



~~X-Pole~~
DUAL FILTER

User's Manual X-Pole

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If you're in big hurry, call us, we'll try to answer your questions right away.



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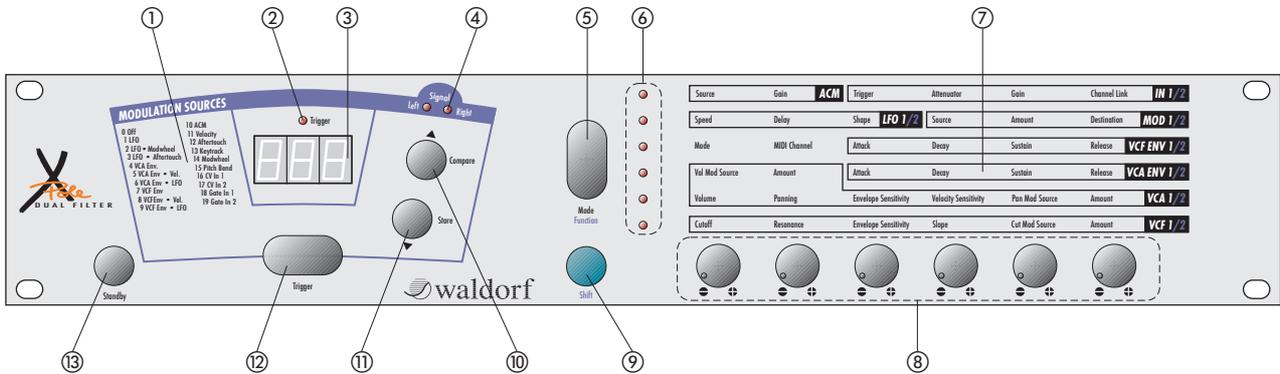
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Control Features and Connections

Front Panel



- ① Modulation source assignment table
- ② **Trigger** LED
- ③ Display
- ④ **Signal** LEDs
- ⑤ **Mode** key; selects the parameter level
- ⑥ **Mode** LED; indicates the currently active parameter level
- ⑦ Parameters
- ⑧ Rotary pots; adjust parameters
- ⑨ **Shift** key; activates alternate functions for pots and keys
- ⑩ ▲ **Scroll** key; raises the program number. Alternate function **Compare**
- ⑪ ▼ **Scroll** key; lowers the program number. Alternate function **Store**
- ⑫ **Trigger** key; generates a manual trigger signal
- ⑬ **Standby** key for power switching

Rear Panel



- ① **Audio In CH.1/Left (Mono)**
- ② **Audio In CH.2/Right**
- ③ **ACM In**
- ④ **Stereo Out Left/Stereo**
- ⑤ **Stereo Out Right/Mono**
- ⑥ **MIDI In** jack
- ⑦ **MIDI Thru** jack
- ⑧ **MIDI Out** jack
- ⑨ **CV** jack
- ⑩ **Gate** jack
- ⑪ **Power** supply socket DC 12V with cable clip

Foreword

Thank you for purchasing the X-pole. This device lets you filter any type of signal via a lowpass filter. In addition to the filter parameters, you can manipulate volume and pan position within the stereo signal via complex modulations. A comprehensive MIDI implementation provides comfortable handling via your keyboard and sequencer.

To ensure your instrument functions properly and enjoys a long life, please read and heed the instructions in this manual.

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About this Manual

This manual was written to help you become familiar with the Waldorf X-Pole. It will also help experienced users with routine tasks.

To avoid confusion, the terminology in this manual is based on the X-Pole parameter names. You will find a glossary at the end of the manual; it explains the various terms used herein.

We also used a uniform set of symbols to alert you to topics of particular interest or significance. Important terms are highlighted in bold letters.

Symbols

 **Caution:** The comments that follow this symbol will help you avoid errors and malfunctions.

 **Instructions:** Follow these guidelines to execute a desired function.

 **Info:** Additional information on a given topic.

Highlighted Control Features and Parameters

All of the X-Pole's keys, pots and parameters are highlighted in **bold** letters throughout the manual. Also every control element has a unique position no. ①...⑬ which refers to the diagrams at the beginning of this manual. The connectors on the rear panel are referenced by position no. ❶...❶❶. We suggest you make a copy of this page to have it at hand when necessary.

Example: • Press the **Shift** key ⑨.

The X-Pole's diverse modes and parameters are illustrated in a depiction of the display.

Example: Program 12 is active



A given parameter's value range is indicated from low to high with the two values shown in display-like letters, separated by three dots.

Example: **Cutoff** 0...127

General Safety Guidelines



Please read the following safety tips carefully!
They include several precautions you should always observe when dealing with electronic equipment.
Read all of the instructions before operating your device.

Suitable Operating Conditions

- Use the device in enclosed rooms only.
- Never use the device under damp conditions such as in bathrooms, washrooms or around indoor swimming pools.
- Do not use the device in extremely dusty or dirty environments.
- Ensure adequate ventilation is available at all sides of the device, especially when you mount it in a rack.
- Do not place the device near heat sources such as radiators.
- Do not expose the device to direct sunlight.
- Do not expose the device to extreme vibrations.

Power Supply

- Use only the included AC/DC adapter.
- Plug the adapter only into wall sockets that are properly grounded.
- Make sure the available power supply has the required rating indicated on the adapter. If you have any doubts, consult a qualified electrician.
- Never install a different plug. If the included cable is not equipped with a suitable plug for your local sockets, take it to a qualified electrician.
- Unplug the device when you are not using it for longer periods.
- Never touch the plug with wet hands.
- Always pull the plug when unplugging the device, never the cable.

Operation

- Never place objects containing liquids on or near the device.
- Place the device on a stable base only. Use a suitable platform or rack.
- Make sure no foreign objects find their way into the chassis. If for some reason this should occur, switch the power off, unplug the device and consult a qualified repair center.
- This device, used on its own or with amplifiers, speakers or headphones, can generate volume levels that may do irreparable damage to your hearing. For this reason you should keep the volume at tolerable levels.

Maintenance

- Do not open the device or remove the cover. Refer all service and repair tasks to qualified personnel. The interior of the chassis contains no components that require user maintenance.
- Use only a dry, soft cloth or brush to clean the device.
Never use alcohol, cleaning solutions or similar chemicals. They will damage the surface of the chassis.

Proper Use

This device is designed exclusively to filter low-frequency audio signals for the purpose of processing sound. Any other use is prohibited and voids the warranty extended by Waldorf Electronics GmbH. Waldorf Electronics GmbH is not liable for damages due to incorrect use.

Setup and Operation

Inventory

The Waldorf X-Pole comes complete with:

- the X-Pole
- 12V/800mA DC adapter
- this manual

Please ensure all the items above were included. If something is missing, contact your local dealer.

We recommend that you save the original packing material for future transport.

⚠ Make sure you fill out the warranty card and send it to the appropriate distributor or the address printed on the registration card. This is the only way we can keep you informed of upgrades and updates. Other available services are listed on the warranty card.

Setup

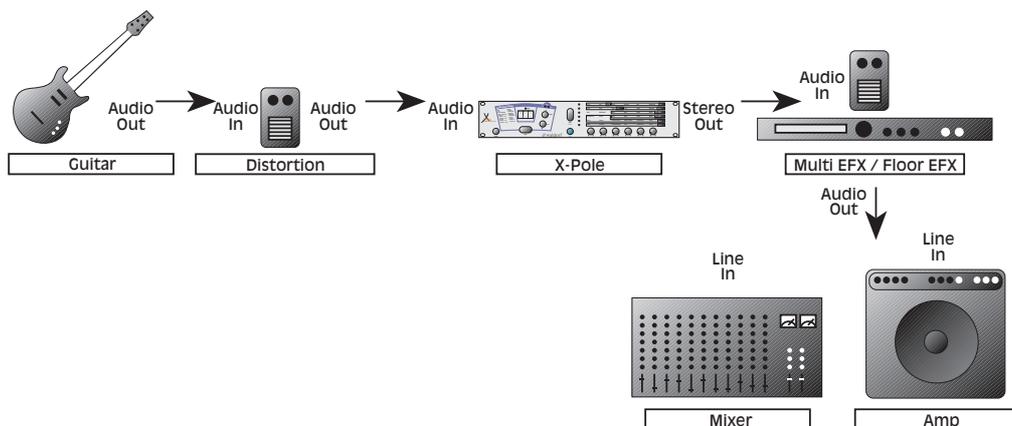
Place the X-Pole on a clean, even surface. If you choose to take the device on the road, we suggest you mount it in a 19" rack. The X-Pole takes up 89mm, equivalent to 2 rack spaces.

Applications

Because its trigger-function can be activated manually, via MIDI, a separate trigger-signal, and the actual audio-signal, the X-Pole is suitable for a wide range of applications. The following sections illustrate a few typical applications. You of course can select any other desired configuration; just let your imagination be your guide.

The X-Pole and Electric Guitars

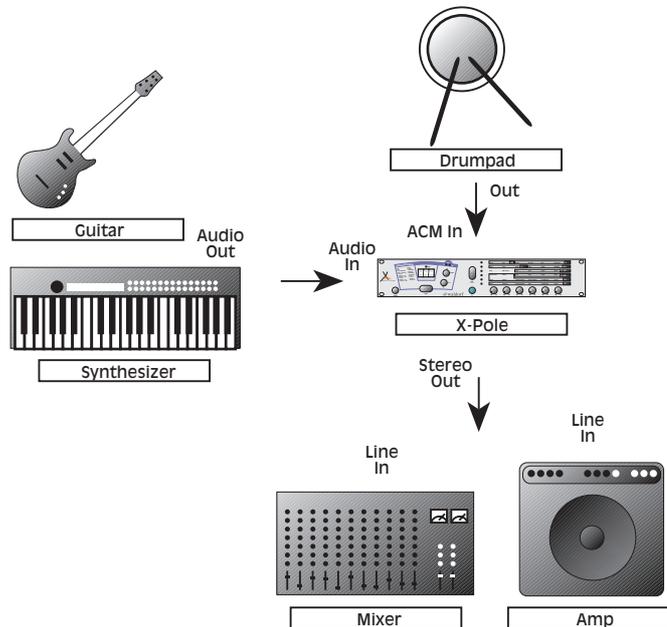
If your rig includes several effects processors, patch the X-Pole in between your distortion unit and reverb or delay unit in the signal chain.



Use the envelope signal to control the cutoff frequency at a medium resonance to generate an automatic wah-wah effect. As an alternative to the signal envelope, you can of course use the LFO.

