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Dennis Fleisher's comments on the acoustical elements of this project are on the next page.

Cover Feature
THE EPISCOPAL CHURCH OF ST. JOHN THE DIVINE
HOUSTON, TEXAS
ORGUES LÉTOURNEAU LIMITÉE
ST-HYACINTHE, QUEBEC

Antiphonal

From the Rector

From the founding of the parish in 1940, St. John the Divine has renovated its facilities regularly for an expanding church family. The latest church renovation and completion of our new pipe organ mark an exciting time in our parish life. Among the changes suggested by our liturgical designer, Terry Byrd Eason, moving the altar forward was the central decision from which everything else flowed. The transformation of the sanctuary has been greeted enthusiastically, worship has been re-energized, and our extraordinary new Létourneau organ now leads music with warmth and dignity. With thanks to Almighty God, our music ministry has planned a special series of inaugural concerts for the next several years. For more information, please visit our Web site at <www.sjd.org>.

The Rev. Laurens A. Hall, dd

From the Project Manager

It was once humorously observed that if St. John the Divine had planned to have poor church acoustics, it couldn't have done a better job. Music in the sanctuary was a particular challenge, thanks to carpeted floors, cushioned pews, and a ceiling composed of half-inch plywood sheets. Sound projection was uniformly poor, as confirmed by acoustical measurements showing a 28-decibel drop in sound energy from the chancel to the balcony.

The catalyst for a renovation project came in late 2001 when the church's pipe organ was damaged by water leaking into the chamber. The vestry wisely chose to resolve the acoustical and organ problems in tandem, committing in 2003 to a complete renovation of the 50-year-old church building and the purchase of a new pipe organ from Orgues Létourneau Limitée of Quebec. A primary requirement for the renovation was remaining faithful to the building's original architecture by McKee and Kamrath, Houston's foremost proponents of Frank Lloyd Wright's prairie style. Other goals included modernizing the building's infrastructure and transforming the acoustic.

The renovations began in 2004 and were completed in August of 2005 to coincide with the beginning of the organ's installation. Organ assembly was completed in mid-November 2005, with the voicing continuing until mid-March 2006. The total cost of the project, including the organ, approached $17 million—and the results are an absolute success.

Addressing the acoustic issues, thick cement plaster on ceilings and walls and slate floors over concrete provide the necessary density for proper sound reflection. The chancel and balcony sidewalls have been

canted outwards to direct sound energy into the nave. Stained glass panels now have half-inch-thick plate glass shields providing reflective surfaces.

The organ chambers are of particular interest: The main chamber is located on the west side of the chancel and houses six divisions in an A-frame shape measuring 45 feet wide and 38 feet deep. The north and south sidewalls are six feet high; from there, the ceiling follows the roofline to a peak height of 30 feet. The chamber is gabled into the sanctuary where the organ's facade fills the opening in a striking architectural statement. Construction materials are massive: eight-inch-thick concrete floors and walls with the chamber ceiling being one-inch solid plate steel, supported by a series of I-beams spaced five feet apart. The weight of the ceiling exceeds 50 tons. The floor and walls of the shallow east chamber are also cement, with a sloping ceiling of cement plaster.

The wood used for the facades and consoles is rift-sawn white oak, accented with American black walnut, to match the new liturgical furnishings. The organ has two matching five-manual consoles—one moveable within the chancel and another in the balcony. Each weighs approximately 2,000 pounds, while the organ proper is estimated to weigh 40 tons. The organ required four 53-foot trailers to transport, and deliveries were staged with many volunteers unloading each shipment. With 113 independent stops, 144 ranks, and 8,361 pipes, the organ has been recognized as the 77th largest pipe organ in the world and is the largest instrument built by Létourneau to date.

Acknowledgements for those primarily responsible for the acoustical design, organ, and construction work on this outstanding project go to Dennis Fleisher, project acoustician; John Clements and Pam Camargo, Jackson & Ryan Architects; Terry Byrd Eason, liturgical designer; Brookstone General Contractors; Fernand Létourneau and Andrew Forrest, Orgues Létourneau Ltée.; and John Gearhart, director of music ministries at St. John the Divine.

This project was a remarkable synergy of talent, skills, and energy. The Létourneau team in particular met all deadlines in designing, building, and installing this magnificent instrument. With proper care, it will provide many generations with glorious music. All are encouraged to come and see this wonderful church and to experience the phenomenal Létourneau organ.

