OUR PIPE ORGAN

PART OF THE FAMILY CALLED
THE KING OF INSTRUMENTS

By David Norment

Part one in a series on the Austin Organ Company Opus 478, built in 1914

I thought it would be interesting to write a series of articles about our pipe organ and about pipe organs in general…the history, how they work and of the various components that function together in unison to produce the sounds that range from thunderous to sweet and delicate. I can honestly say that I do not play the organ, nor can I read sheet music, but I have a strong interest in and a great love for pipe organs that I'd like to share.

I recently volunteered to have a look at our organ to see if I could repair it following a recent Easter Sunday service. Some of you may recall Pastor Jay saying that elves had gotten into the works of our organ and rendered it silent, right when it was going to be used in our service. I can truthfully say I have never attempted to repair a pipe organ prior to this, and I have never attended classes or any other type of schooling on how to repair pipe organs. I have spent many years researching and studying pipe organs on the Internet and in textbook form. I have looked over hundreds of organ specifications, studied the parts and components, and have a firm understanding of how they work and why they work. I am slightly more interested in the mechanics and electronics and the how's and why's more than I am interested in the music, the composers and the organists, but the scales are only tilted in that direction slightly. I have mutual admiration for all aspects of the organ.

Some basics about our organ: this is a small pipe organ in comparison to many. Technically speaking (I will explain all these terms later) it was built by the Austin Pipe Organ Company of Hartford, CT in 1914. The console was replaced in 1970. It has two manuals (keyboards) of 61 notes each and a pedal board (foot pedals) of 32 notes. There are nine stops (nine different kinds of sounds the organ makes) and eight ranks of pipes (eight different kinds of pipes, each in a group that forms a rank). There is a total of 471 individual pipes in this organ. Each one is made by hand, one at a time.

To give you some perspective, our organ has 471 pipes. The Chapel organ at the Wesleyan College has 4400 pipes. The world's largest organ at the Atlantic City Convention Center in New Jersey has over 35,000 pipes. Our organ has three divisions. Divisions are usually several ranks (groups) of pipes. Our divisions are: PEDAL, which are the larger bass pipes. We have two different ranks in the PEDAL division on this organ. They are the BOURDON and the DULCIANA ranks that are 16-foot pipes. I will explain pipe lengths later. The second division is the SWELL division. There are four ranks of pipes in our SWELL division. They are ROHR FLUTE, VIOLIN CELLO, SALICIONAL and HARMONIC FLUTE. The first three ranks are eight foot pipes and the harmonic flute is a four foot pipe. The last division in our organ is the GREAT division. It contains three ranks of pipes. They are the DIAPASON, CLARABELLA

and the DULCIANA ranks, all of which are eight-foot pipes. Again, I'll explain pipe length at a later date.

Why put several ranks of pipes together to form a division? Generally, the large bass pipes are grouped together and are played with the foot pedals, thus called the PEDAL division. The volume of these pipes cannot be adjusted.The SWELL division contains different ranks of pipes that are isolated inside a special chamber where the volume can be regulated by means of shutters that open and close. The operation of the shutters is controlled by a special pedal on the console that resembles the gas pedal in your car. Due to the nature of the sound produced by these pipes, it is a favorable thing to be able to control the volume of these pipes at times. Pipes operate by blowing air through them and are designed to operate on set pressures of air. Volume cannot be controlled by reducing the amount of air they receive, because they will not produce an accurate sound on reduced air pressure. Therefore, the only way to alter the level or volume of sound is to isolate them inside an enclosure with shutters that open and close. Swell division pipes are usually played on their own keyboard, separate from other divisions. That's why an organ console has multiple keyboards.

The GREAT division contains the basic backbone sounds of the organ. Organs can produce many sounds, but there must be a foundational sound that is usually present when an organ plays, upon which many other sounds are added to it. In most cases, that basic backbone sound is produced by the DIAPASON rank of pipes. It's somewhat similar in sound to a flute, but diapason pipes are a bit stronger and crisper than an average flute pipe. The great division is played on its own keyboard as well. On our organ, the great is the first keyboard and the swell is the second or upper keyboard. The pedal division is played on the foot pedals.

