AREFYEVSTUDIO

ADUAL

Stereo & Mid/Side Control Utility — User Manual

VERSION 1.0.0



DEVELOPER
AREFYEV STUDIO

PLATFORM
Windows 10/11 (64-bit)

PLUGIN FORMATS
VST3, CLAP, Standalone

OFFICIAL WEBSITE
arefyevstudio.com/en/

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Documentation note
This manual describes ADUAL v1.0.0 for Windows x64. Control behavior and format limitations are specific to this release.

1. Introduction

AREFYEV ADUAL is a stereo and Mid/Side control utility for mixing, mastering, stem processing, and stereo diagnostics. It provides independent Mid and Side gain, panning, muting, width scaling, polarity utilities, and real-time metering in a resizable interface.



Figure 1. Complete ADUAL interface.

Key features

- Three operating modes: INLINE, ENCODE, and DECODE.
- Independent Mid and Side gain, pan, and mute controls.
- Stereo Width control from 0% to 200%.
- Channel swap, overall polarity inversion, and Side-only polarity inversion.
- Input/output peak meters, correlation and balance meters, and a phosphor vectorscope.
- Six factory presets, user presets, A/B snapshots, Undo/Redo, and Parallel Gain Link.
- 64-bit internal floating-point DSP with 32-bit and 64-bit host audio buffer support.

> **Important distinction**
> ADUAL is a stereo utility, not a limiter. Its Output control is a gain trim; it does not prevent output peaks from exceeding 0 dBFS.

2. Installation & Initial Setup

2.1 System requirements

ADUAL v1.0.0 is distributed for Windows 10/11 on 64-bit x86 systems. Use a 64-bit DAW for VST3 or CLAP operation. macOS, Linux, AU, and AAX builds are not included in this release.

2.2 Installing

• Run AREFYEV_ADUAL_v1.0.0_Windows_x64_Setup.exe.

• Choose installation scope: all users (administrator permissions) or current user (no administrator permissions).

• On the Select Components page, choose VST3, CLAP, and/or Standalone.

• Finish installation, then restart the DAW or rescan its plug-in folders.

Windows SmartScreen
The v1.0.0 installer and binaries are not signed with a commercial Authenticode certificate. Windows may show a protection prompt. Only proceed if the installer came from the official AREFYEV distribution and its identity/hash matches the release information.

2.3 Installation paths

Component	All users	Current user
VST3	C:\Program Files\Common Files\VST3\ADUAL.vst3\	%LOCALAPPDATA%\Programs\Common\VST3\ADUAL.vst3\
CLAP	C:\Program Files\Common Files\CLAP\ADUAL.clap	%LOCALAPPDATA%\Programs\Common\CLAP\ADUAL.clap
Standalone	C:\Program Files\AREFYEV\ADUAL\ADUAL.exe	%LOCALAPPDATA%\Programs\AREFYEV\ADUAL\ADUAL.exe
User presets	%APPDATA%\AREFYEV STUDIO\ADUAL\Presets\	Same location

2.4 First launch and scanning

Open your DAW and run a VST3 or CLAP rescan if ADUAL does not appear. Look for ADUAL under manufacturer AREFYEV, typically in an Fx or Tools category. The exact category and scan procedure depend on the host.

2.5 Standalone

Launch ADUAL.exe. Use the standalone Audio/MIDI Settings window to select the audio device type, input/output channels, sample rate, and buffer size. Use headphones or monitor routing carefully to avoid feedback when processing live inputs.

2.6 Upgrading and uninstalling

Run a newer installer to upgrade the existing installation. Uninstall through Windows Settings → Installed Apps. The uninstaller removes installed binaries and shortcuts but preserves user preset files in the AREFYEV STUDIO AppData directory.

3. Interface Overview

The interface uses a fixed 16:9 aspect ratio. The default and minimum size is 800 × 450 pixels; the maximum is 1600 × 900 pixels. Preset window sizes are 800 × 450, 960 × 540, 1280 × 720, and 1600 × 900.



Figure 2. Main interface and control groups.

