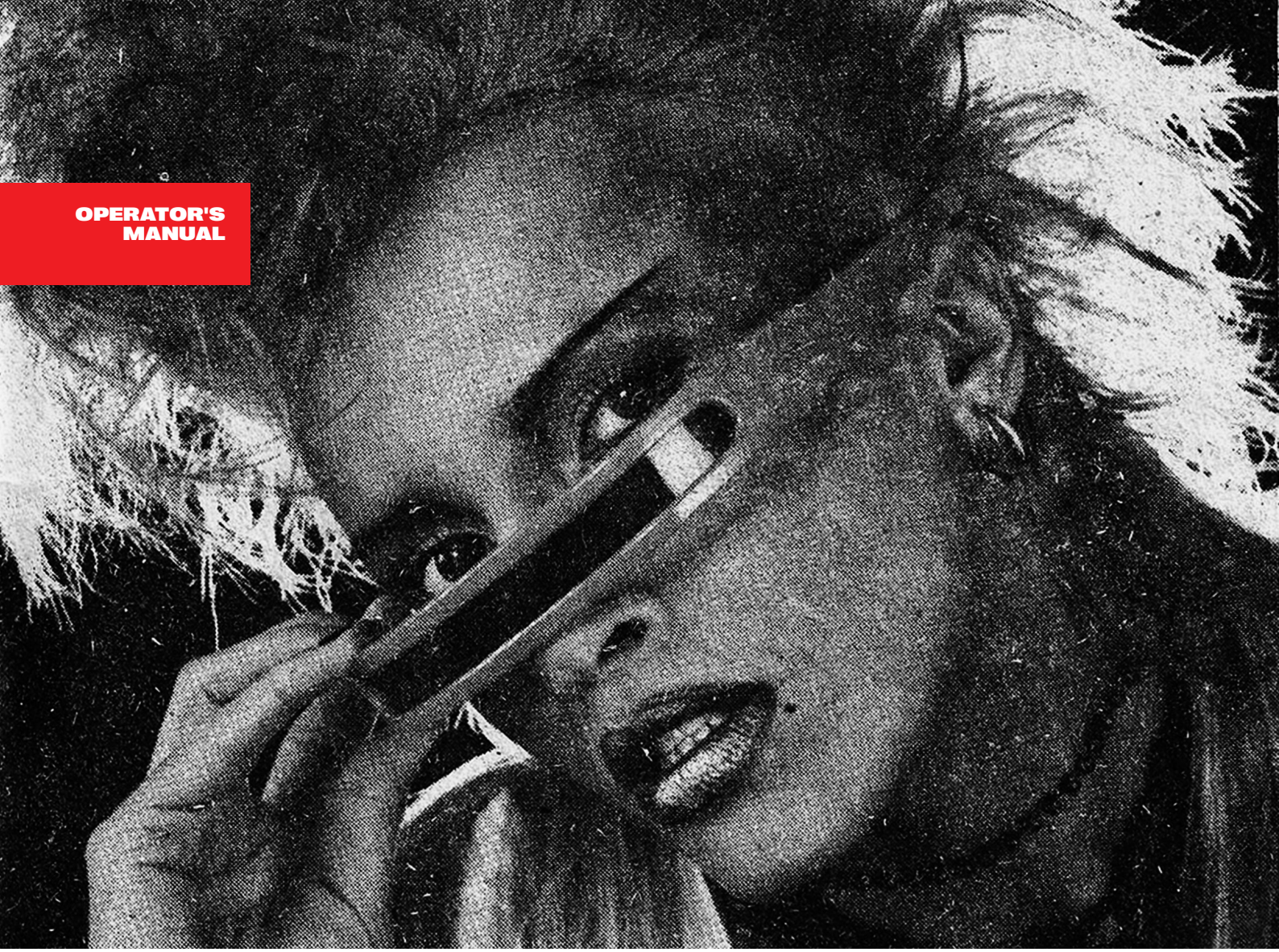

OPERATOR'S MANUAL

ZADAR NIN

QUADRUPLE ENVELOPE GENERATOR
& EXPANDER
Models of 1973

Zadar: Four independent channels · 270 unique vector shapes · Cycle time range: 0,85ms to 30min · Shapes can be radically modified in two dimensions · Immediate operation, accessible interface · Complex envelope looping and chaining features · Assignable CV inputs to control nearly every parameter · 18 preset slots

