

THE WESTERN SKIFF FREE PLANS – BUILDING INSTRUCTIONS

These plans and instructions were created from a kit designed by Nigel Irens and Ed Burnett and sold through Classic Boat in the late 1990s (a series of articles about that project was published in the May-September 1997 issues of Classic Boat). No plans for the boat were available at that time, and when the kit stopped production after a couple of years, the boat was simply unavailable – and so it remained for 20 years.

The idea of making the plans available was concocted by yachting journalist Nic Compton and PBO editor Rob Melotti, with the blessing of Nigel Irens. The job of converting the CNC drawings into templates for amateur construction fell to naval architect Jack Gifford. There are a lot of differences between the requirements for a kit and a set of plans – notably, for example, bevelling the thwarts, which were all supplied pre-cut with the original kit – which we have addressed to the best of our abilities. We see this project as an on-going process, however, and if any builders out there find better ways of doing things (or better ways of explaining things!) then we'd be more than happy to incorporate them in future editions of the plans and/or instructions. We will also in due course be adding photos to these instructions, so you might want to check whether this has been done before you start building, and get the updated version.

These instructions do not include details of the rig which, at the designer's request, is being left open to the builder to develop. The idea is to encourage different approaches to rigging the boat, which can eventually be tested against each other. If enough boats are built, it might prove worthwhile to have an annual gathering where builders and owners can row and sail together and compare notes.

If, after looking at the plans and reading these instructions, you decide building a boat from plans isn't for you, we'd strongly recommend looking at the kit version of the boat (which requires a different set of instructions) offered by Jordan Boats (jordanboats.co.uk). For not much more than the cost of the plywood, he can supply all the plywood components pre-cut, with a big saving in time – and stress! You can follow the first boat being built from a Jordan kit in PBO from the May 2019 issue onwards.

Either way, happy building, and we look forward to seeing you on the water with your skiff!

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1. INTRODUCTION

1.1 These instructions

For those of you with some boat building experience, these instructions will undoubtedly provide more information than you need. You may even choose to ignore the suggestions and build the boat in a different manner. For those people with less or no experience, we hope the instructions will guide you through the building process and make it all as straightforward as possible.

Before you start a job, we would recommend that you read the relevant section, and gain an understanding of what you are going to be doing.

1.2 Planning and managing the project

Where possible we have included information on how long a task is likely to take, and whether or not you will need help. In most cases a helping hand will speed the process as well as giving you someone to talk to.

There are a few tasks which may seem to go on forever, the worst of these is filleting the inside seams of the boat. With a job like this, which is purely a matter of person-hours, as it were, the best course of action is to recruit a few friends and tackle the job as a team.

You do not necessarily have to build the boat in the sequence of these instructions. If you find one particular job is bogging you down, it is sometimes best to do something else for a while to get things moving again. You may also have a particularly enthusiastic helper who wants to get on with something on their own. The following is a list of jobs that can be done at any time before the items in question are needed.

Gluing up units for fitting out (section 8.1)

Assembling the rudder and centreboard (section 9), although you will not be able to hang the rudder until later.

Any of these tasks will provide a change and they all have to be done at some stage anyway.

2. GENERAL PROCEDURES AND PREPARATION

2.1 Using the epoxy resin

In practical terms, the epoxy resin is one of the key ingredients that allows many kit boats to be assembled with success. It's ease of use and gap filling properties make it exceptionally tolerant of kit boats and kit builders.

At a rough estimate, 6 litres of epoxy resin (plus associated hardener and fillers) should get you through the project. The original kit came with WEST 105 epoxy and 205 hardener and stated: "If you are very economical with the epoxy, you may find the big cans (which the pumps fit on), and one set of the smaller cans contain enough to do the whole boat."

Use the calibrated pumps without fail, whatever epoxy system you choose to go with. References in these instructions to one 'pump', or three 'pumps' is referring to WEST 105. 'Neat' epoxy or 'raw epoxy' always means a mix of hardener *and* epoxy.

Use filler to create thickened epoxy for gap filling. Different manufacturers recommend different combinations of fillers for fairing as opposed to structural gluing elements. There's an excellent video on the topic of mixing consistencies, at <https://youtu.be/6-DxqdvSjcU> and the WEST user manual and product guide is available at: www.westsystem.com/instruction-manuals/user-manual-product-guide/

Set up all the epoxy jugs, filler and tools in a quiet corner. Mixing glue and filler should be a methodical, production line process.

When measuring out the resin and hardener, adopt a 'one pump of resin - one pump of hardener' approach. This will help you to avoid losing count of the number of pumps you have used.

The pumps may lose their prime after sitting idle for more than a day or so. Do some little short pumps into a waste jug to make sure the glue is dispensing evenly.

Putting in one more pump of hardener 'just to make sure' is not a good idea. The hardener is not a catalyst like polyester resins, it 'links up' chemically with the resin so if there is too much of one or the other, the mix will not cure properly.

Try not to mix up more than four pumps at a time. If there is a large amount, the mixed epoxy may start to heat itself up and turn into a steaming lump before you know what is going on. If it starts to do this, do not try to salvage the job by spooning it on as a jelly. Put that pot outside (the fumes it gives off are very nasty) and mix up some more. When doing a big mix up for coating, use the roller tray so the glue has a large surface area and stays cool.

Change your gloves from time to time during long gluing operations. A fresh set will stop you sticking to everything.

Spare cured glue can be broken out of the mixing pots so they can be used again.

Brushes and other tools can be cleaned up with vinegar. Dry them out well before using them for epoxy again.

Old credit cards or reward cards make excellent squeegees

If it is a bit chilly in your workshop, playing a hair dryer on the epoxy will thin it and help you to work it into small gaps. Don't get carried away with this, if the epoxy starts to bubble you are getting it too hot.

The hair dryer will also help to clean up cured dribbles. The heat makes the cured epoxy go rubbery and it can be cut more easily with a knife or chisel. Again, take it easy, you do not want to weaken it to the point where the boat starts falling apart.

At all times be clean and tidy. The resin and hardener are not pleasant substances. Don't get them on you, and if you do, wash them off quickly. Try to minimise accumulations of goo on top of the pumps. Once you start to lose control of the mess, it won't be long before everything in your house has a sticky coating.

2.2 Printing the plans and cutting the parts

The general procedure for converting the plans into parts is as follows:

Send the files to be printed on sheets of A0. Your local print shop should be able to do this or, as ever, you can probably get it done cheaper online.

You can specify black and white (cheaper than colour). Ask for highest contrast.

Unpack the prints as received from your printer. You should have 39 individual sheets of A0 paper.

Join together the individual sheets by matching the corresponding numbers in each corner and aligning the dotted lines and target shapes.

The sheets should be joined up in two 15-page sets: pages 1-15 & 16-30 (3 rows of 5 pages each). The final set is smaller: pages 31-39 and covers the timber parts, the quarter sheet of 12mm ply and the half sheet of 6mm.

Divide the large sheets into templates by cutting along the 'plywood lines' (the solid lines).

Affix the templates directly onto plywood/MDF sheets, aligning the edges and you are ready to cut the parts. PLEASE NOTE: We recommend you do NOT cut the planking out at this stage. Cut the triangular 'finger' joints (and circular tabs) and glue the boards together a pair at a time (see section 3) BEFORE cutting the rest of the plank sides and ends out.

