

Chapter Seven

Attaching the soundboard

The sound board is under a lot of strain, and if you are building a light and responsive board, it will eventually rupture or start to come off. The goal is to forestall that failure for 15-30 years. A broken soundboard is not the end of the world, but replacement entails about half the work of building a harp from scratch, so I take some pains with this part of the building process.

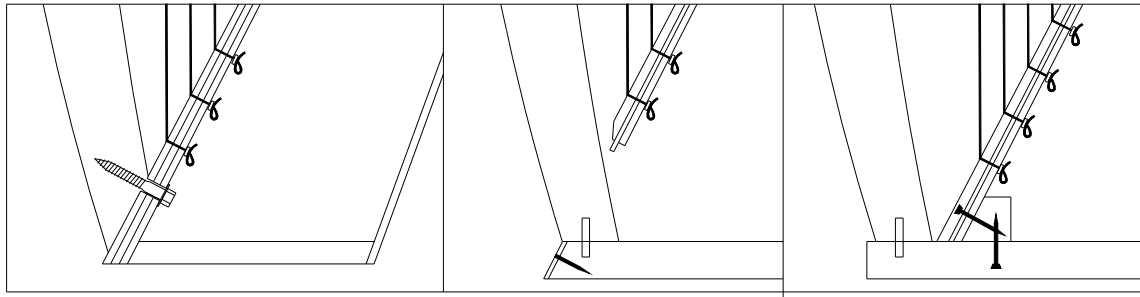
Many modern builders rely solely on glue to hold their soundboard to the shell. This allows them to create a very slick modern look and eliminates the labor required for adding edge battens and mechanical fasteners.

This chapter will describe how to

- prepare the face of the sound box
- glue the board into place
- apply mechanical fasteners and edge treatments to secure the board

This approach presumes the foot of the pillar will be attached to the string band with a lag bolt (a popular configuration for many folk harp designs). Other designs terminate the pillar onto the base of the sound box, and this approach may require additional reinforcement to transfer the strain from the foot of the pillar back to the string ribs which are pulling down on the strings.

Cross sectional view showing three ways to attach the foot of the pillar to the sound box
Bolted Foot, Pocket hole in Soundboard Tie Block.



The pocket hole is usually used with a plywood sound board. A hole for the foot of the pillar is cut into the board, and the bottom of the board is nailed and glued to the base board. In a tie block termination, a chunk of wood is screwed to the bass and the string ribs. Variations on the tie block will use a metal strap or Fiberglass reinforcement in lieu of the wooden block.

Most string ribs are centered at the bass end, and in the bolted foot design, pass underneath the pillar. I cut a channel at the top and bottom end of the sound box for the inner string rib.



Before I cut the channel for the top end, I play around a bit with the lateral alignment of the string rib at the treble end. Most builders strive to make the strings drop vertically down from the neck to the center of the string rib. The strings can angle in from the bridge pin, but if the

angle is too sharp, it will be difficult to fit sharpening levers or the string may slip off the notch on the bridge pin. Some builders are fastidious about centering the string holes down the center of the board, and if this is the look you are striving for, you will need to position the neck accordingly. The alternative is to offset the string rib to one side, which is done by number of harp builders and does not seem to dramatically affect the instrument's tone. The offset will depend on the width at the top of the sound box and the thickness of the neck.

I place the soundboard on the sound box where I want it, and mark the edges of the inner string rib on the sound box at the bass and treble end. I remove the sound board and use a square to extend those marks across the cap and base. With a handsaw, I cut a kerf on top of the line to the approximate depth of the rib. Then use a router set to the right depth to clean out the waste between the kerfs.

After checking the fit of the inner rib in the notches, I trace the inner and outer edges of the sound box onto the sound board. This will help determine where

glue is spread later. At this point, it is customary for the maker to sign and date the soundboard where it can be read through the bottom sound hole.

Harp builders have used a variety of glues for attaching the soundboard. And after loosing a board or two, most builders have some pretty strong opinions as to which glue is most appropriate for this critical joint. I suspect some of these prejudices have more to do with the builder's familiarity with a specific adhesive, their work habits and available clamping. See the appendix for a more complete discussion of glue choices.

