

Barbershop Tuning

By Ted Chamberlain for HCNW - 2014

Singing against a drone is perhaps the best way to learn proper tuning. It becomes easy to hear how the note YOU sing relates to another pitch – and this will result in intervals tuned to JUST INTONATION.

Equal Temperament – Can be useful in the melody.

- All half steps are equal distance.
- Each half step is exactly 100 cents. Do to Re is 200 cents. Do to Me is 400, Do to Fa is 500 and so on.
- In order to maintain tonal center, leads will often sing the melody in equal temperament – and only adjust in certain instances. (See Ron Balck's post: <http://infohost.nmt.edu/~jstarret/bbshop3.html>)

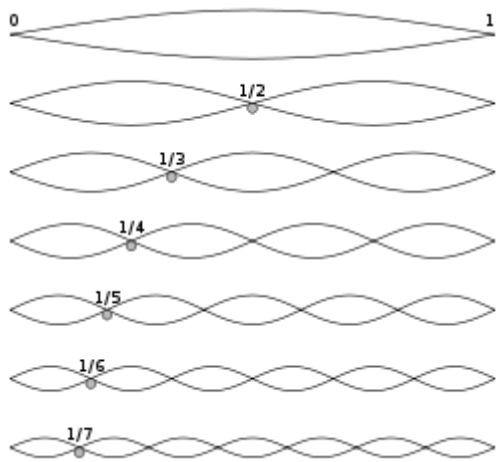
Pythagorean tuning – does not work for tuning chords harmonically as only roots and 5ths of the chord are in tune to the harmonics.

- Tuning is based on pure tuning of the interval of a 5th. Do to Sol is precisely tuned using the frequency ratio of 3/2 yielding 702 (rounded off to the nearest cent)
- Since basses sing mostly roots and 5ths, Pythagorean tuning makes sense **most of the time** for them...always in relation to the lead's melody note, mind you!

