

Equal Temperament from a C Fork

This sequence should be helpful for aural tuners who have used a traditional fourth and fifth sequence and a C tuning fork but have found the results to be faulty. It is useful to take Part 1 of the PTG Tuning Exam in which the notes from C3 to B4 require aural tuning. Although the note A4 must be tuned initially from an A tuning fork or other audible pitch source, the "Pitch" part of the exam is a separate part of the procedure. All that is necessary is to tune A4 within 3.0 cents of exact 440 pitch to pass that section of the exam. If the note A4 changes subsequently to accommodate tuning from a C5 pitch source, there is no penalty whatsoever. There is no scrutiny for accuracy of the note C5 as tuned from a C fork.

These instructions contain no beat rates for intervals. By following the steps, listening and comparing intervals, you can find the proper amount of tempering without trying to count a beat rate. Specified beat rates can only be theoretical. Therefore, attempting to tune an accurate rate is misleading since such rates do not account for the small differences in them necessitated by each piano's unique inharmonicity profile.

The width or size of octave is also a consideration for exact beat rates but I specify no octave size. To explore that more advanced study, see my article, "Octave Types". This method describes octaves only as "beatless", (also called "pure" or "just"). A beatless temperament octave is the more traditional way to tune and will work perfectly well for the tuning exam.

This sequence strictly avoids the compounded and cumulative errors so often experienced by aural tuners who use a traditional fourth and fifth sequence. One set of Contiguous M3s (CM3) is included, considered essential to avoid that type of error. The value of the three CM3s is twofold: to divide precisely the F3-F4 octave into three very reliably equal parts and to solve the most difficult part of the temperament and account for inharmonicity early in the sequence. Tuning CM3s are difficult for many aural tuners to understand and implement but this sequence provides for an easy way to accomplish that goal, without counting beats, only by comparing one interval to another.

The Sequence

1. Tune C5 to the C Fork.
2. Tune C4 to C5, a beatless octave.
3. Tune F4 between C4 and C5, a beatless P4 and P5 first, and then temper both intervals by sharpening F4 until the C4-F4 P4 and the F4-C5 P5 beat proportionately. The P4 beats slightly faster than the P5.
4. Tune F3 from F4, a beatless octave.
5. Tune A#3 between F3 and F4, a beatless P4 and P5 first, and then temper both intervals by sharpening A#3 slightly so that the F3-A#3 P4 and A#3-F4 P5 beat proportionately as above.
6. Temporarily tune A3 from F3, a widened M3 but beating very slowly (the exact amount is not important).
7. Temporarily tune C#4 from F4 also a widened M3 but also very slowly. Notice that the result is a very wide A3-C#4 M3 which beats very rapidly with a "sour" sound. Sharpen A3 and flatten C#4 until the Contiguous M3s F3-A3, A3-C#4 and C#4-F4 beat proportionately at a 4:5 ratio. Work between A3 and C#4 until you find the slight, slower/faster/faster relationship between each interval. When that relationship is established, the notes, F3, A3, A#3, C4, C#4 and F4 may be considered very reliable notes from which to tune the rest of the notes of the sequence.
8. Tune D4 from A3, a beatless P4 first, and then temper the P4 by sharpening D4 slightly. Listen to the F3-A#3 P4 and temper the A3-D4 P4 similarly. Listen to the resultant F3-D4 M6. Compare the F3-A3 M3 and F3-D4 M6 for a slightly slower/faster relationship. Then compare the A3-C#4 and the A#3-D4 M3s and listen for a slight progression in beat rate.
9. Tune G3 from C4, a beatless P4 first, and then temper the P4 by flattening G3 slightly. Listen to the F3-A#3 and A3-D4 4ths and temper the G3-C4 P4 similarly. Listen to the resultant G3-D4 P5. It should beat similarly to the F3-C4 P5. If the G3-D4 P5 is beatless, very nearly so, or too tempered, check again the intervals previously tuned, beginning with the G3-C4 and A3-D4 P4s. If either seems tempered too much or too little, correct one, then check the results, and then correct the other and check the results if necessary. Remember that A3 and C#4 are more reliable than the newly tuned notes but consider no note infallible.

10. Tune E4 from A3, a beatless P5 first, and then temper the P5 by flattening E4 slightly. Listen to the A#3-F4 P5 and temper the A3-E4 P5 similarly. Listen to the resultant G3-E4 M6 and play both the F3-D4 and G3-E4 M6s. They should sound similar but the G3-E4 M6 should beat slightly faster than the F3-D4 M6.
11. Tune G#3 from C#4 a beatless P4 first, and then temper the P4 by flattening G#3 slightly. Listen to the other previously tempered P4s, F3-A#3, G3-D4, A4-D4 and temper the G#3-C#4 P4 similarly. Listen to the resultant chromatic M3s: G#3-C4, A3-C#4, A#3-D4 and check for a smooth progression. Also check for the 4:5 ratio of the contiguous M3s G#3-C4 and C4-E4.
12. Tune B3 from E4, a beatless P4 first, and then temper the P4 by flattening B3 slightly. Listen to the C4-F4 P4 and temper the B3-E4 P4 similarly. Compare it to other previously tempered P4s for similarity. Listen to the resultant G3-B3 M3 and G3-E4 M6 combination and check for a slightly slower/faster relationship as with F3-A3 and F3-D4 M6. Both should have very similar slower/faster relationships.
13. Tune F#3 from B3, a beatless P4 first, and then temper the P4 by flattening F#3 slightly and compare the F#3-B3 P4 to the other previously tempered 4ths. Listen first to the resultant F#3-C#4 P5 and compare it to the other previously tempered P5s. Check the contiguous P4s F#3-B3 and B3-E4 for similarity. Check the progression of chromatic M3s F3-A3, F#3-A#3 and G3-B3 and the contiguous M3s F#3-A#3 and A#3-D4.
14. Tune D#4 from A#3 a beatless P4 first, and then temper the P4 by sharpening D#4 slightly. Listen to the other previously tempered P4s on either side of A#3-D#4. Check the resultant G#3-D#4 P5 and compare it to the other previously tempered P5s. Then check all chromatic M3s, the F#3-A#3 M3 and F#3-D#4 M6 combination and the contiguous M3s G3-B3 and B3-D#4.
15. Finally, play up and down all P4s, P5s, M3s and M6s listening for similarity of P4s, then P5s and for a smooth progression of the M3s and M6s. If any irregularity is noticed, trace the error back to two or three other notes to prove which note should be moved in which direction rather than arbitrarily changing one note to improve just one interval.

Equal Temperament from a C Fork Summary Sequence

1. Tune C5 to C fork.
2. Tune C4 to C5, a beatless octave.
3. Temper F4 between C4 and C5.
4. Tune F3 from F4, a beatless octave.
5. Temper A#3 between F3 and F4.
6. Temper A3 from F3, estimating a M3 and C#4 from F4, estimating a M3.
7. Adjust A3 and C#4 to create the 4:5 ratio between the F3-A3, A3-C#4 and C#4-F4 CM3s.
8. Temper D4 from A3, a P4.
9. Temper G4 from C4, a P4.
10. Temper E4 from A3, a P5.
11. Temper G#4 from C#4, a P4.
12. Temper B3 from E4, a P4.
13. Temper F#3 from B3, a P4.
14. Temper D#4 from A#3, a P4.
15. Check all P4s and P5s for similarity and all M3s and M6s for smooth progressions. Check the 4:5 ratio of all CM3 combinations and M3-M6 combinations for slower/faster relationship.

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