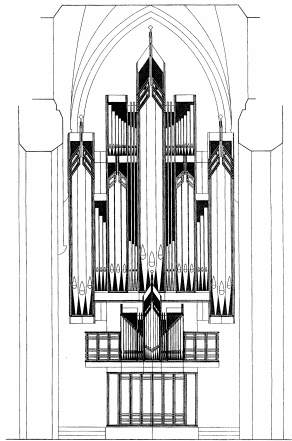


# CHURCH ORGANS

*care  
conservation  
repair  
replacement*



An information  
**Committee on**

**Architecture**  
of the Church of Scotland

leaflet from the  
**Church Art and**

*October 1998, revised April 2000, February 2002, August 2005, August 2008*

**“ Our organ is on its last legs ... It cramps the style of our worship ... We can't find anyone to play it ... Repairs? They must think we're made of money! ”**

**Organs on the agenda? This pamphlet looks at the questions and suggests some of the answers.**

Prepared by Alan Buchan, Douglas Galbraith and Russell Grant, with additional comment from Organ Advisers and members of the Committee on Artistic Matters (from May 2005, redesignated the Committee on Church Art and Architecture).

Cover illustration is of the organ case in St Giles' Cathedral, Edinburgh, by Douglas Laird, reproduced by permission.

### Other Pamphlets in this series

***Church Windows*** maintenance, protection, repair, replacement

***Working with an Architect*** getting the most from a partnership

***Gifts and Memorials*** twenty commemorative ideas

***Re-ordering Church Interiors*** space for a living church

***Open Church*** making better access

***Briefing the Artist*** commissioning a stained glass window

***Sacramental Vessels*** heritage value, care, disposal

These can be obtained from:

**The Committee on Church Art and Architecture, 121 George Street, Edinburgh EH2 4YN. Tel. 0131 225 5722 ext. 359, fax 0131 220 3113, email [wordoc@cofscotland.org.uk](mailto:wordoc@cofscotland.org.uk)**

*Comments and suggestions for inclusion in any revision of this pamphlet are welcomed.*

# CONTENTS

<i>Why organs?</i> .....	5
<i>Organs on the agenda</i> .....	6
<i>An organ fund</i> .....	6
<i>Is the repair necessary?</i> .....	8
<i>When the organ must be replaced</i> .....	8
A. <i>Electronic or digital organs</i> .....	8
<i>Financial considerations</i> .....	8
<i>Musical considerations</i> .....	9
<i>The player of the instrument</i> .....	9
<i>The plus side</i> .....	10
<i>Artistic considerations</i> .....	10
<i>Disposing of the organ</i> .....	10
B. <i>Second hand pipe organ</i> .....	11
<i>The Organ Advisory Service</i> .....	11
<i>When there is no organist</i> .....	12
<i>Conservation</i> .....	14
<i>In praise of wondrous machines</i> .....	15
<i>Choosing an electronic organ</i> .....	18
<i>The choice before us</i> .....	18
<i>The quality of sound</i> .....	16
<i>Analog</i> .....	19
<i>Digital</i> .....	20
<i>MIDI</i> .....	22
<i>Console</i> .....	23
<i>Speaker system</i> .....	25
<i>Reliability and lifespan</i> .....	26
<i>Conclusion</i> .....	27
<i>Value for money?</i> .....	28
<i>Organ builders and tuners in Scotland</i> .....	29
<i>Useful addresses</i> .....	30
<i>Organ advisers</i> .....	31

## WHY ORGANS?

There were organs in Scotland before the Reformation, but it was only in 1864 (Church of Scotland), 1872 (United Presbyterian Church) and 1883 (Free Church) that the return of organs received the blessing of Assemblies. Now churches would consider a life without an organ colourless and its worship drab.

There are many “sides” to an organ. It can have a pleasing aesthetic appearance and contribute to the look of the church; it may be valued for the craftsmanship that has gone into it; its sound may be particularly appealing. Above all, the organ holds its place because of its suitability for leading congregational singing. A pipe organ is generally of a size and tonal design to “envelope”, surround and support the congregation. The additional “reach down-wards” that the organ pedals allow, with their deep reverberations, gives almost a physical foundation for the singers, while the high notes “lead from the top”. The fact that each note, unlike those on a piano, controls several pipes from lower to higher pitches gives the organ a penetrative power which has an enlivening effect on singing. Bellows store wind so that the pipes sounding at the holding of one chord (as many as 80 or so in a middle-sized instrument) are powerful enough to fill the building.

Then there is the matter of variety. An organ may have two “manuals” and a pedal section, each controlling its own range of pipes. To accompany singing is not just to play the notes but interpret the words and bring out both the sense and the beauty of the hymn. The two manuals, as well as being capable of variety within themselves, deliver different colours of sound, enhanced by the second manual's pipes being in a box which can be opened and closed (the 'swell'). The pedal department can be used gently or forcefully, or it can be left silent for a verse. This flexibility, in good hands, can mean that people as they sing are constantly being awakened, alerted and assisted in their interpretation of the words they are singing, to the enhancement of the worship.

# ORGANS ON THE AGENDA

There are particular times when the organ comes under discussion.

