

Setup

Wednesday, January 16, 2013
9:37 PM



Proper position for the neck support when working on the guitar.



Use a pencil that has been flattened on one side to scribe a mark on the nut that is in the same radiused plane as the fretboard. Note that the pencil must span at least 2 frets and be held down on them as the line is drawn.





With the 6" support on the vertical belt sander table, grind to a line proud of the curve you just drew on the nut.



Nut after grinding. Notice the line.



Charles' jig for holding the nut while working on it. Much cheaper than the Stew Mac nut and saddle vice.

✓ Nut and saddle holder



Nut files are from Stew Mac.



Filing the curve on the back of the nut (towards the tuning machines).



Resulting nut in profile. The ends are also domed to a hemispherical shape, much like the fret ends.



Laying out the nut slot locations. This template works for any nut width. String positions are not centered on the middle of the string. Rather, the space between string edges is equalized. Also, the template adds some extra bias to the bass side, as the 6th string is so much larger than the 1st. This is barely visible in the photo as a line on the bass side just outside the line that is symmetrical with the treble side.

StewMac also sells a fret spacing ruler that is easy to use but requires a thin (0.3mm) lead pencil for accurate marking.



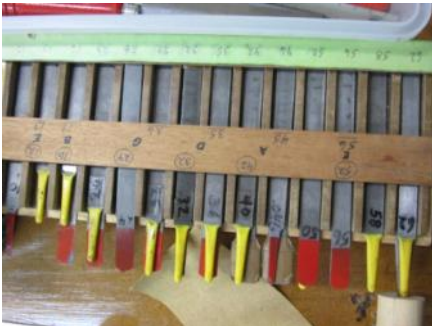
With a very sharp pencil, make a mark at each string location.



With the nut firmly in the "vice", make a notch at each string location with the knife.



Using the diamond-edged file, widen the notch, beginning the nut slot.



Charles' collection of nut files. At each string position, choose the file that is the same size as, or slightly larger than, the gauge of string that will be in the slot.



Filing a nut slot. Begin horizontally. Be sure to square the cut perpendicular to the nut. The file is very thin and should be pulled through the slot with the left hand rather than pushed.



After a clear slot has been cut, begin to slope the cut down and away towards the back of the nut. Note that the angle is not steep. Finish up with the slot depth close to the curved line drawn in step one, but be sure to leave room for adjustment later. Otherwise, you may cut too deep and the string will buzz on the 1st fret.

Finally, put a very slight rounding on the leading edge of the slot (a stroke or 2) to prevent strings from hanging up on the edge and breaking.

