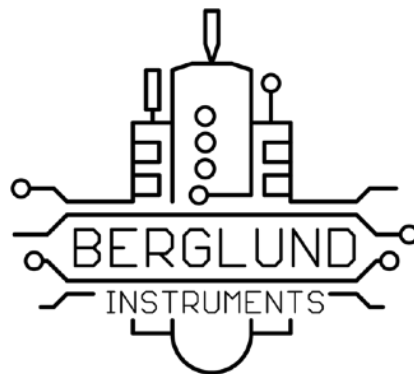


User Guide

NuEVI and NuRAD

Firmware v.1.6.0



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Origins

The Electronic Valve Instrument was invented back in the early 1970s by Nyle Steiner. The first production instruments were using mechanical switches in a handset connected to an analog synthesizer module, and they were sold from 1975 to 1979 by the Steiner-Parker company. When the company had dissolved, the instrument was produced by Crumar.

In the mid 80s, Steiner designed and built a number of instruments with a more complex synthesizer and touch sensing for the keys. They were referred to as Steinerphones, and came in both brass and woodwind variety.

In 1987 a new type of EVI was licensed and sold by AKAI. This new version together with its woodwind counterpart released at the same time, the EWI, was using touch sensing for the finger controls and a programmable synth module capable of sending MIDI for controlling other synthesizers. The Akai EVI was discontinued due to not selling as well as the EWI that is still made by AKAI in new incarnations.

For a while Nyle Steiner did conversions of then current model EWIs into EVIs, until in 1998 when he started building and selling the MIDI EVI he had developed. The MIDI EVI was built to work as a controller for MIDI equipped synthesizers, with no sound synthesis capability of its own. For several years this has been the controller/instrument of choice for EVI players, even when the newer EWIs got alternative EVI fingering settings.

In recent years the MIDI EVI has become hard to come by. Steiner has moved on to many other projects and interests, and so very few new EVIs are being built. In 2012 he posted a YouTube video demonstrating a prototype for

an Arduino based EVI that people could build themselves. In 2017 it was still unclear when the Arduino EVI kit would be available. As the only available EVI would be in kit form and not available as a pre-built instrument, some EVI players started to get a bit concerned about the future of the EVI. With no new instruments being built, the EVI would eventually die. In hope to prevent this, EVI player Steve Anderson initiated a project aiming to create a new EVI. After teaming up with Johan Berglund moving forward with the project, the NuEVI was born.

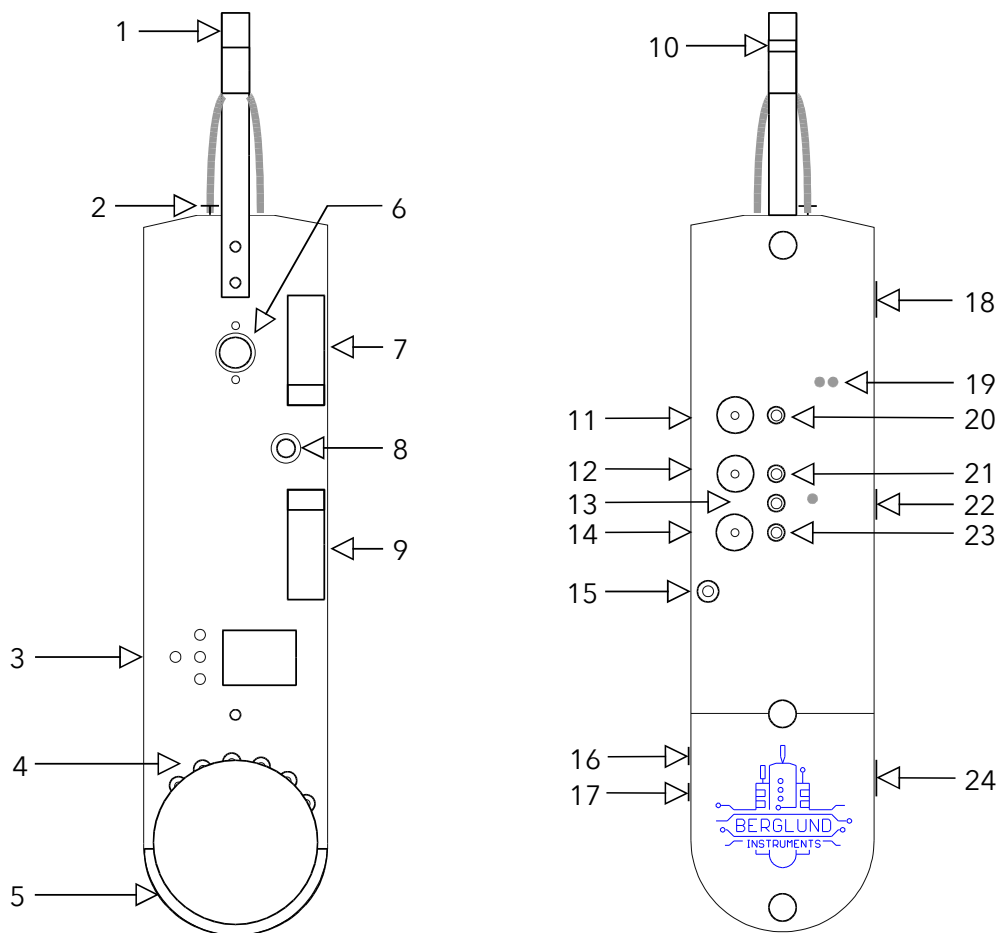
As popularity of the NuEVI grew, EWI players started to get in touch, wanting an EWI counterpart to the NuEVI. When development was initiated for this new EWI, a number of factors pointed to the RAD EWI as the suitable version to modernize and build for people. The original RAD MIDI EWI was made by Nyle in 2004, for saxophone and EWI player Michael Brecker. The RAD EWI featured a new, radical, redesign putting the keys for left and right hands side by side, and having handles attached so it could be played without the use of a neck strap. Michael Brecker was very pleased with this new controller and used it on tour. No additional RAD EWIs were made though, and the controller could have become just this one-off mythical beast.

Development of the NuRAD was done in parallel with building NuEVIs and while it took more than a year to get it all ready, some ideas for the NuRAD would also be available as optional features for the NuEVI, the PneuBite in particular. The PneuBite is based on the bite sensor in the vintage Steiner Master's Touch system, and rather than measuring capacitance between two strips of metal, it senses the air pressure in a closed system where squeezing or bending the mouthpiece will alter the pressure. As an improvement over the original, a pressure valve is added, allowing for equalization to ambient air pressure.

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Instrument Overview



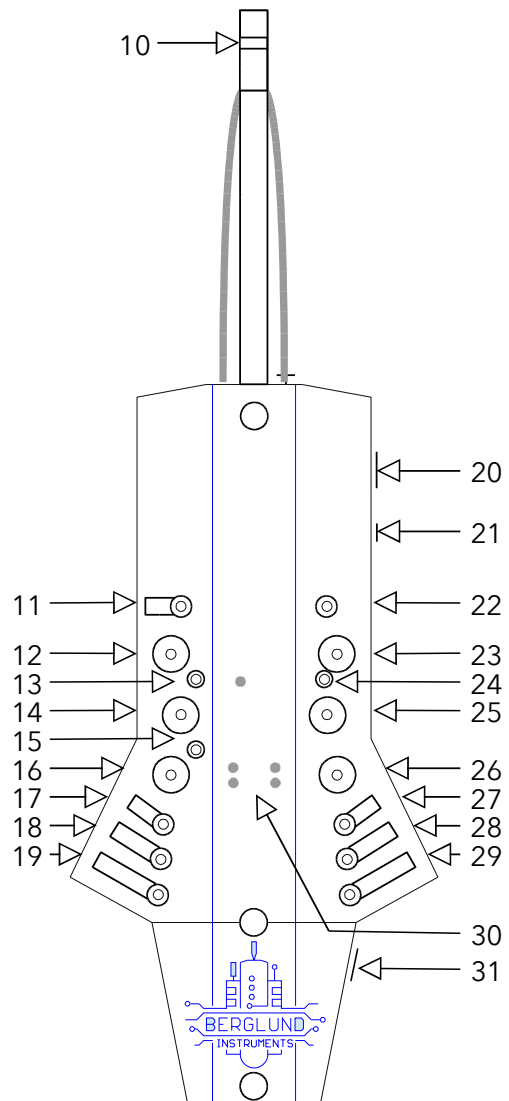
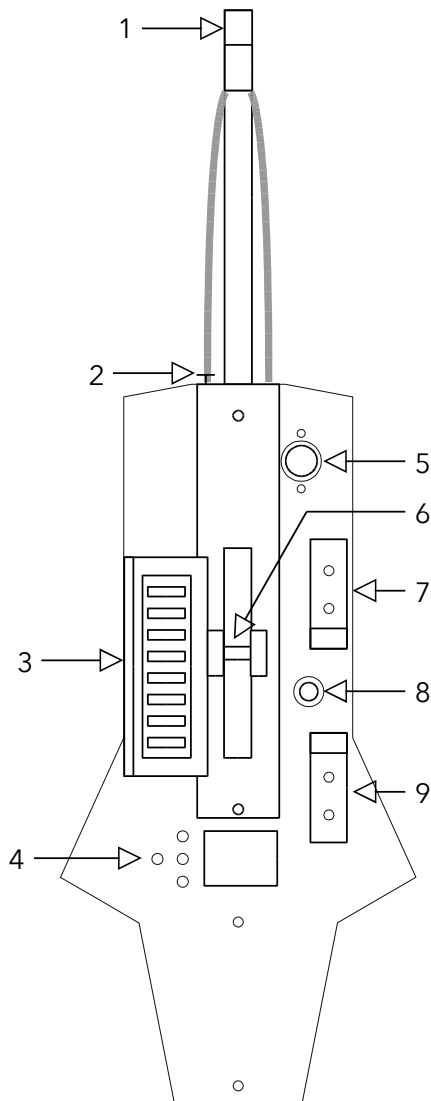
Bottom view:

- 1) Mouthpiece with bite sensor
- 2) Pressure equalization valve (PneuBite only)
- 3) Menu buttons and OLED display
- 4) Octave rollers
- 5) Fourth valve, K4
- 6) DIN MIDI output jack
- 7) Pitch bend up
- 8) Thumb lever
- 9) Pitch bend down

- 16) Breath CV jack (NuEVI CV and Plus)
- 17) Note CV jack (NuEVI CV and Plus)
- 18) Micro USB jack
- 19) LED indicators
- 20) First trill key, K5
- 21) Second trill key, K6
- 22) Power switch (AAA/AA battery versions)
- 23) Third trill key, K7
- 24) Power switch (LiPo battery versions)

Top view:

- 10) Lip sensor (extra controller)
- 11) First valve, K1
- 12) Second valve, K2
- 13) Special key
- 14) Third valve, K3
- 15) Pinky key



Bottom view:

- 1) Mouthpiece with pneumatic bite sensing
- 2) Pressure equalization valve
- 3) Octave rollers
- 4) Menu buttons and OLED display
- 5) DIN MIDI output jack
- 6) Neck strap holder
- 7) Pitch bend up
- 8) Thumb lever
- 9) Pitch bend down

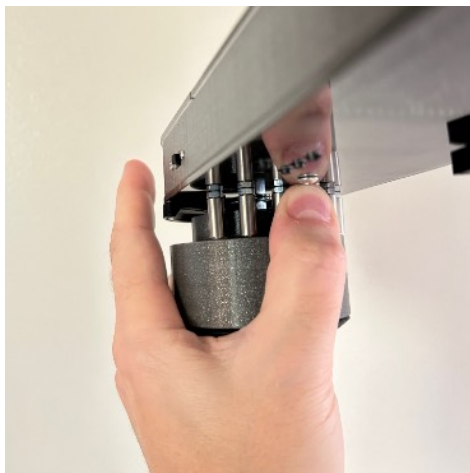
Top view:

- 10) Lip sensor (extra controller)
- 11) Side key, RHs
- 12) F key, RH1
- 13) Special key 1
- 14) E key, RH 2
- 15) Special key 2

- 16) D key, RH3
- 17) RH pinky key 1, RHp1
- 18) RH pinky key 2, RHp2
- 19) RH pinky key 3, RHp3
- 20) Micro USB jack
- 21) Breath CV output jack (3.5mm TS)
- 22) Mod key (configurable)
- 23) B key, LH1
- 24) Bis key, LHb
- 25) A key, LH2
- 26) G key, LH3
- 27) LH pinky key 1, LHp1
- 28) LH pinky key 2, LHp2
- 29) LH pinky key 3, LHp3 (configurable)
- 30) LED indicators
- 31) Power switch

Holding and controls

The way you are holding your instrument will affect both comfort and performance. For both the NuEVI and the NuRAD there are a couple of things to note regarding this. One common mistake for example is to place the thumb controlling the octaves on just one roller at a time, when the correct octave positions are between rollers, touching two at a time. Getting these things right from the beginning will help getting you faster to the point where the instrument feels like an extension of yourself in your musical expression.



The NuEVI canister is held with left hand in a way that the thumb is more or less vertical onto the rollers. Index finger should be free to touch and release the fourth valve, a.k.a. K4, a.k.a. the half octave key that is black arc in the front of the main body. The other fingers grip around the canister without touching the fourth valve.

Right hand thumb is placed between the two pitch bend pads and on top of the (vibrato) lever. Make sure it's not too easy to be touching the pitch benders inadvertently while playing, yet not too hard to reach the pitch benders when you want to use them. Loosen the screws and adjust if needed. Be careful not to over tighten as the benders are plastic.



In some cases there is an additional pad behind the thumb lever. That's an extension of the extra controller sensor routing. Usually the extra controller is

actuated with the lip sensor, but if using the optional mouthpieces available, the lip sensor is removed and instead this pad can be used. If the standard bite type mouthpiece is installed, both the lip sensor and the touch pad can be used.

The NuRAD can be used either with a neck strap or with handles. The handles can be removed if using neck strap. To remove the handle, put the NuRAD up side down on your lap or on a soft surface. Snap the handle out of the slot in the back of the instrument, then slide the handle out of first one side, then the other. Note the way it is oriented for when you decide to put it back. The handle bends down a bit at the sides. To reinstall the handle, start with the sides, then snap it in place in the slot.

When holding the NuRAD, either with or without the handles, preferably use an angle of about 45° out from the body. This makes the balance right and it also reduces the possibility of liquid (spittle) going onto the instrument body. Like with the NuEVI, the pitch benders should be adjusted so that they are easily reached when playing, but not easily touched by accident. As the hand is moving around more on the NuRAD reaching for keys, the benders usually need to be placed a bit further away from the thumb.

The mouthpiece has three sensors. The primary one is the breath pressure sensor. It controls note on/off and the continuous control value for breath sent to the synthesizer. The breath sensor system is of the closed kind. That means no air is flowing through the instrument when it is played. Instead you let air slip out by the sides of the mouthpiece when blowing into it. The second mouthpiece sensor is the bite sensor. This is configurable to provide bite vibrato like on the Akai EWI or to control portamento (glide). A slight bite or bend to the mouthpiece will increase the glide time. When released, it goes

back to zero/no glide. Third, there's the extra controller sensor on top of the mouthpiece. This is a lip sensor that is touch sensitive and it can be set to control modulation, growl or sustain (hold).

If the PneuBite system is installed (standard on NuRAD and on most NuEVI from late 2022 and forward), make sure to press the valve below the bite sensor tube every time you pick up your instrument to play. This is especially important if you are using the bite sensor for portamento control. The system is sensitive to factors as ambient air pressure and temperature, so pressing the valve button before a playing session ensures the pressure level in the system is right and the bite response is as accurate as possible. After a couple of minutes of playing in normal room temperature, the pressure is slightly higher due to air expansion when mouthpiece is heated by body temperature. Therefore, the calibrated threshold setting in the portamento adjustment menu is set a bit above the pre-warmup reading, allowing it to rise a bit when warmed up without going over the threshold activating the portamento. The bite sensor LED is a good tool for monitoring the bite. If you pressed the valve before the session, but after a minute of playing the LED is glowing faintly even if you are not applying bite pressure or bending to the mouthpiece, you should raise the THR setting for the portamento slightly (see adjustment section).

On the NuEVI the the right hand has controls both on top of the instrument and on the bottom. Topside, there are three main valves (-2, -1 and -3 semitones), three trill keys (+2, +1 and +4 semitones), a "special key" between two of the trill keys for chord and interval functions, and a configurable pinky key. The keys are all activated by touch. On the bottom there are two touch sensitive pitch bend plates, behind and in front of the thumb. They are proportional and send pitch bend up and down in response to how much you let your thumb press against them. Between the pitch bend pads, there is a

vibrato lever. This also sends pitch bend control to your synthesizer, but in a manner focused on vibrato. The lever senses position change. A forward movement triggers a slight pitch bend down followed by a return to zero when the movement stops. The movement back will then trigger a slight pitch bend up, followed by return to zero when movement stops. This creates a very violin like vibrato in a way that will feel natural to the player. A slight shaking hand motion back and forth with your thumb kept on the lever will produce this.

