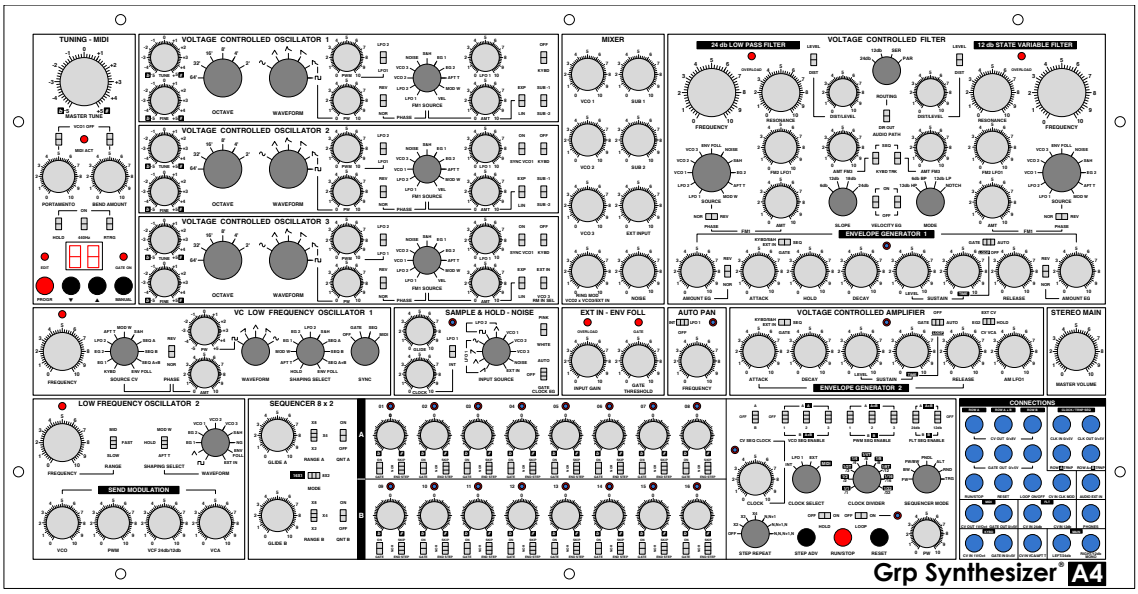
Grp A4 Synthesizer
Owner's Manual
V. 1.09



CONTENTS

Warranty

The guarantee terms listed in full in the purchase agreement, are valid only if the synthesizer is used in the conditions of intended use.
The only exceptions to the maintenance described in the chapter. MAINTENANCE and performed with the procedures, any repairs or modifications to the musical instrument or companies not authorized by the user determines the decay of the warranty.
The warranty does not extend to damage caused by malpractice or negligence in the use of the synthesizer, or by poor maintenance or failure.

The products we sell are covered by warranty as to the synthesizer to the following conditions:

1 The warranty is valid for a period of 2 (two) years.
2 The manufacturer undertakes to replace, at its discretion parts malfunctioning or incorrectly manufactured, only after careful monitoring and feedback of poor construction.
3 The costs of transport and/or delivery are always charged to the buyer.
4 During the period of warranty the replaced products become the property of the manufacturer.
5 The warranty does not cover damage caused by excessive stress such as the use of the product after the discovery of an anomaly, the use of inappropriate methods of operation and the failure to follow instructions for use and maintenance.
6 The manufacturer assumes no responsibility for any difficulties that may arise in the use or resale abroad due to the provisions in force in the country where the product was sold.
7 Are excluded from the warranty cover parts subject to wear, such as connectors, potentiometers, power cords and interconnect cables.
8 The warranty is voided if the unit is opened and / or tampered with, even partially.

Notice: if you consider to use the warranty, please provide the following informations:

1 Model
2 Date of purchase (with a document comproving the purchase)
3 Detailed description of the malfunction

The manufacturer is not liable for any damage to persons, animals or property resulting from tampering with or otherwise by operation of the apparatus other than that described herein.

GRP Synthesizer
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P.IVA 10681631007
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Due to the continuous evolution of products, features and design of this model may change without notice.

ID Labels

The GRP Synthesizer A4 is equipped with an identification plate on which they reported the identification of the device and the main technical data relating to power supplies.

WARNING!

TO MAINTAIN THE INTEGRITY 'OF ALL COMPONENTS DEVICE IS ESSENTIAL COMPLY SPECIFICATIONS LISTED ON THE LABEL.

DANGER

ACCESS TO PROTECTED OR PARTS OF THE CLOSED GRP SYNTHESIZER A4 MUST BE MADE ONLY FOR OPERATIONS AND MAINTENANCE ONLY AUTHORIZED PERSONNEL.

Operation

Connect the power cord into the IEC socket on the rear panel, making sure that the voltage and frequency correspond to the label.

Insert the plug into the wall outlet.

The power LED on the front panel indicates the correct functioning of individual sections of the PSU.

Handling and cleaning

The GRP A4 does not need any maintenance to the internal circuits.
To clean the container is simply a clean cotton cloth and slightly damp. The paint is resistant to normal cleaning products, with the exception of strong solvents (benzene, acetone, diluents in general, etc..).

Troubleshooting

Here are some problems you might encounter while using the GRP Synthesizer A4. Some cases are easy to solve, while others require the intervention of specialized personnel or the manufacturer. Do not hesitate to contact us with any questions. We are here together to solve every problem.
Before connecting the GRP A4, make sure that the voltage and current necessary to be compatible with the characteristics of the device.
GRP Synthesizer disclaims any liability for misuse of the GRP Synthesizer synthesizer A4.

- **The GRP A4 does not come on (all LEDs are off).** Check for any network in the socket. Check the power cord. Check the fuse inserted into the IEC socket on the rear panel. If the GRP A4 still does not light, contact GRP Synthesizer.
- **One or more LEDs on the front does not light up and the synth doesn't sounds.** Contact GRP Synthesizer.

Fuse change

The only user-accessible fuse is contained in the appropriate place in fuse holders IEC power socket on the rear panel. To replace, first disconnect the power cord, then remove the fuse holder using a screwdriver.

WARNING

CHANGE THE EXTERNAL FUSE ONLY WITH ANOTHER OF THE SAME TYPE, CURRENT, DIMENSION AND BEHAVIOR. IF, AFTER A FIRST SUBSTITUTION, FUSE BLOWS AGAIN, DO NOT ATTEMPT A SECOND SUBSTITUTION; INSTEAD, DISCONNECT THE SYNTHESIZER FROM AC POWER AND CONTACT GRP SYNTHESIZER.

DANGER

NEVER ATTEMPT TO CHANGE FUSE WITH DEVICE CONNECTED TO AC POWER LINE

Important safety warnings

The environmental policy of GRP Synthesizer limits to the minimum the use of polluting materials (lead, solvents, etc..). Under current legislation, you must dispose of the GRP Synthesizer A4 in accordance with local regulations regarding disposal of waste electrical and electronic equipment. For no reason to abandon the product in the environment: action, this, a criminal offense, and a source of long term pollution.
In order not to incur the risk of electric shock and / or injuries you must carefully follow the instructions in the manual and in the notes below.

WARNING

TO AVOID RISK OF ELECTRIC SHOCK AND / OR INJURY YOU MUST FOLLOW THE INSTRUCTIONS IN THE MANUAL AND THE NOTES BELOW.

- **Do not open the synthesizer; never open it. The removal or disassembly of any panel involves the operator exposure to potentially hazardous voltages. For working inside, GRP Synthesizer and contact only qualified personnel.Non rimuovere alcuna vite sui pannelli esterni dell'apparato.**
- **• Do not expose this apparatus to rain, water spray, excessive moisture, vapor, dust, metal particles or any other material that can penetrate into the ventilation holes.**
- **Do not put other objects in the AC plug on the rear panel, except the appropriate power cable.**
- **Do not expose this appliance to heat.**
- **Do not expose the unit to excessive shock or vibration during operation.**
- **• When installing, or using in the local hot and humid as a result of storage or transport at very low temperatures, it is possible the formation of condensation on the outside and inside the device. It is therefore necessary to wait for the condensation disappears before turning your unit.**

- **Always use the proper and undamaged power cables. Especially, never break the center conductor of the pins or sockets connecting to earth the protective metal casing.**
- **• Always check that the mains power is consistent with that reported in the back of the device.**
- **• Do not obstruct the ventilation holes of the unit.**
- **In case of severe thunderstorms, avoid using the device and disconnect it from mains and other equipment.**
- **If the fuse is not a result of extraordinary external events, such as sudden or violent network outages, storms etc.., do not try replacement, but do check the unit by a qualified technician.**
- **Do not force the run of the regulations beyond the limits.**

Notes

FOREWORD

Thank you for purchasing the Grp Synthesizer A4: this machine will rewards you with years of sonic satisfactions and, to ensure your instrument will functions properly, please read this manual.

SOME WORDS OF WISDOM

Read the following safely tips carefully! You should always observe some basic precautions when dealing with electronic equipment, for you safety and for safety of your own equipment.

OPERATING CONDITIONS

- Never use the synthesizer under potentially damp/wet conditions such bathrooms, swimming pools, etc.
- Do not use the instrument in extremely dusty and dirty environments.
- Do not place the instrument near heat sources like radiators.
- Do not expose the instrument to direct sunlight; the wooden cabinet is varnished with a traditional and trusted procedure, but ultraviolet rays from sunlight can quickly fade the original wooden colour.
- Do not expose the device to extreme vibrations.
- Save the original crate and boxing for future shipping of the instrument.

POWER SUPPLY

- Your Grp A4 Synthesizer is already set for the correct AC powering for your area. You can read it on the label in the rear panel.
- Unplug the device when you are not using it for longer periods.
- Never touch the plug with wet hands.
- When unplugging the instrument, always grab and pull the plug, never the cable.

OPERATION

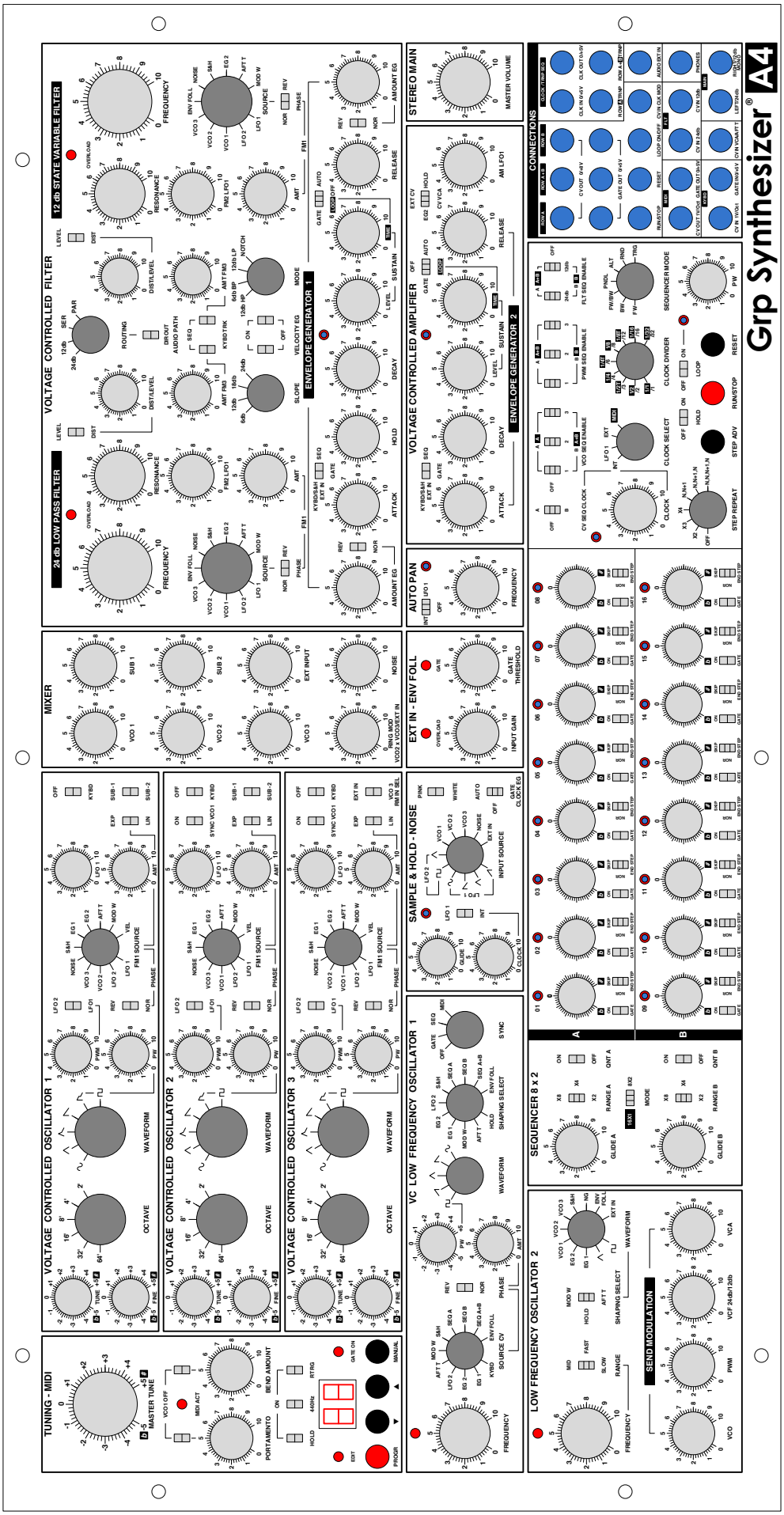
- Although you are a rockstar, NEVER place cans of beer, coke, water (?) or other potentially spilling liquids on or near the instrument.
- The Grp A4 Synthesizer is an heavy synthesizer: place it on a suitable solid surface or table.
- The Grp A4 Synthesizer can be very LOUD: please, be careful with the big volume knob on the lower right of the front panel.

