

Building a Violin

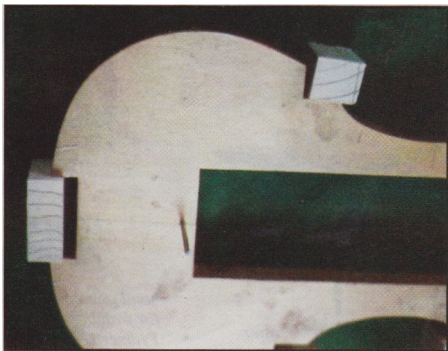
In Part 3 of his step-by-step guide, Dominic Excell looks at the internal blocks, and preparing the ribs

The rib outline template — that with the fine delicate points — is now needed. This must be placed on the ply board, so that the positioning holes cut the centre line you have just scribed. Now use a drill-bit matching the template holes to drill vertically through to the underside. Just one of these holes is to be drilled at this stage, making absolutely certain that this hole cuts the line centrally. At this stage it is necessary to anchor the template to the ply using a pin of matching diameter.

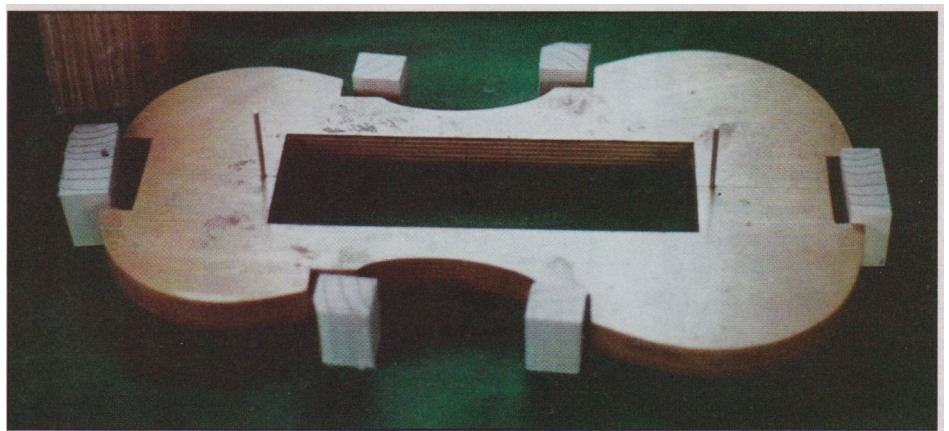
The shank of a similar-sized drill — or a round wire nail — is useful here. I use odd lengths of 1/8in diameter piano wire with a matching drill bit.

Make sure that the template is flat to the board. Mark with a point the centre of the second hole; again, drill vertically, making certain that the hole straddles the line. Accuracy is (as ever) absolutely vital: if the pins are not vertical, the sides of the mould won't align with the template, and inaccuracies will rapidly multiply.

Now comes the task of transferring the outline of the template to the mould. Use a small scriber, ensuring that the line is hard up against the template side — without damaging the edges of the template. Now use the chisel-ended pencil to mark to the bottom of the scribed line; turn the template over and repeat the process.



Lower left corner and bottom blocks in position, with end grain emphasised for clarity.



Blocks prepared and ready to be glued into mould.

You should now have the outline of a slightly undersized violin body, with pin-sharp corners, marked out on your ply board. Mark this face as your datum; when you cut out and clean up the edges, you will get greater accuracy by checking with your square exclusively from one face. In fact, if you use an accurate bandsaw, there is no need even to transfer the line to the back. If you intend to saw this out by hand (it's good practice!) then it is necessary to mark both sides — though still do any checking with the square only from the upper side.

Coping

For hand-sawing, the tool to use is the coping saw. Avoid forcing the pace, or splintering could occur.

