

WALDORF NW1 REFERENCE MANUAL

Waldorf Music GmbH, rev1.0

September 23, 2015



● Introduction

Thank you for purchasing the NW1 wavetable module.

Like any Waldorf product, this NW1 has been developed and produced with love in Germany, for the most demanding musicians. We sincerely hope it will bring you fun and musical inspiration.

Reading this user manual, you will discover all the device features, learn its basic use and benefits from tips & tricks we gathered during product development.

Your Waldorf-team <http://www.waldorfmusic.de>

● Disclaimer

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For additionnal information / sound demos / software downloads, please visit our website :

<http://www.waldorfmusic.de/nw1-overview.html>

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1 General safety guidelines

Please read the following safety guidelines carefully!

They include precautions you should always observe when dealing with electronic equipment.

- Use the device indoors only, in a dry atmosphere.
- Never use the device under too damp conditions such as in bathrooms or near swimming pools.
- Do not use the device in extremely dusty or dirty environments in order to preserve the device's surface finish.
- Make sure that adequate ventilation is available for the device to cool down. Do not place the device near heat sources such as radiators.
- Do not expose the device to extreme vibrations.
- Unplug the device when you are not using it for longer periods.
- Never place objects containing liquids on top or near the device.
- Make sure no foreign objects find their way into the unit. If this occurs, switch the power off, unplug the device and consult a qualified repair center.

This device, used with amplifiers, speakers or headphones, can generate volume levels that may result in **irreparable damage to human hearing**. For this reason, volume should be kept at moderate levels at all times.

This device is **designed exclusively** to generate low frequency audio signals for sound generation. Any other use is prohibited and voids the warranty extended by **Waldorf Music GmbH**. Damages due to incorrect use are not the responsibility of **Waldorf Music GmbH**.

2 Device maintenance

- Do not try to open the device or detach the frontpanel.
- Refer all service and repair tasks to qualified personnel.
- There are no user serviceable parts inside the chassis.
- Use only a soft cloth or brush to clean the device surface.
- **Never use cleaning chemicals** as they will damage the device surface.

3 Package contents

NW1 package comes complete with the following material:

- NW1 wavetable module
- 1 x 16-way 20cm ribbon cable
- 4 x M2.5 x 6 screws
- 4 x M3 washers
- 2 x jumpers (already attached on board)
- A quick start poster
- German protective atmosphere

Only a Phillips head screwdriver #0 is needed to mount the module into the rack frame. No additional tools are needed.

4 Device overview

4.1 Front panel

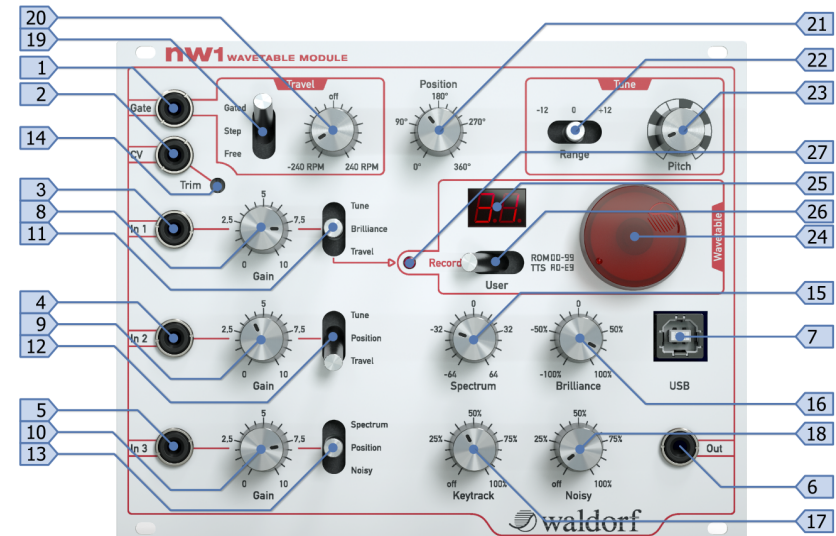


Figure 1: Frontpanel of module

Id Description

1 Gate Input

Used for gated wavetable travel and start wavetable recording.

2 Pitch CV input

Set the pitch.

Signal should be 1V / octave, from 0V to 5V (5 octaves).

Id	Description
3, 4, 5	<p>Modulation CV inputs Modulate selected destination. The modulated destination is chosen using the <i>Destination switches (11, 12, 13)</i>. The amplitude of modulation is set using the <i>Gain potentiometers (8, 9, 10)</i>.</p>
6	<p>Oscillator output Audio output. Signal can be up to 16V peak-to-peak.</p>
7	<p>USB interface Load and save wavetable data with computer or update firmware.</p>
8, 9, 10	<p>Modulation gains Controls depth of each modulation.</p>
11, 12, 13	<p>Modulation destinations Select the destination for each modulation input.</p>
14	<p>Pitch CV trimmer Fine-tune the scaling for the pitch CV input.</p>
15	<p>Spectrum control Transpose spectral envelope of the tone. Transposition range is from -64 to +64 semitones.</p>
16	<p>Brilliance control Sharpen or flatten the spectral envelope peaks of the tone.</p>
17	<p>Keytrack Set wave playback pitch relative to pitch.</p>
18	<p>Noisiness "Noisy" control Adjust wavetable rendering from periodic to noisy.</p>