Make sure the sheets are on the correct thickness of plywood/MDF (there are four thickness, specified on the templates). And remember to transfer the extra lines marked on the plans to the planking, the transom, bottom panel (centreboard slot), rudder and other parts as these will be essential in helping you align joints and build accurately down the line.

Ignore the sharp 180° 'hook' curves and tiny circle shapes that appear either side of a break in an otherwise straight edge, or lines. These are CNC cutting guides.

The major solid timber parts needed to build the boat (the keel, thwarts and various trim sections) are all on the final set of pages. There are other minor timber trim parts required as well - specified in the instructions. Use whatever wood you fancy, depending on your budget and what's available. We suggest one-inch thick Douglas fir (also known as Oregon pine). Whatever it is, make sure it's well seasoned (ie dry) otherwise it will 'move' against the plywood and damage the joints. Note: you will need two of the thwarts (parts T4 & T6) cut before any of the other timber parts.

2.3 Labelling the parts - approx 1.5 hours

Each part has a numeric code.

The separate set of pdfs called 'A0 Kit rev3-Summary.pdf' show the code for each part and their positions in the boards.

Use a permanent marker or a soft pencil to mark the codes/names onto the parts.

3. SCARFING THE PLANKS

3.1 Tools and equipment.

The planks are the longitudinal boards that make up the sides of the hull. There are four per side (each divided into a fore and aft section). In this operation you are going to join the fore and aft sections together in batches, rather than cutting each one out individually first.

There should be four sheets of 6mm plywood that make up the 8 planks. Join the sheets together in pairs, so you are left with two 16ft x 4ft sheets from which you can break out the planks themselves. You can join the planks individually if you like, but doing them in batches like this ensures they are correctly aligned – and is faster too!

To do the job you will need to clear a relatively flat space, large enough to lay two sheets of plywood end to end, with a bit of room left around them to move about. The joined boards will have to lie undisturbed for at least eight hours so bear this in mind when picking a spot.

Eventually, the joints will be sandwiched between two flat boards, ideally these should be about 5ft x 3ft. If you can not find anything suitable, break out a couple of pieces of the jig and use them.

The joints are self locating, however you will need to weigh down the boards when they are glued up. About one persons' worth is enough. We used a couple of tool boxes and gas cylinders.

3.2 Preparation. - 1.5 hours

Having cleared the necessary space, lay down one of the sandwich boards (or jig piece) and cover this with a length of plastic sheeting. This will stop the planks becoming stuck to the sandwich board or floor. Cut two more pieces of plastic sheet for use later.

Now pair up the planking boards and arrange them so the puzzle joints will fit. Carefully cut the tabs and remove the protective ends from the boards, exposing the finger and puzzle joints.

3.3 Gluing up - 1.5 hours

This is the first and one of the most important gluing up jobs on the boat. There is no reason why you should not get it right first time but if you have not yet read the introduction section on using the epoxy please do so now.

We had no trouble gluing up both sets of boards in one go. If you do not want to take this on and are in no hurry, you can do one set now and come back for the other tomorrow. If you are really nervous, you can practice by joining the protective end pieces you broke off the boards.

Before you mix any glue, have a dry run and check the boards fit together easily. You may also find that you need to support the boards a little way away from the joint itself for all the fingers to lie flat. Leave the joint disassembled but ready to be fitted together once the glue is applied.

Mix up two pumps of glue with no filler. Using a brush, coat the edges of both boards where they join with glue. Now assemble the joint, making sure the sandwich board and plastic sheet are under the joint and not creased.

Next, add two more pumps of glue and filler to make a 'mayonnaise' mix. With a credit card or similar item, spread the mix over the joint area, pressing it down into the joint itself. Pressing down on and then releasing the boards will help work the glue down into the gaps. Scrape off the glue that is still on the surface but be careful not to drag it out of the joint.

Although ideally there would be no irregularities in the glue, there will inevitably be some. Do not worry as there are plenty of opportunities to fill them later. That said, you should not be able to see clear through the joint at any point.

When you are happy with the glue, lay on one of the sheets of plastic you have ready and repeat the process for the second set of planking, laying this second set on top of the first. The joints should be more or less on top of each other.

Once this is done, lay on the third sheet of plastic and then the other sandwich board. Pile all the weights on top and that's it.

The bottom panel (in two halves both labelled 'B' in the 9mm ply) is glued in exactly the same way once it is broken out of the board. This joint is self locating and does not need so much room! It also needs less glue. Mix up two pumps worth and coat the edges, then add the filler to what is left and smear it on as you did for the other planking. Pile a bit of weight on top to make sure it is kept flat.

3.4 Cutting out the planks - 3 hours

The glue should now be cured well enough to cut out the planks and move on to the next job. Although the planks can be left in the board until you need them, the boards are now rather unwieldy and the joints are not very strong bending across the board. To avoid any problems, it is a good idea to cut out the planks now and store them out of the way until later.

At some point before the planks are hung on the boat, you will need to clean the excess glue off the surfaces. Use a sanding machine if you have one or a sanding block if you do not. You will also need to fair the plank edges where the tabs were. A rasp or sanding block is fine for this, be careful not to take off too much.

Stack the planks out of the way, preferably flat.

4. SETTING UP THE JIG - approx. 1 hour

This is a fun job that takes no time at all. You can do it easily enough with one person but it is helpful to have a spare pair of hands. If you have not labelled the items in the board it might take a while to find out which bits fit together!

Cut the pieces of the jig out of the MDF boards and pair them up so the puzzle joints fit together. JT1 & 2 make up the top board; JB1 & 2 are the bottom board; JS1 & 2 (twice) are the side boards.

Cut two dozen wedges from the excess MDF.

Start by fitting together the puzzle joint of JB1 and JB2. Then pull the assembled length up on its edge and fit the side piece JS2 over the lugs. Insert the wedges in the holes but do not tighten them up yet. Next fit the forward end of the same side (JS1), fitting together the puzzle joint as you do so, and wedge it loosely in place.

Now flip the assembly over and fit the other side (also JS1 & JS2), then stand it up on the triangular bits. Fit the top pieces (JT1 & JT2) and wedge it on.

Finally go round and tighten up all the wedges with a hammer or mallet. You can hit them pretty hard but don't do more than is necessary to make the assembly rigid, they can be broken!

It is easiest to build the boat with the jig set up on some trestles. Ideally these want to be a little above knee height. Three is best, two is O.K. The jig does not need to be set

up perfectly level, but should be stable and secure. The triangular bits should point upwards.

5. SETTING UP THE THWARTS AND FRAMES

5.1 Fixing the thwarts to the jig - 0.5 hours

Among the timber items, you will find the four boards (T2, T3, T4 & T6) that become the thwarts (seats). The shortest one also has a hole for the mast. For now, you only need two (T6 & T4 – the longest and the one with the notch cut into it); the other two are fitted when you have taken the boat off the jig and turned it over.

You will need to bevel the ends of these two thwarts to match the curve of the hull. To do this, temporarily slot the corresponding frame (F2 for T4 and F3 for T6) and transfer the angle of the frame on each side at the point it meets the thwart. The approximate line to cut to is also shown on the patterns – transfer that line to the underside of the thwart and bevel the end accordingly. But best check it on the frame itself, and cut more off rather than less. It's better for the thwarts to end up a little bit short, which can easily be filled with epoxy, than too long, in which case they will interfere with the run of the planks.