MAINTENANCE

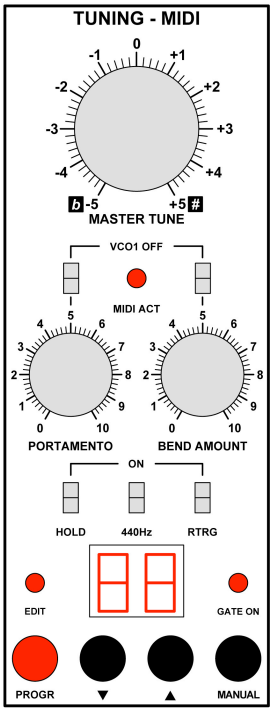
- Do not open the instrument; do not unscrew the front/rear panels. Inside the instrument, there aren't user's serviciable parts.

PROPER USE

- This synthesizer is designed exclusively to produce audio rate frequency signals for musical purpose. Any other use is prohibited and voids the warranty extended by Grp Synthesizer. Grp Synthesizer is non liable for damanges due to incorrect use.


Grp Synthesizer A4
TUNING - MIDI
MASTER TUNE
PORTAMENTO
BEND AMOUNT
VOLTAGE CONTROLLED OSCILLATOR 1
VOLTAGE CONTROLLED OSCILLATOR 2
VOLTAGE CONTROLLED OSCILLATOR 3
MIXER
EXT IN - ENV FOLL
SAMPLE & HOLD - NOISE
AUTO PAN
VC LOW FREQUENCY OSCILLATOR 1
LOW FREQUENCY OSCILLATOR 2
24 db LOW PASS FILTER
12 db STATE VARIABLE FILTER
VOLTAGE CONTROLLED FILTER
ENVELOPE GENERATOR 1
ENVELOPE GENERATOR 2
VOLTAGE CONTROLLED AMPLIFIER
STEREO MAIN
SEQUENCER 8 x 2
SEND MODULATION
CONNECTIONS

Grp A4
MAIN FUNCTIONS



MODULE TUNING – MIDI

This module manages numerous functions related to intonation of the synthesizer Grp A4, the configuration of MIDI parameters (through the two-digit display and menu PROGR), the audio reference signal generation for tuning.

MASTER TUNE CONTROl

Sets the overall pitch of the synthesizer Grp A4, within a range of min/max +/-5 semitones.
Due to the analog circuitry of the instrument before adjusting the tuning it is best to wait about ten minutes with power on, intil the instrument will reach a stable temperature.

VCO 1 PORTAMENTO ON/OFF SWITCH

Allows to release the VCO I from the action of PORTAMENTO applied to the voltage of the keyboard; in this way, it is possible to obtain a different reaction between VCO 1 and the remaining VCO 2, 3 (under control Portamento) during the execution of musical intervals on the keyboard.

VCO 1 BEND ON/OFF SWITCH

With this switch, you can prevent the VCO 1 from receiving the MIDI Pitch Bend control and, whe using VCO 1 as Master Hard Sync for VCO 2 and 3 as a slave, mantain the correct pitch, while the other two slave oscillators will produce interesting harmonic sweepts under bending.

PORTAMENTO CONTROL

Defines the portamento time applied to oscillators under control from analog ports or MIDI keyboard. You can disable the VCO 1 from portamento with the switch described above. The portamento time is between a minimum of 0 and a maximum of 3 sec.
Keep in mind that the PORTAMENTO control works only on the Keyboard CV from the analog CV IN 1V/Oct, and on MIDI codes Note On from MIDI IN. Pitches programmed in Step SEQUENCER 8 x 2 are under control from a pair of independent of Glide generators, GLIDE GLIDE A and B.

BEND AMOUNT CONTROL

Defines the maximum frequency interval allowed to pitch bend applied to all VCOs or, with the switch OFF VCO 1, only on VCO 2 and 3. The bend range is between a minimum of 0 and a maximum of one octave.

MIDI ACT(IVITY) LED
LED flashes when Grp A4 synthesizer receives MIDI codes on MIDI IN port.

HOLD SWITCH
Permits to artificially prolong the Gate On (if there is enough Sustain Level programmed in the two Envelope Generators). In this way, with appropriate programming of the envelopes, it is possible to "freeze" the playing the synthesizer Grp A4 for producing drones of indefinite duration.
Remember that, in the VC AMPLIFIER module, is it possible to put in Hold the amplifier with the switch CV VCA; with this control, unlike the previous, musician does not undertake the two envelope generators (which remains available as modulation sources), but it keeps always open the amplifier gain in order to simplify filtering for any external audio signals connected to the EXT AUDIO IN of the synthesizer.

440 Hz SWITCH
Triggers the generation of a square wave output at 440 Hz, as a useful reference for tuning.

RTRG SWITCH
Enables or removes multiple trigger from MIDI Note On received at the MIDI IN port on the rear panel of the synthesizer Grp A4 and used by the two Envelope Generators. The switch is not active on the gate voltages presented to an analog GATE IN 0/+5 V on the front panel.

EDIT LED
Lights when the unit enters PRGR EDIT mode to access and modify the parameters to display.

GATE ON LED
Lights up when the instrument receives a MIDI Note On code to the MIDI IN on the rear panel or to an analog voltage Gate GATE IN 0/+5V on the front panel, or –still- a Gate extracted from any external signals connected to the gate AUDIO EXTERNAL INPUT. Obviously, the LED also lights up when the player uses the MANUAL GATE button on the front panel.

DISPLAY
Displays the values associated with the parameters contained in the EDIT PROG mode.

MANUAL BUTTON
Manually generates the Gate needed for engage the two Envelope Generators; can be used to play the synthesizer Grp A4 (on a single note…) in the absence of external controllers and for verify the correct connections between instruments and amplification.

BOTTONE PROGR BUTTON
Sets the instrument in PROGR EDIT mode (see below).

INCREASE e DECREASE BUTTONS
For navigating between available display parameters and increase/decrease of their parameter values.

SUB MODULE MIDI INTERFACE

It allows access and modification of parameters relating to the operation of the MIDI interface built into the instrument. With the PROGRAM button you'll see/choose parameters in rotation (with the first digit of the display) and, with the two switches INCREASE (upward arrow) and DECREASE (arrow down), you select the desired value (second digit of the display) for the choosen parameter. The condition of EDIT is displayed via dedicated LED lights.

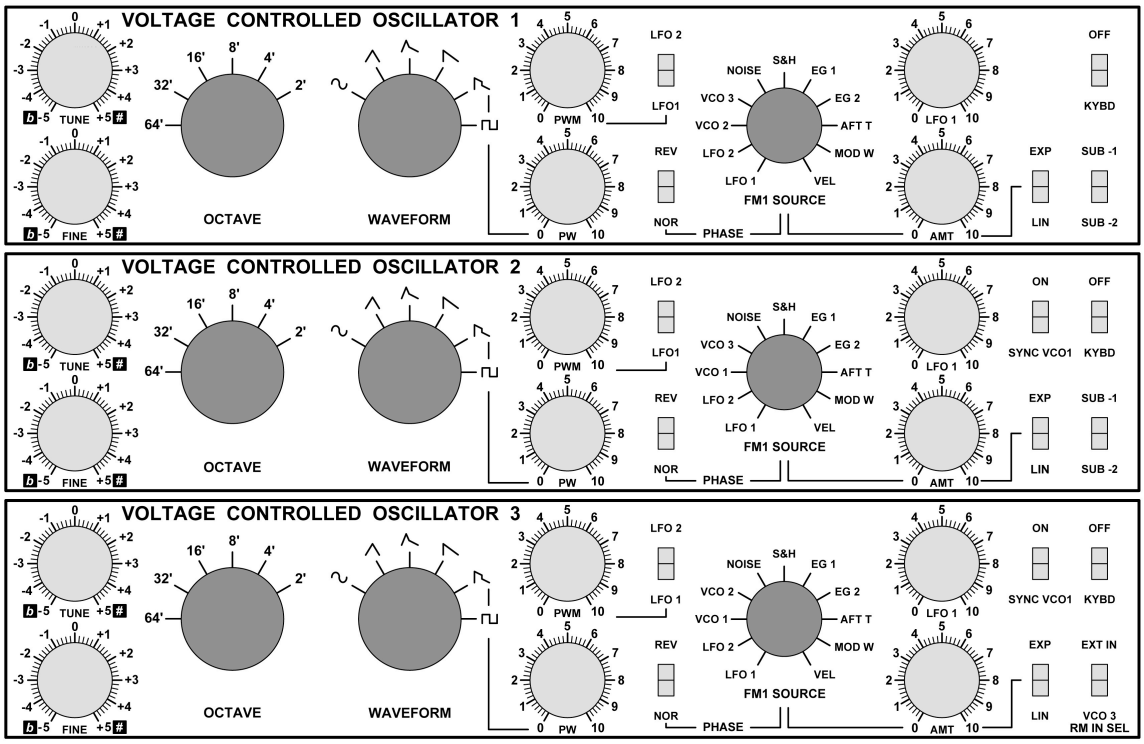
These parameters are available:

- Program 0. Values Off, 1 ... 1: defines *without entering the programming mode* the MIDI receiving channel. This is the only case in which the two digit display shows the value parameter. In the first position, value = Off, turns off the MIDI interface. In this condition, the synthesizer can be controlled only by voltage analog CV/Gate Step or from internal Sequencer.
- Program 1. Values 0 - 1 - 2 - 3 – 4; sets the octave offset value applies on instrument tuning *only* when the three oscillators are decoupled from the control keyboard, with switch KYBD ON/OFF. The display shows the reading 1.x (with x equal to the specified value). *When the keyboard is reconnected to the oscillators, the parameter has no value.*
- Program 2. Values 0 - 1 - 2 - 3 - 4 - 5; adjusts the octave offset value applied over the the three oscillators tuning *when the MIDI interface is set to OFF*. (In that condition, VCOs are only under control of analog voltages received at the input on the front panel).
- • Program 3. Values 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9; sets the dividing factor applied to the MIDI position of the SYNC selector in module VC LOW FREQUENCY OSCILLATOR 1.

