Introducing the organ

Introduction
The organ is widely used for Christian worship. There is nothing intrinsically holy about organs — they also have a tradition of use in cinemas and fairgrounds. Rather, the church use of the organ largely derives from:

- the practicalities of having a single instrument that is capable of such a wide range of tone and volume under the control of one player, and
- the Pavlovian connection between organs and worship from long association.

The organ is sometimes referred to as “the king of instruments” because of its great power and tonal range. Yet the organ is unique among instruments in being a machine. The organist does not in any way “make” the note as on a violin, trumpet, flute or even a drum. A child pressing a key on the organ will produce exactly the same sound as a virtuoso organist doing so.

The skill of organ playing is largely a matter of co-ordination rather than applying parts of the body to get a musical sound from an instrument. The organist reads and plays up to three lines of music simultaneously. The organist plays notes with both hands and feet.

Despite the need for such skill, until the 19th century, organists were often seen as machine operators rather than musicians. That attitude has largely disappeared, but vestiges remain. There is still a Royal College of Organists. There is no royal college for pianists, flautists or violinists.

This article introduces this unique instrument.

Mechanism
All pipe organs have:

- pipes which produce the notes
- bellows which provide the air
- windchest, where the wind from the bellows is sent to the pipes
- console, where the organist sits
- action, which links all the above parts.

Organ pipes are either cylindrical tubes of metal or square tubes of wood. The metal is an alloy of lead and tin, sometimes with small quantities of antimony. The exact alloy depends on the
pipe and pitch. Larger metal pipes need more tin, which is much more expensive than lead. Each pipe is capable of producing one note of a particular pitch and tone.

Metal pipes are either flue pipes or reed pipes. Wooden pipes are always flue pipes.

Flue pipes work by forcing air through a narrow opening in the same way as a recorder or whistle. Indeed, an organ pipe is like a recorder with no finger holes. Reed pipes have a reed tongue, strip of metal which the air vibrates to produce a sound. The pipe above the reed resonates the sound to produce the desired musical tone. This is explained further below.

The bellows is a large chamber which builds up air under pressure. The air is fed from a blower. This is now usually provided by an electric motor, though hand-pumped organs can still be found. (Historically other forms of power were used.) The pressure comes from putting heavy weights on top of the bellows. In most organs, it takes a few seconds for the bellows to fill up, before the organ can be played.

An organ can recycle more than 15 cubic feet of air per second, but does so at pressures just above atmospheric pressure. It is easy to sound an organ pipe just by blowing it. Air pressure for organs is traditionally measured as inches of water. If a manometer (U-tube) is filled with water, the pressure is measured by how much the air pressure moves one column relative to the other. Even for loud stops, this is usually just a few inches.

The console comprises the keyboards, stops and other controls used by the organist. He or she sits on a bench that straddles the pedal board. If the organ is situated in a location making it difficult to see whoever is leading the service, sometimes mirrors or even closed-circuit television is provided.

Some large organs, such as in cathedrals, may have more than one console. Often the second console operates only part of the organ. A second console allows the organ to be played from a different location in the building.

The action is the machinery that links all these parts of the organ together. Traditionally this was done mechanically by systems of levers and rollers, known as a tracker action. This generally requires the console to be near the pipes.

Trackers are thin rods, usually made of wood. They provide a physical connection to the pallets under the windchest allowing air into the pipe. Sometimes, a rollerboard is used where a direct connection is not physically possible.

Opinion among organists remains divided on the merits of tracker action. One school of thought favours it because it provides a measure of direct control by the organist, allowing the organist to control how the pallet is opened. The other school of thought observes that an organ key is simply a switch — a pipe is either sounding or it is not — so you can no more control how an organ note starts than you can slowly switch on a light.
In the Victorian era, **pneumatic actions** were introduced. These take two forms: electro-pneumatic and tubular pneumatic. In this, the trackers are replaced by small air tubes. These actions are no longer used for new organs, but are usually maintained when already installed.

In the latter 20th century, forms of **electronic action** were developed. This turns the console into a giant switchboard. The organist’s playing operates electronic circuitry that determines through which pipe the air is blown. Electronic action has the advantages that the console and pipes do not need to be near each other but can be placed where convenient. Also, electronic action takes up less space than tracker action.

