moonwind

ANALOG FILTER TRACKER

Operating Manual

Contents

Introduction

Thank you for using the Jomox Moonwind!

The Moonwind is a real analog stereo filter with built-in step sequencer, a fantastic sounding digital effects chip, two LFOs and envelope modulation.

Everything is storeable and controllable via midi.

Although this device is basically an effects unit, you can play the Moonwind like a synth via MIDI notes and play melodies using the self-resonating filters.

The sequencer is able to control cutoff, Q and resonance per step and turns a stereo filter with analogously fed back effects into a creative instrument all its own.

The Moonwind is an easy-to-use and awesome sounding analog sound engine that is playable like a synth.
By incorporating MIDI controllers, it can be seamlessly integrated into a DAW recording system.

Use of this filter device is simple and self-explanatory for the most part. We recommend that you read this manual carefully in order to allow quick exploration into all of Moonwind's amazing musical possibilities.

Before we start, please take note of some important security instructions:

- Please use the Moonwind only in dry rooms. Please never let fluids or humidity get into the device!

- Only use the original wall wart adapter. Other power supplies may seriously damage the Moonwind!

- For cleaning of the Moonwind, please use a slightly damp cloth (unit powered OFF), never solvents or agents!

- The Moonwind is a complex electronic device and should therefore be treated carefully!

- If any damadge or malfunctions occur, please immediatly turn off the device, unplug the power supply and contact your music dealer or send an email to mail@jomox.de.

1. Connections

Before you cable your setup, switch off every unit to be connected. On the back side of the Moonwind you can find the following connectors:

(seen from the top)

(seen from the back)

1.1. 10.5V~ AC

The supplied 10.5V~ 1.2A wall wart adapter shall be plugged in here. Please do not use any other power supply since the Moonwind needs AC line supply. In case once you would need a non-Jomox power supply please take care that it delivers at least 9V~ to max. 12V~ AC voltage and at least 1.2 Amps. An average halogen transformer may be able to provide these demands.

1.2. Midi In

This jack serves to control the Moonwind by another Midi capable device, e.g. a soft- or hardware sequencer, a controller box, a Jomox XBASE888/999 or similar. Please use a standard midi cable as short as possible.

1.1. Midi Out

Serves to transmit Midi data from the Moonwind to another Midi capable device, e.g. a soft- or hardware sequencer, in order to exchange data. Please use a standard midi cable as short as possible.

1.2. Midi Thru

Serves to bypass Midi data from the Moonwind to another Midi capable device. The incoming Midi messages get passed through by hardware to the Midi Thru port without any change. Please use a standard midi cable as short as possible.

1.3. Input L(Mono) R

These are the stereo left and right audio inputs for the filter and the effects processor. If you just want to process a mono signal, insert the cable into the L(Mono) jack. The switching jacks bypass the signal automatically to both filters then.
Basically the inputs are made for line level signals, but they are hi-z (high impedance) though and have enough gain to amplify a guitar signal for direct processing without the use of a preamp. Please use standard ¼ inch plug cables for each side.

1.4. Output L R

Delivers the audio output signal of the Moonwind. The output is unbalanced and adjustable from -∞ to about max. +20 dBu. Connect the Audio Out to an audio mixer, DAW interface or an amp. Please use standard ¼ inch plug cables for each side.

1.5. Aux Input L(Mono) R

Here you can connect another auxiliary line level input signal which is fed into the filter without a preamp. It is mixed to the main signal path only at the filter input and cannot pass the FX processor. This input has some limitations: there is not way to adjust the level, and the envelope follower does not work too.

2. Operation

User Interface

2.1. Rotary Knobs (Potentiometers)

2.1.1. GAIN

Controls the gain of the input. The Moonwind can process almost any input levels, from weak guitar signals to very high studio line levels of +20dBu.
Please adjust the gain so that the neighbored Peak LED just does not light up yet.

2.1.2. DRY/WET

Controls the mix between the direct signal and the effects amount. Turned whole to the left the output signal equals the input signal without effects (bypass), turned fully clockwise you get the pure effects signal.

2.1.3. MASTER

Controls the output level. The output is unbalanced and adjustable from -∞ to about max. +20 dBu. Thus you can drive even very sensitive inputs (as e.g. guitar amps) directly with the Moonwind by turning the output level low. In a studio environment however you should turn it as high as possible in order to obtain the best possible S/N ratio and sound.

2.1.4. CUTOFF

This knob controls the cutoff (corner) frequency of the filter. According to the shape setting of the filter you change the fundamental properties of the filter and its sound influencing. The range goes from 16Hz-ca. 35kHz and accordingly covers the whole audio range.
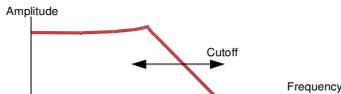
The Moonwind owns two identical filters. Therefore only one side is described more detailed here because the three, in a triangle arranged knobs Cutoff, Q and Res have the same function on each filter.

This is a potentiometer scanned by the cpu. That means, the value will be changed according to the arrow position if you move the knob. Previously stored values jump to the arrow position in case knob lock hasn't been activated before. The advantage is an intuitive editing of parameters since the value corresponds to the arrow position and does not change relative to stored values.

2.1.5. Q

The Q (Q = quality) adjusts the narrowness of the filter. A high value leads to a nosy filter adjustment, a small one to broadbanded sounding filter. At Resonance = 0 the filter will not self-oscillate but instead becomes extremely narrowbanded if Q is at maximum.
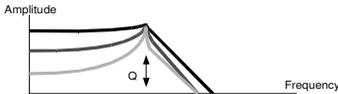
This is a potentiometer scanned by the cpu. That means, the value will be changed according to the arrow position if you move the knob. Previously stored values jump to the arrow position in case knob lock hasn't been activated before.

2.1.6. RES

Adjusts the resonance of the filter. Opposing to most other synth filters the Moonwind has different settings for Q and Resonance. With resonance the filter becomes able to self-oscillate and can produce a stable sine oscillation at cutoff frequency. To make this happen, Q must be set higher than zero as well.
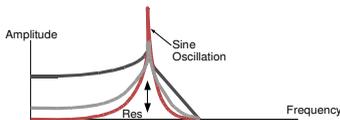
This is a potentiometer scanned by the cpu. That means, the value will be changed according to the arrow positioni f you move the knob. Previously stored values jump to the arrow position in case knob lock hasn't been activated before.

2.1.7. Encoder 1-3

To the left of the LCD display there are three endless encoders which can adjust different values corresponding to the selected mode. The parameters to be changed in quick edit mode are printed on the case

above the knobs. These incremental rotary knobs always work relative to a chosen parameter and increase with clockwise movement and decrease with counterclockwise rotation.