These are the coefficients corresponding to the nine possible values on the display:

- 3.1 = the cycle of the LFO lasts 4/4 ie 96 ppq;
- 3.2 = the cycle of the LFO lasts 2/4 ie 48 ppq;
- 3.3 = the cycle of the LFO lasts 1/3 of 4/4 bar, ie 32 ppq;
- 3.4 = the cycle of the LFO lasts 1/4 ie 24 ppq;
- 3.5 = the cycle of the LFO lasts a 1/4 triplet, ie 16 ppq;
- 3.6 = the cycle of the LFO lasts 1/8 ie 12 ppq;
- 3.7 = the cycle of the LFO lasts a 1/8 triplet, ie 8 ppq
- 3.8 = the cycle of the LFO lasts 1/16 ie 6 ppq;
- 3.9 = the cycle of the LFO lasts 1/32 ie 23 ppq.

These coefficients are identical to those used in the Step Sequencer on the Clock Divider switch for positions lebeled in inverse.



VOLTAGE CONTROLLED OSCILLATOR 1, 2, & 3 MODULE

The three analog oscillators are the main source of the sound synthesizer Grp A4; their structure is almost identical, with small differences in the choice of modulation sources and functions. Each oscillator can choose from six different waveforms (with variable symmetry on square wave), can adjust the frequency in octaves, semitones and cents tone, has two busses dedicated to the modulation frequency (one switchable in Linear and Exponential FM, equipped with a reverse phase selectable). In addition, the first two VCO have a square wave suboscillator circuit at one or two octaves below; the VCO 2 and 3 may be placed in Hard Sync under control from VCO 1. All VCOs can be individually detached from keyboard voltage (CV analog or MIDI notes) and left at complete disposal of Step SEQUENCER 8 x 2 (it is possible, however, to transpose the sequence using the analog connections ROW A/A+B TRNP). Finally, in the adjacent module TUNING - MIDI, you can disable the receipt of Portamento (switch OFF VCO1 PORTAMENTO) and Pitch Bend (switch OFF VCO BEND 1) to differentiate between the harmonic oscillators under Hard Sync Master / Slave and their behavior frequency.
In addition, the frequency of the oscillators can be placed individually under control of the rows A, B, A + B of Step SEQUENCER 8 x 2, acting on the switches VCO SEQ ENABLE.

OCTAVE (VCO 1, 2 e 3) SELECTOR
Used to set the pitch of the oscillator on the desired octave values; available range from a minimum of 64 'and a maximum of 2'.

TUNE CONTROL (VCO 1, 2 e 3)
Defines the coarse deviation of pitch (against the nominal value for the entire instrument previously set with the MASTER TUNE TUNING inside the module TUNING - MIDI); parameter range is +/- 1 octave.

FINE CONTROL (VCO 1, 2 e 3)
Defines the fine deviation of pitch (against the nominal value for the entire instrument previously set with the MASTER TUNE TUNING inside the module TUNING - MIDI); parameter range is +/- 1 tone.

WAVEFORM CONTROL (VCO 1, 2 e 3)
Allows selection of the six available analog waveforms in the synthesizer Grp A4. The selection includes:

- *Sine wave*, composed of sole energy on fundamental harmonic, it is important to achieving pure tonal timbre, not very flashy, but suitable for reinforcing other waves.
- *Triangular wave*; composed of only odd harmonics, alternately in phase and in antiphase, with exponential energy decay. It is suitable for making soft sounds, with a strong presence on the fundamental and a minimum opening on trebles.
- *Triangular + Sawtooth wave*; is the sum of triangular and sawtooth, and is based on greater energy over the fundamental and good opening on odd and even harmonics.
- *Sawtooth wave*; composed of odd and even harmonics, with linear energy decay and alternately in phase and antiphase; is equipped with a are rich, full bodied sound particularly suitable for the realization of brass, strings and "synth" tones.
- *Square + sawtooth wave*; is the sum of the two waves and offers a significant reinforcement portion of the odd harmonics (from square wave). The square wave content is adjustable in symmetry with the PW command.
- *Square wave*; composed of only odd harmonics, alternately in phase and in antiphase with linear energy decay. It is suitable for the production of woody timbre, very different and complementary to those typical sawtooth wave. Its symmetry can be varied with the command PW, with a strong variation the harmonic content.

PW CONTROL (VCO 1, 2 e 3)
Allows you to adjust the symmetry of the square wave generated in the oscillator, to reach all possible variations of wave and rectangular pulse. The harmonic content of the waveform will vary in a manner connected to the relation of symmetry with the control set: in the resulting sound, all of the harmonics whose number is a multiple of the ratio obtained will be missing; in this way, a rectangular wave to 30% will contain only harmonics 1, 2, 4, 5, 7, 8, 10, 11, 13, 14 ...

PWM CONTROL (VCO 1, 2 e 3)
It sets the amount of the modulating signal received into the oscillator for automate the symmetry variation of Pulse Width. The Pulse Width Modulation, when entrusted to a cyclical source control, produces a regular sequence of narrowing and widening symmetry, giving the resulting audio signal a characteristic timbre that recalls - even

with a single sound source - the presence of multiple oscillators not perfectly frequency matched to each other.

LFO 1/LFO 2 SWITCH (VCO 1, 2 e 3)
It allows the choice between two modulation sources provided for the Pulse Width Modulation. Although, apparently, the availability seems limited to VC LOW FREQUENCY OSCILLATOR 1 and LOW FREQUENCY OSCILLATOR 2, you can use for the pulse width control *all sources connected at* the WAVEFORM selector in LFO 2, thus ensuring access at PWM for transient signals coming from different parts of the synthesizer Grp A4 or from external world.

In addition to the sources listed, you can directly use the values programmed in Row A, B and A+B of Step SEQUENCER 8 x 2 using the three switches PWM ENABLE SEQ.

FM 1 SOURCE SELECTOR (VCO 1, 2 e 3)
For choose the source applied to the first buss for the frequency modulation. The eleven possible sources available on each selector varies slightly from oscillator to oscillator. Here is a list of all the sources available:

- LFO 1 (VCO 1, 2 and 3); signal from VC LOW FREQUENCY OSCILLATOR 1 choosed after its WAVEFORM selector.
- LFO 2 (VCO 1, 2 and 3); one of the signals on WAVEFORM selector in the LOW FREQUENCY OSCILLATOR 2 module. Keep in mind that with this selector, you can use either triangle and square wave, or audio signals from VCO 1, 2, 3 e Noise White/Pink and, still, the transient controls from EG 1, 2 e S&H, and still EXT IN signal. All these sources can be used proficiently for driving the VCOs frequencies.
- VCO 1 (VCO 2 and 3); the audio signal from VCO 1 for driving VCO 2 and 3.
- VCO 2 (VCO 1 and 3); the audio signal from VCO 2 for driving VCO 1 and 3.
- VCO 3 (VCO 1 and 2); the audio signal from VCO 3 for driving VCO 1 and 3.
- NOISE (VCO 1, 2 and 3); is the aperiodic audio signal from Noise Generator, after the switch PINK/WHITE into the module SAMPLE & HOLD – NOISE.
- S&H (VCO 1, 2 and 3); signal from module SAMPLE & HOLD – NOISE.
- EG 1 (VCO 1, 2 and 3); the envelope curve from ENVELOPE GENERATOR 1 sub module, located into VOLTAGE CONTROLLED FILTER.
- EG 2 (VCO 1, 2 and 3); the envelope curve from ENVELOPE GENERATOR 2 sub module, located into VC AMPLIFIER.
- AFT T (VCO 1, 2 and 3); the Channel Aftertouch control received at MIDI IN.
- MOD W (VCO 1, 2 and 3); the Modulation Wheel control received at MIDI IN.
- VEL (VCO 1, 2 and 3); the Key Velocity value read at MIDI IN.

FM 1 AMT CONTROL (VCO 1, 2 e 3)
Defines the amount of the modulating signal, choosed with the selector described above, and applied to the control of the oscillator frequency.

FM 1 EXP/LIN SWITCH (VCO 1, 2 e 3)
Allows you to choose the linear or exponential modulation applied at the oscillator frequency. If the oscillator is under linear FM from another oscillator at audio rate, it will be possible to change the harmonic content the oscillator without losing the melodic quality. With exponential FM at audio rate, you'll loose the nominal pitch, but it will easier to get behaviors harmonically fairly complex.

FM 1 PHASE REV/NOR SWITCH (VCO 1, 2 e 3)
Allows the phase inversion for the modulating signal choosed with the selector switch SOURCE FM I and applied to the oscillator frequency.

FM 2 LFO 1 CONTROL(VCO 1, 2 e 3)
Chooses the amount of signal received by the module VC LOW FREQUENCY OSCILLATOR 1 and applied, on the dedicated bus, at the modulation frequency of the oscillator.

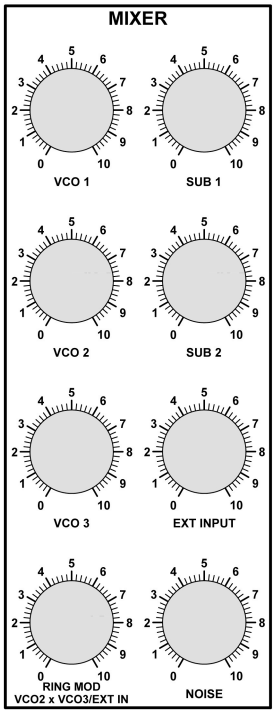
KYBD/OFF SWITCH (VCO 1, 2 e 3)
Allows you to detach the Keyboard Control Voltage (both in its analog format, the received at input connection IN 1V/Oct CV, and in its digital form, received at the MIDI IN port) from the frequency control of the oscillator. If the switch is off, you'll can control the pitch of the oscillator only through the programmed values in Step SEQUENCER 8 x 2.
On the oscillator with the OFF Keyboard, you can still apply a pitch offset with the software menu options available into PROGR menu on the display (in the module TUNING - MIDI).

SUB 1/SUB 2 SWITCH (VCO 1 e 2)
Allows you to choose the square wave sub oscillation produced at lowest octaves by frequency dividing the audio signal; the sub oscillator frequency will be equal to -1 octave (SUB 1) or -2 octaves (SUB 2). The level of the sub oscillator signals can be adjusted individually in the MIXER module (see below).

SYNC VCO 1 SWITCH (VCO 2 e 3)
Puts individually the VCO 2 and 3 under Hard Sync control from VCO 1, which acts as the Master. Remember that, in the TUNING - MIDI module, you can detach VCO 1 from receiving the Pitch Bend and Portamento, allowing interesting differences in behavior between VCO I (Master) and VCO 2, 3 (Slave) under external modulation.

RM IN SEL SWITCH (VCO 3)
Although it is housed into the VOLTAGE CONTROLLED OSCILLATOR 3 module, this switch is about the the Ring Modulator circuit. It makes possible to choose whether, within the Ring Mod, the signal produced by the VCO 2 will be processed along with that generated by the VOLTAGE CONTROLLED OSCILLATOR 3 (switch in position VCO 3)

or the external one, coming from other equipments connected to the port IN AUDIO EXT (switch to EXT IN).



MIXER MODULE

Drives the relationship between the volume of different sound sources provided in the synthesizer Grp A4 and sent to the next VOLTAGE CONTROLLED FILTER section.

VCO 1 CONTROL
The volume control for VOLTAGE CONTROLLED OSCILLATOR 1 signal.

SUB 1 CONTROL
The volume control for suboscillator signal in VCO 1.

VCO 2 CONTROL
The volume control for VOLTAGE CONTROLLED OSCILLATOR 2 signal.

