

SCROLL PEGHEAD FOR TUB-O-TONE MODEL L

Necessary Tools:

bandsaw (or a sabre saw) with a medium-fine blade (e.g. 14-16 tooth)

drill press (or a 90-degree drill guide) plus 7/16", 1/2", and 1 inch forstner bits in addition to regular 7/64" and 1/8" bits

set of jeweler's files

hobby knife & blades

assorted rasps and chisels including a medium rat-tail file,

glue (Elmer's or equivalent)

set of sanding drums (2", 1", 1/2") in 80 and 120 grit

sandpaper (80 and 120 grit, plus a 1" 120-grit sanding belt)

a miter box with a slot for making 45-degree cuts into the end of a piece.

Materials Needed:

Cello tuning peg. Get a nice inexpensive rosewood peg (Style P2C) from Southwest Strings (<http://www.swstrings.com/Store/Shopping.jsp?Category=Lutherie&SubCategory=Cello&Group=P2C>.) It tapers from 17/32" at the large end to 13/32" at the small. The specs and procedures described here are based on a peg of this size. Be aware that not all cello pegs are the same size.

1x4 flat stock. Enough for two 3x8 side pieces and a 4x9 center piece. I break this down since you may wish to use a different type of wood for the center. My current prototype uses cottonwood sides and a red oak center; the previous one used poplar sides and a cherry center. It could all be pine, so far as that goes.

Two wood buttons (not plugs) for 1" diameter hole.

Material for the nut (see Installing the Nut section, below.)

Shaping the Pieces

First check to make sure the RR box is really 1-1/2" square when you print out the pattern page. If it is not, resize it with an enlarging/reducing copier (or in your computer drawing program.)

Cut out two side pieces and one center piece. A bandsaw is best for this although it can be done with a sabre saw at the expense of more sanding and filing to square up the cuts. Sand out the major bumps and flat spots that interfere with a smooth curve on any of the pieces. This is just a preliminary shaping, so you can use fairly rough (80 grit) paper. An inexpensive sanding drum kit makes the job simpler, especially if you have a drill press.

Choose which side pieces are to be the left and right sides of the peghead, so that the best surfaces are toward the outside. Mark them left and right as seen looking into the throat of the scroll (see Fig.1). On one side piece, drill a 7/64" guide hole at points h1 and h2. Use a drill guide/drill press for this as it is very important that these holes be perpendicular to the piece. Align side pieces together as closely as possible, inside face to inside face, and clamp. (Other things being equal, match the inside curls, since it's easier to take off any excess from the outside curves.) Extend guide holes through other side piece, then unclamp.

On the outside face of the right piece, centered on h1, drill to a depth of 1/8" with a 1" forstner bit. Do the same to the outside face of the left piece. On both the inside and outside faces of the right piece, and centered on the h2 guidehole, drill to a depth of 1/4" with a 1/2" forstner bit. On both faces of the left piece, and centered on its h2 guidehole, drill to a depth of 1/4" with a 7/16" forstner bit.

NOTE: I've specified forstner bits here since they tend to make a cleaner hole. Whatever bit you use, place your side piece on a scrap to drill into when drilling through the piece.

In the right piece (but not in the left), enlarge guide holes h1 and h2 to 1/8". With #6 1" screws through the right side piece, fasten the side pieces tightly together, inside face to inside face. With wood rasp, sanding drum, and sandpaper, work the pair until they are pretty much identical in shape. (I say "pretty much" since if one side looks good and the other has, say, a flat spot, you shouldn't give the first one a flat spot just to be identical.)

Separate the pieces and finish-sand them to the degree you'll want in the final construction, because when the peghead pieces are glued together many areas will be very difficult to reach. A set of jeweler's files is useful here, as is a section of 120-grit 1" sanding belt (for sanding around the outside curves.)

From the outside face of the right side, use a 1/2" forstner bit to extend the 1/2" peghole on until it meets the hole on the inside of the piece. Do the same with the left side but use a 7/16" bit. NOTE: This plan places the peg on the side of the peghead away from the player, assuming they're plunking right-handed. If you play left-handed, you may want to reverse the large and small holes.

