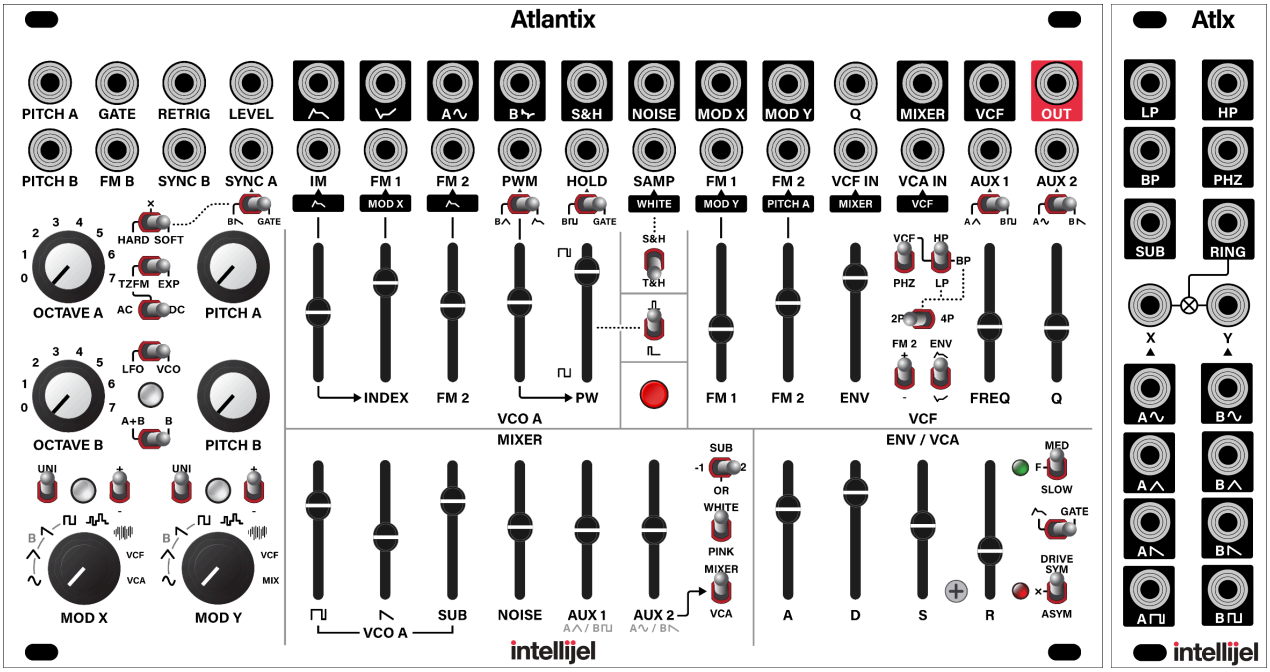
intellijel

Atlantix

Analog Dual-Oscillator Synthesizer Voice & Optional Expander



Manual (English)
Revision: 2024.09.12

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COMPLIANCE

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by Intellijel Designs, Inc. could void the user's authority to operate the equipment.

Any digital equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

This device meets the requirements of the following standards and directives:

EMC: 2014/30/EU
EN55032:2015 ; EN55103-2:2009 (EN55024) ; EN61000-3-2 ; EN61000-3-3

Low Voltage: 2014/35/EU
EN 60065:2002+A1:2006+A11:2008+A2:2010+A12:2011

RoHS2: 2011/65/EU

WEEE: 2012/19/EU

INSTALLATION

Intellijel Eurorack modules are designed to be used with a Eurorack-compatible case and power supply. We recommend you use Intellijel cases and power supplies.

Before installing a new module in your case, make sure your power supply has a free power header and sufficient available capacity to power the module:

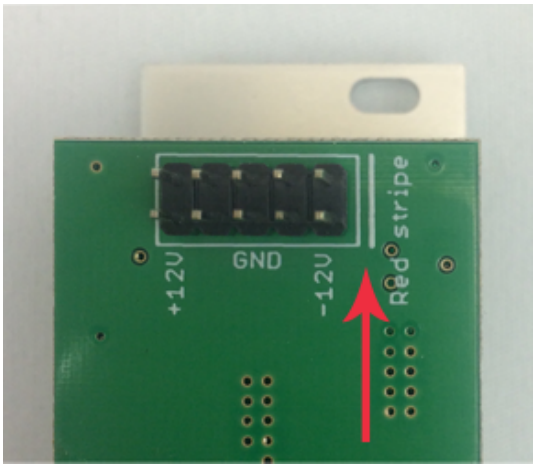
- Sum up the specified +12V current draw for all modules, including the new one. Do the same for the -12 V and +5V current draw. The current draw will be specified in the manufacturer's technical specifications for each module.
- Compare each of the sums to specifications for your case's power supply.
- Only proceed with installation if none of the values exceeds the power supply's specifications. Otherwise you must remove modules to free up capacity or upgrade your power supply.

You will also need to ensure your case has enough free space (hp) to fit the new module. To prevent screws or other debris from falling into the case and shorting any electrical contacts, do not leave gaps between adjacent modules, and cover all unused areas with blank panels. Similarly, do not use open frames or any other enclosure that exposes the backside of any module or the power distribution board.

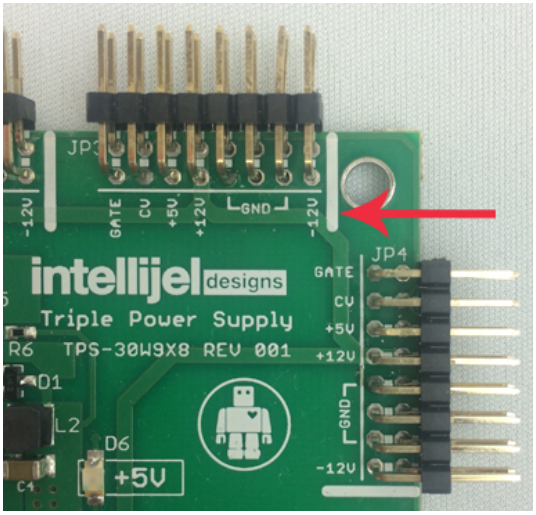
You can use a tool like ModularGrid to assist in your planning. Failure to adequately power your modules may result in damage to your modules or power supply. If you are unsure, please contact us before proceeding.

Installing Your Module

When installing or removing a module, always turn off the power to the case and disconnect the power cable. Failure to do so may result in serious injury or equipment damage.



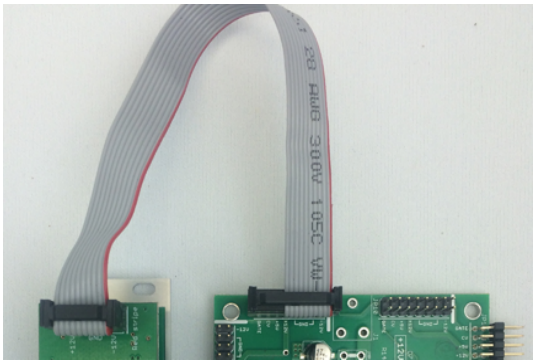
Ensure the 10-pin connector on the power cable is connected correctly to the module before proceeding. The red stripe on the cable must line up with the -12V pins on the module's power connector. The pins are indicated with the label -12V, a white stripe next to the connector, the words "red stripe", or some combination of those indicators. Some modules have shrouded headers to prevent accidental reversal.



Most modules will come with the cable already connected, but it's good to double check the orientation. Be aware that some modules may have headers that serve other purposes, so ensure the cable is connected to the correct one.

The other end of the cable, with a 16-pin connector, connects to the power bus board of your Eurorack case. Ensure the red stripe on the cable lines up with the -12V pins on the bus board. On Intellijel power supplies the pins are labeled with "-12V" and/or a thick white stripe, while others have shrouded headers to prevent accidental reversal.

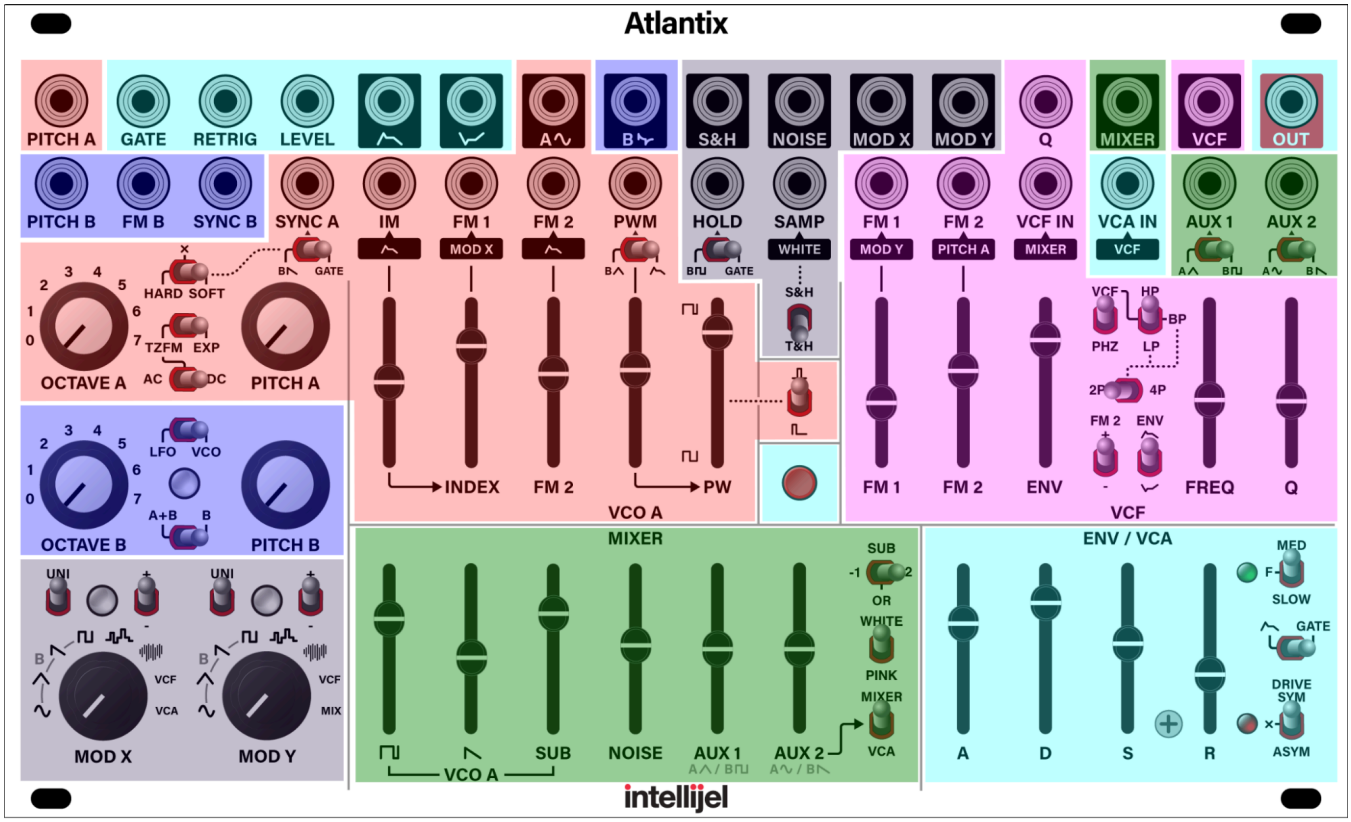
If you're using another manufacturer's power supply, check their documentation for instructions.



