Tricent mk III

Polyphonic Synthesizer Ensemble

Version 1.1

© 2020-2023 by Björn Arlt
http://www.fullbucket.de/music

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Introduction

The *Tricent mk III* is a software synthesizer plug-in for Microsoft Windows (VST2/VST3) and Apple macOS (VST2/VST3/AU) simulating the classic KORG® *Trident mk II* from 1982. It is written in native C++ code for high performance and low CPU consumption. The main features are:

- *Synthesizer*, *Brass*, and *Strings* sections
- 8 or 64 voice polyphony
- Flanger effect
- Individual stereo outputs for the three sections
- Tweaks...
- Double precision audio processing
- MTS-ESP (https://oddsound.com/) dynamic micro-tuning support
- All parameters can be controlled by MIDI controllers
- Plug-in supports Windows and macOS (32 bit and 64 bit)

Tricent mk III is based on the new **iPlug2** framework maintained by **Oli Larkin and the iPlug2 team**. Big thanks, guys!!! Without your work it would not have been possible to create a resizable *Tricent mk III* user interface.

To resize the plug-in you just grab the yellow triangle at the bottom right of the *Tricent mk III* window and drag it. You can save the current window size using the menu entry "Save Window Size" in the *Options Menu*.

If you have trouble with the standard version of *Tricent mk III*, please grab the (sound-wise identical) "N" version of the plug-in which is based on the original **iPlug** framework.

The KORG *Trident mk I & mk II*

In 1980 and after the PS-3X00 polyphonic synthesizer series, KORG released the *Trident*: An eight-voice programmable polyphonic synthesizer in the fashion of other successful machines such as Sequential Circuits' *Prophet* and Oberheim's *OB-X(a)*. But while the latter offered a pretty sophisticated architecture with Sync and Cross-Mod options, the *Trident* synthesizer engine was reduced to almost the absolute minimum. Instead, KORG added two additional (non-programmable) *Brass* and *Strings* sections which lifted the *Trident* into the league of classic multi keyboards as known from *Farfisa*, *Crumar* and the like. Obviously the *Trident's* subtitle "Performing Keyboard" was chosen to designate the target audience: Live performing artists with the need for a large variety of sounds in a single box.

Two years later came the *Trident mk II* with some improvements (e.g. two dedicated envelope generators for VCF and VCA, program recall from memory etc.) and a light face lift (most notably the black knob caps of the MS/PS series were replaced by the modern ones as known from the *Polysix* and the *Mono/Poly*). But the *Trident* never reached the same status as its "brothers" (errr, well…) *Jupiter 8*, *Prophet 5*, *OB-Xa* and the like. Its sound was said to be "thin" and "cheesy" – which is (at least in my opinion) not true. Furthermore its hardware was believed to be rather unreliable: Well, that's a problem with almost *all* analog gear (ask the owners of a *Polymoog*) and one of the good reasons why industry switched over to digital technology.

The *Tricent mk III*

Many folks asked me to create a VST/AU recreation of the *Trident* but I was reluctant. Anyway, you know how things go, I checked the *Trident's* schematics, well, not bad, nice ideas, wow, these KORG engineers were cool, let's check some videos, okay, done. And since the so-called "Tricent" would become a "mk III" I added the following features which hopefully are nice to have:

- Stereo: All parts can be panned individually.
- Additional outputs: Each part can be routed to its individual output.
- 8 or 64 voice polyphony: Maybe eight voices are a bit tight these days…
- (De-)Tuning capabilities for the *Brass* and *Strings* sections.
- Stereo Ensemble: Makes the *Strings* section shine.
- Stereo Flanger: Funky.
- Not to forget: 64 presets and MIDI CC support!

Acknowledgments

And at this point I would like to say **Thank you!** to all the people who share their information about the *Trident mk I & II* via the Internet, especially and again **Ben Ward** for his excellent supporting material at http://www.korganalogue.net/.

And another THANK YOU! to the KVR Audio community and to the KORG engineers.