JOSEPH A. FENNINGER

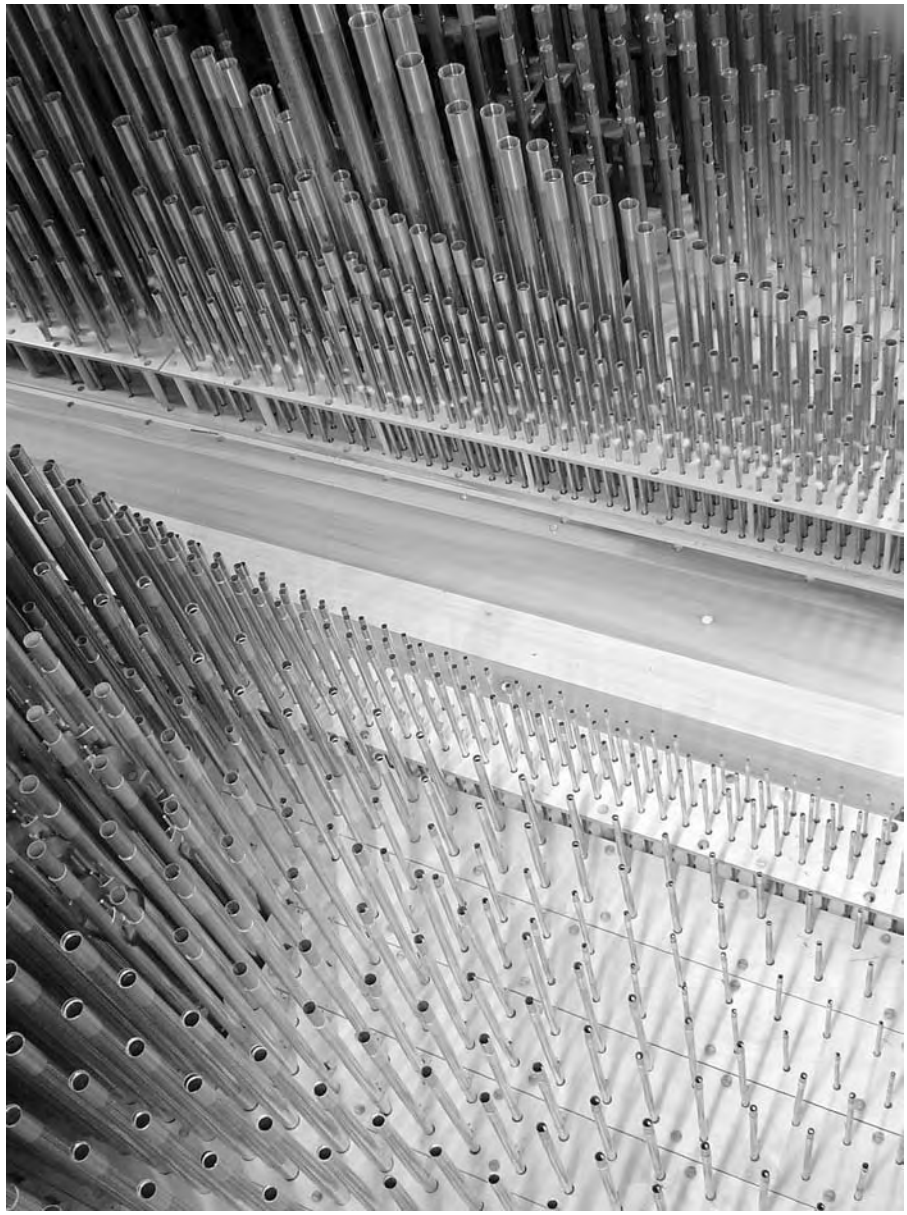
From the Acoustician

Individuals dealing with acoustics in worship spaces, particularly those that house fine pipe organs and support congregational singing, can appreciate the art and craft that comprise an acoustician's efforts. We're often fond of saying that the most important stop on the organ is the room itself, and indeed, it is the acoustical character of a space that shapes and enhances the ultimate quality of sounds that reach the ears. But as much as we might wish otherwise, the acoustician alone can't make these things happen.

