

Desert Moon Audio

ANALOG TAPE ENHANCER

ATE - 03

Passive Analog Tape Simulator & Buss Processor



The ATE-03 is modelled on a passive analog tape simulator: a box with no gain stage of its own, in which two transformers and a network of harmonic circuits stand in for the behaviour of three different tape machines. There is no transport in it, and there is none in here either — no wow, no flutter, no scrape. What it has instead is saturation, compression and a set of harmonic contours.

Five controls carry all of it: **Deck**, **Bias**, **Enhance**, **Headroom** and **Calibration**. They are not independent. Bias moves the saturation knee of whichever deck is loaded, Enhance sets the threshold the tape compressor works against, Headroom scales both, and Calibration colours the lot. Learning the unit is mostly learning how those interact.

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BEFORE YOU START



The unit has no output gain of its own beyond the trim. Drive it from the input, not from the fader ahead of it — how hard you hit the tape stage is the single thing that changes the sound most.

The plug-in installs as an Audio Unit and a VST3.

Audio Unit	~/Library/Audio/Plug-Ins/Components/Analog Tape Enhancer.component
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VST3	~/Library/Audio/Plug-Ins/VST3/Analog Tape Enhancer.vst3
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Presets	~/Library/Application Support/Desert Moon Audio/Analog Tape Enhancer/Presets
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If the plug-in does not appear after installing, macOS is holding a stale component list. Quit the host, run `killall -9 AudioComponentRegistrar` in Terminal, and reopen.

2 Quick Start

Insert it on a source and leave every switch where it starts. The default state — Deck HI, Bias (+), Enhance 0, Headroom HI, Calibration HX — is the cleanest configuration the unit has, and it is also the exact state the reference measurements were taken at.

- 1 Set **Input** so the source is hitting the unit at a sensible level. Around -12 dBFS is a good starting point; higher drives the tape harder.
- 2 Step **Deck** through LO, PRO and HI. This is the largest single change available.
- 3 If it is too clean, drop **Headroom** a position. If it is breaking up, raise it.
- 4 Set **Calibration** last. TK is the darkest and most compressed, HX the most open.
- 5 Trim **Output** to match bypassed level, then compare honestly.

LEVEL MATCHING

Calibration changes the through level as well as the tone — TK is about 2.6 dB quieter than HX. That is real, measured behaviour of the circuit, not a fault. Match levels with the Output trim before deciding which one you prefer.

3 The Panel at a Glance

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The ATE-03 front panel. Each control carries a pair of knobs, left and right channel, ganged together as one stereo control.

Signal runs through the unit in this order:

Input transformer	Harmonics and the low-frequency character of the box.
Headroom	Sets how hard the tape stage is driven.
Bias	Filter, plus the saturation knee and compression ratio of the deck.
Tape deck	Compression, then saturation, then the replay contour.
Enhance	A parallel path, summed back in after the deck.
Calibration	Harmonic contour and the measured response trim.
Output transformer	The last stage before the output.

Enhance runs *parallel* to Bias, the Deck and Headroom, and is the only control that does not pass through them. It does pass through Calibration.

4 Deck — Choosing the Machine

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Four positions. Three are tape machines; the fourth takes the tape circuit out of the path entirely and leaves the electronics.

LO

Cassette, four-track

The smallest format and the slowest speed, through a mixer section built to a price. Lowest headroom of the three, heaviest compression, most obvious harmonic grit. Crunchy and very compressed. It will distort hard on LO Headroom — that is the point of it, but it means the Headroom switch matters more here than anywhere else.

PRO

Japanese professional, ½ inch at 15 IPS

Unusually sensitive to transients. Mellow and laid back, with a thickness through the midrange and a bass response that is clearly worked on rather than reproduced. The middle setting in every sense.

HI

Swiss professional

The most top end, the clearest midrange, the least compression, the most honest response of the three. Extremely clean without being clinical.

