OPERATOR'S MANUAL

LUBLIN

DUAL PINGABLE VOLTAGE CONTROLLED AMPLIFIER

Model of 1957

Dual voltage-controlled amplifier · High quality, low noise and distortion, DC-coupled signal path · Ping inputs for emulating vactrol response · Three variants of ping response · Exponential CV response with adjustable sensitivity · Gain limiting circuit for protection against signal clipping

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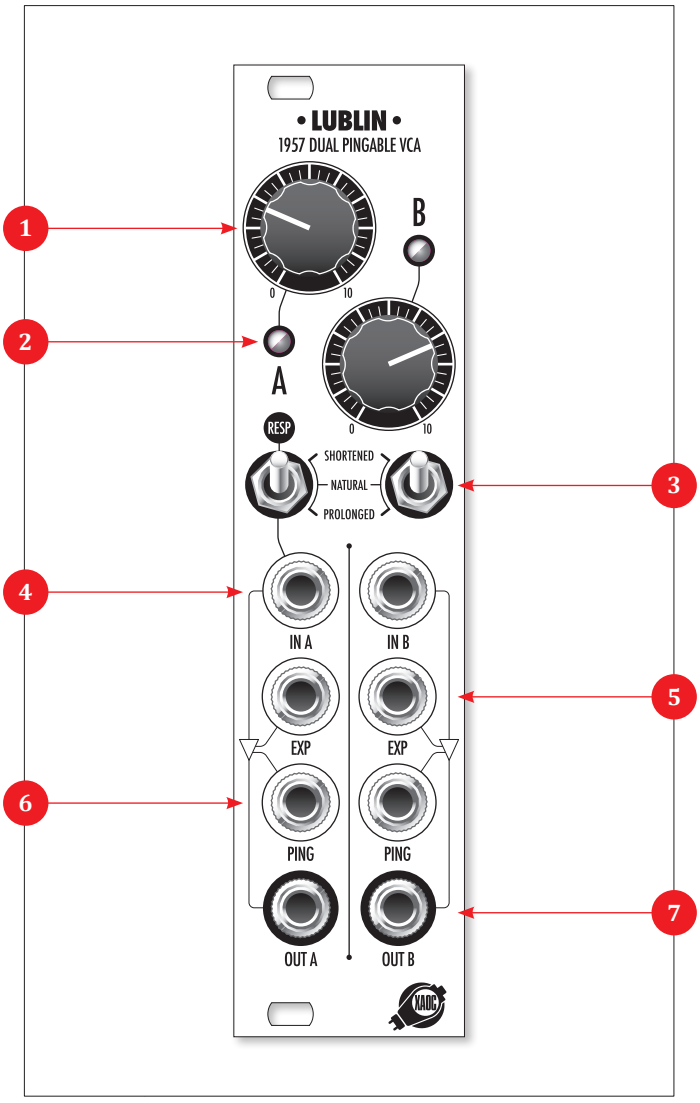
MODULE OVERVIEW

Salut! Thank you for purchasing this Xaoc Devices product. Lublin ['lublin] is a dual, DC-coupled, high-quality VCA module with exponential control characteristics. It features a gain control circuit that prevents distortion from excessive amplification, which is common with traditional VCAs.

Besides audio and CV inputs, it features additional pinging inputs that use an elaborate analog circuit to model the dynamic behavior of vactrols, allowing you to trigger a carefully crafted gain response that mimics the natural decay of plucked and struck acoustic instruments.

Note that despite this emulation, Lublin is not a lowpass gate type module as it retains the full frequency bandwidth when reducing gain. Unlike many modules that use vactrols, Lublin's dynamic profile can be varied within a wide range.

fig. 1: LUBLIN FRONT PANEL LAYOUT AND CONTROLS



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 arrowhead, –**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

Lublin consists of two entirely independent VCA channels behind a 6hp front panel (fig. 1) featuring for each of its channels: a **VOLUME** *potentiometer* ❶*, signal level indicator* ❷*,* **RESP** *response switch* ❸*, and a group of jacks.*

The signal inputs labeled **IN** ❹ *accept all modular signal levels and are DC-coupled. The exponential CV control inputs labeled* **EXP** ❺ *accept positive control voltages in the range of 0V to +8V or 0V to +10V, depending on how the* **VOLUME** *knobs are set. These inputs are internally normalized to 8V unless you also use the* **PING** *inputs* ❻*. The* **PING** *inputs react to any trigger signals that are at least 4ms long.*

The processed signal is available at the **OUT A** *and* **OUT B** *jacks* ❼*.*

THE PRINCIPLE OF OPERATION

Lublin is designed with intelligent normalization offering great flexibility. When nothing is plugged into the **EXP** *or* **PING** *jacks, the potentiometers simply control the input signal attenuation from -90dB to 0dB. With control voltage patched into the* **EXP** *inputs, the potentiometers act as attenuators to*

