



Berna 3

Operator's Manual

www.giorgiosancristoforo.net

v3.0

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FOREWORD BY MASSIMILANO VIEL

According to media theorist Marshall McLuhann, we approach new technologies as if we were looking into a "rearview mirror" facing old technologies. If this is often the case with many computer applications, we can also say the same for the music production platform of the "Berna" family, by Giorgio Sancristoforo, of which we have today the third result.

It is clear that for McLuhann this way of approaching the media is understood in a negative sense, because it prevents us from getting closer to what is the innovative aspect of new media. In this case, however, the question is quite different. In fact, if with "technological unconscious" we can mean that way of structuring the user's gestures through the interface, as a privileged way to structure their consciousness, perhaps presenting those defaults that will never be changed by the musician, then here we are right in the direction which is opposite to that of most music production software. Berna 3 is in fact based on the simulation of the instruments that have inhabited two of the most important and historic electroacoustic music studios: the one linked to the RAI Phonology Studio in Milan, founded by Luciano Berio and Bruno Maderna and dismantled in the 1980s, to be, to date, present only in museum form at the Museum of Musical Instruments in Milan, and that of the German radio studio, ie the WDR of Cologne, linked to the name of composers such as Gottfried Michael Koenig and Karlheinz Stockhausen.

The user of Berna 3 therefore has the opportunity to build their own compositions starting from the instruments and practices that defined electronic music at its origins and therefore facing a way of thinking that, too easily, is now removed to be replaced by easy reversibility of digital thinking.

We are therefore certainly faced with a didactic tool that will give us the opportunity to understand how masterpieces such as *Gesang del Jünglinge*, *Fontana Mix* or *Visage* were conceived and created, but also the possibility of approaching the very idea of electronic music, as it was invented in the first half of the last century, without being entangled by the allurements of technologies that in the end offer us pre-chewed musical forms already well oriented to a market, which has now forgotten the curiosity and the experimental courage placed at its foundation.

Massimiliano Viel is an Italian Composer.

He collaborated, as interpreter and sound designer, with composers such as K.Stockhausen, L.Berio, L.Francesconi, F.Romitelli and F.Guerrero. He performed many works of K.Stockhausen both as world and national premieres. Among them, in 1997 he performed the Canadian première of the "XV Piano Piece" at the Mercure Theater in Montreal, Canada and in 2013 he performed the Italian premiere of "Luzifers Zorn" for one singer, one actor and one keyboard player.

In 2001 he joined Otolab, a collective audiovisual laboratory with whom he collaborates producing performances and installations that have been presented in festival such as: Biennale in Zagreb 2003, NetMage in Bologna, Expérience de Vol in Bruxelles, the Festival de las Culturas Universales Monterrey (Mexico) and Mutek Festival in Montreal, Canada among many others.

He has written books and papers in the fields of music theory, sound studies and music education. He is a full professor at the Conservatory "G.Verdi" of Milano, Italy, where he teaches courses related to music composition and analysis.

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INTRODUCTION

Welcome!!!

Berna 3 is the latest major update of this simulation of an early electronic music studio (50s/60s).

The idea of simulating test equipment as used in early electronic music, begun in 2009 with version 1.0 as a celebration of the Studio di Fonologia Musicale of Milano (Studio for Musical Phonology) of the RAI National Radio and Television and the German WDR Studio of Radio of West Germany in Cologne.

The second version of the software was released in 2013.

After 12 years from Berna1, I'm glad to present you Berna3.

Berna does not refer to the name of the Swiss city, but rather it is a mix of the names Berio and Maderna: the Italian composers who founded the Studio di Fonologia in Milano.

Berna 3 is a great update, written from scratch, which adds new instruments, an amazing UI and vintage warm tone to all the devices.

I've designed this software mainly for schools of music to give to the students the chance to put their hands on vintage test equipment and experience electronic music as it was made before the advent of the synthesizer and sequencer. Of course Berna 3 can be an amazing creative tool for your music.

Compared to modern DAWs workflow, Berna can look primitive and limited, but that's exactly how it was back in the days of the electronic avant-garde of the 50s.

Audio recording is possible on multiple tracks, but editing is very limited and MIDI only concerns faders and potentiometers' mapping.

You will not use any keyboard or sequencer.

Instead you will find yourself in a full blown radio laboratory with lots of function generators, modulators, amplifiers, filters, a four tracks tape recorder, four mono tape loops and one stereo tape recorder.

The reason why Berna is not a VST plugin or an Ableton device, is twofold.

First, Berna is a very big software with lots of devices and functions, second, Berna is designed to be an "experience" rather than a simple plugin.

You will immerse yourself in this lab and find your way into this primitive stack of equipment, following its rules. It's a full workstation the old way.

The idea is to give you a realistic experience of the early electronic music of the pioneers. Of course you can record sounds and use them later in your most beloved DAWs, but first of all, take your time to learn how this lab works and you will soon find yourself composing electronic tones like it was 1958. Maybe you will not need any DAW and you will use Berna as it is, with all its realistic limitations and qualities.

I invite you to carefully read this manual, because the rules here are not those of modern DAWs and synths.

Learn first of all about the MATRIX patchbay and then explore every device.

There are two MATRIXes, one for the devices and one for the internal routing of the mixer and recorders/loopers. Without using the MATRIXes you will not hear any sound, so it's very important to learn this fundamental tool. All the devices can be connected with the MATRIX, it's indeed a full modular software.

At the end of this manual you will find suggested readings, a discography and the link to a video tutorial.

Welcome to the 1950s!

MAIN INTERFACE



The main interface is simply the MIXER of Berna3.

You will find 8 channels at the left (INPUT from the MATRIX), 8 channels at the right (4track tape return and loopers return), plus a master fader and a master 2 Track tape return.

Every channel has an AUX SEND for REVERB and ECHOGEEK delay.

Keep in mind that the REVERB and ECHO return can be patched in the MIXER MATRIX.

The MASTER FADER has a MASTER EQ in insert on MASTER FADER and 2TRK TAPE.

At the bottom of the window you will find important buttons:

DSP ON/OFF: turn on or off the audio processing

Unlock Demo: to authorize your software

SAVE/LOAD: to store or recall a preset

Assign MIDI: to assign MIDI CC to potentiometers and faders

Assign Keys: to assign computer keyboard keys to buttons

Read Mapping: to load a file with midi/keys mapping data

Write Mapping: to save a file with midi/keys mapping data

OPEN MAPPING: to see your stored mapped keys or MIDI CC

Audio Settings: audio interface settings, sampling frequency, vectors size, audio routing from and to your audio interface and Berna 3.

MATRIX AND MIXER MATRIX

First and foremost, you must use the MATRIX and the MIXER MATRIX to connect devices to and from the mixer. These two matrixes make of Berna a full modular software. Anything can be connected in more than 1600 patch points!

The usage is very simple. Think at the MATRIX just like as an EMS VCS3 pin board.

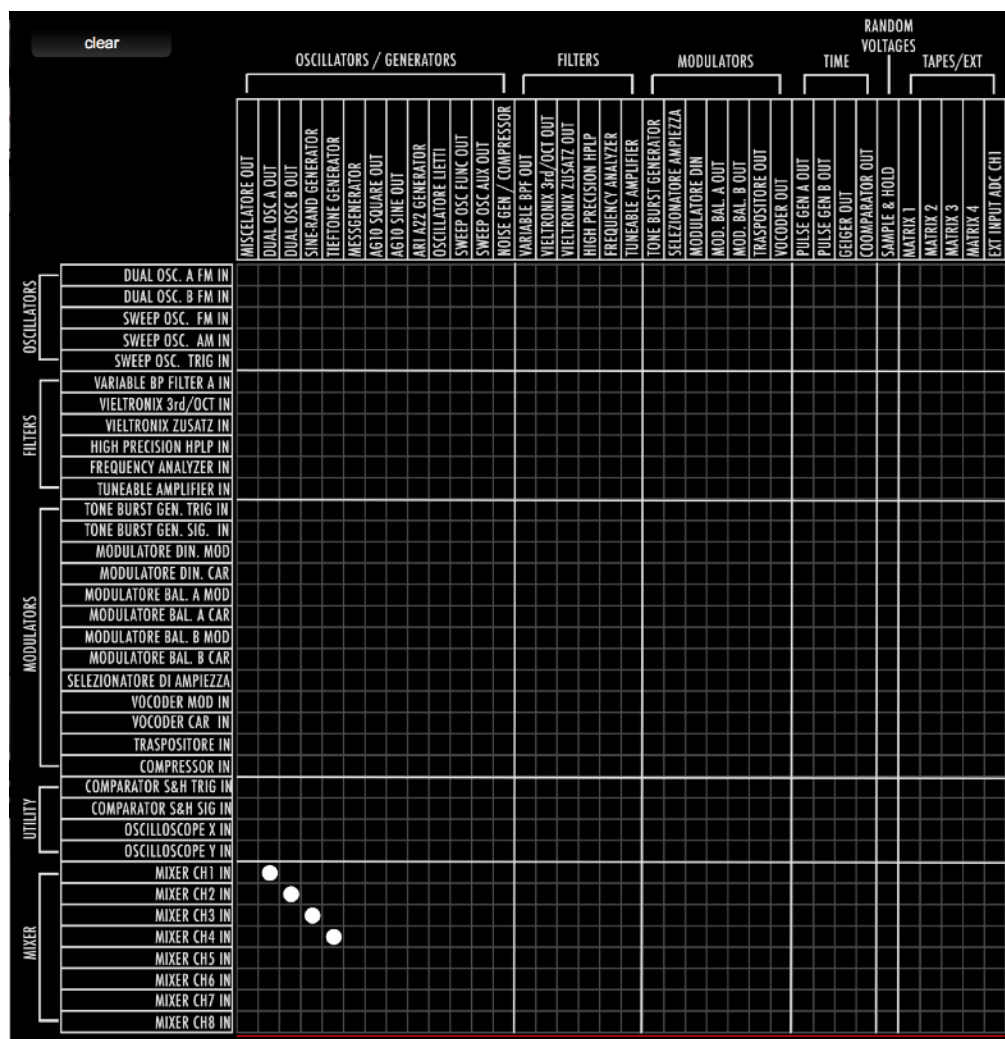
At the top you find always the OUTPUTS and at the left the INPUTS.

