Nottingham 60 Build Manual

Introduction.

The Nottingham 60 is a model which endeavours to reproduce the design, elegance and style of the original J Class yachts of the early 20th century. The model can be built up to carry a bermuda rig, or a gaff rig however the hull, internal woodwork, mast position, deck and hatches are the same for both rigs. The principal differences are the deck fittings and there is a minor difference in the sheeting, to accommodate two foresails for the gaff rig compared with a single jib for the bermuda rig.

1.1 The first step is to check your hull. Both the hull and rudder have been checked for imperfections and given a final polish and we pride ourselves in creating a hull and rudder to the highest standards. If however you find something that you are not happy with, now would be a good time to let me know!

It is quite possible that both when building the model, and when using it, that you will put small scratches into the fibreglass gel coat but these can be simply removed by lightly sanding with a 1200 or 1500 grade wet and dry paper (used wet) and then polishing. The gel coat is up to 1mm thick to allow for refinishing the surface over the years as small scratches appear.

1.2 Building the model is not difficult, but the model is more complicated than the Nottingham 48 as it contains more parts. The model should be sufficiently absorbing and challenging to give you a sense of satisfaction as you build it, but you should be able to create an attractive and desirable craft when completed. It will pay dividends to measure and mark the hull where the beams fit as carefully and as accurately as possible, take your time!

When building the first model I found that it was easy to put twist into the hull so after gluing each part I checked for straightness using a string line between the bow and the centre of the stern (see pics later). Twist is more easily created when gluing in the inwales as they are under tension so it is prudent to take special care at this stage.

The 60 requires patience and regular measuring as the build progresses. A handy tool is the “Centre Finding Ruler” which is a ruler where the graduations start with “0” in the middle. With the 0 under your bow/stern line it’s easier to read the measurement to each side of the hull. I obtained mine from Axminster Tools

1.3 Fibreglass can take up to a year to cure fully so if you are not going to build the model immediately I recommend storing the hull upside down with two small pieces of wood used

to support the bow and the stern. This will help to keep the shape of the deckline and avoid the sides of the hull splaying out or otherwise distorting.

1.4 You may have your own favourite glues and stains however if you are unsure I use the following:

a) Where wood is being fixed to fibreglass I use Devcon two-part epoxy adhesive. It can be obtained in two setting speeds, 5 minute and 30 minute but the actual setting time will depend on temperature. Low temperatures will substantially extend the setting time of both so in the winter, in a cold workshop I tend to warm both parts before mixing.

b) Where wood is being fixed to wood I use either the Devcon as above or an Evostick exterior grade wood adhesive. The Evostic doesn't require mixing so is quicker to use where larger areas of wood are being joined, (eg when laying on the deck) and takes longer to go off giving more time for adjustments.

c) I use standard Colouron stains for the woodwork (available from B&Q) and Colouron Danish Oil for the deck. I personally prefer to oil, rather than varnishing the deck as it's easier to apply and easier to maintain. Staining the top surface of the deck is not normally necessary as the Oil will add some colour when applied.

d) I use a PVA sealer (available from B&Q or builders merchants) on all woodwork, (and especially under the deck) after staining where the finish is unseen. This will protect the wood from the damp environment that can build up when the model is being used and stored. Wood that is visible is oiled or varnished.

1.5 When working on the internal woodwork I tend to dry fit as much as possible before gluing. You will need to glue in the bow and stern pieces and the inwales but I then dry fit the main beams and longitudinal runners to assess the overall fit before final fixing. Only little sanding of the beams should be necessary to cater for the curve in the hull and it will improve the final look of the deck if you try to keep to the overall width measurements as in the instructions noted later.

1.6 Preparing the hull. As the fibreglass cures in the mould it develops a waxy surface to which most glues will struggle to adhere. The inside of the hull should be thoroughly rubbed down to remove the waxy surface and create a key for the glues. The exterior gelcoat has already been given a polish but applying a good quality wax (car wax or similar) will create a barrier against the inevitable glue and stain that mysteriously transfers itself from the part to be fixed to the outside of the hull…I blame the "sticky finger fairy"… but when the glue has dried it can be easily removed with a fingernail.

1.7 The wood parts are contained within a sheet of 6mm laser ply with small nibs. These will need to be cut with a sturdy, Stanley knife or similar. Don't be tempted to press the parts out of the sheet as you will damage the surface ply. When the parts have been removed, lightly sand the edges to remove excess carbon that has built up from the laser.

1.8 Above all, if you are unsure about how to progress the build, or have any questions, then email me either using the address on the website, info@jclasshulls.co.uk or alan@alanhorne.co.uk

Index of Parts

Part Number.	Description
1	Bow piece
2	1st Beam
3	2nd Beam
4	3rd Beam
5	4th Beam
6	5th Beam (The Mid Beam)
7	6th Beam
8	7th Beam
9	8th Beam
10	9th Beam
11	10th Beam
12	Stern piece
13	King Plank
14	Upper Mast Deck
15	Mainsail sheeting post support
16	Main hatch longitudinal side runners
17	Aft hatch longitudinal side runners

18	Rear of aft hatch
19	Stern longitudinal runners
20	Rudder servo tray
21	Main servo/winch tray
22	Jib trimming servo tray
23	Rudder support tray
24 (a & b)	Forward fixed loop support
25	Aft fixed loop support
26	Aft hatch temporary brace
27	Main (forward) hatch temporary brace
28	Lower mast tube support

Section 2. The Stand

Description

The stand comprises two ends which support the keel of the hull, with the aft end designed to locate just forward of the rudder. The ends are joined by four pieces of ply which locate into the end pieces and when complete will form a reasonably robust way of supporting the model.