Before reconnecting power and turning on your modular system, double check that the ribbon cable is fully seated on both ends and that all the pins are correctly aligned. If the pins are misaligned in any direction or the ribbon is backwards you can cause damage to your module, power supply, or other modules.

After you have confirmed all the connections, you can reconnect the power cable and turn on your modular system. You should immediately check that all your modules have powered on and are functioning correctly. If you notice any anomalies, turn your system off right away and check your cabling again for mistakes.

FRONT PANEL



1: VCO A	2: VCO B	3: MIXER	4: VCF	5: ENV/VCA	6: MODS

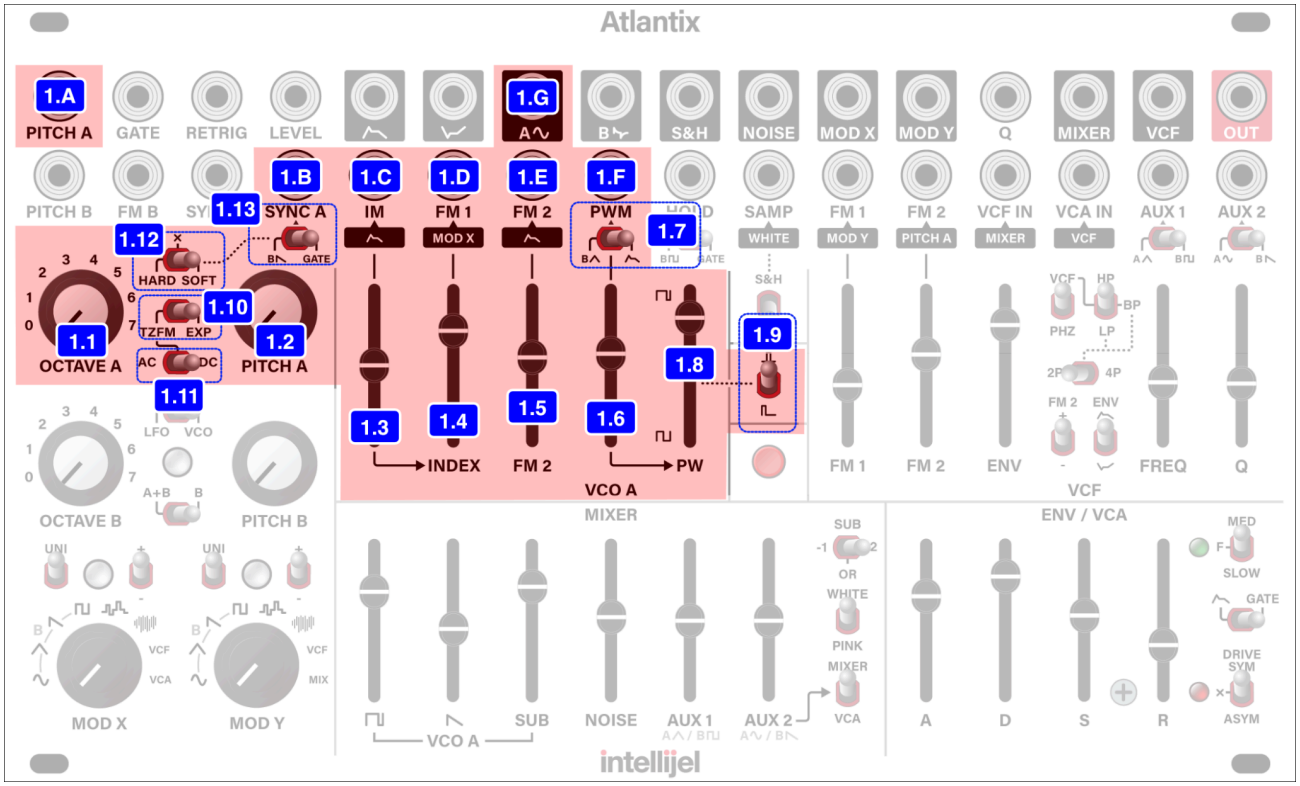
Atlantix is a standalone two-oscillator synth voice, encompassing numerous internally-patched synthesis blocks, which facilitate immediate and extensive sound design options. Though sonically rich on its own, Atlantix features 32 individual patch points to enable advanced configurations and to integrate with other eurorack modules. Another 16 patch points are available on the optional ATLX expander module, discussed later. Those synthesis blocks, seen color-coded in the previous illustration, are:

1. VCO A
2. VCO B
3. MIXER
4. VCF
5. ENV / VCA
6. MODS

VCO A

SECTION 1

VCO A is Atlantix' primary oscillator and is capable of a wide variety of analog timbres via its extensive sync, FM (frequency modulation) and PWM (pulse width modulation) features.



VCO A Controls

[1.1] **OCTAVE A** selector - This 8-position selector knob sets the coarse tuning of VCO A. Each clockwise rotation shifts the tuning up by one octave. Fine tuning adjustment can be made using the **VCO A PITCH** **[1.2]** knob.

[1.2] **PITCH A** knob - This knob finely adjusts the VCO A tuning frequency, and covers approximately 12 semitones (1 octave). The oscillator's actual pitch tracks the voltage present at the **PITCH A IN** **[1.A]** jack.

[1.3] **IM** slider - You can modulate the INDEX amount with a control signal patched into the **IM IN** **[1.C]** jack. The **IM** slider adjusts the extent to which that control signal is added to the value set with the **INDEX** **[1.4]** amount slider. With the **IM** slider at the top, maximum modulation is applied; with the slider at the bottom, no modulation is heard.

*DEFAULT ROUTING: If nothing is patched into the **IM IN** [1.C] jack, then the output of the ENVELOPE is used as the index modulation source.*

[1.4] **INDEX** amount slider - Sets the base FM INDEX level, which is the amount that a signal patched into the **FM 1 IN** [1.D] jack will modulate the VCO frequency. At the highest position, frequency modulation is at its maximum. When the slider is at the bottom, no frequency modulation occurs. Use the **TZFM/EXP** [1.10] switch to select between Linear Thru-Zero FM and Exponential FM.

*DEFAULT ROUTING: If nothing is patched into the **FM 1 IN** [1.D] jack, then the output of **MOD X** (set with the **MOD X Source** [6.1] selector) is used as the FM 1 source.*

[1.5] **FM 2** amount slider - This controls how much a signal patched into **FM 2 IN** [1.E] modulates the oscillator's frequency. When the slider is at the top, maximum FM occurs. When the slider is at the bottom, no FM occurs. FM 2 uses exponential frequency modulation. For more information about exponential FM, see DETAILS: Understanding FM, later in this manual.

*DEFAULT ROUTING: If nothing is patched into the **FM 2 IN** [1.E] jack, then the output of the ENVELOPE is patched into the FM 2 input.*

[1.6] **PWM** (Pulse Width Modulation) slider - You can use a control voltage (CV) to modulate the pulse width amount (as set with the **PW** [1.8] slider) over time. The **PWM** slider attenuates the voltage arriving at the **PWM IN** [1.F] jack, which therefor controls the extent to which the PW modulation is heard. PWM gives the waveform a sense of "movement." Maximum PWM occurs when the slider is at the top, while no modulation occurs when the slider is at the bottom. TB: Depending on the position of the **PW** [1.8] slider, it's possible to modulate the overall pulse width to a 100% duty cycle, which effectively silences the oscillator. This can be used to create interesting rhythmic effects.

*DEFAULT ROUTING: If nothing is patched into the **PWM IN** [1.F] jack, then the **PWM Source switch** [1.7] selects the input.*

[1.7] **PWM Source** switch - Switches between two default normals into the **PWM IN** [1.F] jack. When set to the left, VCO B's SINE output is normalled to **PWM IN**. When set to the right, the Envelope is normalled to **PWM IN**.

[1.8] **PW** (Pulse Width) slider - Sets the pulse width of the oscillator's PULSE wave output (accessed in the MIXER section on the **PULSE** [3.1] slider). Different pulse widths produce different timbres. With the slider at the bottom, the output produces a pulse wave with a 50% duty cycle (a square wave). With the slider at the top, the resulting pulse has approximately a 95% duty cycle, resulting in a thinner sounding pulse wave. You can reach 100% (silencing the oscillator) using the **PWM IN** [1.F] control.

[1.9] **PULSE POSITION** selector switch - Sets whether pulse waves are edge-triggered or center-triggered. Specifically, with the switch in the up position, the pulse wave is center-triggered. With the switch in the down position, the pulse wave is edge-triggered.

Although the two waveforms are essentially the same, they have different phase relationships, so they sound different when blended or synchronized with other waveforms. In general, edge pulses are better for syncing, but center pulses are perhaps more sonically 'pleasing.' Ultimately, let your ears be the judge.

[1.10] **TZFM/EXP** selector switch - Switches between two types of frequency modulation methods for **FM 1** **[1.D]**: TZFM (which is through-zero linear frequency modulation), and EXP (which is exponential frequency modulation).

The effect is most clearly heard (and understood) when an audio rate signal is sent into the **FM 1 IN** **[1.D]** jack. If nothing is patched into **FM 1 IN**, then the mod source selected by the **MOD X Source** **[6.1]** selector is normalled to **FM 1** input.

See DETAILS: Understanding FM to learn more about these two types of frequency modulations, including their sonic characteristics, fundamental differences and sound design uses.

[1.11] **AC/DC** selector switch - Switches between two variations of TZFM: DC (which is the deepest variant, and is ideal for slower modulators, such as LFOs); and AC (which is not as deep, but is more accurate at tracking pitch).

[1.12] **SYNC TYPE** selector switch - Switches between Hard Sync (left position); No Sync (middle position); and Soft Sync (right position).

Sync occurs when the periodicity of VCO A is governed by another oscillator (patched into the **SYNC A** **[1.B]** jack). Different timbres are produced when the two oscillators run at different pitches. In order to synchronize to the SYNC oscillator, VCO A restarts its wavecycle every time the SYNC oscillator reaches some predetermined point in its cycle. This causes abrupt changes to VCO A's waveform, which results in a harmonically rich sound. For more information, see DETAILS: Understanding OSC Sync.

- **HARD** (left) - This is the traditional VCO sync method. It resets the VCO A waveform each time the oscillator patched into **SYNC A** **[1.B]** crosses zero in the positive direction.
- **X** (middle) - This removes the **SYNC A** **[1.B]** oscillator input, meaning no sync sound occurs.
- **SOFT** (right) – This produces a 'softer' sync sound. It flips the VCO A waveform each time the oscillator patched into **SYNC A** **[1.B]** crosses zero in the positive direction. Waveforms with sharp edges (like square or saw) work best with SOFT sync.

