

Boat No. 146 - Build Instructions Book Three

SECTION 25 - SHEER

25.1 Sheer

25.1.1 The sheer will need to be planed off fair, so that the top edge of the skin is flush with the top of the shelf, and then the shelf and skin top edges are bevelled off to suit the side deck angle.

25.1.2 So, first plane the top edge of the skin off flush with the top of the shelf.

25.1.3 Provided the shelf notches were cut and bevelled accurately, the inside top corner of the shelf should be flush with the top edges of the frames (because all your hull/deck angles are greater than 90°, so the shelf is highest on the inside). Have a check to see if this is so. You may also have made your shelf a little deeper than the scantling depth. Also eye up the line of the shelf by putting your eye close to one end of the shelf and looking along it - any bumps or hollows will be apparent. Repeat this from the other end, and on both sides of the boat. Mark any areas that seem unfair.

25.1.4 Check to see if any unfairness noted coincides with the shelf not being completely correct in its notches (or the notches not cut or bevelled correctly).

25.1.5 Once you have established any problem areas they can be dealt with before the shelf is bevelled off. If there are humps, and the shelf is high (for whatever reason) in its notch, then the solution is simple - the hump can be planed off. Use a sharp smoothing plane or jack plane, set fine, working over a longish length of the boat and

taking care not to turn a hump into a hollow. Also take care not to break out the ply veneers on the tops of the frames - cramp a piece of softwood each side of the frame, flush with the top edge.

25.1.6 Small hollows can usually be eased out by planing each end of them. Hollows where the shelf is lower than the frame edge will need a thin slip of timber bonded to the top of the shelf, and then planed fair when the WEST has cured.

25.1.7 If the shelf appears to be fair but is above a frame edge, and planing the shelf down would make it unfair, then you can bond a slip on the edge of the frame to bring it up to the shelf.

25.1.8 The likelihood is however, that apart from possible very minor adjustments, the shelf will lay nicely fair in its notches.

25.1.9 Once you are basically happy with the line of the shelf/skin, they can be bevelled down to suit the deck angle. At each frame lay a short straight edge on the sheer, and hold it parallel to the frame top edge. Measure the distance from the underside of the straight edge to the frame top edge. This is the amount of bevel required at that position. Mark this distance down the hull skin.

25.1.10 Once you have all the frame position bevels marked, joint them fair with a batten in the usual way.

25.1.11 Now bevel the top edge of the hull skin almost down to the bevel line as marked. We usually leave the outside line of the sheer just a little high (say 1mm maximum) so that

Boat No. 146 - Build Instructions Book Three

when the deck is bonded and fastened down, the outer edge is really pulled down tight. If, when the sheer bevel was planed on, you were to allow the bevel to fall below the bevel line, then you would tend to get a gap on the outside edge when the deck was fixed. Of course this was more of a problem in the days before decent gap-filling adhesives, but the principle still holds good.

25.1.12 The sheer edge is vulnerable to damage until the deck is in place, so it is best to protect it well where you clamber in and out of the boat regularly.

SECTION 26 - FOREDECK STRUCTURE

26.1 Stem, apron & breasthook

26.1.1 The top of the stem can be cut off square to the height shown on the profile drawing (dwl+1110).

26.1.2 The top of the apron will have camber on it. In theory the camber at the fwd face of the apron is 3mm and at the aft face 8mm, giving heights on the centreline of 1040 and 1037 respectively.

26.1.3 The camber heights (rather than the absolute heights) are in relation to the deck edge sheer. So the aft face of the apron will be 8mm higher on the centreline than it is at the sheer edge. These are in theory. In practice, the deck camber is often flattened out a little right at the fwd end or else it looks to have excessive curvature.

26.1.4 At the aft face of the apron, lay a straight edge across from sheer to sheer. Tick

off this line on the centre of the apron. measure up 8mm to mark the theoretical camber height on the centreline. Then take a little batten and spring it from the sheer to the 8mm centreline height and draw the camber on the aft face of the apron.

26.1.5 Remove the batten and cut the top of the apron off allowing the centreline at the

26.1.6 Plane or spokeshave the top of the apron off so that the aft edge is cambered to the line and the fwd edge is cambered about 3mm.

26.1.8 The breasthook is a 24mm thick lamination. The curve on the underside is constant; the curve on the top face varies to give the correct deck cambers over its surface. This, together with the plan view shape will give a constant 24mm thickness down the centreline but varying thicknesses at the edge.

26.1.9 Make a simple jig to laminate the breasthook over. The usual way to do this is to make two ply formers (say 12mm ply or thicker), cut to the camber shape and set the breasthook length apart, with softwood battens laid fore-&-aft. If the battens are, say, 20mm thick, then the shape of the ply formers will need to be camber curve, but dummied 20mm down.

26.1.10 So get out two pieces of ply, say 200 deep x 300 wide - twice the offset shown on the drawing 146/009/02. Mark the breasthook underside camber on the ply - use the heights shown on the drawing for Position 000 (0; 11;19;22) at their offsets. Mark both sides of the boat and join the marks with a batten as usual. Now mark a new line 20mm in

Boat No. 146 - Build Instructions Book Three

from the camber line and cut your ply pieces to this shape.

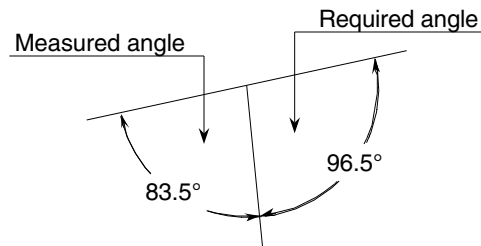
26.1.11 Set the two ply formers accurately on a flat base and 250mm apart. Get out 20 x 20 lengths of batten and screw them to the top edges of the ply formers, starting with one on the centreline and leaving about a 20mm gap between each batten.

26.1.12 Get out the six pieces of 4mm ply for the lamination. The pieces will need to be about 310mm wide by 200mm long. Have a dry run as usual, cramping the pieces down over the jig, to ensure that you have all the necessary cramps etc. The WEST bond the laminates, wetting out as usual. Allow to cure thoroughly before removing from jig.

26.1.13 The breasthook houses 5mm into the shelf each side. Draw a line on the tops of the shelves in way of the breasthook, 5mm in from the inner edge. Mark the Positions 000 and +60. Check that the breasthook offsets given at these positions, and the fwd end, are in fact correct - or note any variations. Set up a temporary straight edge accurately on the centreline with its bottom edge sitting on the top of the apron and lifted to height 1033 at Position 000. With a bevel gauge, take the angle between the aft face of the apron and the underside of the straight edge. This angle is the bevel to come off the fwd edge of the breasthook.

26.1.14 Mark the breasthook accurate length (124mm) and mark the positions and offsets on the top face of the breasthook; join the marks with a batten to give the shape of the breasthook outer edges. Cut the breasthook to shape. Note that the

breasthook edges are not normal to (i.e. at 90° to) the top surface. They will be at an angle parallel to the shelf faces so you can arrive at this angle with a bevel gauge from inside of shelf to top edge. Set this angle off a straight line - the angle we need is the complement of this angle:



26.1.15 You should be able to set your jig saw to cut at the necessary angle. If not, set out a line 24mm parallel to the straight line (that you measured the angles from) and measure how much larger the breasthook needs to be cut out to allow the top edge to be bevelled back to give the correct edge bevel and shapes. Cut the breasthook out, clean up the edges (beveling if necessary). Cut the fwd end and bevel off to the stem/deck centreline angle.

26.1.16 On the boat, measure down the amount the breasthook will house down into the shelf each side. You will see from the drawing that this is the full 24mm at Position 000; 20mm at Position +60; and 20mm at the aft face of the apron. Join these three points with a batten. Then chop out the breasthook housing in the shelf each side a parallel 5mm wide and to the depth lines marked.

26.1.17 Try the breasthook in place. It should be a reasonably good fit, though any minor gaps will be filled by the WEST adhesive. Adjust as necessary. Mark the fwd end top surface shape by drawing over the top of the apron on to the end of the breasthook.

Boat No. 146 - Build Instructions Book Three

Also mark the top of the shelf line along the outer edges of the breasthook.

26.1.18 Remove the breasthook. Make yourself a little female pattern (from thin ply) of the top shape at Position +60. Clean the top surface of the breasthook off to the foredeck camber, using the female pattern at +60 to check the shape at this position as you go. Make sure that the edges are not planed off below the shelf lines marked. Remember that the aft edge remains a constant 24mm thick at the laminated shape (i.e. nothing to clean off). The same is true of the fore-&-aft centreline - this remains at 24mm thickness so there is nothing to clean off. It is best to get the breasthook near to shape and then have a final clean off when it is bonded in place so as to ensure it fairs in nicely to the shelf each side and the apron fwd.

26.1.19 Bond the breasthook in place and, when the WEST has cured, clean off the to the final camber.

26.2 Forehatch carlings.

26.2.1 At this stage we shall be making and fitting the hatch carlings and beam. The rest of the hatch is made after the foredeck is fitted.

26.2.2 Get out the carlings. These are 20 sided and 32 deep.

26.2.3 The carlings are curved in the fore-&-aft direction and the top edge is bevelled athwartships. The inner and outer faces are vertical and the bottom edge is square to the faces.

26.2.4 The carling curvature and bevels are given in the table on the drawing. The heights are given from a datum 900mm above the dwl, which is more convenient to work from.

26.2.5 The carlings house into the beam on Frame -1000 at the aft end and the ply and beam on Frame -300 at the fwd end. Just check from your boat that the frames are indeed the correct distance apart (700 from, say, aft face to aft face). If they are a little different, then you can adjust your carling length to suit.

26.2.6 Depending on your timber, you may get a little spring back when you cut the carlings out. Therefore its best to mark the carling shape out on a piece of thin ply to use as a pattern. So mark the positions given and then the heights on them. Join these with a batten as usual. Dummy 32mm off your batten for the bottom edge. Leave the ends square - in fact you could continue the curve a little each end. Mark the real ends. Cut out the pattern and clean it up accurately.

26.2.7 Plane the timber for the carling to the finished thickness of 20mm. Lay the pattern on your timber and mark out the carling top edge; move the pattern down say, 10mm and mark the bottom edge. Cut out the carling. Now lay the pattern back on the the carling and remark - this should take account of any spring. Cut the carling to its final shape and clean up square all round.

26.2.8 Mark the given positions on the top edge of the carling and then mark the amount of bevel down the outer face (the bevel will be the inner height less the outer height. Join the bevel marks with a batten as usual and then

Boat No. 146 - Build Instructions Book Three

plane the bevel on the carling top edge.

26.2.9 Get the other carling out the same - remember they are a handed pair. If your timber didn't spring back at all, then you may not need the double mark out - but can mark and cut initially to final size.

26.2.10 Now cut the ends of the carlings as shown on the detail drawing.

26.2.11 Measure the 240mm offset for the inner faces of the carlings on the frames and then mark out the 20mm wide by 32mm deep housings for the carling ends.

26.2.12 You will be able to cut a little way in at an angle for the sides of the housings - use a fine tenon or dovetail saw. Then the housings will need to be chopped out with a sharp chisel. If the frame beam is a bit springy, put a shore under it in way of the housing while you are chopping out.

26.2.13 One of the great benefits of WEST is the ability to structurally bond the carlings into the beam housings, even if the fit is not too perfect.

26.2.14 Drop the carlings into the housings and adjust until they sit down flush with the beam tops and, importantly, with their inner faces nicely vertical. Take care not to force the carlings down and thus push the frames apart. When you are satisfied with the fit, WEST bond the carlings in place, wetting out well as usual.

