Immanuel Lutheran Church

Pipe Organ Primer

by Steve Aadland

In Memory

This booklet is dedicated to the memory of my mother, Inga Aadland, organist, and my father, the Rev. A.O. Aadland, musician, composer, pipe organ builder and pastor. They served Immanuel Lutheran from 1952-1963. They taught their children and many others about the love of Jesus Christ and instilled in them a passion for music that glorifies His Holy name.

I wish to also mention two others who were especially dear to me. Jean Fiveland, who died prior to the fulfillment of her expressed hope, ". . . to hear it play before I die.", was such an inspiration to me and to all who worked on the project. Don Ostrum helped in the steeple, in building the organ chamber. His genuine warmth permeated all of us who were fortunate enough to work with him. Don also died before the project he worked on was complete.

With Gratitude

As project Liaison, I wish to recognize a few others that deserve far more than a simple mention. My brother Art, our builder, gave of himself and sacrificed so much as he built the organ. His reverence for this special project to truly honor God and the memory of our parents was something I'll never forget. My brother Dan, faithfully serves as Immanuel's Director of Music and enhances the ministry of Immanuel in so many ways. Sandy Verschoot, our organist, faithfully plays beautiful inspirational music at Immanuel without any expectation of reward or recognition. Dick Hardel, our Organ Project Team leader, set an example of steadfast faith as he led the fundraising and guided the project team. John Schatz gave an enormous amount of time and expertise in the design and construction of the organ chamber. Pastor Leaverton quietly worked on the project in so many ways, often behind the scenes. Other team members: John Chepulis, Richard Evans and Nancy Chase worked tirelessly as they planned and supported many facets of the project, from fundraising, to transporting, to pipe renovation, to wiring of windchests. Thank you to the hundreds of individuals, both members and non-members, from the area and throughout the country, that supported this project financially. To the army of volunteers that gave over 6000 hours of time to help make this project a success--thank you all. Finally, to the spouses of those volunteers who patiently supported their efforts and in so doing gave up so much time with their beloved partners--thanks a million.

Steve Aadland,
Project Liaison

Historical Note*: The instrument described here is actually Immanuel's second pipe organ. In the mid-1950s, Pastor Aadland hand-built an 8-rank pipe organ for Immanuel. His children helped build it. That organ had a single manual, a 58-note keyboard and 30-note pedal. The organ console along with three ranks of exposed wooden pipes were situated to the left of the chancel. The 16' bass (Viole) pipes were behind the pulpit, floor to ceiling. A swell shutter was built into the North wall of the chancel. Behind it, a chamber housing 5 ranks was located inside what is now the inner office. For a decade, beautiful pipe organ music accompanied worship at Immanuel, with Inga Aadland as organist. That organ was removed in 1964 and sent to Old Westbrook Lutheran Church in Minnesota, where it was incorporated into their pipe organ that still plays today.*

Immanuel's church building (the congregation's second building) is also historic, built in 1915-17. The congregation had actually begun to form in 1895 and was formalized in 1897 (the 3rd-oldest Lutheran church in Montana). The continuous parabolic shape of the nave, with walls and high ceiling of original lath and plaster produces wonderful acoustics, both for the spoken word and music. The acoustics promotes good singing and provides for excellent projection of pipe organ sound.

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Immanuel's Sanctuary (Nave)

Prelude

With the completion of the installation of our new pipe organ at Immanuel, built by the Aadland Pipe Organ Company, you may wish to know more about pipe organs. Most people love the sound of a real pipe organ. Known as the "King of Instruments", the organ has an incredible range of power and a nearly infinite diversity of tone. For over a thousand years pipe organs have thrilled those who have listened to the music they produce, inspired those who have sung with them and awed those who have viewed the splendid array of beautiful pipes. Music is a fundamental part of Christian worship. And the pipe organ has been the most fundamental instrument supporting Christian music for centuries.

Immanuel is a very musical church. Music is truly at the heart of our worship and ministry. Music as the heart of worship goes way back in time. King David wrote "Let us come before him with thanksgiving and extol him with music and song." *Psalm 95:2*. In *Ephesians 5:19*, the Apostle Paul wrote, "Speak to one another with psalms, hymns and spiritual songs. Sing and make music in your heart to the Lord." And Paul sets the example. When he and Silas were in prison they used music to spread the Gospel. "About midnight Paul and Silas were praying and singing hymns to God, and the other prisoners were listening to them." *Acts 16:25*. And it isn't just in singing--it is with musical instruments. Psalm 150 emphasizes the use of instrumental music (with breath!) in His sanctuary (that is, inside the church!).

Praise the LORD!
Praise God in his sanctuary;

praise him in his mighty heavens.
Praise him for his acts of power;
praise him for his surpassing greatness.
*Praise him with the sounding of the **trumpet**,*
*praise him with the **harp** and **lyre**,*
*praise him with **timbrel** and dancing,*
*praise him with the **strings** and **pipe**,*
*praise him with the clash of **cymbals**,*
praise him with resounding cymbals.

*Let everything that has **breath** praise the LORD.*
Praise the LORD!