No, I am not affiliated with KORG in what relation ever except that I always find myself entangled with their instruments. ☺

Architecture

Because hardware is expensive, the *Synthesizer*, *Brass* and *Strings* sections of the *Trident* were based on the same set of oscillators (one per voice, each one generating a 16′, 8′ and 4′ Sawtooth simultaneously). These signals are fed into the three sections and processed accordingly (in the *Synthesizer* section, the signals drive VCO 1).
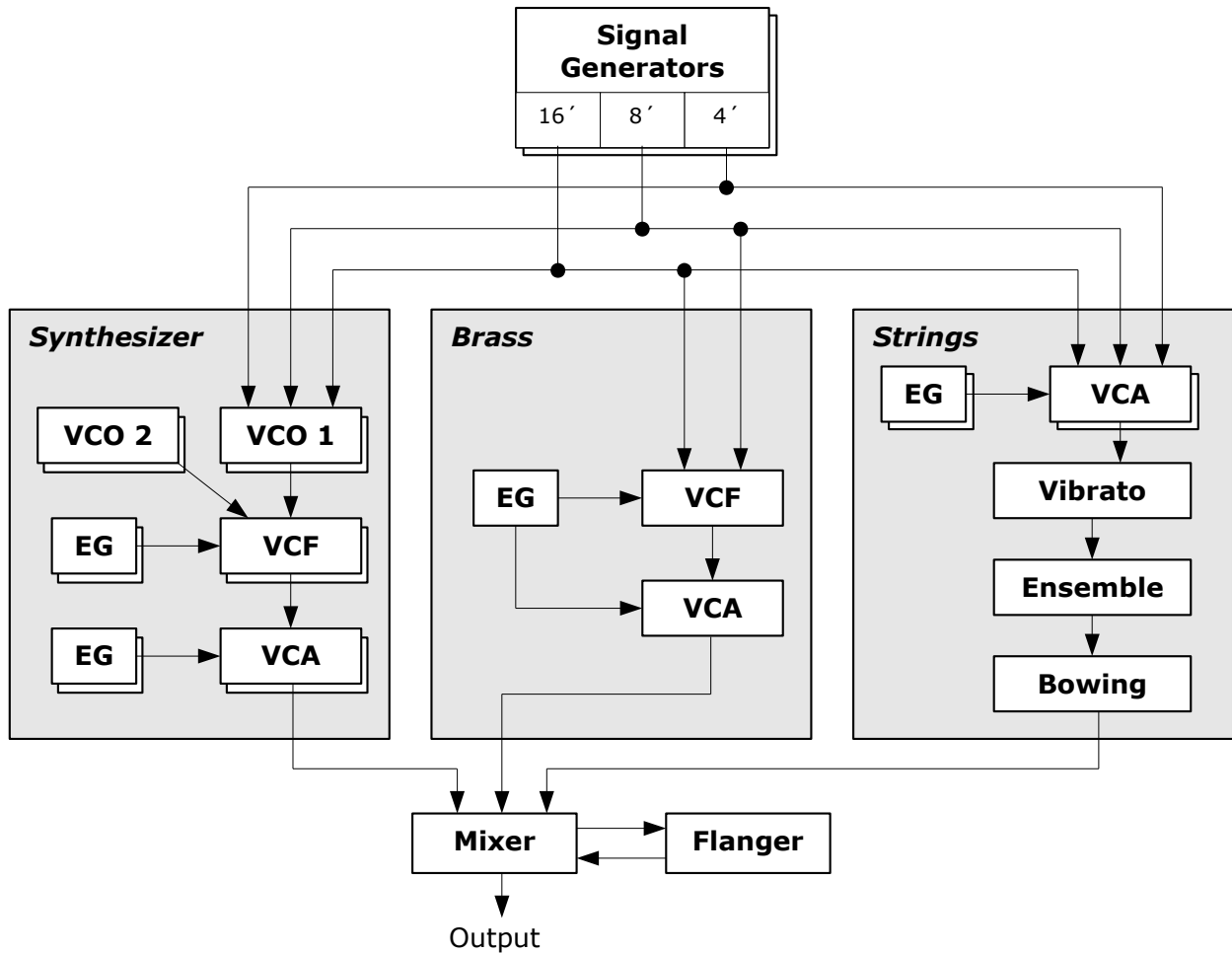
Note that while the *Synthesizer* section is truly polyphonic (one VCO 1, VCO 2, VCF and VCA per voice), the *Brass* section is *paraphonic*: There is only one VCF and one VCA for *all* voices.

