RS400 Upwind Notes

I'll try to explain how we rig the boat.

We weigh in at roughly 24 1/2 stone. Everything written here is all relative to your weight. So the wind speeds I mention are rough guides to OUR set up at those wind speeds. Heavier crews will be depowering later and lighter crews earlier.

In Garda (high winds) we aimed to be the first on the water to allow us to not only get used to wind patterns, laylines and all the other pre start checks, but to se the boat up for those conditions. We sail the first beat with the aim of setting up the boat so that: we can sail it flat, keep the mainsheet in to max setting, stay off the kicker as long as possible and keep a neutral helm on the rudder. These are our objectives for upwind sailing for speed. This is why:

- 400s have to be sailed flat upwind in everything except <5 knots. This is not just from the rig, obviously if you hike harder you can carry more power, but we all get lazy and hiking hurts. If the boats not upright you are going sideways.
- 400s don't have a traveler, so the only way to hold the boom on the centerline is with the mainsheet. To get height you ideally want the mainsheet in tight to keep the leech tension on and the boom centered.
- Kicker is slow as it kills your height. But managing power is far more important and kicker is the best way of doing it without adjusting the static rigging. You will have to use it a lot, but if you are pulling it on 75% to 100% max, over long periods of time then you need to be adjusting the static rigging, i.e. shrouds and ram.
- The helm should always feel light. To check this, get the boat flat going upwind, let go of the tiller extension and it should carry on tracking upwind. A tiny bit of weather helm is not a bad thing (boat tries to point up) but you shouldn't feel this through the helm. Some people like to feel weight on the helm, they are normally big boat sailors, but its slow and excessive drag.

We set the boat up for 5-12 knots. This is when the rig is fully powered up and we can manage it. This is similar to Nick Craig's settings. Take all measurements for rake with 340lbs on the shrouds about 500mm up from the deck, and the mast ram neutral (it spins freely and the mast doesn't move). We have 6990mm of rake to the rudder mount (not the pintle) with the mast foot all the way forward. The aft bolt for the mast foot is in the 3rd hole from the aft end of the foot and the forward bolt is in the 8th. The deflection on the spreader is 140mm and the length 425mm. Once you have the rig set up like that, mark it all off. This is your base settings, all other settings are just adjustments to this.

Our base settings resemble Nick Criag's settings. This is the basic static set up. We increase the power between 5-12 knots by:

- Increasing rig tension: the general rule is the more you pull on the faster and higher you go, but it punishes the boat, so use it sparingly. We normally sail at 450lbs in all wind but if you need a pace boost, increase to 500. Roger Gilbert used to pull 600lbs on but the boat won't like that.
- Winding the ram aft: this straightens the mast, inducing depth. Aim to have the mast between the deck and shrouds straight or inverted 10mm.

The boat will be fully powered up when you are fully hiked and with the rig set up as above, achieving the aims set out earlier, i.e. flat, mainsheet in tight (hard as you can pull), neutral helm and the kicker just snugged so the boom will go out and not up. As the wind comes on start winding the ram forward and pull on kicker and cunningham. As you pull on kicker, it will bring the C.O.A of the main aft and increase weather helm, the cunningham pulls it forward. Use these settings to achieve the aims stated out earlier.

If you find you are wound all the way forward on the ram, loads of kicker on and the main are having to be eased on the main more than 70% of the time to keep the boat flat and to achieve the rest of the aims, then you are over powered and need to move onto the next stage of depowering by raking.

The next stage of depowering
We come down half a hole on the shrouds (i.e. forward or back and down) from our base setting. I have no idea what the rake is, never bothered measuring I'm afraid. You will have to re measure your rig tension to get it 450lbs. We don't bother winding the ram back again, just keep it all the way forward unless you are racing (you cant change the shrouds whilst racing in class rules) and are seriously underpowered, i.e. kicker cunningham off, sails tight and struggling to stay out hiking.

With the rig in this setting you should be able to sail with the kicker eased off max, the cunningham eased and still achieve the aims. Obviously as the wind increases you will need to pull them on again. If you find you are too over powered to achieve your aims, then you need to move the rig again (about 18 knots).

We come down another half a hole so we are in the hole directly below our base setting. Again you will have to have another measurement for the rig tension.

We used to max out that rig tension about 23 knots and drop another half hole, but it doesn't feel too good and is hard to find the balance. But we have developed a different technique in these winds that is rapid.

It's very hard to achieve, I've not come across anyone in the class that does it, but it was what we were doing at Garda when it was really windy and no one could match it. It takes some practice and we have found at our weight you cannot achieve it in anything less than 20 knots. Basically it's what Slingsby does in the Laser and has devastating speed in the windy stuff. It's a case of getting the boat plane-ing upwind. We bear away 15-20 degrees. This will require the mainsheet to be really eased and also the jib eased 100mm or so. The speed increase should be noticeable, the bow should lift and the boat should start skipping, you can then start pointing up again but try and keep it plane-ing. The boat has to be flat for this to work. You need to hike hard and use the mainsheet and jib to keep the boat flat, big eases on both in the gusts, use the steering to give you power. If you are slowing, bear away, if you are trucking point up (the opposite of downwind). You have to be confident you can get it on the plane before you dive down otherwise its massive losses if the boat wont plane, so experiment in the pre-start.

