Hauptwerk Hardware

System One

Full Organ Rebuild Solution

SYSTEM ONE
Hauptwerk Hardware

Lighted Pistons Matrix Type Interfaces Installation & User Manual

Covers both 32 & 64 piston versions

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Table of Contents

A brief introduction to System ONE....3
What is System ONE?....3
Who is it for?....3
The Lighted Pistons Matrix Type Interfaces....4
How the Lighted Piston Controller works....4
Interface Variants....5
Polarity....5
Connections....6
The 8 x 4 matrix....8
The 64 piston variant....9
Daisy-Chaining....10
Configuring your lighted pistons in Hauptwerk....10
Hauptwerk Scoped Pistons....13
Troubleshooting tip....16
Monitoring MIDI events using the System ONE Serial monitor....18
Configuring your lighted pistons in Grand Orgue....21
Configuring other virtual organ software....25
Mounting....26
Our Hardware Ethos....26
Legal Disclaimer:....27
Warranty....27
Further Information....27
Contact Details....27

This manual should be read in conjunction with the System ONE Control Board user manual which is available from the downloads page of the website.

A brief introduction to System ONE.

What is System ONE?

System One is an electronic system which comprises a main control board and a number of separate interface boards which connect to the various controls of an organ console. It is very versatile and can be used in the smallest organ right up to the largest. It copes with pretty much any type and combination of organ controls, including:-

- Matrix Keyboards
- Bus Keyboards
- Lighted Stops/Rocker Tabs
- Motorized Stops
- **Lighted Pistons**
- Basic Unlit Stops & Pistons
- Memory Level Display
- Swell & Other Pedal Controls
- Crescendo Indicators
- On Demand Re-scan of static controls (Transpose, Tuning etc.)

The system requires only two Midi connections to the computer running the Virtual Pipe Organ software and it works with Windows, MacOS and Linux operating systems. There is no programming required and it is simple to set up with your virtual pipe organ of choice.

It has been designed to meet the specific needs of the organ enthusiast as well as the professional, in that it addresses the unique requirements of the organ as opposed to the many other products already used in this field which are really just generic Midi devices which the builder then has to connect together to form their own 'system'. For more information on System ONE please refer to the Overview Document available from the downloads page of the Hauptwerk Hardware website.

Who is it for?

Hauptwerk Hardware System One is designed for both enthusiasts and professional users.

If you are planning an organ console build from scratch it is the ideal solution as you can plan each feature you want in your console and be certain that System One will cope with it easily. If you are rebuilding or 'Midifying' an existing console, System One will provide you with the easiest way to connect all the controls of your console and generate the required Midi signals to work with your computer without the need to perform any programming, only a few jumpers need to be set in order to tell the system what options you want to select.

It is ideal for use with Hauptwerk, Grand Orgue and any of the many other virtual organ software solutions available which use Midi as their input.

The Lighted Pistons Matrix Type Interfaces.

Below is a picture of a lighted thumb piston & rail as found in many organs.

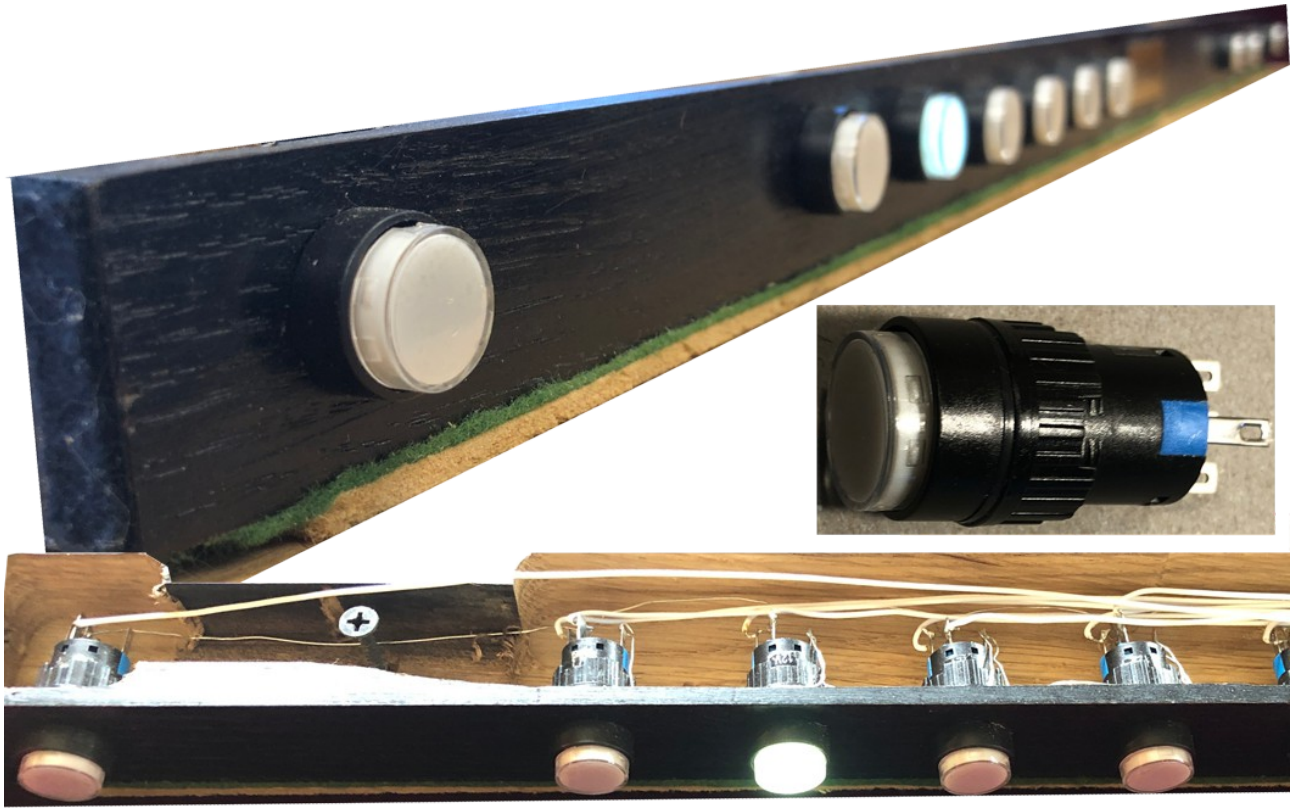


Illustration 1: A Lighted Thumb Piston Rail.

How the Lighted Piston Controller works.

I use the term 'Lighted Piston Controller' in this context to mean the functions of the System ONE main board and the Matrix Lighted Piston interface board combined.

The job of the lighted piston controller is to control the power to the piston LEDs and to communicate, via MIDI, with the computer. The controller continuously scans all the piston switches to see which, if any, are pressed, and if so it will send a MIDI note on event for that piston, followed by a MIDI note off event as soon as the piston is released.

As well as this the controller is constantly listening out for any incoming MIDI messages from the computer. If a MIDI message arrives requesting a change of state for any particular piston, the controller first looks at the current state of that piston, and if it already matches the requested condition it will do nothing. However if the requested state is different to the current state it will illuminate or extinguish that piston's LED as necessary and update the state of that piston in it's internal memory.

Note that this is different from other controllers such as stop controllers where operating a stop directly causes the light to illuminate and MIDI event to be sent to the computer. This is because of the way that virtual organ software handles lighted pistons. Firstly, a lighted stop sends a MIDI note on event when the stop is turned on and a note off event when the stop is turned off again. Consequently it makes sense for the stop controller to illuminate the stop when it sends the note on and extinguish it when it sends the note off.

This is not the case with pistons though. A piston will send a note on event when it is pressed and

then send a note off event when it is released. The computer running the virtual organ software will receive that midi note on/off pair and see that as a piston press, to which it has to respond by first setting the required registration and then making an intelligent decision as to whether to illuminate the piston. This becomes obvious when one considers the role of the piston in question. For example it may be one of a set of general pistons or it may be one of a set of divisional pistons. Let us examine a simple scenario. We have 16 pistons arranged as two sets of 8 pistons. Set one are Swell pistons and set two are Great pistons. The actual pistons and the piston controller have no knowledge of these roles that are assigned to these pistons. They can't have because the same pistons may have different roles when different virtual organs are loaded, and therefore need to behave differently for each virtual organ. So, back to our scenario I press piston 1 which is the first Swell piston. That piston should now illuminate. I then press piston 2, which is the Swell piston number 2 and that piston should illuminate and Swell piston 1 should extinguish. This behaviour continues throughout the Swell pistons. However if I now press piston 9, which is the first Great piston it should illuminate but the last Swell piston used should not extinguish. This required behaviour makes it impossible for a piston controller to operate it's LEDs in direct response to piston presses, because, as described above the controller has no knowledge of the roles of the actual pistons.

The control of each pistons LED is the job of the virtual organ software and consequently all the piston controller needs to do is either illuminate or extinguish each LED in response to MIDI events received from the virtual organ software. We will see more of this when we look at setting up our lighted pistons with Hauptwerk later in this manual.

All lighted piston activity takes place on MIDI channel 9, with note 0 being piston 0 - up to note 127 being piston 127. Therefore if one presses piston 3 a MIDI note on event for note 3 will be sent by the controller on channel 9, when the piston is released the corresponding note off event will be sent. If the System ONE Control Board receives a MIDI note on event for note 6 on channel 9 then it will illuminate the LED for piston 6. Receiving the corresponding note off event on channel 9 will extinguish the LED in piston 6.

Interface Variants.

There are two variants of the Matrix Lighted Piston interface available, and 4 variants of the Bus Lighted Piston Interfaces. This manual only covers the Matrix Lighted Piston Interfaces with the bus varieties being covered in their own separate manual.

One is for up to 32 lighted pistons and the other is for up to 64 lighted pistons. System ONE supports a total of 128 lighted pistons which can be made up of any combination of the two board sizes, BUT only of a single type; i.e. MATRIX or BUS. In other words **you cannot mix matrix and bus interfaces in a single system.**

The type of interface used is selected by the installer by the setting of a jumper link on the main System ONE Control Board. There are two jumpers that need to be set when using the Matrix Lighted Pistons Interfaces; namely 'LP Mode' and 'LP Polarity'. LP Mode tells the system whether you are using the Matrix type interfaces, if so it is placed in the rear-most position, or the Bus type interfaces, in which case the link must be placed in the front-most position. No damage will be caused if the interfaces are connected with this link in the wrong position but odd behaviour will result and the pistons will not work until the link is correctly placed.

Polarity.

The matrix of the lighted piston controller requires that diodes are fitted to each piston as is the case with all matrix based controllers. These diodes can be fitted in two different orientations; either with

their cathodes connecting to the column line, be that directly or via the piston switch, or with their anodes connecting to the column line, again directly or via the switch. So far as the Matrix Lighted Pistons Interfaces are concerned it does not matter which way these diodes are connected so long as they are all connected in the same orientation and you tell the System ONE Control board which way they are installed. This is done via the 'LP Polarity' jumper on the System ONE Control Board as shown below. This setting only affects the operation of the piston matrix NOT the operation of the pistons LEDs. If pressing your pistons does not result in any midi being sent as monitored from the System ONE Controllers' Serial monitor, then try setting the 'LP Polarity' jumper to the opposite position ***and restart the System ONE Control Board*** as without restarting it will not know that you have changed anything!

