

Desert Moon Audio

VU METER

V U - 0 2

Analog Volume Unit Meter



A VU meter is not a level detector with an attack and a release. It is a moving-coil movement driven by a rectifier, and everything characteristic about it — the lag, the slight overshoot, the way it ignores short peaks — falls out of that mechanism. The VU-02 models the mechanism rather than approximating its symptoms.

It measures and does nothing else. The audio leaves the plug-in bit for bit as it arrived, and no latency is reported.

1	Installation	3
2	Quick Start	3
3	The Panel at a Glance	4
4	Headroom — Calibrating the Meter	5
5	Reading the Meter	6
6	Graphic Delay	7
7	The Peak Lamp	8
8	Finishes and the Window	9
9	Parameter Reference	10
10	Specifications	11

WHY A SLOW METER IS THE USEFUL ONE

A peak meter tells you the highest sample in the last instant. That matters for avoiding clipping and for almost nothing else. A VU meter is slow by design, as hearing is, and averages the short peaks away — so what it shows tracks how loud something actually seems. Mix to the VU and check the peaks; the two answer different questions.

1.1 What Gets Installed

FORMAT	LOCATION
Audio Unit	~/Library/Audio/Plug-Ins/Components/VU Meter.component
VST3	~/Library/Audio/Plug-Ins/VST3/VU Meter.vst3

1.2 First Launch

Most hosts scan for plug-ins only at start-up. If the VU-02 does not appear, quit the host completely and reopen it — it will not be found while the host is already running.

It appears under **Desert Moon Audio** in any insert slot. Being a metering plug-in it can go anywhere in a chain without changing the sound; put it last if you want to see what is leaving the track.

MONO AND STEREO

There is one plug-in, not two. It follows the layout the host gives it: one face on a mono track, two on a stereo one. Mono → stereo is deliberately refused — a meter has nothing to widen.

2.1 Five Minutes In

#	DO THIS	WHAT IT GIVES YOU
1	Insert on a busy mix bus	Needles start at rest and settle over about a third of a second
2	Set Headroom to your session's reference	0 VU now means what it means in your studio
3	Play the loudest section	Aim to sit around 0 VU, drifting a little either side
4	Watch the PEAK lamp	Lights at -0.009 dBFS; click it to clear
5	Drag the bottom-right corner	Any size from 0.7× to 2.5×, remembered with the session
6	Press a finish button	Four panels; the dial never changes

2.2 Typing Exact Values

Double-click the number in either window to type one straight in. Press **Return** to accept, **Esc** or a click anywhere else to cancel. Click and slide vertically to change it by dragging, click either arrow to nudge it by one step, and hold **Shift** while dragging for finer steps.

3 The Panel at a Glance

VU METER VU-02



The stereo instance. On a mono track the same panel carries a single face.

#	CONTROL	WHAT IT DOES
1	Nameplate	Brushed steel, screwed to the panel. Decorative
2	HEADROOM	Where 0 VU sits below digital full scale, 4–26 dB
3	DELAY	Holds the display back, 0–1000 ms. Does not delay audio
4	Finish buttons	Black, cream, walnut, silver. The lit one is in use
5	?	A short reminder of what the three above do
6	PEAK lamp	Lights at –0.009 dBFS and latches. Click to clear
7	The dial	–20 to +3 dB, red above 0 VU



The two value windows read out on lit displays, red on near-black.



Illuminated lens pushbuttons — the lit one is the finish in use.

HEADROOM

4 – 26 dB · default 18 dB

This is the one setting that has to be right before the meter means anything.

Headroom is the distance in decibels from 0 VU up to digital full scale. Set it to 18 and a –18 dBFS tone reads 0 VU, leaving 18 dB of room above the needle before anything clips.

A VU meter has no absolute reference of its own — it was designed for a world where 0 VU meant a known voltage on a known line. In a digital session you choose that reference, and this is where you tell the meter what you chose.