**Keyboards**

An organ typically has keyboards of two types: **manuals** that are played with the hands, and **pedals** that are played with the feet. The pedals usually play the bass note, though many works have solo pedal passages. The pedals can also be used to play a melody.

Manuals are usually of five octaves from two octaves below Middle C to three octaves above. It is fairly common for some manuals to stop short of the full range, ending on an F or G.

Each manual can have a different registration (explained below). This allows, for example, the organist to have one manual louder than the other and to switch between them. It also allows the organist to play a solo on one manual, accompanied by quieter stops on the other.

The pedals are of about two and a half octaves, ranging from bottom C to an F or G. In other words, this equals the bottom half of a manual. Pedal boards are either straight, where the pedals are parallel, or radiating, where they form an arc that more easily matches the swing of the organist’s legs. The latter is preferred.

The organist plays the pedals using the toes, and sometimes the heels also, of both feet. For this the organist may wear special shoes where the sole is of a slippery material such as leather or felt (not rubber or crepe), and where there is no welt. Organists sometimes play in their socks without any shoes at all.

The organist balances on the bench as he or she must swivel to play with both arms and legs.

The main manual is called the **great**. This is the one used for most playing. It usually contains the loudest stops, apart from solo reeds.

A second manual is usually called the **swell**. This is placed above the great. Its pipes are put into a box-like structure connected to a separate pedal placed above the pedal keyboard. The front of the box has a system of heavy wooden shutters that can be opened or closed by the pedal. This allows the pipes to be heard louder or softer, and for a genuine crescendo to be achieved.
It should be noted that closing the box not only reduces the volume but changes the tone, as it reduces the higher frequencies more than the lower frequencies, giving a muffled effect.

In addition to the pipes in the box, it is common for a loud solo reed stop also to be put on the swell. Such a stop may be marked “unenclosed” which simply means not in the box.

A swell box should be left open when an organ is switched off. This ensures that the air in the box is of the same temperature and pressure as the air for the rest of the organ.

Many organs have just two manuals and pedals. Larger organs may have more manuals. The largest organ has seven.

A third manual is usually called the choir, from the tradition of placing its pipes nearest to the choir stalls in church, making it particularly suited for accompanying the choir.

Cathedrals and very large churches may have organs with four or more manuals. These are usually placed above the swell, further from the organist. A fourth manual may be called a solo because it predominantly has stops for solo use. A fifth manual may be called a bombarde or echo. A bombarde has powerful stops, whereas an echo manual has quiet stops, often distant from the console and often in a swell box operated by a separate pedal from the swell stops.

The pipes associated with each keyboard are called divisions. An alternative name is to refer to the great organ, swell organ, pedal organ etc. This alternative name originates from past practice of putting different stand-alone organs together.

Chamber organs may have just one manual and no pedals.

**Stops: pitch**
The tone of the organ depends on which stops are selected by the organist. This is usually done by pulling out an appropriate drawstop. Sometimes stops are selected by tablets.

If no stops are drawn, the organ is silent.
Selection of organ stops for pedals and great manuals.

Each stop is marked with its function. Stops are distinguished between **speaking stops** which produce a sound, and **non-speaking stops** which perform other functions such as coupling.

Speaking stops have the name and pitch of the pipes to which it relates, such as “8ft diapason”.

The first part indicates the **pitch** as the traditional length of the longest pipe in the rank of pipes. For an **8ft** diapason, the longest pipe is two octaves below middle C and is about 8 feet
(4.9 metres) long. This means that the pipe sounds at pitch. If the organist plays middle C, you will hear middle C.

Other stops multiply and divide 8ft by simple factors. The indication 4ft means that the stop plays one octave higher; 2ft means two octaves higher and the (rare) 1ft is three octaves higher. Similarly, 16ft means one octave lower, and 32ft means two octaves lower. The commonest 32ft stop is the “acoustic bass”. This comprises two pipes of 16ft and 5⅔ft which produces the low note as a resultant (as explained in the article on Acoustics).

