# The MicroWave Manual

Addendum to Firmware revision 1.20

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# O. Welcome to the MicroWave, "the next generation"!

The MicroWave's worldwide success can be partially attributed to its incredible sound–generation technique and rebirth of the classic 4–pole true analogue low–pass filter. However, the MicroWave owes much of its acclaimed sound–shaping characteristics to its versatile architecture and unique features. Continuing improvements and updates are always on our minds here at Waldorf, hence revision 1.20, "the next generation."

There are several areas in which revision 1.20 will further set the MicroWave apart from the synthesis crowd:

- 1. Intelligent, realtime harmonic "Just-Intonation" based upon what YOU play, not on a fixed table.
- 2. Realtime MIDI system–exclusive parameters that can address the different virtual instruments of the MicroWave independently (in multi-mode).
- Two or more MicroWaves can be completely networked to expand the available voices, while maintaining complete control from a single front panel or sequencer, using the "Link" mode.

We believe these new features will provide an ever-increasing opportunity to create artistically satisfying and commercially successful music on one of the world's leading Synthesizers (that's right, a capital "S"!)

You should be familiar with the two main manuals shipped with your MicroWave, the "Performance Manual" and the "Program Manual", and have a working knowledge of the synth. If you just purchased your first MicroWave, please start by studying those two manuals, then come back to this addendum. Don't be afraid of having to re-learn everything – nothing has been changed, only more has been added.

In order not to damage any components within your MicroWave we suggest that a firmware exchange be done only by a qualified technician.

# DO NOT OPEN THE UNIT UNLESS YOU KNOW EXACTLY WHAT YOU ARE DOING!

The MicroWave warranty will be void if the E-PROMS are not exchanged by a qualified Waldorf service center.

# I. Realtime Just-Intonation

### 1. Realtime Just-Intonation

Waldorf is proud to be the first synthesizer-company worldwide to implement the radically new "hmt"-tuning algorithm developed by Hermode-Tuning-Systems of Germany.

This tuning algorithm allowes you to play in "just-intonation" regardless of the key or where your chord progression may lead. Instead of using static tables that provide only another fixed form of tuning, the "hmt" tuning calculates the frequencies of each note played in REALTIME according to the chord or interval that you are playing.

No matter how wild your key-modulations, if you alway or never change keys, or whether you use four or four hundred different chords per minute, the "hmt" tuning will analyse and adjust each note independently. This is possible because this tuning-system does not use tables, as everybody else does, but rather an intelligent algorithm that calculates in realtime while you feed it the music.

The best aspect, though, is yet to come: Due to very clever implementation, the "hmt" re-tuning of each note is compatible to the standard equal-tempered tuning. This is done by keeping the "tuning centre of gravity" in the equal-temperment region, and adjusting the individual pitches around it. The "tuning center of gravity" is the perceived base pitch of an interval or chord.

Therefore, you could use the MicroWave to play backing pads in "just-intonation" while soloing on top of it with a guitar, piano, or even (bite your tongue) a regular synth Wind and string players will immediately enjoy the MicroWave's new tuning, as they are used to adjusting their intonation in an ensemble so that chords will sound perfect – and that's just-intonation (sorry 'bout the pun!).

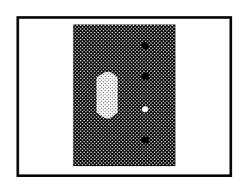
On the other hand, if you program a patch with some subtle animation built into it (e.g. slight detuning or LFO on one oscillator only) you will notice how well this effect will transpose when you play in just-intonation. And finally, a pipe-organ patch will bear massive and beautifully pure basses and stunningly sharp harmonics – besides being the only pipe-organ sound in the world which sounds in perfect just-intonation, even when changing from C-major to F#-minor to follow the audiences gospel!

# I. Realtime Just-Infonation

You can activate the "hmt"tuning both for single sounds as well as individually for each instrument in "multi-mode". Here's how:

### 1.1 Single Sounds

 Press the [mode button] until you reach Sound-Edit mode. The third LED from top should be lit.



