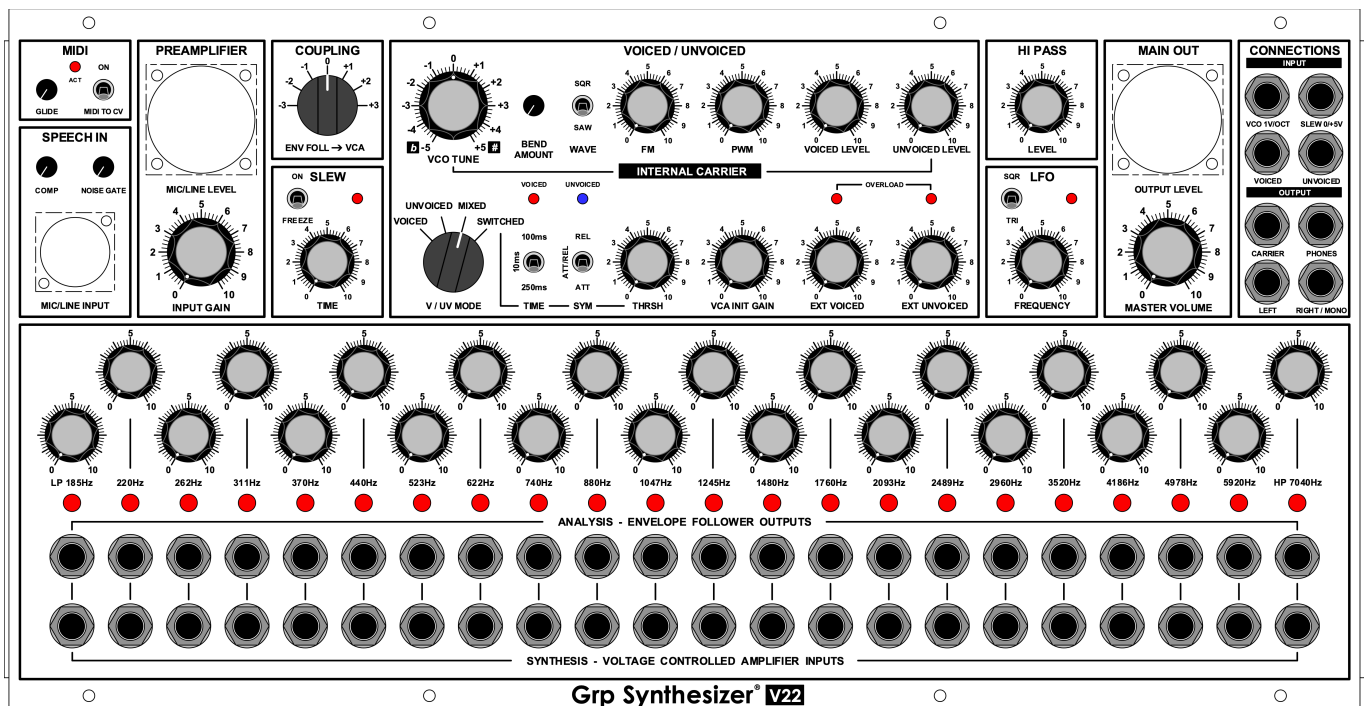


# GRP SYNTHESIZER®

## V22 ANALOG VOCODER

### OWNER'S MANUAL



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## CREDITS AND CONTACTS

# 1. WELCOME

Welcome and thank you for purchasing the Grp V22 Analog Vocoder. Your device is a refined analog Vocoder equipped with a rich configuration of 44 analog filters -24dB/Oct for performing all the classic operations that we are used to considering indispensable in a good Vocoder and much more, guaranteeing you years of tonal satisfaction.

## 1.1 OPENING AND INSPECTING

After opening the box, check inside for the presence of:

- Grp V22 Analog Vocoder.
- Dedicated external power supply.
- Cable for external power supply.
- Two metal rack ears for mounting the Vocoder into a standard 19" rack cabinet.

**WARNING! To rack mount the Vocoder using the metal rack ears, it is mandatory to use the supplied screws. If you use the screws that hold the wooden side panels in place to anchor the rack ears, you'll run the risk of damaging the internal electronics boards. Grp Synthesizer is not responsible for damage caused by the use of screws other than those provided and recommended.**

**TIP: Keep the original packaging and all its parts in case you need to ship the Vocoder.**

## 1.2 FEW SIMPLE SAFETY RULES

GRP Synthesizer's environmental policy limits the use of polluting materials (lead, solvents, etc.) to the minimum. According to current EU legislation, it is necessary to dispose of the GRP Synthesizer V22 in accordance with local regulations on the disposal of electrical and electronic waste. Under no circumstances should you abandon the product in the environment: this action is punishable by law, as well as a long-term source of pollution. In order to avoid the risk of electrocution and/or injuries, it is necessary to carefully follow the instructions given in the manual and in the following notes.

