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Articulateness and the Organ: A problem for the Organ Builder

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"SOMEDAY People Will realize that the organ is a keyboard instrument and not just a big vat of sound." These words were from 1954. They were spoken by Walter Holtkamp, Senior, a man who labored hard to make them come true.

Most of what I have learned about organs has come from working on organs or from observing organs. But I have had two principal teachers. The first was *John Swinford* of Redwood City, California. He taught me about organ tone. The second was *Walter Holtkamp,* Sr. He taught me that an organ should be articulate above everything else. And he did a fair job of teaching this lesson to the country as a whole. Articulateness is something American organ builders now understand and even achieve, whenever architecture permits. As for good tone ... well, I think America has forgotten more than it has learned about tone. Sometimes I think both America and Europe have sacrificed good tone to achieve articulateness. Anyone who knows the best of the old organs knows that that sacrifice was not necessary-one can have both.

But when we talk about *articulateness* in America, we are talking about a kind of success story, a *partial* success story, at any rate. Now, what do I mean by articulateness? Well, any small instrument heard close to is articulate. Think of a music box or a clavichord. If everyone is very quiet, it is possible, by listening carefully, to hear every stroke, every vibration, every tiny clunk, thud or whir in the mechanism. This is the very definition of articulateness: to be able to hear and comprehend every sound, every utterance made by the source. Articulateness depends more on the careful handling of high frequencies than of low frequencies. It implies a kind of "close miking"-the familiar result of hanging the microphone so close that the listener imagines he is almost inside the source.

My use of the microphone analogy is premeditated. For, is it only coincidence that our generation's passion for clarity in musical performance parallels the. coming of the radio and the phonograph? I think not. It was the close miking of the nineteen-thirties that first put articulate musical performance within reach of all ears. Notice, too, this was the era of jazz and swing on radio and phonograph. Consider how the swing arrangements of the thirties, recorded in the driest acoustics, depended for their effect on the precise electro-acoustical renderings of snare drum rim shots, of syncopated squirts of sound from the large-bore, fast speaking trumpets and saxes employed by the jazz men. Indeed, consider just how much the *saxophone* owes to the radio and phonograph. You may say it sounds like an unwell cow and be right, but the saxophone boasts a *wieldiness,* an articulateness, that is uncanny. It can *move.* And its ability to move is most clearly manifest in a close-miked recording in which the listener, in effect, sits right alongside the performer, sways with the music, and cherishes every golden grunt of that glittering, colon-shaped cornucopia.

Now the organ is a very different kind of an instrument from the saxophone. Some have argued that the organ is *at bottom* an inarticulate musical instrument. What other instrument employs a separate oscillator (i.e., pipe) for every note and for every timbre it produces? (And many of the pipes are larger than the largest saxophone--why, a single pipe can weigh a thousand pounds and more!) The organ's entire effect is based on an almost cancerous proliferation of oscillators, tens of thousands of them. A nightmare I sometimes have involves trying to find my way out of a castle. There are doors leading everywhere. Each time I open a door I peer in on yet *another* room full of windchests with mean looking organ pipes standing on them. Dreams like this have far too much basis in fact, in the haunted houses and churches of 20th-century America.

How can such a multi-chambered instrument-such a *dinosaur* of an instrument-gather itself together for a concerted musical lunge at anything? How can such an organ *organize* itself, mobilize itself for concerted action? By what irony of semantics comes so disorganized an instrument to be known as an *Organ?* Should it not be called a *Dis-organ?*

Many a Disorgan has been built within the present century, as we all know, and it was this particular prehistoric beast that Walter Holtkamp rode out to slay some forty years ago.

Let us now look at organ history. Most of the earliest organs would have been articulate simply because they were small. Some surely had the

quality of a music box. But the churches were large, and with the Reformation came congregational singing for which large organs were needed. The organ builders of those days included many brilliant and gifted men. By the end of the 16th century these men had in effect *created* the large organ as we know it today. What is truly remarkable, they devised ways of making an organ of sixty stops articulate, as well as beautiful of tone. Furthermore, *nothing* contributed after the 16th century made any improvement whatever in the articulate quality of the organ as an instrument . . . In what follows, therefore, I would like to give my interpretation of the methods these wise men chose to achieve articulateness in the organ. I will dwell less on those methods which are commonly understood today, more on those which are not.

