

AFB 16 ANALOG FILTER BANK
User Manual

Foreword

Thank you for purchasing the Waldorf AFB16 Analog Filter Bank. You now own an extraordinary product that integrates 16 analog filters with overdriveable VCA's into a computer-based music production environment.

Why should you read this manual ?

Even if you are a professional musician you should read this manual front to back at least once. The basic concepts of the AFB16 are totally new and will need some explanation.

Feel free to put this manual back into the package, but in our opinion this is a bad choice.

If you do decide to read the manual we promise you a lot of fun while reading about and working with the AFB16!

Your Waldorf Team

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Waldorf-Music AG, Schloss Ahrenthal, D-53489 Sinzig, Germany

AFB16 Development Team

AFB16 Software:	Stefan Stenzel
Plug-in Software:	Wolfram Franke, Stefan Stenzel
USB driver:	Dietmar Hoppe-Jagonak, Stefan Stenzel
SDK:	Wolfram Franke, Stefan Stenzel
Hardware:	Thomas Kircher
Housing:	Martin Neideck, Frank Schneider
Design:	Axel Hartmann, Holger Steinbrink
Manual/Layout:	Holger Steinbrink
English proofing:	Graham Hunter
Beta test/Sound design:	Juergen Fornoff, Joerg Huettner, Holger Steinbrink
Head:	Wolfgang Dueren
Revision:	Version 1.0, March 2003

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Holger Bahr, H.-P. "Bonni" Bonnenberg (†), Design Box, Mert Erguen, Geoff Farr, Oliver Feinauer, Juergen Fornoff, Gunther Graefe, Florian Gypser, Sigi Heinz, Martin Herbst, Joerg Huettner, Graham Hunter, Thilo Kloft, Werner Kramer, Dirk Krause, Achim Lenzgen, Sabine Litauer, Wolfgang Moers, Dr. Georg Müller, Martin Neideck, Optiprint, Ottic, PPF, Stefan Profittlich, Norbert Reiss, Alex Sauff, Sven Steglich, Steinberg, Hermann Vogt, Beate Walkowiak, Kurt "Lu" Wangard, KD Warnecke, Rocco Zodiac ... and anyone we have forgotten.

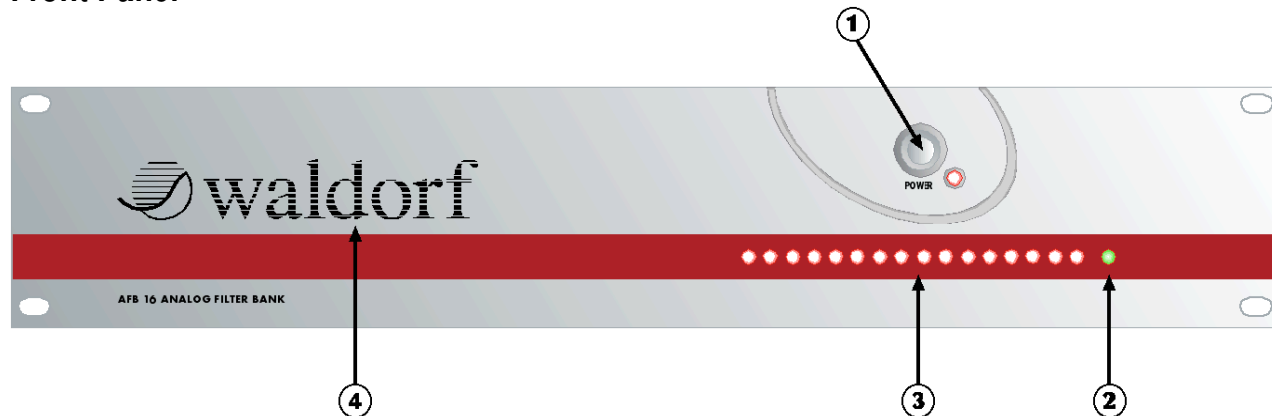
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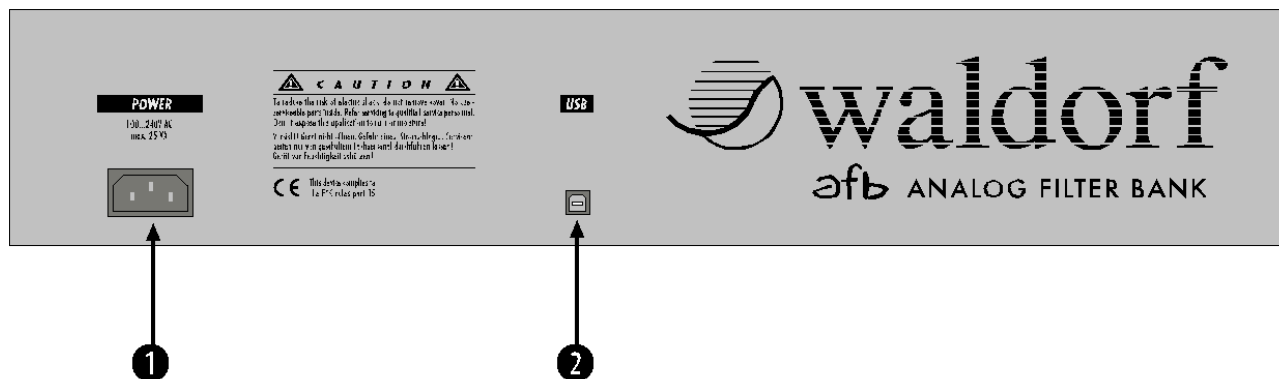
Features & Connections

