NAUTILUS TOOLS
DOCUMENTATION

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WELCOME – VERSION 1.0.8 – 15/04/24

This software works with the Korg Nautilus, Kronos and Oasys workstations. In Mapping mode, it will work with any synth.

The Korg Nautilus, Kronos and Oasys Synthesizer workstations are some of the world's best electronic instruments. They combine superb modelling and sampling technology with beautiful build quality and they are also great Midi controllers. Thank you Korg.

When the Korg Oasys came out in 2006 I bought one of the first available. It was a wonderful synth, the best I ever had. After all these years I wanted to return to the Oasys - in the form of the Nautilus. I wrote sequencers, editors and librarians over the years for the Korg MS20, Triton, Oasys, Roland RD2000 and now Im writing an app for the Nautilus/Kronos/Oasys. Not an editor that replicates Korg's one, or the instruments touch screen, but an app which adds something new.

Some of its features benefit from controlling with a computer. There are features which can be added or done more effectively and faster on a computer. I've started off by providing an extensive midi mapping facility which is built in the software. For instance, you can now control the Synths Drawbars with a hardware controller like the Korg Nanokontrol.

Have fun.

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This software can be downloaded from my website for free. If you like the full version and want to support its development you can use Paypal.com from the Menu item on the main form - 'Make A Donation'. Remember to download the latest docs from my website and overwrite the Nautilus.pdf file in the installation directory.

**Nautilus Tools and my RD2000 editor can be run and be controlled from different computer platforms.**
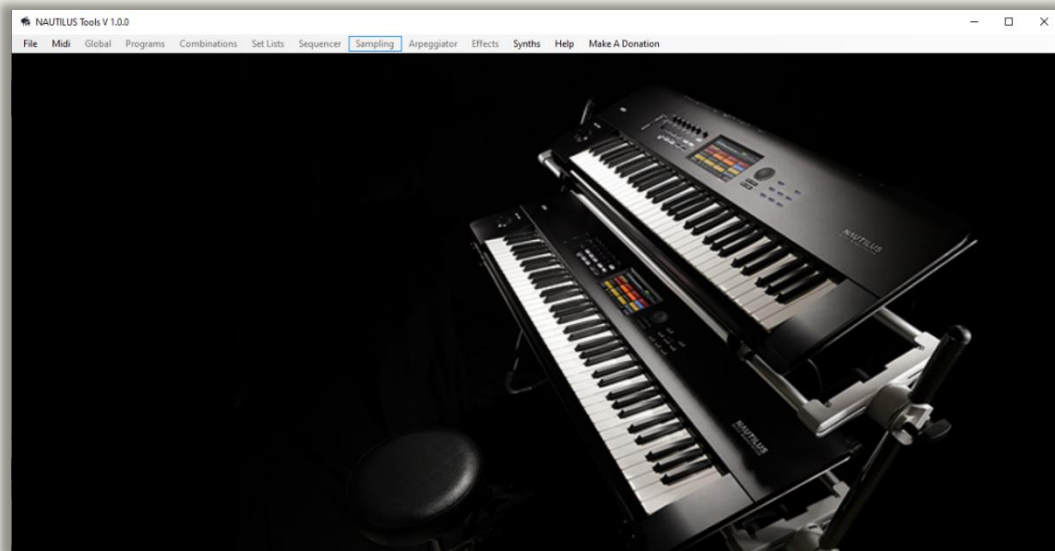
Nautilus Tools running on a Windows PC

Midi can be sent and received between a pc running this software and a Mac – if say the Mac is your studio computer – To do this use RPTMidi which uses a wireless Midi protocol.
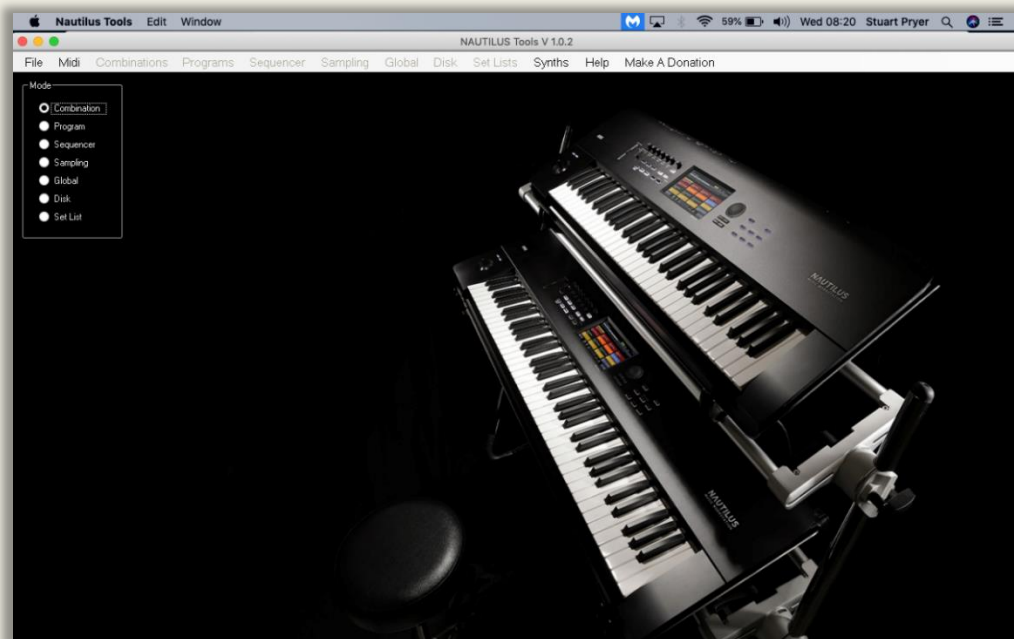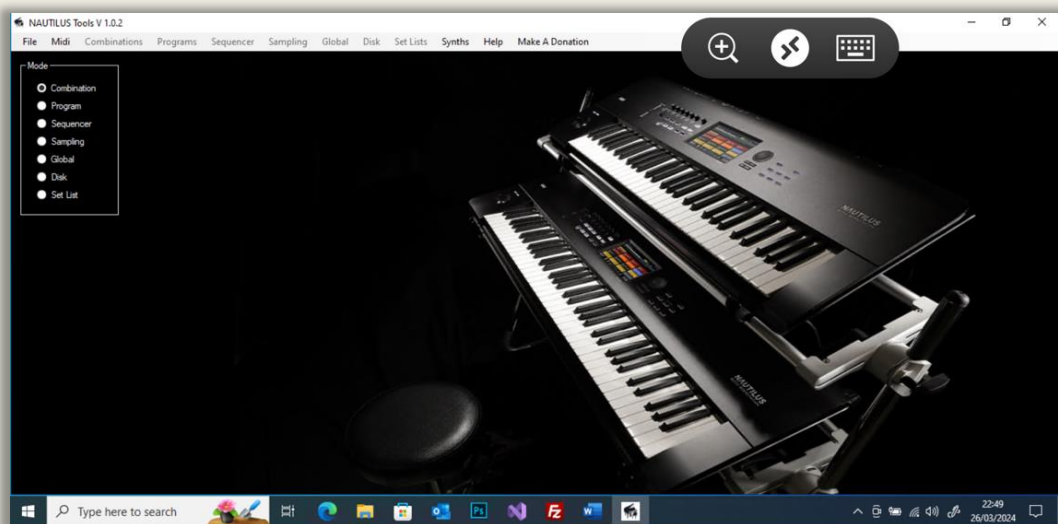

Nautilus Tools Running on a Mac

Using Code Weavers Crossover app. It should also run on Linux and Android. Or you can control a PC running Microsoft Desktop.
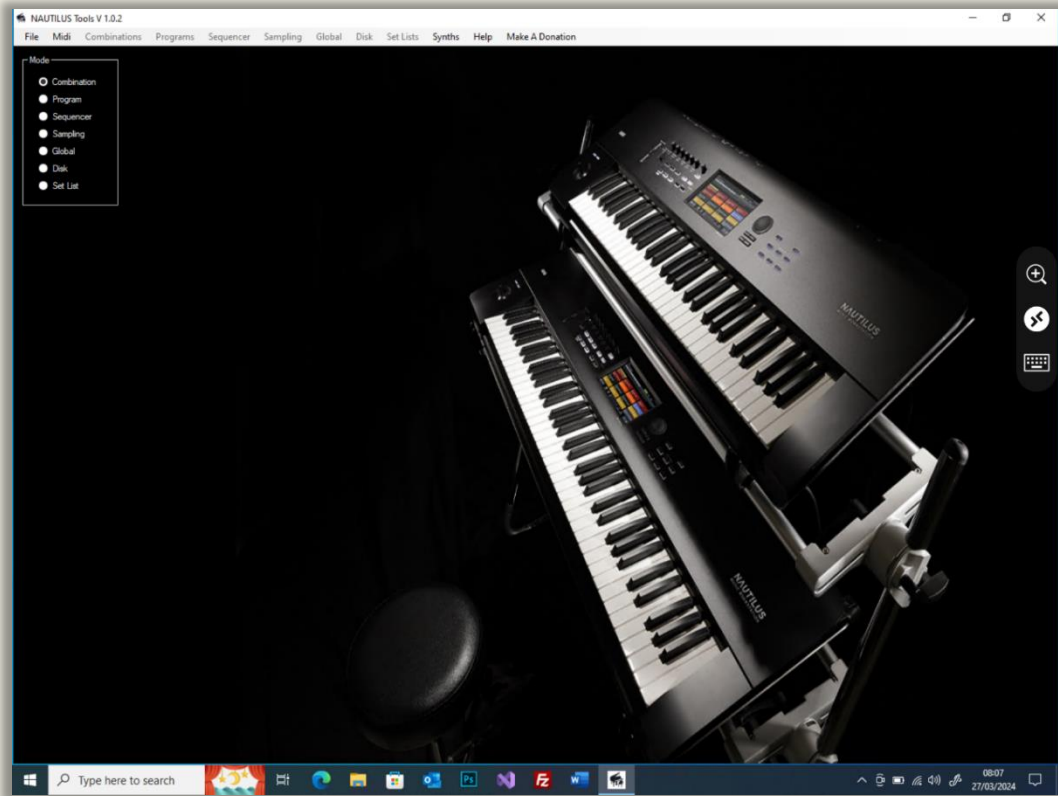
Nautilus Tools controlled from an iPad using Microsoft Remote Desktop. You can also use iPhones and Android or Linux devices running the Remote Desktop app.

Nautilus Tools is controlled via an iPhone using Remote Desktop.

CONTENTS

VERSION 1

KRONOS 3

This manual and software will help you turn your Korg Nautilus into a 'Kronos 3'. Below are the differences between Nautilus and Kronos and what to do to turn Nautilus into a 'Kronos 3' !

Nautilus	Kronos 2	How to Make Kronos 3 With the Nautilus
Control Surface – No sliders	Has 9 Sliders	Use any Midi Controller eg. a NonoKontrol 2 and Map CCs for the sliders. The Studio buttons design matches the Nautilus buttons! See Using NanoKontrol with the Nautilus. Tutorial 3 & 4
No hardware Drawbar control	Hardware Drawbar control	Use a NanoKontrol and this software to map CC to Sysex – See Mapping Sysex – You can map just about anything. - Using a NanoKontrol 2 with the Faders. Tutorial 5
No inbuilt network adaptor – for FTP transfer	Network adaptor built in	Use a Korg listed USB network adaptor. See Tutorial 2.
1 USB A / 1 USB B	3 USB A & 1 USB B	Use a powered USB hub. You can then have more than 3 Type A USB ports Tutorial 1
Improved graphical interface with 7 " Touch View Screen	8" Touch View Screen	Nautilus has an improved graphics interface to make up for slightly smaller screen
Many additional new sounds included	No new updates	Korg continue to add to the expansions available for the Nautilus. Eg. M1 expansion is free. Tutorial 6

Twin Polyphonic Arpeggiators – No Karma	Karma but no Arpeggiators	The developer of Karma Stephen Kay is updating Karma for Mac/PC so one day it may be available for the Nautilus on PC and Mac?
AT Aftertouch models 61 AT and 88 AT	Aftertouch	Identical
Non AT models 61/73/88 no Aftertouch	Aftertouch	Use a controller such as a pedal to add aftertouch. Also See Mapping CC to AT.
73 key version Synth action	73 key version Weighted action	It seems the general preference with Kronos users was that the 73 key should have been synth action.
Nautilus Price 2/3 of a Kronos 2 as new	Some components no longer available so issues with maintenance	Nautilus is new so less issues with reliability and you get a warranty.
Korg PC/Mac Editing software Version 1.2	Version 1.0	Version 1.2. This gives you a computer screen size user interface
Operating system and main board similar spec as Kronos. Mini Sata SSD 60Gb	Sata SSD 60Gb with second Sata slot	Both 4 GB ram, 3 Gb is available after OS loaded. 60GB SSD, Intel Atom processor.
Operating system and firmware updates. Latest Sub sys firmware 1.1 3/2/23 Latest sys update * 1.3.3 7/7/23	No new updates	Hopefully new features and bug fixes will come to the Nautilus. 32 bit Custom Linux OS for both. See Korg Website.

Note. To turn the Nautilus into Kronos 3 you do need to use some peripherals and this software. However, the upside is if peripherals go wrong, it's a lot cheaper replacing these than replacing internal components. You will also get less wear and tear on your Nautilus controllers etc. Mapping sysex from CCs give you massive hardware control over the synth.

* Update sub system firmware before updating the system OS. See Global settings for your current versions.

SWITCHING BETWEEN THE NAUTILUS, KRONOS AND OASYS

The Software contains a powerful mapper which can change settings on the Korg Nautilus (AT and non-AT), the Korg Kronos and Korg Oasys using MIDI system exclusive messages – Sysex - plus Control Change CC messages and Channel Voice Messages.

Several people asked if I could add some Kronos functionality, so I have. And as I used to own an Oasys, I've added that too 😊. The Nautilus's software architecture is very similar to the Kronos and Oasys, with the main differences being in the physical control surface and the Nautilus having an arpeggiator instead of Karma.

When you first open the software, you need to select the synth Model on the Sysex form. See below. This changes the Midi sysex header to the Instrument chosen. This also stores your choice in the windows registry for the next time you use the software.

'User Mode' allows you to control any instrument, but you need to enter the sysex header as well. If it's a Roland instrument you may need to use the Roland Checksum. See later.

Note. When I use the word Nautilus in this document it also means Kronos or Oasys unless otherwise stated.
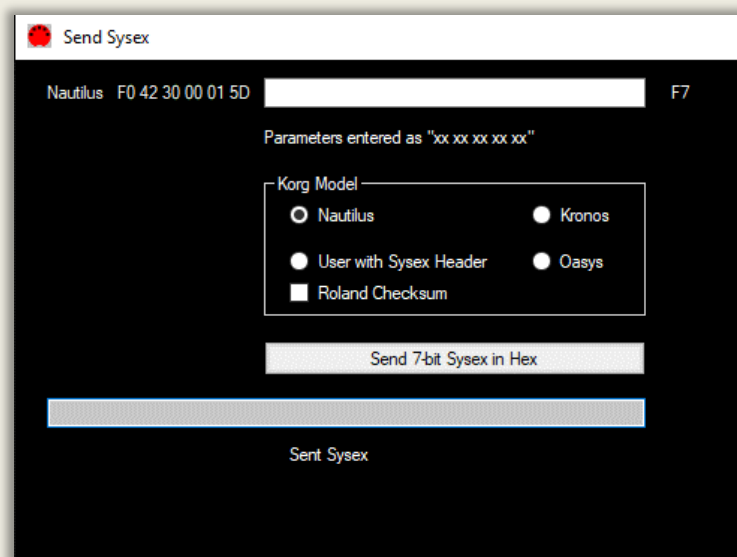
Selecting the Instrument Model . This is required when you are using sysex as each instrument has a different sysex header

CONDITIONS OF USE

License Conditions for Nautilus Tools Software

1. **Please support this software's development. Donations for the software can be made at PayPal** Donate (paypal.com)**. Please Pay what you think it is worth.** 😊 You can also get a link to my Paypal donation page in the Help Menu.

2. The licensee is entitled to install the full software on PC's belonging to them.

2. The licensee shall not give the software to other people, resell it, distribute it, post it on a web site or attempt to decompile it or reverse engineer it.

3. The license is non-transferable.

4. At the moment the licensee will be entitled to free updates for future releases of the software. These updates will be available on my website.

5. The licensee may ask for support from the author to assist them in operating the software.

6. Licensee's may request new features. The author may implement them if they are feasible and the code does not take too long to write.

7. The licensee is solely responsible for the consequences of use of the software and any damage to equipment or loss of data shall remain their responsibility.

If you accept the license terms then you may install the software.

I would appreciate any feedback on layout, features, bugs, documentation, reviews, and tips' on using the software or the Nautilus or ideas on how to make it better.

If you need any help at all please e-mail me.

Thank you once again.

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INSTALLING ON A PC - WINDOWS

NB. To install on a Windows computer, log on with administrator rights and run the installer Nautilus tools.msi. The associated setup.exe file ensures the .net framework is updated if needed and the installation is properly managed.

The MSI contains the software, installer, free synths and pdf manuals. There is a separate executable setup.exe which checks the .net framework on your pc is up to date (4.8 or higher) and the software installation is properly managed. Note. The synths and documentation will be installed in the programme directory. C:\program files\Nautilus Tools for 32 bit operating systems or c:\program files (x86)\Nautilus Tools for 64 bit OS pcs.

NB. Software updates will normally consist of just an updated MSI file and setup.exe. **The previous version must be uninstalled first.**

The PC should be running preferably Windows 10 or 11. 32 or 64 bit. Updated with .net 4.6.1 or higher. Recommended PC spec. Intel Core i3 or higher, 4GB RAM, Screen resolution 1280x720 or higher. Min Spec. Intel Atom processor, 2GB RAM screen resolution 1024x600. The software takes up about 38Mb of disk space. It may run in Windows 7 with a few minor limitations.

It has been written in the latest version of Microsoft Visual Studio 2022 and the installer has been created using the Microsoft Vsix installer project. It is a 32 bit application but will run on 32 and 64 bit systems.

Note. A shortcut will be placed on the windows desktop, add and remove programs list and the start menu.

Other software

For internal midi routing I recommend Loopbe - free version available. For internal audio routing from VST's I recommend Jack a free driver.

A great simple host program for Windows VSTs' is Cantibile 3 by topten software.

Also rptMidi for transferring midi between Mac and Windows computers.

INSTALLING ON A MAC - MACOS – OSX
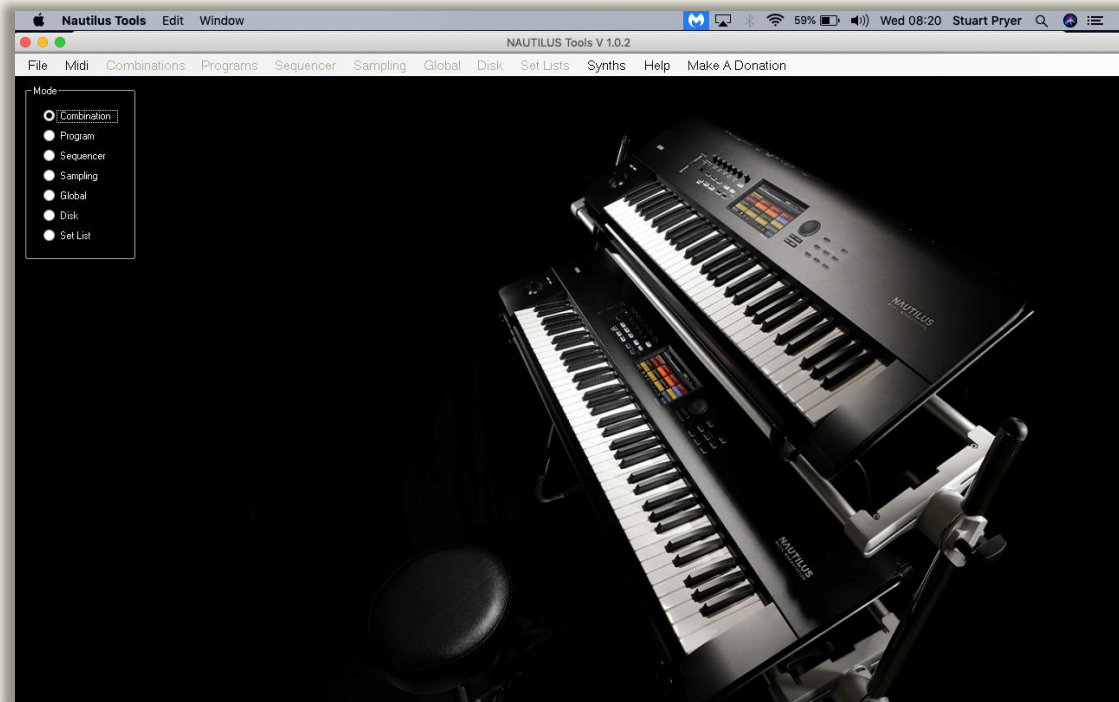
Nautilus Tools will run on a Mac/Macbook running MacOS Mojave or higher, using the excellent software Crossover 22.x or higher. The software is sold by https://codeweavers.com and is based on 'Wine'. A free 14 day trial is available on their website. This software is in the Codeweavers compatibility C4 database.

1. Install Codeweavers Crossover 22.x or higher.
2. Set up a windows 10 - 32 bit bottle.
3. Point Crossover to the Nautilustools.msi installer.
4. When done, click on the new Nautilus Tools shortcut to run the software.

Note. For soft synth users - The IAG driver on a mac provides internal midi routing as standard. Mac spec. OSX Mojave or higher, i3 or higher, 4gb ram or higher, Screen resolution 1280x720 or higher.

