CYBERVOX

user's guide

version 1.0

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About Cybervox

Cybervox is a voice refill and toolkit for creating wide range of artificial or humanoid voice type sounds in REASON. It offers formant shaping, advanced vocoding and realtime sound manipulating techniques for live performance.

We have tried to approach the subject from various aspects, so this refill is an interesting mixture: you might use it as a conventional sound library, or explore the experimental parts, which might be very useful for creating and playing totally new sounds in totally new ways.
And last but not least it gives you a lot of fun!

Before you fire your singer: keep in mind, Cybervox is only a voice refill and toolkit, it won't replace a real singer!;) It's a great tool to create a wide range of special robotic and human like sounds, but not a know-all stuff. Cybervox is a unique refill, completely different from any of our previous products.

Let's draw up an analogy taken from the art of gastronomy! If – for example – Analogue Monsters is the vegetable fundamentals and Virology is the meat ingredient to the wonderful plate, then Cybervox is a fine picant herb: a bit spicy in itself, but if added in proper quantities, it will magnificently make your masterpiece tasty and delicious.

Abbreviations – special tags

We use some special tags in the file names. These special tags can be useful if you're looking for a certain type of patches. You should use these tags in the Reason browser for searching the desired patch type.

Abbreviations used in NN-XT

[Syn – tempo synced
[vsp – velocity split
[Alt – alternate triggering
[Rt – trigger by release
-A, -B, -C : variations of the same patch

Abbreviations used in Combinator

(RUN) – Run button must be enabled for use
(R4) – the patch needs Reason 4
(Xfade) – you can morph between two sounds
(2X) – you can switch between two different sounds, similar to patch change

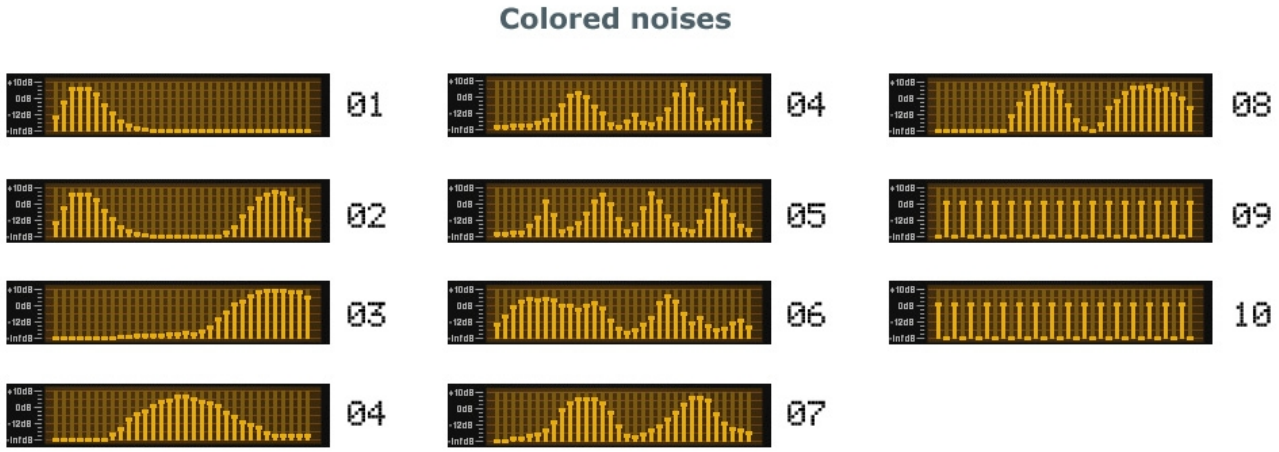
Parts of CyberVox

1) wave samples

Formant synth library – based on the sounds of Yamaha FS1R synthesizer. The FS1R is a very unique synth, it uses formant shaping synthesis. The result: beautiful artificial vocal textures, rich pads and silly voice leads, and all of them have a special sound character, which can't be imitated with other instruments – you have to hear it!

Human voice library – optimized for the Reason's vocoder. More than 700 English words and human sound elements, see the "**Human Voice List.pdf**" for the complete list. You can use them as a modulator source for vocoder.
What does optimized mean? These wave files are "*pre-digested*", we used a special FFT technique to remove the voiced content and leave the unvoiced component only. The result sounds like a "shouting whisper". We chose this method because it seemed to be a good idea to remove the personality of the speaker, and we found that this method improves the articulation of the vocoded sounds.