The X-Pole and Electronic Drumpads

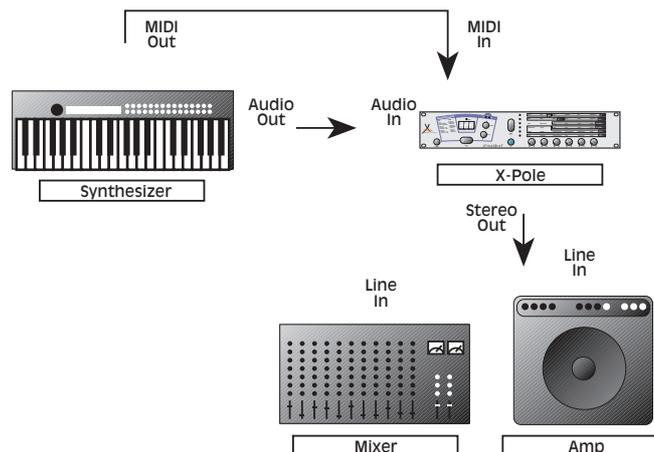
You may use an electronic drumpad to trigger the X-Pole's envelopes. Connect the pad's output to the **ACM In** jack ③ and adjust the signal level via the ACM section's **Gain** parameter. The **ACM In** jack ③ makes it possible to use an additional audio device as trigger source. In addition, you can generate a continuous modulation signal from the source's signal envelope.



You can trigger any signal you have patched into the **Audio In** jacks ① and ②. You can also connect a MIDI sound generator to the **MIDI Out** jack ⑧ and play its sounds via your drumpad. The X-Pole sends a C3 note (note number 60) each time a trigger occurs.

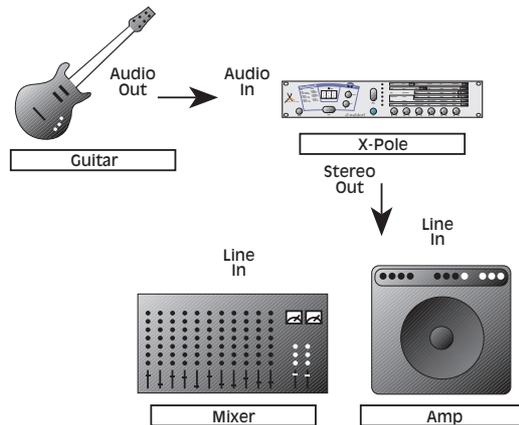
The X-Pole and Synthesizers/Samplers

Connect the synthesizer's MIDI output to the **MIDI In** jack ⑥ and the Audio outputs to the X-Pole's **Audio In** jacks ① and ②.



The envelopes can be triggered via the MIDI notes that you or the device play. The filter can be modulated via envelopes, the LFO, etc. in the same manner as with an analog synthesizer, which is an especially interesting feature when you are using samplers and sound generators that are not equipped with analog filters.

The X-Pole as a Denoiser



Let the appropriate envelopes control the volume and cutoff frequency. Use the envelopes for a short attack and a relatively long release time and set the Audio Trigger to Single Trigger Mode. As an alternative, you can also use the signal envelope to control the cutoff frequency.

The X-Pole as an Effects Device

The LFO is capable of producing frequencies in the audio range. Its highest frequency is 261.6 Hz, which is equivalent to a C note. If you modulate the cutoff frequency or volume via one of these LFOs, you will generate a ringmodulation-like effect.

You can also achieve audible effects by panning via an LFO or envelope. You can generate everything from a slow right/left wavering effect to a stereo amplitude modulation.

You can also generate compression when the signal envelope, preceded by a minus sign, modulates the volume.

The X-Pole and CV/Gate Applications

The X-Pole is equipped with a two-channel cv/gate input that makes it possible to feed in control signals from classic analog synthesizers. The cv signals can be used as continuous modulation sources in the same way as internal generators. The gate signals can be used as modulation sources, too. Further, they can act as trigger sources for the envelopes. Since the cv inputs as well as the gate inputs use an active design, you can also connect a pedal or a foot controller to the jacks.

Undoubtedly you have already realized that with the Waldorf X-Pole and just a little imagination, you can create an untold number of other effects or effect combinations based on these examples.

Connections

Audio and MIDI

In order to get started with your X-Pole you will need an AC wall socket, a signal source like a synthesizer or a guitar, a MIDI keyboard, a mixing console, an amp and an audio monitor such as a speaker cabinet.

You can also use a computer or sequencer rather than a MIDI keyboard.

☞ Follow these steps to connect the devices:

- Turn all units off.
- Connect the X-Pole's audio inputs **Audio In CH.1/Left (Mono) ①** and **Audio In CH.2/Right ②** to the signal source. If you do not want to process a stereo signal, use the **Audio In CH.1/Left (Mono) ①** only.
- Connect the X-Pole's audio outputs **Stereo Out Left/Stereo ④** and **Stereo Out Right/Mono ⑤** to your mixing console.
- Optionally, connect an external audio device to the **ACM In** jack ③.
- Connect your keyboards **MIDI Out** jack to the X-Pole's **MIDI In** jack ⑥.
- Connect the included adapter to the X-Pole's **Power Supply ⑪** socket.
- Insert the adapter plug in a suitable wall outlet.
- First switch on the connected MIDI keyboard and then the signal source, the mixing console and amp.

i If you do not choose to connect a mixing console, you can patch the X-Pole's output signals directly to an amp. Use an input usually called Aux or Tape input. If you do not want to send a stereo signal, use the **Stereo Out Right/Mono ⑤** output. If you do not insert a plug into **Stereo Out Left/Stereo ④**, then the mono master signal is routed via the right output.

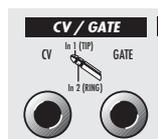
⚠ **Before connecting and disconnecting the X-Pole to a power supply source, turn your amp's volume control all the way down to avoid damage due to on/off switching noise.**

The X-Pole produces a high level output signal (see technical data). Please take care that the connected playback device is suitable for the high level of an electronic instrument.

Never use the mic or phono input of the connected amp!

CV/Gate

Optionally, you can connect external control devices like analog synthesizers etc. to the X-Pole's **CV** jack ⑨ and **GATE** jack ⑩. Both connectors are designed as 1/4" stereo phone jacks. Use the tip for CV in 1 (Gate in 1) and the ring for CV in 2 (Gate in 2).



The gate inputs are pulled up to high level via internal resistors. Therefore, you can also use a footswitch as a gate trigger device. The same can be done for the cv inputs in principle. Both cv inputs are pulled up to +5V via 4.7k resistors internally. You may use foot controller pedals with 1k...50k pots as control devices, but be aware that due to technical reasons you cannot use the whole modulation value range 0...127 in these cases.

Operation

Power Switching

The X-Pole is equipped with a software-based power control. When you connect the X-Pole to a wall socket, it is powered on initially.

First, an animated startup message and the version number of the X-Pole's operating software will appear in the display.

After several seconds, the display will change to show the program number; the X-Pole is now ready for use.

Switching off

The X-Pole has a special shutdown feature, that prevents data loss by accidentally pressing the power button. When you want to switch off the power, press and hold the **Standby** button (13). After a few seconds the X-Pole will switch off. If you release the **Standby** button (13) before, the shutdown process is cancelled.

Bypass

The bypass function allows you to disable the X-Pole temporarily in order to listen to the unprocessed sound.

☞ This is how you bypass the X-Pole's sound processing features:

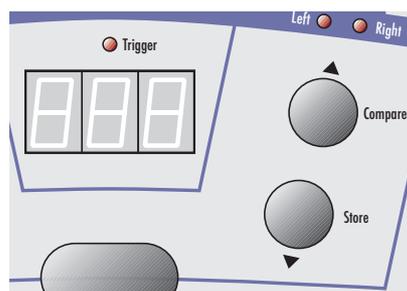
1. Briefly press the **Standby** key (13).
The display shows `bYPASS` `PrESS` `button` `to` `End` in animated letters.
You are now listening to the original sound.
2. Briefly press the **Standby** key (13) again. The display changes back to the program number and the filtered sound is active again.

i Please note that this function only does a "soft bypass" by disabling some parameters. Therefore any distortion will remain when overdriving the X-Pole's input stage.

Selecting Programs

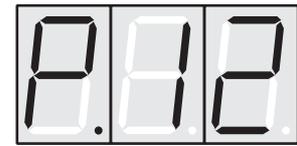
Factory and User Programs

The Waldorf X-Pole features 60 programs which are also called memory locations. Programs 1 through 30 are freely-programmable; programs 31 through 60 are permanent factory preset programs. When you first activate the X-Pole, programs 1 through 30 are identical to factory preset programs 31 through 60.



Use the Scroll keys ▲ ⑩ and ▼ ⑪ to select programs. The currently selected program is indicated by the display ③ .

Example: Program 12



☞ This is how you select a program:

- Press ▲ ⑩ briefly to select the next program.
- Press ▼ ⑪ briefly to select the previous program.

i To scroll through a number of programs quickly, press the appropriate scroll key and hold it down. After approx. 1 second, the display will scroll faster. Once the desired program is indicated in the display, release the scroll key. More acceleration can be achieved by pressing down the opposite scroll key while holding down the first scroll key. In this case, the program no. is changed in steps of 10.

Editing Parameters

In order to change or edit in the X-Pole, you must access the appropriate parameters. These parameters are arranged in a matrix. Accessing parameters requires two steps: First you must select the desired parameter level. Then you can use the rotary pots located below the six columns to edit the parameter directly. The parameters and how they function are described in detail in the next chapter.

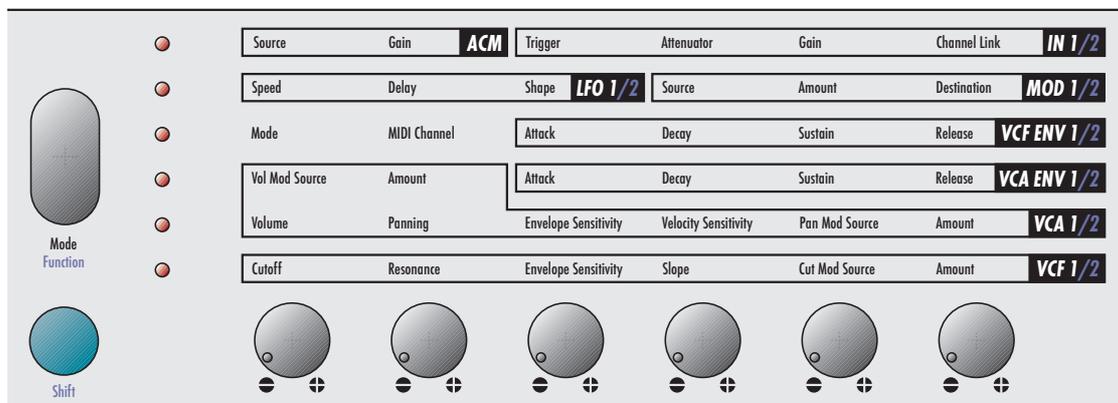
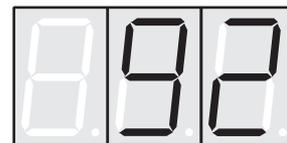


Diagram 1: Parameter Matrix

☞ This is how you access a desired parameter:

1. Press the **Mode** key ⑤ repeatedly until the LED ⑥ next to the desired parameter level illuminates.
2. Alternatively, you can press and hold the **Mode** key ⑤, and use the Scroll keys ▲ ⑩ and ▼ ⑪ to select the desired level.
3. Turn the rotary control ⑧ located below the column ⑦ containing the desired parameter.

