wave ReX

The Waveform Refill Expansion

ENGLISH VERSION

# OPERATING MANUAL


WWW.WAVEREX.DE | SHOP.WAVEREX.DE

# Preamble

Thank you for purchasing WaveReX - M1. We are convinced that it will give you a lot of pleasure in the future and above all will bring a lot of momentum into your now 30-year-old Korg M1 Music Workstation. We promise you one thing: with your help we will try everything to make the M1 great again.

## Why you should read the manual

Manuals are usually unpopular, boring or even annoying. We did our best not to put you to sleep after the first two pages.

Whether you read this manual is up to you. However, you should know that this manual details the correct use of WaveReX. In addition, you will find important safety and operational information here, which you must be observed. These statements have a grey background and are therefore easily recognizable.

Your WaveReX Team


## Advice

We assume no responsibility for errors that may occur in this manual. The contents of this manual are subject to change without notice. A current version of this manual can be found at:

**www.waverex.de/downloads/**

Great care has been taken in the preparation of this manual to minimize errors, however some may have slipped through our quality assurance process.



**Manufacturer:**

SynthastiX - Komponenten für elektronische Klangerzeuger

Owner: Marco Pawlowski

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## The WaveReX Team

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## Manual - Revision

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## Special thanks to

Emily und Josephine, Dominique Bayer, Tobias Hopp, Dirk Stephan, Michael Wolter, Frank Neumann, Don Solaris, Paolo Di Nicolantonio, John "Skippy" Lehmkuhl, Peter Gorges, Matrixsynth, Moogulator and all our supporters

## How to reach us


www.waverex.de
www.waverex.com


www.shop.waverex.de


www.instagram.com/waverexboard/


www.facebook.com/WaveReX/


www.youtube.com/channel/UCfJzIp27T1ikvZaYJJHWSPA

# Table of contents

# Safety Notes

Read these safety instructions carefully. To use WaveReX safely, you must understand these instructions.

Keep these safety instructions to hand throughout the life of WaveReX.

If you have any questions or are unsure how to use WaveReX, please contact our support immediately.

WaveReX is a slot card for the PCM DATA slot of the Korg M1 Music Workstation. It can also be used in the M3R synthesizer and T-Series Music Workstations. It serves as a replacement for the PCM cards from Korg.

**ATTENTION!**

Only insert WaveReX into the card slot provided. Pay attention to the correct orientation of the WaveReX card.

WaveReX was developed for use in private residences and recording studios.

**ATTENTION!**

Usage outdoors doors may cause damage to WaveReX and your device (exposure to direct sunlight, high humidity and rain for example).

Due to its design, WaveReX is particularly sensitive to inappropriate force effects.

**ATTENTION!**

Do not try to bend, compress or twist WaveReX. Never force WaveReX into the card slot of your device. Do not drop WaveReX and never apply force to the case.

WaveReX is an electronic product that was designed and developed using state-of-the-art electronic components.

**ATTENTION!**

Use WaveReX only in rooms at room temperature and low humidity. Do not expose WaveReX to liquids. This can damage or even destroy the electronic components.

The housing of WaveReX protects the underlying components and serves as an insertion aid into the card slot.

**ATTENTION!**

Never open the case. This can destroy the board and the electronic components. A defective housing can no longer guarantee the proper insertion into the card slot. This can lead to malfunctions or to the destruction of WaveReX or even your device.

The contacts of WaveReX are gold-plated to withstand mechanical demands for longer. Nevertheless, it is a contact technology.

**ATTENTION!**

Although WaveReX is designed for durability, only remove it from the card slot only when necessary

You should avoid touching the gold contacts as these can be damaged when touched excessively. And don't even think about licking the contacts! (Keep cats, pizzas and kids away from them).

Placing metallic objects on the contacts can cause short circuits.

**ATTENTION!**

Never short-circuit the contacts! This will destroy WaveReX and can cause you serious physical damage! (Which we are not liable for).

Never insert WaveReX into your device while it is switched on.

**ATTENTION!**

Never plug your WaveReX into your Korg M1 Music Workstation while it is switched on. This can cause serious damage to your M1.

A faulty WaveReX can seriously damage your device.

**ATTENTION!**

Do not use WaveReX if it has obvious damage. If you are not sure, contact support.

**Web:** www.waverex.de

**Mail:** support@waverex.de

# Memos

# EU Declaration of Conformity

We hereby certify

**Manufacturer:** SynthastiX – Komponenten für elektronische Klangerzeuger

Marco Pawlowski, B.Eng.

Staatsrat-Schwamb-Str. 89c

D-55278 Undenheim

that the following described product

| | |
|---|---|
| **Product:** | WaveReX® |
| **Type of product:** | Memory card with passive electronic components for use in synthesizers Korg M1 and Korg Wavestation |
| **Type number:** | SX 001 |
| **Serial number:** | 10001 to 19999 (continuous) |

complies with the basic safety and health requirements of the EU directives listed below in its design and construction as well as in the design we put into circulation. This declaration loses its validity if the product is modified without our consent.

The sole responsibility for drawing up this declaration of conformity lies with the manufacturer.

***Compliance with the following guidelines is declared:***

- EU-Derective EMC 2014/30/EU of 26 February 2014
- EU-Derective RoHS2 2011/65/EU of 8 June 2011
- EU-Derective 2017/2102 of 15 November 2017

***Applied harmonized standards in particular:***

**EN 55032:2016-02** Electromagnetic compatibility of multimedia equipment - Emission Requirements (CISPR 32:2015); German version EN 55032:2015

Undenheim, 05.03.2019

Place/Date

Marco Pawlowski, CEO

# Intended use

WaveReX was designed exclusively for devices from KORG Inc. of Japan. It was developed to be used in the PCM DATA slot of the corresponding device.

WaveReX is compatible with all devices that use AI synthesis.

These include:

- Korg M1(EX) and M1R(EX) Music Workstations
- Korg M3R Synthesizer
- Korg T1, T2 and T3 Music Workstations

WaveReX is compatible with the following devices that use AV synthesis:

- Korg Wavestation(EX) and Wavestation A/D

This manual refers primarily to the Korg M1 Music Workstation, all instructions also apply if you are using WaveReX on one of the other compatible devices.

WaveReX is not compatible with devices with AI2 synthesis such as the Korg 01/W Music Workstation or with the AV Synthesis Wavestation S/R module.

**ATTENTION!**

Never use WaveReX in incompatible devices it may destroy your device and WaveReX!

# Preparation

To connect WaveReX to your computer you will need a micro-USB cable. This cable is included with the WaveReX card.

You can also use a USB extension, but make sure that the total length does not exceed 5m. This is not included with the WaveReX card.

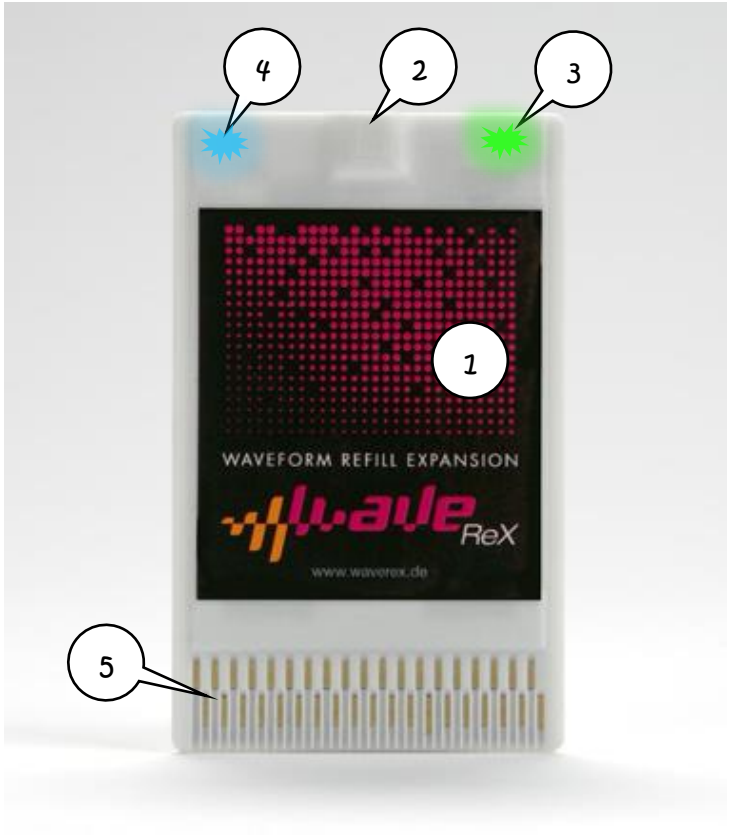
For Windows 7 a USB driver is needed. You can download it from the download page **www.waverex.de/downloads/**

If you are using Windows 8 or higher, you do not need any additional drivers.

