# FLAME

# BLACK FILTERBANK

### ANALOG FILTERBANK SEQUENCER

### EURO RACK MODULE

**for firmware version 2.00 and above**

last change: February 17, 2025

**BLACK FILTERBANK**
ANALOG FILTERBANK SEQUENCER

ENV/SMOOTH

SEQUENCE

GAIN

VARI/TYPE

FILL/CUTOF

OVERDRIVE
ON   PRE

DRY   MIX   WET

MAINOUT

| 90 | 150 | 240 | 350 | 500 | 750 | 1,0K | 1,4K | 2,0K | 2,8K | 3,9K | >5,6K |
|----|-----|-----|-----|-----|-----|------|------|------|------|------|-------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |

MIDI-IN

MONO

ENV/SMOOTH   VARI/TYPE   FILL/CUTOF   SEQ   L/mono   R

L   R

RESET   CLOCK   CV-IN   AUDIO-IN   AUDIO-OUT

FLAME

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# SHORT DESCRIPTION

Thank you for purchasing the FLAME BLACK FILTERBANK eurorack module!

In short, the Euro Rack module is an analog 12-channel 24dB filter bank with a digital control for each filter band and an integrated analog stereo overdrive for distorting the input signals. A modulation sequencer allows the rhythmic modulation of each individual band. It can be synchronized with an external clock (16ths) either via MIDI clock or via analog clock and reset inputs.

There are 99 memory locations with pre-programmed patterns available, into which you can also load your own sequences of up to four bars via SYSEX. The patterns are selected either directly on the module using a button, via MIDI program change or via CV input. The filter channels can also be played separately with velocity sensitivity using MIDI notes.

Using the "Curves" editor (PC or MAC version), the patterns can be edited and loaded into the module, and the necessary MIDI settings (e.g. receive MIDI channel and note numbers for the filter channels) can be made. The sequencer is a MIDI sequencer with tick resolution with settings for gate time, velocity, track last step and 16th note shuffle.

There are 3 controls on the module itself for influencing the pattern:
- Envelope (different envelopes in trigger or gate mode)
- Variations (random values for velocity and envelope lengths)
- Fill (adjusting all filter channels)

All three functions can also be controlled via external CV.

In manual mode (Sequencer=OFF) the filter channels can be controlled directly (and also via CV) with these three controls:

- Smooth (selection of hard-locked and soft cutoff movement)
- Type (selection of filter type: Allpass, Lowpass, Bandpass 1-3, Highpass)
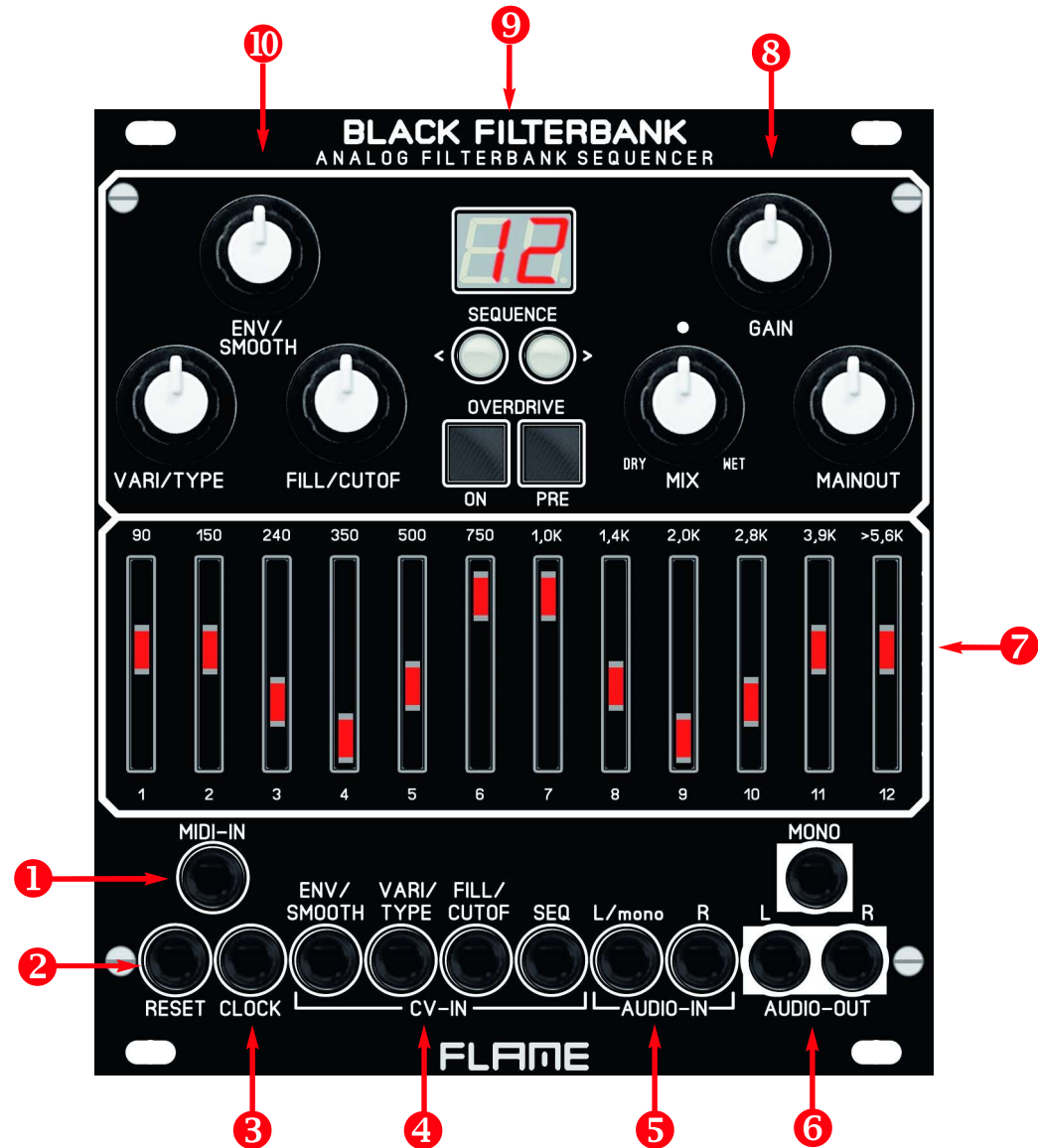- Cutof (Cutoff = movement/traversing the bands)

The filter channels are distributed in the stereo panorama across the left/right channels and can be operated separately in stereo or together in mono. Two inputs for left (mono)/right, as well as individual outputs for stereo and a mono sum channel are available for this. The stereo and mono audio path is completely controlled via the gain, dry-wet mix controls and main out controls. The volume of each filter channel can be controlled with a fader (passive attenuator). The LED in the fader signals the VCA control.