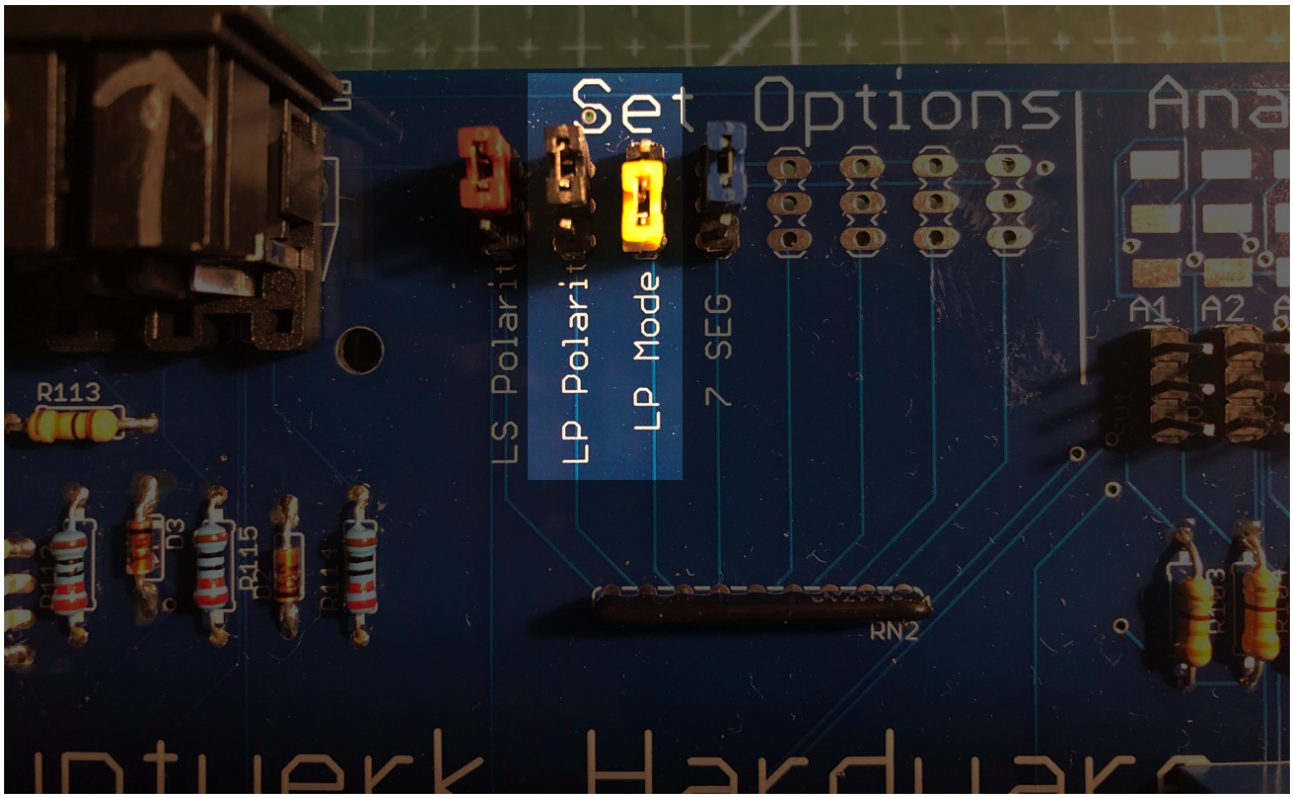


Illustration 2: Lighted Pistons Interface setting jumpers

Connections.

As with most of the System ONE boards there are two RJ45 connectors on the left of the board and these are used to connect the board to the System ONE control board and for daisy chaining.

As can be seen from Illustration 3 below there are three IDC type connectors on the interface. The one placed toward the lower left of the board and is for the connections to the matrix. This is a 16 pin type, and is labelled 'Tutti Compatible Connector'. This means that it has the same pin layout as the sockets used on the Tutti encoder and therefore Tutti accessories, such as the Tutti Connection Strip can be used. The reason for using a Tutti Connection Strip would be if you had to create the matrix yourself because the organ had bare unconnected pistons. The Connection strip contains all the diodes and creates the matrix for you allowing you to simply connect the wires from the pistons directly to the connection strip without having to worry about adding diodes. The other two 16 pin sockets are placed to the right of the board, and these are for the LED connections. Their primary use is with the System ONE Incandescent Lamp Driver boards, but they can be used to connect the

piston LEDs via 16-way ribbon cables if required. Together these three 16 way IDC headers allow the Piston Interface to be connected using all ribbon cables and, if desired using a Tutti Connection strip, and/or Incandescent drivers.

Below is a picture of the System ONE Matrix Lighted Pistons 32 Interface.

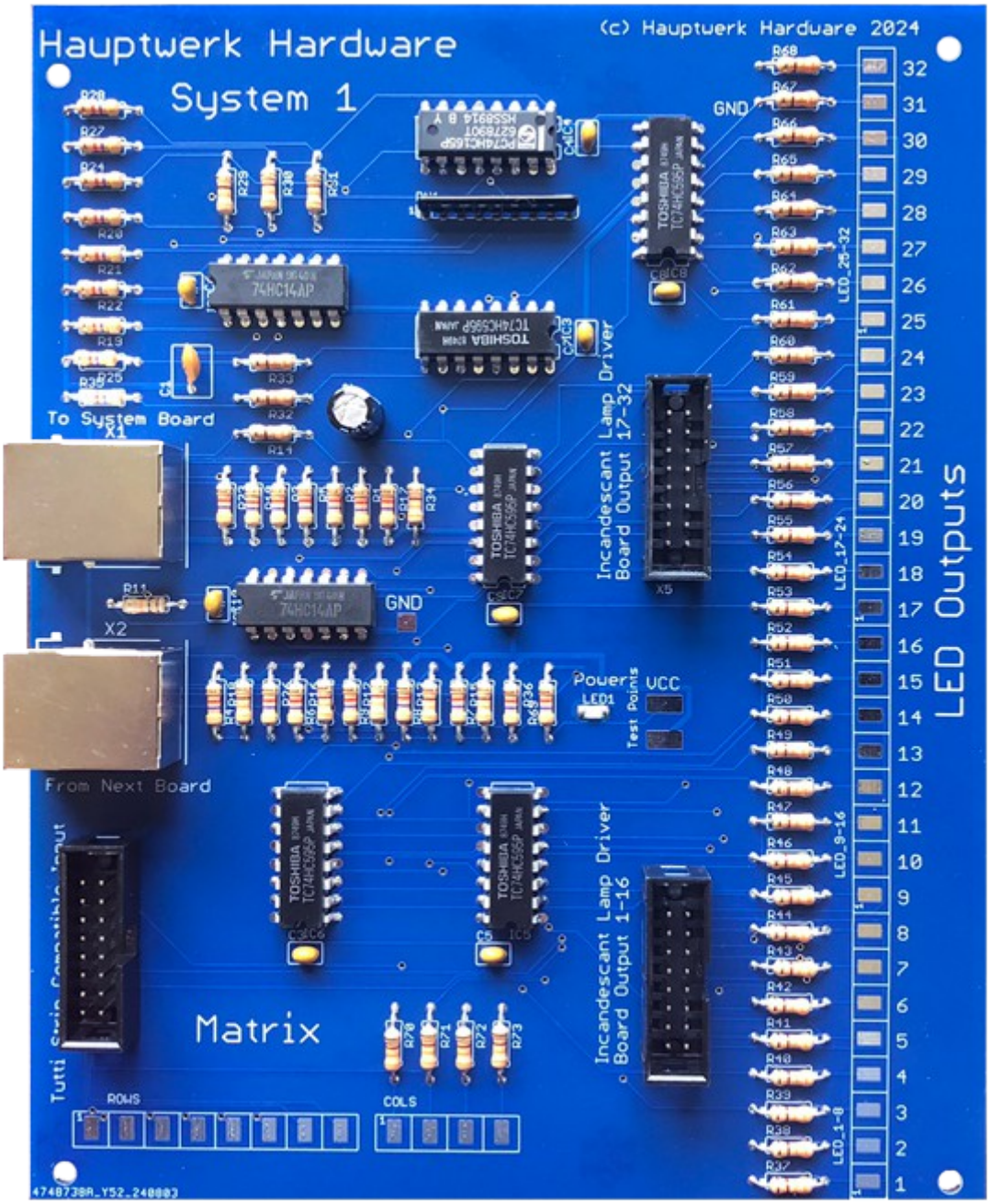


Illustration 3: The System ONE Matrix Lighted Pistons 32 Interface

The other way to connect these boards though, and probably the one most used are the solder pads provided around the edges of the board. The LED outputs are provided up the right side of the board and all are protected by 330R resistors. This means that you can connect LED's directly to the board without needing to add series current limiting resistors. Although the output from the LED solder pads is only 5v it is acceptable to directly connect pistons with in-built LEDs, which are usually rated at around 12v, and due to the high efficiency of modern LEDs they usually give sufficient light output. This is a bonus as it provides for more options when choosing pistons for a

new installation.

The 8 x 4 matrix.

In order to control 32 pistons we require a suitable matrix. As most commercial matrices use an 8 by X configuration it would seem logical to follow this and use an 8 x 4 matrix. That is how the lighted piston controller is designed and so there are inputs for 8 rows and 4 columns. These are available from the solder pads to the lower left of the board as well as from the Tutti Compatible 16-way IDC socket. In the case of the IDC socket only the first four column inputs are connected, meaning that if you use a Tutti Connection strip only the first 32 inputs will function.

The 64 piston variant.

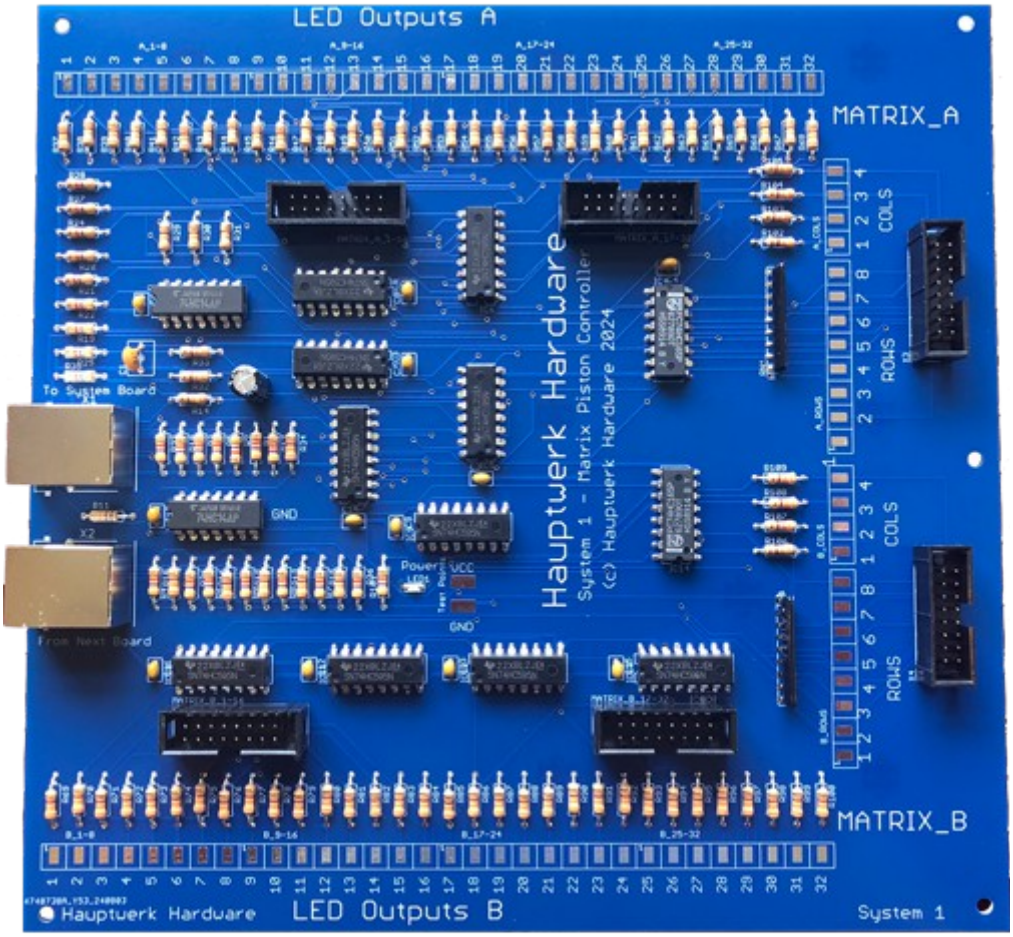


Illustration 4: The System ONE Matrix Lighted Pistons 64 Interface

Above is a picture of the 64 piston interface. This is basically two 32 piston interfaces on the same board. There are two 8 by 4 matrices and each one has it's own input solder pads for the 8 rows and 4 columns. These are located along the right side of the board. Further to the right there are two 16 way Tutti compatible input sockets. The lower set of solder pads and associated socket are for the second matrix labelled 'matrix B', the upper set is for Matrix A. The LED output solder pads for Matrix B are located along the bottom edge of the board. Above these solder pads are two 16 way header sockets and these carry the Matrix B LED outputs for use with the 'Incandescent Lamp Driver' boards. The top edge of the board carries the solder pads and 16 way sockets for the LEDs

of Matrix A. Functionally the 64 piston variant operates in exactly the same way as two of the 32 piston boards daisy-chained together. The midi output from Matrix A runs from 0-31 and that from matrix B from 32-63.

Daisy-Chaining.