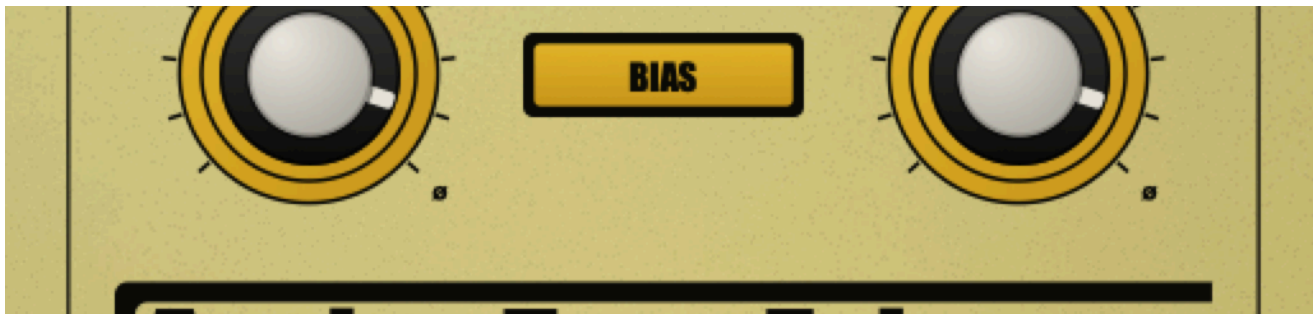
Ø

Tape circuit bypassed

Signal passes through the electronics without the tape stage. The transformers and the calibration circuits still run, so this is not a bypass — it is the box with the tape taken out, and it still adds harmonic energy of its own.

WHAT THE DECKS ACTUALLY DIFFER BY

Measurement of the hardware shows the three decks within **0.33 dB** of each other at 10 kHz. They are not tone controls. What separates them is saturation and compression behaviour, and the model is built that way — you will not find large EQ differences between them, because the hardware does not have any.



Twelve positions: eleven bias settings and a bypass. On the surface it is a filter — fully clockwise is the brightest setting, fully anticlockwise the darkest. Underneath, it is doing more than that.

Bias also moves the saturation knee and the compression ratio of whichever deck is loaded. Turning it down does not simply remove treble; it makes the deck saturate earlier and compress harder, the way under-biasing a real machine does. The two effects arrive together and cannot be separated.

Fully clockwise Brightest, latest saturation, least compression. This is the reference position.

Centre Neutral saturation and compression, moderate darkening.

Fully anticlockwise Darkest, earliest saturation, hardest compression.

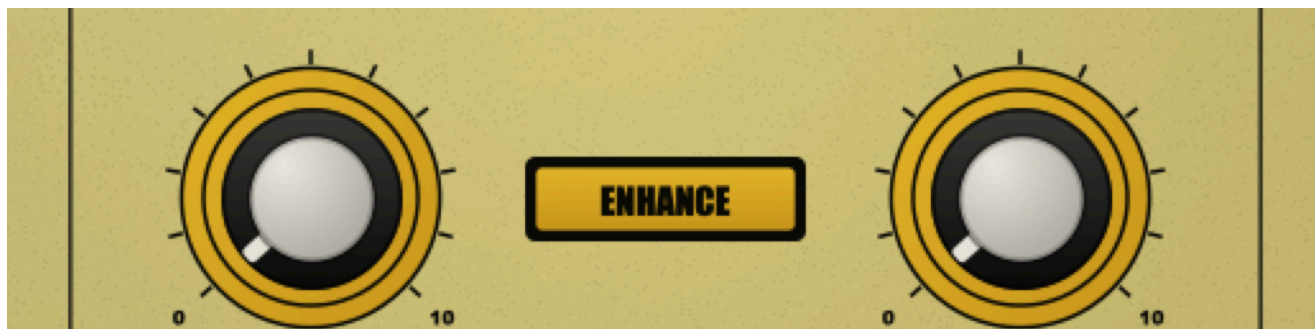
Ø Filter disengaged. Still alters the saturation and compression behaviour of the deck.