The firmware and pattern structure are compatible with the previous module "CURVES". In comparison, however, the new module is more compact because the separate individual outputs and CV inputs of the bands have been dispensed with. The dry-wet channel is now completely in stereo and an analog stereo overdrive (type OCD with germanium diodes) can be switched on if required, which allows for more sound options. The distribution of the bands in the stereo panorama has also been adjusted: both bass channels are now centered and all other left/right channels have been moved slightly towards the middle.

Future firmware updates can be easily loaded via Sysex dump.

# MODUL OVERVIEW

❶ **1x MIDI input (Typ: TRS-B)**

❷ **Input: RESET IN (0/+5v)**

❸ **Input: 16th analog CLOCK IN (0/+5v)**

❹ **4x CV inputs (unipolar 0..+5v)**

❺ **Stereo/mono audio inputs**

❻ **Stereo & mono audio outputs**

❼ **Filter channel attenuators (12 fader with channel LED)**

❽ **3x Audio controls: GAIN, DRY-WET MIX, AUDIO OUT**

❾ **Display, Sequence buttons, Overdrive buttons**

❿ **3x Filter bank controls**



BLACK FILTERBANK
ANALOG FILTERBANK SEQUENCER

# CONNECTION TO THE MODULAR SYSTEM

**DOEPFER POWER CONNECTOR**

The module is delivered with a ribbon cable connected to the Doepfer bus. The color-coded wire (usually red) represents minus 12 volts.

It is important to ensure that the polarity is correct when connecting. If the module is accidentally connected incorrectly, protective diodes prevent the module from being destroyed immediately (but it cannot be ruled out that damage may still occur).

**Therefore, be careful:** Check the connection several times before switching on for the first time!
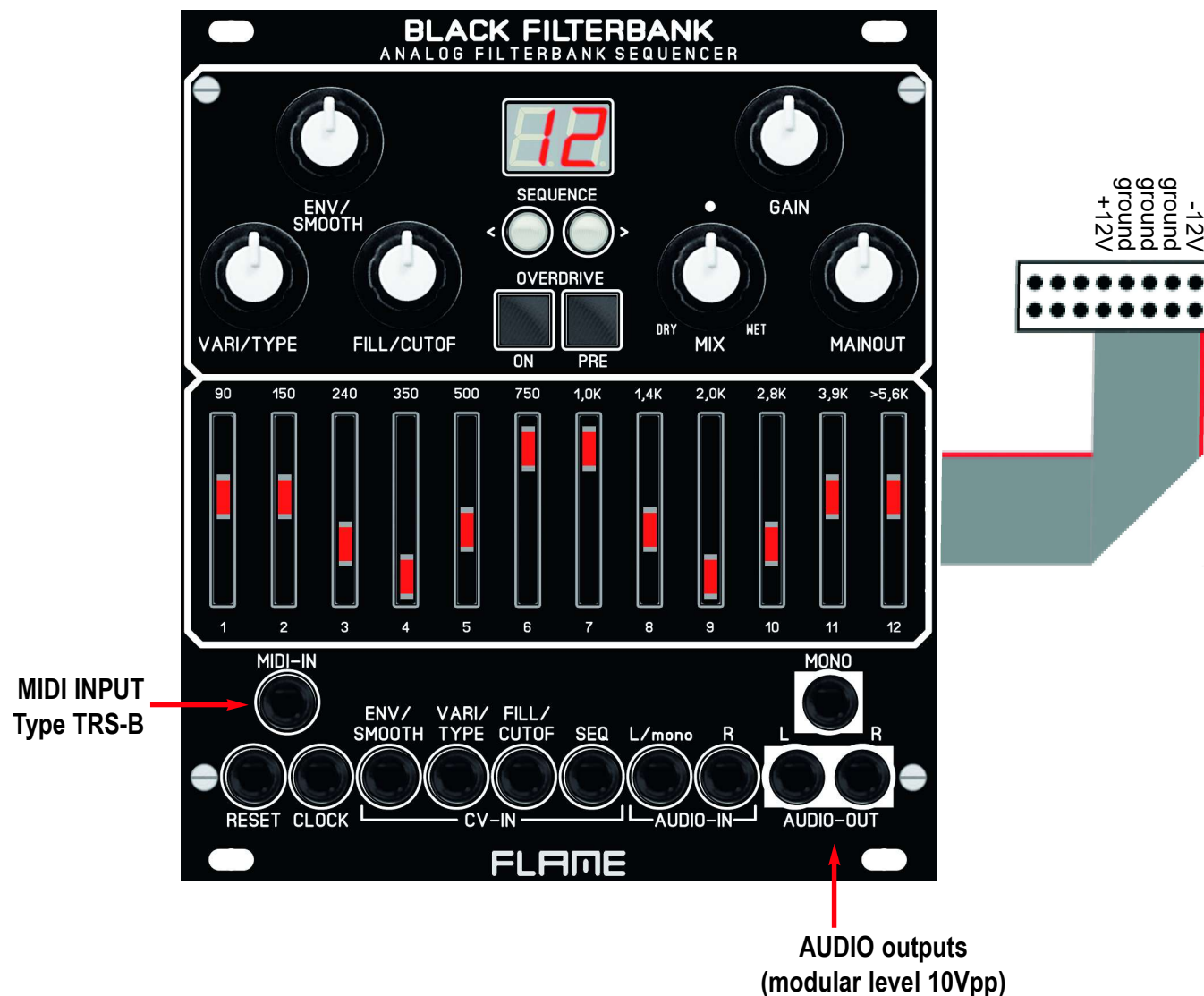
The module's maximum current consumption at 12V is approx. +250mA / - 180mA. The 5V supply is not used.

**NOTE!**
Do not accidentally connect high CV voltages to the MIDI-IN! This may damage the hardware!

**MIDI / CV / RESET & CLOCK INPUTS**

All four CV inputs operate in a voltage range of 0 to +5 volts. The reset and clock inputs each require gate pulses of 0/+5 volts. The MIDI input is of type MIDI-TRS-B !

