Nottingham 48

“J” Class

Build Manual

www.jclasshulls.co.uk

(08/2021)

Below Decks index of parts.

1) Bow

2) King Plank

3) 1/4 Beam

4) Forw`d mast deck beam

5) Mast Deck

6) ½ Beam

7) ¾ Beam

8) ½ to ¾ hatch runner (x2)

9) Servo hatch, forw`d brace

10) ¾ to Stern brace hatch runner

11) Rudder Hatch braces (x2, fore and aft)

12) Stern brace

13) Lower Mast brace

14) Servo Tray

15) Servo Tray Sheet brace

16) Forw`d Sheet brace

17) Rudder Brace

18) Forw`d (bow) through deck pulley brace

19) King Plank brace

Also included are

A stand. This is reasonably rigid but is primarily designed as a support while you build up the hull.

4 x 5mm x 5mm hardwood strips for the inwales. There will be sufficient leftover for the hatches.

20 x 3/8 brass screws (internal wood) plus 20 x ½ brass screws (stand)

4 stainless steel hex bolts. 3 x .5mm (Servo tray)

Oval mast tube

Rudder index of parts

1) Lower brass rudder pintle (final finishing and polishing by the builder) with 4mm grub screw and locating screw

2) Brass upper rudder tube, 8mm I/D

3) Upper brass bush

4) Rubber sealing “o” ring

5) Angled rudder arm (nickel plated brass)

6) Rudder

Ballast Index of parts

1) Main ballast with 6mm protruding threads

2) Trim weight pre-drilled to 8mm

3) Stainless nyloc nuts and washers

4) Aluminium bar shaped and pre-drilled

Note and disclaimer

This build manual has been put together with the best of intentions and in the view of the writer includes sufficient detail to complete both a competitive and attractive Nottingham 48. I can`t guarantee the accuracy of the manual and I anticipate that the builder will to use his/her own judgement to complete the build. It is always a sensible idea to seek the help and guidance of others, especially other members of your club.

The finished yacht will reflect your time spent, planning and attention to detail. Ensure that you are entirely satisfied with each stage of the build before progressing on to the next as changes are difficult to make at a later date, especially after the deck is fixed.

There are numerous different ways to both build and rig a radio controlled sailing yacht and I can`t state that the method in these instructions is the “best”. Using this manual as guidance should produce a well finished yacht that is something to be proud of.

If you feel that this manual contains errors, or that there are some areas that could do with improvement, or you have questions or need further guidance then contact me through the web site **www.jclasshulls.co.uk.**

Enjoy your build; take pride in your finished yacht.

BUILD INSTRUCTIONS

Introduction (1)

Welcome to Canterbury J Class ownership. These are instructions are designed as an aid to the completion of the Nottingham 48 and Canterbury J Class boat, and its associated packages, as supplied by J Class Hulls of Nottingham.

These instructions were originally written as I built up the development model myself so that you will have the benefit of my mistakes. I have subsequently added to the manual as I have made further models and developed the kit. The experienced model builder may find these instructions somewhat laborious as they are primarily intended as a guide for the less experienced model builder.

The glue I use is a standard two-part epoxy and is available with various drying/curing times. Some parts will be better fitted using glue with a longer drying time to give you time to properly position part however glue also acts as a lubricant and you need to take care that the parts are held securely whilst the glue cures.

Almost the entire hull with its woodwork can be assembled dry, without gluing, and if necessary support can be provided by wrapping an elastic band around the hull to help pinch in the top of the deck line. I suggest that you fit as much as possible dry to start with, just to check the relationship between different parts and to ensure that the parts fit as required. Some sanding and shaping of the wood parts will be required to adapt to the shape of the hull however these parts should then fit neatly and snugly without having to apply excess force to either the hull, or to the wooden part itself.

Fibreglass gel coat and resin can take up to a year to fully cure and if not stored properly the hull can distort. Until the model is started store the hull upside down on small blocks of wood at the bow and the stern to retain the shape of the hull.

When you unpack the hull, the first thing to do is to check for any transit damage and that the kit is complete. We will have rigorously checked the box and its contents

before posting however if there is anything that you are unhappy with you should contact me immediately.

Note that the hull and rudder package are made individually by hand and are therefore likely to vary a little between one model and another. To some extent, you will need to make some compensation for these individual features however they should not affect the overall build.

Provided that you complete the model to the specifications at the end of these instructions you will comply with the Canterbury Rules and be eligible to race your Nottingham 48 in the UK…Enjoy your build!

The Bare Hull (2)

Description

The Nottingham 48 hull is constructed using traditional fibreglass techniques and taken from a two-piece mould to improve quality. The outer finish is by a gel coat supported by a 300GSM mat with additional strength added along the deck edge, keel and amidships. The construction complies with the Canterbury Rules but the mould is not approved by the Canterbury Association. In the UK the Nottingham 48 and the Canterbury are considered the same model for racing but this is not the case outside the UK.

The Canterbury hull is taken from a mould approved by the Canterbury Association and its construction complies with the Canterbury Rules so when complete this model can be raced outside the UK provided other requirements in the Rules are complied with.

Fibreglass is both light and strong but the gel coat is brittle and can chip if not treated carefully, especially when drilling. Chips can however be easily repaired with typical car fillers but it is easier to avoid the damage in the first place by handling the bare hull with care.

The bare hull is flexible and the rigidity is created by the addition of the deck beams and the mast tube. Deck beams create rigidity on a horizontal plane and the mast tube creates rigidity on the vertical plane. Although you may note some flexibility in the structure, by the time the beams, tube and deck are fitted, the structure should be very rigid indeed.

The Canterbury moulding has a gel coat finish but the finished model will require to be filled and painted when finished. There are some faults in the moulding, all of which are solved when the hull is painted.

The Nottingham 48 is a high quality moulding and no filling or painting is required. Minor scratches can be removed with polishing compound, T Cut or similar, deeper scratches can be gently flatted with 1500 wet and dry paper and then polished.

Although the bare hulls are built in different ways the completed models should be the same in all respects and there are no sailing advantages to either design of hull.

Instructions

1) Build a stand. If you have purchased the below decks package, a stand is included if you haven't purchased this package, is suggest that you use the pictures on the website to help you design one for yourself. The stand provided in the below decks package is designed primarily to be used when building up the hull, and for storage, and may not be strong enough for use at the lake side.

You may find it beneficial to lightly sand the surfaces where the ply touches the fibreglass and cover with a soft material to avoid scratching the gel coat.

The stand should be fixed with the ½ inch brass screws provided and drilling pilot holes using a 1.5 mm bit will avoid splitting the wood.

The rigidity and overall strength of the stand will be improved if you add a rectangular base to the bottom of the stand and the parts are glued with a wood glue prior to screwing together.

2) Check the bare hull in the water, a bath makes for an ideal test tank.

Place a level across the boat to satisfy yourself that the boat will sit level in the water when the deck is fitted. The hull should sit reasonably level in the water straight from the mould however some sanding to the deck edges may be necessary to both smooth the edges ready to accept the inwales and deck, and also for a perfect level in the water.

If you don't have a bath this process isn't strictly necessary as the hull is good out of the mould but this process is useful especially where the hull has been stored for some time.

3) Lightly sand the entire inside of the hull including the keel sections with a medium grade sand paper. As fibreglass resin cures it develops a waxy surface which will affect the ability of the glue to adhere properly. Sanding creates a good surface key for gluing. The inside of hull will also benefit from wiping with acetone to remove dust and any remaining wax.

