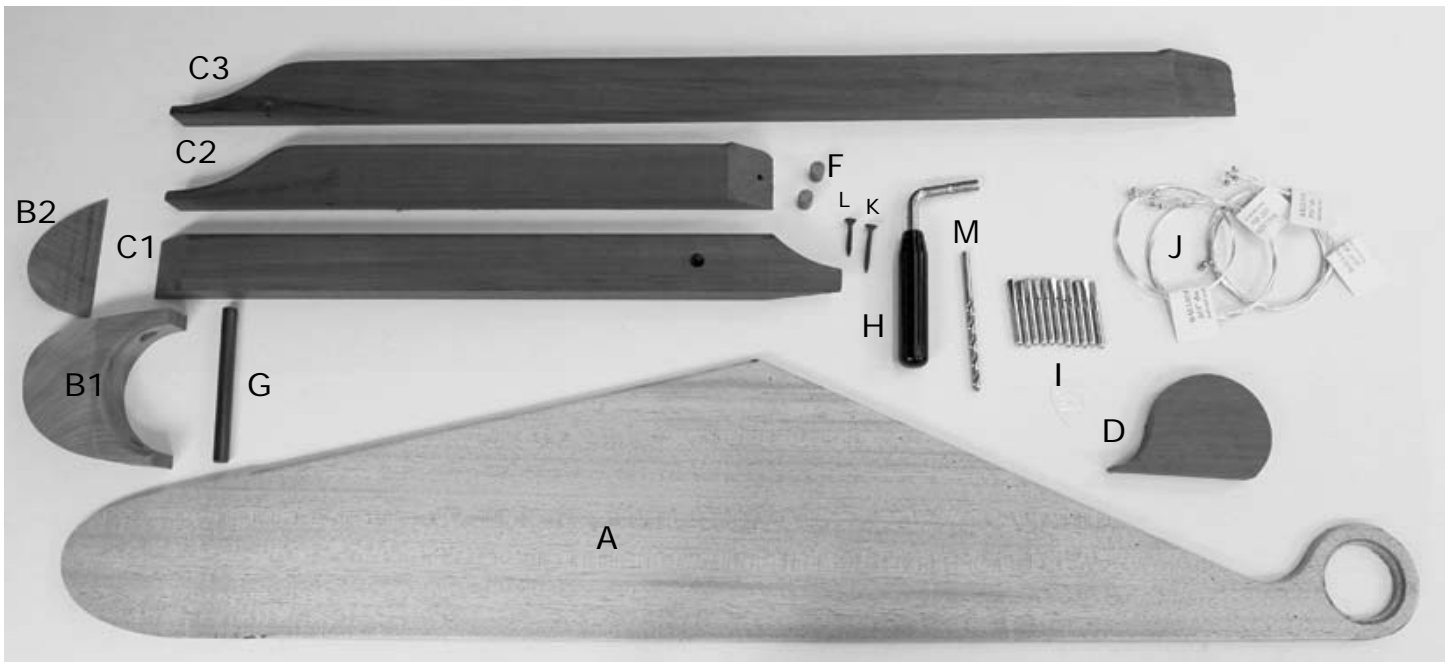




**Muscimakers**  
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**Getting Started** - Please take the time to carefully inventory and inspect your parts. If anything is missing or defective please contact us right away so we can take care of it.

If you have any questions about the assembly of your kit - please visit our online Builder's Forum - [www.harokit.com/forum](http://www.harokit.com/forum)



**Wood Parts**

- \_\_\_A. Top
- \_\_\_B. Tail Piece
- \_\_\_B2 Clamping Scrap for Tailpiece
- \_\_\_C. 3 Frame Pieces
- \_\_\_D. Snail
- \_\_\_E. Small Rosette (not pictured)

**Hardware**

- \_\_\_F. 2 wood plugs, 3/8" walnut
- \_\_\_G. Bridge
- \_\_\_H. Tuning Wrench
- \_\_\_I. 10 Zither Pins
- \_\_\_J. Set of 10 Loop end strings
- \_\_\_K. 1 Wood Screw, 1-1/4"
- \_\_\_L. 1 Wood Screw, 1"
- \_\_\_M. 3/16" Drill bit

**Tools you will need for this project**

- Glue, Yellow Woodworking - Elmers or Titebond
- at least 6 clamps (spring clamps or C-clamps)
- Hammer
- Wire Cutter
- Electric Sander (optional but a real time saver)
- Sandpaper
- Varnish



When you see this icon it means there is a short video demonstration on our web-site!