USING NAUTILUS TOOLS ON PC VIA A MAC

You can route two-way Midi data via a Mac using the free rtpMIDI program on a PC. rtpMIDI | Tobias Erichsen (tobias-erichsen.de), So if your studio computer is a Mac connected to your instruments you can run this software on a PC and connect to the Mac as an intermediary then to your instruments/midi interfaces.

Below is the Network Midi screen of the Mac (my Studio Computer). Mac Midi setup – Globe. Note the input and output ports are set to Korg –a midi interface connected to the Nautilus. It is connected via my network connection (wirelessly or through a network switch) to rtpMidi running on my PC – computer name DESKTOP-DVIV1NU. The latency is 0 to 3ms. The Mac calls it Session1.
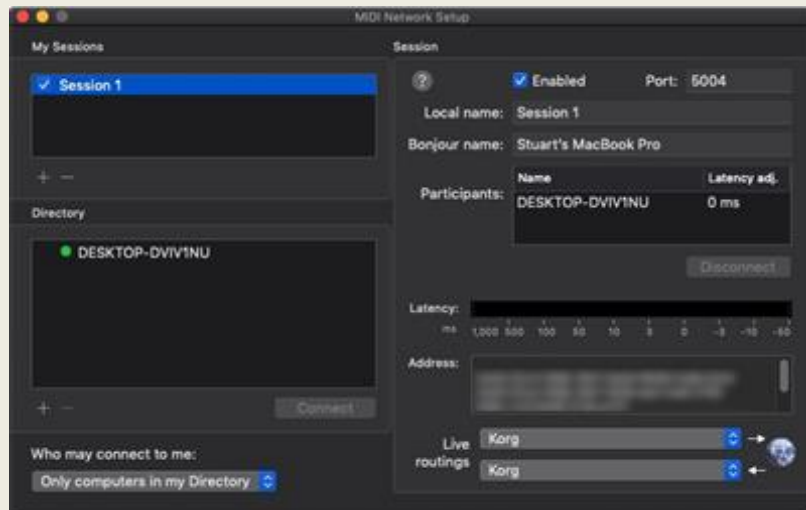
Below is my PC screen. rtpMidi is running and is connected to my Macbook
Enable the session by checking the Enabled box on the PC form
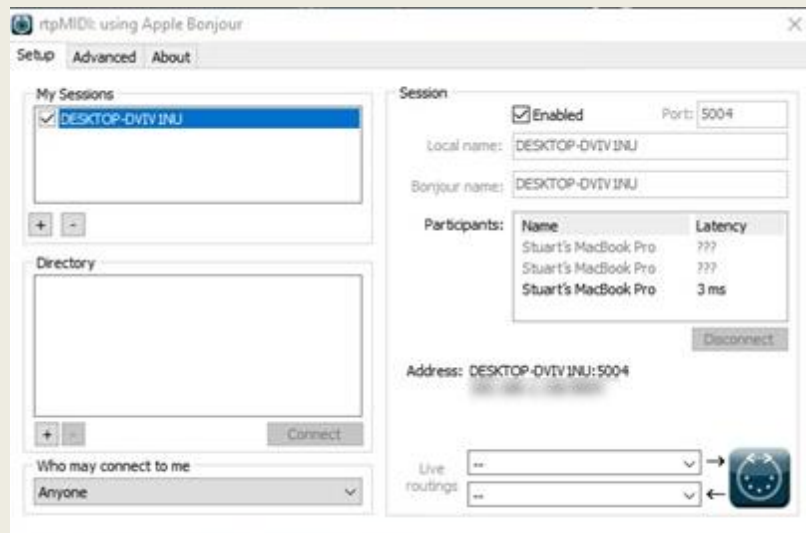
So now a two-way MIDI connection is established between the PC and Mac. On Nautilus Tools set midi input/ output to the name of your pc desktop. In my case Desktop-DVIV1NU

So, Nautilus Tools on the PC is now connected midi in/midi out through the Mac to the Midi interface and the Nautilus. If you want to control the PC and see the windows desktop on the Mac use Microsoft remote desktop on the Mac too. Get it free from the app store.

USING AN IPAD, IPHONE OR ANDROID DEVICE WITH THE SOFTWARE

The software can be controlled by an iPad or iPhone etc. sitting on your Nautilus. This makes it very convenient to use. In fact, any phone, tablet or computer which runs Microsoft Remote Desktop – RD for short – will work. E,g, Android devices. So now you can control the software using the touch screen of the Tablet or phone. To use this setup, download the Free app on your device – Microsoft Remote Desktop (RD) – from the App store or Play store. You can control all features of the software this way without needing to be near your PC. The PC only needs to be connected by Midi to the Nautilus.

1. Open the RD app on the handheld device. Make sure blue tooth is on both PC and the hand-held device. Both need to be on your local wireless network. On RD you need to enter your PC's name, your login and password for the PC. to connect.
2. In the RD app make sure you send Audio to your remote PC and not the iPad. Otherwise, the software will not be able to access your midi ports on your PC to connected to your synth. It will try to find the midi ports on the hand-held device.

Below is a screenshot of my iPad screen. The three RD icons on the right allow you to zoom in and out by 'pinching', access to the RD home screen and onscreen qwerty keyboard. Instead of a mouse you use the hand-held devices touch screen. The whole windows 10 desktop is visible.
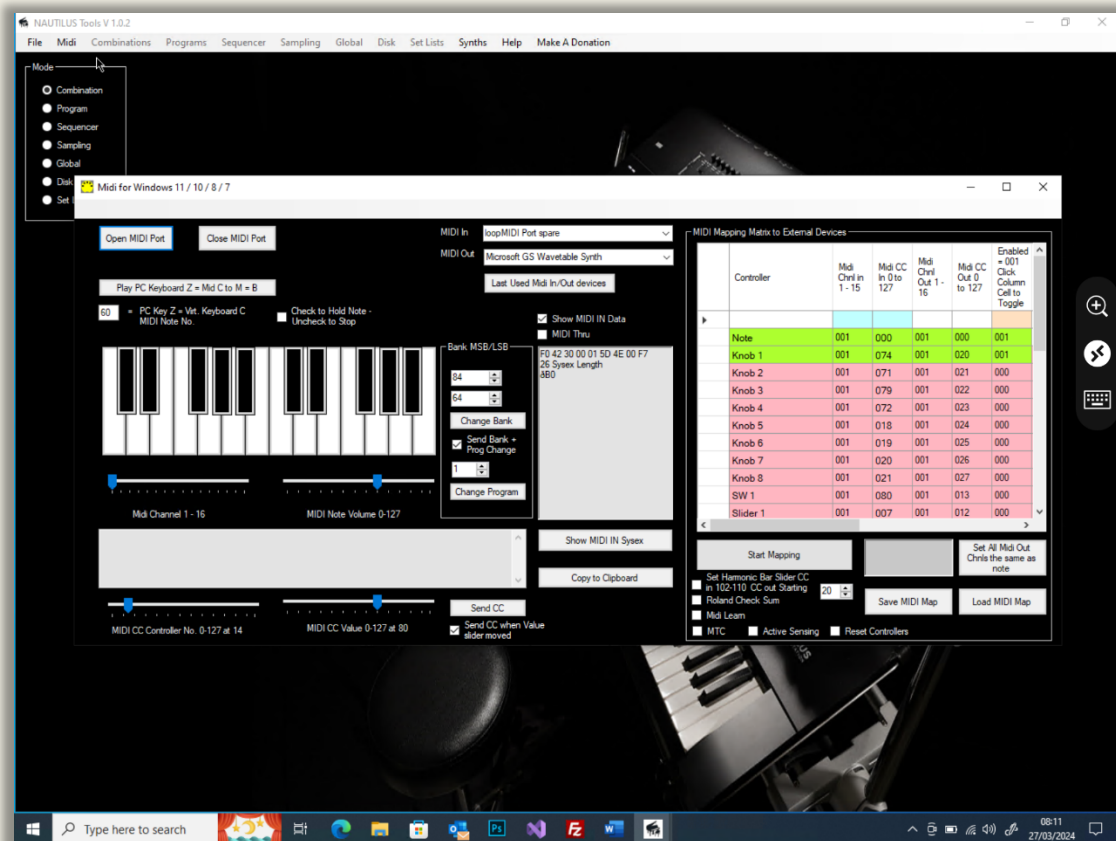
As you can see the image quality is excellent. You have access to all of Nautilus Tools software's controls and forms.

USER MANUAL

Important. This pdf help file Nautilus tools.pdf will be copied to the same folder as the software's exe file during installation. Normally C:\program files\.... - do not change the pdfs name.   NB. The help file won't work if you name it 'something else' or it's placed in another folder. You will be able to access it from the program 'Help' Buttons which will automatically open your browsers pdf reader and then open the file. Tool bar tips also appear for some commands,

STARTING THE SOFTWARE

Your PC should be located adjacent to the keyboard. Ideally with the keyboard of the PC at right angles or above the keyboard. As the software is mainly mouse driven, all you really need near the keyboard is a screen and mouse. Connect the two devices using midi cables or usb between the PC's midi port/usb port and the Nautilus. USB hubs are not recommended unless they are powered.

Choose the Model Synth you are using – Nautilus, Kronos, Oasys or other.

Turn on the Nautilus, turn on the pc and run the program. When you run the program, configure the midi device by using the **'MIDI'** form. Then set the midi channel of the software (I normally use 1 – this is the default value). Then open the midi port.

Please contact me if you have any problems.

WORKFLOW

Two important points!

This software sends and receives Midi Channel Voice messages, Control Change CC messages and System Exclusive (Sysex) messages.
Features :-

- The Midi Mapper converts and incoming Midi,CC/Note etc to CC, Sysex etc on any outgoing Midi Channel
- You can change Mode – Program, Combi etc.
- -
- *Pending – ability to download midi dumps of programs, alter and send back to the Nautilus*
- *Pending – ability to merge % program 1 and % program 2 to make new sounds*
- *Pending – Byte High, Byte Low and average to make new sounds.*
- *Save individual Midi Dumps/Programs into a Master PCG File*
- *More to come!*

Remember. Once you have edited a sound it is still in the temporary memory of the Nautilus. You have to WRITE *it on the Nautilus and save the program to a location in one of the program banks. If you don't it will be lost when you change programs or switch off.*

OTHER RECOMMENDED SOFTWARE

1. Korg Nautilus Editor from Korg – An Editor and Librarian v 1.2.0 For PC and Mac. http://Korg.com
2. PC Tools for Nautilus – A Windows PCG Librarian by Michael Keijzers v 3.2.0 PCG Tools | Kronoshaven.com
3. Nautilus Remote for iPad – Gives you some of the Nautilus Screen functionality on an iPad. By Daniel Luscher – Apple App Store

NAUTILUS TOOLS – MAIN FORM
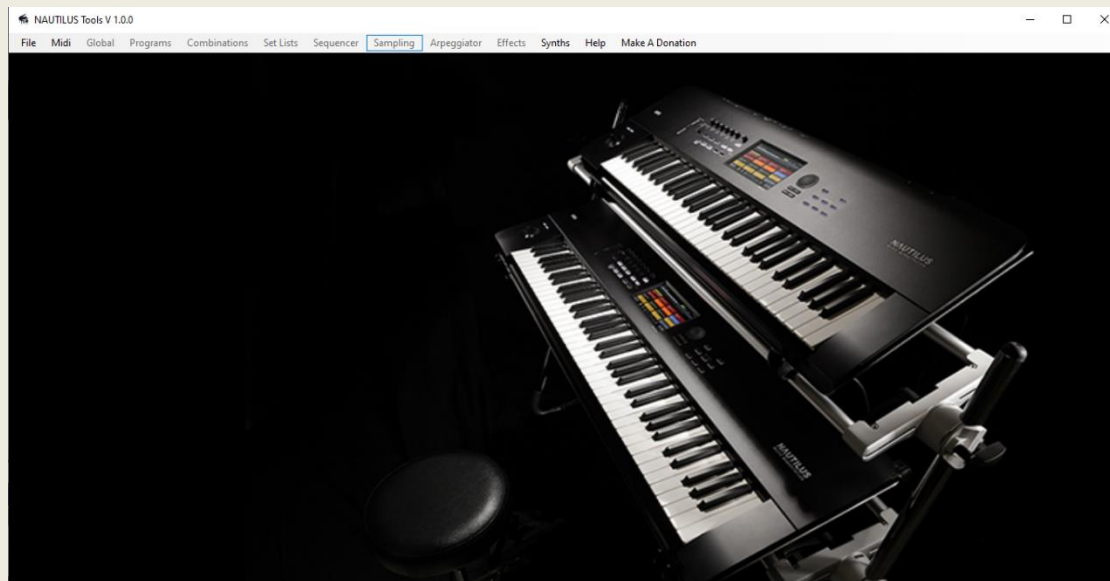
The main screen has a menu system at the top. Each menu item is described in detail later.

1. File /Exit– closes the midi port and application.
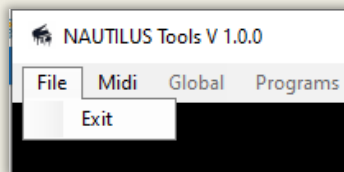
2. The Midi - menu allows the user to set up the midi input/output port for the software. This is used to turn on or off the midi in and out ports or if the user wants to change the midi routing. It also contains the Midi Mapper. There is also a two-octave keyboard. Note to use midi you need to have at least one midi in and one midi out connecting the Nautilus. There is also a sysex viewer - make sure midi thru is off. The second menu option enables sysex to be input and sent. As well as IRQ sysex dump requests from the Nautilus. Finally, the third menu is an 88 note virtual keyboard.
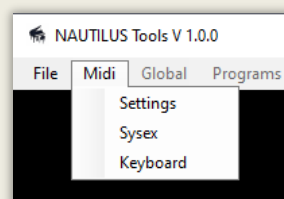
3. Global – allows changes to system wide parameters of the Nautilus

4. Programs

5. Combinations

6. Set List

7. Sequencer

8. Sampling

9. Arpeggiator

10. Effects

11. The 'Synths' menu shows a pdf of my free Roland SH1000 synth emulation. It runs in Reaktor 6.x (Full or free Player version) as a standalone or VST/AU plugin in a DAW, Windows and Mac. The sh1000v24.ens ensemble can be found in Nautilus Tools installation directory. There is also The Blue synth 3 VST dll plugin and the stand-alone version in the installation directory plus my Midi Recorder and arpeggiator.

12. The Help button accesses my website and the Nautilus tools.pdf help file. This is installed automatically with the software in the installation directory. Updates can be downloaded from my website and the pdf file can be overwritten. Please keep the name the same. 'Nautilus.pdf'. All sliders have tooltips. Just hover the cursor over the control and the tool tip appears and shows the value. Hold Ctrl and arrow buttons for fine control. There is a link to Paypal if you can make a donation for the software.

13. There is also quick access to the Nautilus Quick Start guide, Operations Guide, Parameter Guide and voice name list. All Copyright of Korg Inc.
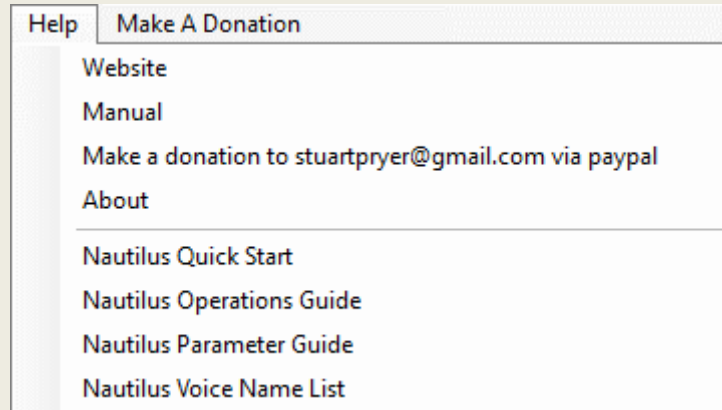
EXITING THE SOFTWARE

To Exit the program, click on the 'File/ Exit' drop down menu at the top left when the composer form is loaded. The software will close the midi port and terminate the program. Use this rather than closing down the window with the Window's 'X' top right-hand corner of the main window. This is so all notes are stopped and the midi port is closed properly.

TOOLTIPS

Tooltips are provided for all slider controls

A typical Slider Tooltip showing precise values. Hold Ctrl and use the arrow keys for precise movement.

SETTING UP MIDI IN/OUT IN THE SOFTWARE
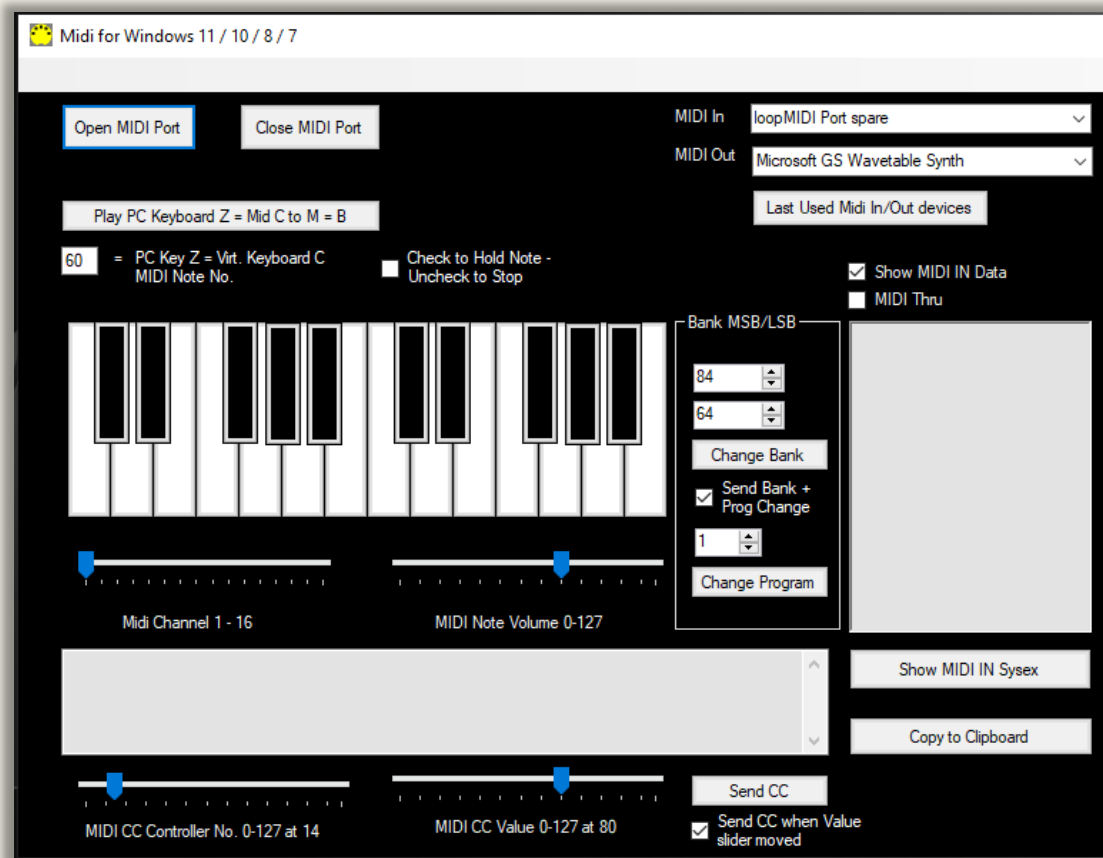
Important. The first time you use the software set the Model synth you are using on the Sysex form. Nautilus, Kronos, Oasys etc. This will be saved in the Windows registry.

This software generates Channel Voice data, Control Change (CC) data and system exclusive (sysex) data for sending to the Nautilus and can also receive this data from the Nautilus.

Connect the Nautilus Keyboard or controller to the PC (midi ports or usb). Make sure the Korg usb driver is installed (Vendor) if you want to use Midi over USB.

The generic OS driver is MIDI class compliant and uses the operating systems in-built midi driver but may be less reliable if multiple Korg devices are used as it works in Midi exclusive mode.
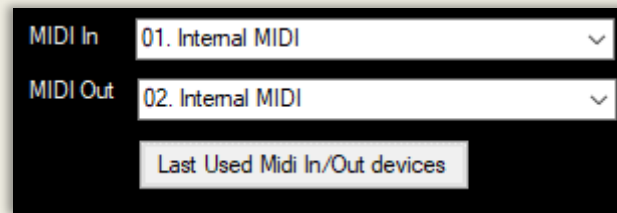
On the Settings/Midi Settings form select the MIDI In and Out devices. To start with set Midi out to Nautilus. See Mapping Midi Messages section for various Midi routings. Set midi out and midi in on the PC. Click 'Open MIDI Port' button. The button will turn Green. When you close the MIDI Port the Open Midi Port will turn pink and the software saves your selection of Midi In/Out devices to the Windows Registry, so next time you can just click 'Last Used Midi In/Out devices' and Open the Midi Port and you don't have to reselect. If your device list changes you will just need to manually select the devices again.

Midi/Settings on menu bar. An example of the midi devices in/out is shown above. Your list will look different. For downloading and sending settings from/to the Nautilus set both Midi In / Out to Nautilus.

1. Set midi channel to correct channel – default on this software is 1.
2. To check all is working, use the mouse to play the virtual keyboard - OR
3. You can play the Midi software or device from the PC keyboard. Press 'Play PC Keyboard Z= Mid C…' button **immediately** before playing the pc keyboard.
4. The Nautilus should sound its current program.

You can hold a note set by the text box with 60 in it by checking the Hold Note checkbox. The Note number box will turn green. The note is releases when it's unchecked. You can change the Midi Note number from 60. 0 to 127.