A pipe organ can simulate most instruments of the orchestra (with breath) and can be used for almost every genre of music. We find pipe organs in concert halls, convention centers, theaters, pizza parlors, homes and of course, in churches. Those who love the music of the pipe organ may not care about how it makes sound or about details of its tonal diversity. If you are in that category, that's okay. It is completely understandable--just enjoy the sound and sight and let the organ speak for itself. May God be praised with every breath.

For those who are interested in knowing more about this fascinating instrument, please join in as we explore some of the basics of the King of Instruments. I hope you enjoy this "primer" and find what follows as both helpful and interesting.

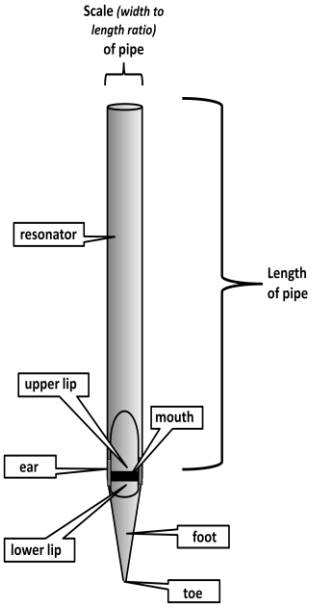
<u>The Pipe</u> (what makes the sound)

We start with the most basic pipe organ component, ***the pipe***. There are two basic kinds of organ pipes--***labial*** (lips) and lingual (reeds). Both are wind instruments. It takes air, under pressure, to "blow" a pipe. <u>Labial</u> pipes or <u>flue</u> pipes, produce sound (speak) in the same way humans whistle with their lips or as a referee's whistle. Most pipes in a typical church organ are labial pipes. A noteworthy characteristic of some labial pipes is a consonant sound at the instant the pipe speaks, called ***chiff*** *(or articulation)*. This sound, gives character and provides some percussion aspects to music, though if overdone, it can slow the response and prevent ranks from providing smooth transitions between notes.

Lingual (or reed) pipes use reeds that vibrate similar to that of a clarinet, oboe or saxophone in the band (or as the human vocal cord). Lingual pipes add tremendous power and orchestral character to the organ sound. Large pipe organs typically have many labial and lingual pipes whereas smaller pipe organs typically utilize mostly labial pipes.[1]

Depending on design, organ pipes can produce many different-sounding tones.[2] Just as an orchestra has many different-sounding instruments (from oboe to violin to trumpet), a pipe organ can produce a tremendous variety of pipe sounds. Each organ pipe, however, can only produce a single note and only a single tone. Therefore, in order to produce music, many pipes are required. Each design (or unique musical tone) of pipes is built (then voiced and tuned) as a set or ***rank*** of pipes to complete a musical scale of pitches capable of producing all of the notes on the keyboard. This is done by varying the length of the resonators of pipes. In general, long pipes produce low pitches while short pipes produce high pitches.

Pipe terminology is dominated with names from the human body. When a pipe makes a sound it is said that it ***speaks***. The sound comes from the ***mouth***, between upper and lower ***lips*** and between the ***ears***. A "tongue" called the ***languid*** is positioned near the lower lip. The pipe stands on its ***foot***, the bottom of which is the ***toe***. Even a ***beard*** may be on the lower lip. A drawing of a typical metal pipe is shown below. The metal used is soft and malleable, either zinc or an alloy of tin and lead. On Immanuel's organ, 536 of the 694 are made of metal.

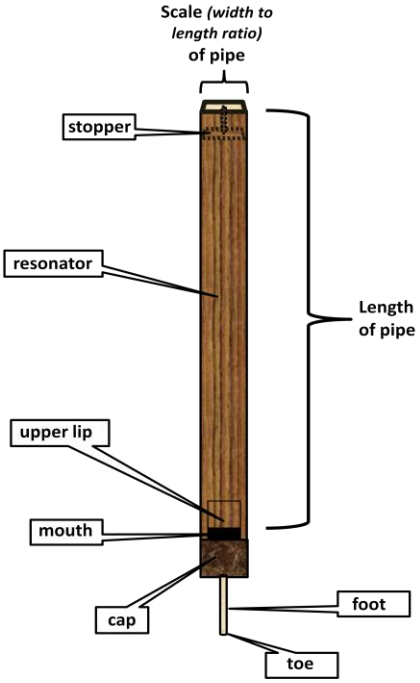


[1] Immanuel's pipe organ uses labial pipes exclusively. The one "reed" stop on Immanuel's organ (in the Swell Division), the Oboe 8', is actually a composite using two ranks of flue pipes to simulate the sound of the Oboe: the Salicional 8' along with the Nazard $2^2/_3$' played at a pure tuned prominent 5th, plus one octave (above).

[2] Four families of tones are commonly associated with ranks of pipes, depending on design:

1. ***Principal*** or ***diapason*** tones
2. ***Flute*** tones
3. ***String*** tones
4. ***Reed*** tones of the orchestra

Pipes can also be made of wood. Immanuel's organ has 158 wooden pipes, 85 of which are "***stopped***". An open (unstopped) flue pipe has a resonator that is an open tube from the mouth to the end. The resonator causes a wave-length that is approximately twice its length. When a wooden pipe is plugged at the end with a "***stopper***", the resonation is reflected back, so is twice as long (about four times its length). Thus stopped pipes produce a tone that is an octave lower in pitch than an open pipe of the same length.



