Jeannie

POLYPHONIC DIY SYNTHESIZER

User manual

Firmware V2.19

Jeannie is an 8-voice polyphonic open source synthesizer kit with digital sound synthesis and digital filters based on a fast ARM Cortex-M7 processor with 1MByte Ram.
For sound generation, the user has a variety of classic and band-limited waveforms at his disposal, as well as a polyphonic multi-saw. A pool of 15 waveform banks with 63 different waveforms each offer plenty of space for sound experiments. A waveshaper with different characteristics provides for gentle to vicious sounding distortions. To tame the waveforms, there are three digital filters. The 1st filter is a 12dB state variable filter with TP/HP/BP function. The 2nd filter is a 24dB ladder low pass filter. The 3rd filter is located at the internal sum output. It is a 12dB high pass filter with adjustable cut-off frequency from 20Hz - 2000Hz. A 24Bit DSP effect module with adjustable parameters rounds off the sound synthesis. An integrated polyphonic step sequencer provides for the playfulness of the small synthesizer.

A total of 2048 sound programmes from 15 banks can be loaded and stored via an integrated SD card. A colour 1.8 inch TFT display allows a clear menu structure and easy operation of the synthesiser. The parameters are entered via four rotary knobs below the display as well as an encoder for selecting the sound programmes and switching to the menu functions. In addition, six keys are available for operating special functions of the synthesiser.

Inhaltsverzeichnis

Prologue

Thank you for purchasing the polyphonic synthesizer kit "Jeannie" from TubeOhm Instruments.

The synthesiser is designed as a kit and is aimed at customers with basic knowledge of electronics and some experience with digital or analogue synthesizers.
Some mechanical experience is required, as soldering and the assembly of a cabinet are necessary.

This synthesiser combines different types of sound synthesis and is thus a great playground for sound tinkerers. A graphic 1.8-inch TFT display for visual representation of the waveforms and a simple menu structure facilitate operation.

Special thanks to

Paul Stoffregen,   https://www.pjrc.com/

ElectroTechnique,   https://electrotechnique.cc/

and to all those who have been forgotten here.

The development team

Hardware	Andre' Laska, Rolf Degen	
Designe:	Andre' Laska	tubeohm.com
Software:	Rolf Degen	github.com
Firmware:	V2.19 Januar 2023	
Download:		tubeohm.com
Jeannie DIY Block:		sequencer.de

The assemblies

The kit consists of a total of four boards, whereby the Teensy 4.1 board and the PCM5102A board are supplied already assembled and are simply plugged into the existing contact strips on the back of the panel board.

The panel board contains all the controls and a 160x128 pixel colour TFT display. The FxDSP board is equipped with an FV-1 reverb IC from Spin Semiconductor and is responsible for the sound effects.

Panel Board *(SMD bereits bestückt)*
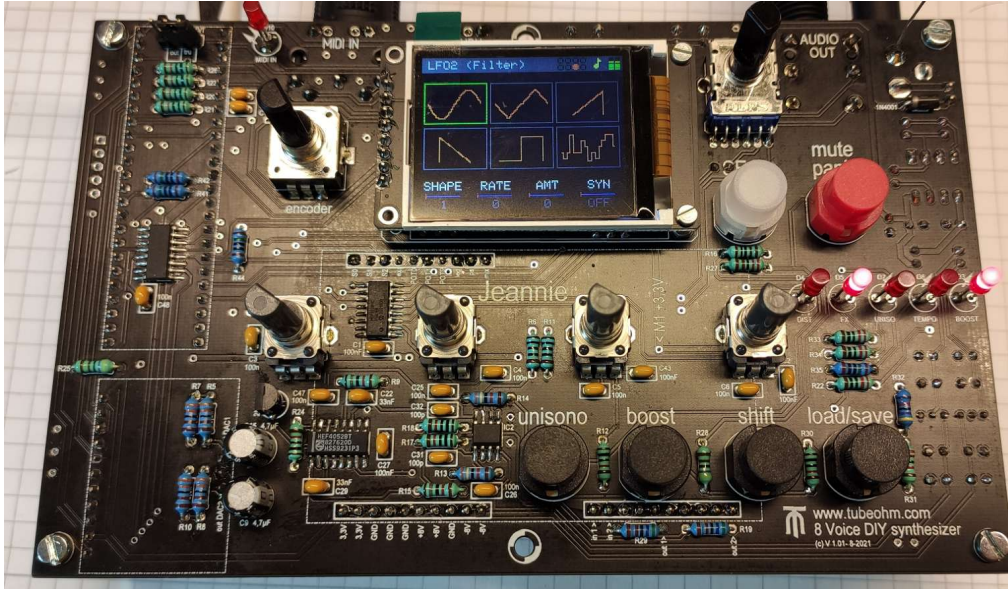
Teensy 4.1 Board *(fertig bestückt)*

PCM5102A Board *(fertig bestückt)*
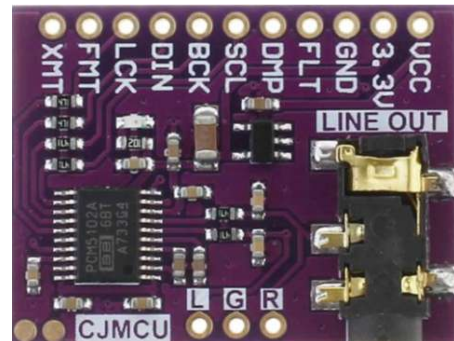
Fx DSP Board *(SMD bereits bestückt)*
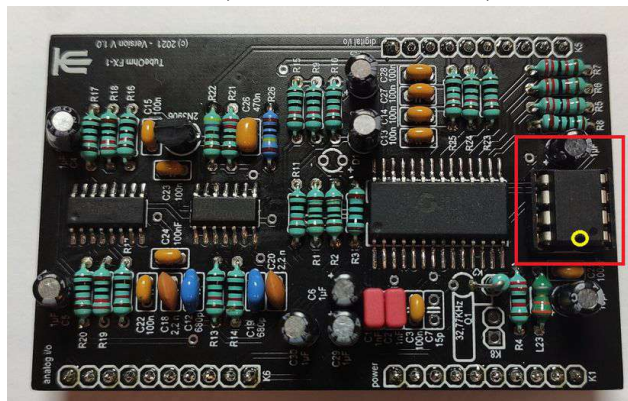
Jeannie V2.12
POLYPHONIC DIY SYNTHESIZER
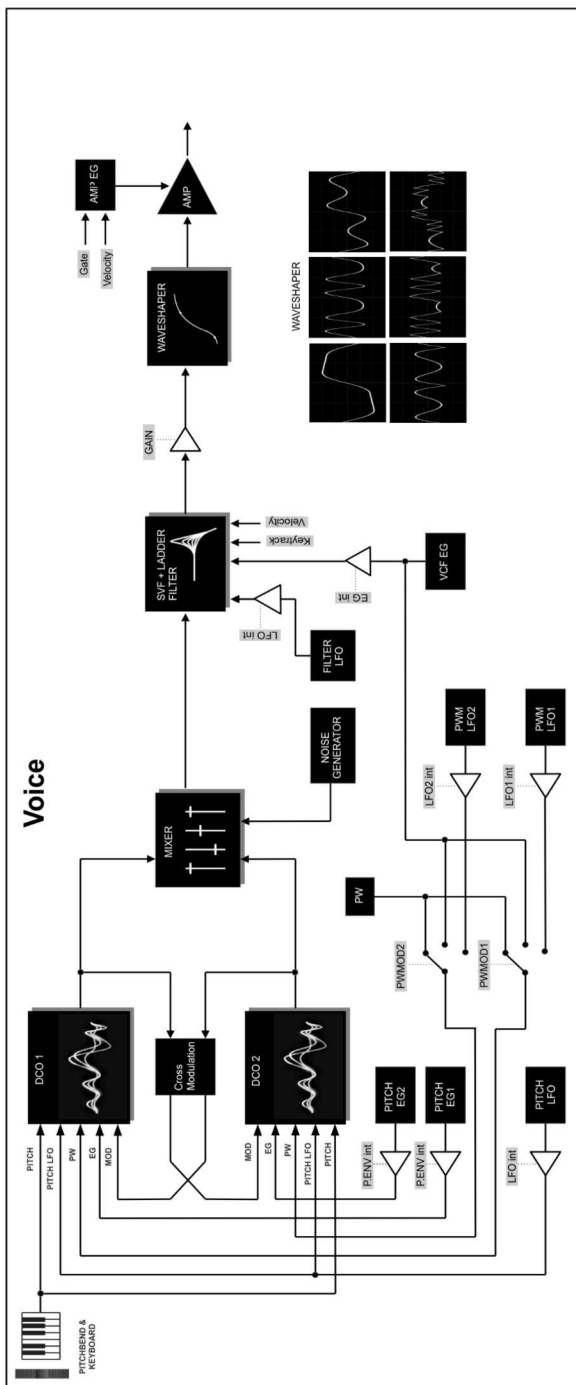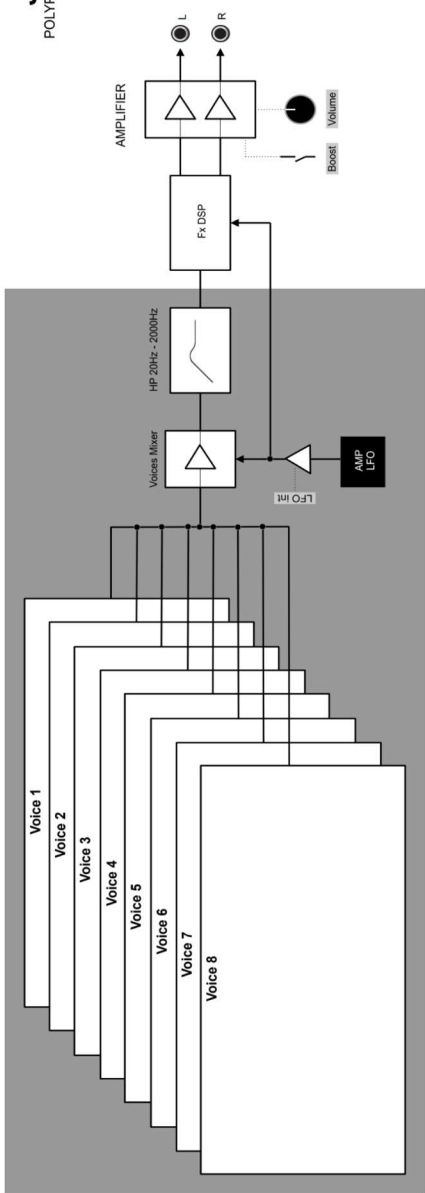
Jeannie

