

Mirror 16' Dinghy

Building Instructions

Foreword

At one time it would have been considered impossible to build a 16' sailing dinghy without complicated jigs and formers. Using completely new principles of construction the Mirror Class Dinghy achieved a break-through in the field of home boat building. For the first time, a complete novice could assemble his boat, with the simplest of tools, in any spare space he had. What is more he knew, at the end of his labours, that his boat was bound to measure correctly and qualify for a measurement certificate.

Basically, the designers achieved that in two ways. First of all, most of the component parts were cut exactly to shape and size - a few of the pieces were supplied a little larger than necessary to allow for a margin of error. Secondly, instead of fixing panels to a heavy wooden frame-work the whole job was simplified by welding each marine plywood panel to the next with epoxy held in place by fiberglass tape making a seam which was many times stronger than the wood itself.

An indication of the success this design achieved is the fact that of all the thousands of Mirror dinghies sold throughout the world 80% of them were in kit form and were built at home.

It was natural that many of these owners, after several years sailing in an 11 foot dinghy, would aspire to a somewhat larger craft and, because of their requests, the Mirror 16 was born.

Using the knowledge gained from the Mirror dinghy we could produce an even more sophisticated boat but incorporating the simplicity of the construction. Some of the lessons learned have been used in the actual boat and some used in these instructions which follow.

I, as the writer of this book, have already learned the hard way that it is impossible to produce a set of instructions which satisfies everybody. The absolute tyros ask for more detailed notes and less diagrams whereas the highly technical and experienced bodies would like a set of very accurate blueprints with no notes. Most people, however, seem to prefer the type of booklet which eventually evolved with the Mirror Dinghy so, with a few refinements, this is the format I will adopt.

I am writing this for one person - he is a family man of average intelligence, no experience of boat-building and little of carpentry, he has no elaborate tool kit and any assistance he gets is decidedly unskilled. If you are not he. Forgive me because I am sure you will still be able to build a good boat using these instructions - it might just take a little longer.

If you have already built a Mirror dinghy, you will find some of this book rather familiar but, even so, I ask you to read it through before you actually start to build in order to give you a rough idea of the sequence used.

One final plea! Everyone has a well-meaning friend or relative who always knows a better and easier way of doing a job - don't listen to them! If they knew so much they would not be wasting their time offering advice to you, the boat-builder.

One comment from the editor: [Text that is blue is the incorporated author addendums to the instructions.](#) Text that is green are comments/updates from the editor. These are usually centered around the fact that this kit no longer exists and some materials (glues, paints, etc.) have been superseded by modern versions or better (or more available) options in later years.

Building from Scratch

The kit parts referenced in these instructions are no longer made for this model of boat. Therefore all of the parts discussed in these instructions will need to be fabricated before assembly can commence.

As the larger panels are too long or wide to fit on one sheet of plywood, several plywood sheets will need to be joined together with scarf joints. Using a scarf joint will allow the butt joints using buttstraps described below to be eliminated. They will also need to be used to join the longer trim pieces together.

To make a scarf joint: the sheet edges (that will be joined together) need to be beveled then the bevels need to be glued together. The bevel width needs to be eight times the thickness of the panel (8:1) and as flat as possible. So for a ¼” thick panel, the bevel will be 2” wide. While it is possible to cut out the pieces before doing the scarf joints, there are multiple chances for errors to occur (beveling the wrong side of a piece, having a less than perfect bevel, not getting the pieces properly aligned, etc.) That is why it is recommended that the panels be joined (whole) before cutting out the panels. Then if there are issues with the joints, they can be addressed before the panels have been cut.

When several sheets are joined together, you will be able to mark out the larger panels and cut them out with a jigsaw or bandsaw. Make sure to leave about an ⅛” extra so that the panels can be sanded right to the line. It is recommended that pairs of matching pieces be cut out and shaped together. This is most easily done by screwing two layers of plywood together prior to cutting and shaping the parts.

If a CNC router is available the CAD plan files can be used to cut out very accurate parts. Additionally, it is possible to cut the larger pieces out in sections with puzzle end connection with a CNC router.

The plans, as of this writing, are untested. The user is warned that adjustments to the geometry or assembly may be required as assembly progresses. All of the wood strips for battens and trim can be shaped at this point. Leave cutting the trim pieces to length for later as their required lengths may vary. It is recommended that the hull panels, transom pieces, keel web, centerboard case, bulkhead and a few pairs of floor ribs be cut out first. One of each of the other pairs of floor ribs can be cut out. Prior to taping the hull seams, the bulkhead and floor ribs should be dry fit to ensure tight joints and that everything will fit properly. If the geometry of the bulkhead or ribs need to be adjusted (or if they need to be remade to a different shape), it will be easier to do so before applying epoxy to the seams. Then the rest of the floor ribs can be cut out and prepared for installation.

Introduction

The kit you have contains all the pieces you will need to build a Mirror 16, and each piece has been numbered so that it is instantly recognisable. As each component appears in these notes, it will be referred to by its name and number - subsequently, it will merely be named.

Although most of the actual construction can be done by one man, it will sometimes be quite impossible to cope unless you have a willing assistant to hold ends of panels and pass you tools etc. Another aid is some

rough trestles on which to build the dinghy - They need to be fairly low to the ground to enable you to reach inside the boat. Three long flat boxes about 18" high, with some wedges to steady the hull, would be ideal.

While you are arranging this you had better check your tool kit. A complete list of recommended tools and materials is provided in the plans. These are the main items you will need:

- 1 pin hammer (or a pin nail gun with various length of 18ga stainless pins ½" to 2")
- 1 tenon saw
- 1 set square
- 1 drill (preferably electric)
- A drill bit and countersink set with bit sizes that will work for the different size screws used
- 1 screwdriver (or at least one that correctly fits each of the different screws used)
- 1 chisel (½" or 1")
- 1 top-cutter (wire cutting pincers)
- 1 smoothing tool (plane)
- 1 pair broad nosed pliers
- 1 measuring tape
- Sandpaper (two or three grits from 100 up to 220 grit)
- 2 C-clamps
- Pencils
- Masking tape
- Old paint brushes for applying epoxy (or plastic scrapers)
- A good paintbrush or two for final finishing.
- Several foam paint rollers for applying a lot of paint and epoxy quickly
- Several drip cloths
- Several rags

I admit that C-clamps are not found in every home but, although they are not vital to the operation, they will make life easier so see if you can borrow a couple (or just buy some). If you plan on laminating the coamings and keel you will need several clamps (probably 6 to 10 rod clamps and several clothespin clamps). It would also help to have some ratchet straps for the keel.

In addition to the above you will require a couple of old 1" paint brushes (for putting on epoxy) and plenty of old rags for wiping the epoxy off tools, fingers and anything else it gets on.

Epoxy is used for embedding the fiberglass at the joints, making sawdust/epoxy fillets, waterproof covering/sealing wood, and gluing panels and pieces together. Epoxy mixing, gel times, and cure times vary significantly from product to product. Follow the manufacturer's instructions for mixing, applying, and cleaning. Epoxy is not generally UV resistant and should be limited to places which will be painted or shaded. A waterproof quick curing glue can also be used to glue pieces together. Epoxy will sometimes be referred to as resin and glue in the rest of these instructions. It is advisable to have a couple of epoxies with different gel times. Longer setting epoxy can be used when extensive gluing and glassing needs to be done at one time. A shorter setting epoxy can be used in small batches when gluing together small component parts.

And now I shall list the same general hints on woodwork which were in the Mirror dinghy booklet. If you have read them before, read them again - you might have forgotten one or two.

1. When driving in nails or pins make sure that the head of the hammer is clean.

2. All nails etc. should be driven in using a flat, firm surface as a backing; something like an iron weight or the side of an old hammer head will do admirably.
3. The usual practice for screwing two pieces of wood together is to drill a hole the same size as the screw shank in the first piece of wood to be fixed and then a small lead hole in the other piece of wood. A screw should never have to be really forced into position. It is common sense that, in soft wood, lead holes need to be somewhat smaller than ones in hardwood.
4. On the subject of screws, remember that brass screws are easily twisted and broken if hard pressure is brought to bear.
5. Do not try to glue wet, greasy, or painted wood.
6. If you are working in an outbuilding in frosty weather, do not let the glue or epoxy freeze before setting. This particularly applies to joints left to set overnight.
7. Going to the other extreme, remember that the hotter the atmosphere, the quicker glue and epoxy sets so, if you are working during a heat wave or in a heated room, you will have to apply your glue or epoxy much more speedily but with the same care as normal.
8. You will see, eventually, that the fiberglass webbing strip fits tightly to the angles formed by the seams. I must stress, even at the early stage, that the strip must be absolutely bonded to the wood at all points with no air bubbles beneath it. Secondly, when it is sanded down this must only be done to the edges of the strip - the bonded corners must be as strong as possible.
9. Talking of sanding I must mention a technique which I will remind you of later at the appropriate time. Use a softwood block for your glasspaper and sand ACROSS the grain for PAINTED surfaces and WITH the grain for VARNISHED surfaces, remembering that the finished interior of the boat will all be varnished and the exterior will be painted.
10. Every wood on wood joint must be glued as well as pinned or screwed.
11. Having mixed up a batch of epoxy and used it on the seams, you might find that you have some left over. Don't throw it away - go over all existing seams once again.
12. When you finish with the epoxy, wash the brush out in solvent.
13. Before using epoxy, apply a good barrier cream to your hands or else you will have a terrible job to remove the dried epoxy from your skin. The barrier cream supplied with the kit can be used for removing epoxy from either your hands or the brush. The method used is to rub the cream well in and then remove with a dry cloth. **Use nitrile gloves when handling epoxy always.**
14. A lot of people use far more glue than is necessary, thinking that the more adhesive one uses the stronger the joint one achieves. This is not true - a thin film of glue is quite sufficient to make the strongest joint. **Just make sure there is enough gap filling glue in the joint to fill the gaps. A tight wood joint with just enough glue is best but the epoxy will fill the gap if the joint is not perfect.**
15. It would be just as well to memorise the previous fourteen notes because they apply to every stage of construction and to forget and one of them might prove to be a costly blunder.

Some of the photographs illustrate more than one aspect of construction so it is no cause for concern if you spot some detail to which I have not referred. It is likely that further on I will mention the same picture again regarding that particular point.

Finally I give you two DON'TS.

DON'T try to build your boat to a thousandth of an inch - it is not necessary. Try, by all means, to achieve accurate work but don't get worried if there is a tiny gap between seams (the epoxy will fill it) or if a piece of wood doesn't quite fit (trim it off slightly).

DON'T listen to the know-alls who are better at giving advice than building boats! There is an old Danish proverb which says "He who builds according to every man's advice will have a crooked house". The same applies to boats.

Painting

Pick a paint that will be durable, easy to apply, and UV resistant for the exterior finish. Pick a bilge paint for coating the inside of the tanks. Pick a durable, UV resistant clear coat paint to show off the woodwork in the cockpit (if desired). Follow the manufacturer's recommendations for application and fishing.

Building the Mirror 16

Before you start on the actual construction, it might be of some help to you to have an overall picture of the early stages - in this way, you can relate the individual task to the integrated whole.

The skin of the boat is made from four long shaped panels of marine plywood - one pair forms the bottom of the boat and are curved upwards and inwards to become the complete bow whereas the other pair are laced more or less vertically to the outside edges of the bottom panels to form the sides of the dinghy. This structure would be very wobbly to work on so it is stiffened by building the whole of the bottom section onto a backbone along the full length of the boat - this is called the center plate case and web. The center seam of the bottom panels is glued and screwed to this spine which terminates at the aft end of the dinghy in a short cross member at the bottom of the aft transom. Again the bottom panels are glued and screwed to this.

Elsewhere, when two plywood panels meet edge to edge they are laced together through matching holes with short individual pieces of copper wire. Later on a completely bonded seam will be made with use of fiberglass tape and epoxy.

In the early stages to provide extra stiffening you will be fitting gunwales along the top edges of the topsides.

The initial building program described above is certainly less simple than any of the later stages so pay particular care and you will not be sorry.

Now we will start on the actual detailed work - each section will have a sub-heading and I advise you to read the particular section through before you commence work.

Assembling the Bottom Panels - can be skipped if panels are cut out whole

Pieces 11 and 12 have to be joined together to make one side of the bottom section. You will notice on one of the longer edges of each of these pieces there is a long cutaway portion which, when the two complete bottom panels are placed edge to edge, forms the centerboard slot. It should now be evident that the two parts (11 & 12) of each panel join along the resultant matching straight edges.

The method of joining is to butt the two edges together and place along this join one of the butt straps (15) so that it lies centrally. It should also lie short of the edge with the centerboard cutaway by 1" - this is to allow for the center case assembly to be fitted directly to the ply (Photo 1). The butt strap is now glued and nailed (using short copper nails) to the two sections. It is easier to have a line drawn straight down the center of the butt strap so that you can fix first one section and then butt the other to it. In each case, use a zigzag pattern of nails and where the points protrude they should be neatly bent over flat in the buttstrap. Remember the nails

must go from the ply to the buttstraps so that only the heads are visible on the outside of the join. (Photo 2 shows a completely assembled panel).

Each buttstrap finished up on the inside of your boat so it is important that when you assemble the other bottom panel it is done the reverse way to the first one. A simple check on this is to lay the four pieces together as two matching panels with the centerboard slot formed between them - the buttstraps then lie on top as you look at the assembly.

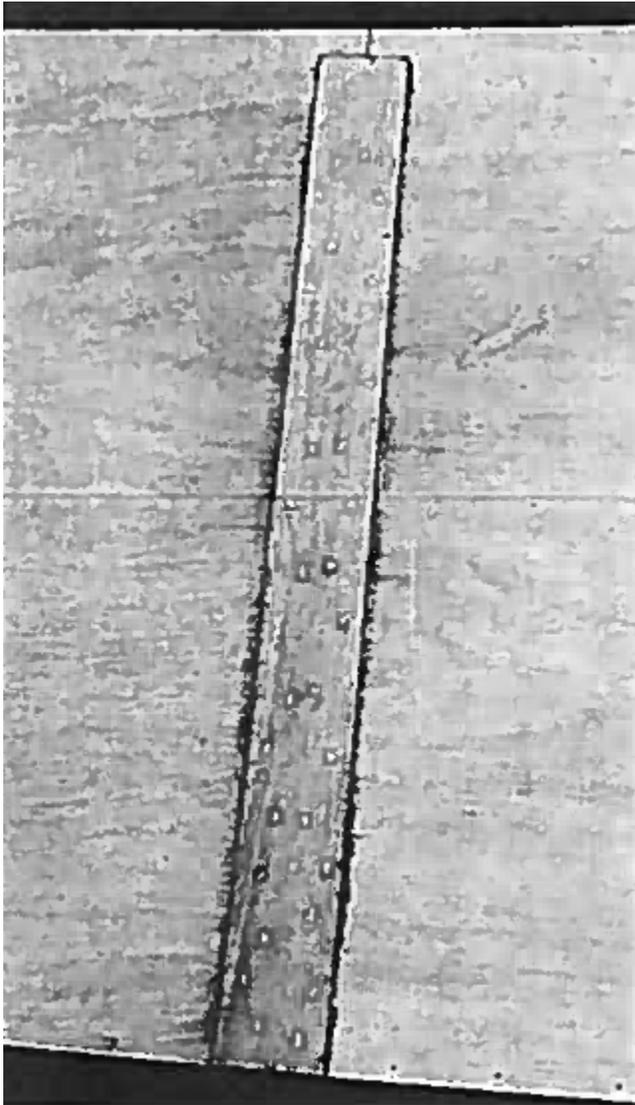


Photo 1

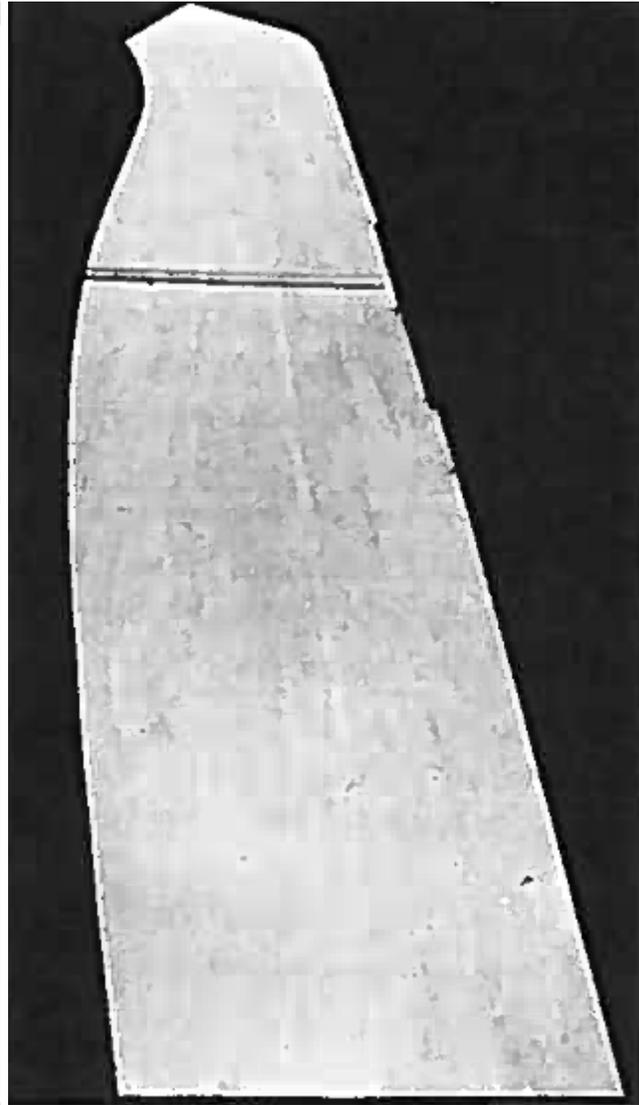


Photo 2

Assembling the topside panels (13 & 14) - **Can be skipped if panels are whole**

The method of joining the four pieces to form two separate lengths is exactly the same as that used for the bottom panels but you must be watchfull when you butt the short straight edges together. As originally designed, it was possible, unwittingly, to reverse one panel against the other. To guarantee that you have these pieces joining correctly the short edges have been cut so that each has a fraction of its length curved - on one panel it is a convex curve and the other a concave to enable one curve to fit inside the other. By using this jigsaw puzzle technique it should be impossible to join the panels the wrong way round.

Be very careful that, again, the buttstraps (15A) are placed so that they finish up on the inside of the boat. The simplest way to achieve this is to join two sections together to form one panel and then lay the other two sections on top, chines together, so that the two complete panels coincide exactly. If the buttstrap on the joined panel below is uppermost then one only has to open the upper sections like a page in a book and its respective buttstrap will also be placed uppermost. I am sorry to be so wordy here but this is the one part of the construction where a mistake will easily occur and will be one that cannot be remedied.

Finally, I must tell you that when gluing and nailing these buttstraps you must leave a gap of $1\frac{5}{8}$ " at the gunwale edge and $\frac{3}{16}$ " at the chine edge (the edge which, at the forward end, curves up to the point) (Photo 4). A finished pair looks like those in Photo 3.

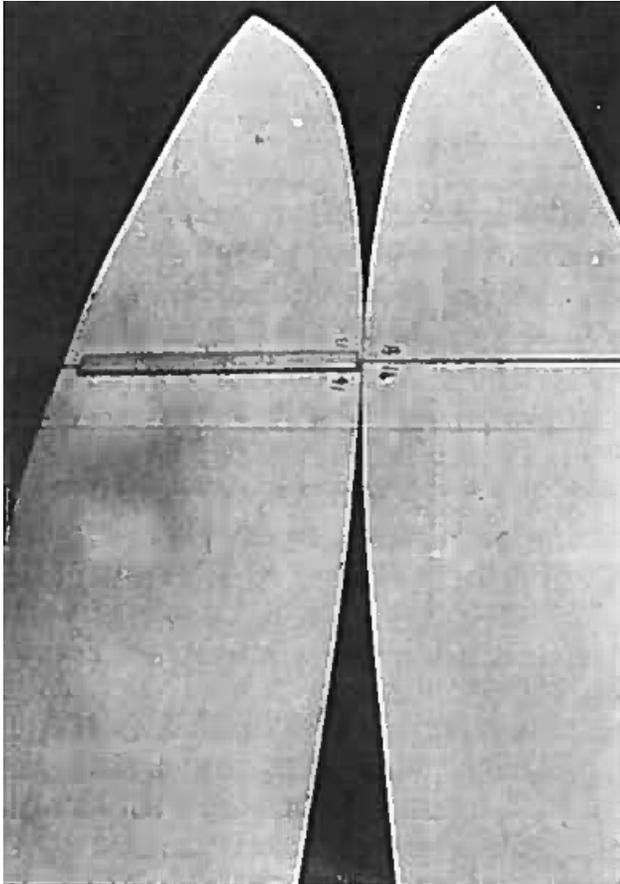


Photo 3

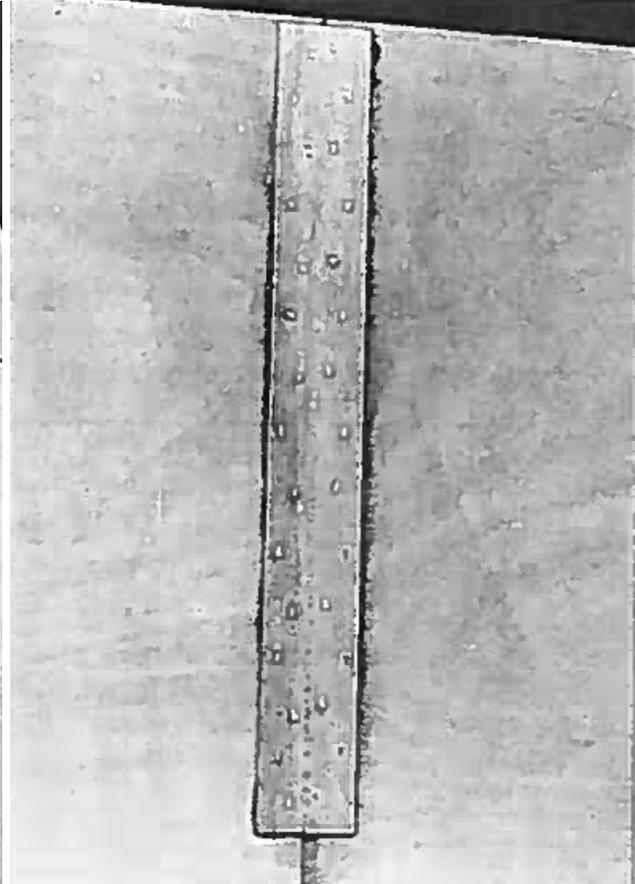


Photo 4

Fixing Gunwales (64) to Topsides

Each gunwale is a long batten of wood, much longer than the gunwale edge of the topside. It should be glued and nailed, with its flat edge flush with the gunwale edge and its bevelled edge opposite, on the outside of the side panels (opposite side to buttstraps) starting at the aft end, which is square, and leaving 1" of the gunwale overlapping this end. Continue curving and nailing the gunwale to the side (one nail every 5") until you reach the forward (pointed) end of the topside. You should now have about 2'-0" of gunwale left over but this will eventually be fixed to the bow portion of the bottom panels.

Assembly of the Centerboard Case and Web

This now is the backbone of the boat and although it looks a bit complicated (Photo 5 shows an end-on view) it is really quite simple. It can divide into three sections and this is virtually how it is made - the fore and aft sections are assembled first and then they are joined together by the center section - the plate case itself.

In the following diagram (not to scale) you can see the manner in which the numbered parts go together to form the forward section. All parts are glued and copper nailed.

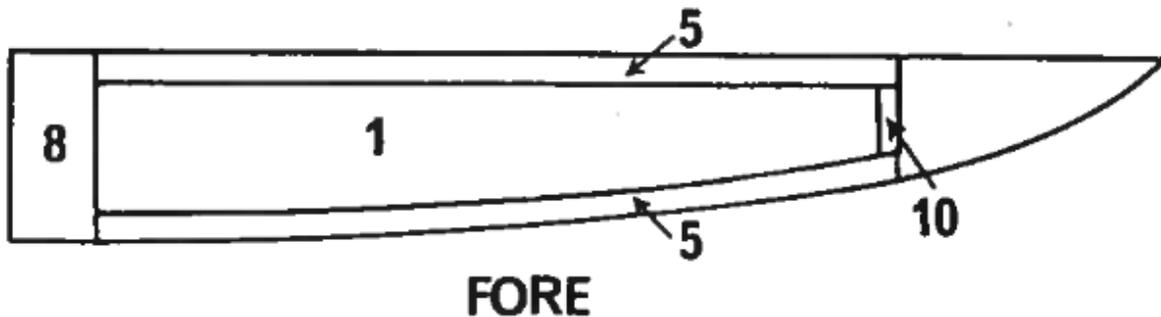


Diagram 1

The wide end of piece 1 is sandwiched between the two blocks of wood (8) - butted up to these and running flush with the top and bottom edges on both sides of the web are the bow web edges (5). These do not go right to the pointed end (Photo 6) and the lower one, because it is slightly curved, does not finish quite in line with the top edge. This is apparent when the last pieces (10) are fixed in position. These short uprights joining the forward ends of the top edges should be vertical because this is where the forward bulkhead will sit. When fixing the bulkhead blocks you will obviously encounter a small gap between it and the lower edge - ignore it for it will eventually be filled with epoxy.

This next diagram shows the aft web assembly and you will notice that it is put together in a similar manner.

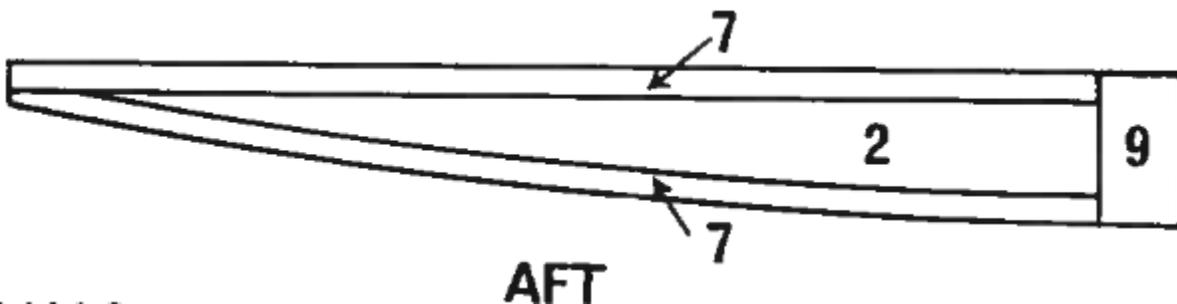


Diagram 2

The web (7) is sandwiched at the wide end between blocks (9) - the top and bottom edges running flush with the edges of the web meet at the narrow (aft) end (Photo 7) - if necessary shape them slightly to fit against each other.

The web edges (5 and 7) should run the full length of the web panel (1 and 2, respectively) and be notched where the daggerboard case panels will overlap.

The centerboard case itself is made in two separate sections which eventually sandwich the fore and aft webs between either end (Photo 8).

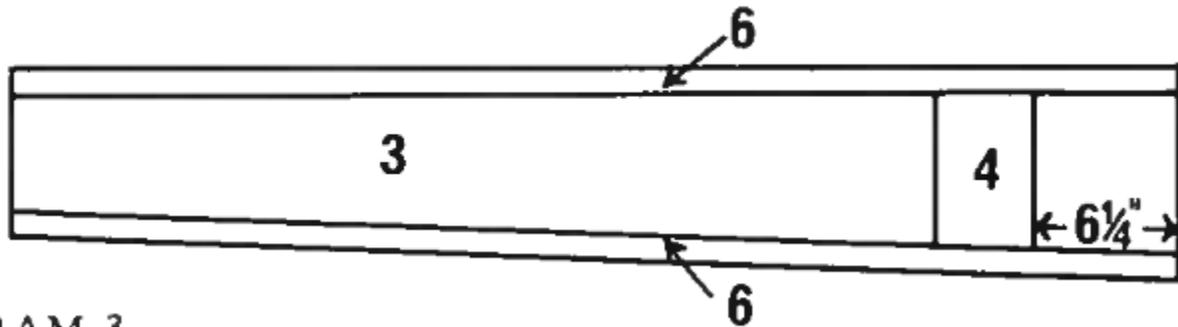


Diagram 3

The diagram above shows the starboard side of the case formed with piece No. 3 with a top and bottom edge (6) on one side only - the outside. The inside of the box (in other words, pieces No. 3) has a slot to take the metal fitting which holds the center plate. The stirrup. These vertical slots must be opposite to each other at the forward end of the case whilst on the outside of the case are fixed the stirrup pads to act as strengtheners to the ply where the slots are.

One word about these slots - the machine which fashions the groove is incapable of cutting a slot to even depth. It will be necessary for you to deepen this groove for its complete length consistent with that at the edge.

[Check that the stirrup fits correctly before assembly.](#)

[The daggerboard version of the plans does not have this slot.](#)

To return to the assembly, the stirrup pad has its forward edge $6\frac{1}{4}$ ” away from the forward end of the case - in other words it is fitted on the other side of the ply to the stirrup groove. This pad is fitted after the top and bottom edge.

Photo 8 shows how the three pieces are fastened together.

It is best to fasten the fore and aft ends to one of the sides - each butts up to the end of the plate case side. **IMPORTANT** - It is vital that the top of the whole assembly is absolutely straight to take no chances when joining the sections together - keep checking.

When one side has joined the end sections together, the inside face of the case (where the vertical slot is) must be painted because it will be in contact with the water - use a coat of metallic pink primer followed by one of Danbolin.

After this, paint the other case side **BEFORE** fixing it in position but **DON'T** paint the surface to which you have to apply glue.

[This method of construction for the centerboard slot has been a source of failure and water leakage in these boats over the years. The editor recommends coating the insides of the slot case with epoxy prior to assembling the case. While the epoxy is still wet assemble the case making sure the assembly is straight and nail the case to the webs \(while the epoxy cures\) and add two 6” wide strips of fiberglass to the inside of each](#)

end of the case (across the ends and 2½” onto the case sides). Secure the fiberglass in place with two appropriately sized (finished) blocks of wood with a mold release agent applied. **DO NOT FORGET THE MOLD RELEASE AGENT.** Wrap the epoxy impregnated fiberglass around the block and push the block with the fiberglass into the end of the centerboard case. Four C-clamps (or screws) might be useful in keeping the case from working its way apart as the blocks are placed at the ends. Once the epoxy cures the blocks can be popped loose and taken out. The embedded fiberglass will reinforce the ends of the centerboard case and prevent the splitting that was so common in these. Later, after the keel is fastened to the hull, instructions are given to fiberglass the whole inside of the centerboard case. It isn't absolutely required, but it will provide a better seal across the joints (especially the ones between the keel, hull panels, centerboard case, and floor panel). It may be difficult, but bilge paint should be added to the inside of the case after the epoxy has cured.

