

31 String Gothic Harp *Kit*



Musicmaker's Kits

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31 STRING GOTHIC HARP KIT

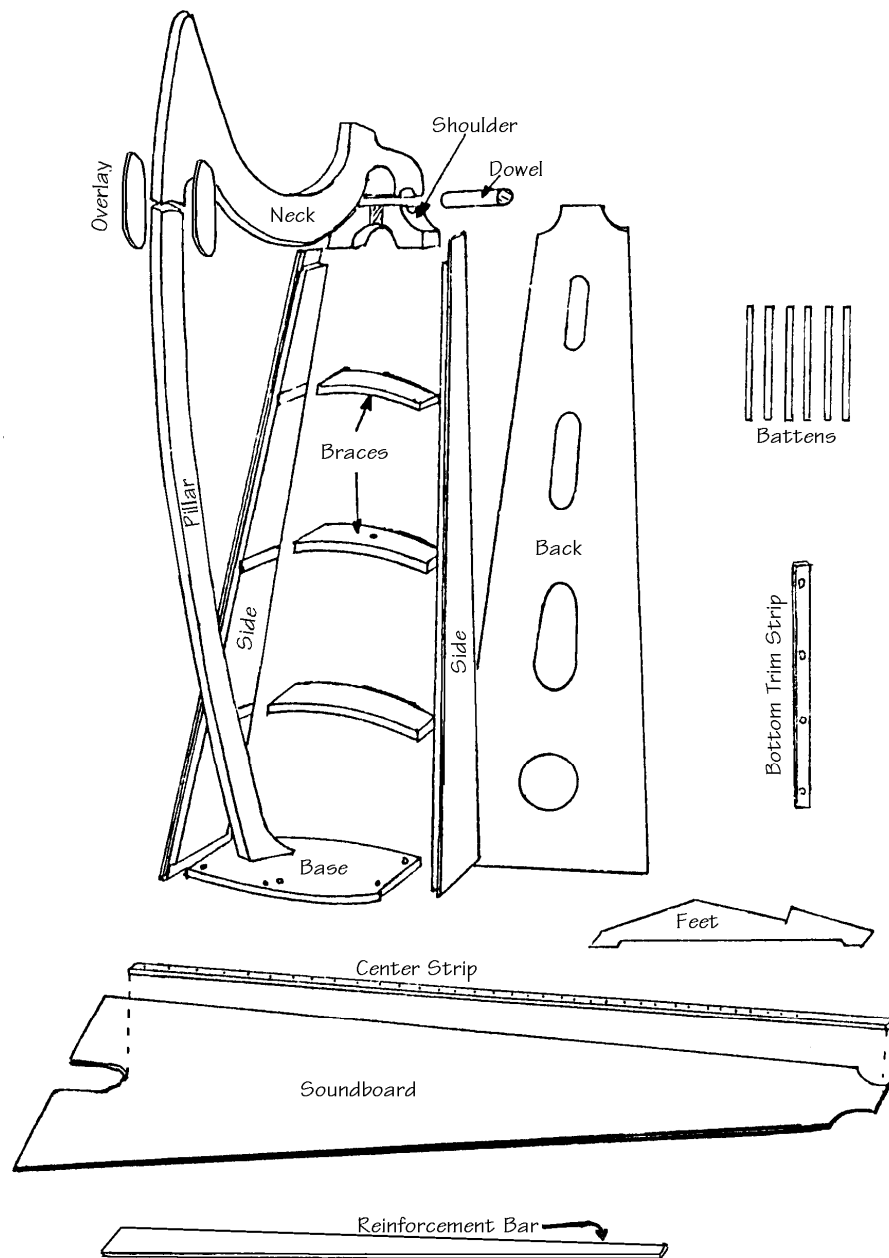
1 set of Assembly Instructions

WOOD PARTS:

1 soundboard, laminated birch
1 back panel, thin plywood
2 sides, solid hardwood
1 curved neck, laminated hardwood
1 pillar, laminated hardwood
1 shoulder, laminated hardwood
2 feet, solid hardwood
3 internal braces, hardwood
1 base, laminated hardwood
1 ctr strip for soundboard, hardwood
1 reinforcement bar, hardwood
1 hardwood dowel, 1" dia, 3-1/4" long
2 oval wood overlay pieces, hardwood
1 bottom trim strip, hardwood
6 stiffener battens (for back)

HARDWARE:

31 threaded harp pins
31 medium brass eyelets
31 threaded bridge pins
Allen Driver 5/64"
1 brass driver for threaded harp pins
4 wood plugs, 3/8" cherry
1 oz wire nails, 3/4" X 18
2 wood screws, 3" drywall
2 wood screws, 2" drywall
6 wood screws, 1-5/8" drywall
4 wood screws, 1" drywall
Spacing Guide
1 set of 31 harp strings
1 tuning wrench
1 drill bit, 1/8" (for eyelets)
8 ft of decorative inlay banding (Inlay J - 3 strips)
10 ft of iron-on veneer tape, cherry
1 small dowel pin, 1/4 X 2"



If you have any questions about the assembly process – please visit our online Builder's Forum at www.harpskit.com/forum

BEFORE YOU BEGIN

Please take the time to check over the parts of your 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. We also suggest skimming through the entire directions before beginning, just to get an overview of the project. You may decide that you need to gather more tools or purchase a few optional decorations or accessories to enhance the finished instrument. Now is a good time to decide so you can avoid delays when you reach those steps of construction.

A NOTE ABOUT GLUE

DO NOT ASSEMBLE THIS PROJECT WITH 5-MINUTE EPOXY, SUPERGLUE, OR HOT MELT GLUE! Find a good woodworking glue. Many luthiers (guitar & violin 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 must do the same. We build this instrument with modern woodworking adhesives (such as Elmer's Carpenter's Wood Glue or Titebond) because they hold the parts even more securely than the old hide glues. The few advantages that some people claim with hide glue are more than offset by the strength, durability, ease of application, and availability of modern woodworking adhesives.

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. Most woodworking adhesives "set" sufficiently after 30 minutes of clamping to allow you to proceed. Check your dispenser for recommended drying times.

THE SOUNDCHAMBER FRAME

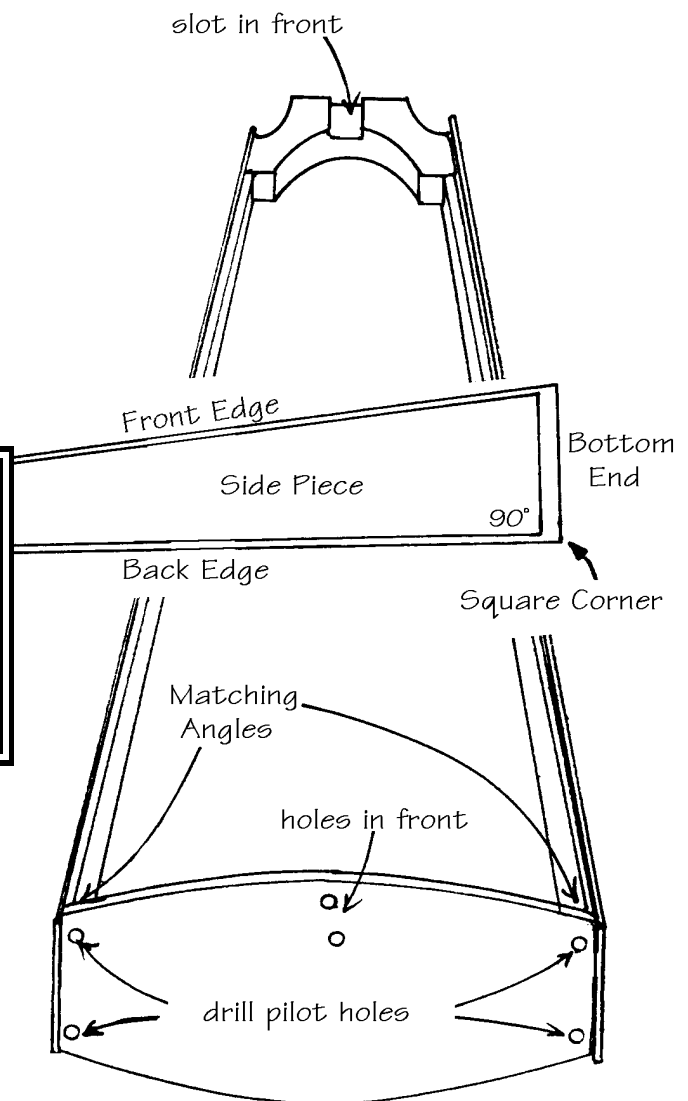
_____ **1.** Check all parts of your kit against the parts list, lightly labeling them in pencil if desired.

_____ **2.** Find the two **SIDES**, the **BASE**, and the **SHOULDER** for the soundchamber frame. Hold them together dry to check the fit of each joint.

IMPORTANT

*Be certain that you understand which is the front and which is the back of each piece. The front of the **SHOULDER** has a slot cut in to allow for more vibration of the soundboard. The front of the **BASE** has two holes pre-drilled in the center for attaching the pillar. The front edge of the **SIDES** is *not square* with the **BASE**.*

_____ **3.** Drill pilot holes for wood screws at each end of the **BASE**, as follows: Hold the **BASE** in position on the ledge of the **SIDE** piece with all edges flush and tight. Drill through the **BASE** into the **SIDE** piece with a 7/64" bit. Repeat for the other **SIDE**. Take care to aim your pilot holes into the core of the **SIDE** material. These holes will guide your screws.



Find the following items for the next step:

Carpenter's glue

4 small wood screws, 1-5/8"

Cordless drill with Phillips screwdriver bit

Woodworkers clamp or large C-clamp

____ **4.** Clean all surfaces of the **SIDES**, **BASE** and **SHOULDER**. Apply glue to the ends of the **BASE** and the bottom notch of each side. Hold pieces together while you insert the screws to draw the joints up tight.

____ **5.** Apply glue to the edges of the shoulder and to the notch at the top of each side piece. Place the parts together and clamp them, making sure all edges are flush. (Note: it is very important that the front of each part faces the same direction.)

____ **6.** Turn the frame (if necessary) so the front faces down on your work surface.

Find and check the fit of **BRACES** #1, #2, and #3. They should fit between the **SIDES** at the positions of the notches.

