



Multimedia master

Tidy away those stacks of CDs and DVDs with our distinctive cherry cabinet. Designed and made by **Dave Mackenzie**



Once upon a time houses were designed to hold freestanding pieces of furniture. Today, we acquire so many possessions that houses are built around storage ideas. This unit has been designed to bridge the gap - a freestanding piece that looks good in its own right but also keeps all those disks out of view.

The construction methods are traditional and English cherry is used throughout except for the base of the drawers and the cabinet back, which are 6mm plywood. The grain of English cherry can be convoluted and more difficult to work than American cherry,

but because of the twisted grain it looks outstanding when finished. Some compromises have to be made with English cherry because it is difficult to obtain large clear boards.

Making the cabinet

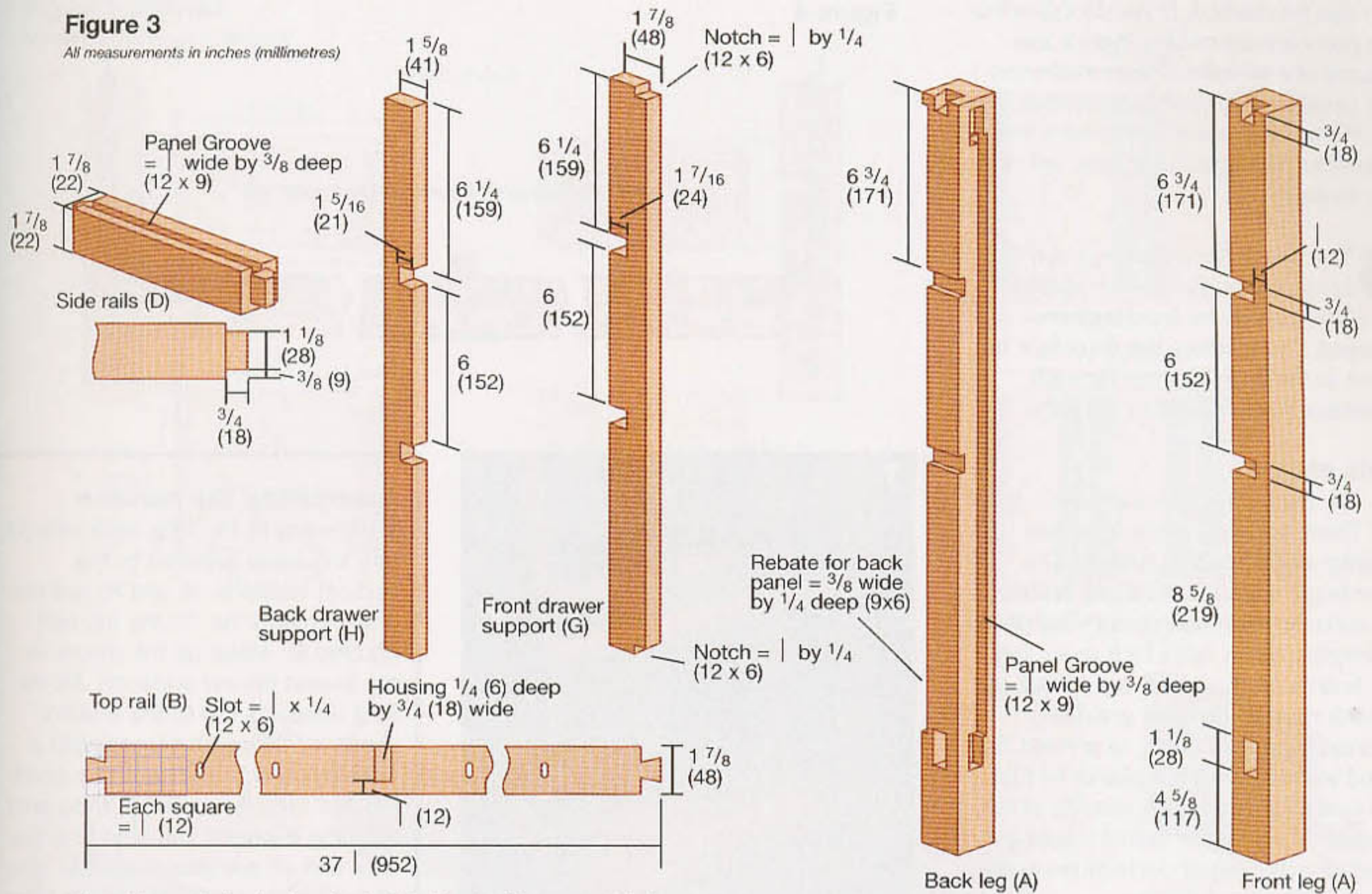
1 Work is started on the four legs (A). They are marked out and cut to size from pieces of rectangular-sectioned timber measuring 48 x 48mm square. Look at the pieces carefully and select the best lengths for the front legs. Mark on each leg where it will be located i.e. front left and also which side faces front. Cut the two long top rails (B) and on the

ends of each piece use a plywood template to mark a large dovetail on each end (Fig 3, Pic 1).



Figure 3

All measurements in inches (millimetres)



The slots are in the back rail only. The front rail has screw holes

from them where they meet the dovetails on the top long rails.

5 On the legs mark out the position of the mortises to house the tenons for the sides, front and back rails and cut them with a router fitted with a 12mm flat cutter. Assemble the ends without glue to make sure the joints all fit and that they assemble flat and square (Pic 4). Mark the grooves for the side panels (F) and if the long rails are also put in place, the position of the back panel (P)



Media cabinet cutting list

The sizes given for the backs and sides of the drawers do not include the extra width required for making the joints on a dovetail jig.

Ref.	No.	Description	Millimeters
A	4 off	Legs	737 x 48 x 48
B	2 off	Long top rails	952 x 48 x 18
C	2 off	Long lower rails	952 x 48 x 48
D	4 off	Short side rails	235 x 48 x 48
E	1 off	Top	1092 x 330 x 25
F	2 off	Side panel	552 x 216 x 12
G	1 off	Front drawer platform support	575 x 48 x 18
H	1 off	Back drawer platform support	575 x 41 x 18
I	4 off	Drawer platform long side	952 x 48 x 18
J	9 off	Drawer side lays	203 x 18 x 18
K	6 off	Wide drawer base supports	197 x 89 x 18
L	2 off	Narrow drawer base supports	203 x 48 x 18
M	2 off	Lower drawer supports	914 x 28 x 12
N	1 off	Lower drawer central support	203 x 89 x 18
P	1 off	Back	930 x 578 x 6
Q	4 off	Small drawer back	448 x 143 x 12
R	8 off	Small drawer sides	273 x 149 x 12
S	4 off	Small drawer fronts	448 x 152 x 18
T	6 off	Drawer bases	435 x 267 x 6
U	2 off	Large drawer backs	448 x 210 x 12
V	4 off	Large drawer sides	273 x 216 x 12
W	2 off	Large drawer fronts	448 x 219 x 18

Also required: 6 pieces of scrap for drawer back stops.

can also be marked. If you do this when the parts are assembled there's less chance of a mistake. Disassemble, cut the panel grooves and back rebates (Pic 5). Note that some of the rebates and grooves are stopped and some are cut to the ends.

6 The final joints in the legs are the housings for the drawer platforms. The housings in the front legs are stopped 12mm before the front face but those in the back legs are through housings. This completes the legs.

Side panels

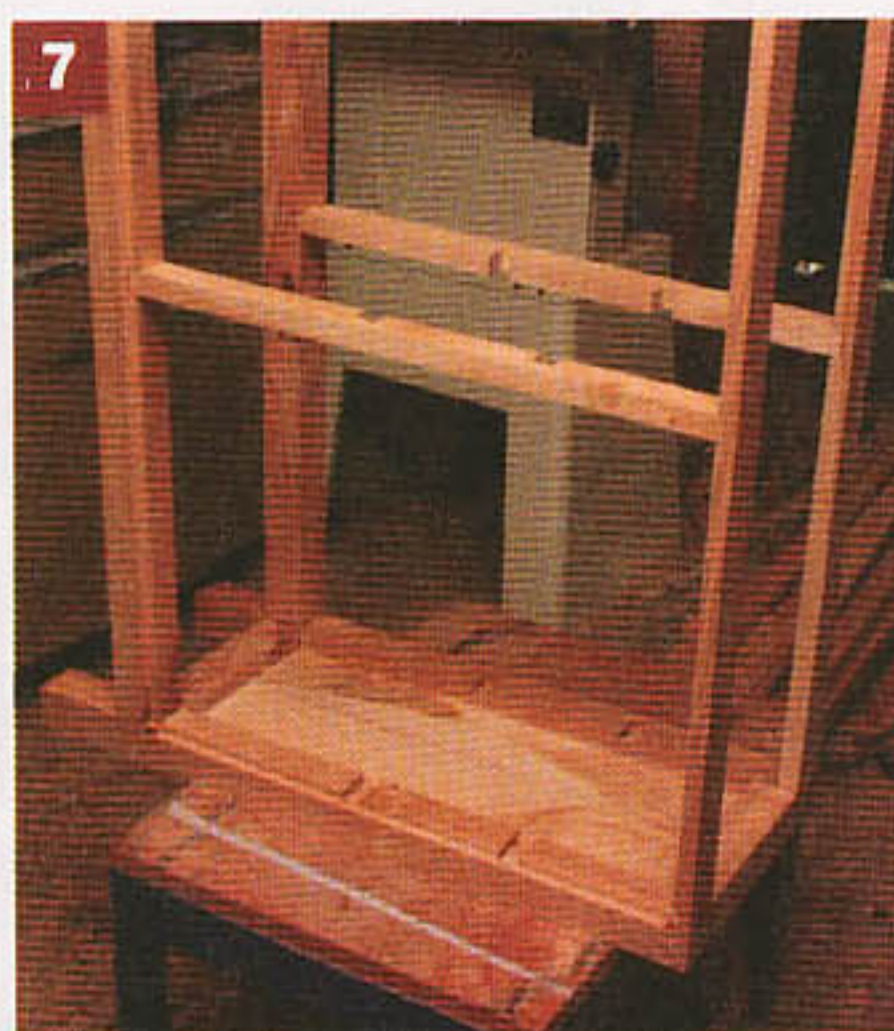
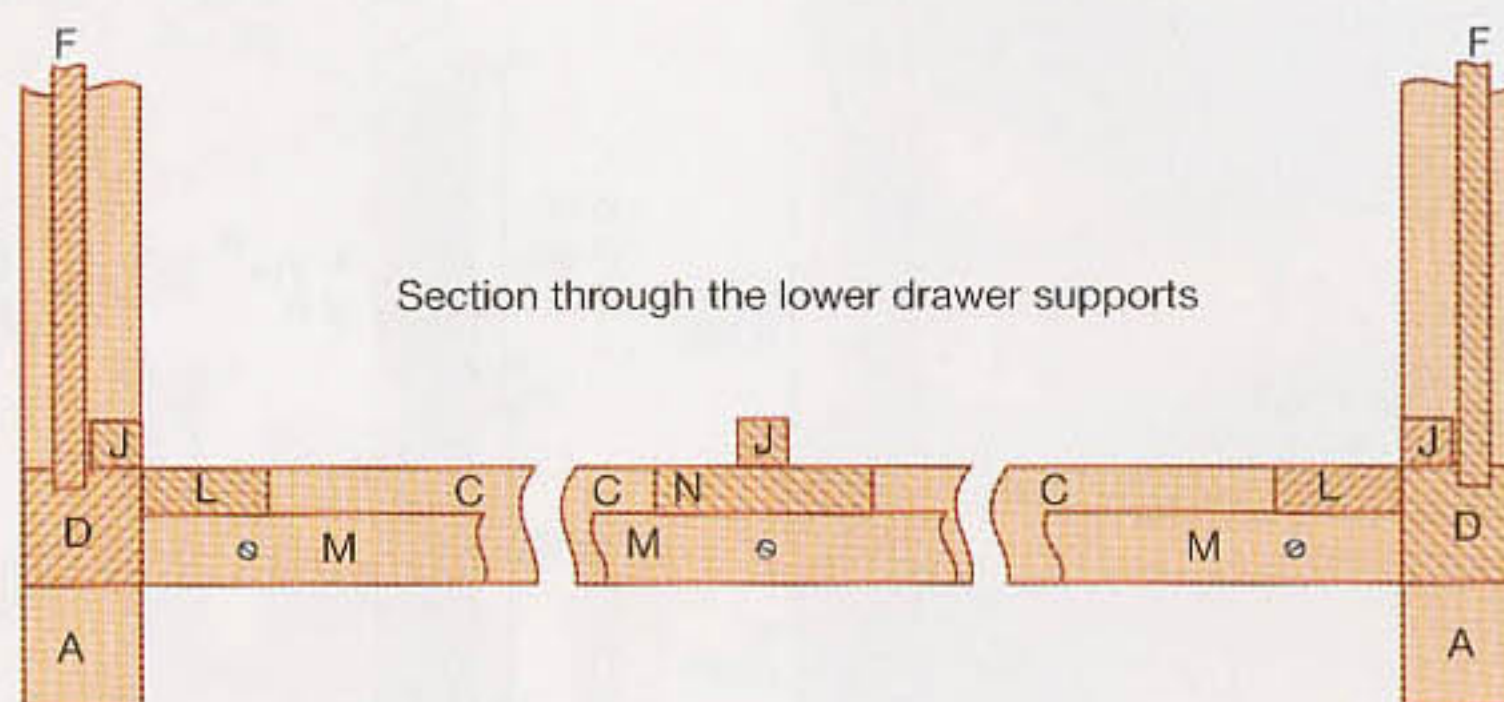
1 The next job is the side panels (F). These are each made from two lengths of 12mm thick boards. The boards are edge jointed using biscuits. To make up wide boards cut your planks to length plus an extra inch or so. Lay the boards on the bench top so that the growth rings on the end grain are alternately up and down, to prevent the wood warping. Sort the planks so that the best faces are on the outside of the cabinet. Mark up the butted edges and, if needed, make minor corrections to the edges with a hand plane.