We often find ourselves in discussions about the trade-offs between pew pads and comfort, carpeting and footfall noise, or safety. It seems, as valiantly and passionately as we lobby for all the necessary elements to make a space sing, that acoustical priorities are often sacrificed for other perceived values. The undertaking at St. John the Divine was a rare exception wherein every member of the design team was wholly dedicated to providing an outstanding acoustic space without compromise. The musicians had a vision to see and hear grander things than the space suggested; the staff supported their vision and contracted for the extraordinary work necessary to make it a reality; and the parishioners supported the entire project with their generosity and cooperation. Another source of inspiration for the design team was the compelling instrument offered by the organbuilder and how it resonated with the musical vision for the parish.

All of the foregoing descriptions give sufficient details about the acoustical demands and architectural efforts, shepherded by a fine architectural firm that had the skills and artistic sensitivity to incorporate the acoustical factors with grace and beauty. It takes a gifted team and visionary leadership to make projects like this happen. I am honored to have served the people of St. John the Divine in providing a home for outstanding worship and music.

DENNIS FLEISHER



String division

From the Music Staff

This project began in 1999 with a memo requesting the vestry to study the church acoustics and poor chancel sight lines. Committee work began and William Gray was engaged as consultant to coordinate an architectural and acoustical team. Mr. Gray supplied many ideas that were eventually incorporated, and we remain grateful for his wise counsel. An expression of thanks is also owed to Joseph Fenninger, project manager at St. John the Divine, as it was through his Herculean efforts and enthusiasm that the project's momentum never waned, whether working with one of many church committees or dealing closely with the design team.

Once the vestry decided not to rebuild our former instrument, many firms were considered for a new organ. Our tonal ideals harkened back to a time when pipe organs thrilled people with luxurious grandeur and beauty of tone. We wanted the new organ to be a testament to the craft of pipemaking and the art of voicing, with solo stops of poignant beauty to inspire listeners and enhance the Episcopal liturgy. We also wanted color at all dynamic levels to accompany the softest

The Choir facade

child's voice or a full symphony orchestra. Fernand Létourneau best demonstrated a willingness to explore and develop the ideas of Rodman Wanamaker, Ernest M. Skinner, G. Donald Harrison, and Arthur Harrison without utilizing electronic tone generation.

We traveled widely to find recent instruments that came close to our tonal ideas and were particularly impressed with the Létourneau organs at the First Presbyterian Church in Greensboro, North Carolina (TAO, May 2001) and the Church of the Ascension and St. Agnes in Washington, D.C. (TAO, November 2001). Létourneau's ability to construct all pipes and components in-house and install the instrument within a relatively short time frame was another influential factor in our decision.

We are genuinely captivated with the new pipe organ at St. John the Divine. The instrument is thrilling to hear and play and is scaled perfectly to our renovated sanctuary. Please do come and visit if you are in Houston.

JOHN GEARHART
STEVEN A. NEWBERRY

From the Builder

Summing up this project brings a flood of happy memories. From designing and building the organ in our workshops to installing it and carrying out the final voicing, we have encountered only encouragement and cooperation from everyone associated with the project. While individuals are named above, this project team we felt established a new standard of excellence in terms of communications, creativity, and professionalism. It was an equal privilege to work with Joe Fenninger, John Gearhart, and Steve Newberry of St. John the Divine. Their vision and dedication throughout the 32-month project was absolute, and we count these gentlemen as friends rather than clients.

As the church renovations were getting under way, Opus 97 was also developing on a parallel track. Messrs. Gearhart and Newberry had clear ideas about the tonal design they felt would best serve the church's music ministry. They provided us with many stoplist suggestions and then worked closely with us to flesh out Opus 97's tonal design. The draft specification soon exceeded 100 ranks and there was concern that even this might be too much organ for a sanctuary seating 850 people.

There was, however, a method to the madness, and this becomes evident upon studying the stoplist. Consider the Orchestral String division: rare among even the largest of pipe organs, the String division was inspired by Mr. Gearhart's experiences at the Wanamaker organ when he substituted for the late Keith Chapman in the mid-1970s. The String division for St. John the Divine represents a logical tonal development in providing an instrument that stresses variety in color and texture between *pianissimo* and *mezzo-forte*.

Prior to being awarded a contract, we committed to studying several historic instruments to better understand some of the more romantic elements in the specification. While we had previously built some pencil-thin 8' Viole d'Orchestres and matching Celestes, we felt building an entire division largely made up of orchestral-type strings was a learning opportunity not to be missed.

