Being "organised" at home

The notes which follow attempt to show ways and means by which an organist may inexpensively arrange some form of practice instrument. Of course, the many arguments for having an instrument at home increase during the colder months, even under "normal" circumstances and before one factors in the cost of transport. Even so, constraints on space, finance (and domestic happiness) mean a full-size instrument usually cannot be considered – there are some "compact" consoles on the market at prices around £7000 – so one then needs to seek something more cost effective.

A piano may be used for initial note-bashing but the touch is quite different and the greater range of the keyboard has the possibility that one may end up trying to play the key-slip on returning to the organ (*and that hurts!*). Small electronic keyboards are available but do not as a rule have either organ-like touch or any way of building up voices in an organ-like manner. After much cogitation it was almost inevitable that a software-based "Virtual Pipe Organ" or VPG should become the preferred approach, either using a computer already to hand or investing a few hundred pounds in a suitable machine. Even fairly old machines, by today's standards, are capable of reasonable performance for this purpose and have been found, for instance, in the computer shop in Stevenage Market. More modern machines, perhaps with features such as touch-sensitive screens, can add some convenience but need not be considered essential.

The project here began with an old laptop, passed to me by a colleague and already well battered by his children. For my purposes, this was fine as I needed a machine on which to try out some software on an "it doesn't matter if it breaks" basis, thus leaving my main machines unscathed.

On to the laptop, over a period, I installed sound-related software together with samples of organ stops from a variety of local instruments. Because of the restricted size of the room where the equipment was installed, a limitation of 49-note (4-octave) manuals was accepted early on. As experience (and confidence) increased there emerged replicas of several complete instruments culminating in a 3-manual with about 40 speaking stops based roughly on the specification put together 30+ years ago by an expert friend. By this time I had three MIDI/USB keyboards of 4 octaves, and also my original 2-octave keyboards (bought early on when I was not sure this was all going to work). The latter became a test unit after I obtained the third keyboard.

The laptop, although no longer young, performed well as a practice instrument but with limitations: I had neither a pedalboard nor swell pedals (though both could be accessed, sort of, with mouse clicks on the laptop screen). The built-in audio system was just about adequate since, operating in a room next to the party wall of the house, headphones were generally used (though with some artificial reverberation added).

The full effect of the sheer power of a large instrument could be obtained only with some effort.

The summary of the development process which follows may be of interest to others. It should be noted that the writer has no claim to being any sort of organ-builder in the usual sense, begs forgiveness from those who are and assures the reader that no real pipe organs have been damaged or disturbed.

The VPO (Virtual Pipe Organ)
You need a suitable machine and:
- an operating system, whether some flavour of Windows or of Linux
- a sound system (in the limit, just a pair of headphones)
- one or more input ports, MIDI and/or USB with which to connect keyboards etc.
- the VPO application software

You also need:
- A set of sound samples
- Some form of definition file describing a specific instrument and its capabilities

The VPO application software programs, of which there are many, have names such as jOrgan, Hauptwerk and Grand Orgue. The first and last are freeware, but Hauptwerk, while having a limited free version, is offered mainly on a commercial basis, some firms offering complete instruments as a package of hardware and software.

Of the programs most easily available, the one which has been adopted here is Grand Orgue. Apart from the price, attractive features include the facilities already built in and the general stability (so far!) of the software running on a number of platforms over several years. The software is available for Windows (XP or later) and also various Linux flavours. So far, machines in use here have run the software on several varieties of Windows.

To use the Linux version, one first has to get to grips with the sound sub-systems on a Linux machine, and to date that (apart from the demonstration version – see below) is a learning curve too far. However, the Raspberry Pi microcontroller, in Version 4 guise, is said to be powerful enough to run Grand Orgue. We happen to have one available and perhaps one day we will feel brave enough to try it.