ENGINEER'S NOTE

Bias fully anticlockwise with Enhance three clicks up and Headroom at PRO or HI, Calibration on TK or MX, works particularly well on vocals through the PRO and HI decks.

6 Enhance

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Eleven positions. Enhance is a resonant circuit that combines the output of the tape simulator with the original dry signal, adding harmonically enhanced upper midrange and a saturated bass alongside it.

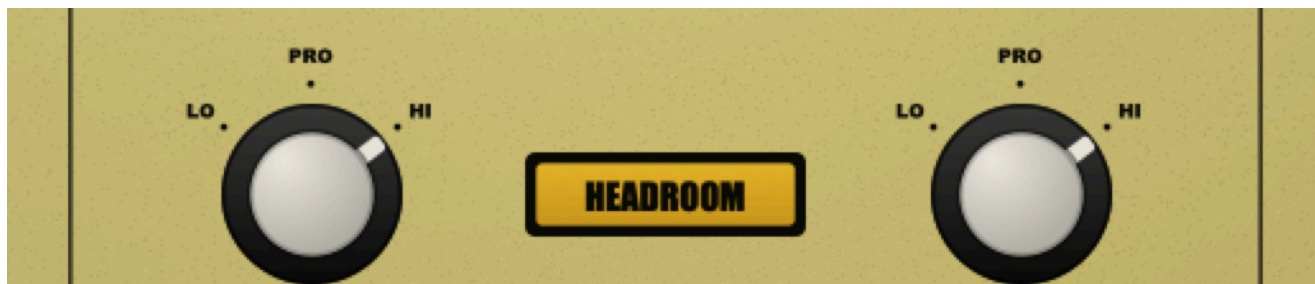
It runs parallel to every other control except Calibration. Whatever the Deck, Bias and Headroom are doing, Enhance is working from the signal *before* them and summing back in afterwards — which is why it can add weight and presence without softening the tape effect the way a dry/wet blend would.

It has a second job. As it opens, it lowers the threshold the tape compressor works against, so raising Enhance also makes the deck compress sooner. At high settings the two effects run together: more parallel colour, and a tape stage that is working harder underneath it.

ENGINEER'S NOTE

PRO deck, Bias at twelve o'clock, Enhance at twelve o'clock, Headroom at PRO or HI, Calibration on TK or MX. This is the setting the circuit was voiced around.

7 Headroom



Three positions, and the most consequential switch on the unit after the Deck. Headroom is a global sensitivity control: it sets how much level reaches the tape stage, and it scales the compression along with it.

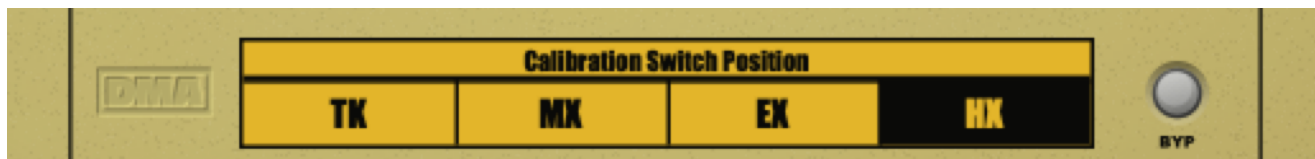
LO Least headroom. The tape stage is driven hardest and compresses most.

PRO The middle setting, and the one most sources want.

HI Most headroom. Cleanest, least compressed.

The interaction with Deck is the thing to internalise. The LO deck already has the least headroom of the three machines; put it on LO Headroom and it will distort wildly. That is a usable sound, but it is a destination, not a starting point — the LO deck generally wants PRO or HI Headroom.

Because Headroom changes drive rather than output level, the through level stays broadly consistent as you switch it. What changes is how much work the tape is doing.



On the hardware this is a switch on the rear panel, and the front carries only a printed chart to remind you where you left it. The plug-in has no rear panel, so the chart is the control: click a cell to select it.