Philadelphia's Wanamaker organ played a pivotal role in Opus 97's evolution. As the largest playing pipe organ in the world, it boasts 88 ranks of strings in one division with tones that range from serene to overpowering. Wanamaker's also has an unparalleled diversity of orchestral reeds and flutes; a profusion of expressive possibilities; and a traditional principal and reed *tutti* that is aristocratic and gripping. In recent years, the Wanamaker organ has undergone a thorough restoration thanks to the instrument's curator, Curt Mangel, his staff of volunteers, and Grand Court Organist Peter Conte. (For more information on the Wanamaker organ, please visit <www.wanamakerorgan.com>.)

Mr. Mangel proved a generous host, offering many practical suggestions for our forthcoming Houston instrument and permitting us to study many unique stops. The legendary 8' Clear Flute in the Ethereal division was one of many we measured and this enabled us to produce a sister stop for St. John the Divine. Mr. Mangel was equally kind in permitting us to return on a second occasion to study various ranks in the String division; this invaluable experience translated into constructing 17 replica ranks for our String division in Houston.

Also in Philadelphia, we visited the 1933 E.M. Skinner organ at Girard College. Bruce Schultz, College Organist and an organbuilder in his own right, gave us a complete tour of this landmark instrument, which in turn provided us with many ideas for Opus 97. For example, Mr. Skinner would probably recognize the mitering technique we used for most of our Pedal Bombarde's 64' and 32' wooden resonators.

We also examined Toronto's 1930 Casavant instrument at Metropolitan United Church, the largest pipe organ in Canada with 8,233 pipes. With the permission of organist and director of music Patricia Wright, we examined many of the well-stocked Orchestral division's reed stops, including the French Horn, the Orchestral Oboe, the Corno di Bassetto, the Tuba Sonora, and the Orchestral Trumpet with flared brass resonators.

Studying these instruments was invaluable in finalizing our tonal ideas, and indeed, the new organ at St. John the Divine pays homage to these instruments from a different era. Nonetheless, it is still a Létourneau and demonstrates our contemporary interest in chorus structures for all tonal families, prompt pipe speech, and clear voicing. Opus 97 makes a strong argument towards proving such a marriage can be rewarding.

Another influence on the organ's tonal design was the unusually shaped chamber housing the Great, Swell, Orchestral String, Solo, Fanfare, and Pedal divisions. Because of its depth and peaked roof, the placement of chests within the main chamber was carefully considered. The Great division sits closest to the congregation where a complete principal chorus—16' Double Diapason through mixtures, with additional mutations—sings without obstruction. With two Great 8' Open Diapasons, the 2nd Diapason and its 4' Principal counterpart—plus the Pedal 8' Violonbass—were placed in the Choir facade opposite the main chamber. This creates a surround-sound effect in the chancel, and the 2nd Diapason and Principal can provide a modest Great when accompanying with the Choir.

The Great division's 32' Contra Violone marks the first time we've provided a 32' stop on a manual and adds depth to the Great while giving rich pitch definition to the Pedal. The first seven pipes are of wood behind the facade; the remainder are of 70% tin and appear in the facade beginning at 32' GGGG.

With five 8' stops, the Great has a wealth of unison tone, including a treble-ascendant 8' Harmonic Flute. The V-rank Cornet is mounted traditionally above the Great chest

and projects a single, lyrical voice that takes on a wonderfully bittersweet dimension with the tremulant. Independent 16', 8', and 4' Tromba stops complete the Great with a crown of warm, cheerful reed tone.

The Pedal division is beside the Great, assuring adequate projection. The larger Pedal stops are made from wood, including the 32' and 16' Subbass, the 64' and 32' Bombarde, the 16' Posaune, and the 16' Open Wood. These pipes are in rows parallel to the sidewalls of the chamber, leaving front-to-back passages for tonal egress. While there are some borrowed stops from the manual divisions, the Pedal itself is fully independent with choruses in all families.