**MIDI INPUT Type TRS-B**

**AUDIO outputs (modular level 10Vpp)**
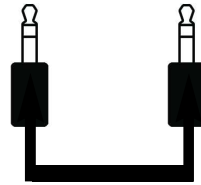
# CONNECTION TO THE MODULAR SYSTEM

## MIDI CONNECTIONS

The module has a MIDI INPUT socket (3.5mm mini jack in TRS-B standard) for controlling parameters, loading/editing sequences or firmware updates via Sysex. Connect the MIDI input to the MIDI output of your keyboard/controller or computer. A suitable commercially available adapter (MIDI-DIN to mini TRS-B) or a 3.5mm stereo jack cable is used for the MIDI connection.
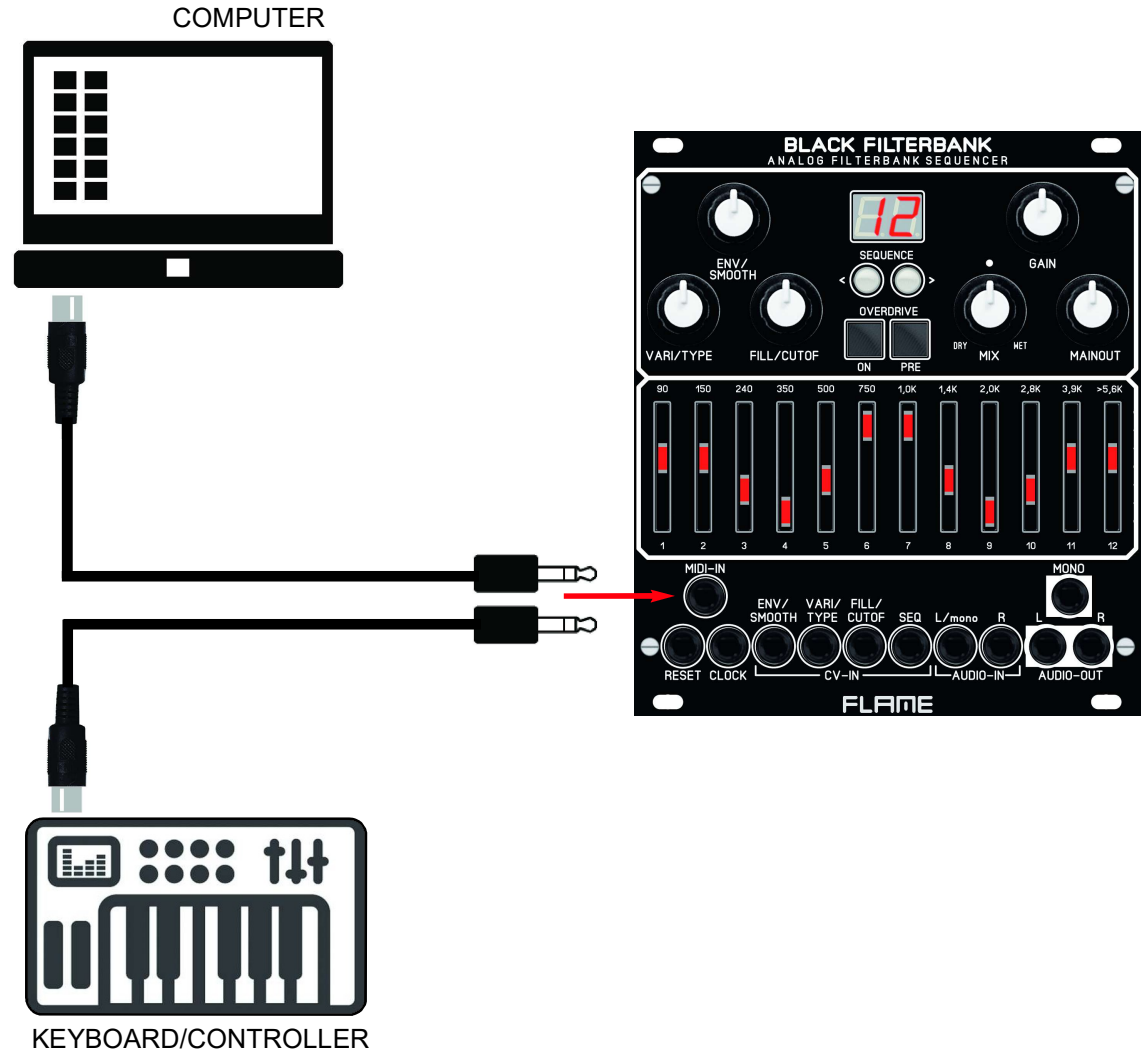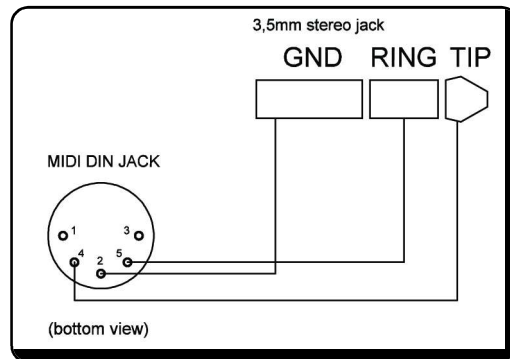
An overview of the MIDI commands can be found in the appendix.

**Examples of possible connections:**

COMPUTER

BLACK FILTERBANK
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*12*

ENV/ SMOOTH    SEQUENCE    GAIN

VARI/TYPE    FILL/CUTOF    OVERDRIVE    DRY    WET
ON    PRE    MIX    MAINOUT

90  150  240  350  500  750  1,0K  1,4K  2,0K  2,8K  3,9K  >5,6K

1   2   3   4   5   6   7   8   9   10  11  12

MIDI-IN    ENV/ VARI/ FILL/    MONO
SMOOTH TYPE CUTOF  SEQ  L/mono  R    L    R

RESET  CLOCK    CV-IN    AUDIO-IN  AUDIO-OUT

FLAME

3.5mm mini jack stereo cable
for direct MIDI connection between
two TRS-B sockets

3,5mm stereo jack

GND    RING  TIP

**Adapter diagrams**
MIDI DIN socket to
3.5mm mini jack
in MIDI TRS-B standard

MIDI DIN JACK

1    3
4    5
2

(bottom view)

KEYBOARD/CONTROLLER

# CONNECTION TO THE MODULAR SYSTEM

## AUDIO SIGNAL FLOW

The module has two audio inputs left/right. The signal can be amplified or attenuated using the GAIN control and is routed to the filter channels via a switchable stereo overdrive.

The bass channels 1 and 2 are centered in the panorama (middle) and all other channels are alternately distributed to the left and right, but are pulled slightly to the middle in the stereo panorama. If there is no cable in the right input, the input signal is routed to the filter channels as a mono signal via the Left/mono input socket. A stereo signal with the bands arranged in the panorama and a separate mono signal can be tapped at the outputs.

