

Introduction

Most, if not all, pipe organ builders will endeavour to provide a bespoke organ. They have no such thing as a "standard range". Nor do we, because we believe that every installation is totally different, and requires the right instrument for the surroundings. The electronic organ industry has been trying for over thirty years to emulate as closely as possible the might and majesty of the "King of Instruments". The pipe organ gets this in part by being designed and adjusted tonally for the room in which it is to be installed. We feel the one thing that a lot of manufacturers have missed is that no two instruments of similar size, even from the same builder, can ever sound the same, and for a manufacturer to come along with Organ Model "A" or "B" or "C", take it out of its box, plug it in, switch it on and say to the customer "There you are sir, your organ is installed" is not really good enough. Any organ requires detailed setting up, and the chances are that the factory setting is not correct for that particular acoustic. Equally, there is a very good chance that none of the standard models are totally suitable in any case.

Old-world craftsmanship and the highest standards of excellence characterise the design and construction of our consoles, using traditional pipe organ components. Everything about a Phoenix Organ makes it authentic to its pipe organ counterpart. The sounds emanating from the instrument, along with the look and feel of the console, will convince you that you are playing a truly fine pipe organ, one that you will enjoy playing over and over again.

We believe that our instruments are the *best* substitute for the real thing. It may be argued that a good digital organ is better than a poor pipe organ. We have a solid *musical* background within the company and all our senior staff are players. We have the necessary expertise to help you put together a specification which will embody both musicality and flexibility, and which will be ideal for your set of circumstances.

Our system was designed from the "ground up", with no technical pre-conceptions, and is the most flexible on the market today. Gone are the "standard" specifications, the "standard" models. Everything is custom built and adjustable, even after the organ has been completed. Mixture ranks can be added and compositions changed, pistons can be re-assigned their functions, and the number of parameters controlling each note is many times greater than that available to our competitors.

All these factors lead to a unique flexibility, but it is the sound of an instrument that is most important of all and here that the benefits of our specially designed voicing software become apparent. We can get exactly the sound you want from your organ, and the control we have over each note of each stop means we can easily tailor the overall sound to match the acoustic properties of the building.

Our ultimate goal is to build for you the best possible musical instrument—one that will give you endless hours of enjoyment, one that will fulfil your particular desires - be they Baroque, Romantic, Gallic or Eclectic.

A Phoenix Organ will achieve all these things and much more. Above all it will look, feel, sound and play just like the real thing. Custom building normally commands a high price tag. Not so with a Phoenix Organ. We can offer you a bespoke product at an off the shelf price, and, like all works of art, it will be totally unique. It is no mere reproduction print—it is a one-off original in oils.

We are confident in the reliability and quality of our organs. We demonstrate this by including a warranty covering all parts and labour costs for five years and a further five year warranty on parts.

The Product

Building of organs brings together many different crafts and by far the largest proportion of work and indeed cost goes into the actual cabinet which houses the keyboards and stops and all the works.

If you stop and consider the console of any instrument with which you are familiar, the over-riding material used is wood. The console is a piece of furniture, as handsomely finished as anything which would grace your dining room. You sit on a solid wooden seat which must stand the rigours of organists - including the heavyweights. The keys sit on a shelf far thicker and more rigid than an average dining table, and this supports anything up to 75% of the total weight of the console.

These and many other factors make the quality manufacture of the console of paramount importance. Phoenix consoles are made to our own designs by a well-established firm of independent organ console builders, and this allows us to build in the expertise of these craftsmen, all of whom have spent many years in the trade. We fit only the finest ancillary components such as keyboards and stop units. These are perhaps the most important aspect of any organ as they are the player interface—the point at which the player actually makes music from muscular movement. These components are sourced from the same suppliers as pipe organ builders use, and we can offer many alternatives with regard to keys, stop heads and so on, which will comfortably fulfil the client's budgetary requirements, as well as make the player feel totally and instantly at home.

As you would expect, equal care has been taken with the electronics inside the console. All designs have been carried out in-house by two engineers who formed the company. Both are electronics graduates and have spent many years working with leading edge technology in software, electronics and organ businesses.

Phoenix technology has the edge over the competition, thanks to the design process which started with a clean sheet of paper and without the hindrances of existing production schedules or compatibility issues. At Phoenix we have been able to work very closely with the designers of our sound generation chip to ensure that the technology we use is the most up to date in the world.

Our circuit boards and sub-assemblies are manufactured in the UK using the latest techniques with accredited quality assurance and testing at all stages of production. This offers the end user a product which is inherently reliable, and will continue to give sterling service for many years to come.

