

## SAILING YOUR COMET – Part 1

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Having considered the principles of sail theory and control settings this article is the first of a short series aimed at improving the sailing of your Comet in the various conditions we encounter.

The articles will cover:-

- sailing to windward,
- sailing downwind,
- controlling the boat,
- sea sailing, tides and currents,
- wind shifts.

Before going into the details of sailing in any specific manner there are some definitions not previously covered in my articles and some general points about setting your Comet up for sailing which need to be covered. DEFINITIONS:

a) Weather and Lee helm: The statement of whether a boat is carrying weather or lee helm is a question of balance between the position of the centre of effort (CE) of the sail and the centre of lateral resistance (CLR) of the hull and its foils. Simply put, if the centre of effort of the sail is behind the centre of resistance of the hull, largely controlled by the centreboard, then the boat will have a tendency to be twisted and turned towards the wind. This will require the helm to be held to weather of the boats centre line in order to bear the boat back off the wind and maintain a straight line course and hence the term weather helm, (fig 1).

Conversely, with the centre of effort in front of the centre of lateral resistance, the boat will have a tendency to slew and bear away from the wind and require lee helm in order to maintain a given course, (fig 2).

In the extreme, either case is damaging primarily because of the extra drag resistance created by the rudder being held permanently at an angle to the course being sailed and acting effectively as a brake on the boat's progress. An ideally balanced boat has the centres of effort and resistance roughly in line vertically and a rather neutral helm with, ideally, a very slight amount of weather



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helm which will tend to aid the helmsman in sailing as close as possible to the wind when beating.

The Comet, with its single sail set well forward in the boat, appears to be naturally well balanced with a generally neutral helm and being easy to control. However, dependent on the sail control settings, some weather helm can be experienced when sailing to windward and, in stronger winds, may well become excessive leading ultimately to broaching and capsizing.

b) **Apparent Wind:** In looking at sail theory and the setting of the sail controls I considered the wind as if it was coming from one fixed direction, the true wind, which is, in fact, only true whilst the boat and rig is stationary. Once the boat is moving, it creates a wind equal in speed and of opposite direction to its own movement and course. This induced wind (I) then interacts with the true wind (T) to create an apparent wind (A) which will lie between the true and induced winds in proportion to their strength, (fig 3).

The positioning of the sail relative to the centre line of the boat in motion is actually dependent on the apparent wind as being the wind shown by a burgee and felt by the sail. The direction of the apparent wind is most affected by changes of boat speed on a reach, particularly in planing conditions, but there is still some effect on the beat and run largely in light winds when the boat speed is relatively a larger proportion of the true wind speed, (fig 4).

c) **Sail Twist:** The angle of attack of the sail is not constant through its height to the peak but widens slightly as the sail twists towards the peak, (fig 5). This is quite natural and advantageous to a limited degree as the angle of the apparent wind also widens slightly towards the mast head due to the slightly increased velocity of the true wind away from the frictional effects at water level, (fig 6). However, the effect of sail twist needs to be controlled, particularly in stronger winds, and one use of the kicking strap, in addition to controlling mast bend and sail depth, is to reduce sail twist by holding the boom end down and tightening the leech of the sail.

There is a relatively greater wind gradient between water level and mast head in lighter winds and, in these conditions, reduced kicking strap tension will naturally allow an acceptably greater amount of sail twist.

**SETTING UP THE BOAT:** The Owners Handbook supplied with the Comet by AMS Marine gives the basic guidance necessary to initially start sailing and the



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following tips are intended to expand on certain areas which are required to obtain improved performance from the boat.

a) Wind Indicators:- It is essential that you are well aware at all times of the wind direction reaching the boat and the air flow around the sail. I use three forms of wind indication to help in sailing the boat.

Firstly, I have a soft burgee fitted to the mast head, in my case through a hole drilled in the top mast plug although a better arrangement is with tape around the mast top and inside the sail sleeve. This burgee shows the apparent wind at the mast head and, being soft, gives an indication of wind strength which is particularly useful in light winds.

Secondly, I have a wind vane indicator fitted at deck level and a more recent version fits on a collar around the mast at gooseneck level. Both these indicators are directly in the helmsman's line of sight when sailing and show the apparent wind at water level. My vane indicator has secondary arms which I arrange at an angle from the centre line of the boat which is approximately the angle at which I normally sail the Comet to windward. This gives me a simple, if crude, guide for beating where the vane should roughly coincide with the secondary arm. If the vane points inside the arm then I may be pointing too close and if the vane points outside the arm then I may be too far off the wind.

Finally, I have tell-tale wind flow indicators attached to the sail itself which will show the direction in which the wind is affected by and flows across the shape of the sail. The number of tell-tales is a matter of preference but I have two fitted at Approximately one-third and two-thirds height and about 18 inches to 2 feet<sup>1</sup> back from the luff. These are the main guides as to the air flow as it starts around the aerofoil and it may be of use to have two at similar heights attached to the leech as a check for air flow leaving the sail. The use of the tell-tales will be covered in the sailing articles but basically the key is the leeward tale which shows the critical attachment of air around the back of the sail. If the sail is sheeted too close to the centre line for a specific direction of apparent wind then the air flow will not adhere to the sail but will separate and cause the tell-tale to collapse rather than stream with the air.

b) Control Lines:- From the articles on sail theory and the proper use of the control lines it should now be fairly clear as to the principles of setting a given

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<sup>1</sup> 45 to 60cm



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sail shape for specific wind conditions. However, once you have established the preferred settings for your own requirements, there is always the problem of repeatability in the settings. Unless you are certain in your ability to judge the required settings before and during a race it is well worth calibrating your boat for the settings which you find through trial and error to be best suited for yourself and the boat.