## **1) The congregation wishes to make use of more contemporary styles of music and the organ seems unsuitable for accompanying these.**

Ask first of all whether the hindrance is not in the instrument but in the organist's unfamiliarity with the idioms in question. Music written for the organ can be rhythmic and fast moving. It may be that the instrument is capable of more flexible use than is usually required of it but needs to be played in a certain way. Again, the organist may have strong views on 'modern hymns' and be unwilling to play them. Thoughtful and sympathetic dialogue is called for before expensive decisions are taken. The organist may be making an important point from his or her knowledge, experience and commitment to music and its role in worship, and should be listened to. Equally, he or she may need to hear other genuinely held views. The Panel on Worship's music pamphlets may help in such a dialogue.

Nevertheless, the organ is not always the right instrument to accompany some music. There are, however, more ways of achieving variety than of replacing the existing pipe organ entirely. Many have found it helpful:

a) to acquire a piano or an electronic keyboard, which will widen the scope of the kind of accompaniments that can be provided. This means that songs and hymns in other styles can be sung;

b) to gather together a small group of instrumentalists who might accompany suitable songs and hymns for which an organ would sound too heavy (see the Panel on Worship's pamphlet *With a loud noise skillfully* which gives advice on forming and arranging music for such a group);

c) to recover the old Scottish custom of singing unaccompanied with the help only of a precentor. Many hymns and songs which come from other countries today require this kind of approach, and indeed are so structured that harmonies are created.

**2) There is a growing feeling that a particular instrument is not equal to what is required of it.**

A solution proposed may be to re-site the instrument. The organ might have been built into a cramped space which restricts the sound. Or it may 'speak' in the wrong direction, across the chancel area for example. Some find that turning the organ round is their solution. Another is to place the instrument at the back of the church where it is often found to given better support.

Adding 'stops' to the existing organ – for example, to give a brighter sound at the top end of the pitch spectrum – is quite often done. Here, however, care must be taken not to spoil what is at the moment an 'artistic unity'. Many Scottish organs have been spoiled by adding to the existing specification, destroying the 'tonal design' and detracting from the historic value of the instrument. The organ in question might be a good example of a particular school or builder, a small part, if you like, of our national heritage. The effect can be similar to adding a wing to an historic building without properly designing it to merge with the style of the original. Here, expert advice should be sought.

**3) A decision may be required because the organ has been giving trouble and repairs have been found to be costly.**

**An organ fund**

The long life of a good pipe organ depends on occasional refurbishment or renewal of particular parts. Some congregations keep a "running organ fund" so that when the time comes the appropriate repairs can be made. This precaution means that the "evil day", when a substantial and costly repair is required, is longer in coming round.

## **Is the repair necessary?**

The first question to ask is what the builder is offering to do. This may indeed be desirable but, given the financial climate in a particular church, there may be a less ambitious scheme which could be undertaken – or necessary work might be phased over a few years. Here, a visit from an Adviser will be helpful (see page 31).

## **When the organ must be replaced**

Where however all agree that substantial work is required which the church cannot afford, what comes quickest to mind is to go for a digital instrument. Indeed, organ advisers have made this recommendation themselves in some cases, particularly when the existing organ is not of great merit. Another solution, however, which is not often entertained but which merits careful consideration is the acquisition of a good redundant instrument from another church. The following considerations may be helpful.

### **A. Electronic or digital organs**

This is not such a straightforward decision as it may seem. In the last section of this pamphlet all the issues are given careful consideration. However, two points may be made at this stage.

#### **Financial considerations**

A well made organ will have pipes which will last indefinitely. The action required to activate the pipes, particularly if it is mechanical, will last, when in good repair, for 70-150 years. This is why insurance companies calculate depreciation on pipe organs at only 1 per cent per annum.<sup>1</sup> A digital organ, it is widely acknowledged, has a far shorter life – 20 years is common, often less. This is not surprising in that the technology is similar to that of a personal computer, which both ages and becomes redundant. There is also the danger of companies going out of business and the difficulty of spare parts.

---

<sup>1</sup> *Repair or replace?* Council for the Care of Churches, p.7

## **Musical considerations**

'State of the art' digital organs are now able to produce a much truer sound than before. But even though it is claimed that a particular make stores and reproduces 'actual sounds' of real pipe organs, it is wise to recognise that too many can still sound 'characterless'. Partly this is due to the fact that the sound is delivered through a speaker or speakers which means that the sound is more 'closed in' than the more pervasive sound of a pipe organ. This is why digital organs can sound at their best in recordings. The pipe organ depends on the voicing of the pipes and wind pressure to give enough volume, while the digital organ is measured in watts (see page 24). Although clever use of speakers can assist, the lower the wattage the more distorted the sound can be through speakers.

This factor also has a financial dimension. Congregations typically will choose an organ with what looks like a large enough range of stops. Often this is far more than is necessary for the building. In a building seating 150 a single manual pipe organ of some five stops is adequate, in a building seating 300 a moderate sized pipe organ of two manuals each of 5-6 stops is suitable.<sup>2</sup> To make a marketable package, digital organs are usually supplied with a specification similar to a far larger organ. To do this, however, compromises have often had to be made and the actual delivery of volume and variety does not match its pipe equivalent.

