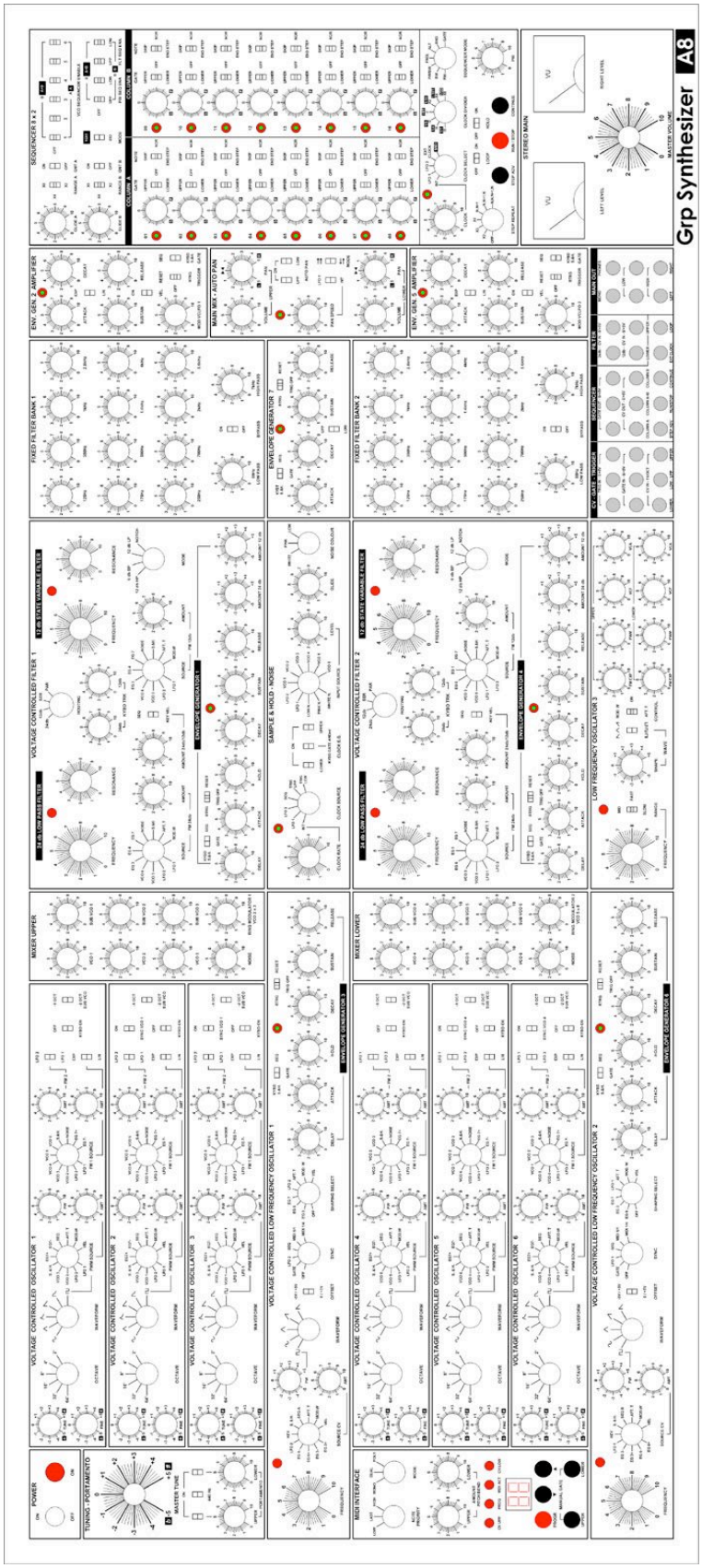
Grp Synthesizer

A8 USER'S MANUAL

www.grpsynthesizer.it


Grp Synthesizer A8

CONTENTS

FOREWORD

Thank you for purchasing the Grp Synthesizer A8: 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

- Always check that the AC current in your area is correct for the instrument BEFORE turning it on. The Grp Synthesizer A8 can be powered with 110-220 V 50-60 Hz, switchable in the rear panel. Please, check and re-check.
- 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 A8 Synthesizer is an heavy synthesizer: place it on a suitable solid surface or table.
- The Grp A8 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.

SETUP AND CONNECTIONS

Contents

Your Grp Synthesizer A8 comes completed with:

- The instrument (pretty big, eh?) itself.
- The suitable power supply cable.
- This manual.

Ensure that all the items above listed were included. If something is missing, contact your local dealer. As said above, we recommend that you carefully save the original packing material for future transport/shipping.

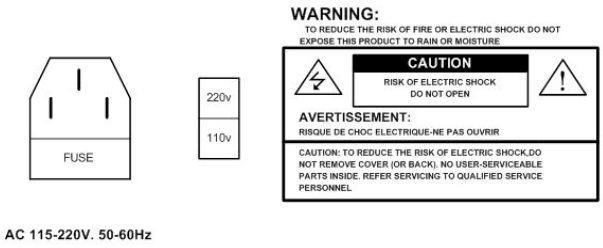
Connections

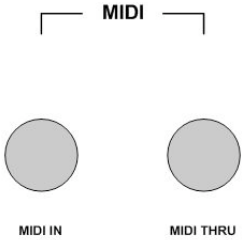
In order to get started with your Grp Synthesizer A8, you will need some connections:

- Suitable AC powering. Make sure (twice) that the power available in your country matches the correct position in voltage switch 110-220V on the rear panel.
- A MIDI Keyboard/Controller with proper MIDI cable. Those can be unnecessary if you plan to use the synthesizer only with analog CV/Gate or with the internal Step Sequencer.
- A analog CV/Gate source, with a bunch of ¼" TS unbalanced cables.

AC Connections

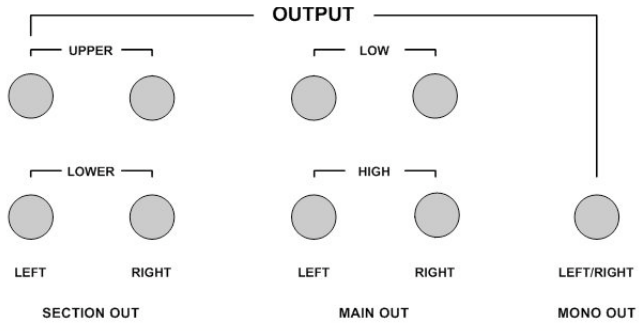
Without doubts, the only place to make connection for AC cord is on the rear panel; please. DO NOT detach the ground connection.





MIDI Connections

Another easy issue:
the MIDI Port (with In and Thru) is located on the rear panel. While the Grp Synthesizer A8 doesn't emit any MIDI signal, it can receive MIDI messages simoultaneously from up to two different sources connected to its MIDI Input. The data received at Input connector are echoed back to MIDI Thru connector.



Audio Connections

The things are more varied: you can choose different connections, suited to different needs, on both front and rear panel.

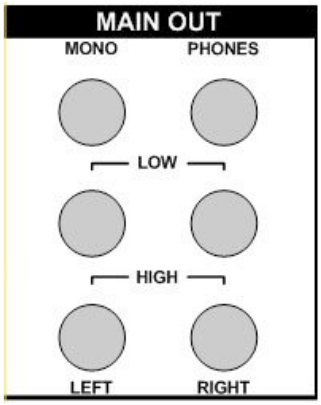
Rear Panel Audio Connections

If you'll use the A8 in a fixed, studio environment, is best to use the Rear panel Audio Connections, otherwise, you'll be free to use the more easy access to the front panel connection (more on this, later). On the rear, you'll find:

- SECTION OUT UPPER LEFT-RIGHT: separate stereo out for Upper part *after* Pan/AutoPan module, but *before* the Main Out Volume.
- SECTION OUT LOWER LEFT-RIGHT: separate stereo out for the Lower part *after* Pan/AutoPan module, but *before* the Main Out Volume.

- MAIN OUT LEFT-RIGHT LOW LEVEL: doubles the front panel main stereo output (this output is at a quiet low level).
- MAIN OUT LEFT-RIGHT HIGH LEVEL: doubles the front panel main stereo output (be careful: this output is at a fairly high level).
- LEFT+RIGHT MONO OUT: the sum of Upper and Lower Sections; the connection doubles the front panel mono output.

Front Panel Audio Connections



On the front panel, there are the following audio connections:

- MONO OUT: summed signal of Upper and Lower Sections (same as Mono Out on the rear panel)
- PHONES: headphones stereo output.
- LEFT - RIGHT LOW LEVEL OUT: low impedance stereo output.
- LEFT - RIGHT HIGH LEVEL OUT: (fairly) high impedance stereo output.

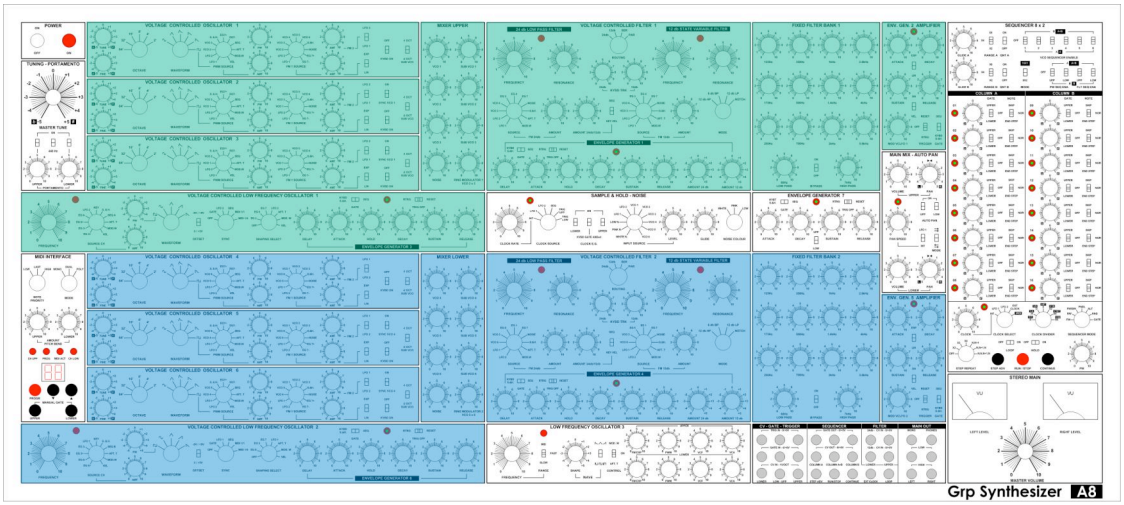
Analog CV/Gate Connections

If you dislike (or if you dont need) MIDI, you can rely on old school analog CV and Gate connections; on the front panel you'll find direct access to separate Upper and Lower Sections of the instrument or, for a full scale control on a single couple of CV/Gate, the common Lower-Upper analog interface. In details, there are connections for:

- LOWER SECTION Connections: Trig Input (0/+5V), Gate Input (0/+5V), CV Input (1V/Oct).
- UPPER SECTION Connections: as above.
- LOWER and UPPER Connections: as above, in common for both sections.

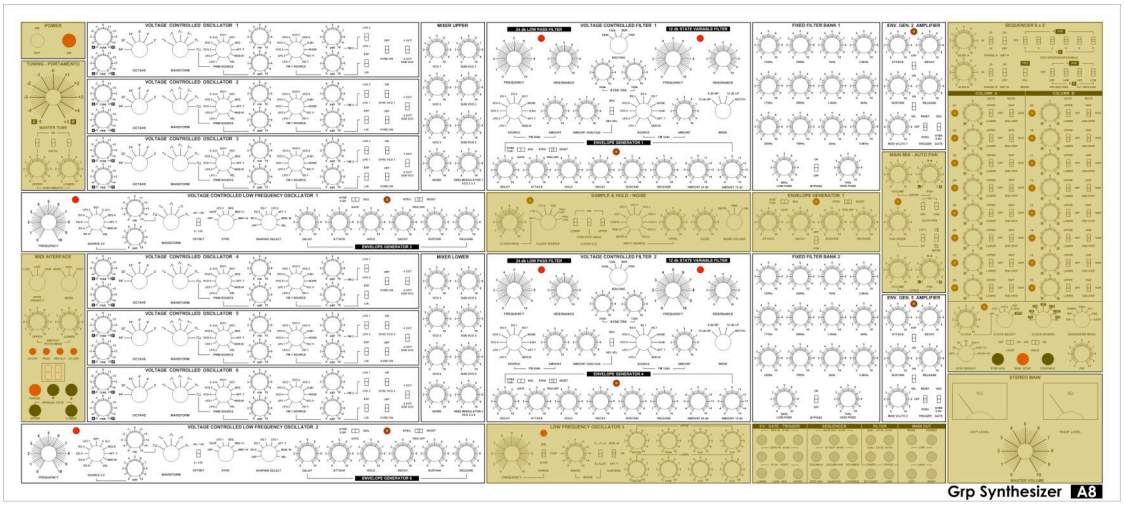
OVERVIEW

The Grp Synthesizer A8 is a complex, but not-so complex analog machine dual structure/bitimbral, with an integrated Step Sequencer.
Each part (Upper or Lower section) is a complete and independent analog synthesizer fitted with three VCOs each with separate SubOsc, one Ring Modulator, one Audio Mixer, two dynamic VCFs, one Fixed Filter Bank, one VCA, three EGs, one LFO.



The above picture shows the modules concerning the Upper and Lower sections. As you can see, they are disposed in a pretty simmetrical way on the front panel.

In addition, there is a group of common modules who can be shared by the two section or can controls both sections simoultaneously; they are: Tuning-Portamento, MIDI Interface, Sample & Hold/Noise Generator, Auxiliary Envelope Generator 7, Main Mix/Auto Pan, LFO 3, Main Volume, Step Sequencer and Front Panel Connections.

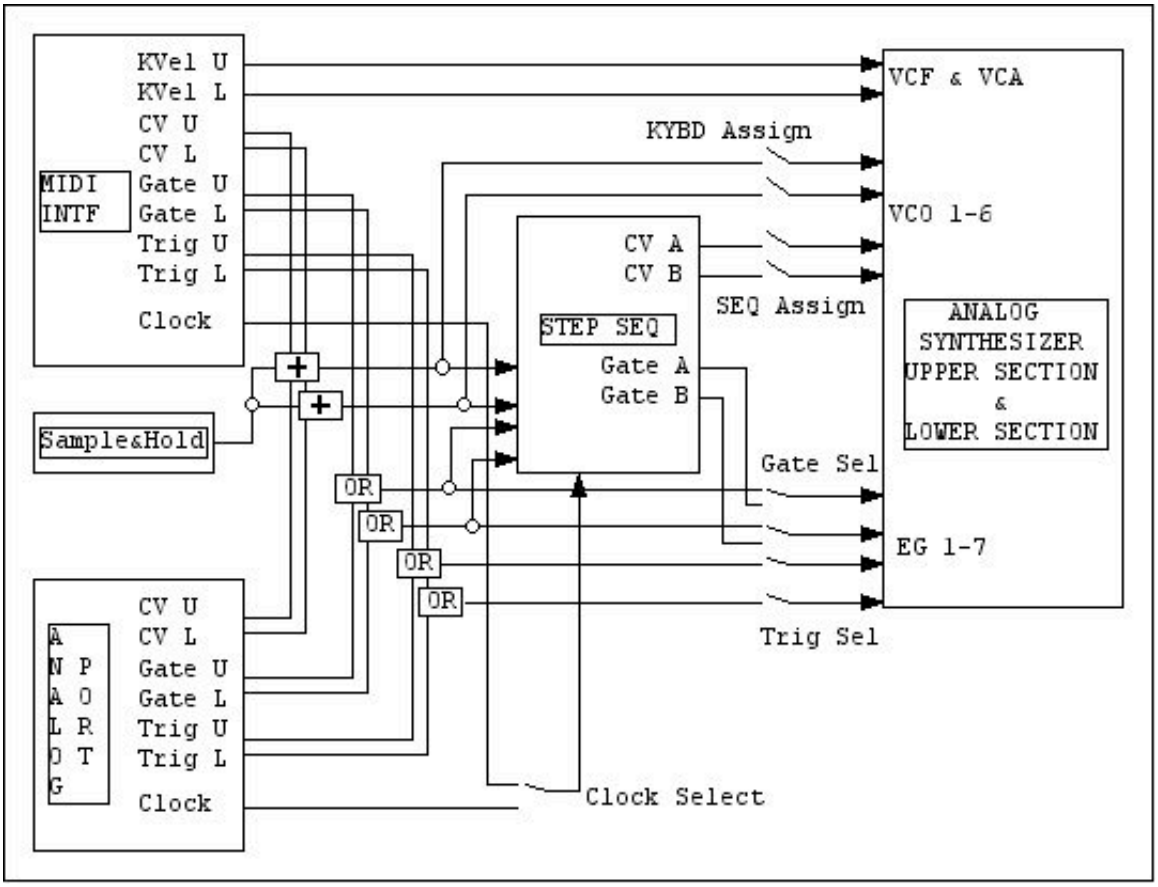


The above picture shows the modules in common for both Upper and Lower sections of the instrument.

WHAT'S INSIDE THE A8?

The whole instrument contains several different circuits:

- A MIDI INTERFACE who converts MIDI data in CV, Gate, Trigger, Key Velocity and Clock data for Upper and Lower Sections.
- An ANALOG PORT who receives CV, Gate, Trigger, Clock for Upper and Lower Sections.
- A STEP SEQUENCER who drives VCO Freq & PWM, VCF Freq, EG Gate for Upper and Lower Sections.
- A dual section ANALOG SYNTHESIZER able to create two entirely separate patches, or - at request - work in cross audio rate modulation between VCOs on VCOs and VCOs on VCFs.



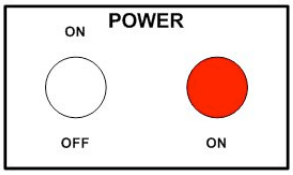
The above (simplified) picture shows the interactions between the different components of the A8.

Feel free to experiment with different sections of the synthesizer; first, with Upper/Lower synth parts, then, with Step Sequencer.

BASIC OPERATIONS

Powering the instrument

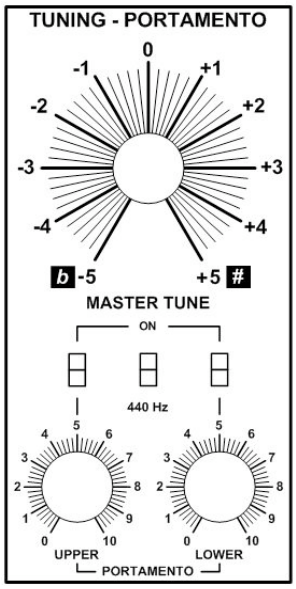
As you can easily imagine, this operation is done in the Power module on left part of the front panel; the lamp goes red when the instrument is turned on. Before turn on, please CHECK THE CORRECT AC RATING.