DEFAULT ROUTING: If nothing is patched into the **SYNC A** **[1.B]** *jack, then VCO A syncs to either the* ***VCO B SAW*** *output or the* ***GATE*** *signal, depending on the position of the* ***SYNC A SOURCE*** ***[1.12]*** *switch.*

[1.13] **SYNC A SOURCE Switch** - This switch determines whether a sawtooth wave from VCO B or the GATE signal (useful for percussive voices) serves as the normalled SYNC A input signal. Note that this signal can be overridden entirely by patching into the **SYNC A** **[1.B]** input jack.

VCO A Jacks

[1.A] **PITCH A** IN - This input controls the pitch of VCO A, and is designed to take a 1 V/Oct input, typically generated by the output of sequencers or standard keyboard controllers.

[1.B] **SYNC A** IN - VCO A syncs to the waveform received at this input.

DEFAULT ROUTING: If nothing is patched into this jack, VCO A syncs to either the ***VCO B SAW*** *output or the GATE signal, depending on the position of the* ***SYNC A SOURCE*** ***[1.12]*** *switch.*

[1.C] **IM** IN - CV input to control the FM INDEX (which is the amount that a signal patched into **FM 1** **[1.D]** will modulate the VCO A frequency). The extent to which this input modulates the INDEX amount is governed by the associated **IM** **[1.3]** slider.

DEFAULT ROUTING: If nothing is patched into this jack, then the output of the Envelope is used as the index modulation source.

[1.D] **FM 1** IN - FM (frequency modulation) input for VCO A. The amount of frequency modulation is controlled by a built-in VCA, which is governed by both the **INDEX** **[1.4]** amount slider and the **IM IN** **[1.C]** CV input and its corresponding **IM** **[1.3]** attenuator slider.

Use the **TZFM/EXP** **[1.10]** switch to select whether **FM 1** is Linear (TZFM) or Exponential. If TZFM (Thru-Zero Frequency Modulation) is enabled then the **AC/DC** **[1.11]** selector switch chooses the desired TZFM variant.

DEFAULT ROUTING: If nothing is patched into the ***FM 1*** *input jack, then the* ***MOD X Source*** ***[6.1]*** *selector determines the input.*

[1.E] **FM 2** IN - FM (frequency modulation) input for traditional (exponential) FM. The extent to which this input modulates the frequency is set by the **FM 2** **[1.5]** amount slider.

DEFAULT ROUTING: If nothing is patched into this jack, then the output of the Envelope is used as the FM 2 input.

[1.F] **PWM** IN - This input has a range of +/- 5 V, and is used to modulate VCO A's pulse width. The amount of PWM is governed by the **PWM** **[1.6]** slider, and the resulting voltage is summed with the current Pulse Width (as set with the **PW** **[1.8]** amount slider), and together

they set the width of the VCO A PULSE wave (accessed in the MIXER section on the **PULSE** [3.1] slider). Note that external PW MOD allows for pulse widths that extend up to 100%, thus silencing the PULSE output, allowing for pulsing/rhythmic pitches.

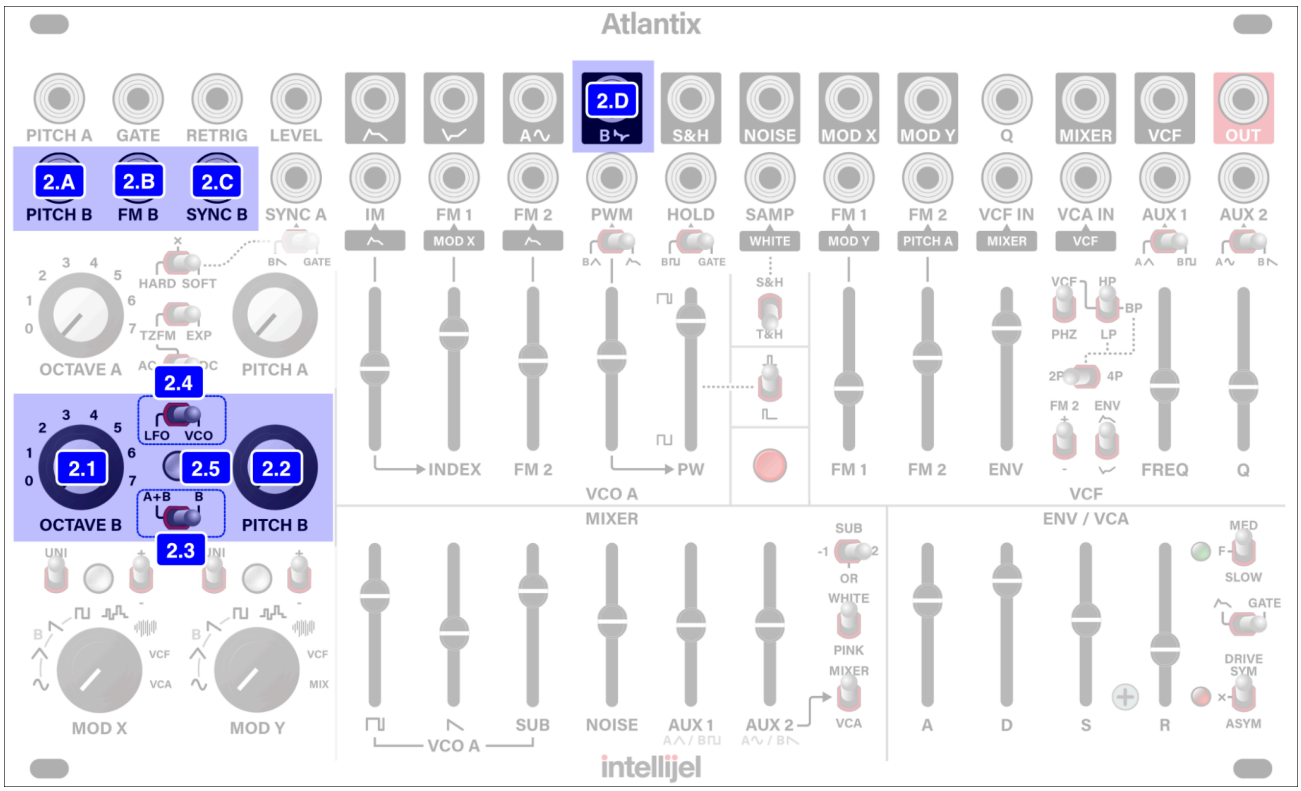
*DEFAULT ROUTING: If nothing is patched into this jack, then the **PWM SOURCE switch** [1.7] selects the input.*

[1.G] **VCO A SINE** out - Dedicated Sine wave output for VCO A.

VCO B

SECTION 2

VCO B is Atlantix' secondary oscillator — useful as either a secondary audio rate source or as a modulation source capable of running at either audio or LFO rates.



VCO B Controls

[2.1] **OCTAVE B** selector - This 8-position selector knob sets the coarse tuning of VCO B. Each clockwise rotation shifts the tuning up by one octave. Fine tuning adjustment can be made using the **PITCH B** **[2.2]** knob.

[2.2] **PITCH B** knob - This knob finely adjusts the VCO B tuning frequency, and covers approximately 12 semitones (1 octave). Depending on the position of the **PITCH SOURCE** **[2.3]** selector switch, the oscillator's actual pitch tracks either the **PITCH B** **[2.A]** input voltage alone, or the sum of the **PITCH A** **[1.A]** and **PITCH B** **[2.A]** input voltages.

[2.3] **PITCH SOURCE** selector switch - This switch selects which pitch input controls VCO B:

- **A+B** - When set to the up position, VCO B tracks the sum of the **PITCH A [1.A]** input and the **PITCH B [2.A]** input. If nothing is patched into the **PITCH B [2.A]** input, then VCO B follows the pitch of VCO A.
- **B** - When set to the down position, only the signal patched into the **PITCH B [2.A]** input controls the pitch of VCO B. If nothing is patched into that input, then the pitch of VCO B is determined solely by the position of the **OCTAVE B [2.1]** selector and the **PITCH B [2.2]** knob.

[2.4] **VCO/LFO** selector switch - This switch changes whether VCO B operates as a low frequency oscillator (LFO) or as an audio rate oscillator (VCO).

- **VCO** - When set to the left position, the oscillator runs at audio rates.
- **LFO** - When set to the right position, the oscillator cycles at 1/1000 the frequency of VCO mode, allowing for cycles as slow as approximately 50 seconds.

[2.5] **VCO B INDICATOR LED** - indicates the cycle rate of VCO B. The LED glows red when the waveform is negative, and green when positive. Note that this LED is most useful when the **VCO/LFO [2.4]** selector switch is set to LFO, since audio rates cause the LED to cycle too quickly for the eye to see (giving an orange appearance).

VCO B Jacks

[2.A] **PITCH B** IN - This input controls the pitch of VCO B, and is designed to take a 1 V/Oct input, as typically generated by the output of sequencers or standard keyboard controllers. Use the **PITCH SOURCE [2.3]** selector switch to determine whether this input is used exclusively to control VCO B pitch, or whether it's summed with the **PITCH A [1.A]** input.

[2.B] **FM B** IN - Exponential FM (frequency modulation) input for VCO B. For more information about FM (and exponential vs linear FM), see DETAILS: Understanding FM, later in this manual.