After the mould has been sawn out from the board, it is important to clean up the edge so that it is perfectly square to the face, and it's most important that it follows the outline of the template with absolute precision. This is vital. You may, however, ignore the final 10 mm — though no more! — at each point, as this will be removed a little later for the block cutouts. It is important not to cut these away until the outline has been finished to the very best of your abilities, as the transition between mould and block must not be rounded over in any way. The tools

to use are chisel and / or knife for the initial trimming, with flat and crossing files for the final touches.

A small, slightly curved cabinet scraper is very useful to counteract the tendency of the edges to become rounded during filing. Be patient with this job: the best results take a little time.

Taking the dimensions from the diagram, mark out the cutouts for the two end and four corner blocks, and for the interior cutouts — these are for the clamps, when the time comes to glue the ribs to the blocks.

As ever, make sure that everything is absolutely square when you're sawing. Finish as before, using knife, chisel and file.

Raising the mould

A rummage in the scrap box is now called for. You will need a couple of strips 10mm square, one 125mm long, the other 150mm. These are glued under the mould, between the end block cutouts and the centre hole. This is to raise the mould from the bench, allowing it to be fairly central to the ribs and to provide space to fit the linings to the ribs with the mould in position.

The final task is to varnish the entire mould with the exception of the gluing areas shown in the diagram. Make sure

