NIVIEM

DALEQ CORE

USER MANUAL

Premium 8-Band Parametric Equalizer with Spectrum Analyzer

Version 1.0

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INTRODUCTION

DalEQ Core is a professional 8-band parametric equalizer designed for precision audio shaping. Whether you're mixing, mastering, or sound designing, DalEQ Core provides the tools you need with studio-grade quality and an intuitive workflow.

WHAT MAKES DALEQ SPECIAL

- **8 Fully Parametric Bands**: Each band independently configurable with frequency, gain, Q, and filter type
- **Zero-Delay Feedback Filters**: TPT (Topology-Preserving Transform) filter design for analog-like response
- **Variable Slopes**: 6 dB/oct to 96 dB/oct for surgical precision or gentle shaping
- **Linear Phase Mode**: Zero phase distortion for mastering applications
- **Real-Time Spectrum Analyzer**: 4096-point FFT with multiple display options
- **Mid/Side Processing**: Per-band stereo mode selection (Stereo, Left, Right, Mid, Side)
- **Dynamic EQ**: Built-in dynamics processing per band (compression, expansion)
- **Modern Workflow**: Undo/Redo, A/B comparison, keyboard shortcuts
- **Full DAW Automation**: 126 automatable parameters for complete host integration
- **True Peak Metering**: ITU-R BS.1770 compliant stereo meters with clip detection

FEATURES OVERVIEW

FILTER ARCHITECTURE

DalEQ Core uses **Zero-Delay Feedback (ZDF)** filter topology based on the work of Vadim Zavalishin. This provides:

- Correct analog-like response at all frequencies

- Stable behavior at high resonance values
- Accurate frequency response even near Nyquist
- No pre-ringing or phase anomalies in Zero Latency mode

PROCESSING MODES

MODE	LATENCY	BEST FOR
Zero Latency	0 samples	Live performance, tracking, real-time use
Linear Phase	1024-8192 samples	Mastering, transparent EQ, parallel processing

FILTER TYPES AVAILABLE

TYPE	DESCRIPTION
Low Shelf	Boost/cut below target frequency
High Shelf	Boost/cut above target frequency
Bell (Peaking)	Boost/cut centered on target frequency
Low Cut (High Pass)	Remove frequencies below target
High Cut (Low Pass)	Remove frequencies above target
Notch	Remove narrow band at target frequency
Bandpass	Pass only frequencies around target
Tilt Shelf	Simultaneous low boost + high cut (or vice versa)
Allpass	Phase rotation without amplitude change

INSTALLATION

SYSTEM REQUIREMENTS

PLATFORM	REQUIREMENTS
macOS	10.13 (High Sierra) or later, Intel or Apple Silicon
Windows	Windows 10/11 (64-bit), SSE2-compatible CPU

- **Formats**: Audio Unit (AU - macOS only), VST3 (macOS & Windows)
- **DAW**: Logic Pro, GarageBand, Ableton Live, Cubase, Studio One, Reaper, Bitwig, FL Studio, Pro Tools, or any AU/VST3 host
- **RAM**: 4 GB minimum, 8 GB recommended
- **Disk Space**: ~30 MB

INSTALLATION STEPS

MACOS

1. Download the DalEQ Core ZIP file
2. Extract the archive
3. Copy the plugin files to:
   - **AU**: `/Library/Audio/Plug-Ins/Components/`
   - **VST3**: `/Library/Audio/Plug-Ins/VST3/`
4. Restart your DAW
5. Scan for new plugins if required

> **NOTE:** On first launch, macOS may ask you to allow the plugin in System Preferences > Security & Privacy.

WINDOWS

1. Download the DalEQ Core ZIP file
2. Extract the archive
3. Copy the VST3 folder to:
   - **VST3**: `C:\Program Files\Common Files\VST3\`
4. Restart your DAW
5. Scan for new plugins if required

> **NOTE:** Windows may show a SmartScreen warning. Click "More info" and then "Run anyway" to proceed.