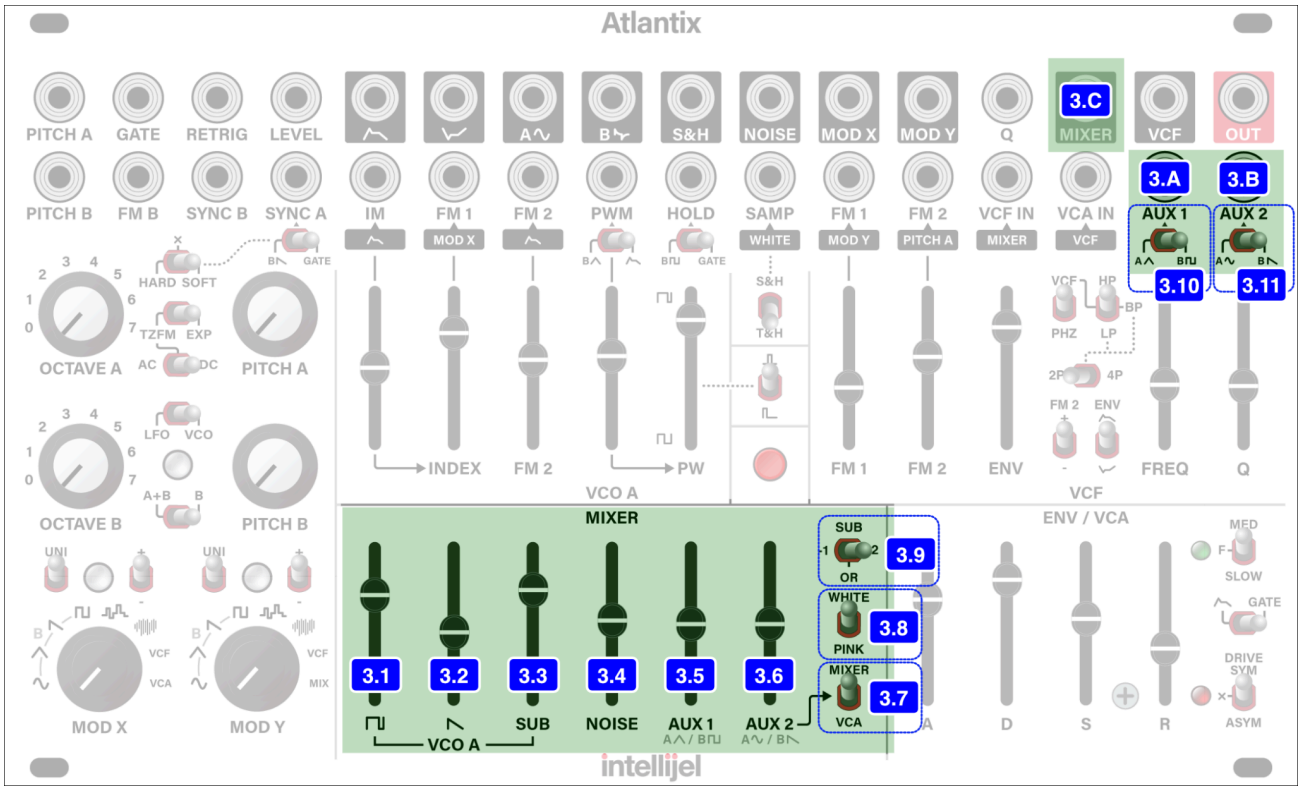
[2.C] **SYNC B** IN - VCO B will sync to the waveform received at this input, using hard sync. For more information about oscillator sync (and the meaning of "hard" sync), see DETAILS: Understanding OSC Sync, later in this manual.

[2.D] **VCO B SPIKE** out - Dedicated Spike wave output for VCO B.

MIXER

SECTION 3

This section is used to mix levels from numerous sources, including the PULSE and SAW waveforms generated by VCO A; a SUB oscillator pitched either 1- or 2-octaves below the pitch of VCO A, a NOISE sources and, if enabled, two patchable AUX inputs.



MIXER Controls

[3.1] **PULSE** amount slider - Controls how much of the VCO A PULSE wave is included in the mixed waveform that's sent to the **MIXER** **[3.C]** output, which is also normalled to the VCF input.

[3.2] **SAW** amount slider - Controls how much of the VCO A SAW wave is included in the mixed waveform that's sent to the **MIXER** **[3.C]** output, which is also normalled to the **VCF** input.

[3.3] **SUB** amount slider - Controls how much of the SUB OSC is included in the mixed waveform that's sent to the **MIXER** **[3.C]** output, which is also normalled to the **VCF** input.

The SUB OSC is derived from the VCO A pulse wave, with its pitch and shape determined by the **SUB TYPE** **[3.9]** selector switch.

[3.4] **NOISE** amount slider - Controls how much of the NOISE source is included in the mixed waveform that's sent to the **MIXER** **[3.C]** output, which is also normalled to the **VCF** input.

The NOISE source can be either WHITE or PINK, depending on the position of the **NOISE TYPE** **[3.8]** selector switch.

[3.5] **AUX 1** amount slider - Attenuates the level of the signal patched into the **AUX 1** **[3.A]** input jack, which is sent to the **MIXER** **[3.C]** output, and is also normalled to the **VCF** input.

*DEFAULT ROUTING : If nothing is patched into the **AUX 1** **[3.A]** input, then the **AUX 1 Source switch** **[3.10]** sets whether the VCO A Triangle wave or the VCO B Square wave is normalled to the **AUX 1** **[3.A]** jack.*

[3.6] **AUX 2** amount slider - Attenuates the level of the signal patched into the **AUX 2** **[3.B]** input jack. The **AUX 2 ROUTING** **[3.7]** switch then determines where, in the signal chain, the attenuated AUX 2 signal is patched. In the MIX position, it's patched into the input of the MIXER (along with all the other waveforms in the MIXER section); In the VCA position, it's patched into the VCA at the end of the signal chain.

*DEFAULT ROUTING : If nothing is patched into the **AUX 2** **[3.B]** input, then the **AUX 2 Source switch** **[3.11]** sets whether the VCO A Sine wave or the VCO B Sawtooth wave is normalled to the **AUX 2** **[3.B]** jack.*

[3.7] **AUX 2 ROUTING** switch - Determines where, in the signal path, the **AUX 2** **[3.B]** input is sent.

- **MIXER** : In this position, the signal patched into the **AUX 2** **[3.B]** input jack is attenuated by the **AUX 2 amount** **[3.6]** slider, and added to the other signals that are combined in the MIXER and sent to the **MIXER** **[3.C]** output. By default, since the **MIXER** **[3.C]** output is normalled to the VCF, this results in AUX 2 being mixed *pre-VCF* (rather than bypassing the VCF, which would be the case with the switch in the VCA position).
- **VCA** : In this position, the signal patched into the **AUX 2** **[3.B]** input jack is attenuated by the **AUX 2 amount** **[3.6]** slider, but is not mixed in with the other waveforms in the MIXER section. Instead, the attenuated AUX 2 signal is summed with the signal feeding the **VCA IN** **[5.F]** jack. By default, since the **MIXER** **[3.C]** output is normalled to the VCF, this results in AUX 2 being mixed *post-VCF* (rather than pre-VCF, which would be the case with the switch in the MIX position).

[3.8] **NOISE TYPE** selector switch - Switches between one of two noise colors: WHITE and PINK.

- **WHITE** : White noise is the brightest sounding, since it contains equal energy at every frequency. This gives more emphasis to the higher frequencies.
- **PINK** : Pink noise is 'darker' than white, since it contains equal power per octave — giving more emphasis to the lower frequencies.

[3.9] **SUB TYPE** selector switch - Determines the pitch and shape of the SUB oscillator mixed into the **MIXER** **[3.C]** output. Specifically:

- **SUB -1** (left) : The SUB Oscillator outputs a square wave exactly 1 octave below the pitch of the other VCO A waveforms.
- **SUB -2** (right) : The SUB Oscillator outputs a square wave exactly 2 octaves below the pitch of other VCO A waveforms.
- **OR** (center) : The SUB Oscillator is the logical OR of SUB -1 and SUB -2, which results in a PULSE wave 2 octaves below the pitch of the other VCO A waveforms, but with a 75% pulse width (rather than a square wave).

[3.10] **AUX 1 Source** Switch - If nothing is patched into the **AUX 1** **[3.A]** input jack, then this switch determines whether the VCO A Triangle wave or the VCO B Square wave is normalled to the **AUX 1** jack.

[3.11] **AUX 2 Source** Switch - If nothing is patched into the **AUX 2** **[3.B]** input jack, then this switch determines whether the VCO A Sine wave or the VCO B Sawtooth wave is normalled to the **AUX 2** jack.

MIXER Jacks

[3.A] **AUX 1 IN** - Use this jack to patch an external signal into Atlantix (or to self patch a signal from within Atlantix). The signal is attenuated in Atlantix' MIXER section and injected into the input of the MIXER.

*DEFAULT ROUTING : If nothing is patched into the AUX 1 jack, then the waveform selected with the **AUX 1 Source switch** **[3.10]** determines which signal feed Atlantix' AUX 1 input (VCO A Triangle or VCO B Square).*

[3.B] **AUX 2 IN** - Use this jack to patch a second external signal into Atlantix (or to self patch a signal from within Atlantix). The signal is attenuated in Atlantix' MIXER section and injected either into the input of the MIXER or into the input of the VCA (depending on the position of the **AUX 2 ROUTING** **[3.7]** switch).

*DEFAULT ROUTING : If nothing is patched into the AUX 2 jack, then the waveform selected with the **AUX 2 Source switch** **[3.11]** determines which signal feed Atlantix' AUX 2 input (VCO A Sine or VCO B Saw).*

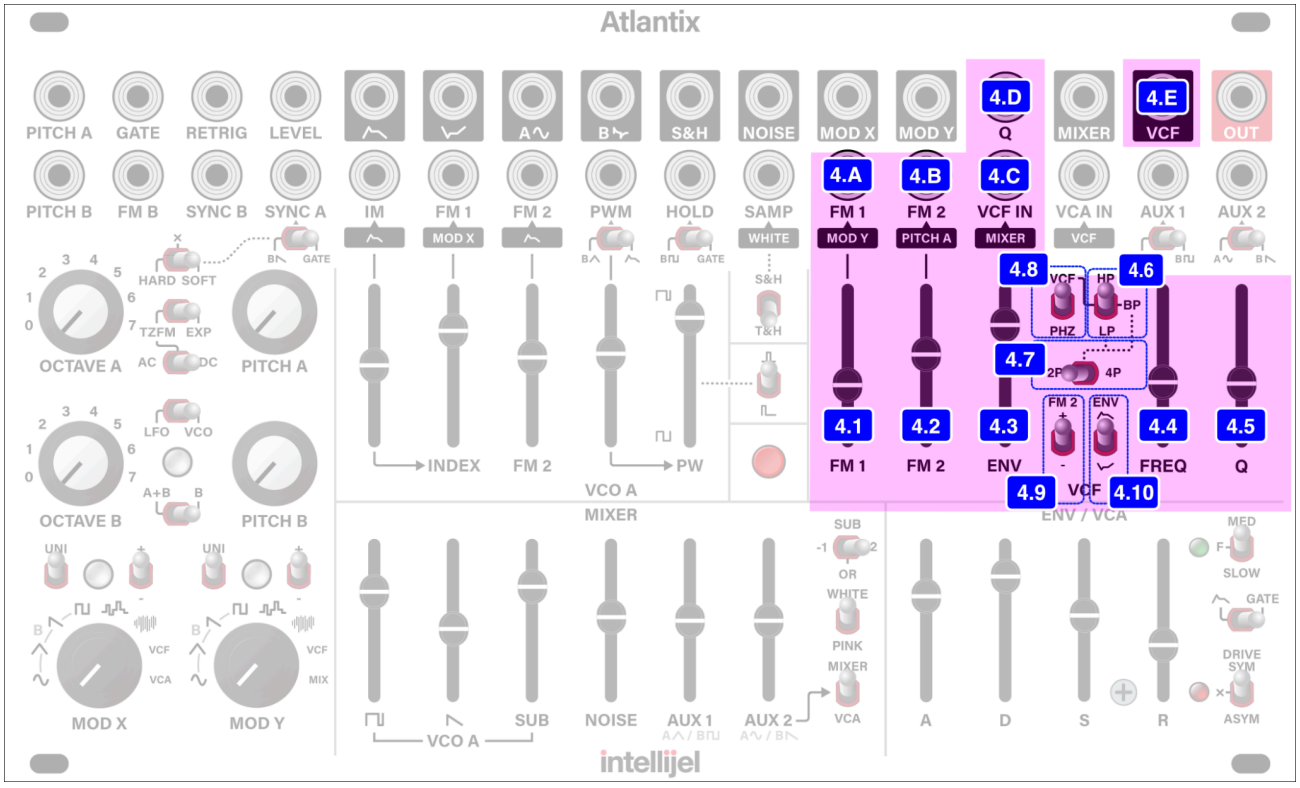
[3.C] **MIXER** output - this jack outputs the sum of all the waveforms selected and attenuated in the MIXER section. It may or may not include the attenuated **AUX 2** **[3.B]** signal, depending on the position of the **AUX 2 ROUTING** **[3.7]** switch.