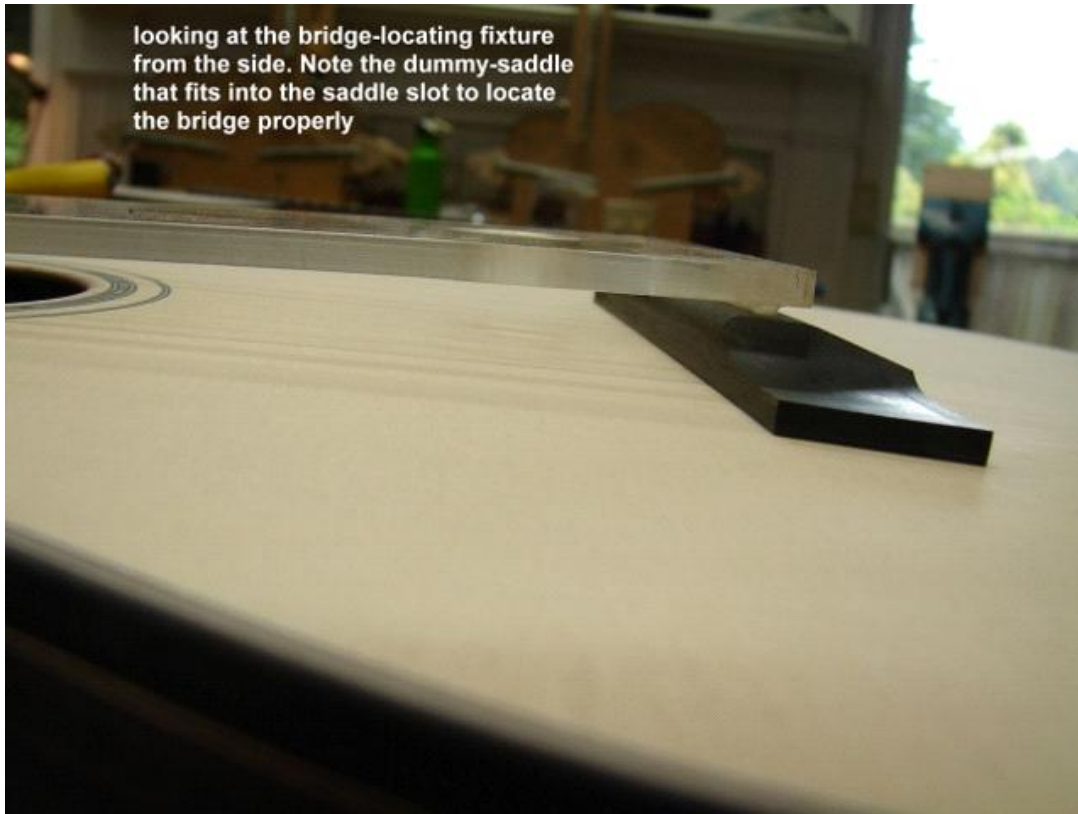


Determine the bridge location. Naturally this is done with a jig that precisely locates the bridge given the nut location for the appropriate scale of the guitar.

✓ Bridge locating template



Another view. In general, the jig allows you to set things up straight along the centerline of the guitar. However, there is an opportunity here to set a **very slight** bias by moving the jig a bit outboard on the bass side. This makes the first string easier to fret as you move up the neck.



Putting a 25" radius on the saddle. I have no photos of preparing the saddle. Those steps are:

- Round one end of the saddle with a file and perhaps some #80 sandpaper.
- When the end matches the saddle slot, measure the length, cut the length (a little proud) on the band saw.
- Flatten and then round the cut end.
- Remove saddle thickness as needed until it fits snugly into the bridge. It's right when the fit is snug and the saddle can still be easily removed by hand

If the saddle gets stuck in the bridge during the last step, use pliers with parallel jaws (a common jeweler's tool) to pull them out.

✓ [Saddle radius jig](#)



Bridge in place... not shown: the bridge is positioned using the jig (above). When the final position is set, clamp the jig to the neck. Drill out 3/16" holes, as follows:

- Drill through the bridge and down through the bridge plate at the 1st string. Be careful to control the drill as the cut is finished.
- Put a temporary peg in the hole to hold the location firm.
- Repeat the above at the 6th string.
- With two pins maintaining the bridge location, remove the jig and drill the remaining holes.

In this setup, the bridge remains removable. This is accomplished with the hollowed brass screws shown. They are held with a washer and nut at the underside of the bridge plate. The screw heads are drilled out enough to taper them toward the hole through the screw while retaining some of the original screw slot at the edge. A dime is the perfect implement for turning these screws from the top. From underneath, a 3/8" nut driver with a deep throat and shallow drive shaft is needed.



✦ First stringing of guitar. Be sure that the strings pass through one of the slots in the bridge bolts on their way to the saddle. Once strings are on, use the truss rod to add a bit of relief before cutting slots in the nut and compensating the saddle.

The desired action is $3/32$ " between the top of the 12th fret and the 6th string. At the first string, this action should be $1/16$ ".

Since the 12th fret is $1/2$ the scale length, it takes twice the adjustment at the saddle to obtain the adjustment needed at the 12th fret.

At this point, if the action is a bit low but is close and there is no fret buzz, leave it alone, as the bridge will rise due to string tension.

🔗 I believe the above specs are correct here. From the internet:

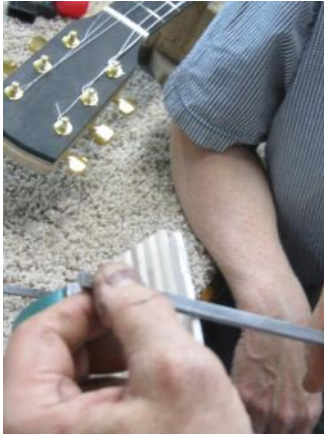
Most factories set action at $3/32$ " to $7/64$ " on the bass E string at the 12th fret and $2/32$ " to $5/64$ " on the treble E.