3.1 Main areas

Area	Main elements
Header	ADUAL logo link, preset selector, Undo, Redo, A/B slots, Parallel Gain Link, Options, Power/Bypass.
Mid section	Mid Gain, Mid Pan, Mid Mute.
Side section	Side Gain, Side Pan, Side Mute.
Vectorscope card	Vectorscope axes and M/S Side Energy Ratio bar.
Utility strip	Mode selector, SWAP, FLIP 180, S 180, Correlation and Balance.
Bottom bar	IN and OUT peak meters, Width, Output, window resize handle.

3.2 Knob interaction

• Drag vertically to adjust a rotary control. Large gain knobs use a 220 px full sweep; smaller controls use 180 px.

• Hold Shift while dragging for finer adjustment at one-quarter of the normal drag speed.

• Double-click a rotary control to reset it to its default.

• Click the numeric readout to enter a value. Press Enter to commit or Escape to cancel.

• Use the mouse wheel or arrow keys for value changes. Shift + arrow keys provides finer steps where supported.

4. Operating Modes

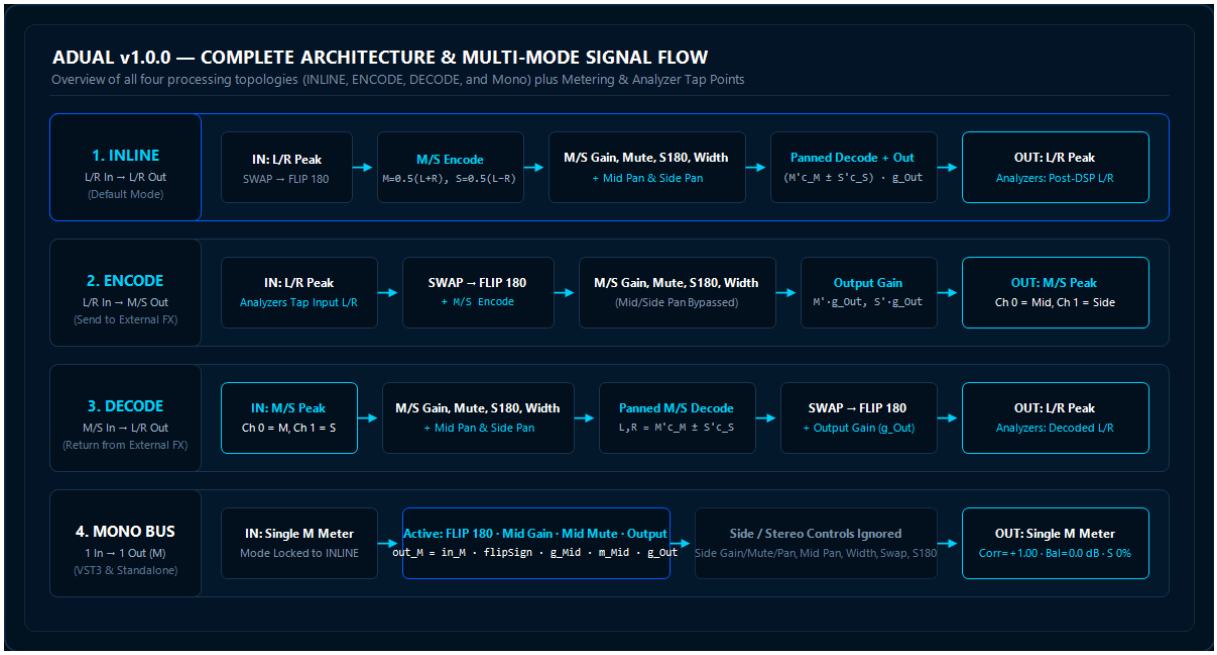


Figure 3. ADUAL signal flow overview.

4.1 INLINE — Stereo in to Stereo out

INLINE is the standard operating mode for stereo tracks, buses, and master channels. ADUAL converts the incoming Left/Right signal to Mid/Side, processes the components, then reconstructs Left/Right.



Figure 4. INLINE mode.

