Practical Woodworking

Complete guide to Simple furniture

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September/November 2013

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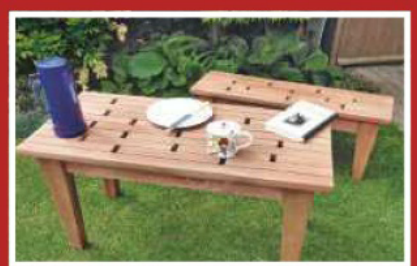

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WELCOME

Just what do we understand by the word 'simple'? To me it means not only easy in the sense of making something without difficulty, but, perhaps more importantly, it refers to ease on the eye. So when we were considering projects for this issue we had in mind two aspects: the making and the design, and the two of course do not necessarily go together. While some pieces may be easy to build and undemanding but pleasing to look at, others,like our complex dresser and desk, will require much thought and consideration. But it will simply all be worth it because the furniture will always please thanks to unjarring, clever and, dare I say it? simple design.

So why are we theming this issue as Simple Furniture Projects? Because, for all the reasons stated above, simple is best, and we wanted to save the best until last. For, very sadly, after 47 years, this is to be the last issue of Practical Woodworking.

Your much-loved magazine was born in March 1966 as a monthly and of course was in simple black and white then, but the exploded drawings were very clear even if the typography was a trifle idiosyncratic. By the 1970s covers were in colour and during the '80s more colour was seen inside the country's 'Most Popular Woodworking Magazine', which covered all aspects of home woodworking to the delight of its readers.

Today's woodworkers are well served by Practical's stablemates The Woodworker and Good Woodworking, and in signing off for the last time I hope that you will join me in wishing the craft all good fortune.

Andrea Hargreaves

Practical Woodworking

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Office & elsewhere

There is no reason why office furniture should be dull and utilitarian. With good design it can be both functional and attractive, and look good either in a dedicated room or as part of your living room. We feature a curvy desk by Duncan Rose, a set of bookcases by Alan Willey and, for first-stage filing, a letter rack by Phil Davy

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Curvy desk job

Duncan Rose's desk, with its sculptured legs, is almost too handsome to be hidden away in an office

I've been keen to make some shapely furniture for a long time. This pedestal desk was commissioned for a 'grand design' modern home. The wish list was for the desk to be used as a home office filing system, with 'his' and 'hers' pedestals to accommodate hanging files. The desk was to be made in ash with a minimum of intricate moulding to complement the set of bookshelves in the same room.

First thoughts

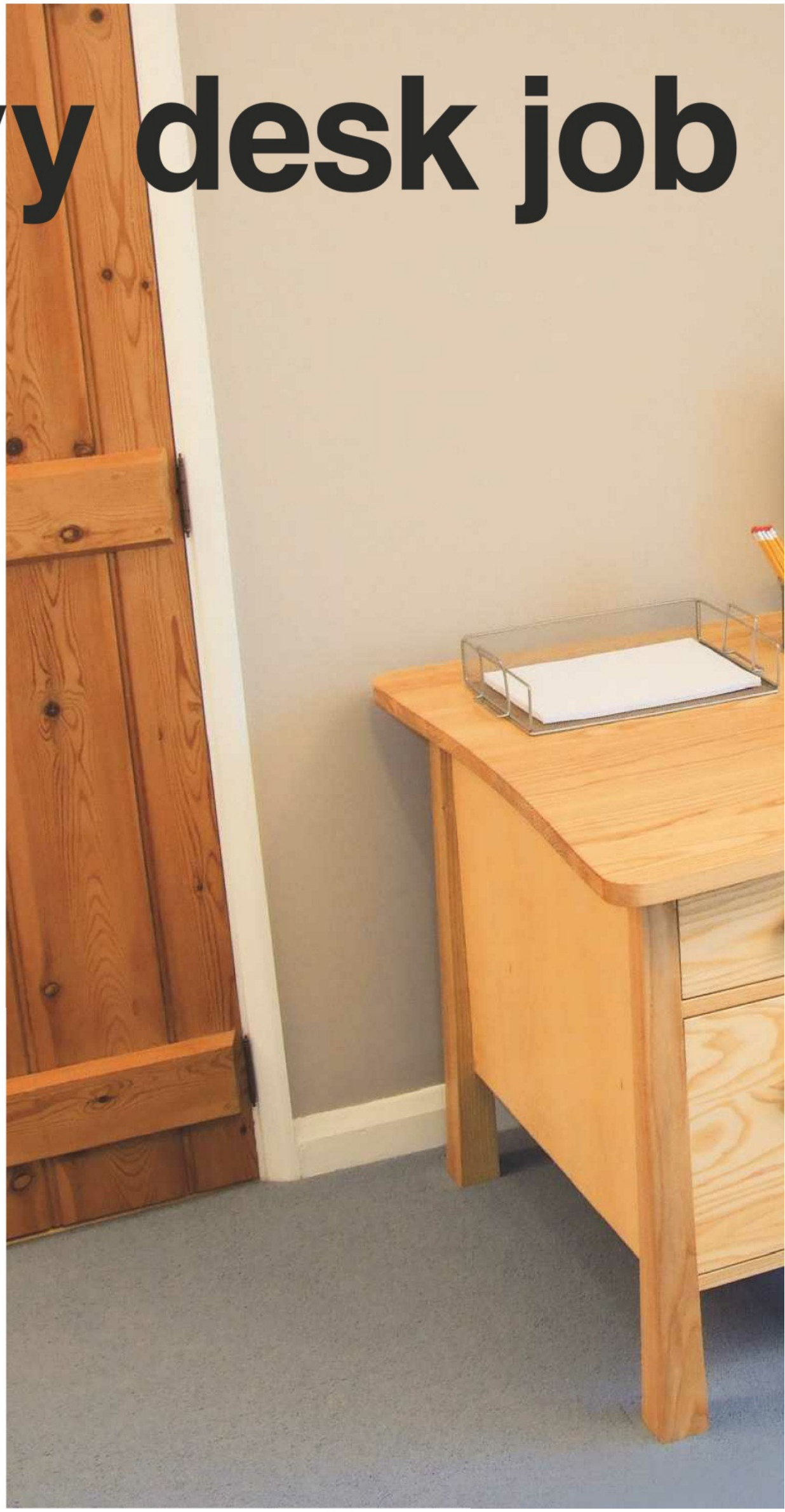
The design evolved with the help of my CAD system. Initially I drew the desk with simple pedestals and desktop shapes to get the overall size and proportions right. Next I modified the shape of the pedestal legs so they were curved along their two outer faces. Finally the desktop edge was shaped with a combination of convex and concave curves. These changes gave a more pleasing appearance, and were enhanced by adding ellipse-shaped drawer handles. The customer loved the design, so it was time to start work.

Adding the details

The construction is simple because the desk is just a pair of pedestals bridged by the desktop (see **fig 1** overleaf), so it's easy to dismantle and to move. Solid ash is used throughout the construction, except for the pedestal and drawer base panels, which are made from ash-veneered plywood. The drawers have inset fronts.

To support the weight of filing drawers full of documents, I chose high-quality metal runners. These give a soft-close action and also allow the drawers to be pulled out fully, even when they are loaded to capacity.

This design could of course be altered



1 Stack the raw timber using stick spacers and allow it to acclimatise for two weeks

2 Cut out the eight leg blanks, then rip them to width on the bandsaw

3 Plane each blank flat, square an edge, thickness it and cut it to length

4 Use the bow and string method to mark the arc on the MDF template

5 Cut the template shape on the bandsaw, working close to the pencil mark

6 Sand the edge of the template by hand until it's smooth to the touch

to make the desk without the curves, and the number of drawers within the pedestal could be changed. The overall dimensions of the desk could be varied as well. The final design choices are yours.

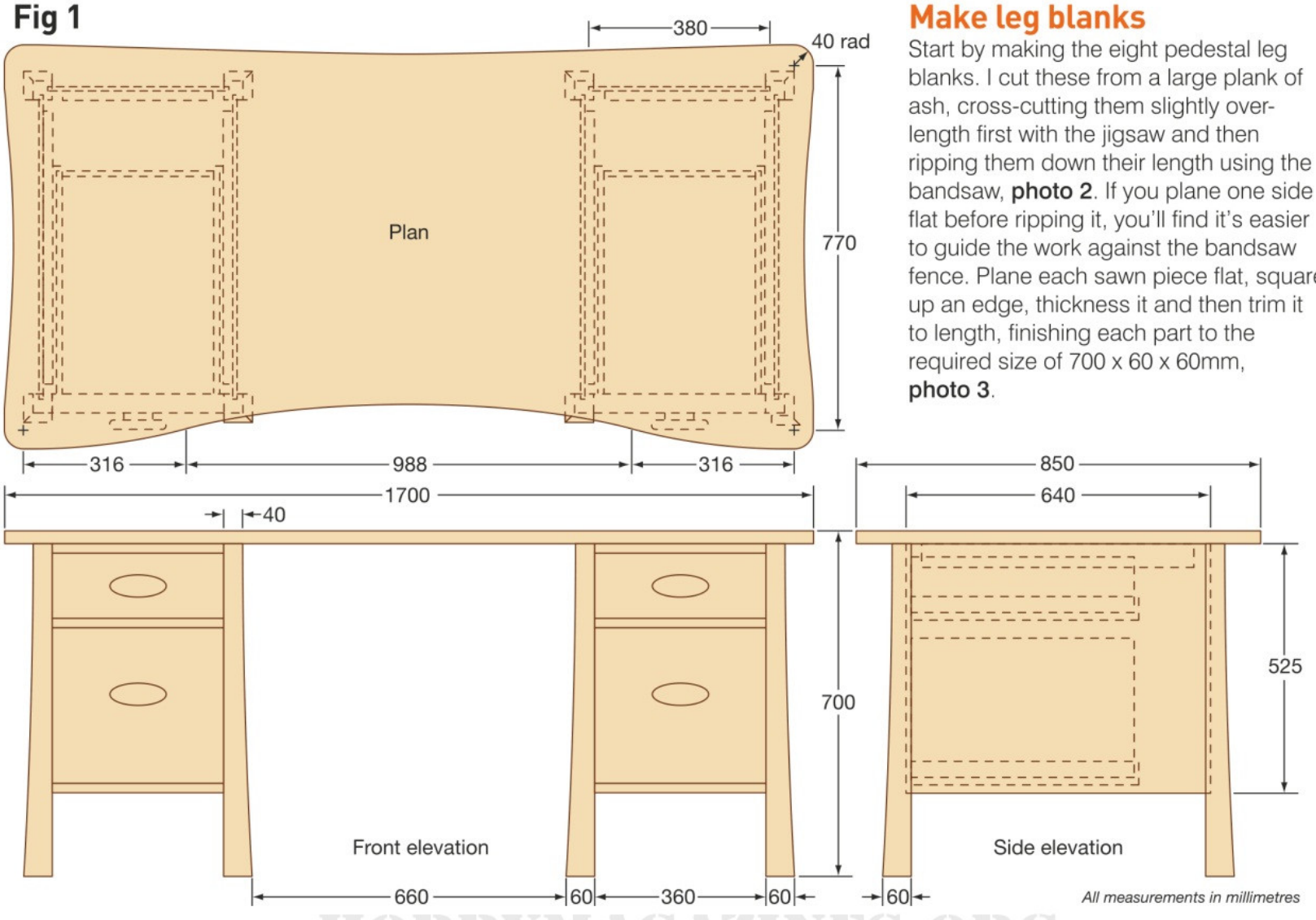
Stick and stack

I bought all the timber well in advance of starting work on the desk and stored it in my workshop, stacked flat using sticks between the planks to allow air flow around the wood, **photo 1**. Leaving the wood stacked for two weeks allows time for the timber moisture content to acclimatise to that of the workshop. This helps reduce any unwanted timber movement both during and after construction.

Make leg blanks

Start by making the eight pedestal leg blanks. I cut these from a large plank of ash, cross-cutting them slightly over-length first with the jigsaw and then ripping them down their length using the bandsaw, **photo 2**. If you plane one side flat before ripping it, you'll find it's easier to guide the work against the bandsaw fence. Plane each sawn piece flat, square up an edge, thickness it and then trim it to length, finishing each part to the required size of 700 x 60 x 60mm, **photo 3**.

Fig 1



7 Use the template to cut each jig side in turn on the router table

8 Screw the jig sides to the base. Note that the template is 50mm longer than the sides

9 Screw small wooden blocks to the base of the jig to locate the leg ready for routing

10 To save router time and cutter wear, rough-cut each leg to shape first

11 Cramp the rough-cut leg in the jig and secure it with two screws

12 Shape each leg by making a series of shallow cuts with the router

Shaping the legs

I intended to shape the legs using a template and a bearing-guided straight cutter in the router table. However, I've found that hardwood routed with a wide cut has a tendency to snatch dangerously. Of course there are ways to prevent this, but I really wanted to avoid the whole scenario.

Instead I made a simple but effective jig that avoided the danger of snatch and gave excellent duplication of the work. The jig consists of two sides and a base. The sides are shaped with the exact leg profile. A simple carriage fitted with a hand router rests on top of the sides. With a leg blank secured to the jig base, the carriage is slid along the sides as the overhead router cuts the leg to shape. Making the jig longer than the legs gives cutter lead-in and lead-out.

Making the template

Before making the jig, make a template of the leg profile. Extend the profile to allow for the lead-in and lead-out. I made the template from a 1m long offcut of 9mm MDF.

The inner faces of the legs are vertical and the outer edges are curved, giving a greater cross-section at the foot of the leg compared to the top. This leg profile is a half-arc shape, 700mm long and 20mm high. The profile corresponds mathematically to a full arc with an overall length 1400mm and a height of 20mm.

There are several methods for drawing arcs and I adopted the bow-and-string method by simply tensioning a slim length of ash, like an archery longbow, to give an arc 1400mm wide with a centre height of 20mm. Hold the bow in position and mark the arc on the template, **photo 4**. Cut the template close to the mark on the bandsaw, **photo 5**, and then sand the curved edge until it's smooth to the touch, **photo 6**.

ASH DESK CUTTING LIST 1

All dimensions are in millimetres

Part	Qty	L	W	T
Leg	8	700	60	60
Rail	6	360	40	20
Back panel (plywood)	2	525	380	9
Side panel (plywood)	4	525	640	9

You will also need four pairs of drawer runners with locking clips (Blum 560H5000B and T51.1700.04), and some offcuts of 18mm plywood to make drawer runner spacers and strengthening battens. I used some 9 and 18mm MDF offcuts to make the jig for shaping the legs

Making the jig

Now you can make up the jig. I made the sides and base using 18mm-thick MDF. An overall length of 950mm allows for 125mm lead-in and lead-out for the router. Make sure that the jig sides are made tall enough for the carriage to clear the fresh leg blanks when you start cutting.

Mark the shape of the leg template on the two MDF sides and rough-cut the sides close to the mark. Then screw the template to each side of the jig in turn and cut it to its final profile using a bearing-guided straight cutter in the router table, **photo 7**. Note that the template is 50mm longer than the sides, so there is a good lead-in and out for the bearing-guided cutter. Finally, screw the jig sides to the jig base, **photo 8**.

Securing the leg

Place a leg blank in position on the base of the jig and fit wooden blocks to locate it, **photo 9**. This ensures that the eight legs are all positioned identically in the jig.

Drill a pair of holes through the jig base, so two screws can be used to hold the leg tight in the jig while it's being shaped. The screw holes in the legs will be lost later if they're positioned where the side or rear panels fit.

Make the carriage from a piece of plywood with a central aperture for the

13 Prepare all the mortises in the legs, ready to take floating tenons

14 Cut the grooves to take the panels in the legs with a suitable cutter on the router table

15 Glue and cramp up each pedestal front by assembling two legs and three rails

16 Assemble two rear legs and a back panel, then add in the two side panels

17 Cut, drill and fit plywood side spacers as shown to carry the drawer runners

cutter, and mount the router overhead. Attach a strip of wood to each end, so the router can move from side to side over the width of the leg width but is physically stopped before it can touch the jig sides.

Shaping the legs

Now you can cut the leg curves using the jig. I rough-cut them on the bandsaw first, **photo 10**, to speed up the process and reduce wear on the router cutter. Use the leg template to mark the blanks with the arc profile, then cut them with the bandsaw or jigsaw,. Locate the rough-cut leg in the jig with a cramp and secure it from underneath with two screws, **photo 11**.

Shape each blank by making progressive passes with the router, **photo 12**. Avoid scorching the legs by keeping the router moving, by using a moderate cutter speed and by taking cuts of a millimetre or less. I used a type of cutter called a surface trimmer and the results were very good, requiring just a little follow-up sanding.

I found it easiest to mark out the leg, rough-cut it and machine one face at a time, before repeating the operation for the second face. I then repeated the whole process to shape the remaining three legs.

Preparing the leg joints

Next, cut the pedestal rail and panel joints. Each pair of front legs is connected by three rails. Mark the rail positions on the legs, with the rear faces of the legs and rails sitting flush. Cut the

18 Add a strengthening batten to the inner face of each side panel, aligned with its top edge

19 Position the drawer runners accurately and mark their fixing holes

rail joints but don't glue them up yet. I planned to use floating tenons, so I cut the mortises using a proprietary handheld cutter, **photo 13**.

Alternatively, the top rails could be jointed to the legs using a dovetail and screw, and the lower rails could be mortised and tenoned.

20 Screw the runners in place and the two pedestals are completed

Cutting the panel grooves

The pedestal side and back panels are jointed to the legs in grooves. The front legs each require a single groove and back legs a pair, cut on adjacent faces.

Cut the panels to size first. If you're careful with your marking out, all the pedestal panels and the drawer bases can be cut from a single 2440 x 1220mm sheet of ash-veneered plywood.

Mark and cut the grooves in the legs to match the panel height and thickness (525mm and 9mm). The grooves are all inset by 18mm from the inner edge of the leg, and are cut 10mm deep to ensure a strong joint. I cut the grooves using a 4mm-wide grooving cutter mounted in the router table, adjusting the cutter height to give the required 9mm groove width, **photo 14**. Chisel the stopped ends square.

Gluing up the pedestals

Dry-assemble each pedestal and check the fit of the panels and rails within the pedestal legs. Then glue them up. I did this in two stages, starting with two front legs and three rails, **photo 15**, and then two back legs and a back panel. Once they had dried, I glued the two side panels into place to complete the first pedestal assembly, **photo 16**. Check for squareness at each stage, and cramp the assembly until dry, then remove any dry squeezed-out glue with a sharp chisel.

Repeat the process to assemble the second pedestal.

Adding support battens

Now it's time to fit the drawer runners to the pedestals. I used Blum Tandem Plus Blumotion runners (part 560H5000B). These give the drawers a full-extension opening of 500mm, a load capacity of 30kg and a soft-closing action – ideal for filing drawers.

The runners are screwed to the pedestal side panels. Because these panels are inset from the face of the legs by 18mm, you'll need to make some spacers to fill this gap. I used offcuts of 18mm birch plywood, fixed in place with glue and screws, **photo 17**.

This is also a convenient time to fit the battens that will allow the desktop to be attached to the sides of the pedestals. These battens provide sufficient material for the depth of the desktop bracket fixing screws. I cut them from 18mm birch plywood, then screwed and glued them in position to the top edges of the pedestal sides, **photo 18**.

The battens for the runners and top fixings also help to stiffen up the relatively thin pedestal panels.

Fitting the runners

Position the runners with their front ends resting on the drawer rail. You need to inset each runner by the thickness of the drawer front plus an extra millimetre – a total of 21mm. This insets the drawer front slightly to improve the desk's finished appearance.

It's essential to check that the runners are both truly horizontal and parallel to each other. Using a length of scrap helps to support the rear end of the runner while you do the marking up, **photo 19**. Cut the scrap piece to the same length as the rail height. Fitting the upper runners first prevents drill swarf from falling into the lower runners. Then screw the runners to the spacers. You now have two complete pedestals, **photo 20**.

The drawers

I made the drawers in ash as a simple box with an ash-veneered plywood base. Each one has through dovetail joints concealed by a separate laid-on drawer front.

Each pedestal contains a deep drawer designed to hold hanging files. To support the weight of a load of paper documents, you need top-quality metal runners, thus my choice of the Blum's Tandem Plus Blumotion runners. These give each drawer a full-extension opening of 500mm (essential for easy access to the files), a load capacity of 30kg, and a soft-closing action that works even when the drawers are fully loaded. The dimensions given in the cutting list are tailored to this brand of runners.

Making the box panels

Start by making up the panels for the drawer boxes, which are finished to a thickness of 11mm, **photo 21**. The larger panels are made from several pieces of ash, rub-jointed using PVA glue and cramped tight until dry using four-way panel cramps and cauls, **photo 22**.

Dimension the panels to size. The runner manufacturer's technical data (available on their website or from your supplier) will give you the lengths and widths required. Note that the box sides are 21mm wider than the ends.

Cutting the dovetails

You can now mark out and cut the through dovetail joints on the drawer panels. To speed up the job, I cut them all using a dovetail jig. Mine has adjustable fingers which allow the spacing between the tails and pins to be varied as you wish, **photo 23**.

Set up the jig and make some test cuts on pieces of scrap wood until the resulting joint is a snug fit. As the pin and tail cuts require separate straight and dovetail cutters, a pair of routers is invaluable for maintaining the set-up and avoiding cutter changes. I also like to set the pin and tail ends to protrude slightly when the joint is assembled. This means I can then plane the corners flush to leave a neat and tidy finish.

Cut the tails on the side panels first, followed by the pins on the end panels, **photo 24**. Dry-assemble the joints to check their fit. If they're too tight, try cutting the pins a little narrower by making a small adjustment to the jig.

Forming grooves

Before gluing up the drawer boxes, cut slots in the sides of the filing drawers to take the metal rails that will support the file hangers. Positioning the slots 390mm apart suited the span of my foolscap-sized file hangers. Size the slots to suit the rail material you're using; mine was thin aluminium bar with a 12 x 3mm cross-section. It's a good idea to cut these slots about 25mm long so the tops of the hanging files will be below the top edges of the drawer sides. To cut the slots I used a hand router fitted with a 3.3mm diameter straight cutter and a simple grooving jig, **photo 25**.

At this stage you should also cut the 9mm-wide grooves in the drawer sides to accept their base panels. The position is easily marked on the sides when the box is dry-assembled, **photo 26**. I cut the grooves 5mm deep using a grooving cutter in the table router, adjusting the height to give the required 9mm width.

Finishing the boxes

It's now time to glue up the drawer boxes and fit their bases. Apply glue on all the contacting pin and tail surfaces. I recommend sticking low-tack masking tape along the inside of each joint first, **photo 27**; this makes it easy to clean up any squeezed-out glue later. Assemble the boxes and hold the joints tight. I usually cramp right-angled corner webs inside the assembly to hold it square, **photo 28**. Remove any squeezed-out glue on the outer faces with a damp sponge.

Adding the bases

Next, cut the four plywood drawer bases to size and sand them smooth. Before gluing them in position, sand the inner faces of the drawer boxes; this is easier to do before the base is fitted. Glue the bases in position and remove excess glue. Then add screws along the front and rear edges, **photo 29**. When everything's dry, use a hand plane to flush off the protruding pins and tails at the corners, **photo 30**.

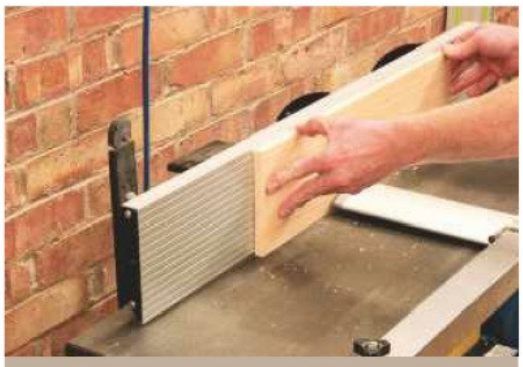
Fitting the hardware

Each drawer is held to the runners by using a pair of Blum locking clips, and the rear of the drawer is also held by a pair of metal locating pins on the runners. The clips allow quick removal of the drawer and also permit fine-height adjustment at each side.

Mark and drill stopped holes in the drawer backs to correspond with the position of the runner locating pins. A simple alignment tool from Blum positions the drill bit precisely, **photo 31**. It also locates the pilot holes for fitting the locking clips to the underside of each drawer. Screw the clips in place using roundhead screws, **photo 32**.

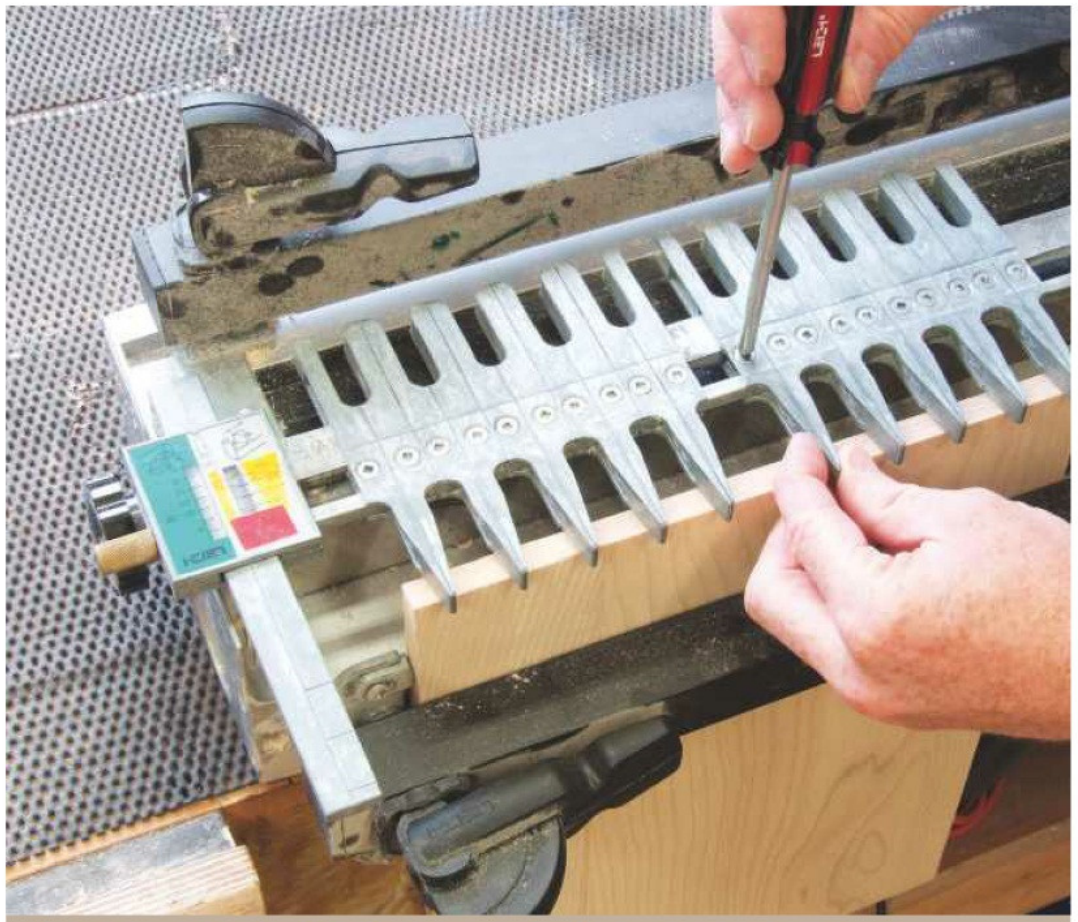
Laying on the fronts

Drill the clearance holes in the front end



21 Make up the drawer box panels to the sizes in the cutting list

22 Assemble the larger panels by rub-jointing and cramping narrow boards



23 An adjustable dovetail jig allows you to choose the joint spacings

24 Cut the side panel tails first, followed by the end panel pins

25 Rout two slots in the top of each filing drawer sideto take the hanger rails

26 Dry-assemble each box to test its fit, then mark the base position

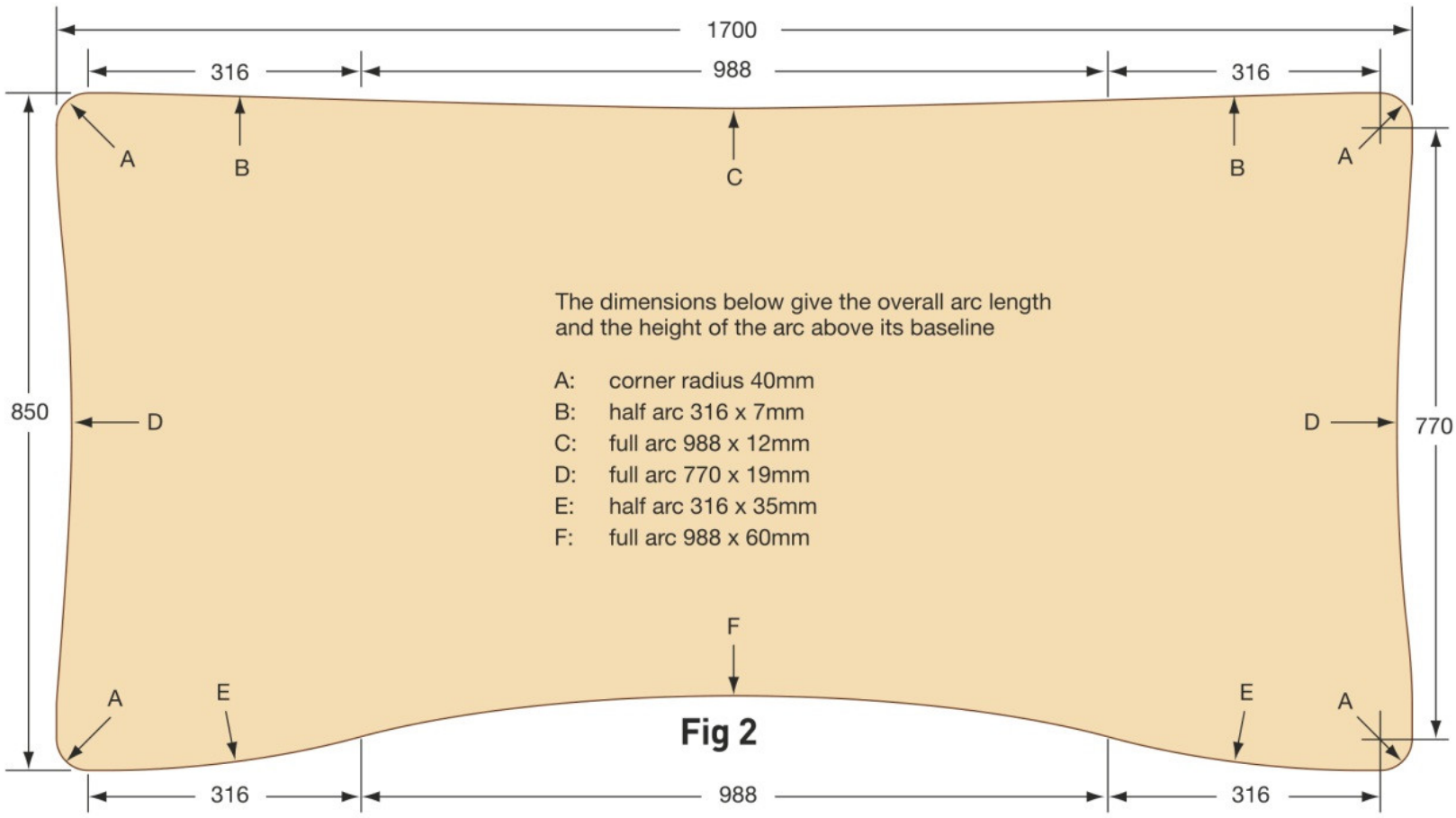
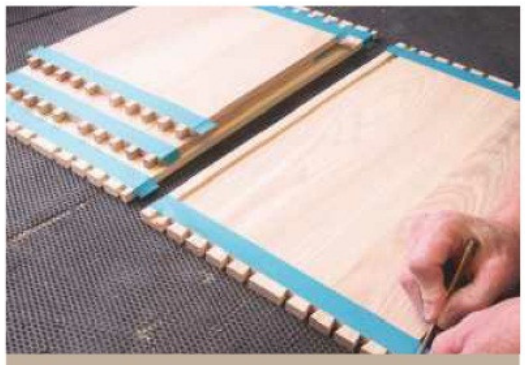


Fig 2



27 Low-tack masking tape allows easier clean-up of excess glue from the internal corners after assembly

28 Tape and right-angled corner webs help to hold the assembly square

29 Glue each drawer base in place and screw the front and rear edges

ASH DESK CUTTING LIST 2

All dimensions are in millimetres

Part	Qty	L	W	T
Desktop	1	1700	850	27
Upper drawer side	4	490	111	11
Upper drawer end	4	340	90	11
Upper drawer front	2	360	137	20
Lower drawer side	4	490	287	11
Lower drawer end	4	340	266	11
Lower drawer front	2	360	327	20
Drawer base panel (veneered ply)	4	490	326	9
File hangers (aluminium bar)	4	324	12	3

You will also need four pairs of drawer runners with locking clip (Blum 560H5000B and T51 .1700.04), and some ash offcuts to make the drawer handles

of each drawer box so you can attach the drawer fronts, **photo 33**, and countersink them on the inside. Then prepare the drawer fronts, dimensioning them so they will just fit within the pedestal apertures. I made the fronts for the filing drawers from several pieces of ash, rub-jointed and cramped together and left to dry.

Now you can screw the drawer fronts to their boxes. To do this, fit each box in turn on its runners, locate its front within its aperture and drive in the screws from inside the drawer, **photo 34**. Then mark each front to give an equal clearance gap all round before removing it again and making the final trim cuts.

Making a handle template

The elliptical ash handles are a simple two-piece construction, with a main front piece and a smaller rear spacer. The front piece is 20mm thick, 120mm long and 48mm wide. The matching spacer is 12mm thick, 60mm long and 26mm wide.