The 'Midi Through' checkbox allows data to pass from the midi in port to the midi out port of this app. If unchecked it won't pass through - default. Note if midi thru is enabled in this software and your device you will get a midi loop and crash the app. Midi thru is used if you are generating midi from another app/device and monitoring it here before forwarding it with this app to yet another app/device.

SENDING NOTE DATA

To send note data from this software, set up your Midi In / Out ports and open the Midi Port. It will turn green. Make sure you set the Midi Channel slider to the channel you are using.

When you use the Nautilus with another Instrument or VST you will probably want to Map the controller Midi CC's to the external instruments controls CCs. It's often easier to just do this once and save the settings for each setup. This software contains a versatile Midi Mapper. You can save a Midi configuration on your PC rather than set it up each time.
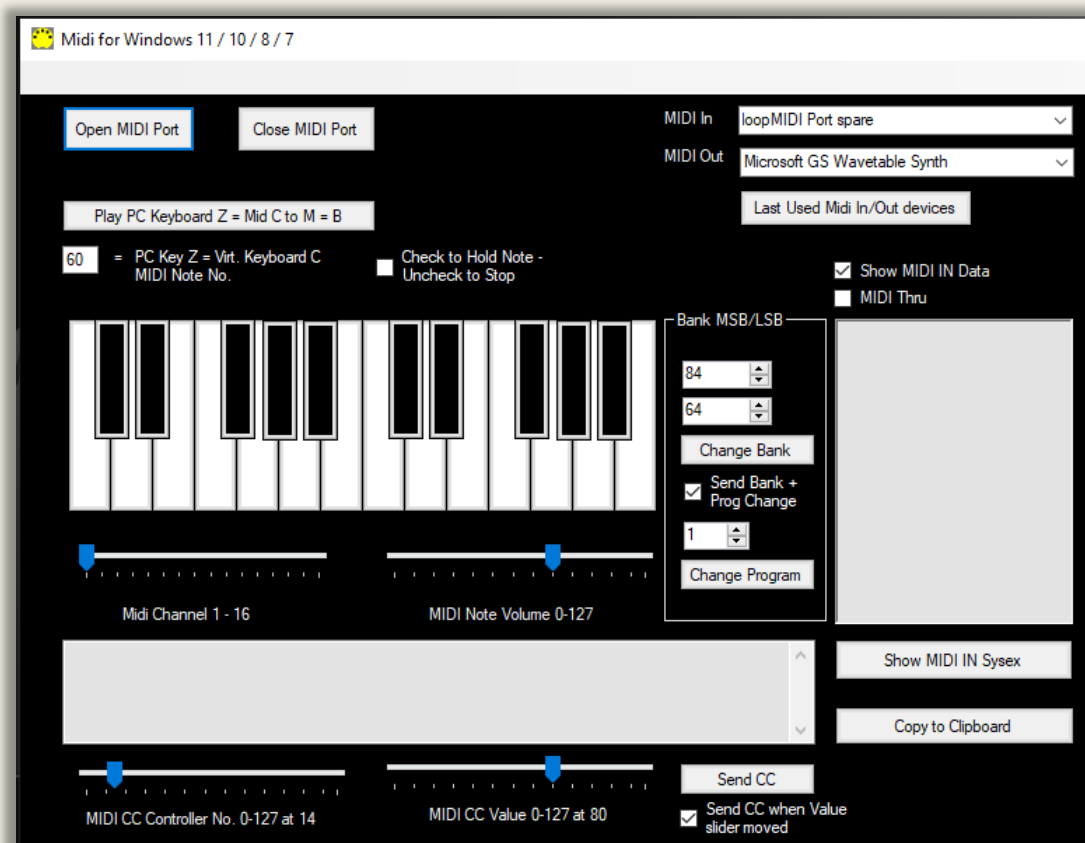
The Midi Settings Form.

The MIDI form has a nifty virtual keyboard for remotely playing the Midi software or device whilst you edit the sounds on the PC. The keyboard has a range of 2 octaves.

If you want to play the Midi software or device using the PC keyboard – press the 'Play PC Keyboard Z=....' Button on the midi settings form just

before playing. You must press the 'PC keyboard' button every time - immediately before you use the PC keyboard to play the Midi software or device. PC Key z = Note C. s = note C#. x = note D. etc. The notes run from z s x d c v g b h n j m. Which map to C, C#, D, D# etc. The 'PC Keyboard' is polyphonic, so you can play chords. By the way the polyphony depends on your PC. My very old Pentium 2 - 400mhz could play 4 notes at once. My ancient laptop only two notes at once. Depends on their keyboard buffer.

The pitch of note Z can be set using PC Key Z or Virtual Keyboard C = Midi Note text box at the top left of the form. This facility to play from the PC keyboard has been added to enable the user to audition sounds whilst editing.

SENDING MIDI CONTROL CHANGE MESSAGES CC
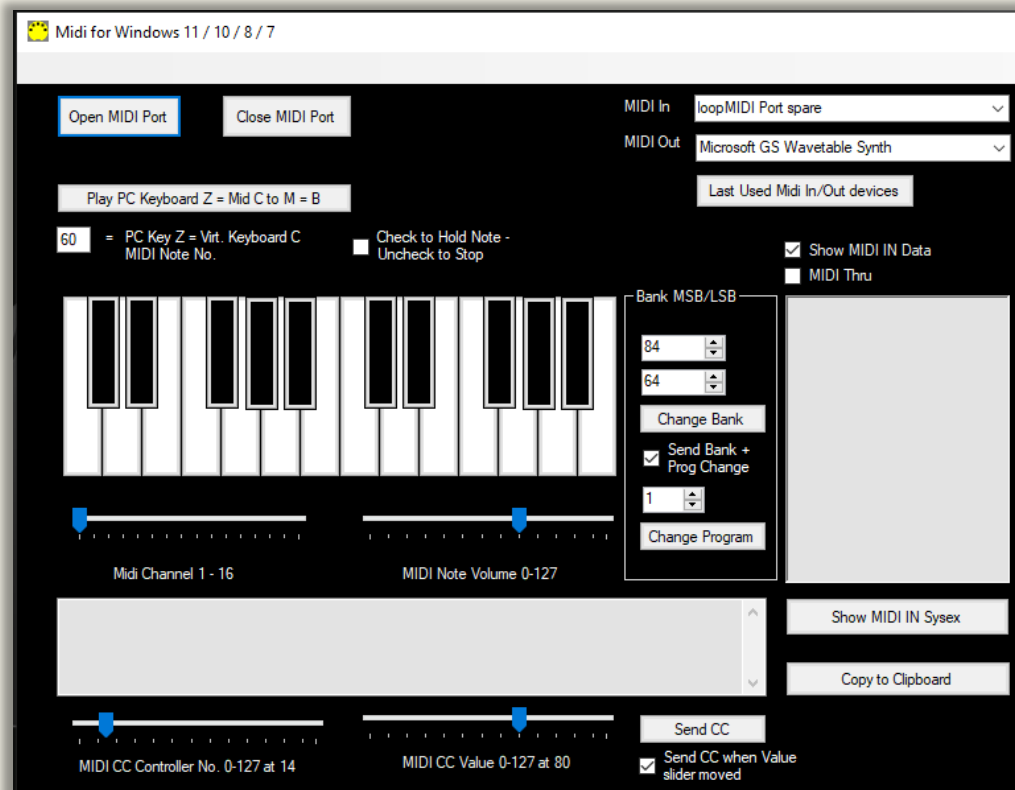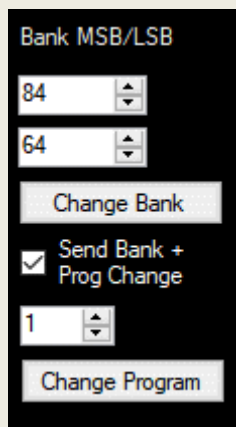
If you want to send Midi CC Control Change to the Nautilus then select the controller number 0 to 127 using the left-hand slider and the controllers value right hand slider at the bottom of the form.

Data is sent immediately if the 'Send CC when Value Slider is moved' check box is checked and the right-hand slider is moved. If unchecked press the Send CC button. See Nautilus midi implementation manual for CC the messages the Nautilus responds to.

Note. Some CC controller numbers require two Midi CCs to be sent in quick succession – eg Bank Change – this has its own section on the form. These require a separate MSB/LSB as the number of values available is over 127.

SENDING PROGRAM / BANK CHANGE

You can change the MIDI Bank and Program on midi instrument using MIDI.   Note. The Nautilus uses a MSB and LSB bank address. There are 128x128 banks available in the midi spec. and 128 programs.

Set the programme number 1 to 128 and press button "Change Program". The Bank MSB and LSB default are set for the Nautilus for Banks starting at 01. It easier to use the Program Library form to select Programs. See earlier.

There are 128 x 128 = 16384 banks available in midi, with each one containing 128 programs. To try it on another midi instrument. Set Program to say 02 and click 'Change Bank'. Normally instruments need the program change message sent immediately after for this to work, so leave the check box ticked. See later how to change Tones, Rhythms and Program banks on the synth.

Note that if you set the MIDI channel to "10", Bank 1, you will get the General Midi percussion instruments with each key sounding a different percussion instrument. There is no change if you vary the MIDI instrument number. If Bank 1 is set to 01 then you will get the General Midi instruments in the synth.

RECEIVING NOTE DATA MIDI MESSAGES

Note data is a MIDI a Channel Voice Message and is sent whenever a midi instrument is being played.

```
Chnl: 1 note: 71 Volume: 0
Chnl: 1 note: 71 Volume: 80
Chnl: 1 note: 69 Volume: 0
Chnl: 1 note: 69 Volume: 80
Chnl: 1 note: 67 Volume: 0
Chnl: 1 note: 67 Volume: 80
Chnl: 1 note: 65 Volume: 0
Chnl: 1 note: 65 Volume: 80
Chnl: 1 note: 64 Volume: 0
Chnl: 1 note: 64 Volume: 80
Chnl: 1 note: 62 Volume: 0
Chnl: 1 note: 62 Volume: 80
Chnl: 1 note: 60 Volume: 0
Chnl: 1 note: 60 Volume: 80
MIDI IN Open
MIDI OUT Open
```
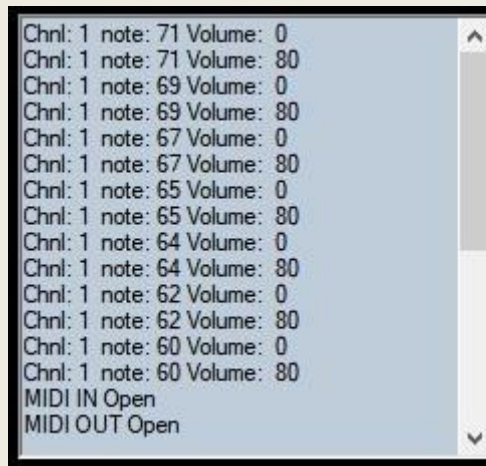
In the example above I opened the midi port and sent a series of 7 notes to the app and they appeared like this. The list shows the Midi Channel (1 to 16), note number which will lie between 0 to 127. In this case 60 to 71 each with a volume of 80. (Volume range 0 to 127). With every note in this example there is a following note off message. Volume 0. The last note is at the top of the list with the oldest at the bottom.

RECEIVING CONTROL CHANGE CC MIDI MESSAGES

Data shown on the Main text box can be filtered by the check box 'Show Midi Data' as to whether to show Notes and CC messages as they arrive. Newest data at the top of the list. Notes, Sysex and CC data is only passed through from the Midi input to the output port of the app if midi thru is checked.

CC data takes the form for example - Bank change
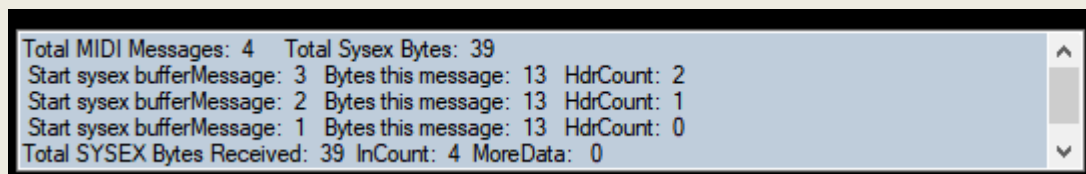
Bn (data1) (data 2),
B in Hex is 176 in decimal (if n=0) to specify CC type message. n is the Midi Channel.

The Control Change CC data has the most common values described by text. See below where I have sent a series of CC messages to the app. Chnl is the MIDI channel the CC message is being sent to. Undefined CC messages just show CC. Defined ones such as 'Mod Wheel' = CC 1, Value 0.

```
Chnl: 1 Channel (Main) Volume  7 Value: 0
Chnl: 1 CC: 6 Value: 0
Chnl: 1 Portamento Time  5 Value: 0
Chnl: 1 CC: 4 Value: 0
Chnl: 1 Foot Controller  3 Value: 0
Chnl: 1 Breath Controller  2 Value: 0
Chnl: 1 Mod Wheel  1 Value: 0
Chnl: 1 CC: 0 Value: 0
```

RECEIVING SYSEX MIDI MESSAGES

To receive a midi data dump from an instrument, set the instruments midi out to the midi in of the app. Instruct the instrument or software (This is done on the Load buttons in Vpiano for instance) to start the dump. Incoming data will be displayed as it comes in together with Sysex data. When the midi sysex dump is complete (F7 at end of sysex data), the bottom text box will report 'Start Sysex Buffer Message'. Together with its sysex message number in list starting at 1 and its size in bytes. HdrCount is message number – 1. See below.

You can then display Sysex data received in the main textbox by clicking the 'Show MIDI IN Sysex button. Note the bottom text box shows the total number of midi messages received by the software. In the image above 4 messages were received in total, of which 3 were Sysex. The latest Sysex message is at the top of the list and can be displayed.

Tip. Sysex is only shown if the Show MIDI IN Sysex button is pressed to display it after a dump is complete. See below.
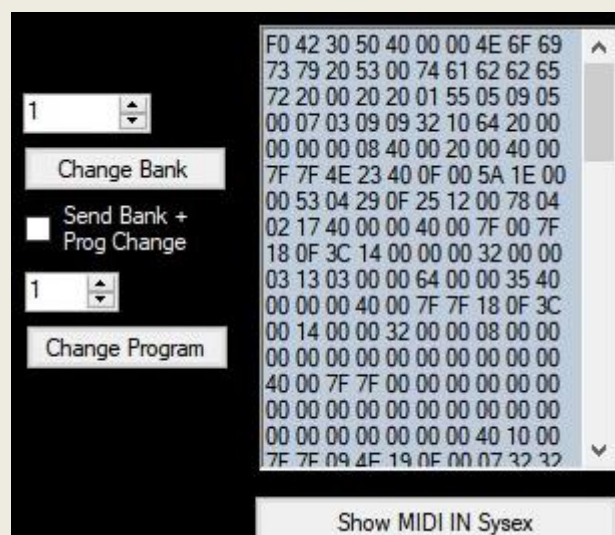
The entire main text box can be 'copied to the windows clipboard'. 'Copy to clipboard' button. This includes the complete dump sysex data.

The 'Midi Through' checkbox allows data to pass from the midi in port to the midi out port of this app. If unchecked it won't pass through. Note if midi thru is enabled in the software and your device you will get a midi loop and crash the app. Midi thru is if you are generating midi from another app and monitoring it before forwarding it with this app to another device.

GUS'S 88 NOTE KEYBOARD
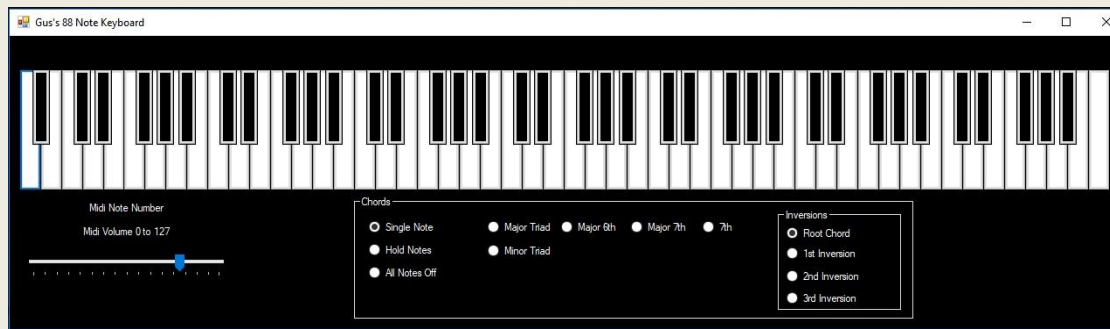
The 88 Note Keyboard is dedicated to Gus at Roland Clan Forums for his fantastic efforts and hard work in testing the RD2000 program.

The keyboard is useful when designing sounds as you can hear the entire range of the standard instrument keyboard. First set Midi ports and input/output on the Midi form.

The Midi volume is controlled by the slider on the form. The midi channel is set on the Midi settings form.

You can play single notes, hold notes (for creating chords with the mouse) until 'all notes off' selected. Various chord types are included too, together with their inversions.

SETTING THE MODE

Note. This groupbox appears on the top left of the main form. The title of the group box will indicate the model chosen. Kronos, Nautilus, Triton Classic/Rack = User Mode* or Oasys. The Model is set on the sysex form and can be saved to the windows registry as this determines the sysex header. When you load the program for the first time the Nautilus is chosen. The next and subsequent times you run the program the model is automatically set if you change it. So set the model first. See next page.

There are 7 principal modes which the Synth can be in. Make sure Midi out of the software is connected to Midi in of the synth. Open the Midi Port. At the top left of the main form you can change mode by clicking on the Radio Buttons. See Below.

Note. The Oasys and Triton Classic does not have a Set List Mode so won't respond to 'Set List'
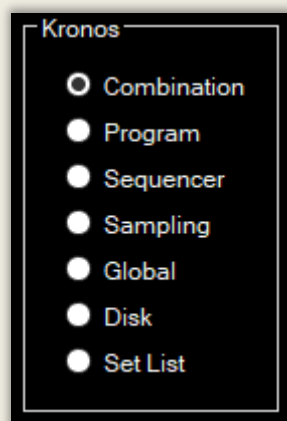
Note. When using sysex to change parameters on the synth you need to be in the correct mode if the synth is to respond to the Sysex, so to edit a program it needs to be in 'Program' mode etc.

I added the Korg Triton Classic as I used this synth to partly develop the software.

KORG'S DATA FORMAT

Behind the scenes stuff!

If the data which is being sent or received by the synth is larger than 7 bits (> F7 or > 127 decimal) it needs converting. This only applies when you are sending bigger chunks of data, not individual settings for a control which is normally < 8 bits.

Korg Synths' such as the Triton, Oasys, Kronos and Nautilus store internal data as 7 bits, which is historical and based upon 7-bit midi data transmission. If you say dump a whole Program or Combination from the synth by sysex it will need converting to 8 bits when editing individual values on the computer. Then converting back to 7 bits when sent back to the synth. However, I have added conversion routines which can do this automatically. This would apply when dumping a program or combination and writing back to the synth for instance. PCG files store data as 8-Bit binary but need converting to 7-Bit when sent to the Synth.

Other Manufacturers such as Roland store data as 8-Bit internally but they have the added complication of a Checksum. But I have written automated routines for that too.

This does not apply to the Midi Mapper as data < 7-Bit in size.

SENDING SYSEX
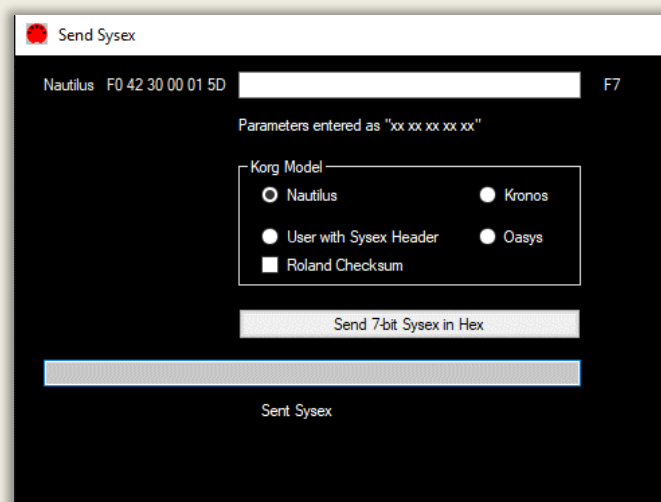
Firstly, choose the Model synth you are using. This will be saved in the Registry and the name will appear on the Mode form on the Main form. This form is handy for checking 7-bit sysex strings to make sure they work. These strings might be used to change a single parameter eg. Cutoff frequency. Firstly, choose the Model synth you are using. Default is Nautilus. This saves the choice to the Windows registry. Here you can send a 7-bit Sysex string of your choice. The sysex will be sent to the output port and the sysex string will be displayed in the 'Sysex Sent' text box and on the main midi form. The software will add the Nautilus header "F0 42 3g 00 01 5D" or Kronos sysex header "F0 42 3g 68" and the end of sysex string "F7". So, you just enter what goes in between.

Note. g is the global midi channel and is set by the midi chnl slider on the Midi Settings form. Normally g=0 but you can change this if you have say two synths of the same model, so you can distinguish between them and decide which one gets the sysex data. Some manufacturers also use instrument ID in the sysex header which also distinguishes between the same model synth.

Users can enter any sysex string, which complies with the Nautilus/Kronos sysex implementation manual using the 'Send 7-bit Sysex in Hex' button. Note values must be in hex as per the manual an in pairs. 0 to 9 and A to F. eg. A9, 00, 7C. Note that a 0 must be entered as 00. 0A is entered as "0A" not "A". Enter values and click "Enter Sysex in Hex'. No space before the start of the string and no trailing space after

the last pair of values. Here is an example "43 2A 22 63 1B 3C 1D" this would go in the white text box. The full sysex string sent is displayed in the bottom text box.