2 Mark the position on each plank for the biscuits, about 150mm apart. Check they aren't too near the ends of the boards as they could be exposed when the edges are trimmed. I used the smallest size of biscuit. Check the sash cramps are padded at the ends and that they are placed alternately over and under the board. Wipe off excess glue with a damp rag.

3 Glue and clamp the two ends (Pic 6). Don't let any glue get into the panel grooves. Leave the sides for eight hours, take off the clamps and clean all of the joints with a belt sander fitted with a fine grit belt.

4 Now make the front and back supports for the drawer platforms. Cutting housings for the vertical supports (G and H) in the upper and lower long rails. Cut the vertical supports from 48mm square stock and cut the notches at the ends where they

Figure 4



fit into the rails and the halving joints that the drawer platforms slot into.

5 Next the housings for the central vertical supports (G and H) in the top (D) and bottom (C) long rails are made and also the housings for the drawer trays in the central vertical supports. Test fit (Pic 7).

Drawer platforms

The top and middle drawer platforms are made up as complete units. The drawer supports for the bottom drawers are fitted after the carcass is assembled. Start on the top and middle platform by cutting the long sides (I) to size and making the halving joints. Cut the wide base supports (K) and join to the long sides (I) with biscuits. When these are set the side lays (J) are made and fitted to the wide base supports with screws and glue (Pic 8).

Assembling the carcass

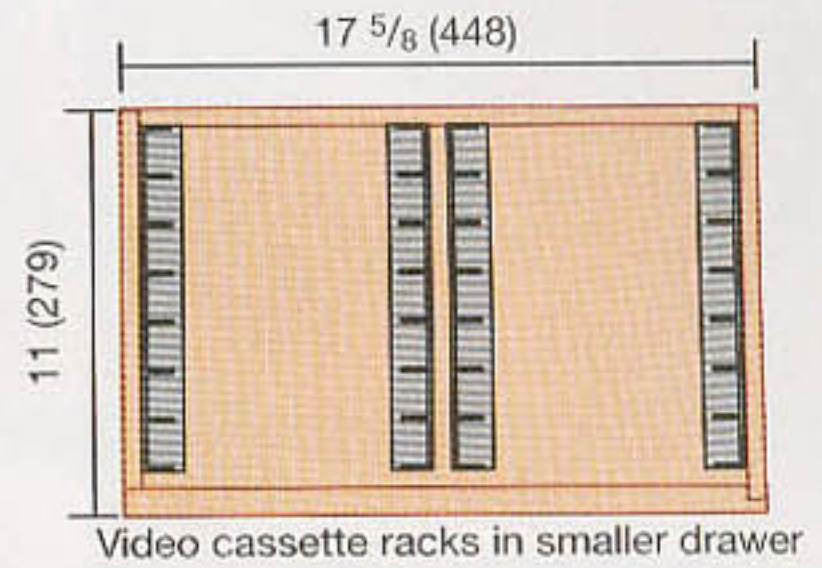
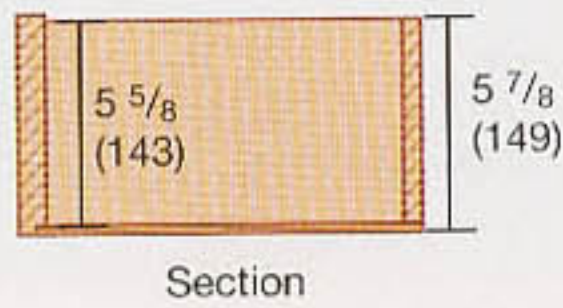
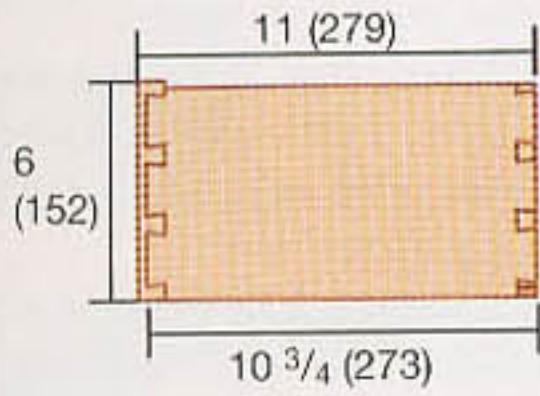
1 Glue and fit the long base rails (C) into the sides followed by the vertical supports (G and H) and the drawer platforms. Fit the top rails (B), (Pic 9). Make up the pieces for the lowest drawer supports. Fix the long supports (M) to the inside of the lower rails with screws. Join a side lay (J) onto the central support (N) and then fix pieces N and L onto the long supports (M). The final two side lays (J) are glued onto the tops of the lowest short rails of the sides (Pic 10). The next job is the top, made from three boards butt jointed with biscuits. To plane the end grain without the back edge splitting away, clamp a piece of scrap wood to it so that the scrap wood will split and not the cabinet top (Pic 11). The front and side edges are chamfered using a power plane and the top is fixed with screws. The back screws are fitted with a washer in a slot so that they will slide if the wood shrinks (Fig 4) (Pic 12).



Figure 5 drawers

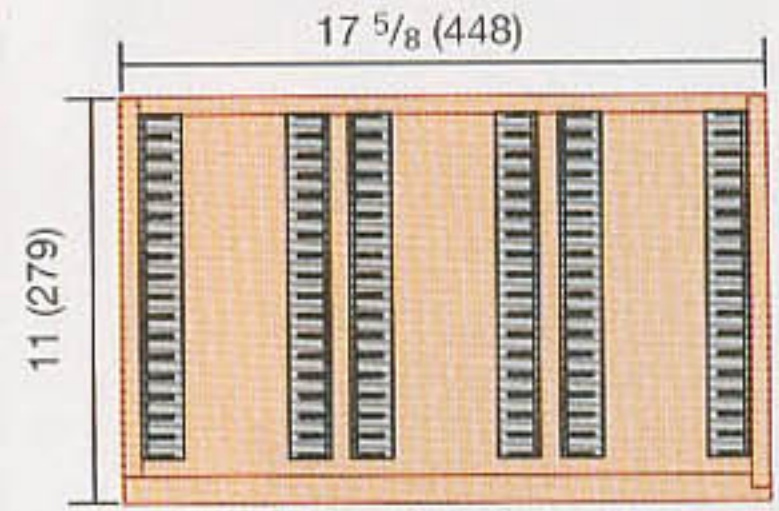
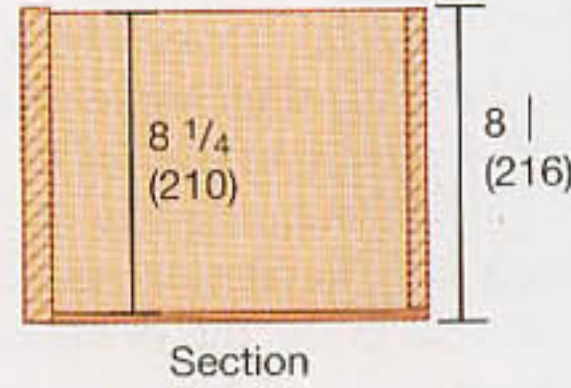
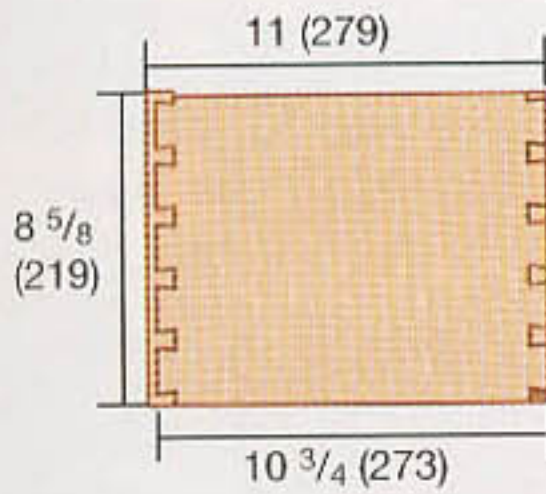
All measurements in inches (millimetres)

Small drawer

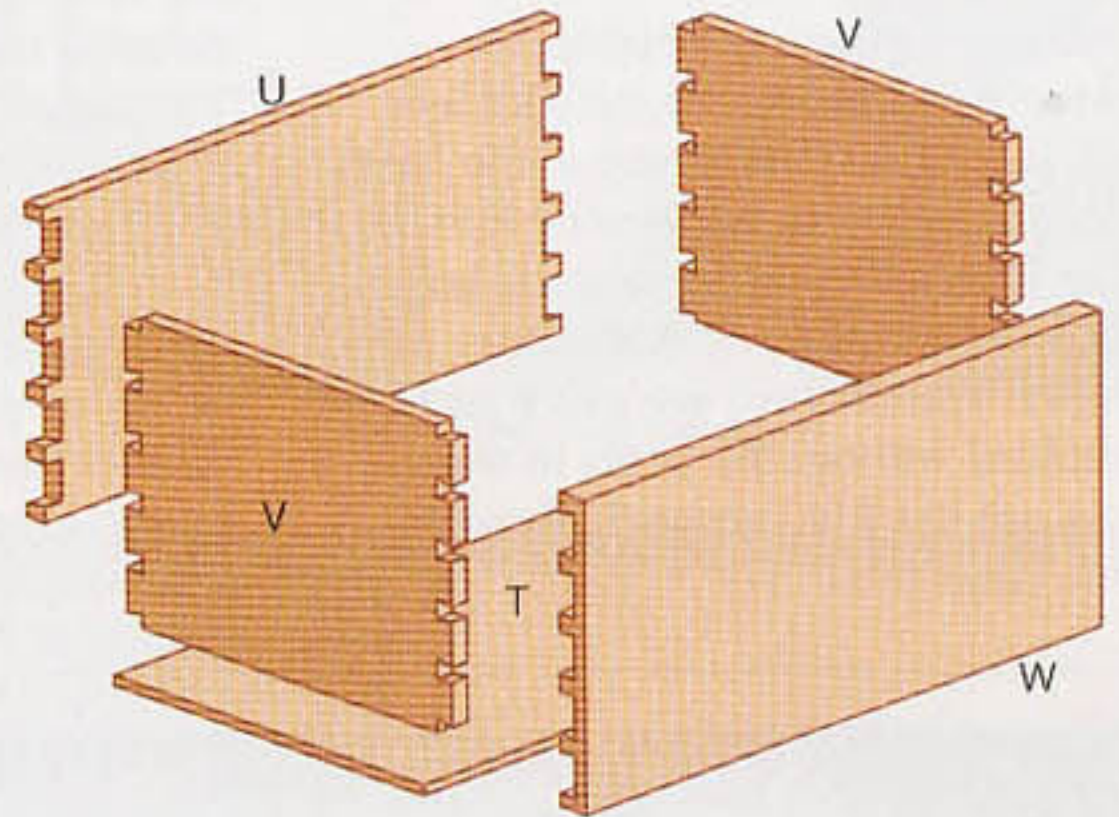
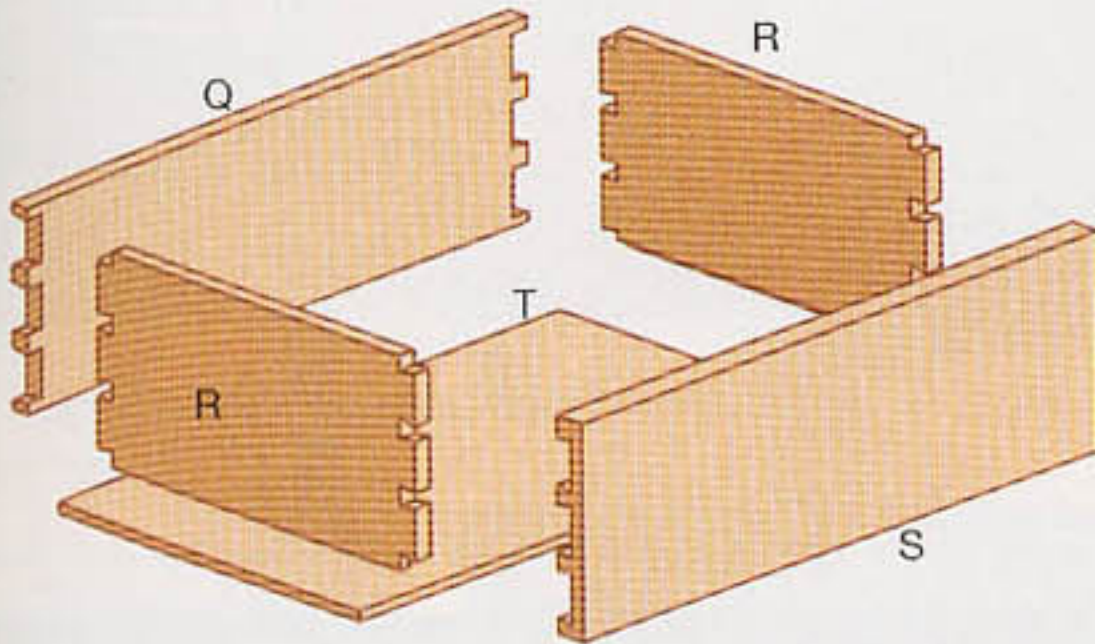


Video cassette racks in smaller drawer

Large drawer



CD/DVD racks in largest drawer



Making the drawers

1 To make the dovetail joints I used a Trend dovetailing jig. This enables you to cut through dovetails as well as lapped dovetails and also to change the spacing between the tails so they look like tails cut by hand. Once set up it can



reduce the time to make the joints considerably (Pic 13).