Left hand controls octaves and the fourth valve (perfect fifth, -5 semitones). Octaves are controlled using the thumb rollers. Let your thumb rest between two rollers. Rotate your hand while holding the canister and let your thumb move along the arc of rollers to change octaves. Octaves go from -3 (thumb left of leftmost roller, not touching it), to -2 (touching only the leftmost roller), -1 (between the first two rollers) and all the way up to +3 (between the two last rollers). Your index finger controls the fourth valve (-5 semitones).

On the NuRAD there is a similar, but slightly different setup. Topside, there are three main keys, three pinky keys, a side key and a "special key" (consisting of two keys to be touched simultaneously to activate) for chord and interval functions. On the bottom there are two pitch bend pads and a lever like on the NuEVI, but for NuRAD it can be useful to have the lever control portamento instead of vibrato.

Left hand top controls are three main keys, a bis key, two standard pinky keys, one configurable pinky key and a configurable side key called the mod key. Octaves are controlled using the thumb rollers on the bottom side. Let your thumb rest between two rollers. Swipe your thumb up and down over the rollers to change octaves.

Connections

The NuRAD/NuEVI has two main ways of connecting to synthesizers and computers. The first is using the standard DIN MIDI OUT jack, connecting using a standard MIDI cable to the MIDI IN of a hardware synth or computer MIDI interface. The second way is by using the Micro USB port on the side of the NuRAD/NuEVI. Using a standard Micro USB charge/sync cable, you can connect the controller to any computer or MIDI USB host hardware supporting class compliant MIDI over USB. The instrument will be recognized by your system as "NuRAD MIDI" or "NuEVI MIDI". Using a Lightning to USB Camera Adapter, you can even connect your NuRAD/NuEVI directly to an iPad or iPhone and use it with soft synth apps. The Micro USB connection will also power the NuRAD/NuEVI when the battery switch is in the back most position (battery power off). The low power requirement of the NuRAD/NuEVI makes it possible to run it from any computer USB port, USB charger (please use quality ones and don't put your instrument at risk) or even from your iPad. Mind that switching between USB power and battery power will switch the controller off and on again.

NuRAD model also features a of 3.5 mm mono jack for supplying breath pressure CV to analog synths. Breath CV is 0V-5V and is produced by the Teensy microcontroller with a fast 0.5ms update interval. Breath THR and MAX adjustment settings do have effect on this output, as it is not coming directly from the sensor.

NuEVI CV and NuEVI Plus has two 3.5 mm mono jacks in the front that will provide 1v/oct pitch CV and 0-10V breath CV (Eurorack levels). Tuning settings for the pitch CV are found in the EXTRAS menu.

Power

Depending on your model you may have either a battery holder for AAA or AA batteries, or a built in LiPo power system. To monitor the battery power, the battery voltage will be indicated top right in the display when the main menu is activated. Values over 4.9V will indicate that the instrument is powered over USB, and below that it will indicate it as battery voltage. Normal voltage for a set of new alkaline batteries will be about 4.6V. The value will drop as the batteries are being used, giving a hint of the current battery condition. Below 3.8V they are due to be replaced, and the indicator will say BAT LOW. If you are using NiMH rechargeable batteries or the optional LiPo built in rechargeable battery, change the battery type setting in the EXTRAS menu to corresponding type. This will set the right threshold value for BAT LOW indication (3.6V for NiMH and 3.7V for LiPo). Going into the ABOUT menu, you will also see the set battery type and a rough approximation of remaining battery percentage.

To replace alkaline or NiMH batteries, make sure the NuEVI or NuRAD is switched off and disconnected from USB or DIN MIDI, then unscrew the frontmost thumbscrew on top of the controller and loosen the one at the back of the battery compartment slightly. Slide the lid forward and lift it off the controller. Replace the batteries (3xAAA or 3xAA depending on model, alkaline or NiMH) and slide the lid back in place. Get the front thumbscrew in place first, then tighten both screws. Only finger gripping power should be applied. Do not use pliers or similar tools or you will most certainly scratch the plastics of your instrument.

For the LiPo system, here's the deal. First of all, LiPo batteries can be really nasty if you do bad stuff to them, so don't ever puncture or otherwise put the

LiPo cell in any kind of extreme situation with heat, water, fire, etc. Now, this cell used in the NuEVI is small (1500mAh, 3.7V), and it has protection against over voltage, short circuit and under voltage, and we are charging it with a relatively small current (<430mA), so normal use should be all safe. And of course, the LiPo cell should be recycled in a proper way if for any reason replaced or retired, not ever just thrown in the bin.

With the LiPo battery solution installed, the NuEVI or NuRAD has three positions on the power slide switch instead of two.

The switch positions are:

[•][][]

Leftmost position - Power ON from battery, battery time 20+ hrs

[][•][]

Mid position - Power OFF, battery charge when USB is connected to a USB power adapter (500mA or higher) Charges to 80% in 3.5hrs, 100% in 5.5-6 hrs. The red LED in the battery compartment is lit until the battery is fully charged.

[][][•]

Rightmost position - Battery power off, power ON from USB if connected (no charging, low power consumption)

For models with AAA or AA battery holder, the power switch has two positions: Left for battery power and right for USB power if connected.

Settings

To simplify configuration, the NuRAD and NuEVI have been equipped with an OLED display and four navigation buttons. The middle buttons are MENU/BACK (left) and ENTER (right), and the buttons above and below are the buttons for UP and DOWN selection. When not used for configuration or patch viewing, the display will be shut off to conserve power. Pressing MENU will activate the display and the main menu. A flashing cursor will indicate items, and ENTER will select the indicated item. Menu items directly controlling a setting will trigger a square being shown on the right in the display, with the adjustable value flashing inside it. Press UP and DOWN to select the desired value and then press ENTER or MENU to select that value and store it in non-volatile memory. The controller will remember this setting even if it is switched off. To make a temporary change that will not be stored, leave the menu open with the value flashing. After a while, the menu will shut off and the setting will not be stored.

TRANSPOSE

This menu item allows you to transpose the instrument up or down twelve semitones. Factory default transposition is C.

OCTAVE

This menu item changes the octave transposition of the instrument. Values go from -3 to + 3, with +0 as factory default.

MIDI CH

This menu item selects the active MIDI channel, 1 through 16, for both DIN MIDI and USB MIDI. Factory default is MIDI channel 1.

POLY PLAY

In the Poly Play menu you configure everything having to do with polyphonic playing functions.

POLY PLAY - POLY MODE

Here you select harmonization or rotator setup to be activated by holding MOD key (NuRAD) or Pinky Key (NuEVI) and touching Special Key(s). Deactivate by just touching Special Key(s). Chords contributed by Bert Lochs.

OFF - disables all Special Key functionality, including the Parallel Chord, Slur Sustain, Slur Sostenuto and Sub Octave functions (see Special Key section).

MGR - Major Gospel Root - a gospel type triad voicing

MGD - Major Gospel Dominant - same as MGR, but with a dominant on V instead of an inversion of the root

MA9 - Major add9 - pop style add9 harmonization

MND - minor Dorian - jazz type minor

MNA - minor Aeolian - classical minor

MNH - minor 4-voice Hip - a more hip dorian minor

FWC - Four Way Close - old school block chord harmony (with additional options further down in the Poly Play menu)

RTA - Rotator A

RTB - Rotator B

RTC - Rotator C

POLY PLAY - HMZ KEY

Selects the key you are playing in for the key based harmonizations.

POLY PLAY - OTF KEY

Enables on the fly key change for the key based harmonizers. To change key on the fly while playing, finger the key (not blowing) and briefly lift your thumb off the rollers (when in octave two or higher). Key change on the fly will not be stored when powered off.

POLY PLAY - HMZ LIMIT

Limits the number of voices to be played, starting elimination from lowest note and up. Applies to the key based harmonizations only, not Rotator, Parallel Chord or Slur Sustain.

POLY PLAY - FWC TYPE

Type of block chord for the Four Way Close harmonization. (6, m6, 7 or m7)

POLY PLAY - FWC LOCKH

"Lock Hands" (double melody) adds another melody note one octave down for the Four Way Close harmonizations. (OFF/ON)

POLY PLAY - FWC DROP2

"Drop 2" moves the second note (the one below melody note) one octave down for the FWC. (OFF/ON)

POLY PLAY - PRIORITY

Sets which note will get priority when playing mono patches (sounds really great to layer a mono patch with a poly patch for use with with the Poly Play functions). HI will play the melody note as the mono lead and LO will play the rotated note or last note of other poly modes.