 Press the rightmost select button labeled (Pan/Glide/ Name) until the display reads:

PAN/GLIDE I PANNING: M00

- Press the red [Parameter/Value button], so the cursor is positioned under the "parameter" field of the display.
- Use the [alpha-dial] to select the "temperment" parameter. The display should read:

PAN/GLIDE I TEMPERMENT: LN+

Press the [Parameter/Value button] again, so that the cursor rests under the "value" field. Use the [alphadial] to select "hmt" as shown in the adjacent display:

PAN/GLIDE E TEMPERMENT: HMT

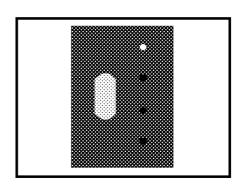
As it holds true for all tuning-table selections, the "hmt"-tuning can be individually selected for each Sound-program.

Of course you can still use all other temperment values as discussed in the Programming Manual, pg. 4–32.

# I. Realtime Just-Infonation

### 1.2 Multi-Sounds

Press the [mode button] until the topmost LED illuminates.



Press the [select button] labeled (Instr. Parameters) until the top line of the display reads:

MUL:A01 INS:1 I ENABLE INST: ON

- Select the instrument you wish to have realtime "just-intonation" by repeatedly pressing the rightmost button labeled <Instr. Select> until you reach the desired instrument number.
- Switch the [alpha-dial] into parameter-mode and select the Instrument-parameter 'Temperment'

MUL:A01 INS:1 I TEMPERMENT: LN+

 Press the [paramter/value button] again to select the value field of the display. Use the [alpha-dial] to select "hmt"-tuning.

MUL:AB1 INS:1 E TEMPERMENT: HMT

### **ATTENTION!**

Each instrument's temperment parameter can be set to a different value. Therefore, if you want to use the "hmt" just—intonation algorithm on each instrument, you must define each instrument separately. On the other hand, you might define one instrument with "hmt"tuning, and a second one with standard equal-temperment tuning. By layering these two instruments together, you can achieve a very interesting chorus—effect. The possibilities are endless.

### 2. Link Mode

This is a very handy feature for all MicroWave users who need more voices and own two or more MicroWaves.

Link mode is the next logical step upwards from "overflow" mode. While the latter will output all MIDI notes which exeed the voicelimit, it doesn't sernt any information about a currently changed parameter etc. "Link mode", on the other hand, puts each MicroWave into a slave mode, whereby it will track all commands of the master-unit. Thus, any parameter changed on the master-unit, will be obediently duplicated on all slave units.

A master-unit will also send the active program to all slave-units, as well as all subsequently selected programs, whether they are "Sounds" or "Multis." Don't worry about losing stored programs, as slave units will play only from their edit-buffers (of which there are nine). Therefore, the only volitile programs are edited versions. To save edited versions, store them to a valid location before moving on. In summary, by using "Link" mode, you may address any number of MicroWaves as if they were one unit. All parameter changes will be made from the master-unit, which also recieves all the MIDI data for all the linked units.

You only have ONE MicroWave?! No problem. Up until you get your second unit you can still use the "Link" mode in a different way. Since the "Link" mode will output all data generated from the front panel, you could:

- "Play" the [alpha-dial] and knobs live into your computer to achieve more musical control over your sounds.
- Record actual sound parameters directly into you your sequencer. This can be achieved because whenever the MicroWave sees a MIDI program-change, it outputs the Sys-Ex bytes that define that program. First record program-changes into the sequencer. Then that track back into MicroWave play simultaneously re-record the MIDI out of MicroWave onto an unused track, filtering everything except Sys-Ex data. What you will have left are the Sys.Ex definitions of the sounds you use, recorded into the appropriate positions of the song. You'll never lose

your sounds, and it's actually very easy!