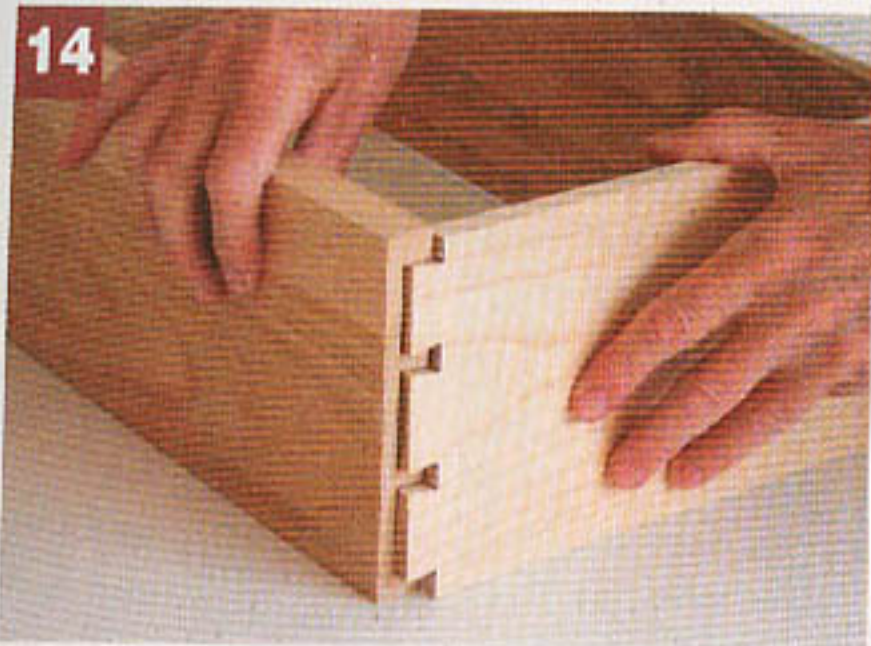
2 To get the best from the jig all of the parts are prepared before work is started on the joints. The sides back and front are all made initially to the same width as it complicates the process if they are different widths. After the joints are made the widths of the sides and backs are reduced to suit the design. So, for the smaller drawer the back, sides and front all start as 152mm wide boards and for the larger drawer they are all 219mm. The drawer fronts (S and W) are made so that they fit the carcass with about a 1mm gap all round.

3 To make the joints mark each piece: front, back, sides and on each mark the top edge. On the four top drawers the spacing of the tails is different from the two lower drawers. The pin spacing for the top drawers was prepared first and set up on the jig and all of the tails on the sides were cut. This is followed by cutting the pins on the lapped joints on the fronts of the drawers.

4 The size of the dovetail cutter depends on the thickness of the drawer fronts. The cutter is used to make the tails in the sides and also the pins in the drawer front. After all of the tails and the drawer front pins have been made, the cutter in the router is changed to a flat cutter so that the pins on the drawer backs (Q and U) can be cut. The shape of the cutter guides in the jig are changed for each part but not their position on the jig. After the two top drawers are finished the jig guides are changed and the lower drawers are made in the same way.

5 Assemble the drawers (Pic 14) and mark the position for the rebate to house the drawer bottoms (T). The bases are housed in a rebate on the edges of the sides and front to give the

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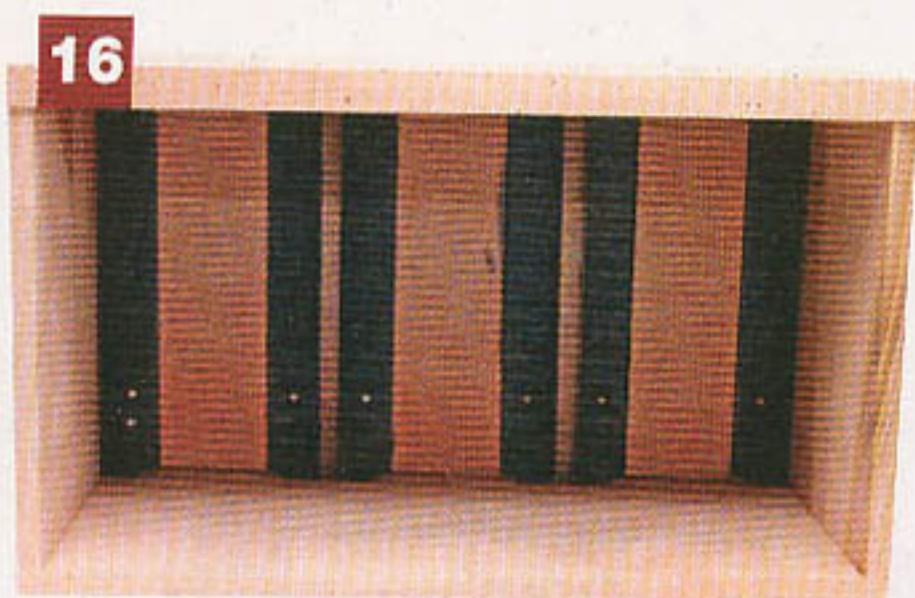


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maximum depth on the inside. The backs of the drawers are cut with less width so that they sit on top of the bases. Take apart and cut the rebates with a router (**Pic 15**). Cut all plywood bases to size and glue and assemble the drawers. The drawers are glued and assembled without the bases in place. These are fixed in later with glue and 12mm panel pins.

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6 Use a belt sander to smooth the joints and mark where the rear of the drawers fall on the back of the drawer platforms and fix some drawer stops to the top edge of the back. The two largest drawers house the disks (**Pic 16**), as they need more depth than is available in the top drawers. To pack the most disks and cassettes possible into the drawers the rails are cut short and placed in the drawers running from front to back (**Fig 5**). The bases of the drawers are too thin to fix the rails with screws so they are fixed with glue.

7 Finally the plywood back (P) is cut, pinned and glued into place. The cabinet has been given several coats of Liberon Finishing Oil, rubbed down with steel wool between coats. Finally, fit the handles. We used a bullet-

USEFUL INFORMATION

Some of the drawers are fitted with plastic slots to house DVDs, CDs and videotapes. You will need six plastic disk rails, part number 810.66.337 and four cassette rails part number 810.66.328.

Supplied by Isaac Lord of High Wycombe ☎ 01494 835200, www.isaaclord.co.uk

Handles from a wide range of modern and traditional brassware available from Danico Brass ☎ 0207483 4477, fax: 0207722 7992, email: sales@danico.co.uk



shaped design available from Danico.

Picnic table



13 pages of sizzling summer projects



James Hatter describes how to make this functional piece of garden furniture which is ideal for a picnic on your patio

Last summer was a memorable one for the long hot sunny days, when outdoor living became the norm. In anticipation of another good summer a friend asked me to make him a picnic table suitable for the patio.

This project is simply a table and attached seat combination that can seat up to six people, although this could be

increased by making a larger table and double-end seats. The overall size is approximately 1.87 x 1.62m, with a table height of 730mm and a seat height of 450mm.

Exterior finish

Outside projects need to use components that will withstand the

extremes of the weather. An example of a good durable timber is iroko, and although this is cheaper than teak, it still represents a big outlay. A more economical alternative is to use European redwood treated with a preservative and finished with exterior grade water-based varnishes or paints. This is the material used for the frame components of this project, however for the table and seat tops, stable and durable 18mm WBP plywood is used. Far eastern ply is usually the most economical to buy, although there are often voids that will need to be filled. A

standard 8 x 4ft sheet will provide all the necessary parts. Select the best surface for the visible surfaces.

Making the table

The construction method is simple, and coach bolts are used to join the main frame components and tops together. This allows disassembly for storage or transport. Stainless steel coach bolts and screws have been used to prevent corrosion and discolouration. The table and seat tops are made by selectively edge jointing strips of 18mm plywood together using biscuits and an exterior grade adhesive.

Tabletop

The tabletop blank is made from four 203 x 1150mm panels of 18mm ply, and six 30 x 240mm insert strips.

1 Mark the positions for the strips and cut matching size 20 biscuit slots. Put a slight chamfer along each top edge. Assemble the tabletop blank by joining the 203mm wide strips together with the insert strips between. Use size 20 biscuits and exterior grade adhesive. Clamp the assembly together and check that it's flat.

2 When dry, mark the perimeter of the tabletop onto the blank and cut out the shape. I used a circular saw and guide but you could also use a jigsaw.

Cutting biscuit slots in the table top sections



Materials used

Approximate cost of materials: £160

Adhesives used: Screwfix Exterior grade PVA; Polyurethane Adhesive.

Protection and Finish: Screwfix Microemulsion Universal Wood Preservative; Rustins Exterior Quick drying Woodstain, satin finish, colour Teak. And clear varnish (satin)

Other: Stainless steel screws, coach bolts, nuts, washers. Biscuits - all supplied by **Screwfix Direct** 0500 414141



Joining the table top sections with biscuits and adhesive



Cutting the table top angles

Prepare three 200 x 900mm crosspieces and temporarily attach these to the underside of the tabletop. Line two of these flush with each end and one centrally.

3 Mark the table outline on these supports. Remove and cut off the excess. Re-attach the support crosspieces using polyurethane adhesive and 4 x 25mm stainless steel screws.

4 Cut four edge in-fills to length with a 12.3° angle at each end. Attach these to the gaps between the crosspieces using 4 x 25mm screws and adhesive. Clean off the adhesive residues and sand the edge. Use woodfiller to fill any voids in the plywood edge. This will give a smooth edge when finished, but you could add a pine lipping if you prefer.

5 Put a slight round over to the edges, I used a 3mm round over bit in a hand held router. Drill a 38mm diameter

Marking off the table top cross pieces



hole centrally in the table top to take a parasol. A forstner bit will give a clean cut hole.

Legs and frame

Each leg uses 44 x 95mm pine and is 800mm long with a 25° angle at each end. The top of each leg is attached to the underside of the tabletop by using a coach bolt through two 150 x 33 x 80mm pieces of pine separated by 45mm and mounted on a 150 x 150 x 9mm plywood base that is screwed and glued in place.

1 Cut the components to size and take the sharp corners off the pine pieces. Clamp pairs of the pine pieces together and drill a 10.5mm hole through each pair to take the M10 coach bolt, and then attach the pine pieces to the plywood base using 4 x 30mm screws and adhesive. It's helpful to use a scrap of the leg material with a couple of layers of masking tape to give adequate spacing between the two side pieces after the finish is applied.

2 With each attachment, take the end of a leg and hold it in its correct position with the front edge of the leg 35mm from the front edge of the plywood base. Push a M10 coach bolt through to mark the leg. Use the mark to drill an 11.5mm hole. Identify each leg and leg attachment pair so that they can be reassembled later. Attach each assembly into position on the underside of the tabletop using 4 x 30mm screws and polyurethane adhesive.

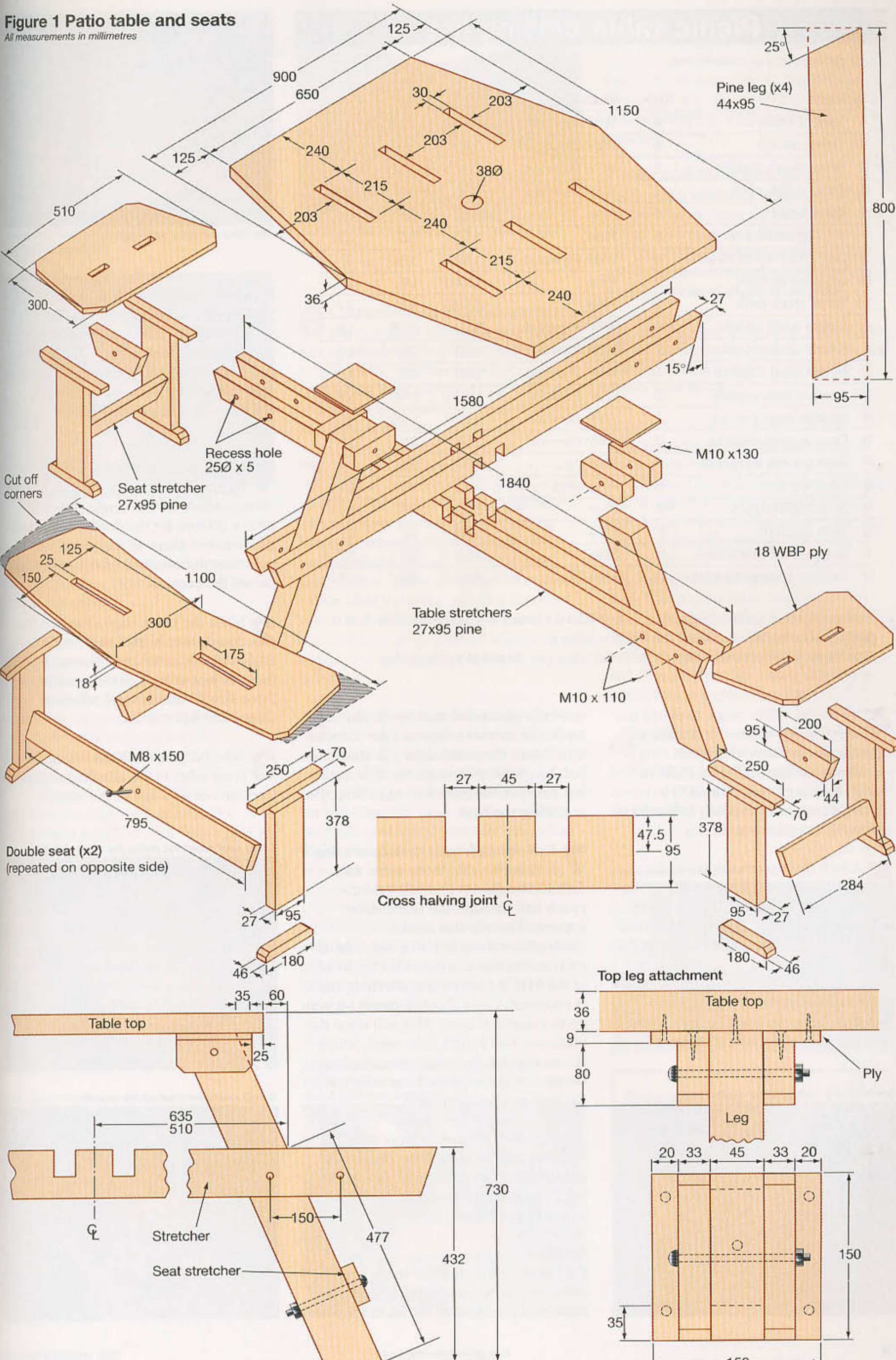
3 There are four stretchers that hold the legs in place and also protrude to form the centre support for the seat tops. There are two 1580mm lengths and two 1840mm lengths all using 27 x 95mm pine. Measure the central point and clamp all four together. Mark the positions for the double cross-halving joints. I used a sliding mitre saw with a trenching facility to remove the unwanted material, then fine tuned with a chisel. Cut the ends of each stretcher with a 15° angle.