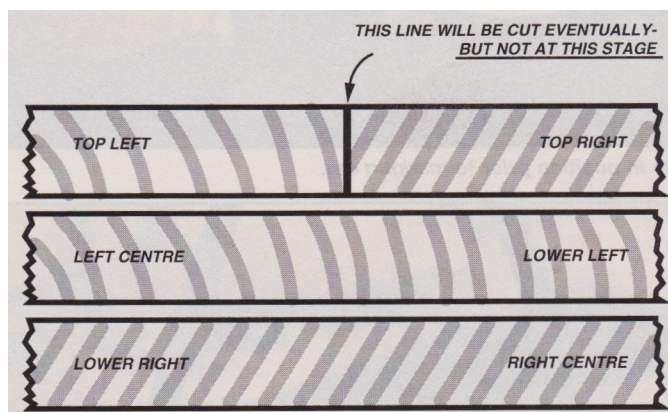
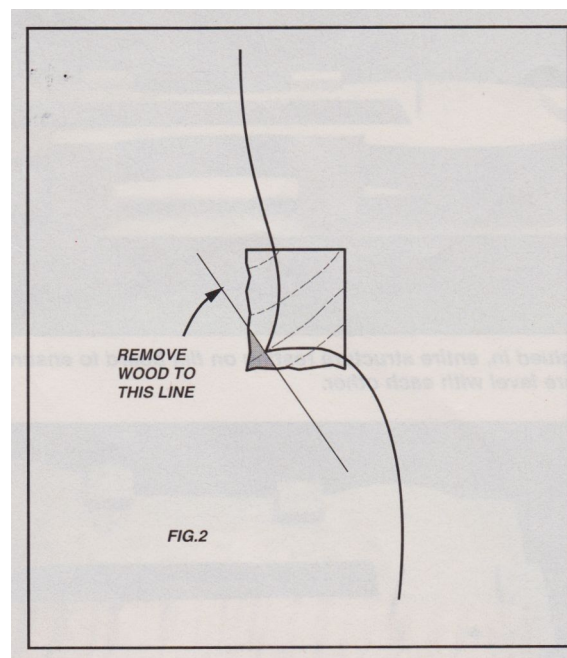
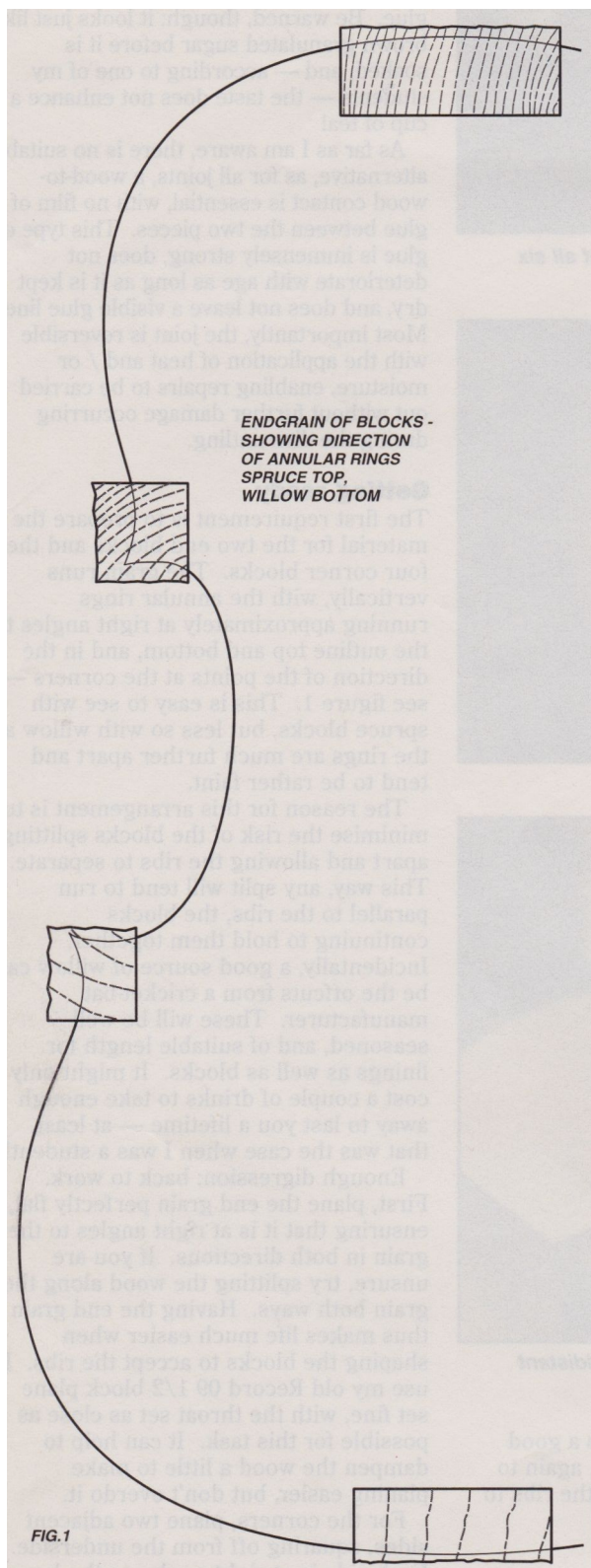
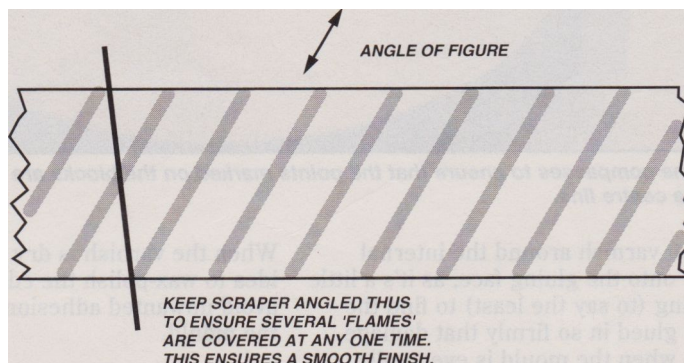
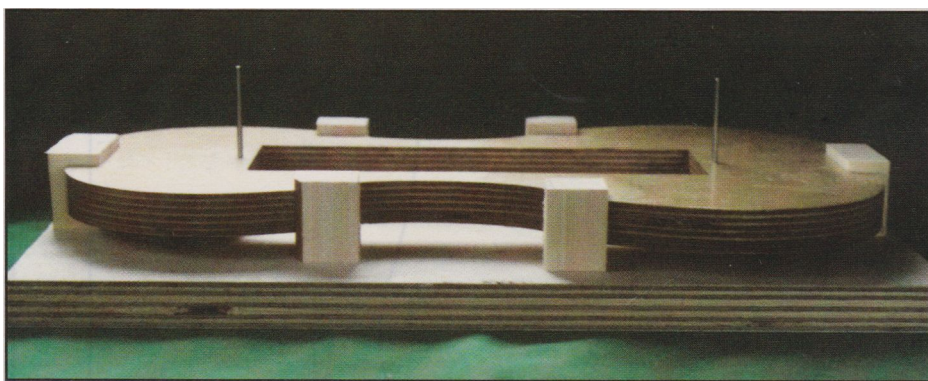


