

Caring for the king of instruments

This series of articles by Dominic Gwynn were first published in Church Music Quarterly, the journal of the Royal School of Church Music.

Dominic Gwynn ARSCM is a founding partner of the organ-building firm, Martin Goetze & Dominic Gwynn, which specialises in classical British organs. His publications include Historic Organ Conservation: a practical introduction to processes and planning, which is published by Church House Publishing (2001).

1. Understanding the basics

Organs are almost as varied as the buildings they stand in. The problems and challenges they present vary with the level and kind of use asked of the organ and with the level and kind of use to which the church is put. Even so, it should be possible to reduce the anxieties and frustrations that people often feel towards their organ, and reduce some of the thoughtlessness that is the despair of the organ builder and tuner.

At least our relationship with the organ is not subject to the vagaries of human relationships. Indeed one of the reasons for the introduction of the organ into British churches was to reduce the influence of church choirs and bands on the decorum and smooth running of the service! Even so, anyone who grapples with a car or a computer knows how wilfully independent the behaviour of a machine can be. Nothing (in the case of the organ) is worse than the involuntary wail of a sticking key or the palpitations induced by a missing note. Not to mention that sinking feeling, as the realisation dawns that this time something really will have to be spent on the poor old thing.

The organ mechanism

In the eighteenth-century the organ mechanism was seen as complex but today traditionally made pipe organs are now simple machines by comparison to many of the tools we use in our daily lives. The organ is made of three elements:

- a supply of air under a low, but constant, pressure,
- a mechanism to take the wind to the desired pipe (which means keys to play a particular note, stops to choose a rank of pipes with a particular pitch, volume and tone colour),
- pipes, voiced and tuned.

These three elements converge on the wind chest, which distributes the wind to the chosen pipes. Other elements, which are not essential to the working of the instrument, but which are important parts of its character, include the casework and the space in which it stands.

The air supply

Today the air is usually supplied by an electric fan blower and is regulated by a reservoir, weighted to provide the correct level of wind pressure. The standard wind pressure for a modern organ will be around 3ins (75mm), perhaps less for a classical organ, rather more for a romantic organ. The effect of the wind pressure can be tried on a recorder, starting with the optimum pressure for the most appealing tone, noting how the life drains away as the pressure is reduced, and how hard the tone becomes as one blows harder. The success of a wind system depends on wind tightness, as leakage results in a loss of wind pressure. If the leakage is not constant, it also affects the stability of the tuning. Leakage is usually the result of ageing leather seals and hinges – as the leather hardens it becomes more porous – but it can also be affected by mice chewing holes and by water.

The mechanism

The keys and stops usually have a mechanical linkage to the valves which let the wind into the pipes. Pneumatic and electrical actions were introduced in the twentieth century, although these tend to be more delicate and less durable than mechanical actions as well as less amenable to first aid. The actions consist of rods, levers, rollers and trundles, which are in themselves quite basic but which have to be carefully regulated if the machine is to work as a musical instrument. The standard of regulation is obviously related to

the standard of the music performed on the organ. There are organs which have had almost no attention for many decades, and still respond to the rather basic and occasional demands placed upon them, with the occasional elastic band and bleed hole to help them along.

The wind chest

The wind chest is the heart of the organ. It is where the wind and mechanisms meet. It is also the most delicate part and it is usually the first place that problems start when an instrument needs restoration. While a leakage of wind in the bellows results in no more than reduced wind pressure, problems in the wind chest may allow air to escape into unwanted places, such as neighbouring pipes. Wind chest faults are likely to be expensive to correct, partly because it is often difficult to tell where the fault is, since wind is invisible, and partly because the pipes may have to be removed to get at the affected parts.

Finding faults

The effects of faults may be obvious to nobody except the organist, but the worst are those which are obvious to everybody else. If a pipe is speaking when it shouldn't, there are ways of shutting it up. If a pipe is quiet because a moth or a wedge of dust has fallen down it, it is possible to remove it. Other faults probably require a professional visit, though for centuries there must have been local people able to tune pipes and fix basic faults. At the very least, the organ's long term health will be assisted by an organist who takes an intelligent interest in what is happening behind the music desk.