As technology allows us to simulate the sound of the original pipe more accurately than ever before, the tonal gap between pipe organs and their electronic counterparts is narrowing all the time. It is now at the stage that the difference is so small that the rate of improvement is slowing down accordingly. Thus today's organ will go out of date less quickly than an organ of the eighties.

In addition to complete organs, we also offer a rebuilding service for instruments built by other manufacturers that have become unreliable or simply outdated. Many older electronic organs still have fine consoles, but without the benefit of the latest technology, sound dated. The addition of a new sound generation system will bring these instruments right up to date for a fraction of the cost of a new organ. There is a strong parallel to the pipe organ industry here, where there are many more contracts to rebuild existing instruments than there are to build brand new instruments. A rebuild is universally accepted as a convenient way forward in the Pipe Organ world, so why should it be any different in the electronic world?

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Sound Generation

The sound generation process in a Phoenix Organ uses the sample replay technique. The starting point is with a digital recording of a rank of real organ pipes. A selection is made of these, covering five octaves, for programming into our sound card.

A Phoenix sound card has 64 generators, each of which can replay one sample at a time. If eight stops are assigned to a single sound card, this will allow up to eight notes to be played with all stops drawn simultaneously. However, the number of stops (or mixture ranks) on a sound card is normally limited to five. Not only does this increase the polyphony of the instrument, it also yields much better quality.

Some stops can utilise up to forty or fifty long samples - virtually one per note, which is particularly important for flutes which contain complex and uneven starting transients (chiff). This ensures that these transients are naturally re-created from the original pipe itself. The use of multiple samples also avoids the "chromatic whistling" effect which seriously flaws the sound if too few samples are used.

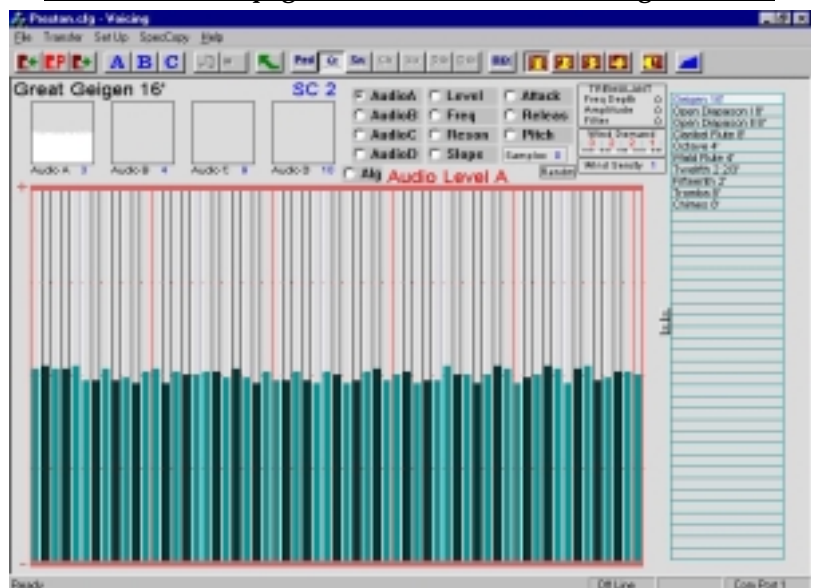
Stop lists can, at times, be pretty meaningless, and we have all experienced the disappointment when the sound emanating from the organ does not match one's expectations from the engraving on the drawknob. This applies as much to pipe organs as electronic ones. For this reason, the voicing software has tremendous control over the sound and timbre of each individual note for each stop.

Even though the Phoenix voicing software has the capability of turning a Lieblich Gedeckt into a Stopped Diapason, it is better to start with the correct sample in the first place. Thus we have the added flexibility of being able to change samples on site, so that the organist can get the Stopped Diapason that they really wanted, or a much brighter Trumpet or a stringier Diapason.

When your Phoenix Organ is installed, our skilled staff will carry out fine regulation and voicing so that the instrument meets your expectations.

The Voicing parameters of each stop are all displayed graphically on a screen similar to that on the right. Adjustments are made by simple clicking and dragging of the graph with the mouse. In addition to normal manual parameter adjustment, our Voicing Software also allows us to automatically randomise any group or range of parameters. This can be used to provide the same slight inconsistencies in a Phoenix Organ that occur in a pipe organ. The illustration to the right shows the effect of a small amount of randomisation to what was a straight line for the Level of Audio Channel A for the Great Geigen 16'.