Front Panel



- ① Power button with status LED
- ② USB activity status LED
- ③ 16 analog filter activity LED's
- ④ German synthesizer manufacturer from the Schloss Ahrenthal near River Rhine

Rear Panel



- ❶ Power supply socket (100V to 240V AC)
- ❷ USB 2.0 jack for connection to a computer

Introduction

About this Manual

This manual was written to help you to become familiar with the AFB16, and will also assist experienced users with routine tasks.

To avoid confusion, the terminology in this manual is based on the parameter names used in the AFB16 and its standard plug-ins. You will find a glossary at the end of this manual that explains these terms in generic language.

We have also used a uniform set of symbols to show you 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.



Info – Additional information on a given topic.



Instruction – Follow these guidelines to execute a desired function.

Highlighted Control Features and Parameters

All of the AFB and plug-ins buttons, controls and parameters are highlighted in **bold** letters throughout the manual.

Example:

- Press the **Power** button.

The different modes and parameter pages of the plug-ins are illustrated in the following chapters.

The value range of a continuous parameter is indicated from low to high with both values shown in italic 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

- Only use the device in enclosed rooms.
- Never use the device in damp conditions such as in bathrooms, washrooms or around indoor swimming pools.
- Do not use the device in extremely dusty or dirty environments.
- Make sure that adequate ventilation is available at all sides of the device.
- 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

- Never use a different power cable than the one that came with the AFB16.
- Unplug the device when you are not using it for long periods.
- Never touch the plug with wet hands.
- Always pull the plug when unplugging the device, and never the cable.

Operation

- Never place objects containing liquids on or near the device.
- Only place the device on a stable base, or use a stable platform or rack.
- Make sure no foreign objects enter the chassis. If this should occur, immediately switch the power off, unplug the device, and consult a qualified repair center.
- This device, whether 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 reasonable levels.

Maintenance

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

Proper Use

This device is designed exclusively to produce low-frequency audio signals for the purpose of generating sound. Any other use is prohibited and voids the warranty extended by Waldor-Music AG. Waldor-Music is not liable for damages due to incorrect use.



Don't leave your AFB16 near small children or animals. This could lead to critical interactions.

Setup and Connection


Inventory

The Waldorf AFB16 comes in a box that includes:

- AFB16 hardware unit,
- Power cable and high-speed USB cable,
- CD-ROM with AFB installer and VST plug-ins, and
- This manual, including a warranty card on page 74.

Please ensure all of these items were included. If something is missing, contact the dealer where you purchased the unit for replacements.

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

 **Make sure you fill out the warranty card and send it to your Waldorf distributor or to the address printed on the card. This is the best way for us to keep you informed of updates and upgrades.**

Setup

Place the AFB16 on a clean, even surface. We recommend installation in a stable 19-inch rack.

Connections


In order to get started with the AFB16 you will need an AC power outlet and a compatible computer with USB 2.0 interface.



The AFB16 can not work in “stand-alone” mode - it always needs a computer to operate.



To connect the device:

1. Make sure your computer and the AFB16 are turned off.
2. Connect the power cable to the **Power Supply**  jack on the rear panel of the AFB16. Plug the other end of the cable into a suitable AC power outlet.
3. Connect the USB 2.0 jack of the AFB16 to a USB 2.0 interface port on your computer using the supplied cable.
4. Switch your computer on.
5. Install the AFB driver as described on the next page.

Installation

Installation under Windows

In order to use the AFB16 and the included VST plug-ins you will need a PC with the following requirements:

Hardware Requirements

- Intel Pentium III or compatible processor, 500 MHz or faster
- Minimum of 128 MB RAM
- 30 MB free space on your hard drive
- USB 2.0 interface
- MME or ASIO compliant sound card with low-latency driver

Software Requirements

- Microsoft Windows 98, ME, 2000 or XP
- Host application or plug-in that supports AFB

Installation of the AFB16 software

1. Insert the AFB16 CD-ROM into your CD-ROM drive.
2. Switch on the AFB16. Windows will recognize the new hardware and open the Add Hardware wizard.
3. Click “Have disc” and select the drive where you inserted the AFB16 CD-ROM.
4. Follow the on-screen instructions.

