

Build a Guitar or Ukulele Body.

- **Glue Top + Install Rosette**
 - Glue top and back
 - Install Rosette
 - Final thickness sanding
 - Cut sound hole and fill rosette
- **Brace Top + Back**
 - Prepare the soundboard and back
 - Prepare the brace wood
 - Glue top braces
 - Glue back braces
 - Trim braces to voice top and back

Prepare Sides + Head/Tail Blocks

- - Bend Sides
 - Glue head and tail blocks
 - Glue kerfing
 - Sand top and back of body
- **Glue Up Body**
 - Cut kerfing slots for back
 - Glue back to body
 - Dremel kerfing slots for sound board
 - Glue sound board to body
 - Trim and sand
- **Mortise Joint + Bindings**
 - Route mortise for neck joint
 - Cut channels and install bindings
- **Making a Ukulele Bridge**
 - Prepare material
 - Route slots
 - Drill string holes
 - Cut the wings

Build the Neck

- **Prepare Mortise + Tenon Joint**
 - Layout
 - Neck angle
 - Cut side profile
 - Fit neck joint to body
- **Route Slot(s) in Neck**
 - Ukulele
 - Guitar
- **Bolt-on Hardware and Heel**
 - Cut heel to length
 - Ukulele
 - Guitar
 - Glue Heel Cap
- **Peghead Work**
 - Peghead angle
 - Final sand neck/fretboard joint
 - Glue and trim peghead overlay
 - Cut peghead to thickness
 - Drill tuner holes
 - Install peghead inlay
- **Cut Neck to Width**
 - Final Fitting of Neck to Body
- **Shape neck**
 - Optional peghead binding
 - Rough shape neck
- **Prepare fingerboard**
 - Attach fingerboard
 - Install and level frets

Finishing and Set Up

- **Finishing Prep**
 - General sanding and prep
 - Optionally tape off bridge location
 - Pore fill
 - Apply finish
- **Post Finish Set Up**
 - Bridge location
 - Glue on bridge
 - Attach neck
 - Nut, saddle and set up

Build the Body**Glue Top + Install Rosette**

- **Glue top and back**
 - The first step in a build is to join the top and back plates.
 - To get a good joint, shoot top and back joints with a hand plane.
 - For difficult-to-glue woods, it can be helpful to very lightly sand the glued surfaces with 180 to rough joint. Go extremely light and do not round edges!
 - I use Titebond 2 for top and back joints for better water and heat resistance. This is not a joint you will ever want to take apart.
 - For clamping during glue-up, you can use two boards clamped to table and pairs of small wedges to clamp
 - Put weight on both sides of joint, but not directly on joint to allow air circulation.
 - Take out of glue jig after 30 minutes and allow air circulation on both sides to avoid warping and promote glue drying. Handle carefully as glue will not be fully dry.
- **Install rosette**
 - Flatten front and back of soundboard with drum sander or hand plane so there is a flat surface for rosette installation
 - Pad shellac around rosette area to help avoid tear-out when curling rosette channel and sound hole.
 - Mark center of rosette on soundboard
 - Using compass, draw outline of rosette and soundhole – must do this **before drilling hole**
 - Drill 11/64th hole in center of soundhole. Gently ream hole from back side to achieve tight fit with guide pin for Stewmac Dremel router base
 - **Cut rosette slot(s)** using Dremel with router base
 - Cut 1/16 inch deep
 - Be sure to clamp soundboard when cutting slots or soundhole
 - Install rosette using 30 minute **epoxy**
 - Use 30 minute epoxy rather than glue because epoxy does not swell wood
 - Titebond can cause the rosette channel to shrink due to swelling from water.
 - Trim rosette flush with plane and scraper
- **Final thickness sanding**
 - Top, back and sides should now be drum sanded or hand planed to final thickness.

- **Cut soundhole and fill rosette**

- Cut soundhole using Dremel and Stewmac base. Be sure to clamp soundboard while cutting.
- Sand front and backs to 180.
- Fill rosette with West 207/105 finish epoxy
- Tape off soundboard around rosette.
- Apply West finish epoxy and let dry.
- Gently scrape, plane or sand epoxy down to wood.

Brace Top + Back

- **Prepare the soundboard and back**

- Then draw a line about ¼ inch outside of the outline of the top and back. Cut to outer line on bandsaw.
- draw bracing pattern on soundboard and back.

