III Understanding Organ Specifications

To an organist or committee person involved with an organ project, or even for the concert listener, the written specification for an instrument can prove to be a valuable asset. A visiting organist may ask for a copy of the specification to become familiar with an organ in preparing a concert. An organ committee person will find the specification valuable as they analyze a proposal for a new or renovated organ. Organ specifications, as we provide them, are clear and concise about the stops provided on an organ and the tone source of each stop. This distinction becomes crucial for a committee reviewing proposals as there are different ways to achieve a speaking stop for the organ, and some builders are using electronic voices to augment or build an organ. (See Section II for organ definitions).

The following definitions are offered for ease of understanding:

Specification - The list of speaking stops in an organ, as arranged by divisions or departments. A proper specification should indicate how many pipes are assigned to a given stop. If there is not a rank(s) of pipes for a given stop, it should indicate that the tone source for a stop is unified or duplexed from another set of pipes, or that it is provided as a digital/electronic stop. The specification will also give the basic information regarding the number of manuals or keyboards, the number of speaking stops and the complement of couplers and capture action provided.

Division - The organ stops will be grouped together in divisions - or, in British specifications, departments. Each division is assigned to a given manual or to the pedals on the organ console. Likewise, the pipes for that division will be grouped together in a given chamber or section of the organ case.

Rank (or pipe rank) - A set of pipes that develops a particular tone for the pipe organ, ranging from lowest note to highest note on the keyboard or pedalboard. Pedal ranks can have from 27 to 32 pipes, while manual ranks may range from 37 pipes for a short compass rank to 97 pipes for a unit rank. The average *straight* manual rank is 61 pipes.

Stop (or speaking stop) - A stop is a control for a particular sound and pitch for a given manual division or pedal division.

Pitch notations - In the specification you will see a list of stop names in each division. Each name will include numbers such as 16', 8', 4' and so on. Based on a concert pitch of middle A=440Hz, these numbers indicate the pitch of a given stop. Unison pitch is based on an 8' pitch, meaning that for an open flue pipe or full-length reed stop, low C will be approximately 8' tall (not counting the toe of the pipe). The number 16' indicates that low C will be approximately 16’ tall, so this stop will play one octave below unison pitch. Conversely, 4' pitch will be one octave above unison pitch. If a stop name includes a Roman numeral, this numeral indicates the number of ranks in a stop rather than the length of the low C. Stops with Roman numerals often indicate mixtures, which add brightness to the ensemble by playing several higher-pitched ranks at the same time. Most manual mixture stops are no more than 2' long at low C. This is an important item to understand, because single rank stops of 16' and 8' designations take far more space in the organ chamber or case than would a IV-rank mixture. This will also have bearing on the "price per rank"

used to estimate cost, because mixture ranks take far less metal and labor to build, and they produce less foundation tone
.
Straight ranks - A straight manual or pedal stop will have one independent set of pipes dedicated for use for that one stop only. Straight stops are one rank of pipes unless designated by a Roman numeral on the stop knob or stop tab. For example, IV Mixture would have 4 independent ranks of pipes for the one Mixture stop.

Unit ranks – A unit rank is a single rank of pipes has been extended to play at multiple pitches in a given division. For example, an 8' Gedeckt (flute) will require 61 pipes. However, if we add 12 pipes to the treble, we can use a unit chest and relay to play the rank as a 4' Flute: 61 notes in total, with the first 49 pipes drawn from the upper end of the 8' flute and the last 12 notes played from the 12-pipe extension. In some cases a builder may number their stops in the specification, and the higher or lower pitch stop may say "from no. xx" indicating the rank that was extended to create the extended stop. **Note:** With unit ranks, you will have multiple *stops* drawn from a single rank of *pipes*.

Duplex stops - A duplex stop is a single rank of pipes that has been wired to play as two or more independent stops. An excellent example is the "duplexing" of solo stops, commonly a Trompette (En Chamade, Festival, or Fanfare) or a Tuba. Only one rank of pipes exists, but for reasons of literature, the stop may be required to play in different divisions without the use of couplers. The stop may be duplexed as an independent stop in multiple divisions by means of a relay and stop control. In addition, manual 16' stops may also be duplexed to a pedal division.

