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imperfection is a feature

Presents

The Ultimate Virtual Tonewheel Organ

Operation Manual

License

VB3 version 1.2.1, copyright Guido Scognamiglio - SoundFonts.it - June 2008

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System Requirements

Minimum System Requirements:

- Microsoft Windows 98se/ME/2000/XP
- Intel Pentium 3 @ 500 MHz or AMD Athlon @ 500 MHz
- 256 Mb of RAM
- 4 Mb of free disk space
- An ASIO compatible sound card
- A 61 keys MIDI keyboard

Recommended System Requirements:

- Microsoft Windows XP
- Intel Pentium 4 Dual Core @ 3000 MHz or AMD Athlon @ 3000 MHz
- 1 Gb of RAM
- 10 Mb of free disk space
- An ASIO compatible sound card with near-zero latency
- Two 61 keys MIDI keyboards and an expression pedal

VB3 is a VST plug-in, and needs a VST host application to run. We recommend EnergyXT or Hermann Seib's VSThost / SAVIhost. And if you want to experience the feeling of playing "the real thing", you should have at least two 61 keys MIDI keyboards, better with "waterfall" keys, stacked one on top of the other, an expression pedal and at least a drawbar controller. Or if you have a digital dual manual organ console you can map all of its physical controllers to VB3's controls using third party applications like MIDI-OX and/or Bome's MIDI Translator in conjunction with the Maple Virtual MIDI cable for interconnection between the applications.

Installation

Copy the file VB3.dll (or whatever it may have been renamed to, in case of future updates) to your VSTplugins folder, usually
C:\Program Files\Steinberg\VSTPlugins

Inserting VB3 into a project varies according to the VST Host used. For example, if you're using EnergyXT simply right click in the middle of the main window and choose VST -> VB3, then connect its input and output to your desired source and destination. For further assistance, consult the documentation supplied with your host.

In the case you have bought a license, install it before running VB3 to prevent it from running in Demo mode. To do this, just insert your full name and your 24-characters license key in the text fields in the screen that appears when the plugin is launched.

The DEMO version shows a reminder screen at start-up, then plays a white noise for 2 seconds every 10. No limitations are applied soundwise.

If you would like to purchase a license, please visit www.SoundFonts.it.

Please note that two versions of the plugin are supplied (instrument and effect): as such, you can use your activation key for both versions.

Instrument Description

VB3 is a virtual tonewheel organ which simulates an american electromagnetic organ of the old days, but it's also capable of other simulations like the italian transistor organs of the seventies or the red-tolex organs played by famous pop bands of the sixties.

Main features:

- Full polyphony (147 notes)
- Virtual 91 modeled tonewheels generator with accurate phase synchronization
- Adjustable leakage noise and cross modulation between tonewheels
- Three sets of waveforms: Set H (American Electromagnetic), Set F (Italian Transistor), Set V (Red Tolex Transistor)
- Three different organ models *New in v1.2!*
- Adjustable global tuning *New in v1.2!*
- Foldback on 16" deactivable *New in v1.2!*
- Realistic motor wow & flutter *Improved in v1.2!*
- Busbars and 9 key contacts simulation *Improved in v1.2!*
- 17 steps drawbars
- Two separate sets of drawbars per manual
- Full "inverted octave" presets *New in v1.2!*
- String Bass with adjustable release time *Improved in v1.2!*
- Dynamic pickup coil impedance loss
- Adjustable generator filters scaling *Improved in v1.2!*
- Single triggered percussion with natural capacitor discharge/recharge
- Adjustable global Percussion Level *New in v1.2!*
- Adjustable global Percussion Decay *New in v1.2!*
- Vibrato/Chorus virtual scanner
- Adjustable Vibrato Scanner depth *New in v1.2!*
- Electronic vibrato simulation when Sets F or V are selected *New in v1.2!*
- Separated Upper and Lower V/C tablets with smooth switching *New in v1.2!*
- Dynamic tube overdrive simulation *Improved in v1.2!*
- Spring reverb *Improved in v1.2!*
- Smooth action volume pedal with adjustable MIDI response *Improved in v1.2!*
- Stereo wooden rotary speaker simulation with artificial environment and microphones positioning *Improved in v1.2!*
- Five different rotary speaker algorithms with adjustable "character" *New in v1.2!*
- Tone Cabinet (stationary speaker) simulation *New in v1.2!*
- Rotors brake position
- Adjustable background hum and noise *Improved in v1.2!*
- Very low CPU consumption *Improved in v1.2!*
- Midi controllable, supports VST automation
- Easy MIDI Learn function *New in v1.2!*
- Up to four separated outputs *New in v1.2!*
- Upper and Lower manuals SPLIT with adjustable split point *New in v1.2!*
- Upper and Lower manuals octave transposers *New in v1.2!*