2. Environmental Issues

Pipe organs are on the whole robust instruments and can put up with a surprising amount of abuse. We would hesitate to ask a top organist to play a concert on an organ in less than excellent condition, but it is also surprising how village church organs filled with dirt and dead animals still manage to perform adequately on a Sunday morning. If the conditions are generally favourable for the materials from which an organ is made, it can last for decades without attention.

On the other hand, I am sure most organ builders can tell stories about restoring or repairing an organ, only to see their work reversed in days. There is something about organ projects which seems to stimulate the juices of church councils, so that an opening recital is immediately followed by a redecoration scheme, which fills the organ with dust and grit, or a new heating system, which dries it out and splits the joints of the bellows, wind chest and pipes. Organs are not *that* robust, and some things can be disastrous.

Wear and tear

The following remarks apply to organs which get used for Sunday services, funerals and weddings and not much more. If an organ is used regularly for practice and teaching, the keys may go up and down tens or hundreds of thousands of times a week. Those organs will tend to require attention to wear and tear in the moving parts of the system before dirt becomes a problem.

Dirt and dust

Grit, dust and debris often arrive in an organ as a result of carelessness, e.g., by repairing the church roof over the organ without covering it, spring cleaning in a hearty way, sweeping dust under the blower box. Generally speaking, the more a church is used, and the more eager the cleaners are, the more dust will collect in the organ. Before spring cleaning, or re-decorating, it is essential to have the organ completely sealed with plastic sheeting.

It helps to have a roof over the organ, which will stop the grit which falls off the ceiling, as well as insects, birds, bats, etc. A roof may also help to divert water from a leaky roof. Water in the organ can be a disaster if it penetrates to the leather parts, as it makes the leather go hard. Most Victorian organs, however, were designed without roofs, intentionally, and either cannot, or for tonal reasons, should not, be covered.

If dirt gets onto the pallets or down the reeds, everyone will know about it on Sunday morning. A silent Trumpet pipe, or a cipher (a pipe murmuring when the stop is pulled but no key is touched), is usually the

result of dirt entering the organ from above. After a period of years, all organs have to be cleaned out by the professionals.

Heat and humidity

Heat is usually only directly a problem for materials when accompanied by moisture, or pollutants. Warm, humid air will encourage mould and fungi, and chemical reactions take place more quickly at higher temperatures.

Heat does have an effect on the humidity though. The higher the temperature, the less water the air can hold, so as the temperature rises in any given space, the drier the atmosphere, and vice versa.

Churches in this country usually suffer from damp rather than dryness, but the effects of dryness are more serious than those of damp. A lot of organs in this country gave serious problems during the dry summers of the late 1970s, when they had lived happily in very damp churches for decades before. Most of the organ's mechanism is designed to ensure that the wind arrives at the correct pipe at the desired moment. Splits and cracks are the organ builder's nightmare, as the wind goes where it wants rather than where the organist demands. A new and more efficient heating system can have the same effect, especially if it is not monitored or is difficult to control. It is always a good idea to ask the organ tuner for advice, as the choice of heating system may have an effect on the tuning as well as the humidity levels.

Damp can increase the risk of mould, wet rot, failed joints, spoiled varnished surfaces, etc. It is usually impossible to lower humidity levels, but if an organ is in a damp church, it is important that it is protected from damp spots, especially where the organ is in a chamber and does not have its own case. Moderate damp is not usually a problem if the church, or the area containing the organ, is well-ventilated and if the humidity is stable. If a damp church is occasionally dried out, the organist may discover that the key ivories stick to his fingers rather than the keys.

Mice and moths

Animals are usually only pests if the conditions help them. They like dirt, damp, quiet and warmth. The organ is usually the most undisturbed part of the church; a haven for woodworm, mice and moths. Woodworm is the greatest scourge. If it has got a general hold on the woodwork, treatment becomes a major operation. Mice can cause irritation by chewing bellows or key action leather, eating keys or leaving droppings between them. They need to be harassed if they are persistent troublemakers. Moths can destroy the cloth on which the keys rest. Bats can cause havoc to a facade. They have to be encouraged to fly out of the church rather than in.

