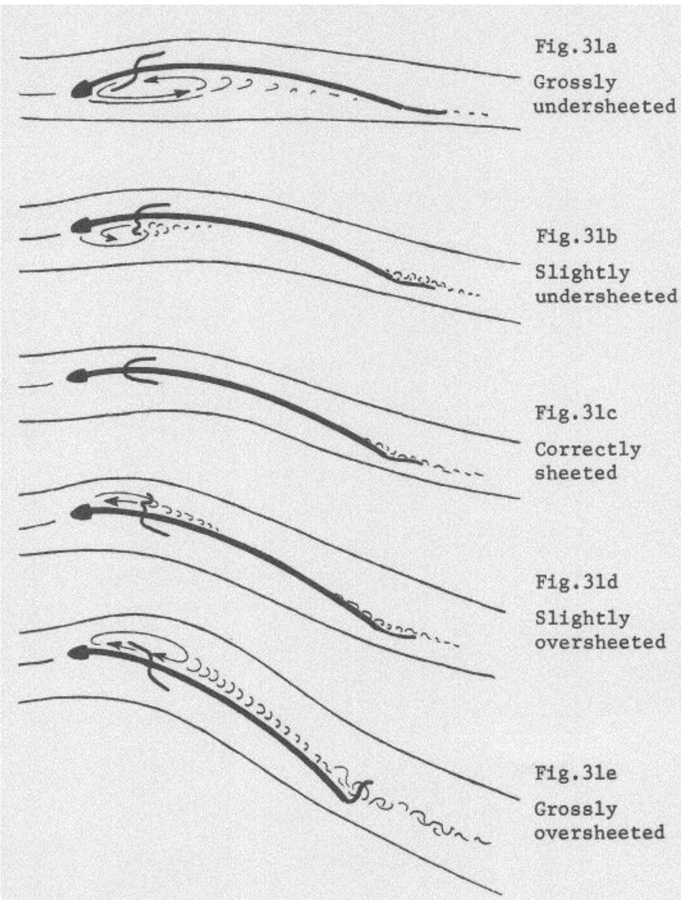
Section IV
Sailing to windward

1 Sail shapes and flow patterns - to windward

a) Moderate airs

If a sail is set correctly when sailing to windward, in a 5-9 knot breeze, the tufts and leech ribbons will all stream as in Fig. 31c. As the sheet is eased, the airflow begins to separate downstream from the mast on the windward surface of the sail, thus forming a separation bubble (Fig.31b). The more the sheet is eased, the bigger the bubble will grow (Fig.3la). As the aft edge of the bubble moves across a windward tuft, the tuft will agitate at random. When the aft edge of the bubble is aft of a windward tuft the tuft will reverse in the reversed airflow inside the bubble.

Separation bubbles will similarly form on the leeward surface of the sail if the sheet is pulled in too far, (Figs.3ld & e) and their presence will similarly be indicated by the behaviour of the leeward tufts.



The sails shown in Fig.31 all have a depth of curve of 1 in 10, or a "10% camber", which means that the maximum depth in the sail is 10% of the distance between mast and leech, Fig.32. This is about right for sailing a Tasar close-hauled in flat water in winds stronger than 5 knots. If the sails are set too full, a separation bubble will form as in Fig.31b and the windward tufts will not stream smoothly until the sail is flattened correctly, (unless they are placed so far aft on the sail that they lie outside the bubble).

Because separation bubbles cause substantial drag, a boat with its sails trimmed correctly, i.e. without any separation bubbles, will sail upwind fastest (in flat water). The great importance of tufts is their ability to indicate, instantly, the presence of any bubble, and what action to take to correct it. The boat with its tufts streaming properly for most of the time, will arrive first at the windward mark.

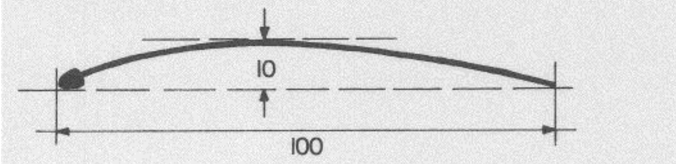


Fig.32
A 10% camber

The ideal is always to use the fullest sail setting at which the tufts and leech ribbons will remain streaming. In practise, this will call for about 10 - 11% when closehauled in flat water.

b) Light airs

When the apparent wind is less than about 4-5 knots, a different set of flow patterns occurs. The slower-moving air begins to behave like thick oil or syrup. Wind near the surface of the sail will slow down, lose momentum, and accumulate where it stops unless some force keeps it on the move.

It turns out that near the leech of the sail, on the leeward side, is the place where the wind stops and accumulates. Fig.33a shows a sail with a 10% camber perfectly set in a 6-10 knot breeze. Fig.33b shows exactly the same sail, but in 4 knots or less. What has happened is that the air near the leech on the leeward side has stopped flowing off the sail. Instead, it has accumulated into a wedge of dead air xyz, and the main airflow pq is behaving as if the surface yz were the surface of the sail - so pg is not much curved and, therefore, there is not much suction.

Additionally, the resistance of the sail its drag - has increased substantially

because the drag of any sail is proportional to how much air it stops (consider a spinnaker). So the thicker the wedge across x-z, the less the sail will drive, and the more it will drag. Performance decreases disastrously. Note the key indication: both tufts are streaming, but the leech ribbon has fallen limp behind the leech This is called laminar separation.