How VB3 works

Have a look at this scheme:
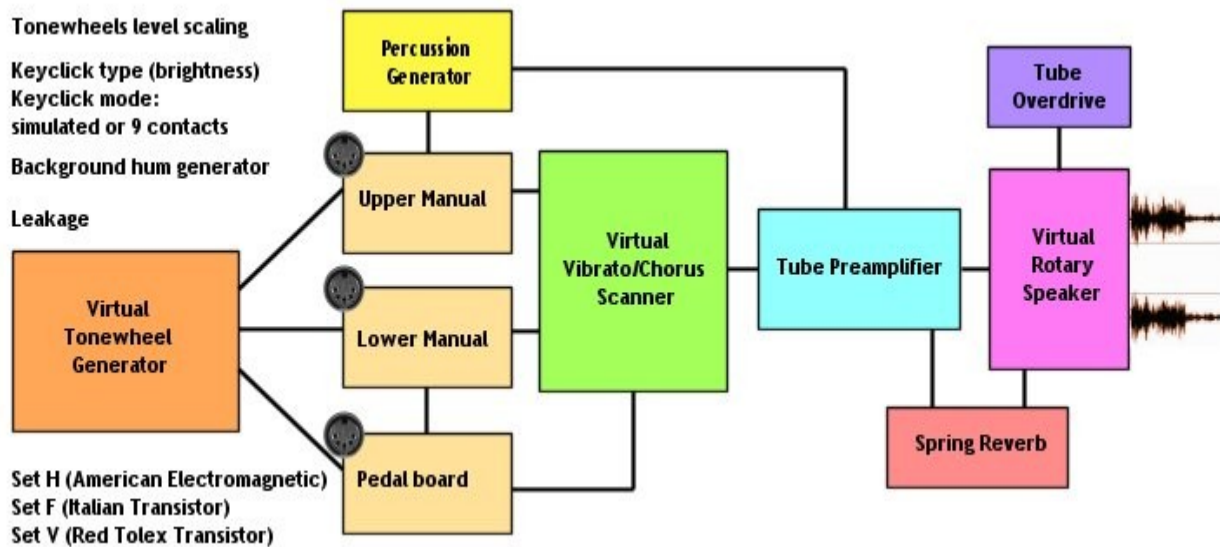
There is a "virtual tonewheel generator" which constantly plays 91 waveforms. When you depress a key, a connection matrix decides which "tonewheels" have to be played according to the note played and the drawbars setting. If more than one note requires the same tonewheel to be played, this is amplified twice but no other "oscillators" are required other than the 91 already available. Actually, only 79 tonewheels are used for the two manuals, while the first 12 are only used for the first octave of the pedalboard. *New in v1.2!* You can, however, choose to use the first 12 tonewheels for the upper and lower manuals too by deactivating the foldback on the 16" drawbars from the Global Options Menu.
Also, you should know that VB3 doesn't use any samples. All the sound it produces is 100% calculated in real-time. The waveforms are modeled after an accurate examination of actual electromagnetic organ's output signals, and digitally reproduced with the help of mathematical formulas and computations.

Nine key contacts simulation

The original american electromagnetic organ has, underneath each single key, 9 mechanical contacts, one for each drawbar. When a key is depressed these contacts are closed sequentially in a very short time interval, near contemporarily. In most cases you won't notice any particular effect due to this kind of mechanics, but some great organists take advantage of this feature in order to create some soft nuances during their playing. Unfortunately there's no way to let the computer know exactly how deep a key has been depressed, since the only message that a MIDI keyboard can send is that of note ON or OFF (leaving apart velocity and aftertouch features which, in this example, are unused). Thus, the simulation happens almost randomly.