QUICK START

BASIC EQ IN 30 SECONDS

1. **Insert DalEQ Core** on your audio track
2. **Click a band point** on the EQ curve to select it
3. **Drag horizontally** to change frequency

4. **Drag vertically** to change gain
5. **Scroll mouse wheel** on a band to adjust Q

INSTANT SETTINGS

GOAL	BAND	TYPE	FREQUENCY	GAIN	Q
Warm up vocals	1	Low Shelf	200 Hz	+2 dB	0.7
Add presence	2	Bell	3 kHz	+3 dB	1.5
Remove mud	3	Bell	300 Hz	-3 dB	2.0
High cut on bass	4	High Cut	8 kHz	-	12 dB/oct
De-ess vocals	5	Bell (Dynamic)	6 kHz	-6 dB	4.0

> **TIP:** Double-click a band to reset its gain to 0 dB.

USER INTERFACE OVERVIEW

LAYOUT ORGANIZATION

```
+-------------------------------------------------------------------------+
|                              HEADER BAR                                 |
|  [NIVIEM] [DalEQ Core]   [Bypass] [Undo/Redo] [A/B] [Preset v] [+]     |
+-------------------------------------------------------------------------+
|                                                                         |
|  +-------------------------------------------------------------------+  |
|  |                        SPECTRUM DISPLAY                           |  |
|  |                                                                   |  |
|  |   dB                                                              |  |
|  |   +12 +-----------------------------------------------------      |  |
|  |       |                    o Band 3                               |  |
|  |    +6 +----------------o-------------------------------------     |  |
|  |       |             Band 2      o Band 4                          |  |
|  |     0 +=====================================================      |  |
|  |       |  o Band 1                            o Band 5             |  |
|  |    -6 +-----------------------------------------------------      |  |
|  |       |                                                           |  |
|  |   -12 +-----------------------------------------------------      |  |
|  |       20    50   100   200   500   1k    2k    5k   10k   20k Hz  |  |
|  |                                                                   |  |
|  |  [Spectrum Analyzer overlay with real-time FFT]                   |  |
|  |                                                                   |  |
|  +-------------------------------------------------------------------+  |
|                                                                         |
+-------------------------------------------------------------------------+
|                             TOOLBAR                                     |
|  [Band Count: 4 v] [Phase: Zero Lat v] [Analyzer: Post v] [Channel v]   |
+-------------------------------------------------------------------------+
```

VISUAL ELEMENTS

- **Band Points**: Draggable circles representing each EQ band
- **EQ Curve**: Combined frequency response of all bands
- **Spectrum Analyzer**: Real-time FFT display (optional)
- **Grid Lines**: Frequency (logarithmic) and gain (linear) reference

CONTROLS REFERENCE

BAND CONTROLS

Each of the 8 bands has the following parameters:

FREQUENCY

Range: 20 Hz - 20,000 Hz

Sets the center/corner frequency for the band.

RANGE	TYPICAL USE
20-80 Hz	Sub-bass, rumble removal
80-300 Hz	Bass, warmth, mud
300-1000 Hz	Low-mids, body, boxiness
1-4 kHz	Presence, clarity, harshness
4-10 kHz	Brilliance, air, sibilance
10-20 kHz	Ultra-highs, sparkle

GAIN

Range: -30 dB to +30 dB

Sets the boost or cut amount. Only applies to Bell, Shelf, and Tilt types.

RANGE	CHARACTER
+/-1-2 dB	Subtle, mastering-grade
+/-3-6 dB	Noticeable, mixing-grade

+/-6-12 dB	Significant shaping
+/-12+ dB	Extreme, creative/corrective

Q (QUALITY FACTOR)

Range: 0.025 - 40.0

Controls the bandwidth of the filter. Higher Q = narrower bandwidth.

Q VALUE	BANDWIDTH	USE CASE
0.3-0.7	Very wide	Gentle tonal shaping
0.7-1.5	Wide	Musical EQ moves
1.5-4.0	Medium	Standard mixing
4.0-10	Narrow	Surgical cuts
10-40	Very narrow	Notch filtering, resonance removal

FILTER TYPES

LOW SHELF

Boosts or cuts all frequencies below the target frequency. The transition follows a shelf curve that reaches full effect about one octave below the set frequency.