Id	Description
19	<p>Travel mode Controls the wavetable scanning: Gated: Travel the wavetable from start position when gate is asserted, stop at current position when gate is deasserted. Step: Advance the wavetable position on each gate pulse. Free: Cycle through the wavetable according to Travel.</p>
20	<p>Travel speed In playback mode: Set the wavetable playback speed. Speed ranges from -120 RPM to +120 RPM (rotation per minute). In recording mode: Set the recorded wavetable playback quality.</p>
21	<p>Wavetable position In playback mode: Set the wavetable playback start position. Position ranges from 0° to 360°. In recording mode: Set the recording compression ratio.</p>
22	<p>Tune range Select the octave. Octave can be set from -4 (C-4, 16.35Hz) to -2 (C-2, 65.41Hz).</p>
23	<p>Tune pitch Adjust pitch. Adjustment range covers 12 semitones.</p>
24	<p>Wavetable dial In playback mode: Select wavetable. In recording mode: Set the recording threshold level or gate triggering.</p>

Id	Description
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25	Display In playback mode: Shows the wavetable in use. In recording mode: Shows the input signal level and the recording state.
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26	Operating mode Select the operating mode: Record: Record user wavetable using <i>Modulation CV input 1 (3)</i> as audio source. User: Play wavetables recorded or transferred using the Editor (U0 to U9). ROM / TTS: Play factory ROM wavetables (00 to 80) or Text-To-Speech (A0 to E9) wavetables.
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27	Recording / gate LED In playback mode: Shows the gate signal level. In recording mode: Shows trigger state for recording.
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4.2 Back panel

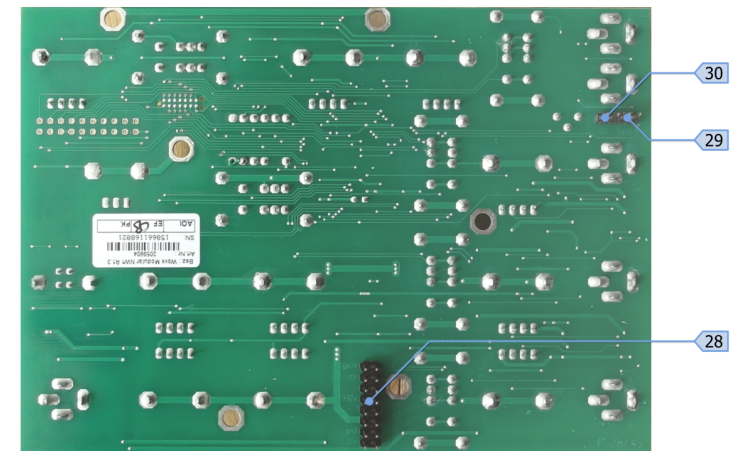


Figure 2: Backpanel of module

Id	Description
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28	Euro rack bus connector Bus connector providing power and bus CV / Gate signals to the oscillator module. Regulated +12v and -12v power rails must be supplied for the module to work.
----	--

29	Bus CV jumper Use CV signal from the Euro rack bus when no jack is inserted in <i>Pitch CV input</i> . To disable bus CV usage, the jumper must be detached.
----	--

30	Bus Gate jumper Use Gate signal from the Euro rack bus when no jack is inserted in <i>Gate input</i> . To disable bus Gate usage, the jumper must be detached.
----	--

5 Device connection

You now own a fantastic wavetable / speech oscillator. It is time to integrate it in your modular system.

5.1 Power connection

The first step is to provide your module with power. The module only requires stabilized +12v & -12v voltages. These voltage should already be provided by your modular system power supply.

Before connecting any module to the Eurorack bus, it is **mandatory** to switch the modular system power off. Otherwise you may severely damage your module or put yourself at risk.

Please connect the supplied 16-way ribbon cable to the module *Eurorack bus connector* (28) and your modular system bus board (Figure 3).

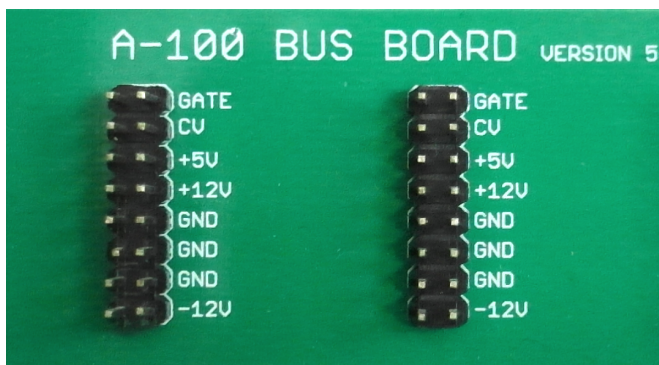


Figure 3: Eurorack bus connector

Eurorack connectors are usually orientated so the *Gate signal* is on top and the *-12v* supply at the bottom. Refer to Figure 3. The NW1 module follows the same convention.

Please **make sure** the ribbon cable does not swap the lines.

The module can now be installed in the rack using the provided screws, washers and a Phillips head screwdriver #0. With the module installed, switch the system power supply on. The module *Display* (25) will show a short animation followed by the selected wavetable number.

If the *Display* (25) stays dark when powered on, **please switch it off immediately**. The cable has probably been attached incorrectly, it is possible nothing has been damaged.

