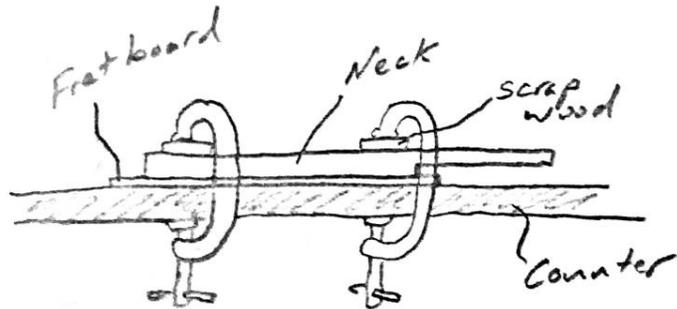


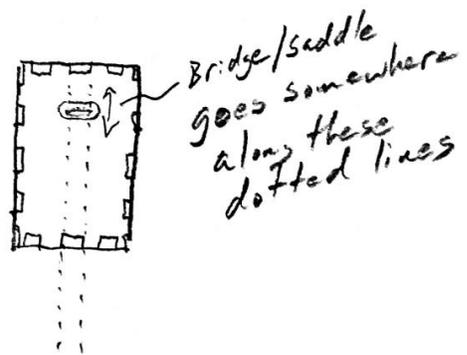
Day 3 (Full block)

1. Glue the fret board to the neck
  - a. With the proper overhang on the body end of the neck, glue the fret board to the neck
  - b. Use clamps for at least 15 minutes. Place the fretboard top-down along the edge of a lab table. Place the neck on top of the fret board. Place two pieces of scrap wood on top of the neck, and compress tightly with C-clamps that touch only the table top and scrap wood. The scrap wood prevents the clamps from damaging your instrument neck.



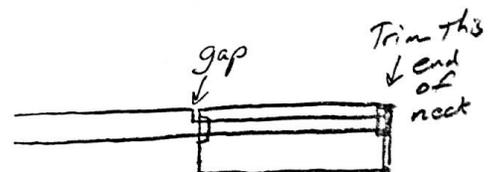
2. In D104:
  - a. Cut the sound hole(s).
    - i. Remove the masking tape.
    - ii. Mark the exact center of your body top (lightly, in pencil)
    - iii. Place the body on the laser cutter bed in landscape orientation, so that the red dot is on the center of your box. Align the body edges with the grid.
    - iv. Confirm the bed height with the dangling metal stick. If necessary, adjust the bed height.
    - v. Close the lid and press GO.
  - b. Use the belt sander to sand the body edges and the front of the peg box.
    - i. Rest your instrument body on the platform in front of the sanding belt. The belt will pull your instrument downward, so resting it on the platform will keep it stable.
    - ii. Sand the edges and corners of your instrument body. Don't overdo it! Don't sand the faces of your instrument body with the belt sander!
    - iii. Sand the front (stair step) edge of your peg box. Following the stair step contour, sand until the surface is planar. It is very important that the surface is perfectly planar, rather than concave or convex.

3. Determine your bridge/saddle placement.
  - a. I do this by thumping or tapping the top of my instrument until I have found a location that gives a nice, loud sound. My assumption is that this is the most efficient place to transmit waves from the strings to the body. However, the loudest spot is probably not the strongest spot. Therefore, if you are using steel strings or 6 strings, you may have too much string tension for this location. In that case, you might want to move the bridge closer to the edge of the instrument body.



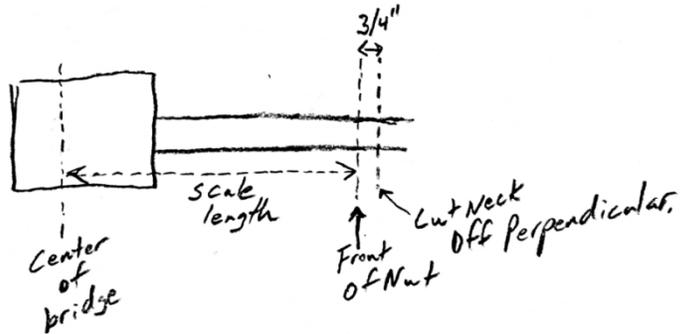
- b. Lay the saddle in your chosen spot and use a pencil to trace the location of the bridge. Use a ruler to make sure that the saddle will be centered and lined up perfectly with the neck.