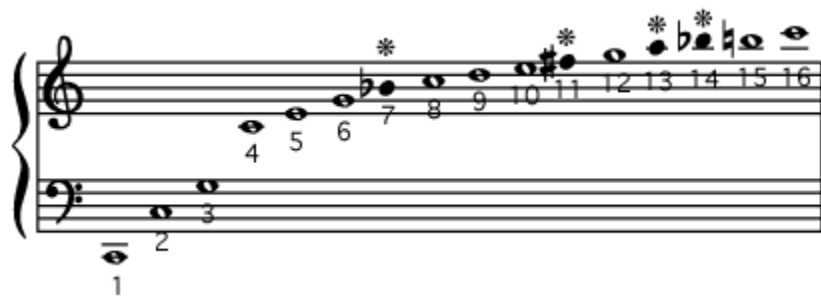
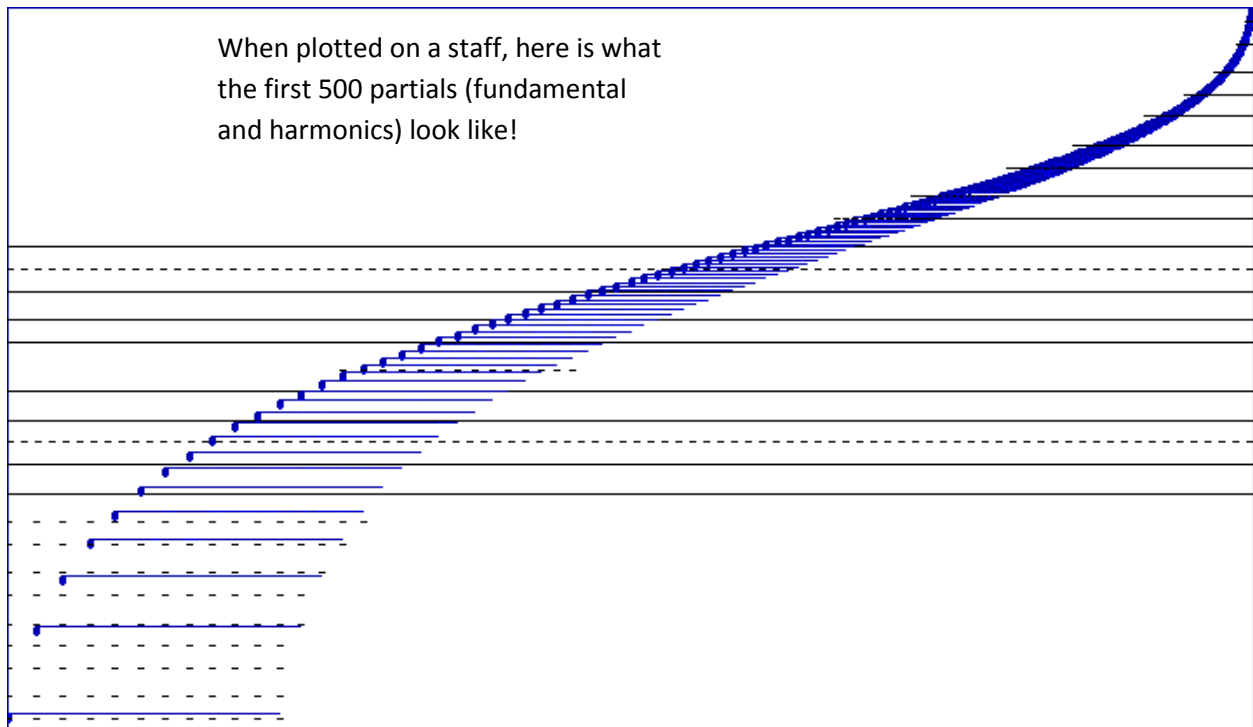
The most important thing for LEAD intonation is that the melody “sounds in tune”. It is likely that exceptional lead singers sing some combination of Equal temperament, Pythagorean tuning and Just Intonation, depending on many complex factors of the melody and its interplay with the chosen harmony of the given arrangement...and probably other factors.

JUST intonation allows all harmonies to be in tune. THIS is a fundamental component of barbershop and other a cappella harmony styles. In order for a chord to be fully in tune, it must be tuned to the harmonics. That is what just intonation is – tuning to the (mostly the first 8) harmonics of the Root, 3rd 5th and 7th.

Scale degree	Note example in C	Cents in Equal Temperament	Cents in Pythagorean Tuning (rounded off)	Cents in Just Intonation (rounded off)
1	C	000	000	000
#1/b2	C#/Db	100	90	112
2	D	200	204	204
#2/b3	D#/Eb	300	294	316
3	E	400	408	386
4	F	500	498	498
#4	F#/Gb	600	612	583
b5	F#/Gb	600	588	617
5	G	700	702	702
#5/b6	G#/Ab	800	792	814
6	A	900	906	884
#6/b7 (melodic)	A#/Bb	1000	996	1018
b7 (harmonic)	A#/Bb	1000	996	969
7	B	1100	1110	1088
8	C	1200	1200	1200



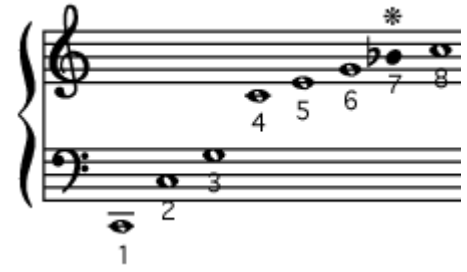
Each note we sing is a combination of the fundamental pitch and the multiples of that pitch...harmonics (overtones).



This example starts 2 octaves higher than the example above and shows only the first 16 partials. Notice that the * notes are *severely* out of tune compared to a piano.

Let's examine the first 8 partials more closely...