To ensure that the handles were all

30 Use a sharp hand plane to trim the protruding pins and tails flush

31 Drill stopped holes in the drawer backs for the runner locating pins

33 Drill four screw clearance holes in the front end of each drawer box

32 Screw the runner locking clips to the front edge of each drawer base

34 With the drawer fitted, locate the drawer front in its aperture and drive screws into it from inside

35 Cut an MDF template for the oval handle shape using the scroll saw

exactly the same size and shape, I made templates for the front and spacer pieces from MDF offcuts. I then drew out the ellipse shapes on paper and taped a copy to the MDF before cutting through both layers on the scrollsaw, **photo 35**.

Making the handles

Use the templates to mark out and cut all eight pieces of ash. Then sand the cut edges smooth, **photo 36**, and round over both edges of the four front pieces. I used a small router table fitted with a 6mm radius roundover bit to do this, **photo 37**. Finally, sand the handles until they're smooth as silk to the touch.

Glue a spacer to the back of each front piece, **photo 38**. Then use the spacer template to mark the fixing screw positions on the handles and the drawer fronts. Drill clearance and pilot holes and screw the handles to the drawer fronts.

Back to the top

I made the desktop from rub-jointed planks of ash and then shaped it using a template and a hand-held router. Start by preparing the boards, finishing each one to a thickness of 27mm. Then arrange them to get the best appearance. I also try to have the growth rings facing opposite ways in adjacent boards. Check that the joint edges fit together tight and square, and that the boards lie as flat as possible.

When you're happy with the layout, apply glue to the edges, rub them together and cramp them as before, **photo 39**. You can if you like use floating tenons or biscuits to maintain the edge alignment during assembly, but do position them well clear of the board ends.

When the glue is dry, flatten all the joints with a sharp plane, **photo 40**. Plane the underside too, as much of its surface will be within reach when the desk is finished.

Making desktop template

Make an exact template of the worktop shape; I used a sheet of 9mm-thick MDF that's easy to mark, cut and sand smooth. The shape may appear complex, but it's straightforward to draw on the template if you build up the arcs one by one; all the information you need is given in **fig 2** .

Start by marking the four rounded corners (arc A); then mark the extents of the various arc spans and their heights. Next, tension a bow with spreaders to the dimensions of each arc in turn, hold the bow on the template and mark the shape of the arc, **photo 41**.Cut the template out, sawing fractionally on the waste side of the marked outline, and sand the edge to remove all cut marks.

Shaping the desktop

Attach the template to the underside of the desktop with two screws, located within the position of the pedestals so the holes will be hidden when the desk is finished.

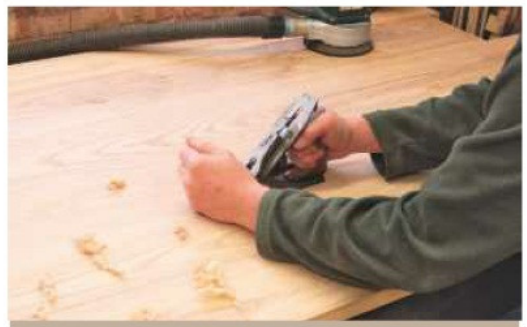
Draw around the perimeter of the template. I used a thin spacer to make

36 Cut four handles and four spacers and sand their edges smooth

37 Round over both edges of the four handles on the router table

38 Glue a spacer to each handle, taking care to centre it accurately

39 Glue up and cramp the boards you've selected to form the desktop



40 When the glue has dried, flatten all the joints with a sharp plane

41 Mark the different arc shapes on the desktop template with a string bow

the resulting outline slightly oversize, **photo 42**. Unscrew the template and cut the desktop roughly to shape, **photo 43**, following the oversized line. I used a jigsaw.

Reattach the template and trim the desktop to its exact shape using the router, fitted with a bearing-guided straight cutter that will follow the template edge, **photo 44**. My straight cutter wasn't quite long enough, so I made a second pass with the cutter plunged a little further. Avoid timber scorching by using a sharp cutter at a reduced speed and keeping the router moving forward as you work. Sand the routed edge until it's smooth to the touch.

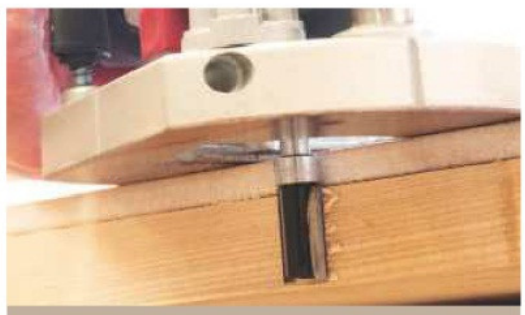
Assembling the desk

You can now attach the desktop to the pedestals using metal shrinkage brackets. The bracket slots allow any movement in the top due to shrinkage and expansion.

Place the desktop face down and carefully position the pedestals on it. The

42 Draw around the template with a slim spacer to mark up the desktop

43 Cut the desktop roughly to shape, following the oversize marked line



44 Reattach the template and trim the desktop precisely to size with a straight router cutter

45 Place the desktop face down and carefully align the two pedestals on it

tops of the inner pedestal legs are 700mm apart, and the inner front legs are inset by 19mm from the front edge of the desktop. A straightedge placed across the pedestal fronts, plus a pair of spacer sticks between them, greatly simplifies the alignment process, **photo 45**.

Position the metal brackets inside the pedestals, then mark and drill pilot holes for the fixing screws. Fit the brackets in place using round-head screws, **photo 26**, then loosen them very slightly so the desktop is secure but free to move if it wants to.

46 Fix the two pedestals to the desktop using metal shrinkage brackets

47 Cut the aluminium hanger rails to length with a fine-toothed saw and file their ends smooth

Odds and ends

You can fit a modesty panel if the desk is going to be sited away from the wall. This can be made from a piece of veneered plywood, screwed to the inside face of the inner pair of rear pedestal legs.

Stick a self-adhesive felt pad to the bottom of each leg if the desk will stand on a wood or other smooth floor.

Measure the span between the drawer grooves for the file hangers and cut the aluminium bar to length with a hacksaw, **photo 47**. File the ends smooth.

Unscrew the desktop and remove the drawers. Sand all the components, including their edges, to remove any unwanted saw and pencil marks. Then wipe over everything with a tack cloth to remove the dust.

48 Apply hardwax oil and then liquid wax to the various components

Finishing touches

At last it's time to choose and apply your favourite finish to the desk. I used a couple of coats of hardwax oil applied with a foam brush, **photo 48**. A screw in the base of each pedestal leg will lift it clear of the bench and make the job easier. Sand gently between coats to remove any nibs. When the oil was dry, I applied liquid wax using a fine-grade nylon sanding pad to leave a smooth surface with a soft sheen.

Finally, reassemble the desk as you did earlier, fit the drawers on their runners and correct their alignment if necessary using the adjusters.

Then stand back and admire a job well done.

Modular design

Alan Willey's three different oak storage units are not only stylish but very practical too, and will function well in any area of the house

Recently, I received a commission for three free-standing oak units that not only had to match each other and some existing furniture, but also came with some very specific requirements. The first unit needed shelves to store CDs, while the second was for the hallway, where it would not only be used for the usual shoes and keys but also to house a charger for a golf trolley battery(!). The third unit, meanwhile, was to be a bookcase for whose shelf spacing I was given particular dimensions.

Robustly styled...

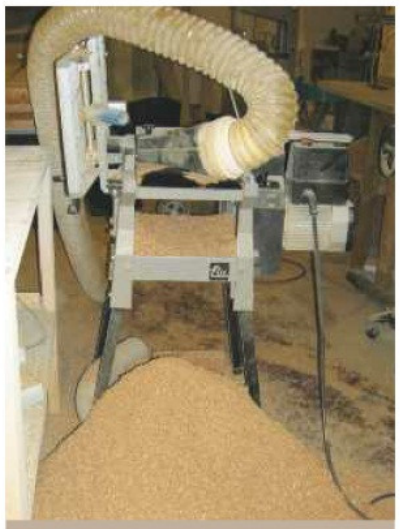
Looking at the drawings overleaf you can see that the carcase construction of all three units is essentially the same, employing a robust, frame-and-panel approach in which the legs – made up from 3in- and 4in-wide oak boards edge-jointed into L-shapes to create the appearance of solidity – house the 6mm oak-veneered MDF panels that form the sides and backs. I prefer to use MDF for sections like these because its stability helps to minimise the potential for movement when furniture is moved from the workshop into what, these days, is often a centrally heated environment.

Rebates at the tops of the legs, meanwhile, house simple frames made from 2 x ¾in oak lap-jointed at each corner, and to which the units' tops are attached. The tops themselves reflect the robustness of the carcases, being made up from three edge-jointed boards finished with breadboard ends, which not only serve to hide the boards' end-grain, but will also help to keep the top flat by resisting any tendency for the jointed boards to warp (see also Breadboard basics, page 23).

...but flexible, too

Their common carcase construction meant that the units satisfied the 'matching' part of the brief, yet allowed each piece to be adapted to suit its

1 Six of these kiln-dried oak boards were used



2 They took quite a lot of processing and generated a small mountain of sawdust...

3 ...but the resulting components were reduced to almost their final dimensions

particular purpose: the CD cupboard, for example, was to be fitted with two glazed doors, while the shelves – though all housed in ¾in housings routed across the inside of the legs – would be made with regard to the different loads that they'd need to carry along their different lengths. The shelves for the CD unit and the hall unit used oak-veneered 18mm MDF with a decorative lipping of solid oak, while the heavier-duty shelves for the bookcase were made in solid oak.

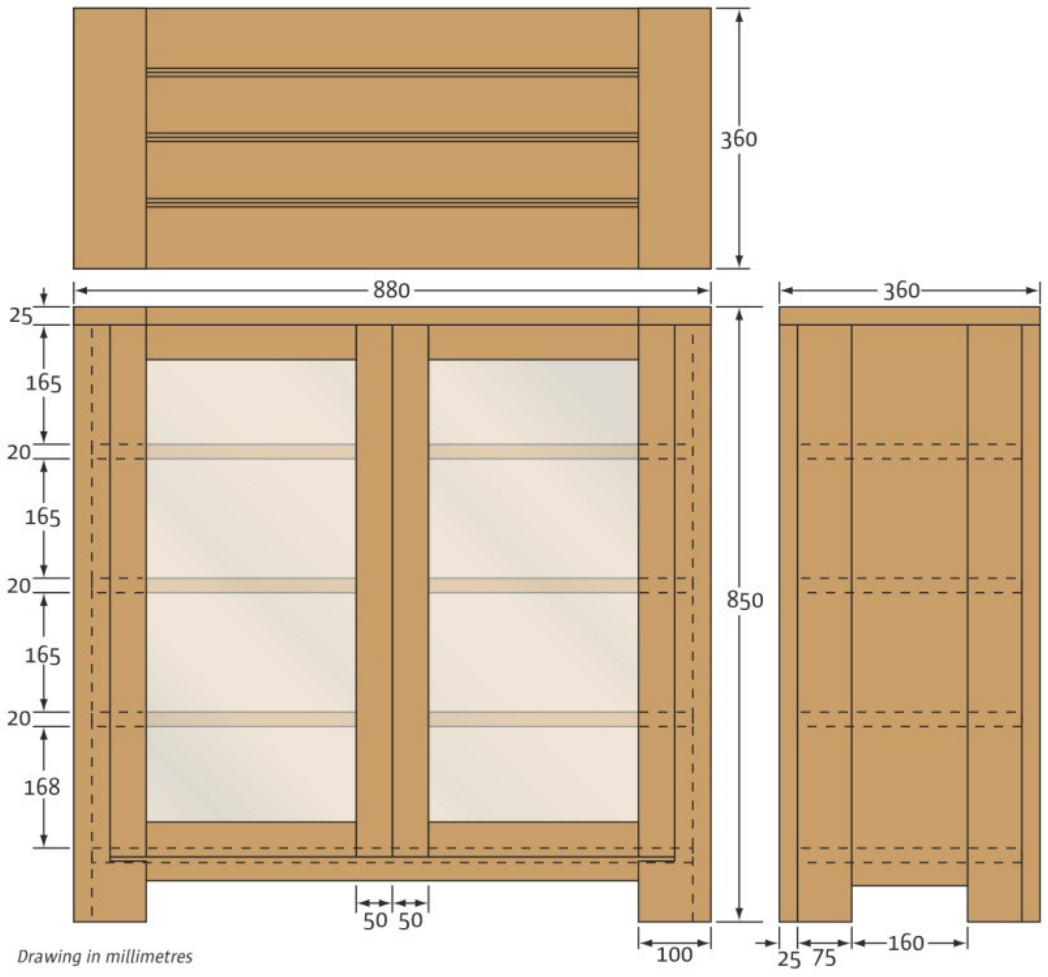
Once these designs had been given the nod by the customer, it was off to my local timber merchant to select the wood for the job – six large boards of kiln-dried oak, **photo 1,** amounting to about five cubic feet in all. After sorting the timber with an eye to show faces and choosing pieces for the legs in particular, the boards were radically machined as you can see from the sawdust generated, **photo 2**, and reduced to components that were close to their final dimensions, **photo 3**.

Modular construction

The modular nature of my designs allowed me to save a good deal of setting-up time by preparing batches of parts that required the same processes – routing the housings in the legs, for example, **photo 4**, or preparing the timber for the tops (see Making the top, right). However, to avoid any confusion between their parts, I built one unit at a

4 The modular design means you can save time by machining batches of parts like these shelf housings in the legs

5 The legs were glued up using biscuit joints to reinforce the long edge joints



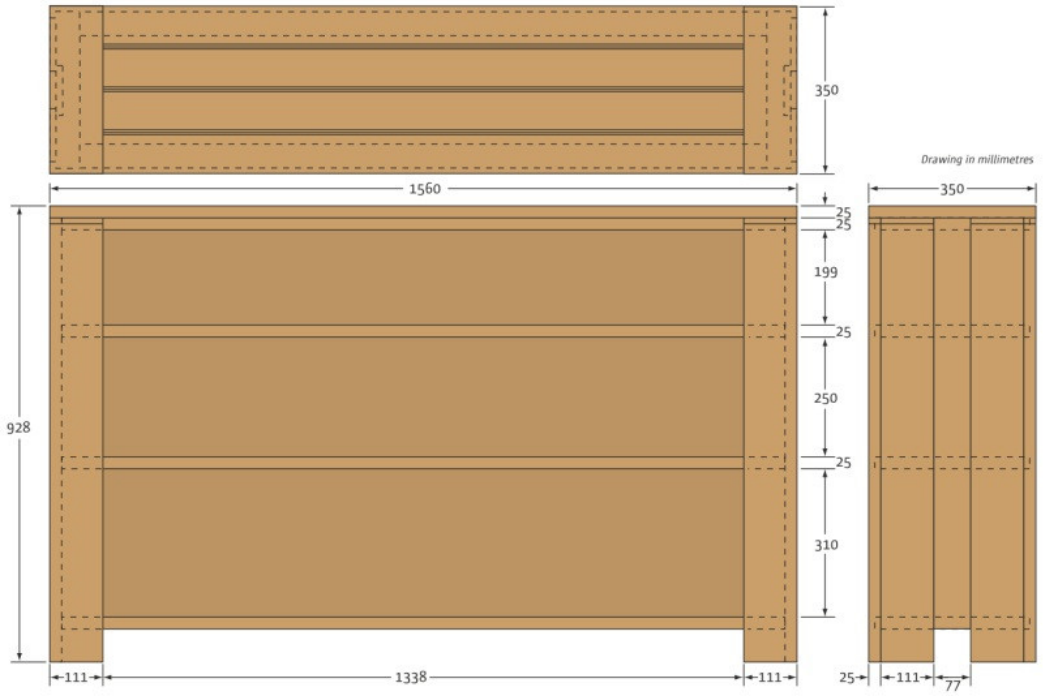
Drawing in millimetres

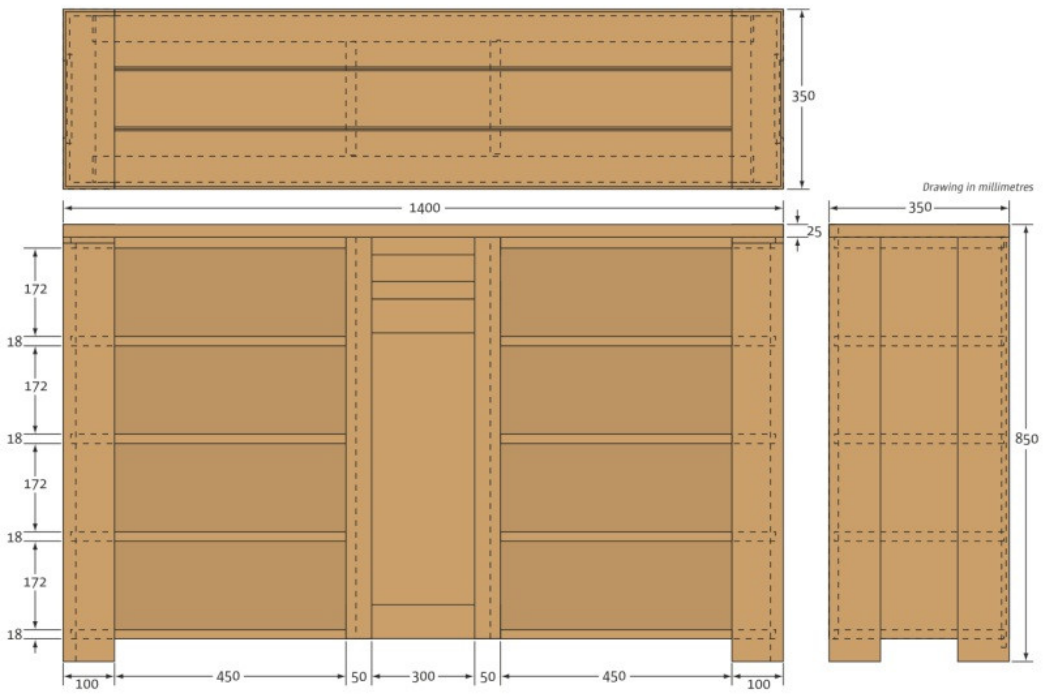
Breadboard basics

As Alan says, the breadboard ends on his units' tops will help to counter any tendency for their ¾in-thick boards to cup – something that's especially useful if your tabletop doesn't have a reinforcing sub-frame like the ones to which the tops in Alan's units are attached.

While breadboard ends can be attached using elaborate and decorative sliding dovetails, Alan has opted for a simple tongue-and-groove joint that's held in place with screws run through slotted holes to allow for movement.

If you use the same method, it's handy to know the following rule of thumb: the thickness of the tongue between the top and the breadboard should be one third that of the tabletop, while the tongue's length should be equal to the thickness of the top.





time, starting with the CD unit.

The outer stiles of the two glazed doors were made by cutting two strips from the fronts of the legs, my thinking being that this would maintain some continuity of the grain from the leg into the doors. The rails and closing stiles were cut from fresh timber – leaving extra width in the stiles to allow them to be overlapped when fitted – and all the door components were then rebated on their insides faces for the glass, and assembled using mortise and tenon joints.

After gluing up the legs, **photo 5**, using biscuits to reinforce their long edge joints, I set about making the side panels, first cutting them roughly to size from a sheet of 6mm veneered MDF with a circular saw, and then running them through the table saw to reduce them to their final dimensions.

To bring all these parts together, I placed both of the cupboard's front legs face down on the table and glued the shelves into their housings before fitting the rear legs onto the shelves. The 6mm side panels were then slipped into their grooves – which stop 2in short of the bottom of the legs – and the whole lot was cramped up. Though the fit of the shelves in their housings help to hold the assembled carcase square, it's always a good idea to double check that everything is true while there's still time to correct any errors.

Once dry, the carcase was stood on the workshop floor so that I could lay the top frame in position and mark out where its corners needed to be trimmed to fit within rebates in the top of the legs. After removing the waste, the frame was glued into position and made doubly secure using screws. The rear panel was then dropped into place between the rear legs, where routed slots made it unnecessary to use glue.

Successful edge-jointing

The success of a long edge joint like the ones Alan has used in his units' tops depends upon the mating faces being perfectly planed at right-angles to the surface. Counsel of perfection further suggests that working a slight hollow – the depth of a light plane shaving or two, no more – across the edges' thickness and along their length will mean that when the boards are glued-up and brought together with clamps, the ends and edges will be in compression, which helps to counter their tendency to shrink and for the joints to open up.

6 When it comes to edge-jointing, alternating the growth rings reduces the effect of any cupping

Making the top...

For the top, I ripped lengths of 1in-thick oak down to 4in widths and sawed them to length, allowing 8in for the width of

the breadboard ends. When it comes to edge-jointing pieces like these, I favour alternating the growth rings to reduce the effect of any cupping, though other makers prefer to arrange the timber for best appearance; the choice is yours (see also Successful edge-jointing, page 23).

After cutting a small chamfer on their long, upper edges, the boards were glued and biscuited together. Once dry, I routed a 6mm slot in the ends of the top; corresponding slots were machined along one edge of each breadboard, into which I glued tenons made of 6mm ply. Fitting the breadboard ends – whose outside edges were also chamfered – was then a simple matter of fitting the tenons into the slots in the top, and using screws fitted through slotted holes in the underside of the top to allow for any cross-grain movement. The completed top was then fitted to the carcase's top frame, again using screws running through slotted holes in the frame.

...and finishing the doors

Offering up the door frames to the carcase, I marked out and cut rebates on the closing stiles to create an overlap; a small bead routed on the front edge of the overlying door helps to offset the stiles' different widths and balance their appearance when closed.

The doors were hinged to the frame with stainless butt hinges, but as you can see from the drawings and photos, the frames weren't set flush with the rest of the carcase. Instead, the edges of the legs adjacent to the stiles were chamfered slightly in order that the doors could be set a tad back, creating a shadow line between the doors and frame; touches like this add interest to a piece and lighten what might otherwise be a heavy design. To hold the doors closed, a Bales (ball) catch from www.hawthornecrafts.com was fitted in the top of the overlying closing stile.

The finishing touch was to glaze the doors, which I did by bedding the glass on a bead of silicone mastic, and then holding it in place with beading which was tacked into place with glue so that it could be removed easily should the glass need to be replaced in future.

7 The shelves of the hall cupboard, for example, are divided by a central unit containing a drawer, and a cupboard to house shoes and the charger set-up

8 The half laps on the side pieces were cut short, thus leaving the show edge of the frame unbroken

9 The door...

10 ...and the drawer front for this cupboard were made up by once again framing 6mm veneered board with solid oak

Variations on a theme

Assembly of the other two carcases followed the same procedure as the CD cupboard, but with a few variations.

The shelves of the hall cupboard, for example, are divided by a central unit comprised of a drawer, and a cupboard to house shoes and the charger set-up. The sides of this unit were made from 18mm veneered MDF lipped with solid oak, into which I routed dados to house the main shelves. The opposite sides of the panels, meanwhile, were drilled with 5mm holes for the pegs that would support an adjustable shelf in the centre cupboard, and also routed with dados to house a drawer frame.

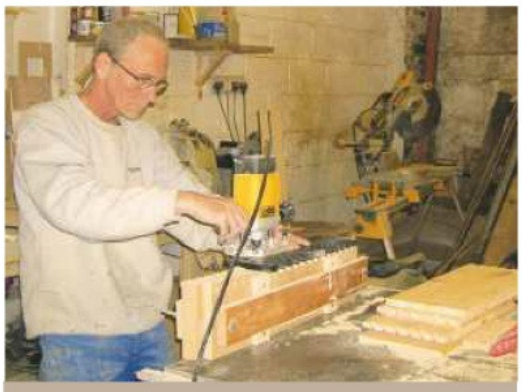
As with the top frames, this drawer frame was made using half-lap joints; to ensure that these joints didn't show, however, I cut the half laps on the side pieces short, thus leaving the show edge of the frame unbroken, as you can see in the assembly shot, **photo 8**.

The door and drawer front for this cupboard were made up by again framing 6mm veneered board with solid oak, **photos 9 & 10**. To hang the door I used Blum-style concealed hinges which required 35mm-diameter holes to be cut in the door stile – a job for which a pillar drill is ideally suited. To finish the door and drawer front, I ran around their edges with the router and a rounding-over bit to soften their profile.

To make the drawer box, I thicknessed some of the remaindered oak to ½in and, following my usual approach, joined the box's sides and front with dovetails cut with a router and jig, **photo 11**, while the back was fitted into dados cut in the sides. The 6mm ply drawer bottom, meanwhile, was housed in slots cut in the front and sides, **photo 12**. Completing the drawer was then a matter of fitting soft-close undermounted runners, and attaching the drawer front to align with the door below.

As a footnote, it's worth mentioning that, whereas the CD unit's back panel had been made from a single piece of 6mm veneered MDF, achieving the best yield from the 2440 x 1220mm sheet of backing material meant making the panel for the hall cupboard in three parts. Handily, this also meant that I could arrange for the back panel of the centre cupboard to be removable, allowing me to make the cut-out for the battery charger wiring once the unit was *in situ*.

For the bookcase, meanwhile, the back panel was made up in two parts, and in order to disguise the join I took the opportunity, as shown in **photo 13** – to incorporate a support mid-way along the shelves' length.



11 The drawer box was made by thicknessing some of the remaindered oak to ½in and the sides and front were joined with dovetails cut on a jig

12 The 6mm ply drawer bottom, meanwhile, was housed in slots cut in the front and sides

The perfect finish?

To finish his oak units, Alan applied a coat of clear sealer followed by a light sanding and a clear AC lacquer coat, which laid a hard-wearing, non-yellowing and heat-resistant foundation for the application of a clear wax.

The advantage of using the AC lacquer (which can be a finish in its own right, of course) is that, while the polished wax may be damaged by water or a carelessly placed coffee cup, the timber underneath will be well-protected. And the joy of a wax finish, of course, is that it's easily revitalised with fresh wax and a spot of elbow grease.

Then again, the oak of these units would have lent itself perfectly to an oil finish. Like wax, drying oils such as linseed, Danish, or tung oil, soak into the wood and then solidify as they oxidise. However, they penetrate the fibres more deeply than wax, and tend to give a low-lustre finish that will show up any defects in the timber and shortcomings in your preparation much more than a high-gloss finish. And while oil finishes do offer some resistance to water and wear, durability isn't their forte. On the other hand, it's also easy to refresh areas that have been scuffed.

Whereas hardwoods like oak respond well to oil finishes, if it's softwood you're finishing it's definitely worth applying a foundation of sanding sealer; this will not only help you to build a finish more quickly, but also prevent the timber's resins from interfering with the drying of the oil, which can lead to tackiness.

That said, applying too much oil will make a surface sticky and liable to attract dirt, regardless of the timber you're using.

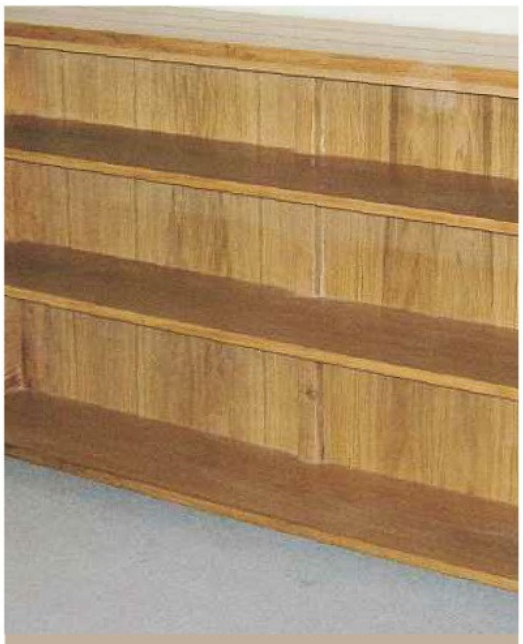
Whatever finish you choose, however, the golden rule is to keep it as thin as possible so that the light can reach the timber underneath.

Why? Because as every reference on finishing will tell you, it's the reflection and refraction of light by the layers of cells and pores in timber that create the colours, depth and iridescence that makes wood so attractive.

Buttoned up

While Alan used screws to attach the tops to his units, with slotted holes to allow for any cross-grain movement, an alternative approach would have been to use buttons – square pegs screwed to the underside of the tops and fitted into slots in the top frames.

The idea is that the slots are cut fractionally low in relation to the buttons so that, when assembled, the top is pulled down onto the frame and held firmly in place. However, there should be enough depth in the slots to allow the buttons to move in and out should any cross-grain movement of the top occur.



13 The bookcase has a vertical support mid-way along the shelf length as belt and braces for support for heavyweight reading matter

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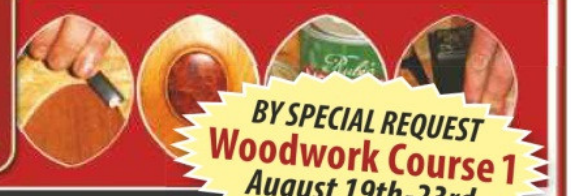
The Wood Workshop



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Filed & tidy

Phil Davy uses his scroll saw to make this mountain-themed letter rack

Even with postage costs soaring and the future of mail deliveries in question, I seem to get more letters and bills than ever dropping on the doormat. In need of some re-organisation in this department, a letter rack seemed to be the answer. This makes a handy indoor project and you can use pretty much any thin timber offcuts, with MDF ideal if you want a painted finish. A decent scroll saw is fun to use and a letter rack allows you to be as creative as you wish. For the first rack I sketched out random outlines of hills, adding trees for interest. This got me thinking, and with loads of images of the Brecon Beacons and Black Mountains stored on my computer, I decided it would be more fun to incorporate these landscapes into the second box. You can either draw directly onto the wood, or you may want to sketch the outlines on paper first if using a dark timber. Use spraymount adhesive or thinned PVA to fix the drawing, then simply follow the outline on the scroll saw. It's easier to see the outline when cutting if you go over the pencil with a fine black gel pen.

Overall measurements for both racks are 300mm wide by 110mm deep, although dimensions are not too important. You should be able to fit C5 envelopes inside easily, however. Material thickness ideally should be between 6 and 10mm; I used 8mm-thick sapele and American cherry. With certain shapes (such as the tree cutouts) the sawn edges are quite vulnerable and will probably snap if you make them too tall. One solution is to glue a piece of matching veneer behind to strengthen them. This could be stained a darker colour to provide a contrast.

Lap joints are used at the corners, the front and back rebated to half material thickness to accommodate the ends. Rout rebates for the base at the same time so you don't have to reset the cutter height. It's easier to cut all the rebates before you saw any of the outlines. The divider is held in place by routing a central groove on each end piece. To make life easier, this is glued in place after oiling the rack; just a few dabs of PVA are sufficient.

Instead of using hardwood, a letter rack would make a useful exercise in simple veneering techniques, with 6mm MDF as the core.

Inner surfaces would need to be veneered before gluing the box together, with the outside veneered after cleaning up the corner joints and base. You could stain or paint the exposed outlines after cutting and before gluing the face veneers.

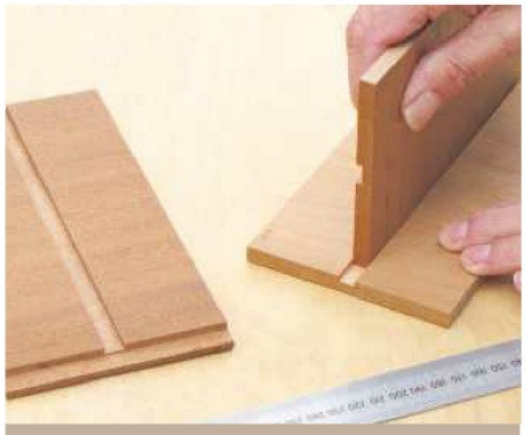
1 Thickness the timber to about 8mm and saw panels to length. Cut the front and back 2mm oversize

2 Using a shooting board, plane bottom edge of all four panels, plus divider. Trim ends square

3 Mark out ends of front and back panels. Using a router table, form rebates to half depth of timber

4 Draw outlines onto paper or wood, using photos or postcards if you're feeling creative

5 Carefully mark out positions of grooves for the divider panel on both end pieces



6 Using offcuts, check the groove width. The divider panels should be a sliding fit

7 Rout through grooves on both end pieces to a depth of 3mm. A simple jig holds these when routing

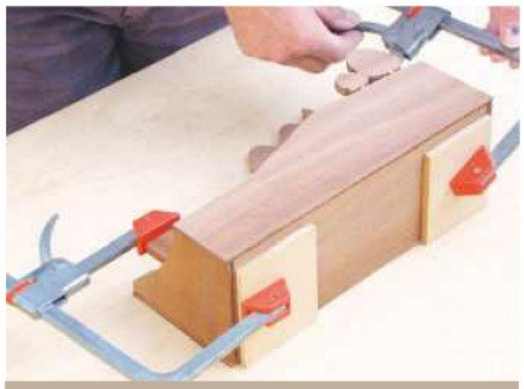
8 Sand inner surfaces with 180 grit abrasive or finer before assembling the box

9 Drill holes for inserting blade where necessary. Follow the pencil line carefully on the scroll saw

10 With the outlines cut on front and back panels, mark the height on both end sections

11 Check ends fit into the rebates on front and back panels neatly. Apply PVA glue sparingly

12 Cramp the box together on a flat surface. Check for square, adjusting cramps if necessary



13 Cut the base from the same thickness material. Trim for a snug fit and glue in place

14 When the glue has dried, carefully trim the excess end grain on the corner joints

15 With the box held upside down, plane the panel edges flush with the base

16 Use a sharp chisel to contour upper edges if they meet at slightly different heights

17 Soften the sawn outlines using a multi-tool fitted with a fine-grit sanding drum

18 Cut the divider so it slides between the grooves. Saw the outline and sand it smooth

19 After final sanding brush on two coats of Chestnut Finishing Oil. Denib and complete with wax polish

20 Letter rack ready for Postman Pat...The mountain-themed rack is made from American cherry, the arboreal box from sapele

Wot, no scroll saw?