Trenching out the stretcher cross-halving joints



Figure 1 Patio table and seats

All measurements in millimetres



Picnic table cutting list

All dimensions in millimetres

Part	Qty	Material	L	W	T
A Table panels	4	WBP Plywood	1150	203	18
B Table inserts	6	WBP Plywood	240	30	18
C Table cross pieces	3	WBP Plywood	900	200	18
D Table edge infills	4	WBP Plywood	295	50	18
E Table Legs	4	Pine	800	95	44
F Top leg attachments	8	Pine	150	80	33
G Leg attachment base	4	WBP Plywood	150	150	9
H Table stretchers	2	Pine	1840	95	27
I Table stretchers	2	Pine	1580	95	27
J Single seat panels	4	WBP Plywood	510	138	18
K Single seat inserts	2	WBP Plywood	100	25	18
L Single seat inserts	4	WBP Plywood	160	25	18
M Double seat panels	2	WBP Plywood	1100	150	18
N Double seat panels	2	WBP Plywood	1100	125	18
O Double seat inserts	6	WBP Plywood	250	25	18
P Seat centre supports	4	Pine	200	95	44
Q Seat leg top	8	Pine	250	70	27
R Seat leg uprights	8	Pine	378	95	27
S Seat leg foot	8	Pine	180	46	27
T Single seat stretchers	2	Pine	284	95	27
U Double seat stretchers	2	Pine	795	95	27

Stainless steel Coach Bolts (A2); 8 x M10 x 110mm; 4 x M10 x 130mm; 4 x M8 x 150mm; M8 and M10 nuts and washers.

Stainless steel screws - Stainless Turbo Ultra (all supplied by Screwfix)

4 It's useful at this stage, to pre-fit the legs and stretchers. First mark on each leg the position where the stretchers will attach. Drill a 10.5mm hole in each leg to take the M10 x 110mm stainless steel coach bolt used to attach the stretchers to the leg.

5 Attach the top of each leg to its attachment on the underside of the tabletop using an M10 x 130mm coach bolt, washer and nut. Rest the table onto its legs and have them splayed out at the correct angle.

6 Correctly position one of the stretchers on opposing legs. Make sure that the cross-halving joints are

centrally positioned and check that the top is the correct height to take the seat tops. Mark the position for the attaching bolt by marking through the hole in the leg. Remove the stretcher and clamp the matching one to it.

7 Drill through both stretchers using a 10.5mm drill. At the same time drill 10.5mm holes that will hold the coach bolt through the seat centre support. You will also need to counterbore these holes on one side of each pair of stretchers so that the head of the M10 x 110mm seat attaching bolts is recessed. Use a 25mm forstner bit and go to a depth of 5mm. This will allow the minimum bolt length to be used, which is essential for the single seat attachment because of the restricted space between the legs and the stretchers.

8 Re-attach both stretchers with the coach bolts. Repeat the procedure for the other two stretchers. Leave the table pre-assembled so that the seats can be made and fitted.

Seats

Each seat unit is attached to the table assembly by two coach bolts. These are made and pre-fitted to the table, they can



Forming the long seat top

then be easily removed for the final protection and finish to be applied.

The seat top blanks are formed in a similar way to the tabletop. The inserts are 25mm wide and are attached using size 10 biscuits. Each double seat top requires two angled attachments to its front.

1 Make up the seat blanks using 18mm plywood, this will give a 510 x 300mm blank for the single seats and 1100 x 300mm for the double seat. Mark the required shape of the single seat tops onto the blanks then cut to size and cut off the corners.

2 Mark the outer edge shape on the double seat blanks and cut off the angled pieces at the rear. Use each of these to join to the front edge using three size 10 biscuits and adhesive. Clamp and leave to set.

3 When dry, mark 35mm along the inner edge of the attached angled piece and draw a line to the outside

Long seat clamped ready for final shaping



Small seat clamped up for shaping



Marking the bolt position on the leg



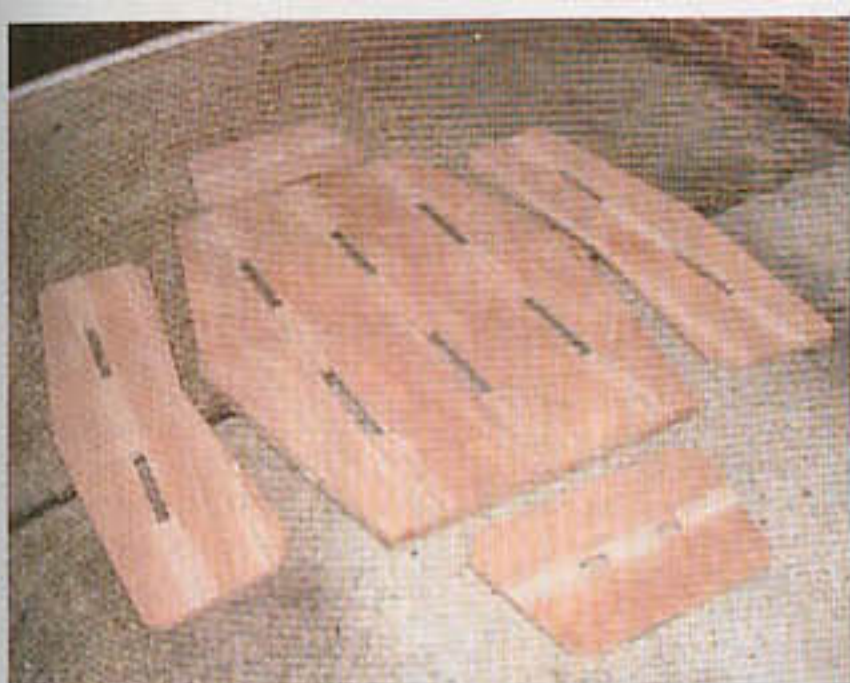
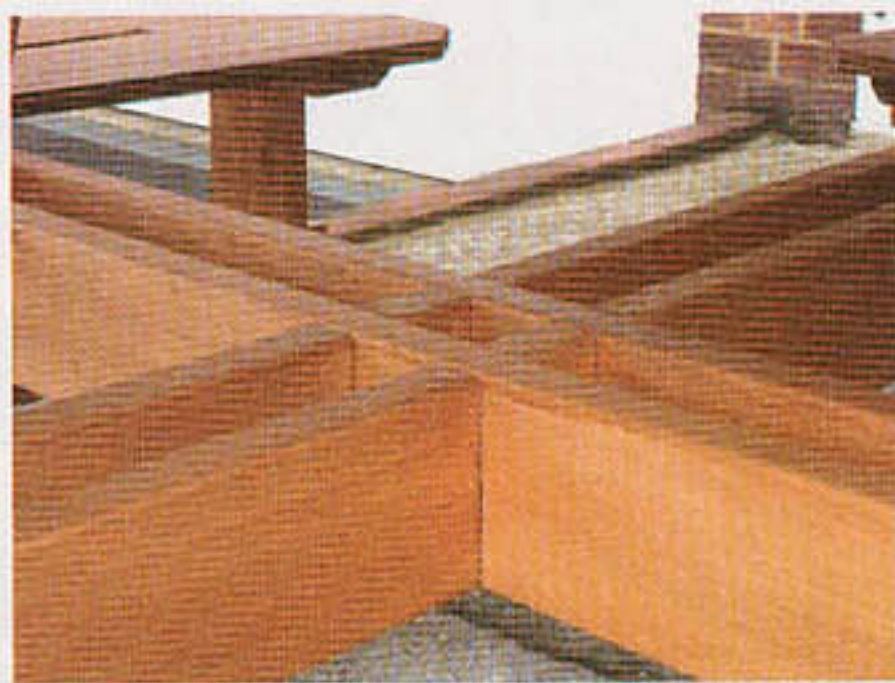


Table and seat panels ready for further assembly



Detail of stretcher double cross-halving joint



Joining the leg assembly to small seat top

corner. Cut off the unwanted material and the corners. Put a 3mm round over to the seat edges.

4 All the seats have a central crosspiece of a 200mm length of 44 x 95mm pine that will rest on, and be attached to the protruding table stretchers using a M10 x 110mm coach bolt. Additional seat support is provided by a leg at either end of the seat top.

5 The seat legs each consist of a 250mm length of 27 x 70mm pine at the top, a 378mm upright of 27 x 95mm pine and a 180mm long foot of 27 x 46mm pine. The top and foot are attached to the upright using two 4.5 x 50mm screws and polyurethane adhesive, while the top of the leg is attached to the seat bottom using two 4 x 30mm screws through the seat top, and adhesive, although dry fit initially until the stretcher is available.

Attaching the long stretchers to a leg



6 Counterbore the seat fixing screw holes, and fill after with wood plugs. Before attaching the central support, prepare it for attachment to the protruding table stretchers by drilling a 10.5mm hole to match holes drilled in the table stretchers.

7 The seat legs are connected to each other and to the table leg with a pine stretcher. These will require position adjustment in situ before attachment. You will require a 795mm length for each double seat and 284mm for the single seats. These are attached centrally to the table leg using an M8 x 150mm coach bolt. The ends of the stretcher and the seat legs are connected together using two 5 x 70mm screws and adhesive.

8 To fit the seat stretchers, first rest each seat top into position, with the bottoms of the legs resting on a level surface. Offer each seat stretcher in turn, and adjust its position by sliding it up and down the table leg, so that the ends are positioned centrally within the width of each seat leg. Mark the positions of the stretcher ends and the point where it crosses the table leg, and then drill a 10mm hole through the stretcher and the table leg, and the clearance holes in the seat legs for attachment. The screw heads are counterbored and the bores filled with either a wood plug.

Make sure that the bolt is fed through the first stretcher before lowering the small seat into position



9 The distance between the single seat leg and the table stretcher is approximately 90mm, it's therefore important to insert the M10 x 110mm coach bolt into the first table stretcher before lifting the single seat unit into position.

Finish and final assembly

Enlarge the size of the holes drilled in the legs for the stretchers to 12mm; this will give extra leeway to cope with an uneven surface. Before assembly, sand all the components and round over any remaining sharp edges or corners.

1 Apply a coat of wood preservative to all surfaces. It's best to stand the leg bottoms in a container of preservative for an hour or so.

2 Before final assembly, it is also advisable to give the timber three coats of water-based exterior grade woodstain. This will give better cover and will be easier to apply. I used Rustin's exterior acrylic varnish, colour teak. The first coat was diluted with 10% water.

3 Reassemble the table by first attaching the legs, then the stretchers. Follow this by attaching the seat units. Smear a little waxoil or grease on the shanks of the bolts before insertion and do not tighten the coach bolt fixings until all the components are assembled.

4 Finish the assembly by applying a coat of clear exterior acrylic varnish to the table and seat tops. This can be repeated from time to time to maintain the plywood surfaces.

Pre-assembled table



Transport and storage

The design allows easy dismantling so that you can store away the table and seats over winter, or for routine maintenance. To dismantle, remove the two coach bolts holding each seat unit, remove the coach bolts holding the table stretchers to the legs, and finally remove the coach bolts at the top of each table leg. Reassemble in the reverse order.



This decorative feature can be used with trellis to divide off a section of your garden or simply as freestanding extra seating. Designed by **Dave Mackenzie**



Trellis archway

This trellis arch could be used to link two parts of the garden and is strong enough to support a small seat as well providing a growing space for a rose or other climber. It's made from pressure-treated softwood, fixed with halving joints and screws.

If your garden has deep sandy loam then post holders are easy to hammer into the soil. For stoney soil use Postcrete quick-setting concrete or hammer in the spikes and work out the exact measurement of the structure from the fixed posts. When fitting the posts, use a spirit level to check they are all placed in the ground to the same depth (**Pic 1**). Bear in mind the post holders have metal flanges that grip the

post and stop them pulling out. This means that the posts have to be hammered into the holders. This is easier if the rest of the structure is added afterwards.



Time taken: Weekend project

Construction

1 The four corner posts (A) used in the structure are 76 x 76mm fence posts. Start by marking each one with its final position, eg front left, front right etc. On the two left-hand posts, cut the halving joints for the three seat rails (F). Use a set square, a panel saw and a lin bevel edged chisel.