People

The worst pests are often people – and often well-meaning ones at that. Organs can make convenient glory holes but take unkindly to people blundering about in them. Cleaning the visible woodwork and pipework often leaves a patchy effect as the more accessible areas are cleaned or polished, the less accessible are not. Ladders leant against front pipes (perhaps assuming they are made of stainless steel) leaves dents and bruising. Organists use the stop jambs as a noticeboard, and the console becomes a museum of twentieth- and twenty-first-century electrical fittings.

Stewardship

It is a good idea if somebody in the church is responsible for the organ. Even if it is not used, it is a church asset. The organist is obviously in the best position to notice if pipes are sounding when they shouldn't, or not sounding when they should, and if keys are sticking or rattling. An organist who jealously guards his musical instrument may be a pain to everyone else but he may also be saving the church money in the long run, as well as contributing to his own performances during services.

3. Usage; Overcoming Faults

The organist probably needs more cooperation from his musical instrument than any other musician, or to put it another way, the potential embarrassments are probably further from his (or her) control. One advantage is that the blame can always be shifted to the instrument, and indeed, one can do without heavy

key touch, stiff stop knobs, intermittent ciphers, and so on. There are enough impediments to producing a well-ordered service without the organ fighting back as well.

Actually, organists do become adept at hiding the faults and negotiating the peculiarities of their instruments. Indeed, when organ builders start a restoration project, they have to encourage organists to emphasise the faults rather than hide them, so that the congregation realises the enormous difference that their money has made.

This short article suggests some of the things that organists can (and do) do to get round the occasional malfunctions to which organs, and especially ageing organs, are prone. The next will give a brief insight into the things that organ builders may have to do to keep them going, and finally, we will consider the issues that arise when an overhaul or restoration become necessary. My remarks are obviously generalized; I am thinking mainly of reluctant organists in parish churches where the organ is not restored regularly.

Problem solving

Organ builders are understandably wary of amateurs entering organs, but there are times when a service will be organ-less without some local initiative. That is less true now than it would have been before the Railway Age, when the country came within comparatively easy reach, and there was an organ builder in almost every market town, but it is also true that an increasing number of organs are in increasingly dilapidated condition, as declining congregations become less able to keep their churches going.

Complete silence when the blower is switched on is only solvable if it is a trip switch which has gone. Occasionally blower motors seize, which one can help to prevent by making sure that it is switched on once a week, and by making sure that it is oiled at least once a year. In other words, it is more likely to happen where the organ is only used very occasionally, though it may also happen if the blower has been over-worked. It is a good idea not to leave the blower running for a week; if there is any risk of that happening, ask an electrician to connect the blower to the console light. But most wind systems resemble the movement of the Spirit through the Temple.

If the blower is audible but no wind getting through, then the cut-off valve is likely to have dropped. Electric blowers produce wind whether required or not, so a mechanism is required to stop the bellows over-inflating. That is usually provided by a sheet of metal or a curtain inside a box attached to the blower, attached with a string to the top leaf of the bellows reservoir, which lowers over the trunk hole when the leaf reaches the full position. The string runs over pulley wheels, and can occasionally jump off them and get stuck. The same fault may result in the cut-off valve jamming open, which results in a loud wind noise. Putting the string back in position is usually an easy matter, though the pulley wheels can be inaccessible.

Pulling out the stops

The next action that the organist makes is to pull a stop, if he can. If all the stop knobs are stiff, it is probably safe to draw them, and they will improve when the atmosphere is drier, but if a single stop knob is very stiff, it is advisable not to force it, as there may be something preventing it from moving, and not just a stiff slider.

So the stop is on, and there is a cipher, a pipe speaking or murmuring without playing a note. Something is preventing the pallet for that note from closing properly. The first thing to do is find the key and waggle it up and down. It may be that a mouse dropping or dirt has got stuck between the keys. Sometimes a threaded wire gets caught in a roller arm, or the pulldown wire (where the key action enters the wind chest) has jumped sideways. Sometimes humidity has caused the pivot holes in the wooden parts of the key action to close over the pins, and repeated playing may help to free it up.