On the upper edges of the jig sides, you will see two pairs of lugs. One pair is either side of the puzzle joint in the top flat piece, the other is half way between there and the front of the jig. The thwarts sit between the lugs and are wedged in place (we will set up the frames on the thwarts later). The longest thwart goes between the aft pair of lugs (over the puzzle joint), and the shorter one between the forward pair. The forward edges of the thwarts should be hard up against the forward lugs, with the wedges going against the aft edge. The cut out in the edge of the forward thwart should be facing aft.

Remember, the boat is upside down at this stage. Make sure the angles at the end of the thwarts match the shape of the upside down hull.

5.2 Fixing the frames and transom to the jig -0.5 hours

Cut the frames and transom out of the 15mm ply board.

The forward and aft frames and the transom (parts F1, F4 and FT) get screwed to the jig, the two middle frames (F2 and F3) get mounted onto the thwarts you have just set up.

Use three or four 25mm x size 8 screws to mount the forward frame (F1) against the triangular upstands at the forward end of the jig. It should sit down on the projecting pieces of the jig sides. Make sure it is central when you drill the holes.

The same thing happens at the other end with the aft frame (F4). Make sure it is central.

You may have noticed that there is still one small rectangular piece still left in the MDF board. This helps to locate the transom on the end of the Jig. Cut it out and screw it to the face of the transom inside the marks drawn on the template. It only needs a couple of screws. This bit now plugs into the square hole that is made by the end of the jig, and will locate the transom in the right place. Screw through the transom into the end of the jig.

5.3 Mounting the central frames on the thwarts -0.5 hours

The two midships frames slot down onto the thwarts that are mounted on the jig. They then get epoxied into place. It is worthwhile having a final check that the thwarts are the right way up before you glue on the frames. It is also a good idea to clean and round off the inside edges of the frames, as they will be hard to get at later on.

Fit the frames down into the slots in the thwarts. Similarly to the plank joints, they do not fit tightly and you will be squeezing glue down into the gaps. To stop it all dribbling out the bottom, stick some masking tape around underneath the gaps and over the end of the thwarts.

Mix up a couple of pumps of glue and prime the inside of the joints (just sort of squidge the brush down in there). Then add some filler to peanut butter consistency and force it down into the gaps. Now you can practice your filleting technique (you may need to mix up a bit more glue to do all four joints). These bits will not be seen when the boat is finished so it is as good a place as any for learning.

5.4 Setting up the apron

The apron (part B2) is the inner piece of the bow. This hooks over the top of the forward frame and sits in the notch in the forward end of the jig. We put a strap of masking tape over to hold it into the notch.

6 BOTTOM PANEL AND GARBOARDS

6.1 Fitting the bottom panel - 0.75 hours

If you have not done so already, clean the excess glue off the scarf area. If you are planning to fit a centreboard, you can cut the slot marked on the template now – or leave it until later if you prefer. Note the centreboard is not on the centreline: it is offset to enable the keel to be centred beneath the boat.

The bottom panel should sit in the recesses in the tops of the frames, with its narrow end fitted up to the shoulder in the apron. Its aft end will run past the transom for you to trim off later. Before you fasten it in place, check that the slot for the centreboard (if cut) is on the same side as that in the forward thwart. If it is not, turn the bottom panel over. If you get it the wrong way up, you may find yourself with an interesting centreboard installation.

Screw through the board into the apron, frames and transom. Start at the forward tip and work your way aft, bending the board down as you go. Use one screw through the end of the board into the apron and two screws for each frame and the transom, about

25mm in from the edge of the board is fine. No glue is needed at this stage, you will be filleting on the inside when all the planks are on.

When drilling for these screws, note that you cannot drill square through the plank, you have to drill straight into the edge of the frame or transom. When the screw is in, you want the head to be just below the surface of the plywood. It might take a bit of practice to get the countersink depth right. If your screw comes out the side of the frame, have another go with a new hole next to the first one. The odd mistake of this sort is O.K, you can fill the dead holes later. Do not put the screws in too tight at this stage.

6.2 Fitting the garboards - 2 hours

The garboards or lowest planks, are the hardest of the lot to fit but providing you are methodical and patient they should not be too much trouble. We tried several ways of going about the job with the prototype and settled on this as the best one. Throughout the planking operation be careful and subtle, no great force is needed anywhere. Have faith, they will fit!

Assuming the garboards (P1P & P1S) are cleaned up and ready to go, pick the side you want to start with and lay it on top of the bottom board. The rounded pointy end goes forward, the edge with the long notch cut in it is the lower one with the boat set up the way it is (ie upside down).

Just to see how it will go, you can hold it against the boat in the middle and wrap it around the frames. It sits in the notch cut into the frames and should fit (more or less) neatly against the bottom board. You will not be able to twist the very front end into the apron from where you are standing, that is the tricky bit. In doing this you will see how the curved shape of the plank wraps nicely around the hull, and you can get an idea of why boats are not planked with parallel sided, straight boards.

O.K, if you are of a nervous disposition, or in a bad mood, stop and have a cup of tea and compose yourself now. You are going to start at the forward end of the plank, and do the nasty twisty bit first.

If you look at the upper edge of the plank at its forward end, you will see one of the vertical marks transferred from the template, where the gentle curve coming along the edge of the plank joins the tighter curve where the plank will fit against the apron. With the plank resting in the frame notches, line this mark up with the end of the bottom panel (where it fits against the shoulder in the apron). There should be two more vertical marks where the plank sits against the first two frames. If these do not line up perfectly do not worry, the important one is the first one nearest the tip.

The first screw should go through the upper edge of the plank (about 25mm down from the edge) into the bow frame. Remember to drill the hole straight into the frame, *not* square to the plank surface.

The next screw goes through the bottom edge of the plank into the bow frame. Before you drill for this one, make sure the plank is aimed straight down the boat by checking it is sitting correctly in the notches of the next few frames back. If you like,

you can clamp the plank to the frame to save you having to hold it by hand as you check the way it is lined up.

Now you can twist the end of the plank into the apron. You can just about hold it by hand but it is more relaxing to clamp it there. It is a bit tricky grabbing the apron without the clamp sliding off, but you should be able to make it stay there. Be gentle with the clamp, use just enough pressure to hold the plank into the apron. The plank will start by lying alongside the apron near the end of the bottom board, but will ride up over it further down. It might look a bit odd at the moment but once it is trimmed and filled it will be fine.

Pop in a screw through the end of the plank, near the lower edge, aim to go into the apron about 10 - 20mm back from its forward face. Put another screw into the apron near where the bottom panel ends, be careful not to hit the screw that holds in the tip of the bottom panel.

Now work your way aft, bending the plank down over the frames and screwing it into them. Two screws per frame, again about 25mm in from the edges of the plank. Be extra careful when you get to the transom that you drill the holes at the right angle. It is very easy to come out the side.

When fitting any of the planks, do not tighten up the screws fully. Because of the way the planks wrap around the boat, they come into the apron and across the frames at an angle. If you take a look at the plank from inside the boat, you will see it fits tightly against one edge of the frame, but that there is a gap between it and the other edge. If you were building the boat by a more traditional method, you would cut the frames out with angled edges (bevels) so the planks rested flat against them. We've gone for a simplified approach, so we have to live with the gaps for now and fill them with glue later. If you wind the screws in tight, you start to pull the plank in flat against the square edge of the frame, which distorts the way it bends around the hull.

