



OSTRAWA BOHUMIN USTKA

**FULL STEREO VOLTAGE CONTROLLED MIXING CONSOLE
& MIXING CONSOLE COMMANDER & MIXING CONSOLE BREAKOUT**
Models of 1966

Ostrawa: Full stereo architecture · Natural volume response · Channel level indicators · Stereo auxiliary send and stereo returns · Clickless channel muting · Expandable by chaining more units

Bohumin: Additional AUX B effect loop · Full stereo sends and returns · CV inputs for controlling AUX B sends · Return attenuators for AUX A and AUX B · Gate control inputs for clickless channel muting

Ustka: Per-channel VCA direct outputs · Modular or line signal level



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MODULES EXPLAINED

Salut! Thank you for purchasing this Xaoc Devices product. Ostrawa [os'trava] is a fully stereo four-channel voltage-controlled mixer featuring a stereo mixing bus, one stereo auxiliary send per channel (switchable between pre and post-VCA) with stereo returns, clickless muting, individual level meters, and a super-clean and DC-coupled signal path designed with high-quality VCA and op-amp chips. We have carefully crafted Ostrawa's voltage control response to achieve what we believe to be the optimal user experience found in a Eurorack mixer. The design features an elaborate control circuit that combines the internal voltages generated by the panel potentiometers with external CV over volume and stereo balance. The result is a natural attenuator response that constrains VCA gain to a usable range while minimizing distortion.

Ostrawa, a sister module to Xaoc Devices Praga, features similar response characteristics and layout of controls with some functional differences due to its stereo inputs and limited panel space. Multiple Ostrawa and Praga units may be chained for a custom configurable mixing system.

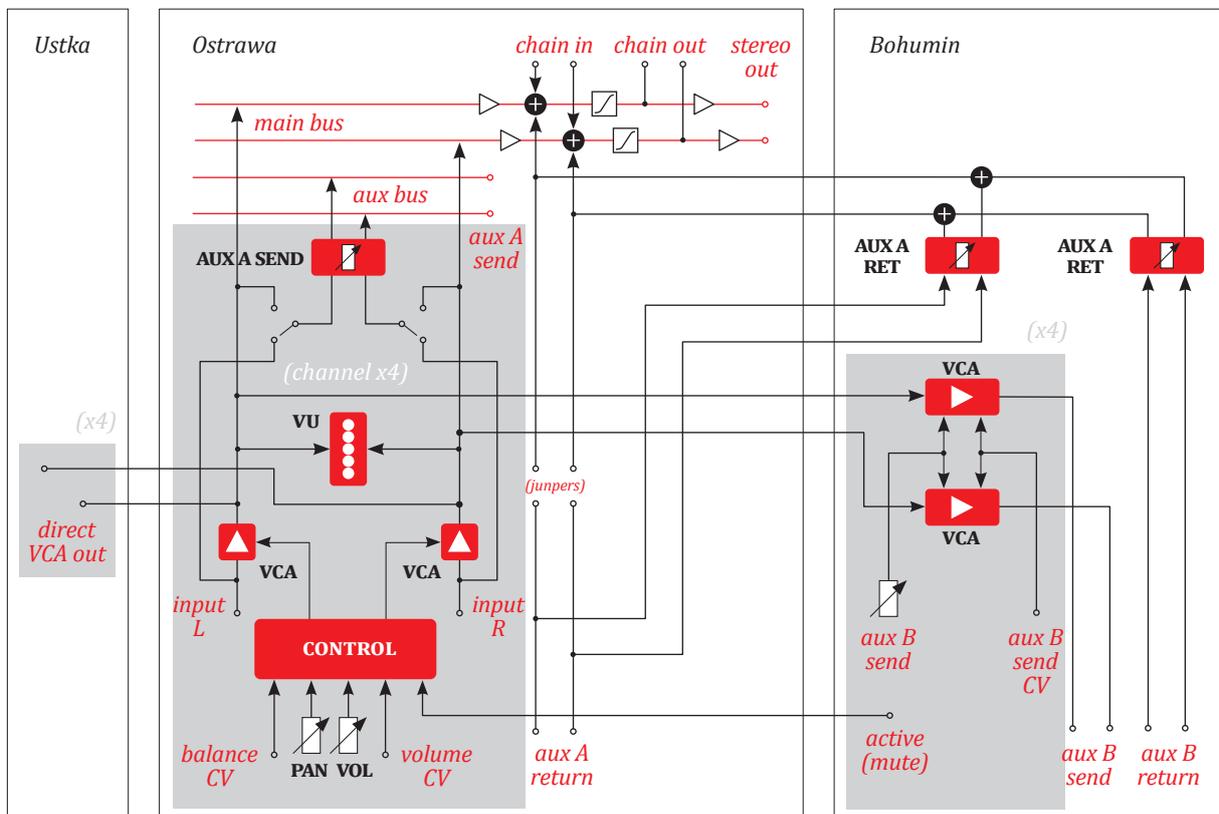
Bohumin [bo'xumin] is an expander for the Ostrawa module. By connecting to Bohumin, Ostrawa gains a second full stereo AUX bus with voltage control over the amount of the effect on each channel. In addition, Bohumin features manual attenuators for stereo returns of both **AUX A** (note: the **SEND** and **RETURN** jacks for **AUX A** are located directly on Ostrawa) and **AUX B**, as well as four gate inputs for automated clickless muting of each stereo input channel.