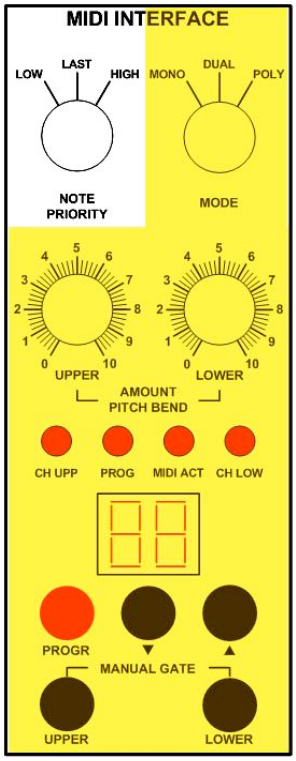


Tuning the instrument

The Grp A8 is an analog synthesizer but, despite this, the VCOs inside stays in tune pretty well. For tuning the instrument to concert pitch, you should work in the Tuning-Portamento module on the left part of the front panel.

With the Master Tune control, you can adjust the main tuning of the entire instrument in a range of -7/+5 semitones; for a quick reference, you can switch on the dedicated A-440 oscillator.
In the same module, there are the two Portamento Time Upper and Lower (max time 2 seconds per octave) and Portamento On.





Dealing with Modes and MIDI Interface

In this module you'll find all the settings related to Note Priority, Voice Assign Modes, Pitch Bend Amount and - obviously - MIDI Interface.

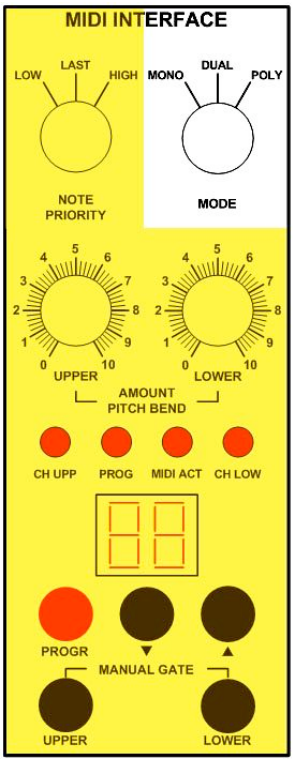
Note

As you can imagine, the external analog controls connected at the CV, Gate & Trigger ports *are not influenced* by the settings of the Note Priority & Mode sections of the MIDI Interface.

Note Priority

The Grp A8 offers three different Note Priority modes:

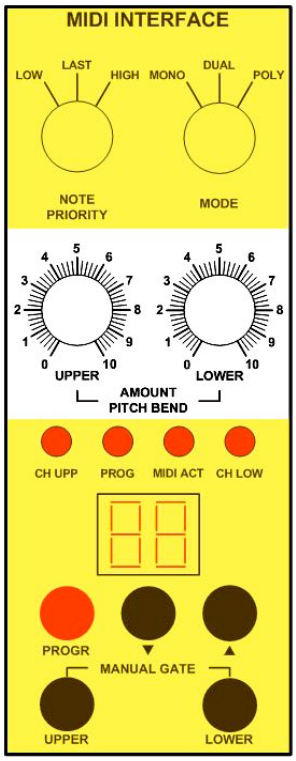
- In LOW Note, if the musician press more than a key, the instrument will plays the lowest note .
- In LAST Note, the instrument will play the last note executed.
- In HIGH Note, the instrument will play the highest note.



Mode Selection

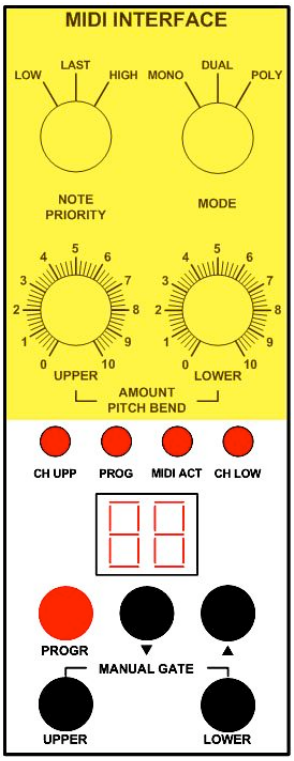
With the MODE Selector, you can choose between three different behaviours:

- MONO: Upper and Lower sections works on the same MIDI Channel previously set from the user (see below); all six oscillators, four filters, amplifiers and modules plays together forming a single *big* instrument.
- DUAL: the synthesizer works as a two-voice single instrument on the *same* MIDI Channel for Upper and Lower parts. When one key is pressed, you'll have both Upper and Lower sections playing the same note. When you press two key simoultaneously, you'll get high note played from Upper synth section and low note played from Lower synth section.
- POLY: the sinthesizer works on two separate and independent user's definable MIDI Channel, one for Upper and the other for Lower part (see below).



Pitch Bend

The two PITCH BEND AMOUNT controls (UPPER and LOWER) allow the exact setting of the frequency deviation from the nominal pitch; the maximum range equals +/-12 semitones.



MIDI Interface

With this part of the module, you can set the MIDI Channel(s) with the two Increase/Decrease pushbuttons (see below). The MIDI Interface manages the following messages:

- Note On/Off w. Key Velocity
- Pitch Bend
- Modulation Wheel
- Channel Aftertouch
- Expression & Volume Pedal
- Damper Pedal
- Clock

Note

You can choose between the standard MIDI Channels 1-16 and seventeenth position corresponding to OFF; in the latter setting, you'll disconnect the MIDI data from reach the Upper or Lower synth section, leaving them at *only* disposal of the analog CV-Gate-Trig Interface on the front panel.

As we'll see later, the MIDI Interface reacts to Start, Stop and Continue RealTime Commands: those will be routed to the internal Step Sequencer for normal transport functions.

In the MIDI Interface, there are four LEDs:

- CH UPP LED: lighted in MONO and DUAL MODE, shows that the dual digit number displayed *is* the MIDI Channel for the Upper synth section of the instrument.
- CH LOW LED: lighted in MONO and DUAL MODE, shows points that the dual number displayed *is* the MIDI Channel for the Lower synth section of the instrument.
- PROG LED: turns on when you press the red PROG pushbutton in the MIDI Interface. When lit, you are able to superimpose an octave(s) CV offset for the 3 Upper and 3 Lower VCOs. More commands will be added in the future, with firmware updates (thru Host multiport on rear panel).
- MIDI ACT(IVITY) LED: turns on if the synthesizer receive any MIDI message.

The available controls act as:

- MANUAL GATE UPPER: this button act as a Gate source for all the envelope generators available (or assigned, as for the Aux EG 7) in the Upper synth section.
- MANUAL GATE LOWER: this button act as a Gate source for all the envelope generators available (or assigned, as for the Aux EG 7) in the Lower synth section.
- INCREASE Button: will step forward the numeric value on the display.
- DECREASE Button: will step backward the numeric value on the display.

- PROGR BUTTON:
    - If the instrument is set in MONO MODE (see above), the button enters the Programmable Mode for the MIDI Interface (for load firmware upgrades thru HOST port on rear panel).
    - If the instrument is set in DUAL MODE, the button has the same function as above.
    - If the instrument is set in POLY MODE, each pression on the pushbutton will loop cycle on the numeric display one of the following options:
        - MIDI CH UPP [the corresponding LED will light],
        - MIDI CH LOW [the corresponding LED will light],
        - PROGR MODE [the corresponding LED will light].

    - In CH UPP and CH LOW MODE, you'll set the desired MIDI Channel with the two Increase/Decrease buttons. (Range 1-16, Off).

    - In MONO or DUAL Mode, pressing repeately the PROG button, will cycle thru one of the following options:
        - CV Offset (see below),
        - Upper *plus* (see note below) Lower MIDI Channel select options (01-16, Off).

Note

The value you select will be applied simoultaneously for *both Parts*; as wrote before, if you choose "Of(f)", the selected Part of the instrument will be left under full control of the analog control connections.

    - In POLY Mode, you gain separate access to Upper and/or Lower MIDI Channel adjust; the corresponding LED will turn on.

CV Offset

It is possible to add an octave offset on the CV received at the analog control inputs; in this way, you can match the octave played by A8 with the range of your external analog controller.

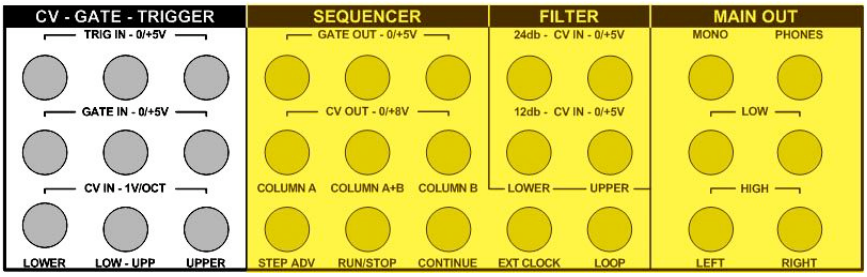
One more pressing on the PROG button will enter the synthesizer's MIDI Interface in CV Offset Mode; Upper and Lower Parts can be offset in 1 octave increment on a range of 5 available octaves. In the numeric display, you'll read:

- U1/U5 (the default value is U3).
- L1/L5 (the default value is L3).

Note
As a rule of thumb, with VCOs Octave on 8', if you want to hear in the *real octave* of your external analog controller, you should select an Offset value of 3 (remember that the parameter range is 1-5). So, if you want to hear A3 = 440 Hz, put your VCOs on 8' and impart a CV Offset with value U3 and/or L3. If you impart a CV Offset with value U2/L2, you'll play a lower octave (e.g.: like if you have selected 16' on VCOs). If you impart value U4/L4, you'll play a higher octave (like if you have selected 4' on VCOs).

FRONT PANEL CONNECTIONS

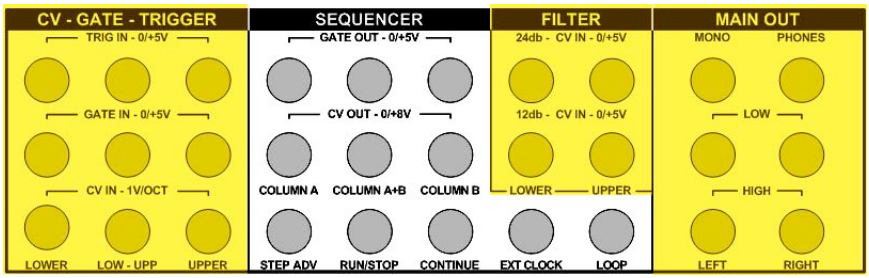
On the front panel, the available connections are organized in four separate blocks related to: CV-Gate-Trigger, Sequencer, Filter, Main Out.



CV-Gate-Trigger

This block of nine connectors is for the analog control of Lower section, Upper section, Lower & Upper section; for control simoultaneously the two parts, you should connect external sources to the central column of connections marked LOW-UPP. You can choose between:

- TRIG IN LOWER - LOW/UPP - UPPER: Analog Trig In 0/+5V
- GATE IN LOWER - LOW/UPP - UPPER: Analog Gate In 0/+5V)
- CV IN LOWER - LOW/UPP - UPPER: Analog CV In 1V/Oct.



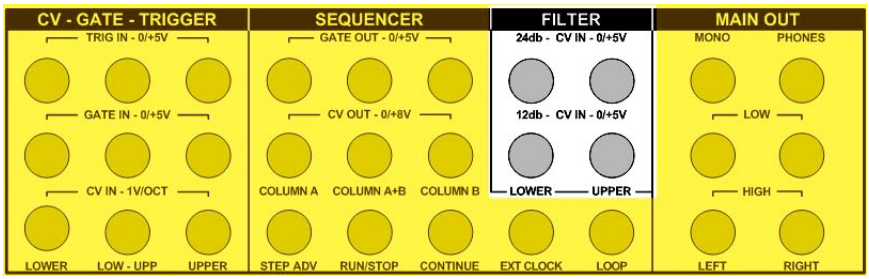
Sequencer

Here are the connections for the Step Sequencer outputs and its external controls:

- GATE OUT COLUMN A - COLUMN A+B - COLUMN B: the Gate Output for the single Column A or B and for the two Columns A+B combined in series (16x1 steps). Range: 0/+5V.
- CV OUT COLUMN A - COLUMN A+B - COLUMN B: the CV Out for the separate Column A or B (8x2 steps) and for the two Columns combined in series. Range: 0/+8V.

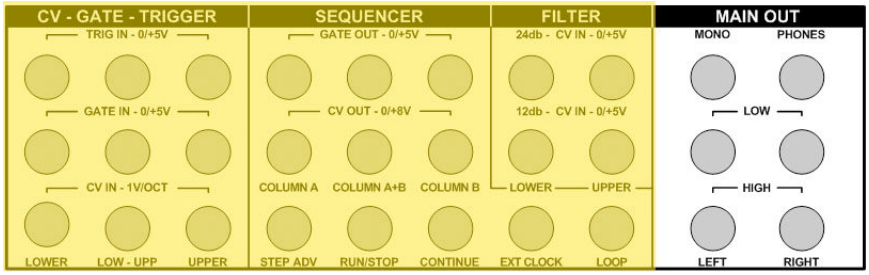
- STEP ADVANCE: on each pulse (0/+5V) received at this port, the Step Sequencer advance one step.
- RUN/STOP: each pulse (0/+5V) received will alternate between Run and Stop. This external input will interact with the front panel control RUN/STOP. The Step Sequencer will restart from step no. 1.
- CONTINUE: the pulse (0/+5V) received at this port will put the Sequencer in playback from the last step played without resetting to step no. 1.
- EXT CLOCK: a train of pulse (0/+5V) received at this port will advance the Step Sequencer; it will function only if the Step Sequencer is set to EXTERNAL CLOCK SELECT position.

- LOOP: the switching closure received on this port will enable the LOOP ON MODE for Step Sequencer. This external input is parallel with the hardware LOOP SWITCH on the front panel. If you want to remotely control LOOP ON, don't forget to *turn off* its hardware switch on the front panel).



Filter

- 24dB CV IN LOWER: external frequency control (0/+5v) for the Lower Low Pass Filter.
- 24 dB CV IN UPPER: external frequency control (0/+5V) for the Upper Low Pass Filter.
- 12 dB CV IN LOWER: external frequency control (0/+5V) for the Lower State-Variable Filter.
- 12 dB CV IN UPPER: external freqyency control (0/+5V) for the Upper State-Variable Filter.

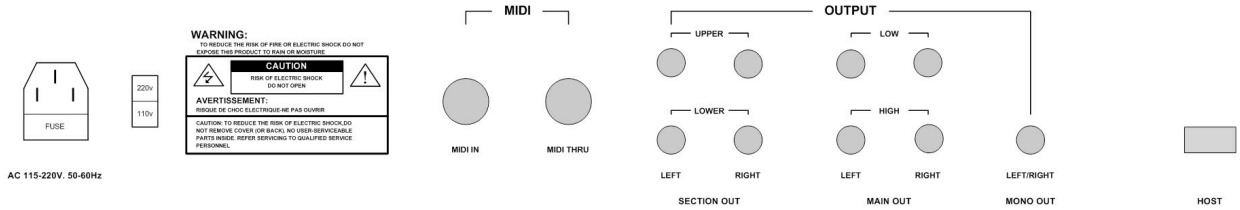


Main Out

- MONO OUT: summed signal of Upper and Lower Part.
- PHONES: headphones stereo output.
- LEFT - RIGHT LOW LEVEL OUT: low impedance stereo output.
- LEFT - RIGHT HIGH LEVEL OUT: high impedance stereo output.

REAR PANEL CONNECTIONS

On the rear panel, you'll find the connection related to:



Power

- AC RECEPTACLE

Midi

- MIDI IN
- MIDI THRU

Audio

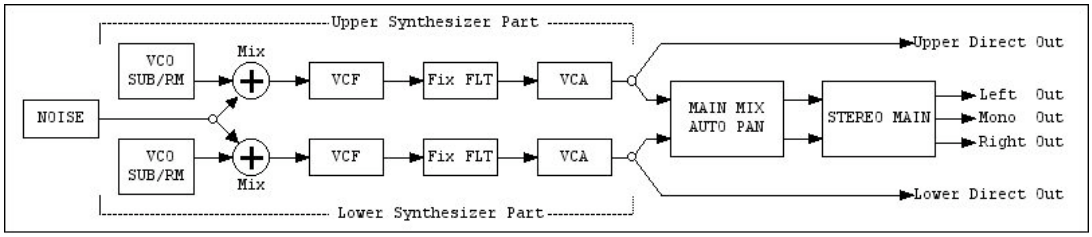
- SECTION OUT UPPER LEFT-RIGHT: separate stereo out for Upper part *after* Pan/AutoPan module, but *before* the Main Out Volume.
- SECTION OUT LOWER LEFT-RIGHT: separate stereo out for the Lower part *after* Pan/AutoPan module, but *before* the Main Out Volume.
- MAIN OUT LEFT-RIGHT LOW LEVEL: doubles the front panel main stereo output (low level).
- MAIN OUT LEFT-RIGHT HIGH LEVEL: doubles the front panel main stereo output (high level).
- LEFT+RIGHT MONO OUT: doubles the front panel mono output.

Future upgrades

- HOST: this port is for future upgrades to the internal MIDI Interface firmware. At this very moment, it is disabled.

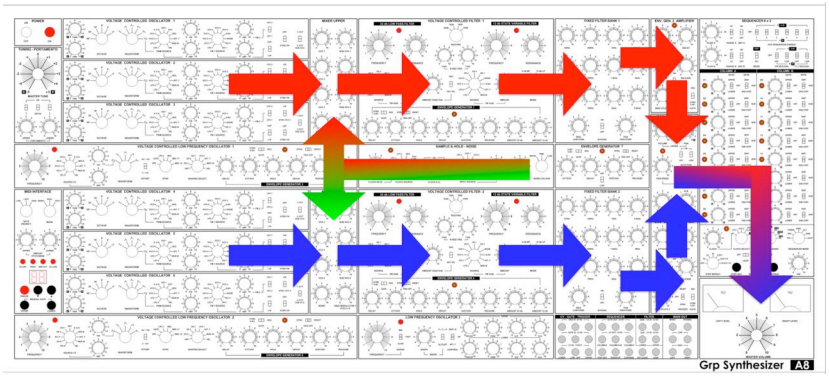
A8 AUDIO AND MODULATION ROUTINGS

We'll start from audio signal path (sources and modifiers): from oscillators thru the filters, till the amplifier. Then, we'll follow the modulation sources and their applications on the audio circuit.



