MAHOGANY & SYCAMORE GUITAR KITS

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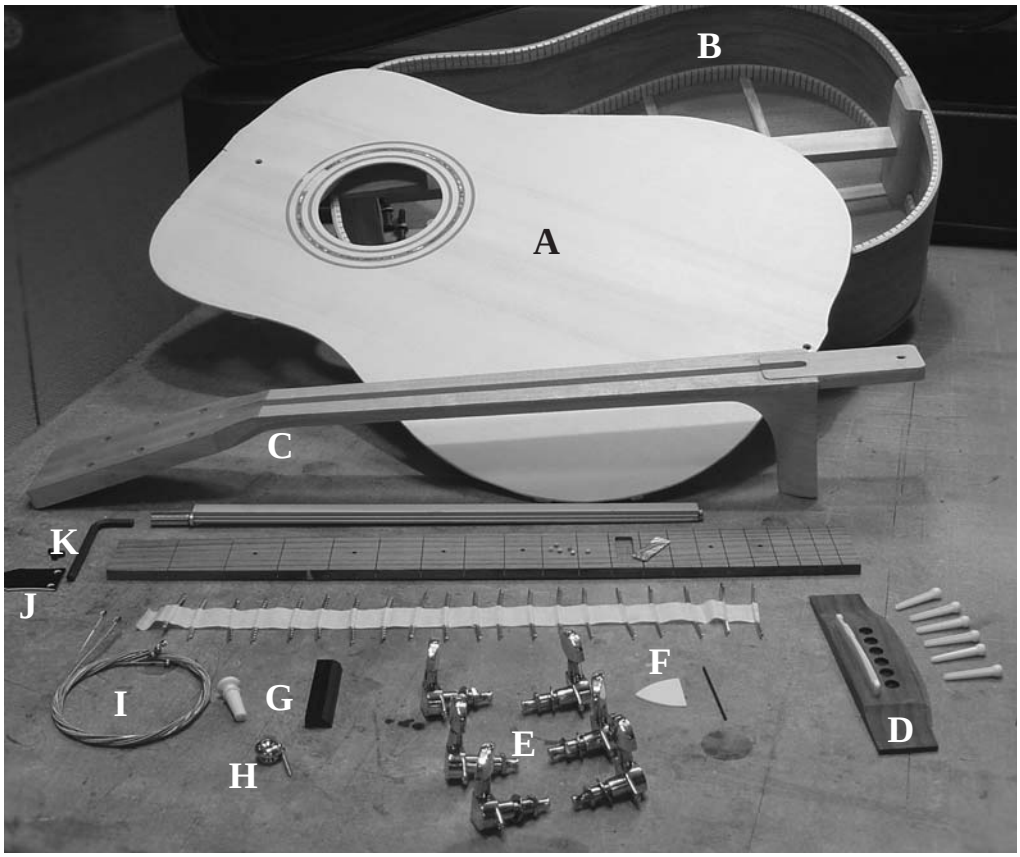
Mahogany or Sycamore Guitar Kit

Kit Parts:

A - Soundboard
B - Body Assembly
C - Neck Assembly
(truss rod installed)
D - Bridge
(w/saddle & Pegs)
E - Geared tuners
(with 6 tiny screws)
F - Heel Cap
G - Nut & Endpin
H - Strap Button
(with screw)
I - Set of guitar strings
J - Truss Rod Cover
(with screws)
K - Truss Rod Wrench



Parts not shown:
Abalone inlay markers
Fretwire coil (48”)
Plastic Binding Strips (2)
Radiused Sanding Block
Bridge Placement Board
Binding Adhesive
2 Tiny Nails
12” Veneer Tape
Bridge Clamp w/bolts & pads
Heel Cap (plastic)
Guitar Case

Please take the time to check over the parts of our kit now, to make sure everything is there. If you discover a problem, call us right away so we can rectify it quickly without causing you much delay in your project.

A NOTE ABOUT GLUE

We strongly recommend that you use a modern woodworking glue for assembling the wood parts in this project. The yellowish Aliphatic Resins (such as Elmer's Carpenter's Wood Glue or Titebond I) are best because they hold the parts more securely than the old animal glues of yore. You might use some epoxy or superglue for some things, such as the plastic Nut and the Abalone inlays, but not for the wood parts. The yellow colored Elmer's or Titebond is best for wood because of its excellent holding power and simplicity of use.

Yes, many luthiers (instrument makers) still use the natural hide glues that have been around for centuries, carrying on a fine old tradition, but that does not mean that you should do the same. The experts who use hide glue effectively are careful to cook up each batch to their own specifications from a high grade of granules. We have found the prepared liquid hide glues on the market to be inferior for this project.

When gluing parts together, be sure to put enough glue on the joint to wet the entire surfaces to be joined. A good sign of proper gluing is that a little excess will squeeze out around the joint when clamping pressure is applied. Too little glue may cause the parts to separate later, whereas too much glue makes things messy. We always keep a damp rag handy for quick cleanup, as necessary. It is especially helpful to keep your fingers clean while gluing, because gluey fingerprints have the embarrassing tendency to appear on the finished product in places you never expected.

We suggest skimming through the entire directions before beginning, just to get an overview of the project. You may need to gather more tools or purchase a few optional decorations or accessories to enhance the finished instrument. Now is a good time to make those plans so you can avoid delays later.

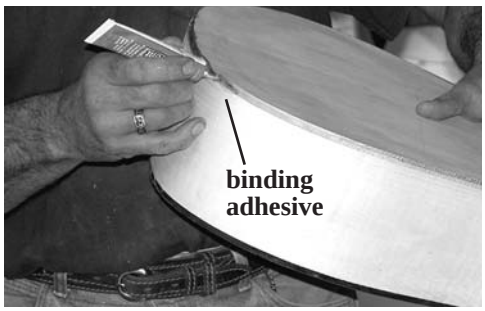
Here are a few of the tools & supplies you'll want to have on hand:

Metal straight-edge, at least 24" long
Small rat-tail file (6") or reamer for bridge pegs
Small triangle file (or Nut files)
Sandpaper (80, 120, 180, 220, 400, 600 grits)
Yellow woodworking glue (such as Elmer's)
Super glue (CA), medium gel (or 5-minute epoxy)
Finish of your choice (see page 19)
Router with sharp straight bit & flush trim bit
Electric Hand Drill with bits (1/16", 3/32", 3/16")
8-10 clamps that open at least 6", or make 20 spool clamps (see page 6)

Hammer
Screw Drivers
Flat mill file
Masking tapeSharp Chisel
Razor knife
Sharp cabinet scraper
a few spring clamps

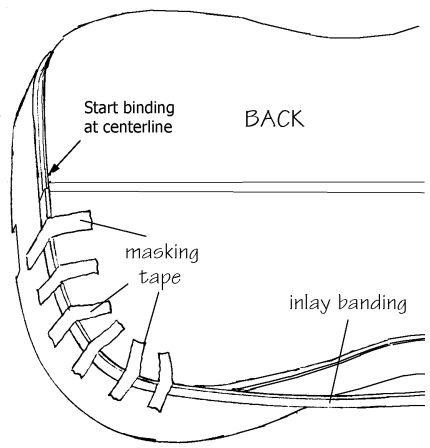
_____1. BINDING THE BACK

NOTE: The binding supplied with this kit is ABS Plastic. We use a rather thick (.090") solid color strip because it is easy to work with than multiple thin strips, and you won't be likely to wear through it later on when you use the scraper to level the binding with the wood.



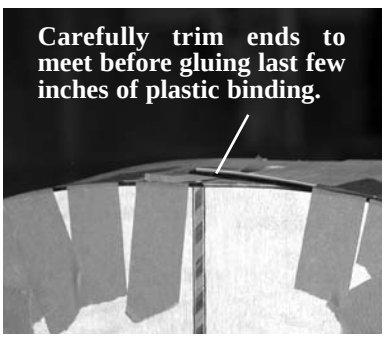
We have already routed the ledge for binding around the back of your guitar, so this will be an easy start for your project. Use the tube of binding adhesive (Weld-On #16) and a roll of masking tape for this step.

Begin by sealing the wood in the routed ledge with a quick coating of binding adhesive. It will dry very quickly and fill the pores of wood so the glue will stick better when you apply more as you install the binding.



Trim one end of the binding strip clean and square (or at a 45 degree angle if you want to overlap the other end), and begin by gluing that end at the centerline of the guitar at the front end (where the neck meets the body). Squirt fresh binding adhesive into the ledge for a distance of about 6" at a time and use masking tape every inch or two to hold the binding tightly in place.

When you get nearly all the way around the body, take care to trim the other end of the strip so it fits snugly up against the starting end. A razor knife or sharp chisel should work well for cutting the binding.



IMPORTANT: Leave the tape in place overnight before removing. The adhesive does not reach full strength until 24 hours.

This does not mean, however, that you can't work on the body of the guitar. Just don't remove the tape too early.

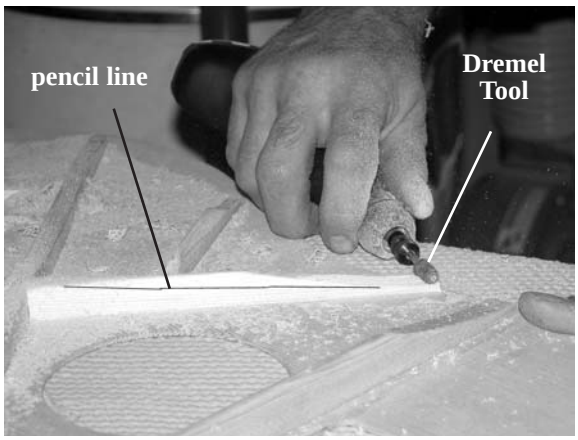
_____2. SHAPING THE SOUNDBOARD BRACING (OPTIONAL)

WARNING: The soundboard is very fragile!

Be very careful in handling your soundboard, especially around the edges. This solid softwood is meant to be lightweight, with verical grain, and that makes it very easily cracked. Don't worry, however, if you find (or cause) a crack or two in the soundboard. These can easily be glued back together with Elmer's or Titebond glue, using masking tape to hold the glue seam tightly until dry.

When working on your soundboard, we recommend always placing a clean cloth on your work surface first. That way you will be less likely to scratch the beautiful face of the wood.

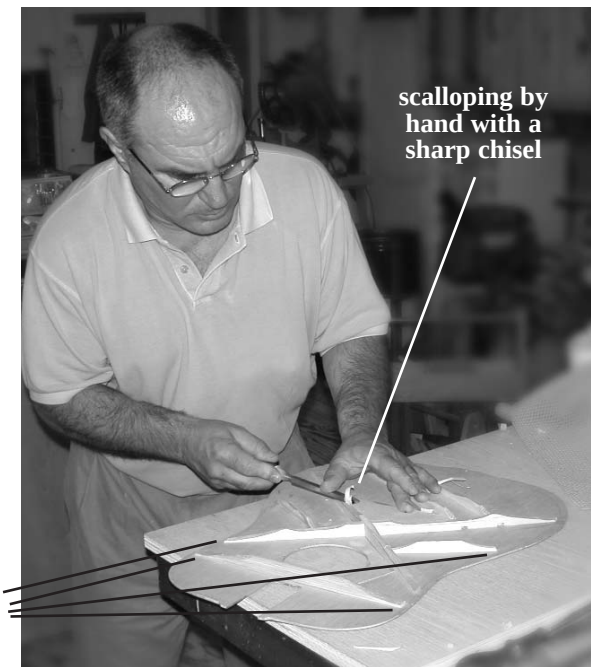
The sound of your guitar will be improved if you take the time to "scallop" the inner bracing before closing up the box. This step is optional, however, and you will have a very nice instrument even if you do not shape the bracing further. You may skip to step 4 if you decide to omit this operation.



