

Harmonics, Overtones, and an Introduction to the Altissimo Register

By Jim Piela

For contact information, visit Jimpiela.com

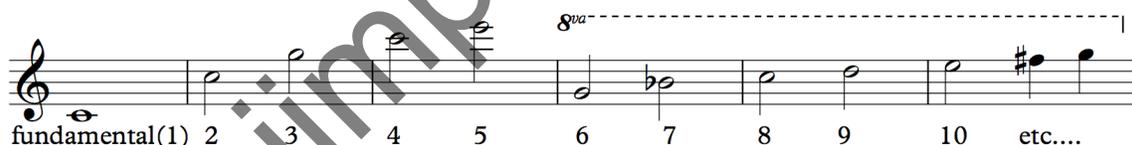
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Introduction to Harmonics

Have you ever considered why a violin and a clarinet have a different sound, even if they are playing the same note? Or why different instruments seem to sound good together, and others seem to clash? Part of the difference in tone color can be explained by **harmonics**.

A vibrating body produces a musical tone. On a violin, this body is a string, on a xylophone, a bar of metal. Singers create sound with their vocal chords. On a woodwind instrument, this body is a column of air, but harmonics work the same no matter what is vibrating. This body vibrates not only at the **fundamental** (the pitch you are fingering, striking, or singing), but also at other, sympathetic notes. These pitches are called **overtones**, and they, in part, help to define the color of a musical sound.

These are the notes of the **harmonic series**; the set of overtones, or sympathetic notes, that vibrate along with the fundamental pitch. They're much quieter than the fundamental, but they're there:



The reason for this phenomenon, and why these notes sound specifically is a bit beyond our discussion here, but these principles are universal to music and sound production. Different instruments bring out different harmonics at different strengths; giving that instrument it's unique tone.

On the saxophone and other woodwinds, we sometimes take for granted that if we finger a particular note, that pitch will sound. But on some instruments, blowing overtones is the primary way music is produced. A natural trumpet is probably the most well known example:

Classic Bugle Call:

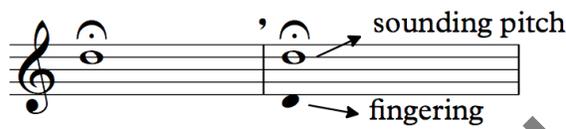


Knowing these principles, and being able to manipulate the harmonic series will give you a stronger, more colorful tone; as well as help higher notes speak fully. These exercises are also prerequisites for the altissimo register of the saxophone.

Exercises

The easiest way to demonstrate overtones is by playing in the second octave of the saxophone without using the octave key. Look at your instrument, and how the mechanisms work as you press the octave key. One of two vents, or small holes, is opened as you press down. This breaks the biggest sound wave that's vibrating inside the instrument, and allows the next note in the harmonic series to sound strongest – in this case, an octave.

Play a middle register D. Then, stop the tone, and play the same tone again, only this time don't apply your thumb to the octave key:



Try to feel the note in your throat and mouth, not in your embouchure. Notice what vowel sound are you making in your throat – is it an “ahh,” “ohh,” or “eee?” Your lips should remain firm but relaxed, and you shouldn't feel that you're “squeezing” the note out.

I. Long-tube Exercises

These exercises are easiest when the column of air we're manipulating is large. Hence, we'll start with the lowest notes on the instrument.

A. Play a low Bb. Now, keeping the same fingering and using an air attack, play a middle Bb.



Now, add F, the next note in the harmonic series:



It will help if you hear the note you're aiming for – play or sing your goal note if you're having problems.

Repeat these exercises, slowly and methodically, on B, C, C#, and D.



Your tone should be full and musical. Don't settle for a tone that's splitting – sounding two pitches at once. Another way to strengthen these notes is to play a harmonic for as long as possible – see how long you can hold it until it breaks.

B. On those five fundamental tones, add the next overtone: two octaves above the note being fingered.



Take a look at the exercises page for more shapes and patterns on these overtones. Remember, speed is not an issue with these exercises; concentrate on accuracy and having a musical tone.

II. Moving from fundamental to harmonic on the same pitch/alternate fingerings

On this exercise, we'll be starting with the normal fingering, then jump to the harmonic fingering on the same note. These exercises should be done with a tuner, as well.

A. Play and hold a middle Bb (with the bis key, not the side fingering). Then, switch as quickly as possible to the low Bb fingering:



The note should not change, although the intonation may. Return to the normal Bb fingering, but try to keep the timbre of the tone from the low note fingering with the proper tuning of the normal fingering.