Nin: Second set of assignable CV inputs · Manual trigger/gate push-buttons

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Salut! Thank you for purchasing this Xaoc Devices product. Zadar ['zadar] is a powerful, four-channel envelope, modulation, and transient generator, in a compact yet very complete, feature-rich package. It is capable of synthesizing a vast palette of envelopes starting from hundreds of shapes stored in the memory. These starting shapes are flexible vectors that can be stretched (from a fraction of a millisecond to half an hour), flipped, warped, distorted, delayed, shuffled, repeated, and amplitude modulated in real time. A set of freely assignable CV inputs allows for external control of most parameters. Each channel can work independently or combined with other channels within one of the chaining and looping algorithms. Operating Zadar is quick and immediate, thanks to its accessible interface and crisp OLED display. The main screen displays all parameters together with the currently selected shape. Entering the simple three-page menu is needed only for advanced settings.

Nin [nin], an expander module, offers a second set of assignable CV inputs (increasing the number of Zadar's menu pages to four) and manual trigger/gate push-buttons for more comfortable tweaking.

To work with Nin, pre-2019 Zadar units require the firmware to be updated to rev. 2.0. You can download the latest package from www.xaocdevices.com and follow the bundled instructions. When in doubt, please get in touch with our support at: support@xaocdevices.com.

VECTOR SHAPES

Each shape is a vector curve comprising 3 to 1000 breakpoints, and each segment interpolates between those breakpoints in real time. This method allows the shapes to be scaled from a fraction of a millisecond to half an hour, without any stepping artifacts that would otherwise be caused by undersampling. Similar to vector graphics, these synthesized envelopes are infinitely scalable and therefore have infinite resolution. This flexible approach allows shapes to be smooth when you want them to be smooth and sharp when you want them to be sharp—regardless of time scale.

Within the 2.0 firmware revision, there are 270 different shapes organized into 27 BANKS *of 10 shapes. They have been carefully designed to suit a wide range of use, from essential synth envelopes to complex transients, from modulation cycles to rhythmic patterns, from quasi-random modulations to perfectly regular functions, from natural envelopes extracted from a variety of acoustic and electronic instruments to fractal abstractions and sequences. Several renowned artists have been invited to contribute extra "signature" shape* BANKS *(see the separate chart for a graphical representation of each shape). The essential feature of Zadar is that the vector shapes can be easily modified and modulated in a variety of ways—in fact, some have been deliberately designed to be deformed. Many of the complex shapes are intended for long, evolving envelopes (for example* BANK **X***), while others may serve better as snappy transients or resonator exciters (like* BANK **U***).*

INSTALLATION

Zadar module requires 10hp 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 should point in the same direction on both the bus board and the unit. 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.*

Nin expander requires an extra 3hp worth of free space in the Eurorack cabinet. Find the expansion header on the back of Zadar. Plug the Nin ribbon connector into the expansion header so that the red stripe or mark points toward the white dot printed next to the expander header. Connecting the cable in a wrong way will not cause any damage, but the expander will not operate correctly. Nin does not have its own power connector and should not be plugged into the bus board. After powering the modules up, if prompted, follow the Zadar calibration procedure steps. **CAUTION: BE CAREFUL NOT TO CONFUSE THE POWER CONNECTOR WITH THE EXPANSION CABLE!** *Connecting Nin to a powered bus board will damage the module and void the warranty.*

