mini WORKS **4**pole

User's Manual

waldorf

EG-Konformitätserklärung

Declaration of Conformity

CE

Für das folgend bezeichnete Erzeugnis
For the following named product

Waldorf 4-pole
Serien-Nr. / *Serial No.* 95500395 - 96521500

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:

- DIN EN 55013:08-1991, DIN EN 50081-1:03-1993, DIN EN 55020:05-1995,
  DIN EN 50082-1:03-1993

Diese Erklärung wird verantwortlich für den Hersteller abgegeben:
This declaration is given responsible for the manufacturer:

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Table of Contents

1. Introduction

Thank you for purchasing the Waldorf miniworks 4-pole filter! This device lets you filter any type of signal via a 24dB lowpass filter featuring resonance. This filter is identical to the one the MicroWave is equipped with. In addition to the filter frequency and resonance, you can manipulate volume and position within the stereo signal via complex modulations. A comprehensive MIDI implementation provides comfortable handling via your keyboard and sequencer.

1.1 Conventions and Terminology

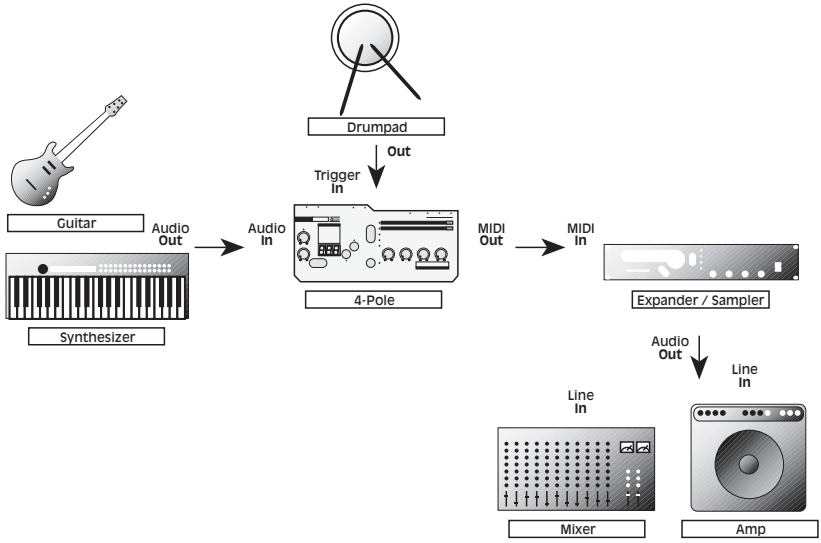
For the sake of simplicity, all technical terms in this manual correspond to the parameter names we used for the 4-Pole. You will find a glossary in the final chapter of this manual; it includes a brief definition of all pertinent terms.

2. Applications

Because its trigger-function can be activated manually, via MIDI, a separate trigger-signal, and the actual audio-signal, the 4-Pole is suitable for a wid range of applications. The following sections illustrate a few typical applications. You of course can select any other desired configuration; just let your imagitnations be your guide.

2.1 The 4-Pole and Electric Guitars

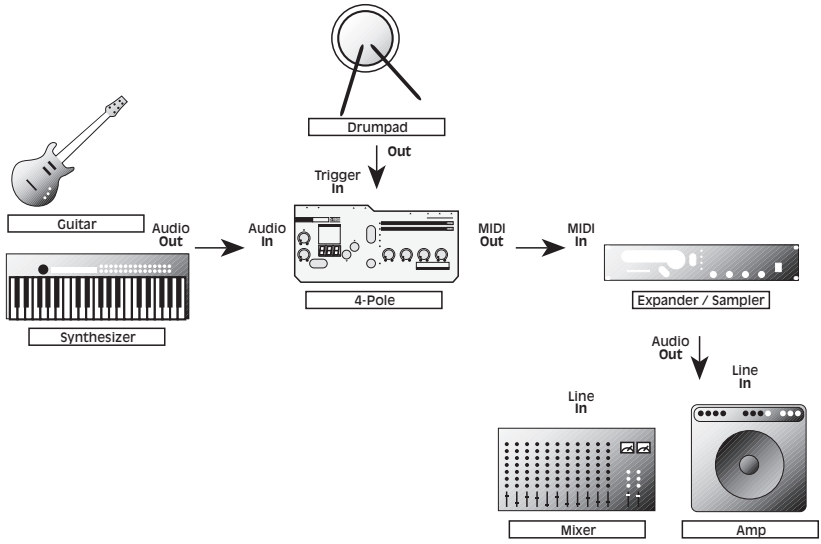
If your rig includes several effects processors, patch in the 4-Pole between your distortion unit and reverb or delay unit in the signal chain.



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 factory programs 21 to 24 were programmed specifically for electric guitars.

2.2 The 4-Pole and Electronic Drumpads

You may use an electronic drumpad to trigger the 4-Pole's envelopes. Connect the pad's output to the <Trigger In> jack and adjust the signal level via the <Trigger Level> control.

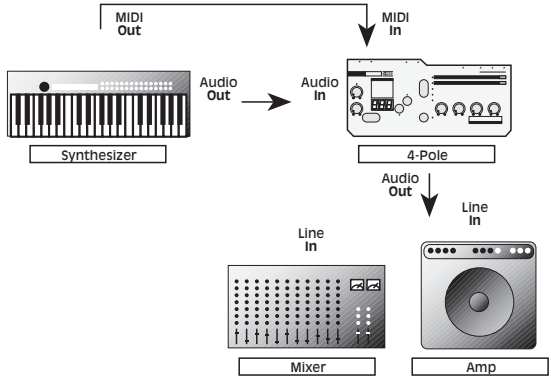


You can trigger any signal you have patched into the <Audio In> jack. You can also connect a MIDI sound generator to the <MIDI Out> jack and play its sounds via your drumpad. You will probably have to assign the MIDI channel and the note number (Section 5.6).