2.1.8. DATA Encoder

With the DATA encoder presets or sequences get selected or parameter values changed. Pressing the knob includes a click function and resembles an enter key. Loading of presets and acknowledge of storing are performed with this click function.

2.2. Tact Buttons

2.2.1. LINK

If Link is pressed the LED Link lights up. In this mode both filters left/right are not separately editable, but instead the lefthanded Cutoff/Q/Res section controls both filters at the same time. That is useful in stereo operation to make both sides sound the same. Pressing Link again leaves the Link mode.

2.2.2. SHAPE L

This button changes the Shape (form) setting of the left filter. By pressing it again four different shapes step through. They are displayed in the LCD. There are four settings:

Lp (Low Pass)
Only low frequencies up to the cutoff (corner) frequency get passed. The trebles are being cut off.
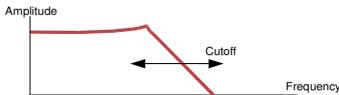
Hp (High Pass)
Only the high frequencies down to the cutoff frequency get passed. The low frequencies are being cut off.

Bp (Band Pass)
Only frequencies within the pass band around the cutoff frequency get passed. The high and the low frequencies are being cut off.
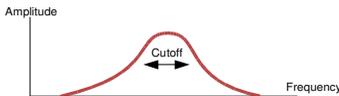
Nt (Notch)
All frequencies except the stopband around the cutoff frequency get passed. The band around the cutoff frequency is cut out.
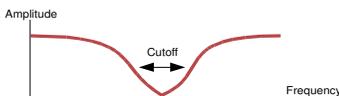
2.2.3. SHAPE R

This button changes the Shape setting of the right filter. The values are the same as with Shape L (see above).

2.2.4. LFO

If LFO is pressed the LED LFO lights up. If you are in the quick edit menu (main single menu), the LFO settings can be changed with econders 1-3. Pressing again leaves the LFO mode again.

2.2.5. PAGE/TAP

With this button you switch between pages I and II. This is indicated by the LED I/II right next to encoder 3. The printing above encoders 1-3 shows which parameter in quick edit mode is addressed to which page.
In sequence mode, this buttons turns the individual step edit mode on or off.
Furthermore, (in a later OS version) it is possible to tap in the tempo.

2.2.6. SINGLE/SEQ

This button switches between the single mode and sequence mode.
In single mode, the Moonwind works as a standalone filter bank.

```
Home FilOOO    Lp    Hp
ChoRv     St   Sdo   Si
```

In case one is within the edit area of single mode, pressing this key turns back to main menu (quick edit menu) first and then changes to sequence mode.
In sequencer mode, the Cutoff/Q/Res can be edited and played back as sequences.

```
                    C120 OO
                    1 16 01
```
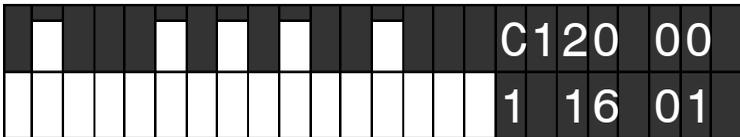
2.2.7. MIDI

Selects the Midi Setup menu in which different Midi settings can be made.

```
Midi Setup        TxClkOff
RxChO1 TxChO1 ClkSyncOff
```
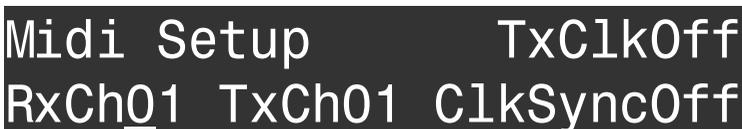
Please find more detailed descriptions of the functions in chapter 6. Midi Parameter.

2.2.8. STORE

Stores a single preset or a sequence. After pressing the display shows:
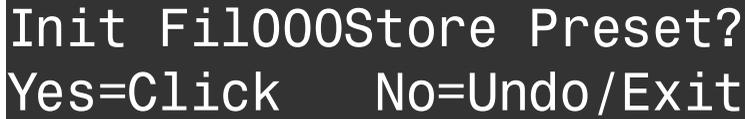
```
Init Fil000Store Preset?
Yes=Click   No=Undo/Exit
```

Now you can still select the destination preset by turning the DATA encoder.

This implies a copy function. If you store a non-edited preset to another location, the unit creates an identical copy of this preset there.

If you click on the DATA encoder or press the Knob Lock button now, the preset gets stored. This proceeding is displayed by a short flashing of the Knob Lock LED.

In order to cancel the storing procedure, press the button UNDO/EXIT.

2.2.9. < LEFT/RIGHT >

With these cursor buttons you can navigate through the edit menu. According to the chosen mode you can select the detailed parameter menus and edit them by encoders 1-3 or the DATA encoder.

If you hold one of cursor buttons longer than a second, the cursor skips automatically quickly through the menus (autorepeat) to reach distant menu pages faster.

2.2.10. DOWN/UP

If the unit is in the main menu (quick edit menu), you can step through presets depending on the chosen mode (Single/Seq) without needing to load them.

Within the detailed edit menus you can edit values in discrete steps with these buttons .
If you hold one of the Up/Down buttons longer than a second, the value changes repeatedly (autorepeat).

2.2.11. KNOB LOCK

If Knob Lock is pressed, the LED above this button lights up. In this mode, no edits can be made by the continuous potentiometer knobs Cutoff/Q/Res.
This is useful if you play the Moonwind live or in a studio recording and only want to use previously programmed presets which are not due to change during playing or recording.

Although the potentiomers are filtered well, you can't eliminate 100% that a recalled value might jump unintendedly because the knob stands between two values or is moved a little bit.
Pressing this button again leaves the Knob Lock mode again.

2.2.12. UNDO/EXIT

Cancels the storage process (see Store) or undoes previous parameter records in sequence mode (see Sequencer).
Up to 500 edit steps can be made undone. If the undo level has ended, the line 'no further undo!' is displayed in the LCD.

2.2.13. STOP

Stops the sequencer.

2.2.14. START

Starts the sequencer. Regardless of the Single/Seq mode the sequencer runs and shows the played steps by the flashing of the Start LED. Please note that if you are in Single mode and the sequencer runs, the filter editings get overriden each time a step is played back.

2.2.15. RECORD

Activates the realtime recording of Cutoff/Q/Res knobs movements while the sequencer is running. You can see the recorded changes as a bar graph only if you are in sequencer mode. With UNDO/EXIT you can undo up to 500 edit steps.

Record can only being activated if the sequencer is playing. The red LED next to the button lights up. Pressing the button again leaves the record mode.