Signal order: Input → SWAP / FLIP 180 → M/S encode → Mid/Side gain, mute, Width and S 180 → panned M/S decode → Output gain → stereo output.

4.2 ENCODE — Stereo in to Mid/Side out

ENCODE converts a standard stereo input into a two-channel Mid/Side output: Channel 0 = Mid; Channel 1 = Side. Use it before a third-party processor when you want to process the Mid and Side channels independently.



Figure 5. ENCODE mode.

> **ENCODE mode limitation**
> Mid Pan and Side Pan are bypassed in the DSP because this mode outputs M/S rather than decoding back to L/R. The knobs remain interactive and automatable, but do not change the encoded output.

4.3 DECODE — Mid/Side in to Stereo out

DECODE accepts Channel 0 = Mid and Channel 1 = Side, then reconstructs Left/Right. It is used after an external M/S processing chain or with a correctly routed Mid/Side microphone pair.



Figure 6. DECODE mode.

Signal order: M/S input → Mid/Side gain, mute, Width and S 180 → panned decode → SWAP / FLIP 180 → Output gain → L/R output.

4.4 Mono bus operation

VST3 and Standalone support matching Mono input/output. On a Mono bus, ADUAL locks to INLINE. ENCODE and DECODE are unavailable. Mid Gain, Mid Mute, FLIP 180, Output, and Bypass affect the mono signal. Side Gain, Side

Mute, Mid Pan, Side Pan, Width, SWAP, and S 180 are ignored by the Mono DSP path. CLAP is Stereo-only in this release.



Figure 7. Mono operation.

5. Mid & Side Processing Controls



Figure 8. Mid and Side control sections.

Control	Range / default	Function
Mid Gain	–24 to +12 dB / 0 dB	Scales the Mid component. In Mono, scales the mono signal.
Mid Pan	L100 to R100 / Center	Steers Mid during L/R decoding in INLINE and DECODE. No DSP effect in ENCODE or Mono.
Mid Mute	Off / On	Mutes Mid. In stereo, Side remains for auditioning; in Mono, output becomes silent.
Side Gain	–24 to +12 dB / 0 dB	Scales the Side difference component.
Side Pan	L100 to R100 / Center	Steers Side during L/R decoding in INLINE and DECODE. No DSP effect in ENCODE or Mono.
Side Mute	Off / On	Mutes Side. In INLINE/DECODE, the output becomes the Mid mono sum.
Width	0 to 200% / 100%	Scales Side amplitude: 0% removes Side; 100% is unity; 200% doubles Side amplitude.
Output	–24 to +12 dB / 0 dB	Post-matrix output trim. Does not act as a limiter.

5.1 Gain controls

Mid and Side Gain use decibel values from –24 dB to +12 dB. A 15 ms smoothing process reduces abrupt parameter changes. Raising Mid emphasizes the correlated center component; raising Side emphasizes stereo difference information. Always level-match when judging tonal or spatial changes.

5.2 Pan controls

Mid Pan and Side Pan use a 0 dB center cosine attenuation law. At Center, both left and right coefficients are unity. Moving a component left or right keeps the selected side at unity and attenuates the opposite side. Pan is active in INLINE and DECODE, but bypassed in ENCODE and Mono.

5.3 Mute controls

Mid Mute and Side Mute ramp their respective components to silence over 15 ms. In stereo, Mid Mute lets you audition Side information; Side Mute removes the Side component and leaves the Mid mono sum.

6. Utility & Phase Controls

6.1 SWAP

SWAP exchanges the Left and Right channels. In INLINE and ENCODE it is applied before M/S encoding. In DECODE it is applied after M/S decoding, so it swaps the reconstructed stereo channels rather than the incoming Mid and Side channels. It has no audible effect on a Mono bus.

6.2 FLIP 180

FLIP 180 inverts the polarity of both channels. In stereo this multiplies Left and Right by –1. In Mono it inverts the mono signal. Use it when checking polarity relationships between a track and other microphones or stems; it is not a time-alignment tool.