4) Place the hull on its stand and make marks for the quarter, half and three quarter beams and it will also be helpful for future if you make a mark in the centre point of the stern. More detail is provided in the instructions for the below decks wood package however it is important that these marks be accurately made.

5) Plan your build. If you are using the packages provided by myself, there is a logical way to progress.

1. Prepare the hull
2. Fit the rudder
3. Fit the ballast weight
4. Fit the below decks package
5. Fit the deck
6. Fit the hatches
7. Attach the deck fittings and sails

I have made some changes to the way I make models for myself and where appropriate I have noted these in this manual. These are not fundamental alterations to the model and have no effect on how the model sails and are changes to the aesthetics only.

a) The method of sheeting used on the original models brings the lose sheeting up at the bow and then back to the jib and mainsail. This is in conjunction with a long deck channel which is used to fix the jib boom to the deck, as an adjustable fairlead and locates the mast ram. This approach is likely to continue to be appropriate to those who intend to use the model to race as it is simpler, offers a greater range of adjustment, is easier to repair at the lake and is less expensive.

There is a second approach which uses a shorter channel to locate the jib boom only (and I fit this flush with the deck), uses a fairlead through the deck under the jib for the loose sheeting, a different mast ram and a mainsail sheeting post. Most of the loose sheeting runs under the deck. This is more complicated, requires more “modelling” and is more expensive in parts. The details are in the “Alternative Sail Control” section.

b) The king plank and outer plank are etched deeper allowing a contrasting stain to be applied without bleeding across the etch. Getting the look right will require more time, patience and regular taking of measurements! Again, probably of less interest to the racing skipper but may be of more interest to the modeller looking to create a more attractive finished yacht.

c) I now offer a “Lifty” (it helps with lifting the yacht into the water and its shaped like a “T”) which fits in front of the main hatch at the Centre of Gravity.

Rudder (3)

Description

Your rudder is constructed in fibreglass and meets the dimensions stated in the Canterbury rules. A brass tube, the rudder stock, is sandwiched between 300 gsm matt and a polyester foam filling is used for lightness.

The bottom of the brass rudder stock is designed to accept the stainless steel grub screw which screws into the lower brass pintle and the upper part is designed to fit into the brass bush which itself locates in the upper rudder tube. A rubber “O” ring seals the upper rudder tube and bush to prevent water passing by the bush into the boat.

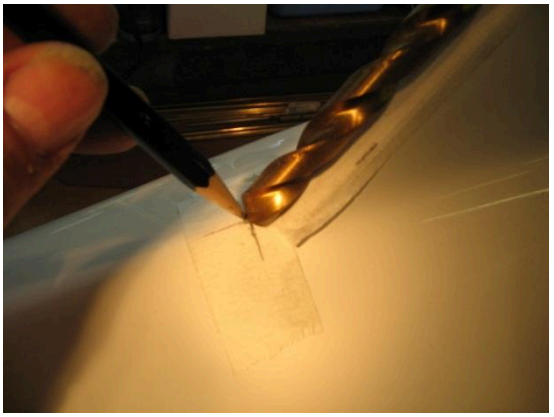
The lower grub screw can be removed with the upper brass bush to facilitate the removal of the rudder and this will allow the entire rudder to be removed for servicing without distorting the upper rudder stock.

In order to avoid tight spots as the rudder moves it is important to ensure that the upper rudder tube is fitted in line with the lower pivot.

Instructions

1) Place masking tape at the rear lower and upper parts of the keel and hull in preparation for marking and drilling.

2) At the bottom of the hull make a mark which is central to the keel line and which is 5mm away from a line drawn parallel to the keel line. The idea is that the rudder will fit between 1 – 1.5mm from the keel line and as the diameter of the upper rudder tube is 8mm, the centre of the hole into which the rudder tube fits should be approximately 5 –5.5mm from the keel line itself.



Using a 10mm drill bit held parallel to the keel line to accurately mark 5mm from the keel line….

…and then rechecking with a 5mm bit!

3) out with a
ma t you star nt
an w passes ll
and drilled at an angle parallel to the keel line to

Regularly check measurements and use the rudder tube to obtain a good snug fit.

Some may prefer to open up the hole by using a small round file rather than using a larger drill bit which will create less damage, and produce a better fit. Try to keep the centre of the hole at 5mm to 5.5mm from the keel line

4) Do not be surprised if some chipping in the gel coat occurs however this can be relatively simply fixed at a later date. Drill carefully and slowly to avoid damaging the gel coat.

5) At the lower part of the keel mark a hole which is 9mm from the bottom of the keel and drill this hole out to 4mm. This hole will accept the screw fitting which fits to the lower pivot. Trial fit the brass pintle to ensure it fits square with the keel.

The hole should be bigger than the shank of the screw to allow glue to flow into the hole and grip the threads of the screw. This will also allow for some adjustment if the pintle isn't quite square with the keel.

6) Glue and fix the pivot ensuring that the pivot shaft points in a line which is parallel to the keel line, central to it and directly into the hole that you have made for the upper rudder tube.

7) Remove brace 17 and stain. You may wish to lightly sand the forward face of the brace into a concave shape to make a snug fit with the upper rudder tube. This is a simple operation as the brace is made from ply and if you lightly score the central ply with a knife or saw, you will ensure that the file moves centrally down the ply.

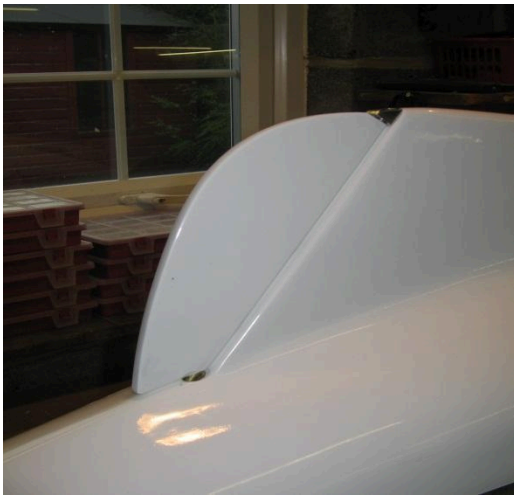
8) The upper rudder tube will need to be cut at an angle which suits both the hull and the fit of the rudder tube to the brace.

If the top of the rudder tube is left longer, and above the water line, there is less chance of water getting into the boat. I have cut mine about 10mm above the top of the rudder brace and will rely on the "O" ring to keep the water out as the lower the rudder arm when fitted, the easier it is to fit the ball joints.

9) It is now time to glue to the top rudder tube into position and I suggest that this is done with the rudder fixed to the lower pivot and with a upper brass bush in place as this will ensure that the upper rudder tube is fitted at the right angle.

The brass tube that protrudes from the lower part of the rudder will need to be trimmed to remove excess. Aim to leave about 3mm to 4mm.

Use a small amount of glue in one place to fix the rudder tube to the hull to hold it in position and when dry, apply glue to the rudder brace and finish gluing the rudder tube to the hull.



Completed rudder

10) When the entire fixing ha rudder for movement. The rudder should move with relative free xis of 35 –40 degrees and visually should be parallel to the keel li gap of no more than 1.5 – 2mm.
11) Note that the weight of t e taken by the lower pivot, and not the brass bush fitted into the upper rudder tube.