The 12 faders only serve as manual attenuators for the corresponding filter channel. In order to hear the filter of a sequence, the channel fader must be turned up. The maximum output signal is therefore also determined by the position of the faders.
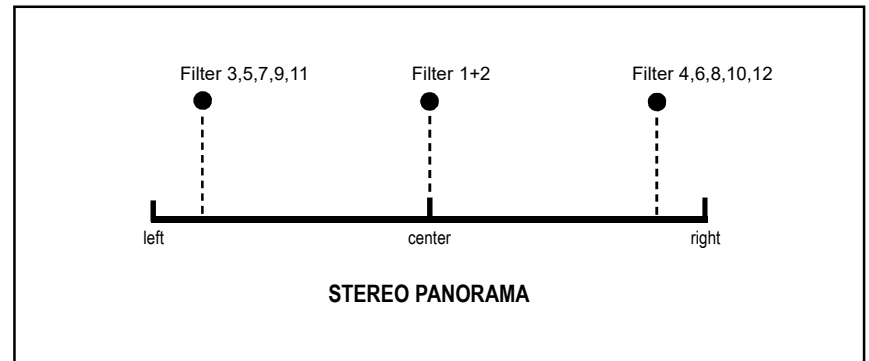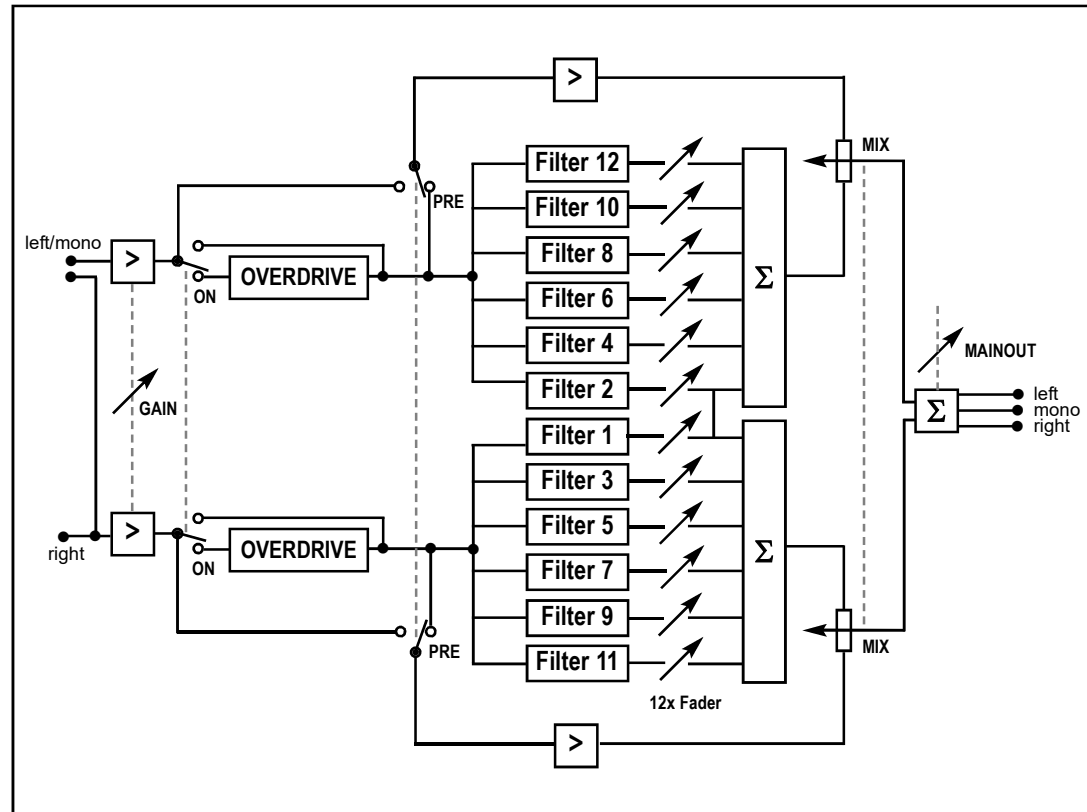
## DRY-WET-MIX

The module has (in comparison to its predecessor module "Curves") a "real" stereo dry-wet mix routing. The MIX control regulates the mix ratio between the original signal (dry) and the effect signal (wet). The downstream MAINOUT control then determines the level of all audio outputs.

## ROUTING OVERDRIVE DISTORTION

The input signal GAIN can be routed to an overdrive (Overdrive ON). This signal then goes to the filter channels. The distortion can be influenced somewhat with the GAIN control. If you want to route the distorted audio signal from the input to the output signal, press the PRE button. The original distorted signal now also goes to the output via the dry mix channel.
The overdrive distortion is designed in stereo.

**TIP:** When the Overdrive ON and PRE buttons are pressed and the MIX control is in the DRY position (leftmost position), the module works as a pure stereo distortion unit. The filter channels are then not audible.
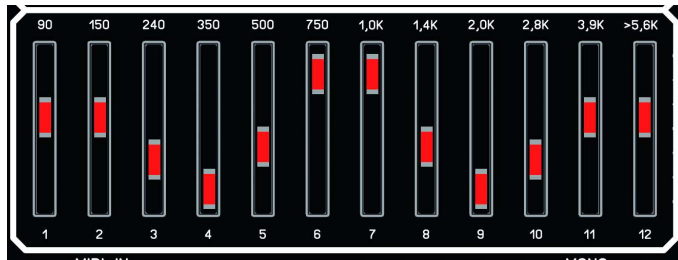




STEREO PANORAMA

# FILTERBANK

## STRUCTURE OF THE FILTER BANK

The module has an analog filter bank consisting of 12 filter bands. The first 11 filter bands are 24dB bandpasses (resonance filters) with fixed frequencies and medium resonance, with the exception of channel 12, a 24dB highpass filter that lets through all higher frequencies from about 5Khz.

## FILTER CHANNEL FREQUENCIES

**90Hz, 150Hz, 240Hz, 350Hz, 500Hz, 700Hz, 1KHz, 1,4KHz, 2KHz, 2,8KHz, 3,9KHz, >5,6KHz**



Each filter band has a slider for the output volume. This allows you to lower these frequencies in the overall sound or remove them completely. Up to this point, the filter bank resembles a graphic equalizer. But the filters in the module have other properties that clearly distinguish them from an equalizer. Firstly, there are the resonant filters that particularly amplify the area around the respective center frequencies. Secondly, the individual frequency bands do not overlap. This noticeably influences the timbre because it adds resonances at important points in the sound spectrum.

Each channel has a VCA for electronic volume control, which is controlled by the internal sequencer or via MIDI notes. The BAND LEDs in the sliders indicate the level of the respective active VCA. The BAND slider has no influence on the VCA level, but acts as an audio attenuator at the BAND output. This is why the BAND LEDs continue to show the level of the VCAs, even though the slider is turned down and this band cannot be heard.
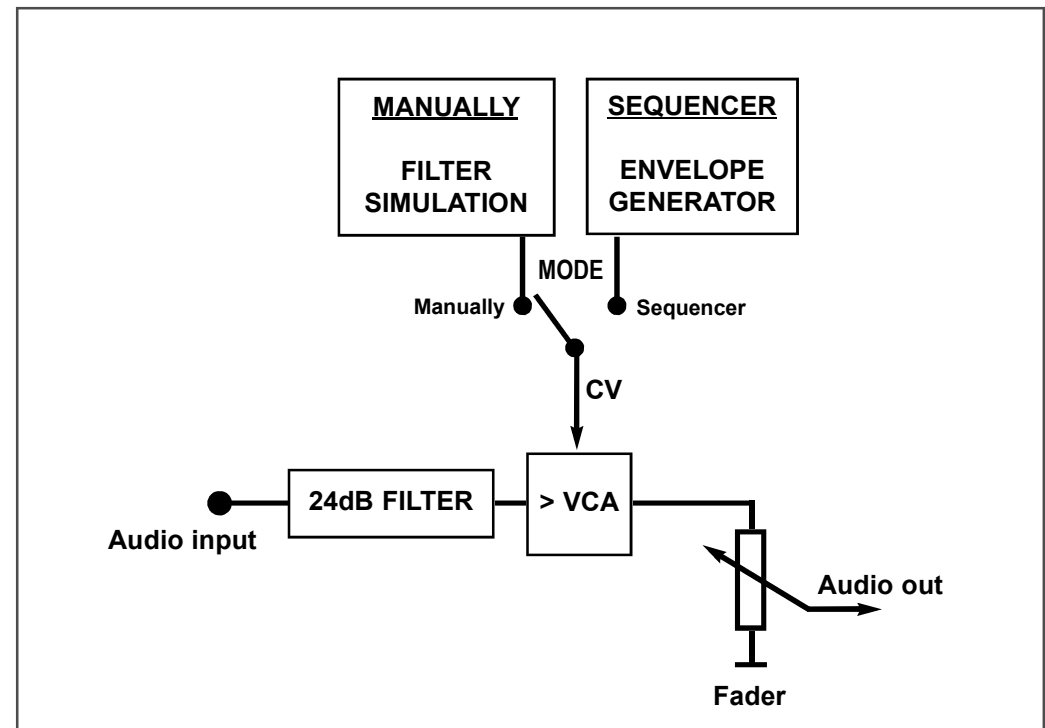
## STRUCTURE OF THE FILTER CHANNEL

