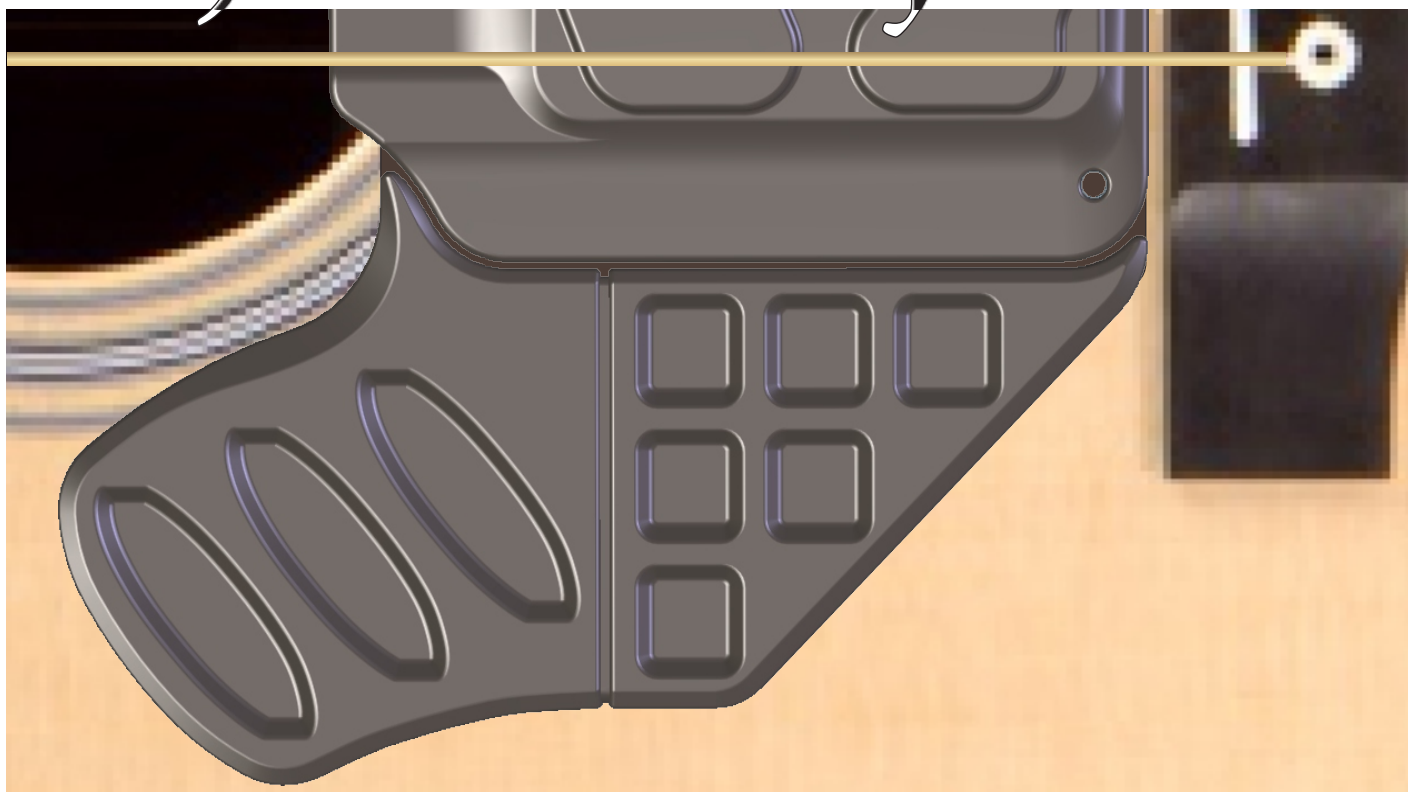


Artist's Manual

for operating the

Vo-96 Acoustic Synthesizer



Paul Vo

Vo Inventions LLC October 2016.