- Do not open the Vocoder for any reason. The removal or disassembly of any panel involves exposure of the operator to potentially dangerous voltages. For internal interventions, contact only Grp Synthesizer and qualified technical personnel.
- Do not remove any screws on the external panels of the device.
- Do not expose the Vocoder to rain, water splashes, excessive humidity, steam, dust, metal particles or any other material that can penetrate inside the ventilation holes.
- Do not insert any objects other than the appropriate plug into the rear socket of the device.
- Do not expose the device to heat sources.
- Do not expose the device to excessive vibrations or shocks during operation.
- At the time of installation or use in hot and humid rooms following storage or transport at very low temperatures, condensation can form inside and outside the device. It is therefore essential to wait for this condensation to disappear before turning on the device.
- Always use standard and intact power cables. In particular, never interrupt the central conductor of the plugs or sockets that connects the metal casing to the protective earth.
- Always check that the power supply conforms to what is written on the back of the device.
- Do not obstruct the ventilation slots with which the device is equipped.

- In the event of severe thunderstorms, avoid using the device and disconnect it from the power supply and other equipment.
- Disconnect the device from the power supply when not in use for long periods.
- In the event of a fuse blown as a result of non-extraordinary external events, such as sudden changes or violent power outages, thunderstorms, etc., do not try to replace it, but have the device checked by qualified technical personnel.
- Do not force the adjustment travel beyond the limits.
- Even if you are a rockstar, NEVER place containers with liquids that could spill inside it near the device.
- The device must be placed on a stable surface or, alternatively, it can be mounted in a 19 "rack cabinet **using the two metal rack ears supplied and the two special screws for anchoring them; do not use the screws of the wooden side panels, otherwise you run the risk of damaging the internal electronic boards.**

### 1.3 PROPER USE

This device is designed exclusively to produce audio frequency signals. Any other use is prohibited and voids the Grp Synthesizer warranty. Grp Synthesizer is not responsible for damage due to improper use.

## 2. WHAT IS A VOCODER

The Vocoder is an analog circuit conceived in the first half of the last century. Its operation is based on the possibility of adapting the harmonic and energy content of a spoken signal called Speech or Modulator to a second electronic signal - indifferently monophonic or polyphonic - called Carrier; in this way, at the output of the Vocoder you will be able to hear the voice message expressed by the Speech and adapted over the Carrier that becomes "speaking". The Grp V22 is an Analog Vocoder that starts from the classic circuits of the last century and offers an enhanced version in full compliance with analog technology.

For properly work, the Vocoder simultaneously needs two signals identified as Modulator and Carrier; the information contained in the Modulator is used to re-equalize the harmonic content of the Carrier in real time; the latter, according to the taste of the musician, can be a signal generated internally in the Vocoder circuit or received from the outside world. The operations with the Modulator and Carrier signals take place in two separate stages of processing defined as Analysis and Synthesis.

### 2.1 ANALYSIS

In the signal analysis phase, the Vocoder circuit extracts from the Speech/Modulator spoken signal the energy activity present within the different frequency bands. To do this, a bank of Band Pass filters is built whose number and center-band frequencies are properly chosen to accurately document the spoken signal (in Grp V22 there are 22 Analysis filters covering from 185 Hz to 7040 Hz: twenty Band Pass -24dB/Oct filters comprised between a Low Pass -24dB/Oct and a High Pass -24dB/Oct).

The Modulator/Speech signal received at the microphone input, or reproduced from a previous recording, is then analyzed by the Band Pass filters and sliced into a number of slices corresponding to the number of available Band Pass stages: the higher the number of bands analysis, the higher the quality of the signal produced by the Vocoder; a good size analog circuit can have from 15 to 22 analysis bands; the Grp V22 has - obviously - 22 simultaneously operative analysis bands.

The received audio signals from each of the analysis filters include any active signal portions - band by band - within the analyzed signal; in this way, if the Speech signal contains a sibilant or a confricative, it will be easy to find more energy in the medium-high analysis bands rather than in the low ones; a vowel "o" emitted by a male baritone voice will engage mainly the low and medium-low analysis bands.

The output of each analysis filter is connected to an independent Envelope Follower module, which transforms the slice of audio signal into a control voltage whose amplitude and movement are proportional and corresponding to the activity and energy present in the band analyzed; at the end of the Analysis stage, the Modulator/Speech audio signal is transformed into a group of 22 parallel control voltages that document the activity and energy distribution in the original signal.

### 2.2 SYNTHESIS

In the Synthesis section, a second signal called Carrier which can be indifferently monophonic or polyphonic, generated internally in the Vocoder or received by an external source, is subjected to the treatment of a battery of Band Pass filters of number and frequencies in the center of the band identical to those used in the Analysis section. In this way, the Carrier signal (which is hopefully chosen to offer a full and equally distributed harmonic content, e.g. a sawtooth wave or a white noise) is sliced by 22 filtering sections which will produce as many partial audio streams but parallel to each other. Unlike what was done in the Analysis

section, all 22 filters (as in the case of Grp V22) will simultaneously find full energy to process because the Carrier source was properly chosen to offer a wide and constant range of energy activity, while the Modulator signal/Speech can vary its content depending on what is said (the "message") and the age/gender of the speaker.

