



Piano Terminology

How to better communicate with your piano technician

Have you ever had that uncomfortable conversation with your doctor or mechanic when they were talking in technical terms you didn't understand? As with any trade or profession, piano technicians also have their own vocabulary when discussing pianos. And while most technicians will take the time to explain things, it doesn't hurt to learn some of the technician's vocabulary.

Key Naming

An early item to establish is how we identify the different notes¹. There are at least four different systems for identifying the keys. Fortunately most technicians typically only use a couple of these.

The simplest method (used more widely by piano rebuilders) is a straightforward numbering of the keys from 1 to 88. That is, the lowest left-most A is key 1, the adjacent black key (B \flat) is key 2, the next B is key 3, and so forth all the way up to the highest C which is key 88. Using this system, middle-C is key 40 and the A-above-middle-C that is tuned to 440Hz is 49. Usually the note name is included along with the key number in this scheme, so these would be called C40 and A49, respectively.

This numbering method is even more apparent if you have the opportunity to look at an upright piano with the music desk removed. Looking at the keys as they extend into the piano, you should be able to see the key numbers printed or stamped on every key (though on older pianos, these may be hard to read). The same is true with grand pianos.

The other referencing method is only slightly more complicated and is widely used by piano technicians. In this scheme, the entire keyboard is divided into numbered octaves, each octave extending from C up to the next B. Since we have a few extra notes below the lowest-C on the left, these have been designated octave 0. Starting with the lowest A these are in sequence: A0 A#0 B0 C1 C#1 D1 and so forth. Middle-C in this scheme is C4 and the A tuned to 440Hz is A4. High-C is C8 (the only note in this octave).

¹ The terms "key" and "note" will be used interchangeably in this article. Not to be confused with a key signature.

One oddity in this scheme is the lack of "flats". Unlike in music notation, piano technicians have no need to refer to any particular key by more than one name. So all the black keys are called "sharps" and they will always be referenced to the natural key immediately to the left (that is, the black key between C4 and D4 would only be referred to as C#4 and never as D \flat 4).

Cents

"Cents" are a piano technician's way of characterizing how far a single note or an entire piano is out of tune. Rather than measure the frequency error of a note, it is far more convenient and relevant to state the error sort of as a percentage. Simply put, there are 100 cents between any two adjacent keys (half-steps, e.g. A4 and A#4) anywhere in the piano.

A4 is normally tuned to 440Hz² and A#4 is roughly 25Hz higher. So in this area of the keyboard, each cent of error is about 0.25Hz. If the note were 10 cents flat (2.5Hz) then A4 would be at 437.5Hz. If a piano were 100 cents flat then it's a complete half-step low – someone with perfect pitch listening to C#4 being played would say, "that's C4".

Piano Tuning

Whether your piano technician is an aural tuner or uses an electronic tuning device (ETD), in the end they are both trying to accomplish the same thing: Adjusting the tension in each string so that the pitch is correct. This is done using their tuning hammer (aka a tuning wrench or lever) and turning the tuning pin associated with each string.

The tuning pins are readily visible in grand pianos, being immediately under or behind the music desk. In uprights you need to lift the lid and look inside the top of the piano. (It always amazes me the number of piano owners who have never looked inside the top of their piano. Although just as with your car, where you could drive indefinitely without ever lifting the hood, it certainly doesn't hurt to look inside once in awhile). Though it looks like the pins are anchored in the cast-iron plate, in reality the tuning pins go into

² 440Hz is the international pitch standard, though some orchestras use other pitch references. Your technician can adapt if needed.

a block of wood (called the pin block) immediately under or behind the plate. The pin block is what holds the tension on the tuning pin and ultimately the string.

Ideally, we'd like to imagine that the plate, pin block, bridges and casework are all perfectly rigid. But in reality these pieces are expandable and compressible, at least on the scale of the tensions in the strings. To understand how this complicates the tuning process, follow along an example.

Imagine that a piano is perfectly in tune except that one string is extremely flat (low in pitch). To correct this, the tuner must pull up the pitch by significantly increasing the tension on that string. However with this increased tension, the plate compresses slightly and the tension on every other string is ever so slightly reduced, dropping them all in pitch.

This is would not be a problem if only one string was off. But it's easy to imagine how this complicates the tuning process if the entire piano is significantly flat or sharp. As a tuner works to pull up a very flat piano to pitch, they are effectively de-tuning the notes already adjusted as they move along.

As a result, tuning a piano can best be thought of as an iterative process – you keep getting closer to perfection with each pass through the tuning process, but you never quite get there. A piano technician's work is never done. Even a freshly tuned piano can always be slightly improved on.

If your piano is well maintained (tuned at least twice a year) then it should be possible to do a good job tuning the piano with a single pass. However if it's been a few years, then the piano is likely more than 10 to 20 cents off, and two or more passes will be needed (a service referred to as a "pitch raise").

One final topic relating to tuning the piano is "octave stretch". In a mathematically ideal world, each octave doubles in pitch (A4 is 440Hz, A5 would be 880Hz). But surprisingly, a piano tuned in this manner sounds very dull and lifeless. In practice, piano technicians "stretch" each octave a few cents, which adds considerably to the color and tone of a piano. Larger concert grands can support more stretch whereas smaller uprights less. But this is a matter of personal preference for the pianist and is something you should discuss with your technician.

Regulation & Voicing

Depending on the piano, there are between 10 and 20 adjustments *per key* that are available to the technician. These adjustments are made to optimize the power and repetition speed of the piano (among many other things), and the process of adjustment is called "regulation".

A finely regulated instrument can be a pleasure to play – one that is out of regulation can be quite a challenge. The pianist may feel that they have to work harder than usual to get the full expression out of their music. Although nothing is "broken", some notes may eventually reach the point where they either won't repeat or won't play at all.

All new pianos are regulated before leaving the factory and the level of regulation is adequate for most players. (The most discriminating pianists may desire some fine regulation even on a new piano and this is certainly something that a qualified technician can accomplish.) More typically, regulation becomes an issue over time as the various parts in the piano action wear. Your piano technician should identify regulation issues as they come up and should be able to demonstrate the positive effects of regulation on a few notes prior to doing a full regulation.

"Voicing" is a very broad (and frequently misused) term that some people reduce to sticking needles in the hammers. It more correctly refers to everything after repairs, tuning and regulation that affects the quality of the sound produced. There are many factors affecting this, most notably: room acoustics, string seating on the bridges, string-to-hammer mating, hammer shaping and (finally) hammer adjustments through needling.

It can be difficult for pianist and technician to discuss voicing problems since the issues may be subjective and abstract. But it helps if the pianist can isolate differences in various areas of the keyboard ("I like the way these notes sound, but not these over here"). Your piano technician should be able to demonstrate voicing improvements on a few keys before launching into a complete revoicing.

All of these factors come together to produce a beautiful instrument that is a pleasure to play and to listen to. For more information or to request an appointment, visit www.mitchellpianoservice.com