If you cannot get a nice tight fit between your shell and the sound box, or if you cannot provide even, adequate clamping pressure, I would suggest you use epoxy because it can tolerate gaps and does not require much clamping pressure.

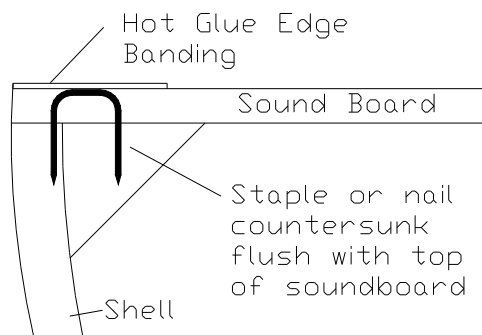
Before you mix your epoxy, select a clamping method and do a dry run so you have a good idea of how much time you have before the adhesive sets.

I use about 60ml of epoxy to attach the sound board for a 36 string harp. I carefully measure the epoxy to the specified ratio and thoroughly mix the epoxy for a full minute, scraping along the sides and bottom of the mixing cup. Then I use a cheap flux brush (50 cents) to spread the un-thickened epoxy along the face of the sound box and between the pencil lines on the sound board.

<pic of thickened epoxy spread on top of Sound box>

I mix fine sanding dust (wood flour) with the balance of the epoxy to make a paste the consistency of catsup. This is spread with the mixing stick along the top edge of the sound box.

It is fairly easy to clamp a soundboard to a square back harp. Stave backs and round backs prove to be more of a challenge. Some builders solve this by using mechanical fasteners as clamping devices. The redundancy provides a backup system if and when the glue loses its integrity (a belt and suspenders approach).



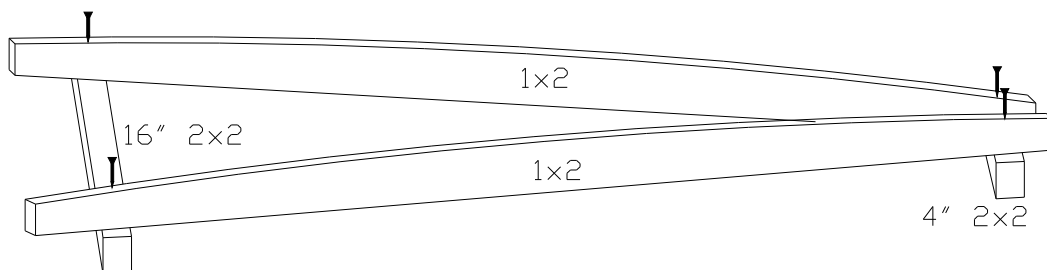
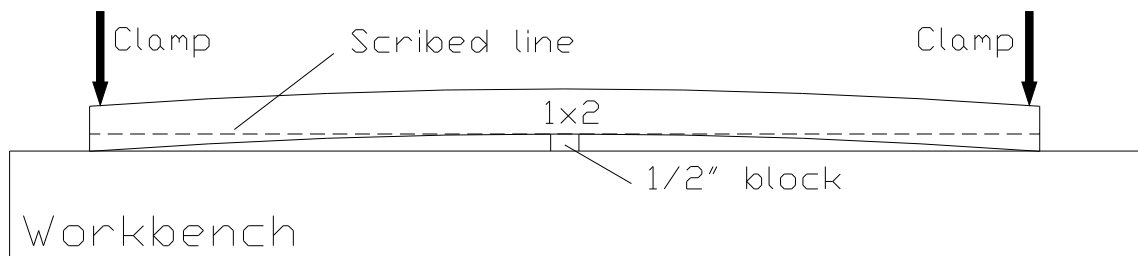
The simplest approach is to use a pneumatic stapler with 1/2 inch staples to staple the soundboard down. Care must be taken to ensure the force of the driving head does not push the staples through the thin, soft wood at the treble end of the soundboard. Most builders set the pressure fairly low then go back with a hammer and punch to level any

staples standing proud. Later the fastenings may be covered with a decorative lamination of some kind.

