



Church Organs of Colorado

*Rodgers Digital & Pipe-Combination
Instruments Sales and Service*

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Organ Planning and Placement Guide

ORGAN PLACEMENT GUIDELINES

- An organ consists of three major components.
 - The organ console which the organist uses to control the instrument. It usually consists of multiple manual keyboards, a pedalboard and various controls to select and control the desired sounds.
 - The sound producing components. In the case of a pipe organ, the sound producing components are the pipes sitting on wind chests that actually make the sound. In the case of a digital organ, the sound producing components are the speakers.
 - The support components. In the case of a pipe organ, this would be things like blowers, reservoirs, rectifiers, driver boards and cabling systems. In the case of a digital instrument, this would be the amplifiers and cabling systems.
- It is best to place the organ console in a location that accomplishes the following.
 - The organist can hear the organ as the congregation hears the organ. Too often the organ console is placed in a way that the organist has no idea of how loud or soft he/she is playing from the congregation perspective nor can the organist determine the balance between the various divisions of the organ as heard by the congregation.
 - The organist can comfortably see the choir director, the choir and the worship leaders.
 - The console can be moved to be visible by the congregation for special concerts or performances.
 - The front and back of the console is assessable for service purposes.
- It is best to place the sound producing elements (the speakers) of a digital instrument in a room as you would the place the pipes of a pipe organ that it is attempting to imitate. (Rodgers uses “parallel digital” or stereo imaging to image the sound of organ pipes as they were originally sampled from real pipe organs.)
 - Pipe organs require a certain amount of space for the pipes: height, width and depth. With the digital counterpart, height and width are critical to proper imaging of the original pipe sound. Depth is helpful to allow the sound to develop as the sound of a pipe organ would before projecting into a room but is often sacrificed for economic reasons.
 - A pipe organ consists of divisions (Swell, Great, Choir, Pedal, etc.) that are groups of pipes located together in specific locations. We call these divisions. These typically correspond to the various keyboards on the organ console. With the digital counterpart, audio dedicated to the reproduction of each division should be placed as one would expect the pipes to be placed for each division.
 - The organ (pipe, digital or combination) is much like an orchestra. While it provides a wide variety of “musical instruments” (its voices) to produce sound, it is best to locate them together as a group except for special effects. For example, one would not place the violins of an orchestra clear across a room away from the cellos with a major hole in the middle. This would create a fragmented sound, not the sound of an orchestra. Further, it would be difficult for the players to play together in a unified manner. At the same time, placing the trumpets in the back of the room for special effects can add excitement to a performance. We want the organ to sound as one instrument or an orchestra.

- The organ console and sound producing elements are best placed in the same room with the listeners. The sound producing elements should speak directly into the space occupied by the listeners and preferably down the long axis of the room if there is one.
- The organ should be placed near the choir or other musical performers. Generally the organist and other musical performers should hear the sound of the organ as the sound travels from the organ on its way to the congregation.
- The sound of the organ should not be placed too high or too low. If too high, the sound becomes diffused for leading congregational singing. If too low, it becomes too loud and too harsh for individuals located near the sound source. The rule of thumb is about two thirds the way up the wall (or walls) from which the organ projects.
- It is best to place all of the support components of the organ in places that are easily assessable for service.

MECHANICAL CONSIDERATIONS FOR DIGITAL ORGANS

- For a digital instrument, standard 110 VAC power outlets are generally required at the following locations.
 - At the console.
 - At all amplifier locations.
- It is generally preferred for an all-digital instrument that all power outlets are controlled by a single circuit breaker. A single 20 amp circuit is adequate. Some larger installations may require more circuits. In this case, we generally ask that all power sources come from the same electrical phase and that breakers for the organ be located near one another in the breaker panel.
- Amplifiers should be located in service assessable locations as close to the speakers they drive as reasonable possible.
 - Typically there is an amplifier cluster for the main organ that drives all the speakers in the front of the worship space.
 - Often there is an amplifier cluster for the antiphonal or room modeling speakers located in the rear of the worship space.
- Conduits (or provisions for cable runs) should be provided for all cable runs between the console, amplifier and speakers locations. Technology changes. We assume that the church building could be in place for over a hundred years. Even the support systems for pipe organs are upgraded more often than this. Recommended conduit sizes for an all digital instrument are as follows. If the digital organ console is to also drive pipe work, the sizes should be expanded one half of an inch between the console and the location of the pipe controller.
 - Between the console and the amplifier cluster - 1 inch to 1.5 inches depending on the number of channels.
 - Between the amplifier cluster and the speaker locations depends on the locations and the numbers of speakers. We recommend a minimum 14 gage wiring between the amplifier and the speaker it serves. Expect 0.3" diameter per speaker cable run.
 - Use solid aluminum conduit. We have found flexible plastic conduit to be problematic on even short cable runs and often have to find an alternative because we are unable to complete a run.

