



BELLE HARP KIT

Assembly Instructions

Updated November 2018

Musicmakers
14525 61st ST CT N
Stillwater, MN 55082



WOOD PARTS

- A - 1 Soundboard, Aircraft Birch
- B - 1 Back Panel
- C - 2 Sides
- D - 1 Pre-drilled Neck
- E - 1 Pillar
- F - 1 Top Block
- G - 1 Arched Cap Block
- H - 1 Inner Brace
- I - 1 Base Block
- J - 2 Feet
- K - Inner Reinforcement Strip
- L - 1 Short Trim Strip, Back
- M - 1 Short Trim Strip, Front (Drilled)
- N - 4 Long Trim Strips, Sides

HARDWARE

- 1 Scrap Soundboard Piece
- 30 Threaded Harp Tuning Pins
- 1 Brass Driver for Tuning Pins
- 18 Threaded Bridge Pins
- 1 Allen Wrench, 5/64"
- 12 Large Bridge Pins
- 1 Allen Wrench, 3/32"
- 23 Medium Brass Eyelets - 1/8"
- 4 Large Brass Eyelets - #24
- 3 Jumbo Brass Eyelets - 3/16"
- 2 #14 x 2" Wood Screws, square drive
- 1 #3 Square drive bit
- 6 Wood Screws, 1 1/4"
- 8 Wood Screws, 1-5/8"
- 1 Wood Screw, 2"
- 4 Wood Screws, 2-1/2"
- 3/8" Wood Dowel
- 4 Wood Plugs, 3/8" dia
- 1 Wood Plug, 1/2" dia
- 1 Harp Medallion, 3/4" dia
- 4 Drill Bits, #24", 1/8", 7/64" & 3/16"
- 1 oz Wire Nails, 3/4" X 18
- 4 Rubber Bumpers
- 4 Screws for Bumpers, black #6 X 3/4"
- 1 Tuning Wrench
- 1 Set of 30 Harp Strings (with 15 wooden dowels)
- 1 Spacing Guide for Bridge Pins
- 1 Assembly Instructions

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, contact 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.

NOTE:

DO NOT ASSEMBLE THIS PROJECT WITH CHEAP 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 should do the same. Animal glues require lots of experience for successful use. **WE BUILD THIS INSTRUMENT WITH MODERN WOODWORKING ADHESIVE, SUCH AS ELMER'S CARPENTER'S WOOD GLUE OR TITEBOND** (yellow aliphatic resins), 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 the modern woodworking adhesives.

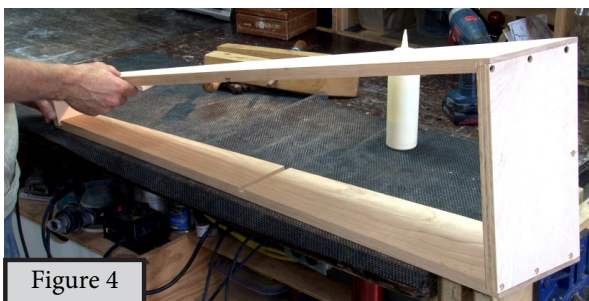
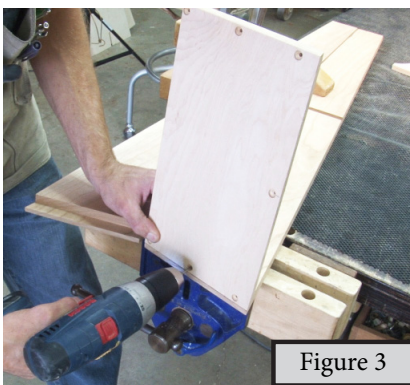
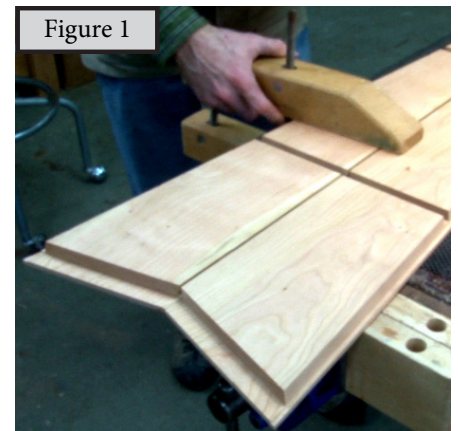
When gluing parts together, be sure to put enough glue on the joint to wet the entire surfaces to be joined. A good sign of proper gluing is that a little excess will squeeze out around the joint when clamping pressure is applied. Too little glue may cause the parts to separate later, whereas too much 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.



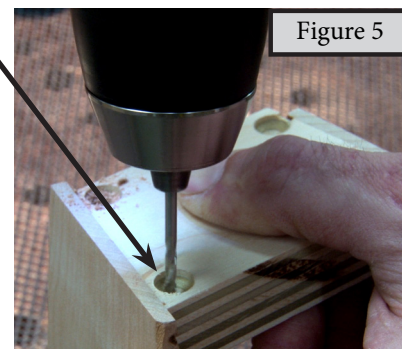
Please note that some of the pictures shown in these directions are taken from the Jolie Harp. The wood may appear a little different, but the steps to complete will work the exact same in both kits. If you have a question, don't hesitate to give us a call!

THE SOUNDCHAMBER FRAME

- 1) Clamp the harp sides to your bench. This will prevent the sides from sliding around during the assembly process. (Figure 1)
- 2) Dry fit the base block and inner top block to ensure a good fit. If the pieces aren't perfect, you can adjust them with a hand plane or sanding block. **It's easier to remove the excess BEFORE the parts are glued in place.**
- 3) Drill $7/64$ " pilot holes in both sides for the base block screws. Apply glue to one side and insert $1-5/8$ " wood screws. Allow time to dry (Figures 3 & 3a)
- 4) Flip the harp over so that the glued side is on top. Use the inner top block to help balance the sides together. Align the base block, apply glue and insert the screws for the remaining side. (Figure 4)
- 5) Stand the frame and lean it against your workbench. Drill pilot holes for top block. Be sure to tilt the drill bit to follow the angle of the sides. If you drill the holes straight down, you might split the wood of the sides. Apply glue and screws to top block. (Figure 5)



Angle drill to match sides.



Once the pilot holes are drilled, apply glue and insert four $1-1/4$ " wood screws into the top block.

6) Place the frame on your bench so that the back side is facing up. (Fig. 6)

7) Find and check the fit of the inner brace. Orient the brace so that the shallow scallop is toward the front. Be sure that the ends of the brace sets flush with the edges on each side.

NOTE: Sometimes the brace is not the correct length to fit between the sides. This can be caused by sloppy cutting on our part, but more likely the sides have bowed a little from humidity changes after we prepared them. You can check that with a straight-edge and push or pull the sides into alignment as you glue the braces in place. If a brace is simply too short, however, you can shim the space with a thin scrap of wood. If too long, use a disk sander to remove a small amount without changing the angle or rounding the end. If the brace is too thick to slide into the dado, you can sand it a little at a time with an orbital sander.

This brace serves two purposes: 1) to straighten the sides during assembly and 2) to keep the body of the harp from deforming later under string tension.

8) Apply glue and clamps. Please note the various different methods of clamping. Taping cawls will make it easier to apply the bungee cord. Choose the method that works the best for you and your working environment. Be sure to clean up excess glue drips that might interfere with installation of the front or back panels.

HINT:

Figure 7 details how to utilize elastic/bungee cord. Figure 8 details the use of f-clamps (aka bar or pipe clamps) and a 2 x 4 to help distribute pressure along the length of the sides.