The stand will benefit from a base of 9mm to 12mm plywood (not supplies) cut and shaped as above to provide additional strength and rigidity.

Note: The model should be supported on its keel, and not the sides of the hull. If the weight of the model is rested on the sides of the hull the hull will distort.

Instructions

2.1 Cut out the nibs that retain the parts in the sheet and stain.

2.2 Using a 1.5mm drill bit, make pilot holes in the tabs that locate the side pieces in the ends. I use two brass screws in each tab (total 16 in the stand)

2.3 Apply some wood glue to the tabs before locating them in the recesses in the ends and ensuring that all is square, make further pilot holes through the tabs and screw the parts together.

2.4 The completed yacht is quite heavy so I used a thicker piece of wood as a base, (see photo) to add more strength.

2.5 Place the hull on the stand with the aft of the keel just forward of the supporting end. Ensure that the hull is supported by its keel only, and that the sides of the hull do not contact the sides of the stand. If there is contact then remove material from the stand until the hull feels loose in the stand, and can move from side to side.

2.6 I found that the hull wanted to slide further back in the stand until it was stopped by the sides of the hull making contact with the stand. To stop this, I placed a small piece of wood along the base of the stand to give further support to the keel at its base. (See pic)

Section 3. Fitting the Rudder.

Description

The rudder is a one piece laminated construction with a foam inner core which both adds strength and reduced weight. The rudder is fixed to the hull using a brass rudder tube which is supported at its base but a small brass plate epoxied into the hull. The small brass plate is tapped to take a 4mm brass bolt which fits into the rudder tube allowing it to pivot.

The top of the tube fits into a wider brass tube fixed into the hull and then supported in the upper tube by a brass bush. A rubber “O” ring is pressed into the upper tube and this makes the fitting watertight.

The rudder is easily removed for servicing as the upper tube has clearance allowing the rudder to be moved to the side when the 4mm bolt is unscrewed.

The rudder is operated by a rudder arm connected to the rudder servo with ball joints to allow for the articulation required as the tiller arm on the rudder stock turns on a

different plane to the rudder servo. The rudder arm locates above the top bush at the top of the upper rudder tube. The O ring sits in the rudder tube below the bush.

The finished yacht is sensitive to rudder movement and only smaller movements of the rudder are required to steer the craft. The final movement of the rudder will be about 35 degrees each way but in practise the boat will steer well with less than this an if you have a programmable transmitter you may find it advisable that you adjust the speed of the rudder, and also the total movement.

Instructions

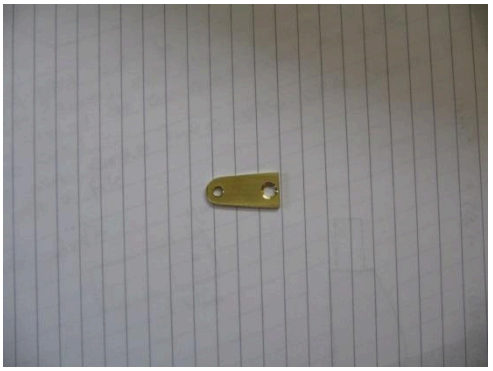
3.1 The inner rudder tube has an external diameter of 4.7mm and sits about 2.5mm from the front of the rudder. It's worth checking this as the rudder is handmade and distances may vary. The objective is for the leading edge of the rudder to lie parallel to the trailing edge of the keel with a gap of about 1mm. Using these measurements it follows that the hole required in the hull to take the upper rudder tube should have a centre about 6mm from the keel line. In practise I start with a small pilot hole in the hull about 5mm from the keel line as I find that the back of the hole opens out more quickly than the front.

3.2 Mask the area to be drilled as this will help protect the gel coat and make a mark about 5mm from the keel line and start drilling…you will feel the tension in the air!!

3.3 The upper rudder tube has an external diameter of 8.8mm but as it sits in the hull at an angle your finished hole will be oval. I use a maximum drill bit of 6mm to create a round hole and then use a file at the same angle as the keel line to open the hole up to the required oval shape. The front of the oval hole will be at the back of the keel.

3.4 Work slowly and gently to avoid damaging the gel coat but some minor damage is inevitable. Regularly check the shape, size and angle of the hole using the piece of upper rudder tube.

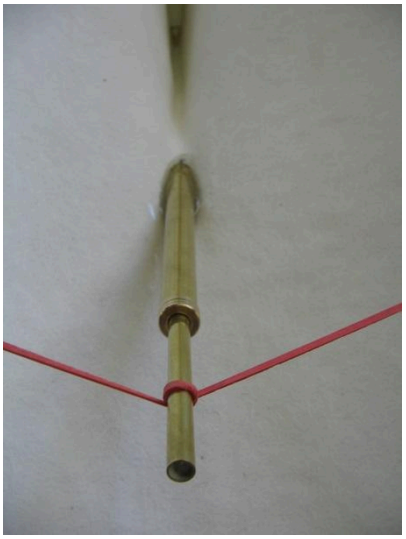
3.5 When the hole is complete, and you've relaxed a bit, cut the upper rudder tube so that its angle suits the hull.



3.6 At the bottom of the keel you will see two raised marks, one on each side of the keel. Using a junior hacksaw carefully cut a slot into the keel and open it with a thin file to take the lower rudder pivot. Cut slowly and carefully to avoid chipping the gel coat. The cut should extend into the hull sufficiently so that when the lower pivot is inserted the centre of the tapping is about 5.5 to 6mm from the keel.

3.7 You will need to trim the brass tube from the bottom of the rudder, leaving about 1mm protruding, and also to use a 4mm drill bit by hand, remove excess wax from the inside of the tube.