The display will indicate this parameter's current value.



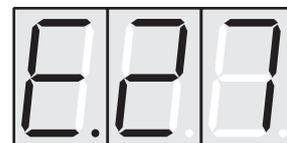
When the X-Pole is in Dual mode, you can adjust the parameters of both channels independently. Briefly press the **Shift** key ⑨ to toggle between channel 1 and 2. When the Mode LED ⑥ lights green, channel 1 is selected. When it lights red, channel 2 is selected.

i Several parameter values are not indicated as numerals, but as alphabetic abbreviations. Please consult the chapter describing the parameter for further information.

You can quickly reset integer-type parameters (e.g. Envelope Sensitivity) to 0 by holding down the **Shift** key ⑨ and moving the rotary control.

When you change a parameter value, the current program is automatically in Edit mode. The letter E. will appear in front of the program number in the display.

Example: Program 27 in Edit mode



The X-Pole is equipped with a feature called an edit buffer. It enables you to activate other programs without deleting the changes you made to the current program. However, as soon as you begin editing another program, the modifications you made to the previous program are lost.

⚠ Make sure you save the modifications you made before you begin editing the next program. If you fail to save the changes, they will be irretrievably lost! The next section describes how to save modifications.

👉 Example: How to change a filter cutoff frequency:

1. The desired parameter is entitled **Cutoff** and is located in the **VCF** group (bottom line).
2. Press the **Mode** key ⑤ repeatedly until the LED ⑥ next to the bottom parameter level illuminates.
3. The filter cutoff frequency, aptly entitled **Cutoff** is located in the first column. Turn the appropriate rotary pot ⑧, i.e. the first one from the left.
4. Observe the value as it changes in the display ③.

The Compare Function

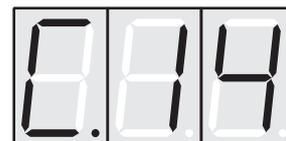
The Compare function allows you to compare the currently edited program to its original stored in the internal memory.

👉 This is how you use the Compare function:

1. Press and hold the **Shift** key ⑨.
2. Briefly press the Scroll key ▲ ⑩. This Scroll key's alternate function is **Compare**, indicated in blue lettering.
3. Release the **Shift** key ⑨.

4. A C. appears in front of the selected program number in the display ③.

Example: Program 14 in Compare status



You will now hear the unedited version of your program.

5. Briefly press the **Compare** key ⑩ while holding the **Shift** key ⑨ again.

6. The C. in the display changes to E. again. The edited version of the program is now active again.

i Please note that no parameters can be edited when the Compare function is active. You can only view the original settings. If you select a new program while the Compare function is active, the Compare status is automatically terminated.

Recalling Edits

You can void edits at any time and return to the original program.

 This is how you recall an edited program:

1. Press and hold the **Shift** key ⑨.
2. Press the **Compare** key ⑩ and hold it down.
3. After approx. 2 seconds, the C. in the display is replaced by P.
4. Release the **Shift** ⑨ and **Compare** ⑩ keys.

All edits have been recalled and the program is back in its original state.

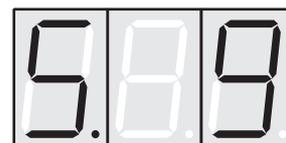
Storing Programs

After you have finished editing a program, you must save it if you intend to use it again. The program memory locations 1 through 30 are available for this purpose.

 This is how you store a program:

1. Press and hold the **Shift** key ⑨.
2. Briefly press the Scroll key ▼ ⑪. This Scroll key's alternate function is **Store**, indicated in blue lettering.
3. Release the **Shift** key ⑨.
4. A flashing S. appears in front of the selected program number in the display:

Example: Program 9 is the selected memory location



5. If you want to store the program at a memory location other than the suggested one, use the Scroll keys ▲ and ▼ to select the desired program number.

6. Briefly press the **Store** key ⑪ while holding the **Shift** key ⑨ again.

You now have stored the program. When you activate the store function, the Edit or Compare status of the stored program is terminated.

By pressing the **Mode** key ⑤ before performing the last step, you can discard the Store process at any time.

i The indicated memory location number will always be from 1 to 30, i.e. within the range of the freely programmable memory locations. If you have edited a factory preset program, it must be stored in one of these memory locations. The X-Pole will suggest a program number equivalent to the original number modulo 30.

Original Program	Suggested Program
1...30	1...30
31...60	1...30

Use the Store function also if you want to copy programs. There is no need to edit a program before storing it.

! Whenever you store a program, the selected memory location is overwritten. Therefore, any previously stored program under this location will be erased and there is no way to get it back.

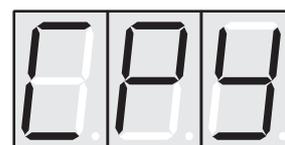
Copying Parameters between Channels

In Dual Mode, the X-Pole provides a utility function that allows you to copy all parameters from channel 1 to channel 2.

☞ This is how you activate the Copy Parameters function:

1. Press and hold the **Shift** key ⑨.
2. Briefly press the **Mode** key ⑤. This key's alternate function, indicated by the blue lettering, is **Function**.
3. Release the **Shift** key ⑨.
4. Press the Scroll key ▲ ⑩ once to select the copy function. The display now shows:

Copy Parameters function:



5. Briefly press the **Function** key ⑤ while holding the **Shift** key ⑨ again.

All parameters from channel 1 are now copied to channel 2.

Viewing Parameter Values

You can also view the value of a parameter without changing it.

☞ This is how you can check out a parameter value:

1. Select the appropriate parameter level via the **Mode** key ⑤.
2. Press and hold the **Mode** key ⑤ again.
3. Turn the parameter's rotary pot ⑧.
4. The parameter value appears in the display ③.
The value does not change when you turn the rotary pot.
5. Release the **Mode** key ⑤.

- i** If the currently active program is in Compare status, the original parameter value will appear in the display when you turn the pot.

Manual Trigger

In Addition to the X-Pole's audio and MIDI trigger features, you can use the **Trigger** button ⑪ to start a trigger manually. This function is helpful in situations e.g. when no keyboard is available or while adjusting parameters. Also, each time you press the button, the X-Pole sends a MIDI note C3 (note number 60) on the selected MIDI channel.

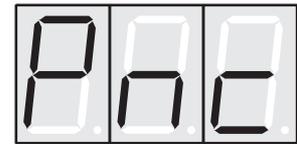
Panic Function

The Panic function executes a MIDI "All Notes Off" command. It is used to terminate stuck notes. Panic will immediately set all envelopes to their release phases.

☞ This is how you activate the panic function:

1. Press and hold the **Shift key** ⑨.
2. Briefly press the **Mode** key ⑤. This key's alternate function, indicated by the blue lettering, is **Function**.
3. Release the **Shift** key ⑨.
4. A flashing **Pnc** appears in the display to indicate the selected Panic Function:

Panic Function



5. Briefly press the **Function** key ⑤ while holding the **Shift** key ⑨ again. The display will show a short animation while Panic is proceeded.

Program Parameters

Overview of Functions

The Waldorf X-Pole consists of numerous sound-shaping components. The following overview gives you an idea of how the individual components interact:

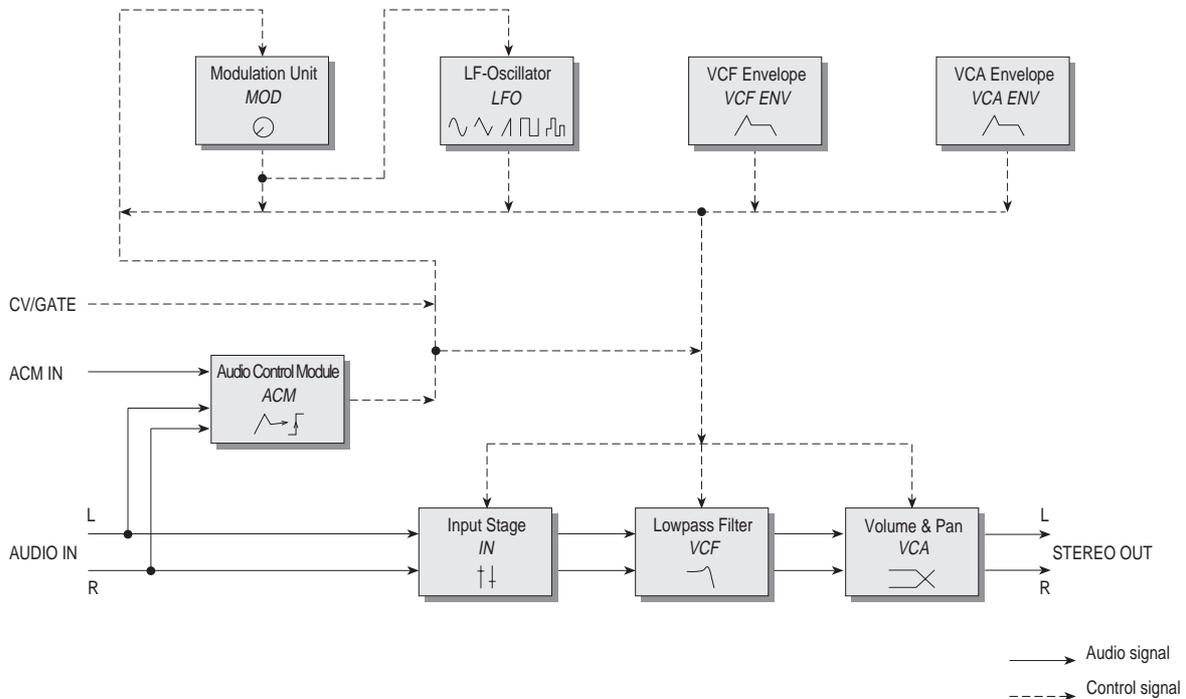


Diagram 2: Block schematic diagram

As you can see, the X-Pole consists of two different types of components for sound processing and modulation:

- **Input Stage, Lowpass Filter and VCA:**
Sound processing actually occurs within these three components. The Input Stage is designed to control the level of the incoming signal and, optionally, to add some saturation. The Filter then shapes the sound by amplifying (boosting) or attenuating (dampening) certain frequencies. The VCA is located at the end of the signal chain. It determines the overall volume and position of the signal within the stereo panorama.
- **Modulators: ACM, Modulation Unit, LFO and Envelopes:**
The Modulators are designed to manipulate or modulate the sound processing components to add dynamics to the audio signal. The Low-frequency Oscillator (LFO) is designed for periodic or recurring waveshapes and the envelopes for modulations that occur once within a given time frame. The Audio Control Module (ACM) is a special unit that acts as an envelope follower for the incoming signal. It also provides a trigger generator for starting the envelopes according to the input level.

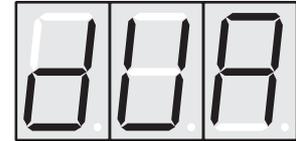
Mode

Since the X-Pole consists of two independent signal chains, it can be used to process either a stereo signal (Stereo mode) or two mono signals (Dual mode).