To create your own sounds and upload them onto your WaveReX you will need the WaveReX software editor. Download it from the download page **www.waverex.de/downloads/**. Make sure you always use the latest version so you don't miss any updates or bug fixes.

In the following we will introduce you to the functionality of WaveReX and the software editor with a kind of quick start. If you are familiar with the basic principles of your device's sound generation, you can get started right away. However, we recommend that you first understand the basics and technical specifications.  This section explains the basics of how the whole system works and what you should pay attention to.

# The Hardware




① – WaveReX card

② – Micro-USB-connector

③ – State-LED (green)

④ – Transmission-LED (blue)

⑤ – Contacts

## The USB port

The USB port on your WaveReX is used to transfer data from your computer to WaveReX. It's a USB-B-Micro port, and we've included a USB cable to match it.

To guarantee the longevity of your WaveReX we have chosen a USB connector, which is fixed with four solder points on the board. Therefore a tearing off of the socket is impossible under normal conditions.

WaveReX is powered via your device as well as via USB, depending on which voltage is higher.

**Attention!**

In the new condition, the connector may still be slightly tight. Never insert your USB cable by force, you can destroy the connector!

## The case

The case was designed according to the original drawings of the PCM cards. In particular, the contact guides above the pads correspond exactly to the original and thus guarantee a perfect fit in the card slot of your device.

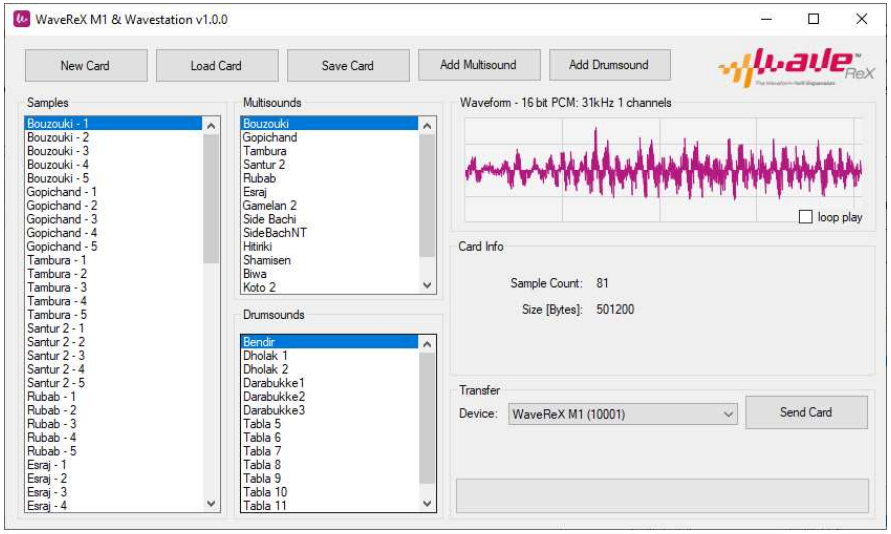
The case is made of a special plastic for industrial use using the 3D printing process. This is extremely wear and abrasion resistant.

If you should have problems that your card is not recognized, please pay attention to the chapter **Troubleshooting**.

# The Software Editor

## The Main Window

In the main window you can manage and edit your compilations. Here you can add samples, create sounds and upload your compilation to your WaveReX. You can also preview samples here and always have an overview of the memory size used.




The content of the main window represents the content of your virtual card. All sounds listed in the **Multisounds** and **Drumsounds** lists are loaded onto the WaveReX and are then available as card sounds in the Korg M1 Music Workstation. It does not matter how many samples are in the sample list. Only samples that were used for sounds are transferred.

### User Interface

***NEW CARD button***
Press this button if you want to discard your compilation and create a new one.

***LOAD CARD button***
With this button you can load previously saved compositions into the editor.

Note that you can only open files with the extension **.m1**.

Also note that opening a card will irretrievably delete your current compilation. Always save your work before loading a card.

***SAVE CARD button***
Use this button to save your compilation as a virtual card (image). Cards are saved with the file extension **.m1**.

***ADD MULTISOUND button***
Adds a new, empty Multisound to your compilation.

***Add DRUMSOUND button***
Adds a new, empty Drumsound to your compilation.

***List of samples***
All samples listed here are available for your compilation.

***List of Multisounds***
Here all Multisounds in your compilation are listed.

***List of Drumsounds***
Here all Drumsounds in your compilation are listed.

***Waveform Info***

If you have previously selected a sample in the sample list, you can see the waveform and information about the sample here.

You can also click on the waveform if you want to play the sample. Click on the waveform again if you want to stop playback prematurely. If you want to hear the sample in the loop, check **loop play** first.

***Card Info***

Information about the number of samples already used and the size of the compilation is displayed here at any time. Note that you must not exceed 512kb.

***Transfer***

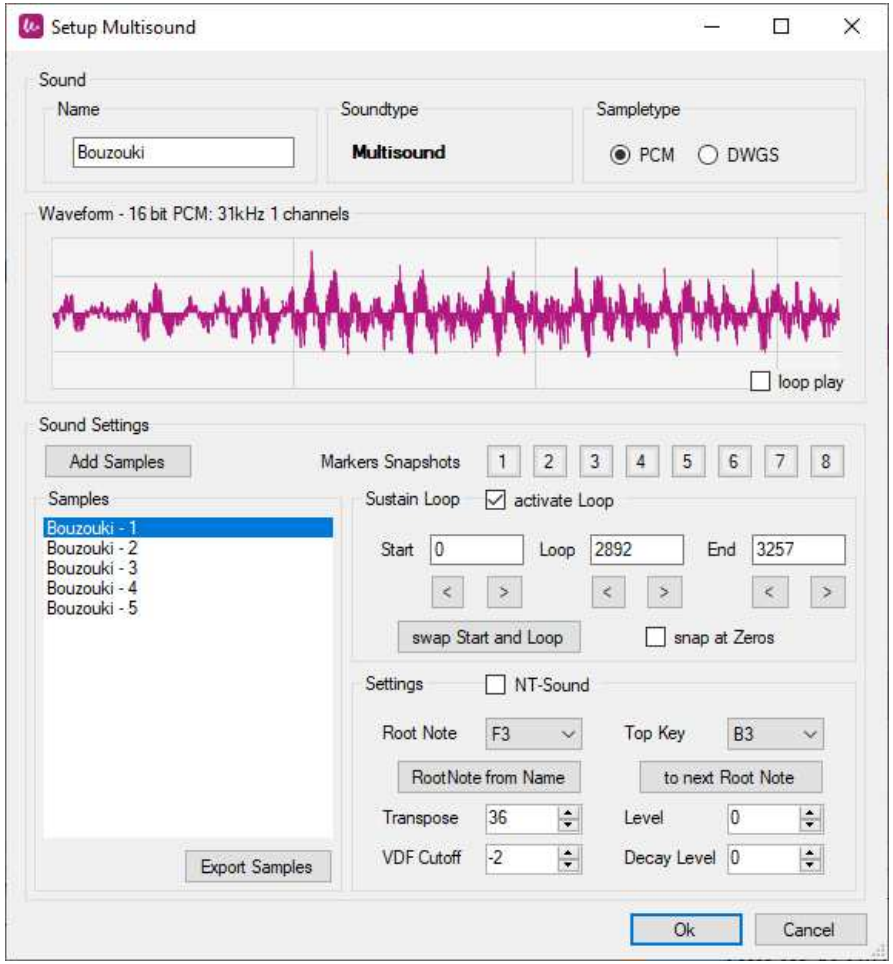
In the Transfer section you will find the Device selection field. All WaveReX connected to your computer are displayed here. Select the WaveReX you want to describe using the selection box.