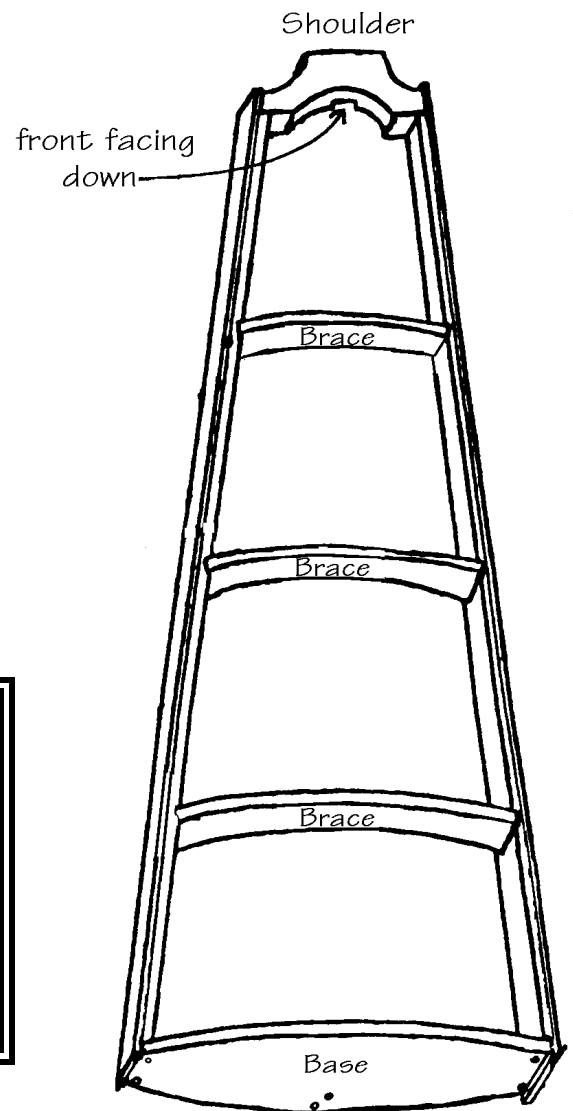
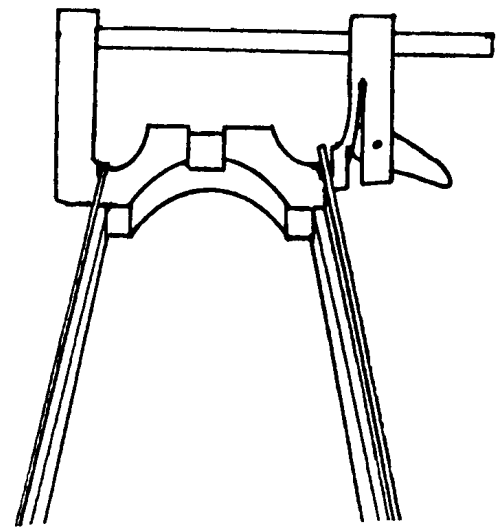
*Be sure the convex curve (hump) of each **BRACE** faces up, and that you place these **BRACES** right up to the back edge of the **SIDE** pieces, so the curve matches the ledge cut along the **SIDE** piece, as these braces establish the curvature of the back.*

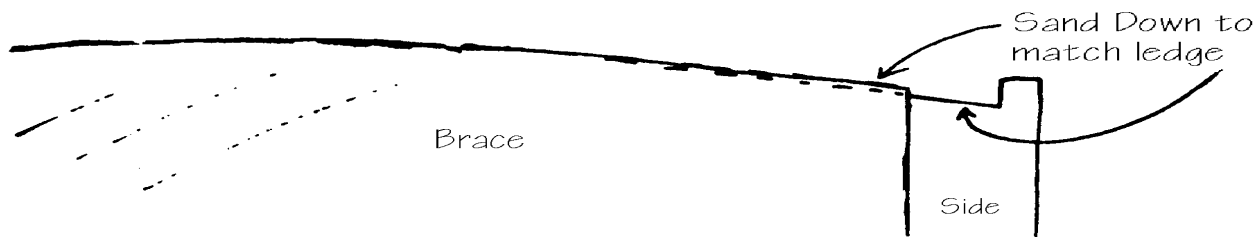
NOTE

Sometimes the **BRACES** do not fit perfectly between the **SIDES**. This could be caused by sloppy cutting on our part, or it might be that the **SIDES** have bowed a little on their own. We recommend checking the **SIDES** with a straight-edge and fitting the **BRACES** so as to push or pull the **SIDES** into alignment. If a **BRACE** is too short, you may shim it with a scrap of veneer. If too long, use a disk sander to remove a small amount of material without changing the angle or rounding the end.

____ **7.** When satisfied with the fit of each brace, glue them in place and apply pressure (clamps or tape) to hold until dry.

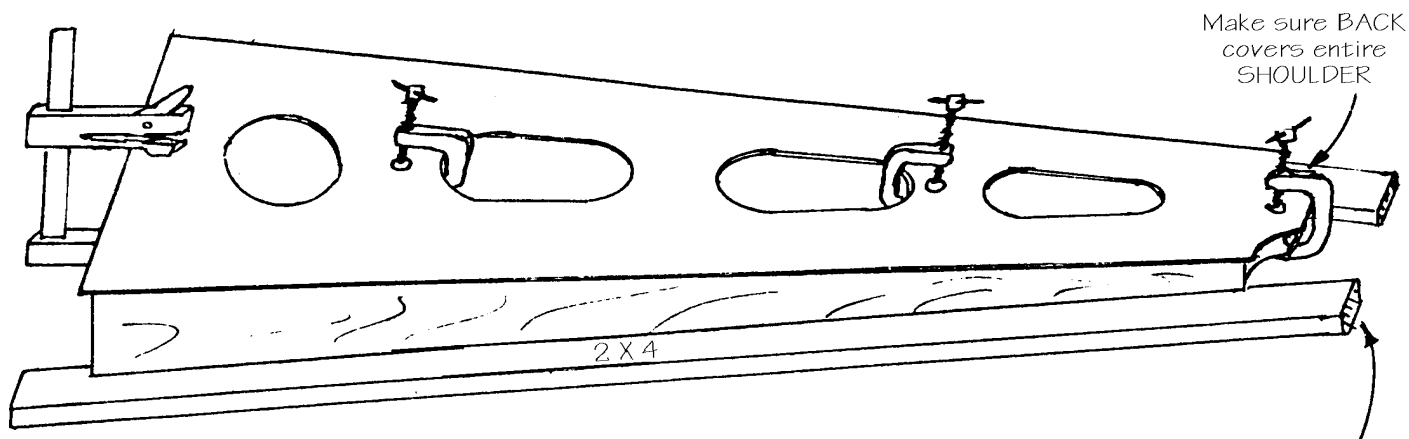
____ **8.** Check over the back edges of the harp frame. If any of the **BRACES** stand taller than the **SIDES**, sand them down flush with the ledge.





____ **9.** Test fit the **BACK** panel to the convex (humped) side of the frame. With a little effort, it should bend to fit the curve of the **BRACES** and seat into the ledges of each **SIDE**. You may have excess plywood extending beyond the **SHOULDER** and **BASE** of the frame which can be trimmed off later.

It is not uncommon for the **BACK** to need sanding or planing along the edges to make it a little narrower. Our parts are often generously sized. Use a hand plane to shave the edges of the **BACK** to fit. Don't be concerned about a perfect fit, however. Slight gaps will be covered over later on when you add veneer tape.



HINT: Find two scrap boards (bed slats or old 2 X 4's work fine) to place under the **SIDES** of the frame before beginning to tack the **BACK** in place. This will keep the frame from rocking from side to side as you pound the nails in. It may also help to place a thick blanket or towel under the harp for padding.

Find the following items for the next step:

- hammer
 - a few C-clamps
 - glue
 - bag of small nails included in this kit.
 - a friend to help with this step (four hands and two hammers make this easier)
-

____ **10.** Clean off all sawdust from the frame and the back panel.

HELPFUL HINT

Before gluing the **SOUNDBOARD** or **BACK** into place, get two clean rags wet, and have them readily available for cleaning up excess glue that squeezes out of the joints. Keep your fingers clean too. The second rag should be used for final “scrubbing” any affected area, just to make sure all glue residue is removed. This will help save you lots of time toward the end of this project when you are preparing to apply the finish.

Before you begin gluing, locate and start several nails along the sides of the panel, so they are going in but not through the panel. This will make installation considerably faster after gluing.

11. Apply a thick bead of glue to the backside of the entire frame where it contacts the **BACK** panel, including the cross **BRACES**, **SHOULDER**, and **BASE**.

Immediately place the **BACK** in position with one clamp at the **BASE** and another at the top of the **SHOULDER**. Make sure the panel will bend down to fit into the ledges at each **SIDE**.

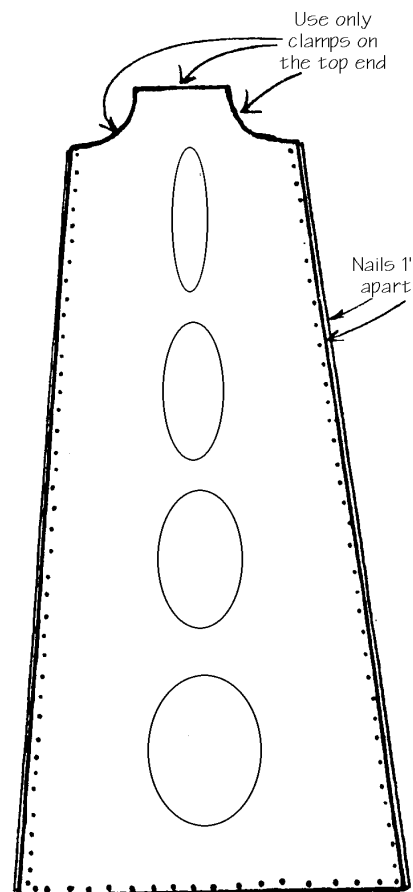
Install a few more C-clamps at each **BRACE**, using the large holes for easy access.

Begin tacking the plywood to the frame. Start by tacking across the bottom so the **BACK** is held firmly to the **BASE**. Place the nails 1" apart and centered on the frame below.

You might want to start tacking in every other nail, working your way up each side to the **SHOULDER** to get the plywood attached, then go back and put in the rest of the nails.

DO NOT PLACE TACKS ACROSS THE TOP OF THE SHOULDER OR ACROSS THE CENTER OF THE BACK BRACES.

Try to work quickly, before the glue becomes too thick.



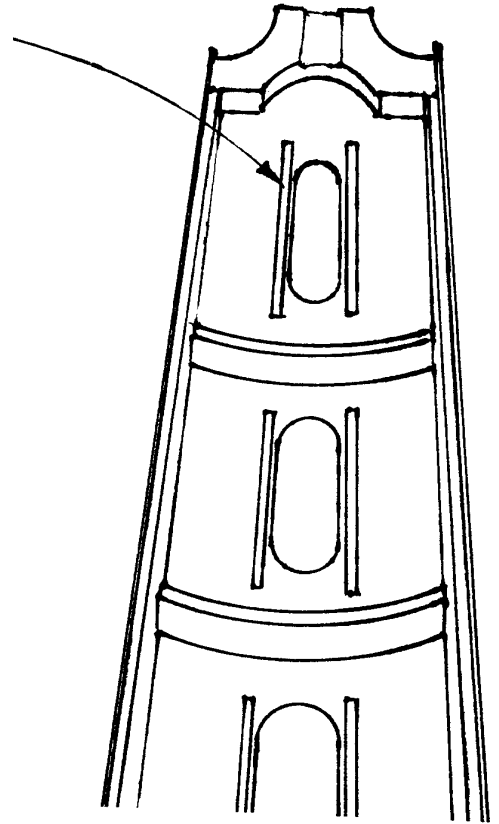
POINT OF INTEREST

We use nails here because it is difficult to put clamps on these curved surfaces. The nails do a nice job of holding the parts together until the glue dries. We provide wood veneer tape to cover them later so they won't be noticed by nosy friends or critical relatives.

12. When the nailing is complete, check over all the seams to see if you need to add or adjust clamps. Check especially at the top of the **SHOULDER** where the seams will show on the finished harp.

____ **13.** Clean off excess glue with your damp rag right away, making a thorough job of it.

____ **14.** We find it helpful to add **STIFFENER BATTENS** along each side of the top three access holes in the **BACK**, just to reinforce this thin laminate. Glue and clamp these **BATTENS** to the **BACK** near the holes, as shown.