Mode `dUA / St . 1 / St . 2`

Selects the X-Pole's basic operation mode.

Dual Mode:
Both audio channels can be parameterized separately. The ACM section is used in common.



Stereo Mode 1:
Both audio channels use the same set of parameters. Panning is set to balance mode (standard behaviour).



Stereo Mode 2:
As above, but panning is set to crossfade mode as explained below.



The following paragraph illustrates the difference between the two stereo modes:

- In Stereo Mode 1, panning is similar to "balance":
So if **Panning**=Ctr is selected, input channel 1 will come out on output 1 and input channel 2 will come out on output 2. If **Panning**=L64 is selected, input channel 1 will come out on output 1 and input channel 2 will be muted. Accordingly, if **Panning**=r63 is selected, input channel 2 will come out on output 2 and input channel 1 will be muted.
- In Stereo Mode 2, panning is similar to "crossfade":
So if **Panning**=Ctr is selected, input channel 1 will come out on output 1 and 2 (centered). Also channel 2 will come out on output 1 and 2 (centered). If **Panning**=L64 is selected, input channel 1 will come out on output 1 and input channel 2 will come out on channel 2. Vice versa, if **Panning**=r63 is selected, input channel 1 will come out on output 2 and input channel 2 will come out on channel 1.

i Please remember that you have to press the **Shift** key  briefly to toggle between the channels when in Dual Mode.

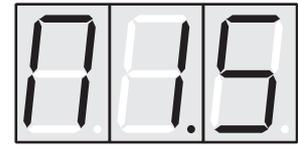
Input

The input stage is the first component in the X-Pole's signal chain. It contains a set of parameters that control the signal level, an optional distortion unit and the envelope trigger source. Furthermore you can determine whether both channels are mixed down to a mono signal.

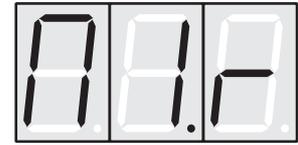
Trigger `MI . S / MI . r / ACM / G1 . L / G1 . H / G2 . L / G2 . H`

Selects the trigger source for the VCF and the VCA envelope.

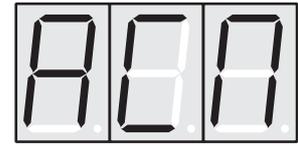
MIDI key single:
The first note starts the envelopes. All other notes do not restart while a note is sustained.



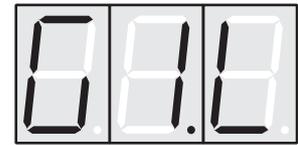
MIDI key retrigger:
The envelopes are restarted with every incoming note.



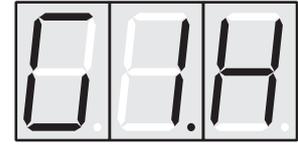
ACM signal:
Selects the ACM as trigger source.



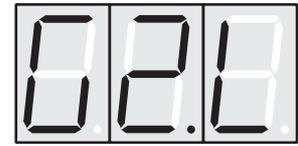
Gate 1 low:
Triggers the envelopes each time the gate input 1 signal changes from high to low level.



Gate 1 high:
Triggers the envelopes each time the gate input 1 signal changes from low to high level.



Gate 2 low:
Triggers the envelopes each time the gate input 2 signal changes from high to low level.



Gate 2 high:
Triggers the envelopes each time the gate input 2 signal changes from low to high level.

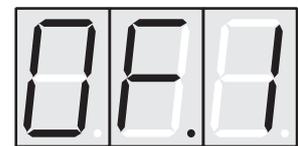


Attenuator

OF.1 / OF.2 / On.1 / On.2

Determines the attenuation and saturation of the input signal.

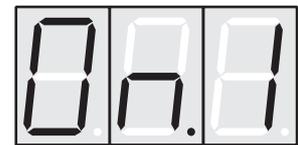
Attenuation off, saturation off



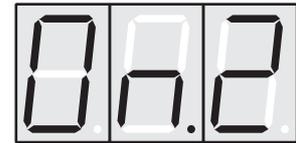
Attenuation off, saturation on



Attenuation on, saturation off



Attenuation on, saturation on



When attenuation is enabled, the input signal will be damped by 15dB. Use the attenuator in high input level situations that cannot be handled by the **Gain** parameter only. Saturation is similar to an analog-type distortion that adds some harmonics. It is performed by limiting the signal level at the end of the input stage or, in other words, before passing it to the filter. Another type of distortion can be obtained by disabling the saturation and overdriving the filter itself with a high level signal.

Gain 0...127

Determines the gain setting of the input signal. Use the **Signal** LEDs to check the setting. Raise the value until the LEDs light green. The level is set properly now. On signal peaks, the LEDs may also flash red occasionally. When the LEDs light red continuously, the input signal is clipped and therefore some distortion will occur. You may use this intentionally to add some harmonics to the sound. Since the X-Pole is an analog device, distortion is similar to saturation which produces a soft and warm sound character.

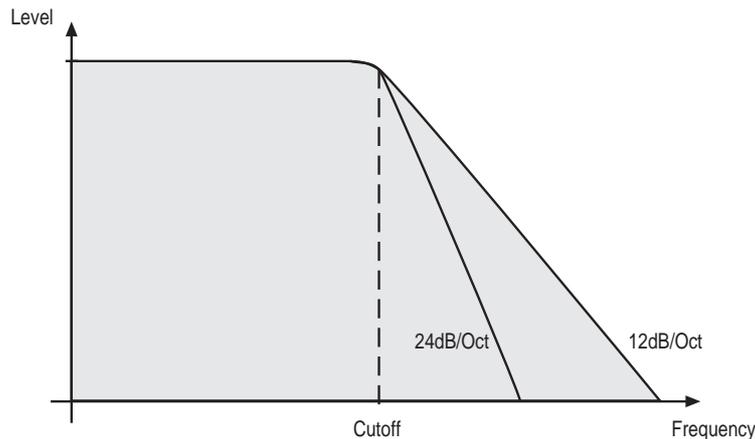
Channel Link OFF / On

Selects if both input signals are mixed down to a mono signal. If **On** is selected, the signals of both input channels are summarized after the gain control stage, i.e. before being passed to the filter. Use this setting e.g. when processing a mono input signal with two different filter characteristics and/or panning effects. If **OFF** is selected, both channels work completely independently.

Filter

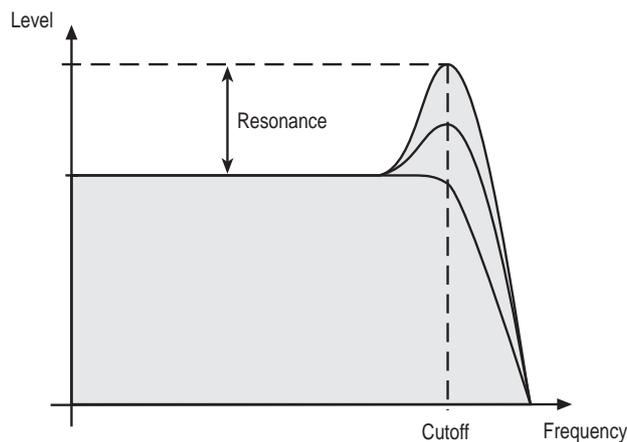
The heart of the X-Pole is the Voltage Controlled Filter (VCF). It is the unit that has most significant influence on the processed audio signal.

The filter type most commonly used is a low pass filter. This type dampens frequencies that lie above a specified cutoff frequency. Frequencies below this threshold are hardly affected. The frequency below the cutoff point is called the pass band range, the frequencies above are called the stop band range. The X-Pole's filter dampens frequencies in the stop band with a certain slope. The slope is selectable between 12dB and 24dB per octave. This means that the level of a frequency that lies an octave above the cutoff point will be 12dB or 24dB less than those frequencies of the signal that fall into the pass band. The following diagram shows the basic principle of a low pass filter:



To give you an idea of the extent of damping, consider this: A reduction of 24dB reduces the original level by approx. 94%. The damping factor two octaves above the cutoff point reduces the original level by more than 99%, which in most cases means this portion of the signal is no longer audible.

The X-Pole's filter also features a resonance parameter. Resonance in this context means that a narrow frequency band around the cutoff point is emphasised. The following diagram shows the effect of the resonance parameter on the filter's frequency curve:



If the resonance is raised to a great extent, then the filter will begin self-oscillation, i.e. the filter generates an audible sine wave even when it does not receive an incoming signal.

Cutoff 0...127

Determines the cutoff frequency. Tuning is scaled roughly in semitone steps. At a value of 57 and a **Keytrack** value of 32, the filter cutoff frequency is equal to the pitch of a given MIDI note. If the tuning is not scaled correctly, please refer to the chapter about the filter tune function. You can bring more movement into the sound by modulating the cutoff frequency via the LFO or the Filter Envelope.

Resonance 0...127

Filter resonance parameter. Determines the amplification of the frequencies around the cutoff point. Use lower values in the range 0...60 to give more brilliance to the sound. At higher values of 60...100 the sound gets the typical filter character with a strong boost around the cutoff frequency and a loss in the other range. When the setting is raised to values above 100, the filter starts to self-oscillate, generating a pure sine wave.

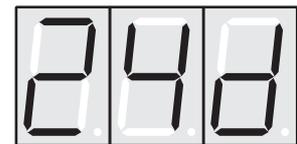
Envelope Sensitivity -64...63

Determines the amount of influence the VCF Envelope has on the cutoff frequency. For positive settings, the filter cutoff frequency is increased by the modulation of the envelope, for negative settings, the cutoff frequency is decreased. Use this parameter to change the timbre of the processed sound over time.

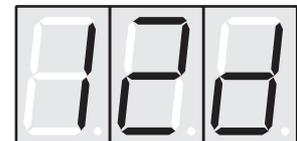
Slope 24d / 12d

Selects the filter slope.

24dB slope



12dB slope



Use the 24dB slope if you want to create a typical audible filtered character, use the 12dB slope if you want to get softer results.

Cut Mod Source S.00...S.19

Selects an additional cutoff modulation source. Sources are assigned in the same manner as in the modulation unit. Each source appears as a number in the display. See table 1 for further details. The modulation sources are also printed on the chassis of the device for easy reference ①.

Amount -64...63

Determines the amount of modulation applied to the filter's cutoff frequency by the modulation source selected via the **Cut Mod Source** parameter.

VCA

The final component in the X-Pole's signal chain is the VCA (voltage-controlled amplifier). The VCA determines master volume and the stereo position. The signal is then sent to the outputs, where you can patch it to other devices.

To understand the operation of this unit, it is important to know that the VCA Envelope is always acting as a modulation source for the volume. This means that an audio signal can only pass through if the VCA Envelope is triggered and opened.

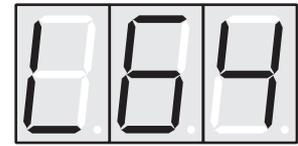
Volume 0...127

Determines the master volume of the program.