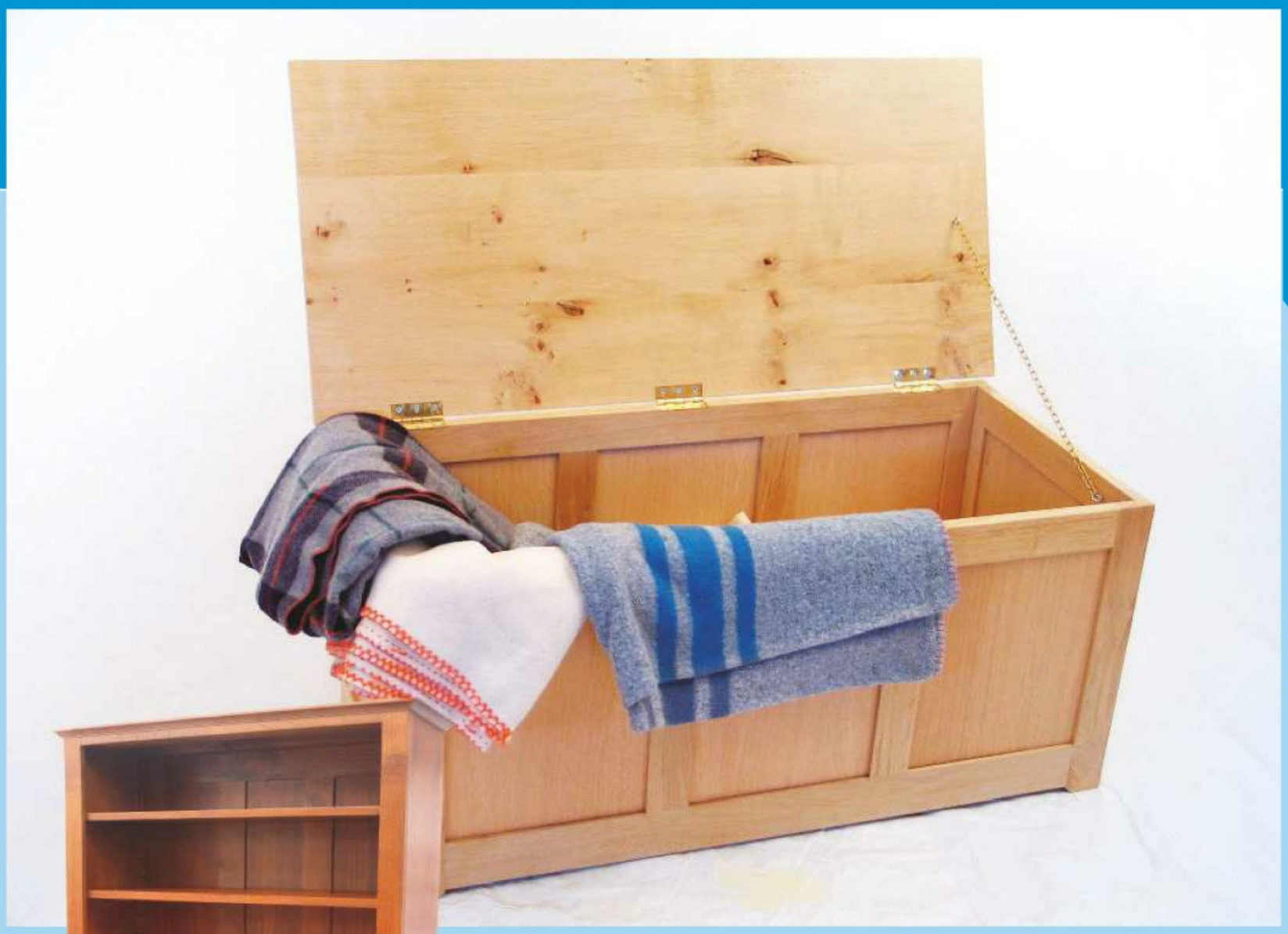
This project can still be built if you don't have a scroll saw. Depending on the complexity of your design, you should be able to cut the outline with a piercing saw. This hand tool has a cutting width capacity of about 70mm, so the waste edge of the panel needs to be reasonably close to the outline. Alternatively, you could remove most of the waste with a powered jigsaw, finishing off with the piercing saw. Unlike a coping saw (which has a greater capacity and wider blade), you cannot swivel the blade on the smaller saw. This means cutting intricate shapes will be a bit trickier than with a scroll saw. Piercing saw cuts are finer than those made with a coping saw, so should not need cleaning up afterwards. Blade length is 125mm and plain ends mean piercing and scrollsaw blades are interchangeable. For enclosed cuts (called pierced work) drill a small hole through the workpiece. Slacken off one end of the blade, poke it through the wood and retighten. This is a slower process than using a scroll saw, so you may want to reduce the amount of enclosed cuts in your design.

1 A piercing saw can be used for intricate shapes, though its blade cannot be rotated. This is secured with two thumbscrews, Slackening off the knurled thumb wheel on the frame releases tension and enables you to replace the blade

2 Fit a new blade so teeth are pointing down towards the handle. This keeps it under tension when sawing

Storage

Well, you can never have enough space to hide things away, or display them attractively, and we think that for a classic but contemporary look Roger Berwick's cherry dresser is a crowd pleaser. And for spare sheets and blankets or even as a repository for no-longer-used toys you cannot bear to throw away, how about Peter Bishop's blanket chest? And we all need bookcases



Storage to the max

Roger Berwick takes the complexity out of this dresser by constructing it in concise stages

The story starts back in 2005, when I was approached by a gentleman and asked to make a cherry writing desk as a ruby wedding anniversary present for his wife. Since then I've made several other pieces for them, all in in cherry, including a bookcase, a television cabinet and an occasional table. However, one piece of furniture had been discussed on several occasions but never actually commissioned. The piece in question was a large dresser to fit in an alcove in their lounge, providing both storage capacity and display space for a collection of ornaments.

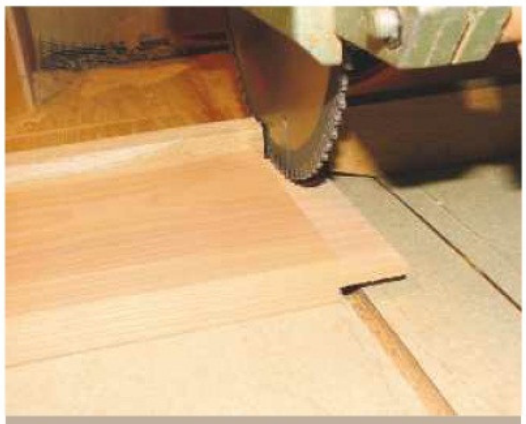
Sadly, his wife died in the meantime, but he commissioned me to make it as he had always promised her this piece to complete the suite of European cherry furniture in their property. He felt it would make a fitting tribute to her memory.

Buyer beware

Shortly after receiving the go-ahead, I ordered a quantity of cherry sufficient for the job from a reputable timber company I use in the Midlands. It arrived very late one day as the light was fading, and was duly unloaded into my dimly-lit wood store to acclimatise. It wasn't until some time later, when I started moving it into my workshop, that I realised the boards were actually a mix of European and American cherry.

These timbers are quite different in colour when finished, but in the sawn board they can appear very similar, especially as the outer bark on the waney edge is almost identical. So I contacted the company in question to complain, but was surprised to be told that I should have rejected the boards on delivery. So much for customer service… Unfortunately there wasn't enough

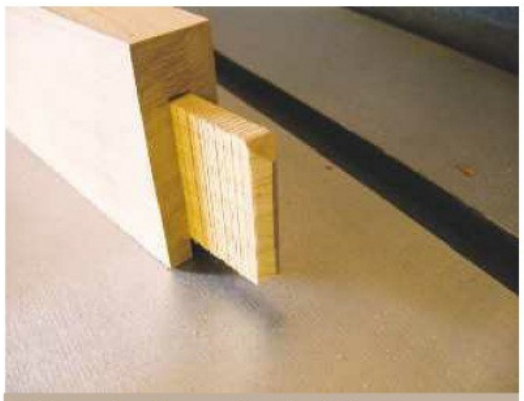
1 Cut all the mortises after machining the various frame components to size



2 Create the tenons by making a series of parallel cuts on the radial arm saw

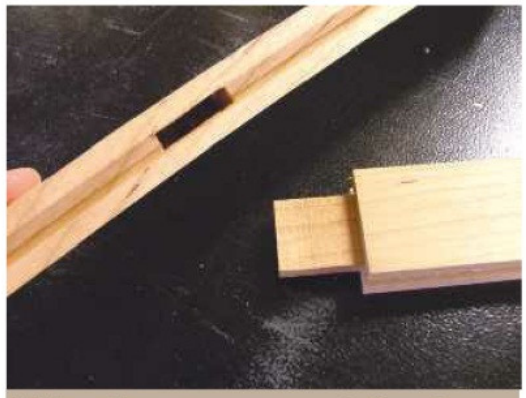
3 Use the bandsaw next to cut down the tenons and form square haunches

4 Cut grooves for the panels into the stiles and rails using a slotting cutter



5 Chamfer the ends of all the tenons to make assembling the frames easier

6 Do a head count of the door frame components to check none is missing



7 The slimmer components forming the door muntins don't need haunched tenons

8 Make up the top frame. The one for the upper cabinet is also shown here

European cherry in the consignment to complete the project, so I had to think again.

Local sources

There are several timber yards in my area, and while the prices may be a bit higher locally I use them regularly because they know me. So I jumped into my van and was soon back in the workshop with another ten cubic feet of European cherry, ready to start work.

I began by removing the waney edge from the new boards and started passing them through the thicknesser, only to find that they were riddled with worm! I returned the timber to the yard after a chat on the phone, and on closer inspection we discovered that the entire consignment from which my order had been selected seemed to be contaminated.

Third time lucky

I now had the headache of finding yet more replacement timber from another supplier to meet my delivery deadline. The next day I found myself heading off to a workshop in Ipswich, where I had located another ten cubic feet of European cherry. What's more the boards had been stored for a while in a heated workshop, so they were already acclimatised and ready for use. What a lucky break… at last!

Design elements

The dresser was intended to maximise storage, and was to be just over two metres long with closed cupboard space in the base. We discussed the possibility of including drawers, but the client decided against them. Above this the upper section would consist of a full-length door at each side, flanking two shorter doors above an open central area. These doors would have bevel-edged glass, and the cupboards would be fitted with glass shelving.

The first cut

I could see that there was one board in particular which had a beautiful grain and some rippled figuring, so I decided to use this to make the base of the upper section. Resorting to a trusty handsaw, I cut it to length to save manhandling it across the workshop to the radial arm saw – no mean feat in view of the lengths and widths of these boards!

I needed this board to be a finished size of 2100 x 470mm.

The board I'd chosen was a shade narrow after thicknessing, so I biscuit-jointed a strip cut from another board to its back edge to bring it up to the width required, and left it in cramps to cure overnight. The next day I cleaned up the board with a cabinet scraper to remove

the traces of excess glue from the joint line, and put it to one side for use later.

Plain or panelled?

Knowing that the dresser was to stand in an alcove where the sides would not be seen from day to day, I initially suggested making the ends in flat board. However, on starting work I decided to make them up as frames incorporating raised and fielded panels so the piece would look more attractive if it was ever moved out into the open.

I started by machining all the frame components to size, and cut all the mortises with a 6mm chisel in my bench mortiser (**Pic.1**). I then produced the corresponding tenons by removing the waste from the cheeks using a series of repetitive cuts on the radial arm saw (**Pic.2**).

Having removed the cheeks I used the bandsaw to cut down the tenons to form square haunches (**Pic.3**). These would fit into the grooves in the frames, closing the joints when they were assembled. Finally I cut the corresponding grooves into the stiles and rails on the router table with a 6mm slotting cutter (**Pic.4**).

Technical aside 1

I find that using a dedicated slotting cutter on the router table provides a far superior finish on the timber, as it effectively delivers a shearing cut. This is preferable to using a twin-flute straight cutter protruding up through the table surface, mainly because the chip clearance of the slotting cutter doesn't backfill the grooves with waste as the twin-flute cutters do.

Technical aside 2

To finish the joints I chamfered the ends of the tenons (**Pic.5**), not only to make location easier during assembly but also to compensate for the uneven bottoms of the mortise holes left by the hollow chisel. I had previously done this chamfering with a shoulder plane and chisel, but found it a quicker and easier procedure using my oscillating belt sander.

I now had all the door frame components prepared (**Pic.6**). The four slimmer components would form the central muntins (**Pic.7**).

Framing up

The large board I mentioned earlier, which will become the base of the upper carcase, needs supporting on a frame on the top of the base unit, as shown in **fig 2**. This is connected to the sides with biscuit joints; it also locates in a shallow housing to support the central divider. This divider was duly made up, and at the same time the frame which would eventually form the top of the upper section was also made and dry-assembled. **Pic.8** shows the two completed frames side by side.

A similar frame was made for the bottom of the unit (see **fig 2** again). This was in-filled with tongued-and-grooved boards (**Pic.9**), which would allow for any movement that might occur in the future.

Fielding panels

With all the frames made for the base carcase, I decided before gluing it up that I would get the doors made for the lower section, as I had the mortiser and router table all set up.

I also knew that I had to machine the raised fielding on the side panels in the same manner as the panels for the doors, and I reckoned this would save me time in the long run.

I use an Axminster fielding cutter on my spindle moulder for this job. Before each use I always dress the flat surfaces of the cutters on a diamond stone to ensure the cleanest cut possible.

I cut the timber for both the door panels and the end panels.

Having thicknessed the timber and dimensioned it to the correct sizes, I set up the spindle moulder ready to machine the fielding. Each board was then passed across the cutter (**Pic.10**), taking a succession of passes until the desired depth of cut was achieved. The fielded panels then had their back faces rebated (**Pic.11**), forming a tongue to sit snugly in the grooves in the frames.

I could now dry-assemble the end

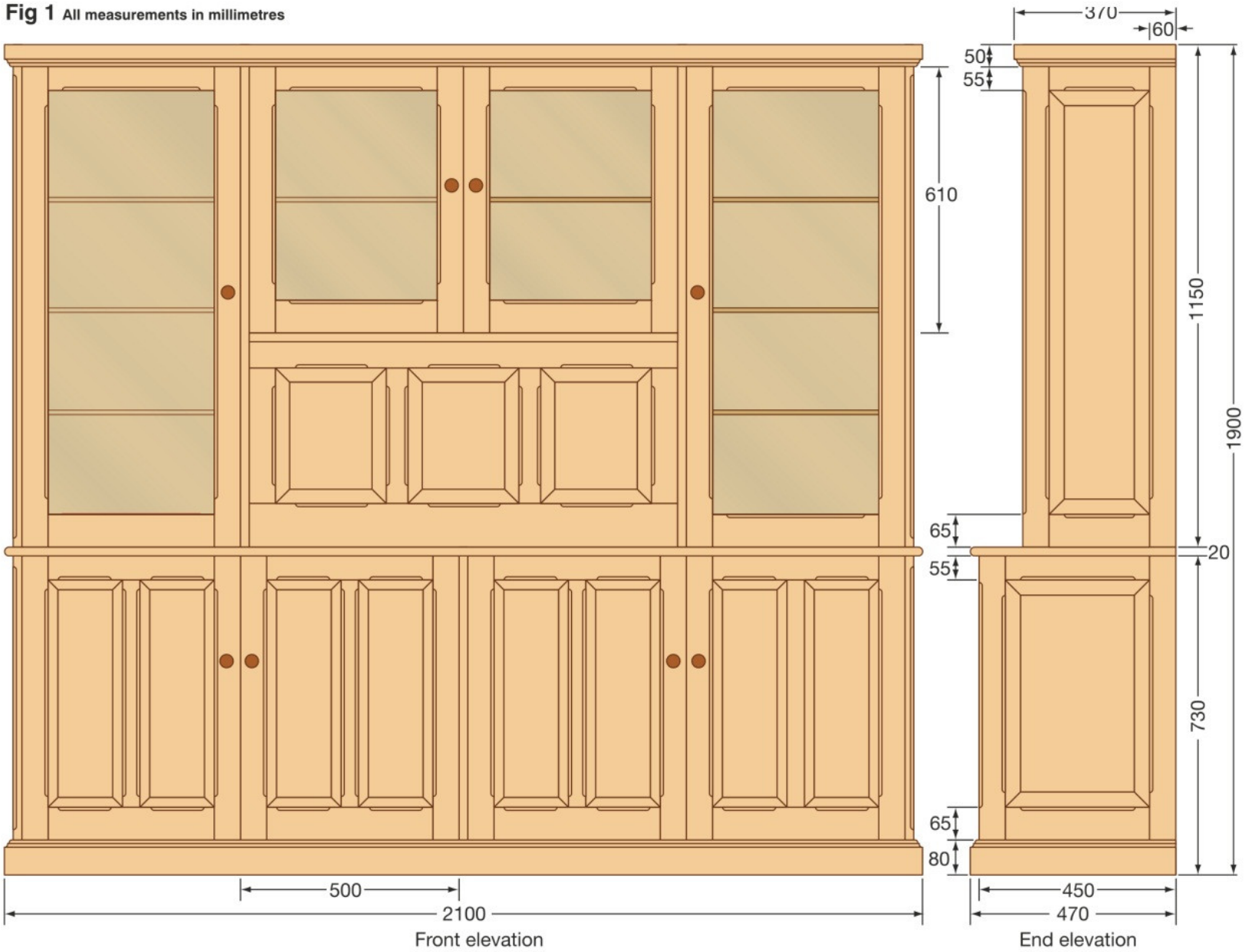
DRESSER BASE CUTTING LIST

All dimensions are in millimetres

Part	Qty	L	W	T
Top panel	1	2100	470	20
Top frame stile	2	2060	60	20
Top frame rail	4	450	60	20
Top frame centre rail	1	450	100	20
Base panel stile	2	2080	60	20
Base panel end rail	2	450	100	20
Base panel inner rail	2	450	75	20
Base panel centre rail	1	450	200	20
Base panel board	12	400	130	20
Base cleat (long)	2	2060	80	20
Base cleat (short)	2	450	80	20
Plinth (front)	1	2150	80	20
Plinth (end)	2	500	80	20
End frame stile	4	730	60	20
End frame top rail	2	450	55	20
End frame bottom rail	2	450	155	20
End frame panel	2	535	345	20
Central divider stile	2	680	60	20
Central divider rail	2	450	60	20
Central divider board	6	450	90	20
Door stile	8	650	60	20
Door rail (top)	4	500	55	20
Door rail (bottom)	4	500	75	20
Door muntin	4	600	40	20
Door panel	8	540	190	20
Back panel (plywood)	2	1030	660	6

Cross-sectional dimensions are net. An allowance has been made on the lengths to allow for cutting joints.

Fig 1 All measurements in millimetres



9 Make up the base panel and infill between the rails with tongued-and-grooved boards

10 I fielded the panels on my spindle moulder, taking a succession of thin cuts

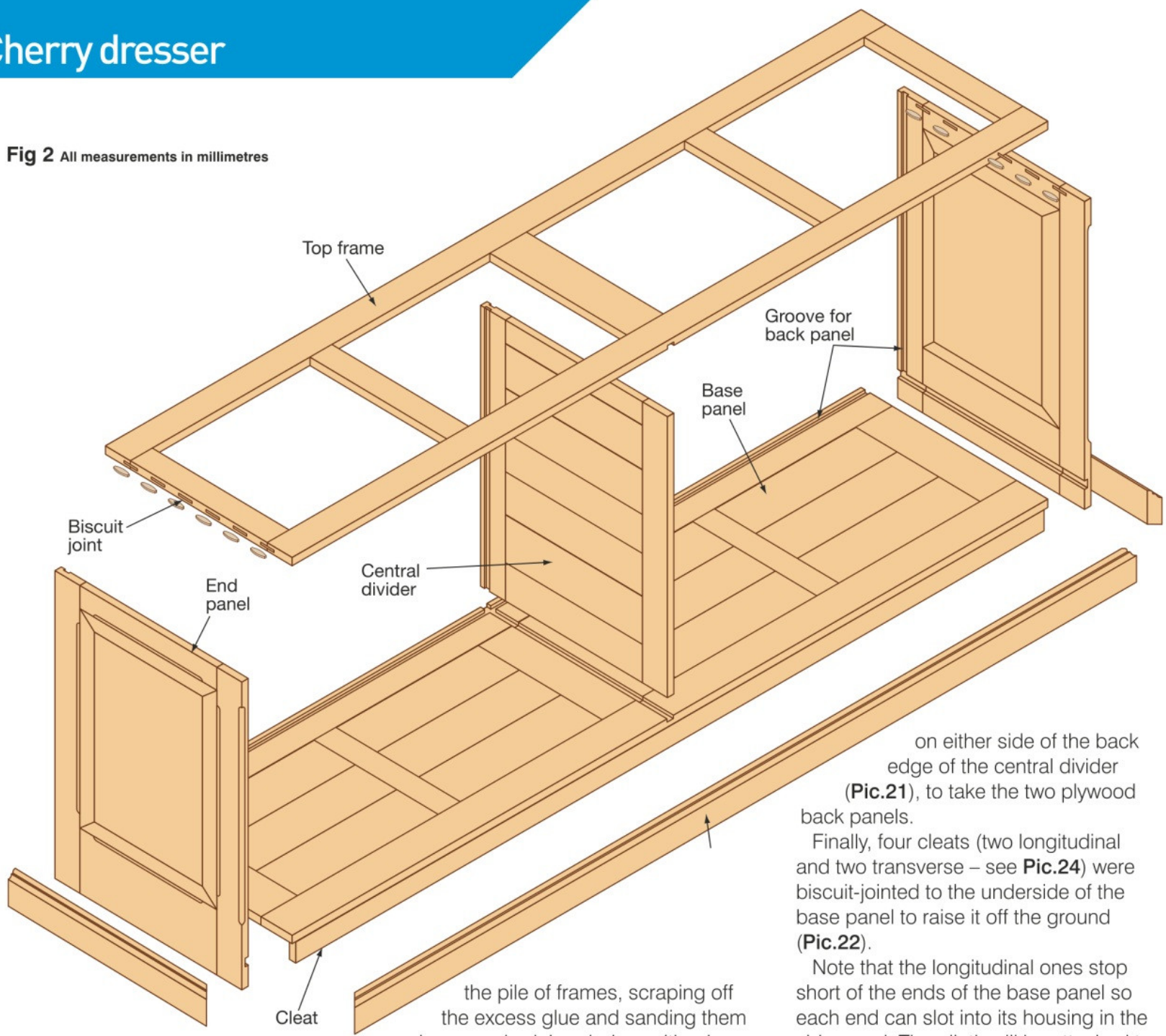
11 Form a rebate on the back of each panel to create a tongue all round

12 Dry-assemble the two end panels and check their overall dimensions

13 Do the same for the door panels, which have two narrow panels and a muntin

14 Make up the central divider with two stiles, three rails and tongued-and-grooved board infills

Fig 2 All measurements in millimetres



frames complete with its single panel, (**Pic.12**), and also the doors which featured twin fielded panels along with a central muntin (**Pic.13**).

At this stage I also made up the central divider and filled it in with more tongued-and-grooved boards (**Pic.14**).

Finishing the frames

After applying a stopped chamfer to the inner edges of the panel frames, (**Pic.15**), I started gluing up the various components (**Pic.16**), putting the frames to one side as I completed them to allow the Titebond glue to cure fully.

I then slowly worked my way through the pile of frames, scraping off the excess glue and sanding them where required. I ended up with a large pile of frames on the bench **(Pic.17)**, ready for the jointing to be finalised before the lower carcase could at last be assembled.

I rounded over the internal edges of the open frames (the ones without either panels or tongued-and-grooved boards in them) with a bearing-guided cutter in the router (**Pic.18**).

I then cut housings across the base and top frame (**Pic.19**), ready to accept the central divider. Housings were also cut in the carcase sides to accept the ends of the base panel.

Then a groove was applied to the end frames and base panel (**Pic.20**), and also on either side of the back edge of the central divider (**Pic.21**), to take the two plywood back panels.

Finally, four cleats (two longitudinal and two transverse – see **Pic.24**) were biscuit-jointed to the underside of the base panel to raise it off the ground (**Pic.22**).

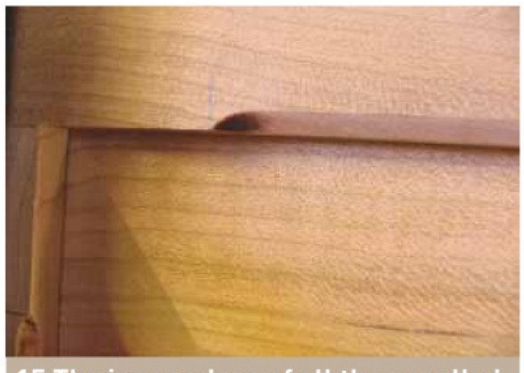
Note that the longitudinal ones stop short of the ends of the base panel so each end can slot into its housing in the side panel. The plinth will be attached to these cleats later on in the assembly.

Assembly time

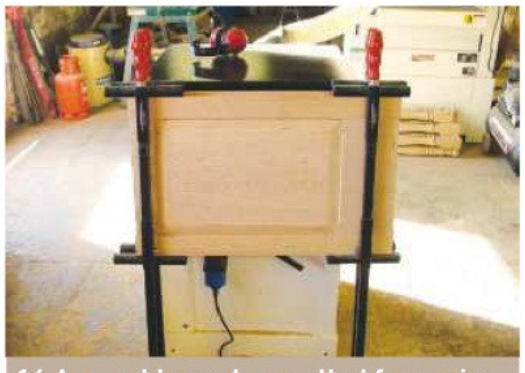
I was now seeing the light at the end of the tunnel! After applying biscuit joints to the top of the carcase ends to connect them to the top frame (see **fig 2**), I glued up the base carcase section by section. **Pic.23** shows the base panel, the top frame, the end panels and the central divider in position and securely cramped.

Once the glue was dry, I turned the carcase over so I could attach the mitred plinth mouldings (**Pic.24**).

These were glued and screwed into place from the inside so the screws were



15 The inner edges of all the panelled frames feature a small stopped chamfer



16 Assemble each panelled frame in turn, cramp it up and put it aside to dry

17 Clean up all the glued joints and stack up the frames, ready for the final assembly

18 Round over the internal edges of the open frames with a bearing-guided cutter

19 Cut a housing across the centre of the top and bottom frames to accept the central divider

20 Form a groove in the end frames and the base panel to take the plywood back

21 The central divider has a groove at each side into which the two back panels slide

22 Attach two long and two short cleats to the underside of the base panel

23 Assemble the base panel, the top frame, the end panels and the central divider

24 Turn the carcase over so you can attach the mitred plinth mouldings to the cleats

25 Glue and pin the corner mitres to make sure they can't open up over time

26 Trim the horns off the dry-assembled doors and test-fit them in their openings

never seen. The mitred corners were perfect (**Pic.25**), even though I say so myself!

The base section was now effectively complete. The doors were not yet glued up, as the panels still lacked their dentil inlays. However, I was able to trim off their horns and test-fit them in the frame openings (**Pic.26**).

I also fine-tuned the top panel to size and applied a fingernail moulding to its edges (**Pic.27**).

I decided to turn my attention to the upper half of the dresser at this stage, as I wanted to do all the inlaying at one time and there is a lot more of it on the upper cabinet doors and panels.

Finishing would also be left until last for both sections.

27 Fine-tune the size of the top panel and add a fingernail moulding to its edges

Top section

The construction had gone very smoothly so far, in part down to the quality of the timber that I had eventually acquired. To continue the project I now needed to turn my attention to the upper half of the unit, incorporating the glass-fronted cupboards for displaying ornaments on concealed glass shelves.

Essential changes

Having changed the original design of the base to incorporate fielded panels in the ends rather than just flat boards, I needed to follow this theme in the upper half for continuity. This left me with a slight dilemma regarding various other parts of the design.

When the plans were originally drawn, the upper half of the dresser was designed to have a full-length glazed door at each side, reaching from the top of the base unit to the underside of the cornice, and a pair of shorter glazed doors positioned in the centre to leave an open area above the base for the display of larger items.

The back of this open area was originally meant to have cherry tongued-and-grooved boards, while the backs of the glazed cupboards would be cabinet-grade plywood.

My dilemma here was that the flat board uprights between the outer and inner cupboards would leave a rather bland-looking central area, and that in turn would not flow effectively into the rear tongued-and-grooved boarded back panel.

A new plan

Another design consideration came into play here. The door panels on the base of the dresser were to have dentil inlay stringing applied, but there was nowhere on the upper section where matching inlay could be applied to marry up the style of the two halves. So after some discussions with my client, we agreed the following changes.

The inner uprights would be made in a framed construction, and the lower section of each would feature a fielded panel facing into the central area.

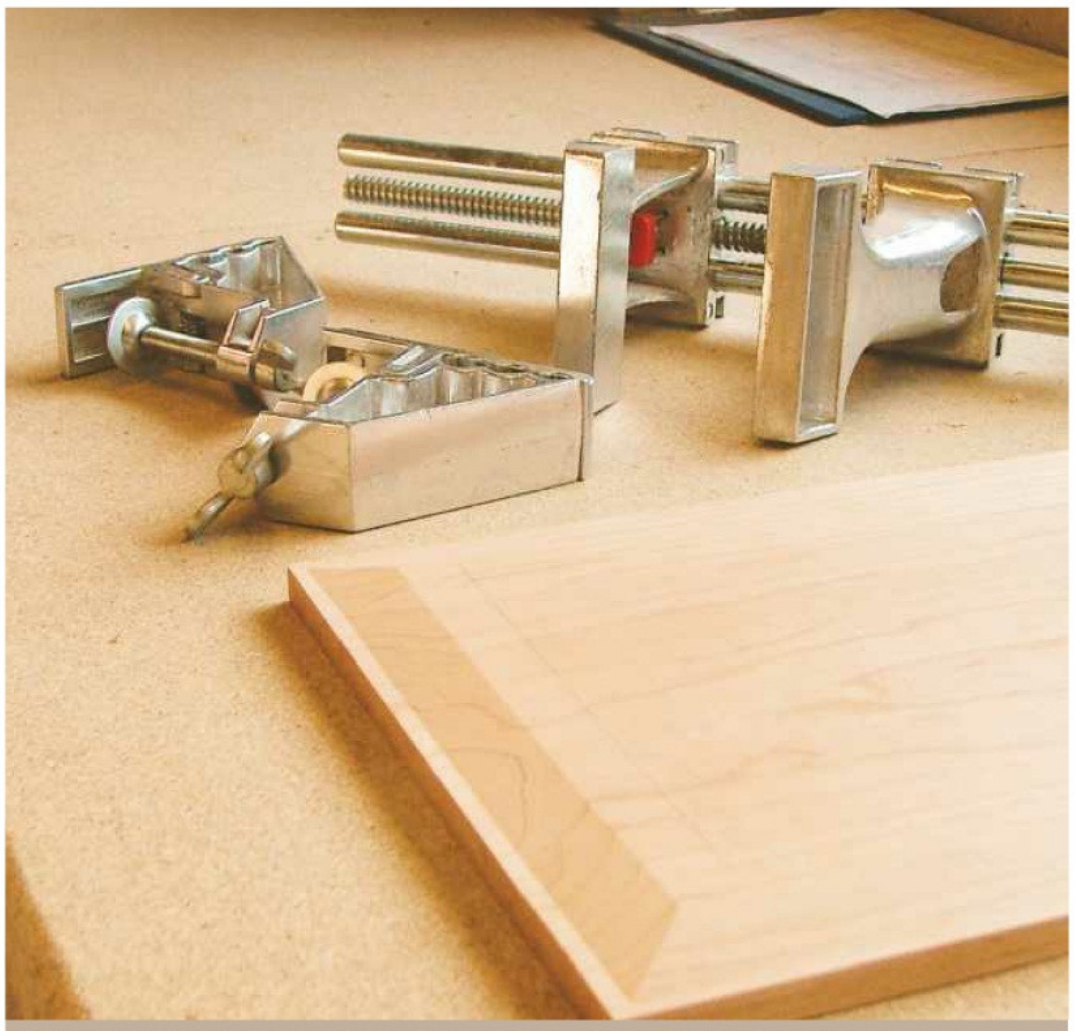
The other change would be to make another panelled frame to insert below the middle twin-doored cupboard to replace the planned tongued-and-grooved boarding. The three fielded panels in this frame could then be inlaid with the dentil stringing to marry up the top with the lower half of the dresser. **Fig 1** gives all the details of the revised design and construction.

1 The end panels for the upper carcase

2 The inner panels contain one fielded panel and have a rebate along the bottom edge

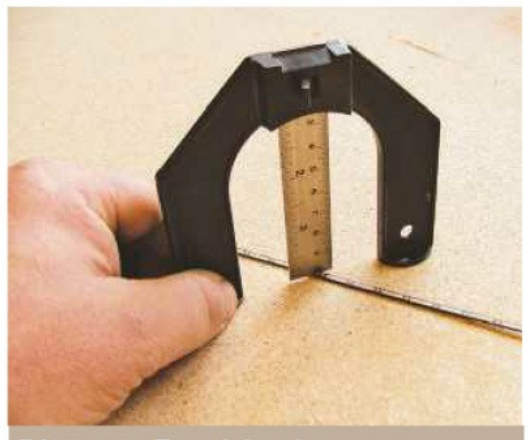
3 Stopped housings cut across the centre rails of the inner panels will receive the shelf ends

4 Mark the position of the inlay on the various raised panels with a fine pencil line



5 I find that this Zyliss clamp is the easiest way to hold the panels...

6 ...as the jaws grip their edges but don't impede access to the panel surface



7 I use my Trend depth gauge to measure the thickness of the inlay...

8 ...and then transfer the measurement to set the correct router cutter depth

Making the framed panels

With these changes agreed, I proceeded to make the outer sides of the top by following exactly the same construction method described earlier. The outer frames were jointed with square haunched mortises and tenons, with a fielded panel floating in a groove in the frame. These panels were then dry-assembled to check the fit of the joints (**Pic.1**), and put aside until later in the construction process. I also made the frames for the inner panels, for the backboard with its fielded panels (see **fig 2** for the details), and for the fixed shelf that would fit between these panels.