To use it, simply use the mouse and place a white dot at the corresponding x and y coordinate.

Let's make some examples:

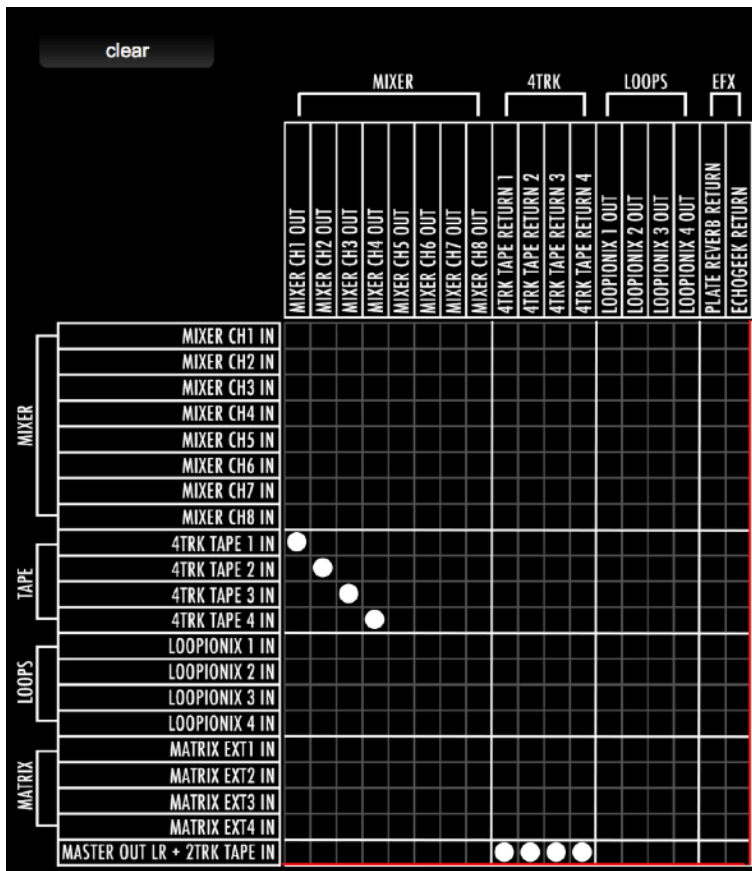
Let's say we want to record on the 4TRK Tape Recorder four generators:
Dual Oscillator 1 and 2, Sine-Random Generator and Tiefertone Generator.

First we use the MATRIX to route these four oscillators to four channels of the mixer:



On the Mixer you will rise the faders of channels 1 to 4.

Then we use the MIXER MATRIX to route the channels 1 to 4 to the four tracks of the 4TRK TAPE RECORDER



Because we can listen the signals directly from the tape recorder, we don't need to route Channels 1 to 4 to the MASTER OUT.

Now from the 4TRACK TAPE RECORDER we go finally to the MASTER OUT.

To listen to the sound coming from the oscillators we need to:

- 1) arm tracks 1 to 4 on the 4TRK TAPE RECORDER
- 2) Rise the faders of TRK1, TRK2, TRK3 and TRK4.
- 3) **Open the Dual Oscillator 1 and 2, Sine-Random Generator and Tiefertone Generator windows (use the dropdown menu in the main interface), turn every oscillator ON and set their frequency and output level.**



Let's make another example:

This time we'll use a noise generator and we will filter it with a 3rdOctave BandPass filter. Then we will go straight into the mixer and add some reverb.

Let's first open the noise generator (select it on the dropdown menu at the top left of the main interface) Turn on the generator and select and output level.



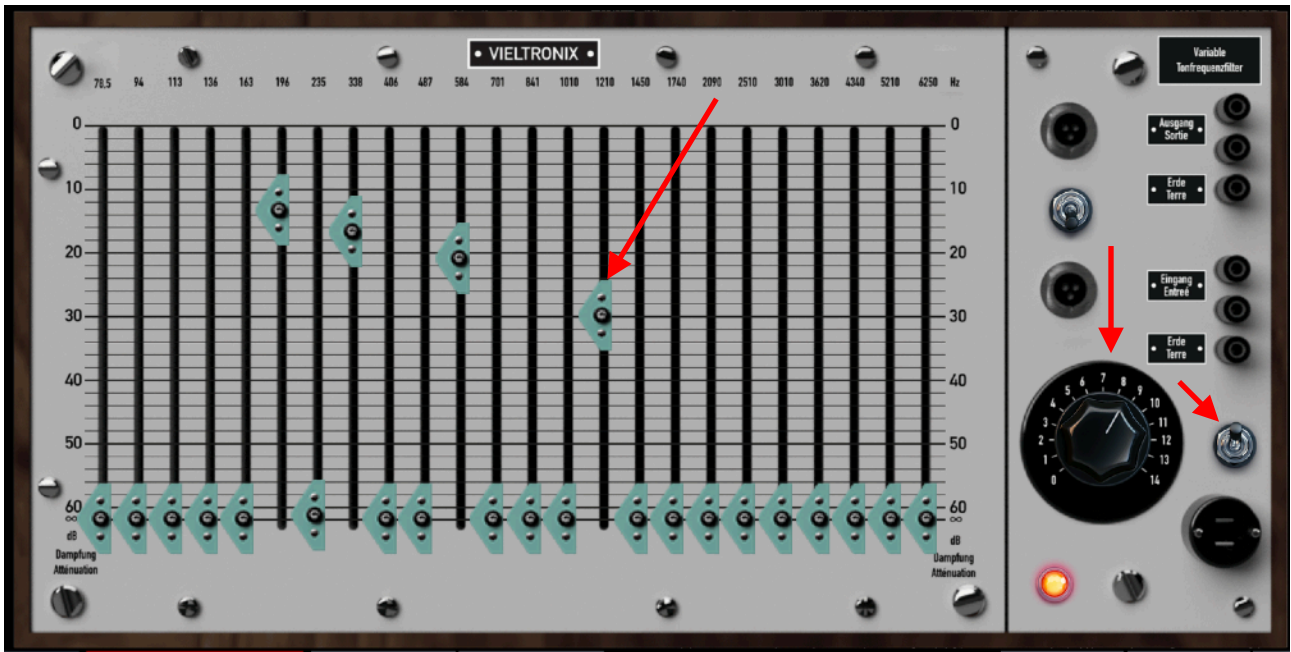
Now we connect the Noise Generator output to the 3rdOctave Filter (VIELTRONIX1) input in the MATRIX:

clear

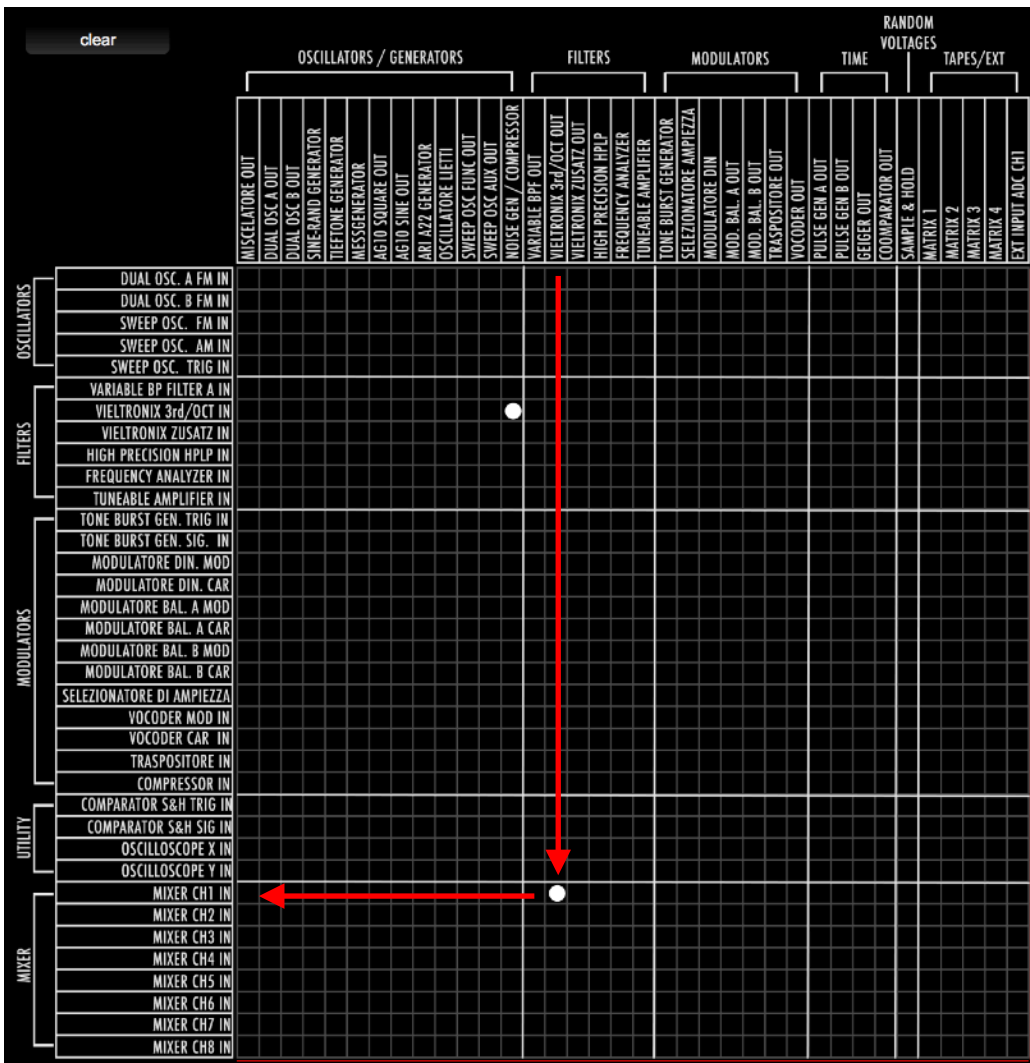
	OSCILLATORS / GENERATORS	FILTERS	MODULATORS	TIME	RANDOM VOLTAGES	TAPES/EXT
	MISCELLANEOUS OUT	VARIABLE BPF OUT	TONE BURST GENERATOR	PULSE GEN A OUT	COMPARATOR OUT	EXT INPUT ADC CH1
	DUAL OSC A OUT	VIELTRONIX 3rd/OCT OUT	TONE BURST GEN. TRIG IN	PULSE GEN B OUT	SAMPLE & HOLD	
	DUAL OSC B OUT	VIELTRONIX ZUSATZ OUT	TONE BURST GEN. SIG. IN	GEIGER OUT	MATRIX 1	
	SINE-RAND GENERATOR	HIGH PRECISION HPLP IN	MODULATORE DIN. MOD		MATRIX 2	
	TIEFTONE GENERATOR	FREQUENCY ANALYZER IN	MODULATORE DIN. CAR		MATRIX 3	
	MESSGENERATOR	TUNEABLE AMPLIFIER IN	MODULATORE BAL. A MOD		MATRIX 4	
	AG10 SQUARE OUT		MODULATORE BAL. A CAR			
	AG10 SINE OUT		MODULATORE BAL. B MOD			
	ARI JAZZ GENERATOR		MODULATORE BAL. B CAR			
	OSCILLATORE LIETTI		SELEZIONATORE DI AMPIEZZA			
	SWEEP OSC FUNC OUT		VOCODER MOD IN			
	SWEEP OSC AUX OUT		VOCODER CAR IN			
	NOISE GEN / COMPRESSOR		TRASPOSITORE IN			
			COMPRESSOR IN			
			COMPARATOR S&H TRIG IN			
			COMPARATOR S&H SIG IN			
			OSCILLOSCOPE X IN			
			OSCILLOSCOPE Y IN			
			MIXER CH1 IN			
			MIXER CH2 IN			
			MIXER CH3 IN			
			MIXER CH4 IN			
			MIXER CH5 IN			
			MIXER CH6 IN			
			MIXER CH7 IN			
			MIXER CH8 IN			

Note: A red arrow points from the 'NOISE GEN / COMPRESSOR' output to the 'VIELTRONIX 3rd/OCT IN' input in the MATRIX.

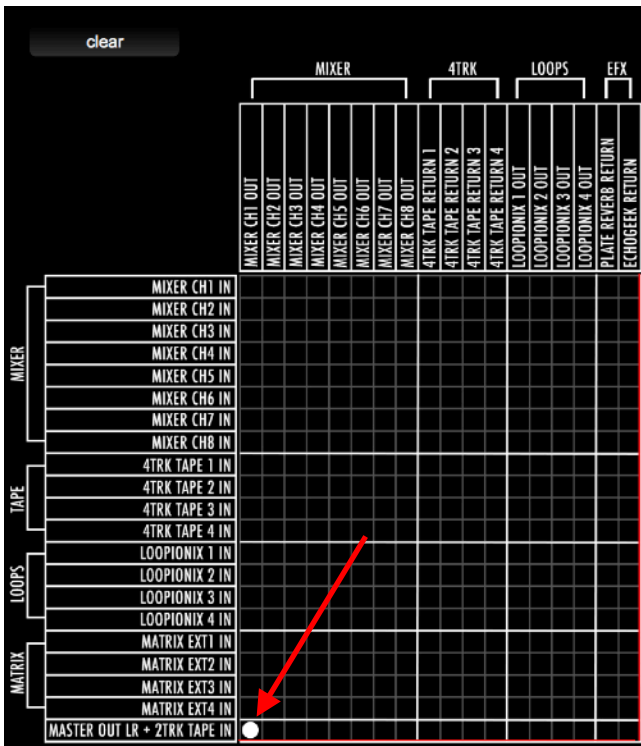
Now let's open the 3rdOctave filter window from the main interface drop down menu.



We turn on the filter, set the output volume with the big black potentiometer and rise some faders to let some sound out. Now we connect filter's output to Channel 1 of the Mixer.



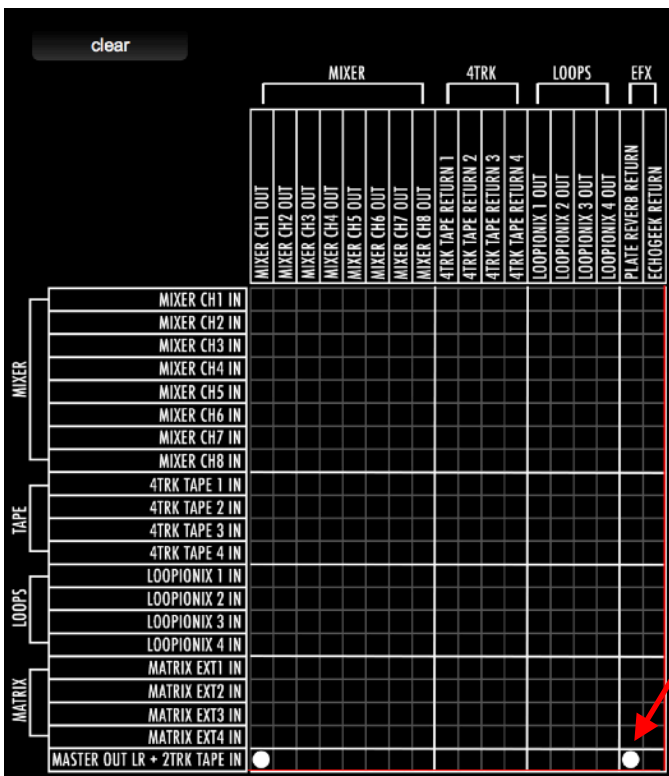
Ok, now the sound is going inside the mixer, we route MIXER MATRIX Ch1 to the MASTER OUT



