

SMALL CATAMARAN HANDIPAP RATING SYSTEM

WORLD COUNCIL REVIEW 2014

(Draft 16/2/2014)

Background

Once a year we review the SCHRS formula in the light of comments and criticisms received during the year. We also have to respond to new technology – lift generating foils for example.

The process has been as follows:

1. We have studied 2013 results from France to see if they indicate any major problems.
2. We then collated comments and criticisms received during the year
3. We developed ideas for dealing with each significant problem in isolation
4. The results were then put into the formula and the changes moderated
5. We consulted other members of the technical committee and three manufacturers
6. One issue required special attention – penalties for lift generating foils
7. Following final approval from the World Council we will publish the results on the SCHRS website, and communicate them to FFV, RYA, Sailwave and HALS

2013 results

Summary chart	AHPC Viper Double	Nacra 20 carbone	F18	A Class	Nacra 17
Ratings SCHRS 2013	1,022	0,856	0,988	0,990	0,962
Ratings on average performances 2013	1,022	0,867	0,974	0,983	0,891
Gap ratings SCHRS 2013 / performances	0,000	-0,011	0,014	0,007	0,071
Conversion time per hour	00:00:00	00:00:45	00:00:51	00:00:25	00:04:17

The C1 results show that all classes performing within 1.5% of their rating. The Nacra 17 is outperforming by 7.1%, but as an Olympic boat there is clearly an inequality in the quality of the sailors.

Summary chart	15.5	SL16	HC16	Dart 18
Ratings SCHRS 2013	1,228	1,143	1,143	1,210
Ratings on average performances 2013	1,228	1,130	1,142	1,214
Gap ratings SCHRS 2013 / performances	0,000	-0,013	-0,001	0,004
Conversion time per hour		00:00:39	00:00:03	00:00:12

The C3 results show that the SL16 is outperforming. This could be due to a shift in France by the best youth sailors to the SL16, which is now the ISAF youth catamaran.

LTM Review 2014

In 2012 we introduced a substantial penalty for square top mainsails. We made it quite harsh – perhaps too harsh.

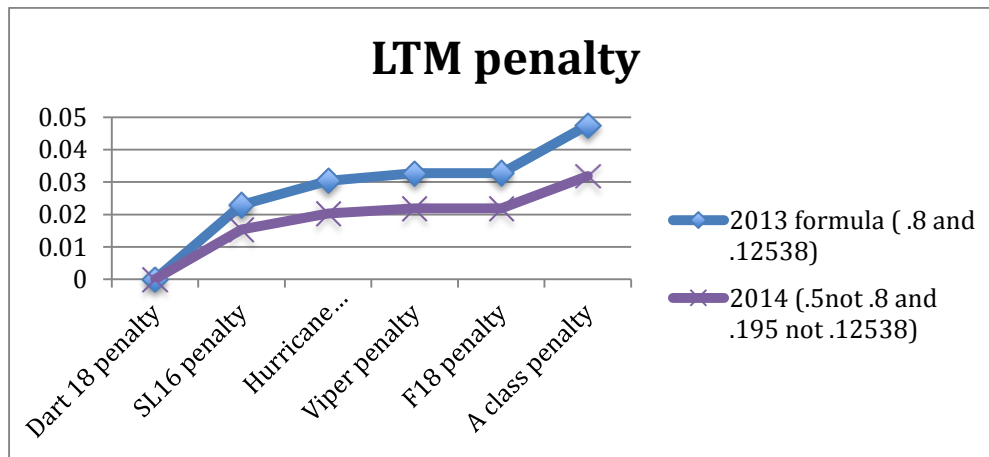
This has caused problems in classes where square top and pinhead mainsails compete. Performance anomalies have been noticed and we have been asked to reconsider. For example:

- The Sprint 15DX with square top underperforms
- The Hurricane SX with square top underperforms compared to the pinhead
- Nacra have reduced the LTMs of their Nacra 16 and 17 mainsails

The LTM penalty works by increasing the Mainsail Efficiency Penalty (ME) which adjusts the rated area of the mainsail (A).