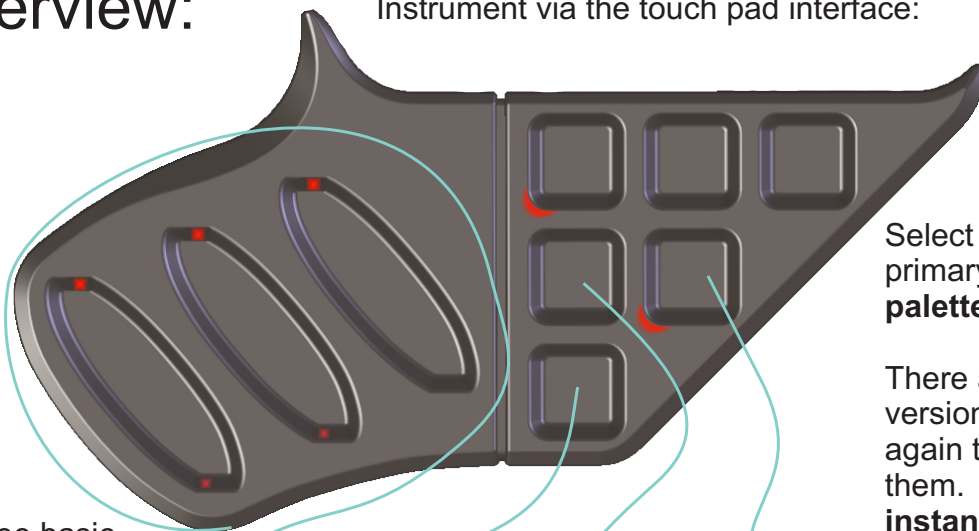
Vo-96 Acoustic Synthesizer Artist's Manual

First, if your unit has no battery, plug in the power cord either by the E1 string or close to the back strap post if you have a pro installation. You've probably already figured out how to **turn on your Vo-96 instrument**: Touch the flat edge of the pickup housing with your fingers, close to the sound hole over by the E1 string. Please wait just three seconds before using the touchpads to give the unit a chance to adjust to its environment.

Everything else, including turning the unit off, is controlled by the touchpads as described in the following pages....

Overview:

You control the sound and feel of your Instrument via the touch pad interface:



Adjust three basic parameters of the sound using these '**sliders**'.

The relative brightness of the LEDs indicates slider position.

Double-tap here to lock out the UI touchpads.

Double-tap again to re-enable the touchpads.

Tap here 5 times to turn the system power OFF and save your settings.

This touch pad activates the **harmonic arpeggiator**.

You can set a different arpeggio for each preset.

Double-tap to edit an arpeggio setting using the '**sliders**'.

Select between three primary **harmonic palettes**.

There are two preset versions of each: Tap again to toggle between them. That's **6 instantly available presets**.

This touch pad activates **modulation**.

You can set a different modulation for each preset.

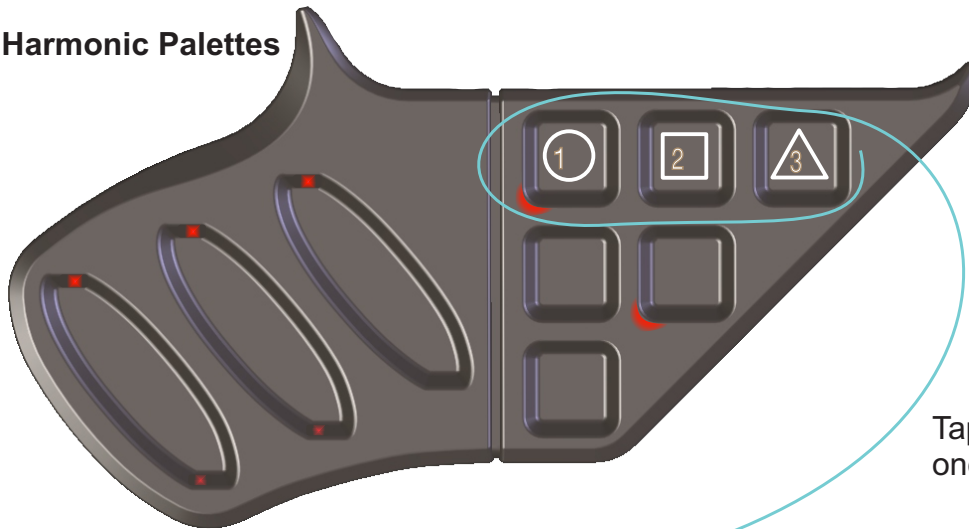
Double-tap to edit a modulation setting using the '**sliders**'.