## **The player of the instrument**

It has been suggested that the purchase of a "mass-produced" digital instrument might deter applications from serious musicians when a post falls vacant. A committed organist may seek an instrument with individuality – "one of a kind", or may prefer the "natural" sound of a pipe organ. Further, it is often the case that digital or electronic instruments are not of a standard design, either in the way the manuals relate to each other or in the number of pedals. In the latter case, it will be disconcerting for someone who has learned on a pedalboard of 28 notes to meet a standard organ with 32.

---

<sup>2</sup> see further *Church Organs* CIO Publishing, pp. 5-6

## **The plus side**

That being said, some models are fine pieces of engineering and make good instruments. One or two firms, also, do not follow the practice of simply marketing a variety of standard models but build in the digital organ after study of the building and local requirements (Copeman Hart are an example of this). Good digital organs, however, are very expensive, and a congregation may find that what it could pay for such an organ could in fact finance a rebuild of their existing organ (or a good redundant pipe organ – see below). It has been calculated that for a building seating 600 the most desirable digital organ and a pipe organ would cost roughly the same; as the size of the building decreases, the financial cost would favour the pipe organ.<sup>3</sup>

## **Artistic considerations**

Where a digital organ is the best solution, it must be borne in mind that large speakers will need to be mounted, perhaps at different parts of the building. The siting of these would need the approval of the Committee on Church Art and Architecture. To keep the pipe façade of the former organ and hiding the speakers behind it is less desirable because of the ‘pretence’ involved, although this is quite common. The Committee’s approval is also required for the positioning of the console.

## **Disposing of the organ**

If it has been decided to purchase a digital instrument, the Committee will advise about the disposal of the old organ. However, one possible solution is to retain it intact, disposing of or storing only the console. If it is potentially a good instrument but finance only is the bar, it may be that when the digital organ needs replaced, a future congregation may be able to afford the pipe organ’s repair.

---

<sup>3</sup> *Repair or replace?*, p.7

## **B. Second hand pipe organ**

Another solution which applies in a number of situations is to explore the possibility of installing a good redundant pipe organ. With closures, there are now several excellent instruments awaiting new homes, often with the only costs being that of rebuilding into the new location. The Committee keeps a list of these.

The first step is to arrange for an organ adviser from the Committee to see the building (if he or she has not already been involved in the discussions), who will be able to 'match' one of the existing redundant organs to the building. Such an organ may be available free of charge "to a good home". An organ builder will then be asked to give an estimate for moving and, if necessary, making any repairs that are necessary to the instrument as it is installed.

## **THE ORGAN ADVISORY SERVICE**

The Committee on Church Art and Architecture is able to draw on a team of advisers through the Scottish Federation of Organists. A visit to the church is free of charge. The adviser may spend an hour or two examining the workings of the instrument in close detail. This allows him to give very specific comment on what exactly might need to be done, what best left alone, and what could be left for a few years until money becomes available. The adviser will then send a detailed report to the Committee which, if it receives agreement, will then be forwarded to the congregation. This will give a detailed technical appraisal of the instrument and offer an opinion of its musical and historical value. The report typically would outline the options and make recommendations for the congregation to consider.

Advisers may suggest that estimates from more than one firm be sought and advise as to the specific matters that should be covered by the estimate. If estimates have already been received, advisers can offer comment and interpretation so that the congregation are

helped to choose between them, since no two estimates will exactly cover the same ground.

Also, a lower estimate may not be the best in a particular instance, while an estimate may be high because quotes had been included for work that does not need to be done, at least at present. Advisers can help in these instances also. The advisory service exists both to prevent congregations spending more money than is necessary as well as to ensure that they acquire the instrument that best suits their needs.

## **WHEN THERE IS NO ORGANIST**

Modern digital organs have one particular advantage in that they may have attached to them a 'midi' system by which whole services can be keyed in in advance. This can be a useful solution where it is difficult to find a regular organist and allows someone to provide accompaniments to cover his or her absence. Alternatively, another organist can provide this, although it is desirable that he or she know the congregation.

In conjunction with this, commercially produced disks can be bought which store a large selection of hymns.

A related solution is the Gilbenkian Digital Hymnal which is an instrument in itself which stores, it claims, over 2000 hymns. This might seem an ideal solution for country kirks where an organist, say, is only available for special services, and indeed in many circumstances it will be. Two types of comment need to be made, however.

One relates to the system itself. Its American origin means that a good proportion of the tunes are not in common currency here (one user suggests that 1300 are redundant - but this still leaves quite a lot!) The style of playing is recognisably different also and the sound produced represents an instrument which can sound incongruous in a small church. Further, with the necessity for programming the system so that the right tune appears in the right order for the

service, with the right number of verses, at the right pitch and at the right speed, some skill is required of the programmer! Some small rural churches may find that, once bought, they cannot make the use of it that they would like. Nevertheless, many are grateful for it.

The other type of comment relates to the desirability of seeking other solutions involving people before what should really be a last resort. Music in worship is a co-operative effort between people and leader(s); in this partnership there is come and go as each adapts to the other. With a machine this is less easy. It is not essential that an 'organ sound' be found for worship. For centuries, a precentor led unaccompanied singing. If there is no-one among the regular attenders, is there a local singer or instrumentalist (fiddle or flute, say), a regular participant in the local ceilidh perhaps, who might help – and perhaps be glad to have a role in the local church. Also, young people learn instruments at school; is there one who could 'keep the line' and supply the pitch and momentum required? The most common solution is to acquire a piano, since more people are able to play this than can play an organ.