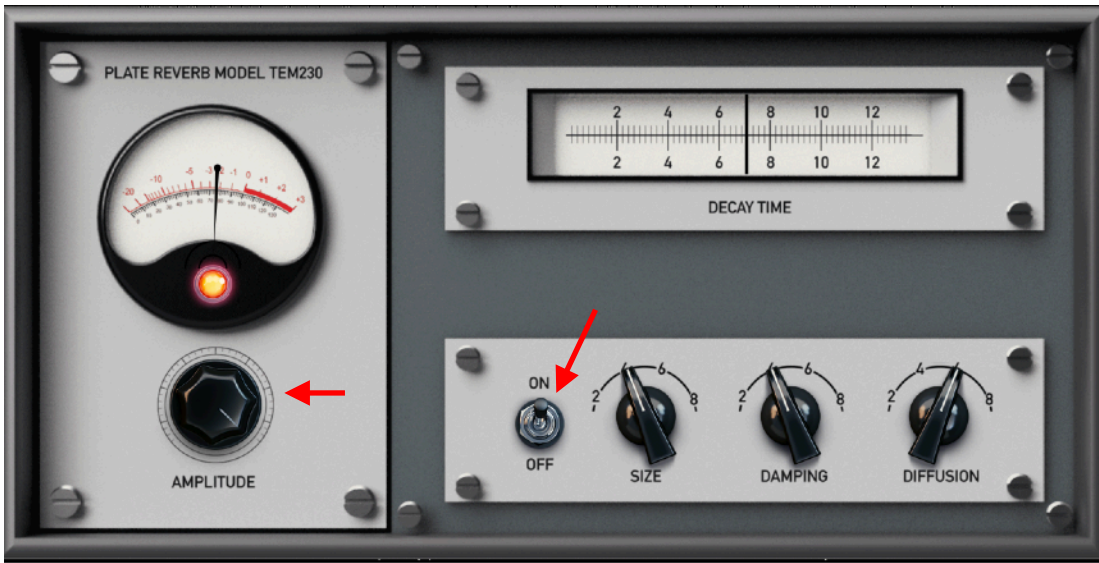
We rise up the fader of Channel 1 on the Mixer.
Now you will hear sound and the meters will read the output levels:



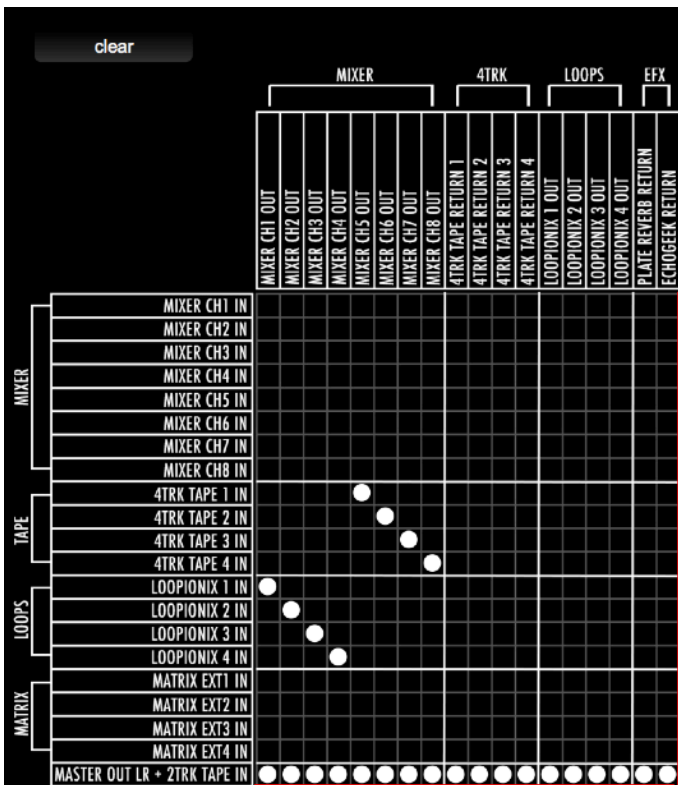
To add Reverb we now turn the REV send potentiometer on CH1
 And we patch the REVERB return to the MASTER FADER on the MIXER MATRIX.



Now open the Plate Reverb window from the main interface (at the top right)
 Turn on the Plate Reverb and make your adjustments.



By default the MIXER MATRIX however has already a set of connections for a quicker start:



CH1 to 8 go at the master out, AND CH1 to 4 go to the four Loopers, and CH5 to 8 go to the four tracks of the 4TRK Tape Recorder. Loopers and Recorder then go to the MASTER OUT as well. Reverb and Echo too.

DUAL WAVEFORM GENERATOR (DUAL OSCILLATOR A and B)



This audio generator (we have two of this in Berna3) is a Sinusoidal / Triangular oscillator with FM modulation capabilities.

- 1) Frequency adjustment (USE THE MOUSE) fine tuning
- 2) Frequency adjustment/DIAL (CAN BE MAPPED WITH CC MIDI)
- 3) ON OFF Switch
- 4) Output amplitude
- 5) Scale of amplitude
- 6) Sine or Triangular waveform
- 7) Duty Cycle for Triangular waveform (turns it into sawtooth)
- 8) Modulation off, FM External Modulation Selector, FM Internal Modulation Selector and Frequency
- 9) FM Frequency deviation index (amplitude of modulation signal)

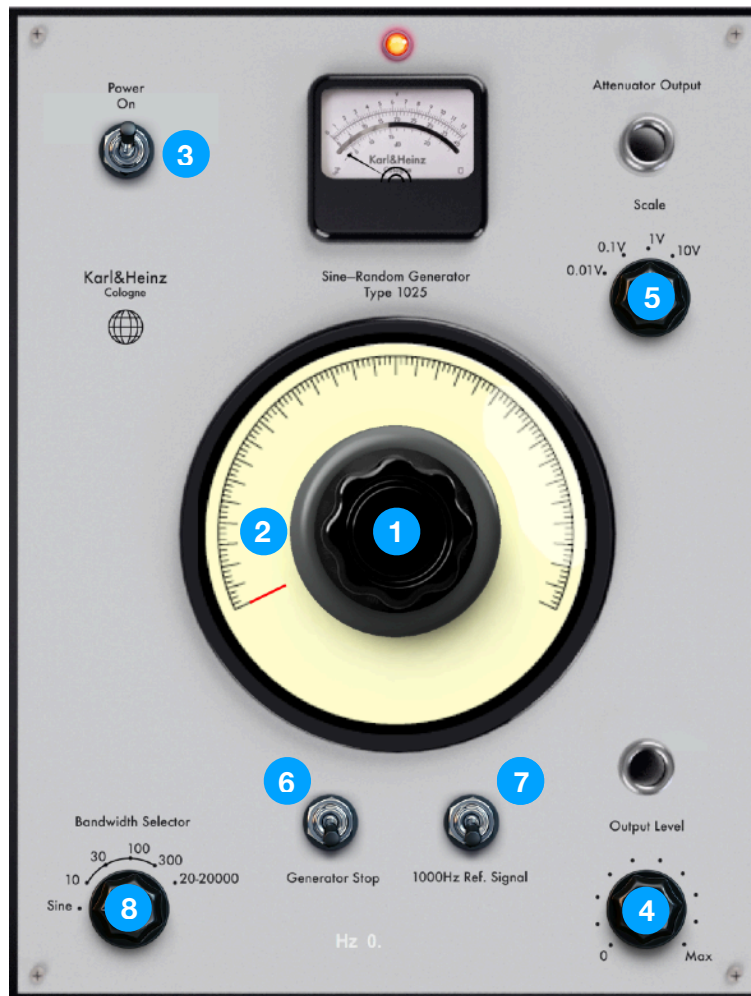
TIP: you can cross modulate two DUAL WAVEFORM GENERATORS

Use the matrix to send Dual Osc OUT A to Dual Osc FM IN B
and Dual Osc OUT B to Dual Osc FM IN B

Then route Dual Osc OUT A to the Mixer as well.

Use the Frequency Deviation (9) and Frequency (2) of both oscillators to select your degree of chaos!

SINE-RANDOM GENERATOR



This audio generator can produce a sinusoidal tone, white noise or a sine tone modulated by white noise with different bandwidths.

- 1) Frequency adjustment (USE THE MOUSE) fine tuning
- 2) Frequency adjustment/DIAL (CAN BE MAPPED WITH CC MIDI)
- 3) ON OFF Switch
- 4) Output amplitude
- 5) Scale of amplitude
- 6) STOP the generator
- 7) 1KHz reference tone
- 8) Select Sine, Modulated Sine or White noise

TIEFTONE GENERATOR



This audio generator is a “low frequency oscillator” that can produce a sinusoidal tone from 0.1 to 1100Hz. It has also Amplitude Modulation. Inspired by the TIEFTONE GENERATOR oscillator used by Stockhausen in Kontakte.

- 1) Frequency adjustment 1 to 10
- 2) Frequency adjustment 0 to 1
- 3) ON OFF Switch
- 4) Frequency adjustment multiplier x1, x10, x100
- 5) Output Amplitude
- 6) Output Amplitude of AM modulation

The Tieftone Generator can be AM modulated by the AUX Generator of the Sweep/Modulation/Oscillator

TIP: Every potentiometer of every device can be mapped by MIDI CC.

