FLAME

4VOX quad wavetable oscillator

MANUAL

Version 1.02

Index

1. Short description

The 4Vox is a quad wavetable oscillator with up to four voices per VCO channel, resulting in a maximum of 16 voices at four individual outputs. Due to a MIDI input the module can be played both with CVs or/and directly via MIDI - MIDI allows for modulating some additional parameters. There are 39 memory locations for wavetables and 32 patches for all global and VCO parameters.

The parameters of a wavetable can be controlled by CVs and by MIDI. For instance you can morph through a wavetable with a CV, a MIDI controller or manually with the potentiometer. The range of waves within a wavetable can be selected by minimum and maximum values individually per voice which allows for creating more complex morphs.

Further controllable parameters are Detune, Semitone, Octave, Chord, Portamento, Amplitude and Amp Move (90 degrees phase shifted volume modulation of a VCO's 4 voices). Min and max values can be selected for those parameters as well. Via MIDI it's possible to control further parameters (notes, chords, pitch bend, patch selection and wavetable selection)

The VCOs can be played analog (frequency by Pitch CV input), monophonic via MIDI or 4-voice polyphonic via MIDI.

The VCO can be used as a voltage controllable LFO with 3 modes: LOOP, ONE SHOT and GATED. The SYNC input is used to trigger/reset the LFO. In ONE SHOT mode the LFO can be used as a trigger delay, too (SYNC = trigger in, GATE = trigger output, PITCH = delay time).

Each VCO has an analog 1V/octave input including a fine tune control (+/-1 semitone) and pitch control (approx. 10 octaves), two freely assignable CV inputs, two freely assignable potentiometers, a trigger input for Sync/LFO-reset as well as a Gate and VCO/LFO output
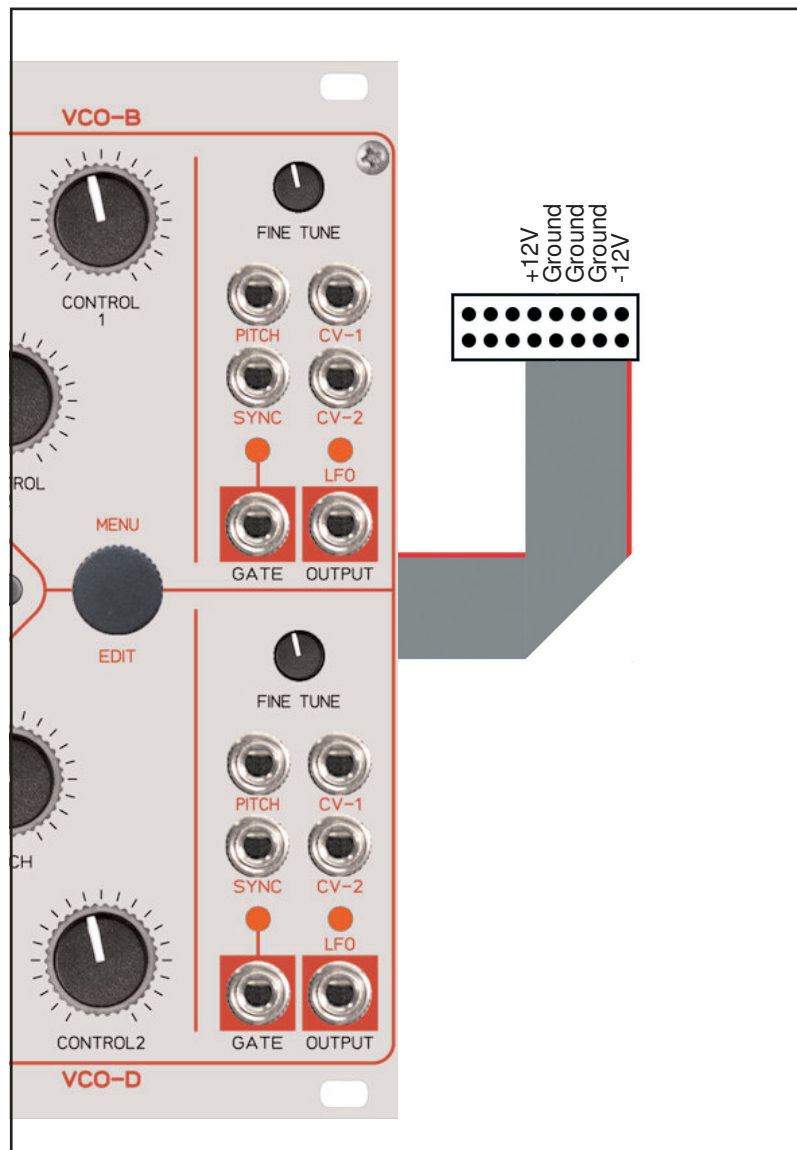
All global parameters and also the VCO's settings can be named and saved as a non-volatile patch by the user (32 patch memory locations are available).