Once the first garboard is fitted, swap sides and fit the other one in exactly the same way. Be careful not to hit the screws you put in for the first one when you are drilling into the apron.

Now stand back and take a look at the joint between the garboards and the bottom board. You will see that it is rather wavy, and generally does not look that good. Before you glue this seam, you need to tie the plank edges together to even out the waves. This is done using plastic cable ties.

Drill pairs of holes in the plank edges and stitch them together wherever they are needed. You may need one every few inches at the forward end but should get away with less at the aft end. The holes should be about 10 - 15mm in from the edges of the planks. Aim to get the two plank edges neatly meeting the edges of the bottom board. The odd gap here and there is O.K, small "billows" in the edges can be faired out but do the best you can.

When the edges are tied together, have another look at the planks where they pass over the frames and where they are screwed to the apron and transom. If it looks like the screws are distorting the planks, ease them out a little. This is most likely to be a

problem at the ends. Look along the plank at the forward and aft ends, if it looks like it is pinched in, ease the screws a little. You only have to have the plank touching the edge of the transom and apron.

6.3 Gluing up -0.75 hours

When you are happy that the plank edges are fair, crawl underneath the boat and apply masking tape to the back of the seams. This is a rather awkward job but it is infinitely more pleasurable than cleaning up glue dribbles later on. Do not forget to remove the tape when the glue has cured. If you leave it on for more than a couple of days, it becomes more tenacious and can be a pain to remove. A hair dryer will help a lot if this happens, but don't get the epoxy too hot.

This gluing operation is essentially the same as any other. First mix up some raw resin (start with 3 pumps) and prime the seams, then add another 3 pumps and some filler and fill the seams flush with the plank surfaces. It is a good idea to get a bit of glue into the joints at the ends of the planks, this has to be done from under the boat. There are big "V" shaped gaps between the plank and the transom and the plank and the apron. You do not need to fill these completely, or particularly neatly, just try to get a bit into the bottom of the "V" to help the screws. While you are at it, fill over the screw heads and any dead screw holes.

You will probably not be able to fill the seams perfectly the first time around. When you come back in a few hours time there will inevitably be gaps and hollows in the resin. This is not a problem, the planks will be stuck together well enough for you to remove the stitches and start getting ready for the glass cloth.

6.4 Preparing the hull for glass cloth - 1.5 hours

The glass cloth gets applied over the bottom board and the garboards and helps protect them if you drag the boat up the beach. It has to be laid onto a reasonably smooth and even surface. A bit of extra trouble in preparing the planks now will save a lot of bother when you come to lay the cloth.

First of all, trim off the ends of the planks where they overlap the transom and the apron. Then sand the ends so they are flush with the surface of the transom. (A sanding block will help a lot). At the bow, you want to end up with the planks finished flush with the forward face of the apron. Some places will need a bit of filling to achieve this. You may be able to remove some of the plastic cable tie 'stitches', those that will not come out should be cut off flush with the surface and filled around. It is better to have one filling session and fill up any voids in the seams and flush off the screw holes while you are at it.

When the filler is dry, go over the planks and bottom with some 50 grit sandpaper. Smooth off the filler in the seams and round the edges a little so the cloth does not have to go around any sharp corners. Do not round the lower edges of the planks or the aft edge where they stop flush with the transom. You are going to let the cloth run over these edges and trim it off neatly later. Make sure there are no splinters or raised screw heads sticking up which could snag the cloth.

6.5 Laying the glass cloth -1 hour

This is not the most pleasant of tasks but is worth doing so grin and bear it and it will soon be done. Always handle the glass cloth with care, it is easy to disturb the weave if it gets snagged on something. When you need to cut the cloth, use a sharp pair of scissors. Do not try to push the scissors through the cloth, cut slowly and pull back slightly as you do so. Before you get the cloth out of the bag, dust off the boat, yourself and the area where you are working.

There are three stages to laying the glass cloth;

Lay the cloth on dry and cut it to fit

Apply the resin to the hull

Lay the cloth into the resin and smooth it all out

Lay the cloth starting from the stern. Leave a few inches overhanging the aft edge of the planks and unroll the cloth forwards. The cloth is just wide enough to go over all three planks. Run it over the front and down the apron. Trim it to length a few inches beyond the lower end of the garboards.

This particular type of cloth drapes easily over the shape of the boat however you will need to cut a small dart in the end to get it to lie nicely over the apron. There is no need to cut a full triangular dart, just make an incision up to the point where the apron starts to straighten out into the bottom and overlap the cloth lower down. There is no need to trim the edges of the cloth to the edges of the planks. If you do this it is guaranteed that the cloth will never fit again once you have taken it off! Trim around leaving at least a couple of inches hanging over the edge.

Now fold / roll the cloth up again from forward as neatly as you can and lay it to one side. Before you roll from the forward end, fold the sides up over the bottom board. This makes it easier to position the cloth in the resin later. Try to place the roll in such a way that you can remember how it goes back on.

Now give the hull a final dust off and lay out the tools for the next stages. Once you have mixed the glue up, you need to work reasonably quickly to get the job done before the epoxy starts to cure. There is no need to rush but you do not want to have to go and search for tools. You will need a roller for applying the epoxy to the planks, and a squeegee for smoothing the cloth into the resin and driving out air bubbles. Have the epoxy jugs, mixing pots and stirring sticks to hand. As soon as your gloves start to get gunged up, change them for a new pair or pretty soon everything will be covered in goop.

As mentioned above, you are going to roll a reasonably thick coat of resin onto the boat and then lay the glass cloth into it. The coating will take quite a few pumps of epoxy. Mix up batches of three pumps at a time and roll them onto the planks and bottom. Try to get it as even as you can but do not waste time getting it perfect.

Now put the roller aside and change your gloves before reaching for the cloth. Once the cloth is laid in the resin it is pretty hard to move it around so unroll it very

carefully over the hull. Unroll it over the full length and position it as well as you can before unfolding the sides.

By the time you have the cloth unrolled, the first bits will be starting to soak up the resin. It is very easy to see where the cloth is saturated. Using a squeegee, gently smooth the cloth down into the resin. It takes a little while for the cloth to absorb the resin so work over the hull fairly quickly and come back to the bits that still look white. You want to end up with all the cloth looking clear and flat, with no wrinkles or bumps. Methodically smooth out any air pockets to the edge. You may find that the cloth gets “massaged” around a bit, try to avoid this by not working too hard in one area.

There may be patches that still look white after you have worked them over. You can apply more resin on top of the cloth but do not use the roller as this tends to pull up the cloth behind it. If you find a puddle of resin, spread it out over the surrounding area. Ideally, the cloth will be saturated but you should still be able to see the weave. That said, it is better to have the odd puddle than a dry patch. Small areas of trapped air can occur under saturated cloth, these are harder to spot than dry cloth but work out as many as you can find. It can take up to half an hour to get it all evened out depending on how well you laid it down in the first place.

There will come a point where fussing with it does no more good. Peel off your gloves, walk away and leave the mess until the glue has cured.