Best for: Adding warmth, reducing low-end rumble, bass enhancement

HIGH SHELF

Boosts or cuts all frequencies above the target frequency. The transition follows a shelf curve that reaches full effect about one octave above the set frequency.

Best for: Adding air/brilliance, reducing harshness, high-frequency rolloff

BELL (PEAKING)

Boosts or cuts frequencies centered on the target frequency. The Q parameter controls the width of the affected region.

Best for: Most mixing tasks, presence boosts, notching out problem frequencies

LOW CUT (HIGH PASS)

Removes all frequencies below the target frequency. The slope setting determines how steeply frequencies are attenuated.

Best for: Removing rumble, cleaning up low-end, reducing proximity effect

HIGH CUT (LOW PASS)

Removes all frequencies above the target frequency. The slope setting determines how steeply frequencies are attenuated.

Best for: Darkening sources, removing hiss, vintage character

NOTCH

Creates a very narrow cut at the target frequency. Useful for removing specific problem frequencies like hum or resonances.

Best for: 50/60 Hz hum removal, resonance elimination, feedback control

BANDPASS

Passes only frequencies around the target frequency, cutting both above and below. Width controlled by Q.

Best for: Special effects, isolating frequency ranges, telephone/radio simulation

TILT SHELF

A unique filter that simultaneously boosts low frequencies while cutting high frequencies (or vice versa). Creates a "tilting" effect across the spectrum.

Best for: Overall tonal balance, quick brightness/warmth adjustments

> **NOTE:** The Q parameter is not used by Tilt Shelf filters. The tooltip will display "Q: —" to indicate this.

ALLPASS

Rotates the phase of frequencies around the target without changing amplitude. Useful for phase alignment and special effects.

Best for: Phase correction, creative effects, comb filtering when mixed with dry signal

FILTER SLOPES

For Low Cut and High Cut filters, you can select the steepness:

SLOPE	CHARACTER	USE CASE
6 dB/oct	Very gentle	Subtle rolloff, natural sound
12 dB/oct	Standard	General purpose, musical
18 dB/oct	Medium	Tighter control
24 dB/oct	Steep	Clean cuts, mixing
36 dB/oct	Very steep	Surgical precision
48 dB/oct	Extreme	Brickwall-like behavior
72 dB/oct	Ultra steep	Near-brickwall
96 dB/oct	Maximum	Maximum steepness

> **NOTE:** Higher slopes introduce more phase shift in Zero Latency mode. Use Linear Phase mode for transparent steep filtering.

SPECTRUM ANALYZER

DISPLAY MODES

PRE/POST EQ

- **Pre**: Shows the spectrum BEFORE EQ processing
- **Post**: Shows the spectrum AFTER EQ processing

Toggle via the Analyzer Mode button in the toolbar.

CHANNEL SELECTION

- **L**: Left channel only
- **R**: Right channel only
- **L+R**: Both channels averaged
- **M**: Mid channel (L+R)/2
- **S**: Side channel (L-R)/2

ANALYZER SETTINGS

SETTING	OPTIONS	DESCRIPTION
Speed	Slow / Medium / Fast	How quickly the display responds
Range	60 dB / 90 dB / 120 dB	Vertical display range
Tilt	0 / 3 / 4.5 dB/oct	Pink noise compensation (default: 4.5)
Resolution	Low / Medium / High / Maximum	FFT size (1024 / 2048 / 4096 / 8192 points)

> **TIP:** Use 4.5 dB/oct tilt (default) for a balanced visual representation of most audio material.

FREEZE FUNCTION

Click the **FREEZE** button to capture the current spectrum for detailed analysis. While frozen:

- The spectrum display stops updating
- You can examine specific frequency content
- Click **FROZEN** to unfreeze and resume real-time display

TIME-BASED DECAY

The analyzer uses professional-grade time-based smoothing:

- **Separate attack/decay**: Fast attack preserves transients, controlled decay provides smooth visuals
- **Frame-rate independent**: Consistent behavior at any display refresh rate
- **Peak hold**: Configurable hold duration before peaks decay

OUTPUT METER

DalEQ Core features a premium True Peak stereo meter in the footer area.