Program 25 was programmed specifically for use with drumpads; for this program, the signal envelope is used to control the cutoff frequency. The filter resonance is tuned so that the filter oscillates and produces a sound much like the early drum synthesizers.

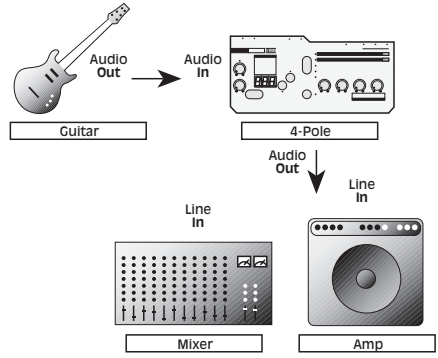
2.3 The 4-Pole and Synthesizers/Samplers

Connect the synthesizer's MIDI output to the <MIDI In> jack and the Audio output to the 4-Pole's <Audio In> jack.



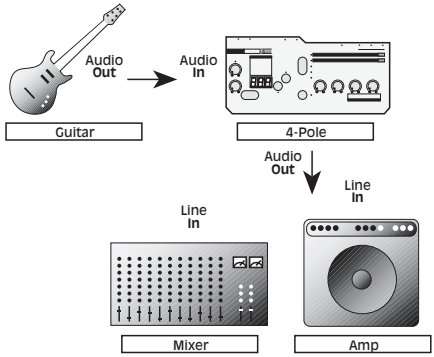
The envelopes can be triggered via the MIDI notes that you or the device are play. The filter can be modulated via envelopes, the LFO, etc. in the same manner as with an analog synthesizer, which is an especially interesting feature when you are using samplers and sound generators that are not equipped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

2.4 The 4-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 (refer to Section 5.6). As an alternative, you can also use the signal envelope to control the cutoff frequency. Program 26 is an example of a noise suppression program.

2.5 The 4-Pole as an Effects Device

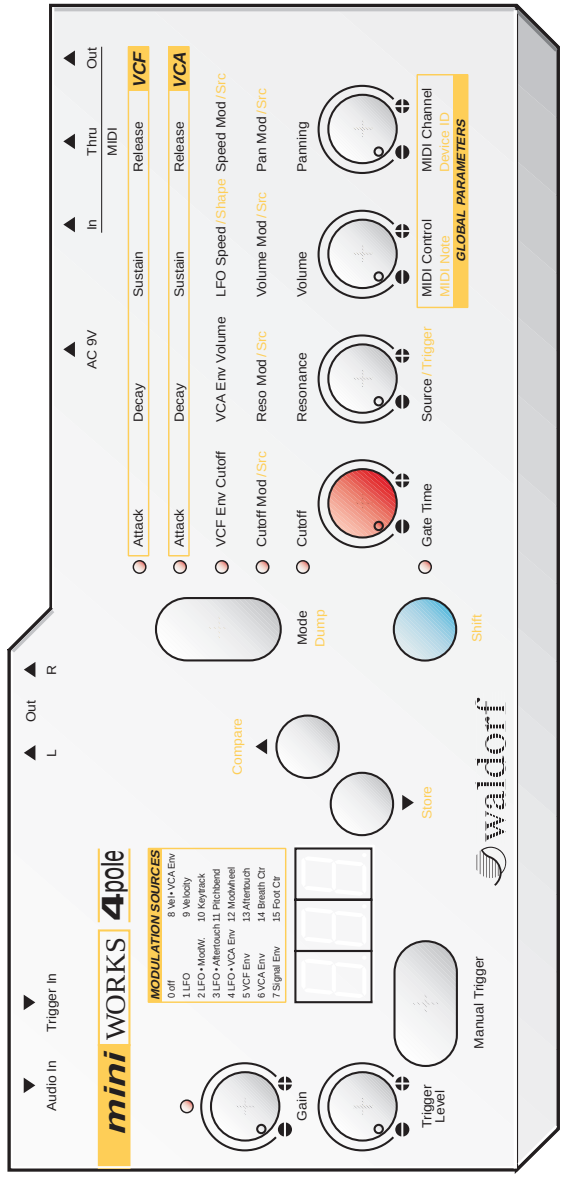


The LFO is capable of producing frequencies in the audio range. Its highest frequency is 261.6 Hz, which is equivalent to a C note. If you modulate the cutoff frequency or volume via one of these LFOs, you will generate an ringmodulation like effect. For an example, check out Program 28.

You can also achieve audible effects by panning (refer to Section 5.4 PAN MOD) via an LFO or envelope. You can generate everything from a slow right/left wavering effect to a stereo amplitude modulation. For an example, check out Program 29.

You can also generate compression when the signal envelope, preceded by a minus sign, modulates the volume. Check out Program 30.
Undoubtedly you have already realized that with the Waldorf and just a little imagination, you can create an untold number of other effects or effect combinations based on these examples.

