

# Notes on Piano Study No.5 for JPR

by Larry Polansky

When I first became convinced that I could choose the intonation I needed for a given piece, at least in an ideal sense, and that in fact not to choose was an act of negligence on my part (to paraphrase Kenneth Gaburo: what else do you have to do but really finish the work?), I began to look around for instruments that might be easily tuned. Coincidentally, at that same time, the trumpet player and composer Jon Hassell was "in residence" just down the hall from me at the York University Electronic Music Studios (where I was doing some research with James Tenney), and we got the idea to try to tune an electronic keyboard instrument to accompany his rather extraordinary trumpet playing, which was strongly influenced by studies of Indian singing styles. Jon had developed techniques of lipping and fingering the horn so that he could very accurately play Indian rags in an intonational system that had little to do with twelve-tone equal temperament, and one of my goals was to try to isolate significant intonational ideas in his playing to use in the keyboard tuning.

After some experimentation, it seemed clear to me that one of the easiest ways to formulate an intonational schema for Jon Hassell's playing was to examine the half-steps "resolving" down to primary tones in his improvisations. Although that was only one small facet of the way he structured his melodic invention, to my ears it seemed to be both important and more easily definable than others. Also, many of the intervals he used in this manner were clearly just, or very close approximations to several of the "canonical" just half-steps (like 21/20, 33/32, and so on). Using this as a starting point, along with the ideas that pure fifths and thirds were preferable, and that the keyboard did not have to use an octave replicating intonation (that is, each octave had a different tuning), I began a series of tuning experiments with Jon. The choice of which keyboard to use was purely practical. At that time (in the mid-70's), there weren't many electronic keyboards that lent themselves to the retuning of individual keys, sometimes by more than 50 cents. We finally settled on the Fender Rhodes, which was relatively

simple to tune--by moving a small spring up and down a tine--and also had a simple and rather natural-sounding timbre. This piano and tuning was used in a series of studio tapes that Hassell did at York, in collaboration with musicians including David Rosenboom, William Winant, Andy Jerrison and others, but these tapes have not, to my knowledge, been released commercially. However, Hassell's first record for Lovely Music, titled Vernal Equinox also partially emerged from those sessions, and one can hear the tuning on that record as well.

"Piano Study #5 (for JPR)" was a direct result of those early experiments, and the tuning is quite similar, though with certain important changes. One of my intentions at the time I wrote the piece was to create a musical structure which was in large part determined by the intonational system used. Thus, tuning and form are not only related, they are much the same. In the piano study, the various possibilities of higher and higher prime tonalities (ratios based on 2, 3, 5, 7, 11, 13) are explored systematically and in simple cumulative order by the performer, in the context of a simple folk tune. The instructions for the piece are:

"Study #5 is a harmonic meditation. Using the consonances and dissonances inherent in the four octave tuning, the pianist should extend an arch-form over the piece (which lasts somewhere between eight and fifteen minutes) in the following manner:

1. One unifying theme is chosen for the entire piece. It should be simple, in C (256), with little chromaticism, and maybe of one's own invention. I use 'Rally 'Round the Flag' and highly recommend this tune.
2. Gradually moving from lower primes to higher and then back again (1-2-3-5-7-11-13-11-7-5-3-2-1) the pianist should exploit the consonances and dissonances of the particular prime tonality. Once one has been incorporated (during the first half), it should be retained until it is removed (during the second half)."

The remainder of the score consists of the tuning itself, which is:

Octave 1:

1/1 21/20 9/8 6/5 5/4 4/3 7/5 3/2 8/5 5/3 7/4 15/8

Octave 2:

1/1 21/20 9/8 6/5 5/4 4/3 7/5 3/2 8/5 5/3 7/4 15/8

Octave 3:

1/1 33/32 9/8 6/5 5/4 21/16 11/8 3/2 8/5 13/8 7/4  
15/8

Octave 4:

1/1 21/20 9/8 7/6 5/4 4/3 11/8 3/2 8/5 27/16 7/4  
15/8

One can easily see the type of improvisation this tuning will engender in the context of the ideas of the piece. All of the primes have at least a just fifth (except for 13 which is used as a kind of singularity at the middle of the piece), and most of the tonalities have many possible relationships. The manner in which one forms harmonies and melodies on the keyboard requires an intimate knowledge of the tuning and the primary and secondary relationships that will result from its different pitches.

Equating formal and intonational processes has been important in almost every work of mine in which I've used just intonation. For example, my large tape piece entitled "Psaltery" (and its many instrumental "realizations"), has no "form" to speak of other than the microstructure of the sound masses themselves, and the intonational transformations. As I look around (with great interest) at the various experiments in intonation of my fellow composers, this kind of idea seems to be highly, and surprisingly unusual (although there are notable exceptions, like Ben Johnston and James Tenney). As I have stated elsewhere, I believe the exploration of what Ben Johnston calls "ratiometric" perception to be an important new musical resource, especially with the new technologies available to us. It should be rather simple, for example, to program many digital synthesizers to actually realize "Piano Study #5," and though that is of no particular interest in and of itself, the ramifications of that capability are, to me, quite extraordinary, and musically and philosophically very fertile.

"Piano Study #5" has been performed four times: twice in Santa Cruz, in 1976; at Roulette in New York City, in 1979; and at Mills College in 1981. The piece was published in Xenharmonikon #6 (Sum-

mer, 1977). To my great and miserly glee, the advent of cheap and powerful digital keyboard instruments which can successfully imitate the sound of a Rhodes may make them more or less obsolete, and possible for me to actually buy one, so that I might record and begin performing the piece again.

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(Prophet Five...continued from page 6)

For those who are not using reference tones, copy the A scale into the program locations for scales derived from A, then tune each new scale around its respective tonic, just as you tuned the A scale. With these scales, new generations can be derived, as in Fig. 3.

For those using reference tones, a quick and easy method is available which saves hours of time. After tuning the A and C scales and loading them into other locations as indicated in Fig. 3, make a first pass through each scale, tuning each note to the corresponding note on the tape. For the scales derived directly from A or C, do not retune the respective tonic keys. These are probably more accurate left as they are—derived directly from the first generation scale. This first pass will get you to within one or two Hz of the right frequencies. Be especially careful tuning the tonics, because the rest follows from them. Now go back and fine-tune each scale to its tonic. This method is probably more accurate than chain derivations.

When you finish, you will have a justly-tuned keyboard which enables you to transpose keys while staying in tune—a feat hitherto considered almost impossible. There are still some problems, however. Not many synthesizers offer a retuning option like the Prophet Five. Even on the Prophet, there is no MIDI support for tuning changes. [Any MIDI sequencer which supports changes will permit tuning changes on the Prophet Five. It does not, however, appear to be possible to switch the Prophet between its patch and tuning modes under MIDI control.—Ed.] If we would like to see more development in this area of electronic music, we should let the synthesizer companies know...maybe someday they will catch on! ⑤