The signal slices processed by the 22 Synthesis filters are connected to the inputs of as many Amplifiers, whose output levels are placed under the control of the 22 signals produced by the Envelope Followers of the Analysis section; the sum of the outputs of the 22 Amplifiers is connected to a summation point (a real Mixer) and is subsequently made available for listening at the Vocoder output. In this way, the harmonic content of the Carrier signal is re-equalized in real time using on the harmonic content of the Modulator Speech signal. If the latter is a male voice that counts "one, two, three and four", at the output of the Vocoder you will hear the Sawtooth wave oscillator used as Carrier recite "one, two, three and four" with its own intonation (and polyphony, if available).

## 3.0 VOCODER IN ACTION

While a top level quality analog Vocoder like the Grp V22 works better than a cheaper structure, offering a better quality signal, it is always possible to enhance the functioning of the original circuit by resorting to a few simple behaviors.

### 3.1 WORKING WITH SPEECH/MODULATOR SIGNAL

To make the Vocoder circuit work as well as possible, the Speech/Modulator signal must be suitably adjusted to offer a signal level as homogeneous and constant as possible (it is therefore necessary to carefully adjust the level of the microphone input signal to the circuit); for this reason, the Grp V22 features two SPEECH IN and PREAMPLIFIER sections which offer, in addition to the volume adjustment with direct control on the Vu-meter, also COMP(ression) and NOISE GATE adjustments. It is advisable, especially during the musical production phases, to send Speech / Modulator signals previously recorded and properly subjected to level compression/normalization to the Vocoder. For live usage, it is recommended to use headset microphones capable of maintaining a constant distance between the mouth and the microphone capsule.

### 3.2 WORKING WITH CARRIER SIGNAL

To engage the 22 Synthesis bands in a homogeneous way, the signal sent to them must be as rich as possible in harmonics and energy; from this point of view, a simple Sine wave is the worst choice you can make. For this reason, analog Vocoders almost always offer one or two oscillators that produce Sawtooth and Square waves, notoriously rich in harmonic content; Grp V22 offers an analog oscillator that produces Saw/Square with PWM, coupled to a White Noise Generator (more details below).

The simply filtering behavior offered by the Synthesis section is indifferent to the monophonic or even polyphonic nature of the Carrier signal: for this reason, the most characteristic musical applications of the analog Vocoder see equally used many full-bodied Saw/Square wave analog oscillators used to generate robotic voices, and dense chords played on external polyphonic instruments used to generate complex harmonic textures. As it is easy to imagine, for using of the external Carrier signal it is mandatory to recommend accuracy in adjusting the input level and in choosing a signal with a harmonic quality/complexity high enough to be active on the different Synthesis bands.

### 3.3 IMPROVING QUALITY OF VOCODER SIGNAL

Even if today the Vocoder is considered a musical instrument for the production of Electronic Music, in the original intentions of its inventor the most important point was the guarantee of intelligibility for the signal produced and the possibility of recognizing what was being pronounced. For this reason, a top-quality quality analog Vocoder must provide two essential precautions: Voiced/Unvoiced selection for the Carrier signal and the capability of recovering a variable portion of the Speech/Modulator signal processed through one dedicated High Pass Filter.

### 3.3.1 VOICED/UNVOICED SELECTION

The Voiced/Unvoiced selection engine allows you to optimize the quality of the Carrier signal by smoothly adapting it to the characteristics of the spoken signal received at the input of the Analysis section; when pronouncing vowels or diphthongs, the Carrier must be sufficiently rich in acute harmonics, but must mainly offer a good amount of energy on the frequencies normally used by human speech; when pronouncing consonants - especially sibilants - the Carrier used must be much more active on the mid-highs. As it is not possible to satisfy the two needs in a single carrier signal, it is necessary to automatically and safely alternate two different analog signals optimized for their respective tasks: an oscillator that produces a rich tuned waveform (Voiced portion of the Carrier signal) and a White Noise Generator that produces an energetically rich signal of mid-high components (Unvoiced portion of the Carrier signal).

In this way, by pronouncing the word "sector", the Voiced/Unvoiced selection circuit will subject the received Speech/Modulator signal (the word "sector") to a comparator that weighs the energy for the medium-low portion against the medium-high portion of the signal spectrum: when there is more energy in the medium-low part (the "\_e\_o\_" sections of the word "sector") the circuit opens for the Carrier Voiced signal produced by the oscillator; when there is more energy in the medium-high part (the "s\_ct\_r" sections of the word "sector") the circuit opens for the Carrier Unvoiced signal produced by the Noise Generator.

The transition between the two Voiced/Unvoiced components is regulated, in older projects, according to the manufacturer's preferences; in Grp V22, it is possible to apply different transition rules (see in the Reference Section) to have very fast, fast or not-so-fast transitions applied independently in the two directions V/UV or UV/V.

Furthermore, in Grp V22, it is possible to work with the traditional alternation SWITCHED (the two V/UV signals are alternated mechanically by the internal circuit - the result is pleasantly robotic) or in MIXED mode, providing for the simultaneous and miserable presence of the two V/UV components (which guarantees greater fluidity, intelligibility and naturalness to the final result).

Still, in Grp V22, it is possible to disable the Voiced/Unvoiced automated selection by choosing to always work only with the vocal portion of the Carrier Voiced signal (full bodied sound results, but without the higher average components that ensure intelligibility) or only with the noise portion of the Carrier Unvoiced signal (useful for playing whispered voices, ghost voices, wind telling ancient horror stories, etc.).