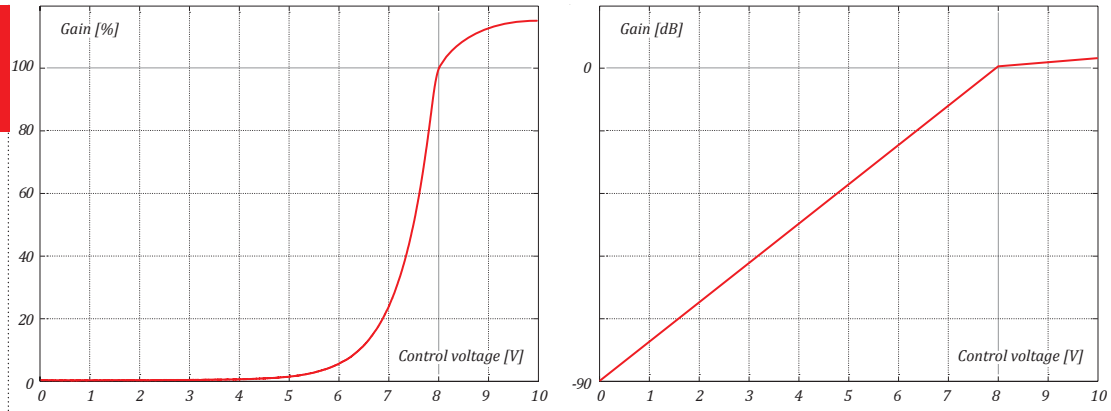


fig. 2: CV RESPONSE OF LUBLIN IN LINEAR (LEFT) AND dB SCALE (RIGHT)

this CV, allowing you to adjust its impact. Note that a CV of zero or negative value will always shut the VCA down, regardless of the knob position. Similarly, turning the potentiometers all the way down will not let any CV open the VCA. However, in both situations, it is still possible to open the VCA briefly via the **PING** *inputs.*

Lublin features a CV saturation circuit that tempers the gain controls, making it quite difficult to open beyond 0dB. Thus it is nearly impossible to distort the signal with too much gain.

For this reason, there is no soft-clipping or saturation in the signal path, allowing for maximum range of linear operation without any shade of distortion. In other words, if your output signal is clipped, it means it was already clipped before it entered Lublin.

The CV saturation level can be adjusted using a trimmer at the back of the module, which sets the overall and maximum gain in a reasonable range. All factory units are calibrated to 0dB. Please note that adjusting it significantly above 0dB introduces a risk of distortion.

Trigger signals patched into the **PING** *inputs start a short envelope in the corresponding channel. This envelope is not attenuated by the volume potentiometers; hence it always opens the VCA to 100%, i.e., 0dB. When CV is present at the* **EXP** *input and is already opening the VCA, the pinged envelope rides on top, but the 0dB limit makes the sum less dynamic.*

When the **PING** *inputs are used without any CV patched, the potentiometers allow you to adjust the tail of the pinged response and dial in the appropriate decay length. Together with the selection between* **NATURAL**, **SHORTENED**, *and* **PROLONGED** *envelopes, this control offers a broad range of dynamic profiles from short and clicky through plucked and bell-like up to long, compressed, and boomy.*

THE CONTROL RESPONSE

The two individual VCA cores of Lublin, based on the legendary Blackmer Cell implemented in high-quality integrated circuits, are intrinsically exponential in their response to control voltage, wherein each 1V change of CV yields an equal change of gain in the dB scale (see Fig. 2). Remember that dB is a relative scale corresponding to human sensitivity to loudness change. The 0dB point on this scale is equivalent to a gain factor of 1 or 100% (there is no change in signal amplitude compared to the input signal). The -90dB point represents extreme attenuation, down to a practically inaudible level.

Exponential VCAs offer a more "dynamic" sound than linear VCAs, with more precise control over the quiet end of the range. On the other hand, an already exponential envelope driving an exponential VCA yields hyper-exponential decays, which are perceived as short and "spiky". It is always recommended to carefully select an appropriate envelope shape for a given VCA. For example, Xaoc Devices Zadar has a continuously adjustable envelope response shape, making it an ideal partner for Lublin.

Since the potentiometer acts as a scaling factor, its position determines the slope of the response (in dB/V), thus allowing Lublin to adapt to envelopes exceeding the A-100 standard of 8V amplitude by simply turning the knob slightly down.

The plateau of the curve illustrates how the gain constraint works. It deliberately does not allow Lublin to amplify the signal above the 0dB point regardless of the level of CV driving it. The sonic effect is very similar to a brickwall limiter, without any of the artifacts of a real limiter, such as transient ripples and distorting the peaks of the waveform.