NOTE: By default, the MIXER output is normalled to the input of the VCF.

VCF

SECTION 4

This section provides both a flexible and colorful filter, supporting multiple modes and poles, and featuring a wealth of modulation options.



VCF Controls

[4.1] **FM 1 Amount** slider - This controls how much a signal patched into the filter's **FM 1 IN [4.A]** jack modulates the filter's frequency. When the slider is at the top, maximum Frequency Modulation occurs. When the slider is at the bottom, no FM occurs.

DEFAULT ROUTING: If nothing is patched into the **FM 1 IN [4.A]** *jack, then the output of* ***MOD Y*** *(set with the* ***MOD Y Source*** ***[6.5]*** *switch) is used as the FM 1 source.*

[4.2] **FM 2 Amount** slider - This controls how much a signal patched into the filter's **FM 2 IN [4.B]** jack modulates the filter's frequency. When the slider is at the top, maximum Frequency Modulation occurs. When the slider is at the bottom, no FM occurs. The **FM 2 Polarity [4.9]** switch determines whether the FM 2 voltage is inverted, allowing for negative modulation.

DEFAULT ROUTING: If nothing is patched into the **FM 2 IN [4.B]** *jack, then the PITCH of VCO A is used as the FM 2 source, allowing the filter to track pitch.*

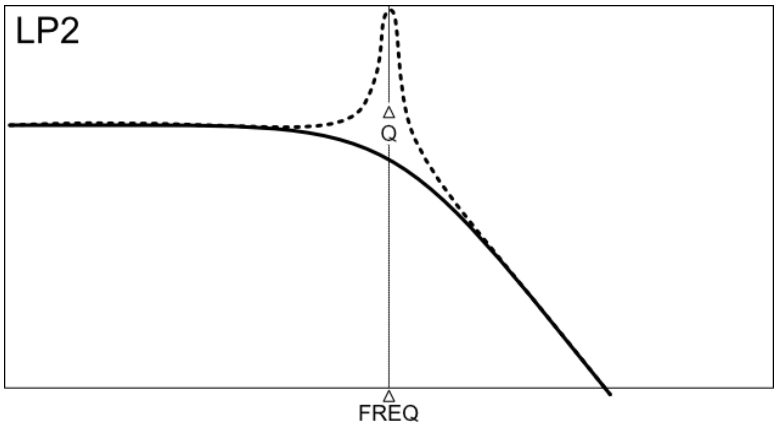
[4.3] **ENV Amount** slider - This controls how much Atlantix' ENVELOPE modulates the filter's frequency. When the slider is at the top, maximum Frequency Modulation occurs. When the slider is at the bottom, no FM occurs. The **ENV Polarity** **[4.10]** switch determines whether the ENVELOPE is inverted, allowing for negative modulation.

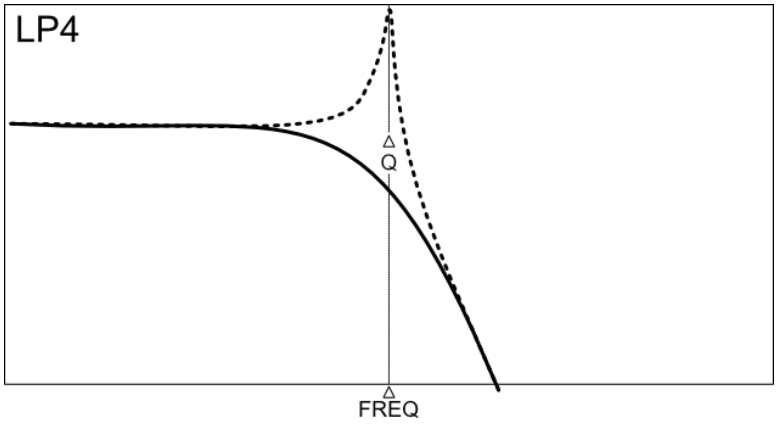
[4.4] **FREQ** amount - Sets the cutoff frequency of the filter. The filter's actual frequency is a combination of this setting and the **FM 1** **[4.A]**, **FM 2** **[4.B]** and hard-wired **ENV** inputs (as attenuated by their corresponding sliders: **[4.1]**, **[4.2]** and **[4.3]**).

[4.5] **Q** amount - Sets the resonance of the filter. The filter's actual resonance is a combination of this setting and the voltage appearing at the **Q** **[4.D]** input jack.

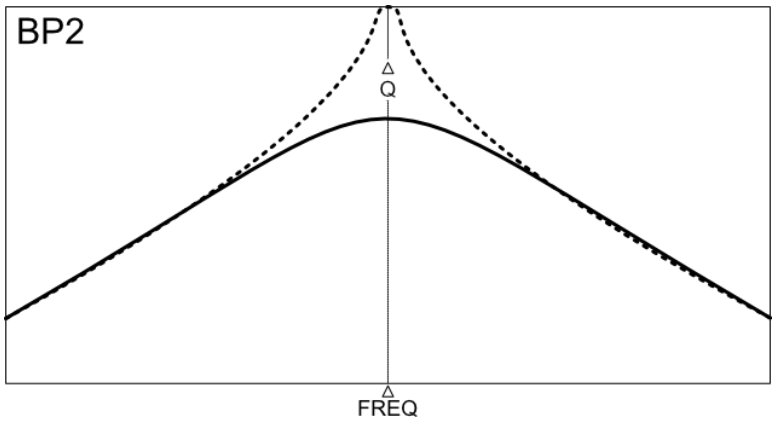
[4.6] **LP/BP/HP** switch - With the **PHZ/Filter** **[4.8]** switch in the up position, this switches between three different filter types:

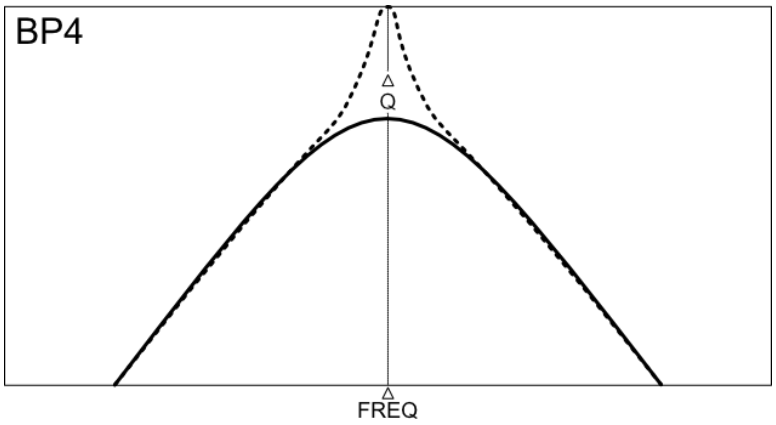
- **LP** - Lowpass filter. Frequencies higher than the modulated cutoff **FREQ** **[4.4]** are attenuated. As **Q** **[4.5]** increases, the cutoff frequency becomes emphasized, growing in amplitude until it self oscillates. Select between 2-pole and 4-pole variants using the **4P/2P** **[4.7]** switch.





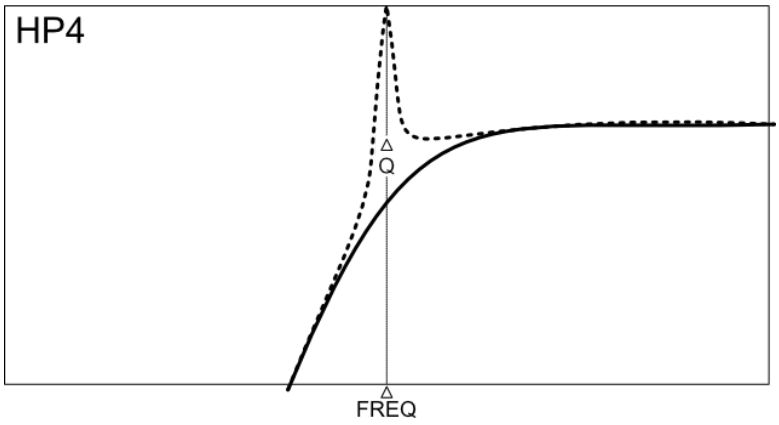
- **BP** - Bandpass filter. Frequencies both above and below the modulated cutoff **FREQ** [4.4] are attenuated. As **Q** [4.5] increases, the cutoff frequency becomes becomes emphasized, growing in amplitude until it self oscillates. Select between 2-pole and 4-pole variants using the **4P/2P** [4.7] switch.





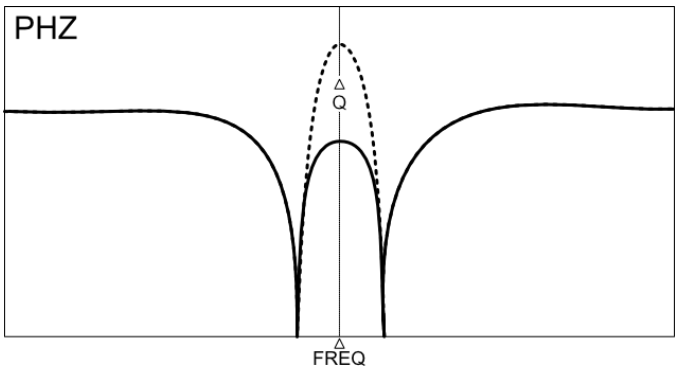
- **HP** - Highpass filter. Frequencies lower than the modulated cutoff **FREQ** [4.4] are attenuated.

  The **4P/2P** [4.7] switch has no effect on the HP filter, which always operates as 4-pole filter.



[4.7] **4P/2P** switch - If the **PHZ/Filter** **[4.8]** switch is the up position and the **LP/BP/HP** **[4.6]** switch is set to either **LP** or **BP**, then this switch determines whether the filter has a 2-pole (12 dB/oct) or 4-pole (24 dB/oct) roll off. It does not affect the **HP** filter or the Phaser (**PHZ**).

[4.8] **PHZ/Filter** switch - Switches the filter into *Phaser* mode, which is a double notch with some particularly interesting phase shifting characteristics. The **PHZ** filter responds particularly well to sweeping the cutoff frequency, since the phase changes sweep across the frequency band accordingly.