Some stops may be marked 2⅔ft, which is one third of 8ft. This sounds an octave and a fifth above the note played. So playing middle C on this stop produces top G. A stop marked 1⅓ft produces a G one octave higher.

Occasionally a stop may be marked 1⅗ft, which is one fifth of 8ft. From middle C, this produces the note E two octaves and a third above the note being played.

Stops which have fractions in their pitch description are known as mutation stops.

It should be noted that these terms indicate the pitch and not necessarily the length of the longest pipe. Stopped pipes sound one octave lower than their length; some strings-toned pipes may have a length much longer than their speaking length; while the pitch of reed pipes is unrelated to their length.

**Organ pipes**
Organ pipes are of two types:
- flue pipes (by far the most common)
- reed pipes.

Most pipes sit vertically in a pallet which controls the air supply by using a shutter. The air enters from the bottom.

In a flue pipe, the toe sits in a hole on the wind chest and is supported at the foot by a frame. At the mouth, near the bottom of the pipe, a languid shuts off most of the pipe’s cross-sectional area, forcing the air between the edges of the languid and mouth. This causes a column of air audibly to vibrate in the pipe above. The sound comes through the mouth and top of the pipe. The tone is adjusted by the ears of the pipe. The languid can also be nicked to alter how the pipe sounds.

In a reed pipe, air again enters through the foot into the reed block, which is usually detachable from the pipe above. The reed is a strip of metal that vibrates against a shallot. The pitch is determined by the length of the free reed tongue. This is controlled by a tuning spring which is accessed from the top of the reed block. The pipe above acts as a resonator which brings out the desired tone of the pipe.
**Analysis of organ pipes:**

![Diagram](image)

*Diagram taken from The Organ by David Baker, published by Shire Books Ltd and used with permission.*

**Stops: tone of flue pipes**

The second part of the speaking stop’s name indicates the **tone**.

Almost every organ will have a stop marked **diapason**. This is an open cylindrical pipe which produces the traditional church organ sound. If pipes are part of a display in the organ case, they will probably be diapason pipes.

The word “diapason” comes from Greek, and means “of full compass”.

Sometimes an organ may have more than one diapason. They are then numbered as open diapason 1, open diapason 2 etc. Usually, the higher the number, the quieter the stop.

Another distinction may be made between **open diapason** and stopped diapason. The open diapason is the standard form of diapason. The stopped diapason is usually made from wood and is sealed at one end. It sounds more like a flute stop.

Organs usually have a range of stops of the same tone but at different pitches. So there may be diapason stops at 8ft, 4ft, 2⅓ft and 2ft. Collectively these are known as the **diapason chorus**. In this context, a chorus means more than one stop of the same tone but at different pitches. For diapasons, stops of those four ranks are likely to be called: 8ft diapason, 4ft principal, 2⅓ft twelfth, and 2ft fifteenth. These last two terms come from the fact that the notes they play are the twelfth and fifteenth notes in the scale.
Organ pipes tend not to have as many harmonics as orchestral instruments. The chorus compensates for this by allowing those higher harmonics to be selected by the organist. A more detailed discussion of harmonics is given in the article on Acoustics.

For **flue pipes**, there are three main families:
- diapason
- strings
- flute

**Strings** are produced from cylindrical pipes of narrower diameter than diapasons. This gives a softer and gentler sound that bears a slight relation to the sound of strings in an orchestra. Such stops have names like salicional, dulciana and gamba.

Some string stops are slightly detuned. They may have names such as vox angelica or voix celeste. These stops are designed to be used with other string stops. The detuning creates beat notes which produce a vibrato effect. Beat notes and tuning are explained further in the article on Acoustics.

**Flutes** are produced from either metal or wooden pipes. They produce a tone that sounds a little like an orchestral flute. There are many variations of flute sound. The term flute is used for the 8ft and 4ft pitches. The 16ft and 2ft pitches are usually called bourdon and piccolo. The bourdon is the commonest stop for the pedals. It provides a quiet bass note that blends with almost any tone.

A common flute stop on the manuals is the hohlflute. This is German for “hollow flute”. It uses wooden pipes that are open at the top.