6.3 S 180

S 180 inverts only the Side component while leaving Mid unchanged. It can be useful when decoding an M/S microphone recording with reversed Side-capsule polarity. It has no audible effect on a Mono bus.

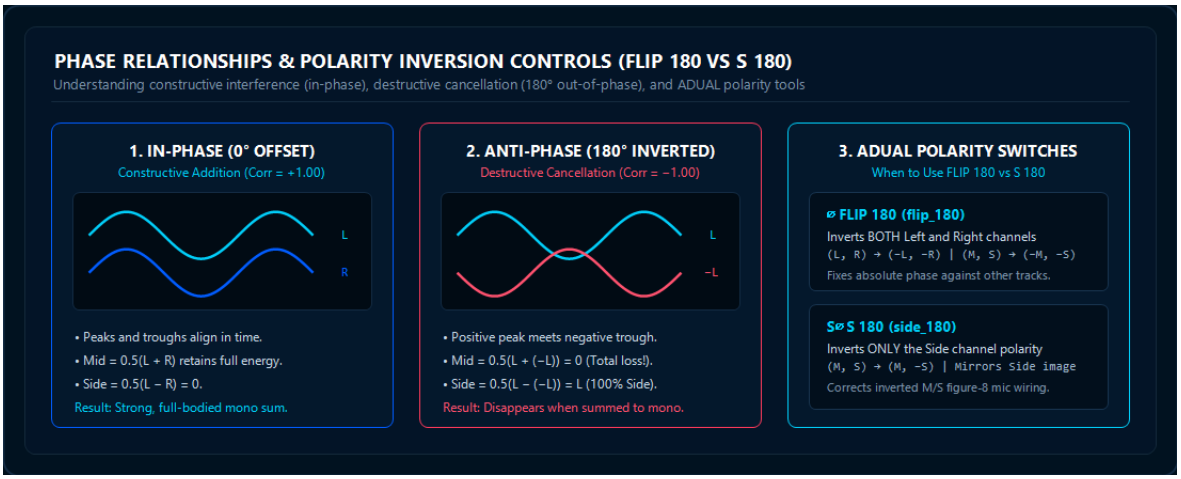


Figure 9. Overall polarity and Side polarity relationships.

6.4 Width

Width multiplies the Side component by a factor from 0.0 to 2.0. At 0%, Side is removed and the output becomes the Mid component, provided Mid Pan is centered. At 100%, Side is unchanged. At 200%, Side amplitude is doubled (+6.02 dB relative to its original level). Width is not a substitute for checking mono compatibility.



Figure 10. Width scaling concept.

7. Meters & Visual Analyzers



Figure 11. Active meters and vectorscope.

7.1 IN and OUT peak meters

The meters display sample-peak levels over a visual range of –60 to 0 dBFS. Attack is instantaneous at the sample level; release is approximately 20 dB per second. The red clip indicator latches when a sample exceeds 0 dBFS (absolute sample value greater than 1.0). Left-click the meter bar to clear the latch. These are sample-peak meters, not true-peak meters.

7.2 Vectorscope

The vectorscope maps each stereo sample pair to x = (R – L)/2 and y = (L + R)/2. The vertical M axis represents in-phase center content; the horizontal Side axis represents left/right difference. A pure mono signal forms a vertical trace. A pure anti-phase signal forms a horizontal trace.