12) If it is found that there is insufficient movement in the rudder, it is quite likely that the top of the rudder, close to where the rudder tube exits from the laminate is catching on the hull and will need light filing to relieve the area.

13) When the glue has dried fit the rudder in position. Using a small amount of Vaseline or waterproof grease slide the O ring down the rudder stock and into the upper rudder tube, it should be a snug fit.

14) Slide the upper bush down the tube, this centralises the upper rudder stock and it doesn't matter if the rudder stock turns in the bush or the bush turns in the upper tube but the parts are machined so that the upper rudder stock turns in the bush.

Note: It can be difficult to fix the upper rudder tube parallel to the keel line. I now use an 8mm rod, drilled 4mm at the bottom which is long enough to slip onto the lower drub screw and extends above the line of the hull. I use this to locate the upper rudder tube and the tube will then be parallel with the keel line. Ensure that you don't inadvertently glue the rod to the tube!!

Note: 45 degrees of movement is probably more than necessary and indeed, in normal usage, the movement of the rudder will be significantly less than this.

Ballast Weight (4)

Description

The ballast weight is in two parts, the main ballast and a trim weight and is the same for both the original Canterbury "half" hull and the Nottingham 48.

The original Canterbury moulding is designed for the ballast weight to be bolted up under the hull and the weight completes the shape of the hull with some filling and sanding. The full moulding is designed so that the ballast weight fits snugly into the bottom of the moulded keel and is retained either by epoxy glue, silicone or resin.

The trim weight is fixed onto the forward bolt.

There is an aluminium tag attached to both bolts. This can be used to support the lower part of the “Lifty” so that when lifting the model, the weight and stress is taken at the ballast and not the deck.

Instructions

1) Mark a point on the hull which is 30mm aft of the centre beam. When a right angle is dropped into the hull, with a weight fitted, this should line up with front bolt.

2) Make a mark on the hull which is 200mm behind the centre beam and when the right angle is dropped into the hull, this should meet the lead roughly 40mm from its aft point.

3) With the trim weight removed ensure that the ballast weight sits comfortably in the hull and measure the distance or drop from the points 30mm and 200mm aft of the centre beam. The objective is to achieve a distance of approximately 195mm to 197mm from the top of the lead to the deck line.

Note that if the lead is moved too far forward, it will rise in the boat which may improve the measurement at the back of the lead, but will upset the measurement at the front.

4) Lead is a soft material and as you move the lead into position it will leave “tell-tale” dark grey marks on the white gel coat. Lightly sand these marks until the ballast can be fitted without any stress to the fibreglass.

The objective to for the lead to fit as low as possible in the hull. If the main ballast sits too high in the hull you may find it necessary to remove small amounts of lead at the bottom of the ballast to match the shape of the bottom of the hull. (The bottom of the hull is a “U” shape and the bottom of the ballast is squared. The amount of

weight that you remove will be negligible and the performance of the boat improved if the ballast weight sits lower in the hull.

Be very patient and remove small amounts of material at any one time.

Regularly refit the ballast to create more tell-tale marks which will indicate where removal of material is necessary.

Note that the Canterbury rules have very little to say about the main ballast weight except that they recommend that as little lead as possible is removed for obvious reasons. The rules are however very strict about the trim weight and no alterations are allowed to this weight.

5) If the screw attaching the lower rudder pivot protrudes into the hull it may interfere with the ballast. I recommend that a small amount of lead is removed from the back of the ballast either with a drill or a file. It's not very scientific but when the ballast feels right, it's probably right!

6) When you are happy that the ballast is sitting in its correct position it can be permanently fixed. The preferred method is to use fibreglass resin which can be poured into the hull with the weight in position.

To completely fill the voids should take no more than 30 to 50 grams of resin but I mix 100 grams to start.

Resin is viscous so give it time to settle around the ballast and for the air to surface (you will see small bubbles) before topping up to the level of the ballast.

If you are uncomfortable using resin then the ballast can be secured with epoxy but it would make sense to seal the edges with silicone so pond water can't get down the sides… it can get a bit smelly!

7) If you use resin care is needed as resin cures with heat. If you use too much resin at one time and/or if you have made a hot mix (more catalyst) there is a danger that you will adversely affect the gel coat. My suggestion is that you mix catalyst at .5% to 1.0% and certainly no more than 1.0%.

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I recommended that the hull is placed in cold water as the resin is poured and the bath is ideal. Pick a time when your partner is out as tramping through the house with a pot of resin has its own risks and a certain aroma!

Note: My practise is now to remove some of the weight from the back of the ballast. I cut down 20mm at about 10mm behind the aft bolt and the cut along from the back horizontally to meet the vertical cut. Keep the piece you have removed.

Removing this portion makes a small adjustment to the way the hull sits in the water, lifting the stern and dropping the bow a little. When the model is finished, if you are unhappy with the way the model sits in the water you can always pop the cut piece back into the hull but removing lead after the ballast is fitted is very difficult!

BELOW DECKS PACKAGE (5)

INTERNAL BEAMS (5a)

Description

The internal beams and other woodwork comprising the Below Decks package are laser cut from a ply specifically designed for cutting by laser. The inwales are a hardwood with a long strait grain that makes it good for forming regular curves. The heat created by the laser cutting process does leave a carbon deposit on the surface of the laser ply but it is superficial and does not significantly penetrate into the ply as would be the case with normal ply or marine ply.

The laser ply is not waterproof and some water protection will be necessary before final gluing into position. Although it is not intended that water get into the inside of the boat, the working model is referred to as a “wet boat” as water will regularly wash over the decks. It is always a possibility that some water will make its way inside the finished boat and some protection will be useful.

The beams and other parts are numbered on the sheet and will need to be removed using a sturdy and sharp craft knife, a Stanley knife or similar.

Generally, there is little sanding required and most parts are a good fit from the sheet. Some attention is necessary to accommodate the shape of the hull, in particular the bow and stern pieces. Note that a gap between the items to be fixed can be useful to accommodate a layer of glue. This will produce a stronger joint than a joint that is a precise fit.

If not done already, you should lightly sand the inside of the hull to aid the adhesion of the glue.

You can lightly sand the carbon from the areas affected by the laser before final staining or other waterproofing. The overall finish is at your discretion!

Woodwork removed from the main sheet and dry fitted to the hull

1) Ensure that the hull is marked out properly. The first mark to make is for the ½ beam, in the middle of the hull, and then the ¼ and 3/4 beams. It is worthwhile both checking and re-checking for the accuracy of these marks. (See the diagram at the end of this section)

2) The measurements can be achieved either by making a first mark at the precise centre of the hull and then marking 305 mm forward and 305mm aft, or measuring from the bow 305mm (1/4 beam) 610mm (1/2 beam) and 915mm (3/4 beam)

3) As a guide to start you can measure and mark along the edge of the deck on both sides at 313mm, 619mm, and 919mm from the bow and when you place a straight edge across the hull at these points they will roughly line up with the required 305mm, 610mm and 915 when measured along the centre line of the hull. Remark accurately and remove any old marks that might cause confusion.

4) Remove the bow and stern parts, numbers 1 and 12 and sand the edges to fit the shape of the hull. These parts will require significant sanding to achieve the profile of the hull. Absolute accuracy is not necessary but is very satisfying.

