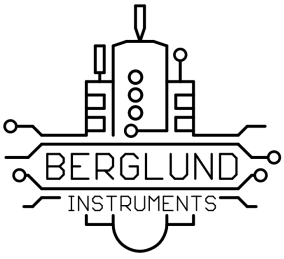
NuRAD

Electronic Wind Instrument

user guide



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Short history

In 2004 the inventor of the EWI and EWI, Nyle Steiner, made two new EWI prototypes based on his previous work with the MIDI EVI. These new EWIs were the MIDI EWI, that became the prototype for the Akai EWI4000s, and the RAD EWI that he made 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...

However – sprung from the lack of availability of new EVIs on the market was the ”Save the EVI” project and from that emerged Berglund Instruments and the NuEVI. The NuEVI was a modernized take on the Steiner MIDI EVI, and it was well received. EWI players started to get in touch, wanting an EWI counterpart. 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. Development 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 sqeezing 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.

Overview

The NuRAD EWI is a woodwind instrument MIDI wind controller based on the RAD EWI that Nyle Steiner built for saxophone and EWI player Michael Brecker back in 2004. This was a special side-by-side version of the MIDI EWI (that became the prototype for the Akai EWI4000s). The NuRAD combines this radical form factor with the functionality of the Berglund Instruments NuEVI, with a menu system for ease of adjustment and setup. It is also able to send MIDI over USB, in addition to the standard DIN MIDI, making it easier to use with computers and tablets.

The NuRAD can be used with the removeable handles attached for neck strap free playing, or with the handles removed and the included neck strap hooked onto the strap holder on the back of the instrument. Using with handles, a more outwards angle of holding the instrument is recommended, distributing more weight onto the thumbs and increasing comfortability.

Controls

The mouthpiece has got three sensors. The primary one is the breath pressure sensor. It controls note on/off and the continuos 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).

The right hand has controls both on top of the instrument and on the bottom. Topside, there are three main keys, three pinky keys, a side key and a ”special key” (consisting of two keys to be touched simultanously to activate) for chord and interval functions, 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 (that can also be used to control portamento). 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 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.

Settings

To simplify configuration, the NuRAD has 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 12 semitones. Factory default transposition is C, +0 semitones.

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.

If your synth can’t keep up with the density of breath CC from the NuRAD, you can reduce the density of those MIDI signals by touching the mod key (LH side key) when pressing ENTER here. An ”S” in the lower right corner will indicate that this slower mode is activated.

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.

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 - 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 vibrato setting is set to LVR. 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.

MAX sets the bite or bending level corresponding to full portamento signal output. Press the valve to equalize pressure, then set THR two or three millimeters higher than idle reading to compensate for thermal expansion of the air in the system when played.

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.

ADJUST - PITCH 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 - EXTRA CTR

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 - 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.

SETUP BR

Submenu 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 resolution 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 resolution 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 – BRTH CC 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 wether 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. The value number is arbitrary, and 20ms is generally at setting 15.

OFF – No velocity sample delay.
1 – Lowest delay setting
..
15 (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 CTR

Submenu for settings related to controllers in general.

SETUP CTR - PORT/GLIDE

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. (factory default)

SETUP CTR – EXCT CC A

The extra controller can be disabled or set to control transmission of selected MIDI CC data.

OFF – extra controller is disabled.
MW – Modulation 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 wind synth patches. (factory 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 60. Default OFF.

SETUP CTR – HARM SEL

As default, the lip sensor harmonics are set up to use the natural harmonic series (omitting the first "pedal" note), so for a C, it would go up G, C, E, G, Bb and C. This is the HMS setting. Alternative settings are 5TH (going up fifths and octaves), OCT (going up octaves), 5DN (going down fifths and octaves) and ODN (going down octaves).

SETUP CTR - VIBRATO

Menu for vibrato settings.

SETUP CTR - VIBRATO - CONTROL

This setting selects the controller to use for vibrato. Default it is set to use the thumb lever (LVR). Switching to bite sensor (BIT) will also move the portamento control to the thumb lever. They can both be controlling vibrato at the same time (BTH), in which case none of them controls portamento.

SETUP CTR - VIBRATO - DEPTH

This setting controls the vibrato depth.

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, and bite will bend up or down depending on DIRECTION setting. Normal EWI/EVI behaviour is auto return, and the default setting is 2.

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 CONTROL is set to use the bite sensor.

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 pitchbend 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 pitchbend 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 - 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
2 ms
..
20 ms (factory default)
..
70 ms – Highest deglitch setting

SETUP CTR – MOD KEY

The mod key (LH side key) is the NuRAD equivalent of the NuEVI pinky key. The standard and legacy behaviour 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.

- 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 using mod key. Change level with first and second RH pinky keys.
LVP – Like above but current level is transmitted on power up.
GLD – Momentarily sends the the set level amount as static glide/portamento level.

When setting LVL/LVP or GLD level, 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

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 for the NuRAD (See separate charts for details.)

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.

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.

ROTATOR

Menu for setting the intervals of the rotator function. See separate section.

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 – SPEC KEY

Setting to disable the Special Key functionality to avoid accidental activation.

