Figure 1.9 Peterson Stomp Classic pedal tuner.

- On older tuners, you had to manually select the note to be tuned. Most new electronic tuners have the capability to automatically sense the note being tuned. If your first string is tuned to an E flat, the automatic note sensing won't know that you really wanted to tune to E natural. Pay attention to the display on the tuner to make sure you are tuning to the desired pitch.
  Several modern tuners have the ability to operate in automatic mode or manual mode. Manual mode is still useful if a particular string on a particular instrument doesn't seem to read well in automatic mode. Manual mode will focus the tuner on one note at a time.
- A new twist on the automatic tuner is a tuner that can hear all six strings simultaneously, such as the TC Electronic PolyTune.
- One of the greatest innovations in tuning technology in the past decade is the advent of small clip-on tuners that mount to the headstock of a guitar. Rather than use a microphone or a 1/4-inch input, clip-on tuners sense the pitch through vibration. This means that they can be used even when there is a lot of background sound. These tuners can be easily stored in a guitar case.
- Piano technicians have been using software-based tuners for a number of years. Now there are software-based tuners designed to work with a number of instruments. The flagship software application for guitarists is Peterson's StroboSoft (see Figure 1.10). StroboSoft comes with a number of tuning presets and can store tuning offsets.

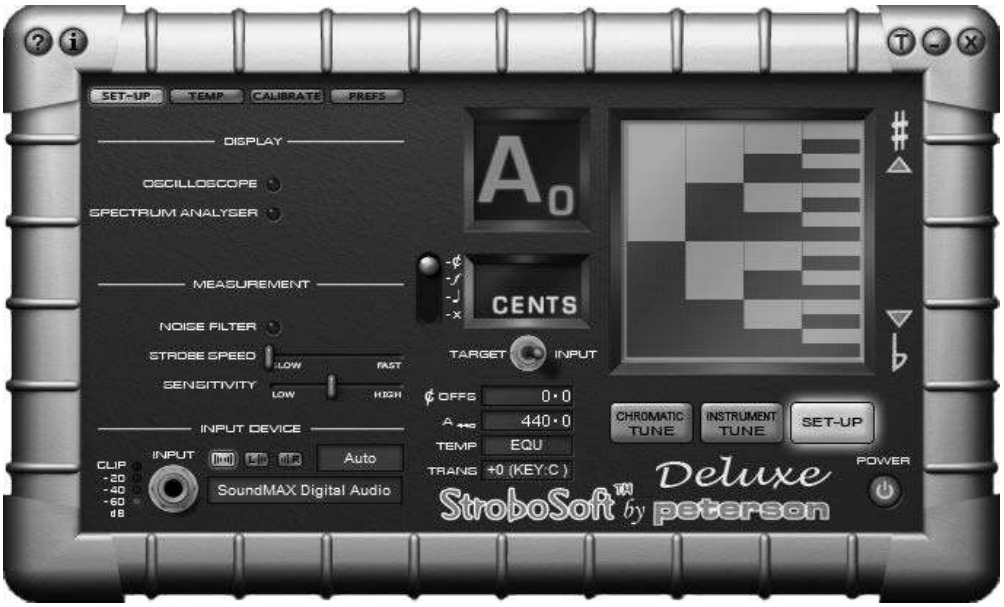

Figure 1.10 Peterson's StroboSoft 2.0 VST/AU software.
© Peterson Electro-Musical Products, Inc.

One of the cool features about StroboSoft is that you can set the tuning window to be full screen. Imagine being on a big stage and having a big monitor screen in front of you or off to the side that would let you see StroboSoft so you could make quick, accurate adjustments.

- ▷ There are now hundreds of tuner apps available for smartphones. They range in price from free up to about $10. Sometimes it's advantageous to check your tuning using two different apps. There are many great tuning apps, but my favorites are Peterson's iStroboSoft™ ($9.99) and Trace Tuner ($0.99). Peterson's app gives you a virtual stroboscopic display with incredibly accurate resolution. Trace Tuner is unique in that it traces the waveform of a note over a period of time. This is helpful for guitarists because strings tend to go a little sharp when first struck (plucked or picked) and then settle back down. Trace Tuner is useful for seeing the behavior of a string and then making an assessment ultimately based on your ear. The amount of fluctuation in pitch created by pick attack is determined by the force of the attack as well as the type and gauge of string being played.
- ▷ Unless you have an acoustic guitar with a built-in tuner, a built-in pickup plugged directly into a tuner is probably the best route to take. A clip-on tuner would also give excellent results. A suction-cup tuner pickup is a handy tool to have in your guitar case. A suction-cup tuner will improve the performance of any electronic tuner when used with an acoustic guitar.
- ▷ Tuners can hear only one note at a time (unless you're using the PolyTune). Take great care to ensure that only one string is being played at a time, or you will confuse the tuner. If you're just using the microphone on the tuner, don't put the tuner 10 feet away from you and expect good readings. Put it on your knee or on a music stand right in front of you if you're playing an acoustic guitar. Put the tuner in close proximity to your guitar amplifier if you're playing electric guitar.
- ▷ There are guitars out in the marketplace that will physically tune themselves or auto-tune themselves, such as the Gibson Robot Les Paul.
- ▷ It's important to remember that a guitar will probably go sharp if moved to a place with a colder room temperature. Conversely, it will tend to go flat if brought into a warmer space. It takes diligence to keep a guitar in tune!
- ▷ Even moving the guitar at a different angle or putting it flat with its back on a horizontal surface will change the pitch of the guitar slightly. Test this with a good strobe tuner.