# 2 Link Mode

How to use the "Link" mode:

- Connect the MIDI-output of each previous unit to the following unit's MIDI-input.
- Connect the master keyboard/sequencer to the first unit's MIDI-input (This will be your master-unit).
- Set the last unit in the chain to "Overflow: Off". You will find this parameter in the "Device-parameter" page in "Global" mode (see pg. 4-11 of the Performance Manual)

 Set the second through the second-to-last (You DO have at least four MicroWaves, don't you?!) to "Overflow: On".

 Finally, put the first MicroWave into the master-mode by setting it's "Overflow" parameter to "Link".

Now you're ready to roll! Should you have but one MicroWave, all you have to do is set it to "Overflow: Link". When you power down, "Link" mode is automatically switched off (but regular Overflow-mode is stored). This is so you won't inadvertantly put your MW's into a Link chain, as it might ruin the other units' event buffers. After power-up, you must set the Master-unit to "Link" mode manually.

DEVICE STATUS I MIDI OVERFL.:OFF

DEVICE STATUS I MIDI OVERFL.: ON

DEVICE STATUS I MIDI OVERFL.:LNK

# 3 Realtime Parameter System-Exclusive Reception

# 3. Real Time Prameter System–Exclusive Reception

This feature allows you to manipulate ny sound-parameter via MIDI using short MIDI Sys-Ex strings. If you have a sequencer which has a function to generate and transmit Sys-Ex events, peferably by some sort of screen-fader, you can invoke real time control of any parameter.

Great as it may be, we at Waldorf simply had to top this basic feature. Now, when in "Multi" mode, you can control each parameter of EACH instrument separately! This holds true even if all instruments recieve on the same MIDI channel!

This function opens wide applications for those that like to remotely access or change certain parameters in real time while playing or sequencing. Please be aware, however, that because MIDI is linear data, it can only travel so fast (or so slow, depending on how you look at it). Too much Sys-Ex data may noticeably slow down note reception.

Since real time parameter Sys-Ex acts only on recieved MIDI data, there are no corresponding user-interface functions. Simply send the correct Sys-Ex bytes to the MicroWave and it will happily carry out the command. Hopefully, it will do what you thought it would.

So you know what to send, and how, here is a brief explanation:

All of the following examples are written in Hex-Code. This makes it easy to input these into most sequencer Sys-Ex editors. Should you need the data in any different form (binary/decimal), please refer to a conversion chart that will translate the corresponding formats.

# 3 Realtime Parameter System = Exclusive Reception

### 3.1 General Sys-Ex handling.

All System-Exclusive messages must be in the following format:

FØh IDW IDE DEV IDM -----data----- VALID F7h

The meaning of those terms are:

FØ: start of Sys-Ex message

h : Hex

IDW: Waldorf MIDI ID, which is 3Eh

IDE: Equipment ID = OOh for MicroWave

DEV: Device number, OOh to 7Eh, 7Fh = global

 ${\tt IDM}: \textbf{Message ID}$ 

Data: whatever data bytes, OOh to 7Fh

VALID: the check-byte for real time sys-ex data 7Fh.

The VALID-flag is needed for identifying the origin of a sys-ex message. A value of 7Fh shows a non-MicroWave origin of the data, as is true for an editor or sequencer. Data originally send by a MicroWave carry a different VALID-flag. All of this, however, is of no concern for day-to-day use.

An unknown message will lead to no reaction; it will be ignored completely.

It is important to address the correct device number, since otherwise the MicroWave will simply ignore the recieved messages. Therefore, first get to know your device number by looking in the device status page. Usually the device–number would be zero.