Ustka [ustka] is a simple passive expander module. It offers direct access to four pairs of stereo signals before they are combined into the mixed signal at the output of Ostrawa. Ustka's main application of is interfacing with external multichannel devices like computer audio interfaces and hardware multitrack recorders.

OSTRAWA INSTALLATION

The module requires 20hp worth of free space in the Eurorack cabinet. The ribbon-type power cable must be plugged into the bus board, with close attention paid to polarity orientation. The red stripe indicates the negative 12V rail and should align

fig. 1: OSTRAWA, BOHUMIN & USTKA SIGNAL FLOW



MODULES INSTALLATION

with the dot, -12V, or **RED STRIPE** marks on both the unit and the bus board. The module itself is protected against reversed power connection; however, reversing the 16-pin header **MAY CAUSE SERIOUS DAMAGE** to other components of your system by short-circuiting the +12V and +5V power rails.

Unless you are using Ostrawa with the Bohumin expander, make sure the factory-installed jumpers are present on the **BOHUMIN EXPANDER 2** header as indicated on the PCB.

BOHUMIN INSTALLATION

The Bohumin module requires 10hp worth of free space in the Eurorack cabinet. Bohumin does not have a separate power connection; instead, it draws power from Ostrawa and adds +50mA/-40mA to Ostrawa's power consumption. **ATTENTION: NEVER CONNECT A POWER CABLE TO ANY PIN HEADER ON THE BACK OF YOUR BOHUMIN; IT WILL DESTROY THE UNIT!**

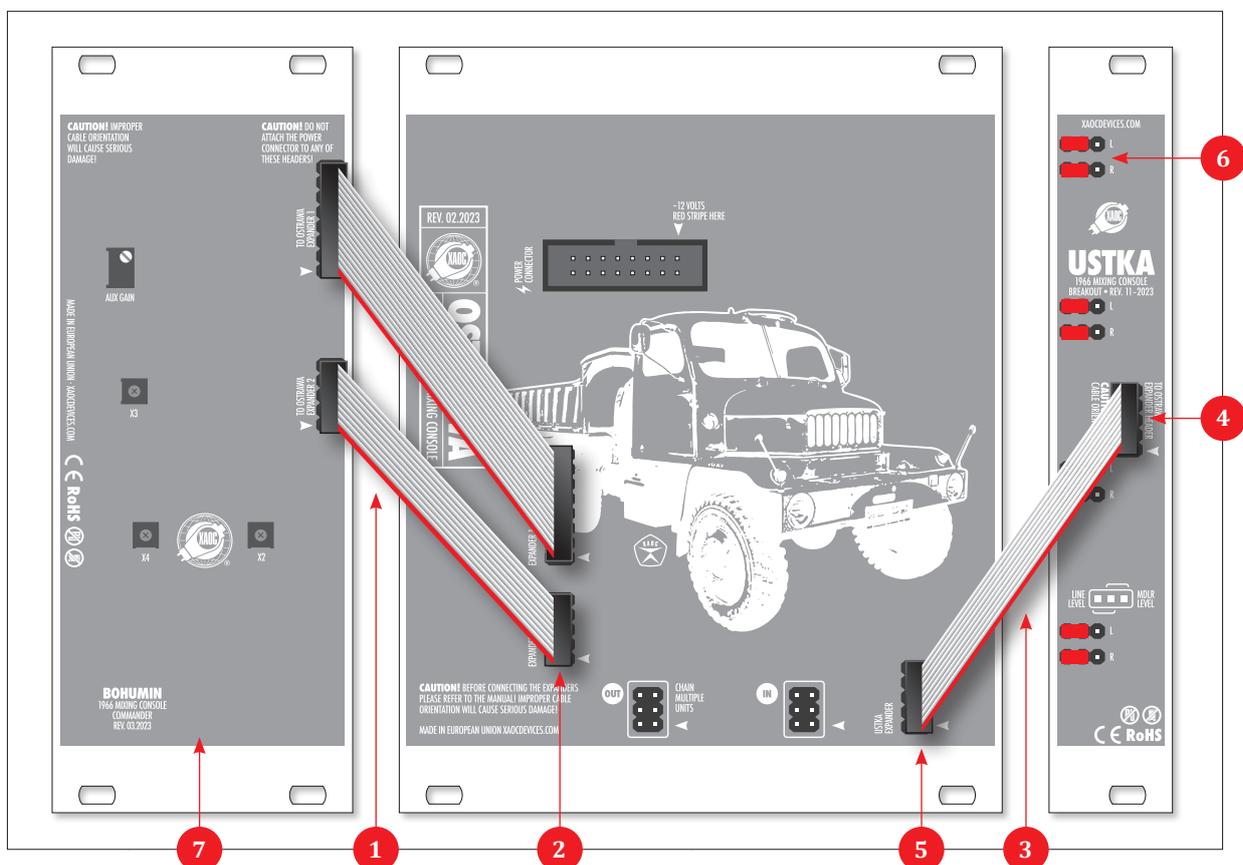
Bohumin connects to Ostrawa using one 16-pin and one 10-pin ribbon cable **1** (fig.1), both supplied with the unit. Note that these cables are deliberately