Capture System (sometimes referred to as a combination system) – The capture system allows the organist to set predetermined registrations or selected stops and “capture” them to a piston or toe stud memory. Older organs only employed one level or channel of memory for each piston, as the mechanisms were mechanical or electro-mechanical by design. Later, organbuilders began to employ the use of solid-state electronics for capture memory, thus allowing additional memory levels or channels. The description of the capture system should indicate the number of available memory levels or channels for memory. **Note:** Capture systems used with mechanical (tracker) action pipe organs will require the use of electric *stop* action to make the organ accessible for a capture system.

Organ action – Pipe organs use one of two primary conveyances between the key and the valve under the pipes.

A – Mechanical or *tracker* action systems use a physical mechanical link between the key and pipe valve. This link is built using rods or conveyances (called trackers) and various squares or corner connections. The rods and squares may be constructed of wood or metal. A well-designed tracker precisely transmits the action of the organist's finger to the pipe valve and is extremely advantageous for practicing performance technique. One of the keys to good design is the arrangement and the length of the tracker runs. Therefore, large instruments -- or instruments that require considerable distance between the key and the pipe valve -- may present limitations or challenges that might better warrant electric actions.

B – Electric action systems use electro-magnetic solenoids either to directly open pipe valves or, the preferred option with our company, to trigger a pneumatic action to open the pipe valves.

Pneumatic designs may be referred to as electro-pneumatic actions and will be offered in unit, pitman, or slider chest configurations. (See Section V for chest action details.) In any configuration, the signal is sent from the console key as an electric signal rather than a mechanical link. Thus, electric consoles offer almost infinite options for placement.

Console – The part of the pipe organ which contains the keyboards, pedalboard, stop controls, swell shoes and capture action is called the console. This is often mistakenly called the "organ." In the realm of a pipe organ, the console serves as the control center for playing the pipes. Most electric action pipe organs will have a stand-alone console. For tracker organs, this will be called a "detached" console. If the organ is built as a free-standing case instrument, the organ console may be attached directly to the case of the instrument. Attached consoles are most common with tracker organs.

Derived or Synthetic stops – In some pipe organs, certain stops may be derived from a combination of stops when space and/or budget will not permit the installation of a real set of pipes for the stop. One of the most common situations is the inclusion of a 32' pitch stop. A 32' stop usually requires the space for pipes that are 32 feet long. Since many churches cannot house such stops, the ear is lead to believe they exist by playing higher pitches in the harmonic series of a 32' tone. For example, a 32' Resultant plays a unison and quint (or fifth) tone from the 16' octave to create overtones for a 32'. A 32' cornet uses pitches to play the octave, quint, tierce, seventh, and ninth harmonics for a reedy overtone pitch. In our company, such stops are denoted in the specification as *derived*.

Digital stops - These stops are created not with pipes but with computer tone generation sources. Our policy is to limit these stops to 32' pedal stops and percussion stops such as Chimes and Harp. Other builders may use digital stops for a wide variety of stops in the instrument. In any case, each digital stop should be duly noted in the specification. There are different manufacturers of digital stops, much as there are different builders of pipe organs.

Winding systems - Like actions and windchests, there are different ways to build winding systems. Except for historic restorations or historical replicas, all current modern pipe organs use electric blowers to provide wind to the organ. The blowers are designed to provide high-volume, low-pressure wind for the organ pipes. The wind pressure and volume are regulated by devices called reservoirs or Schwimmers. (See Section VI for more on reservoirs.)

AGO specifications - The American Guild of Organists (AGO) is a professional guild for concert and church organists. The AGO has established a set of physical configuration and measurement standards for the construction of pipe organ consoles. These standards have been refined over the decades to provide ergonomically efficient and comfortable designs for organ consoles. Our firm uses these standards in our own console design to promote a comfortable and user-friendly instrument.