Both holes will have to be partially enlarged. They don't really need to be tapered-- there's plenty of friction between the tapered peg and the two straight holes. But 1/2" and 7/16" are probably going to be too tight where the peg enters the side pieces. So the entrances to both holes will have to be enlarged a bit. (Now is the time to get it exactly like you want it-- it's a whole lot harder when the peghead is glued up.)

There are several ways this might be done:

A special reamer for fitting cello pegs can be bought from a luthier supply house, but they are pretty pricey. The 1/8-1/2" reamer commonly available in hardware stores will work fine for the 7/16" hole, but not on the 1/2" hole, and they're fairly pricey too.

The hole can be gently scraped with a rat-tail file, though care must be taken to keep it circular. Check often by fitting the peg into the hole. A small sanding drum or rotary rasp can be used in a similar way. A tapered shaft or dowel can be wrapped with sandpaper and twisted by hand in the hole. If you have one of the reamers mentioned above, you can wrap a short section of sanding belt around it to sand out the 1/2" hole.

Work on the large hole first. Push the peg into the 1/2" hole from the outside until it sits pretty snug. If this leaves too much peg on the outside, dress the hole to let more peg push through. When the peg looks right and fits snugly in the 1/2" hole, push the peg on into the 7/16" hole until it's snug there too. Now try to slide the center piece between the two side pieces. If it slips in snugly, you're done. If it's too loose, the 7/16" hole needs to be enlarged; if it's too tight, go back and enlarge the 1/2" hole somewhat and repeat the process.

Gluing Up the Peghead

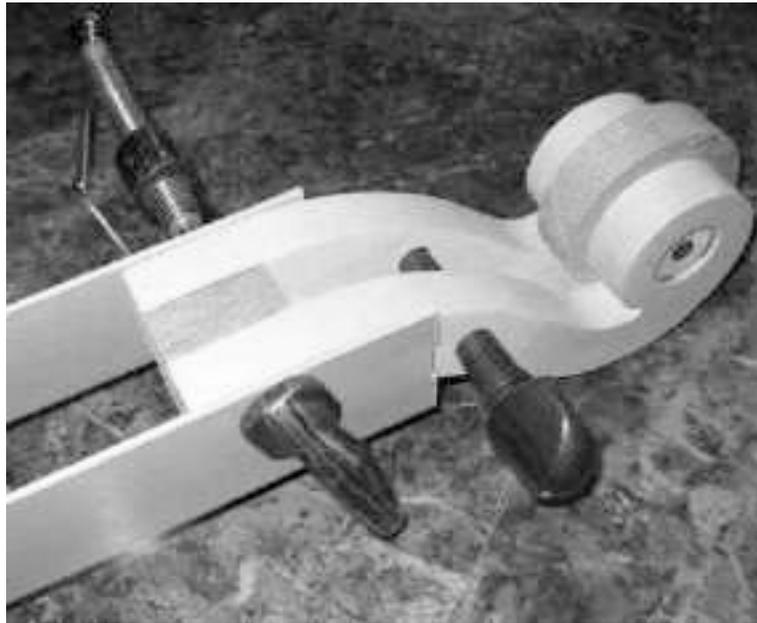
Align the left side piece to the center piece so that the round head of the side looks well-positioned against the round head of the center piece. Make point j on the center piece (at the end of the dotted diagonal line on the pattern) coincide at some point along line k on the side piece.

With these pieces so aligned, extend the 7/64" guidehole at h1 in the side piece scroll into and through the center piece scroll. Enlarge the guidehole in the side piece only, to 1/8". Attach the side to the center with a #6 1" screw through h1. With a #6 1" screw through h1, attach the right side to the center piece. Put the peg in place and adjust the center piece so that its point j is on (or, if necessary, slightly below) line k on both side pieces. Clamp the three pieces together in this position.

With the back side of the tip of a hobby knife, faintly outline the curve of each side piece onto the center piece. This is to show where to put glue. The scratched line will disappear, but a pencil line might not.

On one side of the center piece, apply a uniform layer of Elmer's glue to the area between the scratch line and the inner edge. Align the side piece to the line on the center piece as closely as possible and attach it less-than-snugly with a screw through the scroll. Repeat for the other side. Check the alignment and clamp the stems of the three pieces together. Completely tighten the scroll screws. Clean up any excess glue that is extruded. Allow to dry.