2.2.16. LCD Display

The 2x24 digits alphanumerical liquid crystal display (LCD) in the center of the device shows the actual settings according to the modes. Above and below the LCD small letters are printed on the case in order to ease the assignment of the parameter bars in quick edit mode.

```
              C Q R        C Q R
Home Fil000       Lp       Hp
ChoRv     St      Sdo      Si
    1 2 3 F     R I E    R I E    L
```
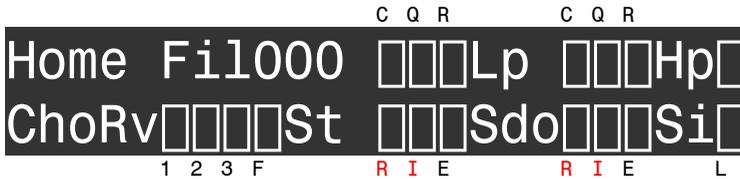
The meaning of the abbreviations are as follows:

C = Cutoff
Q = Q
R = Resonance
1 = FX Parameter 1
2 = FX Parameter 2
3 = FX Parameter 3
F = FX Feedback
R = LFO Rate
I = LFO Intensity
E = Envelope Amount
L = Level (Bar goes across both lines)

2.3. Single Presets

After turning on, the Moonwind is in Single mode and in the main
menu i.e. quick edit mode.
The filter and the effects processor now work like a filter bank and
can be edited directly by the rotary knobs. Each change is immediatly
audible and can be stored right away.

```
Preset Name + Number      Left  Shpe  Rght  Shpe
                          C Q R       C Q R

Home Fil000        Lp        Hp
ChoRv      St      Sdo       Si

            1 2 3 F         R I E    R I E     L
FX Program + Param Rout  Modulation  Modulation
```

In the picture you can see the layout of sections in quick edit screen.
For the most important adjustments and quick sound editings you
normally don't need to leave the quick edit mode.

By turning the DATA encoder you can recall a maximum of 512
preprogrammed sounds – a small number of them are factory
presets. The number and the name are shown at scrolling. By clicking
on the DATA knob the chosen preset gets loaded.
A second way to choose presets is by stepping up or down with the
Up/Down buttons. Now you don't have to explicitly load the preset, it
loads automatically.

2.4. Editing in Quick Edit Mode

If you apply an audio signal to the Moonwind and level it with the gain knob, you can see the level indicator bar moving right above the letter L.

With the Cutoff/Q/Res knobs you can immediatly edit the sound. You see the changes as bar movements in the quick edit screen display.

To edit the filter shape, press buttons Shape L/R in the upper row. They work without a menu and show the current Lowpass/Hipass/Bandpass/Notch setting in the quick edit screen.

The white printed items of the first line (= Page I) yield for the three encoders now.
If you turn the encoders, you edit the values of FX Parameter 1-3 of the effects chip which is shown in the lower left area of the quick edit screen.
The effects chip always has three values to edit: FX Para 1-3. The selected effects algorithm is shown by the abbreviation down left.

Now press the page button and you can edit the two envelope amounts of the filter envelope and the FX Feedback by the three encoders. The white items behind roman II correspond to these page II functions.

Attention, with some effects programs the analog FX Feedback (if cranked up) can produce some strong feedbacks which might sound awful!

By pressing the LFO button you enter the LFO mode. Now the red printed items yield for LFO left or LFO right.
In LFO mode, the three encoders control the rate, intensity and wave form of one of the LFOs. With the page button you can switch between them.

2. Operation

2.5. Editing of Sound Parameters

If you are in the main menu (quick edit mode) of Single mode, press the right cursor.
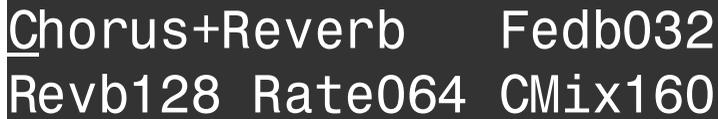
```
Chorus+Reverb   Fedb032
Revb128 Rate064 CMix160
```

Now you can navigate through the different menu pages of sound parameters. At the cursor location you can change the value by turning the DATA knob or the Up/Down buttons.

You can also use encoder 1-3. Within a page the cursor jumps automatically to the position addressed by the respective encoder of the three values of the lower row. In the above example encoder 1 edits Revb, encoder 2 Rate and encoder 3 CMix.

A detailed description of all menu pages and sound parameters you can find in chapter 4. Sound Parameter.

Furthermore, you can find a detailed description of the sequencer and its usage in chapter 5. Sequencer.

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3. Functional Description

3.1. Hardware Description

The Moonwind is an analog stereo multi mode filter with an additional effects processor.
Who doesn't want to spend too much time with technical details of sound processing may proceed now to chapter 4. Sound Parameters.

Multi mode filter means that a circuit with several gain stages and two integrators is made in a way that it offers a lowpass, a highpass, bandpass and a notch (bandgap) on its outputs at the same time.
One of these signals is tapped and forwarded by an electronic switch in the Moonwind filter.
The Q (quality) of the filter determines the narrowbandedness of slope at the cutoff frequency. The term comes from coil filter techniques where selectivity (namely quality) of a resonating LC circuit or a band filter are most important properties.
If Q reaches maximum the filter is extremely narrow banded but does not self-resonate though.
Therefore in the Moonwind there is adjustable Resonance added to Q. With this the filter is able to self-resonate and to produce a stable sine oscillation at the corner frequency.
If Resonance>0 then Q must be >0 as well to get the filter vibrate.
The adjustable frequency range of the Moonwind filter reaches from 16Hz – 35kHz. The cutoff is controlled by an analog exponential generator to obtain a logarithmic-musical frequency resolution.

Other than that, in the Moonwind there is an effects processor FV-1 of SPIN Semiconductor (www.spinsemi.com). This chip has 7 firm effects programs included and is able to address 8 free programmable algorithms. In the Moonwind there are also eight effects of Jomox integrated which may be upgraded or changed with future OS updates.
Basically the fx processor has three adjustable external parameters FX Para 1-3 which are provided by the Moonwind hardware.

Additionally we have added a programmable analog feedback way for the fx section in hardware.

How does it work?