Jeannie is a digital synthesiser. The sound generation of Jeannie is based on an ARM Cortex-M7 processor with a clock frequency of 720 MHz and 1 MB RAM. With this, eight voices can be generated. Two digital oscillators with a selection of over 900 waveforms are available for each voice. These include classic to band-limited waveforms and a multisaw. In addition, a noise generator with white and pink noise is available. There is a digital multimode filter with 12 dB slope, which can be operated as low-pass, band-pass or high-pass. In addition, the multimode filter can be switched to a ladder low-pass filter with 24 dB slope. At the sum output, an adjustable high-pass filter attenuates the low tones. Downstream of the filter is a waveshaper with different characteristics, which can be used to distort the sound from light to strong. Two ADSR envelopes and three LFOs are available for modulation. A 24-bit DSP effect module based on the FV-1 processor from Spin Semiconductor rounds off the sound synthesis. A polyphonic sequencer with 16 steps provides for further playfulness.

DCO / Noise / Modulation / Waveshaper

Two oscillators are available for each voice and can generate different oscillation forms simultaneously. For the pulse oscillation form, the pulse width for each oscillator can be varied manually, by its own LFO or via an ADSR generator. Both oscillators can be switched on or off. Stepless mixing of both oscillators is also possible. In addition, white or pink noise can be added if desired. The pitch can be adjusted up or down over 2 octaves. In addition, there is a pitch envelope that can affect both oscillators separately. The oscillators can modulate each other with the modes XOR, XMOD, MOD, AND, Phase and FM. A waveshaper with different characteristics and adjustable gain provides gentle to vicious sounding distortions behind the filter.

Filter

Jeannie has three digital filters, which have different settings. In the filter menu you can choose between a controllable 12dB state variable filter (TP / HP / BP) or a 24dB ladder filter (TP). At the sum output there is a 12dB high-pass filter with a frequency from 20Hz to 2000Hz. For each filter the frequency and resonance can be adjusted. The ladder filter also has a drive parameter.

Envelope / LFO

An ADSR envelope generator is available for both the filter and the VCA. The attack phase can be set from linear to exponential. Decay and release are always exponential. The adjustable rise and fall times range from 0.3ms - 12sec. Jeannie has three LFOs that are permanently assigned. LFO1 modulates the pitch of oscillator1+2. LFO2 modulates the frequency of the filter (cutoff). LFO3 modulates the VCA and effect parameters in the FX DSP. Each LFO also has an adjustable fade-in and fade-out function. This allows you to create small delays or decay effects in the LFO modulation.

Effekte

Jeannie is equipped with a programmable effects module. The module is based on a 24bit FV-1 reverb chip from Spin Semiconductor. There are 15 effects to choose from. Each effect can be changed by modifiable parameters such as reverb time, feedback or pitch. With the LFO3, each effect parameter (P1-P3) and the Fx volume can be modulated.

Sequencer

An integrated polyphonic sequencer with 16 steps ensures playability. A maximum of 4 notes can be entered per step. The notes can be recorded and edited directly in the sequencer editor using a midi keyboard. The volume of the notes (velocity) is also recorded. It is displayed in the form of coloured steps.

Memory

The synthesiser has an internal SD card on which a total of 2048 sound programmes can be stored. Individual programmes or banks can be loaded or saved via USB using the SysEx protocol.

Specifications

- 8-voice polyphonic DIY synthesizer

- ARM Cortex-M7 processor 720MHz with 1MByte Ram

- two digital oscillators per voice

- 15 waveform banks with a total of 945 waveforms and MultiSaw

- 12 standard waveforms, some of them band-limited

- Noise generator (white and pink noise)

- Oscillator modulation (XOR, XMOD, MOD, AND, PHA, FM)

- Waveshaper with different waveforms

- 3 LFOs with 64 waveforms for pitch, filter, AMP and effect modulation

- 2 PWM LFO from 0.04Hz - 25Hz

- digital filters

  12dB state variable filter with resonance LP/HP/BP per voice

  24dB low pass ladder filter with resonance, gain and saturation per voice

  12dB global high pass filter 20Hz - 2000Hz with resonance at sum output

- 2 ADSR generators 0.3ms - 12s with linear and exponential waveforms

- 24Bit DSP effect module with 15 effects and adjustable parameters

- Polyphonic sequencer with 16 steps

- SD cards for loading and saving a maximum of 2048 sound programmes

- USB SYSEX protocol for transferring sound programmes

- colour 1.8 inch display with a resolution of 160x128 pixels

- Volume control

- Bass boost function

- 4 potentiometers for parameter input

- Rotary encoder for menu control and sound selection

- 6 function keys

- Midi In and Midi Out /Midi True

- stereo audio output jack 6.3mm

- USB 2.0 Midi interface

- Easy firmware update via USB

Controls and connections

Front
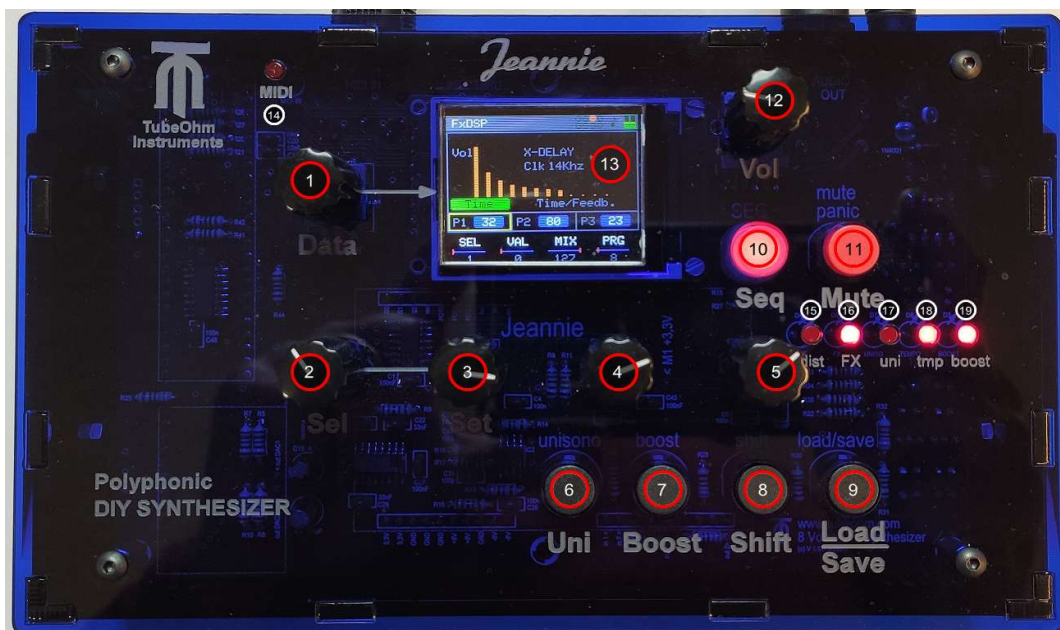
1	SOUND PATCH / MENÜ	8	SHIFT FUNcTION	15	FX CLIP LED
2	PARAMETER pot	9	LOAD / SAVE	16	FX ON / OFF LED
3	PARAMETER pot	10	SEQUENCER	17	UNISONO MODE LED
4	PARAMETER pot	11	MUTE / PANIC	18	TEMPO LED
5	PARAMETER pot	12	VOLUME	19	BASSBOOST ON / OFF
6	UNISONO	13	DISPLAY		
7	BASSBOOST	14	MIDI LED		

Connections on the back

20	12V DC POWER SUPPLY CONNECTION
21	Power switch
22	STEREO OUTPUT
23	MIDI OUT / MIDI THRU
24	MIDI IN
25	USB CONNECTION (for firmware update)

Power supply connector

The synthesiser is powered by an external 12V DC power supply at the power supply connector (20). The power supply must be rated for a current load of at least 500 mA or more. The power switch (21) is used to turn the synthesiser on and off. Make sure that all peripheral devices such as active speakers or amplifiers are switched off and turn down the volume on the volume control (12).

Power supply unit

The synthesiser is supplied without a power supply unit. We recommend using a switching power supply with 12 volts DC and 1000mA load. The power supply should have a 5.5 mm / 2.1 mm spar connector and a positive polarity of the inner conductor as shown in the illustration.
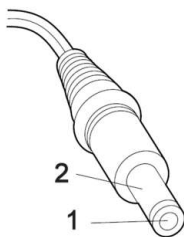
PIN	Spannung
1	+ 12V DC
2	Ground

Switch on

After switching on, the system parameters for initialising the synthesiser are loaded from the internal SD card located in the Teensy 4.1 board. During this time the start screen with the TubeOhm logo is displayed. The necessary system folders and files must be present on the SD card, otherwise an error message will appear.
A detailed description of the required system folders and files can be found on the following page.