There are numerous other divisions present on much larger organs, each with its own keyboard. That's why larger organs can have as many as seven keyboards. Just for the sake of understanding, other divisions can include: Antiphonal, Choir, Echo, Positiv and Solo. None of these are present on our organ. In the case of our organ, all you really need to understand about divisions of pipes is that it's desirable to group similar types and sounds of pipes together and have them played on their own keyboard.

Some other basics about this organ are: the pedal division of pipes are located in the bottom of the organ case. The swell and great divisions are located in the upper portion of the case. The gold colored pipes in the upper front of the case do not play. They are decorative pipes that are called façade pipes or dummy pipes. The very long gold pipes to the left and right rear of the organ case do play. They are the sixteen-foot pedal dulciana pipes. There are three basic parts of this pipe organ: the blower, which produces all the wind necessary to make the pipes sound. The blower for this organ is located in the basement. Secondly, there is the console, which contains the pedals and keyboards and the switches that turn the different sounds on or off. Thirdly, there is the pipe case which contains the air reservoir, the pipe chests and the pipes.

What you have just read are the very basics of this organ. The basics don't really differ from organ to organ. They all operate on the same principles. I will go into more detail in future articles.

While recently attempting to troubleshoot a problem with our organ, it became necessary to remove the back panel of the organ console and to gain access to the inside of the pipe chamber. I noticed the blower would start and run normally but the organ console appeared dead and without electrical power. This organ requires two main sources of electrical power to operate. One is a circuit to operate the blower, the device that produces the wind to make the pipes sound. The second source of power is dedicated to the organ console and the pipe case. This source of power is much lower in voltage than what is used to operate the blower.

In simplified terms, a power supply provides electricity to the organ console. When you press a key on the keyboard, an electrical switch sends power to the organ case. There is an air valve located at the base or bottom of each organ pipe that opens and closes whenever the corresponding key is pressed for that particular pipe. When the valve opens, air is introduced to the pipe from the pipe chest. All the pipes in the organ sit on top of chests that are filled with air. The pipes and chests are designed so one pipe can play on the chest or many pipes can play from the same chest. As mentioned above, each pipe has an air valve that opens whenever a key on the keyboard is depressed.

The pipe chests are filled with air, which can be rapidly depleted depending on how many pipes are sounding at the same time. The chest or chests (there can be many chests, depending on how many pipes are installed on that particular organ) receive air from the reservoir. The main function of the reservoir is to maintain constant set air pressures to all the pipe chests, no matter how many or few pipes are speaking. This is accomplished by way of a bellows that expands or retracts much like an accordion. The blower supplies constant air to the regulator/bellows. When no pipes are speaking, the bellows will contract in size and the excess air will be vented out of the reservoir. When air demand is high, the bellows will expand in size to maintain constant pressure to meet the demand of many pipes speaking.

In the case of our organ, all electrical functions of the organ console and the pipe case are supplied by a low voltage power supply located in the bottom of the organ case. After checking for proper voltages within the console, and after not finding what the specifications call for, I opened up the pipe case and located the power supply. The problem with the organ was a rather simple fix. The thirty-amp fuse for the power supply had blown. All I had to do was replace the fuse. Fuses usually blow for a reason and in this case, it could have been a power surge that caused it. It also could have been an old fuse that had been in service for an extended period of time. Old fuses under constant load or use can become weak to the point where they will not handle the demand placed upon them. Lastly, there could possibly be a weak or shorted wire. There are hundreds of individual wires within this organ. There could also be a weak or failing component within the system. Only time will tell if this problem repeats itself. If it does, it will require more in-depth diagnostics to be able to isolate the problem.

In future editions of this article, I will go into a deeper explanation of the various parts and components of pipe organs and talk more about the individual pipes and the sounds they produce. I hope you will continue to follow these articles and gain a better understanding about pipe organs!