New in v1.2! In VB3 version 1.2 the 9 Key Contacts simulation is always active. From the Preset Options Menu you can set the maximum time between the first and the last contact to be closed. The range is from 1 to 39 milliseconds. The effective time is calculated according to the MIDI velocity: the harder you hit a note, the shorter is the time required to close all 9 contacts. For softer keystrokes you'll have slower times beween contacts. And if you have ever played one of those beautiful vintage console organs, you do know what we're talking about, and you'll notice a great similarity between the real thing and this simulation.

Two sets of drawbars per each manual... and more.

What do you usually do with other tonewheel clone organs when you want to switch from a drawbar setting to another, and back again, and again, and again during a song? You can either change presets and hope the organ is fast enough to not play any "hole", or you have to be fast to use the drawbars / faders / knobs... if you have any. With VB3 you have two separate sets of drawbars per each manual, two for the upper manual and two for the lower manual. The interface will show only one set at a time, but with the new selection switch you can switch from a set to the another simply by clicking on that switch or better you can use MIDI CC# 49 (for the upper manual) and CC# 59 (for the lower manual) using values 0=Set A, 127=Set B.

New in v1.2! But if you have an extra octave below the 61 playing keys, you can also use the A# and B keys for switching respectively to Set A and B, and all other keys to choose between 9 pre-set drawbar settings, including the CANCEL (no sound) status, associated with the lower C key, just like in the real thing. These presets are user programmable, as shown below.

Please Note: for the upper manual you have access to the percussion feature only if Set B is selected. Please also note that there's a protection against accidental and unwanted preset switching that requires a keypress of at least 100 milliseconds in order to activate the desired preset.

Difference between Instrument Programs (or Patches) and Organ Presets.

VB3 comes with 32 programs, easily accessible from the Preset Options Menu or by using your host's program functions. These programs store and recall almost all instrument's settings, including rotary speed selector, swell pedal and all other GUI controls, but excluding the Global Options (which are stored separately) and the SPLIT functions.

Organ Presets are a different matter. Like in the original console tonewheel organ, here you have two separate sets of drawbars per each manual, plus 9 pre-set drawbar combinations. These presets are accessible by clicking on the numbered stripes below the drawbars or using the octave below the first playable C key.

These 9 combinations are pre-set by the instrument manufacturer, but they can be freely edited by accessing the DAT file which is created the first time the instrument is run. This is a plain text file, open it with a common text editor. The last 18 rows of the file should read:

PresetU1=005320000
PresetU2=004432000
PresetU3=008740000
PresetU4=004544222
PresetU5=005403000
PresetU6=004675300
PresetU7=005644320
PresetU8=006876540
PresetU9=327645222
PresetL1=004545440
PresetL2=004432220
PresetL3=007373430
PresetL4=004544222
PresetL5=006644322
PresetL6=005642200
PresetL7=006845433
PresetL8=008030000
PresetL9=427866244

Each digit corresponds to a drawbar position, and the 9 digits correspond to the 9 drawbars as seen from left to right. Feel free to edit these numbers when the plugin is not in use, but be careful to not leave blank spaces at the end of each row and between rows. Also, be sure that each number has 9 digits, and leave the rest of the file untouched.

Erroneous alterations of the DAT file may cause instrument malfunctions. However, you can still delete the DAT file and let the software create it again in case of troubles.

Virtual Acoustics

VB3 also provides an accurate simulation of the famous Rotary Speaker vastly used to amplify those amazing organs, but it not only simulates the speaker itself. As you surely know, all the sounds we hear in nature are the result of the actual sound source (a car's motor, a human's voice, a bird, etc.) and the natural reflections which happen in the surrounding environment, that is what we also know as "reverberation". VB3 recreates the environment where an imaginary Rotary Speaker is in, and is recorded with three or four microphones at a distance from the cabinet of about one feet each.