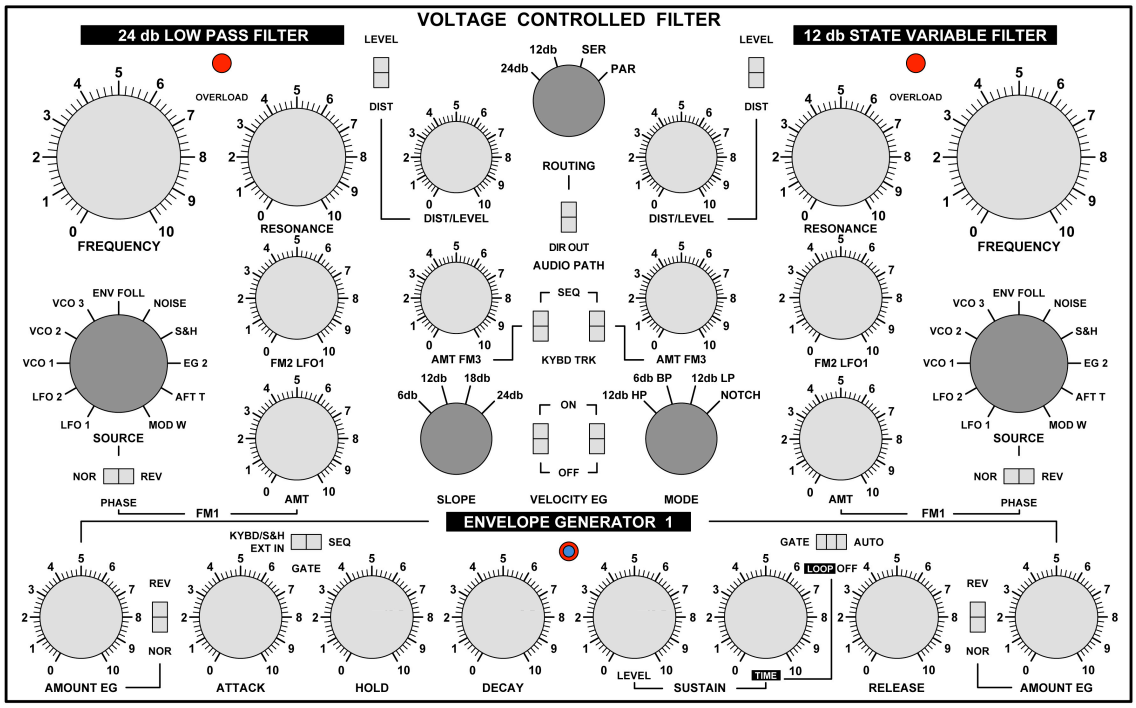
SUB 2 CONTROl
The volume control for suboscillator signal in VCO 2.

VCO 3 CONTROL
The volume control for VOLTAGE CONTROLLED OSCILLATOR 3 signal.

EXT INPUT CONTROL
The volume control for signal connected at AUDIO EXT IN port.

RING MOD VCO2 x VCO3/EXT IN CONTROL
Drives the amount of output signal from the Ring Modulator. Depending on the position of RM IN SEL (including into the VOLTAGE CONTROLLED OSCILLATOR 3 module), the circuit can process the signal from the VCO 3 or the one connected to the EXT AUDIO IN port, combining them with the signal of the VCO 2.

NOISE CONTROL
The volume control from Noise Generator available in the SAMPLE & HOLD – NOISE module.



VOLTAGE CONTROLLED FILTER MODULE

The Voltage Controlled Filter module contains two independent filters 24 dB LOW PASS and 12 dB STATE VARIABLE; the two structures can be used independently managing the audio path with the ROUTING switch or taking the filtered signal in DIR OUT mode with switch AUDIO PATH. In addition to filtering controls, you can adjust the output level for each filter section with the control DIST/LEVEL or, with the switch LEVEL/DIST, using the same control for gradually distort the output signal from the filters.
Each filter is equipped with a bus dedicated to Envelope Generator 1, plus three other independent buss for the frequency modulation and a port for external analog control voltages; the first FM bus is equipped with switches for the choice of the mod source, for reversing polarity and an adjustable Amount control; the second buss, dedicated to the management of the control signal developed by VC LFO 1, has only the Amount control; the third bus can receive either the modulation from Step SEQUENCER 8 x 2 or Keyboard Tracking and is equipped with dedicated Amount control.
VOLTAGE CONTROLLED FILTER section contains sub-module ENVELOPE GENERATOR 1.

ROUTING SELECTOR
Defines the behavior of the filter section. It is possible to work in the following modes:

- 24 dB; only with transistor ladder 24 dB/Oct filter.
- 12 dB; only the state variable filter 12 dB/Oct.

- SER; both filters *in series*; signal goes first into low pass and then in the state variable.
- PAR; both filters *in parallel*; signal goes simultaneously at both filters. User can balance the output levels from two filters with controls DIST/LEVEL (if switch is in LEVEL position).

AUDIO PATH SWITCH
Allows you to choose the signal path from the two filters Low Pass 24 dB and 12 dB State Variable against hardware stereo outputs.

- ROUTING position; signals from filter 24 dB Low Pass and 12 dB State Variable are treated separately, in series or parallel (it depends on position of ROUTING selector). I.e., outputs from filters in parallel goes *at the center* of the stereo image.
- DIR OUT position; signals from filters are directly routed at the outputs: Left connector for 24 dB Low Pass; Right connettor for 12 dB State Variable.

SUB MODULE 24 dB LOW PASS FILTER

Has the classical behavior of low-pass filtering transistor ladder, with progressive attenuation of the audio signal in correspondence with the increase of resonance and can be adjusted to work at slope to 1, 2, 3 or 4 poles. The filtered signal can be saturated with the dedicated distortion circuit. A red OVERLOAD LED flashes when the signal input to the filter begins to saturate and stays on when the signal has reached a significant level of distortion.

FREQUENCY CONTROL
The filter's cutoff frequency.

RESONANCE CONTROL
The filter resonance.

SLOPE SELECTOR
Defines the filter slope: you can pick up the signal at the output of the first RC cell (1 pole, -6 dB), the second (2-pole, 12 dB), the third (3-pole, 18 dB) or the entire four cells sequence (4-pole, 24 dB).

FM 1 SOURCE SELECTOR
Allows you to choose the modulation source to occupy one of the first bus FM applied to the Cutoff Frequency. You can choose between:

- LFO 1; the signal produced by the VC LOW FREQUENCY OSCILLATOR 1, taken *after* the SHAPING circuit; if the frequency of the VC LFO 1 is in sub-audio range, the modulation will produce a *wah* with a profile corresponding to the waveform used in the VC LFO 1; if the LFO 1 frequency reaches the audio band, the circuit will work in real frequency modulation, with the generation of sidebands.

- LFO 2; the cyclical modulation signal produced by the LOW FREQUENCY OSCILLATOR 2 or, as option, a signal connected to its WAVEFORM selector; obviously, the considerations stated above for of the sub-audio/audio rate modulation are still valid.
- VCO 1; audio signal from VOLTAGE CONTROLLED OSCILLATOR 1.
- VCO 2; audio signal from VOLTAGE CONTROLLED OSCILLATOR 2.
- VCO 3; audio signal from VOLTAGE CONTROLLED OSCILLATOR 3; in this, as in the other two cases, the modulation may take behavior of wah/tremolo (if the VCO is set at sub audio rate) or real FM, with generation of sidebands (if the modulating VCO goes at audio rate).
- ENV FOLL; the control extracted from signal connected at EXT IN – ENV FOLL.
- NOISE; audio signal from NOISE GENERATOR; modulation from NOISE adds a tipical turbulence on cutoff frequency.
- S&H; control signal produced by Sample & Hold.
- EG2; control signal from ENVELOPE GENERATOR 2 sub module, enclosed in VC AMPLIFIER.
- AFT T; control signal from Channel Aftertouch received at MIDI IN or, the control voltage received at front panel input CV IN VCA/AFT T.
- MOD W; control signal from Modulation Wheel received at MIDI IN port.

FM 1 PHASE SWITCH
Allows the phase inversion for the modulation source choosed with SOURCE CV selector (see above); positions NOR and REV means normal and inverted behaviour.

FM 1 AMT CONTROL
Opens the amount of FM1 modulation source on cutoff frequency.

FM2 LFO1 CONTROL
The amount of VC LOW FREQUENCY OSCILLATOR 1 over cutoff frequency.

FM3 AMT FM3 CONTROL
The amount of control signal choosed with SEQ/KYBD TRK switch (see below) over cutoff frequency.

FM3 SEQ/KYBD TRK SWITCH
This switch has two position for two sources on FM3 modulation bus:

- In SEQ position, the control signal coming from Step SEQUENCER 8 x 2 (routed thru switches FLT SEQ ENABLE) goes to cutoff frequency.
- In KYBD TRK position, the Keyboard Tracking from MIDI codes or from analog CV at KYBD CV IN 1V/Oct input goes to cutoff frequency.

INTERRUTTORE DIST/LEVEL SWITCH
For turning on the distortion on filtered signal (position DIST) or, for audio level control on filter out (position LEVEL); with the level control, it s possible to balance, especially in parallel mode, the relative levels from Low Pass and State Variable filters.

DIST/LEVEL CONTROL
Sets the distorion amount (position DIST, see above) or the output level for the filtered signal (position LEVEL, see above).

12 dB STATE VARIABLE FILTER SUB MODULE

For the classic 12 dB/Oct filtering, alternative to transistor ladder filtering; the State Variable Filter simultaneously produces three modes low, band, high pass; also, it produces band reject adding low and high filtering. State Variable Filter 12 dB/Oct has ha *wild* sound and doesn't attenuate the input signale even with a lot of resonance. A red LED for OVERLOAD blinks when the signal at the filter input begins to overdrive and stays on when the signal reach severe distortion.

FREQUENCY CONTROL
As for 24 dB Low Pass Filter.

RESONANCE CONTROL
As for 24 dB Low Pass Filter.

MODE SELECTOR
Chooses the behavior for 12 dB/Oct filter:

- 12 dB HP; two pole high pass filtering.
- 6 dB BP; one pole band pass filtering.
- 12 dB LP; two pole low pass filtering.
- NOTCH; one pole band reject filtering.

FM 1 SOURCE SELECTOR
As for 24 dB Low Pass Filter.

FM 1 PHASE SWITCH
As for 24 dB Low Pass Filter.

FM 1 AMT CONTROL
As for 24 dB Low Pass Filter.

FM2 LFO1 CONTROL
As for 24 dB Low Pass Filter.

FM3 AMT CONTROL
As for 24 dB Low Pass Filter.

FM3 SEQ/KYBD TRK SWITCH
As for 24 dB Low Pass Filter.

DIST/LEVEL SWITCH
As for 24 dB Low Pass Filter.

DIST/LEVEL CONTROL
As for 24 dB Low Pass Filter.

ENVELOPE GENERATOR 1 SUB MODULE

The ENVELOPE GENERATOR 1 module controls both filters with separate amount on Low Pass and State Variable units. The envelope is Attack-Hold-Decay-Sustain-Release and offers powerful looping functions (conditioned/unconditioned) for the auto repetition. In Loop mode, there is an additional Sustain Time parameter. The envelope generator can be started with MIDI note on at MIDI In, or with analog Gate at Gate In 0/+5V port, or with Clock generator available into the SAMPLE & HOLD module. Still, you can fire the ENVELOPE GENERATOR 1 with Step SEQUENCER 8 x 2. A dual-color LED blinks at the envelope firing: *red* color is for envelope control under keyboard/S&H, *blue* color is for sequencer control. If, in TUNING – MIDI module, the musician turns on the RTRG ON switch, the envelope circuit will responds to Retrigger condition for Note On messages received at MIDI IN port. The envelope amount and its polarity (normal/inverted) are separately controllable with a couple of AMOUNT EG pots and switches for the two filters.