Other samples – collection of other samples that couldn't be placed in the aforesaid categories.
Modulator samples for Vocoder: synthetic vowels, various continuously sweeping LP, BP and HP noises, static colored noises, white noise.
The colored noises were created from white noise, using the BV512's equalizer (see the picture below).
Carriers: pure saw and square waveforms from Moog Prodigy synthesizer.



2) NN-19 bank

NN-19 patches were created for compatibility reason. This bank contains patches of Yamaha FS1R synthesizer only.

3) NN-XT bank

It provides elements for the combinators, but some of them can be used in themselves, especially the FS1R patches. You can find the following categories:

FS1R Patches 1 - Original
These are the original sounds of Yamaha FS1R synthesizer, without any manipulations.

FS1R Patches 2 - Mutant
Tweaked versions of the original FS1R sounds, we used the NN-XT's extensive modulating capabilities, like sample start offset, multi-layering, filters and adsr envelopes.

FS1R Patches 3 - Combination
Different FS1R patches layered together and modulated, some of them sound just fatter, some of them give totally new sounds.

Modulator Patches 1 (C1-A#1)
These patches provide modulator sources for the VPK-[SPLIT] Vocoder player Combi devices. The valid keyboard range is between C1 and A#1, that means each patch can store 11 modulator samples.
Some of them are human voices, some of them are different noises. For more details please read the "Combinator templates" section.

Modulator Patches 2 (full range)
They provide modulator sources for the VPK-[FULLR] Vocoder player Combi devices. As you will see, the main difference is that these patches cover the full keyboard range. For more details please read the "Combinator templates" section.

Vocoder Carrier patches
Collection of sounds that can be used as carrier in the vocoder. Thes patches sounds clean and bright with lot of harmonics in the spectrum. This comes from the principle of vocoding.

XTernal patches
A nice and useful vocal pad collection for our users who are lucky enough to already possess our other refills, like Analogue Monsters, Deepflight Orange2 or Virology.

4) Combinator bank

These are definitely the **heart** of Cybervox!:-) In a long experimental test and research period we have developed several combinator setups: vocoder players, realtime sound manipulating tools and sound morphing machines. No doubt, they will give you totally new playing techniques changing your views, and hopefully you will gain a lot of inspirations, both for creating and for playing music.

In the Combinator folder you can find many categories (Arp, Pads, etc.) which obviously speak for themselves, so we won't get lost in details, but one category is above all others, the **most important: the templates!**

Once you become fully familiar with the templates you will know everything about Cybervox and won't be lost in the other Combi patches. We do mean it! So, check out those template patches! But first of all, the next section is based on the assumption that you are familiar with Vocoder, and you know how it works. If not, please read the **vocoder's section** first!

The Combinator templates

These templates are the parents of almost all other Combi patches that can be found in the adjoin folders. So we believe it's worth describing them in detail, and you will understand the usage and operation of the other combi patches as well.

Vocoder players: this is the biggest family, we can distinguish them by the usage of Vocoder. Two questions: what and how?
What to use as a modulator source? We can use human voices, noises, drum sounds or drumloops, anything that has a characteristic spectrum. For loops, the obvious choice is to play them with Dr.Rex player (VPRex player), for human voices and noise-based filterbanks we should use one of the the keyboard controlled players (VPK family), while for playing drum sounds, the VPReD player seems to be the expedient choice.

Another question: how to trigger them? We can start playing them using midi keyboard, independently from the carrier's playing (VPK-1) or parallel with it (VPK-2).
For rhythmic vocoding sounds we can use the Redrum or the Dr.Rex to trigger the modulators. (It is a very comfortable position, but don't forget to press the **RUN** button on the Combinator panel, otherwise you won't hear anything! ;D) OK, that's enough for grouping, let's see them one by one.