Sometimes a keyboard or digital piano is proposed. These tend to have a low output and work best in the context of other (usually electrified) instruments. These are more suitable for the 'performance' type of church music and may be welcomed as part of an ensemble but not be expected to sound well when amplified to the level required to support a congregation.

One not so daft idea is to bring back into use the harmonium that had been left in a corner. There are people who can restore and repair these, and when working smoothly they are not so daunting to pedal as an uncared for instrument. These have a carrying sound and represent a very cheap solution to the problem.

# CONSERVATION

Mention has been made (page 6) of certain pitfalls when adapting or adding to an instrument. The original may well have been carefully designed and crafted as a 'complete' entity and this has made it unique. If the builder has over time become celebrated as an unusually fine craftsman, the resulting organ is a work of art and (as we have suggested) part of our musical and religious heritage. This suggests that an element of conservation enters into the picture when changes are being proposed or an instrument is about to be declared redundant. Often when repairs or refurbishment are called for, an opportunity is offered of restoring a fine historic instrument to its original state. In such instances, the congregation finds itself in the role of custodian of a possible 'national treasure'.

This goes also for the appearance of the case. For example, many organs have intricately painted pipework, and any redecoration of these should only be undertaken by a firm recommended by your organ builder.

A small final matter – when internal repairs are required to the church and, say, scaffolding is to be erected, thought should be given to the protection of the organ from dust and rubble. Advisers will be able to make suggestions in such an event.

# IN PRAISE OF WONDROUS MACHINES

(This article appeared in *Life & Work* in July 1998  
and is reproduced by permission of the editor)

*As congregations consider new forms of music in worship, Church Art and Architecture Committee Organ Adviser Alan Buchan urges churches to remember the benefits of an increasingly neglected instrument.*

Is there a future for the pipe organ in Scottish churches? The answer is certainly “yes” for the foreseeable future.

There are at least 1700 pipe organs in Scotland, most of them working, and many able to survive for decades, if not centuries.

Properly looked after, the pipe organ is a durable machine: the oldest Scottish one dates from the early 17th century and still works well.<sup>1</sup>

The number of these organs is likely to decline gradually in the coming years, partly due to church closures, though there are other factors to consider, not all of which are directly related to the instruments themselves.

Organs have to be played to stay in working order – even turning on the blower and playing through the keys with stops drawn helps greatly – but in many churches this does not happen.

Also, trained organists are steadily becoming fewer in number, especially in the 20-40 age range.

In this regard, the regular practice required to master co-ordination of hands and feet, coupled with a commitment to extra work on Sundays, can be unattractive.

The organist remains the most cost-effective way of accompanying worship.

At weddings and funerals, the organ will often be the only instrumental aid available, and retired organists are frequently called upon from a distance to play on such occasions.

One significant threat to the future of the pipe organ comes from an unexpected source – the misuse of modern central heating systems.

It is not temperature itself which is the problem, but the low humidity levels created by excessive central heating – perhaps aided and abetted by time-clocks with minds of their own!<sup>2</sup>

Organ-builders will always discourage unnecessary heating,

although they will ask for churches to be at normal service temperatures to enable them to tune accurately.

### **Pipe or digital**

Another threatening factor is the increasing number of digital instruments replacing pipe organs.

Let's be clear about the arguments: both have moving parts, both require maintenance, and both can malfunction and become unusable.

Neither option is cheap to buy and maintain over a long period, though, if you have a good instrument and have heeded carefully its minimum maintenance requirements, costs can be surprisingly low.

All too often a few minor faults on an old pipe organ are enough to convince church authorities that it is reaching the end of its useful life.

Of course, it is infinitely easier to install a digital organ. The whole process can be achieved within a day.

There are situations where a digital organ is the best option, and the Church of Scotland's organ advisors may recommend such an instrument in the right circumstances.

If your church building is of a multi-purpose design, with limited space, daily central heating and, perhaps, an uncertain future, a

scheme for an expensive pipe organ would be irresponsible, as well as impractical (though such plans are mooted from time to time by over-zealous organists and church authorities).

It can be frustrating to see extremely expensive and misguided pipe organ schemes being approved without any questions asked at presbytery level, while perfectly valid, cheaper plans receive a rough ride.

Electronic keyboards or synthesizers are sometimes a more sensible alternative, from a technical point of view.

The expense of an elaborate console and pedalboard is also saved and – most importantly – the equipment is easily portable. Another inexpensive option – not pursued as often as it might be – is to seek a good, redundant, pipe organ from a church which is about to be closed.

Often such an instrument can be obtained cheaply, or without charge, and its quality of workmanship can be extremely good.

Costs of relocating an organ are often quite small, with the whole exercise of removal, storage and rebuilding sometimes being achieved for £10-15,000 (as compared with perhaps £20-50,000 for purchasing a high quality digital instrument).

Initial removal to storage costs very little, but the decision to do so has to be taken quickly, to

avoid missing a valuable opportunity to acquire a worthwhile instrument.