3. Control Features



4. Operating the 4-Pole

4.1 Cable Connections and Powering Up

The 4-Pole's <Audio In> is a monophonic circuit whereas the outputs (<Out L> and <Out R>) constitute a stereophonic circuit. In order to exploit the 4-Pole's potential to the fullest we recommend you connect it in stereo mode. All audio in/outputs and the trigger input were implemented as 1/4" jacks.
Connect the <Audio In> jack to your signal source's output and <Out L> and <Out R> to an amp/mixing console's input. If you want to use a 1/4" stereo plug to access the 4-Pole's output signal, you must insert it into the <Out L> jack. The mono master signal is routed to the <Out R> jack, assuming you have not plugged a cable into the <Out L> plug.
Connect the included powerpack to the 9V socket located on the rear panel of the device. Then plug the powerpack into a wall socket. Your 4-Pole is now ready to roll.

4.1 Selecting Programs

Use the <Up> and <Down> keys to select programs. The display indicates the program you have selected. Programs 1-20 are freely programmable whereas programs 21-40 feature non-user programmable fixed factory programs.
When you initially switch on the 4-Pole the first 20 programs are identical to the other twenty factory programs.

4.3 Selecting an Edit level

Select any of the six different edit levels via the <Mode> key. The diverse levels are indicated by the Mode LEDs.
You can also press and hold the <Mode> key and then select an edit level via the <Up/Down> key. At the 6th level, the first five Mode LEDs function as a display for the signal envelope (refer to Chapter 6).
When you select a level, the current program number is displayed, and is usually preceded by the letter "P". The letter "E" indicates that this program was edited. "C" indicates the program is in Compare mode (refer to Section 4.7).

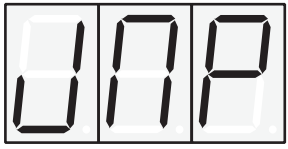
4.4 Editing Parameters

Select an edit level (e.g. Level 1, VCF Envelope) and manipulate the corresponding control located in the column of the desired mode, e.g. <Attack>. The display will immediately indicate the edited attack value. In several modes, another parameter is selected when you press the <Shift> key, e.g. LFO Shape. These are indicated on the control panel via orange markings.
If you change a parameter, the current program is automaticallly in edit mode, indicated by the letter "E" preceding the program number. However, the 4-Pole is equipped with just one editing buffer, so that all changes you have made to a program are irretrievably lost if you did not save them first (refer to Section 4.8)! These controls have several different functions, as the following chapter will illustrate.

4.5 Knob Mode

The 4-Pole was equipped with potentiometers featuring right and left limits because we feel these are the best tools for editing parameters. They do have a disadvantage: the position of the knob rarely corresponds to the actual value of a given program's parameter. Consequently, we integrated two distinct modes to give you the opportunity to edit values as you see fit.
If you press and hold the <Mode> key and simultaneously press the <Manual Trigger> key, "KNOB MODE" will appear in the display. Knob Mode can be changed again by pressing the <Mode> and <Manual Trigger> keys again.

JMP - Jump Mode



In Jump Mode, the parameter jumps directly to the value you set via the knob regardless of the parameter's original value.

REL - Relative Mode

In contrast to Jump Mode, in Relative Mode the parameter value change from the original value to new the value reflects precisely the amount you adjusted via a given control.

4.6 Viewing Parameters

If you just want to take a look at the value of a parameter, simply press and hold the <Mode> key and manipulate the appropriate knob. A new edit level is not activated when you release the <Mode> key. If the current program is in Compare mode (refer to Section 4.7) then only the original program's parameter value is displayed when you manipulate a control.

4.7 The Compare Function

The Compare function lets you compare the edited program parameters to its original parameters. This feature comes in handy in a number of situations, for instance when you are not sure which version you prefer for a particular song.
Press and hold the <Shift> key and simultaneously press the <Up> key to activate the Compare function. If the current program has been edited, the original program is retrieved and the program number diplay is preceded by the letter "C." If the Compare function was already active for this program, then the edited version is retrieved and the display will read "E". If the current program is not identical to the one you last edited, then the one you last edited is retrieved. You cannot edit parameters in Compare mode. You can also exit Compare mode by selecting another program.

4.8 The Store Function

The Store function lets you save an edited program for later use. Press and hold the <Shift> key and simultaneously press the <Down> key to activate the Store function. When you first activate this function, the program number and a flashing "S" are displayed. If the current program number is between 1 and 20, the appropriate program number is displayed. If the current program number is greater than 20, then 20 is automatically subtracted from the number. Programs 21 through 40 are not user-programmable. Use the <Up> and <Down> keys to select a new program number. Press <Shift-Down> again to store the current program at the program number's memory location. All Editing or Compare modes are deactivated automatically. The <Mode> key terminates the Store function.

5. The Parameters

5.1 Edit Level 1, VCF Envelope

This is where you can adjust the VCF envelope's parameters. The attack phase of the envelope is activated via a MIDI Note On message or an audio trigger. The release phase is activated via a MIDI Note Off message or at the point when the trigger signal's decay value drops lower than a specific defined value. The current volume level is used as the reference value. In other words, the level is not automatically set to "0" at the start of the envelope. You can start envelopes at any time via the <Manual Trigger> key. The VCF envelope is used primarily to control the cutoff frequency (refer to Section 5.5, <Cutoff>), but it can also be used to modulate other parameters (refer to Chapter 6).

Attack

Value range of 0...127
<Attack> describes the ascent rate of the envelope. At an initial level of zero, the value of 0 is equivalent to approx. 2 milliseconds; 64 equals one second; 127 equals approx. one minute.

Decay
Value range of 0...127
<Decay> is the descent rate of the envelope until it reaches the defined sustain value. If the sustain value is equal to zero, then the attack values pertain.