26.3 Hatch beam

26.3.1 The hatch beam is 20mm sided by

30mm moulded depth and is laminated. Use a minimum 7 laminations.

26.3.2 The shape of the beam is given in the table on the drawing by heights from the +900mm datum line at different offsets. It is best to laminate the beam up a bit longer than is required, so heights are give at offsets of 100, 200, & 300, to provide a 600mm beam.

26.3.3 The beam is marked out and laminated up in the same way as you have previously done for the frame beams.

26.3.4 Clean the beam up, mark the centreline and then cut to length. Cut the ends as shown on the detail drawing. Bevel the beam top edge.

26.3.5 Cut the beam housings in the carling. Shore under the carlings to reduce bounce. The whole structure may seem a bit weak at the moment but it will become very strong indeed once the deck ply and the hatch inner coamings are fitted.

26.3.6 Fit the beam down into the housings until the top edge is flush with the carling top edges and the aft face (well both faces of course if the beam is truly square!) is vertical. Take care not to force the carlings apart - you can screw a temporary brace across them to hold them accurately the correct distance apart.

26.3.7 Once you are happy with the fit, WEST bond the beam in place as usual.

26.4 King plank

26.4.1 The king plank runs from the hatch

Boat No. 146 - Build Instructions Book Three

beam fwd to the breasthook. The aft end is housed 10mm into the hatch beam and the fwd end 15mm into the breasthook. The king plank is 100 sided by 15 deep.

26.4.2 Mark out the the housings on the hatch beam and the breasthook and the notch on Frame -300 beam. The housings and notch can be 15 deep on the centreline with their bases level across. Thus, because of the camber they will be a little shallower at the sides. The housings are just simple square housings.

26.4.3 Get out the king plank, cut to length and try into the housings and notch. Adjust the fit as necessary. Then WEST bond the king plank in place. You can bore off for a pair of screw fastenings into the hatch beam, frame beam and breasthook if you wish - or the king plank can be cramped in place while the WEST cures.

26.4.4 Once the WEST has indeed cured, camber the top face of the king plank to fair in with the beams and breasthook.

26.4.5 This completes the basic foredeck structures - though the main carling will run into the hatch carlings in due course.

SECTION 27 - COACHROOF STRUCTURE

27.1 Coachroof front.

27.1.1 The coachroof front is 18mm thick solid Mahogany.

27.1.2 The Coachroof Front drawing gives the shape and bevels of the front.

27.1.3 Get the front out and shape up as drawn. Check from the boat that the bottom edge curve is correct to fit flush with the underside of the beam on Frame -1000.

27.1.4 The beam can be cut from solid or laminated - whichever you prefer. Get the beam out to shape and bond it to the front. You can make the beam 15mm short at each end so that the roof carling can land on it - but be sure to keep the correct end bevel on it.

27.1.5 Bevel the top edge of the front and beam. Bevel the ends as carefully as possible, with a good sharp plane set fine, so that the coamings will be a nice fit on to the front.

27.1.6 Mark the athwartships location of the front very carefully so that you get it truly central.

27.1.7 Cramp the front in place on the aft face of beam -1000. Check that the front is accurately vertical - you may need to brace it temporarily to ensure this.

27.1.7 Bond the front in place. Once the WEST has cured, it is best to WEST coat the front all round one coat - this will help prevent any tendency for splits to develop should your workshop get a bit warm.

27.2 Top carlings

27.2.1 Brace the frames in the coachroof to make sure that they are not forced out of place as the carlings are bent round.

27.8.2 We need to cut notches in the frames for the carlings to run through. The carlings are 15 x 40. There will be bevel off the top edge.

Boat No. 146 - Build Instructions Book Three

27.2.3 On each frame in the coachroof, mark a line 15mm parallel in from the outside edge. Do this on both fwd and aft sides of the frame to see the fore-&-aft bevel on the notch faces. On the 15mm parallel lines, measure 40 down from the top edge of the beams and square this out to the frame edges to give the base of the notches. There is no fore-&-aft bevel on the notch bases as the top edge of the roof is a constant height.

27.2.4 On Frame -3500, the carlings only house into the beam to butt on to the fwd face of the ply or tongue-&-groove bulkhead.

27.2.5 On the coachroof front the carlings will butt on to the aft face of the front, so you will need to cut the beam ends back by 15mm (you may already have left the beam ends 15mm back – as described earlier).

27.2.6 Cut and bevel the notches and the housings in Frame -3500.

27.2.7 Get out the material for the carlings (best just over 40mm depth to allow for bevelling - say 41 x 15) and a bit over length to allow for fitting the ends. It's usually easier to fit both carlings at the same time.

27.2.8 Bend the carling round in the notches, letting the end run over the bulkhead aft and with the fwd end neatly against the aft face of the front (or just entering the housing in the front if you cut this). You will need to pull the fwd end in with a light tackle or spanish windlass. If you fit both carlings at the same time, you can use a spanish windlass across their fwd ends. Screw a piece of temporary timber or ply on to the edge of the front running aft about 50mm over the carling - this will locate the carling in place athwartships.

27.2.9 Make sure that the carling is down on to the bases of the notches. Mark the angles of the fwd end. Remove the carling and cut the fwd end. Replace the carling and check for a good fit fwd; adjust as necessary.

27.2.10 Mark off the aft end. Remove the carling and cut the aft end. Don't have the carling too long or else it will tend to force the bulkhead or front out of upright as you cramp it fully home in the notches. There can be a mm or so of gap between the aft end of the carling and the fwd face of the bulkhead.

27.2.11 Cramp the carlings fully into place. Check to make sure that the frames have not been pulled out of square by the action of bending the carlings around them.

27.2.12 Tick off the bevel on the outside face of the carlings at each frame and the front. Also mark the frame positions lightly on the inside faces. Remove the carlings and bevel the top edges (you can leave just a little bevel to be cleaned off after the carlings are bonded in place). Radius or chamfer the inner bottom corners in between the frames - stop the radius/chamfer at a constant distance (say 15mm) from the frames. Sand off the frame marks.

27.2.13 Bond the carlings in place, wetting out the bonding surfaces well as usual. At the fwd ends, if you have cut housings, the carlings can be pulled into them by a spanish windlass (but be sure not to overdo this and induce athwartships hollows into the run of the carlings). If you did not cut housings use your temporary pieces screwed to the edges of the front and screwed to the outer faces of the carlings.

27.2.14 Once the WEST has cured, finish

Boat No. 146 - Build Instructions Book Three

beveling the top edges of the carlings - be careful not to splinter out the frames (cramp a piece of softwood each side of the frame, flush with the top edge). Sand the carlings smooth and clean and WEST one coat.

27.3 Main carling notches.

27.3.1 The main carlings run from the fwd face of the ply on frame -3500, to house into the forehatch carlings at the fwd ends. The carlings are 35 sided x 15 deep.

27.3.2 In the frames the notches will be the width of the coaming plus the carling (18 + 35). In frame -1000 the notches will only be the carling width, though they will of course be set outboard by the coaming thickness.

27.3.3 Make up a short dummy piece of timber to represent the coaming plus the carling - say 150 long by 15 thick by 53 wide. In fact, because the deck/coaming angle is greater than 90° the thickness of the coaming is marginally more than 18mm measured athwartships along the deck line: it is about 18.5mm. So you could make your piece of timber $35 + 18.5 = 53.5$ wide. Or we can simply make the carlings 0.5mm narrower, which will tend to happen naturally as their inner edges are bevelled to account for the deck angle.

27.3.4 Using the dummy laid against the frame edges at inside of deck, mark off the outboard edge of the main carling at each frame position, and at the coachroof front on beam -1105.

27.3.5 Drive a small nail on the line at each frame and bend a batten around the nails to extend the carling line fair to run on to the forehatch carlings and mark this on the

forehatch carlings.

27.3.6 Cut the notches in the frames. Cut the notch in frame -1000 only 35 wide. All the notches will have the outer edge square to the deck angle and the inner edge vertical (because the coamings are vertical). The notches are a constant 15mm deep. The housings in the forehatch carlings are best cut when the carlings themselves are bent around in place.

27.4 Coachroof coamings.

27.4.1 The coachroof coamings are 18mm thick solid mahogany.

27.4.2 The coamings usually have three oval portlights in them but the apertures for these should only be cut later on once the coamings and roof are all finished.

27.4.3 We need to make a pattern of the coamings so that we can find the accurate developed shape - i.e. the shape to mark out on a flat board of timber that will give us the correct shape when curved around the frames on the boat.

27.4.4 Make the pattern from strips of ply (say 6mm) about 100mm wide. Join the strips together with butt straps. It is best to screw the pattern strips together, though they can be nailed if you prefer. Join up a strip for the top edge and tack this in place on the top carlings so that its top edge is just above the outer top corner of the carlings. let the strip lay naturally - don't force it to bend at all on edge.

27.4.5 Similarly make a strip to fit in the carling notches. Tack this to the frames and the coachroof front - the bottom edge of the strip won't touch the bottom of all the notches and don't force it to do so, just let it lay

Boat No. 146 - Build Instructions Book Three

naturally around the frames and front.

27.4.6 Joint the upper and lower strips with vertical strips at the fwd and aft ends - these can align exactly with the fwd face of the coachroof front and the aft face of the bulkhead respectively. Add additional vertical strips at, say, three approx equal intermediate positions. fasten on some diagonal braces so that the pattern will hold its accurate shape.

27.4.7 Mark the top edge shape on the pattern. Dummy the bottom edge shape on to the pattern at each frame position and the front. Tick off each frame position on the pattern.

27.4.8 Remove the pattern from the boat. The top edge can be cut carefully to shape as marked.

27.4.9 If possible get each coaming out of a single piece of timber. If this is not possible (because you can't get boards wide enough) then we shall make a single lengthways join. If you can get boards wide enough, but cannot pass this width through your thicknesser then consider planing them up by hand (not such a dreadful job as it may sound), or try to find a timber yard with a large planer/thicknesser to thickness them for you. If neither of these is possible, then you will have to cut the boards and proceed to join them after thicknessing. If you are joining the boards up, it's best to make them a little over thickness (say 19mm) to give yourself a little thickness for cleaning up after bonding.

27.4.10 Use the pattern to find out how long and wide your timber needs to be. Plane the boards up to thickness (if you are doing this by hand you may find that an old fashioned wooden smoothing plane is useful). If planing by hand you will often find that

working at about 20° across the grain works better than straight along it.

27.4.11 If the boards need to be joined to give the width, plane up the joining edges - over the top of the planer set very fine and moving slowly and steadily will give a good finish. Or hand plane with a steel jack plane set fine. Arrange stools or blocks to give a firm, straight base to lay the boards on, without twist. Lay the boards on the base and cramp them together. You will need at least 3 sash cramps. Intermediate clamping can be by spanish windlass. You will also need some straight cramping pieces (say 50 x 50) to cramp across the surface of the boards to keep them straight - otherwise the cramps and spanish windlasses will tend to pull them into a bowed shape.

27.4.12 Have a dry run to check your cramping arrangements and also of course to check the fit of the joining edges. Adjust the edges if necessary to get a really good tight join. Remember to cover base and cramping pieces etc. with parcel tape or similar. use protector strips on the edges in way of the spanish windlasses.

27.4.13 Once the edges fit well, plough a 6mm x 13mm deep groove down the centre of each to take a 25 x 6mm ply tongue. Get out the tongue and try it in the grooves to make sure that it's a nice fit (not too tight).

27.4.14 Wet out the bonding surfaces well and then bond the coaming together. Clean off excess WEST.

27.4.15 Once the WEST has cured, remove all the cramping apparatus, clean the boards up and sand smooth.

27.4.16 Lay your pattern on the board and

Boat No. 146 - Build Instructions Book Three

mark around the top edge, and the fwd and aft edges. Transfer the frame positions to the board and dummy the bottom edge marks back on to the board.

27.4.17 You have marked the inside bottom edge of the coaming; the outside bottom edge is larger. You can establish the amount of this at each frame position with a piece of dead square ended timber 18mm thick sat on the frame edge hard down in the carling notch. Measure on the outside of the timber down to the base of the notch - this is the amount of extra that is required to give the outside bottom edge of the coaming (it should be about 5mm). Keep a note of the amount for each frame and the front.

27.4.18 Return to the board and add the bevel amounts at each frame position and the front. Join these marks with a batten.

27.4.19 Now, have a final check of all your marks and measurements - measure twice and cut once is a good motto with big expensive pieces of timber! However in this case it is probably wise to cut the coaming out a little oversize - say 7mm along the bottom and 20mm each end; the top edge can be cut to the line. As a final check, you can measure the height at each frame and the front - these should be the same as you have marked on your board - the only difference is that the frames are further apart on your flat coaming than their distance dead fore-&-aft, in order to allow for the greater length around the curve. When you are satisfied, cut the coaming out.

27.4.20 Take the coaming up to the boat and stand it in its notches. Adjust it fore-&-aft so that it is hanging over the ends about the same amount and cramp it in place. You will need cramps top and bottom at each frame and probably maybe intermediate ones

along the top. At the fwd end, cramp a good stout length of timber to the coachroof front about 25 or so in from the edge and cramp the coaming to this to pull it on to the edge of the front. Use cramping pieces everywhere to prevent damage/marks.

27.4.21 Check to see how well the bottom edge fits and mark any adjustments necessary. Remove the coaming and make any necessary adjustments to the bottom edge. Then bevel the bottom edge.

27.4.22 Try the coaming in place again. Make any adjustments necessary. Mark the fwd and aft ends accurately.

27.4.23 Take the coaming down and cut the fwd and aft ends, leaving just the lines showing for a final clean up when the coamings are bonded in place. Radius or chamfer the inside bottom corner between the frames as you did for the upper carlings.

27.4.24 The coaming can now be bonded in place, wetting out the bonding surfaces thoroughly as usual; pay particular attention to the end grain on the front and wet this out twice before bonding. Clean off excess WEST. The fwd and aft ends will have corner posts fitted later on, which will provide further strengthening.

27.4.25 Once the WEST has cured, remove the cramps. Plane the top edge off flush with the top carling and then bevel it down as you did for the hull sheer. Sand the coaming inside and out and WEST one coat. protect the top edges.

27.4.26 Repeat the process for the coaming the other side.

27.5 Main carlings.

Boat No. 146 - Build Instructions Book Three

27.5.1 Get out the timber for the main carlings.

27.5.2 Bend these round the coamings on top of the deck - they won't go into their notches until they are bevelled. Mark the frame positions on the carlings. At the fwd end check to see if they bend fair on to the marks on the forehatch carlings - adjust the positions if necessary and re-mark.

27.5.3 Remove the carlings. At each frame position establish the amount of bevel required on the inside edge of the carlings. Mark these amounts on the carlings at the appropriate positions. Join the marks with a batten as usual. Plane the bevels off the inside edges. Fwd the bevel can continue to run on after frame -1000, to the fwd end; or you can sweep it out at, say 100 fwd of the beam, to remain square.

27.5.4 Cut the housings in the forehatch carlings. These can be simple housings 10mm deep. The edges will both be square off if you left the inner edge of the carling square fwd of frame -1000; if you continued the bevel, then the inner edge will be angled to suit.

27.5.5 Bend the carlings round the coamings again, this time down in the notches. Make sure the aft end is a snug fit - adjust if necessary. Mark the fwd ends to fit the housing. Cut the fwd ends and refit the carlings with the fwd ends snug in their housings.

27.5.6 Inside the boat, the bottom face of the carlings should run nicely flush with the bottom edge of the coamings. You may need to pull down or shore up the carlings to get them to do so.

27.5.7 Outside, the carlings should be fully down in their notches and lie nicely flush with the frame and beam tops. Make any adjustments necessary - the most common fault being that the carlings are just marginally too wide, so won't pull fully down in the notches, so require easing a little.

27.5.8 Once the carlings are a good fit, they can be bonded in place. Drill off for permanent screws into the frames, beam and angled down into the forehatch carlings if you wish. No fastenings are necessary, but may be found useful. Get your cramps and cramping pieces all arranged. You can screw from the coamings into the main carlings if you wish and dowel over the heads. Again there is no structural requirement for this and we prefer to avoid it if possible (for purely aesthetic reasons).

27.5.9 Remove the carlings. Radius or chamfer the outside bottom corner between the frames as you did for the upper carlings and the coamings.

27.5.10 Bond the carlings in place, wetting out the bonding surfaces as usual. When the WEST has cured, clean up, sand smooth and WEST one coat.

27.6 Coachroof beams.

27.6.1 There are two laminated beams in the coachroof intermediate between the frames. They are at -2150 (aft face) and -3000 (aft face). Both are laminated from 3mm Khaya and are 25 sided x 36 moulded depth. The Coachroof Beams & Carlings drawing gives the shapes and bevels.

27.6.2 Laminate the beams as usual and clean up to the 25mm siding. Bevel the top edges.

Boat No. 146 - Build Instructions Book Three

27.6.3 Mark the beam positions and cut the housings for the ends. These are shown as 5mm top depth tapering to nil bottom depth, but if wished they can be 10mm top depth and 5mm bottom depth to give the beam something to 'sit' on whilst bonding. There is absolutely no requirement for dovetail housings.

27.6.4 Cut the beams to length and fit the ends to the housings so that the tops of the beams are flush with the upper carlings. Don't make the beams too long so that they try to force the coamings out or induce extra camber into themselves.

27.6.5 Radius or chamfer the bottom corners. Don't bevel the aft corner of beam - 3000 in way of the hatch aperture as there are hatch liners to fit around the aperture. Bond the beams in place. Once the WEST has cured, clean up and sand; WEST one coat.

27.7 Main hatch carlings.

27.7.1 Make the main hatch carlings as shown on the drawing. Bevel the top edges.

27.7.2 Cut the housings into the beam and frame and fit the carlings.

27.7.3 Radius or chamfer the outboard bottom corners, stopping the set distance (suggested as 15mm) back from the beam and frame. Don't bevel the inboard corners as there are hatch liners to fit around the aperture.

27.7.4 Bond the carlings in place.

27.7.5 Once the WEST has cured, clean up, sand and WEST one coat.

27.8 Corner Posts

27.8.1 Make the corner posts as shown on the Coachroof Front drawing.

27.8.2 The top ends can house over the beam and carling to butt up under the coachroof top.

27.8.3 The bottom ends finish flush with the underside of the front – or you can finish them flush with the underside of the coachroof coamings; either way is good.

27.8.4 WEST bond the corner posts in place.

27.9 Mast runner

27.9.1 The runner houses into the beam on Frame –1000 at the fwd end. Originally it passed through a notch on Frame –1600 and finally housed into the beam on Frame –2250 at the aft end. With the new Frame –1615, we shall make the runner in two sections each side of Frame –1615 and we shall let the runner sections just house 10mm into the Frame

27.9.2 Cut the housings - 10mm into the fwd beam, 10mm into the fwd face of Frame –1615, 10mm into the aft face of Frame –1615, and 15mm into the aft beam. The housings are 15 deep on the centreline, rather less at the edges because of the beam camber.

27.9.3 Get out the timber for the runner sections and fit them into the housings. Bond the runner in place.

27.9.5 Camber the runner to match the beam cambers.

SECTION 28 - OUTBOARD WELL

28.1 Hull aperture

28.1.1 The geometry and dimensions of the well and the outboard mounting arrangements were designed around the Mariner 4hp with integral tank. They should be OK for most 4 to 6hp single cylinder outboards but check them against the outboard that you are intending to use. Check particularly shaft length and transom angle geometry. .

28.1.2 The first job is to cut out the section of hog and keel in way of the outboard well. The position of this can best be determined from the outside as the fwd face of the slot through the keel is at the aft face of the aft deadwood. The section to be cut out is 375mm long measured level. This equates to 386mm measured along the line of the keel.

28.1.3 So, mark out the fwd and aft ends of the aperture square across the keel. You can saw through the majority of the keel lamination using a small tenon or dovetail saw. In way of the outboard well, the keel laminates were not bonded to the hog, so it is not too difficult to chop out the laminate remaining below the planking, down to the outer surface of the hog. You should end up with a nice clean slot 375mm long by 60 wide.

28.1.4 Now we have to cut out the aperture in the planking and hog. This can be done from inside or outside, probably easier from inside as the structures can be seen better.

28.1.5 To establish the fore-&-aft position of the aperture on the inside of the boat, drill a pilot hole (say Ø5) through the

hog at a known point (say the fore-&-aft centre of the slot just cut out in the keel). Drill as accurately vertical as you can.

28.1.6 Using the pilot hole as a datum, mark out the shape of the aperture inside the boat on the hog and planking. Note that the ends of the aperture are 9mm fwd and aft of the ends of the slot in the keel to make a rebate for the 9mm ply outboard well transom and outboard well aft end to sit in.

28.1.7 Now cut out the aperture, using a jig saw and boring holes in the corners as usual to get a start. At the fwd and aft ends make your primary cuts well in from the actual ends so that the jig saw blade doesn't hit the keel.

28.1.8 Chisel back the fwd and aft ends of the hog to form the rebates for the 9mm ply (for the outboard well transom and the outboard well aft end). Finally shape up the aperture in the planking out to its full length.

28.1.9 The hull skin is doubled internally in way of the outboard well. The doubling fits inside the outboard well sides and ends, so it can be fitted and bonded into place now. The doubling can be 9mm ply or solid timber. If using solid timber you will probably want to make it about 12mm thick. The outer edges of the doubling will form a rebate with the skin for the sides and ends to sit against.

28.1.10 So fit the doublers each side with the outside edges and ends nicely vertical. Bond the doublers in place. Clean up the inside edges to the shape of the aperture

28.1.11 Radius the inside edges around the aperture, sand smooth and WEST coat.

28.2 Outboard well structure.

Boat No. 146 - Build Instructions Book Three

28.2.1 Get out the ply components for the outboard well sides, outboard well aft end and outboard fwd end. These fit under the cockpit sole; the outboard well fwd end is stiffened to take the outboard mounting bracket.

28.2.2 Fwd of the outboard well fwd end there is a dropped section to allow room for the outboard mounting bracket clamps. Check your outboard mounting bracket to make sure that the dropped section is deep enough for the clamp handles to be turned. Then get out the clamp well base and fwd end ply components (modified for a deeper dropped section if needed).

28.2.3 Make and fit the outboard well fwd end, with egg-box slots to take the sides. The Table of Offsets gives the shape and bevels of the bottom edge. You may want to leave 5mm on the top edge until you have checked the fit to the hull. Make sure it fits snugly into the rebate formed by the hog and keel. The fwd end bonds to the hull skin with WEST fillets and, within the outboard well, sits up against the end of the hull doubler and WEST fillets to that. It can be bonded to the cockpit sides (when these are fitted) either with cleats or WEST fillets.

28.2.4 Fit the outboard well sides. Note that these are doubled with a 9mm ply doubler on their outboard faces. The Table of Offsets on the drawing gives the shape and bevels for the sides and doublers. The top edge is straight and the slope matches the slope of the cockpit sole. You may want to leave say 5mm on the top edge until you have checked the fit of the bottom edge.

28.2.5 The aft ends of the sides butt on to the transom and will need cutting out to fit around the transom fashion pieces. They slot

over and egg-box to the fwd end.

28.2.6 The sides are bonded to the skin and into the rebates formed by the skin doublers. The sides are WEST filleted to the hull skin (and skin doublers around the well), both inboard and outboard and in all four corners of the egg-box join to the fwd end. The sides bond to the transom and can either have 20 x 20 cleats each side or WEST fillets. Indeed any of the vertical cleats can be replaced with fillets if you wish. The horizontal cleating should not be replaced with fillets as we need to provide a decent landing for the cockpit sole around the well.

28.2.7 Now fit the outboard well aft end and the stern knee. Make sure that the aft end fits snugly into its rebates in the hog/keel. The knee is simply WEST bonded to the sternpost, hog and outboard well aft end. The aft end is bonded to the hull and outboard well sides - use WEST fillets to the hull and either fillets or cleats to the sides. It is worth completing the WEST coating (minimum 3 full coats) to the areas aft of the aft end, and the aft face of the aft end, before the end itself is finally bonded into place.

28.2.8 Now bond in the clamp well base and fwd end with 20 x 30 horizontal cleating and 20 x 20 vertical cleating. Note that the clamp well base slopes aft so that water drains aft. It is easier if the fwd face of the outboard well fwd end and the hull surfaces adjacent receive their full WEST coating (minimum 3 coats) before the clamp well base and fwd end are finally bonded into place.

28.2.9 Make and bond in the outboard well fwd end fwd stiffener. Note the drain hole through the fwd end and its stiffeners.

28.2.10 Make and bond in the outboard

Boat No. 146 - Build Instructions Book Three

well fwd end aft stiffener. The taper on this may vary to suit your outboard and bracket. Continue the drain hole through the stiffener.

28.2.11 The 20 x 30 horizontal cleating components to take the cockpit sole are best fitted with the remainder of the sole sub-structure.

28.2.12 WEST fill any minor gaps where the ply fits into the hog/keel etc. WEST coat all the structures minimum 3 coats. Sand the interior of the well, keel etc. smooth for final coatings.

SECTION 29 - COCKPIT

29.1 Cockpit sides.

29.1.1 These are shown on the Cockpit Sides drawing.

29.1.2 The sides are 9mm ply and run from the aft face of Frame -3500 through to the transom. Their bottom edges bond down to the hull between Frame -3500 and Floor -4910 Aft of this, the sides are cut up to over the floor and then again to run 25mm below the cockpit sole in order to prevent a narrow slot being formed between them and the outboard well sides.

29.1.3 The cockpit sides and the outboard well sides provide additional longitudinal hull stiffeners.

29.1.4 The tops of the cockpit sides slope down aft parallel to the cockpit sole.

29.1.5 Get out the ply for the sides; shape the bottom up (and bevel the edge). Cut the slots and cut-outs for the frames and floors. In order to be able to fit the sides

sensibly you will need to make the slots and cut-outs a free fit. The drawing shows the theoretical dimensions. Also before cutting the slots etc. check how close in reality your frames and floors are to their nominal positions. If there are many differences it may be worth making up a pattern (from say 50mm wide strips of ply nailed or screwed together) with plenty of clearance; then sit the pattern in place and dummy the actual structures on to it. Another useful device is to make a measuring stick and tick off the real positions of the frames and floors on it (with the fwd end of the stick on Frame -3875). If your frames are good and accurate, then you should be able mark the ply directly from the dimensions on the drawing; otherwise you may need to draw the bottom edge out and then mark the slots in. Leave some material on the top edges to allow for fitting the bottom edges.

29.1.6 Fit the ply sides down to the hull, around the frames and floors and up to the transom. Then mark the final top edge and cut it straight.

29.1.7 Bond the cockpit sole carlings to the inboard faces of the cockpit sides. You can complete at the WEST coating system on the sides before they are bonded into the vessel - sand them smooth after final cure.

29.1.8 Now bond the sides into the vessel making sure that they are accurately upright and the correct distance apart for their full length (some lengths of timber to use as spacers will assist this).

29.1.9 The sides fillet to the hull skin and to frames and floors. The sides can either be filleted to the transom or fixed with cleats.

29.2 Cockpit sole.

Boat No. 146 - Build Instructions Book Three

29.2.1 Make sure that all the WEST coating in the areas under the sole is completed.

29.2.2 Fit and bond the cleats on the transom and sternpost, bevelled to allow for the transom angle.

29.2.3 Fit and bond the cleating around the outboard well

29.2.4 Make the athwartships bearers, halved into the sole carlings and WEST bonded in place. Note that the main bearer aft has a centreline post down on to the frame floor.

29.2.5 Make sure that the top faces of all the sub-structure is flush and slopes consistently. Then WEST three coats and sand off the top faces ready for the sole to be bonded.

29.2.6 Get out the sole ply as good a fit as you can. If you have any doubts about how nearly your cockpit matches the drawn dimensions, then make a pattern of the sole (from strips of approx 50mm wide ply screwed together) and mark your ply from this.

29.2.7 An alternative to a tight fit all round is to deliberately leave a 5mm gap all round the outside of the sole and fill this with a WEST/#423 Graphite or a 2-part polysulphide compound (be sure to prime the seam and lay a bond-breaker as per the manufacturer's instructions).

29.2.8 Various finishes are possible on the sole. The simplest is to mix a small amount of silver sand with the final coat of varnish (once all the WEST coating is completed). If you mask off a band (say

50mm wide) around the edges and around the outboard well aperture, this can look quite pleasant and is very effective.

29.2.9 Another good alternative is to bond strips of teak to the sole. Make the strips about 40mm wide by 5mm thick and leave approx 25mm gap between each. The strips should finish about 25mm in from the fwd and aft ends of the well. The ends of the strips can be fully rounded off or left square with just a radius on the corners. This system provides a good-looking effect and is practical; it is non-slip and allows good water drainage. The teak is left bare and scrubbed; the sole between the strips is either varnished or painted.

29.2.10 Other more conventional finishes are fully teak laid, anti-slip deck paint; or a scrubbed teak grating.

29.2.11 Decide on the finish you want and fit the sole ply. Mark the line of the top of the sole on the transom. Then cut a drainage slot through the transom each side. Make the slots 100mm long by 25mm high. The outboard bottom corners of the slots go right into the corner formed by the sole and the cockpit sides; the others are radiused.

29.2.12 Sand the edges of the slots well and WEST them thoroughly.

29.2.13 WEST the sole thoroughly (minimum 3 coats as usual), sand the top surface smooth and then WEST bond the sole down. If you are bonding spaced teak slats down to the sole, this can be carried out on the bench before the sole is finally bonded down.

29.2.14 Make sure that the joint around the edges is fully WEST filled - fill if necessary and apply a further WEST coat to the corners. You can run a small WEST fillet around the

Boat No. 146 - Build Instructions Book Three

cockpit well corners if you wish, in which case the corners of the drain slots (including the outboard bottom corner) can be radiused to match the radius of the fillets.

29.3 Cockpit carlings

29.3.1 The cockpit carlings are 35 x 15, running from the aft face of Frame -3500, housed through Frame -4550, through to the transom, where they house into the transom beam.

29.3.2 The fwd ends house into a short beam bonded to the aft faces of Frame -3500. Get out the beams and fit them as shown on the drawing, just blading off on to the shelf outboard. Cut the housings for the carlings and bond the beam in place accurately to the heights and offsets given.

29.3.3 Cut the housings in the transom beam and, if not already cut, the housings through the ends of the Frame -4550 beams.

29.3.4 Get the material out for the carlings - a little over length. The angle between the deck and the coamings is close to 90° (actually varying between 94° and 96°) - so for practical purposes the carlings can be planed up square edged (the bevel off the bottom edge would be 0.5mm)

29.3.5 Drop the carlings into the notches and mark and cut the fwd ends to butt on to Frame -3500.

29.3.6 Then mark and cut the aft ends to length to drop into the housings in the transom beams.

29.3.7 Check that the carlings run flush with the frame and beam tops. Bond the carlings in place

29.4 Cockpit coamings.

29.4.1 The coamings are 18mm solid Mahogany, laying outboard at an angle of 10°.

29.4.2 In order to hold the coaming at the correct angle, before the seat tops are in place, it is best to make a couple of formers from, say 20mm shuttering ply or similar. These can sit on top of the cockpit sides at Position -4425 and -5200. Make these full width across the boat, using the coaming dimensions offsets and heights given - but remember the bottom offsets are at top of seat ply - not underside (which is the top of cockpit sides) - so continue the angle down for another 9mm to arrive at the top of cockpit side height.

29.4.3 Sit the temporary formers in place across the cockpit, with their aft faces at the dimension fore-&-aft positions (otherwise you will have to bevel the outer edges). Fix them in place with temporary posts cramped to the cockpit sides and brace them lightly fore-&-aft so that are set firmly.

29.4.4 Screw a temporary piece up the aft face of Frame -3500, where the corner post will eventually be.

29.4.5 It is best to make a pattern of the coamings, using strips of ply, say 100 wide, or similar cross braced to keep it in shape - just as you did for the main coachroof coamings - though the shape of these is less complex. Mark the pattern up for a good fit.

29.4.6 The shape of the aft end is suggested - but it can be to your choice.

29.4.7 Lay the pattern on your Mahogany; mark and cut the coaming out - leaving it a little oversize for final fitting.

Boat No. 146 - Build Instructions Book Three

29.4.8 Try the coaming in place and adjust for a good fit to the bulkhead fwd - if the aft end fit to the transom is not so good this is less important.

29.4.9 The seat carling along the bottom of the coaming can be made and bonded to the coaming now - this is made from 20 x 25 material bevelled off on the outboard face to the coaming angle ($10^\circ = 4\text{mm}$ of bevel for 25mm depth).

29.4.10 With the coaming in place, cramp the carling on to it and check with a level from cockpit side top across to carling top that the seats will be level athwartships. Because the seats slope fore-&-aft it is important to check for athwartships level with the spirit level accurately square across the boat or else you will get a false reading. The carling tight up under the temporary formers should give correct level readings.

29.4.11 Once the carling is correct, mark along the top edge on to the coaming and also drill off and screw it in place.

29.4.12 Remove the coaming and carling. Remove the carling from the coaming so that it can then be bonded permanently in place.

29.4.12 Once the WEST has cured, the bottom edge of the coaming can be planed up level across (rather than square across) and flush with the bottom edge of the carling.

29.4.13 The top edge of the coaming is planed up square across.

29.4.14 You can complete the WEST coating system on the carlings if you wish, before bonding them in place. If so, sand smooth once the WEST has cured. Or you

could apply two coats, leaving the final coat for later; again sand smooth.

29.4.15 Finally bond the coaming in place (make sure it does not bond to the temporary cleat on the fwd bulkhead, or to any of the temporary formers. Use a well-thickened mix to the cockpit carlings because of the top-open gap (about 0.5mm). The coamings can be screwed into the carlings (counterbore and dowel over heads) if necessary to secure in place while the WEST cures, if you don't have sufficient long-reach cramps. Use only a light cramping pressure to the carlings.

29.4.16 Repeat the procedure for the other coaming.

29.4.17 The fwd corner posts and the top capping are fitted after the seat tops and aft sampson posts are in place.

29.4.18 The temporary formers and the temporary cleats fwd can be removed now. But tack a couple of temporary battens coaming top to coaming top and coaming bottom to cockpit side top, just to hold the coamings in place until the seats are fitted.

29.5 Seats & lids.

29.5.1 You may want to leave the fitting of the seat tops until the berth base is made and fitted.

29.5.2 Make and bond in place the seat carlings on the outboard faces of the cockpit sides. Note that the inboard gutter replaces the carling in way of the seat lid on the stbd side. Also make and bond the bearers on the fwd bulkhead and transom. Complete any WEST coating to the hull and other structures inside the lockers.

Boat No. 146 - Build Instructions Book Three

29.5.3 Make up and fit the athwartships gutter assemblies on the stbd side. Make sure that these are well WEST coated internally. Cut the drain slots through the cockpit sides and WEST these well.

29.5.4 Make the outboard fore-&-aft gutter and house this through the athwartships gutters. WEST the gutters thoroughly and bond them in place. Bond a section of 9mm ply from the outboard gutter back to the carling, as shown on the seat detail drawing – this stiffens the ply to take the seat lid hinges.

29.5.5 Now make the ply fixed part of the seat tops with the outboard edge bevelled to fit snugly to the coaming and the aft edge to the transom. Complete the WEST coating on the underside and then bond in place.

29.5.6 Make the ply lid from two layers of 9mm ply as shown on the drawing. Fit and hinge. WEST coat.

29.5.7 Fit the cleating for the bridgedeck front; make and fit the bridgedeck front, WEST coated and bonded in place.

29.5.8 Fit the cleating for the bridge top and bond in place.

29.5.9 Complete all the WEST system coatings inside the bridgedeck. Make and fit the bridgedeck top as for the side seat tops.

29.5.10 Double up under the seat and bridgedeck tops and fit the hardwood nosing – all WEST bonded and coated.

29.5.11 Fit toggle fasteners to the lid so that it can be secured shut at sea. It is important to do this for the safety of the vessel. DO NOT OMIT THIS.

SECTION 30 - DECKS

30.1 Foredeck.

32.1.1 The foredeck comes largely out of a single sheet of 9mm ply laid with the face veneer grain running athwartships.

30.1.2 The foredeck sub-structures have all been fitted so you should now be able to lay the ply directly down.

30.1.3 The forehatch aperture is cut out after the ply has been bonded down, though the hole for the sampson post can be precut.

30.1.4 Don't be tempted to save ply and make the foredeck from two or more pieces as this almost certainly result in an unfair deck camber. In particular do not make a join along the fore-&-aft centreline.

30.1.4 Before laying the ply the notch for the sampson post can be cut in the king plank. The sampson post requires a 75 x 75 hole through the deck, with the centre 66.5mm to port of the centreline and 37.5mm fwd of the fwd face of the beam on Frame -300. So the notch in the king plank will be 75 long x 21 deep.

30.1.5 Measure the fore-&-aft dimension of the foredeck – this should be about 1165mm + the bevel on the fwd edge against the stem. Also measure the largest athwartships width at the fwd face of the coachroof coaming. Get your ply out to size and plane the bevel on the fwd edge in way of the stem.

Boat No. 146 - Build Instructions Book Three

30.1.6 Lay the ply over the deck and tack it down to the sub structure; use 30 x 30 pieces of hardboard or thin ply under the nails so that they can be withdrawn again easily. The ply should lay smoothly over the structures with no gaps.

30.1.7 If there are gaps this means that your sub-structures are not running fair or your bevels are incorrect. Have a good look round inside and mark any corrections required. Usually it is better to bond a slip of timber on rather than start planing timber off - unless there is a very obvious hump or similar. Mostly however, you will find that the play fits easily within gluing and fastening tolerances.

30.1.8 From outside now mark around the hull side on the underside of the deck ply. From inside the boat draw round the forehatch aperture on to the underside of the ply; also draw round the sampson post notch in the king plank.

30.1.9 Make some witness marks from the stem face back on to the deck ply and from the coachroof front on to the deck ply, so that you can be sure to get the deck ply back exactly in the same place. Also accurately mark the positions corner of the coachroof corners on to the ply.

30.1.10 Remove the ply from the boat and cut the sides to shape - you can leave about 5mm on the sides as it is easy to clean this off flush with the hull skin once the deck ply is bonded down.

30.1.11 Mark the remainder of the 75 square hole for the sampson post and cut this

out.

30.1.12 In way of the forehatch aperture, just drill a (say Ø10) hole accurately in each corner to use a starter for the jig saw when cutting the ply out of the aperture. As mentioned previously, this is cut out after the deck ply is bonded down - not now. However, if your jig saw is too wide to make the aft athwartships cut after the ply is bonded down, then this cut can be made now, leaving the others until later. If the whole aperture is cut out now, the ply will not lay down on the foredeck so fair.

30.1.13 At the aft edge of the foredeck, the ply fits tight to the coachroof front. At the coachroof corners the ply is cut back at 45° so that its aft edge lies on the centreline of the Frame -1000 beam - this will be the join to the sidedeck ply.

30.1.14 Once the ply is cut to shape etc. WEST the underside 3 coats. WEST the fwd and aft edges one coat. The deck can then be bonded down to the sub-structure.

30.1.15 No fastenings are necessary structurally but it will probably be easier to use some to hold the ply down while the WEST cures. If you have someone to hold inside with a heavy "dolly" then you can use nails (of the "Gripfast" ring-barbed variety). A dolly is usually a length of steel bar (say 350mm x Ø40) with the end turned smooth or fitted with a timber cap. This is held under the structure being nailed to, so as to prevent it bouncing away from the deck ply. Without a dolly you will not be able to nail to the sub-structures successfully and you should use screws instead. Bore off for these dry (before

Boat No. 146 - Build Instructions Book Three

applying the bonding WEST) with a combination drill (Stanley "Screwsink" or similar). Let the drill *just* start to cut the counterbore for the screw head but no deeper. 6g countersunk head screws will be the best size and you will need to bore for them at about 125mm centres. The screws can be pulled a few mm below the surface and then WEST filled over.

30.1.16 The edges of the deck ply can be planed off flush with the hull skin - either now or later at the same time as the sidedeck ply.

30.1.17 The designed deck finish is anti-slip deck paint over the WEST coatings. The teak toe-rail is set 12mm inboard from the deck/hull edge and the edge itself is radiused over. The hull paint colour runs over the edge up to the footrail. The footrail is in sections with gaps between for scuppers. The hull paint line continues to run 12mm in in these gaps. This system works well and provides an easy deck-edge finish. The toe-rail is also less susceptible to damage. The rubbing strake (if fitted) is usually about 150 down the hull running parallel to the sheer.

30.1.18 We prefer this system to the more conventional toe-rail flush out to the hull skin and a rubbing strake flush up to the deck top surface. Unless this is very carefully carried out, water tends to sit on the top of the rubbing strake and leak into the toe-rail/deck joint (which is susceptible to opening if the toe-rail is damaged)

30.2 Side decks

30.2.1 The side deck ply is fitted in much

the same way as the foredeck ply, but the face veneer grain runs approximately fore-&-aft.

30.2.2 It is probably best to make butt joints in the ply on Frame -3000 and Frame -4450.

30.2.3 Offer the ply up to the coaming and dummy the coaming shape off on to the ply. Cut this inside edge to shape and offer up for final fitting. Tack the ply to the deck and measure the bevel required on the inside edge. Mark the outside edge on the underside of the hull.

30.2.4 Remove the ply and cut the outside edge (allow about 10mm on as you still have the bevel on the inside edge to shave off). Bevel the inside edge. Offer the ply back up and mark the ends; also mark any adjustments needed to the inside edge. Remove the ply; make any adjustments necessary and cut the ends.

30.2.5 WEST the underside of the ply 3 coats and sand smooth. Bond the ply down as described for the foredeck. Clean off the outside edges.

30.2.6 As mentioned previously, the joint of the sidedeck ply to the foredeck ply is over the centre of Frame -1000 beam.

30.2.7 At the aft end the ply runs out flush with the transom. This end will not be radiused back like the side edges as the taffrail capping sits on top of the deck and overhangs the transom.

30.3 Finishing off.

Boat No. 146 - Build Instructions Book Three

30.3.1 Clean off the outside edges all round. Radius off the deck edges along the hull sides but not across the transom. This can be done by hand or using a bearing guided rounding over cutter in a small router or trimmer. Make sure that the edges are really flush back to the hull skin and transom or else when you are sanding the hull down finally you will keep cutting through the WEST on the edges.

30.3.2 Cut the forehatch aperture and clean the edges up smooth and flush with the hatch carlings and beams.

30.3.3 Sand over the deck surface and WEST coat. Then WEST fill all fastening holes etc. Finally sand and apply at least two more WEST coatings. Along the edges WEST fill any voids in the ply and WEST coat very thoroughly.

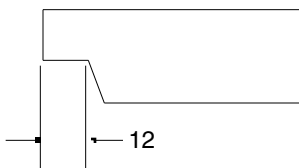
30.3.4 Finally sand the decks smooth.

30.4 Toe-rail.

30.4.1 Refer to the Deck Plan for details of the toe-rail profile and the placement of the sections.

30.4.2 Get the toe-rail lengths out (a bit over-length) and sand them up.

30.4.3 Make a gauge from a piece of ply and mark a parallel 12mm line along the deck, holding a pencil on the end of the gauge.



30.4.4 Mark out on the deck where the gaps between the sections are.

30.4.5 Start with say a fwd section. Measure the accurate length of the section on the deck. Cut the toe-rail section to length. Radius down the ends. Mark off the fastening holes - space these equally along the length of the rail, starting at 50mm in from the ends. Fastening spacings should be 250mm to 300mm.

30.4.6 Fastenings are 2.5" x 10g stainless c/sunk head screws. Depending on the position on the boat you will need to steep (angle) the fastenings a little to make sure that they drive into the shelf, not break out on the inside. Use a combination drill. Make the counterbores for the heads about 10mm deep. You may need to redrill from the underside of the rail to make sure that the hole through the rail is shank diameter all the way through. It is important that the screw is a free fit through the rail or else it will not pull the rail down hard on to the deck.

30.4.7 Now take the rail up to the boat. Hold the rail on to the deck so that the fwd end is accurately in place and the rail is laying as near as possible along the 12mm parallel line. Prick off for the fwd end fastening into the deck. Lift the rail off and bore for the fwd fastening. Refit the rail and drive the fwd fastening, not really hard home, just enough to secure the rail.

30.4.8 Now bend the rail round. If you are working alone you will need a system of shores or blocks on the deck in the middle section of the rail, so that you can pull the aft

Boat No. 146 - Build Instructions Book Three

end round. Once you get on to the sidedecks, you can shore easily against the cabin coamings. On the foredeck a piece of timber cramped up in the hatch aperture will give something to shore against. We are not aiming to get the rail running on the 12mm parallel for its full length - just for say the next two fastenings. The bore off for the first of these and drive the screw in just sufficiently to hold the rail in place. Then bend it round for the next two fastenings and drill of the first of these and so on until you get to the end. If there are two of you, one person can usually bend the rail by hand and hold it while the other drills off, making things rather easier.

30.4.9 Once the fastenings are all drilled off, remove the rail from the deck again and blow off the drillings. Degrease the underside of the rail thoroughly and wet out well. Then apply WEST/#403 microfibres and finally fix and bond the rail section in place.

30.4.10 Clean off the excess WEST as usual. Dowel over the screw heads WEST bonding the dowels in. When the WEST has cured, shave off the dowels and sand to match the rail.

30.4.11 Continue in the same way with all the rail sections.

30.5 Taffrail.

30.5.1 Get the taffrail out to the section shown on the Cockpit Coaming drawing . In way of the sidedecks the taffrail will be rebated out for the ply deck thickness

30.5.2 Bend the taffrail over the transom and deck and bore off for fastenings (at about

250mm centres).

30.5.3 Mark the ends. Remove the taffrail. Shape up the ends. Degrease the underside and wet out well. Bond and fix the taffrail in place.

30.5.4 Clean off the excess WEST; dowel over the fastenings. When the WEST has cured shave off the dowels and sand to match the taffrail.

SECTION 31 - SAMPSON POSTS

31.2 Fwd Sampson Post

31.1.1 The sampson post is shown on the Fwd Sampson Post drawing.

31.1.2 It sits to port of the centreline so that the bowsprit, the heel of which houses into it, can pass alongside the stem.

31.1.3 The post is basically 75 x 75 at the top tapering to 40 x 40 at the heel. But the taper is asymmetric, being all on the fwd and port faces. This allows the aft face to lay against Frame -300 and keeps the heel of the post sitting on top of the apron lamination.

31.1.4 The post is best made from a timber such as Iroko, which is harder than mahogany and can be left bare above deck.

31.1.5 From the boat, check the actual heights in way of the post, in case they are different from those on the drawing.

31.1.6 Get the post out and taper off the fwd and port faces.

Boat No. 146 - Build Instructions Book Three

31.1.7 Drop the post in place and mark off the angle of the heel; cut the heel.

31.1.8 Fit the post and cramp it in place. Measure and mark the accurate height of the bowsprit centreline.

31.1.9 Once you've established and marked the bowsprit heel mortise it is worth refitting the post in place and checking how the run of the bowsprit will be. Refer to the Bowsprit drawing. You might like to get a batten out to mimic the bowsprit to see if you like this angle. If you want to give the bowsprit rather more angle then you need to drop the heel a little pivoting it about the stemhead or else you will have to make changes to the stemhead fitting. We don't recommend that you give it any less angle up or else it will appear to tip down.

31.1.10 Once you've either established that the designed heel position is OK or marked your preferred one, then you can remove the post and go ahead and cut the mortise, and trim off and shape up the top of the post.

31.1.11 Now bond the post in place. Iroko is not a particularly good timber for WEST bonding so prepare it particularly well. Abrade the bonding surfaces so they are not shiny smooth. Degrease the bonding surfaces thoroughly. Double wet out the bonding surfaces (i.e. wet out - leave 15 minutes and wet out again). Use Colloidal Silica in place of Microfibres in the final bond. You can also bolt the post to the frame - say 2 off M6 bolts at the lower end and 1 off through the beam. If you do bolt as well as bond, then

drill off the bolt holes first and fudge WEST down them (use a pipe cleaner), before finally inserting the bolts and pulling home with post on its bonding bed of WEST. Use large pattern washers under head & nut.

31.1.12 It can be difficult to get a really good seal where the post passes through the deck - even with modern epoxies - as the passage of the post pushes the epoxy off. You can counter this by cutting a shallow seam (say 4mm x 4mm) in the deck around the post and retro-filling this with epoxy (mixed with #423 Graphite if you wish). Or you can make the hole in the deck tapered (about 2mm bigger all round at the top than at the bottom) so that a "wedge" of epoxy is retained all round the post.

31.1.13 An alternative is to fit beadings or quadrants around the post afterwards. These are usually screwed and bedded to the deck with a seam against the post. Or nowadays they can be epoxy bonded to both post and deck. If you are intending to do this then make sure that sufficient straight post is left above the deck when you shape up the top part. Don't plan the beadings to be too big or else they will foul up with the bowsprit.

31.2 Aft Sampson Posts

31.2.1 The inner faces of the aft sampson posts run parallel to the centreline at an offset of 610 – refer to the Aft Sampson Posts drawing.

31.2.2 The posts drop through holes cut in the cockpit seat top and carling, to land on a block bonded to the hull skin. On the fwd and aft faces, and the inboard face, the posts are

Boat No. 146 - Build Instructions Book Three

housed 5mm over the cockpit seat top. On the outboard faces, the post is angled until it reaches the full 70mm dimension; above that point and up to the underside of the coaming cap, there is a wedge shaped block fitted between the posts and the coamings.

31.2.3 Dimensions of these are given on the drawing but it is as well to check from the boat.

31.2.4 The hole through the seat top should be 60 fore-&-aft, tapering from 29 at the aft end to 40 at the fwd end – but again check this from the boat itself by setting out the 610 parallel lines on the seat top.

31.2.5 Once you have established the position of the posts and the holes through the seats, cut the holes through the seats and through the carling beneath. Fix a batten across the cockpit at top-of-coaming height and mark the 610 offset and the -5200 position on it. Drop a plumb line from the batten down to the hull to locate the 610 offset and -5200 position on the hull.

31.2.6 Make and fit a block to bond on to the hull – dimensions approximately as shown on the drawing. Bond the block to the hull with a good thick bed of WEST.

31.2.7 Mark out the mortice housing for the end of the posts and chop it out.

31.2.8 Get out the posts, using a tough timber such as Iroko – see Fwd Sampson Post instructions for comments on using WEST and Iroko.

31.2.9 Drop the post through the hole

and into the housing in the block below. Adjust the fit as necessary so that the post is plumb fore-&-aft and athwartships and fits tightly down on to the seat tops.

31.2.10 Measure and make up the wedge blocks between the posts and the coamings.

31.2.11 Finally WEST coat the posts (leave the top parts bare wood) and bond them in place. You may find it best to use a fairly thick WEST mix, using Colloidal Silica in place of Microfibres.

SECTION 32 - COCKPIT CORNER POSTS AND CAPPINGS

32.1 Corner Posts

32.1.1 The corner posts are shown on the Cockpit Coaming drawing.

32.1.2 Get the timber out for the posts. Fit the bottom ends down on to the seat tops.

32.1.3 Mark the top ends, making them flush with the coaming tops and following the angle of the coaming top edge both fore-&-aft and athwartships.

32.1.4 Clean the posts up and WEST coat three coats. WEST bond in place.

32.2 Cappings

32.2.1 The cappings are basically 25 x 40, rebated out over the coaming tops to be flush on the inside and nose over on the outside.

32.2.2 At the fwd end the cappings swell

Boat No. 146 - Build Instructions Book Three

out inside to cover the top ends of the corner posts.

32.2.3 At the aft ends the cappings swell out in way of the aft sampson posts and also to provide a mount for the main sheet eyes.

32.2.4 Get out the material for the main run of the cappings. The fwd and aft sections can be separate pieces, scarphed to the main centre section run.

32.2.5 Get out the fwd sections and shape up to size; cut the scarphs on the inner ends (scarph through the 25mm depth).

32.2.6 Fir the fwd ends and bond into place. Offer the main section up, mark and cut the scarph at the fwd end. Temporarily fix the sections in place (screws, doweled over, down into the coamings). mark the scarphs on the aft ends. Remove the sections and cut the scarphs.

32.2.7 Bond and fix the centre sections in place. Dowel over the screw heads.

32.2.8 Get the aft sections out to shape; scarph the fwd ends and adjust to fit. Bond the aft sections in place.

32.2.9 Clean up the whole length of the cappings, sand smooth and WEST 3 coats.

SECTION 33 - COACHROOF TOP

33.1 Making and fitting the top.

33.1.1 You may like to leave fitting the roof until after most of the interior is fitted out as this does make life easier - and allows

plenty of fresh air down below.

33.1.2 The roof is a single layer of 9mm ply. You will need three sheets of ply for the job. They are laid athwartships (so the 2440 long way is running athwartships). The sheets are cut so that they butt join on the centres of the beams at -2150 and -3000 - so there will be three sections. As with the foredeck it is better to have the joins running athwartships as fore-&-aft joins tend to will produce an unfair result.

33.1.3 Get out the fwd sheet, cut to run from the fwd face of the coachroof front to the centre of beam -3000. Tack this in place over the roof and mark around the edges each side - all in much the same way as you did for the foredeck. As for the foredeck check inside to see that the ply fits down well on the sub-structure.

33.1.4 Don't be tempted to try to fair in the roof sub-structure by eye because you haven't been able to lay a straight edge over it to prove the bevels etc. The nature of the coachroof shape is such that, while there are some straight lines that can be drawn through the roof, they are not easy to find and a small deviation from them produces very strange looking results. In the first place trust that the shapes and bevels are correct. You should find that the ply lays down over the sub-structure easily and fair with no gaps. Only if the ply will not do this do you need to make any adjustments and then be very cautious about planing bits off until you are sure that this is needed.

33.1.5 Cut the fwd section of ply to shape. As with the foredeck you can leave the

Boat No. 146 - Build Instructions Book Three

edges 5mm full to plane off after it is bonded in place.

33.1.6 WEST coat the underneath of the ply and then bond and fix in place. As with the foredeck you will need someone holding on with a dolly if you are going to nail into some parts of the sub-structure. It is also a good idea in any case to fit a shore under the coachroof beams to stiffen them up while the roof ply is being fitted. Don't make the shores such a tight fit that you push the beams up - just a nice easy fit to prevent the beam being forced down is what is required.

33.1.7 Proceed in the same way with the middle section to run from the centre of beam -3000 to the centre of beam -2150, and the aft section running from the centre of Beam -2150 to the aft face of frame -3500.

33.1.8 The main hatch aperture is cut after the ply is bonded on - not now. As with the foredeck aperture you can drill holes through the ply accurately in the two fwd corners to make entering the jig saw easier.

33.1.9 Once the WEST has cured you will find that the roof has become surprisingly stiff and you can remove the temporary posts below. Final stiffening of the roof structure is provided by the coachroof runners which form part of the main hatch structure.

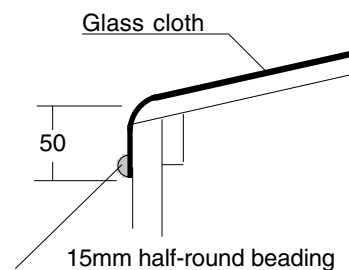
33.1.10 Trim round all the edges so the ply is flush with the coamings and bulkhead. The edges are then rounded off to a 30mm radius. Its best to make up a marking gauge from thin ply with two legs to fit approximately on the coaming side and on to the roof. Make saw cuts in the gauge on each leg, 10mm in and

20mm in from the corner. Then run the gauge along the roof edge with a pencil held in the 10mm saw cuts and then in the 20mm saw cuts - thus marking lines on the roof and the coaming a parallel 10mm and 20mm from the corner. Plane the corner off to a flat bevel across the 10mm lines and then radius right off back to the 20mm lines. This won't be an exact 30mm radius but it should be close enough.

33.1.11 Do not radius the corner in way of the ends of the hatch runners at the aft end or the coachroof runners at both fwd and aft ends - refer to the main hatch drawing to establish these areas.

33.2 Glass clothing the roof.

33.2.1 A fine woven glass cloth is probably the best finish for the roof. We take the cloth 50mm down the coamings and finish it with a half-round beading.



3.2.2 Before glassing the top however, laminate up the hatch and hatch box tops (see later instructions).

33.2.3 WEST fill over fastenings, any gaps between the roof sections, any voids in the ply edges etc. Sand the roof smooth, mask up to the line of the underside of the half-round beading, and WEST coat the roof.

Boat No. 146 - Build Instructions Book Three

33.2.3 There are two types of ribbed roller that are used to roll the glass into the WEST and help make the WEST work up through the glass. One type has horizontal ribs; the other vertical ribs. Both are satisfactory. The rollers for this job need to be about 100 to 150mm long. You may also need a shorter roller - made with just three or four vertical ribs (you can make this with small and large washers on a piece of rod bent round)

33.2.4 Use a fairly open weave cloth about 190 g/m² to 250 g/m² in weight. Your WEST supplier should be able to recommend the most appropriate weave - it mustn't be too tight a weave or else you will have difficulty wetting it out.

33.2.5 The cloth can be dry laid or wet laid. With dry lay you lay the cloth on the dry surface and apply the resin over it and work it down through the cloth. With wet lay, you coat the surface and lay the cloth on the wet resin and work it up through the cloth. We prefer wet lay.

33.2.6 Plan out reasonably accurately where the cloth lengths are going to lie. These could be in two lengths running fore-&-aft. However the cloths might lay better like the diagonal veneers, draped at about 45°, opposite to the final veneer direction. This way they may drape easier around the fwd part of the roof

33.2.7 You may find it easier to use slow hardener for the coat incorporating the glass cloth as this gives longer working time.

33.2.8 Cut the first cloth to length, - leaving about 100mm extra each end. When you cut the cloth, apply a length of masking tape to the cloth in way of the cut and cut down the centre of the tape - this stops the cloth fraying. Handle the cloth carefully so that the weave keeps in place and you don't get 'ladders' or disturbed areas.

33.2.9 Mix rather more WEST than you would usually use for the area and apply a generous coat as evenly as possible (a squeegee is good for this).

33.2.10 Lay the length of cloth on to the WESTed area - make sure that there is WEST right to the edges and a bit beyond - gently lift the edges of the cloth and apply a little more if necessary.

33.2.11 Adjust the cloth in place and start to roll it gently into the WEST, starting from the middle and working out to the ends and edges. Don't roll too fiercely or heavily as you will start to fluff the cloth up and also force the WEST out from under before it has had time to soak through.

33.2.12 As the cloth wets out it will become more malleable and will start to drape easily without wrinkling up. If you get a difficult area, leave it to wet out for a while more and then return to have another gentle roll at it.

33.2.13 It is important that there are no dry areas - if necessary, extra WEST can be added on top of the cloth and worked gently through with the roller.

33.2.14 Once the first cloth is thoroughly

Boat No. 146 - Build Instructions Book Three

wetted out and draped smooth to the roof, you can start on the second.

33.2.15 Lap the cloths about 20 - 25mm. there are two ways to deal with laps:

- ◇ They can be left to cure fully and then sanded smooth - it is important that there is sufficient WEST to wet out the double layer.
- ◇ Or you can wait until the WEST has started to go off but is still just flexible and then cut through both layers of the overlap with a sharp knife and straight edge. Remove the excess from the top layer and then peel back the top layer enough to remove the excess from the bottom layer. Press the top layer down again and it should be a perfect butt join. You will need to apply a little more WEST to the join and lightly roll over it with the ribbed roller.

33.2.16 This latter system only works when you have the time to get at the join at just the right moment in the cure process - if you can't manage this, just leave the overlap join and sand it off later.

33.2.17 Continue with the second and subsequent cloths as for the first one.

33.2.18 Allow the WEST to cure 'green' before you trim off round any apertures etc.

33.2.19 West bond and pin the half-round beadings on and trim off excess cloth below. Remove the masking tape.

33.2.20 Once the WEST has fully cured, go

over the whole roof and deal with any defects, sanding off overlaps etc.

33.2.21 Have a very careful check for any bubbles, dry spots etc. these can be cut now and lifted carefully to be re-WESTed and rolled down.

33.2.22 Then continue with the coating system. Check for any remaining defects WEST fill and sand them off, sand overall and apply two further coats of WEST, sanding between coats. This should entirely fill the weave of the cloth and leave a smooth surface.

33.2.23 If your cloth was a very open weave this may not be the case. If so, allow the fourth coat to cure thoroughly and then sand smooth before applying a further WEST coat

33.2.24 Finally sand the roof to a matt finish ready for final paint finishes. Don't paint the roof until the main hatch and coachroof runners are bonded on and also the tabernacle is bonded on.

33.2.25 If you use silver sand in the final paint finish to provide an anti-slip surface, this looks best if the sand is mixed with a final coat of paint and applied to regularly masked off areas – rather than just all over.

SECTION 34 - MAIN HATCH & COMPANIONWAY.

34.1 Hatch & Hatch box tops.

34.1.1 Refer to the main hatch drawing. The hatch top is laminated from three layers of

Boat No. 146 - Build Instructions Book Three

4mm ply. The top can be laminated on top of the coachroof over the as yet uncut hatch aperture. To achieve just a little more curvature than the coachroof put a 5mm spline along the centreline and two 3mm splines about half way out each side.

34.1.2 Get out the three 4mm ply laminates for the hatch top at least 150mm wider and 100mm longer than the final size needed.

34.1.3 Staple a piece of polythene to the coachroof top so that there is no danger of the hatch laminates bonding to it.

34.1.4 You can cramp the laminates at the aft edge and hold them down with weights in the middle and fwd. Or you can drive some screws through the laminates into the roof (in way of the hatch beam); the holes can be WEST stopped up later and in any case the hatch stop will cover over them.

34.1.5 Along the edges you can also use a length of timber each side cramped at the aft ends and screwed at the fwd end.

34.1.6 Have a dry run to make sure that the laminates pull down evenly and fair.

34.1.7 Wet out the ply surfaces and then apply WEST/#403 microfibres, spreading it evenly with a notched spreader. Cramp/screw the laminates down. Clean off excess WEST as usual.

34.1.8 When the laminate has cured the hatch box top can be laminated over the top of it in a similar way (again using 5mm & 3mm packing strips so that the hatch box top has

slightly more curvature than the hatch top).

34.1.9 Finally remove both tops. WEST fill any screw holes and proceed with the glass clothing the coachroof.

34.2 Hatch.

34.2.1 Cut out the hatch aperture and finish the edges flush with the hatch carlings and hatch beam.

34.2.2 Get out the hatch runners. These are shaped so that the top is parallel to the roof, while the sides are vertical. There is a rebate in the top faces of the runners to take the half depth of a 25 x 3 Tufnol strip running the full length of the runners. If Tufnol strip is not available, you can usually buy lengths of sail batten from chandlers which are made from Tufnol or a similar material. If the thickness of your material is different from that shown, then adjust the depth of the rebate so that 1.5mm of the runner strip protrudes.

34.2.3 The runners are screwed and bonded to the roof so that their inner sides are flush with the hatch aperture and carlings. Screw the runners temporarily in place. Make sure that they are truly parallel to each other or else your hatch will bind as it is slid.

34.2.4 Get out the hatch stop. This is a curved member that sits on top of the roof with its aft face flush with the aperture edge and the hatch beam beneath. The shape can easily be found by holding a piece of ply or similar in the aperture against the fwd end and drawing the curve of the roof on it. The stop can be laminated or cut from solid.

Boat No. 146 - Build Instructions Book Three

34.2.5 The hatch stop is housed 5mm into the hatch runners. So mark the runners for the housings, remove them and cut the housings; cut the hatch stop to length. Cut the drain slots through the runners immediately fwd of the fwd face of the hatch stop.

34.2.6 Once the runners and hatch stop are fitted together, they can be fastened and bonded to the roof - make sure that the runners stay parallel to each other. They are best pre-WESTed three coats and sanded smooth before bonding in place - be particularly thorough in the drain slots.

34.2.7 Now get out the hatch retainers. These will run the full length of the hatch top and be bonded (and fastened if required) to it. Note the drip groove on the underside of the retainers.

34.2.8 The hatch fwd end is a laminated curved member running across the underside of the hatch top at the fwd end. When the hatch closes it hits against the hatch stop to prevent the hatch being pulled aft any further. When the hatch opens it hits against the hatch box fwd end to prevent the hatch being opened any further fwd. It also helps to hold the hatch top lamination to shape and stiffen it - which is why it in itself is laminated.

34.2.9 You can laminate the fwd end directly on the underside of the top. It is as well to cut a former or two to cramp to the top so that it doesn't pull out of shape while you are doing this. Have a piece of polythene between the first laminate and the hatch top so that you can remove the lamination to clean it up, cut it to length and cut the dovetail grooves for the rubber buffer strips.

34.2.10 The hatch fwd end is cut to length leaving a 10mm gap between its ends and the inner faces of the hatch runners. The dovetail grooves and rubber strips are the same system as used on the cockpit locker lid.

34.2.11 Make the laminated hatch handle in much the same way as the fwd end. It also helps to retain the hatch curvature and stiffen the the hatch. Cut the rebate for the hatch top to sit in.

34.2.12 Now try the hatch top on the runners and set out the accurate width and length. Make sure that the top is accurately positioned centrally over the runners, so that its centreline is on the boat's centreline. If the hatch is laid so that its centreline is not parallel to the boat's centreline, then it won't run nicely. Cut the top to size.

34.2.13 The hatch runs on four 25 x 3 Tufnol pads 75mm long, one positioned each end, each side of the hatch. Running on pads rather than full length strips allows the hatch to run much better and to overcome minor inconsistencies. The pads are WEST bonded (and can be screwed as well - but make sure that the screw heads are countersunk in below the surface of the pads).

34.2.14 Bond the fwd end, handle and retainers to the hatch top. You may like to dry screw them on first and try the hatch to make sure it all works OK. The hatch should slide easily without binding or rocking. A little wax on the runners will help make it slide really well.

34.2.15 Once complete the hatch can be

Boat No. 146 - Build Instructions Book Three

WEST coated and sanded smooth for final finishing coats of varnish. The hatch should be strong and stiff - strong enough to stand on.

34.3 Hatch box & coachroof runners.

34.3.1 Get out the material for the coachroof runners. These run the full length of the coachroof and provide substantial additional structural stiffness to the coachroof. The runners are bonded to the coachroof and additionally screwed down into the coachroof beams (use 3" x 14g, well countersunk and doweled over); you may also drive screws up from the coachroof top into the runners in between the beams (use 1½" x 10g just pulled flush with the underneath of the roof).

34.3.2 The basic shape of the runners is shown on one of the detail drawings on the main hatch plan. The bevel on the bottom (shown as 7mm on the detail drawing) will increase towards the fwd end of the coachroof to 11mm at the fwd end)

34.3.3 There is also shape in the underside of the runners fore-&-aft - about 14mm maximum of hollow. So initially get the runners out oversize in height - say 90mm x 45 thick.

34.3.4 Set out the line of the inside of the runners on the coachroof top - 317 parallel each side of the centreline.

34.3.5 Plane the basic 7mm bevel off the bottom of the runners and then increase this from -1700 fwd to arrive at about 11mm

bevel at the fwd end.

34.3.6 Try the runners in place and check that the bevels are correct so that the inside faces sit vertically. This is only important in way of the hatch and hatch box; fwd of this there are no operational reasons why the faces need to be upright - though it would not look too good if they laid in.

34.3.7 Provided the bevels seem reasonably correct then dummy off the bottom shape from the roof top to the runners. Remove the runners and plane the bottom shape on retaining the bevels. Try the runners on the roof; mark for a final fit and adjust as necessary.

34.3.8 Now mark and cut the top edges at 73mm parallel to the bottom for their full length.

34.3.9 Plane off the outside faces so that the top edge is 30mm wide. Taper the height of the fwd part of the runners from 73mm at 1200 in to 40mm at their fwd ends. Then bevel off the top edges 4mm as shown on the full 73mm height section; as the runner tapers in height, the top edge width will increase so the amount of bevel will also increase so as to keep the top edge at a reasonably constant angle. In way of the hatch box, the bevel is intended to suit the curvature of the hatch box top; fwd of this, the top edge bevel is aesthetic rather than material.

34.3.10 Make the hatch box fwd end; this can be laminated or cut from solid. The end will house 15mm into the runners so fit it down to the roof and mark off and cut the ends to length.

Boat No. 146 - Build Instructions Book Three

34.3.11 Dry screw the runners in place. Mark the housings for the hatch box end. Mark the drain slots through the runners immediately fwd and aft of the hatch box fwd end. You could try the hatch in now and make sure that it all works OK end that the geometry is all correct. Remove the runners and cut the housings. Cut the drain slots.

34.3.12 Assemble the runners and the hatch box end on the roof, again all dry screwed. Note that the hatch box end is pushed down in the housings firmly on to the roof and then held in place by two screws each side through the runners into the ends of the hatch box fwd end (use 2½" x 10g). The fwd end is not screwed to the roof - only bedded with mastic in the two mastic grooves in the underside; and a thin film of bedding in the housings. Because the housings and the hatch box end are pre-WESTed (rather than WEST bonded together) the housings will need to be eased out a little to allow for the thickness of the WEST coatings.

34.3.13 Cut the laminated hatch box top to size. Laminate up the hatch box top aft end, rebate it and bond it to the hatch box top itself.

34.3.14 Lay the hatch box top on the runners and hatch box fwd end. Mark around the edges for the rebates in the runners and box fwd end.

34.3.15 Remove the runners and fwd end from the roof and cut the rebates. Or you may be able to rout and cut them out in situ if you have a suitable router and cutters. Because the hatch box top and runners are

pre-WESTed before final assembly you will need to leave clearance in the rebates (both width and depth) for the WEST thickness. You can if you wish make the rebates wider than required to show a 5mm wide seam (pay with black polysulphide).

34.3.16 Dry assemble everything; drill off the hatch box top - this will be bedded and screwed to the runners and box fwd end. Remove and disassemble the components.

34.3.17 Radius the top corners of the runners and angle off the fwd ends as shown on the drawing

34.3.18 WEST the components 3 coats minimum. Be sure to WEST coat really thoroughly in the drain slots.

34.3.19 Bond and screw the runners permanently to the roof; dowel over the external fastenings.

34.3.20 Fit the hatch and make sure that it works smoothly and correctly.

34.3.21 Fit the hatch box fwd end bedded into place and secured with the screws through the runners (you can dowel over these if wished - but just varnish the dowels in rather than WESTing them in).

34.2.22 Finally bed the hatch box top in place.

34.4 Companionway trim.

34.4.1 Refer to the Companionway drawing.

Boat No. 146 - Build Instructions Book Three

34.4.2 The trim is based on 13mm thick boards - 9mm + 4mm bonded together. It is best basically to do this before making up the trim. Then if your final thickness is a bit different from 13mm, you can adjust the trim details to suit.

34.4.3 Get out the inner rebate side pieces. These are basically 55 x 20 with a 15 x 5 rebate.

34.4.4 Get out the inner rebate bottom piece - basically 55 x 20 with a 23 x 5 rebate

34.4.5 Fit the inner rebate pieces around the companionway aperture, mitred at the bottom corners. The top ends of the side pieces butt under the roof, cut out around the hatch carlings and then continue up to the level of the hatch aperture trim).

34.4.6 Once fitted, the inner rebate pieces can be WEST bonded and screwed into place (you can screw through the ply into the rebate pieces - the screw heads will be hidden by the outer rebate pieces).

34.4.7 Make and bond the angled capping strip into place on the bottom edge of the companionway.

34.4.8 Get out the outer rebate side pieces. These are basically 55 x 15. They will be cut back to 40 x 15 where the outer rebate bottom piece houses in and they continue at this size down to the bridgedeck. At the top the ends are cut off at an angle to suit the underside of the hatch, leaving a 1-5mm gap between the ends and the hatch.

34.4.9 Make the outer rebate bottom

piece, angled off as shown. Dry screw the side pieces in place and fit the bottom piece to length.

34.4.10 The outer rebate pieces can now be bonded and screwed in place but you may like to make the boards up first as it is easier to fit an adjust them without the outer rebates in place. When you finally bond the rebates in place, make sure that the bottom ends are well wetted out and bonded to the bridgedeck top.

34.4.11 Fit the brass tread strip to the bottom inner rebate piece.

34.5 Drop boards.

34.5.1 You have already laminated up the basic 13mm ply to make the boards from.

34.5.2 Get the bottom board out at 270 +6 (for the rebate) in height and a shy 500 in width. If you wish, you can bond a solid mahogany trim to the top and bottom edges (and indeed the side edges) of the boards - in which case make the ply smaller.

34.5.3 Bevel the bottom edge to suit the companionway bevel and then cut a drip groove. Form the top edge rebate.

34.5.4 Try the board in place and make sure that it will slide from top to bottom OK. Adjust if necessary.

34.5.5 Get out the rebate piece to be bonded to the top of the board; the length of this should be just a free fit between the companionway inner rebate pieces. Bond the rebate piece to the board. Try the board again to test for a smooth slide up and down. WEST

Boat No. 146 - Build Instructions Book Three

the board and fit the brass tread strip.

34.5.6 Make the top board with a rebate on the bottom edge to suit the rebate on the top edge of the bottom board. The top edge is curved to suit the hatch, leaving a 1.5mm gap between it and the hatch. Fit the board so that it slides smoothly and WEST coat.

34.5.7 The lock noted on the plan is an UK supply item so will probably not be available in the US. It is a cylinder lock, also operable from the inside by a turn knob, thus allowing locking from either inside or outside the boat. It shoots up into a small mortise cut into the hatch top. Because of the cylinder length it needs to be mounted on a 7mm thick pad on the inside of the top board. You may need to adjust this to suit your supply lock.

34.5.8 In addition to the lock, European regulations require shoot bolts to be fitted on the inside of the top board so that the boards are retained in place (in case of a knock down) should the hatch not be fully shut, thus preventing the boards being lost.

34.6 Hatch aperture trim.

34.6.1 Refer back to the main hatch drawing.

34.6.2 Get out the hatch aperture trim pieces, which cover the end grain of the aperture in the ply roof and also the joins of the roof to the carlings, hatch runners etc.

34.6.3 Fit the trim pieces in place. The fwd corners can be mitred; the aft ends butt on to the companionway inner rebate pieces.

34.6.4 The trims should be WEST bonded and screwed in place.

SECTION 34 - FOREHATCH

35.1 Inner coamings.

35.1.1 Cut out the aperture in the foredeck and trim the edges nicely flush with the beams and carlings.

35.1.2 The inner coamings are 18mm thick material - preferably solid timber rather than ply.

35.1.3 The top edges of the coamings are level and flat at 1120 above the dwl (this dimension is not vital, as long as the tops are level and flat so that the hatch sits down on them flat)

35.1.4 The bottom edges of the inner coamings are shaped to run flush with the bottom faces of the beams and carlings - or alternatively the fwd and aft inner coamings can be flush with the bottom faces of the beams and the side inner coamings left down below the carlings so that they run flush with the bottom edges of the fwd and aft coamings.

35.1.5 Get out the basic material for the inner coamings. Fit the fwd and aft coamings to length and set them in place at the correct height. Mark the curvature of their bottom edges; remove the coamings and cut the curved bottom edges. Cut the 5mm housings in the ends to take the side coamings. Refit the coamings, dry screwed.

35.1.6 Cut the side coamings to length and

Boat No. 146 - Build Instructions Book Three

drop them in place. Mark the bottom edges. Remove and cut the bottom edges.

35.1.7 Now the inner coamings can be WEST bonded and screw fastened permanently in place.

35.2 Outer coamings.

35.2.1 The outer coamings sit down on the deck, with their top edges flat and level with the tops of the inner coamings.

35.2.1 There is no aft outer coaming; the coachroof front serves.

35.2.3 Mark the line of the outer coamings on the deck. Then get out the fwd coaming and fit it down to the deck; dry screw it up through the deck from underneath (use 1½" x 10g just pulled flush with the underneath of the deck). Mark off the top edge level with the tops of the inner coamings. Mark the housings for the side coamings.

35.2.4 Remove the fwd coaming; cut the top and cut the side coaming housings; refit to the deck.

35.2.5 Fit 15 x 15 vertical cleats to the coachroof fwd coaming to take the side coamings; WEST bond the cleats on (screwed as well if required).

35.2.6 Get out the side coamings and cut them to length to be a good fit between the coachroof front and the housings in the fwd coaming. Dummy off and fit the bottom edges. Mark and cut the top edges, level with the inner coamings. Cut the drain slots at each end.

35.2.7 WEST coat the outer faces of the inner coamings and WEST coat (if necessary) the deck and coachroof front in way of the space between the inner and outer coamings. Then bond and fix the outer coamings into place.

35.2.8 If necessary clean the coaming tops off level and flat throughout. WEST coat the whole structure.

35.3 Hatch top.

35.3.1 The hatch top is a piece of 15mm ply, preferably with a solid timber edging bonded on. The overall size is flush with the outer faces of the outer coamings and with a 2mm approx gap between it and the coachroof front.

35.3.2 Get out the top ply, edge it and make it to size. Plough dovetail grooves in the underside for D-rubber strip to sit on the centre of the inner coamings as for the cockpit locker lid. WEST the lid outside and inside.

35.3.3 Get out the 30 x 12 drip strips. These are bonded to the underside of the hatch as shown on the drawing - note that the fwd strip is differently positioned to the other three to allow the hatch to hinge and the strip to clear the inner coaming. The strips can be mitred together at the corners or the sides can be housed into the ends (as the coamings were). WEST the strips and bond them to the hatch; they can be screw fastened through the hatch top if required - dowel over the screw heads.

35.3.4 Now fit two 76 x 30 brass butt

Boat No. 146 - Build Instructions Book Three

hinges on the fwd end of the hatch (recessing the hinges in nearly flush as usual). Stretch the rubber strip into the dovetail grooves and check the operation of the hatch.

35.3.5 The hatch can be secured externally by two toggle fasteners as noted on the drawing (which can be the sort to take a padlock if required). Internally the hatch can be secured by barrel bolts (swan neck type will be required - or straight type mounted on pads).

35.3.6 It is useful to fit a couple of timber trigs, pivoted on the inner side coamings so that the hatch can be propped open about 100mm for ventilation at night. With a canvas cover stretched from the coachroof top to the fwd end of the hatch, and a bit wider than the hatch, the hatch will be rain tight even in a heavy rain storm but still let some air in.

35.4.7 Alternatively there is a variety of telescopic strut available which will prevent opening the hatch in excess of 90° (so that it doesn't bang down on the deck) and also hold it in any open position for night-time ventilation. Two UK supply struts are noted on the drawing.

35.4.8 The hatch will need a handle to open it from outside - a proprietary UK supply handle is noted on the drawing. Or you can easily fashion a suitable handle from timber. Make it rounded off so that headsail sheets don't catch on it.

35.4.9 It is pleasant to fit a deadlight of some sort in the hatch top. This can be a proprietary item or you can make one from a circle (or rectangle) of acrylic sheet, preferably

fitted with a frame or set in a shallow rebate. Us about 8mm thick material.

35.4.10 You could alternatively fit a mushroom type ventilator to the hatch top, but these tend to be a bit easily damaged unless they are of rather old-fashioned robust construction. On the whole we prefer the deadlight.

END