Screenshot of a page from the Phoenix Voicing Software



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Software

One of the most important features in any organ is its response to key presses. The Phoenix Organ utilises a scaleable multiple processor architecture for its main control system. For example, each keyboard is scanned by an individual micro-processor and key presses and releases are passed to the main organ control processor (the organ's 'brain'). This main control processor in turn controls the operation of the sound generation pre-processors, so controlling the sound of the instrument. Similar processors handle input from stops and pistons. More control processors are provided in larger instruments to ensure that the response to all events is always consistent and prompt.

The software for Phoenix organs has been developed using the Yourdon method. This is a modern structured analysis and design technique that is widely used in both business and computer control systems. Briefly, it involves the definition of the system requirements and then expands these in to processor tasks. By developing the control software using this formal method, the Phoenix Organ software is much more likely to offer a reliable service than other systems.

A pipe organ usually contains thousands of pipes. Each pipe can be voiced, regulated and tuned. Our system works on a similar basis. We can voice, regulate, adjust the attack and release, and tune every note of every rank independently. Our voicing software is written in the latest PC development environment which takes the strain out of setting up an organ.

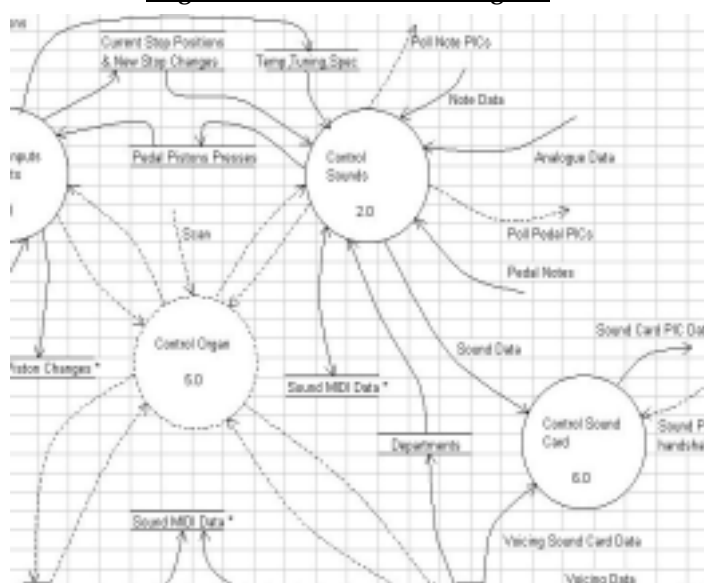
On a pipe organ, moving the expression pedal does not just vary the volume of the sound, it also changes the tone by damping higher frequencies. The Phoenix software simulates this by also attenuating these higher frequencies. The calibration curves of our expression can be set using the voicing software.

The effect of wind variation on a pipe organ can have a significant effect on the sounds we hear. Our software simulates this effect, and using our voicing software, each stop's loading on the bellows can be set across four areas of the keyboard. A large Open Diapason's bottom octave will use far more wind than say the top octave of a Larigot. Each stop's response to bellows movement is also adjustable. Wind calculations are performed hundreds of times per second to guarantee pipe-like response.

A pipe organ tremulant changes the pitch and loudness of a stop. We have incorporated this into our design, plus a feature to provide some randomness in tremulant levels which occurs in pipe reed stops.

One of the key issues in the control of an electronic organ is the allocation of sound resources. In a Phoenix Organ, a separate, independent generating source is used for each note of each stop that is played. Some technologies in the market place do not work in this manner – sound generators are shared across stops. At Phoenix, we believe that it is important that an electronic organ replicates a pipe organ as closely as possible. We have yet to come across a pipe organ whose pipes morph into one rank when multiple stops are drawn.

Highest Level Data Flow Diagram



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System Capabilities

The Phoenix system capabilities are enormous - a system controlled by a single master will cater for up to 6 keyboards plus pedals, 256 stops, 256 ranks and 256 pistons. Two or more systems can of course work in tandem if you require something larger! Six departments may seem like a lot, but this is the only convenient way to handle "floating" departments if they are required, as departments do not necessarily have to have physical key inputs. When the system is applied to a cinema organ, only three departments with double-touch are covered.

System Capabilities for Sound Generation and Stop Control										
Dept.	Ranks	Stops	Audio	Expr	Trem	Midi (Assignabl Chnl for each dept.)				
Total	256	256	*64			In	Out 1	Out 2	Expr	
Pedal	32	32	8	poss		recv	Pre	Post		
Great	48	40	20	poss	yes	recv	Pre	Post		
Swell	48	32	18	yes	yes	recv	Pre	Post	sent	recv
Choir	48	24	22	yes	yes	recv	Pre	Post	sent	recv
Solo	32	24	16	yes	yes	recv	Pre	Post	sent	recv
Fifth	32	20	16	no		recv		Post		
Sixth	16	14	8	no		recv		Post		

Up to 16 mixture stops can be put *anywhere*, with up to 10 ranks in each stop, as long as the maximum departmental stops and ranks boundaries are not exceeded.