The Sections

Although the *Trident* (and the *Tricent* plug-in) is not a very complicated machine I'd like to take some time explaining the various sections of it and its peculiarities.

Synthesizer Section

The *Synthesizer* section is pretty basic: The signals of two VCOs (Voltage Controlled Oscillators) are mixed and processed by a standard 24dB lowpass filter (VCF; Voltage Controlled Filter) following a standard VCA (Voltage Controlled Amplifier). Of course the term "voltage controlled" has to be taken with a grain of salt – there is no "control voltage" inside the software plug-in. ☺

VCO 1 offers three waveforms: *Sawtooth*, *Pulse Width* and *Pulse Width Modulation*, where the latter is modulated by a dedicated LFO (Low Frequency Oscillator). VCO 2 only produces a Sawtooth wave and can optionally be turned off.

The VCF has its own envelope generator (EG) and allows for self-oscillation. Keyboard tracking is available in five steps (off, 25%, 50%, 100%, 150%).

Besides an *Attenuator* control, the VCA features the mystical *Auto Damp* function (which is known from the Mono/Poly, too). Since the *Trident* does not offer a *Unison* mode, playing solo lines on the polyphonic synthesizer may result in unwanted "tails" of previously played notes. With *Auto Damp* switched on, these "tails" are cut. Try it for yourself, this feature is hard to explain in words…

The volume of the whole section is set by the *Volume* knob. Furthermore, the section can be completely turned on or off using the *Output* switch.

Brass Section

The *Brass* section is even more simplistic: Here, the 16' and/or 8' Sawtooth signals are run through a *single* VCF and a *single* VCA controlled by a *single* envelope generator (EG). This means that the whole section is *paraphonic*.

However, there are some cool extras: You can control whether the EG should be triggered for each key ("Multi[ple]") or only for the first one played, but you can also select *how many keys have to be pressed* (2, 4, 6 or 8) before the EG starts. This function is activated by the *Select* button.

Strings Section

Some folks say that the *Strings* are the heart of the *Trident*. The 16', 8' and 4' Sawtooth signals can be activated individually and are sent through a (polyphonic) VCA section with a simple Attach/Release envelope. After that the *Strings* signal is processed by an equalizer followed by a delayed Vibrato and an Ensemble effect.

Note that the *Strings* Vibrato is realized by a bucket brigade device (as known from vintage stomp boxes) and not by modulating the signal generators themselves! Furthermore note that the Vibrato and Ensemble effects are *turned off* if the respective button is lit.

An interesting addition is the Bowing effect: The intend here obviously is to simulate the characteristics of bowing the strings. Hmm, I tend to call it the "Something" effect.

Finally, the keyboard balance of the built-in Filter effect controls the "sharpness" or "dullness" of the string sound with respect to the played note.

Flanger Effect

In the early 80s it was already pretty common for synthesizers to be equipped with a Chorus effect. However, the KORG designers decided to add a Flanger to the *Trident* (unique selling point?). This characteristic effect is capable of self-oscillation and can be activated individually for the three sections. Many artists were heavily using it as an additional source for experimental sound shaping.

Delay Vibrato and *Wheels* Section

There is a global delayed Vibrato effect which directly modulates the signal generators (as opposed to the *Strings* Vibrato) and thus affects all three sections (*Synthesizer*, *Brass* and *Strings*) at the same time. The vibrato delay can be switched on or off but its delay time is fixed (well almost; see section *Tweaks and Output Section*). The speed of the Vibrato effect is controlled just below in the *Wheels* section.