5.2 Audio connection

The second step is connecting the audio output of the module so you can hear the sound. A mixing desk or an audio amplifier system should be attached to the *Audio output* (6) of the module. It is essential to use some volume attenuation before power amplification. The NW1 output level is rather high (up to 16v peak-peak) compared to line audio standard.

Connections are made using mini patch cables. These cables are standard mono male-male mini-jacks (3.5mm) and can be bought from any audio store.



Figure 4: Mini patch cables

In modular systems, it is common practice to attach an oscillator *Audio output (6)* to a VCA module, a mixer module or a filter module. The NW1 has a broad spectrum range and can generate low frequencies as low as 16Hz. Therefore its output can be used as a modulation source for another module.

Do not be afraid to experiment crazy patch configurations using other modules with NW1. The inputs and output are buffered, nothing serious can happen.

6 Playing back wavetables

This section contains information about the nature of wavetables and the way they are played by the NW1.

6.1 Wavetables basics

As naive as it may sound, a **wavetable** is a table of waves. **Waves** are tiny audio snippets representing a cyclic waveform. A wavetable contains many waveforms in succession to store complex and evolving tones.

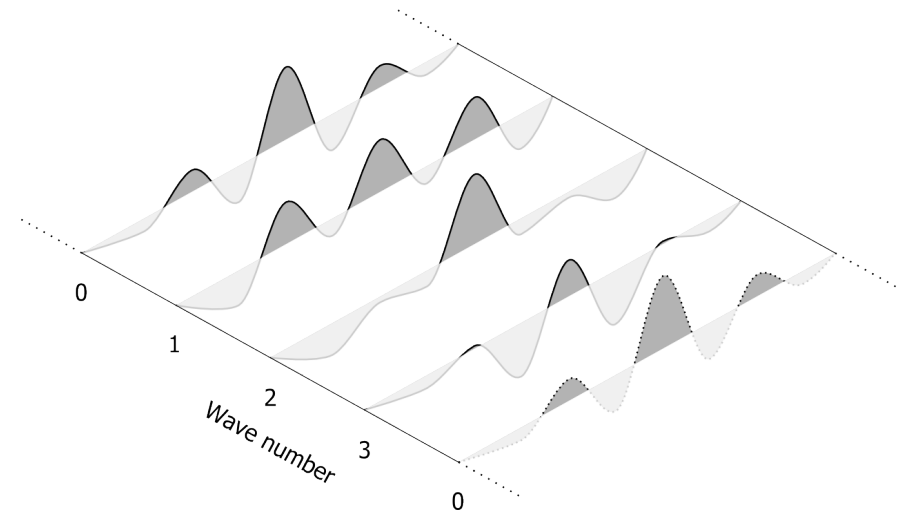


Figure 5: A wavetable of 4 waves

Wavetables have the following properties:

Number of waves:

The more waves a wavetable consists of, the more complex and interesting can the sound tonal evolution be.

In NW1, a wavetable can have from from 8 to 4096 waves.

Number of samples per single wave:

The longer a single cycle wave is, the more harmonics can be represented.

In NW1, wave lengths of 32, 64, 128, 256, 512 or 1024 samples are possible.

Samples bit resolution:

Waves resolution defines the accuracy of the ratios between tone harmonics.

The greater is the resolution, the more subtle an harmonic can sound compared to the others.

In NW1, resolution is 16 bits.

The principal difference between digital wavetable oscillators and classic analog-style oscillators (like *sine*, *triangle*, *saw* ...) is the extensive flexibility of waveform shapes. The waveform shape, and thus the tonal spectrum, can be freely programmed and can evolve in time in a controllable manner.

6.2 Choosing a wavetable

To play a wavetable, select one of the three available banks using the *Mode (26)* switch.



Figure 6: Wavetable dial and display

The banks contain:

- **User:** 10 x user wavetables.
These wavetables can be recorded wavetables or wavetables transferred using the computer Editor.
- **ROM:** 80 x factory installed wavetables.
These are classic wavetables from Microwave and Nave synthesizers. The wavetable list can be found in *Appendix A*.
- **TTS:** 50 x user text-to-speech wavetables.
These wavetables are created and transferred via the computer Editor.

Select wavetable using the *Wavetable dial (24)* and *Display (25)*.

If the wavetable does not play as expected, try disabling modulations by **turning down** the *Modulation input gains (8,9,10)*.

The best way to *preview* a wavetable is to:

- adjust the *Travel speed (20)* for slow wavetable scanning
- set *Spectrum (15)*, *Brilliance (16)* and *Noisy control (18)* to 0
- set *Keytrack (17)* to 100%

6.3 Scanning wavetables

The NW1 plays wavetables continuously in a loop. Whenever the wave cursor reaches one of the wavetable boundaries (top or bottom), it continues from the opposite one. The cursor can travel in either directions.