CV VPK-1 (SPLIT) vocoder player

Let's split the keyboard at C2. We can use the upper range for playing the carrier (the melody), and we can use the lower range (typically between C1-B1) to trigger the modulators, which determine the spectrum of the sound. So frankly, in live playing situation: left hand for modulators, right hand for carrier to play the melody!:-)

And now a few notes about the lower range, let's call them "control keys" from now on.
The control keys control the frequency characteristic of the melody. In **VPK-1**, the valid range for modulator samples is between C1 and A#1.
But hold on, C1 to A#1, the upper range starts from C2, so what about B1 key? Yes, good question, B1 is very important and special key. Please remember, **B1 is a magic key**!;-)

When you press the B1, it triggers the **hold** function of vocoder, which freezes the modulation bands and holding that curve as long as the B1 key is pressed. This is a very important feature that enables you to use the vocoder in a very creative way. For example, you can freeze the speech at any vowels during the playing melody and continue it with another modulator on the fly. Check it out, after a little practice you will be able to create some very interesting realtime sound manipulations and morphing effects!

CV VPK-2 (FULLR) vocoder player

In this case the layers of modulator and carrier are not separated, and you play them together. This is less interesting then the previous setup, but sometimes it can be useful to create simple modulations (la-la-la type sounds).

CV VPK-3 Midi Controlled vocoder player (SPLIT)

This is an interesting device. At first sight it looks like VPK-1, but if you unfold the combinator, you will see that there is no modulator source. As the BV512 vocoder responds to midi events, we tried to exploit this capability in this setup.

When the vocoder's band count is set to 8, you can control the 8 individual band levels on your keyboard between C1-G1 range. The level control is velocity sensitive, which allows for a very precise filter control.
So, the keyboard range mapping is as follows: C1-G1 for filter control, **B1** for freeze vocoder, and from C2 upwards the keyrange is exclusively dedicated to the carrier.

CV VPReD (SPLIT) vocoder player

In this device the modulators are triggered by the ReDrum. The keyboard has been split, therefore you can play the carrier up from **C2**, and the **C1-A1** keyrange plays the modulator samples that are loaded to ReDrum. Remember, **B1** freezes the vocoder (as it's described at VPK-1).
The modulators can be triggered in two ways. You can use the pre-programmed patterns (RUN must be enabled!) or you can play them on the keyboard (C1-A1).

Please keep in mind that only the 3., 4., 5, 7. and 8. sample slots offer sample start offset option, so if you use human voices that need sample start offset, you should use these slots.

CV VPRex Vocoder Player

This device uses a trick that I read first in Powertools for Reason 3.0 (a great book by Kurt Kurasaki, see p.233). The modulator is a Dr.Rex player, and it plays continuously the loaded recycle loops. When Dr.Rex receives a note value of **D0**, it will begin the playback cycle of the entire loop from the first slice to the last. We can use the Matrix to send this **D0** note to Dr.Rex.

Unfortunately Matrix can't send lower notes than C1, so (this is different from Kurt's solution) we inserted a Spider CV to transpose down the CV note by one octave. When you activate the RUN button, Dr.Rex start playing the loaded rex file.
VPReD is good for playing rhythmic chords, basses and leads.

Now we have finished with the vocoder-based templates. Now let's see what other stuff we have.

CV Instrument w.Formant Filter (R4)

It's a simple NN-XT instrument container using the formant filter of Thor. The formant filter was introduced in the 4th version of Reason for the first time. Formant filter is used to create different vowel type sounds. It has two main controls, X and Y.

X controls the position where the vowel is forming, from back to front, Y controls the opening of the vowels (see Formant filter for more details).

CV Simple Instrument Rack

The name speaks for itself: it's a simple NN-XT instrument container with some preloaded effects (eq, limiter, delay).

CV Simple Instrument Rack Xfade

This is quite similar with the previous device, but it contains two NN-XT instruments You can morph between these instruments using the Xfade (Equal Power Crossfader, by Kurt "Peff" Kurasaki) controller (knob1 of Combinator).

CV PolyMorph (SPLIT)

It's a very useful device in a live situation, if you need to switch or morph among different instruments. Polymorph templates enable you to preload up to 4 different instruments and to morph them on the fly. Since it eliminates the loading time, you can change the patch while you play.

There are four control keys: C1, D1, E1 and F1. Each key enables one instrument as long as it is pressed. You can set the morph speed, which controls how fast the instruments fade among each others.

We created two versions. Please note that in v1 you will not hear any sounds until you press at least one control key. In v2 we placed a fifth instrument (let's call it lead), that sounds until you press a control key. When you play a control key, this lead is fading out while the appropriate instrument is fading in.