The original *Trident* featured a joystick instead of the well-known Pitchbend and Modulation wheels: The horizontal axis was used for pitch bending while moving the joystick "up" controlled the intensity of the Vibrato effect and moving the joystick down introduced a "trill effect" – basically a vibrato with a rectangular waveform.

Since today's MIDI controllers typically are equipped with wheels instead of joysticks I decided to "map" the joystick functionality here. Thus you can select whether the Modulation wheel controls a standard Vibrato or the "trill" effect. Furthermore you can set the range for the Pitchbend wheel.

Key Assign Section

The *Trident/Tricent* features two modes for assigning the eight voices. In mode 1 the engine tries to assign any new note to a new voice so that the other voices are not cut off (if possible). Mode 2 is suitable for solo play because here the engine will assign the next note to the same voice as before if only one note is played at a time. This prevents potential "mudding" of the sound for long release times (also see *Auto Damp* in the *Synthesizer* section).

It was not a good idea to switch the mode while playing the *Trident* – this caused a weird pitch drop of the played voices to the lowest note. On the *Tricent* plug-in it will cause all notes to be stopped. You may also note a slight itching at the back of your head (just kidding).

Besides a global tuning knob the three sections can be split across the keyboard. While the *Trident* had a fixed split point between the second and third octave of the keyboard, the *Tricent* plug-in provides a variable split point.

Tweaks and *Output* Section

Here come the things that make the "*mk III*"-part of the *Tricent* plug-in – the tweaks. First of all you can change from the original eight to sixty four voices of polyphony. This really makes a big difference when playing pads, arpeggios etc.

Second, you can switch the Flanger and/or the *Strings* Ensemble effects to stereo mode (the original *Trident* was an "all mono machine"). Space – the final frontier.

Next, you can *detune* the *Brass* and the *Strings* sections individually. Remembering what was said in section *Architecture*, this means that both *Brass* and *Strings* will have their own additional set of signal generators, and this exactly what happens when you turn one of the *Detune* knobs (LED is on). Be aware that this will increase the CPU load of your computer!

There are some more parameters that are not accessible from the front plate (you can adjust them using the plug-in parameter control of your DAW): Ensemble speed and modulation amount as well as Delayed Vibrato delay time.

Finally, the *Tricent* offers a dedicated *Output* section where you can adjust the stereo panorama and the response to velocity for each of the three sections (note that the original *Trident* did not react to velocity). The EG-to-VCF amount of the *Synthesizer* and the *Brass* sections can be controlled by velocity, too. And there is a *Total Volume* knob.

Control Operation

Control Section

To select one of the 64 patches just click on the program number or the previous/next arrow buttons, and edit its name by clicking in the text field.
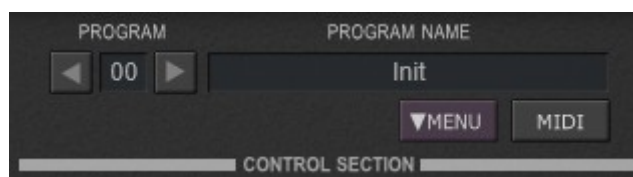
MIDI Learn And The Config File "tricent.ini"

Every parameter of the *Tricent* can be controlled by one MIDI controller. If you want to change the assignment of MIDI controller (CC; *MIDI Control Change*) to *Tricent* parameter the *MIDI Learn* function comes in quite handy: Just click the *MIDI* button at the *Control* section (button turns yellow) and wiggle both the MIDI controller and the parameter you want to assign (you can abort *LEARN* by clicking the button again). If you want to unlearn the assignment, right-click the *MIDI Learn* button (the label now reads "UNLEARN"). Now wiggle the MIDI controller or the parameter that you want to unlearn. To save the controller assignments use "Save Configuration" in the *Options* menu (see next section); they are stored in the `tricent.ini` configuration file. The exact location of this file depends on your operating system and will be displayed when you click on "Reload" or "Save Configuration".