FIG.3

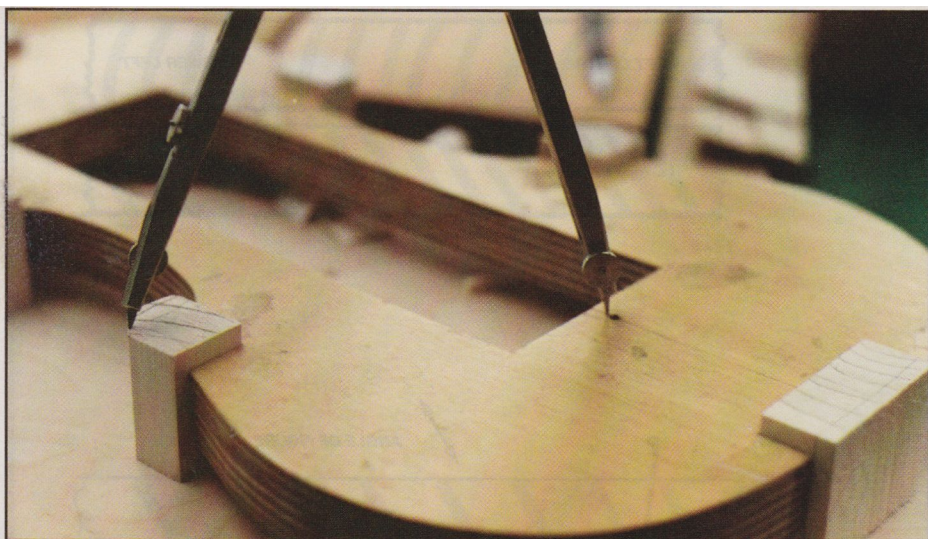




Blocks glued in, entire structure resting on flat board to ensure undersides of all six blocks are level with each other.



Template in position prior to marking out.



Using the compasses to ensure that the points marked on the blocks are equidistant from the centre line.

that you varnish around the internal corner onto the gluing face, as it's a little upsetting (to say the least) to find the blocks glued in so firmly that damage occurs when the mould is eventually removed ...

Apply a couple of thinned coats of varnish. Make certain that the edge is well sealed, and that there are no runs to disturb the squareness of the edge.

When the varnish is dry, it is a good idea to wax-polish the edges, again to avoid unwanted adhesion of the ribs to the mould.

Starting the violin

Hopefully, you will now be in a position to start work on the violin itself. But before we start cutting wood, five words about the glue:

MODERN ADHESIVES ARE NOT SUITABLE

In fact, the only type of glue to use for a violin is the old-fashioned animal-skin variety. The best of these is rabbit skin glue. Be warned, though: it looks just like brown granulated sugar before it is soaked, and — according to one of my students — the taste does not enhance a cup of tea!

As far as I am aware, there is no suitable alternative, as for all joints, a wood-to-wood contact is essential, with no film of glue between the two pieces. This type of glue is immensely strong, does not deteriorate with age as long as it is kept dry, and does not leave a visible glue line. Most importantly, the joint is reversible with the application of heat and / or moisture, enabling repairs to be carried out without further damage occurring during the dismantling.