MESSGENERATOR



This audio generator is an oscillator that can produce a sinusoidal tone from 10 to 11000Hz
Inspired by the MESSGENERATOR oscillator used by Stockhausen in Kontakte and Studie II.

- 1) Frequency adjustment 1 to 10KHz
- 2) Frequency adjustment 0 to 1KHz
- 3) Frequency adjustment 0 to 100Hz
- 4) Frequency adjustment 0 to 10Hz
- 5) Fine adjustment. Subtracts n‰ Hz from the overall frequency set by 1, 2, 3 and 4
- 6) ON/OFF Switch
- 7) Output Amplitude.

TIP: if you use the mouse on the pots, you can fine tune while keeping SHIFT button pressed

AG-10 SINE-SQUARE WAVE GENERATOR



This Function Generator is a Sine-Square Oscillator.
Sine and Square have separate outputs in the MATRIX.
Inspired by the AG10 oscillator used by Stockhausen in Kontakte.

- 1) ON OFF Switch and Square Wave OUT Amplitude
- 2) Square Wave Amplitude Range
- 3) Sine Wave OUT Amplitude
- 4) Sine Wave Amplitude Range
- 5) Frequency adjustment (USE THE MOUSE) fine tuning
- 6) Frequency adjustment/DIAL (CAN BE MAPPED WITH CC MIDI).
- 7) Frequency range multiplier x1, x10, x100 (x1K and x10K are disabled)

AG-22 SQUARE WAVE GENERATOR



This Function Generator is a Square Oscillator.

- 1) ON OFF Switch
- 2) Frequency adjustment (USE THE MOUSE) fine tuning
- 3) Frequency adjustment/DIAL (CAN BE MAPPED WITH CC MIDI).
- 4) Duty Cycle
- 5) Frequency range
- 6) Output amplitude

LIETTI'S OSCILLATOR



This is a sine generator inspired by the oscillators created by Alfredo Lietti for the RAI Studio di Fonologia Musicale.

There were 9 oscillators at RAI Studio and each oscillator had a different set of frequencies ranges. Here the user can chose the Lietti's oscillator of his choice with the selector (5).

- 1) ON OFF Switch
- 2) Frequency adjustment (USE THE MOUSE) fine tuning
- 3) Frequency adjustment/DIAL (CAN BE MAPPED WITH CC MIDI).
- 4) Oscillator's Frequency Range
- 5) Oscillator Number 1 to 9

SWEEP/MODULATION/OSCILLATOR



This is the most complex function generator of Berna3.

It is made by two independent function generators (FUNC and AUX) with multiple waveforms, internal and external FM and AM modulation plus a Sweep function, continuous or trig/gate modes.

FUNC Oscillator is the main Oscillator, AUX is the auxiliary Oscillator

- 1) ON OFF Switch
- 2) Frequency adjustment FUNC OSCILLATOR (USE THE MOUSE) fine tuning
- 3) Frequency adjustment FUNC OSCILLATOR /DIAL (CAN BE MAPPED WITH CC MIDI).
- 4) FUNC Oscillator's Frequency Range
- 5) FUNC fine adjustment. Subtracts n% Hz from the overall frequency set by (3) and (4).
- 6) FUNC Oscillator Mode. Cont: Continuous sound, Trig: short impulse (need external trig/clock), Gate impulse long as the gate length defined by external clock or square wave oscillator)
- 7) FUNC waveform: sine, tri,rect or AM by AUX oscillator.
- 8) Trigger treshold for TRIG and GATE mode.
- 9) Simmetry for tri and rect waveforms of FUNC oscillator.
- 10) AM carrier (FUNC AM) level
- 11) Suppression of carrier (FUNC AM)
- 12) AUX Oscillator mode: Sweep, sine, tri, rect.
- 13) Simmetry for AUX Oscillator of tri and rect waveforms.
- 14) AUX Frequency adjustment
- 15) AUX Frequency range.
- 16) Modulation mode (WORKS WITH (17)
 - AM: AM Modulation of AUX Osc (Input of modulating signal on MATRIX)
 - SWEEP: AUX Sweeps the frequency of FUNC at speed set by (14) and (15) - (12 MUST BE SET TO SWEEP FORM)
 - FM1: AUX FM Modulates FUNC (Sine, tri, rect mode of AUX)
 - FM2: FM External Modulation of AUX (Input of modulating signal on MATRIX)
 - FM3: FM External Modulation of FUNC (Input of modulating signal on MATRIX)
- 17) Index value for every mode of (16)
- 18) Attenuation of 18dB of FUNC

19) Output Amplitude of FUNC

NOISE GENERATOR/COMPRESSOR



Noise generator and levelling amplifier.

- 1) ON OFF Switch
- 2) Mode: noise generators or compressor (Compressor input is in the MATRIX)
- 3) Compressor Threshold
- 4) Compressor Speed
- 5) Output Amplitude

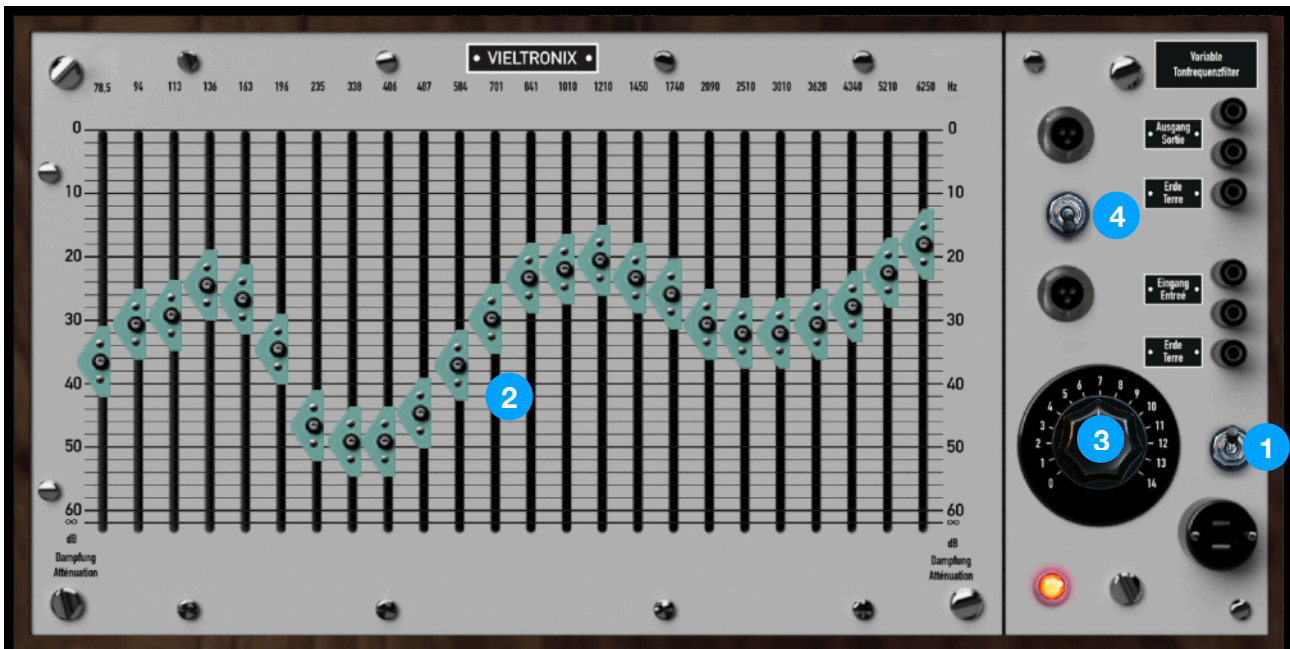
VARIABLE BAND-PASS FILTER



Band-Pass filter made with an High Pass filter and a Low Pass Filter in serial connection.
Both filters are 2nd Order.