The display can show a graphic of the selected waveforms.

Software/wavetable updates are easy possible via MIDI sysex dump.

2. Hardware / Connections

Connection to the modular system (Doepfer bus)

The module is delivered with a connected ribbon cable for the Doepfer bus. The red lead marks -12 volt. Connecting the module please note the right polarity!
If the module is poled accidentally wrong safety diodes avoid the immediate destruction of the module but further damages cannot be excepted. So please pay attention: Check the connection various times before switching on!

Advice: Please check the correct connection several times before switching-on the module!

Attention! Please avoid doing electrostatic voltages (don't touch the pins of the chips or the electronic). Please touch only the modul frontpanel for installation in your rack.

Module frontpanel overview

Finetune Pot

1V/Oct. Input

Sync/Reset Input

LED GATE

GATE Output

MIDI Input

VCO-A

VCO-B

VCO-C

VCO-D

Finetune Pot

CV1 Input

CV2 Input

LED LFO-Mode

VCO/LFO Output
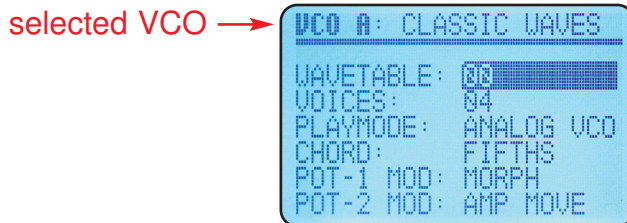
Data Entry

Frequency

Control Pots
(individual programable)