A list of redundant organs is maintained by the Church of Scotland, with another operated by the Cheltenham-based Redundant Organ Housing Company.

The quality of each instrument should be checked. Church of Scotland organ advisers will be happy to make or suggest arrangements for this.

Whether a digital or pipe organ is being considered, very careful assessment of individual church requirements is needed.

The organ did not assume its widespread role in the Church of Scotland by accident. It proved to be the most sensible way of accompanying worship and, essentially, this has not changed.

Under the right circumstances, the organ remains a reliable workhorse, helping to maintain high standards in our congregations.

<sup>1</sup> In normal circumstances, pipe organs should be tuned and serviced by a recognised organ builder at least twice a year.

<sup>2</sup> Pipe organs function reliably within a relative humidity range of 60% to 75% at normal interior temperatures. If the level falls below 50%, a pipe organ may suffer in all sorts of ways. If the level increases above 80%, dampness may be a slight problem. Hygrometers can be bought from gardening centres and can be useful in keeping an eye on approximate humidity levels. Generally water-pipe systems are the least harmful to organs, and forced-air and overhead radiant systems the worst. Careful monitoring and control of heating levels is essential. Organ humidifiers can help but are not a panacea for the problem.

# CHOOSING AN ELECTRONIC ORGAN

*Russell Grant, Organist of Inverness Cathedral and  
Organ Adviser in the North, looks at the options*

## **The choice before us**

Any organist who is involved in the buying of an electronic organ, whether it be for home practice or installation in the grandest church building, will be bewildered by the immense choice which the industry has to offer.

Bewildering also is the jargon, technical data and claims such as “the most advanced” and “finest quality”, which go to make up the “salespeak” which accompany each make and model available.

It is the purpose of this section to try to sort out the gobbledygook and give, in as simple terms as possible, the principal facts about electronic organs.

## **The quality of sound**

Irrespective of any technical information, two questions should be uppermost in the mind when making any selection:

- How does it sound?
- How does it handle?

Ideally, the technical specifications and the answers to these two questions should balance each other.

Every pipe on an organ creates an individual and characteristic sound. This sound can be analysed as a wave formation. This contains all the information about the note structure and harmonic content. The shape of the wave is a recipe made up of the following ingredients:

- the proportion of the pipe
- the material from which the pipe is made
- the way in which the air column is set in motion

What all this means to our ears is the difference between a flute, a clarinet or a trumpet, etc.

The way for a machine to “read” and reproduce such sounds is by the analysis of the wave patterns.

Two fundamental concepts which have to be grasped before any literature or jargon can be understood is that there are, basically, two types of electronic tone production: the older type is called **analog**, the newer type is called **digital**.

### **Analog**

This type has its roots in the late 1930s and uses electronic components called oscillators. An oscillator is a generator which produces a desired vibration which, when subjected to various filters, can reproduce specific sound waves such as ‘flute’, ‘oboe’, ‘trumpet’, etc. The more oscillators, the better the quality.

In older, cheaper makes only one oscillator is used. In this case, the sound is ‘hard’ and gets ‘harder’ as more stops are drawn. Better quality manufacturers use multiple oscillators. Twelve per rank of generators is an infinitely better starting point. More recently, multi-core generators with 288 oscillators have become readily available. Obviously these produce a far superior sound.

The wave forms from which the tones are derived are described as squarewave and sawtooth. On cheaper models, only squarewave will be used. This results in most of the stops sounding much the same.

Voicing reference points are important. If ‘full compass voicing’ (which sounds impressive) is used, then smooth, even voicing is difficult to obtain. Much better is to voice every six notes.

Harmonics speaking before the fundamental, chuff, breathiness, windiness, are all available effects on an analog organ.

## Digital

If there ever was *the* buzz word, this must be it! Anything which is digital must be 'state of the art', 'best sound ever', 'most advanced', 'developed from the Space Programme', 'what all top quality CDs use' and now 'about to revolutionise TV'; and all these claims are true! However, before you get carried away with your little share of NASA investment, another two questions:

- Is digital sound reproduction the best? [Answer: **yes**]
- Are all digital sound systems the same? [Answer: **no**]

Digital recording means the analysis of sound, the conversion of the information into binary codes, and the storing of this data. Storage space is measured in units of information, bit, byte, megabit, megabyte; be sure not to get them mixed up! (See table.)

The wave forms are recorded and analysed from real pipes in an echoless chamber and are as true as 1) below will permit. There is no question here of enveloping the basic wave form into squarewave or sawtooth; with digital sound it should be an exact reproduction of the original.

There are three digital sound specifications:

- 1) sampling rate
- 2) bit resolution
- 3) memory capacity

### 1) *Sampling rate*

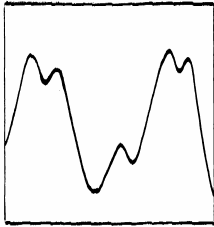
Imagine a boat with sonar equipment. The sonar sends signals to the sea bottom. As they hit and reflect, readings and measurements are taken. By moving the boat and repeating the process, a map of the ocean floor can be drawn. Obviously, the closer together the readings are, the more accurate the map.

Thus with digital sound, the computer 'scans' the soundwave at various points in time (measured in kHz), updating the information as it goes; it converts this information into binary codes and stores the data in the memory bank.