GATE SWITCH
The EG 1 module can be started from two sources available at GATE switch:

- KYBD/S&H EXT IN: envelope generator EG 1 can be started *either* (OR condition) from an external analog keyboard connected at KYBD GATE IN 0/+5V, *or* from a MIDI controller connected at the MIDI IN port on the rear panel, *or* from Clock generator available into SAMPLE & HOLD – NOISE module (only if the CLOCK EG switch is not in OFF position), *or* from Gate extracted from audio signal connected at AUDIO EXT IN port by comparison with threshold level set with GATE TRESHOLD control in module EXT IN – ENV FOLL.
- SEQ: envelope generatore EG 1 is under control of Step SEQUENCER 8 x 2.

EG 1: TIME AND LEVEL CONTROLS
The Envelope Generator EG 1 controls include:

- ATTACK: sets the Attack time needed for reach (at Gate On) the maximum level available; time range is min/max 1 msec/20 sec.
- HOLD: sets the Hold time, for staying at maximum level before start Decay segment. A little bit of Hold time permits to obtain well known *clipped* envelope behavior of historical analog synths.
- DECAY: sets the Decay time for traveling from maximum level to programmed Sustain level (see below). Maximum Decay time is 20 seconds.
- SUSTAIN LEVEL: sets the value for energy segment of the envelope; as rule of thumb, Sustain level lasts till Gate Off occurs, but if the LOOP switch (see below) is *not* in OFF position, is it possible to define the duration of Sustain with the control SUSTAIN TIME (see below).
- SUSTAIN TIME: sets the duration for Sustain segment when EG 1 is in LOOP condition. Sustain time min/max is 1msec/20 sec.

- RELEASE TIME: sets the time needed for traveling, at Gate Off, from Sustain level to minimum (zero) level; maximum duration is 20 seconds.

LOOP SWITCH
According on the swich LOOP, envelope EG 1 acts like a standard ADSR envelope or repeats endlessly its cycle (keep in mind that SUSTAIN TIME control works only when LOOP is on). On LOOP switch, the three available positions are for:

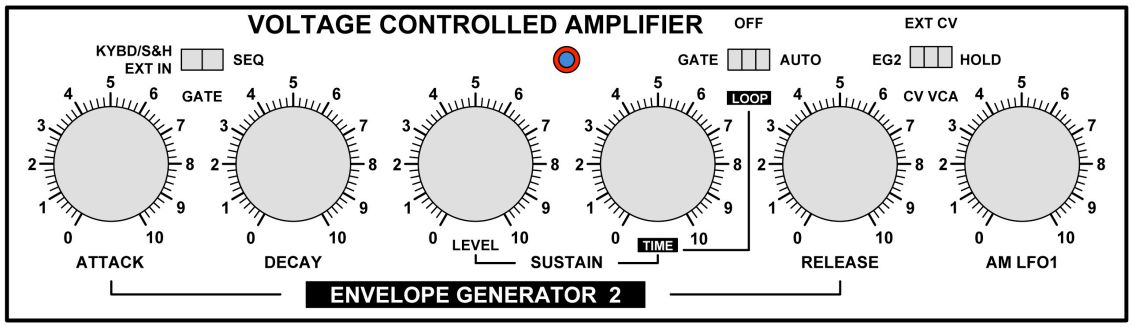
- GATE: envelope EG 1 repeats in loop its curve *as long as* musician holds Gate On (MIDI or analog) with keyboard: as soon as musician turns off leaves the key, loop repetition stops and EG 1 begins the Release segment.
- OFF: Loop mode is disabled and EG 1 acts in standard one-shot ADSR mode
- AUTO: loop repetitions for EG 1 are free from Gate condition and lasts *ad infinitum*.

AMOUNT EG 24 dB LOW PASS FILTER CONTROL
Sets the amount of ENVELOPE GENERATOR 1 on cutoff frequency of Low Pass filter. The curve polarity for envelope can be set with REV/NOR switch (see below).

REV/NOR 24 dB LOW PASS FILTER SWITCH
Sets polarity NOR(mal) – not inverted – or REV(erse) – inverted – for envelope applied to 24 dB LOW PASS FILTER cutoff.

AMOUNT EG 12 dB STATE VARIABLE FILTER CONTROL
Sets the ENVELOPE GENERATOR 1 amount for State Variable filter cutoff. Envelope polarity can be choosed with REV/NOR switch (see below).

REV/NOR 12 dB STATE VARIABLE FILTER SWITCH
Sets polarity NOR(mal) – not inverted – or REV(erse) – inverted – for envelope applied to 24 dB LOW PASS FILTER cutoff.



VC AMPLIFIER MODULE

VC AMPLIFIER module sets the audio signal articulation in time domain; it includes a dedicated envelope generator and can be amplitude modulated with VC LOW FREQUENCY OSCILLATOR 1. Audio signal from amplifier can be volume controlled with an analog CV between 0 and +5V at analog port CV IN VCA/AFT on the front panel.

CV VCA SWITCH
This three position switch sets the control source for VCA; you can choose:

- HOLD: VC AMPLIFIER is constantly on, regardless of dedicated envelope generator; this is useful when you want to treat an external audio signal with A4 filters, or for make some Drone Music. Don't forget that, in the TUNING – MIDI module there is an HOLD switch for *freeze* the Gate On (thus, prolonging indefinitely the Sustain level). So, you can work with amplifier always *open*, with or without loop repetitions
- EG 2: is the normal behavior of A4 Synthesizer; VC AMPLIFIER is under ENVELOPE GENERATOR 2 control.
- EXT CV: VC AMPLIFIER is under analog CV control (from 0 to +5V) at CV IN VCA/AFT port. In this position, EG 2 no longer controls amplifier

Note: The external analog CV at CV IN VCA/AFT is evaluated in both switch positions HOLD and EG 2. When working with both external CV *and* EG 2, is easy to "overcontrol VCA", driving amplifier into distortion. Keep in mind…

Note: Port CV IN VCA/AFT is (with stereo phones out) the only TRS connector on the A4 Synthesizer; its terminal correspond to:

- CV IN VCA/AFT Tip = CV control for VCA;
- CV IN VCA/AFT Ring = CV control for *all* Aftertouch destinations.

AM LFO 1 CONTROL
Sets the modulation amount from VC LFO 1 on VC AMPLIFIER gain. If VC LFO 1 works in sub audio range, you'll obtain the standard tremolo (with shape corresponding on choosen VC LFO 1waveform); if VC LFO 1 works in audio range, you'll obtain full Amplitude Modulation, with new *sidebands* in the final output.

ENVELOPE GENERATOR 2 SUB MODULE

Controls VC AMPLIFIER; the envelope can work as standard one-shot four stage ADSR or can loop repeat the whole curve. A bicolor LED displays the behavior of envelope: *red* color is for envelope driven by keyboard, Sample & Hold, External In; *blue* color is for envelope driven by Step SEQUENCER 8 x2. If, in TUNING - MIDI module, musician turns on the RTRG ON switch, the envelope will evaluate the Retrigger condition received at MIDI IN port.

GATE SWITCH

EG 2 can be fired from two different sources:

- KYBD/S&H EXT IN envelope generator EG 1 can be started *either* (OR condition) from an external analog keyboard connected at KYBD GATE IN 0/+5V, *or* from a MIDI controller connected at the MIDI IN port on the rear panel, *or* from Clock generator available into SAMPLE & HOLD – NOISE module (only if the CLOCK EG switch is not in OFF position), *or* from Gate extracted from audio signal connected at AUDIO EXT IN port by comparison with threshold level set with GATE TRESHOLD control in module EXT IN – ENV FOLL.
- SEQ: envelope generatore EG 2 is under control of Step SEQUENCER 8 x 2.

EG 2: TIME AND LEVEL CONTROLS

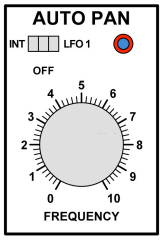
Envelope Generator EG 2 controls are:

- ATTACK: sets the Attack time needed for reach (at Gate On) the maximum level available; time range is min/max 1 msec/20 sec
- DECAY: sets the Decay time for traveling from maximum level to programmed Sustain level (see below). Maximum Decay time is 20 seconds.
- SUSTAIN LEVEL: sets the value for energy segment of the envelope; as rule of thumb, Sustain level lasts till Gate Off occurs, but if the LOOP switch (see below) is *not* in OFF position, is it possible to define the duration of Sustain with the control SUSTAIN TIME (see below).
- SUSTAIN TIME: sets the duration for Sustain segment when EG 1 is in LOOP condition. Sustain time min/max is 1msec/20 sec.
- RELEASE TIME: sets the time needed for traveling, at Gate Off, from Sustain level to minimum (zero) level; maximum duration is 20 seconds.

INTERRUTTORE LOOP

According on the swich LOOP, envelope EG 2 acts like a standard ADSR envelope or repeats endlessly its cycle (keep in mind that SUSTAIN TIME control works only when LOOP is on). On LOOP switch, the three available positions are for:

- GATE: envelope EG 2 repeats in loop its curve *as long as* musician holds Gate On (MIDI or analog) with keyboard: as soon as musician turns off leaves the key, loop repetition stops and EG 1 begins the Release segment.
- OFF: Loop mode is disabled and EG 2 acts in standard one-shot ADSR mode
- AUTO: loop repetitions for EG 2 are free from Gate condition and lasts *ad infinitum*.



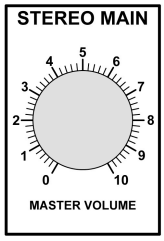
MODULO AUTO PAN MODULE

AUTO PAN section automates the pan position of the stereo signal Left-Right; besides the dedicated LFO, you can modulate the pan position with VC LFO 1. A bicolor LED turns on when the pan modulation is on; *red* color is for pan position under LFO INT control; *blue* control is for pan position under VC LFO 1 control.

SOURCE SELECT SWITCH
The three position switch chooses the pan modulation behavior/source:

- INT: Pan modulated with internal LFO.
- OFF: Pan modulation is off.
    - If, in VOLTAGE CONTROLLED FILTER, the ROUTING switch is in DIRECT OUT position, signal outputted from filters are routed to Left/24 dB and Right/12 dB
    - If ROUTING switch is in the up position, signals from both filters – with respect to serial/parallel mode – will be available *at the center* of stereo pan.
- LFO 1: Pan modulation is under VC LFO 1, with all capabilities of speed/rate, waveform, CV modulation and sync.

FREQUENCY CONTROL
FREQUENCY control works on Pan modulation rate; the dedicated triangle wave goes up to 200 Hz

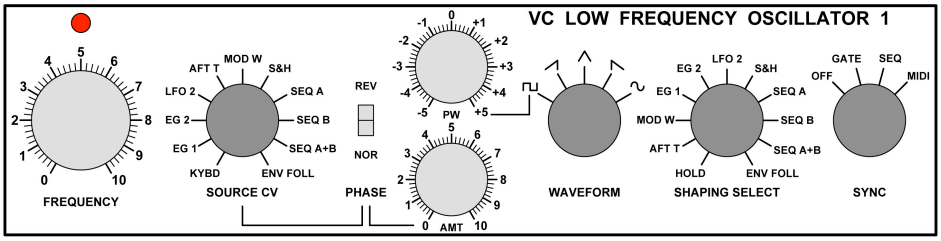


STEREO MAIN MODULE

MASTER VOLUME CONTROL

MASTER VOLUME control sets the output level from Grp A4 Synthesizer on analog out MAIN: LEFT/24 dB e RIGHT/12 dB MONO.

If needed, it is possible to drive the out level of the synthesizer with an external CV (from 0 to +5V) applied at CV IN VCA/AFT port, or with a MIDI Expression Pedal control.



VC LOW FREQUENCY OSCILLATOR 1 MODULE

Produces cyclical modulations with adjustable frequency (either from other synthesizer's modules), simmetry/duty cycle, shaping and syncable with other events either from synthesizer or frome external devices. A red LED blinks at VC LFO 1 rate.

FREQUENCY CONTROL
Sets the VC LFO 1 rate; the red LED displays the rate.

