DUO-ART VOICING

Note to John: the Ariel font is 11 pt. And Times Roman is 12 pt. One is dark brown, the other dark blue.

It should go without saying that all players, Duo-Arts included, should be voiced well and voiced the same. And it should stand to reason that the playing mechanism should never interfere with the tone or action of the piano it's in. But there are "experts" today who insist that your "correctly voiced" Duo-Art should be voiced progressively softer in the treble. Just the opposite of the way most musicians like their pianos.

They will never tell you **why** they believe this. Only that *it has to be this way* for the Duo-Art mechanism to be optimized so that it might play its music well, and the old dodge-- *"any real expert rebuilder knows this to be a fact.*" In other words, they are actually faulting this reproducer, saying that Duo-Art doesn't sound natural until you voice the piano in such a way as to make up for its limitations.

Reminds me of the golfer who, after a bad round, returns to the pro shop and discusses the "design flaws" of his new clubs with the manager. The manager, being a wise sort, listens intently, knowing that on his best day, this guy shoots in the upper 90's, as was expecting 20 strokes off his game with these new clubs. So he suggests to the customer, "*I have just what you need. Since eye-shoulder-wrist coordination is so crucial, and since it all begins with the eye, you need just a bit of a shank target for the eye to glance to. It makes all the difference.*" So on the driver shank he places a band and on the putter shank he does the same. "*Slide these up or down until you have fine-tuned them precisely for your own twist and swing. It may not seem like much, but it trains your entire body to hit the ball the same way each time.*"

So the man went away happy, knowing that he bought the right clubs all along, from the right man all along, and it was just a matter of properly interpreting the weight, balance, and signals he was getting from his new clubs and fine-tuning this "interpretive arrangement" as he swung them at the ball. Never would he suspect that the real problem was the programming.

If you don't want the technical explanation, page down to the SIMPLE EXPLANATION at the bottom of this article. Otherwise, stay plugged in and I think I can take you through it clearly.

Now first, before I give you the technical answer, allow me to explain two characteristics about the Duo-Art. Then I will draw these facts together and you will see just how expert some claimants really are.

The characteristic of a Duo-Art which promotes this erroneous voicing belief is a mechanical fact of life that every arranger of Duo-Art music has to abide by. That is, an intensity scale which is dependent not only on one of the 15 step combinations available, but also on how many notes are in transit (not necessarily playing down) at any given time. This is because the Duo-Art mechanism doesn't regulate itself at all. All regulation must be accomplished from the

roll. The so-called “regulators” do one thing-- they reference the zero intensity in relation to the accordion settings. That is why the knife valve does not hinge on a fixed pivot, but floats on a moveable hook connected to the very end of the “regulator.” **Keep this in mind.** It is one of the basics that a few self-professed “experts” never considered to be much more than black magic. So while the accordions are trying to open up the leaf valve to let more air pass, the spring regulators are trying to close it off. Since the lever ratio in that arrangement is 3 to 1, the regulator cannot actually keep the pressure constant, but it does one thing-- positions the lever very close to the zero intensity setting. That way, the instant the accordions relax, the player will be back at zero. It doesn’t have to make a transition from a high intensity back to a low intensity.

The second characteristic of many Duo-Arts (but not all, and certainly not the latest models in the latter 20's) is a little-understood mechanical fact of pneumatic graduation. That means, the bass pneumatics were larger than the treble ones. In most, there were 3 graduations, but in earlier Webers and Steinways, there were 4 different sizes.

Regardless of the number of different sized pneumatics, the difference between the volume of the largest versus the smallest (treble) was 20%. The reason for the different sizes, we are told, is because bass strings are so much larger and their hammers also must be larger and heavier, so they require more power in the strike to actuate. It is a “voicing” consideration. A fine detail that Aeolian knew all about and so adjusted their instrument accordingly. Well, that is true, but not for the reason given. Just the opposite, actually.

In a very old reprint that I was fortunate enough to read many years ago, Aeolian engineers were discussing this technical question. Sorry I don’t have it anymore, but I won’t forget the answer, and I can corroborate it with physics. It turns out that the sounds from the large, heavy bass strings seem to be louder than an equal strike in the treble. This is a characteristic of all pianos regardless of the way the piano action has been designed to compensate for it. The reason is that bass strings vibrate at full power longer because of a constant known to engineers as “elasticity.” Elasticity is the ability of a string to bend and stretch without resistance (*Air has an elastic constant of 1 because it exhibits no resistance. Wire’s constant is very high because it is very stiff*). So short strings are much more effected by stiffness than long strings are.