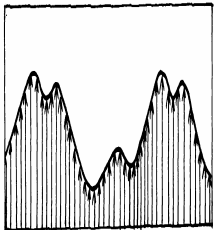
Crucial point number one: how close are the 'scanning' points?

This is the first area where digital quality can vary; the closer the scanning points, the better the quality, but also the greater must be the memory to store this data in – thus more expensive!

The minimum standard sampling rate for compact disc and DAT players is 44.1 kHz.

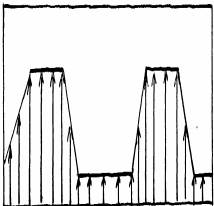


**original sound wave**



**sampling rate 52.5 kHz**

**high quality reproduction**



**sampling rate 26.5 kHz**

**low quality reproduction**

## 2) *Bit resolution*

Ideally, bit resolution and memory capacity should be considered together. Think of Bit Resolution as a 'book', and Memory Capacity as the 'bookcase'. Each sound is a 'book' – so the 'book' will contain 'pages' of information affecting that sound – tone, timbre, pitch, intensity etc. The more information you wish to write in the book the more definitive it becomes, but the larger it gets – thus the more space it will take up in the bookcase! Remember, *all* the note information, including expression, is retained in 'the book' – which is measured in capacity 8 bit; 16 bit; 32 bit etc., theoretically on to 256 bit resolution. Sixteen bit resolution will give good quality capacity.

How does this affect the sound?

Here is a test to find out whether or not the bit resolution is sufficient for your needs: on an unenclosed manual listen to a fairly low mixture note – can you hear the different pitches or is it just a 'fuzz'? Next, repeat the same test, but on an enclosed section. Whilst listening to the note, open and close the box. Does the clarity of the mixture change as the box opens and closes?

## 3) *Memory capacity*

This is the 'bookcase' in which you store the 'books'. To avoid costly errors, the compatibility of each is predetermined by the manufacturer (i.e. optimum 'books' to 'bookcase'). Thus, the equation is normally outwith your control. However, always aim for the largest 'library' you can afford. The more memory allows more of the original sampled sound to be stored; thus, the greater the memory, the better the sound! Small organs may use about 30/40 megabits, large organs may use over 200 megabits. Storage space is expensive, so you get what you pay for.

## **MIDI**

Musical Instrument Digital Interface allows different pieces of digital music equipment used in composing and recording to be connected to the organ. The information-sending device, which can be any electronic instrument, is called the controller and the reading device, such as a computer, is called the sequencer. Pitch, dynamics, decay rate, etc., can all be transmitted using the interface.

Some systems enable full auto-playback, with the operator having complete control over keying, stop selection, expression, and other console functions.

## **Console**

Basic construction This varies from manufactured sheeting to solid oak. Again, you get what you pay for. [Note: some old makers built superb quality consoles, and although the 'innards' may be scrap, a digital refit may be worth considering.]

Internal switch gear 'Open' switches attract dirt and carbonisation. Hermetically sealed Reed switches eliminate pollution and any other atmospheric interference.

Keyboards These vary in standard from hollow plastic to wood covered with ivory.

Stop action There is a huge variety:

- 1) The cheapest is a tablet which, instead of rocking, either lights up or lights a tiny bulb (or LED) above the tablet.

- 2) Next is a proper rocking tablet.

(Both these systems belong to the continental-type console and may not be activated by the piston system, thus relying on the player's memory.)

- 3) Next is system 1) but activated by the pistons so that the lights change with the pistons. (In a darkened building this can be very pretty indeed!)

- 4) Then comes system 2) but activated by the pistons.

- 5) There now follows a generation of drawstop consoles which duplicate the systems listed above until:

6) what I would describe as a standard drawstop action – one inch draw heads connected to an adjustable, capture piston system.

Pistons Unlike British consoles, continental organs tend to favour a few general pistons located below the lowest manual. This concept tends to pervade the lower end of the electronic market. A few have pre-set 'tutti' pistons, probably marked 'p', 'mp', 'f', etc. Another major difference may still remain: a piston switch is usually conceived as a spring-loaded return device. On the lower market electronics it is a 'dead-end' switch with a definite 'click' action (much like a light switch) which has a totally different 'feel' from a normal piston action. This, combined with a non-reading stop display, makes registering, at best, awkward.

Great to Pedal Combination Coupler This is not always available, being catered for by a number of general pistons. Registration is more flexible and user-friendly if there is one.

Pedalboards Be wary of descriptions like 'type' and 'design'. Many foreign pedalboards are described as being of RCO 'type' or RCO 'design'. 'Radiating' can often be interpreted by a straight board with varying lengths of sharps to create an optical curve. A *standard* RCO board is the correct description.

Expression A swell pedal which controls the whole organ defeats the object of the device and should be avoided.

In an analog system, the swell pedal operates as a volume control as on a radio or TV set. Due to its location and type, it is often the first control to suffer from 'scratch' distortion.

In a digital system, 'opening the box' accesses more information stored on the hard disc (see bit resolution) so none of the technical problems, above, are relevant here. The more information stored, the more subtle box touches are manageable.

