Hauptwerk Hardware

System One

Full Organ Rebuild Solution

SYSTEM ONE
Hauptwerk Hardware

Power Management Sub-System
Installation & User Manual

Bob Howlett

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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 System ONE Power Management Subsystem....4
IMPORTANT NOTE....4
What does it do?....4
Connections & Operation....5
External Control....7
Monitoring....7
Mounting....8
Our Hardware Ethos....8
Legal Disclaimer:....8
Warranty....8
Further Information....9
Contact Details....9

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. See link below.

https://www.hauptwerkhardware.com/downloads_page/

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 System ONE Power Management Subsystem.

The System ONE Power Management system, technically a subsystem, is designed to improve the user experience when operating the organ or console by mimicking the original operation of the organ's power switch.

It is really only required when building a 'headless' organ; that is one which has no keyboard, mouse, touchscreen or monitor of any kind, but relies solely on such usual console controls as a power switch, stops, pistons, etc. This is usually the aim when electrically rebuilding an end of life console.

The use of a power management system is important for two reasons, first the computer equipment used is protected from users simply cutting the power at the end of a session and second it makes it easier for the user as they do not have to worry about any new or different operating procedures for their instrument. I feel that this is important because over time I have encountered several organists who flatly refuse to do anything other than turn on, play and turn off. Operating a computer based organ in this way is not sustainable and so a solution had to be found. This power management system is it.

IMPORTANT NOTE.

This power management system is designed to work with a Raspberry Pi5 Single Board Computer and an ATX type power supply, this is the ultimate solution I have found for use in a headless organ. The system is partly compatible with a desktop computer using an ATX power supply and running Hauptwerk but I have found issues with getting the system to reliably control the operation of such a computers power supply directly. I therefore point out that should you decide to try using this with a computer other than a Rpi you do so entirely at your own risk. There will be no issues operating the Bi-colour LED should one wish to do so, but I really see no requirement for a power management system in any set-up that is not run headless.

What does it do?

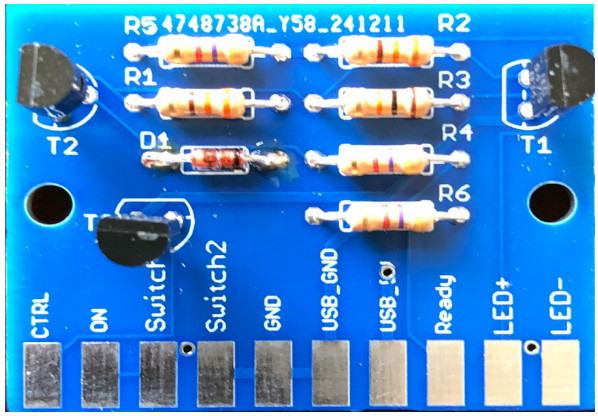

Illustration 1: The System ONE Power Management Board

The power management system consists of a small board which connects with the main System One Control Board using two connections as well as connecting to all the other parts of the power

control such as a bi-colour LED, a 'power' switch and so on.

The operating sequence is as follows:-

The user turns the 'power' switch on. - this puts the ATX power supply into the ON state

The Rpi applies power to it's USB ports – this turns the LED on (RED)

The Rpi boots up and loads the necessary organ software.

Once loaded the organ software issues a midi note on event for note 100 on midi channel 11 – this turns the LED to Green and activates the relay.

Organ session is now established and nothing further happens until the session ends, then:-

The user turns the 'power' switch off. - this causes System ONE to send a midi note on event for note 126 on midi channel 11 as well as changing the LED back to RED and deactivating the relay.

The organ software responds to this event by saving any changes and initiating an operating system shutdown.

Once the computer has shutdown it removes power from it's USB sockets. This extinguishes the LED and causes the ATX power supply to return to standby mode.

As you can see from the description of operation this creates a safe way to control the actual computer as well as providing the user with a simple and familiar operating procedure.

Connections & Operation.