You can also use the **Send Card** button to send your compilation to your WaveReX.

The progress bar at the bottom informs you about the progress of the transfer.

## The Setup Windows

Use the setup window to edit multi and drum sounds. In the main window, double-click the sound you want to edit to open the setup window.



## User Interface

### *Sound*

In the **Name** text box, you can change the name of your sound. Note that you can only use ten characters. Umlauts and special characters are possible.

The **Sound Type** info box tells you whether it is a Multisound or drum sound.

Under **Sample Type** you can specify whether your samples are PCM-encoded samples (PCM) or single cycles (DWGS). Please refer to the chapter **Basics**.

### *Waveform Info*

If you have previously selected a sample in the sample list, you can see the waveform and information about the sample here.

You can also click on the waveform if you want to play the sample. This allows you to hear directly whether your loop point is perfectly selected or whether the loop cracks.

Click on the waveform again if you want to stop playback prematurely. If you want to hear the sample in the loop, check **loop play** first.

### *Sound Settings*

#### Add Samples

Here you can add samples to your sound. A multi-selection is available for multisounds. Drum sounds can only contain one sample.

The sample format is automatically converted during import.

If the samples contain loop information (in **smpl** chunk, no cue-points) they will be automatically imported.

#### Samples

A list of all samples used in this sound. Select a sample from the list to edit its parameters in the right part of the window.

#### Sustain Loop

If you want to activate the loop for the previously selected sample, check the **Activate Loop** box. Otherwise the M1 will play the sample without loop.

In the input boxes you can change the **start**, **loop** and **end point** of the sample. If there is no loop information in the sample, the full length of the sample is used as default and the loop point is set to the middle of the sample.

To change the values of the points, you can also use the arrow keys below the input fields, where the step size is 1.

With the **swap Start and Loop** button you can swap the start and loop point, this is especially useful for DWGS.

If you don't have any loop information available, the editor can help you find the perfect loop. Activate the control box **snap at Zeros**. Then you can use the arrow keys to jump to the nearest zero crossing of the sample.

If you change the loop point, you will notice that the value in the Transpose field also changes automatically. This value is calculated mathematically each time the loop is changed. As a small rule of thumb, the most likely loop is found when the Transpose is smallest. The values should be between 0 and +/- 30 until the 6th octave. In higher octaves the values can be higher. Please also note the section **Transpose** on the next page.

Note that the "perfect loop" does not necessarily have to be on a zero crossing. So it can be useful to use this as a rough default and to adjust the loop in single steps.

You can also try different loops by saving them as Marker Snapshots.

To save a snapshot, simply click on one of the eight memory slots. The memory slot used will turn dark gray. Repeat this for all settings you want to test. Each slot can only be used once. It is not possible to overwrite it.

To access the saved settings, simply click on one of the occupied memory slots.

**Settings**
Here you can declare the respective sample as NT-Sound by checking the box at **NT-Sound** (Attention! We built in a special feature). Please refer to the chapter **NT-Sound**.

**Root Note:** This is the fundamental of the sample. Select the note that corresponds to the frequency of your sample. If the root note is contained in the name of your sample, you can simply click the **RootNote from Name** button to copy the root note. Please refer to the **Tips** section!

**Top Key:** Enter the highest note up to which the selected sample is to be played on the keyboard. The sample is then transposed upwards through the M1, starting from the fundamental, up to this note.

**Transpose**: Here you can adjust the transposition of the sample in cent steps. This is particularly necessary because the correct physical frequency cannot always be achieved with digitally stored waveforms. Please refer to the chapter **Transpose and the length of digital samples**.

As already described in the Sustain Loop section, the Transpose is recalculated mathematically when the loop is changed. The set Root Note is used for the calculation. Also a plausibility check is performed. If the Transpose value turns red, this is an indicator that the set Root Note does not match the loop. This will result in a detuned sustain loop. In this case you should check whether the Root Note of your sample is correct.

**Level**: with the level control the volume of the sample can be lowered. This serves to adjust all samples in the sound to a volume.

**VDF Cutoff**: This is a low-pass filter upstream of the sound synthesis of the device. It can be used to filter alias effects. In addition, differences in the timbre of the individual samples can be adapted to each other.

**Decay-Level**: This allows you to adjust the decay level of the sample.

Please note that Drumsounds are not looped and no parameter input is necessary. For this reason, all parameters are grayed out for drum sounds. In this case, the setup window is only used to assign a sample or a name.

You can export your samples, including all set parameters and loop points, in WAV format. We use a mixture of standard parameters of the sampler chunk and an extension of it. Simply click on the **Export Samples** button or drag and drop the samples from the **Samples** list.

The next time you import the files, the parameters are automatically taken over.

# Quick Start

## Principle

With the WaveReX software editor you can create a virtual card, a so-called image, on your computer. This compilation can contain Multisounds and/or Drumsounds. The compilation can then be transferred from the editor to your WaveReX and used by the Korg M1 Music Workstation.

## Connecting

Turn on your computer and wait until it boots up.

Take your WaveReX out of the box. The side with the label is the top side. On the bottom you should therefore see the back of the board.

Don't put it in the Korg M1 Music Workstation for now. Place your WaveReX on a smooth, dry surface, e.g. a table.

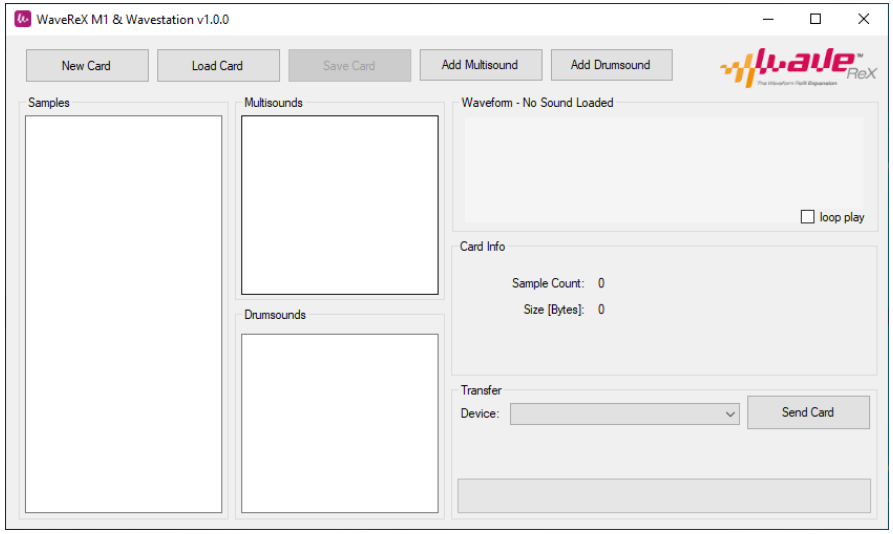
Now take the micro-USB cable and connect it to your WaveReX. You can then plug the other side of the cable into an available USB port on your computer. The WaveReX is compatible with both USB2 and USB3 ports. WaveReX is powered when the green LED is lit.

Your WaveReX starts for five seconds in bootloader mode. You can tell by the double flashing of the blue LED. After that your WaveReX starts automatically in operating mode.

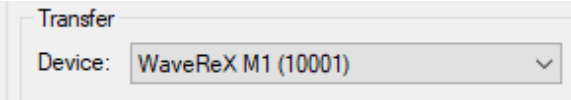
With Windows 8 (or above), Windows should now install the drivers automatically. Check in the Device Manager (click start->run and type devmgmt.msc) if your device appears as WaveReX, then you have successfully installed the driver.

