

# Flying Fifteen Rig Tuning

## Objective

The purpose of rig tuning is to arrange the mast and rigging of the Flying Fifteen so that they are optimised for their set of sails. This gives a basic set-up, capable of further fine tuning as conditions require whilst on the water.

## General principles

1. Flying Fifteen sails produced by the leading sailmakers are not identical. Each sailmaker has a preferred approach to designing the sails, which gives rise to subtle differences in the cut and shape of the sails.
2. The Flying Fifteen mast is flexible, so that it can take on a particular shape, for example the mast can be set straight upright or can take on a curve. The foot of the mast is fixed in place in the boat. The basic shape taken by the mast is achieved by adjusting the shrouds, in effect by pulling the top part of the mast to bend or straighten as required.
3. The sailmakers' different approaches to sail design each start from a different way of setting up the mast. For example, Steve Goacher designs sails which favour a straight mast, whilst Pinnell and Bax uses a mast which has some bend induced.
4. Each mast type has distinct characteristics in terms of flexibility. The sailmakers publish tuning guides which can be used to establish the rig geometry for the different permutations of mast manufacturer, boat builder and crew weight. By following the appropriate guide, you create the mast profile recommended by the sailmaker for your sails.

## Equipment Required

- The sailmakers tuning guide for your boat \ mast \ sail type
- Surveyors tape measure - 30 foot long or more
- Two steel rules
- Steel tape measure
- Rig tension gauge

## Procedures - overview

1. Ensure you note the current settings before making any change. This will enable a reset if you have taken a wrong turn.
2. Remove the mast from the boat.
3. Measure the keel position - you only need to check this once!
4. Measure the position of the mast step and adjust as required.
5. Measure the spreaders and adjust as required
6. Refit the mast into the boat. Attach shrouds, jib and apply rig tension
7. Measure rake and adjust until the critical rake measurement is achieved
8. Mark neutral mast position on side of mast gate.

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## Why tune the rig at all?

Flying Fifteens can be complicated boats. A few ill conceived adjustments could make a big difference. The boat could get out of trim and seems slow. Maybe the spreaders got knocked out of alignment. Or maybe it's something more fundamental - different sails or a new mast - so the boat needs to be re-calibrated. Whatever the cause, it's a worthwhile check up to perform every now and again.

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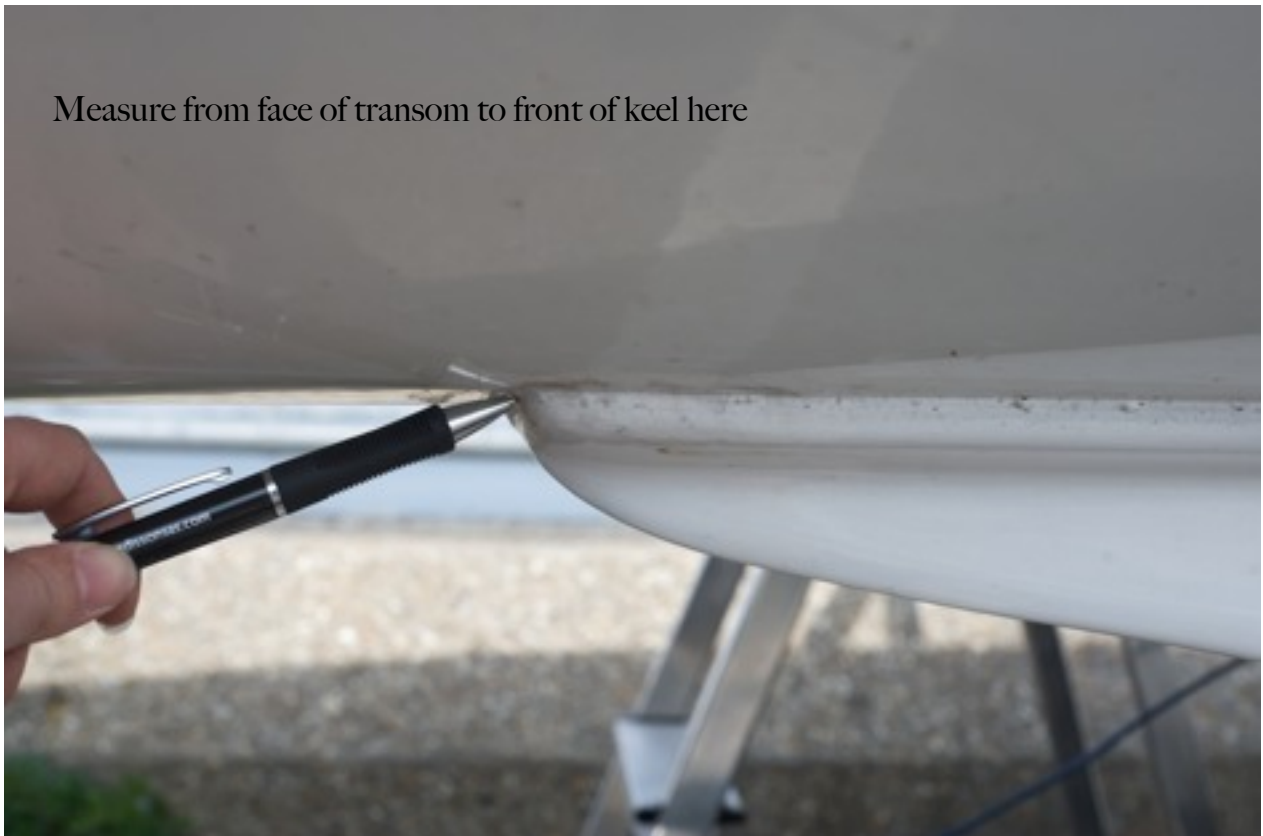
## Step 1 and 2 - Record your settings, then lift out the mast