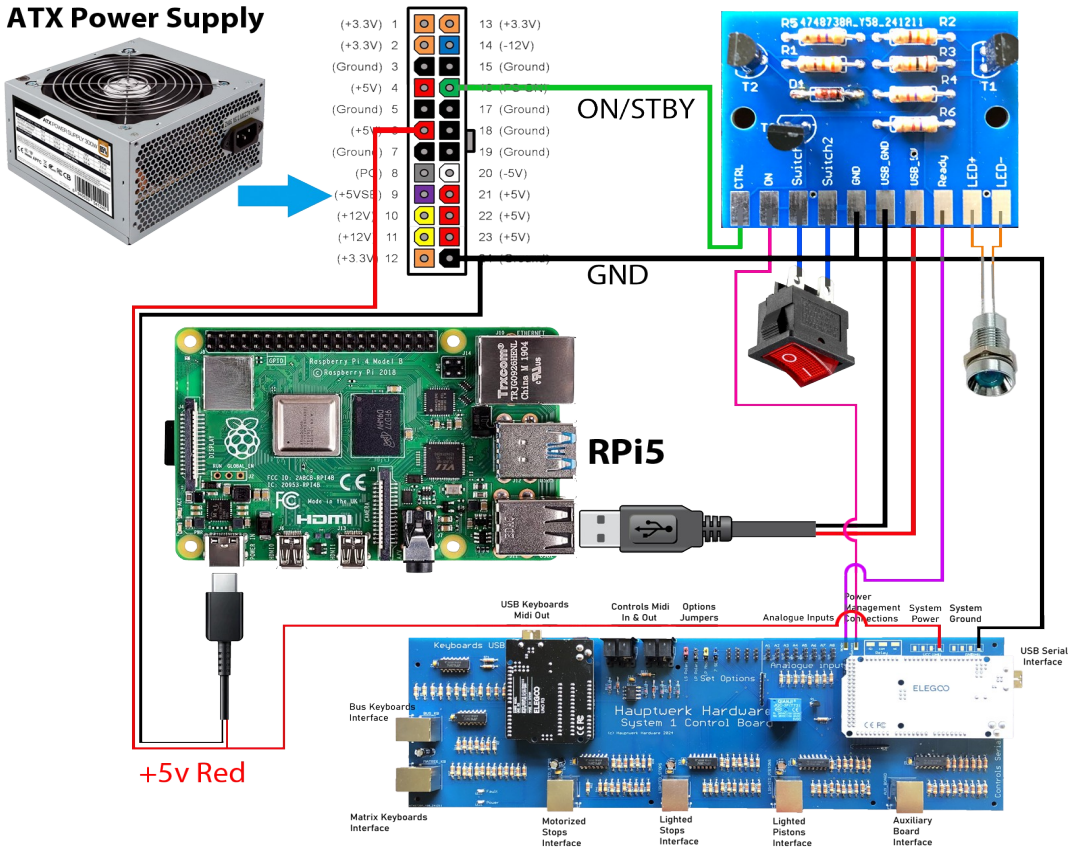

Illustration 2: Wiring for the System ONE Power Management Sub-system

The above illustration shows how the Power Management Subsystem connects to the other parts of the organ.

I have not included the Midi connection between the Rpi5 and the System ONE Control Board in order to keep the picture more understandable, but that would be a USB to 5 pin DIN adaptor and would connect between one of the Rpi5's USB ports and the DIN sockets on the Control board.

Also there would be a further USB connection between the USB Midi out socket on the Control Board and one of the RPI5's USB connectors. **Point to note here: If the Control Board is being powered from a source other than the USB midi out connector it is wise to include USB power blocker plugs or adaptors in the USB connections to the Control Board. In theory it should be safe to simply plug a USB host device into a USB peripheral device that is externally powered but sometimes bad things happen when this is done, and personally I have seen two boards, one Raspberry Pi and one of my Control Boards fail when connected in this way. So I repeat, if you are powering the Control board externally and not from it's USB socket(s) make sure to use a power blocker plug on the USB lead. They are available from Amazon etc.**