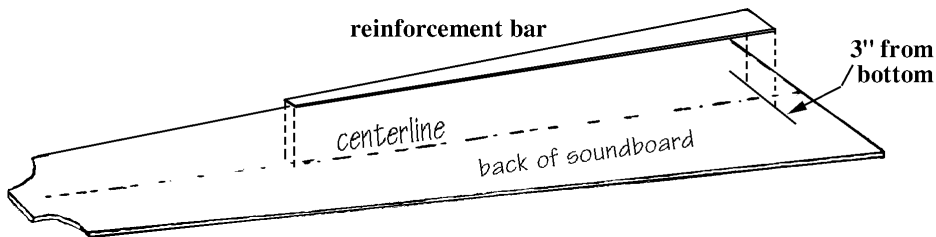


THE SOUNDBOARD

POINT OF INTEREST

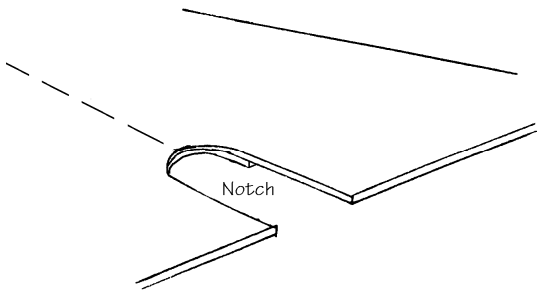
Many people ask why we use *laminated* wood instead of solid for the soundboard. The reason for this is that we get much more strength from laminated material than from solid, and much less trouble with cracking. This superior strength allows us to use a thinner soundboard than if we were to use solid wood, so you get remarkable sound and tuning stability with minimal risk of breakage.

____ **15.** Draw a centerline down the length of the **SOUNDBOARD**, on the front and back sides. Then draw a pencil line 3" from the bottom on the **back side only**.



____ **16.** The **REINFORCEMENT BAR** is to be glued to the backside of the **SOUNDBOARD**, starting at that line. It does not reach all the way to the top of the instrument because we want the **SOUNDBOARD** to be thinner at the top. You may taper the thickness of the top 6 inches of this **REINFORCEMENT BAR** to make it gradually blend into the **SOUNDBOARD**. Then glue and clamp it in place, as shown.

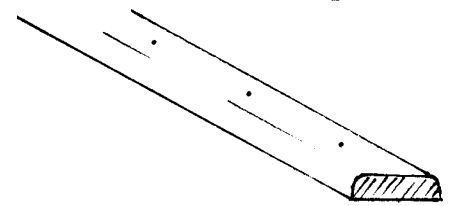
____ **17.** The front face of the **SOUNDBOARD** has the notch drawn on it (or precut).



Cut out the notch marked at the bottom, using a jigsaw or coping saw, so the reinforcement bar is flush with the notch in the soundboard.

NOTE: SAVE THE SCRAP of wood from this cut-out. You will use a portion of it later on.

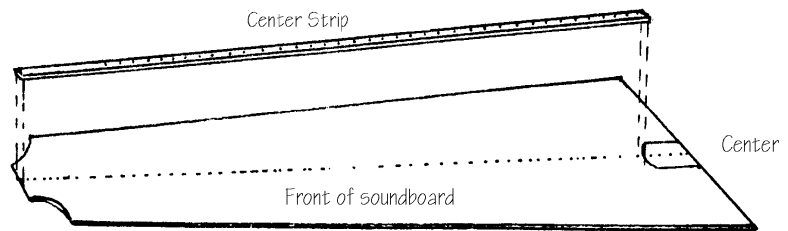
____ **18.** Find the **CENTER STRIP** for the **SOUNDBOARD**. It is a long narrow piece of walnut or cherry with punch marks in it. Sand the sharp corners of this strip, as shown, to round them over.



____ **19.** Glue the **CENTER STRIP** to the **SOUNDBOARD** as follows:

A) *Be sure the top and bottom are properly oriented.* The punch marks are closer to the bottom end than to the top.

B) Place the bottom of the **CENTER STRIP** right next to the notch. The upper end may extend beyond the top of the **SOUNDBOARD**, or you may cut it shorter and taper the top end just beyond the last punch-mark.



C) Draw the outline of the strip in its proper position so you can be sure to keep it properly centered when clamping.

HINT: If the **CENTER STRIP** is not straight, hold a straight-edge against it to force it into place, and use masking tape to hold it straight before applying clamps or weights.

D) Make certain string hole markings are facing up.

E) Apply only a small ribbon of glue to the underside of the **CENTER STRIP** so you don't get too much squeeze-out that will need to be cleaned up.

F) Use weights or clamps (in an emergency, look for a heavy sacks of flour, sugar, sand, or fertilizer to use as weights!) to hold it until dry.

G) Check it again for straightness, if possible. This little strip can easily slide around under the pressure of your clamps.

CUSTOMER SUGGESTION: One customer who has built several of these harps suggests **tacking** the **CENTER STRIP** in place with the tiny nails in the kit, instead of using clamps. Place the nails at the punch-marks, but be careful not to pound them all the way in -- leave the heads sticking up so you can pull the nails out later. We think this is a great idea! Just take care not to split the wood when pounding the nails in.

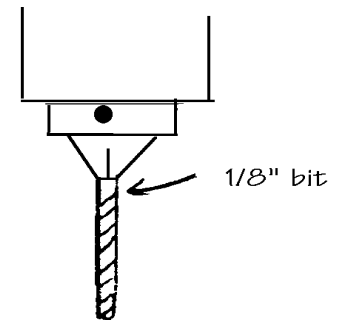
____ **20.** This would be a good time to sign and date your harp, on the inside of the **SOUNDBOARD**, where it can be seen through one of the access holes in the **BACK**.

POINT OF INTEREST

Some people ask about finishing the inside of the soundchamber. We do not recommend trying it. Guitars and violins are never finished on the inside, so this instrument need not be sealed on the inside either. We understand people's concern about the effects of humidity on the wood, but even the best varnish or lacquer does not hermetically seal the wood. It blocks spilled milk from soaking in, but it does not prevent the wood from "breathing" moisture vapor from the surrounding air.

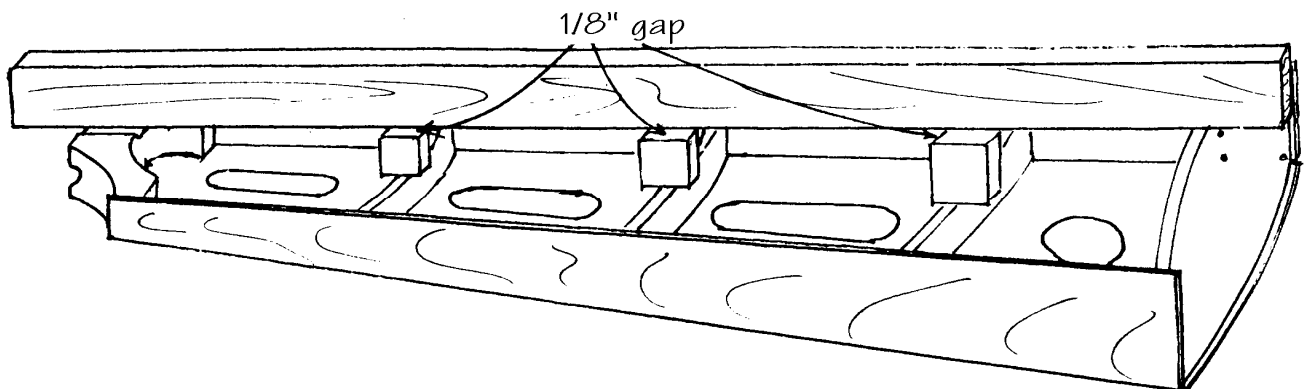
____ **21.** Turn the **SOUNDBOARD** over and note the punch marks along the **CENTER STRIP**. Use a 1/8" drill bit to bore these 31 holes through all three layers of wood in the **SOUNDBOARD** assembly, as shown below.

NOTE: These holes should be vertical (perpendicular to the soundboard)



INSTALLING THE SOUNDBOARD

____ **22.** Lay a straight-edge across the frame, from **BASE** to **SHOULDER**, and measure the gaps between the straight-edge and the center of each **BRACE**.



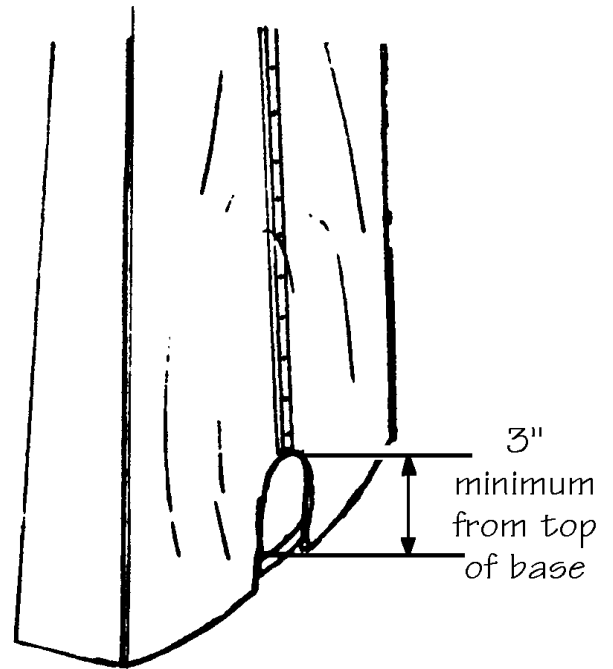
HINT: Just as for the **BACK**, use bed slats or other supports along the sides of the harp, underneath the protective padding, to hold it steady while pounding the nails into the frame.

___ **23.** Subtract 1/8" from each measurement and cut a small scrap of wood to fill each gap, so it reaches up within 1/8" of the straight-edge. Tape the scraps to the corresponding **BRACES**, so the soundboard **REINFORCEMENT BAR** will rest on the scraps when you install the **SOUNDBOARD**. (Don't worry; you will remove the scraps later!)

___ **24.** Test fit the **SOUNDBOARD** to the front of the frame. You want it to have the same kind of curve that the **BACK** has, along the entire length. And you want the top of the "notch" to be at least 3" from the top of the **BASE**. The scraps that you just taped to the **BRACES** will help you achieve the proper curve to the **SOUNDBOARD**. These scraps can be left in place until you install the strings. The string tension will pull the **SOUNDBOARD** away from the **BRACES**, allowing the scraps to fall free.

You may have to push pretty hard to test fit the **SOUNDBOARD** all the way along its entire length.

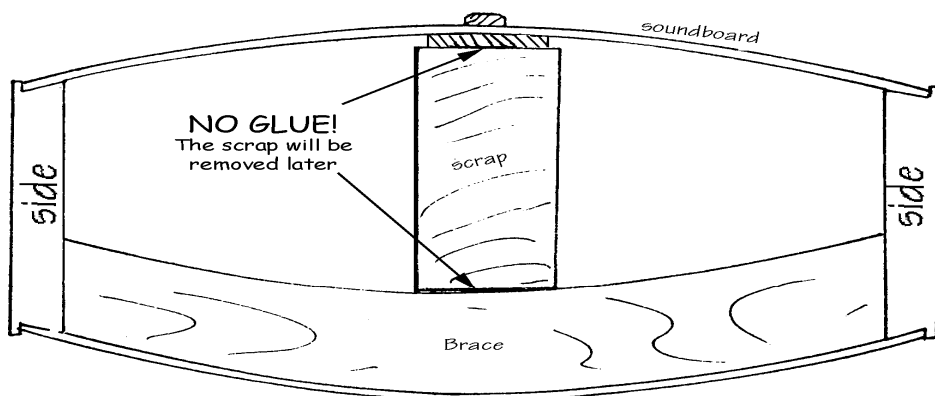
Make sure the **SOUNDBOARD** fully covers the **SHOULDER** and the **BASE**. Again, you may need to shave a little off each side to make this piece narrower. Don't be concerned about a perfect fit along the **SIDES**. Slight gaps will be covered over later when you add decorative trim.



___ **25.** When you are satisfied with the fit, make some pencil marks on each edge so you know where to position the assembly quickly after applying the glue.

