

HINTS ON PIANO TUNING: IMPLICATION FOR STUDENTS OF MUSIC

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Abstract

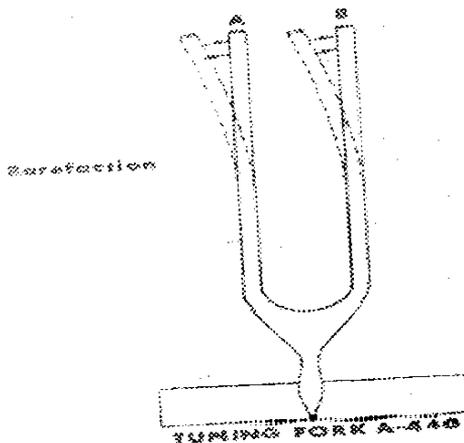
The piano tuning technique has undergone many changes during the last hundred years. Innumerable theories have advanced and methods of study devised which have found favour for a time and have then been superseded by fresh ideas. The success of a tuning job depends almost entirely on the way in which the pattern scale is set. But a rather extensive background study of temperament is also essential. So as a means of providing knowledge of both, a tuning process is presented here as a step-by-step procedure, by this paper, to help the young tuners.

Hints on Piano Tuning

Just as the fine artist or sculptor uses his eyes, so the piano tuner uses his ears, as much as or more than his hands. A musician who is totally deaf is as handicapped as an artist who is blind. If one wants to be a good tuner, he should be a musical artist who feels what he hears and hears what he feels; one must train one's ear as carefully so that he will be able to pass critical judgment on every piano or organ he tunes.

One may have a natural ear for music, in which case he will be able to develop it very easily. But if one feels that he has only a very poor ear at the moment he should not be dismayed, for it may be improved, by practice, to a remarkable degree. To develop one's sense of pitch, one should get a tuning fork or a pitch pipe. A tuning fork is a small metal fork shaped as shown below.

DIGRAM



If the fork is held by the handle, and one of the prongs is struck against something hard, the prongs will vibrate. The sound may be heard either by bringing the fork close to the ear, or by applying the end of the handle to a solid surface, such as the top of a piano or table. A pitch-pipe is a little pipe about two inches long, which produces a note when blown. The tuner should look for a tuning fork or a pitch pipe in C and make certain that it is of international standard pitch. (A – 440) The tuner's constant companion for a time so that he can be used to the pitch or sound produced. When he has an opportunity, strike the fork, listen carefully to the note and hum it. As soon as he can do this easily and accurately, he can proceed to the next stage. This time try to hum the note before he strike the fork, then listen to the fork, and hum the correct note. One's first attempts will probably be very wide of the mark, but if one perseveres he will find that before long he can pitch the note with tolerable accuracy.

If one has a piano, one can of course strike the note C, instead of using the fork or pipe. But this is not nearly so convenient, for one cannot slip his piano into his pocket, or take it to bed with him.

When he can pitch the note of the fork correctly and easily, he will be able to invent other exercises for the fork "C" and then hum the note a third higher "E". Next time, hum the note before striking the fork. Then do the same with the note a fourth higher than the fork "F" and so on. One should frequently vary the exercises by thinking the note instead of actually humming it; this will teach one to hear musical sound with one's mind as well as with one's ear.

A sense of absolute pitch, through to some extent a natural gift, can often be developed by practice on these lines – orchestral musicians and conductors frequently acquire it from the constant association of certain sounds with a fixed pitch. This "tone memory" usually brings a valuable aid to the performance of unaccompanied vocal music.

In view of the fact that most piano technicians use the pattern built on f-F, it must be a good temperament. It is simpler, of course, if the technician has an F-fork but with practice, the C-fork can be used without problem. First tune C-prime to the tuning fork (C – 523.3) one octave lower, or 261.1 with no bears. Next tune the small f a fifth below the middle C and leave it a little sharp, less than half a beat.

Now, once the pitch of the small octave f has been set from C (using the C fork), it becomes the basis of the pattern.

First Series of Major Thirds

Sound the major third, f-a. Tune the A pure, then sharp to about 6.86 beats. Listen to the f-a harmony, and to the fifth, f-C and then listen to the triad, f-a-C. One may think at first that it is not there, but if one listen closely enough one will hear it and also the distance, but one must hear these other tones too, so do not guess at hearing them. You are tuning a scale scientifically by beat and harmony.

Sound the major third, a – C#. Tune the C# pure, and then sharp to about 8.62 beats. Listen to the a-C# harmony also and to fifth of a, the E above. Do you hear the triad, a-C# - E? Now hear the complete chord a-C#-E-A. Compare the a-C# with the f-a major third. The a-C# should beat slightly faster, 1.76 beats faster as a matter of fact.

Sound the major third, C# - E# (or F octave above the original f obtained from the tuning fork). Now this F should be tuned to beat correctly to 10.86 beats, yet it must not, under any circumstances, exceed twice the vibration number for f in the small octave. Listen to the harmony of the third, C# - E# (F) and to the fifth of C# the C#. Do you hear the triad, C# -E# -G#, and the chord, C# -E# -G#- C#? Compare the beat rate with the two adjacent thirds just tuned. This one will now beat 2.24 beats faster than a-C# and 4.00beats faster than f-a.