If you want to send sysex to another instrument, choose "User with Sysex Header". You will need to put in the full sysex string wth its header starting at F0. Eg.   "F0 xx xx xx xx xx xx xx" The final "F7" is added automatically. Use the Roland Checksum for Roland keyboards if required.

Sending System Exclusive Message Form

Example. The first part of the string is entered automatically, for sending data to the Korg Nautilus its always : -

"F0 42 3g 00 01 5D" – The sysex header for the Nautilus

F0 = start of sysex string
42 = Korg ID
3g 00 01 = Global Midi Chnl / Device ID
5D = instrument ID => Nautilus 61/73/88

Next comes the Message type for transmission of data to the Nautilus
        for example "43" is a parameter change

Enter HEX values from the Nautilus Midi Implementation Manual of the data you want to send - in pairs in the white text box. "xx xx xx xx xx"

The software adds a final "F7".

Final String =>   "F0 42 3g 00 01 5D xx xx xx xx xx data F7"

"Xx xx xx xx xx xx" data etc is the parameters/data you are
        entering/sending with no trailing space or quotation marks.

To capture a Midi Dump on the sysex form:

1. After entering the specific sysex parameters to request a particular dump, Press 'Send 7-bit sysex in hex'.
2. The incoming sysex will be stored and can be displayed in the text box on the Midi settings form.

3. Press 'Show Midi In sysex' then 'Copy to clipboard' button on the Midi settings form, which will copy the entire contents of the text box to the windows clipboard for pasting into the sysex form text box. 'Paste Text from Clipboard' button.

EDITING SYSEX

This section is under development so use at your own risk. Here you can send whole programs for instance. It's not really a section to use at the moment. There are various data formats used by the synth and PCG files. This section acts as a converter for future developments of the application. Such as a synth parameter editor, Librarian etc. The big text box shows the data being held in the applications memory. Generally, in Hex pairs in the form "0A" etc. See below.
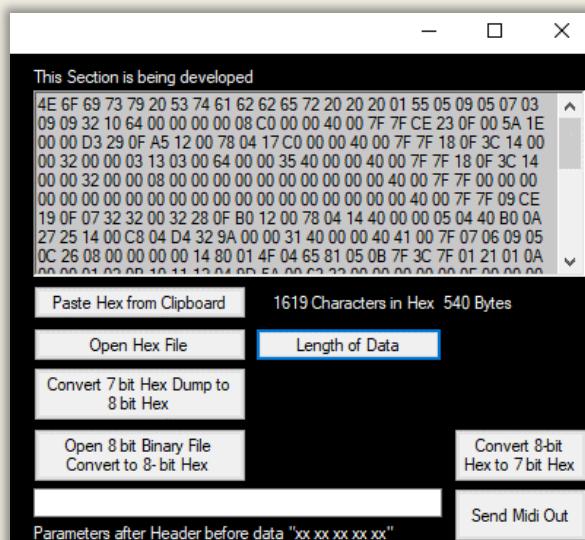
- If you download a midi dump to the Midi Settings form you can copy and paste it – 'Paste Hex from Clipboard'. It will be in Korgs 7-bit format. The internal format used by the Synth.
- Open Hex File – you can open 7 or 8-bit hex files. If its 7 bit it will need converting to 8-bit Hex if you want to edit any parameters and then save or send them back to the synth.
- The button Convert from 7-bit hex dump to 8-bit hex does the conversion.
- If you open a PCG file it will be in 8-bit format already, but in binary. So, these needs converting to Hex. That's the next button 'Open 8-bit PCG program binary'.
- When edits are done, they must be converted back to 7-bit format by pressing the button 'Convert 8-bit Hex to 7-Bit Hex. You can then send back to the synth. But you need to add the parameters for the midi string which are entered in the text box, 'Parameters after header' are entered in the form "xx xx xx xx xx" with no trailing space. Then press 'Send Midi Out' to the synth. The end of string "F7" is added automatically.

USING THE NAUTILUS AS A CONTROLLER

There are different ways to set up the Nautilus or any instrument to act as a controller for another instrument or VST.

1. You can reassign the Nautilus controllers so they match the other instruments/VST controls.
2. You can reassign or use Midi Learn on the other Instrument/VST you are controlling to accept the Midi messages from the Nautilus
3. Or you can use a Mapper so that the Nautilus and the other instrument stay at their default settings. This is the approach used in the Midi Mapper.

USING WITH VIRTUAL INSTRUMENTS

If you want to play the Nautilus with a virtual instrument you will need to route its midi and audio signal to the computer. Set the midi in channel of the virtual instrument or DAW to the Nautilus Midi out channel.

TIP. For internal PC midi routing, if you ever need to do this :-

1. On a PC Download the Freeware application for internal PC midi routing. I recommend the free LoopMIDI [Software | Tobias Erichsen (tobias-erichsen.de)](tobias-erichsen.de)
2. Set the Midi **output** of the app too the Midi input of your virtual instrument.
3. You can now transfer midi from one pc application to another application on the same PC!
4. On a Mac you just use the inbuilt IAG driver.

RECORDING USING SOFTWARE SUCH AS LOGIC, ABLETON, BITWIG, BANDLAB SONAR, CUBASE ETC.

You can record from the Nautilus directly into a midi/audio PC sequencer/editor like Bitwig, Logic, Cubase or BandLab Sonar. The user can send Nautilus midi out and audio out to midi and audio in on the DAW. This will enable you to edit the recording as desired in the DAW. Then send midi and/or audio to the synth. See Tutorial 7.

The advantages of doing this might be if you want to add VST instruments, external effects or use the DAWs editing features. However, if you want to use a DAW-less setup you can just use the Nautilus's features.

MAPPING MIDI MESSAGES

Midi Controller   To DAW

➡️   ....NAUTILUS TOOLS...   ➡️
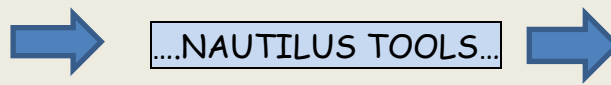
Midi Synth   To Synth etc.

This software allows you to map any incoming Midi from any instrument/controller to a different Midi CC value / mid channel / sysex message. You can map a note to a CC or a CC to sysex! You might want to keep your midi assignments kept at default and just remap using this software to any VST or external instrument. The Nautilus drawbars for the CX 3 engine can be controlled by sysex messages. You can map midi CC messages to sysex with this mapper. If you have a midi controller which does not send sysex, which are most, but sends CCs, such as the Korg NanoKontrol, you can use the mapping matrix to translate it to sysex!

Hardware controllers are listed in the left column of the Mapping Matrix above. You can tailor these to your instruments if you edit the names and Midi CC in values for their controllers. You can sort alphabetically/numerically by clicking on the column headers. You can drag the column width as required. Those rows selected as active are coloured Green.

Inactive rows in the matrix are pink. If the right-hand column is 001 the row is enabled. If its 000 if the row is not enabled. By clicking on a rows right hand column, you can toggle whether the controller/row is active or not in the matrix.

Tip. *See assignable controller list in Nautilus Parmeter manual.*

MIDI SIGNAL FLOW (1)

Nautilus/Kronos/Oasys control surface controlling another instrument or VST.

Nautilus/Kronos
Midi Out to Nautilus Tools Midi in

↓

Nautilus Tools (via Mapping Matrix)
Midi out

↓

To a VST or another instrument's (midi in)
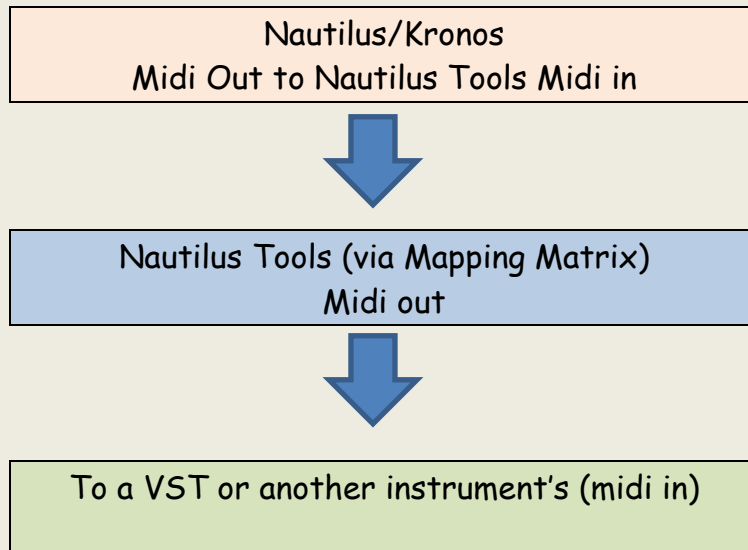
MIDI SIGNAL FLOW (2)

Controller controlling Nautilus/Kronos.

Controller
Midi Out to Nautilus Tools Midi in

↓

Nautilus Tools (via Mapping Matrix)
Midi out

↓

To Nautilus/Kronos (midi in)
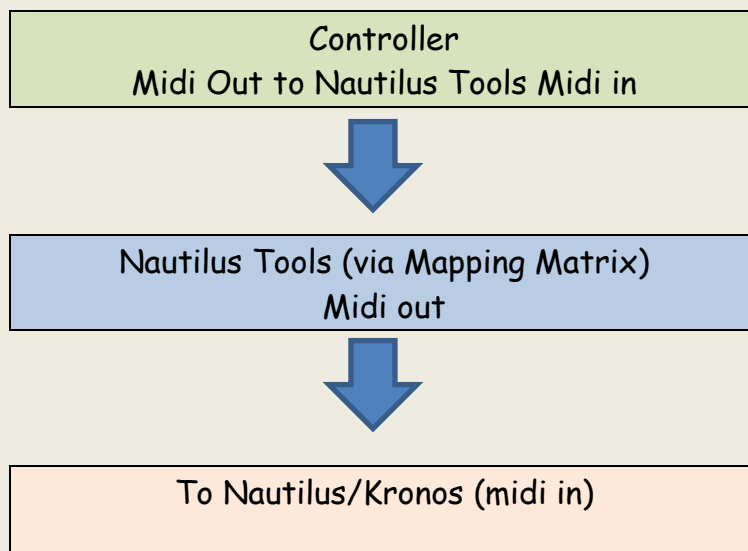
MIDI SIGNAL FLOW (3)

Synth control surface controlling another user defined parameter on itself by CC or Sysex.

Nautilus (or another keyboard)
Midi Out to Nautilus Tools Midi in

Nautilus Tools (via Mapping Matrix)
Midi out
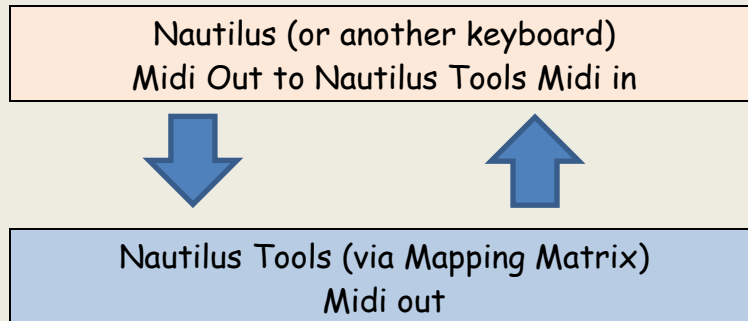
Example. Here is how to make knob 1 CC 014 on Midi channel 1/zone 5 ext converted to Midi channel 002 CC 15 to send to another instrument. Note any values you enter MUST be in the form xxx. 3 digits. When you edit a value click on the row below to finalise it, notice the right-hand column icon changes when edited. To activate the row just click the rows right hand column. Row is now Green and value 001.

RD Controller	Midi Chnl in 1 - 15	Midi CC In 0 to 127	Midi Chnl Out 1 - 15	Midi CC Out 0 to 127	Enabled = 001
Note	001	---	001	---	001
Knob 1	001	014	002	014	001
Knob 2	001	015	001	015	000

Edit mode for Knob 1 icon on left row is a pen.

RD Controller	Midi Chnl in 1 - 15	Midi CC In 0 to 127	Midi Chnl Out 1 - 15	Midi CC Out 0 to 127	Enabled = 001
Note	001	---	001	---	001
Knob 1	001	014	002	015	001
Knob 2	001	015	001	015	000
Knob 3	001	016	001	016	000

Edit for Knob 1 finalised by clicking on another row. The Icon has now changed to a triangle. To deactivate the row, click on its right-hand column which will change from 001 to 000 and the row will become pink.

REMAPPING A CC MESSAGE

1. Make sure 'Midi Thru' is not checked on this software. Set midi in from the Nautilus and midi out to your external synth/vst.
2. Operate a Nautilus controller. You can see the incoming CCs' in the text box to the left of the Matrix. Also See Midi Learn next page.
3. Set the knob 1 row of the matrix to incoming channel 001, Note. The Note Row of the matrix transmits the Note on/off/volume messages. So always use row 1 if you want notes transmitted and set it to the Midi output channel of the controller.
4. Set the CC output channel on the matrix for Knob 1 to Midi channel 002 and CC 015.
5. **To activate the matrix,** click on the 'Start Mapping' button. See below. You will then get the message box below which asks you to click a key on the virtual Piano keyboard to the left, which initialises the matrix. The 'Start Mapping' button will turn green.

RD2000 ⚠ Click OK and then Click a Key on the Virtual Piano Keyboard on the Left and then Start using Mapping. You can then use the RD2000 or a controller connected to Midi In and Map its controls. OK
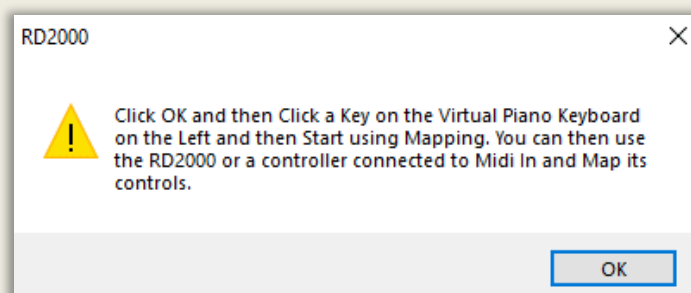
Now when you move knob 001 on the Nautilus the software now sends it to Midi out on the new midi channel 002 and CC 15 with its values. So, you can control external synths and VSTs with ease. For instance, you could use all 9 sliders with different Midi CC remapped to another midi channel. You can stop the mapping function by clicking the Green Button.

Stop Mapping
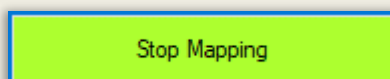
MIDI LEARN

Instead of entering the Incoming Midi Channel number and Midi CC/ Note Number arriving from your controller, you can just use Midi Learn.

1. Connect the Nautilus/Instrument/ Controller to the software and open the Midi Ports
2. Check the 'Midi Learn' Checkbox - see above. You will get a Message box.
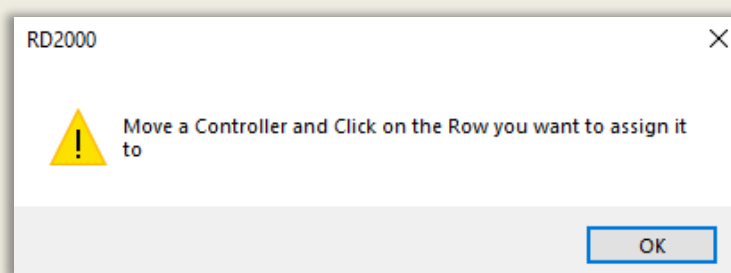
3. So just move a controller – Knob, slider, note etc and click on the appropriate row in the Matrix you want to assign it to. The new values will be set in the Matrix for the incoming Midi Channel and CC/note number.
4. Repeat point 3 for each controller you need
5. When finished uncheck the Midi Learn Checkbox

Note. For Pitch Bend, Channel or Polyphonic Aftertouch only the incoming Midi Channel is updated as this is all that is required.

Tip. To quickly set up Midi In/Out channels to the same as row 1 - Note – Click on the button ' Set All Midi IN/OUT Chnls the same as Note'.

SAVING AND LOADING MIDI MAPS

You can Save and Load Midi maps as a plain text comma separated files. This means you can have a map for each of your setups. You can use any number of the rows. Note. If you click on the table header you can sort numerically / alphabetically. For instance, you can list so the remapped channels 001 on the right-hand column are at the top. Below is a view of the lower half of the Midi Mapper when you scroll down. If you want to rename the Controllers you can save the new names when you save the map and then reload them.

MIDI Mapping Matrix

Controller	Midi Chnl in 1 - 15	Midi CC In 0 to 127	Midi Chnl Out 1 - 16	Midi CC Out 0 to 127	Enabled = 001 Click Column Cell to Toggle
Note	001	000	001	000	001
Knob 1	001	074	001	020	001
Knob 2	001	071	001	021	000
Knob 3	001	079	001	022	000
Knob 4	001	072	001	023	000
Knob 5	001	018	001	024	000
Knob 6	001	019	001	025	000
Knob 7	001	020	001	026	000
Knob 8	001	021	001	027	000
SW 1	001	080	001	013	000
Slider 1	001	007	001	012	000

Start Mapping   Set All Midi IN/OUT Chnls the same as note

☐ Set Harmonic Bar Slider CC in 102-110 CC out Starting
☐ Roland Check Sum   20
☐ Midi Learn   Save MIDI Map   Load MIDI Map
☐ MTC   ☐ Active Sensing   ☐ Reset Controllers

Setting Midi Out Channel for All controls to the same channel

You will normally use the same midi out channel for all controllers. If you are controlling a VST or midi instrument you can use all of the Nautilus controllers if you want to. If you set the Note Midi out channel to the one you want. You can quickly set all the other controller Midi Out channels to the same value by clicking the button 'Set all Midi Channels out same as Note'. Remember the controllers you want to use need to be enabled by clicking in the right-hand column to turn the row green.

For information. CC Control Change messages start a Status byte of B followed by the Midi Channel (0 to 15). Hex(B0) to Hex(BF) in the Midi 1 Specification. -> 176 to 191 in decimal. Where B defines it's a CC message and the second byte 0 to F is the Midi Channel - which is normally transposed to Channel 1 to 16 for the user.

MAPPING MIDI CC TO CHANNEL AFTERTOUCH

Some models, such as the Nautilus (non-AT) don't produce channel aftertouch. This is not a problem though. You can produce Channel Aftertouch data if you assign a controller such as a Damper or Sustain pedal to generate the AT data. When you press a note, you can create the AT data by pressing a pedal, expression pedal or other controller.

To do this Choose your incoming channel number and incoming CC controller number (say channel 001 knob 1 - 014 as below). Then just set the outgoing channel number and set the Midi CC out value to 128. See Below.

Controller	Midi Chnl in 1 - 15	Midi CC In 0 to 127	Midi Chnl Out 1 - 16	Midi CC Out 0 to 127	Enabled = 001 click column cell to toggle
Note	001	---	001	---	001
Knob 1	001	014	001	128	001
Knob 2	001	015	001	021	000
Knob 3	001	016	001	022	000

Then press 'Start Mapping'. Now when you play notes and move Knob 1 the channel after touch data will be sent value 0 to 127.

Note. Aftertouch would be assigned to a parameter. Eg cutoff frequency. This is useful if you have factory programs set up for aftertouch. However, the other way is just to map a controller directly to the parameter which aftertouch is assigned to. Map swell pedal to Midi CC Cutoff frequency directly.

PITCH BEND – JOY STICK X DIRECTION

Any Midi Data coming in as Pitch Bend data on the Pitch Bend Row (Joy Stick X direction) will be mapped and also sent out as Pitch Bend Data to the output channel specified by the user if the Midi CC out column is set to 128. If that column is set to 0 to 127 it will map pitchbend to a Midi Control Change CC message of your choice. In the example below pitch bend data is set as coming in on Midi channel 1 and being sent out on Midi channel 1. You can choose any channel between 1 and 16 for in and out. The right-hand column 001 means the row is active and hence the row is Green.

Midi Channel In column

	Ext Expression Pedal	001	007	001	007	000
	Joy Stick Y	001	016	001	016	000
	Pitch Bend Joy Stick X	001	---	001	128	001
	Note to CC	001	021	001	018	000
	Channel After Touch	001	---	001	---	000

128 = pitchbend or Pitchbend MSB
0 to 127 = CC

Midi Channel Out column

For information. Pitch bend messages start a Status byte of E followed by the Midi Channel (0 to 15). Hex(E0) to Hex(EF) in the Midi 1 Specification. -> 224 to 239 in decimal. Where E defines Pitch Bend and the second byte 0 to F is the Midi Channel - which is normally transposed to Channel 1 to 16 for the user. Pitch bend is defined by two bytes MSB & LSB which give a resolution of 128^2 values = 16384 values which give a smooth sweep in pitch, as 128 values would result in audible steps in the pitch bend.

CHANNEL AFTERTOUCH

The Nautilus AT, Kronos and Oasys generate Channel AT but not Polyphonic after touch, although they can respond to it. For the Nautilus (non-AT) you can assign a controller to AT such as an expression pedal and send that AT data out to an External Zone. You can also use the matrix with a synth that does generate AT data and map to another synth that responds to AT. I've included Channel AT and Polyphonic AT for these purposes. You can map the incoming after touch data from one midi channel to another midi channel if a value of 128 is entered in the Midi CC out column. See below. You can also convert a channel AT message to a Midi CC message if a value between CC 000 and CC 127 is entered in the Midi CC out column.