Browse to [www.harokit.com/kantele](http://www.harokit.com/kantele) for assembly videos. If you are reading these instructions on your computer you can just click the box and you will be taken directly to the video!

*After silence, that which comes nearest to expressing the inexpressible is music.*  
- Aldous Huxley

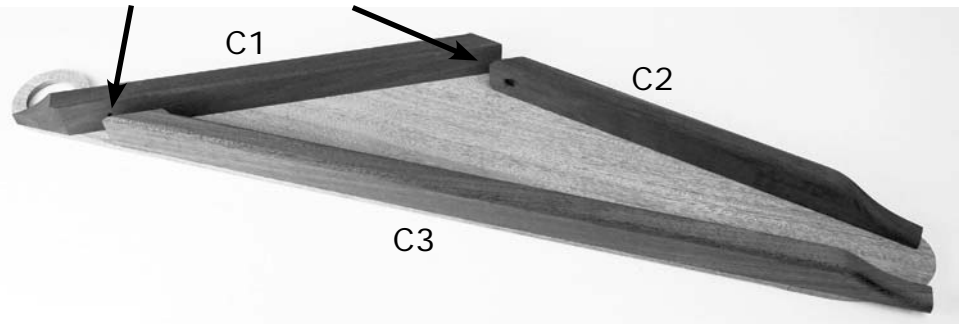
**Gluing Tip:** Always keep a wet rag handy when you are gluing parts together. You will want to keep your fingers clean so you don't leave gluey fingerprints all over your instrument. Dried glue spots are tough to see on the bare wood, but they show up prominently after you apply the finish!

## Gluing the Frame

Take a minute to study the picture to the right so you know where each frame piece goes. The letters in the picture match the parts picture on page 2.

It is important that you glue the frame pieces to the top in the correct order: C1 first, C2 second, and C3 last.

No gaps when gluing



### 1. Gluing Piece C1

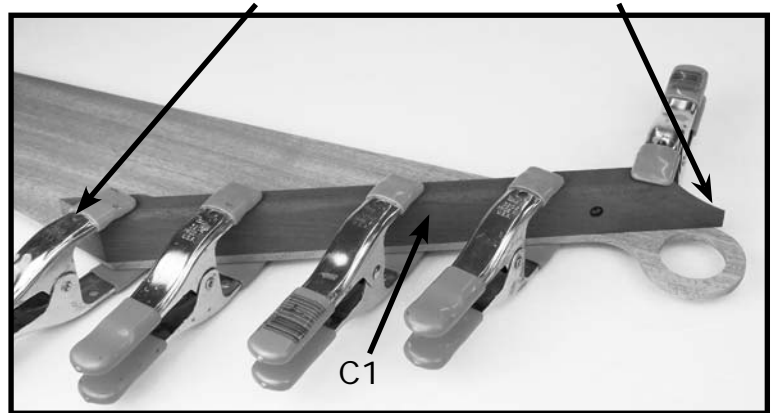
Begin by gluing Frame Piece **C1** to the underside of the soundboard (top). This piece is cut to fit with a slight amount of overhang at each end.

There is a hole near one end of the piece and the hole is countersunk on one side. Orient the piece so that the countersunk hole is facing out and close to the round knob where the rosette will go. There is only one way this piece will fit properly, so take the time to study the correct orientation.

Glue in place being careful to keep the long edge flush with the top, with an equal amount of overhang at each end. Let dry for 1 hour.