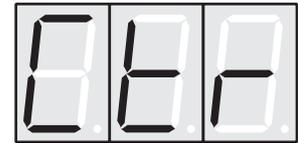
Panning L64...Ctr...r63

Determines the position of the signal within the stereo panorama. The following illustrations depict the extreme settings. All other values lie within this range.

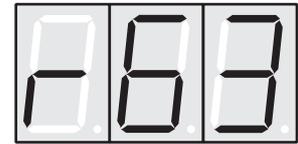
Far left



Center



Far right



The exact behaviour of the panning parameter also depends on the selected Stereo Mode:

- In Stereo Mode 1, panning is similar to "balance":
So if **Panning**=Ctr is selected, input channel 1 will come out on output 1 and input channel 2 will come out on output 2. If **Panning**=L64 is selected, input channel 1 will come out on output 1 and input channel 2 will be muted. Accordingly, if **Panning**=r63 is selected, input channel 2 will come out on output 2 and input channel 1 will be muted.
- In Stereo Mode 2, panning is similar to "crossfade":
So if **Panning**=Ctr is selected, input channel 1 will come out on output 1 and 2 (centered). Also channel 2 will come out on output 1 and 2 (centered). If **Panning**=L64 is selected, input channel 1 will come out on output 1 and input channel 2 will come out on channel 2. Vice versa, if **Panning**=r63 is selected, input channel 1 will come out on output 2 and input channel 2 will come out on channel 1.

Vol Mod Source S.00...S.19

Selects an additional volume modulation source. Sources are assigned in the same manner as in the modulation unit. Each source appears as a number in the display. See table 1 for further details. The modulation sources are also printed on the chassis of the device for easy reference ①.

Amount -64...63

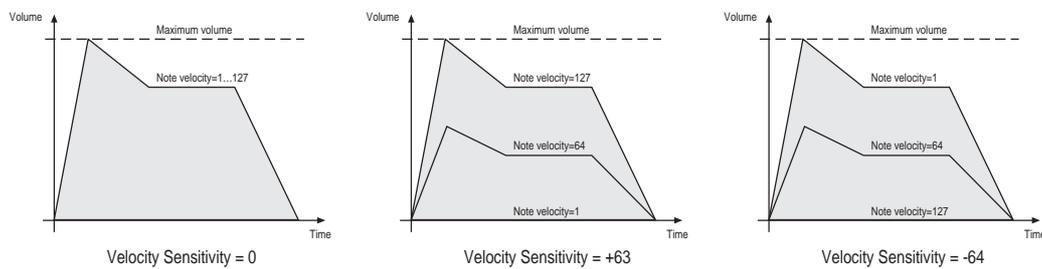
Determines the amount of modulation applied to the volume by the modulation source selected via the **Vol Mod Source** parameter.

Envelope Sensitivity -64...63

Determines the amount of influence the VCA Envelope has on the volume. For positive settings, the volume is increased by the modulation of the envelope, for negative settings, the volume is decreased. Use this parameter to change the volume of the processed sound over time.

Velocity Sensitivity -64...63

Specifies how much volume will be affected by MIDI note velocity. With a setting of 0, velocity will have no effect on the volume. For positive settings, the volume rises up to higher velocities. This is the most commonly used setting which gives a natural character. For negative settings, the volume falls up to higher velocities. As the VCA always works in conjunction with the VCA Envelope, this parameter actually determines the envelope velocity amount. The following diagram illustrates this functionality:



Pan Mod Source S.00...S.19

Selects a panning modulation source. Sources are assigned in the same manner as in the modulation unit. Each source appears as a number in the display. See table 1 for further details. The modulation sources are also printed on the chassis of the device for easy reference ①.

Amount -64...63

Determines the amount of panning modulation applied by the modulation source selected via the **Pan Mod Source** parameter.

ACM

"ACM" stands for "Audio Control Module". The purpose of this unit is to process an input signal in a way that makes it usable to act as a control signal. Although the X-Pole is a two channel device, it contains only one ACM. Therefore, the output signal of the ACM is used by both channels in common.

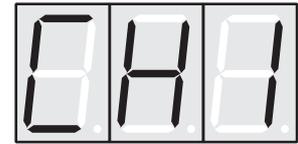
The ACM can be used to do 2 things:

- provide a trigger source for the envelopes
- work as envelope follower to generate a modulation signal

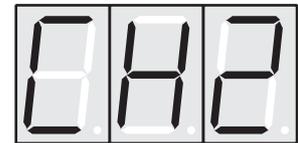
Source CH1 / CH2 / AUd / C1 . 2

Selects the ACM's input source.

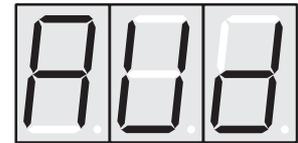
Channel 1



Channel 2

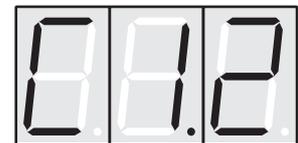


External Audioinput **ACM In ③**



Channel 1 and 2:

Uses the sum of both channels' input signals.



Gain 0...127

Determines the gain setting of the ACM. To adjust the gain setting properly, first make sure that the input stage's **Trigger** parameter is set to ACM. You can alter the trigger setting later, if necessary. Raise the ACM's gain setting until the **Trigger** LED ② flashes according to the input signal. Each time the LED flashes, the ACM generates a trigger signal that can be used to start the X-Pole's envelopes. When setting the gain as described above, the envelope follower works properly, too.

Low-frequency Oscillator (LFO)

The X-Pole is equipped with a low-frequency oscillator which can be used for modulation purposes. The LFO generates a periodic waveform with adjustable frequency and shape.

Rate 0...127 / 8b...32

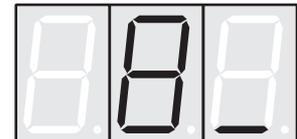
Determines the frequency. A value of 0 is equivalent to 0.0008Hz, i.e. one cycle in two minutes. A value of 127 is equivalent to 261.6Hz, i.e. the frequency of the middle C on a MIDI keyboard (C3). Within the value range of 16 to 127, the LFO is scaled in semitone increments. For instance the value 115 is equivalent to 130.8 Hz or C2. 110 is equivalent to G1 or 98Hz.

If you use a MIDI Sync Mode via the **Shape** parameter, you can determine the LFO speed by the note length in a range from thirty-second notes to 8 bars. Also dotted values are available.

Example: 1/4



Example: 1/8 dotted



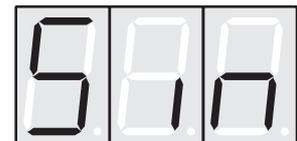
Example: 2 bars



Shape Sin / tri / SAt / PLS / S-H / tr.C / SA.C / PL.C

Determines the type of waveshape to be generated.

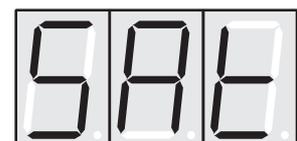
Sine



Triangle



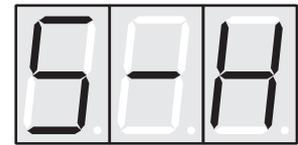
Sawtooth



Pulse



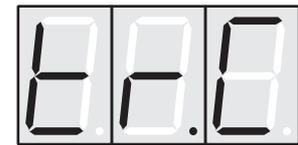
Sample & Hold



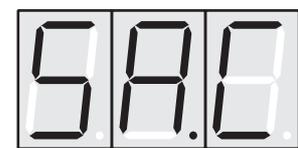
Sample & Hold samples a random value and holds it until the next LFO cycle begins. If **Rate** has a value of 0, then a random value is generated each time the LFO is triggered.

For the waveshapes triangle, sawtooth and pulse there is an additional MIDI Sync Mode, which is used to synchronise the LFO speed to MIDI Clock. Therefore the LFO can follow a given song tempo and all tempo changes are recognised, too.

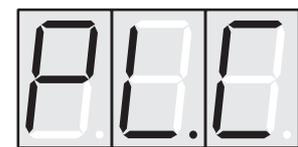
Triangle with Clock:



Sawtooth with Clock:



Pulse with Clock:



Please read the paragraph about the parameter **Rate**. You'll get some additional information there.

i When MIDI Sync is used for the LFO, the speed cannot be modulated via the modulation unit.

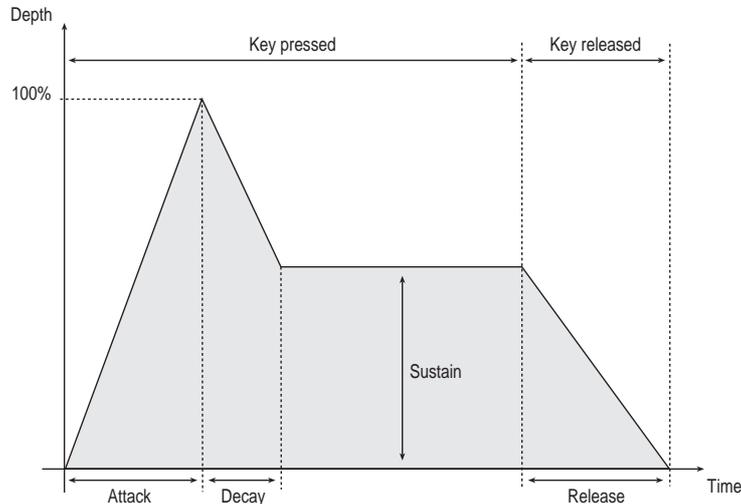
Delay 0...127

Delays the start of the LFO cycle from 2 milliseconds to one minute after an incoming trigger signal.

Envelopes

The X-Pole's envelopes allow you to manipulate parameters via rate or timed modulations. These envelopes feature ADSR characteristics.

Most traditional synthesizers feature ADSR envelopes. These envelopes are made up of four parameters that determine their response: **Attack**, **Decay**, **Sustain** and **Release**. The following diagram illustrates the structure of an ADSR envelope:



The attack phase of the envelope is activated via a MIDI Note On message or an audio trigger. Initially, the envelope ascends to its maximum value at the rate determined by the **Attack** parameter. It then descends at the rate determined by the **Decay** value until it reaches the predetermined **Sustain** value. The release phase is activated via a MIDI Note Off message or at the point when the trigger signal's value drops lower than a specific defined value. The envelope then descends to zero at the rate determined by the **Release** parameter. You can also start envelopes at any time via the **Trigger** key.

VCF Envelope

This envelope is designed to control the filter (VCF) but can also be used for other modulations. The following parameters determine the envelope's response.

Attack 0...127

Determines the attack rate or amount of time it takes for a signal to go from zero to maximum level.

Decay 0...127

Determines the decay rate or amount of time it takes for a signal to reach the **Sustain** level.

Sustain 0...127

Determines the sustain level which is held until the trigger ends.

Release 0...127

Once the trigger has ended, the release phase begins. During this phase, the envelope fades to zero at the rate determined by the Release value.

VCA Envelope

This envelope is designed to control the VCA, but can also be used for other modulations. It's parameters are identical to those of the VCF Envelope.