MOONWIND BLOCK DIAGRAM
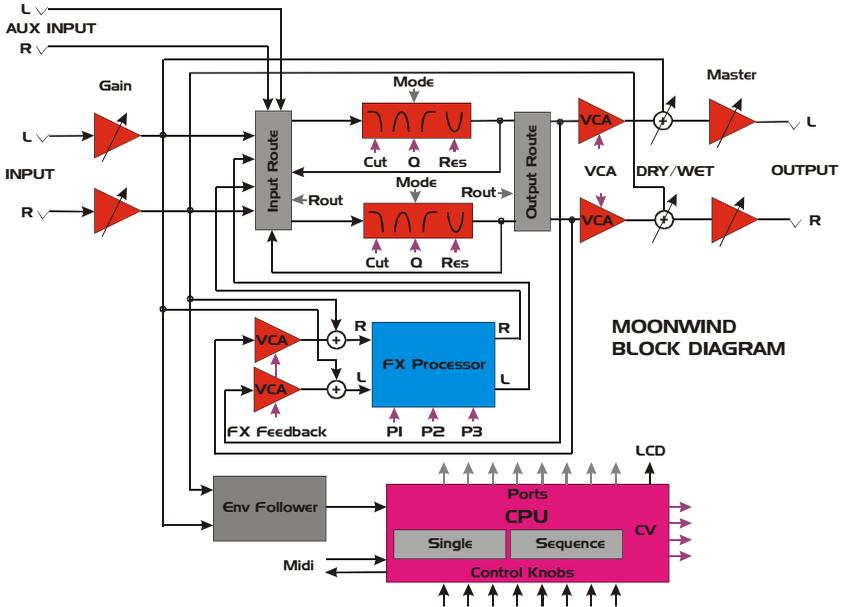
The signal comes from the high impedance inputs and the gain section and feed the input router and the fx processor inputs. Both stereo inputs also feed an analog envelope follower which creates an envelope signal in order to modulate the filters later on. The outputs of the fx processor also go into the input router. The input signals and the effects signals are mixed together here. Within the filter section there are electronic switches that select the various shape signals (LP, HP, BP, Notch) for the filter output. From the output of the filter a part of the signal is fed back to the fx processor via a VCA (FX Feedback) in order to create e.g. tape delays or wave guide reflexions.

The input/ouput router of the filter determines the several routing setups of both filters. They can be routed as follows: 2-channel stereo (default), parallel (1:1 mixed), serial, with feedback and parallel feedback. In this case feedback means a direct analog cross feedback between the filters (not the FX feedback) which results in strong distortions or screaming sounds. This is most interesting if both filters have alternating shape settings (e.g. Lp/Hp).
And there is some more global routing possible:
filter only (inputs go only into the filter without fx processor),
fx processor first (signals first pass the fx processor and then go into the filter), or direct signal plus fx (default mode).

The AUX input serves as an auxiliary input which directly feeds the input router without passing the fx processor. In the input router the AUX signal is mixed to the main signals which feed the filter inputs. Please note that the AUX input can only process line level signals, has no gain adjustment, feeds no envelope modulation and does not pass the dry/wet stage. But for some applications it may be very useful to add a pure filter signal to the mix.

Behind the filter stage with its several feedback ways there is a final VCA which can be used to modulate the main signal level.
The dry/wet knob controls the mix between the global input signal and the effects signal (including all filters, fx processors, feedbacks). Before the outputs there is the master volume amp which can either lower the signal or amplify it depending on your application.

The whole analog sound circuitry is controlled by a CPU which scans the user interface on the front plate, provides the Midi communication, generates the CVs (CV=control voltage) for the analog circuitries and the port bits for the routers and fx algorithms. All presets and sequences are stored in the processor's internal flash memory and are therefore endureably saved without battery.

3.2. Memory Model
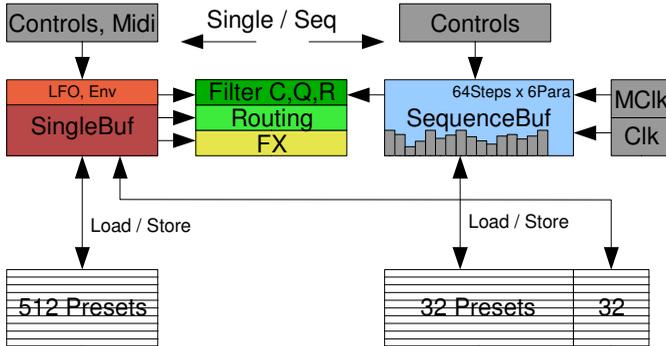
The Moonwind has two buffer systems: the Single mode buffer
(SingleBuf) and the Sequence mode buffer (SequenceBuf).
The SingleBuf mainly controls the hardware with all layers from FX,
Routing up to the Filter Cutoff/Q/Res. It can be loaded from 512
preset memories residing in flash memory or store into them. The
LFOs and envelope modulations are also controlled only by the
SingleBuf.
All controls (rotary knobs, tact buttons, parameters, Midi) of the user
interface layer are made in the SingleBuf and get stored from there
or are being loaded into there.

Opposing to this, the SequenceBuf can only control the uppermost
hardware layer of the filters (Cutoff/Q/Res). It manages a maximum
of 64 steps x 6 parameter tracks per sequence, the bars, steps,
tempo and clock divider. It is edited and changed by the controls of
the user interface as well.
It has access to a memory consistent of 32 presets which can load it
or being stored into. Additionally, to each sequence preset a single
preset is attached which also is loaded or stored along with the
sequence buffer.
So if a sequence is loaded, at the same time the SingleBuf gets
overriden. If a sequence is stored, the current SingleBuf is stored
within the sequence preset memory.

4. Sound Parameters

Press the right cursor button to enter the edit menus. The cursor skips under the editable entries. Now you can change values either with the Data encoder, the Up/Down buttons or encoders 1-3. Encoders 1-3 only have access to one of the three entries in the lower row of the menus.

4.1. Effects Page

On the first menu page you can select effects and edit their FX parameters.

4.1.1. Effects Program   < Effect Name>

The effects processor of SPIN semiconductor offers 7 unchangeable ROM programs and 8 algorithms updateable via OS, which makes a total of 15 effects programs plus a test program without function. They can be chosen one after each other.

```
Chorus+Reverb   Fedb032
Revb128 Rate064 CMix160
```

If the cursor is located under the name of the effect program, you can select them with the DATA encoder or the Up/Down buttons. Because the three available Fx parameters have a different meaning for each fx program, the value description of them changes individually for every algorithm.

Following here is a list of fx programs with a short description of parameters (OS 1.0).

Firmly built-in effect programs of SPIN Semiconductor:

Algorithm	Parameter 1	Parameter 2	Parameter 2
Chorus+Reverb	Revb (Reverb Level)	Rate (Chorus Rate)	CMix (Chorus Mix)
Flanger+Reverb	Revb (Reverb Level)	Rate (Flanger Rate)	FMix (Flanger Mix)
Tremolo+Reverb	Revb (Reverb Level)	Rate (Tremolo Rate)	TMix (Tremolo Mix)
Pitch Shift	Ptch (Pitch Shift)	-- (no function)	-- (no function)
Pitch Echo	Ptch (Pitch Shift)	Dely (Delay Time)	Echo (Repetition)
Test no FX	-- (no function)	-- (no function)	-- (no function)
Reverb 1 (Open Reverb)	Time (Reverb Time)	HFil (Reverb Highpass)	LFil (Reverb Lowpass)
Reverb 2 (Dense Reverb)	Time (Reverb Time)	HFil (Reverb Highpass)	LFil (Reverb Lowpass)