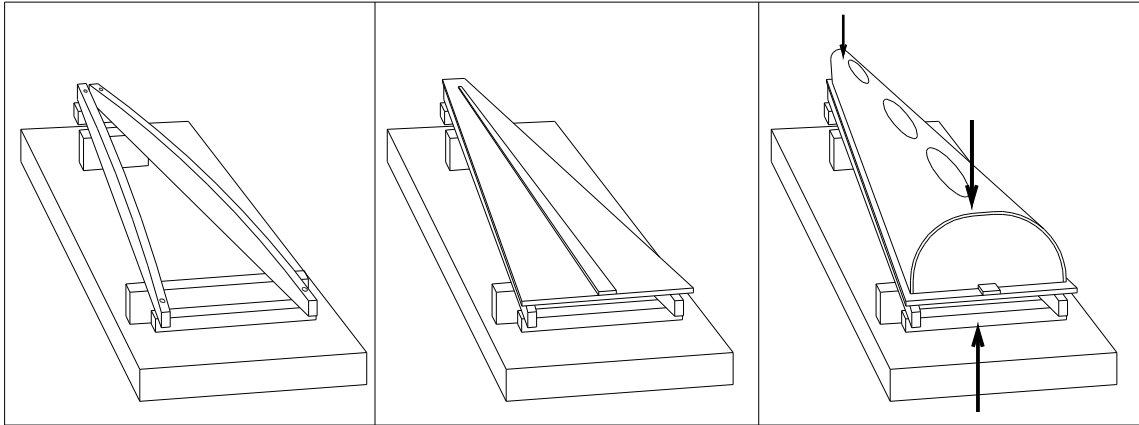
Sprung Soundboard Clamping Frame

I developed a jig with two curved beams that allow me to clamp the sound board to the sound box using one clamp at each end. It works well with epoxy for stave backs and round backs, and allows ample access to remove excess glue inside the sound box through the sound holes.

Two curved 1x2's are used to distribute clamping pressure from the ends of the jig along their length to the edges of the soundboard. The curve is set by bending the 1x2 over a 1/2" block while clamping each end to a sturdy work bench. A line is scribed along the board a half inch above the bench top. Each 1x2 is then trimmed to the line.



The two curved 1x3 boards are screwed to 2x2 blocks so that they are held apart at the widths of the treble and bass end of the sound box.

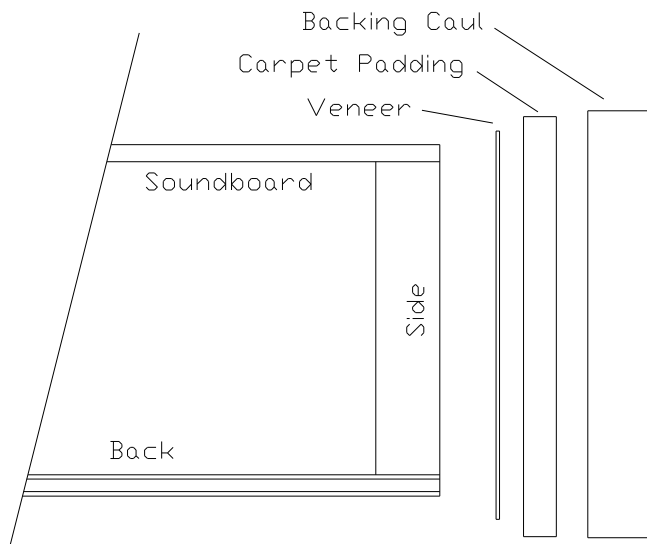


Clamping the soundboard – the jig is placed on scrap 2x4's, and the soundboard positioned on top of that. Spread the adhesive on the edges of the shell and place clamps at each end (indicated by arrows in the last panel). It is usually necessary to screw a temporary block on the base plate to give the clamp purchase.

Dressing up the Sound Board Edge

There are a variety of treatments that can be used to dress up the joint between the sound box and sound board. I will describe the basic approach for my favorites here.