Extensions of 16' pedal reeds to 32' are hardly unusual, but we were asked to provide three additional pipes extending the range of the Bombarde down to 64' AAAAA. A company first, there is much organ and choral literature where the result is welcome, including the Liszt *Ad nos*, toccatas by Gigout, Duruflé, and Vierne—even Parry's "I Was Glad." We also provided a milder 16' Posaune stop with mahogany resonators that has prompted as many compliments for the beauty of its appearance as for its sturdy tone. Both the Posaune and Bombarde ranks are nicely reinforced by the independent 8' Trumpet and 4' Clarion.

Immediately behind the large Great division is the 24-rank Swell voiced on nearly six inches of wind. The deep chamber lends Full Swell registrations a slight sense of distance, an agreeable effect that intensifies as the box is closed. Among the Swell reeds, the two 8' trumpets are markedly different in character, with the Cornopean displaying patrician nobility and the Trompette supplying French verve.

Next to the Swell is the Orchestral String division, winded on ten inches. At 22 ranks, this division offers string tone ranging from silky smooth to razor sharp and is the dynamic equal to Full Swell without reeds. The cutting Viole d'Orchestre chorus—16' and 8' Viole d'Orchestre, 4' Salicet, and the III-rank Choeur des Violes—functions effectively in a general crescendo, providing an early sense of intensity that foreshadows the reeds and mixtures to come. The 8' Viole d'Orchestre and the 8' Muted Violin stops have 1st and 2nd Celeste ranks, with each providing a slightly different effect. Other sonorities include an 8' Dulciana and Unda Maris—the only flat-tuned celeste rank—and a V-rank Harmonia Aetheria mixture comprised of Dulciana pipes. The 8' Vox Aetheria is the organ's softest voice, testing the limits of one's hearing as the box is closed.

Towards the peak of the chamber roof are the Solo and Fanfare divisions. The Fanfare's shades open into the Solo box, and the Solo speaks out over the Great and Pedal. The Solo offers a chorus of buoyant harmonic flutes, plus several orchestral reed colors. The mournful 8' English Horn contrasts well with the vivid 8' Orchestral Oboe. The buttery 16'–8' Clarinet also provides an excellent counterpart to the Choir's classically voiced 8' Cremona.

The Fanfare division provides splendor for festive occasions and benefits from being under double expression. The heart of the division is a chorus of Tubas (16', 8', and 4') in the English manner speaking on 17 inches of wind and providing a distinctive high-energy sound. All three Tuba ranks can be played simultaneously at 8' pitch via the Tuba Chorus III stop, while the hooded 8' Orchestral Trumpet distinguishes itself with a blaze of white-hot sound. Thanks to the availability of high wind pressures and double expression, the smooth 8' French Horn and substantial 8' Clear Flute were also placed in the Fanfare division. From the beginning, our goal had been for the Fanfare division to add a conspicuous intensity to the *tutti* without transforming the overall sonority, and the musical results demonstrate the astuteness of this choice.

Swell division

The Choir division sits opposite the main chamber, and from this location it fulfills its double role. First, it is adept at accompanying singers because of proximity, its expressive capabilities, and variety of modest unison stops. Second, it functions as a Positive division thanks to its shallow chamber. A VII-rank Cornet décomposé and a II-rank Jeu de Clochettes provide colorful textures as needed. The throaty 16' Dulzian stop with solid poplar resonators is another company first.

A diminutive instrument unto itself, the 13-rank Antiphonal organ possesses multiple flutes, keen string tone, a complete principal chorus, and two different trumpet ranks. Being under expression further enhances its functionality and ability to draw sound from the chancel.

On the subject of expression, the organ is equipped throughout with horizontal expression shades measuring 2¼ inches thick—the thickest we've ever built—controlled by 16-stage pneumatic engines. Special attention ensured that the expression boxes were tightly constructed, giving maximum dynamic control.

The completion of Opus 97 marks the conclusion of a bold journey for both Létourneau and the music ministry at St. John the Divine. From preparing the first proposal until the last pipe was voiced and tuned, it has been exceptionally rewarding to simultaneously build on our past work and explore new tonal directions. Like us, our clients are justly proud, and we are confident that organists who wish to experience this instrument firsthand will be warmly received in Houston. We will always be grateful to the Episcopal Church of St. John the Divine for this deeply satisfying opportunity; there can be no doubt that the experience has made us better organbuilders.