Midi Channel In column

Note to CC	001	021	001	018	000
Channel After Touch	001	---	001	128	001
Polyphonic After Tou...	001	---	001	---	000

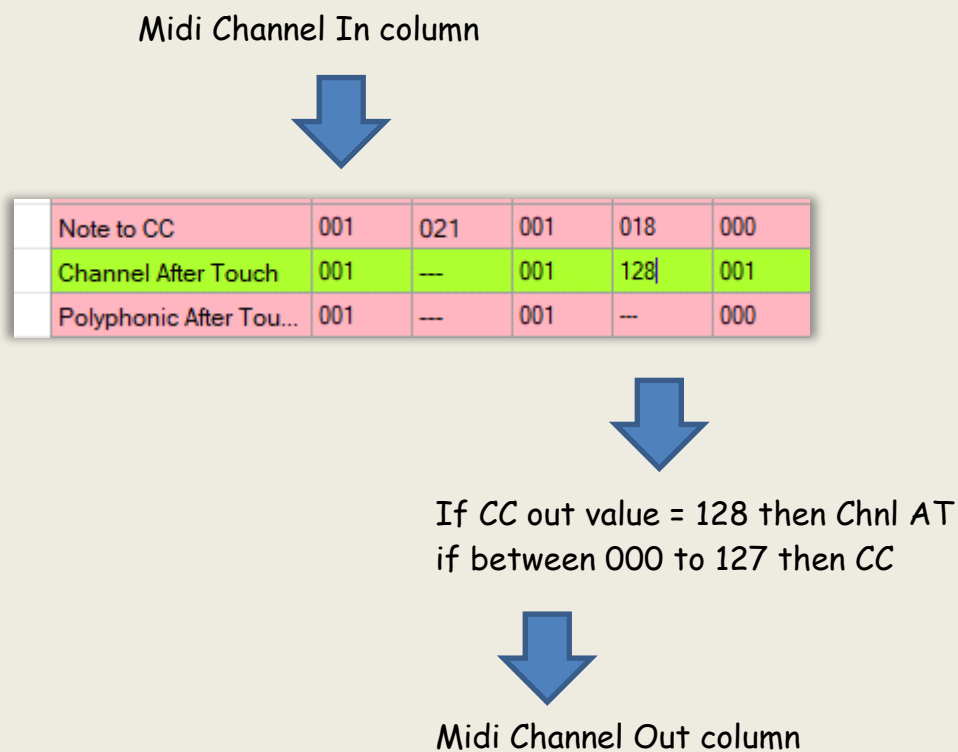If CC out value = 128 then Chnl AT
if between 000 to 127 then CC

Midi Channel Out column

For information. Channel AT messages start a Status byte of D followed by the Midi Channel (0 to 15). Hex(D0) to Hex (DF) in the Midi 1 Specification. -> 208 to 224 in decimal. Where D defines Channel AT and the second byte 0 to F is the Midi Channel - which is normally transposed to Channel 1 to 16 for the user.

POLYPHONIC AFTERTOUCH

Poly After Touch produces a different AT message for every midi note 0 to 127 and can be very expressive. The Nautilus keybed does not generate Poly AT, but I've included it in case you use a synth which does.

Ext Expression Pedal	001	007	001	007	000
Joy Stick Y	001	016	001	016	000
Pitch Bend Joy Stick X	001	---	001	--	000
Note to CC	001	021	001	018	000
Channel After Touch	001	---	001	--	000
Polyphonic After Tou...	001	---	001	--	001

This maps incoming Polyphonic AT to a different midi channel. Status byte A, Midi channels 001 to 016. -> 160 to 175 in decimal. It produces two data bytes – Midi Note number and its Poly AT value.

SETTING UP SLIDERS

Each fader outputs certain CCs on a defined Midi Channel by default,

To use each slider/fader with an external instrument or VST, all you need to do is set their midi channel to the external instrument's Midi channel and assign a different Midi CC out to each control. See below. Then enable their row by clicking on the righthand column so it becomes green. For any VST or external instrument refer to its manual for Midi CC's it responds to. Finally save your Midi CC map for future use.

Note the Slider Midi CC out column now runs from 020 to 027. All sliders output on Midi channel one now.

MAPPING A NOTE TO A CC

This row is a special mapping. It converts a note to a CC. You reserve one key on the keyboard to this function. Like before you choose the midi in channel and the mapped midi out channel. Below in is 001 and out is also 001. The midi note you might reserve for this feature is A0 midi note 021 (the lowest note on the Nautilus 8 keyboard) in this example, but can be any note up to C8 midi note 108. Generally best to choose one you won't use often for playing.

	Ext Expression...	001	007	001	007	000
	Joy Stick Y	001	016	001	016	000
▸	Joy Stick X	001	017	001	017	000
	Note to CC	001	021	001	018	001

Finally, you decide what Midi CC you want to map to. In this case 018. When you hit A0 the harder you hit the note the higher the CC's value. Notes output values (volume) 0 to 127. Note off, volume 0 is ignored here. You could use this feature for switches or variable CC values. Obviously gradual changes in CC value depend on how gradually you change your strike for subsequent A0 notes.

If Note to CC is enabled then the note number selected, 021 in this case – A0 - will only send Midi CC and note 021 will not sound. This is because you want to control CC value and only use the note as a controller. The 'louder' you play the A0 key the controller value will increase. As you play the note softer the CC value will reduce.

For information. Note messages start a Status byte of 9 followed by the Midi Channel (0 to 15). Hex(90) to Hex(9F) in the Midi 1 Specification. -> 144 to 159 in decimal. Where 9 defines it's a note and the second byte 0 to F is the Midi Channel - which is normally transposed to Channel 1 to 16 for the user.

SUMMARY OF POSSIBLE MAPPINGS

To From	Notes	Poly After Touch	Midi CC	Chnl After Touch	Pitch Bend	Sysex 7 Bit and 4/4 Bit
Notes Note	⌂		5 ⌂			
Poly After Touch		⌂				
Midi CC			1a ⌂	1b ⌂		4 ⌂
Chnl After Touch (Pressure)			3a ⌂	3b ⌂		
Pitch Bend			2a ⌂		2b ⌂	

Notes

1a Set Midi CC out column value 0 to 127 to remap CC
1b Set Midi CC out column value to 128 to map CC to Chnl AT
2a Set Midi CC out column value 0 to 127 to map PB to CC
2b Set Midi CC out column to 128 to remap PB
3a Set Midi CC out column 0 to 127 to map Chnl AT to CC
3b Set Midi CC out column to 128 to remap Chnl AT
4   Set Right Hand Column to 001 for 7-bit. 004 for 7bit reverse faders and 002 / 003 for 4/4 bit. Input sysex string /max/min values - See next section
5   Set chosen Midi note number Midi CC in Column and Set Midi CC out value 0 to 127

MAPPING MIDI SYSTEM REAL TIME MESSAGES

Some Midi Messages are channel independent but can be passed through the Midi Mapper if you wish.

MTC - Midi Timing Clock pulses (plus Start, Continue and Stop). This allows you to have the Timing master device transmit through this software and out to the slave devices. Just check MTC check box to allow these messages to pass through. The timing clock runs at a rate of 24 messages per quarter note.   Hex Status byte F1 to FC

Active Sensing – This sends a signal at a minimum of every 0.3 seconds to check that a midi device is connected and not become disconnected. Check the Active Sensing check box to pass through. Not all devices recognise this but it's part of the Midi specification.   Hex Status byte FE

Reset Controllers – This returns all devices to their initialised power up configuration. Check the Reset Controller check Box to pass through. This would be sent from the input device by a manual command. Best to use with caution.   Hex Status byte FF

Note. MTC and Active sensing will pass quite a lot of Midi data through. Normally they work fine. However, if you get any problems with Midi data becoming corrupted uncheck the boxes for these messages. It will depend a lot on the hardware/software instruments you use and if they followed the Midi specification faithfully.

MAPPING SYSEX

There are four important points:-

- The user must have a reasonable understanding of the sysex implementation of the instrument you want to control. The user has to input the start of the sysex strings.

- You can use this Korg, Yamaha and just about any manufacturer etc. from any control surface which generates CC messages.
- If you use a Roland instrument you will probably need the Roland checksum. If it requires a checksum then check the checksum box – see image above.
- The sysex only sends the LSB values which means only one byte of data is sent. This is either 7 bit or 4/4 bit sysex data. To map from a *CC* value there is generally only one byte to use anyway.

When you enter the Sysex string the software adds the data generated from the Midi *CC* mapping, check sums if required and the final " F7" to end the string. Note. You can only map Midi *CCs*. Notes, pitchbend or aftertouch are not allowed.

Example – Korg Nautilus

A Korg sysex string (which has to be in Hex), would look like this for say the Korg Nautilus. Changing the 16' upper manual drawbar.

F0 42 3g 00 01 5D 43 0B 06 00 00 00 00 00 DT F7

F0 always starts a sysex string
42 is korg products ID
3g where g is the instrument global Midi Channel – normally 0 (0 to 15)
00 01 5D Nautilus Instrument ID (Kronos is just 68)
43 = Parameter change command
0B 06 00 00 00 00 00 – defines 16' upper drawbar
DT is the data being sent – 0 to 8 for a drawbar
F7 always ends a sysex string

Example – Korg Triton Classic

A Korg sysex string (which has to be in Hex), would look like this for say the Triton Classic - setting a multisample:-

- User inputs start of sysex string "F0 42 30 50 41 03 00 01 00"
- Data collected from Midi CC input added by this software
- " F7" ends sysex string added by software.

The final string sent out is "F0 42 30 50 41 03 00 01 00 Data F7"

Example – Roland RD2000

Make sure the Roland Checksum check box is checked. Here is an example of the sysex string in Hex you would enter for the RD2000

"F0 41 10 00 00 00 5B 12 xx xx xx xx"

F0 = start of sysex string
41 = Roland ID
10 00 00 00 = Device ID – change this as necessary for your Roland model
5B = instrument ID = RD2000 – change this as necessary for model
12 = Message type for transmission of data to the Instrument

Enter HEX values xx in pairs xx xx xx xx = PARAMETERS from the midi implementation manual for the instrument

Data coming in from the Midi CC mapping - added by this software

The penultimate part of the string is the Roland Checksum - to ensure the data is properly sent – added by this software

Then " F7" end of sysex string - added by this software

SENDING SYSEX

When you scroll to the right of the Mapping matrix you can see the Sysex mapping section.
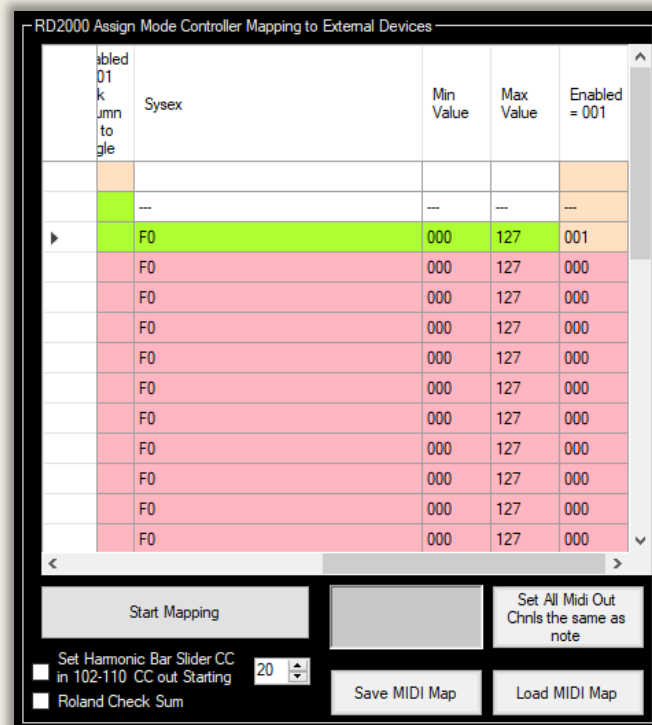
To send sysex the whole row has to be enabled "green" as before. To send Sysex instead of CC data. click on the right-hand column cell headed 'Enabled = 001" if the cell shows 000. The remaining part of the row will turn green. If you are sending to a Roland Instrument, check the Roland Checksum checkbox. Then Click "Start Mapping" button as before.

Remember you can't use Notes (row 1) or Notes to CC, pitchbend or chnl/poly aftertouch to map Sysex (rows 26 to 29). The sysex row will remain white. Not pink or green.

In the sysex column cell you enter the sysex string in Hex pairs starting with F0 with a space in between each pair and no trailing space. The Data part and F7 are added by the software. The Max and Min values turn the incoming Midi CC data to the range you want. For instance, a drawbar for a typical external instrument such as the Korg Kronos or Nautilus typically accepts a value range of 0 to 8. So incoming data 0 to 127 is scaled to 0 to 8 by the software if you set max value to 8 and min value to 0.

A Korg Triton Classic Synth example below for the "Knob 1" row.

	---	---	---	---
	F0 42 30 50 41 03 00 01 00	000	127	001
	F0	000	127	000
	F0	000	127	000
	F0	000	127	000

To check the sysex string works just open the Midi port and connect to your external instrument. Click on the green Sysex string Cell (F0 42 30…….) which you entered and the Sysex will be sent using a data value set by the updown box below the matrix – set to a permissible value. If it does not work you can edit the sysex string and try again! The grey textbox to the right of the 'Start Mapping' button shows the sysex that has been sent. See example below.

Start Mapping	F0 42 30 68 43 0B 06 00 00 00 00 00 01 F7	Set All Midi IN/OUT Chnls the same as note
☐ Midi Learn		
☐ Roland Check Sum	Save MIDI Map	Load MIDI Map
☐ Pass MTC ☐ Pass Active Sensing	☐ Pass Reset Controllers Sysex Data	20 ⬍
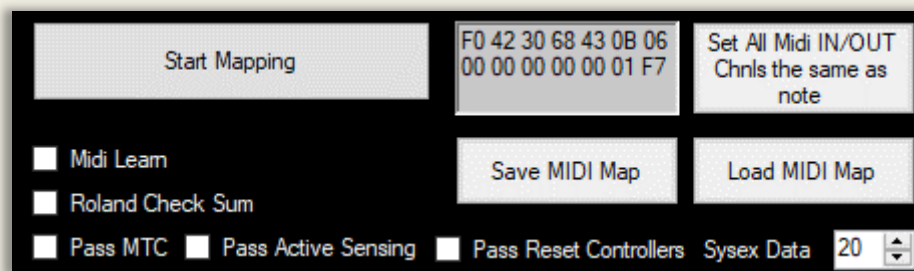
Once its working save the Map. You can then Load it another time.

Now you can then turn on Mapping as described earlier by pressing "Start Mapping" and control the sysex values with a physical controller on your Nautilus, or any other control surface, outputting Midi CC. In the example above slider 1 will control the sysex values transmitted. You can then add further rows of sysex strings if you want to use more physical controllers.

Tip… You can use windows cut and paste to copy values in any of the cells.

If you are comfortable with Sysex give it a try!

USING 4/4 BIT SYSEX DATA

A bit of theory which you can skip if you want. Most midi commands you need will use the standard 7 bit data format, However this software can map CC to both 7 bit and 4/4 bit data.

- 7-Bit data takes values from 0 to 127 -> 00000000 to 11111110

- 4/4 bit splits a 7-bit value into 2 values 0 to 15 and 0 to 127 -> 0000000 to 1111xxx and 0000000 to 1111111 in steps of 16 – so 7 bits can portray two values. Two Drawbars for instance !

Most sysex is 7-bit but you can use 4/4 bit in the matrix with the range of max/min values possible would be between 0 and 15.

Note. As Midi CCs only provide 7-bit data for their value, sysex parameters requiring an MSB & LSB can't be mapped. Nor can sysex requiring 4/4/4/4-bit data.

In this example we only need values 0 to 8 for the data. So

- The first data would have a Min of 0 (00000000) and Max of 8 (00010000)
- The second data would be represented by a Min of 0 and Max of 8 in the columns again but being mapped to 0 (00000000) to 127 (11111110) in steps of 16

Incoming CC of 0 to 127 would be scaled so that

- For the first data incoming CC 0 to 127 is mapped 0 to 8 - Min 0, Max 8

- For the second data incoming CC 0 to 127 is mapped 0 to 8 - Min 0 to Max 127 in steps of 16. So, 0 to 15, 16 to 31, 32 to 47 … each produce a value of 0, 1 ,2 etc.

The first 4 bits are accessed by putting 002 in the right column of the Matrix. The second 4 bits can be accessed by putting 003 in the right column.

NAUTILUS / KRONOS OVERVIEW

The basic building blocks of Nautilus sounds are Tones. There are built in sounds, samples etc.

Each PROGRAM contains tones.

A collection of Programs is a COMBINATION

The collection of all the current settings on the Nautilus is a SET LIST.

There are 3 main hardware setups I might use with a Nautilus :-

1. Nautilus only.
2. Nautilus with a second Keyboard connected. Tutorial 10
3. Nautilus Option 2 above and a computer for recording and/or using VSTs'. Tutorials 7. 11 and 12

MIDI ROUTING

Note that if you are using Nautilus USB it is not fully Midi class compliant in Windows and MacOS. Use the Korg Driver and driver tool to set up in first 10 Midi slots.

Midi In Nautilus

Using Midi cables & USB. System edit / system

NAUTILUS

If USB Midi Thru is not enabled then midi in will just goto the Nautilus ie. The Nautilus will react to Midi In.

If USB Midi Thru is enabled then midi in
is output as Midi Thru at the USB Thru and Midi
Din Ports Out 2 of the Nautilus
(Assuming Midi Out 2 is set to thru)
Note the Nautilus will not react to Midi in.

Midi Out / Thru Nautilus

Midi Out 1 Din port will always output the Nautilus data.
USB midi out will output just the Nautilus data.
USB midi thru will output midi data received at Nautilus midi input if midi thru enabled.

AUDIO ROUTING

Note that if you are using USB audio, it is class compliant in Windows and MacOS.

Audio Input to the NAUTILUS/KRONOS

1. Analog signals sent to the ¼ inch analog input will be routed to the ADC then USB audio out.

NAUTILUS /KRONOS

Audio Output of the NAUTILUS/KRONOS

1. XLR L/R analog outputs
2. ¼ inch L/R analog outputs TR
3. Headphones ¼ inch TRS
4. Sub Outs -
5. USB digital audio from Nautilus if enabled will be output by USB.

EDITING THE NAUTILUS SETTINGS

Above is a view of the Nautilus screen and some of its controls. In fact, when you edit settings using the software the Nautilus screen will probably be showing a different page. It does not matter, because both the screen and the software are just viewing different parts of the Temporary Memory settings bitmap. That is what you are editing.

1011011110010101000010100110010101011010…..

Nautilus settings bitmap

………..101110101000101010

Nautilus Tools showing this parts settings

When you finish any editing, you must WRITE the settings on the Nautilus or it will be lost when you power down.

PROGRAM MENU

MIDI DUMPS – BETA VERSION –

Note. this only works for Korg Triton Classic for now in User Defined Mode.

This tool is found under the program menu. It allows you to Request and Load Midi Dumps and convert to 8-Bit format. Also, Open and Save a Dump file as 8 Bit Format. Finally Send the 8-Bit Program and convert it back to 7 Bit and send back to the synth

Set the Midi in, Midi out and Midi channel to the synth.
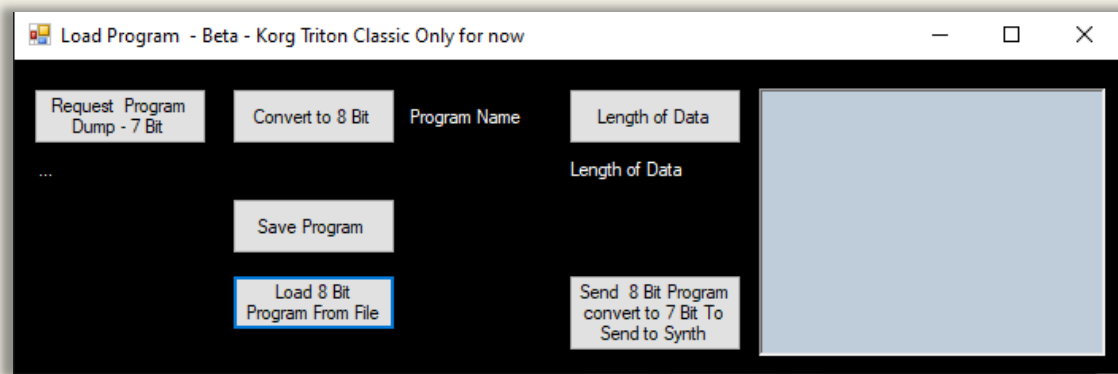
Saving and Loading Dumps

Click on 'Get Current Program Dump' To request the synth sends a Midi dump of the current Program on the Synth to the computer. The Button will go Pink awaiting the Dump.
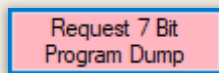
Once the complete dump is received the Button will go green.
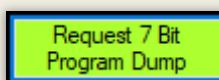
When the Dump has completed you will also get a message, Dumps take under 2 seconds. Press 'Prog to 8 Bit' button which will show the dump in 8 Bit Hex in the Large Text Box. You can then Save and later Load the dump. Press 'Send Program to Synth' to reload it.

Its necessary to be in 8 Bit format so we need to covert Dumps from 7 Bit, which is the synths native format. The reason for working in 8 Bit is that any setting in the program can be edited by an editor. This is the format of the Midi Sysex implementation and of PCG Files.

Note. If you are in 'User Defined Mode' it will only work with a Korg Triton Classic or Rack - for now.

PART 2

THE SYNTHS

ROLAND SH1000 SYNTH

INSTALLATION Version 2.4

Note you need Native Instruments Reaktor 6.x Player or Full Version installed on your PC or Mac. The SH1000v24.ens (ensemble file) can be found in the Nautilus Tools installation directory. Copy it to say your documents folder. Open this with NI Reaktor 6 or Reaktor 6 Player free download by double clicking on it. It can be run as a standalone or as a plugin in a DAW. VST/AU. Windows and Mac.

