



SCHRS Review for 2018

From: SCHRS Technical Committee
 To: SCHRS World Council

9th January 2017

1.0 Introduction

We recommend keeping the SCHRS formula unchanged for 2018. But we should maintain a watch list for some items for 2019. These are:

1. Penalties for foiling and semi foiling boats
2. Deck-sweepers (a deck-sweeper rig won the 2017 f18 Worlds and is being copied)
3. Inclusion of trimarans

This paper summarises some of the issues we have debated during the year. It is an update for World Council and Technical committee members who may not have been copied in.

2.0 SCHRS performance Review

2.1 Each year we prepare a detailed review of actual results compared to SCHRS predictions. This is done using the FFV database. It is done solely to check that the formula is up to date. All actual ratings continue to be calculated using the formula.

2.2 Performance is calculated from the finish times of the leading boats in each of the major classes and comparing them to a “reference” boat – the F18 for the dagger-board catamarans (C1) and the SL15.5 for the skeg boats (C3). A negative “gap” indicates that the class is over-performing compared to its SCHRS – for example the Nacra 17 outperformed by 0.9%.

2.3 Performance trends over the last 7 years are also analysed. This is a vital part of understanding what is going on in the real world, and checking that the SCHRS formula is working as it should. It is encouraging to see how small the differences are in relation one design race times. Typically the last F18 might take 20%-40% longer than the leader suggesting that the SCHRS gaps of under 2% are very small indeed.

Summary chart for C1	AHPC Viper Double	Nacra 20 carbone	F18	A Class classic	Nacra 17 old Olympic
Ratings SCHRS 2017	1,040	0,879	1,000	1,002	0,994
Average performances 2017	1,040	0,886	0,993	1,013	0,985
Gap ratings SCHRS 2017 / performances	0,000	0,007	-0,007	0,011	-0,009

Summary chart for C3	Ref 15.5	SL16	HC16 spi	HC16	Dart 18
Average performances 2017	1,225	1,122	1,145	1,186	1,207
Ratings SCHRS 2017	1,225	1,141	1,143	1,193	1,217
Gap ratings SCHRS 2017 / performances	0,000	-0,019	0,002	-0,007	-0,010

2.4 All these differences are below 2% and most are as expected. There is nothing here to compel us to make any changes to the formula.

3.0 Relationship between SCHRS and the RYA’s PN (and the Great Lakes system)

3.1 Each year the Royal Yachting Association publishes a Portsmouth Number list based on an elaborate system of returns from sailing clubs. We regard SCHRS and PN as complementary: SCHRS helps the RYA handicappers by providing sensible handicaps for a much wider range of catamarans than they have reliable data for - at present they only cover 10 catamaran types compared to 250 for SCHRS. Even the Tornado has dropped from the RYA list for the lack of usable performance data.

3.2 We currently use a fixed conversion factor of 678 to switch between the two systems. This number is reviewed upwards or downwards each year depending on the results of catamarans as a whole rather than individual classes. We call the resulting number a “Portsmouth Yardstick look-alike”. A similar approach is used for the Great Lakes system, a version of PN which has been adapted for UK inland sailing. Bob Carter from Grafham Water Sailing Club keeps a close eye on this.

3.3 This approach has worked satisfactorily for several years. Confusion only arises for the 10 classes that have both SCHRS and PN ratings. Should they use the PN or the PY lookalike? We have never definitively solved this, and race officers for mixed fleet racing have an element of discretion. The differences are small because the correlation is close (as shown in Figure 1). We would expect highly competitive fleets such as the Dart 18 and Sprint 15 to be below the line, and fleets with a large number of beginners such as the Dart 16 to be above the line.