SD-Card

The synthesiser is supplied without an SD card. Micro SDHC cards of the type Class 10-UHS I from 8 - 64GB can be used as shown in the illustration.

microSDHC Karten Class 10-UHS I   Teensy 4.1 mit SD-Karte
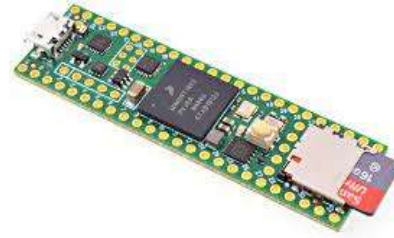
All required folders and files can be downloaded as a ZIP file from the download section of the tubeohm.com website. SD cards up to 32GB must be formatted as FAT32, SD cards up to 64GB as exFAT. Please copy the contents of the unzipped ZIP file completely onto the SD card (see below).

Folder and file structure on the SD card

The folders A - P contain the stored sound programmes. Sound programmes are numbered from 1 to 128. An exchange of files and folders is possible at any time, as long as the numbering and designation matches the original.

The PIC folder contains the start screen and other picture elements. The SEQ folder contains the saved sequencer patterns. A sequencer pattern can be saved as individual files in the sequencer editor. The pattern files are numbered from 1-128.

Up to 128 sequencer patterns can be saved and loaded in the Sequencer Editor. If you are outside the Sequencer Editor and save a sound programme, the current sequencer pattern is saved as part of a sound programme.

DATA controller and potentiometer

The data knob (1) is used to select a sound programme and to switch the menu pages. It is equipped with a push-button to switch between the sound programme and the menu pages. Below the display (13) are four potentiometers (2 - 5) for entering parameters. The respective parameter functions are shown in the lower area of the display menu.

Keys Functions (6 - 11)

Uni switch

The Uni key (6) activates the unison mode. All voices sound when a note is struck. The key has two modes. In unison mode 1 (uni LED lights up) the voices are slightly out of tune with each other. The detuning can be changed in the OSC2 menu with DETUNE. If you press the button a second time, you enter unison mode 2 (uni LED flashes). With Detune you can now select the type of chord (major, minor, augmented...). Pressing the button a second time switches the unison mode off again (uni LED off).

Boost switch

The output amplifier in the synthesiser is equipped with a switchable bass boost. The low frequencies below 100 Hz are boosted to make the sound fatter. The boost key (7) switches the function on or off. LED 19 signals this function.

Shift switch

The shift key (8) is used to change to an existing submenu (SUB) or to cancel a function. It is also used when selecting a sound programme to scroll through the sound programmes in steps of 10 with the rotary knob (1).

Load / Save switch

The Load / Save button (9) is used to save and load a sound programme or sequencer pattern.

Seq switch

The internal step sequencer can be started and stopped with the SEQ button (11). The Temp LED (18) lights up in time with the sequencer.

Mute switch

With the mute button (10), a step can be muted or reactivated in the sequencer editor. If the button is pressed for longer in the sequencer editor, all sequencer settings are deleted and reset to default values.
Pressing the MUTE button outside the sequencer editor for longer than 2 seconds sends a note off to Jeannie.

Volume

The analogue volume control (12) is used to set the volume level for the stereo output (22) of the synthesiser. It is recommended to turn the volume to zero before switching on (turn the potentiometer to the left) and to set the desired volume level only after switching on.

Display
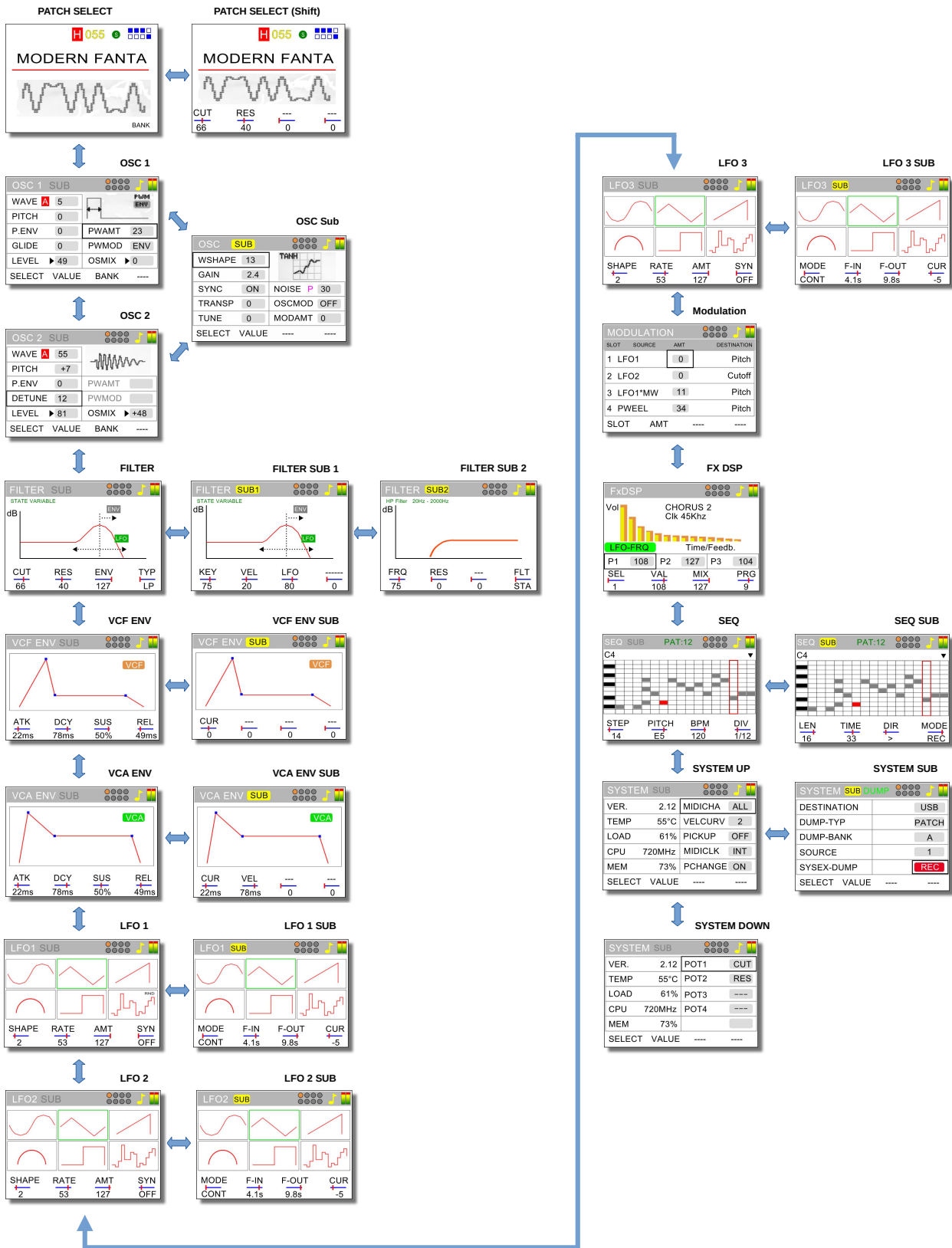
The colour TFT display (13) in the synthesiser has a resolution of 160 x 128 pixels and has LED backlighting that cannot be changed in brightness.

When assembling this synthesiser kit, please ensure that you use the TFT display supplied by tubeohm.com. There are similar displays on the internet which are not compatible. To prevent errors, the display is supplied with all kit variants.

Menu structure

From the sound programme page, pressing the DATA knob takes you to the editing pages. Pressing it again takes you back to the sound programme page.

PATCH SELECT

H 055 ⊚ ▪▪▪▫
MODERN FANTA

BANK

PATCH SELECT (Shift)

H 055 ⊚ ▪▪▪▫
MODERN FANTA

CUT	RES	---	---
66	40	0	0

OSC 1

OSC 1 SUB

WAVE	A	5	PWM ENV
PITCH		0	
P.ENV		0	PWAMT 23
GLIDE		0	PWMOD ENV
LEVEL	▶	49	OSMIX ▶ 0

SELECT VALUE BANK ----

OSC Sub

OSC SUB

WSHAPE	13	TANH
GAIN	2.4	
SYNC	ON	NOISE P 30
TRANSP	0	OSCMOD OFF
TUNE	0	MODAMT 0

SELECT VALUE ---- ----

OSC 2

OSC 2 SUB

WAVE	A	55	
PITCH		+7	
P.ENV		0	PWAMT
DETUNE		12	PWMOD
LEVEL	▶	81	OSMIX ▶ +48

SELECT VALUE BANK ----

FILTER

FILTER SUB
STATE VARIABLE
dB ENV LFO

CUT	RES	ENV	TYP
66	40	127	LP

FILTER SUB 1

FILTER SUB1
STATE VARIABLE
dB ENV LFO

KEY	VEL	LFO	------
75	20	80	0

FILTER SUB 2

FILTER SUB2
HP Filter 20Hz - 2000Hz
dB

FRQ	RES	---	FLT
75	0	0	STA

VCF ENV

VCF ENV SUB
VCF

ATK	DCY	SUS	REL
22ms	78ms	50%	49ms

VCF ENV SUB

VCF ENV SUB
VCF

CUR	---	---	---
0	0	0	0

VCA ENV

VCA ENV SUB
VCA

ATK	DCY	SUS	REL
22ms	78ms	50%	49ms

VCA ENV SUB

VCA ENV SUB
VCA

CUR	VEL	---	---
22ms	78ms	0	0

LFO 1

LFO1 SUB
RND

SHAPE	RATE	AMT	SYN
2	53	127	OFF

LFO 1 SUB

LFO1 SUB

MODE	F-IN	F-OUT	CUR
CONT	4.1s	9.8s	-5

LFO 2

LFO2 SUB

SHAPE	RATE	AMT	SYN
2	53	127	OFF

LFO 2 SUB

LFO2 SUB

MODE	F-IN	F-OUT	CUR
CONT	4.1s	9.8s	-5

LFO 3

LFO3 SUB

SHAPE	RATE	AMT	SYN
2	53	127	OFF

LFO 3 SUB

LFO3 SUB

MODE	F-IN	F-OUT	CUR
CONT	4.1s	9.8s	-5

Modulation

MODULATION

SLOT	SOURCE	AMT	DESTINATION
1	LFO1	0	Pitch
2	LFO2	0	Cutoff
3	LFO1*MW	11	Pitch
4	PWEEL	34	Pitch

SLOT AMT ---- ----

FX DSP

FxDSP

Vol CHORUS 2
Clk 45Khz

LFO-FRQ Time/Feedb.