short for safety and to keep noise and interference low and should not be replaced with longer ones. Bohumin should be located next to your Ostrawa. Before making the connection, remove the 2-pin jumpers from the lower pin **EXPANDER 2** header **2** of your Ostrawa. Keep them for later use, as you will have to put them back if you ever decide to use Ostrawa without Bohumin; otherwise, the AUX return will not work properly. Next, carefully connect the cable going from the upper and the lower headers of Bohumin to the upper and the lower headers of Ostrawa, respectively (see fig. 1), paying attention to not mix them up or rotate them as this would seriously damage both units!

USTKA INSTALLATION

Ustka requires an additional 4hp worth of free space in your Eurorack cabinet, located directly at either side of Ostrawa. Ustka comes equipped with a deliberately short 10-wire ribbon cable **3**, allowing it to be connected to Ostrawa only if sitting next to it. To maintain a high signal-to-noise ratio, we advise against replacing it with a longer cable.

fig. 2: CHAINING MULTIPLE OSTRAWA UNITS & CONNECTING THE BOHUMIN & USTKA EXPANDERS



OSTRAWA OVERVIEW

Plug one end of the ribbon cable into the **TO OSTRAWA EXPANDER 4** at the back of your Ustka and the other end into the header labeled **USTKA EXPANDER 5** at the back of Ostrawa. Pay close attention to cable orientation. The red stripe indicates pin #1 and should match the arrowhead mark on both units.

NOTE: Ustka is a passive device, so it does not need a power supply. While installing, you may decide on the output signal level. There are four double-jumper sets **6** at the back of the expander, installed on the pin headers behind each pair of output jacks. Each jumper is associated with a single signal output. A jumper bridges the middle pin with either the left or right pin from its particular 3-pin header. Put the jumper in the right position for full mod-