SCHRS 2013	SCHRS 2014 proposal
Ratio for Top of MainSail = $LTM * VLM / CM / 4$	Ratio for Top of MainSail = $LTM * VLM / CM / 4$
Correction for Top of Main Sail = $(1 - (.12538 - RTMS))^{.8}$	Correction for Top of Main Sail = $(1 - (.195 - RTMS))^{.5}$
Mainsail Efficiency = Quadratic equation x CTMS	Mainsail Efficiency = Quadratic equation x CTMS

The impact on various classes ratings would be as follows:



Notes: The impact of the LTM penalty can be scaled up and down using the exponential, which is reduced from .8 to .5. The constant of .12538 is also adjusted so that the pinhead mainsails such as the Dart 18 have no penalty.

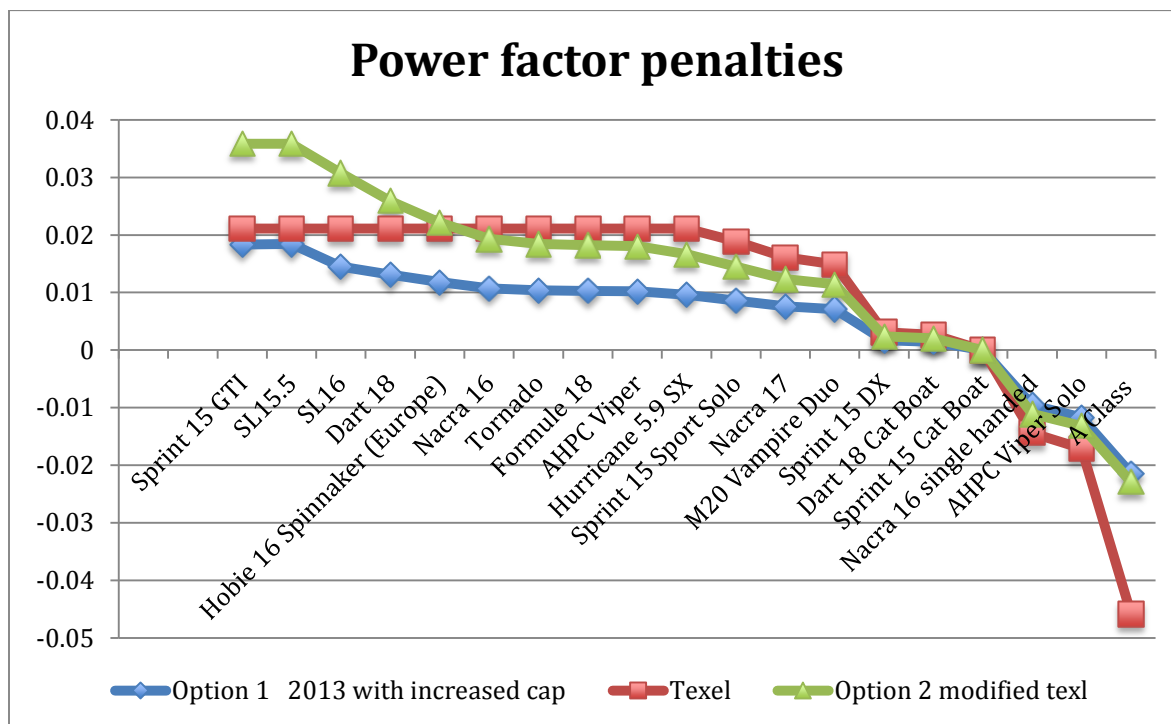
Power factor

For many years SCHRS dumbed down the power factor so it had almost no impact. In 2012 we increased it slightly.

2013	2014
PF = quadratic equation based on RM/HM capped at 1.036	PF = $RM/HM^{.1}$ with a cap of 1.040 and a floor of .981

For 2014 we are recommending that we adopt a simpler formula – no more quadratic equations. Note that:

- We cap the penalty arising from the power factor. This helps underpowered classes where extra weight is rarely an advantage (e.g Sprint 15, SL15.5)
- We sharpen the penalty for other classes where the benefits of weight are seen to be neutral.
- The increase in power factor will significantly benefit single handers



Lifting generating foil penalties 2014 – to be completed

In 2013 we had a 1.5% penalty for any boat allowing lifting generating foils of any kind. Rudder winglets are not treated as generating lift and are ignored.

Recommendation:

In 2014 we propose:

- a 3% penalty for lift generating foils designed to help boats skim the surface
- a 7% penalty for lift generating foils intended to promote full foiling

The full length of all main foils and appendages will be measured, resulting in an additional penalty of up to 3%.