6.6 Trimming the cloth 0.5 hours

When the resin is cured, you can trim the cloth off neatly flush with the edges of the planks. If there are any spiky bits of epoxy sticking up, clean them off with a bit of sandpaper.

7. PLANKING

7.1 Hanging the remaining planks - 0.5 hours per plank

The remaining planking is easier to fit than the garboards were, but follows a similar sequence. From now on, the planks do not meet edge to edge, but overlap each other. This leaves a “V” shaped seam which you are going to fill with glue when they are all on. All the remaining planks are fitted with no glue, this makes doing a great deal easier and less messy. When they are all hung, you are going to have a big filleting session to stick the boat together

Work your way down, alternating sides. Do not plank all of one side and then the other or you might end up with an asymmetric boat.

Each plank will take about half an hour to fit. The prototype planking was hung by myself, working alone, but a helper will make it easier. The basic sequence for hanging a plank is as follows:

Find the plank you need (P2P or P2S) and line up the vertical line transferred from the template with the forward frame (F2).

Sit the plank down in the notches in the frames at the forward end of the boat. You may need to elevate the aft end a bit (by helper, string or clamp) to get it to lie in properly.

The first screw goes through the top edge of the plank (25mm in), into the forward frame. Check the plank alignment by trial wrapping it around to the transom and apron, then screw through the bottom edge into the forward frame. Don't forget to screw straight into the edge of the frame.

Hold or clamp the plank into the apron and screw it into the bow frame, then the apron itself. The long notch in the bottom edge of the plank above allows the planks to finish flush at the apron. Fit the planks up reasonably tight edge to edge at the apron. As you work your way down, try to ensure that the forward ends of the planks on either side are finishing up at the same level.

Now wrap the plank around the aft frames and work your way back, screwing into the frames and finally the transom. Watch the funny screw angle into the transom, it gets easier as you go down.

Before you hang the first plank (which overlaps the garboard) run a bit of sandpaper over the edge of the glass cloth so the epoxy fillet will stick.

If the planks do not want to lie evenly in the notches, do not try to force them. If you do, you will notice that one of the edges starts to bulge out. It is difficult to cure this once the plank is fully fitted, so if it starts happening, back out the screws in reverse order and realign the plank. Drill new screw holes next to the old ones if you have to.

Apart from at the transom, there are no notches for the last plank (P4, the sheerstrake) to sit in. You can see how high it goes at the apron because the edge fits against the plank before, but for the mid part of the boat you have to line its bottom edge up with the ends of the frames. Do not worry if this does not happen perfectly, the most important thing is to have the plank sitting happily without any bulging edges.

It so happens that the planks get easier to hang as you go down. Like a lot of things with boat building or similar pursuits, just as you are getting the hang of a job, it's finished.

When all the planks are fitted, you need to spend some time fairing them out. If the plank edges are not meeting well and you can see down through gaps between them, put in some plastic stitches as you did with the garboards. You also need to go round tightening and easing screws where necessary to get the planks looking even. At least try to get them the same on each side. As with the garboards, pay extra attention to the screws at the ends of the planks.

7.2 Gluing the seams -approx 4 hours

Like you did for the garboards, crawl under the boat and mask up the backs of the seams.

Mix up epoxy in three or four pump batches and prime all the seams, then add filler and fill the gaps flush with the edge of the overlapping plank. Where the plank edges stop overlapping and fit edge to edge near the bow, you might have to be a bit creative with the filler. Try to get it all looking even and neat.

Don't worry if it is not perfect the first time around. When the glue from the first session has cured, remove or cut off the plastic cable ties and go around again. While you are at it, check that there are no gaps in the plank scarfs, or dead screw holes that need filling.

7.3 Lifting the hull off the jig

With all the planking glued on, you can remove the hull from the building jig and turn it over. This is an exciting moment worthy of a bit of celebration.

Remove the screws that hold the transom to the jig, then crawl underneath and unscrew the bow and aft frames. While you are under there, knock out the wedges that hold the thwarts to the jig.

Check that the forward tip of the jig is free to move on the apron. If it has become stuck, you can cut it off.

You should now be able to lift the boat straight up off the jig. Be careful not to rest it on its side as the top edge is not very strong yet.

So there you go! Disassemble the jig and put it aside, and set the boat up the right way up on the trestles.

7.4 Filleting the inside -approx. 8 hours

This is a surprisingly extensive and uninteresting task. You might wish to spread it over a few sessions, or enlist some help. It took two of us four hours from start to finish.

You need to fillet along each plank seam, and either side of each frame. You also need to squidge filler into the gaps between the planks and the frames, apron and transom. These last two would require a large amount of glue to fill completely, just put in enough to form a fillet of reasonable size. As most of these big gaps will be unseen inside the buoyancy tanks you do not need to be particularly neat, but locate the level of the tank tops (see 8.1 below) and be as neat as you can above them.

If you take the time to mask off either side of the plank seams and around the frames, you will save yourself a lot of cleaning up later.

As far as the gluing goes, follow the usual procedure. Mix up batches of 3 - 4 pumps at time, prime the seams, then add filler and form the fillets.

7.5 Coating the inside -approx 3 hours

One more nasty job and then you can start fitting bits to the inside of the boat.

Before you can coat the inside, you need to clean up any epoxy dribbles from the filleting process. Use a hair dryer to soften them, then scrape or slice them off with a chisel, knife or similar item. If you have a power sander, you can sand off dribbles on the planks (don't forget to wear a dust mask).

Using some coarse sandpaper, a rasp or a spoke-shave if you have one, round off the inside edges of the frames. DO NOT round the horizontal top edges of the bow and aft frames, or the notches cut into the tops of the frames.

This is your last chance to smooth edges that might be hard on bare feet or hands, it is worthwhile spending a bit of extra time in getting it all nice and smooth.

When you are happy, have a good clean up and reach for the goop.

For this coating job, you only need to apply a thin layer of neat epoxy. We have found that wiping on the glue with a rag is very successful. It gives a nice thin, even coat and leaves a good finish for painting on top of.

Mix up neat epoxy in 3 - 4 pump batches and pour it into the roller tray. Just dip the rolled up rag in the goop and wipe it on. You need to coat everything on the inside of the boat, except the wooden thwarts (don't worry about getting some on the ends of the thwarts). You will need a brush to get into nooks and crannies, these are the bits that need the coating most.

While you are in the coating mood, it is a good idea to do one face of the aft and stern tank tops (parts T43 & 15), and one face of the side buoyancy tank parts (K1 and K2 from the 9mm sheet; 13 & 14 from the small 6mm sheet). You will have to do this before you fit them and it is easier to fit them if the coating is dry.

Once the tops are on, you will not be able to get more epoxy or paint onto the inside of the buoyancy tanks. To ensure they are well protected, lay on the coating good and thick below the line of the tank tops, and on the one side of the tops themselves.

Note that the side buoyancy tanks are optional, and you can use strategically-placed inflatable buoyancy bags instead, if you want to keep the inside of the boat uncluttered.

8. FITTING OUT

8.1 Gluing up the thicker items

There are a few parts of the boat that need to be glued up from double thicknesses of ply. It is a good idea to glue up all these thicker blanks in one session so they are ready when you need them. You may also wish to glue up the centreboard case while you are at it (see 8.4 below) In general, assemble the blanks dry and drill for screws to hold them together. If you try weighting them down with no locating screws the pieces will inevitably slide around and you will return to find them stuck together at odd angles.