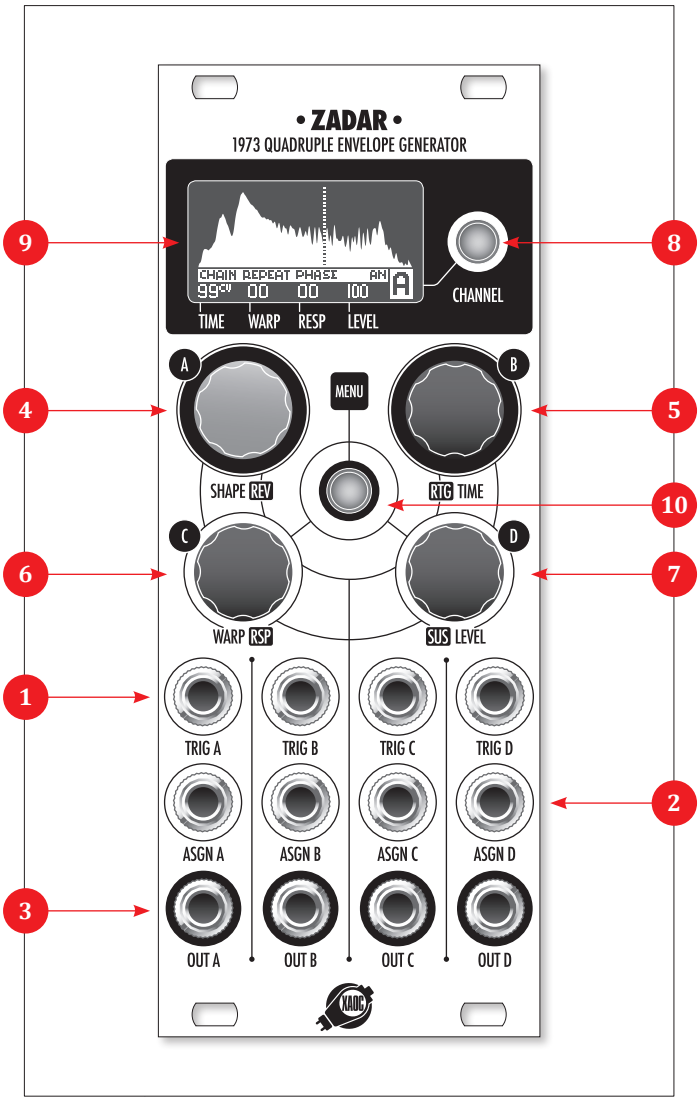
The modules should be fastened by mounting the supplied screws before powering up. To better understand the devices, we strongly advise the user to read through the entire manual before using the module.

ZADAR OVERVIEW

Zadar features four identical channels named **A, B, C, D** *with dedicated CV inputs and outputs, all sharing a common set of controls. Within each channel, the* **TRIG** *input* ❶ *expects a trigger or gate impulse to initiate the envelope. The* **ASGN** *socket* ❷ *is an assignable CV input for external control (-10 to 10V) over a desired parameter. To learn how to assign a parameter, please read further down this manual. In each channel, the corresponding envelope is available at the* **OUT** *jack* ❸ *as unipolar voltage (0 to 10V).*

The set of four rotary "endless" encoders **A, B, C,** *and* **D** ❹❺❻❼ *is shared between the channels and dedicated to key parameters as described on the front panel.*

fig. 1: ZADAR FRONT PANEL LAYOUT AND CONTROLS



The blue–illuminated **CHANNEL** *button* ❽ *(lit when active) allows cycling through the channels. The OLED display* ❾ *provides all the necessary visual feedback in real time, for the selected channel, with its name clearly displayed in the bottom-right corner (fig. 3).*