Peghead being glued:



Remove screws from scroll end. Apply glue to the inside edge of the 1" holes and insert the wooden buttons. Use a mallet to seat them entirely into their holes.

With the peg fully in place, mark a point on the peg about 1/4" in from the 1/2" hole. Remove the peg and drill a 7/64" hole directly across the peg, for the string.

Attaching The Peghead

Using a try-square, mark a line m across the peghead just slightly above point j on the center piece, and with an angle gauge mark a diagonal line across the lower end of each side, running at 45 degrees down and back from the ends of line m. Lay the peghead nose-down in your miterbox, aligned so that the 45-degree slots at the end coincide with the diagonal lines. Clamp the peghead in place, and saw off the lower corner.

Similarly, lay the neck stock on its back in the miterbox, clamp it in line with the 45-degree end slots, and saw off the corner. The overall length of the straight section of completed neck is to be 48", so if you're working with 4' of stair-rail you make this cut right at the end. If you are retrofitting the peghead to an existing Model L neck, the top edge of the cut should

begin right where string contacted the nut (i.e., roughly 48 inches up from the bottom end of the neck.)

Neck and Peghead Ready for Joining:



There's no good way to squeeze neck and peghead together while the glue dries, but we do need something to keep the components in steady alignment. To do that, clamp slats alongside the peghead, projecting down enough to let them be clamped also to the neck. Make some arrangement to hold the neck very firmly in a standing position, preferably tilted so the diagonal cut is now horizontal. Apply glue to the diagonal cut surfaces of both the peghead and the neck, making sure to distribute it to the perimeter on both pieces.

Align the peghead to the neck and give it a couple of light taps with a mallet. Remove it and even out any thick or thin spots in the glue. Replace the peghead, clamp the slats against the sides of the neck, tap it again to seat it. Allow to dry.

Gluing Peghead to Neck:



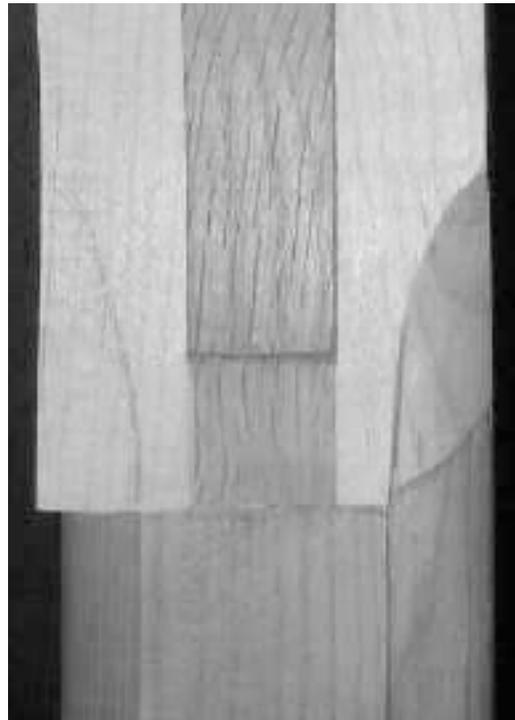
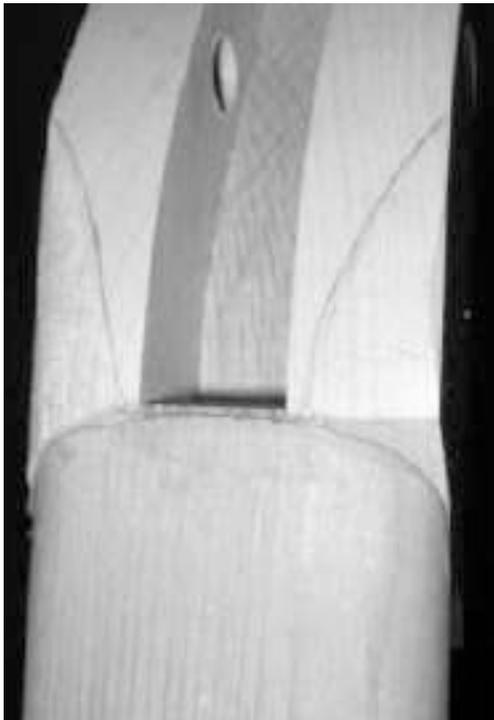
Carving Peghead Corners to Fit Neck