Fernand Létourneau
Andrew Forrest
Dudley Oakes

The Episcopal Church of St. John the Divine, Houston, Texas

Orgues Létourneau Limitée, Opus 97 (2006)

GREAT (II)

** indicates 5" wind; otherwise 3 7/8" wind*
22 stops; 32 ranks; 1,914 pipes

32' Contra Violone ..... 61 pipes
16' Double Open Diapason ..... 61 "
16' Bourdon ..... 61 "
8' 1st Open Diapason ..... 61 "
8' 2nd Open Diapason (Choir facade) ..... 61 "
8' Harmonic Flute ..... 61 "
8' Salicional ..... 61 "
8' Bourdon ..... 61 "
5 1/3' Quint ..... 61 "
4' Octave ..... 61 "
4' Principal (Choir facade) ..... 61 "
4' Open Flute ..... 61 "
2 2/3' Octave Quint ..... 61 "
2' Super Octave ..... 61 "
1 3/5' Tierce ..... 61 "
1 1/7' Septième ..... 61 "
V Mixture (15-19-22-26-29) ..... 305 "
III Acuta (29-33-36) ..... 183 "
V Mounted Cornet ..... 245 "
16' Contra Tromba * ..... 61 "
8' Tromba * ..... 66 "
4' Octave Tromba * ..... 78 "
Tremulant
8' Festival Trumpet ..... Antiphonal
8' Tuba ..... Fanfare
Zimbelstern
Chimes (fr. Choir)

CHOIR (I)

enclosed; 3 7/8" wind
18 stops; 22 ranks; 1,347 pipes

16' Gemshorn (ext. of 8') ..... 12 pipes
8' Italian Principal ..... 61 "
8' Chimney Flute ..... 61 "
8' Gemshorn ..... 61 "
8' Gemshorn Celeste (fr. c13) ..... 49 "
4' Principal ..... 61 "
4' Flûte triangulaire ..... 61 "
4' Octave Gemshorn ..... 61 "
2 2/3' Nazard ..... 61 "
2' Octave ..... 61 "
2' Quarte de nazard ..... 61 "
1 3/5' Tierce ..... 61 "
1 1/3' Larigot ..... 61 "
1' Fife ..... 61 "
IV Mixture (22-26-29-33) ..... 244 "
II Jeu de Clochettes (36-38) ..... 122 "
16' Dulzian ..... 61 "
8' Echo Trumpet ..... 66 "
8' Cremona ..... 61 "
Tremulant
8' Clarinet ..... Solo
8' Festival Trumpet ..... Antiphonal
III Tuba Chorus (8') ..... Fanfare
Chimes, Harp and Celesta

SWELL (III)

enclosed; 5 5/8" wind
20 stops; 24 ranks; 1,520 pipes

16' Viola di Gamba (ext. of 8') ..... 12 pipes
16' Stopped Diapason (ext. of 8') ..... 12 "
8' English Diapason ..... 61 "
8' Viola di Gamba ..... 61 "

SWELL (continued)

8' Viola Celeste ..... 61 "
8' Stopped Diapason ..... 61 "
8' Dolce Flute ..... 61 "
8' Flute Celeste (from g8) ..... 54 "
4' Principal ..... 61 "
4' Spire Flute ..... 61 "
4' Viola ..... 61 "
2 2/3' Twelfth ..... 61 "
2' Fifteenth ..... 61 "
2' Flageolet ..... 61 "
1 3/5' Seventeenth ..... 61 "
V Full Mixture (15-19-22-26-29) ..... 305 "
32' Contra Fagotto (ext. of 16') ..... 12 "
16' Fagotto ..... 61 "
8' Trompette ..... 66 "
8' Cornopean ..... 66 "
8' Hautboy ..... 61 "
8' Vox Humana ..... 61 "
4' Clairon ..... 78 "
Tremulant

ORCHESTRAL STRING (IV)

enclosed; 10" wind
15 stops; 21 ranks; 1,342 pipes

16' Viole d'orchestre (ext. of 8') ..... 12 pipes
16' Double Dulciana (ext. of 8') ..... 12 "
8' Violoncello ..... 61 "
8' Viole d'orchestre ..... 61 "
8' 1st Viole Celeste ..... 61 "
8' 2nd Viole Celeste ..... 61 "
8' Dulciana ..... 61 "
8' Unda maris (from c13) ..... 49 "
8' Muted Violin ..... 61 "
8' 1st Muted Violin Celeste ..... 61 "
8' 2nd Muted Violin Celeste ..... 61 "
II Vox Ætheria (8') ..... 122 "
4' Salicet ..... 61 "
4' Salicet Celeste ..... 61 "
4' Sylvestrina ..... 61 "
III Choeur des Violes (10-12-15) ..... 183 "
IV-V Harmonia Ætheria (12-15-19-22) ..... 293 "
Tremulant
8' Clarinet ..... Solo
8' Festival Trumpet ..... Antiphonal
8' Tuba ..... Fanfare
Nachtigale

