Skywalker
Sound™ Tools

Available exclusively in

PixelStrings™

Channel routing, loudness control, intelligent mixing, and retime sampling

Standard Features

All audio processing is guaranteed to be faster than real-time for up to 24 channels on hardware, meeting our minimum specification. The processing performance guarantee includes all dependent libraries.

- Accepts up to 48kHz, 24-bit PCM audio
- Up to 256 total channels per file
- Up to 24 hours per file
- Up to 24 files per job

- **Loudness**
  - Loudness Analysis and Correction of soundfield groups up to 7.1
  - User-defined target loudness and True Peak levels
  - ITU BS.1770-4, dialog-gated 1770 algorithms
  - Leq(m), PPM algorithms
  - Content dialog percentage
  - Look-ahead limiting with clip protection
  - Analysis-only functionality for studio specification QC
  - Loudness compliance per segment or entire program

- **Downmixing**
  - Define up to 2,000 program segments Intelligent downmixing of soundfield groups up to 7.1
  - User-specified downmix coefficients, or Skywalker Sound proprietary formulas
  - Parallel downmixes per job
  - Headroom & digital clipping managed during downmix

- **Summing & Mapping**
  - Advanced mapping matrix allows for channel summing, swapping, exclusion and duplication, and reorganization
  - User-specified summing gain coefficients, or Skywalker Sound proprietary formulas
  - 32-bit float processing

- **Output File Handling**
  - Interleaved or mono WAV file outputs
  - RIFF or BW64 WAV file formats, dependent on length
  - 48 kHz, dither to 24-bit
  - Custom filenames, output locations
  - Sample-accurate output

Premium Features

- **Segment Building**
  - Define up to 2,000 program segments per job
  - Sample-accurate segment bounds
  - Ability to cut, move, replace, trim program
  - Generate null audio for pads and insertions

- **Retiming**
  - High-fidelity audio retiming up to +/- 50% of program length
  - Phase-accurate pitch correction/time alteration of up to 8 channels per group
  - Sample-accurate definition of time-altered segments
  - Individual retime ratios allowed per segment
  - Loudness and true peak transparent through process
  - The Standard Feature set is stackable with the retiming process

- **Upmixing**
  - Content-aware stereo to 5.1 upmix
  - Intelligent field balancing for excellent spatial experience
  - High-quality secondary downmix from upmix
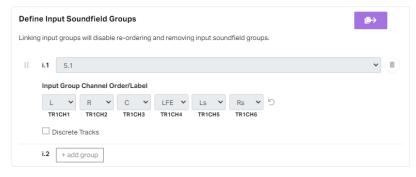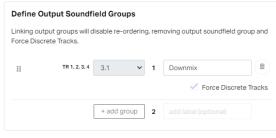
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Overview

The Skywalker Sound Tools Mixing module takes the format of given soundfield groups and performs high-quality summing and up/downmixing based on the user's desired output contents and formats. The Mixing module operates in 32-bit float, allowing for proper headroom during high-gain summing scenarios, and will sequence operations intelligently according to input and output groupings. Additionally, users can swap channels with a comprehensive mapping matrix.
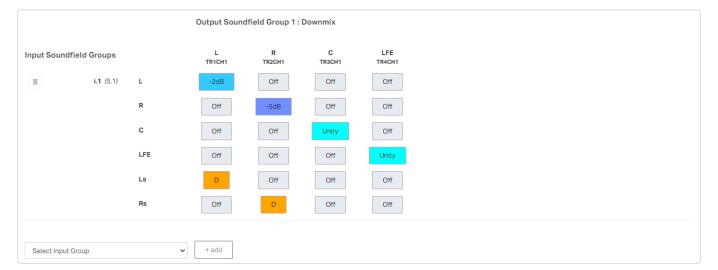
Channel Routing / Mapping

Any channel to any position in any track, replicated, downmixed, or upmixed, in addition to creating any track layout. That is the premise of the channel routing engine of Skywalker Sound Tools. Rearrangement of channels also includes the ability to attenuate to eliminate trips to sound desks for volume imbalance issues.

Define Input Soundfield Groups

Linking input groups will disable re-ordering and removing input soundfield groups.

i.1   5.1

Input Group Channel Order/Label

| L | R | C | LFE | Ls | Rs | ↺ |
| TR1CH1 | TR1CH2 | TR1CH3 | TR1CH4 | TR1CH5 | TR1CH6 | |

☐ Discrete Tracks

i.2   + add group

Define Output Soundfield Groups

Linking output groups will disable re-ordering, removing output soundfield group and Force Discrete Tracks.

TR 1, 2, 3, 4   3.1   1   Downmix

✓ Force Discrete Tracks

+ add group   2   add label (optional)

Channel Routing Mode 🔘

NOTES:
1. Disable channel routing mode to modify input and output groups.
2. Disabling channel routing mode will reset all custom routing matrices.