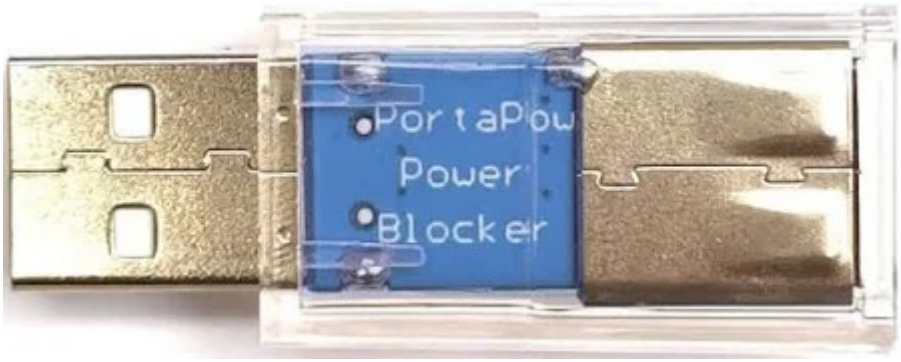

Illustration 3: A USB Typical Power Blocker.

The switch and the LED would be mounted on the front panel of the console and the rest mounted in a suitable set of locations within the instrument. The idea of using an ATX power supply is that it is very safe in terms of not having any high voltages exposed, and it is reliable as well as capable of providing sufficient power to drive the entire organ including moderately powerful amplifiers.

When assembling a console or organ using an ATX power supply I use one of the ATX breakout boards which are cheaply available from Amazon and other online sources.

Illustration 4: A Typical ATX Breakout Board

Using these boards makes connecting to the power supply a simple and reliable proposition. All the

connections are clearly marked and the only essential thing that must be done is to ensure that the push switch on the breakout board is left in the 'off' position, otherwise the System ONE Power Management will not be able to switch the power supply off as it is being overridden by the switch on the breakout board.

External Control.

Turning once more to illustration 2 we can see that there are a set of three solder pads in a bounding box labelled 'Relay'. These contacts are also singly labelled as 'NO', 'COM' & 'NC'. These pads are connected to the on-board relay and are 'dry contacts', meaning that they have no voltage present on them and they are not connected to anything other than the relay. Their purpose is to provide a way of remotely controlling amplifiers connected to the system. The relay changes over when the System ONE Control Board receives a 'Ready' signal. This is the point when the organ is ready to play and the LED turns green.

It is desirable to keep amplifiers off or muted whilst the computer is starting up and loading software and drivers as often it generates unwanted pops and noises which are unappreciated by audiences. Many venues which have amplifier systems external to the organ use a system whereby a 12v 'control signal' is required to be sent to the amplifier(s) in order to turn it on. By connecting a wire from the ATX 12v supply to the 'NO' solder pad and another to the 'COM' solder pad, which then continues on to the amplifier 'control' input the amplifiers can be easily controlled. **Note: The relay is ONLY for controlling low voltages and currents, under no circumstances should you attempt to use it to switch mains voltage.**

I explain all this in detail in the YouTube video I made entitled 'The System ONE Power Management System'.

As this manual is due for release before that video you may not find it on the channel straight away. It is due for release on Sept 5 2025 at 6pm UK time.

Monitoring.

As with other System ONE Interfaces it is possible to monitor the midi activity from the System ONE Control board and this information can be useful in tracing issues should any unexpected behaviour occur. As previously mentioned midi activity pertaining to the power management sub system takes place on midi channel 11. Monitoring the System ONE activity from the USB Serial port on the System ONE Control board will show any operations or midi sent and received, such as when a note on/off event is generated as a result of operating the 'power' switch, or when a midi event is received in order to operate the LED.

Simply connect a USB Cable from the USB Serial port on the System ONE Control board to your PC and use a terminal emulator program to communicate with the controller. The settings are 115200 baud, no parity 8 bits & 1 stops bit.

NOTE: It is advisable to take steps to ensure that if the System ONE Control Board is powered by a source other than the Serial USB connector, that a power blocker type USB connector is used for this connection so as to prevent the possibility of 'back-feeding' your PC from this USB connection.

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.

Contact Details.

Hauptwerk Hardware

0333 577 2393

contact@hauptwerkhardware.com

www.hauptwerkhardware.com