The inner braces on your soundboard are quite a bit heavier than they need to be. You will notice that we have drawn pencil lines on them to show how we like to shape them for optimum sound. You may be surprised at how much material you'll need to remove to pare these braces down to the pencil lines. Our goal is to maximize the acoustics of the instrument without sacrificing the strength and longevity of it. There is a saying among luthiers (instrument-makers) that goes, "An instrument always sounds its best just before it breaks." Of course, we want to prevent a disaster from happening, but some of us also like to "push the envelope" a little to achieve a fine sounding guitar. The lines we have drawn on your guitar represent a fairly conservative amount of scalloping, similar to a Martin style guitar, so you need not worry about sanding or carving right to the pencil lines.

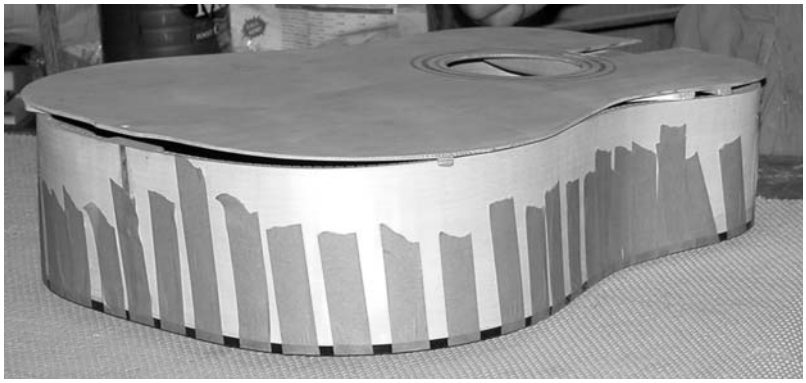
There are several ways to accomplish this task: Use a Dremel Tool with a grinding wheel or sanding drum, put a sanding drum into a hand drill, cut by hand with a chisel, or hold the bracing up against a drum sander or the curved end of a belt sander.

These photos show alternative methods of carving the inner braces.



The ends of all braces around the perimeter of the soundboard should be reduced to about 1/8" thickness.

_____3. FITTING THE SOUNDBOARD TO THE BODY



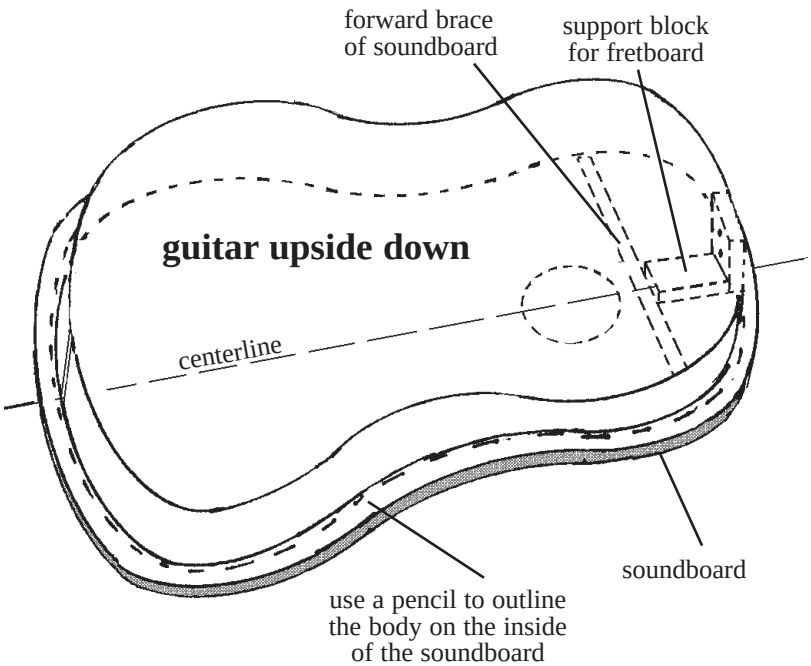
Now that the inner bracing is shaped the way you like, you can fit the soundboard to the body. This is a time-consuming and very important step, so exercise your utmost patience, and make sure you get a good fit.

Notice that the braces prevent the soundboard from fitting flat on top of the body. This step will show you how to trim the braces shorter so they tuck into small cutouts in the kerfing around the inside edge of the body.

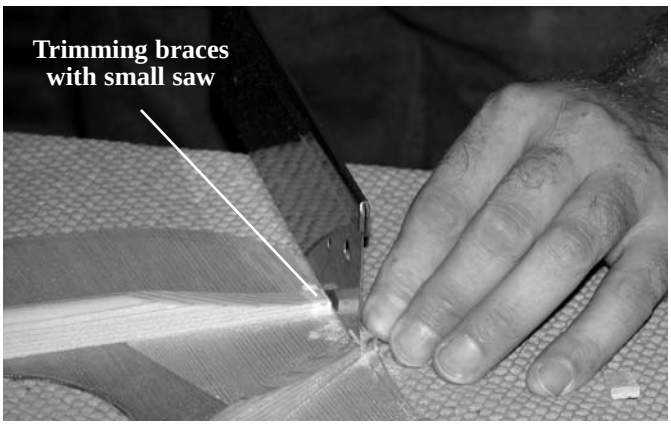
Place the soundboard on a padded work surface with the front facing down (braces up). Then flip the body over onto the soundboard and carefully line up the centerlines of both parts. The soundboard should extend out beyond the sides of the body a little bit all the way around. If not, you may need to press the sides in a little somewhere to make sure the soundboard covers the entire body.

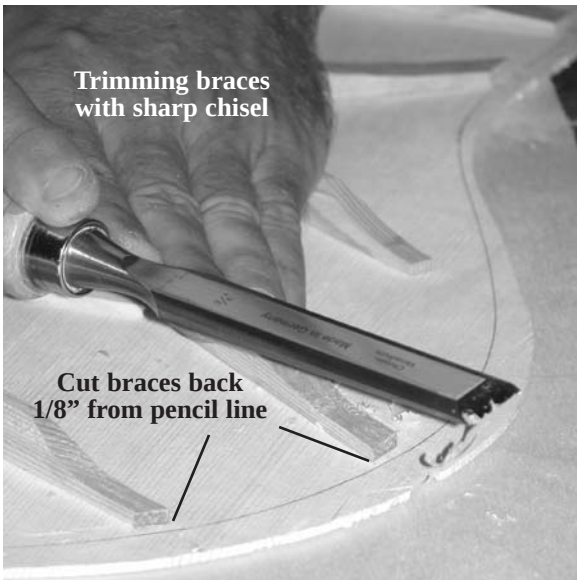
You'll notice that the soundboard can be slid a little forward and aft on the body and still cover the entire circcumference. We suggest positioning it so there is no more than 1/8" gap between the forward brace of the soundboard and the support block for the fretboard at the front of the body.

When you have the parts centered and positioned properly, hold it still and draw a pencil line on the soundboard, following the circumference of the body.

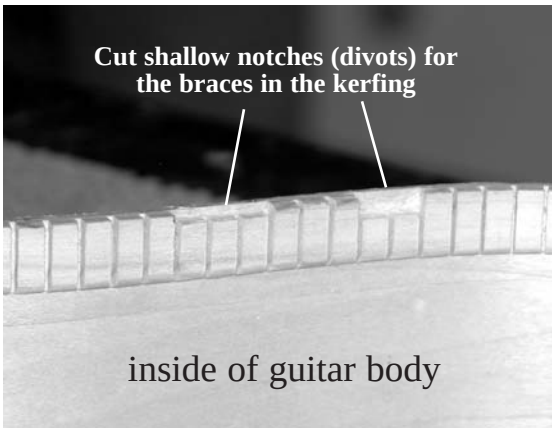


Once you have the outline of the body on the soundboard, you will need to trim all braces back away from that line by about 1/8 inch. Please note that this will not make the braces clear the inner kerfing of the guitar. You'll cut divots in the kerfing in the next step. This step is just meant to cut the braces short enough to miss the laminated sides of the guitar.





When the braces are trimmed shorter, place the soundboard on the body again and carefully mark the points where the braces rest on the inner kerfing of the guitar sides.



Then remove the top and use a razor knife or sharp chisel to cut shallow notches in the kerfing to match the thickness of the ends of the bracing, as shown. The kerfing is very soft wood, so it is quite easy to push the blade into the grain, twist the tool and break out a small piece of wood to create a divot.

The reason for all this detail work is that guitar bracing can easily come loose inside the guitar in the future. Re-gluing inner bracing is one of the most common repair jobs! Your braces will be much less likely to come loose if the ends are held by the kerfing. Notice that the back braces have been installed the same way.

Yes, this task requires some patience. Perfectionism is not required -- the notches can be wider than necessary, but please take your time and **make sure the top will fit completely down against the sides all the way around the circumference of the body.**

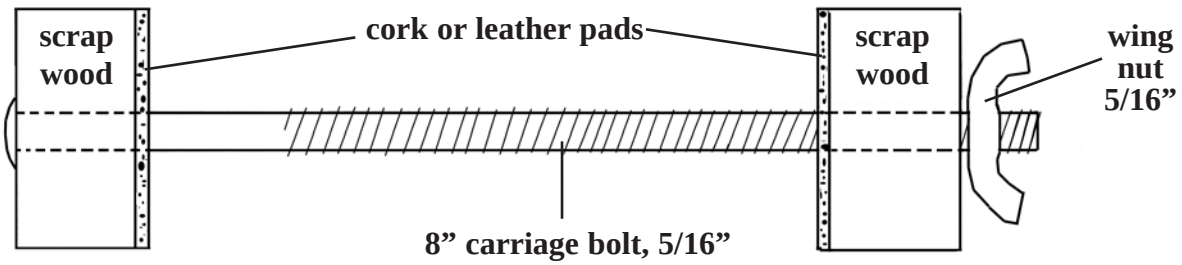
_____4. GLUING THE SOUNDBOARD TO THE BODY

Before actually gluing the soundboard in place, take the time to plan how you will clamp it firmly to the body. Take care, however, to avoid cracking the fragile soundboard wood! There are several options here:

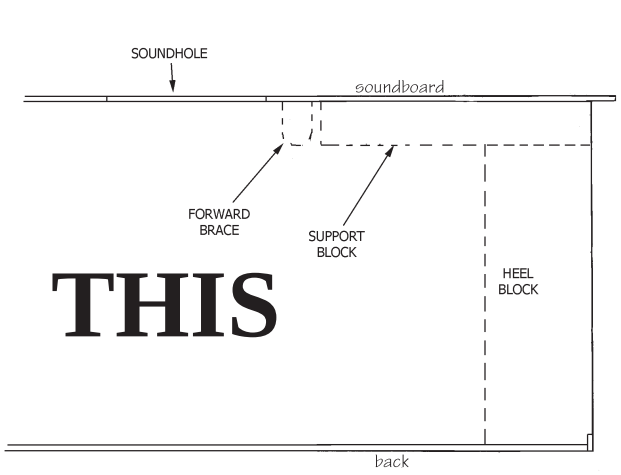
• Use 20 clamps (or so) to put light pressure all around the circumference (spool clamps or cam clamps work very well for this) -- see below
• Use masking tape to hold the soundboard body against the body;
• Cut a number of wood scraps to use as clamping pads to distribute the pressure of 8-10 clamps pressing down against the soundboard on the body.