The SH-1000 is an emulation of the Roland SH-1000 synthesizer first released in 1973 and which was Roland's first synth. Its successor was the SH-2000 but that was designed to be more of a preset instrument and had far less flexibility. The SH-1000 was used by Vangelis, Blondie, The Band, Jethrow Tull, The Human League and Eddie Johnson (Roxy Music) as well as many others. This was also the first synth I owned.

It is available as a Native Instruments Reaktor 6 or a NI Reactor Player 6 instrument (if Player is run in demo mode).

See my website. Www.stuartpryer.co.uk for more VSTs and music applications.

Reaktor 6 can be a VST, AU or AAX plugin.
PC /Mac Specs. Windows 10 or 11 / OSX 10.14 or higher - Mac or PC

Main features

    1. SH1000 comes with over 50 snapshots (programs) in 1 bank. Please lower volume when trying these as some are much louder than others.

    2. I also recommend 'Simply Fast Shots'. A Bank by Paule Amca in the NI User Library for the SH1000. This is embedded in the ensemble as bank

    3. I have tried to keep the instrument as the original as possible except for the settings and oscillator sections. If you use initialise snapshot 002 values it emulates the original instrument fully. The synth has info hints for all controls. You can adjust the waveform frequencies to apply slight mistune which gives a fuller sound. You can also vary the individual volume of the waveforms.

There is a Portamento switch to turn the effect on/off and you vary the amount by turning the knob like the original. The synth has the organ style tabs below the keyboard modelled. The preset instruments tabs link to the snapshots in Reaktor – 42 to 51. You can of course change these should you wish.

The settings box and oscillator box contain enhanced features over the original. If you want just the original instrument use program 002 initialise. In settings it's possible to vary the vibrato delay (value in milliseconds) and vibrato waveform. You can also vary the Growl and Waw waveform as well as cross fade parameters.

    4. Pitch – adjust in Reaktor or on Instrument for fine tuning, in cents. Like original it has option to raise or lower by 1 octave.

    5. Tremolo – cyclic variation in volume – choose waveform, depth and frequency. Tabs switches on/off and waveform type sine/triangle.

6. Vibrato–cyclic variation in frequency. Choose delay in settings box (sine wave only) waveform, depth and frequency. Original had 2 waveforms. Tabs switches on/off, delay and waveform type. Noise – adjust cutoff frequency and resonance of noise generator – select HP, BP or LP filter using LEDs. Original had just white/pink option. = HP and LP.

7. Growl – phase modulation. Waw cut off frequency modulation. You can Select waveform, depth and frequency'

8. Portamento – when polyphony set to 1 notes glides in frequency. When polyphony set higher say 2. When third note played first note glides to it. Original SH-1000 was monophonic. Switch on panel switches on/off.

9. The ADSR envelope and cut off frequency controls are modelled as faders as per the original instrument. Envelope can also control volume and cut-off frequency Filter – cut-off and resonance – filter type selectable – High Pass, Band Pass and Low pass – use yellow LEDs to select. Original was just high pass. VCF sensitivity knob added like the original.

If the ADSR is used for the filter this over rides the cutoff slider. Note the instrument responds to touch sensitive keyboards (note velocity)

11. Polyphony 1 to 128 notes. Original monophonic. Adjust polyphony in Reaktor.

12. Oscillator section - Waveform mixer – adjusts each waveform volume and de tuning. Original on/off only.

13.Modulation wheel changes note frequency when moved up or down – use LED switch below it to activate. Original had simple glide button.

14. Playing - use PC keyboard which is polyphonic or even better your own external midi keyboard. Full 128 midi notes accessible. Three octave on-screen monophonic keyboard activated by mouse will produce sounds which are not as rich as using the computer keyboard or an external midi keyboard. Original limited to 3 octaves with pitch raise/lower by 1 octave.

15. Like Original has hold note tab which holds note until next note played.

16. See Fractal Sequencer on my website for advanced sequencer/generative music features which can be used with SH-1000. To connect use midi yoke freeware or LoopBe1 on windows or IAC driver on a Mac. Original had simple Random Note generator.

17 There are 128 available program slots in Reaktor for a Bank. Original had no option to save or load settings. Program/bank load and save.

18.Midi enabled – Original no midi.

19. Version 2.4 - has updated sound presets which are closer to the original. Fixed bug when changing presets. Added tool tips (info) for all controls.

20. Can be used as a plugin in via Reaktor in a host - Logic, Bitwig, Sonar, Cubase, Cantibile, Ambleton etc. Host DAW controls the audio and Midi parameters.

21. Multiple instances of synth can be run if Reaktor is used as a plugin.

23.For plugin place Reaktor.xxx in your normal virtual instrument folder.

24.For more information email me at stuartpryer@gmail.com

25. My website with more synths is at www.stuartpryer.co.uk
Copyright Stuart Pryer – 25th November 2016 SH1000
This text updated 11th November 2023

BLUE SYNTH 3 - PHASE MODULATED SYNTHESIZER

A dedicated windows stand-alone/VST Phase Modulated synth. The blue3.exe file will be automatically installed in the RD2000 editor installation directory. Click on the 'Blue Synth' menu item in the 'Synths' menu to open it from within the software. The Windows VST 2.4 Blue Synth 3.dll plug-in is in the Nautilus Tools installation directory as well so you can use in a DAW.

The top menu bar. Exe version only.
1. Midi in - allows the selection of all the available midi inputs
2. Midi out - allows the selection of all the available midi outputs including Microsoft GS wavetable synth often found on PC sound cards. Make sure midi in is different to midi out otherwise you will get a midi feedback loop.
3. Audio - allows the choice of ASIO or WDM sound drivers
4. Zoom on the executable version changes the size of the synth on the screen.

The Blue Synth is a touch sensitive, two oscillator phase modulation virtual synthesizer designed to provide a useful audio source for the playing or recording. It can produce lush pads or powerful leads. It can run as a standalone application or run with the Nautilus.

There are two oscillators to create the carrier waves which can both be phase modulated by a sine wave. The polyphony can be adjusted between 1 and 128 notes. You can choose the carrier waveform and apply an attack, decay, sustain and release envelope whose amount can be adjusted. The Modulator knobs control the detuning of the carrier from the modulator and the large knob the amount of modulation, Oscillator 2 can be detuned. The output can be fed through two filter banks with cutoff, resonance and track as well as ADSRs' affecting the filters. There is a ping pong delay and reverb. Programs can be saved. The built in Oscilloscope allows the user to view the wave forms and ensure the signal is not clipped. If it is you will get distortion. To stop this just reduce the 'amount' knobs of the two ADSRs on the left side.

There are 10 factory sounds preloaded in the synth courtesy of Yoa out of the 20 available program slots in each program bank. Programs/banks can be saved as text files.

Please set midi and audio preferences (direct sound or ASIO etc.) in synth menu before you use it.

All I ask is for feedback and ideas for additions or modifications. Also additional programs/banks welcome. I will host on my site.

PC Specs. Windows 7 to 11 - Laptop or PC - ideally >2gb ram and >2ghz processor. Also a mac running crossover for the .exe.

Main features
1. Touch sensitive.
2. Oscillator 1 and 2 have a choice of waveforms. Sine, square, Sawtooth, triangle and noise. 1 to 128 note polyphony.

3. Osc 2 Pitch – adjust by up to +- 5 octaves, semitone and fine. Slightly detuning and enriches the sound.

4. 2 Envelopes per oscillator control volume and cut-off frequency

5. Filter – cut-off and resonance – filter type selectable.

5b. Polyphony 1 to 128 notes.

6. 88 note on-screen keyboard activated by mouse or use PC keyboard keys or even better your own external touch sensitive midi keyboard. Full 128 midi notes accessible.

7. A stereo ping pong delay and reverb enriches the sound.

8. See fractal sequencer which can be used with synth and midi yoke or loopbe1 freeware to connect.

9. There are 20 factory sounds preloaded in the synth courtesy of Yoa (see link below) out of the 40 available program slots in each program bank. Programs/banks can be saved/loaded as text files. Program/bank load and save.

10. In standalone set midi in & midi out/audio/zoom feature at top of window.

For more information email me at stuartpryer@gmail.com

MIDI RECORDER

A Windows app.

The MIDI Recorder does three things

- You can record any midi signal coming into the recorder and play it back to its midi output.
- You can play standard MIDI files
- You can add an arpeggiator to any incoming MIDI note and send to its MIDI output. The arpeggio pattern can be designed by the user or a random patter can be generated. The speed, mode and number of steps can be varied.

PART 3

TUTORIAL 1 – SETTING UP USB MIDI & AUDIO

The Nautilus's sound pallet can be expanded limitlessly using a computer loaded with virtual instruments. The Nautilus is also a midi controller and has an inbuilt midi/audio interface. So how do you set up the Nautilus and a DAW to work together so you can use the Nautilus sounds and the sounds from a computer mixed together?

1. On the Nautilus you can use its built in Audio/ Midi interface OR and external one. The Nautilus is Audio class compliant but for Midi its best to install the Korg Midi Driver for Mac or Windows. See below regarding avoiding issues with Windows 10. This enables multiple instances of the driver to be accessible.

2. On the DAW set midi in chnl and midi out chnl to Nautilus and turn off local control on the synth to 'uncouple' its keyboard from its sound engine. Set audio in/out to Nautilus or to your audio interface. Select an instrument on the DAW.

3. When you play a note on the Nautilus, midi out note data is sent on to the DAW which reads it. Produces a digital audio signal which is sent back by USB audio to the Nautilus or audio interface where you can hear it mixed with the built-in sounds of the Nautilus.

Important. Windows 10 – Loading the Korg Midi Driver latest 1.15 r51 e. When you load the Korg Midi Driver it has to occupy the first 10 slots in the Windows 10 Midi Driver List or it won't work. When you install the Korg driver it installs a separate program in installation directory for checking this – see below. If your first 10 slots are full you need to delete an existing USB Midi Driver. Note. Each usb port used on the computer with the Korg driver takes a slot.
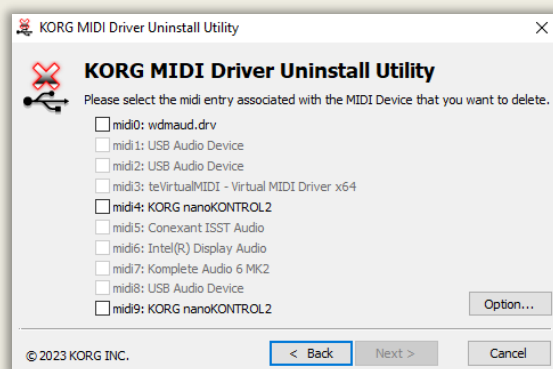
TUTORIAL 2 – SETTING UP NETWORK FILE TRANSFER

For fast file transfer between a computer and the synth, Korg recommended using a USB to Ethernet adapter. The list is the same for the Kronos. Unfortunately, most of these are no longer available.

• Apple USB Ethernet Adapter (MC704ZM/A)
• Cisco Linksys USB-300M
• BUFFALO LUA3-U2-AGT
• BUFFALO LUA3-U2-ATX
• BUFFALO LUA-U2-KTX
• IODATA ETX3-US2
• Logitec LAN-TX/U2B
• Logitec LAN-TX/U2H3
• Planex UE-100TX-G3

But. It has also been confirmed that the USB 2 Network adaptor by Plugable also works. Most adaptors with an Asix AX88772A chipset should work. This chipset driver is built into the Linux Kernal 2.6.35 +. Also runs on Win XP + and Mac OS 10.7+. Transfer speed of up to 100Mbps over USB 2.

The adaptor can be connected to your router by ethernet cable or you could connect a wireless adaptor by a Cat 5 ethernet cable to its ethernet port to it to avoid long cable runs. I recommend FileZilla, a free FTP client which runs on Mac and Windows. You can change the Nautilus password (Nautilus) in Global settings.

Above. All you need to network – A USB ethernet adaptor, ethernet cable and Wireless adaptor. See page 646 Nautilus parameter manual to set up. DHCP as default. Then set up your FTP client pointing to the Nautilus.

TUTORIAL 3 – NAUTILUS CONTROL SURFACE AND AT

The Nautilus control surface has far fewer controls that the Oasys and Kronos. However, it can be remedied by using a separate USB control surface. I recommend the Korg NanoKontrol 2. They only output Midi CC or note values but this can be rectified by using this software which can map Midi CC to Sysex as well should you need it. Not many controllers can be set up to output sysex.

Using this software and a NanoKontrol you can do what the control surface on a Kronos does. I would also recommend getting the Korg DS 1h pedal which is a continuous controller, Korg EXP 2 Expression Pedal and PS 1 footswitch to give you greater control. The latter can be set to increment or decrement the Program, Combination or Set List slot number if in these modes. You can set what it does in Global Mode.

For non-Aftertouch Nautilus users you can assign a foot controller to the aftertouch parameter or Sysex using this software, or just assign it directly to a Midi CC.

Midi Learn on a DAW is a useful feature. You can leave the CC values as they are and use Midi Learn on the VST/Daw. Then save the project in your DAW to retain the midi learn values. The normal way of doing this for instance in Bitwig is to right click the particular control with the knobs on the Nautilus set to User Select, then move the controller on the synth. This sets the link between the Nautilus and the VST graphical controller. Most DAWs/VST's have midi learn. There are default settings for each controller, but most of these can be re assigned to different Midi CC values. Note. You can change Bank and Program on external synths if you enter the Bank MSB/LSB & Program Number of the external synth on the Nautilus.

TUTORIAL 4 - USING A KORG NANOKONTROL 2

Using a separate USB control surface with the Nautilus such as the NanoKontrol 2 can give you the same control surface features as a Kronos. Controllers plug into USB Port type A on the rear of the Nautilus and must be Midi Class compliant. The NanoKontrol and Nautilus need to be set to the same Midi chnl - normally 1. You can also the controller to control a DAW and the NanoKontrol 2 has templates built into Bitwig and there are control surface plugins for the other main DAWS.

Example. **Using with the Nautilus**. Use the NanoKontrol editing software to set up the Midi CC values for each controller as suggested below, using free CC values. Write and Save the Scene data on the NanoKontrol. Note CC values 14 to 31 and 102 to 117 are undefined in the Midi Spec and are unused by the Nautilus. If you want to use the Nanokontrol for drawbar function use this software to map to sysex. A Mapping template is in the installation directory for the 'out of the box' setup for Nanokontrol 2.

Suggested NanoKontrol Controller Assignments for Nautilus

NanoKontrol Assignments	Set CC Values on Nanokontrol
Slider 1	CC 24
Slider 2	CC 25
Slider 3	CC 26
Slider 4	CC 27
Slider 5	CC 28
Slider 6	CC 29
Slider 7	CC 30 for Sysex to drawbar 7
Slider 8	CC 1 for Modulation Or CC 102 for Sysex to drawbar 8
Knob 8	CC 103 for Sysex to drawbar 9
Inc Button	CC 20 – Program /Combi/SetList up
Dec Button	CC 21 - Program /Combi/SetList dowm
Play Button	CC 22 – Play Song/Arp
Rec Button	CC 23 – Record Song
Damper/Sustain Pedal	Sustain CC64
Expression Pedal	Volume CC11 % of Master Volume
Foot Switch	Set in Global Mode to a parameter
Joy Stick Y +ve	Modulation
Joy Stick Y -ve	Assignable
Joy Stick X	Pitch Bend

See also Table of Midi CC messages at the end of this document and the Nautilus or Kronos documentation for CCs' which they send and respond to and which are unused.

Once the NanoKontrol is set up ->

On the Nautilus and select Mode/Global/Controllers/Function assign.
Assign Knobs 1 to 6 as CC 24 to 29. Note knobs can control CC 0 to 119
Set Page Up and Page down to CC 20/21
Start / Stop CC 22
Then Write Global Settings

This now enables the NanoKontrol and Studio to control the Nautilus.

Remember the 'Cycle' button on the left of the NanoKontrol toggles between DAW mode and Controller mode. Use the Latter Mode which if not connected to a DAW is the only option.

Korg NanoKontrol 2 – Black or White !

Bitwig Studio CONTROL SURFACE GUIDE

KORG – nanoKONTROL2

SET ML MR

Nano Kontrol 2

TL/TR

CYCLE

K 1–8
S 1–8
M 1–8
R 1–8

REW FF STOP PLAY REC   F 1–8
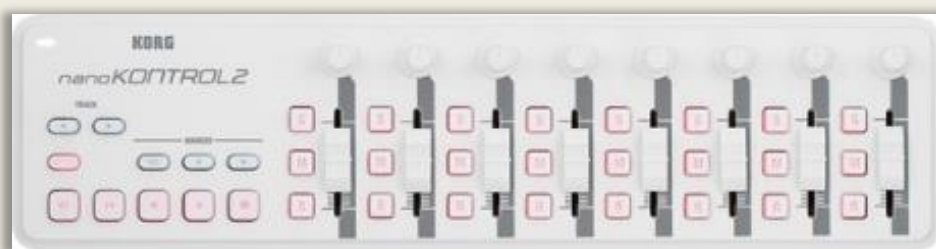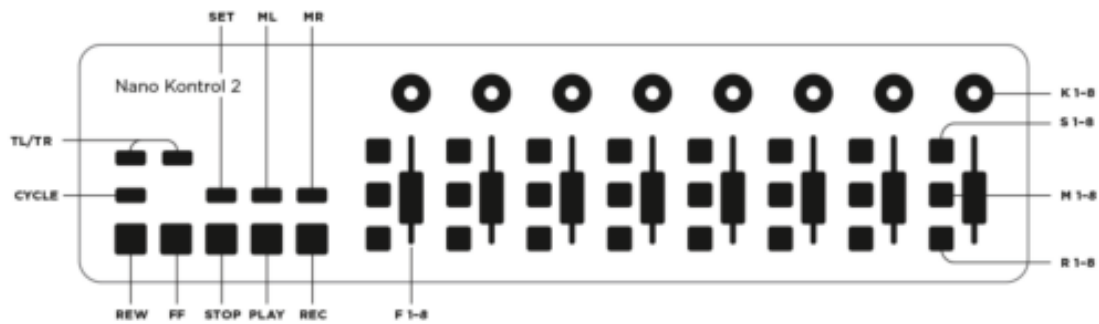
GLOBAL

Transport buttons	Global transport control
Cycle:	Toggle between Mixer and Device mode.
Set + Cycle:	Toggle loop
Set + Fader/Knob:	Reset parameter to default value
Stop + Play + Rec	Toggle engine state
Set + Play:	Global return to arrangement
Set + Stop:	Reset automation override
Set + Rec	Arm/disarm cursor track
Set + FF:	Toggle playback follow

MODE

MIXER

Set + TL/TR	Select previous/next Track Bank
Other	WYSIWYG

DEVICE

K1–8	Panel parameters of the primary device of the current track
F1–8	Macros of the primary device of the current track.
S1–8	Select page for the panel parameters
M1–8	Toggle mapping on/off of a macro
R1–8	
TL/TR	Select previous/next track
Set + TL/TR	Select previous/next device
ML/MR	Select previous/next preset of the device
Set + ML/MR	Select previous/next preset category of the device

NanoKontrol – DAW & Device Mode Features - Copyright Bitwig GMBH.

Note. It works straight out of the box. Transport controls set up automatically. For Bitwig set the nanoKontrol to 'Other Daw' = cycle + set when plugging in, this is the default when new. Press Cycle to change to control mode where you can control an instrument (Device) by CC. Press Cycle again to return to DAW(Mixer) Mode. Use NanoKontrol 2 (manipulated.js script). This allows control of any instrument in the chain on a track (if selected with the mouse) rather than just the first one as with the inbuilt nanokontrol 2 script. This script is in my install directory. Place in documents\bitwig studio\controller scripts folder.

TUTORIAL 5 - USING NANOKONTROL FADERS FOR THE DRAWBARS

Ever wanted to control the Drawbars on the Nautilus with a hardware controller like NanoKontrol? Here's how to do it. For Sliders on a Controller such as a Korg NanoKontrol which don't output sysex.

MIDI SIGNAL FLOW

Korg NanoKontrol or other controller
Midi Out to PC

Nautilus Tools midi in on computer (via CC Matrix sysex mapping) to
Midi out

To Korg Nautilus midi in
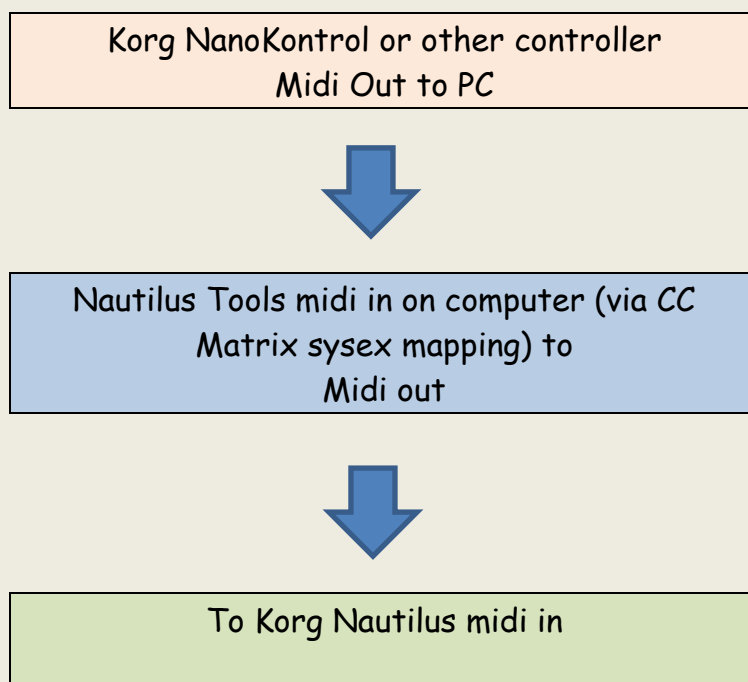
Sysex (System Exclusive) messages can control almost all an instrument's settings. And are very powerful. Now you can map a Midi *CC* message to a Sysex message. This can give you virtually total physical control of the Nautilus or another synth/keyboard. A MIDI Sysex message always starts with a Status byte F0 and the message always ends with F7. Manufacturers can put mostly what they like in between but they have to start with a manufacturer ID and instrument ID.

