

## UKULELE NECK JOINTS

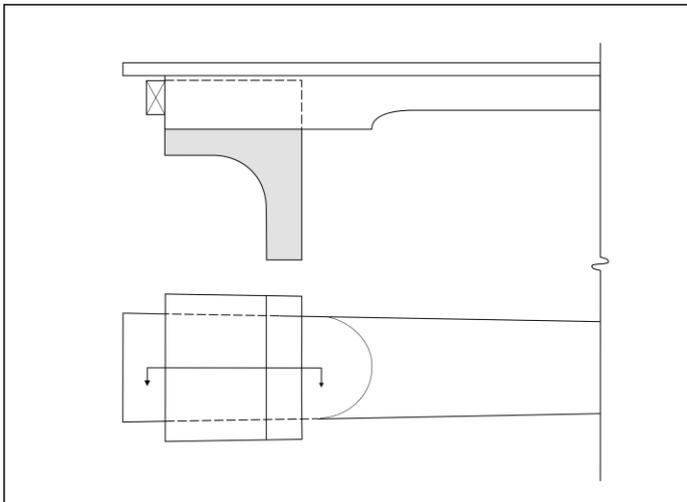
By Jerry Hoffmann

All the ukuleles I build have some form of a pocket or cantilevered neck joint. They're the result of a stylistic choice, and a structural solution. Stylistically, the change in the joint from vertical to horizontal creates a new visual impact. Structurally, the neck extends to support the fret board for its full length, and is cantilevered from inside the body. Horizontal joints also make it easier to fit the neck to unusual upper bout profiles.

The pocket joints I use are a "function follows form" approach tailored to specific body designs. The only constant is a pocket that shares the same depth and taper of the neck at the heel. The taper also aids in fitting the joint for the tightest possible fit. All the heel blocks I use are made of basswood or mahogany. There are two basic neck joint designs for my ukuleles that I've named: Reverse Heel, and Full Block.

### REVERSE HEEL

I call these reverse heel joints because the block has a center line cross section profile like a traditional heel, only it's a block on the inside of the body. **Drawing 1** shows the cross section of a reverse heel block. These blocks extend into the body where they are glued to the front side of the upper bout brace when the top is glued on. The back of the block can be closed or open depending on the application. Two examples (**photo 2&3**) show its flexibility when used on two very different body styles.



1.



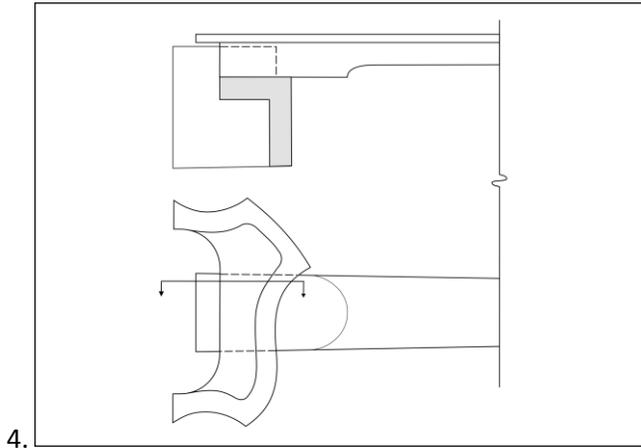
2.



3.

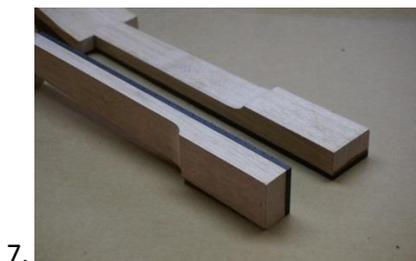
## FULL BLOCK

This variation borrows features from other instruments like mandolins where miter joints in the ribs need to be backed up. The block has the dual function of forming a neck pocket and backing up two rib (side) joints. **Drawing 4** shows a section of the block similar to that in a Reverse Heel block. The sides are glued to the concave portions of the block and the front is covered with a veneer that is an extension of the side wood. Examples of these joints (**photos 5&6**) show the miter joints and the intersection of the neck pocket and body.



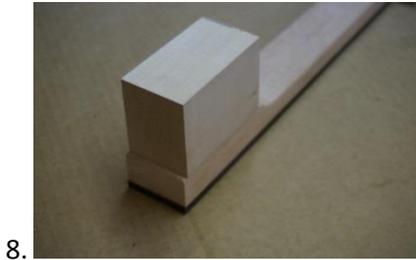
## THE NECK

My pocket joint necks are roughed out with the fret board slotted and glued in place, and the taper finished to final size (**photo 7**). They are the first thing I make so they can be fitted to the heel block before it is glued to the body. They are made the same for both Reverse Heel and Full block Pockets.