But the problem can be more serious. It may be that the pallet spring (which holds the key action up and keeps the pallet shut until the key is depressed) has jumped free, or a bit of dirt has positioned itself to keep the pallet open, which requires professional assistance. In the short term, the organist might be able to reduce the cipher by pulling another stop, which takes some of the wind away from the first stop. One may be able to transfer to another manual, if there is one. If the cipher is on the pedal, and only a single pipe is speaking, then one can stop the wind getting to it by placing a service sheet under the toe of the pipe (though it will then be missing in the music). The same solution might help if the key action is direct pneumatic or electric,

with a pallet for each pipe, though generally speaking the more sophisticated the key action, the less advisable it is for an amateur to interfere.

What organ builders call a running, is more difficult to find a solution to, as the cause is usually more fundamental. A running is when wind escapes from the note being played to the neighbouring notes, so that A sharp and D play at the same time as C. Usually the result is a quiet murmur, and sometimes pulling another stop reduces the problem.

The silent treatment

If a pipe is silent, the cause may be simple. It may be that an animal has decided to corpse inside the pipe, or in smaller pipes, a piece of dirt or fluff. Reeds are particularly prone to silence from foreign bodies, as it can take no more than a piece of wool from a jersey to stop the reed tongue from moving properly. An organ builder would take the pipe out and turn it upside down and tap it lightly. If the problem is under the tongue, one can pull the tuning wire up, which may be enough to loosen the hair, and bring the pipe back into tune. It takes some experience to fiddle with reed pipes, but it is annoying when such a simple matter prevents the organist from using them.

In stopped wood pipes, silence is often caused by the tuning stopper falling down the pipe, during a dry period. It may also be the cause of out-of-tune pipes. With open metal pipes, a tuning slide may have slipped. Again, it does not require much enterprise to re-tune the pipe, and it is irritating to have to ask the organ builder out for such faults. Reeds are always going out of tune, and an organist able to tune the reeds himself is a blessing. Actually, it is not usually the reeds that go out of tune, since their pitch does not react to the changes in temperature, unlike the flue pipes, whose pitch goes up as the air gets warmer, and down as it gets colder. But it is the reeds that get re-tuned, because it is easier to do, and tuning them does not affect the long term stability of the pipes.

Sometimes the organist just has to give up, and recognise that with organs, as with so many things, you get out what you put in. A bit of TLC goes a long way, but there are times when only spending a bit, or a lot, of money will do.

4. Organ Builder's Troubles

Organs are usually visited for routine maintenance and tuning, anything from once a year for instruments in smaller churches and chapels, to once a fortnight for cathedral organs. The frequency is determined partly by the standard to which the tuning and mechanism have to be maintained, and the amount of playing and practice to which the organ is subjected. Usually organs are tuned at the change of the seasons, or because of an important musical event.

Tuning

Seasonal temperature changes are the main reason for organs going out of tune. That is because the principal pipes of the chorus, that is, the open metal pipes, do not go out of tune with each other; their pitch goes up and down with the temperature. At middle C, a rise in temperature of 7°C from say 15°C to 22°C, will raise the pitch by about a quarter of a semitone. But the stopped wood pipes tend to react slightly differently and the reeds do not react to the temperature. Nonetheless, because there are fewer reed pipes, and because they are easier to tune, it is the reeds that get tuned, at the temperature at which it is anticipated they will be used!

Tuning can be a trial of experience and patience. It is always to some extent a compromise, either because two pipes are in tune with each other but not with a third, or because drawing more stops lowers the pitch. There may be acoustical oddities within the case, but it is more likely to be variations in the wind pressure, which is lowered with each extra stop that is pulled and pipe that is played. In the tuner's favour, there is a tendency for organ pipes to draw into tune with each other, so that organs which are frustrating to tune can end up sounding satisfactory.