3.8 When you are happy with the loose fitting of the rudder, glue the lower pivot and upper rudder tube into place. I use the rudder itself to ensure correct alignment but you could use any suitable tube. It will help if you slide the rubber “O” ring to the bottom of the upper rudder tube and then use the bush to support the top. You may also feel more comfortable with the upper tube held in place (the rubber “O” ring help to stop things moving around at the top) to glue in the lower pivot and after it has set, to glue in the upper tube.



My practise for this operation has now changed a bit. I use an 8mm rod, drilled out to 4mm at the bottom to locate on the lower grub screw and glue the upper tube in place. Wax the rod and be careful with the glue, you don’t want to glue the rod into the tube!

3.9 If you are using Devcon Epoxy, you can add white colour to it which will avoid seeing the less attractive epoxy as it yellows in time. I use a fibreglass pigment as I have it to hand but I understand that chalk works well. This mix can then be use to disguise any chips that have developed in the gel coat at both the top and bottom of the keel.

3.10 Add more epoxy to the lower pivot from inside the hull to ensure that the hull is watertight when it is immersed in water and the ballast is fitted.

3.11 Et, Viola…as we say in Nottingham…That's the most challenging bit done. The rest is…dare I say…plain sailing!

Section 4. The ballast.

Description and instructions.

The front of the keel of the Nottingham 60 is shaped into a bulb which allows more weight to be carried, both lower in the boat and slightly forward. This improves the sailing characteristics of the yacht but means that a moulded lead ballast can't be used and so lead shot is the better alternative.

The disadvantage of lead shot is that it is not as dense as a moulded weight so the centre of gravity of the completed model in the water will be higher than with a moulded ballast. If you have access to some solid lead blocks and use these with the lead shot taking up the remaining space you will improve the C of G a bit but if blocks aren't available I have found that the model sails well using only lead shot, tamped down well to exclude air pockets.

I use very small lead shot (less than 1mm in diameter) and have reclaimed shot is relatively inexpensive but some work is needed to clean it up before using it. You will need about 10kg and will probably use 9 to 9.5 kg. (Note: more ballast can be added

later to balance the model if necessary, but it's harder to remove ballast if you've used too much)

The lead shot is retained in the keel using fibreglass resin but it is very important that the keel is immersed in water as the resin cures with heat as heat will damage the gel coat finish if the resin gets too hot. It's important to use a "cool" mix and I suggest using less than 1% catalyst, about ½% to ¾% is ideal. It has been suggested that using a good quality varnish will retain the ballast as well as resin but I haven't tried with this yet. I will experiment when I make my next model.

I ballast using 2.5kg of lead shot at a time and tamp down well to exclude air pockets. For the volume of lead there is a big surface area allowing heat to escape. Wait for the resin to set and repeat with a further 2.5kg. When all the lead is in place and the resin has set I will float more resin over the top to properly seal the surface.

The water line on the hull should be about 2 to 3mm high to allow for the internal fittings.

When finished, the shot should be laying reasonably level in the bottom of the hull and there should be a "sheer" at the deck line, when measured at the mast position, of about 1.5 to 2 degrees.

For those with single colour hulls (no waterline on the hull) the bow should be about 130mm to 135mm out of the water and the stern 70mm to 75mm out of the water.

Fitting a "Lifty"

The Lifty is so called because it aids lifting the model into and out of the water and its shaped like a "T"! It's mainly used on the 48 where it sits on the deck at the centre of gravity but it can also help with the launch and retrieval of the 60. It's an attractive fitting with a sort of nautical look to it!

Although visible on the deck, this wouldn't be a secure place to lift from so the fitting drops down to, and is secured within the ballast

The fitting on the 60 cannot be at the centre of gravity as with the 48 as the C of G is within the hatch area but it can still make launch and retrieval easier lifting from the fitting with one hand and balancing the model with the other.

The captive nut should be placed into the ballast as deeply as possible to ensure a strong fix. I pin the long nut to the thread but a good quality threadlock will do. Aim for the completed fitting to be just over 50mm.

The level of the ballast from the deck is about 205mm so I aim to leave about 10mm of the long nut exposed above the surface of the ballast.

I place a wider piece of wood across the hull and measure to centre the threaded rod from each side. (Note: these measurements may change when the frames are fitted) I can then double check using a line from the bow to the centre of the stern. The centre of the threaded rod should be 740mm to 745mm from the bow.

If the deck fitting is too close to the hatch then it will be difficult to grip but if it's too far away from the hatch there is a risk that it will clash with the boom vang.

In this picture I have fitted about 5kg of lead leaving sufficient to cover the captive bolt and a part of the Long nut. The remaining lead shot will cover and secure the captive nut.

I put extra resin around the captive bolt area and then used a small amount of fibreglass matt to ensure a strong fixing.

Using a wider piece of wood ensures that the threaded rod is vertical to the deck fitting which will then fit flush to the deck

Section 5. Internal woodwork.

Description

The internal woodwork is all in 6mm laser ply. The beams, and servo trays strengthen the hull on the horizontal plane and the mast tube adds vertical rigidity to the hull ensuring that all the power from the sails is passed to the hull and is not absorbed by flex in the hull structure.

The biggest problem that the modeller may experience is twist in the hull as the woodwork is fitted. Identify the middle of the stern and run a length of cord from the stern to the bow and take regular measurements to ensure that the sides of the hull are equal.

Laser ply uses a glue that doesn't burn, so leaving a cleaner edge, with significantly less carbon deposit than a normal plywood however it is considered to be an "internal ply" so it will need to be sealed to protect it from water/humidity. I stain the parts first, and when fitted (but this can be done before gluing) I coat the parts that

are not seen in PVA and the parts that are visible with the hatches removed in exterior grade waterproof oil as this gives a more attractive finish.