# 3 Realtime Parameter System-Exclusive Reception

### 3.2 Sound-edit parameter Sys-Ex

With that in mind, a typical real time parameter string would look like this:

FØh 3Eh ØØh ØØh 6Øh ii pp pp vv 7Fh F7h

### where:

the first four entries indicate the header with ID's and Device-number,

60h: realtime Sound parameter Sys-Ex message

ii: Instrument number (O..7), ignored in Single mode

pp: parameter number, explained below

vv: value of the specified parameter

7Fh: real time sys-ex VALID flag

F7h: end of Sys-Ex message

The Instrument number tells the MicroWave which of the eight available instruments to address in Multimode. Thus you can individually control each instrument, even if all recieve on the same MIDI channel. But beware! If you address an undefined instrument, you will pollute your environment with digital garbage whose only function is to question the allmightiness of the user.

There are two parameter bytes. This is due to the fact that the MicroWave has provision for 18O parameterslots, but MIDI only has 127 distinct values per MIDI-byte (7 bit instead of the "regular" 8 bits). In order to address all of the MicroWave's parameters, the 8 bit information is split into two "nibbles" (not what you think, Jack!), which are sent one after the other.

Appendix A, at the end of this addendum, will give you all parameter numbers and value-ranges as they must be used for this Sys-Ex message.

# 3 Realtime Parameter System – Exclusive Reception

### 3.3 Multi-program Sys-Ex

Of course all Multi-program parameters can be accessed the same way as Sound-parameters. But since there is only one Multi-program present at a time, there is no Instrument to define, thus this byte is simply ommitted.

A typical Multi-programm parameter Sys-Ex message might look like this:

FØh 3Eh ØØh ØØh 61h pp pp vv 7Fh F7h

### where

the first 4 bytes define the now well-known MicroWave header with device number OO.

61: realtime Multi-parameter Sys-Ex message

pp: parameter number

vv: value of the specified parameter

7Fh: real time sys-ex VALID-flag

F7h: end of Sys-Ex message

The same parameter address trick is used as in the realtime Sound-parameter Sys-Ex message.

See appendix B for the Multi-program's parameter bytes and value-ranges.

# 3 Realtime Parameter System-Exclusive Reception

### 3.4 Realtime Global-parameter Sys-Ex

To really get everything automated, you can even remotely change MIDI filter settings, master volume, or even the basic MIDI channel. This could become quite a mess, so be careful.

The message looks fairly familiar:

FØh 3Eh ØØh ØØh 62h pp vv 7Fh F7h

### where

the first 4 bytes define the now unforgettable MicroWave header with devive number OO.

62: realtime Global-parameter Sys-Ex message

pp: parameter number

vv: value of the specified parameter

7Fh: real time sys-ex VALID-flag

F7h: end of Sys-Ex message

Since there are only a few "Global" parameters, this message uses only one MIDI byte to encode the Global-parameter number.

See appendix C for the Global's parameter bytes and value-ranges.

With all this information, you can now have fun programming all your master keyboard or sequencer Sys-Ex strings for real time control of the MicroWave. The sky's the limit (So's the MIDI baud-rate)!

### 4. New System-Exclusive dump-functions

Besides the real time Sys-Ex parameter implementation, there are a few minor improvements in the dump-department of the MicroWave that will make the day-to-day job a bit easier.

### 4.1 Sound programs in Single-mode

If you manually dump a Sound-program in Single-mode, the usual Sound-program dump will be issued. This is the same old dump the MicroWave has sent for years.

However, if such a dump (or any Sound-program dump that was saved before this firmware release, for that matter) is recieved by the MicroWave, it will automatically switch to Single-mode if it has been in Multi-mode. If it already was in Single-mode, nothing else will happen.

The idea of this is that the MicroWave will automatically switch into the mode most useful for a specific dump. Also, in a sequencer environment, you may switch between "Multi" and "Single" mode environment if you wish to do so.

### 4.2 Sound programs in Multi-mode

Unlike previous firmware revisions, you can now send a Sound-program dump while you are still in Multi-mode. You achieve this by selecting the Instrument that plays the desired Sound-program, pressing the [mode button] until you are in Sound-edit mode, and then calling the MIDI-transfer page by holding [Shift] and pressing the [Store button] four (4) times.