Menu Keys

Keys VCO-Select
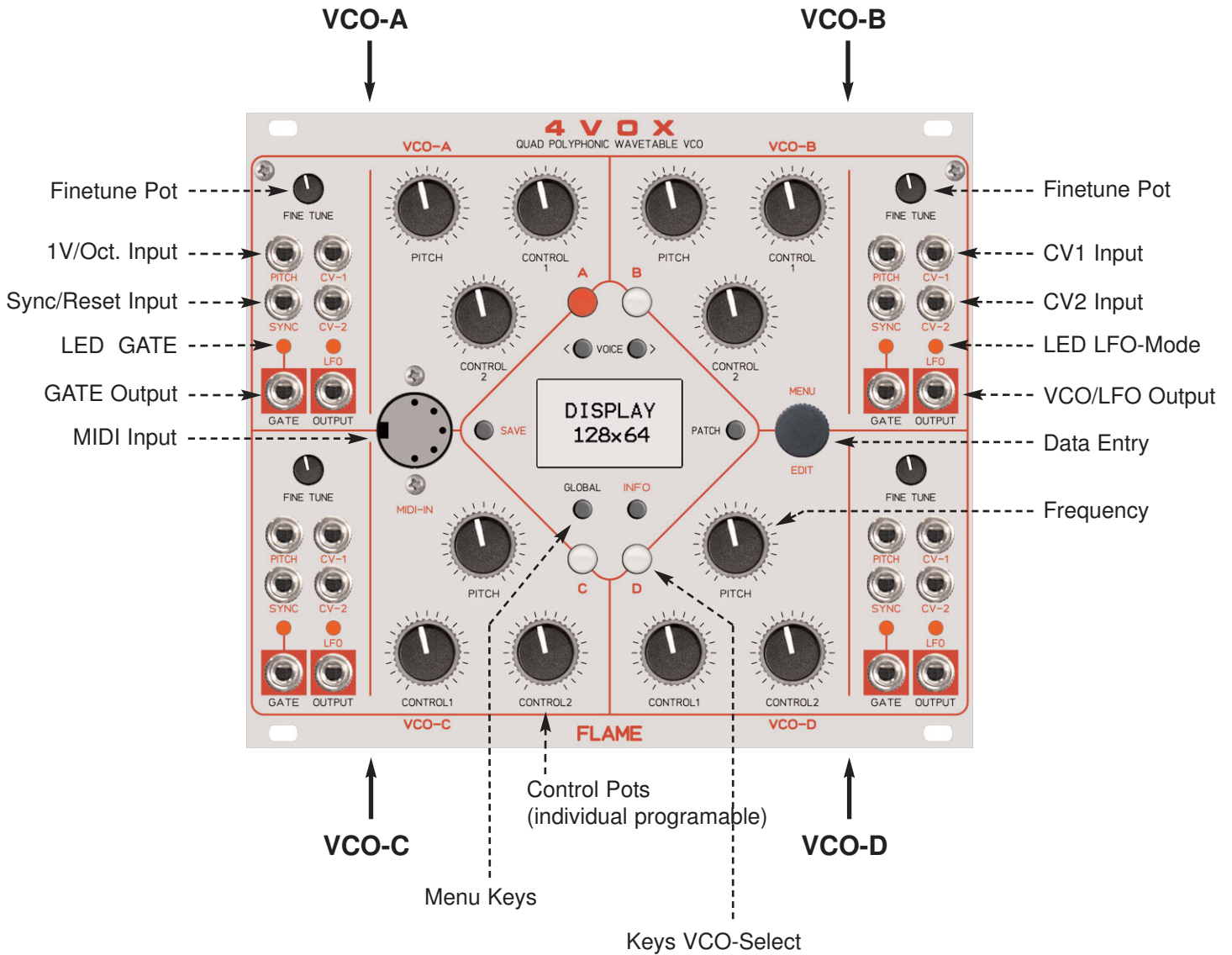
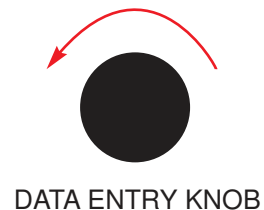|	
PITCH POT	Pitch potentiometer Mode Analog VCO/LFO
FINE TUNE POT	Fine adjust potentiometer Mode Analog VCO/LFO
CONTROL-1 POT	individual programable potentiometer
CONTROL-2 POT	individual programable potentiometer
CV-1 INPUT JACK	individual programable CV input with 3 input ranges: **0..+5v, -2,5v..+2,5v, -5..+5v**
CV-2 INPUT JACK	individual programable CV input with 3 input ranges: **0..+5v, -2,5v..+2,5v, -5..+5v**
PITCH INPUT JACK	1v/Octave pitch input Mode Analog VCO/LFO
SYNC INPUT JACK	Sync trigger input VCO-Wave or Reset/Start LFO-Wave
GATE OUTPUT JACK	**0/+5v** Gate output Mode MIDI-VCO, Trigger/Gate output Mode LFO
VCO OUTPUT JACK	**-5v..+5v** VCO or LFO output
KEYs VCO-Select	Select buttons with red LED VCO-sections A..D
MENU KEYs	Select buttons main menus
DATA ENTRY	Data entry with push button

3. OPERATION

Select VCO:

Push LED-button A, B, C, D to select the VCO A, B, C or D.
The LED-button of the selected VCO flash red.

selected VCO →

```
VCO A: CLASSIC WAVES

WAVETABLE: 00
VOICES:    04
PLAYMODE:  ANALOG VCO
CHORD:     FIFTHS
POT-1 MOD: MORPH
POT-2 MOD: AMP MOVE
```

Change the cursor position:

Move the cursor by pressing and turning the data entry knob.
Move left = cursor down, Move right = cursor up
Change the value by turning the data entry knob.

```
VCO A: CLASSIC WAVES

WAVETABLE: 00
VOICES:    04
PLAYMODE:  ANALOG VCO
CHORD:     FIFTHS
POT-1 MOD: MORPH
POT-2 MOD: AMP MOVE
```

DATA ENTRY KNOB

Select VOICE:

Push the <VOICE> buttons (left right) to choose a voice.

selected VOICE ↓

selected VCO →

```
VCO A:    VOICE 1

WAVE:       00 ... 16
DETUNE:    +00...+00
OCTAVE:    + 0...+ 2
SEMITONE:  +00...+00
AMPLITUDE: 000...128
PORTAMENTO:000...000
```

Call the MAIN-MENUs:

Push directly the key of the menu:

key **SAVE**	- Save Patch menu to store a patch
key **GLOBAL**	- Global menu for global settings
key **INFO**	- Info menu displays the waveform
key **PATCH**	- Load Patch menu for loading a patch

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4. FUNCTIONS

There are 4 indepent VCOs A, B, C and D, each with maximal 4 voices (VOICE 1-4) . Each VCO can set to LFO mode (monophon: only voice-1 is active).