- 1 is the fundamental. 2-8 are the first 7 harmonics or overtones.
- Let's say that 1 = 100Hz [as a simple number to work within rather than its actual pitch of 65.406Hz]
- The octaves: 2 is double (or 200), 4 is double that (or 400) and 8 is double again (or 800Hz)
- The frequency EXACTLY half way between two octaves is the 5th (represented by the 3 and 6 on the staff to the right) and these would be 300 and 600Hz respectively in our example.
- The frequency EXACTLY half way between the Root and the 5th is where we find the major 3rd (number 5 above) and it is 500Hz in our example.
- Finally, EXACTLY half way between the 5th and the next higher root we have the dominant 7th (harmonic flat 7th).
- SO... in the first 8 harmonics we have the structure of a dominant 7th chord (barbershop 7th) with four roots, two 5ths, and one 3rd and one flat 7th!!!



We won't even get into Combination Tones (Difference Tones and Summation Tones) which further reinforce these same tuning principles. And yes, we haven't even explored minor 3rds, or other 7th tunings that are used in other chord tunings. HOWEVER, having this basic understanding of what we are trying to accomplish when TUNING our chords should be what is needed to take us to a much higher level.

HOW to apply this???

First, we must learn to hear/feel the smoothness of "in tune" so we can begin to really SING them in tune.

- There is a roughness to intervals/chords that are not harmonically tuned.
- And there is a smooth consonance to them when they are exactly right.
- Challenge yourself to listen to the lowest overtones and sing in tune to the overtones you hear.

EXERCISES:

To aid in the development of this skill, use the chromatic tuning scale I have developed.

- Each pitch is sustained for about 4 minutes.
- Begin by singing the most basic intervals – Work to **LOCK and RING** against the recording using an "ah/aw" that matches as closely as possible.
 - Unison
 - Octave
 - 5th [NOTE...there is another (albeit weaker) tuning of the 5th at about 680 cents. Make sure you zero in on the higher alternative at 702 cents.]
- Practice adjusting your pitch slightly higher and lower and listen for the "BEATS" created between your voice and the recording when not EXACTLY in tune. Notice that the further out of tune, the faster the beats. DO NOT GO ON UNTIL YOU HAVE MASTERED THIS STEP with the unison first, then the octave and finally the 5th !!! You will notice that you can still hear the beats when singing the 5th, but they are less prominent.
- Next, try the interval of a 4th.
- Now try the Major 3rd. NOTE – you will hear A LOT of Barbershoppers try to tell you that a 3rd should be sung high (melodically, in equal temperament...YES! – but NOT harmonically!!!!) when in fact it should be 14 cents lower than a piano 3rd. Smooth vs. rough!!

- OK, now the dominant 7th. Notice how low this must be to be in tune!!! 31 cents lower than the piano – roughly 1/3 of a half step flat!!!
- Now on to the minor 6th, followed by major 6th and minor 3rd.
- Finally, try to hear the two variations of the tritone (augmented 4th is 34 cents lower than the diminished 5th)
- Practice, practice, practice...lock and ring and don't let go...every interval.

It is also helpful as a learning exercise to sing a melody against the tonal center. Even though it is suggested that it may be useful that the melody be in equal temperament, it is still great practice to tune every note to that sustained pitch – just awesome ear training!!!

In a barbershop, the lead tunes to the tonal center, [*As mentioned, some authorities believe primarily in equal temperament – but that may be debatable*]. The harmony parts ALWAYS tune harmonically to the lead, using just intonation intervals. It is useful to consider the following rules when singing barbershop

- Tonal Center is the God of the Lead's pitch.
- The Lead's pitch is the God of the harmony parts' pitches.

On the PRACTICAL side, in order for a chord to lock and ring, and for the audience to perceive the song and chords are precisely in tune, SINGING JUSTLY TUNED INTERVALS AND CHORDS IS PARAMOUNT!!

Learn the “feel” of smooth vs. rough that indicates “in tune”. Once you've got a handle on THAT you will OWN intonation on any song you sing.