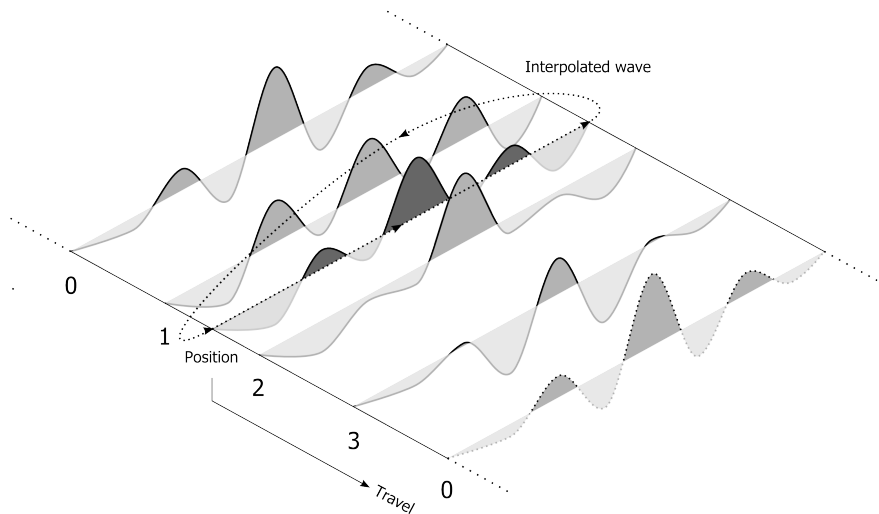


Figure 7: Interpolated wave, position and travel controls

As shown on Figure 7, the wave cursor is **not discrete**. Rather, played waves are interpolated between adjacent waves of the wavetable to create smooth sweeps in the tone's spectral content.



Figure 8: Wavetable scanning controls

Because wavetables are arranged in an infinite loop, wavetable *Position* (21) is expressed in degrees and *Travel speed* (20) in RPM (Rotation Per Minute).

Several scanning modes are offered, they can be selected using the *Travel mode* (19):

Gated mode: When Gate signal is asserted (high level), the wave cursor starts from wavetable *Position* (21) and progresses at *Travel speed* (20). Wave cursor stops as soon as *Gate signal* (1) is deasserted (low level).

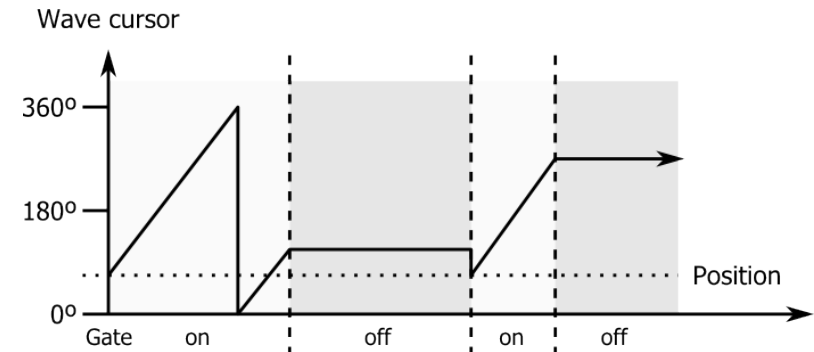


Figure 9: Travel - Gated mode

Step mode: Each wavetable is divided into a predefined number of sections. Every section contains the same number of waves. When Gate signal is asserted, the wave cursor advances at *Travel speed* (21) by a section length. Wavetable *Position* (21) offsets the sections beginning by the number of degrees set.

Refer to Appendix A for the predefined number of sections of the factory programmed wavetables.

Free mode: Regardless of the Gate, the wave cursor constantly progresses at *Travel speed* (20), scanning the wavetable in an infinite loop.

For every *Travel modes* (19), when *Travel speed* (20) is assigned to 0 RPM, the wave cursor reverts to the wave defined by the wavetable *Position* control (21). This allows specific wave selection.

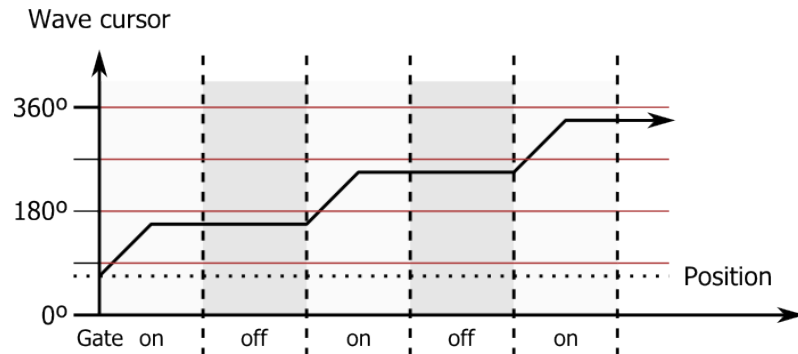


Figure 10: Travel - Step mode (4 sections wavetable)

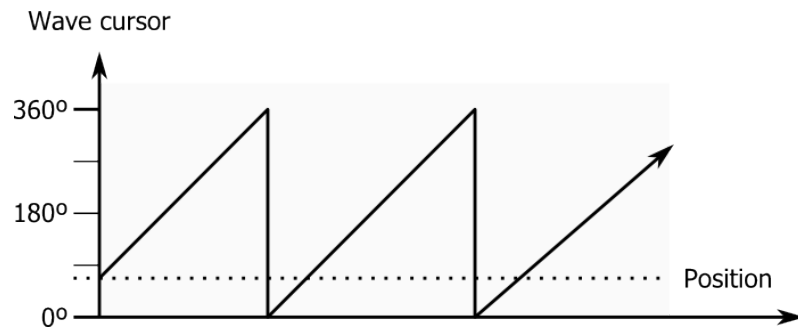


Figure 11: Travel - Free mode

The *Gated* and *Step* mode of *Travel mode* (19) switch requires an external Gate signal. Gate signal can originate from *Gate input* (1) or from the *Euro rack bus gate* (28) if no patch cable is inserted.