- **Prepare the brace wood**

- Cut brace wood to the necessary height and width dimensions for the bracing pattern.
- Apply radius curve to bracing using radius dish
 - 30' radius for top of guitar. Flat top for uke.
 - 15' radius for back of guitar and uke
- Cut lap joint in guitar x brace (ensure that joint is tight)
- Use oscillating sander to taper brace ends where they meet the kerfing
 - Also can just shape with chisel after gluing

- **Glue top braces**

- Uke - Glue top braces on a flat surface in go-bar deck.
- Guitar
 - Glueing is done in go-bar deck
 - Glue x braces first. Use 30' radius dish
 - Glue remaining below-the-soundhole braces in the radius dish
 - Cut and glue bridge plate – in 30' radius dish
 - Glue transverse brace, popsicle on flat surface
 - Drill truss rod hole in transverse brace **prior to gluing**

- **Glue back braces**

- Use 15' radius dish for both uke and guitar back
 - If you don't have a radius dish, the ukulele back can be made flat. A curved back is primarily for extra strength and durability. A domed surface allows a thinner (and hence lighter) plate with the same mechanical strength.

- **Trim braces to voice top and back**

- Height of braces at side wall should be 3/32 for guitar, 1/16 for uke

Prepare Sides + Head/Tail Blocks

- **Bend Sides**

- Be sure sides are thicknesses and sanded to 180 grit
- Cut sides to shape
 - Leave sides about 1/32 - 1/16 wider than final dimension
- Bend sides on hot pipe
 - Bindings can be bent at this time. Can be done two at a time.
 - Bend kerfing
- Cut sides to final length
 - Use clamping cauls to be sure sides are tight in the mold
 - Sand inside of sides with 180 grit to remove water marks from bending and provide good gluing surface

- **Glue head + tail blocks**

- Cut and shape head and tail blocks.
- Attach head and tail blocks to sides in mold using epoxy with wood flour
 - Epoxy fills gaps that may be present due to imperfect fit over curved surfaces
 - Wood flour stops epoxy from flowing out

- **Glue kerfing**

- Check that side profile is approximately correct before gluing kerfing
- glue kerfing slightly above the side profile
 - glue kerfing about 1/16 high at waist on back
- **Sand top and back**
 - For uke - flatten front and sand 15' curve into back kerfing using radius dish.
 - Clamps sides into mold with cauls when sanding
 - For guitar back - sand back in 15' radius dish
 - Clamps sides into mold with cauls when sanding
 - **Be sure head block angle is correct**
 - For guitar front - 30' radius below the sound hole. Flat above the soundhole so fretboard will sit flat
 - Use actual front as guide so front is not stressed when glued
 - **Make sure sides make the proper angle with the soundboard.** 90 degrees for uke. About 88.5 degrees for guitar.

Glue Up Body

- **Cut back kerfing slots**
 - If building a guitar, cut slot in head block for truss rod adjuster (if truss rod adjustable from body)
 - Bolt-on hardware holes can be drilled in head block at this time. Or can be done later.
 - Route slots into kerfing to accept back braces
 - Mark the location of the slots. Mark and cut only two at a time for better overall fit.
 - Freehand route slots with Dremel using 1/8 inch bit
 - Clean up edges of routed slots with safe file.
 - Depth of cut is 3/32 for guitar, 1/16 for uke
- **Glue back to body**
 - Gluing back first gives clean visible surface through sound hole
 - Sand sides to 180 grit to clean up marks from bending process
 - Glue back to body
 - Final clean-up and sanding of inside walls
 - Install reinforcing braces on inside of side-walls
 - Apply shellac to interior of body
 - Apply logo with fish glue
- **Route kerfing slots into side for soundboard braces**
 - Use Dremel to route slots into kerfing to accept top braces
- **Glue soundboard to body**
- **Trim and sand**
 - Trim soundboard and back flush with the sides using a **downcut** spiral bit with bearing
 - Sand sides with 180 grit so that routed channels will be based on final side profile. Sides may be carefully sanded with random orbital sander on lowest speed setting using a transfer pad. Be careful not to over-sand or create issues.
 - Sand tops and back with 180 grit so that entire body is at near final shape
 - For a uke, make sure the sides are flat at the neck joint and square to the soundboard
 - For a guitar, the angle between the sides and soundboard at neck joint will be about 88.5 degrees.