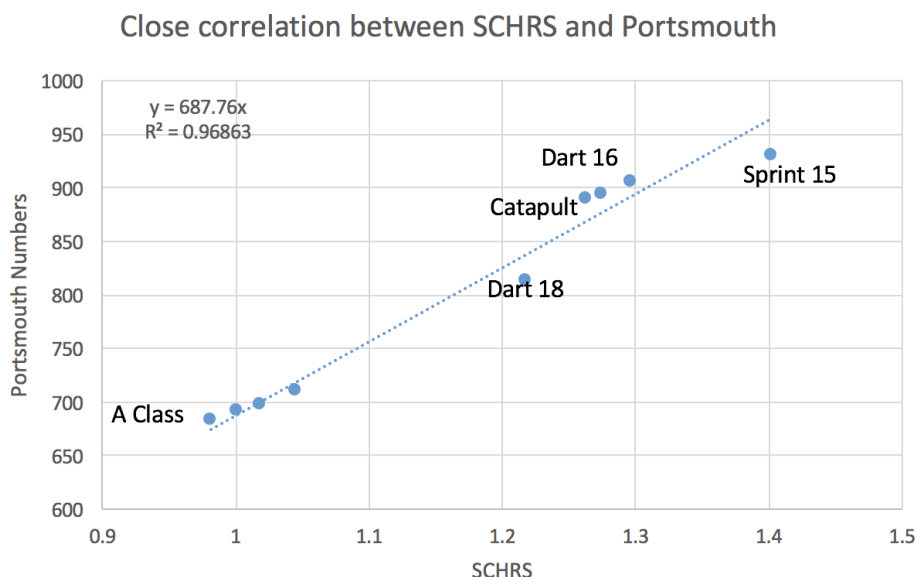


Figure 1: Correlation between SCHRS and Portsmouth ratings

4.0 Relationship to the US PN system

4.1 In 2017 we have seen a rise in interest in SCHRS from the US, and both Will Rottgering and Mark Schneider have contributed to our discussions. US PN covers about 250 catamaran variants using performance data rather than a formula. Of these, 69 directly overlap with SCHRS.

4.2 The correlation (R squared) between SCHRS and USPN is .74 - much lower than for the .97 for the RYA PN system. The correlation with USPN rises to .92 for the 21 most recognisable classes, suggesting that some of the US PN data may either be out of date or misaligned ie. not comparing like with like. We are told that there USPN has not been fully updated for about 10 years.

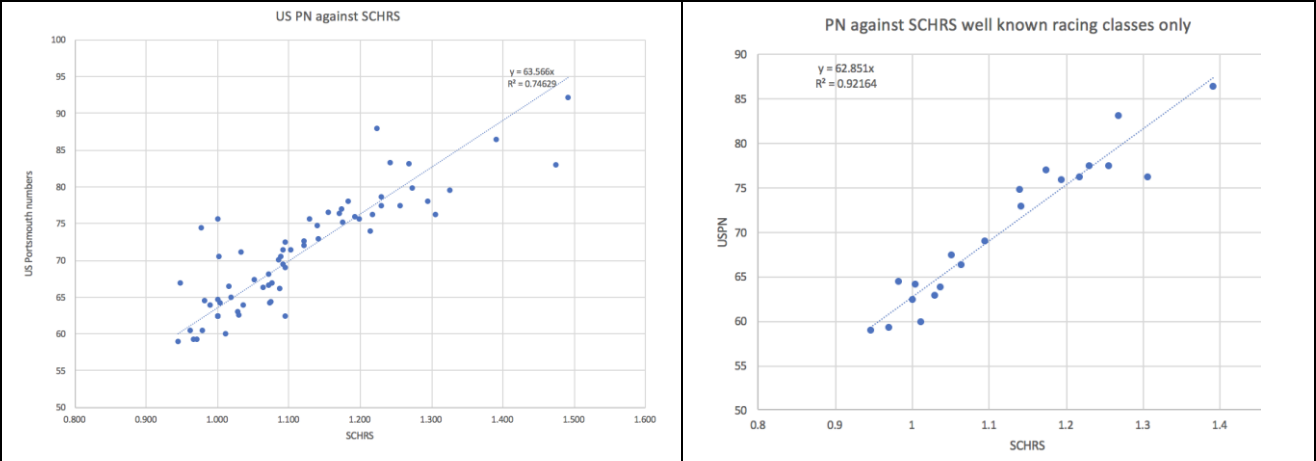


Figure 2: Correlation of SCHRS against USPN for 69 types and 21 types

4.3 We hope to do more work with US colleagues on aligning the two systems. SCHRS needs to widen its coverage, and has already included some new, US-specific catamarans (6 Supercats) in the 2018 list and will continue to gather data to expand in this regard. US PN may want to review its “outliers”¹ and check that the supporting data is up to date. We need to recognise that a “performance system” such as USPN will never align exactly with a “measured system” such as SCHRS, but it is worth understanding any anomalies and addressing them where appropriate. A performance system will inevitably rate both boat and sailor whereas SCHRS just rates the boat. A performance system will always have problems rating new boats and variants for which there is limited data.