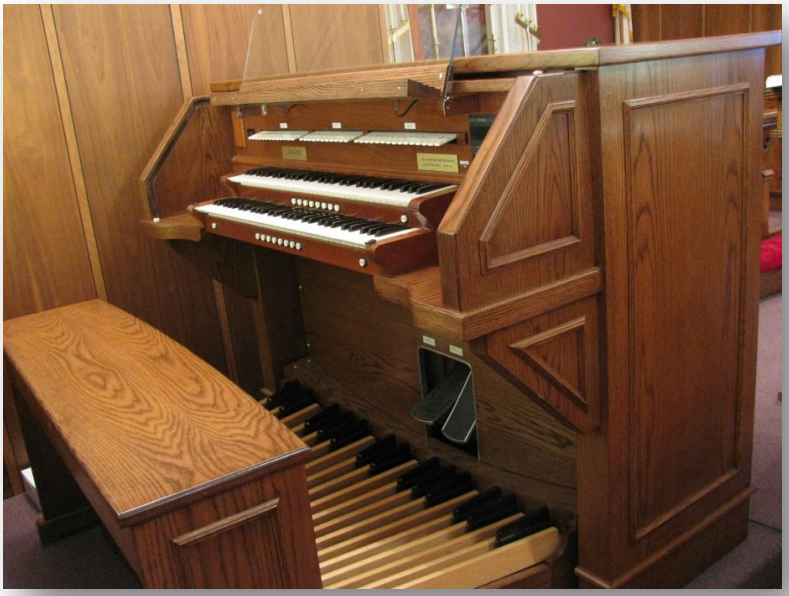
Pipes are tuned by increasing (dropping pitch) or decreasing (raising pitch) the effective length of the resonator. Think of the sound made when one blows air across the top of an empty bottle. It is quite low in pitch. If water is placed in the bottle, partly filling it, the pitch is higher. That's because the column of air is shorter.

On some pipes a slot at the end of the pipe is "covered or uncovered" (from the bottom of the slot) by "rolling or unrolling" a tab of pipe metal called the ***tuner***. On other pipes a cylindrical piece of metal (sleeve tuner) can be raised or lowered to cover or uncover the slot or to adjust the actual length of the resonator. Some wooden pipes are tuned with a piece of pipe metal attached to the top of the pipe. This piece can be rolled over (or retracted from) the open end of the pipe. On stopped pipes, the stopper is moved up (to lower pitch) or down (to raise pitch).

As with the piano, the organ is an equal-tempered instrument tuned to the ***tempered chromatic scale***. The chromatic scale is a musical scale with 12 pitches per octave, each a semitone apart, so all the half steps are the same size.

The volume (loudness) of pipes depends on the mouth design and the ***scale*** (width to length ratio) of the pipes. Big fat pipes (large scale) are usually louder (flute & principal families). Thin pipes (small scale) tend to be softer (string family). Volume can also be adjusted by ***voicing***. The amount of air (by adjusting air pressure or the size of the opening in the toe) affects volume. Mouth design (distance between upper & lower lip) also affects volume and overtone structure. Pipe placement is a major factor in pipe volume. Pipes may be placed inside an ***organ chamber*** behind ***swell-shutters***. Swell-shutters are composed of vertical boards (swell shades) that can pivot, similar to vertical blinds on a window. The boards fit tightly together when closed, thus dramatically limiting the volume. When opened, however, the sound is free to enter the space of the listener at a much higher volume. In this way, the organist has a nearly unlimited control over volume. Pipes placed in a chamber behind a swell-shutters are said to be ***under expression***.

<u>The Console</u> (where the organist plays)



Immanuel's Organ Console (left side of chancel)

An organ is played at a ***console*** with ***keyboards***. On a pipe organ, when a key is depressed, a valve in a ***wind chest*** opens that allows air to enter a pipe or group of pipes corresponding to the note desired. A single organ keyboard (for hands, called a manual) is similar in appearance to a piano keyboard (long white keys and shorter black keys) but with fewer keys. The organ manual keyboard typically has 61 keys (five octaves plus one) whereas pianos have 88 keys (seven octaves, plus four). They both start on the left side with the lowest note, (the lowest A on the piano and the lowest C on the organ) rising by half steps (the tempered chromatic scale) to the right and end with the highest C-note. Each full octave has 12 keys (7 white keys and 5 black keys). In addition to keyboards for hands, an organ typically has a keyboard for feet (called a pedalboard). The keys on a pedalboard are essentially boards (set on edge), large enough for feet, but otherwise resembling a keyboard for hands. Typically, they have 32 keys (pedals), controlling $2^2/_3$ octaves, starting with the lowest C on the left and ending with the highest G on the right.