Improved in v1.2! In version 1.2 the rotary speaker simulation has been greatly improved. Now you can choose from five different algorithms:

1. Rock 147: the "Rock" algorithms are based on a four microphone configuration with a wider stereo separation, much amplitude modulation and a less reflective ambience. This considers a close miking with 4 dynamic mics;

2. Rock 122: very similar to the previous algorithm but supposed to simulate the use of two large diaphragm condenser microphones for the upper horn;

3. Jazz 122: almost the same as in VB3 version 1.1, based on a three condenser microphone configuration with a wide stereo image and a notable distance from the cabinet. This gives a brighter sound and a nice stereo effect, and is particularly suitable for Jazz and for the STOP position;

4. Rock 760: similar to "Rock 147" but the rotary cabinet is inspired to a solid-state stage model, supposedly with the horn deflectors removed, like many Rock and Prog bands of the seventies used to do. This results in a very pulsating modulation and a wide stereo image;

5. Monaural: same as algorithm "Rock 147" but based on a two-mics recording. This can be particularly useful in live situations where it's impossible or impractical to amplify the instrument in stereo.

6. Tone Cabinet: this is a simulation of a two-channel stationary speaker, presumably miked in stereo.

Also you can choose between a clean sound and an "aggressive" character, which gives a nice saturation on the high frequencies at high volumes. With the few controls you have on the interface, you can vary the sonic result of the virtual recording of a Rotary Speaker: use the Distance knob to set the virtual microphones near or far from the cabinet: when you are very far, the sound becomes almost monaural, and the resonances of the wooden cabinet are prevalent on the dry speaker outputs. Basically, this control mixes between the cabinet resonance and the rotary sound. Use the Balance knob to balance between the bass rotor and the treble horn. Use the Spread knob to set the position of the two upper microphones relative to the cabinet louvers (wider or narrower stereo image).
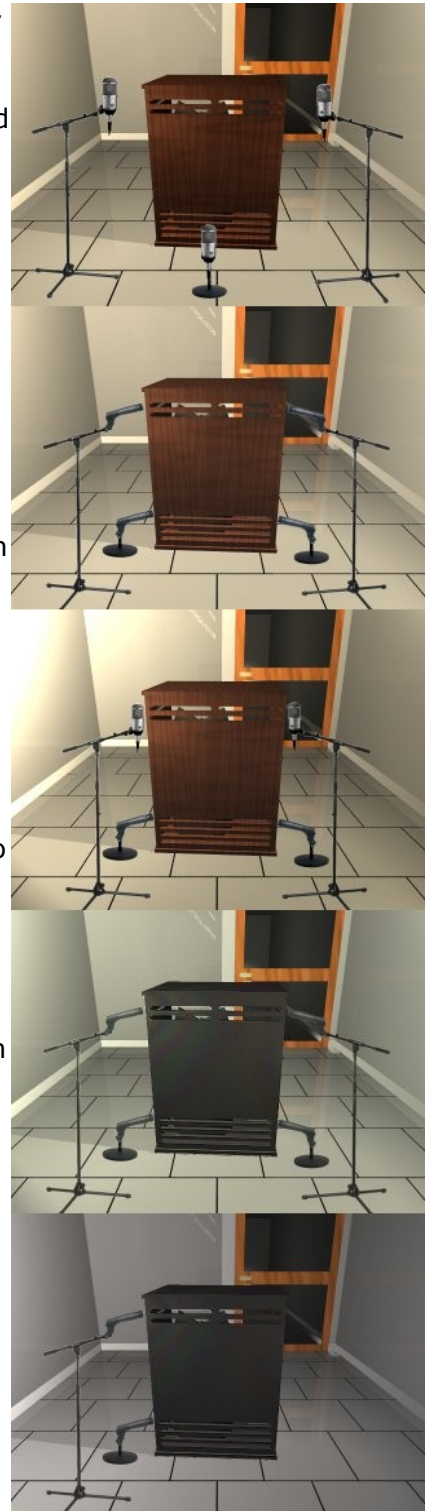
The sweet contour: the "Vibrato Scanner"

VB3 brings you a Vibrato / Scanner simulation 100% faithful to the original. In the electromechanical organ, the vibrato is accomplished using a series of LC filters which form an analogue delay line. This line is divided into a number of "taps", and each tap is connected to a terminal of a circular variable capacitor which, in turn, carries the sound from the organ's generator to the preamplifier through a moving pickup. This fast movement causes a variation in pitch that generates the well known Vibrato effect. If this effect is coupled with the dry audio signal, you have a Chorus effect. In VB3 each single element of this electronic circuit is perfectly reproduced with the use of digital synthesis, with the aim to bring you the warm and *alive* sound of an electromechanical vintage organ.