With the inner panels glued up, a rebate was routed along both the top and bottom edge of each one to form a long tenon (**Pic.2**). By using a bearing-guided rebate cutter to form the tenon, the fine height adjuster on your router allows you to fine-tune the thickness of the tenon easily to fit into the corresponding housing.

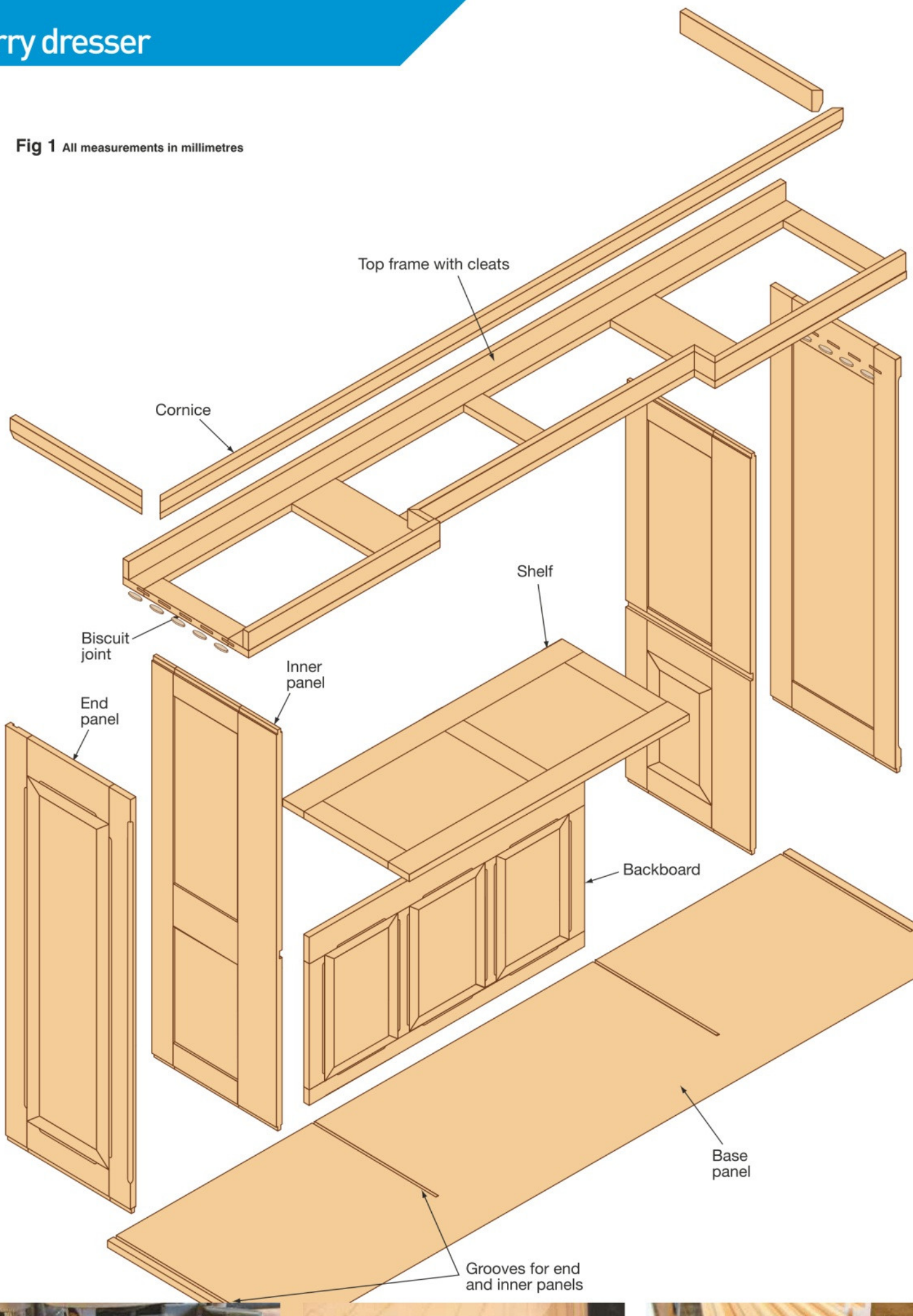
The same process was adopted for forming a tenon on either end of the fixed shelf, before cutting the corresponding housings in the uprights (**Pic.3**), as well as into the base board, which is of course the top of the lower half of the dresser.

Inlaying the panels

It was now time for me to tackle the inlay stringing on the base unit doors and the top unit backboard, so I dismantled the dry frames of these components to release the panels. Next, I drew a fine pencil line on each panel, approximately 20mm in from the edge of the raised fielding (**Pic.4**), to provide a reference line for the outside of the stringing line.

Cherry dresser

Fig 1 All measurements in millimetres



9 Run the router fence against the panel edges to cut the grooves for the inlay

10 Glue the inlay strips into their grooves and finish them flush with a cabinet scraper

11 Rebate the stock for the glazed door frames before cutting the tenons on them

I find that the easiest way of holding the panels when installing the inlays is to use a Zyliss cramp (**Pic.5**), mounted onto the leading edge of my workbench (**Pic.6**).

The dentil inlay I planned to use was 3mm wide, and after routing a groove with a 3mm straight cutter it's a simple job to stick it into place. To get the correct groove depth I laid the stringing onto the bench and set my Trend depth gauge to its thickness **(Pic.7**). I then transferred the gauge to the router and used the fine height adjuster to set the depth of cut exactly (**Pic.8**).

I always set the router cutter to the exact thickness of the inlay, as the glue tends to raise the height of the inlay fractionally when it's glued in, leaving it slightly proud and simple to clean up and leave flush with the panel face using a sharp cabinet scraper.

The panels can then be grooved, running the fence of the router against the edge of the panel (**Pic.9**), and using the pencil lines applied as reference points for where to start and stop the cuts. The rounded corners left by the router cutter can then be cut square with a sharp chisel, leaving them ready to accept the stringing (**Pic.10**).

Tackling the doors

With all the panels inlaid, I glued up the base unit door frames so they were dry when I wanted them later.

While the lower doors have wooden panels held in a groove, the doors for the upper section need to be made slightly differently to accept the glass panes. Glass is always held in a rebate, mainly because it needs to be applied after the frames are completed. This also allows for the pane to be easily removed and replaced should it get broken at some point in the future.

I know that a lot of people make their frames in rectangular section stock and rebate them with a router after gluing them up. However, I always make the frames traditionally with off-set shouldered mortise-and-tenon joints. Having initially rebated the frame stock on the router table (**Pic.11**),

12 Cut the mortise in each door stile tight against the shoulder of the rebate

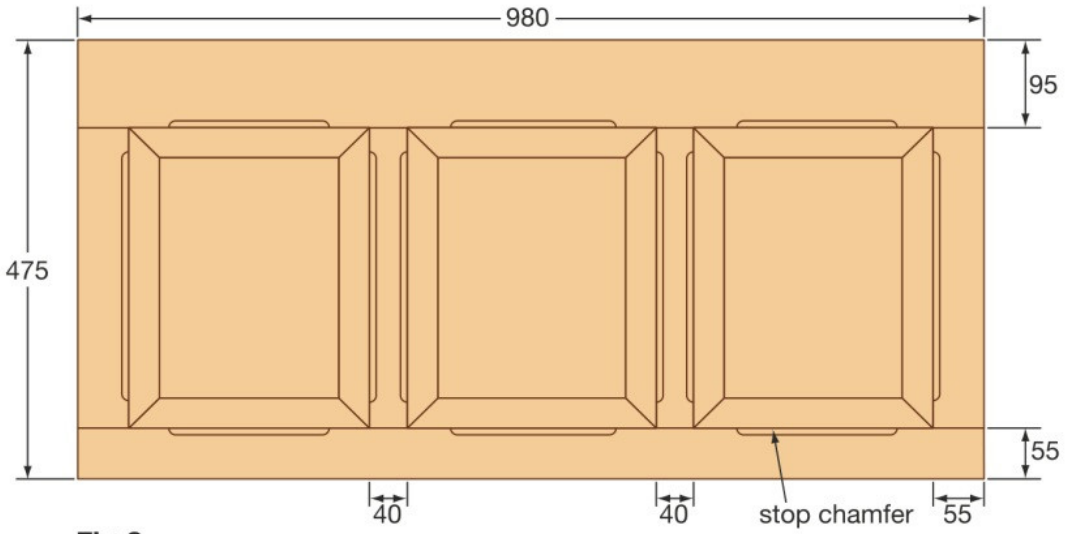


Fig 2 *All measurements in millimetres*

DRESSER TOP CUTTING LIST

All dimensions are in millimetres

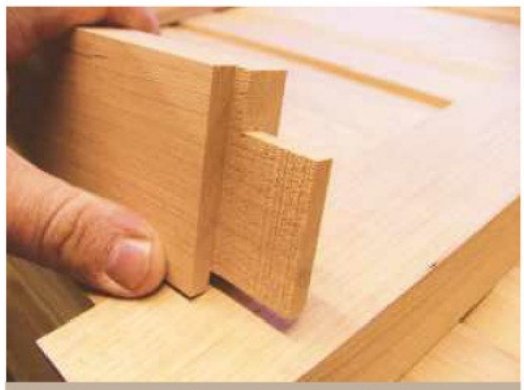
Part	Qty	L	W	T
Base*	1	2100	470	20
Top frame stile	2	2100	60	20
Narrow top frame rail	3	350	60	20
Wide top frame rail	2	350	140	20
Cornice support cleat	2	2100	50	20
Cornice (front)	1	2200	50	20
Cornice (side)	2	400	50	20
End frame stile	4	1150	60	20
End frame top rail	2	350	105	20
End frame bottom rail	2	350	75	20
End frame panel	2	1000	250	20
Inner frame stile (front)	2	1100	110	20
Inner frame stile (rear)	2	1100	60	20
Inner frame top/bottom rail	4	350	60	20
Inner frame centre rail	2	350	120	20
Inner frame top panel (plain)	2	580	190	20
Inner frame bottom panel	2	325	190	20
Backboard top rail	1	980	95	20
Backboard bottom rail	1	980	55	20
Backboard stile	2	400	55	20
Backboard muntin	2	400	40	20
Backboard panel	3	325	280	20
Shelf stile	2	1000	60	20
Shelf rail	3	250	60	20
Shelf panel	2	420	205	20
Door stile (long)	4	1150	60	20
Door stile (short)	4	615	60	20
Door rail (top)	4	450	55	20
Door rail (bottom)	4	450	65	20

You will need some 6mm veneered plywood for the backs of the cupboards, and inlay stringing for the three backboard panels.
Cross-sectional dimensions are net. An allowance has been made on lengths and panel dimensions to allow for joints

I cut the mortise in each stile tight against the shoulder of its rebate (**Pic.12**).

The cheeks of the tenon are then removed, with a 6mm difference in either side to account for the rebate. I remove the waste with the radial arm saw, although you could use your bandsaw if you preferred. After cleaning up the shoulder lines with a sharp chisel (**Pic.13**), the joint was ready to be assembled (**Pics.14** and **15**). By cutting the joint in this way, a crisp square corner is left in the rebate ready to accept the glass and its glazing bead (**Pic.16**).

13 Clean up the shoulders on the tenons carefully with a sharp chisel



14 The result is a clean and crisp offset shouldered tenon that will...

A tale of two halves

With the last stage of work on the panels completed, it was time to start assembling the unit. Having glued up the inner panels and the bridging shelf, I positioned this and the end panels on the base of the unit and fitted the top frame in place to link everything together.

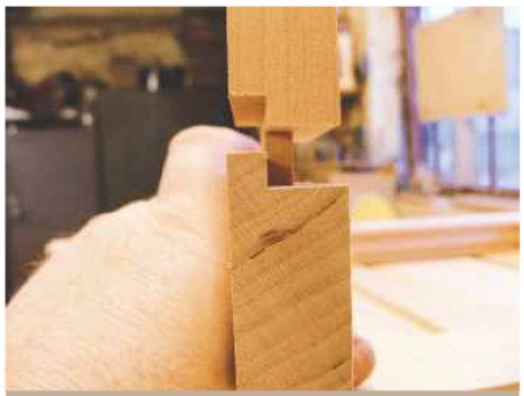
Cleats were applied to the top frame and the cornice moulding was glued and screwed into place.

Then the four doors were hung on solid drawn-brass butt hinges, and for the first time I was able to see the dresser in one piece (**Pic.17**).

The panelled frame made to go into the back of the dresser was glued and cramped up (**Pic.18**), before being fitted into the back of the upper carcase. I fitted it using a couple of cherry Miller dowels through each adjoining surface (**Pic.19**).

Initially I'd planned to apply clean birch-faced ply to the rear of the upper section, but I decided to push the boat out and finish the job properly by purchasing a sheet of European cherry veneered plywood instead.

The board I chose had a very similar grain pattern to the solid timber of the unit, and was an exact match for colour.



15 ...fit perfectly into the matching mortise in the door stile's rebate

16 The result is a clean rebated corner in the door frame, ready to accept the glass

17 The upper and lower parts of the dresser can now be united and the top and bottom doors fitted

Finishing time

Having spent some time doing the final clean-up and rub-down, it was time to start applying the finish.

Normally I like to treat cherry with Danish oil and wax, but having finished a couple of off-cuts in this manner the timber colour had darkened a bit more than I wanted. Instead I opted to finish the surfaces with pre-catalysed lacquer before polishing them with a neutral wax.

The various parts were laid out (**Pic.20**), and over a period of several days all the faces were sprayed with a couple of coats of lacquer – first semi-matt to seal the surface and then, after a light de-nibbing with fine abrasive paper, a coat of gloss lacquer to leave a mirror finish (**Pic.21**).

This wasn't the final appearance I wanted, however.

By rubbing the surfaces over with Webrax dipped in finishing wax, I removed the glassy appearance. Then I buffed the surfaces with a bit of flannelette sheet to generate a deep, lustrous, natural shine (**Pic.22**).

Final touches

I turned a set of matching handles from some cherry off-cuts (**Pic.23**). Then I fitted the glass shelves into each cupboard using adjustable shelf supports (**Pic.24**), and the actual construction was now complete.

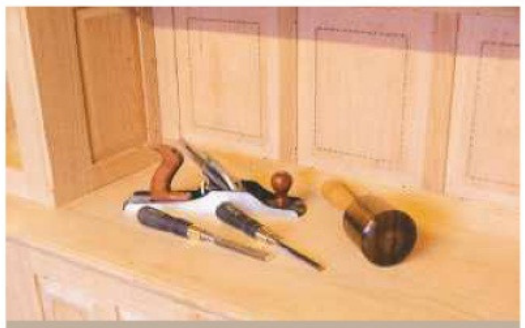
The glass in the upper doors had to be the toughened type.

I ordered them with their edges bevelled, not only to match the raised fielding in the other door panels but also because I like the way the light is reflected off the angled surfaces.

With the dresser now completed, I was able to arrange a time to deliver it and place it in the alcove for which it was designed. It completed the suite of cherry furniture I had started making for my client some seven years earlier.

On calling back soon after to check that all was well, I was delighted to see that a picture of his late wife had pride of place in the open area of the dresser. His promise to commission it had been fulfilled.

18 The panelled frame for the rear of the upper section is assembled and cramped

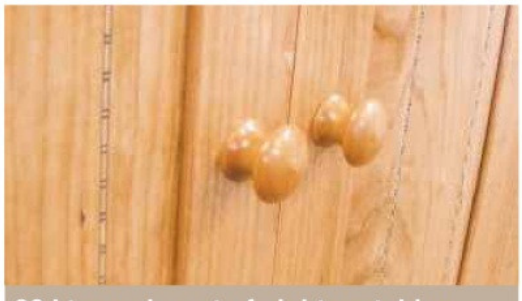


19 The frame is flush-fitted in its recess using cherry Miller dowels through the adjoining surfaces

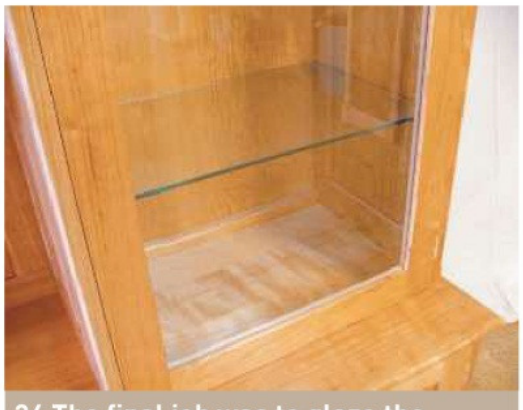
20 Remove the doors so they can be sprayed with a couple of coats of pre-catalysed lacquer

22 Buffing the surface with a soft cloth generates a deep, lustrous natural shine

21 The resulting high-gloss finish needed de-nibbing and waxing to soften the glassy look



23 I turned a set of eight matching knobs and dowel-jointed them to the cabinet doors



24 The final job was to glaze the doors and to fit the glass shelves on adjustable pegs

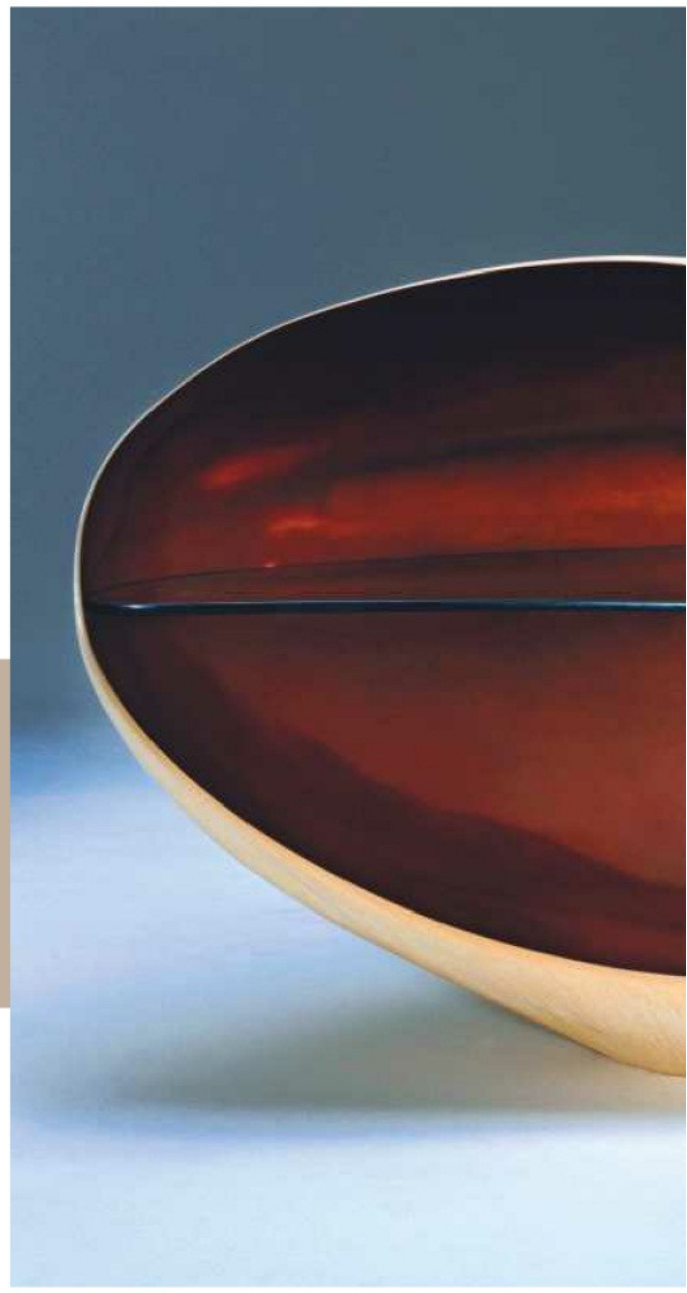
GALLERY

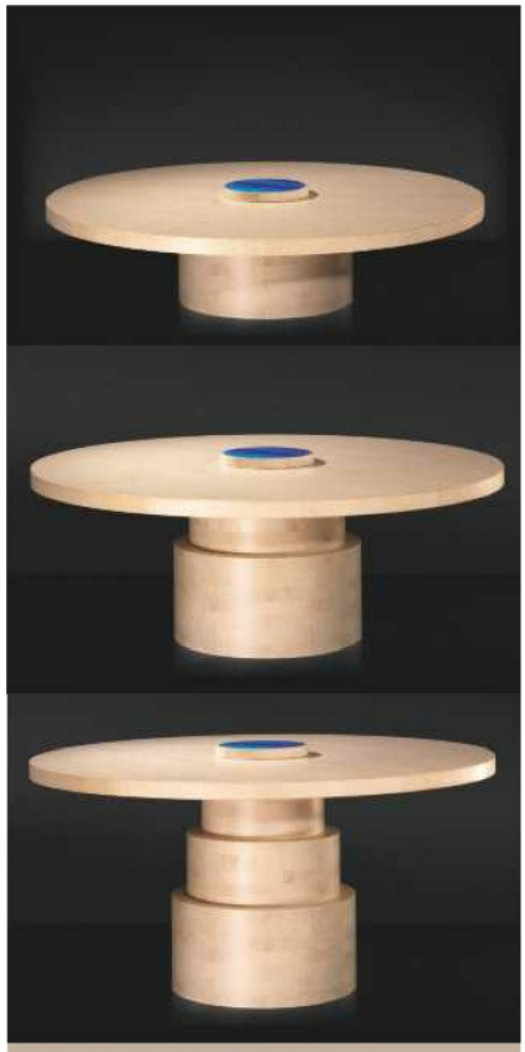
Stunning work

No, we are not asking you to make this furniture, but to gaze at the images and be inspired to design and make your own creations

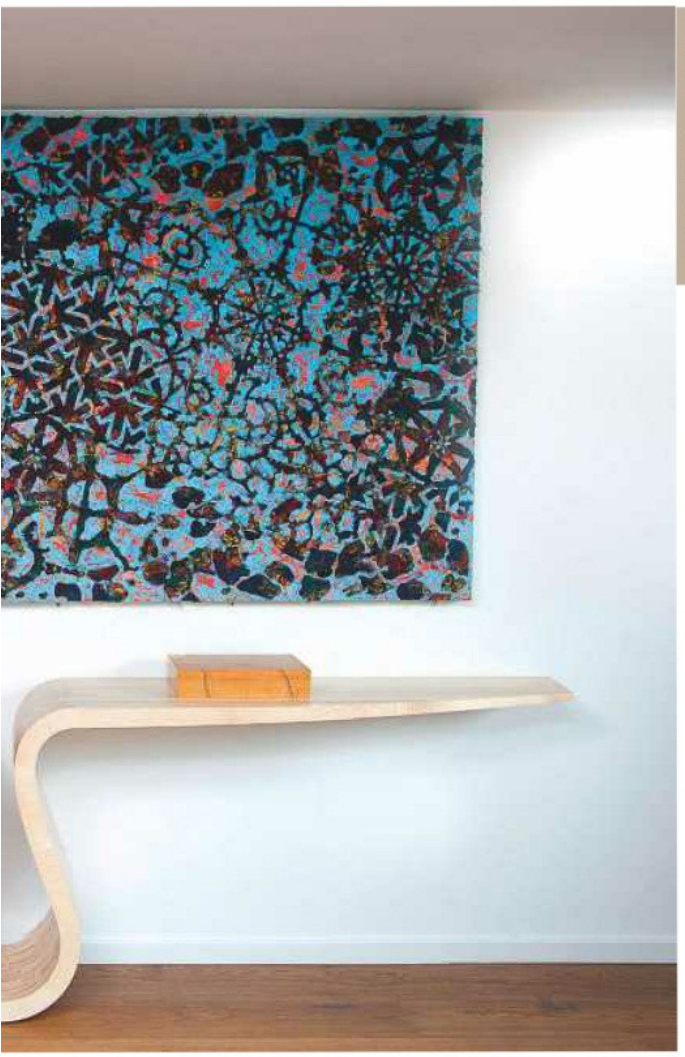
Nick Hobbs was still a student at the Building Crafts College in London when he made this console table from European oak. Inspired by Fenland waterways, he wanted to learn more about tapered laminates and using threaded bar dowels as a jointing mechanism

When Marc Fish came up with the idea for Mollusque 2012 he was exploring the Victorian obsession with natural history. It is made of sycamore, glass and copper and involves a double compound curve





Rachel Hutchinson's telescopic table in solid sycamore and sycamore veneered MDF works with two rotations of the top, allowing it to travel to coffee table height and then up to dining height



Matthew Burt made his Ribbon Angel table in rippled English ash to answer a client's brief for a statement piece to complement the artwork above it

Peter Lloyd's Kissing jewellery box in rippled wild service tree and American black walnut, with dark-blue velvet lining, was perhaps inspired by Salvador Dali's lips couch, but we like the hinging at the back

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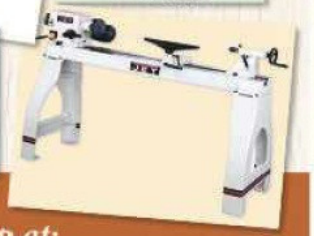

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Chest right

Peter Bishop's coffer is made of solid oak and features fielded panels

To be honest, there was another bit of an incentive to build this piece. I'd bought an expensive router cutter in readiness for a jointing job that didn't happen, and I wanted to see how it worked. So with that excuse at the ready, I was able to design this project in a slightly different way.

Preparing the parts

With some thick planks of waney-edged kiln-dried English oak in hand, I soon had the components marked out (**Pic.1**). I then sawed them to nominal sizes, end-sealed them (**Pic.2**) and stored them inside the house for a couple of weeks to acclimatise.

Once all the framing and lid components were ready, they went back into the workshop to be planed to size (**Pic.3**), and to have their edges squared, (**Pic.4**). I took some trouble over this, as I wanted to make the corners of the chest out of two right-angled components rather than the traditional square post. To make the legs appear solid, I planned to use a cunning router cutter called a mitre lock jointer (**Pic.5**).

Mitre magic

This forms a tongue and a groove on each mitred edge. You can reassemble these in the flat – at 180° to each other – as a variation on a tongued-and-grooved edge joint, although you wouldn't buy this relatively expensive cutter just to do this! The magic appears when you join them at right angles; then the mitred edges interlock to leave an external corner that looks just like solid wood.

To machine the components on the router table, one piece is passed over the cutter flat to the bed, and the other flat to the fence.

A little bit of trial and error with some offcuts of the same thickness eventually produced a good joint for me. It was time to machine the eight pieces that would form my four legs.

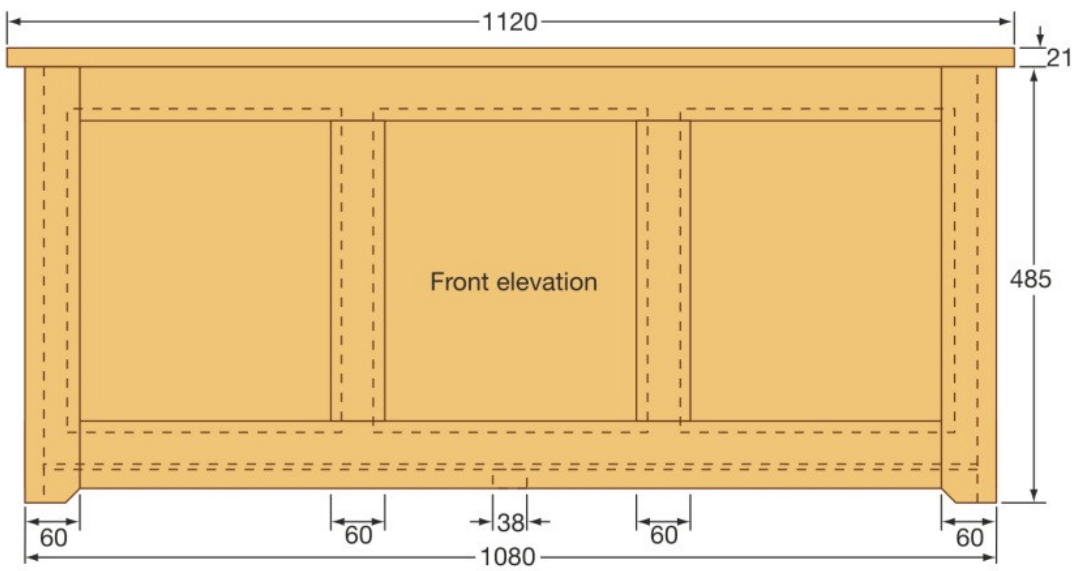
As long as the joint is strong enough, there are some advantages in creating a right-angled corner rather than using a square post. Firstly you don't use so much wood and, secondly, the rectangular base panel doesn't need to be notched to fit round the corner posts.

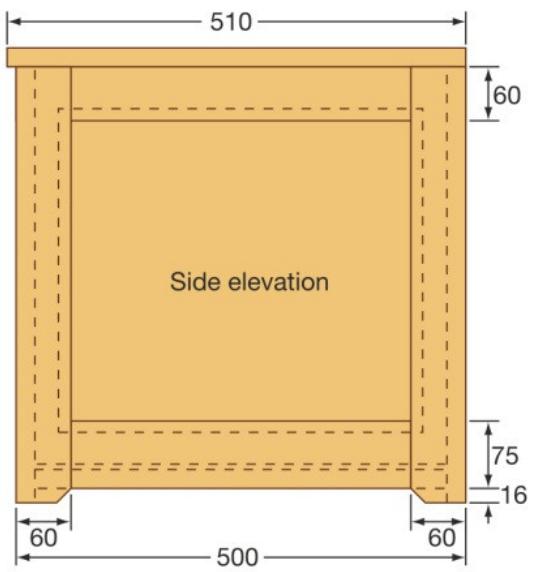
Making the corner joints

I assembled the legs by applying PVA glue to the abutting faces and cramping them up. The critical points here are to make sure that all the excess glue is squeezed out of the joint, and that each corner is a perfect right angle on the outside faces once it's cramped up, (**Pic.6**).

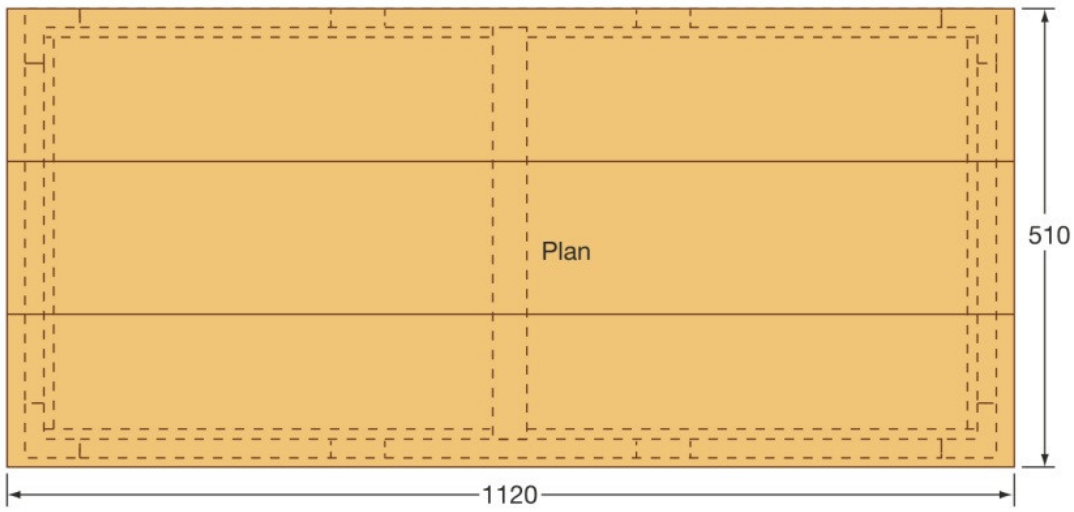
I'd deliberately finished the eight corner components slightly wider and longer than required. Once the glue had gone off I then planed each L-shaped post to its finished width to match the top rails, (**Pic.7**), and trimmed it to length. Now they were ready to be marked out for their

Blanket chest





All measurements in millimetres



joints (**Pic.8**), which I did with the four leg assemblies laid side by side for accuracy.

Cutting the mortises

I set the width of the mortises to match the thickness of the panels. This meant that when the grooves for the panels were cut, the recess for a haunch on the tenons would be formed automatically. Each mortise must be cut parallel to the outside face. So in a mortising machine, the clamping action must force this face against the back fence (**Pic.9**). Cut all the mortises and set the legs aside for now.

Panel imitations

I didn't have enough solid oak for the panels, so I decided to try another cunning technique. I had a quantity of 4mm-thick oak-faced MDF offcuts kicking around from another recent job. With oak on one face only, I decided to stick two pieces together to make flat panels 8mm thick. I spread a generous quantity of PVA glue on the face of one panel (**Pic.10**), and then rubbed the other into it. Each panel was then pressed down with heavy weights, but as their numbers were limited I could tackle only a couple of panels at a time. I needed eight in all…

Before you go any further, now is the time to rout out the 8mm-wide grooves on all the components to accept the edges of these laminated panels. Mark all the edges that need a groove clearly so you don't make a mistake, and then cut all the grooves on the router table.

Dry assembly

With the legs already mortised, I formed matching tenons on the ends of the eight top and bottom rails and trimmed them to fit. I could now dry-assemble the frame of the chest and work out the exact positions of the four muntins at the front and rear. I also marked out the position of the bottom brace that would support the centre of the plywood base panel, and determined its length including an allowance for a tenon on each end.

This done, I cut the mortise holes on the long top and bottom rails and tenoned the muntins to fit, along with the bottom brace. Another dry assembly, just to check, also gave me the opportunity to measure the size of the side and end panels. These were cut to size, plus an allowance for them to fit into the grooves in the panel frames, and then everything was cleaned up ready for assembly for real.