Gather the following tools and supplies ready for quick use:

- hammer (s)
 - glue
 - bag of small nails
 - padding to protect the back of the harp
 - two damp rags for clean-up
 - a friend to help you with this step (just as with the **BACK**)
-



___ **26.** Remove the **SOUNDBOARD** and start several nails along the edges, as on the back, to make installation faster, and then apply a thick bead of glue around the four edges of the frame that will contact the soundboard.

____ **27.** Quickly replace the **SOUNDBOARD** in the position you had it during the test fitting. Nail it in place along the bottom and sides, just as you did the **BACK** panel, and clamp the top to the **SHOULDER**, checking for tight seams.

Clean off excess glue with your damp rags right away, making a thorough job of it.

____ **28.** When the glue is dry, trim off all excess wood that hangs over the top of the **SHOULDER** and the bottom of the **BASE**. Take the time to do a nice job with this. A drum sanding attachment to your electric drill will help for the curved parts of the **SHOULDER**. This is the most visible portion of the finished instrument, so it shouts your woodworking skills to the world.

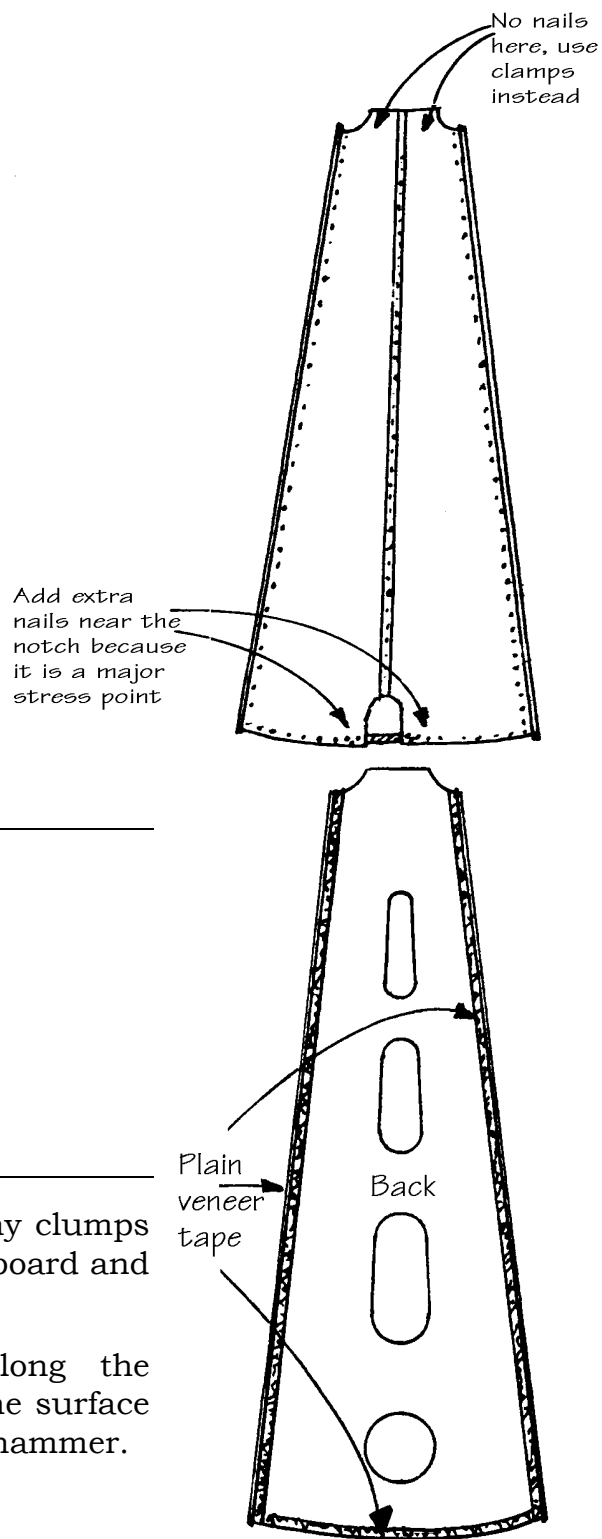
ADDING DECORATIVE TRIM

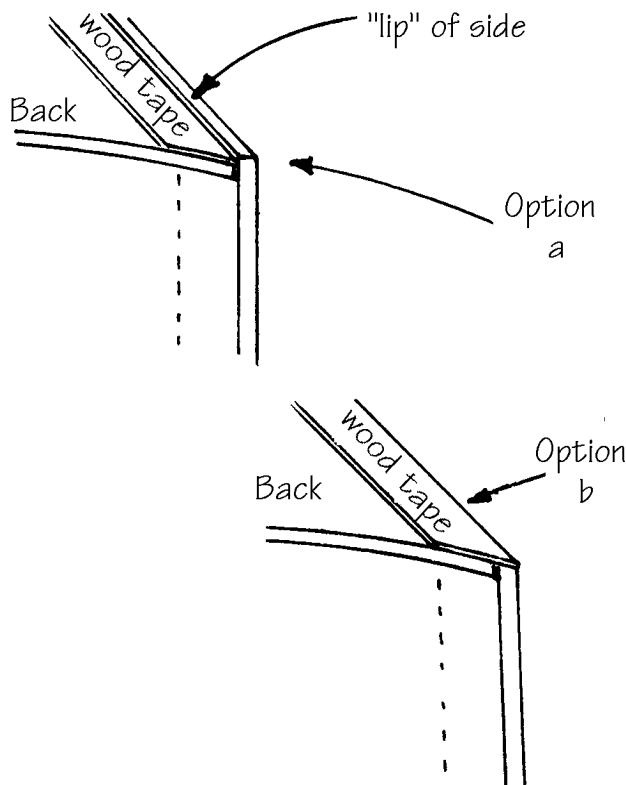
Gather the following items for the next steps:

- Wood veneer tape
- Decorative inlay banding
- Sanding block or electric sander
- Electric iron
- Glue
- Sharp knife or chisel
- Hammer
- Nail set or large nail

____ **29.** Use a sharp knife or chisel to remove any clumps of glue or slivers of wood along the edges of the soundboard and back that might interfere with the decorative trim.

____ **30.** Check to see if any nail heads along the **SOUNDBOARD** or **BACK** panel are raised up above the surface of the wood. If so, tap them deeper with a nail set and hammer.





____ **31.** Begin with the back of the instrument. Cut two pieces of wood veneer tape long enough to cover the full length of the soundchamber, from **SHOULDER** to **BASE**, along the side edges. Test the way you want these to fit, making sure they cover all the nails. You have two options:

OPTION A) Lay the **VENEER TAPE** against the “lip” of the **SIDE** that sticks up higher than the **BACK**, or

OPTION B) Sand that “lip” flush with the **BACK** and lay the **VENEER TAPE** over the seam.

We think option **B** looks better on the **BACK** (but not on the **SOUNDBOARD**), but it requires a little more work. If you decide on this second option, be careful when sanding down the “lip” to avoid sanding through the thin outer layer of the **BACK**.

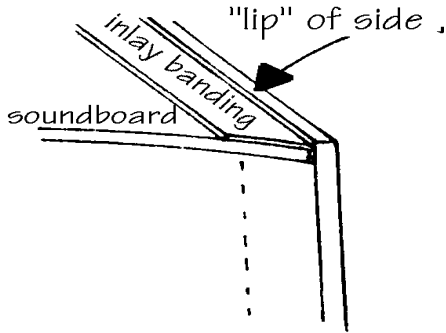
____ **32.** This **VENEER TAPE** is pre-glued. If there is cellophane protective paper over the glue, peel that off first. Then lay the tape in place, covering the nails and the small gaps along the sides.

____ **33.** Preheat the iron to 300 degrees (medium setting) *without steam*.

____ **34.** Iron the two wood **VENEER TAPE** strips to make them adhere permanently, following behind the iron with a block of wood to press on the tape as it cools. If a portion of veneer comes loose, just iron it down again.

NOTE: The veneer tape can be moved slightly while it is still hot, so if the tape slides out of position a bit, just heat it up again and push it back into place. Follow behind your iron with a block of wood, pressing the **VENEER** into place as it cools.

____ **35.** Cut a piece of **VENEER TAPE** to fit across the bottom of the **BACK** panel, between the other two strips. Iron that in place to cover the nails at the bottom. Save any leftover scraps of **VENEER TAPE** for later. They sometimes come in handy for shims and fillers.



____ **36.** Turn the harp over and prepare the decorative **INLAY BANDING** for covering the nails in the **SOUNDBOARD**.

This decorative trim should be installed beside the “lip” of the **SIDES**, as shown, so it covers the nails and hides the crack between the **SOUNDBOARD** and each **SIDE**.

NOTE: There are two possible methods of installing this **INLAY BANDING**. Some customers prefer to simply spread glue on one side of the **INLAY** and hold it down with lots of masking tape until dry, and others prefer the iron-on method,

which is a little tidier but takes a little more time. Both methods are acceptable. Here is how to do the iron-on method:

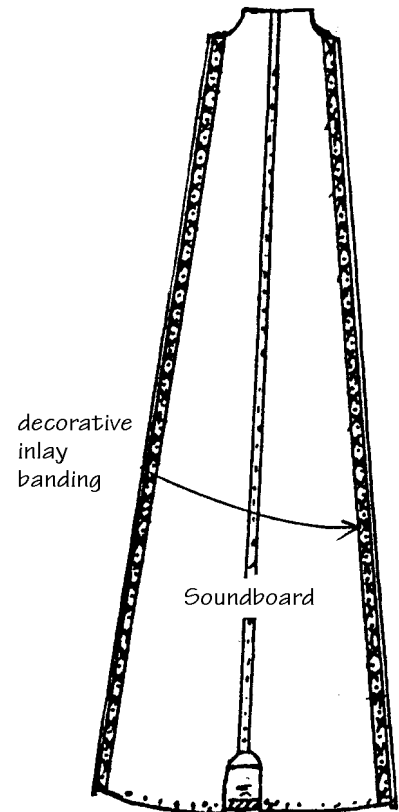
OPTIONAL IRON-ON METHOD

a) Spread a smooth coating of carpenter's glue on one side of the **INLAY BANDING**. Set aside to dry thoroughly.

b) Spread a 1/2" wide band of the same glue (Elmer's works well) along each side of the soundboard where the **INLAY** is to be installed, Allow to dry thoroughly.

HINT: use a scrap of wood that is slightly less than 1/2" wide for spreading this glue, so you don't inadvertently smear glue out onto the **SOUNDBOARD** where it will have to be cleaned off later.

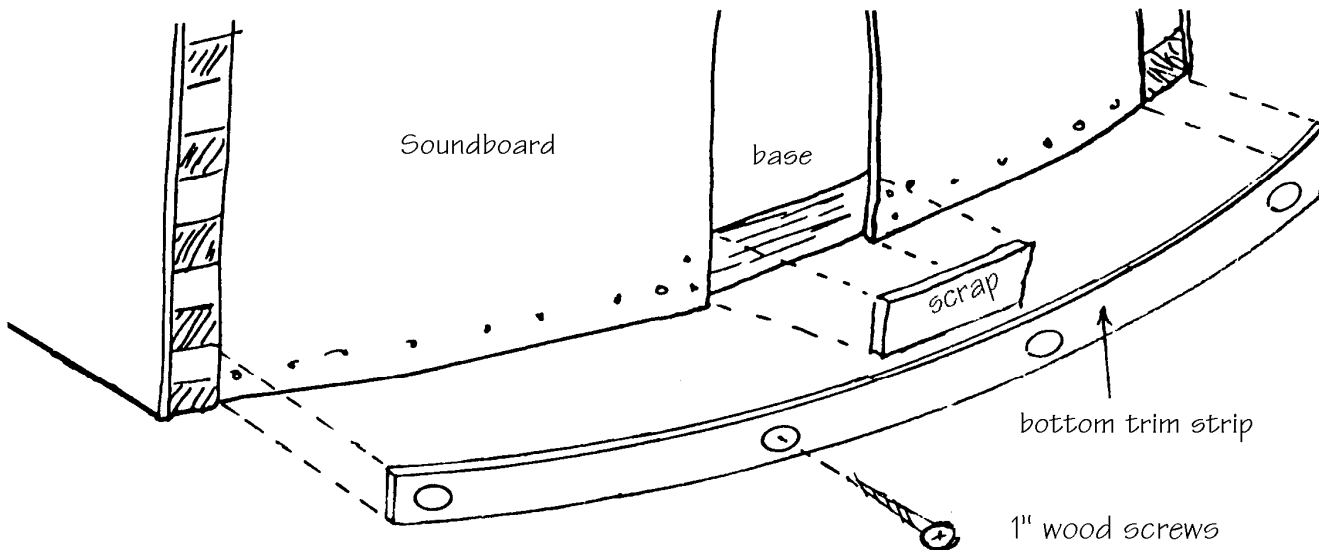
c) When both surfaces are dry to the touch, you can iron the banding onto the **SOUNDBOARD** just as you did with the veneer tape.