Getting ready

The first requirement is to prepare the material for the two end blocks and the four corner blocks. The grain runs vertically, with the annular rings running approximately at right angles to the outline top and bottom, and in the direction of the points at the corners — see figure 1. This is easy to see with spruce blocks, but less so with willow as the rings are much further apart and tend to be rather faint.

The reason for this arrangement is to minimise the risk of the blocks splitting apart and allowing the ribs to separate. This way, any split will tend to run parallel to the ribs, the blocks continuing to hold them together. Incidentally, a good source of willow can be the offcuts from a cricket-bat manufacturer. These will be well seasoned, and of suitable length for linings as well as blocks. It might only cost a couple of drinks to take enough away to last you a lifetime — at least, that was the case when I was a student!

Enough digression: back to work. First, plane the end grain perfectly flat, ensuring that it is at right angles to the grain in both directions. If you are unsure, try splitting the wood along the grain both ways. Having the end grain thus makes life much easier when shaping the blocks to accept the ribs. I use my old Record 09 1/2 block plane set fine, with the throat set as close as possible for this task. It can help to dampen the wood a little to make planing easier, but don't overdo it.

For the corners, plane two adjacent sides, squaring off from the underside. Each side is at right angles to the base and adjoining sides. Cut to a height of 32mm. Make sure the blocks are big enough, so that when the template is in position, the point sits well inside the

boundary. The end blocks are started in the same way, but a fourth side also needs planing up, again with each side square to its neighbours; these blocks must also fit snugly — but not too tightly — into the cutouts in the mould.

Check that these blocks can slide out smoothly when the mould is lifted upwards, as any slight tapering can make life difficult later on, when the mould is lifted out from the finished ribs. Also, make sure that the block has sufficient depth for the outline of the template. The height is also 32mm at this stage, though the finished height will eventually be 32mm at the bottom block, tapering to 30mm at the top block.

Flat surface, hot glue

Now the mould must be placed on a flat surface: another piece of ply is ideal. This board needs to be large enough to accommodate the mould, plus enough space for a square. I find a four-inch engineer's square a useful size for checking.

Next, heat up the glue, which you have already prepared. The granules are soaked in cold water for an hour or so, and then heated in a jar which is in a small pan of simmering water. The hot glue needs to run off the brush in a fairly fast stream, just beginning to run to droplets. Make sure that the glue is not boiled, as it will lose strength.

The blocks need to be very lightly glued in position, making certain that they all sit flat on the board. Only a small drop of glue is required, as they are only in place temporarily. Set the assembly aside overnight, after making certain that the blocks have not stuck to this board!

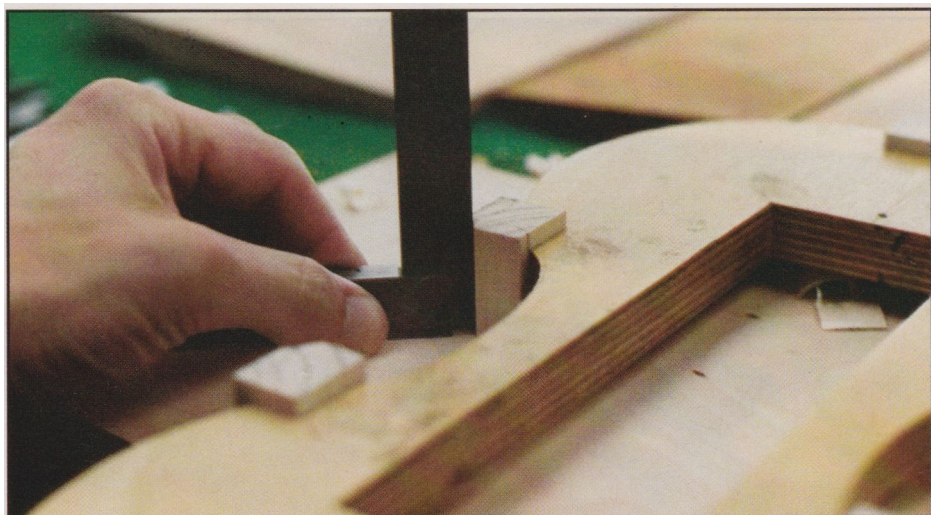
When the glue is dry, place the template over the pins, and very carefully mark around it onto the upper surface of the blocks. Turn the mould over and mark the underside of the blocks, positioning the template again with the pins.