The use of *Euro rack bus gate* (28) as trigger when no patch cable is inserted can be disabled by removing the *Bus Gate jumper* (29).

6.4 Tuning the oscillator

An oscillator often needs to be tuned when playing along with other sound sources. The NW1 offers three controls to adjust the basic pitch.

It is recommended to disable any modulation, stop wavetable traveling and select a basic waveform before calibrating pitch.

Using a guitar tuner or a tuning application, the root key is adjusted with the *Tune pitch* (23) potentiometer. The available range is a little more than an octave. The root octave is selected with the *Tune range* (22) toggle switch. The available range is from -12 to +12 semitones.

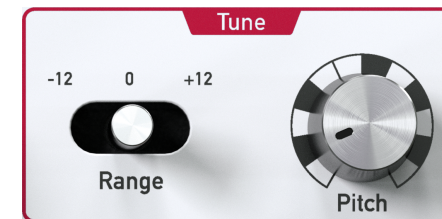


Figure 12: Oscillator tuning

When controlling pitch using *CV input* (2) or *Euro rack bus CV input* (28), the input scale must be manually adjusted. The NW1 expects a unipolar Pitch CV in 1V / octave format, ranging from 0V to 5V, offering a 5 octaves play range.

Pitch sampled on *CV input* (2) or any of the *Modulation inputs* (3, 4, 5) it is assigned to is summed with the root Pitch set with the *Tune pitch* (23) and *Tune range* (22) controls.

With a precision screwdriver, scale is rectified turning the *Pitch CV Trimmer* (14). Trimmer hole can be seen on *Figure 9*. The *pitch scale* is properly adjusted when a specific note's fundamental frequency is exactly doubled when played one octave higher.

CV scale can be a little tricky to calibrate and it is easier to adjust using high pitched notes. The *Tune range* (22) should be set to +12 semitones.

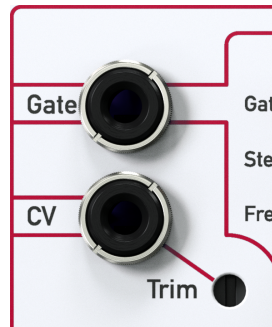


Figure 13: Scale trimming

In addition to *CV Input (28)* and *Modulation inputs (3, 4, 5)* pitch can be driven by the Eurorack bus CV. This is the default behavior when **no patch cable** is inserted in *CV Input (28)*.

Not every module makes use of the Eurorack bus CV, but when it is available, this feature can be quite convenient.

The use of *Eurorack bus CV (28)* as pitch control when no patch cable is inserted can be disabled by removing the *Bus CV jumper (29)*.

NW1 is able to produce pitches ranging from 16.35Hz (C-4) to 14.08kHz (A9), so please handle it carefully.

6.5 Transforming the sound

The NW1 sound engine is a direct descendant of the acclaimed Nave engine. It combines advanced resampling techniques and wavetable synthesis for extended control of tone generation and high quality audio.

The engine employs different algorithms to satisfy the demands of both the *gritty and harsh old school* playback of classic Microwave and Wave-series wavetables and the *pristine quality* reproduction of Nave.

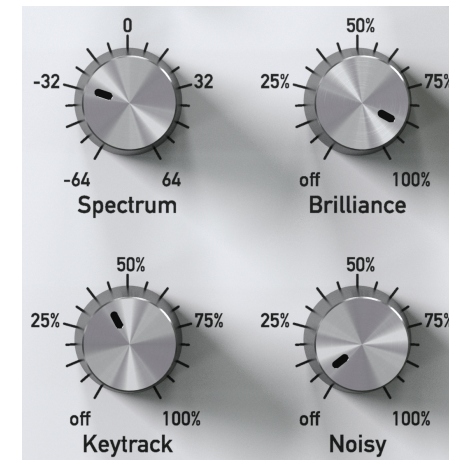


Figure 14: Sound parameters

The effect of *Spectrum (15)* and *Brilliance (16)* on tone is identical to their effect in Nave. However, the *Brilliance control (16)* is now bipolar with an extended range of -100% to 100%.

Spectrum The *Spectrum (15)* transposes the spectral content without affecting pitch. Setting spectrum to negative values lowers the spectral content. Conversely, positive values move the spectral content to higher frequencies. Set to middle position for conventional wavetable playback.

In *Figure 15*, from front to back, the Spectrum is increased and the wave harmonics are shifted to higher frequencies.

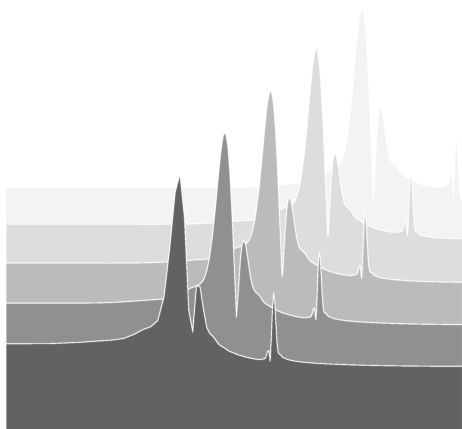


Figure 15: Spectral envelopes for different settings of Spectrum

Brilliance *Brilliance (16)* sets the *amount of detail* of the spectral content. It controls the spread and definition of harmonic peaks. Set to middle position for conventional wavetable playback.