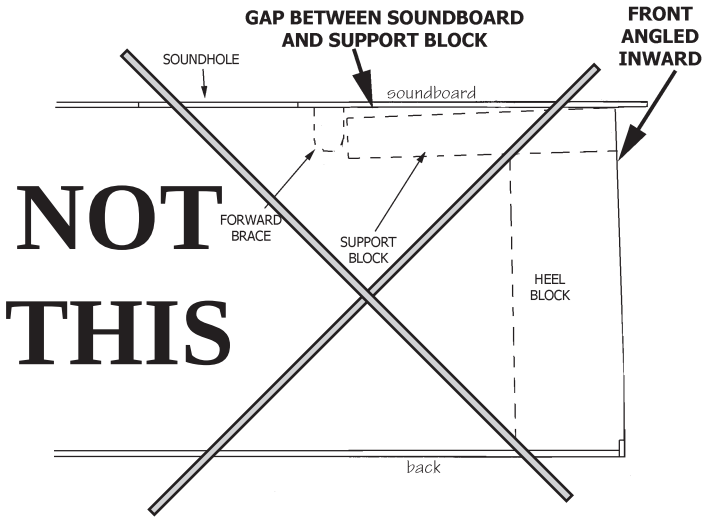
NOTE: If you do not have enough clamps, and you don't want to use this project as an excuse to buy more, a thrifty option is to make simple spool clamps from 5/16" carriage bolts, wing nuts, and scraps of wood and cork.

Home-made Spool Clamps



Test fit the soundboard to the body dry first (without glue), making sure you can draw all the gaps closed around the circumference. Remember the support block for the fretboard? That's the block that you can see through the notch at the front of the soundboard. Take a good look to see if this block makes good contact with the underside of the soundboard. If necessary, remove some clamping pressure around the front of the body so you can push the front forward or pull it backward in order to get this support block to rest flat against the soundboard. This will help make sure the neck fits properly onto the guitar.





One more thing: Before gluing the soundboard in place, check to make sure each brace is firmly glued to the soundboard. We have seen some soundboards with loose bracing, and this is the time to re-glue it easily.

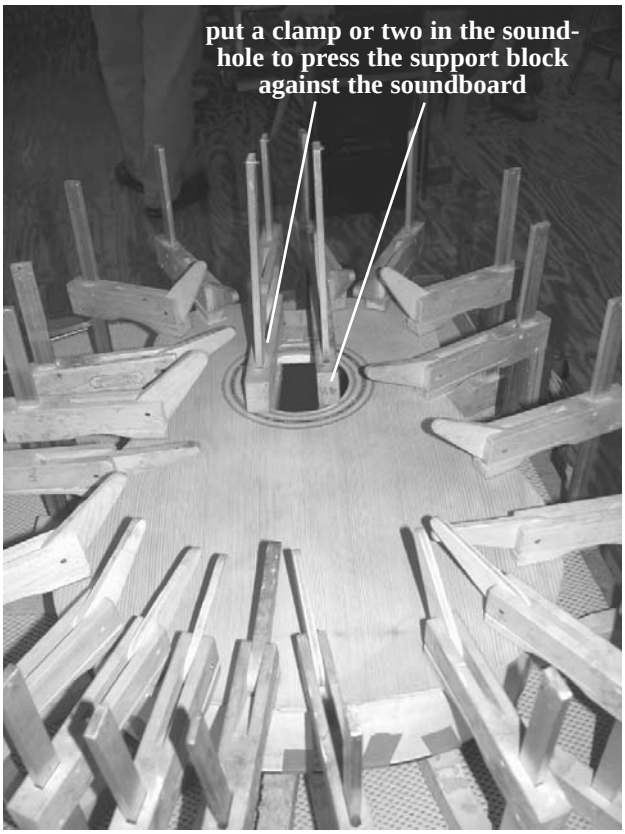
And another thing: This is your last chance to sign and date the inside of the guitar for posterity. Place your signature where it can be easily seen through the sound hole.

Once you are satisfied with the fit of the soundboard, and you are fully prepared with clamps, weights, and/or tape, go ahead and glue the soundboard to the body. Apply glue all the way around the perimeter of the body, including on the tail block at the back and the flat portion of the support block in the front. Put some glue in the little divots cut for the braces too. That will help secure the ends of the braces firmly.

Place the soundboard on the body and clamp it down, making sure to push or pull the front of the body so the support block can be clamped against the inside of the soundboard (clamping through the hole), as shown.

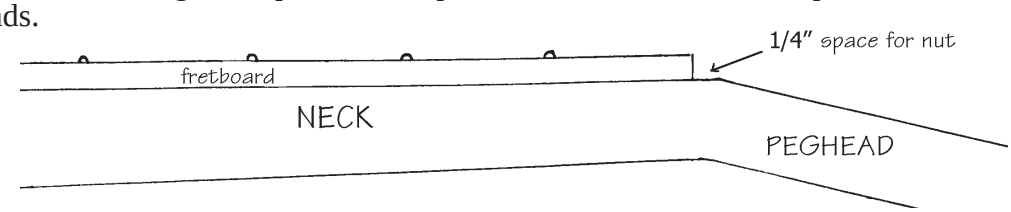
Double-check around the perimeter of the body to make sure the soundboard completely covers the sides all the way around. If you find a spot where the side extends out beyond the soundboard, loosen a few clamps in that area, push the side inward, and re-clamp.

Allow the soundboard to dry overnight with clamps in place.



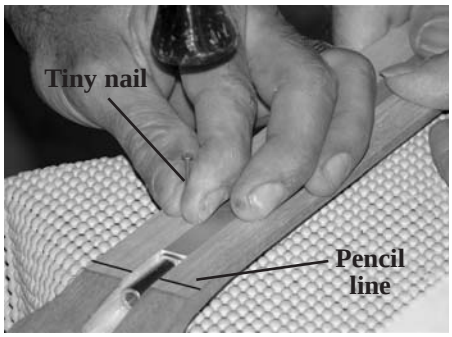
_____5. GLUING THE FRETBOARD TO THE NECK

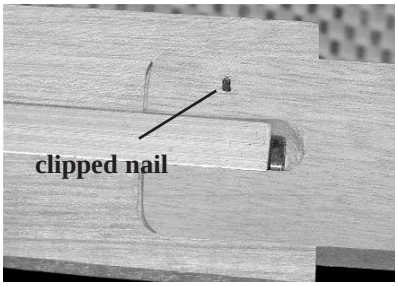
Test fit the fretboard to the neck, leaving 1/4" space for the plastic nut, as shown. Use a pencil to mark neck where the fretboard ends.



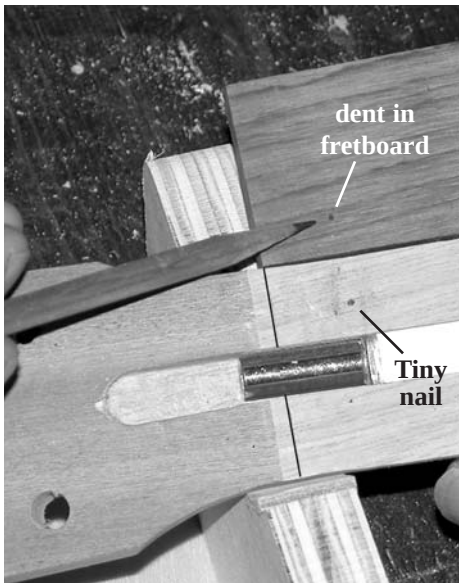
The fretboard is tapered to match the neck, but neck has not been trimmed completely yet. Don't worry about that at this time. Once the parts are glued, you can sand the edges flush.

A common problem when gluing the fretboard is that it tends to slide out of position under clamping pressure.





The best way to avoid this problem is to put a tiny nail into the neck near each end and clip the heads off so you end up with small barbs sticking up about 1/16", as shown.



With these barbs in place, carefully position the fretboard on the neck again, centering it on both sides, and making sure the narrower end fits up against your pencil line. Use tape or a couple spring clamps to hold the parts in place.

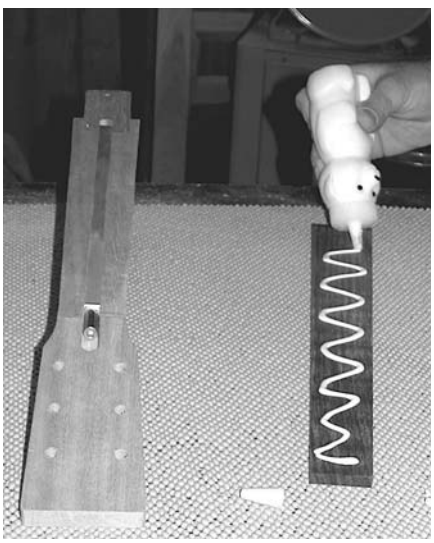
Supporting the neck firmly, use a hammer to tap the fretboard down onto the nail barbs so you end up with a little matching dent in the underside of the fretboard from each nail, as shown.

The fingerboard is made of Rosewood, a wood that contains a fair amount of natural oils, so it will help to wipe the underside with denatured alcohol before gluing it to the neck.

When all is ready, squirt glue on the fretboard and carefully position it on the neck so the tiny barbs find their proper positions. Then use several clamps to hold it firmly until dry.

wipe fretboard clean

apply glue



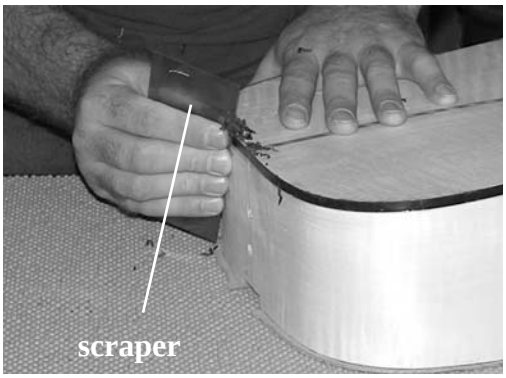
install clamps

_____6. USING A SCRAPER

By now, the binding has probably been glued for at least 24 hours, so you can learn how to use a scraper. A steel scraper is a wonderful tool that many woodworkers have never used. It is especially helpful for removing small amounts of plastic binding around the edge of your guitar -- a task that does not work well with a sanding block.

If you have never used a scraper before, we recommend that you take the time to learn how it works and how to sharpen the edges. You can type "cabinet scraper" into Google on the Internet and find all sorts of helpful information about them.

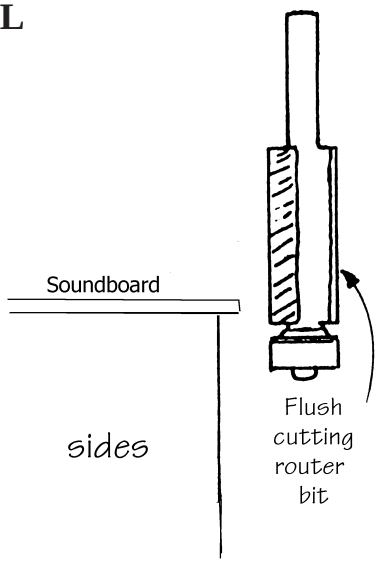
Once you have your scraper sharpened and ready, you can try scraping the plastic edge binding around the back of the guitar body. It is helpful to stabilize the guitar in some some way. We like a non-skid pad, but you could hold the guitar **gently** in a vise if you pad the instrument well.



Keep the scraper parallel to the adjacent wood and use short strokes to scrape peelings off the plastic edge binding. Stop when the plastic is level with the wood.

WARNING: Be careful not to scrape (or sand) the wood too much if you can help it. The veneer is very thin on the sides and back of the guitar, and you don't want to scrape through to the next layer. Just work the plastic binding down flush with the wood.