Algorithms 8-16 of Jomox

Algorithmus	Parameter 1	Parameter 2	Parameter 2
Stereo Delay (Dual delay with cross feedback)	TimL (Delay time left)	TimR (Delay time Right)	PPng (Ping pong L/R)
Delay + Chorus (Mono delay with chorus)	Time (Delay time)	Dmix (Delay mix)	Cmix (Chorus mix)
Wave Guide 1 (Single pipe with filter)	Pipe (Pipe pitch)	Rflx (Reflexion coefficient)	Filt (Lowpass filter)
Wave Guide 2 (Dual pipe)	PipA (Pipe A pitch)	PipB (Pipe B pitch)	Rflx (Reflexion coefficient)
Bit Crusher (Bit cut, quantize and chorus)	Bits (Bit depth min:24 max:5)	Quan (Quantization bits mix)	Chor (Crushed+ chorus mix)
Warp Tracker (Scratch effect VCO tracking)	Trac (Tracking VCO)	VCO (VCO mix)	Chor (VCO+chorus mix)
Warp 2 (Four pipes, two filters with modulation)	Pipe (Pipes pitch)	LFRt (LFO rate)	Warp (Warp modulation)
Formant Voxer (Vocal formants with modulation and reverb)	F1pt (Formant 1 pitch 300-1000Hz)	F2pt (Formant 2 Pitch, relative to F1 Δ400Hz-3kHz)	Revb (Reverb mix)

4.1.2. FX Parameter 1   < 000-254 >

```
Chorus+Reverb   Fedb032
Revb128 Rate064 CMix160
```

This parameter controls the first external value of the fx processor.

4.1.3. FX Parameter 2   < 000-254 >

This parameter controls the second external value of the fx processor.

4.1.4. FX Parameter 3   < 000-254 >

This parameter controls the third external value of the fx processor.

4.1.5. FX Feedback   < 000-254 >

With this value you change the FX feedback. If delay programs are activated, you can create beautiful tape delays and ping pong echoes, as the filter output is fed back analogously and the signal is filtered a bit more with every run through.
Basically you have to experiment with each fx program to get the desired result since every algorithm interacts different with analog feedback.
Attention: if FX Feedback is cranked up it may suddenly result in strong feedbacks when certain fx programs are chosen which might sound pretty awful!

4.2. LFO Left (Right)

With the LFO (Low Frequency Oscillator) you can create interesting modulations of the cutoff. Slowly uprising and fading filter sweeps up to tonal vibratos are possible. A large number of wave forms is at your choice.
If the filters are in self-resonance, you can create modulated sine waves with the LFOs which remember of large modular systems.
Anyways, this is a box of tricks for a large number of awesome sound effects, for a steady filter is never as interesting as a modulated and moving one.

You can select the values with the cursor and change them with the DATA encoder resp. the Up/Down buttons.
Alternatively you can use encoders 1-3 to edit the values of the lower row.

```
LFO Left        Env 032
Rate000 Inty000 WaveSdo
```

4.2.1. LFO Rate   <000 - 127>

Controls the rate of the left LFO.
Rate can be set in a range from 0.015Hz (T=65sec) to about 30Hz (T=0.033sec)

4.2.2. LFO Intensity   <000 - 127>

Controls the intensity of the left LFO. The LFO modulates the cutoff by adding its wave form multiplied by factor intensity to the cutoff.
Intensity = 0 turns off the LFO.

4.2.3. LFO Wave   <Sdo, Sup, Tri, Sin, R50, R75, R87, R25, R12>

The wave form of the LFO is selected here. If you turn encoder 3, the different wave forms are displayed as abbreviations of three letters. These following nine wave forms are at your choice:

Sdo = Sawtooth down

Sup = Sawtooth

Tri = Triangle

Sin = Sine

R50 = Rectangle with 50% duty cycle

R75 = Rectangle with 75% duty cycle

R87 = Rectangle with 87.5% duty cycle

R25 = Rectangle with 25% duty cycle

R12 = Rectangle with 12.5% duty cycle

4.2.4. Env Envelope Amount   <-127 - 127)

The Moonwind has an envelope follower which generates a signal
that is proportional to the level of the input audio. With this signal
the cutoff may be modulated in order to obtain a wah wah effect or
other filter modulations.
The value sets the amount of cutoff envelope modulation.

The signal is mixed together from both stereo inputs and is then
generated. But modulation amount can be made for each side
individually.

+Env
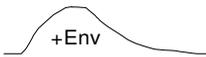
Note that opposing to the rest of parameters in the Moonwind the
parameter Env has a sign and can be negative too.

-Env
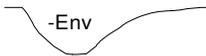
This lets you create a filter modulation which closes the filter if a
signal appears and which slowly reopens when the tone fades.
Env= 0 turns off the envelope modulation.

4.3. LFO Right

Because the page LFO Right is exactly identical with LFO Left we
have renounced a detailed description here. The same values and
ranges yield as LFO left except for the only difference - LFO right
works for the right cutoff.

```
LFO Right      Env 032
RateO00 IntyO00 WaveSdo
```

4.4. Filter Routing

Both stereo filters can be connected with each other in several ways.
On this menu page you can also decide how the effects processor
and the filter are routed together. Last but not least there is a noise
generator that can be switched on and off.
Since the shapes do belong to the filter routings too, they are listed
here again.

```
Filter Routing Lp    Hp
Stereo   FilFx NoiseOff
```

4.4.1. Filter Cross Routing

Both filters can be coupled together in order to get further sound
possibilities. This is possible by the in/output router which is
described more detailed in chapter 3. Functional Description.
Following settings are possible:

4.4.1.a) **Stereo** *(Default):*
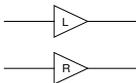
Both filters work independently of each other. The signal paths are
separated. This is the default mode.

4.4.1.b) **Parallel**:
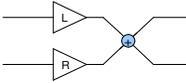
The outputs of both filters are being mixed together 1:1. This mixes and interferes both filter characterstics and produces a unified mono signal. This can be useful e.g. with formant filters or more complex filter shapes (two peaks), or if you need a mono signal (mixer, amp). Example:
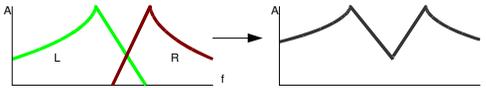
4.4.1.c) **Serial**:
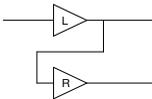
The output of the left filter is being routed into the input of the right filter. The resulting signal coming from the right filter is a serial connection of both filters now.
Both filter characteristics get multiplied. From the both 2 pole filters a steeper 4 pole slope arises. A highpass and a lowpass form a bandpass. This requires of course that the passing bands (cutoff) overlap enough, or almost no signal would come out as a result. Example:
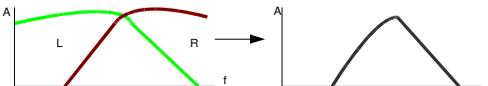
4.4.1.d) **Feedback**:
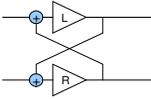
The output of the left filter is mixed into the input of the right filter and vice-versa.
The result is an analog cross feedback that can produce strong distortions or screaming feedbacks with certain filter shapes.
Especially interesting are alternating filter shapes, e. g. hipass on the left and lowpass on the right side. Then both filters form a positively fed back bandpass which will eagerly start to scream if both cutoffs are coming closer to each other. Be careful:)