POLY PLAY - ROTATOR A, ROTATOR B, ROTATOR C

RTx PARAL

RTx ROT 1

RTx ROT 2

RTx ROT 3

This last section of settings the poly play menu is for the three rotators. They create a three note chord using the melody note, a fixed interval parallel note and a third note taken from a rotating selection of four notes. For every new note triggered, the rotation is advanced one step, and a new combination of notes is played. For each of the three selectable rotator setups you can configure the fixed interval with RTx PARAL and the four intervals to be rotated for the third note with RTx ROT 1 to RTx ROT4, where x represents rotators A through C.

Setting an interval to 0 disables the note output for that interval. For the rotated intervals, this also means it is skipped, moving on to the next note. This means you can have rotation between only two or three notes instead of four, or create a set interval or chord with no rotation.

Rotator original idea by Robby Kilgore.

SETUP BR

Menu for settings related to breath control.

SETUP BR - BRTH CC A

Sets the MIDI CC to be sent to represent the breath data.

OFF - No breath CC data is sent.

MW - Breath data is sent as CC#1 (Mod Wheel)

BR - Breath data is sent as CC#2 (Breath, factory default)

VL - Breath data is sent as CC#7 (Volume)

EX - Breath data is sent as CC#11 (Expression)

MW+ - High res breath data is sent on CC#1 and CC#33 (Hi-res Mod Wheel)*

BR+ - High resolution breath data is sent on CC#2 and CC#34 (Hi-res Breath)*

VL+ - High resolution breath data is sent on CC#7 and CC#39 (Hi-res Volume)*

EX+ - High res breath data is sent on CC#11 and CC#43 (Hi-res Expression)*

CF - Breath data is sent as CC#74 (Filter Cutoff)

UNO - Breath data is sent as CC#20 (for use with IK Multimedia UNO Synth)

*) Hi-res MIDI is very often not supported in the receiving end, i.e. synths or DAWs. It also uses more MIDI bandwidth. In most cases you are better off with the regular CC signal. In cases where smoothing is not implemented in the receiving end, Hi-res CC can be a way to get less stepping in the filter control. As an example, the Minibrute gets stepping in the sound when the filter cutoff is controlled with Aftertouch, but a smooth sound when the filter is controlled by high resolution Modulation Wheel data.

SETUP BR - BRTHCC B

Secondary MIDI CC for breath data. Can be set to any CC between 1 and 127 and be used together with CC A or on its own with CC A set to OFF.

SETUP BR - CC B RISE

Multiplier to faster reach top value for CC B compared to CC A. For example if you want to control amplifier (VCA) value with CC B and have it reach full value at 25% of full breath, while CC A controls filter (VCF) cutoff in normal fashion, set the CC B RISE to 4x.

1x - 10x (in steps of one)

SETUP BR - BREATH AT

Controls whether or not breath data should be sent as Aftertouch (Channel Pressure).

OFF - No Aftertouch breath data is sent (factory default)

ON - Breath data is sent as Aftertouch.

SETUP BR - VELOCITY

Note velocity can be set to follow the initial breath value dynamically (DYN) or to a fixed value (1 to 127). When fixed value is used, the velocity sample delay is also bypassed for optimal timing of note on vs rising breath signal.

SETUP BR - CURVE

This sets the breath sensor to control signal transfer curve. See curve diagram for a graphical representation of each curve.

-4 to -1 curves are more responsive (faster rising) in the low pressure end.

+1 to +4 curves are more responsive (faster rising) in the high pressure end.

LIN is a straight linear signal transfer.

S curves have a faster transition in the middle and is less responsive in the low and high pressure ends.

Z curves have a slower transition in the middle and is more responsive in the low and high pressure ends.

The LIN curve is factory default.

SETUP BR - VEL DELAY

The time it takes for a tongued note to reach its attack peak is generally about 20ms. Normally, that's the amount of time the NuRAD waits until it samples the breath pressure level to set the note velocity. However, there are situations where we would want to adjust that delay. For example, if we are using a high THR value for the breath sensor, some of the rising time will occur before the THR is reached and the delay time starts. Also, if the connected synthesizer is not responding to velocity, setting the delay shorter will increase the response time. Even if the synth responds to velocity, you can experiment with cutting down the delay time and compensating for lower velocity values with the VEL BIAS setting.

OFF - No velocity sample delay.

1 - Lowest delay setting

..

20 (factory default)

..

30 - Highest delay setting

SETUP BR - VEL BOOST

This setting helps boosting velocity values. Useful for compensating short velocity sample delay settings and for situations where you want to reach high velocity levels faster in relation to breath level.

OFF - Velocity bias disabled (factory default) **1** - Lowest setting

..

9 - Highest setting

SETUP BR - BR INTERV

Interval between breath messages sent. If your synth is not keeping up with the MIDI stream from your controller, try increasing the interval. Values below 6ms are not recommended for wireless use, and this is set as default value.

Settings go from **3ms to 15ms**.

SETUP CTR

Menu for settings related to controllers in general.

SETUP CTR - BITE CTL

Sets control destination for bite sensor.

OFF - No destination active for this controller

VIB - Vibrato

GLD - Glide/portamento (defined by GLIDE MOD and GLIDE LMT settings)

CC - Custom CC output (defined in BITE CC settings)

SETUP CTR - BITE CC

CC number for bite (sent if CC is selected in BITE CTL).

0 to 127

SETUP CTR - LEVER CTL

Sets control destination for thumb lever.

OFF - No destination active for this controller

VIB - Vibrato

GLD - Glide/portamento (defined by GLIDE MOD and GLIDE LMT settings)

CC - Custom CC output (defined in BITE CC settings)

SETUP CTR - LEVER CC

CC number for lever (sent if CC is selected in LEVER CTL).

0 to 127

SETUP CTR - GLIDE MOD

Settings for the portamento/glide function (controlled by the bite sensor).

OFF - No portamento CC data is sent.

ON - Portamento Time (CC#5) is sent.

SW - Portamento Time (CC#5) and Portamento Switch (CC#65) is sent. (default)

SEL - Roland SE-02 linear mode.

SEE - Roland SE-02 exponential mode.

SWO - Switching only (CC#65 is sent for glide on/off).

SETUP CTR - GLIDE LMT

Max level for glide amount CC. Especially useful when triggering glide with pinky/mod key.

1 to 127

SETUP CTR - VIBRATO

Menu for vibrato settings.

SETUP CTR - VIBRATO - DEPTH

Main vibrato level control. OFF disables manual vibrato completely.

OFF - Vibrato lever disabled.

1 - Lowest vibrato depth setting

..

9 - Highest vibrato depth setting

The factory default setting is 4. Vibrato depth is also depending on the vibrato sensitivity settings. After fine tuning the lever and bite sensitivity for a smooth vibrato response, you may want to revisit the depth setting.

SETUP CTR - VIBRATO - RETURN

This setting lets you adjust the speed of the automatic return to zero for the vibrato. Values go from **0 to 4**, where 4 is the fastest return and 0 is no automatic return, i.e. the vibrato lever will work as a conventional pitch stick. Normal EWI/EVI behavior is auto return, and the default setting is 2. Setting 0 is not recommended with bite sensor vibrato.

SETUP CTR - VIBRATO - DIRECTION

This setting lets you set the direction of the vibrato. For most people this should be kept to the default setting **NRM** (normal), where the pitch will fall in response to thumb movement in direction away from the mouthpiece, or rise in response to bite when bite sensor is used for vibrato. Setting **REV** will simply switch directions.

SETUP CTR - VIBRATO - SENSE LVR

This setting controls vibrato lever sensitivity. As individual vibrato sensors may vary in values a bit, this setting will help adjusting the sensitivity to get the best result. Setting values go from **1 to 12**, where 12 is the most sensitive.

SETUP CTR - VIBRATO - SQUELCH L

This setting helps eliminate pitch bend MIDI chatter for when vibrato is not touched and idle. Setting it too high makes the vibrato lever require an unnecessary amount of movement before initiating vibrato, and with the setting too low the natural sensor noise will cause MIDI chatter around zero. To find the right setting, use a MIDI monitor software on your computer or other device. It should not be showing pitch bend activity when idle, yet be set close enough to this limit to allow good sensitivity when lever is touched slightly. When you are pleased with the setting, press ENTER or MENU to save it. Setting values go from **1 to 30**, where 12 is the factory default.

SETUP CTR - VIBRATO - SENSE BTE

This setting controls vibrato sensitivity. As individual vibrato sensors may vary in values a bit, this setting will help adjusting the sensitivity to get the best result. Setting values go from **1 to 12**, where 12 is the most sensitive.

SETUP CTR - VIBRATO - SQUELCH B

This setting helps eliminate pitch bend MIDI chatter for when bite vibrato is not touched and idle. Setting it too high makes the bite sensor require an

unnecessary amount of movement before initiating vibrato, and with the setting too low the natural sensor noise will cause MIDI chatter around zero. To find the right setting, use a MIDI monitor software on your computer or other device. It should not be showing pitch bend activity when idle. When you are pleased with the setting, press ENTER or MENU to save it. Setting values go from **1 to 30**, where 10 is the factory default.