You only need a few screws as no great clamping pressure is required for the epoxy to bond well. Ideally, remove the screws when the epoxy has cured although there may be some assemblies where this is not possible, as well as some screws that get epoxied in rather too well.

The parts that need to be glued up in this way are as follows.

The breasthook (parts 1 & 2 in the 12mm sheet). The two thicknesses are identical, line up the edges and place the screws near the centre.

The quarter knees (parts 4, 5, 6 & 7 in the 12mm sheet). Two of the parts are slightly smaller. Each knee requires one large and one small piece. Align the notches cut in one of the “legs”, the adjacent edge, and the curved edge. The remaining edge will be staggered but parallel.

The stem (parts 11 and 12 in the 12mm sheet)

The rudder blade (part 18 from 6mm sheet and part RB from 15mm sheet)

The two central parts of the rudder stock (parts 3 & 10 and 8 & 9 in the 12mm sheet)

The mast step (parts ML and M1 in the 15mm sheet). Line up the long edges, with the larger part overlapping by equal amounts at each end.

8.2 Fitting the tank tops- approx 1 hour

The bow and stern tank tops (parts 15 and T43) are shaped to fit into the hull when they are level. Before you epoxy them into place, make sure the areas you are sealing off have been thoroughly epoxy coated, including the underside of the tank tops.

Make sure you seal all the gaps around the tank tops, put plenty of glue on the joint between the tank tops and the upper edges of the frames.

8.3 Fitting the side buoyancy tanks -approx 2 hours

The prototype was not fitted with side buoyancy tanks but, having performed the odd (not necessarily planned) swamping / capsize test, these tanks have been added to improve the stability and floatability of the boat when it is flooded.

The tops of the side tanks (K1 and K2 from the 9mm sheet) fit up against the underside of the forward and main thwarts. The faces of the tanks (13 & 14 from the 6mm sheet) overlap the frames at either end and hold up the inboard edge of the tops. Remember to epoxy coat the inside faces of these parts before fitting.

8.4 Assembling and fitting the centreboard case

The centreboard case comprises two sides of 6mm ply (parts 16 & 17 on the small 6mm sheet) and two vertical spacers to hold them apart. Match up the two sides (the shorter edges are the vertical ones, the bottom edges are slightly curved) and fit 19mm x 22mm solid timber (eg Douglas fir) spacers between the two shorter edges. The

wider faces of the spacers go against the sides, which makes the slot for the centreboard about 19mm wide. Make sure the spacers stick out of the bottom of the case by at least 10mm. The bits sticking out will fit into the slot in the bottom panel and help to locate the case assembly in the boat.

Before you stick the assembly together, epoxy coat the inside faces of the slot.

Put in a few screws to hold it all together until the glue dries. You will by now have noticed that as soon as you get epoxy on anything it tends to slide around all over the place. Drill the holes for the screws before you apply the glue, this also keeps the drill bit clean.

The assembled centreboard case unit fits into the slot in the bottom board and tight up against the underside of the forward thwart. Let the vertical spacers at each end of the case run through the slot. When the case is fitted, you can trim the ends off flush with the bottom board.

The case sides should fit against the bottom board and thwart, put a healthy fillet all around the seam to fix it securely in place.

Dribbles of glue inside the case are hard to clean up so be careful. If you get any dribbles, smear them over the inside of the case with a stick before the glue goes off.

8.5 Fitting the bow and aft thwarts and the centreboard cap -approx 2.5 hours

The bow and aft thwarts (Timber parts T3 & T2) slot down over the frames and sit on top of the tank tops. Before you fit them, you need to cut drainage channels into the ends of the thwarts (the bottom, end corners) so the water can drain out from the tops of the tank tops rather than sitting there. These drains can easily get clogged up, so we recommend making deep channels (about half the thickness of the wood) and sealing the ends thoroughly with epoxy.

Bed the thwarts down in thickened epoxy and fillet around the frames as you did for the other thwarts. There is no need to screw them down, piling some weight on top will ensure they are well stuck.

[Another option, to prevent water gathering on the tank tops, is to raise the bow and aft thwarts and sit them on wooden spacers – though you will have to figure this out yourself if you go down this route!]

The centreboard cap (Timber part T1) fits into the rebate cut in the aft edge of the forward thwart. You may have to do a bit of trimming to get it to fit neatly in place. Use a couple of short pieces of solid wood to help brace it to the thwart. Stick one to the underside of the cap and thwart either side of the centreboard case. It is very helpful if you can put a clamp on each one to hold it while the glue dries, in extremis you can screw them in place.

As you did at the bottom of the centreboard case, lay a good fillet around the top edge of the case to fix it securely to the cap and thwart.

8.6 Fitting the mast step

The mast step sits on top of the raised end of the apron, with its short edge hard up against the bow frame.

It should be epoxied to the top of the apron and the face of the frame, as well as being filleted to the planking on either side. Before you stick it down, epoxy coat the underside which is hard to get at later.

8.7 Fitting the stem and keel -approx. 2.5 hours

The stem fits outside the apron and caps the forward tips of the planking. Before you fit it, plane off the faces so the forward edge is smooth and even. The stem head detail is one of the opportunities you have to make your boat look especially good, you may like to depart from the diagram a little if you prefer a different look.

Glue and screw the stem in place on the boat. You will need to use two or three long screws to hold it in position. Fit it first without glue to drill the holes, and be careful not to hit any planking screws with the drill.

The keel (Timber part T5) fits down the centre of the bottom panel, and joints into the bottom end of the stem. You may need to trim the joint a little, but do not worry about it too much as the glue can fill any gaps. There is a bit of extra length to the keel to allow slack for fitting the joint, let any spare run over the transom edge and trim it off later. If you have not yet trimmed the projecting ends of the centreboard trunk uprights, do so now. Be careful not to damage the glass cloth on the bottom panel.

You are going to screw through the bottom panel into the keel from inside the boat. Mark the centre of the bottom panel on the outside, and drill pilot holes with a small drill bit through to the inside of the boat. This avoids the problem of having to drill through the bottom from inside, wondering if you are going to hit the keel in the middle, if at all. Space the holes by about 300 - 400mm, be careful not to get too near any frames. There is no point drilling into the aft buoyancy tank as you will not be able to fasten from the inside, the keel has a little 'extra' curve cut into it so the ends should be held down well enough without screws.

Get a helper to hold the keel in place while you drill through from underneath. Make sure your helper is holding the keel over the pilot holes (mark a line either side of the keel so it is easy to see where it goes) and do not drill into his or her hand. Put screws in the holes as you drill them or you may find the first ones are out of line by the time you reach the other end. When all the holes are drilled, back out the screws, and refit the keel with glue.

8.8 Fitting the gunwales

You'll need to cut four long lengths of Douglas Fir, 22mm x 13mm and about as long as the boat. Two of these are for the gunwales, which wrap around the outside top edge of the hull. The other two are for the inwales, which sit in the notches in the top ends of the frames and are fitted into the breasthook and quarter knees, which you will fit in a minute.

When you fit the gunwales, you are going to screw through the top of the sheerstrake from the inside, as well as gluing. Start at the forward end by cutting the end of one of the strips to fit neatly against the side of the stem. You will need to pop a screw through into the apron to hold the forward tip in place, be careful not to hit the screws in the tips of the sheerstrakes. Let the aft end run by the transom for trimming later.