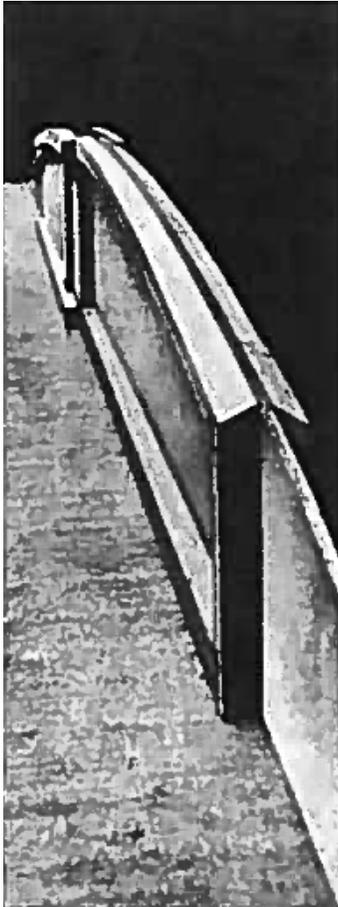


Photo 5

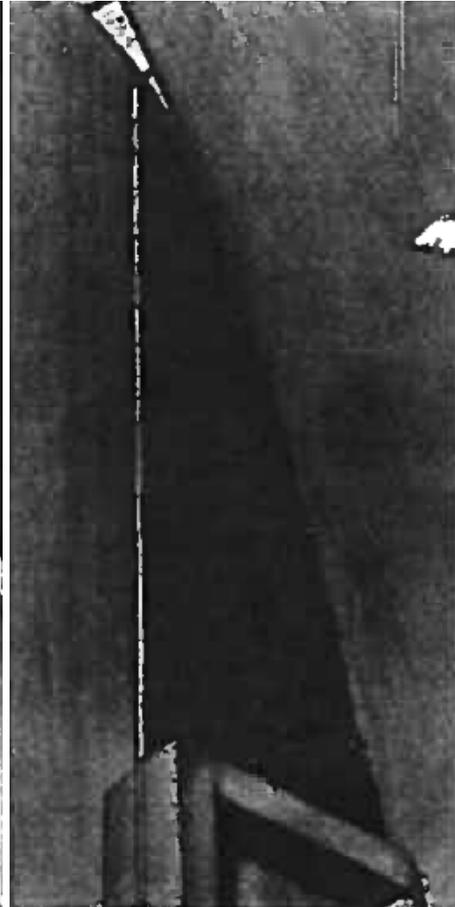


Photo 6

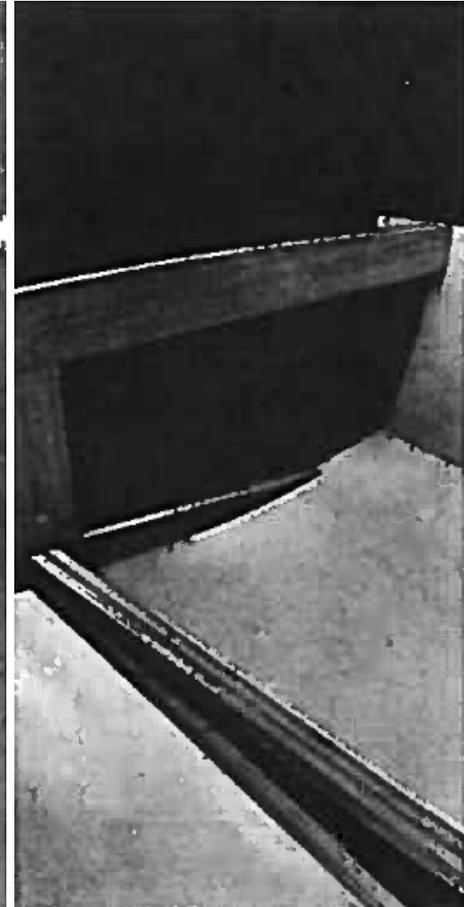


Photo 7

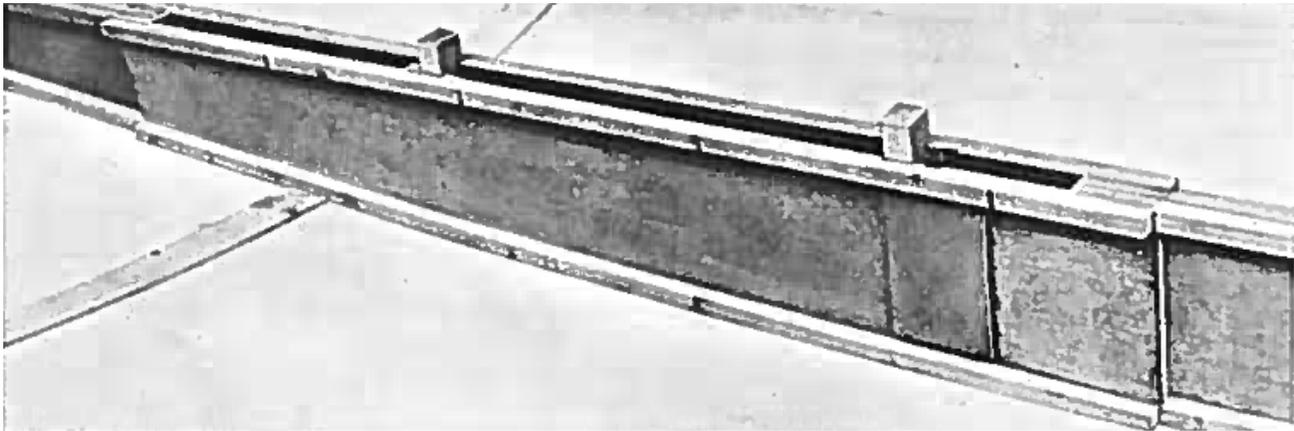


Photo 8

Fixing the centerboard Case & Web

The top of this assembly is the long straight edge to which the floor will subsequently fit but, at the moment, you are concerned with the bottom edge so turn the whole thing upside down and, if possible, clamp it to your trestles - in any case, you need it to be quite firmly held.

First of all, you will need to shape the forward end of the bow web bottom edges (Photo 5). A bevel must run from the front end where it is about half the thickness of the batten, (this is to say, the batten must be reduced to $\frac{3}{8}$ " deep), DECREASING to nothing at a point 1'-0" aft of the start of the centerboard case itself after which you will leave a completely flat surface along the bottom of the web. The easiest way to do this is to mark the limit of the bevel with a pencil line along the bow web edges and plane down to this.

The editor recommends cutting the bottom web and case edges with a 7° (or less) bevel for a better glue joint between the web/case edges and the bottom plywood panels. Ensure that the 'pointy' edge of the beveled edge is aligned flush with the bottom edge of the web and case plywood. Then the front portion of the case and web edges can be beveled further per the paragraph above.

One other task which is simpler to tackle while the centerboard case and web are still out of the boat is the cutting of the slots which will eventually take the floor webs. In plate 7 you will see a shot of the dinghy as it will appear at some stage in the near future. From the backbone, sticking out like ribs, are the floor webs each notched at right angles to the centerboard case and web. Photo 10 shows you a close-up of one of these webs in position - the floor web batten has been left off to give a clearer picture of the way in which the ply clips into the slot. This plate also shows a number of neighbouring slots. The slots ($\frac{1}{4}$ " deep and the rib plywood thickness wide) are cut in both sides of the plate-case web top edges at intervals of 1'-0" (on center) for the whole length but, for reasons we won't go into, you must start at an odd distance ($11\frac{1}{8}$ "") so I am giving you another diagram to illustrate this - again, this diagram is not to scale.

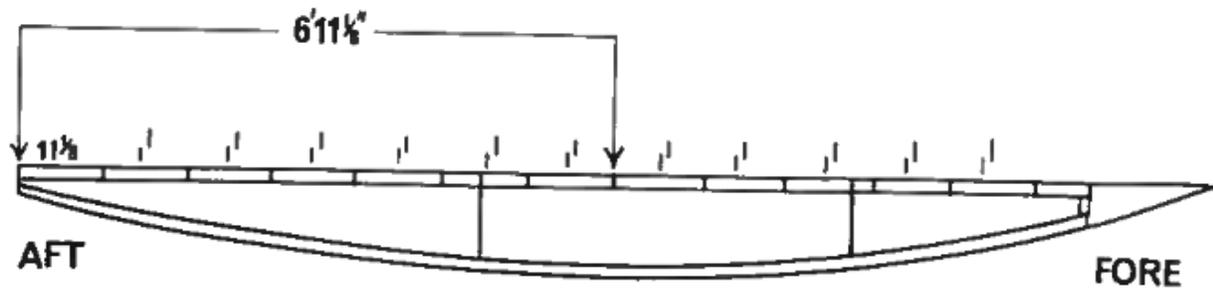


Diagram 4

Finally, before you fit the plate case assembly to the bottom panels, it is advisable to insert two blocks into the top of the centerboard slot (Photo 8) - any two pieces of spare wood will do as long as they are the correct width to hold the case to shape.



Photo 9

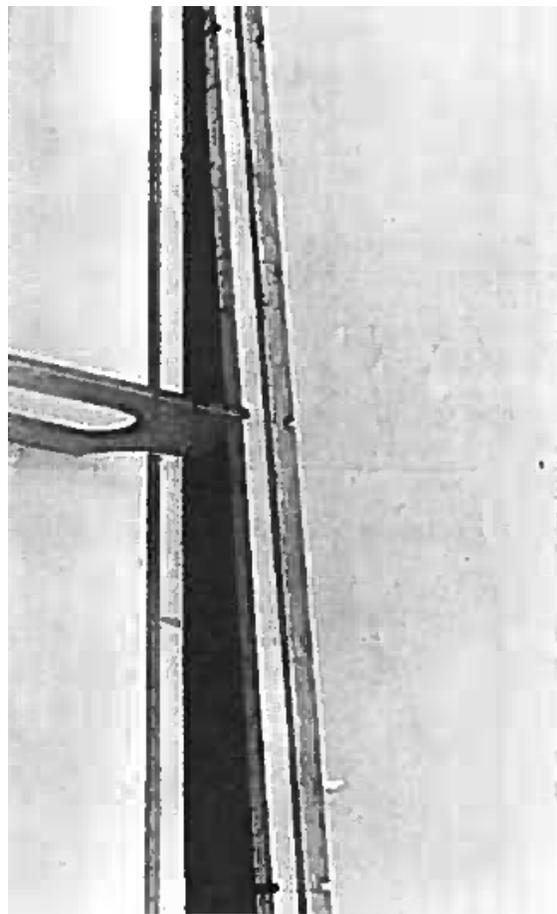


Photo 10

Drilling of Lace Holes in Bottom Panels

Another shortcut to make life easier is to pre-drill both the holes for the copper lacing and also the lead holes for the screws. Because the panels need to have matching holes it is quicker to put both panels together with edges corresponding exactly and then drill through both at the same time. With the panels in this position, scribe a line all round the top one, $\frac{1}{2}$ " from the edge and running parallel to it.

Lace holes are drilled 2½" apart using a 3/32" bit the entire length of the chine i.e. the side opposite that with the centerboard slot. These lace holes continue around the forward end of the panels until a point is reached 4'-3½" from the forward end of the centerboard slot - this is where the first of the screw holes is drilled. Photo 11 shows the lace holes followed by the positions of the screws marked as crosses.

When the position of the first screw hole is reached, change to a 5/32" bit and continue drilling holes along the guideline, this time at 3" intervals. The pattern of holes around the centerboard slot is shown in Photo 12. The screw holes continue right up to the aft end of the panels and around the corner along the actual end for about 1'-0" (these holes will be for the bottom edge of the transom Photo 7) - for the rest of the aft end drill lace holes as previously.

This can be done while the panels are still screwed together from cutting and shaping.

All the screw holes you have drilled should be slightly countersunk - but only slightly!

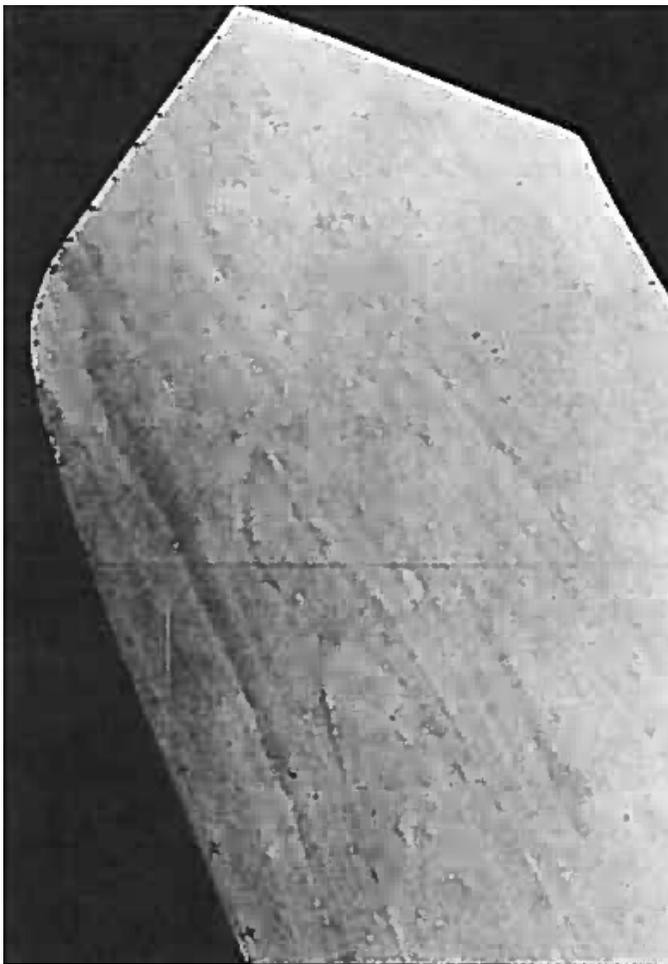


Photo 11

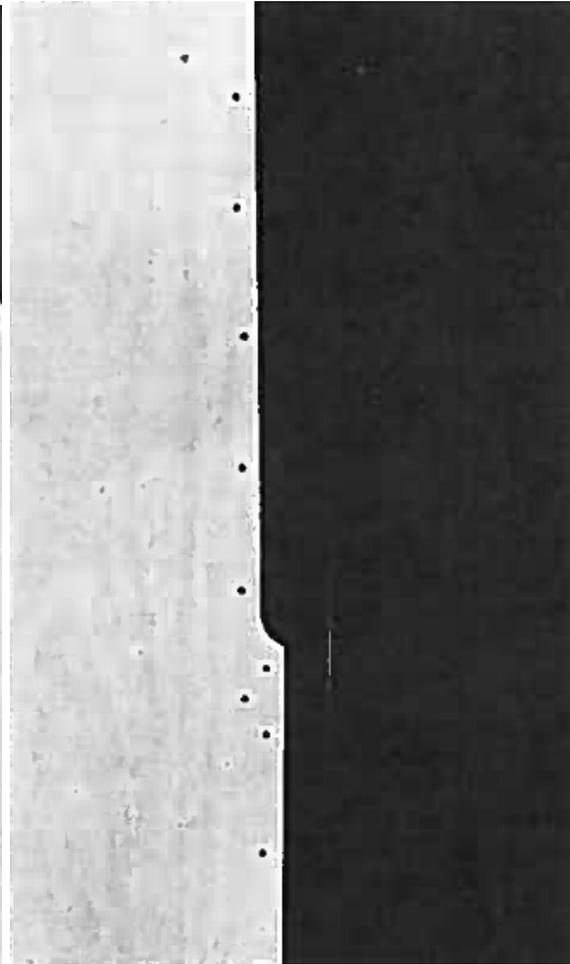


Photo 12

Fixing Bottom Panels to the Centerboard Case Web.

With the centerboard assembly upside down and firmly screwed the bottom panels can be glued and screwed into position. The final result should be that the two bottom panels butt together, edge to edge, with the centerboard slot complete and matching that in the plate case assembly.

You will find that the aft end of the panels overlap the center plate case web by 1-1/8" - this is to allow room for the transom bottom edge to be fixed (Photo 7).

The panels are glued and screwed to the web with 3/4" #6 screws being fixed at 3" intervals set 1/2" in from the edge of the ply. It is best to fix one panel first (using the ply of the web as the center line guide (and then butt the other to it. Photo 12 shows how the line of screws alters at the centerboard slot.

Before the second panel goes on, however, you should drill lace holes along the curved edge of the forward part of the plate case web - these holes should match the positions of those in the first panel. You will observe that it is not possible to screw down the panels for their complete length - the section forward of the fore plate web battens is all connected with copper wire and brings the bow up to shape. This last little job you can do later with the rest of the lacing.

It has been the experience of several members that there is a simpler method of fixing the bottom panels to the center web.

Having drawn the center line along the web you should start by offering up one of the panels to its respective side of the web. After drilling lead holes for the screws and applying glue and hardener you should commence fixing this panel by screwing about 2' of its length immediately aft of the centerboard slot. Repeat this over a similar area, forward of the centerboard slot and drill off the forward center web lacing holes.

Now offer up the other panel and butt its edge to that already fixed then screw and glue similarly. After this you should screw both panels along the centerboard case edge so that you finish this stage with both panels glued and screw over the complet center section.

By screwing a section at a time you will find that it is easier to achieve a really good but joint right down to the both ends of the boat.

One word of warning! If your hardener dries before you actually screw down the panels, especially at the extreme ends, remember to renew it otherwise the joint will be useless!

I must also mention that the aft end of the center case assembly falls short of the panel ends. - this is where the aft transom bottom edge will fit.

Now that the spine of the boat is firmly fixed, I think it is better to leave the bottom of the boat upside down because this way it will be easier to fit in the transom.

Assembly of Transom (22)

The bottom edge (24) of the transom is a crescent-shaped piece of wood in which there are two drainage holes - these match those in the transom itself. The bottom edge is glued and copper nailed to the transom flush with its lower edge and situated centrally.

Ensure you are positioning part no. 24 correctly. If it does not fit one way, try it the other, remembering that the draining holes must line up with those in the transom.

The transom panels will need to be beveled per the plans in order to fit the hull panels tightly.

Copper nail and glue top edge (23) flush with the upper edge of transom - the shapes coincide so there is no difficulty here. Finally fix the transom pad (29) in an upright position on a vertical line which is central to the

transom - the upper end of the pad fits tight to the underside of the transom top edge but there is a gap of 3/16" (1/4") at lower end to allow for the ply of the floor to slide in (Photo 7).

Fixing of Transom

Photo 7 gives you a right-way-up picture of the transom in position. You can see how the bottom edge butts up to the aft end of the center plate web.

The aft face of the transom is, of course, flush with the aft end of the bottom panels.

As the whole thing is at present upside-down, it is a simple matter to screw (5/8" #6 screws) and glue it in place using the screw holes in the ply already drilled. The rest of the lower edge should be copper laced to the bottom panels but this can be left until the topsides are laced on.

The assembly should now be turned over and, from now until the very latter stages, it will stay this way up.

Drilling Lace Holes for Fixing Sides

With each side in turn mark along the chine edge positions of lace holes matching those already in the bottom panel. Your assistant will have to hold one end of the side while you match the two panels edge to edge. You can then drill the holes.

This might be easier to do while the bottom panels and side panels are still screwed together (after cutting and shaping). Mark the chine edges of the bottoms and sides at 2 1/2" on center starting from the bow end (make sure there are the same number of marks on the sides and bottom panels). Use a square to add a mark across the 1/2" guideline that corresponds to the 2 1/2" on center edge marks. Make sure the marks end up in similar places at each end of the chine of both pieces. There should be around 72 marks (on each side) and they should start and end about 2" from each end of the chine. Drill the marks on the guideline. Then the panels can be

Remember also that the aft ends of the topsides have to be laced to the sides of the transom so again you will have to drill out a series of corresponding holes on topside and transom - three will be enough because the upper end is screwed to the transom.

While you are drilling both topsides, your helper can be cutting the coil of copper wire into lengths of approximately 2 1/2" - accuracy is not necessary here as long as the pieces are not too short. It will be helpful if each of these pieces is bent to form a U-shape.

Preparation for Fixing Sides

The bow of the dinghy tends to be a bit floppy so I advise that you, temporarily, tie the two top corners nearly together using a piece of thin string through the top lace holes. Photo 13 will give you an idea of the way to do it - the 'G' clamps in the picture are referred to in the next section.

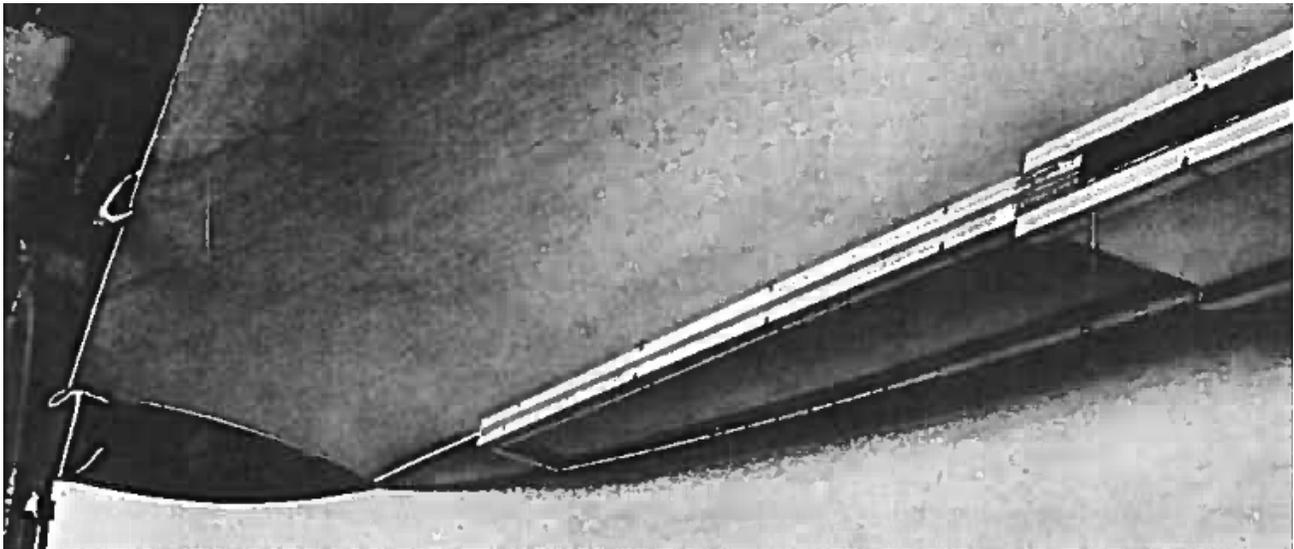


Photo 13

Fixing Top Sides

Starting at the bow and working aft. Lace each topside to its bottom panel. Slipping each copper staple through two matching holes on the inside, you finish off by twisting the ends together on the outside of the hull - to do this tightly you will need the blunt-nosed pliers.

The curved forward section of the side should fit edge to edge with the corresponding shape of the bottom panel. The gunwale already on the topside should lie along the straight top edge of the bottom panel. It will facilitate your work if the forward end of the gunwale can be clamped to the side of the bow. The butt strap on each side sits on top of the bottom panel edge.

When you reach the aft end of the top side it is laced to the transom through the holes already drilled and the upper portion is glued and screwed (1½" - #8) to the side of the transom top edge - one screw through the gunwale and another about 1½" below it will do the trick.

The principal thing to remember is that the join between panels must be a good one and not with one panel overhanging the other. The main advantage to the copper lacing method is that this can be achieved in the simplest manner possible.

Having fixed one topside, repeat the performance with the other.

Lacing Underside of Bow

Photo 6 shows how the underside of the bow is laced together and the forward portion of the plate case web. The pieces of copper wire need to be a little longer than before and each link passes through both the bottom panels AND the web, to be twisted tightly on the outside.

Before lacing together the actual sides of the bow itself it will simplify the job if you slightly bevel the inside edge so that the two sheets of ply join comfortably. Also you will need to glue and copper nail the remaining length of the gunwale to the top edge of the bow. The gunwale ends can be trimmed off square to the bow.

Placing the Spreaders

These long pieces of wood have a cut-out shape at each end which clips over the gunwale at each side of the boat. They serve to tension the sides of the boat to the correct shape.

The positions of the spreaders are as follows: "A" 3'-0" from aft transom, "B" 6'-0" from aft transom, "C" 9'-0" from aft transom - in other words, they are at intervals of 3'-0".

The editor plans to try making spreaders out of some 1"x1" wood, cutting the ends to the correct angles and screwing through the gunwale into the ends of the spreader sticks. This may not be as easy to work around but should keep them from shifting up and down the boat. Also, it is not obvious from these instructions how the spreaders included with the kit actually looked or worked.

It might help you later on if you place some weight in the center of each bottom panel because eventually the underside of the boat will curve outwards - this is not absolutely necessary but it aids the process of fitting the floor webs. Also a pair of vertical struts (any rough piece of wood can be used) screwed to the topside and resting on the floor as center props which can be adjusted at the foot to prevent a twist developing in the dinghy.

The skin of your boat is virtually complete and the most difficult part of the construction is over. From now onwards it is merely a matter of fitting pieces inside the hull you have created.

General Notes on Shaping the Boat

The next section of construction deals with the fitting of the bulkheads and floor webs all of which go under tension and press the skin out to shape. This is accomplished more easily by fitting all these pieces before the epoxy sealing the seams has really had time to bond off completely. This will take several hours but to avoid undue haste on your part I have planned a sequence to achieve a successful job without too much trouble.

It is strongly recommended that the bulkhead and ribs be test fit at this point. Drill the holes for stitching the outside bottom corners of the ribs to the hull. Drill a few holes for temporarily stitching the bulkhead to the hull panels. Force the bulkhead into the boat and stitch into place then place the few pairs of ribs that have been cut out into the hull and stitch them into position. Ensure that the edges of the bulkhead and ribs contact the hull well. Some gaps are okay. Gaps over 1/4" will require shaping or remaking the part. Make sure the top curve of the bulkhead aligns with the side panel top edges and gunwales. Once the bulkhead and rib pairs are shaped well, check the other ribs for fit and cut out the rest of the ribs. Remove the ribs and bulkhead from the boat and move on to completing the sub-assemblies.

It will first be necessary to sub-assemble the bulkhead and floor webs so we will start with this.

Assembly of Bulkhead (16)

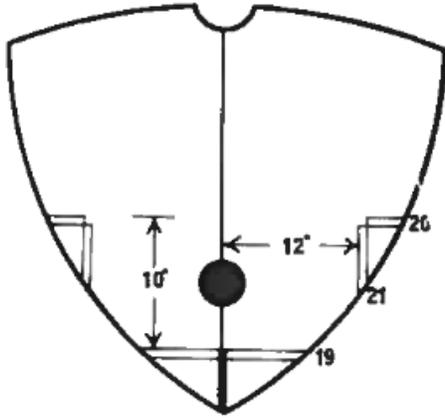


Diagram 5

The bulkhead is shield shaped and, at its lower point, has a vertical slot - a horizontal line should be drawn across the bulkhead level with and at right angles to the top of the slot. This is the setting line for the upper edge of the floor battens (19).

From this line measure up a further 10" and draw another line parallel to it. Now draw a vertical center line starting from the top center of the slot. From where this center line crosses the upper horizontal line measure out to either side a distance of 1'-0" and draw a short vertical line running down from the horizontal. From Photo 14 you will see that you now have the setting lines for the seat top battens (20) and the seat front battens (21). With glue and copper nails, fix all these pieces as in the illustration.

On the other side of the bulkhead fit the top edge flush with the upper edge of ply and notches coinciding. Also fit on this side the bulkhead hatch frame (18) - Photo 15 shows both these pieces in position.

It is recommended that bulkhead location on the gunwale be marked from several points. The measurements have been indicated in the plans. They likely will not all match exactly. This is okay. The bulkhead needs to be placed perpendicular to the top of the keel web and as close to parallel to the transom as possible.

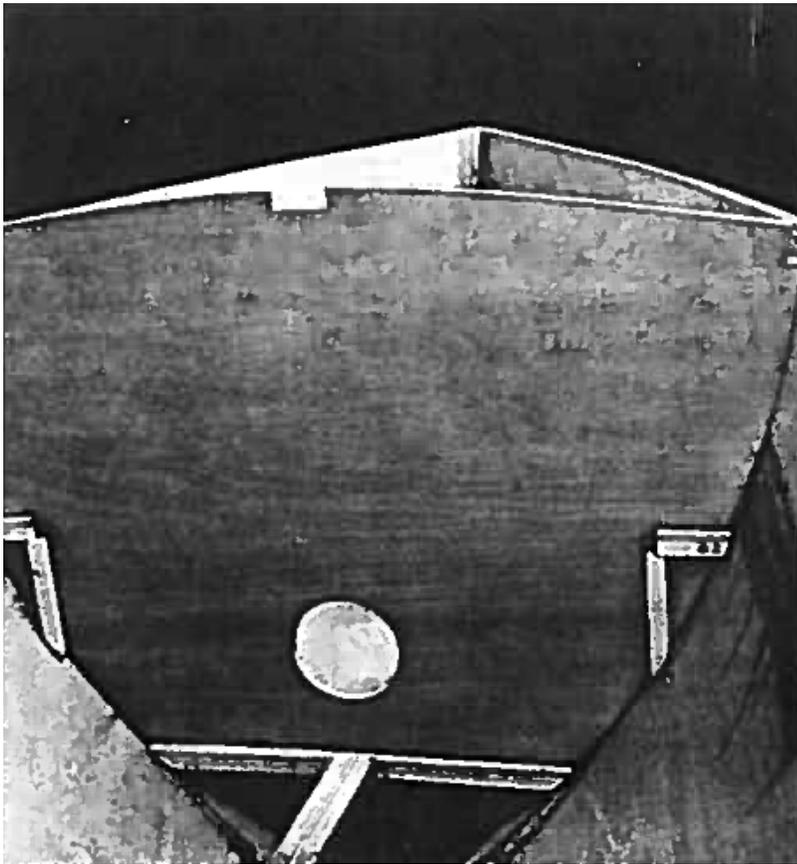


Photo 14

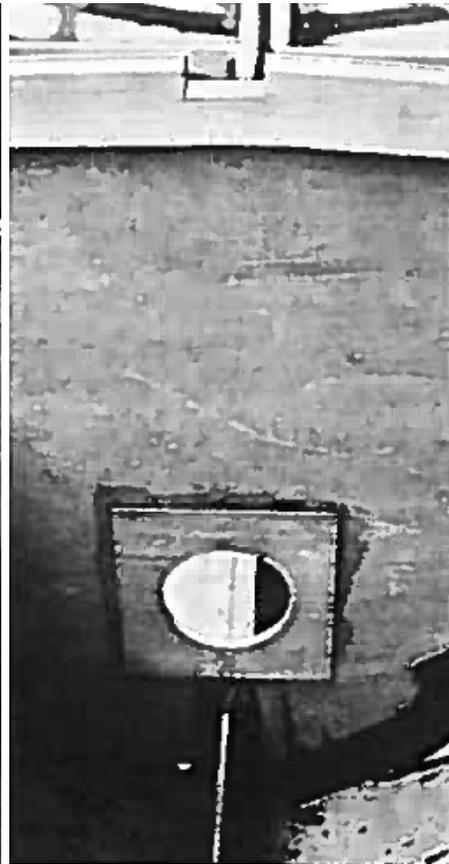


Photo 15

Assembling Floor Webs

Photo 9 shows all the floor webs in position - it can be seen that each web has a batten along the aft face of its top edge with the exception of one web which has battens on both sides. The flooring will be fastened to these battens and because it is laid in two separate halves, the web where these meet is double sided in order to take the join.