## Open the Software Editor

Make sure your WaveReX is already connected to your computer. Now open the WaveReX software editor (available at www.waverex.de/downloads). You should now see the main window:




You can see if your WaveReX is connected to the software in the lower right corner of the device overview. The connected WaveReX and its serial number are displayed here.



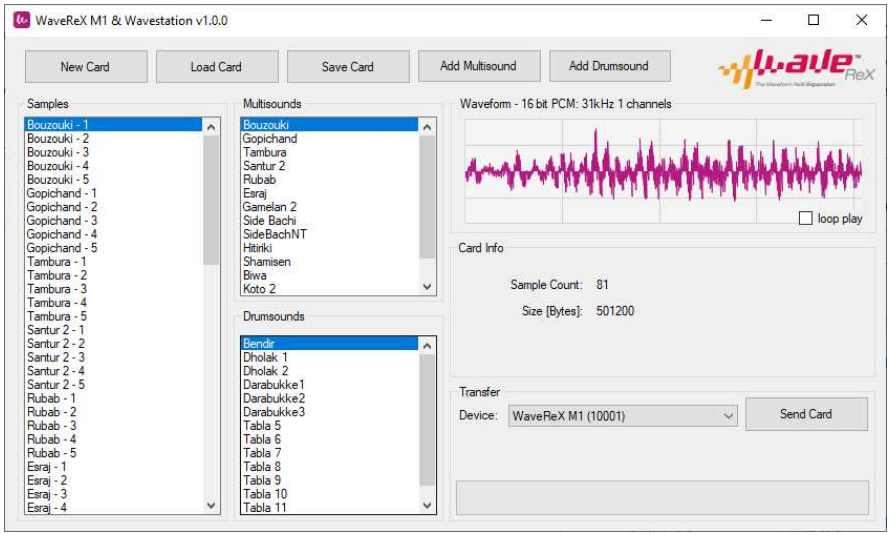

You can also connect more than one WaveReX. In this case you can use the drop-down box to select the device you want to use.

## Load a card

Click the **Load Card** button. A dialog box opens. Here you can now select a previously saved card. We have already provided you with a card for this. The file has the extension **.m1**

If your files are in a different folder, navigate via the window to the desired folder.

Double click on the file or select it and click the **Open** button. The content of the card is loaded and displayed in the main window.

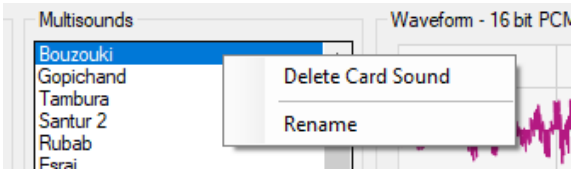



## Editing a card

### Delete a Sound

To delete a Multisound or Drumsound from your compilation, select it in the corresponding list and then right-click on your selection.

A context menu opens up.



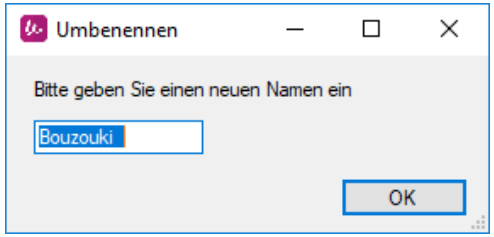

Click on **Delete Card Sound** to delete your sound from the compilation.

### Renaming a sound

If you want to rename your sound you have two options.

Select a sound and right-click on your selection. In the context menu that now appears, select Rename.

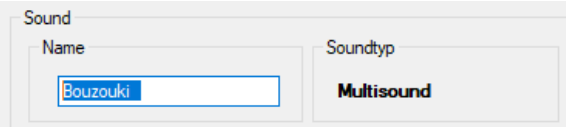
The Rename window opens.




Enter the new name in the text box and confirm by clicking the **OK** button.

Note that the M1 only supports ten characters for the names.

The second way is to change the name in the setup window of the respective sound. Double click on the sound whose name you want to change. The setup window opens.




You can assign a new name in the name box in the upper left corner. Then confirm your entry by clicking **OK**.

### Adding a Multisound

To add a Multisound to your compilation, right-click on the Multisound list in the main window.

In the context menu that now appears, select **Load Card Sound**. A dialog box opens. Navigate through the window to the folder where your Multisounds are located. The files have the extension **.msound**

Select the Multisound you want to add to your compilation. Double click on your selection or confirm by clicking **OK**.

### Adding a Drumsound

To add a Drumsound to your compilation, right-click on the drum sound list in the main window.

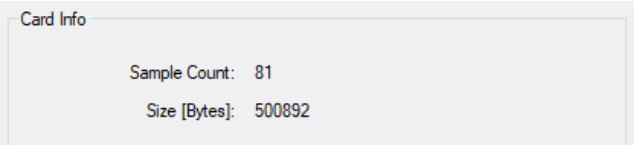
In the context menu that now appears, select **Load Card Sound**. A dialog box opens. Navigate through the window to the folder where your drum sounds are located. The files have the extension **.dsound**

Select the drum sound you want to add to your compilation. Double click on your selection or confirm by clicking **OK**.

## Transferring a card

When you have completed all settings to your satisfaction, you can transfer the card to your WaveReX.

Make sure you are back in the main window. Check if your compilation fits on your WaveReX. Remember: you have 512kB memory available. You can see how much space your composition takes under **Card Info**.

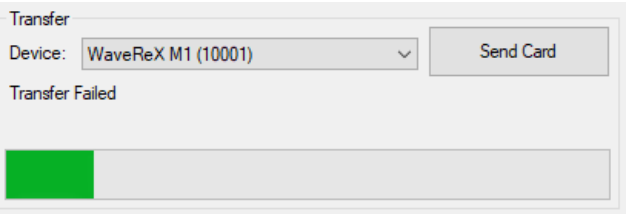



Here you can see the number of samples used in your sounds and the size of the compilation.

Click on **Send Card** at the bottom right to start the transmission.

The blue LED on the WaveReX flashes to indicate that the transmission is in progress. You can see the progress of the transfer in the progress bar of the software. After a few seconds the transmission should be completed and the blue LED goes out.

The status display informs you whether the transmission was successful. If the transfer was not successful, the **Transfer Failed** status is displayed. In this case, check if your WaveReX is connected to your computer and is displayed as described above under Device.



## And into the Korg M1 Music Workstation…

If the transfer was successful, close the software editor. Disconnect the micro-USB connector from your WaveReX and make sure your Korg M1 Music Workstation is switched off.

**ATTENTION!**

Never plug your WaveReX into your Korg M1 Music Workstation while it is on, especially when the Korg M1 Music Workstation is switched on. This can cause serious damage to your Korg M1 Music Workstation.

Insert your WaveReX into the PCM DATA slot of the Korg M1 Music Workstation with the label facing up and the gold contacts in front, and you will feel a slight resistance twice. These are the double-row contacts of the Korg M1 Music Workstation, which slide over the edge of the card.

Slide your WaveReX straight into the slot as far as it will go. Depending on how often your card slot has been used in the past, this can be harder or easier. Don't worry, WaveReX fits perfectly into the slot!

Turn on your Korg M1 Music Workstation now.


When the card is correctly seated in the slot, the green LED lights up, indicating that WaveReX is powered by the Korg M1 Music Workstation.

Select a program on your Korg M1 Music Workstation that you want to use. You can choose an Init program or use a similar program as a template.


Now switch to the edit menu of the M1 by pressing the **EDIT PROG** key.

On the first page you can set whether you want to run the Korg M1 Music Workstation in single, double or drum mode. You can use your previously created Multisounds in single and double mode. Select the appropriate mode depending on whether you want to use one or two oscillators.


Switch to the next page by pressing the **PAGE+** key. Here you can assign a Multisound to Oscillator 1. Use the **UP** and **DOWN** buttons to navigate through the available Multisounds. All internal sounds are displayed first, followed by all sounds on the card. These are marked with a C in front of the number.


Proceed accordingly for Oscillator 2. Hit the keys briefly in between, you can already hear your sound.

To use your drum sounds, select Drum Mode on the first page.