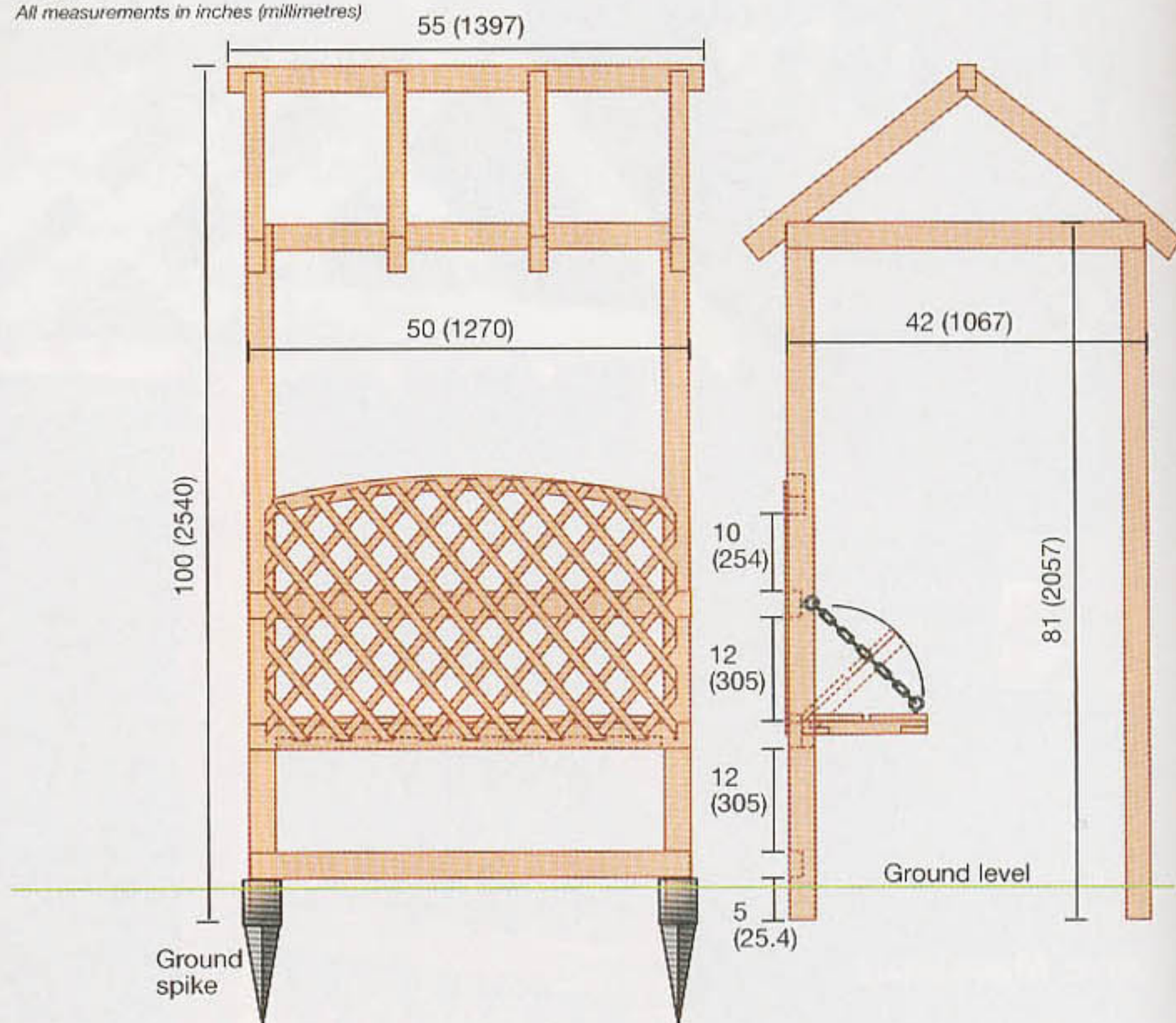
2 Next make the halving joints. To do this, mark the position of the joints (**Pic 2**) and cut down the cheeks of the joints with the panel saw (**Pic 3**) then



remove the waste with a chisel (Pic 4). At the top of the corner posts mark and cut the housings for the crosspieces (B and C) and make them in a similar way.

3 Hammer the posts into the holders (Pic 5). Use a piece of scrap wood to protect the tops of the posts as they are easily damaged. Cut the four top rails

Figure 1
All measurements in inches (millimetres)



(B and C) to size and cut halving joints into the ends of them. Screw into place at the top of the posts, also fix in place the rails at the back of the seat (Pic 6). Use plated screws.

4 The next pieces to be made are the parts for the pitched roof (E). I made a template from Fig 3 to mark out the first shape and used this piece to mark out all of the other pieces (Pic 7). Test fit the first pieces before cutting the rest.

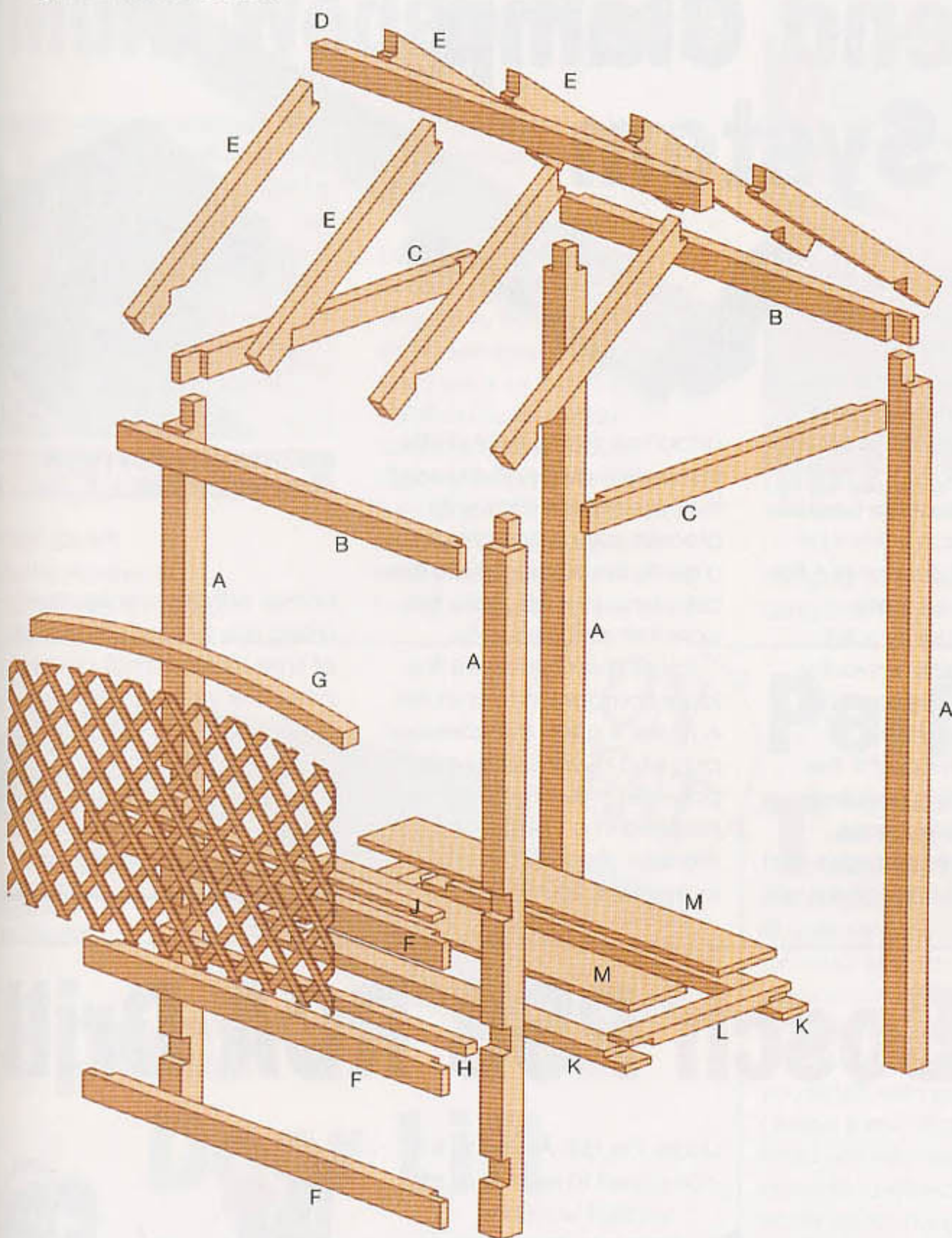


Pergola cutting list

Part	No.	Description	Millimetres
A	4 off	Legs	2057 x 76 x 76
B	2 off	Side top rail	1219 x 76 x 51
C	2 off	Front and back top rail	1067 x 76 x 51
D	1 off	Roof apex	1397 x 76 x 51
E	8 off	Roof beams	813 x 76 x 51
F	3 off	Lower side rails	1270 x 76 x 51
G	1 off	Curved side rails	1118 x 127 x 51
H	1 off	Rear seat support	1118 x 38 x 38
J	1 off	Hinge support	1118 x 38 x 18
K	2 off	Long seat rail	1092 x 76 x 38
L	2 off	Short seat rail	368 x 76 x 38
M	2 off	Seat slats	1092 x 152 x 18

Also required: A small expanding trellis panel, two 457mm galvanised chain pieces, four large screwed eyes, four ground spikes, gate latch

Figure 2 construction



5 The apex of the 'roof' (D) is a length of 76 x 51mm that slots into the top of the sloping pieces after they have been fixed at the lower end (pic 8). Next, the curved shape is marked out using Fig 3 as a guide. This supports the top of the trellis behind the seat. After the shape is marked, cut with a bandsaw and sand. Fix in place with screws.



6 The small piece of expanding trellis is shaped along the upper edge, cut and fixed in place with galvanised nails.

The seat

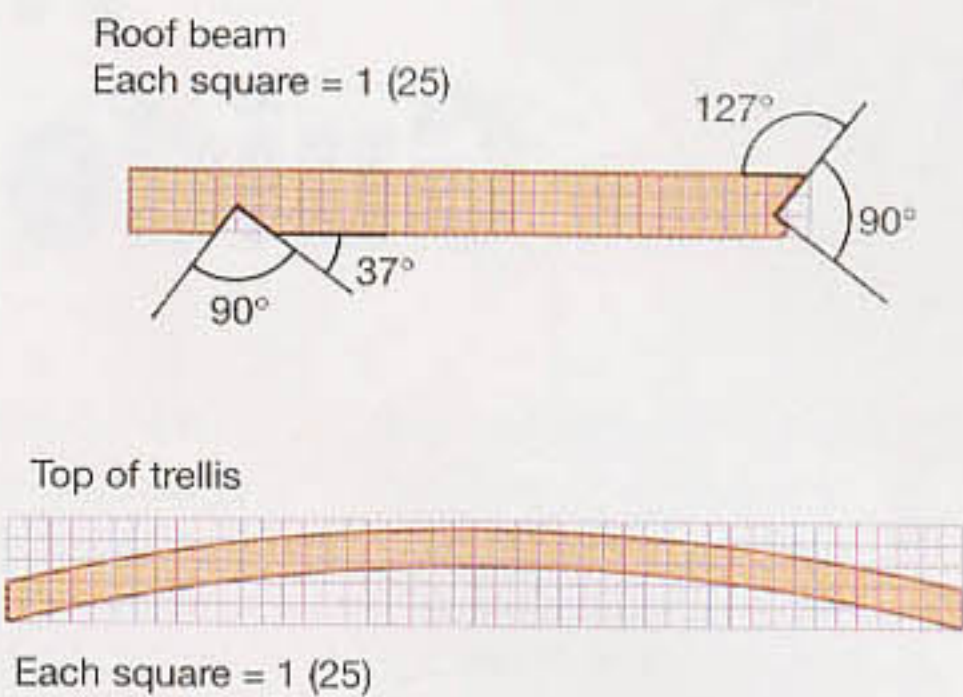
The next job is to make a seat. As this pergola straddles the entrance to a vegetable plot, wide access is required for a wheelbarrow. So, the seat is made so that it can be raised.

1 The seat is made from four lengths of 76 x 38mm timber (parts L and K) with screw-reinforced halving joints at the corners and a couple of 152 x 18mm planks screwed on top. It is hinged to the middle rail on the back of the pergola with a couple of 100mm brass plated hinges. You could also use galvanised hinges.

2 To raise the central side cross piece (F) to the same height as the seat, so that the hinge sits correctly, a length of wood (J) is screwed to the top edge of

Figure 3

All measurements in inches (millimetres)



the central back rail. The back edge of the seat is not only supported by the hinges but also by a length of 25mm square timber (H) screwed under the back edge of the seat. The front edge of the seat is supported by a couple of lengths of galvanised chain, fixed by galvanised screwed eyes. A gate latch is used to hold the seat in the upright position.

3 I laid some paving slabs at the base as this pergola straddles the path leading to the veggie plot and could become muddy (Pic 9).





Mackintosh double



Careful surface preparation is the key to this wardrobe project, inspired by Mackintosh's Hill House interior. Made by **Keith Smith**

On a recent trip to Glasgow I visited the Hill House which was built at the turn of the century by Charles Rennie Mackintosh for publisher Walter Blackie. Mackintosh also designed the furniture for several rooms including the master bedroom in which there is a pair of rather imposing wardrobes. These are painted white and have a simple but striking design with insets of pink glass in the doors. I had wanted to make some large wardrobes, but had been at a loss as to a design. The wardrobes needed to be interesting but as unobtrusive as possible; I thought his design, simplified by the removal of the glass insets, would be ideal. Fortunately the book *Charles Rennie*

Mackintosh published by W. & R. Chambers Ltd has good photography of the wardrobes and from this I was able to draw out the detail of the doors.

Construction

The wardrobe is tall enough to allow it to be laid out with $\frac{3}{4}$ half hanging to maximise storage of shirts and jackets with a smaller full length hanging space for coats. With the exception of a few lengths of hardwood moulding the wardrobes are made entirely from MDF. The body of the wardrobe is straightforward and is biscuit jointed together. The finished wardrobe, even with the doors removed is extremely heavy. This was built for a ground floor

bedroom with good access but took four people to carry it into position. An alternative would be to use cam dowels instead of biscuits and assemble the wardrobe in situ. The cornice is made separately and is screwed in place when the wardrobes are in position.

“Most European manufacturers now produce low formaldehyde board made to the stringent German ‘E1’ standard of 0.1 parts per million”

If you want to be ultra cautious in the making, zero formaldehyde emission MDF boards are available (*see MDF...the risks*). Medite make a ‘ZF’ zero formaldehyde board. These are about 50% more expensive than standard boards and

MDF... the risks

MDF is the ideal material for a project like this; it is inexpensive, stable, easily machined and gives an excellent painted finish; but it has had some bad press. There have been rumours that it has been banned in America and Australia but these are not true. Machining, particularly sanding MDF, creates a very fine dust but it is not considered any more dangerous than other wood dust; all dust should be treated as potentially dangerous.

One issue of concern is the use of formaldehyde resins in the manufacture of MDF, and the health risks associated with emission of formaldehyde from the finished board. Formaldehyde can cause eye or throat irritations, asthma and rhinitis; it can also affect the skin, leading to dermatitis. However, it's worth bearing in mind that formaldehyde is present in many products, and occurs naturally in wood.

The Health and Safety Executive have given formaldehyde a Maximum Exposure Limit of 2 parts per million. Most European manufacturers now produce low formaldehyde board made to the stringent German 'E1' standard of 0.1 parts per million. However it is still easy to buy imported MDF which has been produced in plants where they have not made the investment to produce low formaldehyde board. Some suppliers don't even know if their boards are low formaldehyde or not.

are less widely available, Travis Perkins can get these boards to order. Workability and physical properties are the same for 'ZF' as standard board.