We considered and rejected a graduated formula based on horizontal length / 22. This would have resulted in a bigger penalty for boats generating more lift, which is logical. However such a formula wouldn't produce a big enough penalty for full foiling. For example a horizontal length of 1.2m (sufficient to foil) would only produce a penalty of 5.4%. The expected speed increase in breezy conditions is significantly more than that. Also it needs to take into account the weight of the boat – a small foil would lift an A class clear of the water, whereas it would barely lift a heavier cat at all.

Alternative approach:

An alternative would be to introduce a graduated foiling penalty based on horizontal length / 22. This is a crude approximation of the lift which might be generated from the foils. The table below shows the horizontal length and the resulting penalty.

	LF	Alternative approach	Recommended penalty
A class	0.40	1.8%	3%
Nacra 17	0.45	2.0%	3%
Nacra carbon	0.54	2.5%	3%
Flying Phantom	0.70	3.2%	10%

This approach has been rejected because the penalties are not seen as harsh enough.

Practical matters:

In 2014 more than 30 Flying Phantoms are likely to appear. The formula will allow them to have ratings if they are independently measured. There will also be a foiling version of the Nacra 20 Carbon available plus a number of one offs – the M20 Vampire and a number of A class sailors are experimenting.

Under the existing SCHRS rules prototype boats “may” be ranked apart in a C0 class. This is at the discretion of the race officer. The rule has fallen into disuse because in general the SCHRS formula has coped well with innovation.

We suggest that a 7% penalty + up to 3% from measuring the length of all main foil appendages is sufficient to prevent the domination of foilers in 2014. However if race organizers wish to rank foilers apart they should do so and it should be clearly indicated in the notice of race. Ranking apart need not exclude foilers from line honors trophies.

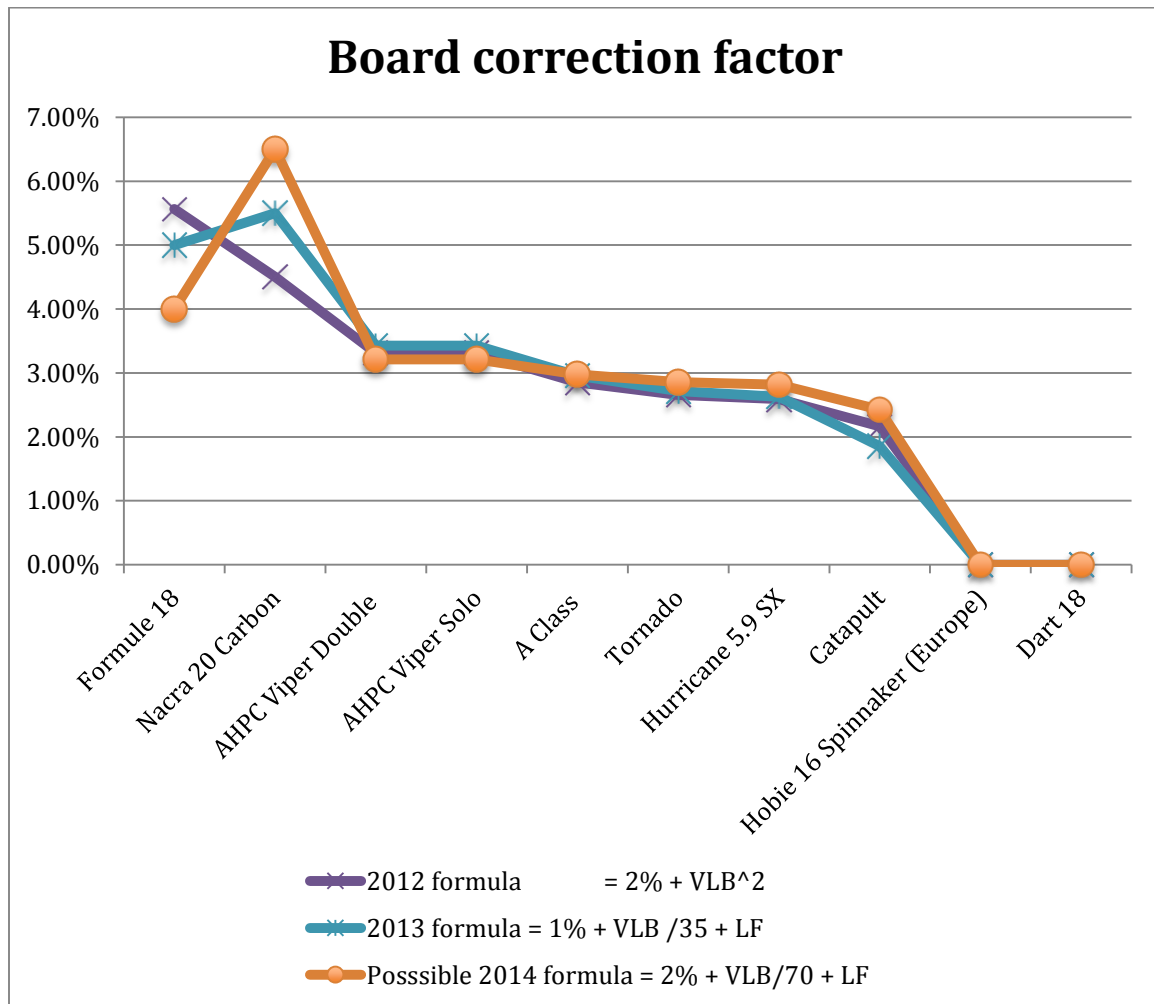
The future: ideally SCHRS would have use a credible VPP foiling model which would take account of:

1. Lift generated in relation to the weight of the boat.
2. Time to lift onto foils
3. A weighted average approach to speed during a typical race, taking account of time spent upwind and downwind, and time climbing onto foils after each tack or gybe
4. A weighted average approach to wind conditions – clearly foils are a hindrance in light winds but a massive advantage in flat water and breeze.

At present VPP models that can deal with foils are commercial secrets. The quantum of the penalty will necessarily be a guess, but it should allow participation, in line with the SCHRS principles of inclusivity.

Board correction Factor

We have had comments that the 2013 penalty for extra daggerboard length is too harsh. One builder (Nacra) may be producing boats (Nacra 16s) with shorter boards to improve its rating without significant loss of performance. For 2014 we considered but rejected the idea of flattening the curve as follows:



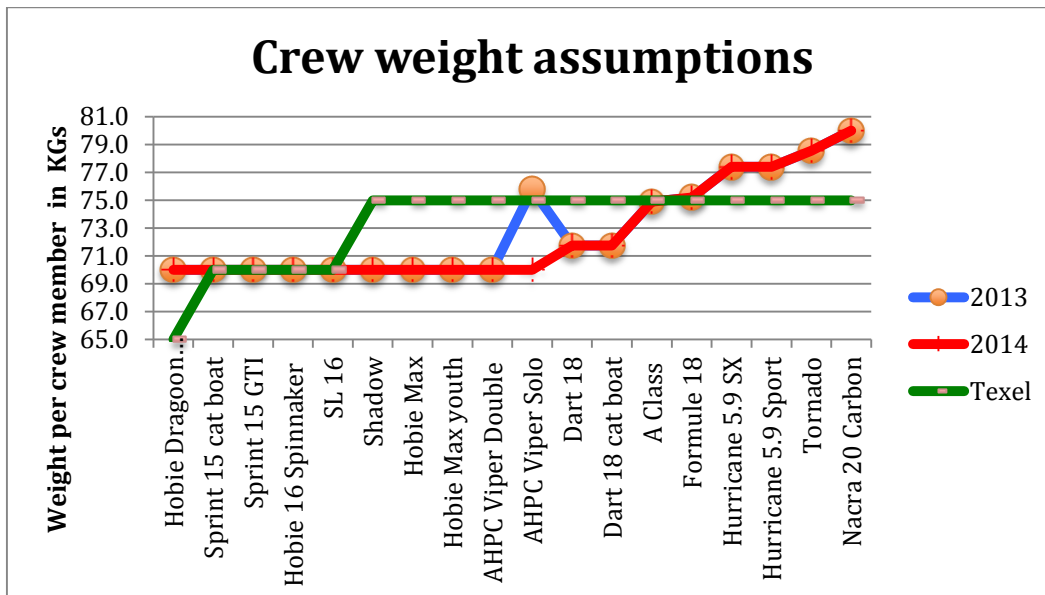
Crew weight assumption

In 2013 we introduced a different assumption about crew weights, dependent upon:

- The length of the boat
- The number of crew
- Sail area (for single handers only)

In 2014 we are recommending that we ignore the number of crew. Single handers have been favoured by the increase in the impact of the power factor, and no longer need the extra crew weight allowance.