It is possible to have a **flute chorus** of flute stops of different pitches. Organs tend not to have strings choruses, though there may be an occasional 4ft stop of string tone.

**Stops: reeds**

**Reed stops** produce strong tones of character. They are also often loud. Small pipe organs often have no reed stops, or perhaps only one (usually on the swell).

Common reed stops at 8ft pitch are:
- trumpet
- clarinet
- oboe
- horn
- tuba

These are named after orchestral instruments to which they bear only a slight relation in tone.
The **trumpet** is a loud stop, useful for fanfares and similar. It can usually be blended with other stops. The 16ft and 4ft versions are usually called trombone and clarion.

The **clarinet** and **oboe** are quieter stops which are particularly useful for playing solo parts. Care is needed in using them with other stops, though they can sometimes be used to thicken a sound.

The **horn** is similar to a trumpet, though usually a little quieter and with a more rounded sound.

The **tuba** is a very loud stop designed to be heard over all other stops. It is used for solos, and should then be used sparingly.

Other reed stops include crumhorn, ophicleide and bassethorn.

**Stops: mixtures**

While choruses can produce some of the higher harmonics, for extra brightness even higher harmonics can be useful.

These are provided by stops known as **mixtures**. Here each note is not connected to a single pipe, but to two, three or four pipes of high pitch. These stops are never used on their own. They add brightness to other registrations.

Mixture stops are described in the form “Mixture II ranks”. This means that two pipes sound when a note is depressed for that stop. The stop may indicate what those notes are as in “Mixture II 19,22”. This indicates that the 19th and 22nd notes of the scale are played. For middle C, this stop will play top G and the C above (three octaves above middle C).

A mixture with three or more ranks is said to be a **sharp mixture**. A mixture on the pedals is sometimes called **fourniture**. A brassy sounding mixture may be called a **cornet**. A mixture of very high diapason pipes may be called a **cymbel**.

**Stops together**

Part of the art of organ building is to produce stops that not only sound nice on their own, but in combinations. On a good organ, a pleasing sound can be obtained from almost any combination. On less well-designed organs, stops can clash and produce a raucous tone.

The term **full organ**, or organo pleno, means that all the stops are used. For organs with tubas and other very loud stops, there may be some exclusions. Full organ is a dramatic effect that should be used sparingly.
Organ pipes

Organ pipes are grouped together in ranks. Generally each rank corresponds to one stop for one keyboard. Occasionally a rank may be accessible from more than one manual.

The ideal position for organ pipes is high above the floor and with heavy casing at the back and sides. It is often necessary for a compromise to be reached between this ideal and other practicalities.

Pipes are generally arranged vertically with the toe of each pipe sitting in a hole in the windchest and a support a little higher. Very occasionally a rank of pipes is described as en chamade. This means that the pipes are placed horizontally. These are usually flared pipes that look like, and sound like, posthorns. They are often attractively arranged to protrude between vertical pipes.

In many cases, a rank provides one pipe for each note on the relevant keyboard. This typically means between 55 and 61 pipes for a five-octave manual, and between 30 and 32 pipes for a 2½-octave pedalboard.

The pipes are usually set in pallets in decreasing size. A rank of pipes for an 8ft diapason will have lengths from 8 feet to 3 inches, to which must be added a few more inches for the pipe to stay in place. Display pipes are usually arranged with the longest in the middle and pipes alternately set on each side. So a display may have bottom C in the middle, with C# next to it on side, and D on the other.

Pipes are commonly referred to as being in septaves. This is an octave without the repeated tonic. It comprises the seven remaining notes of the scale plus the other five notes. So there are 12 pipes in a septave.

The provision of one rank of pipes for one stop means that up to 61 pipes are needed for each stop. However, where an organ has stops of the same tone but of different pitch, some organs use borrowing. For example, an organ has 61 pipes for an 8ft diapason. It wishes to add a 4ft principal of the same tone.

Rather than add another 61 pipes, it can add just a further 12. Middle C played on the 4ft principal will have the same pitch and tone as the C above played on the 8ft diapason. Under borrowing, there is no duplication of pipes of the same tone and pitch. Four of the five octaves will use the same notes, so only a new top octave is needed.