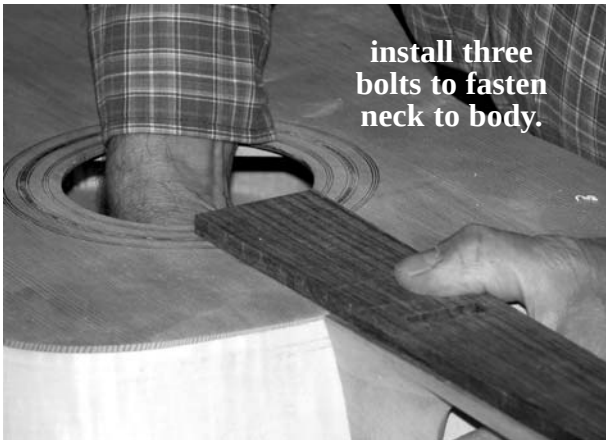
_____7. TRIMMING OFF EXCESS SOUNDBOARD MATERIAL



The easiest way to remove the overhanging soundboard material is with a flush-cutting router bit, as shown. This bit has a roller that follows the curve of the guitar so you cannot cut too deeply.

If you don't have a router, this is the perfect excuse to buy one! But if that's not an option, you may use a sanding block with coarse (80 grit) sandpaper to remove the excess soundboard material. Be very careful, however, to avoid breaking this thin material as you work on it.

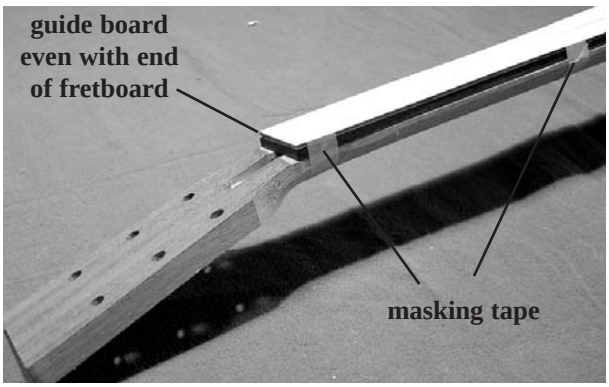
_____8. MEASURING FOR THE BRIDGE



This is a good time to check the fit of the neck to the body and measure the correct location for installing the bridge.

Use the three allen-head bolts to fasten the neck into place, as shown. You'll find an allen driver in your hardware pack for tightening these bolts.

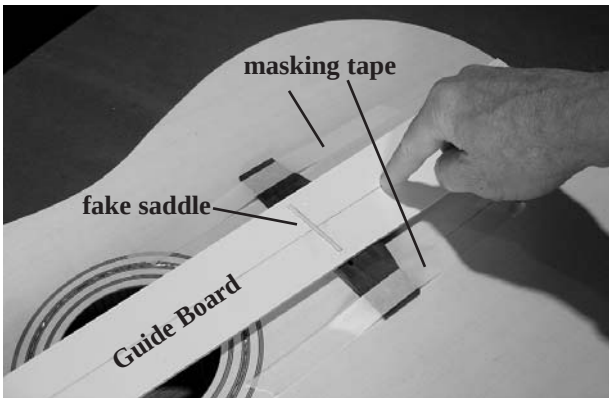
We have included a long "bridge placement board" with your kit to help you get the proper placement for this critical piece. Notice that the board is tapered to match the fretboard.



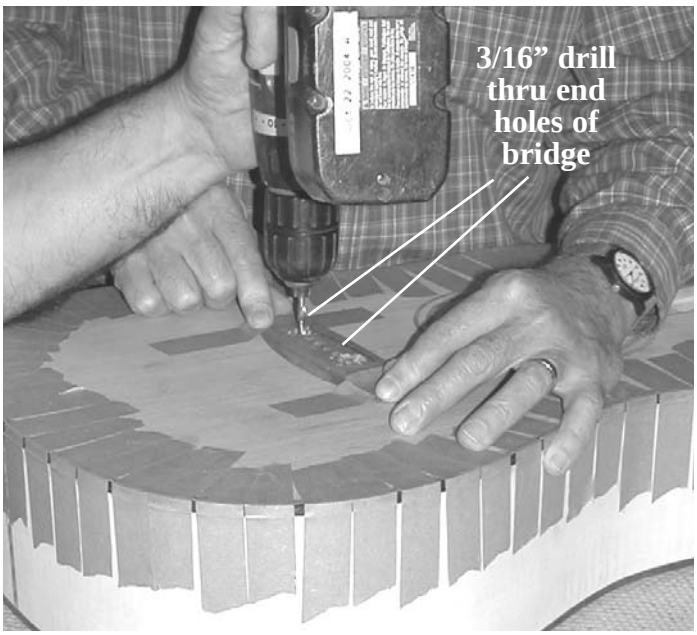
You'll line up the narrow end even with the narrow end of the fretboard. Use masking tape to hold the long white guide board in place, as shown.

Make sure the sides of the guide board follow the fretboard. This is important because it will determine how the strings follow over the fretboard when the guitar is finished.

When the guide board is correctly placed, position the bridge so the fake "saddle" fits into the slot of the bridge, as shown.



When you find the right position for the bridge, use masking tape to hold it in place temporarily, but **DO NOT GLUE THE BRIDGE YET.**



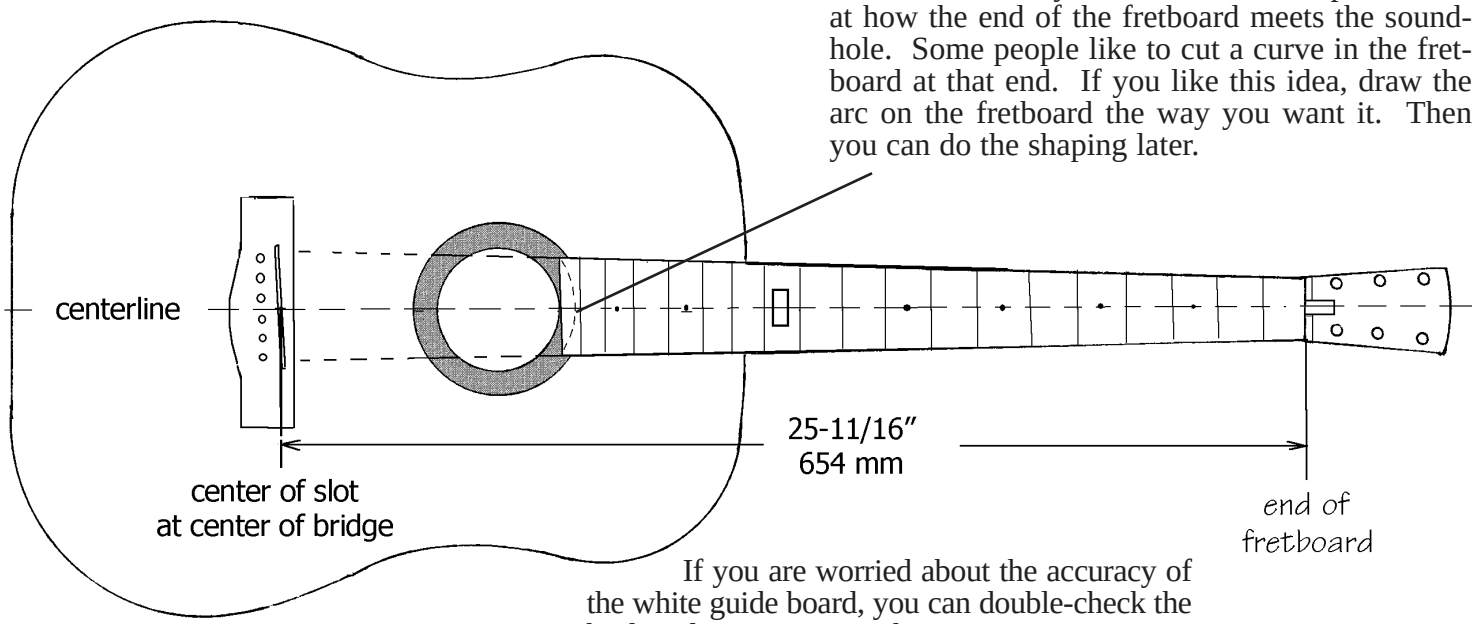
Make sure the bridge is held firmly by your masking tape so it does not shift out of position as you drill for mounting screws. Then you can remove the white guide board.

Use an electric drill with a 3/16" bit to drill through the two outer-most holes in the bridge. Drill all the way through the bridge and the soundboard into the inside of the guitar. These holes will be used when you clamp the bridge.

(Yes, the photo shows us drilling these holes after installing the inlay binding around the soundboard, but we think it will be easier for you to drill now, before you install the binding.)

Another Option:

Now that you have the neck in place, look at how the end of the fretboard meets the soundhole. Some people like to cut a curve in the fretboard at that end. If you like this idea, draw the arc on the fretboard the way you want it. Then you can do the shaping later.



If you are worried about the accuracy of the white guide board, you can double-check the bridge placement using these measurements.

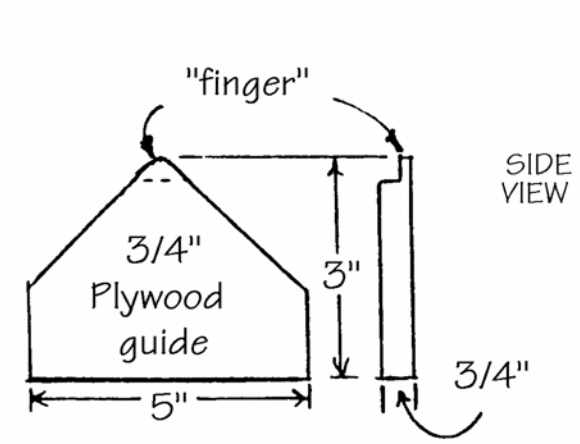
_____9. ROUTING FOR INLAY AROUND THE SOUNDBOARD (Optional)

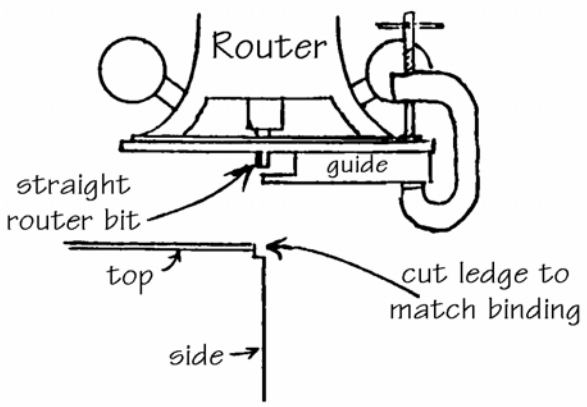
You do not need to install inlay binding around the front of the guitar, but it will look much nicer if you take the time to do this step. It is not as scary as you might think, and you might learn some tricks with your new router!

If you decide to proceed with this step, do it before installing the bridge. Now that you have drilled the mounting holes for the bridge, you can remove it from the soundboard so it won't interfere with your routing. It will be very simple to clamp the bridge back in exactly the same place when you are ready.

There are several special router devices available from luthier suppliers for routing precise ledges around a guitar, but you need only a router with a straight bit to do a fine job. You can make a simple jig to clamp right to your router base to guide the bit cleanly around the curves of the body. Here's how to set up your router:

Make your jig from a scrap of plywood or particle board and clamp it to the base of your router so the "finger" hangs over the bit, as shown. Set the cutting depth of the bit to match the width of the binding, and adjust the position of the "finger" to allow a cutting depth to match the thickness of the binding (.090").