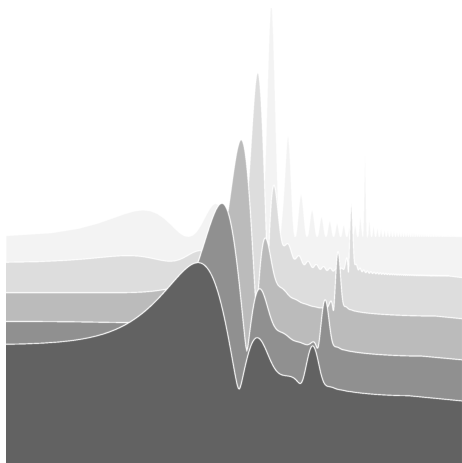


Figure 16: Spectral envelopes for different settings of Brilliance

In *Figure 16*, from front to back, the Brilliance is increased, harmonic peaks are refined and the contribution of weaker harmonics is improved.

Positive values of Brilliance (16) only affect the tone when the Spectrum control (15) is not set to 0.

Keytrack *Keytrack (17)* defines how the spectral content is transposed according to the pitch. A setting of 100% for classic wavetable synthesis like in Waldorf Microwave. When set off, the result resembles a filterbank defining the spectral contour, very useful for speech wavetables where formant frequencies must not be affected by pitch.

Noisy Wavetable playback has adjustable noisiness. When set off, waves are rendered perfectly periodic. With higher settings, playback becomes noisier.

Tips and tricks:

- Punchy lead sounds can be created controlling the spectrum with an envelope generator.
- Vocal wavetable sound best with Keytrack set to off.
- When Brilliance is set to extreme negative values, the effect is similar to a high-pass filter.

6.6 Modulating the sound



Figure 17: Input 2 modulation path

Modulation capabilities are mandatory for any modular system. NW1 provides three assignable modulation paths with dedicated CV input.

All modulation paths follows the same scheme:

Modulation CV input

Modulation CV input (3, 4, 5) is the modulation source signal. This signal can be bipolar from -12V to +12V.

Modulation gain

Modulation gain (8, 9, 10) defines the amount of modulation. It specifies how much of the input signal is added to the selected destination. While Low values allow subtle modulation, high values can drastically change the sound characteristics.

Modulation destination

Modulation destination (11, 12, 13) assigns the modulation signal to a specific destination. Depending on the modulation path used (1, 2 or 3), different destinations are addressable.

NW1 sound engine has been optimized to quickly track sound parameters evolution. Oscillator FM modulation (in a reasonable frequency range) is therefore possible.

In order to avoid DC offsets on modulations, each NW1 oscillator comes factory calibrated. However, due to temperature changes and shipping, minor offsets may be noticeable. To reduce them, the computer Editor can recalibrate the modulation inputs. Please refer to the **editor section** of this manual for more details on calibration procedure.

Using high *Modulation gains (8, 9, 10)* values in conjunction with strong CV signals will saturate the modulation input stage. Though there is **no risk of damage**, the input signal will inevitably clip, changing the modulation wave shape.

Experiment a lot!

7 Recording wavetables

The factory classic wavetables have been designed to cover a wide range of tones. To complement these, the NW1 is designed for users to actively create their own wavetables using the included original wavetable recorder.

7.1 Recording basics

Recorded wavetables exhibit the following characteristics:

- **Number of waves:**
Recorded wavetables can contain up to 256 waves.
This corresponds to recording times of roughly 7s.
- **Waves length:**
Wave length is fixed to 512 samples (in compressed format).

When *Oscillator mode (26)* is switched to User, 10 wavetables slots (labelled U0 to U9) can be selected for both recording and playback.

The recording can be triggered on *Modulation CV input 1 (3)* level or using the *Gate input (1)* (or *Bus gate input (28)*) signal.

Wavetable recording system is based on real-time *sample-to-wavetable* conversion. While an audio signal is recorded, it is conditioned, chopped in pieces that are converted and stored as single waves. Recorded wavetables use a special storage format allowing more detailed envelope representation while ignoring the phase information.

Due to nature of wavetables, the result will not sound identical to the recorded audio material. However, the conversion process does its best to preserve the harmonic evolution of the recorded sound.

7.2 Recording setup

To record, an audio source must be plugged in the *Modulation CV input 1 (3)* using a mono mini jack. A variety of sources (electronic instrument, computer, tape player, ...) can be attached.

Almost any source can be recorded using the NW1, as long as signal level is loud enough.

Pay close attention to high impedance or weak signal sources such as microphones or guitars. Before feeding the signal to the *Modulation CV input 1 (3)*, it must be amplified by an external device. For example, condenser microphones require a pre-amplifier and guitars a dedicated amplifier to adapt their signals levels.

Present day home studio sound cards or mixing desks integrate quality pre-amplifiers that are sufficient for the task, no need to buy additional hardware.

7.3 Recording a wavetable

Wavetable recording consists of five steps which must be performed in the following order:

1. Choosing a recording slot
2. Attaching the source and adjusting the gain
3. Setup recording parameters (optional)
4. Arming the recorder
5. Recording the new wavetable

Each step will now be detailed.

7.3.1 Choosing a slot

Switch the *Mode (26)* to User mode and use the *Wavetable dial (24)* to select the user wavetable that will be overwritten by the recording. Eventually switch the *Oscillator mode (26)* to Record Mode. The selected wavetable is latched and used for recording.