Options Menu

When clicking on the *Menu* button, a context menu opens with the following options:

Copy Program	Copy current program to internal clipboard
Paste Program	Paste internal clipboard to current program
Init Program	Initialize the current program
Load Program	Load a program file containing a patch to the *Tricent's* current program
Save Program	Save the *Tricent's* current program to a program file
Load Bank	Load a bank file containing 64 patches into the *Tricent*
Save Bank	Save the *Tricent's* 64 patches to a bank file
Select Startup Bank	Select the bank file that should always be loaded when the *Tricent* is started
Load Startup Bank	Load the Startup bank file; can also be used to check what the current Startup bank is
Unselect Startup Bank	Unselect the current Startup bank
Default Path for Program Files	Sets the default path for program and bank files
Show Voice Schedule	A leftover from development which I forgot to remove
MIDI Thru	Set globally if MIDI data sent to the *Tricent* should be sent through to its MIDI output (stored in configuration file)
Ignore Program Change	Set globally if MIDI Program Change data sent to the *Tricent* should be ignored (stored in configuration file)
Reload Configuration	Reload the *Tricent's* configuration file
Save Configuration	Save the *Tricent's* configuration file
Check Online for Update	When connected to the Internet, this function will check if a newer version of the *Tricent* is available at fullbucket.de
Visit fullbucket.de	Open fullbucket.de in your standard browser

Parameters

Key Assign

parameter	ID	value / notes
Trident Mode	0	Off / On [64 / 8 voices polyphony]
Key Assign	1	Mode 1 or 2
Total Tune	2	± 100 cent
Range Synthe	3	Lower, Both, Upper
Range Brass	4	Lower, Both, Upper
Range Strings	5	Lower, Both, Upper
Split Key	6	C-2 – G8

Synthesizer

parameter	ID	value / notes
VCO 1 Octave	7	16', 8', 4'
VCO 1 PW/PWM	8	0 – 100%
VCO 1 PWM Speed	9	0.001 – 25Hz
VCO 1 Wave	10	Sawtooth, Pulse Width, PW Modulation
VCO 2 Octave	11	Off, 16', 8', 4'
VCO 2 Detune	12	± 100 cent
VCF Cutoff	13	0 – 100%
VCF Resonance	14	0 – 100%
VCF KBF Track	15	0 – 150%
VCF EG Intensity	16	± 100%
VCF Attack	17	0 – 100%
VCF Decay	18	0 – 100%
VCF Sustain	19	0 – 100%
VCF Release	20	0 – 100%
VCA Attack	21	0 – 100%
VCA Decay	22	0 – 100%
VCA Sustain	23	0 – 100%
VCA Release	24	0 – 100%
VCA Attenuator	25	± 10 dB
VCA Auto Damp	26	Off / On

Brass

parameter	ID	value / notes
Brass Cutoff	27	0 – 100%
Brass Resonance	28	0 – 100%
Brass Silent Notes	29	2, 4, 6, 8
Brass EG Intensity	30	0 – 100%
Brass Attack	31	0 – 100%
Brass Decay	32	0 – 100%
Brass Sustain	33	0 – 100%
Brass Release	34	0 – 100%
Brass 16'	35	Off / On
Brass 8'	36	Off / On
Brass Multi Trigger	37	Off / On
Brass Trigger Select	38	Off / On

Strings

parameter	ID	value / notes
Strings Attack	39	0 – 100%
Strings Release	40	0 – 100%
Strings EQ High	41	± 12 dB
Strings EQ Low	42	± 12 dB
Strings Bowing Level	43	0 – 100%
Strings Bowing Tone	44	0 – 100%
Strings Vibrato Delay	45	0 – 100%
Strings Vibrato Speed	46	0.001 – 25Hz
Strings Vibrato Intensity	47	0 – 100%
Strings KBD Balance	48	0 – 100%
Strings 16'	49	Off / On
Strings 8'	50	Off / On
Strings 4'	51	Off / On
Strings Bowing	52	Off / On
Strings Vibrato	53	On / Off
Strings Ensemble	54	On / Off