Cases - Cases are used for architectural presentation on two levels. Cases may provide a front for an existing organ chamber designed as part of the building, or they may be designed as complete, free-standing enclosures for the pipe organ. The case offers benefits for focusing sound and providing tonal egress for the pipe organ. The cases also provide the visual personality of the instrument.

F/L or L/2 - These are designations sometimes found when addressing reed ranks. When building reed pipes, the speaking length of an actual vibrating reed can affect the pitch of the pipe in spite of the actual length of the reed pipe resonator. Thus a reed pitch may speak a pitch lower or higher than the actual length of the pipe might dictate. Commonly in organ building, pipe organ builders may build reed stops that speak one octave lower than the actual length of the pipes. For example, a pipe organ may include a Trombone or Contra Bombard that speaks at 32' pitch, even though the lowest pipe is only 16' long. The pipe organ builder will designate this by indicating the stop as follows:

32' Contra Bombard (F/L @ C2)	L/2	12 pipes

"L/2" is length divided by 2 or half-length. "F/L" indicates full-length.
Since the church may not have space for the 32' pipes, the organ builder opts to build the pipes half-length (L/2) in the bottom octave, reverting to full-length (F/L) at C2 or note #13 (the second octave) and remaining full length for the balance of the rank of pipes.

Enclosed or expressive – The term "enclosed" will usually appear just under the Division name. This indicates that the following pipes are enclosed in a chamber or in part of the organ case that has swell shades over the tone opening. These shades are controlled by a shoe on the console, which opens and closes the shades to express or control volume of the pipes. These shades control volume in much the same way that window blinds can be adjusted to let in or block out light.

Unenclosed or non-expressive – These terms indicate that this division does not have swell shades to control tonal egress of the division.

The following example shows how our firm notates a specification for the benefit of the client and our shop.

GREAT – *Division name*
(unenclosed)
No swell shades or enclosure

16	Spitzfloete	61 pipes
8	Principal	61 pipes
8	Bourdon	61 pipes
8	Spitzfloete	12 pipes
(This rank is unified with the 16' Spitzfloete; thus one rank of 73 pipes plays at 16' pitch and 8' pitch, yielding 2 speaking stops.)		
4	Octave	61 pipes
4	Flute	61 pipes

2	Super Octave	61 pipes
IV	Mixture 1 1/3'	244 pipes

(This Mixture has 4 ranks of pipes as indicated by the Roman numeral and the pipe count: 4x61=244. Note the lowest pipe is 1 1/3' in length.)

8	Trompete	61 pipes
8	Festival Trumpet (Mounted Horizontal in case)	61 pipes
	Chimes	25 Notes/Digital

(These chimes are provided as electronic sounds, not real chimes.)

Cymbelstern existing

Stops = 10 *Speaking stops*
Ranks = 12 *Sets of pipes*

SWELL - *Division name*
(enclosed)
This Division is expressive

16	Bourdon	12 pipes

(This stop is an extension of the 8' Flute a Cheminee. There is a single rank of 73 pipes, which provides 2 speaking stops.)

8	Flute a Cheminee	61 pipes
8	Viola Pomposa	61 pipes
8	Viola Celeste GG	54 pipes

(Note that this rank is 54 pipes and is marked GG. Celeste ranks, which provide an undulating sound for the string, or the Viola Pomposa in this case, are often short ranks, beginning at C2 or Tenor C. This Celeste starts lower at G1 or GG.)

4	Geigen Principal	61 pipes
4	Nachthorn	61 pipes
2	Spitzfloete	61 pipes
IV	Plein Jeu 2'	244 pipes

(This mixture has 4 ranks of pipes. The lowest pipe is 2' long.)

16	Basson L/2	12 pipes

(This stop is an extension of the 8' Hautbois. Note that this 12 note extension is L/2 or half-length.)