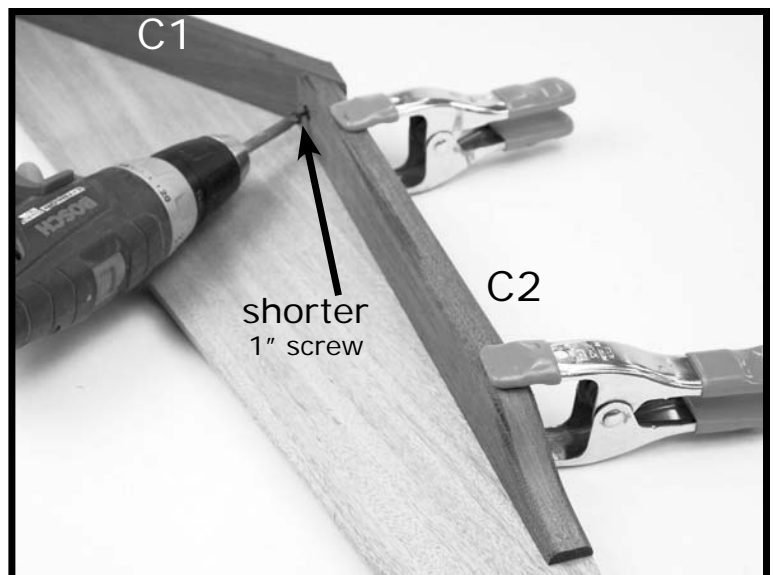
Slight overhang at each end



### 2. Gluing Piece C2

Test fit frame piece **C2** checking to make sure you can keep the outside edge flush with the top without creating a gap where the **C1** meets **C2**. A gap here won't create a structural problem - just a cosmetic one. You can fill any gaps later with wood filler before you finish.

When ready, spread glue on the end of **C2** where it meets **C1**, and under the length of **C2** where it contacts the top. Use one clamp near each end to hold **C2** in place while you install the shorter (1") wood screw to draw the joint together, as shown here and on next page.





## Kantele Building Step 2

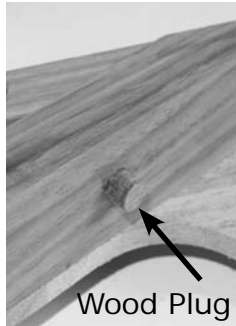
Once the screw is installed, add more clamps to press **C2** firmly against the top. You should see some glue squeeze out all along the seam. It would be smart to clean up the excess glue with a damp rag before it hardens, especially inside the frame.



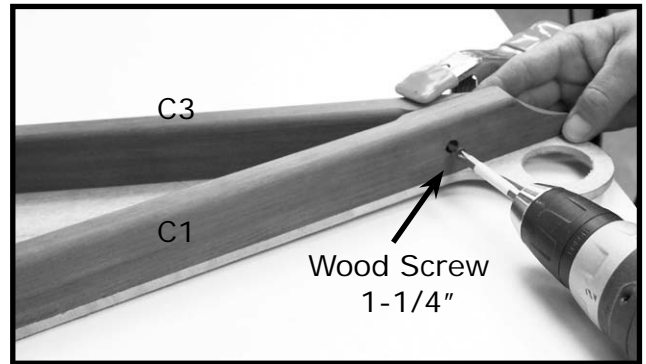
### 3. Gluing Piece C3

Repeat the same procedure for frame piece **C3**. Test fit the joint between **C3** and **C1** trying to keep the edge flush with the top. Make any adjustments necessary, then glue and clamp the piece in place. Insert the 1-1/4" screw before adding all the clamps.

Glue a wood plug over this screw in part **C1** by putting a little glue in the hole and tapping the plug into place.



When dry (after an hour or so), you can sand the wood plug flush with the surrounding wood.



