

Maintenance and Repair

DISCLAIMER: Maintenance and repair of high end acoustic and electric guitars and mandolins should be done by qualified luthiers. The information set forth below is for reference only and not intended to suggest ALL repairs and maintenance should be done by an instrument owner. Consult with a qualified luthier before engaging in any repair or maintenance of fine acoustic and electric instruments.

There are many types of maintenance and repair that an instrument owner can do themselves; however, unless you are absolutely sure and knowledgeable about what you are doing, it is not recommended that you do this work. For high end instruments, seeking the counsel of qualified luthiers should be your first step. They have the experience, tools, and facility to effect repairs and maintenance to quality instruments. With that said, there are many occasions in which you can maintain and repair your own instruments, provided you have a clear understanding of what you're about to do, knowing that the repair can affect the instrument, and knowing whether or not you have all right tools. Your comfort level will, in most cases, determine whether or not the instrument should go to a qualified luthier, or whether the repairs and maintenance can be done by you.

As you become more familiar with your instrument, you will get more comfortable with tweaking and making adjustments. The same goes for repair. Starting with simple maintenance (changing strings, polishing fingerboards, or tightening/loosening truss rods, adjusting tuner gears) your comfort level will increase.

ACTION/INTONATION

The action of your acoustic guitar is the relative height of strings off the frets, which is determined by your saddle and nut height. Most people like medium action, but it is really subjective. It is highly recommended that you have a licensed and experienced luthier adjust your action. Usually, it will require a nut and saddle to be cut. The cost of owning the tools to accomplish this is more than having a luthier do the work. The best way to not only get an idea of how the neck is bowed, but how high the saddle sits up off the fretboard relative to the nut, is to look down the guitar from the head, slightly off center with your eye close to the head of the guitar. You can see if the frets are on the same plane as the top of the bridge. This is the ideal neck placement. See Taylor Guitars' *Symptoms of a Wet Guitar* article below:



Photo 7.

This photo shows the neck angle when wet. The top is so swollen that the bridge has risen above the fingerboard (see broken lines). If you were to "sight" down the neck, you'd find that it points "low" on the bridge. It would be a mistake to reset the neck while the body is this wet.

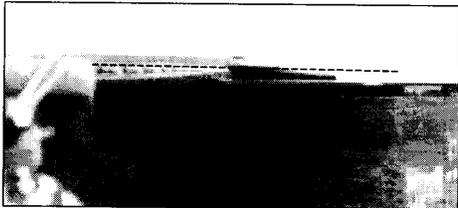


Photo 8.

In this photo, the neck angle is correctly set. Notice that if you sight down the neck to the top of the bridge, the top of the frets and the bridge are on the same plane.

SYMPTOMS TO LOOK FOR:

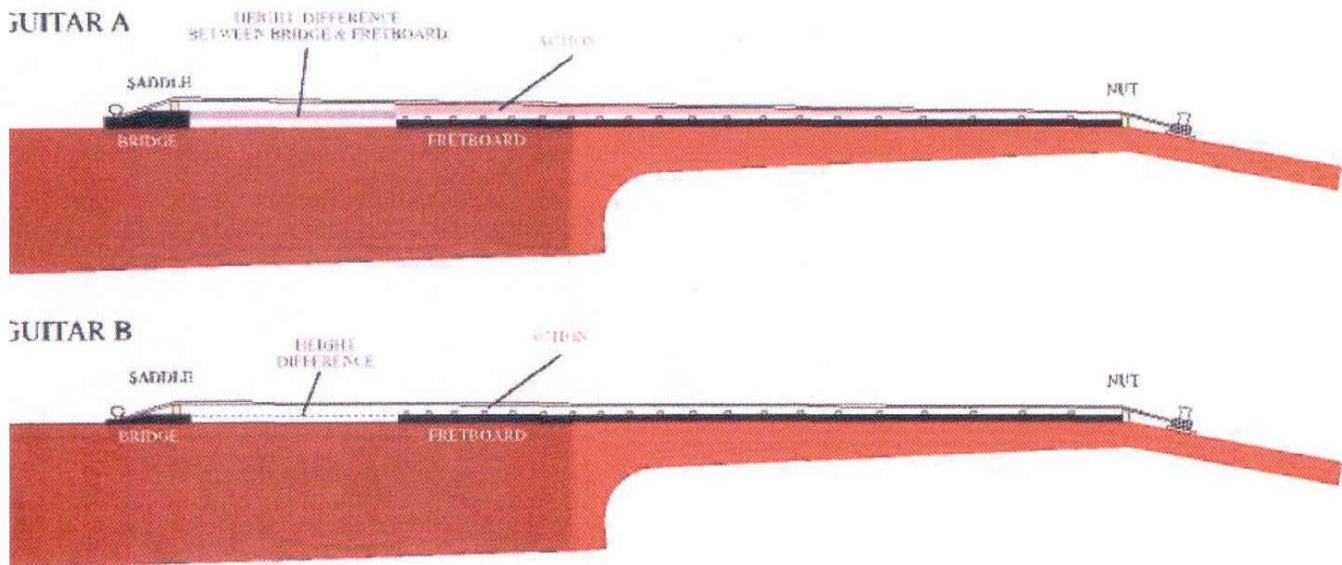
1. High action. Strings that are unusually high off the fretboard, making it difficult to play.
2. Portion of fretboard on the body is raised above the portion on the neck. Causes fret buzzing in the high registers.
3. Unusually swollen top. See photo 2.
4. Unusual warp on the top, back or both at the end-block.
See photos 1 and 2.
6. Improper neck angle. Sighting the neck to the bridge, the frets will appear to hit below the bridge.
See photo 7.