8	Trompette	61 pipes

8	Hautbois (1-6 L/2)	61 pipes

(For tonal reasons, the L/2 extends into the 8' part of the of the Hautbois.)

4	Clairon	61 pipes
8	Voix Humaine	61 pipes

Tremulant
Swell 16 - *Intramanual subcoupler, playing an octave lower*
Swell Unison Off

Swell 4 - *Intramanual supercoupler, playing an octave higher*
Stops = 13 *Speaking stops*
Ranks = 14 *Set of pipes*

CHOIR - *Division name*
(enclosed)
This Division is expressive

8	Gedeckt	61 pipes
8	Gemshorn	61 pipes
8	Gemshorn Celeste	49 pipes

(Note this Celeste rank begins at C2 or Tenor C and is thus a rank with 49 pipes.)

4	Praestant	61 pipes
4	Koppelfloete	61 pipes
2 2/3	Nazat	61 pipes
2	Oktav	61 pipes
2	Blockfloete	61 pipes
1 3/5	Terz	61 pipes
1 1/3	Quinte	61 pipes
III	Scharf 1'	183 pipes
III	Zimbel 1/2'	183 pipes

(Note that these two mixtures add six ranks to the organ. One mixture starts at 1'pitch and the second mixture starts at 1/2' pitch.)

8	Cromorne	61 pipes

8	Festival Trumpet	Great

(Note the Festival Trumpet is "based" or physically located in the Great but is available as a separate stop on the Choir. Because it is a solo type stop, it is not affected by the intra- or intermanual couplers.)

Tremulant
Harp Digital
Celesta Digital
(The Harp and Celesta are electronic)
Choir 16 *Intramanual subcoupler, playing an octave lower*
Choir Unison Off
Choir 4 *Intramanual supercoupler, playing an octave lower*

Stops = 14 *Speaking stops*
Ranks = 17 *Sets of pipes*

PEDAL - *Division*

32	Subbass	12 notes/Digital

(This stop is an electronic extension of the 16' Subbass. Space was a determining factor in this decision, and yes, it is possible to add electronic extensions to real pipe ranks.)

16	Principal	32 pipes
16	Subbass	32 pipes (existing)

(This rank and two others were retained from the old organ as noted by the word "existing.")

16	Spitzfloete	Great

(Home based in the Great and duplexed to the Pedal as an independent stop.)

16	Bourdon	Swell

(Home based in the Swell and duplexed to the Pedal as an independent stop.)

8	Octave	12 pipes
8	Floetenbass (ext. of 16 Subbass)	12 pipes

(In addition to the 32' electronic extension for the 16' Subbass, 12 more pipes were added to create the 8' Floetenbass stop.)

8	Spitzfloete	Great

(Home based in the Great and duplexed to the Pedal.)

8	Rohrbourdon	Swell

(Home based in the Swell and duplexed to the Pedal.)

4	Choral Bass	32 pipes (existing)
4	Flute	32 pipes (existing)
IV	Raushquinte 2 2/3'	128 pipes

(4 independent ranks x 32 pipes each=128 pipes, As a Pedal mixture

this stop has a lowest pipe of 2 2/3 long.)

32	Contra Posaune	12 notes/Digital
16	Posaune	32 pipes

(This reed is extended down to a 32' Contra Posaune with a digital extension and extended in the treble with real pipes to create the 8' Trompete. The end result a unit rank that plays 32', 16' and 8' pitches from a single rank of pipes.)

16	Basson	Swell

(Home based in the Swell and duplexed to the Pedal.)

8	Trompete	12 pipes
4	Hautbois	Swell

(Home based in the Swell and duplexed to the Pedal.)

8	Festival Trumpet	Great

Stops = 18 *Speaking stops*
Ranks = 9 *Sets of pipes*

COUPLERS

These are inter-manual couplers that couple stops one from division to another division, as opposed to intra-manual couplers (which couple stops up or down an octave within a single division). On a drawknob console, inter-manual couplers are usually found on tilting tablets on the name rail above the keyboards, and intra-manual couplers are on drawknobs in each division. As noted earlier the 16' coupler plays one octave lower and the 4' coupler plays one octave higher than unison pitch.