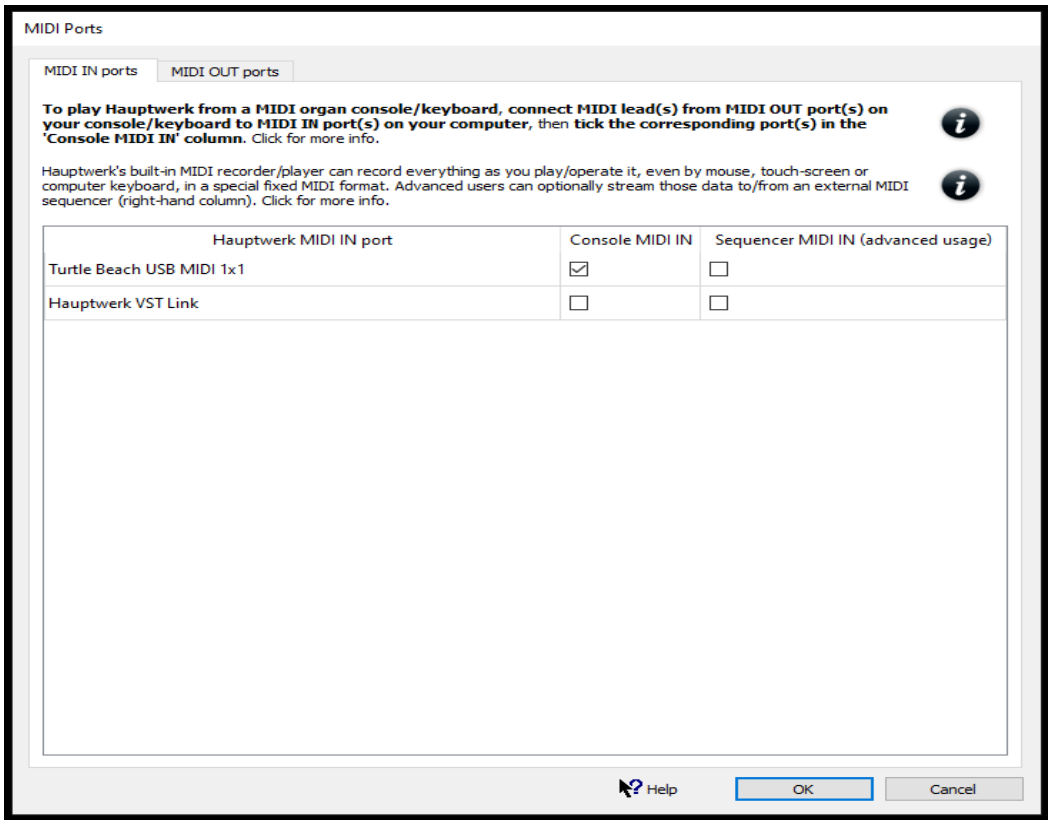
Lighted Piston interfaces, like most all other System ONE interfaces are able to be daisy-chained together. Lighted piston interfaces can be daisy-chained together up to a maximum of 128 lighted pistons and piston 1 will be the first piston on the first board in the chain, that is the one nearest the controller, is designated as piston 1 by the piston controller. Likewise the first piston on the next board, if fitted, will be assigned the number piston 33 or piston 65 depending on whether the first interface is a 32 piston or 64 piston one. This is easily done by simply plugging each board's 'To Encoder' socket into the previous boards 'From Next Board' socket. There is no programming required, the system will automatically 'see' all your interfaces and configure itself accordingly at boot time.

Configuring your lighted pistons in Hauptwerk.

In the following examples I have used a 'Turtle Beach USB Midi 1x1' 5 pin DIN to USB adaptor.

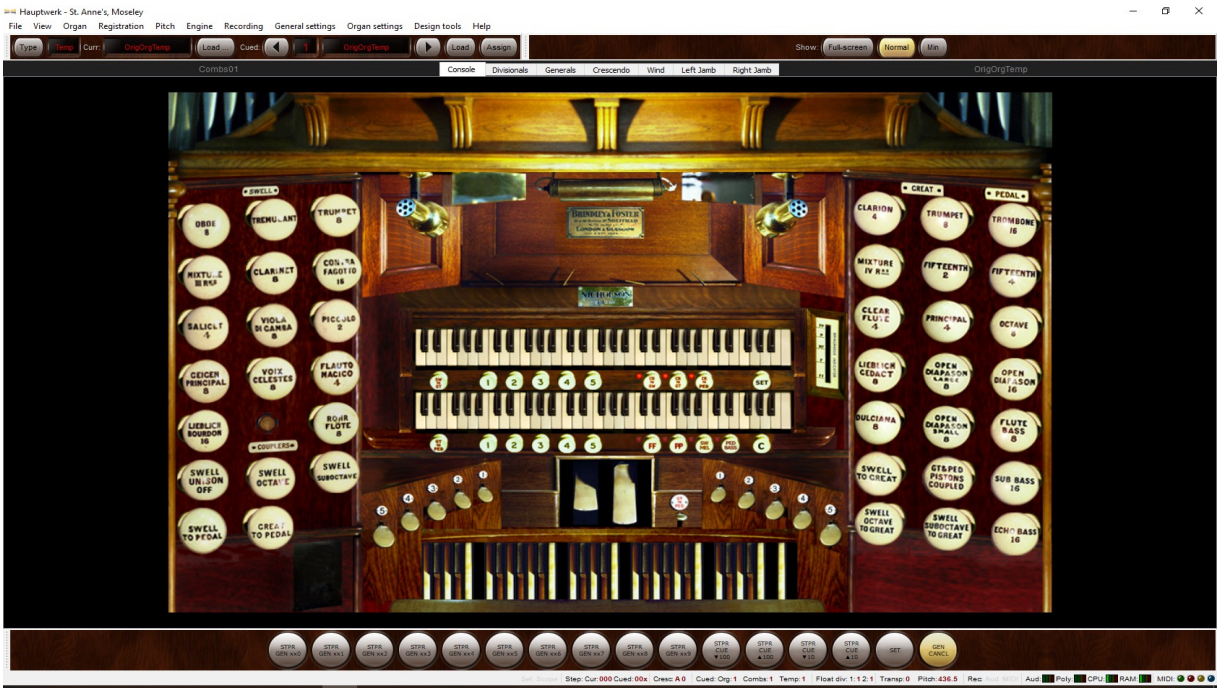
You will remember from the 'System ONE Control Board' user manual that there are two midi connectors on the board. One is USB midi which carries midi from the manuals only, and the other is a legacy 5 pin DIN interface which carries the midi for everything else. This is the one to use for the lighted pistons.

Once you have your midi interface connected, the first thing to do is to tell Hauptwerk that you want to use the midi from your System ONE Control Board to control the virtual controls on your computer. Open Hauptwerk and from the 'General Settings' menu select 'Midi Ports'. That will open a window that looks like the one below.



Tick the box for 'Console MIDI IN' for your USB Midi adaptor, as shown above. Then click the second tab at the top of the window labelled 'MIDI OUT ports'. This will reveal an almost identical screen but this time click the 'Console MIDI OUT' box. Once done click the 'OK' button.

You have now told Hauptwerk that you want to use your USB Midi adaptor for both incoming and outgoing midi commands. Everything is ready to proceed, so now load an organ – I have used the 'St Annes Moseley' organ that is bundled with the Hauptwerk software. Once the organ has loaded we can take a look at what can be done with the pistons on this organ.



As can be seen in the picture there are thumb pistons on both manuals and some toe pistons. One *could* assign some of our lighted pistons to these pistons but the results would be disappointing.

Looking at the on-screen representation of these pistons we can see that they are not lighted types but simply the usual push button ones. This means that they are modelled in the virtual organ representation as simple buttons with the software having no idea of how to control any lamps that may be connected to them. Whilst they do have the ability to configure a midi output which matches their midi input it is of little use.

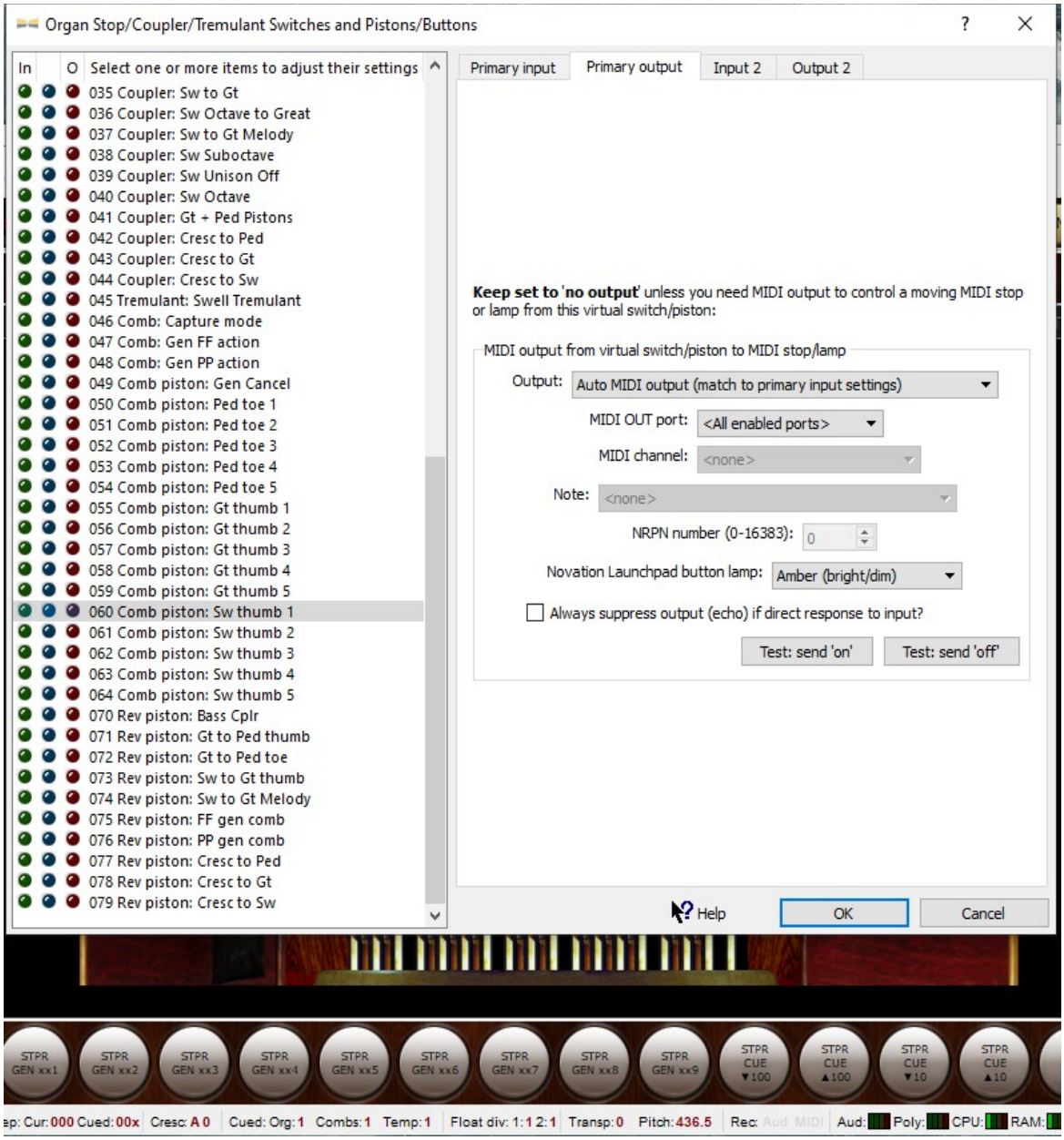


Illustration 5: Hauptwerk midi SEND setup screen for an unlit piston.

If we set the midi output for any of the pistons depicted on this virtual organ to match their input then one might expect that this would be all that is required, after all it works fine for stops! In fact all that happens is that when piston is pressed and Hauptwerk receives the resulting midi event, the Hauptwerk software will then send a midi on event back to the controller, thus lighting the piston BUT as soon as the piston is released and Hauptwerk receives the midi note off event it will send the same back to the controller and extinguish the piston. This results in the piston only being lit

whilst it is pressed. Not a lot of use really!

The reason this happens is that Hauptwerk sees the piston as simply a button which it expects to be pressed and released and when it is it reacts by setting the registration programmed to that piston but nothing more. This is, after all what would happen ordinarily when a standard piston is pressed, so it is reasonable that this behaviour is modelled within the virtual organ.

If we want lighted pistons to work in a logical, and useful manner then we need to use a different feature found within Hauptwerk.

Hauptwerk Scoped Pistons.