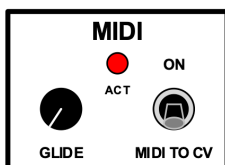
### 3.3.2 ADDING SPEECH HIGH PASS SIGNAL

Even if a fairly high number of Analysis / Synthesis bands guarantees a proper intelligibility of the signal produced by the Vocoder (with a consequent increase in the final price of the unit, sadly), the quality of what is produced by the Vocoder can be made much clearer by mixing carefully on the output a small portion of the original Speech / Modulator signal limited with a strong High Pass filtering to only the very highest part of the harmonic spectrum. On the control panel of the Grp V22, the LEVEL control of the HI PASS section regulates the amount of highs originally present in the Speech / Modulator signal that will be granted in the final output of the Vocoder.



## 4. FRONT PANEL - REFERENCE

Below, the description of the controls and connections on the front panel of the device. On the Vocoder V22 control panel there are different categories of controls: activity LEDs, knobs to rotate (controls), switches to be activated (with two or three positions), selectors for choosing a behavior, inputs and outputs. The description proceeds section by section.



### 4.1 MIDI SECTION

Contains commands for MIDI behavior.

#### 4.1.1 ACT LED

The LED lights up every time the V22 receives a MIDI messages transmitted from other devices.

#### 4.1.2 GLIDE Control

Adjusts the Glide Time applied to the pitch of the Internal Carrier oscillator; in fully clockwise position, the maximum Glide Time corresponds to 2.5 sec/oct.

#### 4.1.3 MIDI TO CV Switch

In the ON position, this switch enables the pitch control of the Internal Carrier oscillator by the MIDI Note On/Off messages transmitted from other devices. When the switch is in the OFF position, the frequency of the internal oscillator can only be controlled with the VCO TUNE panel command and/or from the control voltage received at the VCO 1V/OCT input port.

The Switch and the ACT LED perform multiple functions.

##### 4.1.3.1 Setting the Vocoder receiving MIDI Channel

When the Vocoder is turned on, when the MIDI TO CV switch is in the ON position, the LED starts flashing indicating that the unit is waiting to receive any MIDI message to set the Vocoder to the MIDI channel of the message itself. With the MIDI channel assigned, the LED stops flashing, indicating that the interface is working properly; from that moment on, the LED works as a MIDI Activity viewer.

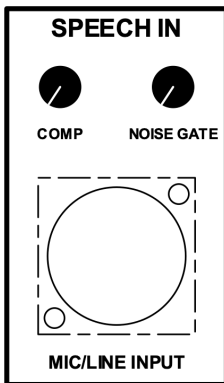
If the MIDI TO CV switch is in the OFF position when the Vocoder is turned on, the MIDI interface is not activated and the LED does not flash. The internal VCO in the INTERNAL CARRIER section receives a default voltage equal to + 3V which sets its base frequency (you can change the Carrier pitch with the front panel knob or with an external analog CV). As soon as the switch is turned ON, the LED starts flashing to indicate the standby status of any MIDI message useful for tuning the reception channel.

#### 4.1.3.2 Changing receiving MIDI channel without turning off the unit

If you want to change the MIDI channel without turning off the instrument, first set the MIDI TO CV switch to the OFF position and then move it to ON; the LED starts flashing indicating the start of the previously highlighted MIDI reception/tuning waiting procedure.

#### 4.1.3.3 Driving Vocoder pitch with MIDI

If you want use analog CV for control the Vocoder pitch generated by the CARRIER INTERNAL analog oscillator, set the MIDI TO CV switch to the OFF position.



### 4.2 SPEECH IN SECTION

It contains the COMBO connector for the external Speech/Modulator signal and controls to optimize its performance. The Speech/Modulator signal is essential for the correct operation of the Vocoder.

#### 4.2.1 MIC/LINE INPUT Connector

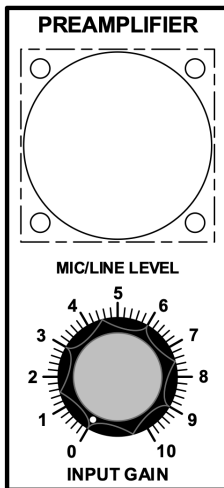
The combo connector accepts XLR microphone signals or 1/4 "TS/TRS format line signals. The signal at this connector is used as a Speech/Modulator by the Vocoder circuit.

#### 4.2.2 COMP Control

Clockwise adjusts the intensity of the compression applied to the input signal.

#### 4.2.3 NOISE GATE Control

Clockwise adjusts the effectiveness of the noise reduction applied to the input signal.



### 4.3 PREAMPLIFIER SECTION

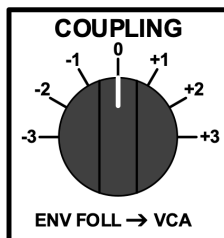
Display and adjust of the level for the microphone signal.

#### 4.3.1 Vu-Meter MIC/LINE LEVEL

Displays the level of the Speech/Modulator signal received at the MIC / LINE input.

#### 4.3.2 INPUT GAIN Control

Adjusts the level of the MIC/LINE input signal.



### 4.4 COUPLING SECTION

It manages the numerical correspondence between the analysis and synthesis bands.