We all know about "Chiff". It is the little incise or transient that an organ pipe gives out naturally when it begins its tone. The basic Principal organ pipe “chiffs" if its windway is lightly nicked or not nicked at all. More and more nicking diminishes the chiff until finally it becomes inaudible. The chiff sounds like "KAA. . . " and sometimes "CHAA. . ." or even "SHAA. . . ." With too little wind it takes on a tubercular quality, a kind of cough. In E. Power Biggs's words, the chiff is the consonant that precedes the vowel. Using his metaphor it is easy to show that the chiff, or something like it, is essential to articulateness--for: Who ever heard of articulation without consonants? Some form of chiff was present in all the early organs.

I now wish to introduce what I believe to be a new viewpoint. Always we have thought of an organ pipe simply as a device for making musical tone, an end in itself. Always we have thought of all other parts of the organ as simply being there to serve the pipe. What if we now turn around and consider the pipe the servant of what lies beneath it? What if we now say that a vital function of the organ pipe is that of sensing and converting into audible pulses the air pulses that enter its toe hole? In other words, we are going to think of the organ pipe as a *transducer* of *air* pulses into *sound* pulses. For those who understand the principles of radio, we are thinking of the organ pipe as providing a carrier wave which will be modulated by whatever air pulses may enter the toe hole.

Suppose I blow an organ pipe by mouth and I tongue it, like a trumpeter: "Ta, ta, ta." An ideal principal pipe tongued in this fashion will somehow tell us that it is being tongued using an initial "T". I can next blow the same pipe using the letter "K": "Ka, ka, ka". The ideal pipe will now begin its note in a slightly different way, somehow letting us know that the letter "K" was involved in initiating the pulse of air instead of the letter "T".

In a similar way the ideal pipe can tell us how an air pulse *terminates*. The pulse "TAAAT" sounds different from the pulse "KAAAK". (Also we can tell the difference between "TAAAK" and "KAAAT".) From this we see that the ideal pipe can give us all sorts of information about the way pulses of air coming through the toe hole begin and terminate.

We have talked about the beginning and ending of the tone. What about the part in the middle; what can the pipe tell us? Well, we know, for example, that the regular air pulses produced by the tremulant are "recorded" by the pipe in the form of alternating surgings and ebbings of pitch, volume and harmonic output-a wave motion which, at its worst, can make us slightly seasick! Much more important, actually, is the pipe's habit of recording--i.e., transducing--*irregular* surges of air coming into its foot, because in these surges is contained the information by *which the ear perceives clusters of pipes as unities,* and this is of course crucial for the articulateness we seek.

Those of you who know about the voicing of organ pipes will have been put on edge by my use of the term "ideal principal pipe" in the above. By this I mean *a classically voiced pipe,* but this implies a good deal more than just that there be a few nicks in the windway. John Swinford used to say, "A pipe always sounds best when it is a little underblown." All the classical organ builders knew this, yet it is a fact largely disregarded by the present day proponents of the neo-baroque in organ building. Let me try to explain what I mean by underblowing: If you first agree that the windway must be kept open (almost the width of the material of the lower lip) and that there will be enough nicking or “antiquing" of the languid edge to rid us of the unpleasant sizzle that the open windway otherwise causes, then classical voicing becomes a matter of balancing the toe hole opening and the cutup (i.e., the height of the mouth opening). If we choose a wide open toe hole, then underblowing will be achieved if we raise the cutup *just beyond* the point at which the pipe appears to be giving out its maximum volume of sound. Thus the classically voiced organ pipe is one in which the cutup is "a little too high." With the cutup on the high side, the tone becomes fuller and gentler; more important, the pipe is not quite as stable as it would be with a lower cutup, and this makes it *much* more easily influenced by pulses or irregularities in the flow of air coming through its toe hole.

Let me indulge in an analogy that will be close to the heart of all church musicians. The ideal pipe-this classically voiced pipe-can be likened to an ideal member of a chorus of *human* voices. Obviously it is no *prima donna*. Nor is it your average solo coloratura, hired to drown out the volunteer voices in the village choir. Rather, it is a somewhat *insecure* voice that

looks to the other voices around it for substantiation in both pitch and diction. It is a bit of a white-toned voice, too, one that blends very well. And, to carry the analogy one step further, the ideal pipe *watches the conductor like a hawk,* since in my analogy the conductor is the pallet valve, controlling the wind to all pipes of a given note.

So far I have talked about a single pipe. What about its relationship to other pipes?

For more than a thousand years (discounting the first half of this century) it has been customary to connect each key of the keyboard, via sticks and wires known as trackers, to a *single valve.* For discussion, let us choose a note, say treble C--the C above middle C. Like all others, treble C's pallet valve is normally shut, and thus holds back the ever ready chest air from flowing into the treble C *note channel.* The note channel is a kind of corridor connecting the pallet valve hole to toe holes of all treble C pipes, of which there might be 30 or 40 in a large organ.