Calibration can be recorded, in the form of numbered strips stuck on the boom and mast at the outhaul and cunningham control points or, more simply, with marker lines on the spars to coincide with settings for the three basic conditions.

In addition to such calibration, it is extremely useful to be easily able to adjust the settings of cunningham, kicker and outhaul at any point during a race. The control line purchases as supplied new from AMS Marine are certainly adequate for all normal sailing purposes but may not be fully adjustable in more extreme conditions whilst racing where easy and instant response is required.

I find the kicker purchase, with the swivelling block feed at deck level is perfectly adequate but I prefer to add a 2:1 purchase on the cunningham control and to double the outhaul purchase to 4:1 advantage.

The cunningham is most simply achieved by fixing a small block to the down haul cringle at the tack of the sail and passing the control through this block back to deck level.

The outhaul is achieved by either fixing a double block to the clew cringle and a single block on either side of the boom end fittings or by a cascade system of another single block positioned mid-boom with the outhaul line in two parts.

c) Toe Straps:- One very nice feature of the Comet as supplied is the provision of a simple adjustment facility to the length of the toe strap. To be able to sail the boat properly, particularly in any wind, it is essential to have the length of the toe strap properly set to the most comfortable and effective position.

I set my toe strap such that, with the strap over my feet at the instep, the back of my knees fit comfortably to the rounded inner edge of the side deck. This allows my lower thigh to sit out on the side deck with my backside firmly wedged outside the boat and avoids any tendency to slide back into the boat through the pull of the mainsheet. In this position, I can sit out for lengthy periods



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without undue stress on the back which remains fairly upright and is only leant out further and more horizontal to the water to power the boat through stronger gusts, (fig 7). Having set the strap to the right position for your length of leg then do not forget to set the shockcord to hold the toe strap tight and clear of the cockpit floor.

It is a mistake to set the strap such that you are sitting with your backside on the side deck and attempting to hold the boat upright solely by leaning back as this puts undue strain on the back and stomach muscles, (fig 8).

d) Centreboard and Rudder:- These two foils are essential to the proper performance of the boat and must be maintained in perfect condition in order to avoid any unnecessary water disturbance and resulting drag.

The rudder must lock down very positively under the shockcord and the wing nut should be tightened to avoid any possibility of vibration at speed.

The centreboard must be positively held in any required position by tightening the retaining shock cord and you may find it helpful to mark the board for 1/4, 1/2 and 3/4 positions, (fig 9).

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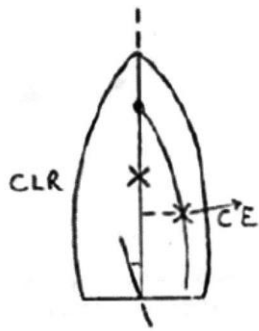


Fig 1  
WEATHER HELM

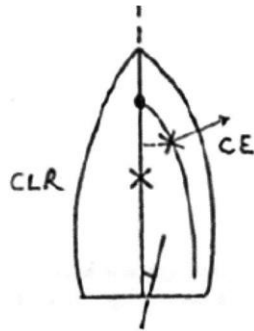


Fig 2  
LEE HELM

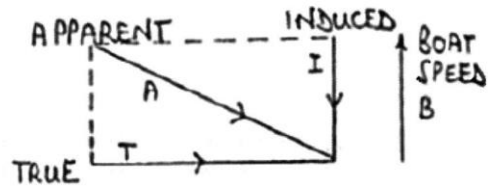


Fig 3  
APPARENT WIND

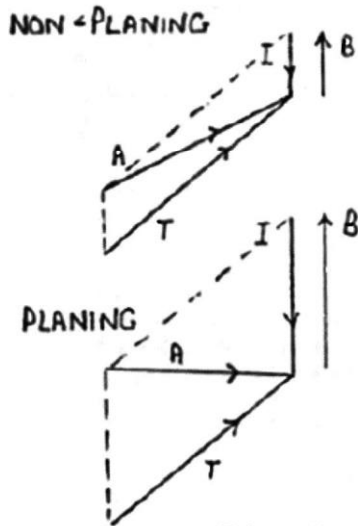


Fig 4

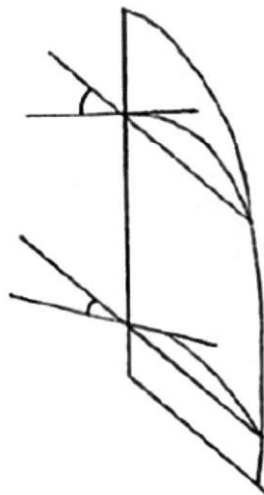


Fig 5  
SAIL TWIST

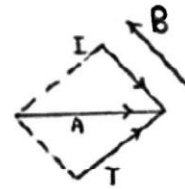


Fig 6  
WIND GRADIENT

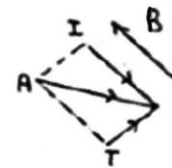


Fig 7



Fig 8

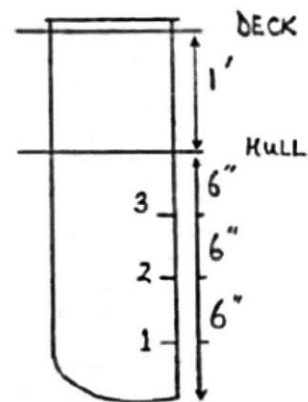


Fig 9