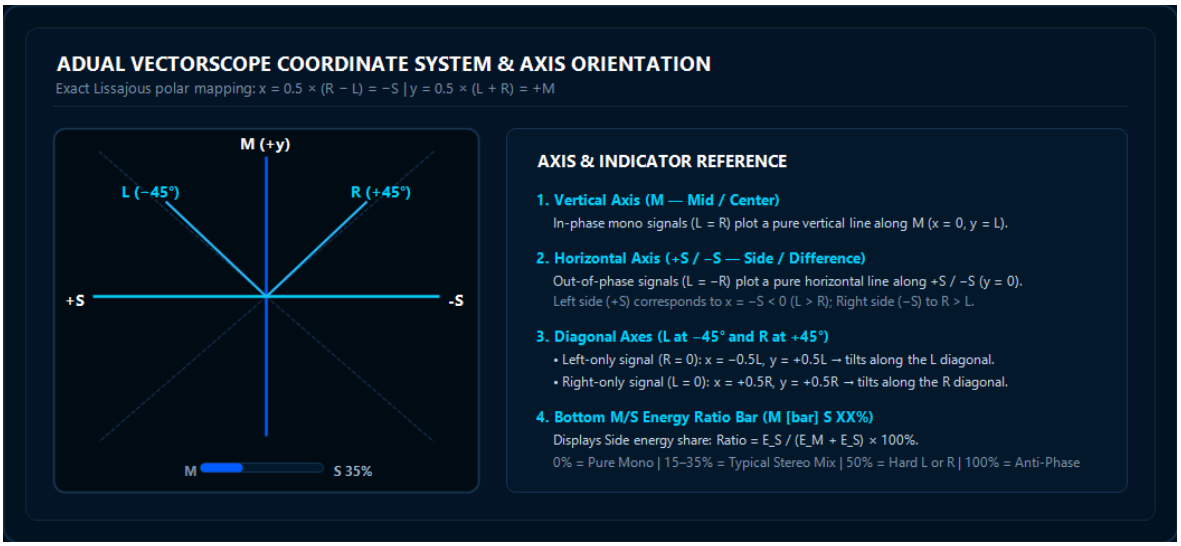


Figure 12. Vectorscope axis orientation.

7.3 Interpreting common patterns

Signal pattern	Typical display	Interpretation
Pure mono	Vertical M-axis trace; Side 0%	Left and Right are identical.
Narrow stereo	Narrow vertical cloud	Limited Side energy.
Balanced stereo	Vertically oriented cloud	Mid energy remains substantial.
Wide / anti-phase-heavy	Horizontally spread cloud	Check mono compatibility and correlation.
Left-only / Right-only	Diagonal trace	Signal is present predominantly in one channel.
Pure anti-phase	Horizontal Side-axis trace; Side 100%	The signal cancels when summed to mono.

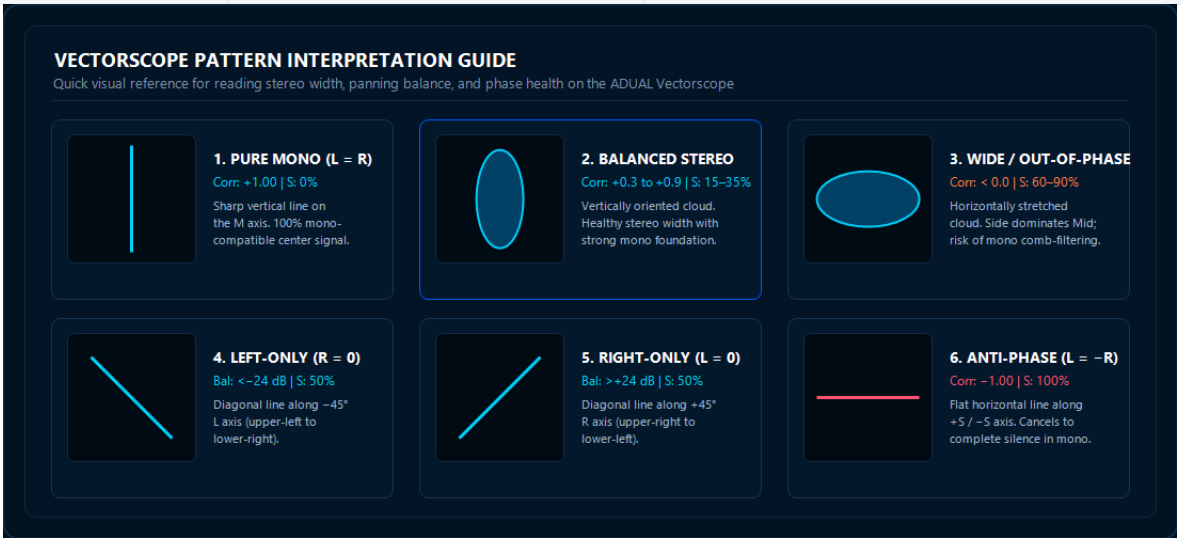


Figure 13. Vectorscope pattern interpretation.