There will be a dusty carbon edge where the laser has made its cut and this can be removed by light sanding. It's only necessary to remove the dusty deposit to promote good adhesion from the glue, it's not necessary to remove the blackening back to white ply.

A further note is that if you glue in the main servo/winch tray before the beams, there is a risk that the hull will open up, but, the tray is too big to position through the beams after they have been glued in so I left the tray loose in the bottom of the hull until the bulk of the beams were fitted and then glued in the trays.

The beams have been measured and cut at specific widths so that the outer plank of the deck is of a similar width along its length which will make the finished model more pleasing on the eye. Try to avoid reducing the overall width of the beams when sanding although you might want to chamfer the ends to match the curvature of the hull. Regularly compare the measurements of the hull to the measurements of the internal edge of the deck to ensure that the outer plank on each side of the hull is a mirror image to the other.

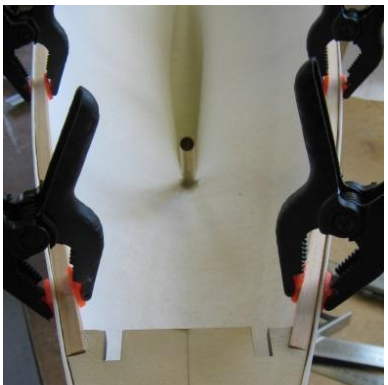
The parts are held to the sheet by small nibs which will need to be cut with a sturdy craft knife. Cut from both sides of the sheet and don't be tempted to press the parts out as this will damage the surface of the ply.

Instructions

5.1 Remove parts No1 and No12, the bow and stern pieces. The stern piece will need some shaping to its lower edge for a good fit. Both parts will need some shaping to take ends of the inwales. Glue in the parts and it will be useful later if the etched line is in the centre of the hull.

5.2 Measure and cut the inwales to size. It is better if they are slightly short, rather than long as a longer length than required will have the effect of pushing out the side of the hull when fitted. I dry fit the inwales first and then measure the width at the mid-point to ensure that the tension created by bending the inwales is not creating distortion in the fibreglass of the hull.

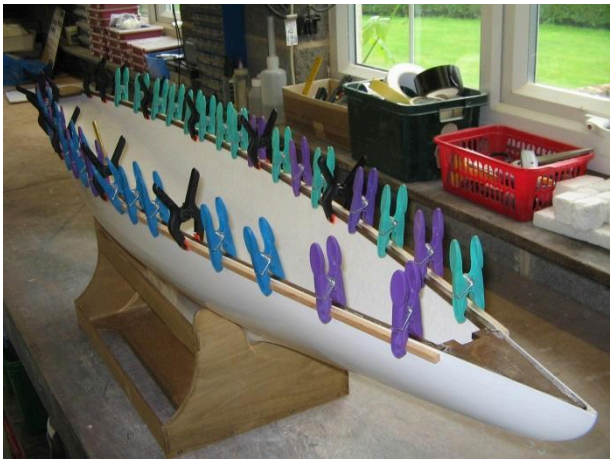
Note: All the woodwork, including the inwales, should fit slightly lower than the height of the top of the hull. This will simplify fitting the deck and ensure a good seal between the top of the hull and the deck. If the inwales are fitted about ¾mm to 1mm



below the top of the hull, all the other parts should sit at a similar height.

5.3 The inwales can then be glued in. I use the longer setting epoxy which gives me time to apply the glue, and make adjustments if necessary. The glue acts as a lubricant in the joint until it sets so ensure that the inwales don't slip against the hull.

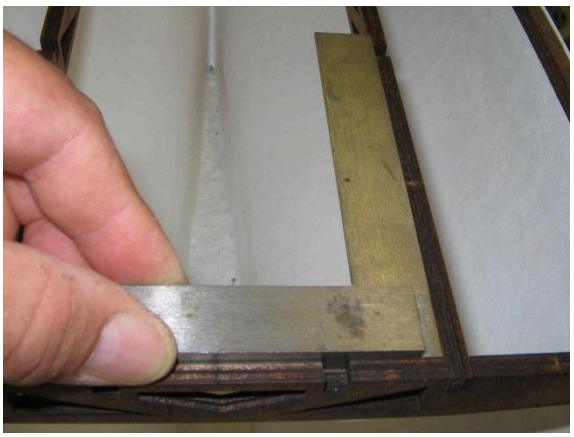
5.4 I have found that where the grips/clamps/pegs grip the side of the hull that the compression can produce a wavy finish. Using a second piece of wood to sandwich the hull between the two pieces will avoid this.



5.5 Find and mark the mid-point of the edges of the hull. It will be useful if this mark is as accurate as possible as when the mid-beam (No 6) is fitted, it will determine the position of all the other beams. I measure a straight line from the bow and start by making a mark at 781mm from the tip of the bow. If you then place a straight edge (ruler or similar) across the hull at the marks, the measurement from the bow to the middle of the ruler should be 770mm. Trim the end of the beam so that the top of the beam is at the same level as the top of the inwale.

5.6 To find the optimum position for the mid-beam No 6, remove the beam No 8 from the sheet, and the two longitudinal runners No 16 and dry fit. Adjust the beams so that the hatch opening is square, ie that the corners are all at 90 degrees, check that the middle of the beam No 6 is 770mm from the bow (767mm when measured from the front of the beam to account for its thickness) and mark the edge of the hull accordingly. Be patient, it's worth getting this bit right!

Note that all the beams are at 125mm apart at their centres.