- 1) ON OFF Switch
- 2) HPF Cut Off Frequency
- 3) LPF Cut Off Frequency
- 4) HPF Cut Off Frequency Range x1, x10, x100
- 5) LPF Cut Off Frequency Range x1, x10, x100

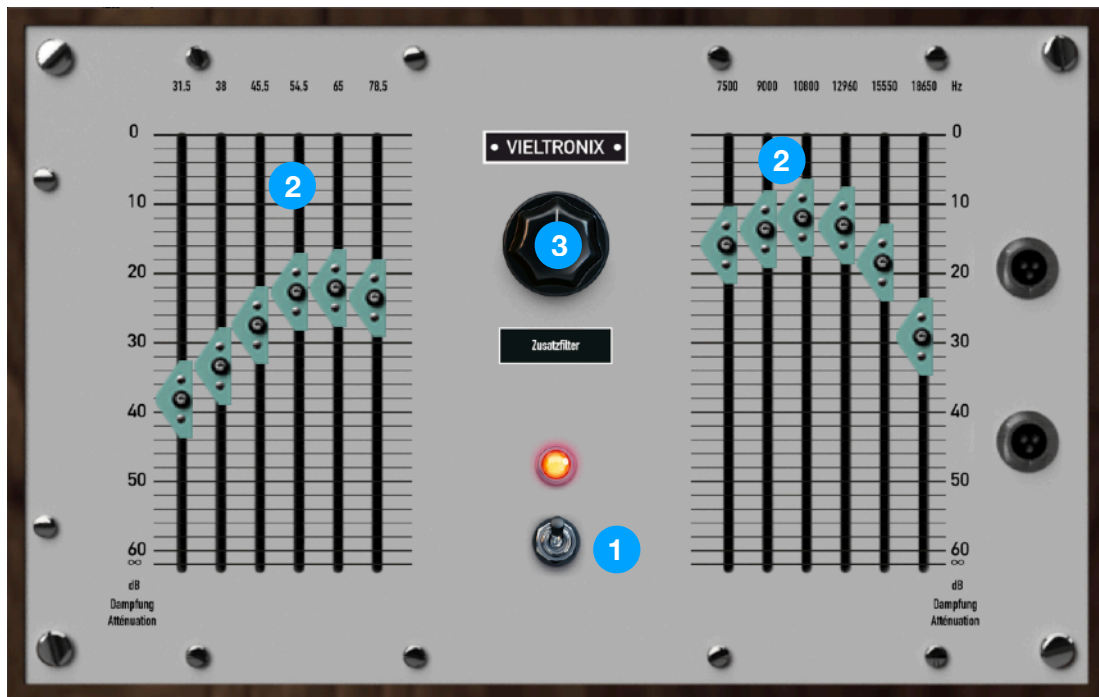
VIELTRONIX 3rdOCTAVE FILTER and ZUSATZ FILTER



This is a 3rd Octave filter inspired by the one used at WDR by Stockhausen and also present at the RAI Studio.

- 1) ON OFF Switch
- 2) Filters' bands faders
- 3) Output Amplitude
- 4) LOW or HIGH Q of the filters (Affects also VIELTRONIX 2 ZUSATZ FILTER)

Zusatz Filter is just an extension of the filter in the high and low ranges, however the IN and OUTS on the MATRIX are separate.



HIGH PRECISION HIGH PASS FILTER & LOW PASS FILTER



This is a 1st Order High pass OR Low Pass filter.
Its main goal is to shape pulses to create envelopes.

- 1) ON OFF Switch / HPF MODE / LPF MODE
- 2) Frequency adjustment (USE THE MOUSE) fine tuning
- 3) Frequency adjustment/DIAL (CAN BE MAPPED WITH CC MIDI).
- 4) Frequency adjustment range: x1, x10, x100
- 5) Output amplitude

FREQUENCY ANALYZER



This is a frequency analyzer (an amplifier with BPF/NOTCH filter) that can be used for interesting filtering and distortion effects.

- 1) ON OFF Switch
- 2) Filter Frequency adjustment (USE THE MOUSE) fine tuning
- 3) Filter Frequency adjustment/DIAL (CAN BE MAPPED WITH CC MIDI).
- 4) Input amplitude
- 5) Input range multiplier (can create nice distortion!)
- 6) BPF / Notch Filter Selectivity.
- 7) Filter Frequency Range
- 8) Function: Notch, No Filter, BPF, BPF+clean
- 9) Notch Level

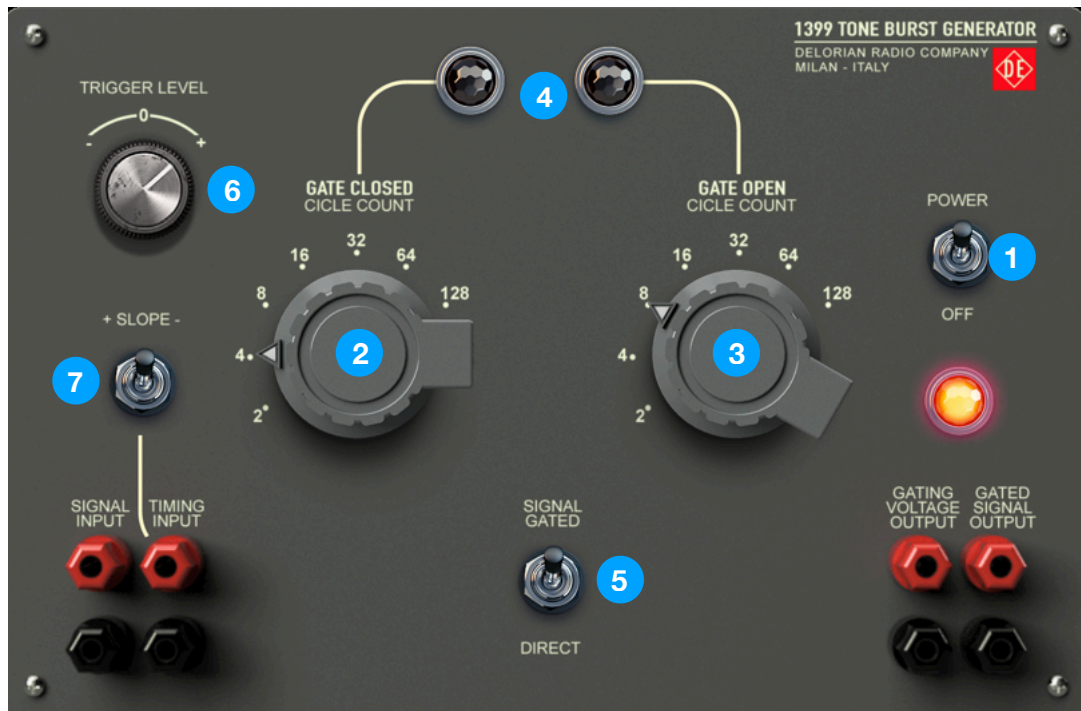
TUNEABLE INDICATING AMPLIFIER WBM



This is another frequency analyzer (an amplifier with BPF filter) that can be used for interesting filtering and distortion effects. This model is inspired by the UBM Filter used by Stockhausen in Kontakte, at the WDR Studio.

- 1) ON OFF Switch, INDICATOR ONLY, AMPLIFIER+FILTER
- 2) Filter Frequency adjustment (USE THE MOUSE) fine tuning
- 3) Filter Frequency adjustment/DIAL (CAN BE MAPPED WITH CC MIDI).
- 4) Filter Frequency Range
- 5) Input Sensitivity (can create nice distortion!)
- 6) Feedback or Resonance of the BPF filter

TONE BURST GENERATOR



The Tone Burst Generator is a device for gating or passing a sound signal for an n number of cycles of a clock/trig signal. The instrument has 2 inputs: Carrier (the gated signal) and Modulator (the clock/trig). This model is inspired by the TBG that was used at the RAI Studio di Fonologia.

- 1) ON OFF Switch
- 2) Closed gate time (multiples of the clock INPUT frequency)
- 3) Open gate time (multiples of the clock INPUT frequency)
- 4) Open/Close gate indicators
- 5) Gated or Direct signal
- 6) Trigger Threshold
- 7) Trigger slope (positive or negative) – Usually a positive trig from a Pulse Generator

SELEZIONATORE DI AMPIEZZA (AMPLITUDE SELECTOR)



The Selezionatore di Ampiezza was a gate circuit created by Alfredo Lietti for the RAI Studio di Fonologia.

- 1) ON OFF Switch
- 2) Threshold
- 3) Release time: SLOW - FAST

MODULATORE DINAMICO
(DYNAMIC MODULATOR - ENVELOPE FOLLOWER)



The Modulatore Dinamico was an envelope follower circuit created by Alfredo Lietti for the RAI Studio di Fonologia. This device can be used to send envelopes to the Balanced Modulator/Amplifier.

- 1) ON OFF Switch
- 2) Input amplitude
- 3) Delay
- 4) Balance between delayed and clean signal
- 5) Time for Manual Attack
- 6) HPF Filter Cut Off Frequency for transient shaping
- 7) Manual or Automatic Attack

BALANCED/UNBALANCED MODULATOR VCA AMPLIFIER



This is an amplifier with balanced or unbalanced AM modulation (Ring/Bal)
It can be used as a VCA or as a ring / balanced modulator.