Four harmonic circuits, each interacting with the tape model rather than sitting after it. Calibration changes the compression, the saturation character, the frequency response and the headroom before saturation all at once.

TK

Vibey, aggressive

The most compressed of the four. Even on the cleanest settings the top end stays mellow. Also the quietest — about 2.6 dB below HX.

MX

Everyday

Punchy but open, smooth on top, with the bass less compressed than TK. The most generally useful setting and comfortable across a mix buss.

EX

Rich upper harmonics

The most extended of the four. Offers slight compression when pushed but otherwise stays out of the way. Mixbuss preferred.

HX

Mastering grade

The most open. Three-dimensional upper midrange, bass that stays alive, a top end that glows rather than softens. The least compressed setting the unit has.

MEASURED BEHAVIOUR

The response differences between the four calibrations are small but consistent and have been matched to the manufacturer's published measurements exactly: TK -1.46 dB at 10 kHz relative to 1 kHz, MX -0.82 , EX -0.62 , HX -1.16 , each within 0.00 dB of target.

The preset bar

Across the top, left of the name window: step back and forward through the list, then undo and redo, which walk every knob and switch move in steps. To the right: the A/B compare, save, discard changes, and the full menu. A dot beside the name means the settings have moved away from the loaded preset.

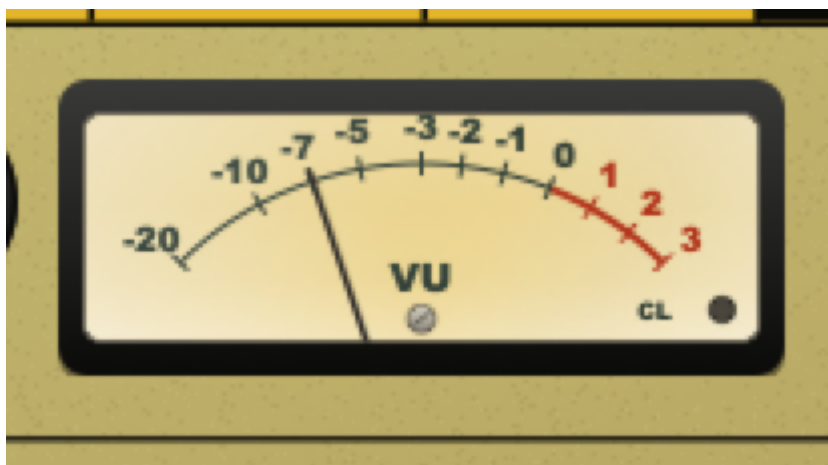
The A/B key holds two independent states and shows which one is sounding. The first press copies where you are into the other slot, so the toggle starts as an audible no-op; adjust, then flick between the two to compare.

The factory bank is not invented. Every entry is a setting recommended in the original hardware documentation, transcribed into switch positions.

Reference	The state the published measurements were taken at.
LoFi Crunch	LO deck, Bias centred, Enhance 1, Headroom PRO, TK.
Japanese Glow	PRO deck, Bias (+), Enhance 3, Headroom PRO, MX.
Swiss Master	HI deck, Bias (+), Enhance 0, Headroom HI, EX.
Vocal Vibe	PRO deck, Bias (–), Enhance 3, Headroom PRO, TK.
Enhance Magic	PRO deck, both Bias and Enhance centred, MX.
Parallel Drums	The LO deck setting, for a parallel drum buss.
Mix Buss	HI deck, Enhance 2, Headroom HI, EX.
Electronics Only	Deck Ø — the box without the tape circuit.

Your own presets are saved as files and appear under *Yours* in the menu. They are deliberately kept off the host's program list: a host stores a program *number* in the session, so adding to that list would change what an old session recalled.