New in v1.2! When you're using waveform Sets F or V (transistor organs), the V/C effect automatically switches to a common electronic vibrato simulation. The six steps are: Type V Min, Type V Max, Type F Slow Shallow, Type F Slow Deep, Type F Fast Shallow, Type F Fast Deep.

The warm element: the "Tube Overdrive"

Improved in v1.2! VB3 uses an all new approach to tube overdrive simulation. This new simulation is mainly based on the dynamic response of tube amplification electronics. If the nominal dynamic range is exceeded, the sound gets "saturated" and the result is a very musical and pleasant distorted sound. On the interface you only have two knobs and a switch: use the switch to turn on and off the distortion; the Drive knob lets you adjust the distortion amount along an exponential scale; the Edge knob lets you choose the harshness of the distortion: if you just want a sweet saturation, mostly on the low-end, keep this knob low, but if you need a very distorted sound for your hard rock songs, you may want to increase this parameter. Move it at little steps and hear the result for yourself.

And what about the spring reverb? VB3 brings you the warmth of the famous "Type 4" american spring reverb of the sixties, driven by a tube preamplifier. The right tone for a great organ sound.

The digital breath

Among the many features that make VB3 a realistic simulation of the electromagnetic organ, there are a couple of internal "facts" that make it yet more "alive". As you may know, the tonewheel generator of the electromagnetic organ is driven by an asynchronous motor and is stabilized by a long series of springs, and is hung by four springs for more stability. Nevertheless, the intonation still flutters, even if in some models this fluctiation is hardly noticeable. Also, you should know that the passive components used for the generator filtering, mostly responsible of the "leakage" defect, can vary their value from time to time according to weather, humidity, wear, temperature, etc. resulting in a slightly different leakage component in the sound. Not to mention that not all the keys have the same keyclick. Well, VB3 reproduces all these behaviours randomly every time it is run.

Panel Controls

VB3 reflects the same controls you will find on one of the most famous models of the american tonewheel organ, with the same look, in the same positions and with almost the same lables, so if you're familiar with the real thing you won't find yourself confused when looking at VB3's interface. Other controls are there for further sound customization.
Here are just a few guidelines for a better and quicker use of the software.

- Like a real organ, turning on the percussion mutes the 1' upper drawbar.
- Like a real organ, when the percussion is set to "Normal", the volume of the upper drawbars is decreased.

The Preset Options Menu

Here you can set a number of options that will be saved with your presets:

1. Waveform set:
2. Set H: American Electromagnetic
3. Set F: Italian Transistor
4. Set V: Red Tolex Transistor
   When waveform Set F or V is selected, the Vibrato effect switches automatically to "Electronic Vibrato" and the leakage noise will be turned off.
5. Set the KeyClick type: dark or bright. This is not a simple equalization: this settings actually affects the algorithm used to generate the electrostatic discharge noise that you hear at each keypress. Some of the older tonewheel organs have a darker tone, while modern ones (and for "modern" we mean those build in the seventies) usually have a brighter tone. This is particularly audible in the high frequency range.
6. Set the max time delay between keycontacts. As already explained in the dedicated chapter, with this option you can choose the maximum time lapse between the first and the last key contact to be closed (and reopened) when you depress (or release) a key. The actual time is calculated based on the MIDI note velocity: the harder you press a key, the faster the contacts are closed, resulting in a shorter keyclick.
7. Set the volume of the background hum noise: Off, Low, Mid, High. This is the continuous playback of a long sample that gets generated during the plugin initialization phase. This noise produces the AC current hum, the circuitry hiss and the tonewheel leakage.

In this same menu you can see other functions:

1. Preset List: here you have the complete list of all factory presets;
2. "Revert to factory presets": with this function, you can recall all the factory presets and cancel all your editing. You can save your own preset bank by using your VST host's internal facilities;
3. "Save current as Start-Up": with this function, you can save a special preset which will be loaded automatically each time the plugin is run. This way, you can have your "start-up" setting. VB3 will save a standard "FXP" preset file named {name_of_the_DLL}.fxp in the same folder where the DLL file resides.