SOURCE CV SELECTOR
For choose the modulation source on VC LFO 1 rate; selected modulating signal can be set in polarity (normal/inverted) or amplitude scaled (AMT). Control sources available are:

- KYBD: keyboard control voltage (analog CV at KYBD CV IN 1V/Oct port or from MIDI messages at MIDI IN port).
- EG 1: control from Envelope Generator ENVELOPE GENERATOR 1 located into module VOLTAGE CONTROLLED FILTER.
- EG 2: control from ENVELOPE GENERATOR 2 located into module VC AMPLIFIER:
- LFO 2: control signal from LOW FREQUENCY OSCILLATOR 2.
- AFT T: control Channel Aftertouch at MIDI IN port.
- MOD W: control Modulation Wheel at MIDI IN port.
- S&H: control from SAMPLE & HOLD – NOISE module.
- SEQ A: row A out from SEQUENCER in 8 x2 mode.
- SEQ B: row B out from SEQUENCER in 8 x2 mode.
- SEQ A+B: rows A & B from Step SEQUENCER in 16 x 1 mode.
- ENV FOLL: control signal from module EXT IN – ENV FOLL, obtained from external signal's amplitude at port AUDIO EXT IN.

PHASE SWITCH
For phase inversion of the choosen SOURCE CV; positions NOR e INV are – you bet – for normal and inverted phase.

AMT CONTROL
The amount of modulation control applied to VC LFO 1 frequency.

WAVEFORM SELECTOR
Selection of the waveform from VC LFO 1.

- SINE, well suited for vibrato; smooth and round.
- SAWTOOTH, for rhythmic effects on cutoff frequency or VCA gain.
- TRIANGLE, wel suited for vibrato.
- RAMP (ascending), for rhythmic effects on VCF and VCA.
- SQUARE, suited for trills (-5/+5) with FM on VCO or tremolo on VCF and VCA.

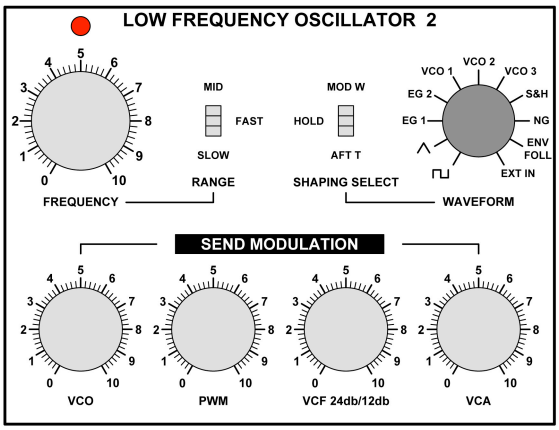
CONTROLLO PW CONTROL
Simmetry/duty cycle on square wave from VC LFO 1.

SHAPING SELECT SWITCH
For choose the modulation source which shapes the VC LFO 1 output. Available shaping sources are:

- HOLD, no SHAPING effect, VC LFO 1 always outputted at full strenght.
- AFT T, Channel Aftertouch (at port MIDI IN) shapes VC LFO 1.
- MOD W, same as above, but with Modulation Wheel.
- EG 1, control signal from ENVELOPE GENERATOR 1 (into the VOLTAGE CONTROLLED FILTER).
- EG 2, control signal from ENVELOPE GENERATOR 2 (into the VC AMPLIFIER).
- LFO 2, control signal from LOW FREQUENCY OSCILLATOR 2.
- S&H, control signal from SAMPLE & HOLD - NOISE.
- SEQ A, row A output from Step SEQUENCER in 8 x2 mode.
- SEQ B, row B output from Step SEQUENCER in 8 x2 mode.
- SEQ A+B, rows A & B from Step SEQUENCER in 16 x 1 mode.
- ENV FOLL, control signal from module EXT IN – ENV FOLL, obtained from external signal's amplitude at port AUDIO EXT IN.

SYNC SELECTOR
Waveform from VC LFO 1 can be synched on three different control sources:

- OFF, no sync for VC LFO 1.
- GATE, every Gate On (either on analog input GATE IN 0/+5V, or at MIDI IN rear panel), resets VC LFO 1 cycle.
- SEQ, VC LFO 1 cycle is synched with step advance.
- MIDI, VC LFO 1 cycle is synched with MIDI Clock; in module TUNING – MIDI, you can choose same Clock dividing factors available for Step SEQUENCER, ovvero: /1, /2, /3, /4, /6, /8, /12, /16, /32.



LOW FREQUENCY OSCILLATOR 2 MODULE

Two tasks for this module: generation o cyclcical modulation (triangle and square wave) and routing for several audio/control signal toward four destinations available at SEND MODULATION section. A red LED shows modulation rate.

FREQUENCY CONTROL

Sets modulation rate according at RANGE selected (see below).

RANGE SWITCH

For choosing one of three frequency range – slow, mid – fast – available at FREQUENCY CONTROL. Ranges are:

- SLOW: sub audio rate, for slow and extra slow modulations;
- MID: sub audio *and* audio rate, for plain modulations as vibrato, tremolo, etc; FAST: fully in audio rate, for work in FM e AM with a lot of sidebands.

SHAPING SELECT SWITCH

Sets the control signal for multiply/shape the modulation from LOW FREQUENCY OSCILLATOR 2; shaping sources available are:

- MOD W: modulation wheel position scales signals emitted from LOW FREQUENCY OSCILLATOR 2.
- HOLD: modulation from LOW FREQUENCY OSCILLATOR 2 is always on, it can be scaled with the four controls of SEND MODULATION (see below).
- AFT T: modulation from LOW FREQUENCY OSCILLATOR 2 is multiplied/scaled with Channel Aftertouch.

As you can imagine, this control works only on triangle and square waveform generated *from* LOW FREQUENCY OSCILLATOR 2, but is inactive on the other routed control signals.

SELETTORE WAVEFORM SELECTOR

For chosing modulating waveform/signals produced in LOW FREQUENCY OSCILLATOR 2 *or* routed from other A4's modules. You can work with cyclical behavior in audio/sub audio range *and* signals/control signals from VCOs, Noise Generator, Sample & Hold,

External Input. Still, you can double modulation strenght for EG 1 and EG 2 signals *redirecting* on the four destination (VCO Freq, PWM, VCF Freq and VCA Gain).

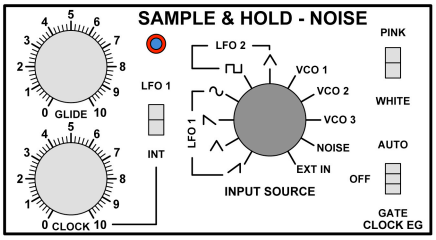
Here's the available modulation sources:

- SQUARE Wave: square wave produced in LOW FREQUENCY OSCILLATOR 2. (0/+5)
- TRIANGLE Wave: triangle wave produced in LOW FREQUENCY OSCILLATOR 2.
- EG 1: envelope signal from ENVELOPE GENERATOR 1.
- EG 2: envelope signal from ENVELOPE GENERATOR 2.
- VCO 1: audio signal from VOLTAGE CONTROLLED OSCILLATOR 1.
- VCO 2: audio signal from VOLTAGE CONTROLLED OSCILLATOR 2.
- VCO 3: audio signal from VOLTAGE CONTROLLED OSCILLATOR 3.
- S&H: il control signal from SAMPLE & HOLD – NOISE.
- NG: audio signal from Noise Generator available in module SAMPLE & HOLD – NOISE.
- ENV FOLL: audio signal at port AUDIO EXT IN, converted in control signal.
- EXT IN: the original audio signal (not converted in control signal) at port AUDIO EXT IN.

SEND MODULATION CONTROLS

For modulation sends for signals routed in LOW FREQUENCY OSCILLATOR 2 and choosed with WAVEFORM selector. Available destinations are:

- VCO: frequency of three Voltage Controlled Oscillators.
- PWM: simmetry/duty cycle of square waves in three VCOs; modulation works either on pure square wave and on square + saw mixture.
- VCF 24dB/12dB: cutoff frequency on both filters Low Pass e State Variable.
- VCA: gain of Voltage Controlled Amplifier.



SAMPLE & HOLD – NOISE MODULE

Noise generation (with Pink or White color available) and Sample & Hold treatment for user's selected source; sampling rate is freely adjustable with internal Clock or VC LOW FREQUENCY OSCILLATOR 1. A dual color LED blinks at sample rate: *red* color is for internal Clock, *blue* color is for VC LOW FREQUENCY OSCILLATOR 1 rate.
Sampled signal is converted in control and can be smoothed with Glide.
The internal Clock generator can be used for trigger both Envelope Generators, either in free mode or *AND*ed with Keyboard Gate (see below).

PINK – WHITE SWITCH
For choosing the Noise color available at MIXER. Colors available are:

- WHITE, equal energy for fixed bandwidth, hissing quality.
- PINK, white noise low pass filtered at -3dB/Oct; equal energy per octave.

INPUT SOURCE SELECTOR
For choosing the signal (audio or control) to be sampled. You can choose:

- LFO 1 RAMP, ramp wave from VC LOW FREQUENCY OSCILLATOR1.
- LFO 1 TRIANGLE, triangle wave from VC LOW FREQUENCY OSCILLATOR 1.
- LFO 1 SAWTOOTH, saw wave from VC LOW FREQUENCY OSCILLATOR 1.
- LFO 1 SINE, sine wave from VC LOW FREQUENCY OSCILLATOR 1. In all four cases, waveforms are tapped *after* SHAPING circuit in VC LOW FREQUENCY OSCILLATOR 1, always at full strenght.
- LFO 2 SQUARE, square wave from LOW FREQUENCY OSCILLATOR 2.
- LFO 2 TRIANGLE, triangle wave from LOW FREQUENCY OSCILLATOR 2.
- VCO 1, audio signal from VOLTAGE CONTROLLED OSCILLATOR 1.
- VCO 2, audio signal from VOLTAGE CONTROLLED OSCILLATOR 2.
- VCO 3, audio signal from VOLTAGE CONTROLLED OSCILLATOR 3.
- NOISE, audio signal from NOISE GENERATOR.
- EXT IN, audio signal at port AUDIO EXTERNAL IN; its level is scaled with INPUT GAIN control in module EXT IN – ENV FOLL.

LFO 1-INT SWITCH
For choosing the sampling clock source. Sources available are:

- LFO 1, VC LOW FREQUENCY OSCILLATOR 1 frequency (LED blinks in *red* color).

- INT, frequency of internal clock in SAMPLE & HOLD module (LED blinks in *blue* color).

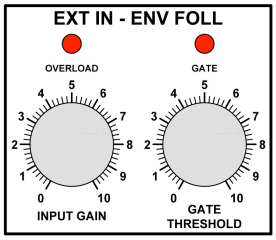
CLOCK CONTROL
Sets the internal Clock frequency. Clock range is comprised between 8 sec and 130 Hz. LED blinks in *red* color at Clock frequency.

GLIDE CONTROL
Softens jumps in control value outputted from SAMPLE & HOLD module.