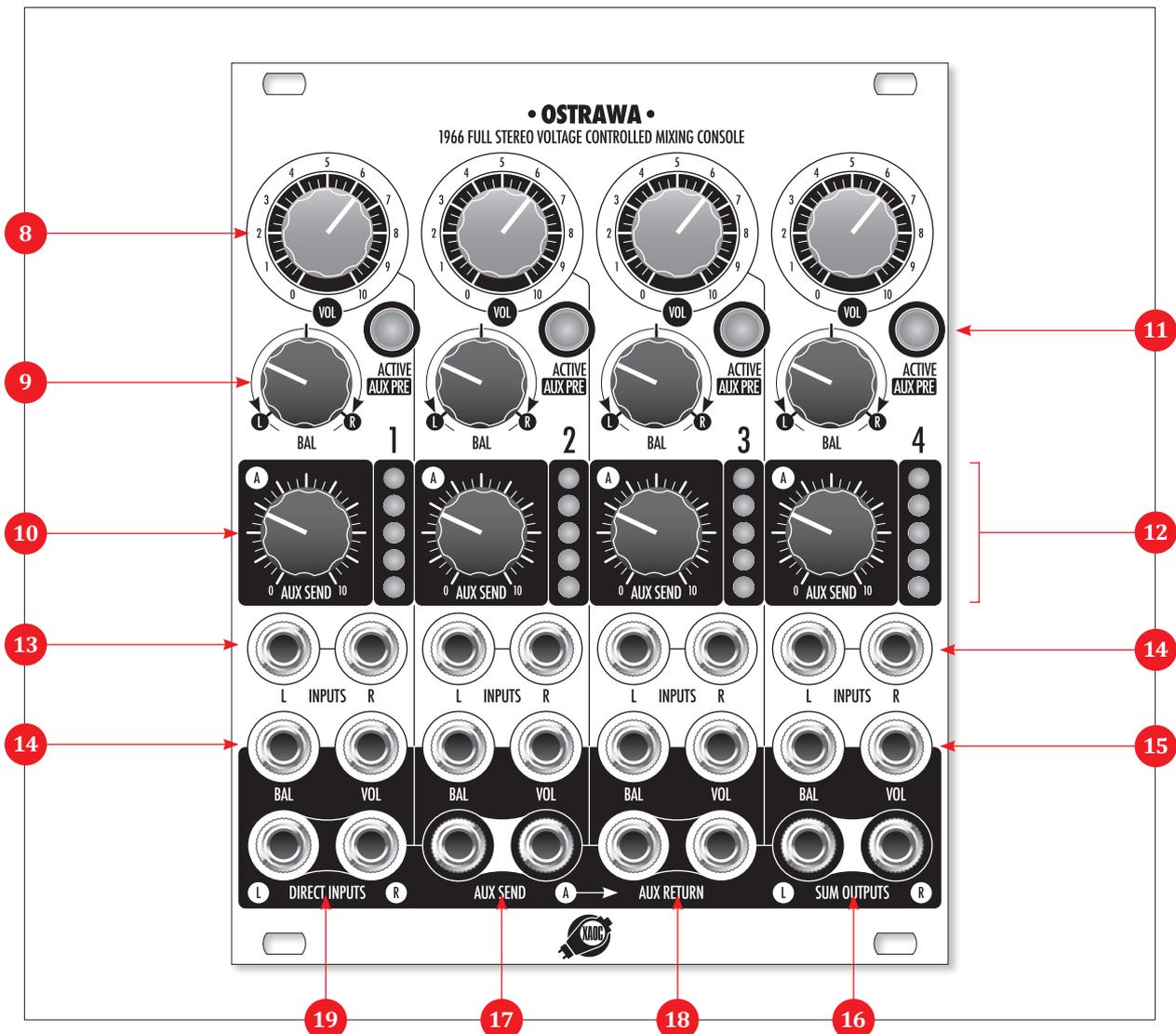
ular level output (+20dBu) or in the left position for additional attenuation down to +4dBu aka line level. The jumpers must be set individually for each of the outputs.

The modules should be fastened by mounting the supplied screws before powering up. To better understand these devices and avoid common pitfalls, we strongly advise the user to read through the entire manual before using the modules.

OSTRAWA OVERVIEW

Ostrawa's front-panel topology (see fig. 3) resembles a typical mixer with four identical channels. The **VOL** knobs **8** allow for manual control of each channel's respective level. The **BAL** knob **9** adjusts the channel's position in the stereo panorama. The

fig. 3: OSTRAWA FRONT PANEL LAYOUT AND CONTROLS



OPERATIONAL MODES

AUX SEND A knob 10 adjusts the amount of stereo signal (pre or post-VCA) sent to the auxiliary outputs. The illuminated **ACTIVE|AUX PRE button 11** allows the user to mute the channel and switch between two AUX send modes. The five-bar LED level indicator **12** displays each channel's post-fader level of combined left+right signals. The lower section contains pairs of jacks for signal **INPUTS 13** and CV inputs for **BAL 14** and **VOL control 15**.

The bottom row of jacks is common to all four channels and offers pairs of **SUM OUTPUTS 16**, stereo **AUX SEND A outputs 17**, stereo **AUX RETURN A inputs 18**, and **DIRECT INPUTS jacks 19** that allow you to stack other sub-mix modules with Ostrawa.

STEREO VS MONO SOURCES

Ostrawa features four stereo pairs of inputs, which enable mixing up to four stereo sources. However, monophonic sources may also be mixed in, as each stereo pair of inputs is internally normalled so that connecting a mono signal into the **L INPUT** correctly places it in the center of the stereo scene.

VOLUME CONTROL

The signal amplitude in Ostrawa is controlled using high-quality VCA chips which have an exponential response we carefully bent to achieve the natural fader curve found in professional studio consoles.

The control circuit combines incoming CV with attenuator settings (fig. 14). The **VOL knob** generates appropriate offsets to the incoming CV while retaining the dynamic response to CV regardless of the attenuator position. For example, with attenuators at max, a CV of 8V opens the channels to +1dB, while closing the attenuators silences

the channels to -85dB. Control voltages above 8V are well-tolerated, although the gain response is strongly compressed above 0dB, offering only up to +3dB to minimize distortion.

This behavior affects the sound similarly to dynamic compression; however, lowering the attenuator's setting diminishes the effect, bringing it down to a non-compressed operation (fig. 5). Each **VOL** input jack is internally normalled to a fixed 8V, allowing the attenuators to operate at full range without any CV patched in.

CHANNEL MUTING

A short press on the **ACTIVE|AUX PRE button** silences the corresponding channel. This state is confirmed by turning off the button backlight. The clickless muting action is achieved by introducing a few-millisecond fade-out to near -90dB. Pressing the button again reactivates the backlight and brings the channel back through a similar clickless fade-in.