Note that the stern part in particular will need major shaping to suit the profile of the hull.
On both the bow and stern parts you will also need to sand to accommodate the angle of the inwales when fitted.

5) I made a measurement 245mm from the ¾ beam marks on each side of the hull and matched the forward edges of the stern part to these marks to ensure that this part fitted square in the hull. A line is etched into the stern part which should line up with a cord stretched between the centre of the stern and the bow.

6) At this stage you might want to consider whether you want to fit a drain inside the hull to conveniently remove any water that might accumulate while the model is in use. I don't use a drain as the risk of the plug falling out in use overcomes the benefits and the hull should be dry in use. If I get water in the hull I use a syringe to remove it. If you decide to fit a drain the hole is better drilled in the stern before the stern piece is fitted

You may also want to consider fixing a captive nut under the stern brace for the aft mast stay. Ensure that the drilling in the stern piece is central to the hull as this will look obvious when the deck is fitted.

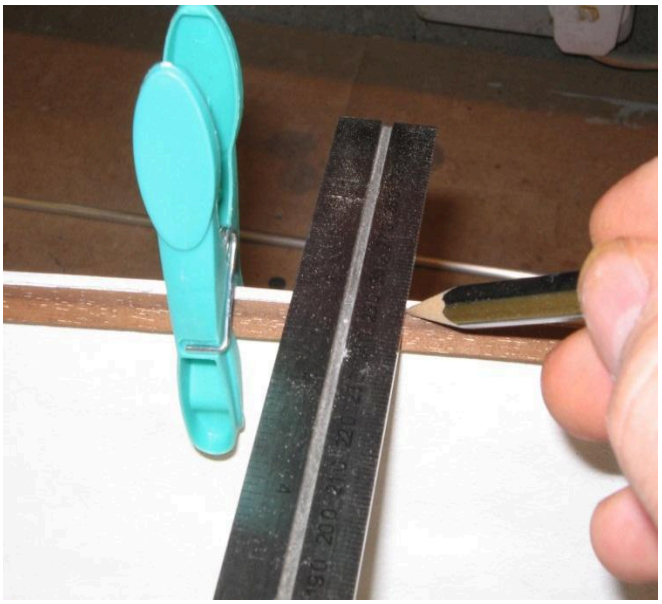
The aft stay can be fitted at its furthest aft point onto the stern however in racing situations this can foul other boats which might collide with yours. I suggest that the aft stay is fitted as far forward as the stern brace will allow.

7) Glue in the bow and stern parts at a level which is slightly lower than the edge of the hull. This small gap is to accommodate the glue for the deck when it is fitted. All other parts will be dry fitted from now on to ensure that they fit properly and you may prefer to only lightly glue in the bow and the stern pieces until such a time as you are entirely happy with the fit of the all of the other parts.

8) Trial fit the inwales. Fit against the hull and hold in with a couple of pegs. The objective with the inwales is for them to fit so that the highest point is no higher than the height of the edge of the hull. And slightly lower is preferred. As the inwale will fit at an angle to the deck, there is a small area for glue to puddle to form a watertight seal.

It will be useful to mark with pencil the uppermost line of the inwale on the hull.

I cut the inwales slightly short to ensure that the edge of the hull is not distorted by squeezing the inwale into the hull.



9) Note that because of the shape of the hull, that the inwale will sit lower in the hull at the bow (lesser) and the stern (more pronounced) than in the middle where the hull is more vertical.

Note the inwale is not fitted to provide any further strength to the hull but to act as a support when fitting the deck.

If the inwales are fitted properly, the beams will fit at the correct height, level with or slightly below the top of the edge of the hull.

10) Parts 4, 5 & 6 (Mast deck) can now be fitted together. Note that the beams and the mast support 5 are notched to accept the king plank 2 and the fore/aft mid hatch braces 8.

The mast support will need sanding to suit the angle of the inwales and the curvature of the hull. Gaps can be filled with glue.

Glue and screw the parts together using the 3/8th brass screws provided ensuring that the notches for the king plank and the for/aft mid hatch sides line up. .

Dry fit into position with the ½ beam straddling the mid mark on the hull.

11) Dry fit the ¾ beam (7) so that it straddles the ¾ mark. Dry fit the mid hatch runners (8) which should be a precise fit when the ½ and ¾ beams are fitted accurately. Use a square to ensure the angles inside the hatch are all 90 degrees.

12) With the ¾ beam (7) accurately straddling the ¾ mark, line up the rear hatch runners (10). These are supplied slightly too long and you will need to shorten them to suit. Cut where the brace meets the stern not the ¾ beam.

Note that it is important that the ½ and ¾ beams are fitted accurately as the hatch openings are precisely calculated to match the hatch openings marked on the deck.

13) The King Plank (2) can now be dry fitted. It is also supplied slightly too long and will need to be cut to length. Ensure that the ½ beam straddles its ½ mark and cut sufficient material so that the king plank is a snug fit.

The ¼ beam (3) can now be fitted to straddle it`s ¼ mark.

14) With most of the woodwork dry fitted measure the width of the boat at the ¼, ½ and ¾ marks to ensure that the beam measurements are within those specified for the Canterbury.

¼ beam	145mm to 150mm
½ beam	215mm to 220mm
¾ beam	185mm to 190mm

At this stage it makes sense to measure the hull so that the edges port and starboard are a mirror image to a line run from the bow to the stern. I use a “Centre Finding Ruler, a natty ruler where the graduations start with “0” in the middle. Using the front of the forward hatch as a datum make measurements across the hull at convenient points and note them down. I take measurements at 100mm distances.

On the deck, transfer these measurements to the edge of the deck once again using the forward edge of the forward hatch as a datum. The objective is to try to get the outer plank to be a similar width at the same point at each side of the hull. The beams may require either packing (preferred) or sanding to achieve the desired width and re-measure to the centre line.

The ¾ beam tends to give me the most problems and patience is required. I use small pieces of veneer as packers and also check if the beam is pressing against the inwale at the top or the hull. I tend to be more concerned with this process than getting the measurements to meet the rules

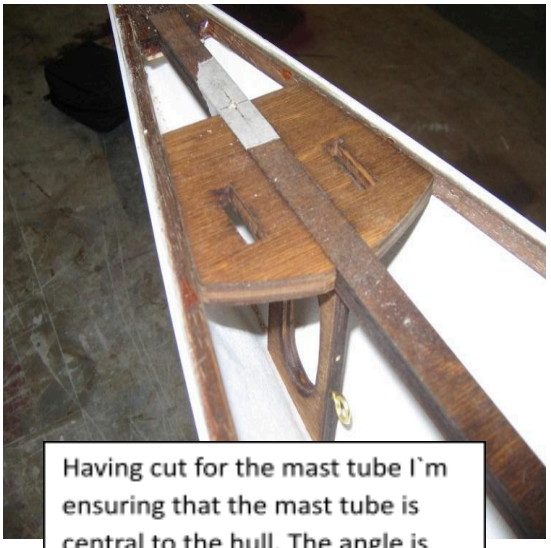
The beams are in their correct position if the corners of the hatch openings are at 90 degrees, it's easy to get the beams slightly twisted in the hull.

The fit should be reasonable "out of the box" and if something is well out of alignment it's likely the beams are incorrect.

15) Take a straight line from the bow and mark onto the mast support deck at 516mm and 538mm. These are the forward and aft marks for the mast tube.