Sustain
Value range of 0...127
<Sustain> is the level at which the envelope remains constant until the start of the release phase.

Release
Value range of 0...127
<Release> is the rate at which the value descends to zero. If the sustain value is 127, then the attack values pertain.

5.2 Edit Level 2, VCA Envelope

This is the volume envelope. The information discussed above the VCF envelope's parameters also pertains to the VCA parameters. The VCA envelope can also be used for modulations. Additionally, the product of the VCA envelope and the LFO is also available for use as a modulator (see chapter 6.).

5.3 Edit Level 3

This is where you set the amount of effect the VCF envelope has on the VCF, VCA and LFO parameters.

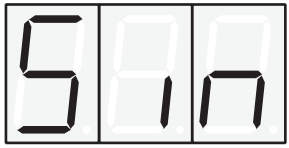
VCF Env Cutoff
Value range of -64.. +63
Determines the amount of effect the VCF envelope has on the cutoff frequency. Negative values lower the cutoff frequency.

VCA Env Volume
Value range of -64.. +63
Determines the amount of effect the VCA envelope has on the volume. Negative values lower the volume.

LFO Speed
Value range of 1.. 127
Determines the frequency of the low-frequency oscillator, also called the LFO. Its frequency range is from approx. 0.008 Hz to 261,6 Hz.

LFO Shape
Determines the LFO's waveshape.

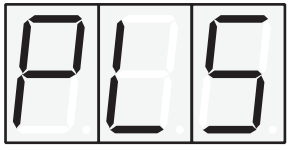
Sin - Sine



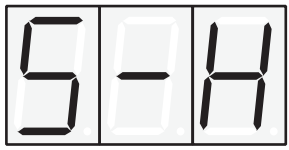
Tri - Triangle

SA. - Sawtooth

PLS - Pulse (Square)



S-H Sample & Hold



Speed Mod

Determines the depth of the LFO's modulation which can be fixed by the modulation source parameter <Speed Mod Src> (see chapter 6.)

5.4 Edit Level 4, Modulations

You can define the modulations for cutoff, resonance, volume and stereo panning at this level. Press <shift> and use the appropriate knob to select the source of the modulation and <LFO Speed Mod Src>.

Cutoff Mod
Value range of -64.. +63
Determines the extent of the cutoff frequency modulation generated by the modulation source you defined via <Cutoff Mod Src>.

Reso Mod
Value range of -64.. +63
Determines the extent of the resonance modulation generated by the modulation source you defined via <Reso Mod Src>.

Volume Mod
Value range of -64.. +63
<Volume Mod> determines the extent of the volume modulation generated by the modulation source you defined via <Volume Mod Src>.

Pan Mod
Value range of -64.. +63
<Pan Mod> determines the extent of the stereo panning modulation generated by the modulation source you defined via <Pan Mod Src>.

5.5 Edit Level 5

You can define the values for the cutoff frequency, resonance, volume and stereo panning at this level.

Cutoff
Value range of 0.. 127
Determines the filter cutoff frequency.

Resonance
Value range of 0.. 127
Determines the amount of amplification in the range of the cutoff frequency, which is called the resonance. High values cause self-oscillation and an audible tone. This effect is not an error, it is supposed to happen.

Volume
Value range of 0.. 127
Determines the basic volume. You of course must lower the volume when you want to make volume changes via the VCA envelope.

Panning
Value range of -64.. +63
Determines the position within in the stereo panorama. -64 is the far left position and +63 the far right.

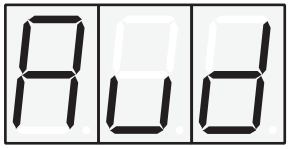
5.6 Edit Level 6

At this level, you can define the diverse parameters that determine how the two envelopes are triggered during the attack phase. The controls on the right are used to set global parameters that apply equally to all 40 programs.

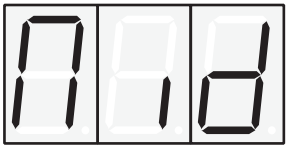
Gate Time
Value range of 000.. 508, 1.00...1.02
<Gate time> is the duration following a trigger during which no new triggers are accepted. This time is displayed in milliseconds (000 to 508).

Source
<Source> determines how the envelopes are triggered.

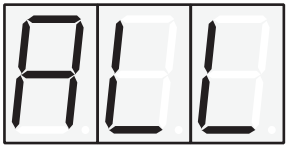
Aud - Triggering via audio. If you have not inserted a plug in the <Trigger In> jack, the 4-Pole accesses the <Audio In> signal.



MID - Triggering via MIDI Note On/Off messages sent through the designated channel (refer to Section 5.6, <MIDI Channel>).



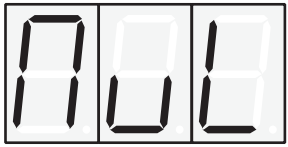
ALL - Triggering via both audio and MIDI.



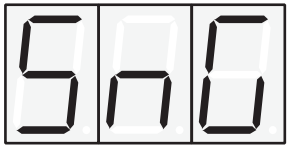
Trigger

<Trigger> determines the envelope trigger mode.

Mul - Triggers are accepted at all times.



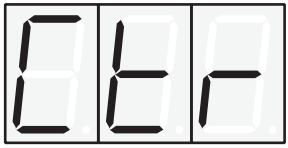
SnG - Triggers are accepted only when the envelopes have run their course or when they are in the release phase.