Do not coat the whole length of gunwale in one go, apply epoxy to both gunwale and the sheerstrake in stages as you work your way back along the boat. Wrap the gunwale around, with its top edge flush with the top of the sheerstrake, gluing and screwing as you go. You need to use small screws (12mm x size 6), put one in every 300mm or so.

As you work your way back down the boat, try to make sure that the gunwale is nice and fair. Sight along it to spot any lumps as you go. If you see a hump or hollow developing, it is OK to wander a little from the top edge of the sheerstrake in keeping the gunwales fair. The sheerstrake can be trimmed down or filled up flush with the gunwale later.

When the epoxy has cured, trim off the projecting end of the gunwale flush with the transom, and round off the corner a bit. Then round off the outside edges of the gunwales to a nice half oval section.

8.9 Fitting the breasthook and quarter knees

The breasthook helps to tie the two sides of the boat together at the stem. It fits with its top face about 5mm proud of the top edge of the sheerstrakes. Glue it in place with a couple of longer (37mm x size 10) screws per side, driven through the gunwale.

When drilling for these screws, be sure to countersink deep enough for a bung to go over the top of the screw head.

The quarter knees brace the top edges of the sheerstrakes against the transom. One of the “tips” has a notch in to accept the end of the inwale. The angle of the transom causes a bit of a gap where the knees sit against it, this will eventually get filled with goop (the epoxy rep’s eyes lit up when he saw the amount of glue that was going in there!). Glue and screw the knees to the sheerstrakes as you did the breasthook, although the top faces of the knees should be flush with the top of the strakes.

There is a bit of a trap here which you need to be careful of, it caught us out when we were building the prototype and although small, the effect is not pleasing. Once the knees are fastened to the sheerstrakes, pushing the inboard end up and down, causes the plank to bow in and out. On the prototype, we clamped the inboard ends a little too high which caused a bit of a hollow to appear in the top edge of the sheerstrake. Rather than clamp the inboard tips in position, you should push them down the transom a little (watch what this does to the plank), and tap a little nail or screw into the transom to hold the inboard end down. You don’t need to screw through the knee, just pop the screw in against the top edge to hold it down until the glue has cured.

Once you have done this, you can start shovelling epoxy filler into the gap.

8.10 Fitting the inwales

You'll need to cut a pile of small blocks, about twenty 50mm blocks, 22mm x 25mm, to act as spacers.

Pick a side and fit the end of one of the strips into the shoulder of the breasthook, you will need to clamp it into the notches of the first one or two frames to get the angle right. Do not glue it yet, it is easier to fit both ends without goo on everything.

Spring the strip around inside the hull, clamp it into the notches and cut the aft end to fit tightly into the shoulder of the quarter knee. Carefully remove it again and refit it, gluing it into the shoulders in the breasthook and quarter knee as you do so. Once it is in position, you can squidge glue in between the inwale and the frames where there are the usual v shaped gaps. You may need to clamp the inwale into the frames. If you run out of clamps you can pop a screw through the inwale to hold it in position.

When the inwale is fitted, you need to fit the bracing blocks to strengthen it. You should have about thirty of these blocks, which need to be fitted at regular intervals (one every 250mm or so) between the inwale and the top of the sheerstrake.

You need to fit two pairs (touching end to end) where the rowlock pads will go. There are two rowing positions (the main and forward thwarts) so there will be four rowlock pads. In each case, the hole you will drill for the rowlock needs to be 280mm (11 in) aft of the aft edge of the thwart in question. Arrange the blocks so there is a pair beneath where each rowlock pad will eventually go. The remaining blocks can be spaced evenly between the pads and the ends of the inwale.

Glue the blocks in place, they can be held in with masking tape or clamps if you have enough.

8.11 Shaping and fitting the rowlock pads

You'll need to cut four rowlock pads from the Douglas fir, wide enough to cover both the gunwale and inwale, and about 150mm long.

The rowlock pads are one of the areas you can apply your artistic flair and make the pads look really elegant. Before you get too carried away, dig out the rowlock sockets and be sure to leave a flat on the top of the pads that is big enough.

Each pad fits above one of the double sets of inwale blocking you have already fitted. The important dimension is from the middle of the block (where the rowlock stem will be) to the aft edge of the thwart. This needs to be 280mm (11") for comfortable rowing.

Glue the blocks down with a couple of screws in each one to hold them in place while the glue cures.

Drill a hole down through the pad and inwale blocking to take the socket. Fasten the sockets in position with a couple of bolts each, going right down through the

blocking. This may seem over the top but you will be pulling on these with all your strength so they need to be strong.

8.12 Tidying up and final filleting

With all the bits now stuck into the boat, you need to have one last session to tidy up the fillets and fill any screw holes or gaps. Go around the boat and top up any filled gaps that may have sagged a bit in curing. You will probably need to do this around the top edge of the aft tank top, and where the quarter knees meet the transom. There will be a couple of gaps at the very top aft corner of the sheerstrakes, where they sit in the notches in the transom. Make sure all the buoyancy tanks will be airtight. You may also have to do a bit of creative filling where the stem is fitted to the apron.

9. RUDDER AND CENTREBOARD

9.1 Assembling the rudder

You have already glued up the two blocks that make up the middle of the rudder stock, now you need to stick the cheek pieces (RC x 2 in the 15mm sheet) on either side. In doing so you form the slots for the tiller and rudder blade.

The sides are marked to show how the two blocks should be located (check the pattern); glue the assembly together with a few screws to locate them until the glue dries.

Before you finally stick them together, clean up the edges of the central blocks that will be hard to get at once the rudder is assembled. Apply epoxy to the entire inside surface of the cheeks, and the edges of the blocks to seal them.

When the assembly is dry, clean off all the excess glue and round off the outside edges. Leave the straight edge square for now, the rudder hangings will be mounted here and they go all the way to the edges.

9.2 Shaping and fitting the tillers

The template for one long tiller is provided. This is ideal when you are sailing on your own, as it allows you to get your body weight further forward. You can make a shorter one using the same template which lets you sit further back when you have a large crew on board, or if someone is helming (coxing) while another person is rowing.

Once the tillers are cut roughly to shape, clean up the edges and round off all the corners so they are nice to hold. Try them for a fit in the slot in the rudder head, trim a bit if you have to but be careful not to make them too loose.

You should be able to lift the inboard end up and down to keep the tiller handles at a comfortable height.

9.3 Shaping and fitting the rudder blade

The rudder blade should already be glued up from 15mm and 6mm ply. The next job is to clean it up and round the edges off.

Before you do any rounding, fit the blade between the cheeks and put the hinge pin through to locate it in the stock. With the blade in the “down” position, mark where the rudder cheeks are on the sides of the blade. When you are rounding the edges, don’t do so too heavily in this area (just knock off the corner) or the downhaul elastic will get jammed in the gap.

The leading edge of the rudder should be shaped to a half round section, the trailing edge should have a longer taper, but don’t make the edge too fragile.

You will see a large hole marked on the template, near the leading edge of the rudder. This is to take the stopper knot in the end of the downhaul elastic. Clamp the rudder blade securely and drill an 8mm hole from the front edge of the blade into the larger hole, you will now be able to thread the downhaul elastic through the 8mm hole, tie a knot in the end and hide this within the large hole through the blade.