Mortise Joint + Bindings

- **Route mortise for neck joint**
 - Mark centerline on neck block. The centerline should go down the center of the soundboard at the joint.
 - Mortise jig needs to sit flush against body just like the neck will. For uke, sides at neck joint should be square to body for jig to align properly – i.e., a 90 degree neck angle.
 - Rout mortise in neck block using jig. The jig has a 1 inch wide opening. Using a 1/2 router bit and 3/4 OD brass template bushing gives 3/4 inch slot in body.
 - jig is 1 inch wide ("W"). "d" is the outside width of the brass template router fitting (use the thin 3/4 fitting). "f" is width of router bit.
 - width of cut in jig = $(W - d) + f = 3/4$ mortise slot for 1/2 bit and 3/4 template bushing
 - for guitar use shims to keep front of guitar against jig if the soundboard is curved above the sound hole.
- **Cut channels + Install Bindings**
 - Be sure joint at tailblock is filled and smooth where router bit bearing will ride.
 - Same with respect to the joint at neck end of back.

- Pad on shellac on soundboard to avoid tear out and dirt
- Route purfling channels before binding channels
 - For purfling, route along with grain of top/back, not the grain of the sides
 - Route with grain even if it means a "climb cut" with the router
 - Slowly rotating body against router allows controlled climb cut.
- Route binding channels
 - For bindings, route with the grain of the sides, even if it requires a "climb cut".
 - If you don't use a climb cut, tear out is highly likely
- Clean channels with sandpaper/file/x-acto knife
- Sand still-attached fibers off of top. Gently position fibers and sand them *against* their grain direction
- **Cut the channel for the tail block trim piece.** Use Japanese saw, dremel and chisel.
 - Much more difficult to cut this channel after bindings are installed.
- Bend bindings/purflings – accurately bent bindings will make glue-up much easier
- Test fit and cut bindings to size
 - Front bindings can be easily cut to size because the fretboard covers the bindings at the neck end of the body
 - For the back, cut one binding to exact size and the other to approximate size (leave just a tiny bit long). Then trim to exact size with x-acto knife during glue up.
- Use fish glue on bindings/purflings.
- Use scraper/small plane to level bindings with side
 - Be very careful not to damage top while scraping/planing
- Use a large sanding block for final leveling of bindings

Making a Ukulele Bridge

• Starting material

- Start with 1 inch wide and 5/16 thick board
- I like to use Indian rosewood for bridges due to its good acoustic properties (low internal damping)

• Route slots

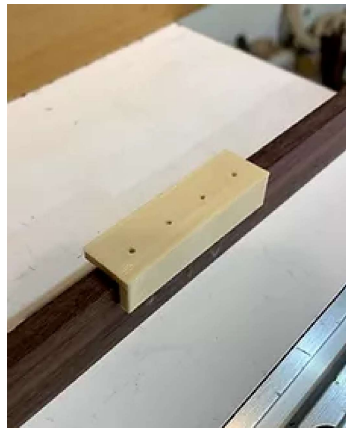
- Route 1/4 inch slot down center and 7/64 slot for the saddle.
 - It's difficult to get a good tight fit with a 1/8 saddle and 1/8 routed slot. The slot always comes out a bit wider and the saddle will be sanded smooth, losing a small amount of thickness.
- Leave 3/32 or so wood thickness at bottom of channel
- If you have a long board you can make multiple bridges at the same time

• Drill string holes

- Mark and drill holes for string holes. I use a 3D printed template to mark the holes. Here's a [link to the design file](#) for this template and some others.
- Preferably drill the holes at a 5° or so angle to give a bit more wood for the strings to hold onto. The hole where the drill bit entered should be closer to the bottom of the bridge than the hole inside the channel.

• Cut the wings

- Place two strips of tape in the 1/4 inch channel. The tape is there so you don't hit the bottom of the channel in the next step.
- With a handsaw and miter box carefully cut the bridge stopping just short of the channel bottom.
- Use the bandsaw to carefully cut off the excess wood from the wings.
- Use a rabbet block plane, chisel or file to level the wings.
- Cut the wings to proper length
- Sand a bevel onto the wings.





Routing the slots. If you have a long board you can make multiple bridges at once.



Simple 3D printed template for easy marking of hole locations.



Drill holes at 5° angle



Scrap board with 5° "overhang" used on drill press.



Holes should be near bottom of channel.



I use a small miter box and hand saw to make the cut at the wings.



Carefully cut wings on bandsaw.



After bandsawing.



Using a block rabbet plane to clean up the wings.



After clean up with plane.



Ready for final sanding.



Installed on baritone ukulele.