DOTMATRIX

LIGHTWEIGHT ENGINEERING

DOTMATRIX / LIGHTWEIGHT AUDIO PLUGINS

SPULENTONBAND

The Studer A800 2-inch multitrack, rebuilt from its own schematics. The good noise, none of the aliasing.



Spulentonband by Dotmatrix

USER GUIDE | VERSION 1.0.0 | AU | VST3 | CLAP | macOS 10.14+ | INTEL + APPLE SILICON

Hit the tape. Watch the needles. Saturation, weight and the machine's own life, without the digital grit.

DOTMATRIX

CONTENTS

User guide

Getting started 4

The panel 6

Dark or light 7

Where it comes from 8

Record 9

Tape 10

Repro 11

Machine 12

Presets 13

Reference and troubleshooting 14

— ABOUT SPULENTONBAND

Spulentonband is a tape machine from Dotmatrix: the Studer A800 2-inch multitrack, the machine behind decades of landmark records, rebuilt from Studer's own service manual and schematics. Run a track, a drum group or a whole mix through it and you get what engineers have always loved about tape: saturation that thickens instead of breaking up, transients rounded into punch, the weight of the head bump and the gentle softening of the top end when you hit the tape hard. Choose the tape (250, 456, 900 or GP9), the speed (7.5, 15 or 30 IPS), NAB or CCIR emphasis and the calibration, then drive it with INPUT and watch the two backlit VU meters. The record amplifier's own equaliser, treble chain and limiter and the reproduce amplifier's equaliser come from the A800's circuit cards, and the low end is matched to Studer's own measurements of the machine within half a decibel. Bias follows Studer's bias table, with over-bias for classic tape compression and under-bias for grit. Spulentonband keeps the good noise, too: tape hiss shaped by the playback EQ, the grain of modulation noise, wow and flutter from the transport, and optional mains hum, all at a real machine's levels and all adjustable. What it leaves out is the digital aliasing: its own oversampler (4x by default, up to 8x) and exact anti-aliasing on the tape curve, the record amp limiter and the line amplifier keep it clean. Twenty factory presets cover machine line-ups, the mix bus, drums, tracks and characterful worn machines, and you can save your own. Spulentonband runs as an AU, VST3 and CLAP plug-in, universal for Apple Silicon and Intel Macs on macOS 10.14 or later, with a dark or light panel you can resize from 60 to 200 %. Studer is a trademark of its owner; Dotmatrix is not affiliated with or endorsed by Studer.

— QUICK FACTS

Type	Tape machine: record electronics, 2-inch tape and repro electronics in one audio effect. For any track, a group or the mix bus.
Formats	Audio Unit, VST3 and CLAP effects. Universal: Apple Silicon and Intel, macOS 10.14 Mojave or later on Intel, macOS 11 or later on Apple Silicon.
Machine	Tape 250, 456, 900 or GP9; 7.5, 15 or 30 IPS; NAB or CCIR (30 IPS is AES); calibration +3, +6, +9 or the stock's own.
From the schematics	The A800 repro amplifier 1.180.710 and record amplifier 1.180.712, with the head bump fitted to Studer's own measurements.
Clean	Oversampling 4x by default (none, 2x, 4x or 8x). The tape curve and every clipping stage are anti-aliased.
Presets	20 factory presets: machine line-ups, mix, drums, tracks and character. Your own are saved in ~/Music/Spulentonband Presets.
Identity	Manufacturer Dotmatrix (Dtmx). AU code: Sptb.

SECTION 01

Getting started

Put it on a track or a bus, pick a tape and a speed, then drive it with INPUT.

— NEW IN VERSION 1.0

1.0	The first release: the A800 tape path from the schematics, VU meter bridge, the tape read-out on the LCD (drive re MOL, peak flux, distortion, compression), dark and light panel, 20 factory presets.

— INSTALLING

Copy each plug-in from the download's **Plug-Ins** folder into its folder: **~/Library/Audio/Plug-Ins/Components** (Audio Unit), **~/Library/Audio/Plug-Ins/VST3** and **~/Library/Audio/Plug-Ins/CLAP**. The release is not yet signed through Apple's developer program, so macOS needs one Terminal line before it will load it; **READ ME FIRST.txt** in the download has the exact steps. Logic Pro checks new Audio Units the first time it starts; Spulentonband appears under **AU Effects > Dotmatrix**.