Making the sail fuller is disastrous, because the air just accumulates on the windward side as well. Fig.33c shows the end result: the flow lines pq and rs split around the whole wedge xyz, - neither flow line is much curved so there is not much force at all, and the full sail buried inside the dead air is simply ignored by the wind. The indications are a limp leech ribbon, and a limp forward windward tuft as well.

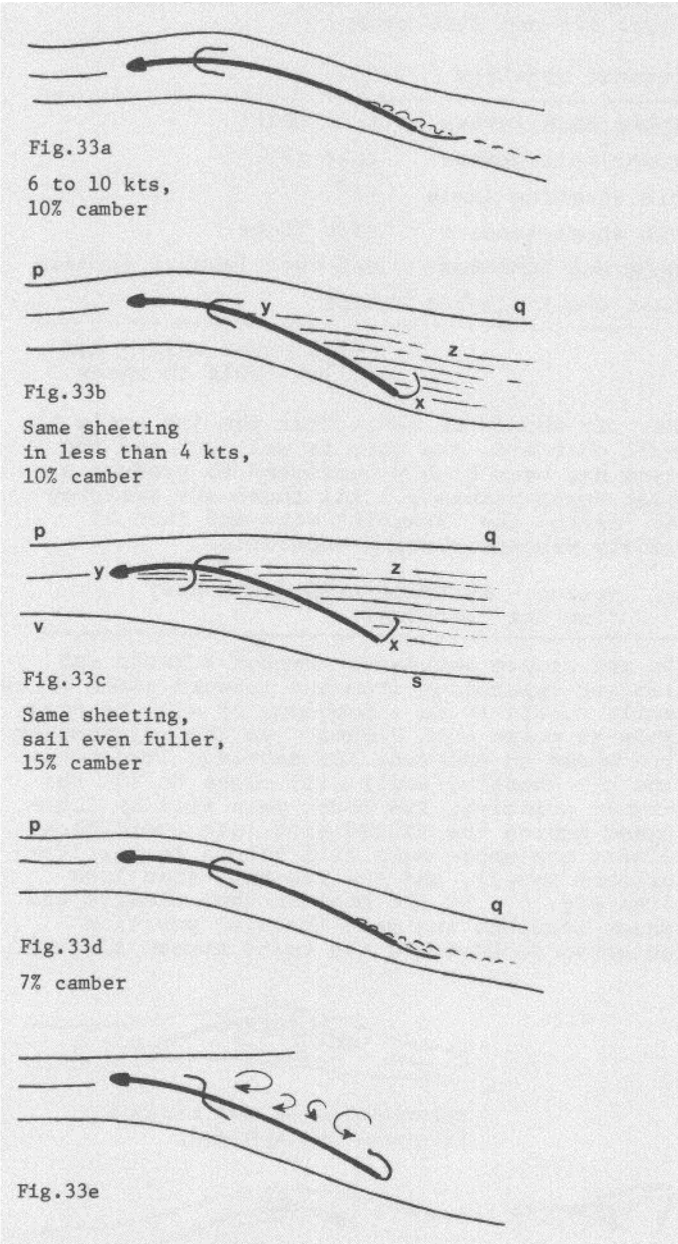


Fig.33a 6 to 10 kts, 10% camber

Fig.33b Same sheeting in less than 4 kts, 10% camber

Fig.33c Same sheeting, sail even fuller, 15% camber

Fig.33d 7% camber

Fig.33e

Surprisingly, the fix is to make the sail a little flatter (slow-flying creatures like moths, butterflies and dragonflies all have flat wings). In Fig.33d the camber has been reduced to 7%. This flatter sail is able to shed the wedge of dead air, the flow line pq follows the curve of the sail again, and the result is that the flatter 7% sail (d) creates more force than the 10% sail (b) which, in turn, is better than the 15% sail (C), and the 7% sail has much, much less drag because it stops no air.

In light airs, sails cannot stand much angle before they stall, and the leech ribbons become all-important The leeward tuft and the

1eecribbon will usually collapse together, Fig.33e, when the sail is sheeted in too far.

Light-air, flat-water sailing is essentially an exercise in keeping the leech ribbons alive Some crews who sail in predominantly light air areas fit leech ribbons to their jibs as well.

Because, in light air, flatter sails can create more force than any fuller sails, it follows that the same flatter sail setting will be correct for all points of sailing upwind crosswind and downwind Any fuller sail will give less thrust, and must be slower - (unless there are waves). The ideal is to use the fullest sail setting at which all tufts and leech ribbons will stream. In practice this will be about 7% camber.

c) Lift versus drag - the effect of waves

When sailing in flat water there is very little resistance to the movement of the boat through the water. This coupled with an extremely light boat with very fine lines means that we do not need a truck motor to do the job of moving a Ferrari.

With less hull resistance much higher speeds should be attainable in these conditions and we at the same time want to sail the boat as close to the wind as possible. A flatter sail accomplishes both by reducing the angle of attack and considerably reducing the drag. A fuller (more powerful) sail in these conditions does not really accomplish anything because, as speed increases, the apparent wind moves forward and the full sail starts to luff, creating considerable drag. The fix would be to bear off but this reduces the overall speed upwind.

In waves however, fuller sails will always be called for because waves affect performance in three ways.

1. Wave impact resistance The crest of a wave moves downwind faster than the trough. This gives rise to "wave impact resistance", as the bow meets each wave. A breaking crest increases this resistance.

2. Out-of-trim resistance Because the water surface is curved into crests and troughs, a boat balanced on a crest or spanning a trough, cannot float to its designed trim. In addition its own weight and momentum underway will cause it to pitch sometimes to its own rhythm and not that of the waves, and so it will cut deeply into the occasional on-coming wave - all of which will increase the "out-of-trim" resistance.