Output Soundfield Group 1 : Downmix

Input Soundfield Groups			L TR1CH1	R TR2CH1	C TR3CH1	LFE TR4CH1
🗑	i.1 (5.1)	L	-2dB	Off	Off	Off
		R	Off	-5dB	Off	Off
		C	Off	Off	Unity	Off
		LFE	Off	Off	Off	Unity
		Ls	D	Off	Off	Off
		Rs	Off	D	Off	Off

Select Input Group   + add
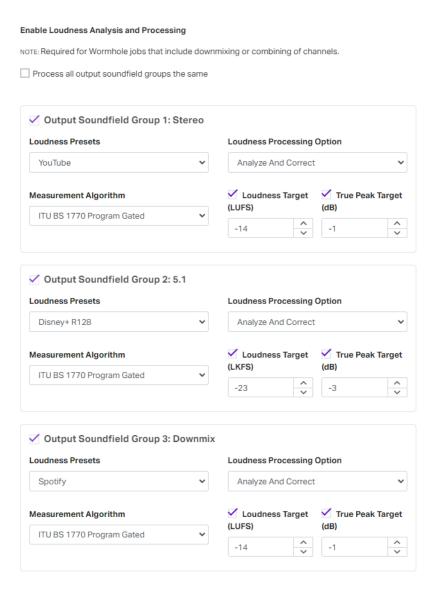

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Loudness Processing

The Skywalker Sound Tools Loudness module provides comprehensive analysis and correction for loudness and peak specifications for up to a 7.1 soundfield group. Current measurement algorithms include ITU BS.1770-4 and dialogue-gated detection (A/85), as well as the ability to adhere to studio-specific technical requirements. There are presets for most popular distribution platforms (Disney+, YouTube, Netflix, etc.).

SST allows for different loudness specifications per soundfield group in the same output. Whether the soundfield group is set for interleaved track or discrete track outputs, the ability to specify different loudness standards is maintained.

Enable Loudness Analysis and Processing

NOTE: Required for Wormhole jobs that include downmixing or combining of channels.

☐ Process all output soundfield groups the same

☑ **Output Soundfield Group 1: Stereo**

Loudness Presets

| YouTube ⌄ |

Loudness Processing Option

| Analyze And Correct ⌄ |

Measurement Algorithm

| ITU BS 1770 Program Gated ⌄ |

☑ **Loudness Target (LUFS)**   ☑ **True Peak Target (dB)**

| -14 ⌃⌄ | | -1 ⌃⌄ |

☑ **Output Soundfield Group 2: 5.1**

Loudness Presets

| Disney+ R128 ⌄ |

Loudness Processing Option

| Analyze And Correct ⌄ |

Measurement Algorithm

| ITU BS 1770 Program Gated ⌄ |

☑ **Loudness Target (LKFS)**   ☑ **True Peak Target (dB)**

| -23 ⌃⌄ | | -3 ⌃⌄ |

☑ **Output Soundfield Group 3: Downmix**

Loudness Presets

| Spotify ⌄ |

Loudness Processing Option

| Analyze And Correct ⌄ |

Measurement Algorithm

| ITU BS 1770 Program Gated ⌄ |

☑ **Loudness Target (LUFS)**   ☑ **True Peak Target (dB)**

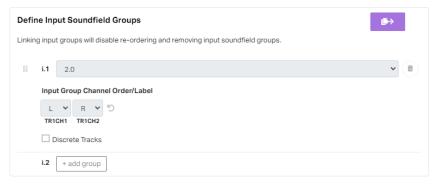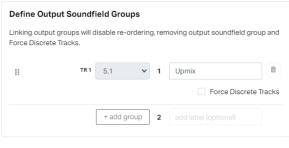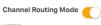| -14 ⌃⌄ | | -1 ⌃⌄ |

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Upmixing

The Upmix functionality within the Skywalker Sound Toolset is designed to be a content-aware, dynamic upmixer that stands out in a relatively crowded and varied field. When the content permits, the upmixer extracts an anchored and full-range center channel adaptive to the incoming signal while minimizing any artifacts typically seen in extraction technology.

The surround channels are expanded from phase and timing cues based on the content itself, maintaining a truly decorrelated and balanced image across the sound field, different from static algorithms such as Lt/Rt decodes. LFE is extracted from the implied common energy within the source material and then balanced across the sound field so the main channels can remain full range.
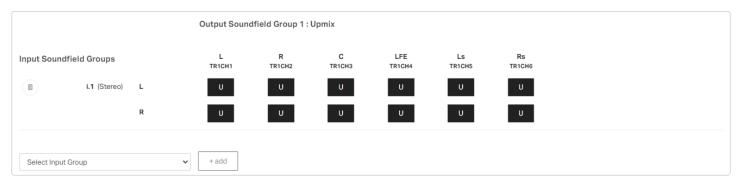
The upmixer also takes care to ensure that any subsequent downmixes in the pipeline still bring the same sonic impression as the original track.
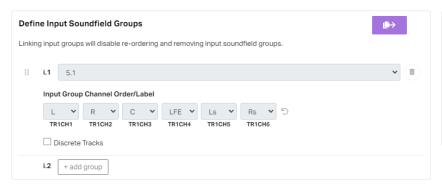
Define Input Soundfield Groups

Linking input groups will disable re-ordering and removing input soundfield groups.

i.1   2.0

Input Group Channel Order/Label

L   R
TR1CH1   TR1CH2

☐ Discrete Tracks

i.2   + add group

Define Output Soundfield Groups

Linking output groups will disable re-ordering, removing output soundfield group and Force Discrete Tracks.