More details...



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Three Harmonic Palettes



Tap to activate any one of six presets.

- 1 This palette uses **all the harmonics**.
- 2 This palette uses only **even harmonics**.
- 3 This palette uses only **odd harmonics**.

Each one of these harmonic palette touchpads accesses two presets. You can tell one preset from the other by the touchpad LED - it glows solid for the first preset and it undulates to denote the second preset. **Touching the same pad again toggles between these two presets.**

You can set each preset independently to its own intensity, tonality and note duration using the sliders.

When you activate a preset it recalls its own unique slider settings. You can change those slider settings to change the sound. Any changes you make are saved as part of the preset.

You can also assign an arpeggio or modulation to any preset and this setting is also saved and recalled.

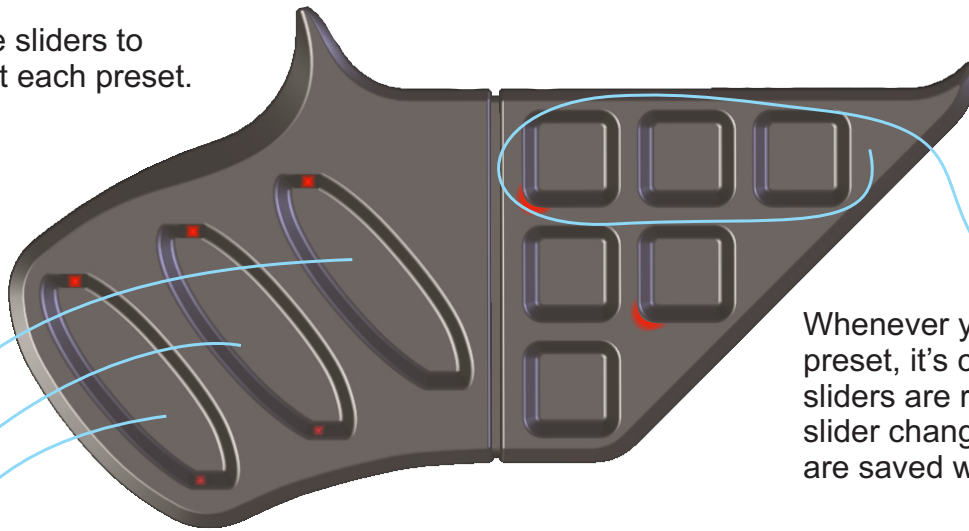
The touchpads remember and always return to their previously active settings when touched.

More...

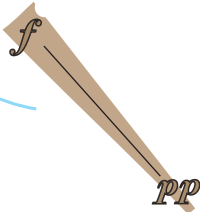


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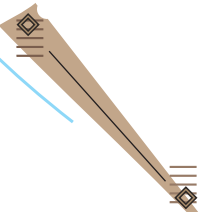
Three sliders to
adjust each preset.



Whenever you activate a preset, it's corresponding sliders are recalled. Any slider changes you make are saved with the preset.

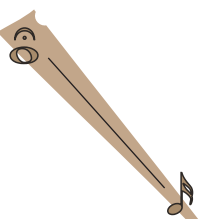


This slider adjusts the master **intensity** of the preset. At 'forte' the effects are loudest. At medium settings there may be better harmonic definition and subtler timbres. At the minimum setting the magnetic power is turned off entirely, though the touchpads remain on - sort of like "standby". NOTE: If this slider is at minimum, none of the other touchpads or sliders will do anything.



This slider sets the **harmonic balance** between higher and brighter harmonics and lower, darker harmonics. It's a kind of a "tone control" for the strings.

The lower settings are warmer and more generally useful. At the highest setting the harmonics can be shrill, almost like feedback, but still fully playable. The electronics can control individual harmonics up several octaves above the pitch.