The answer to our requirements lies in a Hauptwerk feature called scoped pistons. By default there are 60 scoped pistons available for use with an organ. These can be set up as generals, divisionals or a combination of both. For our purposes though I will just show how to set up a couple of them and leave you free to decide how you can best use them for your own organ install.

From the 'view' menu in Hauptwerk open the 'Mini Control Panels' submenu and select 'Master scoped combination bank A' as shown below.

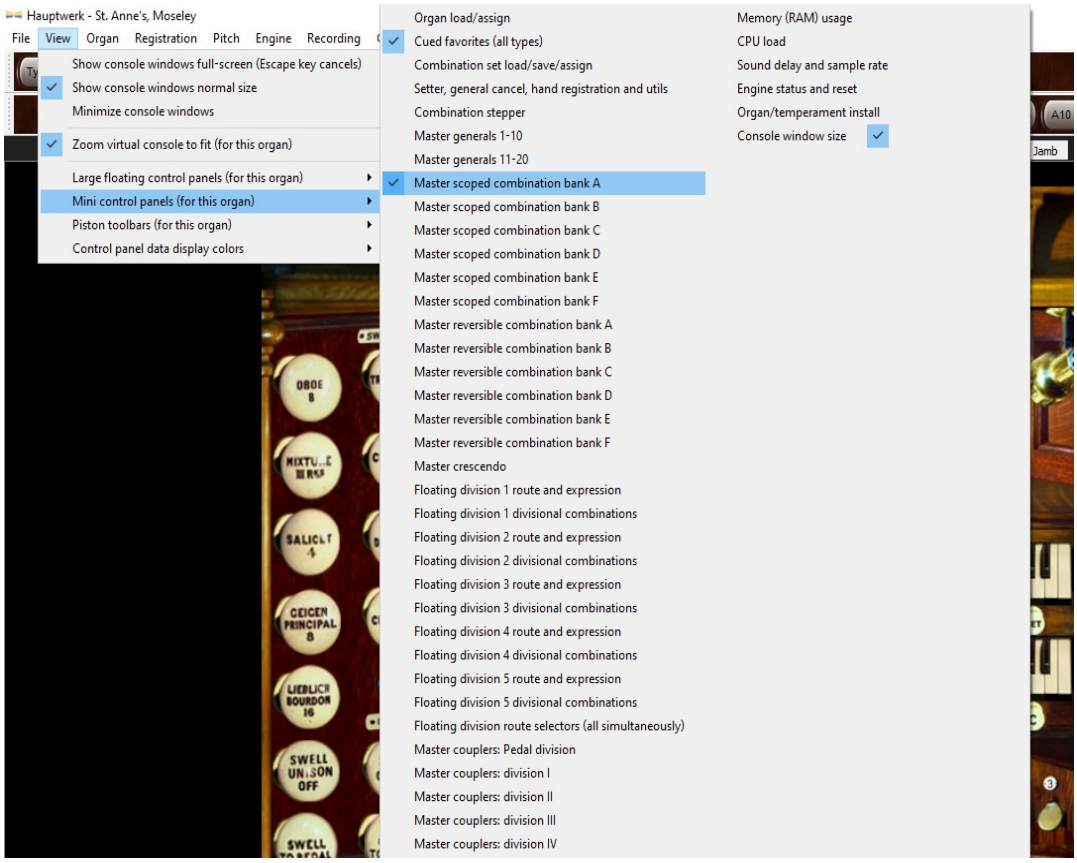


Illustration 6: Hauptwerk 'Mini Control Panels' menu

Once this option has been chosen you will see an additional panel along the top of the Hauptwerk console screen containing 10 pistons labelled A0 through A10. These can be set up as divisional or general pistons and are generals by default. The important thing though is that they support lighted buttons. For information on how to configure them as divisional, generals etc. have a search on YouTube as a couple of people have made good videos about how to do that, or if you're feeling adventurous take a look at the Hauptwerk user manual.

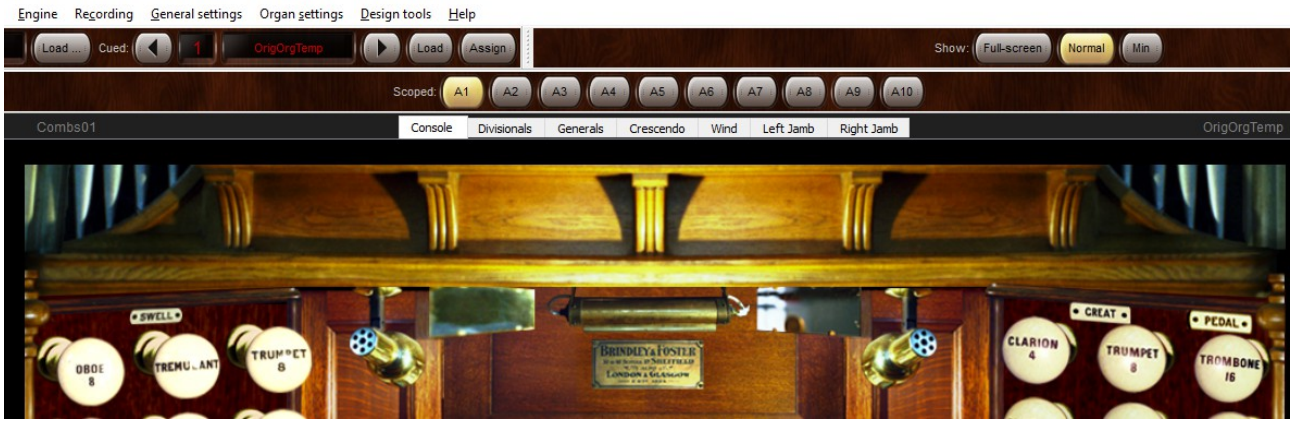


Illustration 7: Hauptwerk Console screen showing Scoped pistons A1-A10 at the top.

In the next picture I have set a simple registration on piston A1, and pressed A1 to select it. You can see from the picture that the A1 piston is active by the different colour it displays compared to the other scoped pistons. Additionally you can see the stops that I set for A1 are now 'pulled'.

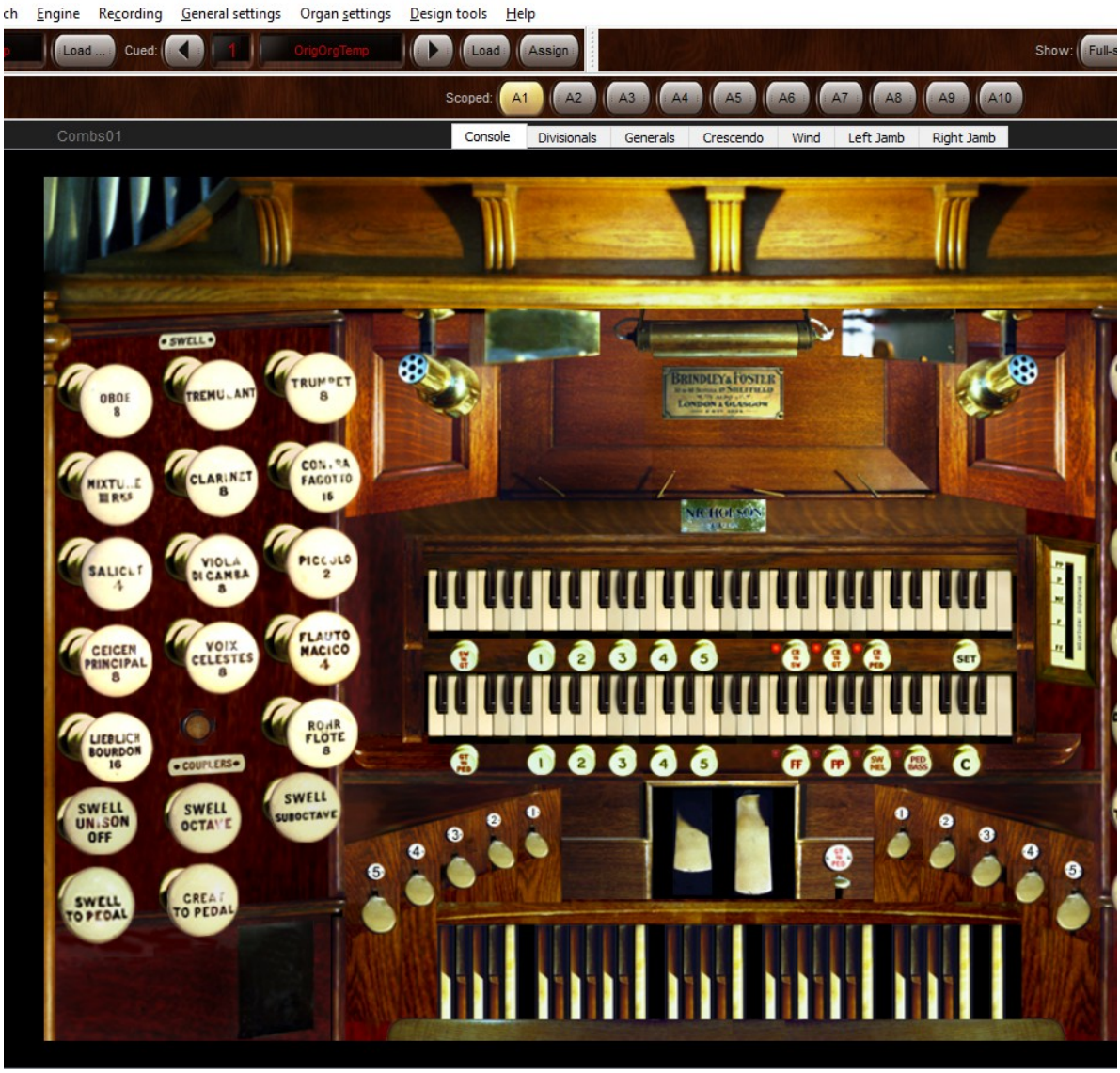


Illustration 8: Hauptwerk Console screen with Scoped piston A1 active

We can set the other scoped pistons in the same way and their state is reflected when they are pressed as one would expect. If General Cancel is pressed then all pistons are reset to their off state and they will illuminate whenever they are pressed or at any time when the registration they have stored is active.

So, now we have pistons with the desired behaviour we can assign our physical lighted pistons to operate them. Right click on one of the scoped pistons and you will see the familiar menu.

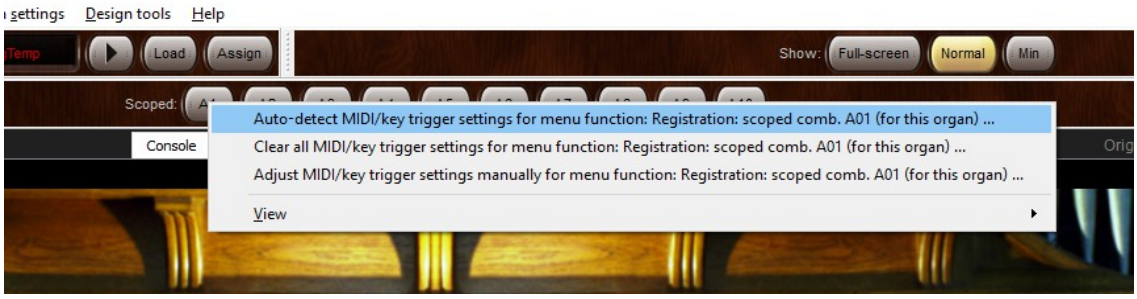


Illustration 9: Hauptwerk midi autodetect for scoped piston A1

Select the first option 'Auto-detect...' This will open a new dialogue box as in the next picture.