ACOUSTICAL CONSIDERATIONS

- The grand sound that most people associate with a magnificent organ evolved in the highly reverberant worship spaces in Europe. We enjoy some of those spaces in the United States but they are very infrequent here. In the case of an organ, reverberate space is as much a part of the sound as the sound source itself. In contrast, today's worship in America typically seeks a balance. We want to hear the spoken word clearly. We want to understand the words as they are sung by soloists or choruses. We want our congregations to participate with responsive readings and song. Most

- importantly we regard worship as a participative activity by all present, not a performance by a few. Hence we believe that acoustical considerations should focus on participation, not performance.
- Today's Rodgers digital organs can electronically make up for lack of proper room acoustics for the organ. However, the choir, congregation and a real pipe organ are at the mercy of the acoustical space. If a church would like the congregation to participate and sing, an acoustical environment that encourages participation and singing should be considered. A sound space that absorbs sound causes individuals to be more reticent in making their joyful noise because they can only hear themselves. A space that reflects sound causes individuals to better hear the sounds of others, hence to be less conscious of their own voice as they participate. Sound reflections themselves contribute to the quality of sound by covering up imperfections in the raw sound source. Think of someone singing in the shower. This brings us to the sound of the choir, soloists, organ and other instruments.
 - If a church would like the choir to sound at its best, again the acoustical environment should be considered. The best sounding choirs in the world are in environments that require no amplification. In fact concert halls require sound to properly project into a large space without any amplification at all. If the church is considering a pipe organ, a pipe organ is best served by an acoustically live and responsive room. A live room naturally reinforces the sound source in many ways.
 - The sound comes at the listener from all around creating warmth.
 - As mentioned above, reverberation covers many imperfections of the sound source. The microphone, amplifier and speaker amplify every imperfection. Most of our choirs and soloists are made up of volunteers that are not perfect.
 - Finally and most importantly when sound absorbing materials are used, any sound that is intended to reach all participants must be louder at its source to make up for the absorption and lack of even reflection around the space. Hence, choirs, soloists or other instrumentalists must either sing or play louder or be amplified artificially. In such an environment, the organ has to be voiced louder. In the case of the organ, any one close to the sound source for the organ is bombarded with sound as we attempt to provide an adequate level of sound to support congregational singing. This situation is very undesirable for those near the organ sound source.
 - We find that generally the amount of money spent on sound-absorbing materials is directly proportional the amount of money that is spent for the sound system to make up for them. If a room naturally reflects sounds, the role of a sound system in a worship space will be to provide articulation for speech, choirs or soloists (if used), not raw power for amplification. Some sound consultants prefer sound spaces that approach the acoustics of a recording studio with no uncontrolled sound in the space. We do not believe this is the appropriate sound space for participation in worship. It is possible to design a room that reflects sound without undesirable "echo slap" or excessive reverberation for participative worship.
 - Finally, some architectural designs for worship spaces create problems for acoustics and/or the organ.
 - Those that inadvertently create separate acoustic spaces as in the case of varying ceiling heights as when a balcony projects into the room above congregational seating area or a "tall story" runs down the center of the space for dramatic effect with lower ceilings to either side above the congregation.
 - Those that have low ceilings above the choir leaving no wall space to properly place the sound source for an organ as mentioned above.
 - Those that simply do not provide sufficient wall space behind the choir to properly image the sound that would be made by a real pipe organ designed for the space. Today's challenge in worship space design often comes to balancing the need for proper placement of the organ sound sources versus the need to place projection screens. Obviously, both requirements must be considered from the outset.

APPEARANCES

The sight of real organ pipes can add beauty to a worship space in much the same way as stain glass windows. We have done installations that combine real pipes with digital sounds. This is considerably less expensive than doing the entire organ in real pipes. We have also done installations with all digital instruments that are encased in wooden cases with pipe façades. You can visit our web site at www.churchorgansofcolorado.com to see pictures. The pipes are real organ pipes but are simply not winded for tone production. Not only is the visual impact stunning but the affect on listeners is such that when they see real pipes they think that they are listening to real pipes. This approach is not inexpensive but is significantly less expensive than installing and maintaining real winded pipes. In any case, we prefer to install digital instruments in a way that the speakers are not seen while accomplishing all of the objectives in the above sections.

SIZING THE ORGAN TO THE SPACE

Obviously the size of the organ affects the cost and the cost affects the size of the organ. In organ specification terms size is basically a function of how many keyboards does the organ console have, how many stops or voices the organ has and how many actual tone producing elements are included. The minimum number of keyboards for most churches is two and is serviceable for most service music. The most popular number of keyboards at this point in time is three because most organists find that the additional keyboard provides significantly more flexibility. Rodgers makes instruments with up the five keyboards with four becoming more popular.

The number of voices determines the available variety of sounds (like in an orchestra) available to the organist as well as the overall fullness of sound when all are selected. Organists and congregations alike enjoy variety. Festive occasions like Christmas, Easter and Weddings are enhanced by the sound of a massive instrument. It is important that the instrument be sized to the room both in terms of the stop list (available voices) and sound producing elements. An instrument with too few voices or not enough sound producing elements (i.e. speakers and amplifiers in the case of a digital organ) can sound weak in a large space. An instrument that provides too much may not be financially justifiable for a particular project.

FINAL THOUGHTS

Installing an organ (pipe, digital or a combination) is more involved than moving in a piano. Space needs to be allocated for the console but space and proper placement of the actual sound producing elements also needs to be planned to assure the best possible sound. Worship space layout can be materially affected by organ placement considerations. Hence it is important that, to the extent plans are to have an organ in the worship space, it be given due consideration in the early worship space planning steps and people knowledgeable in organ design and installation be consulted as plans are formulated. We have seen too many cases where the church wanted an organ from the outset but construction was started before building accommodations were given due consideration. The result is usually change orders during the construction process (which are usually expensive) to accommodate the instrument and less than optimal placement.

Church Organs of Colorado provides no charge consultative services to assist a church planning to incorporate an organ into their new or remodeled building design. We use the software program AutoCAD to be compatible with architects. We can exchange files with architects during the design process over the Internet to save time and provide accurate input for equipment placement. As such, everyone can accurately see what the results will be before making final commitments.