You also need to drill a smaller hole (about 6mm) through the trailing edge to take the uphaul line.

When the holes are drilled, have a last clean up of the blade and put it aside for epoxy coating.

9.4 Hanging the rudder

You’ll need two gudgeons and two pintles to hang the rudder – one pintle having a longer pin than the other. The pintle with the longer pin is the lower one, and the difference in the pin length makes the rudder easier to mount when you are in the boat.

It is best to fit the gear to the rudder and boat, then take it all off again to paint the rudder. Once you are done with painting, you can re-fit the various bits and bobs with minimal damage to the finish. When you are preparing to paint the rudder, you can round off the forward edge (the one you left earlier) leaving a square section where the fittings go.

Fit the gear to the rudder first. The short pintle goes near the top pointing downwards. One of the gudgeons goes near the bottom. These get fastened to the rudder with large screws into the edge of the rudder cheeks. Be sure to get the rudder fittings straight on the rudder or they might jam.

Now hold the rudder up against the transom, with the fittings assembled (tape them together so you don’t run out of hands), and mark where the fittings have to go on the transom. The rudder should hang on the centreline, just high enough for the tiller to clear the transom. Drill holes through the transom so they can be fitted with bronze or stainless steel bolts.

Next, fit the rudder retaining clip which stops the rudder riding up and off the pintles accidentally. This gets screwed to the rudder stock, below the upper pintle. If you put it off to one side a little it is easier to push it in when you have to remove the rudder.

For the uphaul line, you'll need a small fairlead and jamming cleat (small black plastic jobs) which you need to screw to the top side of the rudder stock. Use stainless self tapping screws and arrange the fittings to allow you to operate the uphaul from forward in the boat. Be sure to get the jammer the right way around!

You have already prepared the rudder blade for one end of the downhaul elastic, when the rudder is painted you can deal with the other end. You need to form an eye in one end of the elastic, this can be done with a knot but it is neater to stitch the loop in with some twine. Do this before cutting the elastic to length, you will need to make adjustments to find the right length and it is easier to do this at the stopper knot end.

Screw through the loop you have made up into the central part of the rudder stock. The penny washer is to help stop the eye slipping off the head of the screw. Thread the elastic through the gap as shown, and then through the hole you made in the leading edge of the rudder blade. Adjust the elastic so it is almost fully stretched when the blade is in the "up" position. This should leave it taut enough to hold the blade down when you are sailing. When you have found the right place for the stopper knot, cut the spare elastic off and tuck the knot into the hole through the blade.

9.5 The centreboard

The centreboard does not require much attention. You'll need a couple of pieces of timber to stick along its top edge so you can pull it up and down (and to stop it falling out the bottom of the slot!), these can be shaped a little so you can get your fingers under them to lift up the board.

Check the board fits in the case, and mark how much of it sticks out the bottom of the boat when it is fully down. Below the marks, round the front edge (the shorter of the two) and taper off the trailing edge to make a nice looking section. It is easy to see how you are doing as the layers of plywood show up as "contour lines". Above the marks, just knock the corners off so they don't splinter.

Avoid making the bottom of the board too thin as this is vulnerable to damage if it hits the bottom.

A short dummy centreboard can be made to prevent water slopping up the centreboard when you are rowing. This is a very important feature for anyone sitting on the forward thwart! Cut a scrap of 6mm ply and glue / screw it to one of the long edges of the dummy board to stop it dropping out the bottom of the slot.

11. OUTBOARD WELL

Although the Western Skiff was primarily designed for rowing, with a small rig for sailing, there's no doubt that having an outboard can increase your 'cruising range'. A simple option would be to fit an outboard bracket on the transom – one of those hinged metal brackets which fold out to hold the outboard at the right angle. The

drawback is you end up having too much weight aft (especially as the person operating has to sit further aft too), plus it looks very ugly indeed!

Our solution was to cut a small well through the aft buoyancy tank, which the outboard clamps onto. That puts the outboard in a better position and doesn't spoil the line of the boat – though you do have to cut a hole in its bottom...

To do this, we calculated the space needed to accommodate the outboard propeller, shaft and bracket, and added a couple of inches for good measure. We then cut a square out of the top of the buoyancy tank, aligning the front of the box with the aft edge of the thwart and the inboard edge of the box with one side of the keel (in our case, the starboard side, though it could go either way). You could equally place the well right in the middle of the buoyancy tank, though that would mean cutting off the back end of the keel, which we didn't want to do.

With the hole cut into the top of the buoyancy tank, we measured up the four sides (angled vertically down from the top and angled at the bottom to the shape of the hull) and cut the box out of four pieces of 12mm plywood – with about 75mm sticking out above the buoyancy tank top. We doubled the front end of the box with an extra layer of plywood, to give a 24mm thickness. We then primed and glued the well and clamped it in place, without the use of any screws (though it might have made life easier if we'd screwed the box together first!). Once it was glued in place, we filleted around the bottom, both on the inside of the well and around the outside, reaching inside the buoyancy tank as best as well could.

We then added a third layer of plywood to the front edge of the box, overlapping it over the thwart, to bond the structures together for extra strength.

With the well in place, we then measured a more exact shape that would just allow the prop and shaft through the hull – the idea being to minimise the size of the hole. With that established, we drew a couple of pilot holes through the hull, to make sure the hole was lined up correctly, and cut the hole from the outside.

We then attached the cut-out to a couple of pieces of plywood (offcuts from the buoyancy tank top) to make a kind of 'plug' which can be slotted into the hole to minimise drag while rowing or sailing. A couple of simple latches stop the plug popping out due to pressure of water.

We fitted a 3.5hp outboard to the boat, although as we usually run it at half-throttle, it seems that 2.8hp or similar would be ample. Or, better still, fit an electric outboard!

12. FINISHING – Preparing the surface for paint and varnish

The original set of instructions read: "Wessex resins recommend that you leave the epoxy coating to cure for a week or so before painting over it. There may be some "blush" on the surface (a sort of waxy deposit) which you should remove with warm soapy water. Do this before trying to sand off the surface as it clogs up the sandpaper in no time at all.

As we all know, the key to achieving a good finish is preparation. You may well find yourself putting quite a lot of time into finishing the boat but this will be rewarded.

Good luck!

Shopping list

4.5 sheets (2440mm x 1220mm / 8ft x 4ft) 6mm ply
1 sheet 9mm ply
1 sheet 15mm ply
0.25 sheet 12mm ply
2 sheets 12mm MDF
Solid timber (eg. 1in Douglas Fir) for thwarts, etc
Trestles x 3
Epoxy (approx 6lt) + hardener + fillers
Glass cloth
Gloves
Mixing pots
Stirrers
Brushes, rollers, rags, squeegees
Plastic Sheeting
Plastic cable ties
stainless self-tapping screws (for rudder kit)

Chandlery

Oars (8ft)
Belaying pins?
Inspection hatches
Rowlocks
Rowlock sockets and bolts
Rudder hinge pin
Rudder downhaul elastic
Two gudgeons
Two pintles (one with slightly longer pin than t'other)
Bronze bolts for gudgeons
Rudder retaining clip
Small fairlead
Jamming cleat
Penny washer