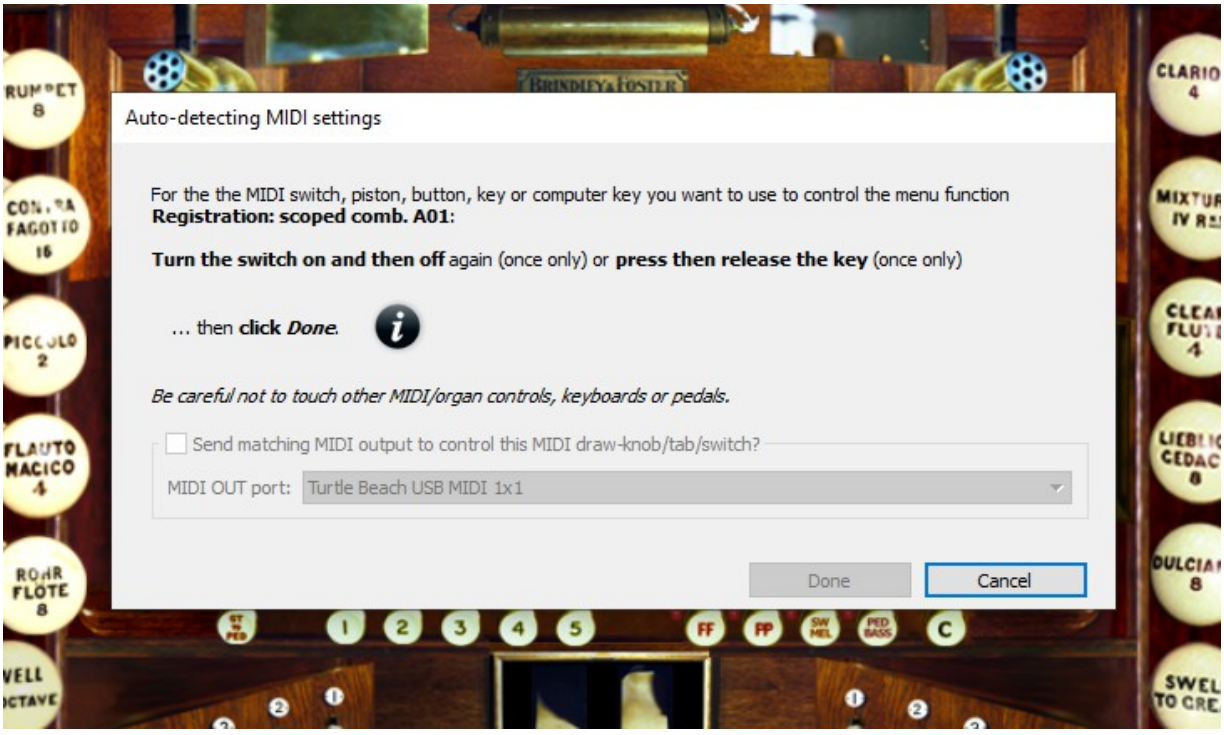


Illustration 10: Hauptwerk midi autodetect - waiting for piston press

Once you see this box you will notice that the 'Done' option is greyed out, along with other options. This is because Hauptwerk is waiting for you to operate the piston. Press and release the piston and you will see that the 'Done' button becomes available, i.e. no longer greyed out. Notice the last option 'Send matching MIDI output...' Make sure that this is ticked and select the 'MIDI OUT port' to be your USB to Midi adaptor. Once you have done this your screen should look like the next picture.

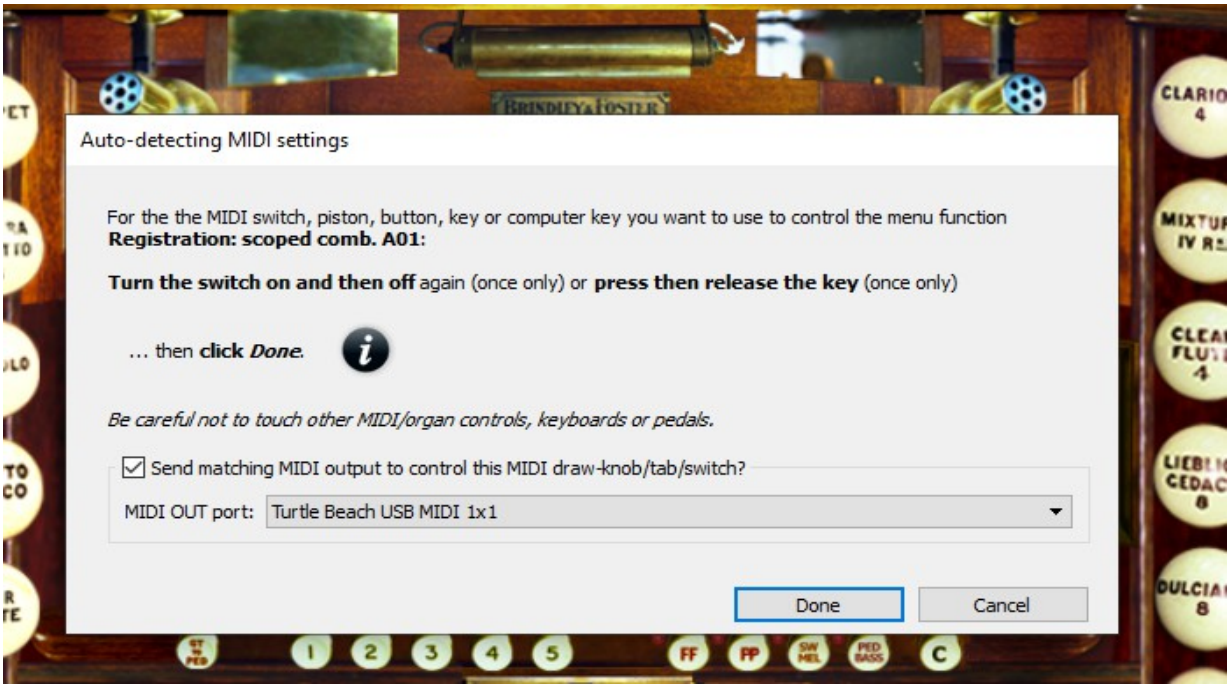


Illustration 11: Hauptwerk midi autodetect complete

That completes the assignment of your first physical lighted piston. Now go on to configure the others in the same way. You will see now that as you operate the physical pistons that the required registration is selected and the relevant piston lights up.

Troubleshooting tip.

If for any reason your pistons fail to illuminate there are a couple of ways for you to identify the problem. Let's take a look at what we can do.

The first place to start would be to make certain that Hauptwerk is setup and sending the midi correctly. We can look at and test the settings for each element within Hauptwerk. Starting Hauptwerk from the console screen right click the troublesome piston and you will see the now familiar menu as below.

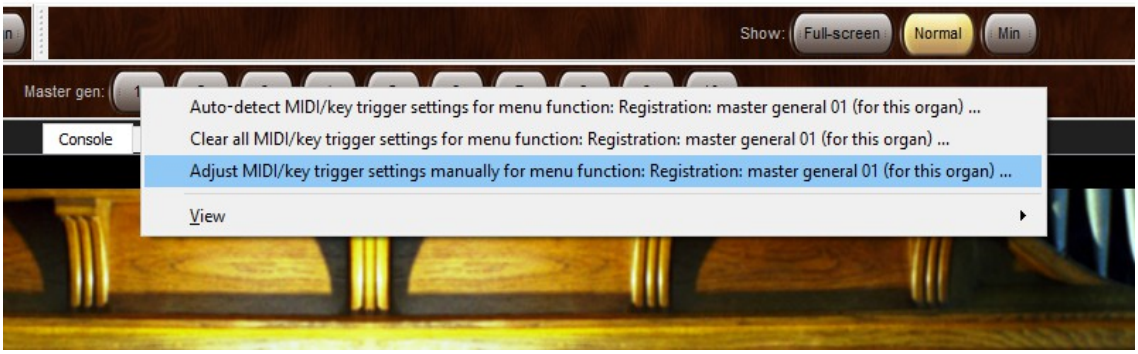


Illustration 12: Hauptwerk midi autodetect piston A1

This time select the last option 'Adjust midi settings manually'. That will open a new window as

shown below.

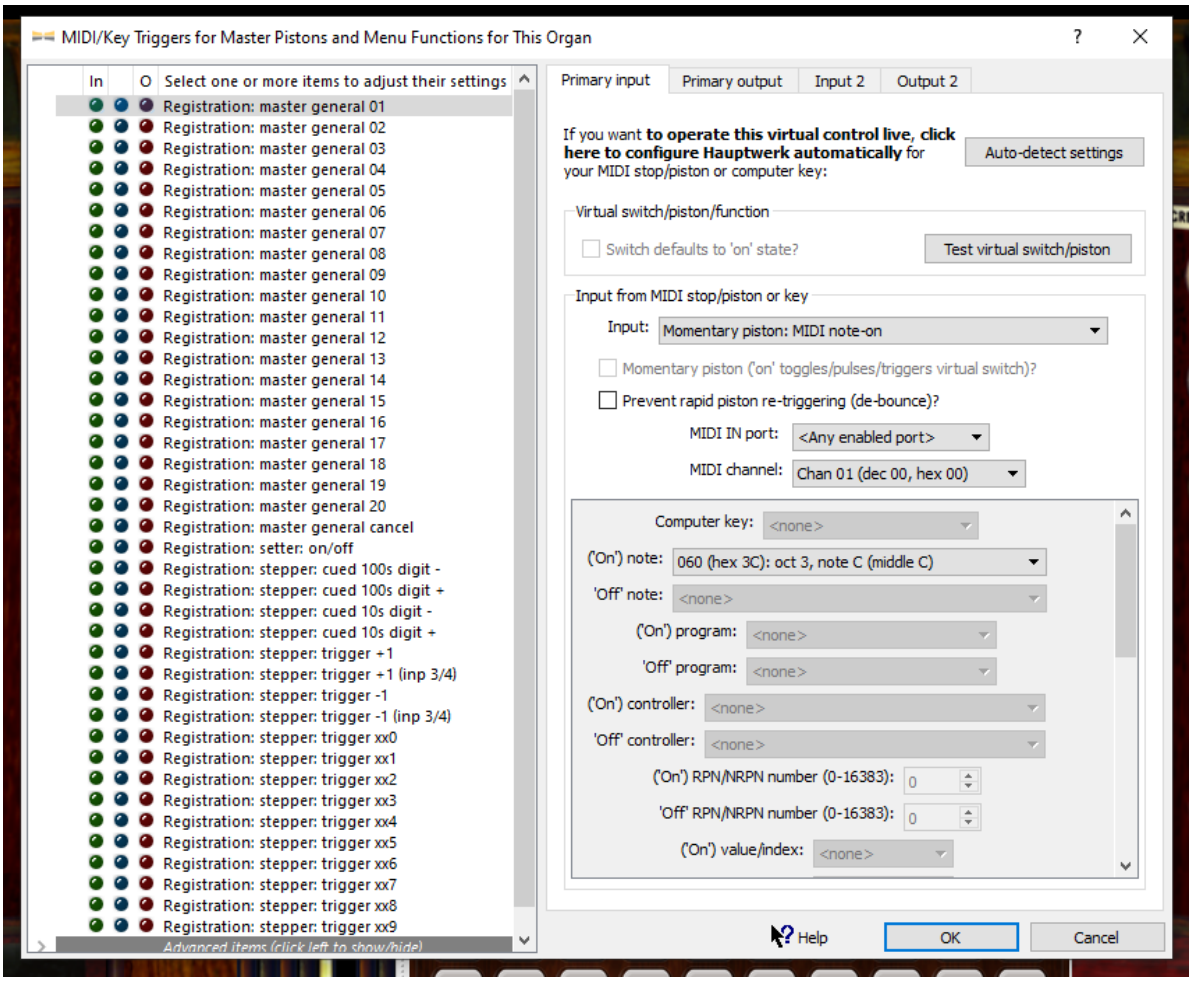


Illustration 13: Hauptwerk midi primary input screen

This is the manual midi adjustment screen and at the top you can see there are four tabs. This is the input tab where we select the correct parameters for the midi message that Hauptwerk is expecting for the particular piston. From here we can check that the parameters are correct and match those expected and sent from the System ONE Control board. We can see what it is sending by monitoring it's serial output. This is covered later in this manual. If the piston works in triggering the on-screen control but is not lighting we need to check the midi being sent from Hauptwerk. To do so click the 'Primary output' tab at the top of the screen. That will display the window as shown below.