CV Arpeggiator Instrument Rack Xfade (R4)

It's a simple arpeggiator setup using RPG-8, so it requires Reason4. It contains two NN-XT instruments, and you can morph between them using Xfade controller on knob1.

It's simple but powerful, and is particularly good to easily create continuously morphing arpeggios.

Useful tips

Insert FX points

If you unfold the Combinator templates, you can see some red PEQ-2 in the chain. Since they are bypassed, they obviously don't do anything: they are just placeholders.
These placeholders might be useful if you just want to insert an FX unit (chorus, phaser, scream4, etc.) into the setup. They will save you from being lost in the cable-jungle: just right-click on the placeholder, choose create and select an FX unit from the list. Cable routing will be set automatically. It's a very comfortable option. If you change your mind and want to remove the FX, just select it and press Ctr-delete.

How to load modulators into NN-XT

Load the "- Empty C1.. template.sxt" NN-XT patch, located in the NN-XT Bank/Modulator Patches 1 (C1-A#1) folder. Now open the keymap editor. As you can see, there are 11 empty layers in the keymap between C1 and A#1.
Select one layer, right click and choose "browse samples..." option from the drop-down list. You will find the Cybervox own sample library in the "Wav Samples" folder, but you may want to use your own recorded samples too.
Please notice two things: in this patch we set the pitch keyboard tracking knob to 0 cent/key (the default is 100), and the unity note of the layer is set to C3. Please check them, these two settings automatically ensure that the loaded wave file will sound at the original and correct pitch!

How to create new words

The following example demonstrates, how we can exploit the multilayer capability of NN-XT to create new words from the existing library.
Please create an NN-XT device and load the "PNS presents.sxt" patch (located in *NN-XT Bank/Modulator Patches 1 (C1-A#1) folder*).
Now unfold the keymap editor and check the third and fourth samples ("stupid" and "radio"). As you can see, they're both mapped to the same key (D1).
Select the "stupid.wav", and look at the AMP envelope: it has short hold and very short decay settings,

so when you press the D1 key, it says "stu" only. Now select the "radio.wav". As you can see, it has a different AMP envelope: the short attack phase is delayed by 0.33s, so you won't hear the "ra" and then playback is sustained at maximum, which enables you to hear the end of the word "dio".
As a result, when you play the D1 key, you will hear a new word: "studio". ;-)

Using the sample start offset in NN-XT

If you play words as modulators live on the keyboard, you may experience that sometimes the emphasis of the word is not falling on the rhythm. For example at the word “yes”, the emphasis is somewhere between y and e, but not at the start. In this case you have two options. You can trigger the sample a bit earlier to get the proper timing, but it's hard to hit. The second option is using the sample start offset in NN-XT.
To do this, unfold the keymap editor in NN-XT, select the sample in question, and look up the small “start” button, located under the LCD panel, at the *single adjustment parameters*.
It's set to 0.0% by default. Now start turning this knob slowly - simultaneously with playing the sample on the keyboard - until you get the proper sample start offset.

Appendix

Compatibility

Cybervox is compatible with all versions of REASON.
We believe that backward compatibility is a very important feature, so we have paid special attention to this issue. You can use former versions of Reason, but obviously you won't be able to load Combinator patches into Reason2, for example.
So in general, NN-XT patches need Reason 2 or higher, Combinator patches need at least version 3. Those patches that require Reason 4 are marked with "(R4)" at the end of patchname.

We recommend that you use the latest version of Reason, but – it's up to you – you can use the previous versions with several restrictions – not all patches will be loaded.

Formant filter

The Formant filter is a special resonant bandpass filter with three bands (f1, f2, f3, see also Vowels and formants). This filter was introduced in THOR polysonic synthesizer first, and it can produce different types of vowel sounds (check the picture). There are no Frequency or Resonance parameters, but you have a horizontal "X" parameter slider and a vertical "Y" parameter slider that operate together to produce the various filter formant characteristics.

Vowels and formants

Vowel is a type of sound for which there is no closure of the throat or mouth at any point where vocalization occurs. Vowels can be contrasted with consonants, which are sounds for which there are one or more points where air is stopped. **Formants** are the distinguishing or meaningful frequency components of human speech and of singing. Formants are the characteristic partials that identify vowels to the listener. The formant with the lowest frequency is called f1, the second f2, and the third f3. Most often the two first formants, f1 and f2, are enough to disambiguate the vowel. These two formants are primarily determined by the position of the tongue. f1 has a higher frequency when the tongue is lowered, and f2 has a higher frequency when the tongue is forward. Generally, formants move about in a range of approximately 1000 Hz for a male adult, with 1000 Hz per formant.