5.7 When you are happy with your marks for the two beams, it's time to deal with the two servo trays. The position for the main servo/winch tray is not critical however I suggest that it fit so that the two screws retaining the forward part of the servo are accessible from the hatch. If the servo fails it will be easier to remove and replace. Make a mark on the edge of the servo tray approximately 230mm from the front of the tray and a second mark on the inner hull vertically down from the mid beam mark. This will give you a rough position for the tray.

5.8 The main servo tray and the rudder tray support the fixed sheeting loop. Part No 25 should be screwed to the rudder tray on the mark etched on the tray and one of parts No 24a, or 24b should be screwed to the main servo tray. 24a and 24b are the same but have different heights. If you fit 24b, and are using a Hitec winch, the top pulley on the sheeting loop will line up with the top drum of the winch.

If you are using a Hitec winch, mark a line parallel to and 15mm from the edge of the servo cut out and screw 24b to this line. In theory at least… when the rudder tray and main sheet tray are fitted, parts no 24b and 25 should line up!

5.9 I chamfer the edge of the servo tray to improve the fit in the hull and to take account of any variations in the hull and trial fit with the two beams, parts no 6, and 8 in place. Try to avoid removing too much material as this will lower the tray in the hull and it won't line up with the rudder tray….

5.10 Take the rudder support tray and chamfer the same. You will need to remove more material from the rear of the rudder support as the hull has a shallower angle at this point.

5.11 Dry fit the main servo tray and rudder support tray and use a straight edge to check for fit. Note that I have dry the mid beam when trial fitting the servo tray otherwise the main servo tray will tend to drop in the hull, opening the sides up. Mark the positions for future reference.

5.12 Now dry fit the jib trimmer tray (if you are using one). Trial fit with a servo in place as this tray is offset and if fitted too low in the hull the bottom of the servo will foul the hull. The position of this tray is not critical but ensure that the arm of the jib trimmer servo doesn't foul the bottom of the main winch servo. Mark the position for future reference.

5.13 Now would be a good time to double check the hull for straightness. I had inadvertently put some twist into the hull when I fitted the inwales (see photo). I think that this was because one inwale was slightly too long and a tight fit to the bow and stern piece. This put pressure on the side of the hull, pushing it out a bit. (In the photo, the right hand inwale.)

5.14 The answer was to use a piece of scrap 6mm wood, cut to the right length, to apply pressure on the other side to push the hull back to shape. Where ever possible after this, and when finally gluing in the beams I retained this brace in the hull. (Note the position of the line before and after the brace is fitted in the above pics.)

5.15 Now the bit you've been waiting for, you can glue in the parts. Start with the main winch tray and the rudder support tray. Use the straight edge to ensure that the fixed loop supports line up and also position a couple of beams to stop the hull opening up. When the glue has dried, the main winch tray will significantly strengthen the sides of the hull so if you've found the need to use a brace to straighten a twist, ensure it remains fitted until the glue has dried. When dry, glue in the jib trimmer tray.

5.16. I started with the mid beam and worked aft. When each beam was fitted, I double checked the widths against the measurements listed at the end of this section. The closer you can get to these measurements, the better and more uniform the outer plank will look on the finished model. Also ensure that no part fits higher than the top of the deck line. I have small spacers (washers to anyone else!) that I use to ensure that the parts are slightly lower than the deck line.

5.17 I started with the mid beam, No 6, and the rear main hatch beam, No 8 and glued these parts in together with the longitudinal runners, No 16. I re-checked to ensure that the hatch aperture was square.

Note: Before fitting the beam which forms the rear of the hatch I screwed in two small brass hooks at the point where the beam and the runner meet. These hooks will be used to retain an elastic band to keep the main hatch secure, and also to locate a single pulley for the jib.

When dry I glued in No 9, front of aft hatch beam and No 11, the final beam aft once again with the longitudinal runners No 17.

5.18 The final stern runners, No 19, will be too long and will need to be cut to fit before being glued in.

5.19 Part No 18, the rear of the aft hatch can now be fitted.

5.20 When the glue has set, you can now fit the short beam sections, Numbers 7 and 10. When fitting these, use the braces 27 and 28 to retain the shape of the hatch.

5.21 It is prudent to check the hull for straightness as you go, check that the beams are below the deck line and also check the widths at the beams. If everything is going to plan, all the beams should be a “light fit”, by this I mean if the boat is tapped lightly, the part will drop out. If you find that something is either tight or too loose, you will need to identify the cause first as removing material from one beam will have an impact on all the others!

5.22 When the rear of the model is finished, you can deal with the front. This is much simpler however is will save time of the holes for the mast tube are made in part numbers 14 and 28 first. The centre of the mast tube should lie between the slots of part 14 where the two side beams, No 5 fit. Do not glue in part no 28 yet.

5.23 I found it easier to screw the beam No 4 to the upper mast deck, No 14 before final fitting and fit both parts together. Drill a 2mm hole where at the centres etched on the beam No 5.

5.24 The king plank, No 13, is too long and will need to be cut before fitting. After this is fitted and the glue has dried you can fit the beams No 3 and No 2 noting that all the beams are at 125mm centres. Once again, check the widths and that none of the woodwork is higher than the top of the hull.

5.25 The final parts, No 15, the mainsail sheeting post support can be fitted. (note the etched mark for drilling a 6mm hole to take the post) No 20, the rudder servo tray can be fitted.

The Mast tube

I supply an oval mast tube which can be used, in conjunction with the mast ram, to adjust the rake of the mast to suit different wind conditions. This is used by racing

boats but you may find it unnecessary for the Nottingham 60. If this is the case, a round brass tube with an inner diameter to suit the mast can be fitted in the same way as the oval tube. In this case a mast ram will be unnecessary.

Remember to seal the bottom of the tube so that water cannot get into the hull!

The oval tube needs a little final shaping to reflect the shape of the mast. I use a ½ inch steel rod as a former and lightly hammer the tube to obtain a better shape.