4.4.1.e) **Feedbk P (Feedback Parallel)**:
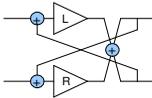
This setup feeds back crosswise exactly like the single feedback, except for the fact that the outputs are mixed together 1:1 beforehand as with the parallel setting.
This makes the feedback character even stronger because both feedback ways have more level and each filter gets fed back itself and across the neighbour.
The yields almost the same properties as with Feedback, yet the effect of distortion and screaming is more extreme. Be careful:)

4.4.2. Input Routing

The FX processor and the filter inputs can be configured by the input router. With encoder 2 you can choose three different input configurations.

```
Filter Routing Lp    Hp
Stereo   FilFx NoiseOff
```

4.4.2.a) **FilFx** *Filter+Fx (Default)*
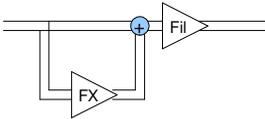
The input signal feeds either the filter as the fx processor. Before the filter input the fx signal is mixed to the direct signal 1:1. All effects run through the filter, but the filters also get the direct input signal.

4.4.2.b) **---Fx** *Input Solo Fx*
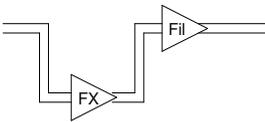
The input signal only feeds the fx processor. The fx output feeds the filter input. This configuration is useful if you want to process a pure effect (e.g. bit crusher, compressor, wave guide) with the filters.

4.4.2.c) **Fil--** *Only Filter no Fx*
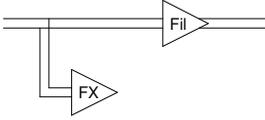
The input signal only feeds the filter input. The fx output signal is not mixed to the filter input. This interrupts the signal flow from the fx processor. This has the same effect as fx processor mute.

4.4.3. Noise   **<On / Off>**

At this menu item you can decide if white noise is fed into the Moonwind filter or not. For some experimental sound applications this can be very useful. The Moonwind emerges to be a complete sound producer.
The noise is just mixed to the main signal flow, but it can't be volume controlled.
Attention, the level is pretty high.

4.5. Name Edit Page

On this last menu page you can edit the name of the preset and/or initialize a whole preset.

```
Name Edit < > Initialize
Anit Fil      Press up
```

4.5.1. Name Edit

The cursor is underneath the letter which is to be edited. You can edit the selected letter with the DATA encoder, one of the three encoders or the Up/Down buttons. With the cursor buttons you can choose other letters. The name of a preset can have 8 letters maximum. It is stored together with the preset.

4.5.2. Initialize Single Preset

If you go beyond the name editing, the cursor is located underneath the entry 'Initialize/Press up'. If you want to reset the whole preset to default, press the button Up or turn the DATA knob to the right. Immediatly the whole single edit buffer (not the stored preset!) is initialized to default settings.
The display shows now:

```
Name Edit < > Initialize
Init Fil      Done.
```

Attention: all previous editings and non-stored preset settings get lost by doing this and cannot be recalled.

5. Sequencer

5.1. Editing the Sequencer

Press the button SINGLE/SEQ. If the Moonwind was in the quick edit screen of single mode before, the display switches to sequencer mode now.

The bars of various height represent the values for the cutoff (or another parameter) which are played back at the steps of the sequence.
Besides cutoff, the sequencer can record and play back Q and resonance as well.

5.1.1. Parameter Tracks

The letter (Pa) in the upper row resembles the track in which you are right now. There are six parameter tracks:

C = Cutoff left
Q = Q left
R = Resonance left
c = Cutoff right
q = Q right
r = Resonance right

You can change between the six parameter tracks with the Left/Right cursor buttons which is displayed by the corresponding letter (see above) and by the changed bars.

5.1.2. BPM Direct Input

Right next to the sequencer diagram and the letter abbreviation for the track the speed in BPM (Beats Per Minute) is shown. With encoder 3 you can edit the BPM in steps of 1 BPM.

5.1.3. Sequencer Preset Selection

Right next to the BPM number the sequence preset number is shown by a two-digit number. You can select the sequence preset with the DATA knob and load it by clicking on the knob. Alternatively you can use the Up/Down keys which load them automatically.
There are 32 memory slots for sequences.
To make the Moonwind a music instrument of its own, there is a parallel running single preset memory attached to each sequence memory as well which is loaded and stored together.
So loading a sequence implies loading a preset to single mode too.

5.1.4. Realtime Display of Bars

Whilst the sequencer is running, the number of the currently played bar (measure) is shown right next to the parameter diagram in the lower row.
If the sequence has more than one bar, this number counts up to the maximum number of bars and jumps back to '1'. To each bar count the display changes and shows the part of the sequence related to that bar.

5.1.5. Number of Steps

This is the two-digits number of steps played in one bar (measure). A maximum of 16 step per bar is possible. You can change this number with encoder 1, even if the sequencer is running. The sequence diagram adapts to the altered number of steps.

5.1.6. Number of Bars

The two-digits number of bars shows how many bars (measures) a sequence has. The maximum number of bars is determined by the length of a bar in steps. The global maximum of steps per sequence is 64. Therefore with 16 steps you can choose max. 4 bars, with 8 steps maximum 8 bars, with 4 steps max. 16 bars and so forth. The maximum number of bars is calculated and limited automatically. $Bars_{max} = 64/Steps$.
You can change the number of bars with encoder 2, even if the sequencer is running.

5.2. Sequencer Play

Press the Play button. The LED Play starts to flash in the rhythm of the steps. A letter runs through the lower row to the right and shows the currrently played back position. The filter 'chops' or changes the audio signal in the rhythm of the sequence bargraph.
If Q and resonance are properly programmed on some steps, the sequence will play back sine wave tones of the self-resonant filters.
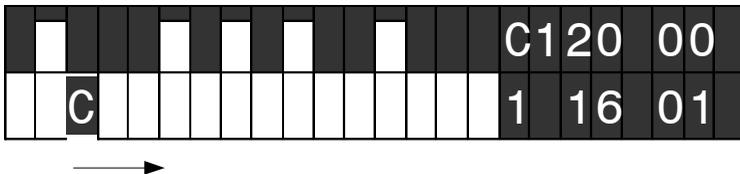
The running letter resembles the chosen parameter track and changes if you select another track with the Left/Right cursor keys.