- A new set of tuning keys sometimes helps alleviate mechanical problems associated with tuning.
- My violin teacher, Mrs. Berg, showed me a trick that still works. If a string gets caught in the nut, making it difficult to tune, slide the string over for a second and rub some graphite from a pencil lead in the slot. This will help reduce friction, thus allowing the string to move more freely. There are some commercial products available that accomplish the same thing but work even better, such as Big Bends Nut Sauce.
- A capo can wreak havoc on your guitar's tuning. Some capos utilize a strong spring to clamp to the back of the neck. These capos have the advantage of being able to be unclamped quickly, removed, or moved up or down the neck to a new fret. I've found that, since the pressure of the spring is fairly forceful and not adjustable, these spring-loaded capos always require retuning once the capo is on or moved. My preference for capos is the Shubb brand, which use a lever and a user-adjustable set-screw to control the amount of pressure applied by the capo. If the capo is lined up straight behind the chosen fret and the amount of pressure is adjusted to mimic the amount of normal left-hand finger pressure, there should be minimal effect on tuning. The set-screw may have to be adjusted if you re-capo at a different position on the neck, where the neck thickness is different. It's a good idea to strum a few chords with the capo on, in order to equalize string tension, and then double-check your tuning. You may be able to adjust the capo before you go on stage so the effect on tuning is minimal. Plan B would be to have some good jokes prepared or be able to tell the audience the story about your very first guitar while you are retuning on stage with the capo on.
- Sometime in your life, you'll meet a guitar salesman who can pick up a completely out-of-tune guitar and tune it, zing, zing, zing, zoom, zing, zoom, za perfectly, in about 7.3 seconds.

If it's so easy, why don't more guitarists sound in tune? There are probably two reasons for this. The first is that their guitars don't have the proper intonation setup, meaning their guitars don't play in tune with themselves from the top to the bottom of the instrument. This can usually be solved easily on an electric guitar because most (though not all) electric guitars have an adjustable bridge for each string (see Figure 1.11).

Figure 1.11 Gibson Tune-o-matic bridge with adjustable saddles. Thanks to About Music of Broad Ripple, Indiana.

You can do the adjustment yourself or take it to your repairperson. The advantage of doing it yourself is that the adjustment is somewhat dependent on your personal touch with your fretting fingers. Acoustic guitar can have a "compensated" bridge, which is fabricated to account for the string lengths necessary for the guitar to play in tune with itself. Other acoustic guitars may have a bridge without the fine-tune compensation but at a slight angle, which provides some degree of compensation. These are sometimes referred to as *straight* bridges.

Figure 1.12 Straight acoustic guitar bridge. Thanks to About Music.

Some electrics utilize bridges that take special skill to properly compensate, such as a vintage Fender Telecaster or an Esquire bridge.

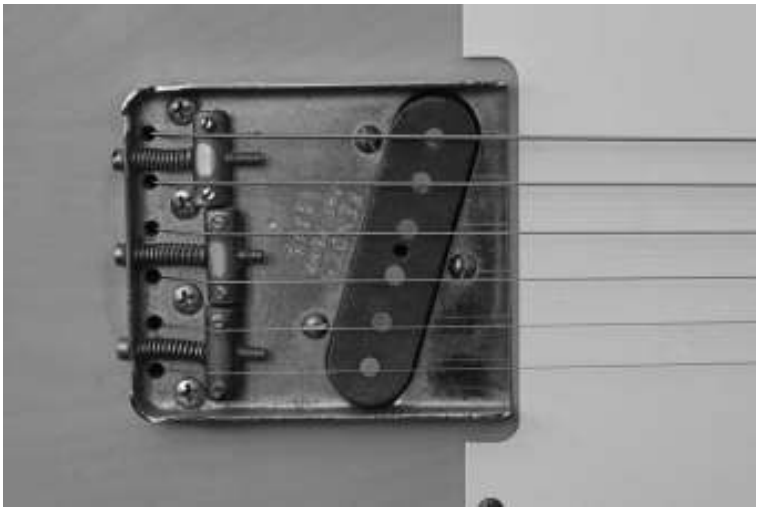

Figure 1.13 Fender Esquire three-piece bridge assembly. Note the angled bridge saddles. Thanks to About Music.

I would take these guitars to the shop for professional love and care.

The second reason why more guitarists don't sound in tune is that they rely on an electronic tuner but fail to double-check the instrument by using their ear. I'll be the first to say I'm guilty of this. That's one of the reasons why I think it has taken me years to really know how to get a guitar in tune.