The module's filter bank has 12 filter bands.
Each of these filter bands basically consists of a fixed frequency filter (24 dB bandpass or highpass), a downstream VCA for volume control via CV, and a slider for manually attenuating the audio signal.
The VCAs can be controlled in different ways:

- directly via channel CV input
- filter simulations using manual controls/CV
- internal modulation sequencer



See also the following chapter: "Controlling the filter bank"

# FILTERBANK

## CONTROLLING THE FILTER BANK

In the module there are two different ways (MODE) to modulate the filter bank:

**1.** Using an internal modulation sequencer (one track for each filter band) with controls for envelope, variations (random) and fill mix (additive control of all filter bands).

2. Manually using a filter type simulation and with controls for cutoff, filter type and smoothing of the filter bands.

## MODE SELECT

Use the "SEQUENCE" buttons to select either a pattern "01..99" or set the display to "OFF" (press the sequence button "<" until "OFF" appears). Hold down the corresponding sequence button to automatically count up or down.

| | |
|---|---|
| **01..99** | **Mode SEQUENCE** (Modulation sequencer) |
| **oF** | **Mode MANUALLY** (Filter simulations) |

The three controls have different functions in the two modes:

**MODE SEQUENCE (Display 01..99)**

| | |
|---|---|
| KNOB ENVELOPE | Envelope of the sequence |
| KNOB VARIATION | Random = Variations of envelope/volume |
| KNOB FILL | Increase the level of all filter bands (mix in) |

**MODE MANUALLY (Display "oF")**

| | |
|---|---|
| KNOB SMOOTH | Smoothing the passage through the filter bands |
| KNOB TYPE | Selection of one of 6 filter types |
| KNOB CUTOF | Control the cutoff of the filter type |

❶ **KNOB ENV/SMOOTH**  Envelope or smoothing (of passing through the filter bands)

❷ **KNOB VARI/TYPE**  Variations (random) or filter type (of the filter simulation)

❸ **KNOB FILL/CUTOF** Level of all filter bands or cutoff (of the filter simulation)

❹ **BUTTONS SEQUENCE**  Pattern or mode selection (OFF=filter simulation)

# FILTERBANK

## MODE SEQUENCE

To rhythmically animate the filter bands, the module uses a relatively simple sequencer with 12 parallel tracks. The module has 12 envelope generators, one for each filter band, which influence the output level of the respective filter. The "shape" of the envelope (i.e. the times for attack, decay or release) depends on the "ENVELOPE" control. This allows differentiated volume curves to be created, such as percussive sounds or slowly rising curves.

## Activate SEQUENCE MODE:

Use the buttons to select a sequence between 01 and 99.



Display

Sequence buttons up/down

The sequencer does not have its own clock and can only be driven externally. This is done either with MIDI clock (start/stop) or analog via the CLOCK and RESET sockets. The analog CLOCK input requires a 16th pulse sequence. Since the sequencer runs internally with a higher resolution, the clock should run evenly (the tempo is measured between two clock pulses). The RESET input resets the pattern. If no clock arrives for more than a few seconds, the sequence is stopped and reset.

The memory contains up to 99 patterns (sequences) with a maximum length of 4 bars. You can create your own patterns with the "CURVES" editor and transfer them to the module via MIDI.

More information can be found in the editor's help file (see the Download section on the Flame website).

The following figure shows the "CURVES" editor with a loaded pattern:



## CONTROLLER / CV IN SEQUENCE MODE

Mit den drei Reglern oben links lässt sich die Sequenz beim Abspielen beeinflussen:
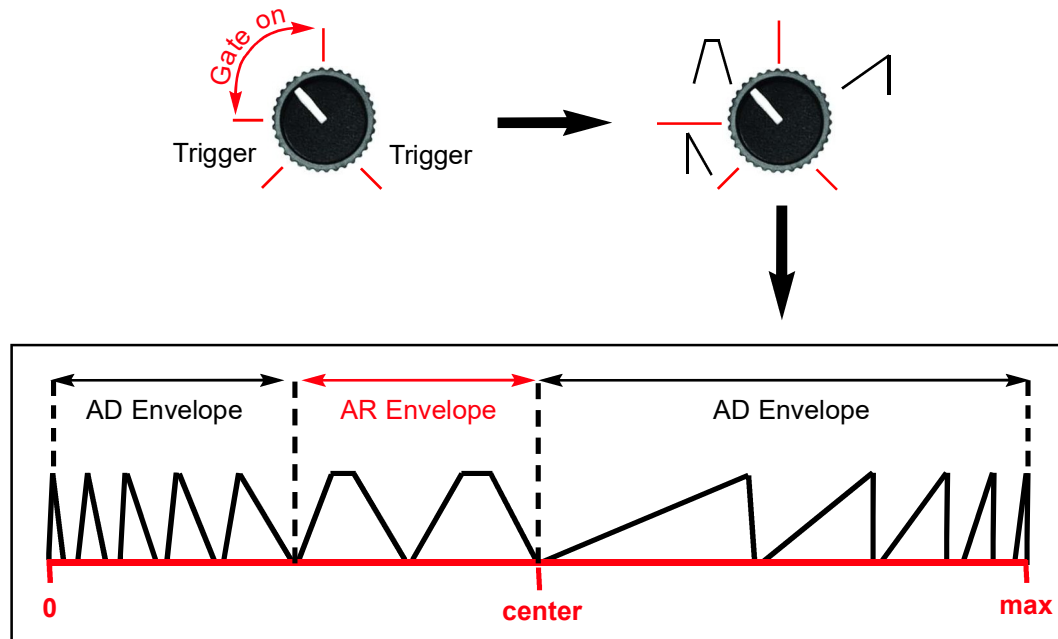


❶ ENVELOPE

❷ VARIATIONS

❸ FILL

# FILTERBANK

## KNOB ENVELOPE

This is one of the most interesting functions of the filter bank. When playing the sequence, the controller can be used to "morph" through the different shapes of the envelope. If the controller is set to ZERO, the sound is short and choppy. The attack and decay phases are very short. If the controller is turned up a little, you can hear the steps fade out for longer (the decay becomes longer).