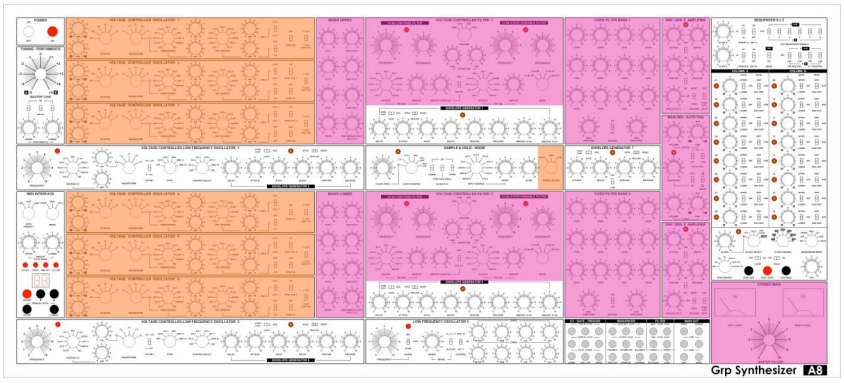
SOUND SOURCES AND SOUND MODIFIERS PATH

The above scheme is an over simplified view of the audio path for both Upper and Lower A8 Sections. As you can see, the signal produced from VCOs, SubOSCs, Noise Generator (in common for both sections) and Ring Modulators is treated thru the dual VCF section and then equalized with the Fixed Filter Bank; finally, the signal is amplified in the VCA and outputted thru the direct connection on the rear panel. Both Upper and Lower signals goes into the Main Mix / Auto Pan and the Stereo Main section.



Above, you can track the Upper and Lower audio signal path on the synthesizer's front panel.

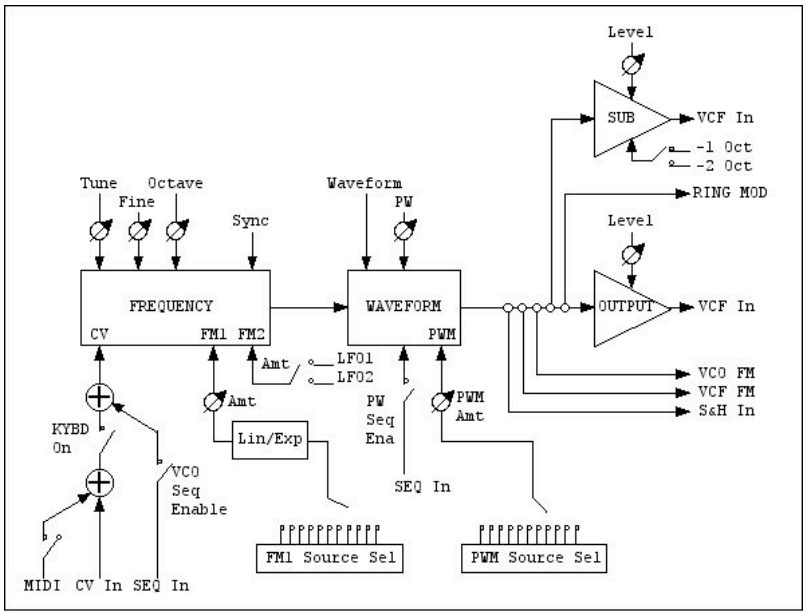
Below, the front panel with the highlighted positioning of the Sound Sources and the Sound Modifiers.



Following, we'll give explanations of the single audio source/modifier sections.

VOLTAGE CONTROLLED OSCILLATOR 1-6

The six VCOs comprised in A8 Synthesizer are, more or less, all equal; minor differencies are found in the FM/PWM Sources and Hard Sync capability.

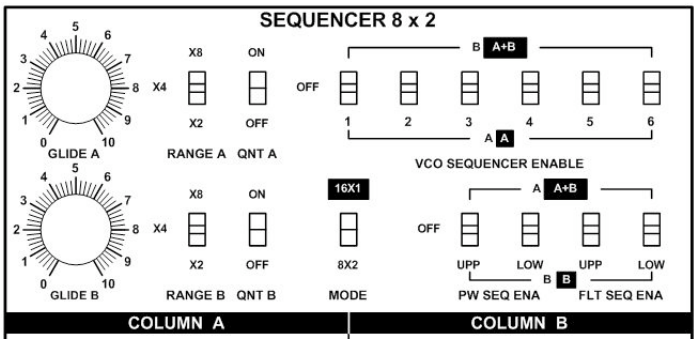


The VCO behaviours are organized in three main stages: Frequency Control and Frequency Modulations, Waveform Selection and Pulse Width Modulation, Output Leveling and Suboscillation.

Frequency Control

The nominal Frequency of the VCO is defined with three dedicated controls on the front panel: Octave Selector, Tune Pot and Fine Tune Pot. In addition, is possible to put the VCO under control of any combinations of three external CV Sources: MIDI Interface, CV In (analog ports on the front panel), Step Sequencer.

As we'll see later, those three sources interact each other, for (e.g.) real-time transpose of the sequencer or whatever. Is it possibile to detach the realtime Keyboard Control from the VCOs Frequency; in this way, both the MIDI Note On conversion *and* the external CV In data are disconnected from the selected oscillator; the Step Sequencer remains only external frequency control available, free from unnecessary real-time transposition, *but* you'll be forced to raise the footage of VCOs for re-gain the correct playing range.



Note
Once you'll turn on the Oscillator Sequencer Enable switch (in Step Sequencer section), the Step Sequencer CV is *always* connected to the oscillator nominal frequency; so, the only way for prepatch VCOs under Step Sequencer control and not have undesired transposition is to put at zero the Step Value (zero means in full counterclockwise motion).

The VCO has two FM busses: FM 1 buss has a Linear/Exponential selector and a huge amount of possible FM sources (low rate for cyclic modulation or audio rate for harmonic control). With audio-rate modulation in Exponential mode, the perceived intonation drifts from nominal value; with audio-rate modulation in Linear mode, the perceived intonation (for an ample modulation index) remains stable. FM 2 buss works only in Exponential mode and can be connected with LFO 1 or 2; while this kind of circuit can be found useful mainly for vibratos, don't forget that in A8 Synthesizer, the LFOs goes fairly high in the audio range.

As above, the Hard Sync capability can be useful not only for rock-steady tune, but for generating more harmonic peaks in the slave oscillator.

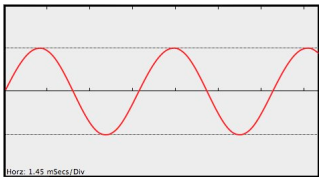
Waveform Control

The waveform of the VCO can be selected with a dedicate multiposition switch; you can choose between the typical analog waveshapes, plus the combination of Sawtooth and variable Pulse.

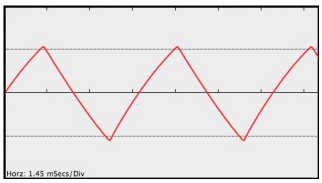
The Pulse Width Modulation can be controlled in nominal position, for the "starting point" in the Symmetry value, and can be assigned as destination for a huge amount of possible modulation sources. In addition, it is possibile to route straightly the output of the Step Sequencer CV (Row A or Row B) to drive the PWM.

The waveforms

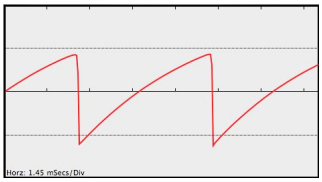
As you expect, the VCOs in A8 Synthesizer are full analog; so, the waveforms available are pretty standardized in the analog heritage:



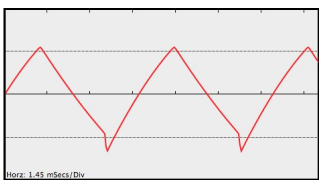
Sine Wave: full energy on the fundamental frequency, no higher harmonics.



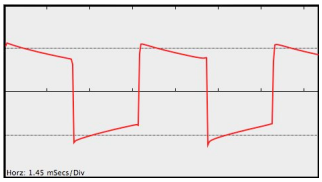
Triangle Wave: odd harmonics only, with energy decaying in exponential shape.



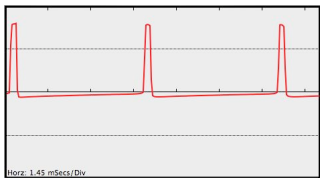
Sawtooth Wave: even and odd harmonics, with energy decaying in linear shape.

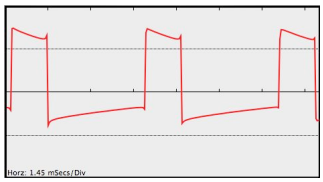


Triangle + Sawtooth: mix of the previous two waves.

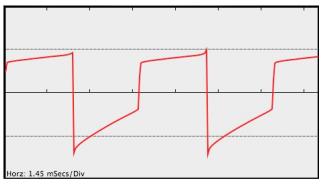


Square/Pulse Wave: odd harmonics only, with linear decaying energy, when the duty cycle (a.k.a. symmetry, a.k.a. pulse width) is at 50%.





When the duty cycle goes on different ratio, the harmonic content will loose the harmonics multiples of the numeric ratio (e.g.; a Pulse Wave at 30% has harmonics 1, 2, 4, 5, 7, 8, 10, 11, 13, 14…). Upper left pictcure shows a 10% Pulse Wave; upper right shows a 75% Pulse Wave.



Square + Sawtooth: mix of the previous two waves. The Square component can be PW modulated as usual.

Output

The signal outputted from VCO goes straight into the Filter(s) Section; is it possibile to control the amount of signal with the dedicated Level potentiometer. The signal form VCO, before Level regulation, is routed to a dedicated frequency divider, for Suboscillation -1 Octave (original Frequency /2) or -2 Octaves (original Frequency /4).

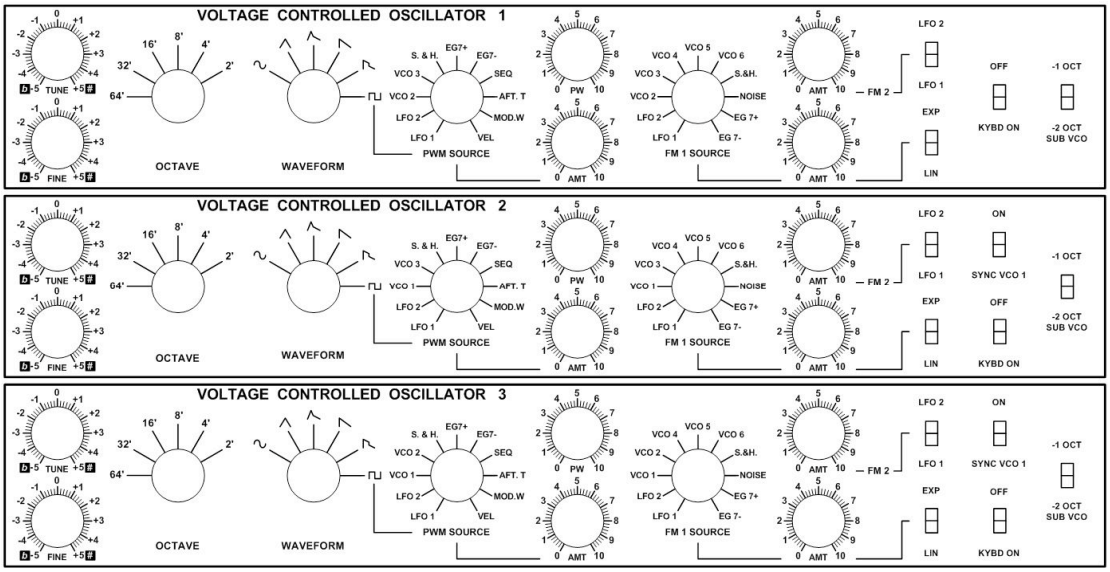
Each VCO has his own indipendent Suboscillator; the signal subdivided is always a Square Wave, with no respect for the original waveform generated.

The signals from VCOs 2 and 3, 5 and 6 are respectively routed to Upper and Lower Ring Modulators; in this case, the waveform selection (and Frequency ratio) can severely alter the final result.

Finally, the full range (audio and low freq) signal form the VCO can be routed to the others VCO FM Input (for audio rate/low freq linear/exponential frequency modulation), to theFilter(s) Cutoff (for the audio rate/low freq exponential frequency modulation) and to the common Sample & Hold section (like the other possibile S&H sources).

VOLTAGE CONTROLLED OSCILLATOR 1-6 REFERENCE

As stated above, there are few minor differencies between VCOs, but the core functions are the same.



Following here, we'll give description of every available control.

- TUNE: Coarse Tune Control; operating range: +/- one octave.
- FINE: Fine Tune Control; operating range: +/- 1 tone.
- OCTAVE: Selection of the playing octave; operating range: 64'-2'.
- SYNC: Enable Hard Sync for the slave VCOs (2 and 3, 5 and 6); operating range: On/Off.
- KYBD: Detach the keyboard CV (thru MIDI Interface or CV/Gate Interface) from the control of VCO; operating range: On/Off.

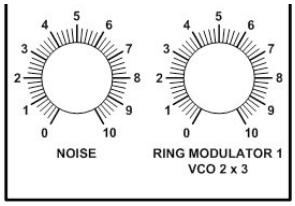
- FM 1 SOURCE: Selection of the modulating source for PW; operating range (in full option): LFO 1, LFO 2, VCO 1, VCO 2, VCO 3, VCO 4, VCO 5, VCO 6, S&H, NOISE, EG7+ (positive going only), EG7- (negative-going only).
- AMT: The Frequency Modulation 1 buss Amount; operating range 0-10.
- LIN/EXP: Selection for FM behaviour; operating range: Linear/Exponential.
- FM 2 AMT: the Frequency Modulation 2 buss Amout; operating range: 0-10.
- FM 2 LFO 1/LFO 2: Selection for the modulating source; operating range: LFO 1/LFO 2. As said above, FM 2 buss follows always exponential mode.

- WAVEFORM: Selection of the desired audio shape; operating range: Sine, Triangle, Triangle+Sawtooth, Sawtooth, Sawtooth+Pulse, Pulse.
- PW: Nominal value for Pulse Simmetry; operating range 50-100%. At 100, you'll get silence.
- PWM Source: The possibile Pulse Width Modulation source; the sources slightly differs from VCO to VCO; operating range (in full option): LFO 1, LFO 2, VCO 1, VCO 2, VCO 3, VCO 4, VCO 5, VCO 6, S&H, EG7+ (positive-going only), EG7- (negative-going only), SEQ, AFTERTOUCH, MODULATION WHEEL, Key VELOCITY.
- AMT: The Pulse Width Modulation Amount from the selected source; operating range 0-10.

- SUB VCO: Selection for frequency dividing factor; operating range: -1 OCT/-2 OCT.

The VCO Level and VCO SUB Osc Level are located into the rightmost MIXER module (Upper and Lower for VCOs1-2-3 and 4-5-6).

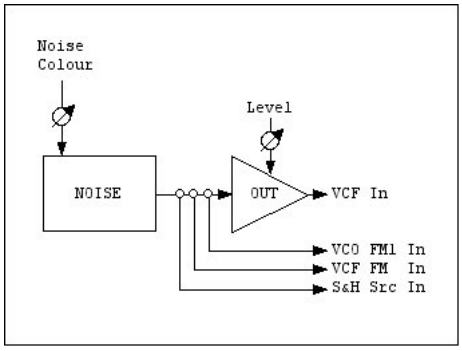
RING MODULATOR



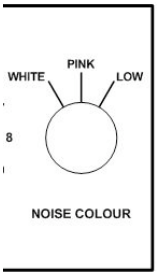
Each section of A8 has a separate Ring Modulator module; the Upper Ring Mod treats the waveforms selected in VCOs 2 and 3, prior Level attenuation; the Lower Ring Mod treats the waveforms selected in VCOs 5 and 6.

Ring Modulation performs sum and subtraction for each harmonic frequency present in the two signals at the input of the circuit: if signal "a" (e.g.; VCO 2) is a single sine wave at 100 Hz and signal "b" (e.g.; VCO 3) is a single sine wave at 500 Hz, the outputted result of Ring Modulation is: 100 + 500 = 600 Hz plus 100 - 500 = -400 Hz (the minus sign means phase inversion); if the two input signals contains more than a single sine wave, the sums and subtractions are performed *for each couple* of harmonic frequencies available. So, two sawtooth waves ring modulated leads to a dense harmonic result.
If one of the two VCOs ring modulated is slowly modulated (from an LFO or from a Envelope Generator), the Ring Mod result will be fairly *clangorous*.
Each Ring Modulator has only one panel control regarding its output Level; this control is located, as usual, in the Upper/Lower MIXER.

NOISE GENERATOR



There is only one Noise Generator that works in both Upper and Lower sections of A8 Synthesizer. It acts mainly in two roles: as sound source (winds, surfs and similar) available into the audio MIXER Upper/Lower, as modulation source for VCO/VCF FM and as sampling source for the SAMPLE & HOLD module.



While each Upper and Lower MIXER has a separate NOISE Level control (as seen two pictures before), the colour noise will be the same in both parts of A8 Synthesizer. You can choose the type of noise (Low Frequency, Pink, White Noise) with the Noise Colour control located into the SAMPLE & HOLD module.