SOLO (floating)

enclosed, 10" wind
6 stops; 6 ranks; 378 pipes

8' Harmonic Flute ..... 61 "
4' Traverse Flute ..... 61 "
2' Harmonic Piccolo ..... 61 "
16' Bass Clarinet (ext. of 8') ..... 12 "
8' Clarinet ..... 61 "
8' Orchestral Oboe ..... 61 "
8' English Horn ..... 61 "
Tremulant

FANFARE (floating)

enclosed (speaking into Solo division)
** indicates 17" wind; otherwise 15" wind*
6 stops; 6 ranks; 393 pipes

8' Clear Flute * ..... 61 "
8' French Horn ..... 61 "

FANFARE (continued)

16' Contra Tuba * ..... 61 "
8' Orchestral Trumpet ..... 66 "
8' Tuba * ..... 66 "
4' Tuba Clarion * ..... 78 "
III Tuba Chorus (8') ..... derived
Tremulant *(does not affect Tubas)*

ANTIPHONAL (V)

*enclosed; * indicates 8" wind, otherwise 3 7/8" wind*
10 stops; 13 ranks; 803 pipes

16' Bourdon ..... 61 pipes
8' Open Diapason ..... 61 "
8' Chimney Flute ..... 61 "
8' Ethereal Violin ..... 61 "
8' Violin Celeste ..... 61 "
4' Principal ..... 61 "
4' Open Flute ..... 61 "
III-IV Mixture (15-19-22) ..... 232 "
16' Contra Trumpet (ext. of 8') ..... 12 "
8' Trumpet ..... 66 "
8' Festival Trumpet * ..... 66 "
Tremulant
8' Clear Flute ..... Fanfare
8' Tuba ..... Fanfare
Glockenstern
Chimes (fr. Choir)
Harp (fr. Choir)
Celesta (fr. Choir)

PEDAL

5" wind
15 stops; 18 ranks; 603 pipes

64' Gravissima ..... derived
32' Contra Violone ..... Great
32' Subbass (ext. of 16') ..... 12 pipes
16' Open Wood ..... 32 "
16' Principal ..... 32 "
16' Subbass ..... 32 "
16' Violone ..... Great
16' Viola di Gamba ..... Swell
16' Viole d'orchestre ..... String
16' Gemshorn ..... Choir
16' Stopped Diapason ..... Swell
16' Double Dulciana ..... String
10 2/3' Quint ..... 32 "
8' Octave ..... 32 "
8' Violonbass (Choir facade) ..... 32 "
8' Bass Flute ..... 32 "
8' Viola di Gamba ..... Swell
8' Gemshorn ..... Choir
4' Choral Bass ..... 32 "
4' Nachthorn ..... 32 "
2' Open Flute ..... 32 "
IV Mixture (19-22-26-29) ..... 128 "
64' Bombarde Ravalement (ext. of 32') ..... 3 "
32' Contra Bombarde (ext. of 16') ..... 12 "
32' Contra Fagotto ..... Swell
16' Bombarde ..... 32 "
16' Posaune ..... 32 "
16' Fagotto ..... Swell
16' Bass Clarinet ..... Solo

PEDAL (continued)

8’	Trumpet	32 ”
4’	Clarion	32 ”
4’	Clarinet	Solo
	Tremulant	
8’	Festival Trumpet	Antiphonal
16’	Contra Tuba	Fanfare
8’	Tuba	Fanfare
4’	Tuba Clarion	Fanfare

ANTIPHONAL PEDAL

3 7/8” wind
1 stop; 1 rank; 56 pipes

32’	Resultant	12 pipes (at 10 2/3’ pitch)
16’	Subbass	32 ”
16’	Bourdon	Antiphonal
8’	Flute (ext. of 16’)	12 ”
16’	Contra Trumpet	Antiphonal
8’	Trumpet	Antiphonal