You can load the sysex part of the matrix from a file I've created in the installation directory called 'Nautilus upper drawbar c.txt' for the Nautilus and NanoKontrol 2. With a different controller set the incoming *CC* values for your particular controller.

For Information. In the Nautilus drawbar example we only need to send values 0 to 8 to the Nautilus to set each drawbar position. All drawbars would receive a Min value of 0 and Max value of 8 from the Matrix'.

Incoming CC data from the controller fader is outputting values of 0 to 127. These would be scaled by the matrix so that they are mapped 0 to 8. To control the EXi CX3 16' upper drawbar on a Korg Nautilus the sent sysex in Hex would look like this: -

"F0 42 30 00 01 5D 43 0B 06 00 00 00 00 00 Data F7"

The 16' Drawbar Korg Nautilus 'Data' comes from the mapped incoming CC data value 0 to 127 and added automatically by the Matrix. The final "F7" is also added by the Matrix. This is the finished Matrix below. Normally midi in chnl would all be the same and the CC number in would be different on each row dependent on your controller's setup.

MIDI Mapping Matrix to External Devices

Controller	Midi Chnl in 1 - 15	Midi CC In 0 to 127	Midi Chnl Out 1 - 16	Midi CC Out 0 to 127	Enabled = 001 Click Column Cell to Toggle	x	Min Value	Max Value	Enabled => 001 Click Column Cell to Toggle
Knob 3	001	079	001	022	000		000	127	000
SW 1	001	080	001	013	000		000	127	000
Mod Wheel 1	001	001	001	001	000		000	127	000
Slider 1	001	012	001	012	001	30 00 01 5D 43 0B 06 00 00 00 00 00	000	008	001
Slider 2	001	013	001	013	001	30 00 01 5D 43 0B 06 00 00 01 00 00	000	008	001
Slider 3	001	014	001	014	001	30 00 01 5D 43 0B 06 00 00 02 00 00	000	008	001
Slider 4	001	015	001	015	001	30 00 01 5D 43 0B 06 00 00 03 00 00	000	008	001
Slider 5	001	016	001	016	001	30 00 01 5D 43 0B 06 00 00 04 00 00	000	008	001
Slider 6	001	017	001	017	001	30 00 01 5D 43 0B 06 00 00 05 00 00	000	008	001
Slider 7	001	018	001	018	001	30 00 01 5D 43 0B 06 00 00 06 00 00	000	008	001
Slider 8	001	019	001	019	001	30 00 01 5D 43 0B 06 00 00 07 00 00	000	008	001
Slider 9	001	020	001	020	001	30 00 01 5D 43 0B 06 00 00 08 00 00	000	008	001

If you enter sysex values manually you enter a space between each pair of characters in the sysex string! When you input the string there is no space after the last character you enter. Eg,
"F0 42 30 00 01 5D 43 0B 06 00 00 00 00 00" in the above example.

The next drawbar would use a slightly different sysex string - See drawbar sysex table next page. To send sysex the whole row has to be enabled "green" as does the CC part to the left. To 'Enable' sending Sysex instead of CC data, click on the far right-hand column cell headed 'Enabled = 001" if the cell shows 000.

To check the sysex string works just open the Midi port and connect to your external instrument. Click on the green Sysex string Cell (F0 42 30…….) and the Sysex will be sent using a data value set by the updown box below the matrix – set to a permissible value. 0 to 127. If it does not work you can edit the sysex string and try again! Once its working 'Save the Mapping' as a plain text file. You can then 'Load the Mapping' next time! Now your faders will control the drawbars.

```
F0 42 30 00 01 5D 43 0B 06 00 00 00 00 00 DT F7          = 16'
F0 42 30 00 01 5D 43 0B 06 00 00 01 00 00 DT F7          = 5 1/3'
F0 42 30 00 01 5D 43 0B 06 00 00 02 00 00 DT F7          = 8'
F0 42 30 00 01 5D 43 0B 06 00 00 03 00 00 DT F7          =4'
F0 42 30 00 01 5D 43 0B 06 00 00 04 00 00 DT F7          = 2 2/3'
F0 42 30 00 01 5D 43 0B 06 00 00 05 00 00 DT F7          = 2'
F0 42 30 00 01 5D 43 0B 06 00 00 06 00 00 DT F7          = 1 3/5'
F0 42 30 00 01 5D 43 0B 06 00 00 07 00 00 DT F7          = 1 1/3'
F0 42 30 00 01 5D 43 0B 06 00 00 08 00 00 DT F7          = 1'
```

Table of Nautilus sysex strings to control upper drawbars

Note. A Parameter Change is defined by 43. For lower drawbars swap 0B to 0C (12), Data (DT = 00 to 08) and F7 are added by the software from incoming CC, DT accepts a min value of 0 and a maximum of 8 for drawbars.

For Info. Extract of CX-3 Midi sysex & Dump from Nautilus Midi Implementation, Copyright Korg Inc.

[43] Parameter Change (integer)   Receive/Transmit
    F0, 42, 3g, 00, 01, 5D = Excl Header
    43   Function = parameter change
    TYP   part of parameter id (see CombiAndSongTimbreSet.txt, etc)
    SOC   part of parameter id (see CombiAndSongTimbreSet.txt, etc)
    SUB   part of parameter id (see CombiAndSongTimbreSet.txt, etc)
    PID   part of parameter id (see CombiAndSongTimbreSet.txt, etc)
    IDX   part of parameter id (see CombiAndSongTimbreSet.txt, etc)
    valueH   Value (bit14-20) (*4) = 00 drawbars
    valueM   Value (bit7-13) (*4) = 00 drawbars
    valueL   Value (bit0-6)   (*4) = 00 to 08 drawbars
    F7   End of Excl

OFS	bit	parameter	data(hex)	value	TYP	SOC	SUB	PID	IDX
68	3~0	[Drawbar] Upper Drawbar1 Level	00~08	0~8	11/12	6	0	0	0
	7~4	[Drawbar] Upper Drawbar2 Level	00~08	0~8	11/12	6	0	0	1
69	3~0	[Drawbar] Upper Drawbar3 Level	00~08	0~8	11/12	6	0	0	2
	7~4	[Drawbar] Upper Drawbar4 Level	00~08	0~8	11/12	6	0	0	3
70	3~0	[Drawbar] Upper Drawbar5 Level	00~08	0~8	11/12	6	0	0	4
	7~4	[Drawbar] Upper Drawbar6 Level	00~08	0~8	11/12	6	0	0	5
71	3~0	[Drawbar] Upper Drawbar7 Level	00~08	0~8	11/12	6	0	0	6
	7~4	[Drawbar] Upper Drawbar8 Level	00~08	0~8	11/12	6	0	0	7
72	3~0	[Drawbar] Upper Drawbar9 Level	00~08	0~8	11/12	6	0	0	8

If you want the faders reversed so they act like drawbars – so as you pull them towards you the sound gets louder - just put 004 in the right-hand column instead of 001. See below.

Sysex			
F0 42 30 00 01 5D 43 0B 06 00 00 05 00 00	000	008	004
F0 42 30 00 01 5D 43 0B 06 00 00 06 00 00	000	008	004
F0 42 30 00 01 5D 43 0B 06 00 00 07 00 00	000	008	004
F0 42 30 00 01 5D 43 0B 06 00 00 08 00 00	000	008	004

KORG KRONOS USERS

The Kronos string for the Upper Drawbars is almost the same except the sysex header is different; F0 42 3g 68. g = midi chnl. I've included a Kronos Upper Drawbar sysex map in the installation directory too for Kronos users. Its file name is "kronos_upper_drawbar_map.txt". Its set so the incoming midi channel from the midi CC is 001 which you can change, but you will need to change the incoming CC number in the next column headed 'Midi CC in 0 to 127' for each of the 9 sliders to match your Midi controller. See Kronos sysex map section below. The end of the string is the Data and "F7" end of sysex string which is added by the software automatically from the CC mapping.

MIDI Mapping Matrix to External Devices

Sysex	Min Value	Max Value	Ena => Clic Colu Cell Tog
F0 42 30 68 43 0B 06 00 00 00 00 00	000	008	001
F0 42 30 68 43 0B 06 00 00 01 00 00	000	008	001
F0 42 30 68 43 0B 06 00 00 02 00 00	000	008	001
F0 42 30 68 43 0B 06 00 00 03 00 00	000	008	001
F0 42 30 68 43 0B 06 00 00 04 00 00	000	008	001
F0 42 30 68 43 0B 06 00 00 05 00 00	000	008	001
F0 42 30 68 43 0B 06 00 00 06 00 00	000	008	001
F0 42 30 68 43 0B 06 00 00 07 00 00	000	008	001
F0 42 30 68 43 0B 06 00 00 08 00 00	000	008	001

Note. If you enter 004 in the right-hand column the faders will reverse so as you move the fader towards you the volume increases.

TUTORIAL 6 - THE ROLAND RD2000 AS A CONTROLLER

The Left-Hand side of the RD2000 Stage Piano

The RD2000 is a very powerful controller keyboard and Stage Piano. Apart from the superb PHA 50 88 Note graduated weighted wood and plastic piano keyboard it has a full complement of controllers. By assigning zones (midi channels & Int sounds/Ext instruments) you can control its internal sounds and external midi devices, such as the Nautilus, other instruments or VSTs.

The control surface is similar to the Kronos and Oasys. It has 9 faders which in harmonic bar mode act as drawbars and can be mapped to sysex on the Nautilus using this software. Plus 9 knobs, an assignable button, 2 mod wheels, pitch bend/ mod lever and 4 pedal inputs. Used in conjunction with this software it can control almost anything. For details see my RD2000 Editor software and documentation.

There is an RD2000 mapping template in the installation directory 'rd2000 template.txt'. Note templates are interchangeable between Nautilus Tools and my RD2000 Editor.

Note. Another good controller particularly if you own a Nautilus 88 are the Roland A300/500/800 pro midi controllers. They have a full complement of faders, knobs, pads and aftertouch and can send Note, CC and sysex messages and more. You can swap controller maps easily. I use an A800 pro 61 note controller and it is very flexible and has Midi Merge built in.

TUTORIAL 7 – COMPLIMENTARY SOUNDS

The Nautilus's inbuilt sounds are really good. However, if you want some variations on them see below.

NAUTILUS/KRONOS/ OASYS ENGINES	COMPLIMENTARY SOUNDS
HD 1 – Multi Samples samples	Korg Triton & VST Native Instruments Kontakt VST Korg Collection
SGX-2 Piano *	Roland V Piano & S/N Piano Pianoteq VST 6.x or higher Synthology Ivory Kontakt – Alicias Keys, Una Corda etc
EP – 1 Electric Piano	Roland RD2000 e pianos and clavs Lounge Lizard VST Pianoteq VST 6.x or higher
CX-3 Organ	Native Instruments B4 11 & Vintage Organs VST
MS20 – EX Synth	Korg MS 20 VST - same code
Polysix – EX Synth	Korg Polysix VST - same Code
AL-1 Analog Synth Model	Korg Moss Reaktor ensembles Cherry Audio - Korg P3300, GX80 Arturia Various- Buchala, Moog Modular
Mod-7 FM Synth	Korg Opsix Native Instruments FM 8
STR-1 String Model	Korg Moss Native Instruments Kontakt Roland SuperNatural sounds
Wave Sequencer	Korg Modwave Korg Wavestate Serum Native Instruments Massive X Arturia Mini Freak
M1 Sound Set **	Korg M1 VST – Same Samples

* Expanded piano types in the Nautilus
** Nautilus only

TUTORIAL 8 - SETTING UP A DAW

The Nautilus is a brilliant sound source. This tutorial shows you how to set up the Nautilus with a DAW (Digital audio workstation) so you can record your performance and add some Virtual Instruments.

1. Make sure you load the Korg driver on your computer. This enables fully functional USB in non-exclusive mode (or you can use a USB interface) and you can use class compliant Audio input and output through USB.
2. Make sure the Audio is set as the audio input and output. Create a new audio track. Make sure you can hear the Nautilus playing through the DAW. I use a buffer of 256. Be careful not to drop the latency so low that you get pops and crackles or the cpu is overloaded. Aim for 10 ms.
3. In your DAW create a new midi track, make sure the Nautilus is set as MIDI and Audio input. If you create a midi track you can edit your performance later and even change the instrument.
4. Bounce or export your track to a wav file etc.

   Note. In Logic if you play the wave file back it will probably play on iTunes or Quicktime player. These will normally output the sound to the inbuilt mac speakers not the Nautilus. If you use speakers or headphones connected to the synth be prepared for that. You can change this in 'audio settings' on the Mac.

MORE SOUNDS !

1. Korg collection, particularly Triton, Modwave, Wavestate and Opsix. These are superb instruments. If you have a Nautilus I recommend getting these VSTs to us with it.

2. Native Instruments also produce good software synths and include samplers (Kontakt), FM synth (FM8), Absynth, Wavetable (Massive and Massive X) and Reaktor where you can design your own or download other's synths – Monark is a good Mini Moog emulation.

3. If you want to use a second keyboard you can either use a hardware synth or use a controller keyboard. Its personal preference. If you use a Nautilus 88, I recommend using a synth weighted midi keyboard with it. So the 88 Note Nautilus controlling its own sounds. The second keyboard can also be used as the upper manual for Organ tones and VSTs.

4. If you use a Nautilus 61 or 73 I would recommend a weighted Piano keyboard on the bottom rack. I use a Roland RD2000 stage piano which is a great controller keyboard and piano, particularly the German V Piano expansion.

5. For live playing of Virtual instruments I have found Bitwig to be the most stable DAW I've used and its cross platform. I particularly like the way it sand boxes the VST's. So if a VST crashes the DAW doesn't. Alternatives are Mainstage (Mac) or Cantabile (Windows)

6. For recording I recommend Bitwig Studio. Version 5 or higher. You can also design your own instruments and effects in it using PolyGrid and the Grid.

TUTORIAL 9 - RECOMMENDED ACCESSORIES

1. I use headphones most of the time. Do not scrimp here as you are using a very expensive and beautiful sounding instrument. I use Sennheiser HD 600s'. Classic neutral sounding headphones for listening and mixing. Remember the Nautilus has a large dynamic range and requires Headphones which can handle this. Most CDs have compression applied and aren't so demanding. I cannot over emphasise how important good quality headphones are.
2. A good quality Headphone amp. I use Fiio but there are others. This provides a high impedance load for the Nautilus output. And the ability to drive high impedance headphones like the HD600 at 300 ohms. The result is smoother and warmer sound.
3. Speakers for home use. I use Yamaha active monitors and a Yamaha active subwoofer. If you play to an audience either the house PA or good quality keyboard amps/speakers.
4. Use balanced connections when possible and high quality leads.
5. Mac or PC i5 or higher ideally with an SSD and >8gb ram for virtual instruments – for recording and virtual instruments.
6. If you use more than one other hardware instrument an Audio Interface or a mixer. I use a Native Instruments KA6 mk2.
7. A very sturdy stand. I use a four-leg table stand. It folds, is compact and very strong.
8. Korg sustain pedal / Swell pedal / PS1 metal foot switch.
9. Surge protector – to protect your instrument
10. Dust cover - to protect your instrument
11. A good Daw. For Mac I recommend a host such as Bitwig, Logic or Mainstage. For Windows I recommend Bitwig or Cantabile (Cakewalk by Bandland is free). Plus NanoKontrol 2!
12. Virtual Instruments. Korg collection 3 -Triton, Modwave, Wavestate and Opsix. I also use my own Virtual Instruments. I recommend Native instruments – Reaktor (Monark, Cloud Lab, my SH1000 and thousands more instruments) FM8, Absynth, Vintage Organs, Massive and Massive X. Kontakt is a great sample based VST with some interesting alternative Pianos. Una Corda, Alicias Keys, The Giant.
13. Possibly a second / third keyboard with a synth or Piano weighted action I use a Korg Triton Pro 76 with a Moss physical modelling board and a Roland RD2000 stage piano.

TUTORIAL 10 - A TWO OR MORE KEYBOARD SETUP

I prefer using two keyboards. A piano weighted 88 note keyboard being on the bottom rack – I use a RD2000 and a top rack keyboard, a synth having a semi weighted action. I recommend a Nautilus 73 or 61 for internal sounds. The benefit of this arrangement is that for synths I use the Synth action keyboard or virtual instruments either separately or layered with its internal sounds and get a quicker and lighter action for them. I can also use the upper keyboard for the top manual of Organs and the RD2000 as a control surface. So, in summary the upper synth weighted keyboard just plays internal sounds or virtual instruments and the lower weighted keyboard, plays its internal sounds such as Piano, Electric Pianos and Clavs and or virtual instruments.

I recommend using Mac computers for recording. Their Midi and Audio functionality are much better than Windows PCs. You can also easily set up local networks to send midi to Windows PCs or iPads with The IAC network driver built into to the operating system. You can also set up aggregate audio devices.

I also recommend a separate Midi interface for more than 2 instruments. Note. A midi output always goes to a midi input. For controller keyboards such as my Roland A800 Pro you generally only need Midi out as there are no onboard sounds. And or a Korg NanoKontrol2.

For Audio I use a separate Audio interface – A Native Instruments KA6 mk 2. It is midi and audio class compliant on a Mac and includes midi in/out. This then drives my Yamaha active speakers and Yamaha Sub Woofer (important in my opinion especially for synths and Pianos). I also use a laptop for editing / librarian functions for the Triton and RD2000 using my own software (Triton Controller, RD2000 Editor and Nautilus Tools).

TUTORIAL 11 – SETTING UP BITWIG STUDIO

Bitwig studio is the most intuitive DAW I have used. I have used many DAWs in the past! You can also build your own instruments and effects. So how do you set up the NAUTILUS and Bitwig to work together so you can use the Nautilus sounds and the sounds from a computer and maybe another hardware synth mixed together?

MIDI. In Bitwig I use keyboard plus 8 knobs as the Controller Script. This enables the routing of midi channels properly. Set midi out of the Nautilus to Bitwig midi in and midi out of Bitwig to the Nautilus. If you are using VSTs then set their MIDI in from the Nautilus. NB. You need a Bitwig controller script for each hardware synth/controller. Another good script is DrivenbyMoss with the Generic Flexi controller where you can map controllers on unsupported equipment – ie. where Bitwig does not have a dedicated controller script.
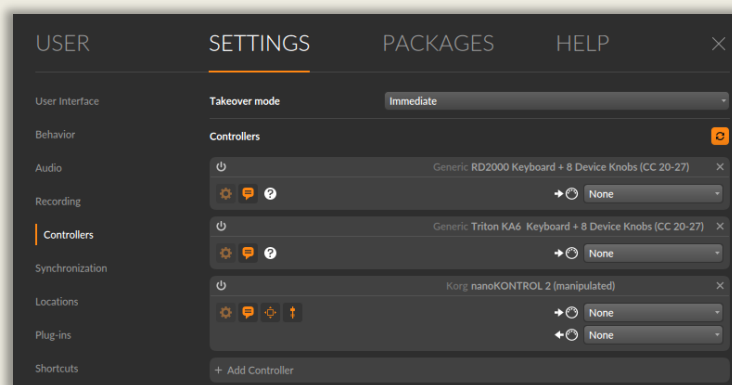
AUDIO. Set audio driver model in Bitwig as Nautilus or the audio driver of your audio interface. Set audio output busses of Bitwig to speakers or headphones.
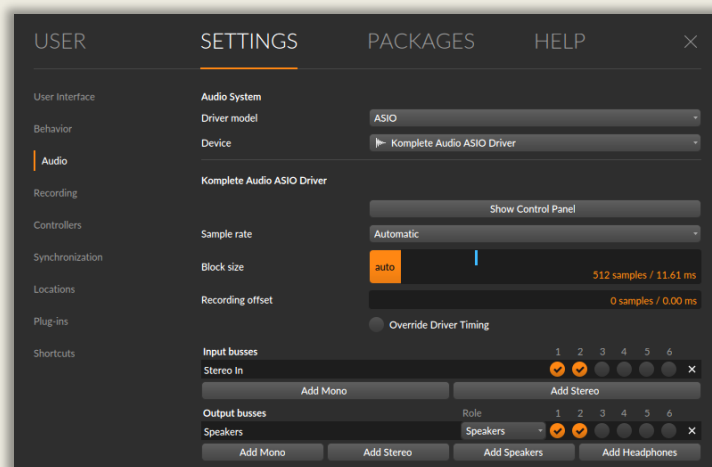
NB. Bitwig has the Grid, Note and Polygrid for creating your own effects and instruments! It supports VST 2/3 and 32/64 bit plug-ins and runs on Macs and PCs.

Setting up in Bitwig - Summary.