Travis Perkins have branches nationwide and their standard MDF board is low formaldehyde, produced in Scotland by Caberboard, who have been producing low formaldehyde board for 8 years.

How to reduce the risks:

- Wear eye protection and a respirator with a P3 rating. However a mask gives only partial protection, as machining MDF produces tiny particles which can pass through most masks; efficient extraction at source is the best protection.
- If you have any skin irritation, gloves should be used, especially when sanding to avoid formaldehyde coming into contact with the skin.

- When I'm routing I always wear a leather apron, this is not just with MDF. Even with good dust extraction the router fires wood chips at high velocity, usually at about groin level. The chips can pass through clothing and irritate the skin, causing a nasty rash.

- When painting it is good idea to coat the whole of the wardrobe, as this will help to prevent the release of any formaldehyde present in the MDF.

How to make the wardrobes

Each wardrobe takes three sheets of 18mm, 1 sheet of 6mm MDF and half a sheet of 12mm MDF. These boards are heavy and awkward to cut, so it's a good idea to get them cut to size at the timber merchant. The cutting layouts are arranged for the minimum number of cuts to be required.

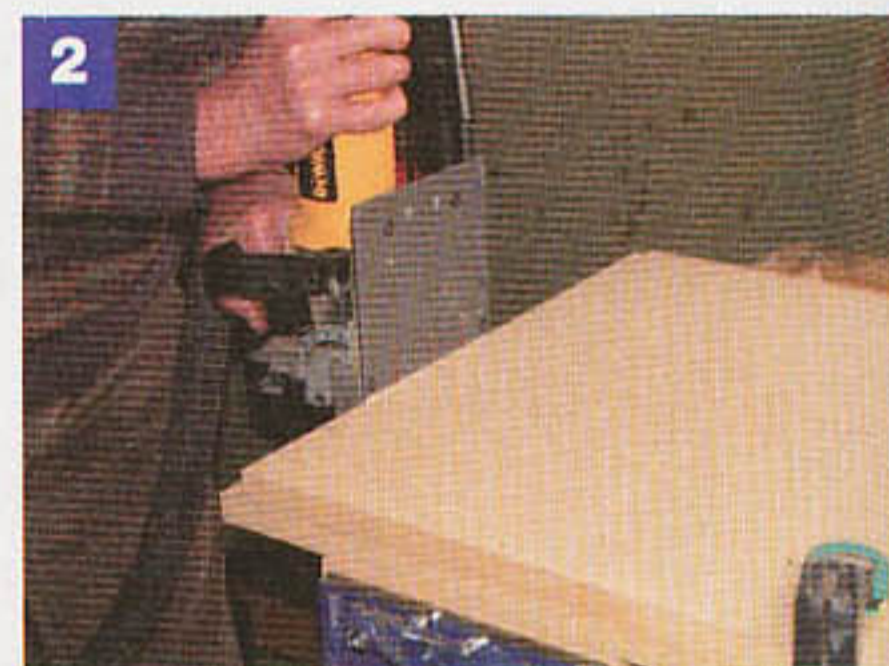
Check all the pieces for size and mark them clearly 'left side' etc and also their orientation with arrows. All these boards will look similar at some point and it is easy to cut the joint in the wrong board if they are not marked well. Cut an 8mm wide, 8mm deep rebate to the inside face at the rear of each side, to accommodate the back panel.

I use size 20 biscuits, but some biscuit jointers cut a particularly deep slot and, as the biscuit swells, it can show on the outside face of 18mm board. So, I would advise some experimentation, if you have not used a biscuit jointer before. If this is a problem use a size 10 biscuit.

Lay the left side face down, place the top on the side with the front edges aligned. Use a piece of scrap 18mm MDF along the top edge as a spacer and clamp the boards together. It's only necessary to mark the centre position



1 Use a piece of scrap 18mm thick board as a spacer for setting up the biscuit joint



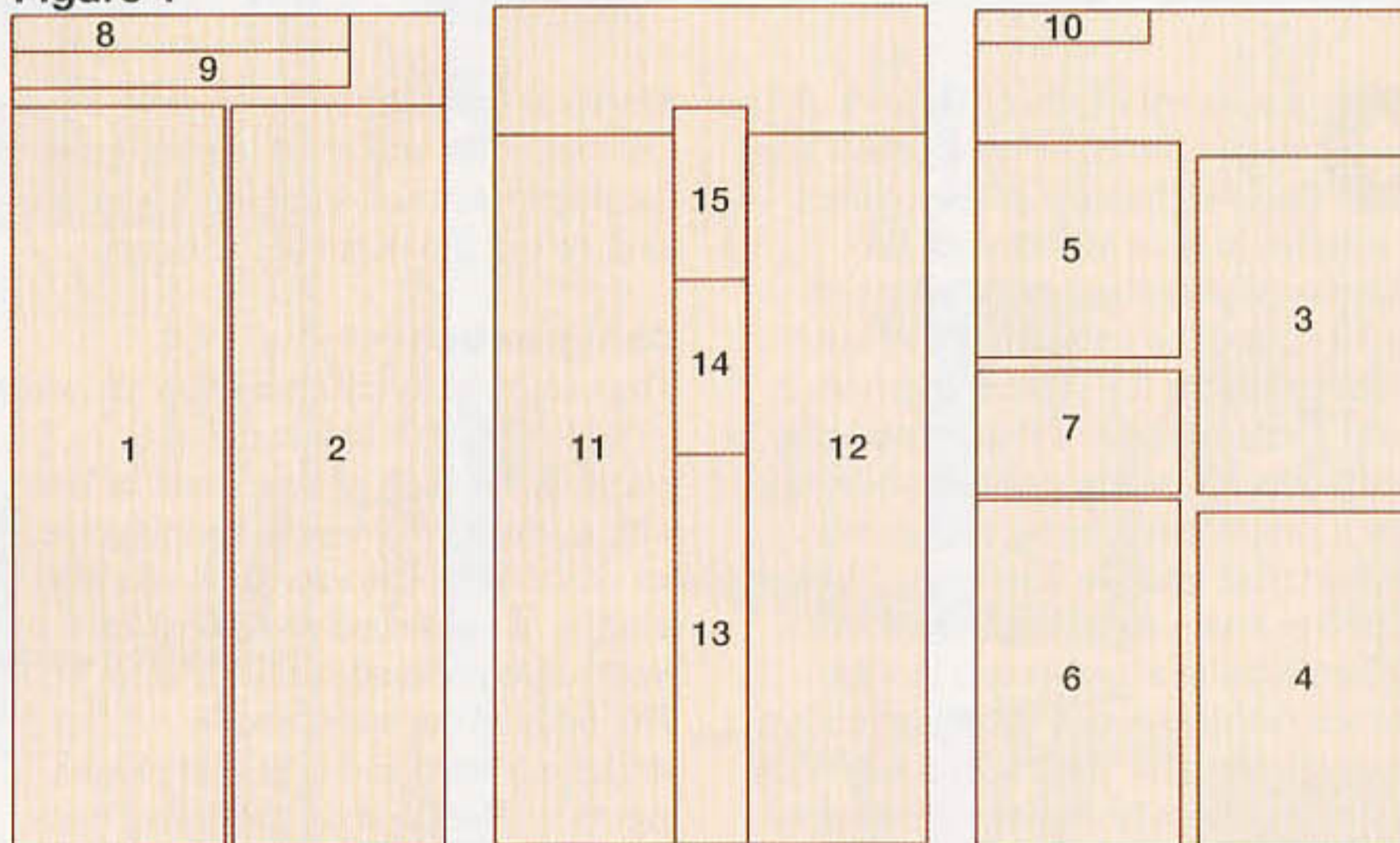
2 Biscuit joints with a No20 biscuit can swell and leave faint marks on the surface of an 18mm thick board. Experiment on scrap first

of each biscuit as the biscuit jointer should have a centre line mark. I don't normally do too much formal measuring of biscuit position.

The two outermost biscuits need to be 70mm in from the edge, then the other biscuits are spaced at between 100-150mm centres. With the two boards clamped together cut the slots for the biscuits, this way there's no need to use the fence on the biscuit jointer, **Pics 1 & 2**.

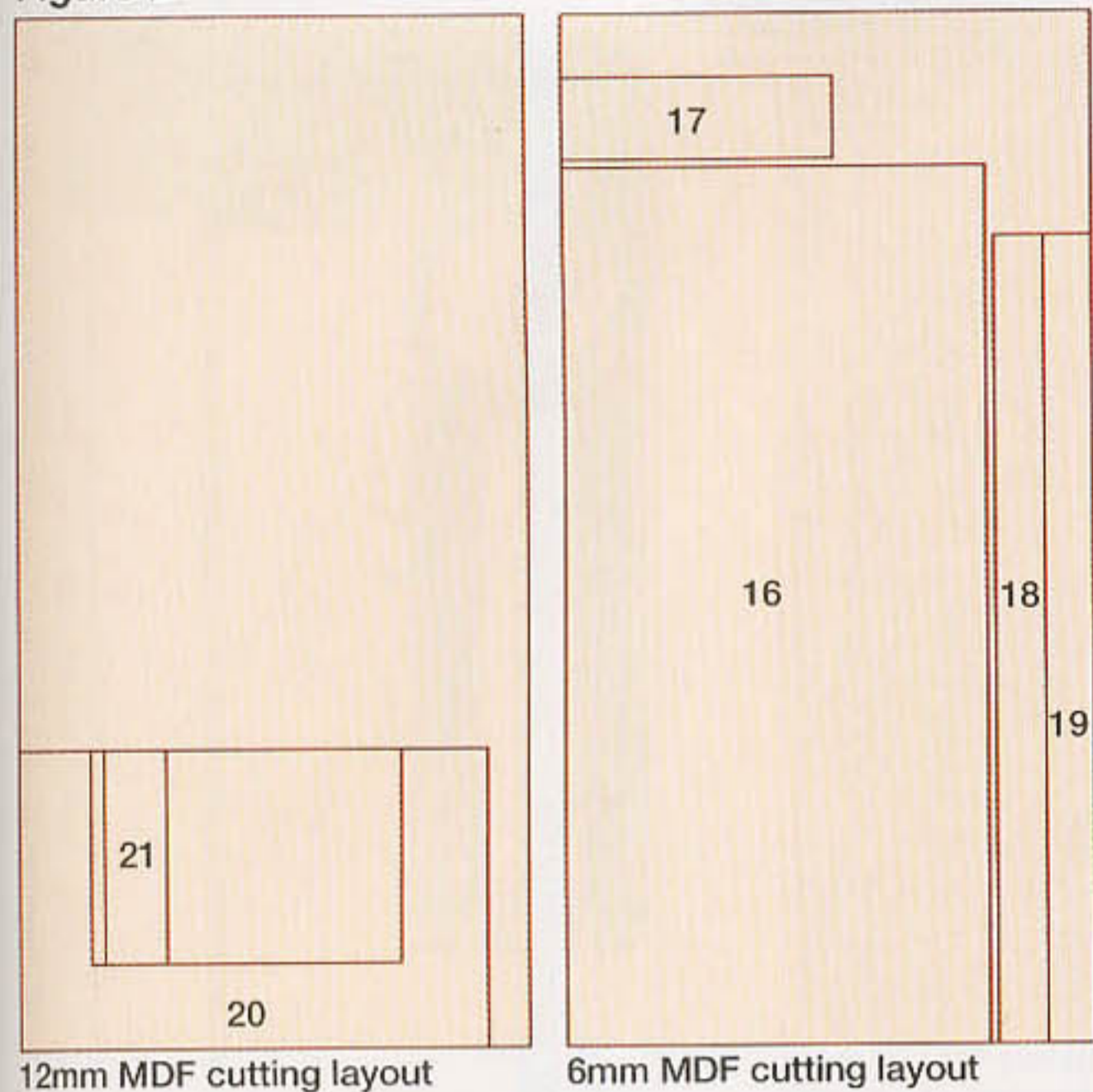
Lay the plinth along the bottom edge and place a piece of scrap 18mm MDF along its top edge. Mark the position of

Figure 1



18mm MDF cutting layout

Figure 2



12mm MDF cutting layout

6mm MDF cutting layout

the base, lay the base in position against this mark and clamp the boards together; cut the slots for the biscuits in the same way as for the top.

The internal parts of the wardrobe should align with the rebate cut out in the back panel. They are set back slightly from the front edge of the wardrobe to allow clearance for the doors. Continue using the panels as guides to mark their positions, and cut all the remaining biscuit joints for the wardrobe.

Assembly

I use Titebond original when biscuit jointing, but any good PVA adhesive will work well. I would advise against using polyurethane glue as it does not allow the biscuit to swell and grip, unless you wet the biscuits before inserting them. This is fiddly as, if it is left too long, the biscuit will expand and no longer fit in the slot.

Lay the side outside face down; fit the base, the plinth and the two base supports, clamp together whilst the glue dries. If you don't have clamps large enough, you could use two or three carcass screws into pre-drilled and countersunk holes; being careful not to place them where there is already a biscuit. These screws can be left in place and the heads filled over before painting.