#### 4.4.1 ENV FOLL -> VCA Selector

It allows you to alter the coupling between analysis bands and synthesis bands. In the central position "0", the 22 analysis bands control the 22 synthesis bands with direct numerical correspondence; in the positions "+1, +2, +3", the analysis band controls the immediately following synthesis band (numerical offset equal to +1), or the second (numerical offset equal to +2) or the third (numerical offset equal to +3) and so for all the other 21 bands. In positions "-1, -2, -3" a negative offset is applied which allows the twenty-second analysis band to control the twenty-first synthesis (numeric offset -1) or the twentieth (numeric offset -2) or the nineteenth (offset numeric -3). With numerical offsets other than "0", synthesis bands in numerically extreme position can remain uncontrolled.

Below, the reproduction of the possible couplings

## Condition 0

## ANALYSIS

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22

## SYNTHESIS

## Condition +1

## ANALYSIS

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	-

## SYNTHESIS

## Condition +2

## ANALYSIS

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	-	-

## SYNTHESIS

## Condition +3

## ANALYSIS

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	-	-	-

## SYNTHESIS

## Condition -1

## ANALYSIS

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
-	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21

## SYNTHESIS

## Condition -2

## ANALYSIS

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
-	-	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20

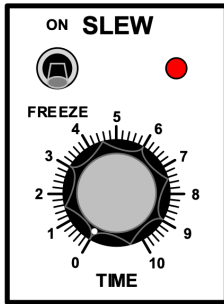
## SYNTHESIS

## Condition -3

## ANALYSIS

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
-	-	-	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19

## SYNTHESIS



#### 4.5 SLEW SECTION

Adjusts the response speed of the Envelope Followers present in the Analysis section of the signal.

##### 4.5.1 FREEZE Switch

In the ON position, it freezes the decay of the Envelope Followers, prolonging endlessly the reading of the analysis signals. The parameter can be controlled from the outside using a control voltage applied to the SLEW 0 / + 5V input.

The command responds to MIDI CC # 64.

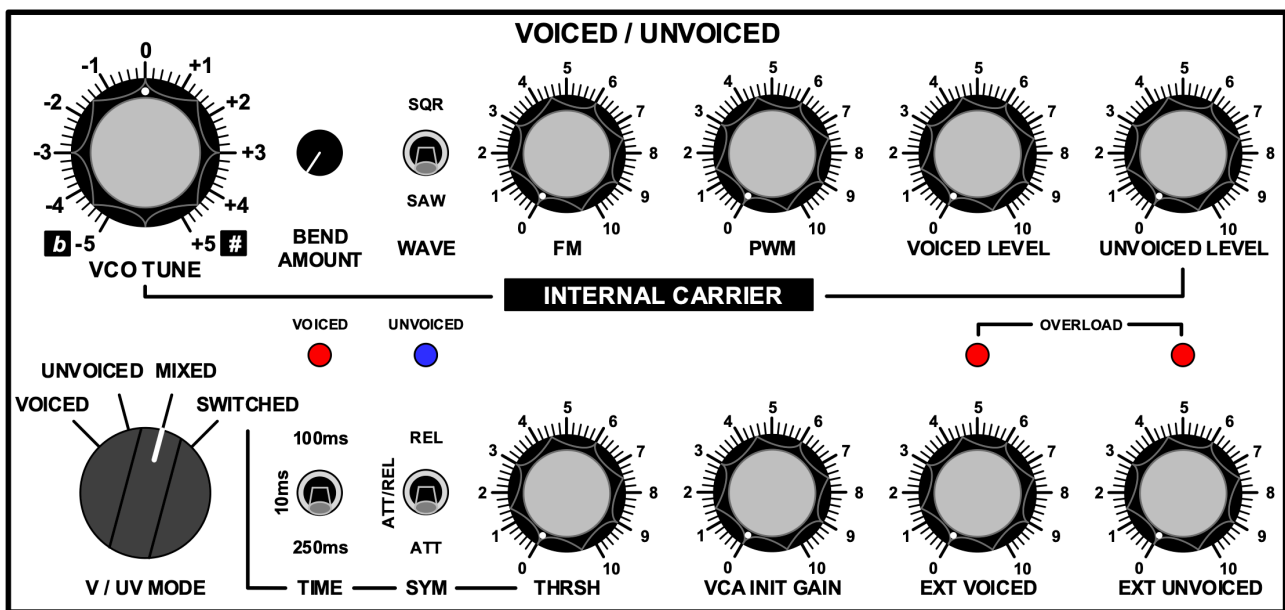
##### 4.5.2 LED

The LED lights up monitoring the activity/speed of the Time command.

##### 4.5.3 TIME Control

Adjusts the response speed of the Envelope Followers in the Analysis section. With minimum TIME values, the Vocoder responds quickly to variations in the Speech/Modulator signal; with higher TIME values, the behavior becomes progressively more lethargic.

The command responds to MIDI CC # 01 Mod Wheel.



#### 4.6 VOICED/UNVOICED SECTION

It contains all the controls related to the generation of the Carrier signals inside the Vocoder (Voiced-Oscillator, Unvoiced-Noise Generator), with the possibility of receiving external signals alternative to those produced internally and the customization of Voiced/Unvoiced operation variations.