5.3. Sequencer Record

Whilst the sequencer is running, press the Record button. The LED record lights up.
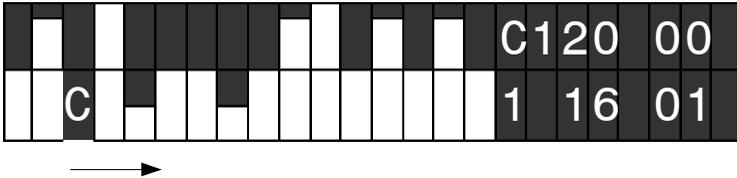
Now if you move e. g. the left cutoff knob, the knob movements get recorded and are displayed as values in the bargraph.
Values get recorded only when you move the knob and if the step just changes.
If you change the rotary knob, the track automatically follows and switches to this parameter. For instance, Q:
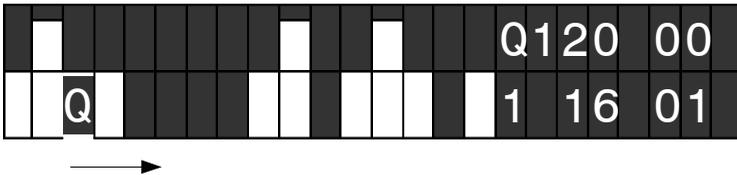
If you want to make recordings undone, press the Undo/Exit key a couple of times until you have the state to which you wanted to return. A maximum of 500 edit steps can be made undone this way.

5.4. Sequencer Step Edit

You can also edit single targeted steps. When you are in sequencer mode, press the Page button. The Page II LED lights up.
Now the bargraph display changes by making all bars slimmer:

Now you can select one single step with the Left/Right cursor keys.
At the location of the cursor an 'x' appears.
If the sequence has more than one bar, you can select the bar with the Up/Down keys.

Please note that during this step edit mode the bar (measure) does not change automatically during playback but can only be selected by the Up/Down keys.

If you move one of the Cutoff/Q/Res rotary knobs now, the display jumps to respective track and changes the parameter only for this particular step. Alternatively you can use the DATA encoder in order to make little editings.

Press the Page button another time to leave the step edit mode again. The display returns to the normal bargraph display and the measures are being played back automatically again.

5.5. Sequence Preset Store

If you have recorded a sequence, don't forget to store it. Press the
Store button, and the display says:

```
Store Sequence? C120 00
Yes=Click   No=Undo/Exit
```

Exactly like in the single mode you can select another sequence
preset with the DATA knob to which you want to store this sequence
to. A click on the DATA knob or pressing the Knob Lock button
performes the storing.
You can cancel with Undo/Exit.

5.6. Sequencer Setup

If you go right with the cursor and step beyond the parameter track
'r' , you reach the first menu page of the sequencer parameters.

```
Sequencer Setup  CkDv02
LaStp16 Bars01 BPM120.0
```

You can change the value above the cursor with the DATA encoder.
Also you can use encoders 1-3 which automatically address one of
the three values in the lower row.

5.6.1. LaStp Last Step   <01 - 16>

Like in the sequencer display you can change the number of steps from 1–16.

5.6.2. Bars   <01 - 64/Steps>

Like in the sequencer display you can change the number of bars here. The maximum number of bars depends of the number of steps per bar and calculates as follows:
$Bars_{max} = 64/Steps$.

5.6.3. BPM Tenths   <20.0 – 330.0>

With this menu item, you can edit the BPM in steps of tenths of one BPM. In the normal sequencer display the BPM input is only possible in steps of 1 BPM but here you can adjust the BPM precisely to your desired tempo.

5.6.4. CkDv Clock Divider   <1 – 64>

The sequencer has a clock divider which divides the internal clock of the step sequencer once more. The default setting is 2 which corresponds to a resolution of $1/16^{th}$ per step at a given BPM (Beats Per Minute, i. e. quarter beats).
The smallest division ratio is 1 which corresponds to $1/32^{th}$. This was made in order to stay compatible with the midi clock of 24ppq (pulses per quarter).

This function can be useful if you create sequences that work with other note lengths than $1/16^{th}$. If you syncronize the Moonwind to another device and the filter steps should e.g. only change in a quarter measure, set CkDv to 8. Triplets and other uneven divider clock division ratios are therefore also possible of course.

This is a little overview of some important clock division ratios:

Clock Divider	Note Length per Step
1	$1/32^{th}$
2	$1/16^{th}$
3	$1/8^{th}$-triplets
4	$1/8^{th}$
6	1/4-triplets (¾ Ms.)
8	1/4
12	1/2-triplets
16	1/2
32	1/1 (1 Measure)

5.7. Initialize Sequence

If you go on right with the cursor, the following menu page opens:
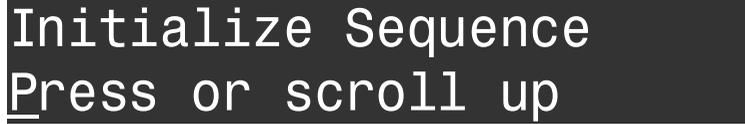
```
Initialize Sequence
Press or scroll up
```

If you now press the Up button or turn the DATA knob right, the sequence edit buffer gets loaded with the default settings.
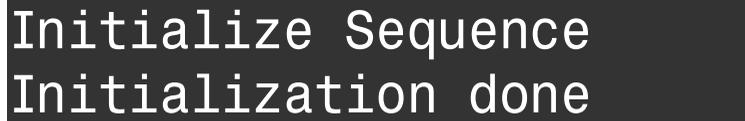
```
Initialize Sequence
Initialization done
```

Attention: all previous editings and non-stored sequence preset settings get lost by doing this and cannot be recalled.
This also rules for the parallel editings of the single mode, as this is stored and loaded along with the sequence.

The stored sequence memory will not be affected by the initialization though.

6. Midi Parameters

Press the MIDI button. Now you are in the Midi Setup menu and able to navigate to the respective values and change them with the DATA knob resp. the Up/Down buttons.
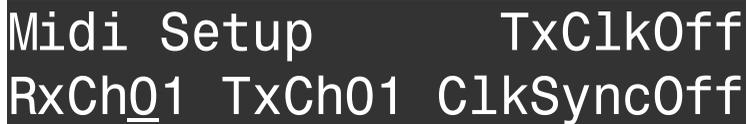
```
Midi Setup      TxClkOff
RxCh01 TxCh01 ClkSyncOff
```

6.1. Receive Channel RxCh   < 001 - 016 >

This is the midi channel on which the Moonwind receives.
Received are note on/off, program change, controller (CC).

6.2. Transmit Channel TxCh   < 001 - 016 >

This is the midi channel on which the Moonwind transmits data.
Transmitted are note on/off, program change, controller (CC).