Installation of the included VST plug-ins

1. Insert the AFB CD-ROM into your CD-ROM drive.
2. Launch Windows Explorer or open the “My computer” window.
3. Double-click the symbol for the drive that holds the AFB16 CD-ROM.
4. Double-click on the VST plug-ins installer symbol.
5. Follow the on-screen instructions.

Basic Operation AFB16

Switching on

The AFB16 is equipped with a power button.


To switch on the AFB16:

- Press the **Power** ① button and the power LED will turn on. If the AFB16 detects a PC, the USB activity LED will light up quickly after this.
- After a couple of seconds, the filter LED's will light up to show the calibration of the analog circuits. The AFB16 will be ready when these filter LED's turn off.

Switching off

To switch off the AFB16:

- Press the **Power** ① button.

 To reset the AFB16 during operation, turn it off and on from the front panel.

What is the AFB16?

The AFB16 is a filter bank that features a filter stage with 16 real analog low pass filters followed by a Voltage Controlled Amplifier (VCA) stage. Unlike other analog filters, the AFB16 can be fully and seamlessly integrated into a digital music production system.

There are no analog inputs or outputs on the AFB16's rear panel. This is because all audio data is transferred using the USB connection, allowing you to forget all the usual hassles of wiring and complicated input/output routings.

Included with the AFB are the first two AFB16-aware VST plug-ins: the ROT Analog Filter Step Sequencer and PPG Red Wavetable Synthesizer. More plug-ins and adaptations of existing music software are currently in development.

You will find a list of the latest AFB compatible software on our web site:

<http://www.waldorf-music.com/afb>

AFB16 Control

An AFB16-aware plug-in can be thought of as a remote control for the AFB16 hardware unit. It automatically routes the audio signal to the AFB16 hardware and back to the computer via the USB connection. At the same time, the plug-in can also send control information for cutoff, resonance, and VCA volume.

Practical Uses of the AFB16

- As a fully controllable analog filter bank that can enhance mono or stereo audio tracks using the included ROT VST Effect plug-in.
- As a fully controllable analog resonant filter inside the signal path of a virtual instrument, such as the included PPG Red VST instrument.
- As an analog overdrive for a dramatic upgrade to any audio input.

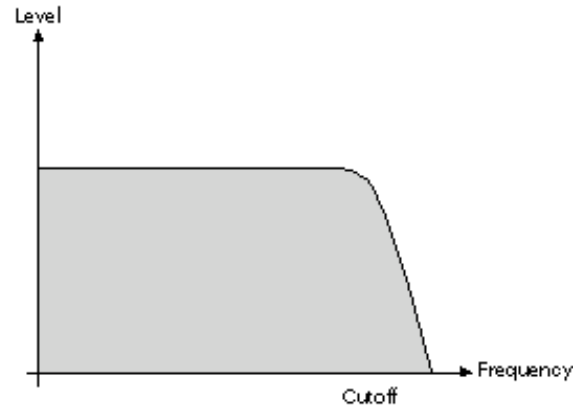


You can simultaneously use more than one AFB16-aware application. For example, you can use 8 mono plug-ins at the same time as a virtual instrument with 8 analog filter voices.

How does a filter work?

The AFB16 is equipped with 16 analog low pass filters.

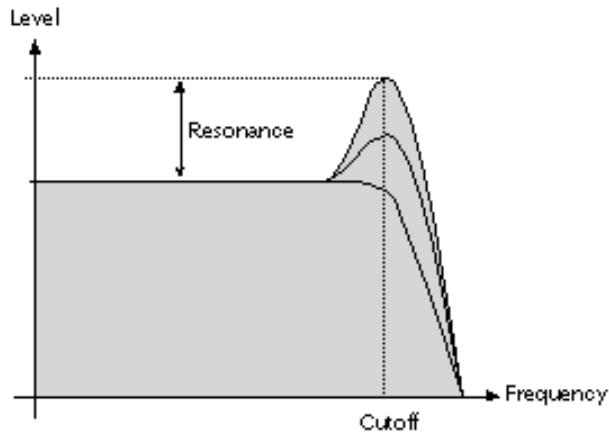
The low pass filter type dampens frequencies that lie above a specified **cutoff frequency**, and frequencies below this cutoff point are allowed to pass through unaffected. The frequencies below the cutoff point are referred to as the “**pass band range**”, and the frequencies above are called the “**stop band range**”. The AFB16’s filter dampens frequencies in the stop band with a slope of either 12dB or 24dB per octave. This means that the level of a frequency that lies one octave above the cutoff point will be either 12dB or 24dB lower than the level of those frequencies of the signal that fall into the pass band range. The following picture shows the basic principle of a low pass filter:



Low Pass Filter principle

To give you a more specific example of the dampening effect, consider this: a reduction of 24dB reduces the original level one octave above the cutoff point by approximately 94%. The dampening 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 will no longer be audible.