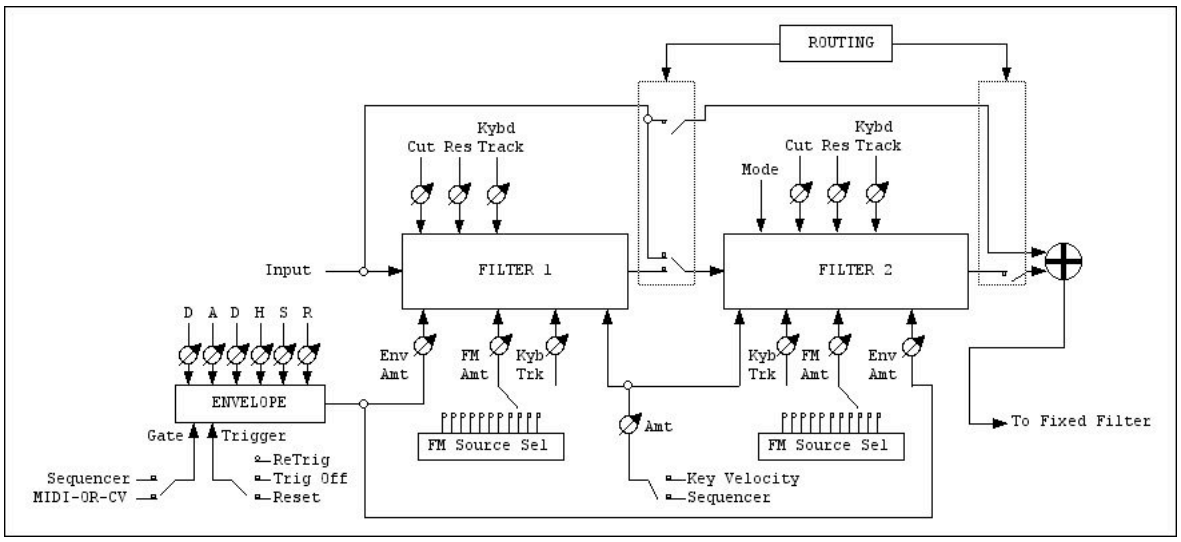
NOISE GENERATOR REFERENCE

As above, the two controls concerning the Noise Generator are distributed on the whole front panel of A8 Synthesizer:

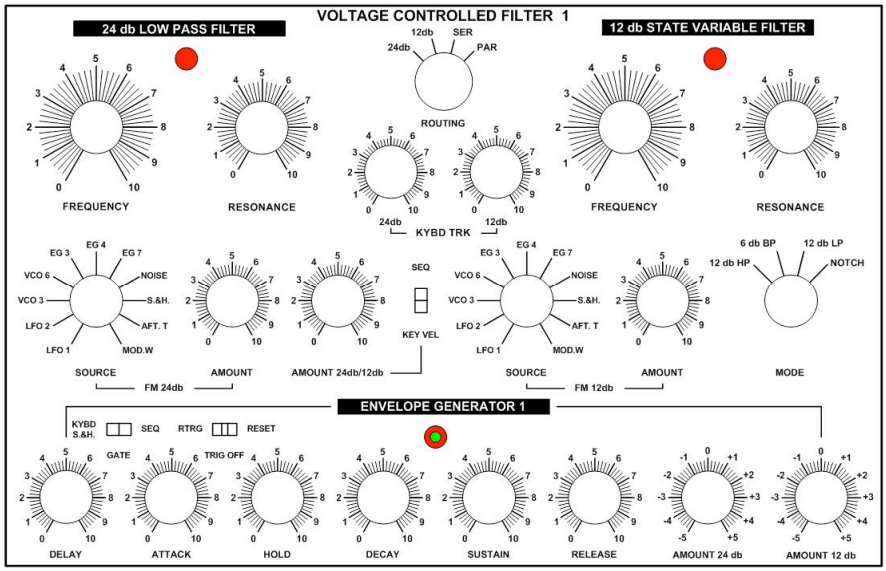
- NOISE Level: each MIXER (Upper and Lower) has separate volume control for *the same* Noise Generator; operating range: 0-10.
- NOISE COLOUR: available in the S&H module, it allows the choice between three different noise types; operating range: White (equal power per unit bandwidth - apparently, more presence on trebles), Pink (equal power per octave - apparently, more balanced), Low Frequency (LowPass filtered at 120 Hz).

VOLTAGE CONTROLLED FILTER 1-2

Each section of the A8 Synthesizer has a double Filter module comprising a real transistor-ladder 24 dB/Oct Low Pass Filter and a Multi Mode 12 dB/Oct Filter. The two filters can be used in serial configuration (first LP, then MM), or in parallel mode (both on the same sources); still, you can choose to work only with Low Pass or only with Multi Mode.
As usual, each filter has separate controls for Cutoff Frequency and Resonance; a couple of red LEDs shows when (if any) clipping occurs at the input stage; as you can imagine, rasing the VCOs Levels and the Resonance are two good ways for see the two LEDs flickering.



Both Filters has indipendent three FM busses: one for Keyboard Tracking, the second for Envelope Generator, the third for a selection of different modulations and (as on the rest of A8 structure, there is a fair amount of modulation sources for Cutoff Frequencies).
There is a fourth, common, modulation buss that can be shared between two switchable sources: Key Velocity (with direct access to the mod summing point for Cutoff Frequency, no EG Level multiplication) or Sequencer CV (with option for choose which Sequencer Column will drive the Cutoff); the voltage on this fourth buss will affect both Filters (LP and MM) in equal intensity; e.g., there is only one dedicated Amount.
Each Filter (in Upper or Lower section of the instrument) has a dedicated multistage Envelope Generator: we'll discuss about it later, in the Modulation Section of this manual.



VOLTAGE CONTROLLED FILTER 1-2 REFERENCE

Controls in common for both Filters

In common, both 24 and 12 dB filters shares controls for:

- ROUTING: selection for work with 24 dB/Oct only, 12 dB/Oct only, both filters in Series connection (first 24 dB, second 12 dB) or both filters in Parallel connection.

- AMOUNT 24 dB/12 dB: the amount of modulation from the source choosen for the common modulation buss on the Cutoff Frequency. With the following switch, you can choose between two available sources. The same amount works on both 24 dB and 12 dB filters.
- KEY VEL/SEQ: the Key Velocity and the Step Sequencer shares the same modulation buss. This make sense: when the filter is under sequencer control, you'll probably don't need the keyboard velocity on the cutoff frequency. And vice-versa.

Controls for 24dB/Oct transistor-ladder Low Pass Filter

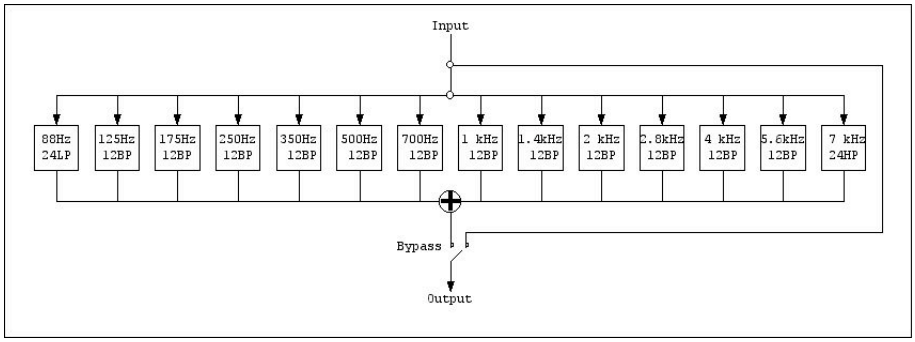
- LED: this red LED glows when the input signal is clipping.
- FREQUENCY: the Cutoff Frequency of the Filter.
- RESONANCE: the Resonance governs the amount of filtered signal routed back at the input of the circuit; the filter goes into self-oscillation (producing a steady sine tone).
- 24 dB KYBD TRACK: the keyboard tracking amount; operating range: from 0 to 100%.
- AMOUNT 24dB: the dedicated Envelope Generator 1 (Upper) or 4 (Lower) Amount. This control is bipolar and offers polarity inversion for the connected Envelope Generator. You'll find this control near the Envelope knobs, on the lower part of the module; operating range: +/-5.
- FM 24 dB SOURCE: is the source for the other modulation bus on Cutoff Frequency. You can choose between many different sources; in full options, they are: LFO 1, LFO 2, VCO 3, VCO 6, EG 1, EG 4, EG 6, EG 7 (only positive-going), NOISE, S&H, AFTERTOUCH, MODULATION WHEEL.
- FM 24 dB AMOUNT: the amount of modulation from the selected source routed to Cutoff Frequency.

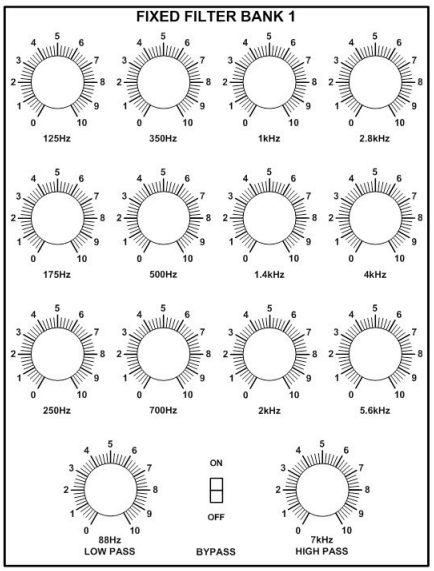
Controls for 12 dB/Oct state-variable Filter

- MODE: selection for the filtering mode; operating range: 12 dB/Oct High Pass resonant, 6 dB/Oct BandPass resonant, 12 dB/Oct LowPass resonant, 6 dB/Oct Notch non-resonant.
- LED: this red LED glows when the input signal is clipping. There's no problem for occasional flickering.
- FREQUENCY: the Cutoff Frequency of the Filter.
- RESONANCE: the Resonance governs the amount of filtered signal routed back at the input of the circuit; the filter goes into self-oscillation (producing a steady sine tone). Be careful! This module is an hot-rodded version of the classic State Variable design and can goes *very bad*…
- AMOUNT 12 dB: the dedicated Envelope Generator 1 (Upper) or 4 (Lower) Amount. This control is bipolar and offers polarity inversion for the connected Envelope Generator. You'll find this control near the Envelope knobs, on the lower part of the module; operating range: +/-5.
- FM 12dB SOURCE: source for the other modulation buss on Cutoff Frequency. You can choose between many different sources; in full options, they are: LFO 1, LFO 2, VCO 3, VCO 6, EG 1, EG 4, EG 6, EG 7 (only positive-going), NOISE, S&H, AFTERTOUCH, MODULATION WHEEL.
- FM 12 dB Amount: the amount of modulation from the selected source routed to Cutoff Frequency.

FIXED FILTER BANK

Each section of the instrument has a Fixed Filter Bank, suitable for imposing formants or peculiar kind of equalization over the (previously) dynamically filtered signal. The structure of fhe FFB is pretty straightforward: the signal is treated with 14 separate band, 12 band pass 12dB/Oct and - at lowest and highest extremes - one 24 dB/Oct Low Pass and High Pass.





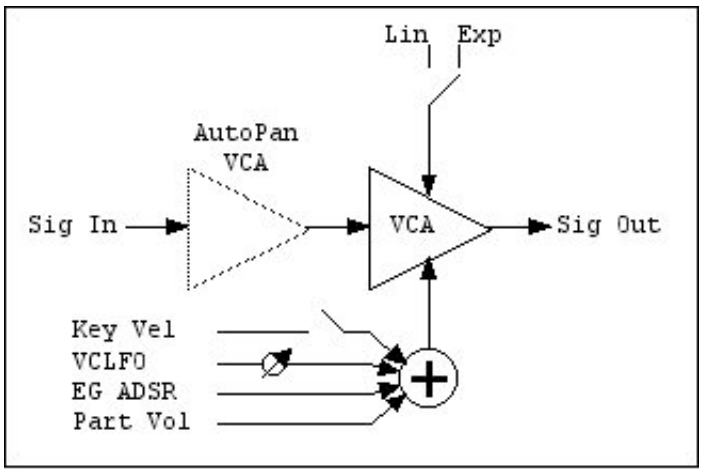
FIXED FILTER REFERENCE

The module has the following controls (mainly devolved to individual filters gain):

- Low Pass Level @ 88 Hz.
- Band Pass Level @ 125 Hz, 175 Hz, 250 Hz, 350 Hz, 500 Hz, 700 Hz, 1 kHz, 1.4 kHz, 2 kHz, 2,8 kHz, 4 kHz, 5.6 kHz.
- High Pass Level @ 7 kHz.
- Bypass On/Off: you can entirely bypass the Fixed Filter Bank.

VOLTAGE CONTROLLER AMPLIFIER

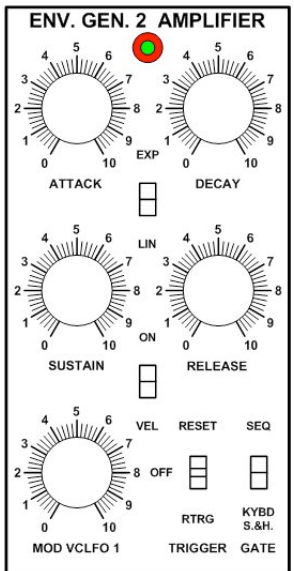
With the Voltage Control Amplifier, you can multiply the filtered audio signal(s) with the shape programmed in the dedicated Envelope Generator (EG 2 on Upper Part, EG 5 on Lower Part); tweaking the EG parameters, you can reach different kind of articulation in your sound: from slow and letargic to fast and percussive. We'll see later the Envelope Generator behaviours. The Amplifier reacts in Linear or in Exponential shape to the external CVs: you can choose which one is the best for your needs.



Each VCA Section in the A8 Synthesizer contains *two* cascaded amplifiers: the first one is involved in the complex Main Mix / AutoPan structure which we'll talk later; the second one is the "official" VCA who drives the articulation of the Upper/Lower Part(s). In the upper scheme, the Part Volume control *is* to Upper or Lower Volume control available in the Main Mix / AutoPan Section.

As pointed before, there is a dedicated ADSR Envelope for driving the amplifier; in addition, , is possible to use the VCLFO 1 (Upper) or 2 (Lower) for obtain sub-audio rate modulation (e.g.: tremolo) or fast audio rate modulation (e.g. unbalanced AM). On this way, you'll end with a different harmonic content: as you probably remember, the AM Output is equal to C, C+M, C-M, where C is Carrier Frequency (the frequency of the audio signal) and M is the Modulator Frequency (the modulating audio rate control).

Still, if needed, is it possible to control the amplitude with MIDI Key Velocity.



VOLTAGE CONTR AMPLIFIER REFERENCE

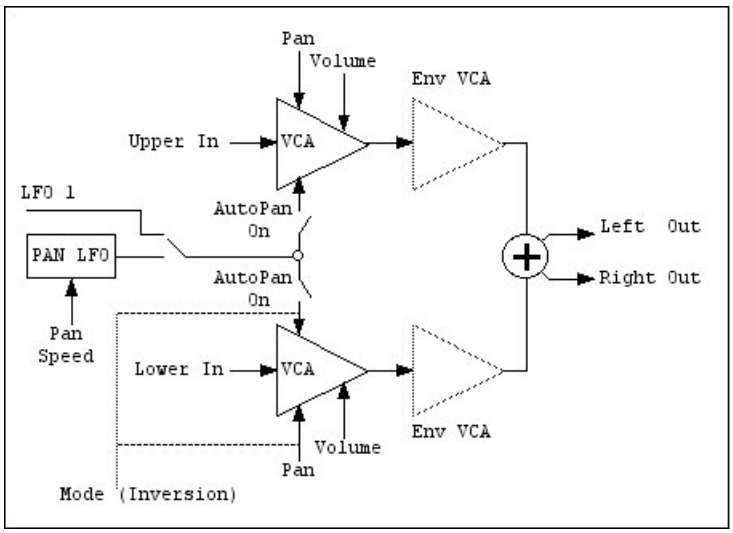
Here are the Voltage Controlled Amplifier controls:

- EXP/LIN Switch: the behaviour of the amplifier in reaction to external CV. You can choose between Exponential or Linear mode.
- VEL ON/OFF: the switch enable MIDI Key Velocity on VCA Gain.
- MOD VCLFO 1 (or 2): the amount of CV from LFO 1 (Upper Part) or 2 (Lower Part) for control the VCA level.

As stated before, we'll talk later about the dedicated ADSR Envelope Generator functions and controls.

MAIN MIX / AUTO PAN

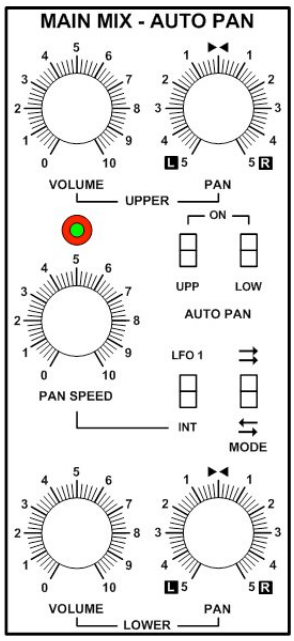
In this module, at last, both Upper and Lower section are joined together toward the final output of the entire instrument. Each section has separate controls for Volume, static Pan position (mono in/stereo out) and AutoPan enable switch. The pan position(s) of the signal(s) can be automated with an integrate triangle-wave LFO or with the VCLFO 1 of the Upper Section. Still, you can choose parallel or cross pan motion for Upper/Lower Section; in parallel mode, both Upper and Lower signals moves in the same direction; in cross mode, the pan position movements are mirrored.



Note

If you select the mirrored/cross pan motion, the Lower (static) Pan control works in inverted mode; e.g.: full cw = all Left, full ccw = all Right.

While the dedicated LFO Speed goes sufficiently fast for AutoPan, if you want to drive very high the sound movement, don't forget to choose the LFO 1 as Pan Source;: as soon as you reach the audio rate, the harmonic content of the signals will change according to AM rules.



MAIN MIX / AUTO PAN REFERENCE

Controls for the Upper Section:

- VOLUME: the level of the Upper synthesis channel.
- PAN: the static position of the signal in the stereo field.
- (Auto Pan) UPPER ON: this switch enable the LFO pan modulation for the Upper signal.

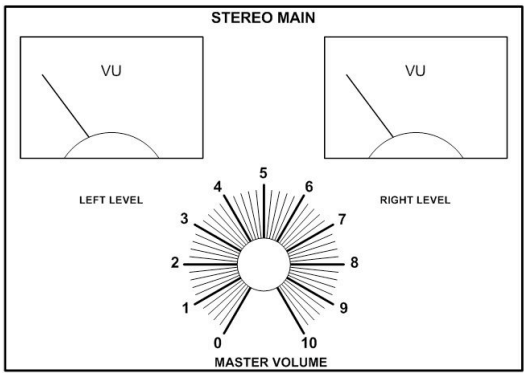
Controls for the Lower Section:

- VOLUME: as above.
- PAN: as above.
- (Auto Pan) LOWER ON: as above.

Controls for the Auto Pan Section:

- PAN SPEED: the rate for automatic pan movement. The upper LED will flash (in time) in red when the internal LFO is selected, will flash in blue when the LFO 1 is selected. The Pan Speed goes pretty high, but - as said above - if you need to dig deeply into audio rate AM, you should choose the LFO 1 as pan source.
- LFO 1/INT: this switch choose the modulating source for the Auto Pan movement.
- MODE: this switch choose between parallel motion (both Upper and Lower Sections moves with the same direction, in respect of the individual static PAN positions) or cross mirrored motion (when Upper is left, Lower is right and vice versa).