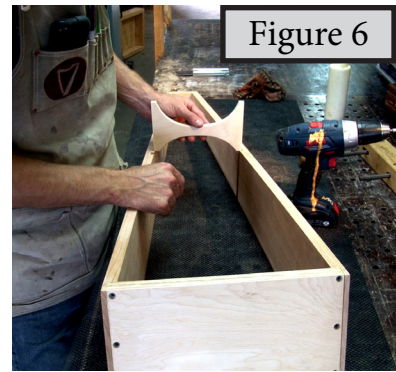
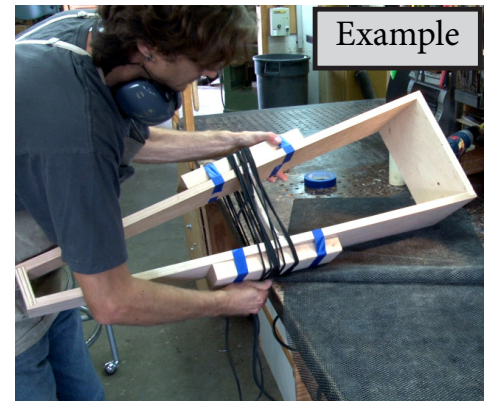
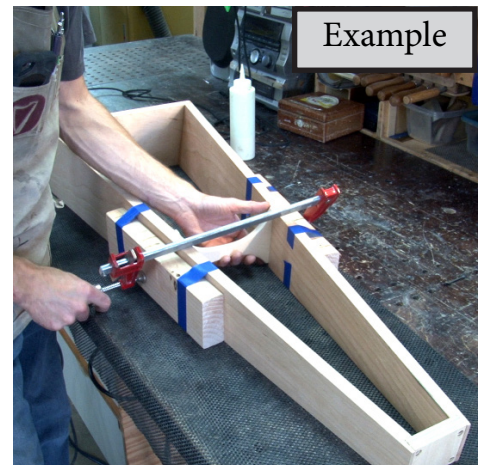


Figure 6



Example



Example

PREPARING THE SOUNDBOARD

Take note that the soundboard is punch marked on the outside surface of the board. The punch marks are purposely off center toward the narrower end of the board.

9) Using a hand drill or drill press, drill the lowest and highest punch marks with a 1/8" drill bit. These holes will act as a guide for the reinforcement strip. Perform the drilling on a workboard to prevent the wood from tearing out on the soundboard, and hold the drill perpendicular. (See figures 9 & 9a)



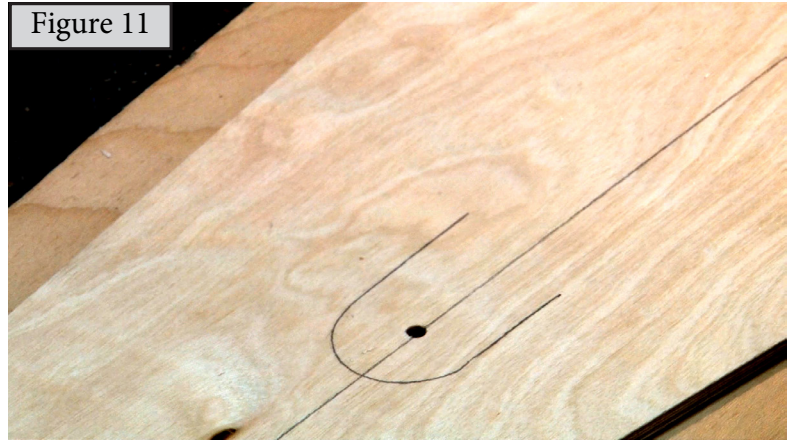
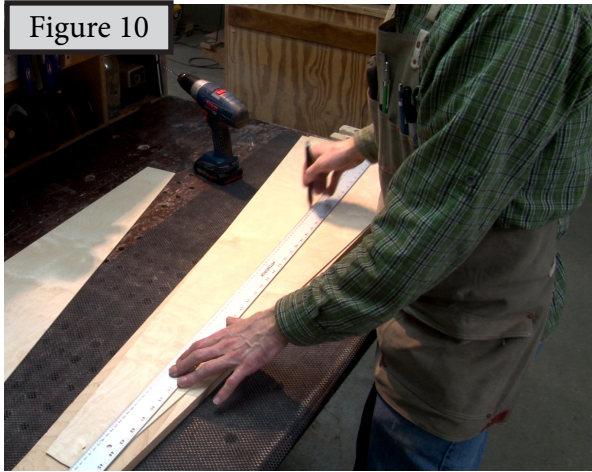
Figure 9



Figure 9a

10) Flip the soundboard to the inside face. Connect holes with straight edge and mark with a pencil. This line will act as a reference for gluing the reinforcement bar. (Figure 10)

11) Dry fit the reinforcement bar and trace around each end with a pencil on the inside of the soundboard. (Figure 11) Be sure that the reinforcement bar covers the highest hole. Gather weights or clamps for pressing the reinforcement bar and dry fit the reinforcement bar with the clamps.



12) Apply glue along the length of the reinforcement bar and tape on both ends to prevent slippage, then add weights/clamps. (Figure 12 & 12a)

NOTE:
You can sand the inside of the soundboard but this is not necessary.



HINT:
This is a great time to sign and date the inside of the soundboard. Your name and skills as a luthier will live on in infamy!

POINT OF INTEREST:
A go-bar deck is an optional clamping system using flexible sticks or dowels and your own work bench!



13) Once glue is dry, drill remaining holes. The bottom 3 holes will be drilled with a 3/16" drill bit. The next four holes will be drilled with a #24 drill bit. The rest of the holes are 1/8". Use the drill bits provided in your hardware pack to complete this task.

SUGGESTION:

Every time you do some gluing on your project, we advise having a clean damp rag handy for cleaning up the excess glue that squeezes out of the joints. Keep your fingers clean too. Rinse the rag frequently to avoid spreading glue around as you wipe. Make sure all glue residue is removed. This will save you lots of time toward the end of the project when you are preparing to apply the finish.

INSTALLING THE BACK AND SOUNDBOARD

14) Make a large sanding block to level the edges of the sides. This will make for a better gluing surface. Use double stick tape or spray adhesive to apply 60-grit sandpaper to a flat block of wood. (Figure 14)

Check to make sure the base block, braces, and top block are all flush with sides. Use a file, chisel, or sanding block to remove any spots that are too high. (Figure 14a)

15) Dry fit the back. This can be done while you're waiting for the glue to dry on the soundboard reinforcement strip. The back and front are cut slightly large to ensure a bit of overhang that can be removed after gluing.

16) Mark where the back panel covers the center of side edge. This will serve as a guide line for your staple or nail placement. You don't want staples punching through the sides of your harp! (Figure 16)