VPO sound samples
At this point, it is worth covering sound files briefly. For the VPO, recordings of the stops to be used are of course essential. Some of these are available free, others as commercial products. It is also possible to do one's own recording and processing to "model" a specific instrument. For most purposes it is sufficient to record a sample length of about 3 seconds then leave 3 or 4 seconds' silence before going on to the next note. The presence of outside noises – aircraft, children, road traffic – and inside noises – ticking clocks, clock mechanisms – can be missed when doing the actual recording and the "silent" intervals can provide noise samples for later processing. If one is very keen, then a sample of each note is obtained, but some software can cope with as little as one or two samples per octave, by arranging to retune these on the fly. This technique relies on adequate computing power being available offering in return some savings on disk space and memory used.

There are two main systems for generating the sample that the software will use; one uses a series of files (usually in .wav format), often arranged in a subdirectory per stop. The other approach processes all the samples into an overall file called a "Sound Font", especially useful if one's system is based around the Creative Audio series of sound cards. In practice, either approach can work well. What is needed is a means to preserve the start of a note, to form a "loop" of the sustained part of a note and possibly to preserve the tail end (the decay) of the sound. (Note: this last part has not been found to be essential, especially if some form of artificial reverberation is used.) Using free software, Audacity is suitable for general editing,

and Polyphone may be used for looping the samples, though its primary purpose is the creation of sound fonts.

Grand Orgue software
A demonstration version is available which can be run from CD. When a machine is booted from the CD it loads and runs a version of SUSE Linux, then starts up Grand Orgue with a "demonstration organ" having about 14 stops over 2 manuals and pedalboard. It also has provision for a swell pedal for each manual, the usual couplers and not only a capture-combination system but also pistons for preset combinations. All you need then is a keyboard or two and perhaps pedals, swell pedals and some pistons.

A great deal can be learned from study of the definition file for this version, some of whose tricks may be applied to one's own instrument(s). By default, however, the stops for the lower manual are shown on the left-hand side of the screen, those for the upper manual on the right-hand side, so as an exercise the definition file was copied and from it a new version produced with the layout changed to have the stops the other way round (which also matches many of the local instruments).

PC interfaces
The Grand Orgue program needs to receive MIDI signals, either via a MIDI interface (usually built into a PC sound card) or via a USB connection. The latter is now the preferred method, especially as one or more keyboards can get their power from the USB port (the old laptop was found to support three keyboards in this way) or via a powered USB hub if the main computer cannot provide enough power.

The headphone output from the PC may be fed to an external amplifier or just used with 'phones. The software is capable of sending sound outputs to more complicated audio systems, if required.

Keyboard(s)
If a MIDI keyboard is not already available there are many on the market, both new and secondhand. There is no requirement for lots of bells and whistles, so something like the M-Audio Keystation range will do. The first thing is to establish whether it is feasible to have 61-note (5 octave) keyboards or whether the available space means being limited to 49 notes (4 octaves) – still usable for a fair amount of organ music. Sets of keyboards are also available, ready-mounted in the correct relative positions, and sometimes having pistons as well. Alternatively, it is not too difficult to arrange a support structure to hold several individual keyboards, perhaps also including a music desk. If one just wants to dip a toe in the water, then a small (2-octave) keyboard such as the Akai LPK25 is not very expensive, and can also be useful for test purposes.

Pistons
The Grand Orgue demonstration system has sets of pistons visible on the screen. While one can click on these with the mouse, it is also possible to get them to respond to MIDI signals from an external source. One such is the Akai LPD8, a small unit (the same size as the LPK25 mentioned above) which has eight pads and eight rotary controls. The pads would normally be used with, for example, a drum machine, but work well when mapped to Grand Orgue pistons.

Swell pedal

The Grand Orgue demonstration system has a swell pedal for each manual. An external pedal unit must take the position and movement of each pedal to be presented as MIDI messages to the software, usually via some form of micro-controller. If one were feeling brave, it might be possible to dismantle a unit such as the LPD8 and wire its pads to pedal pistons and two of the rotary controls to swell pedals, but that level of bravery has not yet been reached!

