Industrial Music Electronics

BIONIC LESTER
DUAL MORPHING MULTIMODE FILTER WITH OVERDRIVE VCA

MODE

CV 3
+/- 10V

CV 2
+/- 10V

RESONANCE

CUTOFF
+/- 10V

A CUTOFF

CV 3
+/- 10V

CV 2
+/- 10V

CUTOFF
+/- 10V

B CUTOFF

MODE

LINK

RESONANCE

GAIN OVERDRIVE

PRESET CV
+/- 10V

PRESET/EDIT

A B
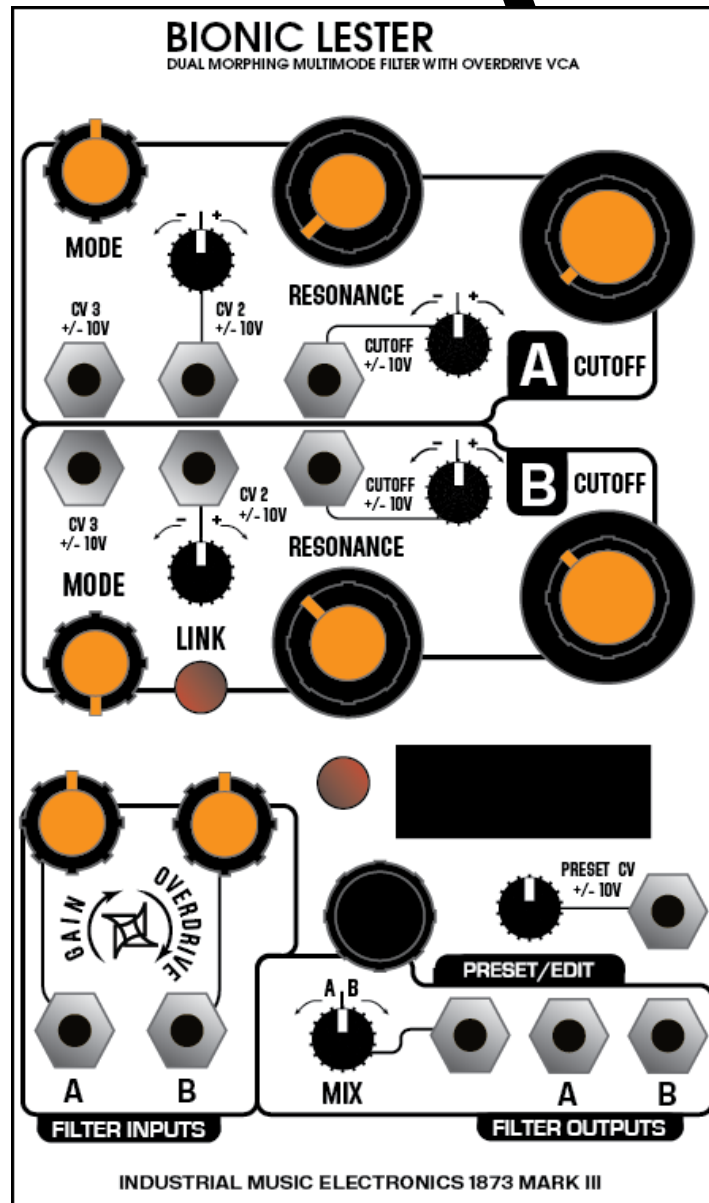
MIX

A B

FILTER INPUTS

A

B

FILTER OUTPUTS

INDUSTRIAL MUSIC ELECTRONICS 1873 MARK III

BIONIC LESTER MARK III
OPERATIONS MANUAL • FIRMWARE V1.1

FUNDAMENTALS

BIONIC LESTER is a dual digital filter with a digital overdrive VCA. The voltage-controlled filter is a fundamental component of modular sound synthesis that modifies the spectrum of an audio signal. Bionic Lester excels at classic subtractive lowpass filter effects, as well as multimode operation and advanced short delay lines with the allpass/comb filter modes.

Each Bionic Lester filter section is a 2-pole (-12db per octave) state-variable filter with smoothly morphable mode. The filter does not self-oscillate, though in the comb filter mode it will sustain the harmonic peaks without clipping.