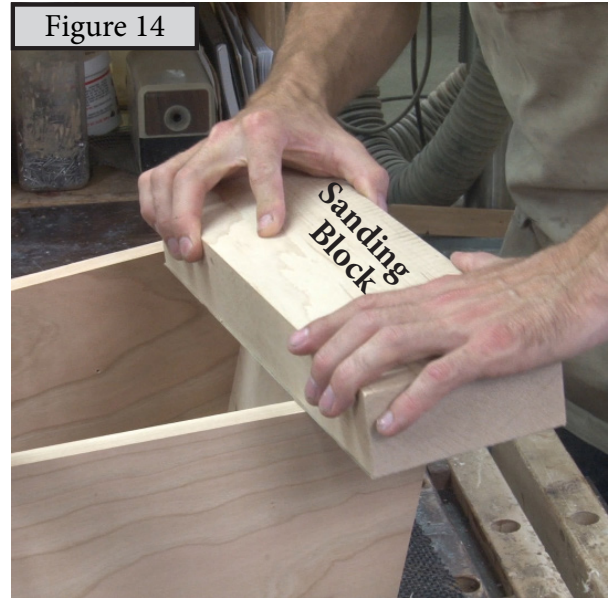


Figure 14



Figure 14a

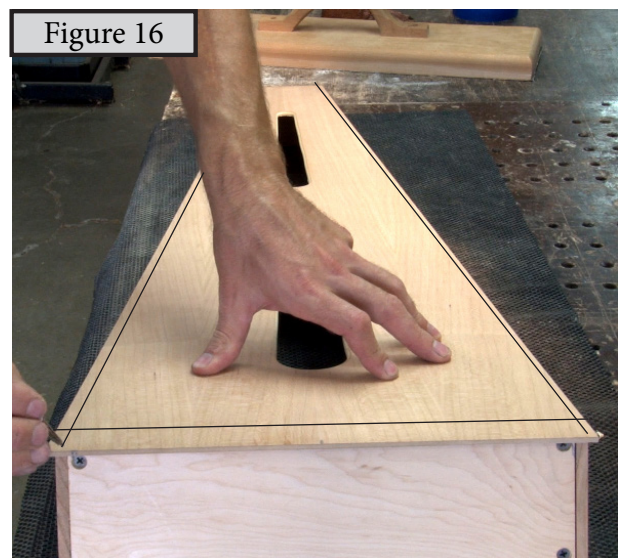


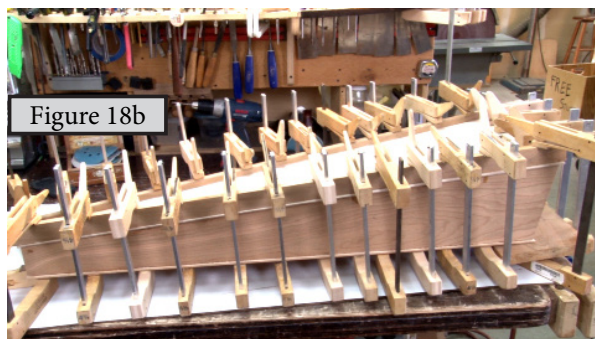
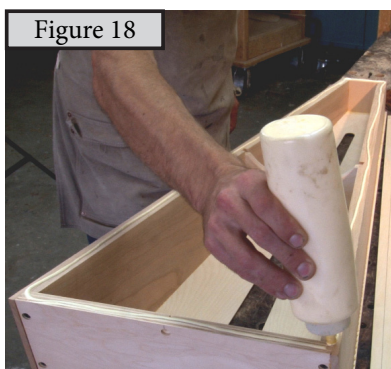
Figure 16

NOTE:

Sanding the front and back with a large sanding block creates a better gluing surface and will prevent gaps from appearing under the soundboard.

17) Once the back is fitting nicely, remove excess overhang from the top and bottom with a saw. This step can be done after gluing, but you may find it easier to do before you glue it to the frame.

18) Apply a liberal amount of glue and proceed to staple or nail the back panel in place. Place your nails or staples about 1-1/2" to 2" apart. This step will go easier with an extra set of hands to speed things up before the glue dries. Be sure to NOT staple or nail along the top block as there is no trim to cover this area. You will need to clamp the back to the top block to be sure it gets held down. (Figures 18, 18a, & 18b) This will be easier if you install one nail at each end of the panel to keep it aligned as you add more nails down each side and across the bottom.



SOUNDBOARD

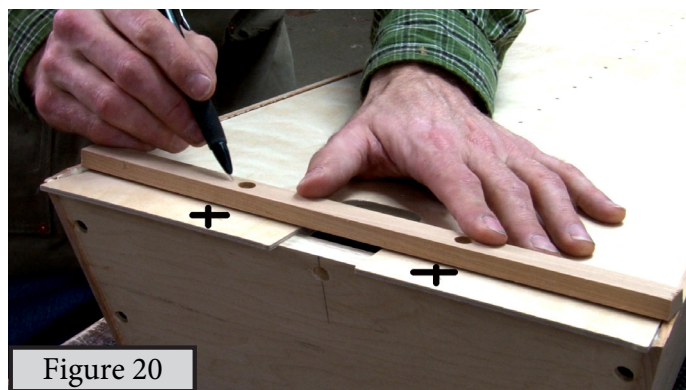
19) Fit the soundboard using the same fitting techniques as you used for the back panel.

20) Test the bottom front trim strip in place and mark holes where screws will be. DO NOT staple or nail within 1/4" of where these holes are marked. (Figure 20)

When ready, apply glue to the front of the frame and nail or staple close to the edges. Space the nails about 1" apart on the front because of the string tension on this panel.



Soundboard scrap



21) Attach the soundboard scrap by nailing or stapling the scrap on either side. It's best to avoid the middle of the scrap as this is where the pillar screw will come in. (Figure 21)

22) Use a hammer and nail set or flat head screwdriver to sink the nails or staples just below the surface. This will keep them from interfering with the trim strips. Don't drive the nails too deep. High humidity could cause the wood to swell over the heads of the nails, in the future. (Figure 22)

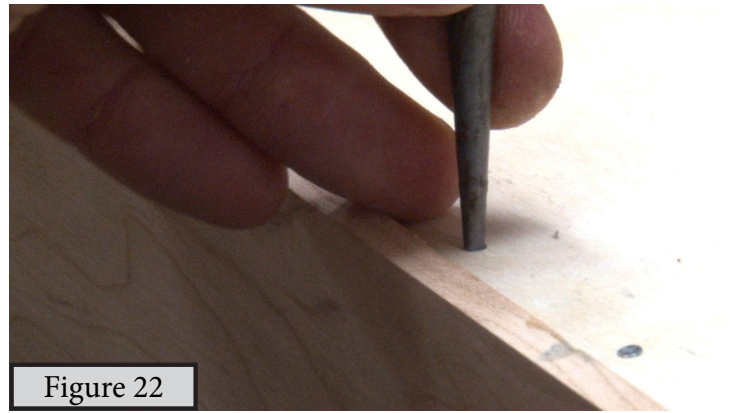


Figure 22

POINTS OF INTEREST:

I

We use nails here because most people do not have enough clamps to hold the entire back in place at once. The nails do a nice job of holding the parts together until the glue dries. If you prefer to clamp the back in place, you may do so, as there is not much stress on this part of the instrument. You would, however, need a good number of clamps to span the entire perimeter of the harp. Staples/nails are necessary for the soundboard - because all string tension pulls on the front. This hardware helps prevent "cold creep."

II

Many people ask why we use laminated wood instead of solid for the soundboard. The reason is that we get much more strength from laminated material than from solid, and virtually no breakage. The superior strength of this material allows us to use a thinner soundboard than if we were to use solid wood, so we also get better sound with a laminated front than we would with a solid front.

III

Some people ask if they can customize this project with a solid wood soundboard of their own making, such as solid spruce. To do that successfully, you'd have to alter the way the pillar attaches to the bottom of the harp, so as to avoid cutting a notch in the soundboard. Any hole in a solid wood soundboard would weaken the front panel so that it will break under the 1,000 pounds of string tension. We recommend consulting the book Folk Harp Design and Construction, by Jerry Brown, if you want to experiment with the way this harp is built.