Optional chamfers

By the way, if you want to chamfer the edges of the panel frames, now's the time to do it. Mark the positions of the chamfer stop ends on each dry-assembled frame with a spacer to get

1 When marking out the various components, take care to avoid knots and splits

2 Prepare the rough-sawn components, then seal all the ends to prevent splitting

3 Any 'misses' that occur during surfacing can be removed during the thicknessing stage

BLANKET CHEST CUTTING LIST

All dimensions are in millimetres

Part	Qty	L	W	T
Top	to make	1120	510	21
Leg	8	500	60	21
Long upper rail	2	1080	60	21
Short upper rail	2	500	60	21
Long lower rail	2	1080	75	21
Short lower rail	2	500	75	21
Muntin	4	380	60	21
Front/back panel	6	370	300	8
End panel	2	370	400	8
Base panel (mdf)	1	1200	600	6
Bottom brace	1	500	38	21

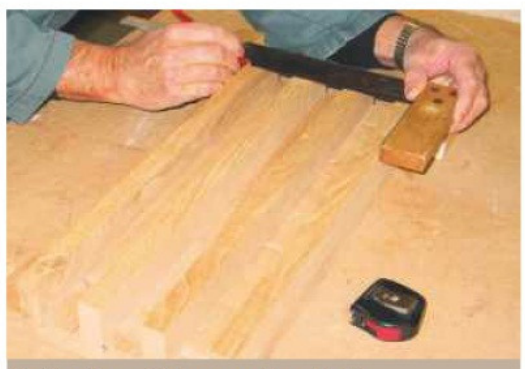
An allowance has been made on all the lengths for cutting joints.
You will also need some 25mm sq softwood battens to support the base panel, and two brass butt hinges, two screw eyes and a short length of chain to secure the lid.

4 Square the edges carefully in preparation for making the L-shaped legs

5 I planned to use this cunning router cutter, called a mitre lock jointer, to assemble the legs

6 Each two-part leg assembly is glued, cramped up and checked for square

7 Plane the oversize legs to their finished size and then cut them to length



8 Mark out the mortise hole positions on the four legs in one operation

9 Position each leg on the mortiser so that the slots are cut in the same place

10 Prepare the panels by gluing one surface and rubbing the other onto it

them all the same (**Pic.11**). Then use another small plastic template to mark the ends of the chamfers at 45° (**Pic.12**). Form the chamfers on the router table and neaten the stop ends with a sharp chisel.

Assembly time

I glued up the front and rear panel assemblies first (**Pic.13**). The joints

went together sweetly without too much pressure, and I checked that the frame was square overall. The other important thing to check is that the legs haven't gone out of square. Some adjustment to the packing for the sash cramps might be necessary to ensure this doesn't happen.

Later, these two panel assemblies were cleaned up and were then linked by the end rails with the end panels located in their grooves (**Pic.14**). Don't forget to put in the bottom brace as you do the assembly; I nearly did! Once the glue was dry, the whole lot was cleaned up.

Adding the base

Pieces of slim softwood batten were then glued and screwed in place around the inside of the bottom rails (**Pic.15**), to support the rectangular base panel. You can see clearly here how my L-shaped legs avoid the need to notch the corners of the base. I used a piece of 6mm-thick MDF (**Pic.16**), marking it out from underneath. After cutting it to size I applied glue along all the battens and on the bottom brace, dropped the panel in place and weighted it down for a few hours to secure it, (**Pic.17**).

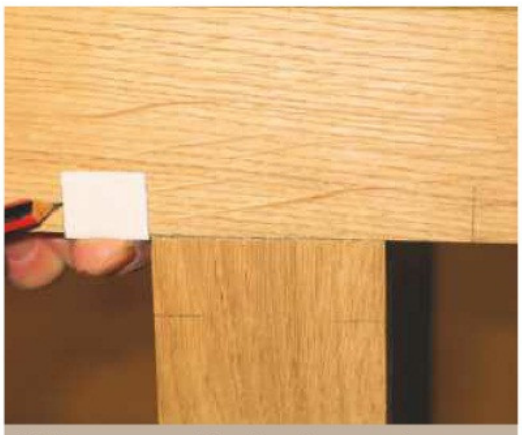
Making up the top

While all this had been going on, I'd made the top out of three pieces of oak. These were planed with square edges, biscuit-jointed (**Pic.18**), glued and rubbed together and then cramped up (**Pic.19**). Later I cleaned off all the excess glue, applied filler as required and sanded the surface smooth.

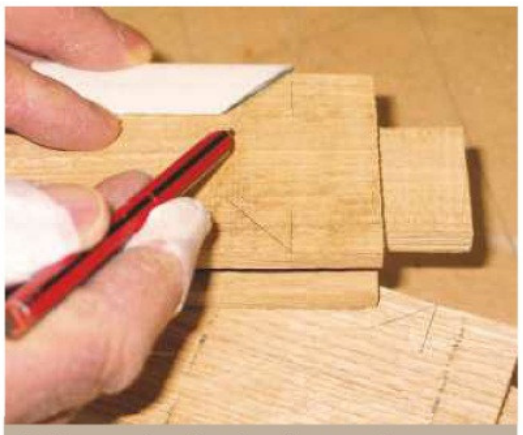
With the chest carcase completed I could work out the finished size of the top. I sliced a strip off one long edge and planed that square. Then I marked the width required and made the second long edge cut working freehand on the bench saw (**Pic.20**). This edge was again planed square; then I trimmed off the top to the required length.

Finishing time

I decided to use an acrylic non-yellowing satin finish on the chest. This is great stuff to apply, but unfortunately it always raises the grain more than an oil- or



11 Dry-assemble the chest and mark the points where the frame chamfers will start and finish



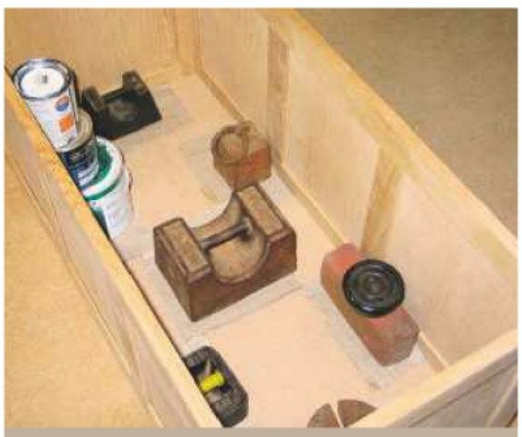
12 Use a simple plastic template to mark out the 45° ends of the chamfers

13 Cut the panels to size, then assemble the front and the back sections

14 Complete the chest carcase by fitting the end rails and panels in place

15 Screw and glue softwood battens to the lower rails to support the base panel

16 Mark the dimensions of the base panel from underneath and cut it to size



17 Spread glue on all the battens, fit the base panel and weight it down

18 The planked top is jointed up from a number of pieces using biscuits

19 Rub the joints and cramp the top up from both sides to keep it flat

polyurethane-based finish. This meant that each coat had to be sanded well back before the next was applied. I applied four coats to the top panel before I was satisfied with its final appearance; just three coats made a good job of the body of the chest.

Selecting the hardware

A trip to B&Q sourced a pack of three decent brass hinges 75mm long, a length of fine brass chain and some strong screw-in eyes.

I fitted the three hinges to the top first. Having marked their positions, I set a straight cutter in my router and removed the bulk of the waste to a depth of about 3mm. I cut the rest by hand, then fitted and fixed each hinge.

Next I put the top onto the main body of the chest free, not fixed, and positioned it where I wanted it. I marked the extremities of each hinge on the back rail and removed the top.

I then cut the ends of the hinge recesses using a fine saw and a square (**Pic.21**), and chopped out the waste with a chisel, (**Pic.22**).

Once the recesses were finished, I placed the top safely on some supports alongside the chest so I could align the hinges with their recesses and drive in the screws.

Pilot holes and a little grease on each screw make sure they go in smoothly, (**Pic.23**).

Adding the safety chain

The chain, about 500mm long, and the screw-in eyes are essential to stop the top from going too far over the back of the chest and straining the hinges. I opened up each eye by holding the threaded end in a vice and inserting a flat-tip screwdriver blade into the closed loop. I then fitted one end of the chain into the first eye and squeezed it closed again. This was the eye to go in the top. I worked out its position and screwed it in, making sure that it was clear of the side rail when the lid closed. I then attached the second eye to the side of the chest, hooked the chain on and closed the eye, (**Pic.24**). Job done, and I was back in my wife's good books!

20 Cut the top to width on the bench saw and square the edges The guard has been removed for clarity

21 Mark the hinge positions and cut the ends of the recesses to depth with a trnonsaw

22 Chop out the waste from each hinge recess to the required depth using a sharp chisel

23 Applying a little grease to each screw thread will help them to drive in easily

24 Fit the eyes and chain to one (or both) sides of the chest to stop the top opening too far

STORAGE

On the case

If you are making a case for heavy books then the right joints and fixings are paramount, says Peter Nicholson

I received a phone call recently from a very pleasant lady, asking if we made bookcases. 'Of course we do,' I replied, and within a few minutes I'd made an appointment to visit her and discuss dimensions, designs and finishes.

As I walked into her lounge, I couldn't help but notice a heap of books lying on the floor in an alcove at the side of the fireplace. "There's the problem," she said. "We fitted one of those shelving systems with metal brackets that are concealed by the shelves, but as you can see they simply weren't strong enough. The top shelf collapsed in the middle of the night and demolished the others like dominoes. It made such a racket that we thought someone had broken in!"

I hadn't the heart to tell her there was nothing wrong with the shelving system: it was the fixings that had failed.

Looking for a theme

When I'm designing furniture I usually try to develop a design theme, or else to find something in the room to match – the existing furniture or décor, for example. On this occasion the bookcase almost designed itself. The alcove where it was to stand defined its overall dimensions. As for its appearance, most of the furniture in the room was made from cherry, all with the same colour and degree of sheen. The left alcove already housed a glazed cherry display cabinet which was an obvious piece to match.

Buying trees

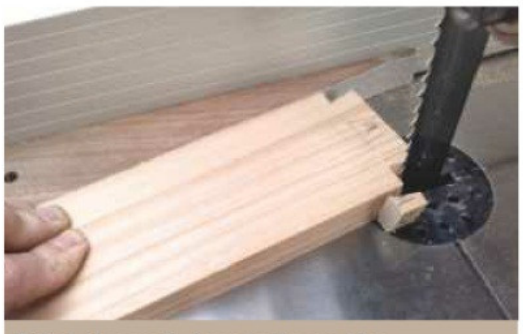
Over the last few years, rather than buying timber from a traditional yard, I've started getting it from a local arborist. This enables me to choose my own timber, and gives me the advantage of worry-free staining and polishing because I know the various components have all come from the same tree. **Pic.1** shows the planked cherry butt I bought recently on my workshop floor, waiting to be examined for best use of grain pattern and location in the bookcase.

1 You get a lot of waney-edge boards when you buy a whole tree!

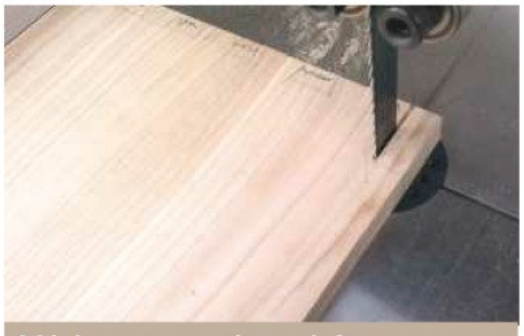
3 Rip each board in half down the middle on the bandsaw...

2 Mark parallel edge lines on each board and saw off the sapwood

4 ...to reveal a pair of perfectly book-matched grain patterns



5 Cut the rail dovetails on the bandsaw against a 1:5 wedge held against the fence



6 Make a cut-out in each front corner of the top and base panels to accept the face frame

Preparing the boards

Using either a chalk line or a pair of long straightedges placed on the timber, (**Pic.2**), mark parallel lines and bandsaw off the sapwood. Then rip each board down the middle (**Pic.3**), and open up the two halves like a book to reveal the symmetrical grain pattern (**Pic.4**).

I used this technique of book-matching on all the bookcase components that will be visible. When butt-jointing these long edges together I use biscuits on the glue line, not only for strength but also to help keep the wet joint from slipping when the sash cramps are tightened.

Adding the rails

After cutting the cabinet sides to size, I lap-dovetailed the base and the bearer rails into the sides using a dovetail rake of 1:5. These dovetails can be cut out on the bandsaw using a 1:5 plywood wedge held against the fence (**Pic.5**). When you mark out the pins, remember to allow for a 20mm rebated back and a 50 x 26mm cut-out at the front to take the face frame. **Pic.6** shows this cut-out being formed quickly and easily on the bandsaw. I then cut the lines of the dovetails on the bandsaw and chiselled out the waste.

Pic.7 shows the base being positioned so the tails can be marked onto the cabinet sides. Note the 20mm shim the base is resting on to create the rebate for the back. **Pic.8** shows the bearer rails being positioned in a similar way. Once the pins are marked out, you can drill out the waste with a twist drill bit fitted with a depth stop (**Pic.9**). It's best to do this with a hand-held drill, as the length of the sides will be difficult to support on a pillar drill. **Pic.10** shows the pins and sockets being cleaned up with a chisel. The main carcass can now be glued up and tested for square.

Adding the face frame

The two uprights that form the face frame are glued to the front of the cabinet (**Pic.11**); I added biscuits along the joint line for extra peace of mind. Sand the uprights smooth before gluing them on. To stop the sander from rounding over their edges, cramp them to the bench and sand them together (**Pic.12**).

A good tip here is to loop a length of chain long enough to touch the floor round your dust extractor (**Pic.13**). This will earth the machine and eliminate any risk of a static electric shock created by the fine dust entering the dust extractor. When the pieces are smooth to the touch, glue them onto the main carcass (**Pic.14**).

Making the base frame

With a large (and ultimately heavy) piece of furniture like this, mortise-and-tenon joints are the obvious choice for the base

frame. Although the bookcase fits snugly into an alcove, it's sure to get dragged out for decorating or cleaning at some point, and 30mm-long tenons will be much stronger than biscuits or dowels.

When making a frame, it's best to keep everything square for as long as possible. When all the mortises and tenons have been cut and checked, you can then shape the legs.

Machine the timber for the legs and rails, allowing 30mm for each tenon. I always cut the mortises first using either a mortise machine (**Pic.15**), or a pillar drill and chisel. These mortises are 12mm wide and 36mm long, and are set 8mm in from the outside edge of the leg.

Tenons and tapers

You can now cut the tenon shoulders on the table saw. Remember that one shoulder is 8mm deep and the other only 2mm deep (**Pic.16**), leaving a 12mm tenon in the middle. Then cut the tenon cheeks on the bandsaw (**Pic.17**).

Once the frame has been dry-fitted together and any adjustments made, you can taper the legs on the bandsaw (**Pic.18**), and remove the saw marks on a disc sander (**Pic.19**).

Before assembling the frame, rout an 8mm groove on the inside face of the rails 8mm down from their top edges. These grooves will enable the base to be fitted to the main carcase using traditional wooden buttons.

Glue and cramp up the frame (**Pic.20**), then fix it to the carcase with a single screw driven through the centre of each button (**Pic.21**).

Adding the back panel

One of the most important aspects of any piece of furniture is its back. Apart from its looks, its main purpose is to stop the cabinet racking from side to side. In the frame construction I've used here, the stiles, rails and muntins all have a 6mm groove routed on their inside edges (**Pic.22**). The rails and muntins have stub tenons 6mm thick and 8mm long cut on the table saw (**Pic.23**), to fit into the

7 Put a 20mm thick shim below the base as you mark the tails on the cabinet sides

8 Prop the bearer rails in place so you can mark the positions of the dovetails on the sides

9 Drill out the waste between the dovetail pins using a twist drill fitted with a depth stop...

10 ...and remove the rest of the waste from the sockets with a really sharp chisel

11 The uprights that will form the face frame fit into the notches cut in step 6

13 Earth your extractor to eliminate the risk of static electric shock from the fine dust

14 Use biscuits for alignment as you glue and cramp the face frame on

12 To avoid rounding over their edges, sand them while cramped together as shown

15 Cut the mortises in the base frame members using a mortising machine or pillar drill

grooves. Any fine trimming that's needed can be done with a shoulder plane (**Pic.24**).

The three 6mm-thick panels can now be machined to fit into the grooves, and the complete back assembly glued and cramped up. Make sure no glue gets onto the panels, as these must be able to expand and contract within the frame as the humidity changes. When the glue has dried, sand the completed back assembly smooth (**Pic.25**), and screw it into its rebate.

Preparing the top

Machine the timber for the top to its finished size. I routed a simple cove moulding on the underside to make the bookcase more delicate in appearance (**Pic.26**). The finished profile is shown in **Pic.27**; note the small rebate that I've added just below the cove to create a shadow line.

Screw the top onto the bookcase carcase through the bearer rails. Counterbore the holes so they can be filled with wooden plugs. Use a plug cutter to form several plugs; then cut them out on the bandsaw (**Pic.28**). After driving in the screws, glue a plug into each counterbore, chisel off the excess and sand it smooth.

Standards and cleats

This is my preferred way of making shelves adjustable. Not only is it very strong; it also looks good. It consists of two pairs of standards containing semi-circular holes. To make a pair, machine timber at least double the width of each standard and mark a centre line along the length. Then drill the holes on the centre line in accordance to the required shelf spacing (I used a 25mm Forstner bit) and cut the piece along the line on the bandsaw (**Pic.29**).

Make the matching cleats just loose enough to fit with ease; a disc sander is helpful here (**Pic.30**). **Pic.31** shows all the finished standards drilled with their clearance holes and ready for installation.

There are five shelves in all, which need a notch cut in each corner on the bandsaw so they'll fit neatly round the standards (**Pic.32**).

When they're ready, screw the standards

CHERRY BOOKCASE CUTTING LIST

All dimensions are in millimetres

Part	Qty	L	W	T
CABINET				
Side	2	1594	304	26
Top	1	880	355	26
Base	1	820	310	26
Bearer rail	2	820	100	26
Face frame	2	1594	50	26
Standard	4	1542	22	15
Cleat	10	260	20	15
Shelf	5	778	282	26
BASE				
Front/back rail	2	784	60	26
Side rail	2	284	60	26
Foot	4	180	53	53
BACK				
Stile	2	1594	100	20
Rail	2	618	100	20
Muntin	2	1414	70	20
Panel	2	1414	173	6

16 Cut the tenon shoulders on the table saw; note that they're offset

17 Cut the tenon cheeks on the bandsaw; take care not to overshoot

18 After a dry assembly of the frame, you can remove the legs and cut the tapers on them

19 Remove the bandsaw marks from the tapers using a disc sander

standards to the bookcase sides, fit the cleats and position the shelves, (**Pic.33**).

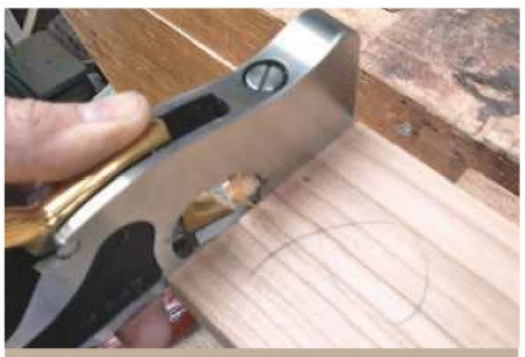
Finishing touches

Strip the completed bookcase down to its separate components and sand them all down to 320 grit. I had to mix up various oil stains to get the colour I wanted. I applied the stain with a brush and then wiped off the excess quickly. When the stain was dry I applied a coat of linseed oil, followed by several coats of shellac once the oil was dry. The final stage was to wax the surface with fine wire wool.

21 Attach the frame to the carcase with a screw through each button

22 Rout a 6mm groove in the inside edges of all the back frame parts

23 Cut stub tenons on the rails and muntins to fit into the grooves

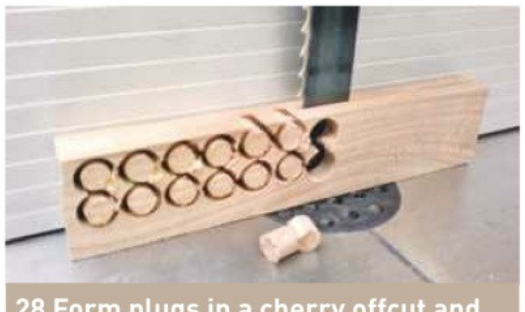


24 Trim the tenons with a shoulder plane if necessary to get a good fit

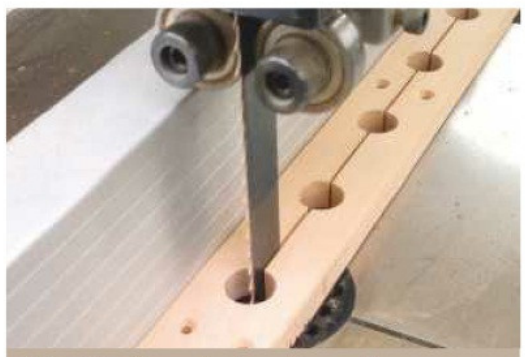
25 Sand the assembled back smooth and screw it into its rebate

26 Cut the top panel to size and rout a cove moulding on its edges

27 You can add a small rebate just below the cove to create a shadow line



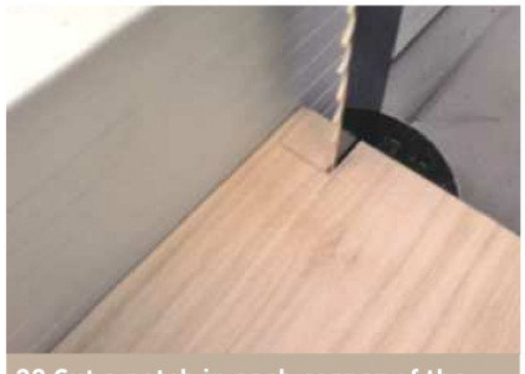
28 Form plugs in a cherry offcut and cut them off on the bandsaw



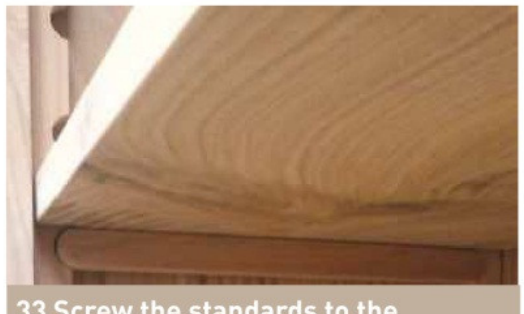
29 Drill 25mm holes down the centre line and saw the standard in half

30 Cut the cleats to size and then round their ends on the disc sander

31 The finished set consists of four standards and ten cleats, ready for fitting into the carcass



32 Cut a notch in each corner of the five shelves so they'll fit round the standards



33 Screw the standards to the bookcase sides and fit the cleats and shelves

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Tables & chairs

We start this section with a sequoia occasional table by Ken Stratford while Duncan Rose goes back to the early days of Ercol with his nest of three tables that takes inspiration from the great Lucian Ercolani. Meanwhile Roger Berwick's dining chairs are inspired by Charles Rennie Mackintosh and Peter Bishop contributes a glass-topped coffee table

The simplest table can be made special by the use of the right timber and Ken Stratford's choice of sequoia works a treat here

Red & white contrast

At first I thought of cutting the two boards into blanks and turning them into stools or bowls, but in the meantime I decided to clean up one of them. It was then that I saw the wonderful potential of the wood, with its superb colours of deep red and creamy white. I also had an old plank of ash which would do for the legs, so I decided to make a low occasional table from the wider piece.

Preparing the board

I used 60-, 80- and 120-grit abrasives in my belt sander to clean up the top and the underside, then finished off with the orbital sander. I soon saw the beauty of the wood starting to reveal itself, and continued until I was happy with the result. I then started sanding the edges of the board after setting it upright on two saw-stools and using a couple of blocks of wood fixed with G-cramps to hold it steady. I did all the sanding out of doors because of the amount of dust that I was generating.

Marking the curves

I marked out the sanded board using a couple of paint tins and my old carpenter's compasses (**Pic.1**), to give an attractive asymmetric shape to the ends. I highlighted the pencil lines in chalk and scored along the lines with a Stanley knife to prevent break-out while I used my jigsaw to cut the shapes. After sanding the ends in the same way as before (**Pic.2**), I polished the top and underside of the board using our household floor polisher and some Liberon Black Bison clear wax (**Pic.3**).

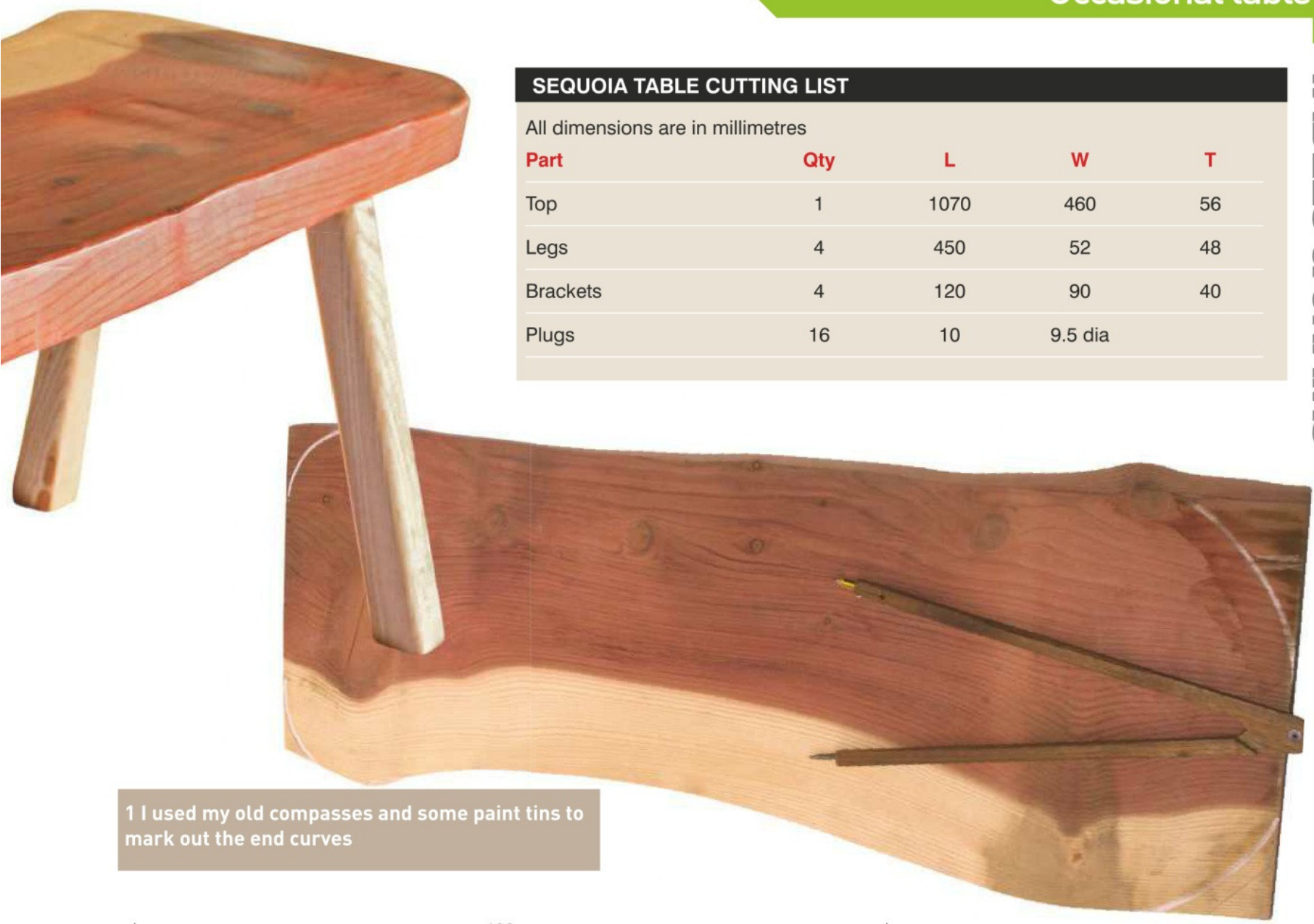
Designing the sockets

My thoughts now turned to fixing the legs. I could have just drilled four holes into the underside of the table and turned spigots on the legs to fit, but I really wanted to do something different. I didn't think framing or part-framing would be suitable, so I decided to make some sockets instead.

Each socket was made from a piece of ash measuring about 130 x 110 x 40mm, marked out as shown in **fig 1**. The angle between the table top and the legs is 75°. The sockets are located at an angle of about 45° beneath each corner of the table top to give an attractive splay to the legs, as you can see in the main picture above.

Marking out the sockets

Once you've marked out each socket, cut off a wedge with the bandsaw (**Pic.4**). Leave just enough wood to allow planing down to the lines. Don't cut the shape yet, though; it's easier to grip a block in the vice than an awkward wedge. Hold the block with the bevel as near horizontal as



1 I used my old compasses and some paint tins to mark out the end curves

SEQUOIA TABLE CUTTING LIST

All dimensions are in millimetres

Part	Qty	L	W	T
Top	1	1070	460	56
Legs	4	450	52	48
Brackets	4	120	90	40
Plugs	16	10	9.5 dia	

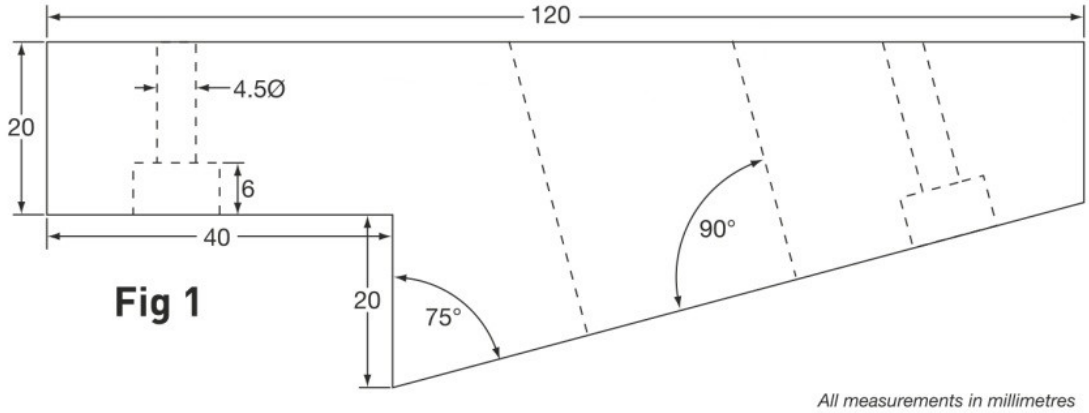
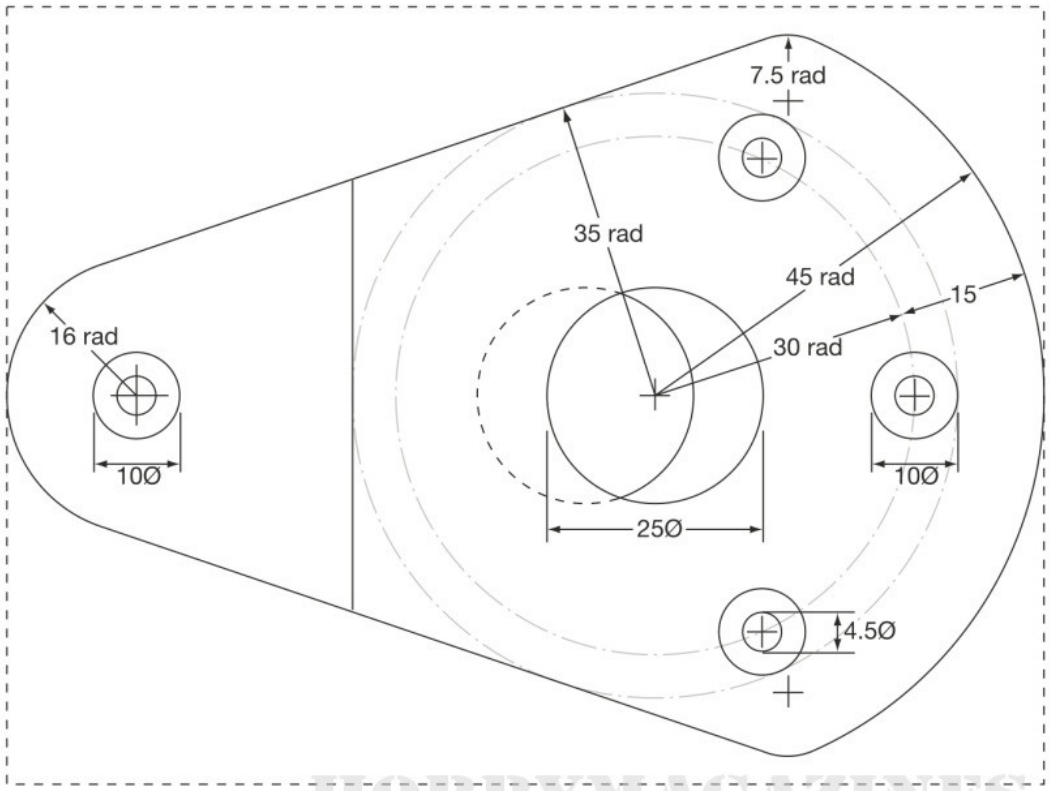


Fig 1

All measurements in millimetres



possible and plane it down to the pencil line with a very sharp plane. Try to get a good finish both along and across the grain; then use the template to mark out the shape of the socket (**Pic.5**).

Making the sockets

On the first socket I made, I cut out the shape first on the bandsaw (**Pic.6**), and then used a tenon saw to cut the step. Once the sockets were cut to size and shape, I fixed each one in turn in the vice using a wedge-shaped offcut for packing, and sanded them all round to remove the arrises. I then used my template again to mark the positions of the screw and leg holes. I used a 4.5mm drill bit for the screw holes, a 10mm bit for the counterbores (**Pic.7**), and a 25mm saw-tooth Forstner bit for the leg holes (**Pic.8**). Again I used a wedge-shaped offcut on the pillar drill to keep things as horizontal as possible, and placed a piece of non-slip matting between the parts to reduce the risk of the whole lot spinning out of control. The pillar drill was set to a depth of 6mm for the counterbores, while the leg holes were drilled all the way through.