When we depress treble C's key, the treble C pallet valve opens and air surges into the treble C note channel. Immediately air starts into the treble C pipes, and they commence to sound. After some initial bobbing about, the pressure in the note channel stabilizes,at virtually the same pressure as is in the wind chest, and remains so as long as we hold the key down. When we release the key the pallet shuts vigorously, residual compressed air drains out through the pipes, and all treble C pipes become mute until their services are required again.

Picture a cluster of 30 or 40 ideal treble C pipes, each pipe highly sensitive to the pressure fluctuations beneath it, all standing over a common note channel, waiting quietly for the wind. The finger presses, the pallet begins to open; all pipes now execute their chiffs in unison. The note channel pressure rises jaggedly up to and momentarily past its stable value; the combined wails from all pipes also rise jaggedly up to and past their stable values, in unison, like a Greek chorus (only more perfect). The pressure now settles back down to its stable value, and the pipes descend to the pitch/volume/timbre that they give out in their "normal" valve-open sounding position. While they are still sounding, there occur fluctuations in the chest pressure, caused by other musical happenings deep inside the organ; these fluctuations are "recorded" by all pipes of our cluster simultaneously as variations in the pitch/volume/timbre of the note they are sounding. Now, finally, the valve begins to shut. As the valve nears its closed position, the air rushing through it drives it shut with a slam, just like a slamming door. This final slamming of the valve drives a final pulse

of air through the pipes that momentarily raises the note-channel pressure above anything heretofore experienced, and our cluster records that fact with the highest values of pitch/volume/timbre yet experienced. Immediately thereafter the pressure in the note channel falls away rapidly and the wail of the cluster subsides into silence.

Can you now see how singularly important to the articulateness of the classical organ are the single pallet and the single note channel? For, whatever the form of the pressure fluctuations in the treble C note channel, all treble C pipes give out the same message about these fluctuations, and this fact tricks the human ear into regarding them as the work of but one voice. It is as if the choir director in our previous analogy could, with only his fingers, control the flow of air through the larynxes of all his sopranos simultaneously! Imagine how precisely his sopranos would attack, release, crescendo and diminuendo if the director possessed such a power! He would have the most articulate choir in Christendom.

We have discussed the single note, or pipe-cluster, treble C and how it can become a unity, capable of the articulateness of a single voice. What now of its relationship to other notes, other pipe clusters?

Imagine we are sustaining our old friend, the soprano note treble C, and, simultaneously, the alto note, *middle C*. Now let the alto voice move stepwise upward to middle D (all the while we are sustaining treble C). What change do we observe in the soprano note while the alto is in process of moving?

In the classical organ the slamming of the middle C valve causes a surge in the chest pressure. This is followed immediately by a drop in chest pressure due to the opening of the middle D valve. These two pulses, the first positive, the second negative, are minutely transduced into sound pulses by the continuously sounding treble C cluster. Thus, treble C, by not remaining absolutely constant in pitch/volume/timbre, is making a little announcement that there occurred a movement in another voice. In the contrapuntal music written for the classical organ this type of *little announcement* represents an enormous clarification for the ear. In a six voice fugue, if one voice moves while the other five sustain, there will be five simultaneous little announcements from the five sustaining voices "pointing to" the motion of the moving voice. Under these circumstances the listener is able to keep track of the motion of inner parts, even with all stops drawn and even with reverberant acoustics.

The classical organ builders made these little announcements possible by

designing wind systems which were susceptible to slight fluctuations of pressure whenever the demand for air changed. The average value of the pressure was always constant, however. For modern organ building this subject, known as Flexible Winding, is still a controversial one, because it is so natural to assume that the air pressure in an organ must always be imperturbably constant, even though in fact it never is.

I hope it is clear from all of the foregoing that enormous importance attaches to the design of the "chassis" of the organ, if clarity is to be achieved. I feel that not nearly enough attention has been paid to the problems of the bellows, the dimensions of wind ducts, of pallet boxes, of note-channels-the whole air system that represents the matrix for the pipes. In a real sense, every organ is "cushioned on air." How does that cushion work? What nobility (or the opposite) does it impart to the music? What serenity (or the opposite)? What zest for life (or the opposite)? The interesting thing is that the pipes are telling us, during every moment the organ is playing, about this wind matrix they draw their unity from; yet we tend not to notice, and indeed, we are forever praising or blaming the pipes, action, case, placement, acoustics for properties of the organ which derive mainly from the character of the wind matrix. We see this matrix through a veil, darkly. We will never see it clearly. But we can at least recognize its existence and pay it some measure of the respect it is owed.