The corner blocks need to be chiselled back with care, to the point where the lines of the centre bouts cross over those of the upper and lower bouts: see figure 2.

Symmetry

It can be a help to the maintenance of symmetry to use a pair of compasses or dividers from a convenient point on the centre-line, to check that these points are in fact equidistant from centre.

Check that these new faces are square to the board, and mark a vertical line at the point. This line should join the points on upper and lower surfaces of the block. Also mark out vertical lines where the mould meets each block; these lines should coincide with the lines marked from the template.



Checking that face of block is square (see also fig. 2).

Now chisel or plane the top and bottom blocks back to the marked line, so that when the template is in position there is no discernible 'step' from it to the block.

Check with the square frequently, as this curved face to the block must be vertical. This applies of course to each face of the corner blocks. Now, using an inside bevelled gouge — ideally one whose radius matches fairly closely — remove the waste away from the inner curves of the corner blocks. Do not remove wood from the upper and lower curves at this stage.

When these inner curves are perfectly vertical, and coincide exactly with the template, you are ready to prepare and fit the centre bout ribs.

Good-looking ribs

I always feel that the ribs look at their best when the figure on one side is a mirror image to that on the other. This however is not always possible, unless you are lucky enough to have a spare matching piece. Figure 3 shows the

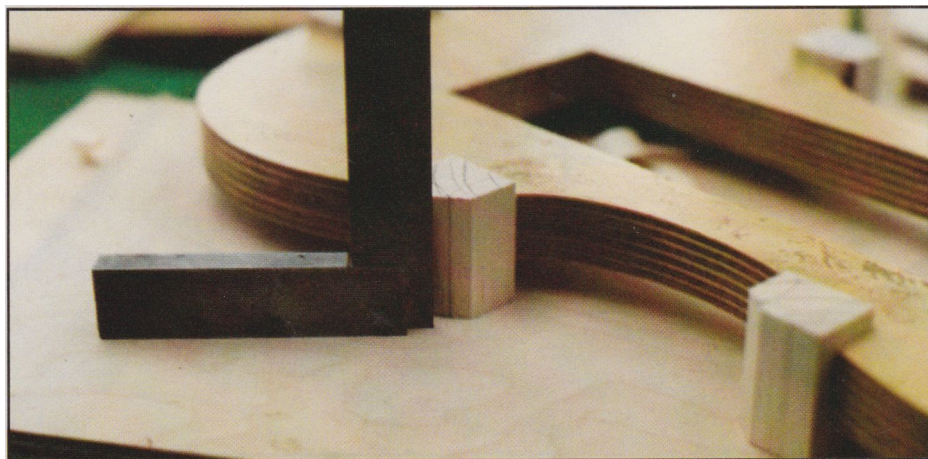
best layout to achieve near-symmetry.

Note that the strip used for the two upper ribs has to be finished equally well on both sides, as one of these ribs is going to be made up 'inside out' to preserve the symmetrical look.