P1	108	P2	127	P3	104

SEL	VAL	MIX	PRG
1	108	127	9

SEQ

SEQ SUB PAT:12
C4

STEP	PITCH	BPM	DIV
14	E5	120	1/12

SEQ SUB

SEQ SUB PAT:12
C4

LEN	TIME	DIR	MODE
16	33	>	REC

SYSTEM UP

SYSTEM SUB

VER.	2.12	MIDICHA	ALL
TEMP	55°C	VELCURV	2
LOAD	61%	PICKUP	OFF
CPU	720MHz	MIDICLK	INT
MEM	73%	PCHANGE	ON

SELECT VALUE ---- ----

SYSTEM SUB

SYSTEM SUB DUMP

DESTINATION	USB
DUMP-TYP	PATCH
DUMP-BANK	A
SOURCE	1
SYSEX-DUMP	REC

SELECT VALUE ---- ----

SYSTEM DOWN

SYSTEM SUB

| VER.	2.12	POT1	CUT
TEMP	55°C	POT2	RES
LOAD	61%	POT3	---
CPU	720MHz	POT4	---
MEM	73%		

SELECT VALUE ---- ----

Pressing the Shift key takes you to the edit submenus (SUB menu). Pressing the Shift key repeatedly takes you either to a second submenu (if available) or to the previous edit menu page. You can also scroll to other menu pages within the submenus.Pressing the Shift key takes you to the edit submenus (SUB menu). Pressing the Shift key repeatedly takes you either to a second submenu (if available) or to the previous edit menu page. You can also scroll to other menu pages within the submenus.

Sound programme page

After switching on, the synthesiser is on the programme page. The DATA knob (1) is used to select a sound programme from 1 - 128. The BANK knob is used to select a sound bank from A - P. When switching a programme, the sound is switched off for a short time and the message [Loading...] appears in the display. This avoids loud interference peaks in the audio signal. If you hold down the shift key (8) while switching, you can step through the sound programmes in steps of 10.

The upper half of the display shows the programme name and number as well as the sound bank. Next to them are eight blue indicators that show which voices are active. A green dot with an S indicates the presence of a sequencer pattern in the sound programme.
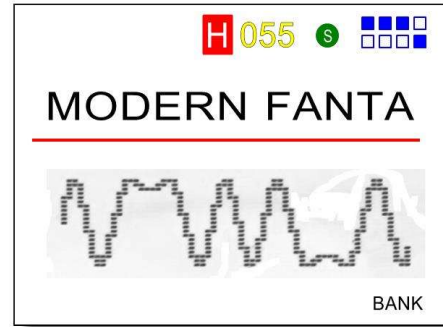
The oscilloscope is located in the lower part. It shows the signal amplitude of all active voices in the internal audio processor of the Teensy CPU. The effect signal is generated in a special DSP chip (SPN1001-FV-1 Spin) and mixed analogue to the audio signal. For this reason, it cannot be displayed in the oscilloscope.

Display of the function parameters

When you are on the programme page, you can use the shift key to show a total of four function parameters. This allows quick and direct access to individual parameters and saves searching in the menu pages. The function parameters are selected in the system menu (last menu page). The parameters for cutoff and resonance are preset.
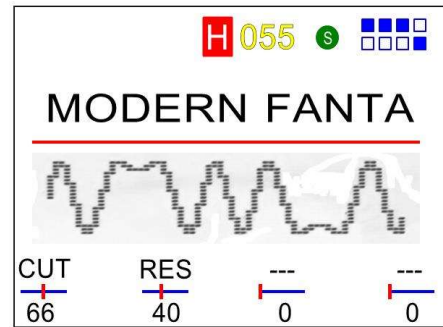
Oscillator 1

The synthesiser has two digital oscillators per voice whose parameters are almost identical. The parameters are selected with the SELECT knob. A coloured rectangle marks the selected parameter. The parameter values are changed with the VALUE knob. If the WAVE parameter is selected, one of 15 waveform banks (A - O) can be selected with the BANK knob.
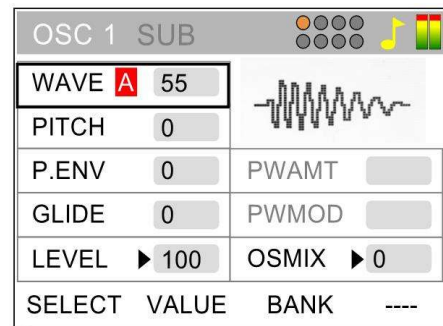
Waveform selection

WAVE

With WAVE, one of a total of 63 waveforms can be selected from a waveform bank. A total of 945 waveforms are available to the user in banks A - O. The waveforms 1 - 12 in bank A differ from the other waveforms. They are calculated by the CPU in real time and are partially band-limited (recognisable by the designation BANDLIMIT in the waveform preview window).

0	The oscillator is switched off (All banks)	7	Sawtooth sloping
1	Sinus	8	*Sawtooth to triangle (varying)*
2	Tri	9	*Sawtooth sloping (band limited)*
3	Sawtooth rising/ QuadSaw	10	*Sawtooth ascending (band limited)*
4	Rectangle	11	*Rectangle (band limited)*
5	Pulse width modulation	12	*Pulse width modulation (band limited)*
6	Sample & Hold		

The other waveforms are sample-based and are loaded from the programme memory. The selected waveform is shown in a small preview window at the top right of the display.

Only if the WAVE parameter is selected, a waveform bank can be selected with the BANK control. The same applies on the menu page of oscillator 2.

PITCH

With PITCH, the pitch of the oscillator can be adjusted in semitone steps in the range of -24 ... +24 semitones.

P.ENV

The P.ENV (Pitch Envelope) modulates the pitch of oscillator 1 and is controlled by the filter envelope.

GLIDE

The GLIDE parameter determines the continuous glide of the pitch from one note to the next. Low GLIDE values produce a short glide and higher values a longer glide. GLIDE affects the pitch of both oscillators.

LEVEL

LEVEL controls the volume of oscillator 1 and oscillator 2.

OSCMIX

The OSCMIX influences the volume ratio of Osc1 to Osc2 .

The parameters LEVEL and OSCMIX are marked with an arrow on the menu page of oscillator 1 and oscillator 2 and influence both oscillators simultaneously.

PWMOD / PWAMT

Both oscillators have variable pulse and variable triangle waveforms. These are located in waveform bank A (wave no.5 / no.8 / no.12). With PWMOD, the modulation type (PW / ENV) or the modulation frequency can be determined by the PWM LFO. If the parameter is set to PW (left stop), the pulse width or triangle waveform can be set with PWAMT. The middle setting corresponds approximately to a pulse wave with 50% pulse width or a triangle waveform. If you turn the PWMOD control clockwise a little further, the ENV sign is displayed in the waveform preview window.
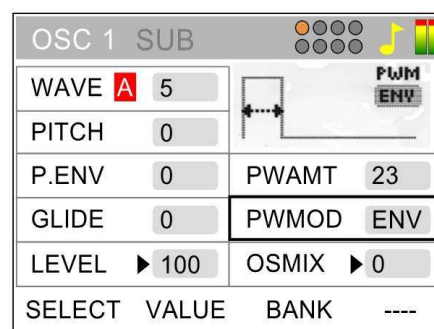
The pulse width or triangular waveform is then controlled by the Envelope filter. The strength of the envelope modulation is determined by PWAMT. If you turn the PWMOD parameter a little further to the right, the control range for the PWM LFO (1 - 121) begins. An LFO sign then appears in the waveform preview window. The frequency of the PWM LFO can be set from 0.04Hz - 25Hz. The waveform can be set in MODULATION menu slot 5. You can choose between sine, triangle and SAW.

SAWMIX / SPEAD (only QuadSaw)

Oscillator 1 and oscillator 2 have a polyphonic QuadSaw Engine (wave no. 3 in bank A). Four modulated sawtooth waves are generated in each oscillator, detuned against each other. SPREAD adjusts the amount of detuning. With SAWMIX, the three additional sawtooth waves are blended to the fundamental wave. The higher the SAWMIX value, the louder the additional waveforms. If the value is set to zero, only the fundamental wave is heard.
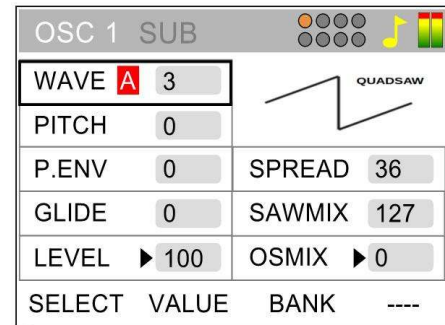
Oscillator 2

WAVE

Function as described in oscillator 1. To visually distinguish between OSC1 and OSC2, the colours of the waveforms are different.

PITCH
Function as described in oscillator 1

P.ENV
Function as described in oscillator 1

DETUNE
The DETUNE parameter detunes oscillator 2 relative to oscillator 1. This is useful to achieve a fat sound or chorus-like effect. In unison mode 1, DETUNE slightly detunes all 16 oscillators. In Unison Mode 2, DETUNE can be used to set different chord types (e.g. Major, Minor, Diminished and more...).