INSTALLING THE TRIM

23) If you haven't already done so, this is the time to remove the overhang from the top and bottom of the back and soundboard. Use any sort of handsaw to accomplish this cleaning up. Also use this time to double check that all nails or staples are driven down slightly below the surface of the back and soundboard. (Figures 23 & 23a)

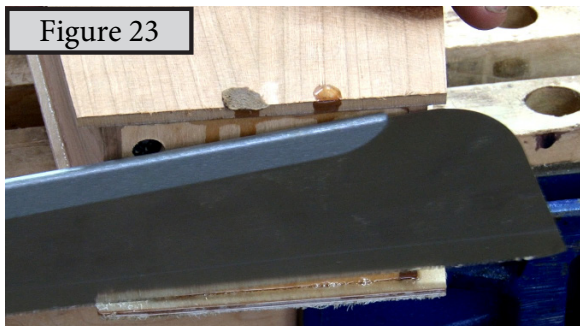


Figure 23

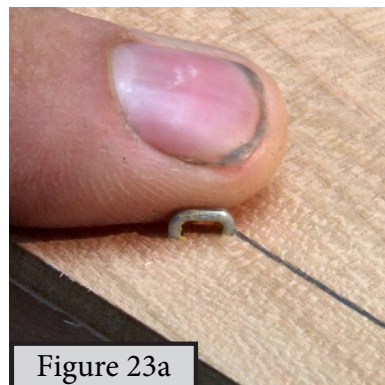


Figure 23a

24) Remove the excess overhang from the along the sides of the frame. You can use a router with a flush trim bit, for this step. (Figure 24) If you don't have a router, a fine-tooth hand saw will work too! (Figure 24a)

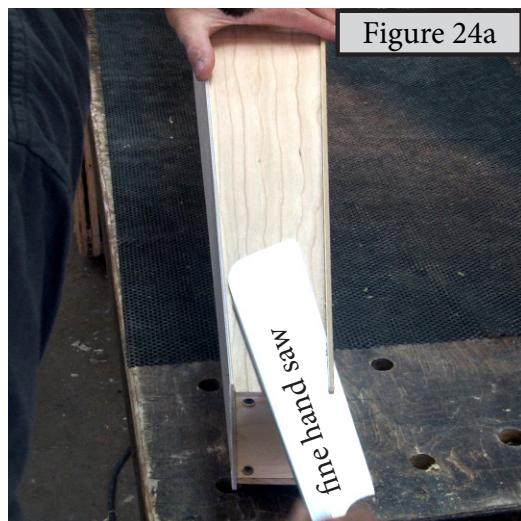


Figure 24a



Figure 24

25) Sand the access holes in the back panel using a 120- then 180-grit sandpaper. Be sure to clean up the entire perimeter of each hole. This will make for more comfortable handling once the harp is finished. (Figure 25)

26) Use an orbital sander to **lightly** sand the entirety of the back and soundboard (220-grit). Take extra care to hold the sander flat. (Figure 26)

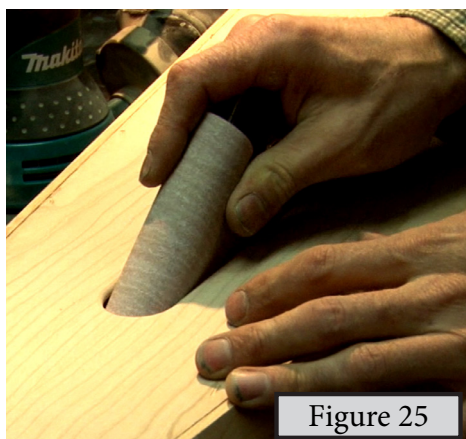


Figure 25

NOTE:

Be careful sanding - the back has a VERY thin cherry veneer. There is no need for heavy sanding.



Figure 26

27) Test fit the trim strips to the box. Be sure you know which strip is going where.

28) Sand along the entire inside edge (NOT the edge that will be glued down...) of the trim strips. It is easy to do this step, now. The inner corner of the trim strip will be harder to access once it's glued down. Rounding the edge will ensure that no one will get a splinter from handling the harp near the trim. (Figure 28).

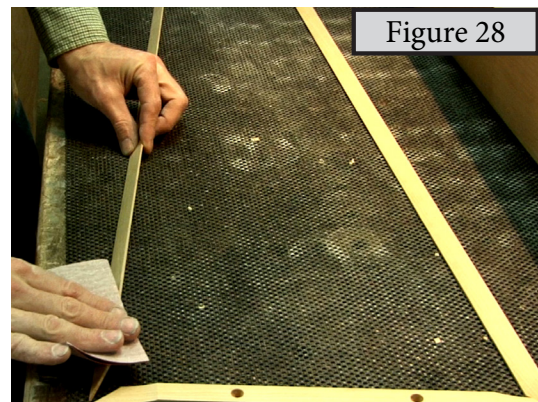
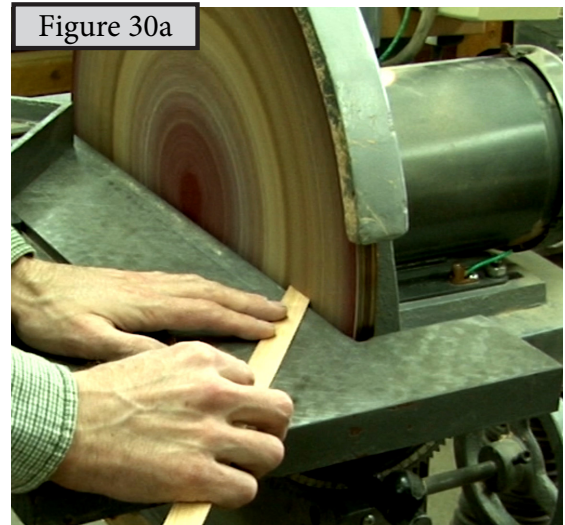
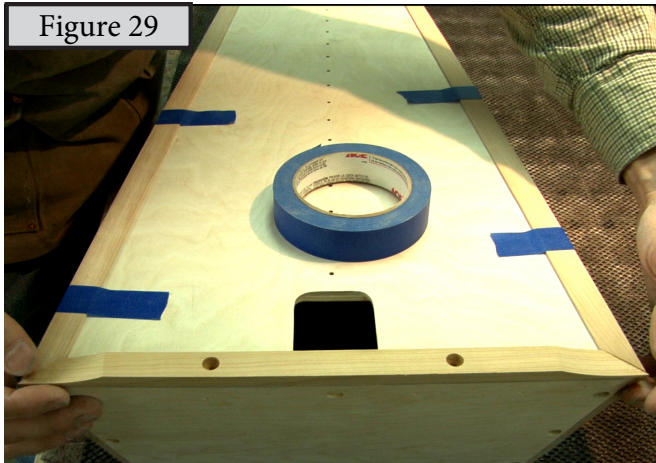


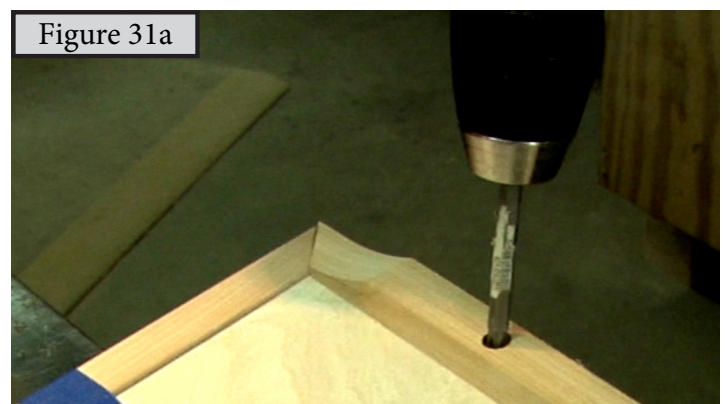
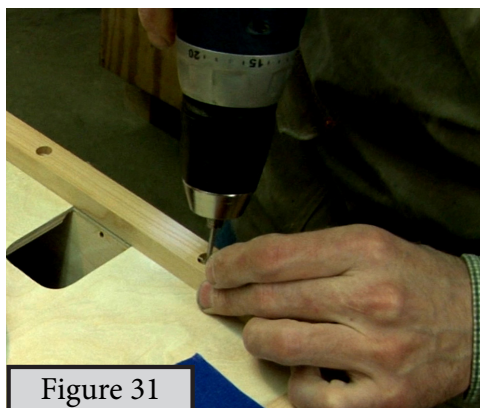
Figure 28