While there is an obvious saving of space and expense, borrowing creates a disadvantage in that the organ may not perform as the organist expects. This is best illustrated by a simple example. Suppose an organist plays a full chord of C major comprising seven notes thus:
If played on an 8ft diapason, seven pipes will sound together.

If the 4ft principal is added on an organ without borrowing, a further seven pipes will sound. There are now 14 pipes producing this chord.

If the organ uses borrowing, the bottom C played on the 4ft principal will be the same pipe as the C one octave higher already played on the 8ft diapason. Similarly, the tenor C on the 4ft principal will use the same pipe as middle C on the 8ft diapason. The same applies to the G and C above. In fact, only three additional pipes will sound. These are the three highest notes, one octave higher.

So adding a 4ft principal means that we go from 7 pipes to 14 on a non-borrowing organ, but to only 10 on a borrowing organ. This means that a borrowing organ chord is less loud and has a less thick texture (from the lack of duplicated pipes on the lower notes). This can produce a less balanced sound.

**Non-speaking stops**

Organs usually have some stops that do not relate to ranks of pipes at all.

The commonest of these is the **coupler**. This bears a legend such as “swell to great”. It means that whatever is on the swell manual can also be played on the great manual just by drawing this coupler. This allows for additional registrations to be made quickly. As the pipes on the swell can be operated by a swell pedal, this can also allow some dynamic change when playing on the great as the swell stops will be affected by the swell pedal while the great stops are not.

Almost always, there is one coupler for each manual to couple it to the pedals. For a two-manual organ, there will be a swell to great coupler. For a three-manual, there will usually also be “choir to great” and “swell to choir” couplers.

For a tracker action organ, these couplers involve moving more machinery. This can make the keyboard very heavy to play. Fast music on an extensively coupled tracker action organ can become physically tiring.

Sometimes organists use an **organ assistant** to assist in changing stops and turning pages.
Another non-speaking stop is the **octave**. In effect this is another coupler, as it also plays the pipes one octave higher on the same manual. The exception is for notes in the top octave where there are no pipes one octave higher.

Less common is the **sub octave** which adds pipes one octave lower.

There are **octave couplers** such as swell octave to great. This means that middle C played on the great also plays the treble C on the swell. There can also be sub octave couplers.

**Unison off** means that the stops do not sound at their normal pitch at all. This is used with an octave coupler so that the entire keyboard plays one octave higher (except for the top octave).

A **tremulant** is sometimes provided for the swell or choir (almost never for the great or pedals). This provides variations in the air supply which gives the note a “wobbling” effect. To the extent that church musicians use this stop at all, it is generally restricted to quieter stops. This can be effective with a solo stop on which a melody is being played, such as in chorale preludes by Buxtehude where an elaborate melody is heard against a simpler accompaniment.

A **zymbelstern** is a separate machine that provides a percussion effect of little bells of indeterminate pitch. When the stop is drawn, the machine operates. It can produce some interesting effects when blended with organ pipes. Although other forms of organ percussion and similar effects have been devised, these are rarely encountered on church organs.

Some organs have **synthetic stops**. These appear to be normal speaking stops, but are actually a combination of other stops to simulate a particular sound, such as a clarinet.

Organs with an electronic action may have a **midi control**. This allows the organ keyboard to operate an electronic keyboard such as a separate synthesizer. This is little used in practice.

**Registration**
The particular combinations of stops used at any time is called a **registration**.

This is a largely a matter of taste and experience. An organist should experiment with different combinations. Sometimes unlikely combinations can produce interesting effects.

An organist should always take the opportunity to familiarise himself or herself with a new instrument. A stop may have a significantly different tone and volume from the same-named stop on another organ.

In normal organ playing, there will usually be 8ft stops used on the manuals and 16ft and 8ft stops used on the pedals.
To this choruses can be established for the diapason and flute sounds. Strings sounds can be blended to the desired effect and volume. A manual may be set with a solo stop. Reed stops can be drawn either as a solo stop or to thicken a chorus. Mixtures may be added when a particularly bright sound is desired.