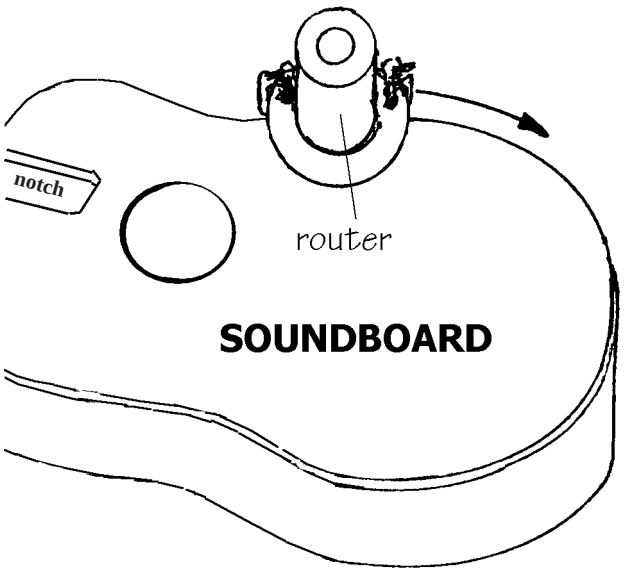
NOTE: You will be cutting with the side of the router bit, not the end. It may take a minute of study for you to see how this will work.

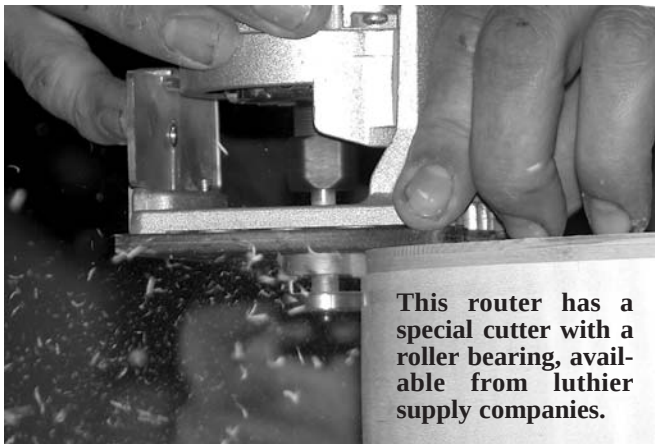
Test your cut on scrap wood first and make adjustments as necessary so the binding fits nicely into the groove.

CAUTION: When you cut the grooves, we recommend pushing the router in a clockwise direction around the circumference. This is called "climb cutting", and is opposite the normal direction for routing, which would be to move the router against the spin of the bit. By moving the router with the spin of the bit, you eliminate any chance of chipping the veneers as you cut. It may sound odd, or even unsafe, but it works beautifully and does not cause a safety problem with such a small cut.

We like to run the router around the instrument two or three times, just to make sure we cut the ledge to full depth. Remember that the plywood "finger" prevents you from cutting to deeply.

You can also make minor adjustments to the cut by hand if necessary, using a razor knife, a file, or a sanding block, just to make sure the inlay binding will fit nicely all around the body.

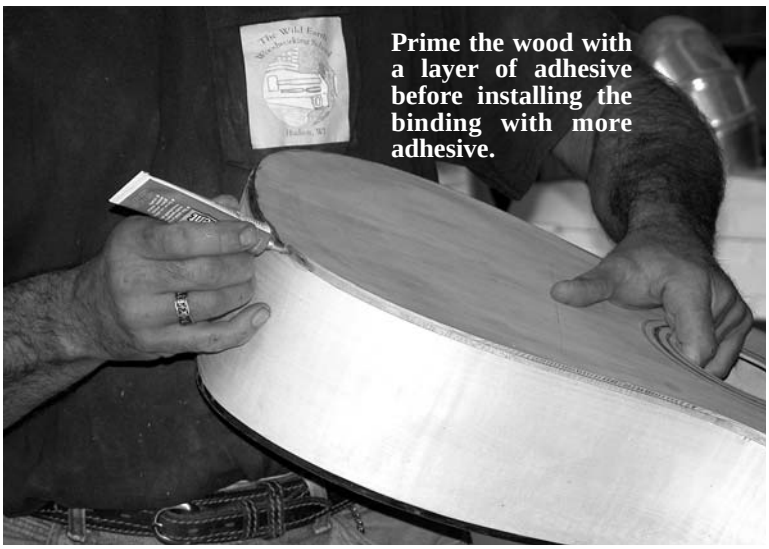




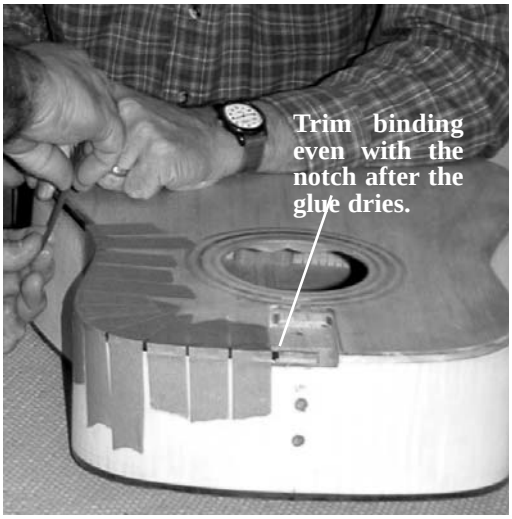
This router has a special cutter with a roller bearing, available from luthier supply companies.

When satisfied with the ledge, go ahead and glue the plastic binding around the soundboard, just as you did around the back, 6" at a time. This time you won't need to fit the ends so carefully. Just start and end at the notch in the front of the guitar.

Allow the binding to dry 24 hours before removing the tape.

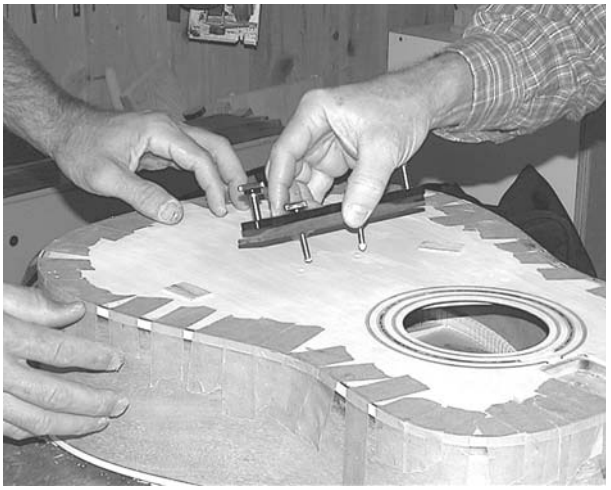


Prime the wood with a layer of adhesive before installing the binding with more adhesive.



Trim binding even with the notch after the glue dries.

_____10. INSTALLING THE BRIDGE

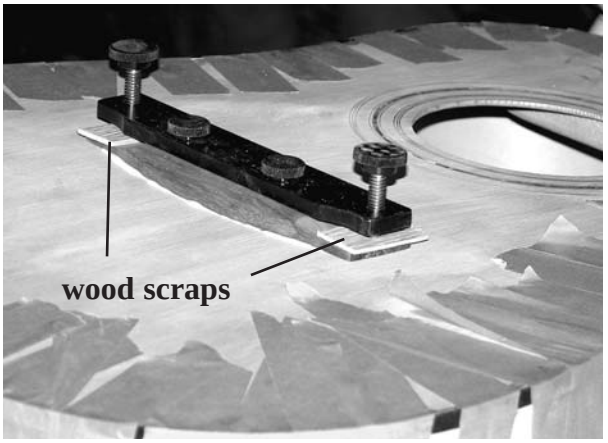


You can install the bridge while the binding is still drying around the soundboard.

Make sure the bridge fits flat on the soundboard. If not, sand the underside as needed. Then wash the underside of the bridge with alcohol to remove any natural oils that might interfere with the bond of your glue.

Find the wooden clamp included with the kit and orient it properly on the bridge (there is a front and back to both the bridge and the clamp). The front of the clamp should line up with the straight edge of the bridge.

The two inner bolts go through the clamp, the bridge, and the holes you drilled through the soundboard, and the other two will press down against the "wings" of the bridge. Use the two thin wood pads to protect the "wings" from the bolts pressing downward, as shown.



CAUTION: IT IS POSSIBLE TO MOUNT THE BRIDGE BACKWARDS! BE SURE TO FACE THE STRAIGHT EDGE OF BRIDGE TOWARD THE SOUNDHOLE.

When ready, squirt glue (Elmer's works fine) on the underside of the bridge and bolt it down to the soundboard. You'll reach into the body with one hand to install the nex nuts inside the body, and use a screwdriver in the other hand to tighten the bolts. When the bridge is bolted in place, gently add pressure to the "wings" with the outer bolts. Watch for glue to squeeze out as you apply pressure -- that's a sign of good contact.

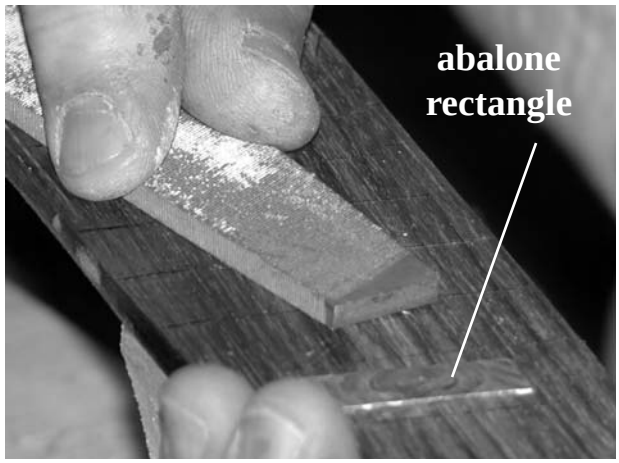
Take the time to wash off the excess glue right away, before it sets up. Scrub the area with a clean damp rag to remove all glue residue.

_____11. SHAPING THE FRETBOARD (optional)

Use a drum sander to cut a curve at the end of the fretboard if you wish, sanding to the line you drew earlier.

_____12. INSTALLING ABALONE INLAYS IN FRETBOARD

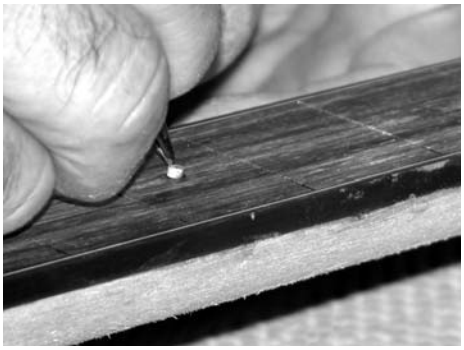
Find the large rectangular piece of abalone and test the fit in the depression routed for it at the 12th fret position. Use a sharp chisel to cut the corners of the hole if necessary, so the abalone fits down into the wood. If the routed depression is deeper than the thickness of the abalone, that's fine. You'll just fill the depth with glue and press the inlay into it until the inlay is nearly flush with the surrounding wood.



If the depression is a little shallower than the abalone, that's fine too. You can either: 1) use your chisel to cut the depression deeper, or install the abalone as deep as possible and file off the exceess that stands above the surrounding wood, as shown.

When satisfied with the fit, use epoxy glue or Superglue to install the abalone permanently. Use enough glue to fill around the edges of the inlay material. Allow time for the glue to cure fully before sanding or filing.

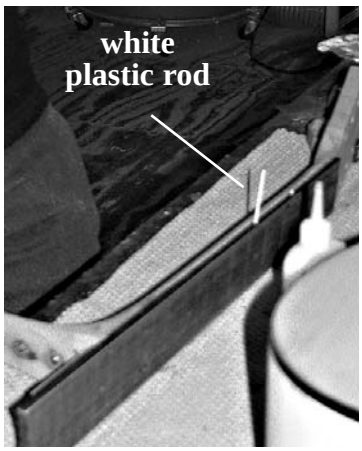
Next you can install the tiny round abalone dots in a similar way. It might help to use a pair of tweesers to hold these small parts as you install them. A drop of epoxy or Superglue is all that is needed to glue these markers in place.