TR 1   5.1   1   Upmix

☐ Force Discrete Tracks

+ add group   2   add label (optional)

Channel Routing Mode 🟠

NOTES:
1. Disable channel routing mode to modify input and output groups.
2. Disabling channel routing mode will reset all custom routing matrices.

	Output Soundfield Group 1 : Upmix					
Input Soundfield Groups	L TR1CH1	R TR1CH2	C TR1CH3	LFE TR1CH4	Ls TR1CH5	Rs TR1CH6
i.1 (Stereo) L	U	U	U	U	U	U
R	U	U	U	U	U	U

Select Input Group   + add
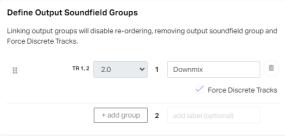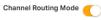
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Downmixing

The Downmixing capabilities in Skywalker Sound Tools allow for definition of up to 2,000 program segments for intelligent downmixing of soundfield groups up to 7.1. Users can specify the downmix coefficients or leverage Skywalker Sound proprietary algorithms. All downmixes are intelligently managed while processing to ensure headroom and digital clipping do not become an issue.
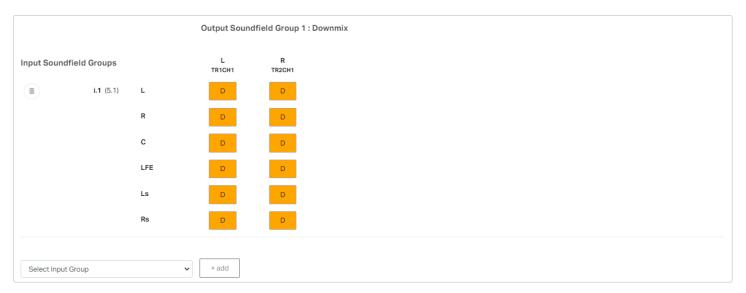
Define Input Soundfield Groups

Linking input groups will disable re-ordering and removing input soundfield groups.

i.1 5.1

Input Group Channel Order/Label

L	R	C	LFE	Ls	Rs
TR1CH1	TR1CH2	TR1CH3	TR1CH4	TR1CH5	TR1CH6

☐ Discrete Tracks

i.2 + add group

Define Output Soundfield Groups

Linking output groups will disable re-ordering, removing output soundfield group and Force Discrete Tracks.

TR 1, 2 2.0 **1** Downmix

✓ Force Discrete Tracks

+ add group **2** add label (optional)

Channel Routing Mode 🔶

NOTES:
1. Disable channel routing mode to modify input and output groups.
2. Disabling channel routing mode will reset all custom routing matrices.

Output Soundfield Group 1 : Downmix

Input Soundfield Groups

			L TR1CH1	R TR2CH1
🗑	i.1 (5.1)	L	D	D
		R	D	D
		C	D	D
		LFE	D	D
		Ls	D	D
		Rs	D	D

Select Input Group   + add

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Segment Builder

The Skywalker Sound Tools Segment Builder allows users to construct an output timeline made up of one or more clips. The clips can be time-window selections from the source file (sample accuracy) or silence. Users can identify, edit, insert, and rearrange up to 2000 segments of content within one job. This allows not only for the definition of retiming bounds but also allows the user to effectively specify pads and trims throughout the program. Skywalker Sound Tools intelligently join segments after processing, with appropriate crossfades or fade in/out, maintaining sample accuracy and phase coherence without perceptible bumps, ticks, or dropouts. Null (blank) audio may be created using the Segment Builder.

Supported Input Types

The PixelStrings transcoding engine prepares audio sources for processing within the Skywalker Sound Tools module. Skywalker Sound Tools accept 24 or 16-bit PCM WAV audio files at 48 kHz to ensure the highest quality audio fidelity processing. Each generated WAV file can contain a maximum of 24 interleaved channels and a maximum of 24 hours of content length. Each job can contain a maximum of 24 distinct WAV files, for a maximum of 576 audio channels processed per job.

Retimer

The Skywalker Sound Tools Retimer module intelligently groups channels for sample-accurate, phase-coherent time stretch from .5x to 2x of original program length. The advanced signal processing ensures no crosstalk between channels and includes the ability to match loudness and peak values to the original input program. Segment bounds within a program can also be defined for individual retime ratios.

Special handling of "spoken word" is included with the SST retime. When spoken word is retimed, there are unique processing requirements to ensure the fidelity of the retimed asset closely mirrors the source, preventing the orator from sounding thin or dull.

File Writer

Processed WAV files can be interleaved or split into individual mono elements, per the user's specification.