Quantum™ Organs - The New Paradigm

Organs have historically been both an icon of tradition and an instrument of cutting-edge technology. Prior to the development of electronic instruments, pipe organs were technological marvels with the two most sophisticated devices in European communities in the 17th and 18th centuries being town clocks and organs. Early organs used advanced mechanics to control thousands of pipes thus gaining the title "King of Instruments".

With the advent of electricity, organs remained at the forefront of technology and Allen Organ Company played the pioneering role. In 1938, Jerome Markowitz, Allen's founder, was granted a patent titled *Radio Tube Oscillator* for the stable audio oscillator. The basic technology included in this patent was the heart of electronic organs for decades.

In 1971, Allen introduced the *Digital Computer Organ* with revolutionary technology that changed the entire world of sound production. The *Digital Computer Organ* was the first musical instrument to use digital sampling, a process by which recorded sounds are stored in digital memory for accurate sound reproduction. The significance of this digital technology was recognized with Allen receiving the *IR 100 Award* as one of the most significant new products of that year. In 2004 the *Smithsonian Institution* again recognized the significance of this technology by acquiring the first *Digital Computer Organ* for its collection.

Various musical instrument manufacturers licensed Allen's digital patents. The fact that Allen's nearest competitor did not use digital tone generation technology until nearly two decades later testifies to the pioneering nature of this technology.

Since 1971, many advances have been made to digital technology, and Allen has been granted additional patents. These advances led to Allen's Renaissance™, the first fully software-based organ. Additional Renaissance advances include complete sampling technology. While some digital organs include only the sampled *attack* and *steady state* portions of pipe sound, Allen's Renaissance organs also include the sampled *decay* sounds.

Quantum™ - The New Paradigm

Until Renaissance, the goal of every digital organ was faithful reproduction of pipe sound. Allen recognized that the most significant improvement to future organ development could be achieved by advancing a different, but crucial part of the organ's digital system; mixing and acoustical enhancement resulting in Quantum™ technology.

Quantum Organs go beyond the goal of faithful pipe sound reproduction. These features take Quantum Organs to a level of performance that no other instrument can match.

1. Acoustic Portrait™

It has often been said that the best stop on an organ is the room in which it is located, an acknowledgement of the importance that the acoustical environment plays in the success of an organ. One of Allen's prime goals in the development of Quantum was to provide the accuracy of sampled space, as well as sampled sound. Today, Quantum instruments are the only digital organs that bring the science of sampling to acoustics.

Electronic reverb found in other instruments is a synthetic imitation of acoustics "applied to" the sound, not created as an integral part of it. Acoustic Portrait produces the real thing in exacting detail! Acoustic Portrait begins with a sampling process using impulse responses to measure a room's actual acoustic properties. These measurements are then stored in the organ. Through a real-time mathematical process called convolution, the acoustics of the sampled room become an integral part of the organ's sound, producing a more natural result than synthetic reverb.

Allen engineers have recorded the acoustics of cathedrals and other acoustically desirable buildings throughout the world. With advanced processors (DSP's) and low-latency convolution

algorithms, Acoustic Portrait reproduces the true acoustics of each original room with stunning realism. Quantum-based organs feature 10 different Acoustic Portraits™, ranging from intimate rooms to cavernous cathedrals. This includes well-known *Saint Denis Cathedral* in Paris, France. Listening to an organ with Acoustic Portrait setting is like traveling to France to hear the organ "live"!

2. The Allen Stoplist Library™ and Quad Suite™

At the touch of a control, organists can change the organ's entire specification. Each specification includes unique pipe sounds from the world's finest examples of organ- styles with independent scalings; the flexibility of multiple organs in one console!

Quantum Organs' Stoplist Library™ feature includes seven suites: *Classic Allen*, *English Cathedral*, *Orchestral*, *Cavaillé-Coll*, *Schlicker*, *Aeolian-Skinner*, and *Arp Schnitger*. The *Orchestral* specification, perfect for blended worship, complements traditional organ voices with sounds found in MIDI modules, such as Strings, Piano and Percussion. An Allen organ can be "Music Central" for your church, no matter what style of music you prefer.

Protégé Organs also feature four complete specifications or Quad Suite: *American Classic*, *English, French* and *Baroque*.

3. Multi-Point Audio™

Larger Quantum Organs also include Allen's exclusive audio channelizing called Multi-Point Audio™. Different organ voices are assigned to multiple channels for spatial imaging and sound placement results that exceed those of mono or stereo systems. This channelization also provides greater tuning and equalization control. The clean, robust power of Multi-Point Audio produces ensembles unmatched in pipeless organs.

Quantum™ Technology

Hearing a Quantum Organ, one quickly recognizes a tonal clarity that sounds live, rather than recorded. This clarity is a direct result of unique technological advancements.

- Superior Digital Audio Processing - Allen starts with advanced digital mixing that is more precise than analog-based mixing and includes 96 digital audio channels.
- Superior Resolution - DAC's include 24-bits of output with 128X over sampling and a signal-to-noise ration of 120 db's.
- Superior Processing Power & Advanced Technology - Real-time convolution (Acoustic Portrait) requires enormous processing power. An eight second stereo convolution reverb requires 35 billion calculations per second, unobtainable for any musical instrument. With exclusive technology, Quantum-based organs can produce this eight second reverb with 400 million calculations per second. Allen dedicates multiple SHARC® DSP's (Digital Signal Processors) with ***floating-point*** rather than *fixed-point* technology supplied with most consumer products. Floating-point offers a greater range of computational numbers resulting in substantially higher definition, improved sound quality and lower distortion.

How advanced is Allen's Quantum technology? A digital organ that produces CD quality sound without convolution reverb requires only about 100,000 calculations per second for each sound. Quantum Organs include about 4,000 times that capacity to create the convolution reverb alone! With high-speed circuitry this is the most advanced computer processing power ever placed in a musical instrument.

While the technological statistics are amazing, it is Quantum's tonal result provided that is truly fantastic. Quantum is the new benchmark of design and performance that will chart the course for the future of organ building!