##### 4.6.1 INTERNAL CARRIER - VCO TUNE Control

Adjusts the pitch of the internal oscillator used as the Carrier signal. The range is +/- 2 octaves.

##### 4.6.2 INTERNAL CARRIER - BEND AMOUNT Control

Adjusts the range of the MIDI Pitch Bend command applied to the frequency of the internal Carrier oscillator. The range covers +/- 12 semitones.

##### 4.6.3 INTERNAL CARRIER - WAVE Switch

It chooses the SQR (square) or SAW (sawtooth) waveform for the internal Carrier oscillator.

##### 4.6.4 INTERNAL CARRIER - FM Control

Adjusts the intensity of the frequency modulation received by the LFO module and applied to the oscillator.

##### 4.6.5 INTERNAL CARRIER - PWM Control

Adjusts the intensity of the modulation on the symmetry received by the LFO module and applied to the oscillator.

##### 4.6.6 INTERNAL CARRIER - VOICED LEVEL Control

Adjusts the output volume of the internal Carrier oscillator allowing the balance of the Voiced component (the sound of the oscillator) against the Unvoiced component (the sound of the Noise Generator).

##### 4.6.7 INTERNAL CARRIER - UNVOICED LEVEL Control

Adjusts the output volume of the internal Noise Generator allowing the balance of the Unvoiced component (the sound of the Noise Generator) against the Voiced component (the sound of the oscillator).

#### 4.6.8 Selettore V/UV MODE Selector

This command sets how the Voiced and Unvoiced signals are combined before being sent to the Summary section.

- **VOICED.** The Synthesis section only receives the Voiced signal produced by the Internal Carrier oscillator. This can make it more difficult to recognize the spoken signal.
- **UNVOICED.** The Synthesis section only receives the Unvoiced signal produced by the Noise Generator. This mode is useful for recreating the classic whispered "ghost voices".
- **MIXED.** The Synthesis section receives the mixed sum of the two Voiced (Oscillator) and Unvoiced (Noise Generator) signals previously adjusted with the two VOICED LEVEL and UNVOICED LEVEL commands. This mode allows for a softer behavior and makes easy to understand of the spoken signal.
- **SWITCHED.** The Synthesis section receives the Voiced signal (Oscillator) when the vowels prevail in the Speech/Modulator signal, it receives the Unvoiced signal (Noise Generator) when the consonants prevail in the Speech / Modulator signal. The Switched transition is adjustable in speed and symmetry using the two TIME and SYM switches (see below). This is the classic way of operating the old analog vocoders.

#### 4.6.9 TIME Switch

The command is active only if the V/UV MODE selector is in one of the two positions SWITCHED and MIXED. The Switch choose the transition speed between Voiced and Unvoiced position between 10, 100 or 250 milliseconds.

#### 4.6.10 SYM Switch

The command is active only if the V/UV MODE selector is in one of the two positions SWITCHED and MIXED. Adjusts the speed symmetry of the Voice-Unvoiced and Unvoiced-Voiced transition, ie the opening of the selector that alternates the two Oscillator and Noise Generator signals towards the Analysis section.

- **ATT/REL.** The TIME value is applied in both opening and closing directions of the Voiced (Oscillator)/Unvoiced (Noise Generator) selection.
- **ATT.** The TIME value is applied to the Voiced/Unvoiced transition only. The opposite Unvoiced/Voiced transition remains set to 0 msec.
- **REL.** The TIME value is applied to the Unvoiced / Voiced pass only. The opposite Voiced / Unvoiced pass remains set at 0 msec.

#### 4.6.11 THRSH Command

The command is active only if the V/UV MODE selector is in one of the two positions SWITCHED and MIXED. Establishes the threshold beyond which the transition/selection of the Voiced and/or Unvoiced signal is triggered.

#### 4.6.12 VCA INIT GAIN Control

It allows you to keep the levels of the VCA sections in the the Synthesis bands constantly open. In this way, the Vocoder can be used as a Fixed Filter Bank to influence/equalize the external signal connected at the EXT.VOICED input instead of the Internal Carrier. In normal Vocoding operations, the control must be set to zero, i.e. in the fully counter-clockwise position.

#### 4.6.13 EXT VOICED Control

Adjusts the audio level of the external signal possibly connected to the VOICED port. It can be used as an alternative to the Internal Carrier oscillator (for example, to obtain polyphonic behaviors in the Summary section). With the control at maximum, x100 amplification is achieved.

#### 4.6.14 LED OVERLOAD

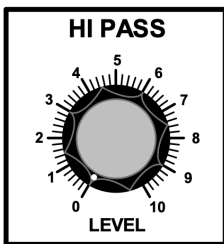
Lights up when the EXT VOICED signal exceeds the level allowed by the internal circuit.

#### 4.6.15 EXT UNVOICED Control

Adjusts the audio level of the external signal possibly connected to the UNVOICED port. It can be used as an alternative to the internal Noise Generator. With the control at maximum, x100 amplification is achieved.

#### 4.6.16 LED OVERLOAD

Lights up when the EXT UNVOICED signal exceeds the level allowed by the internal circuit.