7.4 Correlation

The Correlation meter ranges from –1.00 to +1.00 and uses a 500 ms exponentially weighted measurement. +1.00 indicates identical channels; values near zero indicate weak or undefined inter-channel correlation; negative values indicate opposing polarity relationships and potential cancellation when summed to mono. A single active channel and silence can also produce 0.00 because the normalized correlation is undefined in those cases.



Figure 14. Correlation guide.

7.5 Balance

The Balance meter shows the Left/Right energy ratio over a 500 ms window. 0 dB indicates equal energy. Negative values indicate more Left energy; positive values indicate more Right energy. The visual scale spans approximately –24 dB to +24 dB.

8. Presets & Header Workflow Utilities

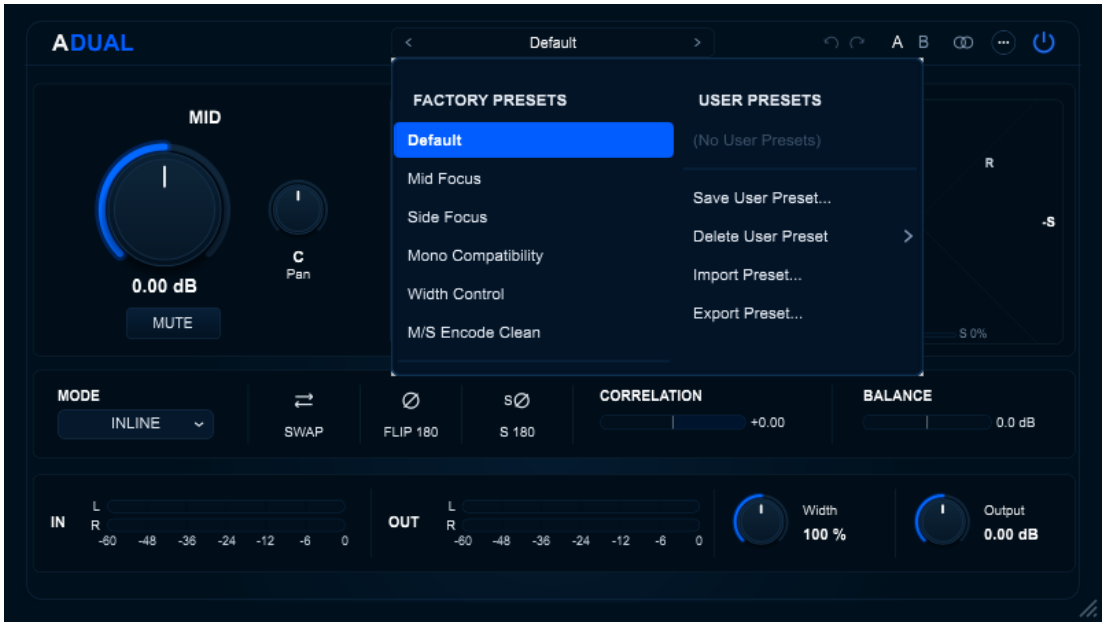


Figure 15. Preset browser.

8.1 Factory presets

Preset	Starting configuration
Default	INLINE; gains 0 dB; pans Center; Width 100%.
Mid Focus	INLINE; Mid +2.0 dB; Side –2.0 dB; Width 90%.
Side Focus	INLINE; Mid –1.5 dB; Side +2.5 dB; Width 115%.
Mono Compatibility	INLINE; Width 0% (Mid Pan centered for a conventional mono sum).
Width Control	INLINE; Width 130%; Output –0.5 dB.
M/S Encode Clean	ENCODE; Width 100%.

