



TALLIN

DUAL DISCRETE CORE VOLTAGE CONTROLLED AMPLIFIER

Model of 1956

Discrete core analog VCA circuitry · Simultaneous linear and exponential voltage control · DC-coupled for control voltage processing · Multi-color signal level indication · Two distinct amplifier overdrive characteristics



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MODULE OVERVIEW

Salut! Thank you for purchasing this Xaac Devices product. Tallin [*tal*in] is a dual voltage controlled amplifier (VCA) with overdrive, offering some unusual control features and a range of attractive tonal characteristics. Each of the two identical channels offers two simultaneously available inputs for voltage control over signal attenuation or gain, with linear and exponential response to CV. Volume control knobs offer manual gain settings ranging from fully closed (-80dB) up to +18dB. A color LED indicator displays output signal levels.

A soft-clip circuit avoids harsh clipping distortion, while a switchable overdrive circuit offers two carefully crafted distortion responses, simulating the sound of classic tube amplifiers. Since both CV inputs are simultaneously active, they can be joint-

ly exploited within patches featuring more complex volume control that otherwise would require using two traditional VCAs in series. As the signal path is DC-coupled, Tallin can also be used for handling the control voltages.

INSTALLATION

The module requires 6hp worth of free space in the eurorack cabinet. The ribbon type power cable must be plugged into the bus board, paying close attention to polarity orientation. The red stripe indicates the negative 12V rail and is supposed to match the arrow head, -12v, or red stripe marks on both the unit and the bus board. The module itself is secured against reversed power connection, however, reversing the 16-pin header **MAY CAUSE SERIOUS DAMAGE** to other components of your system, because it will short-circuit the +12V and +5V power rails.

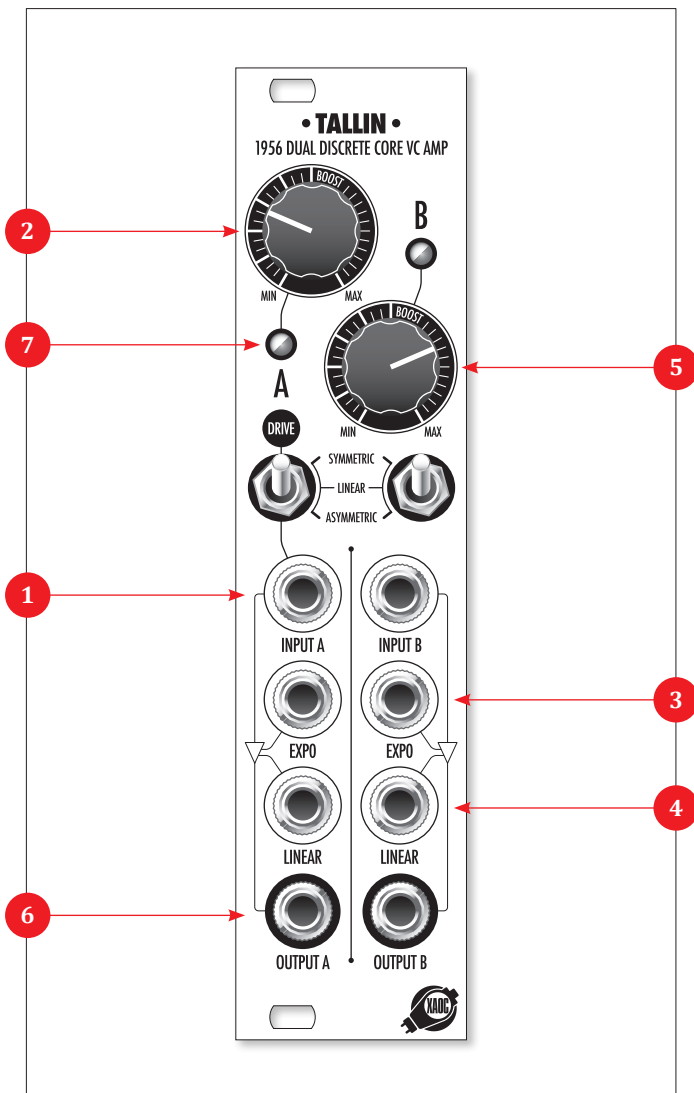
The module should be fastened by mounting the supplied screws before powering up. To better understand the device, we strongly advise reading through the entire manual before using the module.