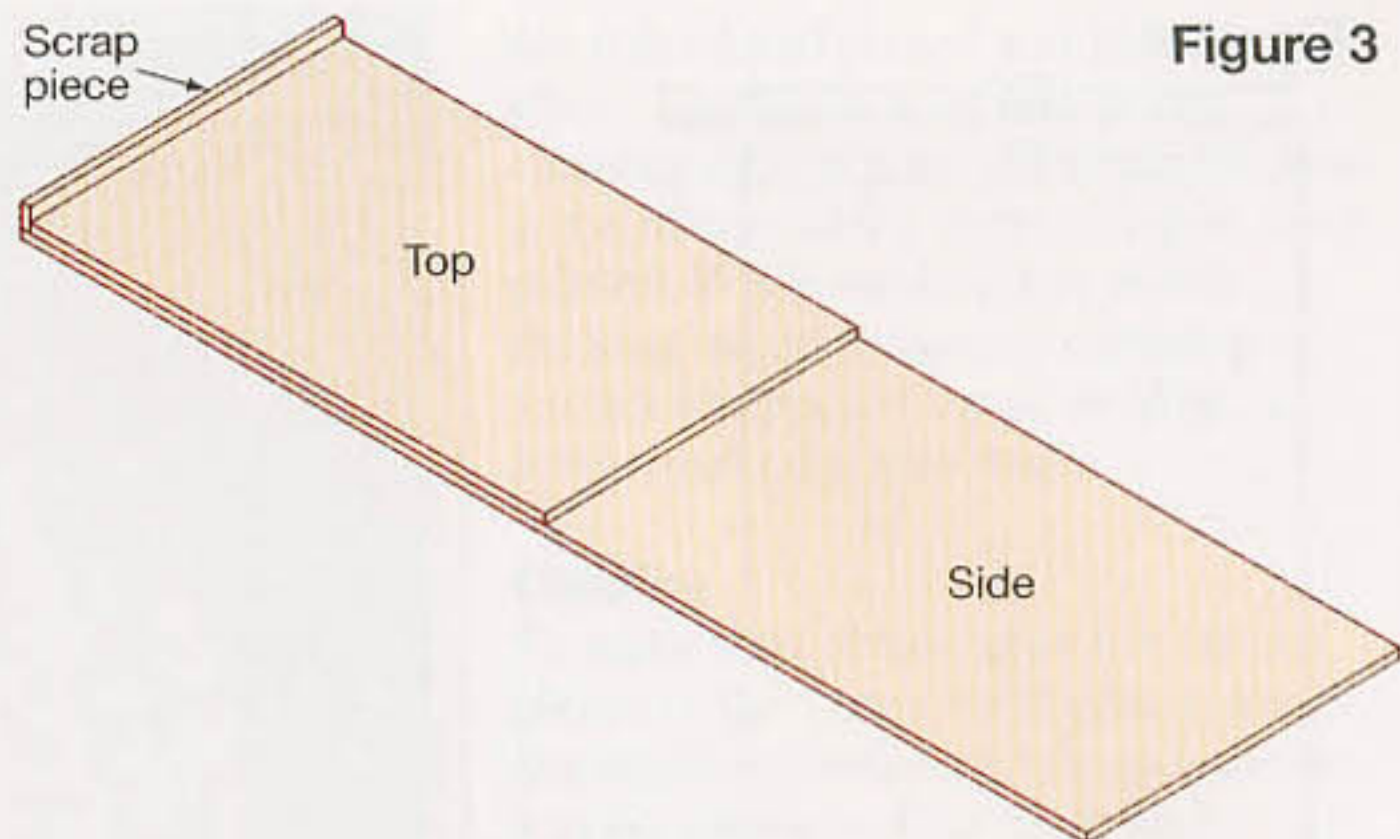
Now fit the back into the rebate in the side, make sure the top edges are level; glue and pin it to the side and screw and glue it to the base, ensure the base is square to the back. The top can now be glued into position, put one screw through the back to temporarily hold the top in position. Fit the remaining side; remove the screw which temporarily held the top to the back and check the wardrobe for square before cramping and screwing the back and side in position. Leave to dry, preferably overnight before standing the wardrobe upright; ready to fit the three internal pieces.

Interior fittings

Place the internal upright and shelves in position, draw round them and drill holes in the back between the marks to simplify screwing them in position.

Fix the small lower shelf to the upright and fit as a pair in the wardrobe, the top

Figure 3



Wardrobe cutting list

Cutting list is per wardrobe

3 sheets of 18mm MDF
1 sheet of 6mm MDF
½ sheet 12mm MDF

Hardwood moulding

25x6x2040
12x12x1770
12x12x260
12x12x190

CUTTING LAYOUT DETAIL

18mm MDF

1&2	Sides	600x2135
3	Top	590x964
4	Base	590x964
5	Top shelf	580x615
6	Internal upright	580x1002
7	Lower shelf	580x349
8	Plinth	964x102
9	Base support	964x102
10	Base support	500x102
11&12	Doors	500x2040
13	Cornice	200x1030
14&15	Cornice	200x495

6mm MDF

16	Back	980x2036
17	Central pattern	618x190
18	Lower hockey stick	1273x110
19	Top hockey stick	1865x110

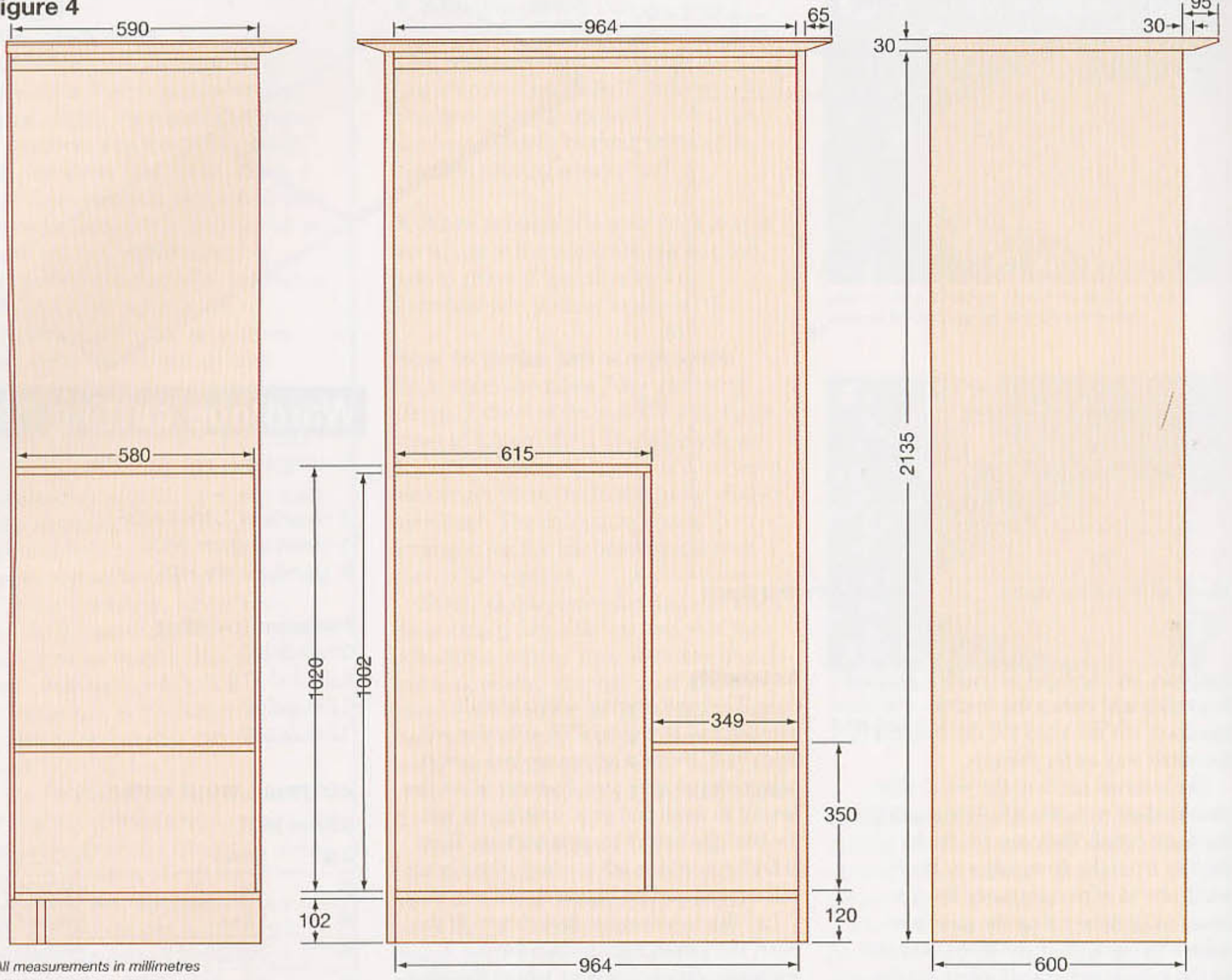
12mm MDF

20	Cornice	1130x695
21	Top pattern piece	490x150

shelf then fits on top. Screw the back to the shelves and upright using the holes drilled earlier. Any rebated screw heads can now be filled, preferably with a two part filler. Also the joins where the plinth meets the base and the side panels will need some work to hide them completely.



Figure 4



All measurements in millimetres

Doors

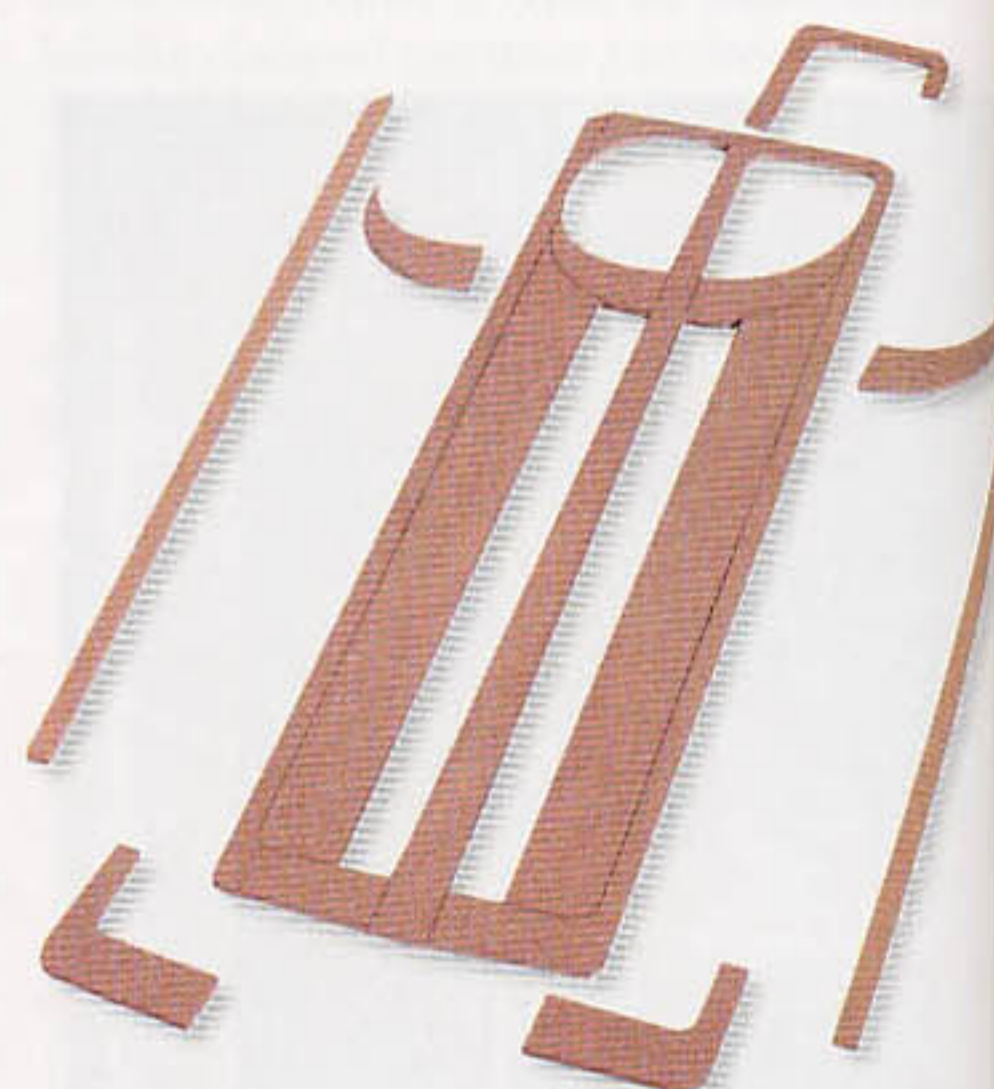
The right hand door has a moulding applied to seal the doors when closed. This is 25mm wide by 6mm deep and has the two long faces rounded over. Glue it in position so that half the moulding projects beyond the door.

Temporarily fit the two doors, each door has four cranked flush hinges, these have a 16mm offset so they will need to be slightly rebated into the door. Use short screws so that when the doors are fitted permanently the longer permanent screws will get a good

purchase. If the doors are too tight adjust the size of the left one to avoid having to alter the position of the moulding on the right. Mark a line along the left door where the moulding overlaps this will act as a guide for fitting the pattern; remove the doors.