*NOTE: The **4P/2P** **[4.7]** switch has no effect on the PHZ filter.*

[4.9] **FM 2 Polarity** switch - Inverts the polarity of the voltage patched into the filter's **FM 2** **[4.B]** input. In the up (+) position, the polarity of the incoming voltage is not inverted, meaning positive voltages increase the filter frequency and negative voltages decrease it. In the down (-) position, the incoming voltage is inverted, such that positive voltages decrease the filter frequency in a negative voltages increase it.

[4.10] **ENV Polarity** switch - Inverts the envelope's effect on the filter frequency (at an amount set by the **ENV Amount** **[4.3]** slider. In the up position, the incoming envelope is not inverted, meaning positive voltages increase the filter frequency and negative voltages decrease it. In the down position, the incoming envelope is inverted, such that positive voltages decrease the filter frequency in a negative voltages increase it.

VCF Jacks

[4.A] **FM 1** IN - First of two patchable CV inputs for controlling the filter cutoff frequency. The voltage arriving at this jack is attenuated by the **FM 1** **[4.1]** slider.

*DEFAULT ROUTING: If nothing is patched into the **FM 1** input jack, then the output of **MOD Y** **[6.5]** is used as the FM 1 modulation source.*

[4.B] **FM 2** IN - Second of two patchable CV inputs for controlling the filter cutoff frequency. The voltage arriving at this jack is attenuated by the **FM 2** **[4.2]** slider, and can be inverted by the **FM 2 Polarity** **[4.9]** switch.

*DEFAULT ROUTING: If nothing is patched into the **FM 2** input jack, then FM 2 tracks Atlantix' pitch input.*

[4.C] **VCF** IN - Audio Input to the filter.

DEFAULT ROUTING: If nothing is patched into the VCF IN jack, then the output of MIXER feeds the VCF.

[4.D] **Q** IN - CV input for controlling the resonance (Q) of the filter. The incoming voltage offsets the Q value set with the **Q** **[4.5]** slider.

[4.E] **VCF** OUT - Audio Output from the filter.

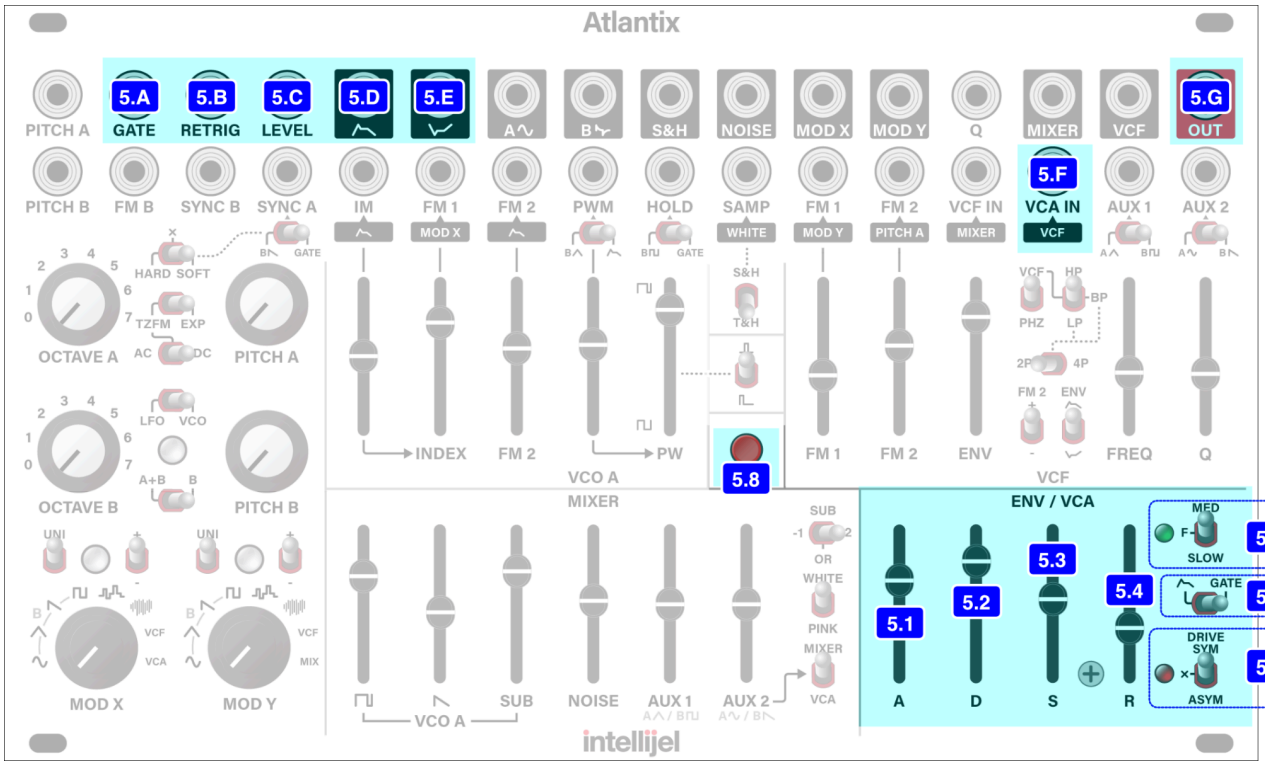
ENVELOPE / VCA

SECTION 5

This section combines a traditional ADSR (attack, decay, sustain, release) envelope generator and a VCA.

By default, the envelope controls the overall VCA volume (if the **ENV/GATE** **[5.6]** switch is set to ENV). The envelope is also normalled to VCO A's **IM** **[1.C]** and **FM 2** **[1.E]** inputs, and to the VCF's cutoff frequency, where it can be attenuated by the **ENV Amount** **[4.3]** slider and inverted by the **ENV Polarity** **[4.10]** switch. It's also available in both regular **[5.D]** and inverted **[5.E]** outputs on the panel.

The VCA is a unity-gain linear voltage controlled amplifier that controls the amplitude of any signal passing through it.



ENVELOPE / VCA Controls

[5.1] **A (ATTACK Time)** Slider - Sets the time required for the envelope to rise from zero (0V) to its maximum level (5V). The higher the slider, the slower the attack time. The slider's overall time range depends on the setting of the **ENVELOPE RATE** **[5.5]** switch.

[5.2] **D (DECAY Time)** Slider - Sets the time required for the envelope to decrease from its maximum value (5V) to a level set by the **SUSTAIN** **[5.3]** slider. The higher the DECAY slider, the slower the decay time. The slider's time range depends on the setting of the **ENVELOPE RATE** **[5.5]** switch.

[5.3] **S (SUSTAIN Level)** Slider - Sets the sustain level of the envelope, which is the level at which the envelope sustains while the gate voltage remains high (or a note is held). The higher the slider, the higher the sustain level. At the bottom, there is no sustain (0V), and at the top the sustain level is at maximum (5V).

[5.4] **R (RELEASE Time)** Slider - Sets how quickly a sound fades out to zero (0V) when the gate voltage goes low (or a note is released). The higher the slider, the slower the release time. The slider's overall range depends on the setting of the **ENVELOPE RATE** **[5.5]** switch.

[5.5] **ENVELOPE RATE** Switch - Selects between three different ranges for the attack, decay, and release times. Specifically:

- **FAST** : Fastest overall envelope. Use FAST to create short, snappy envelopes ideal for percussive sounds. Approximate maximum times are:

  A : ~1.5 to 2.0 s
  D/R : ~7 to 8 s

- **MED** : Medium speed envelope. Use MED for general envelope shapes. Approximate maximum times are:

  A : ~10 to 12 s
  D/R : ~35 to 40 s

- **SLOW** : Longest, slowest envelope. Use SLOW to create slower, more evolving envelopes for pads and drones. Approximate maximum times are:

  A : ~19 to 21 s
  D/R : ~70 to 75 s

The switch's associated LED indicates the voltage of the envelope as it plays through. The brighter the LED, the higher the voltage.

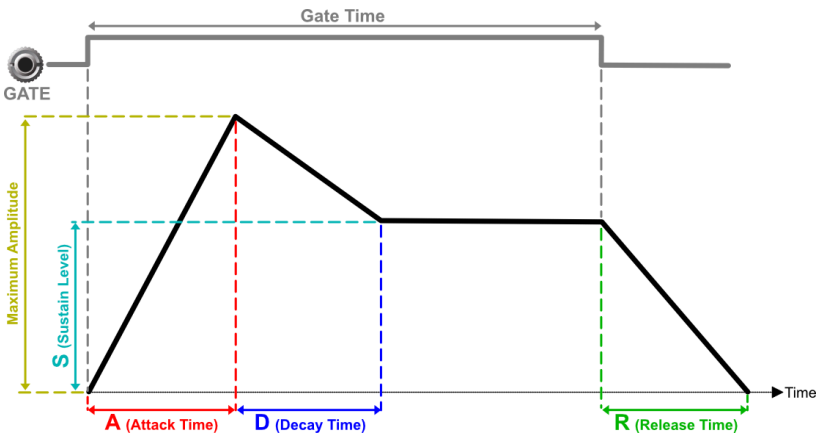
[5.6] **ENV/GATE** switch - Selects whether the VCA (loudness) is controlled by Atlantix' ADSR envelope or if it's simply gated (like an organ) by the **GATE [5.A]** input or **MANUAL GATE [5.8]** button. Specifically:

- **ADSR** : In this position, the VCA uses the ADSR envelope settings to control the loudness of a note over time.
- **GATE** : In this position, the VCA ignores the ADSR envelope settings, and uses a simple on/off, organ-like envelope instead. In this mode, when the **GATE [5.A]** input goes high (or the **MANUAL GATE [5.8]** button is pressed), the VCA instantly rises to full volume, where it remains for as long as the GATE voltage is high (or the GATE button is held). When the GATE input goes low (or the GATE button is released), the VCA instantly falls to no volume.

[5.7] **DRIVE** switch - Select whether to add drive into the VCA and, if so, the characteristics of the drive circuitry. Depending on both the amplitude and harmonic structure of the signal going into the circuit, the drive effect can be anywhere from subtle to crunchy and distorted.

- **SYM** : In this (top) position, the signal is boosted (driven) and any clipping that occurs is symmetrical (meaning the positive and negative values of the input waveforms clip evenly (symmetrically), giving a different sonic character than asymmetrical clipping.
- **X** : In this (middle) position, no signal boost/drive is added.
- **ASYM** : In this (bottom) position, the signal is boosted (driven) and any clipping that occurs is asymmetrical (meaning positive and negative values of the input waveforms clip unevenly (asymmetrically), giving a different sonic character than symmetrical clipping.

[5.8] **MANUAL GATE button** - Press this button to gate the envelope (just as if you had patched a gate signal into the **GATE [5.A]** input. As long as the button is held down, the gate is high (+5V), as indicated by the LED next to the **ENVELOPE RATE [5.5]** switch.



ENVELOPE / VCA Jacks

[5.A] **GATE** Input - When the gate goes high, the envelope moves through its ATTACK and DECAY stages, then sits at the SUSTAIN level. When the gate goes low, the envelope enters the RELEASE stage.