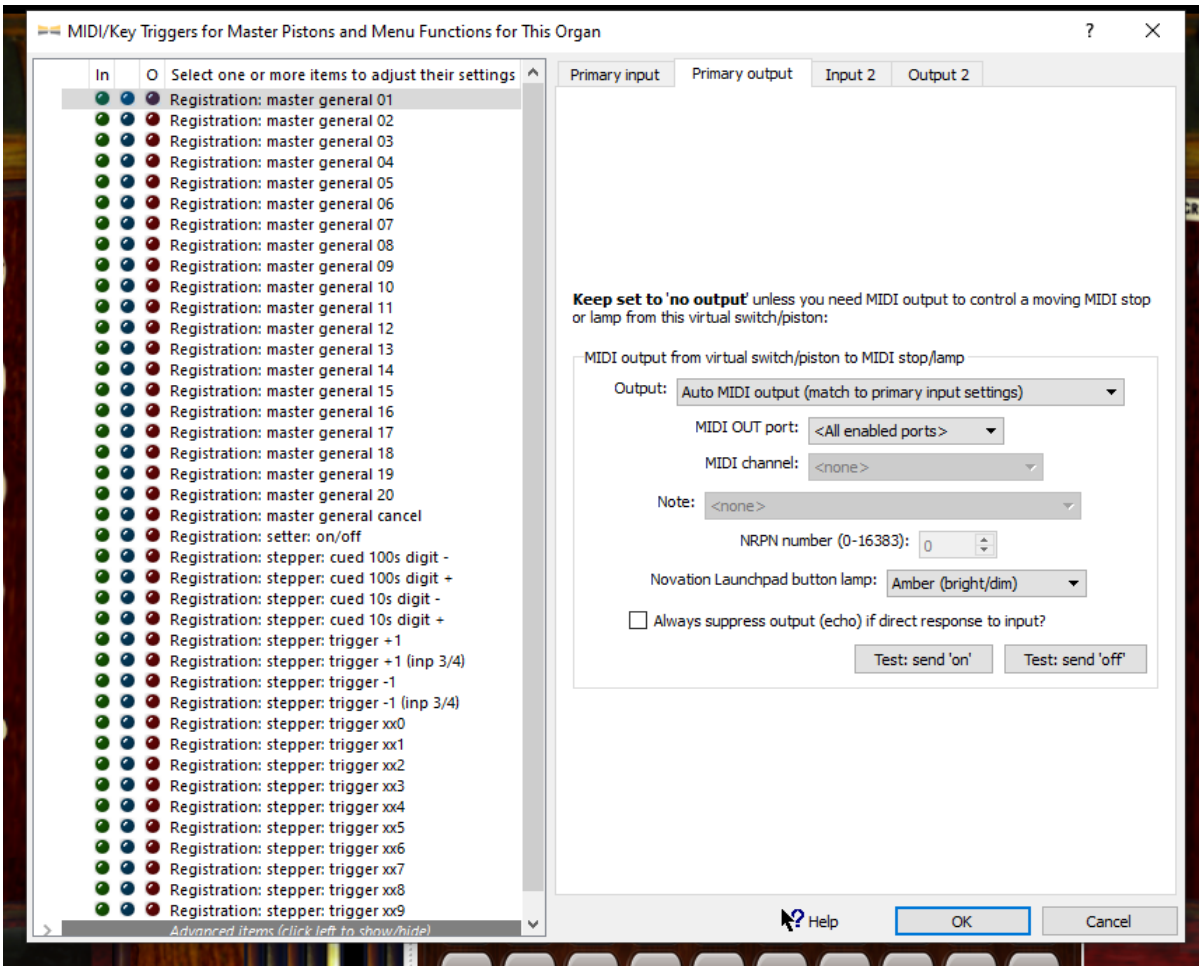


Illustration 14: Hauptwerk midi Primary Output screen.

Make certain that the 'Output' box has 'match to primary input settings' selected. If it has then you have two useful buttons at the bottom of the window, namely 'Test: send on' and off. Pressing the on button will cause Hauptwerk to immediately send the midi event which should light the piston. Off obviously has the opposite effect. If you are still having problems take a look at the data from the System ONE Control board serial monitor.

Monitoring MIDI events using the System ONE Serial monitor.

All the activity taking place with the midi in and out of the System ONE control board can be monitored by using a serial monitor such as PuTTY connected to the USB Comms port of the control board. This makes it possible to easily find problems with your system because if you can see the correct midi going into your control board you know that your computer running the virtual organ is working correctly and so is your midi to USB interface. For details of how to connect and setup your serial connection see page 8 of the System ONE Control board Installation and user manual available free from the downloads page of the website.

Once you have your serial connection setup you can monitor the midi events that pass between the control board and the computer running Hauptwerk. Take a look at the next picture.

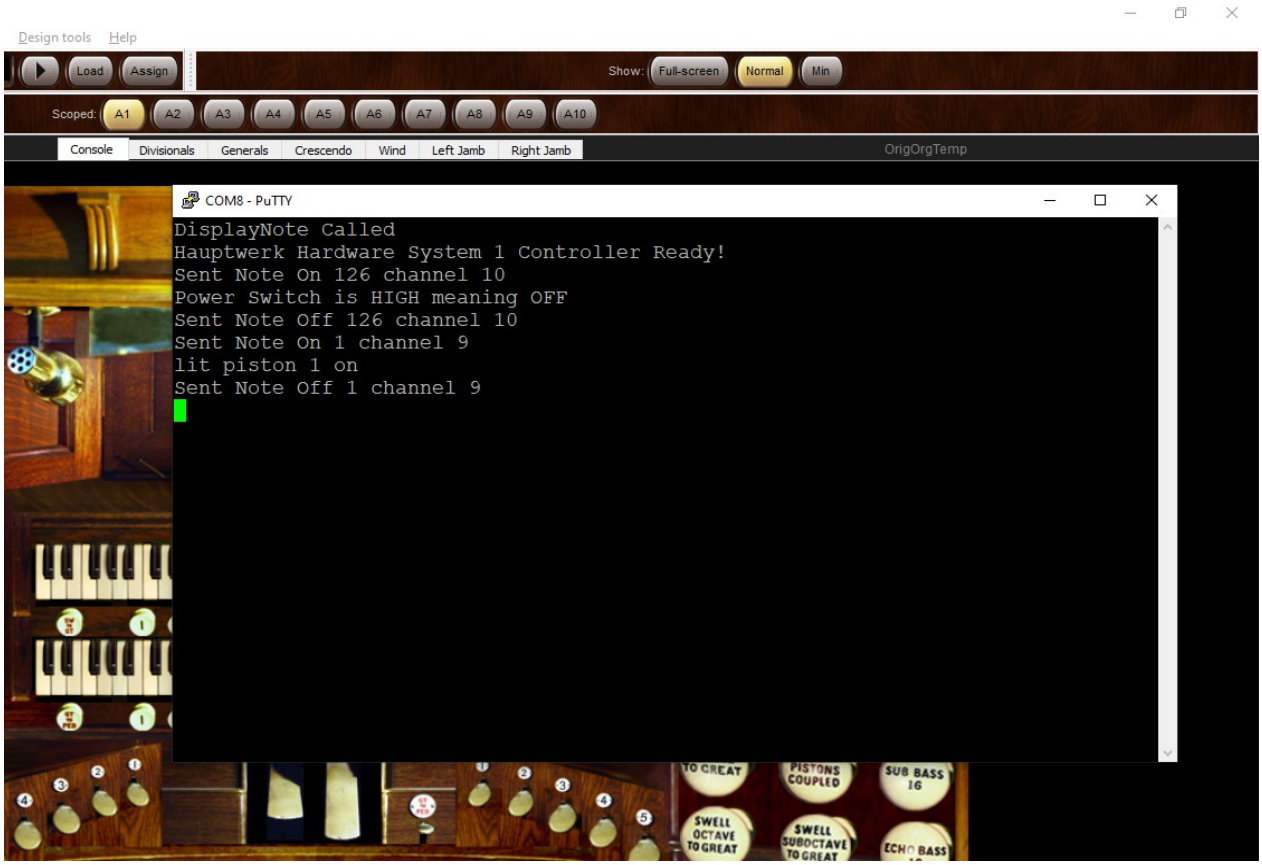


Illustration 15: Midi events seen on the System ONE Serial Monitor

The display above shows the midi events that took place when I pressed the physical piston assigned to the A1 scoped piston in Hauptwerk. Let's analyse them.

The first five lines are the usual output expected when the Controller starts up and refer to some midi power management events as well as a message saying the controller is ready.

The next line 'Sent Note On 1 channel 9' is the midi event which the controller sent to Hauptwerk when I pressed the piston. Since we see that line we know that the piston is connected and working.

The next line 'lit piston 1 on' was printed when the controller received the midi event from Hauptwerk and illuminated the piston. If the actual piston is not alight now then we know the problem lies with either the wiring between the piston and the lighted piston interface or the piston LED itself.

The next line 'Sent Note Off 1 channel 9' is the midi event that the controller sent to Hauptwerk when I released the piston.

Now lets see what happens when I press piston number 2. What do we expect to see here?

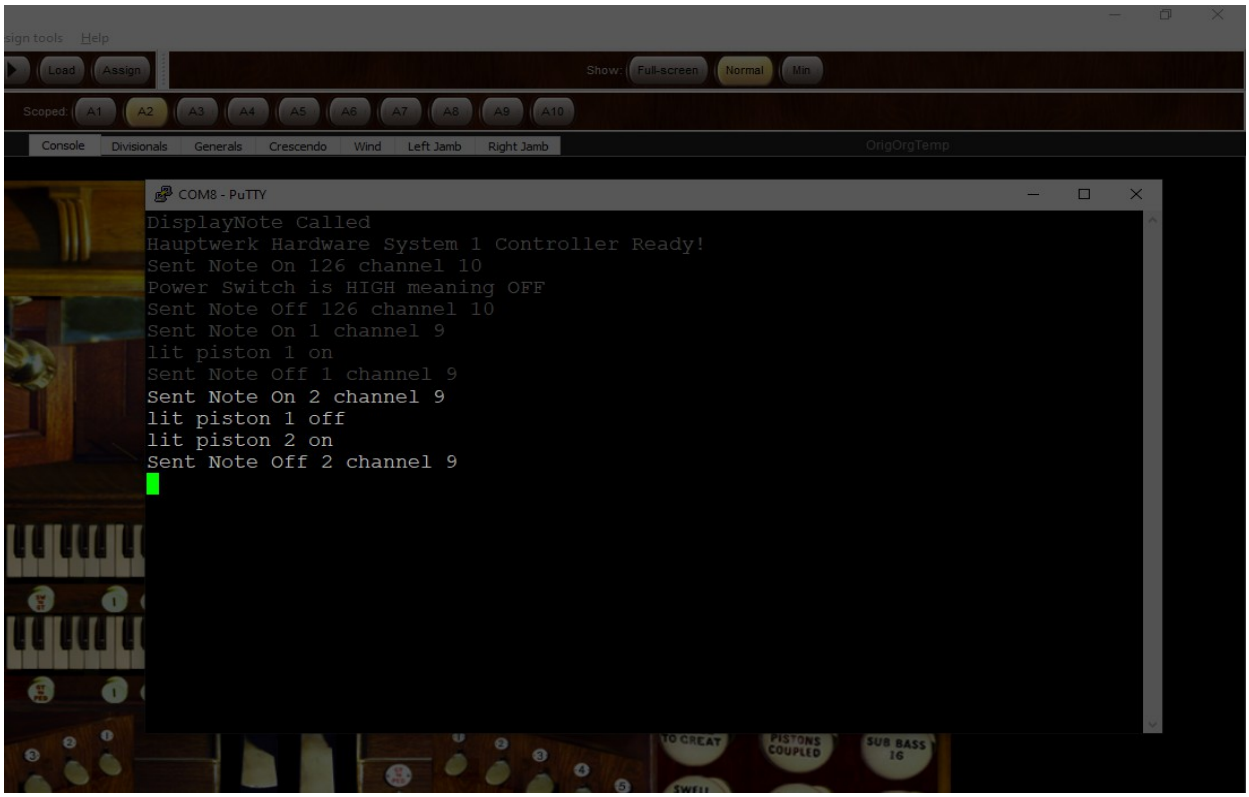


Illustration 16: System ONE Serial Monitor after piston 2 pressed.

The highlighted events are as a result of pressing piston 2. The rest of the text is what we already saw in the previous picture.

When I pressed the second piston the Controller sent a Midi 'Note On 2 channel 9' event. This tells Hauptwerk to press the second on-screen piston A2. You can see that this has been interpreted and executed by Hauptwerk because the A2 on-screen piston is now active as can be seen on the Hauptwerk screen just above the PuTTY window.

Once the A2 piston was activated, Hauptwerk sent two midi events back to the System ONE Controller, these can be seen next in the monitor, 'lit piston 1 off' followed by 'lit piston 2 on'. This caused the System ONE Controller to extinguish the Piston 1 LED and turn on the Piston 2 LED. Finally the controller sent 'Note Off 2 channel 9' when I released the piston.

Finally I pressed the General Cancel piston and the last 3 midi events shown in the serial monitor are the result of this.

First we see the event sent by the controller to Hauptwerk when I pressed the GC piston. 'Sent Note On 9 channel 9'. Hauptwerk received this and executed a General Cancel operation, this is reflected in all the A2 on-screen piston becoming inactive and changing colour to match. Hauptwerk then sent back a midi event to extinguish Piston 2's LED which resulted in the display line 'lit piston 2 off'. The very last line which the controller sent was 'Sent Note Off 9 channel 9' was the result of my releasing the GC piston.