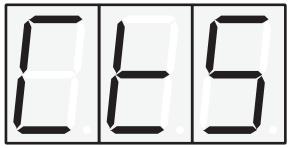
MIDI Control

This global parameter determines the type of MIDI messages that are sent.
OFF - Program Change, Note On/Off for audio/manual triggers and System Exclusive data are sent.

Ctr - Additionally, Controllers are sent when program parameters are changed (refer to Chapter 9).



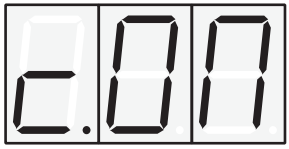
CtS - Controllers for the program parameters are sent and additionally, the signal envelope's output is sent as a Breath Controller, Ctr.#2.



MIDI Note
Value range In, C -1 c.-1, D-1 ... F.9, G9
You can determine which MIDI note number is sent for an audio or manual trigger. If you enter "In", then the last note the 4-Pole received via the designated MIDI channel is sent. The value range encompasses C#-1 to G9. The sharp symbol (#) is displayed as a period.

MIDI Channel
Set the device's send and recieve channels here.

c.OM - Omni Mode; MIDI messages are received via all channels and sent via Channel 1.



c.1 - c. 16 Channels 1 -16 for sending and receiving MIDI messages.

Device ID
Enter the device ID for System Exclusive messages here (refer to Section 7.5).

6. Modulation Sources

For your convenience, all available modulation sources are listed in a table on the device (refer to Chapter 2).
The modulation sources are:

0 Off
No modulation.

1 LFO
The output of the low-fequency oscillator, the acronym for which is LFO.

2 LFO * ModS.
The LFO is scaled according to the value of the MIDI Modulation Controller #1. If you are addressing the 4-Pole with a keyboard, you can control the LFO's modulation depth via its modulation wheel.

3 LFO * Aftertouch
The LFO is scaled according to the MIDI Channel Pressure value.

4 LFO * VCA Env
The LFO is scaled according to the VCA envelope value.

5 VCF Env
The VCF envelope; refer to Section 5.1.

6 VCA Env
The VCA envelope; refer to Section 5.2.

7 Signal Env
The trigger signal's envelope. If you have not inserted a plug in the <Trigger In> jack, the 4-Pole will access the <Audio In> signal. The trigger signal envelope is also called the "envelope follower."

8 Vel * VCA Env
The VCA Envelope is scaled according to the MIDI Note On velocity value.

9 Velocity
MIDI Note On velocity.

10 Keytrack
MIDI Keytrack. For manual/audio triggers, the note number you entered via <MIDI Note> is accessed.

11 Pitch Bend
MIDI pitch bend.

12 ModWheel
MIDI Controller #1, Modulation Wheel.

13 Aftertouch
MIDI Channel Pressure.

14 Breath Ctr.

MIDI Controller #2, Breath Control. For modulation purposes, you can play back a signal envelope you recorded previously to a sequencer.

15 Foot Ctr.
MIDI Controller #4, Foot Controller

7. MIDI Control

7.1 Program Change

The 4-Pole sends a Program Change message containing the new program number everytime a program is changed. When it receives this type of message via the proper MIDI channel (refer to Section 5.6, <MIDI Channel>), the new program is activated.

7.2 Note On/Off

When an envelope is triggered via <Manual Trigger> or <Audio Trigger>, a Note On message is sent. The note number will be the one you defined via <MIDI Note>. The appropriate Note Off message is sent at the end of the trigger sequence. Incoming notes trigger the envelopes when the <Source> parameter is set to MIDI or ALL.

7.3 Controller

If the <MIDI Control> parameter is set to Ctr, then all changes to the program are sent as Controller messages. When these messages are received, the appropriate parameters are changed. This feature lets you record all changes to a sequencer (refer to Chapter 9, "Controller Numbers"). If the <MIDI Control> parameter is set to CtS, then the siganl envelope is sent as a Breath Controller. The Modulation Wheel Controller, Breath Controller and Foot Controller are available for use as modulation sources.

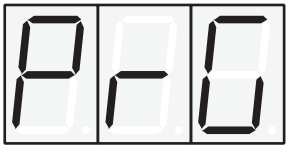
7.4 Pitch Bend, Aftertouch

These are also available for use as modulation sources.

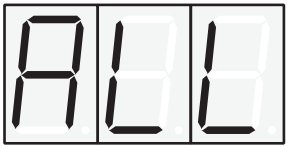
7.5 Sending System Exclusive Data

Press and hold the <Shift> key and simultaneously press the <Mode> key to activate the dump function. Once you have pressed <Shift-Mode>, you can use the <Up> and <Down> keys to select the type of System Exclusive message you want to send.

PrG - Program Dump - sends the current program.



ALL - All Dump - sends a backup of all program data and global parameters.



Press <Shift-Mode> again to start the SysEx transfer. Chapter 8 describes the dump format in detail.

7.6 Receiving System Exclusive Data

Once a program dump is received with the proper Device ID (refer to Section 5.6) and the correct Checksum (refer to Chapter 8), the current program is set to EDIT MODE and receives dump data. If this program or another program was in EDIT Mode prior to the dump, then all edited data are irretrievably lost! Once an all-dump is received, all twenty programs and the global parameters are saved. This may take up to 5 seconds, so whatever you do, do not switch off the device, otherwise you may lose all data!