— FIRST STEPS

1	**Insert it**	Put Spulentonband early in the chain, where a tape machine would be: on tracks before your mix processing, or on the mix bus (in Logic: Audio FX > Dotmatrix > Spulentonband).
2	**Pick a preset**	It opens on **456 at 15 IPS**, the classic line-up. Click the preset name for the other 19, or step with the arrows.
3	**Watch the needles**	With METERS on REC the needles show what goes onto the tape. 0 VU is the calibration level; the tape starts to bend a few dB above it and reaches its MOL (3 % distortion) 10 dB above it.
4	**Drive it**	Raise INPUT until the needles swing into the red on the loud parts and the TAPE SATURATION LEDs light. With LINK on the output comes down to match, so you hear colour, not volume.
5	**Season to taste**	Over-bias for rounder, more compressed transients; a slower speed for more colour and a softer top; NOISE and WOW & FLUTTER for the machine's life.

— BASIC HANDLING

Dials	Drag up or down. Double-click to reset. Click the value under a dial to type one.
Keys	The lit key in a row is the one chosen: tape, speed, emphasis, calibration, hum, meters. LINK, XFMR and BYPASS light when on.
Meters	Two VU meters with real VU ballistics (99 % in 300 ms). REC shows the level onto the tape, REP what comes off it after OUTPUT. MAX holds the highest reading.
Tape saturation	Five LEDs for how hard the tape is bent: one at 0 VU, four at MOL, all five past it.
LCD	How hard the tape is being hit. Click it to step through DRIVE (peak flux in dB re the tape's MOL, the 3 % distortion point: 0 is MOL, + is past it), PEAK FLUX in nWb/m, DISTORTION (% THD, estimated from the stock's calibrated curve) and COMPRESSION (how far the tape squashes the peaks, in dB). Peaks hold for a second; the view is saved with your session. On the left, the stock, speed and oversampling.
Help line	Hover over any control and the strip at the bottom of the panel says what it does.
Light and size	LIGHT switches to the light panel and back; every window remembers it. Drag the window's corner for any size from 60 to 200 %.

SECTION 02

The panel

The meter bridge across the top, then the signal path left to right: record, tape, repro, and the machine's own life.



Header	LIGHT, the preset name with its arrows, SAVE, and the LCD tape read-out (click it to change view).
Meter Bridge	The two VU meters, REC / REP, the tape saturation LEDs and the line-up read-out (stock, speed, emphasis, calibration flux, bias, MOL and S/N).
Record	INPUT, HF DRIVER and BIAS: how hard and how the tape is recorded.
Tape	Tape stock, speed, emphasis and calibration.
Repro	OUTPUT, REPRO LF and REPRO HF, and LINK.
Machine	NOISE, WOW & FLUTTER and MIX; hum; the line transformer; oversampling; BYPASS.

SECTION 03

Dark or light

The same panel, lit two ways. LIGHT switches it; drag the window's corner for any size from 60 to 200 %.

— LIGHT

A light panel with light grey dials and keys, for bright rooms. The VU glass, the LCD and the LEDs stay lit the same way.



SECTION 04

Where it comes from

Spulentonband is built from Studer's A800 service manual and service bulletins, not from impressions of the sound.

— THE RECORD AMPLIFIER, 1.180.712

Its equaliser's time constants come straight from its parts (17.5, 35, 70 and 50 / 3180 microseconds). Its treble chain, which adds the second derivative of the signal to it, is the HF DRIVER. And its own limiter, a zener and diode bridge in the driver stage, clips about 16 dB over 0 VU at the +6 calibration: hit the tape hard and the record amp runs out too, just as on the machine.

— THE REPRODUCE AMPLIFIER, 1.180.710

Its equalising stage is modelled as its actual network and solved, so you get what the real card does differently from the textbook curve: for NAB a 4.7 ms low corner instead of 3180 microseconds, a little extra weight between 20 and 40 Hz. Its line amplifier clips at +16.5 dBm (+12.5 VU) into the output transformer; Studer's later transformerless output has more headroom.