Internal voice structure

VCO-A
VCO-B
VCO-C
VCO-D

VOICE-1
VOICE-2
VOICE-3
VOICE-4

MIX

OUTPUT-A
OUTPUT-B
OUTPUT-C
OUTPUT-D
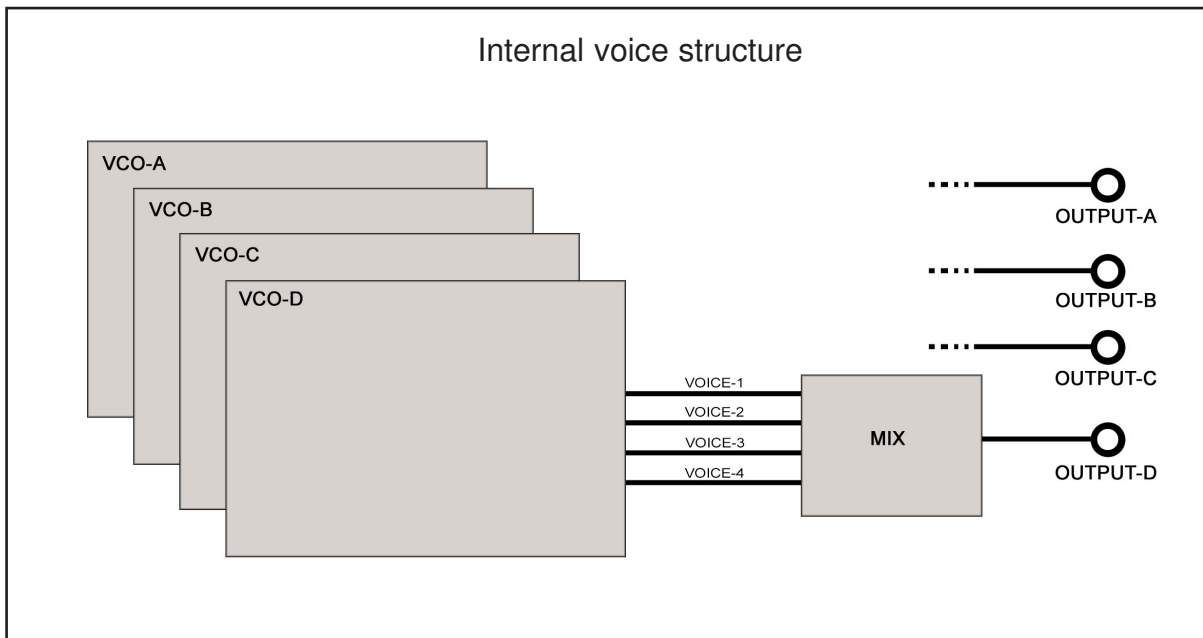
VCO SETTINGS

WAVETABLE: Select wavetable (name in topmost row)
VOICES: Select number of voices
PLAYMODE: VCO/LFO/MIDI modes
CHORD: Chord from list
POT-1 MOD: Parameter of Pot CONTROL-1
POT-2 MOD: Parameter of Pot CONTROL-2
CV1 RANGE: Input voltage range of CV-1 jack
CV1 MOD: Parameter of CV-1 jack
CV2 RANGE: Input voltage range of r CV-2 jack
CV2 MOD: Parameter of CV-2 jack

```
VCO A: HARMONICS 1

WAVETABLE: 01
VOICES:    04
PLAYMODE:  ANALOG VCO
CHORD:     FIFTHS
POT-1 MOD: MORPH
POT-2 MOD: AMP MOVE
```

```
VCO A: HARMONICS 1

POT-1 MOD: MORPH
POT-2 MOD: AMP MOVE
CV1 RANGE: 0...5v
CV1  MOD:  MORPH
CV2 RANGE: 0...5v
CV2  MOD:  AMP MOVE
```

WAVETABLE 00..38

Select one of 39 wavetables . The wavetable consist of 64 waveforms.
Each wave consist of 128 values with 16bit resolution. The name of the selected wavetable is displayed in the first topmost row.