Modulation Unit

A modulation can be described as influencing a parameter by a signal generating unit. The terms used in this context are "source" and "destination". The X-Pole offers an independent modulation unit with individual settings of source, destination and amount.

Source S.00...S.19

Defines the modulation source. Each source appears as a number in the display. The table below depicts the assignments. This table is also printed on the chassis of the device for easy reference ①.

Nr.	Setting	Description
S.00	<i>Off</i>	Modulation off
S.01	<i>LFO</i>	LFO signal
S.02	<i>LFO*Modwheel</i>	LFO signal multiplied by the Modulation Wheel value (MIDI Controller 1)
S.03	<i>LFO*Aftertouch</i>	LFO signal multiplied by the MIDI Aftertouch value
S.04	<i>VCA Env.</i>	VCA Envelope signal
S.05	<i>VCA Env * Vel.</i>	VCA Envelope signal multiplied with MIDI Note Velocity
S.06	<i>VCA Env * LFO</i>	VCA Envelope signal multiplied with LFO signal
S.07	<i>VCF Env.</i>	VCF Envelope signal
S.08	<i>VCF Env * Vel.</i>	VCF Envelope signal multiplied with MIDI Note Velocity
S.09	<i>VCF Env * LFO</i>	VCF Envelope signal multiplied with LFO signal
S.10	<i>ACM</i>	ACM Envelope Follower signal
S.11	<i>Velocity</i>	MIDI Note Velocity
S.12	<i>Aftertouch</i>	MIDI Aftertouch
S.13	<i>Keytrack</i>	MIDI Note Number
S.14	<i>Modwheel</i>	MIDI Modulation Wheel (Controller 1)
S.15	<i>Pitchbend</i>	MIDI Pitchbend signal
S.16	<i>CV In 1</i>	Signal from cv input 1
S.17	<i>CV In 2</i>	Signal from cv input 2
S.18	<i>Gate In 1</i>	Signal from gate input 1 (0=low, 1=high)
S.19	<i>Gate In 2</i>	Signal from gate input 2 (0=low, 1=high)

Table 1: Modulation sources

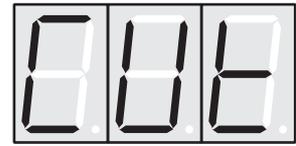
Amount -64...63

Determines the amount of modulation applied to the destination. Since the modulation is in fact a multiplication of the source signal and this parameter, the resulting amplitude depends on the type of modulation source you select:

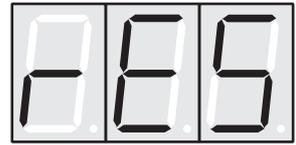
- For the so-called unipolar modulation sources, the resulting amplitude lies within the range of $0...+1$, if Amount is positive or $0...-1$, if Amount is negative. These sources are: *VCA Env*, *VCA Env * Vel.*, *VCF Env*, *VCF Env * Vel.*, *ACM*, *Velocity*, *Aftertouch*, *Modwheel*, *CV In 1/2* and *Gate In 1/2*.
- For the so-called bipolar modulation sources, the resulting amplitude lies within the range of $-1...0...+1$. These sources are: *LFO*, *LFO*Modwheel*, *LFO*Aftertouch*, *VCA Env * LFO*, *VCF Env * LFO*, *Keytrack* and *Pitchbend*.

Destination CUt / rES / uOL / PAn / LFO
Defines the modulation destination.

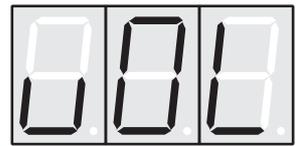
Filter cutoff frequency



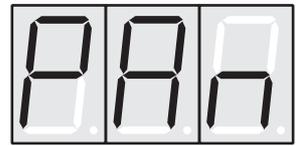
Filter resonance



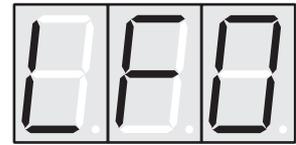
Volume



Panorama position



LFO rate



MIDI Control

This chapter describes the options you have available to control the X-Pole via MIDI.

MIDI Send and Receive Channel

Before using the X-Pole in a MIDI environment, you have to setup an appropriate send and receive channel.

MIDI Channel c. 1...c.16

Determines the send and receive channel for all programs. When the X-Pole is in Dual Mode, you can setup a separate MIDI channel for each audio channel. As usual, you can toggle the audio channels by briefly pressing the **Shift** key ⑨.

Calling Programs via Program Change

All of the X-Pole's programs can be called via MIDI Program Change messages. As the device contains 60 program locations, it recognizes program numbers 1...60.

The X-Pole uses a global parameter to determine whether Program Change messages are received or not.

☞ This is how you enable or disable receiving MIDI Program Changes:

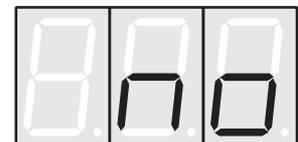
1. Press and hold the **Shift** key ⑨.
2. Briefly press the **Mode** key ⑤. This key's alternate function, indicated by the blue lettering, is **Function**.
3. Release the **Shift** key ⑨.
4. Use the Scroll keys ▲ / ▼ ⑩ and ⑪ to select the Program Change switch:

Program Change switch



5. Briefly press the **Function** key ⑤ while holding the **Shift** key ⑨ again.
6. The Program Change switch is now toggled from its previous state. The display shows the actual setting:

Program Changes disabled



Program Changes enabled



7. Repeat all steps if you want to toggle the setting again.

Influencing Programs via MIDI Messages

There are two ways to influence programs via MIDI:

- Modwheel, Aftertouch, Pitchbend, Velocity and Note Number can be used as modulation sources.
- Controllers can change program parameters directly.

When the X-Pole is in Dual Mode, each audio channel sends and receives its control messages on a separate MIDI channel.

Modwheel, Aftertouch and Pitchbend

The Modwheel controller, Aftertouch and Pitchbend messages can be used as modulation sources for modulating filter cutoff frequency, volume, panning. These sources can also be used in the freely-programmable modulation unit.

Velocity and Note Number

Key Velocity and Note Number of a MIDI trigger note can be used in the same way as Modwheel, Aftertouch or Pitchbend. The MIDI Note Number is called "Keytrack" in the list of modulation sources.

Changing Parameters via Controllers

Every parameter is assigned a Controller number through which the parameter can be changed. If a parameter is changed at the device, then this change is sent along with the appropriate Controller number via MIDI. This is especially helpful when you want to record changes you made at the X-Pole to a sequencer.

All controller messages are sent and received via the channel defined in the **MIDI Channel** parameter. The appendix of this manual contains a table listing the Controller numbers and the parameters they are assigned to.

System Exclusive Data Transmission

System exclusive data transmission lets you send and receive the contents of the X-Pole's memory via MIDI (dump).

The following types of dump are supported:

- Program Dump
- All Programs Dump
- Global Parameter Dump

The appendix contains a table with detailed information on the diverse dump formats.

MIDI Device ID

The MIDI device id used for system exclusive message transfers is always equal to the MIDI channel setting of audio channel 1 minus 1. E.g. if MIDI channel 5 is selected, the X-Pole's device id is 4.

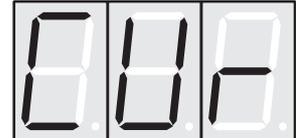
Sending System Exclusive Data

When you activate the send functions, the X-Pole sends the contents of its memory to the **MIDI Out** jack ⑩. Using a sequencer, you can record and archive this data.

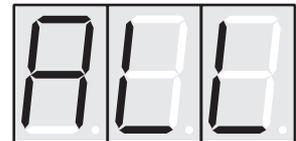
☞ This is how you activate the dump function:

1. Press and hold the **Shift key** ⑨.
2. Briefly press the **Mode** key ⑤. This key's alternate function, indicated by the blue lettering, is **Function**.
3. Release the **Shift** key ⑨.
4. Use the Scroll keys ▲ / ▼ ⑩ and ⑪ to select the desired dump function.

Dump Current Program



Dump All Programs



Dump Global Parameters



5. Briefly press the **Function** key ⑤ while holding the **Shift** key ⑨ again.

See appendix for detailed information on system exclusive specifications.

i Depending on the selected type, the dump may take some time. The X-Pole cannot be used during this time.

Receiving System Exclusive Data

You are not required to activate a special receive mode at the X-Pole in order to receive system exclusive data via MIDI. The transmission is activated via a Dump Request command originating at the device that is sending the messages. However there are a few things you should check prior to the transmission:

- Check out the MIDI device id. Data transmission will only be executed successfully if the sender and receiver setting coincide.
- Make sure none of the X-Pole's programs are in Edit mode. The edit buffer is cleared via data transmission and therefore all edits that were not stored prior to the dump will be irretrievably lost!

After activating the dump command at the sender device, the X-Pole will receive data and store these in its memory.

Other Functions

Gain/Trigger Recall Switch

As default, the X-Pole uses different gain and trigger settings for each program. In some situations it is more handy to keep the values for these parameters while selecting programs. Therefore, the X-Pole provides a switch which determines, if gain and trigger settings are recalled when you select a new program.

The following paragraph explains how things work exactly:

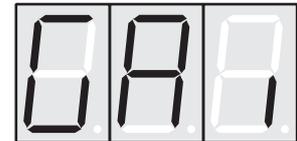
- Whenever you store a program, all parameters – that means also the gain and trigger settings – are stored, independent of the switch's state.
- When you load a program by selecting it manually, via MIDI Program Change or via MIDI system exclusive dump, the parameters **ACM Source**, **ACM Gain**, **Trigger**, **Attenuator** and **Input Gain** are only recalled when the switch is enabled.



This is how you toggle the Gain/Trigger Recall switch:

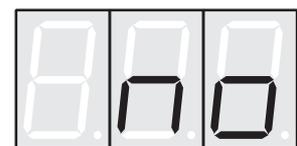
1. Press and hold the **Shift key** ⑨.
2. Briefly press the **Mode** key ⑤. This key's alternate function, indicated by the blue lettering, is **Function**.
3. Release the **Shift** key ⑨.
4. Use the Scroll keys ▲ / ▼ ⑩ and ⑪ to select the Gain/Trigger Recall switch:

Gain/Trigger Recall switch



5. Briefly press the **Function** key ⑤ while holding the **Shift** key ⑨ again.
6. The Gain/Trigger Recall switch is now toggled from its previous state. The display shows the current setting:

Gain/Trigger Recall disabled



Gain/Trigger Recall enabled



7. Repeat all steps if you want to toggle the switch again.

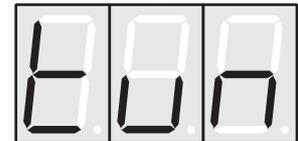
Tuning the Filter

The filters of both channels are tuned at the factory prior to shipping and, as a rule, are very stable. However, the X-Pole is an actual analog device, so diverse factors may cause slight tuning problems. Therefore we recommend that you re-calibrate it from time to time. On demand, the X-Pole executes this function automatically.