*There is some duplication of audio channels especially on Solo, Fifth & Sixth

Coupler Table							
	Sixth	Fifth	Solo	Swell	Choir	Great	Pedal
to Sixth							
to Fifth	8						
to Solo	8	8	16.0.4				
to Swell	8	8	+ 8+	16.0.4			
to Choir	8	8	+ 8+	16.8.4	16.0.4		
to Great	8	8	+ 8+	16.8.4	16.8.4		Auto
to Pedal	8	8	8.4	8.4	8.4	8	

If Swell or Choir Octave to Great is present, then none of the Swell or Choir Octave or Sub-octave couplers act through. However Solo Oct & Sub (+) will *always* couple through as they are *not available separately*.

Standard Pistons - these have 8 independent memory levels		
16	Adjustable Pistons to operate on stops assigned to Group 1	Normally General
16	Adjustable Pistons to operate on stops assigned to Group 2	Normally Pedal
16	Adjustable Pistons to operate on stops assigned to Group 3	Normally Great
16	Adjustable Pistons to operate on stops assigned to Group 4	Normally Swell
16	Adjustable Pistons to operate on stops assigned to Group 5	Normally Choir
16	Adjustable Pistons to operate on stops assigned to Group 6	Normally Solo
16	Adjustable Pistons to operate on stops assigned to Group 7	Normally Fifth
8	Adjustable Pistons to operate on stops assigned to Group 8	Normally Sixth
8	Adjustable Pistons to operate on stops assigned to Group 9	Any set of stops e.g. doubles
8	Adjustable Pistons to operate on stops assigned to Group 10	Any set of stops e.g. reeds
8	Adjustable Pistons to operate on stops assigned to Group 11	Any set of stops e.g. mixtures
8	Adjustable Pistons to operate on stops assigned to Group 12	Any set of stops e.g. tremulants
8	Pistons specifically for the left-hand toe pistons which can be set to either Gen 1-8 or Sw 1-8	
32	Reversible Pistons each of which can be programmed to reverse any stop on the organ	

Sequencer Controlled Pistons with 99 independent memory levels	
16	Adjustable Pistons under Sequencer Control
12	Pistons can be mapped to the Sequencer NEXT/FORWARD function
12	Pistons can be mapped to the Sequencer REVERSE/BACK function
	Sequencer ON/OFF and Page Up/Down controls with individual page locking
	The Sequencer Pistons can be used as conventional generals, giving the flexibility of separate memory level control for departmental and general pistons

Global Functions
SET
CANCEL
Global LOCK
Current Level LOCK
Memory Level Up/Down
Level Copy Up/Down
Temperament Up
Spec Up
Tuning Up/Down
Volume Up/Down
Transpose Up/Down
Reverb Level Up/Down
Reverb Time Up/Down
Crescendo ON/OFF
Crescendo Adjust
Temperament, Memory and Spec can also be controlled via individual switches or rotary knob
Volume, Tuning, Transpose and Reverb can also be controlled by knob

System Features

- Scalable, customised instruments with customer selected specifications.
- Every note of every rank (including mixtures) uses a separate sound generating source.
- Beautiful consoles built by professional cabinet makers.
- Best quality *METAL-FRAMED* keyboards with tracker touch standard, wood core keys optional.
- Pedalboards utilising Hall Effect semiconductor switches - no moving parts *AT ALL* for ultimate reliability.
- 4 different specifications with different samples for each stop, if required. Each specification can have either the Choir or Great as lowest keyboard for authentic French performance.
- 11 totally independent voicing parameters per note of every stop, which can be automatically randomised for even greater authenticity.
- 4 Temperaments:- Equal - Vallotti - Silbermann - Werckmeister.
- 8 department piston levels and 99 general piston memory levels, all individually lockable.
- Up to 256 pistons, all configurable.
- Up to 64 independent audio channels.
- Expression pedals affect brightness as well as volume of sound, and both amounts are fully adjustable over the total pedal travel.
- Programmable sound delays for each department to simulate some being further away than others - this works in 8 feet increments from 0 to 100 feet. This also creates authentic acoustic rendition of antiphonal divisions.
- Programmable MIDI channel assignment to each keyboard with MIDI Out 1 for recording to sequencer (using pre-coupled data), and MIDI Out 2 for connecting to sound module (using post-coupled data).
- Digital Display Panel allows the player to adjust global settings such as Volume, Pitch, Transpose etc. Panel "wakes and displays" at time of adjustment, and resumes minimal display of memory level after 10 seconds. All Display Panel parameters can be saved as power-up defaults.
- Integrated control of Lexicon MPX 100 Reverb direct from Display Panel. We believe that this is the best reverb module on the market, and recommend its use. Others may be used, with a concomitant reduction in sound quality, and some integrated control functions may not be available.
- "Dangerous" functions such as transpose indicate red when active - i.e. SHARP or FLAT.