CLOCK EG SWITCH
For driving ENVELOPE GENERATOR 1 e 2 at Clock frequency set in SAMPLE & HOLD module; envelope firing can be unconditioned (always firing) or conditioned in *AND* with keyboard Gate. In unconditioned mode, envelopes will be continously triggered at S&H Clock rate; in conditioned *AND* mode, envelopes will repeats (at S&H Clock rate) only when musician plays a note on keyboard (MIDI or analog, or Manual Gate on front panel)

Switch positions are for:

- AUTO, envelope generators are unconditionally fired from S&H Clock; repetitions lasts until musician reset the switch at OFF position (see below). OFF, no auto repetition, normal behavior for envelope generators under keyboard or sequencer control.
- GATE, auto repetition for both envelope generators starts only when musician plays a note on keyboard (either MIDI controller or analog controller, or Manual Gate on front panel). Still, is it possible to start the *AND*ed Gate repetition with an external signal whose strenght is sufficient to cross the Threshold set in EXT IN-ENV FOLL module. As soon as musician release the key, auto repetition stops



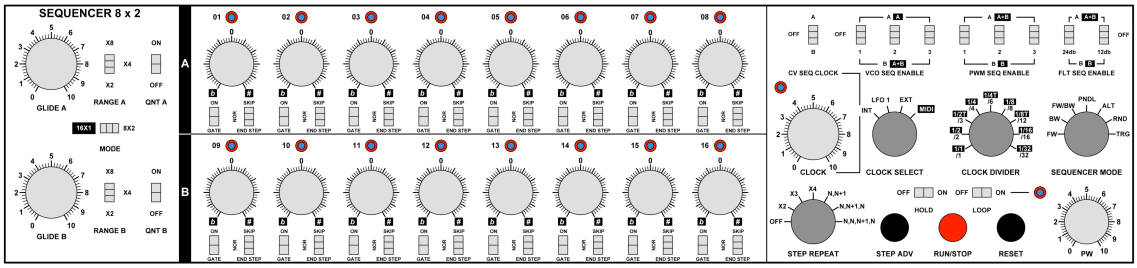
EXT IN – ENV FOLL MODULE

Audio signal connected at AUDIO EXT IN port on front panel can be used either for additional sound source (under level control with EXT INPUT in MIXER, for filtering, for ring modulation, *and* for generating/extracting control whose strenght is proportional at signal amplitude itself (thru ENV FOLL circuit); you can extract a Gate On from external signal compared at a selectable GATE THRESHOLD.

Two red LEDs blinks at OVERLOAD condition for external signal and GATE On condition.

INPUT GAIN CONTROL
Sets the level for external signal connected at AUDIO EXT IN port; LED OVERLOAD blinks and remains on when level is too high.

GATE THRESHOLD CONTROL
Sets threshold against compare signal connected at AUDIO EXT IN port; if signal is > threshold, the module will generate Gate On for envelope generators. LED GATE will turn on at Gate On.

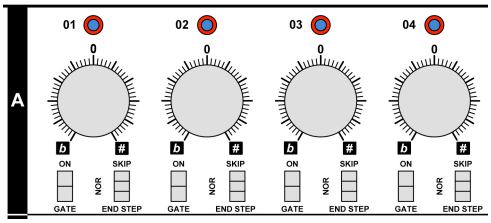


STEP SEQUENCER 8 x 2 MODULE

The built in Step SEQUENCER 8 x 2 module is quite the same complex and powerful unit previously available in the big Grp A8 Synthesizer. It is possible to program 16 steps, in two parallel rows A and B (mode 8 x 2) or in long single row (mode 16 x 1); Musician can select the preferred sequence lenght (each row in 8 x 2 mode can play with a different lenght/step number), the individual step behavior (VCO assign, PWM assign, VCF assign, EG assign). A powerful clock dividing system is available on the internal Clock and on the MIDI Clock; still, the Sequencer can be driven with a TTL external pulse clock signal. Sequencer output(s) can be quantized and smoothed with Glide; is it possible to drive external *analog* synthesizers with CV and Gate Sequencer Out. Using the available front panel routing switches, is it possible to connect the Sequencer out to typical analog destination *inside* the Grp A4 Synthesizer: VCO frequency, PW simmetry, VCF cutoff; still, there are sophisticated advance modes (control SEQUENCER MODE)and step repetition routines (control REPEAT)which allow to obtain results technically very complex.

There is a hierarchical architecture for Step SEQUENCER 8 x 2:

- Step Parameters; indipendently available for each sequencer's step;
- Row A & B Parameters; the settings for each row;
- Sequencer Parameters; the *global* parameters for sequencer (clock select and divide, sequencer advance, step repetitions, etc.).



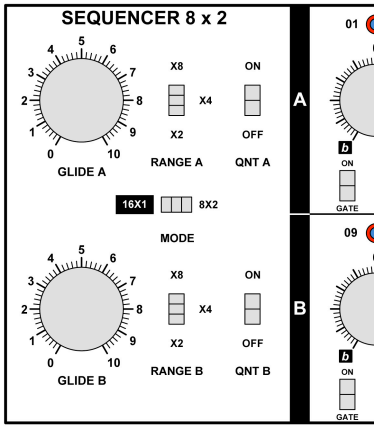
STEP PARAMETERS

Each Step has separate controls and displays :

- Dual Color LED; flashes when the step is executed. LED change color for Gate On (color *red*) or Gate Off (color *blue*);
- CONTROLLO STEP VALUE CONTROL; sets the CV programmed on every step; according to RANGE (see below) control, the step value con be 2, 4 or 8 Volts,

for 2, 4 or 8 octaves of frequency range; programmed value can be chromatic quantized turning on the two switches QNT A e QNT B (see below).

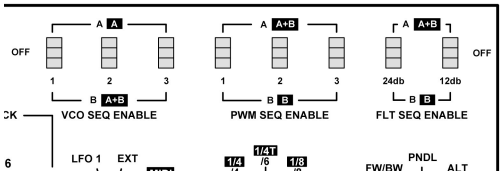
- GATE/ON SWITCH; enable or disable the Gate On for the selected step (Gate On percentage is globally set for entire Sequencer with contrllo PW control – see below); Gate On starts the Envelope Generators of the instruments. If Gate is Off for a selected step, during sequence playback, envelopes will not start on the step with Gate Off generating a pause into the sequence itself. The *pause content* will depend on envelope Decay/Release length and HOLD mode selected for whole Sequencer (see below).
- END STEP/NOR/SKIP SWITCH; sets the *step behavior*; you can choose:
    - END STEP; step acts as *last step* for the the row (in 8 x 2 mode) or for the entire Sequencer (in 16 x 19 mode. If you need a 4 step sequence, you should put the fourth step in *End Step Mode*.
    - NOR; the step plays *normally.*
    - SKIP; step is *skipped*, shorting the sequence's lenght. In contrast to GATE ON/OFF and END STEP, a 4 step sequence with one step in SKIP mode, lasts *tree steps only*; a 4 step sequence with one step in GATE OFF, lasts *four steps*, but plays three steps and a pause.



ROW A E B PARAMETERS

Each row A and B can be customized with controls of:

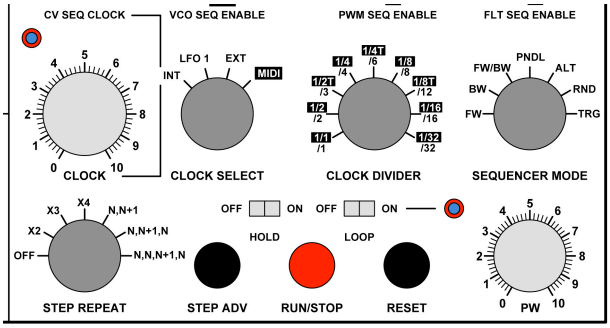
- GLIDE A/B CONTROL; defines the Glide/Portamento rate for CV smoothing on Row A and B.
- RANGE A/B SWITCH; sets the min/max CV range for steps into row. You can choose 2, 4 or 8 Volts range, corresponding at positions X2, X4, X8 on the swtch. In all three cases, *zero value* is always fully counterclockwise on STEP VALUE controls.
- QNT A/B SWITCH; turns on chromatic quantization for Row A and/or B outputs; quantizing can be very useful for huge CV range available with X4 and X8 positions (see above).



ROW A E B ROUTING

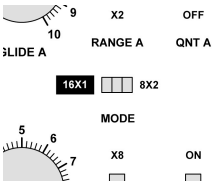
Step values programmed in rows A & B can be routed on several *internal* destinations on Grp A4 Synthesizer; otherwise, they can be connected to *external* analog devices. Three groups of switches are available for internal Sequencer CV routing.

- VCO SEQ ENABLE 1, 2, 3 SWITCHES; three switches (one for each oscillator) with three separate available settings. If Sequencer is in 8 x 2 mode, you can drive each oscillator frequency with Row A output (switches in *upper* position), or with Row B output (switches in *lower* position) or decide to *not control* oscillator's frequency (switches in *middle* position). In the latter case, the oscillator can be left at MIDI or CV/Gate Keyboard disposal. If Sequencer is in 16 x 2 mode, you can drive oscillator's frequency with just Row A out (switches in *upper* position) or with the serial output from Row A *and* Row B (switch in *lower* position); still, if you choose *middle* position, oscillator(s) are left free from Sequencer' control.
- PWM SEQ ENABLE 1, 2, 3 SWITCHES; three switches (one for each oscillator) with three available settings: If Sequencer is in 8 x 2 mode, you can drive Pulse Width for each oscillator with Row A Output (switches in upper position), with Row B Output (switches in lower position) or *not* control the PW (switches in central position). If Sequencer is in 16 x 2 mode, you can drive oscillator's PW with just Row A out (switches in *upper* position) or with the serial output from Row A *and* Row B (switch in *lower* position).
- SWITCHES FLT SEQ ENABLE 24 dB, 12 dB; each filter can be drived with Sequencer output(s). Each switch correspond to one of two available filters. If the Sequencer is in 8 x 2 mode, the Cutoff Frequency will be under Row A Out (switches in upper position), or under Row B Out (switches in lower position), or *will not be* under control of Sequencer (switches in central position). If Sequencer is in 16 x 2 mode, you can drive filters cutoff frequencies with just Row A out (switches in *upper* position) or with the serial output from Row A *and* Row B (switch in *lower* position). But *always*, in the VOLTAGE CONTROLLED FILTER Module, you should first select Seq source (switches SEQ/KYBD Track) and then raise the modulation amount with the controls AMT FM 3 (one for each filter).



SEQUENCER PARAMETERS

You can choose the SEQUENCER mode in 8 x 2 or 16 x 1 shape; still, is it possible to define the advance mode for both rows, the playback loop (or one-shot), the HOLD mode for step value *over Gate Off condition*, the step Simmetry/Duty Cycle/PW, the internal/external clock (there's a clock modulation capability from Row A or B), with CLOCK DIVIDER, SEQUENCER (advance) MODE and STEP REPEAT.



MODE SWITCH

Sets the Step SEQUENCER in mode 8 x 2 or 16 x 1. In 8 x 2, there are *two parallel rows* with 8 steps of maximum lenght, with indipendent step values, articulations, destination and row length. In 16 x 1 mode, there's *only one row* of maximum 16 step freely programmable; however, in 16 x 1, you can still send to different destinations the content of steps 1-8 and 9-16.

CV SEQ CLOCK CLOCK

For routing the Row A or B out on internal Clock modulation. The more CV programmed in each step, the fast playback rate in sequence. Keep in mind that, for every Volt programmed, you'll have a neat *doubling speed* in the sequence…

INTERRUTTORE HOLD SWITCH

Sets, for both Row A and B, a dedicated Sample & Hold under Gate On control programmed with switches GATE/ON on every step. So, you can *extend* the step value *over* the next step with (eventually) disabled Gate.
With HOLD ON, the same value contained in (e.g.) first step is prolonged *in latch mode* over the second step without Gate articulation; with HOLD OFF, the value contained in one step *without articulation* (e.g., with Gate Off), will still reach the intended destination. This condition, especially if the EG Decay and Release are fairly long, could lead to an unpleasant *yodeling* on VCOs frequency.

LOOP SWITCH
Sets the full, unconditioned, sequence repetition. Loop command can be externally programmed: one pulse (momentary close) connected at port porta LOOP ON/OFF will set Loop On for the active steps. For enable remote Loop recall, the front panel LOOP control should be in OFF position.

LED LOOP
The LED lights when LOOP is on; LED color will change for front panel enable (*red* color) or remote enable (*blue* control).

