

Equal Temperament from a C Fork

This sequence should be helpful for aural tuners who have used a traditional 4ths and 5ths sequence and a C tuning fork. It can be used to take Part 1 of the PTG Tuning Exam in which the notes from C3 to B4 must be tuned aurally. 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 is changed subsequently to accommodate tuning from a C5 pitch source, there is no penalty whatsoever. Tuning to the C5 pitch source is not scrutinized for accuracy.

These instructions contain no beat rates for intervals. By following the steps, listening and comparing intervals, the proper amount of tempering can be found 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 and every piano's unique inharmonicity.

The width or size of octave is also a consideration for exact beat rates but no octave size specifications are given in this example. To explore that more advanced study, see my article, "Octave Types". This method describes octaves as "beatless", also called "pure" or "just". A beatless octave is the more traditional way to tune. When the octaves, C4-C5 and F3-F4 are tuned so they are beatless, the range of difference in size is expected to be minimal and negligible.

This sequence strictly avoids the compounding and accumulation of errors so often experienced by aural tuners who use a traditional 4ths and 5ths sequence. One set of Contiguous M3s (CM3) is included, as it is considered to be essential to avoiding that type of error. The value of the three CM3s is twofold: to precisely divide 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 is considered unusual and difficult for many aural tuners to understand and implement but this sequence provides for an easy and simple way of accomplishing that goal, without counting beats, only by comparing one interval to another.

1. Tune C5 to the C Fork.
2. Tune C4 to C5, a beatless octave.
3. Tune F4 between C4 and C5, a beatless 4th and 5th first, then temper F4 by sharpening it until the C4-F4 4th and the F4-C5 5th beat proportionately. The 4th beats slightly faster than the 5th.
4. Tune F3 from F4, a beatless octave.
5. Tune A#3 between F3 and F4, a beatless 4th and 5th first, then temper A#3 by sharpening it slightly so that the F3-A#3 4th and A#3-F4 5th beat proportionately as above.
6. Temporarily tune A3 from F3, a widened M3 but beating very slowly (the exact amount is not important). Temporarily tune C#4 from F4 also a widened M3 but also very slowly.
7. 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 the slight, slower/faster/faster relationship is found. 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 4th first, then temper D4 by sharpening it slightly. Listen to the F-A# 4th and temper A3-D4 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 4th first, then temper G3 by flattening it slightly. Listen to the F3-A#3 and A3-D4 4ths and temper G3-C4 similarly. Listen to the resultant G3-D4 5th. It should beat similarly to the F3-C4 5th. If the G3-D4 5th is beatless or very nearly so or too tempered, check again the intervals previously tuned, beginning with G3-C4 and A3-D4. 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 C4 are more reliable than the newly tuned notes but no note can be considered infallible.
10. Tune E4 from A3, a beatless 5th first, then temper E4 by flattening it slightly. Listen to the A#3-F4 5th and temper A3-E4 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 4th first, then temper G#3 by flattening it slightly. Listen to the other previously tempered 4ths F3-A#3, G3-D4, A4-D4 and temper similarly. Listen to the resultant consecutive 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 4th first, then temper B3 by flattening it slightly. Listen to the C4-F4 4th and temper similarly. Compare it to other previously tempered 4ths 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 4th first, then temper it by flattening F#3 slightly and compare the F#3-B3 4th to the other previously tempered 4ths. Listen first to the resultant F#3-C#4 5th and compare it to the other previously tempered 5ths. Check the contiguous 4ths F#3-B3 and B3-E4 for similarity. Check the progression of consecutive M3s, and the contiguous M3s F#3-A#3 and A#3-D4.
14. Tune D#4 from A#3 a beatless 4th first, then temper it by sharpening it slightly. Listen to the other previously tempered 4ths. Check the resultant G#3-D#4 5th first and compare it to the other previously tempered 5ths. Then check all consecutive 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 4ths, 5ths M3s and M6s listening for similarity of 4ths, then 5ths 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, and octave.
3. Temper F4 between C4 and C5.
4. Tune F3 from F4, an 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, F3-A3, A3-C#4 and C#4-F4 Contiguous M3s sequence.
8. Temper D4 from A3, a 4th.
9. Temper G4 from C4, a 4th.
10. Temper E4 from A3, a 5th.
11. Temper G#4 from C#4, a 4th.
12. Temper B3 from E4, a 4th.
13. Temper F#3 from B3, a 4th.
14. Temper D#4 from A#3, a 4th.
15. Check all 4ths and 5ths for similarity and the Rapidly Beating Intervals (RBI) for smooth progressions. Check the 4:5 ratio of all Contiguous M3 combinations and M3-M6 combinations for slower/faster relationship.

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