the extremely low frequencies found there.

The limiters on each channel are completely unlinked, so a large transient on the left channel will not cause a dip on the right or center.

CPU:
Due to the oversampling necessary for (so called) "True Peak" compliance, the limiter does have a noticeable tax on the CPU. Disabling the limiter will remove this CPU load, so keep this in mind if you do not intend to use it on a particular instance of Stemcell.

LATENCY:
The limiter is the source of all latency in Stemcell, contributing the 196 samples of delay compensation (at 48kHz). When the limiter circuit is disabled, Stemcell ensures that this latency value does not change, saving you from the dreaded "mystery pop" when the DAW delay compensation engine changes during playback.

8. Console Layouts

In the AAX version of Stemcell, the standard AV81 layout is provided for Avid consoles.

There are 22 separate layouts (one for each channel width) so they all vary in how things are arranged, but the following are representative.

The first page/s offer channel gains on the main fader/knob, plus channel mutes on the IN button.

The SEL button can be used to access the Limiter Threshold on fader/knob.

The Next set of pages are dedicated to each channel separately, with all relevant variable and toggle controls for that channel on one page.

Finally there are pages with REDIRECT gains laid out for all channels, and the global REDIRECT GAIN control.

9. Specifications, Supported Formats etc

HOST PLATFORMS
Mac OS 10.13 or greater. Universal Apple Silicon & Intel binaries.
Windows 10 or 11

PRO TOOLS
Minimum version: unknown - no requirement for recent Pro Tools releases.

PLUGIN FORMATS
VST3, AU, AAX Native & Audiosuite.

SAMPLERATES
44.1kHz thru 192kHz

CHANNEL FORMATS
The following formats are supported as input and output, where input = output.

Mono, Stereo, LCR, Quad
5.0, 5.1, 5.0.2, 5.1.2, 5.0.4, 5.1.4
7.0, 7.1, 7.0.2, 7.1.2, 7.0.4, 7.1.4, 7.0.6, 7.1.6
9.0.4, 9.1.4, 9.0.6, 9.1.6

COPY PROTECTION & AUTHORISATION
Copy protection is provided by PACE Anti-Piracy in the form of the iLok system.
Any use of the Subquake software requires an account with iLok.com, though a hardware dongle is not necessary.
Authorisation is enabled to the iLok dongle, the host computer, or the iLok Cloud.

STEMCELL 1 COMPATIBILITY:
Stemcell 2 is a very different product to v1.x, with many parameters fundamentally changed, and many are entirely new. Automation and presets from v1 will not be compatible with v2 and vice versa.

In order to smooth the transition to v2, the new plugin binary will be named Stemcell2 and appear as a different plugin in your DAW, allowing you to run both v1 and v2 concurrently.

There is a final "legacy" build of Stemcell1 available which runs under the v2 license asset. See https://thecargocult.nz/downloads near the bottom of the page.