MODULE OVERVIEW

Tallin consists of two completely independent but functionally identical channels, A and B (fig. 1). Each channel is built around a “modern vintage” discrete VCA core with a matched transistor pair and multiple feedback topology. This gives Tallin a specific character not present in other VCAs that use mathematically precise and sonically pure integrated gain cell VCA chips. With Tallin, we opted for a discrete core, to provide a thick and charming sound that reflects Xaac’s tonal idiosyncrasy.

The signal **INPUTS** ① accept Eurorack signal levels (typically 10Vpp, but capable of handling up to 20Vpp). They can also accept normal studio level (+4dBu) signals which can be amplified to the modular levels, thanks to the gain reserve of up to +18dB. The knobs ② control the attenuation or gain by scaling the corresponding control voltages. Thus, in a **MIN** position, they fully silence the channel, regardless of whatever control voltage is applied to the VCA. Turning a knob up will gradually open the VCA, offering a significant boost when above the 12 o’clock position (depending on the control voltage patched in).

fig. 1: TALLIN FRONT PANEL LAYOUT AND CONTROLS



VOLUME OPERATION

There are two CV inputs in each channel, respectively featuring an **EXPO** (exponential) ③ and **LIN-EAR** ④ control response. Both controls are available simultaneously, and they jointly determine the gain of the VCA. A CV of 0V at either jack will close the VCA entirely, however both jacks are internally normalized to a constant voltage, so it is possible to use both, just one, or—for manual control only—neither.

It is convenient to think of each channel of Tallin as consisting of two VCAs in series (exponential followed by linear), even though the internal implementation is a single circuit.

Both CV inputs are optimized for voltages up to 8V, however they can handle envelopes as hot as 10V, or as low as 5V (although the VCA may not open fully in such a case). The internal normalization of both CV inputs is set to 8V. Tallin's response to combined CV and manual settings is discussed in next section.

Each channel of Tallin features a 3-position **DRIVE** switch ⑤ that selects between the non-distorted **LINEAR** operation (switch in middle position), a **SYMMETRIC** overdrive yielding mostly 3rd harmonic distortion (switch in up position), or a **ASYMMETRIC** overdrive yielding mostly 2nd harmonic distortion (switch in down position). See "Overdrive Operation" for more details.

The amplified signals are available at the **OUTPUT** jacks ⑥. Signals that would exceed 18Vpp are subject to internal soft clipping to avoid harsh distortions due to the limited dynamic range (20Vpp) of Tallin's operational amplifiers.

The multi-color LEDs ⑦ indicate output signal levels in four stages, from silence to the normal 10Vpp level (gradually lit green), exceeding it (by changing to yellow), and finally, reaching very hot levels (by turning orange), and engaging the soft clipping circuit (by turning red).

OPERATING THE VOLUME CONTROL

The volume knobs are scaled so that the central position yields 0dB, or 100% of original amplitude, provided there is either nothing patched to the CV inputs, or there is a control voltage of 8V (fig. 2).

Turning the knob past the central position will engage a **BOOST** allowing the amplification of quiet signals up to modular levels. Keep in mind that if the input is a modular level signal you should expect soft clipping to engage quickly and provide a heavy distortion by the end of the knob's travel.

The **EXPO** input offers an exponential control of the output amplitude, which means the amplitude will decrease rapidly as the voltage approaches zero (fig. 3). Since human sensitivity to sound intensity is nearly exponential, this exponential input yields a natural sounding loudness decrease when using CV sources that change linearly in time.

Since there is a significant variety of envelope amplitudes in eurorack, the sensitivity of this input can be adjusted to adapt to the provided control source by using the knob. It is optimally suited to 8V envelopes in the central (12 o'clock) position, and should be turned down to the 10 o'clock position when using a 10V envelope. Using 10V envelopes without turning down the knob will result in a severely compressed response, that delivers a thick, and somewhat unnatural, sound which can be creatively abused if that's your preference. For 5V envelopes, the output will be very quiet. This can be compensated with the boost range of the knob, however you may be unable to reach overdrive levels in this case.

The **LINEAR** input offers linear control, which means the output amplitude will scale proportionally to the CV (fig. 4). If you have an exponential envelope, it's a good idea to use this input, because it will result in signal amplitude that follows the envelope, decaying towards zero with a natural exponential tail. Envelopes with amplitude different from 8V can be easily used here, requiring only a small adjustment of the knob to compensate.

OVERDRIVE OPERATION

The overdrive circuit in Tallin offers two distinctive distortion characteristics switchable via the **DRIVE** toggles.

The **SYMMETRIC** position activates a bi-polar parabolic distortion curve that equally amplifies and squashes both peaks of the waveform (fig. 5), yielding a spectrum dominated by 3rd order harmonic overtone.