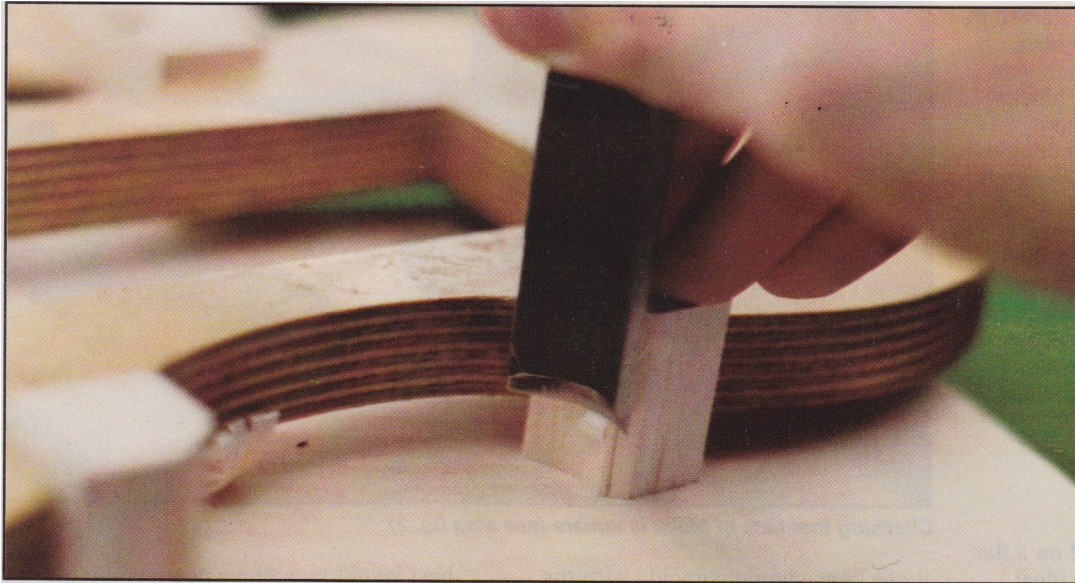
To start with, plane up the lower edge of each piece absolutely flat, then trim to 32mm width. I leave the upper edge rough sawn at this point — it helps with the orientation of the pieces.

Turn one of the pieces around, end to end, still keeping the planed edge down. Mark the ribs as in figure 3. It helps also to mark 'inside' and 'outside' on each rib — when planing up, you will still know which piece you are working on by the marking on the reverse.

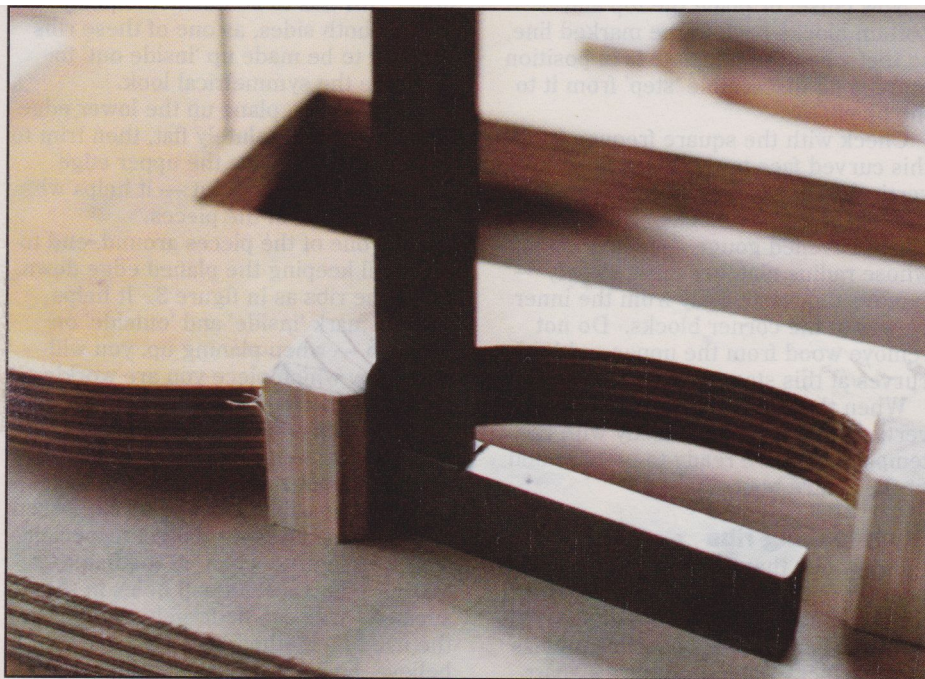
These ribs now need to be planed absolutely smooth. I use the block plane as before, this again being set to the finest cut possible with the throat closed up. There is always a danger, especially with well figured wood, of the flame tearing out, leaving small holes in the surface. This can be largely avoided by the use of a toothed blade. These can, I believe, be bought from specialist tool suppliers — or they can be readily made.