4.1 Choosing a Value

SETTING	0 VU LANDS AT	WHERE IT COMES FROM
14 dB	–14 dBFS	Loud contemporary mixing; less room for transients
18 dB	–18 dBFS	The EBU alignment level, and the default here
20 dB	–20 dBFS	The common American post and film reference
24 dB	–24 dBFS	SMPTE alignment; generous room for peaks

If your studio already has a reference level, use it here and use the same number on every instance. The value is a whole number of decibels because that is what a calibration tone is cut at.

CHECKING IT

Send a sine tone at your reference level — –18 dBFS RMS for the default — and the needle should come to rest exactly on 0. It will, to within a fifth of a decibel: this is measured in the build, not eyeballed.

4.2 What It Does Not Do

Headroom changes only where the needle sits. It applies no gain, and it does not move the peak lamp, which always watches digital full scale regardless of what the dial is calibrated to.

5 Reading the Meter

VU METER VU-02



The printed scale. Numbered graduations are struck heavier than the marks between them.

5.1 The Ballistics

Two published facts define the movement, and between them they leave nothing to taste:

A step to 0 VU reaches 99% of full deflection in **300 ms**

The needle then overshoots by **1.0% to 1.5%**

The VU-02 measures **300.0 ms** and **1.30%**, unchanged from 44.1 kHz to 192 kHz — and not just at the endpoints: the whole rise is pinned to the standard movement's own curve, measuring 15.6% at 50 ms, 43.2% at 100 ms, 67.6% at 150 ms and 84.3% at 200 ms. The movement is a property of the instrument, not of the host.

5.2 What the Needle Is Actually Measuring

The movement responds to the *average* of the rectified signal — not its peak, and not its RMS. The face is then calibrated so a sine wave reads its own RMS.

Every other waveform reads differently from its RMS by exactly as much as its own shape differs from a sine's. A square wave reads 0.91 dB high. That is the instrument working, not an error, and it is the reason a VU meter tracks loudness better than a meter that computes RMS directly.

5.3 Where to Sit

Aim to average around 0 with the needle drifting either side. Brief excursions into the red are normal and are what the red is for; a needle that sits in it is telling you the part is too loud for the reference you set, not that anything is clipping.



At rest. The needle parks left of -20.



0 VU — 70.8% of the travel.



Against the end stop, lamp lit.

DELAY

0 – 1000 ms · default 0 ms

This delays the display, not the audio. Nothing about the signal changes and no latency is introduced.

6.1 What It Is For

Busses in a session rarely have the same latency. A meter on a bus behind a look-ahead limiter is showing you a moment that a meter on a raw track has already passed. Comparing the two is then misleading, however carefully you watch.

Hold the earlier meter back by the difference and the two show the same instant. The delay is exact in milliseconds: the needle's position is sampled at 1 kHz and read back the requested distance, whatever rate the host is running at.

6.2 Setting It

METHOD

- 1 Find the reported latency of the slower bus in your host
- 2 Set that many milliseconds on the meters of the faster ones
- 3 Leave the slowest bus at 0

A thousand milliseconds is a long way at one millisecond per click, so hold **Shift** while dragging for a coarse pass and release it to fine-tune, or double-click and type the number.

THE LAMP IS NOT DELAYED

Only the needle is held back. The peak lamp is a latch — it stays lit until you clear it — so there is no moment for a delay to align, and a clip should reach the eye as early as it can.



One lamp per face, watching that channel alone.

The lamp lights when a single sample reaches **-0.009 dBFS**. It is tested sample by sample, not once per block, because one sample over the line is a clip and it is exactly the one a block average would hide.

It **latches**: once lit it stays lit until you clear it, so you can leave the room and still know whether anything went over. **Click the lamp to clear it.**

7.1 It Is Not Part of the VU Scale

The needle and the lamp answer different questions and are calibrated differently. The needle is referenced to whatever you set Headroom to; the lamp always watches digital full scale. At 18 dB of headroom a signal can light the lamp while the needle sits comfortably below 0 — that is a transient, and it is precisely the thing a VU meter is designed to average away.

IF THE LAMP KEEPS LIGHTING

Lower the level going in, rather than raising Headroom. Raising Headroom moves the needle down but changes nothing about the signal, and the lamp will go on telling you the truth.