With this slider you set the **duration of each note**. In synth terms, you are really setting the **decay**, how quickly the note fades.

At the top, sustain is infinite. At the bottom, the system works to mute the string.

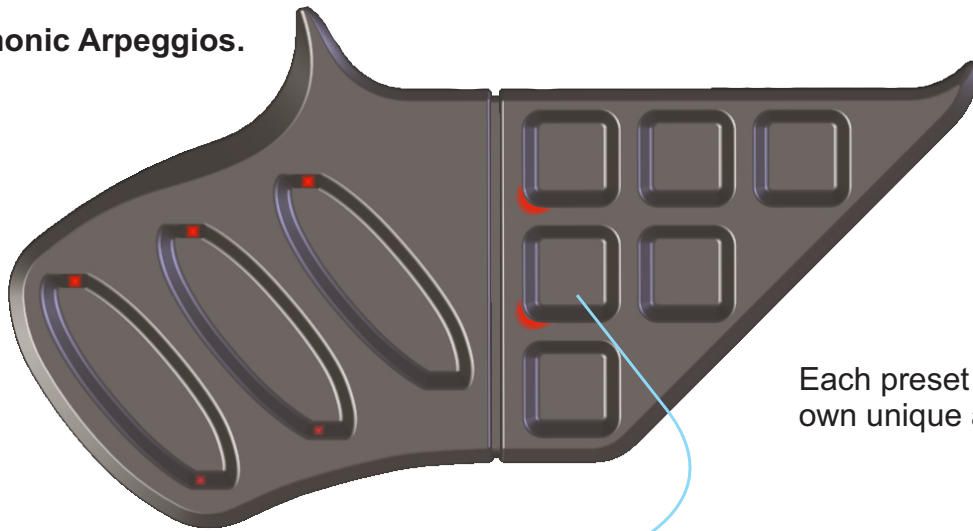
The relative brightness of the LEDs indicates slider position.

More...



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Harmonic Arpeggios.



Each preset can have its own unique arpeggio.



This touchpad activates **Arpeggio**. There are six unique arpeggio settings corresponding to the six presets. The 'brightness' of the arpeggio is governed by the underlying 'harmonic balance' setting for the preset. The arpeggio touchpad LED glows to indicate an arpeggio is active.

When you tap this once, you toggle arpeggio on and off.

To edit the current preset's arpeggio, double-tap this touchpad.

The arpeggio LED and the slider LEDs now blink together, indicating that the sliders are now ready to adjust the arpeggio settings:



The Intensity slider now adjusts the mix of arpeggio to the underlying preset's timbre. The overall loudness is still controlled by the underlying preset Intensity.



The middle slider now chooses between several pre-defined arpeggio patterns. Towards maximum the arpeggios use multiple harmonics and are more like moving harmonic chords - an evolving timbre.



The Duration slider now changes the length of the arpeggio by changing the duration of each step of its sequence of harmonics. If the note duration of the underlying preset is set to infinite sustain, the arpeggio plays in a rhythmic loop, otherwise it plays for the set length of the note.

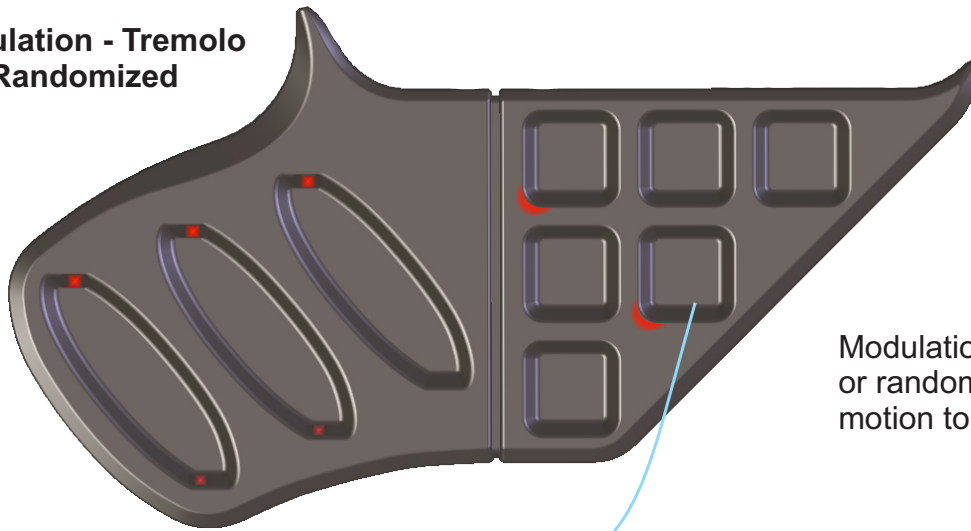
Touching any touchpad terminates arpeggio editing. Your changes become part of the current preset.