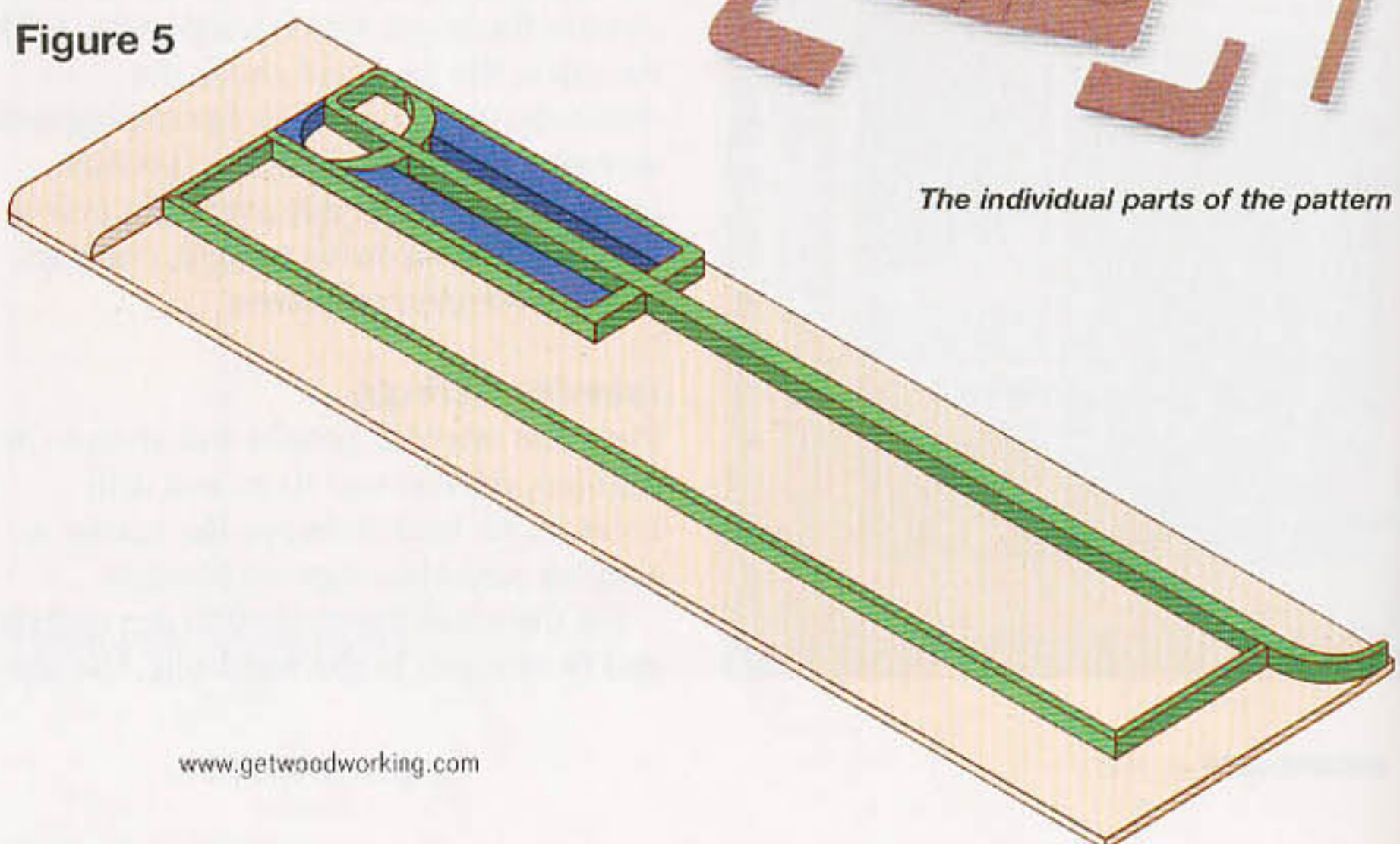
Making the pattern

At this stage it's possible to alter, or use a completely different pattern for the doors. Wallpaper is a good source of



The individual parts of the pattern

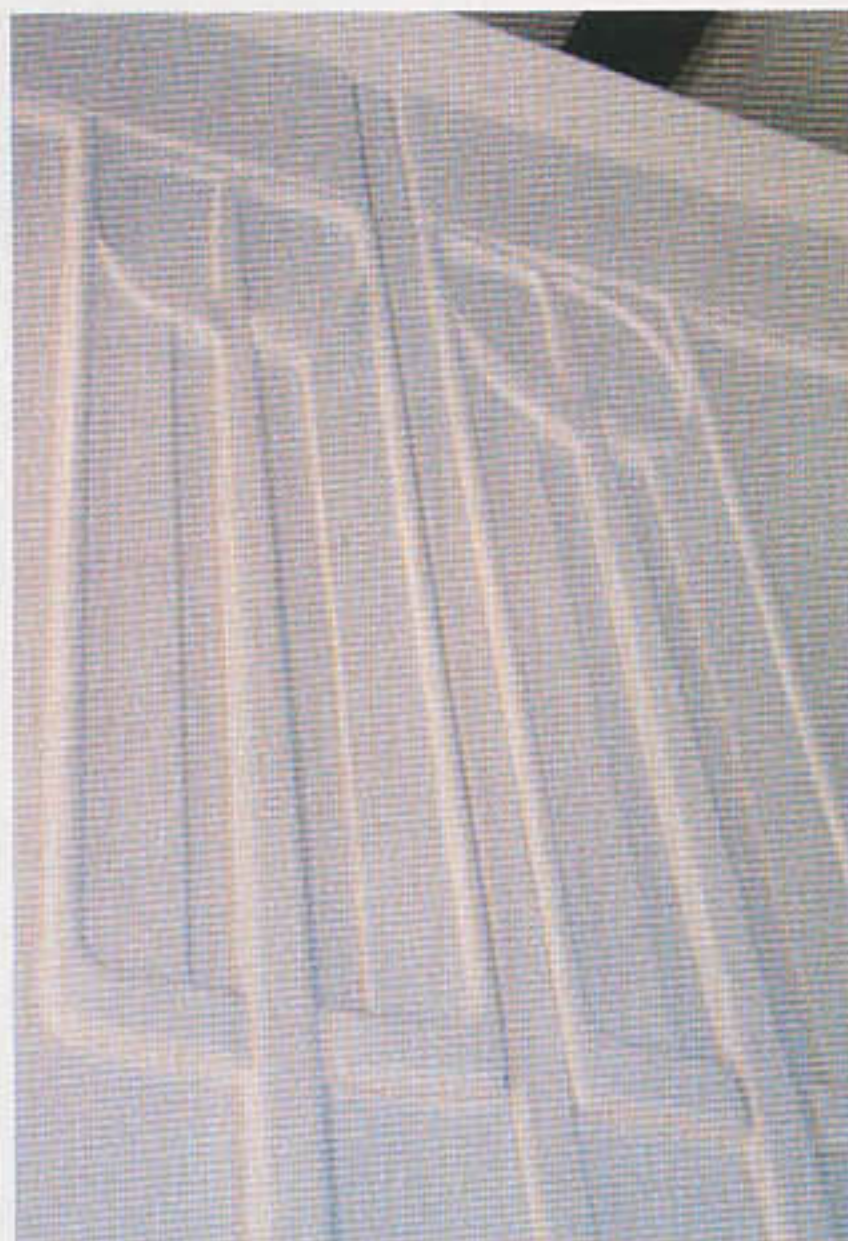
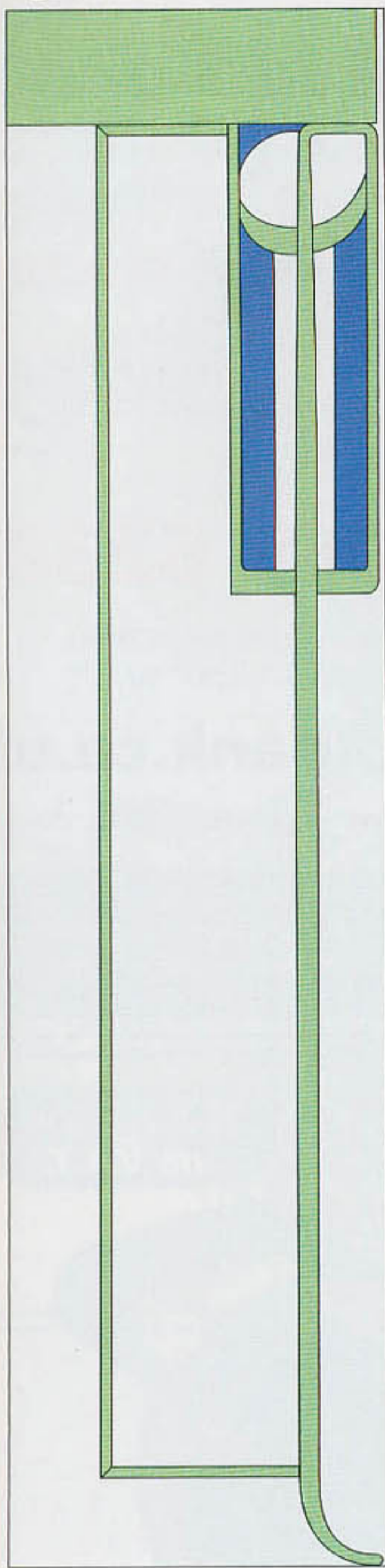
Figure 5



The cut out pattern ready to fit



Figure 6



Use an MDF primer followed by several thin coats of undercoat and satin topcoat

transfer it onto the doors, the paper pattern can then be used to trace out the smaller parts. The details here are for one door; remember the pattern on each door is a mirror image of the other.

The top most pattern piece is 12mm thick; round over both short edges and stick in place. Keep a slight gap on the left door between the moulding and the pencil line to ensure the cover moulding on the right door doesn't foul it when the doors are closed.

Transfer the shape and detail of the central pattern onto a piece of 6mm MDF. Cut out making sure the sides and the long slots are absolutely straight. Using the paper pattern, trace out the seven smaller parts of this central section. The final shaped moulding is the hockey stick shaped piece. This is made in two parts both from 6mm MDF. The shorter goes from the bottom of the central pattern to very nearly the bottom of the door. The top piece is identical to this but it extends over the middle of the central pattern where it is tapered to fit up to one of the smaller pieces. Glue the two hockey stick shaped pieces together. All the pieces now need shaping.

Leave the hockey stick piece to one side and glue the central motif together. Clean up any joins, smooth the two long straight outside edges and complete any remaining shaping. Glue this in place on the door, against the moulding on the right door and slightly inside the pencil line on the left.

Make sure the hockey stick fits over this motif and glue that in place. The final three mouldings are 12mm square hardwood with a half round side. These

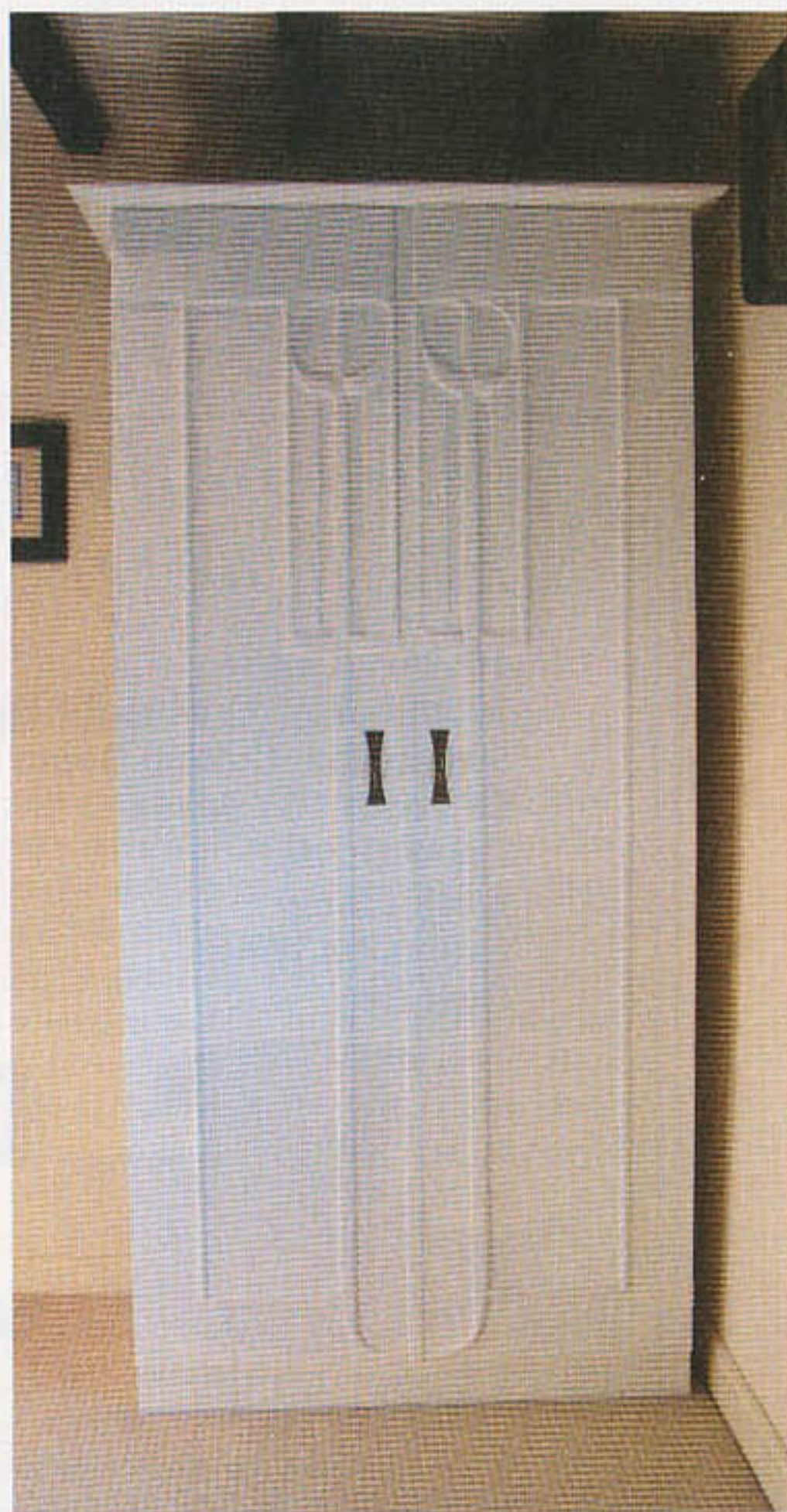
are mitred and pinned and glued in place. The whole door now needs cleaning up; the joins will probably need some filler to make them invisible when painted. While sanding it is worth sticking masking tape on adjoining surfaces to protect them, as MDF is easily marked at this stage.

Cornice

To make the cornice, glue the 18mm pieces to the 12mm section to make up the required thickness, cramp together and do not pin so that it can be machined. I rounded the top edge with a router before cutting the bevel with a power planer.

Finishing

I don't have the facility to spray paint so I have to use a small sponge roller and a small brush for the fine detail. Everything gets a coat of MDF primer, then two coats of undercoat and two coats of satin finish. Put the wardrobe in place before hanging the doors and fitting the cornice. Use two magnetic catches to hold the right door closed and fit the two hanging rails.



inspiration, and there are many paint effects which could add to the design. If you are going to try your own design, try and keep things as simple as possible; for instance, this wardrobe uses pattern pieces which are either 6 or 12mm thick.

If a piece is straight it needs to be just that, so if you don't have the facilities to cut perfectly straight mouldings, it is best to buy ready made moulding.

Draw the pattern in pencil on both doors; make sure they are an exact mirror image of one another. I draw the pattern on paper then with carbon paper