LEVEL
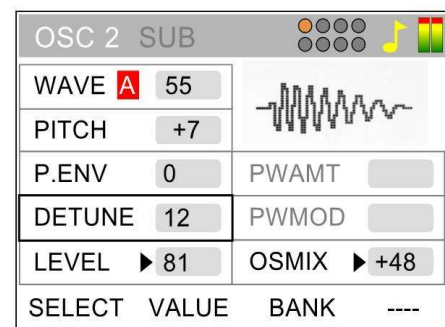Function as described in oscillator 1

OSCMIX
Function as described in oscillator 1

PWMOD / PWAMT
Function as described in oscillator 1

SAWMIX / SPREAD
Function as described in oscillator 1

Oscillator submenu (SUB)

The oscillators have a common submenu which is marked SUB (submenu) in the menu bar. The Shift key takes you from the oscillator level to the submenu. A flashing SUB marker at the top of the screen indicates this. The oscillator submenu contains various functions, including the settings for oscillator synchronisation, noise generator, waveshaper and more. All functions are described in more detail on the following page.
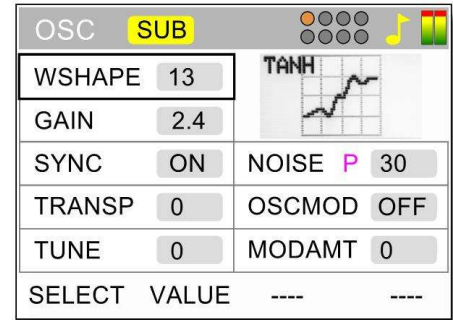
WSHAPE

The waveshaper changes or distorts the shape of the set waveform. Complex spectra are created from simple tones. In this synthesiser, we have not placed the waveshaper behind the oscillators as usual, but behind the filters. This gives us an additional distortion effect. With the parameter WSHAPE you can select a certain characteristic curve for the waveshaper. The characteristic curve is displayed graphically in a small window on the right side of the display.

GAIN

With GAIN, the amount of distortion in the waveshaper can be adjusted. If the waveshaper is switched off, GAIN has no function.

SYNC

If SYNC is switched on, both oscillators are synchronised in phase when a note is received.

TRANS

Transposes the pitch of the synthesiser in semitone steps. This also affects the received MIDI notes.

TUNE

With TUNE you determine the overall tuning of the Jeannie 430Hz - 450Hz. The default setting is 440Hz.

NOISE

The synthesiser has a noise generator. The level and colouring of the noise can be adjusted with the NOISE control. A W in the menu stands for a white noise and a P for a pink noise. In the middle position, the noise generator is switched off.

OSCMOD

Different oscillator modulations can be set (see table).

MODAMT

Adjust the strength of the oscillator modulation.

Oszillator Modulation

OFF	Oscillator modulation is switched off
XOR	Ring modulation effect
XMO	Cross Modulation. Modulates one oscillator with the other, depending on the setting of the OSCMIX knob. Turning past centre to the left increases the modulation of oscillator 1 by oscillator 2. Turning to the right increases the modulation of oscillator 2 to oscillator 1.
MOD	Digital MODULO operation of both oscillator outputs
AND	Digital AND operation of both oscillator outputs
PHA	Phase modulation of oscillator 1 by oscillator 2
FM	Ring modulation of oscillator 1 by oscillator 2

Filter

Jeannie has either a State Variable Filter or a Ladder Filter for sound programming. In the filter submenu 2, you can choose between a 12dB state variable filter (TP / HP / BP) or a 24dB ladder filter (TP). A 12dB high-pass filter with a frequency of 20 - 2000Hz is also available at the sum output.

CUT (all Filter)
With CUT you determine the cut-off frequency for the low-pass and high-pass filters or the centre frequency for the band-pass filter.

RES (all Filter)
The resonance determines the boost of the frequencies in the range of the set cutoff frequency.

ENV (SVF and Ladder)
With ENV you determine the influence of the filter envelope on the filter frequency. With positive values, the filter frequency increases with the amplitude of the envelope. With negative values, the filter frequency falls accordingly. The display shows a visualisation of the envelope and LFO value.

TYP (SVF)
In the State Variable Filter, the filter type is set via TYPE (LP / HP / BP). You can choose between low-pass, high-pass and band-pass. You can crossfade between lowpass and highpass with the TYP control. The middle position results in a typical notch filter character.

DRV (Ladder)
DRV (Drive) is used to control the input gain in the ladder filter.

PBG (only ladder in submenu 1)
With PBG (passband gain), the passband gain can be set in the ladder filter.

Filter submenu 1 (SUB1)
Press the SHIFT key to enter the filter submenu 1 and press it again to enter submenu 2. Pressing it again takes you to submenu 2. A flashing SUB marker at the top of the screen indicates this. In submenu 1 you can set the values for KEY tracking, filter velocity and LFO modulation. Submenu 2 is reserved for the high-pass filter at the sum output. Here you can only set the filter frequency and resonance. Furthermore, it is possible to switch from SVF to ladder filter here.


KEY
KEY sets the keytracking for the filter frequency. This determines how much the filter frequency depends on the midi note played. The setting +100% corresponds to a 1:1 scaling, i.e. if you play an octave on the keyboard, the filter frequency changes by the same amount.

VEL
The velocity parameter (VEL) determines the influence of the filter envelope on the filter frequency depending on the velocity of a midi note. The stronger the note velocity and the higher the VEL value, the greater the modulation of the filter frequency.

LFO
With the LFO parameter, you determine the strength of the frequency modulation by LFO 1.
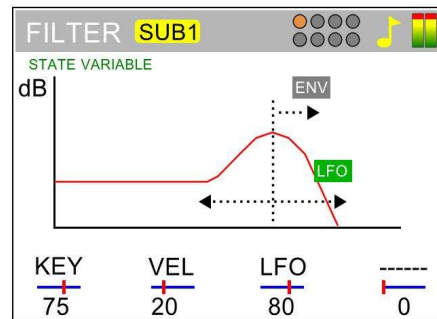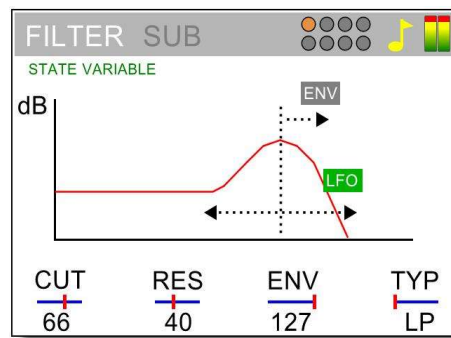
Filter submenu 2 (SUB2)

Submenu 2 is reserved for the high-pass filter at the sum output. Here you can set the filter frequency and resonance. Furthermore, it is possible to switch from state variable to ladder filter.

CUT

With CUT you determine the cut-off frequency of the high-pass filter. The frequency range is adjustable from 20Hz - 2000Hz.

RES

The resonance determines the boost of the frequencies in the range of the set cutoff frequency. Low settings make the sound more brilliant and high settings give the sound a typical filter character.

FLT

This function can be used to switch between ladder and SVF.
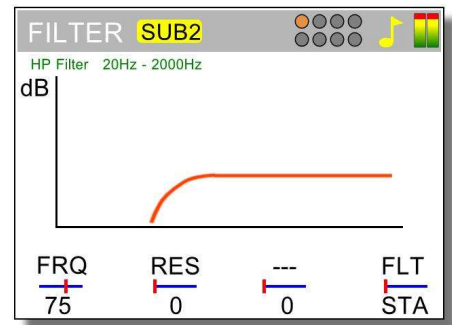
Envelopes (VCF + VCA)

Jeannie has two ADSR envelopes. The filter envelope (VCF ENV) is primarily intended to control the filter. The amplifier envelope (VCA ENV) controls the overall volume. .

ATK

ATK (Attack) indicates the time in which the envelope signal rises from zero to the maximum level. Long attack times result in a swelling sound (brass, strings), short attack times in a more percussive sound. The attack time can be set from 0.3ms to a maximum of 11.9 seconds.

DCY

DCY (Decay) determines the time in which the envelope signal decreases from the maximum to the sustain level. The decay time can be set from 0.3ms to a maximum of 11.9 seconds.

SUS

SUS (Sustain) indicates how high the envelope signal is (as a percentage of the maximum) while the keyboard key is held. The sustain value can be set from 0 to a maximum of 100%.

REL

REL controls the release time. As soon as a keyboard key is released, the release phase begins. In the release phase, the envelope signal drops from the current sustain level to zero in the set release time. The release time can be set from 0.3ms to a maximum of 11.9 seconds.
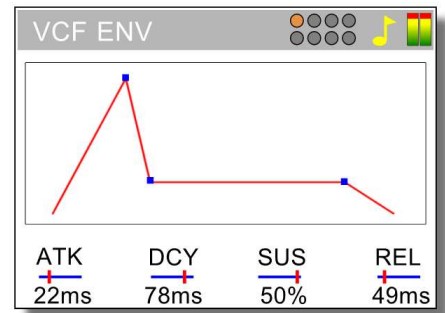
Envelopes submenu

The Shift key takes you to the envelope submenu of the filter and VCA envelope.

CUR

With CUR, the curve type for the attack phase of the envelopes can be set. The value can be set from positive exponential to negative exponential or linear.