VOICES

Each VCO can play four voices at once. The maximum amplitude is shared between the four voices. If multiple voices are played you can select a chord from a list. You can choose diffrent settings for each voice (see VOICE-menu). Thereby you can create more complex and interesting sounds. Furthermore each voice can be morphed into a diffrent range of the wavetable.

PLAYMODE

You can set the playmode for each VCO separately.

Analog VCO
Pitch control via analog CV pitch input, Pitch pot and Finetune pot (not MIDI notes!)
Analog LFO
CV controllable LFO with waveform of VOICE-1
MIDI VCO
Pitch control via received MIDI notes (Pitch CV/Finetune pot/Pitch pot are inactive).
The MIDI-keyboard is monophon, but can play the chords of the VCO.
MIDI VCO P
Pitch control via received MIDI notes (Pitch CV/Finetune pot/Pitch pot are inactive).
The MIDI-keyboard is quad polyphon (you can play one's own chords)

CHORD - chord list for several voices

POT-1 MOD, POT-2 MOD

Choose the parameter for the pot-1 and pot-2 here. The pot ruls between the min- and the max values, selected from the voices.

Please note: Each parameter can be selected only by one pot (and not by both). In this case, the MIDI controller of the selected parameter is inaktiv.

OFF   - no parameter is selected
MORPH   - Morphing the wavetable between the MIN-and MAX waves
AMPLITUDE - Volume of all voices between the MIN-and MAX values
AMPMOVE   - 90 degrees phase shifted volume modulation of a VCO's 4 voices
DETUNE   - Detune between the MIN-and MAX values
OCTAVE   - Octave jumps between the MIN-and MAX values
CHORD   - choose a chord of the chord-list
SEMITONE   - Semitone jumps between the MIN-and MAX values
PORTAMENTO - Glide between the MIN-and MAX values

CV-1 RANGE, CV-2 RANGE

Select the input voltage range of the jack:
0..+5v
+/- 2,5v
+/- 5v

CV-1 MOD, CV-2 MOD

Choose the parameter for the cv-1 and cv-2 jacks here. The CV ruls between the MIN- and the MAX values, selected from the voice parameters.

Please note: Each parameter can be selected only by one CV jack (and not by both). In this case, the MIDI controller of the selected parameter is inaktiv.

OFF   - no parameter is selected
MORPH   - Morphing the wavetable between the MIN-and MAX waves
AMPLITUDE   - Volume of all voices between the MIN-and MAX values
AMPMOVE   - 90 degrees phase shifted volume modulation of a VCO's 4 voices
DETUNE   - Detune between the MIN-and MAX values
OCTAVE   - Octave jumps between the MIN-and MAX values
CHORD   - choose a chord of the chord-list
SEMITONE   - Semitone jumps between the MIN-and MAX values
PORTAMENTO   -Glide between the MIN-and MAX values

VOICE SETTINGS

Push the <VOICE> buttons (left right) to choose a voice of the selected VCO.

WAVE: Range of the wavetable
DETUNE: Detune of the selected voice
OCTAVE: Octave of the selected voice
SEMITONE: Semitone of the selected voice
AMPLITUDE: Volume of the selected voice
PORTAMENTO: Glide of the selected voice
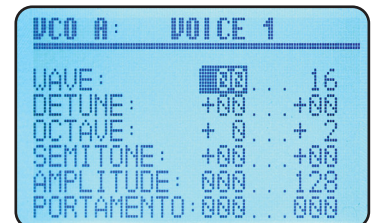
Please note: As long as a parameter is not selected by any pot or CV jack, the current maximum value is used.

INFO MENU

Call and exit the menu by push down the key INFO.

You can see here the selected waveform (and the morphed waves).
Select the waveform with the VCO and VOICE buttons.
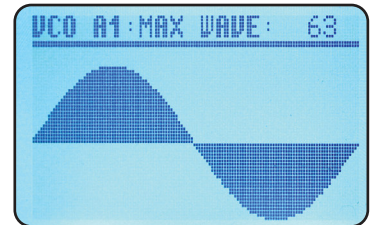In the topmost row you can see the name of the wavetable