At the midpoint of these marks, make a mark in the middle of the mast deck, approx. 98.5mm from the edges of the hull. A centre line is etched into the mast deck and at this stage it should line up with the centre line running from the bow to the stern.

16) Remove the mast support deck (complete with mast support rib and ½ beam) and using the mast tube as a template, cut an oval hole to take the mast tube.



Having cut for the mast tube I`m ensuring that the mast tube is central to the hull. The angle is used to keep the mast support deck level with the hull deck height.

17) Cut a similar oval hole in the lower mast brace (13) approx. 5mm to 10mm from the rear of the brace and in the centre. This piece is longer than necessary and can be shortened.

18) Trial fit the Through Deck Pulley and King Plank braces. Two pulley braces are provided to allow flexibility in sheeting arrangements and to even the shape of the hull (see pic)

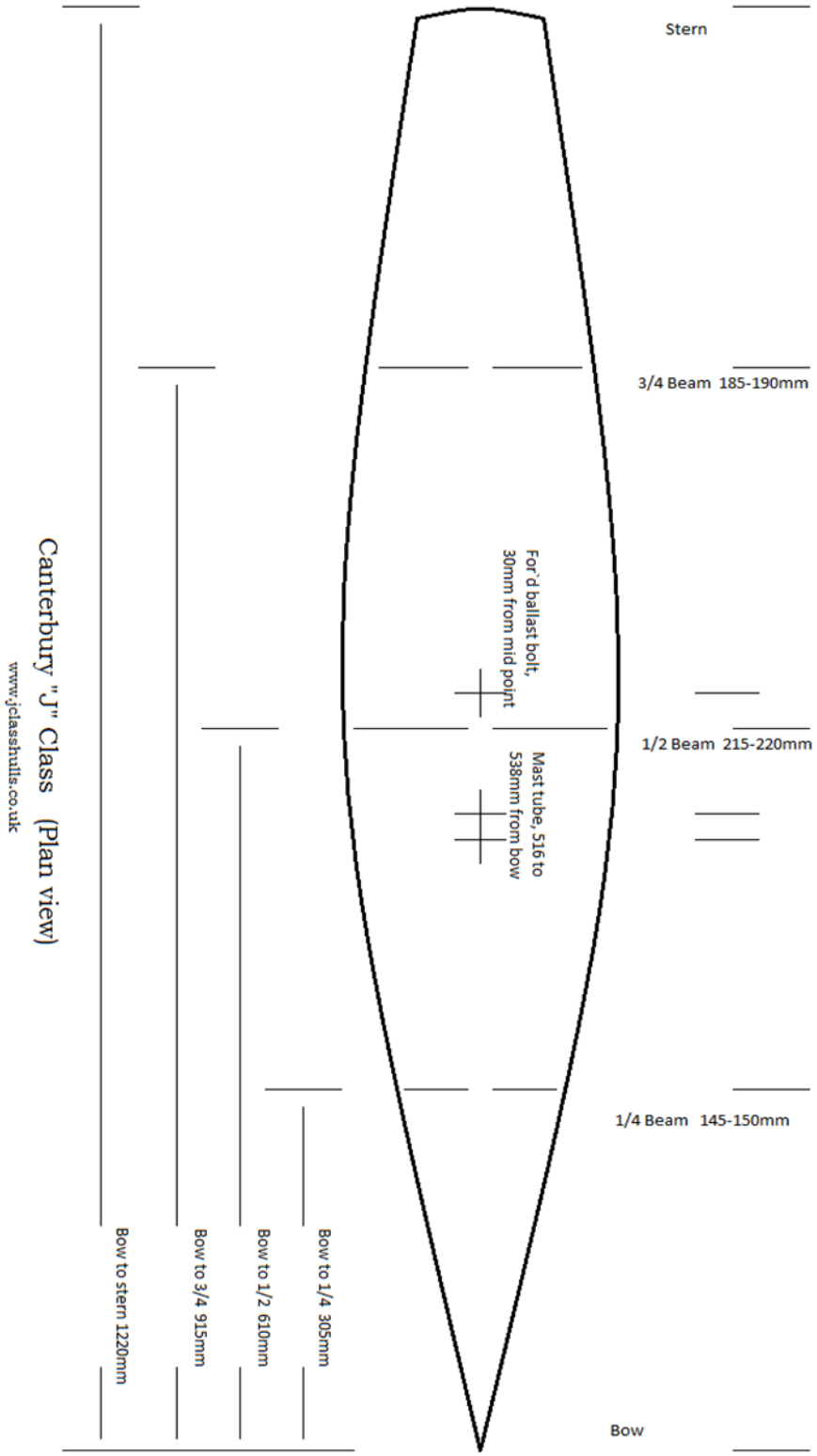
19) Remove all parts, lightly sand and stain/varnish or otherwise protect against water or damp. PVA such as Unibond will dry clear, produce a water resistant finish and shouldn`t affect the adhesion of the glue.

In this picture you can see that I have added two braces to the back of the aft hatch. This centralises the middle of the hatch to the centre line and also centralises the hatch so the outer planks are of an equal width.

Note: If you are following the alternative method of sheeting and the jib boom channel is to be fitted flush with the deck you will need to cut the king plank before gluing it in. When the necessary aperture is cut use a piece of scrap 6mm ply glued to the underside of the king plank to strengthen it and as the base for the channel.

You should also prepare the brass tube for the jib sheet and add some scrap 6mm to support the mainsail sheeting post.

If you are using the Lifty, some more scrap will be needed between the main runners, in front of the hatch, to support and strengthen the deck at this point.



Canterbury Build Manual
Diagram 1 Hull measurements

SERVO TRAY AND FIXED SHEETING LOOP (5b)

Overview

The following represents my original approach to sail control and it is still the simplest and least expensive approach. Over the years I have evolved a different system which is more expensive to build and offers no better sail control but in my view is neater and looks better engineered, but this is down to looks only! There are two main objectives: a) that the system control the sails to your satisfaction, offering appropriate adjustment where required, and b) that the system works reliably. In my case there is a third objective which is that the system looks good on the finished model.

If you are building a bermuda rigged model the method of sail control detailed below will work well and for the racing skipper will also offer additional adjustment. If you are building a gaff model, then you will need to use the evolved sail control method detailed in the section headed “alternative sail control”. The reason for this is that there are two foresails and the lose sheeting to the foresails only needs half the travel of the sheeting to the mainsail. This is better achieved at the fixed loop than on the deck.

Both systems use the same foundations, the two-part servo tray, the upstand support and the same sail winch and the initial build up is also the same.

There are a number of different ways to sheet up the sails to a radio controlled model yacht which may involve the use of sail arms as opposed to sail winches and also different designs from the winch to the sails. I`m not going to state here that my approach is best but it is a tried and tested approach which is simple and easy to repair if it fails at the water’s edge.

Description

The servo tray is made up of two parts, the first being glued into the hull and retaining the servo for the rudder and the second being a separate tray that bolts to the first tray and is removable. This second tray retains the sail winch and also the aluminium tube that is used for the fixed sheeting loop. As the sail winch rotates, the sheeting to the sails moves fore and aft attached to the fixed loop however as the fixed loop is always held under tension, it cannot slip off its pulley, even if there is no tension from the sheeting attached to the sails.

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The entire sail winch and fixed loop is designed to be removed so it can be set up on the workbench as space for hands is limited inside the hull.

When screwing into any wood a pilot hole is recommended to both properly locate the screw and to avoid splitting the wood. I suggest using a 1.5mm drill bit for pilot holes used for the 3/8th brass screws supplied, and that the wood parts are also glued before final screwing together. You may find it necessary to nip off the tip of the screw to avoid going through the wood.

The aluminium angle (10x10x1mm) the aluminium bar (10x3mm) and the aluminium tube (6mm) are available from B&Q and cost is nominal.

Completed servo tray is shown below

Instructions
(Refer to drawing)

1) Remove the servo tray (14) from the sheet and mark to the port side three points, 15mm, 40mm and 65mm from the forward edge along a line which is 30mm from the centre line of the tray.

Pilot drill three holes at these marks and countersink the underside.

2) Remove sheet brace (15) and from its front edge (the steeper angle) mark and drill matching pilot holes at 15mm, 40mm and 65mm on the lower edge.

3) Drill pilot holes to suit the servos you intend to use and cut the sail servo tray from the main tray.

4) Using the 10x10mm aluminium angle cut an appropriate length to suit the width of the tray and shape to suit the angle of the hull.

It will be useful at this stage to sand the side edges of the main tray to fit the shape of the hull and dry fit as close to the rudder tube as possible

5) Cut the 3mm bar to suit the width of the full servo tray at its lower edge (approx. 145 mm)

6) Approx. 35mm from the centre line drill and tap two holes in the aluminium bar to accept the 3mm socket head bolts supplied. (for tapping purposes the drill should be 2.5mm) You may wish to drill 3mm mirror holes in the angle for the bolts to pass through if necessary.

7) Approx. 60mm from the centre line mark and drill both the angle and the bar to allow for two 3/8th brass screws supplied to fix both the angle and the bar to the servo tray. Fix to tray

8) Cut two 50mm lengths of the aluminium bar, at one end of each drill two holes to fix the bar to the tray at 5mm and 20mm and at 40mm drill and tap for two 3mm socket head bolts supplied. Fix to tray

9) From the underside of the servo winch tray mark for the four holes necessary to accommodate the 4 socket heat bolts.

10) Glue the main servo tray to the hull ensuring that the tray is level on all planes

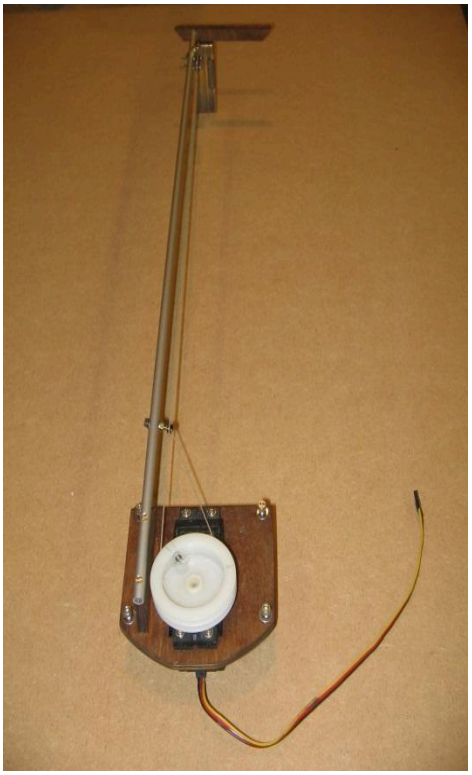
11) Take the 6mm aluminium tube and pilot drill 10mm and 45mm from the ends to screw the tube to the sheeting brace. Using these marks as a guide, make further marks onto the sheeting brace onto which the aluminium tube can then be further drilled and then screwed.

Screw the tube to the sheet brace 13 and then the sheet brace to the servo tray.

Attach the sail servo to the tray.

12) An eye bolt needs to be fixed to align the sheeting with the lower pulley on the servo tray with the forward pulley at the end of the aluminium rod and a further eye is bolted to the tube to align the sheeting to the sails in the same plane as the forward pulley as it returns to the upper pulley on the sail winch.

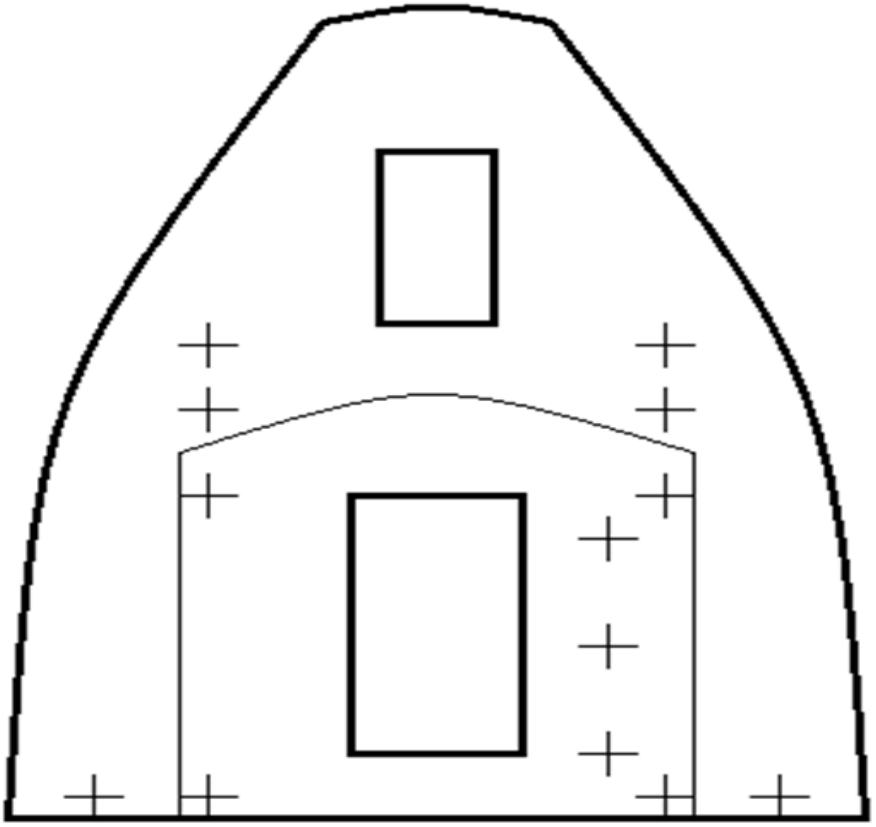
13) The rear eyebolt is fixed last. Make four turns around the upper servo pulley and run forward to the sheeting pulley and return to the lower servo pulley, through the eye of the eyebolt which is not attached to the tube at this stage. Make four turns around the lower servo pulley and pull to take up the slack. Tension is created by bolting the rear eye to the aluminium rod.



Note that the brace that supports the forward end of the rod is glued into the hull and when the end of the rod is located into the hole the loop becomes rigid in the hull and not subject to flexing from the strain of the sails.

The rod is longer than necessary as the lose sheeting from the forward eye needs to travel up the through deck pulley without chaffing on the forward ¼ beam.

SERVO TRAY DETAIL



CANTERBURY "J" CLASS

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WET FIT OF BEAMS (5c)

1) Satisfy yourself that the bow and stern pieces are in their correct positions and finally glue them just below of the level of the deck to allow for glue.

Bow stern and inwales glued in. Note the thin supports fixed to the bow and the stern notches to support the king plank and rear deck hatch runners.