VEL (VCA ENV)

With Velocity, you determine how much the volume depends on the key velocity. This can be used to give the sound a stronger expression. In the system menu you can set a velocity curve for the velocity (see p. 22).
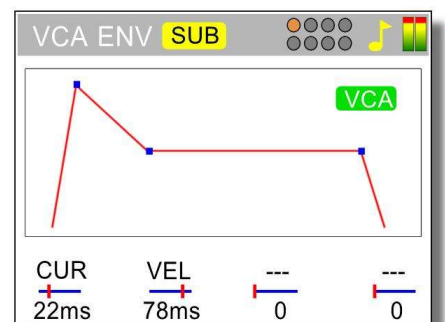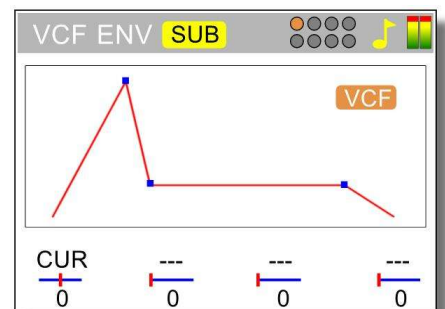
LFO 1-3

The synthesiser has three low frequency oscillators (LFO) for modulation purposes. Each LFO generates a periodic oscillation with adjustable frequency and waveform. LFO 1 controls the pitch of Osc1 and Osc2. LFO 2 controls the filter cutoff frequency of SVF and ladder filter. LFO3 controls the amplitude of the output

SHAPE
With SHAPE you can select one of 63 waveforms for the LFO.
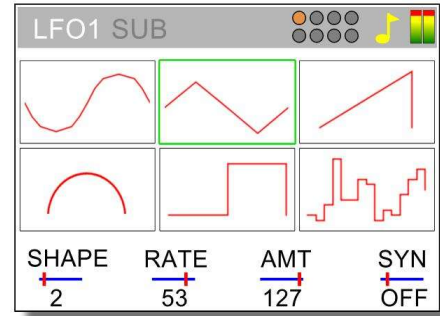
RATE
RATE sets the LFO frequency. With small values, the LFO needs a few minutes for a complete cycle. At higher values, the LFO oscillates up to a maximum of 40Hz.

AMT
This parameter determines the LFO modulation strength. If the value is set to 0, the modulation is deactivated.

SYN
SYN triggers the LFO. There are different settings (see table).

OFF	LFO runs freely
0°	LFO is restarted with a keystroke at 0 degrees.
180°	LFO is restarted with keystroke at 180 degrees

LFO 1 - 3 submenu

The shift key takes you to the LFO submenu. Here you can set additional functions such as One Shot or Fade-In and Fade-Out.

MODE
With MODE you determine whether the LFO runs continuously (CONT) or only one waveform with each keystroke (One Shoot Mode).

F-IN
The parameter F-IN (Fade-IN) causes a fast or slow fade in the modulation strength of the LFO.

F-OUT
With F-OUT (Fade-OUT) you can set the LFO so that after releasing a note, a fast or slow fade out of the modulation takes place.

CUR
With CUR (Curve) you set the exponential course of Fade-In. Negative values accelerate the course at the beginning. Positive values slow down the course at the beginning and have a steep course at the end. If the parameter is set to zero, the fade-in is linear.
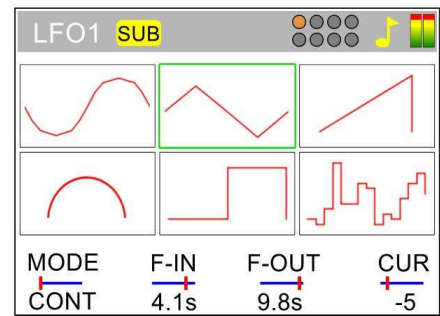
MODULATION

In the modulation menu, the strength of the modulation can be set for specific modulation sources and destinations. Due to the special audio architecture, the synthesiser has no possibility to change the modulation sources and destinations. But one advantage over a conventional modulation matrix is that all modulations can be active at the same time.

MODULATION			
SLOT	SOURCE	AMT	DESTINATION
1 LFO1		0	Pitch
2 LFO2		0	Cutoff
3 LFO1*MW		11	Pitch
4 PWHEEL		34	Pitch
SLOT	AMT	----	----

SLOT 1: LFO1 > Pitch
Determines the strength of the pitch modulation by LFO1.

SLOT 2: LFO2 > Cutoff
Determines the strength of the cutoff modulation by LFO2.

SLOT 3: LFO1*MW > Pitch
Determines the amount of pitch modulation of LFO1 by the modwheel controller of a keyboard.

SLOT 4: PWHEEL > Pitch
Determines the amount of pitch modulation by the pitch wheel controller of a keyboard.

SLOT 5: PWMA > OSC1
Determines the waveform (sin,tri,saw.sqr) for the pulse width modulation of oscillator 1.
***AMT settings are made in the Osz 1 menu.
SLOT 6: PWMB > OSC2
Determines the waveform (sin,tri,saw.sqr) for the pulse width modulation of oscillator 2.
***The AMT settings are made in the Osz 2 menu.
SLOT 7: OSC1 > CUTOFF
Determines the strength of the filter cutoff modulation by oscillator 1 (Filter FM).

SLOT 8: OSC2 > CUTOFF
Determines the strength of the filter cutoff modulation by oscillator 2 (Filter FM).

SLOT 9: LFO3 > VCA
Determines the strength of the VCA modulation by LFO3.

SLOT 10: LFO3 > FxP1
Determines the strength of the P1 modulation in the effect menu by LFO3.

SLOT 11: LFO3 > FxP2
Determines the amount of P2 modulation in the effect menu by LFO3.

SLOT 12: LFO3 > FxP3
Determines the strength of the P3 modulation in the effect menu by LFO3.

SLOT 13: nicht benutzt

SLOT 14: LFO3 > FxMIX
Determines the modulation strength of the Fx volume by the LFO3.

SLOT 15: Atouch > Cutoff
Determines the amount of cutoff modulation by keyboard aftertouch.
** Press key to increase cutoff.
SLOT 16: Atouch > Pitch
Determine the amount of pitch modulation by keyboard aftertouch.
** Press key to increase pitch.
SLOT 17: Atouch > LFO1 Amt
Determines the amount of modulation by LFO1 on the pitch of both oscillators.
**works like the Mod Wheel, only on pressure
SLOT 18: Atouch > LFO2 Amt
Determines the strength of the cutoff modulation by LFO2.

SLOT 19: Atouch > FxP1
Determines the strength of the FxP1 modulation by keyboard aftertouch.

SLOT 20: Atouch > FxP2
Determines the strength of the FxP2 modulation by keyboard aftertouch.

SLOT 21: Atouch > FxP3
Determines the strength of the FxP3 modulation by keyboard aftertouch.

SLOT 22: not in use

SLOT 19: Atouch > FxMIX
Determines the modulation level of the Fx volume by keyboard aftertouch.

SLOT 24: not in use

DSP Effekt Modul

Jeannie has a DSP effect module with e.g. corus, reverb, echo and other effects. Each effect has adjustable parameters to adjust or change the effect. The FV-1 effect processor is a programmable DSP designed for audio and effects applications. It has a built-in 24-bit AD/DA converter, making it easy to integrate into existing analogue circuits. The FxDSP menu has four controls for setting the effects.
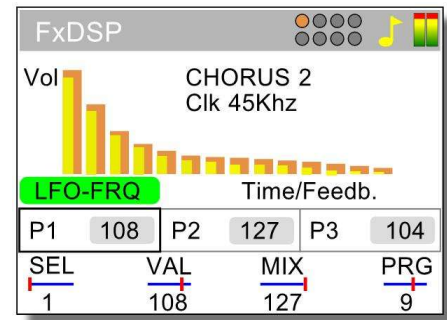
SEL

SEL selects one of three effect parameters P1 - P3 and the clock rate of the effect processor. The effect parameters vary depending on the selected effect programme. The respective parameter names are shown in the display when you select them with SEL.

VAL

With VAL you can adjust the strength of the respective effect parameter. A bar chart visualises the effect setting.

MIX

Determines the volume ratio of the original and effect signal. When set to 0, only the original signal is routed to the audio outputs, so that no effect is audible. When set to 127, the original signal + effect signal appears at the audio outputs.

PRG

Selecting an effect programme. There are a total of 15 effect programmes that you can set with the PRG control. When set to 0, the effect is completely switched off.

CLK

With CLK, the clock rate of the effect processor can be set from 10KHz to a maximum of 60KHz. Changing the clock rate has an influence on reverb and delay times, for example.

SEQUENCER

Jeannie has a polyphonic sequencer with 16 steps and different playback modes, e.g. forward, backward or random. Notes can be recorded and edited directly in the sequencer editor with a midi keyboard. You can also change the beat rate and the divider for the beat rate. Note velocity is also recorded and displayed in the form of coloured steps. Light colours represent loud notes and dark colours represent soft notes.
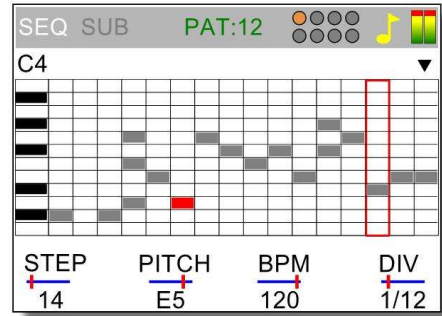
STEP

With STEP you set the position to be edited. In sequencer REC mode, you can record new notes from this position or switch a step off or on (mute button). When you move over the steps, the notes are played for a short time. A display above the keyboard shows the corresponding note octave.

PITCH

With PITCH you can change the note pitch of a step.

## *BPM*

Sets the speed in beat per minute (BPM).

DIV

With DIV you determine the divider for the master clock (BPM setting).

1/2	Half note	*3/32*	Dotted sixteenth note
3/8	Dotted quarter note	*1/12*	Twelfth note (eight-note triplets)
1/3	Third note (semitone triplets)	*1/16*	Sixteenth note (the default value)
1/4	Quarter note	*1/24*	24th note (sixteenth note triplets)
3/16	Dotted eighth note	*1/32*	Thirty-second note
1/6	Sixth note (quarter note triplets)	*1/48*	Forty-eighths (thirtieths triplets)
1/8	Eighth note		

Sequencer submenu

You can access the sequencer submenu by pressing the SHIFT key. Various functions can be set here. For example, the number of steps to be played or the note length of the entire pattern. Furthermore, various functions for sequencer operation are possible via the mode setting (see p. 21).
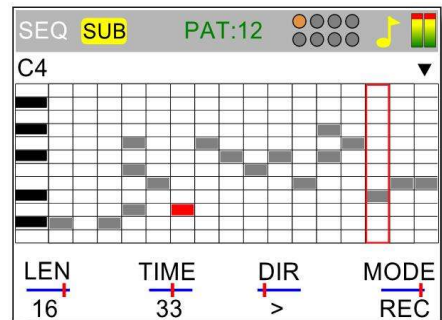
LEN

The parameter LEN (pattern length) determines the number of steps to be played (max 16 steps). A small triangle above the grid indicates the end position of the sequencer loop. When the sequencer reaches the last step, the sequence is played from beginning to end or backwards, depending on the running direction (DIR) (see p. 21). A random mode (RND) is also available.