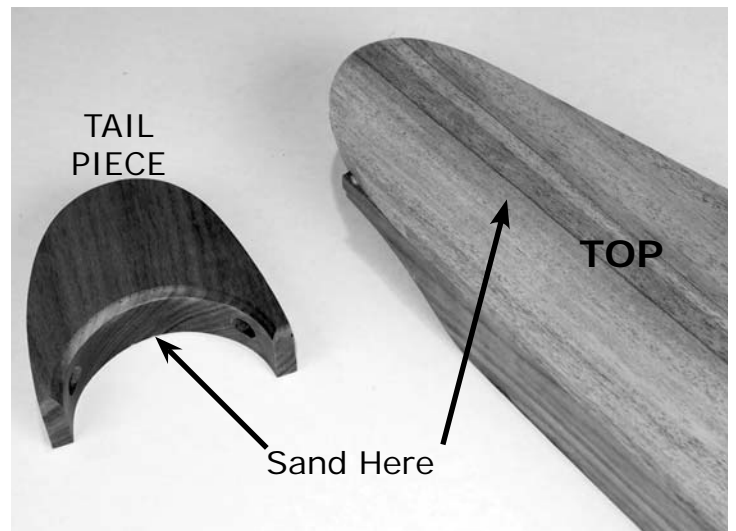
## Kantele Building Step 3

### 4. Initial Sanding.

Before gluing on the SNAIL and the TAIL PIECE it is helpful to do a little sanding on some parts that will be hard to sand later. The inside curve of the TAIL PIECE is hard to sand after it is installed. You can do that more easily now by wrapping sandpaper around a thick dowel (broomstick) or small tin can.

You should also sand the TOP of the instrument as it will be difficult to sand the area near the TAIL PIECE once it is installed.

Use a sanding block when sanding the TOP to avoid adding any dips or contours.



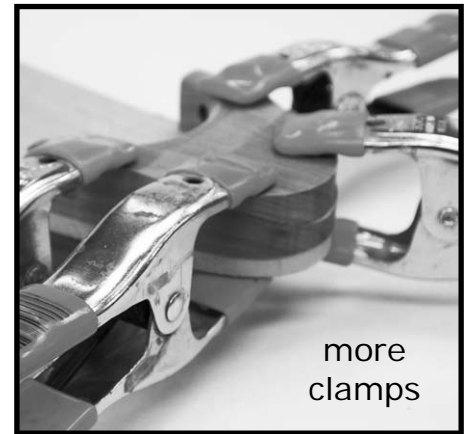
## Kantele Building Step 4

## 5. Gluing the TAIL PIECE and the SNAIL.

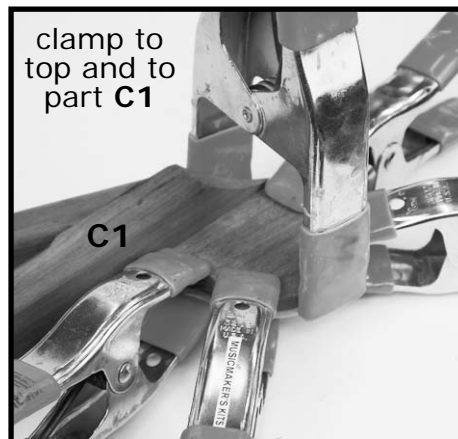
The TAIL PIECE is shaped to match the back end of the TOP. Take a moment to dry fit the TAIL PIECE so you are clear about how to position this piece. It will hang over the edges of the TOP slightly



One edge of the inside curve is rounded over and this is meant to be facing up. When you are confident about the position of the TAIL PIECE, you can glue and clamp it to the TOP as shown below. Use the clamping scrap to provide a level clamping surface at the back end, but DO NOT GLUE THE SCRAP TO THE TAIL PIECE!



The SNAIL fits only one way. Glue it under the TOP beneath the knob where the rosette will sit.



## 6. Gluing the ROSETTE

Lightly sand the rosette before gluing in place. The laser cutting process sometimes leaves a smoky haze on the top that can be sanded off. If the Rosette does not quite fit in the hole, sand the outside of the rosette a little until it fits.

To avoid making a mess, apply a thin bead of glue to the "step" of wood around the inside of the hole, instead of to the underside of the rosette. Go easy on the glue here, as it is pretty tough to clean up any squeeze out from underneath the rosette.