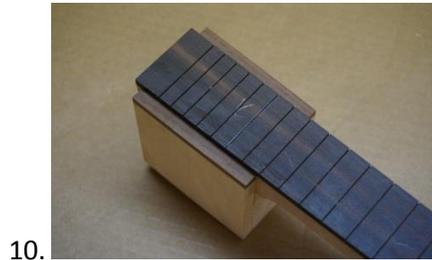


## MAKING A REVERSE HEEL BLOCK

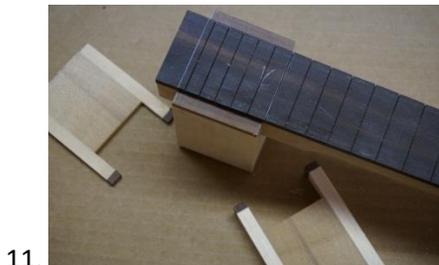
The core of the heel block pocket is matched to fit the taper of the neck (**photo 8**). It is made longer than needed so it can be trimmed at the 14<sup>th</sup> fret neck to body joint, and at the end of the block after fitting the neck.



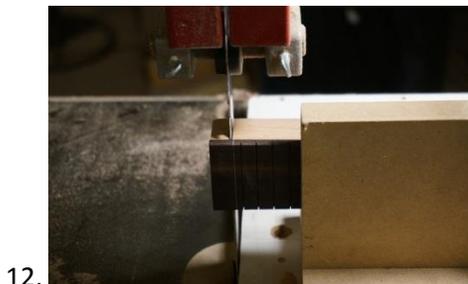
The pocket is formed by gluing sides onto the core (**photo 9**). Walnut on top of the sides (**photo 10**) is for a body style where the top of the block is exposed—see photo 21).



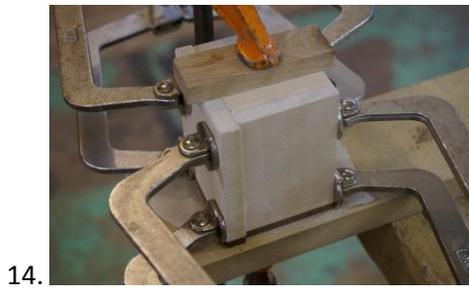
Ends are marked and trimmed for a 14th fret to body alignment after firmly fitting the neck into the pocket (**photo 11**).



The remaining stock is marked and trimmed off at the end of the neck. The first cut is made perpendicular to the neck (**photo 12**), and the second cut is made centered on the fret board glue line (**photo 13**). Cutting into the fret board allows a small space between it and the sound board so that the heel will seat fully into the block.



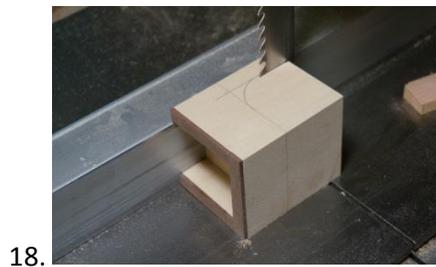
The back is glued to the block and trimmed flush (**photo 14**) (A back isn't required for all applications). A block of wood held down by a bar clamp keeps the back in alignment with the top of the pocket until the glue begins to set up.



The top of the block is trimmed (**photo 15**) so that there is a space equal to the thickness of the sound board between the bottom of the fret board and top of the block. A scrap of thickness sanded top wood serves as a gauge (**photo 16**).



To finish, the block is marked for removal of material to lighten it (**photo 17**), then cut and finished to the line (**photo 18**). **Photo 19** shows an inside profile being cut at the angle of the upper bout for a different style instrument (see photo 2).



The neck should fit snugly in the pocket (**photo 20**). After gluing on the block, the front portion of the ukulele is cut out and finished flush with the inside of the pocket. The top is also cut out flush where it meets the pocket (**photo 21**).



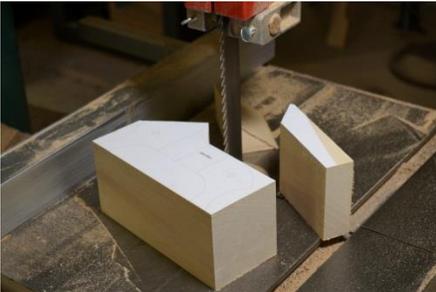
## MAKING A FULL HEEL BLOCK

A vector drawing of the top view of the block is printed on paper and pasted to the stock (**photo 22**). This drawing shows the location of the pocket, neck, and dowel pin holes that will be used to register the parts after cutting apart the block to form the pocket.

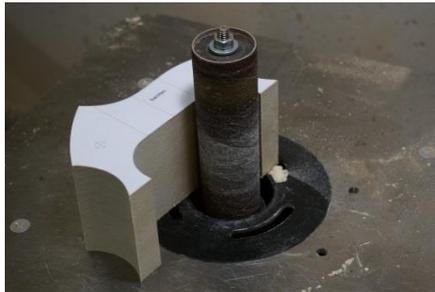


22.