TIME

With TIME you determine the note length of all steps.

DIR

DIR determines the running direction or random playing order in the sequencer. You can choose between forward (>) or backward (<) as well as forward and backward (<>) or random order (RND).

MODE

With MODE you can set various functions of the sequencer.

KEY	In KEY mode, midi notes can be received and played in parallel.
TRP	This function allows transposition of the sequencer notes via a midi keyboard. The received midi notes are not played.
REC	With REC, the sequencer is in edit mode. Now the sequencer receives midi notes for a step with each keystroke. A maximum of four notes per step is possible. After releasing the key(s), the step automatically jumps to the next step. If you have played a wrong note in a step, you can go to the step with the STEP control (1st sequencer page) and play it again or change the pitch with PITCH.

Sequencer Pattern

When you are in the sequencer editor, you can load or save a sequencer pattern with the Load / Save button.

Load Pattern
Pressing the LOAD button briefly opens the Load menu. Now you can select one of 128 sequencer patterns with PAT. If the name field remains empty, either no pattern is available or the pattern was not given a name when it was saved. Pressing the Shift key cancels the loading process.
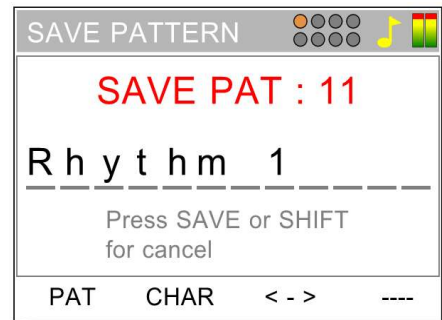
Save Pattern
To save a sequencer pattern, press and hold the Load / Save button in the sequencer menu for more than 2 seconds. Now the SAVE menu appears. With PAT you can select a memory location (1-128) for the new pattern. An existing pattern is displayed in the name field. Now you can enter a name or change an existing name with the two controls CHAR and < - >. To save the new pattern, press the Load / Save button again. If the SAVE menu was called up by mistake, the saving process can be cancelled with the Shift key.

Saving a Sequencer Pattern in the Sound Program
Outside the sequencer editor, the current pattern is saved directly with the sound.
This has the advantage that you can change or delete old patterns in the sequencer editor without changing the sequencer pattern in the sound programme.

If a sequencer pattern is available in the sound programme, a green dot with a small "s" is displayed to the right of the patch number on the main page. In the sequencer editor, the pattern can be changed, deleted or saved as a separate sequencer pattern.

SYSTEM

The system menu informs you about special processor data, e.g. temperature, utilisation of the audio buffer or clock rate. Furthermore, you can set some global parameters for the synthesiser, which are described in more detail here.

SYSTEM SUB			
VER.	2.12	MIDICHA	ALL
TEMP	55°C	VELCURV	2
LOAD	61%	PICKUP	OFF
CPU	720MHz	MIDICLK	INT
MEM	73%	PCHANGE	ON
SELECT	VALUE	----	----

MIDICHA

Determines the Midi reception channel. You can set the channels 1-16 and ALL. If MIDICHA is set to ALL (Omni-Mode), the synthesiser receives Midi data on all channels.

VELCURV

The velocity curve sets curves for the velocity. There are five velocity curves to choose from.

1		Linearer Verlauf
2		Exponentieller Verlauf
3		Steiler Exponentieller Verlauf
4		Flacher Exponentieller Verlauf
5		Steiler Exponentieller Verlauf

PICKUP

To prevent the parameter values from jumping, you can activate the PICKUP function (pick-up function) for setting the potentiometers. When the PICKUP function is activated, the displayed parameter value only changes when the potentiometer sweeps over the stored value (green dot). A green arrow indicates the direction of rotation of the potentiometer for the sweep. When the stored value is reached, the arrow symbol and the green dot are deleted and the parameter values change.

MIDICLK

Here the midi clock signal can be set to internal or external..

PCHANGE

The programme change is a midi command to switch a sound programme in the synthesiser. The reception of this midi command can be switched off in the menu function PCHANGE to ignore the sound change command from another synthesiser.

POT1 - POT4

If you scroll down a little in the system menu, you can select so-called function parameters for the programme page with SELECT and VALUE. Cutoff (CUT) and resonance (RES) are preset for the state variable or ladder filter.

H 055

MODERN FANTA

CUT	RES	---	---
66	40	0	0

SYSTEM SUB			
VER.	2.12	POT1	CUT
TEMP	55°C	POT2	RES
LOAD	61%	POT3	---
CPU	720MHz	POT4	---
MEM	73%		
SELECT	VALUE	----	----
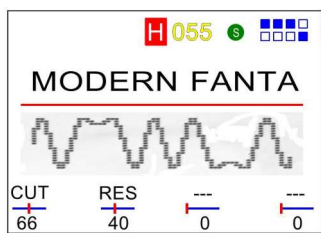
SYSEX DUMP

In the system menu, pressing the shift key calls the SYSEX DUMP menu. In the SYSEX DUMP menu, a single patch or a complete patch bank can be received or sent as SYSEX data. The data transfer is indicated by a progress bar on the menu page.

SYSTEM SUB DUMP	
DESTINATION	USB
DUMP-TYP	PATCH
DUMP-BANK	A
SOURCE	1
SYSEX-DUMP	REC
SELECT VALUE ----	----

Destination
With Destination you determine the transmission path. Only USB is available for selection in the current firmware.
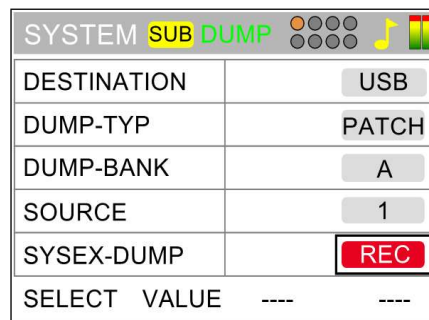
DUMP-TYP
If you want to transmit or receive a sound programme (PATCH), set the DUMP TYPE to PATCH. If you want to transmit or receive a complete sound bank, set the DUMP TYPE to BANK.

SOURCE
Here you set the sound number to be transmitted or received. If a sound bank is selected as DUMP TYPE, this selection is inactive.

SYSEX-DUMP
With this parameter you determine whether SysEx data is to be received or sent. Transmission or reception is started via the 'Load/Save' key. The cursor must be on [REC] or [SEND]. A progress bar informs you about the progress of the transmission.

Receiving SysEx data
When receiving SysEX data, please note the following. Before sending SysEx data from the computer to the synthesizer, you must select a programme bank (A-P) as the destination, or if a single sound programme is to be received, a programme space as the destination. It does not matter if the original sound has a different programme number or the original bank has a different name. After pressing the "Load/Save" button, you have 15 seconds to start the transmission on the computer. During this time, the [REC] field is red. When SysEx data is received, a progress bar is displayed.

Save Sound Program

Outside the sequencer editor, the Load/Save button can be used to save sound programmes. The Load / Save key opens the SAVE menu for a sound programme. The menu displays the current programme name. With BANK and PATCH you can select another programme number. If the selected programme number is already occupied, the programme name appears to the right of the programme number. The programme slot is then overwritten. With CHAR and < - > a new programme name is entered or an existing name is changed. To save the new programme, press the Load/Save key again. If necessary, the Shift key can be used to cancel the saving process. Furthermore, in the Save menu you have the possibility to copy a selected sound programme to another programme location. A total of 15 sound banks with 128 sound programmes each are available for selection.

Init Sound Program

Outside the sequencer editor, a longer press (> 2sec) of the Load/Save button initialises a sound programme. This deletes all sound parameters including the sequencer data in the programme memory and resets them to default values. To confirm, press the Load/Save key again. The function can be cancelled with Shift.

Please note that the "init Patch" function only deletes or initialises the data in the programme memory but not the programme data on the SD card. To save the init patch to the SD card, press the Load/Save button again.

Tipps & Tricks

Start Problem

If the synthesiser hangs in a continuous loop after switching on, this is probably due to a faulty sound programme. To solve the problem, press and hold the 'Mute' button before switching on until the screen displays the sound programme 'A000'. The synthesiser is now ready for use again. Then select a new sound programme with the menu encoder.

SD card is not recognised

If the screen turns red after switching on and the display shows 'No Disk', this can have several causes.

A contact problem with the SD card socket could be a cause. To solve the problem, please switch off the synthesiser and pull the SD card out of the contact socket of the Teensy 4.1 board. Then clean the contacts on the SD card with a dry cloth and push the SD card back into the SD card slot. Then switch on the synthesiser.

Another problem could be a faulty file and folder structure on the SD card. On the Tubeohm website you can download the complete files and folders as a ZIP file. Before you rewrite or format the SD card, you should copy your own sound programmes in the folders A-P, as well as the sequencer data in the folder SEQ, from the SD card to a PC.

Tutorial 1 : Programming Sound

Here are some tips on programming sound.

Tutorial 1) Avoid distortions or use them correctly. First of all I will describe one of the most important parameters.

On the oscillator 1 and 2 side there is the <LEVEL> parameter.
LEVEL: 0..100 both oscillators are influenced in volume.
*** digital distortions can usually occur with high resonances and high input volume of the oscillators into the filter.

Digital distortions occur when the highest possible value is exceeded during a calculation.
Then there is either a 'folding over' of a signal or the signal is cut off.

Especially with high resonance, such signal levels can occur. Mathematically, the signal amplitude approaches infinity at very high resonance of a filter.