Table of Vowel formant centers

vowel	formant f1	formant f2
u	320 Hz	800 Hz
o	500 Hz	1000 Hz
a:	700 Hz	1150 Hz
a	1000 Hz	1400 Hz
ø	500 Hz	1500 Hz
y	320 Hz	1650 Hz
æ	700 Hz	1800 Hz
e	500 Hz	2300 Hz
i	320 Hz	3200 Hz

Tip: check the "Synthetic Vowels.sxt" modulator patch, located in the *NN-XT Bank|Modulator Patches 1 (C1-A#1)* folder. We recreated these basic vowels using only two pure sine waves (for f1 and for f2). These waves sound quite silly by themselves, but if you use them as vocoder modulator, they will reproduce the original vowels surprisingly clear!

The vocoder

The BV512 is an advanced vocoder device with a variable number of filter bands. It also has a unique 1024-point FFT vocoding mode (equivalent of 512-band vocoding) for very precise and high quality vocoded speech. By connecting the BV512 to two instrument devices, you can produce anything from vocoded speech, singing or drums to weird special effects.
Even if you have worked with a vocoder before, please read the following section. Knowing the basic terms and processes will make it much easier to get started with the BV512!

How does a vocoder work?

Carrier and modulator

A vocoder accepts two different input signals, a "carrier" and a "modulator". It analyzes the modulator signal, applies its frequency characteristics to the carrier signal and outputs the resulting "modulated" carrier signal.
In the most typical case, the carrier signal is a string or pad sound and the modulator signal is speech or vocals - the result will be a talking or singing synth sound. The modulator could also be drums or percussion (for rhythmically modulated sounds and effects) or any sound with changing frequency content.

Filter bands

Technically, a vocoder works in the following way: the modulator signal is divided into a number of frequency bands by means of bandpass filters (called the "modulator filters" or "analyzing filters"). The signal in each of these bands is sent to a separate envelope follower (which continuously analyzes the level of the signal). The carrier signal is sent through the same number of bandpass filters (the "carrier filters"), with the same frequency ranges as the filters for the modulator signal. The gain of each bandpass filter is controlled by the level from the corresponding envelope follower, and the filtered signals are combined and sent to the vocoder's output.
In this way, the carrier is filtered to have roughly the same frequency characteristics as the modulator. If the modulator signal has a lot of energy in one of the frequency bands, the gain of the corresponding filter band for the carrier signal will be high as well, emphasizing those frequencies in the output signal. If there is no signal at all within a frequency band in the modulator signal, the corresponding band in the output signal will be silent (as the gain will be zero for that filter).
There are several factors determining the quality of the vocoder sound, but the most important is the number of filter bands. The larger the number of filter bands, the closer will the output signal follow the modulator's frequency characteristics. The BV512 offers 4, 8, 16 or 32-band vocoding.

FFT vocoding

The BV512 has an additional FFT mode, in which the vocoding process isn't based on bandpass filters as described above. Instead, FFT (Fast Fourier Transform) analysis and processing is used. This equals 512 "conventional" frequency bands and results in a very precise and detailed vocoder sound. Please note:
• The FFT mode is best suited for vocoding speech or vocals, giving crystal clear and highly intelligible results. It is not so well suited for vocoding drums and percussion, since the FFT process is inherently

“slower” than the regular filtering and doesn’t respond as quickly to transients, and also there will be a slight delay added to the signal (in the region of 20ms). A workaround solution to this would be to move the modulator signal slightly ahead to compensate for the delay.
• Where the conventional filter bands are distributed logarithmically (i.e. the same number of filter bands per octave), the 512 bands in the FFT mode are distributed linearly. This means a lot of the bands will be in the high frequency range – this is one of the reasons for the clear sound but it is also something to keep in mind when making settings for the vocoder in FFT mode.

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Credits

András Haász: main idea, recording, sound design & artwork

Viktor Haász: sound editor

Kilfish: graphic design

Dr. Gábor Bárdosi: voice of Cybervox and consulting editor of this Users' Guide

Tamás Zsiros aka "Welder": consultant

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