I hope you can appreciate how useful this feature can be in seeing exactly what is going on when the system is in operation if you have any problems, but also how simple it is to configure pistons in Hauptwerk without any technical knowledge of what's happening behind the scenes.

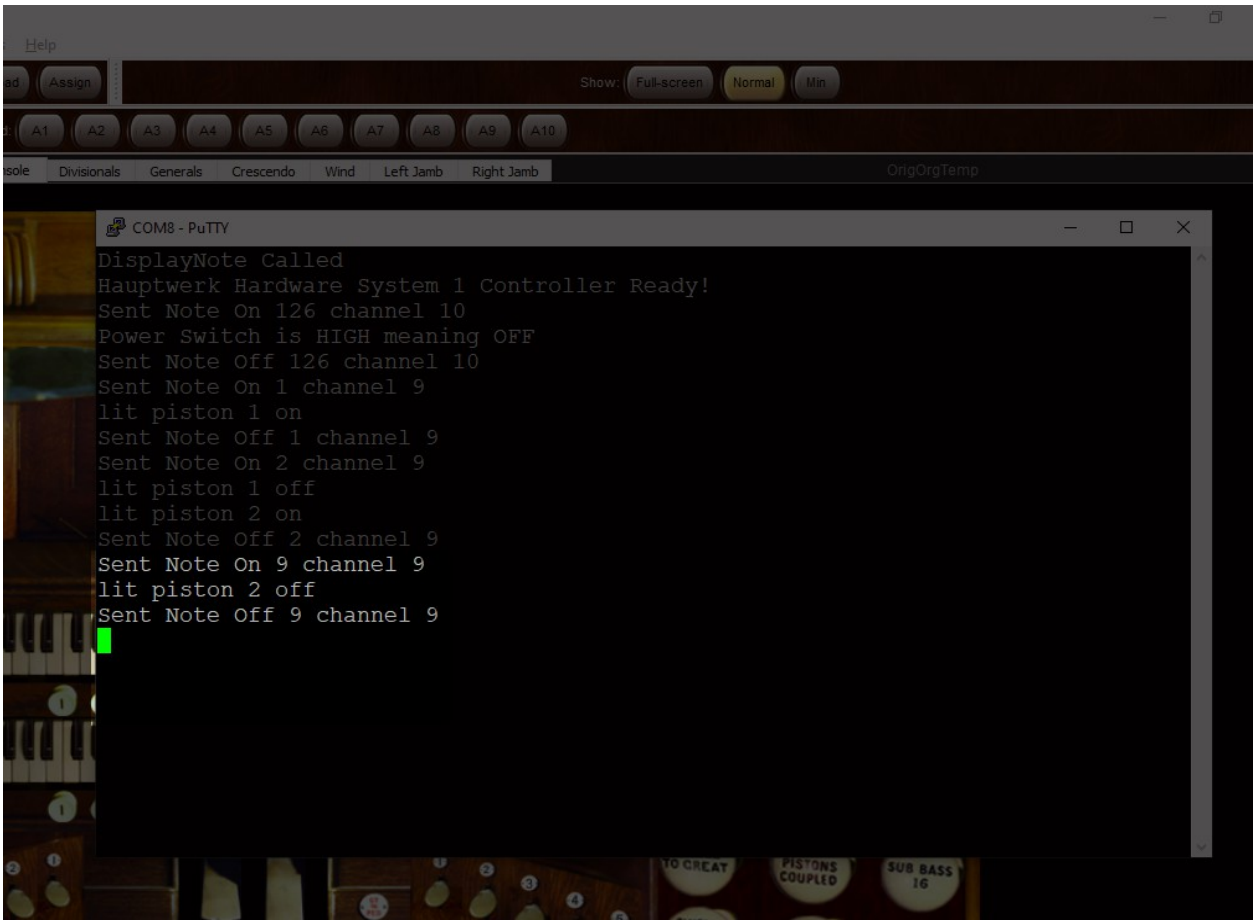


Illustration 17: System ONE Serial monitor following a General Cancel.

That concludes the setup of pistons in Hauptwerk, so lets take a look at how it works in Grand Orgue.

Configuring your lighted pistons in Grand Orgue.

Start by opening Grand Orgue and loading your desired organ. In this example I am going to use the default organ that is downloaded with the Grand Orgue windows installer. Once you have it installed and working you should see a window similar to the one below.

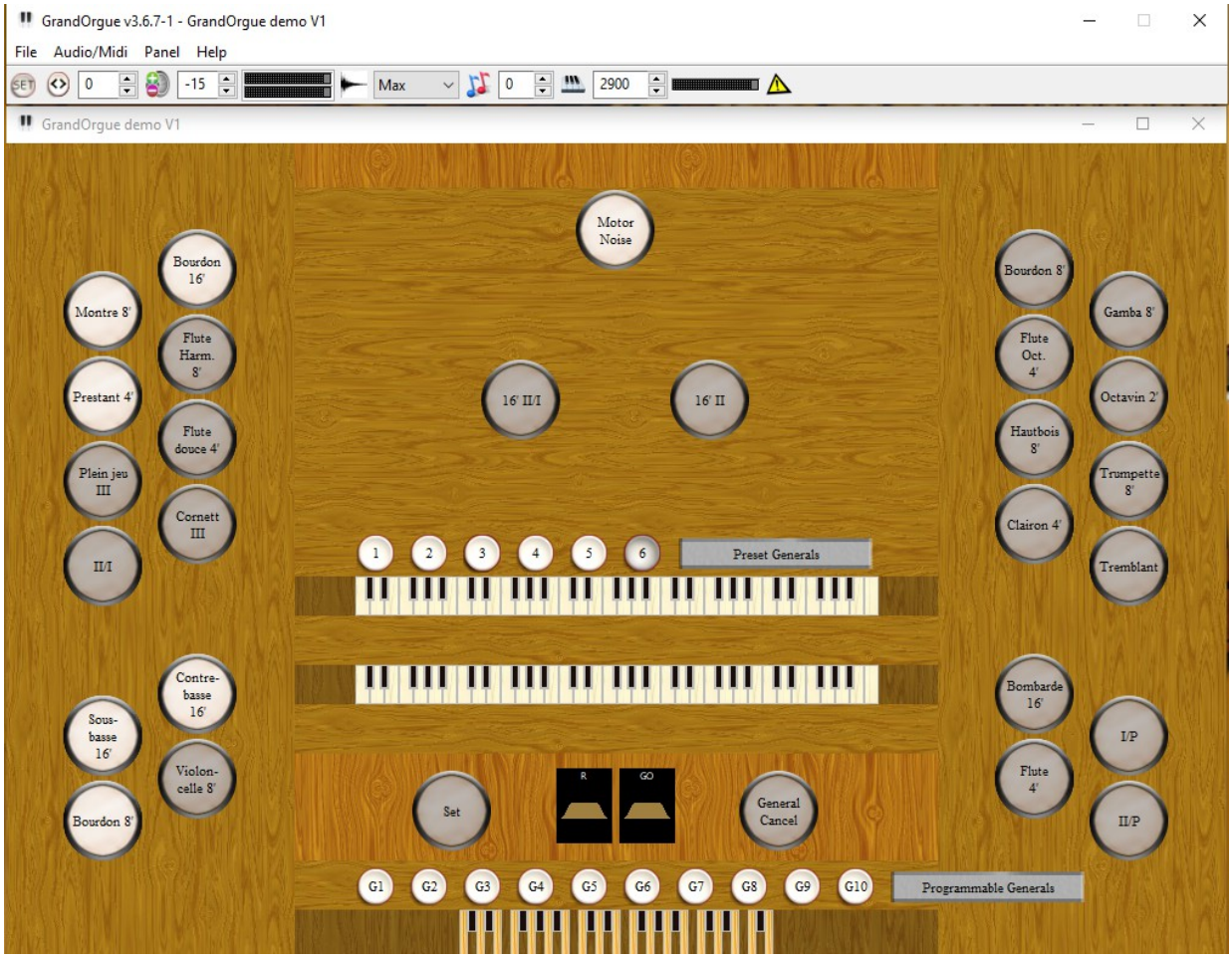


Illustration 18: Grand Orgue main window

The first thing you need to do is to open the Grand Orgue settings window which will spawn a window as shown below.

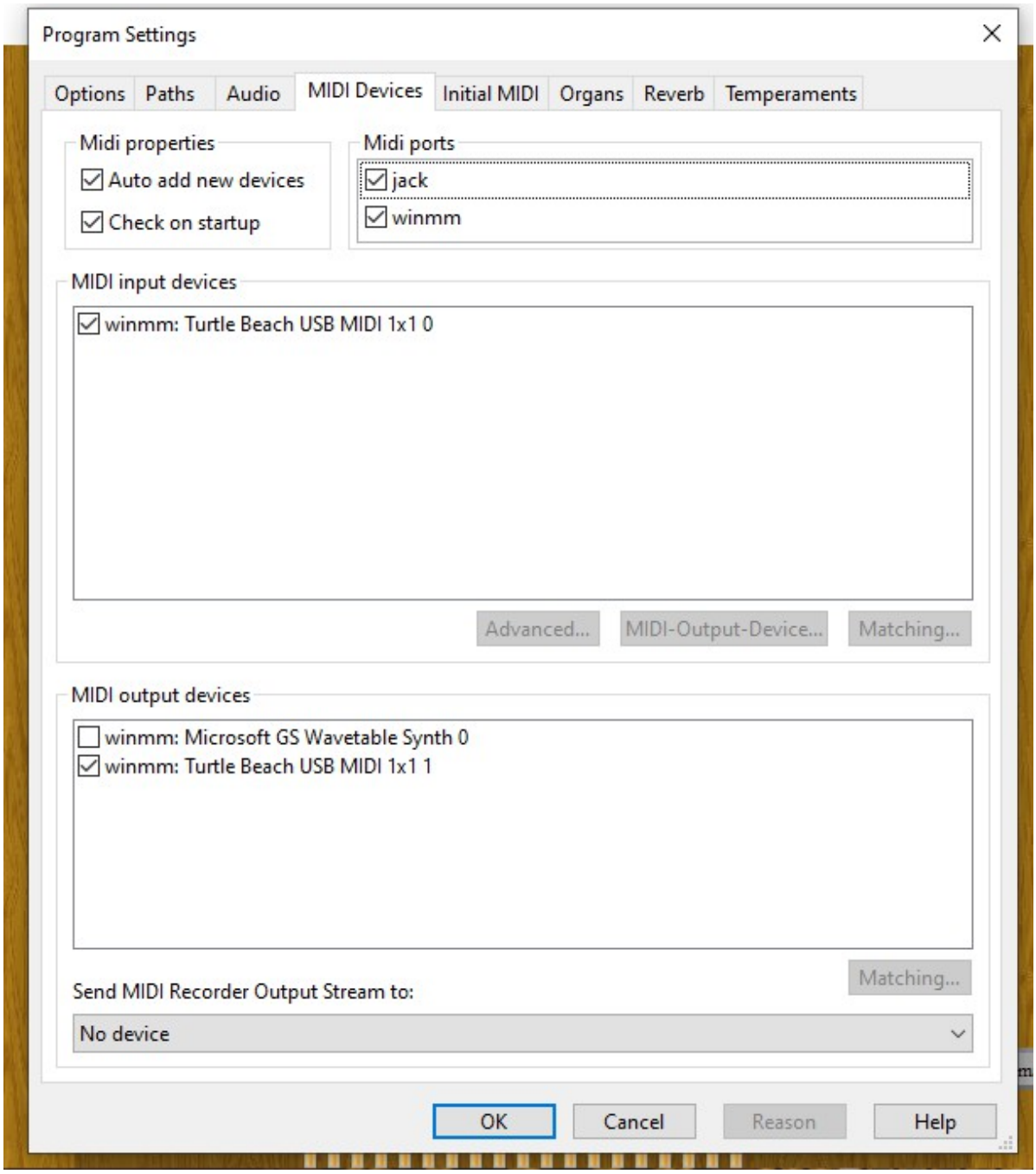


Illustration 19: Grand Orgue 'Program Settings' window

Once the window opens press the 'MIDI Devices' tab at the top of the screen and make sure that the 'MIDI output devices' box has the correct device selected. This is not automatically added when you select the 'MIDI input device' so double check because without the right device selected in the output box your lighted stops won't work!