TOTALS

113 stops ; 144 ranks ; 8,361 pipes

Tonal Analysis by Rank

Principal tone:	**49**	**34%**
Unisons, Subs, Octaves, Supers	17	12%
Independent Quints, Tierces	7	5%
Mixtures	25	17%
String tone:	**35**	**24%**
Orchestral type	13	9%
Organ type	12	8%
Gemshorn type	3	2%
Dulciana type	7	5%
Flute tone:	**34**	**24%**
Open	15	10%
Stopped	9	6%
Mutations, Cornets	10	7%
Reed tone:	**26**	**18%**
Chorus type	18	12%
Solo or Color type	8	6%
TOTALS:	**144**	**100%**

Mixture Compositions

Great V Mixture:

c1-b12	12 notes	15	19	22	26	29
c13-f#19	7 notes	12	15	19	22	26
g20-f#31	12 notes	8	12	15	19	22
g32-f#43	12 notes	1	8	12	15	19
g44-c61	18 notes	1	5	8	12	15

Great III Acuta:

c1-g#9	9 notes	29	33	36
a10-d#16	7 notes	26	29	33
e17-c#26	10 notes	22	26	29
d27-a34	8 notes	19	22	26
a#35-f42	8 notes	15	19	22
f#43-d#52	10 notes	12	15	19
e54-c61	9 notes	8	12	15

Swell V Full Mixture:

c1-b12	12 notes	15	19	22	26	29
c13-b24	12 notes	12	15	19	22	26
c25-b36	12 notes	8	12	15	19	22
c37-b48	12 notes	8	12	15	15	19
c49-c61	18 notes	1	8	12	15	15

Choir IV Mixture:

c1-f6	6 notes	22	26	29	33
f#7-e17	11 notes	19	22	26	29
f18-e29	12 notes	15	19	22	26
f30-b36	7 notes	12	15	19	22
c37-b48	12 notes	8	12	15	19
c49-c61	13 notes	1	8	12	15

Choir II Jeu de Clochettes:

c1-f#7	7 notes	36	38
g8-c#14	7 notes	31	36
d15-g#21	7 notes	29	31
a22-d#28	7 notes	24	29
e29-a#35	7 notes	22	24
b36-f42	7 notes	17	22
f#43-c49	7 notes	15	17
c#50-c61	12 notes	10	15

Orchestral String III Choeur des Violes:

c1-c49	49 notes	10	12	15
c#50-f54	5 notes	8	10	12
f#55-g#57	3 notes	5	8	10
a58-c61	4 notes	3	5	8

Orchestral String IV-V Harmonia Aetheria:

c1-f#7	7 notes	12	15	19	22	
g8-f#19	12 notes	8	12	15	19	22
g20-f#43	24 notes	1	8	12	15	19
g44-c61	18 notes	1	5	8	12	15

Antiphonal III-IV Mixture:

c1-b12	12 notes	15	19	22	
c13-b36	24 notes	12	15	19	22
c37-b48	12 notes	8	12	15	19
c49-c61	13 notes	1	8	12	15

Couplers

Usual suboctave, unison and octave inter- and intra-manual couplers with Unison Offs, plus Pedal to Great and Pedal to Choir.

Console Accessories

Coupling and capture systems supplied by Solid State Organ Systems of Alexandria, Virginia.

300 levels of memory, each with 90 different general and divisional pistons.

3 adjustable Full Organ pistons (*f*, *ff* and *fff*).

General crescendo pedal with bargraph indicator, with 1 fixed and 3 adjustable 60-stage programs.

Independent registration sequencer with up to 3,000 adjustable sequences.

Total Recall disk-based memory back-up system.

All Swells to Swell, coupling all expression motors to Swell pedal.

Orchestral String Expression to Swell, coupling String expression motor to Swell pedal.

Antiphonal Expression to Solo, Fanfare, String, Swell, Choir or Crescendo pedal.

Transposer (up or down 7 semitones).

MIDI Record and Playback capability.

Pedal Divide, permitting only Pedal stops to play from c^{1} to b^{12} and only coupled manual stops to play from c^{13} to g^{32}.

Master Antiphonal Silent, silencing all pipes located in Antiphonal division.

Pedal on Great Pistons coupler; Pedal on Swell Pistons coupler; and Antiphonal Pedal on Antiphonal Pistons coupler.