29) Test fit the bottom trim strip with the pre-drilled holes. Check that the mitered edges fit properly without leaving a gap anywhere. (Figure 29)

30) Use a sanding block or disc sander to adjust the miters on the bottom trim strip. The width of this strip should match the width of the harp's soundboard at the bottom. You may need to adjust one side more than the other to get the width and miters to match. If you run out of wood to remove from the bottom trim, the long side trim strips can also be adjusted for miter angle. (Figures 30& 30a)



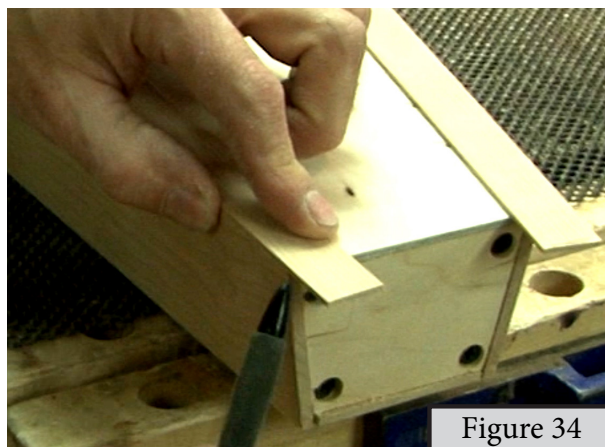
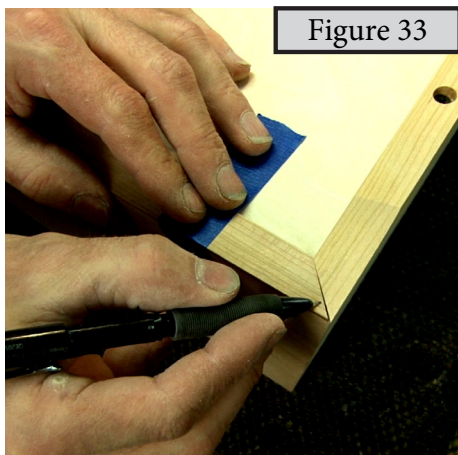
31) When you're satisfied with the fit of the bottom trim, use a 7/64" drill bit to bore pilot holes into the base block. (Figures 31 & 31a)



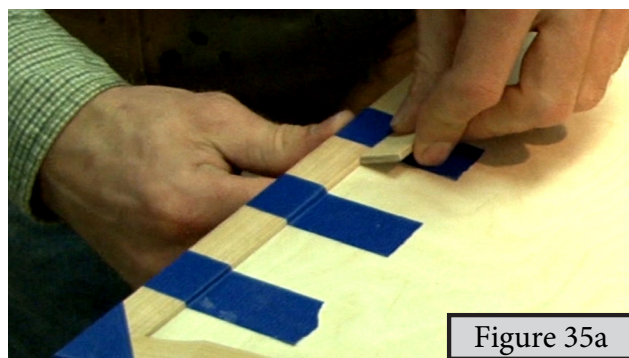
32) Apply glue and use 1-1/4" screws to attach the bottom trim strip to the frame. Be sure to clean up the excess glue right away.

33) Double check the miter angles. Sometimes a gap can occur once the bottom trim has been attached. One more dry fit should correct any problems. (Figure 33)

34) Use a pencil to mark the overhang of the thin side trim strips at the top of the frame. Cut with any type of saw. Be sure to leave about 1/16" overhang from your pencil line. (Figure 34)

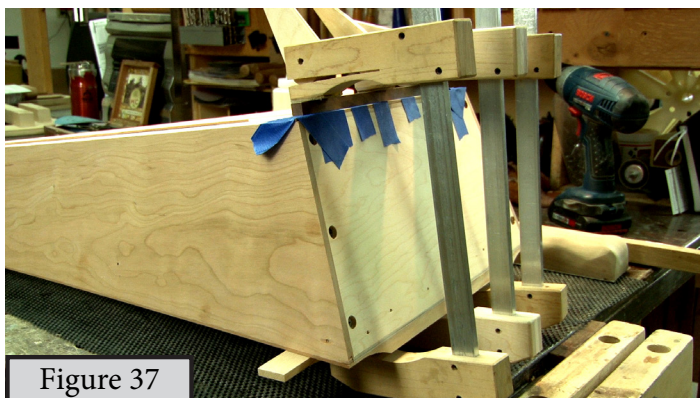


35) Apply glue to the trim. Lay the trim on the body and use cam clamps or masking tape to secure it down. Space the tape about every inch. Use a scrap block to push the tape against the inside edge of the trim strips. If using tape, think of applying each piece like a bandage where you are pulling tightly and ensuring the gap closes. Loose tape holds nothing well. (Figures 35 & 35a)

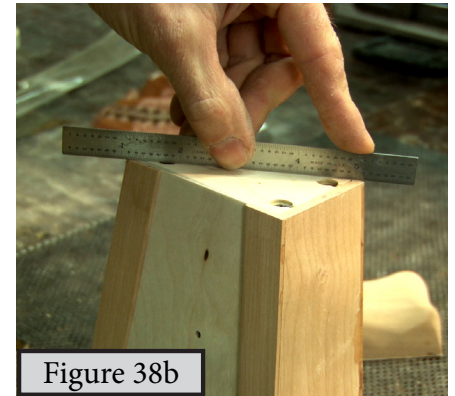
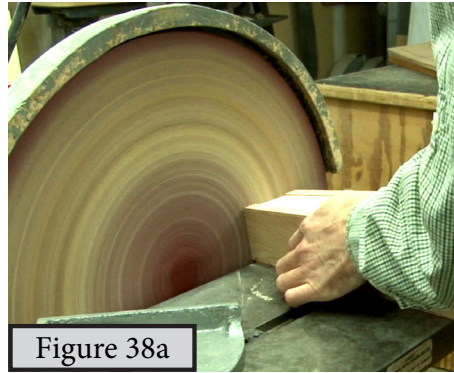


36) Allow 30-60 minutes for the glue to dry. Then remove the tape or clamps. Remove the excess glue with a purposefully dulled chisel. (We're trying to remove glue... not wood!) (Figure 36)

37) Repeat trim process for the back. Use clamps or tape to secure the bottom trim strip on the back. (Figure 37)



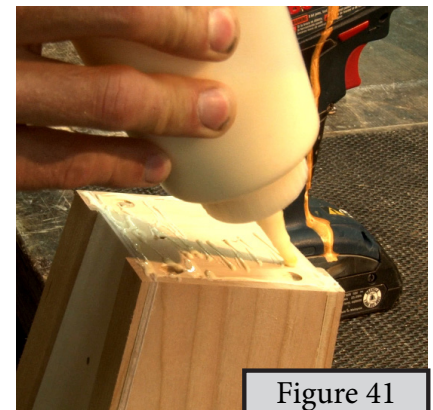
38) Use an 80-grit sanding block or disc sander to flatten the top of the inner top block. Check the block with a straight edge to make sure it's flat across the entire top surface. This will eliminate gaps when fitting the arched cap. (Figures 38, 38a, & 38b)



39) Orient the arched cap block on the top block and check for best fit. Use two 1-5/8" wood screws and a hammer to make punch marks into the top block for guiding your pilot holes. (Figure 39)

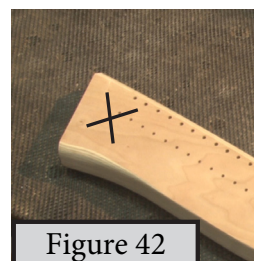
40) Use a 7/64" drill bit to bore two pilot holes, using the punch marks you just made with the screws as a guide. (Figure 40)

41) Apply a liberal amount of glue and screw the arched cap block into the top block with the same 1-5/8" screws you used as punches. Be sure to clean excess glue! (Figure 41).