Apart from web 36 which has batten (36A) on either side of its top edge, all the rest of the floor webs (30, 31, 32, 33, 34, 35, 37, 38, 39, 40, and 41) can be fitted with their single battens (30A, 31A, 32A, 33A, 34A, 35A, 37A, 38A, 39A, 40A, and 41A respectively). Each batten must be fitted to leave a $\frac{1}{4}$ " gap at the wider end - this is the part which clips in the plate-case slots.

One other piece of preparation is that you can drill a copper-lacing hole in the lower corner at the narrow end of each web. Web No. 30 does not need a hole because it is fastened as shown in Photo 16 (the wire goes all the way around the small end of rib 30); also shown is web 31 laced, like all the rest, through the holes you are now drilling.

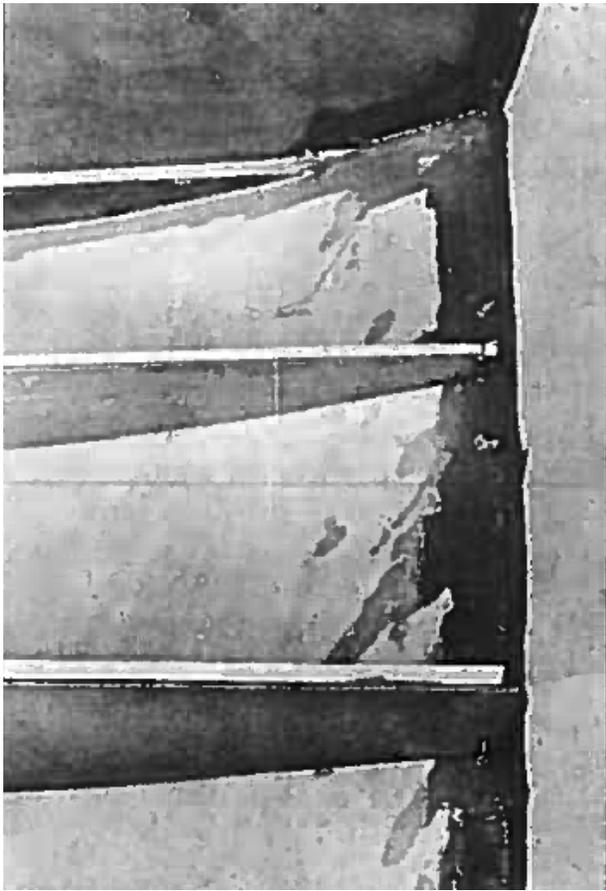


Photo 16

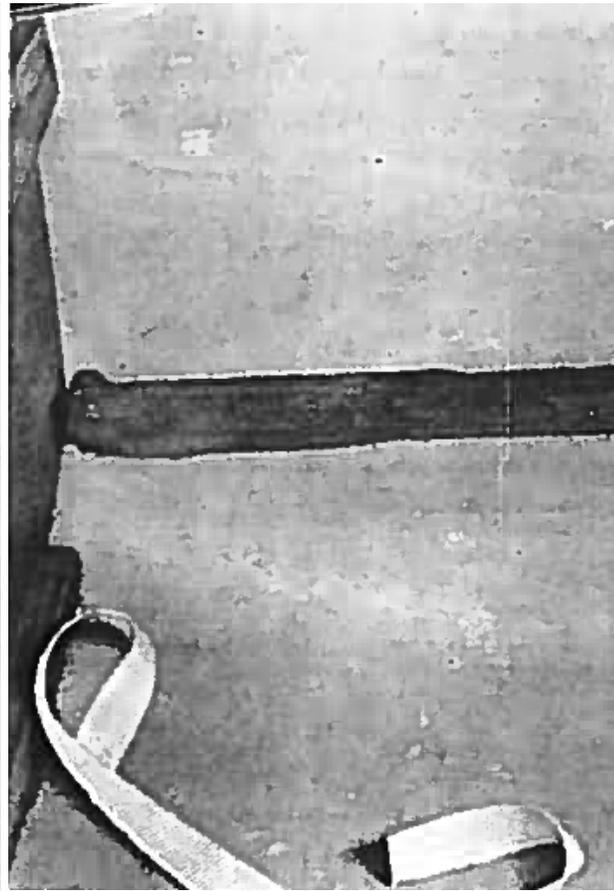


Photo 17

Application of Fiberglass Ribbon & Epoxy

The inside of each seam, where plywood meets plywood only, has to be bonded with fiberglass tape and epoxy. First of all cut off two strips of tape sufficient to cover the seams between the topsides and bottom panels with about $\frac{1}{2}$ " overlap at each end. A better seal is made if the copper loops are flattened into the corner with something like the butt end of a hammer before the initial application of epoxy is done.

The method of applying is to paint epoxy along the seam first, lay the ribbon on top and then brush epoxy down through the weave of the tape so that it becomes impregnated.

So, after cutting your tape, mix the epoxy carefully according to instructions and proceed with this job. Photo 17 shows the tape as it looks before and after this process.

Here is where we use a shortcut. Get your assistant to do the epoxying and instruct him to do the seams at the bow on both sides of the boat first. This will mean that, after he has passed the point at which the forward bulkhead is fixed, you can actually fit the bulkhead into place while the epoxy is still wet. He then continues down the length of the hull carefully laying the epoxy and fiberglass so that it is tight to the seams with no air bubbles.

Do not tape along the centerboard assembly where it meets the bottom panels - part of this will be resinned but not until after the bulkhead is fitted.

Although, at this stage, a few runs of epoxy down the ply surfaces is somewhat immaterial, it would be as well to insist that these be avoided where possible because when you come to epoxy the portions of the boat which will be visible when the structure is complete it is imperative that the finish is not marred by ugly trickles of the compound.

Fitting the Bulkhead

Photo 14 shows how the slot at the bottom of the bulkhead clips down over the forward end of the plate case web butting tight up against the upright battens (10). The bulkhead floor battens line up with the top of the web casing and face aft. You must ensure that the whole assembly is vertical or everything else will be thrown out of position. A set square place on the center case web will show any discrepancies immediately. Once you have decided the correct placing for the bulkhead mark the gunwale to indicate the line of its location.

As your principal assistant is busy, I suggest you co-opt someone else to push down on the bulkhead in its correct position while you first hammer in a couple of copper nails from the forward side into the upright battens of the center case web - these will act as retainers. Then put a long screw (1³/₄" x 8) through the gunwale at each side so that it comes through into the side of the bulkhead top edge. These screws are temporary and will be removed later. Ensure that the line of the bulkhead top comes down correctly to the gunwales.

By the way, a bit of glue at the joint between the bulkhead and plate case web might be advisable but don't worry if you forget it.

From a point roughly halfway along the centerboard slot to the forward bulkhead, you should tape and epoxy the bottom edges of the center board assembly to the hull. This taping is on both sides of the assembly.

Fixing Floor Webs

By this time your epoxying should be complete so start fixing in the floor webs. Each pair must be put in at right angles to the plate case web and clipped in the slot at its inner corner. The part numbers are in order going forward.

In an effort to adhere the ribs and provide some extra waterproofing (in the floor tanks), the editor recommends using a foam paint roller to apply a thin coat of epoxy to the inside of the hull panels and the bottom and center edges of each rib before installing the ribs into the hull. It is recommended that each rib pair be installed before moving on to the next. It is also recommended that the ribs be dry/test fit prior to epoxying and installation.

HERE ARE TWO MOST IMPORTANT POINTS!

First you must start at the aft end of the boat with webs 30 and proceed pair by pair until you reach the bulkhead.

Second, each web must be pressed down tightly to the hull in order to force the underside of the skin to shape - the top edges of the webs should lie on the same flat plane as the center case web and each web should be upright with its top edge facing aft (except, of course, web 36).

To hold them in position, lace them at their outer ends to the hull as previously described (Photo 16).

This job is nowhere as difficult as it sounds because all the pieces are shaped for you but it is vital that care is taken in their fitting because the ultimate form of your boat depends on it.

The curve in the bottom edges of the transom may require that the two aft ribs also be slightly curved. This should be test fit and new ribs cut out if required. Alternatively the straight-line transom and ribs may be used. There doesn't appear to be a reason that the transom is curved slightly except perhaps for looks. (It's not in the class measurements).

By the way, if necessary, you will have to temporarily remove a spreader so that you can reach your work but don't forget to replace it!

Fitting the Stem Post (27)

The first step is to finish fiberglassing the rest of the inner seams i.e. around the corners of the aft transom and the bow.

In the case of this latter you have to epoxy and tape the forward face of the bulkhead where it meets the hull.

Then cut two pieces of tape long enough to run from the bulkhead, along the bottom of the boat where it meets the forward end of the plate case assembly (the piece of shaped ply which you have laced right through the hull) and then up the inside of the bow to the top. This means that when these tapes are epoxied in place there will be a double thickness right down the inside of the bow. While the epoxy is still wet, screw ($\frac{3}{4}$ " #6) the stem post in place - this can only fit in one way and the top of it should, of course, be level with the gunwales. (Photo 18). You will need three screws either side but stagger them slightly so that they do not impinge on one another. Photo 19 shows the positions of these screws on one side of the bow and also those for the stem trailer block (28) which we will deal with in the next paragraph.

Meanwhile the stem post should also be epoxied into place with tape down either side for its full length.

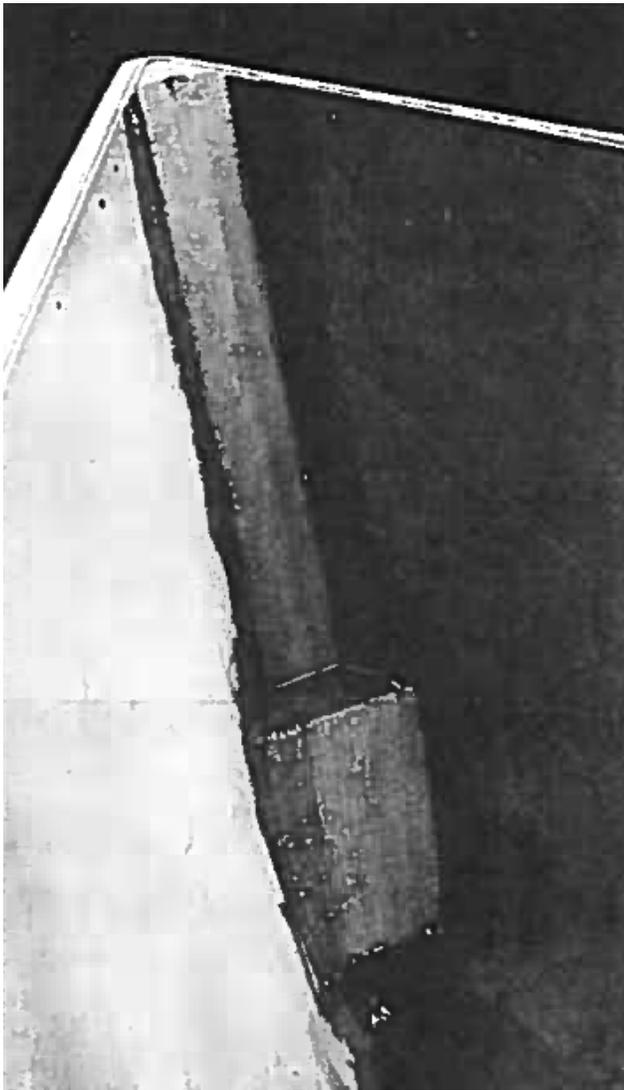


Photo 18

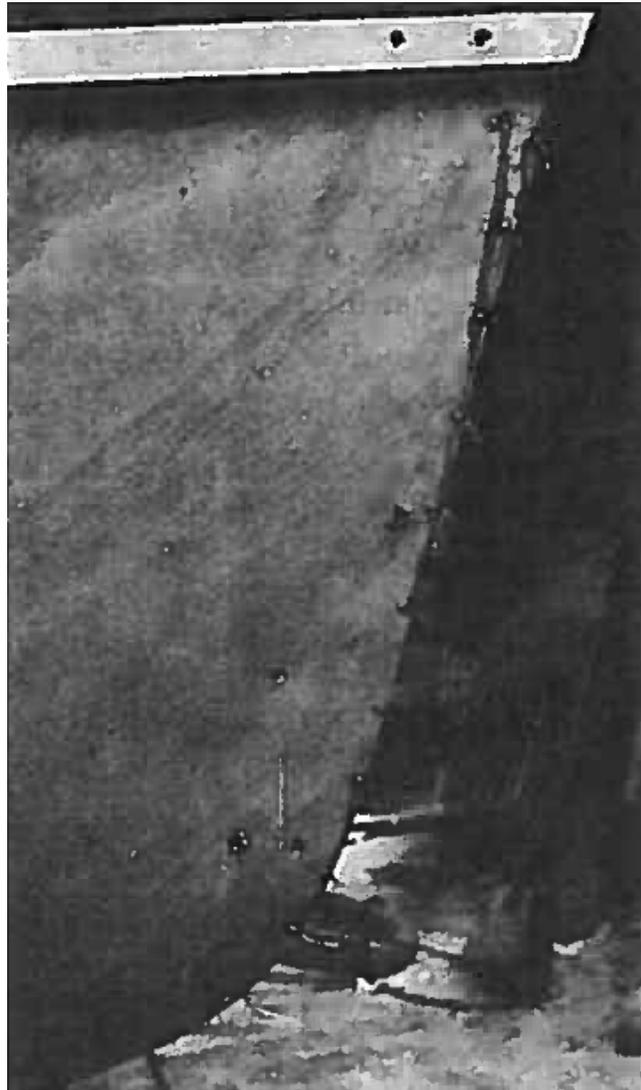


Photo 19

Fixing Stem Trailer Block (28)

This, again, will only fit in one way round but the top surface of the block should be 14" from the top of the stem post. Screw it into place while the epoxy on the stem is still tacky - the pattern of screws ($\frac{3}{4}$ " #6) either side is indicated in Photo 19. In a similar manner to the stem post, fixing tape and epoxy are applied to bond the block to the hull.

The top of the stem trailer block is fitted 1'-5" from the top of the stem post NOT FOURTEEN INCHES.

Epoxying Floor Webs

Strips of fiberglass tape and epoxy should now be applied to the edges of each floor web where it meets the hull and center plate assembly (Photo 20). This needs to be done only on the forward face and NOT on the aft face of each web.

There are small cutaway sections at the inside lower corner of each web which will allow any water to drain right through the boat - these must not be blocked with fiberglass and epoxy.

When you have finished all your taping don't throw away any left-over epoxy - brush it along the full length of the center case assembly where it meets the bottom panels. This will ensure that it is completely watertight because, if there are slight gaps due to bad gluing, the epoxy will fill them.



Photo 20

Preparations for Fixing Floor Panels

Along the inside of the hull above each end of the floor webs, make a rough mark with a pencil to indicate the position of the webs so that you can locate them when they are covered by the decks.

Now lay the two aft portions of the floor in position to make sure that they fit - the center aft corner of each slips under the transom pad. (Photo 21). Using the pencil lines on the hull as a guide, mark each piece of flooring to give you some guidance when you come to apply hardener on the panels to match the upper surfaces of the floor webs. Now clean out all the sawdust and wood shavings from your boat.

There are one or two important jobs to do before you can fix the floor in position. One is that you have to fix strengthening pads (43A) to the undersides of the floor ventilation hatches. Photo 22 shows the floor in position with the two pads on top and the cutaway corners adjacent to the centerboard slat. The picture was taken like this to demonstrate the correct relative position of the pads to the slot BUT, as I have said previously the pads go UNDER the floor. You, therefore, have to glue these in place before the flooring goes

down - a pin at each corner, from the floor side and clenched over where it protrudes from the pad, is sufficient to hold this piece while the glue hardens.

Because the lower part of your boat will be a sealed compartment, it has to be waterproofed to prevent rot being caused by dampness. This is done with a special paint made for use in the bilges of a boat. There are several types on the market but the one recommended is DANBOLIN by International Paints, with initially a first coat of metallic pink primer.

When the primer is dry put a good coat of Danbolin on all surfaces which are to be enclosed but not on any surface which is subsequently to be glued e.g. the top surfaces of the floor webs and centercase assembly. Also, remember that the tow aft corners on the inside of the hull are not covered by flooring and therefore not painted (Photo 23).

Don't forget to paint the underside of the floor but NOT along the line to which the glue will adhere i.e. the guidelines for the floor webs.

It is recommended that the floor be cut out of one scarf-joined panel of plywood. It is also recommended that the centerboard slot and vent hatch openings be cut out of the panel and the panel dry-fit and trimmed to fit the boat. Drill four ½" diameter holes near the perimeter for the vent tubes to be inserted (see plans). Once the floor fits well, the hatch doublers should be attached around the vent hatch openings. They should be positioned so that they do not interfere with the center case or rib battens. Once the panel is ready to be installed, some fiberglass fabric should be cut to completely cover (and be just larger than) the floor panel and set aside. It is recommended that the bottom side of the floor panel be coated in a thin layer of epoxy. Then the fiberglass should be placed on the bottom surface of the floor panel and more epoxy should be added as needed to wet out the fiberglass and eliminate any air bubbles below the fabric. The edges of the panel as well as the holes and slots should be sealed with epoxy. Once the epoxy on the floor is just starting to gel, the openings should be cut in the fiberglass and epoxy should be added to the tops of the tops of the center web, case, and ribs, then the spreaders should be removed, and (with the help of a friend) the floor panel should be flipped over (fiberglassed side down) and set into the boat (making sure it slides into the slot in the transom ribbing and that everything is properly aligned and secure). Fasten the floor panel in position with a few pin nails (into the battens) at opposite ends/sides of the panel then reattach the spreaders and check that the boat is still true. Finally, attach the panel to the center web, case, and ribs with pins. The edges of the floor panel can be fiberglass taped and epoxied to the hull side panels, transom, and bulkhead. Check that the boat is still straight. Install the hatch covers as described below then take a break and let the epoxy fully cure.

The last job to complete is the installation of the nylon drain hole sockets in the floor web which is next to the floor ventilation hatches. This floor web (No. 39) is the only one with a solid surface but with two small drain holes at the well of the boat - it is into the aft side of these holes you will have to fix the sockets using Aerolite glue to seal.

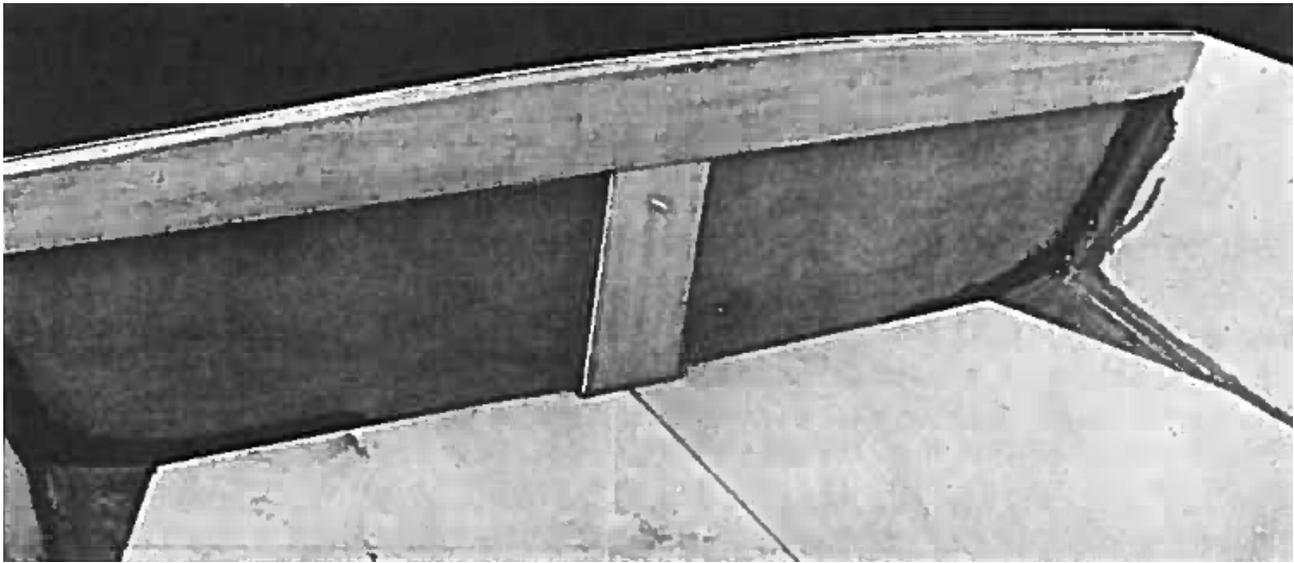


Photo 21

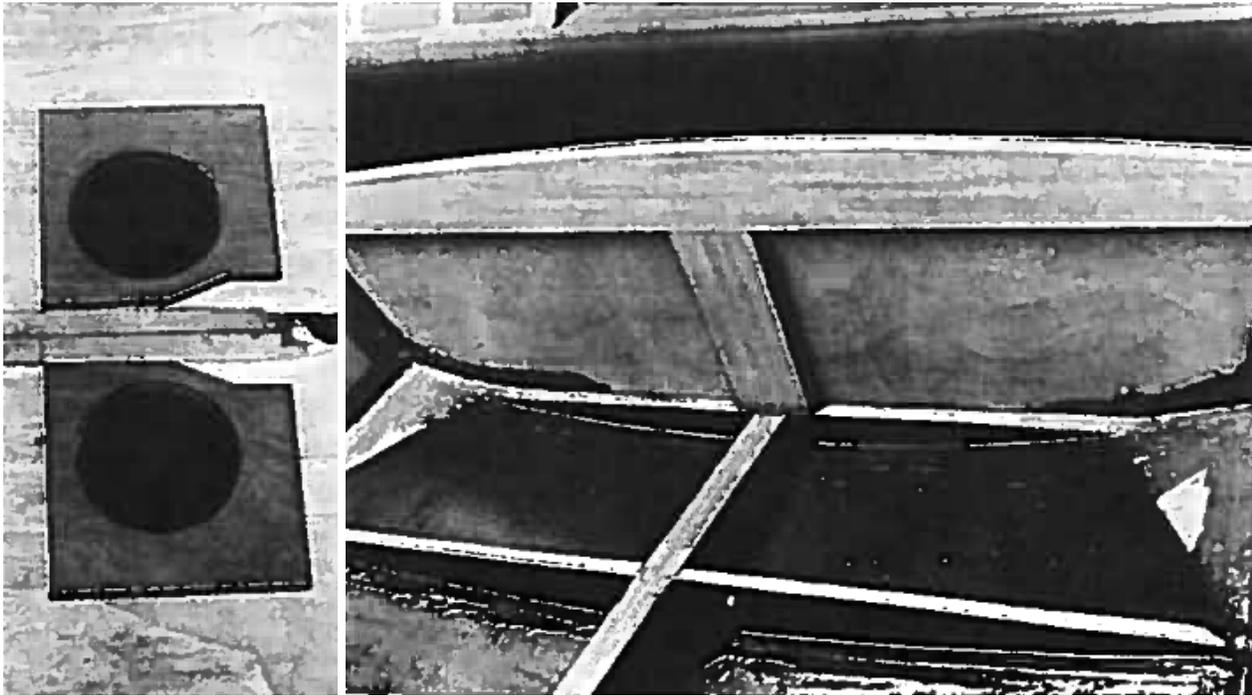


Photo 22

Photo 23

Fixing the Floor

Each section of floor, starting with the two at the aft, has hardening solution applied to all the relevant parts and is then pinned to the center board assembly and the floor webs which have previously had glue applied. The joint along the center of the boat should be as exact as you can make it - the outer edges of the floor will be covered eventually so there is less need for accuracy there.

When the two aft panels are on, repeat the process with the two forward sections. The front ends are, of course, pinned and glued to the battens on the bulkhead.

Photo 24 shows roughly what the boat looks like with flooring in position.

The final stage of this operation is to tape and epoxy all the outer edges of the floor to the boat. Do not apply tape to the center seams of the flooring but a neat application of epoxy alone across the seam where the forward floor sections meet the aft is permissible because this will ultimately be covered by a batten.

If you have some epoxy left over it will be needed for the next job.

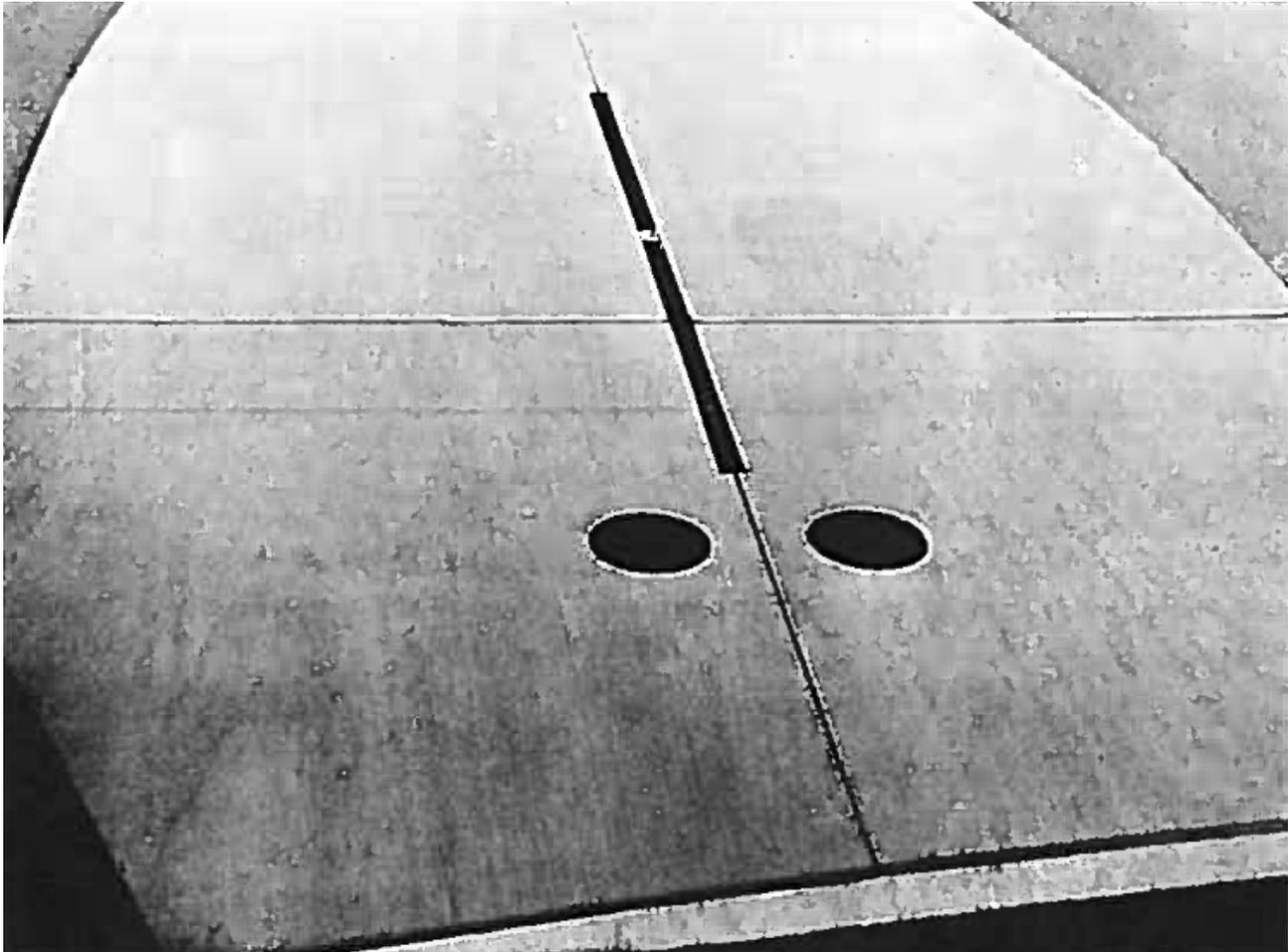


Photo 24

Fitting of Ventilation Hatches

It is a good idea to fit these black screw type hatches now because they prevent any sawdust and shavings dropping under the flooring and messing up the under-floor compartment.

The installation is almost self-evident - the outer ring is screwed down to encircle the ventilation hole but first it is necessary to seal the plywood, particularly the end-grain, to prevent absorption of water. With the epoxy left over from taping the floor, go over the edges of the apertures and the surface which will lie beneath the black outer ring of the hatch. It is best if the epoxy is beginning to solidify when you do this because then the outer ring will screw down tight to a firmer seal. Use 1/2" #4 screws (roundheaded) as fastenings.

The actual hatch cover merely screws into place. Photo 25 shows a view of the fitting.