1. Ensure you note the current settings before making any change. This will enable a reset if you have taken a wrong turn. It is worth noting down the changes applied, for example number of turns of an adjuster as well as in terms of the measurement difference.
2. Remove the mast from the boat. This is not necessary if you can work easily at spreader level without lowering the mast, for example from a platform. At the Datchet club house there is the capability to reach the spreaders from the balcony by parking your boat and trailer at the end of the club building.

### Step 3 - Keel measurements

3. The tuning guides give measurements from the transom of the boat to the front of the keel and to the mast step. All measurements from the transom are from the vertical face of the transom and should not include any projecting lip or overlapping part of the deck.
4. Measure the distance from the transom to the front flange of the keel, see picture below. It's hardly likely that you will move the keel if it doesn't match the suggested measurement, nevertheless it may be a figure which influences matters later on if it proves to be very different. Keel positions have changed a little, from 3939 mm (transom to forward edge) for the Windebank Mk 4 hull, to the successful Mould 9 hull, which is positioned at 3921 mm, 3936 mm for the smooth 9 or 2920 mm for Mould 10.

Measure from face of transom to front of keel here



## Step 4 - Mast step measurements

5. The next measurement is used to locate the bottom of the mast. The foot of the mast fits into a mast step, a channel bolted into the bottom of the boat. The position of the mast foot can be moved fore or aft by changing the position of bolts which run from side to side. The bolts pass through holes 1 centimetre apart, so you may only make changes in 1 centimetre increments. The mast step needs to be positioned at the correct distance from the transom.
6. The total measurement from transom face to mast step is obtained by adding two separate measurements together. The first is made outside the boat, the second inside the hull. The recommended method of doing this is to measure to and from the first keel bolt, but if this has been faired in and is invisible another reference point should be used. The Datchet method is to use the bailer as the common measurement point.
7. The example below shows the measurement taken as:

Transom to Bailer measured outside the hull

Plus

Bailer to front mast step bolt measured inside the boat



Measuring from transom to bailer outside the hull





Measuring from bailer to front of the mast step inside the hull

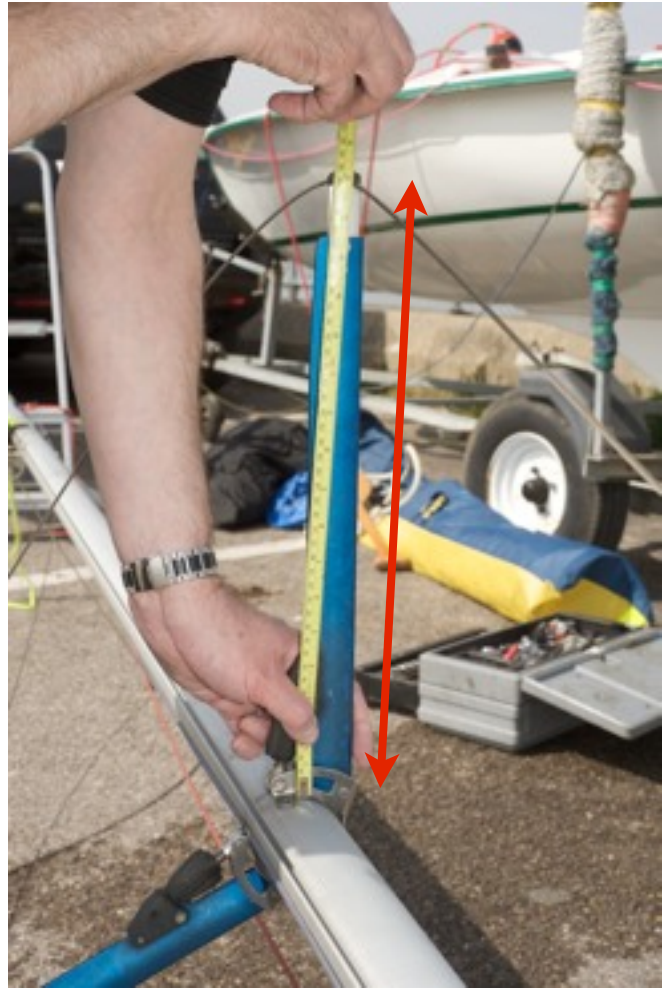
If you need to adjust the mast step, remember to adjust both the fore and aft transverse bolts together. The bolts require a 4 mm Allen key.





## Step 5 - Spreader length and angle measurements

8. Both spreaders should be the same length, which is measured from the mast wall as shown. Adjust the length as required by the tuning guide. Remember to tape over any split rings after making the adjustments. The taping is to ensure that the fittings do not come undone or catch on the sails.
9. Setting the spreader angles is achieved by adjusting the spreaders backwards or forwards until the line formed between the tips of the spreaders lies at the set distance from the mast. To make this process straightforward, a long steel ruler is held against the shrouds at the spreader tips. A second ruler is held at right angles to the first and the distance from the mast to the edge of the long ruler measured.
10. Adjustments to the spreader angle are then made as required.



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## **Step 6 - Replace the mast in the boat**

- 11.** The mast can now be replaced in the boat, with the shrouds bolted into place. The jib is now fitted and the rig tensioned. Set the rig at the specified tension using a gauge, checking that the readings are the same on both shrouds.

## Step 7 - measure and set mast rake

- 12.** The next step is pure flying fifteen voodoo, measuring the mast rake. You must measure from a point near the top the mast to the centre of the transom. The end of the tape measure is attached to the mainsail halyard and raised up the mast. The tape is held against the mast and using the halyard is moved up or down until the top of the blue band on the mast lines up with 20' 6" (6.096 metres). The halyard can be now cleated in place as the tape is now measuring from the correct point up in the sky.
- 13.** Now take the tape to the stern of the boat and measure to a point on the centreline, directly above the face of the transom. This is the rake measurement.





- 14.** In the case of this boat, the rake should be set to 24' 10 1/2" (7.315 meters). To make adjustments to the rake, change the length of the shrouds using the adjusters where the shrouds are bolted to the deck.
- 15.** To move the mast tip away from the stern make the shrouds longer. You do this by increasing the length of the adjusters which connect the shroud to the deck. Use a spanner to turn the adjuster nut anti-clockwise and the shroud will lengthen. This will increase the rake measurement.
- 16.** Shortening the adjusters has the effect of pulling the mast tip back towards the stern. This will decrease the rake measurement.
- 17.** Once set, the adjusters can be locked into position and taped over.





## Step 8 - mark the neutral mast position.

- 18.** The mast is now allowed to settle into its neutral position and checked for straightness and alignment. If you have adopted Goacher settings, i.e. a very straight mast, this can look as though the mast is almost bending towards the front of the boat. This is acceptable.
- 19.** The neutral position is now marked on the side of the mast and the deck, to give a quick indication of mast position. This neutral position is the most powerful rig setting used under most circumstance. The mast is pushed forward in heavier conditions to de-power. The mast is also moved forward in very light conditions.
- 20.** As shown the mast is also marked to give a quick reference for jib tension. If you have a number of marks in place, taping over then gives a clean surface on which to write.



## **Disclaimer.**

This document has been produced to guide beginners through a basic rig set up in simple language. It is not guaranteed to improve your boat's performance, in fact it may worsen it. Be prepared for having to go back and reset your previous settings. Specifics of boats and sails vary with age and manufacturer, again this is the basics not a comprehensive guide to every variant.