The usual display will await you:

SYSEX TRANSFER DUMP SOUND: A01?



As usual, press [OK] to acknowledge or any other button to abort.

This will issue a Sound-program dump with its corresponding instrument number. Depending on what mode the MicroWave is when it receives the dump, one of two things will happen:

### A - The MicroWave is in Single mode.

The dump will be recognized and put into an unused edit-buffer. It can immediatly be played via MIDI, just like the old Sound-dump. In this mode there is no difference betwen the two.

### B - The MicroWave is in Multi mode.

The dump will be put into the edit-buffer used by the Instrument number that is attached to the dump. This sound will then replace the currently selected Sound-program of that Instrument.

In marked difference to the old Sound program dump the MicroWave will remain in Multi-mode when recieving this Sound-dump. It's purpose is obviously to exchange certain sounds within a Multi-arrangment by sending the correct dump.

If you are in doubt of which type of Sound-program dump you should generally use, our advice is to use the new one. You then at least have the option to one day replace a Sound-program in Multi-mode. If you want to change remotely from Multi- to Single mode you can always send a dummy dump first to switch modes and then send the desired Sound-program dump in the new format, which wouldn't have switched modes by itself.

If you have an existing library, and want to store it in the new format, load the Sound-programs into the MicroWave, change to Multi-mode, and select each sound as Instrument #1. Dump it using the above mentioned procedure. However, this is only necessary if you really intend to use those Sys-Ex functions described above – otherwise just leave the programs as they are. They will play perfectly under the new firmware.

One last thing to recall: the new Sound-dump is not compatible to firmware revisions below 1.20. If this compatibility is of importance to you, you must store sounds by using the old dump.

### 4.3 Multi programs

Multi-programs will now switch automatically into Multi-mode unless the MicroWave already was in that mode.

The dump-format itself, however, has not been changed at all.

However, in marked difference to what the original manual states, sending a Multi-program dump from the frontpanel will actually issue an Arrangement-dump, which eases things for sequencer users.

### 4.4 Arrangement dump

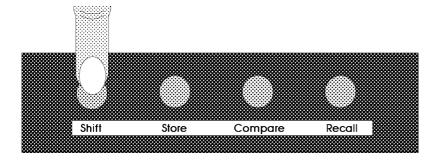
The same holds true for recieved Multi-Arrangements, which send a Multi-program together with all associated Sound-programs.

The dump-format itself, however, has not been changed at all.

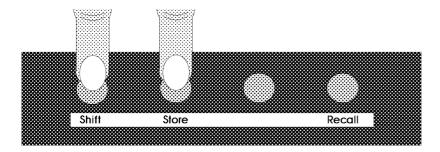
### 4.5 User-wavetable dump

User Wavetables may now be dumped manually. This might be necessary when using Link-mode, since no user-wavetables will be sent automatically from the master-unit. This is a precaution, since any transmitted wavetable will erase the previously stored table, and might even destroy other tables that use some of the same waves.

You should definetly back-up all wavetables even if you only want to dump a single table from one unit to another. (This, of course, doesn't hold true if you hate the previous wavetables, or are rather adventurous).



- Press the [Shift button] and hold it.
  - → don't let go of the [Shift button], otherwise it will act as a regulat [select button] and select a page.



 Press the [Store button] four times amd let go. Release the [Shift button] also. The display will read the following:

SYSEX TRANSFER DUMP SOUND: A01?

You are now in the fourth store level.

Besides the previously mentioned dumps, you now have a new option:

- Dump Userwaves? will dump all User-Wavetables and according Waves.
- To execute, press the[OK button].

# The MicroWave Manual

TRANSMITTING PLEASE WAIT...

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# 5. Status memory

4.6 Global parameter request

### 5. Status memory

Appendix A: Sound-parameter Sys-Ex chart

Appendix B: Multi-parameter Sys-Ex chart

Appendix C: Global-parameter Sys-Ex chart

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### "the next generation"!

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