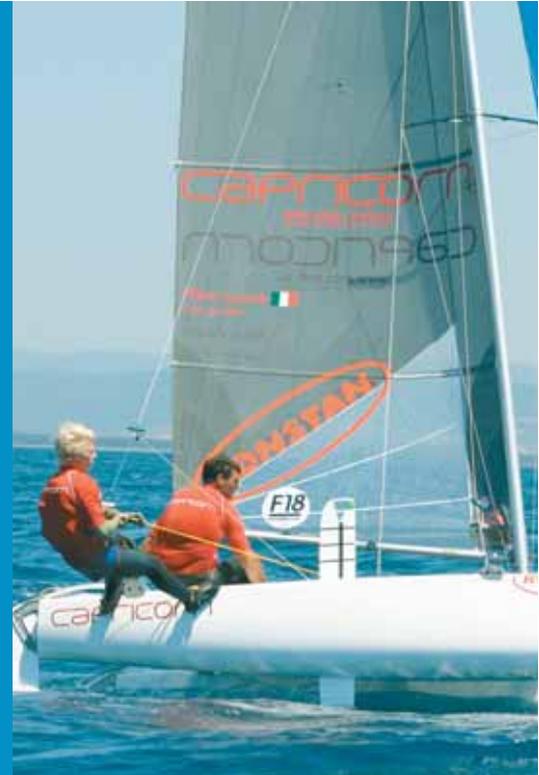




Capricorn F-18 Tuning Guide



1 General aspects

The Capricorn seems to have advantages in medium to heavy conditions with respect to other F18 boats. This holds especially upwind, where the Capricorn shows sparkling performance. We therefore propose to bias the basic set-up of the boat slightly towards lighter conditions. Thus a small portion of the heavy wind superiority is sacrificed in order to get an advantage in light winds.

The rig of the Capricorn is derived from latest A-Class developments and is quite different from traditional F18 set-ups. This shows especially with the adjustment of the mast rotation. In contrast to basically all other F18 boats, the mast rotation on the Capricorn is reduced with increasing wind speed. The main sail has a special cut. The panels have already a built in twist. Thus the sail opens nicely even when sheeted relatively hard, which helps to maintain a flat and twisting sail in strong winds. This means also that the sail must be sheeted very hard in light to medium conditions to compensate for the built in twist and to close the upper part of the leech.



2 Boat setup

The Capricorn is a very fast high performance F18 with impeccable handling qualities. When you first sail one you are aware that every thing happens very quickly. This can also include getting into trouble. As a result it is important that the set up of your boat is kept clean, simple and efficient. Things that tangle or are difficult to adjust should be eliminated. Almost any system can be made to work in light winds but if it doesn't work in strong winds then you would be better not having it on the boat.

2.1 Platform

It is important to have your boat as stiff as possible. Make sure that the beam bolts are tight. The beam pads are accurately moulded to your beams. After a couple of years sailing it may be necessary to reseal the beams as it will improve the boats stiffness. Keep the tramp laced up tight as this makes it much easier to move about on the boat.

2.2 Rudder alignment

The rudder alignment is checked by measuring the distance between the leading edges of the rudders and then measure the distance between the trailing edge of the rudders. The rudders need to set up so that they have 0 - 2mm of toe-in. The leading edges of the blades are closer together. Adjust the length of the tiller crossbar if necessary.

2.3 Rig tension

The rig tension is in general high to avoid forestay sacking. The limit is passed if the mast no longer rotates easily, in this case the tension should be slightly reduced. For light winds set the side stay tension at approximately 50kg. In strong winds set the side stay tension at approximately 100kg

2.4 Mast rake

The mast rake is measured with the forward trapeze wire. The distance to the attachment point of the forestay in the hull is measured (trapeze has to be extended with a rope). This distance is then taken to the stern of the boat. The end point of the point taken should be about 10cm below the upper edge of the transom. Light crews (140 kg or less) can go all the way to the lower edge of the transom; heavy crews should sail with slightly less mast rake.

In general the mast rake on the Capricorn is quite substantial compared to other F18 boats. If the boat is sailed with too much mast rake the boat feels a bit heavy on the rudder, and the acceleration out of the gust becomes a bit slow.

2.4 Spreader Rake, Diamond Tension.

These are the primary controls for tuning your rig to the sailing conditions and to your crew weight.

Spreader rake.

Spreader rake is the method of tuning the fore aft stiffness of the mast below the hounds. The ideal amount of spreader rake is dependent on the fore-aft stiffness of the mast and to a lesser extent, the amount of luff curve cut into the sail. Stiff masts require more rake to make the mast bend sufficiently, soft masts require less rake. The spreader rake is measured by placing a straight edge or string line between the diamond wires at the spreaders and measure the distance to the back of the mast. Values between 30 mm for heavy crews and 75 mm for light crews are usual.

As the basic angle we use 45 mm. To answer how much is sufficient rake can only be determined by sailing the boat and knowing what to look for. If you have excellent height, but lack boat speed up wind and the boat does not want to accelerate in the wind gusts, then you need more rake. This helps the mast bend fore and aft which allows the sail to flatten and the leech to open in the wind gusts. If you are lacking height and "grunt" in light weather, then you have too much spreader rake.