A pleasant effect can be produced using *gap registration*. This is a chorus with the middle missing, such as using 8ft and 2ft stops together with no 4ft stop. This can be very effective when playing baroque music as it gives a bright and clean sound.

There are many more combinations of organ stops than organists may realise. For example just four stops: A, B, C, D, can produce 15 different registrations:

- 4 of A, B, C or D alone
- 6 of two stops: A+B, A+C, A+D, B+C, B+D, C+D
- 4 of three stops: A+B+C, A+D, B+C+D, B+D
- 1 of all four stops.

Mathematically, the number of registrations (R) for a number of stops (N) is:

$$ R = 2^N - 1 $$

The number of registrations per number of stops can be shown in this table:

<table>
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<th>Stops</th>
<th>Registrations</th>
<th>Stops</th>
<th>Registrations</th>
<th>Stops</th>
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</table>

10 stops produces more than 1,000 registrations; 20 stops more than one million; and 30 stops more than one billion. Every additional stop doubles the number of possible registrations.

It is recognised that many of these registrations will be of no practical use or of inaudible difference from other combinations. Nevertheless, the table does illustrate the huge range of registrations available even on small organs.
Other organ controls
In addition to the manuals, pedals and stops, organ consoles often have other controls.

The most common is the piston. This allows for a predetermined combination of stops to be selected at the push of a single button.

Pistons are of two types. Thumb pistons are little buttons placed under the manual to which they relate. They are usually placed in ascending order of loudness, so the loudest combination is the last piston on the right. Toe pistons are placed behind the pedalboard to be operated by the feet. Often some toe pistons relate to the pedals only, while others relate to manuals.

Pistons are also used to operate couplers. It may be more practical to operate a piston to bring out the “great to pedals” coupler than to pull out the coupler while playing. Such pistols are usually reversible. This means that pressing it again while push the coupler back in.

Pistons are either set up by the organ builder or by the organist. For the latter, there may be further controls such as a set button that allows the organist to choose a combination of stops, and then press this button with a piston to set that combination for that piston.

A further refinement is a rotating switch with perhaps 10 positions. This allows 10 sets of combinations to be set for the pistons. This can allow the organist to programme the pistons in different ways. It can also allow different organists to set their personal preference on the same organ.

Yet another refinement is an electrical data capture unit. This allows the organist to set up a sequence of registrations for playing a major organ work.

Some large organs have ventils. These are switches that can disconnect part of the organ if there is a malfunction there. It allows the rest of the organ to be used.

The organ will have an on/off switch to provide power to the bellows and any electronic action. There should be a gently sloping reading desk to hold the music, of sufficient depth to hold thick hymn books, and preferably with four rotating retaining clips. There will usually be a reading light for the music stand, and possibly also one for the pedals. The front of the lower keyboard may have a hinged cut-away section for ease of playing. There are jambs by the organ and, ideally, other available surfaces as an organist can need six or more different books for a service.

Fingering
Most people who start to learn the organ can already play the piano. So they are already familiar with the layout of a manual keyboard.
The organ differs in that the note does not die, as on a piano. An organ key is like a switch. The pipe keeps sounding while the finger remains on the key. For this reason, the organist must develop legato styles of playing. If an organist needs to change one note in a chord, he or she must be able to hold down all the unchanged notes and quickly change the one note using available fingers. To enable this, Czerny (among others) developed finger exercises. An organist should be able to place his or her fingers on a table and alternate between any five fingers on either hand. This is difficult at first, particularly for some fingers, but can be mastered.

In early keyboard music, the thumb and little finger were little used. While subsequent organ music is incapable of being played with three fingers, the middle three fingers are still the most commonly used.

Many problems of fingering can be resolved by the organist keeping the hand in one position over the keyboard for as long as possible and playing the notes by moving the fingers only. Consideration should be given as to when the hand, rather than the fingers, should be moved.

While staccato rarely sounds effective on an organ, some breaks between notes greatly assist phrasing. As an organ note is either sounding or not, the normal methods of phrasing used by other musicians are not available to organists. This is addressed, at least in part, by how and when the organist removes the fingers. The quickness of the hand can deceive the slowness of the ear. Very small differences in playing a note just before a beat and finishing it before the end can create phrasing effects. Similarly, not taking all the fingers off at the same time and, for example, allowing lower sounds to sound very slightly longer, can also create phrasing effects.