3. Reduction of aerodynamic force wave impact drag and out-of-trim drag both increase the resistance of the hull, and so call for fuller sails to create more power as the higher speeds of flat water sailing are not attainable. But more important still is the way wave action reduces the power available from the rig.

When a boat sails to windward in waves, the upper part of the rig "feels" a lighter wind each time the masthead moves backwards. This reduction of apparent wind speed is substantial, because as the bow lifts to each wave:

a. the boat is sailing "uphill" and so actually slows down.

b. the water of the wave crest is moving downwind at a respectable speed (about 2 knots in some 3 ft waves) and so further reduces boat speed and thus reduces the strength of the apparent wind.

c. any breaking crest increases wave impact drag and further slows the boat, and

d. the masthead is at this time swinging backwards

All four components combine momentarily, to reduce the strength of the apparent wind once each wave cycle, and the force available from the sails during this momentary lull is greatly reduced. As the masthead sweeps forward, all the factors reverse but because sails always need two or three seconds in a new wind before they can generate their full power, the increased power potentially available can never be attained because the buildup of power is always interrupted by the next wave. This is why boats need much fuller sails in waves: the sails "feel" the effect of only a much lighter wind.

Offwind the situation is completely different; because the boat crosses each wave much more slowly, there is enough time to sense and exploit the power from each period of increased wind.

In light airs and flat water, the sail shape shown in Fig.33d was demonstrated to give much better performance than any fuller sails. But the airflows around the lee sides of sails in light airs are so fragile that they cannot survive any "jiggling" due to waves or swell.

Therefore, whenever the wave motion is significant, and big waves and swell are always

significant even in strong winds - shift immediately to fuller sails, and ignore tufts and ribbons if necessary. How much fuller the sails should be must then become solely a question of "feel" and how much "power" you need to get through the waves.

d) Tuning - LIGHT AIRS (0-4 kts)
"One dot" settings

When the Downhaul, Outhaul, vang and Jib traveler are set at Light Air (one dot), the sail shapes approximately as in Fig.34 will

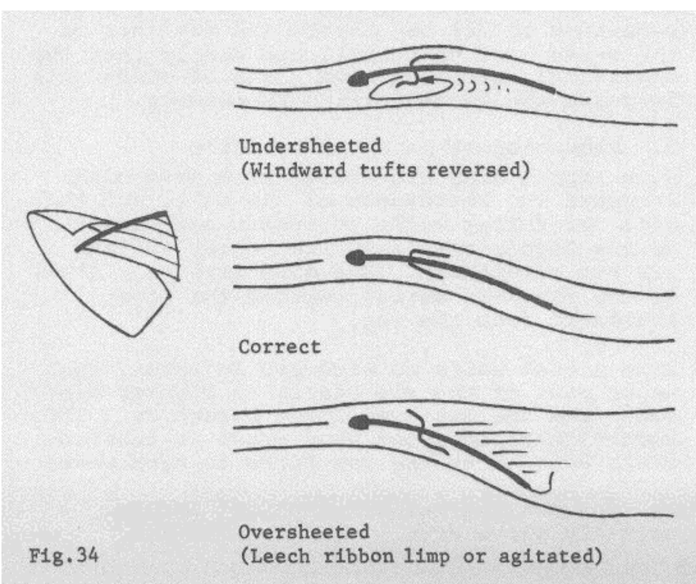


Fig.34

result. If the boat is then steered and the sails sheeted so that jib and mainsail tufts and the upper mainsail leech ribbons stream as in the "Correct" sketch, the crew can be confident that the rig is adjusted and trimmed reasonably well for sailing to windward in light air and flat water.

Fastest Settings

Upper main camber	1/14 (7%)*
Lower main camber	1/14 (7%)*
Jib sheeting angle	17°
Jib sheet tension	very light
Boom end position	out over leeward gunwale
Main sheet tension	light

*Flat water only - use fuller sails in waves.

NB. It should be noted that the jib angle is well outboard, the boom is well out and the vang has been highly tensioned to produce a flat upper mainsail. All these are designed to "catch" the "fragile" wind and turn it gently without causing separation.

e) Tuning - MODERATE AIRS (5-il kts)
"Two dot" settings

As the breeze increases through 4 knots and laminar separation from the leeward sides of the sails ceases to be a problem, it will be possible to point much higher. As the adjustments are moved to Moderate Air settings (two 0dots), the jib sheeting angle will close to 10 for higher pointing, the lower main will be flattened behind the closed slot, (to avoid backwind), the upper main will become fuller (for greater power), and the rig will then look like Fig.35. If the boat is then steered and sheet tensions and main traveler position adjusted so that all the tufts stream smoothly,