The AFB16’s filter also features a Resonance parameter (also called “emphasis”). In the context of a low, band or high pass filter, resonance means that a narrow frequency band around the cutoff frequency is emphasized. The following picture shows the effect of the resonance parameter on the filter’s frequency curve:



Low Pass Filter Resonance

If the resonance is raised beyond a certain level, the filter will begin to self-oscillate, and will generate an audible sine wave even when it is not receiving an incoming signal.

i After passing through the filter stage, the signal enters an analog VCA stage which can be overdriven for adding even more analog warmth to the signal.

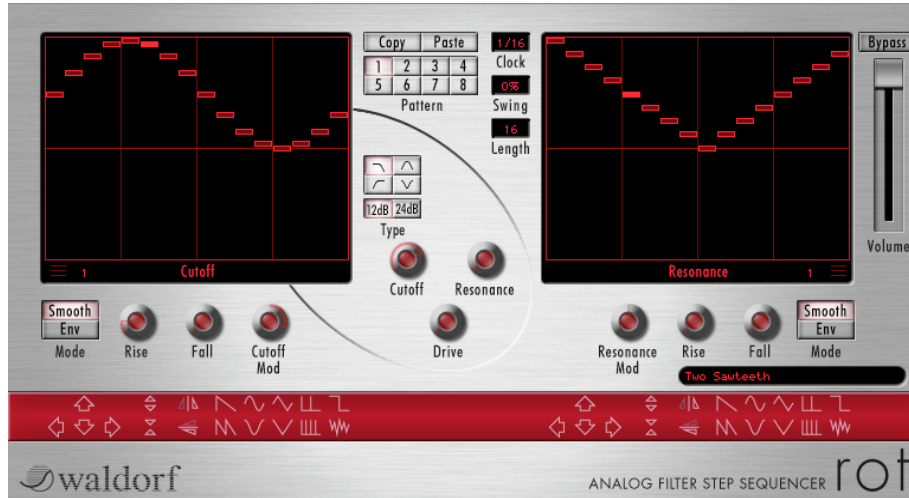
Differences between digital and analog filters

An analog filter is made of many individual electronic components that interact with each other in a non-linear fashion, especially with high resonance settings. This is very much unlike a digital filter circuit, which has only one part (the chip which it runs on), and usually sounds very calculated and precise. Surprisingly, the less exact sonic variations inherent in analog filters are actually more pleasing to the human ear (whether trained or untrained), and as such analog filters are usually described as being very “warm” or “fat” when compared to their digital equivalents.

Difference between digital and analog distortion

An analog VCA, such as those found in the AFB16, enables analog distortion without aliasing, which is a common artifact of digital amplifiers. This means the audio signal will sound more raw, leading to enhanced focus in a mix.

Waldorf ROT Analog Filter Step Sequencer VST Plug-In



What is ROT?

ROT is a pattern-controlled filter sequencer for the AFB16 that can create rhythmic filter effects. As well as routing audio data, it sends cutoff frequency, resonance, and drive control signals to the AFB16. All of this is set up graphically in its sophisticated computer interface,

enabling a large amount of creativity with the high-quality analog components inside the AFB16.



ROT is the german word for "red".

Installing the ROT VST plug-in

The ROT installation program is on the CD-ROM included with the AFB16. To install ROT:

1. Insert the AFB CD-ROM into your CD-ROM drive.
2. Launch the Explorer or open the “My computer” window.
3. Double click on the symbol for the CD-ROM drive that holds the AFB CD-ROM.
4. Double click on the VST plug-ins installer symbol.
5. Follow the on-screen instructions.

Setting up ROT

To make the best use of the ROT plug-in, we recommend using it as an insert effect (i.e. serial processing). Please read the documentation of your host application for instructions on setting up a VST Effect in this way.



When used in a stereo track, the ROT automatically reserves two AFB16 filters.

Preset Banks and Programs

When you first load the ROT plug-in, you will find preset programs filled with useful settings for various tasks.

Both Bank and Program presets are selected, loaded, and saved directly in your host application. Please read the corresponding section in your host application’s documentation for instructions.

MIDI Controller Data

All ROT parameters can be dynamically controlled with MIDI Controller data. A list of all available Controllers can be found in the appendix of this manual on page 61.

Parameter Automation

Moving any control on the ROT will send automation data to the host application. This data can be recorded, manipulated, and sent back to control the ROT as you see fit. For more details on handling automation data, please read the corresponding section in your host application’s documentation.

The User Interface

The ROT user interface corresponds to the internal design of the AFB16, and can be considered as a remote control for the filter hardware. The following sections explain the individual functions and parameters in detail.

The Operating Controls

All controls can be manipulated using the mouse.



Display: shows the active parameter and its current

value. The display is also where you will find the parameter name and corresponding numeric value of any control you move the cursor over.



Knobs: clicking and dragging the mouse button around a knob will set the value of that knob's parameter. Using a wider circular motion will allow you to make more subtle changes. The

ROT display will update to show you the parameter you are editing and its current value.



