

**Fact Sheet Produced for the SSLSO
'Come and Meet Us' Event
At Dulwich on May 7th 2016**



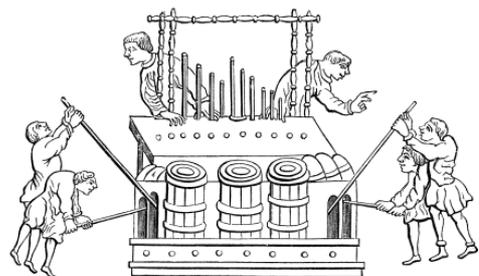
First, here are a few interesting facts which didn't quite make it into the final script:

The Hydraulos



The earliest recognisable pipe organ – the Hydraulos - was designed by the Greek Ktesibios in 246 b.c.. He was an expert in water and air pumps and head of the Library at Alexandria – his water pumps were used throughout the ancient Roman empire. The air pump was water-based and experts reckon that the wind pressure was quite high so this would have sounded quite shrill – but it would need to be if it was used in Roman theatres and circuses.

The first Winchester Cathedral Organ, built in 951, had 400 pipes and took 70 men to pump it and a further two people to play it. In this woodcut (which is of a different, smaller instrument) the four

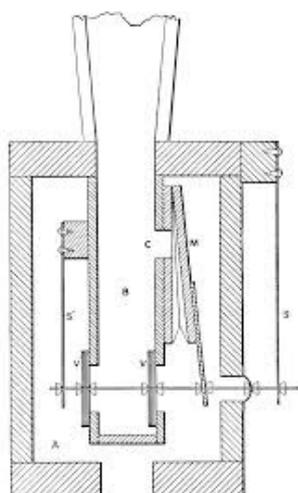


people on the sides are pumping the bellows and the two at the top, presumably, playing it, though they seem to be telling the others off !

Organs were once the most complex pieces of machinery ever made, but lost this distinction to the Telephone Exchange in the late 19th Century!

Note: Robert Hope-Jones (1859-1914) was an early Telephone engineer and inventor. He realised that the technology used in the telephone exchange could be applied to organs too. This interesting cross-fertilisation of ideas eventually gave rise to the mighty Wurlitzer. So the organ got the last laugh.

- London's Albert Hall organ has 9,999 pipes.
(<http://www.mander-organs.com/portfolio/r-a-h.html> or google 'RAH Organ')
- The biggest playable organ in the world is in Macy's Department Store (formerly "Wanamaker's", who installed the organ to entertain customers) in Philadelphia. It has 28, 604 pipes and a permanent staff of organ builders to maintain and tune it. See: <http://www.wanamakerorgan.com/> or google 'Wanamaker organ')
- The biggest pipe organ on the planet – in fact the biggest and loudest musical instrument **ever** made is in Atlantic City with 33,110 pipes. But owing to storm damage in 1944 only about 20% of it is playable. It is currently being restored ! (Google 'Atlantic City Organ' – or 'Midmer-Losh' (the name of the maker)).



Diaphones:

In addition to the two basic types of pipe "Flue" (like whistles) and "Reed" pipes (physically like a clarinet), Cinema organs also have a third type of pipe called 'Diaphones' – invented by Robert Hope-Jones (we've met him before) - it makes a sound like a mellow, smooth reed pipe, but can be

extremely loud too – the design was widely used as a fog horn !

Pitch

Normal pitch is called “Eight Foot Pitch”. That is the length of the longest pipe¹ on the keyboard, i.e. 2.44 metres (it predates the metric system by centuries, and ‘8’ looks nicer on a stop knob !)

Some stops even play a chord ! – they’re called ‘Mixtures’ and sound very peculiar when played on their own, but when combined with other stops they add extra harmonic colours to the sound. The ear doesn’t perceive them as separate pitches. (They are actually tuned to harmonics of 8’ pitch – i.e. whole number multiples of the base frequency or fundamental). Pipe organs were synthesising unique new sounds from harmonic series a long time before Fourier invented the mathematics, or Hammond invented the tonewheel.

Materials

Flue pipes can be made of metal or wood. Organ pipe metal (alloy) contains lead (so don’t put them in your mouth). Centuries of experience has shown it is the only metal suitable for the job. But this lead does **not** get into the environment – old pipes are always re-used in new organs or melted down to make new pipes. More exotic materials have sometimes been used – paper, glass, copper and even gemstone rock, but this tends to be for artistic rather than musical reasons.

Wind

The pressure used isn’t very high – about 3.5 inches water gauge (tyre pressure in a car tyre is about 250 times higher, about 900 inches water gauge) but a huge volume of air is needed. The bottom pipe on an organ can require more air than the whole of the rest of the instrument.

¹ Assuming it’s an ‘open’ pipe.

Keyboards

Often one or more of the wind chests with its pipes is placed inside a heavy-duty wooden box fitted with 'venetian' shutters under the organist's control and forming a sort of volume control. Closing the shutters muffles the sound and opening them causes the sound to swell out – so it's called a 'swell box'. This Keyboard is usually referred to as the "Swell". The main keyboard on a church organ is called the "Great" which contains the louder stops for accompanying a congregation. If there is a third keyboard it is usually called the "Choir" and contains softer sounds for choral accompaniment.