Metering



One VU movement, at the foot of the plate between the trim knobs, scaled -20 to $+3$ with the red arc above 0 , exactly as printed on the mechanical instrument. It reads the *record level* — the signal after the Input trim, which is what is actually reaching the tape — because on a tape machine that is the level the meter exists to set: drive decides saturation, and the Output trim is only makeup gain after the fact.

The needle carries the ballistics of the real movement — roughly 300 ms to settle — so it reads average loudness the way a VU does, riding the body of the signal rather than twitching at every transient. That slowness is the point: set the needle around 0 on the loud passages and the peaks look after themselves.

The **CL** lamp in the corner of the face latches on a clip — at either the input or the output — and *stays* lit. A clip is something that happened rather than something that is happening, and an indicator that cleared itself the instant the sample passed would be missed every time. Click the meter to clear it.

Input, Output and Mix

Three things the hardware does not have, as knobs flanking the meter: Input and Output to its left, Mix to its right — signal order, read left to right. Input sets how hard the unit is driven (watch the needle), Output matches the level back, and Mix blends the processed signal against the dry. The dry path is delay-compensated, so partial Mix settings do not comb-filter. Drag for coarse moves, double-click to return a knob to its default; the value shows in a bubble while you drag.

Bypass

The grey switch to the right of the calibration chart takes the unit out of circuit. The VU shows the state the way the hardware would: its lamp goes out and the needle falls to rest, because a passive box in true bypass has nothing lit and nothing moving. Bypass is latency-compensated and ramped, so it does not click and the signal does not shift in time. It is also exposed to the host, so a DAW's own bypass button drives the same switch rather than fighting it.

11 Parameter Reference

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PARAMETER	RANGE	DEFAULT
Deck	LO · PRO · HI · Ø	HI
Bias	12 positions, (–) to (+) plus Ø	(+)
Enhance	0 – 10	0
Headroom	LO · PRO · HI	HI
Calibration	TK · MX · EX · HX	HX
Input Trim	–24 to +24 dB	0.0 dB
Output Trim	–24 to +24 dB	0.0 dB
Mix	0 – 100 %	100 %
Bypass	Off · On	Off

Interactions worth remembering

Bias → Deck	Moves the saturation knee and compression ratio, not just the tone.
Enhance → Deck	Lowers the tape compressor's threshold as it opens.
Headroom → everything	Scales drive into the tape stage and the compression with it.
Calibration → everything	Compression amount, harmonic mix, response and through level.

Mouse and keyboard

Double-click a control	Returns that control to its default.
Click a meter	Clears a latched clip indicator.
Click a chart cell	Selects that calibration.
Click the preset name	Opens the preset menu.
Drag a window corner	Resizes; the panel keeps its proportions.

12 Specifications & Accuracy

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Formats	Audio Unit, VST3
Channels	Mono, stereo
Sample rates	44.1 kHz to 192 kHz
Internal processing	4× oversampled, 32-bit float
Latency	Reported to the host; dry path and bypass compensated
Requirements	macOS 10.15 or later, Intel or Apple Silicon

How accurate is it?

Worth being straight about, because the two halves of the model are not equally well founded.

The frequency response is matched exactly. Twelve response curves published by the original manufacturer — three decks against four calibrations — were digitised and used as targets. The model reproduces all twelve measured points to within 0.00 dB, and the per-calibration insertion losses with them.

The saturation and compression are inference. No published data covers the nonlinear behaviour, so that part is physical modelling of the circuit as documented rather than measurement of it. It is in the right family and it follows the documented behaviour of each control, but it has not been verified against a unit.

Two things were deliberately left out. There is no wow, flutter or scrape, because the hardware is a passive circuit with no transport and cannot produce any. And there is no textbook cassette gap loss, because measurement shows the three decks within 0.33 dB of each other — a conventional 15 kHz corner would have invented several dB of deck-to-deck difference that the hardware does not have.

MODELLED ON



The ATE-03 is modelled on the Handsome Audio Zulu passive analog tape simulator. Desert Moon Audio is not affiliated with Handsome Audio, and the name is used only to identify the hardware the model is based on.