EXTRAS – DAC MODE

This setting controls the DAC output channel, outputting to one of the unused pins of the DIN MIDI jack. (The other pin is a buffered direct output from the breath pressure sensor).

The available options are:
BRTH - Output the breath sensor signal.
PTCH - Output note pitch (v/Oct through optional external CV box).

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 rechargable batteries (100% at 3.9V, LOW BAT at 3.6V)
LIP – LiPo rechargable battery (100% at 4.3V, LOW BAT at 3.7V)

EXTRAS – FAST BOOT

Enabling this setting will make the NuRAD start up as fast as possible when powered on. Note that this will also make some of the sensor calibration routines less precise, and should only be used when you need to be able to restart quickly.

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. NuRAD 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 NuRAD, 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 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 LH1, LH2 and LH3 keys when pressing any of the buttons ENTER, UP or DOWN from display sleep or patch view state. (Just hold the key combo and reach with your RH 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 pinky keys touched). From display sleep, finger the pinky key combination you want to use as memory slot, press and hold MENU, then immediatly 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 pinky key combination for the slot, press and hold MENU, then immediatly press UP while still holding MENU. The display will briefly indicate that the FastPatch slot has been cleared.

Mind that accidentally touching pinky 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 pinky keys 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 SPEC KEY is enabled in the EXTRAS menu.

The first function is slur sustain. To activate this, touch the Special key while holding a finger on LH pinky key 1. 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 tongueing 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. 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. 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.

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 will switch off any active special key functions.

Rotator

As an additional chord playing feature, we have added a ”rotator” that will bring some extra magic into the chord playing. It creates a three note chord using your base 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.

To activate the rotator, touch the special key while holding the mod key. This will at the same time switch off any other special key functions.

When in rotator play, the orange LED on the Teensy will be flashing, as with the other chord playing functions.

Touching only the special key then will turn the rotator playing off.

Setup of the rotator note intervals can be done in the ROTATOR menu in the main menu. PARALLEL sets the fixed parallel note and ROTATE 1 – 4 sets each of the four intervals being rotated for the third note. 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 rotator/chord play). MEL will play the base note as the mono lead and ROT will play the rotated note. This setting also affects playing with parallel chord and interval, where you can choose from having the base note or the last note of the chord as the lead voice.

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.

Legacy instant controls (not thoroughly tested for NuRAD yet)

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 and NuRAD 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 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 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 cromatically, 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 to the NuRAD. For notes on that, see separate page.

Yet another alternative way for patch number selection is to finger the number like above, then lock it in by momentarily touching the mod 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.

Connections

The NuRAD has two 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, new to the EVI world, is by using the Micro USB port on the side of the NuRAD. 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 NuRAD will be recognized as "NuRAD MIDI" by your system. Using a Lightning to USB Camera Adapter, you can even connect your NuRAD directly to an iPad or iPhone and use it with softsynth apps.

The Micro USB connection will also power the NuRAD when the battery switch is in the backmost position (battery power off). The low power requirement of the 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.

NuRADmodel also features a of 3.5 mm mono jack for supplying breath pressure CV to analog synths. Breath CV is 0V to 4.6V 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.

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

The pinky keys can be also be loosened using a screwdriver (philips) and rotated into favoured 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

With the NuRAD 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 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.

Firmware updates

Updates for the NuRAD firmware are supplied in .hex format when new features or bug fixes are released. The current firmware version is shown in the NuRAD 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 in program mode, making it visible to the Teensy software, press all four buttons by the NuRAD 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 EWI 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 EWI 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.

Mind that major updates to the firmware will often reset the NuRAD to default settings, except for the sensor adjustments. You will be required to set it up again to your liking after the update. Please take notes (or pictures) of your custom settings if you are unsure.

Firmware update releases 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. Release 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.

Breath CV output

The primary breath CV output of the NuRAD is from the 3.5mm TS jack next to the USB jack on the NuRAD. The output here is 0 to 4.6 volts, and it is a signal created by the microcontroller, allowing for it to take advantage of the breath sensor adjustment settings and breath curves.

There is also a control voltage output for breath level on one of the unused pins of the DIN MIDI jack on the NuRAD. The pin is the same as it was for the MIDI EVI (looking at the jack, with the arch of holes going the ”rainbow” way, it’s the leftmost pin). A special breakout cable or breakout box will be needed to get access to this, and the DAC MODE should be set to BRTH. The CV goes through the D/A converters of the Teensy microcontroller in the NuRAD. It nevertheless provides a smooth signal at a fast rate, ranging from 0 to 3.3 volts. Those 3.3 volts are enough to fully open many modular filters, but others will need amplification to a 0 to 5V CV signal using a CV scaler or a breakout box with this kind of amplification built in.

With an optional CV box or CV module connected, the DAC MODE setting in EXTRAS menu should be set to PTCH. Using CV box with the NuRAD, the pin otherwise used for breath CV is then carrying note pitch CV, and the other pin is carrying direct analog breath CV from the breath sensor (0.6 to 3.3 volts).

Nyle's program button notes

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 toggled on for this to work. Press MENU button while holding extra controller and pinky key as per instruction manual.

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 - 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

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. 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.

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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.