More...



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Modulation - Tremolo and Randomized



Modulation adds tremolo or random harmonic motion to any preset.



This touchpad activates a unique **Modulation** setting according to the currently active harmonic palette and preset. There are six unique modulation settings corresponding to the six presets. The modulation touchpad LED glows to indicate when modulation is active.

When you tap this touchpad once, you toggle modulation on and off.

To edit the current preset's modulation, double-tap this touchpad. The arpeggio LED and the slider LEDs now blink together, indicating that the sliders are now ready to adjust the arpeggio settings.



The Intensity slider now adjusts the mix of modulation to the underlying preset's timbre. The overall loudness is still controlled by the underlying preset Intensity.



The middle slider now acts as a toggle switch selector between rhythmic tremolo modulation at the high setting and random modulation at the low setting. It only accepts these two positions.



The Duration slider sets the modulation rate. With random modulation it sets the average rate from a slowly evolving always changing timbre to a faster randomized harmonic dance. With tremolo, it adjusts the tremolo speed.

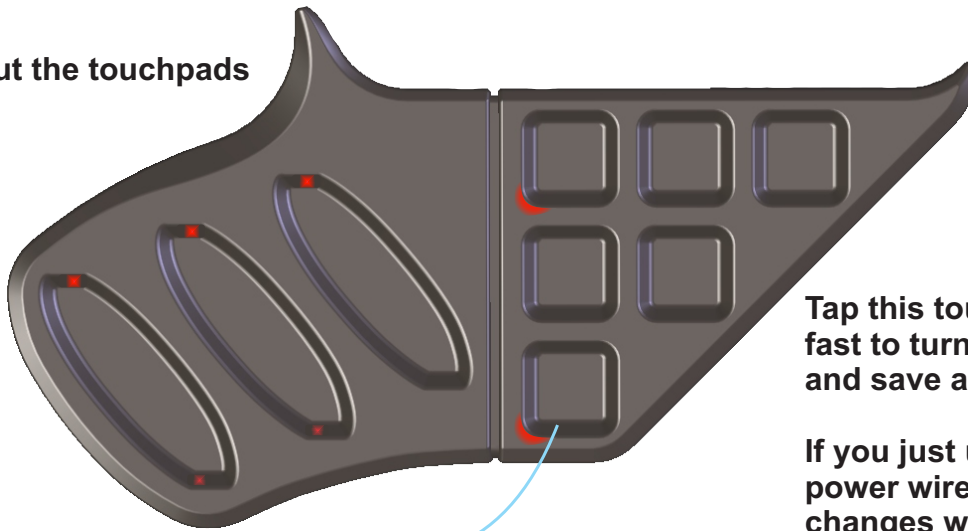
Touching any touchpad terminates editing.
Your changes become part of the current preset.

More...



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Locking out the touchpads



Tap this touchpad 5 times fast to turn off the system and save all your settings.

If you just unplug the power wire, your recent changes will not be saved.



This touchpad locks out the UI touchpads so that you can play the instrument without accidentally changing your settings.

Double-tap to lock. Double-tap again to unlock.

We chose a double-tap because this can be done quickly, and yet it won't easily happen accidentally.

BUT: You can still change presets while locked out. Just double-tap a palette touchpad to activate or toggle it's preset. Only presets can be changed, the sliders, arpeggio and modulation are locked completely.