The Global Options Menu

1. Choose the MIDI channels for UPPER, LOWER and PEDALBOARD;
2. Choose whether to invert the response to the MIDI CC for the drawbars;
3. Receive MIDI Program Change: enable this option if you wish to switch programs from your MIDI keyboard sending Program Change events;
4. Use MIDI Velocity for KeyClick: this option is ON by default, but you may need to switch it off if your keyboard controller doesn't send the Velocity information. This is only used for the keyclick simulation as described before;
5. Enable/Disable Organ Preset Octave: if you don't want to use the first octave for switching organ presets, set this option to 'no';
6. Set the Global Tuning, from A=437 Hz to A=443 Hz;
7. Choose between different models of organs, based on measurements from actual console organs;
8. Set the Leakage noise level: None, Low, Mid, High;
9. Set the ToneWheel volume scaling:
10. Flat: default setting, based on actual organ measurements;
11. Ascending: higher harmonics (tonewheels) are louder, brighter timbre;
12. Mid Cut: harmonics in the middle range play quieter;
13. Mid Boost: harmonics in the middle range play louder (this setting particularly boosts the last 2 octaves for all drawbar configurations);
14. Descending: higher harmonics are softer, resulting in a darker overall timbre;
15. Set the overall Percussion Decay Time;
16. Set the overall Percussion Level;
17. Set the overall Vibrato Scanner Depth;
18. Choose whether to disable the foldback on the 16" drawbar or not;
19. Choose the appropriate volume pedal scaling that matches best your physical volume pedal; P settings are positive course, N settings invert the pedal response;
20. Choose wether to use a single controller or two different controller for the Rotary Speaker speed changes;
21. Adjust the wind noise level caused by the virtual Speaker rotors;
22. Choose your preferred virtual Rotary Speaker type;
23. Choose the sonic "character" of the Rotary Speaker;
24. Choose the number of outputs:
25. Single stereo output: output from the rotary effect;
26. Two outputs: a stereo couple plus a mono out coming from the dry organ;
27. Three outputs: adds a mono out coming from the reverb effect.

When in Demo mode, you can see two further functions:

- Register on-line, opens your default web browser pointing to the web site where you can purchase your license;

- Enter registration key, re-opens the registration screen in case you already own a key and you wish to activate the software.

Note: the global options are saved automatically at every modification and when the instrument is closed.

Using the GUI controls

When you move a knob on the User Interface, a small display appears on the screen showing the current value of the active control.

Tips on using the interface:
- to reset a control to its default value, hold down CTRL and click it;
- for "fine tuning" knob movements, hold down SHIFT while moving the knob;
- all knobs react to both vertical and horizontal movement;
- hold down the ALT key to activate the circular control of the knobs.

Useful Tips

To hear the dry sound from the virtual tonewheel generator:

1. Turn off the Rotary effect
2. Keep the TONE knob at max
3. Turn off the overdrive effect
4. Select Hum Type = OFF

For a transistor organ simulation:

1. Do everything as above described
2. Select TW Set = Set F or Set V
3. Lower the keyclick
4. Preferably only use the even drawbars up to 2'

To connect VB3 to a real rotary speaker

1. Do everyting as above described (turn off rotary, overdrive, Tone at max)
2. Preferably set TW. Scaling = Flat

General Warnings

1. When changing parameters like TW Set, TW Scaling, Leakage and Tuning the software must recompute the internal wavetables, so a glitch in the audio could be heard or, if any notes are still depressed, the sound could be muted. It is adviced not to play when changing these parameters.

2. When the brake is used, i.e. when you set the Rotary effect in stop position, the horns stop randomly after they gradually slow down, and sometimes the position they take could cut or amplify certain frequencies. This also happens with the real thing. If you don't like the position they are at, just set the speed at slow and intermittently disable the brake until you hear the sound you like.

3. Use the knobs "Distance", "Ambience", "Balance" and "Spread" to search the right position of the virtual microphones with respect to the rotary speaker and the virtual environment, according to your tastes. Do this in order to obtain the correct balance between the direct sound from the speaker and the environmental reflections. This situation also applies to the real instrument.