Pipe organ consoles, unlike pianos incorporating a single large keyboard, typically have several keyboards. A very large pipe organ may have six or more keyboards (5 for hands and one pedal keyboard or pedalboard, for feet). By having more than one keyboard, organists can instantly switch between the tonal qualities of the various ranks just as the conductor of an orchestra can instantly switch from the violins to the trumpets.

On Immanuel's console, there are three keyboards (2 manuals and pedalboard, shown in the photographs. The keyboard closest to the organist is used to play the ***Great Organ*** (with 85 exposed Principal pipes, plus 150 pipes inside the chamber). The next keyboard slightly above and away from the organist is used to play the ***Swell Organ*** with 427 pipes placed inside the organ chamber behind a swell-shutter (all under expression). The pedalboard is used to play the ***Pedal Organ*** (with the 32 lowest bass pipes). With combinations, the organ has 27 stops (11 stops on the Great, 8 stops on the Swell and 8 stops on the Pedal).

To control which ***ranks of pipes*** (or ***stops***) are available on the keyboards, the organist pulls out ***drawknobs***, or depresses ***stop-tabs*** (also called ***stop-keys)***. This opens appropriate air-channels in wind-chests to the ranks of pipes needed for the selected voice(s). Technically, the name "stop" refers to the control's ability to stop air from flowing to certain ranks of pipes, unless so desired. When an organist "pulls out all the stops" he/she has the full pipe organ deployed to the keyboards. Immanuel's console uses stop-tabs to activate stops.

The terms, "stop" and "rank" are sometimes confused or used interchangeably which can be erroneous. A *rank* is a full set of pipes graduated in length, one per key, corresponding to the entire compass of the keyboard. The term comes from the military--a rank of pipes gives the visual impression of soldiers standing at attention in full uniform. Typically, a rank has 61 pipes though expanded ranks may have more. Immanuel's pipe organ has seven normal-sized ranks plus three expanded ranks (two of 85 pipes & one of 97 pipes) for a total of 694 pipes.

A *stop* is an individual voice in the organ, composed of one or more playing pipes from the same rank or using combinations of ranks of pipes. Organs can be designed to employ combinations of pipes from different ranks to produce unique voices (or stops). Stops are engraved on the drawknobs or stop-tabs on the console. The name of that voice along with a number like 16', 8', 4' or 2' on the drawknob or stop-tab designates the stop's voice and the pitch of the longest pipe corresponding to low C on the keyboard.[3] The artistic use of the combinations of the stops available on the organ, is the organist's skill of ***registration***.

There are other controls the organist can use on the console. ***Couplers*** connect the various keyboards. By coupling, the organist can use the stops normally associated with the other keyboards on the one keyboard selected. In other words, he/she can play the full organ (or any stops desired) on a single keyboard. All three keyboards can be coupled on Immanuel's organ (Great, Swell and Pedal), activated by coupler stop-tabs.

Combination Pistons, activated by ***thumb buttons*** positioned just below each keyboard permits the organist to pre-set combinations of stops on the console. By pressing the appropriate button, he/she can bring the preset combinations into action instantly. Some consoles use ***toe studs*** just above the pedalboard instead of buttons. The settings are stored in memory and remain available indefinitely, until changed at the console. Immanuel's pipe organ has 16 pistons (using buttons).

Some pipe organ consoles are armed with the latest computerized technologies for switching and activation. An Integrated Control System (***ICS***) allows for the console to be located away from the pipes in any convenient position. These consoles do not depend on air-assisted activation (as do pneumatic organs) or a mechanical connection (as do tracker action organs). They connect to the chests, swell-shutters, etc., by a computer chord. With enhanced controls, a pipe organ has a ***transposer***, which allows the organist to play music at a different pitch than what is on the music sheet. A ***MIDI*** can be connected to allow the use of other instruments to be connected and controlled by the organist. ***Play-back***: The organist's rendition can be recorded in the computer to be played back on the organ from ***memory*** (not an amplified recording played through speakers, but with the real pipe organ actually playing)! In addition, ***resultant stops*** and "borrowed" combinations from other ranks of pipes can be used to create additional stops. All of these features are included in Immanuel's organ, using the *Peterson* control system (ICS-4000).

Two other important controls are at the disposal of the organist at the console. The ***expression and crescendo pedals*** are just above the pedalboard (centered on the panel below the keyboards). The expression pedal controls the ***swell shades*** (louvers) in front of the ***organ chamber***. The organist can vary the volume of music coming from all stops ***under expression***. Crescendo or decrescendo can be accomplished by varying the position of this pedal. The crescendo pedal allows the organist to add additional pipe-ranks (engage additional stops) by moving the pedal. Immanuel's pipe organ has one organ chamber with one large swell shutter system and has the crescendo pedal programmed to add stops, staged from the softer stops to the louder stops.

[3]An 8-foot rank (or stop) has the same pitch as a piano. Four-ft., 2-ft. and 1-ft. stops respectively are pitched an octave higher for each halving of length, whereas 16-ft., 32-ft. stops are pitched an octave lower for each doubling of length.