Switch to the next page by pressing the **PAGE+** key. Here you can set which drum kit you want to use.

Note that you must assign your drum samples to this drum kit first. This is done in the **GLOBAL MENU** of the Korg M1 Music Workstation.

## Saving programs on the Korg M1 Music Workstation

WaveReX does not allow you to save your programs and combinations created on the Korg M1 Music Workstation. You must still store them in the internal memory or on a separately available memory card. (Note: We already have plans to develop a program memory card in the future. Please let us know if you are interested).

Another way to save your programs is to transfer them to your computer via sysex. The best way to do this is to use relevant programs, such as Midi-OX or the M1 Flex Editor.

You should always save your cards and programs as a set, just like the original card sets. These consist of a program card (MPC) and a PCM card (MSC). The sysex corresponds to the MPC card and the WaveReX corresponds to the MSC card.

Save both files together in the same folder and with the same name. This way, there will be no confusion later on.

According to this scheme the two files would be called e.g. **card.m1** (WaveReX = MSC card) and **card.syx** (MPC card = programs for the Korg M1 Music Workstation).

## Loading programs into the Korg M1 Music Workstation

WaveReX does not allow you to transfer programs or combinations from your computer to the Korg M1 Music Workstation. Use relevant programs such as Midi-OX or the M1 Flex Editor.

Make sure that you have loaded the corresponding Multisounds onto your WaveReX if your programs use external waveforms.

# Creating a card

Click **New** in the main window. If you have previously worked on a compilation, remember to save it beforehand.

The main window is now empty and you can start working.

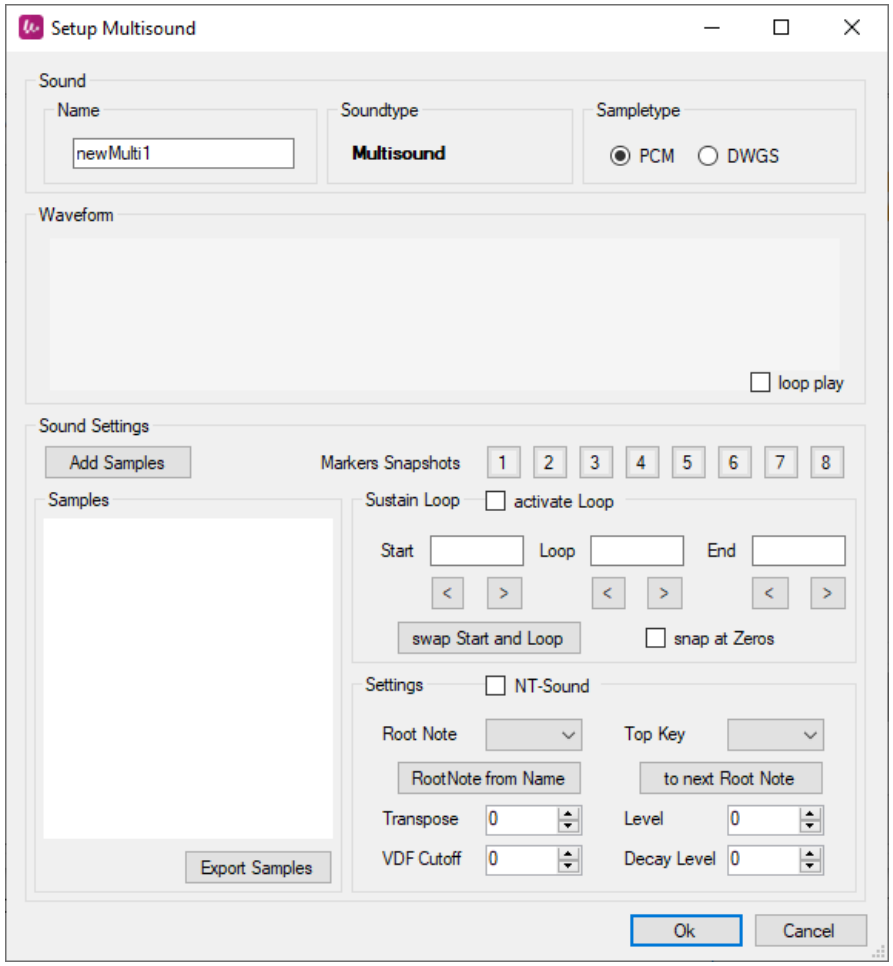
## Creating a Multisound

Click the **Add Multisound** button in the main window.


An empty Multisound is created and displayed in the Multisounds list. Initially it is named **newMulti** followed by an index.

## Editing a Multisound

Double-click an entry in the Multisounds list. Each entry in this list represents a Multisound on the card.




The setup window opens. All settings for the previously selected Multisound can be made here.

As you can see, your previously created Multisound is initially empty. To add samples to your Multisound, click the Add Samples button. A dialog window opens.

Use the window to navigate to the folder containing your samples. Currently you can add WAV, AIFF and MP3 files. During import, the samples are automatically converted to the required format:

Sample format 31250 Hz, 16 Bit, Mono

You can remove samples from the Multisound at any time by selecting the sample and pressing the **Delete** key on your keyboard.

You can listen to the selected sample at any time by clicking on the waveform. Clicking the waveform again stops playback. If you want to hear the sample in a loop, you have to check the **loop play** box.

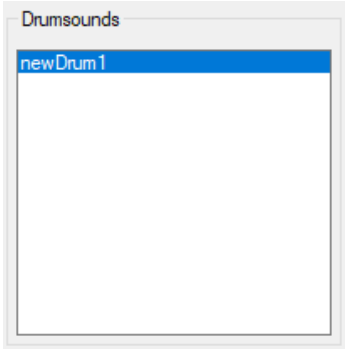
Make all the settings for each sample in your Multisound.

To apply your settings, click the **OK** button.

Repeat the whole process as often as you like for each Multisound you want to change.

### Creating a Drumsound

Click the Add Drumsound button in the main window.

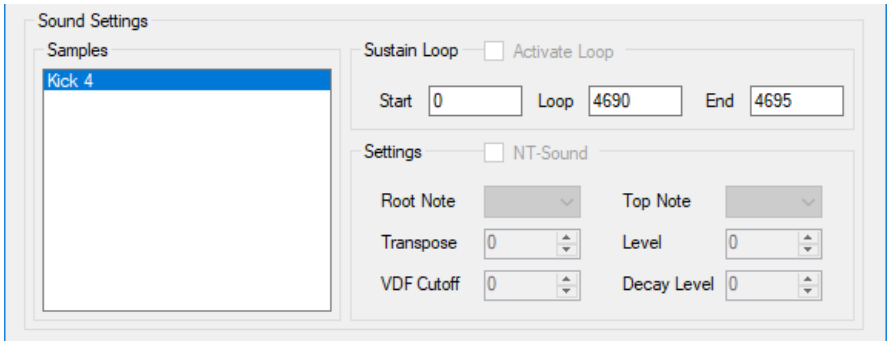



An empty drum sound is created and displayed in the Drumsounds list. Initially it is named **newDrum** followed by an index.

You can assign Drumsounds created in this way to the four drum kits available in the Korg M1 Music Workstation. Drumsounds are not usable in the Wavestation.

### Editing of Drumsounds

For Drumsounds, only the start, loop and end points of the sample can be changed. All other parameters are automatically grayed out, since changing them has no effect on the M1.




Note that in this case all relevant settings are made in the drum kits in the M1.

### Creating drum kits (Multisound)

A different method of creating drums in the M1 is to create your own drum kits as a Multisound. The internal drum kits of the Korg M1 Music Workstation are not used.

Proceed to create a drum kit according to the instructions for creating a Multisound.

Note that drum kits or their samples cannot be assigned to the drum kits in the Korg M1 Music Workstation. They can only be used as Multisounds, unless you also create them as Drumsounds.