Making the legs

The legs were cut and squared off on my table saw to give me four pieces of ash measuring approximately 450 x 52 x 48mm. I marked a line 25mm from the

top end, squared it all round and used the marking gauge to mark the outline of a 25mm square stub, which I cut to shape on the bandsaw (**Pic.9**). I then removed the arrises from the stubs with a sharp chisel and turned them to form a round spigot. Then I removed the arrises on the legs and turned down their tops, (**Pic.10**), to make a feature of the join where the spigot enters the socket.

Fitting and finishing

I was now able to test-fit the legs in the sockets (**Pic.11**). I thought that I'd made every piece the same. However, I found that the legs fitted the sockets slightly differently, so I paired them up to get the best fit and numbered them accordingly.

Next I covered each spigot with masking tape and polished the legs with clear wax. I like using Liberon Black Bison clear wax because it's easy to apply and gives a really good finish.

Trial and error

With such an unusual shape, I wasn't sure precisely where to fix the sockets. I knew that at one end the legs would be closer together than at the other. When I made the legs they came up oblong, and I wanted to have their wider faces parallel to the sides of the table and keep the splay at 45° to the sides and ends. This was achieved by treating each end individually. I placed the sockets at the narrow end first and took some measurements (**Pic.12**). I then tried to mirror this idea at the wider end. Perhaps I should have made the table top a simple rectangle to start off with, but everything worked out fine in the end.

Fixing the sockets

When I had decided where to fix the sockets, I placed them on the underside of the top and marked round each one with a pencil. I sanded the wood within the outline of each socket with 60-grit abrasive to remove the polish and give a key for the glue.

I then brushed Titebond Ultimate 3 glue onto the underside of each socket in turn and screwed them on. Fix one end of the socket first to hold it in place, and don't over-tighten the screw.

Wipe off excess glue with a damp cloth immediately to prevent staining. **Pic.13** shows all the sockets fixed in place, ready for the counterbores to be plugged.

The plugs can be made from any hardwood – ash would be the logical choice, but I used an offcut of mahogany to give a contrast.

When the glue is dry, cut the plugs just proud of the surface with a chisel and use a sharp fine-set block plane to bring them flush (**Pic.14**).

Fitting the legs

Polish the sockets, taking care not to get wax in the leg holes, and re-polish any surfaces where detail sanding has taken place. Smear glue onto each leg spigot and insert it into its matching socket (**Pic.15**). A slight twisting motion is helpful to ensure even glue coverage. Also make sure that the corners are aligned the correct way. Wipe off any excess glue and allow to dry.

Getting things level

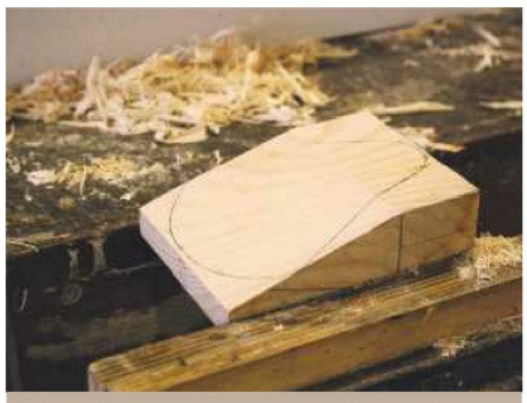
The last thing to do is to get the table to stand level, which means scribing round and trimming the lower ends of the legs. Stand the table on a flat surface (**Pic.16**), and get the top level using wedges of scrap wood and offcuts of non-slip mat beneath the four feet.

Because of the splay of the legs, it's not possible to get close enough to scribe each one using just a block of wood of the right height, so I used a block plus the blade from my combination square to overcome the problem (**Pic.17**). This method enabled me to reach out over the packing piece and get to the leg where it slopes away on two edges. In all modesty, this worked really well.

Make sure that you're happy with the level. Then turn the table on its side and cut each leg at the scribed line.

Job done!

4 Mark out each socket and cut off the wedge on the bandsaw



5 Use the template to mark out the curved shape of each socket

2 A jigsaw made light work of cutting the curved ends, which I then sanded smooth

6 Cut the socket shape on the bandsaw, then cut the step by hand

3 Our household floor polisher soon had the tabletop beautifully waxed

7 Drill the counterbores in the sockets first, then tackle the screw holes

8 Finally, use a 25mm saw-tooth Forstner bit to drill the holes for the legs

12 Position the sockets at the narrow end and take some measurements

13 Use these to position the other sockets, then fix them all in place

9 Mark out and cut a 25mm square stub on the end of each leg

10 Turn the stub to a spigot and create a rounded chamfer on the leg as shown

14 Conceal the screw heads by gluing contrasting wooden plugs into all the counterbores

16 Stand the table on a flat surface and pack under its feet to get it level

11 Test-fit the legs in the sockets; then select and label the pairs with the best fit

15 Apply glue to each spigot and twist it slightly as you push it into place to spread the glue

17 Use a pencil, block and straightedge to scribe each splayed leg, then cut it to length

Table trio

Duncan Rose takes inspiration from Lucian Ercolani's retro designs

This set of tables was commissioned for a modern sitting room to complement an existing coffee table made from American cherry. This is an attractive fine-grained hardwood with a reddish colour that varies through the grain.

The tabletops are shaped with gentle curves along their sides, and their edges are rounded with an elliptical 'thumb' profile. The corners have a generous radius. The proportions of the large tabletop are maintained in the two smaller ones that make up the nest. The leg and rail edges are softly rounded – a detail that adds to the gentle flowing lines of the tables.

Design and approval

The tables were quickly drawn up using CAD software, and the client approved the design with just a couple of minor tweaks. The CAD process is very useful for things like checking the nesting clearances and scaling the tabletops. Making three tables to the same design can be a little repetitive, so I decided on a simple construction.

Traditional nests of tables include runners to guide and support the stack. Our design brief was to omit runners. Also the smallest table in the nest sometimes includes a top rail along the fourth side, but my client said no this time. Client always right, etc!

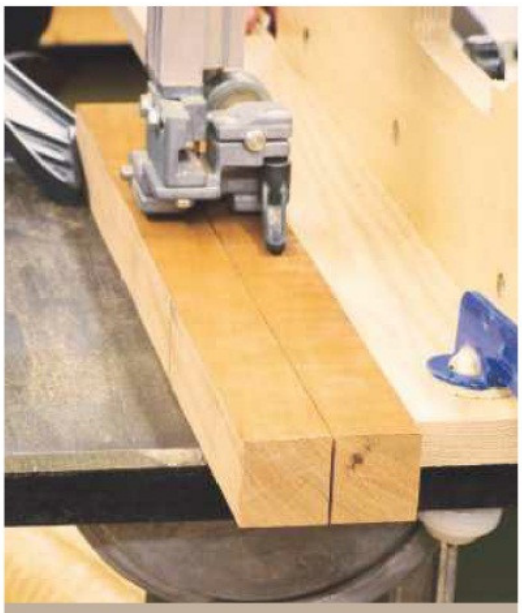
Selecting the stock

I had some suitable cherry in stock and fully acclimatised, so I was able to start

NEST OF TABLES CUTTING LIST

All dimensions are in millimetres

Part	Qty	L	W	T
LARGE TABLE				
Leg	4	430	32	32
Upper rear rail	1	430	70	20
Lower rear rail	1	430	32	20
Upper side rail	2	276	70	20
Lower side rail	2	276	32	20
Spacer	1	400	50	20
Top	1	550	406	20
MEDIUM TABLE				
Leg	4	400	32	32
Upper rear rail	1	306	70	20
Lower rear rail	1	306	32	20
Upper side rail	2	189	70	20
Lower side rail	2	189	32	20
Spacer	1	276	48	20
Top	1	420	312	20
SMALL TABLE				
Leg	4	370	32	32
Upper rear rail	1	187	70	20
Lower rear rail	1	187	32	20
Upper side rail	2	104	70	20
Lower side rail	2	104	32	20
Top	1	296	220	20

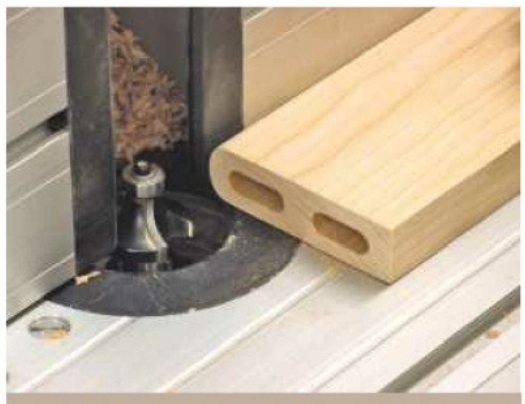


1 Use the bandsaw to rip the various table components to width, then cut them to length on the mitre saw

2 Flatten, square and thickness the legs and rails ready for jointing

3 Cut the mortises in the legs. I'm planning to use loose tenons (Dominos) here

4 Round over the long edges of the legs using an ovolo cutter in the router table



5 Use the same cutter to soften the exposed edges on the upper and lower rails

work straight away. I started by checking the boards for any unwanted knots, damage or splits, before allocating and marking out the boards to make up the tops, rails and legs.

I made all the table parts from 25mm-thick sawn boards except the legs, for which I used boards 38mm thick.

The cherry tree typically grows with a generous amount of pale-coloured sapwood. It is generally regarded as acceptable for sawyers to include sapwood in sawn boards where this is visible on only one face. I allocated the more attractive boards without any visible sapwood for the tabletops, to give the best appearance and dimensional stability. The legs and lower rails were also made from boards having little sapwood visible, as I didn't want it to be a feature. The upper rails were made from cherry that included sapwood only on their inner faces.

Preparing the parts

Next, the various table parts were rough-cut to their approximate sizes. Traditionally, table legs and rails are jointed together using mortises and tenons. However, to save time I decided

6 Give the legs and rails a thorough sanding before you start the assembly

to use floating tenons instead. If you do use traditional mortises and tenons, remember to make the rails longer to allow for the tenons.

I used a mitre saw for the crosscuts and the bandsaw for ripping (**Pic.1**). I then flattened, squared and thicknessed the legs and rails to their final sizes before trimming them all to length (**Pic.2**).

Cutting the mortises

To make the frames, mark out the positions of the leg and rail joints and then cut them.I used a proprietary hand-held jointer (mine's a Festool Domino) to cut the mortises for the floating tenons, (**Pic.3**).

To soften the appearance of the legs I rounded over their long edges. I machined them using a 6mm-radius ovolo cutter in the table router, (**Pic.4**). This resulted in a flat central portion 20mm wide along each leg face – just wide enough for the rails. While the router table was set up, I used the same cutter again to soften the exposed edges on the upper and lower rails (**Pic.5**).

Give the legs and rails a thorough sanding before the glue-up begins (**Pic.6**). This saves time later by making the final sanding, before applying the finish, very quick and easy to complete.

Making up the frames

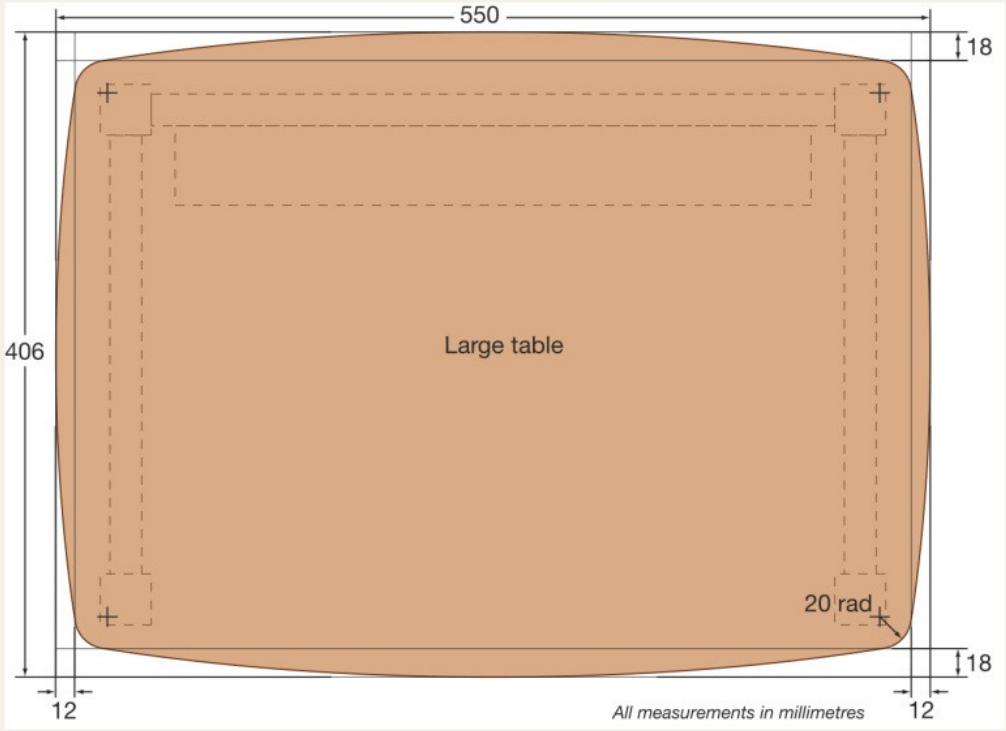
Next you can glue up the legs and rails. I used PVA adhesive, spread over all the contacting surfaces using an artist's brush. To make assembly easier I glued each frame up in two stages. First the pairs of side rails and legs were glued together and allowed to dry (**Pic.7**). Then the rear rails were glued in position to complete each frame assembly. Cramp the frames tightly and leave them to dry, after checking that they're square. Remove all excess glue immediately, as cherry is very absorbent.

Drilling pocket holes

You can fix a tabletop to its frame in several ways, including buttons and slotted angle brackets. I decided to use pocket hole screws on this nest of tables as there are then no protruding fixings to mark the tables when they're stacked together. The screws are driven into the underside of the top through the upper rails.

Mark and drill the holes using a pocket hole jig (**Pic.8**); I drilled two through each side rail and three through each rear rail.

As the tabletops are made from solid wood, the fixings must allow for timber movement in the top. I drilled standard pocket holes along the rear rails and made wider 'slotted' holes in the side rails. You can make these simply by



DRAWING THE ARCS

Marking out the tabletop templates is straightforward. Just use the dimensions in the table, and follow the simple instructions below. The drawing above shows the process for the large tabletop.

1 Draw a rectangle representing each tabletop on the MDF sheet, using the three sets of length and width figures given under 'arc span' in the table.

2 Draw a second line along each side of the rectangle (**Pic.A**), inset from the first one by the required 'arc height'.

3 Set a bow so it spans a side of the rectangle with the required arc height. Tensioning the bow is done by trial and error, by holding the bow in position and adjusting the tension stick until a match is achieved. The August 2011 issue of *The Woodworker* describes using this technique to draw arcs like this in more detail.

4 Place the set bow in position and mark the arc pairs on the template (**Pic.B**). Repeat for the length and width of each tabletop.

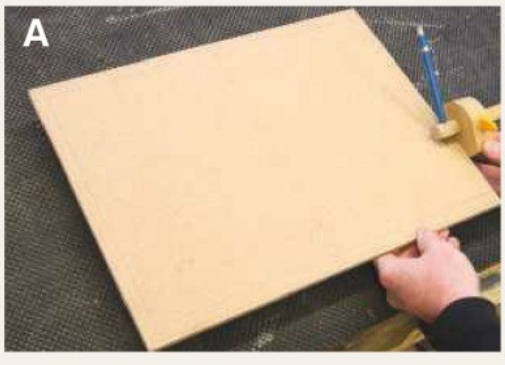
5 Finally draw in the four corner circles to a radius of 20mm, so they just touch the arcs along each side.

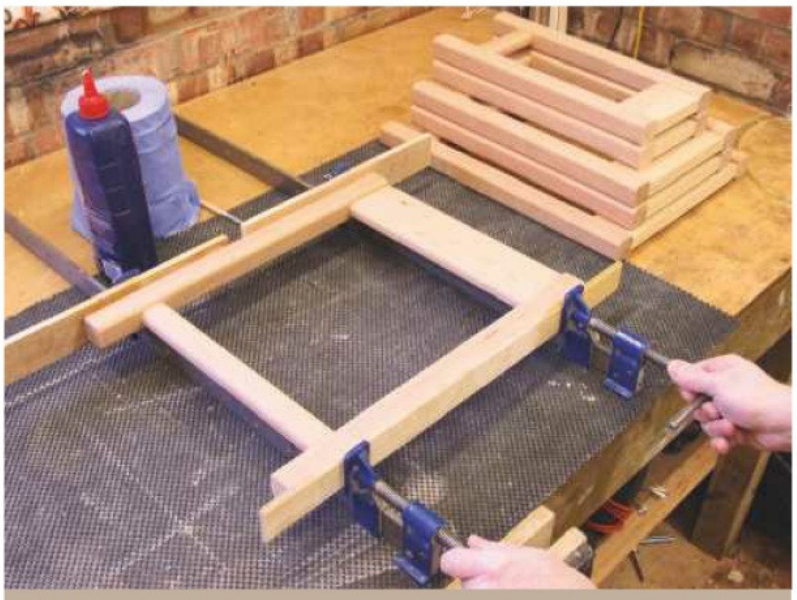
6 Rough-cut each of the three templates close to the marked tabletop outline; I used the bandsaw to do this (**Pic.C**).

Then sand their edges back to the line and check that they're smooth to the touch (**Pic.D**).

ARC SPANS AND HEIGHTS

Table dimension	Arc span	Arc height
LARGE TABLE		
Length	550	18
Width	406	12
MEDIUM TABLE		
Length	420	13
Width	312	9
SMALL TABLE		
Length	296	10
Width	220	7





7 Glue up each frame in stages, starting with a pair of legs and the side rails

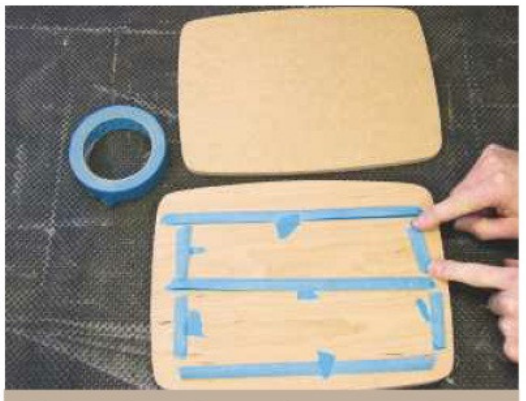
8 I decided to attach the tops with pocket hole screws, and drilled holes in the top rails

9 Thickness to 20mm the cherry boards that will make up the three tabletops

10 Fit biscuits in the board edges to help align the joints during the glue-up

11 Glue up the top boards and cramp them as shown to ensure that they dry flat

12 Mark each tabletop profile on its panel using the appropriate template



13 Attach each template securely to its panel with double-sided adhesive tape

drilling a second pocket hole alongside the first, offset by about 4mm.

Tabletop templates

The next stage is to make exact templates in the required shape of the three tabletops. I've always found that the benefit of having templates for shaped work like this easily outweighs the extra effort that's involved in making them. They allow me to get the shape exactly right before committing it to the expensive hardwood.

Made from MDF sheet, templates are easy to cut and the edges are quickly sanded smooth. Once made, the template shape can be transferred quickly and accurately to the hardwood tabletop using a bearing-guided router cutter.

Making the tabletops

Now you can make up the three solid cherry tops for the tables. To aid stability, I used several narrower pieces of cherry that were planed to a thickness of 20mm, (**Pic.9**), and then rub-jointed them together using PVA adhesive. Arrange the pieces for best appearance and with alternating growth ring directions.

Adding biscuits along the joints is useful for maintaining alignment of the faces during assembly (**Pic.10**). Glue up the pieces and cramp them together until the glue is dry (**Pic.11**).

When the glue is dry, remove the cramps and sand the tabletops until they're perfectly smooth.

Shaping the tops

The next task is to shape the tabletops and round over their edges. Start by placing each template on its top and marking out the required shape (**Pic.12**). Rough-cut each top, making it a few millimetres larger than its final size. Then attach the template securely to the top with double-sided adhesive tape (**Pic.13**).

Use a bearing-guided straight cutter fitted in the table router and cut each tabletop carefully to shape (**Pic.14**). Avoid scorching the wood by keeping the work moving and using a moderate cutter speed.

Remove the templates from the tabletops and round over both edges. Here I used a traditional elliptical 'thumb' profile cutter 20 x 8mm in size, fitted to the table router (**Pic.15**).

Attaching the tops

It's now time to fit the tabletops to their frames using pocket hole screws.

14 Cut each tabletop accurately to size on the router table using a bearing-guided straight cutter

15 Remove the templates and round over both edges of each tabletop

16 Align each frame on its tabletop and drive in the pocket hole screws to attach it

17 Prepare the spacer blocks and screw them to the rear rails of the top two tables

18 Remove the top for finishing and fit four screws as shown to act as temporary supports

19 Apply finishing oil with a foam brush, sanding down lightly between coats. Then wax it

Position the frame in the centre of the upturned top and drive the screws in through the holes you drilled in the rails earlier. Fit the rear rail screws first, followed by the side rail screws (**Pic.16**). Make sure the side rail screws are positioned centrally in their slots to allow the top to move if it wants to.

Simple spacers

Next, make a pair of spacer blocks so the tables stack neatly. I made the spacer widths to inset the nested table frames by 11mm and the tops by 15mm.

Screw the spacers to the rear rails of the two larger tables (**Pic.17**). Position them low on the rail so they don't touch the tabletops. Spacers and runners could also be added to the side rails if required.

The final stages

Disassemble the frames, tops and spacers and sand all the pieces one last time. Check for and remove any unwanted blemishes, machining and pencil marks.

Remove any dust with a tack cloth and apply your chosen finish. Temporarily fitting the tabletop fixing screws provides a handy means of supporting the tops during finishing, (**Pic.18**).

I applied finishing oil with a foam brush (**Pic.19**), rubbing down with fine wet-and-dry abrasive between coats. A final coat of wax gives a pleasingly smooth finish.

When you finally reassemble the tables, leave the screws in the side rails slightly loose to allow for any movement.

Take your Mackintosh

Roger Berwick was asked to make 12 dining chairs in the style of Charles Rennie Mackintosh

This commission came my way recently from a local couple. They had bought a property that incorporated some very striking architecture influenced by Charles Rennie Mackintosh. They asked me to design a suite to be the centrepiece in their large dining room, and wanted the Mackintosh theme to be continued in the furniture.

After some discussions and some research, the design of the suite was agreed. The chairs were to follow the famous high-backed style Mackintosh created for Miss Kate Cranston's Willow Tea Rooms in Glasgow. The large rectangular table was to be accompanied by two small semi-circular ones which could be attached to the ends, enabling 12 to dine in comfort. When not in use, these would stand against the dining room wall, acting as a pair of side tables. However, it's the making of the chairs that I want to describe in this article.

The daunting dozen

The first and possibly most important aspect of any commission is the sourcing of suitable timber for the project. I had ordered some first-quality oak to use for the front and rear legs of the chairs, and was quite shocked when just two very large boards were delivered outside my workshop. There was no way I was going to be able to carry them in on my own, so I decided to cut them up into more manageable pieces where they lay using a portable circular saw (**Pic.1**). I was then able to cut these down further on the table saw before thicknessing the stock to the desired size.

Start at the back

The back legs are 1.5m tall. Knowing I had to make 24 matching ones, I started by making a rod – a full-size template – from 12mm thick birch-faced plywood. This could then be screwed onto each leg blank in turn (**Pic.2**). I located the fixing screws to coincide with the positions of the frame mortises I'd be

1 I had to cut up the waney-edged European oak boards where they were delivered

2 A 12mm-thick plywood rod guaranteed that all the back legs would be identical

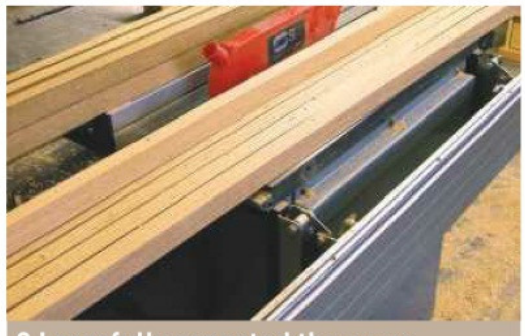
3 After screwing the rod to each blank, I removed the excess timber on the bandsaw

4 This left a couple of millimetres all round for cleaning up on the spindle moulder

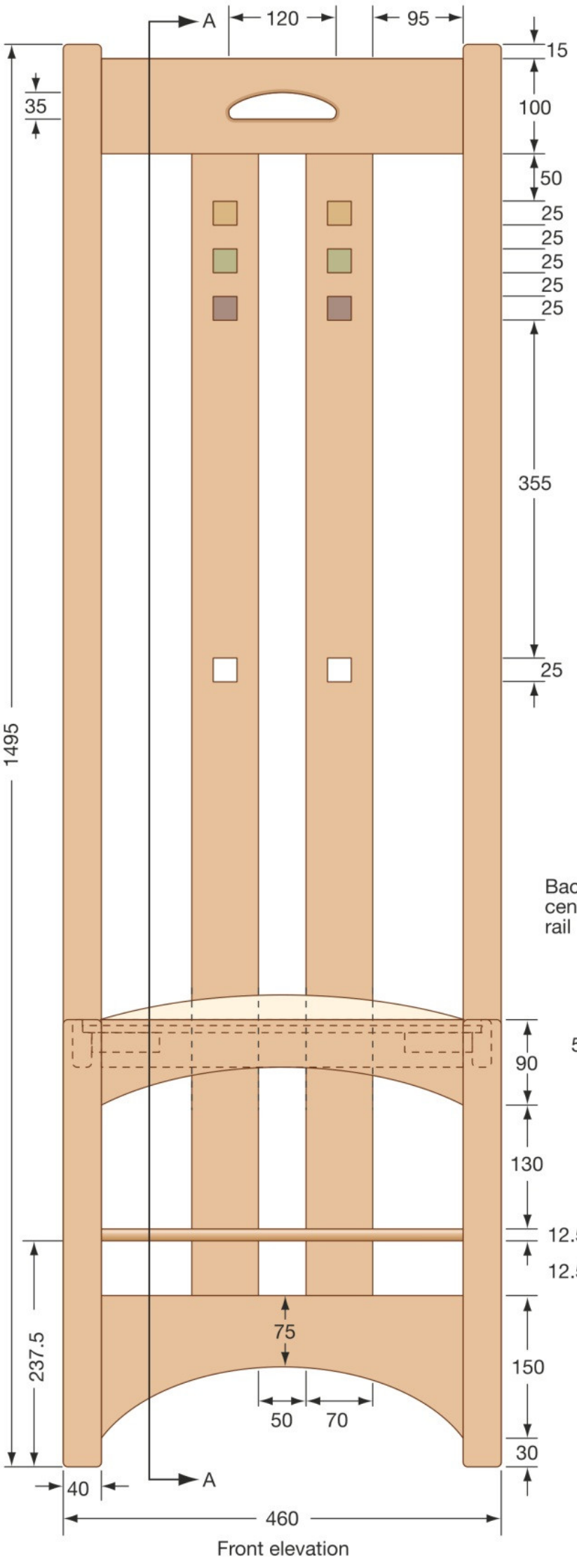
5 A ring fence above the standard cutter block allows you to tackle curved work

6 Most of the excess timber was removed in a single continuous movement

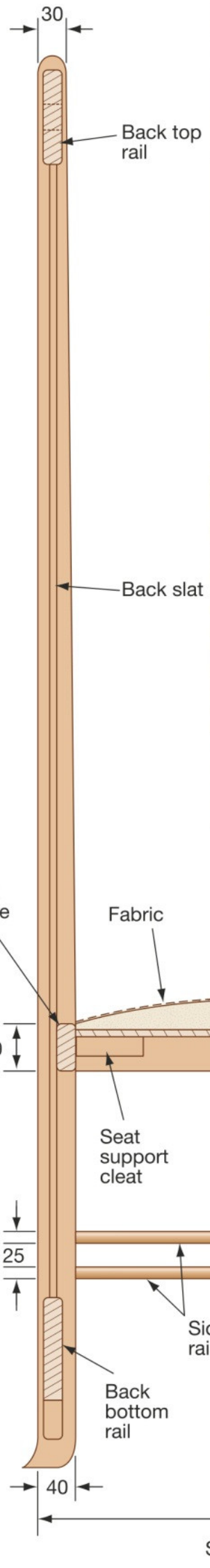
7 To avoid breakout, the top end of each leg was cut by hand and then sanded to shape



8 I carefully repeated the same procedure until I had all 24 legs completed



Front elevation



Section A-A

9 I was then able to sort them into pairs so the colour and grain pattern was a good match

All measurements in millimetres

cutting later so they'd be removed.

I then cut away the excess oak on the bandsaw (**Pic.3**), taking great care not to damage the rod. I tried to get the cut as close to the rod as possible (**Pic.4**), leaving about 3mm to clean up on the spindle moulder.

Moulding with care

The majority of the work done on a spindle moulder relies on straight work being fed against the fence. However, it's also very versatile for tackling curved work, using a ring fence instead (**Pic.5**). This sits above the standard cutter block and rests against your template – in this case the plywood rod – and if carefully set will trim away the excess to leave a perfectly clean edge.

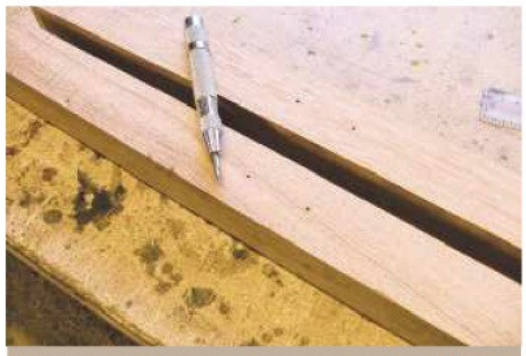
Care must be taken when presenting the wood to the cutting edge, using the lead-in finger on the guard to prevent any chance of kickback. The majority of the excess timber was easily removed in a single continuous movement (**Pic.6**).

I chose to let the cut run out at the top of each leg where there was the greatest risk of breakout (**Pic.7**). I then finished the cut with a tenon saw before sanding it to round on my belt sander.

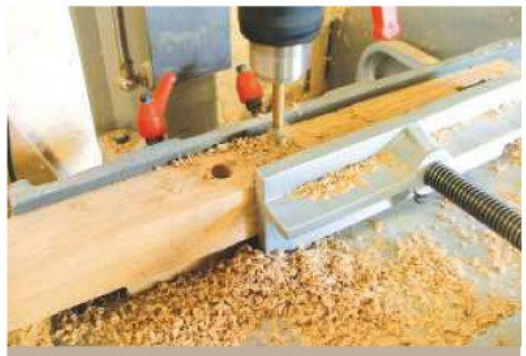
I kept following this procedure and the pile of back legs started building up (**Pic.8**), until all 24 were cut. I then paired them up (**Pic.9**), so the grain characteristics of each pair were a close match.

Preparing the joints

The seat rails will be fixed to the legs with traditional mortise-and-tenon joints for



10 I marked and centre-punched the positions of all the holes for the lower side rail dowels



11 The holes were drilled precisely in line using a Jacobs chuck in my bench mortiser

12 Then all the back legs were mortised ready to accept the chair rails

MACKINTOSH CHAIRS CUTTING LIST

All dimensions are in millimetres. Quantities are per chair

Part	Qty	L	W	T
Front leg	2	470	40	40
Back leg	2	1500	40	40
Front rail	1	460	90	20
Front dowel rail	1	460	12 dia	
Side rail	2	460	50	20
Side dowel rail	4	460	12 dia	
Back top rail	1	460	100	20
Back centre rail	1	460	50	20
Back bottom rail	1	460	150	20
Back slats	2	1270	70	15
Seat panel (plywood)	1	460	460	6
Seat support cleat	4	100	100	20

All dimensions allow for cutting joints where applicable.

13 Cutting the mortises on the front legs was much more straightforward

14 The finished front and back legs added up to almost 50 components

strength. However, the lower side rails are made from 12mm-diameter dowel, let into holes drilled in the legs.

After marking the positions of the holes, I centre-punched them for accuracy, (**Pic.10**), before drilling them using a saw-tooth bit. Instead of using my pillar drill for this, I put the optional Jacobs chuck into my bench mortiser (**Pic.11**); the sliding table then ensured that the dowel holes were exactly in line.

Having drilled these holes I then prepared all the mortises and set the 24 completed legs aside (**Pic.12**).

It was time to turn my attention to the front legs. Compared to the long finely tapered back legs, these were easily cut and planed to their square profile. I then cut all their mortises (**Pic.13**), ready to accept the chair rail tenons.

Tackling the rails

I was relieved to see the pile of front and back legs completed (**Pic.14**), but in the back of my mind I knew I still had six rails to prepare for each chair, not counting the dowel rails, and each rail required a tenon cut at each end!

Every time I get a job like this I wonder whether it would be worth investing in a dedicated tenoner, but that's as far as it ever gets: one day!

I've also looked into the Domino scenario, and no doubt one of these could save me a lot of time.

However, knowing the stresses that chair joints suffer, I'm not sure how the Domino joint would stand up over time. At the end of the day you really can't beat a traditional mortise and tenon. But I digress…

Having prepared the rail components to the required dimensions, I removed the waste from the tenon cheeks by making a series of repetitive cuts on my radial arm saw (**Pic.15**).

I then cut the tenons down to width on the bandsaw (**Pic.16**), cut away the waste with a Japanese hand saw and used a bevel-edge chisel to leave nice crisp, clean shoulders.

Shapely curves

The wider rails on the front and back of each chair are curved, and I cut these on the bandsaw after preparing their tenons, (**Pic.17**). I made up rods for the various rails (**Pic.18**), not only to mark out the timber but also to assist with the cleaning up of the bandsaw marks. I stuck the rod to each rail with double-sided tape; then, using the rod as a guide, I ran a top-bearing-guided router cutter round each curve to leaving a good clean finish.