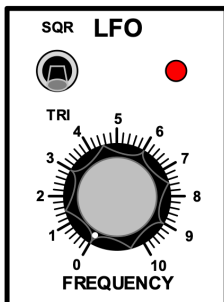


### 4.7 HI PASS SECTION

Improves the clarity of the signal produced by the Vocoder.

#### 4.7.1 LEVEL Control

In the final mix, it adjusts the amount of signal coming from the High Pass filter applied to the Speech/Modulator signal connected at the MIC/LINE INPUT. In this way, it is traditionally possible to significantly improve the intelligibility of the spoken signal produced by the Vocoder.



### 4.8 LFO SECTION

#### 4.8.1 LED

The LED flashes, monitoring the speed of the waveform selected with the SQR/TRI switch.

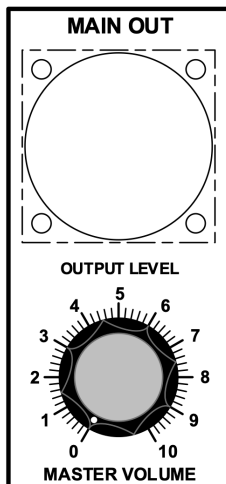
#### 4.8.2 SQR/TRI Switch

It allows you to choose the waveform generated by the Low Frequency Oscillator module. It is possible to choose square (SQR) or triangular (TRI) wave. The modulation is applicable to the frequency of the Internal Carrier Oscillator on both SAW and SQUARE waves through FM control and/or to the symmetry of the only SQR wave of the Internal Carrier through PWM control.



### 4.8.3 FREQUENCY Control

Adjust the speed of the low frequency oscillator. The range is from 0.02 Hz to 13 Hz.



### 4.9 MAIN OUT SECTION

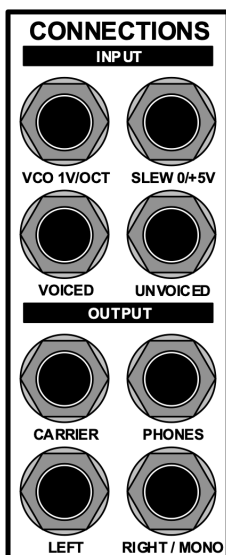
Sets output level of the Vocoder.

#### 4.9.1 Vu-Meter OUTPUT LEVEL

Shows the level of the signal output to the Vocoder.

#### 4.9.2 Controlllo MASTER VOLUME Control

Sets the output level of the Vocoder.



### 4.10 CONNECTIONS SECTION

Contains all the analog input and output connections for audio signals and controls.

#### 4.10.1 INPUT - VCO 1/V OCT

It receives the control voltage to drive the pitch of the Internal Carrier Oscillator.

#### 4.10.2 INPUT - SLEW 0/+5V

It allows remote control of the SLEW response speed of the Envelope Followers present in the Analysis section. By applying a voltage equal to + 5V, the Freeze condition is obtained.

#### 4.10.3 INPUT - VOICED

Input port for the external audio signal to be used instead of the Internal Carrier Oscillator as a Voiced component to be submitted to the Synthesis section.

#### 4.10.4 INPUT - UNVOICED

Input port for the external audio signal to be used instead of the internal Noise Generator as an Unvoiced component to be submitted to the Synthesis section.

#### 4.10.5 OUTPUT - CARRIER

Output for the Internal Carrier signal taken post Voiced/Unvoiced selection; in this way, the same signal sent to the Synthesis filter bank is made available for any external treatments.

#### 4.10.6 OUTPUT - PHONES

Headphone output. Is under control of MASTER VOLUME knob.

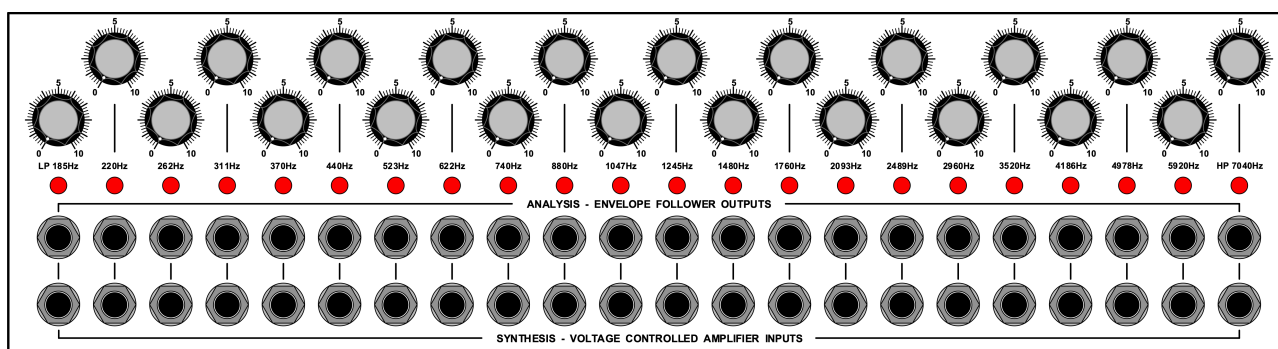
#### 4.10.7 OUTPUT - LEFT

Left Vocoder output. Contains the signals of only the odd number Synthesis bands.