☞ This is how you activate the filter tune function:

1. Press and hold the **Shift key** ⑨.
2. Briefly press the **Mode key** ⑤. This key's alternate function, indicated by the blue lettering, is **Function**.
3. Release the **Shift key** ⑨.
4. Use the Scroll keys ▲ / ▼ ⑩ and ⑪ to select the filter tune function:

Filter Tune:



5. Briefly press the **Function key** ⑤ while holding the **Shift key** ⑨ again.

The filters are tuned automatically.

This process can take up to 30 seconds. The following functions are executed sequentially for both channels:

- First, each filter is tuned to its fundamental frequency. This means the filter is adjusted to 440Hz at maximum oscillation of the resonance frequency. The display indicates the current value for the filter cutoff frequency.
- Then each filter is tuned an octave above the fundamental frequency, i.e. to 880Hz.

i The X-Pole's audio output is switched off during the filter tuning process. Once the filter has been tuned properly, the X-Pole is ready to be played. The filter tune function can also be activated via a MIDI Tune Request command. Conversely, the X-Pole sends a MIDI Tune Request when the Tune function is activated.

Appendix

Specifications

Architecture

Analog Audio Processing Unit

Two Independent Audio Channels

- Input Stage
- Voltage Controlled LP Filter
- Output Stage (2 VCAs)
- LFO
- Modulation Matrix with External Control Inputs
- 2 Envelope Generators (VCF / VCA)
- Trigger Selector

ACM Module

Audio Trigger Processor
Envelope Follower Processor

Input

Audio Inputs (Ch1/Ch2):

Input Level: -50dBm...+15dBm
Input Impedance: 470kOhm

ACM Input:

Input Level: -30dBm...+10dBm

CV Inputs:

Input Level: 0...5V DC
Input Impedance: 4.7kOhm
(pullup to 5V)

Gate Inputs:

Input Level: 0...12V DC
Input Impedance: 4.7kOhm
(pullup to 5V)

Polarity programmable

Output

Audio Outputs (L/R):

Nominal Level: +4dBm
Maximal Level: +15dBm
Output Impedance: 1kOhm

General Performance

Frequency Range: 5Hz...30kHz
(+0.5/-3dB)

S/N Ratio (at Nominal
Output Level): 105dBm
Dynamic Range: 115dB
Total Harmonic Distortion: < 0.5%

Input Stage:

Programmable Attenuator Switch -15 dB

Programmable Attenuator/Gain 127 Steps
Programmable Saturation Circuitry

Filter:

Moog Cascade 12/24dB with Resonance
Enhancement Circuitry
Cutoff Range: 25Hz...36kHz

Output Stage:

Quad VCA

Control Voltage Feedthru:

VCA:
Volume: < -45dB
Pan: < -50dB
VCF:
Cutoff: < -30dB
Resonance: < -15dB

Connectors

Audio In: Ch1/Left (Mono)
Ch2/Right

ACM In
Stereo Out: Left/Stereo
Right/Mono

MIDI: In / Out / Thru
CV: In1 / In2
Gate: In1 / In2
Power

Power Supply

DC-Input: 12...13V / 0.7A
Consumption: 9W (2W Standby)

Buttons, Controls and Indicators

Standby / Bypass / Panic
Trigger
Value Up / Compare
Value Down / Store
Mode / Function
Shift
6 Parameter Pots
Trigger LED
2 Signal LEDs
3 7-Segment LEDs
6 Parameter Matrix LEDs

Dimensions and Weight

Width: 483mm
Height: 89mm
Depth (w. control features): 90mm
Weight (w/o Power Supply): 2.1kg

Accessories

Power Supply 220V (110V)

MIDI Controller Assignments

Contr. No.	Range	Parameter	Value Range
1	0...127	Modulation wheel	0...127
7	0...127	Volume	0...127
10	0...127	Panning / Balance	L64...Ctr...R63
14	0...127	VCF Env Attack	0...127
15	0...127	VCF Env Decay	0...127
16	0...127	VCF Env Sustain	0...127
17	0...127	VCF Env Release	0...127
18	0...127	VCA Env Attack	0...127
19	0...127	VCA Env Decay	0...127
20	0...127	VCA Env Sustain	0...127
21	0...127	VCA Env Release	0...127
22	0...2	Mode	0:Stereo 1 1:Stereo 2 2: Dual
23	0...3	Trigger	0:MIDI key 1:ACM 2:Gate Low 3:Gate High
24	0...127	LFO Speed	0...127
25	0...7	LFO Shape	0:Sine 1:Triangle 2:Sawtooth 3:Pulse 4:Sample & Hold 5:Triangle Clocked 6:Sawtooth Clocked 7:Pulse Clocked
26	0...127	LFO Delay	0...127
27	0...127	Input Gain	0...127
28	0...2	Attenuator	0:Att. off, Sat. off 1:Att. off, Sat. on 2:Att. on, Sat. off 3:Att. on, Sat. on
29	0...127	ACM Gain	0...127
30	0...3	ACM Source	0:Channel 1 1:Channel 2 2:Ext. Audio Channel 3:Channel 1+2
31	0...1	Channel Link	0:off 1:on
50	0...127	VCF Cutoff Frequency	0...127
52	0...127	VCF Cutoff Env. Sens	-64...+63
54	0...19	VCF Cutoff Mod Source	see Table
55	0...127	VCF Cutoff Mod Amount	-64...+63
56	0...127	VCF Resonance	0...127
57	0...1	VCF Slope	0:12dB/Oct. 1:24dB/Oct.

58	0...127	VCA Velo Sens.	-64...+63
59	0...127	VCA Env. Sens	-64...+63
108	0...19	VCA Vol Mod Source	see Table
109	0...127	VCA Vol Mod Amount	-64...+63
111	0...19	VCA Pan Mod Source	see Table
112	0...127	VCA Pan Mod Amount	-64...+63
114	0...19	Routable Mod Source	see Table
115	0...127	Routable Mod Amount	-64...+63
116	0...4	Routable Mod Destination	1:Cutoff 1:Resonance 2:Volume 3:Panning 4:LFO Speed

Modulation sources:

0	Off
1	LFO
2	LFO*Modwheel
3	LFO*Aftertouch
4	VCA Env.
5	VCA Env * Vel.
6	VCA Env * LFO
7	VCF Env.
8	VCF Env * Vel.
9	VCF Env * LFO
10	ACM
11	Velocity
12	Aftertouch
13	Keytrack
14	Modwheel
15	Pitchbend
16	CV In 1
17	CV In 2
18	Gate In 1
19	Gate In 2

Note: When the X-Pole is set to dual mode, two separate MIDI channels are used.

The Xpole uses several kinds of dumps and can recognize several requests, the kind of message is depending on 'TYP'

```
TYP = 00h : current dump
      01h : program bulk dump
      08h : global parameter dump

      48h : request all
      49h : request current
      4Ah : request global parameter
      4Bh : request device ID
      4Ch : request tuning
```

depending of the message type, the datafield contains the data which is related to the message.

2.1 preset dump

The data of a preset is dumped using the following format:

.... data =

offset	description			
0	preset number			
1	mode			
2	VCF	envelope	amount	CH1
3				CH2
4			attack	CH1
5				CH2
6			decay	CH1
7				CH2
8			release	CH1
9				CH2
10		modulation	source	CH1
11				CH2
12			amount	CH1
13				CH2
14		slope		CH1
15				CH2
16		cutoff		CH1
17				CH2
18		resonance		CH1
19				CH2
20	VCA	volume		CH1
21				CH2
22		panning		CH1
23				CH2
24		vel. sens.		CH1
25				CH2
26		vol mod	source	CH1
27				CH2
28			amount	CH1
29				CH2
30		pan mod	source	CH1
31				CH2
32			amount	CH1
33				CH2
34		envelope	amount	CH1
35				CH2
36			attack	CH1
37				CH2
38			decay	CH1
39				CH2
40			sustain	CH1
41				CH2
42			release	CH1
43				CH2
44	LFO	speed		CH1
45				CH2
46		delay		CH1
47				CH2
48		shape		CH1
49				CH2
50		routable MOD	source	CH1
51				CH2
52			amount	CH1
53				CH2
54			dest.	CH1
55				CH2
56	reserved #0 (fixed 0)			
57	reserved #1 (fixed 0)			
58	reserved #2 (fixed 0)			
59	reserved #3 (fixed 0)			
60	reserved #4 (fixed 0)			
61	reserved #5 (fixed 0)			

62	reserved #6 (fixed 0)	
63	reserved #7 (fixed 0)	
64	input gain	CH1
65		CH2
66	input attenuation	CH1
67		CH2
68	ACM	source
69		gain
70	channel link	
71	trigger source	
72	checksum	

checksum is computed with a 8-bit accumulator, result is masked as 7 bits value and this is used for the checksum value

2.1 preset bulk dump

The bulk dump of all presets is done preset by preset. Each preset is dumped as a separate preset dump. After the preset bulk dump a global parameter dump is performed.

2.2 Global parameter dump

In a global parameter dump the global parameters of the Xpole are contained. The format of this dump is:

.... data =

offset	description	
0	input gain	CH1
1		CH2
2	input attenuation	CH1
3		CH2
4	ACM source	
5	gain	
6	channel link	
7	trigger source	CH1
8		CH2
9	MIDI channel	CH1
10		CH2
11	load gain ON/OFF (0=off)	
12	accept program changes (0=no)	
13	start-up program	
14	checksum	

2.3 Requests

These messages are received by the Xpole and the Xpole will return with the requested function.

Glossary

Aftertouch

The majority of contemporary keyboards are capable of generating aftertouch messages. On this type of keyboard, when you press harder on a key you are already holding down, a MIDI Aftertouch message is generated. This feature makes sounds even more expressive (e.g. through vibrato).

Amount

Describes to which extent a modulation influences a given parameter.

Amplifier

An amplifier is a component that influences the volume level of a sound via a control signal. This control signal is often generated by an envelope or an LFO.

Attack

An envelope parameter. "Attack" is a term that describes the ascent rate of an envelope from its starting point to the point where it reaches its highest value. The Attack phase is initiated immediately after a trigger signal is received, i.e. after you play a note on the keyboard.

Control Change (Controllers)

MIDI messages enable you to manipulate the response of a sound generator to a significant degree.

This message essentially consists of two components:

- The Controller number, which defines the element to be influenced. It can be between 0 and 120.
- The Controller value, which determines the extent of the modification.

Controllers can be used for effects such as slowly swelling vibrato, changing the stereo panorama position and influencing filter frequency.

CV

CV is the abbreviation for control voltage. In analog synthesizers, control voltages are used to control sound parameters like pitch, cutoff frequency etc. E.g. to get a tremolo effect, the output signal of a LFO must be routed to the CV input of an (or several) oscillator(s).

Decay

"Decay" describes the descent rate of an envelope once the Attack phase has reached its zenith and the envelope drops to the level defined for the Sustain value.