- 1) ON OFF Switch
- 2) output amplitude
- 3) Balanced (with Carrier) or Unbalanced Modulator (Ring Modulation no Carrier)

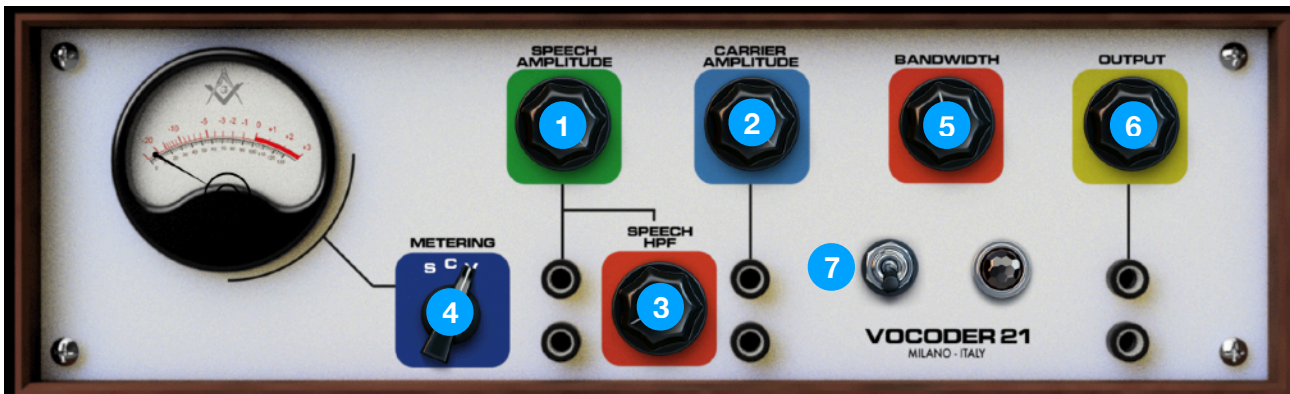
TRASPOSITORE DI FREQUENZA (FREQUENCY SHIFTER)



This is an frequency shifter inspired to the device used at RAI Studios.

- 1) ON OFF Switch
- 2) Transposing Frequency adjustment (USE THE MOUSE) fine tuning
- 3) Transposing Frequency adjustment/DIAL (CAN BE MAPPED WITH CC MIDI).
- 4) Transposing Frequency Range Multiplier x1, x10, x100, x1000
- 5) Selection of Upper Side Band or Lower Side Band
- 6) Output Amplitude

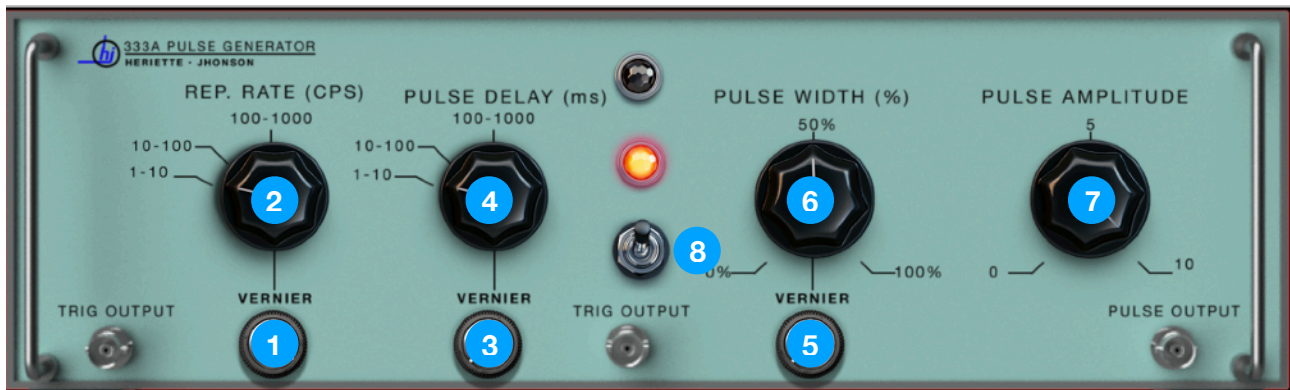
VOCODER



A classic Vocoder

- 1) Speech Amplitude
- 2) Carrier Amplitude
- 3) Speech HP Filter
- 4) Level Meter Selector: Speech, Carrier, Vocoding
- 5) Vocoder's filters bandwidth
- 6) Output Amplitude

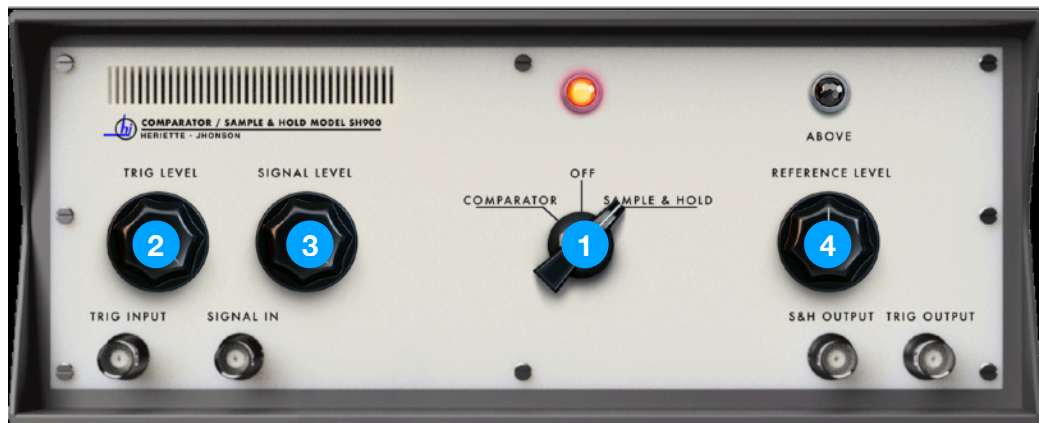
PULSE GENERATOR A & B



This device generates a pulse trig that can be used to create envelopes (with the High Precision HP/LP Filter) or trigs for the Sweep/Modulation/Generator, the Tone Burst Generator, the Sample&Hold or used as a pulse train generator.

- 1) Clock Rate
- 2) Clock Rate Range
- 3) Delay Rate
- 4) Delay Rate Range
- 5) Pulse Width Fine
- 6) Pulse Width Coarse
- 7) Pulse Output Amplitude
- 8) ON/OFF Switch

COMPARATOR / SAMPLE&HOLD



This device has two working modes: comparator and sample&hold.

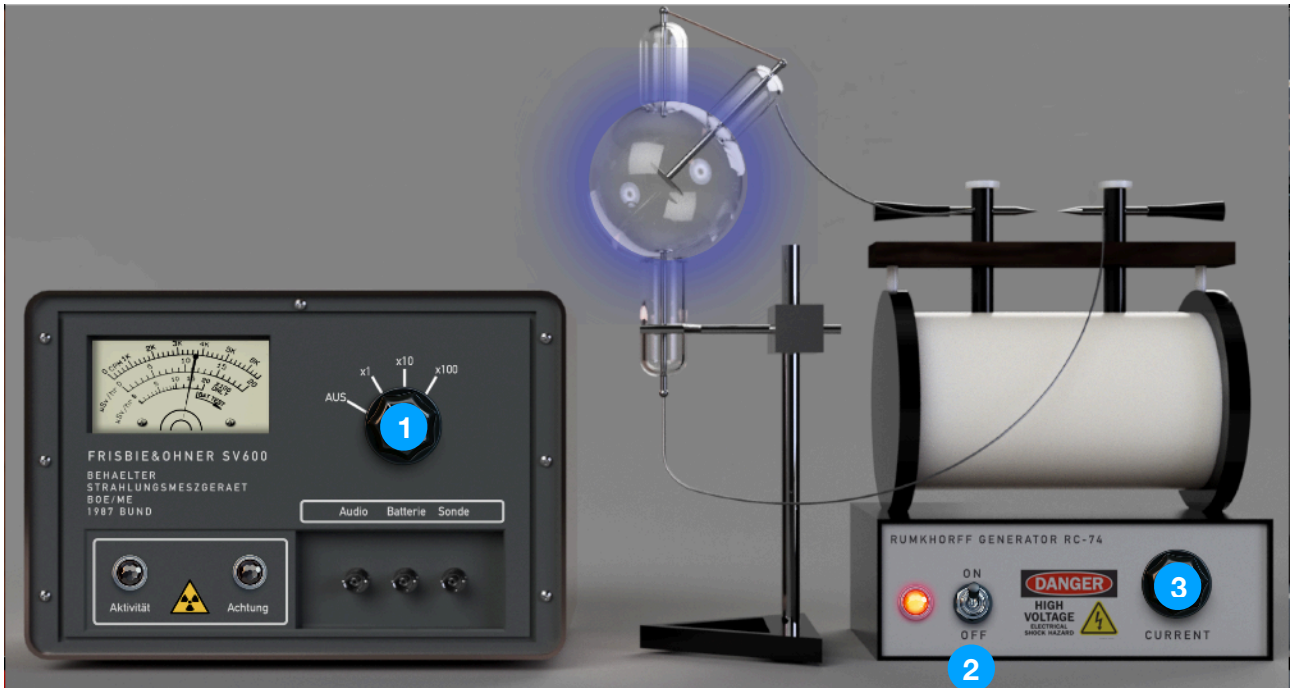
In Comparator mode, a signal is sent to the input and its amplitude is compared with a reference level. When the signal has an amplitude higher than the reference, a gate signal is produced at the comparator's output.