**Pedalling**

Learning to play with the feet is a skill unique to organists.

The organist should be able to access each end of the pedalboard with either leg, and should be able to swivel on the bench to do so. An organist who is particularly short or tall may need to adjust the bench to do so comfortably.

For each foot, the organist uses the toe and heel. Moving from one to the other creates a legato effect between notes. Otherwise, legato effects in the pedals are largely achieved by alternating the feet.

However, a slightly staccato effect in the pedals can be effective in much organ music. The pedal music of Bach, for example, often lends itself to being played using only the toes, which we believe was what Bach himself did.
Practising
Learning to play the organ is no different from learning any other skill; it is acquired by learning from a master and then applying it in extensive practice.

In learning a new organ work, a good plan is:

1 Practise the pedal part first, before the manuals.

2 Practise each hand separately before playing together or with the pedals.

3 Play through pieces in combinations of left hand and pedals, right hand and pedals, and left and right hands before attempting to play the whole piece.

4 Do not practise what you can play. Concentrate on the bars or phrases which cause you problems, and practise them until they are correct. It is quite normal for an organist to spend 55 minutes of an hour practising just three difficult bars.

5 If you come across a tricky passage, practise it slowly enough to get every note right and in tempo with other notes. Only then start to practise it at increasing speeds until it is a tempo. Avoid practising where you slow down at difficult passages.

6 On passages where the fingering or pedalling is not instinctive or obvious, mark it on the relevant notes only, such as writing 4 above a note where you would otherwise play it with your little finger and then be unable to play the next phrase.

7 Consider registration only when you are note-perfect.

Maintenance
As a machine, the organ needs to be maintained through regular servicing. This is usually done by a contract with an organ building firm, possibly the company that built or rebuilt the organ. In a few exceptional circumstances, some basic maintenance may be undertaken by the organist. Examples include the occasional retuning of reed pipes.

There is usually a plaque on the console saying which firm built the organ, and any firm that has subsequently rebuilt the organ. It is also common for a notebook to be kept by the organ in which organists can note any faults with the instrument or other adjustments that need to be made. The organ builder can then deal with these matters.

Most organs are serviced about once or twice a year. About once every 30 years or so, most organs will need a much more thorough overhaul.
It should be noted that responsibility for plant in the Church of England legally rests with the churchwardens. It is they who are responsible for the maintenance of the organ. In practice, this is usually delegated to the organist who deals directly with the organ builder. However this must always be done under the specific authority of the churchwardens.

As the pitch of flue pipes is determined by the length of the pipe, they should not need tuning unless somehow that length has changed. Most flue pipes now have a slider on the end. This is a short length of pipe that fits tightly round the end of the main pipe. The pipe is tuned by moving this up or down. It is possible that this could slip. Otherwise, it should be noted that an organ does not need frequent tuning in the way a piano does.

Older open flue pipes may have a hole where a strip of metal is rolled down. The pitch can be adjusted by how much of the strip is rolled up.

Before this, open flue pipes were tuned by a tuning cone which was hammered into the top of the pipe causing it to flare and shorten. The other end of the tuning cone was a tapering hole. A pipe’s length could be flattened by placing this over the pipe and hammering it over the pipe to reduce the flare and thus lengthen the pipe. This method is now no longer in use because of the obvious damage to the pipes. If pipes have been damaged beyond repair at pitch, they are sometimes shortened to the semitone above and moved up one hole in their rank with just one new pipe needed at the bottom to complete the rank.

The matter is different for the reed pipes where the pitch is determined by the length of the tongue, which can easily slip. These need more frequent tuning.

Stopped flue pipes

It should be appreciated that metal pipes are largely made from thin sheets of a soft alloy. They are easily damaged by normal handling. Also, the pipes sit lightly in their pallets and can easily be knocked, and damaged. For this reason, it is inadvisable for an inexperienced person to wander round an organ loft. There are also safety issues.