Pasted from <<http://www.fretnotguitarrepair.com/repair/acoustic-guitar/action.php>>



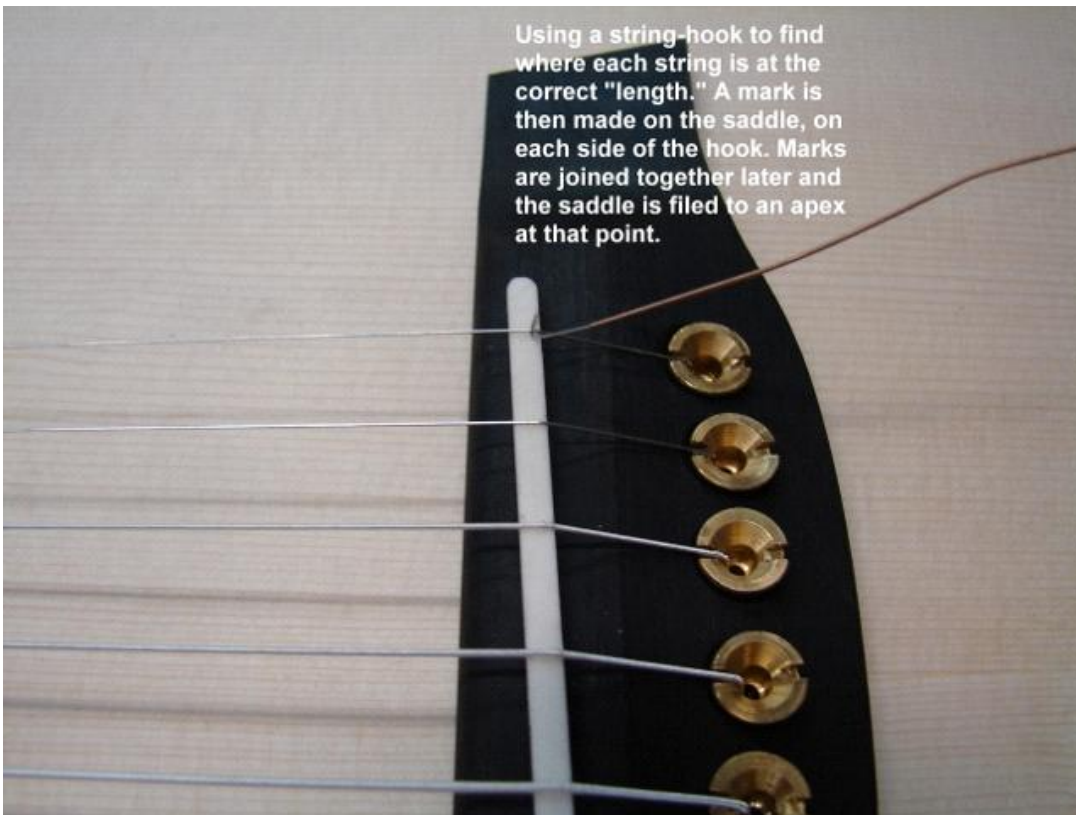


★ Back to nut work: At each string, fret the string at the 3rd fret and observe the clearance and the 1st fret. It should be minimal but noticeable. If there is too little, the string will buzz. If there is too much, carefully file the nut with the appropriate file to lower the action. As you approach the right depth, **check after each file stroke** - it really is that close tolerance.



Finally, compensate the saddle. The core from a wound 3rd string formed into a little metal hook or U-shape is used to position the saddle break point precisely. With that in place, tune the string to concert pitch. Then play the harmonic at the 12th fret, followed by fretting the note at the 12th fret. Adjust the hook until the harmonic and fretted note match. Mark the location on the saddle with a pencil.

NOTE: wait for the harmonic note to dwell, as it may be off a bit at the initial attack.





When all 6 strings have been so intonated, file the saddle so its ridge is at the marks for each string. Usually this is done by drawing a line between the 1st and 2nd string intonation marks and filing to that line. The 3rd string should start a new line forward of the 2nd string line. This is because it is the core of the string, not its overall diameter, that determines the intonation. The 3rd string core is actually thinner than the 2nd string. Again, draw a line between the 3rd and 6th string intonation points. The positions for the 4th and 5th strings may be minimally off, but not enough that the ear will notice the difference.

If this scheme of 2 compensation lines does not seem to lay out after the lines have been set, or if a string cannot be intonated because it is still flat when the compensation is at the very front of the saddle, then there is a problem with the nut. Probably, there is a high point somewhere in the nut slot toward the back of the nut. Look for this with a pencil or nut slot file and file carefully, being sure not to lower the string until it buzzes.



Semi-final result. There is more work to do: some sculpting of the neck, which I only discovered after playing a bit. Also sanding and, obviously, finishing. Can't wait to get it done!

Also, the bridge must be glued on with luthier's glue and the bridge and end pin holes reamed.