Swell to Great 16'
Swell to Great 8
Swell to Great 4
Choir to Great 16
Choir to Great 8
Choir to Great 4

Swell to Choir 16
Swell to Choir 8
Swell to Choir 4

Great to Choir 8

Great to Pedal 8
Great to Pedal 4
Swell to Pedal 8
Swell to Pedal 4
Choir to Pedal 8
Choir to Pedal 4

Total Stops = 56
Total Ranks = 52

CAPTURE ACTION
(100 Memory Levels)

10	General Pistons Thumb and Toe
8	Divisional Pistons Manual Thumb only
6	Divisional Pistons Pedal Toe only
	Great to Pedal Reversible Thumb and Toe
	Swell to Pedal Reversible Thumb and Toe
	Choir to Pedal Reversible Thumb and Toe
	Cymbelstern Reversible Thumb and Toe
	32' Subbass reversible Toe only
	32' Contra Posaune reversible Toe only
	Sforzando Reversible Thumb and Toe
	General Cancel Thumb only
	Reverse Piston for Sequencer Thumb and Toe
	Solid State Organ Systems "Any Piston Next" Sequencer

Notes about the Capture action: Notice the number of levels of memory. General pistons affect each division in the organ, while divisional pistons only change registration in a given division. Thumb *and* Toe *indicate how the organist can access the piston control. Thumb pistons are located on the manuals for the thumb. Toe studs are pistons for the feet.*

The next sections are descriptions that should be easily understood. These areas discuss detail designs relative to each individual instrument. Since pipe organs are custom creations for a specific space and use, these details will vary from instrument to instrument. Specialty items like finishes and woods or architectural details would be covered here. Each area listed is part of our specification. Each would be detailed as per the job specifics quoted.

CONSOLE

Console layouts and dimensions are to conform to AGO standards. Detailed per job.

CASEWORK

Attached with this proposal are proposed drawings of the pipe organ. Detailed per job.

WINDING

This section will be important so that space may be allocated or prepared for the necessary blowers and wind reservoirs required. Detailed per job.

WINDCHESTS

Our firm details the type of windchests and actions designated for the project.

SWITCHING AND CAPTURE ACTIONS

Many companies are available to supply such equipment. Some organ builders will shop price for each project and some organ builders use a given supplier for their own company standards. Our firm has used Solid State Organ Systems as our standard for over a decade. SSOS is recognized as the world standard for pipe organ capture and switching systems.

PIPEWORK

If select pipework has been designated as used or existing in the specification, we would distinguish the source of such pipework in this section.

INSTALLATION / TUNING / TONAL FINISHING

Detailed requirements for electrical and structural needs for the pipe organ should be provided by the organ builder. Final building details are to be determined by licensed contractors and structural engineers. Some companies include things such as hoisting or certain structural supports; some companies do not. This area remains an important part of the cost of an organ project, and this section describes where certain costs and responsibilities are covered by the organ builder and the purchaser.
Some builders consider tonal finishing and final tuning to be optional. Committees should be aware of that!

WARRANTY

This is a normal statement of warranty obligations by the organ builder and the purchaser. The length of time is usually stated and any exceptions that might fall under another manufacturer's warranty. Normal maintenance and tuning are the responsibility of the purchaser. Purchaser is responsible for temperature and humidity maintenance of the space occupied by the organ. Mechanical issues or problems with the pipe organ generated by faults in the structural integrity of the building are not covered by the organ builder's warranty.

QUOTATION

The work as outlined in the specification and case drawing is quoted at $xxx,xxx.xx. This quotation will be honored for a period of 60 days from the date of this proposal.
Bids are protected by time limits to avoid problems with long decision timelines. This is standard for many organ builders. Most suppliers will only honor prices for 60 to 90 days from date of quotation. Good business practices are essential to ensure the organ builder can deliver the instrument desired by the purchaser.