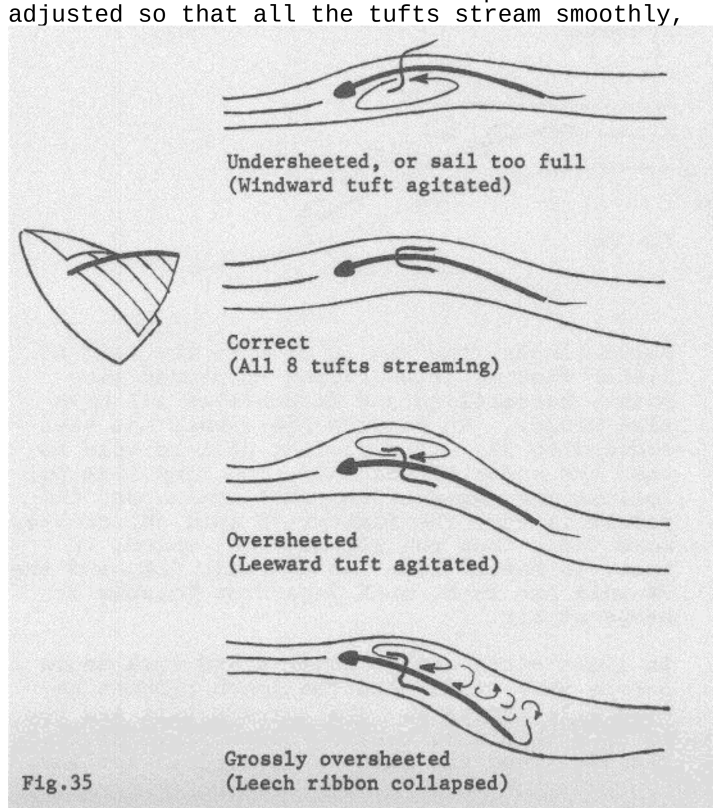


Fig.35

then the rig will be close to its optimum trim, sailing to windward in moderate air and flat water.

Fastest Settings

Upper main camber 1/10 (lO%)*

Lower main camber 1/20 (5%)*

Jib sheeting angle 10%

Jib sheet tension moderate, leave enough twist to match back of mainsail

Boom angle between center line of boat and 2" to leeward of center line. Traveler will be to windward.

Main sheet tension moderate, only enough twist to start the leech ribbons streaming off the upper mainsail.

*Flat water only - in waves use fuller sails.

f) Tuning - HEAVY AIRS (12 kts plus) "Three dot" settings

As the breeze exceeds the 9-11 knot range, the windward mainsail tufts will begin to agitate as the mainsail is eased to keep the boat upright. The vang should be tensioned a little toward the "three dot" setting, to flatten the upper mainsail, but only just enough to restore smooth flow to the upper mainsail windward tuft.

Similarly, the outhaul should be tensioned to flatten the lower mainsail just enough to restore smooth flow to the lower mainsail windward tuft. (Often, an adjustment of only half an inch is sufficient)

If significant waves develop, and it is necessary to sail a little fuller to maintain speed, the jib traveler should be opened toward the "three dot" setting of 14 - again only enough to achieve the speed desired. Not until the wind reaches about 20 knots will the full "three dot" settings be necessary (Fig.36). (At this point boat should be planed to windward. See next section.)

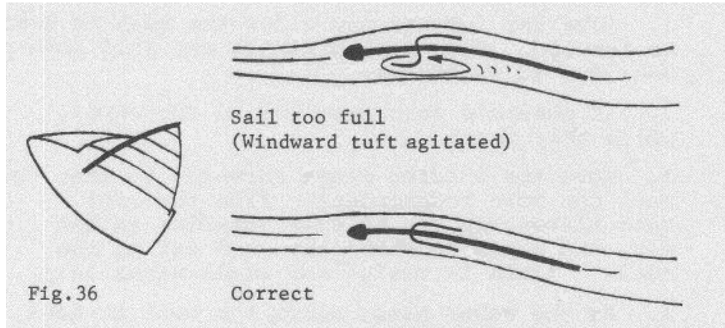


Fig.36

Fastest Settings

upper main camber l0%-. 2% as wind increases

Lower main camber 5%-* 3% as wind increases

Jib sheeting angle 10%--p-14% as waves increase

Jib sheet tension substantial, twist to match main

Boom angle from 0"-.24" off center line - ease traveler more as wind increases and in puffs

main sheet tension substantial, becoming moderate as more twist required in increasing wind

NB. Control "Power" with vang: Tension for flatter upper main through gusts.

2 Sailing faster - to windward

a) In light airs

In light airs which are fluctuating between 1 and 4 knots and flat water, an accelerate then exploit technique can be used to windward. In apparent winds less than 4 or 5 knots, sails cannot develop much force, partly because the wind is so light and partly because the sails must be flattened for best power (because the slow-moving airflow is unable to remain attached to the leeward surface of sails of normal fullness)

At about 5 knots, a "trigger effect" happens, and more deeply curved sails suddenly become efficient. The key idea is that if, in a 3 knot puff, the boat is accelerated close reaching to 2 knots or so, then the apparent wind will become about 5 knots, the sails start pulling hard, and the boat can then be "wound up" pointing well and moving fast, for as long as the puff lasts. The technique is to sail the lulls with "Light Air" settings. At the onset of a puff, accelerate by sailing a little full, so that the leeward jib tuft is just on the point of agitating. Ensure that the upper jib slot is well open, and sheet the main only as closely as will keep the upper leech ribbons streaming. As the boat accelerates, the sails will suddenly begin to "pull" -when you feel this, sheet jib and main in smoothly towards their "Moderate Air" settings, and ease the vang for fullness and power to the upper mainsail, and point as high as possible while retaining speed through that puff. As soon as the puff dies, return to "Light Air" settings for best performance through the lull, and fastest acceleration into the next puff. This is a "flat water only" game: it won't work in waves.