STEREO MAIN



This is the "big knob" for the final main volume of the entire synthesizer; while it's pretty straigthforward, you should keep in mind two things:

- this is a buffered potentiometer; whatever level you set, you'll always have 1000 Ohm.
- the couple of VuMeters has a fairly limited visual dynamic range (-14/+3); so, if you want to see needles dancing, you'll be probably forced to set an high out level. Beware! The A8 Synthesizer can be very LOUD.

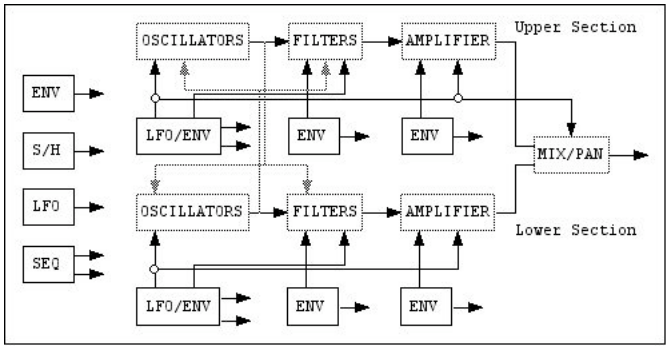
A8 MODULATION SOURCES AND CONTROL MODIFIERS

In the Grp A8 Synthesizer, you can use several types of modulation:

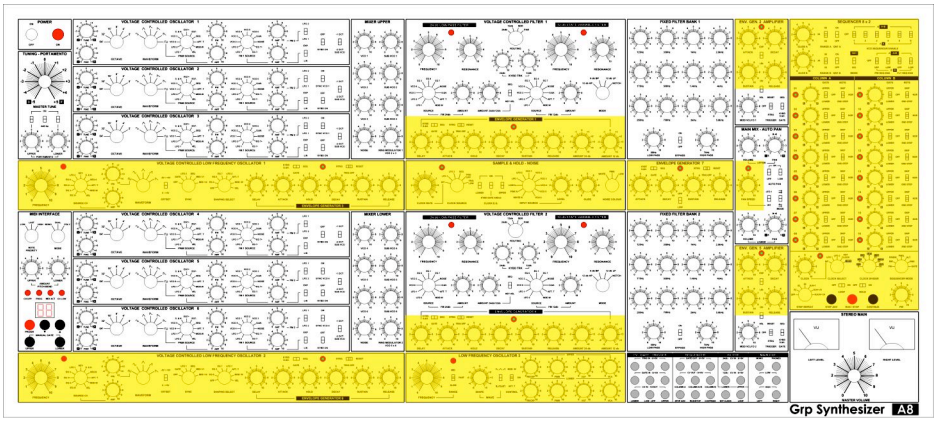
- DC constant Modulations: e.g., the CV informations from MIDI/Analog Keyboards; they are steady values applied to oscillators and filter frequencies.
- Transient Modulations: e.g., the CV outputs from the seven Envelope Generators. They'll follow their stages, from Note On till Note Off and then (hopefully) they'll settle down until the next Gate On.
- Cyclical Modulations: e.g., the CV outputs from the three Low Frequency Oscillators. They'll generate a control with a shape (waveform) and rate (frequency) well definable by the user.
- Random Modulations: e.g., the CV outputs from the Sample & Hold module. You'll can patch the system for randomly pick values from several S&Hed sources.
- Programmable Modulations: e.g., the dual CV outputs from the internal Step Sequencer Module. You can program both columns in 16x1 or 8x2 fashion for drive oscillators frequencies and PW or filter cutoff frequencyes. As we'll see after, you'll can realize complex real-time interactions with Step Sequencer and MIDI/CV Inputs.

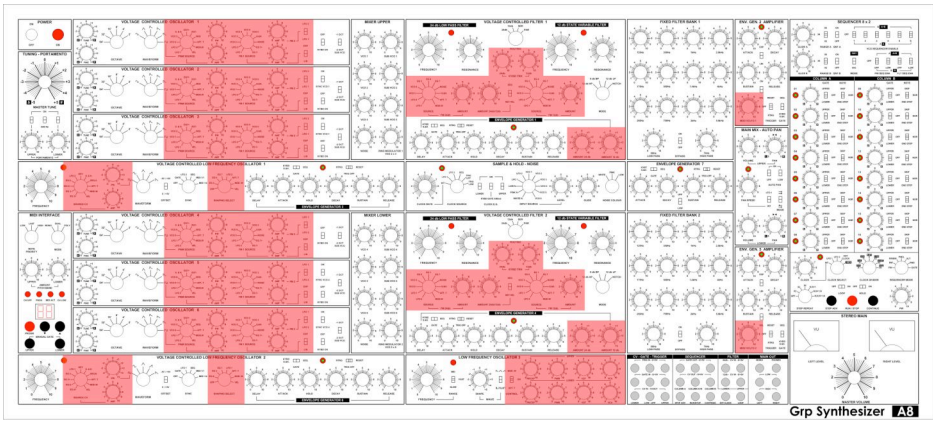
Note

To be fully honest, there is a sixth kind of *audio rate modulation source* into the Grp A8 Synthesizer: you can use (…you should try it!) the VCO signals for lin/exp (cross) modulate the frequency of VCOs and Filters.



The over simplified drawing above shows the available modulation sources. Following, you'll find a picture of the front panel with the highligted positioning of the modulation sources.





The above illustration shows the *destinations* and the *amounts* of modulation routings. When you'll start with sound experiments, it's a good rule to begin turning all them off.

Modulation Sources

Here is a list of the available modulation sources:

- VCO 1.
- VCO 2.
- VCO 3.
- VCO 4.
- VCO 5.
- VCO 6.
- Noise Generator.
- VC LFO 1.
- VC LFO 2.
- LFO 3.
- Sample & Hold.
- Envelope Generator 1 DAHDSR.
- Envelope Generator 2 ADSR.
- Envelope Generator 3 DHADSR.
- Envelope Generator 4 DAHDSR.
- Envelope Generator 5 ADSR.
- Envelope Generator 6 DHADSR.
- Auxiliary Envelope Generator 7 ADSR.
- Step Sequencer Column A.
- Step Sequencer Column B.
- Keyboard Tracking.
- MIDI Pitch Bend.
- MIDI Mod Wheel.
- MIDI Channel Aftertouch.
- MIDI Key Velocity.
- Filter 24 dB Ext CV In.
- Filter 12 dB Ext CV In.

Modulation Destinations

Here is a list of the available modulation destinations:

- VCO 1 PWM, Linear Frequency Modulation, Exponential Frequency Modulation.

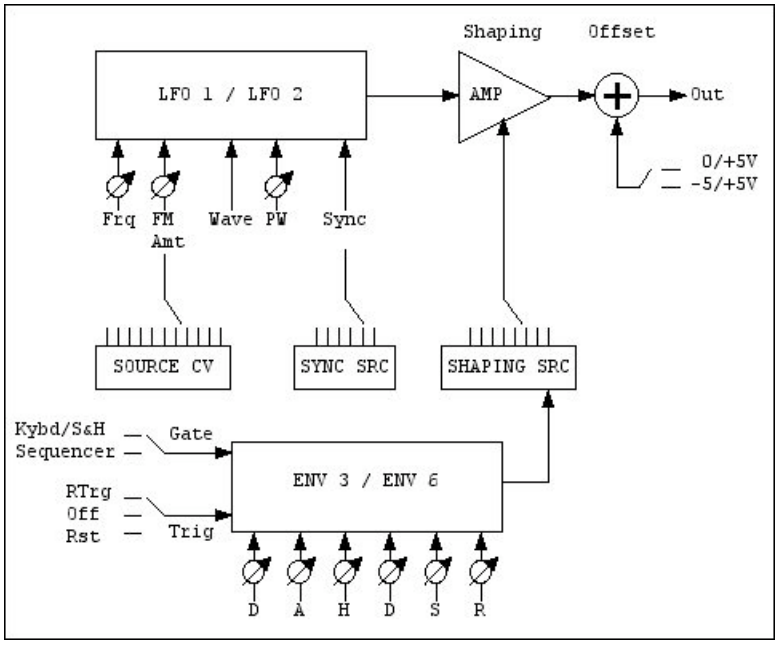
- VCO 2 PWM, Linear Frequency Modulation, Exponential Frequency Modulation.
- VCO 3 PWM, Linear Frequency Modulation, Exponential Frequency Modulation.
- VCO 4 PWM, Linear Frequency Modulation, Exponential Frequency Modulation.
- VCO 5 PWM, Linear Frequency Modulation, Exponential Frequency Modulation.
- VCO 6 PWM, Linear Frequency Modulation, Exponential Frequency Modulation.
- VCF 1 24 dB Cutoff.
- VCF 1 12 dB Cutoff.
- VCF 2 24 dB Cutoff.
- VCF 2 12 dB Cutoff.
- VCA Upper Amplitude
- VCA Lower Amplitude
- Upper Section Pan Position
- Lower Section Pan Position
- VC LFO 1 Frequency, Output Shaping.
- VC LFO 2 Frequency, Output Shaping.
- LFO 3 Output Shaping.

From here, we'll explain the behaviour of the different modulation sources and modifers available in the synthesizer.

VOLTAGE CONTR LOW FREQUENCY OSCILLATOR 1-2

The two main voltage controlled LFOs are pretty similar (few differences are found in the external control sources list) and are mainly at disposal of the Upper (LFO 1) and Lower (LFO 2) sections; however, you can reassign them using the multi-position selectors available on the front panel.

As you probably know, the main goal of an Low Frequency Oscillator is to produce a periodic CV, useful for vibratos and tremolos), whose shape and speed are governed from waveform and frequency choosed by the user; in addition, VC LFO 1-2 can goes very up in the audio range, reaching a whopping 2,2 kHz that you'll appreciate for experiments with FM/AM.



The behaviours of the VC LFO 1-2 are organized in few main areas: Frequency Setting and Frequency Modulation from different external sources; Waveform Selection and Pulse Width Modulation; Hard Sync Setting from several external sources; Output Offsetting and Shaping thru different external sources, enclosing a *dedicated* Envelope Generator (more on this later).

Frequency Control

The nominal frequency of the LFO spans between one cycle every 45 secs and 1.7 kHz; the Frequency knob sets the desired rate and the red LED flashes in time; don't forget that the LFO Frequency can be externally modulated with one of eleven possible sources: the more positive CV goes into the LFO (you can adjust the Source CV Amount), the fastest will be the speed. Still, is it possible to reset in Hard Sync mode the LFO cycle to one of six (with an "off - no sync" position) sources: due to the analog nature of the circuit, the Sync capabilities should be intendend as a cycle-reset and not as a "crystal quartz clear" time alignment on external sources; the different behaviour could be pretty evident at low speed.

Waveform Control

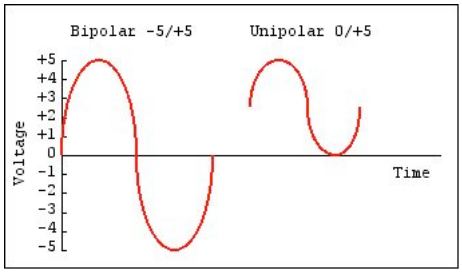
The shape of the modulation is a consequence of the choosen waveform; there are five main waveforms available (sine, triangle, sawtooth, ramp, square) and, thanks to the analog nature of the LFO circuit, is it possible to modulate the shape/simmetry of the square wave, obtaining all the desidered Pulse Widths.

Hard Sync

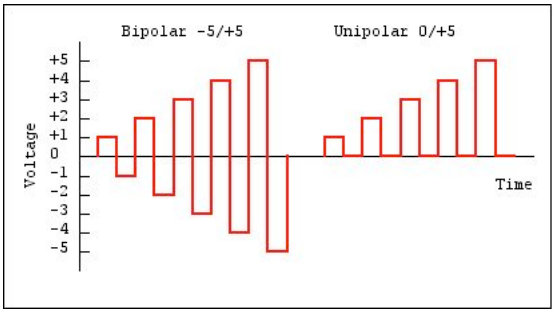
As said before, the cycle of the VC LFO 1-2 can be interrupted and restarted under external sync control; in this way, you can assure that (e.g.) every time you press a note, the LFO will always start from the same point in its waveform. There are six available sync sources: Off Sync, Keyboard Gate, the other VC LFO, the Step Sequencer Clock, MIDI synchronization for 1 LFO cycle every bar or for 1 LFO cycle every quarter note.
Don't forget that you can sync LFO 1 to LFO 2 and LFO 2 to LFO 1…

Output Offset

If you use LFO 1-2 for frequency modulating the VCOs, sooner or later you'll need the rectifying/offsetting capability to start the tune modulation *from zero*, e.g. from the nominal frequency of the VCO. With the Offset switch, you can choose if the waveshape from LFO spans in the entire CV range -5/+5V (ten octaves, five above and five below the nominal frequency of the modulation destination) or is best suited for your needs to limit its range only to the positive field of values 0/+5V (five octaves, *starting* from 0 V, the nominal frequency of the modulation destination).



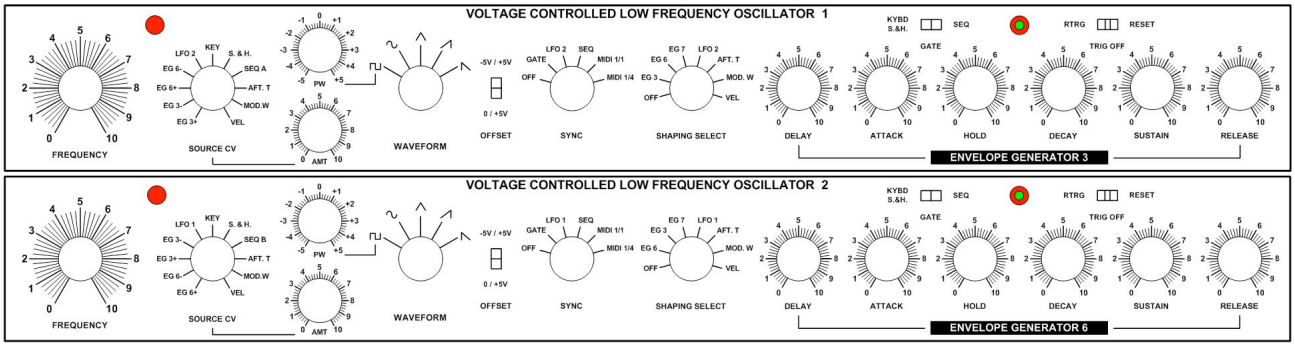
If you are using Square Wave for low frequency modulation on VCO tuning:



- in the first case (bipolar range), turning clockwise the FM Amount on the VCO you'll end with a broad and broad trill whose speed is the LFO Frequency and interval is the VCO FM Amount, *costantly out of tune* with the nominal frequency of the VCO *except* the rarest cases of symmetrical values (+/-1, 2, 3, 4, 5 octaves).
- in the second case (unipolar range), turning clockwise the FM Amount on the VCO, you'll end with a trill that will start *always* from the lowest value = 0V, *the nominal frequency* of the VCO. In this way, it will be more easiest to obtain tuneable intervals.

Shaping

The Shaping capabilities allows to vary *in time* the amplitude of the control signal outputted from the LFO. There are several shaping sources, enclosed a dedicated Envelope Generator for modulation fade in/fade out, comprising MIDI Key Velocity, Modulation Wheel position, Channel Aftertouch value, the other VC LFO value, the auxiliary Envelope Generator 7, several other EGs available in the A8 structure.



VOLTAGE CONTR LOW FREQUENCY OSCILLATOR 1-2 REFERENCE

As stated before, there are only few differences between the two main LFOs; following, we'll give description of every available control.

Frequency Controls:

- FREQUENCY: the LFO rate; from 45 sec to 1700 Hz.
- LED: visual indication for frequency of the selected wave and shape for the square/pulse wave.

- SOURCE CV: source of Frequency Modulation; you can choose between: EG 3 + (positive going), from the dedicated Envelope Generator in LFO 1; EG 3 - (negative going), from the dedicated Envelope Generator in LFO 1; EG 6+ (positive going), from the dedicated Envelope Generator in LFO 2; EG 6- (negative going), from the dedicated Envelope Generator in LFO 2; LFO 2 (available only in VC LFO 1), Freq Mod from LFO 2; LFO 1 (available only in VC LFO 2), Freq Mod from LFO 1; KEY, the keyboard control voltage; S&H, from the common Sample & Hold/Noise Module; SEQ A (available only in VC LFO 1), from the A-column of the Step Sequencer; SEQ B (available only in VC LFO 2), from the B-column of the Step Sequencer; AFT.T., from MIDI Channel Aftertouch, MOD.W, from MIDI Modulation Wheel, VEL, from MIDI Key Velocity.
- (SOURCE CV) AMT: modulation amount for the selected source.

Waveform Controls:

- WAVEFORM: you can choose between square (variable pulse), sine, triangle, ramp, saw.
- PW: pulse width for the selected square wave.
- OFFSET Switch: you can choose between unipolar range (0/+5V) or bipolar (-5/+5V) for the waveforms.

Sync Controls:

- SYNC: selection for the (hard) sync source; you can choose between: OFF, no (hard) sync; GATE, sync/restart on the keyboard Gate On; LFO 2, (available only in VC LFO 1), from LFO 2; LFO 1, (available only in VC LFO 2), from LFO 1; SEQ, the Step Sequencer Clock Generator; MIDI 1/1, sync the LFO cycle on every 4/4 bar of external MIDI Clock; MIDI 1/4 sync the LFO cycle on every quarter of external MIDI Clock.

