EncycloMedia Man *by Mike Overly*

What a Coincidence: Unison Tuning

Music, whether it's seen or heard has three basic parts: *rhythm*, *melody* and *harmony*. Each of these parts may be studied in great detail, but for this lesson let's simply define them as follows; **rhythm** is "time", **melody** is "one sound at a time" and **harmony** is "more than one sound at the same time". Now, what is *sound*?

Non-musical sound is known by one name, *noise*. However, musical sound is known by many names and the following are but a few; frequency, pitch, tone and letter. Let's look at this more closely.

Music is heard as sound, and sound is "air moving". So what's moving the air? On the bass, it's the strings that move the air. With your fingers or a pick, play any "open" string and watch it move back and forth. It's these back and forth motions (vibrations) that are moving the air. These vibrations can be counted and given a number. For now, we won't go into all that physics and acoustics stuff, like resonating bodies, air-pressure and amplitude.

The speed of the vibrations are steady, regular and predictable in time. The number of times the string moves back and forth in one second is called "frequency". **Frequency** is measured in "cycles per second" (CPS), which is also known as **Hertz** (Hz), named after the 19th century German physicist *Heinrich Hertz*. The frequency range of the human ear is approximately 20 to 20,000 Hz and this may also be written as 20 Hz to 20 Khz. Kilo (K) is the Greek prefix for "thousand", 1Khz is 1000 Hz. So, how many times does a string move back and forth in one second? The answer depends upon which string is being played.

All four strings played either fretted "at the nut, fret zero), or "open" (no left hand finger used), vibrate faster than we can see and count, so science has to compute for us. Think electronic tuner.

Not only are the vibrations counted and numbered, as we said earlier, but they may also be assigned a letter and a tone number.

For example: string three "open" vibrates 55 times a second (55 Hz) and is called A (tone 1), while fret two of string one vibrates an octave higher at twice the speed (110 Hz) and is also called A^1 (tone 8). And fret fourteen of string one is two octaves higher (220 Hz) and is also A^2 (tone 15). Remember, *fast* frequencies sound "high in pitch" and *slow* frequencies sound "low". Think **equalization** (EQ), treble and bass. It helps to think about pitch as being either *absolute*, *perfect* or *relative*.

Absolute pitch, is a specific frequency (definite pitch) assigned to a letter or tone upon which everyone agrees. Did you know that the *International Agreement* which made *A = 440* Hz the absolute "reference" pitch used around the world today wasn't accepted until *1939*!

Here are a few good sources of absolute pitch; a tuning fork, an electronic tuner, and a "tuning pitch" from a play-along CD. Remember, cassette tapes are not a good source of absolute pitch due to the varying playback speeds of different tape players.

Perfect pitch, is "pitch memory". In other words, the ability to hear the absolute pitch and "perfectly" store it in your brain. Then later, without having to hear the absolute pitch again, locate and hear "inside your head" the frequency of that absolute pitch. In music school they call this "ear training", and it takes a lot of practice!

Relative pitch is the ability to hear the absolute or perfect pitch and then either match that pitch or locate another pitch relative to it. Tuning your bass by matching or duplicating pitches is known as relative tuning or **unison tuning**.

In Latin, **uni** means "one" and **sonus** means "sound", therefore, **unison** means "one sound"

that may be played in more than one location on the bass . However, unison is really a “co-incidence”, multiple events occurring at the same time.

The prefix “co” means *together* (two or more as one), and an “incident” is an event. So **unison** really means “two tones of the same pitch sounding at the same time”. One of the greatest things about the bass is that you *can* play unison, by playing the same pitch on two different strings. You can’t play unison on the piano, woodwinds, brass or voice!

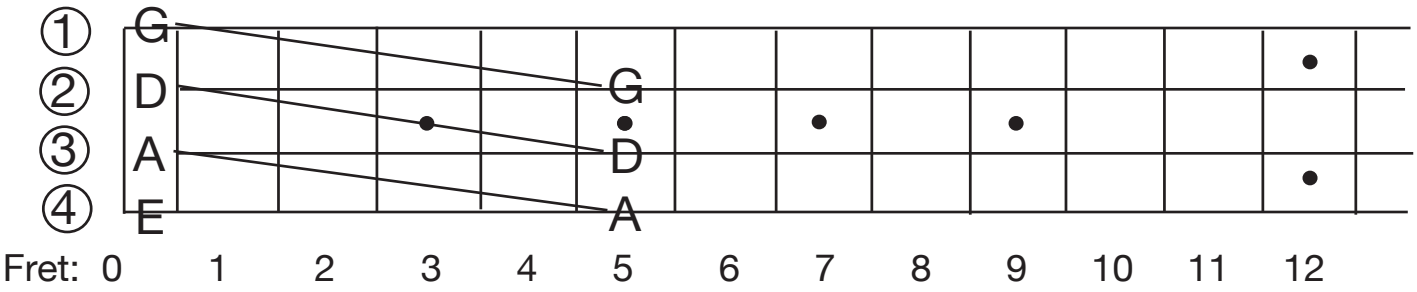
Now, with this elementary understanding of the “science of sound”, let’s apply it to the tuning of the bass. We’ll begin by giving the four “open” strings their letter names and frequency numbers: string four E is 41.21 Hz, string three A is 55 Hz, string two D is 73.42 Hz, and string one G is 98 Hz. What follows is the *method* of **unison tuning** that will enable you to tune your bass by ear (by sound)!

From an absolute or perfect source get the absolute reference pitch. For example, if you want to tune “open” string four, you will need to hear the absolute pitch of E 41.21 Hz. Next, with string four in tune, play string four, fret five, A 55 Hz. This pitch should match the sound of “open” string three. If it does, they’re in unison, and you’re in tune! If they don’t sound the same, you’ll need to tune string three higher or lower until it does sound the same. Be patient, relative tuning takes lots of practice. Remember, the more you practice, the better you get.

When string three is in tune, play string three, fret five, D 73.42 Hz. This should match the “open” string two.

And finally, play string two fret five, G 98 Hz. This will match the sound of “open” string one.

Congratulations! Your bass sounds so much better - now that it’s in tune.



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