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Specification of Four Manual Demonstrator Organ

GREAT		SWELL		POSITIVE		SOLO		PEDAL	
Double Diapason	16'	Diapason	8'	Praestant	8'	Quintaton	16'	Double Open Wood	32'
Bourdon	16'	Nachthorn	8'	Rohr Flute	8'	Viole d'orchestre	8'	Open Wood	16'
Open Diapason I	8'	Salicional	8'	Quintadena	8'	Violes Celeste	8'	Principal	16'
Open Diapason II	8'	Voix Celestes II	8'	Principal	4'	Erzähler Celestes	8'	Bourdon	16'
Claribel Flute	8'	Principal	4'	Koppel Flute	4'	Cor de Nuit	8'	Octave	8'
Stopped Diapason	8'	Chimney Flute	4'	Nazard	2 ² / ₃ '	Flute Celeste	8'	Bass Flute	8'
Quint	5 ¹ / ₃ '	Flautina	2'	Octave	2'	Flute Harmonique	8'	Fifteenth	4'
Octave	4'	Mixture 19.22.26	III	Block Flute	2'	Wald Flute	4'	Mixture 12.19.22.26.29	V
Harmonic flute	4'	Terzymbel 26.29.31	III	Tierce	1 ³ / ₅ '	Recorder	2'	Serpent	64'
Fifteenth	2'	Basson	16'	Larigot	1 ¹ / ₃ '	Piccolo	1'	Contra Bombarde	32'
Fourniture 19.22.26.29	IV	Trompette	8'	Septieme	1 ¹ / ₇ '	Cor Anglais	16'	Bombarde	16'
Scharf 22.26.29.33	IV	Cornopean	8'	None	⁸ / ₉ '	Clarinet	8'	Posaune	16'
Cornet	V	Basson-Hautbois	8'	Cymbel 29.33.36	III	Orchestral Oboe	8'	<i>Solo to Pedal</i>	
Trombone	16'	Voix Humaine	8'	Cremona	8'	Tuba Mirabilis	8'	<i>Swell to Pedal</i>	
Trumpet	8'	Clairon	4'	Harpsichord	8'	Trompette Militaire	8'	<i>Great to Pedal</i>	
Clarion	4'	<i>Tremulant</i>		Harpsichord	4'	<i>Tremulant</i>		<i>Positive to Pedal</i>	
<i>Tremulant</i>		<i>Octave</i>		<i>Tremulant</i>		<i>Octave</i>			
<i>Positive to Great</i>		<i>Solo to Swell</i>		<i>Solo to Positive</i>					
<i>Solo to Great</i>				<i>Swell to Positive</i>					
<i>Swell to Great</i>									
ACCESSORIES									
Thumb Pistons		Toe Pistons		Midi In		Audio		Miscellaneous	
Swell	10	Pedal	8	Midi Out Pre-coupler		100W Channels	14	Equal temperament	
Great	10			Midi Out Post-coupler		300W Channels	2	Werkmeister	
Positive	10			Assignable channels for				Vallotti	
Solo	10	Reversibles		each keyboard		Reverb front/side	2	Silbermann	
General	36	Swell to Great	1			Reverb rear	2		
Reversibles		Great to Pedal	1						
All Couplers	10								
32' reed	1								
32' open	1								

This is ostensibly the same organ as was used for the recording of our Demo CD, but we have made a few minor changes and additions since that time. Four more general pistons were added to the left of the coupler reversibles under each keyboard. The Solo Sub-octave coupler was removed together with the 4' Viole d'Amour, and these were replaced with a Cor de nuit 8' and Flute Celeste 8'. The Great Chorus is now of Hill parentage, and the Positive chorus is now based on samples from a Bishop chamber organ. The Swell Salicional, Great Trumpet, Positive Nazard and Tierce; Solo Violes Celestes, Wald Flute, Recorder, Orchestral Oboe, Trompette Militaire and all the Pedal Reeds except the 64' have also been replaced with new stops since the recording.