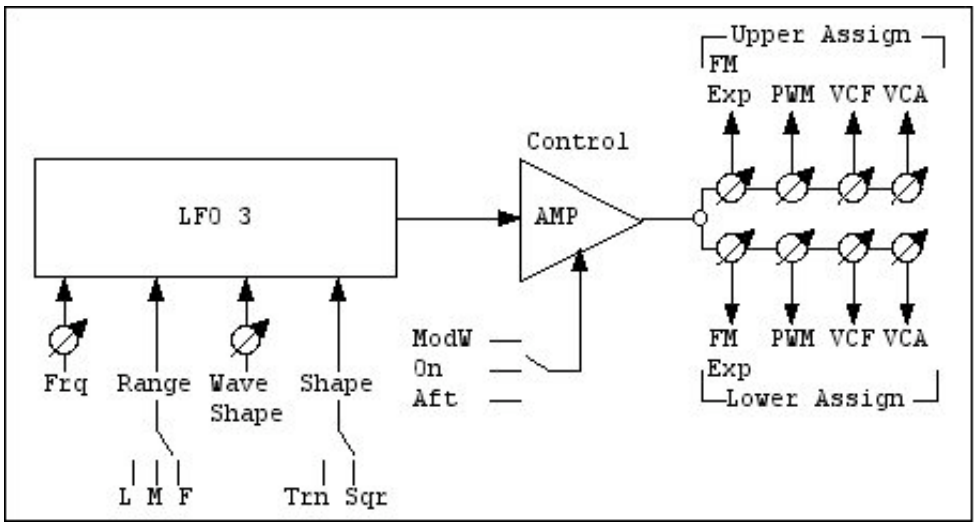
Shaping Controls:

- SHAPING SELECT, the modulation source for the LFO amplitude; you can choose between: OFF, no shaping (a constant value keeps always on the LFO output); EG 3, thru dedicated Envelope Generator in LFO 1; EG 6, thru dedicated Envelope Generator in LFO 2; EG 7, thru auxiliary common Envelope Generator 7; LFO 2, available only in LFO 1; LFO 1, available only in LFO 2; AFT.T., the MIDI Channel Aftertouch; MOD.W, the MIDI Modulation Wheel; VEL, the MIDI Key Velocity.

As you can imagine, well'talk later about the embedded Envelope Generators 3 and 6 controls.

LOW FREQUENCY OSCILLATOR 3

The LFO 3 works for both Upper and Lower Sections of the Synthesizer: the user can adjust indipendently modulation amounts for four indipendent destinations (VCO Exp FM, VCO PWM, VCF Cutoff, VCA Amp) on the Upper and the Lower Sections. Obviously, as there is only one LFO 3, its waveshape and frequency will be the same for both sections and eight modulation amounts.



The structure of the LFO 3 is more "performance oriented" than LFO 1-2; it lacks external FM or Sync, but offers several nifty options; it offers mainly options for adjust: Frequency and Frequency Range, Waveshape, Realtime output shaping control, eight separate Modulation routings (four Upper and four Lower).

Frequency and Frequency Range

The rate of LFO 3 can be set in three different ranges, Fast, Mid and Slow, whose span covers audio and sub-audio rate. As usual, the Frequency control and a red LED permits easy adjustment and rate visualization.

Waveshape

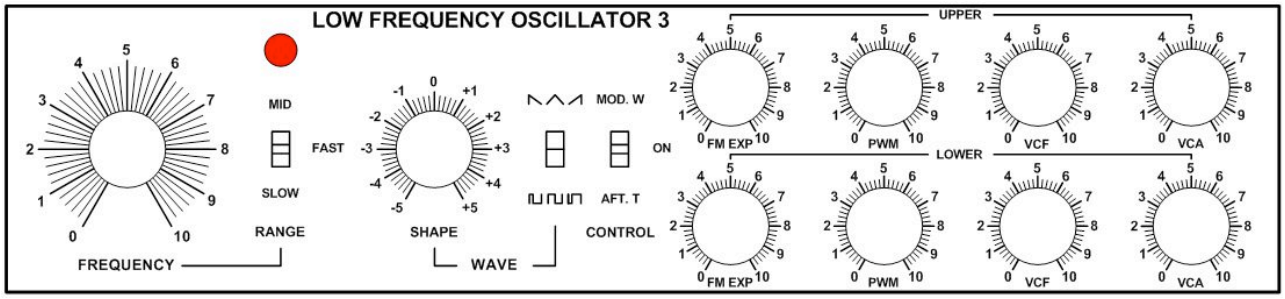
As on other great mono machine of the past, the A8 Synthesizer offers in the LFO 3 two main waves, triangle and square, that can be freely altered from the user. On this way, you can obtain all the intermediate values from sawtooth - triangle - ramp and all the different pulse widths, starting from square wave, till 1% to 99%.

Output Control

You can choose if have permanently on the CV outputted from LFO 3 or re-shape its amplitude scaling with Modulation Wheel position or Channel Aftertouch value. As you can imagine, this is appliable only when the A8 Synthesizer is under MIDI control.

Modulation Routings

The LFO 3 outputs eight different amounts of the same CV (same waveform, same frequency) towards the available Upper and Lower destinations.



LOW FREQUENCY OSCILLATOR 3 REFERENCE

Frequency Controls:

- LED: flash at LFO 3 Frequency.
- FREQUENCY: the speed of LFO 3; three ranges available, see below.
- (FREQUENCY) RANGE: Fast (75-2700 Hz), Mid (2 - 91 Hz), Slow (10"-4 Hz).

Waveshape Controls:

- WAVE SHAPE: control for simmetry of Square/Pulse and Saw/Triangle/Ramp wave. See below.
- (WAVE) SELECT SWITCH: In upper position, you gain access to Saw/Triangle/Ramp wave, continously shapable with previous WAVE SHAPE control. In lower position, you gain access to Square/Pulse wave, continously shapable with previous WAVE SHAPE control.

Output Control Controls:

- CONTROL: three position switch for selection of LFO 3 Amplitude Modulation source: you can choose between: MOD W: the Modulation Wheel position sets the amount of LFO 3 output; ON: constant value; the LFO 3 output is always fully open; AFT.T; the Channel Aftertouch value sets the amount of LFO 3 output.

Destination Controls:

- UPPER DESTINATIONS: the modulation destinations; you have separate amount for: FM EXP: exponential frequency modulation on all three VCOs; PWM: shape modulation on all three audio Square Waves (if available); VCF: cutoff frequency modulation on all two VCFs; VCA: amplitude modulation on the VCA; LOWER MODULATION: same as above.

Note
With LFO 1 on Auto Pan and LFO 3 on Upper/Lower VCA you can superimpose two simultaneous AM treatments on audio signals.

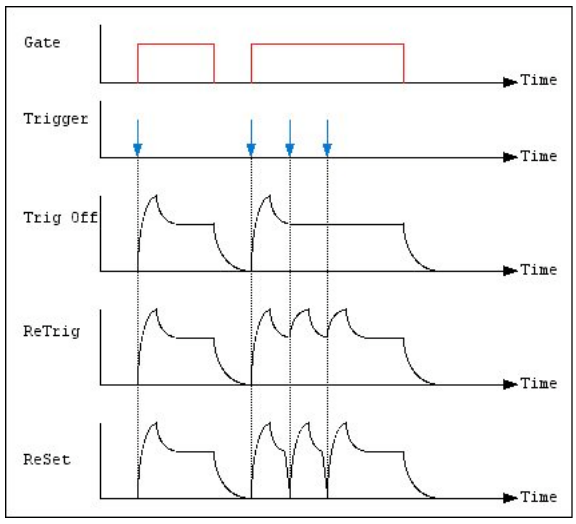
ENVELOPE GENERATORS

The A8 structure contains seven indipendent EGs positioned in logical points of the signal flow; in addition, each EG output is available in the modulation source list of the instrument:

- Envelope Generator 1: controls, with separate bipolar amounts, the cutoff frequencies of Low Pass and State Variable Filters in Upper Section.
- Envelope Generator 2: controls, always at full amount, the gain of Voltage Controlled Amplifier in Upper Section.
- Envelope Generator 3: controls, always at full amount, the output level of VC LFO 1 in the Upper Section.
- Envelope Generator 4: controls, with separate bipolar amounts, the cutoff frequencies of Low Pass and State Variable Filters in Lower Section.
- Envelope Generator 5: controls, always at full amount, the gain of Voltage Controlled Amplifier in Upper Section.
- Envelope Generator 6: controls, always at full amount, the output level of VC LFO 1 in the Upper Section.
- Envelope Generator 7: is an auxiliary envelope, freely assignable to Upper or Lower Section.

Common behaviours and controls - Trigger Mode

All seven Envelope Generators can be controlled in their interaction with Gate and Trigger.



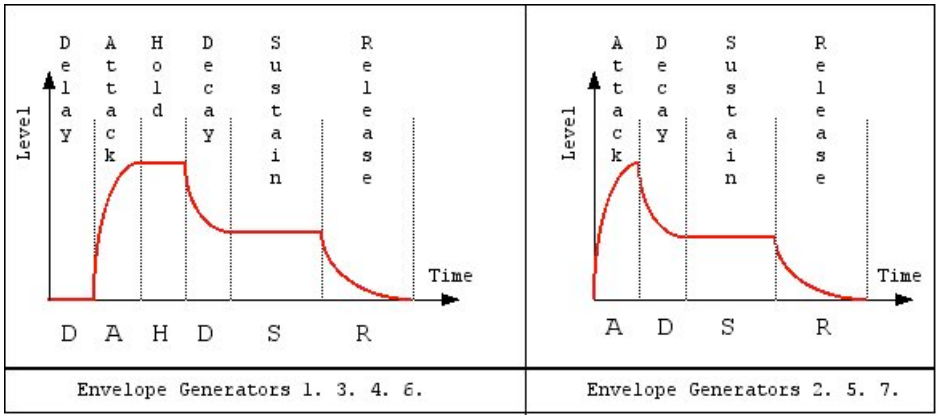
While each EG is *always* under Gate control, there is a three-position switch for Trigger action:

- TRIG OFF position: the selected envelope works only with Gate. Any Trigger received will be simply ignored.
- R(e)TR(i)G position: when the selected envelope receive a Trigger impulse (indipendently from the current Gate On/Off state) it will restart the Attack stage *from the current value*.
- RESET position: when the selected envelope receive a Trigger impulse (indipendently from the currente Gate On/Off state) it will restart the Attack stage *always from zero value*.

Common behaviours and controls - Gate source select

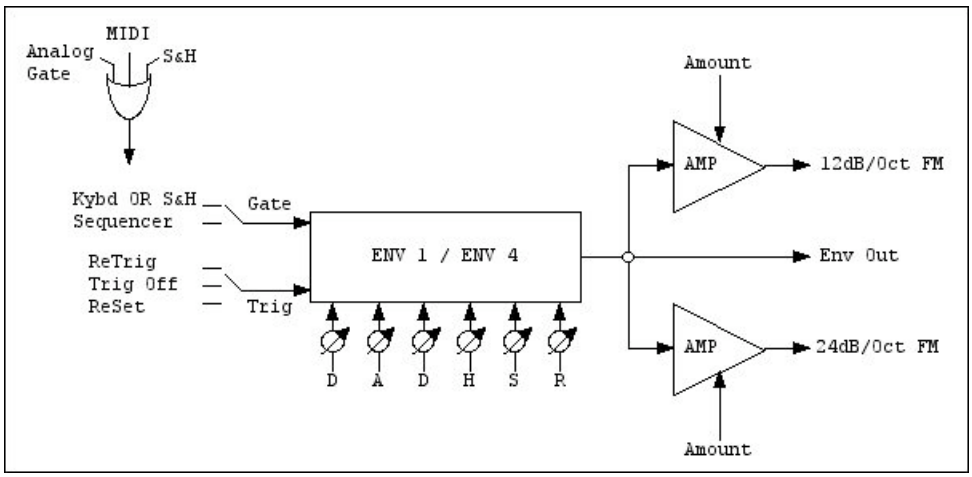
Each Envelope Generator can be "sintonized" on one of two possibile Gate Source using a dedicated two-position switch:

- KYBD S&H position: the selected envelope is fired from any Gate On received thru MIDI Interface *OR* from the analog Gate Input ports *OR* from the internal Sample & Hold module.
- SEQ position: the selected envelope is gated from the internal Step Sequencer.



Common behaviours - Envelope Structure

The most complex envelopes are located in the Filter Modules (Upper and Lower) and in the VC LFO Modules (Upper and Lower); they have a 6-stage structure with Initial Delay, Attack Time, Hold Time, Decay Time, Sustain Level and Release Time.
The most standard envelopes are located in the VCA Modules (Upper and Lower) and in the Auxiliary EG 7 Module (common to both sections); they have a classical 4-stage structure with Attack Time, Decay Time, Sustain Level and Release Time.

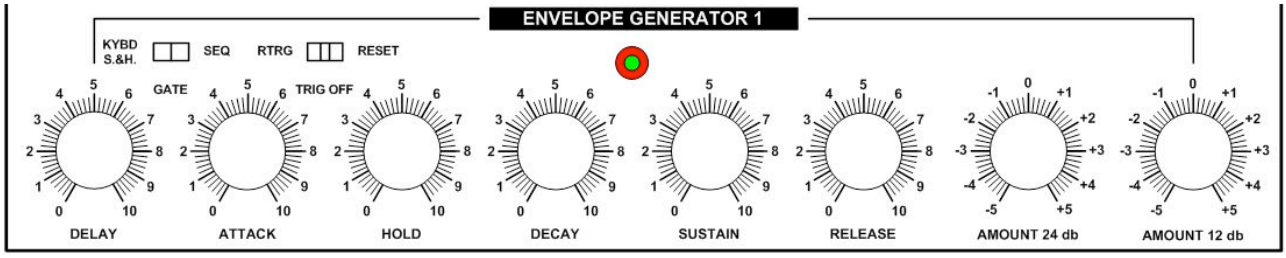


SIX STAGE ENVELOPE GENERATOR (ENV 1 / ENV 4)

The EG 1 and 4 are embedded into the Upper and Lower Filter modules; each envelope drives two filters - one Low Pass, one State Variable - thru a couple of indipendent bipolar Amount controls.
The structure of the envelope is straightforward and, as you can see from the above scheme, is it possible to mimic the classic "clipped decay" envelope from historical vintage mono synths or, if needed, obtain several kind of articulation contours.
This kind of envelope has three separate control outputs:

- Towards the Low Pass Filter - thru dedicated bipolar Amount control.
- Towards the State Variable Filter - thru dedicated bipolar Amount control.
- Direct CV Output; it goes into the modulation source list.

As told before, is it possible to drive the envelope with Gate from Keyboard (Analog and MIDI) ORed with Sample & Hold; the Trigger (from analog ports or from MIDI interface) can be ignored, used for ReTrigger or for forced ReSet.



SIX STAGE ENVELOPE GENERATOR (ENV 1/ ENV 4) REFERENCE

Envelope stages parameters:

- DELAY Time: 0 msec to 15 sec. It defines the timing interval between Note On/Gate On command and the start of the Attack Time. This stage is unaffected in the optional retriggering configuration.
- ATTACK Time: 1 msec to 15 sec; log curve. It defines the timing interval from initial minimum value to maximum value. The optional retriggering starts from this stage.
- HOLD Time: 0 msec to 15 sec. It defines the timing interval of permanence at highest possible level, before beginning the Decay segment.
- DECAY Time: 1 msec to 15 sec; exp curve. It defines the timing interval for moving from the highest possible level towards the Sustain Level.
- SUSTAIN Level: 0 to 100%. The Sustain Level lasts as long as the Gate On signal; as soon as Gate turns Off, the envelope leaves Sustain Level and begins Release Time.
- RELEASE Level: 1 msec to 15 sec; exp curve. It defines the timing interval from Sustain Level back to minimum (initial) level.

Gate (source) parameters:

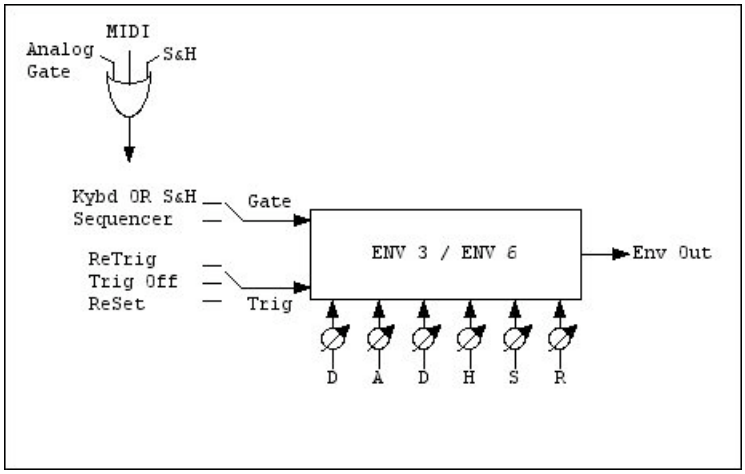
- KYBD S&H position: the envelope is fired from Gate On received thru MIDI Interface or from the analog Gate Input ports OR from the Clock signal emitted from Sample & Hold module.
- SEQ position: the envelope is gated from the Step Sequencer.

Trig switch parameters:

- R(e)TR(i)G position: when the envelope is retriggered, it will restart from the current value.
- TRIG OFF position: the envelope ignore triggers and works only with Gate.
- RESET position: if the envelope is retriggered, it will forced to restart from level zero.

Activity LED:

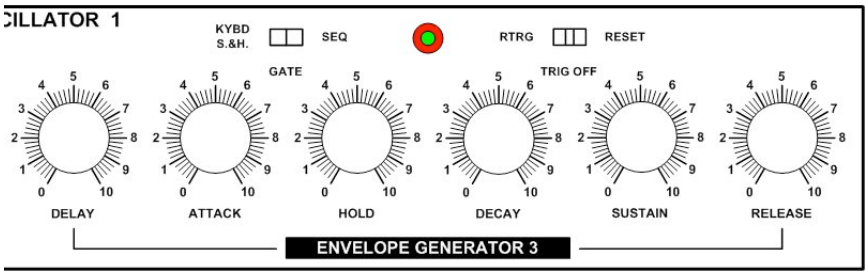
- The *red* colour is for Gate received from MIDI OR from the analog Gate Input Ports OR from the Sample & Hold module.
- The *blue* colour is for Gate received from the Step Sequencer.



SIX STAGE ENVELOPE GENERATOR (ENV 3 / ENV 6)

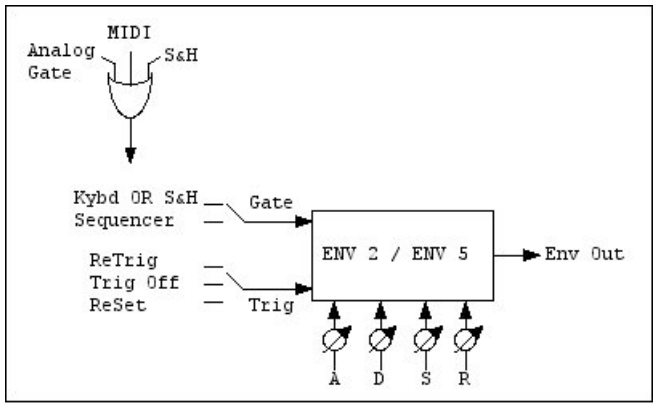
The Envelope Generators 3 and 6 are embedded in the VC LFO 1-2 modules and can be used mainly for shaping the LFO output amplitude; however, their control signals are available into the modulation source list of the instrument.

