

TUNING TERMINOLOGY

A-440: The international standard frequency (440 hertz) for the A above middle C.

Beat: According to Groves Dictionary a beat is “an acoustical phenomenon, useful in tuning instruments, resulting from the interference of two sound waves of slightly different frequencies. The number of beats per second equals the difference in frequency between the two notes. The beats will disappear if the two notes are in perfect union. When the two sounds are in tune they are said to be “beatless,” “pure,” “perfect,” or “just.”

Cent: One-hundredth part of a semitone in European equal temperament. One cent = 1.0005778. Multiplying or dividing a frequency by **1.0005778** raises or lowers the frequency by one cent (see “equal temperament”)

Coincidental harmonic: Partials of two different notes that are close enough in frequency to create detectible beats. That is, when two notes of a consonant interval (octave, fourth, fifth, third or sixth) are played simultaneously, the harmonic series of the lower note contains one or more partials that correspond to a partial or partials of the other note being played. Since the partials have similar frequencies, the corresponding partials set up detectible beats making it possible to tune the interval being played.

Comma: The difference between two sets of just intervals or combinations of just intervals.

Equal temperament: Any system of temperament that divides the octave into units which are all equal in size. The standard European equal temperament divides the octave into twelve units of equal size which are called semitones. European equal temperament has become the basis of an acoustical measuring unit, the cent. A semitone is equal to the twelfth root of two (1.059463), two being the multiplier for an octave. Multiplying or dividing a frequency by **1.059463** results in the frequency of a pitch that is 1/2 step higher or lower. The cent further divides the 1/2 step (semitone) into 100 smaller equal divisions (see “cent”) One one-hundredth of a semitone = 1 cent; 100 cents = 1/2 step; 1200 cents = 1 octave.

Harmonics: The components of a musical tone having frequencies that are integral multiples of the fundamental frequency. Also called partials.

Harmonic series: A series of tones (partials) which result from a vibrating musical generator that vibrates as a whole and also in an infinite number of smaller segments all at the same time. The harmonics are in integral multiples so that the first harmonic, or fundamental, is one times the frequency; the second harmonic is two times the frequency of the fundamentals; the third harmonic is three times the frequency of the fundamental and so on. The partials blend to give the impression of a single note. The loudest partial is usually the fundamental. The relative loudness of each partial is what determines, to a large extent, the tone quality or color of the sound.

Inharmonicity: The deviation of the frequencies of partial tones in the harmonic series from their theoretical values. In piano strings the thickness and stiffness of the thick wire distorts the frequencies of each partial. The upper partials are not simple integral multiples of the fundamental.

Just intonation: Any sonority constructed from just (pure, beatless) intervals.

Partial: Any component of a complex tone; synonym for harmonic or fractional

“Setting the Pin”: The stabilizing of the pitch of a string by relieving the torque in the tuning pin and equalizing the tension in the various string segments

Stretched Octaves: Octaves that are wider than the theoretically pure octave. Due to inharmonicity, octaves in a piano can be tuned a number of different ways, all of which are acceptable. It is impossible to tune all pairs of coincidental partials beatless since each pair is inharmonic with the other pairs.

Temper: To alter from beatless; to narrow or widen a beatless interval

Temperament: The notes of a scale turned to a specific scheme whereby one or all of the consonant intervals (4ths, 5ths, 3rds, 6ths) are tempered.

Unequal temperament: One of hundreds of possible tuning arrangements with $1/2$ steps that vary in size. Unequal temperament was preferred until the late 19th century. With the recent interest in authentic historical performance practice the use of unequal temperament has been revived. Unequal temperaments may have several “pure” or nearly pure intervals. There may be intervals that are so “out of tune” that they “howl” (“wolf” intervals). Tuning in unequal temperament creates differences of key “color” and descriptions of keys as being “happy” or “sad.” Examples of unequal temperaments are Pythagorean temperament, meantone temperament, and well temperament.