You may prefer to keep the system locked like this while playing. You can access all six presets by double-tapping, and you can't accidentally change anything else.

Please use this touchpad to turn the system off. Turning off this way causes your various settings to be saved in memory so that everything is restored exactly the way you left it when you power up the next time. Please wait for all the LEDs to turn off completely before disconnecting power.

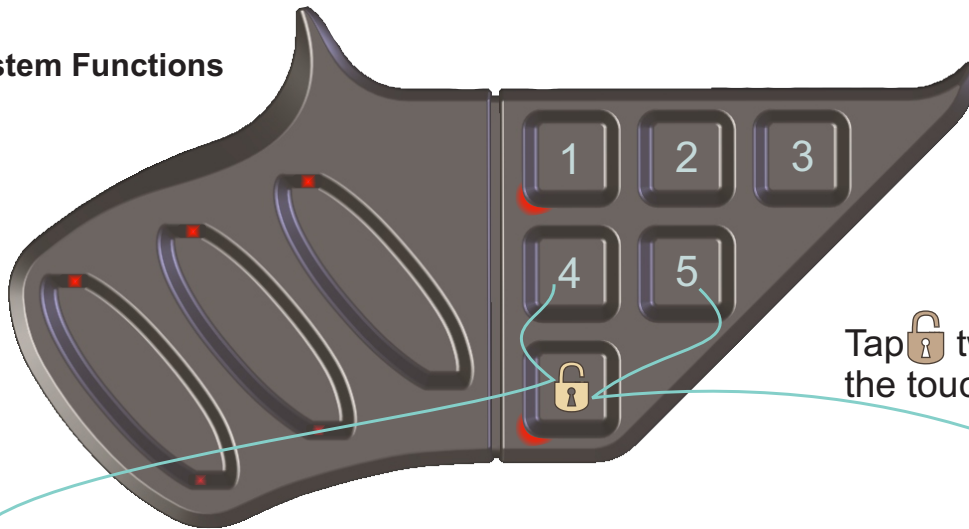
If you just pull out the power wire to power off, any changes you made during the current session will be erased and you will power up back at the settings you had at the start of the current session. it doesn't hurt anything to do that, the system just forgets all the changes you've made since the last time you turned the power on. If you want to discard your recent settings, just remove power without saving and voila!


More...



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System Functions



Tap  twice to lock the touchpad.



You can set the touchpad to power-up in the locked mode by doing this:

- o first lock the interface if it isn't locked already by double-tapping the lock touchpad. It's LED must be on for the following:
- o While holding one finger on the lock touchpad, tap the arpeggio[4] touchpad seven times.

This is a toggle - if you do it again it goes back to powering up locked.





You can erase everything and restore the factory default presets:

- o first, lock the interface if it isn't locked already by double-tapping the lock touchpad. It's LED must be on for the following:
- o While holding one finger on the lock touchpad, tap the modulation [5] touchpad seven times.

Note - this can't be undone. If you have a rotated or left-hand installation please do not use this command, it will undo your customization.

Bluetooth Control Functions. Before you can access any wireless functions, wireless communication must be initialized between your Vo-96 and your BlueTooth capable Windows or Apple computer or computing device. This is called "pairing". Once paired, you can run our firmware updater application or other future applications as often as you need to, but only on this paired computer.

To enable BlueTooth Discovery, hold  and tap touchpad [2] five times. Then use your computer's OS Bluetooth device management to pair with the Vo-96.