FEATURES

- **True Peak Detection**: ITU-R BS.1770 compliant with 4x oversampling to catch inter-sample peaks
- **Stereo L/R Meters**: Independent left and right channel metering
- **RMS Display**: VU-style RMS level shown behind the peak bars
- **Non-linear Scale**: -60 dB to +30 dB range with 0 dB at 80% position for better resolution
- **Peak Hold**: White markers show recent peak levels
- **CLIP Indicator**: Latching indicator that stays lit until clicked (resets on click)

METER BALLISTICS

- **Peak decay**: 26 dB/sec per IEC 60268-10 Type I standard
- **RMS integration**: ~300ms for smooth VU-style response

> **TIP:** Click the CLIP indicator to reset it after clipping has occurred.

PHASE MODES

ZERO LATENCY (NATURAL PHASE)

- **Latency**: 0 samples
- **Character**: Natural, analog-like phase response
- **Best for**: Live performance, tracking, real-time monitoring

The default mode uses minimum-phase IIR filters that introduce no latency but have a frequency-dependent phase response (like analog EQs).

LINEAR PHASE

- **Latency**: Varies by quality setting (see below)
- **Character**: Zero phase distortion, perfectly symmetric impulse response
- **Best for**: Mastering, parallel processing, maintaining transient integrity

Linear Phase mode uses FIR filters generated from the IIR response. This eliminates phase distortion but introduces latency.

QUALITY	FIR LENGTH	LATENCY @ 44.1 KHZ	LATENCY @ 96 KHZ
Low	1024	~12 ms	~5 ms
Medium	2048	~23 ms	~11 ms
High	4096	~46 ms	~21 ms
Ultra	8192	~93 ms	~43 ms

> **NOTE:** Your DAW should automatically compensate for this latency using Plugin Delay Compensation (PDC).

MID/SIDE PROCESSING

MID/SIDE PROCESSING

Each band can operate in different stereo modes:

MODE	DESCRIPTION
Stereo	Normal stereo processing (L and R affected equally)
Left	Only affects the left channel
Right	Only affects the right channel
Mid	Only affects the mid (center) content
Side	Only affects the side (stereo difference) content

USE CASES

- **Mid-only low cut**: Remove center rumble while preserving stereo bass
- **Side-only high shelf**: Add width to high frequencies
- **Left/Right independent**: Fix balance issues in poorly recorded material

> **NOTE:** In Linear Phase mode, non-Stereo bands are processed as IIR (post-convolution) to maintain correct stereo imaging.

DYNAMIC EQ

Each band can have built-in dynamics processing, turning the EQ into a frequency-selective compressor or expander.

DYNAMIC MODES

MODE	BEHAVIOR
Off	Static EQ (normal behavior)
Compress	Reduces gain when signal exceeds threshold
Expand	Reduces gain when signal falls below threshold
Upward Compress	Boosts gain when signal falls below threshold
Upward Expand	Boosts gain when signal exceeds threshold

DYNAMIC PARAMETERS

PARAMETER	RANGE	DESCRIPTION
Threshold	-60 to +20 dB	Level at which dynamics engage
Ratio	1:1 to infinity:1	Amount of gain reduction/boost
Attack	0.1 to 500 ms	How fast dynamics respond to increases
Release	10 to 5000 ms	How fast dynamics recover
Knee	0 to 12 dB	Soft knee width for gradual onset
Range	0 to 30 dB	Maximum gain change

COMMON USES

APPLICATION	MODE	SETTINGS
De-essing	Compress	6 kHz, -6 dB, fast attack
Resonance taming	Compress	Problem freq, narrow Q, low ratio
Presence boost on loud parts	Upward Expand	3 kHz, moderate threshold
Low-end consistency	Compress	100 Hz, wide Q, slow attack

PRESET SYSTEM

FACTORY PRESETS

DalEQ Core includes 30+ professionally designed factory presets organized by category:

GENERAL

- **Default** - Clean starting point with 4 bands
- **Gentle Smile Curve** - Classic smile EQ with subtle low/high boost
- **Flat Response** - Unity gain reference