The Air Supply System (what powers the music)

Pipe organs are powered by moving air (and by electricity)--Breath! Pipe organs have been around since the days of the Roman Empire. The first pipe organs used a system of hydraulics (water pumping) to pressurize the air ([4] see quote below). Later, human muscle supplied the energy for hand-operated air pumps (bellows). Today, the pipe organ uses an electric motor attached to a turbine (or fan) to generate air pressure.

The electric ***blower*** provides wind under pressure for the organ pipes. The noise generated by the blower is best kept to a minimum by placing it in a sound-resistant enclosure or by locating it remotely from the organ. The blower of Immanuel's organ (from the gifted Instrument) is placed in the crawl space beneath the Narthex floor.

The blower cannot regulate the air pressure, however. It just produces a large volume of air at high pressure into the system.

It takes a second device, the ***bellows***, (or regulator) to reduce and regulate the air pressure so that all the pipes are played with consistency and speak with their intended voice. Quick response and accurate regulation are essential if the organ tone is to be steady and unwavering. A ***bellows*** uses an air-tight fabric section to allow a movable lid to rise as it receives air from the blower (and fall when pressure begins to drop). It literally breathes! The bellows sends the air under constant pressure to the wind-chests holding the pipes. The large bellows in Immanuel's pipe organ is located in the organ chamber just below the main Swell (slider) chest. The organ uses a constant air pressure equal to a standing column of water of $3^1/_4$ inches.

[4] "Behold the marvelous art of Archimedes—
I allude to the hydraulic Organ;
So many members,
So many parts,
So many joints,
So many sound conduits,
So much tonal effect,
So many combinations,
So many pipes,
And all at one touch."

Tertullian of Carthage
Circa 200 A.D.

<u>The Windchest</u> (completing the miracle)

Organ builders say that 80% of their work in building a pipe organ is in designing and building the windchests. A ***Windchest*** (or ***chest***) is a rectangular wooden box on which the pipes stand. It sounds simple enough. These chests are filled with wind under pressure to play the pipes sitting on them. Far from simple, these chests contain the most important part of the mechanism which allows wind into the proper pipes at the proper time, causing them to speak as directed by the organist at the console--making glorious music instead of noise.

The original system in historic pipe organs for connecting the console to the rest of the organ was called the ***Tracker action***. A system of levers (called trackers) were installed to carry the organist's key-strokes directly to the valves ***(pallets)*** under the pipes. Many great organists still prefer tracker instruments because they can actually feel the air entering the pipes as valves are opened by their keystrokes. In its purest state in those organs, all parts were mechanical, including connections between ***sliders*** and drawknobs to turn stops on and off, mechanical couplers between the keyboards and mechanical connections between the expression pedal and swell-shutters. It promoted a very compact arrangement of all parts of the organ. Tracker action organs are recognizable, having the organ console built into (below and surrounded by) the chests and pipe-works. This puts extreme limitations on console placement, so tracker action organs are not adaptable to every situation.

Slider chests are used in tracker action organs. They contain the ***key channels*** into which wind is admitted when keys are pressed (and pallets are pulled down). Above each channel are all the pipes corresponding to that key. Between the key channels and the pipes (at right angles to the channels) are sliders--thin flat movable boards perforated with holes corresponding to the holes leading to the pipes. The sliders are connected to the drawknobs. Sliders can be moved to open or close the passages leading to the individual pipes, arranged in ranks along the length of the chest. Each pipe will speak only when its key is pressed and when the slider for that rank is in the 'on' position (pulled out).

These chests can also be fitted with electric 'pull-downs' or solenoid magnets that open the pallets electrically. In like manner the sliders themselves can be equipped with motors to pull out (and push in) the stops. In that case the action is electric even though the stop action (via pallets and sliders) is mechanical. This allows the console to be placed away from windchests and pipeworks. Motors can also be used to activate swell-shutters.

The organ gifted to Immanuel by the Aadland Family was a tracker action organ of 13 ranks. Hand-built by Rev. A.O. Aadland (the third instrument he built), it was installed in his home for the enjoyment of his wife, Inga and himself. Both of them played the organ for many years.

Art, with the historic main slider chest of the Swell Organ
(reconfigured & restored to like-new condition)

Everything in the entire organ was mechanical (tracker) action. The finely crafted main chest made of birch, oak and solid native Minnesota black walnut (hand-harvested by Pastor Aadland), has become the heart of the Immanuel pipe organ. Completely restored to like-new condition and modernized with electric pull-downs and slider motors, it holds most of the pipes in the swell organ. Of the 7 ranks in the Swell, consisting of 427 reconditioned pipes from the gifted organ, 343 of them stand on this chest.

Thirteen additional new windchests have been built for the Immanuel organ. Eight of these windchests hold the pipes in the exposed façade of the Great organ (the Principal 8' pipes in the seven towers with one behind the towers). The ninth of these chests provides the top octave (treble) extension for the seven ranks in the Swell organ. Three chests control the Salicional and Gedecht pipes on the Great, inside the chamber (under expression). The final windchest is for the Bourdon 16' on the Pedal organ.