You will need to make a nice clean splice with a sharp chisel at the point where you join two pieces of banding together to reach the full length of the harp. Try to do this at a point in the pattern that where the joint will be less noticeable.

No, there is not enough decorative inlay to reach across the bottom of the soundboard. We provide a sturdier **BOTTOM TRIM** piece for this place.

___ **37.** Before installing that last bit of trim across the bottom of the **SOUNDBOARD**, find the scrap of 1/8" plywood that you saved from the notch and cut a small piece of it to fit in the gap across the bottom. Glue and nail it in place.



___ **38.** Then find the **BOTTOM TRIM** piece (pre-drilled with four holes) and four short wood screws. Glue and screw this strip firmly to the **SOUNDBOARD**. You may need to drill pilot holes (7/64) for the screws.

NOTE: The **BOTTOM TRIM** piece is longer than necessary. You may trim it to cover over the **INLAY BANDING** or to fit between the **INLAYS**, whichever you prefer.

___ **39.** Cover the screw heads by gluing the **WOOD PLUGS** over them and sanding the plugs flush with the trim piece.

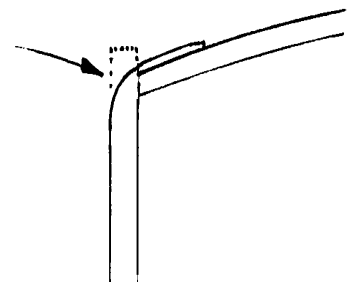
SANDING THE SOUNDCHAMBER

___ **40.** Start with a coarse (#80) sandpaper wrapped around a block of wood. Use it to round over the sharp edges of the soundchamber sides and reduce the "lip" of the sides down so they are flush with the decorative **INLAY BANDING** on the front.

You want the decorative **INLAY BANDING** to appear as though it is inlaid at the **SIDE**.

Remember that your fore-arms will make frequent contact with these corners of the soundchamber as you play, so make them feel comfortable. A sure sign of amateur woodworking is sharp corners. Don't hesitate to round them *generously*, as shown. Then your harp will look and feel like the professionally built instruments.

___ **41.** Switch to a medium grit (120) sandpaper to smooth off the scratches made by the coarse paper. This time, be sure to sand with the grain of the wood so you don't add more scratches.



INSTALLING THE FEET

___ **42.** Place the sound-chamber on a table with the bottom end hanging over the edge at any easy working height. Place the **FEET** in position approximately 2" from each **SIDE** so that the angled ledge of each **FOOT** contacts the **BACK** of the instrument.

We like the **FEET** to point slightly outward at the front rather than being "pigeon toed".

Insert the appropriate length screws into the holes in the **FEET**, and tap them with a hammer to punch-mark the location for drilling pilot holes into the **BASE**.

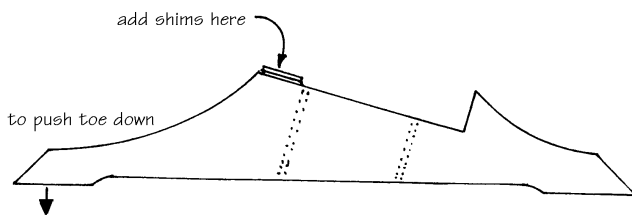
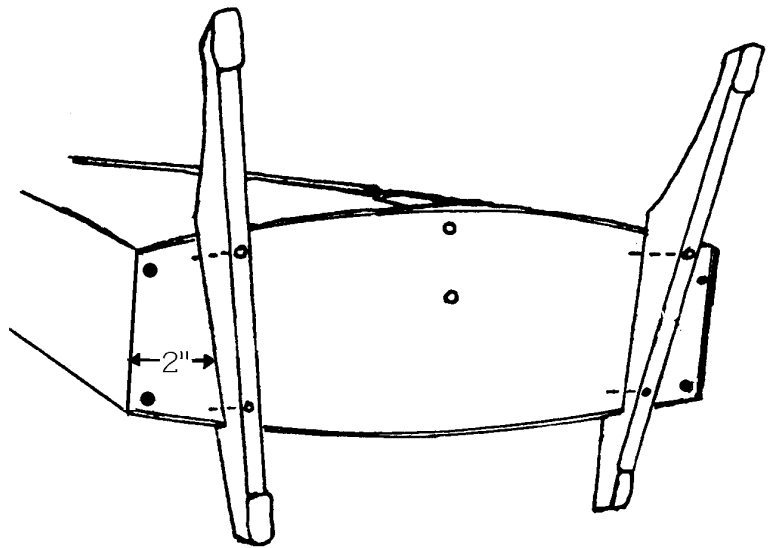
___ **43.** Drill pilot holes into the base with a 7/64" bit so the screws will go in easily

Attach the **FEET** to the **BASE** with screws only - no need for glue. Now the soundchamber will stand up on its own two **FEET**!

Check to see if the **FEET** make contact with the floor at all four points. If the harp rocks on two points, then you can adjust them as follows:

a) Look carefully at which points do not touch the floor (e.g., the "left toe" and the "right heel", or vice versa).

b) Remove the **FEET** and shim them with short pieces of **WOOD VENEER TAPE**, as shown. (If, for example, the "left toe" needs to be lower, add shims near the front screw that holds that foot in place.)



You are doing great - more than half done!

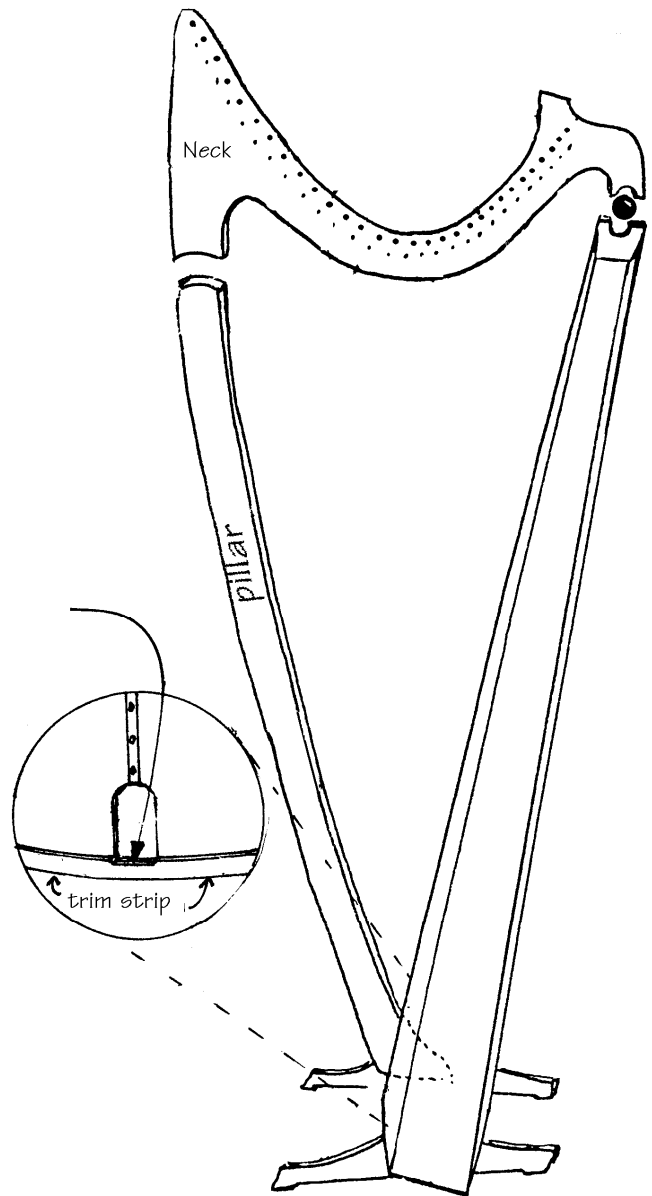
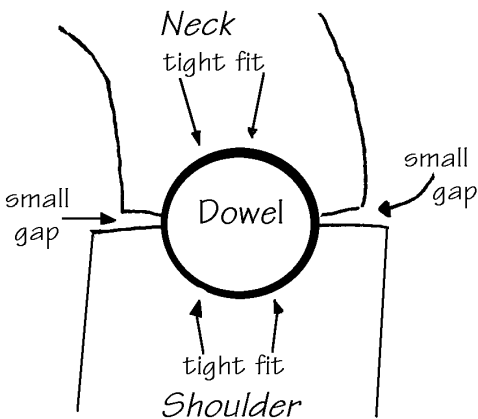
Point of Interest

Many people ask why we use laminated wood for the **NECK** of this harp instead of solid hardwood. The reason is that the strings exert nearly 700 pounds of tension trying to break the wood. With such a deeply curved shape to the **NECK**, there is bound to be at least one weak point where the grain would be quite short, and that is where it would break if the wood were solid (straight grain). So the modern solution to this dilemma is to laminate thin layers of hardwood together, having each layer with the grain going a different direction (we bury these laminations inside the neck in our kit). That way there are always some strong layers of wood in any given section of the **NECK**, regardless of the curves. You can rest assured that this harp will last a long time with this laminated wood.

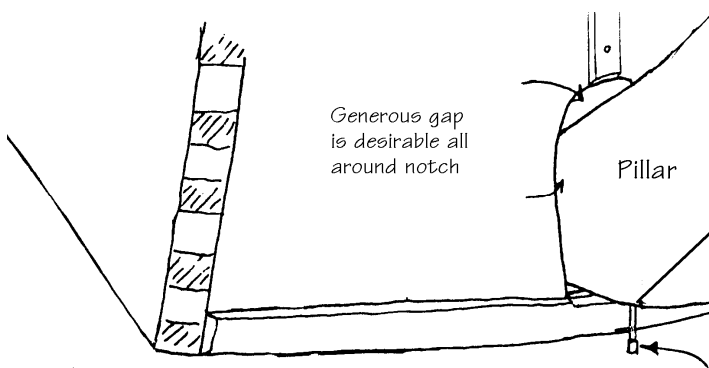
PREPARING THE NECK

___ **44.** The **BOTTOM TRIM STRIP** may require filing at the center so it is level with the surface of the **BASE**. Otherwise it would interfere with the **PILLAR**. Use a coarse file to accomplish this.

___ **45.** Test fit the **NECK** and **PILLAR** to the soundchamber. Place the 1" diameter **DOWEL** across the top of the **SHOULDER**, rest the back of the **NECK** on top of the **DOWEL**, and stand the **PILLAR** up from the notch in the **SOUNDBOARD** up to the front of the **NECK**.



These parts should stay together by gravity. Make sure the **PILLAR** rests flat on the **BASE**. You want plenty of clearance around the **PILLAR** at the notch. The sound of the harp will be dampened if the **SOUNDBOARD** touches the **PILLAR**.