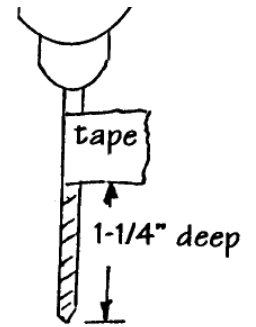


*Music is a higher revelation than all wisdom and philosophy. Music is the electrical soil in which the spirit lives, thinks and invents.*  
- Ludwig van Beethoven -



## \_\_\_\_\_7. Drilling the zither pin holes.

The locations for the zither pin holes have been punch-marked into the TOP. Use a sharp 3/16" twist drill bit (included) to drill these 10 holes straight down into the solid TOP to a depth of 1-1/4". We suggest wrapping some masking tape around your drill bit to mark the proper depth, as shown. CAUTION: DO NOT use a brad point bit for this drilling -- it makes the holes too big for these pins, even though it is the same size drill.



## \_\_\_\_\_8. Final Sanding

Begin by sanding all the edges flush. If you don't have access to an edge sander or a disc-sander you might want to invest in a hand-held electric random orbit sander (or borrow one from a friend). This will speed things along considerably. If you can't get access to any of these tools you can glue some sandpaper onto a flat, level piece of hardwood and make your own sanding block. This will help a lot. Start with 60- or 80-grit to remove excess overhanging wood.

When you have sanded all the edges flush, switch to 100- or 120-grit to round over sharp corners and remove scratches left by the coarse paper. This makes the instrument more comfortable to hold.

Notice that we have done some initial shaping to the TAIL PIECE for you, but you may want to round this block even more, as shown here, to blend the curves into an attractive "sculpted" look. People love handling a smooth block of wood like this and admiring the wood grain.



Finally, go over the entire instrument by hand with some 180 grit sandpaper until you have a nice smooth surface and there are no visible machine marks or glue spots.

If you find a crack or gap in a glue seam, fill it with wood putty that matches the color of the wood (walnut for the dark wood, mahogany for the lighter wood). Wait for the putty to dry before sanding off the excess. Some woodworkers like to sand everything again with even higher grits of paper like 220 or 320, though we don't find it necessary.

Take your time sanding and pay attention to detail. Hold the wood at different angles under good lighting to highlight any scratches or roughness that might still be there. These can be hard to see before the finish is applied, but it really pays to eliminate them before applying the finish!!

## \_\_\_\_\_8. Applying a Finish

Now you're ready to apply the finish of your choice. Here are a few options to consider:

**DECORATING** -- You may decorate the front of your instrument with paints, woodburning patterns, or most any form of decoration you desire. We often recommend applying one coat of varnish as a sealer before painting. That way, you can easily wipe off any mistakes in your decorating, and when you have it just right, you can varnish over the paints to seal and protect the decorations.

**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 this mahogany and 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.

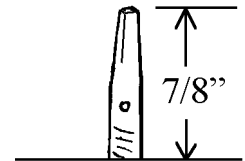
**OIL** -- An oil finish will give your wood a low luster appearance, bringing out the natural color of the grain, but it tends to soak into the wood and appear dry and "thirsty" after awhile. The principal advantage of an oil finish is that it can be applied and wiped dry immediately, so you can proceed to installing hardware (and strings) right away. The 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.

**POLYURETHANE** -- Any regular polyurethane will work fine on this project, but we recommend the wipe-on GEL TOPCOAT shown in our catalog. Our complete finishing kit includes sandpaper sheets, foam applicator, and a half pint can of semi-gloss gel polyurethane. Gel finish is simple to wipe on with a clean cloth, and it won't run, drip or sag. You can apply multiple thin coats for a very durable, soft luster. It also works well for protecting painted decorations.

**LACQUER** -- Many professional instrument makers still use lacquer for their finish. The most readily available lacquer is called Deft Clear Wood Finish. If you choose this type of 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 will not work over certain decorations -- it often dissolves paints, colored pencils, ink, and other materials.

### 9. Install the Zither Pins

When you are satisfied with the finish, and your Kantele is dry, you can install the hardware and strings. Begin by placing your Kantele on a hard, flat surface. Install the 10 zither pins by hammering them in place, threaded end first, until they stand about 7/8" above the wood surface as shown.



**Note: Stringing is a bit of an art.** It is important to do a nice job here so you don't end up with sharp ends of wire that can poke a finger or catch on clothing as people handle the instrument. Check our on-line video to watch the process clearly.