The envelope is of type AD (attack-decay) and is only triggered by the sequencer. The length of the step (gate time) has no influence on the envelope. However, if the controller is between 9 and 12 o'clock, the envelope is set to type AR (attack-release). In this area, the gate length of the step is evaluated and has an influence on the length of the envelope.

The graphic illustrates the behavior of the controller:



Effect of the controller on the attack and decay/release times
(0=left stop MAX=right stop)

The function of the ENVELOPE controller can also be automatically modulated by a CV. The CV input "ENVELOPE" is available for this purpose. The input is designed for unipolar voltages in the range from zero to +5 volts.

## KNOB VARIATION

The "VARIATION" control can be used to regulate the intensity of random changes in volume and envelope times. This varies a running sequence and results in livelier playback patterns or variations of the sequence. If the control is in the ZULL position, the pattern is played unchanged.

The following parameters are affected:

- Volume (volume of the step)

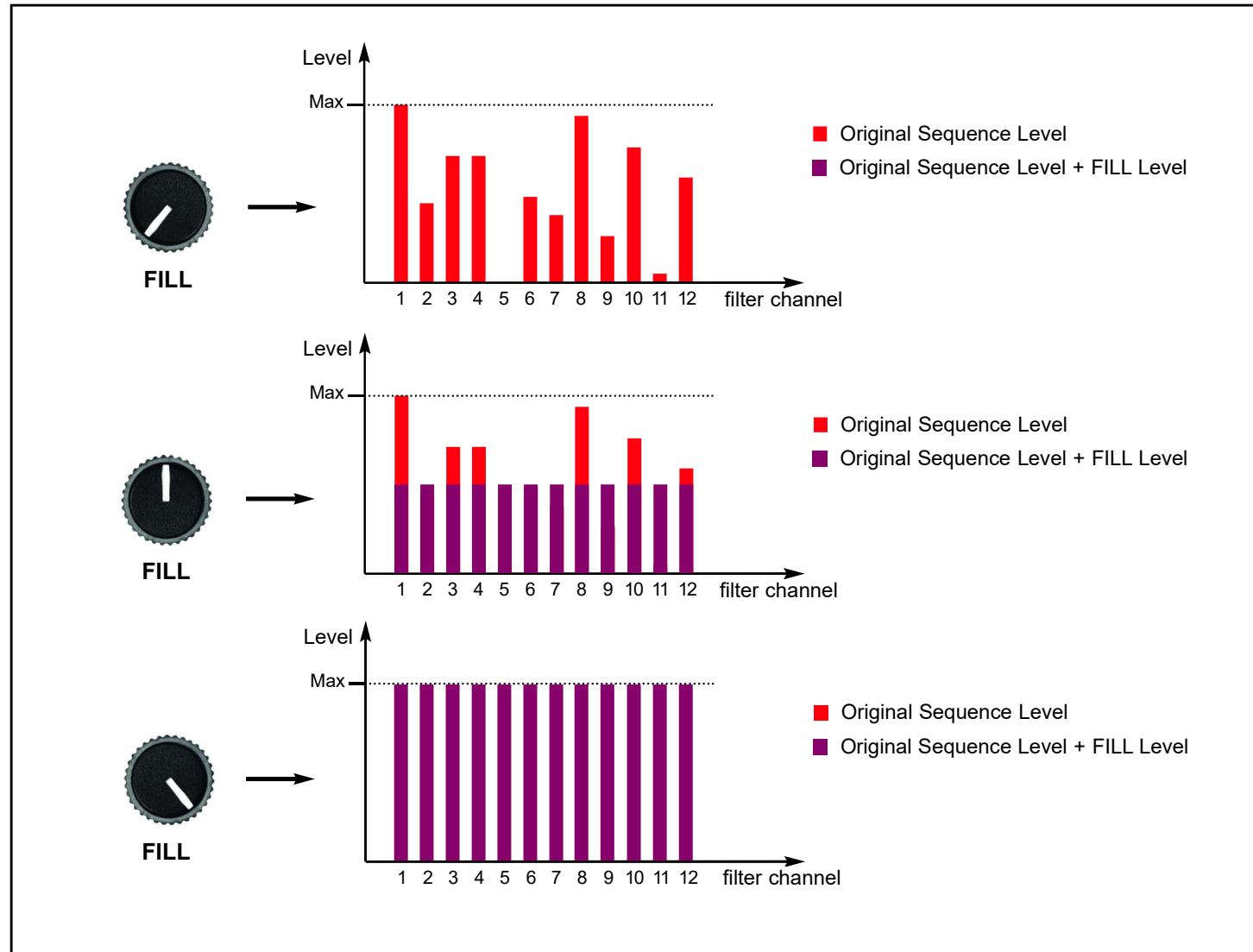- Decay times

- Release times

## KNOB FILL

The third control "FILL" adjusts all VCAs evenly until the maximum volume of all channels is reached ("filling the channels"). This happens in addition to the sequence being played. The sequence can still be heard until the maximum is reached. The effect can be compared to the dry-wet behavior of the MIX control, which mixes the original and effect signals. But here the mix is between the sequence and the uniform low or high level of all filter bands.

The graphic on the following page illustrates the effect

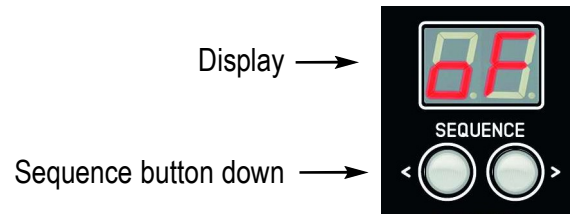# FILTERBANK

Effect of the FILL control:

# FILTERBANK

## MODE MANUALLY

When the modulation sequencer is deactivated, the filter bank can create filter simulations. The individual filter bands are then controlled to create classic filter curves. These are controlled with the Envelope, Variation and Fill controls.

## ACTIVATION MANUALLY MODE:

Use the "<" button to set the sequence to "oF" (press several times or for a long time if necessary).
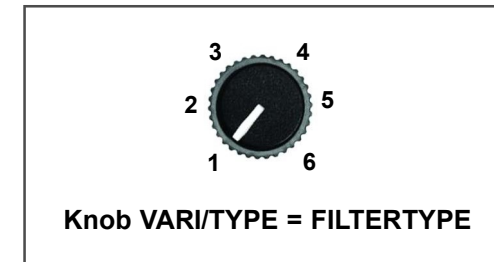
Display ⟶

Sequence button down ⟶

In this mode, the three controls have the following functions:

VARI/TYPE:     FILTER TYPE = selection of one of 6 filter types
FILL/CUTOF:    CUTOFF = control cutoff (frequency) of the filter type
ENV/SMOOTH:  SMOOTH = smoothing of the filter bands

## FILTERTYPE

The VARI/TYPE control is used to set one of six filter types. These algorithms use the filter bands to simulate classic filter types such as lowpass, bandpass, highpass and other types. This is possible because each filter band has its own VCA (voltage controlled amplifier) that controls the volume of this band separately. For example, if you start from the band with the lowest frequency and slowly increase the volume of the channels and then lower it again, you get a classic lowpass filter.