6.3. Clock Sync ClkSync   < On / Off >

<Off> The Moonwind only runs with the internal clock. Received midi clock is ignored.

<On> The Moonwind sequencer reveives midi clock from an external sequencer. In this case the Moonwind sequencer is remotely started and stopped if it receives the corresponding realtime midi commands – e.g. from a computer software or a drum machine like the XBASE 888.

With running midi clock the Moonwind sequencer can be manually stopped and restarted though. It then runs with an offset depending on where it was restarted.

6.4. Transmit Clock TxClk   <On / Off>

<Off> The Moonwind does not send midi clock.

<On> The Moonwind transmits midi clock in order to syncronize an external sequencer (e.g. a drum machine as the XBASE 888).
The Moonwind sequencer sends the realtime midi commands 'Midi Start' and 'Midi Stop' if the internal sequencer is started or stopped. Clock is only being sent if the sequencer runs.

6.5. SysEx Dump

On this menu page you can dump out presets and sequences as SysEx bulk dump to store them on other Midi devices as e.g. computers or file players.

```
SysEx Dump        RcvOff
SingGo  SgAllGo  SeqGo
```

There are three different kinds of bulk dumps: Single, Single All und Sequence.
With Single only one single preset is being sent. The preset number is stored within the SysEx dump.
With Single All all 512 single preset are being sent consecutively.
With Sequence only the current sequence of 32 sequence presets is being sent.

6.5.1. SysEx Dump Transmission

In general, only single presets are being sent and received. You can rearrange the order of presets and load them back if you use a SysEx editor and edit the preset number (see Midi Implementation) within the bulk dump.
Go with the cursor to the desired dump function. Now start recording on the attached Midi device and press the Knob Lock key on the Moonwind. The unit now starts to transmit the SysEx dump. During that process 'BSY' is shown at the cursor position. When the bulk dump has finished, the display shows 'FIN' at the cursor position. The receiving device should be able to show the dump now.

6.5.2. SysEx Dump Reception

Go with the cursor to the last position of this Midi menu and switch Rcv to On by turning the DATA encoder right or pressing the Up button. Now the Moonwind is in reception mode for the different bulk dumps that are accepted in the Moonwind.
Play back the bulk dump on your computer, e.g. with our provided SysExDumper program (available for free at www.jomox.com).
The Moonwind shows the reception of a correct bulk dump in the display and stores the preset or sequence to the location which is described in the bulk dump.
The Moonwind response is:
„Single Preset received' or „Sequence Preset received'.

Please note that in order to store a preset to cpu flash memory, the Moonwind needs some time to turn off any cpu interrupts and wait the time for the internal flash cell storing. During that time no midi can be received. This implies that between the end of the sysex sequence (0xF7) and the next midi command there must be a pause of at least 0.3 seconds, or midi data gets lost.

6.6. Midi Control of the Moonwind

6.6.1. Midi Notes

The Moonwind is processing midi note commands. The notes control the cutoff of both filters. The note number is scaled in such a way that with self-resonating filters roughly musical semitones are met – however the filter modes are never as precise as the VCO of a synth. The pitch varies with Q and resonance amount and the logarithmic scaling is not perfect too. Who expects here a synthesizer with perfect tuning will be disappointed - this is an analog filter bank and not a synth.

If the Moonwind receives midi data on its own midi channel, the MIDI LED close to the Midi In jack lights up shortly.

During the sequence is in recording mode, the filter cutoffs can be recorded by midi notes as well.

The running Moonwind sequencer sends the cutoff steps as midi notes via Midi Out too.

6.6.2. Parameter Control by Midi CC

All sound parameters can be controlled by midi continuous controllers (CCs). This way the Moonwind can be completely remotely controlled by a midi sequencer.
The controller numbers and ranges you can find in the Midi Implementation at the end of this operating manual.

If the Moonwind is in single mode's quick edit screen, the reveived controllers are displayed as moving bars.

During the sequence is in recording mode, cutoff, Q and resonance can be recorded by CC controllers as well.

7. Moonwind Midi Implementation

7.1. Sound Parameter CC

Parameter	Controller No.	Range
Cutoff Left MSB*	16	0..3 MSB
Cutoff Left LSB	17	0..127
Cutoff Right MSB*	18	0..3 MSB
Cutoff Right LSB	19	0..127
Cutoff Left whole range	14	0..127
Cutoff Right whole range	15	0..127
Q Left	1	0..127
Q Right	2	0..127
Resonance Left	7	0..127
Resonance Right	3	0..127
LFO Left Rate	100	0..127
LFO Left Intsy	101	0..127
LFO Left Wave	102	0..8
LFO Right Rate	103	0..127
LFO Right Intsy	104	0..127
LFO Right Wave	105	0..8
ENV Left +Amt	106	0..127
ENV Left -Amt	107	0..127
ENV Right +Amt	108	0..127
ENV Right -Amt	109	0..127
FX Program select	110	0..15
FX Parameter 1	111	0..127
FX Parameter 2	112	0..127
FX Parameter 3	113	0..127
FX Feedback	114	0..127
Shape Left	115	0..3
Shape Right	116	0..3
Filter Routing	117	0..4
Input Routing	118	0..2
Noise On/Off	119	0/64

* In the Moonwind the fine resolution controllers for cutoff can be transmitted by 2 MSB/ LSB controllers. Most sequencer programs are able to do this; you only have to define these CCs as 14 bit controllers with MSB and LSB and edit the respective values. The other CCs only use the regular CC resolution of 127 steps. For some parameters this is less than the internal range or equal but it is absolutely sufficient regarding the control range.

7.2. Note Commands

Parameter	Note Number
Cutoff Left	0..127
Cutoff Right	0..127

7.3. System Exclusive Data

With system exclusive data only the hex dumps of the currently chosen preset are managed as the sound control works only with CC controllers.
The system exclusive command line for a single preset looks as follows:

Single preset dump:
$F0(SysEx Begin), $31(JoMoX Code), $3F(Command Bulk Dump), $77(Product Code), $01(Type Code), $XX(Preset MSB), $XX(Preset LSB), XX(Data0),XX(Data1),..., $F7(End of SysEx)

28x 14-Bit Word (0..16384) + 8x char byte names per preset are transmitted. These are split up in MSB (b13..b7) in Data0 and LSB (b6..b0) in Data1.

Sequence dump:
$F0(SysEx Begin), $31(JoMoX Code), $3F(Command Bulk Dump), $77(Product Code), $03(Type Code), $XX(Preset MSB), $XX(Preset LSB), XX(Data0),XX(Data1),..., $F7(End of SysEx)

419x 14-Bit Word (0..16384) data per preset are transmitted. These are split up in MSB (b13..b7) in data0 and LSB (b6..b0) in data1.

Finally...

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We wish you lots of joy and trans-musical experiences with our products!

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