Diamond Tension

This primarily controls the side bends of your mast. Loose diamonds allow the middle of the mast to bend to leeward and the top of the mast to hook to windward. This tends to cause the boat to heel very easily in wind gusts. Very tight diamonds do the opposite. Downwind, tight diamonds keep the mast bent reducing camber and power. On our boats the diamond tension is set at 30 - 34 on the Loose gauge.

Pre-Bend

Prebend in a mast is the result of diamond arm rake, diamond tension and mast stiffness. These days we do not really measure prebend; as the same prebend can be achieved with varying degrees of spreader rake and diamond tension on any given mast. This is even further confused when the mast stiffness varies.

2.5 BATTENS

Battens should be shaped to match the general curvature of the sail. The battens that I recommend and use are the Fibrefoam battens. These are a fibreglass foam sandwich construction that is light, strong and have excellent bend characteristics. All battens need to be looked after and stored so that they do not become permanently bent or twisted. Battens should be tied firmly into the sail to remove creases along the batten pocket when sailing. (See attached Batten Tying Guide). Battens 2 & 3 (counting from the top) need a lot of tension.

Batten stiffness can affect the camber and twist characteristics of a sail. They are an important aid for tuning your sail and rig. Stiff battens hold the sail flat and help the sail to twist more easily. Soft battens allow the sail to develop more camber and reduce leech twist.

2.5.1 General Sailing Philosophy of Catamarans

A number of years ago I heard the following quote applied to catamaran sailing. "It doesn't matter where you are going as long as you are going there fast." The element of truth in this statement is that boat speed is ultimately important. Go fast. Look for pressure then angles; opposite priority compared to dinghies.

3 Upwind sail and rig settings

3.1 Light wind 2 - 5 knots

No trapeze or only the crew on the wire: Longitudinal trim is "nose-down". The transom should be level with the surface of the water. Having the transom depressed into the water by sitting too far aft only increases the hull drag.

Main sail

The main sheet traveller is in the middle, medium sheet tension, changing as a function of sail pressure. The upper tell tales indicate the correct sheet tension and the right twist. The downhaul is adjusted such that horizontal crinkles just disappear. The outhaul is slightly released, such that the maximum distance between boom and sail is not more than 10 cm. Both dagger boards are all the way down.

3.1.1 Mast rotation

At two vertical positions tell tales are glued to the sail right behind the mast. These tell tales are used to find the correct amount of mast rotation. If the tell tale on the windward side of the sail shows turbulent flow the mast rotation has to be reduced. If the leeward tell tale is detached the mast rotation has to be increased. In very light conditions the mast should be rotated slightly more than indicated by those tell tales, such that the windward tell tale occasionally detaches. The axis of the mast points in these conditions approximately to the leading edge of the dagger board.

3.1.2 Jib

Jib downhaul such that horizontal crinkles just disappear. In very light conditions it might be even better to sail with some horizontal crinkles in the jib. The jib traveller is about 10 cm inside the outer most position.

3.1.3 Spinnaker

Speed is the goal – not the jibing angle. The crew is on the leeward side of the boat and the windward hull should be clear of the water if possible. The dagger boards should be left fully down. They are a very efficient shape and produce much less drag the hull slipping sideways through the water.

3.2 Medium winds 6 - 15 knots

Both crew on wire – longitudinal trim is "nose-up". The lower edge of the bow is just below the water surface.

3.2.1 Main sail

The main sail traveller is in the middle and the sail is sheeted hard. Power is adjusted by the mast rotation and downhaul tension (compare section mast rotation). The tacking angle (pointing high or going fast) can be adjusted over a relatively wide range changing these two parameters. Fortunately the VMG is quite flat as a function of pointing angle if downhaul and mast rotation are properly adjusted, which opens up a large amount of tactical options when racing. If you are in doubt about the downhaul tension it is preferable to sail with too much tension. The outhaul is tight, the distance between boom and sail is about 2-3cm. Dagger boards are all the way down.

3.2.2 Mast rotation

The mast rotation is adjusted such that the tell tales right behind the mast indicate laminar flow on both sides of the sail. It is often a matter of less than a centimetre to find the correct angle. If you want to point higher for tactical reasons the mast rotation must be slightly increased and the downhaul has to be eased a bit. If speed is required the mast rotation has to be reduced and the downhaul tension has to be increased. Mast rotation and Downhaul tension always should be adjusted together:

- More mast rotation – less downhaul tension = height and power.
- Less mast rotation – more downhaul = speed and less height

3.2.3 Jib

Downhaul tension such that horizontal crinkles disappear, lots of sheet tension.

3.2.4 Spinnaker

Speed is the goal – not the jibing angle. Depth comes from the change in the apparent wind. The crew is out on the wire and usually is standing behind the helmsman. At high speed the Capricorn has a slight tendency to nose dive, due to its wide stern. It is therefore very important to keep the bow up. Under these conditions the hull shape develops substantial dynamical lift and it literally starts planing. The dagger boards should be raised to up position.