— MEASURED, NOT GUESSED

The low end (the head bump) is fitted so the whole machine matches Studer's own record and replay charts of the A800, within half a dB. The bias calibration follows the manual's bias table for each tape and speed, and the line-up its recommended NAB calibration.

SECTION 05

Record

How the signal is put onto the tape.

— CONTROLS

CONTROL	RANGE	DEFAULT	WHAT IT DOES
Input	-12 to +24 dB	0 dB	How hard the tape is hit. 0 dB puts 0 VU (-18 dBFS) on the tape at its calibration level. Low is clean; past +6 the tape bends, compresses and thickens.
HF Driver	-6 to +6 dB	0 dB	The record amp's treble chain, set by its boost at 10 kHz. More pushes the top end into the tape and the limiter sooner: glossier, softer highs. Less keeps them clean.
Bias	6 dB under to 6 dB over	CAL	CAL is Studer's calibration for this tape and speed. Over: darker, rounder, more tape compression. Under: brighter and grittier; far under, quiet passages chatter and drop out.

TAPE COMPRESSION ON DRUMS Bias 2 to 3 dB over and INPUT +6 to +9: transients round off and the kit gets denser. Try the Drum Crush preset.

SECTION 06

Tape

The stock, the speed and how the machine is lined up.

— CONTROLS

CONTROL	RANGE	DEFAULT	WHAT IT DOES
Tape stock	250, 456, 900, GP9	456	250: older, softer, saturates early. 456: the classic, fat low end. 900 and GP9: high output, more headroom, cleaner and quieter.
Speed	7.5, 15, 30 IPS	15	7.5: the most colour, a soft top and a low head bump. 15: the favourite for rock and pop, bump near 30 Hz. 30: the flattest and quietest, bump near 60 Hz.
Emphasis	NAB, CCIR	NAB	NAB (US) adds low-frequency emphasis: a little less hiss, a little more hum and rumble. CCIR (Europe) has a different top. 30 IPS always uses AES.
Cal level	Auto, +3, +6, +9	Auto	The flux recorded at 0 VU, in dB over the NAB level (+6 = 355 nWb/m). Auto uses the stock's recommendation: 250 +3, 456 +6, 900 and GP9 +9. Lower: more headroom and more hiss.

HOT OR CLEAN Hot +9 on 456 drives the tape 3 dB harder for the same needle; Clean Headroom +3 on GP9 gives 7 dB more room before anything bends.

SECTION 07

Repro

What comes back off the tape.

— CONTROLS

CONTROL	RANGE	DEFAULT	WHAT IT DOES
Output	-24 to +12 dB	0 dB	The output level. With LINK on it also follows INPUT inversely.
Link	on / off	on	Raising INPUT lowers OUTPUT by the same amount, so driving the tape doesn't just make things louder.
Repro LF	-6 to +6 dB	0 dB	The repro card's BASS alignment trim, around 40 Hz: trim or exaggerate the head bump.
Repro HF	-6 to +6 dB	0 dB	The repro card's TREBLE alignment trim, a shelf around 7 kHz: brighten or darken the playback.

SECTION 08

Machine

The life of a real machine, and how hard Spulentonband works to stay clean.

— CONTROLS

CONTROL	RANGE	DEFAULT	WHAT IT DOES
Noise	Off to 200 %	100 %	Tape hiss and modulation noise. 100 % is the real noise for the stock, speed and calibration: 64 dB under 0 VU for 456 at 15 IPS. The hiss is shaped by the repro EQ, exactly as on tape.
Wow & Flutter	Off to 300 %	100 %	100 % is a well-kept A800 (about 0.04 % at 15 IPS): reel wobble, capstan flutter and scrape flutter, shared by both channels.
Mix	0 to 100 %	100 %	Blends the dry signal back in, latency-matched, for parallel tape.
Hum	Off, 50, 60 Hz	Off	Mains hum with its harmonics, at the NOISE level.
XFMR	on / off	off	The repro card's line output transformer: low-frequency weight, and the line amp runs out at +12.5 VU. Off is Studer's transformerless balanced output.
Oversampling	None, 2x, 4x, 8x	4x	4x keeps the tape alias-free at real-world levels; 8x for extreme high-frequency drive; None for the least CPU.
Bypass	on / off	off	Bypasses everything, latency-matched, so A/B comparisons line up.