OVERDRIVE OPERATION

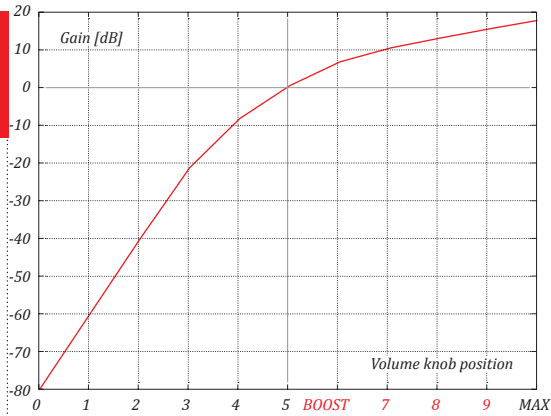


fig. 2: GAIN VS VOLUME KNOB POSITION WITH EXPONENTIAL CV AND LINEAR CV AT 8V

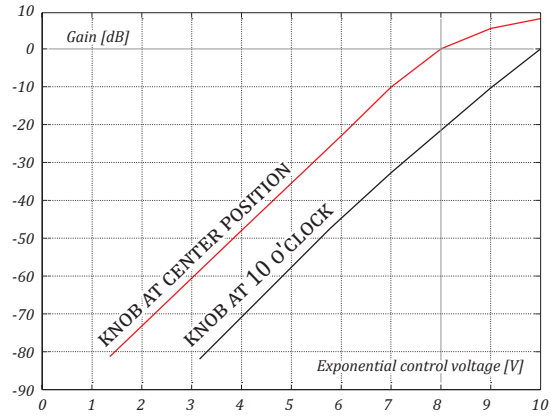


fig. 3: GAIN VS EXPONENTIAL CONTROL VOLTAGE WITH LINEAR CONTROL VOLTAGE AT 8V

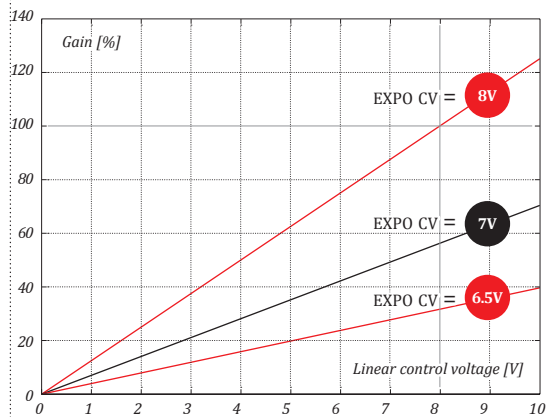


fig. 4: GAIN VS LINEAR CONTROL VOLTAGE WITH CENTERED VOLUME KNOB POSITION

The resulting slightly brightened sound is modeled after an overdriven push-pull power amplifier.

The **ASYMMETRIC** position of the switch activates a distortion curve that is more concave in one direction while it is convex in the opposite direction (fig. 5), yielding a spectrum dominated by 2nd order harmonic overtone.

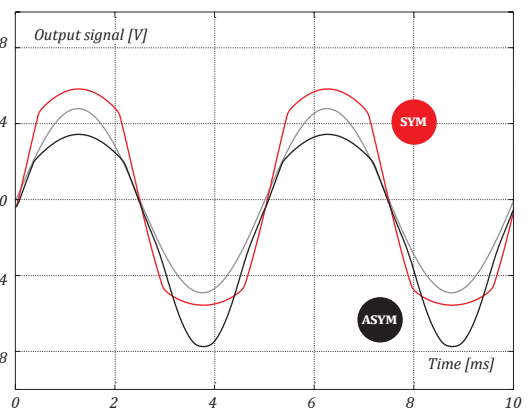


fig. 5: GAIN VS LINEAR CONTROL VOLTAGE WITH CENTERED VOLUME KNOB POSITION

The resulting mellow and warm sound is modeled after a classic single-ended tube amplifier.

ACCESSORY

Our Coal Mine black panels are available for all Xaoc Devices modules. Sold separately. Ask your favorite retailer. •

TECHNICAL SPECIFICATION

WIDTH	DEPTH TOTAL	CURRENT DRAW	REV. POWER PROTECT.
6hp	33mm	+50mA -50mA	protected

INPUTS		OUTPUTS	
INPUT	0 to 20Vpp	OUTPUT	0 to 18Vpp
EXPO (exponential)	0 to 10V	Outputs soft clipped above 16Vpp	
LINEAR	0 to 10V		

FREQUENCY RANGE
DC to 50kHz (-3dB)

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