HELPFUL HINT: You can pull the bottom of the **PILLAR** out away from the **SOUNDBOARD** and pound a finishing nail part way into the **PILLAR** to prevent it from sliding too far into the notch. We like to be able to fit a little finger between the **PILLAR** and the **CENTER STRIP** of the **SOUNDBOARD**.

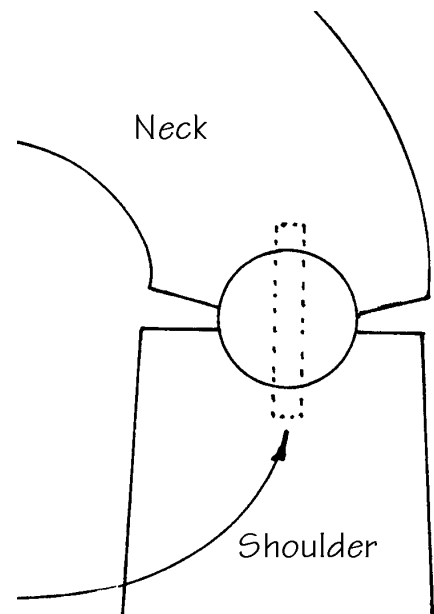
Look carefully at each joint. The **SHOULDER** and **NECK** should fit nicely on the **DOWEL** but should not touch each other (you can sand away some of the wood to make a small gap in front of and behind the **DOWEL**, so there is some room for the **NECK** to pivot on the **DOWEL**). Don't worry if this joint is a little loose now. The string tension will draw these parts together firmly.

POINT OF INTEREST

The joint at the back of the **NECK** is meant to be a kind of *knuckle joint* that allows for some movement in the future. If we were to attempt to glue a permanent joint here, the string tension would eventually cause a crack to open as the harp frame flexes in response to the strings. So we simply create a joint that allows for slight movement. Another benefit of this type of joint is that you will always have the option of taking your harp apart for future repair or refinishing. Just remove the strings and the **NECK/PILLAR** assembly can be taken off the harp.

46. OPTIONAL STEP: We have included one **SMALL DOWEL** (1/4") that can be used to "pin" this knuckle joint, if you wish to install it. We recommend it if you think you will ever ship the instrument somewhere. Occasionally, we have seen the **NECK** shift to one side of the **SHOULDER** during shipment, just because of the constant vibration of transporting it on its side for hundreds of miles.

This pin need not fit tightly, so we use a slightly oversize drill bit (17/64") to drill a hole through the center of the **WALNUT DOWEL**, and just 1/2" into the **SHOULDER** and the **NECK** so the pin will be hidden inside the knuckle joint, as shown.



Point of Interest

Many people ask why we don't have dowels in the **NECK/PILLAR** joint. Doweling this joint would not hurt anything, but it is a difficult and unnecessary step. We have designed this instrument so that the string tension actually holds the parts together. The only force to worry about is the torque from the strings all pulling on one side of the **NECK**. They want to tip it over. Adding dowels would do little to prevent this motion, so we use decorative wood **OVERLAYS** on the outside of the **NECK/PILLAR** joint. They give a kind of "I-beam" strength to this joint. When properly glued in place, they are much more effective than dowels embedded on the inside. If you dislike our decorative shapes for these **OVERLAYS**, you may make your own customized shape. Just take care to make them out of sturdy wood -- no pressed wood, thin veneers, or soft wood here. Make sure also to aim the direction of the grain vertically, so it crosses the **NECK/PILLAR** joint.

___ **47.** Look carefully at the joint at the front of the **NECK** where it rests on the **PILLAR**. It should be nice and tight, no wide gaps, when the bottom of the **PILLAR** is in correct position in the notch. Some adjustment can be made by sanding the top of the **PILLAR**, if necessary. But don't worry if the joint is not absolutely airtight. You may add a little filler paste here later. We usually do.

___ **48.** Test fit the **OVERLAY** pieces to the **NECK/PILLAR** joint, centering the length over the seam. Lightly mark their outlines on each side of the **PILLAR** and **NECK**, so they will be positioned opposite one another.

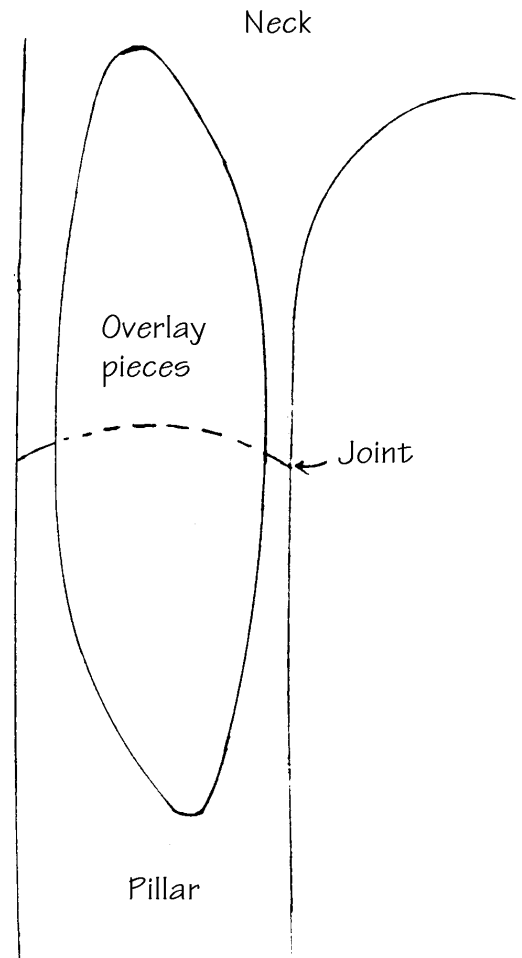
___ **49.** Sand the **OVERLAY** pieces before installing them. It is much easier to smooth off the edges now than it will be after gluing them to the harp.

STOP!

Many customers have glued the **NECK** and **PILLAR** together *without following these directions and have had trouble as a result.*

PLEASE PROCEED ONLY AS DIRECTED!

You must glue the **NECK** and **PILLAR** together *as they are standing in position on the harp.* Otherwise you cannot be certain they will fit back into place again.



Gather the following tools and supplies for the next gluing operation:

- Several C-clamps
 - Masking tape
 - Glue
 - Two damp rags
 - Some scraps of wood for clamping pads
-

___ **50.** Apply glue to the butt joint of the **PILLAR** and **NECK** first, *keeping the parts standing in place on the harp.* Use masking tape to hold the parts together as tightly as possible until the glue dries, about 3 hours.

Once dry, round the edges around this area. It will be easier to do now, without the overlay in the way. Make sure the surface is flush, so your overlay rests nicely on the joint.

CUSTOMER SUGGESTION: One customer suggests burying four tiny nails in the **NECK** and **PILLAR** to help hold the **OVERLAY PIECES** from sliding out of place when clamped. Clip off the nail heads, and drill 1/16" pilot holes into the **NECK** and **PILLAR** near the top and bottom of the pencil outline so the nails will show just enough to poke into the **OVERLAYS** when you clamp them in place. Great idea!

____ **51.** Apply glue to one of the **OVERLAY** pieces and tape it into position (where you drew the outline earlier).

Tape some clamping pads to your clamps, so they don't dent the harp when tightened.

Clamp one **OVERLAY**, watching to be sure the part stays in correct position and is held securely. Use damp rags to clean up all glue as it squeezes out. This is very important! You will kick yourself every time you look at the finished harp if you leave glue residue around these decorative pieces.

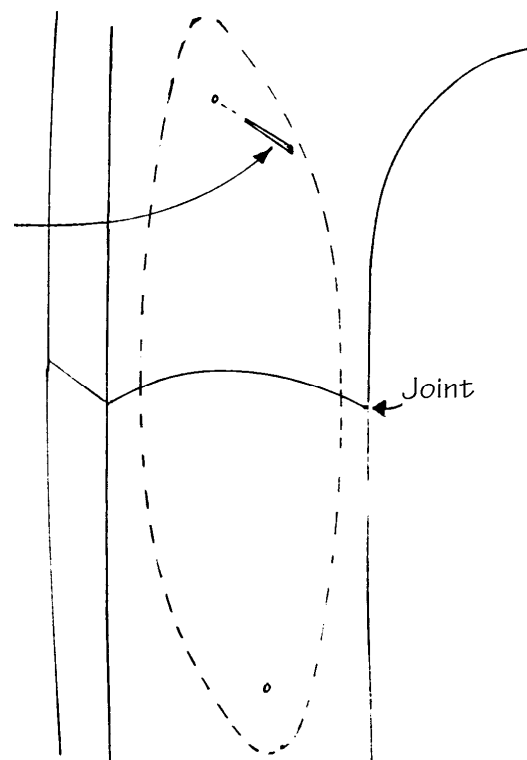
Allow the first side to set for about a half hour, then glue the second **OVERLAY**, clamping both sides at the same time. Again, clean up any glue that squeezes out, to avoid glue marks on your finished harp. Keep the clamps on for about 3 hours, giving it ample time to dry.

____ **52.** When dry, you may remove the **NECK/PILLAR** assembly from the frame of the harp. This is the best time to do final sanding and shaping of these pieces. Here are some guidelines:

Sand all the edges to remove machining marks, scratches, and glue residue. A medium sandpaper (150 grit) should suffice for this. Hold the parts in different lighting to check for scratches and glue spots. They can be elusive!

Note that we have rounded over all edges of the **NECK** *except one*. This lower edge should be left square so you have room for mounting sharpening levers later on.

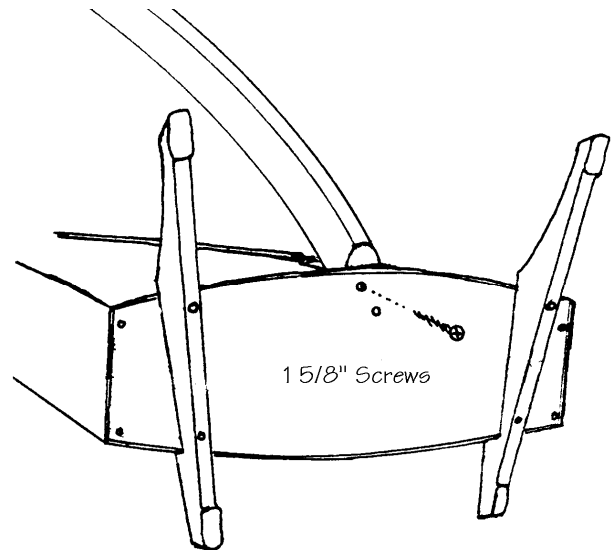
Any minor cracks can be filled with your favorite wood putty. If you have nothing on hand that will match your wood, make up a paste of sawdust and Elmer's glue mixed to a consistency of putty (thin it with a few drops of water). You might also find scraps of the **WOOD VENEER TAPE** handy for filling narrow openings.



FINAL ASSEMBLY

53. Now you can attach the **NECK/PILLAR** assembly to the soundchamber. It requires only two screws (no glue), as the string tension will help hold the entire instrument tightly together.

Lay the harp on its back on a carpeted floor. Fit the **NECK/PILLAR** assembly in place on the harp and then drill pilot holes through the holes in the **BASE**, using 7/64" drill bit, making sure the **PILLAR** is centered in the notch and not too close to the center strip.



Insert the screws to hold the parts together. We use no glue in this assembly step because it is unnecessary and because you may wish to be able to disassemble the harp in the future for refinishing, repairing, shipping, etc. That is a handy option.

FINISHING

Your harp is now assembled. All that remains is to do some final sanding and then apply the finish. Here are some finishing options, along with a few hints from our factory workshop:

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 cherry or walnut. 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.