No liability is accepted for any injury, damage or anything caused by reliance on this information.

No animals were harmed in the making of this document. Photographs taken at Datchet Water Sailing Club - a superb Flying Fifteen sailing venue which welcomes new members.

Comments for improvement to this document will always be welcome.

The boat shown is FF3234 "Willie Wonka", Ovington Mk9.

Credits:

Measuring Expertise - Richard Jones.

Pictures and Words - Trevor Sparrow

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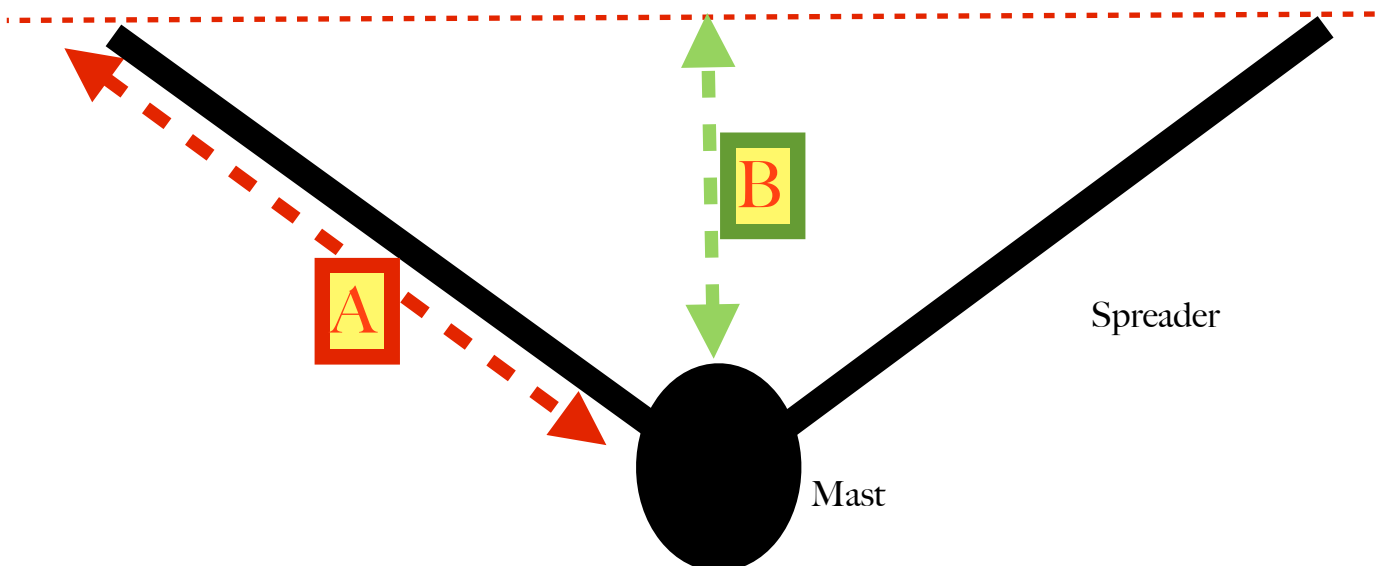


## Appendix I: Gocher settings - 2003 Ovington Mk 9

C/L front bolt to transom		3880 mm
Front of flange to transom		3935 mm
Front face of mast (at step) to transom		3860 mm
Mast gate to transom		3750 - 3840 mm
Shroud base to transom		3242 mm
Width of shroud base		1595 mm
Spreader length to mast wall		430 mm
Jib tracks to transom		2740 - 3115 mm
Jib tracks athwartships spacing	Outer tracks	868 mm
Measured to bearing points	Inner tracks	788 mm

### Spreader settings

Mast	Mast foot / Transom	A Mast Wall to shroud	B Spreader tips aft of mast
Epsilon	3860 mm	430 mm	165 mm
M2	3860 mm	430 mm	180 mm
Nimbus	3840 mm	430 mm	180 mm



## Appendix 2: P&B settings

### Spreader settings

Mast	Crew weight	A Mast Wall to shroud	B Spreader tips aft of mast
Epsilon	21 stone	422 mm	210 mm
	25 stone	422 mm	200 mm
	28 stone	422 mm	185 mm
M2		422 mm	175 mm

Spreader length will vary from boat to boat, the 422 mm is for Mould 9 boats where the shrouds attach to 'U' bolts outside the sheer-line. On older boats such as Wyche & Coppock, the shrouds are closer in, therefore shorten spreader by 15 - 20mm.