If you wish to roll tack, remember that a chine hull cannot turn and roll at the same time. For the Tasar, the correct roll-tack technique is:

1. Allow the boat to heel.

2. Roll it upright and commence the tack as it approaches level.

3. Not until the tack is almost complete should the boat be encouraged to heel toward the new leeward side.

4. When the sail has filled, roll the boat upright.

If you are moving well in light air, but an approaching power boat wake looks like it is going to stop you, try:

1. Move far forward and allow the boat to heel to leeward. This will minimize the hull movement due to the waves.

2. If possible turn parallel to the waves, while they pass.

3. Move the sliding stays forward, so that the hull can move independently from the rig: this allows the rig to stay steadier in the air, and doesn't 'shake the wind out of the sail." (This is useful for small waves only).

4. As the waves pass, allow the boat to heel, then, when the waves have passed and the sail has filled, roll the boat upright to restore speed.

If, in light winds and waves, you need extra power from the jib, ease the sliding stays forward enough to allow the forestay to sag -this will provide some extra fullness.

While it is no part of racing, the boat can be moved by "sculling" with the rudder when approaching or departing a shore or dock in a flat calm. The rudder blade should be raised until it is nearly horizontal. Remember also, that the whisker pole can double as a paddle, a boat hook, a punt pole, or a depth probe, according to need.

b) In moderate airs

When sailing to windward in moderate air, "Hull Speed" and the "Design Wind" are both useful ideas which can provide a substantial competitive edge.

Hull Speed A boat which points high but sails too slowly, and a boat which sails fast but points too low, will both fall behind a boat which selects the best compromise between speed and pointing angle. In the Tasar, it turns out that the best compromise in flat water and steady winds of 7-8 knots or more is to sail it always at "Hull Speed" of 5 knots.

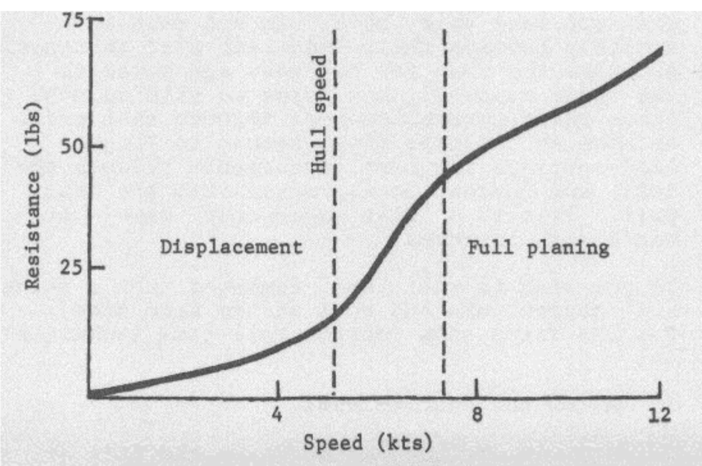


Fig.37 Tasar speed vs resistance

Fig.37 shows how the Tasar hull will sail with little resistance up to its hull speed of 5 knots; how from 5-7 knots there is a transition range in which resistance increases rapidly, and that from 7 knots upward it planes and accelerates freely.

"Hull speed" is always easy to recognize, because it is that speed at which the crest of the first stern wave is exactly under the transom. Fig.38 shows how a crest observed at two feet forward of the transom shows that the hull is sailing at 4 knots, and in this case, the boat should be sailed a little fuller for more speed. At 5 knots, the crest is observed exactly under the transom. At 5 knots, the crest has fallen three feet behind the transom, and the boat is beginning to sail "uphill" up its own bow wave, as the transom sinks into the trough between bow and stern waves. (It is this effort needed to push the hull "uphill" which causes the drag increase between 5 and 7 knots in Fig.37. So whenever the skipper sees the crest behind the transom, the boat should be pointed a little higher to control the speed to the desired 5 knots. In flat water the wave crest is easy to see. In broken water, when it's not so easy to see, precise control of speed is not so important.

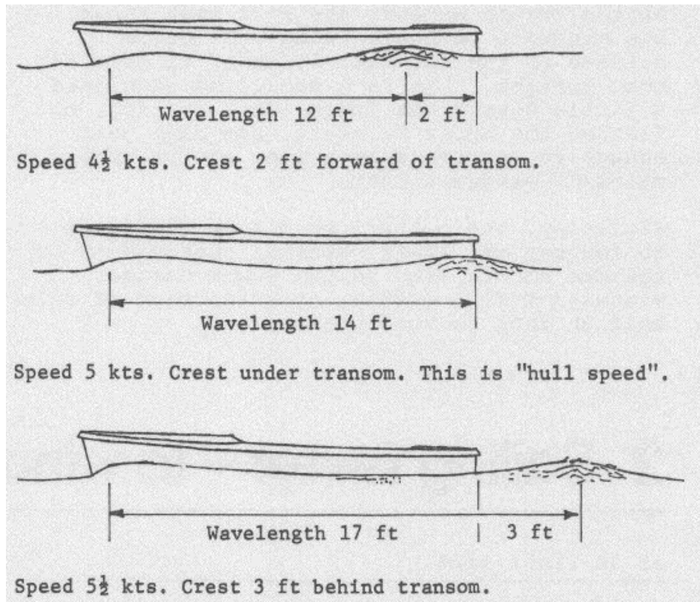


Fig.38

The Design Wind is that wind speed at which the crew, hiking right out can lust keep the boat upright without easing sails (about 9 knots for 300 lb crews and 10 knots for heavier crews).

Except for very light air conditions, in flat water and wind strengths up to and including the Design Wind, the fastest technique to the windward mark is to steer the boat to maintain 5 knots, and to adjust the sails so that at this speed all four windward tufts are just streaming smoothly. The boat should be kept upright through the wind's fluctuations solely by body movement - by hiking. The sails should not be eased

Whenever the wind strength exceeds the Design Wind, the object becomes to point as high as possible while still maintaining 5 knots.