this example:
A2 = VCO-A Voice-2 Wavetable: "CLASSIC WAVES"
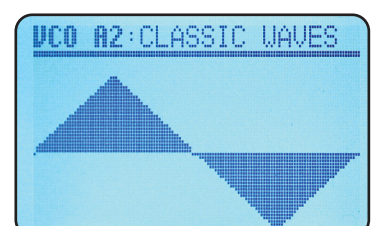
By pressing and turning the data entry knob you can switch between the wavetable name, the wave min- and max value of the selected voice in the topmost row.
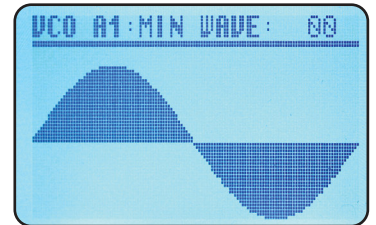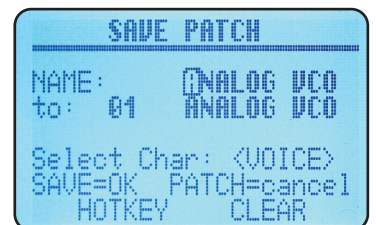

Change the value by turning the data entry knob.
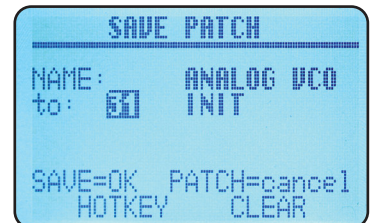

SAVE PATCH MENU

Call the menu by push down the key SAVE.

Store a patch with name of all VCO and VOICE settings.
There are 32 patch memory places (00..31).

Key functions:

<VOICE> keys: Move left/right the cursor of the name characters (or by pressing and turning the data entry knob).

Change the character by turning the data entry knob.

Push HOTKEY to jump fast between characters "- 0 A "

Push CLEAR to clear the position (blank character) and jump to next position.

By pressing and turning left the data entry knob you can change to the patch number.
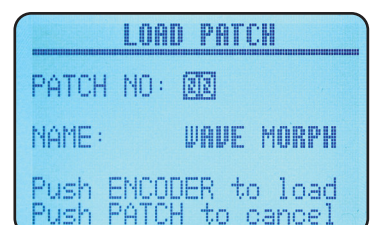The old name of the patch name is displayed for better overview.

Store with key SAVE.
Cancel with key PATCH (no storage).

LOAD PATCH MENU

Call the menu by push down the key PATCH.

Here you can load one of the 32 Patches.

GLOBAL MENU

Call the menu by push down the key GLOBAL.
Move the cursor by pressing and turning the data entry knob.
Move left=cursor down, Move right=cursor up. Change the value by turning the data entry knob.

Following functions/utillities and settings are possible:

LOAD WT to:

If you want to load a wavetable into a specific location, select here the number of the memory location and send the sysex-file.
Advice: If you load a wavetable when you currently not in this menu, the wavetable is stored to the memory location defined by the wavetable-sysex-file.

```
        GLOBAL
LOAD WT to: 00
COPY VCO:    A  >  A
SWAP VCOs:   A <> A
STARTPATCH: 31
MASTERTUNE: +000 cent
```

COPY VCO

Copy the data of one VCO to the memory of a other VCO.
Example: copy data VCO-A to VCO-B. This overwrite the old data of the VCO-B.
Push the key INFO to copy.

```
        GLOBAL
LOAD WT to: 00
COPY VCO:    A  >  B
SWAP VCOs:   A <> A
STARTPATCH: 31
MASTERTUNE: +000 cent
Push INFO to copy VCO
```

SWAP VCOs

Swap the data of two VCOs.
Push the key INFO to swap.

STARTPATCH

Set the number of the autoload patch after power on.
Push the key SAVE to store the setting.

```
        GLOBAL
LOAD WT to: 00
COPY VCO:    A  >  B
SWAP VCOs:   A <> C
STARTPATCH: 02
MASTERTUNE: +000 cent
Push SAVE to store
```

MASTERTUNE

Main tuning of the module (analog and MIDI).
Push the key SAVE to store the setting.

```
        GLOBAL
LOAD WT to: 00
COPY VCO:    A  >  B
SWAP VCOs:   A <> C
STARTPATCH: 02
MASTERTUNE: +000 cent
Push SAVE to store
```

LCD CONT   (LCD CONTRAST)

Set the contrast of the grafical display.
Standard value is 006.

```
        GLOBAL
COPY VCO:    A  >  B
SWAP VCOs:   A <> C
STARTPATCH: 02
MASTERTUNE: +000 cent
LCD CONT:    010
```

LFO MODE

Each VCO can work like a voltage controlled LFO with three diffrent playmodes.
Set the PLAYMODE = ANALOG LFO .
The red LFO-Led is on.