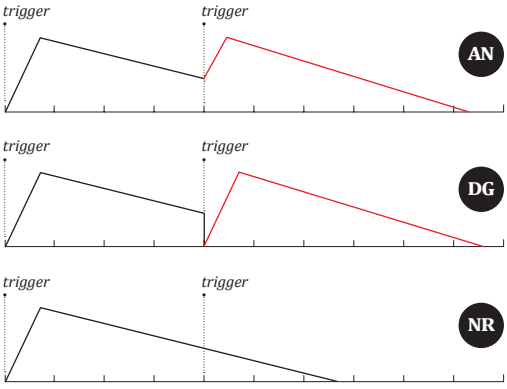
NOTE: *whenever the module remains idle for 10 minutes, the screen turns off; simply push or turn anything to re-enable. Editing the envelope in the current channel is very easy:*

Rotate the **SHAPE/REV** *knob* ❹ *to select a shape. Push the encoder to reverse the shape in time. The result can be observed on the display. Notice that shape and* BANK *number are visible while selecting it.*

Rotate the **RTG/TIME** *knob* ❺ *to set the duration (0,85ms to 30min). The exact value in milliseconds is visible while turning the encoder, and the approximate percentage value is shown in smaller text. Push the encoder to switch between „digital", „analog" and „no retrigger" behavior, indicated by appropriate* **DG**, **AN**, *or* **NR** *label on the screen. The* **DG** *option causes the envelope to restart from the beginning whenever a new trigger arrives which makes it instantly jump to 0V. The* **AN** *behavior is more complex—the restarting is from the first occurrence of the same voltage the envelope had when the trigger arrived, thus there is no glitch due to retriggering. The* **NR** *setting ignores triggers incoming while the envelope or a chain of envelopes is playing, thus Zadar will only retrigger after the envelope or a chain of envelopes ends (fig. 2).*

Press the **WARP/RSP** *knob* ❻ *to toggle between two deformation parameters:* **WARP** *(temporal*

fig. 2: RETRIGGERING BEHAVIOR



skew along the horizontal axis) and **RESPONSE** *(amplitude bend along the vertical axis). Rotate the knob to change the value of a selected parameter, observing the deformation result and bipolar percentage value on the screen. Both deformations have a wide range, therefore each of these may serve as an essential tool for radical shape mangling or simple adjustment (e.g. adapting to the response of a VCA). Please be aware that at maximum setting, the deformation can be rather extreme, dramatically altering the shape from its starting point. Reversing the envelope retains the* **WARP** *value.*

Press the **SUS/LEVEL** *encoder* ❼ *to toggle between* **SUSTAIN** *and* **LEVEL** *parameters. The* **SUSTAIN** *sets the point on the envelope to be held whenever a gate signal fed into* **TRIG** *input is high. The position is indicated with a vertical dashed line. Reversing the envelope does not affect the* **SUSTAIN** *point position (it remains in the same place relative to the starting point).*

NOTE: *to disable the sustain stage, simply move the sustain point to the very end of the envelope until the display reads* **OFF**.

The **LEVEL** *parameter serves as an attenuator to the envelope amplitude, from 10V down to 10mV (and 0). The approximate value is displayed as a percentage of the entire voltage range, and the exact value in volts is visible during adjustment.*

MENU: CV ASSIGNMENTS

The central, red–illuminated **MENU** *button* ❿ *cycles through three menu pages: CV input assignments, chain/loop settings, and preset management.*

NOTE: *with the Nin expander module installed, a secondary CV assignments page appears that addresses the extra set of* **ASGN** *inputs on the expander.* **NOTE:** *encoders behave differently within the first two menu pages than in the top, default screen. Within these pages, encoders correspond to separate channels, and not the default parameters indicated on the panel.*

While on the CV assignment page (fig. 4), push the corresponding channel's encoder to set its CV destination. The list of available parameters is browsed in a loop:

- **SHP** *—selects the envelope shape*
- **TIM** *—adjusts duration*
- **WRP** *—adjusts temporal warp*
- **RSP** *—adjusts response*
- **LVL** *—adjusts amplitude level*
- **REP** *—selects the number of repeats*
- **PHS** *—adjusts phase shift*
- **REV** *—reverses the shape*
- **SUS** *—sets the position of the sustain point*
- **FRZ** *—freezes the envelope state*

The degree of CV control of the selected parameter can be set by turning the encoder and is indicated by bipolar percentage bars with 0V in the middle. The interpretation of the display is straightforward — the higher the bar is displayed, the stronger the influence of the CV to the parameter value.