2) Put the inwales up to the pencil mark and check that the highest part of the inwale is no higher than the level of the deck using a ruler placed across the top of the hull. (See previous) Glue and fix with pegs. (Note that pegs should be sufficiently strong to stop the pieces from moving while they cure/dry but not so strong that they will distort the shape of the hull.)

Note: I have found that the pegs can create pressure points on the hull where the glue is squeezed and this can lead to the top side of the hull adopting a “wavy” look, not so obvious on a white hull, but more obvious on a two tone hull. My practise is now to sandwich the hull between the inwale and another piece of “slave” wood. I use another inwale because I have them in stock but any piece of stripwood roughly 5mmx 5mm or so will do.

Time will be needed to re-position these inwales so use epoxy glue with a longer setting or curing time.

Be patient, the glue will act as a lubricant and the inwale may slide around inside the hull. Re check that the top of the inwale is at, or below the level of the top of the hull.

In the time honoured fashion, remove excess glue with the index finger and wipe on jeans.

3) With the stern, bow and inwales in place, and having been given an appropriate time to dry (overnight) you can now proceed to glue in the rest of the parts. They should all slot together quite simply and so a quick setting glue can be used however I do suggest a number of mixes and that the operation is not rushed.

You should take your time with each part, ensuring that the packers you used in the dry fit are in place and make the adjustment you need to keep each side of the hull a mirror image of the other. Fit each part and re-measure against the line from bow to stern and compare with the measurements you took on the dry fit.

Note that the lower mast support (13) is not glued into place at this time.

Note: if you are using my hatch kit the combing, or aluminium frames, will need to be cut, bent and fitted at this stage, before the deck is fitted.

Setting the mast tube (5d)

Description

The mast tube as supplied is an oval tube made from aluminium and open at both ends. When fixed into the hull the oval shape allows the round mast to rotate forward and back as an aid to tuning. This movement in the mast position moves the centre of effort of the rig relative to the centre of lateral resistance of the hull with the idea that the skipper can tune his model to better point up into the wind.

In practise I have compared the performance of the model on the water with the mast rotated in various positions and unlike a model with a finned keel I haven't found that it makes much difference. I can't give you a scientific reason for this but I think it's down to the keel design, and that the model is generally more stable in the water than a model such as a One Meter with a fin.

I have observed that if the mast is rotated aft that there is a tendency for the end of the mainsail boom to drag in the water which is very undesirable and that adjustments for lee/weather helm are better made by adjusting the power of either the mainsail or the jib.

With this said you could choose to use a round brass tube rather than the oval tube but you would need to get the position right on the bench whereas if you use the oval tube there is some adjustment fore and aft so you only need to get the tube right side to side.

The mast tube, either round or oval, is a structural part of the model. Located at the deck and the keel, and also in the middle it adds rigidity to the hull.

To help with getting the mast in the correct position I use a ½ inch "slave" mast and a plumb line hanging from an arm at the top so that the mast is set correctly when viewed from the bow/stern.

Instructions

1) Prepare the mast tube. The tube as supplied will work but I prefer to get a rounder shape to it, to match the shape of the mast. I use a piece of ½ inch steel rod as a former inside the tube and with the former held against a rigid surface I gently tap the tube at the forward and aft ends with a hammer to create a rounder shape. I pre-cut the tube slightly longer than required before doing this.

2) The lower end of the tube will need to be blocked off to seal against water entering the hull in use. I cut the shape from a piece of 6mm scrap ply and use epoxy to glue it in. The bottom of the tube will get wet so ensure the wood is well protected.

3) At about 100mm from the top of the tube I drill the tube from each side and insert a pin of about 3mm to 4mm in diameter and securely fix this with glue to seal the tube. I only apply glue to the outside of the tube.
The idea is that you will make a matching “notch” in the bottom of the mast which will locate onto the pin allowing for rotation of the mast fore and aft, but securing the mast from any sideways rotation that may occur as the boom swings across the hull.

4) The part 13 used to secure the tube in the middle is longer than it need be at about 135mm so I now cut about 60mm off the end and use this piece to locate the bottom of the mast tube, gluing it into the hull just above the trim weight.

5) I make a hole in the remaining part of No 13 to match the mast tube and this is fixed into the hull part way up to add rigidity.

6) With the parts cut, prepared and dry fitted (no glue) I place two blocks of wood on the hull, one just behind the mast and one just behind the aft hatch and place a straight edge across. I then fit my “slave” mast with plumb line into the mast tube in the hull and adjust the angle so that the straight edge and the mast are at 90 degrees.

Ensuring that the hull is level, adjust the plumb line so that it falls parallel to the mast when viewed from the bow or stern.

It’s a but fiddly but when the angle is at 90 degrees when viewed from the side, and the plumb is parallel the mid brace 13 can be glued into place in the hull and the lower part of 13 glued in just above the trim weight.

7) I then remove the mast tube and trim it to length so that it sits about 4mm above the internal deck. When the deck itself is fitted it should protrude about 1mm to 2mm but this isn’t critical.

8) Finally locate the mast tube and repeat the process in 6 above…just to be sure (!!) the mast tube can be glued into place.

At the time of writing I don’t have any pictures so if you want clarification then get in touch. I due course I will add some pics.

This pic illustrates the previous approach, with the mast tube specially shaped and located into the hull. Using the additional part cut from 13, the bottom of the mast tube is now just above the trim weight and can be cut straight.

The middle of the mast tube is still located with the remaining part 13 and will add structural rigidity to the hull.

The Deck (6)
Description

The Deck is made from 1.5mm birch ply with planking etched into the surface with a laser and the openings for the hatches pre-cut. The hatches are marked to be a precise fit to the hatch openings in the beams pack.

You will note that the outer edge of the deck is not marked. This is to allow for individual differences in the fit of beams etc.

The king plank and inner edge of the outer plank are now etched deeper than the other plank detail on the deck. This allows the builder to use a contrasting stain to the king plank and outer plank without the colour bleeding across. Achieving a good result relies on the outer planks being a mirror image to each other so care is needed in fitting the inner frames to achieve this.

I use a darker stain, dark oak works for me, and I don't apply any other colour to the deck. I then use a Danish oil to finish and this will darken the inner sections a bit producing a good overall finish with the inner planking detail visible.

The underside of the deck will need to be waterproofed but is not seen. The upper deck is visually prominent and most will judge the finished boat by the finish of the deck.
Be careful as until the deck is finished it is vulnerable to damage!

Note: If you are using my hatch kit that the aluminium combing needs to be fitted to the internal frames before the deck is fitted!

Further the hatch openings cut into the deck will be about 1mm too small (the thickness of the aluminium) so each edge of the hatch opening will need about 1mm trimming off.

This is a pic of a deck ready to be glued into place. I'm happy with my measurements so I've pre-stained the outer and king plank, cut out for the mast tube and drilled for the back stay. The deck is cut about 1.5mm oversize and will be trimmed when it's finally glued in place

If you are using the original method of sheeting, you will need to identify where the through deck pulley fits. (I make a paper template of the bow to ensure I cut for the through deck pulley in the correct place.) If you are using the later version of sheeting, you will need to drill for the jib fairlead and mainsail sheeting post and make the necessary cut out for the jib attachment channel if fitting this flush to the deck.