GOOD NOISE Leave NOISE at 100 %: under music the hiss is barely there, but the grain it gives quiet passages and reverb tails is part of the sound. Turn it off for silent bounces.

CPU At 4x a stereo instance uses about 6 % of one core on Apple Silicon; at None about 1.2 %.

SECTION 09

Presets

Twenty factory presets. Machine has the classic line-ups; Mix is for the stereo bus; Drums for kits and drum groups; Tracks for vocals, bass, acoustics and synths; Character for hot, clean, worn and broken machines. SAVE stores your own in ~/Music/Spulentonband Presets; they appear in the menu under User presets.

CATEGORY	21 PRESETS
Machine	456 at 15 IPS, GP9 at 30 IPS, 250 at 15 IPS, 900 at 15 IPS, CCIR
Mix	Mix Bus Cohesion, 30 IPS Master Polish, Warm Mix, Soft Top
Drums	Drum Crush (Over-Bias), Kick And Bass Bump, Snare Tape Smack, Room Squash
Tracks	Vocal Silk, Bass DI Weight, Acoustic Air, Synth Thickener
Character	Hot +9 On 456, Clean Headroom +3 On GP9, 7.5 IPS Lo-Fi, Worn Machine, Under-Bias Chatter
Yours	Every preset you save, listed under User presets

— RECIPES

01	**Mix bus cohesion**	**Mix Bus Cohesion** on the mix bus: needles around 0 VU in the chorus, one or two saturation LEDs, and the mix pulls together.
02	**Drums that hit**	**Drum Crush (Over-Bias)**: INPUT +9 and 2.5 dB of over-bias round the transients into a dense, punchy kit.
03	**Bass weight**	**Bass DI Weight**: the transformer and the 15 IPS head bump add low-end body without mud.
04	**Vocal sheen**	**Vocal Silk**: 900 at 30 IPS, a gentle drive and a touch of REPRO HF.
05	**Lo-fi**	**7.5 IPS Lo-Fi** or **Worn Machine**: slow tape, more flutter, more hiss, a dull top.

SECTION 10

Reference and troubleshooting

— TECHNICAL NOTES

Signal flow	Input, the record EQ and treble chain, the record amp limiter, the tape (magnetisation, modulation noise, hiss), the repro EQ and the repro card, the head, the Repro trims, the line amp (and transformer), wow and flutter, output, mix.
Clean by design	A linear-phase half-band oversampler; an analytic tape curve with an exact antiderivative so its anti-aliasing is exact; anti-aliased limiter and line amp; magnitude-matched filters.
Latency	About 1 ms of tape path (room for the flutter) plus the oversampling filters: 149 samples at 44.1 kHz and 4x. Spulentonband reports it to the host, which compensates.
Sessions	A project stores every parameter, the preset and the meter source. Presets are small XML files.
Compatibility	Universal (Apple Silicon and Intel). VST2 is not available: Steinberg no longer licenses it. CLAP is built with the open-source clap-juce-extensions.
Trademarks	Studer is a trademark of its owner. Dotmatrix is not affiliated with or endorsed by Studer or any tape manufacturer; the names only identify what is emulated.

— TROUBLESHOOTING

Nothing seems to happen	INPUT is low and your material is quiet: watch the REC needles and raise INPUT until they reach 0 VU and beyond.
It just gets louder	Turn LINK on, so OUTPUT follows INPUT down.
It sounds harsh when driven hard	You are past the record amp's limiter or the line amp: lower INPUT or HF DRIVER, or turn XFMR off for more line headroom.
I hear hiss	That's the tape. Lower NOISE, or set it to OFF, or choose 30 IPS and a higher calibration for less.
It does not appear in Logic	Run the Terminal lines in READ ME FIRST.txt, then restart Logic. In Logic > Settings > Plug-in Manager, select it and click Reset & Rescan Selection.
My presets are missing	They live in ~/Music/Spulentonband Presets. Copy the .xml files there on another Mac.



Spulentonband by Dotmatrix

Lightweight audio plugins. Documentation for version 1.0.0.