NECK AND PILLAR ASSEMBLY

42) The neck and pillar have been pre-fitted at the factory, but you should test these parts without glue to make sure the wood has not swollen from humidity. The neck should fit easily into the large slot at the top of the pillar. Lightly sand the area if the joint is tight. Be sure to avoid sanding too much in the area that fits into the pillar. Power sanders are much too aggressive for this step, particularly on the face of the neck where the veneer is located. Use a sanding block with fine grit (150- or higher grit) sanding paper to ensure that the structure of the veneer stays intact. (Figure 42)



43) For the rest of the neck, follow these guide lines: a) the edge below the guide pins must NOT be rounded over. You will need a flat space there for installing sharpening levers. and b) Do NOT over sand the front of the neck where the neck and pillar connect. Also, avoid rounding the pillar. The chamfers are meant to be there. (Figures 39 & 39a)



Figure 43

Do not use power sanders. You risk sanding through the veneer on the neck.



Figure 43a

NOTE: It is much easier to sand the neck and pillar before they have been assembled. Do the majority of your sanding before you put these parts together.

It is crucial to be able to draw the parts firmly together when you glue them, so test your screwdriver/drill to make sure it has enough torque to turn the large #14 screws all the way in. Do a dry run before adding glue -- that will help you prepare for the task and give one more opportunity to sand the parts if needed. **HINT: It helps to clamp the neck in a vise (with padding) or to your work surface so you only need to hold the pillar in position as you install the screws.**

44) Apply glue and fit the neck to the pillar. Use the provided #14 x 2" wood screws and #3 size square drive bit to draw the neck and pillar together firmly. (Figures 44 & 44a)

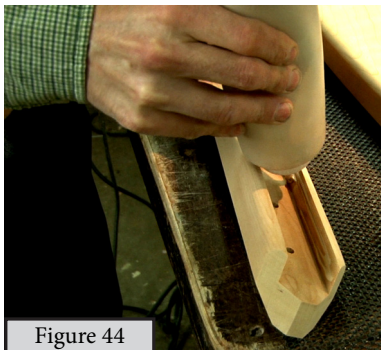


Figure 44

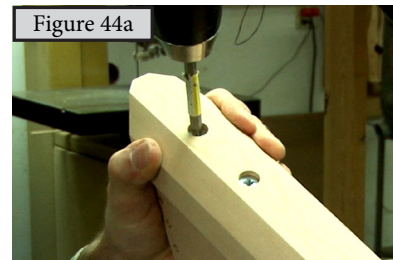


Figure 44a

45) Stand the harp up, leaning it against your work table, so you can check the fit of the back of the neck on top of the soundchamber. Mark hash marks on both sides of shoulder and top of the arched cap. Connect marks across both pieces using a straight edge. Be sure that marks match on both the arched cap and shoulder. (Figure 45 & 45a)

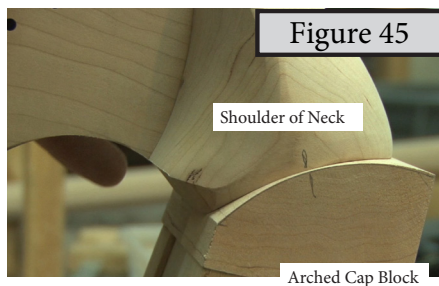


Figure 45

Shoulder of Neck

Arched Cap Block

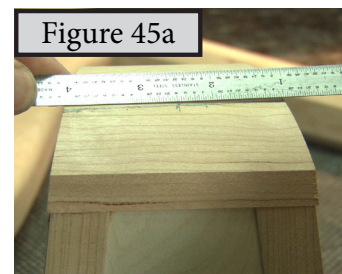


Figure 45a

46) Use masking tape to mark a depth stop on your 3/8" drill bit at 1-1/4". This drill bit is not included in your hardware pack. However, it's a common size in most drill bit sets. (Figure 46)

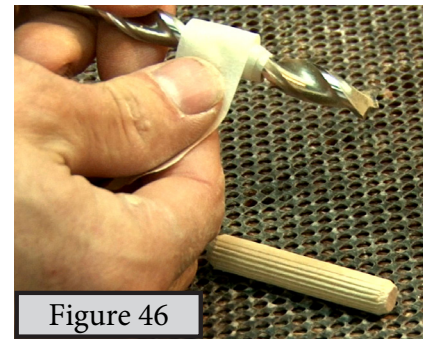


Figure 46

47) Using the guide line you just marked, drill both the top of the arched cap and the under side of the neck to the depth of your tape. Rock the drill front to back about 10° to give the dowel potential for a little movement. **DO NOT ROCK THE DRILL BIT LEFT/RIGHT** (Figure 47, 47a & 47b).

Helpful Hint:

Use a brad-point bit for drilling this hole if you can. Twist bits are OK, but they tend to wander more than a brad-point. (Figure 45)

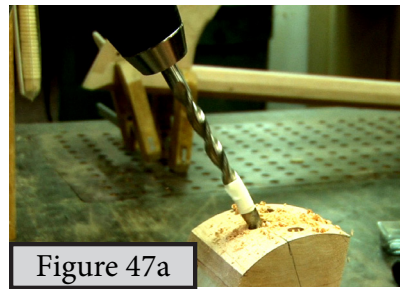


Figure 47a

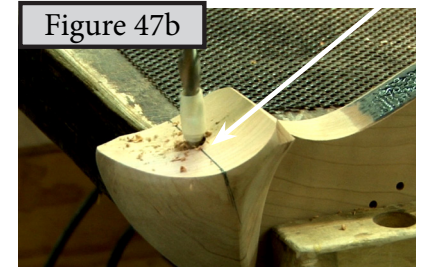


Figure 47b

48) Clean up any excess glue residue using a damp cloth and dulled point to get into cracks. A screwdriver or dull chisel will work perfectly for this application. (Figure 48)



Figure 47

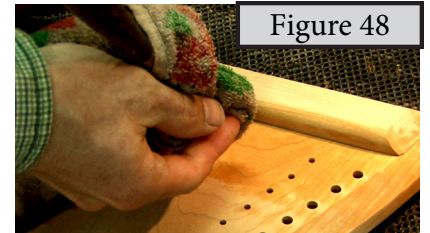


Figure 48

Use two 3/8" wood plugs to close over the holes in the arched top cap.

HELPFUL HINT:

Sanding is the largest portion of work that you will put into this kit. The process of sanding makes the difference between getting a professional looking instrument and something that people might easily identify as a 'home-built harp.' You won't regret giving special attention to this portion of the project.

Sandpaper grits are arranged according to number. The lower the number, the rougher the sandpaper. Sanding with 80-grit is for aggressive work such as removing large bumps and rounding corners. The finer grits are for removing scratches left by the coarse sanding. You'll want to work the sandpaper in the direction of the wood grain when smoothing with medium (150-180) and fine (220) sandpaper.