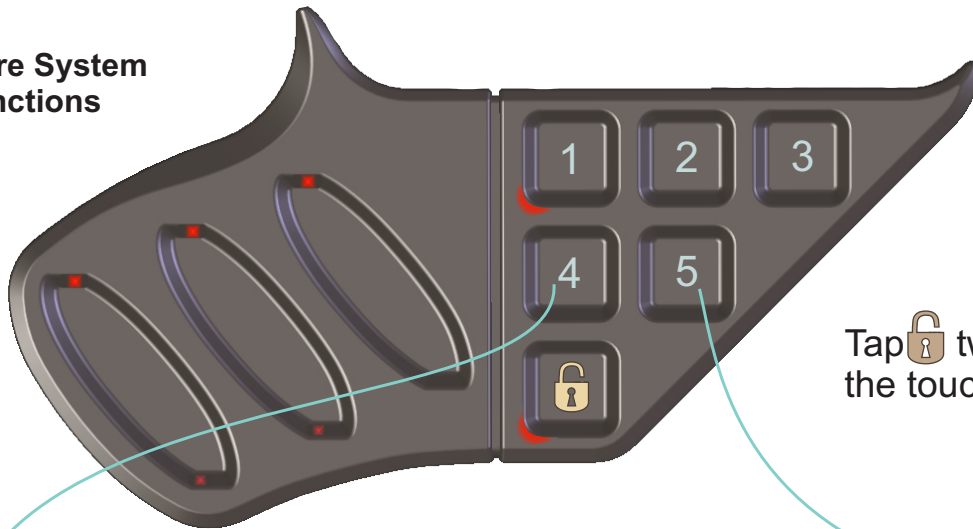
To cancel this pairing, (to free up your Vo-96 to pair with a different computer), hold  and tap touchpad [3] five times.


More...



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More System Functions



Tap  twice to lock the touchpad.



You can flip the orientation for rotations and left-handed guitars:

- o first lock the interface if it isn't locked already by double-tapping the lock touchpad.
- o While holding one finger on the lock touchpad, alternately tap the arpeggio pad[4] and the modulation pad[5] 5 times altogether. In other words, while holding G, tap 4, 5, 4, 5, 4, 5, 4, 5, 4, 5.

When the command is accepted, the top slider leds will pulse twice to indicate the mode has changed to “rotated”. If you execute the same command again, the top slider leds will pulse once to indicate the mode is back to normal.

Please note: You **MUST** turn off the Vo-96 with the “5 taps of the lock key” method to save this setting the first time you set it. This is true for all the lock key functions. Once it is stored, it can be undone only by either re-executing the command or by executing the “return to factory settings” command.

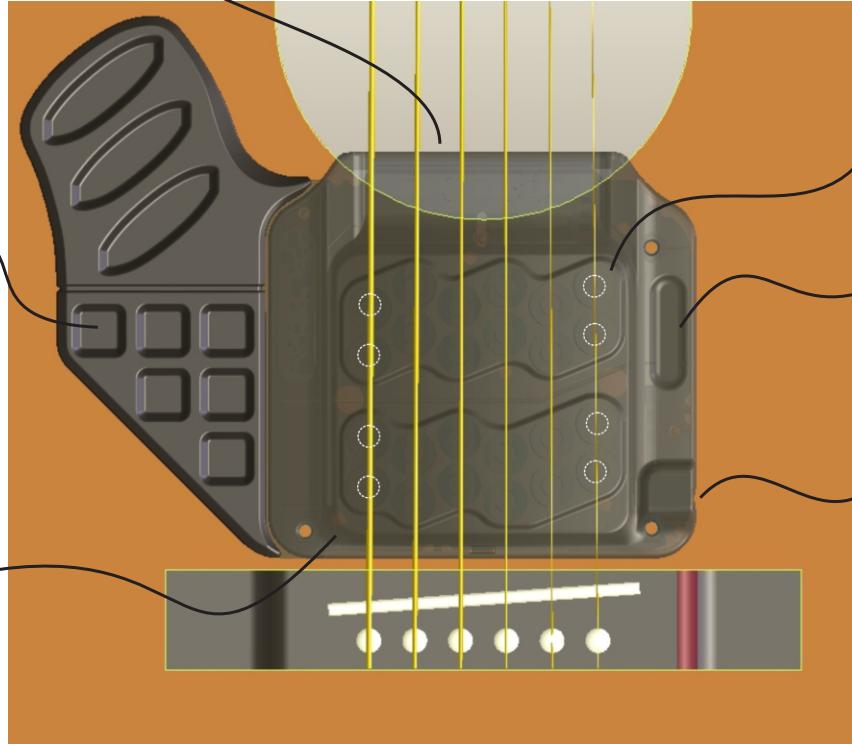
More... 