8. System Exclusive Data Format

8.1. Program Dump

Byte Nr.	*Value*	*Description*
0	F0	Start of System Exclusive
1	3E	Waldorf Electronics GmbH Manufacturer ID
2	04	MiniWorks 4-Pole Machine ID
3	DEV	Corresponds to the global parameter Device ID; refer to Section 5.6
4	00	Dump Type, Program Dump
5	PRG	Program Number 0-39 for P.1 to P.40
6	0-127	VCF Envelope Attack
7	0-127	VCF Envelope Decay
8	0-127	VCF Envelope Sustain
9	0-127	VCF Envelope Release
10	0-127	VCA Envelope Attack
11	0-127	VCA Envelope Decay
12	0-127	VCA Envelope Sustain
13	0-127	VCA Envelope Release
14	0-127	VCF Envelope Cutoff Amount -64...63
15	0-127	VCA Envelope Volume Amount -64...63
16	0-127	LFO Speed
17	0-127	LFO Speed Mod. Amount -64...+63
18	0-4	LFO Shape 0:sin 1:tri 2:saw 3:pls 4:S-H
19	0-15	LFO Speed Modulation Source
20	0-127	Cutoff Modulation Amount -64...63
21	0-127	Resonance Modulation Amount -64...63
22	0-127	Volume Modulation Amount -64...63
23	0-127	Panning Modulation Amount -64...63

24	0-15	Cutoff Modulation Source
25	0-15	Resonance Modulation Source
26	0-15	Volume Modulation Source
27	0-15	Panning Modulation Source
28	0-127	Cutoff
29	0-127	Resonance
30	0-127	Volume
31	0-127	Panning
32	0-127	Gate Time 0.000 to 1.02 s
33	0-1	Trigger Mode 0: Multi 1:Single
34	0-2	Trigger Source 0: Audio 1: MIDI 2: All
35	CHK	Checksum via bytes 4 to 34, bit 7 deleted
36	F7	End of System Exclusive

8.2. Program Bulk Dump

Byte Nr.	*Value*	*Description*
0	F0	Start of System Exclusive
1	3E	Waldorf Electronics GmbH Manufacturer ID
2	04	MiniWorks 4-Pole Machine ID
3	DEV	Corresponds to the global parameter Device ID; refer to Section 5.6
4	00	Dump Type, Program Dump
5	PRG	Program Number 0-39 for P.1 to P.40
6	0-127	VCF Envelope Attack
7	0-127	VCF Envelope Decay
8	0-127	VCF Envelope Sustain
9	0-127	VCF Envelope Release
10	0-127	VCA Envelope Attack
11	0-127	VCA Envelope Decay
12	0-127	VCA Envelope Sustain
13	0-127	VCA Envelope Release
14	0-127	VCF Envelope Cutoff Amount -64...63

15	0-127	VCA Envelope Volume Amount -64...63
16	0-127	LFO Speed
17	0-127	LFO Speed Mod. Amount -64...+63
18	0-4	LFO Shape 0:sin 1:tri 2:saw 3:pls 4:S-H
19	0-15	LFO Speed Modulation Source
20	0-127	Cutoff Modulation Amount -64...63
21	0-127	Resonance Modulation Amount -64...63
22	0-127	Volume Modulation Amount -64...63
23	0-127	Panning Modulation Amount -64...63
24	0-15	Cutoff Modulation Source
25	0-15	Resonance Modulation Source
26	0-15	Volume Modulation Source
27	0-15	Panning Modulation Source
28	0-127	Cutoff
29	0-127	Resonance
30	0-127	Volume
31	0-127	Panning
32	0-127	Gate Time 0.000 to 1.02 s
33	0-1	Trigger Mode 0: Multi 1:Single
34	0-2	Trigger Source 0: Audio 1: MIDI 2: All
35	CHK	Checksum via bytes 4 to 34, bit 7 deleted
36	F7	End of System Exclusive

8.3. All Dump

Byte Nr.	*Value*	*Description*
0	F0	Start of System Exclusive
1	3E	Waldorf Electronics GmbH Manufacturer ID
2	04	MiniWorks 4-Pole Machine ID
3	DEV	Entsprich dem Globalparameter Device ID, s. 5.6

4	08	Dump Typ, Hier All Dump
5	0-127	Program 1, VCF Envelope Attack
6	0-127	Program 1, VCF Envelope Decay
7	0-127	Program 1, VCF Envelope Sustain
8	0-127	Program 1, VCF Envelope Release
9	0-127	Program 1, VCA Envelope Attack
10	0-127	Program 1, VCA Envelope Decay
11	0-127	Program 1, VCA Envelope Sustain
12	0-127	Program 1, VCA Envelope Release
13	0-127	Program 1, VCF Envelope Cutoff Amount -64...63
14	0-127	Program 1, VCA Envelope Volume Amount -64...63
15	0-127	Program 1, LFO Speed
16	0-127	Program 1, LFO Speed Mod. Amount -64...+63
17	0-4	Program 1, LFO Shape 0:sin 1:tri 2:saw 3:pls 4:S-H
18	0-15	Program 1, LFO Speed Modulation Source
19	0-127	Program 1, Cutoff Modulation Amount -64...63
20	0-127	Program 1, Resonance Modulation Amount -64...63
21	0-127	Program 1, Volume Modulation Amount -64...63
22	0-127	Program 1, Panning Modulation Amount -64...63
23	0-15	Program 1, Cutoff Modulation Source
24	0-15	Program 1, Resonance Modulation Source
25	0-15	Program 1, Volume Modulation Source
26	0-15	Program 1, Panning Modulation Source
27	0-127	Program 1, Cutoff
28	0-127	Program 1, Resonance
29	0-127	Program 1, Volume
30	0-127	Program 1, Panning