All of these are chests are known as ***Direct Electric*** windchests. Instead of mechanical, these chest have an electric system for controlling the valves (see solenoid valves--photo on left) inside the chests. The switching system routes electrical impulses from the keys directly to the proper valves.

All thirteen new windchests in Immanuel's organ are built of 2" thick, solid oak housings with deep finger-jointed corners. These are topped with heavy laminated Baltic birch toe-boards with burnished toe-seats. The valve assemblies and wiring are attached to the bottom-side of these toe-boards (photo on left). The rack-boards are also made of laminated Baltic birch. Though not visible from the nave, these wind-chest are incredibly beautiful in their meticulous craftsmanship.

A third type of windchest has been incorporated in pipe organs since the early 1900s, with the ***Electro-pneumatic action.*** In an electro-pneumatic windchest, valves are opened by air under pressure. This is accomplished by means of leather pouches, called pneumatics, which move by flexing when the pressure on opposite sides of the leather is unequal. Two valves are required to complete the action of opening the valve. A small electric valve is utilized to exhaust a pneumatic action, which in turn opens the actual pipe valve, permitting wind to the pipe. Electro-pneumatic actions have a weakness in the life of the leather, which needs periodic replacement. This is known as releathering. Immanuel's organ has no electro-pneumatic windchests.

Immanuel's pipe organ combines some of the best designs and sounds of German, French, English, Italian and American instruments. Though relatively small compared to cathedral-sized organs, it is designed and voiced to produce a tremendous array of tonal variations and volume. With nearly 700 pipes and 27 stops it is matched beautifully to Immanuel's superb acoustics in the Nave and the musical tradition of the congregation.

Immanuel's Pipe Organ Stop List

Great Organ Stop List (11)

- **Salicional (TC) 16'**
- **Principal 8'**
- **Gedecht Flute 8'**
- **Salicional 8'**
- **Principal 4'**
- **Salicet 4'**
- **Flute 4'**
- **Principal 2'**
- **Flautina 2‘**
- **Flageolet 2”**
- **Sifflot 1’**

Swell Organ Stop List (8)

- **Diapason 8'**
- **Melodia 8'**
- **Dulciana 8'**
- **Oboe 8’**
- **Octave 4'**
- **Violina 4'**
- **Nazard 2 $^2/_3$'**
- **Fifteenth 2‘**

Pedal Organ Stop List (8)

- **Resultant 32'**
- **Bourdon 16'**
- **Quintaton 16'**
- **Gedecht 8'**
- **Viole 8'**
- **Choralbass 4'**
- **Flute 4'**
- **Octavin 2‘**

Ranks of Pipes on Immanuel's Pipe Organ *(asterisk * indicates pipes from the A.O. Aadland organ)*

The Immanuel organ has a lovely combination of ranks. From string sounds of the Violina 4', Dulciana 8' and Salicional 8', to the flute sounds of the Melodia 8', Nazard $2^2/_3$', Gedecht 8' and Bourdon 16' or the reed sounds of the composite Oboe 8', Immanuel's organ supplies a rich variety of orchestral tones. Yet the most important sound is that of the traditional pipe organ. This organ has full-sized ranks of Diapason 8', Octave 4' and Fifteenth 2' in the Swell and a robust expanded Principal 8' rank in the Great façade. The solid bass of the Bourdon 16', the Quintaton 16' and the Resultant 32' provides a strong foundation.

Diapason 8' * (61 pipes) and Principal 8' (85 pipes) (Swell Organ & Great Organ façade respectively)

The ***Diapason*** and ***Principal*** ranks represent the characteristic sound of the pipe organ. They are not intended to imitate any other instrument or sound. They are medium-scaled and are often prominently featured in the façades of pipe organs.

On the console, a stop of Diapason may not actually be labeled Diapason. That label is most commonly used in English-style organs, whereas the same type of stop is known as a Principal on German-style organs. For French-style organs they would typically be called Montre (literally on "Display"--the pipes at the front of the organ case) or Prestant ("standing in front" Latin 'praestare').

Immanuel's instrument has both a 61-pipe Diapason rank in the Swell Organ inside the chamber (at an 8’ pitch) and an extra-large 85-pipe Principal 8' rank (with moderate chiff) on the Great Organ (of polished zinc featured in the three large towers of the façade). The Principal rank is brand new and specially designed and fabricated for Immanuel. This expanded rank on the Great Organ also supplies the 4' and 2' Principal stops as well as the Choralbass 4' and Octavin 2' stops on the Pedal.

Dulciana 8' * (61 pipes) (Swell Organ)

The name is probably derived from the Latin *dulcis*, “sweet”. The proper English ***Dulciana*** is invariably made of cylindrical open metal pipes of small scale, though the scale does vary considerably.

The English *Dulciana* was originally a diminutive Diapason, smaller in scale, softer and more delicate in tone. It is often the softest stop on the organ in which it is placed. The name may have come as early as 1640, indicating sweet, gentle flue stop. Over time, English builders began voicing it with a string-like tone.

While some may still define the *Dulciana* as a diminutive Diapason, organ historian, E. M. Skinner, saw it differently. While acknowledging its origin as an Echo Diapason, he wrote: "Reference has been made to the Dulciana as belonging to the Diapason family, . . . but this is erroneous as its scale is out of the Diapason range. It may be appraised more accurately as a *muted string*."