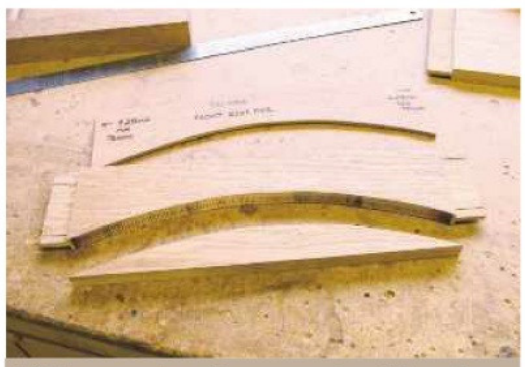
With the rails completed (**Pic.19**), I then rounded over all the square edges using a bearing-guided roundover cutter in my router table, (**Pic.20**).

The top edges of the upper seat rails were also rebated prior to assembling the chairs, ready to receive the seat squabs once they had been upholstered. I now had all the components for 12 chairs prepared.

The assembly begins

I started with the front frames, linking each pair of legs with a curved top rail

15 I used my radial arm saw to remove the waste from the tenon cheeks...



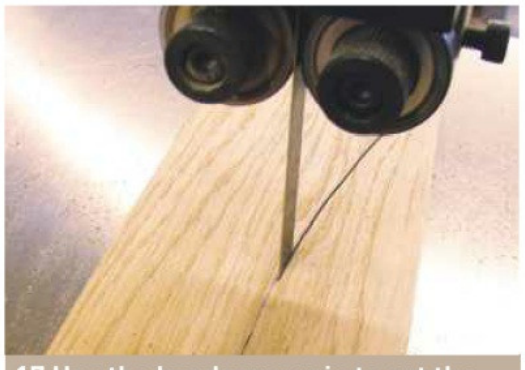
18 To speed up the repeat cutting, I made a rod for each chair rail pattern

21 The first stage of the assembly was to make up all the front frames

16 ...before cutting them down in width as required on the bandsaw

19 The legs and rails department of my workshop was filling up rapidly!

22 I assembled one chair dry so I could measure the length of the back slats



17 Use the bandsaw again to cut the curves into the front and rear rails

20 I rounded over all the square edges of the rails on my router table

23 Each slat has three rebated apertures cut out for a stained glass insert. They need squaring up...

and a lower dowel bar (**Pic.21**). I always glue chairs up in sections, to ensure that each frame is square as it's assembled. While these were setting, I got on with the remaining parts of the chair backs.

The back top rail of each chair features a rounded handhold. These were cut into the Mackintosh originals to make it easier to move the chairs around the Glasgow tea rooms for which they were designed. To replicate the desired shape for the hole on the 12 rails, I again prepared a template. I cut each hole roughly to size with a jigsaw and cleaned up its profile by running a bearing-guided template cutter against the template. Then I rounded over the sharp edges.

Preparing the floating back

The only components not yet prepared were the long back slats for each chair. These are mortised into the top and bottom rails at the back of the chair, but aren't fixed to the back seat rail. This allows them to flex slightly for comfort in use. To get the precise size required, I dry-assembled one of the chair frames (**Pic.22**), and took the appropriate measurements.

Mackintosh added some small square cut-outs to the slats in his chair backs as a decorative detail – three near the top of the chair and one lower down. While I wished to keep the chairs quite traditional and true to their original design, I did introduce one small modification of my own.

A flash of colour

I planned to fit a small piece of stained glass, which would catch the light nicely, into each of the upper three holes in each slat. To do this, I cut the holes using a small template and then rebated each aperture with a 4mm bearing-guided rebate cutter (**Pic.23**).

The router cutter left the apertures with rounded corners, but I soon pared them square with a sharp chisel ready to accept the glass. I had obtained several glass samples from a local stained glass specialist, and after some deliberation with the clients we opted for a pale yellow for the top, pale green for the middle and pale blue for the bottom.

The final stages

With all the slats made and their glass apertures prepared, I started gluing up the chair backs (**Pic.24**). Then it was time to marry them up to the fronts with the side rails and dowels. Each chair was duly glued up and cramped (**Pic.25**). I had made up a quantity of small triangular reinforcing blocks, and I glued and screwed four to each seat frame, level with the bottom of the rebates in the rails, to provide extra support for the seat squab.

The chairs and the accompanying tables (which I'd made first) were now complete. I inserted the pieces of stained glass into their apertures and held them in place with 4mm square glazing bars (**Pic.26**), mitred at the corners. I simply glued the beads in place as I was pretty sure the glass would never get broken.

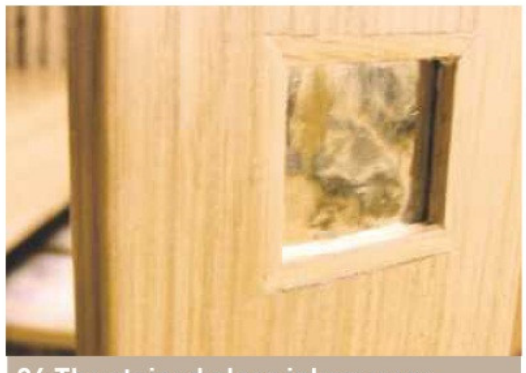
Finishing touches

It took me some time to finish the chairs with several coats of Danish oil. I then polished them with Mylands Light Brown wax to bring out a natural sheen and add a little colour to the Danish oil.

Finally the seat squabs were upholstered (see overleaf), dropped in and secured with screws driven up through the corner blocks (**Pic.27**). The fabric was a true Mackintosh design from a specialist supplier in Glasgow, and completed the theme to perfection.

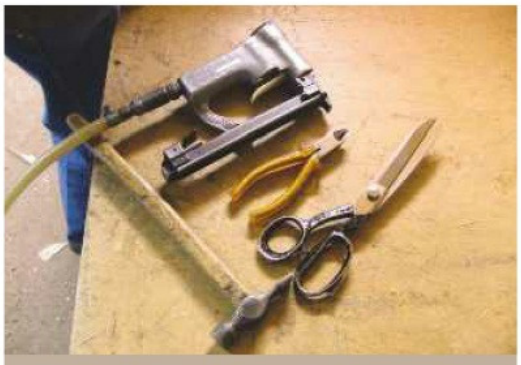
24 I had to tackle the chair back frames in batches due to a shortage of suitable cramps!

25 The front and back frames were married up by fitting the six side rails



26 The stained glass inlays were retained by four mitred pieces of glazing bead

27 Upholstered seat squabs (see overleaf) were dropped in and secured from beneath with screws



1 The upholsterer's arsenal of equipment is quite small – a power stapler (mine is driven by a small compressor), a pencil, a straightedge, a tack hammer, scissors and side cutters

2 Cut a piece of medium-density foam 38mm thick to the same size as the plywood seat panel. Fire a single staple into the centre of each side to hold the foam in place during the upholstery process

3 With the foam attached, turn the plywood panel over and mark a centre line in pencil across the board. Then draw a second centre line at right angles to the first

4 Cut the fabric to size. If it has a pattern, as here, all the chair squabs must match once the upholstery is complete. Cut arrowhead nicks into the edges of the fabric to help this process

5 Align the nick on one edge of the fabric with the line on the plywood panel, and fire in a staple to hold the fabric in position

6 Stretch fabric evenly over the foam to the opposite edge of the panel, align the nick with the corresponding mark and fire in another staple. Repeat this for the other two sides

7 Insert a line of staples along each panel edge, stretching the fabric as you go to leave a smooth edge

8 With the edges securely stapled, you can snip away the excess fabric at the corners

9 Fold the fabric neatly at the corners and pull it over so the foam is compressed evenly on the top surface of the squab

10 Staple each corner in turn to complete the attachment of the top fabric

11 Staple a fabric cover to squab base. Keep the line of staples close to the edge of the plywood so they're concealed by the rebate in the frame

12 The first seat squab is now complete and ready to be dropped into the chair frame. Just eleven more to do...

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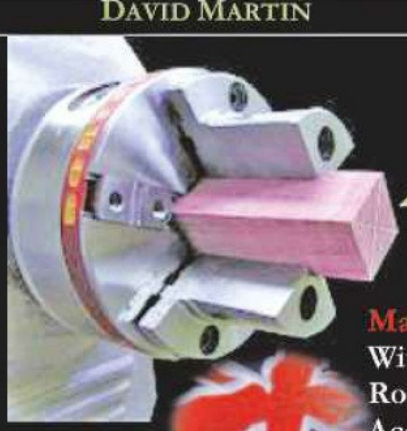

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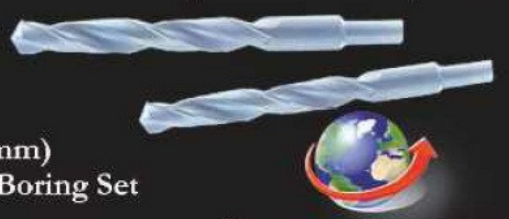

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Glassy job

Peter Bishop reused plate glass from an existing table for the top of this quarter-sawn English oak piece

My client had some firm ideas on what he wanted, so I took some measurements off the existing bevel-edged plate glass top and produced a classic but carefully detailed design and a costing which was accepted. It was time to start work.

A reason to season

The wood I ordered was prime-quality kiln-dried quartersawn English oak. Because my client has underfloor heating, I cut the top frame components to their nominal size, sealed the ends and took them over to his house so they could acclimatise for a few weeks. I hoped this would help to reduce the chance of shrinkage after manufacture.

Because my supplier didn't have any kiln-dried stock 100mm square, I made up the legs from two pieces of 100 x 50mm stock. I planed two adjacent faces flat and true, applied Cascamite and cramped the pairs together. Once set and end-sealed, these four, along with the other components, also went into the house for a few weeks.

Don't spare the rod

With that essential preparation out of the way, I drew out a full-sized plan view of the table – known as a rod in the trade – on a large plywood offcut (**Pic.1**). This rod allows you to calculate the exact dimensions of each component and, if required, to take measurements directly from the drawing. It's an old joinery technique I was taught years ago, and it never fails.

Preparing the parts

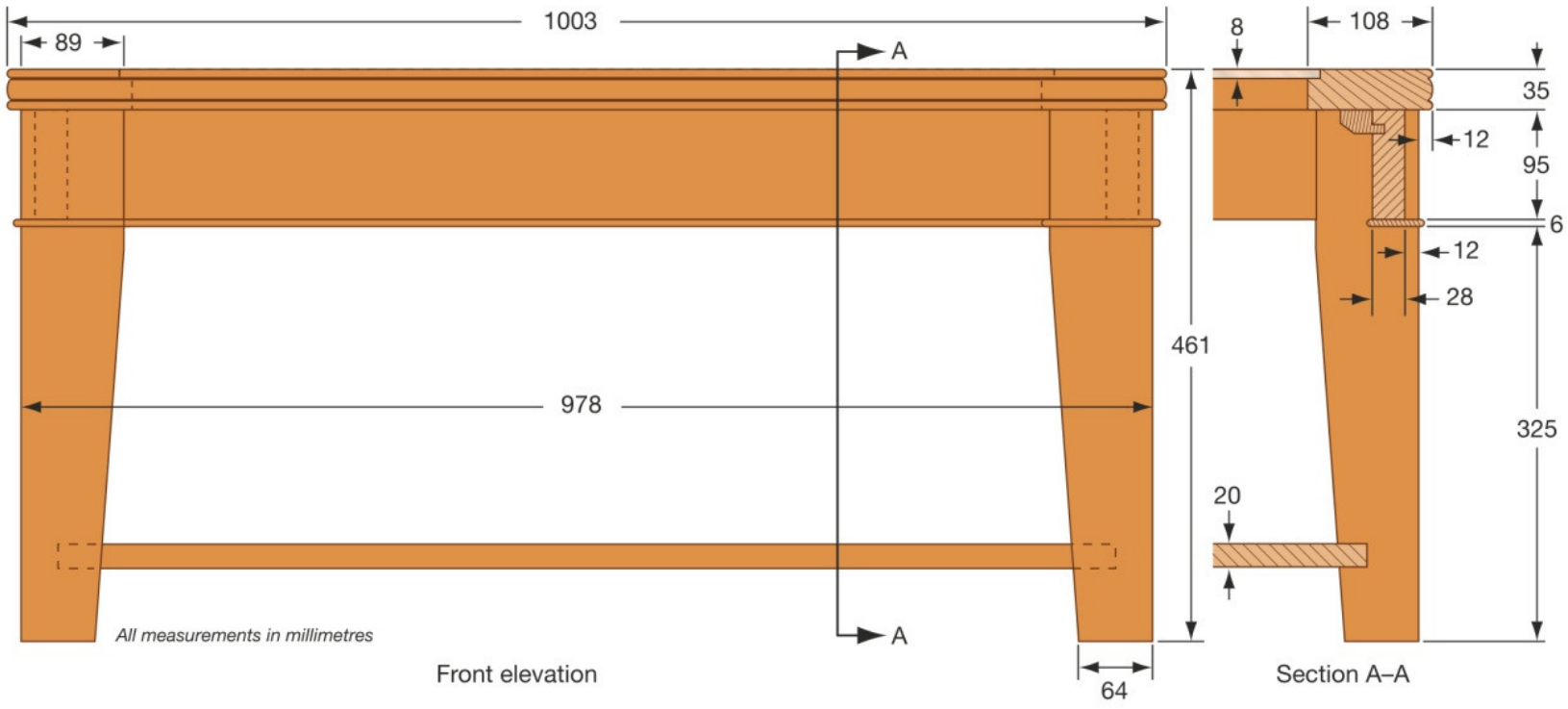
I started with the sub-frame, square-planing the legs and rails along with the four framing pieces for the lower shelf. Then I marked out the leg mortises across all four components at once for accuracy (**Pic.2**), and headed to my bench mortiser to get them all cut (**Pic.3**).

I also used the mortiser to cut out the slots for the shelf while the legs were still square. To avoid breakout I left a small section on the inside corners (**Pic.4**). This can be removed by hand; otherwise it will be sliced off when the inner tapers are cut on the legs.

My next job was to cut the 6mm-wide grooves for the beading on the two outside faces at the top of each leg (**Pic.5**), a task I carried out on with ease on my radial arm saw. I positioned them so they would line up with the underside of the rails when these had been jointed to the legs.

Tapering the legs

It was now time to mark out, cut and clean up the tapers on the four legs.



Front elevation

Section A–A

1 Drawing a rod – a full-size top view of the table – on a large board offcut is a useful technique to adopt

2 Mark out the leg mortise holes on all four components in one go for complete accuracy

3 Using a bench mortiser is the quickest way of chopping out all the leg mortises

I marked the cutting lines carefully with a pencil and straightedge, then headed for the bandsaw to trim them roughly down to size (**Pic.6**). A quick run through the planer soon had them finished and ready for assembly.

Next, I cut the four rails to length and formed tenons on their ends to match the leg mortises (**Pic.7**). Then it was back to the table saw to cut a groove on their inner faces (**Pic.8**). This will take the buttons that secure the table top.

I could now test and trim the leg and rail joints. These eight pieces were then cleaned up before a dry assembly to check that they matched the drawing.

Making up the shelf

I had an oak-veneered MDF board in stock, so I sliced off a chunk and trimmed it to size for the shelf. The edge pieces were then machined and mitred to produce a framed shelf of the required dimensions.

On the bench I laid out these components, arranged them to make the best of the wood grain and marked a couple of biscuit joint positions on them. I then stuck Post-it notes on each component to make sure I reassembled them correctly later.

Once the biscuit joints were cut, I mixed up some more Cascamite and assembled the shelf with plenty of cramps to keep everything flat and square (**Pic.9**). Care needs to be taken to ensure that the edge pieces finish flush with the surface of the shelf panel. Cleaning up afterwards can be a nightmare otherwise; you can easily cut through the veneer to the plain MDF core below!

Cutting corners

Two legs and one rail were dry assembled, squared up on the rod and cramped to the bench. This enabled

GLASS-TOPPED TABLE CUTTING LIST

All dimensions are in millimetres

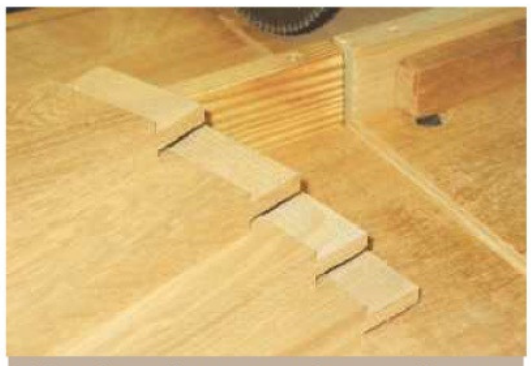
Part	Qty	L	W	T
Leg	4	460	89	89
Rail	4	915	95	28
Top frame	4	1070	108	35
Shelf frame	4	915	89	20
Shelf panel (oak-faced mdf)	1	915	915	20
Rail bead (from)	1	4000	35	6
Leg bead (from)	1	1000	12	6

Cross-sections are finished sizes; lengths are nominal to allow for cutting and jointing. The shelf panel is oak-veneered mdf. You will also need some oak offcuts to make the buttons that secure the top to the frame

4 Use the mortiser to cut the slots for the shelf in the same way while the legs are still square

5 Cut a groove on the two outside faces of each leg to accept the decorative beading later

6 Cut the leg taper roughly to shape on the bandsaw, working just outside the marked line



7 Cut the rail tenons using a pull-over crosscut saw or on the bandsaw

8 Machine a groove on the inner face of each rail to receive the top buttons

9 Fix the outer frame in place with plenty of glue and some biscuit joints

me to make a dummy corner joint and also to take the exact measurements for the shelf from the assembly. I used a piece of scrap stock to make the dummy joint (**Pic.10**). Once I was happy that the dummy fitted well and matched the tapers on the legs, I was able to mark out and cut the shelf corners (**Pic.11**). I cut and tested two adjacent joints on the shelf to start with (**Pic.12**). They fitted perfectly, so I cut the other corners in the same way and cleaned everything ready for the final assembly.

Tackling the top

I recovered the four top frame pieces from the client's house and square-planed them to their finished size. I then ran an 8mm deep rebate round their inner edges on the router table to take the glass (**Pic.13**).

Before making the top frame up I took the precaution of checking the client's plate glass table top for size and square. It was a good job I did: none of the four edges was the same length!

Fortunately the measurements were only a couple of millimetres out, but the slight discrepancy meant that I had to make a squared frame with one side slightly longer than the other. I measured everything twice before making any cuts. I then assembled the frame on the bench with cramps and checked that the glass fitted (**Pic.14**); it did. At last I was able to cut a Domino joint into each of the mitred corners and glue up the top frame.

Colour selection

The table was to be colour-matched to some other oak furniture in the room. I chose to use some Colron 'refined' wood dye. This is a water-based product that claims to be both penetrating and colour-fast, just like a solvent-based one. I've not used it before, but I have to say I was quite impressed. Anyway, colour samples whizzed back and forth. A final choice was made that combined the Colron wood dye, a solvent sanding sealer and a lightly coloured wax.

These decisions were made before the main assembly process took place. The reason was that I wanted to apply the dye before I put everything together. I find this easier to do, and it also enables a much more even application to be made. This time I didn't need to worry about masking off joint areas. The water-based dye would have no detrimental effect on the adhesive I was going to use. Once I'd applied it to my satisfaction, I left everything for a day to dry off thoroughly.

Assembly time

The last stage of the build was to mix up some more Cascamite, get the cramps ready and assemble the top frame. The sub-frame assembly followed shortly

10 Dry-assemble one end of the table and cut a template from scrap wood for the shelf corner

11 Use the template to mark out the shelf corner profiles and cut them by hand. Work with care

12 Test the fit of the shelf corners in the leg slots, and ease them if they're too tight for easy assembly

13 Cut the top frame components to length and form a rebate in one edge on the router table

14 Mitre the corners, dry-assemble the frame and check that the glass fits in its rebate

15 Assemble the sub-frame upside down. The table's top frame is shown in the foreground

16 Shape and drill the buttons in a strip before cutting them off to length

17 Machine both edges of an offcut to make the beading, then cut it to width

18 Glue the leg beads into their grooves and secure them with tape

thereafter, and both were left in their cramps overnight for the glue to go off and harden (**Pic.15**).

After cleaning up I set about preparing the buttons from some oak scrap. I make these in a strip and then cut the individual ones off afterwards (**Pic.16**); I find it's easier to handle them like this. I also made the beading from some offcuts. I used some stuff that was over-width and rounded over both edges (**Pic.17**). This technique makes the workpiece easier to handle, and you can then rip off the edges of each strip to the required width afterwards.

Adding the beading

I up-ended the sub-frame assembly and fitted the beading that runs along the lower edge of each rail. I fixed these pieces in place with fine copper nails to avoid any staining of the oak. After turning the frame back the right way up, I glued the smaller beads into their grooves in the legs. Some masking tape held them in place while the glue set (**Pic.18**). Then everything was cleaned up one final time.

Finishing touches

I applied a coat of sealer, left it to dry and then it cut back with fine steel wool. I then gave the top frame another coat for extra protection against everyday wear. This was also cut back. Finally I used Liberon Black Bison paste wax to finish off. Well worked in, this brought up a very attractive lustre.

The end was in sight. All that remained was to place the top frame face down on a clean dust sheet, position the sub-frame upside-down on top of it and fit the oak button tongues into the machined grooves in the frame.

A single screw attached each button to the underside of the top, and the complete assembly was turned the right way up, ready to receive the glass (**Pic.19**). It still fitted…

19 Clean up all the edges, apply sealer and wax, and drop the glass into place

And relax...

You know those tubular metal recliners that were so popular before the war. Well, Kerry Donovan has set to and made one in wood. Similarly there's no need for dismal plastic garden furniture when it's possible to build an elegant twosome like Ken Jones's garden table and bench

Lunch in the garden

Ken Jones brings a touch of elegance to light refreshments outdoors with this attractive twosome

TABLE & BENCH CUTTING LIST

All dimensions are in millimetres

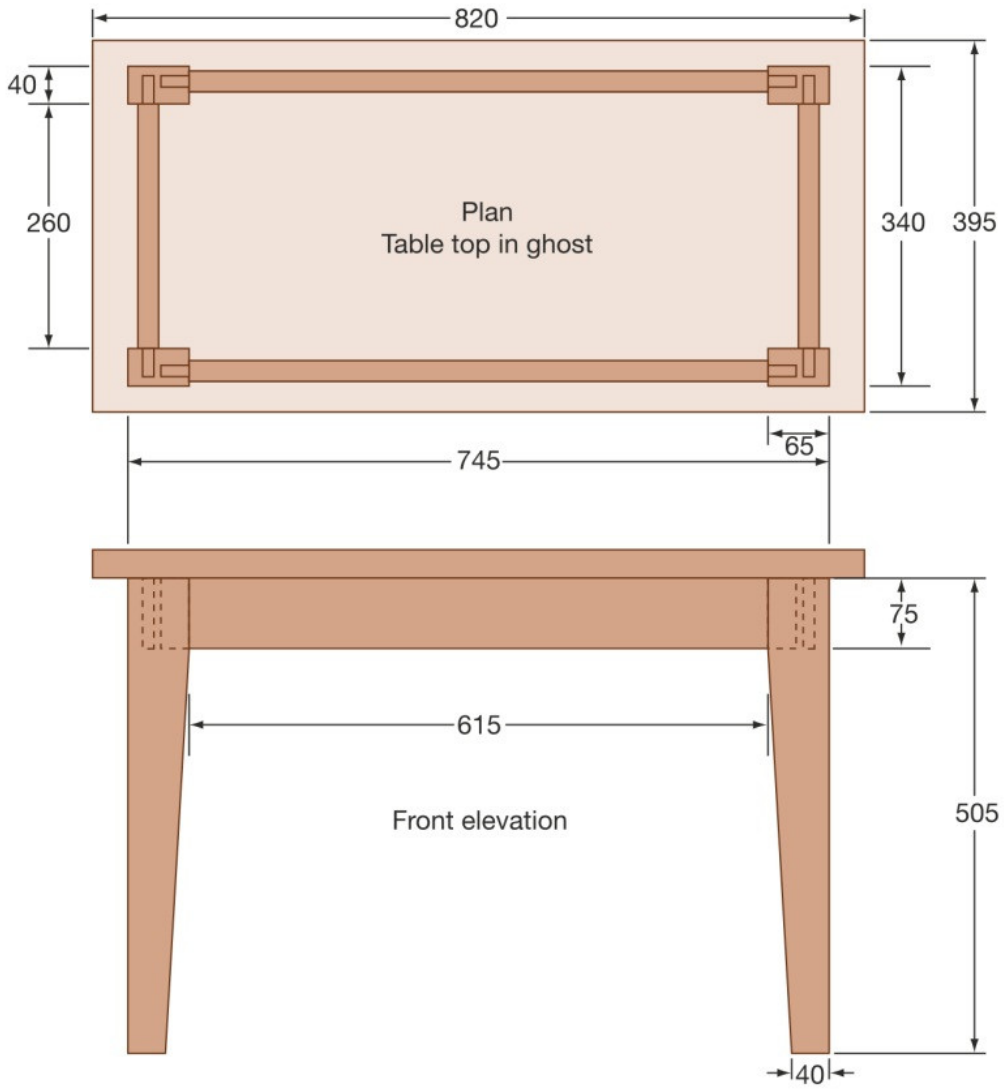
Part	Qty	L	W	T
TABLE				
Top	1	820	395	30
Leg	4	505	65	40
Side rail	2	675*	75	22
End rail	2	320*	75	22
BENCH				
Seat	1	820	240	30
Leg	4	350	65	40
Side rail	2	675*	75	22
End rail	2	200*	75	22

* Includes an allowance for 30mm long tenons
You will need a quantity of random-length 40 x 30mm offcuts to form the table top and bench seat, and eight zinc-plated shrinkage plates to attach them to their frames

The raw materials turned out to be a stack of pine offcuts (**Pic.1**), left over from building a child's climbing frame. Initially I was at a loss to see how I could use them; they were all very short. There were, however, a few thicker pieces which I reckoned I could use for the legs. Then an idea struck me.

Creating gaps

As the table and bench were going to live



All measurements in millimetres

outdoors, I thought I'd try using the large number of random-length 40 x 30mm pieces to form a sort of slatted top with gaps between.

To begin, I selected lengths I could join end to end for the continuous edges of the tabletop, allowing a bit extra for the final trimming. Then I assembled the other random lengths on the bench end to end with a 12mm gap between them, building up the top row by row and staggering the joints at random.

Ten rows looked about right, including the continuous edge strips. Next, I marked pencil lines across them so I could insert biscuits to aid alignment as I glued and cramped them up.

I used a waterproof polyurethane adhesive and assembled the parts using a small offcut of 12mm MDF as a spacer to keep the gaps constant. I then fitted cramps above and below the assembly to keep it flat, (**Pic.2**).

Once the cramps were off, I trimmed the ends of the top to the final size on the table saw (**Pic.3**). It was now ready for cleaning up. I tidied up the long edges by taking off a couple of shavings with a plane, and my belt sander soon flattened the faces (**Pic.4**). I then worked a small radius on both the top and bottom edges with a router and a rounding-over bit, (**Pic.5**).

1 The pile of pine offcuts looked very unpromising to begin with...

It's a frame-up

Next came the table frame. I cut the four legs from the 40mm stock, tapering them with the bandsaw to the dimensions shown in the drawing on the previous page. Then I marked out the mortises for the side rails and cut them to a depth of 30mm (**Pic.6**).

I managed to find enough materials for the side rails from my offcuts bin, cut them to size and ran them through the thicknesser. With everything marked out, I cut the tenon cheeks on the bandsaw (**Pic.7**), with a length stop clamped to the table. Then I cut the shoulders on the table saw, (**Pic.8**).

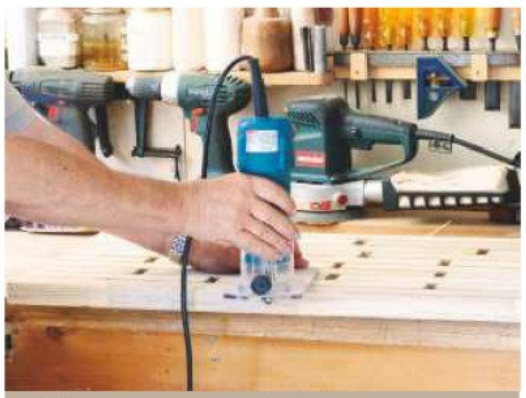
All that's left now is the assembly. I glued up and cramped the two ends first (**Pic.9**). When they were dry, I glued in the side rails to complete the frame. Constructing the matching bench seat followed exactly the same procedure.

Finally I gave both pieces a generous coat of red cedar preservative, attached the tops using the shrinkage brackets, and delivered them to my gardening friend's allotment… just in time for a coffee break!

2 ...then the idea of creating a table top with gaps occurred to me

3 Once the assembly had dried, I trimmed the ends square on the table saw

4 I then planed the long edges and flattened the top surface with my belt sander



5 I finished the top by rounding over all the edges with a small router

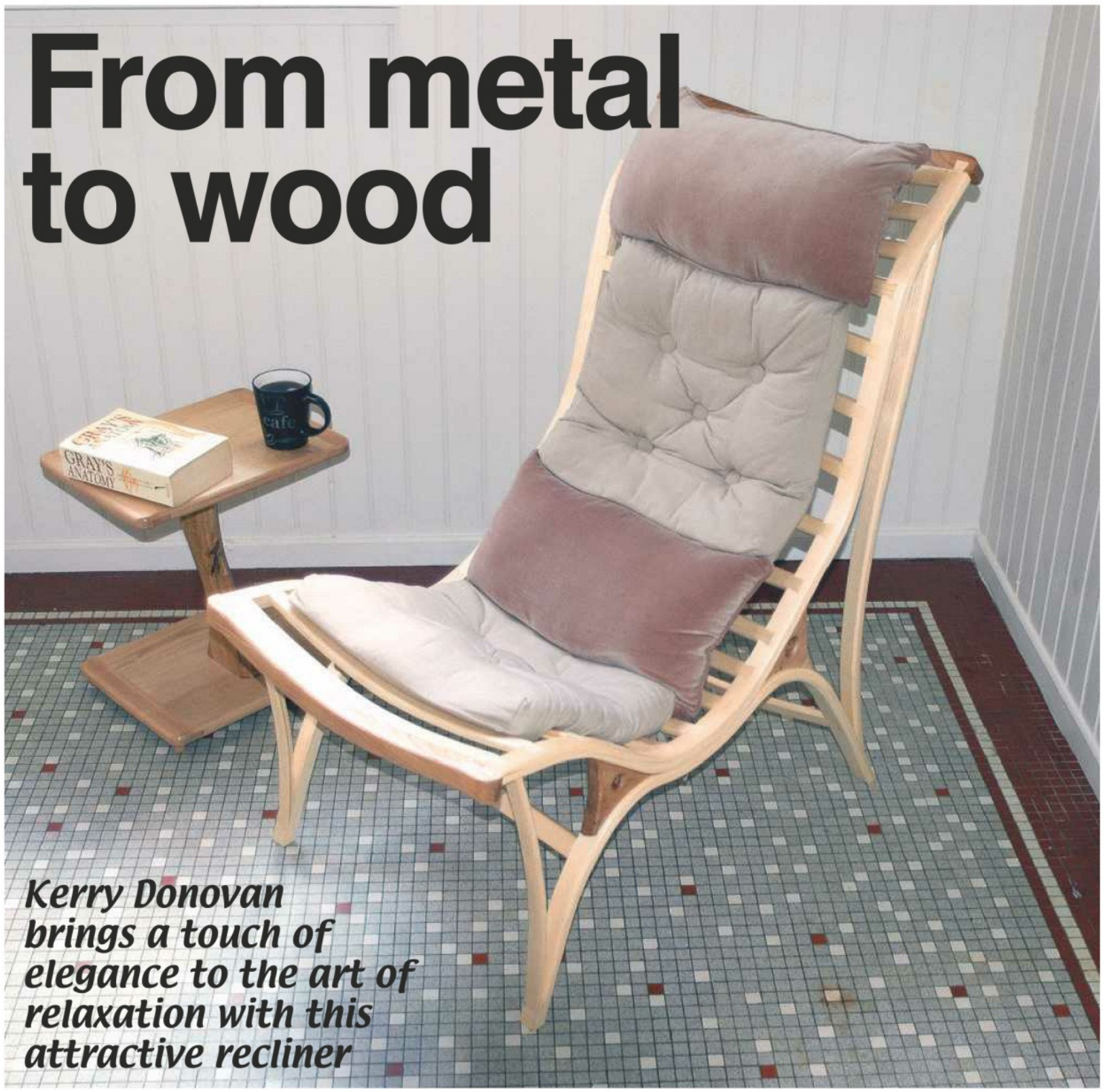
6 After tapering the legs, I cut the mortises in them to receive the top rails

7 I used my bandsaw to cut the tenon cheeks on all the side rails...

8 ...and cut the shoulders on the table saw to complete the corner joints

9 I assembled the end frames first, then added the long rails and the top

From metal to wood



Kerry Donovan brings a touch of elegance to the art of relaxation with this attractive recliner

The design of this chair appears complicated, but in essence it consists of two side frames linked with a series of gently curved seat support slats. The frames have two separate components, each of which is a complex curve; one forms the legs and the other the seat frame. By deconstructing the original design, I was able to work out a way of making it in wood… but it was going to need a fair bit of ingenuity to match the curves of the original!

There are several ways of creating curves in wood; here are some of the options.

1: Cutting from the solid

You can simply cut the curved components you need out of one large blank, or use smaller curved blanks joined together. However, there are drawbacks to this method. It wastes a great deal of raw material, and cutting through long grain weakens the material significantly. This means that the components need to be quite large in cross-section to obtain the required strength. I wanted this chair to be light and elegant, so I ruled out this method.