VOCALS

- **Vocal Presence** - Adds clarity with 3kHz presence boost

- **Vocal Warmth** - Low-mid boost for body
- **Vocal Air** - High-frequency shimmer
- **Vocal De-Mud** - Removes low-mid buildup
- **Broadcast Voice** - Radio-ready vocal tone

DRUMS

- **Kick Punch** - Attack and low-end enhancement
- **Snare Crack** - Midrange snap and body
- **Hi-Hat Sparkle** - Crisp high frequencies
- **Drum Bus** - Full kit enhancement

BASS

- **Bass Boost** - Warm low-end enhancement
- **Bass Clarity** - Definition without mud
- **Sub Bass Enhancement** - Deep low-end boost

GUITARS

- **Acoustic Guitar** - Natural body and sparkle
- **Electric Guitar** - Presence and cut-through

KEYS

- **Piano Clarity** - Clear midrange definition

MASTERING

- **Master - Air** - Subtle high-end lift
- **Master - Warmth** - Gentle low-end enhancement
- **Master - Modern** - Contemporary balanced curve
- **Master - Balanced** - Neutral mastering starting point

EFFECTS

- **Telephone** - Bandpass for phone effect
- **Lo-Fi** - Vintage degraded sound
- **AM Radio** - Classic radio simulation

CORRECTIVE

- **De-Mud (250Hz)** - Remove low-mid buildup
- **De-Harsh (3kHz)** - Tame harsh frequencies
- **De-Box (400Hz)** - Remove boxy character
- **Notch 50Hz Hum** - Remove European mains hum
- **Notch 60Hz Hum** - Remove US mains hum

USER PRESETS

SAVING A PRESET

1. Configure your EQ settings
2. Click the **+** button in the header
3. Enter a name for your preset
4. Click Save

LOADING A PRESET

1. Click the **Preset** dropdown
2. Select from Factory or User presets

NAVIGATING PRESETS

You can quickly browse through presets using:

- **Arrow buttons**: Use the **<** and **>** buttons in the preset modal header
- **Keyboard**: Press **[** or **]** keys to go to previous/next preset
- **Arrow keys**: When the preset modal is open, use left/right arrow keys

SEARCHING PRESETS

1. Open the Preset dropdown
2. Type in the search field to filter presets by name
3. Search works across both Factory and User presets

DELETING A USER PRESET

1. Open the Preset dropdown
2. Hover over the user preset to delete
3. Click the **X** button that appears

> **NOTE:** Factory presets cannot be deleted or modified.

UNDO/REDO & A/B COMPARISON

UNDO/REDO

DalEQ Core maintains a history of your parameter changes.

- **Undo**: Reverts the last change
- **Redo**: Re-applies an undone change
- **History Depth**: Up to 50 steps

A/B COMPARISON

Quickly compare two different EQ settings:

1. Set up your first EQ curve (stored as "A")
2. Click **A/B** to switch to state B
3. Modify settings (stored as "B")
4. Click **A/B** to toggle between A and B

Additional Functions:

- **Copy A to B**: Copies A settings to B
- **Copy B to A**: Copies B settings to A

KEYBOARD SHORTCUTS

BAND SELECTION & CONTROL

SHORTCUT	ACTION
1-8	Select band 1-8
Tab	Cycle through bands
Escape	Deselect all bands
Delete / Backspace	Bypass selected band
Arrow Keys	Adjust frequency (left/right) and gain (up/down)
PageUp / PageDown	Adjust Q of selected band

MOUSE MODIFIERS

SHORTCUT	ACTION
Alt + Drag	Fine control (1/10th speed)
Shift + Drag	Lock axis (horizontal or vertical only)
Double-click	Edit gain value directly
Shift + Double-click	Edit frequency value directly
Alt + Double-click	Edit Q value directly
Cmd/Ctrl + Double-click	Reset gain to 0 dB
Mouse Wheel	Adjust Q (Bell, Notch, Bandpass only)

GLOBAL COMMANDS

SHORTCUT	ACTION
Space	Toggle EQ bypass
Cmd/Ctrl + Z	Undo
Cmd/Ctrl + Shift + Z	Redo
Cmd/Ctrl + A	Toggle A/B
Cmd/Ctrl + S	Save preset