Immanuel's Dulciana rank has this delicate string tone. It is an 8' stop on the Swell Organ.

Octave 4' * (61 pipes) & Principal 4' (from the Principal rank) (Swell Organ & Great Organ respectively)

On German-style organs, the name ***Octave*** is used to indicate the stop one octave above the 8' Principal (or Diapason).

On the Swell, Immanuel's Octave 4' is diapason in tone. On the Great, the Principal 4' is from the façade set.

Fifteenth 2' * (61 pipes) & Principal 2' (from Principal) (Swell Organ & Great Organ respectively)

These are the names most commonly given to the Diapason or Principal of 2' pitch in the manuals. Like their larger and lower 8' relatives, their pipes are of open metal construction.

In Immanuel's organ these stops are configured the same as is mentioned above (in the Octave 4' & Principal 4').

Melodia 8' * (61 pipes) (Swell Organ)

The ***Melodia*** is an open wooden flute rank with an 8' pitch. The tone has been described variously as smooth, singing, round, rich, warm, and mellow. It has a slight horn-like timbre in the tenor and middle octaves, and it furnishes an admirable foundation for the most delicate combinations. Its tone suggests the "aw" vowel sound.

The *Melodia* has been popular in the USA and Canada since the middle of the 19th century. It was also popular in England, but named the Waldflöte. Its intonation is also very similar to the Flauto Dolce. The scale of the *Melodia* is moderate to large.

The pipes forming the *Melodia* are typically made of softwood (quadrangular, not cylindrical) with hardwood mouth pieces and caps. The caps are hollowed with the wind-way positioned just below the lower lip of the mouth to produce perfect intonation. It is a common practice that the top four octaves of the Melodia are composed of open flue pipes while the bass octave uses stopped pipes.

Immanuel's 8' Melodia rank on the Swell Organ, has wooden pipes made of Spruce. The top four octaves are open flue pipes, while the bottom 12 pipes (bass octave) are stopped.

Nazard $2^2/_3$' * (61 pipes) (Swell Organ)

The ***Nazard*** is a mutation stop of 2 $^2/_3$'. It represents the lowest non-unison pitch that reinforces a harmonic of the fundamental pitch (8' on the manuals). It plays a harmonic fifth (plus one octave) above the fundamental and supplies the 2nd overtone. As such, it is the most important mutation pitch. The Nazard pipes are "pure-tuned" to the fundamental (not tempered).

The name Nazard dates from the 1530's. It may trace its origin to the German word *nase*, meaning "nose", and referring to the nasal character imparted by these stops. But a more likely origin is the German word *nach*, meaning "behind", and referring to ranks of pipes placed between the case pipes and the Hintersatz of a separated Blockwerk. They are a stop of flute tone. The *Nasard* of the classical French organ is considered as indispensable for proper registration of its music literature. On theatre organs in the USA, the 2 $^2/_3$' pitch is taken from the Tibia Clausa or Concert Flute.

Immanuel's 61-pipe Nazard set on the Swell Organ is flute-like in tone. This rank also supplies the 2nd overtone for the Oboe 8' (when combined with the Salicional 8'), which is a resultant stop.

Violina 4' * (61 pipes) (Swell Organ)

The ***Violina*** is a 4' rank of flue pipes of raspy violin-like quality. In the Bass range violin pipes are often called *cello* pipes, while middle range pipes are called *violas*, and treble range pipes are called *violin or violina* pipes.

As a 4-foot rank, Immanuel's Violina on the Swell Organ, is mid-range to treble.

Bourdon 16' and Gedecht Flute 8' (97 pipes) (Pedal Organ and Great Organ, both under expression)

A stopped flute-type of pipe in an organ characterized by a very dark, heavy tone, strong in fundamental, with a quint transient but relatively little overtone development. Its half-length construction make it especially well suited to low pitches, and the name is derived from the French word for 'buzz'.

This stop is most commonly found in the pedal at 16' pitch, meaning that the lowest pitched pipe would be 16 feet in length if it were an open pipe, but Bourdons are stopped pipes, that are only half the length of an open pipe of the same pitch. It is also common in the pedal division at 32' pitch, where its very heavy roll of sound can actually shake the building it is installed in. It can be found at 8' as the Gedecht. Although sometimes varying between builders, its tone is usually low pitched and firm.

The pipes are constructed of wood in modern organ building. They are thick walled, and generally square in cross section, with a high mouth cut-up to produce the fluty tone. Bourdon is a stopped pipe, having an airtight stopper fitted into the top. This both makes the tone one octave lower than a similar pipe of open construction, and also eliminates the development of even-numbered harmonics ("squaring off" the timbre), helping to create the characteristic dark tone.

This stop is very common in church organs and theatre organs. In an organ so small as to have only one 16' stop in the pedal division, it will almost invariably be a Bourdon, as the deep, dark and penetrating tone can be clearly heard under soft or loud combinations, and blends well with all sounds of the organ.