This is best achieved by simultaneously luffing slightly and easing the main traveler an inch or so. In practice, boat speed will be controlled by the traveler setting. Balance should be controlled by steering, luffing slightly if heeled to leeward, and bearing away slightly if heeled to windward.

In these conditions - up to the Design Wind -you will notice that, with the boom vang set at the two-dot position it is just slack when the boom is close-hauled. The reason by now should be clear - we want maximum power from the sail, which means full sails, which means a straight mast, which means a tight leech, which means maximum sheet tension -minimum vang

If we assume a wind fluctuating between say 7 and 11 knots, (a very normal situation), then the fastest control sequence as the wind gusts and lulls will be:

Wind 7 knots Hull at 5 knots, all tufts streaming, boom l"-2" to leeward of center line, crew hiking enough to keep boat upright. No vang tension.

Wind 8-9 knots Crew hike right out to maintain boat upright. Nothing else changes. Skipper points slightly higher.

Wind 10-11 knots Crew remain hiked right out. Skipper luffs slightly to keep boat upright, and simultaneously eases traveler 1" to 2" to maintain 5 knots. All windward tufts will now be agitating slightly.

Wind 10-9 knots Crew remain hiked right out. Skipper progressively recovers traveler and bears away to keep boat upright, until all tufts are again streaming smoothly - at which point he stops bearing away.

Wind 8-7 knots Crew progressively sit up, hiking only as necessary to keep boat upright. Skipper steers to maintain 5 knots with tufts streaming.

In stronger fluctuating winds, the principles just described will still apply. However, the sails should be flattened with the vang so that the tufts stream almost all the time, but some agitation during the gusts is normal -otherwise the sails would have to be so flat they would lack power in the lulls.

When the gust/lull sequence is slow, the technique for fastest sailing is for the crew to <u>adjust</u> the fullness of the upper mainsail, <u>with vang</u> to each gust and lull. The adjustment can be made while hiking (with both hands if necessary) and it often takes very little movement to make a bouncing tuft lie back on the sail as the sail flattens. It's also tremendously satisfying

c) In heavy airs - windward planing

Let's now move on to perhaps the most exciting aspect of your Tasar's performance - its ability to "plane to windward" when the wind strength exceeds about 15 knots, (less for lighter crews or in flatter water). Not only is the boat capable of doing this - it must be planed to weather in heavy conditions

We have already shown that a Tasar sails with little resistance up to its hull speed of 5 knots, that from 5-7 knots there is a rapid increase in resistance until over the 7-8 knot range the hull "pops" onto a plane and can again accelerate freely. (We include again a chart reproduced earlier in this section)

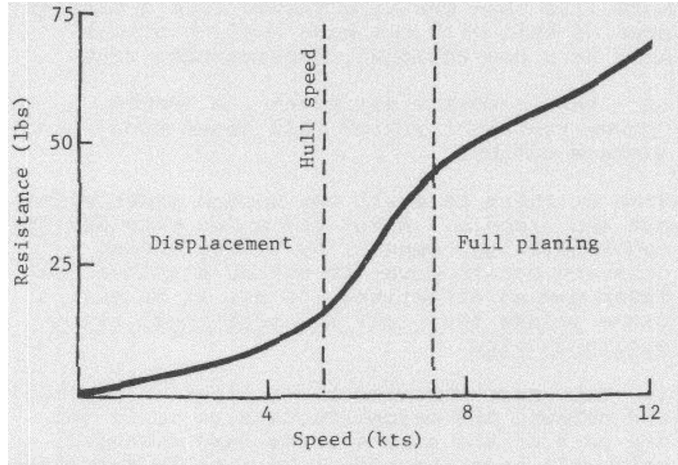


Fig.39 Tasar speed vs resistance

A glance at Fig.39 shows that speeds less than about 8 knots should be avoided. Fig.40 shows how the crest of the first stern wave is still an infallible (and zero cost) speedometer. A planing boat forces the water downwards, thus creating the first wave trough, and at 8 knots the crest will follow 10 feet behind the transom. When the crest is 15 feet behind, the hull is moving at 9 knots, and 20-21 feet indicates 10 knots etc.

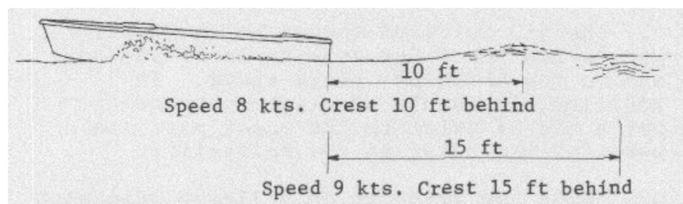


Fig.40 Speed indication at planing speeds

All planing hulls have a similar curve with a “hump" in it; their ability to plane <u>upwind</u>

simply means generating enough driving power, <u>while sailing close-hauled</u> to take you "over the hump'. The principal difference between the Tasar and other planing hulls is that the Tasar's "hump" is a small one because, the lighter the boat the smaller the hump The bigger the hump the more power is required to move you up onto a plane. However, since so little of the force is in a forward direction when sailing close-hauled, very, very few dinghies, even with the use of a trapeze, can carry enough power to get their weight up onto a plane.