THE PING INPUTS

Lublin's **PING** *inputs accept trigger signals and gate signals. Each incoming impulse starts an internal envelope that is directly tied to the VCA core (bypassing the potentiometer).*

The envelope (fig. 3) consists of a short attack phase instantly followed by three precisely formed decay segments which model the dynamic behavior of classic vactrol elements (consisting of an LED and a photoresistor) used in vintage synthesizers. This envelope has a breakpoint selectable with the 3-position switch. Depending on the selection, the behavior of different vintage and modern vactrol-based VCAs can be emulated.

If the **PING** *input is used with no external CV patched, the internal normalization of the potentiometers allows you to adjust the time of the audible portion of the envelope decay. Since the tail is exponential, any small offset added to the envelope voltage results in shifting the end of the tail above or below the threshold of hearing so that a longer or shorter part of the sound becomes audible.*

With external CV patched, the VCA is opened by the sum of this voltage (scaled by the potentiometer) and the pinging envelope (not scaled by the potentiometer). This means that the envelope offers additional short dynamic bumps that ride on top of the external control. However, the general limiting mechanism does not allow the VCA to open above 0dB. Therefore, the more the VCA is being opened by CV, the less pronounced the additional pinging is.

SIGNAL LEVEL INDICATORS

Each Lublin channel is equipped with a multi-color LED signal level indicator. The indicator employs a PPM (peak detection) method with an appropriate discharge time constant, allowing for easier observation of short transients.

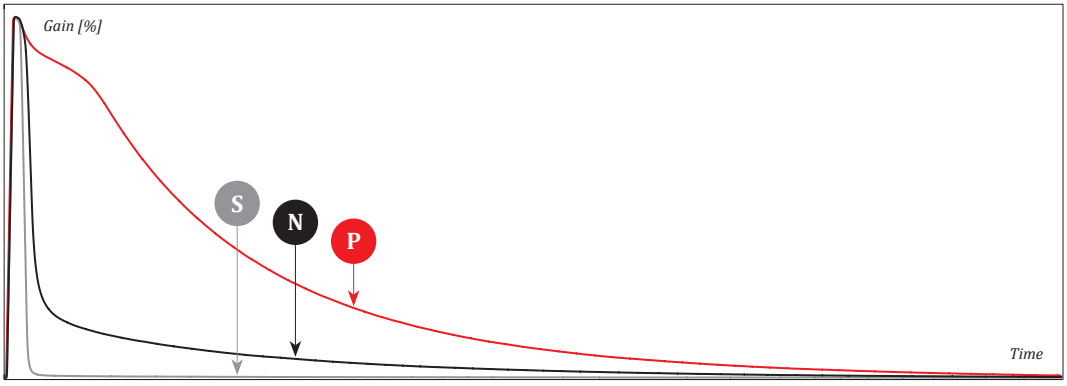
Output levels from silence up to the normal 10Vpp level are shown by the LEDs gradually lighting green. Exceeding 10Vpp is indicated by the color turning yellow, and finally, red whenever levels above 16Vpp are reached. Note that this is never an indication of any distortion caused by Lublin because the maximum gain is squashed above 0dB (unless you adjust the trimmer at the back). Hence, a hot output signal means that the input signal is already hot.

PATCH IDEAS

• *Use the* **PROLONGED** *setting to synthesize a boomy, compressed bass drum sound. Patch a low frequency (but audible!) sine or triangle wave to the* **IN** *jack and a rhythmic gate or trigger to the* **PING** *input. For consistent attack without annoying clicks, use the same trigger to sync/reset your oscillator.*

• *You can easily modulate the length of your pinged sounds. Patch a source of continuous audio signal*

fig. 3: PINGING ENVELOPE (THREE SHAPE SETTINGS: NATURAL, SHORTENED, AND PROLONGED)



to the **IN** *jack. Patch a gate or trigger to the* **PING** *input and a slow LFO signal to the* **EXP** *input. Set the volume knob to minimum and open it slowly so that only a small fraction of the CV is added to the stream of ping envelopes.*

• *Patch a CV offset into the* **IN** *jack. Pinging the VCA will produce CV shaped by the ping envelope, which can be useful for modulating other modules. Adding another CV to the* **EXP** *input and adjusting the knob allows you to modulate the envelope length, as above.*

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*	*+40mA* *-20mA*	*protected*

INPUTS		OUTPUTS	
IN A, B	*0 to 20Vpp*	**OUT A, B**	*0 to 20Vpp*
EXPO *(exponential)*	*0 to 8V*		
PING	*any gate or trig (5V or more, t>4ms)*		

FREQUENCY RESPONSE	LINEARITY
0 to 20kHz (+/- 0.5dB), 0 to 60kHz (-3dB)	*0.3%*

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