#### 4.10.8 OUTPUT - RIGTH/MONO

Right/Mono output of the Vocoder. If the two left and right outputs are connected, this port contains the signals only of the Synthesis bands of even number; if used in Mono mode (connecting only the RIGTH/MONO output and leaving the LEFT output disconnected), the port will contain the entire Vocoder signal.

The signals emitted by the Low Pass and High Pass filters (at the ends of the Sintesi filter battery) are simultaneously made available on both the Left and Right outputs.



#### 4.11 SEZIONE MIXER (no label on front panel)

It allows you to adjust the output levels of the different synthesis bands and to arbitrarily alter the connection between the analysis and synthesis circuits.

##### 4.11.1 LP 185 Hz, 220 Hz, 262 Hz, 311 Hz, 370 Hz, 440 Hz, 523 Hz, 622 Hz, 740 Hz, 880 Hz, 1047 Hz, 1245 Hz, 1480 Hz, 1760 Hz, 2093 Hz, 2489 Hz, 2960 Hz, 3520 Hz, 4186 Hz, 4978 Hz, 5920 Hz, HP 7040 Hz Controls

These adjust the output levels of the individual Synthesis bands. They allow to "re-equalize" the signal produced by the Vocoder. If the VCA INIT GAIN command is not at minimum value, it is possible to use the Vocoder as Fixed Filter Bank on the signal present at the EXT.VOICED input.

#### **4.11.2 LED LP 185 Hz, 220 Hz, 262 Hz, 311 Hz, 370 Hz, 440 Hz, 523 Hz, 622 Hz, 740 Hz, 880 Hz, 1047 Hz, 1245 Hz, 1480 Hz, 1760 Hz, 2093 Hz, 2489 Hz, 2960 Hz, 3520 Hz, 4186 Hz, 4978 Hz, 5920 Hz, HP 7040 Hz**

They monitor the activity present in each of the 22 analysis bands.

### **4.12 ANALYSIS - ENVELOPE FOLLOWER OUTPUTS SECTION**

Is the first row of connections under the signaling LEDs.

#### **4.12.1 LP 185 Hz, 220 Hz, 262 Hz, 311 Hz, 370 Hz, 440 Hz, 523 Hz, 622 Hz, 740 Hz, 880 Hz, 1047 Hz, 1245 Hz, 1480 Hz, 1760 Hz, 2093 Hz, 2489 Hz, 2960 Hz, 3520 Hz, 4186 Hz, 4978 Hz, 5920 Hz, HP 7040 Output Connectors**

Outputs the control signal processed by the 22 Envelope Followers present in the Analysis section and proportional to the energy extracted in each band. The control voltages are internally normalized to the underlying SYNTESIS - VOLTAGE CONTROLLED AMPLIFIER INPUTS inputs, but they can be extracted with patch cords and connected to external analog circuits for their control.

Each control voltage operates with an excursion equal to 0 / + 5V.

### **4.13 SYNTESIS - VOLTAGE CONTROLLED AMPLIFIER INPUTS SECTION**

Is the second row of connections in columns under the signaling LEDs

#### **4.13.1 LP 185 Hz, 220 Hz, 262 Hz, 311 Hz, 370 Hz, 440 Hz, 523 Hz, 622 Hz, 740 Hz, 880 Hz, 1047 Hz, 1245 Hz, 1480 Hz, 1760 Hz, 2093 Hz, 2489 Hz, 2960 Hz, 3520 Hz, 4186 Hz, 4978 Hz, 5920 Hz, HP 7040 Hz Input Connectors**

They receive the control voltages to manage the levels of the 22 VCA in the Summary section. The inputs are internally normalized to the ANALYSIS - ENVELOPE FOLLOWER OUTPUTS outputs above, but can be patched for receive any control signals from an external analog source.

Each input can receive a control voltage with an excursion equal to 0 / + 5V.



## 5. REAR PANEL

The Vocoder is housed in a cabinet with standard wooden side panels, but which can be installed in 19" Rack using the special metal fins supplied. The cabinet, which is used to house both the Grp A2 Analog Synthesizer and the Grp R24 Sequencer, has a double labeling showing the possible uses of the two DIN connectors of the MIDI port:

- If the cabinet houses the Vocoder V22, the two DIN connectors work as MIDI In and MIDI Thru.
- If the cabinet houses the A2 synthesizer, the two DIN connectors work as MIDI In and MIDI Thru.
- If the cabinet houses the R24 Sequencer, the two DIN connectors work as MIDI In and MIDI Out.

The Vocoder V22, due to its analogue nature, does not transmit any MIDI data and does not need a MIDI Out connector.

### 5.1 MIDI IN DIN Connector

Receives MIDI data sent from external devices. To change the Vocoder's MIDI receive channel, refer to the procedures described at 4.1.3.1 and 4.1.3.2.

### 5.2 MIDI OUT/THRU DIN Connector

The connector operates in THRU mode and supplies a copy of the received data to the MIDI IN jack described above.

### 5.3 USB HOST Connector

The USB HOST connector handles the received MIDI data and interprets the same codes as the MIDI DIN serial port.

### 5.4 DC 24V-1.66A Connector

Use this connector to connect only the power supply supplied with the Vocoder.

## **CREDITS & CONTACTS**

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