So what's different about the Tasar? Firstly weight. With an all-up sailing weight of 170-175 lbs (including sails, spars, centerboard, rudder, tiller and sheets) the Tasar is, on average, a third lighter than dinghies of comparable size (65% of a 470, 60% of an International 14), so immediately starts off with a much flatter "hump' in its curve.

Secondly, power. The designer developed a sail with a relatively low aspect ratio (short and wide as opposed to tall and thin) in order to keep the heeling moment low and then hung it on a carefully shaped mast that is rotated to line up with the leading edge of the sail. The effect of this is to reduce dramatically the area of turbulence behind the mast to create less drag and therefore more lift than can be obtained from a similar, area of sail with the same heeling moment hung on a conventional, non-rotating mast.

So - that's what's different - a usable "power-to-weight ratio" well above your average dinghy.

However there is still not enough power without the trapeze. A man and woman with 325 lbs combined weight cannot, by hiking alone, generate enough power to either displace the Tasar upwind effectively or pop it up onto a plane unless they take the additional steps outlined below.

1. Make sure the vang is as tight as possible and release the mainsheet tension until the top part of the sail streams dead downwind. This will have the effect of greatly reducing the heeling forces on the boat. (Be sure the outhaul is also fairly tight to flatten the lower part of the sail: two-dot setting in 15-20 knots, three-dot over 20 knots.)

2. Raise the centerboard until it is half way up while still allowing the vang to clear while tacking. Doing this also reduces the heeling force on the boat and, in fact, if both skipper and crew continued to hike hard they would probably be half in the water with the boat slipping sideways as fast as it was moving forward. Read on

3. The jib fairlead should be about half way to the three-dot setting in 15-18 knots and on the three-dot at 20 knots. In addition, it should be slightly eased to put a bit of twist in the upper part (to parallel the twist in the mainsail)

4. Using the traveler only (leave mainsheet cleated) pull the boat offwind momentarily and get it planing cleanly at 8 to 10 knots. When you have your speed, and only then, work it back on the wind bringing the traveler back toward you slowly so that the boat stays level You will soon be close enough to the wind that the tufts on the jib can be used as you would normally do upwind (when both should stream aft).

5. Do not pinch the boat. SPEED IS ESSENTIAL.

6. It is the speed at which the boat is going through the water that makes this whole exercise possible Without getting deeply involved in theory, just remember the following: the amount of lift (resistance to sideways drift) that you get from a foil (centerboard) passing through the water is proportional to the velocity squared, i.e. at twice the speed, four times the lift Since you have pulled half your board out of the water, it is only this increase in speed that allows you to obtain adequate lift from the part remaining in the water.

7. Don't "steer-for-balance" when windward planing, because the turn direction is not correct for windward technique. Sail on the jib tufts, keep the boat absolutely flat with the traveler (all the way to weather if necessary in a lull, all the way to leeward in a gust) and keep up the speed because if you try to point too close and fall off the plane you will slip sideways very quickly. Luff or bear away so gently and smoothly that the turn forces stay negligible.

Fig.4l shows a Nova (sire of the Tasar) planing to windward in the hands of its designer in virtually flawless trim. Notice the following: stern wave at bottom left of picture about one boat length behind boat indicating speed of approx. 9 knots, top of main twisted well off, jib eased to match twist in mainsail, traveler slightly to windward (it's mounted on the floor in the Nova), centerboard raised half way up and boat absolutely flat

d) When to plane to windward

1. A Tasar can plane to windward at 8 knots in winds of about 10 to 12 knots, but in these lighter winds, the boat's speed moves the apparent wind adversely through 20 to 25 and the resulting pointing angle is so low that the planing boat will fall behind a Tasar being pointed at 5 knots.

2. At some wind speed in the 13-16 knots. range, a Tasar which is planed to windward at 8 knots will just match a Tasar which is being pointed higher and sailing at 5 knots. The heavier the crew, and the flatter the water, the sooner will it pay to plane.

3. At all stronger wind speeds a Tasar which is planed will sail to windward faster than a Tasar which is pointed, and the stronger the wind, the greater will be the difference in speed to windward in favor of the planing boat.

4. In fluctuating winds, a Tasar should be pointedat 5 knots in the lulls, and planed at 8 knots in the gusts. (Use an intermediate,
down, centerboard position). A Tasar which is sailed at an intermediate 5-6 knot speed will fall behind both.

5. Watch the wind shifts. A boat pointing lower and sailing faster will gain more from correctly working the shifts than a boat pointing higher and sailing more slowly, but will lose disastrously if it gets them wrong

