

PGV manual



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The connections

There are six I/O connections in the box: guitar signal **in** and **out** are typical ¼" jacks on the right and left, as well as the **pedal** jack on the left side.

Use only an expression pedal with the potentiometer slider output at the tip of the TRS plug (e.g. in the M-Audio pedal, switch in the "M-Audio" position).

A dynamic vocal microphone input XLR connector is on the right side.

Apply a **9V** power supply adapter with **negative center** to the power connector. The current requirement is 250mA.

In the front panel there are also two balanced 3.5mm mono TRS jacks that can supply a line level output; this is an optional output for studio work, because they have better noise immunity than the single-ended ¼" output.

The effect select controls

The "effect select" footswitch is used to select the effect mode of the PGV and which effect is being controlled by the expression pedal. It is also used to toggle between the parametric vocoder mode and the conventional, direct vocoder mode. Pushing the footswitch will toggle the selection, and turn on the corresponding LED next to the switch. There are three special effect alternatives: noise, vibrato/pitch bend, or modulation. They are only available in the parametric vocoder mode. Some of the control knobs have different functions depending on the active mode. The behavior of each special effect is explained shortly:

- **noise**: When the noise effect is selected, the pedal controls the strength of the noise. The spectrum of the noise follows the vocal spectrum, and is useful in e.g. generating whisper-style signals. The "noise" knob allows adding noise while using another effect mode, but in the actual noise mode, only the pedal adjustment is working. Noise only works in the parametric mode.

- **vibrato**: In the vibrato effect the "vibrato" knob controls the frequency of the vibrato, and the pedal controls its strength, i.e. the deviation from the base notes of the strings. When the vibrato knob is at the minimum position, the pedal instead controls the upward pitch bend up to a maximum of a fourth interval. Vibrato only works in the parametric mode.

- **modulation**: When the modulation effect is selected, the "Modulation" knob controls the frequency of the modulation and the pedal controls strength. When you turn the knob gradually from the minimum position, there are first a few fixed FM modulation frequencies. After that the ratios vary continuously from 0.1 to 1.0 times the base frequency, i.e. at the maximum the modulation becomes phase modulation and the resulting spectrum is purely harmonic. Modulation only works in the parametric mode.

Effect hold: if you keep the "effect select" footswitch down more than about half a second, the currently active effect with the current pedal strength is stored. That way you can stack the effects; the next rapid "effect select" footswitch activation clears the stored effect configurations.

bypass

The bypass footswitch is a typical true bypass switch. The led next to it is lit when the signal is directed to the PGV box, and off when bypassed.

volume

The output volume control is the only analog control of the synth. It is a typical final volume control just before the output amplifier. The maximum is 7Vpp.

threshold

This knob controls the threshold amplitude that the guitar signal from each string has to exceed for entering the signal analysis in the parametric mode. The suitable threshold level is different for each guitar & pickup. If it is adjusted too low, noise, hum or other erroneous signals will be picked up. If it is too high, weaker string signals may be ignored, or higher harmonics are picked up instead of the fundamental note. The usable range is quite large. Keep

the volume knob on your guitar at the maximum when playing, and fix the threshold to correspond to that level. Usually the neck pickup is more reliable. Some string positions are more prone to missing the fundamental note, notably lower frets of the D string. The fundamental for these notes gradually disappears in extended sustain, and eventually the second and third harmonics will switch on.

threshold: in the direct vocoder mode it controls the highpass emphasis setting. When the knob is at the minimum, low frequency guitar signals are attenuated maximally, and when it is at the maximum position, the spectrum remains relatively intact. Highpass filtering typically is needed in the direct vocoder mode, because both the guitar and vocal spectra have strong high frequency roll-off, therefore the resulting vocoder synthesis filter would sound too dull. The player can adjust the setting for convenient level.

mic gain

The mic gain knob controls the internal vocal microphone gain within the compressor. See the section "Compressor" for more details.

noise gate

The noise gate setting is useful especially in loud stage situations. It blocks low amplitude ambient signals from entering to the vocal microphone spectrum analysis. Higher settings correspondingly raise the blocking threshold level. Obviously the singer has to use louder voice, if the threshold is adjusted high.

pilot gain

In addition to the actual vocoder signal output, the PGV also includes sinewave generators that follow the analysed string pitch frequencies in the parametric mode. These are useful e.g. for guitar tuning, or for setting the proper value for the threshold knob. Otherwise it is best to keep the knob adjusted to the minimum to prevent summing it to the actual vocoder output signal. However, when not vocoding, one can also use all the modulation adjustments for generating signals that have more character than the bare sinewave. In the effect controls, there is one difference between the vocoder and the pilot signal: in case of the "modulation" effect, the modulating frequency remains fixed to the base note frequency. In addition, in the "noise" and the "vibration" effect modes, the "modulation" knob is also active for the pilot signal, but in that situation it controls the gain to the amplitude dependent modulation strength. The result is a classic "FM synthesis" effect, so not like a typical guitar fuzz or overdrive, but different kind of amplitude dependent harmonic distortion. Pilot signal is only generated in the parametric vocoder mode.