The tuner gets to know these things. He will listen for pipes whose speech may have deteriorated, either because of dirt, because the metal has moved or because the wind supply has sprung a leak. These affect the

tuning, and they, rather than the tuning, ought to be corrected. He will know which combinations of ranks should be tuned to each other. Open pipes go out of tune when the tops are shaded, so the tuner will be careful where he puts his hand and his body. He will be careful to check pipes that he has had to pick up, because the heat from his hand will affect the tuning for some time afterwards. Even the heat from his body may affect the tuning. In small organs the doors and shutters may affect the tuning. In larger organs some of the larger pipes may be impossible to get to.

Keeping organs in tune

Some organs never stay in tune during services because outside doors and the heating system can set up draughts of cold and/or warm air, which may not settle down till the end of the service. The organ often stands in a remote part of the church or on a gallery, and when the heating starts to warm the church up, the air in the organ is the last cold air to start moving. The result is that pipes may endure fluctuations in temperature. It can be particularly bad when parts of the organ are some distance apart, and particularly at different heights in the building, since warm air rises. For this reason it is important that the swell shutters are left open when the organ is not in use, to give the air within the best chance to adapt to the temperature in the rest of the organ.

It is a wonder that organs are as well-tuned as they are. I personally think there is a tendency in the UK for organs to be tuned quite frequently but too cursorily. The result is that organs are never very out of tune, but they are never completely in tune either. Poul-Gerhard Andersen, the great Danish organ builder, in his wonderful book on *Organ building and design* (published in 1956), wrote that ‘over and above his ability to tune the organ, the good tuner must also “train” it to stay in tune, and for that reason, he occasionally must protest against requests for tuning “out of season”’.

In Continental Europe tunings are less frequent but more thorough. That is partly because continental organists tend to be more proficient at keeping the organ in tune and at curing the odd fault, but there are other reasons as well. In this country, organs rarely have roofs over them, and they often stand on the floor, which makes the pipework more exposed to dust and dirt: this results in the pipes going more out of tune and the periods between cleanings are brought closer together. And when pipes are repeatedly tuned they are more susceptible to damage, which makes them more difficult to adjust and perhaps eventually affects the patience of the tuner. I often find that the same pipes need tuning at every visit to a particular instrument, which must be partly the result of defects in the pipe affecting the voicing and therefore the tuning.

On the other hand, it is possible to make an organ’s tuning more stable. This is particularly the case with new organs as the wood and the moving parts will settle down to the humidity of the building allowing voicing irregularities to be eliminated, but it can be true of old organs too. I am convinced that the ‘training’ of the tuning consists of tuning the whole organ through at each visit, from the fourths and fifths of the tuning octave (where a tuning meter helps to ensure that the tuning octave remains exactly the same each time) through to the mixtures, in the same order each time, so that each pipe is tuned with the same wind and to the same pipe each time. It helps, I think, if the pipes are cone-tuned (see picture), though that may have something to do with the obvious in-tuneness of a pipe cut to length. There is a potential out-of-tuneness of a pipe with a tuning slide (a tinned steel plate rolled to fit each pipe individually, see picture). But there is no reason why the tuning discipline should not apply to pipes with tuning slides as well, so long as they are well-fitted.

The point is that organ pipes themselves, generally speaking, do not go out of tune. If they do, it is likely to be because of changes in the air temperature, or because the voicing has been upset for some reason: dirt falling into the flue, or the pipe metal moving, or a wooden pipe stopper shrinking. The out-of-tuneness these problems cause is unpredictable, meaning that the tuning will tend to be remedial rather than systematic with the pipes not tuned exactly to the intended position in the chorus. But if the environment is stable, and the pipes are well-made and voiced, they will need to be tuned less. And the less they are disturbed, the more likely it is to stay in tune. It is a virtuous circle.

5. Time for restoration

It is not always obvious whether an organ is in need of restoration: many an organ can do good service as a musical instrument in less than perfect condition, and countless instruments stagger on for years before a church needs to bite the bullet. In the same way, an organ can often survive for a few more years with repairs on site, rather than a full restoration which involves dismantling the organ and removing it to the workshop. On the whole, a traditionally built mechanical action organ can be kept going for longer than those with twentieth-century pneumatic and electric key and stop actions, and, in general, the more sophisticated the action, the more difficult it is to tolerate the defects or perform around them.