49) Once the glue is mostly dry (at least 30 minutes), cover the large screw heads with the wood plug and medallion provided, as shown. Glue them in the holes and allow ample drying time before removing the excess plug material. (Figure 49)



Figure 49

50) Use a hand saw, power sander, or sanding block to remove the excess plug material from the front of the pillar. You can lightly sand the medallion too, just to clean off the smoke residue left by the laser machine. (Figure 50)

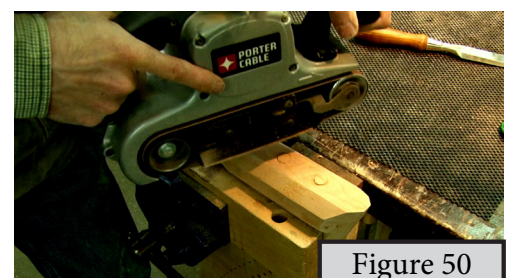
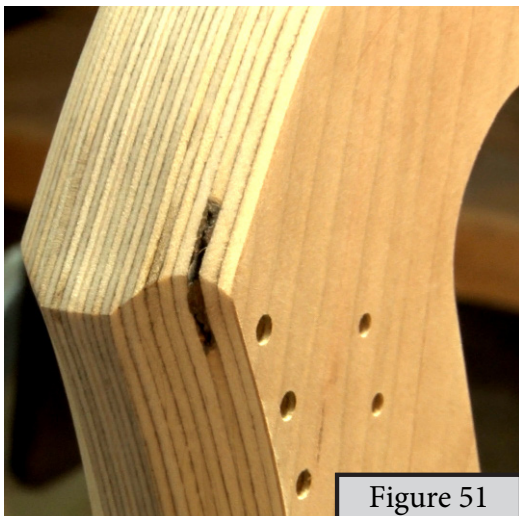


Figure 50

Follow up with medium and fine sandpaper to remove scratches left by the coarse sander. You want the front of the pillar to match the rest in smoothness.

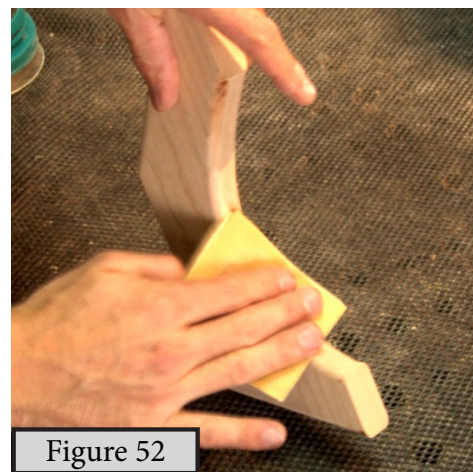
51) Be sure to check over the neck and make sure there are no gaps. Fill any gaps with your choice of wood filler. This will make the wood look more natural, as if there's a knot. (Figures 51 & 51a)



52) Don't forget to sand the feet! This is a part you don't touch as often, but it's still important to get every part of the instrument smooth and ready for the finish (Figure 52).

POINT OF INTEREST:

The joint between the back of the neck and the top of the body will remain dry – no glue. The reason is to create a sort of “knuckle” that allows the harp to flex slightly under string tension over time. It also allows you to take the neck/pillar assembly off the body of the harp in the future, by simply removing the strings and the screw at the bottom of the pillar. That permits you to make repairs, add decorations, or refinish the harp easily, as necessary, down the road. It is one of the best features we have incorporated into our harp designs, saving much time and consternation in some cases.



PREPARING THE HARP FOR FINISH

53) Use a router, sander, or plane to create a 1/4” roundover on entire length of the body. (Figure 49)

55) After gluing the neck and pillar, work the pieces with sanding implements to achieve a good flow over the entire instrument.

56) Sand entire body of harp with 180-grit. Sand the upper shoulder area with 220-grit paper. This creates a smoother surface on the most frequently touched parts of the harp. (Figure 56)



FITTING THE NECK AND PILLAR TO THE BODY

NOTE: We do our best to ensure the neck and pillar will fit the body of your harp, before it leaves our shop. However, as a result of the building process, sometimes slight variations can occur that will require you to adjust the final fitting at the end of the building process.

57) Place the body of the harp on its back on your workbench. Hold the neck and pillar assembly in place on the body. Check the fit at the back of the neck where it slides into the cap block, and then check how the bottom of the pillar meets the base block. Look at the photos below and make minor adjustments as needed to achieve a good fit.

Figure 57A shows a perfect fit. If yours looks like this, you may proceed to Step 58 on the next page.



Figure 57B shows a small gap of about 1/8" between the pillar and the base block, and this is acceptable. The screw that you install in Step 63 will draw this gap closed very easily. If the gap is wider than an 1/8", however, you may want to fit and glue a shim under the pillar to fill the gap.



Figure 57C shows a pillar that is too long and needs to have some wood removed at the bottom. In some cases you may need to remove a significant amount of wood using a hand saw first, then following up with a sanding block or flat file as needed.



58) Drill a 7/64" pilot hole into the bottom of the pillar to make it easier to install the screw. You may need to ask someone to help hold the parts in place for this step. Be sure to follow the angle of the hole that is already drilled in the base block -- you want the screw to match the angle of the pillar.

Then, insert your 2" wood screw to hold the pillar in place. If you did have a slight gap at the pillar body joint, the screw will help close that gap here. The 1,200 pounds of string tension on this harp will also help close this gap. (Figure 58)



Figure 58

NOTE:

You might notice some wiggle room in the neck and pillar once you've inserted the wood screw into the pillar. This movement is natural and will cease once the strings are installed. There is no need for glue on the top block or the base block. We highly recommend leaving those joints dry so the harp can be easily dismantled again for applying finish, adding decorations, or making future repairs.

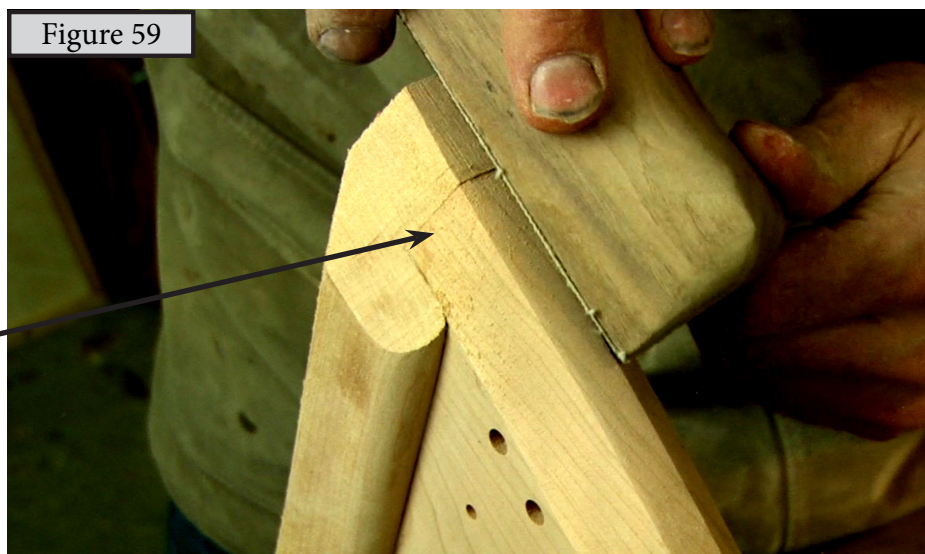


Figure 59

59) Be sure to sand the neck/pillar joint flush with each other. This will make for a much nicer looking finished harp. (Figure 49b)



Any minor cracks can be filled with your favorite wood putty. If you have trouble finding a paste filler that will match this wood, make up your own out of fine sawdust (from sanding the harp) and epoxy, wood glue, or super glue mixed to a consistency of putty (wood glue can be thinned with a drop or two of water). Another option is to use filler that is light in color and then darken it later with wood-tone touch-up pens.

OPTIONAL DECORATING:

Hand painting or woodburning are fun ways to decorate your instrument. Light painting 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 a great way to personalize your harp.

General Finishing Guidelines

STAINS or DYES -- These are coloring agents and should only be used if you want to change 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 best with a clear finish. But, if you want to color the wood, your staining should be accomplished before applying a surface finish such as oil, varnish, or lacquer.