The operation of mutes can be controlled remotely via the Bohumin expansion module that offers four gate inputs.

PANORAMA CONTROL

Ostrawa offers both manual and CV control over the position of each source in the output stereo panorama. Please keep in mind that Ostrawa operates similarly to normal studio mixers. It only controls the attenuation of the left vs. right signal and will not magically rotate the auditory image of your stereo sound source around your head.

The **BAL knobs** act as offsets to the **BAL** input control voltages, which are expected in the range of

fig. 4: GAIN RESPONSE TO KNOB POSITION

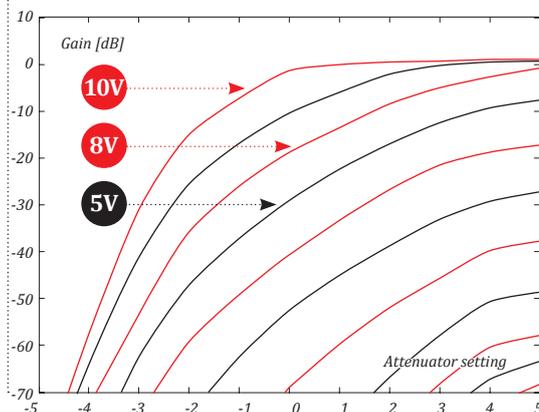
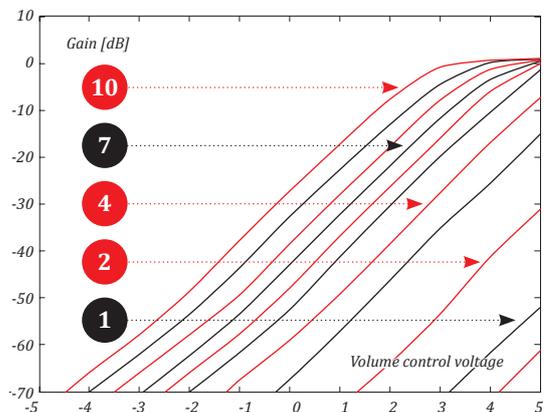


fig. 5: GAIN RESPONSE TO CV



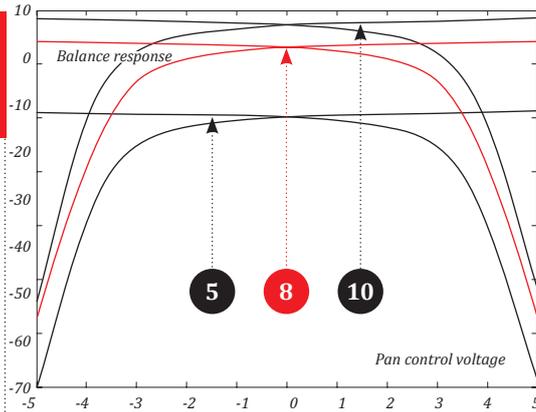


fig. 6: BALANCE CONTROL RESPONSE

-5V to +5V. Negative and positive CV values shift the auditory image to the left and right, respectively. The response of the combined manual and CV controls provides equal loudness in a near-field monitoring setup (3dB pan law); however, as channel gain approaches 0dB, the response is slightly compressed to prevent an increase in loudness (fig. 6).

AUXILIARY OUTPUTS

The stereo pair of **AUX SEND A** outputs and the pair of stereo **AUX RETURN A** inputs facilitate adding external effects in parallel to the main mixing bus. A dedicated **AUX A** knob in each channel sets the amount of signal added to the **AUX** bus.

The **SEND** function has two modes: pre-VCA and post-VCA, similar to pre-fader and post-fader sends in studio consoles. Pressing the **ACTIVE|AUX PRE** button for one second toggles between them, which

is confirmed by changing the backlight color from green to yellow. **NOTE:** pre-VCA mode (yellow backlight) uses the original signal before applying attenuation and panorama balance.