7.3.2 Audio source and gain

Attach the audio source to *Modulation Input (3)* and adjust the *Modulation gain 1 (8)*. The *NW1 Display (25)* shows a simple level meter. The left character is an L followed by a glyph representing the current signal level.

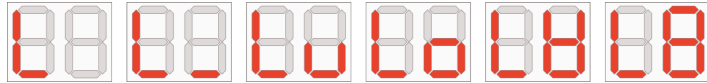


Figure 18: Audio levels, from low to high

To avoid unwanted distortion, the highest levels should only be reached on signal peaks. It is important to set the gain high enough to maximise signal to noise ratio.

7.3.3 Prepare recording

On module startup, the recorder is configured with default values fitting the most common usage. However, it is possible fine tune certain parameters to improve the wavetable generation. Refer to the recording **Advanced options** section for precision on these parameters.

Note that the recorder lets the *Input signal (3)* to pass-through for monitoring its quality. To actually record, the recorder must be *armed* and *triggered*.

The NW1 allows two triggering mode:

- **Trigger on input level (default)**

As soon as the input level cross the defined threshold, recording starts. When it falls below the threshold for long enough, recording stops. The recording threshold level is configured using the *Wavetable dial (24)*. The *Display (25)* blinks to indicate the configured threshold level.

- **Trigger on gate state**

Recording can also be started and stopped using the *Gate input (1)* signal. To switch the recording to *Gate trigger*, the *Wavetable dial (24)* must be turned left until the *Display (25)* shows a blinking GA.



Figure 19: Recording in Gate mode

When not armed, the *Record / Gate LED (27)* shows what would be the record state given the current audio input. This is a guide to:

- adjust the *Threshold level* (in trigger on input level mode)
- control the *Gate signal(1)* state (in trigger on gate state mode).

7.3.4 Arming the recorder

The recorder is ready to capture audio signal. It is now waiting to be armed and triggered. The arming procedure prevents unwanted erasure of previously recorded material, it also disables the *Trigger on threshold* function.

Arming the recorder is done by switching *Modulation destination 1 (11)* to *Record position* (same as *Travel*). If by accident, *Modulation destination 1 (11)* is already set to *Record position*, it needs to be toggled again.

When the recorder is armed, any previously recorded or transferred wavetable on the selected slot is erased. During the erase, the display shows a short animation. Depending on settings, recording may immediately start after the erasing process.

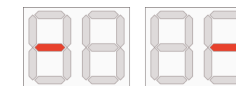


Figure 20: Erasing animation

7.3.5 Recording

Directly after triggering, the recorder converts audio signal to waves. The *Display (25)* draws a circle animation showing the recorded time and the

Recording / Gate LED (27) blinks.



Figure 21: Recording animation

Recording can be interrupted at any time, either by not satisfying trigger conditions or by manually disarming it using the *Modulation destination 1 (11)* switch.

7.4 Advanced options

To enhance wavetable creation, the recorder provides additional controls. These parameters are optional and intended for advanced users.

7.4.1 Compression level

When recording, the signal level might considerably vary and lead to wavetables which are not consistent in level. A compressor is included to help alleviate this problem.

The compressor normalizes single waves to a defined extent. The compression ratio is set using the *Position control (21)*.

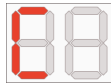


Figure 22: Compression ratio

Higher ratios can bring background noise when source signal is low. It is recommended to do several recording tries.

7.4.2 Playback quality

NW1 sound engine includes three algorithms offering different playback quality and sound character.



Figure 23: Playback quality: High, Low, Aliased

The playback algorithm associated with the next recorded wavetable is specified using the *Travel speed (20)* potentiometer.

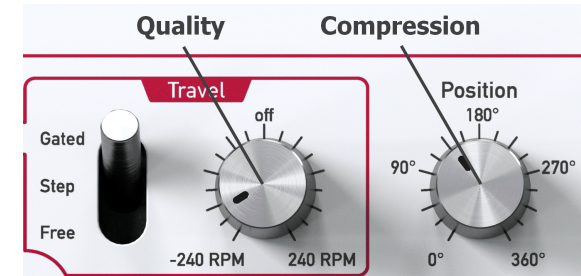


Figure 24: Compression ratio and playback quality controls

The algorithms have the following attributes:

- **Nave-grade quality:**
Best resampling using multiple filters. Beware, perfection can sound boring, especially on low pitched notes.
- **Microwave quality:**
Resampling with additional harmonics at low pitches, not mathematically perfect but has this special 80s feeling.
- **Aliased:**
Crude resampling with a lot of aliasing.

8 Transferring wavetables

Coming soon.

9 Speech wavetables

Coming soon.

10 Updating firmware

The NW1 connects to computers through its USB interface. Attach the module to a computer to update the firmware.

Waldorf Music regularly offers free updates for all its current products. Please visit our web site regularly:
<http://www.waldorfmusic.de/nw1-overview.html>

Keeping your firmware up-to-date gives you access to the latest functionalities, sound engine improvements and bug fixes.

First, download the latest NW1 firmware from **Waldorf Music** website and extract the archive content. The archive contains a sysex file and a readme text) file listing all software evolutions since the first release.

There are two ways to transfer software to the module. The recommended one is using the Editor.