2: Bending the wood

You can soften wood and make it more flexible by steaming it. You can then bend it against a curved former, and when the wood dries the shape is retained. The main advantages of this method are that less material is wasted, and there is minimal use of glue. The main disadvantage is that the components can try to spring back to their original shape when released from the cramps. The

degree of spring-back will vary according to the species of wood used and the size and shape of the component.

I chose to avoid steam bending for three other reasons. I don't have a steamer, I can't be bothered to make one, and kiln-dried timber costs a small fortune so why wet it again? Option 3 beckons…

3: Laminating the wood

This process uses thin, flexible strips of wood which are glued together and immediately cramped against a curved former. Once the glue has set, the component can be released from the cramps and will hold its shape pretty well. As the laminations follow the long grain of the wood, the component pieces retain their initial strength, and can therefore be made much thinner and lighter than with the other two methods. Much less material is wasted, but the manufacturing process is time-consuming as a lot more preparation time is required.

Planning the operation

It looked as though option 3 was the only viable method to use for this project, so I set about creating a rough working drawing of the side frames, **fig 1**. The slats would have to look after themselves for now.

As far as materials for making the chair are concerned, ash is ideal for this project. It's a beautiful light-coloured wood with enough elasticity to bend

ASH RECLINER CUTTING LIST 1

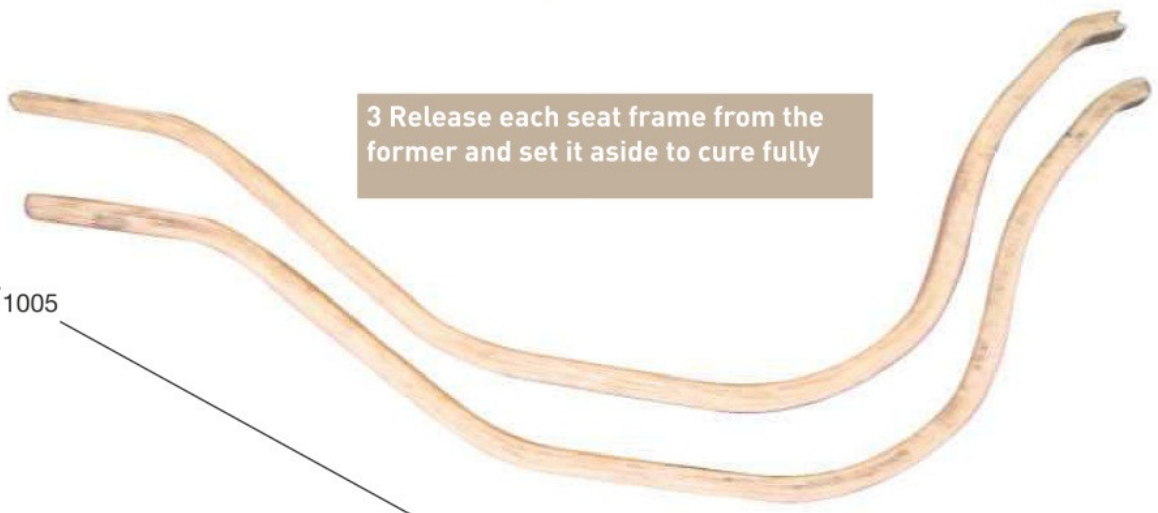
All dimensions are in millimetres

Part	Qty	L	W	T	No of laminations
Seat frame	2	1350	34	27	6
Leg frame	2	1250	34	27	6
Cross-rail	2	435	34	20	4
Front rib	2	435	28	16	4
Back rib	2	950	28	28	4
Seat slat	19	480	34	20	4
Seat end rail	2	500	34	50	
Bracket	4	triangle		24	

All components are ash except the seat end rails and brackets, which are solid elm.

1 Draw out the frame profile on an MDF sheet and attach the former blocks for the seat frame

2 Make up each seat frame by gluing and cramping six ash strips to the former



3 Release each seat frame from the former and set it aside to cure fully

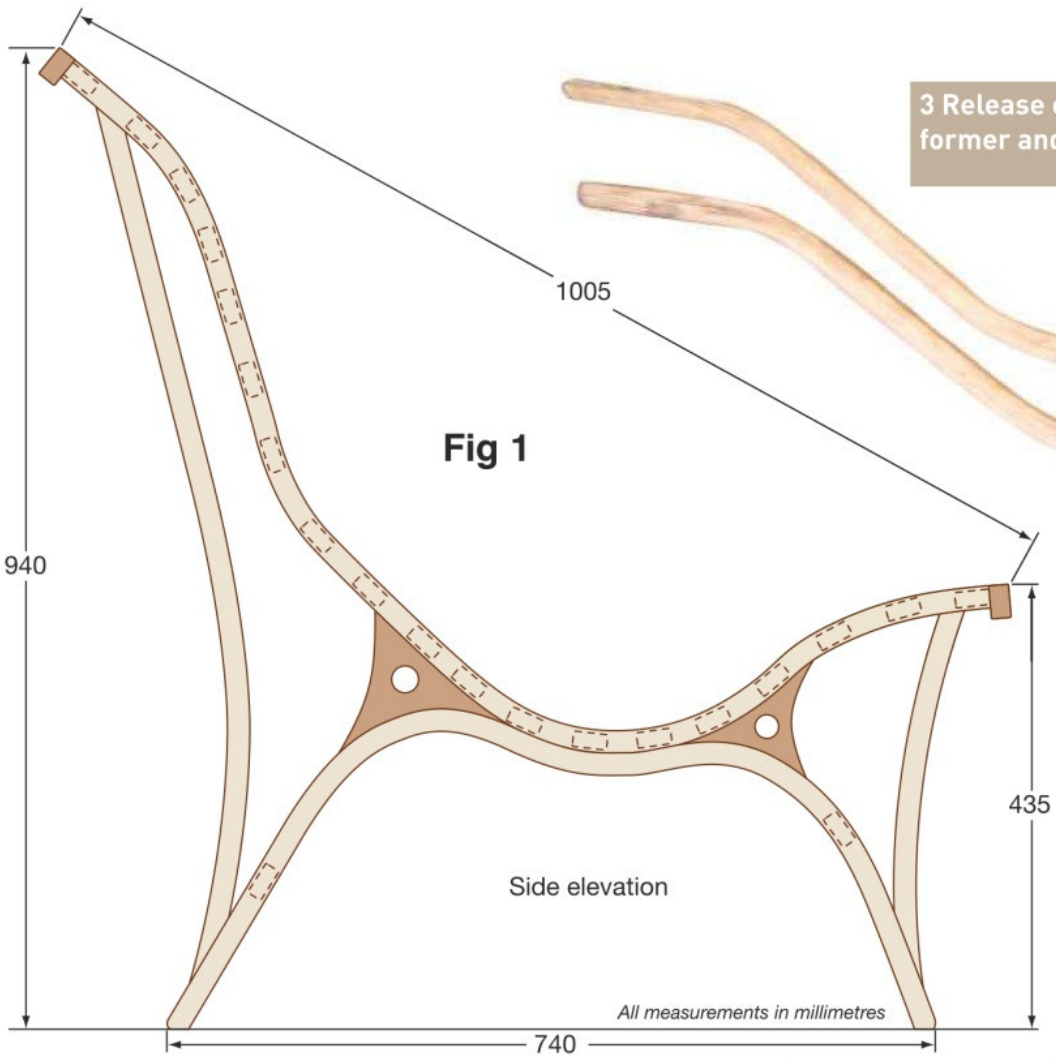
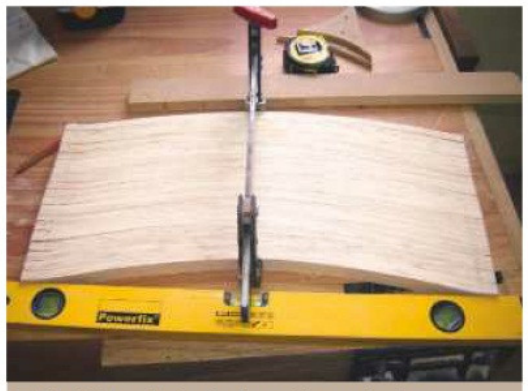


Fig 1

4 Reposition the former blocks and make up the two leg frames in the same way

5 Release the completed leg frames from the former and test their fit against the seat frames

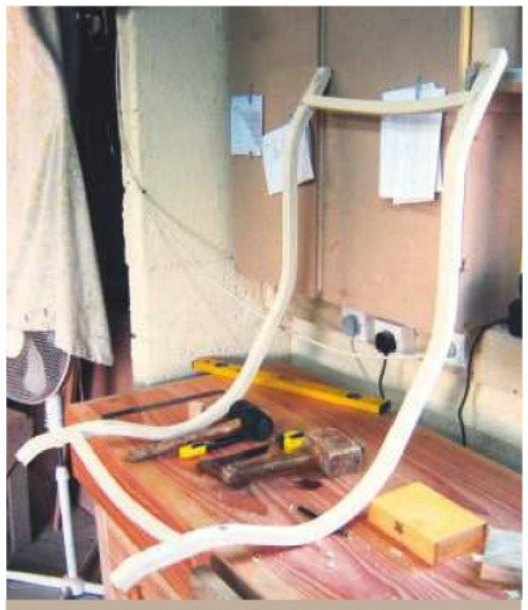
6 Make a former for the curved seat slats and assemble each one from four ash strips



7 Cut the slats to length and store them together in a cramp until they're needed

8 Use a Forstner bit in a drill press to remove most of the waste from the dovetail sockets

9 Then cut each socket accurately to size with a sharp chisel and a mallet



10 Dry-assemble the seat frames with two slats so you can scribe the others accurately

without splitting, so long as the laminate components are not too thick. As a contrast to the ash, I decided to use some darker elm for the end rails of the seat and for the triangular reinforcing brackets between the side frames. The cutting list gives the dimensions of the various components.

Creating a pattern

I started work by drawing a full-sized outline of the recliner onto a large sheet of 18mm-thick MDF. This will act as the former that will hold the laminated ash strips in place while the glue sets. This pattern also allowed me to see the overall shape and style of the design, and to modify the curves as necessary to improve the overall look of the piece.

As I had a model to work from, I already knew that the general shape of the chair would be comfortable to sit in. However, I also needed to make sure that the shape could be reproduced in wood. I used a micrometer gauge to measure the thickness of the rails forming the original frames. They were a uniform 38mm all the way along.

Making the former

I cut away some of the waste material at the top of the MDF sheet and attached the various shaped wooden blocks that would act as the former for the seat frame (**Pic.1**). I took great care to screw them on securely, as they would undergo heavy loading when the laminate strips were being bent into place and cramped against them. Don't glue the blocks on; they'll need to be removed later when the leg frame is assembled.

I applied a liberal helping of paraffin wax to the contact points on the former to ensure that the laminated components could be removed easily after the glue had set. I then fitted a single laminate strip to the former as a test to ensure that the curves were not too sharp and that the strips wouldn't split when they were being bent into position.

Preparing the strips

I formed each of the seat frames by gluing six laminate strips together and cramping them securely to the former (**Pic.2**). I ripped each strip down to about 5mm thick on the circular saw, and then sanded it to about 4.5mm thick on a drum sander. Six of these strips would give me a rail thickness of 27mm.

Making the seat frames

The first strip is placed against the former without glue, and each subsequent strip is glued on one side only using PVA adhesive before being cramped to its predecessor.

When you're laminating the strips, a couple of strategically placed cramps on the former will hold them loosely in position while the rest of the cramps are being attached. This method enabled me to glue all six strips in one continuous operation, which is essential for the overall strength of the finished component.

Use as many cramps as you can fit onto the former to apply even pressure on the lamination and ensure a good bond. Tighten them slowly and evenly to reduce the risk of the strips splitting. Once all six strips are in place and all the cramps are tight, set the assembly aside overnight to dry.

Release the first frame from the former the next day, and repeat the process to make the second frame. The two completed frames are shown in **Pic.3**. I put them aside to set hard and began constructing the leg frames.

Making the leg frames

After removing and re-positioning the cramping blocks on the MDF former, I prepared the strips in the same way as for the seat frames to give a finished rail thickness of 27mm. I repeated the gluing and cramping procedure I used before (**Pic.4**), and produced a pair of leg frames that fitted neatly against the central part of the seat frames (**Pic.5**). So far so good…

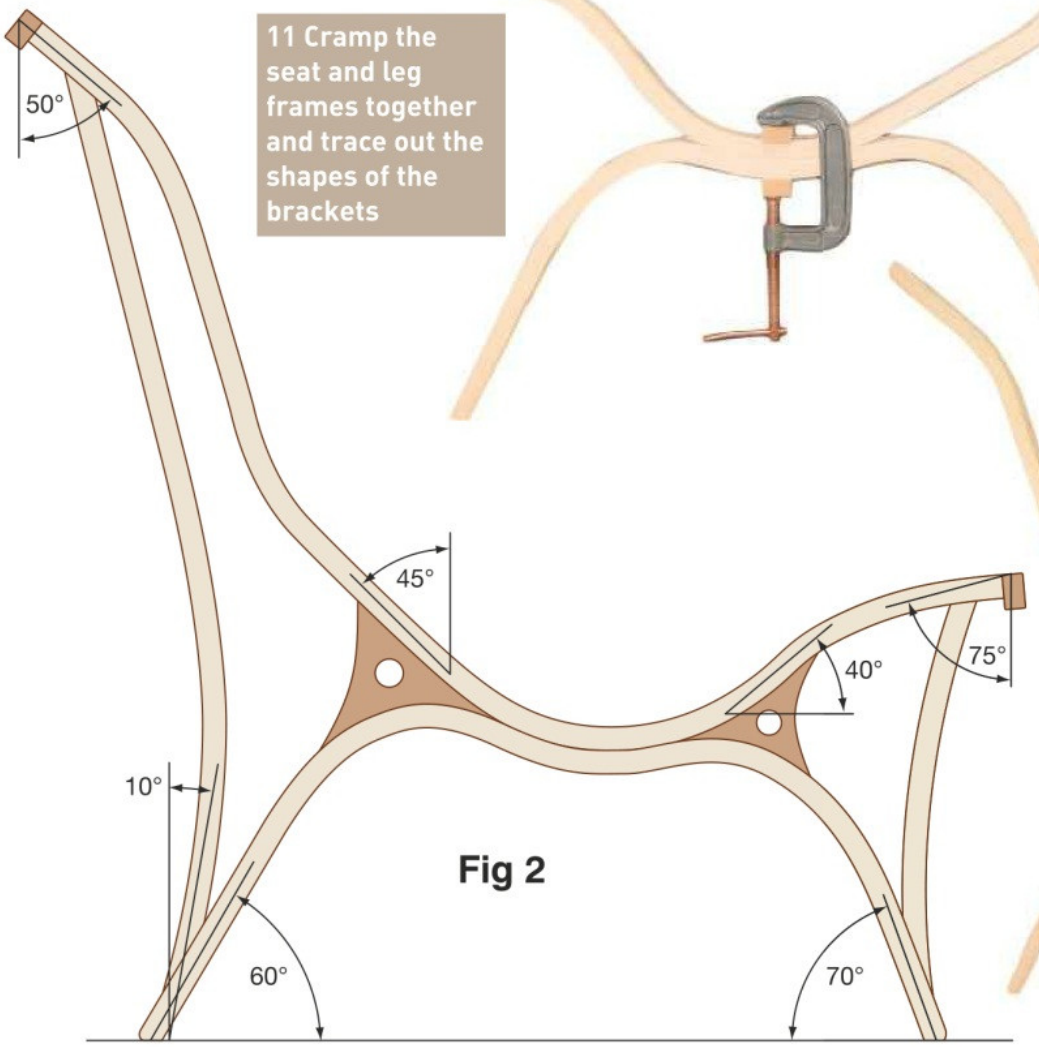
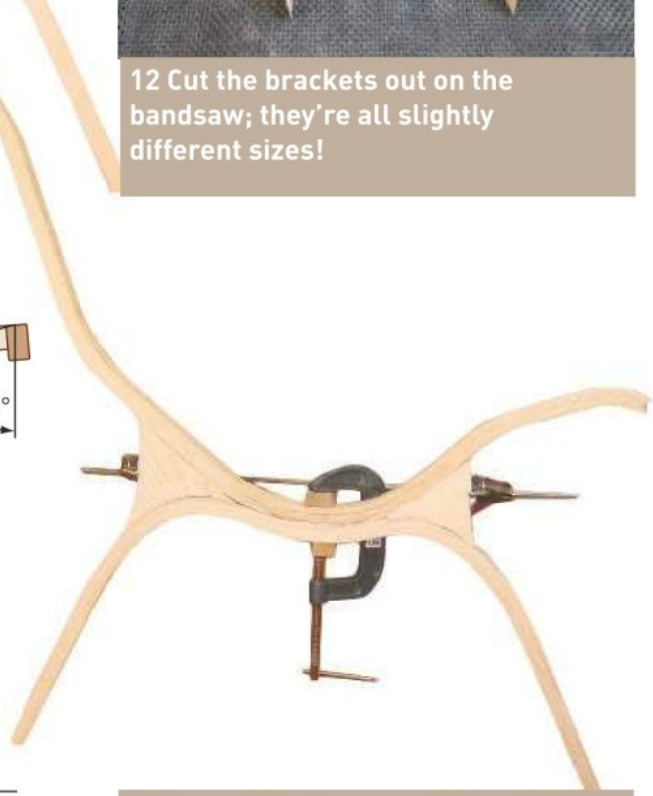


Fig 2

11 Cramp the seat and leg frames together and trace out the shapes of the brackets

12 Cut the brackets out on the bandsaw; they're all slightly different sizes!



13 Cramp the frames and brackets together so you can measure up for the ribs

Preparing the seat slats

The seat frames are joined by 19 gently curved slats, each made up from four laminated strips. To help speed up the laminating process, I made a pair of formers so I could glue up two slats simultaneously (**Pic.6**). Even so it still took me more than four days to produce all the slats I needed. The completed slats were cut to length on the radial arm saw and stored on edge in a cramp, ready for jointing later (**Pic.7**).

Setting out the slats

The slats are attached to the top surface of the seat frames with stopped dovetail joints. There are 38 in all, and each one was individually scribed and cut by hand. Their positioning involved a lot of guesswork, to be honest. I decided that the seat and shoulder area needed more support, so these slats were spaced 30mm apart; for the areas in between, they're spaced 50mm apart.

To mark out the slat positions, I placed the seat frames together face to face in a vice and drew the line of the front edge of each joint on the top of the frames to ensure they lined up exactly. I then started preparing the joints; it took days!

Cutting the joints

I cut the tails on the slats on the bandsaw, but each of the pin sockets had to be cut by hand. With the tails formed, I

14 Make up the curved ribs as before by bending ash strips against a former

15 Lay the frames over each rib so you can mark the tenon shoulder lines

16 Cut the tenons by hand, taking care to follow the marked lines precisely

17 I resorted to using a Dremel multitool to cut the front seat frame mortises

18 Cutting the other mortises to match the rib tenons was a case of trial and error...

19 ...but the resulting fit was surprisingly close and the joints looked very tidy

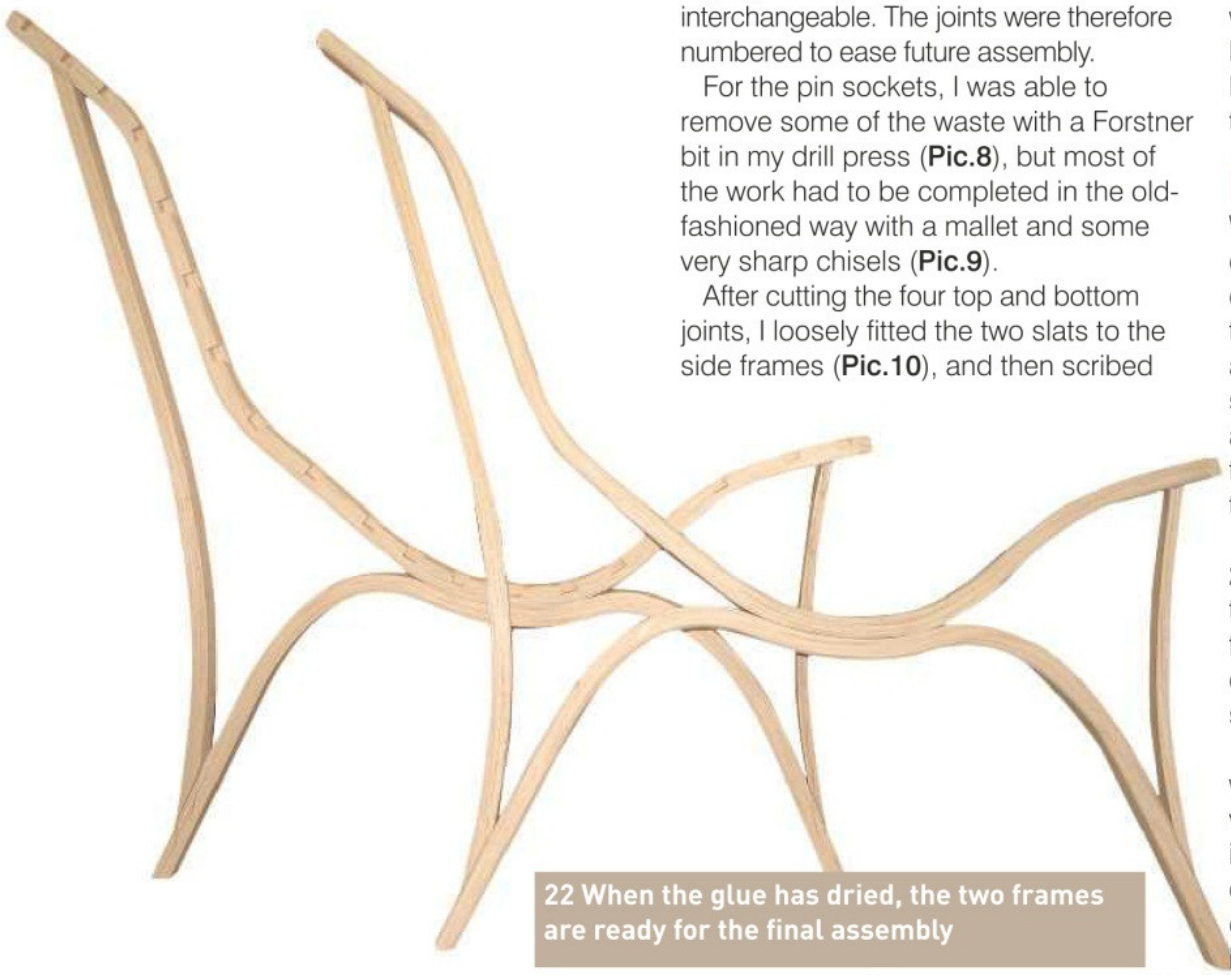
20 These solid curved elm rails are fitted at the top and tail of the seat frames

21 Assemble the side frames and the ribs on the MDF sheet to ensure accurate positioning

placed the shoulder of the slat on the front line I'd scribed on the seat frame earlier. Cut by hand, each joint was inevitably slightly different, so the slats weren't interchangeable. The joints were therefore numbered to ease future assembly.

For the pin sockets, I was able to remove some of the waste with a Forstner bit in my drill press (**Pic.8**), but most of the work had to be completed in the old-fashioned way with a mallet and some very sharp chisels (**Pic.9**).

After cutting the four top and bottom joints, I loosely fitted the two slats to the side frames (**Pic.10**), and then scribed the remaining slats with the chair 'made up'. This ensured that I was lining up the slats correctly. The remaining joints took quite some time to complete, but there was really no other way to do this job. Due to the sharp curvature of the frames, I couldn't think of a way to set up a jig for this operation.



22 When the glue has dried, the two frames are ready for the final assembly

Making the brackets

With the seat and leg frames loosely cramped together (**Pic.11**), I had the exact shape required for the brackets that would fit neatly into the V-shaped area between the frames and add extra support to the front and back of the seat area. I chose to make them out of elm so they would stand out against the white of the ash frames.

I traced the shapes directly onto four 24mm-thick elm blocks. I roughed the triangles out on the bandsaw and sanded them to the exact size required using a combination of bobbin sander and hand sanding.

Even though the side rails and legs were made with the same jig, slight variations in their bracket shape is inevitable (**Pic.12**), given wood, grain and cramp pressure variations. I test-fitted each bracket, and numbered it to ensure it went in the right place at final assembly.

23 Fix the shaped and decorated brackets in place and cover any visible screw heads with ash plugs

24 Glue the slats and cross-rails into their dovetails and cramp up the assembly as tightly as possible

25 Attach the elm rails to the end-most slats with a dovetail, plus biscuits for extra strength

Forming the support ribs

I cramped the frames and brackets together temporarily (**Pic.13**), so I could measure up for the two support ribs that would strengthen the finished chair. I wanted the completed recliner to have a light and airy feel, so the ribs needed to be as thin as possible, but they also needed to be strong enough to do the job. It took me quite some time to decide upon their final shape and position.

In the end I chose gently curved ribs, constructed in the same manner as the seat slats. The short front ribs were made using the same former I used for the slats, but I had to make a longer one for shaping the back ribs. **Pic.14** shows one of the long back ribs being glued up; even this gentle curve required ten cramps.

Attaching the ribs

I decided to use modified mortise-and-tenon joints to attach the ribs to the chair frame for maximum strength. I first scribed the shoulder lines carefully on each rib, (**Pic.15**), before cutting the tenons by hand (**Pic.16**). I've never cut tenons at such an angle before!

I soon discovered that the small mortises at the front of the seat frames were almost impossible to cut using a mallet and chisel. I resorted to using a Dremel multitool with a grinding cutter to reduce the risk of tearing the rail apart (**Pic.17**). Cutting the other sloping mortises was really a matter of trial and error (**Pic.18**), but with care I was able to achieve the close fit I wanted (**Pic.19**).

End slats and leg braces

Topping and tailing the chair required a pair of curved rails, which I made in elm to match the brackets. They were the thickness of three seat slats, and were cut from solid wood to match the slat profile (**Pic.20**). I roughed them out on the bandsaw and sanded them smooth using my bobbin sander.

They were attached to the seat frames with housed dovetail joints. I cut the dovetails on the ends of each seat frame first, and then used these to mark out the sockets on the ends of each elm rail. I then cut the sockets by hand.

Lastly, I added the two laminated cross-rails to link the leg frames and brace them against any sideways movement. These rails were also attached using dovetail joints.

Putting it all together

Before starting the final assembly, I sanded the edges of all the components by running them past my drum sander. I then rounded over all the edges with a bearing-guided roundover cutter in my router table, and finished up by sanding each piece down to 400 grit.

I glued the two side assemblies together first (**Pic.21**). When the glue had dried, I released them from the cramps (**Pic.22**), and fitted the brackets after drilling a porthole in each one as a design feature and rounding over all the edges (**Pic.23**). I fixed them in place by driving countersunk screws down from above through the open dovetail sockets on the seat frame rails. Then I added more screws driven up through the undersides of the leg frames, and covered the holes with ash plugs.

Connecting the frames

The next stage was to glue all the slats and cross-rails in place in their dovetail sockets, using a combination of G-cramps and my trusty webbing cramps (**Pic.24**).

I then added the elm seat end rails, jointing them to their adjacent ash slats with three biscuits slotted into the meeting edges for extra strength. A close-up of one of the finished joints is shown in **Pic.25**.

Finally, a clean-up of all the joints was followed by three coats of lacquer and two coats of wax polish, all applied by hand.

I finished the chair off with a hand-made cushion attached to the curved slats with fabric straps. This ensured that the joints would remain visible. The lady was so pleased with the end result that she's now asked to make a matching footstool as a companion piece.

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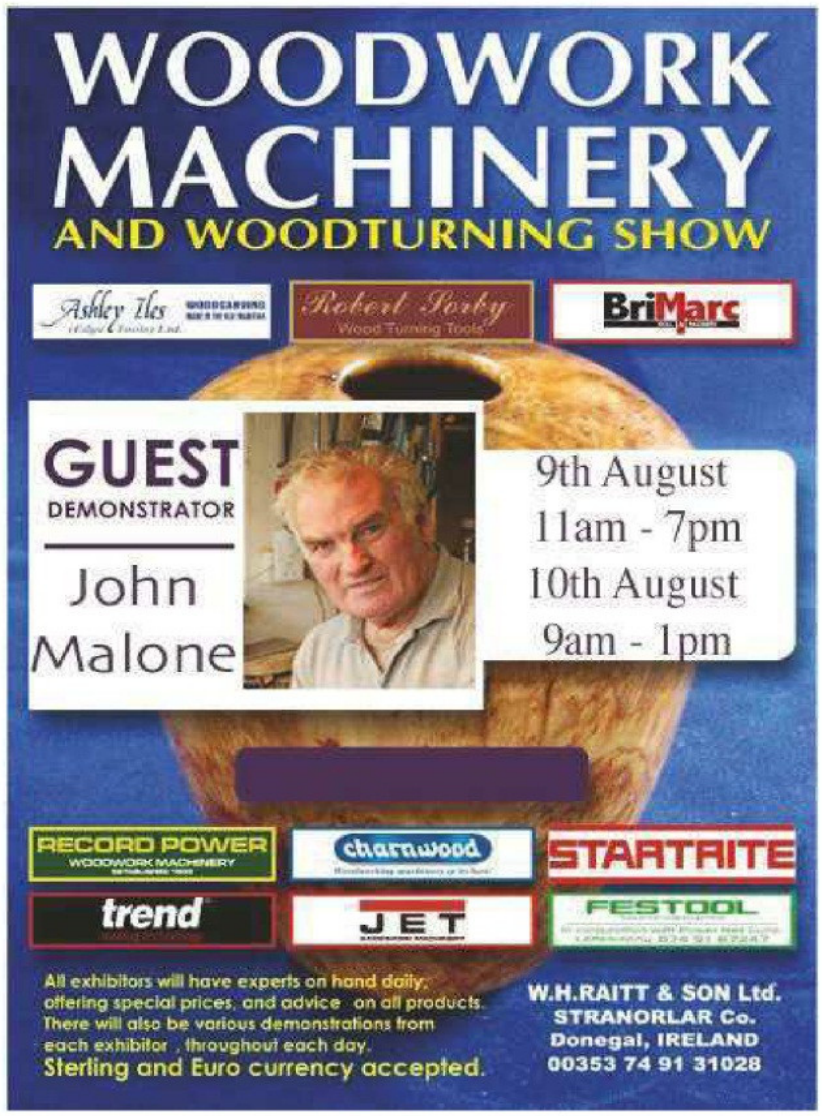

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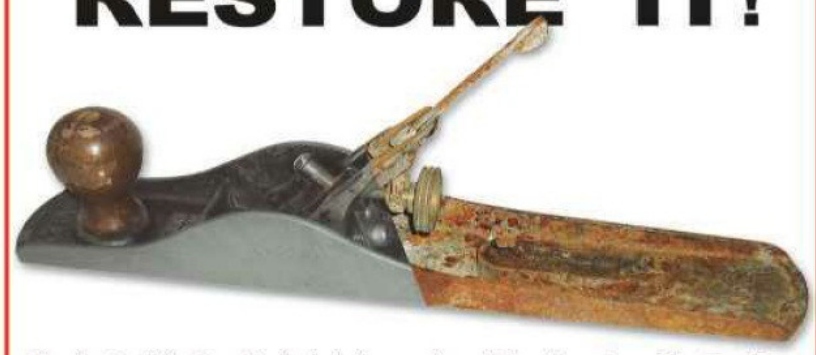

Stanley No.5 'before & after' photo courtesy Peter Hemsley – The ToolPost

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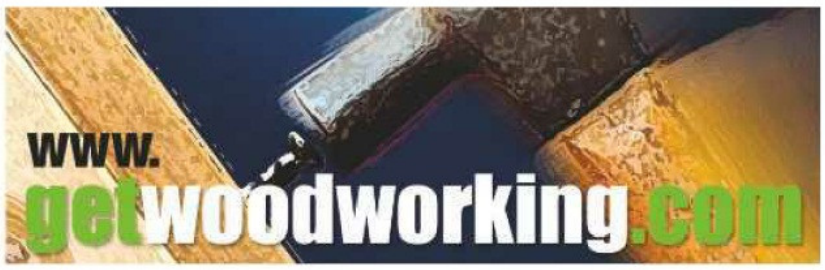

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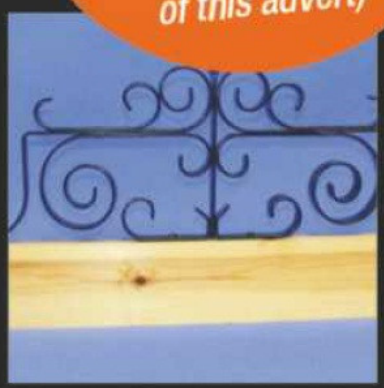

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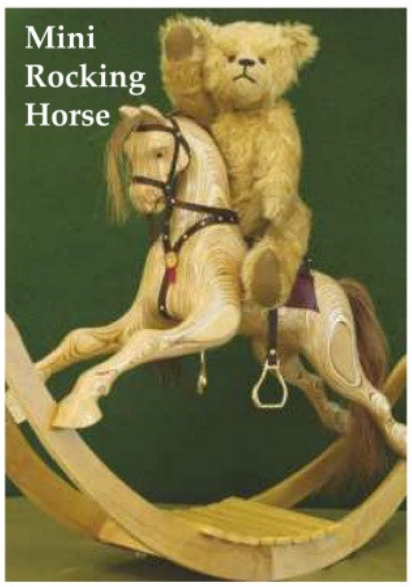

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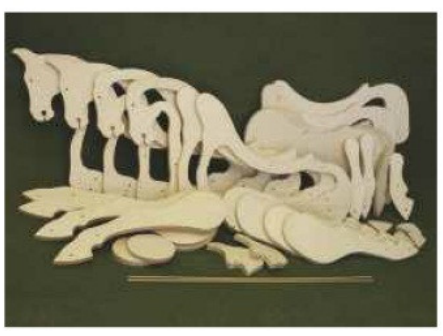

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