OIL -- An oil finish will give your wood a low luster appearance, bringing out the natural color of the grain, but it tends to 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 main 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.

VARNISH -- Any regular varnish will work fine on this project, but we recommend our wipe-on polyurethane called MUSICMAKER'S INSTRUMENT FINISH. Our complete finishing kit includes detailed instructions, sandpaper sheets and a half-pint can of wipe-on gel varnish. The advantages of this finish are its simple application, durability, and deep, soft luster. It also works well for protecting painted decorations, decals, woodburned decorations, etc.

LACQUER -- Many professional instrument makers still 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.

CAUTION: Lacquer finish may not work over some decals and paints because of its aggressive solvents.

____ **54.** Do your final sanding with #220 grit sandpaper, always working with the grain so as not to scratch the wood. Dust the instrument well with a clean damp rag before applying the finish.

____ **55.** Apply the finish of your choice. Avoid getting letting finish drip into the tuning pin holes in the neck. You don't want lubrication there, so brush lightly over the holes!

Sand lightly between coats with very fine sandpaper or steel wool.

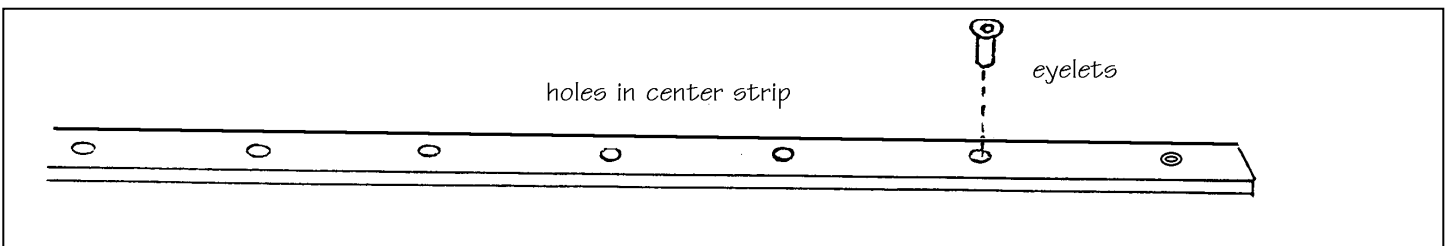
HINT: You may find it easier to apply the finish if you disassemble the harp. Just be careful to avoid dropping the heavy **NECK/PILLAR** assembly - it will dent easily because of its weight.

OPTIONAL DECORATING

Hand painting or woodburning are fun ways to decorate the **SOUNDBOARD** of the instrument. Light artwork or decals can be applied between coats of varnish or lacquer very nicely and will not harm the sound of the harp. Some people use acrylic paints, and others decorate with colored pencils or pastels. This is an opportunity for customizing!

ATTACHING HARDWARE

____ **56.** Find the **BRASS EYELETS** and push them into the holes in the front of the **SOUNDBOARD**.

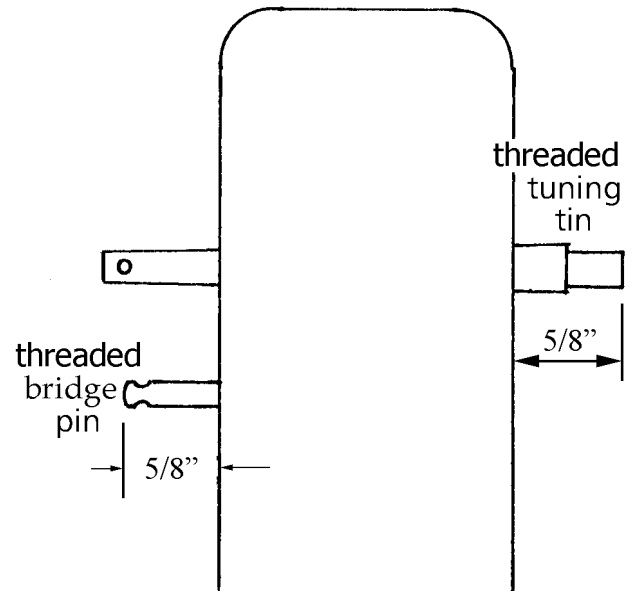


HINT: Install the hardware to the **NECK** when the harp is still disassembled. But be careful to put some cloth padding under it (such as a towel) so you don't scratch or dent the back side as you pound the hardware in.

____ **57.** You can install the **THREADED BRIDGE PINS** into the lower row of holes drilled in the **NECK**. We like to lubricate the threads first by scraping them across some candle wax. Pound them in with a hammer, or screw them in with a 5/64" Allen Wrench, until the threads disappear in the wood. That will put the top of the pin about 5/8" above the surface of the wood. Use the 5/8" **Spacing Guide** to double-check the pin height.

NOTE: Our **THREADED BRIDGE PINS** are adjustable in height, allowing you to change the space between the harp string and the wood surface of the neck, using a 5/64" Allen Wrench. This will be important later when you want to install sharpening levers.

____ **58.** Turn the **NECK/PILLAR** assembly over so the **BRIDGE PINS** are hanging over the edge of your work table, but the **NECK** is still firmly supported. Use the **BRASS DRIVER** in your hand drill to push and turn the **33 THREADED BLACK TUNING PINS** into the upper row of holes in the **NECK**, from the opposite side of the **BRIDGE PINS**. Note that these pins have a fine thread. **DO NOT LUBRICATE THESE TUNING PINS!** When you push firmly as you turn them, they will drive in quite quickly, and that is good. Don't just rely on the microthreads to seat these pins – that takes too long and it only serves to heat up the pins to extreme temperature. Push and turn them until the square end stands about 5/8" above the wood.



Assemble the harp back together again, tightening the 2 screws securely at the base of the pillar.

STRINGING & TUNING

____ **59.** Stringing a harp is somewhat of an art. We recommend that you read through these last pages of directions completely before beginning, so you know what to expect. It is not uncommon for people to call us in a panic because their harp either: a) won't stay in tune; or b) keeps breaking its strings. Careful installation will do much to eliminate these problems. We string this model harp regularly and tune it up to concert pitch right away with rarely a broken string, but it takes a little patience and concentration.

The strings are numbered from 1 (for the smallest) to 31 (for the longest), and they are color-coded to help guide you as you play. "C" strings are all red, and "F" strings are blue.

NOTE: If the color on the strings should happen to fade, you can restore it with permanent marker.

Gather the following tools for this operation:

- Set of harp strings with plastic beads
 - Scissors
 - Tube of Superglue or Krazy glue
 - Tuning wrench
-

Here's how to install the strings:

____ **60.** Start at the bass (longest) end of the harp with string #31, a long string that is very thick. Push the end of the string through the lowest hole in the soundboard from front to back.

____ **61.** Reach into the back of the harp to find the end. Tie a simple overhand knot at the end, as shown.

Put a drop of Superglue or Krazy glue on the knot and then pull the knot up tightly against the inside of the **SOUNDBOARD REINFORCEMENT BAR**. The glue will help prevent the slippery nylon from coming untied under tension.

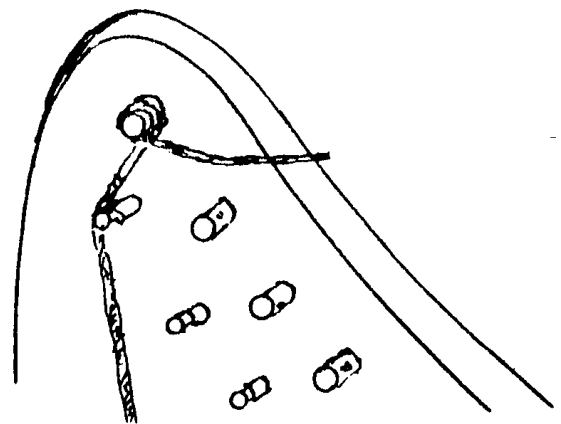
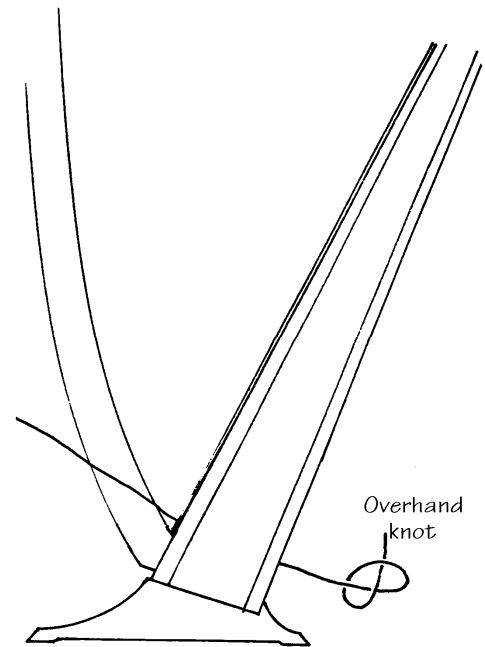
____ **62.** Thread the other end of the string through the last tuning pin at the point of the neck, pulling it through the pin until there is just a little slack left below the tuning pin.

____ **63.** Use the tuning wrench to turn the pin **CLOCKWISE** to wind the string around the pin.

____ **64.** As the string begins to tighten, place it in the groove of the bridge pin as shown.

HINT: Don't accumulate a lot of windings of string around the tuning pins, especially in the bass. They become bulky and cumbersome. If you find yourself with that problem, turn the tuning pin backwards to unwind the string, then pull more slack through the pin and tighten again.

____ **65.** Install all eight of the large (.060") strings this same way, taking care to put the colored ones in the proper positions. We have included one spare clear string in each bundle in case you break one.



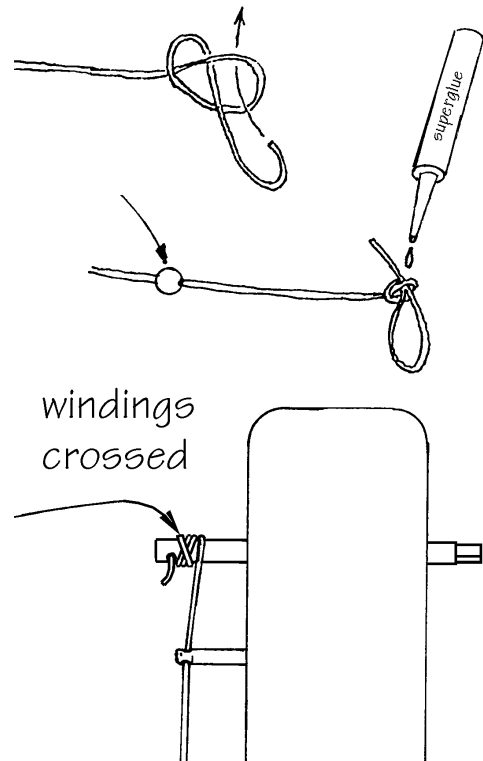
NOTE: you will need to remove those scrap wood pieces that are wedged between the **SOUNDBOARD** and the **INNER BRACES**. If they are too tight to remove now, wait until you have installed most of the strings and put some tension on the **SOUNDBOARD**. The scraps will come out more easily then.

___ **66.** When you come to the .050" strings, tie the bottom knot a little differently to give it more bulk. Start with the same overhand knot, but before tightening it, push the loose end part way back into the knot, just to add one more thickness of string to the knot.

___ **67.** For all the rest of the strings (.040" and higher), thread a small plastic bead onto each string before tying the knot. The bead will prevent the knotted string from pulling through the hole in the **SOUNDBOARD**.

IMPORTANT: It is necessary to also anchor the tops of these .040" strings (and all the lighter ones) securely to the tuning pins, as follows:

Guide one or two windings of string on the **TUNING PIN**, then guide the next winding over the others so the string helps cinch itself tightly around the **PIN** as you tune it up to pitch. If you don't do this, you will surely experience string slippage and breakage, especially in the upper half of the instrument.