This augmented triad just tuned is the pivotal point around which the equal tempered scale evolves. There should be no problem from here on if these first three major third are correct. The next step will be the basis for the second series of thirds, so this is a very important step.

Sound the fifth f#-C#. C# has been tuned, so this fifth should be tuned downward. Remember, all fifth in this system are tuned downward. All fifth are tuned sharp in this system because they are tuned downward. Remember that. As one tune this fifth downward, listen for the octave of f#, then blend the three together with an ever-so-slight degree of sharpness of the f#. This is one sure way of knowing whether the fifth has been tempered to the correct amount. Sound the minor third, f#-a, and then the major third, a-C#. If f#-a beats slightly faster than the a-C#, one will know that the fifth, f#-C# has been tempered correctly. But do not guess at it. Be sure it is correct.

Second Series of Major Thirds

Sound the major third, f#-a# (b that) pure, then temper it to about 7.26 beats. This third beats only 0.40 faster than the first third, f-a, but it is in proper alignment if it tests correctly to f, the fourth below, or to F, the fifth above. Also listen carefully to the triad f#-a#-C # and the chord f#-a#-C#-F#. Test the minor third, a#-C #, against C#-F. the minor third should beat slightly faster.

Sound the major third, a# (now b flat)-D. Tune D pure, then sharp to about 9.51 beats, which is 1.35 beats faster than its adjacent lower third. Incidentally, the beats in all the half steps gradually increase about 6% ascending. With the tuning of this D, it is now possible to make some very valuable tests, which prove the pattern as it progresses.

Test D to f, the major sixth below. Now try b-flat and D. Notice the speed is almost, but not quite, the same as the major sixth, f-D. If the b-flat (formally a#) were not a tempered fourth from the small octave f, the major sixth and the major third would beat exactly the same.

Test D to a , a fifth below. Temper accordingly sounds the fifth, D-g. Tune the g pure, then temper to about 7.69 beats. This is the third fifth tuned downward and again, it is left slightly to the sharp side and proven accurate by the minor third-major test. Any error in tuning is detected immediately and not at the end of the temperament. Each tone tuned is proving correct before going to the next step. Test the major sixths f-D, and the major third, b-flat-D. Note the very slight difference in the speed of the beats.

Third Series of Major Thirds

Sound the major third, g-b. Tune b pure, then sharp to 7.69 beats, or 0.53 beats faster than f#-a#. Listen to the harmony of the major third and also to the triad, g-b-D, and to the full chord g-b- D-G.

Test g-b against f#-a# and f-a. Listen for a gradual increase in the speed of the beats. The b can now be tested to f#, a fourth below and g-b can also be tested. Sound the major third, b-D#. Tune D# pure then temper to about 10.0 beats sharp. Listen to the fifth, F# the chord, b-D#-F#-B, and the ascending major thirds up to this point. Test the major sixths, f#-D# and all the ascending major sixths up to this point.

Test f# -D# against b-D#. They should be about the same speed. Now test D# to a#, a fourth below. Listen carefully for discrepancies. It seems that some of the tones have a tendency to slip away, but not for long if one is listening. Mistakes, if any occur, are found and adjusted at the time they are made.

Sound the fifth D#-g#. Give it the minor third-major third test and temper it correctly, g# can now be tested with f below, a minor third, or with F above, a major sixth and major thirds can be tested in ascending order to this point and their speed noted.

Fourth Series of Major Thirds

Sound the major third, g# (now bb)-C. Tune it pure, then temper to about 8.14 beats sharp, c, you will remember, was the first tone tuned to the tuning fork and should be perfect at this point. If not the small octave f was not correct to begin with.

Test C with g, the fourth below, with f, the fifth below, and also with F, the fourth above. Test all major sixths up to this point and recheck ab-C. Sound the major third, C-E. Tune E pure, then temper it to about 10.26 beats. Listen for the harmony of the major third, the triad, C-E-G, and the complete chord, C-E-G-C.

Play all adjacent major thirds and listen for the speed of the beats.
Play all adjacent major sixth and listen for the speed for the beats.
Test E to a, the fifth below, and E to b, the fourth below.

Conclusion

This is the last step in the f-F pattern, because the octave is now complete. The theme on which this pattern depends is "up a third, down a fifth". All major thirds go to the right. All fifth go to the left and the first thing one should know is that the pattern has been completed and tested and the procedure for tuning the rest of the piano continues.

Now after one has gone through the temperament twice, there are several important steps you should check-habitually and without exception are:-

1. Beginning on the first major third, f-a ascend chromatically and listen alternatively to the speed of the beats, to the harmony of the major thirds which has not been distorted beyond the bounds of this interval, to the triad harmony consisting of the root, third and fifth, and then to the complete chord.
2. Also combining the major sixth-major third progression, i.e, f-D resolving to b-flat-D, one will hear, loudly and clearly, the second partial of f and the fifth partial of b-flat.
3. Play the four diminished seventh chords in a sequence. Listen to the sheer beauty of these fast-beating intervals, tuned to perfection.
4. Test all ascending fourths and fifths. Finally, proceed to tune the piano from this pattern up and down, or down and up- whichever one prefers. With a pattern like this, one cannot fail.

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