31	0-127	Program 1, Gate Time 0.000 to 1.02 s
32	0-1	Program 1, Trigger Mode 0: Multi 1:Single
33	0-2	Program 1, Trigger Source 0: Audio 1: MIDI 2: All
34	-62	Program 2, Parameter wie Program 1
	63-584	Program 3-20
585	0-16	Global MIDI Channel, 0: omni, 1-16: Kanal 1-16
586	0-2	Global MIDI Control, 0: off 1: Ctr 2: CtS
587	0-126	Global Device ID
588	0-39	Startup Program 1-40
589	0-127	Global Note Number
590	0-1	Global Knob Mode 0: Jump 1: relative
591	CHK	Checksum über Bytes 5-591, Bit 7 gelöscht
592	F7	End of System Exclusive

8.4. Program Dump Request

Byte Nr.	*Value*	*Description*
0	F0h	Start of System Exclusive
1	3E	Waldorf Electronics GmbH Manufacturer ID
2	04	MiniWorks 4-Pole Machine ID
3	DEV	Entsprich dem Globalparameter Device ID, s. 5.6
4	40h	Dump Typ, Hier Program Dump Request
5	PRG	Program Number 0-39 für P.1 bis P.40
6	F7h	End of System Exclusive

8.5. Program Bulk Dump Request

Byte Nr.	*Value*	*Description*
0	F0h	Start of System Exclusive
1	3E	Waldorf Electronics GmbH Manufacturer ID
2	04	MiniWorks 4-Pole Machine ID
3	DEV	Entsprich dem Globalparameter Device ID, s. 5.6
4	41h	Dump Typ, Hier Program Bulk Dump Request
5	PRG	Program Number 0-39 für P.1 bis P.40
6	F7h	End of System Exclusive

8.6. All Dump Request

Byte Nr.	*Value*	*Description*
0	F0h	Start of System Exclusive
1	3E	Waldorf Electronics GmbH Manufacturer ID
2	04	MiniWorks 4-Pole Machine ID
3	DEV	Entsprich dem Globalparameter Device ID, s. 5.6
4	48h	Dump Typ, Hier All Dump Request
5	F7h	End of System Exclusive

9. Controller Numbers

Hex	*Dec*	*Description*
01	1	Modulation Wheel
02	2	Breath Controller (Signal Env.)
09	9	Volume Parameter
0A	10	Panning Parameter -64...63
0E	14	VCF Envelope Attack
0F	15	VCF Envelope Decay
10	16	VCF Envelope Sustain
11	17	VFC Envelope Release
12	18	VCA Envelope Attack
13	19	VCA Envelope Decay
14	20	VCA Envelope Sustain
15	21	VFA Envelope Release
16	22	VCF Envelope Cutoff Amount -64...63
17	23	VCA Envelope Volume Amount -64...63
18	24	LFO Speed
19	25	LFO Shape 0:sin 1:tri 2:saw 3:pls 4:S-H
1A	26	LFO Speed Modulation Amount -64...63
1B	27	LFO Speed Modulation Source 0-15
40	64	Sustain Switch
46	70	Cutoff Modulation Amount -64...63
47	71	Cutoff Modulation Source 0-15
48	72	Resonance Modulation Amount -64...63
49	73	Resonance Modulation Source 0-15
4A	74	Volume Modulation Amount -64...63
2B	75	Volume Modulation Source 0-15
4C	76	Panning Modulation Amount -64...63
4D	77	Panning Modulation Source 0-15
4E	78	Cutoff Frequency
4F	79	Resonance
50	80	Gate time 0.000 to 1.02 s
51	81	Trigger Source 0: Audio 1: MIDI 2: All
52	82	Trigger Mode 0: Multi 1:Single
79	121	Reset All Controllers
7B	123	All Notes off

10. Glossary

4-Pole
Describes the number of individual filter components in an VCF (refer to the appropriate section). Each pole is capable of damping the signal's frequencies higher than the filter corner frequency by 6dB per octave, respectively. Consequently, a 4-pole filter dampens the signal by 24dB per octave. The volume of a signal that is an octave higher than the filter cutoff frequency would be 24dB lower when it remains unfiltered. This signal would no longer be audible.

Amount
Describes to which extent a modulation influences the given parameters. This term is used in the System Exclusive data format to describe a value.

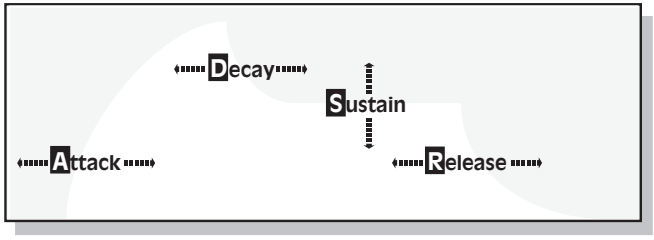
Attack
Describes the ascent rate of an envelope (refer to the appropriate section) from its starting point to the point where it reaches its highest value. The attack phase is initiated immediately after a trigger is received. For the 4-Pole, the attack is defined as a rate value (refer to the appropriate section).

Cutoff
Describes the cutoff frequency, in other words the frequency at which the filter begins to dampen the signal's frequencies that lie above this cutoff frequency. A lowpass filter dampens the frequncies above the designated cutoff frequency. The frequencies that are lower than the cutoff frequency remain unaffected. The filter cutoff frequency can also be emphasized via resonance (refer to the appropriate section).