In spite of EGs 1 / 4, the EGs 3 / 6 lacks the dedicated Amount controls: every kind of attenuation should be done directly at the modulation destination stage.



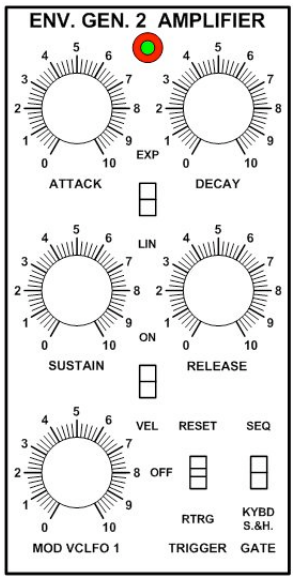
SIX STAGE ENVELOPE GENERATOR (ENV 3 / ENV 6) REFERENCE

You can refer to the previous reference description.



FOUR STAGE ENVELOPE GENERATOR (ENV 2 / ENV 5)

Those two EGs are embedded into the Upper and Lower VCA modules. Their structure is the most common four stage, with Attack Time, Decay Time, Sustain Level and Release Time.
Gating and triggering options are identical to the previous ones.



FOUR STAGE ENVELOPE GENERATOR (ENV 2 / ENV 5) REFERENCE

Envelope stages parameters:

- ATTACK Time: 1 msec to 15 sec; log curve. It defines the timing interval from initial minimum value to maximum value. The optional retriggering starts from this stage.
- DECAY Time: 1 msec to 15 sec; exp curve. It defines the timing interval for moving from the highest possible level towards the Sustain Level.
- SUSTAIN Level: 0 to 100%. The Sustain Level lasts as long as the Gate On signal; as soon as Gate turns Off, the envelope leaves Sustain Level and begins Release Time.
- RELEASE Level: 1 msec to 15 sec; exp curve. It defines the timing interval from Sustain Level back to minimum (initial) level.

Gate (source) parameters:

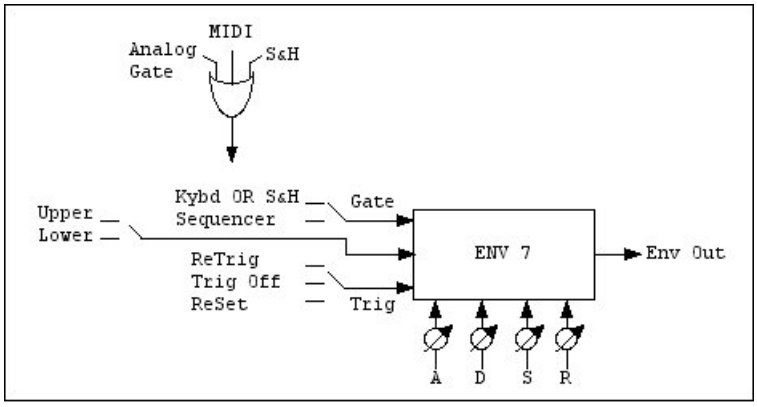
- KYBD S&H position: the envelope is fired from Gate On received thru MIDI Interface or from the analog Gate Input ports OR from the Clock signal emitted from Sample & Hold module.
- SEQ position: the envelope is gated from the Step Sequencer.

Trig switch parameters:

- R(e)TR(i)G position: when the envelope is retriggered, it will restart from the current value.
- TRIG OFF position: the envelope ignore triggers and works only with Gate.
- RESET position: if the envelope is retriggered, it will forced to restart from level zero.

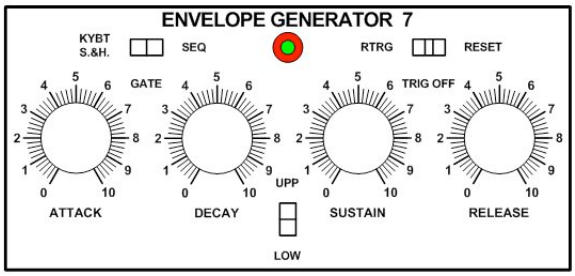
Activity LED:

- The *red* colour is for Gate received from MIDI OR from the analog Gate Input Ports OR from the Sample & Hold module.
- The *blue* colour is for Gate received from the Step Sequencer.



FOUR STAGE AUXILIARY ENVELOPE GENERATOR (ENV 7)

This envelope generator is pretty similar to the previous four stage EGs, with only one big difference: the user can freely assign it to Upper or Lower section for suit his/her needs.
The structure and the capabilities are the same as above, so you can refer to previous text; obviously, there is an extra switch (Upp/Low) for bring the module into the choosen section of the instrument.



FOUR STAGE AUXILIARY ENVELOPE GENERATOR (ENV 7) REFERENCE

Envelope stages parameters:

- ATTACK Time: 1 msec to 15 sec; log curve. It defines the timing interval from initial minimum value to maximum value. The optional retriggering starts from this stage.
- DECAY Time: 1 msec to 15 sec; exp curve. It defines the timing interval for moving from the highest possible level towards the Sustain Level.
- SUSTAIN Level: 0 to 100%. The Sustain Level lasts as long as the Gate On signal; as soon as Gate turns Off, the envelope leaves Sustain Level and begins Release Time.
- RELEASE Level: 1 msec to 15 sec; exp curve. It defines the timing interval from Sustain Level back to minimum (initial) level.

Gate (source) parameters:

- KYBD S&H position: the envelope is fired from Gate On received thru MIDI Interface or from the analog Gate Input ports OR from the Clock signal emitted from Sample & Hold module.
- SEQ position: the envelope is gated from the Step Sequencer.

Trig switch parameters:

- R(e)TR(i)G position: when the envelope is retriggered, it will restart from the current value.
- TRIG OFF position: the envelope ignore triggers and works only with Gate.
- RESET position: if the envelope is retriggered, it will forced to restart from level zero.

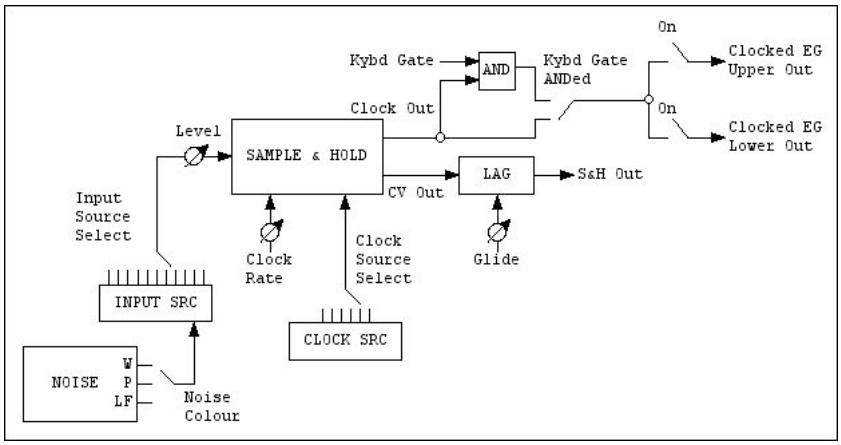
Activity LED:

- The *red* colour is for Gate received from MIDI OR from the analog Gate Input Ports OR from the Sample & Hold module.
- The *blue* colour is for Gate received from the Step Sequencer.

Assign switch:

- UPP position: the envelope receives Gate and Trigger from Upper MIDI Channel OR analog Upper Gate In ports.
- LOW position: the envelope receives Gate and Trigger from Lower MIDI Channel OR analog Lower Gate In/Trig In ports.

Note
As usual, the logic signals (Gate and Trigger) converted from MIDI Interface are ORed with the logic signals received from analog control ports.



SAMPLE & HOLD / NOISE GENERATOR

This is a true Sample & Hold circuit (not a trivial Random Generator), with selectable input source(s) and selectable clock source(s); the same module hosts a Noise Generator with three different colours. As told before, the Noise signal is available to the audio chain of the A8 Synthesizer thru both the audio pre-filter Mixer (Upper and Lower); obviously, there is only one Noise Generator, so once you choose the its colour, you'ii get the same audio result in Upper and Lower section.

The Sample & Hold can be used to freeze, at given timing intervals, the value of any of available input sources (*sample*) and output it in a prolonged form (*hold*) who lasts until the subsequent clock timing event. If applied to (e.g.) the pitch of VCOs or the cutoff of VCFs, the frequency interaction between input source and clock sources leads to a wealth of control patterns of great tonal charme.

In A8 Synthesizer, the S&H module behaviours are organized in several main operations: Selection and Level Adjustment of Input Source, Selection and Frequency Adjustment of Clock Source, S&H Output connection and LAG/Glide Adjust, Automatic EG firing from S&H Clock with/without Keyboard Gate ANDed.

Input Source Selection

The most common input source, for a standard Sample & Hold module, is the Noise Generator, in addition, the A8 Synthesizer offers the two main LFO signals (don't forget to analyze in deept the possible interactions between clock frequencies of LFO-input source and S&H…), and the audio rate signals of all six audio VCOs. In each case, you'll can adjust the input Level, obtaining different weighings in the results.

Clock Source Selection

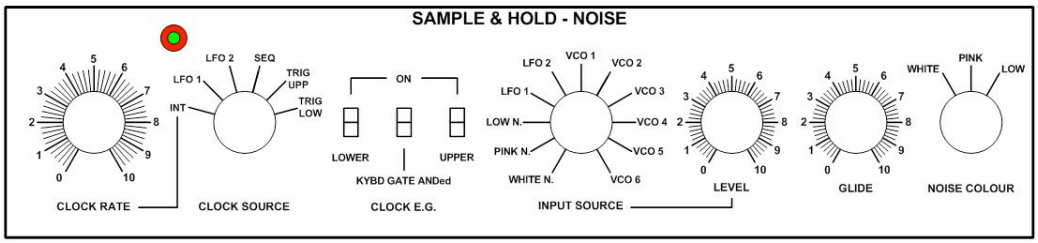
As well as dedicated Internal Clock, the S&H module can be fired from one of both main LFOs clocks, the Step Sequencer Clock (you should try the S&Hed VCF with synthesizer under Sequencer control…) and Upper/Lower Trigger Input (from both MIDI Interface or analog connections on the front panel).

Glide

The Glide knob controls the LAG amount on the S&H CV output; the more clockwise, the more integration in the outputted signal.

Clocked Envelope

If needed, you can fire *all* the Upper or Lower Envelopes with the Sample & Hold EG Clock; thus, it's easy to produce pseudo automatic sequences with VCOs and/ord VCFs under S&H control.
The envelope clocking can be completely unconditioned (once it starts, it will goes on and on…), or can be made keyboard-gate dependent (S&H Clock ANDed with Keyboard Gate): in the latter case, the envelopes are S&H clocked only when there is an open Keyboard Gate, e.g., the musician is playing a note.



SAMPLE & HOLD / NOISE GENERATOR REFERENCE

In this module are available two separate circuits, the Sample & Hold and the Noise Generator.

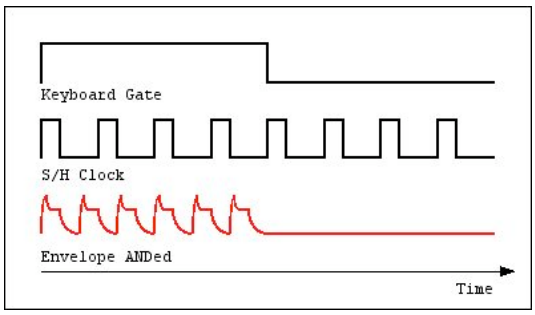
Sample & Hold Controls:

- LED: flash at clock rate; *red* colour for internal clock, *blue* colour for all the other external clock options.
- CLOCK RATE: the sampling rate of the circuit. Range is from 5" to 220 Hz.
- CLOCK SOURCE: you can choose between different sources: INT: the internal Clock Rate control; LFO 1, the S&H is drived by VC LFO 1 Frequency control; LFO 2, the S&H is driven by VC LFO 2 Freqyency control; SEQ the Step Sequencer Clock Generator; TRIG UPP, the S&H is driven (in step-by-step order advance) by Trigger received on the Upper Part from

MIDI Port OR analog Trig Input Port; TRIG LOW, same as above, but from the Lower Part MIDI OR Trig Input.

- CLOCK EG LOWER ON/OFF: when on, the Lower Part envelopes are fired from S&H Clock; when off, as you can imagine, the envelopes are at disposal of Keyboard/MIDI or Sequencer Gate.
- CLOCK EG UPPER ON/OFF: as above, for the Upper Section envelopes.

- KYBD GATE ANDed ON/OFF: if on, the envelopes are gated only when S&H Clock AND Keyboard Gate are simultaneously on, e.g., you should press a note on keyboard to obtain the automatic repetitions of envelopes *at S&H Clock rate*.



- INPUT SOURCE: the signal sampled into the S&H circuit; you can choose between: WHITE NOISE, PINK NOISE, LOW NOISE, LFO 1, LFO 2, VCO 1, VCO 2, VCO 3, VCO 4, VCO 5, VCO 6.
- (INPUT SOURCE) LEVEL: the gain for the signal to be sampled.

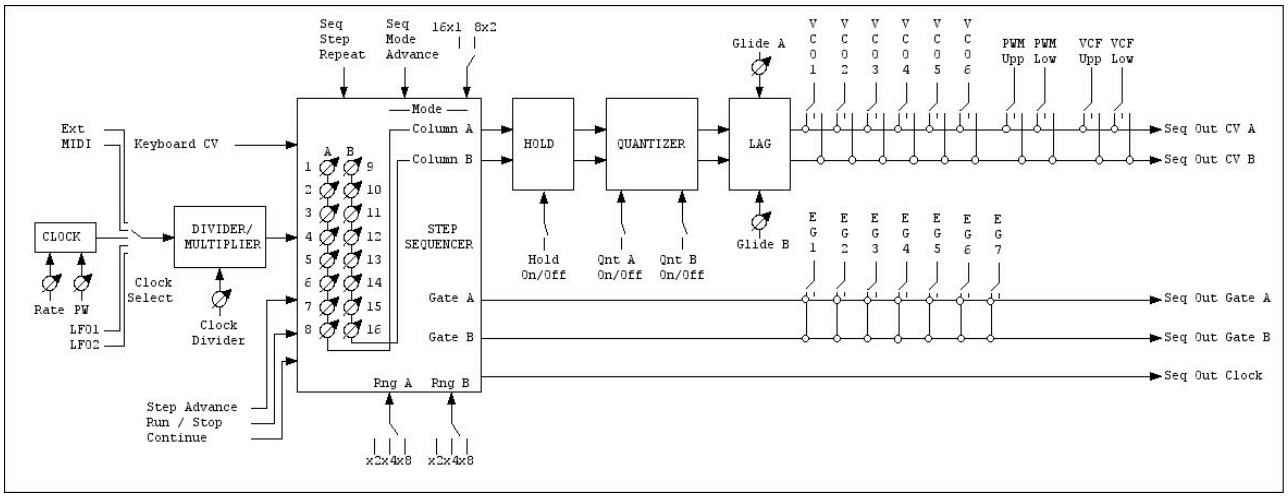
- GLIDE: is a LAG generator for smoothing the abrupt changes in S&H control out. If Glide is full ccw, you get a plain *stepped output*, if Glide is full cw, you'll get a *smoothed output*.

Noise Generator Controls:

- NOISE COLOUR: you can choose between White, Pink and Low Frequency Noise.

STEP SEQUENCER

The A8 Synthesizer contains an integrated Step Sequencer that can be used either on Upper/Lower internal sections or on external analog equipment.



The Step Sequencer has two Columns A and B, each one with 8 steps, that can be freely configured for work in 8x2 parallel or 16x1 serial fashion; as standard, the Step Sequencer drives the Pitch of VCOs and fires the EGs, but you can choose its outputs for drive (simoultaneously) the duty cycle of square waves and the cutoff frequency of the filters. An fair array of clock sources (internal and external) allows the multiplied/demultiplied synchronization of the Sequencer; moreover, there are several advance step modes that, with the Repeat Step engine, leads to pretty complex strings of values.

The behaviour of the Step Sequencer are organized in several stages, concerning: Clock and Divide/Multiply Parameters, Advance and Repetitions Parameters, Sequencer Mode Parameters, Column Parameters, Step Parameters, Assign Parameters.

Clock and Divider/Multiplier Parameters

The Step Sequencer can advance with its own internal Clock or can be drived by LFO 1/LFO2 from Upper/Lower synth sections; still, is it possible to convert MIDI Clock and external TTL Pulse Clock. You can decide the dividing/multiplying factor with *all* the clock sources; e.g., you can define how many steps will be played on every clock impulse (multiply) or how many clock impulse will be needed for advance one single step (divide).

Advance and Repetitions Parameters

As default, the Step Sequencer plays all the available steps in pretty standard forward motion (from first till the last), moreover, is possible to select seven advance modes (forward, backward, forth and back, pendulum, alternate columns, random, gate) that can always synchronized to the selected Clock Source. Still, you can define how many simple repetitions (no repts, 2, 3 or 4 repts) should be executed before to advance to the next step and you can define three different repetition patterns (more on this later).

Sequencer Mode Parameters

As told before, the two columns of the Step Sequencer can be used in parallel mode (acting like a 8x2 sequencer) or in serial mode (acting like a 16x1 sequencer); in both cases, you can freely define the lenght - e.g.: the number of active steps - for *each* column. In this way, it's easy to obtain non

symmetrical patterns or whatever. The Step Sequencer can act in Loop Mode or, alternatively, in One Shot Mode; the looping capability can be externally controlled thru a dedicated analog connection.
If you had previously experiences with analog step sequencer, you'll probably aware of the potentially dangerous interaction between long release times and paused steps into the sequencer: in order to avoid any possibile *yodeling* on the CV output, the A8 Step Sequencer has a selectable Hold mode that can be used for latch (e.g.: for *freeze*) the CV value contained in the last active step, *prolonging it* over all the subsequently paused (e.g.: with no Gate Out enabled) steps. In this way, you'll can program patterns with dotted and paused notes of rock-solid CV values.

Column Parameters

Each column (A and B) of the Step Sequencer is equipped with an adjustable LAG Generator, for Glide between step values, and a selectable Quantizer; the latter can round up every CV output to the nearest 1/12 V, that is the nearest equal tempered semitone. Still, each column can be scaled for span into three separate CV ranges: 0-2V, 0-4V, 0-8V; in all three cases, the maximum value is always at clockwise position of the step potentiometer.

