Pipe Organ

A couple years ago Mindport inherited a 60s vintage Hammond electronic organ from the Lummi Island Congregational Church. The technology that generates the sounds is rather unique, employing hundreds of octagonal discs rotating in magnetic fields. We placed this organ in our gallery, thinking people might be interested in this vacuum-tube antique and, who knows, maybe a few musicians would turn up and make music on it.

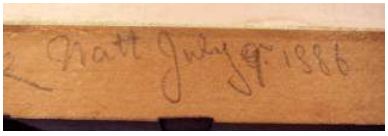
The Hammond organ has been a rousing success as an exhibit, and indeed, more than a few visitors have actually played recognizable tunes on it.

Quite some time before we acquired the Hammond organ, I'd been interested in the idea of making two or three large pneumatic (air driven) organ pipes, just so visitors could see how they work. The advent of the Hammond and its unique sound generator started me thinking more seriously about pneumatic organ pipes and how their sounds and physics would be interesting to compare to the electro-mechanically generated sounds of the Hammond.

I looked on the Web, curious if I'd find plans and dimensions for organ pipes, and discovered the site of organ-builder Raphi Giangiulio (http://www.rwgiangiulio.com/) then Matthias Wandell's site, (http://www.sentex.net/~mwandel/organ/organ.html), which in turn lead to Andy Nelson's site (http://home.earthlink.net/~anelsen/organ.htm). From these three sites I was able to glean essential information I needed in order to build this organ, which turned out to be more than a year-long project.

Raphi Giangiulio had published whole tables of detailed dimensions for several "flavors" of wooden organ pipes, so guided by one arbitrarily selected table, I built a pipe. Its mellow tone was very pleasing to my ear, so I built another pipe, pitched a musical third higher in order to generate harmony. That lead to the construction of a third pipe to make a major chord. Then, I thought, why not build an octave, just for the fun of it. Once I'd gone that far it seemed to me that you'd need at least two octaves if you wanted to be able to play much of a tune, so I settled on 2 ½ octaves, 32 half-tones as a goal. Later I congratulated myself for stopping there.

After a few months the pipes were done and I figured I was coming in on the home stretch. But, as is the case with building a new house, where you think that once the roof is on you're almost done, I was only about half done. I'd intended to build the keys for the keyboard myself, but after discovering the kind of precision this required, I cast about for alternative solutions. On eBay I found several sets of used keys for sale, and eventually settled on a set that had been salvaged from an 1886 vintage parlor organ built by the Weaver Organ Company in York, PA. They cost $50, and saved me a huge amount if time.



Key Inscription

Starting the Keyboard

As it happened, even starting with a set of pre-manufactured keys, the mounting arrangement required more painstaking work than I'd expected. It took me quite some time to get the keys all mounted in such a way that they didn't interfere with each other and operated easily. Here's a picture of the bare beginnings of the key-mounting process.

The keys, being over 100 years old, manufactured at time when much more of the process involved hand work, were not as uniform as I might have wished, so it was necessarily to select the best of the full set for inclusion in my keyboard. The wooden keys are covered, not by real ivory, unfortunately, but the earliest form of plastic, cellulose. Still, considering their age, they're remarkably well preserved.

Valves

The keyboad, once finished, was incorporated into the top of the "wind chest," which is basically a pressurized box with 32 holes drilled in the bottom, over which are installed small blocks of wood serving as valves. The valves are actuated by wires attached to the back of the keys. When you press a key, the wire pulls up the valve and allows air to flow through plastic tubing to its corresponding pipe. Here's what the bank of valves looks like. Each valve is held down by a leaf spring, one of which is shown installed in this picture. At the top of the picture is the back end of a key with one wire installed, leading down to a valve at the front side of the wind chest.

Once the keyboard and wind chest were done, there remained the task of building a mount for the pipes, a shell to cover the keyboard, and to cut plastic hose to proper length to connect between the wind chest valves and the pipes. After the pipe mounting was finished, I set the assembly, along with the keyboard, up on sawhorses so I could actually connect up the pipes and hear the first sounds from the organ as a whole. I'd previously mounted a high-volume blower, salvaged from a huge, 60's vintage commercial video recorder, in a box, along with a makeshift pressure regulator. The latter automatically adjusts the blower output so the air pressure is constant regardless of how many pipes are sounding at the time. I connected the blower to the wind chest via corrugated plastic rain gutter pipe, turned it on,

Blower and Pressure Regulator

and commenced to tune the pipes by adjusting the sliders at the top of each one.

Initial Testing

What a treat to hear the first chords from the instrument! All the work felt immediately justified. I had so much fun picking out tunes on it that I was afraid I'd want to just keep it home and play it myself. But reason prevailed. I packed everything in boxes, hauled them to Mindport, and taxed colleague AnMorgan Curry's generosity by inflicting on her the job of building a stand for the organ, which she kindly has done. She was assisted by other Mindporters, John Ito, who helped with trim work, and Bill Lee who cut a hole in the gallery wall and installed outlets for the organ blower. Thanks to all three for their assistance in getting this exhibit situated in the gallery, and to Raphi Giangiulio, Matthias Wandell, and Andy Nelson for sharing their work on the Web, without which this project would have been difficult or impossible.