The following filter types can be set:

**Knob VARI/TYPE = FILTERTYPE**

**1 - All channels:**            all bands are regulated simultaneously

**2 - Lowpass:**

**3 - Bandpass (1channel):**

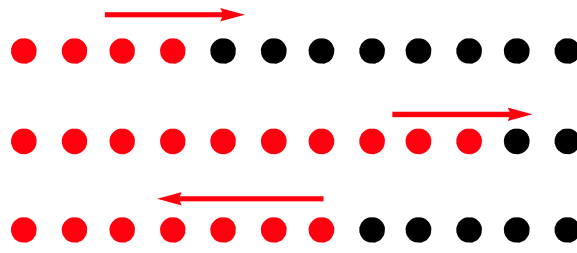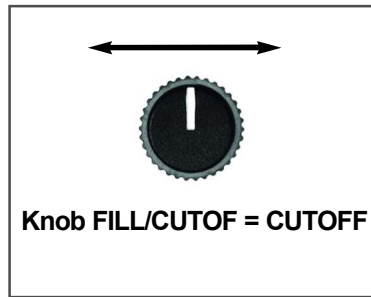**4 - Bandpass (2 channels):**

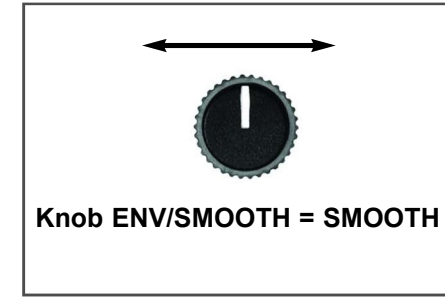**5 - Bandpass (3 channels):**

**6 - Highpass:**

# FILTERBANK

## CUTOFF

The FILL/CUTOF control is used to change the filter cutoff frequency. When you turn the control, the fader LEDs show the active range of the filter. This also makes the filter characteristics visible. Only the filter bands with a lit LED are audible.



**Knob FILL/CUTOF = CUTOFF**

Example: Lowpass filter

## SMOOTH

The ENVELOPE control changes the smoothing of the bands when passing through with the cutoff control. You can smoothly fade from unsmoothed to smoothed. If the setting is unsmoothed, the bands jump straight on. If the setting is smoothed, the bands flow smoothly into one another.



**Knob ENV/SMOOTH = SMOOTH**

## EXAMPLE OF FILTER MODULATION

**Manually adjust the lowpass filter cutoff**

- Set CUTOFF (FILL/CUTOF control) to the middle position
- Set FILTERTYPE to lowpass (VARI/TYPE control to 9 o'clock).
- Turn SMOOTH to maximum (ENV/SMOOTH control to the right)

Now you can use the CUTOFF control (FILL/CUTOF control) to smoothly move through the individual filter bands like a lowpass filter. You can see this from the LEDs on the filter channels lighting up. The filter type algorithm automatically regulates the volume of the individual filter bands to create the effect of a lowpass filter. The other filter types work in the same way. Try them one after the other and listen to the different effects.

All three functions can also be controlled via the corresponding CV inputs. The input voltage range is unipolar from zero to +5 volts.

# MIDI FUNCTIONS

## OVERVIEW
The module has extensive MIDI functions.
The following MIDI commands can be used:

**MIDI Clock/Start/Stop:** sequencer timing
**Note Numbers:** triggering the filter bands
**Programm Change:** selecting a sequence
**Control Change:** controlling parameters
**Sysex:** load sequence pattern, update firmware

## SYNC PER MIDI CLOCK
Connect a computer with MIDI interface and sequencer software, or a MIDI device (for example drum machine) that can send MIDI clock/start/stop.

The internal sequencer can only run as a slave with MIDI clock. MTC (MIDI Time Code) or position data (such as Song Position Pointer) are not recognized.

## PLAYING FILTER CHANNELS VIA MIDI NOTES
Each filter channel can be played with an external keyboard, for example. Each filter band is assigned a note number. The velocity affects the volume of the filter band. The default notes for the filter bands are note numbers 36-47 on MIDI channel 1. The note numbers and MIDI channel can be changed using the CURVES sequence editor.

## PROGRAM CHANGE (Select sequence pattern)
The module understands program change commands on the set MIDI receive channel (default: MIDI channel 1). The numbers correspond to the sequence numbers, i.e. 01 to 99. If a program change command is received while the sequencer is running, the pattern changes at the next ONE in the sequence.

If the sequencer is stopped, the pattern is switched immediately. Program change number 0 switches the sequence to OFF and the module to manual mode.

## PARAMETER CONTROL VIA CONTROL CHANGE
All digital functions are assigned control change numbers. The parameters are controlled with a value between 0 and 127. The controllers are received on the set MIDI receive channel.

| Function | CC-Nr |
|---|---|
| ENVELOPE_ALL | 2 |
| FIL | 1 |
| VARIATION | 3 |
| | |
| VCA_BAND1 | 4 |
| VCA_BAND2 | 8 |
| VCA_BAND3 | 9 |
| VCA_BAND4 | 10 |
| VCA_BAND5 | 11 |
| VCA_BAND6 | 12 |
| VCA_BAND7 | 13 |
| VCA_BAND8 | 14 |
| VCA_BAND9 | 15 |
| VCA_BAND10 | 16 |
| VCA_BAND11 | 17 |
| VCA_BAND12 | 18 |

| Function | CC-Nr |
|---|---|
| ENV_BAND1 | 19 |
| ENV_BAND2 | 20 |
| ENV_BAND3 | 21 |
| ENV_BAND4 | 22 |
| ENV_BAND5 | 23 |
| ENV_BAND6 | 24 |
| ENV_BAND7 | 25 |
| ENV_BAND8 | 26 |
| ENV_BAND9 | 27 |
| ENV_BAND10 | 28 |
| ENV_BAND11 | 29 |
| ENV_BAND12 | 30 |

## LOADING SEQUENCES INTO THE MODULE VIA SYSEX
Sequence patterns can be loaded into the module via SYSEX. The CURVES editor can be used for this. The editor can also be used to change the note numbers and the MIDI receive channel.