### Editing of a drum kit (Multisound)

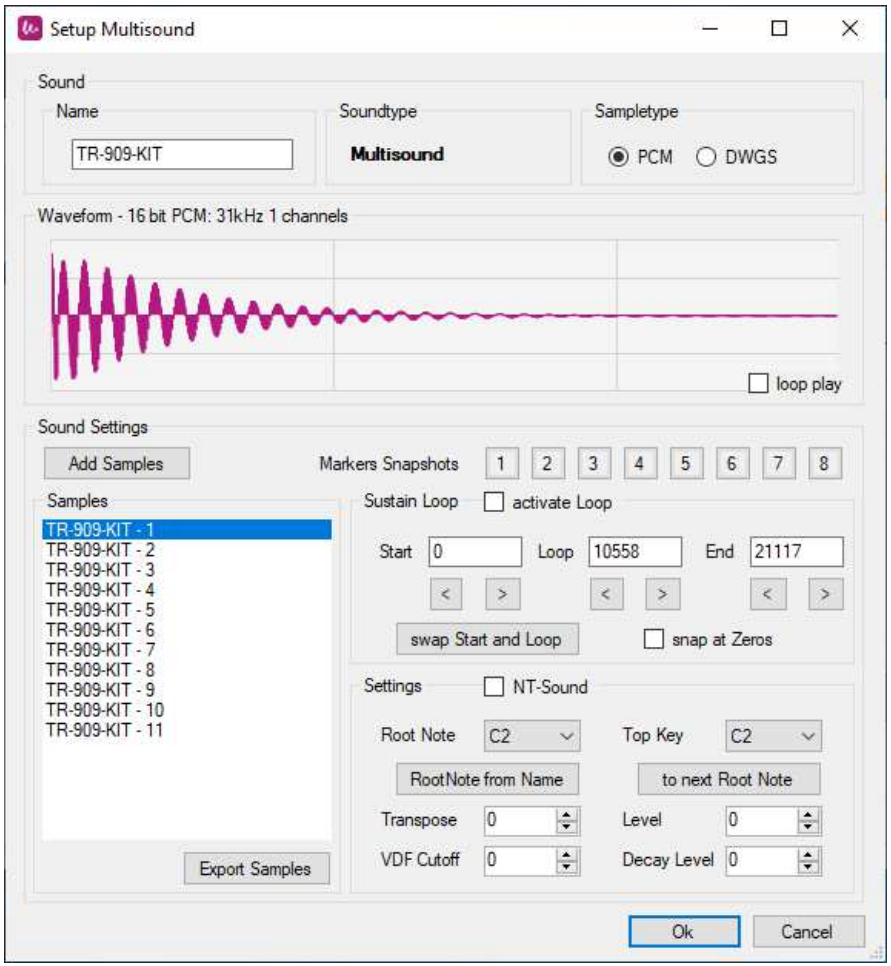
In the **Multisounds** list, double-click your previously created drum kit (Multisound).

The setup window opens. All settings for the previously selected drum kit can be made here. When placing the samples on the keyboard you now have three options:

You can specify a key range for each sample by specifying a top note larger than the root note. Note the chapter **Transposition** (keyword: Transposition below the fundamental). The drum samples are then transposed in this key range. Sometimes you want to, because so different tunings of the drum sound are available.

The second option is to set the root note and top note to the same note. As a result, transposition is only below the keynote (see chapter **Transposition**).

The third way is to declare all samples as NT sound. Here, the sample is placed on all keys between the next lower sample and the root note without transposition.




## Saving a card

You can of course save your compilation at any time. To do this, click the **Save Card** button in the main window. A dialog box opens. Use the window to navigate to your preferred location. Enter the name of your compilation and click **OK** to save it.

Note that the button is grayed out if you have no sounds in your compilation, so there are no entries in the **Multisounds** or **Drumsounds** lists.

# Basics

## Multisounds

Multisounds are multi samples and can, as the name suggests, consist of several samples. You can imagine a multi-sound like a kind of container by storing several samples of the same sound. A Multisound piano can (and should) contain several samples of a piano.

Why do they do that?

Samples are short, recorded excerpts of an instrument or sound. Of course, a sample has the same pitch (frequency) as the sound that was recorded. Now you want to play this sample on the key of the keyboard, which corresponds to this pitch. Assign this sample to the corresponding key. But what about the other keys on the keyboard? You want to play that sound over the entire keyboard.

Now you could simply transpose this sample up or down, i.e. you simply change the pitch of one sample for each key of the keyboard. That would be possible and not so difficult. The problem with this method is only our hearing. We hear that it is the same sample, as there are absolutely no variations in the notes. In nature, the timbre also changes with increasing pitch. If only the pitch would change, it would sound synthetic to our ears, simply not natural. The further you move away from the original note on the keyboard, the greater the difference between the pitch played and the sampled pitch, the clearer the effect.

In order to counteract this, one traditionally tries to sample as many tones of a sound as possible. Preferably at least one per octave. So you try to keep the difference between two sampled pitches as small as possible. The more samples available, the more natural the sampled work will sound later.

Of course, one could also sample all frequencies in the audible spectrum of the human ear. But the more samples you use, the bigger the whole thing gets. This would have exceeded the size of all available memory, especially at this time.

In the end it is not necessary to sample all frequencies. You should always find a good compromise between quality and size. We recommend the series of articles "The Lost Art of Sampling" at **www.soundonsound.com** to all those interested in sampling.

Multisounds take up the principle of combining several samples into one sound. Although the pitches between the samples are also transposed here, the number of samples also reduces the difference between the sampled pitches, keeping the above effect as small as possible. This principle is used by all samplers today. In most cases, several samples for different velocity levels are also possible. This can be done in M1 with the combinations.

## Sample types

Multisounds can contain two types of samples: PCM and DWGS.

### *PCM*

PCM stands for pulse code modulation. This is a method for digitizing analog audio signals. Each WAV file contains, for example, PCM data.

In the M1, PCM sounds represent "real" recordings that are usually much longer than just an oscillation.

### *DWGS*

The **D**igital **W**aveform **G**enerator **S**ystem is Korg's answer to single cycle waveforms.

DWGS are mathematical, i.e. not natural, waveforms with a length of usually only one oscillation. They provide an efficient and compact storage option and are particularly suitable for typical synthesizer sounds.

DWGS are present in several Korg synthesizers, including the DSS-1 and DW-8000, which can be loaded into the WaveReX, as well as all wavetables you can find if they do not exceed 8.388 s in length.

If you want to create your own single cycle waveforms, we highly recommend the **SCW Editor** from Sheets of Sounds (http://scw.sheetsofsound.com/).

When using DWGS, please note the technical limitations of your device (see **Technical Restrictions**).

### Scheme of a DWGS

DWGS must always consist of eight samples with the following properties:

31250 Hz, 16 Bit, Mono, one oscillation

Length Sample 1 = 512, Note B1

Length Sample 2 = 256, Note B2

Length Sample 3 = 128, Note B3

Length Sample 4 = 64, Note B4

Length Sample 5 = 32, Note B5

Length Sample 6 = 16, Note B6

Length Sample 7 = 8, Note B7

Length Sample 8 = 4, Note B8

The transpose is mathematically 20 for all samples. Which top key is chosen is at your own choice. Theoretically every note between the root note and the next higher root note is possible. The default for Korg is the F note.

You should also make sure that you set the loop point to 0. Since the sample consists of only one oscillation, otherwise only half the sample would be looped. The sound would be significantly different.

Just use the swap Start and Loop button to change the start and loop point. The sample will start in the middle and be looped over the whole length. You can also set both the start and loop points to 0.

**The Korg DWGS Standard**

The following standard was used at Korg for the DWGS:

| *Sample* | Start | Loop | End | Trans-pose | Level | Root | Top Key |
|---|---|---|---|---|---|---|---|
| *1* | 256 | 0 | 512 | 14 | -15 | B1 | F2 |
| *2* | 128 | 0 | 256 | 16 | -15 | B2 | F3 |
| *3* | 64 | 0 | 128 | 17 | -15 | B3 | F4 |
| *4* | 32 | 0 | 64 | 19 | -15 | B4 | F5 |
| *5* | 16 | 0 | 32 | 20 | -15 | B5 | F6 |
| *6* | 8 | 0 | 16 | 22 | -15 | B6 | F7 |
| *7* | 4 | 0 | 8 | 23 | -15 | B7 | F8 |
| *8* | 2 | 0 | 4 | 25 | -15 | B8 | F9 |

Each sample thus has a range from the next lower F# to the next higher F, with the fundamental in the middle of the range. An exception is the first sample. This is transposed from the M1 down to the C-1.