4. VB3 can support sample rates up to 96 Khz, but it is strongly recommended to not exceed the 48 Khz sample rate, for optimal performance and reliability (and lower CPU usage).

The SPLIT and Transpose Functions

New in v1.2! If you only have a 61 keys or an 88 keys master keyboard and you still wish to play both upper and lower organ manuals, you can take advantage of the SPLIT function. To activate the keyboard split, click the SPLIT button on the middle of the interface. This way, the keyboard is split into two portions: left side plays the lower manual, right side plays the upper manual, and the instrument is now receiving notes from all MIDI channels. If you wish to set another split point other than the middle C, right click on the active note (visible in yellow) and press the disired key on your keyboard. The choosen key is the fist playable key of the upper manual. You can also transpose both manuals individually by one octave lower or one octave upper. This can be useful in the case you have an 88 keys controller.

Please note: these settings will be automatically stored when the program is closed. Also, please note that when the SPLIT function is active, only the upper preset "inverted" octave is accessible. Notes exceeding the playable range (61 notes per manual) are muted.

MIDI Mapping

New in v1.2! You can assign your MIDI controllers to any of the available controls using the MIDI Learn function. It's very easy: just right-click on a knob or switch of your choice. A menu should pop-up. The first item shows the control's name, the second item shows the MIDI CC# currently associated to that control, the last item activates the MIDI Learn status. Click on "MIDI Learn", the tooltip text should say "Waiting for incoming MIDI data...". Now move a knob/slider/whatever on your physical controller. At this point you should see the virtual control following the movements of the physical control. To abort the "wait state" click on the first menu item, and to reset the assigned control (MIDI Forget) click the second menu item.
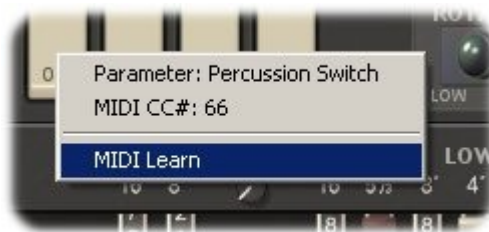
The MIDI Map is automatically stored when you quit the plugin in a file named "{name_of_the_dll}.dat" located in the same directory where the DLL file resides. This is a plain text file, but please don't edit it manually.

Please note: MIDI Controllers respond on all Channels, so be sure that your controller sends all controls with the same channel, or else you'll find two different physical controls (knobs, faders, etc.) moving the same parameters on the screen, or a single physical control moving more than one parameter on screen.

Plase also note that VB3:

- doesn't allow assignment of CC# 0;
- doesn't respond to Pitch Bend messages, or maybe it does... who knows;
- responds on CC#120 & CC#123 for "All Notes Off" (muting and reset).

Default MIDI Map

CONTROL TYPE	Control Change Number
Upper Manual Drawbars A/B Switch	49 (can be changed manually from the .dat file)
Upper Manual Drawbars - SET A	40-48
Upper Manual Drawbars - SET B	12-20
Lower Manual Drawbars A/B Switch	59 (can be changed manually from the .dat file)
Lower Manual Drawbars - SET A	50-58
Lower Manual Drawbars - SET B	21-29
Pedal Drawbars	16'=33, 8'=35
Vibrato Type	73
Vibrato Lower	30
Vibrato Upper	31
Percussion On/Off	66
Percussion Volume	70
Percussion Decay	71
Percussion Harmonic	72
Keyclick Level	75
Tube Overdrive Switch	67
Tube Overdrive Drive	76
Tube Overdrive Edge	78
Reverb	84
Rotary Speaker Bypass	85
Rotary Speaker Speed (Fast/Slow)	1
Rotary Speaker Treble Horn Slow Speed	81
Rotary Speaker Treble Horn Fast Speed	82
Rotary Speaker Treble Horn Acceleration	83
Rotary Speaker Bass Horn Slow Speed	91
Rotary Speaker Bass Horn Fast Speed	92
Rotary Speaker Bass Horn Acceleration	93
Rotary Speaker Brake	68
Rotary Speaker Spread	9
Rotary Speaker Balance	10
Overall Tone	8
Expression Pedal	11
Overall Volume	7