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Ribbon Cable connects
the Vo-96 interface and the
the Core-96.

Tap here 5 times to
turn off the Vo-96

The string height off the
top of the Vo-96 is
important. When
fretting the highest fret
the strings should be
parallel to the housing
surface and as close as
possible without
buzzing on the housing.
The E6 side generally
needs more clearance
than the E1 side.



The magnets and
coils are slightly
visible through the
cover. Strings should
be evenly positioned
over the inner circle
of the magnets as
much as possible.

Touch here to turn the
Vo-96 on and restore
previous state.

If you do not have
the pro-jack installed,
connect the AC
power supply here.

This shows the proper installed position for
a Vo-96. The distance from the bridge can
be varied but should be quite small.

Many improvements have been made
relative to the first version. This version is
lighter, easier to install and has a featured
touch pad area to allow you to adjust the
touchpads by feel, and to reduce
accidental touchpad changes. It is still a
pre-production prototype though.

Your Vo-96 enhanced instrument needs
the same gentle handling as any fine
acoustic guitar.

Beware of condensation when bringing
your instrument in from the cold. Allow it to
acclimate before turning on the power.

- If you have an installation with the LiFePo4 battery, please **remember to disconnect the battery electrically using the toggle switch accessible through the sound hole whenever you travel or store the instrument**. For normal daily use, the soft touch turn on/off facility is preferred.
- Do not leave the Vo-96 unattended while charging. Do not leave the charger connected once the unit has fully charged.
- If you connect the charger and see only the RED LED and not the blue or green, the battery switch is likely in the 'off' position. If you are sure the battery is in the 'on' position and you still do not see either the blue or the green LEDs lit, there is a system fault. Disconnect the charger, turn off the battery and contact Volnventions.



The Strings:

The Vo-96 operates best with our special Acoustic Synthesis strings. These are wound with a magnetically active iron-silver wire treated to resemble brass. They are durable, age very slowly and retain their excellent characteristics for a long time.

Standard acoustic strings are not very magnetically responsive. If you try a standard string, you'll quickly see what we mean.

Standard nickel-wound electrics do not work very well either.

Please note: Lately I've been using GHS "Electric Stainless Steel Precision Flatwound" strings on my Vo-96. Although they don't look or sound like acoustic guitar strings, I am really liking how they respond and how the Vo-96 harmonics mix with the basic underlying string sound. Also – NO FINGER NOISE. Works for me. These strings are made of the right material and are 100% compatible with the Vo-96. (They'll be great on the Moog Guitar too.)

They are not easy to find, but juststrings.com has them.

Ernie Ball Electric Guitar Cobalt work well too.

Final notes:

This is the preliminary manual - for this, the first official firmware release for Vo-96 users and experimenters. Thank you very much - if you have read this far, you must be one of the people who will be with us on this journey of exploration. I welcome you. There is much more to come!

Caution: This is not a mature, well-tested product. This is an experimental prototype. Everything about it is new. We will work with you to repair defects or damage, but there is no pre-paid guarantee. You assume all liabilities and risks arising from your use the Vo-96.

Please use judgement and caution, especially if your installation includes the LiFePo4 battery. I have designed the battery subsystem around the most advanced LiFePo4 Texas Instruments controller chip. It features several safeguards and I have implemented them. The battery pack itself has its own protection circuits. However, it is not inconceivable that a flaw could cause overcharging or short circuit. Like your laptop or any such commercial battery powered device, there is a certain danger. Unlike these devices, the Vo-96 has not been as thoroughly tested. The fact that it has a 19.2V 27 Watt/Hour battery may be unexpected by a guitar tech working on your instrument – be sure to warn them. Shorts can definitely occur if the unit is tampered with. The release of heat possibly leading to fire is possible. (LiFePo4 is supposed to be an inherently safer technology than your standard Li laptop battery, but even this is new and not yet recognized by testing agencies.)

I expect your Vo-96 to last for many years. I have several of them around. All have been going perfectly since October of 2012. The components are all very long-life. Handled with care, you have an instrument that will grow in vintage value and provide years of musical enjoyment.

Paul Vo

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