NOTE: *sensitivity of -50 for the* **TIME** *parameter offers an approximate 1V/octave response. Also, the* **REV** *and* **FRZ** *parameters react to CV in a binary manner. Like a comparator, the respective action is performed when the input CV exceeds the value as indicated by the bar. With* **REV**, *the envelope is reversed in relation to the current panel setting, and with* **FRZ**, *its state is frozen, thus pausing the envelope and holding its current value at the instant the CV exceeds the threshold.*

fig. 3: MAIN SCREEN

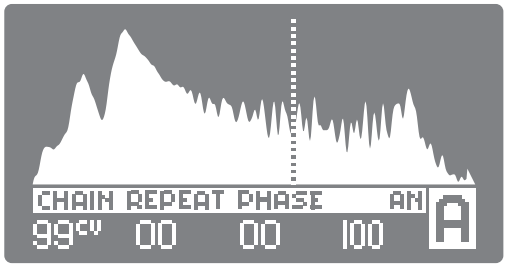
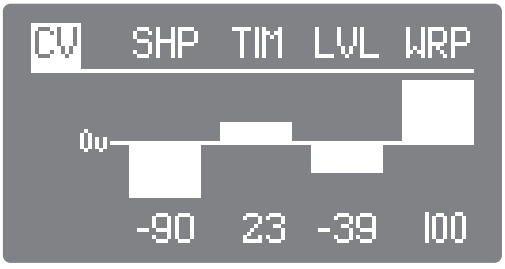


fig. 4: CV ASSIGNMENT MENU



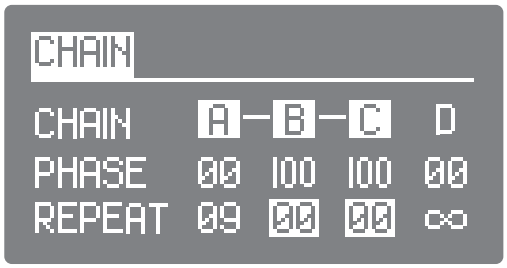


fig. 3: CHAIN MENU

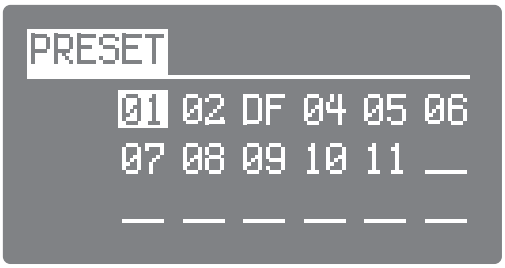


fig. 4: PRESET MANAGEMENT MENU

Press the **MENU** *three times to leave this menu and cycle back to the main screen. Please note that the parameter assigned to CV is indicated by a small* **CV** *label next to its value.*

MENU: CHAIN SETTINGS

Zadar offers several settings for complex behavior of individual channels as well as chaining and looping multiple envelopes across channels. It is possible to combine up to four envelopes into a chain, and furthermore, to define the cycle behavior within a chain. Quite sophisticated envelopes and modulation waveform patterns can be obtained this way. **NOTE:** *even when chained, each envelope appears only on its dedicated output. In this menu, each knob corresponds to a separate channel. Push a knob to select the desired parameter and turn it to edit the value.*

The selection of a **CHAIN** *algorithm is performed by operating the red knob (associated with channel* **A***). There are 16 available algorithms (fig. 7) defining various two-channel chain splits, chains of three or four channels, and looped derivatives of these.* **NOTE:** *envelopes chained to some other previous channel have their* **TRIG** *inputs inactive. Any unchained envelopes can still be used independently.*