Making a smooth transition between neck and peghead is a matter of individual aesthetic judgment and a lot of careful work with knives, rasps and sanding drums. The plans include patterns (RF and LF for the front; RR and LR for the rear) to guide the rough initial shaping of the bottom corners of the peghead. Traced onto the wood, they provide crude limits to the amount of wood to be initially removed, e.g. with rasp or knife. Then various sizes of sanding drum can be used to make a smooth transition from the convex curve of the neck to the flat surfaces of the peghead.

The depth of the side pieces, at the base, is spec'ed a bit larger than the 1-1/4" thickness of the neck, so you'll probably have some excess in back to sand off. The square corner at point n on the center piece should be rounded off, with a rasp or small sanding drum.

Front:

Back:

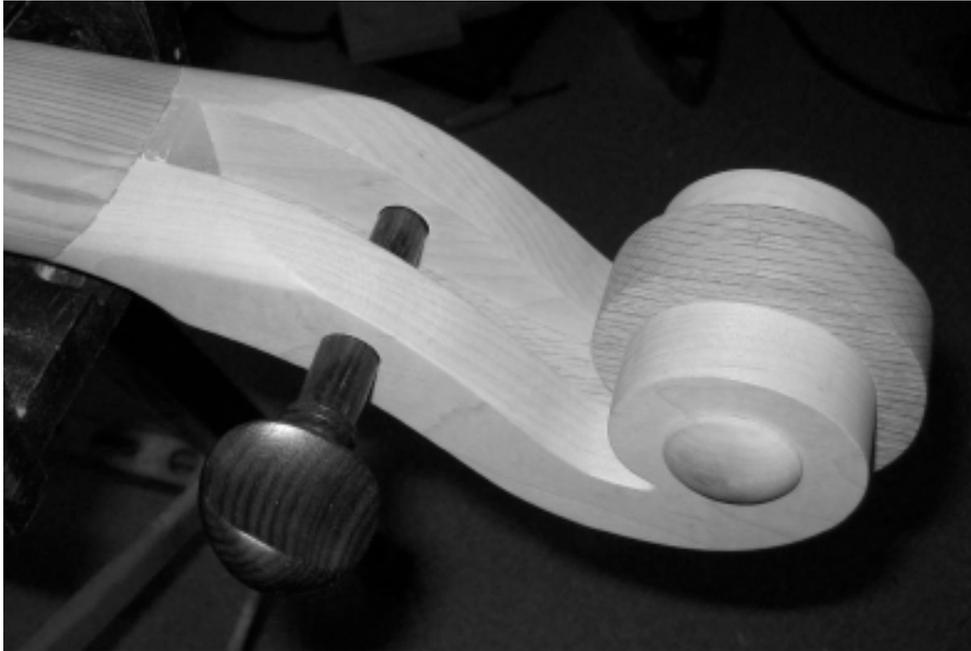


Installing the Nut

Of course, ebony is the traditional material for the nut, but it's not really necessary. Any hardwood would probably do as well. (I have been using polyethylene, in an attempt to squelch metallic overtones from the tub, but I don't know that the effects are worth ruining a good kitchen chopping board to achieve.)

Anyway, whatever the material, you'll need a 3/4" x 1-1/4" rectangle of the stuff, about 1/4" thick, to glue into the square end of the pegbox. This'll probably be too tall for your plunking style-- sand it down as needed. It should be straight up in front, to sharply intercept the string, and then bevel down toward the peg. Use a round jeweler's file to cut a small groove for the string.

Completed Peghead:



Finish

You'll want to give the finished neck a couple of coats of spar varnish to protect the surfaces. I've had no luck using stain to make the thing look as though it were made from one solid piece, decided it looked just fine with natural colors brought out by the varnish.

Plunk in Peace (and now, Style)

L.F.Miller