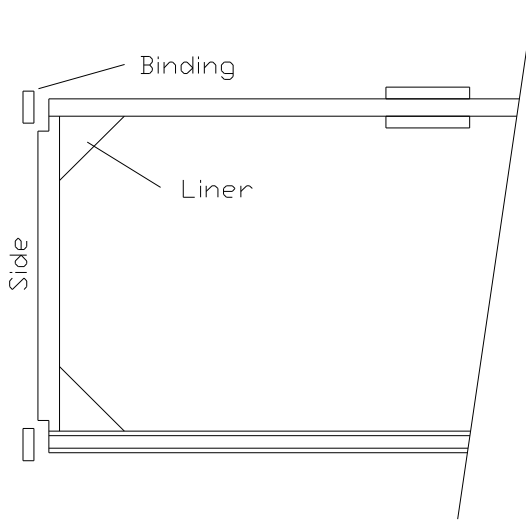
Cross Section - Veneering the Sides



Steve Green used to make kit harps, and he had the builder laminate the entire side of the harp after the back and sound board had been glued into place. I built a few of these kits for clients. First the veneer is cut so it is $\frac{1}{4}$ - $\frac{1}{2}$ inch wider than the side. Next a thin but uniform layer of yellow glue is spread on the side of the harp. Then, the veneer is clamped into place using a layer of carpet padding between the veneer and a $\frac{3}{4}$ " board (backing

caul). The carpet padding helps distribute the pressure evenly over the veneer. After the glue dries, the excess veneer is trimmed flush.

Cross section of Square back box with thinner sides, liners and applied bindings



Bindings

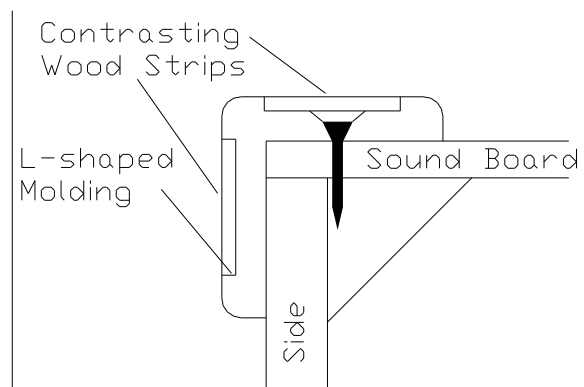
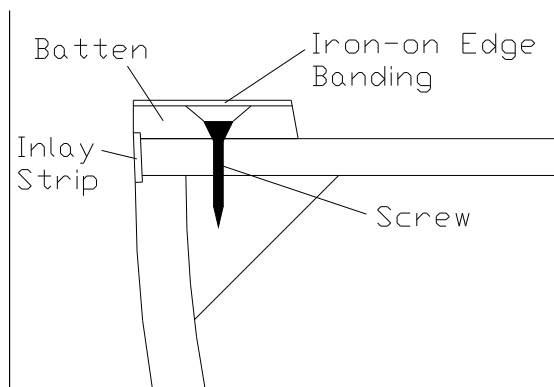
A fancier method is to use a binding. Most guitars use a decorative binding to cover the end grain and any gaps left by less-than perfect seam between the sides and top of the instrument.

To put bindings on a harp, I rout a small rabbet (approximately 1/4" wide and 1/8" deep) along the edge. Next, I cut a strip of solid stock on the table saw. I cut it so it is 1/32" wider and thicker than the rabbet. I glue the strip into the rabbet, securing the binding every 2-3" with

masking tape. After the glue has dried, the binding and excess glue can be scraped or sanded flush. Because the edge of the instrument is subject to a lot of dents and dings, the bindings are usually made from a hard, dense wood. You can make your own, or get fancier bindings with fancy inlays strips from guitar/Luthier suppliers like Stewart MacDonald.

The most reliable method I have found to attach the soundboard is a batten over the top of the soundboard. The batten is secured every two inches with countersunk screw into the liner and shell. The top of the batten is covered with veneer or an edge banding. A complete tutorial for this approach can be found on my website.

Cross section of a batten inlay edging and Jack Yule's L molding



Jack Yule uses a similar approach, replacing the batten with an L-shaped molding. Two shallow dados are cut into each face of the molding strips. Contrasting wood strips are cut to the width of the dados and glued into place over the screw heads.