SETUP CTR - EXCT CC A

The extra controller (lip sensor and/or touch pad) can be disabled or set to control transmission of selected MIDI CC data.

OFF - Extra controller is disabled.

MW - Mod Wheel (CC#1) data is sent. Disabled if breath data is sent over CC#1.

FP - Foot Pedal (CC#4) data is sent. Growl on some synth patches. (default)

CF - Filter Cutoff (CC#74) data is sent.

SP - Sustain pedal (CC#64). Holds fingered notes until controller is released.

SETUP CTR - EXCT CC B

Secondary CC value to be sent with extra controller. Can be sent together with main CC for extra controller, or switched using mod key (see mod key settings). Values from **1 to 127**. Default **OFF**.

SETUP CTR - EXCT HARM

To use the lip sensor extra controller for going through the harmonic series, set this to the range you want. A larger range makes it harder to control, as the

touch sensitivity of the lip sensor is divided into the number of steps added.

Values from **1 to 6**. Default **OFF**.

SETUP CTR - HARM SEL

The harmonic series can be set up in a number of ways, going both up (best option for using the lip sensor) or down (useful for example with a custom experimental mouthpiece sensing amount of lip pressed against it).

HM1 - Harmonics 1

HM2 - Harmonics 2 (7th harmonic not excluded)

5TH - 5ths and octaves, up

OCT - Octaves, up

H1R - Harmonics 1, down/reverse

H2R - Harmonics 2 (7th harmonic not excluded), down/reverse

5TR - 5ths and octaves, down/reverse

OCR - Octaves, down/reverse

SETUP CTR - DEGLITCH

To reduce glitching when fingerings are changed, the deglitching function waits some milliseconds before considering a fingering “done” and settled. Beginners will probably feel the need to increase the deglitch setting, while virtuoso players could feel the need to reduce the setting.

OFF - Deglitching disabled

1 ms - Lowest deglitch setting

..

20 ms (factory default)

..

70 ms - Highest deglitch setting

SETUP CTR - MOD KEY / PINKY KEY

The mod key (LH side key) is the NuRAD equivalent of the NuEVI pinky key. The standard and legacy behavior of the NuEVI pinky key is to set the pitch bend signal to half its value while the key is pressed. In NuEVI and NuRAD, we have added the possibility to instead use this key for instant transposition (an adjustable trill key if you like) or as a control for synth volume or portamento, as well as some other functions.

- **12** - Transpose one octave down when mod key is held

..

- **1** - Transpose one semitone down when mod key is held

PBD - Pitch Bend Divide, PB and vibrato level is half value when mod key is held

+**1** - Transpose one semitone up when mod key is held

..

+ **12** - Transpose one octave up when mod key is held

ECB - Send on/off (0/127) for CC set in Extra Controller CC B setting

ECS - Switch between main and secondary CC to be sent using Extra Controller

LVL - Level control. Set with 1st and 2nd RH pinky keys (RAD) or trill keys (EVI)

LVP - Like above but current level is transmitted on power up.

GLD - Momentarily sends the the set glide limit amount as static glide level.

ECH - Momentary extra controller harmonics activation.

QTN - Quarter tone down (using MIDI pitch bend)

When setting LVL/LVP, the breath and glide LEDs crossfade between them to indicate setting. All breath LED is 127 (max) and all glide LED is 0 (min).

PBD is factory default pinky key setting, as it is the legacy function of this key.

SETUP CTR - LEVEL CC

CC to be sent using pinky key level controls LVL and LVP. **1 to 127**, default **OFF**.

SETUP CTR - EXTRA PKEY (NuRAD only)

Settings for the customizable extra LH pinky key, the LHp3.

OFF - LHp3 disabled

-12 - 12 semitones (1 octave) down

..

-1 - One semitone down

MOD - Use LHp3 as a secondary mod key (see MOD KEY above)

+1 - One semitone up

..

+12 - 12 semitones (1 octave) up

SETUP CTR - FINGERING

Selects fingering mode. (See separate charts for details on NuRAD fingerings.)

EWI - Standard EWI fingering. Flexible, as it allows all keys to affect pitch at all times.

EWX - Extended EWI fingering. Releasing LH1 or touching RHp3 does octave shift where applicable, increasing range above and below the octave breaks.

SAX - Saxophone fingering. Keys below relevant specified fingerings do not have effect on note selection. (Only LHp2 and RHs are always active for -1 and +1)

EVI - Electronic Valve Instrument fingering adapted for EWI. **EVR** - EVI fingering with reversed octave rollers.

On the NuEVI, the fingering menu offers the possibility of reversed roller action or a couple of experimental harmonic series based settings.

EVI - EVI fingering

EVR - EVI fingering with reversed roller action

TPT - Trumpet (experimental) Rollers controlling harmonics, K4 switching between harmonic series version

HRN - Double horn (experimental). Rollers controlling harmonics, K4 switching between horns

SETUP CTR - ROLLRMODE

Sets the way the controller handles octave rollers. Mode **1** = Highest touched roller, no release memory (legacy style); Mode **2** = Highest touched roller, release memory (default); Mode **3** = Touched roller pair, release memory. Mode **4** = Touched roller pair, release memory, bonus octave on top.

SETUP CTR - PITCH BEND

The pitch bend signal can be divided to work with synthesizers that are not able to set the pitch bend range low enough to fit this kind of instrument. As an

example, if a synth has a set pitch bend range of 12 semitones up and down, setting the pitch bend divider to 1/12 will limit the range to just a semitone up and down. The OFF setting will disable the pitch bend pads. Vibrato depth follows the pitch bend divider setting. If the pitch bend pads are disabled, the vibrato will still work at 1/1 range.

OFF - No pitch bend data is sent.

1/1 - Full pitch bend range. (factory default) **1/2** - Half pitch bend range.

..

1/12 - A twelfth of the pitch bend range.

ADJUST

Selecting this menu item enters the sensor adjustment screen. Here you can monitor sensor reading values and change the threshold and maximum (sensitivity) values for the sensors. Scroll through the various sensors using UP and DOWN buttons and press ENTER to move the cursor to THR and MAX items, where UP and DOWN buttons increase and decrease the values (the indicator bar for the setting is moved right or left). Note that the MAX setting can never be set lower than the THR setting. A moving pixel (SNS) indicates the current sensor reading. Where several sensors are involved, a pixel for each sensor will be shown. Also note that the intensive updating of the OLED display while using the SETUP menu will interfere with the transmission of MIDI CC data. For that reason, the ADJUST menu is to be used for setup only, not to be activated during normal play. To perform an automatic calibration of any sensor page, press enter to move the cursor to THR or MAX bar, then press up and down buttons simultaneously. Make sure to keep fingers off the sensors when doing this.

ADJUST - BREATH

THR level sets the amount of pressure needed to trigger a note and start sending breath MIDI data. The breath indicator LED (blue) will light up when pressure is over threshold. If the LED is always lit, even when you are not blowing into the mouthpiece, you need to raise the THR setting until the LED turns off.

MAX sets the pressure level that should correspond to full signal output. This setting is of course to your individual preference, and with different settings of the breath to signal transfer curve (SETUP BR - CURVE) you may want to adjust this too.

ADJUST - LEVER

THR level sets the amount of forward thumb pressure on the lever needed to start sending control data. The portamento indicator LED (red) will light up when input is over threshold in case the lever is set up to control portamento. If the LED is always lit, even when you are not actuating the lever, you need to raise the THR setting until the LED turns off.

MAX sets the actuation level corresponding to full signal output.

ADJUST - TOUCH

THR sets the threshold for the keys and the octave rollers. When all keys and rollers are untouched, the SNS dots should all be to the right of the THR line. Keys touched one at a time, one of the dots should go left of the THR line. This both verifies connectivity and correctly set THR level.

ADJUST - LIP/EC

The extra controller, activated in the SETUP CTR menu, is the lip or embouchure sensor on top of the mouthpiece. It is a proportional touch controller, working much in the same fashion as the pitch bend pads.

THR sets the threshold for the lip touch sensor. Make sure the SNS indicator dot is to the left of the THR line when sensor is not touched.

MAX sets the lip touch corresponding to full controller signal output.

ADJUST - BEND

THR sets the threshold for the pitch bend touch pads. Make sure both of the SNS indicator dots are to the left of the THR line, or you will have issues with your pitch bend signal.