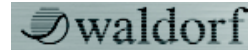
Buttons: are activated and deactivated by clicking them with the mouse. An activated button will be lit up in red.



Value Selectors: to change a value click on the control and move the mouse up or down while holding the button.



Faders: click on a fader and pull it up or down while holding down the mouse button.

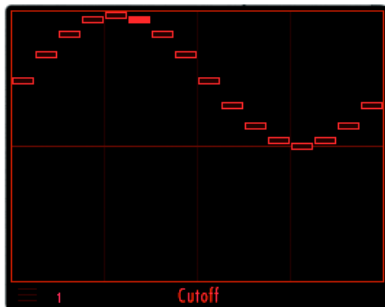


Waldorf Logo: opens a window with information about the plug-in.

Key Combinations

- While holding down the **[CTRL]** button on your computer keyboard (**[CONTROL]** on Mac), clicking on a parameter will reset the value to its default setting (e.g. Resonance will become 0, Cutoff Mod will become 0%, etc.)
- **[ALT] + click** (**[OPTION] + click** on Mac) changes a value's selection mode from circular to linear (and vice versa).
- Other special key combinations for ROT are explained in the next sections of this manual.

The Step Matrix



The left matrix display shows the cutoff frequency pattern, and the right display shows the resonance pattern. On both displays, the horizontal axis shows up to 16 steps, depending on the setting of the **Length** parameter, and the upright axis shows the relative gain or trim applied to the master cutoff and resonance settings for each step.

You can click and drag any single step with the mouse and move it to the desired vertical position, or this can also be accomplished by directly clicking the position you want the step to move to. Clicking the mouse just above or below the matrix display will automatically set the step to its maximum or minimum position.

Using these techniques, you can “draw” curves in the display, or by pressing the **[ALT]** key all mouse movement will be limited to the currently selected step.

[SHIFT] + click creates a linear slope, starting at the active step and ending at the step where the mouse is clicked.

Holding down the **[CTRL]** key and clicking on a step will set it to 0 (the midpoint on the vertical axis).



You can also combine key combinations. For example, use the **[SHIFT]** and **[CTRL]** keys together to create a linear slope ending on the zero position.



The **Grid Mode** switch and **Resolution** setting in the lower corners are used to control the vertical resolution of the matrix.

When **Grid Mode** is deactivated, the grid operates in full resolution, and each step can be freely placed on the matrix.

When **Grid Mode** is activated, a grid will appear on the matrix and have a series of discrete lines corresponding to the **Resolution** setting. When in this mode, each step is locked to a specific grid line. Clicking on the **Resolution** setting and dragging the mouse up or down will change the **Resolution**, and hence the number of lines that appear on the matrix.

Editing Functions and Pattern Presets



The editing functions and pattern presets that appear below each matrix can be used to quickly change all steps in a pattern.



Up and Down Arrows: All steps are moved up or down by the smallest unit of movement allowed by the current resolution (see above).

Holding down the **[ALT]** key with the **Up and Down Arrows** will instantly move the pattern to the top or bottom of the matrix, leaving the pattern's shape intact.

Right and Left Arrows: All steps are moved one position to the left or right.



Expansion and Compression: These buttons vertically expand (separate) or contract (bring closer) all steps. Holding down the mouse button will cause repeated expansion or contraction.

Holding down the **[ALT]** key with the **Expansion Arrows** will expand all steps so that the the top or lowest step will jump onto the maximum position. All other steps will be moved in relation to that.



Mirror steps: The upper mirror symbol will flip all steps across the vertical axis (from right to left), and the lower symbol flips all steps across the horizontal axis (from up to down).

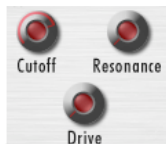


Presets: The preset buttons are used to recall one of ten standard shapes into the pattern matrix.

The default presets are are bipolar with both positive and negative modulation amounts. To load a preset shape with only positive modulation, hold down the **[CTRL]** key when clicking on the preset. To load a preset shape with only negative modulation, hold down the **[CTRL] + [SHIFT]** keys when clicking on the preset.

Pressing the **[ALT]** key when selecting a preset will load the vertical inverse of the default preset shape (i.e. a mirror across the horizontal axis).

Basic Filter Parameters



These three parameters control the global settings for the filters and VCA's. **Cutoff** and **Resonance** control the filters, while **Drive** controls the VCA's.

Cutoff

0...127

Selects the frequency above which the sound is dampened by the filter. Turning this knob clockwise will raise the cutoff frequency, “opening” the filter, and when fully clockwise all frequencies will pass through unfiltered. Turning the knob counter-clockwise will lower the cutoff frequency “closing” the filter.

Resonance

0...127

Controls the emphasis of the frequencies around the cutoff point. Lower values will give more “brilliance” to the sound, and higher values give the sound a typical analog filter character. When this setting is increased to very high values, the filter will self-oscillate and generate a pure sine wave.