4. Trim the body end of your instrument neck.
  - a. Insert the neck all of the way through your instrument, so that the end fits into the internal support. This is a little bit of a hassle.
  - b. When it is finally seated, you will probably notice a gap between the neck and the body. If this is the case, you



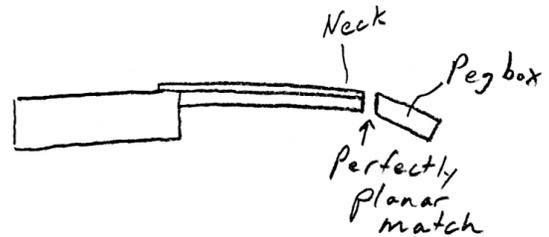
will need to cut off a little bit of the neck tip, so that the neck sits flush with the body. Measure the gap. Then remove the neck and cut off a length equal to or slightly greater than that gap.

5. Decide on your instrument's scale length. A standard ukulele (and a 4/4 violin) has a scale length of about 13". A concert ukulele has a scale length of 15". A standard mandolin scale length is 13 7/8". A viola scale length is about 14 1/2".
6. Measure one scale length from the bridge (middle or near side) and make a pencil mark on your fret board. This will be the front of the nut. Make another mark 3/4" inches behind the nut (opposite the bridge). This is where you will cut off the neck.
7. Cut off the extra neck material between 1/4" and 1/2" from the back of the nut. Make the cut perpendicular to neck length.



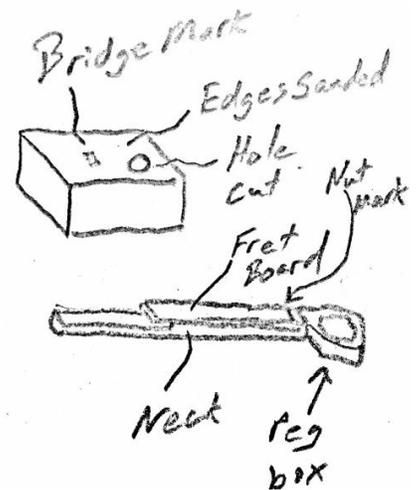
8. Back to D104 for more sanding:
  - a. Make sure that the end of your neck surface is planar. You may want to use the belt sander to make it perfectly planar. Hold your peg box next to this surface to make sure that both surfaces are planar, and that they match properly.

- b. Finishing the neck:
  - i. If the edges of the neck and fret board are not aligned, you can use a plane to shave them off evenly.
  - ii. If you want to sculpt the neck (e.g. make it thinner near the peg box), do that now.
  - iii. This is also the best time to sand the neck. You can use the belt sander today.



9. Glue the peg board to the neck. Use tape to hold it firmly in place. For the first few minutes, you should probably stand up the neck so that the peg box doesn't shift.
10. The weakest part of your instrument will be the junction between the peg box and the neck. If you want to add strength to that joint, wait until the glue cures. Then glue an additional thin strip of wood across the joint. You can also wait to see if it breaks, and add the strip later if it does.

11. By the end of the day (hopefully), you should have a body with a hole (or holes) cut in it, sanded edges, and a mark for the bridge location. Your neck should still be detached from the body, but it should have a fret board, a mark for the nut, and a glued-on peg box.



#### Day 4 (Split block)

12. Final sanding – use the finish sander (orbital “palm” sander) for fine sanding. Use the belt sander to remove larger amounts of material.
13. Create a shallow channel for the nut.
  - a. Mark the edges of the channel with pencil
  - b. Prop up the neck so that its weight does not rest on the peg box. Then carefully cut in on your marks with a coping saw. Stop sawing when the back of the blade is flush with the fret board surface.
  - c. Use a chisel to “twist out” the material between your cuts.
  - d. Insert the nut. Adjust as necessary.
14. Mark the fret positions.
  - a. Measure (in centimeters) the distance between the front edge of the nut to the near side (or middle, if you want) of the bridge.
  - b. Calculate your fret placements, based on this distance.
  - c. Tape a meter stick to your fret board, so that zero cm is at the front of the nut.
  - d. In pencil, mark each location on each side of the fret board. Make sure that an imaginary line between opposite fret marks would be perpendicular to the length of the neck.
  - e. Using scissors, or a file, make **small** notches where each of your pencil marks meets the corner of the fret board.

#### Day 5 (Full block)

15. Attach the fret “wire”
  - a. Drill two ½” deep, 3/32” diameter holes
    - i. The first hole goes on the back of the neck, beneath the first fret.
    - ii. The second hole goes on the back of the neck, beneath the last fret.
  - b.