NOTE: All guitars will have a certain amount of "pull" behind the bridge. This alone is not an indication of a wet guitar. Look for a combination of these symptoms to determine if the guitar is getting too humid.

PREVENTION IS BEST:

1. Periodically, remove the guitar and blow-dry the interior of the case with a hair dryer for 10-15 minutes.
2. Use a small de-humidifier in the room where you store your guitar. It's also wise to monitor the humidity levels with a digital hygrometer. Radio Shack offers these for a nominal fee.
3. Place several silica gel packs in the guitar case and change them every few months

For a more comfortable feel, the bridge height should be on the same plane as the nut. See illustration below. Guitar A has high bridge off the plane of the fretboard. Guitar B has a bridge along the plane of the fretboard.



Keep in mind that even though the bridge sits high, if there is enough "meat" on the saddle, it can be shaved down to alleviate the height of the strings. This is the most cost-effective way of making this particular adjustment.

CHANGING STRINGS/GAUGES

Depending upon how often you play, what strings you use, changing strings will be the most maintenance you will undertake. For medium gauge strings and stronger, make sure string has at least 2-3 wraps around the string post. Drastically changing string gauges can result in a widening of the grooves in the nut, which can cause too much looseness if you revert back to a thinner string. Use led graphic to ease friction on the nut. This helps prevent the “ping” of strings when tuning.

TRUSS ROD ADJUSTMENT

To keep your instruments in optimum playing condition, periodic adjustments are necessary to compensate for the effects of changes in relative humidity. Adjustment and set up skills are easily learned, with the investment of a little time and concentration. It is well worth the time you take to learn to avoid the headache and excessive expense of situations listed below:

1. *Constant buzzing of strings from extreme weather changes;*
2. *Having to drive to and pay a repair shop a lot of money when you only need to turn a wrench a quarter of a turn, and tighten a few screws, which can take a repair shop 30 seconds to do;*
3. *Being on the road or in a session and not knowing anyone who can be trusted to fix a problem without the risk of damage to the instrument and thereby creating an even bigger problem;*
4. *Purchasing an unplayable used guitar because you didn't know how to evaluate the neck, truss rod, bracing, etc.*

Simple skills on repairing those little things will make playing the instrument more enjoyable and less of a disappointment. Going through life playing a guitar that has simple problems that you could otherwise easily correct is a real waste.

To get an understanding of how the neck should be bowed, understand that when a string is either plucked or struck with a pick it vibrates or “travels” in an arc or bow and travels the least at the nut (or just above any note you’re fretting) and at the bridge. It vibrates most halfway between an open note and the bridge.