pilot gain in the direct vocoder mode

In the direct vocoder mode the pilot gain knob is used to control the internal gain of the guitar signal to the synthesis filter bank. This is needed, because in this mode, the guitar signal is not compressed. **Note:** When switching from the parametric vocoder mode to the direct vocoder mode, remember to turn the pilot gain high enough, otherwise the output signal remains attenuated.

spectrum shift

The spectrum shift knob controls the modification of the vocoder output spectrum from the original analyzed vocal spectrum. More accurately, it controls the scaling of the spectrum in the frequency domain. As shown in the knob numbers the spectrum can be contracted by a factor $\frac{1}{2}$ or stretched by a factor of 2 in the extreme cases. When stretched, the spectrum sounds like it is coming from a small speaker (with a short vocal tract), and correspondingly from a tall speaker with a long vocal tract, when contracted. The advantage of the Fourier synthesis of the parametric vocoder mode is the fact that the adjustment can be done continuously, while in the direct vocoder mode the adjustment works stepwise. The spectrum shift adjustment works in all modes.

For **noise, vibrato, and modulation** functions, see the **effect select** -section.

spectrum hold

The spectrum hold -switch can be activated to freeze the currently active spectrum from the voice microphone. When turned "on", the "noise gate" knob setting determines the level that the vocal signal needs to exceed to be frozen. Turn it to high enough setting, otherwise spurious signals are caught. Spectrum hold works in all modes.

transpose

The transpose switch allows one octave down transposition of the guitar note frequencies, but only in the parametric vocoder mode.

Compressor

The PGV has an internal compressor whose actions can be observed from the two bi-color led lights. In the parametric mode both the guitar and the voice microphone signals can be compressed, while in the direct mode vocoder only the voice microphone signal can be compressed. When both leds are dark, the signals are in the linear region. When the guitar compressor led turns green, the guitar signal is compressed, i.e. after that the guitar signal strength increase does not make an increase to the output amplitude. When the other, "mic" led turns green, it indicates the compression of the total input signal that includes both the guitar and the microphone signals. The different situations can be heard in the following way:

When only the guitar led is illuminated, the compression effect is quite mild, for instance the original amplitude differences of the played notes remain intact, and if you vary the vocal strength, these variations can be heard at the output. However, when the "mic" led turns green, then any additional increase in either the guitar or microphone signal does not result output signal increase. Also note, that even if the guitar led remains dark, the total signal can get compressed, if the mic signal is strong enough. This may be annoying, e.g. when the volume does not increase when playing a chord after a single note. That situation can be controlled by adjusting the "mic gain" -knob lower. There is no control for the guitar gain to the compressor, but naturally the guitar volume knob can be used for attenuation, if needed. However, it has to be noted that in the parametric vocoder mode, the compressors do not distort the signals, unlike ordinary compressors, because only the parameters are extracted.

Signal overloading

In "direct mode", only the microphone signal is compressed, not the guitar signal. Therefore output overloading can occur. This will be shown by the guitar LED turning red. In that case, dial down the "Pilot Gain" knob. In the parametric vocoder mode, output overloading can still happen even when the compressor limiter is working if the pilot gain is forgotten high when vocoding in some complex modulation situations.

Input overloading is shown by the "mic" LED turning red, however, the digitizers have high dynamic ranges, so that situation is quite unlikely. There is one exception to this: The microphone digitizer gain can be increased by keeping the PGV effect select switch pushed down when powering up the box. This allows quieter singing in e.g. studio work. In this case input overloading can sometimes occur, please observe the "mic" LED.

Studio mode vs. stage mode

When powering on, the PGV normally starts in "stage mode" where the outputs are in a typical setting suitable for guitar amplifier inputs, and the "volume" knob controls the analog gain of the output amplifier. However, for typical studio mixers the balanced 3.5mm output jacks have a higher noise immunity. The PGV offers an additional option for studio work. If the PGV is powered on so that the "Effect Select" footswitch is kept pushed down, two settings are changed:

- (1) the vocal microphone preamp goes to a higher sensitivity mode, allowing softer singing. The additional gain may then need to be compensated by lowering "mic gain".
 - (2) The two 3.5mm jacks go to stereo mode with separate L and R balanced outputs. Now every other semitone goes to the L and every other to the R channel. The scope for this strange arrangement is to prevent possible beating interference for chords that have very close intervals. To do that, the L and R signals can be fed to e.g. separate reverb units in the mixer before summing together to eliminate the disturbing interference.
- In stage mode, both the 3.5mm jacks have the same mono signal.