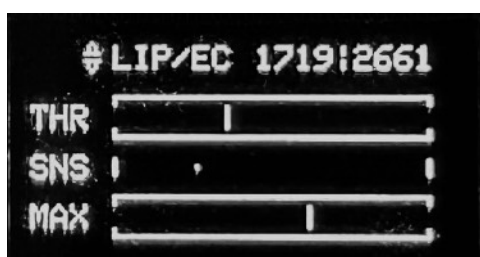
MAX sets the amount of finger pressure against pitch bend touch pads required for full signal output. When adjusting this setting, move your thumb up and down onto the pads to find a good setting. Note that what should be sent as full pitch bend signal is controlled in the SETUP CTR - PITCH BEND menu. The sensor MAX setting should always be set so the SNS reading is reaching the MAX line when the pads are fully touched.

ADJUST - BITE

THR level sets the amount of bite or bend action on the mouthpiece needed to start sending portamento control data. The portamento indicator LED (red) will light up when bite input is over threshold in case the bite sensor is set up to control portamento. If the LED is always lit, even when you are not biting or bending the mouthpiece, you need to raise the THR setting until the LED turns off. If PneuBite system is installed, remember to press the valve button before calibration and put the THR level a bit higher than just right of the idle sensor reading to have some margin for rising value due to temperature change.

MAX sets the bite or bending level corresponding to full portamento signal output.

When using bite for vibrato, the bite adjustment is not relevant, but the SNS dot can still be a good indicator to check proper bite sensor response.



Typical settings. Note that for the touch sensor adjustment the THR bar is to the left of the sensor dot cluster, as the values go lower when sensors are touched. For the other sensors the dots move right on actuation, and the THR and MAX bars should be on the right of idle reading sensor dots.

EXTRAS

Various settings.

EXTRAS - LEGACY PB

ON/OFF switching for the legacy instant controls where both pitch benders are used. (See Legacy Controls section.)

EXTRAS - LEGACY BR

ON/OFF switching for the legacy instant controls where negative breath is used. (See Legacy Controls section.)

EXTRAS - GATE HOLD

Setting to disable the Gate Hold functionality to avoid accidental activation. (See Gate Hold section for details on using the Gate Hold function.)

EXTRAS - 3RD TRILL (NuEVI)

This setting controls the behavior of the 3rd trill key. Available options are **+3** or **+4** (default) semitones. As a hidden extra, the interval that is not selected here can be achieved by touching third valve key and third trill key at the same time. A mechanical mod making this practical is to mount a metal lip onto the trill key, making it protrude just above and behind the third valve key.

EXTRAS - BCAS MODE

This setting changes the behavior of the legacy instant controls, to not require touching pitch bend up for patch change. Only has effect when LEGACY BR is ON.

EXTRAS - DAC OUT

This setting controls the DAC output channel. The available options are:

BRTH - Output the breath sensor signal.

PTCH - Output note pitch (v/Oct).

For NuEVI Plus, NuEVI CV or standard NuEVI or NuRAD with CV box or module, the PTCH option should be selected.

EXTRAS - BAT TYPE

To have the battery voltage monitoring correctly representing the battery type used in the controller, use the corresponding setting.

ALK - Alkaline batteries (100% at 4.6V, LOW BAT at 3.8V)

NMH - NiMH rechargeable batteries (100% at 3.9V, LOW BAT at 3.6V)

LIP - LiPo rechargeable battery (100% at 4.3V, LOW BAT at 3.7V)

EXTRAS - FAST BOOT

Enabling this setting will make the NuEVI start up as fast as possible when powered on.

EXTRAS - CV TUNE

Tuning of the CV output for 1V/Oct when using NuEVI CV, NuEVI Plus or NuEVI/NuRAD with external CV box or module. Modules usually ship with a suggested tuned value to enter here.

EXTRAS - CV SCALE

Scaling of the CV output for 1V/Oct when using NuEVI CV, NuEVI Plus or NuEVI/NuRAD with external CV box or module. Modules usually ship with a suggested tuned value to enter here.

EXTRAS - CV EC LFO

The CV EC LFO setting controls a CV LFO vibrato function for the extra controller (lip sensor). It can be set to OFF (no extra controller LFO vibrato) or values 1 through 8, which represent vibrato frequency from 4.5Hz to 8Hz. Default value is 3 (5.5Hz).

EXTRAS - WL POWER

To set the radio power of the optional midiBeam wireless kit, select a value in this menu and press enter. This should be done with the wireless receiver linked up (steady glowing LEDs on TX and RX). The available values are 0, -6, -12 and -18 dBm. 0 is the highest setting, and is the default setting in the midiBeam. NuEVI does not store the setting (it is only kept in the midiBeam) so the menu will always start on 0 when selected.

EXTRAS - WL CHANNEL

To set the radio channel of the midiBeam wireless transmitter, select a value in this menu and press enter. Available values are 4-80. After changing this, the transmitter and receiver will need to be paired again as the connection will be lost. Note that this is just an “initial channel” that the midiBeam will use, during pairing it will determine what the best channel is. The value is also not stored by NuEVI, so the menu will always start at 4 (the default midiBeam channel).

Before changing any of the wireless settings, please read through the midiBeam user guide describing these settings. This is available at <http://pandamidi.com/support>.

Patch selection

Pressing the ENTER button when the display is off will show the currently selected patch number on the display for a couple of seconds. Pressing UP or DOWN changes the patch number. You can hold the button pressed to get a faster scrolling through the numbers. Pressing the UP or DOWN button when the display is switched off will directly enter the patch view mode and step the patch number up or down.

The patch number will be remembered by the controller even when powered off. Holding ENTER button while powering up the NuEVI/NuRAD will have it send a program change for the current patch selected.

FastPatch selection

You can store up to seven patch numbers that can be instantly recalled by holding a combination of trill keys (NuEVI) or LH1, LH2 and LH3 keys (NuRAD) when pressing any of the buttons ENTER, UP or DOWN from display sleep or patch view state. (Just reach with your LH thumb without looking.) If no patch number is stored for the selected memory slot, the selection will be ignored, and the current patch number will be displayed.

To save a patch number into a memory slot, use UP and DOWN to select the patch you want to store (no trill keys touched). From display sleep, finger the key combination you want to use as memory slot, press and hold MENU, then immediately press ENTER while still holding MENU. The display will briefly indicate that the FastPatch has been set.

To clear a FastPatch memory slot, finger the key combination for the slot, press and hold MENU, then immediately press UP while still holding MENU. The display will briefly indicate that the FastPatch slot has been cleared.

Mind that accidentally touching trill keys/LH keys when using UP, DOWN or ENTER for patch selection will recall a FastPatch or just display the current patch if no FastPatch is set for that slot, so keep fingers off the trills if you are just doing regular patch selection.

All notes off

Should a situation of stuck notes occur, a "midi panic" or "all notes off" can be sent by pressing and holding the ENTER button, then the MENU button while still holding ENTER, from display off state. Big friendly letters on the display will also tell you not to panic.

Special key

Introduced with the Steiner MIDI EVI, the special key added the possibility to play chords and intervals. This has been implemented in the NuEVI and NuRAD too. On NuRAD the special key has been divided into two keys to be touched at the same time, to lessen the risk of accidental activation.

To use special key functions, make sure POLY MODE in the POLY PLAY menu is not set to OFF.

The first function is **slur sustain**. To activate this, touch the Special key while holding a finger on LH pinky key 1 (NuRAD) or K4 (NuEVI arc key, fourth valve). Slur sustain will send a sustain (hold) pedal on command when a new note is tongued, keep it held as long as new notes are slurred, building chords by slurring and holding them until breath is released. A new chord can then be started by tonguing a new note. The latest chord or interval played will be stored for use with the parallel chord or interval function.

Parallel chord or interval is activated by touching the Special key while holding RH pinky key 1 (NuRAD) or K5 (NuEVI, first trill key). If no chord or interval has been stored by slur sustain, a default interval of a perfect fifth below the played note is used. Activating slur sustain will switch the parallel chord function off and any intervals or chords slurred will then overwrite the previously stored chord.

The **sub octave double** function is activated by touching the Special key while holding RH pinky key 2 (NuRAD) or K1 (NuEVI, first valve). This adds a

note played one octave down from played note(s). This can be used in combination with slur sustain or parallel chord functions.

A new addition to the special key functions is **slur sostenuto**. It is activated by touching the Special key while holding LH pinky key 2 (NuRAD) or K2 (NuEVI, second valve). When activated, first note (or chord) will be locked in by MIDI sostenuto pedal and sound as long as following notes are slurred. Note that not all synthesizers support MIDI sostenuto. The slur sostenuto can be combined with parallel chord, sub octave double or harmonizer/rotator.

Last but not least there is the configurable **poly play** function that is activated by touching/holding MOD key (NuRAD) or Pinky Key (NuEVI) and then touching Special Key(s). In the POLY PLAY menu you can set this up to a number of alternative harmonizers and rotators. See the settings section for POLY PLAY for all the different options here.