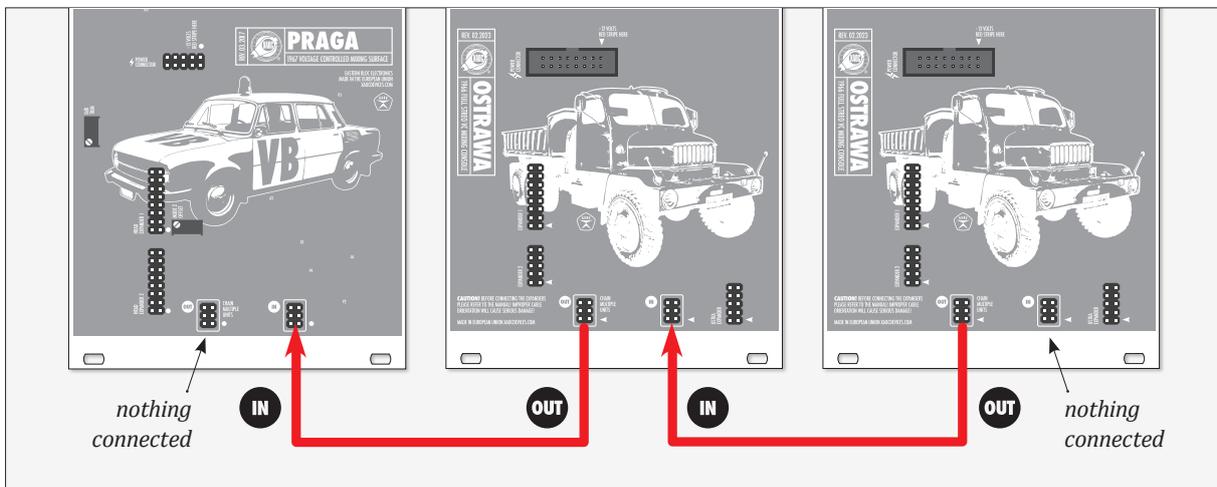
The pre-VCA mode is the only way to obtain a fully wet processed signal (with the channel's **VOL** attenuator turned all the way down). Ostrava does not offer control of the return level. Therefore, you must take care of proper external attenuation of your effect signal. However, such a control is available in the Bohumin expander, which also features a second effects loop (**AUX B**).

LEVEL INDICATORS AND MIXING BUS LEVELS

Each of Ostrava's channels is equipped with an individual post-fader level indicator. The five LEDs show the state of a standard volume detector with thresholds at -40dB, -23dB, -15dB, -10dB, and 0dB referenced to a 10Vpp signal. Bear in mind that Eurorack electronic circuits cannot handle voltages greater than 10V (20Vpp), therefore it is impossible to mix four signals of 10Vpp without serious distortion. It is recommended to keep your attenuators between 50% and 80% of the full range (unless your sources are very quiet).

The mixing bus in Ostrava features a soft clipping circuit that offers a gentle overdrive for signals exceeding 16Vpp. This solution prevents the harsh-sounding distortion resulting from hard clipping should the sum of your signals exceed the dynamic range of the output stage.

fig. 7: CHAINING MULTIPLE OSTRAVA AND PRAGA UNITS



**BOHUMIN
AUX BUSES**

**EXPANDABILITY:
CHAINING MULTIPLE UNITS**

Multiple Ostrawa and Praga units may be chained to provide a cascaded sub-mix setup such that the content of the mix bus of all upstream units is injected 1:1 into the mix bus of every subsequent unit appearing at its **SUM OUTPUTS** (i.e., the output of each chained module is added to the output of the following module in the chain).

The chaining headers at the back of the module (fully compatible between Ostrawa and Praga) should be connected with the supplied ribbon cable so that the **OUT** header of the preceding unit goes into the **IN** header of the following unit (fig. 7). The **IN** header of the first unit and the **OUT** header of the last unit should remain unconnected.