Part of the problem goes back to the noise pollution I discussed earlier in this chapter: It's difficult to find the quiet space needed to listen with the focus to hear the subtleties needed for fine tuning with the ear. Fortunately, we have various electronic tuners at our disposal, but ideally a quick double-check by ear is recommended to make any necessary final adjustments or compromises.

At this point, I should mention that we're discussing a guitar in standard, low to high, EADGBE tuning. Did I say compromise? Yes, in the end, one or two strings may have to be tweaked slightly away from the "perfect" tuning offered by an electronic tuner, in order for the instrument to be in tune with itself. It's important to note that the pitch of a string will change slightly from when you first strike it (attack) to when the note decays. You've probably heard this with your ear, but an accurate electronic tuner will let you see this phenomenon as well. I have found that a good cross-checking (sometimes called spot-checking) method involves playing an open string and then playing the note an octave above or below the open string.

The Octave Cross-Check Method

1. Tune the open strings as precisely as possible with an electronic tuner.
2. Play the open E, sixth string. While it is sustaining, play the second-fret E note on the fourth string.
3. Play the open A, fifth string. While it is sustaining, play the second-fret A note on the fourth string.
4. Play the open D, fourth string. While it is sustaining, play the third-fret D note on the second string.
5. Play the open G, third string. While it is sustaining, play the third-fret G note on the first string.
6. Play the G note, third fret on the sixth string. While it is sustaining, compare it to the open G, third string.
7. Play the B note, second fret on the fifth string. While it is sustaining, compare it to the open B, second string.
8. Play the E note, second fret on the fourth string. While it is sustaining, compare it to the open E, first string.

Believe it or not, this procedure can be performed in a matter of seconds. The idea is to make a quick assessment. Listen and make note (no pun intended) of discrepancies that sound out of tune to your ear. Make any slight adjustments. Perform the procedure again. There is a "chasing your tail" aspect to this method, but it is excellent for using the ear as the necessary and final arbiter in the tuning process. I have another top-secret method for making a quick assessment.

The Fifth Cross-Check Method

1. Tune the open strings as precisely as possible with an electronic tuner.
2. Play the open E, sixth string. While it is sustaining, play the second-fret B note on the fifth string.
3. Play the open A, fifth string. While it is sustaining, play the second-fret E on the fourth string.
4. Play the open D, fourth string. While it is sustaining, play the second-fret A note on the third string.
5. Play the open G, third string. While it is sustaining, play the third-fret D note on the second string.
6. Play the open B, second string. While it is sustaining, play the second-fret F# note on the first string.
7. Play the open E, first string. While it is sustaining, play the second-fret A note on the third string.
8. Play the open B, second string. While it is sustaining, play the second-fret E note on the fourth string.
9. Play the open G, third string. While it is sustaining, play the third-fret C note on the fifth string.

10. Play the open D, fourth string. While it is sustaining, play the third-fret G note on the sixth string. Once again, the idea is to make a quick assessment of how well the guitar is in tune with itself, adjust as needed, and repeat. You can combine both cross-check methods or develop your own hybrid method. In any case, octaves and fifths are useful for revealing any overly offensive tuning issues. Experiment with playing fifths and octaves in different locations on the fingerboard, even up on, say, the seventh or ninth frets.

My final check is to play an open E chord, open A chord, open D chord, open G chord, and lastly open C chord. If all five of those chords sound reasonably in tune, then you are in like Flynn.

Many electronic tuners are capable of being connected in-line with the guitar signal, and most of these have a mute function. There will be many situations when it will be advantageous to use this mute function for "silent" tuning. Believe it or not, the same cross-checks work if you play one note at a time with the tuner in mute mode. This is an effective way to take into account the idiosyncrasies of your guitar.

Being in Tune with a Real Piano

If you've never let your electronic tuner "listen" to a fine piano immediately after it has been tuned and adjusted by a highly trained piano technician, you might be shocked. What you'll find is that the notes in the middle of the keyboard are relatively close to registering as being in tune on your device. As you play notes higher in pitch on the keyboard, you'll notice that they start to register sharp on your tuner, and if you play lower notes on the piano keyboard, the notes will register flat on your tuner. Is the piano out of tune with itself?

Yes and no. Piano technicians "stretch" the tuning on a piano to make the piano more in tune with itself. The reasons for this are beyond the scope of this book but are worth researching. This stretching of the keyboard is worth keeping in mind in situations when you have to play along with a real piano. I take a quick reading of a piano to see whether the A note above middle C is tuned to A=440. If this A note registers different than 440 Hz, then I recalibrate my electronic tuner to match the A on the piano. Virtually every electronic tuner can be set or recalibrated, at the touch of a button, to a different pitch standard. Then I try to get a feel for how flat the lower register of the piano has been adjusted. This is similar to the cross-checking methods I use to fine-tune a guitar in that I find I need to listen and then make a quick assessment. So, use the most accurate electronic tuner you can afford, but don't forget to always let your own ears make the final judgment.To summarize this chapter, before you set foot on stage, put on some groovy clothes (okay, I didn't mention this before), protect your ears, protect your hands, maintain your guitar, spend a nickel on some nice strings, and tune up!