Drive

0...127

This parameter sets the amount of drive added to the signal by the VCA. A value of 0 does not boost the signal, small values will add additional harmonics (providing a

warmer sound), and high levels of **Drive** will add full analog distortion.

Filter Modes

In addition to the AFB16 hardware analog filters, the ROT plug-in has three high-quality digital filter types for even more power and flexibility. The digital filters are completely processed by the plug-in with the host CPU power, and they do not reserve any of the analog filters in the AFB16 hardware.



The following four filter modes are available in ROT:



12/24 dB Low Pass Filter: This filter mode routes the audio signal directly into the external AFB16 analog filters.



12/24 dB High Pass Filter: This digital filter is useful for reducing the bass frequencies in an audio signal. This filter can provide very interesting results when used in combination with cutoff modulation. An example of this would be to fade in a sound starting with its high harmonics and continually evolve into its full sound. Using a high pass filter on percussion sounds (like hihats or crash cymbals) allows you to cut any bass frequencies and make them stand out more in a mix. When the filter

is in high pass mode, the **Cutoff** knob controls the frequency below which the filter dampens the signal.



12/24 dB Band Pass Filter: This filter cuts frequencies on either side of the selected frequency, resulting in a more hollow or “thin” sound that is especially useful for special effects and percussion sounds. This filter is actually a combination of the digital highpass and the analog AFB16 lowpass filters. When in band pass mode, the **Cutoff** knob controls the middle frequency, and a second **Cutoff 2** knob is used to change the bandwidth of the filter.



12/24 dB Notch Filter: A notch filter is the exact opposite of the band pass type, dampening frequencies directly at the cutoff point, leaving other frequencies to pass through without being affected. This filter type is commonly used for programming special effects sounds. As with the band pass mode, the **Cutoff** knob controls the cutoff frequency and a second **Cutoff 2** knob is used to change the bandwidth of the notch.

Filter Modulation Parameters



The filter modulation parameters control how each matrix affects the filter response.

Cutoff Mod 64...+64

Determines the amount of influence each filter step has on the cutoff frequency. The final value of the cutoff frequency is calculated as the value of the **Cutoff** parameter, plus any modulation applied by the position of the active step multiplied by the value of **Cutoff Mod**. In other words, the higher the value of **Cutoff Mod**, the larger the influence of the pattern on the resulting cutoff frequency.

When this value is positive, the cutoff frequency is **increased** when a step is in the upper half of the matrix, and with negative settings, the cutoff frequency is **decreased** when the step is in the upper half. Keep this in mind when the filter does not behave as expected.

Resonance Mod 64...+64

Determines the amount of influence each step has on filter resonance. This parameter works in exactly the same way as **Cutoff Mod**.

Mode Smooth / Env

The Mode switch allows you to control how the filters behave between steps. The **Smooth** setting produces a smooth, gradual change between steps, while **Env** gives you more control over the changes. In **Env** mode the **Rise** and **Fall** knobs are used like those found on a synthesizer's envelope generator, where **Rise** controls the attack phase of the step change and **Fall** controls the release phase.

You can create dramatic filter changes to the source audio material when using these filter modulation parameters. We encourage you to try out all of the different possibilities that are available.

Pattern Selection

Each ROT Program has eight quick-save memory locations for instant recall of cutoff and resonance patterns. To activate one of these patterns, click on one of the eight buttons at the top of the plug-in window.



Only the steps are stored in these slots, and not the other filter parameters. Therefore, when you switch slots **only** the patterns will change. All eight patterns and the corresponding filter settings are saved with the program.

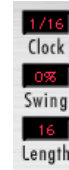
Copying patterns

You can copy a pattern into an internal buffer and paste it back to another pattern.

Copying and pasting a pattern

1. Select the source pattern.
2. Press the **Copy** button. The source pattern is copied into the internal buffer.
3. Select the target location where you want to paste the contents of the buffer.
4. Press the **Paste** button. The copied pattern will be pasted into the target location.

Additional Parameters



If your host application sends timing information to VST plug-ins, ROT will be automatically synchronized to the master tempo it provides. The following parameters will give you even more control over the rhythmic variations.

Clock

1/64t...8 bars

Sets the note value for the steps of the rhythm pattern. Triplets (e.g. 1/8T) and dotted notes (e.g. 1/16.) are also available.

Swing

0...100%

Determines how much the steps are rhythmically delayed. If **Swing** is set to 0 the pattern is played back without any shuffled timing. Settings from 1% to 100% increase the shuffle of the steps.

Length

1...16

Sets the step length of the pattern. The selected steps are displayed in the cutoff and resonance matrix.