The LFO is monofon, therefore change the submenu
VOICES to LFO MODE (see below).

```
VCO A: HARMONICS 1
WAVETABLE: 01
LFO_MODE:  Loop
PLAYMODE:  ANALOG LFO
CHORD:     FIFTHS
POT-1 MOD: MORPH
POT-2 MOD: AMP MOVE
```

With PITCH (CV or Pot, but not MIDI) you can change the speed
of the LFO. The function CHORD has no effect and you can only use
the parameters of VOICE-1.

LFO MODI

Loop
Freewheeling LFO, resetable by SYNC input.
GATE out sends a trigger (5ms long) at the end of the wave.

One Shot
After trigger SYNC input the wave plays once only.
GATE out sends a trigger (5ms long) at the end of the wave.
You can use this mode like a triggerdelay :
SYNC=Trigger-input   GATE=Trigger-output   PITCH=delaytime

```
VCO A: HARMONICS 1
WAVETABLE: 01
LFO_MODE:  One Shot
PLAYMODE:  ANALOG LFO
CHORD:     FIFTHS
POT-1 MOD: MORPH
POT-2 MOD: AMP MOVE
```

Gated
After trigger SYNC input the wave plays once only.
The GATE-output ist high as long as play the wave.
This mode can use in combination with a envelope generator.

MIDI FUNCTIONS

4 MIDI channels for each VCO (fix parameters).

MIDI CHANNEL

VCO A   1
VCO B   2
VCO C   3
VCO D   4

MIDI CONTROL NUMBERS

1   MORPH - morphing the wavetable
5   PORTAMENTO - portamento speed
7   AMPLITUDE - volume
12   CHORD - chord select
13   DETUNE - flanging, vibrato
14   OCTAVE - octave jumps
15   SEMITONE - semitone jumps
16   AMP MOVE - 90 degrees phase shifted volume modulation of the voices
18   Select a wavetable

PITCH BENDER with range over +- 12 semitone

PROGRAM CHANGE select a patch

NOTE ON, NOTE OFF only with PLAYMODEs: MIDI-VCO and MIDI-VCO Poly

If MIDI-NoteOn is received, then the GATE-output is high. This is helpfully to control a external analog envelope generator.

ADVICE:
The MIDI controller of the VCO is out of operation, if one of the pots or CV jacks is already set to the corresponding parameter!

CHORD LIST (since version 1.02)

1   UNISONO
2   OCTAVES 1
3   OCTAVES 2
4   OCTAVES 3
5   FIFTH 1
6   FIFTH 2
7   FOURTH 1
8   FOURTH 2
9   THIRD maj1
10   AUGMENTED
11   THIRD min1
12   DIMINISHED
13   MINOR add9
14   MINOR 7/11
15   MINOR 7 b5
16   MINOR 7/9
17   MINOR maj7
18   MINOR b5
19   MINOR 7
20   MINOR 6
21   MINOR
22   UNISONO
23   MAJOR
24   MAJOR 6
25   MAJOR 7
26   MAJOR maj7
27   MAJOR sus4
28   MAJOR sus2
29   MAJOR 6/9
30   MAJOR #5
31   MAJOR b5
32   MAJOR 7/4
33   MAJOR 7 #5
34   MAJOR 7 b5
35   MAJOR 7/9
36   MAJOR 7 b9
37   MAJOR 7 #9
38   MAJOR add9
39   MAJ 7/9/11
40   MAJOR 7/13
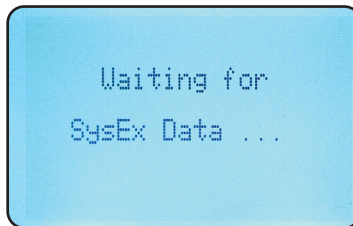41   MAJ 7/9/13
42   MAJOR 7b11
43   UNISONO

FIRMWARE UPDATE

You can easily update the firmware with a MIDI sysex dump. To do so, use a MIDI-sysex-dump-loader for example the freeware MIDI-OX or Electron C6 (win or mac).