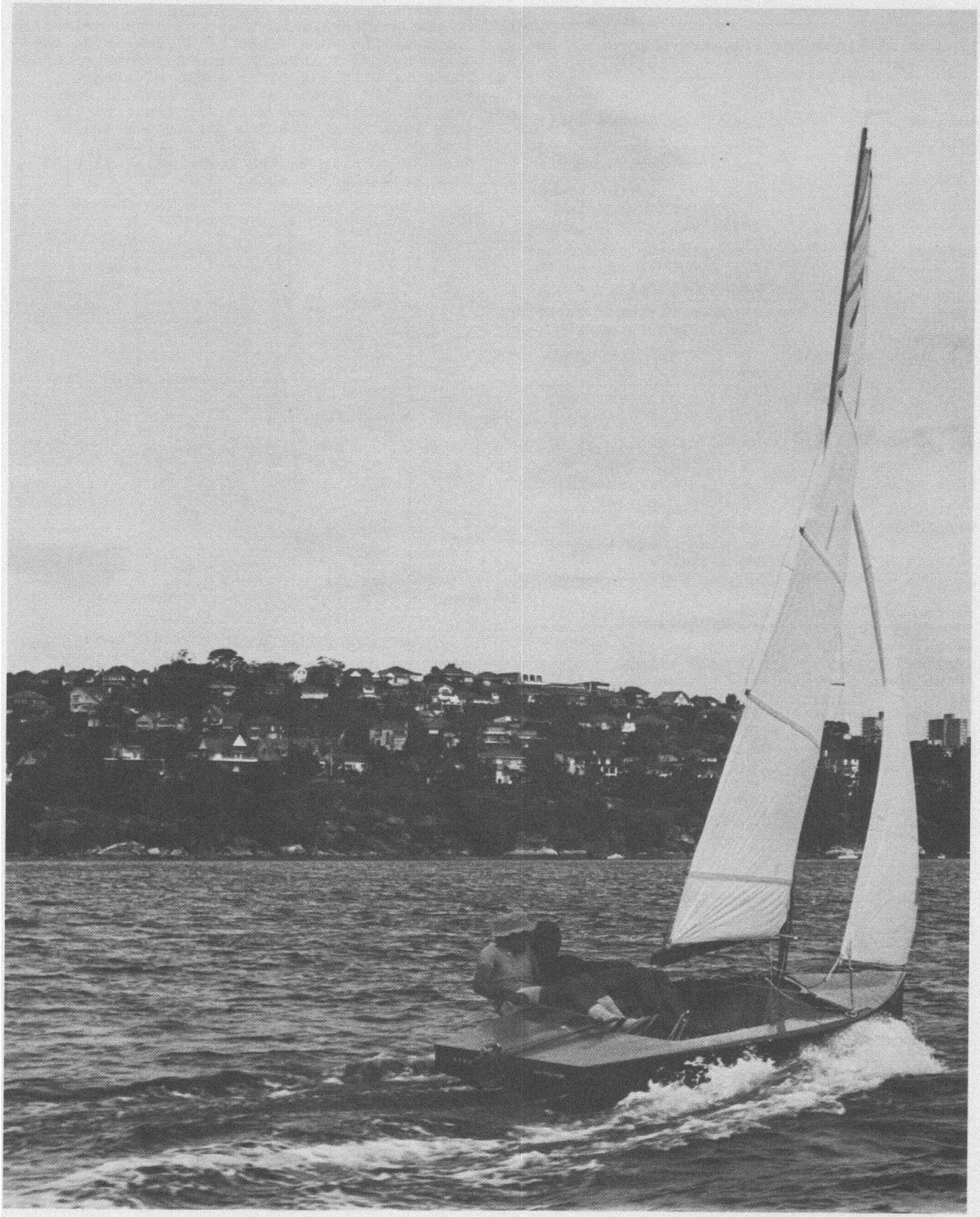


Fig.41

e) Tuning - windward planing

Typical settings for windward planing in 15-20 knots are:

Centerboard half up

Downhaul heavy air (three dots)

Rotation normal for heavier crews and/or flatter water full for lighter crews and/or rougher water (Mainsail more twisted)

Outhaul moderate air (two dots) for about 5% camber in lower mainsail

Vang heavy air (three dots) for flat upper mainsail

Jib sheeting angles 10 for heavier crews and flatter water

14° for lighter crews and rougher water

Jib sheet tension eased slightly for open slot

Boom angle use traveler extensively

to keep boat level

Mainsheet tension eased so upper leech is streaming and sail is well twisted.

f) In really heavy airs

We have been speaking about planing to weather in the 15 to 20 knot range. What about 20 to 30? All the principles still apply but, because of the greater wind strength, we now must also reduce the heeling force from the lower part of the sail. Believe it or not, the way this is done is to reduce twist by letting the traveler go to leeward and then increasing the tension in the main sheet so that the upper mainsail stays at the same angle of attack while the lower mainsail ends up almost directly underneath it with a similar angle of attack (there will always be some twist!). See Fig.42b and compare with Fig.42a. At the same time, move the jib fairlead further toward the gunwale. This is necessary because opening up the lower mainsail will tend to close the slot.

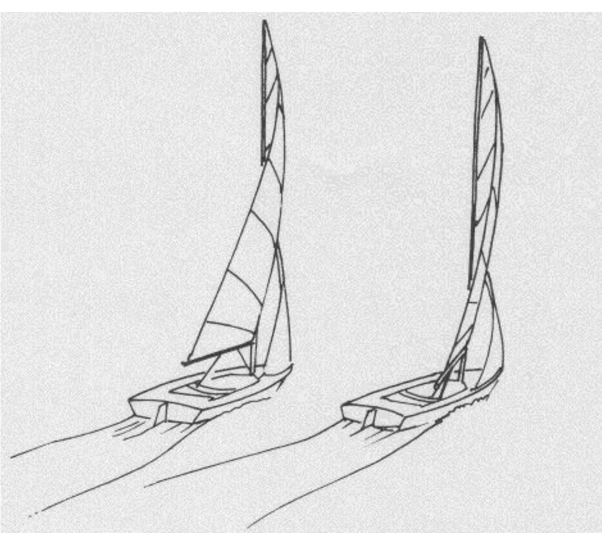


Fig.42a Fig.42b

A final word about diamond tension. Do not make the mistake of thinking that tight diamonds will give you more power. The sail is cut for a healthy bend in the lower mast and very tight diamonds will reduce this bend. It will make the boat difficult to sail in a good breeze and not have much effect in moderate airs.