Pipe organs with mechanical action need cleaning and minor repairs at intervals of 25 to 50 years, depending on usage and environmental conditions. In the long run, pipes and casework can last almost indefinitely if properly cared for, and the mechanical parts may last between 50 and 150 years before a full restoration is required.

Starting a restoration project

I suspect that many restoration projects start when it appears that the organist is about to lose patience and move elsewhere. These days, church musicians are too valuable to lose. The other person to give advice about the state of the organ is the tuner, who knows the instrument best. It should be borne in mind, though, that some organ builders are keener to subject an organ to a full restoration than others, and that some organists are keener than others to add extra ranks of pipes.

However, it is most important to seek outside advice, which is available to everybody, either from your church's advisory body, or the Council for the Care of Churches. In the United Kingdom, all the churches have their advisors and have to provide a system of protection for their organs equivalent to that provided by statutory listed building protection (which in the case of the organ is often minimal, but at least there is a structure for advice and regulation). The advice provided is often basic, and, especially if the organ is of musical importance, it is worth engaging paid advice (try the Association of Independent Organ Advisers at www.musiclink.co.uk/aioa). Many of the contact details required can be found in the grants leaflet published by British Institute of Organ Studies, available online at www.duresme.org.uk/BIOS/biosgran. There is also good advice on the website of the Council for the Care of Churches (www.churchcare.co.uk).

The great thing about a survey is that it tells us what kind of an organ it is, how much it has been altered, and in what condition it is. It is not impossible that the faults will turn out to be superficial, and it may be that the organ behind the case will prove to be of greater historical and musical significance than first thought. More likely, the alterations that have taken place over the years will turn out to be part of the problem, and the work involved in bringing the organ back into working condition will involve a spring cleaning operation, throwing out accretions and concentrating on the core of the organ.

How to start

There is an increasing amount of funding for organ restoration, though on the whole only for organs which are in original condition (or those for which alterations have added to the character of the organ). On the whole the trust funds, listed in the BIOS leaflet above, are looking at musical heritage, not pastoral concerns. For some organists the idea of making an organ smaller, and less up to date, is anathema. But if the funding available makes a serious contribution to restoring the church's hardware, there is sense in accepting the conditions that come with it. The organ will continue to play a full part in today's increasingly eclectic church music making.

The next stage is to look for an organ builder, and ask for estimates. It helps the builder if the church already has a good idea of what is required, and it is easier to compare the estimates. If a full restoration is involved, it is advisable to get three estimates – and for some grant-awarding bodies it is compulsory. It is often obvious which organ builder is best suited to carry out the work, but again, it is advisable to ask outside advice and to consider other possibilities. The Institute of British Organ Building (www.ibo.co.uk) has a list of organ builders, whose suitability can be gauged to some extent by the areas in which they are accredited.

Getting the job done

It is also a good idea to specify as precisely as possible the scope of the project. No organ project is so mystifying that a lay person cannot grasp at least the basics and, although it is often difficult to see how organ building can be quite so labour intensive, you should either be in a position to check whether all the worn out parts have been worked on or pay an advisor to do it for you. On the other hand, it can be difficult to estimate the extent of deterioration or damage before dismantling, and it is a good idea to budget and put aside a contingency fund for work which goes beyond the estimate. Even then, it should be possible to anticipate the possibility of extra work. Do not forget that the work on the organ is rarely the full extent of the expenditure. Finally, do not be afraid to pester the organ builder about unfinished business. There are a large number of small and seemingly inessential jobs in any organ project, and the organ builder will naturally be keener to sign a job off than the customer. Against that, it does raise organ builders' morale if their work is appreciated.

Further information can be found in three books published by the Council for the Care of Churches (Church House Publishing, www.chbookshop.co.uk): *Towards the Conservation of Historic Organs*, *Historic Organ Conservation* and *Sounds Good*.