When in any of these polyphonic modes, the orange LED on the Teensy will be flashing instead of glowing steadily.

Touching only the special key(s) will switch off any active special key functions.

Gate Hold

A trick for getting smooth attacks on some synths, where you don't need velocity values, is to keep notes always on and control the volume/filter with breath only. A way to do this is to change the breath THR value to be just slightly below the idle reading. This is a bit unpractical though, so we put in a little bonus thing to make it easier.

First make sure GATE HOLD setting in EXTRAS menu is ON, then continue below.

To activate Gate Hold on the NuEVI, grab the canister like a door knob, touching the side key and the bottom three rollers at the same time. Then touch the pitch bend up pad. On NuRAD, fold your thumb in to reach over all the uppermost rollers and touch pitch bend up pad. The Teensy LED will flicker fast to indicate activation, then keep flashing until deactivated.

To deactivate Gate Hold, do the same thing but with touching the pitch bend down pad. The LED will flicker three times to confirm.

Legacy instant controls

The MIDI EVI was using fingering combinations to alter settings and send patch change commands. For advanced users this can still be a desired thing, so there's support in the NuEVI for the most important parts.

Set this functionality on and off (default off) using the LEGACY PB setting in the EXTRAS menu.

When the legacy instant controls are activated, you can instantly recall a patch number by its respective MIDI note number. For example, by fingering middle C (any transpositions set are not active here) while not playing, you are selecting patch number 72. Touch both pitch bend pads at the same time to send the patch change command for the patch number you are fingering. The Teensy LED will flash once to confirm. Note that if that patch number is already the patch known as active in the NuEVI/NuRAD, the command will not be sent. To select patch numbers in the top and bottom end of the range 1 to 127, add the pinky/MOD key to your fingering.

Using MIDI channel switching can be useful for switching between synths or patches in performances. To instantly select a MIDI channel number, you can finger it using middle C and upwards chromatically, where mid C represents MIDI channel #1, touch the lip sensor with your lip, then touch both pitch bend pads at the same time. The Teensy LED will flash once to confirm. Note that a MIDI setting selected this way will not be remembered after powering off, unless you go into the MIDI CH menu to confirm the change. This way, if you have no idea why you suddenly can't get a sound (because you accidentally

managed to switch to some other MIDI channel) a power cycle will get you back in business.

Another way to trig the instant controls is to apply a gentle sucking (negative air pressure) to the mouthpiece, while touching pitch bend up, instead of touching both PB pads. To activate this functionality, go to LEGACY BR setting in the EXTRAS menu. Using the sucking together with pitch bend down, Nyle has added the legacy program button control (see below).

Yet another alternative way for patch number selection is to finger the number like above, then lock it in by momentarily touching the pinky key. Send mid range values by touching first valve and first trill keys at the same time, top and bottom range values by touching second valve and second trill keys at the same time.

Nyle's program button functions

I have added the equivalent of the vintage MIDI EVI programming button. It is activated by holding the down pitch bend and sucking. The legacy breath activate feature must be on for this to work.

Implemented so far:

1. Middle octave position (c72). Ability to assign midi breath parameters, midi volume, midi aftertouch, midi breath, midi expression and velocity.

1v - midi volume

2v - midi aftertouch

3v - midi breath controller

side button (4v) - midi expression

1tr - note on velocity

2. Lowest octave position (c36). Ability to increment - decrement and send midi patch change commands.

F29 - decrement and send patch change

G31 - increment and send patch change

E28 - subtract 10 and send patch change

F#30 - add 10 and send patch change

When NuEVI is turned on, Incr - Decr starts from whatever patch number is stored in EEPROM.

3v - send reverb amount cc91, value determined by pinky pitch latch. C36 equals zero. Vintage EVI never had this reverb send feature; I put it in here just because my own setup takes advantage of it.

I still want to add a C36 (open with no keys) All Notes OFF command but have not done it yet.

Pinky pitch latch works exactly the same as it does on the vintage midi evi. When not blowing, just press pinky key momentarily while holding a note fingering. The note and octave position will determine a value and store it in ram memory (latch). This value can then be assigned to a parameter using the programming button.

Note: Calling patch changes randomly by fingering is not part of this programming button feature and does not use the pitch latch. You simply suck with no pitch bend applied and a patch is sent according to which note you are holding. This simulates the missing patch change button that is also on the vintage midi EVI.

Nyle

Pitch bend pad adjustment

The pitch bend pads can be loosened using a screwdriver and slightly shifted in distance from the thumb rest. Find the placement that makes most sense to you and tighten the screws. Don't over-tighten, as you could cause damage to the conductive plastic of the pitch bend pads if you do. If the pad is not moving or wiggling when pressed against from the thumb rest position, you should be good to go.

Pinky key adjustment (NuRAD)

The pinky keys can be also be loosened using a screwdriver (Philips) and rotated into favored positions. They can also be replaced with slightly longer or shorter keys, thinner/wider ones or "blind" keys if you want to remove a key that you are not using. The keys are printed in conductive PLA plastic from a parametric 3D model where these values can easily be altered for printing of custom sized keys. The design file will be available for free on demand if you want to print your own keys, or Berglund Instruments can supply these keys already printed.

Battery check

When the main menu is activated, the battery voltage will be indicated top right of the display. Values over 4.9V will indicate that the instrument is powered over USB, and below that it will indicate it as battery voltage. Normal voltage for a set of new alkaline batteries will be about 4.6V. The value will drop as the batteries are being used, giving a hint of the current battery condition.

Below 3.8V they are due to be replaced, and the indicator will say BAT LOW. If you are using NiMH rechargeable batteries or the optional LiPo built in rechargeable battery , change the battery type setting in the EXTRAS menu to corresponding type. This will set the right threshold value for BAT LOW indication (3.6V for NiMH and 3.7V for LiPo).

Going into the **ABOUT** menu, you will also see the set battery type and a rough approximation of remaining battery percentage.

Battery replacement (AAA and AA)

With the NuRAD/NuEVI switched off and disconnected from USB or DIN MIDI, unscrew the frontmost thumbscrew on top of the controller and loosen the one at the back of the battery compartment slightly. Slide the lid forward and lift it off the controller. Replace the batteries (3xAAA or 3xAA, Alkaline or NiMH type) and slide the lid back in place. Get the front thumbscrew in place first, then tighten both screws. Only finger gripping power should be applied. Do not use pliers or similar tools or you will most certainly scratch the plastics of your instrument.

Firmware updates

Updates for the NuRAD/NuEVI firmware are supplied in .hex format when new features or bug fixes are released. The current firmware version is shown in the NuRAD/NuEVI display while powering on. Firmware upload is done using a software tool called Teensy Loader. It can be downloaded from <https://www.pjrc.com/teensy/loader.html>, where you also find instructions for using the Teensy Loader to upload the .hex file. To restart the NuRAD/NuEVI in program

mode, making it visible to the Teensy software, press all four buttons by the display simultaneously while the display is not active (or open the case slightly and press the program button on the Teensy). If you get a message in the Teensy loader app that the hex file you selected is too big, just ignore it and put your instrument in program mode. The board version will be recognized and the hex file can be uploaded. If the app is in Auto mode it will upload as soon as you get the instrument in program mode, otherwise you need to click Program and Reboot after the Teensy chip has been recognized and the Teensy picture in the app has gone from faded to normal. Firmware update releases for NuEVI and NuRAD (they have separate .hex files for update) are found at <https://github.com/Trasselfrisyr/NuEVI/releases>

Factory restore

Only if you are sure this is what you need to do - to restore the factory default settings, including sensor adjustments, hold ENTER and MENU buttons when switching on the NuRAD. Do not touch keys/sensors. Release buttons when the orange LED glows steadily. Make sure you take notes or take photos of settings and sensor adjustments before doing this. Your sensor calibrations will be off target when reset, and you have to set them right to have a well performing controller. Note that some older instructions for firmware update mentions doing a factory reset. This is not needed anymore and should better be avoided.

Fingering charts (NuRAD)

SAX fingering chart

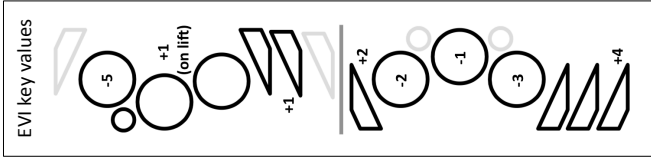
Bb	B	C	C#	D	D#	E	F	F#	G	G#	A	Bb	Bb	Bb	B	C	C#	D

Grid pattern keys in chart signifies that touching key will not affect note selection.