**Photo 23** shows roughing out the profile. I could use a thinner blade, but have only one saw, and it would be too much trouble to swap them. After roughing out, the block is sanded to the line (**photo 24**).

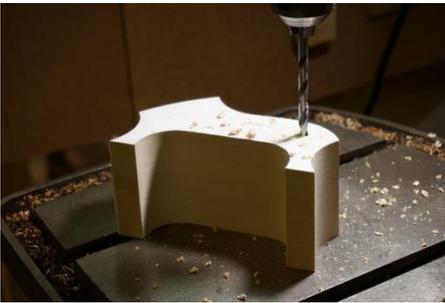


23.



24.

Two  $\frac{1}{4}$ " dowel holes 2" deep are drilled where indicated on the drawing pasted to the block (**photo 25**).



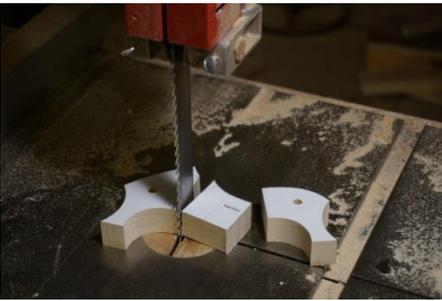
25.

The first step in forming the pocket is to saw off a portion a little wider than the finished depth of the pocket (**photo 26**). It will be finished to final size after the block is reassembled (see photo 32).



26.

The sawn-off portion of the block is cut again to form the two sides of the pocket (**photo 27**). Extra material is left on the two side pieces for final sanding and fitting. Next, dowel pins are inserted in the bottom portion of the block.

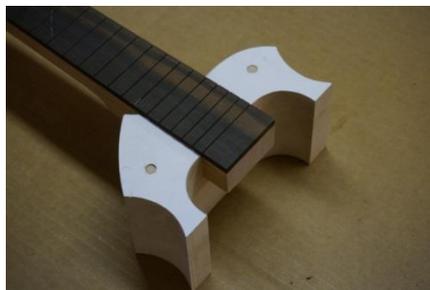


27.

Each side is sanded (**photo 28**), leaving a little white space between the line and edge. They are then assembled over the dowel pins, and the neck is slid in the pocket to check the fit. More material is removed until the neck slides into the pocket just short of where it needs to be with the 14<sup>th</sup> fret slot aligned with the front of the block (**photo 29**). This is where the taper aids in getting an exact fit between pocket and neck.



28.



29.

**Photo 30** shows the sides being glued in place over the dowels, aligned with the outer edge of the bottom portion of the block.



30.

The final fit is achieved by removing material from the sides of the neck at the heel (**photo 31**). A scraper is the best tool for the job because it accurately removes only a small amount of material. (Just .005" removal will move the neck in the slot as much as .065")



31.

A rotary planer is used to shave material off the top of the block (**photo 32**) until the neck fits with a space equal to the thickness of the sound board between the bottom of the fret board and the top of the block. **Photo 33** shows a scrap of top wood being used as a gauge.

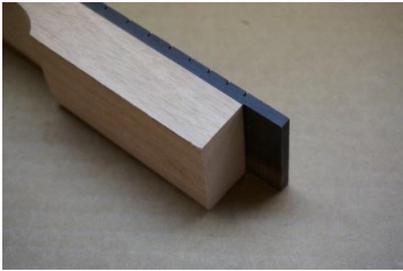


32.



33.

After marking and trimming the neck at the heel flush with the back of the block, I cut along the fret board to allow a small space between it and the sound board so that the heel will seat fully in the block (**photo 34**), also see photos 12&13).



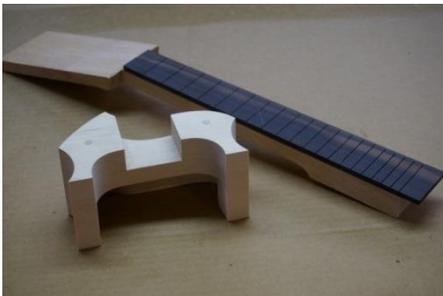
34.

Excess material is removed from the bottom of the block using a pin router (**photo 35**). This will lighten it and provide a narrower gluing surface between the block and the back.



35.

**Photo 36** shows the completed block ready for gluing to the sides. The top is glued on over the pocket, and then cut out flush with the pocket sides and the heel brace (**photo 37**).



36.



37.

The process for making these pocket joints was developed over the period of several years, and after making at least three hundred of them, they have become as fast and easy to make as most others. However, they do affect how other parts the instrument are assembled. Having to complete the joint early in the building process, as opposed to doing it near the end, changes the order in which things are done. The alignment of the neck with the body has to be carefully monitored until the top is glued on. After that, it is basically done and can be forgotten until the neck is attached after finishing.