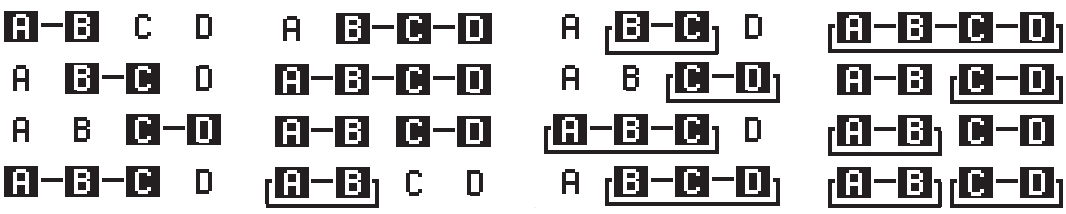
As long as the envelope remains unchained, the **PHASE** *parameter simply defines trigger delay. The value displayed is a percentage of the entire cycle length and therefore depends on cycle duration—longer envelopes allow for longer delays.*

Within the looped chain algorithms, the common behavior is for each envelope to start after the previous one ends. However, by adjusting the **PHASE** *parameter, you can shift the next envelope so that it starts at any point within the cycle of the previous one. Therefore, it is possible to initiate all four envelopes at the same time (***PHASE** *set to 0%) or make them start one after another (***PHASE** *on channels* **A**, **B**, **C** *and* **D** *set to 100%. To loop the entire chain, also set channel* **A PHASE** *to 100%). In other words, within a chain, the* **PHASE** *parameter defines the phase shift with respect to the previous envelope in the chain. For example, if* **PHASE** *is set to 50%, the chained envelope will be triggered exactly at the halfway point of the preceding envelope. For more variations, you can experiment with setting a different number of repeats for each channel within a chain.*

The **REPEAT** *parameter defines how many times the current envelope will be repeated after completing the first cycle. As long as the envelope remains unchained, the* **REPEAT** *parameter sets the number of cycles from 0 to 100 or to infinity (∞). The last value yields an oscillator-like behavior. Repeating is also possible for envelopes that are parts of a chain, however, infinite cycles is then disabled.*

Whenever the **REPEAT** *value is greater than 0, the* **PHASE** *parameter will consider all the repetitions*

fig. 7: CHAIN ALGORITHMS



as one long cycle when calculating phase shift. Hence, the next envelope in a chain may be activated anytime during the repeats of the preceding one. **NOTE:** *the default value of* **PHASE** *is zero. When a looped chain is selected from the algorithms, at least one* **PHASE** *value needs to be set to more than zero for the whole loop to function properly.*

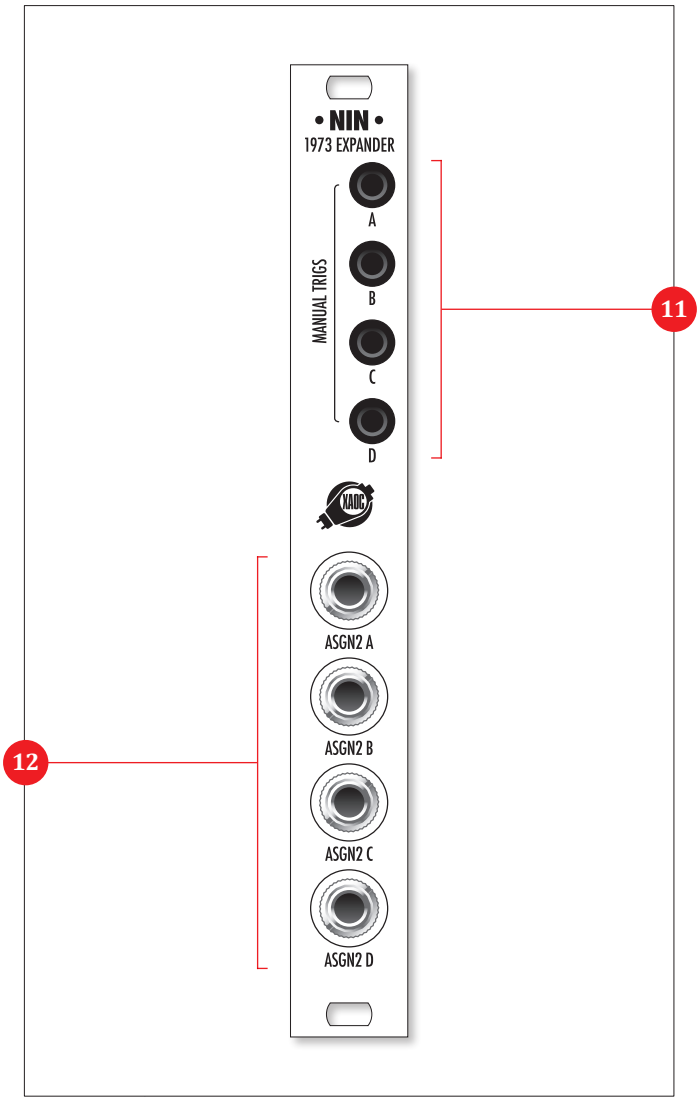
Press the **MENU** *button two times to leave this menu and cycle back to the main screen. Please note that the activated functions are indicated by the small* **CHAIN**, **PHASE**, *and* **REPEAT** *labels below the shape depiction.*