When dry, you can sand or file all the abalone pieces flush with the surface of the fretboard. Sand off any glue residue that may have spilled over onto the playing surface too.

Please note that we have included a radiused sanding block to match the top surface of the fingerboard. Use this for achieving a smooth playing surface.

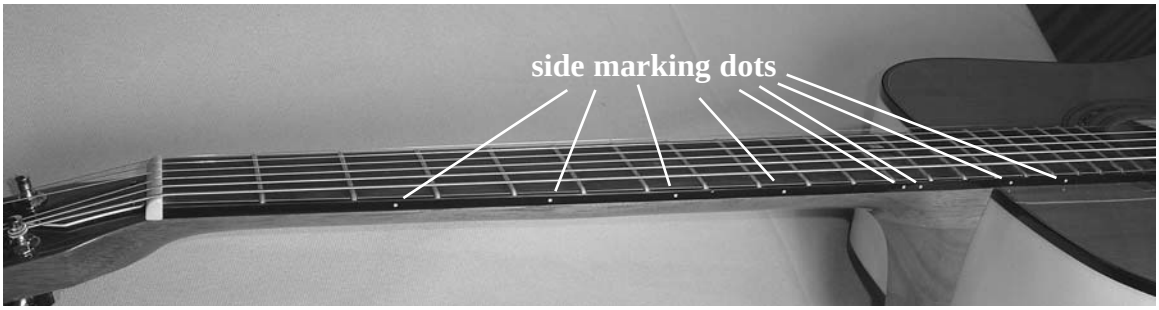
The final inlay detail for the neck is to install tiny contrasting marking dots along the left edge of the fretboard. Look in your parts for a thin "string" of white plastic rod material.



Test the fit of this white plastic in the tiny holes drilled along the edge of the fretboard. If the holes are too small, use a 1/16" drill bit to enlarge them a little.

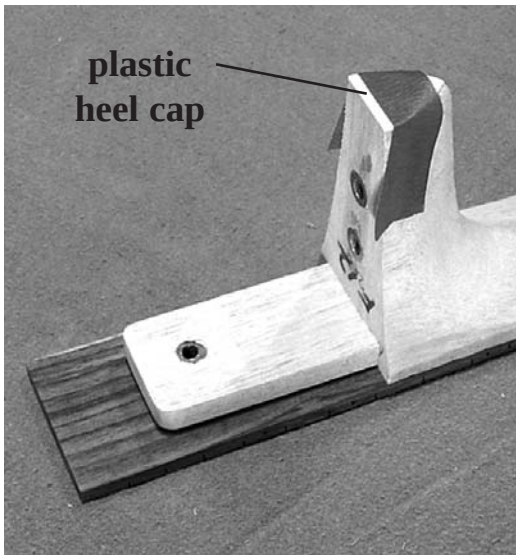
Then put a drop of Superglue on the end of the plastic rod, and push the rod into the first hole. Use a knife or wire cutter to clip off the excess. Then move to the next hole, and so on.

Once these markers are in place, sand the edges of the neck to match the fretboard and smooth out these littles stubs of plastic.



_____13. SHAPING THE BACK OF THE NECK AND HEEL

Use Superglue or 5-minute epoxy to glue the plastic heel cap to the bottom of the heel, as shown. Hold it in place with masking tape until dry.



Once installed, you can sand the wood flush with the plastic.

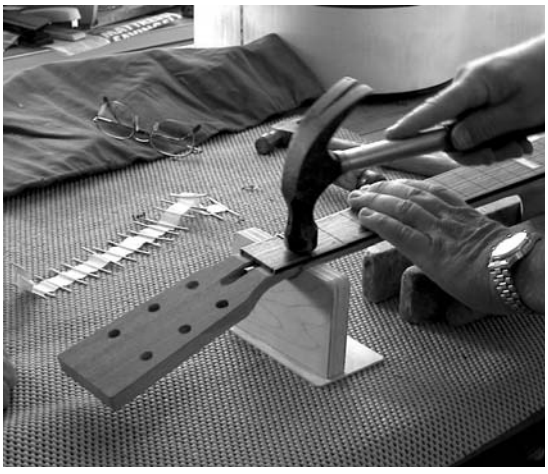
The neck of your guitar is shaped fairly well, but if you play guitar already, you may find that you want to reduce the thickness or change the curve a bit to match another guitar that you like.

You may reduce the overall thickness of your guitar neck by about 1/8" without weakening the instrument. Remember there is a truss rod inside for security. Some people like a slightly more V-shaped neck than a U-shaped cross-section.

Use a spoke-shave, rasp, coarse sanding block, or hand-electric sander, to re-shape the back of the neck as desired. If you have no preference for shaping the neck, we recommend just leaving it as is.

Use medium grit (120-180 grit) sandpaper to smooth out the wood surface after the coarse shaping.

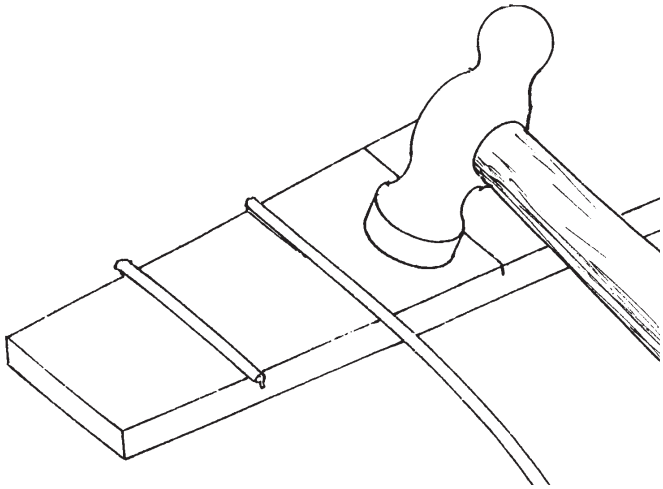
_____14. INSTALLING FRETS



You'll need to support the neck firmly when installing the frets. We like to grip the heel of the neck in a vise or clamp to hold the assembly upright.

Then cut a scrap of 2X4 pine to support under the point where you are pounding. You can place a rag or towel over the support block to pad the neck as you work. The support block should be moved as you work up the neck so it is always directly under the fret you are installing.

Here's how to install the frets:



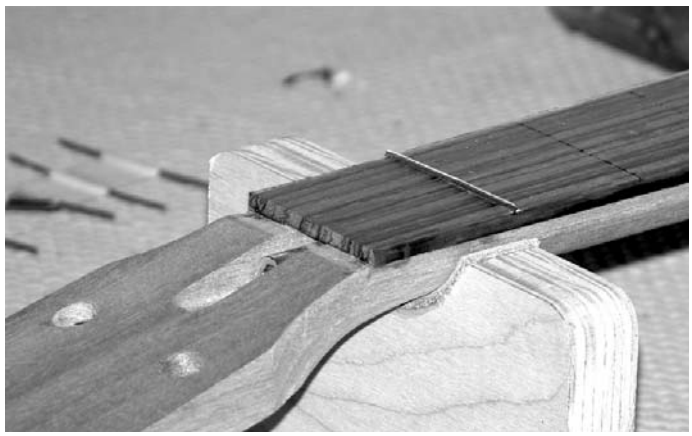
a) Find the coil of fretwire in your kit.

b) Position the support block under the first slot in the fretboard (nearest the peg head).

c) Hold the fretwire on top of the slot so it extends slightly beyond the edge of the fretboard, and the tang lines up with the slot in the wood.

d) Use a hammer to tap the wire down into the slot. We find it best to tap each end of the wire to get it started correctly, and then work your way to the middle. Try to avoid over-working the wire in the middle, because the ends will start to curl back up again. The goal is to get the top bead of the wire to sit fully down on top of the wood surface.

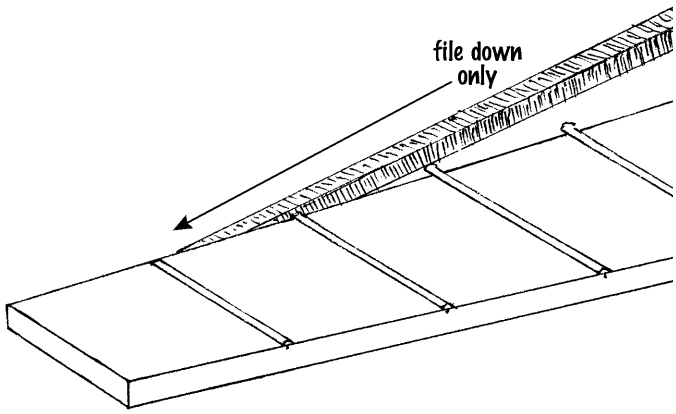
e) Clip the wire as close to the wood as possible.



f) Repeat this process for each fret, keeping them in order so they fit properly.

NOTE: If you mangle a slot in the wood so that the fret becomes so loose that it won't stay down, you may use superglue hold it in place. Be sure to clamp the fretwire down fully as the glue hardens.

ANOTHER NOTE: The fretwire is fairly soft metal, so if it bends the wrong way or gets kinked, you can easily straighten it again with a plyers.

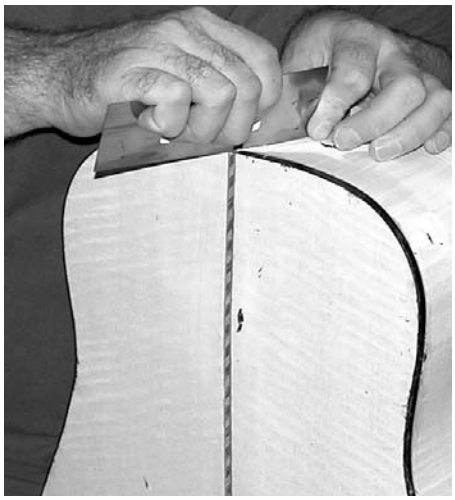


Once the frets are installed, you need to file or sand the ends flush with the edges of the fretboard. If you have access to a belt sander, you can sand off the ends of the frets very quickly. Otherwise, use a file, as shown. Always work the file in a downward motion so you don't inadvertantly lift the end of a fret.

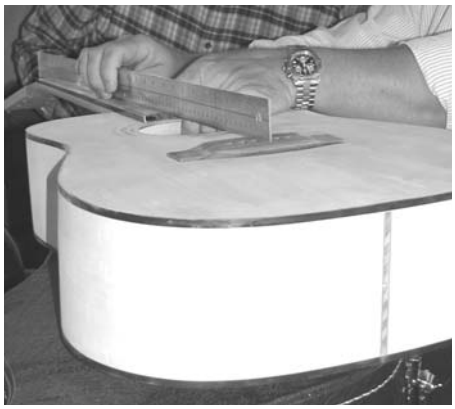
Use the same procedure to bevel the ends of the frets at about a 45 degree angle, as shown. Slide your hand along the edges of the fretboard to make sure you have everything smoothed nicely.

_____16. FINAL SCRAPING AND FITTING

By now, the binding and bridge are probably dried enough that you can remove the tape from around the soundboard of the guitar, and remove the clamp holding the bridge in place. Use your scraper to smooth out the binding flush with the sides and top of the guitar. We also like to use fine sandpaper to knock off the sharp edges of the binding around the body. A slightly rounded or chamfered edge will feel much better than a sharp edge as you handle the instrument. No need to take off much material -- just use 300-400 grit sandpaper to dull the edges.