If using the oval tube, you will need to make a pin of about 3mm diameter that fits across the mast tube, about 120mm down and make a similar notch across the base of the mast. The mast will pivot in the pin and this does also have the advantage that the mast cannot rotate within the tube as the boom swings.

The tube is fitted so that the mast stands vertically when viewed forward to stern and when viewed from the side, the boom (at right angles to the mast) lies parallel to the deck.

I fit the tube with a shorter “slave” mast located in the tube and parallel to it, and a plum line to ensure that the mast is vertical when viewed from the bow or stern and the deck is level.

Using two blocks of wood of the same size, one placed just behind the mast and the other just behind the aft hatch, place a straight edge on the two blocks and set the mast so that it is at 90 degrees to the straight edge.

When I am happy with the position, I glue the mast at the mast deck, and onto the ballast and when this has set the final operation is to glue in the lower mast support No 28.

Fixing the mast tube at three points adds significant rigidity to the hull ensuring no flex as the model is driven forward by the wind.

Measurements at the beams

Beam from	Part No	Width across hull	Measurement the mid beam
Bow	1	69	625
1st	2	122	500
2nd	3	172	375
3rd	4	211	250
4th	5 (mast)	239	125
5th	6(mid beam)	255	0
6th	7	259	125
7th	8	250	250
8th	9	227	375
9th	10	188	500
10th	11	133	625

Measurements across the hull should be as close as possible to these measurements above. Note that due to the curve of the hull that if the beam is slightly out of position then the width can vary quite a lot. It's perhaps more important that the beams have a snug, or light fit, without having to remove or add material. If you achieve the measurements to a tolerance of + or – 1mm or so the outer plank of the deck will run parallel to the eye with the edge of the deck. If you're measurements are out, the outer plank may appear to vary in width but this will have no impact on the sailing qualities of the boat, it's purely aesthetic and can ultimately be disguised!

Section 6. The sheeting loop.

Description

The winch turns a fixed sheeting loop to which the loose sheeting to the sails is attached. No elastic or other means of tension is required in the fixed sheet loop as the loose sheeting is pulled by the sails in the same horizontal plane as the fixed sheeting loop and so the sheeting cannot be pulled off the servo drum.

The fixed sheeting loop runs round two pulleys located at each end of a length of aluminium channel secured onto the main winch tray and the rudder support tray. The loose sheeting is attached to the fixed loop and then runs parallel to the fixed loop to a further pulley at the ends of the aluminium channel before going to the sails.

The mainsail sheet attaches to the inside of the loop, runs back the front bolt of the fixed sheet pulley, and then forward and up to the mainsail sheet.

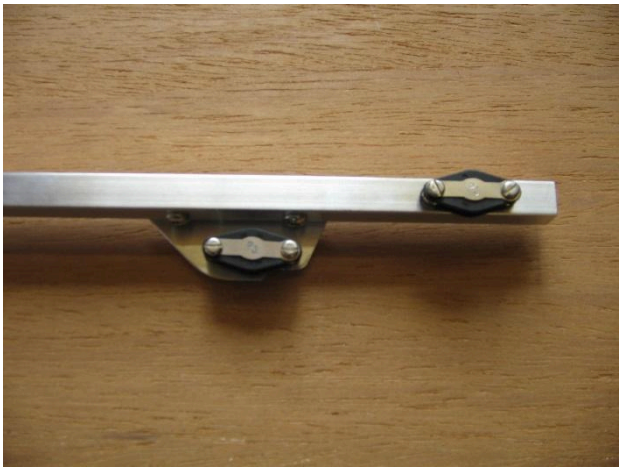
The jib sheet attaches to the outer side of the fixed sheet but then passes through the arm of the trimming servo which can be moved independently of the main winch adjusting the length of the jib sheet and so allowing the jib slot to be adjusted while the model is in the water. The jib sheet is passed through a small brass tube with one end located in the forward hatch, and the other just above the deck, within the fairlead which makes access simpler with the deck fitted.

The system is simple and robust and should provide reliable service over a long period.

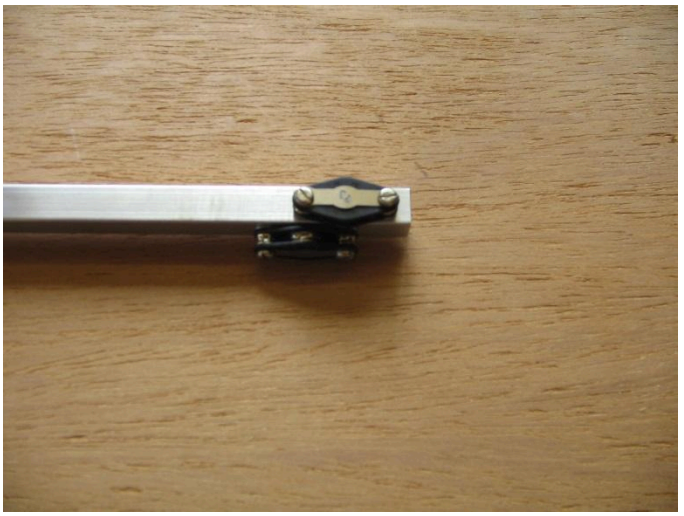
Instructions

6.1 The 8mm aluminium channel has an internal measurement of 6mm and should be a snug fit over the fixed loop supports (24 and 25). The fixed loop support No 24 is cut out at the top to allow space for the nuts that retain the forward fixed loop pulley. The aft pulley fits to the rear of the fixed loop support No 25. Mark and drill the channel accordingly to take the two pulleys.