In Sample&Hold mode a trig signal is sent to the trig input and a random voltage (noise) is sent to the signal input. Using the trig as a clock, the S&H circuit will output a held random voltage.

TIP: You can send a S&H signal to the FM input of an oscillator with FM capabilities.

- 1) ON OFF Switch, Comparator Mode, Sample&Hold Mode
- 2) Trig IN level
- 3) Signal IN level (both for Comparator and S&H)
- 4) Reference level (Comparator Mode)

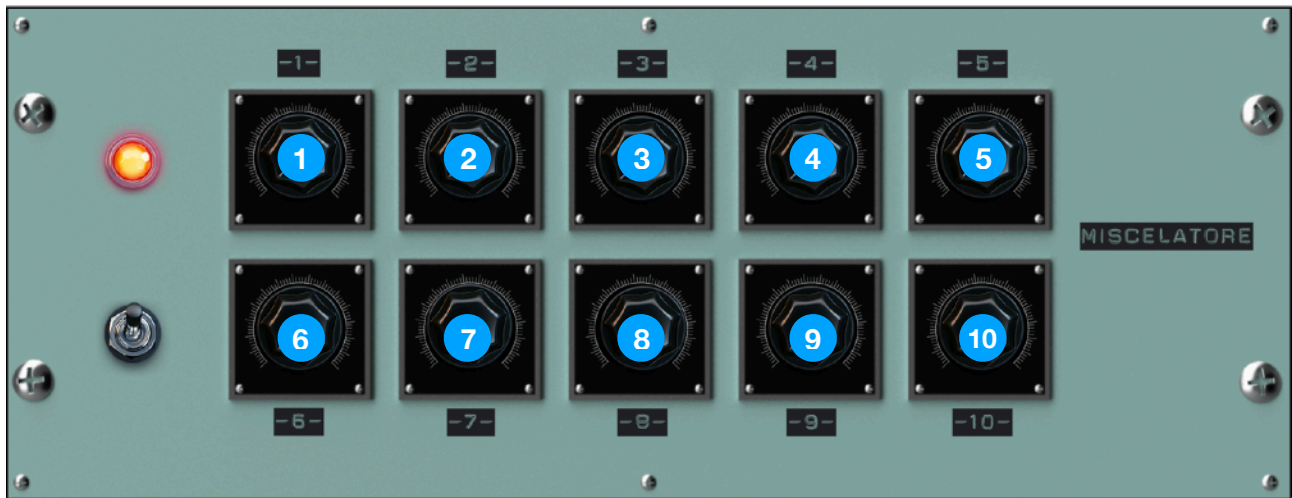
GEIGER COUNTER



This is a simulation of a geiger counter and an X-Ray Tube powered by a Rumkhorff coil. It will generate random trigs or random clicks to be used as clock or signal. The geiger counter alone will simulate a background radiation level ($\sim 0.15\mu\text{S}/\text{h}$) Adding the Xray Tube will generate faster trigs.

- 1) ON OFF Switch and meter scale (x1 for normal operation)
- 2) Trig IN level
- 3) Xray Tube ON OFF
- 4) Xray Tube Current. (More current = more radiation = more clicks).

MISCELATORE (OSCILLATORS MIXER)



For quicker start I have included a small mixer which has pre-cabled connections with some oscillators.

- 1) Dual Oscillator A Output
- 2) Sine-Random Oscillator Output
- 3) Tieftone Generator Output
- 4) Messgenerator Output
- 5) AG10 Sine Generator Output
- 6) AG10 Square Generator Output
- 7) A22 Square Generator Output
- 8) Lietti's Oscillator Output
- 9) Sweep/Modulation/Oscillator Func Output
- 10) Sweep/Modulation/Oscillator Aux Output

LOOPING SOUND



Berna 3 can record and play 4 mono loops.

To make loops send a signal from the MIXER MATRIX to one of the LOOPIONIX Loopers.
(You can also import your loops)

First off turn on the looper (1) and select a tape length (6) in seconds.

Press RECORD (2)

When finished, press STOP (2)

Trim the loop (5)

Press PLAY(2) and adjust speed as desired (4) or direction (3).

- 1) ON/OFF Switch
- 2) PLAY, STOP, REC
- 3) Forward repro, Reverse repro
- 4) Speed
- 5) Trim the loop, Export the Loop, or import a loop (dragging a file in the red space)

NOTE: You must route the sound from the Mixer to the Loopionix in order to use loops, using the MIXER MATRIX. Remember that Loops have return channels on the mixer.

NOTE: Chosing a new tape length will erase the tape.

LOOPS ARE NOT SAVED IN PRESETS. EXPORT THEM AND IMPORT THEM SEPARATELY.

RECORDING SOUND on the 4 TRACKS TAPE



Berna 3 has also a 4 tracks tape

Use the MIXER MATRIX to route the signals inside the 4 tracks.

First of all select the tape length (6) (default 120 seconds)

- 1) ARM TRACK 1 to 4
- 2) PLAY, STOP, REC
- 3) See tracks, import audio (drag and drop) (4 separate MONO FILES)
- 4) Set Play and Record Head position
- 5) ERASE or EXPORT TRACKS

**NOTE: TAPE LEGTH CANCEL ALL THE TRACKS,
REMEMBER YOU CAN OVERWRITE A SINGLE TRACK**

RECORDING SOUND on the MASTER 2 TRACKS TAPE



Berna 3 Master Fader is internally routed to a 2 track tape recorder.
This is basically your master tape.

With the loops and the 4track recorder you can bounce sound as many time you want, here instead, you record your final work in stereo 24 bit.

Any sound that goes to the mixer master fader goes to this recorder.

Select the tape length (1) (default 120 seconds)

Press RECORD (2)

Press STOP when finished (2)

Press PLAY to listen back (2) (Use 2TRK Return Fader on the mixer).

- 1) Select the tape length (1) (default 120 seconds)
- 2) PLAY, STOP, REC
- 3) See tracks
- 4) Set Play and Record Head position
- 5) ERASE or EXPORT TRACKS

NOTE: TAPE LENGTH CANCEL THE TRACKS

MIDI AND COMPUTER KEYBOARD MAPPING

To map your controller press ASSIGN MIDI or ASSIGN Key at the bottom of the main window.

The windows will show you what controls can be mapped, highlighted in blue or red.

Click on one pot or fader and move your controller, it will be automatically mapped.

To exit from MIDI assignment press ESC on your keyboard.

(Key means computer keyboard)

SAVING PRESET DO NOT STORE MAPPING.

STORE AND LOAD MAPPING SEPARATELY.



SAVING AND LOADING PRESETS

You can store and load any pot, fader, button, dial and matrix data into presets using SAVE PRESET and LOAD PRESET at the bottom of the main window.

SAVE **do not store:**

MIDI Mapping data (Save and recall them separately)

Audio files in loopers and recorders (export and load them separately)

THE BIG BERNA3 WALKTROUGH

Watch it on youtube!

<https://www.youtube.com/watch?v=UNuVitn4TGA>

SUGGESTED READINGS IN ENGLISH

The Studio di Fonologia. A Musical Journey 1954-1983

Updated 2008-2012 edited by Maddalena Novati e John Dack, Ricordi Milano, 2012

Electronic and Experimental Music: Technology, Music, and Culture

Thom Holmes, Routledge, 2015

New Music at Darmstadt: Nono, Stockhausen, Cage, and Boulez

Martin Iddon, Cambridge University Press, 2013

Die Reihe Vol 1

Herbert Eimert and Karlheinz Stockhausen, 1954, Universal

On Music

Karlheinz Stockhausen, Robin Maconie, 1989, Marion Boyars Publishers Ltd

In Search of a Concrete Music

Pierre Schaeffer, University of California Press, 2012

Audio Culture: Readings in Modern Music

Christoph Cox, Daniel Warner, Continuum Press, 2004

DISCOGRAPHY (RAI - WDR)

Bruno Maderna

Continuo
Notturmo
Sintaxis
Musica su Due Dimensioni

Luciano Berio

Visage
Thema, Omaggio a Joyce

Luigi Nono

La Fabbrica Illuminata
Non Consumiamo Marx
Contrappunto Dialettico Alla Mente

Henry Pousseur

Scambi
Seismogramme I+II

John Cage

Fontana Mix

Karlheinz Stockhausen

Studie II
Kontakte
Gesang der Junglinge

Franco Evangelisti

Incontri di Fasce Sonore

Herbert Eimert

Klangstudie I
Klangstudie II
Glockenspiel
Klang Im Unbegrenzten Raum

Karel Goeyvaerts

Komposition Nr. 5
Komposition Nr. 7

Paul Gredinger

Formanten I Und II

György Ligeti

Artikulation

Gottfried Michael Koenig

Klangfiguren I

Bengt Hambraeus

Doppelrohr II