## NT-Sounds

NT stands for **N**on-**T**ranspose. Samples declared as NT-Sound are not transposed and played back with the same pitch on the entire keyboard.

In Korg's original M1 concept, NT-Sounds are independent sound types that exist in parallel to Multi and Drumsounds. They always consist of only one sample!

We changed this concept with WaveReX. From now on any number of samples can be declared as NT-Sound in a Multisound. This has the advantage that several non-transposed samples can be placed on the keyboard, e.g. on each octave one. Here you only have to specify the root note for each sample. The M1 then automatically places this sample on all keys between the specified root note and the next lower root note (of another sample).

Nevertheless, NT-Sounds can be created according to the original concept.

## Drumsounds

Drumsounds are always samples of type PCM. Using DWGS as drum sounds is not intended.

The M1 has four drum kits. These kits can be assigned to individual drum sounds on the M1.

To use samples as drum sounds in the kits of the M1, they only have to be created or declared as Drumsounds on the card. This is the traditional procedure.

Another possibility is not to use the drum kits of the M1. Instead, custom drum kits are created as a Multisound. Each key of the keyboard is assigned to exactly one drum sample. For this purpose, the root note and top note are set to the same note for each sample or all samples are declared as NT-Sound (see **Editing a Drum Kit (Multisound)**).

# Additional Information

## The middle C

Like most Japanese synthesizers, the C4 is the so-called middle C. You should take this into account when setting the key range of the samples in the setup window.

## The key range of the Korg M1 Music Workstation

The M1 has a key range from C-1 to G9, which means (almost) eleven octaves.

## Technical Restrictions

### Korg M1 Music Workstation

Due to the technical limitations of the device, the following maximum values cannot be exceeded:

| | |
|---|---|
| Number of Multisounds: | 28 |
| Number of Drumsounds: | 15 |
| Number of PCM-Samples: | 70 |
| Total number of samples: | 256 |
| Transposing capacity upwards: | 19 semitones |
| Transposing capacity downwards: | unlimited |
| Multiple use of samples: | not possible |

Note that a card you have created must comply with the above conventions, otherwise it will either not be properly recognized by the M1 operating system or will be refused (card will not be recognized).

***DWGS***

A Multisound of single cycle waveforms (DWGS) must contain eight samples. The operating system of the M1 cannot properly interpret any Multisound other than these.

If you have less than eight single-cycle waveforms available for a Multisound, you can create a PCM Multisound instead. This makes no difference in sound. The only difference is that it takes up more memory on the card than DWGS.

However, when using single cycle waveforms, you should try to use DWGS Multisounds first, as the M1 cannot read more than 70 samples with PCM Multisounds. With DWGS, the usable number of samples is only limited by the total number of samples allowed, in this case 256.

***M1(R) & M1(R)-EX***

Currently, it appears that M1 or M1R with older operating systems have problems reading cards containing only DWGS. The first Multisound will be displayed, but not played.

If you also have the problem, just add a dummy PCM Multisound to the beginning of the card.

The problem does not exist with the EX version of the devices.

### Korg Wavestation

The following restrictions apply here:

| | |
|---|---|
| Number of Multisounds: | 118 |
| Number of Drumsounds: | not included in concept |
| Number of PCM-Samples: | limited by total number of samples |
| Total number of samples: | > 256 |
| Transposing capacity upwards: | 30 semitones |
| Transposing capacity downwards: | unlimited |
| Multiple use of samples: | possible |

***DWGS***

The use of DWGS was not intended for the Wavestation, at least none are used on the WSC cards of Korg.

Nevertheless, the Wavestation is also able to read and play DWGS, but they are transposed in the device afterwards.

Please note that the sound may differ considerably from the original.

## Transposing and key zones

For each sample a **Root Note** and a **Top Key** must be specified. The area between the root note and the top note is the key range of the sample, i.e. the area in which the M1 plays this sample.

The **Root Note** represents the **fundamental** of the sample, i.e. the original pitch of the sample.

The **Top Key** is the **highest key on the keyboard** to be assigned to the sample. It represents the upper limit of the range in which the sample is to be played. Today, this area is often called the key zone.

The lower limit of the key zone cannot be defined directly, for example by a bottom key. Here the top key of the next lower sample is used indirectly as the lower limit.

Thus the **key zone** is determined by the top key of the sample and the top key of the next lower sample. The M1 automatically transposes the sample over the entire range based on the given root note. The root note must not lie within the key zone. Thus a sample with the keynote E5, for example, can also be assigned to a range from C4 to F4.

It is also possible to set a "wrong" fundamental as root note to tune the sample deliberately differently

The M1 can transpose samples up 19 semitones (Wavestation 30 semitones), based on the specified root note of the sample. Above this, the same note is assigned to all keys (up to the specified top key). All keys above the highest specified top key remain unassigned. Thus the transposition upwards is always limited by the highest defined top key.

The transposition downwards is limited by the next lower Top Key. If there is no next lower top key, the fundamental is transposed down to the lowest key C-1.

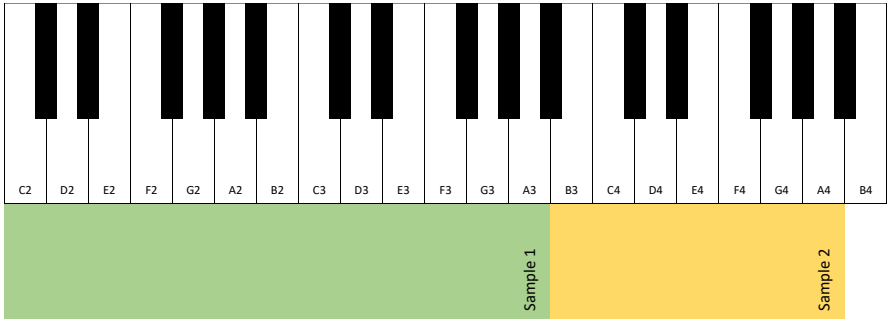
An example:

A Multisound shall consist of two samples. Sample 1 has the fundamental C3 and should be played up to key A3. Sample 2 has the fundamental C4 and should be played up to the A4 key.

For sample 1 the root note is set to C3 and the top key to A3.

For sample 2 the root note is set to C4 and the top key to A4.

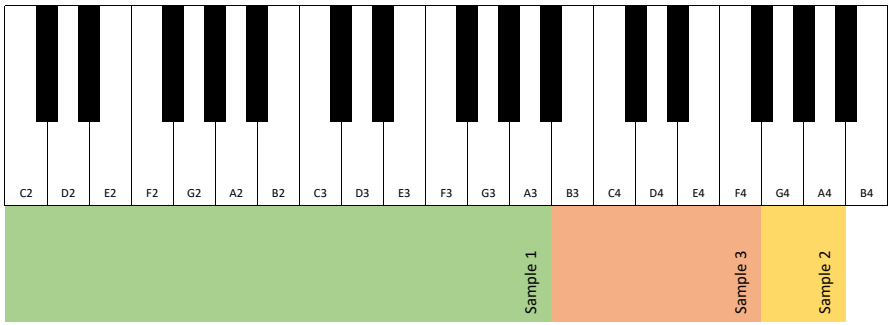
The samples are assigned on the keyboard as follows:




The colored areas show the key zone of the respective sample. Sample 2 therefore sounds in the range B3 - A4. Sample 1 is transposed from A3 to the lowest note C-1 and can be played in this area because no other top key was specified below Sample 1.

Another example:

Now you want to add a third sample. Sample 3 also has the fundamental C4 and should be playable up to F4. The result is as follows:




The Top Key of Sample 1 now limits the range of Sample 3 downwards. The Top Key of Sample 3, on the other hand, limits the range of Sample 2.