8 Finishes and the Window

VU METER VU-02

8.1 Four Panels

The four buttons at the top right refinish the panel. They are four finishes of the same unit, not four colour schemes — each carries its own surface as well as its own colour.



Black — wrinkle-painted steel, the way a broadcast rack looked.



Cream — the ivory a Pultec or a Fairchild was sprayed.



Walnut — the cabinet, for a studio rather than a transmitter site.



Silver — the satin aluminium fascia of a tape machine.

The dial never changes. A VU face is the instrument, not the decor, so the same cream card and the same red above 0 appear in every cabinet.

8.2 Resizing

Drag the bottom-right corner. Any size from **0.7x** to **2.5x**, and the window keeps its proportions — the layout is one drawing scaled up and down, so letting the two axes move apart would stretch the face rather than resize it.

Both the size and the finish are stored with the session, and neither is an automatable parameter: they are how the unit looks, not what it does.

9 Parameter Reference

VU METER VU-02

9.1 Automatable Parameters

PARAMETER	RANGE	DEFAULT	UNIT
Headroom	4 – 26	18	dB, 1 dB steps
Graphic Delay	0 – 1000	0	ms, 1 ms steps

Two parameters, and both are metering settings rather than anything that touches the audio. They are exposed to the host so that a session recalls them and so a template can set them everywhere at once.

9.2 Stored With the Session, Not Automatable

SETTING	RANGE	DEFAULT	NOTES
Finish	4 panels	Black	The buttons at the top right
Window size	0.7× – 2.5×	1×	Drag the bottom-right corner

9.3 Mouse Reference

GESTURE	RESULT
Click and slide vertically in a window	Changes the value
Hold Shift while sliding	Finer steps
Click an arrow	Nudges by one step
Double-click the number	Type a value; Return accepts
Click the PEAK lamp	Clears it
Drag the bottom-right corner	Resizes the window

10 Specifications

VU METER VU-02

ITEM	SPECIFICATION
Formats	Audio Unit (AUv2) and VST3
Platform	macOS 10.13 or later — universal binary, Apple Silicon and Intel
Sample rates	44.1 kHz to 192 kHz
Channel layouts	mono → mono · stereo → stereo
Latency	None. The audio is passed through untouched
Tail length	None
Rise time	300.0 ms to 99% of full deflection, at every sample rate
Overshoot	1.30% — within the 1.0–1.5% the standard allows
Detector	Full-wave average, calibrated so a sine reads its RMS
Scale	–20 to +3 dB; volume units linear in amplitude
Reference	0 VU adjustable from –4 to –26 dBFS
Peak threshold	–0.009 dBFS, tested per sample, latching
Display refresh	60 frames per second
Processing	32-bit floating point throughout
Interface	Freely resizable, aspect locked; size and finish stored with the session

10.1 Troubleshooting

VU METER VU-02

SYMPTOM	CAUSE AND REMEDY
Does not appear in the host	Hosts scan at start-up only. Quit fully and reopen
Needle barely moves	Headroom is set higher than your session's reference. Lower it
Needle sits in the red	The part is loud for the reference you set — this is the meter working
Lamp lights, needle looks fine	A transient. Expected; it is what a VU meter averages away
Only one face on a stereo track	The instance was opened on a mono bus. Re-insert on the stereo one
Meters on two busses disagree	Different bus latencies. Use DELAY to line them up
Another VU plug-in's needle leads this one	This movement is pinned to the published ballistics, measured in the build. A needle that runs ahead of it is faster than the standard movement

10.2 A Note on What Is Being Emulated

The behaviour here follows the published specification of the instrument: the 300 ms rise time, the 1.0–1.5% overshoot, the average-responding detector calibrated to a sine's RMS, and a scale linear in amplitude with its end stop at +3 dB. Both figures are measured off the running filter in the build rather than taken on trust.

The VU face itself is the industry-standard one, unchanged in its essentials since the 1930s. What is around it — the panel, the finishes, the readouts and the nameplate — is Desert Moon Audio's own.

SUPPORT



Desert Moon Audio · DMA Inc, Los Angeles, CA
VU Meter VU-02, version 1.0 · Made in the USA