5.0 Relationship to Texel Handicaps

5.1 The Texel handicap formula is the result of regression analysis on the results of the Round Texel race over many years, originally by Nico Boon. Nico continues to have an input, but most of the work is now done by Geert Ruesink. We continue to work closely with Geert and in 2017 we have done further work on conforming the data between the two systems. In 2017 we agreed to use the same core formula but to allow the “peripheral calculations” to differ (as shown in Figure 3).

¹ By outliers we mean classes where USPN is out of line with SCHRS by say 3% or more.

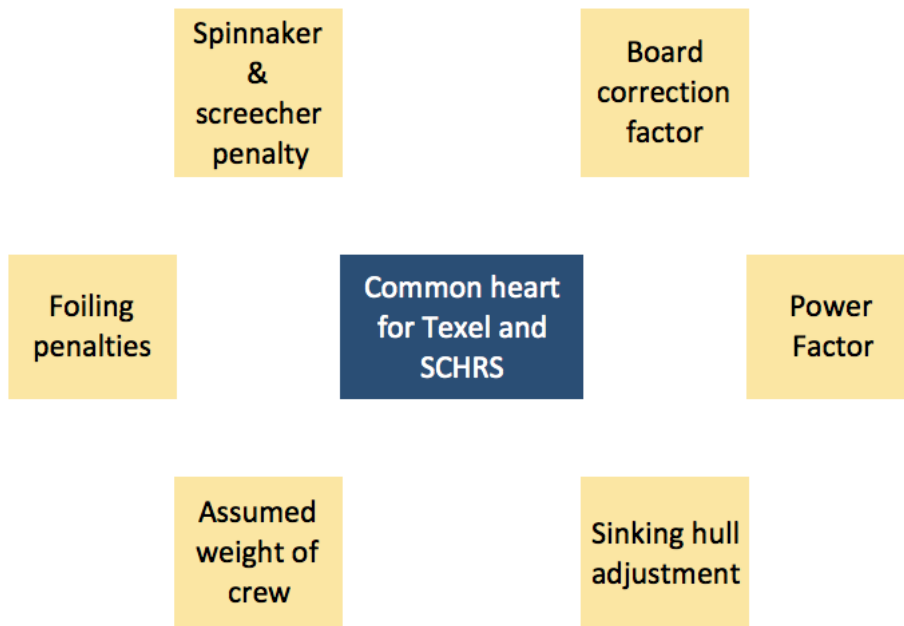


Figure 3: Diagram to show the common heart (blue) with approved peripheral calculations (yellow)

5.2 The agreed core formula, or common heart, in the diagram above is:

$$\text{Rating} = \text{Constant} / (L^{0.325} \times A^{0.41} / W^{0.3})$$

This is the power formula which Nico Boon has tested over a wide range of catamarans – he even used it to analyse the Performance of the 100 foot + catamarans Club Med and Playstation in “The Race” around the World in 2001. He claims that it is simpler than the old SCHRS formula and equally good at predicting performance.

5.3 The differences in the peripheral calculations are described in the following table:

Peripheral item	SCHRS treatment	Texel treatment
Spinnaker	SCHRS rates spinnakers by adding 11% of the measured spinnaker area to the jib area. We increased this from 10% for the 2017 formula. Further back we deducted the jib area from spinnaker area on the basis that the jib is of limited use when the spinnaker is up.	Texel ² adds 15% of the spinnaker area to the jib area. If no figures are available for spinnaker area then it is assumed to be 14,16, 20 sq metres for single handers and 17, 21, 25 sq metres for double or triple handers.
Screecher	Screechers are gennakers whose midgirth is less than 75% of the foot length. The area of screechers is increased by a factor of $1 + ((0.75 - \text{SMG}/\text{SF})/2)^2$.	Additional spi area for screechers is $=\text{IF}(\text{SMG}/\text{SF} < 0.75, 12.7 * 0.01 * (185 - 220 * \text{SMG}/\text{SF}), 0)$ SCHRS is unwilling to adopt the Texel adjustment because it has a “discontinuity” between 75% and 74% and secondly because it adds on an absolute amount in square metres which is harsh on the smaller boats.
Boards	Board Correction = $0.01 + \text{LB} / 35 + \text{LF}$ where LB is the length of the board and LF is the lifting foil adjustment discussed below.	A 4% correction factor is applied to all boards. This is achieved by adding 4% to the handicap of skeg boats with no board at all. Up to a further 5% penalty is applied for long boards by the following formula : $=\text{IF}(\text{lb} = \text{"no"}, 1.04, (\text{IF}(\text{lb} = \text{""}, 1, (\text{MAX}(0.891 / (\text{lb}/\text{rl})^{0.06}, 0.95))))))$
Foiling penalties	See table below	No penalty – just a penalty for long foils as above
Power Factor	The SCHRS power factor is $(\text{HM} / \text{RM})^{.1}$ subject to a maximum of 1.027 and a minimum of 0.983. HM refers to heeling moment and RM to righting moment.	The Texel power factor is $(\text{HM}/\text{RM})^{.11}$ with a minimum of 1
Sinking Hull adjustment	SCHRS uses a sinking hull adjustment to compensate for the high wetted surface area in the old Hobie and Prindle designs. The formula	Texel has no equivalent adjustment.