1. Define your Audio interface driver model – in Bitwig Settings - Audio
2. Each hardware keyboard/controller needs to be set up as a separate Midi controller. In Bitwig I use 'generic keyboard and 8 knobs ' as Korg and Roland are not well represented in Bitwig unfortunately. Give each controller a suitable name. The controller's inputs and outputs can be defined easily by name and Midi channels 1 to 16. – See Bitwig Settings.
3. I normally leave my Korg Triton on channel 5 for its midi transmit channel. Local control off to stop repeated notes and midi loops.
4. On the NAUTILUS it is easy to toggle on/off Midi channels using Combinations.
5. In Bitwig add + a Hardware Controller(s) - (add device – HW controller) name the Controller you use eg. Nautilus. Specify Midi-in to Bitwig in the left-hand box which appears when you click on the track. Do this by the controller(s) name and midi channel(s).
6. Midi out is specified in the device viewer at the bottom left of the arranger screen. Specify Controller(s) and Midi Channel(s)
7. Finally add another instrument track(s) for software synths. Specify Midi In routing as above and audio out routing. Repeat for as many VST's as you need.
8. Set up audio track(s) to record the VST and /or the RD and /or other hardware synth(s). Define the audio tracks Audio in.
9. Remember you will only hear the tracks which you select, by clicking on them. Multiple selections are possible using ctrl windows/Cmd Mac.
10. When it's all working save the project as a Bitwig Template. That way you won't need to set this up again.
11. The first track I lay down is usually percussion. I use the Bitwig Drum Machine which has a very large collection of drum samples and has randomisation. To do this, on a track add the Drum machine instrument. Load a drum kit using the folder icon under the power button. Then draw using the pencil on the note editor or play your hardware midi keyboard to create the drum midi sequence for each drum type. Set loop points and loop. Press 'play'.

Controller Mapping

I normally tend to use several VST instrument per project and hardware instruments. I typically use up to 8 hardware knobs, so I manually soft controller map any hardware controllers I need. Bitwig controls can be mapped using the shortcut menu, or Generic Flexi Script by Moss or a listed Bitwig controller.

1. Set the controller to 'immediate' mode' – not catch"
2. Right click and choose 'manually map the controller or key' or use soft controller mapping which is better.
3. Turn a knob on your hardware controller and click on the onscreen knob and it's is mapped! You can see the list of Mappings in the Mapping Window. Goto step 2. Repeat for each hardware controller knob/slider/key you need.
4. Save the project then saves the mappings.

TUTORIAL 12 – RECORDING SYSTEM AUDIO IN A DAW

Sometimes you may want to sample sounds from the internet to use in your project. This is how you can do it. This requires internal audio routing. This does not come native with either Windows or Mac.

Windows

The Jack 2 audio driver works with any DAW. In Bitwig for instance; like Audacity (Waspi loop back), you can record system audio. Install the Jack 2 driver. Go to Settings/Audio in the DAW and set the
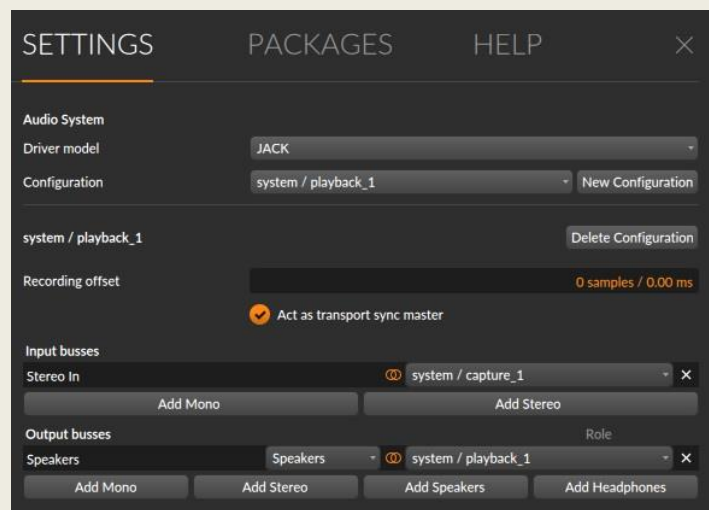Driver Model = Jack
Config = system/playback
Stereo in to DAW = Jack – system/capture
Stereo out from DAW = Jack – system/playback and speakers.

You can now record an audio sample track in your DAW. And then maybe use the audio clips in your project, subject to copyright. See setup below. This is in Bitwig as an example.

Download | JACK Audio Connection Kit

Mac

Note. Jack 2 currently only works on Windows. There seem to be Mac issues with the MacOs installer to do with OS security at the moment. Soundflower no longer works, so I recommend you use the free driver Black Hole. Install the driver.

DAW audio Input = Black Hole.

If you can't hear the audio but can record it, create a Multiple output device of Black Hole and Speakers in Mac/Utilities Audio/midi setup. Then select the Multiple output device in Mac settings/sound. Set that output in your DAW.

Download BlackHole:

TUTORIAL 13 - ELECTRONIC MUSIC

AN INTRODUCTION TO MIDI

MIDI stands for Musical Instrument Digital Interface and allows externally generated signals to control an instrument. For instance a synth to control another synth, or a computer to control a synth. Not only can MIDI control what notes sound and the instrument played using short MIDI messages, but it can control most of the controls on a fully MIDI enabled instrument using system exclusive Sysex messages; long MIDI messages.

MIDI has been pivotal in the development of electronic music. One of the founders was Roland's Ikutaro Kakehashi the other was Tom Oberheim. It was first successfully demonstrated in 1983 with a Dave Smith Sequential Circuits Prophet 600 connected to a Roland Jupiter 6. The standard is largely unchanged and has enabled computers to fully integrate with synthesizers. Before then there were different standards of control voltages CVs' which meant people were tied to a manufacturer's standard. MIDI enables one instrument to control another or a computer to control, or be controlled, by an electronic instrument. It's now the basis of synth and sequencer communications

The first sequencer program I wrote was for the Korg MS20 in 1982. Without MIDI I had to use digital to analog converters to send the monophonic control voltage CV instructions to the synth. The synth then sent back CVs' which had to be converted to a digital value for the computer, I had to build my own circuit boards. It was not an easy task but something MIDI now handles with ease. The latest synthesizers or sound modules are called software or soft synths. See the Bluesynth 3 included with this software. These synths only exist as a program running on a computer and this approach is immensely powerful but the sound quality depends on the quality of the VST and the sound card in the PC. They have not replaced hard wired synths yet, but may do so in the future. See the MIDI association website. https://www.midi.org/

Virtually all midi instruments have a General MIDI instrument list of programs which can be called upon. 128 pre-programmed instrument sounds.

General MIDI 1.0 Instrument list.

Piano:
1 Acoustic Grand Piano
2 Bright Acoustic Piano
3 Electric Grand Piano
4 Honky-tonk Piano
5 Electric Piano 1
6 Electric Piano 2
7 Harpsichord
8 Clavinet

Chromatic Percussion:
9 Celesta
10 Glockenspiel
11 Music Box
12 Vibraphone
13 Marimba
14 Xylophone
15 Tubular Bells
16 Dulcimer

Organ:
17 Drawbar Organ
18 Percussive Organ
19 Rock Organ
20 Church Organ
21 Reed Organ
22 Accordion
23 Harmonica
24 Tango Accordion

Guitar:
25 Acoustic Guitar (nylon)
26 Acoustic Guitar (steel)
27 Electric Guitar (jazz)
28 Electric Guitar (clean)
29 Electric Guitar

Strings:
41 Violin
42 Viola
43 Cello
44 Contrabass
45 Tremolo Strings
46 Pizzicato Strings
47 Orchestral Harp
48 Timpani

Strings (continued):
49 String Ensemble 1
50 String Ensemble 2
51 Synth Strings 1
52 Synth Strings 2
53 Choir Aahs
54 Voice Oohs
55 Synth Voice
56 Orchestra Hit

Brass:
57 Trumpet
58 Trombone
59 Tuba
60 Muted Trumpet
61 French Horn
62 Brass Section
63 Synth Brass 1
64 Synth Brass 2

Reed:
65 Soprano Sax
66 Alto Sax
67 Tenor Sax
68 Baritone Sax
69 Oboe
70 English Horn

Synth Pad:
89 Pad 1 (new age)
90 Pad 2 (warm)
91 Pad 3 (polysynth)
92 Pad 4 (choir)
93 Pad 5 (bowed)
94 Pad 6 (metallic)
95 Pad 7 (halo)
96 Pad 8 (sweep)

Synth Effects:
97 FX 1 (rain)
98 FX 2 (soundtrack)
99 FX 3 (crystal)
100 FX 4 (atmosphere)
101 FX 5 (brightness)
102 FX 6 (goblins)
103 FX 7 (echoes)
104 FX 8 (sci-fi)

Ethnic:
105 Sitar
106 Banjo
107 Shamisen
108 Koto
109 Kalimba
110 Bag pipe
111 Fiddle
112 Shanai

Percussive:
113 Tinkle Bell
114 Agogo
115 Steel Drums
116 Woodblock
117 Taiko Drum
118 Melodic Tom
119 Synth Drum

(muted)
30 Overdriven Guitar
31 Distortion Guitar
32 Guitar harmonics

Bass:
33 Acoustic Bass
34 Electric Bass
(finger)
35 Electric Bass (pick)
36 Fretless Bass
37 Slap Bass 1
38 Slap Bass 2
39 Synth Bass 1
40 Synth Bass 2

71 Bassoon
72 Clarinet

Pipe:
73 Piccolo
74 Flute
75 Recorder
76 Pan Flute
77 Blown Bottle
78 Shakuhachi
79 Whistle
80 Ocarina

Synth Lead:
81 Lead 1 (square)
82 Lead 2 (sawtooth)
83 Lead 3 (calliope)
84 Lead 4 (chiff)
85 Lead 5 (charang)
86 Lead 6 (voice)
87 Lead 7 (fifths)
88 Lead 8 (bass +
lead)

Sound effects:
120 Reverse Cymbal
121 Guitar Fret Noise
122 Breath Noise
123 Seashore
124 Bird Tweet
125 Telephone Ring
126 Helicopter
127 Applause
128 Gunshot

MIDI 1.0 MESSAGES – A BRIEF SUMMARY

All numbers are in Hex 0 to F. n is midi channel in Hex 0 to F. ie. Base 16.

MIDI Notes – Channel Voice messages.

8n (data1) (data 2), Note Off.
8n in Hex is 128 in decimal (n=0) to specify note off message. n is the Midi Channel. This is treated the same as a note on with volume 0.

9n (data1) (data 2), Note On.
9n in Hex is 144 in decimal (if midi channel n=0) to specify note on message. Data1 is midi note in hex 0 to 127, data2 volume 0 to 127. If data2 = 0 (volume 0) it is treated as a note off message.

Control Change CC messages

An Polyphonic aftertouch (data1) (data 2) – An = 160 in decimal if n=0.

Bn (data1) (data 2),
Bank Change is A Control Change message CC

First message MSB – most significant byte
B in Hex is 176 in decimal (if n=0) to specify CC type message.
n is the Midi Channel.
data1 is 00 and data 2 is 0 to 127 in decimal.
           +
Second message LSB – least significant byte sent in quick succession
B in Hex is 176 in decimal (if n=0) to specify CC type message.
n is the Midi Channel.
data1 is 32 (20 in Hex) and data 2 is 0 to 127 in decimal.

Program Change is:
Cn (data1)
C in Hex (192 in decimal) if n=0 to specify message.
n is the Midi Channel.
data1 is 0 to 127 in decimal

Other messages

Dn Channel Aftertouch (data1) (none) - 208 in decimal if n = 0

En Pitch Bend (data1) (data 2) - 224 in decimal if n = 0

F0 System exclusive - 240 in decimal if n=0. (data length variable but includes Instrument manufacturer and instrument identifier at start) ends in F7 End of Exclusive EOX message.

FE (none) (none) Active Sensing (254 in decimal) – This data is filtered so they are passed through but don't show on the main text box as there would be a message every 0.3seconds. This feature was designed to turn off hung notes if a MIDI cable became disconnected. I never had this problem in 40 years of using MIDI.

TABLE OF MIDI CC MESSAGES

CC Number	Purpose	Description
CC 0	Bank Select	Allows user to switch bank for patch selection. Program change used with Bank Select. MIDI can access 16,384 patches per MIDI channel.
CC 1	Modulation	Generally, this CC controls a vibrato effect (pitch, loudness, brightness). What is modulated is based on the patch.
CC 2	Breath Controller	Often times associated with aftertouch messages. It was originally intended for use with a breath MIDI controller in which blowing harder produced higher MIDI control values. It can be used for modulation as well.
CC 3	Undefined	
CC 4	Foot Controller	Often used with aftertouch messages. It can send a continuous stream of values based on how the pedal is used.
CC 5	Portamento Time	Controls portamento rate to slide between 2 notes played subsequently.
CC 6	Data Entry Most Significant Bit (MSB)	Controls Value for NRPN or RPN parameters.
CC 7	Volume	Control the volume of the channel
CC 8	Balance	Controls the left and right balance, generally for stereo patches. 0 = hard left, 64 = centre, 127 = hard right
CC 9	Undefined	
CC 10	Pan	Controls the left and right balance, generally for mono patches. 0 = hard left, 64 = centre, 127 = hard right
CC 11	Expression	Expression is a percentage of volume (CC7).
CC 12	Effect Controller 1	Usually used to control a parameter of an effect within the synth/workstation.
CC 13	Effect Controller 2	Usually used to control a parameter of an effect within the synth/workstation.
CC 14	Undefined	

CC 15	Undefined	
CC 16 – 19	General Purpose	
CC 20 – 31	Undefined	
CC 32 – 63	Controller 0-31 Least Significant Bit (LSB)	
CC 64	Damper Pedal / Sustain Pedal	On/Off switch that controls sustain. (See also Sostenuto CC 66) 0 to 63 = Off, 64 to 127 = On
CC 65	Portamento On/Off Switch	On/Off switch 0 to 63 = Off, 64 to 127 = On
CC 66	Sostenuto On/Off Switch	On/Off switch – Like the Sustain controller (CC 64), However it only holds notes that were "On" when the pedal was pressed. People use it to "hold" chords" and play melodies over the held chord. 0 to 63 = Off, 64 to 127 = On
CC 67	Soft Pedal On/Off Switch	On/Off switch – Lowers the volume of notes played. 0 to 63 = Off, 64 to 127 = On
CC 68	Legato Footswitch	On/Off switch – Turns Legato effect between 2 subsequent notes On or Off. 0 to 63 = Off, 64 to 127 = On
CC 69	Hold 2	Another way to "hold notes" (see MIDI CC 64 and MIDI CC 66). However notes fade out according to their release parameter rather than when the pedal is released.
CC 70	Sound Controller 1	Usually controls the way a sound is produced. Default = Sound Variation.
CC 71	Sound Controller 2	Allows shaping the Voltage Controlled Filter (VCF). Default = Resonance – also(Timbre or Harmonics)
CC 72	Sound Controller 3	Controls release time of the Voltage controlled Amplifier (VCA). Default = Release Time.
CC 73	Sound Controller 4	Controls the "Attack' of a sound. The attack is the amount of time it takes for the sound to reach maximum amplitude.
CC 74	Sound Controller 5	Controls VCFs cutoff frequency of the filter.

CC 75	Sound Controller 6	Generic – Some manufacturers may use to further shave their sounds.
CC 76	Sound Controller 7	Generic – Some manufacturers may use to further shave their sounds.
CC 77	Sound Controller 8	Generic – Some manufacturers may use to further shave their sounds.
CC 78	Sound Controller 9	Generic – Some manufacturers may use to further shave their sounds.
CC 79	Sound Controller 10	Generic – Some manufacturers may use to further shave their sounds.
CC 80	General Purpose MIDI CC Controller	Generic- On/Off switch 0 to 63 = Off, 64 to 127 = On
CC 81	General Purpose MIDI CC Controller	Generic – On/Off switch 0 to 63 = Off, 64 to 127 = On
CC 82	General Purpose MIDI CC Controller	Generic – On/Off switch 0 to 63 = Off, 64 to 127 = On
CC 83	General Purpose MIDI CC Controller	Generic – On/Off switch 0 to 63 = Off, 64 to 127 = On
CC 84	Portamento CC Control	Controls the amount of Portamento.
CC 85 – 90	Undefined	
CC 91	Effect 1 Depth	Usually controls reverb send amount
CC 92	Effect 2 Depth	Usually controls tremolo amount
CC 93	Effect 3 Depth	Usually controls chorus amount
CC 94	Effect 4 Depth	Usually controls detune amount
CC 95	Effect 5 Depth	Usually controls phaser amount
CC 96	(+1) Data Increment	Usually used to increment data for RPN and NRPN messages.
CC 97	(-1) Data Decrement	Usually used to decrement data for RPN and NRPN messages.
CC 98	Non-Registered Parameter	For controllers 6, 38, 96, and 97, it selects the NRPN parameter.

	Number LSB (NRPN)	
CC 99	Non-Registered Parameter Number MSB (NRPN)	For controllers 6, 38, 96, and 97, it selects the NRPN parameter.
CC 100	Registered Parameter Number LSB (RPN)	For controllers 6, 38, 96, and 97, it selects the RPN parameter.
CC 101	Registered Parameter Number MSB (RPN)	For controllers 6, 38, 96, and 97, it selects the RPN parameter.
CC 102 – 119	Undefined	
MIDI CC 120 to 127 are "Channel Mode Messages."		
CC 120	All Sound Off	Mutes all sounding notes. It does so regardless of release time or sustain. (See MIDI CC 123)
CC 121	Reset All Controllers	It will reset all controllers to their default.
CC 122	Local On/Off Switch	Turns internal connection of a MIDI keyboard/workstation, etc. On or Off. If you use a computer, you will most likely want local control off to avoid notes being played twice. Once locally and twice when the note is sent back from the computer to your keyboard.
CC 123	All Notes Off	Mutes all sounding notes. Release time will still be maintained, and notes held by sustain will not turn off until sustain pedal is depressed.
CC 124	Omni Mode Off	Sets to "Omni Off" mode.
CC 125	Omni Mode On	Sets to "Omni On" mode.
CC 126	Mono Mode	Sets device mode to Monophonic.
CC 127	Poly Mode	Sets device mode to Polyphonic.

FINALLY

My website details are http://stuartpryer.co.uk – the web site contains updates from time to time so keep checking. It also has my e-mail address. Please contact me if you find bugs or have suggestions on how to improve the software.

REVISION HISTORY – VERSION NUMBERS

For detailed change log/'blog' see Korg Forums (Irish Acts) – Nautilus

1.0.0   21st March 24. Added settings form to show sysex, cc and note data better. Added midi thru checkbox. Added ability to use the software via an IPad, Android or Linux device. Added Midi mapping matrix for Notes and CCs'. Added button to set midi out chnl in matrix to note chnl. Harmonic mode for drawbar mappings. Bug Fixes. Added the ability to map incoming Midi CCs to a Sysex string to send out giving vast control of instruments/vst. This works for 7-bit and 4/4-bit format sysex. Added Midi Learn to the Matrix. Added facility to map Midi CC data to channel After Touch so you can send aftertouch data on a keyboard without aftertouch using a controller like a damper pedal or expression pedal, knob. Etc. Software now stores your previously selected Midi in /out devices in the Windows registry. Added MTC/active sensing and Controller reset to Mapping options.

1.0.1   24th March 24, Added ability to change Mode on Main Form.

1.0.2   Added map for drawbars in the installation folder. 'upper drawbar map c.txt'. Added ability to reverse faders by putting 004 in rhs column instead of 001.

1.0.3   27th March 24. Added support for the Korg Kronos – you can switch between the Kronos and the Nautilus on the Midi/sysex form. Choice is saved in the Windows registry. On sysex form added User Defined sysex header and string.

1.0.4   Added routines for converting midi dumps to 8-bit data for editing and then converting back to 7-bit for sending back to synth – needed for sysex data >127. Routines not used yet. Modified sysex header to include global midi chnl. Korg/User Model/midi in/midi out saved in Registry.

1.0.5   Finalised registry hive structure. 'Hkey Current User\ AAnautilus. Cosmetic improvements. Updated Icon so its different from RD2000 Editor. Updated Documentation.

| 1.0.6 | Updated these docs and program icon to distinguish it from the RD2000 Editor. Fixed a bug in mapper where 001 would not always toggle to 000 and vice versa in RHS sysex column. |
| 1.0.7 | 12/04/24 Improved Logic when opening software. Now loads Synth model eg. Nautilus, Kronos, Oasys etc from registry. Added beta version of merge program function. |

RD2000 EDITOR USER COMMENTS

Gus – Roland Forums.

You did a great job. Everything is perfect….

V 3.x You have done an exemplary job

RD2000fan – Roland Forums

The RD2000 editor is a great job….

SO THAT'S IT?

If there are features you would like to add, let me know and if it is possible, I will add them. Feedback and a wish list for additional functions are always welcome, together with suggestions for improving the documentation! Have Fun ☺ !

Stuart   Copyright 2024

LINKS TO SOME OTHER SITES

1. For updates, Fractal Sequencer and a free virtual synth and midi file player/ arpeggiator visit my site https://stuartpryer.co.uk
2. KVR Forum and Facebook – great places for electronic music information http://www.kvraudio.com/
3. Korg http://www.korg.com
4. For free Windows Midi utilities try MIDI Tools by Mountain Utilities Mountain Utilities or Midi Ox at http://www.midiox.com/
5. For free internal PC midi routing I recommend LoopMidi Software | Tobias Erichsen (tobias-erichsen.de) or LoopBe1 http://www.nerds.de.
6. RPTMidi – for connecting a PC Midi to mac Midi. Software | Tobias Erichsen (tobias-erichsen.de)
7. Native Instruments – Producers of a fantastic suite of virtual instruments and effects. Special thanks to Stephen Parker General Manager, UK. http://nativeinstruments.com
8. Bitwig 5.x - a very modern DAW which runs on Macs or PCs. http://bitwig.com
9. Cantilble 3 VST host by topten software. A great windows equivalent to Mainstage. www.cantibilesoftware.com

RECOMMENDED BOOKS

- The Nautilus Documentation

- MIDI for the professional – Paul D Lehermann

- Vintage Synthesizers – Mark Vail

- The Synthesizer – Mark Vail

INDEX