TAYLOR TECH SHEET

TAMING THE BEAST: INTONATION

Intonation is a subject I could go on about forever, philosophizing myself to death in conversations with guitar makers, players — almost anyone. Technically, it isn't a four-letter word, like "tone" ("Terry Talk", Spring '97), but intonation is comparable to tone in the sense that it is similarly hard to define and tends to generate heated arguments. It is another one of those subjective issues; in this case, producing and maintaining "proper" intonation depends on the player — his style, attack, fingering technique, string gauge, action, even the brand of strings* used, and so on. I do get calls about intonation — it is a subject about which people are curious — so I figured that it was time to address it here, while trying to keep it simple.

For our purposes as guitar makers, intonation refers to how a given instrument plays in tune with itself. Here's what we mean by that: a guitar string should produce the same note, played as a harmonic at the 12th fret, as it does when you fret that string at the same place. Many people know that when a repairperson is setting up a guitar, and he puts it on a scope (strobe tuner) that compares the 12th-fret harmonic with a fretted 12th-fret note, he's checking its "intonation".

Now, I might be setting myself up, because if you stop reading this, grab your guitar, and analyze it, you might discover that the harmonic 12th and the fretted 12th notes don't match. Or, you might notice that when you tune your guitar and one chord you form sounds perfect, another chord might sound

slightly out of tune. This is where the concept of intonation can get sticky! I won't bore you with long ramblings about the theory of tempered scales, but a little background can't hurt.

The term "temperament" is used to describe an instrument's system of intonation. "Equal" temperament is a system that divides the chromatic scale into 12 equal half-steps; because an acoustic guitar's frets maintain that kind of fixed tuning, the 12th fret is used to gauge whether its equal temperament is producing the desired intonation. The harmonic at the 12th fret produces a tone one octave higher than the note produced when the string is played open. If those tones are consistent with each other, the intonation is acceptable.

What frustrates some players — especially those with a highly refined ear and sense of pitch — is that in equal temperament, the intervals between notes are not always perfect, or "pure". Musicians with "perfect pitch", or who are more familiar with music theory or piano tuning than with guitar construction, frequently fix the blame on a presumably faulty fingerboard or saddle (or both). Actually, the guitar probably is fine. It's just that the player with the ear for "pure" intervals can't handle the built-in idiosyncracies of an instrument that's made to be properly intonated in the equal-temperament system.

Those of you who also play electric guitar know that many models come with saddles that allow for adjustments of each individual string. Because acoustic flattops don't have that feature, we must accept their imperfections and build accordingly. Each manufacturer will position the saddle where they feel it will produce its optimal performance — the oft-cited "sweet spot", if you will. Taylor also uses a saddle with a "compensated" B-string; it's angled to offset the intonation "black hole" that exists between the B and G strings, a result of several factors, including the frequencies to which those strings are tuned.

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Over the years, one of Taylor's selling points has been the fact that our guitars "stay in tune" all the way up the neck. But with acoustic guitars, intonation is a moving target; in fact, we think of it as an art form, and not an exact science.

Acoustic guitars are made of solid woods that "breathe" and move; the wood is much thinner than that used on, say, pianos, which resist movement (cheaper wood laminates seem more stable, but they generally don't boast the same tonal/acoustic qualities as solid-wood guitars). As a solid-wood guitar swells or shrinks (to a lesser degree if you are taking proper care of it, humidity-wise!), the wood moves, and with it, the overall intonation. As a rule, we are talking small degrees of movement here, but it will affect the guitar and how it plays in tune, day to day or month to month. For the same reason, people get their electric guitars intonated every so often, to compensate for the natural movement of wood and mechanics; this, even though electrics are solid slabs of wood that are less prone to movement.

We guitar makers do our utmost to achieve the best-possible results with our instruments, to make them pleasing to the ear. But, at times, intonation can drive the best of us crazy. And although we at Taylor have our own preferred temperament, or "sweet spot", that doesn't mean it will be acceptable to everyone. Unfortunately, many players are looking for perfection, which in this case is as fruitful as chasing the pot of gold at the end of a rainbow.

Take, for example, a friend of mine, Gary Puckett, the well-known singer with many hits to his credit. I never have seen a guitar that can satisfy his sense of intonation. He has a dog's hearing, and can find intonation problems on any brand he picks up, electric or acoustic. Although today Gary mainly is a guitarist and singer, he learned piano first and retains an incredible "pianist's ear" — he's comfortable with a piano's tempered tuning and generally does his best to shut himself off from the, uh, "natural" wonders of the guitar world.

At Taylor, we try not to get too analytical about this stuff. But, at the same time, after years of making guitars, we have found a saddle placement that we like, and that works well for almost all of our customers. According to an old guitar makers' saying, "no guitar is perfect", and while that is very true, many of us have a guitar (or a memory of one) that qualifies as "perfect" for a myriad of subjective reasons. Sometimes, the old junker in the corner might sound the best to your ears. We know one guy who had grown so accustomed to playing with his guitar way out of intonation that when his repairman used a strobe tuner to set it back, it totally messed him up, and he wanted it returned to the "bad" intonation!

I couldn't even tell you right now exactly where our guitars "scope out" at, in terms of intonation — only that our system works for us and for the vast majority of players out there. Some of those few who have a hard time with the intonation question want us to alter our "formula" just for them, but if we changed a guitar's setup to treat a perceived intonation "weirdness" in one area of an acoustic guitar, the "weirdness" would only pop up somewhere else. It's just the nature of acoustic guitars, and a lot of people, depending on their playing style, will notice spots where the intonation seems slightly strange. Intonation is easier to dial-in if you are one-on-one with a player — watching his style, noticing how hard he pushes the strings down, whether he moves strings sharp or flat when he pushes down, and so on.

Hopefully, all is well in your "intonation" world. If your guitar sounds good to you, forget all this stuff and just enjoy playing it! In fact, forget all this stuff, anyway! If you are like Gary Puckett, then my ramblings probably won't help you, but will only remind you how irritating this can be. Sorry!

*Changing from one string brand to another can affect intonation. For example, if a guitar is set up for Elixirs, just changing to Dean Markleys or D'Addarios might throw the intonation off a bit. Most people won't be able to hear the difference, but some will.

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