[5.B] **RETRIGGER** Input - When a trigger is received at this input while the gate is high, it resets the envelope back to the beginning, and starts the attack phase again.

[5.C] **LEVEL** Input - This input expects a 0 to 5 V signal and controls the overall level of the envelope via a built-in linear VCA. It is normalled to a 5 V source so when nothing is connected the envelope uses its maximum range.

[5.D] **ENVELOPE** Out - This is the primary envelope output. The maximum range is 0 to 5 V.

[5.E] **INVERSE ENVELOPE** Out - This output provides the inverted version of the envelope, from 0 to -5 V.

[5.F] **VCA IN** - Primary VCA input. If nothing is patched into VCA IN, then the output of the VCF is routed into the VCA.

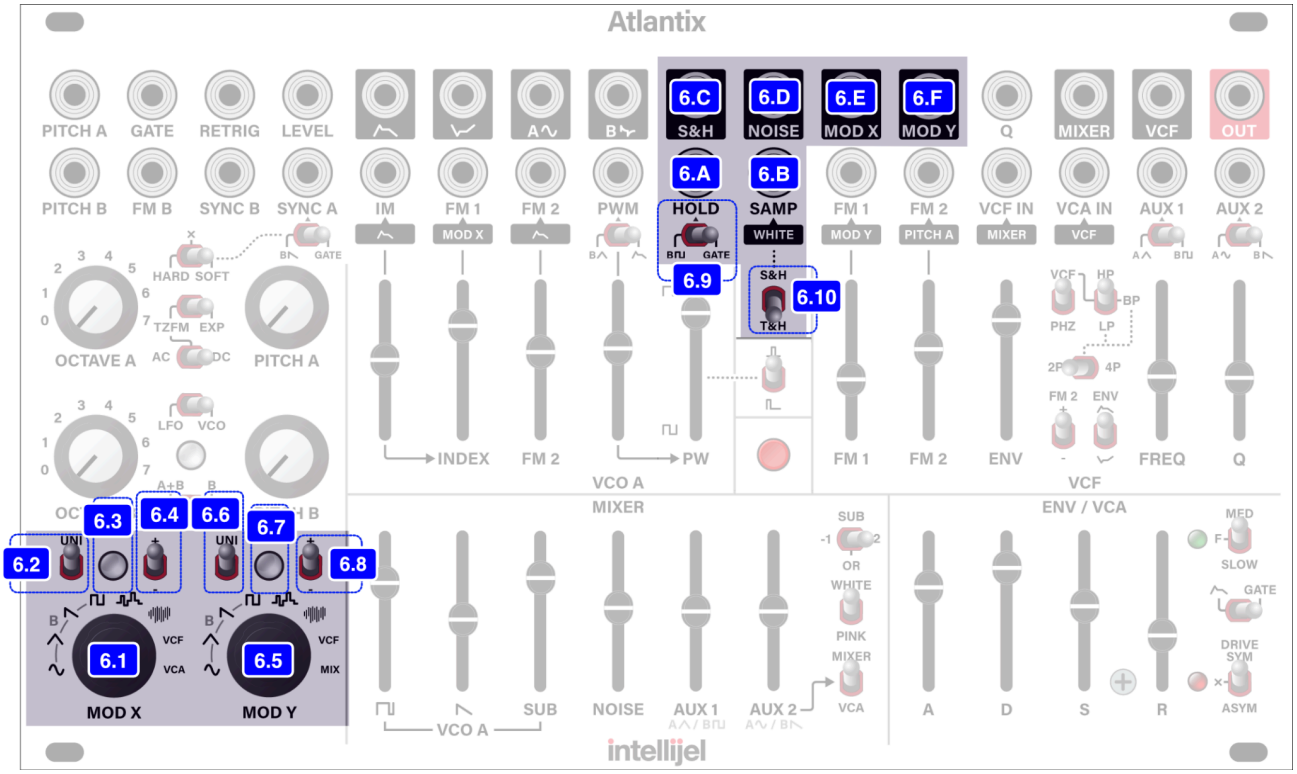
*NOTE: If the **AUX 2 ROUTING** [3.7] switch in the MIXER section is set to the VCA position, then the signal present at the **AUX 2 IN** [3.B] jack is attenuated by the **AUX 2 amount** [3.6] slider and summed with the VCA IN signal.*

[5.G] **OUT** - Atlantix' audio output (maximum of 10V peak-to-peak).

MODS

SECTION 7

Atlantix features a wealth of sophisticated and diverse modulation options for self-patching and/or use with external modules. Besides the built-in sample & hold circuitry, there are two modulation source selectors (**X** and **Y**), each with eight options from which to choose, and the ability to switch between unipolar & bipolar modulation, plus invert the modulation entirely. The outputs of **MOD X** and **MOD Y** are normalled to **VCO A FM1** and **VCF FM1** respectively, though you can override these default routings, and patch the MOD outs anywhere you like.



MOD Controls

[6.1] **MOD X Source** selector - Selects which waveform is routed to the **MOD X** **[6.E]** OUT jack, which is also normalled to VCO A's **FM 1** **[1.D]** input. The MOD X output can be used as an additional audio waveform or as a modulation source.

You can select from eight different waveforms: Four different VCO B outputs (Sine, Triangle, Saw, and Square); plus S&H (Sample & Hold); Noise, VCF and VCA.

[6.2] **MOD X UNIPOLAR** switch - Sets whether the output of the MOD X waveform is unipolar (UP position) or bipolar (DOWN position). This can be particularly useful if, for example,

you're running it at LFO rate and wish to modulate the destination parameter's value in only one direction from the panel setting, rather than both directions.

[6.3] **MOD X INDICATOR** LED - Visual display of the MOD X voltage. When MOD X runs at LFO rates, the LED cycles between red and green, with green indicating positive voltages, and red indicating negative. The intensity of the LED indicates the absolute voltage value (the brighter the LED, the higher the voltage). At audio rates, the oscillations occur too rapidly to distinguish, and the LED appears orange.

[6.4] **MOD X POLARITY** switch - Sets whether the output of the MOD X waveform is normal (UP position) or inverted (DOWN position).

[6.5] **MOD Y Source** selector - Selects which waveform is routed to the **MOD Y** **[6.F]** OUT jack, which is also normalled to the VCF's **FM 1** **[4.A]** input. The MOD Y output can be used as an additional audio waveform or as a modulation source.

You can select from eight different waveforms: Four different VCO B outputs (Sine, Triangle, Saw, and Square); plus S&H (Sample & Hold); Noise, VCF and MIX.

[6.6] **MOD Y UNIPOLAR** switch - Sets whether the output of the MOD Y waveform is unipolar (UP position) or bipolar (DOWN position). This can be particularly useful if, for example, you're running it at LFO rate and wish to modulate the destination parameter's value in only one direction from the panel setting, rather than both directions.

[6.7] **MOD Y INDICATOR** LED - Visual display of the MOD Y voltage. Functionally the same as for MOD X.

[6.8] **MOD Y POLARITY** switch - Sets whether the output of the MOD Y waveform is normal (UP position) or inverted (DOWN position).

[6.9] **HOLD Source** switch - If nothing is patched into the S&H **HOLD** **[6.A]** input, this switch determines the HOLD input's normalized connection.

- **B SQ** (Left) : The output of VCO B's SQUARE wave is normalled to the S&H **HOLD** **[6.A]** input.
- **GATE** (Right) : The output of the GATE is normalled to the S&H **HOLD** **[6.A]** input. This is useful for producing a different **S&H** **[6.C]** OUT voltage with every note, allowing for some dynamic variation in your patches.

[6.10] **S&H / T&H** switch - Selects between Sample & Hold or Track & Hold functionality. Specifically:

- **S&H** (up): The circuit operates as a traditional sample & hold — sampling the S&H **SAMP** **[6.B]** voltage at the rising edge of a signal patched into the S&H **HOLD** **[6.A]** input, and holding that sampled voltage steady until the next rising

pulse edge. This creates a new static voltage every “pulse,” which Atlantix sends out the **S&H** **[6.C]** OUT jack.

- **T&H** (down), The circuit samples the S&H **SAMP** **[6.B]** voltage at the falling edge of a signal patched into the S&H **HOLD** **[6.A]** input, and holds that sampled voltage only for as long as the pulse remains low. When the **HOLD** input is high, the **SAMP** voltage transmits through to the **S&H** **[6.C]** OUT jack unaffected.

Track & hold provides a rather interesting alternative to the more familiar sound of the sample & hold circuit. Although it loses that stepped, static output signal that’s so effective at feeding an oscillator’s pitch input, it gains a less certain (and perhaps more interesting) semi-rhythmic control signal for modulating other parameters in some truly unique ways.

MOD Jacks

[6.A] S&H **HOLD** input - The signal sent here determines the rate at which the voltage appearing at the S&H **SAMP** **[6.B]** jack is sampled (or tracked). If nothing is plugged into this input, Atlantix sends either the VCO B square wave or the GATE signal into the **HOLD** input (depending on the position of the **HOLD SOURCE** **[6.9]** switch).

[6.B] S&H **SAMP** input - This is the signal to be sampled (or tracked) by the sample & hold circuit. Any signal appearing at this input is sampled every time the S&H **HOLD** **[6.A]** voltage goes high.

If nothing is plugged into the **SAMP** jack, then WHITE NOISE is used as the sample source. White noise produces the widest range of random values when sampled by a sample & hold circuit. If you want a more subdued set of random values that skews toward lower voltages, you can set the **NOISE TYPE** **[3.12]** selector switch in the MIXER section to PINK, and patch the corresponding **NOISE OUT** **[6.F]** jack into the **SAMP** input.

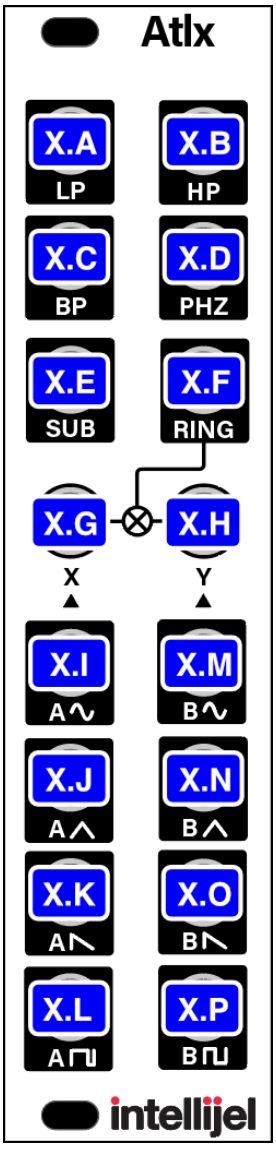
[6.C] **S&H OUT** - Outputs the sampled (or tracked) signal generated by the sample & hold circuit.

[6.D] **NOISE OUT** - Dedicated NOISE output. Select between WHITE and PINK noise using the **NOISE TYPE** **[3.12]** selector switch in the MIXER section. This output is useful when using NOISE as a modulation source (rather than as an audible effect, which is available in the MIXER section).