Acoustic enhancement Reverberation is intended to imitate the decay on a pipe organ in a resonant building and has the effect of allowing sounds to 'linger' once the keys are released. Acoustically dry buildings are always a problem, and any improvement is welcome and perhaps a *little* reverberation will help. However, you can't apply the same to singers, and the organ and choir/congregation need to be reasonably compatible!

Transposers Very useful for those who can't!

Auto-Pedal This is a very useful device for the pianist coerced into playing the organ. The lowest note played by the hands is isolated and reproduced on the pedal stops. This must not be confused with sub-octave or 16' couplers which duplicate *all* the notes an octave lower and just make the texture 'muddy'. For locations which are likely only to have pianists to play services, auto-pedal could be an important aid.

### **Speaker system**

This is the part of the system which lets down all electronic organs. Considering the huge advancement in technology inside the console, the loud speaker is virtually unchanged.

You can imagine how difficult it might be, for example, to recreate with loudspeakers an ff chord held on a pipe organ – 200 pipes generating power and excitement, air being thrashed around the organ loft.

Always go for as large an output as possible. This will be measured in watts per channel. A large domestic hi-fi system will have two channels producing 100 watts per channel; smaller systems might produce 15 watts per channel, and portable machines even less. Now consider the size of your church compared to your living room.

High wattage allows two things: good quality reproduction at low levels and minimum distortion at high levels.

A small organ would require something in the region of two channels producing 120 watts, using three speaker cabinets, whereas a large organ would require something in the region of ten, perhaps fourteen, channels producing 1400 watts, using thirteen speaker cabinets.

Unless for domestic use, built-in speakers are inadequate. Most of the top manufacturers do not include them anyway, but an adequate external speaker system can add approximately a third to the purchase price, and a good or very good system could add half as much again to, or even double, the original cost.

### **Reliability and lifespan**

Like most modern electronic appliances in our homes, organs, nowadays, are extremely reliable, and can give many years of trouble free service.

Lifespan is a very different question, but not always for the reasons one might think. Manufacturers are often victims of their own success. Anxious to provide us with the most up to date and advanced technology means that models will be superseded by improved versions and become out of date – even obsolete – within a few years. There is little point in building a product to last 50 years when it will be ‘old hat’ in 5, the compromise is to build down to a budget and when a major repair does become necessary, although possible, replacing with an up to date model is often, by far, the best option. So the two questions, ‘how long will it last?’ and ‘how long will it last before it’s not worth repairing?’ are two very different questions indeed.

It is difficult to imagine how present technology can be bettered, but there is one field, at least, which is an obvious area ripe for development: hard disc storage – present experiments with multi layer RAM discs could hugely expand the memory capacity at relatively low cost.

# CONCLUSION

Never rely on the acoustics in a shop; an on-site demonstration without a speaker system designed for your building is equally unenlightening. If you are buying British, go to the manufacturer or to the main dealer or supplier for imports. They will take you to installations of which they are proud, but to get a proper comparison the two buildings should be as similar as possible. You can help the dealer to help you by arming yourself with details of your church, such as: dimensions (cubic footage); shape; acoustic properties – resonant/dry, hard surfaces, soft surfaces, etc.

Once you have decided on a builder, they will come to your church and design a sound system to suit.

- Take plenty of time to familiarise yourself with the vast array of instruments on offer.
- Bear in mind the possible extra costs for external sound systems.
- Seek independent advice.
- Remember the two key questions: how does it sound? how does it handle? and the greater of these is: how does it *sound*?

### Value for money?

It is difficult to make entirely fair comparisons in a matter like this, but the following information may give some general guidance.

#### Electronic organ

Organ list price	£15,000
+ adequate sound system	£5,000
*VAT at 17%	<u>£3,400</u>
Total cost	£23,400

Life expectancy: 20 years  
Tuning/maintenance per year £000  
Loss per year = £1,170

#### Pipe organ

Organ value		£20,000
Rebuild costs	£20,000	
*VAT	<u>£3,400</u>	
Total cost	£23,400	

Life expectancy: 80 years  
Tuning/maintenance per year £150  
Loss per year = £442

Value in hand (expressed in today's terms) £20,000

\* In certain circumstances zero rated

# ORGAN BUILDERS AND TUNERS IN SCOTLAND

The Committee does not keep a recommended list of builders and repairers as such. The following are all active in Scotland. The list may not be complete and is emended regularly.

Forth Organs Ltd., Unit 8, Scotway Centre, Newton Village, DALKEITH EH22 1SP. Tel. 0131 660 3767 [www.forthpipeorgans.co.uk](http://www.forthpipeorgans.co.uk)

Alexander F. Edmonstone, The Workshop, Forteviot, Perth PH2 9BT. Tel. 01764 684451. Email: mixture500@aol.com

Michael Macdonald, 39 Rockall Drive, GLASGOW G44 5ES. michael.macdonald1@ntlworld.com. Tel. 0141 637 1014, Tel: 07885 768904 [www.macdonaldorgans.co.uk](http://www.macdonaldorgans.co.uk)

Lammermuir Pipe Organs (Neil Richerby), The Old School, OLDHAMSTOCKS TD13 5XN. Tel. 01368 830411

James Mackenzie, 76 Randolph Drive, GLASGOW G76 8AP. Tel. 0141 637 5576

Paul Miller, 51 Kingshill Avenue, Blackwood, CUMBERNAULD G68 9NF. Tel. 01236 728314