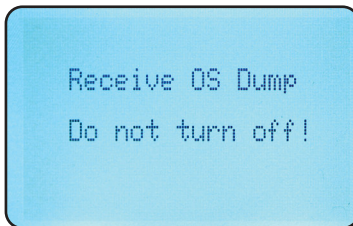Load the firmware sysex file to your computer.

Connect the MIDI interface of the computer with the MIDI input of the 4VOX.

Push down together the booth VCO A and B buttons while power on the module.
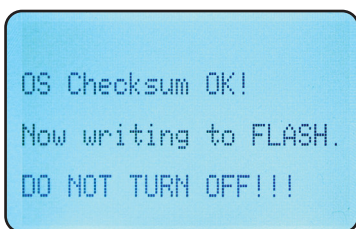The display should show:

```
       Waiting for
     SysEx Data ...
```

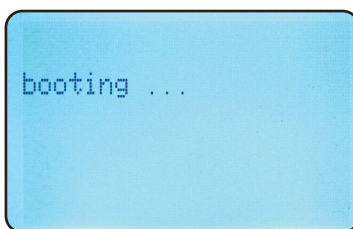Send the sysex file to the module now. The display should show:
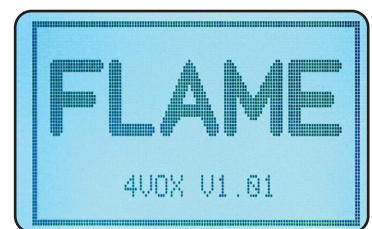
```
     Receive OS Dump
     Do not turn off!
```

Wait until the file is loaded. Afterwords the module reboots and displays:

```
OS Checksum OK!
Now writing to FLASH.
DO NOT TURN OFF!!!
```

```
booting ...
```
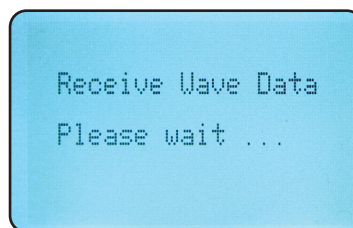
```
FLAME
       4VOX V1.01
```

WAVETABLE UPDATE

There are 39 memory locations for wavetables. Per MIDI sysex dump you can overwrite this locations with altenative wavetables. To do so, use a MIDI-sysex-dump-loader for example the freeware MIDI-OX or Electron C6 (win or mac).

If you want to load a wavetable into a specific location, go to "LOAD WT to:" in the GLOBAL menu and select the number of the memory location.

Advice: If you load a wavetable when you currently not in the GLOBAL menu, the wavetable is stored to the memory location defined by the wavetable-sysex-file.

```
        GLOBAL
LOAD WT to: 00
COPY VCO:   A  >  A
SWAP VCOs:  A < > A
STARTPATCH: 31
MASTERTUNE: +000 cent
```

Send the wavetable sysex file now. The display should show:

```
Receive Wave Data

Please wait ...
```

After the file has been sent the wavetable is automatically stored in the flash memory.
To listen to the wavetable you have to load it to the VCO again.

5. Appendix

Technical details

Current consumption: ca. +180mA / -50mA
Size: Euro format 3U / 29HP 147,5 x 128,5 x 50mm

Warrenty

Beginning from the date of purchase a 2-year warranty is guaranteed for this device in case of any manufacturing errors or other functional deficiencies during runtime.The warranty does not apply in case of:
- damage caused by misuse
- mechanical damage arising from careless treatment (dropping, vigorous shaking, mishandling, etc)
- damage caused by liquids penetrating the device
- heat damage caused by overexposure to sunlight or heating
- electric damage caused by improper connecting
  (wrong power supply/ jacks/ MIDI connections/ voltage problems).
If you have any complaints please contact your dealer or send an e-mail to:
service@flame.fortschritt-musik.de

Terms of production

conformity: CE, RoHS, UL

Disposal

The device is produced with RoHS-conformity (subject to the regulations of the European Union) and is free of hazardous substances (like mercury, plumb, cadmium and hexavalent chrome). But electronical scrap is hazardous waste. Please don't add this to consumer waste. For an environment friendly disposal of waste please contact your distributor or specialist dealer.

Support

Updated and additional informations, updates, downloads and more see:
http://flame.fortschritt-musik.de

Acknowledgment

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Hardware + Concept: Per Salzwedel, Sebastian Preller
Software: Sebastian Preller
Betatest: Ebotronix, Frank FX Lohmeyer