Immanuel's pipe organ has one huge rank of this family (of ninety-seven pipes!). This large set was acquired from another organ and reconditioned for Immanuel. It supplies the Pedal stops: Bourdon 16', Gedecht 8' and Flute 4'. On the Great it supplies the Gedecht Flute 8', Flute 4', Flautina 2' and Sifflot 1'.

Salicional 16' (TC), Salicional 8' and Salicet 4' (85 pipes) (Great Organ under expression)

The name *Salicional* is derived from the Latin *salix*, meaning "willow". *Salicis Fistula* means "willow pipe", a rustic flute made from a branch of a willow tree. Dating from the late 15th century, it was originally rather flute-like in tone, but later evolved into a string stop whose tone varied considerably across centuries and continents. In the 17th century the *Salicional* was a specialty of Habsburg Europe, then brought to England where it became very popular in the 19th century. The German *Salicional* was described as a "horny" string, the French variety a quiet Diapason and the English variety a slightly stringy Dulciana. Now it is one of the most common string stops, most often found at 8' pitch.

The *Salicional* is almost invariably made of open cylindrical metal pipes. The mouths tend to be small. A common feature is a roller beard or harmonic bridge, particularly in the low and middle ranges.

Immanuel's Salicional rank is an enlarged rank of 85 pipes (2 octaves larger than a standard 61-note rank). Designed and built especially for Immanuel, it supplies a wonderful array of stops on the console. Though placed on the Great, it supplies the Viole 8' on the Pedal. It also supplies the fundamental 8' pitch for the Oboe stop on the Swell. On the Great it is available as a 16 foot stop (down to tenor C) plus the Salicional 8', Salicet 4' and Flageolet 2'

Oboe 8' (Composite) (Swell Organ)

This rank is a resultant stop which uses the foundation and upper harmonic structure of the Salicional 8' along with the pure-tuned prominent 5th (+ one octave) of the $2^2/_3$ Nazard.

Quintaton 16' (Resultant) (Pedal Organ)

This resultant stop uses the Gedecht 8' as the fundamental along with the harmonic 5th (also in the Gedecht). This produces a 16 foot resultant pitch.

Resultant 32' (Pedal Organ)

This resultant stop uses the Bourdon 16' as the fundamental along with the harmonic 5th (also in the Bourdon). This produces a 32 foot resultant pitch.

Finale

The Immanuel Lutheran Pipe Organ is now complete. The congregation plans to share the instrument with the community and the region for education, recitals, lessons, and concerts. In keeping with that commitment, the congregation has established a special fund for pipe organ maintenance, organist education, lessons for youth, recitals and concerts. Your gifts to this special fund are welcomed.

The organ was dedicated on July 8, 2012. A dedicatory recital featured Dr. Michael Elsbernd principal organist at First Lutheran Church in Sioux Falls and District Convener of the South Dakota Chapter of the American Guild of Organists. The concert was magnificent! Around 300 people packed the church, parish hall and grounds.

The project was germinated in 2009 with a gift (from his 10 children) of the personal pipe organ of the late Rev. A. O. Aadland, one of several he built. Components from that organ were incorporated into the new instrument built by Art Aadland (son of A.O. Aadland) of Aadland Pipe Organ Company. The new organ was especially designed and voiced for Immanuel Lutheran, by Art, President of APOC of Valley Springs, SD. www.aadlandpipeorgan.com The main wind chest, the powerful blower and 427 of its pipes (7 full ranks) were used from this gifted organ. The main tracker-action chest was totally renovated and converted to solid-state pull-downs and slider motors. The pipes were carefully sorted by rank and restored to like-new condition.

To the gifted organ, APOC added many new components: the two-manual console (with two 61-note keyboards and a 32-note pedal); 13 direct electric wind chests; the bellows; the beautiful oak façade that frames the highly polished exposed Principal pipes in the rear of the Nave; the swell-shutter system and 267 new pipes. The organ incorporates the latest state-of-the-art technology (Peterson) in its control systems.

The organ has nearly 700 pipes with 27 stops. (Seven full ranks plus 3 extra-large ranks). The Great Organ (first keyboard) has 11 stops with 85 Principal pipes exposed and 150 pipes under expression (volume controlled by swell-shutters). The Swell Organ (second keyboard) has 8 stops and 427 pipes, all under expression. The "Pedal Organ", also mostly under expression, has 8 stops including Bourdon 16', Quintaton 16' and Resultant 32'.

For a small church what was accomplished is astonishing. Fundraising is complete and the pipe organ is entirely paid for. The project's total cost was under $150,000--for an instrument now valued at well over $400,000. In a year and a half, member contributions along with gifts from many non-members from our area and from throughout the entire country, poured into the fund. Over 250 financial gifts totaling nearly $60,000, came from 26 states outside of Montana. Volunteer work was especially noteworthy. Eighty individuals (both members and non-members) gave over 6000 hours of work to the project. Nine prayer teams regularly prayed for the organ project. As expressed by King David in Psalm 150:

"Let Everything that has Breath, Praise the Lord"

Facade and Pipeworks at rear of Immanuel's Nave