10.1 With the wavetable Editor

Download the latest version of the NW1 wavetable Editor and launch it. Connect the NW1 to the computer with USB and check its connection state. When correctly recognized by the Editor, the module content is displayed in the *Library panel*.

Open the *Device menu* and click on *Upgrade Firmware*. Once the *Firmware Upgrade* window pops up, browse for the *.syx file using the *Select file* button. If a suitable firmware file is detected, the *Start Upgrade* will be enabled. Click on the button to start the update procedure.

The *Firmware Upgrade* window from the editor also displays the installed version of the module firmware.

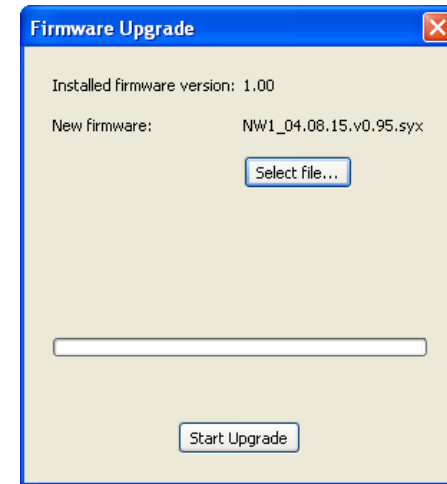


Figure 25: Updating firmware with the Editor

10.2 With a System Exclusive File player

Any software able to manage *System Exclusive File* is apt to update the module firmware. Example list of capable applications includes:

- **MIDI OX**
For Windows platforms: <http://www.midiox.com>
- **Sysex Librarian**
For MAC-OS platforms: <http://www.snoize.com/SysExLibrarian>

Before transferring the software, the module must be started in *Bootloader mode*. Turning the *Wavetable Dial (24)* in either direction when powering the module calls the *Bootloader mode*. The *Display (25)* draws bL.



Figure 26: Bootloader mode

Finally dump, at reasonable speed, the content of the downloaded sysex file using the chosen *System Exclusive File* player.

11 Technical specifications

The NW1 oscillator technical characteristics are:

Engine

Nave-based wavetable engine

Integrated speech synthesizer

Built-in wavetable recorder

USB for custom / text wavetables transfer and firmware update

Connectivity

Gate triggering wavetable travel and recording

Pitch CV 1V / Octave CV, 0V to 5V pitch input, 100k Ω impedance

Mod. CVs 3 x -12V to +12V modulation inputs, 100k Ω impedance

Output 16V peak-to-peak, 8Hz to 18kHz, 470 Ω impedance

USB USB interface with galvanic isolation

Bus: Eurorack 16-pins connector (Power supply, CV & Gate)

Electronics

Storage: Total 8 MB internal flash memory
 5 MB (= 80) MW series / Nave factory wavetables
 2.5MB (= 10) for user custom / recorded wavetables
 0.5MB (= 50) for user text wavetables

Supply: +12V, -12V, 150mA

Mechanics

Width: 32HP, 162.6 mm

Height: 3U, 13.3 mm

Depth: 25mm

Weight: 500g

Technical specifications and design are subject to change without notice.

A Wavetable list

Index	Name	Sections	Index	Name	Sections
0	Resonant	8	25	Echoes	8
1	Resonant2	8	26	Formant 2	4
2	MalletSyn	8	27	FmntVocal	8
3	Sqr-Sweep	4	28	MicroSync	8
4	Bellish	4	29	Micro PWM	8
5	Pul-Sweep	8	30	Glassy	4
6	Saw-Sweep	8	31	Square HP	4
7	MellowSaw	4	32	SawSync 1	8
8	Feedback	4	33	SawSync 2	8
9	Add Harm	8	34	SawSync 3	8
10	Reso 3 HP	8	35	PulSync 1	8
11	Wind Syn	8	36	PulSync 2	8
12	High Harm	8	37	PulSync 3	8
13	Clipper	8	38	SinSync 1	8
14	Organ Syn	8	39	SinSync 2	8
15	SquareSaw	8	40	SinSync 3	8
16	Formant 1	8	41	PWM Pulse	8
17	Polated	4	42	PWM Saw	8
18	Transient	8	43	Fuzz Wave	4
19	ElectricP	4	44	Distorted	8
20	Robotic	8	45	HeavyFuzz	4
21	StrongHrm	8	46	Fuzz Sync	8
22	PercOrgan	8	47	K+Strong1	4
23	ClipSweep	8	48	K+Strong2	4
24	ResoHarms	8	49	K+Strong3	4

Index	Name	Sections	Index	Name	Sections
50	1-2-3-4-5	5	66	Alt 1	8
51	19/twenty	4	67	Alt 2	8
52	Wavetrip1	9	68	Spectrum 1	8
53	Wavetrip2	13	69	Spectrum 2	8
54	Wavetrip3	11	70	Spectrum 3	8
55	Wavetrip4	7	71	Spectrum 4	8
56	MaleVoice	4	72	Drumloop	8
57	Low Piano	4	73	Buzz	8
58	ResoSweep	8	74	Guiro	8
59	Xmas Bell	8	75	Crackle	8
60	FM Piano	4	76	Wire	8
61	Fat Organ	4	77	Metal	8
62	Vibes	4	78	Wood	8
63	Chorus 2	8	79	Glass	8
64	True PWM	4	80	Nave Chant	8
65	UpperWaves	8			