In any case, the signal level in the resonance case is very high. Think of it as 8 voices, and the calculator in the CPU raises the flag.
While it is still moderate with the built-in ladder filter, the state variable filter has an extreme resonance which can be tamed.

We now have several possibilities to control the volume of the oscillators/filters and thus also unwanted distortions.

Possibility 1) to reduce the volume via level, of course.
Possibility 2) to limit the volume dynamically via a soft distortion / limiter curve
Possibility 3) to quickly reduce the VCA ADSR to low levels.

Possibilities 1 and 3 should be clear, so I will go into possibility 2 in more detail.

In the oscillator menu, <SHIFT> takes you to a SUB menu. The following parameters are interesting for us.
1) Waveshape >> changes the curve shape of the shaper.
2) Gain >> changes the amplitude of the signal and thus slows down or speeds up the saturation.

What is it about these parameters and why Waveshaper at all, what does this function do? Here is some preliminary information. The waveshaper is located behind the filter.

A set curve can, depending on the set GAIN:

1) limit a signal
2) drive a signal into hard saturation = distort it
3) add more overtones to the signal
4) give the signal more punch by playing the quiet signals louder and limiting the loud sounds.

Finally, the amplitude of the audio signal is mirrored on the Waveshape curve. Example curve Shape 1 / Clip 0.8 .

0.8 means that the audio signal goes into saturation at 80% of the signal level. The volume cannot get louder than 80%.
But be careful, this only applies to one ! Voice. All 8 voices can still lead to distortions, depending on the setting of the level and the resonance.

And that is why there are several similar curves with low clip levels.

Let's go to curve 2 . The curve shape is identical to the first, but the clip is 0.5. Aha, does it snack? This means that already at 50 % the volume of the individual voices is softly limited. And thus digital distortions are avoided.

Unfortunately, you can't simply say that 0.8 or 0.5 is a good value. Of course, it also depends on the resonance setting, the number of voices played and the volume of the oscillators.

For sound design, I usually proceed as follows. First, a basic volume is set with Level (50..70). Then the filter curve and the resonance. Then I play 3, 4, 8 notes at once.

If distortions occur somewhere, you can
1) reduce the level
2) take a waveshape curve curve 1 or 2 with a clip level of 0.8 or 0.5 or curve 8 and 9 or 11. You can see several identical waveshaper curves which are slightly lower in amplitude.

The sound is then adjusted with <GAIN> so that it is coherent. Gain below 1 makes the signal quieter and changes the volume linearly. Gain > 1 changes/limits the volume in e.g. wave 1 and 2 according to a sinusoidal function. By rounding off the signal, additional overtones are generated - similar to an exiter. You can also hear this, because the signal becomes clearly thicker, more transparent and gets the famous 'double thump' (quote from our chancellor).

I hope the waveshape function is clearer now. If not, please ask.

At the beginning I had also said :****Avoid distortions or use them correctly.

I would have clarified avoidance, now comes ' or use correctly !!!

Unlike analogue devices which can be damaged by distortions, a digital distortion is simply a calculation overflow and nothing happens.
Freely after: < it is not a bug its a feature > how can one use distortions profitably in the sound.

Take a sine wave and run the state variable filter over it. Resonance high. Turn the cutoff. ENV=0. If the resonance frequency of the filter = the frequency of the sine oscillation
and the amplitude of the oscillator is sufficiently high, then the filter starts to distort. That's obvious, because resonance means that exactly this frequency is amplified the most.

But you will also notice that this distortion can also sound quite good musically! The problem is that this sound can only be heard on one key.

Now the trick.
In the filter menu, <SHIFT> takes you to the filter subpage. There you will find the parameter KEY (track). Keytrack 0= the cutoff does not change with higher played keys.

Keytrack=100 means that a filter runs tonally with the played keys. Try it out. Both OSC off, ladder filter resonance maximum. ENV =0, Keytrack 100 and you can play melodies tonally with the filter. It is more or less a third sine oscillator.

What does this mean for our distortions? Well, if the filter runs 100% tonally with the sine, then we can play tonally with the distortions. So it has become a new sound.

Another example.

If I now control the filter with the ADSR envelope, there is a point at which the >resonance frequency = the oscillator frequency<. Only there does the distortion occur.

You can take advantage of this by controlling the filter with the envelope in such a way that the SUSTAIN phase is at the frequency of the oscillator and thus distorts and only generates a completely different sound in the SUSTAIN phase.

This can then also be thickened by a waveshaper, a little FX on it and the ears make eyes.

Midi Controller Messages

0 - 31

Ctrl #	Bereich	Controller-Name	Wertebereich
0			
1	0...127	Modulation Wheel	0...127
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20	0...127	Program Change	Pach No. 0...127
21	0...63	Osc1 Waveform (WAVE)	0...63
22	0...63	Osc2 Waveform (WAVE)	0...63
23	0...127	Noise Level (NOISE)	Wite Noise 0...62 Noise off 63...64 Pink 65...127
24	0...127	Oszillator Level (LEVEL)	0...100
25	0...127	Oszillator Mix (OSCMIX)	Osc1 0...-63 Osc2 0...+63
26	0...127	Oszillator 1 Semitone (PITCH)	-24...+24
27	0...127	Oszillator 2 Semitone (PITCH)	-24...+24
28	0...127	Oszillator 1 Pitch Envelope (P.ENV)	-63...+63
29	0...127	Oszillator 2 Pitch Envelope (P.ENV)	-63...+63
30	0...127	Glide Rate (GLIDE)	0...127
31	0...127	Osc2 Detune	0...127

Ctrl #	Bereich	Controller-Name	Wertebereich
32	0...14	Bank Select LSB	Bank A…Bank O
33			
34			
35			
36			
37			
38			
39			
40			
41			
42			
43			
44			
45			
46	0...63	LFO 1 Shape (SHAPE)	Shape 1...64
47	1...127	LFO 1 Rate (RATE)	0...127
48	0...127	LFO 1 Amount (AMT)	0...127
49	0...63	LFO 2 Shape (SHAPE)	Shape 1...64
50	1...127	LFO 2 Rate (RATE)	0...127
51	0...127	LFO 2 Amount (AMT)	0...127
52	0...63	LFO 3 Shape (SHAPE)	Shape 1...64
53	1...127	LFO 3 Rate (RATE)	0...127
54	0...127	LFO 3 Amount (AMT)	0...127
55			
56			
57			
58			
59			
60			
61			
62	0...127	HP Filter Cutoff (FRQ)	20...2000Hz
63	0...127	HP Filter Resonanz (RES)	0...100

Ctrl #	Bereich	Controller-Name	Wertebereich
64	0...127	Sustain	OFF 0...63 ON 64...127
65			
66			
67			
68			
69			
70			
71			
72			
73			
74	0...127	SVF/Ladder Filter Cutoff (FRQ)	20...20KHz
75	0...127	SVF/Ladder Filter Resonanz (RES)	0...100
76	0...127	VCF Envelope 1 Attack (ATK)	0...11.9sec
77	0...127	VCF Envelope 1 Decay (DCY)	0...11.9sec
78	0...127	VCF Envelope 1 Sustain (SUS)	0...100
79	0...127	VCF Envelope 1 Release (REL)	0...11.9sec
80	0...127	AMP Envelope 2 Attack (ATK)	0...11.9sec
81	0...127	AMP Envelope 2 Decay (DCY)	0...11.9sec
82	0...127	AMP Envelope 2 Sustain (SUS)	0...100
83	0...127	AMP Envelope 2 Release (REL)	0...11.9sec
84	0...127	Filtertyp (SVF/Ladder)	TP 0...40 HP 40...124 BP 124...127
85	0...127	Osc1 PWM Amount (PWAMT)	0...127
86	0...127	Osc2 PWM Amount (PWAMT)	0...127
87	0...127	Osc1 PWM Rate (PWMOD)	0...3 Pulsweite 4...5 Envelope 6...121 Mod Amount
88	0...127	Osc2 PWM Rate (PWMOD)	0...3 Pulsweite 4...5 Envelope 6...121 Mod Amount
89	0...127	SVF/Ladder Filter Keytrack (KEY)	0...100
90	0...127	Filter Envelope (ENV)	0...127
91			
92			
93			
94			
95			

Ctrl #	Bereich	Controller-Name	Wertebereich
96			
97			
98			
99			
100			
101			
102	0...127	Oszillator 1 Spread (SPREAD)	0...127
103	0...127	Oszillator 2 Spread (SPREAD)	0...127
104	0...127	Oszillator 1 SawMix (SAWMIX)	0...127
105	0...127	Oszillator 2 SawMix (SAWMIX)	0...127
106	0,1...5,0	WaveShaper Gain	0...127
107	0...13	WaveShaper	0...13
108	0...127	Fx - P1	0...127
109	0...127	Fx - P2	0...127
110	0...127	Fx - P3	0...127
111	0...127	Fx - Clk	10KHz...60KHz
112	0...127	Fx - Mix	0...127
113	0...15	Fx - Program	0 = off 1...15 Fx Program
114			
115			
116			
117			
118			
119			
120			
121			
122			
123			
124			
125			
126			
127			

Power supply

Supply voltage: 12V DC

Maximum current consumption: 0.17A

Maximum power consumption: 2W

Dimensions and weight

Width: 200 mm

Depth: 115 mm

Height 66 mm

Total weight: 0,22 kg

Temperature range

Ambient temperature 10….35 °C

System TEMPERATUR Status max. 74 °C

Do not place on the heating,

Avoid direct sunlight

Connections

Midi IN / OUT – DIN 5 pol

Micro B USB device 480 Mbit/sec

Audio out 6,35 mm stereo

Power Buchse – 5.5 mm, 2.1 mm, Center positiv

Output level

Audio output max. +/- 6 V all voices and maximum overdriven

Have fun building and creating sounds

Rolf Degen

Andre' Laska

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