Kantele Building  
Steps 9 and 10

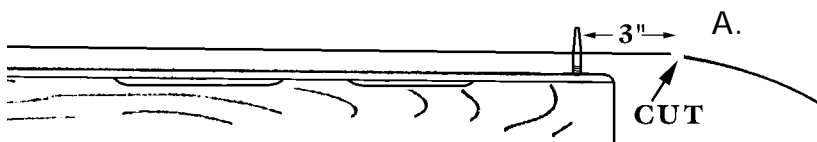
### 10. Installing the Strings

Slide the bridge rod into the holes in the TAIL PIECE and center it. No need for glue here -- The bridge will be held in place by the string tension.

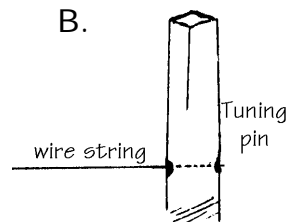
Begin with the longest string (string #10 on your string chart - .020" dia). Slide the loop end under the bridge toward the TAIL and bring it back around the top. Then slip the other end of the string through the loop as shown in the picture.



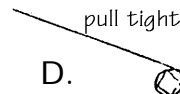
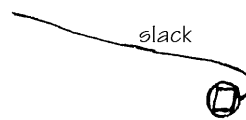
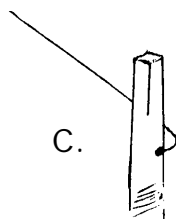
**A.** Stretch the string across the instrument to the furthest tuning pin, and cut it about 3" beyond the pin, as shown here. This will provide you with enough wire to make a few wraps around the tuning pin.



**B.** Pull the end of wire back and insert it into the tuning pin so it just barely shows through the other side of the pin, as shown. This will prevent the sharp end from poking your skin or snagging your clothes.

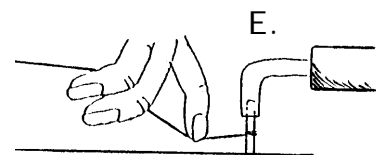


**C.** Use the tuning key to turn the pin clockwise about 1/2 turn, leaving the string loose enough so it does not pull out of the little hole.



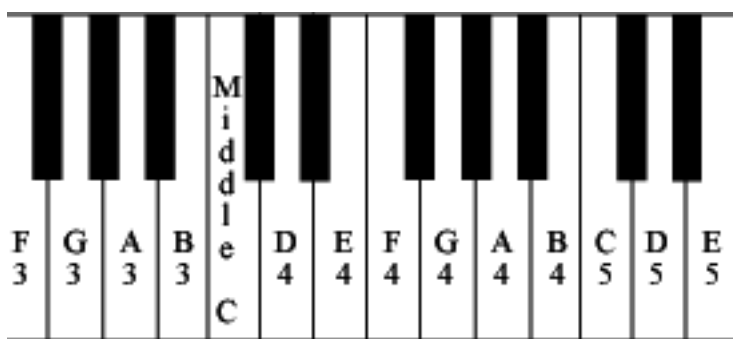
**D.** Then pull the string with your hand to kink the end where it enters the hole, much like "setting the hook" when fishing.

**E.** Turn the tuning key with one hand to finish winding up the slack as you hold the excess wire with your other hand. Don't over-tighten the string - you may break it. Just take up the slack so the string is taut.



**F.** Repeat this procedure with all strings, checking the wire sizes against the string chart as you move across the instrument. You should have one spare of each size string, just in case of a boo-boo.

**G.** Tune your strings according to the string/tuning chart.



<b>STRING</b>	<b>NOTE</b>	<b>String Gauge</b>
1	D5	.014"
2	B4	.014
3	A4	.016
4	G4	.016
5	F#4	.016
6	E4	.018
7	D4	.018
8	C#4	.020
9	B3	.020
10	A3	.020

**Congratulations.** We hope you enjoyed this project and wish you many years of musical fun with your Kantele.

Visit our website at [www.harokit.com](http://www.harokit.com) for accessories, teaching materials and demonstration videos.

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