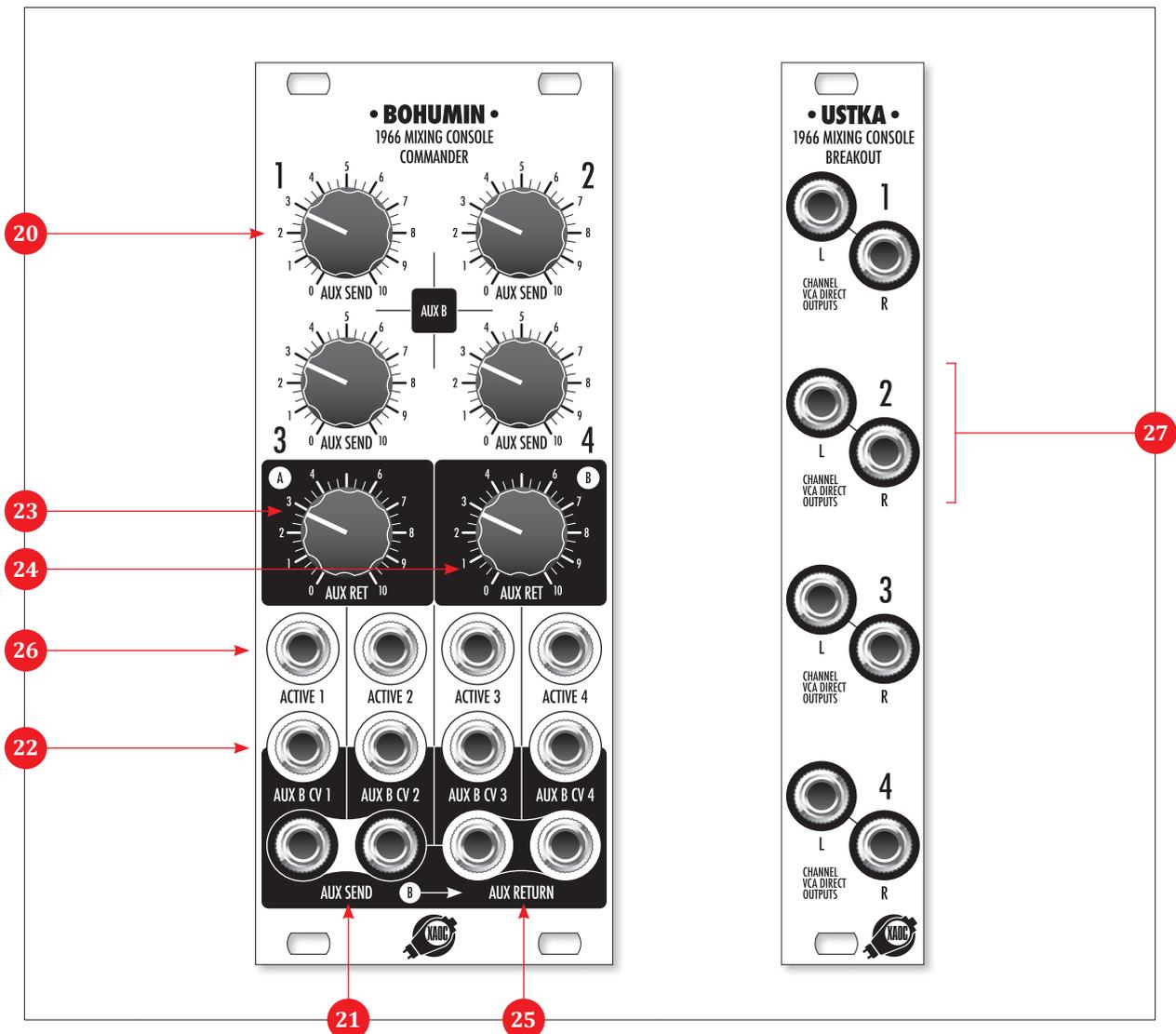
EXPANDABILITY: BOHUMIN

Bohumin's front panel layout (see fig. 8) is straightforward; however, due to space limitations, the order of the potentiometers differs from Ostrawa. The four **AUX B SEND LEVEL** knobs **20** control the amount of stereo signal from each channel of Ostrawa to be sent to the **AUX SEND B** pair of jacks **21**.

The amount of effect is also controlled by the corresponding four **AUX B CV** inputs **22**. The two knobs situated in the middle of the panel, **AUX RET A** **23** and **AUX RET B** **24**, are stereo attenuators for the AUX returns, i.e., the stereo signal pairs patched into **AUX RETURN A** on Ostrawa and **AUX RETURN B** **25** on Bohumin, respectively.

The four **ACTIVE** jacks **26** offer remote mutina and

fig. 8: BOHUMIN & USTKA FRONT PANEL LAYOUT AND CONTROLS



unmuting of the four stereo input channels in Ostrawa.

BOHUMIN AUX BUSES

Please keep in mind that auxiliary effects operate in parallel to the main summing bus of the mixer, which means the processed signal is added to the original signal and does not replace it.

Ostrawa with Bohumin installed offers two entirely independent full-stereo auxiliary effect loops: **AUX A** and **AUX B**. **AUX A** can be switched between pre-VCA and post-VCA and has manual control over the amount of send and return (the return attenuator is part of Bohumin). **AUX B** is only post-VCA, and the amount of send can be controlled manually and via the additional VCAs inside Bohumin. The corresponding inputs accept bipolar voltages. A CV of 0 to +8V increases the amount of send relative to what is set with the knob, while negative CV of 0 to -8V gradually attenuates the signal even with **AUX B SENDS LEVEL** attenuators fully open.

BOHUMIN ACTIVITY CONTROL INPUTS

By feeding gate signals to the four **ACTIVE** inputs in Bohumin, it is possible to remotely control the opening and closing of each channel in Ostrawa in the same way as clicking its front panel buttons. A gate ON signal (about +2.4V or more) activates the channel, while OFF (0V) mutes it (in a clickless way). Even with the gate signal patched, the panel buttons remain operational; however, unplugging the signal will leave your channel muted.

EXPANDABILITY: USTKA

The front panel of Ustka is shown in fig. 8. It features four pairs of two **CHANNEL VCA DIRECT OUTPUTS** jacks (27), each offering the direct post-VCA signal from the corresponding stereo channel of Ostrawa.

Note that these signals are exactly the same signals that are further combined in the mixing bus of Ostrawa, hence, they incorporate attenuation, panning, and mutes applied to the input signals through the front panel controls and CV. Please keep in mind that these signals do not incorporate any auxiliary effects, because these effects run in parallel to the mixing bus and are added to it at Ostrawa's outputs.