PRESET NAVIGATION

SHORTCUT	ACTION
[	Previous preset
]	Next preset
Left/Right Arrow	Navigate presets (when modal open)
Enter	Load first visible preset (when searching)

TECHNICAL SPECIFICATIONS

AUDIO SPECIFICATIONS

PARAMETER	VALUE

Sample Rates	44.1 kHz - 192 kHz
Bit Depth	32-bit float internal
Latency (Zero Lat)	0 samples
Latency (Linear Phase)	512 - 4096 samples
Dynamic Range	>120 dB
THD+N	<0.0001%

FILTER SPECIFICATIONS

PARAMETER	VALUE
Filter Topology	Zero-Delay Feedback (TPT/Trapezoidal)
Number of Bands	8
Frequency Range	20 Hz - 20 kHz
Gain Range	+/-30 dB
Q Range	0.025 - 40
Slope Options	6, 12, 18, 24, 36, 48, 72, 96 dB/oct

SPECTRUM ANALYZER

PARAMETER	VALUE
FFT Size	1024 - 8192 points (selectable)
Default Resolution	4096 points (High)
Frequency Bins	256
Update Rate	60 fps (when UI visible)
Windowing	Hann
Decay	Time-based (frame-rate independent)

OUTPUT METER

PARAMETER	VALUE
Type	True Peak (ITU-R BS.1770)
Oversampling	4x (Catmull-Rom interpolation)
Range	-60 dB to +30 dB
Peak Decay	26 dB/sec (IEC 60268-10 Type I)
RMS Integration	~300 ms

DAW AUTOMATION

PARAMETER	VALUE
Total Parameters	126
Global Parameters	6
Per-Band Parameters	15 × 8 bands

TROUBLESHOOTING

PLUGIN NOT APPEARING IN DAW

Solution:

1. Verify the plugin is installed in the correct location
2. Rescan plugins in your DAW
3. Check that your DAW supports AU (macOS) or VST3 format
4. On macOS, you may need to allow the plugin in System Preferences > Security & Privacy

HIGH CPU USAGE

Solution:

1. Reduce the number of active bands
2. Use Zero Latency mode instead of Linear Phase
3. If using Linear Phase, try a lower quality setting
4. Close the plugin UI when not actively editing

NO SOUND / PLUGIN BYPASSED

Solution:

1. Check that the main Bypass button is not engaged
2. Verify no bands are soloed that would mute your signal
3. Check that gain isn't set to extreme cut values
4. Ensure your DAW's plugin is not bypassed at the track level

SPECTRUM ANALYZER NOT SHOWING

Solution:

1. Verify audio is playing through the track
2. Check the analyzer channel selection matches your content
3. Ensure the EQ is not globally bypassed

CREDITS

DEVELOPMENT

DalEQ Core was developed by **NIVIEM** (Milan Vasiljev).

TECHNICAL REFERENCES

- Vadim Zavalishin - "The Art of VA Filter Design" (ZDF/TPT filter topology)
- Andrew Simper (Cytomic) - SVF filter design and coefficients
- JUCE Framework - Cross-platform audio plugin development

SPECIAL THANKS

To the audio engineering community for continuous feedback and support.

VERSION HISTORY

VERSION 1.0 (JANUARY 2026)

- Initial release
- 8-band parametric EQ with ZDF filters
- Variable slopes from 6 to 96 dB/oct
- Linear Phase mode with quality options
- Premium spectrum analyzer:
  - Time-based decay (frame-rate independent)
  - Separate attack/decay for transient preservation
  - Freeze functionality
  - Selectable resolution (1024-8192 FFT)
  - Default 4.5 dB/oct tilt compensation
- True Peak stereo metering (ITU-R BS.1770):
  - 4x oversampling for inter-sample peak detection
  - Stereo L/R meters with RMS display
  - Latching CLIP indicator
- Mid/Side processing per band
- Dynamic EQ (compression/expansion)
- Full DAW automation (126 parameters)
- Undo/Redo system (50 steps)
- A/B comparison
- Preset system:
  - 30+ factory presets by category
  - User preset save/load
  - Search and navigation
- Full keyboard shortcut support

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