## Transpose and the length of digital samples

Digitally stored waveforms often cannot represent the true frequency of the sampled instrument. This is primarily due to the fact that values in the digital world consist only of whole bytes. This results in a certain length of the sample.

An example: The note E5 corresponds to the frequency 659.2552013 Hz. With the sample rate of the M1 of 31250 Hz this results in a length of 47.4 values. This cannot be represented digitally. It must therefore be rounded mathematically. In this case, it is rounded down to 47.

This results in 47 values that are stored digitally. However, if you now calculate back to the resulting frequency with the sample rate, this results in 664.89 Hz. This corresponds to a difference of 5.6347987Hz or 15 cents compared to the original frequency.

These 15 cents have to be corrected afterwards. This is done via the **Transpose** parameter in the setup window.

Especially when creating loops, make sure that they correspond to a multiple of the "digital" length of the desired note. Otherwise, the loop may become out of tune very quickly. Especially in higher frequencies one byte corresponds to half a note.

## Loops in the Korg M1 Music Workstation

There are several concepts for looping samples. The most common systems are probably systems with four points, **Sample Start**, **Loop Start**, **Loop End** and **Sample End**.

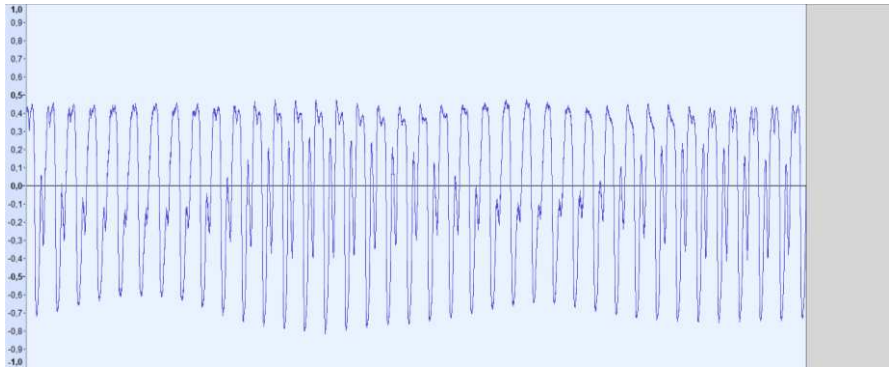
If the note, i.e. the sample, is triggered, it starts at the sample start point, passes through the loop start point and then reaches the loop end point. At this point, the system jumps back to the loop start point and traverses the sample to the loop end point again. As long as the key remains pressed, the loop is made between these two points.

When the button is released, the system does not jump back to the loop start point, but traverses the rest of the sample to the sample end, the sample ends.

These systems are very flexible because you can move the loop freely in the sample. If you want the sample to fade out, you need a sample with the corresponding release phase at the end. However, this piece of the sample unnecessarily takes up memory, so the developers of the M1 have come up with something else:

The Korg M1 Music Workstation creates the release itself by continuing the loop while fading out. This saves space in the memory. With the Korg M1 Music Workstation only three points are needed: **Sample Start**, **Loop Start** and **Sample End**. The M1 loops the sample between the points Loop Start and Sample End.

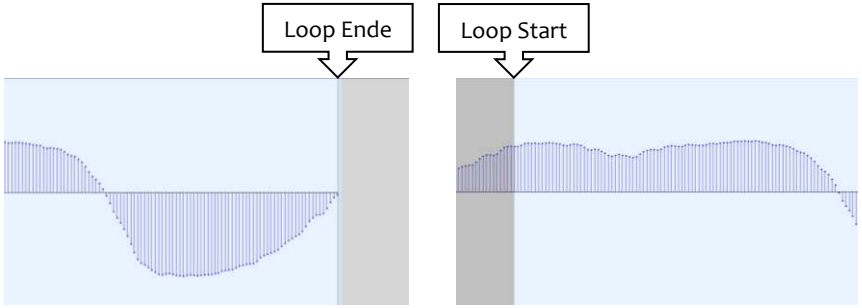
Accordingly, all samples to be looped can and must be cut off "hard" at the end, since the release takes over the Korg M1 Music Workstation.



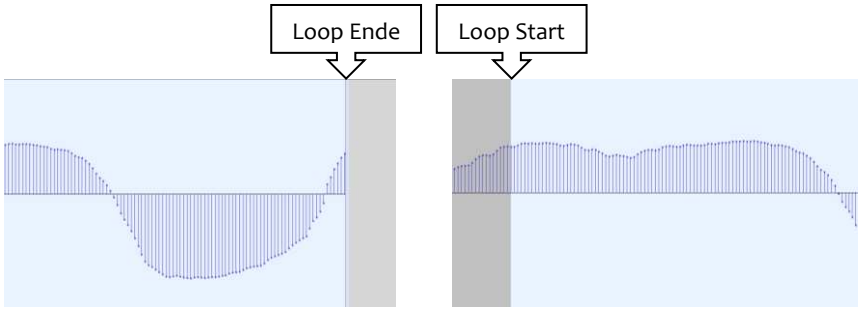
A fade out in the sample would be counterproductive, as this part would be looped. Of course, samples with a fade out can also be used as long as the loop is deactivated for this sample.

**X-Fade**
<this function is still in progress>

Usually it is very difficult to find a working loop. Especially the transition from the end of the loop to the beginning of the loop can be tricky. If the difference between the last value of the loop and the first value of the loop is too large, the loop cracks.




Here cross-fades (also called X-fades) can help considerably. The last values of the loop are adjusted to the beginning of the loop. The result is a smooth transition and cracking is prevented.




## Initialization of the memory of the Korg M1 Music Workstation

Sometimes you want to start a new sound from scratch. An Init program is a good way to do this. Unfortunately, the Korg M1 Music Workstation does not offer any Init programs by default. For this you have to initialize the memory of the Korg M1 Music Workstation. Note that this will erase all memory. You should therefore save it first.

Simply press the **INT + COMBI + PROG** keys on the Korg M1 Music Workstation (when switched off) simultaneously and switch on the Korg M1 Music Workstation. The memory is erased during startup. This means that only Init programs are still in memory.


# Tips

## Root note of samples

You can find many samples on the internet right now whose authors have written the root note in the name to make it easier for you. Double check it. In our experience, it often happens that the root note is not correct!

## Cutting samples optimally

Check if the samples are optimally cut, i.e. if there is still silence at the beginning or end of the sample. Some samples were cut to a certain

length, or a certain timing was intended. That would be counterproductive in this case. Note that every byte, even if it is silence, takes up space on your WaveReX.

## Save your work

Note that the Korg M1 Music Wavestation does not automatically save your edited programs. You must always do this yourself in the corresponding menu. If the power goes out or you switch off the Korg M1 Music Workstation your changes are all gone. This also has the advantage that your programs are never overwritten automatically. Just turn off the Korg M1 Music Workstation if you don't like a change and want to return to the original state of your program.

# Troubleshooting

## My card is not recognized by the synthesizer

First, make sure that there is readable content on your WaveReX. Without content the card is of course unreadable for your device.

However, especially in a brand new state, it can happen that your card is not always recognized.

Don't worry! All WaveReX have been tested and left the house fully functional. The fact that the original PCM cards often have the same problems doesn't comfort you in this situation.

Unfortunately, the card slot of many devices is in better or worse condition, depending on how often the card slot has been used in the past. This can contribute to contact problems.

In addition, the Wavestation seems to be more tolerant than the M1.

If your WaveReX is brand new, the case will have to "sand" itself into your card slot. Experience has shown that the contacts of the card slot snap better into the openings of the pads on the card if you insert the card into the card slot with a little swing.

If you still have problems, please contact support.

## The software editor does not display my WaveReX

Please make sure that your WaveReX is installed correctly. Please refer to the section **Installing the USB Driver**.

If this is not the problem, make sure that your USB cable is not broken. Just replace it with another one.

If this does not help, please contact support.

## I discovered a bug

Please report this to support. We will immediately provide a bug fix.

Do not hesitate to send us your suggestions for improvement. We made WaveReX for YOU.