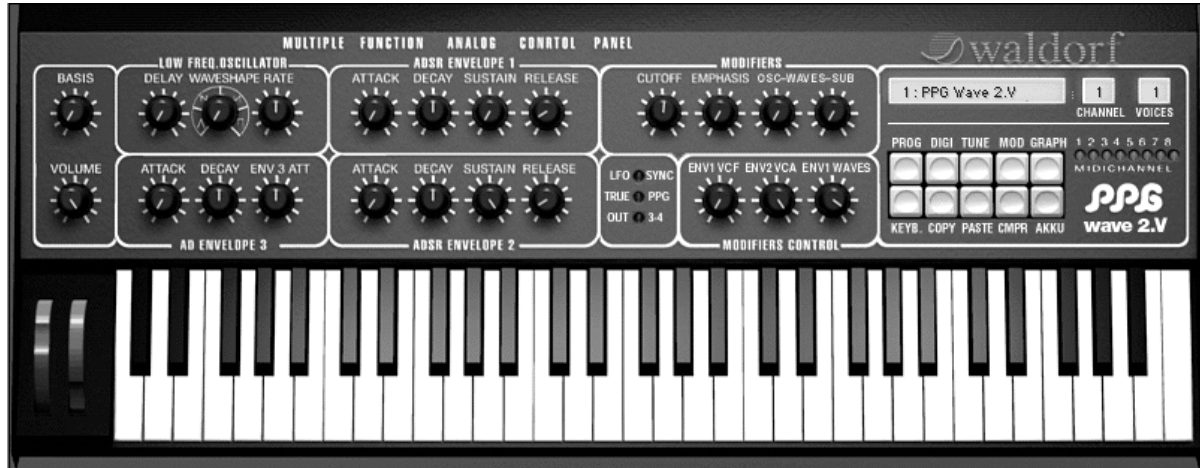
Basic ROT Parameters



The **Volume** slider controls the final output level of the ROT plug-in. Setting this too high can result in undesirable distortion in the audio path of your host application, at which time you should reduce the volume to a lower level.

Bypass removes the ROT from the audio processing chain and lets you hear the original, unprocessed signal. This function is handy for making a quick comparison between the original and processed audio signals.

Waldorf PPG Red Wavetable Synthesizer



Operation instruction for the PPG Red can be only found in the printed manual version.

Other Functions AFB16

Updating the AFB16 Software

The AFB16 has a user-friendly feature that allows the system software to be upgraded without changing any physical parts.

All software updates come in the form of an installer program that can be launched from a standard PC or Mac. The best way to get this file is to download it from our web site at:

<http://www.waldorf-music.com/afb>



If a new upgrade is available, it will be contained in a .zip file with the new operating system, a text file with latest information, and possibly an updated manual addendum.

If you don't have Internet access, please ask your local dealer for a copy on disc.



To update the AFB's system software:

- Double click the unzipped installer.
- Follow the on-screen instructions.



Under no circumstances should you turn off the AFB16 while the upgrade is in progress!

Appendix

Technical Data AFB16 Hardware

Power Supply

Nominal voltage:	100-240V AC
Maximum current consumption:	0.8A
Maximum power consumption:	12W

Connections

High speed USB 2.0.
(maximum cable length 5 m)

Dimensions and Weight

Width:	482mm
Heigh:	89mm
Depht:	208mm
Total weight:	3,6 kg

ROT MIDI Controller Numbers

Parameter	MIDI Controller
Bypass	12
Volume	7
Type	72
Slope	73
Cutoff	74
Resonance	71
Drive	70
Cutoff Offset	75
Cutoff Mod Mode	76
Cutoff Mod	77
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Cutoff Step 05	20
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PPG Red MIDI Controller Numbers

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KEY>LOUDNESS	58
VEL>FILTER	59
VEL>LOUDNESS	60
MOD>WAVES	61
MOD>FILTER	62
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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).

Aliasing

Aliasing is an audible side effect arising in digital systems as soon as a signal contains harmonics higher than half the sampling frequency.

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.

Arpeggiator

An arpeggiator is a device that splits an incoming MIDI chord into its single notes and repeats them rhythmically. Most arpeggiators feature different sequence modes to cover a wide range of applications. Typical controls for an arpeggiator are the octave range, the direction, the speed and the clock, which means the repetition interval. Some arpeggiators also feature preset or programmable rhythm patterns.

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.

Band Pass Filter

A band pass filter allows only those frequencies around the cutoff frequency to pass. Frequencies both below and above the cutoff point are damped.

Band Stop Filter

A band stop filter does the opposite of a band pass filter, i.e. it dampens only the frequencies around the cutoff point and lets all other frequencies pass through.

Clipping

Clipping is a sort of distortion that occurs when a signal exceeds its maximum value. The curve of a clipped signal is dependent of the system where the clipping takes place. In the analog domain, clipping effectively limits the signal to its maximum level. In the digital domain, clipping is similar to a numerical overflow and so the polarity of the signal's part above the maximum level is negated.

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 one or more oscillators.

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 signal passing through corresponding to specific conditions. For example, 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.

High Pass Filter

A high pass filter dampens all frequencies below its cutoff frequency. Frequencies above the cutoff point are not affected.