# FIRMWARE UPDATE

A firmware update requires a computer with a MIDI interface and a SYSEX program. For PCs we recommend the freeware software MIDI-OX, for MACs the software "SYSEX LIBRARIAN". Set the parameter "Delay..." in the SYSEX program to 10..20 ms.
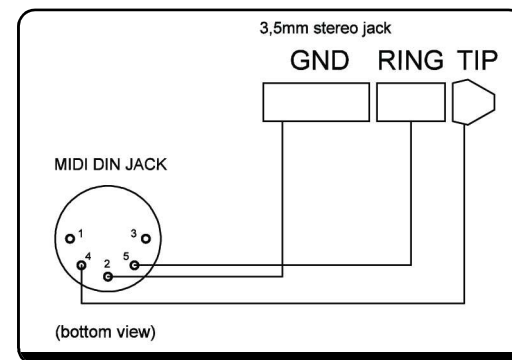
**Proceed as follows:**

❶ First, load the Sysex file of the new firmware onto the computer. The current firmware can be found in the download area of our website.

❷ Connect the MIDI interface of the computer to the MIDI input of the module. Use a MIDI-TRS-B adapter for this.

❸ Hold down both sequence buttons while the module is switched on.
The display shows "UP" (for UPDATE) and waits for the data to be received.

❹ Now send the Sysex firmware file to the module. During the transfer you can follow the progress bar on the display (numbers on the display count up). The upload takes about 1.5 minutes, for example.

❺ After the update process, the module restarts automatically. When switched on, the display shows the current firmware:
U0 (for version 0) or
U1 (for version 1) or
U2 (for version 2) ...

**Attention:** Do not turn off the module before it has rebooted!

**A NOTICE:**
Sometimes it is necessary to set the "Delay" or "Timeout" parameter of the SYSEX software used to higher values (e.g. 100 ms).

**Adapter diagrams**
MIDI DIN socket to
3.5mm mini jack
in MIDI-TRS-B standard

# FAQ / TROUBLESHOOTING

**The FIRMWARE update or MIDI Sysex transmission does not work:**
Check the MIDI cables (use a TRS-B adapter) and make sure you are using a direct MIDI connection to the computer, not a USB hub or similar. Other errors often lie in the Sysx program - make sure the correct MIDI port is selected.

**How do I start the sequencer?**
Send an analog 16th clock (4ppqn) via the clock input. The sequence starts automatically. Or send MIDI start/stop/clock commands from an external MIDI sequencer via the MIDI input.

**How do I get into manual mode (filter simulations)?**
Select pattern 0 (sequence 0) when the sequencer is stopped. The display will then show **oF.** To do this, either hold down the Down button for a long time (pattern counts down) or send a MIDI program change command with number 0.

**How can I create my own patterns and load them into the module?**
To do this, use the "Curves Editor" (for Win/Mac). You can find this (including instructions) in the download area of our website for the Curves module or Black Filterbank module.

**How can I change the MIDI settings (MIDI channel + note numbers)?**
To do this, use the "Curves Editor" (for Win/Mac). You can find this (including instructions) in the download area of our website under the Curves module or Black Filterbank module.

**How can I use the module as a stereo distortion unit (without the filters)?**
Switch on both overdrive buttons ON and PRE. Turn the MIX control all the way to the left (Dry). Only the distorted input signal is now available at the audio outputs.
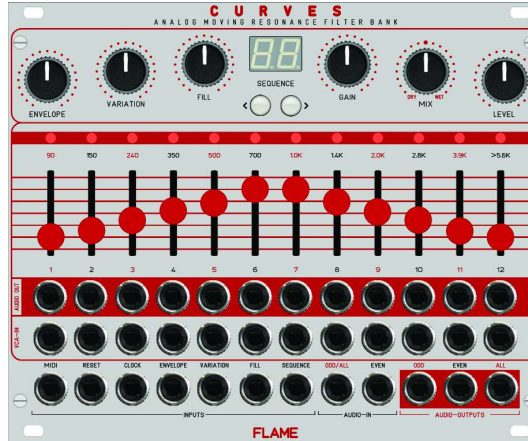
**The module does not receive MIDI notes, what can I do?**
If the module has not been initialized, the note numbers of the filter channels and the MIDI receive channel are not activated. To do this, download the SYSEX file "BFB_Edit_Notenumbers.syx" from the website in the download area under "Black Filterbank - First Settings" and send it to the module via MIDI using a SYX program. The MIDI receive channel is now set to 1 and the filter channels 1-12 are set to note numbers 36-47.
For other settings, use the "Curves Editor" (for Win/Mac). You can find this (including instructions) in the download area of our website under the Curves module or Black Filterbank module.
Also check that the MIDI channel and cables are set correctly.

# MODULE COMPARISON: FLAME CURVES versus FLAME BLACK FILTERBANK



**CURVES**

**BLACK FILTERBANK**

| | CURVES | BLACK FILTERBANK |
|---|---|---|
| **HP dimensions (installation depth), front panel:** | 31TE 157x128,5x60mm (42mm), silver | 22TE 110x128,5x60mm (42mm), black |
| **RRP (europe):** | 749€ | 499€ |
| **Electricity consumption (+-12V):** | +250mA / -170mA | +250mA / -180mA |
| **Number of filter bands / stereo panorama:** | 12 (24dB 11xBandpass, 1x Highpass) / all even/odd | 12 (24dB 11xBandpass, 1x Highpass) / 1+2 center, 3-12 even/odd |
| **Audio output level controls:** | yes - only for output mono | yes - one for all three outputs: left, right, mono |
| **Dry-Wet-Mix chanel:** | Stereo input, mono output only | Completely in stereo (3 outputs: left, right, mono) |
| **Overdrive distortion:** | no | yes - analog stereo (with germanium diodes), routeable |
| **Filter Audio Single Outputs:** | yes - separately for all 12 filter bands | no |
| **Filter VCA individual inputs:** | yes - separately for all 12 filter bands | no |
| **CV inputs / clock reset inputs:** | yes - 4x CV, 1x Clock, 1x Reset | yes - 4x CV, 1x Clock, 1x Reset |
| **MIDI / Multimode:** | yes - 1x Input typ: MIDI-TRS-B / yes | yes - 1x Input typ: MIDI-TRS-B / yes |
| **Pattern sequencer / editor:** | yes - 99 memory locations / Curves Editor (PC+Mac) | yes - 99 memory locations / Curves Editor (PC+Mac) |
| **Filter simulations:** | yes - (identical for both modules) | yes - (identical for both modules) |
| **Firmware:** | Version 2.0 (identical for both modules) | Version 2.0 (identical for both modules) |

# APPENDIX & TECHNICAL DETAILS

## Technical details

**Connections:**
Ribbon cable adapter for Doepfer bus +/-12Volt
Inputs: 1x MIDI-TRS-B, 4x CV, 2x Gate, 2x Audio  3,5mm mono/stereo jacks
Outputs: 3x Audio  3,5mm mono/stereo jacks

**Controls:**
12 Fader with LED
6 Potentiometer, 4 buttons
1 Display

**Current consumption:**  +/-12v: +250mA / -180mA
**Size:**  Eurorack format  3U / 22HP   110x128,5x60mm, Installation depth: 42mm

## 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-instruments.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://www.flame-instruments.de**

**Instagram: @flame_instruments**

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