Decay
Describes the descent rate of an envelope once the attack phase (refer to the appropriate section) has reached its zenith and the envelope drops to the level defined for the sustain phase. For the 4-Pole, the attack is defined as a rate value (refer to the appropriate section).

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 (refer to the appropriate section). Normally, the trigger is a MIDI Note. The classic envelope - which is used in the 4-Pole - 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 program sustain level. This level remains constant until the trigger is terminated. The envelope then initiates the release phase until it reaches the minimum value. The following illustration depicts the envelope sequence.



Filter

(refer to VCF)

Gate

A gate is defined by two values, threshold and time. Once the incoming signal exceeds the defined threshold, a trigger is initiated that lasts for as long as the signal remains above this threshold. The 4-Pole features two different threshold values, whereby the start value is the higher of the two. The time value ensures the trigger is not started several times. A new trigger cannot be started until the the defined interval has passed.

LFO (Low-frequency Oscillator)
The LFO generates a periodic oscillation at an extremely low frequency and features variable waveshapes. Similar to an envelope, an LFO can be used to modulate a sound-shaping component.

MicroWave
This term describes the type of wave a cooking device uses to heat food. It also describes another unit that cooks up some killer waves, one of the most radical synthesizers under the sun. Speaking of which, it too emits broadband waves that heat our planet up to, in most latitudes, a comfortable temperature.

MIDI Channel
In order to transmit data from one electronic musical instrument to another, they are connected via a MIDI interface. Several of these devices can be linked, so the sender must transmit information via a specific MIDI channel. The receiver must also be set to this channel so it can receive and process data, otherwise it will ignore these messages. Your local retailer should have plenty of information on MIDI. The company Roland, Norderstedt publishes a book that covers MIDI in great detail. If you are interested, contact them for information on how to acquire this book.

Modulation
A modulation influences or changes a sound-shaping component via a modulation source (refer to "Source"). Modulation sources include envelopes, the LFO or any MIDI Controller that open filters, change the panning position, modulate volumes and so on.

Panning
The process of changing the stereo position.

Program
This term describes programs that are stored at specific memory locations. A program consists of a set of values that are assigned to the diverse parameters.

Rate
In this context, this term actually describes the steepness of a slope, although rate generally refers to time and speed values. In any case, for our purposes it means the duration of an attack, decay or release phase.

Release
Describes the descent rate of an envelope to its minimum value after a trigger is terminated, for instance when a MIDI note was released. This means for an envelope, the attack phase is immediately followed by the release phase.

Resonance
Describes the amount of emphasis placed on the cutoff frequency. This is achieved by increasing the volume of the signal in this frequncy range. This is one of the most popular methods of manipulating sounds, and also where digital technology loses out to analog technology, big time. A great effect is achieved when the resonance is so powerful that the filter begins self-oscillaton and produces a relatively clean sine tone.

Source
In the context of the 4-Pole, this term describes the element that controls the modulation of the sound-shaping component. For instance, if the filter cutoff frequency is altered via the modulation wheel, then the modulation wheel is the source. Chapter 6 features a detailed list of modulation sources.

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
This term descibes special MIDI message that are sent from the 4-Pole to another device to save the 4-Pole's internal data externally, for instance an editor/manager, MIDI data filter or a computer featuring sequencer software. The 4-Pole recognizes different data types, for instance an individual program or all of the memory contents. Chapter 8 contains a detailed description of the data types.

Trigger
Diverse events can act as a trigger in the 4-Pole. For instance, the actual audio material, a separate MIDI trigger or a MIDI Note can all be triggers. When the 4-Pole receives a trigger, it starts an envelope. Once a trigger is terminated, the envelope enters the release phase.

VCA (Voltage-controlled Filter)
The VCA is the 4-Pole component that controls the volume of the output signal, regardless if the output volume is altered statically, via an envelope or any other modulation source.

VCF (Voltage-controlled Filter)
This filter is the heart and soul of the 4-Pole. It amplifies or dampens specific portions of a signal. Refer to "Cutoff," "4-Pole" and "Resonance."

Volume
This term refers to the output volume. This volume can be manipulated in realtime via the VCA (refer to the appropriate section).

11. MIDI Implementation Chart

Waldorf 4-Pole MIDI Implementation Chart Version: 1.3

Function		*Transmitted*	*Recognized*	*Remarks*
Basic	Default	1	1	
Channel	Changed	1 - 16	omni, 1-16	
Mode	Default		2	No Modes
	Messages	x	x	supported
	Altered	x	x	
Note	True	0 - 127	0 - 127	
Number	Voice			
Velocity	Note ON	o	o	
	Note OFF	64	x	
After	Key's	x	o	
Touch	Ch's	x	o	
Pitch Bender		x	o	
Control	1	x	o	Mod.Wheel
Change	2	o	o	Breath Control
	4	x	o	Foot Control
	10	o	o	Panning Par.
	64	x	o	Sustain
9,14-27,70-82		o	o	Parameters
Program		o	o	
Change	True #	0 - 39	0 - 39	Programs 1-40
System Exclusive		o	o	
System	Song Pos.	x	x	
	Song Sel.	x	x	
Common	Tune	x	x	
System	Clocks	x	x	
Real time Commands		x	x	
Aux	Local ON/OFF	x	x	
Mes-	All Notes Off	x	o	
sages	Active Sense	o	o	
	Reset	x	x	
Notes		-/-		

Mode 1: OMNI ON,POLY
Mode 2: OMNI OFF,POLY
Mode 3: OMNI ON,MONO
Mode 4: OMNI OFF,MONO

o: Yes
x: No

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waldorf

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