GETTING STARTED

Patch your input signal to the FILTER A input, and listen to the signal coming out of the FILTER A output.. Turn the A GAIN control up halfway. Turn the FILTER A resonance and Mode control sfully counterclockwise (low pass mode). Turn the large FILTER A cutoff knob and listen to the effect on the sound. Next, move Filter A's Resonance control and move the cutoff knob again. The Resonance control emphasizes the frequencies around the cutoff. You will now hear that emphasized "peak" frequency move throughout the input sound's spectrum as you move the cutoff.

GAIN CONTROL

The input stage of the filter passes through a special digital VCA that can introduce subtle overdrive and clipping to a signal before it gets filtered. When the control is fully counterclockwise, the signal is fully attenuated. When the control is towards its middle position, the attenuation decreases until the signal is at its full input volume. When you turn the control past the center position, soft clipping will be introduced onto the signal. At the extreme end of the control, the signal will clip harder.

NOTE: The clipping element of the input VCA expects oscillator-level signals in the range of 10 volts peak-peak for best results.

NOTE: When the clipping element is active, the filter's name on the display (A or B) will be displayed with an inverted color scheme (black letter on orange background).
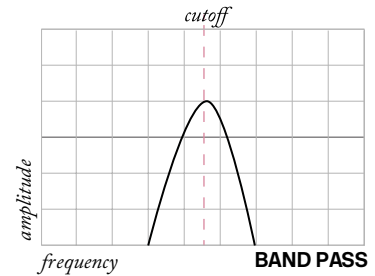
MODE CONTROL

Voltage-controlled multimode filters traditionally feature an array of signal outputs representing each filter mode. Bionic Lester has a smooth Mode crossfade control that feeds one output per filter. When it is turned to the extreme counterclockwise position, the filter is in Low Pass mode. As the control is turned clockwise, the filter output fades its mode from one to the next. The control's position relative to each filter mode is shown on the OLED display.
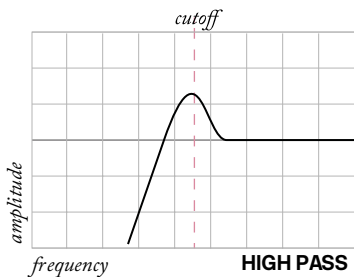

MODE

RESONANCE

CUTOFF

CV input 3   CV input 2   CV input 1
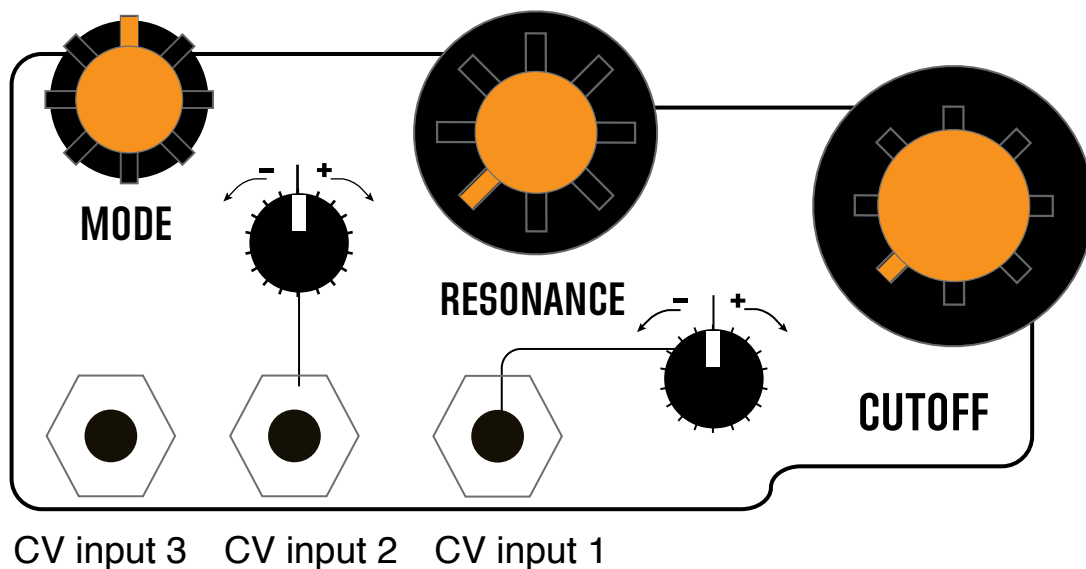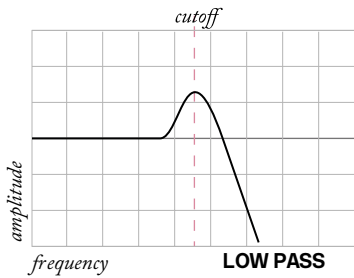
LOW PASS

Frequencies ABOVE the cutoff frequency are attenuated. The resonance control emphasizes the frequencies near the cutoff.