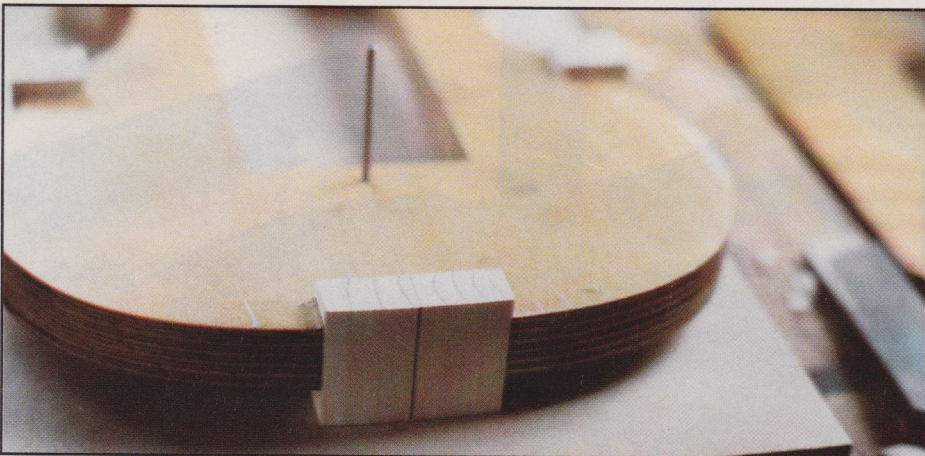
Marking vertical line on face of block. This is where the two curves cross over.



Gouging the inner curves to accept the centre ribs.



Checking the curved surface of block is vertical – block now ready to receive rib.



Finished bottom block with centre line marked on.

up using a spare blade, which is much cheaper! To do this, support the blade in a vice and simply file with a triangular or knife-edged needle file — or even a junior hacksaw blade — a series of nicks about 2 - 3mm apart, across the cutting edge. This sounds crude, but it is very effective.

After planing the ribs, finish off with a sharp cabinet scraper. Make sure that the scraper is not allowed to run parallel to the flame, as it will tend to ride over the figure, giving a bumpy finish. Rather, make sure that it is at an angle to the flame, covering

several 'stripes' at once. This will ensure a smooth finish. See figure 4.

Shattered ribs

When damping the ribs to the bench, it is important to make sure that the bench is free from any debris that might leave indentations on the ribs. If necessary, clamp onto a piece of flat board — melamine, ply or whatever. Never work towards the clamp, as ribs have a habit of shattering under the compression strain. A broken rib always raised a cheer from the other students when I was at college!

Don't use abrasive paper, as this dulls the figure of the wood. Now that the outer surfaces are finished off, the ribs need to be accurately thickened to 1.2mm. Any thicker, and they are difficult to bend; any thinner, and they start to lose strength. I use the block plane with toothed blade — there is no need to use the scraper.

It is vital at this stage to make sure that the ribs are kept in their long lengths, as bending will be very difficult if they are cut to the individual pieces at this stage.

Measurement can be problematical without the correct tools, but inexpensive vernier callipers will suffice. These are available at most good tool shops. The best tool of all is a dial gauge calliper, which gives useful spot measurements. These give readings in increments of 0.1mm, and they allow very accurate work indeed.

If neither of these is available, then a pair of outside callipers set with feeler gauges would probably work, though it would be somewhat cumbersome.

Next month, we will be undertaking the bending of the ribs — so at long last you will have something that begins to look like a violin! •