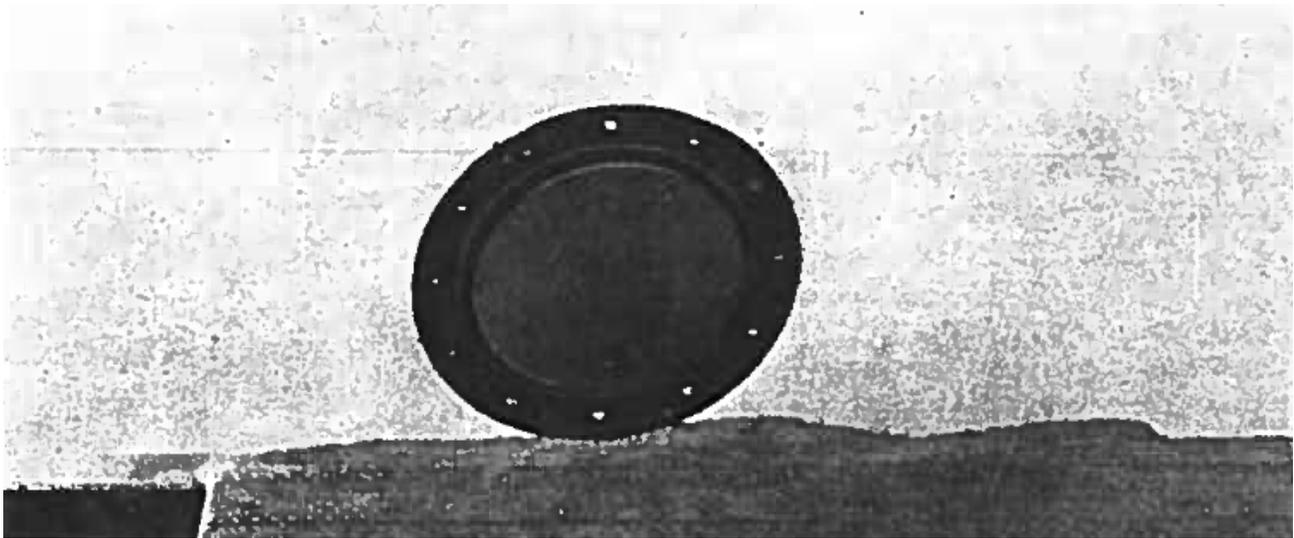


Photo 25

Two Important Notes

1. From about this time onwards several of the illustrations show the dinghy with no spreaders in place. These have been removed deliberately in order to produce clear uncluttered illustration BUT the spreaders in your boat should be there all the time. Also the two upright props screwed to the gunwales at one end and resting on the floor at the other should be checked periodically to ensure your dinghy is without a twist.
2. Once your epoxy has set off around the flooring, and assuming that your dinghy is on a firm base, you will be able to climb into the boat, if you wish, to carry out certain processes. Two in particular, when we come to them, will be the fitting of the floor boards and also the upper sections of the centerboard case.

Assembly of Centerboard Case

This is put together in a similar manner to that of the center case assembly which is now beneath the floor.

The two sides of the plate case top (46) sandwich the foot rest (48) at the aft end and the forward packing at the forward end. The diagram shows one side screwed and glued to the foot rest and forward packing with appropriate measurements - the packing you will notice fits flush with the ends of the sides.



Diagram 6

The inside of the slot is painted and the other side of the plate case is glued and screwed in place to complete the assembly.

Photo 26 also pictures the whole assembly.

One small point - use 1¼" #8 screws and place them in the corners of each section - two diagonally opposite from one side and the other two from the reverse side and opposite corners.

The whole lower edge of the assembly must fit perfectly flat to the floor so ensure that this edge is absolutely right.

N. B. the center plate case forms a slot slightly narrower than that in the boat.

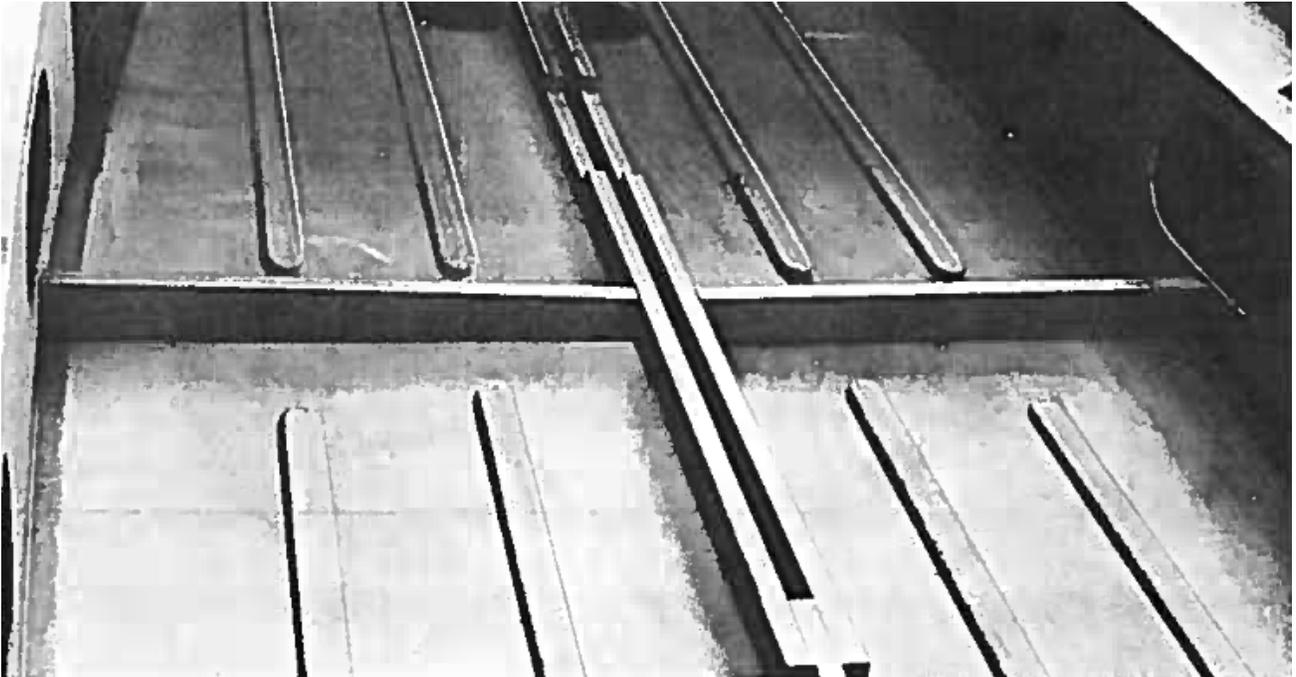


Photo 26

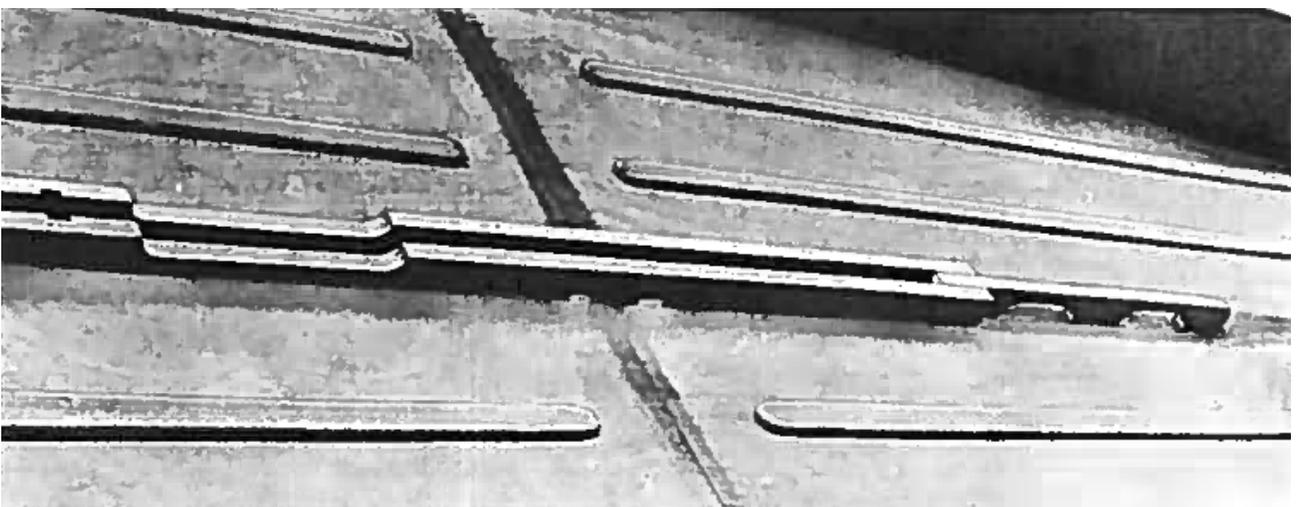


Photo 27

Fixing Center Plate Case

Fair out the slot in the flooring to match the case assembly slot beneath it. Screw and glue the plate case assembly down to its partner under the floor matching up the two slots and with the foot rest aft. (Photo 27).

Because of the depth, use 2½" #10 screws down through the plate case from the top. Make sure that the countersunk lead holes are straight and centrally situated. Space screws at about 4" intervals.

Guidelines for Side Tanks

It is always extremely difficult to give measurements for irregularly curving lines which are inconstant to a curved surface. The guidelines to fit in the side tanks are exactly this.

The string guide line around the inside of the hull has to be on a level plan 10" above and parallel with the floor of the dinghy. This sounds impossible to achieve but you can make the gadget shown in Photo 28 and mark the line out accurately in half a minute. Using any old off cuts of timber, nail on to the horizontal bar (4'-6" in length approx.) two pieces of wood exactly 10" long and at right angles to the horizontal - set each in about 1'-0" from each end of the bar. (see diagram).

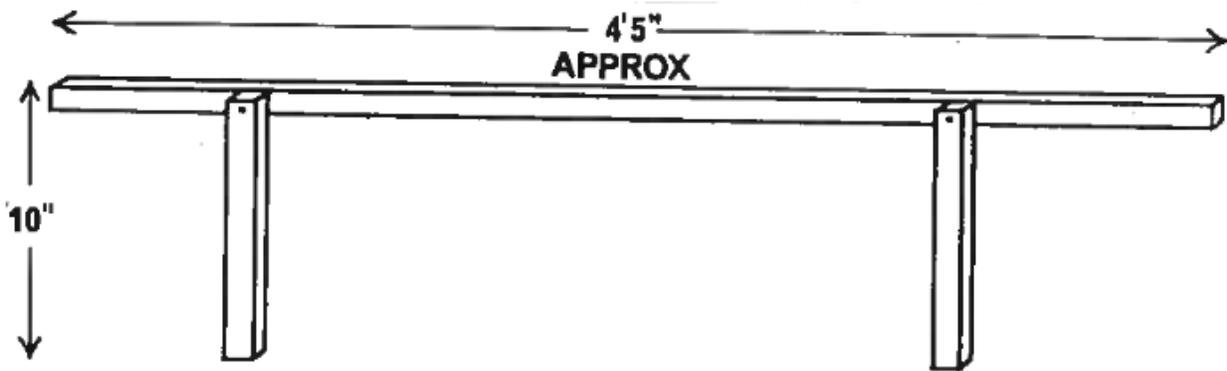


Diagram 7

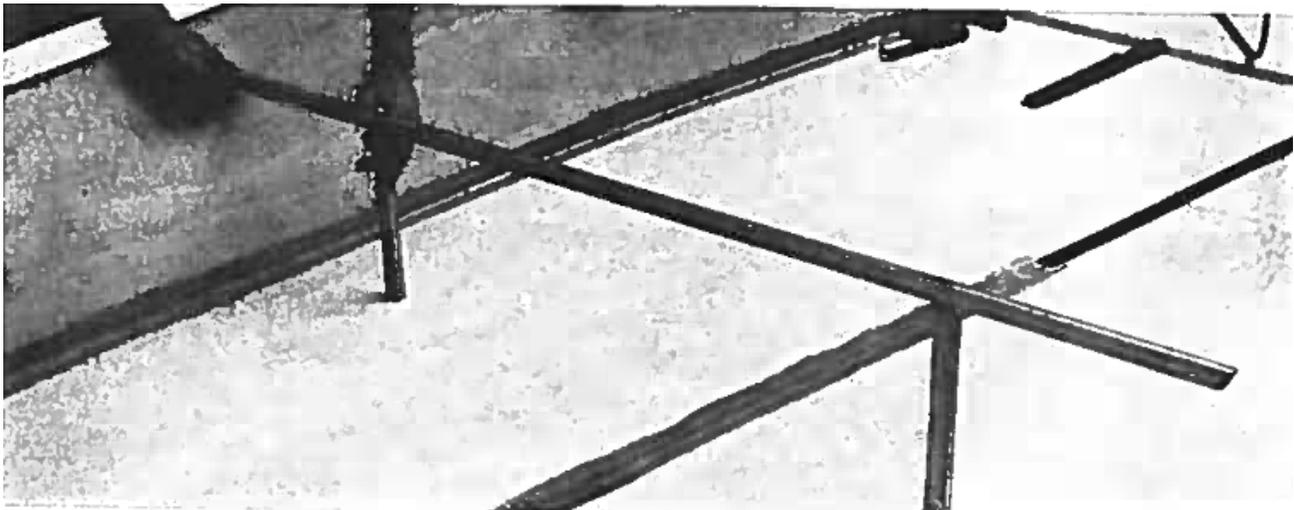


Photo 28

Now, keeping the thing upright with the two legs touching the floor, as in the picture, you can with a pencil, at one end of the horizontal and level with it, go around the inside of the hull inscribing a line. This line will exactly fulfil the requirements and will represent the top edge of the stringers.

The side tanks are merely a number of boxes in a row. It is a modern civil engineering technique, to achieve lightness and strength at the same time, to build a succession of small box sections doing away with girders altogether. Already you have constructed 27 boxes to bring your dinghy to its present state and now you will be adding a few more either side to give added rigidity. I have dealt with this in detail to give a simple general picture of what is required. As you know, a wooden box has to have battens on which to fasten the sides and ends etc.

To get the top batten (25) at the aft end in, first, measure in along the transom, on a level with the stringer guide line, a distance of 9½" (longer for the wider seats in the plans, around 11½"). It is along this line that the transom seat top batten is fixed BUT the piece will be a little longer than necessary allowing you to shape its ends slightly to fit the curve of the hull and the slope of the side tank side. Glue and nail this along its setting line with its outer end flush to the hull and the square notch uppermost (Photo 29).

The stringer (50) represents another of these battens and must be fixed along the guide line. ⅜" beneath this line drill out a series of lead holes using a 3/32" bit - this makes it easier to locate the position of the stringer from the outside.

The stringer can now be copper-nailed and glued along its line with the bevelled face uppermost - this ensures that there is a flat setting for the side tank top. The aft end is tight up to the transom seat top batten and, of course, on the same level. Carefully curve the stringer around the inside of the hull fixing as you go. Trim away the portion which goes over the hull butt strap (butt strap not present - trimming not required if the panels were scarf jointed together). The copper nails should be at roughly 3" intervals.

When you are about halfway round you will be able to judge the exact length which will fit flush to the forward bulkhead. Trim off to this point and conclude fixing. Repeat operation on the other side of the boat. Photos 28 and 29 show various aspects of this operation and I have purposely included later stages in these pictures which permits you to relate one section with another.



Photo 29

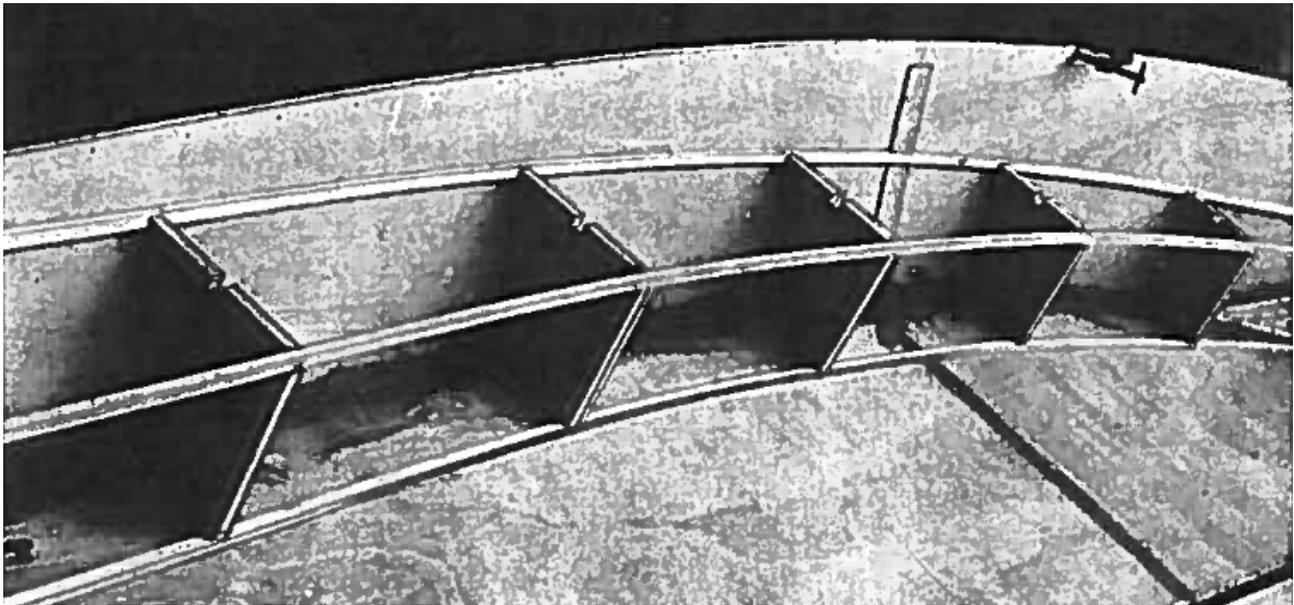


Photo 30

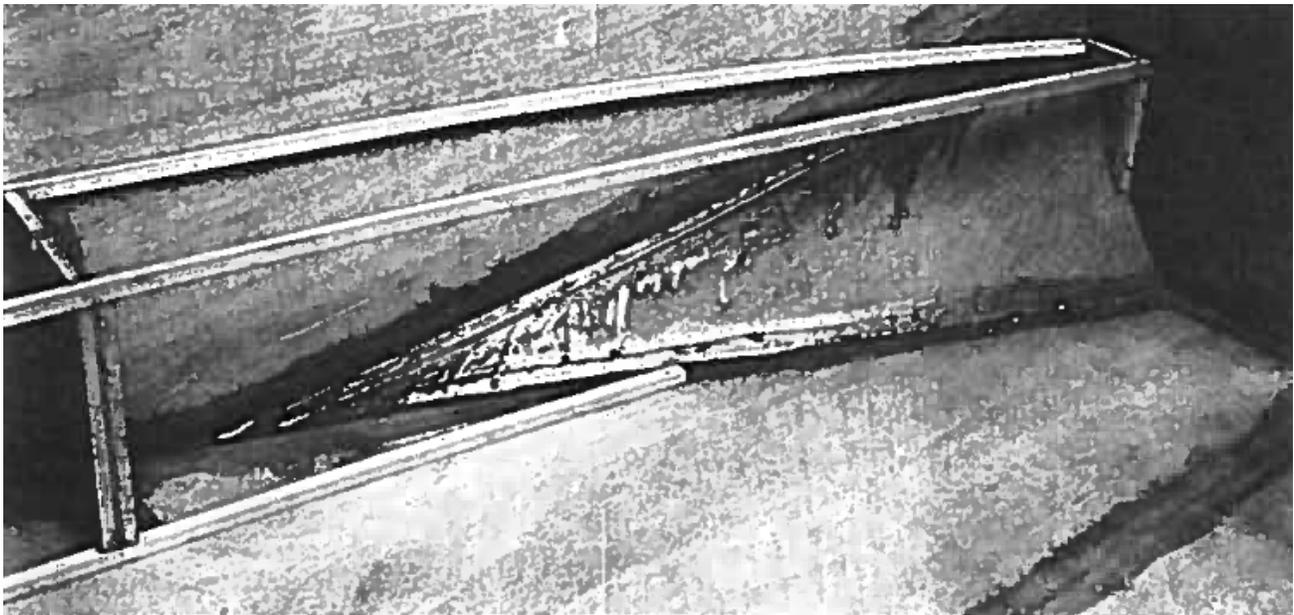


Photo 31

Setting Line for Side Tank Fillet

The fillet is the batten which runs along the floor and to which the lower edge of the side tank side is pinned and glued.

You will see from Photo 30 that the bottom corners of the side tank webs meet this fillet. You will also perceive that (Photo 31) the forward end of the fillet finishes short of the bulkhead.

The simplest method of ascertaining the fillet setting line is to place each side tank web in place and mark where its lower corner meets the deck. Joining these marks give the guideline, all but the forward section.

The side tank webs (56, 57, 58, 59 & 60) are fitted along the stringers in that order starting at the aft end. They are spaced out at 2'-0" intervals so mark these spots along the stringer and lay each web down by its respective setting mark - this way you can tackle them systematically and not get them mixed up.

Each web must be held upright, when marking the fillet guideline, and at right angles to its respective portion of the hull. Because of the curve of the sides, this means that the webs will not be parallel to each other. Photo 32 illustrates this better than words so you had better study that. At this stage, by the way, the webs are just sheets of ply - the fixing of the battens will come later.

It is the editor's opinion that the seat webs should be placed parallel to and directly over the floor ribs below each seat web. This will require that the seat front battens will need to be bevelled to properly fit the seat front curve. This angle has been indicated in the plans. The webs will be parallel to each other. The marks made to indicate the location of the floor webs can be used to place the seat webs.

Having checked that your fillet setting line is accurate, you may now glue and copper nail the fillet down to the floor remembering that the lower notch of the seat web will have to clip over it (some of the nails should go down into the floor webs). Your assistant can check this at each stage with the web to make sure of no error.

Make sure no nails penetrate into the floor tanks. The glue/epoxy should provide most of the bond between the fillet and the floor panel. The nails through the fillet into the floor webs should help hold the fillet in place while the glue dries/cures.

Although Photo 31 shows the forward end of the fillet fixed down, it is just to give you an idea of how it will subsequently be. For the present, leave this loose because it is simpler and more accurate for you to fix this when you put the side tank sides on.

The last part of the outer framework of the side tanks is the transom seat front batten (26) which is fixed vertically on the inside of the transom with its lower end of the floor fillet (Photo 29) and its top end underneath the transom top edge.

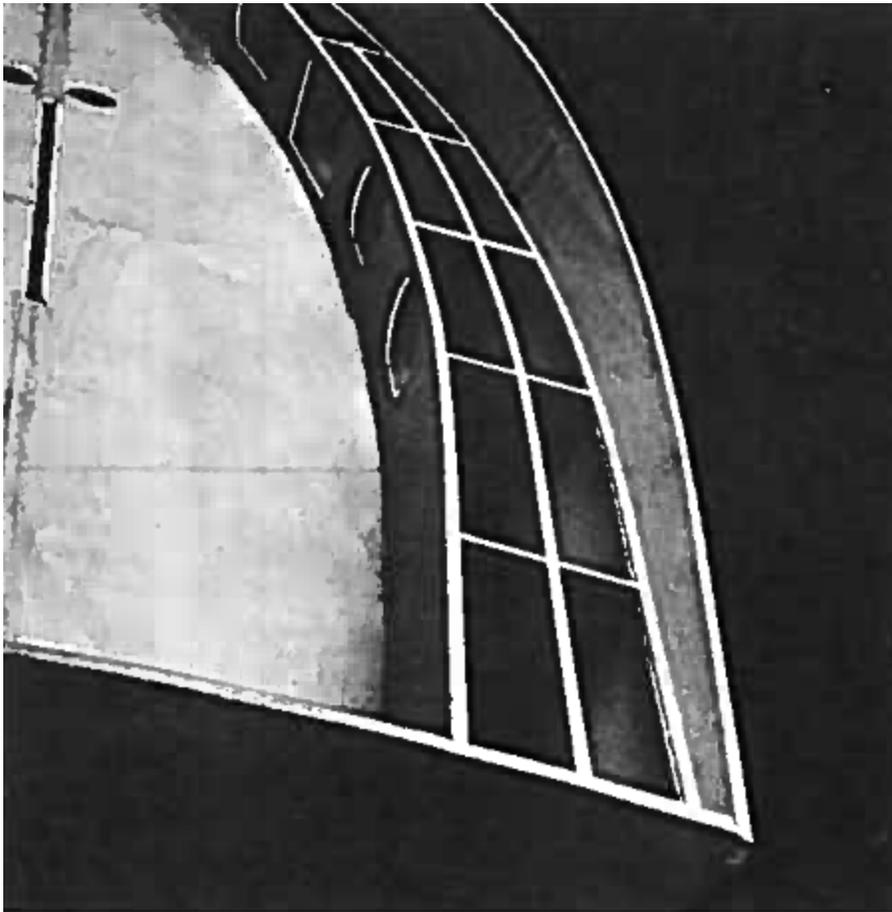


Photo 32

Assembling the Seat Webs

Photo 30 shows clearly that each seat web has its front and top edge fitted with battens - these are to provide surfaces on which the side tank tops (53 & 54) and side tank sides (53A, B, C) can be pinned and glued. Where any two of these panels join at a web, there has to be a batten on both sides to take the ends of the panels.

The webs which have single battens have these on the aft side only.

You will understand now why I told you to lay the webs in the boat in their respective positions - taking each one in turn copper nail the battens (numbered the same as the webs with a "A" added i.e. 56A are battens for 56).

Incidentally, the top batten goes on in one piece flush with the web's top edge and afterwards the section over the square notch is cut away - this is quicker than fiddling about with the very short lengths of batten. **The center notch will need to be cut at an angle if the webs are set parallel to the transom.**

With a reminder that web 56 is the aft one and the rest work up the boat in order, this is how the battens are allocated to each web:

56

57

58

59

60

(1 top, 1 front) (1 top, 2 front) (2 top, 1 front) (1 top, 1 front) (1 top, 2 front)

Fitting Seat Webs

These are merely taped and epoxied into place. One corner notch clips under the stringer, the lower corner notch over the floor fillet and a pin at each of these places to hold the web in position while you tape it. The web is taped along the two edges which meet the floor and the hull, on the forward side only. Do make certain that the webs are correctly sited before you tape them - if you are in any doubt, a quick mockup with the side tank sides will settle the problem. Also, your set square will show you whether the upright edge of the web is at right angles to the deck.

Fitting Side Tank Top Batten (51)

Each batten runs from the inner end of the transom seat top batten to the corner of the short battens on the forward bulkhead, passing through the exposed corner notches of the seat webs and completing the framework of the tanks (Photo 30). It must NOT be fixed until the epoxy on the seat webs is set off hard otherwise they will be pulled out of position.

The notches for the batten may need to be beveled to fit properly.

You might have to trim a little off the forward end to make the batten fit neatly.

Assuming your epoxy has set, start from the aft and glue and copper nail the batten in place.

Once the top battens are in place the seat top opening framing needs to be installed. The short cross members need to be installed first at the locations indicated in the plans. These will need pilot screws drilled and then to be epoxied and screwed into position. The seat top stringers will then need to be cut to fit and installed between openings. These should be epoxied and screwed to the cross members and epoxied and nailed to the seat web battens.

Fitting the Side Tank Top Stringers (55)

These again run from the aft transom but they finish just beyond the forward seat web (60) - each stringer clips down into the center notches of the webs and also that in the transom seat top batten (Photo 32). Copper nails and glue complete the operation.

With the seat top battens and stringers installed, the reinforcing blocks for the seat hatch hinges and the thwart need to be trimmed to fit between the battens and stringers and epoxied/nailed into place.

Fitting Side Tank Fronts

Now the side tank fronts can go on. Each of these is in three sections. The aft 52A is a plain piece of ply, the center 52B has three shaped holes and the fore (52C) has one hole. The two panels with cut-outs are fitted so that the holes are nearer the top of the tank sides - they are cut off-center and one can tell visually which way up they go. Photo 33 will also help in this matter. The aft panel notches under the transom top edge.

Try them for size first and then pin and glue them to the upright battens of the seat webs. When you come to the forward section, you also have to make a final fixing of the floor fillet which has been left loose. The line of this can be determined by putting the side tank front in place with its forward end up to the seat front batten and then setting the fillet just behind the underside of the panel. Fix the fillet - then the tank front.

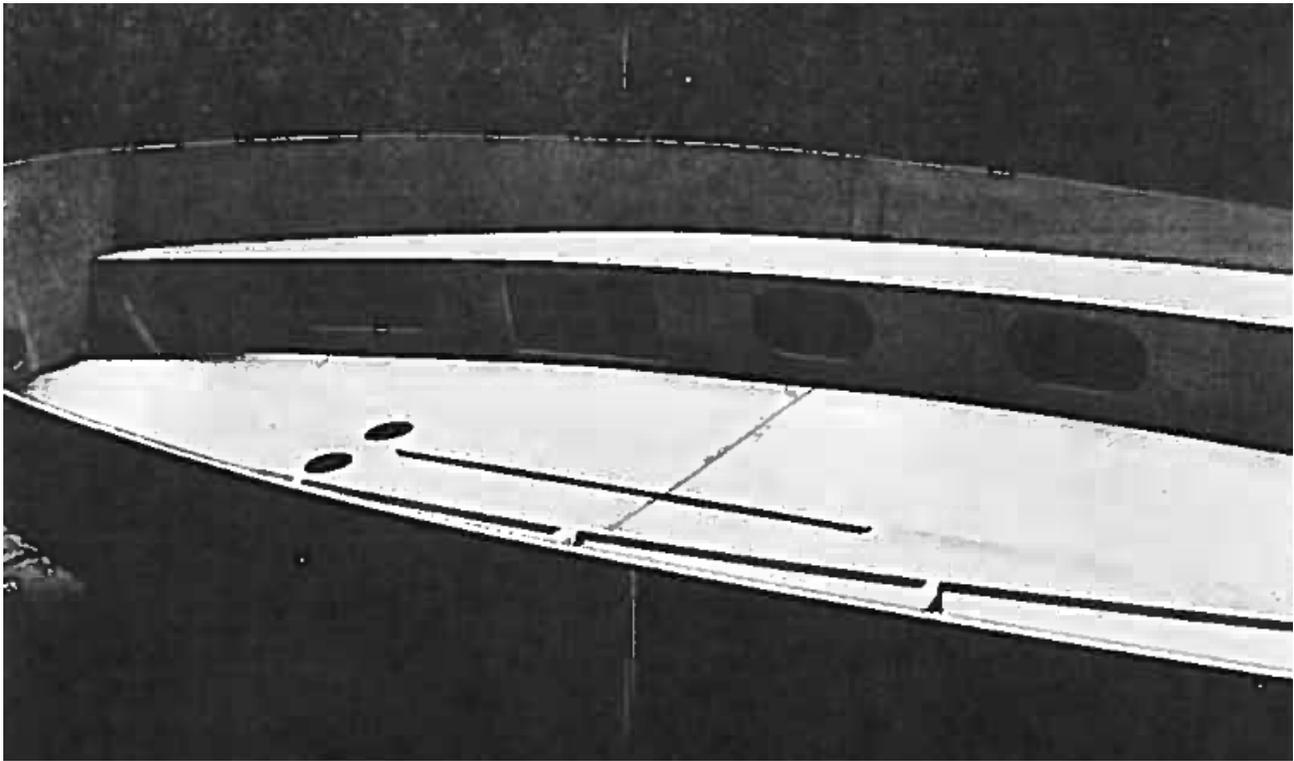


Photo 33

Painting the Side Tanks

Once more you have to use the special bilge paint to waterproof the inside of the side tanks and this must be done before you put the tops on. Paint all inner surfaces including the undersides of the battens but avoid the faces which have to be glued i.e. all the top edges.