3.3 HEAVY WINDS 16 – 25 KNOTS
LONGITUDINAL TRIM IS "NOSE-UP"
(COMPARE PHOTO LEFT).

PICTURE 1:
CAPRICORN IN HEAVY WINDS UPWIND -
LONGITUDINAL TRIM IS "NOSE-UP"

3.3.1 Main sail

Depending on the crew weight and the wind conditions the traveller can be let out by up to 15 centimetres. The sheet tension is still quite high, although slightly reduced compared to medium wind conditions. Twist is mainly controlled by the Downhaul and not by the main sheet. The Downhaul tension is therefore extremely high (pull hard with both hands). The dagger boards are lifted by about 20 cm, in extreme conditions even more.

3.3.2 Mast rotation

From wind speed of 16 -20 knots the mast rotation is almost in line with the boom. The angle between the mast spanner and the boom is about 10 degrees. Above 20 knots the mast rotation can be set to zero; the mast is completely in line with the boom. A slight tendency of the flow detachment on the leeward side of the sail right behind the mast can be observed. This setting can almost depower the rig too much and heavier crew may prefer to keep a few degrees of rotation to improve pointing.

3.3.3 Jib

Lots of sheet tension, downhaul tight.

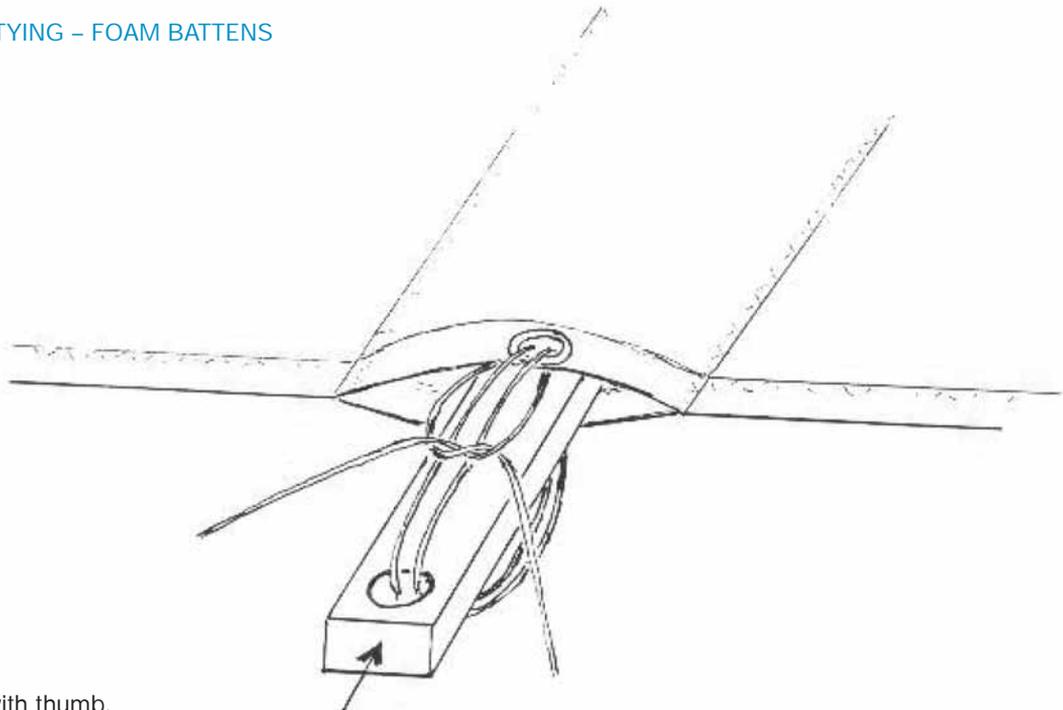
3.3.4 Spinnaker

Under these conditions it is extremely important to place the weight of the crew as far backwards as possible. The crew is therefore on the wire – even if it blows very hard – and puts his body as far back as it is possible.

The dagger boards should be raised to up position. The boat is sailed most of the time on two hulls to provide sufficient buoyancy. Under these conditions the boat shows enormous accelerations the helmsman has to slow down the boat early enough to avoid very spectacular capsizes over the bows. In these conditions it is more important to look for depth in the wind gusts. The boat is already at maximum hull speed.

Attention: The flat hull shape of the Capricorn provides substantial dynamic lift and suggests a higher level of security than actually exists. At high speed the leeward hull is occasionally in full planning mode and is out of the water all the way to the main beam. As soon as the longitudinal angle of the boat changes this dynamic lift collapses and the boat starts nose diving immediately.

BATTEN TYING – FOAM BATTENS



Push in with thumb.

- The tie-in strings should be tied to the bottom eyelet, have both ends of tie-in string the same length.
- Pass both strings through end of batten, then down through top eyelet.
- Separate tie-in ends, one each side.
- Tie half hitch around the tie-in string snugly against the top eyelet.
- Adjust the batten tension using your thumb to push the batten in as you pull on the ends of the string tie-ins.
- The half hitch will hold the batten tension at the selected pressure.
- Complete the knot by tying another reef knot on top of the half hitch.



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