BAND PASS

Frequencies ABOVE or BELOW the cutoff frequency are attenuated. The Resonance control emphasizes the frequencies near the cutoff and steepens the "slope" of the cutoff.
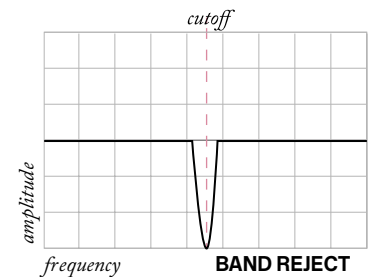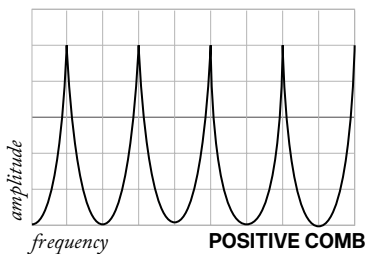

HIGH PASS

Frequencies BELOW the cutoff frequency are attenuated. The resonance control emphasizes the frequencies near the cutoff.


BAND REJECT (NOTCH)

Frequencies near the cutoff frequency are attenuated in a "notch" pattern. The resonance control causes the notch to become narrower and steeper.

ALL PASS/COMB

When the MODE control is turned fully clockwise, the cutoff frequency display will change to show the length of the allpass/comb delay line. In this mode, the filter functions as an all-pass filter when the Resonance control is at zero (all frequencies are passed with no change in amplitude, but with a change in phase) As you turn the resonance control towards the center position, the filter type changes to a positive feedback comb (which introduces equally spaced peaks into the spectrum of the signal), with increasing feedback. The cutoff control changes the spacing of the peaks.
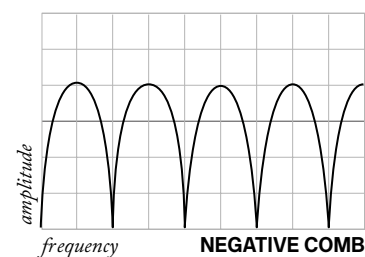
As the control is turned past noon, the filter mode switches to a negative feedback comb (which introduces equally spaced notches into the signal). In this mode, the cutoff frequency control changes the length of the delay line. There is only minor suppression of the knob's "zipper noise" in this mode, adding some action-packed character into the comb modes. If you do not change the length of the delay line while the feedback is near maximum, the harmonics of the input signal will resonate and evolve much like an amplified guitar.

SCREEN SAVER

The Bionic Lester's display is an OLED. It is set to a brightness to provide the best balance between visibility and long life. To preserve the life and maximum brightness of the OLED, it will turn off if a button or encoder is not used for 10 minutes. To turn it back on, press a button or turn the encoder.

MK III MENU SYSTEM

Most function blocks in Industrial Music Electronics modules have hidden menus associated with them. To access them, hold down the rotary encoder button and push the associated button. The menu will appear on the display. Turn the encoder to select the desired menu item. Push the encoder to select the item, and turn the encoder to change the selected item. Push the encoder button again to enter your selection. Exit the menu by pressing any of the other buttons. If a button does not have a menu associated with it, then the button press combination will usually invoke another shortcut function.

CV INPUTS

Each filter section has three control voltage inputs, known as CV1, CV2, and CV3. These inputs are used with external control voltages to remotely modify the synthesis parameters faster than your hands can turn the related controls. CV1 is always assigned to the filter's cutoff frequency, and has an associated attenuverter. The other two inputs can be freely assigned to its filter's cutoff, gain, resonance, or mode. To access the assignment menu, hold down the black rotary encoder button and press the LINK button. You can now use the encoder to select and edit each of the four assignable CV inputs. To leave the menu, press LINK again.

All CV inputs on the Bionic Lester accept full-scale, bipolar control voltages with a range of +/-10v. The response of the various inputs are scaled to provide a musically useful range of motion within the typical range of +/-5V, with additional reactivity far outside of this range. The attenuverters use a nonlinear curve to allow a typical control voltage to subtly modulate a small range of the parameter, or full-swing travel without the use of external amplification.