2013	2014
WCM = 70kg + length rated in excess of 5m x 10 capped at 80kgs,	WCM = 70kg + length rated in excess of 5m x 10 capped at 80kgs,
PLUS	
An extra 3 kgs for single handers for each square meter of rated sail area (A) in excess of 13sqm, capped at 10 kgs	No extra weight allowance for single handers



Comments: this change will make very little difference in practice. It will however simplify the formula. It will be harsh on the single handed F16s (see the AHPC Viper solo in the above graph). But including the impact of the power factor and other changes this boat will have benefitted.

Formula 16 classes

[Declaration of interest: JC Rouves, co-author of this report sails an F16, and has had no part in making the decision]

The problems: these provide a number of challenges to SCHRS

1. The 2013 ratings of individual boats eligible as F16s vary by 3.5% - from .987 for F16 to 1.022 for the Viper and Cirrus Q
2. The class association wants all F16s to be level rated. The manufacturers sometimes want the most favorable rating for their particular boat.
3. Some manufacturers (e.g. AHPC) have developed a class, with its own rules. Others are building nearly bespoke boats for each owner. Its difficult for SCHRS to treat these boats as a class.
4. One F16 type (the Nacra 16), has its own rules which state that “the sails shall comply with the class rules applicable at the time of manufacture by NACRA”. This leaves SCHRS with a dilemma – do we rate the old mainsails LTM 1.08m or the newer ones LTM .925?
5. The class minimum weight is 107kgs, but some of the leading designs weigh 129kgs or more.

One problem within the F16 world is not a problem for SCHRS: carbon masts are allowed offering a performance advantage over aluminium. Both the F16 and SCHRS rules ignore the difference. The only impact on the SCHRS rating is the reduction in overall weight.

Work done: Antoine Meunier, the F16 class chairman, and Gill de Bruhne have been actively involved in suggesting solutions. Peter Vink from Nacra has provided data as has Manu Boulogne. The SCHRS technical team has collected its own data and listened to the views of various measurers. It has also looked at the results to see if they provide evidence of unfairness in the SCHRS formula. We deliberately delayed making further changes to the ratings table until all this review was done – it is confusing for race officials if we change the numbers in mid season.

The examination of results showed that no one F16 class dominated. There were 3 podium positions for Vipers, 1 for Bimare (out of 2 events), 3 for Nacra 16, 1 for Falcon (out of 2 events) and one for Cirrus Q (out of 3 events). If boat speed were the only factor we would expect to see the “faster” F16s dominating, but the wider results illustrate once again that the c.20% time range for competitive sailors is more significant than the 3.5% range of ratings.

2. Comparison of ranking to see if the other boats are competitive front at the Viper

Races Open inter serials 2013	Dates	Total participants	First Viper	First Bimare X16 F Plus	First Nacra 16	First Falcon	First Cirrus Q
Cata sud ouest	30-1er/03	18	5th	1er			
YC Grande Motte	23-24/03	20	6th		1er		
Eurocat	28-01/05	48	1er	29	8th	26	4th
Cataloes	18-20/05	18	5th		3th		
Challenge Ligneuil	06-07/07	22	3th		1er		
Open de France	05-10/08	20	8th		2sd		
Raid des Corsaires	14-15/09	33	4th				3th
Duc d'Albe	20-21/09	27	11th		9th		
Catagolfe	28-29/09	30	3th				2sd
La Pelle Marseille	01-03/11	20	4th		5th		
Armistice Maubuisson	09-11/11	20	6th		5th	2sd	

Conclusion: we will continue to rate F16 classes with their own class rules separately (Viper, Nacra 16, Cirrus Q, Raptor) using figures from the class rules.

Where there are no class rules (Falcon, Stealth and Bimare) we will use “best practice” for 2014. This will be reviewed again in 2015.

Minor changes proposed for 2014 are:

1. If an owner of a F16 which is not in a rated class produces an individual measurement certificate this may be treated by race officers as a provisional rating. If no certificate is produced or there are reasonable doubts as to its accuracy then the F16 rating should be used.
2. A manufacturer’s latest specification will normally be taken as “best practice” and applied to the formula.

Results of the last four years' reviews:

