SECTION 25 – PLANKING

If you are thinking of a clear finish you need to make this decision right from the start of planking and take great care to get good planking joins and carefully spaced fastenings. These are both slightly less vital if you are going for a pigmented (painted) finish.

Scarphing the ply panels rather than butting them is probably preferable for a clear finish.

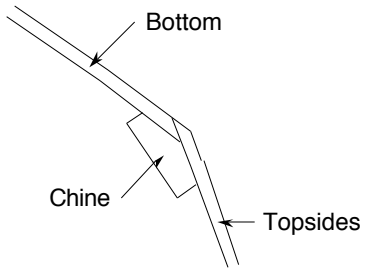
If you are going to glass cloth the hull you will need to use a thinner cloth (about 200 g/sq m) with a finer weave, than maybe you would if you are using a pigmented finish.

25.1 Bottom

25.1.1 The hull is planked with 12mm ply. We prefer to pre-coat the inside faces of the ply with two coats of WEST and sand up smooth and matt as it makes the interior coating and sanding job much easier. Don't pre-coat the exterior surfaces as this will be a nuisance.

25.1.2 The bottom planking joins down the centreline each side. From the front of the keel deadwoods (position -1380) through to about Position -292, finish the join of the hull skins with a (say) 10mm radius. From Position –292, gradually flatten off the skins so that by wl 200 they finish flat across the stem face flush with forward point of the stem. This will give us a flat stem face to bolt on the stemhead fitting and the bobstay fitting.

25.1.3 On the chines it basically joins the topsides planking on the chine centreline. But it is easier to fir the bottom planking to the centreline and then plane it off to the topsides planking angle:



25.1.4 At the aft end the planking finishes flush with the aft face of the transom – it can conveniently be run just over the transom and then planed off flush.

25.1.5 The planking will most likely be made from 1220 x 2440 sheets, so they will need to be joined. They can be scarphed, or they can be butt joined with a butt strap on the inside. A butt join with a butt strap is just as strong as a scarph. Choose whichever you prefer. The butt strap should be 12mm ply, 120mm wide and run from chine to hog. (see below) The butt strap sits 60mm on each plank. With a scarph join, choose a position between the frames, rather than on a frame. And with a butt join of course it cannot be on a frame. Roughly midway between two frames is ideal.

25.1.6 Round the inner edges of the butt straps and carefully cut a scallop out of the stringers to suit (so the butt strap passes continuously through the stringer). This does not leave much wood in the stringer but it will all be OK when it is glued up. Fit a temporary backing strip (about 300mm long) to the stringer while cutting and until all is glued up).

Cut a similar scallop, but only 20mm in from the edge, out of the chine and hog (or shelf for the topsides planking). The instructions assume butt joins with butt straps.

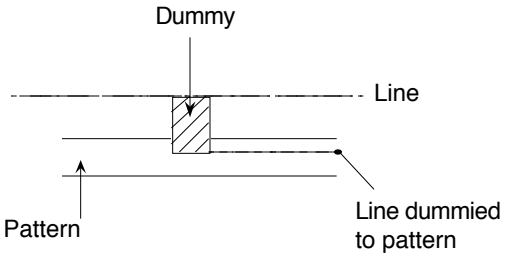
25.1.7 Set out where you want the planks to run and join. Start from the transom and try a join around Position -3900. Then the second piece can run forward to about Position -1900. The third piece should run through to the stem. By measuring around the hull you will get a rough idea of the lengths of ply involved for each piece. Mark the joins on the chines and hog.

25.1.8 You will need some thin lathes of timber to make a plank pattern - something like 100 x 6 would do fine (strips of cheap 6mm ply are ideal). Because the pattern is fixed to the curved surface of the boat it will transfer the actual shape required to the flat sheet of ply.

25.1.9 Screw a strip of pattern on to the hog, so that its edge is as close as possible to the centreline of the hog. Screw a second strip as near as possible to the chine point. These are temporary screws to hold the lathes in place until the pattern is finished, so don't place them where they will be under other lathes.

25.1.10 Screw further lathes across the first two. You will need a lathe plumb over the transom, one at the fwd end in way of the join and one in between. To ensure that the pattern remains in shape when removed, it is best to fit a diagonal strap as well (this can be say 50 x 6). Use 0.5" x 8g self-tapping screws (with thread all the way) and just drill a hole through the top lathe.

25.1.11 We transfer lines from boat to pattern using a dummy stick. This is basically a rectangular piece of thin timber (say 100 x 50 x 10) with nice clean edges. It is used like the sketch below:



25.1.12 Using a dummy stick, transfer the shape of the centreline back on to the pattern (but a dummy's width in). Make a mark about every 100mm. Do the same with the chine line.

25.1.13 Carefully remove the pattern from the boat and lay it on the sheet of ply. Dummy the marks for the centreline and chine line back on to the ply. Draw the transom line and the line of the fwd end of the sheet. Join the centreline and chime line marks fair with a batten.

25.1.14 Now cut the ply out. This first time it might be good to leave about 5mm on the centreline and chine line. Once you have fitted the first piece, you will get an idea of how accurate you are being.

25.1.15 Try the ply up in place. Line up the transom end so that it is nicely flush with the aft face of the transom and see how the chine line and centreline look. Slide the ply until you can start to see the hog centreline;

adjust the edge until you get a good fit to the line. As long as the chine edge is over the chine centreline, the fit doesn't matter too much, because it is going to be planed off to the topsides' angle.

25.1.16 Along the centreline, the ply edges can be beveled to make a reasonably tight fit, one side to the other. Another option is to leave the edges square and WEST fill the gap. This is a good option if you are going to glass cloth the hull externally.

25.1.17 Once you have a good fit, bevel the centreline join if this what you are going to do.

25.1.18 Cut the slots for the butt strap. Make the butt strap and bond it in place.

25.1.19 Now cramp or tack the panel accurately in place (tack over thin ply pads). From the inside mark lightly in pencil the outlines of the edges of the hog, chine, frames, stringer, butt strap and transom. Remove the panel.

25.1.20 Drill the panel for screws fastenings into the frames, stringers, chine, hog and chine. Use 6g screws into the frames; 8g into the rest. Drill a pilot hole from the inside and then drill a shallow (not more than 2mm maximum) counterbore from the outside. If you don't drill a slight counterbore the screws will pull a depression in the surface of the ply, which will, somewhat disconcertingly, tend show in the finished boat however much you fill and sand.

25.1.21 Wet out the hog, transom, frame edges, stringer, butt strap and chine in way of the panel and then apply a reasonably thick WEST/microfibre mix. Place the panel in position and screw fix it to the sub structure.

25.1.21 Go inside immediately and clean off excess WEST. You can use a cloth dampened with acetone as a final clean up. Also clean up externally on the transom, chine, hog and butt strap.

25.1.22 Proceed to fit the same panel on the other side of the boat.

25.1.23 Fit the next two panels forward on both sides of the boat and then the final two, in exactly the same way. You can cut the centrecase slot through the panels as you go.

25.1.24 Once all the bottom panels are fitted and the WEST has cured, plane off along the chine as shown on the sketch earlier.

25.2 Topsides.

25.2.1 The topsides planks are fitted in the same way generally as the bottom planks.

25.2.2 They can be left a little oversize (say 10mm) on both the chine and sheer edges.

25.2.3 At the fwd end, the planking finishes flush with the stem leading edge to give an approximately 24mm wide stem face.

25.3 Finishing

25.3.1 We don't need to glass cloth the hull for any structural reason, but it does provide abrasion resistance and in some ways it does make finishing the hull easier.

25.3.2 A cloth weight of between 200 g/sq m and 300 g/sq m would be suitable. For a clear finish use the thinner cloth with a fine weave. For a pigmented finish use thinner or the thicker, with either a fine weave or a twill weave. Twill will require rather more WEST and filler to fill the weave but drapes rather easier. Our own mild preference is for a 200 g/sq m cloth for all purposes.

25.3.3 These instructions assume finishing the hull for a glass cloth pigmented finish (see next sub-section).

25.3.4 First, sand over the whole hull and transom. Don't go at this too much, especially along the chine line. Just enough to get a good smooth finish overall. Try not to sand wobbles into the chine line – it should run nice and fair to the eye. Once you have finished, just take the sharp edge off the chine.

25.3.5 Dust down thoroughly and apply a WEST coat.

25.3.6 Fill all the screw holes and minor blemishes with WEST/microballons. Allow to cure and sand smooth.

25.3.7 Fill any gap along the centreline with WEST/colloidal silica and allow to cure and sand smooth. Also use WEST/colloidal silica for any minor gaps in the chine, or against the transom and stem. Sand smooth.

25.3.8 We will lay the glass cloth with the second WEST coat.

25.4 Glass cloth

25.4.1 The cloth lays best like the diagonal veneers, draped in lengths at about 45º.

25.4.2 When you cut the cloth stick a wide length of masking tape where you want to cut and cut down the middle of this - the cloth will then be prevented from fraying out. Large scissors (about 250mm or so blades) are best for cutting glass cloth.

25.4.3 You may find that slow hardener #206 is better for this job as it gives you more working time. You will also need some ribbed rollers (#811) or washer rollers (#812) for wetting the resin through the glass. Wear gloves as you have to handle the glass cloth with WEST on it.

25.4.4 Before laying the main glass on the hull it would probably be best to glass the front of the stem, overlapping on to the hull by about 25mm; and a strip about 150 wide right down the centreline of the boat. Cloth the the transom (horizontal or vertical pieces), lapping over the hull 25mm. Once the WEST has cured hard, sand the edges to a feather edge. Follow the methods outlined below for the main hull.

25.4.5 On the hull proper, start by getting a length of cloth out for somewhere about amidships. Cut one end to the centreline angle and drape the cloth down over the boat. Cut the other end off roughly to the sheer. Leave the cloth a bit over length each end. Get out several such lengths.

25.4.6 Apply a good heavy coat of WEST on the area to be glassed. Lay the cloth in

place over the hull and press it down. Roll it down gently with a ribbed roller, forcing the WEST to wet through the cloth.

25.4.7 If there is not enough WEST to come through fully, you can apply some extra on top and work this well in with the ribbed rollers. Don't use the rollers too fiercely or else you will start to fluff the cloth up. Make sure that the cloth is very thoroughly wetted out - you do not want a dry finish.

25.4.8 Continue with the adjoining piece of cloth in the same way, overlapping the two pieces about 25mm. You can deal with the overlaps in one of two ways:

(i) Allow the WEST to cure hard and then sand the overlaps off.
(ii) Wait until the WEST is just ready to start to go off and make a cut down the middle of the overlap with a sharp trimming knife against a batten. The peel back both pieces and remove the cut off strips. Roll the cloth back into place with, hopefully, a perfect butt join.

If you can manage the second method, it produces a better finish easier and more quickly, but the window of opportunity is very small, so most often the first method is employed.

25.4.9 Go back over the laid pieces with the roller, smoothing out any air pockets or any puckered areas. As the cloth wets out it will become more flexible and drape to shape easier. So if you have a problem area, leave it a while and return to it when the cloth has thoroughly wetted out.

25.4.10 Do make sure the cloth is thoroughly wetted out - apply extra WEST if needed.

25.4.11 Continue until the whole hull is glass clothed both sides. You can trim around areas like the centrecase slot when the WEST has cured 'green'.

25.4.12 Once the WEST has fully cured, go over the whole hull and deal with any defects, sanding off overlaps etc. Tidy up all the edges especially around the transom and stem. The sheer will be finally cleaned off when the boat is the right way up.

25.4.13 Once the hull, transom, stem etc. are smooth and any defects WEST filled and sanded off, apply two further coats of WEST, sanding between coats. This should entirely fill the weave of the cloth and leave a smooth surface. Before the final coating is is a good idea to mark the waterline and boottop – see the next sub-section

25.4.14 If your cloth was a very open weave this may not be the case. So, after the first of these final coats, skim over the entire hull with WEST filler. WEST/#410 microlight is the easiest to trowel and sand - but it is not recommended if you are going to overcoat with a dark colour. In this case use WEST/#407, perhaps with a small amount of #406 silica mixed in to improve smoothness. Don't apply vast amounts of filler but trowel over the whole surface with a wide bladed trowel knife, just filling the cloth weave and scraping off as much excess filler as possible. When the filler is well cured, sand over the whole hull and

apply one or two more WEST coats.

25.4.15 Finally sand to a smooth matt finish overall, ready to start the final paint systems. Before the final coating is is a good idea to mark the waterline and boottop – see the next sub-section.

25.4.16 If you are not going to lay glass cloth, then we recommend four WEST coatings, sanding between each. You will need to go carefully over the hull after the first (and probably again after the second) coat to spot fill the staple holes. A general trowel over the hull surface is possibly the easiest way to catch all these. You can with advantage add #420 aluminium powder or to the final coat, to increase the hardness of the coated surface. Or, below the dwl, you can add #425 copper compound which performs the same function and also increases water resistance and acts as a foundation for the antifouling. Before the final coating is is a good idea to mark the waterline and boottop – see the next sub-section.

25.5.1 The waterline is marked at 75mm above (nearer the sheer) the dwl. This will be the antifouling line. The boottop (if required) is painted parallel vertically to the waterline. This will mean that the actual width on the planking will vary according to the hull angles, but that viewed level, the boottop will appear parallel.

25.5.2 The waterline and boottop line are marked in pencil before the final WEST coating, so that they are permanent.

25.5.3 Rig up two posts just aft of the transom and two posts just fwd of the stem. The posts should be a reasonable distance apart - say 2000mm - and fixed firmly and braced fore-&-aft. The posts do not need to be dead upright, but it is just as easy to make them so. Nor do they need to be exactly square to the centreline.

25.5.4 Fix a long board (say 25 x 150) across the posts each end. The planks must have a straight top edge and must be set on the posts so that they are level across. They should be positioned vertically so that their top edges are 75mm above the dwl - You can measure this off the jig rails. The planks need to be about 3000mm long if possible, sticking out about equally each side of the boat.

25.5.5 The basic method of marking the waterline is to stretch a thin strong line (like fishing line) from the top of the aft plank to the top of the fwd plank. Adjust the line sideways so that it just touches the hull about amidships. Tick off this point on the hull. The move one end of the line in and the other out, so that the line just touches the hull about 100mm to 150mm away from the first place. Mark this point. Continue in this way, moving the line so that it lies tangential to the hull at about 100mm to 150mm intervals, marking each point off on the hull.

25.5.6 Unless your planks are very long, they will not be wide enough to mark the ends. You will need to set up a third post each side. These will have a length of level plank fixed to them, the inner end of which can rest on a waterline mark already made on the hull. You will need to set these up first as near the stern as possible and mark the waterline round the hull to the transom. Then move the third set of

posts etc. forward and repeat the procedure round on to the stem.

25.5.7 To mark the waterline in fully, you will need a batten and several people to hold it in place. Hold the batten around the hull so that it lays fair over the waterline marks. Mark the waterline in.

25.5.8 To mark a vertically parallel boottop, you follow exactly the same procedure with the planks set the boottop width higher - or easier, with a boottop thickness block held on top of each of the planks. If you use blocks under the line, then you can mark the boottop at the same time as the waterline, which saves setting up the planks etc. twice. A good width for a boottop would be about 60mm.

25.5.10 The waterline can be marked straight across the transom. To look traditional, it can be marked in a half-moon rather than a straight line. Boottops are not usually marked across the transom - and certainly not if the water is marked as a half-moon.

25.5.11 Then have a final sand over the hull and the final full WEST coat.

SECTION 26 – KEEL

26.1 Basics

26.1.1 You need to look at several drawings to get an overall picture of how the keel is constructed and its various components.

26.1.2 The "Keel & Deadwoods" drawing shows a profile view and a plan view of the whole assembly, the bolting schedule and how it interacts with the centrecase structures.

26.1.3 In the same way, the two drawings "Keel Sections Frames 4 -7" and "Keel Sections Frames 8 -10" give section views of the whole assembly.

26.1.4 From these drawings you can see that the keel assembly consists of an iron ballast keel and deadwoods. The deadwoods are further divided for constructional purposes into:

(i) Bevel pieces, which produce a flat level surface athwartships, but still curved with the hull fore-&-aft. These are shown on the "Keel Bevel Pieces" drawing.
(ii) A keel base, which produces a flat level surface fore-&-aft. This is shown on the "Keel Base" drawing.
(iii) The aft deadwoods, which continue the ballast keel shape aft, to the trailing edge.

26.1.5 The offsets to give the shape of the keel are given on the "Keel Offsets" and a drawing of how the waterlines and sections are set out is shown on the "Plan of Keel Offsets" drawing.

26.1.6 So, let's proceed to making the keel assembly.

26.2 Bevel Pieces

26.2.1 The bevel pieces are shown in detail on the "Keel Bevel Pieces" drawing. And the "Keel Base" drawing contains fairly

comprehensive notes about both the bevel pieces and the keel base. Originally these were a single drawing – they have been broken into two drawings for ease of downloading and printing.

26.2.2 The fwd end of the keel assembly is at Position -1380. The first bevel piece section is shown at -1400; the next section is at -1420. The next three sections are at 40mm intervals. After that we run at 63mm intervals until –1855. Then, because the shape is getting straighter, we run at 315mm intervals aft to the trailing edge tip at -4690.

26.2.3 Follow the instructions given on the Keel Base drawing. Once the bevel pieces are bonded on plane them flat and level athwartships, so that the hull centreline just shows through.

26.2.4 Cut the centreboard slot – NOTE that the centreboard slot is smaller then the centrecase slot in the hog and planking. The centrecase sides sit down on to the top of the bevel pieces; only the centreboard passes through them. The centreboard slot is 1080 x 50 and runs from -2660 to -3740.

26.2.5 Measure and mark the bevel piece bottom widths on to the bevel piece base and join with a batten as usual. The shape can be cleaned off once the keel base is bonded on.

26.3 Keel Base

26.3.1 The keel base turns the surface created by the bevel pieces, which is flat and level athwartships, into a surface that it also flat and level fore-&-aft, ready to receive the ballast keel and the aft deadwoods.

26.3.2 Again, the instructions for creating this are given on the Keel Base drawing.

26.3.3 You should end up with a nice flat base, level both athwartships and fore-&-aft and 400mm below the dwl.

26.3.4 Strike a centreline down the keel base. Measure and mark the kwl -400 widths on to the keel base and join with a batten as usual.

26.3.5 Clean off the sides of the base and bevel pieces to the shapes shown. Try to get the leading edge as accurate as possible. You might want to leave the base just a little oversize for the moment in case the cast iron keel comes big (this can happen if the pattern wobbles in the mould a little when it is being withdrawn.

26.4 Aft Deadwoods

26.4.1 The keel deadwoods are made from four 50mm thick layers.

26.4.2 Mark out and shape the first deadwood layer up. Mark and cut the scarph at the fwd end. Drill off for a series of screws (3” x 10g, well countersunk) Screw and bond the deadwood to the keel base. Be very sure that you keep it truly central.

26.4.3 Repeat the process with the remaining 3 deadwood layers, again being careful to keep everything centered accurately.

26.4.4 Continue the centreboard slot

through the deadwoods.

26.4.5 Clean off the sides of the deadwood smooth and fair. You can leave a little material on the sides at the fwd end in case the ballast keel is oversize.

SECTION 27 – BALLAST KEEL PATTERN

21.1 Basics.

27.1.1 To cast the keel the foundry will need a pattern. They will make this from the keel drawing, or you can make it yourself. If you make it yourself, the the responsibilities of the foundry (with regard to accuracy of shape and weight etc.) will be rather less - though of course they will be responsible for casting the keel properly from your pattern.

27.1.2 Basically the keel pattern is set in casting sand, which is packed firmly around it. The pattern is then withdrawn from the sand, leaving a mould into which the molten metal can be poured.

27.1.3 Some keels are of such a shape that neither they nor the pattern can be withdrawn from a simple mould like this, so then a split mould is made, so that it can be split in two to get the pattern out. This keel should not require a split mould.

27.1.4 It is worth talking to the foundry before you make the pattern to find out how they intend to cast the keel and whether they have any preferred methods of making or finishing the pattern.

27.1.5 As the molten metal in the mould cools it will shrink. Thus to get a keel the correct size the pattern has to be made bigger to allow for this shrinkage. The foundry will usually quote you a shrinkage figure. If this information is not available from the foundry, then make the pattern 1·042% bigger. The allowance for shrinkage has to be applied overall. So, if you were positioning bolt holes on the pattern for instance you would make their spacing just over 1% greater than the real spacing - so the bolts spaced at 250mm on your keel would be spaced at 253mm apart, and so on.

27.1.6 To form the centreboard slot a "core" is required. This sits in the mould where the slot is required, so that, in the keel, a slot is formed. The foundry will make this as it is usually made from metal (often aluminium). You can indicate the position of the slot by a "core plug" on the top of the keel. This will be a strip of timber the width and length of the slot, and about 30mm high, bonded to the pattern. This gives the foundry a slot in the mould in which to place the core. You can do the same for keel bolt holes and the centreboard pivot hole if they are to be cast in.

27.1.7 However, for this keel, it is almost certain that the foundry will prefer to position the slot core themselves, so no core plug on the keel will be necessary. The same applies to the bolt holes and pivot hole - they will almost certainly prefer to drill these. So again check with the foundry first.

21.2 Making the pattern

27.2.1 The pattern can be made in a

variety of ways - the principal requirement is that is is correct to shape (allowing for shrinkage), stable & strong, and well finished.

27.2.2 The two principal ways to make keel patterns are "bread-&-butter" or "planked". Bread-&-butter uses horizontal boards of timber glued one to the other to make up the pattern. Planked is built rather like a carvel boat hull - a top, bottom and planked sides on internal bulkheads. The planked method is usually used for large keels and the bread-&-butter method for smaller ones. The individual board of the bread-&-butter method can be hollowed out in the centre to reduce weight, leaving walls about 20mm thick.

27.2.3 For this keel the bread-&-butter method is the simplest and most effective and to keep the weight down and to ease handling, hollow out the bread-&-butter sections, leaving walls 25 thick.

27.2.4 Make the keel pattern from dry joiners quality softwood 30mm thick, planed to 25.3mm thick, so that 8 pieces will make up the depth of the keel pattern (202mm, including shrinkage allowance of 1·042%). The boards will need to be 1750mm or so in length. The maximum keel offset is 197 for kwl 3 at -2485, so you will need to have boards 400mm wide (or two boards 200mm wide, which is more likely). Don't forget to allow shrinkage on the lengths and heights when you mark out and make the pattern.

27.2.5 Mark out and cut each pair of boards to the shape given by the Table of Offsets for the keel assembly. So the first two boards (making up 50.6 thickness) will be marked out for the kwl 3 (-400). Working through the Table of Offsets, this gives us a width of zero at -1400 (i.e. the leading edge); 41 at -1420; 77 at -1460; 97 at -1500; and so on. These are offsets – half-breadths to be set out each side of the centreline. The nose of the keel fairs in to a 47mm radius. It is probably easier if all the boards run to the aft end of the keel at -3115 – the scarph can be cut once the boards are all bonded together. In this way there is a nice vertical back end of the patter to act as a reference while the boards are bonded together.

27.2.6 Mark out all the widths at the relevant positions (allowing for shrinkage - so the total length of the top of the keel will be -1400 to -2800 = 1400 length; 1400 x 1.042% = 1416. You have to apportion this out between the station spacings. A 315 spacing will become 318. A 20mm spacing is only 0.2mm bigger - hardly enough to worry about. A 40mm spacing will become 0.4mm bigger - say 0.5mm (we can measure that - just!). And a 63mm spacing will become a full 63.5.

27.2.7 Cut the boards making the first 50.6 layer out to shape and clean up. The top board will not be hollowed out, but the next one down can be hollowed out to leave approx. 25mm walls. You do not cut the centreboard slot out of the pattern. Don't forget to leave enough solid at the aft end for the scarph to be cut later.

27.2.8 Proceed in the same way with all the pairs of boards making up the 50.6mm layers (each layer will be two layers of 25.3mm boards). The final board on the bottom is not

hollowed out.

27.2.9 WEST bond the boards together, making sure to keep the whole thing symmetrical about the centreline and the aft end nice and vertical – you can nail or screw the boards together to apply pressure while the WEST cures.

27.2.10 Once the WEST has cured, clean the keel pattern up accurately to shape. Mostly you can clean it off until the 'corners' between the layers just disappear. But at the forward end and back for the first few stations, it is best to make female patterns from thin ply and try these on to the surface of the keel to check how the shape is going. Try to get the front of the keel and nose radius as accurate as possible.

27.2.11 Cut the scarph at the aft end (don't forget shrinkage in the lengths and depths of the scarph).

27.2.12 Sand the pattern smooth and WEST at least two coats, so that the grain etc. is properly filled (WEST fill if necessary) and the keel pattern is a smooth, stable finish.

27.2.13 Ask the foundry whether they want any particular finish, marks etc. painted on.

27.2.14 If the foundry are going to bore and tap the bolt holes, you can make an accurate ply pattern on the keel top (without shrinkage allowance) with the hole centres pricked through (1·5mm drill). They can lay this on the keel when cast to mark the holes out - and you can also lay it on the boat to drill the keel bolt holes. An alternative is to let them drill the holes by measurement (using the drawing dimensions). The bolt holes do need to be accurately placed because there is so not much spare clear of other structures - make this point clear to the foundry.

27.2.15 Don't forget about the pivot hole. The foundry needs to bore this.

27.2.16 Paint your name & address or some other identifying mark/number on the pattern – the foundry may quote you a job number for example.

27.2.17 If you make the pattern early enough to get the keel back before you turn the boat over, you can check the bolts in the keel are correct, and then bore off the keel bolt holes before turning the boat over. Foundries have also got a lot more accurate in this respect than they used to be, so there is no real reason why you can't bore the holes at this time. It is best to talk to your foundry about this. Boring the holes is covered in the later section dealing with fitting the ballast keel.

SECTION 28 - TURN OVER & SET UP

28.1 Turning over

28.1.1 We recommend turning this boat over by crane – she is getting rather large and heavy to do it by hand, even with lots of help. It is best to turn the boat over complete with the jig. This helps you set the boat up level - using the jig members for leveling. You will need some old tyres, old mattresses, or a big canvas cover(s) folded up - in fact anything soft enough to cushion the hull side and edge from the ground and spread the load along the

boat a bit.

28.1.2 We include a drawing of the basics of turning the boat over using a crane, and detailed notes are given on the drawing. You will need at least four well-organized helpers.

28.1.3 The boat and jig should slide out of the workshop pretty easily – either on greased skids or on rollers; greased skids are really easy, even though it sounds a bit primitive.

28.1.4 It has become traditional to have a drink of beer after the boat is turned over - and certainly the lure of a barrel of beer seems to produce helpers for turning over

28.2 Setting up

28.2.1 You should sit the hull on blocks - three in the length of the boat, one near the aft end of the aft deadwoods, one at the fwd end of the deadwoods and on at the fwd end of the keel base. The aftermost two blocks can be quite shallow - say 100mm thick. The fwd set of blocks will need to be 200mm deeper, because they will sit under the keel base. Set the boat up on the fwd and aft blocks so that she is level fore-&-aft - you can use the jig rails to check for level. Then tuck the third, middle set of blocks in with a pair of folding wedges tapped home lightly. Folding wedges are a pair of very shallow wedges, driven one over the other from opposite directions, so they form a sort of expanding rectangle. Drive a couple of nails through the wedges to the block, so the wedges cannot work loose.

28.2.2 To hold the boat upright you will need some bilge chocks each side of the boat. The principal pair should be between -2792 and -3292 so that they can be tied in to the middle keel chock by timber braces. This will stop them working out with vibration as the boat is worked on.

28.2.3 The main bilge chocks want to be about 600mm long on the base with the top angled to suit the hull angle. Arrange for the chock to be positioned so that it picks up both the chine and the lower stringer. Measure the depth for the inside vertical and outside vertical. Make each chock with 9 or 12mm ply sides, with, say, 45 x 45 lengths of softwood sandwiched between them all round. Nail a piece of 12mm ply, 100mm wide on the base. Cover the top with thin foam or a piece of carpet. Push the blocks tightly home so that they hold the boat firmly upright. Strap the chocks to the centre block so they can't work loose.

28.2.4 Make two further pairs of chocks of similar design, one pair on Frame -1792 and the other on Frame -4792. Tie these together with braces also, so they do not work out. Also tie the chocks together with lengthwise braces to further secure them in position

28.2.5 Finally check the boat for level both fore-&-aft and athwartships.

28.2.6 Remove the jig structure.

28.2.7 Lay some planks on the frames inside the bottom of the boat, so that you can walk about inside the boat and work comfortably. Wear soft shoes.

28.2.8 From time to time during the

completion of the boat have a check to see that she is keeping level and the the chocks are all still firmly in place.

SECTION 29 – FINISHING INSIDE

29.1 Filleting

29.1.1 The frames are WEST filleted to the hull. Other structures (shelves, chines, stringers, hog, transom fashion pieces) are not filleted.

29.1.2 The frames and planking have had two WEST coats, so they are ready for filleting.

29.1.3 A fillet is a cove shaped application of thickened epoxy bridging an inside corner. Use WEST/#405 for this purpose.

29.1.4 For forming and smoothing the fillet you will need a narrow spatula with a rounded off end - the rounded off end will form the concave radius of the fillet. For a fillet this size something shaped like a rather large lolly stick is about right, but you will need to experiment. The arms of the fillet should be about 15mm.

29.1.5 Filleting can be messy and a bit of practice on odd bits of timber nailed together to emulate the plank lands will be worthwhile.

29.1.6 Make a little dummy stick 15mm square and use this with a pencil to draw a line on the surface of the hull/frame 15mm away from the corner. Stick masking tape along the surface of the frame and the hull with the edge on the 15mm parallel line. The masking tape will make it much easier to finish the fillets accurately and not get WEST/#405 spread about all over the planking and frames.

29.1.7 You will need a piece of 10mm or 12mm ply about 250mm square, with a handle fixed centrally on one side of it (a 150mm length of broom stick does fine) - like a plasterer's hawk. Mix the WEST/#405 to a non-sagging peanut butter like consistency and put it on the hawk - it will last longer spread out like this and excess material can be scraped back on to the hawk easily. You can add a small amount of #406 colloidal silica to the mix to improve the smoothness - too much #406 will make the fillet tough to sand however. Try about 10% (of the total additive)

29.1.8 Using a trowel knife (about 50mm wide), trowel swiftly along the 'corner formed by the frame and the hull, depositing a small but regular amount of WEST/#405. Draw the spatula along pressing down quite hard so that the fillet runs off to a feather edge on the masking tape. Try to just have the one run rather than keep poking about with it. There will be a point in the cure of the WEST when it is ideal for smoothing - but it is difficult to arrange for this to happen throughout. If the fillets sag away down the hull, then your mix is too thin. If the fillet material drags up very rough then you mix is too thick, or the WEST has started to cure beyond use. Remove the excess material (which should have deposited itself on the masking tape just clear of the fillet joint) using a narrow trowel, chisel or similar. Take care not to tear the masking tape. Make sure that the fillet joint is not running over the masking tape or else you will have difficulty removing it later

29.1.9 When the fillet joint has gone off, but not cured fully hard, pull off the masking tape carefully, bringing with it the remaining excess material.

29.1.10 When the fillet has cured fully, sand it up (using about 80 grit paper).

29.2 Completing the WEST coating.

29.2.1 Go round the entire boat and clean up and messy areas. Clean off any dribbles of WEST etc. that got missed during construction. This takes time but it is worth doing now, while everything is accessible.

29.2.2 Sand all the structures (hog, stem, stringers, shelves, chines etc.) smooth and take off sharp edges. WEST coat these areas two coats. Sand smooth and matt.

29.2.3 WEST fill any areas where water might hang (perhaps where the hog joins the stem for example). But make sure the limbers through the frames are kept clear.

29.2.4 West coat the entire hull and structure two further coats, sanding between coats if necessary (depending on finish and time between coats - look in the Gougeon Bros. Manual for detail).

29.2.5 Finally sand the whole structure smooth and matt, ready to receive further structures, or be coated (perhaps bilge paint below the sole and clear finish in the accommodation).

29.2.6 You will also need to WEST inside the centreboard slot in the keel assembly. The best tool for this is a tiny roller. You can work from inside and outside. You need at least four coats. The final coat can have #423 Graphite Powder incorporated into it. The slot in the hog only needs one coat, because the case is going to be bonded in.

SECTION 30 – CENTRECASE & BOARD

30.1 Centrecase.

30.1.1 The centrecase sides are 12mm ply. From -3780 to -2620, they sit down through the slot in the hog on to the keel bevel pieces. Forward of this they sit on the top of the hog. The gap inside the case is 50mm.

30.1.2 The aft end of the case butts on to the fwd face of Frame 9 and runs up as a trunking to height +540, so that the lift and downhaul ropes can exit through the bridgedeck into the cockpit.

30.1.3 There is a 50 x 40 post at the aft end, running from the top of the bevel pieces to the top of the case trunking. The top of the post is reduced to 30 to allow for the top Roller ‘C’.

30.1.4 Similarly, there is a post at the fwd end of the slot and a further 50 x 40 post at the fwd end of the case. A full depth block, 50mm wide, sits on top of the hog between these two posts – so the fwd part of the case on top of the hog is essentially solid. There is also a 50 x 20 fwd post at the fwd end of the centrecase trunk section.

30.1.5 Get the a centrecase side out to the shape shown on the drawing (leave a little material on the top edges for fitting down). Bevel the bottom edge down in the hog slot. Try the side in place. Adjust as necessary until you get a nice fit, with the top level and at the correct height. Cut the other side out, bevel and fit. Cut the inspection aperture for Roller B.

30.1.6 WEST the sides and edges - outside faces and edges one coat; inside faces three coats.

30.1.6 Get out the three main posts, the trunk fwd post and the fwd block. Fit the bottom ends of the posts. Now assemble the whole case (sides screw fastened into the posts) and try in place. You may need to ease the posts so that the case can slip into the hog slot easily and between the slots in the frames.

30.1.7 It is a good idea to open out the top of the hog slot a little so that, when the case is bonded in, a "wedge" of WEST is formed between the case sides and the slot. Otherwise there is a danger of a dry joint because the WEST gets pushed off as the case is entered into the slot.

30.1.8 Once the assembled case is an easy fit into the case, disassemble it and bore off the holes for the rollers and stop pin. The positions of the holes are given on the keel and deadwoods drawing.

30.1.9 WEST the holes and the inner faces of the two posts in the slot, and the fwd trunk post, 3 coats.

30.1.10 Bond the sides to the posts and fwd block.

30.1.11 Clean up the tops of the posts and the block, so they are all nicely flush with the tops of the sides.

30.1.12 Apply a final coat of WEST/graphite to the inside of the case.

30.1.13 To keep the case pressed down into the slot while the bonding WEST is curing, have some lengths of timber ready to cramp across the frames just above the case top. You can gently drive shallow wedges between them and the case top to keep sufficient pressure on the case.

30.1.14 Bond the case into the slot and down on to the hog. Use WEST/colloidal silica for bonding. Wet out any un-coated areas thoroughly before bonding. Don't make the WEST/silica mixture too thick. Slide the case into place and fit the timber over the top. Wedge the case gently down. Make sure the top is level and flush with the frame tops etc. Clean off excess WEST, both inside and outside. If necessary, trowel excess WEST into the top of the hog slot, between the slot and the sides.

30.1.15 Once the WEST has cured, make good WEST fillets between the case and the frames. Once these are complete, WEST the outside of the case three coats and sand smooth and matt.

30.1.16 Make the inspection trap for Roller A and WESt coat it.

30.1.17 Make the rollers and bushes, and the stop pin and bush. Try these in place.

30.1.18 It is probably best to make the top step and the centrecase front at the same time as the sole and the companionway.

30.2 Centreboard

30.2.1 The centreboard has a 12mm ply core with 50mm wide strips of clean Douglas Fir bonded on to give it the necessary rigidity and profile.

30.2.2 The portion of the board that remains in the case when the board is down remains rectangular at 48mm thickness. This changes to a foil for the part that is outside the boat.

30.2.3 Bond up the basic board with the 12mm core and 50 x 12 strips of timber each side. Make sure the board stays nice and flat.

30.2.4 Cut the board out to its profile.

30.2.5 Shape up the foil section of the board. It is best to make a female pattern from the Centreboard Offsets Table and keep trying this on the board as you shape it up. Cut the groove around the top fwd corner for the downhaul rope.

30.2.6 Once the board is to shape, sand it up smooth. Form the two apertures for the lead weights. Try the board into the centrecase. Give the board one WEST coat and sand smooth.

30.2.7 Bore off the holes for the lift and downhaul ropes - the drawing shows these as Ø14mm, but this is unnecessarily large for 10mm rope; Ø12mm is plenty big enough. Bore the Ø30 holes for the rope ends. The ropes thread through the Ø12 holes and then have a figure-of-eight knot, or a stopper knot, tied , which then sits in the Ø30 hole to secure the rope end.

30.2.8 Bore the pivot hole at Ø35. Wax a length of Ø25 metal tube (copper pipe or similar). With the board laid flat on a protected surface (covered with polythene or parcel tape), stand the pipe accurately in the centre of the hole, wet out the hole and pour a rich mixture of WEST/silica/graphite in to form a bearing. You need to devise a means of keeping the pip squarely in the centre of the hole - like a washer over the top with a stout screw down into the surface the board is laid on.

30.2.9 Once the bearing has cured, remove the tube.

30.2.10 Fill the two weight apertures with a mixture of lead shot and WEST/silica. They should contain about 15 kg of shot.

30.2.11 Clean up everything and WEST coat the board 3 further coast, with graphite in the final coat.

30.2.12 You will need to wait until the ballast keel is fitted before fitting the centreboards, rollers and stop pin permanently.

SECTION 31 – BALLAST KEEL

31.1 Fitting the ballast keel

31.1.1 It really helps to have two people for this job. You can fit the ballast keel at any time. But it is good to get it done early at this stage if possible, because you have better access to everything. Try all the keel bolts in the threaded holes in the keel to make sure that they thread freely fully home (which is at least 25mm). Read through this section fully to the end before starting this job.

31.1.2 The main job is to get the holes bored through the keel base and hog in the right places so they match the studs in the keel. You may have done this before you turned the boat over, which does make life easier.

31.1.3 You will need to take the fwd set of blocks under the keel base away. Make a temporary set at about -792 with folding wedges under the hull centreline.

31.1.4 If you supplied the foundry with a top pattern of the keel with the holes marked, you should be able to fit this up under the keel, align it carefully and prick the holes through. Check that the pattern does actually match the holes in the keel itself.

31.1.5 Whatever the method, the centres of the keel bolt holes need to be marked out very accurately on the underside of the keel base

31.1.6 The keel bolts are Ø12mm. The holes for them need to be a little oversize, else you will never line everything up. So we suggest you bore the holes at Ø16. A simple flat bit is quite good for this job and you can get extenders if a standard bit is not long enough. We shall pour WEST/silica around the keel bolts to fill the holes around them. And we wax the bolts thoroughly so that the WEST doesn't actually stick to them permanently (in case we need to get the keel off sometime).

31.1.7 Once you have bored the holes, WEST them thoroughly – pipe cleaners or similar are good for this. Allow the WEST to cure.

31.1.8 Now move the keel under the boat (no keel bolts in at the moment) - greasy skids or rollers are good. If you use rollers be pretty careful that it doesn't fall off a roller onto your hand or foot.

31.1.9 We have to lift the keel into place and we don't have a lot of room. The easiest lift is hydraulic toe jacks. These are like a normal hydraulic jack but in addition they have an adaptor from the top of the ram to the bottom of the jack so they can lift under things very close to the floor

31.1.10 You will need one jack each side. You can experiment a bit to find the centre of gravity of the keel so it lefts evenly. As you lift slide blocks under the fwd and aft ends, so that if it does fall off a jack, it only has 10mm - 15mm to fall. So you need a ready supply of blocks and strips of, say, 12mm ply, all about 150mm wide.

31.1.11 It helps the stability of the exercise it you thread four lengths of M12 studding (not the keel bolts - just the continuously threaded kind you can buy from hardware stores) down through the keel holes into the keel itself. Thread them the whole way home in the keel These act as guides as the keel is

jacked up.

31.1.12 Jack the keel up until it is touching touching the keel base. Depending on how good the surface of the keel is, the actual join can be several millimetres wide in places. In theory, as long as it is all full of WEST/colloidal silica it doesn't really matter too much how wide it is, though we don't like to see it much more than about 10mm (for no particular good reason!). Check the fit of the scarph at the aft end. Mark for any adjustment you may need to make. Check for the fit of the keel around the deadwoods and base – mark any material to be planed off.

31.1.13 Now lower the keel carefully and gently.

31.1.14 Make any necessary adjustments to the scarph and the sides of the deadwoods. Sand smooth.

31.1.15 Roll a coat of WEST on the keel base, deadwoods and scarph. Allow to cure and sand smooth.

31.1.16 Now apply a second coat to the keel base and scarphs and incorporate woven glass cloth, as you did for the hull. Turn the cloth about 25mm up the sides of the base and deadwoods. Wet out well and allow to cure.

31.1.17 Now we are going to bed the keel on to the keel base etc. Wax the top surface of the keel and all the keel bolts, so that the keel is only bedded on to the keel base, not permanently bonded

31.1.18 Slide the keel under the base and position it. Thread the keel bolts down through the hog and into the keel; put a few drops of "Loctite" thread sealant on the threads. Use a pair of M12 locknuts to tighten them fully home in the keel.

31.1.19 You may want to use slow hardener for the WEST/colloidal silica mix that we are bedding the keel on to the boat with, so that you have plenty of working time. Make the mix fairly stiff (sort of peanut butter consistency)

31.1.20 Get everything prepared inside the boat with all the nuts and square plate washers, spanners etc. ready. Stick shiny brown parcel tape on the undersides of the plate washers.

31.1.21 Spread a good thick layer of WEST/colloidal silica over the keel top, scarph, and around the bottom half of the keel bolts.

31.1.22 Jack the keel up (following it up with blocks fwd and aft as before), fully home on to the keel base and scarph. Now go inside and clean off any WEST that has squeezed up over the hog. Put the square washer plates over the keel bolts, thread the nuts on and gradually tighten them all up, working along the keel. Be absolutely sure that there is no WEST on the threads.

31.1.23 From outside, check that the keel is fully home. Clean off the excess WEST (there is usually rather a lot).

31.1.24 From inside release each keel nut and washer in turn. If there are voids around the bolts, prepare a little fairly runny WEST/colloidal silica and pour it carefully in to

fill the void. Replace the nut and washer and pull firmly home.

31.1.25 This will probably make a bit more WEST squeeze out of the keel outside.

31.1.26 It is important that the keel is nice and upright, which as long as the top is good and flat, should happen automatically. If however the keel tends to pull out of vertical if you tighten all the keel bolts fully home, you can tighten those on the "high" side fully home and pull the remainder home until the keel sits vertically upright - you can only really check this by eye and by measurement to vertical straight edges each side. Then let the WEST/colloidal silica mix cure fully before releasing the nuts inside one by one and filling any voids.

31.2 Finishing off.

31.1.1 Once the WEST has fully cured, put a set of blocks under the fwd end of the keel and wedge them firmly. Remove the temporary blocks at about -792.

31.1.2 Remove the blocks under the fwd end of the deadwoods and relocate them under the aft end of the ballast keel. Wedge them tight. Reorganize your support chocks so that the centre pair are in line with the centre set of blocks and tied to them so they can't vibrate free.

31.1.3 Build a new set of temporary blocks just aft of -4792 – leaving enough space to glass cloth the aft end of the deadwoods. Remove the blocks under the aft end of the deadwoods.

31.1.4 WEST coat under the bottom of the deadwoods and allow to go off. Then glass cloth the underside with the second WEST coat, turning the cloth about 25mm up the deadwood sides.

31.1.5 Now apply a second WEST coat to the sides of the deadwood and keel base, incorporation glass cloth as usual. Allow to cure.

31.1.6 Tidy up the glass cloth all round, trim and sand as necessary. Apply two further coats of WEST over the deadwoods and keel base sides. Allow to cure fully and sand smooth – all as you did for the hull. You can add #422 Barrier Coat Additive or #425 Copper Compound to the final coat if wished.

31.1.7 The ballast keel is not WEST coated or glass clothed. There are special primers to be used once you start the hull coating system.

31.1.8 Once the final WEST coats are fully cured and hard, replace the blocks under the aft end of the deadwoods and remove the temporary blocks aft.

31.1.9 Check that the boat is still level and upright - with all the moving of blocks, she may have got out of level a bit. Set her up now level and upright for the rest of the build. Brace the chocks so they can't vibrate out.

SECTION 32 - SHEER

32.1 Sheer

32.1.1 The sheer will need to 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 beveled off to suit the deck angle.

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

32.1.3 Your hull/deck angles are all a little less that 90º, so the inside corner of the shelf will be sticking up a bit above the frames. You may also have made your shelf a little deeper than the scantling depth. Eye up the line of the shelf by putting you 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.

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

32.1.5 Once you have established any problem areas they can be dealt with before the shelf is beveled 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.

32.1.6 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.

32.1.7 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.

32.1.8 The likelihood is however, that apart from possible very minor adjustments, the shelf will lay nicely fair in its notches, albeit a few millimetres above the frames.

32.1.9 Once you are basically happy with the line of the shelf/skin, they can be planed down to finish flush with the frames and beveled to continue the deck angle out to the hull edge. 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.

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

32.1.11 Now plane and bevel the top edge of the hull skin and shelf 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 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.

32.1.12 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 33 - FOREDECK STRUCTURE

33.1 Stem & breasthook

33.1.1 The top of the stem has be cut off square to the height (1002) shown on the stem sections drawing

33.1.2 The top of the stem will have bevel and camber on it. The height of the aft face at the sheer is edge is 988 and at the centreline the height is 993 – so there is 5mm of camber on the top of the stem at the aft face.

33.1.3 At the aft face of the stem, lay a straight edge across from sheer to sheer. Tick off this line on the centre of the apron. Measure up 5mm to mark the camber height on the centreline. Join this to the sheer both sides with a short length of batten and mark in the deck camber on the aft face of the stem. Plane the stem top down to the camber.

33.1.4 The breasthook is about 25mm thick. It can drop between the shelf each side, or it can be 20mm wider and lodge in a 10mm housing in the shelf.

33.1.5 The camber at the aft end of the breasthook (at position +312) is as follows:

Centreline	974
b 50	972
b 100	969
b 150	964
Sheer at offset 208	958

33.1.6 You can make the breasthook from solid timber, or maybe easier from 4 layers of 6mm ply. To laminate a breasthook, make up a little jig 250 long x 208 wide. Make two ply formers 208 wide, shaped to the cambers given above and set them 250mm apart. Then screw 15 x 15 battens, spaced roughly 50mm centres, from one to the other. Laminate up your four layers of ply over this. It won't be entirely accurate, because the foredeck is actually cone shaped rather than cylindrical, but it will be near enough.

33.1.7 Once your lamination has cured, remove it from the jig. Lay it on the top of the hull, so that the fwd end is touching the aft face of the stem. Draw the outline of the inside of the shelf on the underside of the breasthook. If you are going to house the breasthook into the shelf, add 10mm parallel each side. Cut the breasthook to shape. Bevel the edges and fwd end.

33.1.8 If you are housing it in the shelf, cut the housings.

33.1.9 Drop the breasthook into place and adjust as necessary for a nice fit. Bond the breasthook in place.

33.1.10 Plane the top surface of the breasthook off until the fwd end matches the stem camber and it runs nicely flush with the shelf each side.

33.2 Foredeck beam

33.2.1 Make the full width beam on the fwd face of Frame 2 - this is the beam that takes the aft edge of the foredeck ply. The shape of the fwd face of the beam is given by the following offsets. There is a 1mm bevel off the aft edge.

Centreline	888
b 100	887
b 200	882
b 300	876
b 400	868
b 500	856
b 600	841
Sheer at Offset 685	828

33.2.2 The beam is glued to the ply frame and it can be cut from solid timber. The bottom edge of the beam should be flush with the bottom edge of the ply frame (top of the aperture - continued across). You can just house the ends into the beamshelf (10mm at the top tapering to 5mm at the bottom) if you wish, but this is not actually necessary - just a good fit

33.2.3 Mark out the beam and cut it out. Plane it to shape and bevel the top edge. Try it in place and cut the ends to fit. Run a chamfer on the bottom fwd corner. Wet out the end grain of the beam and WEST into place. No fastenings are necessary but you might find a few helpful to pull the beam hard against the frame ply – use 1" x 8g from the ply to the beam and dowel over the heads.

33.3 Hatch carlings

33.3.1 If you are going to fit a forehatch (which we recommend you do), then there are forehatch carlings to be fitted.

33.3.2 These are shown and dimensioned on the Forehatch drawing.

33.3.3 Make and fit the two fore-&-aft carlings, housed into the beam on Frame 2 and the main carlings. The carlings are straight. WEST bond the carlings in place.

33.3.4 Make and fit the fwd and aft athwartships carlings, to the shapes and bevels shown on the drawing. The housings for these are shown on the drawing. WEST bond the carlings in place.

33.3.5 Clean up and sand smooth.

33.4 King plank

33.4.1 The king plank runs from the fwd hatch carling, fwd to the breasthook. The aft end is housed into the carling as shown on the Forehatch drawing, and the fwd end 15mm into the breasthook. Slope the bottom of the breasthook housing from 15 deep to 5 deep (similar to that shown for the joint of the fore-&aft carlings to the deck beam). The notches are already cut in frames 1 and 0. The king plank is 60 sided by 15 deep.

33.4.2 Mark out the the housings on the carling and the breasthook. The housings 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.

33.4.3 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 carling, frames and breasthook if you wish - or the king plank can be cramped in place while the WEST cures.

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

33.4.5 If you are not fitting a forehatch, the king plank will run back to the beam on Frame 2 (as shown on the Longitudinal Structures plan)

33.5 Sampson post

33.5.1 The sampson post will drop through the king plank, cutting it completely away.

33.5.2 We prepare for this by bonding in a pair of 30x 15 runners each side of the king plank, running from the fwd face of Frame 1 to the aft edge of the breasthook. See the Sampson Post drawing.

33.5.3 Measure the length of the runners, get them out and bond them in place, with their underside flush with the underside of the king plank.

33.5.4 Now get out a piece of 12mm ply, the same length as the runners and 120 wide

33.5.5 Cut a 60 x 60 square out of the aft end of the ply. Bond the ply under the runners and king plank and to the frame and breasthook.

33.5.6 When the WEST has cured, camber the top of the runners off to match the deck camber. Cut the 60 x 60 hole through the king plank. WEST coat the edges of the hole.

33.5.7 This completes the basic foredeck structures - though the main carling runs through Frames 2 and 1 in due course.

SECTION 34 - COACHROOF

34.1 Main carlings & notches

34.1.1 The main carlings are 40 sided by 20 moulded depth. They run from the Frame 9 fwd through to Frame 1.

34.1.2 The notches in the frames will be the carling width + the coaming thickness: 40 + 9 = 49. We can say 50mm for working purposes. The bevel due to the coaming angle is 3mm, so the base of the notches will be 47mm.

34.1.3 There is an error on the Longitudinal Structures Plan Drawing 012_003_02 issue 01. Builders should download issue 02 from the site. Issue 01 shows the carlings running as one continuous length through to the transom. In fact the cockpit carlings start at frame 9 and run through to the transom, and are set 9mm further inboard. The aft end of the main

carlings is bladed off over 25mm, to allow the cockpit carling to scarph on to it.

34.1.4 From Frame 9 fwd the "inside deck" offset on the Table of Offsets is the inside of the coachroof coamings – that is the inside top corner of the carling notches.

34.1.5 For Frames 10, 11 & 12, the "inside deck" offset on the table of Offsets is the inside top corner of the carling itself. There is no bevel on the cockpit carlings because the cockpit coamings are near enough square to the deck angle.

34.1.6 In Frame 1, the carling notch is only 40 wide x 20 deep, and 37 wide at the bottom – the 3mm bevel can run through to the fwd end of the carling even though there is no coaming. The offset to the top inside corner of the carling itself is 176mm.

34.1.7 On the fwd face of the transom, the offset to the inside top corner of the cockpit carling is 711mm.

34.1.8 Mark out the carling notches on each frame. It is simple to make up a dummy 50mm in width and lay this against each of the frame coaming arms. A line drawn on the outside of the dummy on to the frame will represent the outside of the carling notches. Cut the main carling notches.

34.1.9 Get out the timber for the carlings. This should be planed up 50 x 20 square and then have one edge beveled off 3mm

34.1.10 Drop the carling into the notches, with the aft end flush with the aft face of Frame 9. mark and cut the fwd end flush with the fwd face of Frame 1.

34.1.11 Mark each frame position lightly on the carling. Then remove the carling. Blade the aft end off so that the cockpit carling can run on to it.

34.1.12 Repeat for the other side of the boat.

34.1.13 The carlings are not fitted until the coamings are fitted.

34.2 Top carlings

34.2.1 It is best to brace the frames in the coachroof one to the other so that they stay nice and vertical and accurately in position while the top carlings are wrapped round. Fit temporary braces both sides on the tops of the frames, about 50mm in from the edges.

34.2.2 The carlings butt on to the aft face of Frame 2 at the fwd end, and on to the fwd face of Frame 9 at the aft end.

34.2.3 Get out the timber for the carlings, 25 x 43 in case the notches are a little deep. Try the carling round and fit the fwd end to butt on to the aft face of Frame 2, which is the coachroof front. Make sure that the front is braced firmly vertical.

34.2.4 Then mark the aft end to fit snugly against the fwd face of Frame 9, which is the aft bulkhead Don't make the carling too long so that it bulges away from the frames or tries to force the front or aft bulkhead out of vertical. It is better to have a just little space

left at the aft end.

34.2.5 At both ends you can screw a piece of temporary timber to the outside face of the carlings to stop them going in too far.

34.2.6 Pull the carlings both sides into place. A Spanish Windlass at each end and in the middle should do the job. Run a batten on edge along the inside face, hard down on the frame tops and mark the fair line. Mark the frame positions on the carlings. Remove the carlings.

34.2.7 Plane the top edge of the carling off to the line and square across. Measure the bevel at each frame and set this off on the outer face of the carling at the frame positions marked. Join the marks with a batten and then plane the bevel off.

34.2.8 Bond the carlings in place.

34.3 Coachroof coamings

34.3.1 Now we come to the coamings. These are longer than a sheet of ply. You can either scarph two sheets of ply together to obtain the length or you can make a butt join. If you make a butt join, a good place would be 50mm ahead of Frame 4. You can then have a butt strap 100mm wide with its aft edge hard against the fwd face of the frame and it will not be noticeable.

34.3.2 To get at the shape of the coamings we need to make a pattern. Use strips of ply about 6mm x 100mm for this

34.3.3 Join up two lengths to a little longer than required for the whole length of the coaming (≈ 3200mm). Screw one length along the coaming top edge so that its top edge is as near to the coaming top edge as possible but nowhere sticks above it. Screw (0·75" x 6g into the frame edges) the other strip along the coaming bottom edge in the same way. Let the strips lay naturally around the frames - do not attempt to bend them on edge.

34.3.4 Now fit short a short vertical length fwd so that its fwd edge is exactly flush with the fwd face of Frame 2. Repeat this at the aft end with the aft edge of the pattern flush with the aft face of Frame 9. These two vertical pieces sit on top of the longitudinal strips and should be glued and screwed to them - a quick setting glue is useful (Cascamite, 5-minute epoxy etc.).

34.3.5 Now screw and glue on a few diagonal braces, making sure not to cover the temporary screws along the top and bottom edges.

34.3.6 Make a dummy stick about 100 x 50 x 6 - this needs to be nice and square, preferably with beveled edges. A piece of perspex is ideal but a clean piece of ply will do fine. Run the dummy along the top edge of the coaming marking off with a sharp pencil on the bottom edge of the dummy on to the pattern. Repeat on the bottom edge of the coaming, ticking off on each frame. Also mark the position of each frame on the pattern.

34.3.7 Remove the pattern from the boat and lay it on the ply for the coamings. You can now mark off the accurate edges by laying the bottom edge of the dummy on the line and

marking off on to the ply on the top edge of the dummy. The top edge will be a semi-continuous line. The bottom edge will be a series of marks at each frame position - join these with a batten.

34.3.8 Because of the angle of the cabin side and the thickness of the pattern, you will get slight inaccuracies unless you take great care to allow for this when using the dummy to transfer the original lines to the pattern. Also, the top and bottom edges of the coamings are beveled so allowance needs to be made for this. In practice it will be easier to take the pattern as and then allow 15mm extra top and bottom. Also leave 15mm on each and at this stage. Transfer the frame positions from the pattern to the ply – because of the curve, these will be just slightly further apart than they are on a straight line.

34.3.9 Once you have the ply cut out, fair the bottom edge. Now try the coaming in place to see how good a fit the bottom edge is - it should just touch the bottom of each carling notch on the inside edge. You can use the small bits of carling cramped down into the notches to hold the bottom edge – this also tells you if the notches are the right size. Mark off any adjustments necessary. Remove the coaming and bevel the bottom edge (taking the bevels with an bevel gauge from the deck to the frame at each frame position). In practice you will find the bevel to be almost constant throughout the length of the coaming. Clean the bottom edge nicely and put a 6mm approx. radius on the inner corner, between the frames, starting and finishing say 20mm in from the face of the frames.

34.3.10 WEST coat the coaming inside and out but particularly finish the coating on the inside and sand smooth. Glue the coaming in place. Screw fasten (1" x 8g stainless or brass, dowelled over) into the top carling at about 200mm spacings and into the frame edges (1·5" x 6g dowelled over). Drill off for the screws on a dry run first so that drillings don't get into the wet WEST™. Once the WEST has gone off, you can clean off the top edge fair and beveled to match the camber of the coachroof. If anything plane marginally less than the true bevel off so that the outside edge of the coaming is just slightly high (1mm max). This will help you to get a good tight fit when the coachroof top is fitted. WEST™ the top edge (carling and coaming) and protect with bubble pack so that it does not get damaged.

34.3.11 Now fit the main carlings. Make sure that they pull right down to the bottom of the notches and that the top surface is nicely flush with the top edge of the frames. The bottom of the carlings should be flush with the bottom edge of the coamings. You may need to use some cramps in between frames to hold the carling in the right place - do protect against cramp marks. The coamings are screwed to the carlings from the inside (1·25" x 8g stainless or brass dowelled over) at about 200mm spacings. The carlings are screwed down to the frames (1·5" x 6g stainless or brass). You can run a radius along the outboard bottom edge of the carlings between frames as for the coamings. Drill off for the screw fastenings and then WEST the carlings into place and fix. Sand and apply final WEST™ coatings.

34.4 Mast runner

34.4.1 The mast runner runs from Frame 5 through to Frame 3.

34.4.2 The runner is 200 x 25 and sits in notches in the three frames.

34.4.3 Cut the notches for the runner, 25 deep on the centreline and with the bottom level across.

34.4.4 Let the runner run past Frame 3 and frame 5 by about 25mm.

34.4.5 Get the runner out and try it in the notches. Adjust as necessary. Bond the runner in place.

34.4.6 Once the WEST has cured, shape the top face to match the coachroof camber.

34.4.7 Form fillet joints from Frames 3 and 5 to the underside of the runner.

34.5 Coachroof beams.

34.5.1 There is a 20 x 40 beam on the aft face of Frame 2. The beam can be cut from solid. The ends of the beam can butt on to the carlings - there is no need to house them in.

34.5.2 Get the material out for the beam. Cramp it to the aft face of the frame and draw the top edge. Remove the beam and mark the bottom edge 40mm parallel to the top.

34.5.3 Clean the beam up and WEST bond it to the frame.

34.5.4 The beam has no bevel on the centreline, fairing out to 2mm bevel off at the coachroof edge.

34.5.5 There is similarly a 20 x 40 beam on the fwd face of Frame 9. Make this in the same way and bond it to the frame. There is a regular 1mm of bevel off the fwd edge of this beam.

34.6 Hatch carlings and beam

34.6.1 The hatch carlings run from Frame 9 through to Frame 7; they are 20 wide by 30 deep.

34.6.2 The carlings are near enough straight, though not level. They will need to be bevelled to suit the coachroof camber (about a 5mm bevel).

34.6.3 Get the carlings out. Cut the notches in Frame 7. Cut a housing ion the beam on Frame 9 – this can be 10mm at the top and 5mm at the bottom.

34.6.4 Bond the carlings in place. When the WEST has cured, bevel the top to suit the roof camber.

34.6.5 Laminate up the hatch beam to the shape shown on the Main Hatch and Coachroof drawing. Us a minimum of 5 laminates - which would give you 6mm thick laminates. Make the laminations a little wider than the final 20mm required in case they slip up a little as they are cramped up.

34.6.6 The easiest way to laminate this is to set out the shape of the top edge on a flat surface (20mm chipboard or similar). Screw chocks (about 60 long x 40 x 40 – dimensions

not at all critical) to the chipboard fairly close together so that there is about 25mm gap between and so that the middle of the chock is just touching the line. The lamination can then be cramped into shape inside the chocks. Make sure to wax the chipboard and chocks etc.

34.6.7 Alternatively, cut the shape of the beam from a couple of bits of 12mm ply and screw one on top of the other on a piece of chipboard or similar and cramp the laminates inside that. Have a dry run as usual to make sure that you have everything to hand etc. WEST the laminates together (WEST/#403) and cramp up to shape.

34.6.8 If the laminates tend to slip up when you are cramping - screw a few pieces of ply to the top of the chocks or former and drive a shallow wedge between the ply and the laminations to keep them down.

34.6.9 Clean up the beam. Cut the housings in the carlings . Fit the beam ends. Bond the beam in place. There is no bevel on the top of the beam.

34.7 Coachroof top

34.7.1 The roof is made form 3 layers of 4mm ply laminated together. You will need six sheets for the roof, the hatch and the hatch box.

34.7.2 The first and third layers have the face grain of the ply running athwartships; the second layer has the face grain running fore-&-aft. This produces a smoother curved result and the joints in one layer are staggered with those in the next.

34.7.3 You will need a temporary former across the hatch aperture at Frame 9. You can use the offsets of Frame 9 to make this. A piece of 150 x 25 softwood planed up will be fine for this – make it 800mm long (so using the heights out to b 400 in the Table of Offsets). There is no bevel on the top face of this. Cramp the former to the outside face of Frame 9, so that the ends run flush with the top of the frame. Cover the top of the former with parcel tape.

34.7.4 You will need another temporary former cramped to the forward face of Frame 7. This needs to be thicker material as the join of the first and second sheet of layer 1 is going to be at position –2756 (24mm ahead of the fwd face of Frame 7). So you will need something 45mm to 50mm thick. Use three bits of planed 150 x 50, joined together like three bits of a polygon so that they can encompass the curvature of the roof (which is 219mm at Frame 7). The three pieces can be held together with some scrap ply screwed over the joins.

34.7.5 Cramp the former (either joined up or in bits) to the fwd face of Frame 7 and draw a pencil along the top of the frame to transfer the shape to the former. Plane the top surface off to the shape of the roof. In 45mm to 50mm width there is 1mm of bevel to come off the forward edge of the former. When it is made, cramp the former to the fwd face of the frame, with its top flush with the top edge of the frame. Cover the top of the former with parcel tape.

34.7.6 You will need another temporary

former at the Frame 6 position (–2280 to –2292). This can be made from a piece of 12mm ply, or similar. You can use the coachroof offsets for Frame 6 in the Offsets Booklet to shape the top edge; there is no bevel in 12mm width.

34.7.7 The former needs to be held firmly in position - it is for support only, you are not going to fasten to it. You can support the former with shores from the floor, bunk front etc. Stiffen the former sideways with some scrap timber screwed on the faces. Hold the former in position with strips of timber between it and Frames 5 and 9 each side. Put some parcel tape on the ends of the former before it is fixed in position to ensure that any WEST that may ooze out from the coachroof edge does not bond the former permanently in place.

34.7.8 Now you are ready to lay the first layer. Start with Sheet No. 2. This is laid across the roof so that its fwd edge is on the centre of Frame 4 (this will be Position –1536). Tack the sheet in position so that one end is just on the roof at the aft end (so the major amount of the waste is all the other end – we shall use this later). Use hardboard or thin ply pads (about 40 x 40) under the temporary nails to make removal easy. You are going to need to temporarily fasten the aft edge to the former ahead of Frame 7 - if you drive the nails right near the aft edge of the sheet they should just be covered over by the fillet joint between the frame and the roof. Mark the underside of the ply for the outline of the coachroof. Have a look inside to see that it fits down on the frames and around the edges. Mark the outline of Frame 5. Remove the ply and cut it to shape. Bore pinholes through the ply in way of Frame 5 so that you can find the position of the frame from the outside.

34.7.9 This sheet can now be bonded down. Bond in the usual way (WEST/#403, any end grain or ply edges wetted out well) making sure to get a good bond around the edges and down on to Frames 4 and 5. You can nail or screw into the coachroof carlings and Frame 4 - we prefer screws as they don't vibrate the sub structure so much. You may find that you need to drive some fastenings near the edges along the coachroof edges, to pull the edge of the ply well down - you can make these temporary (because of the radiused edge) with ply pads under the heads - or you can screw a length of batten along the edge to trap the ply down. In the same way, a batten might be a better way of temporarily fixing the aft edge of the ply down to the former at Frame 7. A touch of wax on the temporary fastenings will ensure their easy removal.

34.7.10 Generally, fastenings around the edge will need to be at about 120mm spacings and into the frames at about 150mm spacings. Start fastening from the centre and work outwards. Go inside and clean of excess glue as usual. When the WEST has cured, remove any battens and temporary fastenings.

34.7.11 Sheet No. 1 is laid next – aft of Sheet No. 2 to the aft end of the roof. Lay and fix the sheet down temporarily as you did for Sheet No. 2. Have the largest possible amount of the waste at one end. Mark the edges of the roof and, inside, mark the outline of the hatch carlings and beam, and frame 7. Check that the sheet lays tight down. Check that the butt

joint to Sheet No. 1 is a good fit. Leave a bit of overhang aft of the coachroof - otherwise the ply will miss the former in the hatch aperture on the aft face of Frame 9. Remove the sheet and cut to size. Drill pinholes to find the positions of the sub-structures from the outside.

34.7.12 Bond and fasten the sheet down as for Sheet No. 2. Use screws, not nails, into the hatch carlings and beam, and Frame 7. Make sure there is plenty of WEST in the join between the two sheets. Clean off the excess glue; when cured, draw the temporary fastenings etc. as before.

34.7.13 Sheet No. 3 is laid ahead of Sheet No. 2, from the centre of frame 4 to the forward end of the coachroof. The waste from this should be cut in one long strip down the length of the ply (it will be 2440 x about 460 wide) and a second shorter piece about 1200 long x about 750 wide (keep this piece as long as possible).

34.7.14 The procedure for fitting, bonding and fastening is the same as before. That completes the first layer. Make sure that all temporary fastenings are drawn out of this layer before you proceed with the next - or else they will become permanent. Run a sander over the joints to ensure that they are level and fair.

34.7.15 Sheet No. 4 is laid lengthways from the aft edge of the coachroof at Frame 9 (not from the aft edge of Sheet No. 1 which still overlaps Frame 9). The long waste from Sheet No. 3 is laid alongside it. The combined width of the two sheets (1220 + 460) is not quite enough at the aft outer corner, by about 20mm - so a small additional bit will need to be fitted in for a short length. The waste from Sheet No. 1 will fit ahead of these, with the face grain running fore-&-aft.

34.7.15 The important thing now is to ensure that layer 2 bonds to layer 1 without any voids in the WEST etc. The roof has considerable curvature and this should ensure that the sheets of layer 2 pull down tight on layer 1. Have a dry run - temporarily fix Sheet No. 4 down and tap over it to try to see if it is pulling down all over - it should do.

34.7.16 If you need to apply extra pressure the easiest way to do this is with ratchet straps (the sort you use to secure items on a trailer etc.). These are usually 50mm wide, with a hook one end and an adjustable ratchet drum the other to shorten the strap. If the strap is long enough you can pass it right under the boat -– otherwise run a rope, or preferably a second strap) under the boat (protect the boat on any corner where the rope touches). Then ratchet the strap down so that it pulls the ply firmly but gently down - don't overdo tightening the strap else you will start to damage the coachroof structure – we only need gentle pressure.

34.7.17 Once the sheet is pulled down OK, you need to fit it as before, by marking around the roof on the underside; also establish from the first layer, or by measurement, the accurate position of all the sub-structures and mark these out on the sheet.

34.7.17 Wet out the underside of the sheet with WEST and spread WEST/#403 on the top

of layer 1. Spread the WEST good and even - don't put too much on or else it will have difficulty in escaping to the edges and you will get a ridged or bumpy result. Use a notched spreader for the WEST/#403 (a piece of formica about 150mm long x 50mm wide, with 5mm x 5mm notches cut in one edge, spaced with 5mm in between, does this job fine). Pour the WEST on (because you have wetted out the underside of the new sheet, you can mix the WEST/#403 a little stiffer than usual so that it won't all immediately run downhill to the edges.

34.7.17 Lay the sheet on and fasten, working from the centre to the edge and smoothing it down so that any excess WEST is moved to the edges. Clean off the excess WEST.

34.7.18 Fit the other two sections in the same way.

34.7.19 Layer 3 is laid with the grain athwartships again. So sand layer 2 to ensure that it is level and fair.

34.7.20 This time we start at the fwd end and lay Sheet No. 5 with the fwd edge flush with the fwd face of the coachroof. Cut the waste off one end in the largest possible length. Sheet No. 6 is laid alongside Sheet No. 5 and again the longest length of waste possible is cut off one end. Both these sheets are laid with the grain running across the roof.

34.7.21 We need these large pieces of waste for the hatch and hatch box later, so we will use the short piece of waste from Sheet No. 3 to complete this layer. Cut this in half and lay one piece each side of where the hatch aperture will be (its not big enough to go right across in one piece). The hatch itself will be laminated on top of the coachroof, so it is necessary to fill the gap in the middle with some small waste pieces, but these do not need to be fitted accurately.

34.7.22 Fit, fasten and bond layer 3 down as for layer 2.

34.7.23 Now we should make the laminations for the hatch top and the hatch box top . The hatch lamination needs to be 750mm long and 740mm wide (370 each side of the centreline). It is laminated on top of the roof over the hatch aperture, before the hatch aperture is cut out.

34.7.23 The hatch box top is laminated over the hatch. The size is 750 long x 920 wide. So, if enough ply is available, it is best to make both items 750 x 920. Both are laminated from 3 x 4mm. The best run of ply grain is for the first and third layers to have the grain fore-&-aft and the centre layers to have the grain athwartships. You can take the opportunity to use a couple of smaller bits in the centre layers.

34.7.24 The hatch and hatch box are laminated up from 4mm ply. Laminate the hatch on top of the roof in way of the hatch aperture (tape the roof with polythene or shiny brown parcel tape) and the hatch box on top of the hatch, so that the curvature of each one fits that of the other. If this is difficult, you can make a simple jig (marking the shape of this from the coachroof. Make the hatch about 800 by 800; make the hatch box about 800 long by 900 wide. The laminations may

spring back a little so lay a strip of timber (about 25 x 3) full length under the centre of the lamination (between the roof and the first hatch lamination; and between the hatch and the first hatch box lamination) to induce a little extra curvature. If you make a jig, then do the same thing with a strip of timber. It is not too vital that the hatch follows exactly parallel to the roof but it is important that the hatch and hatch box are parallel to each other, so as to maintain a reasonably constant distance between them.

34.7.25 Once the hatch is cured, repeat the process, leaving the hatch in place and laminating the hatch box over the top of it (polythene in between).

34.7.26 Once the hatch box is cured, both laminations can be taken off and put aside for later use. Store them lightly cramped or screwed together to help them retain their shape. In fact, once the hatch aperture is cut out, this too could be cramped to the underside to further help the laminations hold their shape.

34.7.27 So, now to cleaning up the coachroof top. You should be able to walk gently about on the top now, although the structure is not complete until the hatch runners and the coachroof runners are fitted. Remove any remaining temporary fastenings. Remove the temporary formers at Frame 9 and Frame 7 - you could leave the temporary former at Frame 6 for now, if it isn't getting in you way - but just have a check that it can be removed and hasn't mysteriously got bonded or fastened to the roof.

34.7.27 Sand the roof over so that it is smooth and fair. Trim round all the edges (flush with the coamings, and following their angle where appropriate). Cut out the hatch aperture, so that the edges of the ply roof are flush with the inner faces of the hatch carlings and beam. A hatch liner will be fitted around here later, so just finish the edges off square.

34.7.28 Now mark out the outer edges all round for radiusing off. And mark the line 50mm down the coamings, for the little half-round beading as shown on the detail on the hatch and Coachroof Structures plan.

34.7.27 It's best to make up a marking gauge from thin ply (see Deck Bits drawing). 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, the coamings, the front and the aft bulkhead, a parallel 10mm and 20mm from the corner. Mark the 50mm on the coamings and across the front and the aft bulkhead. 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 40mm radius but it should be close enough.

34.7.29 Leave 120mm each side of the hatch aperture un-radiused to accommodate the hatch and coachroof runners which finish flush with the aft face of the frame. Run masking tape along the 50mm line on the coamings, front and aft bulkhead.

34.7.30 Fill any fastening holes and sand off. Coat with WEST. Incorporate the woven glass cloth in the second coat. Lay this generally as you did on the hull. The WEST

ribbed rollers are very good for rolling the cloth into the resin without damaging the cloth. Joins in the cloth are possibly easier across the boat and can be butted with care, or lapped and then the lap sanded off. The glass cloth runs 50mm down the coamings as shown on the detail on the hatch and Coachroof Structures plan

34.7.31 The half-round is to provide a clean finishing line rather than anything else. It is WESTed and pinned on top of the glass, after it has cured - the glass can be trimmed off under the beading. The beading and the roof are best painted with non-slip deck paint to contrast with the varnished coamings. This is done later after the rest of the structure is completed.

34.7.32 In the companionway, the beading will need to be cut back to butt on to the rebate pieces for the drop boards - or you can leave the beading 25mm back from the edge of the aperture in the frame (i.e. 335mm out from the centreline).

34.7.33 At the corners of the coachroof, the beadings can be mitred, and the sharp corner of the mitre just rubbed off. Beneath the beading, and above the beading for the deck glass, the fwd coachroof corners can be radiused off about 10mm radius - best done with a rounding off cutter in a trimmer. The aft corners are left square because the cockpit coamings are going to run past them.

34.8 Corner posts

34.8.1 Inside the boat we need to fit corner posts between the coamings and the front and between the coamings and the aft bulkhead.

34.8.2 The cornerposts are 20 x 40 – the 20 face against coamings. They butt under the carling and beam. The bottom ends finish flush with the bottom edge of the coamings.

34.8.3 Get the corner posts out, fit the top ends; cut the bottom ends to length. Bevel the edges to the coamings as necessary. Radius up the corners.

34.8.4 To hold the posts in place while the WEST is going off, you can screw them from the outside and dowel over the screw heads. Or you can shore them gently in place, which is perhaps preferable.

34.8.5 WEST bond the posts in place.

SECTION 35 – MAIN HATCH & COMPANIONWAY

35.1 Main hatch

35.1.1 All the timber parts and components are WEST coated and, with the exception of the hatch box into its rebates, WEST bonded into place.

35.1.2 The basis of the structure is the coachroof runners. These form the double coaming for the hatch, the sides of the hatch box and they stiffen the structure of the coachroof itself. They run parallel to the centreline, 380mm out from it.

35.1.3 From Frame 9 through to about Frame 5, the coachroof is pretty nearly straight

at 380mm out; from frame 5 to Frame 3 it starts to curve down as the coachroof edge gets nearer to the runners rather more quickly. This does give slight problems in manufacturing the runners. The top of the runners need to be straight and parallel to the coachroof for the length of the hatch and box, so that the hatch will slide properly and keep the same distance away from the roof throughout the length of its movement. The runners are not level - they slope down forward; so the whole hatch structure also slopes down forward.

35.1.4 Forward of the hatch assembly, the top of the runners does not need to run parallel to the coachroof - indeed it would look better if they reduced in height as they ran forward, as suggested on the drawing. It would assist manufacture and use less timber if you made each runner in two lengths: the aft part running from Frame 9 to just ahead of the hatch box; the forward part will run from just ahead of the hatch box to the forward end. The two parts can be scarphed together (scarph horizontal; length about 200mm). You can use the join to set the forward part at a slight downwards angle so as to assist cutting the curvature in the bottom edge to match the coachroof.

35.1.5 Set the timber for the runners (or a piece of ply as a pattern) on the roof and dummy the shape of the roof off on to it and measure the athwartships bevels. The height that the forward part runs down to at the forward end is not particularly vital - we show 50mm, but it could go as low as 35mm if this helps with timber usage.

35.1.6 To lead halyards and other lines aft to the cockpit, then two chocks will be required for the turning blocks for these lines. The chocks should be the same height as the runners and their top surfaces run parallel to the roof. They look nicer if the edges are angle so that the base is larger than the top – make the bevel about the same as that on the runners. Remember to stop the radius on the runners in way of the chocks and continue the radius on the runners around the edges of the chocks.

35.1.6 The runners and the chocks should be properly WEST bonded to the coachroof. To assist this you will need to drive some screws up from beneath through the coachroof top. Otherwise it is difficult to hold the runners down firmly and in the correct position. Dowel over the heads of the screws.

35.1.7 The forward end of the hatch box is a similar profile to the coachroof runners, but curved to match the coachroof shape. You can either laminate up a piece for this (on the coachroof itself or on a simple jig), or you can cut it out from solid. The end is housed 15mm into the coachroof runners and WEST bonded in.

35.1.8 You will need a drainage slot in the runners each side, immediately aft of where the hatch box forward end house in. Water that runs off the hatch into the space between the coachroof runners and the hatch runners will mostly run forward (because the whole structure and the roof slope down forwards) and then run out of these slots.

35.1.9 The hatch runners are also bonded to the roof and can be screwed as well if this makes life easier. They have a shallow rebate in their top surfaces to take a Tufnol strip for

the hatch to slide on. If you have difficulty finding Tufnol, several chandleries sell Tufnol sail batten lengths, which can be cut down to size. Bond the Tufnol into the rebates (abrade the underside well); if you need some screws to hold the Tufnol down while bonding, countersink them well below the surface of the Tufnol.

35.1.10 The hatch box aft end can be laminated or cut to shape. It houses 10mm into the hatch runners. Drainage slots are required in the hatch runners immediately forward of where the hatch box end house in. This is to drain any water swilling about under the hatch box out into the space between the coachroof runners and the hatch runners. The hatch runners also finish short of the hatch box forward end, again to allow water under the box to drain out into the space between the coachroof runners and the hatch runners.

35.1.10 Clean the hatch and hatch box laminations up to size up to size.

35.1.11 On the hatch make and bond on the handle and the forward end (either cut to shape or laminated).

35.1.12 For the hatch box, laminate the beam at the forward end. The hatch box fwd end is housed into the coachroof runners as shown - the housing is a parallel one, the width of the top of the fwd end (35mm). The ends of the fwd end are cut back to form a 35mm parallel tenon to drop into the housing. Make the housing and the tenon a loose fit and WEST both well. The fwd end just wants to slide nicely into the housing after WEST coating.

35.1.13 The fwd end is bedded to the roof top and the housings in the runners. Push the end down on to the roof (dry, no bedding at the moment) and then drill through the coachroof runners into the ends of the fwd end. Use quite big screws (just the one each side) - say 3" x 14g. Counterbore over the heads for a dowel. Plough a groove (about 5mm wide x 3mm deep) in the underside of the fwd end to retain the bedding. WEST the fwd end well. When you come to finally fit the fwd end, (after the hatch is slid in for the final time) apply bedding to the underside and slide the end in place; force it hard down on the roof and drive the screws in from the coachroof runners. You can run a bead of mastic up the inside of the vertical join of the end to the runners, after the end is fixed in place.

35.1.14 In fact, it is not vital that the fwd end is absolutely watertight – it is there to support the fwd end of the hatch box top and to prevent water surging into the hatch box (should a sea or heavy spray land on the roof). However, it is best to aim for a watertight seal as this stays cleaner in the long term.

35.1.15 Make and bond the hatch retainers to the hatch. These will finish 20mm back from the aft end of the hatch - in fact the should finish so that the hatch stops on its rubber buffer strip, rather than hitting the outer liner on Frame 9. Fit four pads of Tufnol (50 x 25 x 3) on the underside of the hatch top, two each side, to slide on the Tufnol strip bonded to the runners. Fit four similar pads to the sides of the hatch to control the sideways movement of the hatch. When you try the hatch in, it should slide freely, without tipping from corner to corner and the side pads should

keep it in place sideways, rather than the retainers binding on the hatch runners. You can correct for minor deficiencies by changing the thickness of the various pads, or packing them out a little, before screwing and gluing them on.

35.1.16 Lay the hatch box on the coachroof runners and mark out for the rebate in the runners and the box forward end. You should cut the rebates about 1mm deeper than the thickness of the hatch box lamination to allow for bedding compound. WEST the edges of the hatch box lamination and the rebate well, but only bed and screw the hatch box top into place as it is the only way of getting the hatch out again should this be required.

35.2 Companionway

35.1.1 The outer and inner liners to make slides for the drop boards are quite straightforward. The side liners can run down as shown on the drawing or they can mitre to the bottom liners - or the outer ones can run down as shown and the inner ones mitre. We have shown just a 0·5mm rebate cleaned out of the inside faces of the liners to give the drop boards just a little play so that they slide easily.

35.1.2 The outer liners swell out at the top (glue a bit on) so that they cover the end of the hatch assembly. Cut a small drain slot (say 20 x 10) so that any water up at the aft end of the hatch assembly can drain out. The inner liners finish up under the hatch carlings with the top inner corner just radiused off. Once the hatch all works properly, the liners can be screwed and bonded to the frame; dowel over the screw heads. The hatch overhangs the aft face of the frame and the outer liners.

35.1.3 Make the drop boards as shown on the drawing – but check the heights on the boat itself. The height relationship between the lower and upper boards can be changed as you wish. The bottoms of the boards and the top of the lower board are bevelled off and the lower board has a rebate piece fitted at its join to the upper board. A lock such as that noted on the plans can be fitted to the upper board, shooting into the underside of the hatch. Normally, barrel bolts are also fitted to the hatch and the upper drop board, so that these items can be independently secured.

35.3 Finishing off.

35.3.1 Go round the whole coachroof and catch the WEST coating inside and out up to two coats. Sand smooth and matt.

35.3.2 Cut the apertures for the portlights and WEST the edges.

35.3.3 Apply two further coats and sand smooth and matt ready to receive final finishes.

SECTION 36 - COCKPIT

36.1 Cockpit carling

36.1.1 The cockpit carling runs from Frame 9 through to the transom. It is 40 x 20, as for the main carling, but there is no bevel, because the deck angle is near enough 10º, the same as the cockpit coaming angle, so the coamings sit square to the deck. The carling sits 9mm further inboard than the main carling.

36.1.2 At the fwd end the carling blades off on to the angled end of the main carling.

36.1.3 At the aft end, the carling will butt on to the fwd face of the transom. We need a notch in the transom beam for it. The inside top corner is 711 out from the centreline.

36.1.4 Get the material out for the carling. Cut the fwd end to blade over the main carling. Lay the carling in the notches in the frames and push the fwd end to lay over the main carling. You may have to cramp the carlings back into the cutouts in the frames.

36.1.5 Make any adjustment necessary so that fwd end fits nicely.

36.1.6 Pull the aft end round so that it hits the 711 mark. Mark the notch in the transom beam. Mark the end of the carling.

36.1.7 Remove the carling, cut the transom beam notch and trim the aft end of the carling.

36.1.8 Bond the carling in place as usual. Repeat on the other side of the boat.

36.2 Lower carlings.

36.2.1 The lower carlings are 30 x 15 with a 10º bevel (about 5mm).

36.2.2 Cut notches for the carlings and the cockpit coamings in Frames 10 and 12. The notches will be 15 + 12 = 27 at the top; the inner face will be square down, which should give a base measurement of 22mm.

36.2.3 On the aft face of Frame 9 we need to fit the 30 x 15 bearer at height 550. This runs between the inside faces of the lower carlings. The offsets and heights given on the cockpit drawings are to the outside top corner of the carlings. So, on Frame 9, the outside top corner of the carling notch is at offset 815. Thus the end of the bearer will be at 800, making the bearer 1600mm long.

36.2.4 Get out the bearer and bond it to the aft face of the frame.

36.2.5 Make and fit a temporary block under the bearer each end to support the bottom of the carling.

36.2.6 At Frame 11, the frame doesn't come up to the carlings, so we need to fit a temporary bearer across the boat, with the notches for the carlings cut in it. A piece of 150 x 25 softwood or similar would be fine for this. Plane the top straight and set it up in the hull resting on the upper stringers, with the top edge at +530. Cut the notches for the carling + coaming at offset 771 + 12 =783.

36.2.7 Set up a similar temporary board at Position -6029, which will be the fwd end of the aft deck. The height is 505 and the notch will be at 689 + 12 = 701.

36.2.8 On the transom, we have a 15mm bearer, similar to that on Frame 9. However, because of the transom angle there is 12mm of bevel on the top of the bearer, so to retain a 30mm depth on the fwd face of the bearer, we need to make it 42mm deep and then bevel 12 off the top face. The offset to the carling top outer corner is 667, so the end of the bearer

will need to be at 652, making the bearer 1304 long. The height is +504.

36.2.9 Get out the bearer and bond it to the transom.

36.2.10 Make and fit a temporary block under the bearer each end to support the bottom of the carling.

36.2.11 Now get the carlings out and bend them into place in the notches, fitting the ends to butt on to the transom and Frame 9.

32.2.12 Make up some 50 x 50 squares of 12mm ply (4 for each side) and cover them in shiny brown parcel tape. Cover the temporary blocks etc. with shiny brown parcel tape.

32.2.13 Bond the carlings in place, with the ply squares slipped in the outsides of the notches to keep the carlings in place. At the fwd and aft ends, drill off for, and drive an 1.5" x 6g screw into the ends of the bearers. Cramp the ends down to the temporary blocks; cramp the carlings down to the bottom of the notches in the temporary Frame 11 and -6029 boards. Pre-drill and drive a 2" x 8g screw carefully down into Frames 10 and 12.

32.2.13 Once the WEST has cured, remove the cramps and tap out the ply squares. Leave the temporary blocks and Frame 11 and -6029 boards for the moment.

32.3 Cockpit side coamings

32.3.1 The offsets and heights of the top inside edge of the coamings are given on the cockpit drawings. Using these heights and adding 12mm for the coaming thickness to the offset, we will set up a temporary support for the outside of the coamings, cramped to the aft faces of the Frames 9, 10 and 12, and the Frame 11 and -6029 temporary boards. These can be pieces of 12mm ply, say 150 wide, or pieces of 150 x 25 softwood planed up. The top of each can either be set accurately to the correct height, or the height can be marked on. The formers will need to be joggled out around the main carlings, so that their inboard faces run flush with the inboard edges of the frames.