Turn COUNTER-CLOCKWISE to SUBTRACT — | + — Turn CLOCKWISE to ADD CV to parameter

CV Input

"Attenuverter"
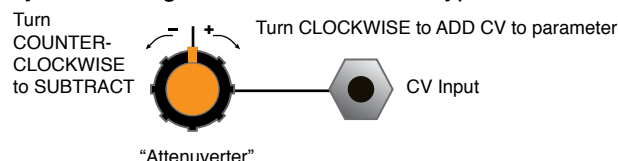
FILTER LINK

The Bionic Lester functions as two independent filters by default. Input A will be processed and sent to the A output, and likewise for the B input.

PARALLEL ROUTING

The input of Filter A is normaled to Filter B. This means that with a signal only input to Filter A, that input will be "copied" to Filter B without the use of additional patch cords. You can then patch the A and B outputs separately, in stereo, or use the nearby MIX output to hear a blend of the two signals.

Push the LINK button to access the following modes of operation. When active, the LINK button will be illuminated red.

LINK OPTIONS

A CTL

In this mode. all filter controls on both sides function normally. However, the cutoff frequency of Filter A will be copied to Filter B, with Filter B's cutoff settings (and CV input) added. A suggested use is to set the Filter B cutoff knob very low, and controlling the filter A cutoff as normal while monitoring both outputs. Set the filter modes to lowpass or bandpass and the resonance high. This gives you the popular "dual peak" stereo filter effect.

SERIES

The signal at the Filter B input jack will be ignored. The output of Filter A is internally routed to the Filter B input, with all controls remaining independent. To hear the combined effect of the series processing, listen to the Filter B output. This mode is useful for finely tuning the response of a dual filter arrangement with precise management of the distortion products.
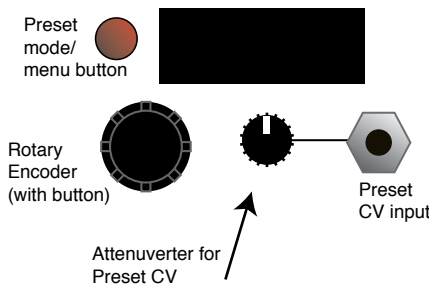
4POLE

The 4POLE mode is identical to the SERIES routing, but all control settings from Filter A will be copied to Filter B. Patch your input signal into Filter A input and listen to the Filter B output. The slope, distortion, and resonance of the filter will be more intense. You can hear the normal 2-pole output of the filter by listening to the Filter A input. The MIX output has a 3-pole output when the knob is in the center position.

STEREO:

The STEREO mode has independent inputs and outputs, but the controls from Filter A are copied to Filter B. This mode is meant to be heard with a stereo signal patched into Filter A and B, with the outputs panned hard left and right on your mixer.

PRESET MANAGER

Preset mode/ menu button

Rotary Encoder (with button)

Preset CV input

Attenuverter for Preset CV

The Preset Manager provides an easy way to manage the entire state of the control panel and menu system from a single set of controls. Eight presets are available and they may be stored to nonvolatile memory within the Bionic Lester. To enable the Preset Manager, push the PRESET button to the immediate left of the display. It will light up red and the display will change to say "PRESET" followed by the currently selected preset number. Managed controls will be locked and set to the values stored in that preset slot. To change the preset, rotate the encoder. The settings will change according to the stored data in memory. The "Preset scope" setting in the GLOBAL OPTIONS menu will determine if all panel settings are affected by the preset change, or just the waveform selection controls. The CV input and attenuator knob just below the display also changes the active preset. The behavior of the CV and knob is defined in the GLOBAL OPTIONS menu with the CTL option.

EDITING PRESETS

To write your own data into the preset slot, press the rotary encoder button while the preset manager is active. The EDITING indicator will appear on the screen. Any controls that you move while the editing indicator is active will be written into that preset slot. Any changes you make to the oscillator menu will be written to the preset whether the EDITING indicator is present or not. To exit EDITING mode, press the rotary encoder again. IMPORTANT: You must choose "Save Presets" from the PRESET menu to write your changes to memory. They will not be stored permanently unless you do this. The "Save to Preset" command will also commit the edited data to your preset of choice.