Pedalboard

The size of one's feet, however dainty, means that a pedalboard must always be comparatively big, so in a domestic situation one usually needs to investigate the means of reducing the size. Is it really necessary to have 32 notes? Can one get away with 29 (nicely symmetrical), or even 25? The American firm of Thomas have been known to fit a 25-note pedalboard on some of their instruments where all the pedals are cantilevered out from the base of the console, and there is no rear frame. The space saving is considerable, and these devices sometimes appear on the second-hand market. In some cases, pedalboards have been made so that they can be pushed under the console when not in use, or they could be lifted to the vertical in front of or behind the console. However it is done, it is always wise to minimise any danger of expressions of Domestic Displeasure! Some means of generating a MIDI signal and sending it from the pedalboard to the computer is needed. Perhaps (again, given a degree of bravery) a MIDI keyboard (LPK25?) could be used as the interface with suitable key contacts operated by the pedals? Some form of bench or seat may be needed and space for this must also be minimised – at least when it is not in use.
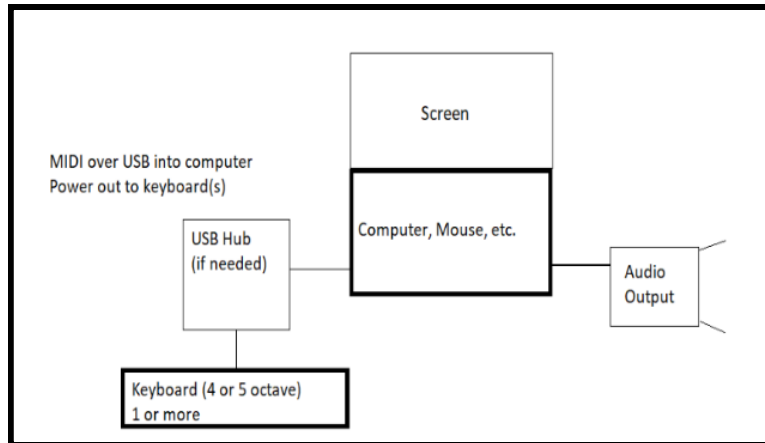
A minimum system might be a computer with keyboard and screen (for which a laptop is both more compact and probably quieter than a desktop), a couple of keyboards fixed together or on a frame, a copy of Grand Orgue – the demo version or the full version plus some sample sets – and a pair of headphones. A pedalboard may be added later, since the savings in petrol could quickly add up to match the cost of that and some form of console, and the benefits of staying in the warm are obvious!

There are, of course, some disadvantages with any VPO, the importance of which will vary from person to person:
- If the machine is used for other purposes, rather than being dedicated to the VPO task, then some setting up is needed each time it is to be used – and the inverse at the end of the session. It may also be necessary to negotiate with other members of the family!
- The application software will usually take a minute or two to start up, load the sample sets and Organ Definition File (ODF) to be used, and present the console picture on the screen. If one is in a hurry to play something, this time seems to expand! To this is added the times for the machine itself to boot.
- Computers in general tend to have many tasks running in the background. These may conflict with the VPO software in use, so one is wise to consider turning off screensaver routines and the Wi-Fi, for instance.

A computer-based Virtual Pipe Organ allows the player to do some practice, trying out new music and making mistakes in private, all without needing to leave home. The effect of different instruments can be tried and the combination of stops from different instruments into a compound definition file raises all sorts of interesting possibilities (yes – you can have that Big Reed - or tremulants with everything!)

Suitable computers and MIDI keyboards are easily obtained, whether new or secondhand, and other items can be bought, or made, to suit one's circumstances. The major expense is likely to be in time spent, especially if one records and processes one's own samples. On the other hand, there is much to be learned about both the art and the science of generating sounds in this way and it is very satisfying when a set of samples sounds just like the original instrument (but perhaps without blower noise and action rattles).

Paul Minchinton, May 2020

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