Since the human ear is such a good “integrator” of loudness, it is more effected by VOLUME. The audio control on a radio was called a volume control instead of a loudness control because engineers knew this decades earlier! Volume is a product of both loudness and decay time of the tone. Bass strings, being much heavier are also much greater in volume, as well. The purpose of building the bass pneumatics larger was to partly compensate for this natural resonance (which is only noticed at very low intensities, anyway) by making the pneumatics larger. The larger the bellows, the slower in comparison is its closure or actuation. 20% slower by actual count, because given the same valve throughout the piano, the optimum valve travel for speed of response and travel losses in each case must be the same. So through this identical restriction for each note in the piano, the air cannot evacuate a large pneumatic as quickly as a small one! The result is that the larger pneumatics closed a bit slower than the small ones did for the same pressure.

[*The reason the size graduation isn’t important for loudness over an intensity of 3 or 4 is because the ear can’t hear those differences, and the piano starts to flatten anyway. It’s dynamic*

range begins as a very slight curve to strike impulse whose slope decreases as it rises anyway.]

These are the two factors-- the loss of useable intensity graduations when many notes are played at once, and pneumatic graduations from bass to treble. It would seem obvious that if larger pneumatics were required to make the bass louder, that we might help everything along by voicing the treble softer. And it might seem obvious that when we have enough power to play the perfect rendition of 4 Crazy Ottos simultaneously expressing themselves in a delicate arrangement (the atypical 8 hand arrangement), that the treble is just going to be too loud in comparison to hear all the wonderful expression of the other three Crazy Ottos in the tenor, baritone, and bass sections!

We are then reinforced in our belief that this is the case when, during the course of this sensitive and artistic 8 hand Duo-Art arrangement we notice that when all these notes are in transit at one time, we have to keep scaling the arrangement up to compensate, intensity-wise. Finally, we reach a point where we must switch to theme perfs although we are not normally requiring an accent. I call that effect, "Gassing out." You just ran out of gas, that's all. So the next step in this artistic arrangement, after every note which can be staggered has already been done, and every intensity change has been compensated for and you still need an accent in the tenor or counter-melody then what are you going to do? As soon as you bump it up with the theme perforation, you over-accentuate the treble which is taking a counter melody itself and will be too loud.

"*There is only one thing left to do. The problem isn't the arranger or the arrangement, and it isn't the Duo-Art. It must be the piano! Duo-Art pianos should be voiced softer than other pianos so that they will sound right. They just don't have as much expression when the treble is bright.*"

I think you can see now that this is not only wrong, but why it is wrong. It partly stems from the wrong premise that "*Larger pneumatics in the bass were there to aid the bass notes to play more loudly, but revoicing the piano would be a better solution*." The other reinforcing belief is that since Duo-Arts must be regulated in evenness from the roll coding, and since theme perfs in complex arrangements affect the treble more than the bass because there are always more notes being played in the treble than in the bass, the solution must be to revoice the piano softer in the treble."

Technically, there are only so many notes that you can expect to play at one time on ANY piano and come up with a sensitive arrangement! After that, your piano just runs out of gas. So you have to do what anybody would do to accentuate a counter-melody tenor note-- keep the theme on and accentuate with the theme accordions everything in the treble. Suddenly, you don't like it anymore. It doesn't sound like what you had in mind, even when you cut the high treble down to one or two notes. Could it be the piano? Of course not. It's the arrangement. You might say, "It's not taking into account the fact that 4 pianists cannot artistically play on the same piano even with one hand tied behind their backs."

THE SIMPLE EXPLANATION

The day that any world-reknown artist would be asked what he thought of the Reproducing Piano after having just played it himself is the day that he would either be able to report that it plays

well-- like any other good instrument. Or, would have to say, “They have changed its tone to suit the mechanism’s failings, apparently. They may sound good enough to the uneducated ear or the tin-ear, but never to a trained musician. Nobody wants to play on a piano that’s mushy in the treble, just to compensate the machinery. I cannot recommend them for use in conservatories when students would be forced to practice on them.”

So much for the nonsense of down-voicing the treble of your Duo-Art player or any reproducer, for that matter, to compensate for whatever the arrangement or player mechanism could not provide. Either the mechanism is a true Reproducing Mechanism, or it isn’t. Either it was designed to do anything a single artist-- or for that matter a duet-- could accomplish on that piano, or it wasn’t. But when you imagine yourself able to “reproduce” the sounds of the machine age running in cacophony or 3 or more artists playing at the same time with both hands blazing-- well, that’s a little much for me. While it’s true that the Original Piano Trio and the First Piano Quartet had some transcriptive arrangements scaled for a single piano, the operative word here is “scaled.” Otherwise, the operative word would be “dumb.”

When seeking new and fresh arrangements for your Duo-Art, remember this: they are out there. But some arrangers can make the piece sound so lifelike that it’s almost an out-of-body experience, while others may stick to novelty numbers that nobody can criticize. It’s up to you, which you would like and which wear the best, decade after decade. Player rolls are a very enduring type of medium and the arranger’s ability stands out for all to hear. Remember-- good arrangements and good music lasts through all generations. It’s why our advertising today is comprised mainly of all the old standards and their variations. Good music sells itself.

Craig Brougher