Step Parameters

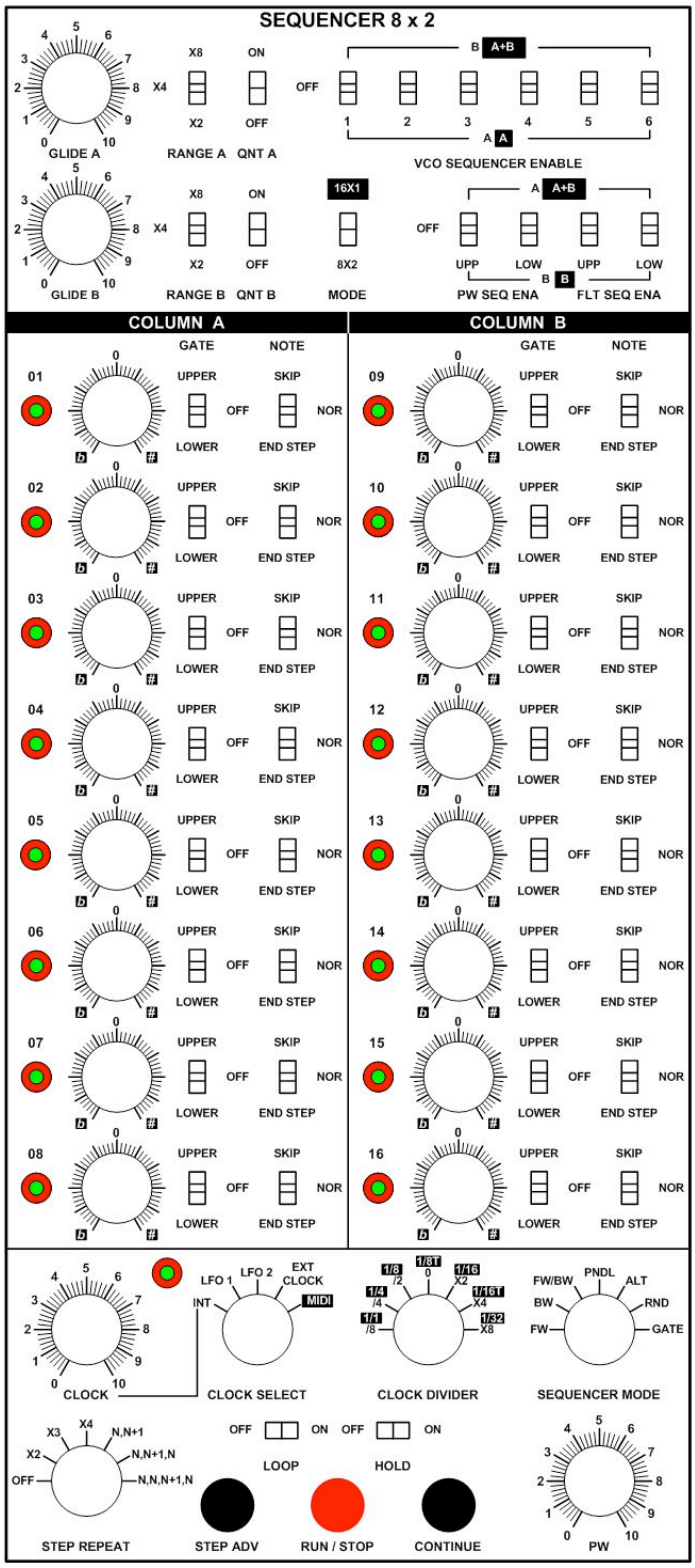
Each of the 16 available steps (you can choose whatever number of steps you need) has a set of individual parameters. The most obvious is the Step Value itself, e.g. the CV programmed with the step potentiometer and emitted from the column output; but for each step there is a couple of three-position switches related to: Gate Assign (step Gate assigned to Upper synth section, no Gate out, Lower Synth section) and Step Behaviour (Normal step, Skip step, End Step). With the latter switch, you can define if the step will be normally exected, or if it will be skipped/ignored during playing pattern, or if it will be the last available step for the column/sequencer pattern. If you need a 4-step pattern, in the fourth step put this switch in End position.

Assign Parameters

While the Step Sequencer is fully equipped with output connections for drive external analog instruments and input connections to be externally controlled, it is also well connected with the internal synth structure of the A8.
You can choose, individually which VCO will be drived by the Step Sequencer and *from what Column* A or B; furthermore, you can route Column A, B or A+B (in 16x1 Seq Mode) to the Pulse Width control or the Cutoff Frequency control. In both latter cases, you can route sequencer control to Upper or Lower synth section of the instrument.

STEP SEQUENCER REFERENCE

For sake of simplicity, the description of the parameters follows their physical location on the front panel, from high left to low right. You can cross control the reference informations with the previously written pages.



Integration, Quantization, Range and Assign Section

In the upper part of the sequencer panel, you'll find those controls:

- MODE: selection of 16x1 or 8x2 behaviour of the Step Sequencer. You can choose betwee 16 steps on 2 columns in series or 8 + 8 steps from 2 columns in parallel. As a rule of thumb, when you are in 16x1 mode, you'll should follow the control labels written *in inverse colour*.

- GLIDE A: the glide time for CVs outputted from Column A.
- GLIDE B: same as above, for Column B.
  - RANGE A: you can select the CV amount for each column:
  - x2: standard range for each step, 2V min-max, 0V full counterclockwise.
  - x4: double range for each step, 4 V min-max, 0V as above.
  - x8: quadruple range for each step, 8V min-max, 0V as above.
  - RANGE B: same as above, for Column B.

- QUANTIZER A: you can quantize the CV Out from Column A on the nearest semitone (1/12V).
- QUANTIZER B: same as above for Column B.

VCO SEQUENCER ENABLE

Each VCO can be assigned to Column A, Column B, Off (no sequencer enable) thru a dedicated three-position switch:

- Position Up B/A+B (*inverted label*):
    - if the MODE switch is on 8x2, this position assigns the VCO to Column B only;
    - if the MODE switch is on 16x1, this position assigns the VCO to Column A *and* Column B.
- Position Centre OFF: the VCO is free from Step Sequencer; you can drive it thru MIDI In port or analog CV in.
- Position Down A/A (*inverted label*):
    - If the MODE switch is on 8x2, this position assigns the VCO to Column A only;
    - If the MODE switch is on the 16x1, this position assigns the VCO to Column A only; same as above.

PW SEQ ENA(BLE)

You can assign the Upper and/or Lower VCOs Pulse Width Modulation to the columns of the Step Sequencer.

Note

In each VCOs, you can dial the desired amount of PWM thru the PWM SOURCE Selector (SEQ position) and (PWM SOURCE) AMOUNT.

(PW SEQ ENA) UPP:

- A/A+B (*inverted label*):
    - if the MODE switch is on 8x2, this position assigns the PWM to Column A only;
    - if the MODE switch is on 16x1, this position assigns the PWM to Column A+B in series.
- OFF: the PWM of the Upper VCOs is free from Step Sequencer.
- B/B (*inverted label*):
    - if the MODE switch is on 8x2, this position assigns the PWM to Column B only;
    - if the MODE switch is on 16x1, this position assigns the PWM to Column B only; same as above.

(PW SEQ ENA) LOW

Same as above, for the VCOs PWM of the Lower part.

F(I)LT(ER) SEQ ENA(BLE)

You can assign the Upper and/or Lower VCFs Cutoff Frequencies to the columns of the Step Sequencer.

Note

This modulation affects *both* 24 dB and 12 dB on each Upper and Lower part. You can adjust the amount of modulation with the AMOUNT 24 dB/12 dB and the switch KEY VEL/SEQ in the upper position.

(FLT SEQ ENA) UPP:

- A/A+B (inverted label):
    - if the MODE switch is on 8x2, this position assigns the Cutoff Frequency to Column A only;
    - if the MODE switch is on 16x1, this position assigns the Frequency A+B in series.
- OFF: the Cutoff Frequencies of the Upper VCFs are free from Step Sequencer.
- B/B (inverted label):
    - if the MODE switch is on 8x2, this position assigns the Cutoff Frequency to Column B only;

- if the MODE switch is on 16x1, this position assigns the Cutoff Frequency to Column B only; same as above.

Column A Section - Column B Section

As said before, each column has 8 indipendent step that can be freely programmed from the user; each step has at disposal:

- LED: for visualize the selected step; *red* colour is for gate assigned to the envelopes of the Upper *or* Lower synth section, *blue* colour is for gate *unassigned.* In the latter case, there is no Gate output from the step.

- VALUE KNOB: the programmable CV; range adjustable with RANGE A/B switch.

- GATE SWITCH: three positions; as told before, corresponding to:
  - UPPER: the Gate Out of the step is assigned to Upper part EGs;
  - OFF: no Gate Out on the step;
  - LOWER: the Gate Out of the step is assigned to Lower part EGs.

- NOTE SWITCH: three position:
  - SKIP: the step is skipped;
  - NORM: normal behaviour for the step;
  - END STEP: sets the last *played* step for the sequence: if you need a 4-step sequence, the fourth step has to be End Step mode enabled.

Clock & Clock Divider

You can define the (internal) clock rate, the clock source and the dividing/multiplying coefficient for the selected pulse train. The available controls are:

- CLOCK: sets the speed for the Step Sequencer; range: 0.2-250 Hz.
- LED: flash at current speed.

- CLOCK SELECT: you can choose between different sources:
  - INT: internal clock;
  - LFO 1: the Step Sequencer plays at the VC LFO 1 frequency;
  - LFO 2: the Step Sequencer plays at the VC LFO 2 frequency;
  - EXT CLOCK: the Step Sequencer will advance with the pulse train events received at the EXT CLOCK analog in port;
  - MIDI (*inverted label*): the Step Sequencer will follow the MIDI Clock commands.

Note

Whatever source you choose, this will be *processed thru* the panel CLOCK DIVIDER (see below). The only exception is when the Step Sequencer is (freely) driven from the Keyboard Gate.

- CLOCK DIVIDER: this section sets the divider/multiplier for *all* the possible Clock Sources (except when the SEQUENCER MODE is in GATE position - see below); in this way, you can decide how many clocks corresponds to one step advance or how many steps corresponds to one clock impulse. Keep in mind that you can easily reach an over busy working condition for the Sequencer. If so, reduce back the global speed and try to re-adjust the PW control. The options available are:
  - /8 /4 /2 0 x2 x4 x8: the dividing/multiplying positions for analog clock sources (all except MIDI); at central 0 position, the Divider is bypassed; at /2 position, the Step

Sequencer will advance *one* position on every *two* clock pulses; at /4 position, you'll need *four* clock pulses for advance *one* position; at x2 position, the Step Sequencer will advance *two* positions on every *one* clock pulse; at x4 position, the Step Sequencer will advance *four* positions on every *one* clock pulse, and so on…

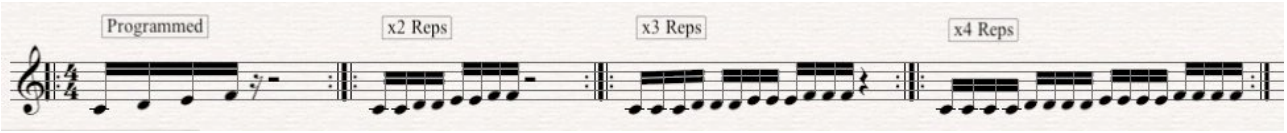
- 1/1 1/4 1/8 1/8T 1/16 1/16T 1/32 (in *inverse labeling*): the dividing/multiplying positions for MIDI Clock. You can choose the rhythmical advance ratio (e.g.: one step on every 4/4 bar, on 1/4 note, on 1/8 note and so on…).

Note
This warning is valid only when the Clock Source is External, LFO 1 or LFO 2, so beware. Due to a peculiar behaviour of the internal clock dividing network, if you want to drive the sequencer in a "one per one" relationship with clock source EXT, LFO 1 or LFO 2 (e.g.; one clock event will advance one step into the sequencer), you *should* put the CLOCK DIVIDER selector on the X8 position. The other positions are still active, but in a "divide only" way ([X4]= divided by 2, [X2] = divided by 4, [0] = divided by 8, [/2] = divided by16, [/4] = divided by 32, [/8] = divided by 64)

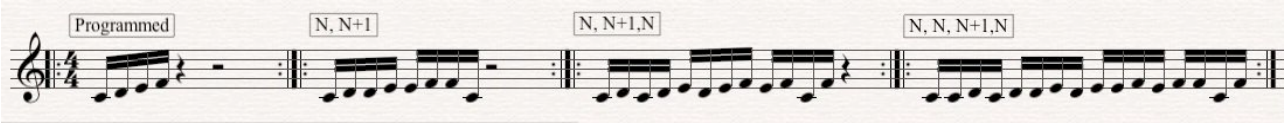
Step Repeat & Loop

The Step Sequencer can prolong the duration of the sequence with several repetitions algorithms.

- STEP REPEAT: you can choose between different step advance ratios:
  - OFF: no step repetition, normal behaviour;
  - x2: each step plays twice before advance in the sequence;
  - x3: each step plays three times;
  - x4: each step plays four times.



  - N,N+1: the sequencer plays steps 1, 2, 2, 3, 3, 4, 5, 5, 6…
  - N,N+1,N: the sequencer plays steps 1, 2, 1, 2, 3, 2, 3, 4, 3…
  - N,N,N+1,N: the sequencer plays steps 1, 1, 2, 1, 2, 2, 3, 2, 3, 3, 4, 3, 4, 4, 5, 4…



- LOOP On/Off: sets the loop condition for the Step Sequencer.

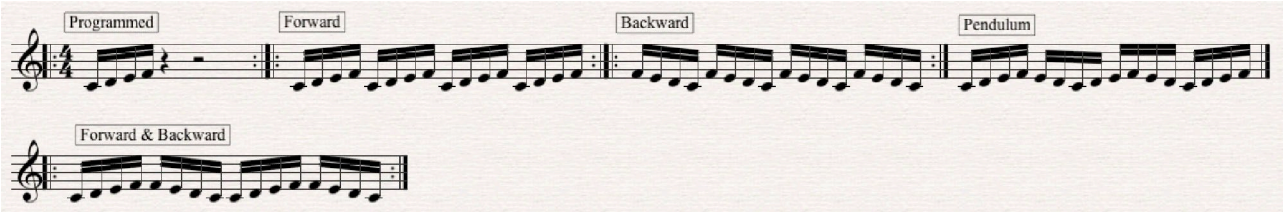
- HOLD On/Off: if you are using two (or more) adiacent steps with different Gate assign (e.g.: the first on, the second off) on a synth setting *with a long EG release time*, you'll probably hear during the release stage the off-step CV still driving the VCOs. In modular synthesis, the only way to avoid this is the insertion of some kind of latch mechanism on the CV output of the sequencer (e.g.: a S&H module or similar). Into the A8 Step Sequencer, you can *freeze* or prolong the CV value from Gate-active step *over all* the subsequent Gate-inactive steps. Obviously, this behaviour is verifable *only* if your release(s) time are long enough.

- PW: sets the duty cycle for the sequencer internal clock; you can choose between different PW ratios, e.g.: different degrees of staccato/legato step percentage.

Sequencer mode

With this selector, you can choose one of the possibile playing direction(s) for the Step Sequencer.

- SEQUENCER MODE: you can choose between:
  - FW: forward motion 1-8;
  - BW: backward motion 8-1;
  - FW/BW: forward & backward mode 1-8-1; terminal notes *are* repeated;
  - PNDL: forward & backward mode 1-8,8-1,1-8; terminal notes *are not* repeated.



  - ALT: Step Sequencer plays steps 1, 9, 2, 10, 3, 11… e.g.: it *alternates* steps from two Columns A & B;
  - RND: random motion;
  - GATE: Step Sequencer advance *and prolongs* one step on each MIDI/CV keyboard note.

Note

Don't forget that you can freely combine the Repetitions, Sequencer Modes and different Columns Step numbers for obtain pretty wild sequenced patterns.

There is a subtile difference between External Clock Advance and Gate Mode Advance: the former takes for granted that the pulse train will be rhythmically constant and equally spaced (e.g.; the steps of externally driven sequencence will be all equal in lenght and rhythm); with the latter option, you can advance step only when you fire Gate On (e.g.: when you press a key) on the MIDI/Analog keyboard. In this way, you can create different rhythms for steps and, best of all, you can indefinitely prolong the step duration with Gate On.

Manual controls

The three following front panel manual controls are doubled as analog input for external controls:

- STEP ADV(ANCE): each press on the button will advance one step in the sequencer; the control is ORed with the analog STEP ADV IN on the front panel (see below);
- RUN/STOP: each press on the button will put the Step Sequencer in Play or Stop mode; the control interacts with the analog RUN/STOP in port on the front panel (see below); the Sequencer will start from the first active step;
- CONTINUE: restart the Step Sequencer from the next step after the last played.

Sequencer remote connections and controls on the front panel

As reported above, we'll (re)list all the available connections and external controls for Step Sequencer.

- GATE OUT COLUMN A - COLUMN A+B - COLUMN B: the Gate Output for the single Column A or B and for the two Columns A+B combined in series (16x1 steps). Range: 0/+5V.

- CV OUT COLUMN A - COLUMN A+B - COLUMN B: the CV Out for the separate Column A or B (8x2 steps) and for the two Columns combined in series. Range: 0/+8V.

- STEP ADVANCE: on each switch closure received at this port, the Step Sequencer advance one step.
- RUN/STOP: each switch closure received will alternate between Run and Stop. This external input will interact with the front panel control RUN/STOP. The Step Sequencer will restart from step no. 1.
- CONTINUE: the switch closure received at this port will put the Sequencer in playback from the last step played without resetting to step no. 1.
- EXT CLOCK: a train of pulse (0/+5V) received at this port will advance the Step Sequencer; it will function only if the Step Sequencer is set to EXTERNAL CLOCK SELECT position.
- LOOP: the change of status from a footpedal toggle switch connected on this port will enable the LOOP ON MODE for Step Sequencer. This external input is parallel with the hardware LOOP SWITCH on the front panel.

Note
If you want to remotely control LOOP ON, don't forget to *turn off* its hardware switch on the front panel.

Manual: Enrico Cosimi

Grp Synthesizer
di Iannotti Rossana
Via Formello, 17 - 00040 Monteporzio Catone (RM)
P.IVA 10681631007