In lighter winds, <5 knots, ease the rig tension, I don't know how much we do, I don't measure with a gauge, but its about 2 and a half inches above our 340lb base setting calibration mark on the mast, which lines up with the top of the stainless hook, probably 150 – 200lbs.

Also this rakes the mast without adjusting the shrouds and lets you get the main in quite a bit to centerline the boom but keep twist in the sails.

Don't pull the kicker on, at all, so if you ease the main the boom goes up. Don't oversheet the jib. Heel the boat a little to help the sails set. As the boat increases speed you can tighten the leeches by sheeting on and increasing rig tension and start pointing higher. (see Paul Hilliar's article on light wind sailing on class website)

Notes

The jib has a massive effect on speed in all wind conditions. We have the cars all the way back and never move them unless its flat then 1 hole forward. We have 40mm Harken ratchets on them (essential) which raises them even more (same as moving them back). Pull the jib in as tight as you can, this is too tight. We never have it in more than an inch eased from this point unless it's howling. Basically the jib needs to be played a lot. Put a ribbon on the leech about 100mm below the top batten on the jib and aim to have it on the edge of stalling (curling round

the back of the jib) all the time. It's hard to see this when hiking, so it requires practice and some rough calibrations on the sheets.
The jib needs to be eased in sync with the main in the gusts. Basically if the main is back winding when eased, the jib needs easing a couple of inches to stop the back winding. Pull it back on as the gust passes.

People don't realise how much kicker the boat can take. It takes a lot. You can pull the kicker on till the main inverts, at this point ease it an inch to stop the main inverting, that's max kicker.

In light winds, the thwart is not a bench for the crew! The crew needs to be up by the mast, tucked under the kicker. With the crew sat on the thwart the boat is still stern heavy. In heavy winds, Jon's front leg is 6 inches back from the shroud.

One thing I have noticed, is that these setting are fast upwind but we feel more vulnerable downwind with them compared to when we used to run the same settings as nicks guide. Even in the lighter wind. This is probably down to technique as we have spent the last 12 months concentrating on upwind pace.

The outhaul is something we don't adjust much. Have 2/3 inches between the centre of the boom and the sail. Pull it bar tight when windy. 3-4" when it's really light. That's it.

Never tried lifting the centreboard as haven't felt that unbalanced in heavy winds.

The jib luff tension should be eased in light winds and progressively pulled on as the wind increases.

Think about what the wind is going to do before committing to a rig setting. If its going to die, does it need to be too depowered? etc

Below is a table of our settings
These are guidelines, all of this changes with any change in wind, sea state, boat position etc. The trick is to have the maximum manageable power. Do not get too hung up on this, remember too steer precisely and smoothly, hike hard, sit in the right position fore and aft and keep your head out of the boat. What is below only makes up 20% of your upwind pace!

Base setting = the hole when the rig is set up with 6990mm of rake (340lbs, neutral ram)
Spreaders, mast step etc are all set as described earlier. This is all on the water adjustments with perhaps the exception of jib luff control.

Crew weight = 155kg

Wind	jibsheet	mainsheet	kicker	cunningham	rig tension	ram	outhaul	jib luff	jib car	shroud hole
0-5 drifting	well eased, lots of twist Increasing tension with speed	in tight (lack of rig tensions should promote twist) unless leech tuffs are stalling	none	none	150-200lbs increasing with flow	straight - 10mm inversion	3-4" at centre of boom	slack	all the way aft	base
5-7 light, searching for power	2.5" off max	as close to centreline keeping leech alive	none so if wind drops, leech can be opened	none	340lbs	straight - 10mm inversion	3-4" at centre of boom	slack	all the way aft	base
8 - 14 fully powered helm and crew hiking	1" off max setting leech and luff tell tales flying	tight 2" between blocks	snug to stop boom rising, increasing to spill power	none, increasing with power to balance boat	450lbs (500 lake)	straight - 10mm inversion winding on to manage power	2" at centre of boom	snug	all the way aft. 1 hole fwd in flat sea/lake	base
14-18 over powered with above settings, looking to depower	1" off max setting leech and luff tell tales flying	tight 1.5" between blocks 70% of time. Pull till leech stalls. Play in gusts	set to managable power	set to manage power and balance kicker	450lbs	all the way forward	2" at centre of boom	tighter	all the way aft. 1 hole fwd in flat sea/lake	1/2 hole down from base
18-22 still in displacement mode upwind	1/2" off max. easing with mainsail (2-4") to maintain constant 'slot'	tight 1" between blocks 70% of time, play lots in gusts	set to manageable power	set to manage power and balance kicker	450lbs	all the way forward	tight	tight	all the way aft	1 hole down from base
22 - 25 high in lulls free up in gusts to enable planing in anything but chop	in max unless blaning when eased 3 inches. Play with mainsail in gusts	in max unless planing in which case boat MUST be flat so big eases	max. pull till main inverts then ease 1". Unless a hole is dropped then set to manage power, 70-80% max	max	450lbs	all the way forward	cant have it tight enough	tight	all the way aft	1 hole down from base if planing, 1.5 holes down in chop
25 till 35, some nut clubs still race in this! Aim to keep boat planing all the time	well eased, loads of twist, big eases in gusts	well eased, expect to be around 2 foot out 50% of time. Try to mininmise flogging backwinding by easing jib as well	max	max	450lbs easing if still overpowered (pull on before dw!!!)	all the way forward	keep pulling till hands bleed	tight	all the way aft	1.5 holes down from base