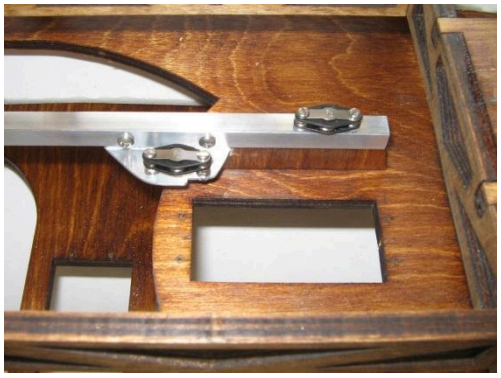
6.2 You will need to fabricate a small bracket as shown in the picture to take the pulley which is positioned to the side of the channel and which both directs the fixed loop back to the lower drum, and which also takes the loose main sail sheet.



6.3 At the aft end of the channel drill and fit the final pulley to the other side (The main sheet runs to the inside of the channel and the jib sheet to the outside.) This pulley is fitted slightly forward of the fixed loop pulley (see pic)

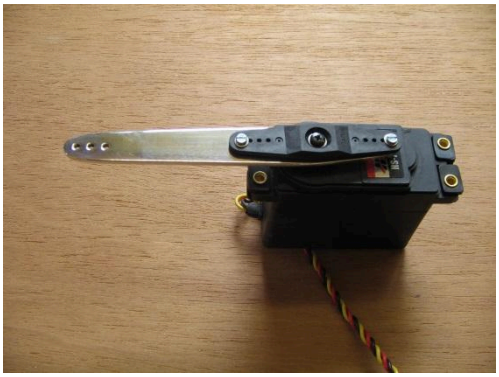


6.4 The channel is then fitted over the fixed loop supports. Check that the forward fixed sheet pulley lines up with the upper part of the servo drum, and the pulley fitted to the bracket lines up with the lower servo drum.



(Note that my bracket is fitted a little too close to the servo so I've had to remove a small amount of material to allow me to conveniently remove the servo if necessary.)

6.5 The arm of the jib trimmer servo requires extending. I fabricated an extension from aluminium bar with the length of the arm 85mm from the turning point of the servo.



Section 7. The Deck.

Note: If you are using my hatch pack, the aluminium angle, used to form the combing, needs to be fitted before the deck is fitted!

Description.

The deck is produced from 1.5mm birch ply with planking detail etched by laser. The etch is a carbon deposit and if the deck is sanded this detail will be lost.

The material is thin and easily warps so before fitting the deck should be stored flat, with something on top to avoid the wood absorbing moisture from the air and deforming. Some slight warping cannot be avoided but if larger warps appear the deck can be flattened by wetting the surface (with a fine mist spray) and laying flat.

There are cut-outs for the hatches but they are deliberately made small to allow for individual builds. You will likely need to open them up by between 1mm and 2mm at each edge and I suggest a sharp and sturdy craft knife run along the edge of a metal ruler. Use light passes with the knife and start from each corner and work to the middle. It's very easy for the knife to slip, and cut into the deck further than you intended.

The deck is designed to sit on top of the edge of the hull so that when finished the edge of the deck is visible and not the edge of the fibreglass.

The inner edge of the outer plank and the king plank are etched deeper than the other plank detail and will allow you to stain the outer plank and king plank in a contrasting colour to the inner planked area. If you do this you will need to pay attention the the fit of the deck over the hull to ensure that both outer planks are a mirror image of each other.

I use a dark oak stain to the outer plank and king plank but I don't apply stain to the inner area and let the wood adopt the natural colour of the oil.

I finish my decks with Danish oil which is easy to apply for a good finish and is waterproof. I apply a reasonably generous first layer with a brush and when it has had an opportunity to soak in (10 minutes or so) I wipe off the excess with a lint free cloth. Subsequent layers of the oil are applied more thinly. Anticipate a minimum of four coats.

Instructions.

7.1 Before fitting the deck ensure that the interior of the hull is complete as access is limited! Also check that there is no internal woodwork which is proud of the top of the hull. If woodwork sits proud of the hull line it will be more difficult to seal the deck and the finish won't be as attractive.

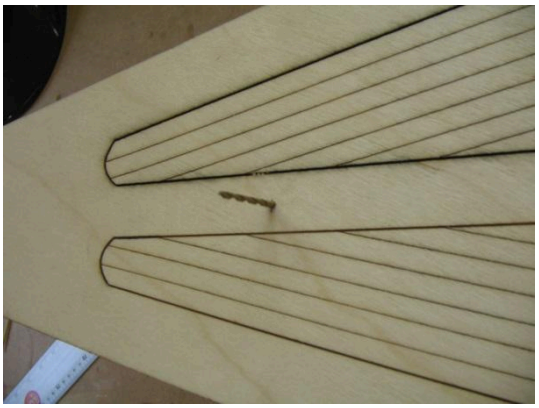
7.2 If you are using my hatch kit, you should now fit the aluminium combing. I previously used small screws countersunk into the aluminium to locate the combing squarely over the hatch area

7.3 I now use two part epoxy as I can get a more precise fit and it's a suitable strength. The underside of the aluminium angle will need abrading with sandpaper to give a good key to the glue

7.4 The openings for the hatches are made slightly small and will need to be enlarged for the deck to fit over the combing. I use a sharp knife and make a number of lighter cuts into the wood using a ruler to ensure the cut is straight. Be wary at this stage as the knife can be “gripped” by the adhesive in the plywood making the cut difficult to control.

7.5 You will need to mark and drill/cut the deck for the mast tube, jib fairlead and mainsail fairlead.

7.6 I align the deck using pins at the bow and stern. Measuring half way across the hull, I drill into the king plank and then make a similar hole in the middle of the etched king plank on the deck. The drill bit can then be passed through each drilling which will centralise the deck over the hull. I then do the same at the stern.