8.2 User presets

User presets use the .adualpreset file extension and are stored in %APPDATA%\AREFYEV STUDIO\ADUAL\Presets\. The preset browser provides Save, Delete, Import, and Export actions. Preset names are subject to Windows filename restrictions; avoid reserved device names and forbidden filename characters.

8.3 Undo and Redo

ADUAL provides a 64-transaction Undo/Redo history. Continuous knob drags are grouped into one action when the gesture ends. Rapid wheel and keyboard changes are grouped using a 400 ms coalescing window. The history is per plugin instance and is cleared when the plugin state is restored.

8.4 A/B snapshots

A and B store two temporary processing snapshots. Click A or B to switch to that state. Shift-click a slot to capture the current state into it. Right-click provides copy actions between A and B. Snapshots cover the processing parameters; they are not independent DAW project files.



Figure 16. A/B comparison and Parallel Gain Link.

8.5 Parallel Gain Link

Parallel Gain Link couples manual GUI adjustments of Mid Gain and Side Gain using normalized delta matching. It does not couple host automation playback. This keeps separate DAW automation lanes independent. Link state is stored in the plugin session metadata, not in user preset files.

8.6 Options menu

The Options menu provides access to Reset to Default, User Presets, A/B Snapshot actions, window-size options, the AREFYEV STUDIO website, and About ADUAL.

9. Mid/Side Audio Concepts & Mathematical Reference



Figure 17. Conventional stereo and Mid/Side representation.

Mid/Side processing represents a stereo signal as a sum component and a difference component. Mid contains information common to Left and Right. Side contains the difference between the channels.

Encoding:

$$M = 0.5 \times (L + R)$$
$$S = 0.5 \times (L - R)$$

Decoding:

$$L = M + S$$
$$R = M - S$$

At unity gains, 100% Width, centered pans, and no mute or polarity changes, encoding followed by decoding reconstructs the original stereo signal to floating-point precision. This is a mathematical unity reconstruction, not a claim of bit-identical digital pass-through.

9.1 Pan law

For normalized pan p between –1 and +1, the channel on the selected side remains at unity while the opposite channel is attenuated by a cosine curve. At center, both coefficients are 1.0 (0 dB).

$$\text{Left coefficient: } c_L(p) = 1 \text{ when } p \le 0; \text{ otherwise } \cos(p \times \pi/2).$$
$$\text{Right coefficient: } c_R(p) = 1 \text{ when } p \ge 0; \text{ otherwise } \cos(|p| \times \pi/2).$$

9.2 Processing equation

The processed Mid and Side components are formed by applying their respective gain and mute factors; Side is additionally multiplied by Width and the S 180 polarity sign. The panned components are then decoded and multiplied by Output Gain. Exact routing differs by operating mode as described in Section 4.

10. Practical Mixing, Mastering & Studio Workflows

10.1 Narrowing an overly wide mix

Start with Width at 100%. Reduce gradually toward 80–90%, listening for a more focused center. Watch Correlation and audition the result in mono. Avoid narrowing by a fixed percentage without listening.

10.2 Expanding stereo width

Increase Width in small steps above 100%. Level-match with Output after widening. Monitor correlation and mono compatibility; wider is not automatically better.

10.3 Emphasizing the center

Raise Mid Gain modestly or reduce Side Gain. Compare at matched loudness to avoid mistaking a level increase for improved clarity.

10.4 Emphasizing ambience

Raise Side Gain modestly or reduce Mid Gain. Check that reverbs, stereo microphones, and panned elements remain stable in mono.

10.5 Auditioning Side information

Engage MID MUTE in a stereo mode to hear the Side component in isolation. Disengage it before returning to normal monitoring.

10.6 Checking the mono sum

Engage SIDE MUTE in INLINE or DECODE. The output becomes the Mid component on both channels. Compare the result with the full stereo signal.

10.7 External Mid/Side processing

Insert ADUAL in ENCODE mode, process Channel 0 (Mid) and Channel 1 (Side) with a suitable two-channel processor, then use a second ADUAL instance in DECODE mode to reconstruct L/R. Confirm that the intermediate processor preserves the channel order.