PRESET MORPH

When in PRESET mode, press the preset button again to enter MORPH mode. All controls under the scope of the preset manager are locked and unable to move (the CV inputs will still respond). Set the "base" preset for the morph by turning the rotary encoder to select. The base preset will determine the state of unison, octave and other button/menu settings that cannot be smoothly morphed. When the base preset is changed, these menu-based settings may change depending on the preset data. . Next, apply a CV to the preset CV input. The presets will smoothly morph from one to another.

PRESET MENU

Access the Preset Menu by holding down the encoder button and pressing the button closest to the display.

RANDOMIZE CURRENT

When selected, the random preset generator will create a new sound setting. The parameters to be changed are subject to the "Preset Scope" setting. This function works even if Preset Mode is not active. NOTE: Randomized presets are NOT automatically saved to memory. You must use the "Save Presets" or "Save to Preset" menu command to write the data to memory.

SAVE TO PRESET

If you are designing a sound and modulation setup and want to save it to the preset memory, choose this menu option. You must select the preset slot number to activate the save. This feature also works if the preset manager isn't active. The preset will automatically be stored in nonvolatile memory.

SAVE PRESETS

This option writes the current state of all preset slots to nonvolatile memory. Presets are stored on a nonremovable EEPROM inside the module, and will survive firmware upgrades.

Note: This will overwrite all of the preset memory with the new data, so subsequent uses of the "Reload Presets" command will recall that data instead of what was there before.

RELOAD PRESETS

This option reloads the saved memory contents of the Preset Manager to active memory. Use this if you have mistakenly initialized or randomized saved data that you would like to keep. Note: You cannot reload presets after initiating "Save Presets."

INIT ALL PRESETS

Initializes all preset slots and replaces the data with a simple sound. This function does not automatically clear the saved data in memory. You must use the "Save Presets" command to make your changes permanent.

INIT CURRENT

Initializes the currently playing sound and replaces it with a simple sound. This function works even if the Preset Manager is not active.

Note: After initializing the current preset, the frequency of the filter will be set to the minimum in lowpass mode. Adjust the frequency controls to hear an audible signal once again.

REBOOT

Restarts the module without the need to power your system down.

PRESET CONFIGURATION (IN PRESET MENU)

PRESET SCOPE

This parameter controls which filter is managed by the preset manager.
You can choose either Filter A or B, or both.

CTL

This menu option determines the behavior of the Preset CV input and attenuator.

CV+OFFSET

Allows the CV input to directly cycle through the bank of 8 presets. The attenuator knob will act as a manual offset. This is useful if you need a manual control to smoothly morph the preset data in Morph mode.

CV+ATTEN

Works like CV+Offset, but the knob becomes an attenuator for the incoming CV. This mode is useful for changing presets within a strictly controlled range, or subtly morphing within a narrow range of preset data.

TRIG + OFFSET

Treats the CV input as a trigger input instead. When a trigger or gate event is received, it will advance the preset number by one. The attenuator knob will manually scan through the presets.

TRIG RANDOM

Randomizes all parameters subject to Preset Scope when a trigger event is received at the CV input. Note that random patch results must be written to memory using the PRESET menu's "Save Presets" command for permanent storage of these changes.

STARTUP

This menu item allows you to enable the preset manager when the modular system is powered on. You may choose to leave PRESET OFF or select either PRESET or MORPH mode ON. This parameter is used when you have several Mark III modules in a live performance setup, to avoid setting the preset state on each one at startup.

UPGRADING FIRMWARE

You will need an inexpensive "Pickit3" programmer device and a computer with a USB connection to install any available upgrades for this module. You may download new firmware and detailed upgrade instructions from http://www.industrialmusicelectronics.com on the relevant product page. Note that upgrading the firmware will not disturb your presets or user settings.
The Pickit3 is available from your local electronics distributor, Microchip part number PG164130. The new Pickit4 programmer will also work, part number PG164140.

FACTORY RESET

To perform a factory reset, make sure that NO patch cables are plugged into the module. Turn the module on while holding the Preset Mode button. The menu settings, CV input calibrations, and preset data will be reset.

MORE INFORMATION

Find the latest firmware, waveforms, and other information:
http://www.industrialmusicelectronics.com/products/23

Need more help?
 Write to support@industrialmusicelectronics.com.