Delay Vibrato and Wheels

parameter	ID	value / notes
Vib. Intensity	55	0 – 100%
Vib. Delay	56	Off / On
Vib. Delay Time	57	0 – 100% (hidden parameter!)
Wheel Vib. Intensity	58	0 – 100%
Wheel Vib. Speed	59	0.001 – 25Hz
Wheel Mode	60	Vibrato / Trill
Pitch Bend	61	± 1200 cent

Flanger

parameter	ID	value / notes
Flanger Speed	62	0.001 – 25Hz
Flanger Feedback	63	0 – 100%
Flanger Intensity	64	0 – 100%
Flanger Manual	65	0 – 100%
Flanger Synthe	66	Off / On
Flanger Brass	67	Off / On
Flanger Strings	68	Off / On

Output

parameter	ID	value / notes
Total Volume	69	-∞ – 0 dB
Volume Synthe	70	-∞ – 0 dB
Volume Brass	71	-∞ – 0 dB
Volume Strings	72	-∞ – 0 dB
Output Synthe	73	Off / On
Output Brass	74	Off / On
Output Strings	75	Off / On
Pan Synthe	76	± 100%
Pan Brass	77	± 100%
Pan Strings	78	± 100%
Velocity Synthe	79	0 – 100%
Velocity Brass	80	0 – 100%
Velocity Strings	81	0 – 100%
Velocity Synthe VCF	82	0 – 100%
Velocity Brass VCF	83	0 – 100%

Tweaks

parameter	ID	value / notes
Stereo Flanger	84	Off / On
Stereo Ensemble	85	Off / On
Detune Brass	86	± 700 cent
Detune Strings	87	± 700 cent
Ens. LFO1 Speed	88	0.001 – 25Hz (hidden parameter!)
Ens. LFO2 Speed	89	0.001 – 25Hz (hidden parameter!)
Ens.1 Amount	90	0 – 100% (hidden parameter!)
Ens.2 Amount	91	0 – 100% (hidden parameter!)
Ens.3 Amount	92	0 – 100% (hidden parameter!)

Frequently Asked Questions

How do I install the Tricent *(Windows VST2 32 bit version)?*

Just copy the files `tricent.dll` from the ZIP archive you have downloaded to your system's or favorite DAW's VST2 plug-in folder. Your DAW should automatically register the *Tricent* VST2 plug-in the next time you start it.

How do I install the Tricent *(Windows VST2 64 bit version)?*

Just copy the file `tricent64.dll` from the ZIP archive you have downloaded to your system's or favorite DAW's VST2 plug-in folder. Your DAW should automatically register the *Tricent* VST2 plug-in the next time you start it.

Note: You may have to remove any existing (32 bit) `tricent.dll` from your VST2 plug-in folder or else your DAW may screw the versions up...

How do I install the Tricent *(Windows VST3 64 bit version)?*

Just copy the files `tricent.vst3` from the ZIP archive you have downloaded to your system's or favorite DAW's VST3 plug-in folder. Your DAW should automatically register the *Tricent* VST3 plug-in the next time you start it.

How do I install the Tricent *(Mac VST2/VST3/AU 64 bit)?*

Locate the downloaded PKG package file `tricent_1_1_0_mac.pkg` in Finder (!) and do a right- or control-click on it. In the context menu, click on "Open". You will be asked if you really want to install the package because it comes from an "unidentified developer" (me ☺). Click "OK" and follow the installation instructions.

What is the plug-in ID of the Tricent*?*

The ID is `Tri3`.

How do I know if a new version of the Tricent *is available?*

When connected to the Internet, open the File menu (see section *Options Menu*) by clicking the disk icon and select the entry "Check Online for Updates". If a new version of the *Tricent* is available on fullbucket.de the respective information will be shown in a message box.

How can I increase the CPU performance?
- Switch from 64 to 8 voices polyphony.
- Undo detuning of the *Brass* and *Strings* sections.
- Turn off (orange buttons!) any section that is not needed.