7.7 With the deck firmly supported on the hull and in its fitting position I then make a mark on the underside of the overlap about 2mm from the edge of the hull and cut the deck to this mark. The overlap is then sanded back to the hull when the deck is fitted and the glue has dried.

7.8 As a double check, I measure the width of the outside plank on both sides of the boat so satisfy myself that they are roughly the same. It's unlikely that both outside planks will be perfectly parallel to the edge of the hull, and also the same! Variations of up to 1mm or so are acceptable, and when the deck fittings are added, a small variation is not so visible to the eye.

7.8 I seal the underside of the deck using a brushed on PVA sealer. This both seals the underside of the deck from moisture that accumulates inside the hull and which can blacken the ply, and also acts as a primer for the glues. A ratio of about 5 parts water to 1 part PVA will be sufficient. As the PVA is taken into the wood, the deck will try to warp so dry flat. Allow to dry overnight.

7.9 You are now ready to fit the deck. This is a tense time so ensure that you are properly prepared, that the deck dry fits well, and that your materials are to hand. I used to use epoxy glues where fibreglass joins to wood and exterior grade ready mixed wood glue where wood joins to wood. I have found that the epoxy sets too quickly and I find myself having to rush which this is a bad thing!

I have used one of the waterproof sealer/glues applied from a gun applicator where the deck meets the hull and the aluminium of the combing, and wood glue as before where the deck joins to the inner frames. This works with a white hull but with a two tone hull there is a danger that you will see an unsightly white line under the deck as this type of adhesive dries white.

So I now use Evostick Exterior wood glue on all the parts. It doesn't make a strong bond to the edge of the fibreglass but is does make a very strong bond and seal to the inwales. Another positive property is that as the glue dries it contracts, pulling the deck down onto the hull.

7.10 Mask off the top of the hull and ensure the woodwork is free of dust. A light sand of the top edge of the hull will remove any contaminants. Lay paper over the inside of the hull to protect the internal parts from excess glue.

Prepare the hatch areas. I use light clamps and lengths of wood to get even pressure all-round the hatch areas.

Apply a thick bead to the inwales and around the hatches, and a thin bead to the internal woodwork. The glue will flow so a further bead may be required to the inwales. The bead should stand proud of the hull and will squeeze out over the inside and outside of the hull so be prepared to wipe away excess.

7.10 Gently press the deck to the outer edge of the hull by applying pressure and running your finger down the outside edge of the deck and along the hatch combing. You will need to do this a couple of times until you note that no more excess glue is being squeezed out of the joint… try to avoid getting glue on your finger and then on the deck as it's very difficult to remove!!

7.11 I use masking tape across the deck at close intervals applying a light and even pressure to hold the deck down.

7.12 There is a stage before the glue sets when it will have a rubbery texture, not wet, but not dry either. (Referred to as “green” but for glues that dry clear it’s an opaque colour) At this stage you can lift the masking tape and use a sharp knife angled upwards into the overlap of the deck to make a cut and peel off the excess glue. This save a lot of effort later if you need to remove a lot of fully cured excess. Replace the masking tape until the glue has cured, 12 hours or so.

7.13 When you are sure the glue is well cured, sand the edge of the deck back to the hull using a sandpaper on a block to create an even curve. Hold the block vertically and sand along the hull and when you see the sandpaper marking the masking tape it’s time to go more carefully.

7.14. As you can see from the photo, I’m brave enough to use a power tool to speed things up a bit. Nevertheless, I still finish the edge with a very fine sandpaper as if this marks the gelcoat, it’s easy to polish out. This tool has a vibrating action and so material is removed in a slow and controlled manner. If you keep the tool or your sanding block at 90 degrees to the deck you should be able to achieve a flush finish to the deck without damage to the hull.

7.15 The finished deck!

You will see from the pictures above that the jib-to-deck channel is going to be fixed to the surface of the deck. I now fit these channels flush with the deck. This requires that the king plank is measured, cut and braced before being glued in and that the deck has a corresponding cut made before the deck is glued down. Out of caution I make the deck cut a bit small and then open it up after the glue has set.

Note that I make the traveller but the item offered by PJ Sails will do just as well!!

Caring for your hull.

Your hull and rudder are handmade and hand finished to the highest possible standards but it's inevitable that both whilst the model is being built, and also then being used that you will acquire some minor scratches. White hulls tend to be more forgiving than hulls with a darker colour, the scratches are still there, but less visible.

The gelcoat is up to about 1mm thick and surface repairs can be made by using a fine wet and dry emery paper. If the scratch is a bit deeper start with 1200 grade and then move to 1500 grade but is the scratch is more superficial, go straight to the 1500 grade.

Use the emery paper wet and work slowly to remove the scratch. I also use a small sanding block as holding the paper in your fingers can result in a rippling effect. When the sanding operation is complete you will be left with a matt finish which can be polished up with a fine polishing compound, T Cut or similar and then the area can be treated to a wax to finish off.

If your hull sustains greater damage in use, all is not lost as most damage can be repaired, even chips out of the gelcoat. Send me a picture by email and I will advise accordingly.

Once a year, or as necessary, I give my hulls a good coat of good quality wax. The car waxes that contain a proportion of Carnauba wax work well. I also find that the deck needs a freshening up with a new coat of oil every five years or so.

Every two to three years it would be sensible to remove the rudder and refit the rubber "o" ring with fresh Vaseline. If the "O" ring looks a bit tired, or perished, it would be sensible to replace it with a new one. Send me an email with your address and I will send you a new one free of charge.

Should you have any questions then get in touch: www.alanhorne.co.uk