EVI/EVR fingering chart

C#	D	D#	E	F	F#	G	G#	A	A#	B	C

Aside from these core fingerings, the trill keys producing +1,+2 and +4 semitones will allow you to create faster fingerings around the octave break. Experiment to find what works for you.



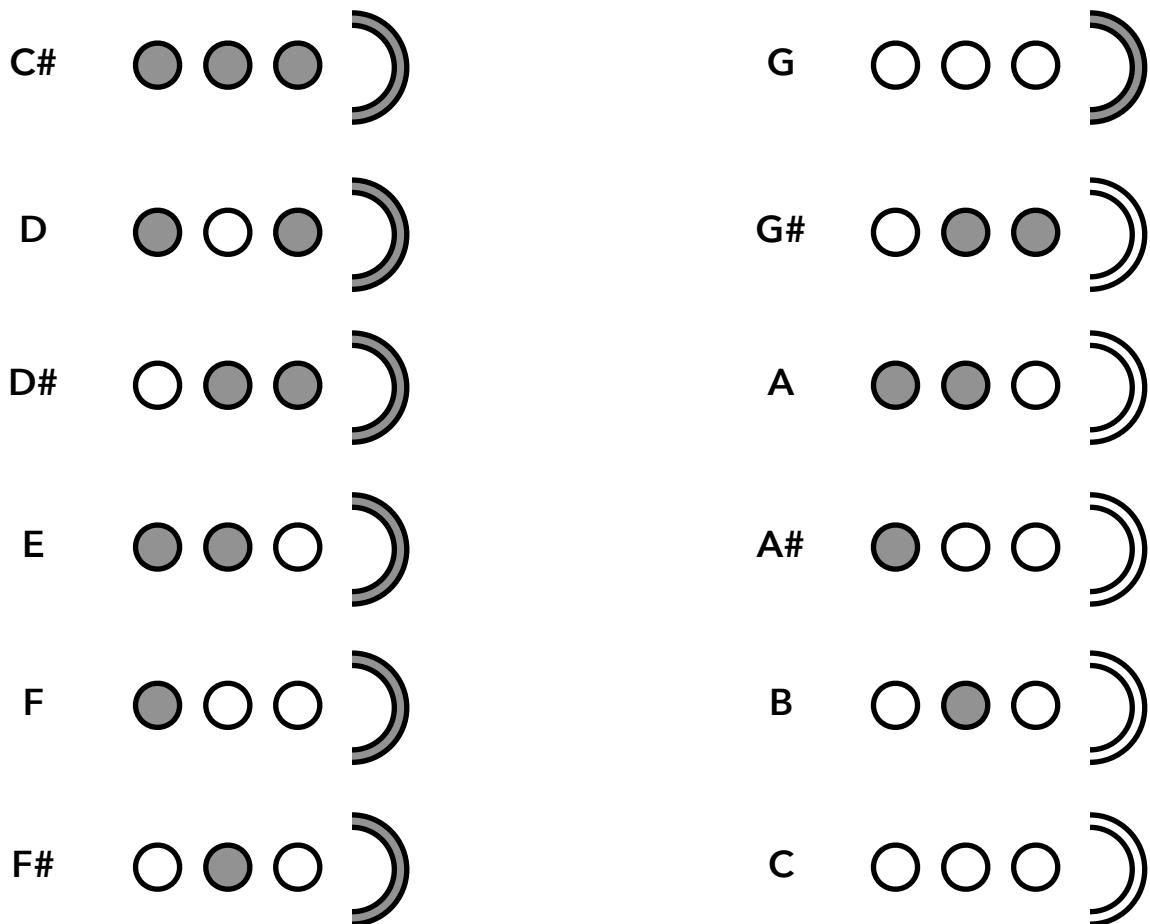
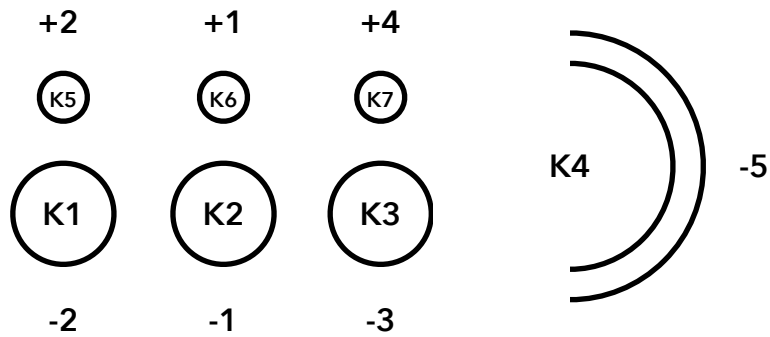
EWI and EWX fingering chart

D		
C#		
C		
B		
Bb		
Bb		
A		
G#		
G#		
G		
F#		
F#		
F		
E		
D#		
D#		
D		
C#		
C#		
C		
C		
B		
B		
Bb		

X H I A		
X H I G#		
X H I G		
X H I F#		
X H I F		
X H I E		
X H I D#		
X H I D		
X H I C#		
X H I C		
X H I B		
X L O C#		
X L O C		
X L O B		
X L O Bb		
X L O Bb		
X L O A		
X L O G#		
X L O G		
X L O F#		
X L O F		
X L O E		
X L O D#		
X L O D		

Note that these are just the most commonly used fingerings. Feel free to experiment outside them to find extra fingerings useful to you. Second row are the extended fingerings of the EWX fingering mode.

Fingering chart (NuEVI)



Core fingerings. Experiment with the trill keys (K5 to K7) to find useful alternate fingerings near octave breaks and in other situations where they could come in handy.

Wireless MIDI (option)

The built-in wireless MIDI system that comes as an option for the NuRAD and NuEVI is the PandaMidi midiBeam. Just power the receiver using USB (from computer or standard USB charger) and switch the NuRAD on to get that link up (steady glowing LEDs on transmitter and receiver). MIDI is output both to the USB port (when connected to computer or tablet) and to the MIDI OUT DIN jack on the receiver box.

For NuRAD, if your mouthpiece protector has a little magnet on the top, the wireless card has been modded to feature a reed switch for pairing. To set the wireless to pairing mode, swipe the magnet over the position of the wireless card in the NuRAD (blinking red LED under LH keys) to make the LED blink faster, indicating pairing mode. Otherwise, if pairing should be needed, the top is easily opened using the back most thumb screw (press down onto top near the screw to relieve tension onto the screw and it will be easier). For NuEVI, to press the button on the transmitter, loosen the mid top screw a bit and then unscrew the back top screw. Tilt the lid up a bit and reach in with a finger to press the button on the receiver. The receiver is positioned at the back of the NuEVI, to the right seen from mouthpiece end.

Troubleshooting tips

Problem: Intermittent small pitch bend messages are sent, especially when blowing into the mouthpiece.

Solution: The vibrato squelch is set too tight. Up the settings value a step or two. Also check pitch bend adjustment settings and make sure the idle sensor readings are not above THR line.

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Problem: When using the optional wireless kit, some keys don't respond properly.

Solution: With the handle loop removed and no natural ground through a cable, the lesser amount of reference grounding may be affecting the capacitive touch readings. Make sure you keep your thumb on the thumb lever and the metal strip on the roller assembly (both are ground points) while playing wirelessly, for better touch response. On NuEVI ground points are thumb lever and canister (bottom or grounding square). Also check the touch sense adjustments, and maybe try bringing the THR bar closer to the cluster of dots. You can use the touch sensor dots to monitor the touch response of each key and roller, to see how they respond with and without grounding.

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Problem: I'm getting dropouts and hung notes when playing, or it stops sending MIDI completely.

Solution: Check your battery level and make sure you have fresh batteries.

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Problem: When using wireless MIDI, the patches start randomly changing or notes get dropped. Or connection is lost, with the receiver LED blinking.

Solution: Batteries are getting low and not providing enough current for the transmission bursts. This can happen before LOW BAT is indicated for some battery types. Switch to fresh good quality batteries. Try repairing the MidiBeam set to find a channel with less interference. To enter pairing mode on the NuRAD, swipe a magnet over the area where the red MidiBeam LED is seen. On NuEVI, open the top just enough to reach the blue pairing button on the MidiBeam transmitter.

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Problem: Bite vibrato or portamento stopped working since last time, and I didn't do anything!

Solution: Ambient air pressure has probably changed since, shifting the bite sensor input out of range. Press the little valve button under the bite sensor tube where it enters the housing to equalize the pressure. It's a good idea to do this before every playing session, just to make sure it's right.

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Problem: Using CV on NuEVI Plus, NuEVI CV or standard NuEVI or NuRAD with CV Box or module, both CV jacks send breath CV.

Solution: Check DAC MODE setting in EXTRAS menu. It should be set to PTCH, not BRTH.