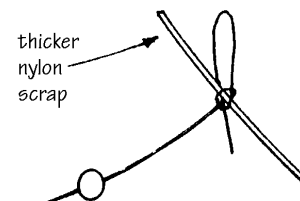
FLASH INTERRUPTION

When about half the strings are installed, double check the position of the **NECK** on top of the soundchamber. Center it nicely now, before the string tension draws the parts together too tightly.

___ **68.** The next two sizes of strings (sizes .036" and .032") are thinner and more fragile. Take care to avoid scratching them as you install them, and don't forget the **PLASTIC BEADS** and the Superglue!

___ **69.** The last seven strings are the most delicate. Take your time with them. This nylon is so thin that even a double knot will sometimes pull through the hole in the bead. The solution is to insert a short piece of thicker nylon into the knot to make it bulkier, as shown.

When all the strings are installed, make sure the back of the **NECK** is still centered on the **SHOULDER**, and tune the entire harp up to pitch so the instrument begins to adjust itself to the tension.



Many people are not certain if they are tuning their harp strings to the correct octave. Tuning the strings an octave too low will result in flabby harp strings that don't provide much volume. Tuning the strings too high will cause strings to break. To make sure you are tuning your harp strings to the correct octave, you can double-check the pitch on our website with our "online tuner". www.musikit.com/freetuner

NOTE: It will take several tunings before the harp will stay in tune. Be patient! It should get better each day. One technique for accelerating the settling of the nylon strings is to slide your fingers up and down each string while pulling on it. **BE CAREFUL!** This activity generates heat quickly, so don't burn your fingers with the friction. But a little heat is good, because it helps the nylon stretch out quickly to its final shape. This should hasten the tuning stability at least a little, but be prepared for *MUCHOS* tuning for the first month!

The strings should all be tuned to the natural C major scale (white keys on the piano). All the red strings will be C notes and the blue ones F notes. Middle C is string number 19 from the top. The lowest note is the E nearly two octaves below middle C (the same note as the bottom string on a guitar).

CONGRATULATIONS! We hope you have enjoyed building this harp and that you enjoy many years of musical pleasure from playing it. We stock a good number of teaching materials and accessories for your instrument to help you get started playing music. Just call us or check our website (harpkit.com) for more information or for placing an order.

After the harp has adjusted well and begun to stay in tune, you may install **SHARPING LEVERS** if desired. They will make it easy to change keys quickly and quietly with your folk harp.

Musicmaker's Kits, Inc.
PO Box 2117
Stillwater, MN 55082

651-439-9120
www.harpkit.com

SHARPING LEVERS

Sharping levers are used on folk harps to facilitate key changes. Installing a lever over a string allows you to raise the pitch of that string one-half step by engaging the cam against the string. Thus an F-string can be raised to F# by a simple flick of the lever. Similarly, a B-string may be tuned to Bb so that the lever will raise it to B-natural and release it back to B-flat, as needed.

Most folk harp players set the key signature (sharps or flats) on the harp before starting each piece of music. For the key of G, you would engage the levers on all the F strings to produce the F# notes needed for that key (making sure all other notes on the harp are natural). If the following piece were then to be played in the key of F,

you would then release the levers on all the F strings to produce F-natural, and also release all the B-string levers to produce Bb.

You may install a lever over every string on the harp, or, if you think you won't use all of them, you can save money by installing only the levers necessary for the keys you are likely to play in.

KEY OF E:	requires F# and C# and G# and D#
KEY OF A:	requires F# and C# and G#
KEY OF D:	requires F# and C#
KEY OF G:	requires F#
KEY OF C:	requires no sharps or flats
KEY OF F:	requires Bb
KEY OF Bb:	requires Bb and Eb
KEY OF Eb:	requires Bb and Eb and Ab

Check our website or current catalog for prices



Loveland Lever



Universal Lever

SOME NOTES ON USE OF YOUR GOTHIC HARP

PLAYING POSTURE: The 31-string Gothic Harp is a floor model instrument. To play it comfortably, sit on a normal straight-backed chair. Lean the harp backwards until it balances lightly on your right shoulder. You should be able to reach the lowest bass strings with your left hand and the highest treble strings with your right hand.

TUNING TIPS: It is best to tune the harp with all sharpening levers flipped down (disengaged), so there will be no interference from the levers. Please note that this means you may be tuning some strings to flats instead of natural notes. If you have levers on the B strings, for example, you should tune those strings to B-flat when the lever is flipped down. You will then flip the levers up when playing in the key of C.

We often tell people that it takes 50 tunings to stabilize a harp. That may be a bit of an exaggeration, but don't expect to be able to play music after just a few tunings. Nylon strings stretch rapidly at first, and the wood frame shifts and bends slightly under all the tension.

If, however, your harp does not stabilize after a month of daily tunings, something is wrong. The strings may be slowly slipping around the tuning pins, or else the knots inside the soundboard may be slowly untying themselves under the string tension. Refer back to steps #61-69, paying close attention to the application of Superglue to the knots, and the crossing of the windings around the tuning pins. Check also to see if a tuning pin is slowly turning back after being tuned up. This is uncommon, but it can happen. We use a solution called Pin-Tite to solve that problem.

BUZZING STRINGS: Your harp need not suffer the problem of rattling or buzzing sounds when you play. If you hear such noises, you can correct them. Here are some troubleshooting hints:

If the buzzing sound occurs only when the sharpening lever is flipped up (engaged), then try tightening the lever more firmly against the neck of the harp. Contact us if that does not help.

If the buzzing occurs when the lever is flipped down (disengaged), the string may be vibrating against some part of the sharpening lever itself. If you have Loveland brand levers, look very closely at the position of the string as it passes through the lever bracket. It may be rattling against the plastic cam (the part that you flip up & down), or against the small "fretpost" (the part that the cam pinches the string against when engaged.) You can change the position of the string by raising or lowering the threaded bridge pin on which the string rests above the sharpening lever. Make sure the string is resting in the groove of that pin.) Use a 5/64" Allen Wrench to turn the bridge pin in or out, watching how that moves the string in relation to the sharpening lever.

If the problem is not located around the sharpening lever, you may have a loose end of string that is rattling inside the soundchamber. Put your hand inside the harp and touch the knotted ends while plucking the harp to see where the problem is located. Oftentimes you can solve it by simply trimming off a loose end of string or by twisting the knotted end in a different direction.

One other source of buzzing that is unique to the Gothic Harp happens when one of the stiffener battens inside the back comes loose at one end (see Step 14). If this happens, you'll need to force more glue under the batten and clamp it until dry.

HARP REPAIRS: If you ever need to repair the wood parts of your harp, you will be glad to know that the neck and pillar can be removed from the soundchamber to facilitate repair work. Simply loosen the strings and unhook them from the tuning pins. Then remove two screws at the base of the harp to allow the neck and pillar to come free of the harp body.

31-STRING GOTHIC HARP

GOTHSTRG

FULL SET OF 31 STRINGS

STRING	NOTE	GAUGE	CODE	COLOR	VIBRATING LENGTH	LOVELAND LEVER SIZE
1	G6	.025	NYL025	clear	5-1/2"	00
2	F6	.025	NYL025	blue	6-1/8	00
3	E6	.025	NYL025	clear	6-3/4	00
4	D6	.025	NYL025	clear	7-3/8	0
5	C6	.025	NYL025	red	8	0
6	B5	.025	NYL025	clear	8-3/4	0
7	A5	.025	NYL025	clear	9-3/8	0
8	G5	.032	NYL032	clear	10	2
9	F5	.032	NYL032	blue	10-7/8	2
10	E5	.032	NYL032	clear	11-3/4	2
11	D5	.032	NYL032	clear	12-5/8	2
12	C5	.036	NYL036	red	13-5/8	4
13	B4	.036	NYL036	clear	14-3/4	4
14	A4	.036	NYL036	clear	15-7/8	4
15	G4	.036	NYL036	clear	17-1/8	4
16	F4	.040	NYL040	blue	18-3/8	5
17	E4	.040	NYL040	clear	19-7/8	5
18	D4	.040	NYL040	clear	21-1/4	5
19	Middle C4	.040	NYL040	red	22-7/8	5
20	B3	.050	NYL050	clear	24-1/2	7
21	A3	.050	NYL050	clear	26-1/4	7
22	G3	.050	NYL050	clear	28	7
23	F3	.050	NYL050	blue	30	7
24	E3	.060	NYL060	clear	32	9
25	D3	.060	NYL060	clear	34-1/8	9
26	C3	.060	NYL060	red	36-1/2	9
27	B2	.060	NYL060	clear	39-1/8	9
28	A2	.060	NYL060	clear	41-7/8	9
29	G2	.060	NYL060	clear	44-5/8	9
30	F2	.060	NYL060	blue	47-1/2	9
31	E2	.060	NYL060	clear	51-1/4	9

NOTE: 20 small beads added for upper strings.

(Full set includes one spare clear string of each size)

**MUSICMAKER'S KITS, INC.
P.O. BOX 2117, STILLWATER, MN 55082
(651) 439-9120 www.harppkit.com**

FLUOROCARBON STRINGS (CC to e) for GOTHIC-31

GOTHSTRGFLUORO

FULL SET OF 31 STRINGS

STRING	NOTE	GAUGE	CODE	COLOR	VIBRATING LENGTH	LOVELAND LEVER SIZE
1	E6	.025	NYL025	CLEAR	5-1/2"	00
2	D6	.025	NYL025	CLEAR	6-1/8	00
3	C6	.025	NYL025	RED	6-3/4	00
4	B5	.025	NYL025	CLEAR	7-3/8	00
5	A5	.032	NYL032	CLEAR	8	0
6	G5	.032	NYL032	CLEAR	8-3/4	0
7	F5	.032	NYL032	BLUE	9-3/8	0
8	E5	.036	NYL036	CLEAR	10	2
9	D5	.036	NYL036	CLEAR	1-7/8	2
10	C5	.036	NYL036	RED	11-3/4	2
11	B4	.040	NYL040	CLEAR	12-5/8	4
12	A4	.040	NYL040	CLEAR	13-5/8	4
13	G4	.040	NYL040	CLEAR	14-3/4	4
14	F4	.040	NYL040	BLUE	15-7/8	4
15	E4	.050	NYL050	CLEAR	17-1/8	7
16	D4	.050	NYL050	CLEAR	18-3/8	7
17	Mid C4	.050	NYL050	RED	19-7/8	7
18	B3	.060	NYL060	CLEAR	21-1/4	9
19	A3	.060	NYL060	CLEAR	22-7/8	9
20	G3	.060	NYL060	CLEAR	24-1/2	9
21	F3	.060	NYL060	BLUE	26-1/4	9
22	E3	.060	NYL060	CLEAR	28	9
23	D3	.060	NYL060	CLEAR	30	9
24	C3	.070 Fluorocarbon	FLUOR070	RED	32	9
25	B2	.070 Fluorocarbon	FLUOR070	CLEAR	34-1/8	9
26	A2	.070 Fluorocarbon	FLUOR070	CLEAR	36-1/2	9
27	G2	.070 Fluorocarbon	FLUOR070	CLEAR	39-1/8	9
28	F2	.070 Fluorocarbon	FLUOR070	BLUE	41-7/8	9
29	E2	.070 Fluorocarbon	FLUOR070	CLEAR	44-5/8	9
30	D2	.070 Fluorocarbon	FLUOR070	CLEAR	47-1/2	9
31	C2	.070 Fluorocarbon	FLUOR070	RED	51-1/4	9

NOTE: 18 Beads added for upper strings

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