LFO

LFO is an acronym for low-frequency oscillator. 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 the Pulse, then the computer is the sender and the Pulse 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 waveform.

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 a trigger. The events a trigger can initiate are also very diverse. A common application for a trigger is its use 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

Wave

Here: A Wave is a digitally memorized reproduction of one single wave pass. Insofar it is identical with a Sample that is looped after one single wave pass. In contrast to the samples in a sampler, all Waves in the Waldorf Wave-

table Synthesizers have the same lengths and are played back in the same pitch.

Wavetable

The sound creation in the PPG Red bases on waveform sets, called Wavetables. You should think of these as a sequence of up to 64 single Waves. This can be played back in a static way or passed through dynamically, which results in the PPG-typical interesting sound transformations. If the Waves do not differ much, then the Wavetable will probably sound smooth and pleasant. If they have a completely different structure, this will result in wild spectral changes.

Konformitätserklärung

Declaration of Conformity

Für das folgend bezeichnete Erzeugnis

For the following named product

Waldorf AFB16 Analog Filter Bank

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:

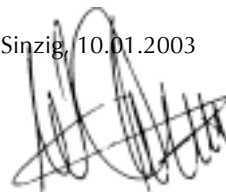
EN 50082-1: 1992, EN 50081-1: 1992, EN 60065: 1993

Diese Erklärung wird verantwortlich für den Hersteller abgegeben:

This declaration has been given responsibly by the manufacturer:

Waldorf-Music AG
Schloß Ahrenthal
D-53489 Sinzig

Sinzig, 10.01.2003



Wolfgang Düren, Vorstand

Wolfgang Dueren, Board Of Managment



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’émet 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.

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 gaeldende EF-direktiv vedrørendareadiostøj.

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

Product Warranty

Thank you for choosing this Waldorf product. It is a dependable device and is designed to last. However, the potential for defects in material or workmanship cannot be eradicated completely. This is why we provide an extended warranty for you. To ensure your unit has full warranty coverage, mail the receipt and the fully completed warranty card back within 14 days of purchase. This warranty covers all defects in material and workmanship for a period of one year from the date of original purchase. During this time, Waldorf-Music AG will repair or replace the product without charge for materials or labor, provided the product was first inspected and found faulty by Waldorf-Music AG or an authorized service center. You must first contact your dealer or distributor by telephone. Products that were mailed without prior agreement cannot be exchanged or repaired free of charge. The unit must be insured and sent prepared in its original package. Please include a detailed description of the defect. Products that were not sent prepared or in the original package will be returned unopened. Waldorf-Music AG reserves the right to upgrade the unit with the latest technological advances if necessary. This warranty does not cover defects due to abuse, operation under other than specified conditions, or repair by unauthorized persons. The warranty covers only those malfunctions caused by material or work-manship defects that occur during normal operation.

Please fill out this warranty card completely, include a copy of the purchase receipt and send the two items to us in order to ensure the warranty is valid.

Product Support

If you have any questions about your Waldorf product, feel free to contact us via one of the four options listed below:

- ① Send us an e-mail message. This is the most efficient and fastest way to contact us. Your questions will be forwarded immediately to the resident expert and you will quickly receive an answer.

support-waldorf@tsi-gmbh.de

- ② Send us a fax. This is as fast as e-mail, but not quite as comfortable for you and us.

+49 (0) 26 42 - 90 20 8-77

- ③ Send us a letter. It will take a bit longer, but it is just as dependable as a fax.

Waldorf-Music AG

Schloß Ahrenthal

53489 Sinzig, Germany

- ④ If you're in big hurry, call us, we'll try to answer your questions right away.

+49 (0) 26 42 - 99 40 16

Garantiekarte/Warranty Card AFB16

Bitte schicken Sie die Garantiekarte vollständig ausgefüllt zusammen mit einer Kopie der Kaufrechnung an nebenstehende Adresse, um die Produktgarantie in Anspruch nehmen zu können.

Please fill out this warranty card completely, include a copy of the purchase receipt and send the two items to us in order to ensure the warranty is valid.

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First Name

Strasse
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PLZ/Stadt
City/Zip Code

Land
Country

Telefon
Phone

Telefax
Fax

Email

Seriennummer
Serial number

Kaufdatum
Purchase date

Händler
Dealer

Ort des
Händlers
City of your
dealer

Computer ☐ PC ☐ Mac

Musiker
Musician ☐ Hobby
amateur ☐ semiprofessionell
semiprofessional ☐ professionell
professional

Sonstiges Equipment
other used equipment:

Mitteilungen
comments:

Waldorf-Music AG • Schloß Ahrenthal • D-53489 Sinzig • Germany
Phone: +49-(0) 26 42 - 90 20 8-0 • Fax +49-(0) 26 42 - 90 20 8-77
<http://www.waldorf-music.com> • info@waldorf-music.com
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