Other Types of Organ

Some organs don't use pipes at all, but use rotating wheels of metal (Hammond) or glass (Compton), magnetic tape or electronic oscillators to produce an electrical signal which can be switched via a keyboard and amplified.

Computers can be used to generate the sound of pipes, either by using recordings of real pipes, simulating the sound by Fourier synthesis or even mathematically modelling the physics of pipes in real time. With a good sound system these can sound quite realistic.

The main value of electronic organs is their ability to create sounds which are utterly unique (the Hammond organ tone-wheel system for instance, the Ondes Martinot, the Theremin or the Moog). These are often used in experimental music, film scores, jazz, rock and pop, just as the Pipe Organ is at its best producing unique sounds not available from any other instrument (to be honest, a pipe organ 'Oboe' stop doesn't actually sound very like a real oboe !).

You can view the video again on You Tube, either search for 'SSLSO' on YouTube, or visit <http://sslso.org.uk/> in a few days time and find the link, probably under the 'Past Events' tab.

I hope you have enjoyed this very basic guide to what makes an organ work. There are many other resources you might like to explore, which are listed below:

Music Clips used on the Video

(just in case you want to hear the pieces again and listen to them all the way through. Most of these pieces are available on YouTube in some form or other).

All the music was recorded specifically for this video by a member of SSLSO, except for the pieces marked '*'.

	Heading	Name of the Piece	Written/Performed
1	Opening	'The Lost Chord'	Arthur Sullivan (of 'Gilbert and Sullivan' fame)
2*	Pan pipes	"Hymn to the Sun" Ancient Greek Melody	Mesomedes of Crete (130 BCE)/ 'Kamibambiraptor' (YouTube)
3*	Bagpipes	(origin unknown)	
4*	Sheng	Unknown piece	played by Wu Wei (YouTube)
5*	Hydraulos and Trumpet duet	Unknown piece	Justus Willberg and Hagen Pätzold (You Tube).
6	Winchester Organ	'Veni Creator Spiritus'	Plainchant
7*	Albert Hall Organ	Organ Symphony (Finale)	Saint Sääns/Olivier Latry (You Tube)
8*	Wanamaker Organ	'Land of Hope and Glory'	Edward Elgar/Virgil Fox (vintage recording)
9	Flute stop	'Toccatina for Flute'	Pietro Yon
10	String Stop	Berceuse from 24 Pièces	Louis Vierne

11	Diapason	Cornet Voluntary in G – I Andante	William Walond
12	Tuba	Tuba Tune	C.S.Lang
13	Trumpet	Prelude to a Te Deum	Charpentier
14	Oboe	“Jesu Joy of Man’s Desiring”	J.S.Bach
15	Clarinet	Largo from the ‘Clarinet Quintet’	W. A. Mozart
16	Medieval Reeds	Medieval Dance from ‘Danseryre’	Susato
17	Pedals	Widor’s Toccata (Finale from 5 th Symphony)	C.M.Widor
18	‘Mixture’ demo	Cornet Voluntary in G – II Allegro	William Walond
19	Crescendo	from one stop to full organ	improvised by JDM
20	Pedals	‘Revolutionary’ Prelude played on the pedals	Chopin/ Cameron Carpenter (YouTube)
21	Finale	In Dulci Jubilo	J. S. Bach/played on the organ of St Mary’s Hay-on- Wye and demonstrating the ‘Zimbelstern’

Bibliography

Early history	http://faculty.bsc.edu/jhcook/orghist/history/hist001.htm
Lots of useful information:	http://www.pykett.org.uk/
British Institute of Organ Studies	http://www.bios.org.uk/
National Pipe-Organ Register	http://www.npor.org.uk/
The Lady Organist blog	http://www.theladyorganist.com/ (also works for men).
SSLSO	http://sslso.org.uk/

YouTube

Hydraulos	https://www.youtube.com/watch?v=atT7Tjpn5js https://www.youtube.com/watch?v=bP2u8NBI5m8 https://www.youtube.com/watch?v=BeJWu18ckbl https://www.youtube.com/watch?v=8SZX-GovKrE
Information about the organ in Philadelphia	http://www.wanamakerorgan.com/

JDM 2016



Raphi Giangiulio designed and built his own home organ, and documented it on video, showing the internal workings.

He very kindly gave us permission to use his video at this event.

Do visit his web page: www.rwgiangiulio.com, where you will find several other videos of his home-organ.

Bert Shapiro of 'Pheasant Eye Productions' also kindly gave permission for us to use his DVD.



'The Organistas' as part of this presentation. This is a documentary about organ building with contributions from many leading organ builders in the UK and USA, and shows them making pipes right from the molten metal stage, through to assembling, voicing and playing the final instruments.

His web page is: <http://pheasantseye.com/>.



A Wurlitzer (Cinema Organ) Console



The Atlantic City Console (biggest organ ever built)



Diaphone Pipes