I used to use two-part epoxy to attach the deck to the hull but this will add some stress to the process. It takes time to mix up the necessary quantity and apply it to the hull and there is the risk that the mix will start to go off more quickly. I now use Evostick Exterior wood glue as its pre mixed and can be delivered directly to the hull saving a lot of time. Whatever glue you choose to use, ensure that it will give you a good work time.

This glue doesn't make a strong fix to the edge of the hull but it makes a very strong fix to the inwales which creates a watertight seal and the joint with the hull isn't

stressed. As the glue sets it “shrinks”, pulling the deck to the inwales to make a nice joint and also dries clear.

Instructions

1) The main issue to address when fitting the deck is to ensure that its lined up properly with the hull so that the middle of the bow and stern on the deck match up with the middle of the bow and stern on the hull. The deck is oversize by a regular amount so it’s better not to cut down to size at this stage.

2) If you are using the hatch kit, you will have the combing in place by now and if the hatch openings are square, these can be used to align the deck. Start by marking out, and removing 1mm on each side of the hatch to match the 1mm thickness of the aluminium angle. In practise it’s unlikely that you will have got everything absolutely right so some adjustment will be necessary.

3) By this time I will have a fitting, either a T nut or a tapped piece of aluminium, under the stern brace to take the backstay. Measure from the back of the hatch opening and make a small drilling on the deck in the centre of the king plank and check that the holes line up. (Note that this is not possible with the Gaff rig as there is no back stay)

4) It’s handy to do the same thing at the bow. Make a small drilling in the centre of the king plank a set distance from the front of the forward hatch and a similar hole in the deck positioned under the jib rack where it won’t be noticed when the jib rack is fitted.

5) Lay the deck over the hull and line up the hatch openings and the two drillings (I use cocktail sticks to hold the deck in position) The deck should lie flat but the hatch openings may need a bit of “relieving” if they are not absolutely square.

6) Using the marks made previously on the deck sheet measure the distance from the outer line of the deck to the edge of the hull and note them down for each side. These measurements should be a mirror image but in practise it’s not possible to be absolutely precise so I work to a margin of error of perhaps ½ mm on each side. Make adjustments to the hatch openings as necessary.

7) Mark under the deck for the initial cut. I use a pencil with a scrap piece of deck or hatch material (1.6mm) against the hull to make a mark 1.6mm wider than the hull. The smaller the packer against the hull the greater the risk of an error, the bigger the packer the more work being required to remove the excess when the deck is glued down!

Ensure that the deck is held flat against the hull where the pencil makes its mark so that its accurate.

Cut around the deck to your mark.

8) With the deck cut slightly oversize place back over the hull to check that all is well.

9) At this stage, if I'm happy with the overall look I put down an initial coat of stain on the king plank and outer plank, mainly as it's easier on the bench than on the boat. A second coat will be required when the deck is fitted.

10) Prepare the hull for the deck. Lightly sand the top edge of the hull to remove dust and contaminants and ensure that the channel created by the inwale around the hull is clear of dust and debris. Put masking tape around the top of the hull to protect it from glue. I position the masking tape so that it sits higher than the hull and then trim with a scalpel to the top edge.

I also put paper inside the hull to protect the internal components from drips of glue.

It's also worthwhile at this stage checking that the internal woodwork, and especially the inwales, are not sitting proud of the top of the hull.

The pics above show the hull ready for the deck. Note the cocktail stick on the bow and stern to help with alignment.

Final measuring indicated that the port side of the hull between the ¼ beam and mast deck was slightly out when compared with the other side so I opened this by adding a strip of wood which I removed after the deck was glued down.

11) Choose your glue. We all have glues that we are familiar with however I use Evostick Exterior Wood Glue for fitting decks. My criteria are that the glue:

Is waterproof.
It gives me a longer work time.
It dries clear.

As mentioned above the Evostick doesn't make a strong joint with the top of the fibreglass hull but it does make a strong, watertight joint with the inwales and frames. The strength of these joints means that a strong joint with the top of the hull isn't necessary. This glue does shrink a little as it cures which helps to pull the deck down.

12) Apply a large bead of glue to the channel created by the inwale. The bead should sit higher than the edge of the hull and if it flows away level then wait for the surface to develop a very slight skin and reapply. I will generally go over the inwale area twice.
Apply a thinner coat to the surfaces of the inner frames that will come into contact with the deck and a further thicker bead around the hatches.

13) Position the deck over the hull and use light pressure to push excess glue out of the joint between the deck and the hull. It's a bit messy but if you have excess glue all-round the hull then you have got it right! Be ready with some tissue to wipe away any drips that threaten to go past the masking tape onto the fibreglass.

14) I use masking tape placed across the hull with light pressure on both sides to attach to the hull to hold the deck in position. Space the strips of masking tape close together for an even hold and as the deck is wider than the hull the masking tape shouldn't interfere with the joint allowing air to circulate and cure the glue.

15) Evostick is white when its applied and dries to a clear when its cured. There is an in-between stage when the glue will be opaque. At this stage gently lift the masking tape from the hull and run a scalpel around the top of the hull, the tip pointing upwards and the excess glue, which at this stage will have a sort of "rubbery" texture will peel away. This will save a lot of time later.
Re-fix the masking tape to the hull, go and have a beer whilst the glue fully cures.

16) When the glue has properly cured, 24 to 36 hours, remove the masking tape. The excess edge of the deck will need to be trimmed back to the hull, this is better done by sanding. I use an electric sander to start, and a version of the "Multitool" is ideal. Sand the edge of the deck back until the sandpaper starts to mark the masking tape and then finish with a finer grade by hand. Always rub in the direction of the

deck, or downwards as the glue trapped in the channel will take a longer time to fully cure as it's not exposed to air.

17) Remove the masking tape and finish the hull. At this stage I will recoat the outer plank and king plank, emphasising the exposed edge of the deck.

18) I use Danish Oil to finish the deck, it's much more forgiving than varnish and easier to apply for a good finish. Excess oil is very difficult to remove from the hull so I suggest you mask up to the edge of the deck before applying the oil and check that oil hasn't dripped passed the tape on to the hull.

This pic shows the deck glued into place and ready for finishing with Danish oil. It's not easy to remove from the places it's not wanted so I've masked the hull again and also masked off the combing to the hatches.

19) The instructions suggest an initial light coat but I have found that a thick coat applied with a brush works better. Apply the oil and watch as the ply absorbs it. As the oil soaks into the deck small air bubbles will appear which can affect the surface finish if left. I give the oil about 10 or 15 minutes to be absorbed into the deck and then wipe off excess with a lint free cloth.

You will need to wait for 6 to 8 hours for the oil to set and then apply a second coat. As with the first coat wait for 10 to 15 minutes and wipe off the excess. Further coats will be required until the ply no longer absorbs the oil. I apply a coat in the morning and another at the end of the day and generally find that 4 to 5 coats will be sufficient.

When the last coat is fully dry the surface can be buffed to a nice satin finish.

The picture above shows a complete hull with the alternative sail control (jib fairlead coming through the deck below the jib boom, mainsail sheeting post and jib boom attachment fitted flush with the deck. A Lifty is also fitted but the mast ram is not yet fitted.

The picture below shows the original sheeting method with the loose sheeting coming through the deck at the bow, a surface mounted channel for the jib boom attachment, jib sheeting adjustment and mast ram.

A final point. I have endeavoured to create a manual which is instructive and easy to follow but if you are unsure about how to proceed with any part of the build, or need further clarification then get in touch.

Enjoy your model!!