MULTI-TRACK RECORDING

Ustka comes in handy when you need to simultaneously record your stems or sources before they are mixed down in Ostrawa. Its four pairs of stereo outputs allow you to record them separately in your DAW or in a multi-track recorder.

Depending on the type of inputs in your recording equipment, you need eight screened cables, four stereo split cables, or even a multi-core cable with an appropriate connector at the far end. The outputs from Ustka are standard Eurorack mono 3.5mm TS jacks.

Keep in mind that the outputs are single-ended (unbalanced); therefore, the connection cables need to be well-screened and not too long. To prevent audible hum or noise interference, properly ground your Eurorack system and recording equipment and power them from the same set of outlets.

SIGNAL LEVELS

By default, Ustka delivers a Eurorack level signal, typically 10Vpp, but in extreme situations, it may be as hot as 20Vpp, which translates to +20dBu. If your recording equipment can tolerate such hot signals, we recommend using this option for better noise immunity. However, many computer soundcards can only take line-level signals (+4dBu). For such cases, it is possible to reduce the output signal level by appropriately positioning the jumpers at the back of the module.

Please note that this optional 16dB attenuation is set individually for each of the outputs (not pairs!), which is why there are 8 jumpers to be configured.

CABLE RECOMMENDATION

The quality of the recorded signal depends on many factors, including the quality of interconnecting cables.

While simple, single-wire shielded cables (so-called 'instrument' cables) work on short distances, even with an unbalanced source, the best connection is via 2-conductor shielded cables (so-called 'microphone' cables) with the screen/shield grounded only at the receiver side (fig. 8). In this way, the AC currents induced in the shield conductor by EM coupling from the mains network do not add to the transmitted signal, because the discon-

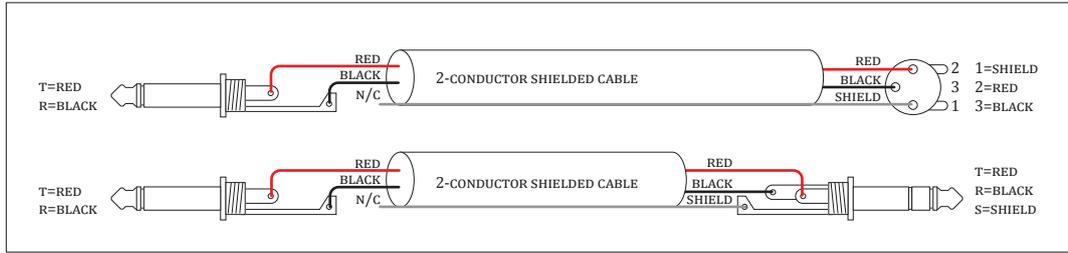


fig. 8: RECOMMENDED CABLE CONFIGURATION FOR RECORDING FROM SINGLE-ENDED OUTPUTS

nected shield is not a part of an exposed ground loop. If you are using plug adapters, keep in mind that they may be wired differently, and not all of them will work properly with such cables.

ACCESSORY

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

**OSTRAVA
TECHNICAL
SPECIFICATION**

WIDTH	DEPTH TOTAL	CURRENT DRAW	REV. POWER PROTECT.
20hp	41mm (including cable bracket)	+180mA -150mA	protected

INPUTS		OUTPUTS	
INPUTS 1-4	Any modular level signal, optimized for 10Vpp	SUM OUTPUTS L, R	10Vpp to 20Vpp, soft saturation above 16Vpp
DIRECT INPUTS L, R		AUX SEND A	
AUX RETURN A			
BAL 1-4	±5V		
VOL 1-4	0 to +10V, optimized for 0 to +8V		

**BOHUMIN
TECHNICAL
SPECIFICATION**

WIDTH	DEPTH TOTAL	CURRENT DRAW	REV. POWER PROTECT.
10hp	31mm (including cable bracket)	+50mA -40mA	Not protected!

INPUTS		OUTPUTS	
ACTIVE 1-4	+5V standard gate	AUX SEND	10Vpp to 20Vpp, soft saturation above 16Vpp
AUX B CV 1-4	0 to +10V, optimized for 0 to +8V		
AUX RETURN	Any modular level signal, optimized for 10Vpp		

**USTKA
TECHNICAL
SPECIFICATION**

WIDTH	DEPTH TOTAL	CURRENT DRAW	REV. POWER PROTECT.
4hp	31mm (including cable bracket)	Passive device	Not applicable

OUTPUTS	
CHANNEL VCA DIRECT OUTPUTS 1-4	+20dBu / +4dBu (individually selectable)
Output impedance: 1k0hm@20dBu, 33k0hm@4dBu	

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