

# Gaff Rig Sails Manual

## Nottingham 48 and Nottingham 60



### Introduction

The shape of the Nottingham hull lends itself well to the use of a gaff rig and the finished yacht is very pretty. A further advantage in designing such a model is that the gaff rig is less efficient on the water than a bermuda rig which allows for a greater sail area which looks more “scale” or realistic but doesn’t compromise the model when sailing.

Nevertheless, both the 48 and the 60 will become more tender as the wind speed increases so the design allows for the removal of the topsail. This lowers the Centre of Effort of the rig and improves stability in stronger winds but I don’t think the model looks as pretty as when its flying the full rig.

The hulls for the 48 and the 60 are the same for both bermuda and gaff rigs. The mast position is the same and there are only minor differences to the deck fittings and the internal sheeting. A model designed from outset to carry the gaff rig can be simply converted to carry a bermuda rig but not vice-versa. Whereas the bermuda rigged “racing” yacht will probably use a simplified sheeting arrangement which allows for quick adjustment and maintenance, I tend to run my loose sheeting under the deck, through small brass tubes, and bring the sheeting through the deck under the respective booms. This will take more time to model and is a bit more expensive in parts but I think the end result is worth it.

The gaff rig is no more complicated than the bermuda rig but there are four sails compared to the bermuda's two sails so there is a bit more to it. The biggest problem is that the gaff boom puts a lot of thrust into the mast and as there is no backstay to counter this thrust the sails will quickly lose their shape. This is particularly so for the foresails as the stays supporting the luff will go slack and the both sails will become baggy and baggy luffs just won't do!

I overcome this by connecting both jib stays together so that they are tensioned by the same amount, and bracing this tension against the shrouds which are angle further back on the deck. In conjunction with using carbon for the mast, which is stiffer than aluminium, the mast is better supported against the thrust from the gaff boom. Mainsail boom movement is more limited but it's the movement of the gaff boom which is more important and a mainsail boom swing of up to 50 degrees is sufficient.

The other main difference between the bermuda and gaff rigs is that the relative movement of the sheeting to the two foresails needs to be half that of the movement in the sheeting to the mainsail in order that all the sails move in and out at the same rate. This can be achieved in a number of ways but I find that the best engineered approach is to use a pulley attached to the fixed loop in order to double the movement in the sheeting to the mainsail boom. This allows for a shorter fixed loop and although the effort on the winch is increased, the Hitec item has sufficient torque to operate even the greater sail area of the 60 with this setup.



Shown in this pic is the Nottingham 48 gaff rigged hull. This colour scheme is Yacht Green over Red. Green is not everyone's choice but gives the model a "period" look.



Shown in this pic is the Nottingham 60 gaff hull in Black over Red. As with the 48 above, separating the two colours with a waterline in white vinyl and a coach line just below the deck adds a nice finishing touch.

### Building the rig.

The bermuda rigged model uses an oval mast tube to locate the mast and to allow the mast to be tuned to the prevailing weather conditions. This is not necessary for the gaff model and you may wish to consider whether you use an oval tube, or a more closely fitting round tube to locate the mast. The aluminium mast of the bermuda model has a notch cut in the base which both locates the mast, and also stops the mast pivoting under the movement of the boom. The carbon tube used for the gaff rig isn't strong enough to support a notch in the base so you will need to make a fitting from aluminium or brass that can be glued to the base of the mast into which a notch can be cut.

I have a slightly different approach in that I make a fitting which I glue into the base of the mast and which is drilled in the middle to take a 3mm bolt ground to a point and this point locates in a drilling in the base of the oval tube. There is no right or wrong here but you will need to decide whether to use a round or oval tube, and if the latter, how to locate the bottom of the mast.



1. The first operation is to attach the boom vang and kicker to the mast. I cut the fitting down to 50mm for the 48 and 60mm for the 60 in order to get the mainsail as close to the deck as possible whilst allowing for good operation of the kicker. (Note that the kicker needs to clear the hatch and that the longer the kicker, the better it will work.) With the boom placed on blocks level above the deck, the mast should be at 90 degrees to the boom.