² Texel spinnaker area calculation

$=\text{IF}(\text{sas} + \text{sas_no_details}, ((\text{sas} + \text{sas_no_details}) * 0.15), \text{IF}(\text{loa} \leq 4.87, \text{IF}(\text{crew} = 1, 14 * 0.15, 17 * 0.15), \text{IF}(\text{loa} \leq 5.8, \text{IF}(\text{crew} = 1, 17 * 0.15, 21 * 0.15), \text{IF}(\text{loa} \leq 6.71, \text{IF}(\text{crew} = 1, 20 * 0.15, 25 * 0.15), 0))))))$

	otherwise ignores hull shape.	
Weight of the crew	WC = 67kg + (Rated Length (L) in excess of 5m x 10) capped at 75kg. (Single handed) ³	LOA boat <= 4.00 m: 65kg LOA boat <= 4.80 m: 70 kg LOA boat > 4.80 m: 75 kg If the total sail area >= 11m ² , than for crew one-man boats always take 75 kg.

6.0 Foiling penalties

The SCHRS approach to foiling boats has been pragmatic. It started with a blanket 7% penalty. As results came through the penalty has been reduced. We will continue to amend the penalties in the light of experience. For 2018 we recommend the same penalty as 2016 and 2017.

LF =	2018
Semi lifting – only curved daggerboards with constant radius	1.5%
Semi lifting – curved daggerboards with stabiliser fins on rudders	2.0%
Full lifting foils (including all boards with variable radius	4.0%

7.0 Additional classes and data changes

Additions to the SCHRS list include:

- Topcats
- 6 Supercats

The increase in the F16 minimum weight makes life simpler for SCHRS. Before that the wide range of weights made it difficult for SCHRS to provide one rating for all F16s. Now there is a realistic minimum we can provide one figure, and it is up to the F16 class to police compliance and ensure that race officers are aware of boats which were built before the new minimum was introduced.

8.0 Trimarans

We are occasionally asked to rate a trimaran. It should be possible to widen SCHRS coverage to include, for example, the Weta, the Diam 24 and the Scissor.

But we are anxious not to stretch the formula too far and lose credibility: so far we have stuck to catamarans only as per our name. During 2018 we will consider whether we could expand coverage, perhaps by building on the experience of MOCRA which covers both in one formula.

9.0 Explaining SCHRS

Will Rottgering has helped prepare two PowerPoint Presentations

- i) to explain SCHRS to the US Sailing Association, and
- ii) to explain the procedure for getting an SCHRS certificates for owners and measurers

These are both useful documents for a wider audience. Subject to committee approval we will put them on our website.

³ SCHRS crew weight assumption WC =IF(AND(No.=1,L<5.48),MAX(58,MIN(67+(10*(Y14-5))),MIN(80,70+(10*MAX(0,Y14-5))))))

10.0 Conclusion

10.1 I hope that the World Council agree that SCHRS is in good shape and that we have no need to change the formula this year.

10.2 The input from the USA is of great value and I believe that SCHRS has much to offer the small cat community there, either directly for races where it is adopted or indirectly through helping to improve USPN. We are actively working with USSA to gain formal recognition for SCHRS.

10.3 It is vital that we i) continue talking to people all over the world, and ii) keep the formula as objective as possible and up to date – both essential if we are to merit our continued status as the sole small catamaran handicap system to be recognised by World Sailing.

William Sunnucks
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SCHRS Technical Committee