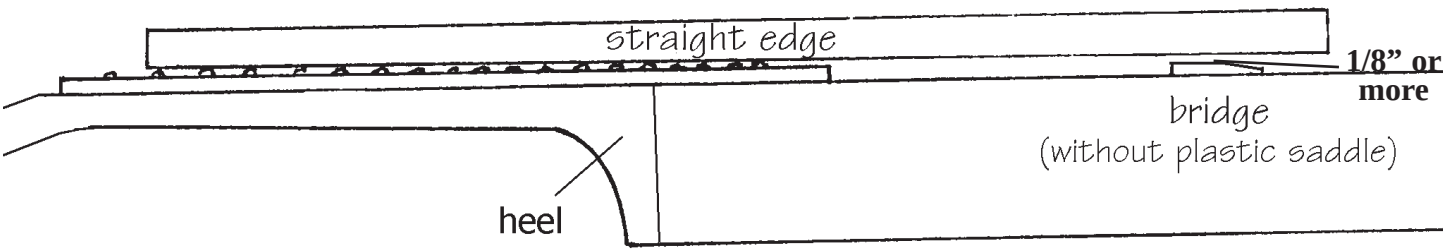


Once the body is scraped, you can try installing the neck again for a trial fit. Use the three bolts to hold the neck in place so you can lay a straight-edge from the fretboard to the bridge, as shown.



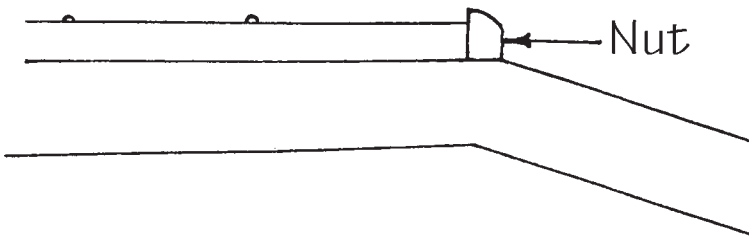
Ideally, there would be some space between the bridge and the straight-edge when the ruler is held down flat against the frets. We'd like to see 1/8" or more space if possible.

If the straight-edge won't even clear the top of the bridge, then you'll need to do some shimming at the heel of the guitar. Basically, you'll need to tilt the neck back slightly by placing wood shims under the end of the fretboard and possibly near the top of the heel. We've provided some thin veneer strips for that purpose, and you can use scissors to cut what you need to fit the spaces.



_____17. GLUING THE NUT

Test-fit the plastic nut to the end of the fretboard. This piece is pre-shaped and notched for the strings, so it should require little, if any, shaping. Just make sure to clean out any excess glue from the end of the fretboard so the nut fits snugly into the space provided.



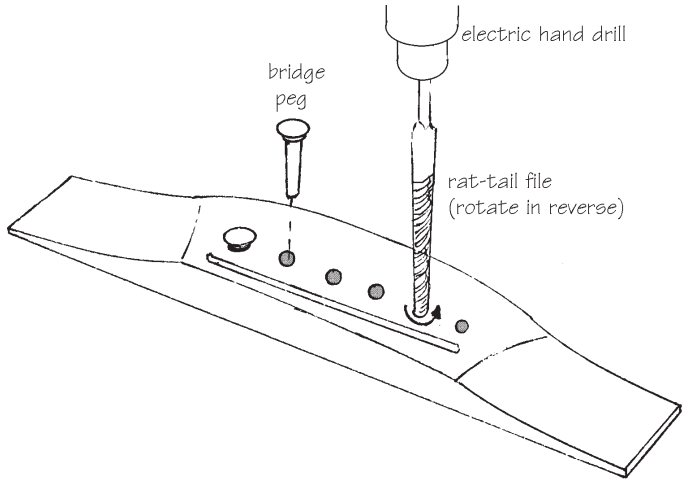
When satisfied with the fit, use Superglue or 5-minute epoxy to glue the nut in place.

_____18. DRILLING AND REAMING FOR BRIDGE PEGS

You only drilled the two outer holes through the bridge earlier in the project, but now you can drill the other four holes, using a 3/16" drill bit.

Once drilled, you'll want to taper the holes slightly so you can fit the plastic bridge pegs all the way into the holes. You don't need to buy a special tool for this. Just use a small rat-tail file in your hand drill, and spin it backwards as you push the file down JUST A LITTLE WAYS. Test a bridge peg and see if you have reamed far enough.

Once the first hole is reamed correctly, mark the proper depth by wrapping masking tape around your file so you can ream all the holes to the same depth.



You may actually install the tuning gears and string up your guitar to test it out at this point of construction. Of course, you'll want to protect the instrument from spilled coffee and dirty hands by applying a finish, but you can do a dry run now if you are the impatient type who wants to see how the instrument sounds before investing more time in it....

_____19. FINAL SANDING AND FINISHING

Remove the neck from the body again for easier sanding. Clean up all glue residue around the entire guitar. Nothing points to an amateur woodworker more than a project with glue blobs and fingerprints on the surface. They may be difficult to see now, but they will stand out prominently after applying the finish. We recommend wiping the entire guitar with a clean damp rag to help highlight these smudges. When you find one, use a scraper or sanding block to get down to bare wood.

Sand the entire instrument with about a 180-220 grit sandpaper to smooth out all surfaces so they feel good in your hands. We like to knock off the sharp edges of any plastic edge-binding slightly too, if you installed these optional strips.

QUESTION: To glue or not to glue? This is your opportunity to decide if you want to glue the neck to the body of the guitar, or just leave it bolted on dry. The advantage of gluing the parts is greater stability, but the advantage of assembling without glue is that it will be easy to take apart in the future if you need to make adjustments, such as tilting the neck. Your choice. If you want to glue the parts together, do it now before you apply the finish, and use the bolts to hold the parts firmly together until dry.

WA-LA! Your guitar is now ready for the finish. There are several finishes that will work fine for your instrument, and some are easier to apply than others. We give a few suggestions on the following page for selecting a nice-looking coat to protect your handiwork and enhance the beauty of the wood.

We recommend masking off the top of the fretboard to avoid getting varnish or lacquer on the playing surface because it can get gummy under the fingers as you play. We also suggest stuffing some newspaper into the soundhole to catch any drips or overspray that might get into the inside of the guitar body. No sense letting this project look sloppy now!

STAIN -- STAINS are coloring agents and should only be used if you dislike the natural color of the wood. We usually do not apply stains to our projects, especially when they are made with naturally beautiful hardwoods such as on this project. These woods look very nice with just a clear finish. But, if you want to color the wood differently, your staining should be accomplished before applying a surface finish such as oil, varnish, or lacquer.

PASTE FILLER -- The sides and back of your guitar are made with quite porous wood, with rather deep grain lines. We don't go to the trouble of trying to fill the grain, but you can if you wish. You can find paste filler at a good paint store or woodworking supply store to use for this purpose. It is available either clear, to show the natural wood color, or tinted so you can darken the grain if you like. If you use this type of product, apply it before adding any surface coatings such as varnish, oil or lacquer.

OIL -- An oil finish will give your wood a low luster appearance, bringing out the natural color of the grain, but it tends soak into the wood and appear dry and "thirsty" after awhile. The principal advantage of an oil finish is that it can be applied and wiped dry immediately, so you can proceed to installing hardware (and strings) right away. The disadvantage of oil is that it usually does not give much surface protection or sheen, although there are some brands that include waxes and/or varnishes to give more surface build-up and luster. If you want a hand-rubbed oil finish, be sure to purchase the highest quality oil designed for hand-rubbing.

VARNISH -- Any satin or semi-gloss varnish will work on this project, but we like a wipe-on polyurethane best. We offer this type of clear top coat, called MUSICMAKER'S INSTRUMENT FINISH. Our complete finishing kit includes instructions, sandpaper sheets, tack cloth, foam applicator, and lint-free wiping cloth, along with a pint can of semi-gloss polyurethane varnish. The advantages of this finish are its simple application, durability, minimal odor, and deep, soft luster.

LACQUER -- Many professional instrument makers use lacquer for their finish. The most readily available lacquer is called Deft Clear Wood Finish. It is best to purchase a can of liquid to brush on as a sealer coat first, and then use an aerosol can of the same product to spray on the final coats. The advantage of this finish is its quick drying time, but the disadvantage is the strong odor of the toxic lacquer fumes.

OUR BEST ADVICE: AVOID GLOSS FINISHES unless you are an expert with spray equipment! Glossy finishes show off every speck of dust and irregularity in your sanding. Satin or semi-gloss is much easier for the amateur.

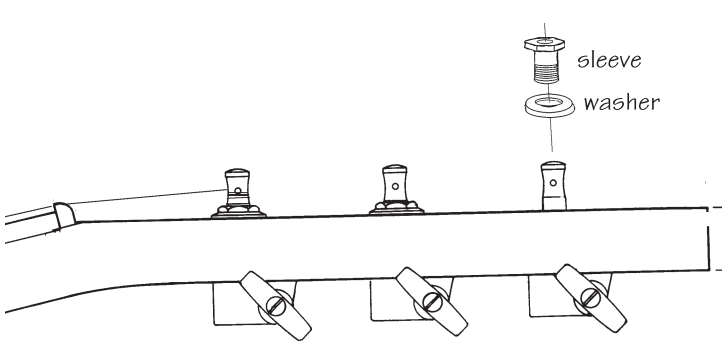
So go ahead and apply the finish of your choice, following the instructions on the container. Sand between coats with fine (400-600 grit) sandpaper or #0000 steel wool. Consult instructions on the can for proper drying time.

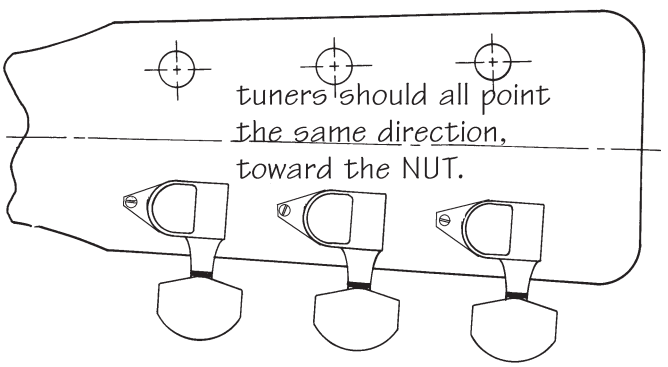
If you want to change the sheen of the finish after it dries, you can smooth it out by rubbing with 0000 steel wool or with a Scotchbright scrubber. We often follow this procedure with a coat or two of paste wax (the same product that you would use on a wood floor) to bring out a nice luster.

_____20. INSTALLING TUNING GEARS

Install the individual GEARED TUNERS to the PEGHEAD, as shown. Note that three are meant for the right side and three for the left.

Use a hex-drive wrench to fasten the SLEEVES and WASHERS into the TUNERS, and then drill 1/16" pilot holes for the tiny screws, taking care not to drill all the way through the PEGHEAD.



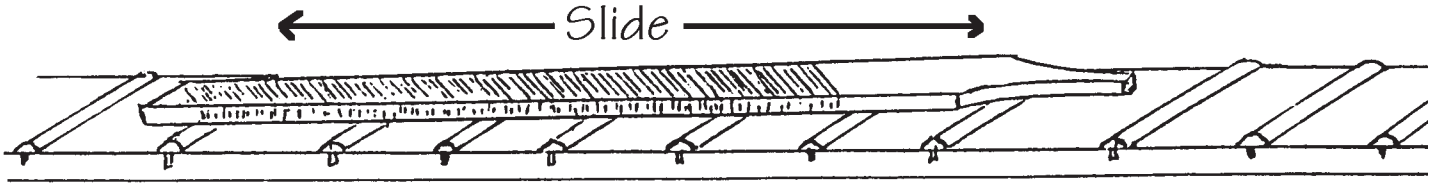


If the guitar neck is still seperated from the body, bolt it in place now, firmly.