While the pain is drying, try the side tank tops for size. The two aft panels (53) first, followed by the two fore (54). If they need trimming slightly, do this and then pin and glue them to the tops of the tanks. Pins every 3" are sufficient.

REMEMBER that the undersides of these tops must also be painted, leaving bare all the parts that coincide with the stringers, seat web top edges and the side tank top batten for all these areas will need to be in contact with glue.

The seat fronts and tops could also be done similar to the floor panel (minus the fiberglass). The sides of the panels that will be inside can be coated in epoxy. The section of the hull (and floor) that is inside the seat tanks can also be coated along with the seat webs. Once the seat fronts are installed, the inside of the seat tanks can be painted with bilge paint (though the epoxy coating will need to be cured before painting).

Fixing the Side Tank Tops

These should now be firmly fixed so complete the sequence by taping and epoxying around both ends of the side tanks and along the complete length at the two edges where they meet the hull and the floor.

With any epoxy leftover, brush neatly over the join between the fore and aft sections of flooring and also the joins between the side tank panels. Tape is not needed on these places but merely enough epoxy to filter into

the cracks - this is to stop water seeping into the end grain of ply and causing eventual discolouration of the wood.

Fitting the Fiddles (75)

Using glass-paper round off the edges of the side seats - it is on the forward parts of these that the fiddles go (Photo 34). The picture shows their position - suffice it to say that the forward ends of the fiddles are 3" from the bulkhead and they are set along the edges of the seats about 1/8" away. Use glue and 2" #8 screws.

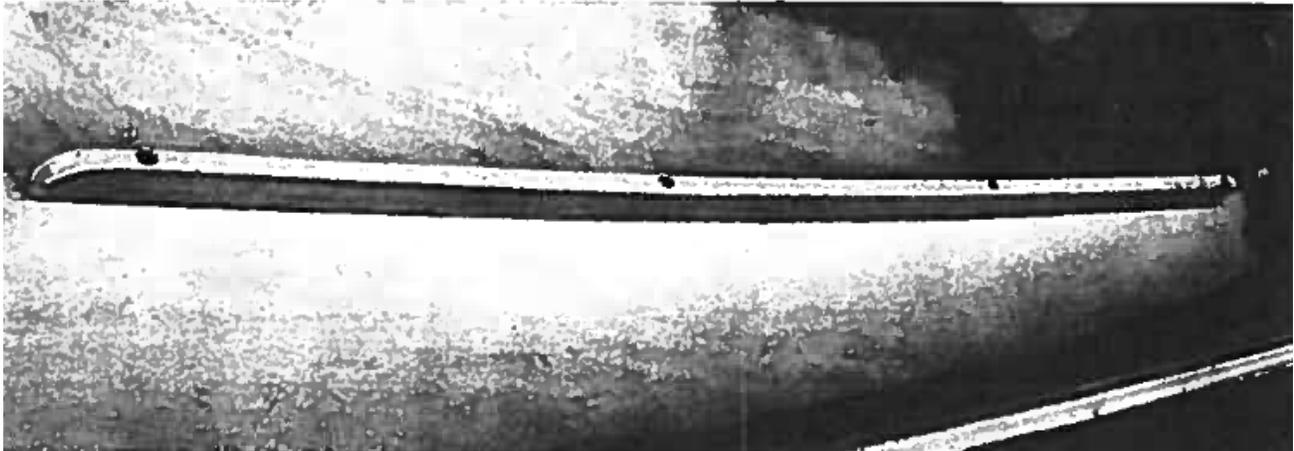


Photo 34

Fitting Floor Battens

You have two sets of battens: the aft 44 (two long, two shorter) and the fore 45 (four all the same length). The diagram shows how these are placed and includes the edge to edge measurements in each case.

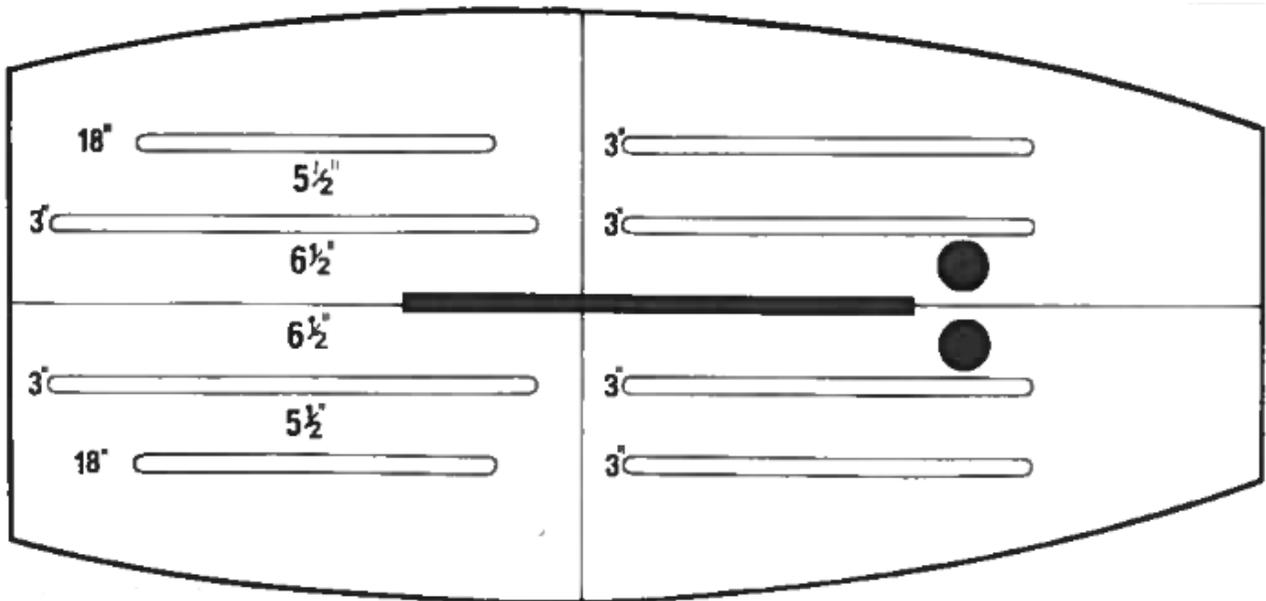


Diagram 8

Round off the ends and top edges of battens.

Lay them in position first and lightly pencil the floor around each one - check the marks with a straight edge before you fix. Put hardener on the floors within the outlines and glue the battens. Fix them with a zigzag pattern of screws ($\frac{5}{8}$ " #6), every alternate screw going down into the top edge of a floor web with one screw fairly close to each end of the battens.

The layout is different in the plans (with the daggerboard).

Fitting Inwales (63)

These go along the inside of the hull's top edge, opposite the gunwales.

You should first shape the aft end of the inwale so that it will fit neatly into the aft corner of the boat. Then you should check that the whole thing will go into place, especially in the notches at the sides of the forward bulkhead. When these are fixed in position, they will not be flush with the gunwales. Specifically, from about halfway along the boat to the bows, they will rise above the edge of the hull until, towards the bows they will be sitting up by about $\frac{1}{2}$ " - there is a reason for this which will emerge later. The correct placing is obvious because the inwale sits on top of the butt strap which joins the side panels together.

Also, the forward end of the inwale does not reach the actual point of the bow (Photo 35) despite the fact that the piece you have is slightly longer than necessary. Photo 36 will show you why this is - a breast hook (70) will fill the gap.

All that remains is for the inwale to be glued and screwed into place. The screws (1" #8) are driven through the gunwales from the outside at approximately 7" intervals. Start at the aft end and continue forwards BUT leave this front end loose because you will subsequently have to trim this to fit the breast hook.

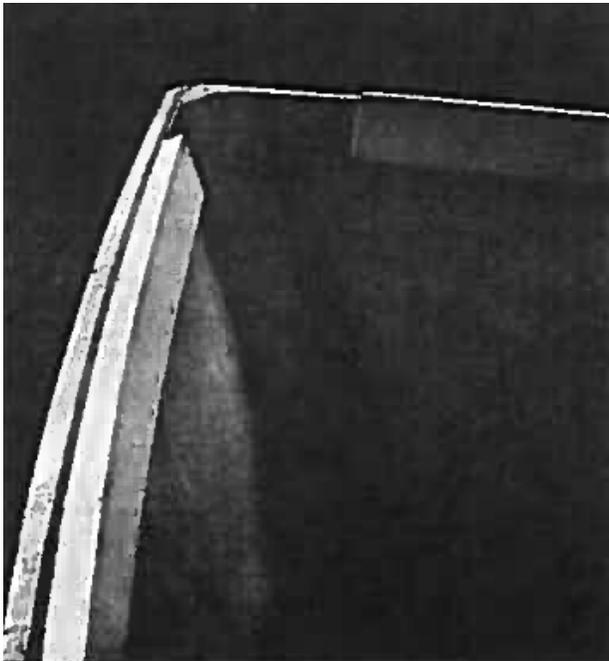


Photo 35

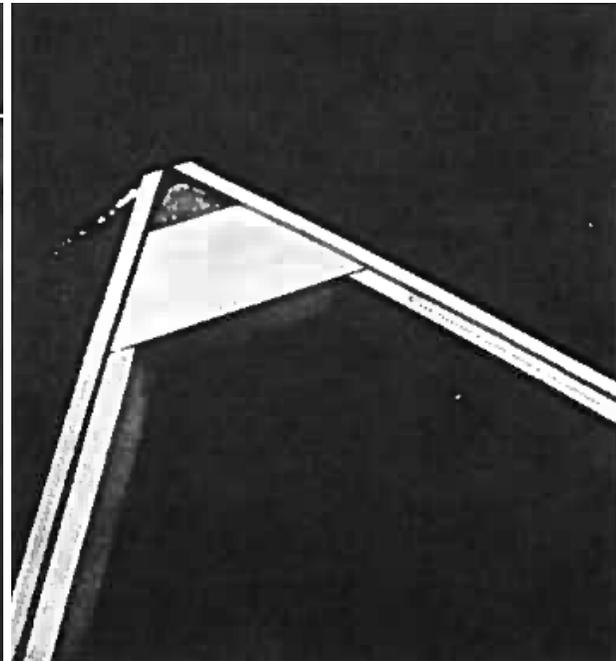


Photo 36

Shaping Topsides

The top surface of the inwales/gunwales should not be horizontal but should slope downwards and outwards: this applies particularly at the front half of the boat because the curve of the fore deck should be followed on the topsides.

As a guide for the correct angle use the slope of the forward bulkhead. Photo 38 demonstrates how a straight edge along the top of the bulkhead continues its line over the topsides.

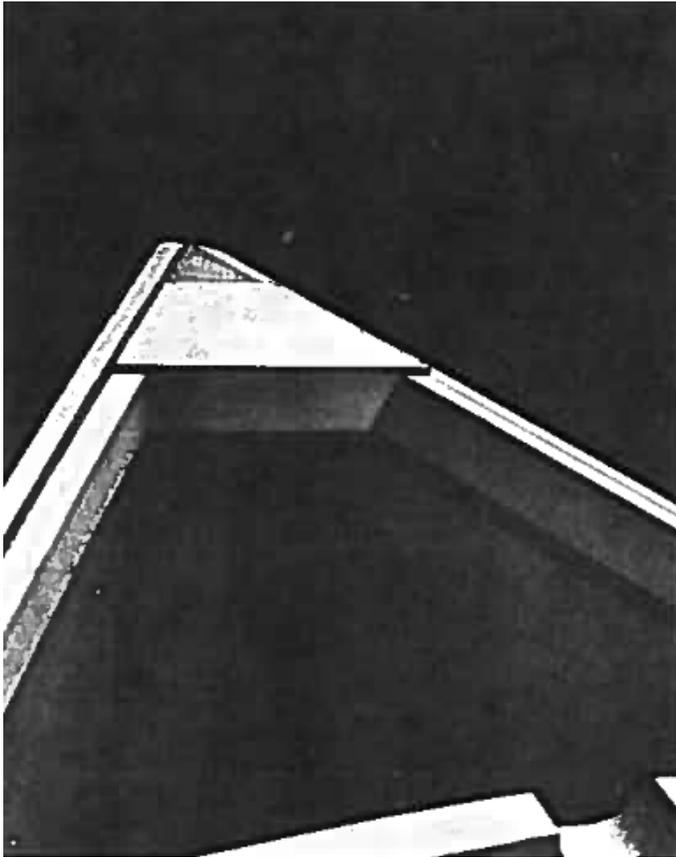


Photo 37

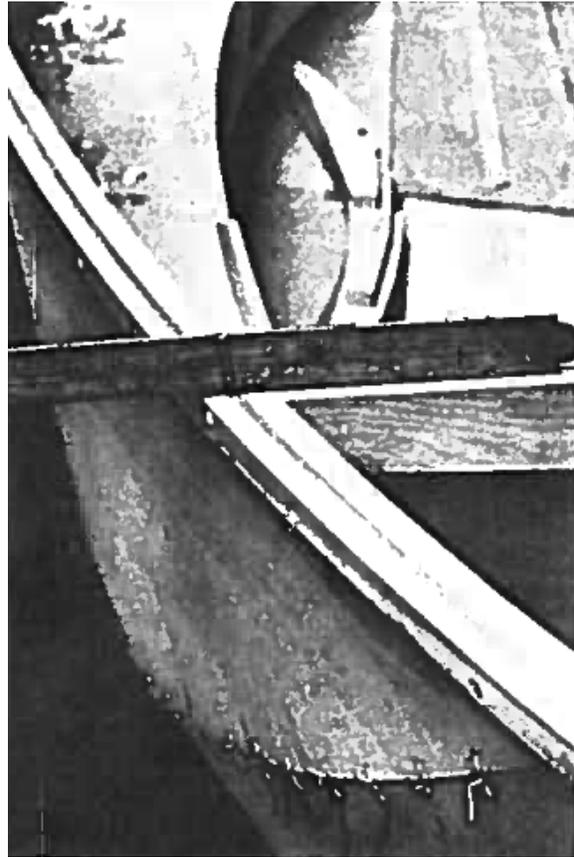


Photo 38

Fitting the Breast Hook (70)

This shaped block fits into the angle of the bow - it may be necessary to cut back the inwales to make room for it. Photo 37 shows how this goes in place and notice that the top of the block, away from the bow, sits up by about 1/4". Before the deck is fitted you have to achieve a slightly rounded surface to the block and the corners will be planed away.

Glue and screw using (2) 1 1/2" #10 screws **each side**.

Bending the Coamings (84)

Photo 48 shows you one of these coamings in position, the curve it takes up is somewhat pronounced and makes the fixing very difficult. To remove some of the elasticity from the wood, you can, at this stage, bend it

to nearly a right angled curve and keep it under pressure with weights or some similar device. Soak the coamings in clean water, bend and allow to dry in the bent position. Be very careful not to break the wood.

When the weight is removed, the wood will almost resume its former shape but, despite this, a lot of its spring will have gone.

The coamings can also be laminated and clamped around a 15" radius mandrel. The drawings will indicate how the coamings should be cut and how the mandrel should be shaped to get the coamings close to the correct shape before installation. Alternatively, the coamings can be laminated and then clamped to the boat deck beam, carlins, and gunwales while the glue cures. Drop cloths should be taped inside the boat below the coamings to prevent any major messes. This will require several (dozens) of clamps

Fitting the Deck Beams

Each of these beams is slightly longer than is necessary and has to be trimmed to length at both ends equally. Also the ends have to be angled in two directions so that they fit into slanting notches cut into the inwales.

First you must mark the positions of the beams and the vital measurement is that of the largest beam - technically, this should be taken from the aft transom but, assuming you have set your bulkhead in absolutely square, it is easier to measure from there. (The dimensions from the transom will be included in the plans for an extra accuracy check).

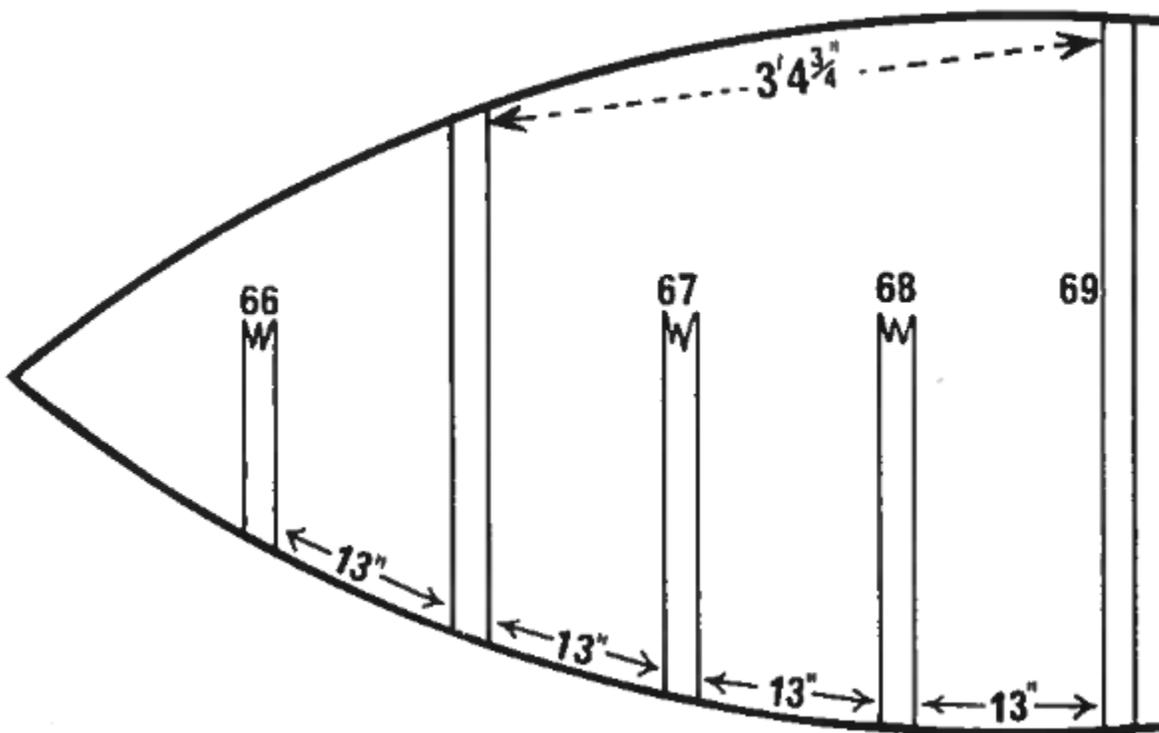


Diagram 9

The dotted line in the diagram shows the position of the main beam and I have exaggerated the curve of the hull to stress that the measurement is a straight one from the aft face of the bulkhead to the forward face of the beam. Lay the beam across the gunwales to coincide with these marked points and pencil lines on the inwale to locate the notches into which the beam will fit.

The other beams are laid across the boat at equal distances from each other (as indicated in the diagram this distance is roughly 13" but it might be slightly different in your case).

Now the inwales must be notched to take the ends of the beams - Photo 39 illustrates how these notches start $\frac{3}{8}$ " deep and slope away to nothing - this is so that the beams are tensioned between the sides of the boat.

All the beams should be trimmed to size and shape until they fit down into the inwales. The curve of each beam is carried on across the gunwales where you planed earlier.

Glue and screw beams using (2) $1\frac{1}{2}$ " #8 screws through the beam ends from the outside.

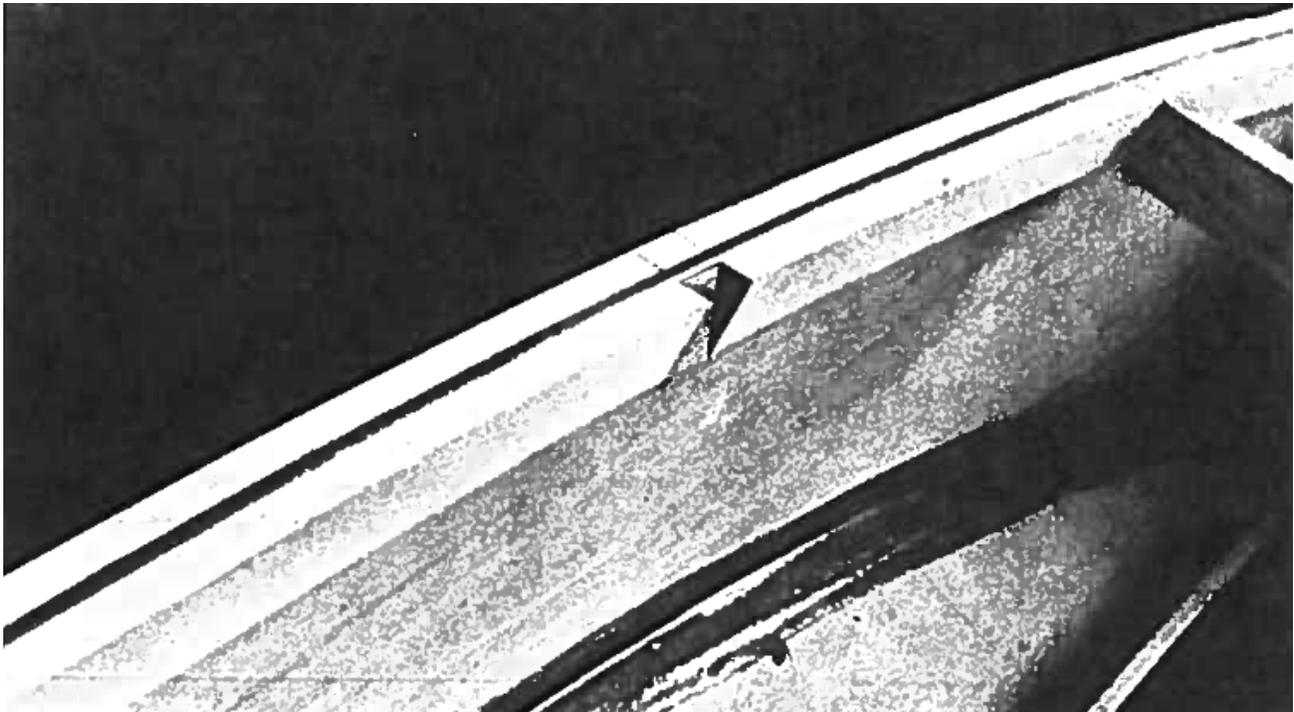


Photo 39

Shaping Frame for Deck

The framework you have now constructed should have a gentle even curve in both directions so check its shape, especially at the joins, and plane away any unevenness.

Fitting the King Plank (71)

Establish a center line from the center of the main deck beam (69) to the point of the bow - mark where this passes through each beam.

The notches in each beam, except beam 68, have to be squared off to the same size as the plank (Photo 41) - you can use one of the king plank edges (72) to test the size of the notches: it is the same measurement as the king plank itself but, being shorter, is easier to handle.

Fit king plank support (70A) centrally on the forward face of the main deck beam - it is set down a distance equivalent to the thickness of the plank. Three screws ($1\frac{1}{4}$ " #8) and glue fix this in place (Photo 40).

The forward end of the king plank fits into the breast hook so cut out a square notch to accommodate 1" of plank (Photo 41) - now the king plank itself can be trimmed to the correct length to fit between the breast hook at one end and the forward face of the main beam at the other.

When the king plank is notched down in place it should sit up a fraction (Photo 42) so that our outer edges can be sloped off to take up the general configuration of the deck - this is not terribly important but can be regarded as a technical refinement.

Now fix the plank in position using glue and two screws (1¼" #8) through countersunk holes down into each beam (Photo 40).

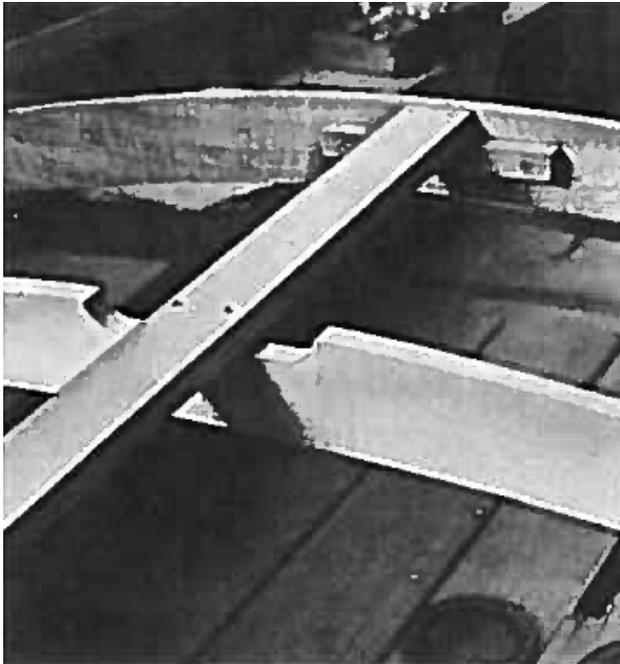


Photo 40



Photo 41

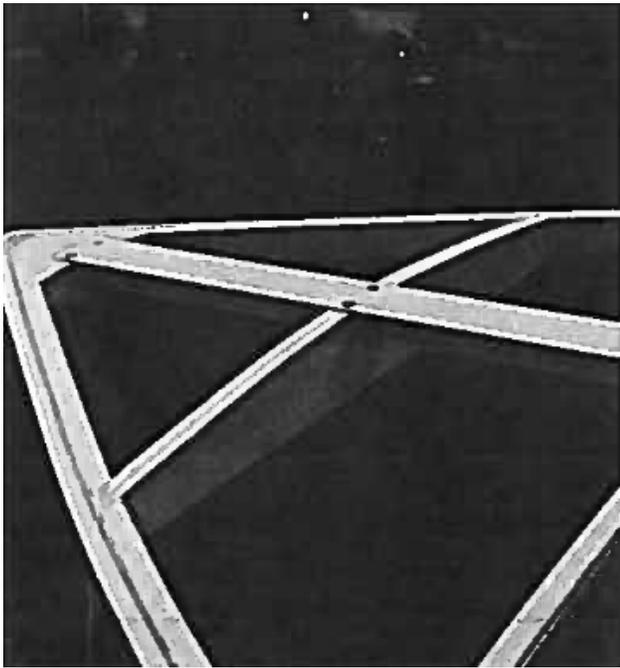


Photo 42

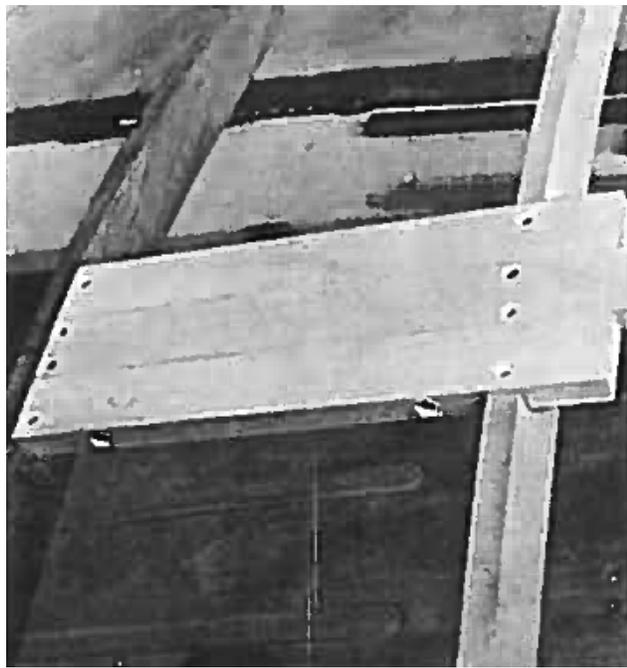


Photo 43

Fitting King Plank Edges (72)

Photo 41 illustrates how these are fixed. The large notch in beam 68 can now be squared to take the edges. These can be glued and screwed down in the same manner as the king plank. You will see in the photograph that two screws (2½" #8) are put through each side to fix the glued edges to the plank.

Fitting the King Post (74) and King Post Step (73)

These two pieces go into the boat together so do a dry mock-up in order to position the step and also to determine the correct length of post. The lower end of the post slots into the step and stands vertically (parallel to forward bulkhead) with its upper end tight under the king plank and against the king plank support on the main deck beam (Photo 44).

When you are satisfied that the siting is correct, draw a line around the step to record its position on the floor of the boat.

Take out the pieces, glue (and screw with two 1¾" #8 screws in opposite corners) the lower end of the post into the step, glue and screw (4, 1½" #8) to the floor down into the center case assembly and finally put a single (or two in opposite corners) screw (1¾" #8) down through the king plank into the top of the post with some epoxy in between.