32.3.2 The the fwd end the cockpit coamings run up over the deck structure and continue for about 60mm to rebate into a blocking which radiuses back to the coachroof coamings. The blocking fills the tapered gap between the cockpit coamings and the coachroof coamings and finishes flush with the aft face of Frame 9..

32.3.3 At the aft end, the coamings continue under the aft deck to butt on the transom. The coaming tops run about 20 past the fwd end of the sidedeck (at -6029) and then angle down at about 45º

32.3.4 Get out a pattern for the cockpit coamings much as you did for the main coamings. Lay the pattern on the ply, mark and cut the coaming out.

32.3.5 At the fwd end, the coamings will actually blade off on the coachroof coamings, rather than fit right down to the deck structure.

32.3.6 At the aft end you need to cut a 9mm slot for the aft deck to pass through.

32.3.7 Now try the coaming in place and adjust for a good fit along the bottom edge. The trim the top edge to the correct heights.

32.3.8 Measure up for the blocking at the fwd end. Make the blocking and WEST bond into place.

32.3.9 Once you have a good fit, WEST coat the coamings at least one coat before bonding into place.

32.3.10 Remove the temporary bearers and blocks.

32.3.11 Make, fit and bond on the 20 x 15 cleats in way of the frames, running from underside of the carling to the bottom edge of the coamings.

33.4 Cockpit aft coaming

33.4.1 The heights of the underside of the fwd end of the aft deck at -6029 are as follows:

C/line	805
b 100	803
b 200	799
b 300	793
b 400	786
b 500	776
b 600	765
b 700	752
Sheer at offset 730	748

33.4.2 Use the heights to draw out the curve of the aft deck on 12mm ply. Then dummy down 40mm to get the bottom edge of the aft coaming.

33.4.3 Measure up the height from the top of the main carling to the top of the side coamings at -6029. Dummy this height up from the underside of deck line, to give the top edge.

33.4.4 Measure the offsets top and bottom of the coaming between the side coamings. Set these out on the the ply. Cut the coaming out to shape.

33.4.5 Mark out a 20 x 40 beam, top edge to the heights given and bottom edge to match the bottom edge of the coaming. Make the beam; trim the ends to match those of the coaming.

33.4.6 Bond the coaming in place; make sure it is nicely vertical and the the top edge fairs off flush to the side coamings.

33.4.7 Bond the beam on the aft face, flush with the bottom edge.

33.4.8 After the decks and capping are completed, make and fit a 30 x 10 corner post on the aft face, under the capping and running down to sit on top of the deck.

33.5 Coaming capping

33.5.1 The capping is fitted after the side decks are fitted and finished.

33.5.2 There is a 25 wide by 30 deep rebated capping on the coaming tops. This rebates out 12mm x 15mm deep so that it is flush on the inside.

33.5.3 A similar capping sits over the

blocking at the fwd end, but extending in width to blade off on the main coamings.

33.5.4 Aft, the capping mitres to a section of capping running down to sit on to the aft deck.

33.5.5 The capping over the aft coaming checks into the side coaming cappings.

35.6 Cockpit sides

35.6.1 The cockpit side run from Frame 9 through to Frame 12.

35.6.2 You can get these out from the drawing, bevel the bottom edges and bond them in place.

35.6.3 The cleating and filleting schedule is given on the drawings.

35.6.4 To get better access to the area under the cockpit sole, you should cut apertures as shown on ther interior furniture drawing for the Quarterberths.

35.6.5 The sides are fitted with a 30 x 15 carling along their outboard faces, top edges, to take the cockpit seat ply. And there is a further 20 x 15 set of cleats through to the fwd face of Frame 12, at dwl - 10 to take the bunk tops.

35.6.6 The cockpit sides are of structural significance, so they are WEST coated, bonded and filleted as for the other structures.

35.7 Transom stiffeners.

35.7.1 The transom stiffeners are an extension of the cockpit sides aft of Frame 12. They can either run at the same offset as the sides (300mm), or they can be set further outboard (490mm). This really depends on what you want to store in the lazarette (maybe a liferaft?)

35.7.2 Shapes and bevels are given for both version. Whichever you choose, you can get the ply out to the drawing, shape it up, bevel the edges as requires and bond the stiffeners in place.

35.7.3 The filleting schedule is given on the drawing. The stiffeners are of structural significance, so they are WEST coated etc. as for the other structures.

35.8 Cockpit seats.

You should leave fitting the cockpit seats and sole until after the rudder skeg, engine, engine beds, P-bracket, stern tube, fuel tank etc. is installed. You may also want to fit the quarterberth tops before the seats are fitted. Also be sure to catch up all WEST coating in this area as it will become less accessible once the seats and sole are fitted. You can move on to fitting the decks at this stage.

35.8.1 The cockpit seats run from Frame 9 through to the transom. They also form the bridgedeck and the aft seat.

35.8.2 The inner carling has already been bonded to the cockpit sides. We have to add a central stringer, also 30 x 15, running from Frame 9 to the transom. The stringer can house into the bearers on the frame and

transom and sit in notches in the frames.

35.8.3 There is also a 30 x 25 bearer on the aft face of Frame 12 and this can be cut as a notch for the stringer to pass through.

35.8.4 Fit and bond the stringers in place.

35.8.5 Now build the sub-structure and gutters for the lazarette hatch and the bridgedeck hatch, generally as shown on the Cockpit Hatches drawing.

35.8.6 The side gutters in the lazarette hatch slope fwd so the the water runs out into the cockpit well. The athwartships gutters drain into the side gutters.

35.8.7 The bridgedeck gutters are similarly arranged, but drain aft into the well.

35.8.8 WEST coat the gutters thoroughly minimum three coats.

35.8.9 Now get out the ply for the seat tops. This will be in two sections joining on the centreline.

35.8.10 Fit the outboard edge, bevelled to make a nice fit against the coamings, and against the transom. Then, mark and cut out the hatch apertures. Mark and cut out the edges around the cockpit well.

35.8.11 To drain the seats etc. we need four slots through the transom. These can be 35mm long and 20mm high, one in each outboard corner and one in each inboard corner each side of the sternpost. WEST around the slots really well.

35.8.12 WEST coat the underside of the seats three coats; WEST coat all the sub-structures. Bond the top in place.

35.8.13 Clean off the edges around the cockpit well and hatch apertures. Fill any gaps etc. against the coamings, frame and transom with WEST/silica. Sand smooth and WEST coat three coats minimum; sand smooth and matt for final finishes.

35.9 Cockpit sole and drains.

35.9.1 Fit the carlings, bearers and central stringer as shown on the cockpit drawings.

35.9.2 The cockpit drains run to seacocks through the hull each side, in the space between the hog and the cockpit sides, close up to Frame 12.

35.9.3 The seacocks should be 38mm (1.5"). We much prefer the bronze cone and lever type (like Blakes) to the threaded skin fitting + gate valve or ball valve type.

35.9.4 Mount the seacocks on 12mm pads to fit between the hog and the cockpit sides. Angle the seacocks so that the port seacock will drain the stbd cockpit drain and the stbd seacock will drain the port cockpit drain. In this way, with crossed drains, the cockpit will not tend to flood when heeled. West the pad well and WEST around the hole in the hull. Fit the seacocks on good quality bedding (Sikaflex polysulphide or similar). We absolutely do not need strainer grills over drain seacocks.

35.9.5 The drain fittings through the

cockpit sole can be good quality plastic, nylon or bronze. They can have an integral hose tail. They are best without a grate (strainer), or at best a simple cross bar - not a fine grate which will prevent cockpit water draining away as quickly as possible.

35.9.6 Drain hoses should be 38mm ID, good quality nylon spiral reinforced plastic hose, secured with two stainless steel hose clips top and bottom. Don't skimp on the quality of the drains and seacocks.

35.9.7 Get out the ply for the sole and adjust for a good fit all round.

35.9.8 WEST the underside three coats minimum. WEST all the sub-structures. Bond the sole in place. Fill andy gaps to the cockpit sides etc. with WEST/silica.

35.9.9 WEST the top three coats and sand smooth and matt to receive final finishes.

35.10 Hatches and finishing off.

35.10.1 Hatches should be watertight and secure against falling off should the vessel invert, or suffer a knock down.

35.10.2 Make up and complete the bridgedeck hatch and the lazarette hatch, generally as the drawings. Note that the hatches have stiffeners, plus drip strips.

35.10.3 The lazarette hatch is hinged on the aft edge and secured with toggle fasteners on the fwd edge. It has rubber D-section set in grooves on the underside, to make as watertight a seal as possible with the tops of the gutters.

35.10.4 The bridgedeck hatch is similarly constructed, and is secured by toggle fasteners from the inside.

SECTION 36 - DECKS

36.1 Foredeck.

36.1.1 The foredeck comes out of a single sheet of 9mm ply laid with the face veneer grain running athwartships. The aft edge of the sheet butts on to the fwd face of Frame 2. The fwd edge of the sheet finishes part way along the breasthook. You will need to add a small extra piece to run fwd to the bow,

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

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

36.1.4 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.

36.1.5 Measure the foredeck width at the fwd face of Frame 2 and get out a piece of ply about 20mm longer than this.

36.1.6 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.

36.1.7 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.

36.1.8 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.

36.1.9 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. Cut the hole for the sampson post.

36.1.10 In way of the forehatch aperture, just drill a (say Ø10) hole accurately in each corner to use a 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.

36.1.11 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.

36.1.12 No fastenings are necessary structurally but it will probably be easier to use some screws to hold the ply down while the WEST cures. Bore off for these dry (before 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.

36.1.13 Bond the foredeck in place.

36.1.14 Get out the small section that runs through to the bow and bond this in place.

36.1.15 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.

36.2 Side and aft decks

36.2.1 The side deck ply is fitted in much the same way as the foredeck ply, but the face veneer grain runs approximately fore-&-aft.

36.2.2 Fit the inner edge first by cramping the ply on the deck and dummy stick the shape of the coamings.

36.2.3 Cut to the curved line and under-

bevel (if anything more under-bevel than is needed so that the top corner is a tight fit. Temporarily nail or screw the ply in place and mark off the outer hull edge. Cut the outer edge, leaving the ply about 3mm big.

36.2.4 Bond and screw fasten (as for the foredeck) the ply into place, pre-coating the underside as before.

36.2.5 Joins from one deck sheet to the next can be butts (butt strap 100mm wide by 9mm thick) or scarphs.

36.2.6 The decks fit up to the cockpit coamings in the same way as the coachroof coamings except that the bevel is reversed because the cockpit coamings lean outwards. Again, arrange the bevel so that the top corner is a tight fit.

36.2.6 The aft deck is best fitted using the length of the sheet across the boat so that there is no centreline join - it is very difficult to get a centreline join to lay with a fair curve; it tends to produce a 'peak' along the join. The only complication with the aft deck is that it slots around or into the cockpit side coamings, otherwise it is fitted in just the same way as the remainder of the decking. If the slot around the coamings is rather a loose fit, it can be filled with WEST filler.

36.3 Finishing off.

36.3.1 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.

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

36.3.3 Sand over the deck surface and WEST coat. Then WEST fill all fastening holes etc. Along the edges WEST fill any voids in the ply and WEST coat very thoroughly.

36.3.4 In the second coat of WEST incorporate a layer of woven glass cloth. The glass should be taken up the coachroof and cockpit coamings about 25mm and finished off with a little half-round beading (about 12mm x 6mm) pinned and glued on, to match that on the coachroof top. This makes a good finish with a decided finish line between the deck paint and the coaming coating (which may be clear). The outboard edge of the glass turns down the hull to finish at the underside of the rubbing strake (see Deck Bits drawing). Along the transom, the glass finishes flush with the hull (there is no rubbing strake).

36.3.4 Apply two further coats of WEST and sand for final finishes.

36.4 Toe-rail.

36.4.1 Refer to the Deck Bits for details of the toe-rail and the Deck Plan the placement of the sections.

36.4.2 Get the toe-rail lengths out (a bit

over-length) and sand them up.

36.4.3 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.

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

36.4.5 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.

36.4.6 Fastenings are 3" x 10g stainless c/sunk head screws. Depending on the position on the boat you will need to steve (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 15mm 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.

36.4.7 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.

36.4.8 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 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.

36.4.9 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.

36.4.10 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.

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

36.5 Taffrail.

36.5.1 The taffrail is 20 x 50, screwed flat

across the aft deck. The aft edge is bevelled to match the transom angle. The top corners are radiused off. The ends finish 12mm in from the topsides.

36.5.2 Get the taffrail out.

36.5.3 Bend the taffrail over the transom and deck and bore off for fastenings (at about 250mm centres).

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

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

END