CAUTION: Be careful to keep a washer on each bolt. The washer prevents the bolt from digging into the soft wood of the heel block, and possibly going too deeply into the heel part of the neck, which could cause a crack.

_____21. LEVELLING THE FRETS

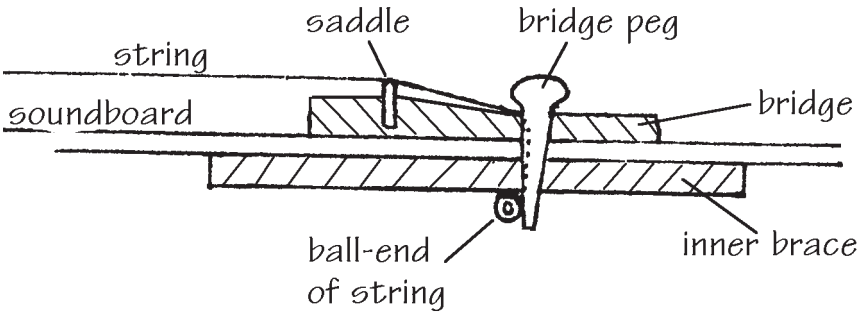
Now is a good time to "level" the tops of all the frets. Use medium grit sandpaper (150-180) with the radiused sanding block included with this kit, or use a large flat mill file resting on the fretwire, to wear down any frets that are too high. Check your progress frequently to see which frets are being cut and which ones are not. As soon as each fret has been scratched lightly, you may consider them all level. Then switch to fine grit (400 - 600 grit) sandpaper to polish the tops of the frets with the sanding block.



_____22. INSTALLING THE STRINGS

Install the strings as follows:

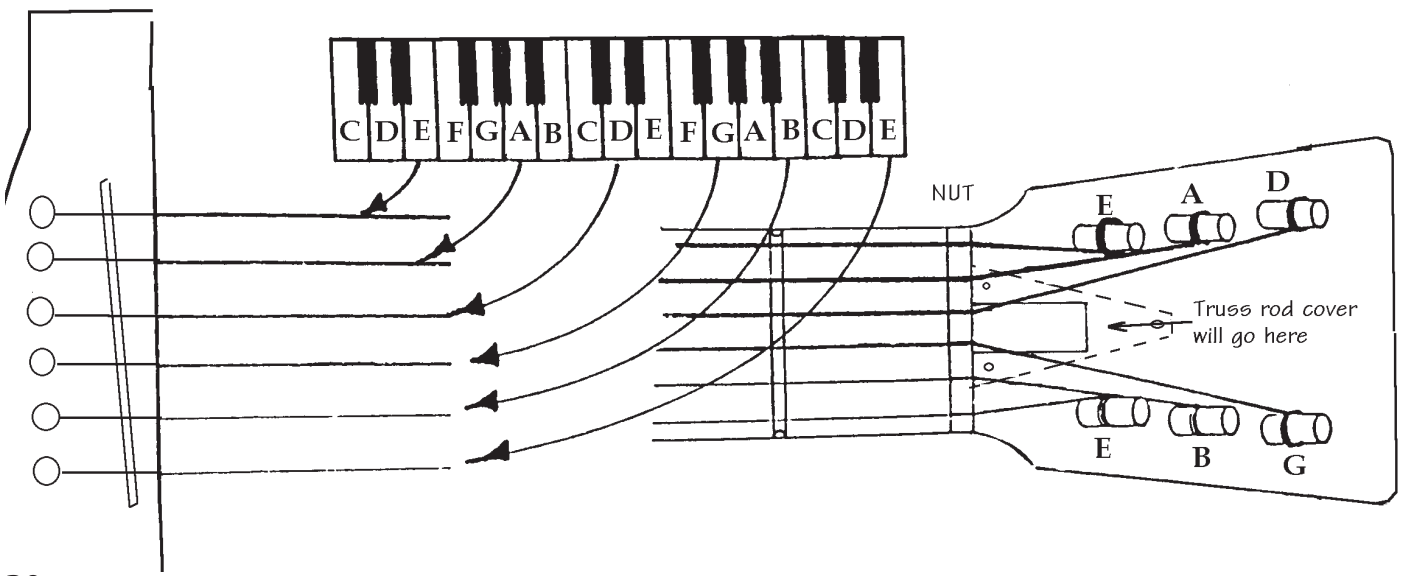
a) Install the plastic saddle into the bridge to full depth. You may need to sand the plastic a little for easy fit.



b) Push the "ball-end" of the heaviest "E" (6th) string into the first hole in the BRIDGE (on the left side) and insert a BRIDGE PEG into the hole to hold it in place.

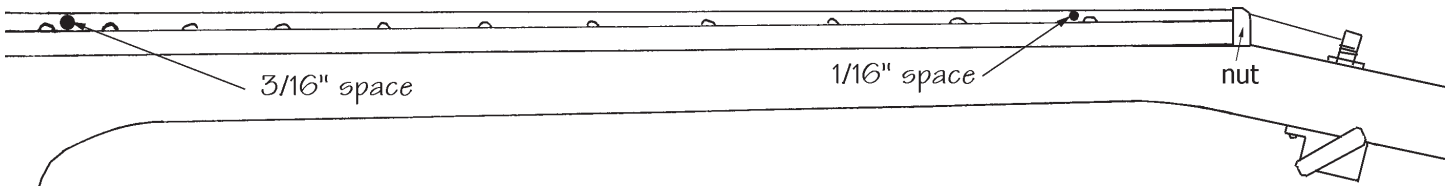
c) Thread the other end of the string through the hole in the first geared tuner (closest to the "nut" on the left side) and turn the button to wind the string until the slack is taken up. Note that we like to have all the strings pass to the inside edge of the tuning posts, as shown.

Consult our free on-line tuner at www.harpkit.com for tuning assistance.



_____22. SETTING THE STRING HEIGHT

Check the height of each string above the fretboard. We like to use a couple of drill bits to check for proper height. A 1/16" drill should just fit under the strings at the first fret (near the PEGHEAD), and a 3/16" bit should just fit under the strings at the 12th fret (at the large abalone inlay).



Sight down the FRETBOARD to make sure it has no bow to it. You can adjust that by tightening or loosening the TRUSS ROD, using the Allen wrench provided. Tightening the rod pulls the PEGHEAD backward, loosening the rod allows the string tension to pull the PEGHEAD forward.

Once the FRETBOARD is straight, you can adjust the 1st fret clearance more precisely by filing down the groove in the NUT where the string rests, but be careful not to file too far. The only way to raise the string at that position is to remove the nut and glue a shim underneath it.

You can adjust the height of the string over the 12th fret by raising or lowering the PLASTIC SADDLE in the BRIDGE. Sand the underside of the SADDLE to lower the strings, or place a shim under it to raise them up. If you cannot lower the SADDLE far enough (because it is as low as the wood on the BRIDGE, you'll need to tilt the neck back by adding veneer shims where the neck joins the body (see step #16).

Your style of playing will dictate how low to adjust the string action. Heavy strumming requires rather high action to avoid excessive buzzing or rattling, whereas light finger-picking is easier with low action.

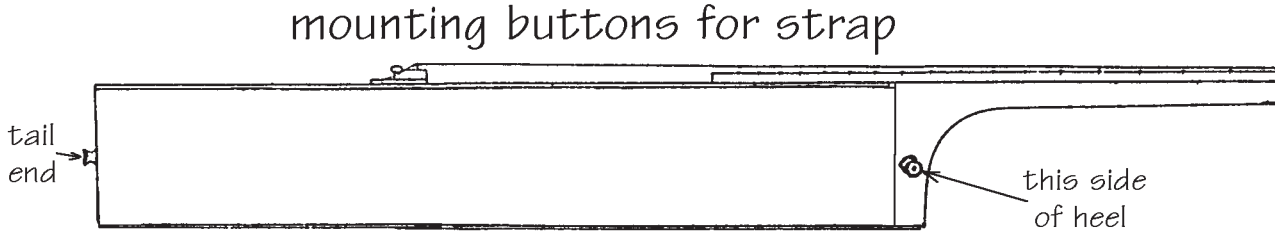
_____23. INSTALLING STRAP BUTTONS

You have three options formounting a strap to your guitar:

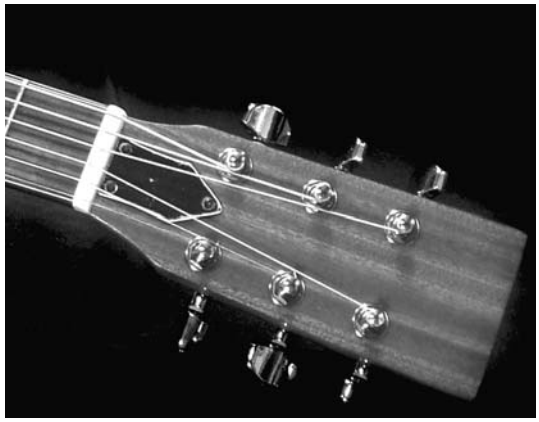
1) You can install the metal strap button to the hole already drilled at the tail end of the guitar and tie the other end of your strap to the peghead;

2) Or you can install the plastic end pin to the tail end of the guitar by drilling and reaming the hole to fit the plastic, and using the metal button on the heel of the guitar, as shown. Use a 3/32" drill bit for the pilot hole for the mounting screw;

3) Or you can buy an electronic transducer pickup for your guitar and install that in the tail position. The jack mount serves as a strap button. Our piezo-2 is an excellent choice for this size guitar.



_____24. INSTALLING THE TRUSS ROD COVER



Install the TRUSS ROD COVER with three tiny screws. You will need to drill 1/16" pilot holes in the PEGHEAD for these screws. Notice that this plastic part has a peel-off protective layer on the top. It will look best if you remove that layer.

TROUBLESHOOTING

There may still be some fine adjustments needed to make your guitar work its best. Test each string by plucking it with one hand while you press it down at each playing position (fret) along the neck. Here is what to check for:

A. If the string is difficult to push all the way to the fretboard, it is too high. Filing the grooves deeper in the NUT will lower the string at the head end, and sanding the underside of the PLASTIC SADDLE in the BRIDGE will lower the strings near the middle of the guitar.

B. If a string buzzes when plucked in the OPEN POSITION ONLY (when not held down to a fret), then the notch in the NUT is too deep -- the string is probably buzzing against the first fret. You'll need to loosen the strings, knock the NUT loose and glue it back with a thin shim under it (even just gluing it back again will raise it a little because of the additional layer of glue build-up).

C. If your strings buzz and rattle in general as you play, sight down the FRETBOARD first. Some seasonal changes may cause it to bend backward. Loosen the TRUSS ROD to allow the strings to pull the NECK forward. You may also shim up the PLASTIC SADDLE in the BRIDGE to raise the strings a little higher, or change to heavier gauge strings to exert greater tension on the NECK.

D. If a string rattles or buzzes at just one or two positions (frets), or if you discover that two or three frets all give the same pitch, then look for a fret that stands up higher than its neighbors. You will need to either tap that fret back down into its slot in the fretboard or use the long flat file to level the tops of the frets some more. Just loosen the strings, lift them out of the grooves in the nut, and hold them along either side of the fingerboard as you work the file lengthwise along the tops of the frets. You can easily see which frets are the highest, as they are the ones that receive the most filing.

CONGRATULATIONS! We hope you've enjoyed the building process and that you receive many years of musical pleasure from the finished product. Don't hesitate to contact us for any further help that you may need. We also appreciate hearing suggestions and hints that you think might help a future kit-builder.

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