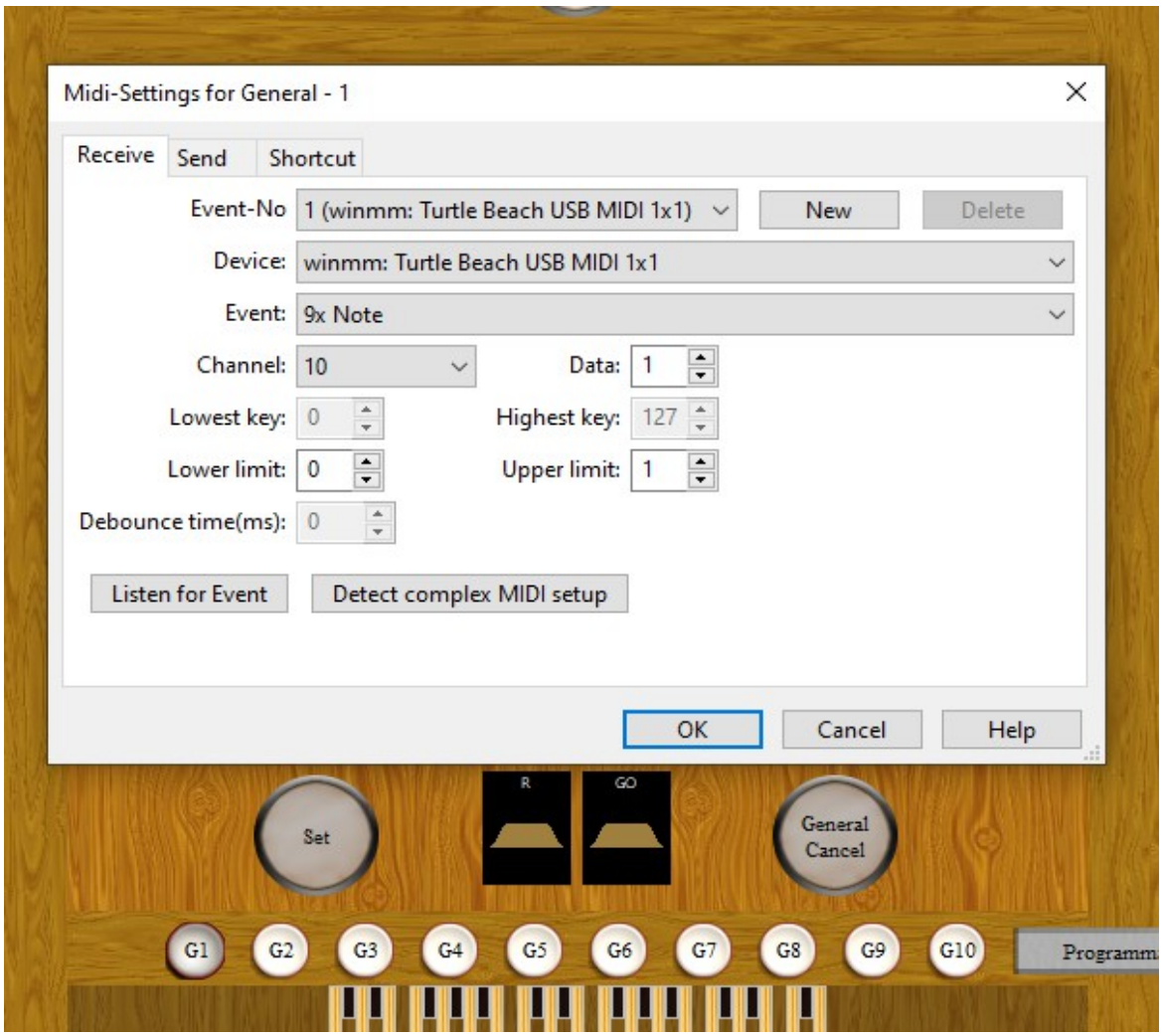


Illustration 20: Grand Orgue right click window.

Right click the piston G1 and you will be presented with the window shown above. Click the 'Listen for Event' then press and release your relevant lighted piston.

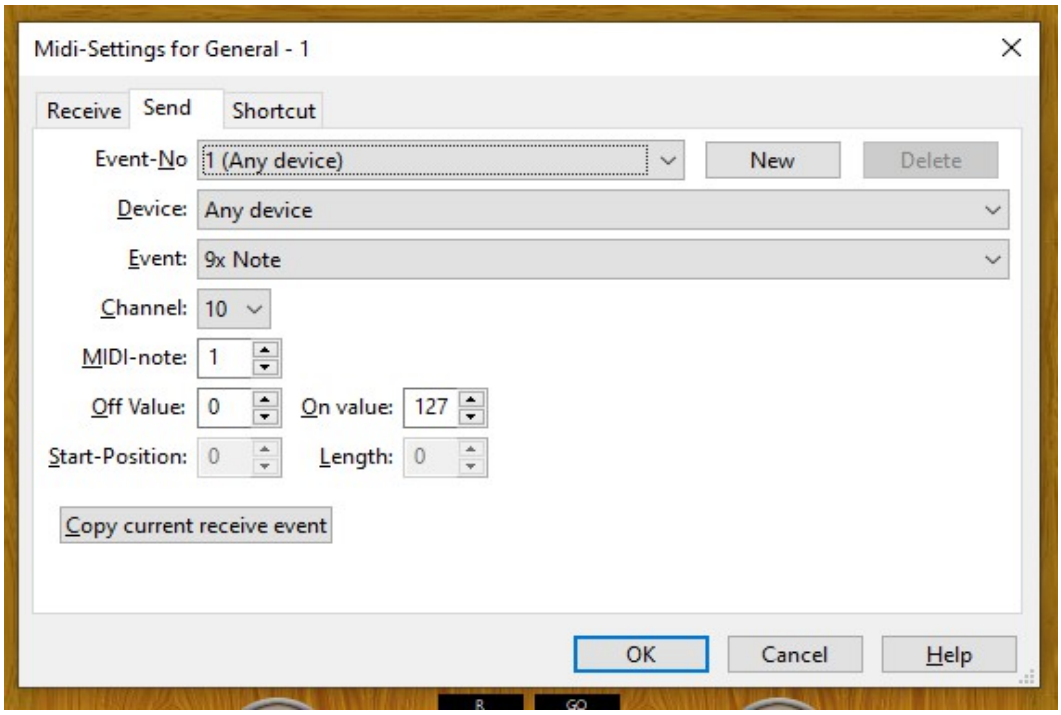


Illustration 21: Grand Orgue MIDI Send Tab.

Now click the 'Send' tab at the top of the window and then click the 'Copy current receive event' button. You can now click 'OK'. Continue to do this for each piston you want to use in Grand Orgue and finally make sure to save your settings before you exit Grand Orgue as the program does not automatically do this for you as Hauptwerk does and if you forget you will lose all the hard work you just did in setting it up!

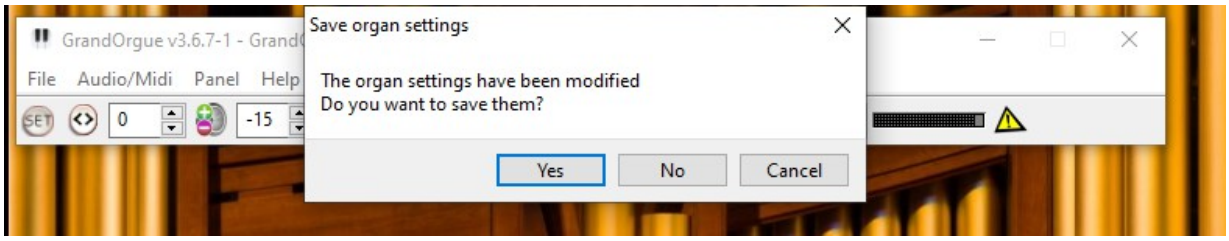


Illustration 22: Grand Orgue 'Save' dialogue.

Different Grand Orgue virtual organs will have different functionalities and the above procedure applies to and works fine with the default virtual; organ that comes with Grand Orgue. You may have to amend things slightly if you use a different virtual organ but the procedure will remain very similar to that previously described.

Configuring other virtual organ software.

The controller will work with any MIDI capable virtual organ software. Hauptwerk and Grand Orgue have the Midi Auto-detect feature which makes it easy to set them up. If you want to use the controller with software that does not have this feature you can easily input the information manually. The things that the software will require are:-

- Midi Device

- Midi Channel
- Midi Note On/off value

The Midi Device name will be 'USB MIDI Device', or whatever name your 5 pin MIDI to USB device enumerates as.

The Midi Channel will always be channel 9 for lighted pistons.

The Midi Note On/Off value will be that of the stop you are using.

As we saw above, if you have a serial terminal connected to the USB Comms output from the System ONE Control board, then operating the desired piston will print on the screen the Midi Channel number along with the MIDI Note On/off number. It will also print the result of any received midi, so for example when you operate the piston on screen the System ONE Controller will print 'lighted piston x' on, and the same for when you return the on screen stop to the off position 'lighted piston x' off will be printed.

Now that you have this information you can simply enter it into the relevant spaces in your virtual organ software for each stop you are using.

Mounting

All System ONE boards have a number of mounting holes of 3mm diameter each. These are for mounting the board in a convenient place within your console. It is important to consider that the reverse of the board is made from copper and that parts of this copper surface carry the electrical signals to and from the encoder. It is therefore necessary to ensure that whatever mounting method you use does not allow the reverse of the board to come into contact with any conductive surface, as doing so may present a fire risk and or cause irreparable damage to the board. It is suggested that suitable insulating spacers be used in mounting the board leaving a gap of at least 5mm between the board and the mounting surface. The front surface of the board is also made from copper and the same advice applies.

The board is suitable for mounting at any angle in any plane. The board must be installed in a position where it will not suffer condensing moisture, water, physical shock or any contact with moving parts. It must be protected from any conductive items, parts or waste that may fall on it.

Our Hardware Ethos.

The hardware used in this controller is an Atmel AVR along with other components. Some of these components are readily available as a ready assembled 'core' unit which can then be programmed with whatever firmware you wish. Hauptwerk Hardware buy these 'dev' boards and use them to build our products. These microprocessors exclusively use our own production firmware and contain no boot loaders or other third party code. This firmware remains our intellectual property. It is copyright and protected from being read from the AVR.

The logic behind using these 'dev' boards is that they are readily available and likely to remain so for some considerable time. Should any of our products ever fail in the future, it is easy to simply unplug the dev board and replace it with a new one, safe in the knowledge that one will still be available. This is in contrast to our competitors bespoke boards whose availability is entirely dependent on provisions made by that particular manufacturer at the time.

Legal Disclaimer:

It is the installers responsibility to ensure that they have familiarized themselves with this product and its documentation and have the necessary understanding and technical and practical competence to be able to install and use it correctly. Whilst every care has been taken in the design, testing and documentation of this product, Hauptwerk Hardware will accept no liability whatsoever for any physical or consequential damage or injury caused by the use of any of our products in any circumstances.

Warranty.

All equipment supplied by us will carry a 12 month warranty against faulty parts or workmanship. Extended warranties are available in some countries at an additional cost. Should any part of the new system fail within this period we will repair or replace it free of charge. It should be noted however that correct operation of the new system depends on the existing console controls such as keyboards, stops etc. continuing to work correctly, along with power supplies et al, especially in pipe organs. Any failure of these existing controls will obviously have an adverse effect on the operation of the new system, this type of issue will ***not*** be covered under the warranty.

Any faulty item must be returned to us for inspection & repair. Initially the customer will pay the shipping for any products returned. All returns from outside the UK **MUST BE CLEARLY MARKED AS "WARRANTY RETURN - ZERO COMMERCIAL VALUE"** as Hauptwerk Hardware will **NOT PAY** any import duty on returns and any packages not marked as above will be returned or destroyed by UK Customs **at their discretion**.

Once the return is received by Hauptwerk Hardware we will video it's unboxing and testing. If the product is found not to be faulty a testing charge* will be made and the customer will be invoiced for this as well as the return shipping. The testing video will be made available to the customer.

If the product is found to be faulty due to faulty manufacturing or premature component failure Hauptwerk Hardware will repair or replace it at our discretion. We will reimburse the customer for the shipping costs they incurred in returning it and we will send the replacement or repaired item to the customer with free shipping.

The same procedure applies to returns from within the UK save for need to mark the package as warranty return. The warranty does not cover damage caused by mishandling, inappropriate connection, incompetent or inappropriate installation.

Further Information.

If you require any further information or have any questions please feel free to call us on +44 (0) 333 577 2393 and we will be happy to clarify anything or provide any further information you may need. Business hours are 09:30 to 17:00 Monday – Friday UK Time.

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