David Stark, Old Schoolhouse, Nenthorn, KELSO TD5 7RY. Tel. 01573 225567; email starkorg@onetel.com

David Loosely, 5 Cauldhame Crescent, Cambusbarron, STIRLING FK7 9NH. Tel. 01786 461899. d\_loosley@hotmail.com

Harrison and Harrison Ltd., St. Johns Road, Meadowfield, Durham DH7 8YH. Tel. 0191 384 3115 [www.harrison-organs.co.uk](http://www.harrison-organs.co.uk)

Willis representative in Scotland: John McCarron, 50 The Oval, Clarkston, GLASGOW G76 8LZ. Tel. 0141 637 8275

## USEFUL ADDRESSES

The **British Institute of Organ Studies** (BIOS) exists to encourage the study of the organ and works for the preservation and restoration of historic British organs.

Publications include:

*'Grants for funding work on historic pipe organs'* and

*'Sound advice: the care of your pipe organ'* downloadable from the website: [www.bios.org.uk](http://www.bios.org.uk))

The **Council for the Care of Churches** (Church of England), Church House, Great Smith Street, London SW1P 3NX, tel. 020 7898 1866, fax. 020 7898 1881, email [enquiries@ccc.c-of-e.org.uk](mailto:enquiries@ccc.c-of-e.org.uk), website [www.churchcare.co.uk](http://www.churchcare.co.uk), is responsible for, or can provide, the following publications: *'Sounds Good'* – a basic introduction to the organ *'Historic Organ Conservation: towards the conservation and restoration of historic organs'* (Dominic Gwynn) – for organ builders and advisers *'Heating your church'* (Colin Bemrose)

The Institute of British Organ Building ([www.ibo.co.uk](http://www.ibo.co.uk))

The Secretary of the Scottish Federation of Organists **Organ Advisory Scheme** is:

Mr Stewart Alston, Ferguslea, 7 Laird Street, Coatbridge ML5 3LJ,  
tel. 01236 424553,  
email [als4ton@tiscali.co.uk](mailto:als4ton@tiscali.co.uk)

The **Scottish Historic Organs Trust** (SHOT), 17 Jordanhill Drive, Glasgow G13 1RZ, tel. 0141 959 5232, email [Kerr.Jamieson@strath.ac.uk](mailto:Kerr.Jamieson@strath.ac.uk), exists to help the preservation of Scottish organs and to conduct research on the history of organ-building and playing in Scotland.

# ORGAN ADVISERS

Approaches to organ advisers should be made through the office of the Committee on Church Art and Architecture which can be reached on Tel. No: 0131 225 5722 extension: 316 or on e-mail address: wordoc@cofscotland.org.uk

## INVERNESS AND NORTH SCOTLAND

**Donald Maclagan, Kingussie.**

**Russell Grant, Ascot.**

## ABERDEEN AND GRAMPIAN

**Ronald Leith, Aberdeen.**

## DUNDEE, TAYSIDE AND CENTRAL

**Andrew McHutchison, Dundee.**

## EDINBURGH AND EAST SCOTLAND

**Alan Buchan, Stow.**

## BORDERS AND SOUTH WEST SCOTLAND

**John Wilson, Melrose.**

**Tom Carrick, Dumfries.**

## GLASGOW AND WEST OF SCOTLAND

**Matthew Hynes, Glasgow.**

**Alan Rodger, Gourock .**

## The Scottish Churches Organist Training Scheme (SCOTS)

SCOTS is an initiative of the Scottish Federation of Organists, the Royal School of Church Music and the Scottish Churches. It has been set up to find and encourage emerging organists as well as to assist those already in posts who wish to develop their skills. The focus is not so much on achieving technical brilliance as on the gifts, skills and understanding which can contribute to a more satisfying experience of worship for the whole congregation.

SCOTS is a flexible scheme in which participants “pace” themselves, with an Adviser who will help them assess what progress is being made and what matters need more concentrated attention. The Adviser also shares his/her experience of the role of church musician. On the technical side, a participant may also have a regular teacher (frequent or intermittent) who is different from the Adviser. There is no fixed time limit in which any one stage should be completed. Training days are planned when participants can meet each other and work together.

At the time of writing, some 50 candidates are part of the scheme, spanning the country from Roxburgh to Kirkwall.

Further information from [www.scotsorgan.org.uk](http://www.scotsorgan.org.uk) or from the Membership Secretary, Miss Susan Wilson e-mail: [susanwilson@scotsorgan.org.uk](mailto:susanwilson@scotsorgan.org.uk)

The Committee on Church Art and Architecture shares an office with the Office of Worship and Doctrine in the Church Offices in Edinburgh. It is staffed by the Rev Nigel Robb, Lynn Johnson, Anna Reid and Ms Anne White. Its address and telephone number are: The Church of Scotland, 121 George Street, Edinburgh EH2 4YN, tel 0131 225 5722, fax 0131 220 3113, email [wordoc@cofscotland.org.uk](mailto:wordoc@cofscotland.org.uk). Faxes should be marked for the attention of the Committee.

Extra copies of this pamphlet may be obtained from the office, price 75p.