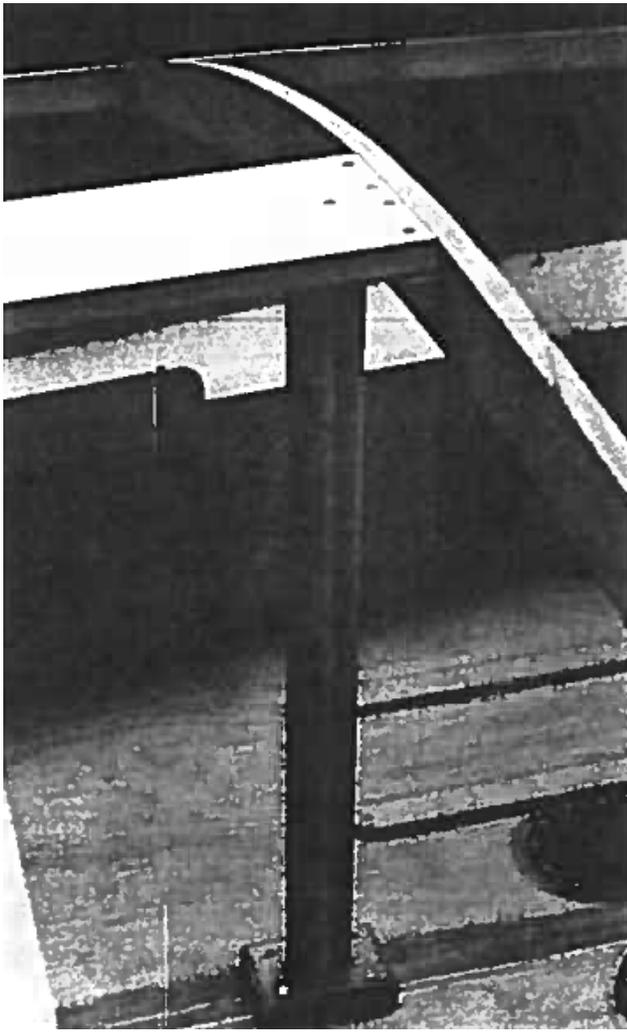


Photo 44

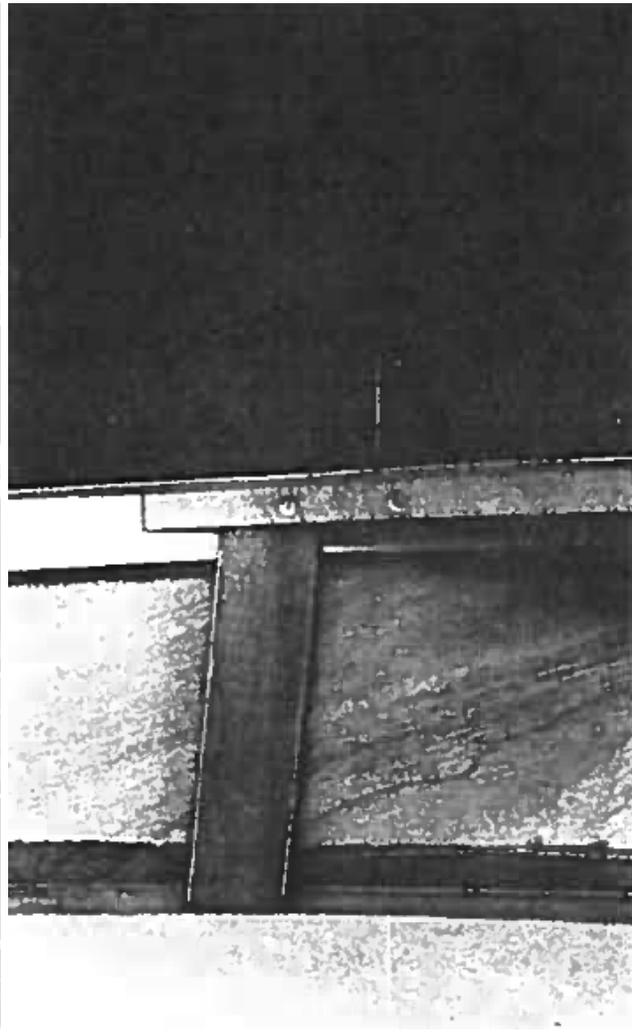


Photo 45

Fitting the Chain Plate Blocks (77)

The rebated ends of these blocks clip under the inwales and they slope forward to take up the ultimate line of the shrouds (Photo 45). A matching pair is supplied so it is impossible to install the blocks the wrong way round. The vertical center line of each block at the inwales is 1'-2 $\frac{1}{4}$ " from the aft face of the main deck beam measured along the inwales themselves.

Screw and glue in place using, for each block, six screws ($\frac{3}{4}$ " #8) set evenly in two vertical parallel lines of three from the outside of the hull.

Fitting the Carlins (76)

Because these pieces, as used, are so fragile at the tapered ends, the pieces supplied in the kit are very much larger than needed - a considerable amount of trimming is necessary.

Photo 46 shows a piece which has been laid on the corner between the main deck beam and the inwales and marked to shape and size. The actual carlin is illustrated in Photo 47 which depicts how the ends are tapered really finely - the better this is done, the better will be the fit of the coamings.

The drawings indicate how these should be shaped. The final shaping of the surfaces that interface with the deck beam and gunwale will need to be done in the boat per the instructions above.

When the carlins are glued and screwed into place, the outer ends sit up slightly to be faired off later.

Glue and screw as indicated in the diagram.

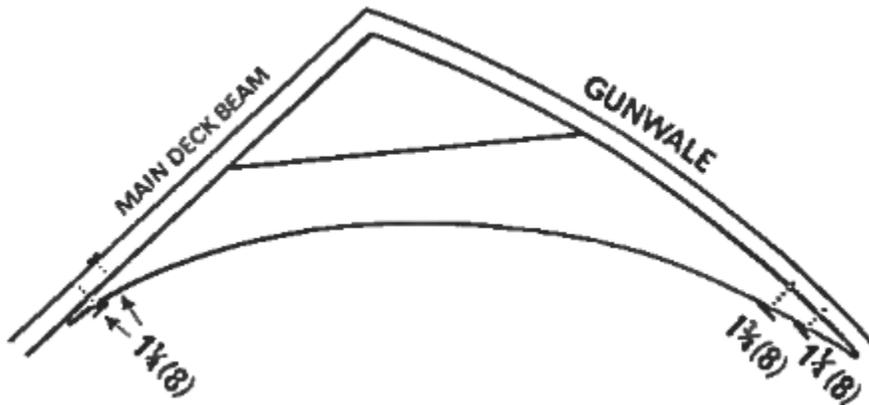


Diagram 10



Photo 46

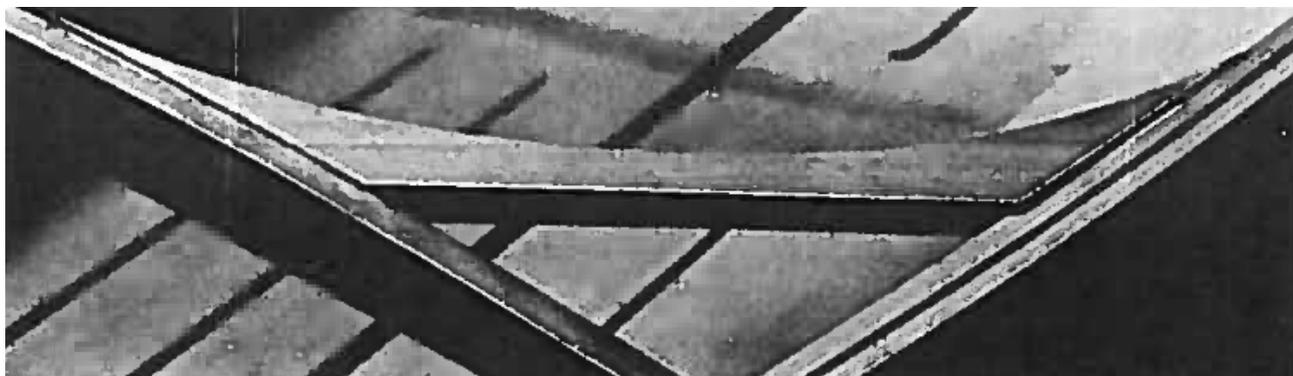


Photo 47

Preparing for Decks

Fair off all the deck beams, king plank and carlins sufficiently to achieve a smooth rounded surface overall so that the decks will fit evenly.

Fit two drain sockets in the bottom of the forward bulkhead using glue and hardener to seal them - these go in from the forward face of the bulkhead.

Paint forward compartment with DANBOLIN covering every surface except those to be glued.

The inside of the bulkhead compartment (including the deck beams) needs to be coated in epoxy prior to installing the deck panel. A waterproof bilge paint is also probably a good idea for this tank as well (after this epoxy cures).

Fitting Decks (78)

It is apparent how the two deck panels fit together over the framework you have built. A little extra wood is allowed around the edges to guarantee a perfect fit. The center seam should not be trimmed but just smoothed slightly to effect a neat joint.

Draw a centerline along the king plank and fit each panel up to that. The ply is pinned and glued around the edges and also across the deck beams but before this is done remember to paint all the undersurfaces which will be enclosed in the forward buoyancy compartment - don't paint areas where the deck beams lie.

The deck from the plans can be fabricated in two pieces or can be cut from one scarf-jointed panel of plywood. The center of the single deck panel should be marked well so that it can be aligned with the center of the main deck beam. Once a dry fit confirms that the deck panel will fit well, paint the underside of the deck panel with epoxy. Add epoxy to the tops of the gunwales, deck beams, bulkhead, and breast hook. Place the deck panel (epoxied side down) and fasten it down to the deck beams, gunwales, bulkhead, and breast hook.

After fitting, fair off all the outer edges flush with the boat. (Flush with the outside face of the gunwales, main deck beam, carlins, and inwales.)

Fitting the Deck Capping (79)

These pieces merely continue to the line of the deck along the tops of the gunwales. The joints between the deck and the capping should be neat, so mock fit the latter and square off the forward ends to match the aft ends of the foredeck. Each piece should be fitted flush with the inwales so that there will be a slight overhang on the outside of the boat.

Glue and pin in a zig-zag pattern, again every 2".

Extra wood has been allowed not only on the width but also on the length so the aft end of the capping will have to be trimmed up to the forward face of the transom top edge.

If you are able to procure a fine nail punch you should knock down each pin slightly below the surface of the deck ply so that you can put wood filler over each hole, concealing the pins and assuring a perfect finish to your boat. The whole job of punching and filling takes less than 30 minutes but is well worth the extra trouble.

Fitting the Transom Capping (98)

In a similar manner, the transom capping is glued and pinned to the top of the transom edge.

The front edge should be flush with the forward face of the top transom edge and the ends lining up with the gunwales. Once more, extra timber is allowed for trimming and shaping so there will be an overhang on the aft side and at each end which has to be faired off.

Fitting the Rubbing Bead (65)

The rubbing bead goes right along the side of the boat covering the side of the decks and the gunwales. The whole of each side should be faired off flat to take the flat side of the rubbing bead.

The bead is put in place with the longer curve below and shorter, flatter curve above flush with the deck.

Starting from the bow and level with it. The bead is glued and copper nailed every 4". In the interests of appearance, you could, before you use the nails, elongate the heads by hammering them on the sides. This long narrow head is placed running with the grain of the wood and the nail can be driven right in to be ultimately covered with wood stopping.

If you half fix the nails in the bead itself first, then glue, then put hardener along the sides of the boat, you will find that the operation is easier.

At the aft end, the bead should be trimmed off flush with the transom.

Fitting the Coamings (84)

Earlier you have soaked these pieces and bent them under pressure so they should now be quite dry and reasonably pliable to handle.

Photo 48 shows one of the two coaming pieces in position. The top edge, for its entire length, is 1½" above the deck and is screwed (1" #8 every 4") and glued to the main deck beam, carlin and inwale. The two halves join at the center line of the deck.

Before actually fitting the coaming, sand off the aft end of the deck itself - the reason for this is that once the coaming is in place that part of the deck is difficult to reach. The direction of sanding should be with the grain of the wood all the time.

A guideline 1½" from and parallel to the top edge of the coaming will help your assistant, who should be bending the piece on while you are fixing, to keep its correct position to the deck. Work from the center line outwards to the inwales. The use of clamps greatly assists the fixing of these pieces.

[The laminated coamings can be fit per the information above.](#)

Assembling & Fitting Sheet Swivel - (Not part of the plans)

The swivel block (99) is sandwiched between the top ends of the two side pieces (100) to form an inverted U-shape. This assembly should clip over the aft end of the center plate assembly where it meets the foot rest (Photo 49) - it is screwed and glued firmly in place. The diagram illustrates this.

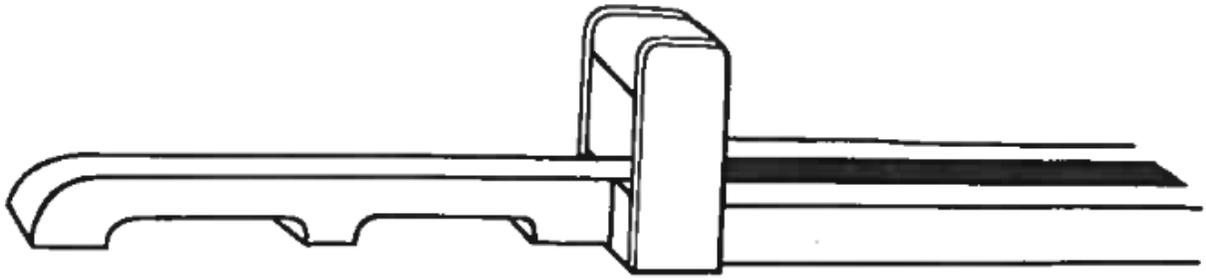


Diagram 11

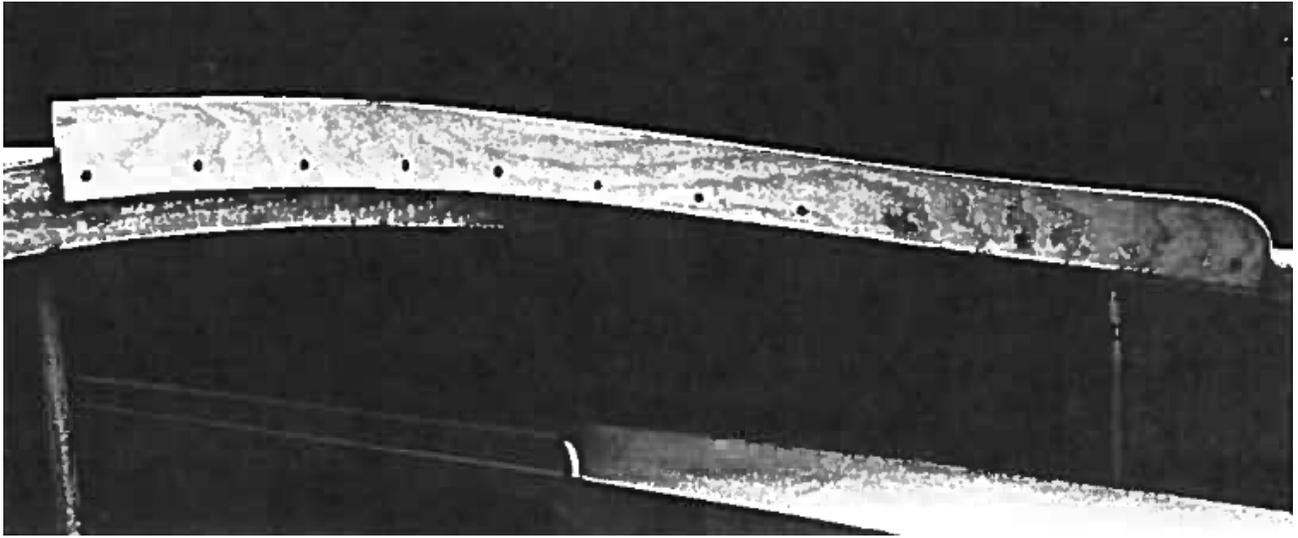


Photo 48

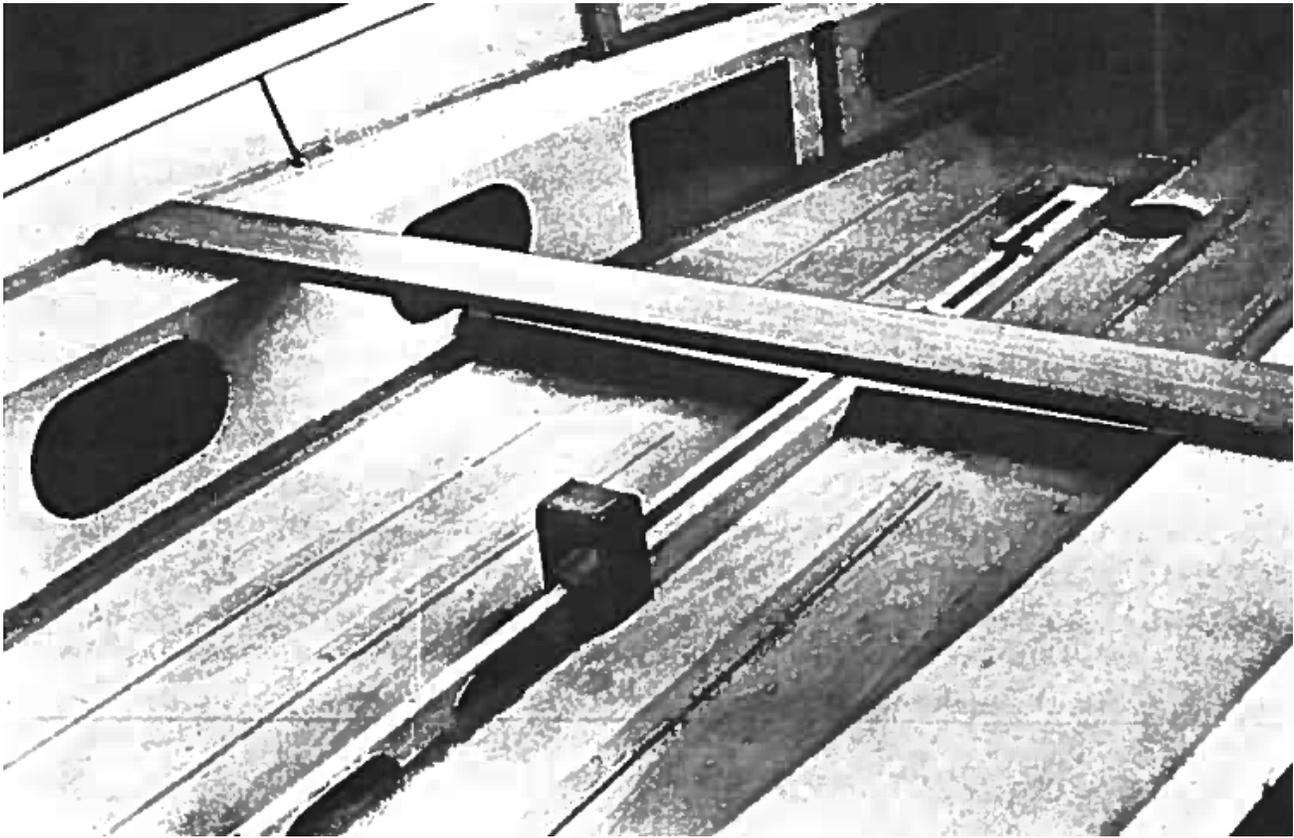


Photo 49

The sheet swivel block is fastened in the location indicated in the plans. The block is screwed with some larger $\frac{1}{4}$ " screws in each corner. The screws go through the floor panel into the reinforcing block around the floor web/rib. A stainless steel eye plate anchor will be screwed to the swivel block for the mainsheet rigging to attach to. The sheet swivel block needs to be thick enough that the anchor screws do not extend into the floor panels. The block will need to be epoxied and screwed into place.

Fitting the Inwale Thickener (103)

The function of this piece is to thicken up the gunwales to make it more comfortable when you sit the boat out.

These fit on the inside of the inwales with the forward end butting up to the coaming. The section of the end touching the coaming should be squared to make a good joint, otherwise both ends of the thickener should be rounded.

The long shallow curve of the piece is the top surface and the shorter, rounder curve is underneath.

The whole thing is glued flush with the topsides using screws ($1\frac{1}{2}$ " #8) every 5".

Fitting the Baffles (92)

These two lengths of timber fit across the center seam between the fore and aft sections of flooring, one piece on either side of the center-board case.

They should fit tightly between the center case and the side tanks with the wider ends adjacent to the latter (Photo 26). They are taped and epoxied to the floor, center case and side tanks on both the fore and aft faces.

These are placed in a different position in the plans. They will need to be cut to fit between the daggerboard case and the seat tank sides. The baffles need to be placed between the self-bailing drain holes in the daggerboard case.

Fitting the Thwart (85)

This lies across the full width of the boat with each end on a side tank and fitting up to the topsides. Trim the thwart to size and shape (this shaping applies to the ends where they meet the slanting sides) and fix each end to the appropriate side tank top using six screws (1½" #10) in parallel rows of three. (Photo 49 shows the thwart lying in place).

With the thwart being longer than the fits in the boat, it might be easier to work out the thwart end shaping with a smaller block and then transfer the line to the thwart. Alternatively the thwart can be cut square about an inch short on each end. The ends can be finished nice before the thwart is mounted to the seats. The screws through the thwart need to be embedded in the seat top stringers/battens.

The aft edge of the thwart should be 5'-8" from the outside face of the transom measure in a straight line. Fiberglass and epoxy the ends to follow the line of tape along the side tank tops.

Fitting the Mast Step (80)

The mast step is screwed and glued centrally over the centerline of the fore deck with its aft edge (the shallowest edge) 2¼" from the aft edge of the fore deck. A screw (1½" #8) down through each corner into the king plank assembly holds the step in place.

Fitting Hatch Cover Slides - or Seat Hatches

Each hatch cover is held in place, top and bottom, by the hatch cover slides. The top slides (82) are fixed above the rectangular openings so that the rebated ends are equidistant from the sides of the apertures: the bottom of each slide should be level with the top of the hatch.

The best way to determine the line of the lower slide is to push the hatch cover itself (81) up into the top slide (82A) as far as it will go and mark the line of its lower edge on the side tank - this is the setting line for the lower slide (Photo 50).

The screws to be used on the slides are as follows:

Top Slides - Four 1" #6 on each

Bottom Slides - Four ¾" #6 on each.

The Seat Hatches are upholstery covered plywood panels that are attached to the seats with hinges to cover the seat top openings. The hinges screw into the reinforcing blocks below seat panels. The hinge pins need to be parallel to the back (straight) edge of the seat hatch. Weatherstripping needs to be added to the seat hatches that will go around the seat top opening. The butterfly latches also need to be attached to the seat front and seat hatches.

Assembling Hatch Cover (81)

The hatch cover handle (83) is screwed and glued to the center of the hatch cover (Photo 50).

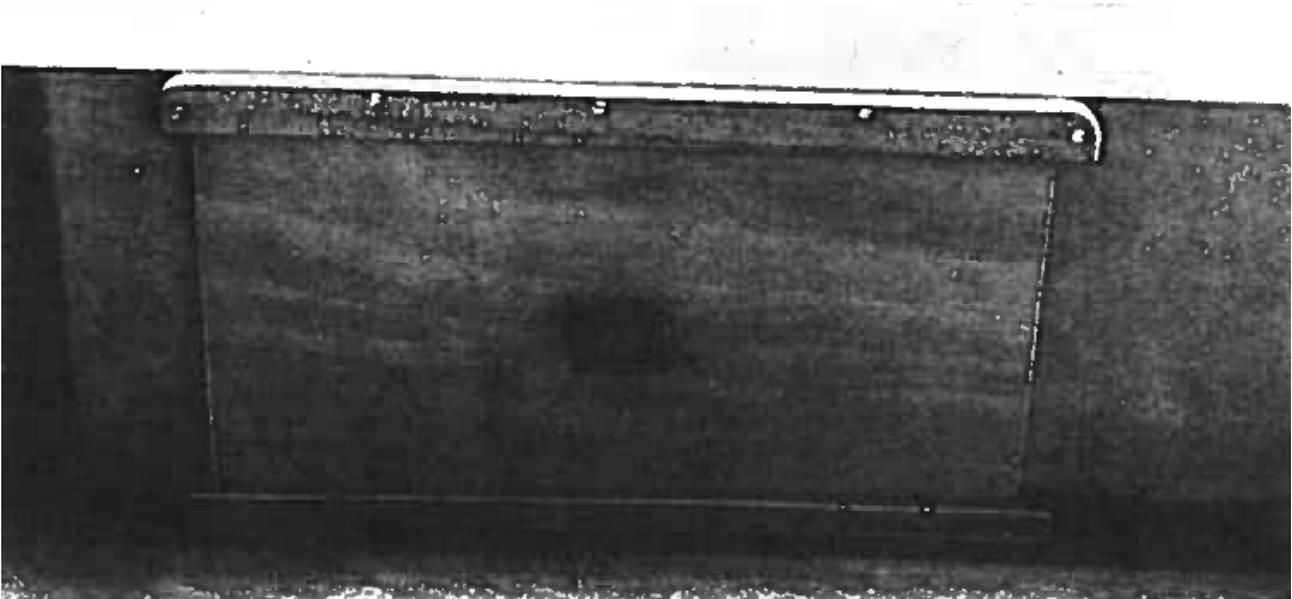


Photo 50

Epoxying the Underside

Turn your boat upside down on the trestles so that it is firm to work on.

Cut off all the twists of wire from the outside. To do this use an old chisel and a mallet and cut the wire off flush with the plywood.

Smooth down these seams with a plane rounding them slightly. Epoxy and fiberglass tape each seam in the same way you did on the inside.

Do NOT tape any of the center seam.

Preparing to Fix the Keel (62)

Lay the keel in place, its aft end level with the transom. The narrow end will eventually bend round the lower curve of the bow. The centerboard slots should match exactly.

Mark the outline of the keel on the boat and then take the keel away.

Your assistant can mark out and drill the screw lead holes. To do this one needs a center line drawn down the top surface of the keel and where the centerboard slot comes, a center line down the top surface at each side. (The drawings will have screw centerlines indicated and dimensioned).

The main portion of the keel will be fixed by screws at either side of the main center line but at the narrow forward end there is just a single line of screws. The lead holes (in the boat) for these screws need to occur only in the keel web. At both sides of the center slot the screws are fixed centrally in a straight line. Photo 53 shows the pattern of screws at the forward end. All lead holes should be countersunk.

Shaping the Boat for the Keel

While your helper is preparing the keel, you will be flattening the bottom of your boat to create an even surface on which the keel can sit.

First of all, remove all the screws which were put in to hold the center assembly in place. Don't worry - your dinghy won't fall apart - it has been glued very well.

Now plane off the whole area contained within the pencil outline of the keel. You must achieve a quite flat surface and, at the forward end, this entails cutting right down through the ply to the centerboard assembly. Do not remove so much that the fiberglass tape (that is inside the tanks) is visible (or cut).

To restore your nerve, take a glance at Photo 51 which shows roughly what your boat should look like after this treatment.

Shaping Keel

The forward end of the keel needs to be shaped down in a similar manner to that shown in Photo 52. To help you bend this end into place; with a tenon saw, score the underside every $\frac{1}{4}$ " over the area between the third and fifth screw holes shown in the illustration. This series of shallow parallel crosscuts enables the wood to be pressed down in a curve.

Alternatively, the keel can be laminated with three $\frac{1}{4}$ " thick layers. The laminations should be screwed together (with some $\frac{5}{8}$ " long screws) while the keel is cut to shape and the other lead holes are drilled. The lead holes in the boat need to be drilled (using the bottom lamination as a pattern). The laminations can be epoxied together and to the bottom of the boat. The screws can then be used to fasten the keel to the boat and clamp the laminations together while the epoxy cures. Before the epoxy cures any epoxy that is squeezed out from between any of the joints can be spread on the keel or in the corner between the keel and the hull panels.

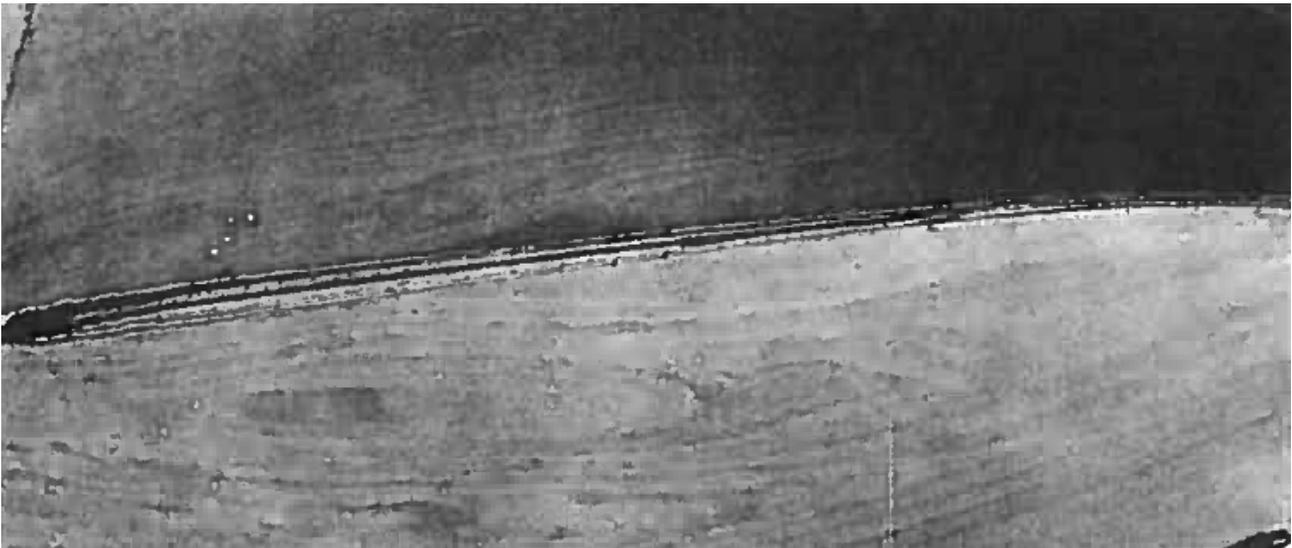


Photo 51

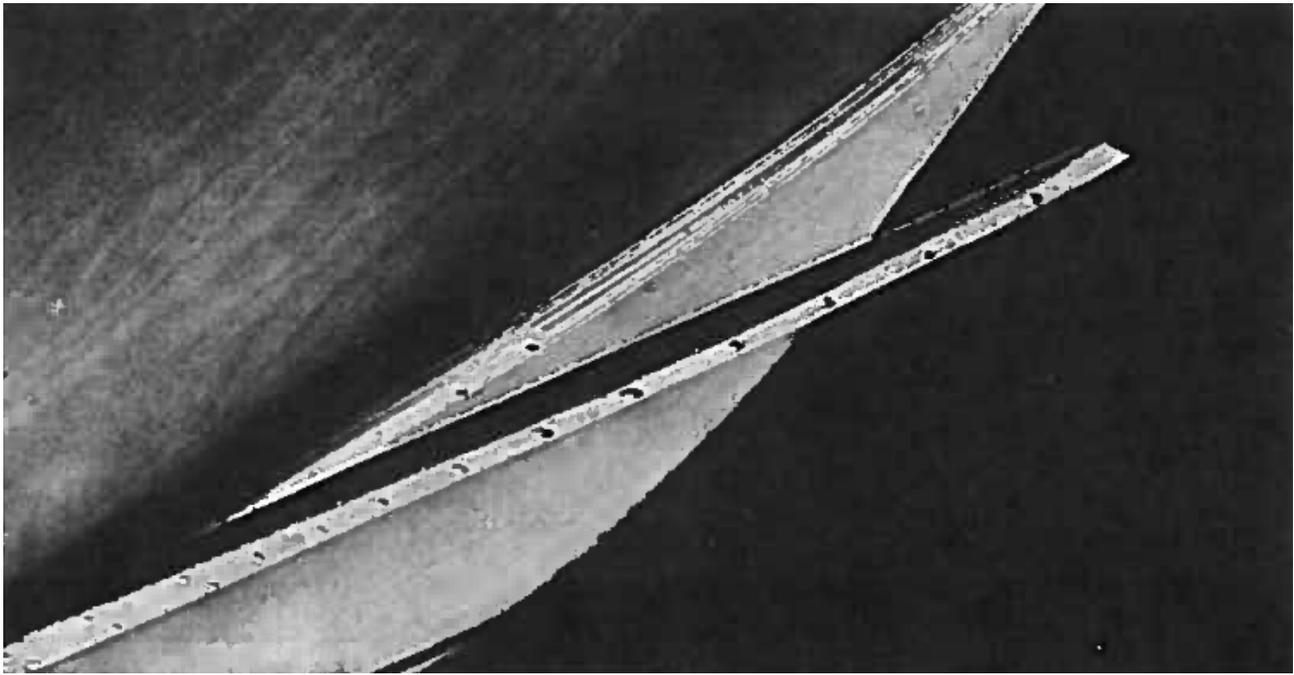


Photo 52

Fixing the Keel

Glue and screw the keel into place. Use 1" #8 screws 5" apart in the pattern already described. At the forward end, for the first 12", screws should be 3" apart (Photo 53).

The thin forward tip of the keel can have one carefully placed copper nail to hold it down - avoid splitting the wood. It may also work to use a strap around the bow of the boat to hold the tip of the keel down while the epoxy cures.

Before applying the tape and epoxy, plane back the bow to a 1/2" wide flat surface from the top of the bow to the front of the keel. The fiberglass tape is then more easily fitted leaving a flat base for the stem band.

Taping the Bow

You can now epoxy and fiberglass the bow. One piece of tape should be sufficient to run down the center seam from the gunwales to the forward end of the keel where it will run along one side for a further 9". A short piece of tape is then run from just forward of the keel along its other side for 9" (Photo 54).

The result should be that the first 9" of keel is epoxied on both sides down to the bot itself.

Taping the Centerboard Slot and Keel

At this point the editor recommends fiberglassing the inside of the centerboard/daggerboard slot.

Cut two pieces of fiberglass cloth the length of the centerboard slot in length and the depth of the centerboard slot plus 4" in width. Another two pieces 6" wide and the depth of the centerboard slot plus 4" long need to be cut. The inside of the slot (which has already been coated in epoxy with two pieces of fiberglass at the ends) needs to be smoothed and scuffed with some 100 grit sandpaper on a stick. A board about 3/4" thick needs to

be cut to fit in the slot (or the daggerboard can be used) and wrapped in plastic wrap. (It would probably help to bevel to edges that will be pushed into the slot so that they are easier to insert). You will also need some peel ply (perforated) and some breather cloth (that should fit somewhat snug between the insert and the slot sides).

With everything ready, completely coat the inside of the slot with epoxy, wet out all of the fiberglass pieces on the bench (with some sort of the plastic protecting the bench from the epoxy). Apply the now saturated side panels to the sides of the slot (leaving about 1" of glass above the slot to fold over onto the keel). Apply the end panels across the ends of the slots (leaving a similar amount of glass extending above the keel). The end panel fiberglass will need to be cut at the corners to lay flat on the keel.

Apply the perforated peel ply to the inside of the slot (making sure all the pieces overlap a bit). Leave at least 2" of peel ply extending above the keel and tape these to the hull bottom. Finally, work the two pieces of breather cloth into the slot and work the 3/4" board into the slot between the breather cloth pieces. The breather cloth and peel ply should help keep the fiberglass fabric from being forced through the slot as the mandrel is worked into the slot. It might also work to use two 1/4" thick panels that are then shimmed (with a couple of air wedges) to be snug against the sides of the slot (with the peel ply and breather cloth between the ply and the fiberglass). This method should make it possible to completely reinforce the completed slot and also extract any air bubbles and excess epoxy from the layup.

Before the epoxy starts to gel, climb under the boat and fold the extra fiberglass (and peel ply) around the centerboard case (cutting the fabric corners if needed) and fasten the peel ply tightly around the centerboard case with tape. Let the epoxy cure, then cut openings in the fiberglass where the centerboard drain holes occur and seal any exposed wood or joints with epoxy.

While the centerboard epoxy is curing, add 1/4" radius fillets to the joint between the keel and the hull on both sides.

Once the centerboard epoxy has cured, cut out a strip of fiberglass 8" wide and the length of the keel. Epoxy this strip of fiberglass across the keel. The fillets should help the fiberglass make the corner more easily. To make cleanup from the next steps easier, it is recommended that the gunwales be taped off and covered.

Cut out to large pieces of fiberglass to cover each side of the exterior of the hull (multiple pieces can be used, they just need to overlap about 1/2") up to about 1" from the gunwales. (Alternatively, the fiberglass panels could be cut to only cover the bottom of the hull and up the sides about 1'-0" above the waterline.) These panels will need to extend up to about 1/2" from the sides of the keel. As these will be overlapping the keel strip it is recommended that they be applied just after the keel strip epoxy has begun to gel but well before it has fully cured. The gelling keel strip epoxy should make it a bit easier to get the side panels laid out and smoothed before wetting out the fiberglass. Epoxy the side panel pieces to the hull.

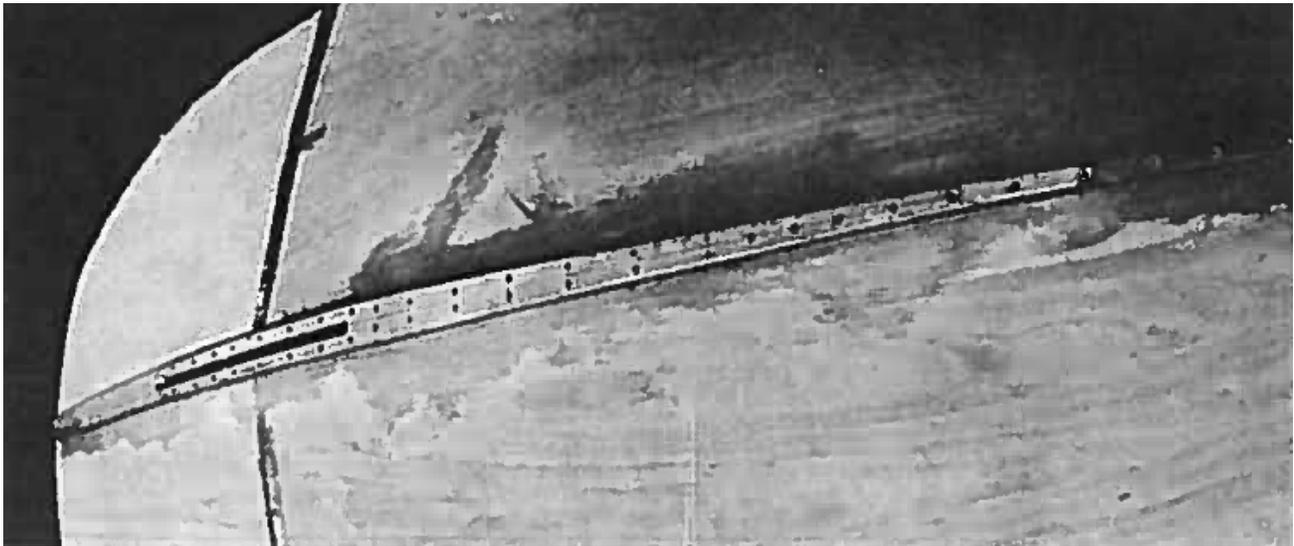


Photo 53

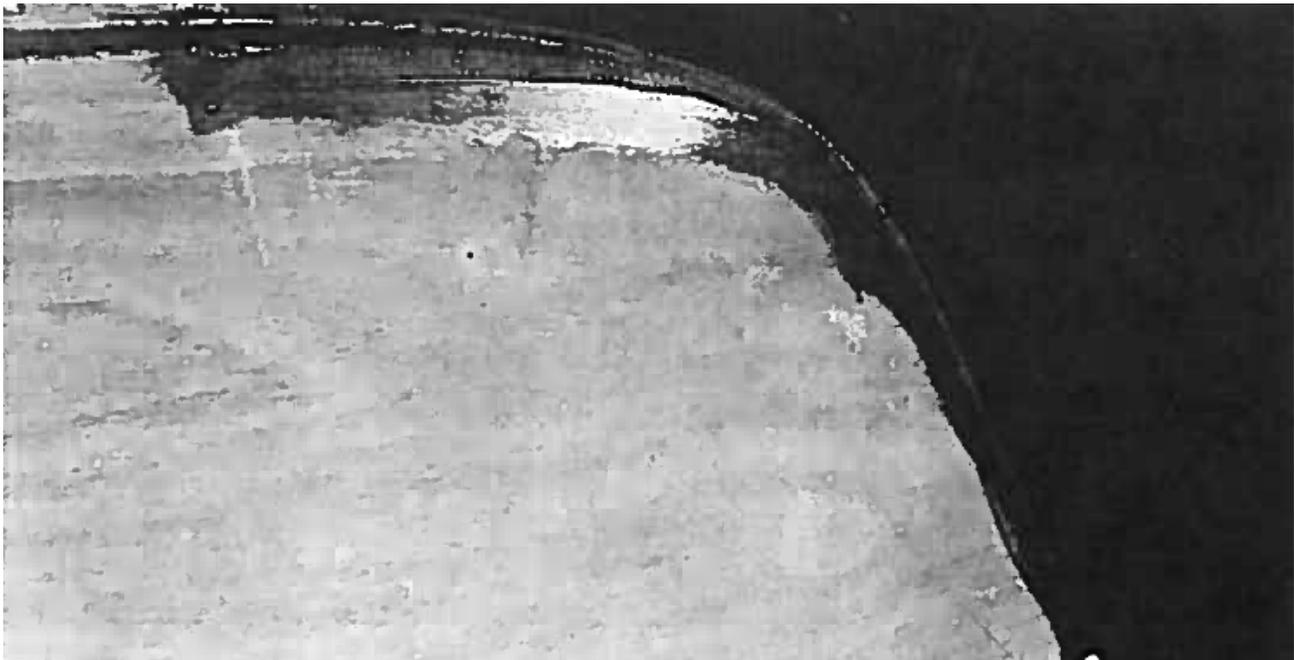


Photo 54

Bits and Pieces

You have now virtually completed your boat and little remains as far as the construction is concerned. There are a few small jobs left and these concern mainly the fittings. Also there are two pieces of construction which, if you intend using the boat purely as a sailing dinghy, you might consider unnecessary.

Trailer Eye

The bolt at the end of the trailer passes completely through the bow of the boat to achieve a positive fixing. To take this bolt, a hole has to be drilled across the bows where the trailer block is located. The position of this

hole must be exact or you will have trouble matching it with the corresponding fitment on the trailer. You need to measure down the line of the bow a distance of 1'-7" measured from the deck - the hole is set in from this point a distance of 1/4", measured at right angles to the line of the bow.

Secondly the hole needs to be 5/8" diameter and this can be made in one of two ways. Either you will have to procure a 5/8" drill to fashion the hole in one go or, and I think this a better method, use a smaller drill and enlarge the hole to the correct size with a round file. With this latter method you can correct the alignment of the hole if it is not quite straight.

A tubular lining for the trailer eye is supplied; this should be firmly glued into the hole and the ends trimmed off flush to the hull.

Alternatively, a bow eye can be affixed to the bow with the bolts extending through the trailer block into the bulkhead tank. With the help of a long armed friend it should be possible to install lock nuts and washers on the shanks of the bow eye through the bulkhead hatch. Drill hole(s) to fit the shank(s) of the stainless bow eye through the trailer block. Squirt some marine grade caulk into the shank holes and in the area where the bow eye will be. Insert the bow eye, tighten the nuts, and wipe away any excess caulk that gets squeezed out as the bow eye is tightened into place.

Rudder and Tiller Assembly

Photo 55 shows how the rudder packing piece (89) is screwed and glued to one of the side pieces (88). The other side piece is fixed on top to sandwich the packing piece. The diagram shows how the fittings hold the tiller in place and also how the tensioned shock cord holds the rudder blade in place; this cord is fixed with screw and washer on the aft face of packing piece opposite the pintle bracket and follows the curve of the dotted lines to be fastened with four copper nails on the upper face of the small shoulder of the rudder blade near the gudgeon bracket. The elastic should be slightly tensioned.

“The word ‘slightly’ has been misinterpreted in the past. Particularly in strong winds the Mirror Sixteen travels at very high speeds. This puts tremendous strain on the rudder blade which tends to rise; the elastic holding the blade down must be very strongly tensioned to overcome this.”

The hempen cord for the upahul is tied through the hole in the large shoulder of the rudder blade, then runs up under the tiller and on to the trumpet jamb cleat on the tiller shaft.

Remember that the exposed inner faces of the rudder side pieces should be painted or varnished to protect them from rot.

The drawings include information on the parts required for the folding rudder assembly (except for the size and lengths of the hempen and shock cords). They also include a simpler single-piece rudder.

The class rules provide limits to the length and width of the rudder blade. They do not specify the angle, shape, cross-section, or location relative to the pivot axis. It is the opinion of the editor that the efficiency of the rudder could be improved by placing the blade nearly vertical, shifting the blade's fore edge about 1" in front of the pivot line of the pintle and gudgeons, shaping the profile to have a more elliptical shape, and giving the cross-section a more aerodynamic shape (NACA 0007?). The rudder blade should be shaped then fiberglassed (tape down the leading edge and around the tip then glass the whole blade). A template with the aerodynamic shape cut out should provide some assistance in shaping the rudder blade and keeping it symmetrical.

Tiller Extension

Screw and glue packing piece to underside of tiller extension end. Then fix the upper bracket of the universal joint to this after which you can screw the other part of the fitting to the end of the tiller, giving a hinged extension.

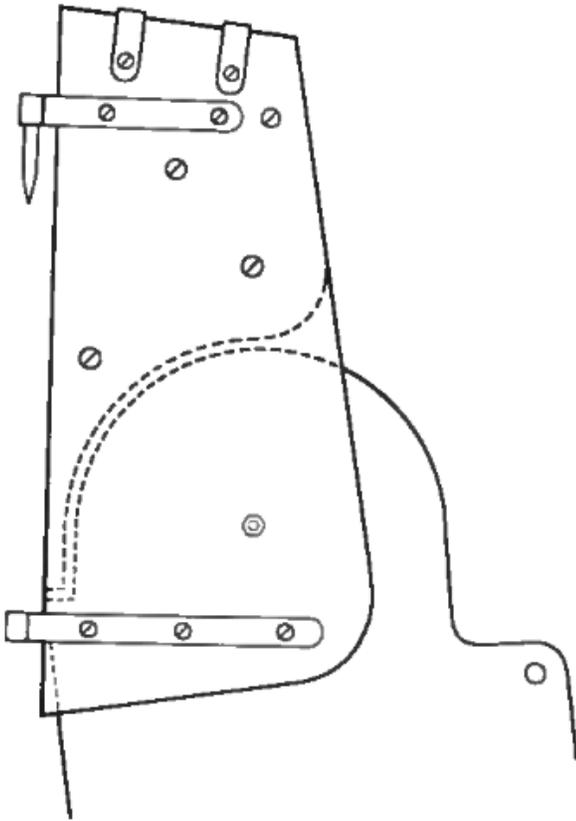


Diagram 12

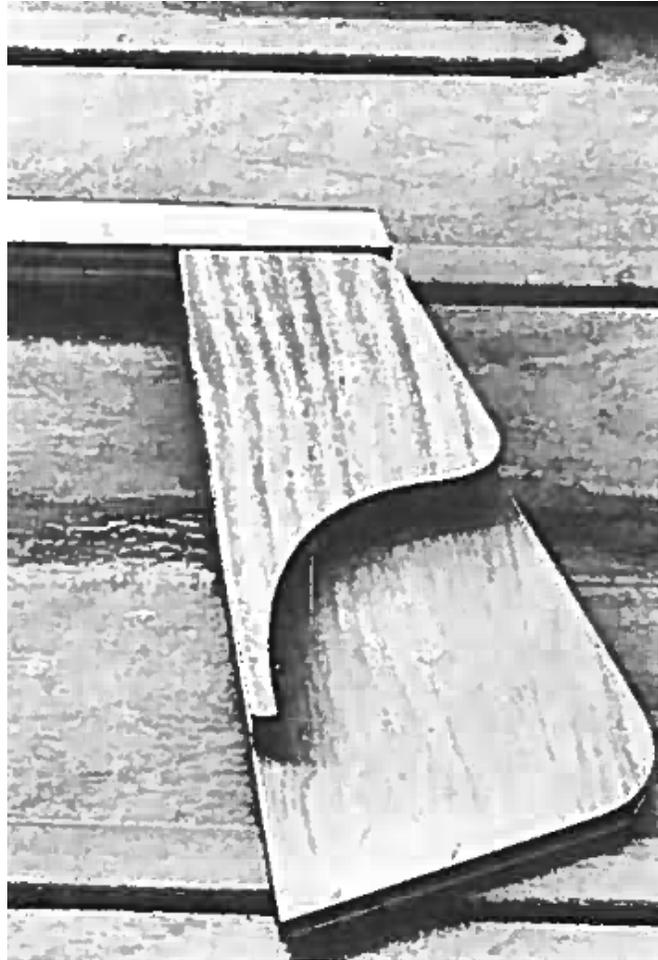


Photo 55

Fittings

All the fittings are supplied with their appropriate screws and the positions are shown in the enclosed plan drawing of the dinghy. Usually the fittings are fixed before finishing and then removed while the paint and varnish is applied - when the finish is dry the fittings are replaced.

The fitting diagram included with the original instructions is good but many of the items are no longer available by the names/part number listed. An updated drawing with more generic names has been included in the plans. It would be a good idea to use caulk to seal the holes drilled for the fittings and between the fitting bases and the boat (especially for the fittings within a foot of the waterline).

Keel Strip

Before turning the boat the right way up you should preliminarily fix the keel strip together with the rubber edging for the centerboard slot. Photo 56 shows how this is positioned and you use $\frac{3}{4}$ " #6 screws for fastening. The keel band starts at the aft end of the keel and, at its forward end, curves right up the bow to a point 4" from the deck. This leaves space for the deck stem fitting.

Hatches and Bungs

You still have to fit the ventilation hatches in the transom - these are done the same as before but remember that the black ring must be fixed on the outside.

Also there are small bung fittings to be put into the side tanks - these are also fixed as before.

Cooker Assembly - (not in the plans)

This is a pivoted platform which swings out from the square fronted hatch on the starboard side. On the lower side of the square end, the nylon hinge is fitted with a batten the width of the platform. When in the closed position the batten lies on top but, when the platform swings out, it is turned underneath to act as support.

The two battens (97) are fixed into the floor of the tank and the platform (95) is pivoted front the aft one.

This assembly need not be fitted at all if you do not wish to store a gas cooker.

See diagram for general layout

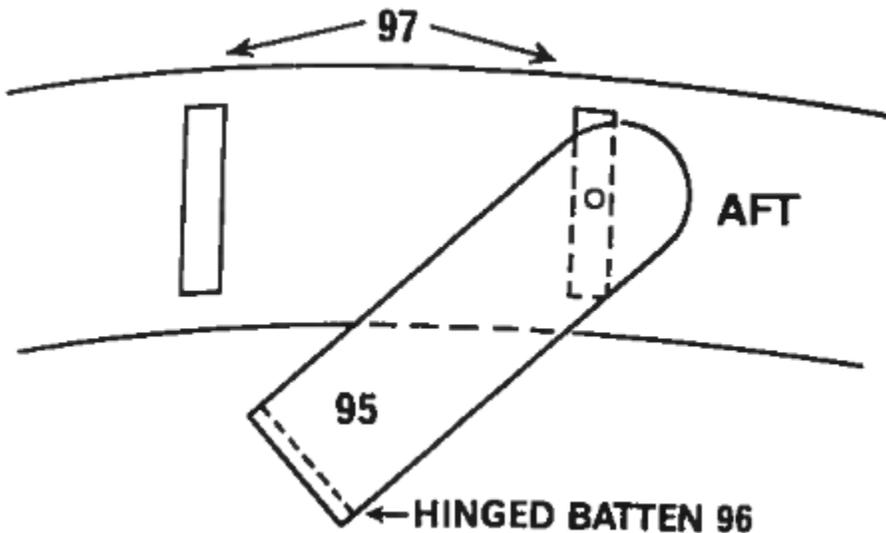


Diagram 13

Bottle Rack - (not in the plans)

This is another piece which is optional - its purpose is to fit into the aft starboard hatch and hold in place oil or water bottles.

Two supporting battens (94) are placed underneath the rack (93) towards each end - the assembly will then clip down into the tank so that the battens are on the floor.

Centerboard - (not enough information to fully define in the plans)

The centerboard needs clearing up and the round rubber stops (like door stops) fitted either side of the handle. The position is central $3\frac{1}{2}$ " from the pointed end.

On the center case assembly there are two cutaway portions towards the forward end which accommodate the two short pieces of rubber hose which act as grips to hold either side of the plate itself.

The pieces are held into the cutouts by metal plates the same length and four retaining screws in each.

Finally, in the centerboard itself you have to drill a hole to take the pivot of the stirrup - the diagram shows where this should be. After drilling glue in the short brown nylon sleeve as you did for the trailer eye. The stirrup connects through this hole and you can lower the plate into the case, the sides of the stirrup fitting in the upright slots.

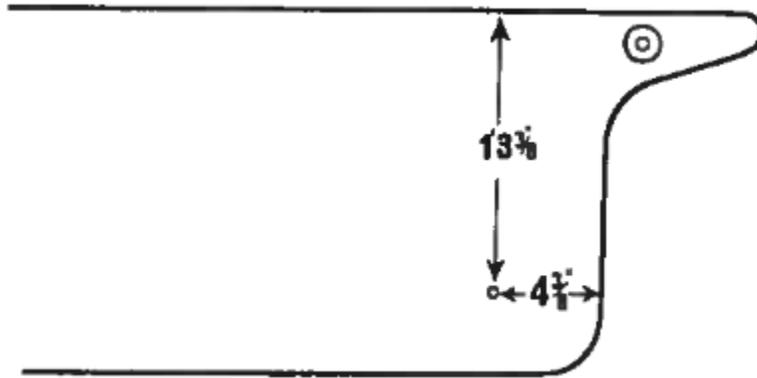


Diagram 14

It is probably possible to work out the general shape of the centerboard from the rectangular daggerboard drawings, the diagram above, and enough internet photos of Mirror 16s. The plans would need to be adjusted a bit to accommodate the larger centerboard case. The editor leaves that up to the builder to make and coordinate those changes.

Daggerboard

There are two options for the daggerboard in the plans. The rectangular option should approximately match the centerboard and should meet the class rules. The second option maintains the same surface area but has been shaped to allow the daggerboard to slide up if the water gets too shallow (it is also a few inches shorter).

The daggerboard needs to be cut out of $\frac{3}{4}$ " thick flat marine plywood. Confirm that the daggerboard will fit loosely into the daggerboard slot. Glue and nail the two handle blocks (1" x $1\frac{1}{2}$ " x 20"?) to each side of the daggerboard flush with the top edge (handle notches down). Insert the daggerboard completely into the slot and mark each side where the keel occurs. The daggerboard will need to be shaped (to a more aerodynamic cross section) below that point. Mark the center of the board around the edge to help with shaping. Shape, smooth, and then fiberglass the daggerboard all the way up to the handles (double layer the leading and bottom edges). More info here.

Toe Straps

You will see from the main fittings diagram where you position the fore and aft anchor plates but the center of the straps fit up underneath the thwart with screws and washers. The lateral place of these is largely a matter of personal choice but the recommended points are 8" either side of the thwart's center line.

“The tow strap thwart fixing i----- line of the thwart but this ----- on length of the legs etc”

There are two holes (7/16") to be drilled through the thwart to take the ends of the mainsheet strop. These should be 10" from the center line and 3½" from the forward edge.

Chain Plates

These are fastened to the outside of the boat to coincide with the chain plate blocks. The top end of the plate protrudes upwards through the rubbing bead for 1" so a slot has to be cut to accommodate this. Seal the bear wood before installing the fitting. Finally, the plate fits over the top of the chainplate and is screwed to the rubbing bead.

Mast Assembly

The mast comes to you in two pieces (to prevent damage in transit) and you need to assemble them.

One piece has a wood block fitted in the end - all you have to do is to screw the other section tight up to the first using a similar layout of the screws. The screws must be very tightly in place so ensure that the lead holes are a good bit smaller than normal. Also it is vital that the whole mast is absolutely straight when assembled.

The grooves of each section coincide but check that the cords run through both halves otherwise it will be almost impossible to use the halyard which tracks through the full length of the mast.

If you like, before assembly, you can apply a thin coat of sealing varnish to the wooden block.

As the actual construction of the mast has been lost to time, it is the editors opinion that an aluminum extrusion can be used instead. The plans will provide information on a suggested mast rigging layout (though this can be changed to fit the builder's preferences).

Rigging Components - Diagram of Fittings - See plans

Diagram of Fittings

Conversion Table: Feet and Inches to Metric (mm)

Adjustments to the Diagram of Fittings - H.A. 76 should be fitted at right angles to and in line with the jib sheet which runs from the fairlead to where the crew will be sitting on the opposite side of the boat.

H.A. 3 kicking strap anchorage plate is fitted on the floor immediately behind the king post step.

The transom has no cut out in its top edges.

Finishing Your Boat

The following instructions have been extracted from a booklet published by International Paints Ltd. and called "Hints on Boat Painting".

Clean Supplies and Workspace

To ensure a satisfactory job it is essential that the work, brushes, clothing and workroom are all as clean as possible. Tools should all be free from grease and dirt so that the woodwork is not contaminated. Shavings, sawdust and debris from the sanding should be carefully removed, not only from the work, but also from the surrounding floor. Brushes should be of good quality and clean, for the bristles of poor quality and dirty brushes will either break or come adrift to cause disfiguration of the paintwork. Keep brushes scrupulously clean to avoid the risk of old dry paint in the brush stock transferring itself on to the job being painted. Wear non-woolly clothing and, if possible, a nylon shirt or blouse. This will help prevent minute portions of hair or wool from your clothing sticking to the wet paint and causing small but noticeable blemishes.

Vacuum Wood Surfaces

When the surface has been sandpapered smooth, the question of removing the sanding-down dust must be tackled. The best way to do this is with a vacuum cleaner, which extracts the dust from the grain and leaves the surface dust-free. If a vacuum cleaner is not available, a vigorous brushing along the grain will remove much of the dust which is lodged there. Then clearing is complete, wipe over the area with a rag lightly dampened with white spirit or thinners to ensure the removal of the last traces of dust. WE WOULD EMPHASISE THAT THE REMOVAL OF ALL DUST IS EXTREMELY IMPORTANT. If any dust becomes mixed with the priming it will lead to poor adhesion of the paint to the wood, and dry as a "bitty" surface.

Sanding

The abrasives most commonly used for preparing paintwork on boats are composition blocks and wet-and-dry "sandpaper". The composition blocks are used almost exclusively for rubbing down existing paintwork and are excellent for this purpose. They contain a cutting effect. It is usual to purchase these in either a medium or fine grade. Wet-and-dry paper is made in a large variety of grade sizes, and can be used in either a wet or dry state. If using wet, put a little soap on the paper to prevent clogging of the paper. Keep the paper or the paint surface properly wetted at all times. The same type of wet-and-dry paper is used for dry rubbing down. When the abrasive paper is used wet its cutting efficiency is increased but it leaves the surface with a slightly polished and smoother finish. This is not suitable for the application of further paint. A surface which has been rubbed down with wet paper should be finished off by rubbing down with the same or a finer grade of dry paper. The paper used for a particular job will give varying results according to the way in which it is used. Its tendency to scratch will depend on the amount of pressure applied by the operator. Finger pressure will apply comparatively concentrated pressure in a small area; if the paper is used with a block the pressure is more evenly spread and the risk of scratching reduced. The use of a lubricant on the wet-and-dry paper reduces the probability of a mass rubbing down debris sticking to the sandpaper. If this should happen it very much increases the risk of the surface being scratched and reduces the cutting efficiency of the paper. It is most important that surfaces to be varnished should be sanded WITH the grain of the wood, and those to be painted should be sanded ACROSS the grain.

Paint Consistency and Thinning

Paint is most likely to be thick during cold weather. Thick paint can be reduced to normal consistency by either adding a little thinner or warming. Before warming, the tin should be inspected to see whether it has a petroleum mixture label on it. If so, there may be a considerable danger in warming it. Therefore exercise caution. The best way to avoid thickening is to store the paint in a warm room or boiler house overnight (away from any open fire, of course). If thinners are to be added, be quite sure the correct thinners are used. Most conventional paints can be thinned with white spirits, but NOT with paraffin or what is sometimes sold as “paint thinners”, which may be a mixture of white spirit and paraffin. Most special paints, including two-pot Epoxides, Polyurethanes and some Antifouling have their own special thinners. In windy conditions (as on an exposed beach) paints dry extremely quickly, so it is often necessary to add the special thinners to ensure easy and smooth application.

The paint should be well stirred until any sediment is thoroughly incorporated. Very occasionally, a tin of paint is found to have a heavy sediment and the easiest way to thoroughly incorporate this is to pour off most of the liquid contents into a separate container and break up the sediment into a thick paste. When this paste is uniform in texture, add back the liquid paint, slowly stirring all the time.

Applying Paint with a Brush

After the brush has been dipped into the paint and “loaded”, to a depth of $\frac{1}{2}$ ” to 1”, it should be held over the tin and tilted upwards to prevent the paint dripping. The paint should then be transferred to the surface and spread as evenly as possible, using both vertical and horizontal strokes to achieve this. When it has been evenly spread, it should be “laid off” in a series of brush strokes all in one direction.