The amount that the string travels is affected by many variables (string gauge, type of string, and whether the strings are old or new, and how hard you strike the string). A slight forward bow will make the guitar sound best. The more forward bow you have, the higher the action; likewise, the straighter the neck the lower the action. For slide guitar playing, it tends to be more desirable to have higher action. However, advanced slide players have great control of the slide, so they don’t need to compensate for action in order to avoid fret noise.

The purpose of adjusting the neck is to put the amount of bow into the neck that will correspond to the amount of string vibration, or to parallel the arc of the string with the arc of the neck. To see the arc of a vibrating string, tune the instrument to pitch, hold it in playing position, pluck the string and notice the difference in vibration at various points along its length. To see the arc in the neck, press a string down at the first and last frets simultaneously. Then, using the tuned string as a straightedge, notice the distance between the strings and frets at various points along the string’s length. To increase the amount of neck bow, loosen the adjustment rod; to decrease the amount of neck bow, tight the rod.

WEATHER CONSIDERATIONS

Hot or humid weather usually means “time to loosen the rod”; cold or dry weather usually means the opposite.

SYMPTOMS/DIAGNOSIS

Lots of buzzing
High action
Fall and winter (dry)
Summer and spring (humid)

CURES/PROGNOSIS

Loosen the rod
Tighten the rod
Tighten the rod
Loosen the rod

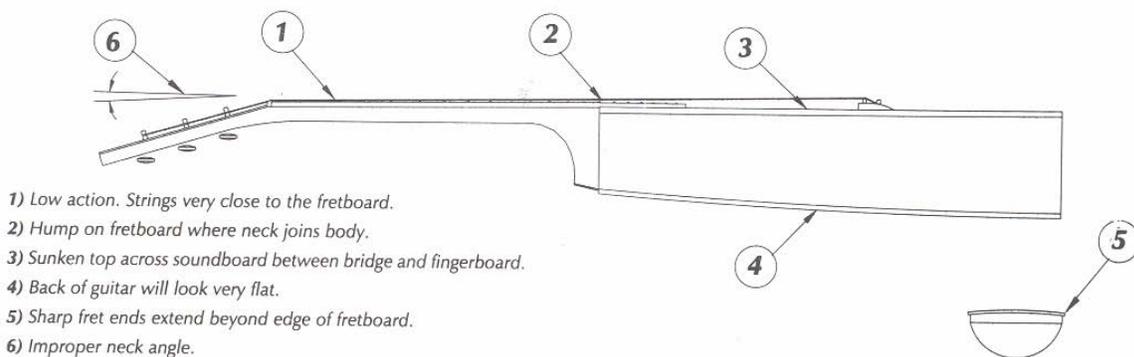
Neck adjustments aren't always the FINAL answer to an instrument's problems. You cannot “adjust away” localized problems like a bridge or nut that are set too high or low, or a few worn frets. Adjustments affect the whole neck, not just a small area. Unless the instrument's frets are level, optimum results are limited. **THE OPTIMUM RELATIVE HUMIDITY VARIES, BUT IS USUALLY BETWEEN 40% AND 50%.**

IT IS IMPORTANT TO NOTE that extreme moisture AND extreme dryness can drastically affect a guitar. The wood in a guitar can swell tremendously in humid environments, causing glue joints to fail and neck angles to change. Likewise, a dry environment can cause wood to contract and pull against the glue joints which, if they don't give, may cause the wood to split.

IT IS IMPORTANT TO NOTE that you CAN over-tighten a truss rod. With a nut driver, turns should not exceed half a turn.

See illustration below.

Illustration of dry guitar showing typical problem areas.



- 1) Low action. Strings very close to the fretboard.
- 2) Hump on fretboard where neck joins body.
- 3) Sunken top across soundboard between bridge and fingerboard.
- 4) Back of guitar will look very flat.
- 5) Sharp fret ends extend beyond edge of fretboard.
- 6) Improper neck angle.

To restore a very dry guitar, multiple applications of an instrument humidifier are needed. Wet, squeeze, and insert it into your guitar. Check it after three days, and rewet the Dampit if necessary. Then check every day until the top and back arches are restored. This takes care of the body. A truss rod adjustment and filing of the fret ends may be needed to restore the neck.

Maintaining the proper relative humidity level is essential if you wish to get many years of enjoyment from your instrument. If you pay a few dollars now, you'll save a lot later.