SEQUENCER MODE SELECTOR
For choose the steps playback mode. Step SEQUENCER can move in several modes:

- FW (FORWARD); steps are read from lowest to highest numbered; a sequence containing steps 1, 2, 3, 4 is read as 1, 2, 3, 4 (with or without Looping).
- BW (BACKWARD); steps are read from highest to lowest numbered; a sequence containing steps 1, 2, 3, 4 is read as 4, 3, 2, 1 (with or without Looping).
- FW/BW (FORWARD/BACKWARD); steps are read first from lowest to highest, then from highest to lowest numbered, *with repetition of the terminal* steps; a squence containing steps 1, 2, 3, 4 (with LOOP ON) will be read as 1, 2, 3, 4, 4, 3, 2, 1, 1, 2, 3…
- PNDL (PENDULUM); as above, but *whithout repetition for terminal* steps; a sequence containing steps 1, 2, 3, 4 (with LOOP ON) will be read as 1, 2, 3, 4, 3, 2, 1, 2, 3, 4, 3….
- ALT (ALTERNATE); Step SEQUENCER plays alternating one step from Row A and one from Row B, from lowest to highest numbered. A sequence – in 8 x 2 – with 4 steps, will be read as 1, 9, 2, 10, 3, 11, 4, 12…
- RND (RANDOM); Step are read randomly, avoiding those in SKIP.
- TRG (TRIGGER); steps are advanced each time A4 Synthesizer receives a Trigger impulse (or a Gate tension) at port KYBD GATE IN 0/+5V.

STEP REPEAT SELECTOR
For choosing the available step repeat modes:

- OFF; no step repeat.
- X2; each step is played *twice* before moving to the next.
- X3; each step is played three times.
- X4; each step is played four times.
- N, N+1; Step SEQUENCER plays current step then the next one, then goes back to previous step and goes on; a sequence with step 1, 2, 3, 4 will be played as 1, 2, 2, 3, 3, 4…
- N, N+1, N; Step SEQUENCER wil advance *for* triplets; a sequence with steps 1, 2, 3, 4, 5, 6, 7, 8 will be played as 1, 2, 1; 2, 3, 2; 3, 4, 3; 4, 5, 4; 5, 6, 5; 6, 7, 6; 7, 8, 7; 8, 1, 8...
- N, N, N+1, N; Step SEQUENCER wil advance for quatrains; a sequenced composed with 1, 2, 3, 4, 5, 6, 7, 8 will be played as 1, 1, 2, 1; 2, 2, 3, 2; 3, 3, 4, 3; 4, 4, 5, 4; 5, 5, 6, 5; 6, 6, 7, 6; 7, 7, 8, 7; 8, 8, 1, 8…

CLOCK SELECT SELECTOR
For choosing the Clock source for Step SEQUENCER:

- INT; SEQUENCER runs under internal Clock. The LED blinks in *red* at corresponding speed.
- LFO 1; SEQUENCER runs under VC LOW FREQUENCY OSCILLATOR 1 speed (with all FM capabilities available for that module. With this option (and for all options following), the LED blinks in *blue* color.
- EXT; SEQUENCER runs under pulses 0/+5V at analog port CLOCK IN on front panel.
- MIDI; SEQUENCER runs under MIDI Clock received at MIDI IN port on the rear panel.

CLOCK DIVIDER SELECTOR
To submit the clock at different coefficients of division; so, you can advance steps under quarters, eigths or sixteenths density over the selected clock source. Dividing factors works *only* over Internal and MIDI Clock, is not possible to divide the external analog TTL clock pulse train.

There are *two* sets of available dividing factors: one for INTernal Clock, the other (reported in *inverse* on front panel) for MIDI Clock.

This is the list of available standard dividing factor for INT, and LFO 1 Clock signals:

- /1; no division; each impulse will advance one Step.
- /2; selected Clock is divided by two; one Step advance will need *two* Clock pulses.
- /3; selected clock is divided by *three*; one Step advance will need three Clock pulses.
- /4; as above, *four* pulses for each Step advance.
- /6; as above, *six* pulses for each Step advance.
- /8; as above, *eight* pulses for each Step advance.
- /12; as above, *twelve* pulses for each Step advance..
- /16; as above, *sixteen* pulses for each Step advance..
- /32; as above, *tirthytwo* pulses for each Step advance..

This is the list of available dividing factors for Clock MIDI:

- 1/1; each Step lasts a full 4/4 bar (96 MIDI ticks).
- 1/2; each Step lasts two quarters (48 MIDI ticks).
- 1/2T; each Step lasts *one third* of 4/4 bar (32 MIDI ticks).
- 1/4; each Step lasts one quarter (24 MIDI ticks).
- 1/4T; each Step lasts one quarter of triplet (16 MIDI ticks).
- 1/8; each Step lasts one octave(12 MIDI ticks).
- 1/8T; each Step lasts one octave of triplet (8 MIDI ticks).
- 1/16; each Step lasts one sixteenth (6 MIDI ticks).
- 1/32; each Step lasts 1/32 (3 MIDI ticks).

PW CONTROL
Sets the percentage legato/staccato for each Step. When control is fully counterclockwise, Step has *minimum* Gate On percentage (staccato mode); when control is fully clockwise, Step has *maximum* Gate On percentage (*almost* legato mode). With PW and envelope, you can obtain some nice articulation effects on A4 Synthesizer.

PW control:

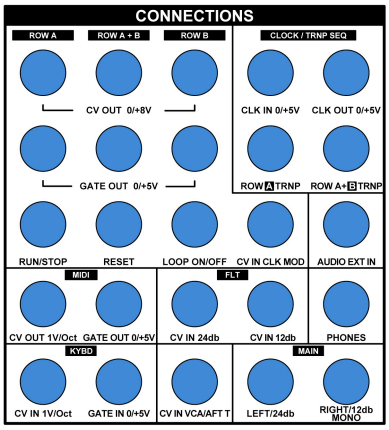
- works on internal clock Internal;
- works on clock from LFO 1;
- works on clock MIDI;
- *doesn't work* on clock EXT; in this position, Step Sequencer will evaluate any changes in PW embedded in external clock signal *only if Clock Divider is in /1 position*; otherwise, the external clock signal will be assumed as fixed 50% PW.

CLOCK CONTROL
Sets rate for Step SEQUENCER 8 x 2 in INT mode. LED blinks at Clock rate in *red* color for internal source, in *blue* color for external source(s). Clock frequency can be modulated with an external CV applied at port CV IN CLK MOD (only in Internal Clock mode) on the front panel. For each Volt received, there is a clock frequency doubling.

RUN/STOP BUTTON
Turns on and off the Step SEQUENCER 8 x 2 playback. One press for Run sequence, a second press for Stop; a *third press* to resume playback from the interruption (*Continue Playback)*.
Run/Stop command can be given externally from a momentary open switch connected at RUN/STOP port on the front panel.

STEP ADV BUTTON
For advance step by step into the programmed sequence during the step tuning procedures. Each press will advance one step; each step under STEP ADV uses an artificially prolonged Gate On for ease of tuning.

RESET BUTTON
Forced reset at first step available in sequence.
The command can be given externally from a momentary open switch connected at port RESET on the front panel.



FRONT PANEL CONNECTIONS

On the front panel of the Grp A4 there are the following connections:

Audio inputs and outputs

- MAIN LEFT/24 dB; if switch AUDIO PATH is in DIR OUT position, you'll hear the filtered out from 24 dB LOW PASS FILTER; if the switch is in ROUTING position, you'll hear the *left side* of stereo field signal.
- MAIN RIGHT/12 dB MONO; if switch AUDIO PATH is in DIR OUT position, you'll hear the filtered out from 12 dB STATE VARIABLE FILTER; if the switch is in ROUTING position, you'll hear the *right side* of stereo field signal. If necessary, this out port carries the *mono signal* for entire A4 Synthesizer.

- PHONES; the main stereo out.

- AUDIO EXT IN; input for externala audio signal. Signal connected to this port goes in MIXER audio *before* filtering, can goes in Ring Modulator, goes into Envelope Follower circuit and, after Gate conversion and after CV extraction, reach Gate Inputs of EGs; still, it reach the modulation source selectors in VCFs, the AM control in VCA, modulation source selector in Sample & Hold, FM source selector and Shaping seletor in LFO 1, AM source selector and Shaping in LFO 2.

Control inputs and outputs

- KYBD CV 1V/Oct; you can connect an analog CV for external frequency control.
- GATE IN 0/+5V; you can connect an analog Gate for external EG control.

- CV IN VCA/AFT T; the analog CV connected at this port goes in *every* modulation destination marked with AFT T (FM1 SOURCE in VCOs, in VCFs, in FM SOURCE CV and SHAPING SELECT in VC LOW FREQUENCY OSCILLATOR 1); still, it reach switch CV VCA in VC AMPLIFIER module (you can use it for control the level of synthesizer).

- FLT CV IN 24 dB: the analog CV connected at this port controls (unity gain, w.o. attenuation) the 24 dB LOW PASS FILTER Cutoff Frequency.

- FLT CV IN 12 dB; the analog CV connected at this port controls (unity gain, w.o. attenuation) the 12 dB STATE VARIABLE FILTER Cutoff Frequency.

- MIDI CV OUT 1V/Oct; is the MIDI interface CV Out; you can use it for drive external 1V/Oct equipment.
- MIDI GATE OUT 0/+5V; is the MIDI interface CV Out; you can use it for drive external 1V/Oct equipment compatable with standard 0/+5V.

Sequencer control inputs and outputs

- SEQ ROW A CV OUT 0/+8V; is the Row A CV output for step SEQUENCER in 8 x 2 mode.
- SEQ ROW B CV OUT 0/+8V; is the Row B CV output for step SEQUENCER in 8 x 2 mode.
- SEQ ROW A+B CV OUT 0/+8V; is the *combined* Row A and Row B CV output for step SEQUENCER in 16 x 1 mode.
- SEQ ROW A GATE OUT 0/+5V; is the Row A Gate Out for step SEQUENCER in 8 x 2 mode.
- SEQ ROW B GATE OUT 0/+5V; is the Row B Gate Out for step SEQUENCER in 8 x 2 mode.
- SEQ ROW A+B GATE OUT 0/+5V; is the *combined* Row A and Row B Gate output for step SEQUENCER in 16 x 1 mode.

- RUN/STOP; the momentary open switch connected at this port takes command on RUN/STOP status.
- RESET; the momentary open switch connected at this port reverts back the Step SEQUENCER at its first step.
- LOOP ON/OFF; the momentary open switch connected at this port takes command on LOOP ON/OFF status; the external command works *only* if the front panel LOOP switch is in the OFF position; LED changes color for visualize external control (*red* color for panel control, *blue* color for external control).
- CV IN CLK MOD; the CV Input for Internal Clock modulation; each Volt received *doubles* sequence's rate.

- CLK IN; analog clock in for 0/+5V signal, selectable with CLOCK SELECT in EXT position.
- CLK OUT; output for internal analog clock signal 0/+5V emitted from Step SEQUENCER 8 x 2.
- ROW A TRNP; you can add an analog CV (1V/Oct) for transpose steps values programmed in sequencer's Row A.
- ROW A+B TRNP; you can add analog CV (1V/Oct) for *concurrently* transpose sequencer's Row A and B in mode 8 x 2 (if the sequencer is in 16 x 1 mode, you can use any transpose input)

REAR PANEL CONNECTIONS

On the rear panel, you'll find AC, MIDI and USB connections.

- INPUT AC; for the AC cable. *Always*, verify the correct powering for instrument (you can read it on the label near the AC prong) *before turning it on*.
- MIDI IN; is the MIDI input for Grp A4 Synthesizer; all codes received at this port will be passed at the internal MIDI interface; here, they'll be interpreted (and used) or – if not provided in the MIDI Implementation – they'll be ignored.
- MIDI THRU; it emits the *copy* of the MIDI data received at MIDI input.
- USB port; for future firmare upgrades concerning Step SEQUENCER 8 x 2 and/or MIDI Interface; when you'll connect and external computer (*only* with suitable Grp soft upgrade), you'll read "PC" on the MIDI interface display. Please, *do not connect anything on this USB port, unless specifically indicated by the manifacturer.*

Manual: Enrico Cosimi

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