MENU: PRESET MANAGEMENT

Zadar offers a myriad of parameters and settings that can create quite complex programming configurations. Fortunately, it is possible to save your work for later use within the desired patching scenarios. The red encoder ❹ *is used to navigate within the* **PRESET** *page (fig. 6). Rotate the knob to select one of 18 preset slots. Then push the knob again to bring up the selection of possible operations:* **SAVE**, **LOAD**, **CLEAR**, *and* **DEFAULT PRESET**.

To prevent mistakes, a confirmation will be required for each operation. Each preset stores all the module settings. The default preset is recalled on module power-up. Press the **MENU** *button once to leave this menu and cycle back to the main screen.*

fig. 8: NIN FRONT PANEL LAYOUT AND CONTROLS



COPYING THE SETTINGS

Press and hold the **CHANNEL** *button* ❽ *to open the channel settings* **COPY** *menu. It is possible to paste the current channel settings to any other channel or all at once. The red encoder* ❹ *is used to navigate within the* **COPY** *menu. To leave the menu without copying, select* **CANCEL**.

QUICK SAVE

Zadar does not auto-save edited channel settings. To quickly save them to the default preset slot, press and hold the **MENU** *button* ❿. *The operation is confirmed by* **MENU** *and* **CHANNEL** *buttons flashing once.*

NIN FEATURES & OPERATION

The upper section ⓫ *consists of four tactile buttons* **A**, **B**, **C** *and* **D** *that provide manual gates for each of Zadar's channels. The buttons are useful in live performance and when finetuning parameters as manual triggering displays the triggered channel's envelope on the screen.*

Most importantly, the expander features a second set ⓬ *of assignable control voltage inputs* **ASGN2** *for Zadar channels* **A**, **B**, **C** *and* **D**. *It also unlocks an additional menu page on Zadar, allowing for the assignment of up to two total voltage controlled parameters for each channel.*

ACCESSORY

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

ZADAR TECHNICAL SPECIFICATION

WIDTH	DEPTH TOTAL	CURRENT DRAW	REV. POWER PROTECT.
10hp	*31mm (including cable bracket)*	*+50mA* *-15mA*	*protected*

INPUTS		OUTPUTS	
TRIG	*Any trigger or gate signal, 1V threshold*	**OUT**	*0V to +10V*
ASGN	*-10V to +10V*		

TIME RANGE
0.85ms to 1800s

NIN TECHNICAL SPECIFICATION

WIDTH	DEPTH TOTAL	CURRENT DRAW	REV. POWER PROTECT.
3hp	*31mm (including cable bracket)*	*not applicable, power drawn from Zadar*	

INPUTS	
ASGN2	*-10V to +10V*

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