[6.E] **MOD X OUT** - This jack outputs the waveform selected with the **MOD X Source** **[6.1]** switch. The output of this jack is normalled to VCO A’s **FM 1** **[1.D]** input, but you can also patch it wherever you like. As such, it can act either as an audio rate modulator, or (if VCO B is in LFO mode) as an additional LFO.

[6.F] **MOD Y OUT** - This jack outputs the waveform selected with the **MOD Y Source** **[6.5]** selector. The output of this jack is normalled to the VCF’s **FM 1** **[4.A]** input, but you can also patch it wherever you like. As such, it can act either as an audio rate modulator, or (if VCO B is in LFO mode) as an additional LFO.

ATLX EXPANDER MODULE



The optional ATLX expander module provides numerous additional outputs plus two additional inputs for the built-in ring modulator.

It connects to the Atlantix module using the included 20-pin ribbon cable. The ATLX expander is passive and does not need a power connection.

[X.A] **LP** out : Dedicated Lowpass filter output, with slope determined by selection of the **4P/2P** switch **[4.7]** on Atlantix.

[X.B] **HP** out : Dedicated 4-pole Highpass filter output.

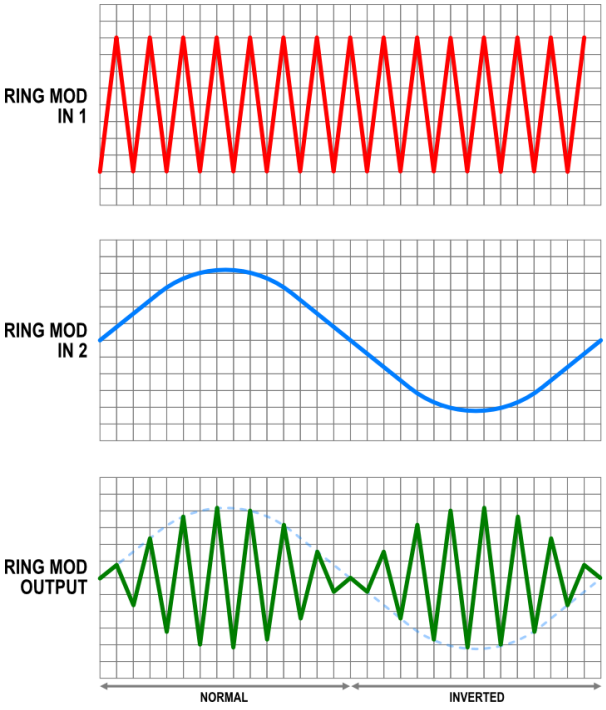
[X.C] **BP** out : Dedicated Bandpass filter output, with slope determined by selection of the **4P/2P** switch **[4.7]** on Atlantix.

[X.D] **PHZ** out : Dedicated Phaser filter output.

[X.E] **SUB** out : Dedicated Sub Osc output, with sub type determined by the setting of the **SUB TYPE** selector switch **[3.9]** on Atlantix.

[X.F] **RING** out : Ring Modulator output.

Output of the Ring Modulator, which is a waveform containing the sum and difference frequencies of the two input waveforms, **X in [X.G]** and **Y in [X.H]**



[X.G] **X** in : First of two inputs to the Ring Modulator. If nothing is patched into the input, then the **OSC A Sine Wave [X.I]** feeds the input.

[X.H] **Y** in : Second of two inputs to the Ring Modulator. If nothing is patched into the input, then the **OSC B Sine Wave [X.M]** feeds the input.

[X.I] **A SIN** out : Dedicated Osc A Sine wave output.

[X.J] **A TRI** out : Dedicated Osc A Triangle wave output.

[X.K] **A SAW** out : Dedicated Osc A Sawtwooth wave output.

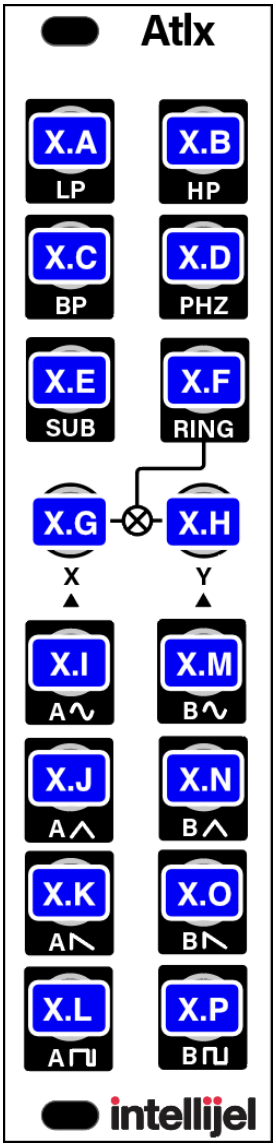
[X.L] **A PULSE** out : Dedicated Osc A Variable Pulse wave output.

[X.M] **B SIN** out : Dedicated Osc B Sine wave output.

[X.N] **B TRI** out : Dedicated Osc B Triangle wave output.

[X.O] **B SAW** out : Dedicated Osc B Sawtooth wave output.

[X.P] **B SQUARE** out : Dedicated Osc B Square wave output.



DETAILS

The following sections expand upon various aspects of Atlantix' architecture — sometimes elucidating on a particular synthesis technique, and sometimes providing additional details about a specific operation or feature.

DETAILS: Understanding FM

Frequency modulation is a classic synthesis technique in which you modulate the frequency of one waveform (the carrier) with a second waveform (the modulator).

It's easiest to understand FM if you first think about what happens when you use a Low Frequency Oscillator (LFO) as a modulator: For example, assume your carrier oscillator is tuned to middle-C, and that you connect an LFO into its FM input. The result, obviously, is vibrato: the carrier oscillator slowly rises and falls in pitch at a rate set by the LFO.

So what happens if you speed up the modulating waveform to audio rates? The pitch rises and falls so quickly that the ear no longer perceives the modulation as vibrato. Instead, it hears new frequencies (called sidebands), which are mixed in both above and below the carrier frequency, resulting in a harmonically complex waveform of fixed pitch. Changing the ratio between the modulating and carrier frequencies alters the quantity, spacing and amplitude of these sidebands. When the modulator and carrier are pitched at simple evenly-divisible multiples of one another (for example, the modulator is 2x or 1/4x the frequency of the carrier), then the sidebands accentuate the natural harmonics. When the pitch ratio between modulator and carrier is no longer evenly divisible (for example, the modulator is 1.618 times the carrier frequency), then inharmonic sounds are produced.

It's not just the difference between the modulator and carrier frequencies that shape your sound. The waveforms you use for both modulator and carrier also impact the harmonic structure, as does the amplitude difference between the waveforms (which is called FM INDEX).

Exponential vs. Linear FM

In general, there are two distinct types of FM, both of which are supported by Atlantix:

- **EXPONENTIAL FM** is the type found in many vintage analog mono synths of the 1970's. When you change the frequency of the modulator, you change the perceived fundamental pitch that emerges from the carrier oscillator. Furthermore, because the harmonic ratio of modulator-to-fundamental changes from note-to-note, neither the resulting pitch nor the timbre track chromatically. This makes Exponential FM ideal for clangorous, atonal sound effects. It's a great source for experimental sounds, particularly when the modulating pitch is, itself, modulated.

- **LINEAR FM** is the type more commonly associated with digital synths in the 1980's, although the linear FM circuitry in Atlantix is purely analog. When you change the frequency of the modulator, you alter a note's timbre without affecting its perceived pitch. Furthermore, because the harmonic ratio of modulator to fundamental remains consistent from note-to-note, both the resulting pitch and timbre track chromatically. This makes Linear FM potentially more "musical" than exponential FM, and it's ideal for creating harmonically complex waveforms that track across a range of notes. Atlantix uses a special variant of Linear FM, called **TZFM** (discussed below).

Thru-Zero FM (TZFM)

When you frequency-modulate an oscillator, you cause its pitch to go up and down. In a typical (non TZFM) linear FM circuit, the oscillator is biased such that, no matter how great the modulation, the output pitch never dips below 0 Hz. Makes sense, right? After all, who ever heard of a negative pitch?

A TZFM oscillator is one that allows the FM input to modulate pitch into negative territory (i.e. "Through Zero"). It does this by reversing the direction of the oscillator whenever it's asked to produce negative frequencies. This ensures that the oscillator will continue to produce sound even when modulated into negative frequencies.

TZFM oscillators can produce "deeper" and "richer" timbres than standard, positive-only FM'd oscillators, and Atlantix supports two types of TZFM: DC (which is the deepest variant — ideal for slower modulators, such as LFOs); and AC (not as deep, but more accurate at tracking pitch variations).

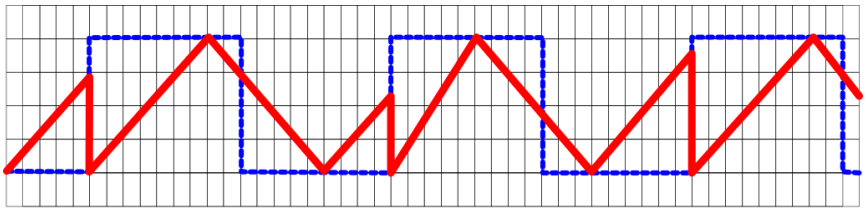
DETAILS: Understanding OSC Sync

Sync occurs when the periodicity of one oscillator (the parent) governs that of another (the child). In other words, when two oscillators are synchronized, the pitch of the parent oscillator forces the child oscillator to cycle at some whole number multiplier of that pitch.

Different timbres are produced when the child oscillator runs at a different pitch than the parent oscillator. In order to synchronize to the parent oscillator, the child oscillator must restart its wavecycle every time the parent oscillator reaches some predetermined point in its cycle. This causes abrupt changes to the child oscillator's waveform, which results in a harmonically rich sound.

There are various ways to define precisely when and how the child oscillator should reset itself, and as you might expect, each results in a different timbre. Atlantix' VCO A supports two such synchronization options (HARD and SOFT).

- HARD SYNC - This is the traditional VCO sync method. Hard sync always resets the child oscillator waveform to ground on the parent oscillator's rising edge. Due to the (potentially) more ragged waveshapes that result, hard sync can result in a fairly aggressive timbre, and is the type usually associated with "the sync sound" in classic synths.



Triangle Wave Hard Sync'd to Pulse Wave

- SOFT SYNC – This is an alternate VCO sync method. Atlantix uses a form of soft sync known as "flip" sync, which reverses the direction of the triangle core wave, rather than resetting it. Additionally, sync occurs only when the triangle core is falling and close to ground (rather than at any point in the waveform, as with Hard sync). This results in a "softer," less aggressive waveform.

TECHNICAL SPECIFICATIONS

Width	Atlantix: 42 hp ATLX expander: 6 hp
Maximum Depth	25 mm
Current Draw (Atlantix)	140 mA @ +12V 138 mA @ -12V