Organs use many natural materials, such as wood for shutters and pallets, leather in valves, and animal skin for the bellows. These are all affected by temperature, humidity and damage from mice and insects. As an organ chamber rarely sees a vacuum cleaner, there can also be a large build-up of dust.

Every 30 years or so, an organ usually needs more substantial maintenance. A shorter period may be needed for exposed organs; a longer period for enclosed organs. This can take many months and is something that needs careful planning and budgeting by the church authorities. The organ is stripped down, with deteriorated parts replaced. The whole mechanism is serviced, and the whole area cleaned. Substantial maintenance is also often used as an opportunity to revisit the specification of the organ, such as by replacing or adding stops, or changing the action.
Pipe organs outside the church
Pipe organs are not found just in churches. They can also be found in concert halls, cinemas and fairgrounds. Concert hall organs tend to be built to a similar specification as church organs, though perhaps on a grander scale.

Cinema organs differ from church organs in these regards:
- the main stop is the flute-like tibia rather than the diapason
- almost every part of the organ is put in a box allowing for crescendos
- tremulants are provided for all parts of the organ
- the manuals may have double position keys, where pressing the note harder pushes it to a second position whereby a different registration applies
- the organ has many percussion and sound effects.

Cinema organs were originally designed to provide music for silent films. They became established just as films with sound were introduced. Nevertheless, the cinema organ has established itself as a distinctive instrument.

Fairground organs are part of a range of mechanical devices where the organist is replaced by machinery. On a fairground organ this may be by punched cards or a fanfold of punched sheets where each little rectangular hole corresponds to a pipe or sound effect. Modern forms can use computer discs. It is worth noting that Mozart, Beethoven and Haydn all composed music to be played on such machines.

A simple form or mechanical organ is the barrel organ which was widely used in churches in the 19th century in addition to being street entertainment for the period. A limited range of tunes could be produced by rotating a wooden barrel with nail-like pins that correspond to pipes.

Non-pipe organs
As pipe organs are expensive, various attempts have been made to find cheaper alternatives.

Perhaps the earliest is the reed organ of which the harmonium is the commonest. Instead of blowing air through a pipe, air is blown across a small metal reed similar to those found in a mouth organ. On larger harmoniums, there can be different sets of reeds with different tones operated by organ stops. Air is provided by the player operating alternate pedals. These must be operated a constant and fairly fast speed which may not relate to the tempo of the music.

The harmonium does not have the same tone quality, power or tonal variety as a pipe organ, but can produce pleasing effects. Much late 19th century French organ music was written to be playable on a harmonium.

A variation is the American organ which sucks across the reeds, producing possibly a better tone. The piano accordion is a form of portable reed organ. The right hand plays the tune and a few harmony notes from a piano-style keyboard, while the left hand presses buttons.
corresponding to chords. The bellows are between the keyboard and buttons and produce sound by being squeezed by the player.

**Electronic organs** were developed from the 1930s as electronics became better understood. The first was the Hammond Organ. This did not sound like a pipe organ but produced a distinctive style using tonewheels.

Electronic organs have the advantages of needing less space and costing much less. However the latter advantage is often less than realised, as electronic organs usually have to be replaced after 10 to 20 years. If you look at your locality, you will probably find more pipe organs over 100 years old than electronic organs more than 20 years old.

Later organs used various forms of circuitry. Earlier instruments used until the 1960s often lacked musical tone with stops producing sounds often little better than buzzes and whistles. Manufacturers routinely claimed that their latest models were as good as pipe organs. Few organists believed them. The attitude was usually a reluctant “better than nothing”.

From the 1970s, digital sound technology considerably improved the tone quality of electronic organs.

Some popular organs for home and pub use were developed at this time. They often have rhythm units, chord buttons and similar controls. There is just one octave of pedals to be played by the left foot only, while the right foot uses a swell pedal that operates over the whole instrument. Such devices have been called **wally boxes** because of the limited musical talent needed to operate them.

There are also now marketed **hymn machines** and pre-recorded compact discs of hymn tunes. The former have also improved in quality and can now be sophisticated machines. However their manufacturers usually admit that they are not as good as a live organist. Again, they can be reluctantly used as “better than nothing”.