Fit the gaff boom to the mast. This should move up and down the mast, and freely around the mast. Attach your mainsail luff to the front of the booms. At about 100mm to 150mm above the gaff boom drill the mast to fit a hook and use this hook to run a piece of cord to the gaff boom so the luff of the mainsail can be tensioned. Fit the flow springs to the back of the mainsail and gaff boom and attach the mainsail.



2. The topsail mast is attached to the main mast in two places, one at the top of the main mast and the other at the bottom of the topsail mast. As you will see from the pics I have made a fitting for the bottom of the topsail mast which locates into a drilling in a brass strip but a hook screwed to the main mast will do just as well.



The tack of the topsail attaches directly to the gaff boom using a hook and you will need to ensure that the hooks securing the top mast apply sufficient tension to the gaff boom to tension the luff of the topsail. If in doubt, make your top mast longer than necessary and include a bowsie to adjust the tension of the topsail.

The clew of the topsail is located to the back of the gaff boom using a second flow spring.

You will need to attach a cord with a bowsie from the mast to a point about half way along the gaff boom to tension the boom. With the topsail in place, you will find that the gaff boom is tensioned by the topsail but when the topsail is removed tension can be provided by this adjusting this bowsie.

3. It's common to find jibs attached to the deck with rubber grommets but I find this approach unattractive. I cut a small slit in the jib boom, just big enough to fit the eye of the swivel. I then obtain a couple of stainless spokes for the wheel of a bicycle (the O/D of the nut is a snug fit for the I/D of the carbon tube). I cut to length and thread the end down the carbon tube and locate the eye of the swivel inside the tube. The nut can conveniently locate the tack of the jib using a hook. This makes for a much neater fitting and also gets the boom lower to the deck.



Cutting a slit in the carbon will weaken it so keep the length of rod inside the tube much longer than it need be. This will reinstate strength to the boom as the strain is taken by the stainless rod inside the tube rather than the tube itself.

Fit the mast to the deck with the mainsail boom level along the deck and at 90 degrees to the mast and use the top shroud to secure the top of the mast. Attach the jib closest to the mast (the staysail) to the deck so that the clew of the jib is about 10mm from the mast. And hold the steel trace at the top so that the leech of the staysail is parallel to the mast and no more than 10mm from the mast.

The point at which the steel trace being held up dissects the mast is the point at which the jib stay should attach to the mast. Repeat this for the second, forward, jib to find the point at which this jib attaches to the mast. I try to keep the luff of the staysail as close to the leech of the foresail as possible but it's more important that the two be parallel.

The steel trace will need to be cut and crimped into a loop just above the head of each sail. Attach cord to one loop, run it through it's eye on the mast, down the mast about 200mm, then back up again through the second eye on the mast and tie off on the second loop. Using a second piece of cord, create a way of tensioning the jib stays against the mast as per the pics.



PJ don't supply flow springs to suit 6mm tube for the clew of the jibs so I obtain the spring clips used by power boaters to retain silicone tube to solid pipe. These are available in a range of diameters and operate in a similar way to flow springs in that as you squeeze them, the diameter increases allowing for movement along to jib boom to adjust the camber of the foot of the jib.



Schedule of measurements. (all in mm's)

## 1. Deck fittings

from the bow in mm > < from mast centre

	Fore sail	Fairlead	Staysail	Fairlead	Mast	F'wd shroud	Aft shroud
48	60	240	310	480	530	25	90
60	70	280	385	590	650	25	120

## 2. Spars

	Main mast	top mast	overlap	main boom	Gaff boom	jib booms
48	960	380	175	575	440	245 & 250
60	1290	470	200	800	520	300 & 300
Diameter	12mm	6m		10mm	8mm	6mm