To ensure the best adhesion, and to obtain even spreading, the brush should be held at approximately right angles to the surface being painted. If it is held at an angle, there is a tendency to slide the paint over the surface, leaving it unwetted. Finally, if convenient, lay off the painting in a vertical direction, as this is less liable to cause runs than laying off horizontally. During the actual operation of laying off, the brush should be held at an angle of 45° so that it leaves less marks than would be the case if held vertically.

If the brush has been overloaded with paint and it is desired to remove it, this is best done by scraping the brush against a clean palette knife or similar object held over the paint tin. The habit of wiping the brush against the side of the tin is not a good one, as this tends to collect thickened paint on the side of the tin, which will skin and transfer itself to the brush.

Most paints are quick drying in nature and after the brush has been used for twenty minutes or so, a certain amount of paint collects and dries in the heel of the brush. This tends to skin and work its way down the bristles to the surface being painted. If the surface to be painted is large, it is advisable to stop as soon as the paint starts accumulating at the stock of the brush and either change to a brush which has already been cleaned or stop and clean the brush which is being used.

The first coat of primer should be liberally applied and well brushed into the surface to ensure good adhesion. The second and subsequent coats of primer should be of normal thickness. Undercoats should be applied as medium coats taking special care to spread these evenly to avoid brush marks and the necessity for excessive rubbing down.

Cleaning and Maintaining Brushes

It is most important to buy good brushes. Apart from other considerations, good brushes last longer. To obtain a good paint or varnish surface free from bits, one essential is to have clean brushes. After use, the brush should be thoroughly washed with Turpentine Substitute or thinners using one or more changes of solvent to ensure that the brush hairs are as free as possible from paint or varnish. The brush should then be washed with soap or preferably a good detergent and warm water until a good froth is obtained by working the brush vigorously on the palm of the hand. This is an indication that all the paint or varnish and solvent has been removed from the hairs and the brush should then be rinsed in warm fresh water. As much as possible of the water should be shaken from the hairs. The brushes should then be wrapped in clean greaseproof paper. When wrapping, care should be taken to imitate as nearly as possible the maker's original wrapping. If an elastic band is used to secure the paper it should be put round the metal part of the brush and not the hairs. Care should be taken to see that in wrapping the brush the hairs are not twisted for, if they are, they will be permanently twisted when the brush is unwrapped. When wrapping the brush, the paper wrapping should be gently stroked from the metal to the tip of the hairs to try if possible to lay the hairs in a flat, even chisel shape.

General Process

Prep boat surface (fair, sand, clean, repeat until smooth). Clean workspace and boat, then paint the boat. Many paint systems have specific suggestions for primers and topcoats. They may also have recommendations for the numbers of primer coats and topcoats.

In the event that recommended procedure is not provided, the following process can be used to obtain reasonably good results:

1. Apply a coat of primer ensuring complete coverage and good adhesion.
2. Sand primer coat to remove bumps and smooth the surface with 220 grit sandpaper (or a foam sanding block). There is no need to be aggressive with this sandpaper (don't sand through the primer coat).
3. If defects are discovered, it is best to fair, sand, clean, reapply primer and sand before continuing on.
4. Wipe away the dust generated by sanding the primer coat.
5. Apply a coat of paint.
6. Sand the paint layer after it dries with 320 grit sandpaper (or a fine grit foam sanding block).
7. Wipe off dust.
8. Apply another coat of paint. There is a good chance that this coat will look great and can be the last coat applied to the surface.
 - a. If needed, additional coats can be added by sanding the previous coat, wiping away the dust and adding a new coat of paint.
9. Once the paint is thoroughly dry, the boat can be flipped over and the other areas of the boat finished in a similar fashion.

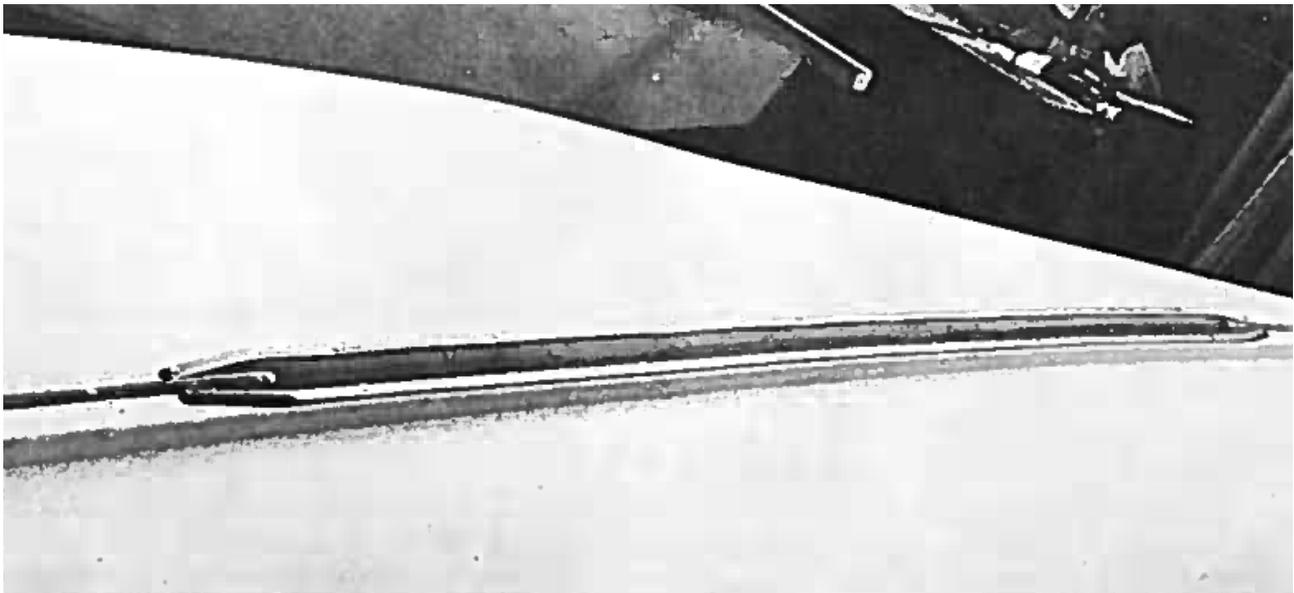


Photo 56

Rigging Instructions

It is assumed that anyone who buys a Mirror 16' Dinghy already has some experience with sailing and is fully conversant with basic techniques and terms. I am, therefore, giving a quick rundown on the rigging sequence for your general guidance. You may find that a different sequence will suit you - well, so much the better for it is always more effective to use a drill which is familiar.

Here then are the notes in order:

1. Lay the mast on the boat, at an angle, with the mainsail groove downwards and the foot of the mast a short distance aft of the king post.
2. Connect the shroud eyes to the two lugs at the side of the mast. The other end of the shrouds (with the bottle screws loosened) can be shackled to the respective chain-plates.
3. Connect the loose end of the forestay to the lug between the shroud lugs.
4. Standing in the boat you can lift the mast so that the foot clips into the mast step whilst your crew is steadying the forestay.
5. The forestay, just below the reefing roller, can be connected to the forward hole in the stem fitting.
6. The bottle screw on the shrouds can now be tensioned correctly and the pins covered with waterproof tape to prevent snagging. Also ensure that the mast is upright. The sort of tension one needs in the shrouds is one that will allow 3" of play at a point 3'-0" from the deck. Having adjusted the bottle screws correctly they should be locked with thin wire, to prevent them slackening off while sailing. Finally, the bottle screws and pins should be well covered with waterproof tape or a 1'-0" length of suitable plastic (water hose) tubing; this prevents the jib sheet catching in, and possibly removing, either the split ring or locking wire.
7. Rig the jib by shackling on the wire halyard from the top of the tube to head of the foresail. Feeding the luff of the sail into the tube, hoist the sail until the locking pin at the bottom end of the tube slot can secure the tack of the sail. The halyard should now be tied (tight enough to take the wrinkles out of the sail) to the plastic hook by the drum. The end of the halyard is now fed (first) the slot in the

typhol drum, (second) the guide onto the drum from the inside, (third) the plastic eye in the deck, and (fourth) pulled through until all the slack rope is taken up.

- a. Holding the roller still, wrap the sail around the tube until it is completely furled. Now attach the jib sheets.
 - b. You will find that pulling on the jib sheet unrolls the sail while pulling on the halyard furls it up.
 - c. With the jib unfurled, tie a stopper knot in the furling line at the plastic fairlead. This is to ensure that the line is kept taut and does not drop off the drum.
8. Rig the mainsail by threading the bolt rope at the foot of the sail into the front end of the boom and pulling the clew lacing along to the outhaul cleat at the aft end.
- a. Put in the sail battens.
 - b. Shackle the head of the mainsail to the main wire halyard and pull the roped luff up the groove in the mast until the peak reaches the black band. Secure the halyard and fix the boom into the gooseneck fitting. When you pull down on the boom and achieve the correct tension, you then tighten the nylon locking nut.

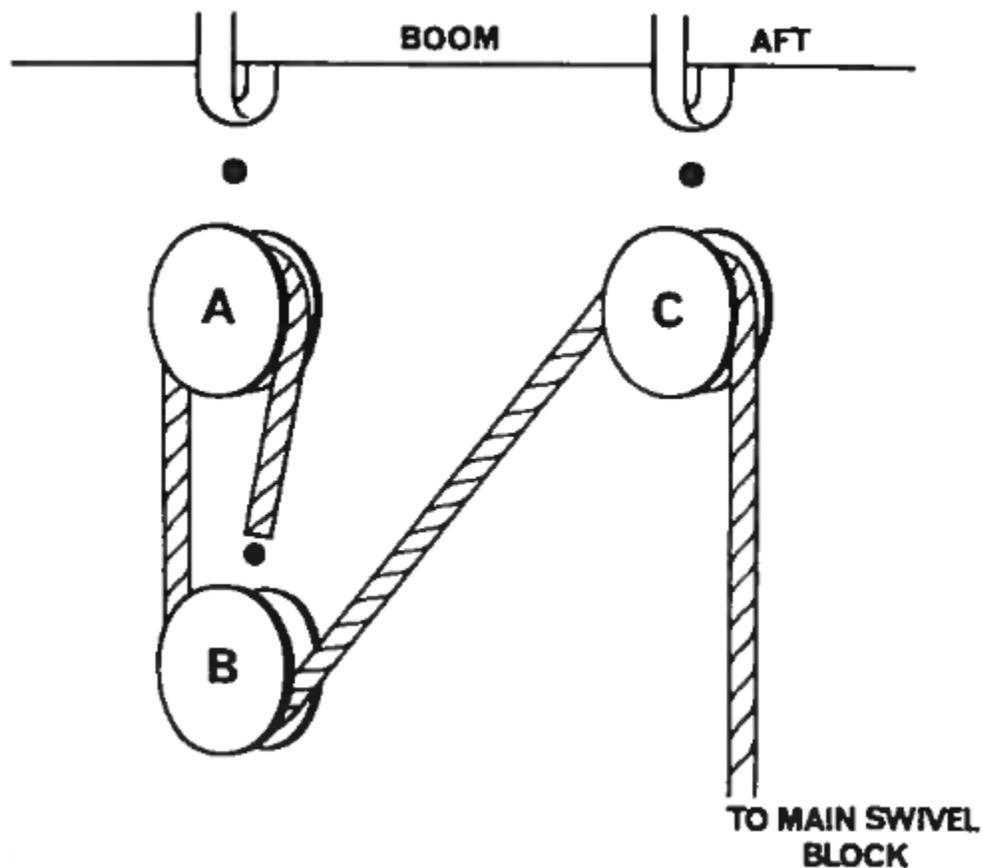


Diagram 15

9. Finally you can rig the mainsheet. The fixed end on the sheet is made fast to the top of Block B which is on the mainsheet strop fastened across the two holes in the thwart. The diagram (Diagram 15) shows how the ropes run from one block to another. As you can see the sheet runs from B to A which it circles from aft to forward - then back to B forward to aft - on the C forward to aft - finally to the main swivel block above the foot rest which it passes through from forward to aft.

- a. Having reeved the mainsheet and hoisted the mainsail the final stage is to fasten Block B . First locate the mainsheet strop which is 1- $\frac{1}{8}$ " circumference terylene rope approx. 4' in length. Tie the center of the strop to the bottom of block B, this rope is secured to the thwart by passing each end through its respective hole and tying a stopper knot underneath. Adjust the position of the knots along the rope so that when Block B is pulled up to tension the rope into the two equal sides of a triangle, the block itself is 3" below Block A when full pressure is exerted on the mainsheet.
10. Put in all drainage bungs and ventilation hatches.

Addition to Rigging Instructions

Main Halyard

Wire approx. 19' long spliced to rope tail approx. 26' long. Attach the end of the rope tail to the thin line running through the top sheave and pull through the mast. Tie a stopper knot in the end of the tail to prevent it from being accidentally pulled back through the mast.

Spinnaker Halyard

Rope approx. 35' long. Attach the plain end to the thin line running through the sheave on the front of the mast just above the forestay lug. Pull through and tie a stopper knot.

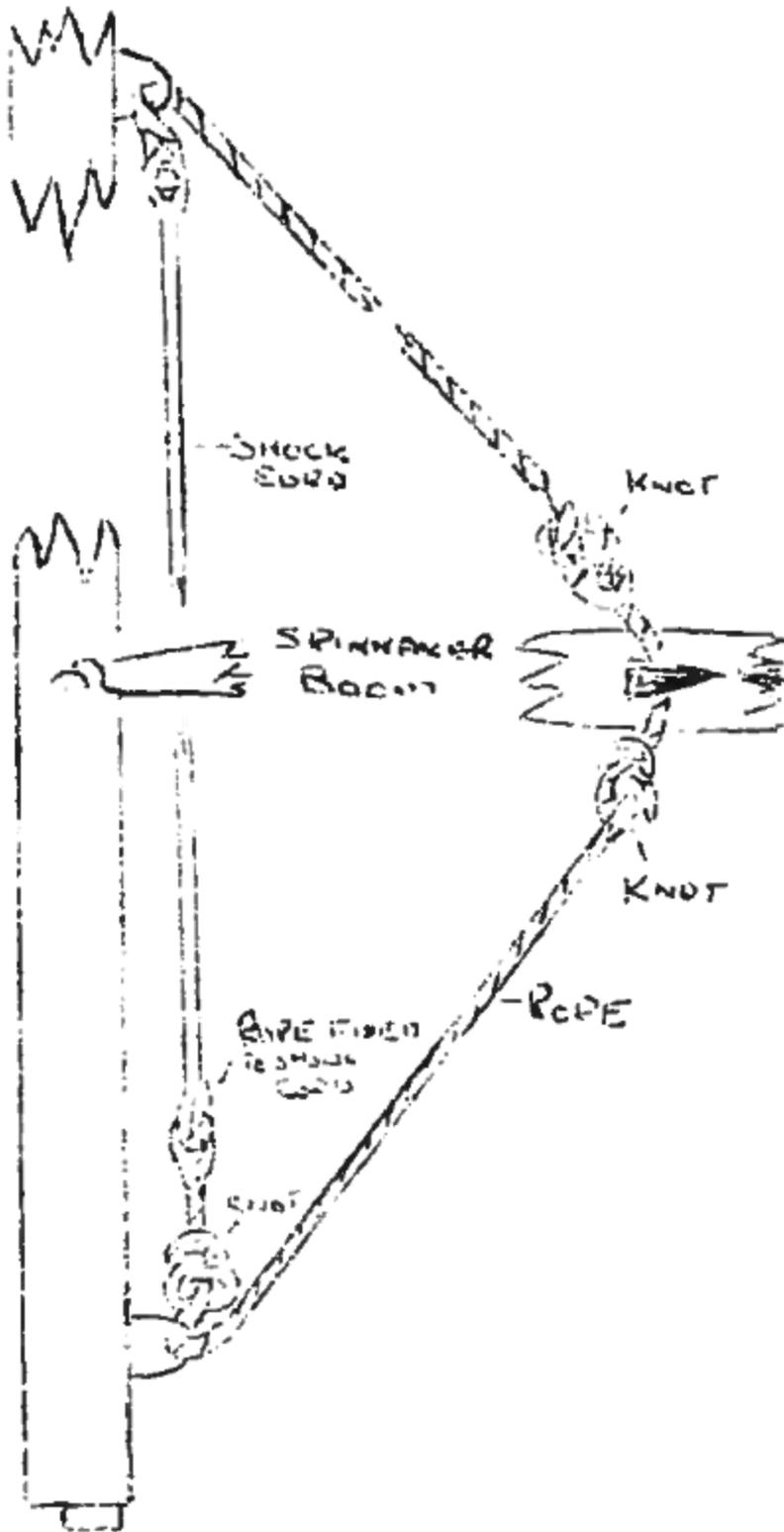
Jib Halyard

Having assembled the luffspar, thread the halyard (approx. 12' wire and 14' rope) through the pulley at the top of the spar. The rope tail is used as the furling line when the jib is hoisted.

Assembly of Luff Spar Unit (Roller Reefing)

1. Remove the nylon bearing block at the upper end of the luff spar.
2. Slip the bearing block over the forestay before the soft Talurit eye is made in the forestay.
3. Insert the forestay through the luff spar from the upper end
4. Locate and secure the nylon bearing block to the luffspar tube by means of two $\frac{7}{8}$ x #6 self-tapping screws through HA 186 assembly.
5. Slide two unattached halves of HA 270 onto the lower end of the luff spar tube.
6. Fit soft eye of Talurit loop into upper end of stainless steel axle and attach by means of 3/16"Ø cross pin.
7. Insert axle/Fairlead/bearing assembly in lower end of luff spar tube lining the $\frac{1}{8}$ "Ø holes in the bearing bush with the 3/16"Ø holes in the tube.
8. Gently slide the lower half of HA 270 down to the extreme bottom limit of the tube, ease it past the belled stainless steel fairlead at the points of the 'ears' formed by the slot.
9. Align the lower half of HA 270 to allow the insertion of the stepped pins through the luff tube and into the bearing bush.
10. Gently bring the lower half of HA 270 into contact with the location pins, making sure the 3/16"Ø portion of the pin is located in the slots provided.
11. Bring the upper half of the HA 270 into contact with the lower half ensuring the slots in the rims of the drum halves are opposed i.e. 6 ox; 12 oc.
12. Complete the assembly by fitting the eight brass screws in the drum halves.

Fitting Spinnaker Boom Topping Lift Downhaul



Lay the mast on its side on the ground. Find the 6' length of shock cord spliced onto 12' of $\frac{3}{8}$ " terylene rope. Thread the plain end of the rope through the plastic fairlead 9' above the mast heel. Now clip on the spinnaker pole and hold at just above right angles to the mast. The rope pulled tight, so that the shock cord is pulled up to the upper fairlead, is not placed in the jamb cleat in the center of the spinnaker pole. A figure of eight knot should now be tied in the rope approximately 1" each side of the cleat. The rope is now lead through the fairlead 3" above the heel, pulled tight and a figure of eight knot is tied in the rope 2" above the fairlead. The shock cord is now stretched down the mast and secured to the rope just above the figure of eight knot. Now slip the rope out of the central cleat on the spinnaker boom. The shock cord should pull the rope neatly against the mast. Check that the pole can be easily and quickly rigged before trimming off the loose ends.

My Spinnaker Chute

By Barrie Skelcher

Following the change in the Class Rules passed at the A.G.M. 1971 and subsequent approval from the designer and copyright holders, the Class Association Committee has been investigating suitable spinnaker chutes. For a trial Barrie Skelcher has fitted one onto his Mirror 16 and he now reports as follows.

“The chute was fitted by Cyril Stetens, Esplanade, Maylandsea, Essex. It is the smaller of the two sizes and is fitted flush with the deck. It consists of a special moulded fiberglass funnel-shaped device which is fitted flush with the deck and penetrates into the forward buoyancy tank. It is sealed in the tank in such a way that the integrity of the tank is not lost. The tail end of this device extends a few" through the forward bulkhead and provides for the attachment of a nylon sock which then extends abaft of the center case. A new spinnaker halyard is required, which has to be long enough to start at the head of the spinnaker, reach up and down the mast, along the floor of the boat and into the hylong sock, where it is attached to the center of the spi. A set of instructions is provided by Mr. Stevens when the chute is purchased. The arrangement used in the case of Puff is shown in the sketch, though of course there is room for personal choice.

The system is now working well ‘though there were one or two snags and some technique of operation to be learned. The big advantage is that the spi can be hoisted and taken down much quicker. This not only has the obvious advantage for racing but also makes the hoisting and striking of the spi a much safer operation.

Although the smaller size is fitted to Puff it is tight and it may be better to use the next size up. Although the nylon sock may be bent it must join the plastic tube concentrically and in line, otherwise the spi tends to gather at this point and is difficult to launch.

A device fitted to the front of the bow to prevent the spi sheets falling under the bow had to be removed, as it tangled with the tail of the halyard attached to the belly of the spi.

The top block of the forestay spar tends to catch up with the spi halyard. This was overcome by making a plastic cone out of the top of a “squeezey” bottle and fixing this as a shroud over the block with sticky tape.

One other problem to be overcome is the leading of the halyard out of the mast. It tends to rub and bind on the deck wash board. On Puff this has been overcome by fixing a small brass plate for the halyard to run on. A block would be better but requires some ingenuity to fit.

This chute was used on Puff during “Deben Week” with considerable success. For those who wish to use their M16 for camping the nylon sock can be unfastened at its tail and folded out of the way.

Assembly of the Mirror 16 Trailer

The three photographs show all the relevant angles of the trailer and will make the following notes much simpler to understand.

1. Bolt Stub Axles to underside of flat end of springs using inner two holes only.
2. Bolt rubber spring snubbers to underside of main cross member.
3. Bolt springs to the underside of the main cross member.
4. Bolt the two main fore and aft members below stub axles using the remaining outer hole.
5. Bolt tow bracket to front of fore and aft members.
6. Fit wheels to stub axles, tighten nut until split pin is inserted, bend out split pin and slacken nut.
7. Snap grease retaining hub caps on after smearing bearings with grease.
8. Bolt on mudguards to the inside of the main member bracket.
9. Bolt long white rubbers to top of main cross member and mudguards.
10. Bolt short white rubber to lower half of front tow bracket.
11. Bolt on ball fitting to front of tow bracket.
12. Secure "V" shaped fitting to hole in top of the tow bracket, using a large wing nut.

General Notes

Always use shake proof washers under all nuts.

Make sure all nuts are tight; it is advisable to check all nuts for tightness after the first 100 miles, and when used on rough and bumpy roads.

Tyre pressure 30 lbs.

Grease all nipples after the trailer has been used for launching.

Trailer Maintenance Instructions

1. Periodically grease the hubs through the nipples provided. This is particularly important before and after immersion in water.
2. Maintain tyre pressures at 30 lbs p.s.i.
3. Periodically inspect for tightness the nuts and bolts holding towing attachment to trailer frame and those holding springs and axles to trailer cross members.
4. Touch up paintwork as and when scratches occur.
5. Hose down trailer with fresh water after immersion in salt water, particularly wheels.

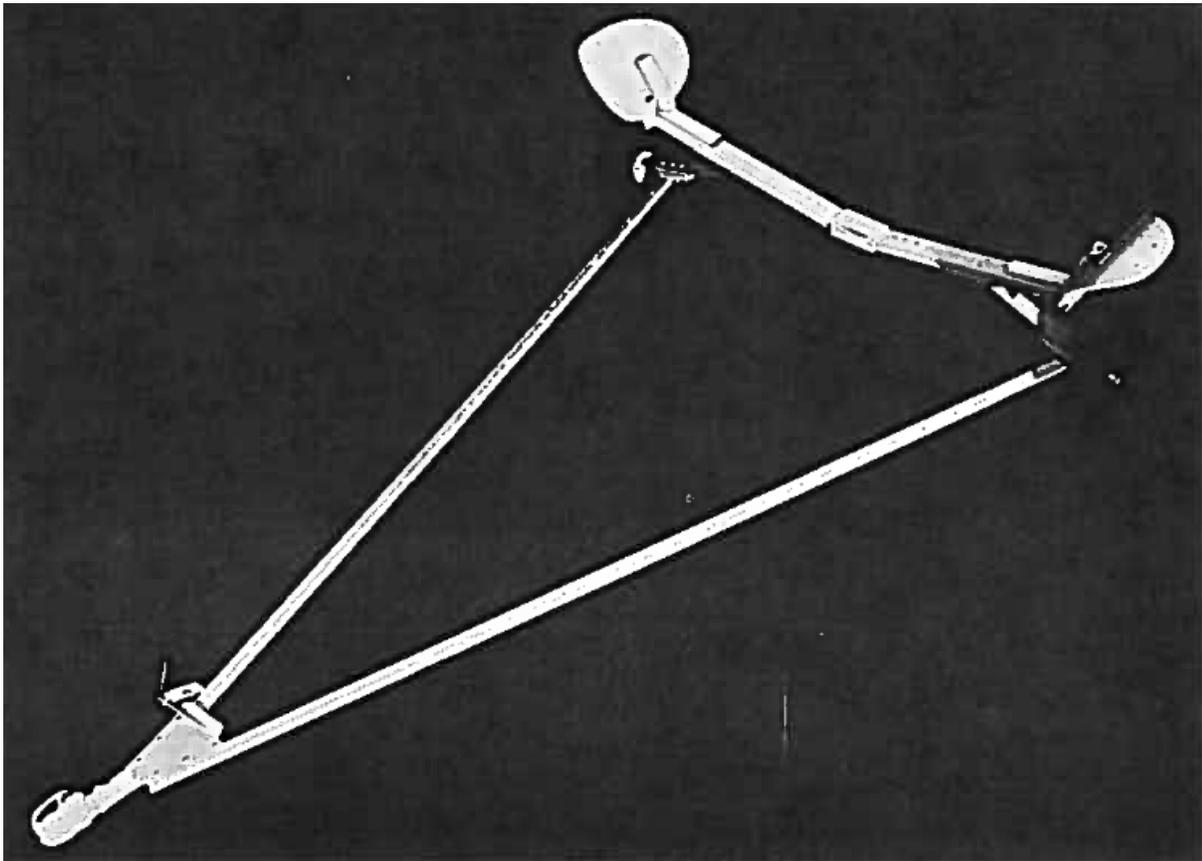


Photo 57

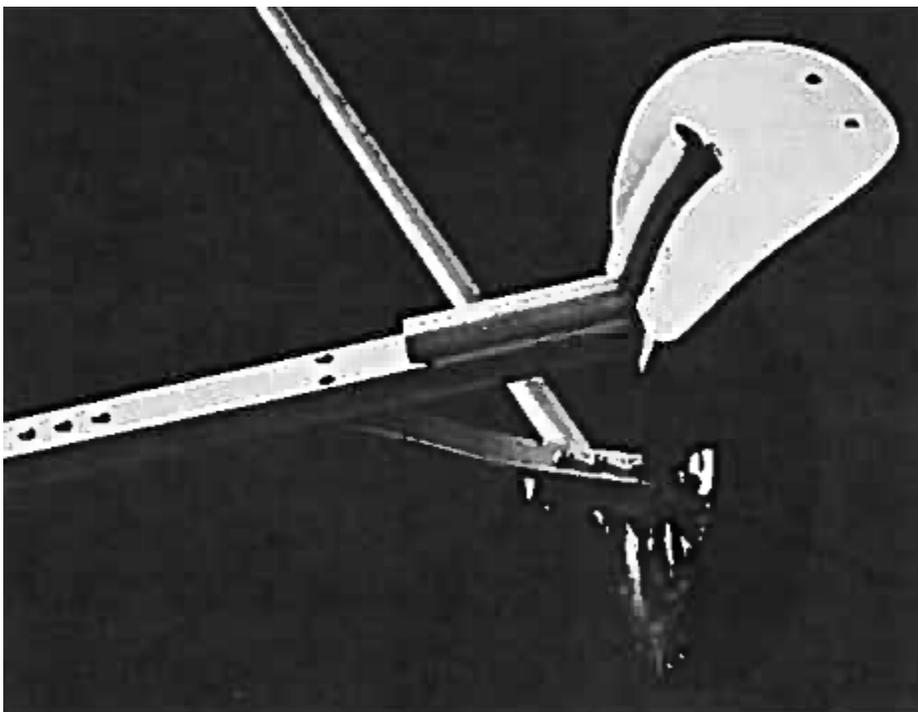


Photo 58

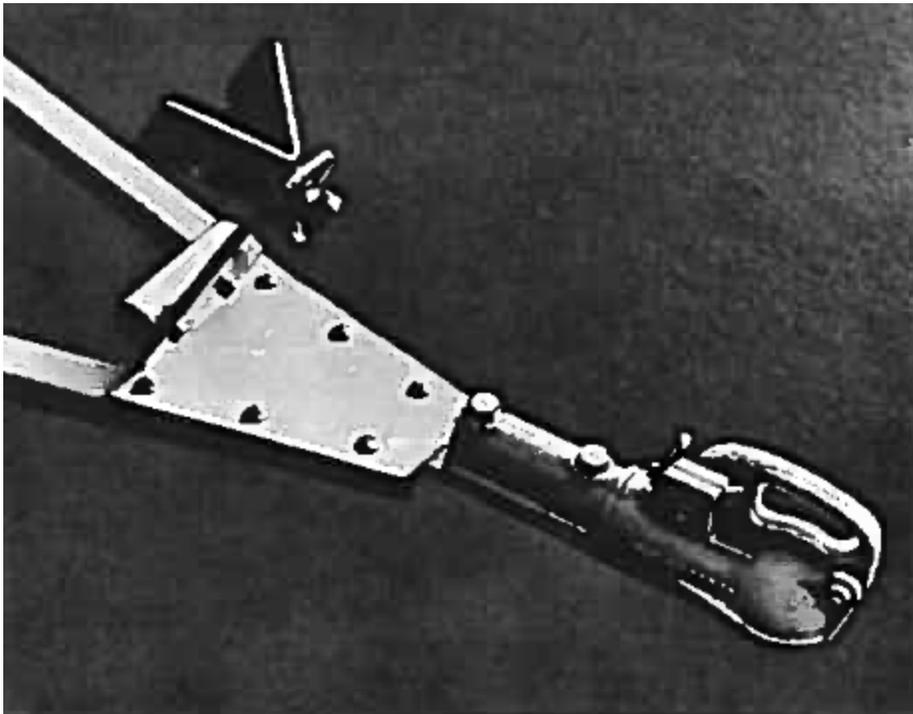


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