Filter

A filter is a component that allows some of a signal's frequencies to pass through it and dampens other frequencies. The most important aspect of a filter is the filter cutoff frequency. Filters generally come in four categories: low pass, high pass, band pass, and band stop. A low pass filter dampens all frequencies above the cutoff frequency. A high pass filter in turn dampens the frequencies below the cutoff. The band pass filter allows only those frequencies around the cutoff frequency to pass, all others are dampened. A band stop filter does just the opposite, i.e. it dampens only the frequencies around the cutoff frequency. The most common type is the low pass filter.

Filter Cutoff Frequency

The filter cutoff frequency is a significant factor for filters. A low pass filter dampens the portion of the signal that lies above this frequency. Frequencies below this value are allowed to pass through without being processed.

Envelope

An envelope is used to modulate a sound-shaping component within a given time frame so that the sound is changed in some manner. For instance, an envelope that modulates the cutoff frequency of a filter opens and closes this filter so that some of the signal's frequencies are filtered out. An envelope is started via a trigger, usually a fixed trigger. Normally, the trigger is a MIDI Note. The classic envelope consists of four individually variable phases: Attack, Decay, Sustain and Release. This sequence is called an ADSR envelope. Attack, Decay and Release are time or slope values, and Sustain is a variable volume level. Once an incoming trigger is received, the envelope runs through the Attack and Decay phases until it reaches the programmed Sustain level. This level remains constant until the trigger is terminated. The envelope then initiates the Release phase until it reaches the minimum value.

Gate

The term „Gate“ has different meanings in a technical context. Like a real gate, it describes something, that can be open or closed, or - to use a technical term - active or inactive. A gate in sense of a device is a unit, that damps a throughpassing signal corresponding to some specific conditions. E.g. in a noise gate a signal is cut off, when its level falls above a predetermined threshold.

Gate stands also for a control signal of analog synthesizer systems. A keyboard generates an active gate signal as long as a key is held down. When the key is released, the gate signal becomes inactive again. An envelope generator can use this signal for its trigger purposes, and as a result a VCA unit can be controlled.

LFO

LFO is an acronym for low-frequency generator. The LFO generates a periodic oscillation at a low frequency and features variable waveshapes. Similar to an envelope, an LFO can be used to modulate a sound-shaping component.

Low pass Filter

Synthesizers are often equipped with a low pass filter. A low pass filter dampens all frequencies above its cutoff frequency. Frequencies below the cutoff point are not affected.

MIDI

The acronym MIDI stands for "musical instrument digital interface." It was developed in the early '80s so that diverse types of electronic musical instruments by different manufacturers could interact. At the time a communications standard for heterogeneous devices did not exist, so MIDI was a significant advance. It made it possible to link all devices with one another through simple, uniform connections.

Essentially, this is how MIDI works: One sender is connected to one or several receivers. For instance, if you want to use a computer to play a synthesizer, then the computer is the sender and the synthesizer acts as the receiver. With a few exceptions, the majority of MIDI devices are equipped with two or three ports for this purpose: MIDI In, MIDI Out and in some cases MIDI Thru. The sender transfers data to the receiver via the MIDI Out jack. Data are sent via a cable to the receiver's MIDI In jack.

MIDI Thru has a special function. It allows the sender to transmit to several receivers. It routes the incoming signal to the next device without modifying it. Another device is

simply connected to this jack, thus creating a chain through which the sender can address a number of receivers. Of course it is desirable for the sender to be able to address each device individually. Consequently, there is a rule which is applied to ensure each device responds accordingly.

MIDI Channel

This is a very important element of most messages. A receiver can only respond to incoming messages if its receive channel is set to the same channel as the one the sender is using to transmit data. Subsequently, the sender can address specific receivers individually. MIDI Channels 1 through 16 are available for this purpose.

MIDI Clock

The MIDI Clock message determines the tempo of a piece of music. It serves to synchronize processes based on time.

Modulation

A modulation influences or changes a sound-shaping component via a modulation source. Modulation sources include envelopes, LFOs or MIDI messages. The modulation destination is sound-shaping component such as a filter or a VCA.

Note on / Note off

This is the most important MIDI message. It determines the pitch and velocity of every generated note. The time of arrival is simultaneously the start time of the note. Its pitch is derived from the note number, which lies between 0 and 127. The velocity lies between 1 and 127. A value of 0 for velocity is similar to „Note Off“.

Panning

The process of changing the signal's position within the stereo panorama.

Pitchbend

Pitchbend is a MIDI message. Although pitchbend messages are similar in function to control change messages, they are a distinct type of message. The reason for this distinction is that the resolution of a pitchbend message is substantially higher than that of a conventional Controller message. The human ear is exceptionally sensitive to deviations in pitch, so the higher resolution is used because it relays pitchbend information more accurately.

Program Change

These are MIDI messages that switch sound programs. Program numbers 1 through 128 can be changed via program change messages.

Release

An envelope parameter. The term "Release" describes the descent rate of an envelope to its minimum value after a trigger is terminated. The Release phase begins immediately after the trigger is terminated, regardless of the envelope's current status. For instance, the Release phase may be initiated during the Attack phase.

Resonance

Resonance is an important filter parameter. It emphasizes a narrow bandwidth around the filter cutoff frequency by amplifying these frequencies. This is one of the most popular methods of manipulating sounds. If you substantially increase the resonance, i.e to a level where the filter begins self-oscillation, then it will generate a relatively clean sine oscillation.

Sustain

An envelope parameter. The term "Sustain" describes the level of an envelope that remains constant after it has run through the Attack and Decay phases. Sustain lasts until the trigger is terminated.

System Exclusive Data

System exclusive data allow access to the heart of a MIDI device. They enable access to data and functions that no other MIDI messages are able to address. "Exclusive" in this context means that these data pertain only to one device type or model. Every device has unique system exclusive data. The most common applications for SysEx data include transfer of entire memories and complete control of a device via a computer.

Trigger

A trigger is a signal that activates events. Trigger signals are very diverse. For instance, a MIDI note or an audio signal can be used as triggers. The events a trigger can initiate are also very diverse. A common application for a trigger is when it is used to start an envelope.

VCA

VCA is the acronym for voltage-controlled amplifier. A VCA is a component that influences the volume level of a sound via a control voltage. This is often generated by an envelope or an LFO.

VCF

VCF is the acronym for voltage-controlled filter. It is a filter component that allows you to manipulate the filter parameters via control voltages.

Volume

The term describes a sound's output level.

MIDI Implementation Chart

Date: 08.12.97

Model: Waldorf X-Pole

MIDI-Implementation Chart

Version: 1.13

Function		Transmitted	Recognized	Remarks
Basic Channel	Default Changed	1 1 - 16	1 1 - 16	
Mode	Default Messages Altered	x x *****	x x x	No Modes supported
Note Number	True Voice	60 *****	0 - 127 0 - 127	
Velocity	Note ON Note OFF	o x	o x	
After Touch	Key's Ch's	x x	o o	
Pitch Bender		x	o	
Control Change*	1 7 10	x o o	o o o	Modwheel Volume Panning
Prog Change	True #	x *****	o 1 - 60	
System Exclusive		o	o	
System Common	: Song Pos : Song Sel : Tune	x x o	x x o	
System Real Time	: Clock : Commands	x x	o x	
Aux Messages	: Local ON/OFF : All Notes Off : Active Sense : Reset	x x x x	x o o x	
*Note: See MIDI Controller Assignments for more information.				

Mode 1: OMNI ON, POLY
Mode 3: OMNI OFF, POLY

Mode 2: OMNI ON, MONO
Mode 4: OMNI OFF, MONO

o : Yes
x : No



EG-Konformitätserklärung
Declaration of Conformity

Für das folgend bezeichnete Erzeugnis

For the following named product

Waldorf X-Pole

wird hiermit bestätigt, daß es den Schutzanforderungen entspricht, die in der Richtlinie 89/336/FWG des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit festgelegt sind; außerdem entspricht es den Vorschriften des Gesetzes über die elektromagnetische Verträglichkeit von Geräten (EMVG) vom 30. August 1995.

will be hereby declared that it conforms to the requirements of the Council Directive 89/336/FWG for radio frequency interference. It also complies with the regulations about radio interference of electronic devices dated on August 30th, 1995.

Zur Beurteilung des Erzeugnisses hinsichtlich der elektromagnetischen Verträglichkeit wurden folgende einschlägige harmonisierte Normen herangezogen:

The following standards have been used to declare conformity:

- EN 50 082-1 : 1992 , EN 50 081-1 : 1992 , EN 60065 : 1993

Diese Erklärung wird verantwortlich für den Hersteller abgegeben:

This declaration has been given responsibly by the manufacturer:

Waldorf Electronics GmbH
Neustraße 12
D-53498 Waldorf

Waldorf, 28.10.97

Wolfgang Düren, Geschäftsführer
Wolfgang Düren, Managing Director

FCC Information (U.S.A.)

1. IMPORTANT NOTICE: DO NOT MODIFY THIS UNIT! This product, when installed as indicated in the instructions contained in this Manual, meets FCC requirements. Modifications not expressly approved by Waldorf may void your authority, granted by the FCC, to use this product.

2. IMPORTANT: When connecting this product to accessories and/or another product use only high quality shielded cables. Cable/s supplied with this product **MUST** be used. Follow all installation instructions. Failure to follow instructions could void your FCC authorisation to use this product in the USA.

3. NOTE: This product has been tested and found to comply with the requirements listed in FCC Regulations, Part 15 for Class „B“ digital devices. Compliance with these requirements provides a reasonable level of assurance that your use of this product in residential environment will not result in harmful interference with other electronic devices. This equipment generates/uses radio frequencies and, if not installed and used according to the instructions found in the users manual, may cause interference harmful to the operation of other electronic devices. Compliance with FCC regulations does not guarantee that interference will not occur in all installations. If this product is found to be the source of interference, which can be determined by turning the unit „OFF“ and „ON“, please try to eliminate the problem by using one of the following measures:

Relocate either this product or the device that is being affected by the interference.

Utilise power outlets that are on branch (Circuit breaker or fuse) circuits or install AC line filter/s.

In the case of radio or TV interference, relocate/reorient the antenna. If the antenna lead-in is 300 ohm ribbon lead, change the lead-in to co-axial type cable.

If these corrective measures do not produce satisfactory results, please contact the local retailer authorised to distributed this type of product.

The statements above apply **ONLY** to products distributed in the USA.

CANADA

The digital section of this apparatus does not exceed the „Class B“ limits for radio noise emissions from digital apparatus set out in the radio interference regulation of the Canadian Department of Communications.

Le present appareil numerique n'emet pas de bruit radioelectriques depassant les limites applicables aux appareils numeriques de la „Classe B“ prescrites dans la reglement sur le brouillage radioelectrique edicte par le Ministre Des Communications du Canada.

This only applies to products distributed in the USA.

Ceci ne s'applique qu'aux produits distribués dans Canada.

Other Standards (Rest of World)

This product complies with the radio frequency interference requirements of the Council Directive 89/336/EC.

Cet appareil est conforme aux prescriptions de la directive communautaire 89/336/EC.

Dette apparat overholder det gaeldenda EF-direktiv vedrørendareadiostøj.

Diese Geräte entsprechen der EG-Richtlinie 89/336/EC.





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