10.8 Decoding an M/S microphone pair

Route the Mid microphone to input Channel 0 and the Side figure-eight microphone to Channel 1. Select DECODE. Adjust Width and Side Gain by ear. Toggle S 180 if the Side capsule polarity is reversed.

10.9 Correcting channel orientation or polarity

Use SWAP to exchange left and right. Use FLIP 180 to invert both channels. Use S 180 to invert only the Side component. Change one control at a time and verify against the source and microphone wiring.

10.10 A/B comparison

Capture one configuration in A and an alternative in B. Switch between them at matched loudness. Use the same musical passage and avoid changing multiple unrelated parameters during the comparison.

Suggested values are starting points
The presets and workflow examples are not universal mastering targets. Adjust settings for the source material and verify the result by listening, metering, and mono checks.

11. Technical Specifications

Specification	Value
Product	AREFYEV ADUAL v1.0.0
Platform	Windows 10/11, x86_64
Formats	VST3, CLAP 1.2.7, Standalone
Channel layouts	VST3/Standalone: Stereo and Mono matching I/O. CLAP: Stereo only.
Internal DSP precision	64-bit floating-point (double)
Host buffer support	32-bit float and 64-bit double
Processing latency	The research package reports 0 samples; host-reported latency declaration was not independently evidenced in the supplied traceability matrix.
Parameter count	13 APVTS parameters
Continuous control smoothing	15 ms
Mode / bypass transition	5 ms direct crossfade for INLINE/Mono bypass; 5 ms fade-out + 5 ms fade-in for domain changes.
Factory presets	6
User preset format	.adualpreset
User preset location	%APPDATA%\AREFYEV STUDIO\ADUAL\Presets\
Window size	16:9; 800×450 minimum/default to 1600×900 maximum
Vectorscope	320×320 accumulation grid; 30 Hz display update; 200 ms decay
Correlation / Balance	500 ms exponentially weighted measurement

The 13 host parameters are: mode, mid_gain, side_gain, mid_pan, side_pan, mid_mute, side_mute, width, output_gain, channel_swap, flip_180, side_180, and bypass.

12. Troubleshooting & FAQ

ADUAL does not appear in the DAW

Confirm that you installed the correct format and that the DAW scans the installation folder. Current-user installation paths may need to be added manually. Use a 64-bit DAW.

ENCODE and DECODE are unavailable

The plugin is on a Mono bus. Switch to a Stereo bus. Mono operation is INLINE-only.

Mid Pan or Side Pan has no audible effect

These controls are bypassed in ENCODE and ignored on Mono buses. Use INLINE or DECODE on a Stereo bus.

Side controls seem ineffective

The source may contain little or no Side energy. A dual-mono source (L = R) has Side = 0, so Side Gain and Width cannot create Side information that is not present.

Audio sounds hollow in mono

Check Correlation and the vectorscope. Reduce Width or Side Gain, inspect polarity, and compare the Side-muted Mid sum.

Red clip indicator remains lit

The clip latch is sticky. Left-click the IN or OUT meter bar to clear it. Lower signal level if clipping is still occurring.

Mid Gain and Side Gain move together

Parallel Gain Link is enabled. Disable the Link icon to edit the two gains independently.

Host automation does not move the linked gain

This is intentional. Parallel Gain Link applies to manual GUI gestures, not host automation playback.

Cannot save a user preset

Check that the name is not empty, does not exceed 120 characters, does not end with a space or period, and does not contain forbidden Windows filename characters or reserved device names.

13. Support

For product information, updates, and support, visit AREFYEV STUDIO:

https://arefyevstudio.com/en/

When reporting a problem

• ADUAL version (1.0.0).

• Windows version and build.

• DAW name and version.

• Plugin format (VST3, CLAP, or Standalone).

• A short description of the issue and the steps required to reproduce it.

• A screenshot or audio example when relevant.

VST3 is the primary recommended plug-in format for this Windows release. CLAP passed its validation suite and has been manually tested in REAPER; other DAW/host combinations have not been individually verified. Compatibility can vary by host version and configuration.

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