OIL or WAX -- Be very cautious about using an oil or wax finish. If the this type of finish gets into the tuning pin holes, it will act as a lubricant, and you may have trouble keeping the instrument in tune. Oil finishes 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. Some people are fond of a beeswax finish for a natural look, but it can show water spots if it gets wet, so you may end up needing to re-wax or touch up the surface in the future.

POLYURETHANE VARNISH -- Any regular varnish will work fine on this project, but we think a wipe-on (gel) polyurethane is the easiest to apply because it does not drip or sag -- just wipe on a thin coat and wipe off the excess. Our complete finishing kit includes a half-pint can of satin gel polyurethane (instructions printed right on the can), plus sandpaper sheets, and foam applicator for the first coat. The advantages of this finish are its simple application, minimal odor, good durability, 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.

HINT: You will find it easier to apply the finish if you disassemble the harp.

60) Apply the finish of your choice, sanding lightly between coats with very fine sandpaper (600 grit) or steel wool (#0000). Don't forget to sand and finish the feet, too!

INSTALLING THE HARDWARE

61) Locate the brass eyelets in your hardware pack. Install the eyelets in the soundboard. The 3 jumbo and 4 large eyelets will go in the bass (wider end) of the soundboard, near the bottom. The medium eyelets get placed in the middle and top end of the soundboard. (Figure 61)



Figure 61

62) The feet should be nearly flush with the sides of the body of the harp. Using a 2-1/2" wood screw placed in the holes of the feet, punch mark the base where you will bore pilot holes into the base using a 1/8" drill bit. Attach the feet using the 2-1/2" wood screws that are provided in your hardware pack. No glue is needed for this step.

63) Install the rubber bumpers on the bottom of the feet. Center the bumpers right/left so you don't get any overhang. Use a piece of tape to make a stop at 5/8" on your 7/64" drill bit. This will mark the depth of the hole so you don't drill too deep. On the back end of the foot, place the bumper 3/4" from the back of the foot to the center of the bumper. The front foot bumpers are not as critical for placement. Center the bumpers front/back and bore your pilot hole. (Figure 63)



Figure 63

64) Install the 30 threaded bridge pins into the lower row of holes drilled in the neck. Tap them partially in with a hammer and then turn them in with a 5/64" Allen Wrench until the top is about 5/8" above the surface of the wood. Use the 5/8" spacing guide to check the pin height.

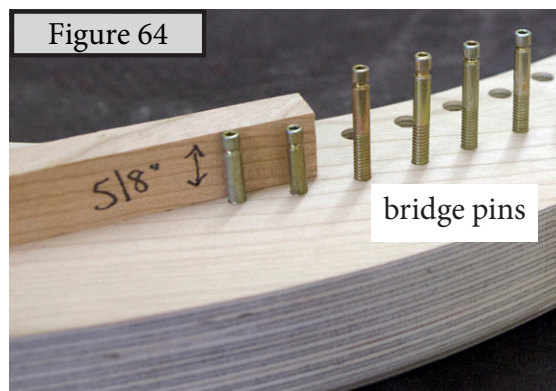


Figure 64

bridge pins

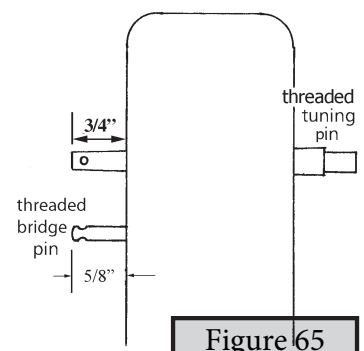
NOTE: Our threaded bridge pins are adjustable in depth, allowing you to change the space between the harp string and the wood surface of the neck, using the 5/64" Allen Wrench provided. This will be important later when you want to install sharpening levers.

65) The 3" long black threaded tuning pins must be installed using the brass driver provided. **DO NOT WAX** these pins or try to lubricate them -- they need to fit tightly in the wood to keep the strings in tune just by friction. Here's how to install the tuning pins:

Lay the harp neck on your work table with the brass bridge pins aiming down toward the table. Support the neck at each end with some scrap wood to lift the brass pins above the table top and provide space for the tuning pins to protrude through the neck. The narrow end of the tuning pin will go through the neck and end up on the same side as the bridge pins.

Find the brass driver packed with the tuning pins and insert it deeply into the chuck of your hand drill so the chuck prevents the soft brass from breaking apart during this operation. The goal is to drive the long tuning pins into the pre-drilled holes while pushing (leaning) hard on the drill so the pins slip in faster than just relying on the micro-threads. Be careful not to burn the wood with this operation by spinning the pin fast for a long time. You can push the pin in quite quickly while turning the drill slowly, and that is best.

How Deep? The goal is to have about equal lengths (approx 3/4") of exposed pin on each side of the neck. You can use a scrap of wood to help guide you to achieve proper depth, but no need for perfection. The final string levels are determined by the bridge pins which are adjustable with the small Allen wrench.



Finally you can install the strings. The installation instructions and string chart are packed in a zip-loc bag with the strings. You will need a pair of scissors and your tuning wrench for this last operation, but the messy work is over. So grab your favorite beverage and move to a comfortable spot in the house to turn this project into a musical instrument!

HELPFUL HINT:

Do not accumulate a lot of windings of string around the tuning pins, especially with the thick bass (low) strings. They become bulky and cumbersome. If you have that problem, turn the tuning pin backward to unwind the string, then pull more of the string through the hole and tighten again.

Expect it to take around 50 tunings before the harp will fully stabilize. That means if you only tune the harp once a week, it will take a year for it to settle in! So we recommend tuning it two or three times a day. Persevere, and be patient! It should get better each day. If you find that it does not get better each day, then something else may be wrong. Take a good look at the “Caring for Your Harp” page at the end of these instructions. This harp was designed with stability in mind!

A NOTE ABOUT SHARPING LEVERS

Sharpening levers are used on folk harps to facilitate key changes. Installing a lever at a string allows you to raise the pitch of that string one-half step by engaging the handle 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 at 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

CARING FOR YOUR HARP

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 these levers up when playing in the key of C.

Note that the tuning pins drive themselves a little deeper as you turn them clockwise to tighten the strings. If you find that they go deeper than you want, you can turn them counter-clockwise to back them out. When you change strings in the future, you should reset the base pin height by turning these pins 3-4 complete revolutions counter-clockwise before installing the new strings.

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), and you have Universal Levers, there are two possible solutions: You need to screw the small brass bridge pins a little deeper into the wood. This lowers the string height so the strings make more firm contact with the sharpening lever.

If the buzzing occurs when the lever is flipped down (disengaged), the string may be vibrating against some part of the sharpening lever. If you have Universal levers, just back the threaded bridge pin out to move the string further away from the lever. 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 brass bridge pin on which the string rests above the sharpening lever. (Make sure the string is resting in the groove of that pin.) Use the small (5/64") Allen wrench provided 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.

Occasionally we hear of a buzz caused by a loose piece of wood, such as a decorative rosette or inlay strip. Test these things by pressing on the part while you pluck the string to see if the noise stops. When you find the loose part, you'll need to add some glue to hold it firmly in place.

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

SCRATCHES AND DENTS: You can restore the luster to the finish of your harp with a furniture polish like Old English with lemon oil. This will help hide scratches too. We avoid using polishes with wax because the wax will interfere with future refinishing or touch-up work.

HUMIDITY: All acoustic instruments are susceptible to humidity. Moisture changes in the air can make the wood of an instrument shrink or swell. Over time, the shrinking and swelling can cause the wood to crack. The general rule for keeping an instrument from cracking is: If the weather is comfortable for a person, then it's also comfortable for wood.

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 to help you get started playing music. Don't hesitate to call us for more information or for help if you encounter difficulties with your instrument.



Musicmakers
PO Box 2117
Stillwater, MN 55082
651-439-9120
www.harokit.com