

# SCHRS Review 2016

From: SCHRS Technical Committee  
To: SCHRS World Council

Submitted 26 December 2016  
Approved January 2017

## Introduction

We normally review the SCHRS rating numbers every winter to ensure that any changes are agreed in good time for the next season. We resist pressures to make mid-season changes.

In theory the Technical Committee should make recommendations to the World Council. In this case Jean-Claude has already had significant input, so I'm sending it to both committees simultaneously. I'm happy to deal with queries and concerns with what we are recommending. When we are all agreed an amended version of this paper will be published on our website.

Its important that we remember that SCHRS is the World Sailing recognised method for rating small catamarans; thus it is important that all informed views are considered and that decisions on the formula are balanced and based on the best available evidence.

## Consultation

**Texel:** We continue to work closely with the Texel Handicap Committee. We met in June in Texel and in October in Stansted.

In 2015/16 we concentrated on conforming the data between the two systems. Both systems now rely more on class rules rather than measurements on the beach, thus outsourcing policing and compliance to the class associations. We are particularly pleased that the F16 association has adopted new class rules which fit better with both handicap systems.

In 2016/17 the main work has been a lot of tests to validate the feasibility of replacing VTVB by a new calculation shared with Texel (the "heart transplant"), and we confirm that the ratings obtained with this new module have been very close to the SCHRS ratings 2016.

**USA:** SCHRS is increasingly used in the USA and we worked closely with the measurers for the Atlantic 300 to calculate objective handicaps before the race.

**ISAF:** We have consulted Jason Smithwick from ISAF about the heart transplant and incorporated his comments in our work. Jean-Claude Rouves attended the ISAF conference in Barcelona.

## Performance monitoring

We have studied the 2016 results from major classes sailed in France and in Netherlands. It's encouraging to see how well the formula is working. Most differences are under 1% which is immaterial when the range of times between the leaders and the competent tail-enders is typically around 20%.

Differences of more than 1% are:

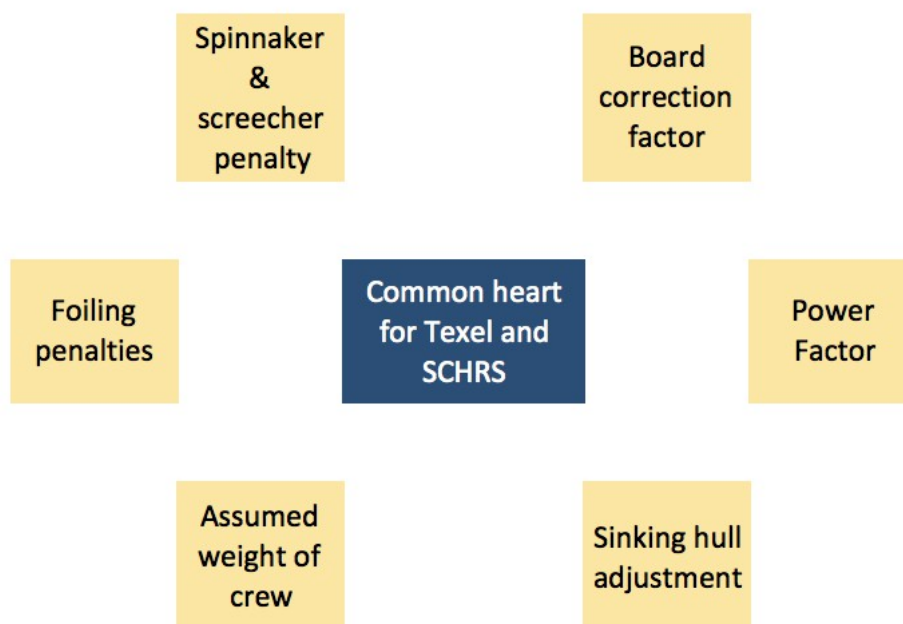
- The Nacra 17 outperforms its SCHRS by 1.71%. This is no surprise given the high quality of the Olympic sailors in the class
- The SL16 outperforms by 1.67%. This is no surprise given the number of top French youth sailors which have moved into this class, which was used for the ISAF Youth Worlds
- The Dart 18 outperforms by 1.07%. Again no surprise given the highly competitive fleet.

The paper also shows the evolution of performance over a six year period, and compares it to the evolution of the ratings.

## Comparison of SCHRS formula to Texel

### Core formula

We have agreed a common core formula with Texel (blue), but the peripheral calculations (pink) will remain different.



In 2017 the core VTVB formula is replaced by a much simpler power factor formula. The VTVB calculation has been regarded as opaque for many years, and although it has served well as a “black box”, it is difficult to amend as circumstances change.

We are recommending the change not just because it brings SCHRS and Texel closer together. We see benefits in transparency and flexibility. We believe that there will be no loss in the formula’s ability to predict on the water results, and no sharp changes to the ratings of the key classes which are raced regularly.

The core formula we have agreed with Texel is  $\text{Constant} / (L^{0.325} \times A^{0.41} / W^{0.3})$ .

The co-efficients 0.325, 0.41 and 0.3 are important. They can be tested each year against actual results, and changed if necessary.

### Spinnaker

SCHRS rates spinnakers by adding 11% of the measured spinnaker area to the jib area. This is an increase from 10% last year.

Texel<sup>1</sup> 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

In 2016 we recommended that the penalty for screechers is increased as follows: Formula  $= (1 + ((0.75 - \text{SMG}/\text{SF})/2))^2$ .

This penalty calculation works very well, but at the moment it remains a point of debate with Texel for two reasons: firstly the Texel module has an undesirable “discontinuity” between 75% and 74% and secondly because it adds on an absolute amount in square metres which is harsh on the smaller boats.

The Texel formula (not to be used) is:

Additional spi area =  $\text{IF}(\text{SMG}/\text{SF} < 0.75, 12.7 * 0.01 * (185 - 220 * \text{SMG}/\text{SF}), 0)$

As part of our project, this is one of the points on which we will work with TEXEL to convince them to use the SCHRS module of calculation

### Board Correction factors

For SCHRS:

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.

For Texel<sup>2</sup>:

All straight boards have a “CB correction” factor of 1

If no boards at all then the factor is 1.04

The correction for curved foils:

factor =  $0.891 / (\text{length board} / \text{length hull})^{0.06}$

If factor < 0.95, than correction factor will be 0.95

### 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, and no major race has yet been won by a foiler on handicap. For 2017 we recommend to use the same penalty than 2016.

LF =	2014	2015	2016	2017
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1 Texel spinnaker area calculation =  $\text{IF}(\text{sas} + \text{sas\_no\_details}, ((\text{sas} + \text{sas\_no\_details}) * 0.15), \text{IF}(\text{loa} \leq 4.87, \text{IF}(\text{crew} = 1, 14 * 0.15, 17 * 0.15), \text{IF}(\text{loa} \leq 5.8, \text{IF}(\text{crew} = 1, 17 * 0.15, 21 * 0.15), \text{IF}(\text{loa} \leq 6.71, \text{IF}(\text{crew} = 1, 20 * 0.15, 25 * 0.15), 0))))$

2 Texel CB correction factor =  $\text{IF}(\text{lb} = \text{"no"}, 1.04, (\text{IF}(\text{lb} = \text{""}, 1, (\text{MAX}(0.891 / (\text{lb}/\text{rl})^{0.06}, 0.95))))$

Semi lifting – only curved daggerboards with constant radius	3.0%	1.5%	1.5%	1.5%
Semi lifting – curved daggerboards with stabiliser fins on rudders	3.0%	2.0%	2.0%	2.0%
Full lifting foils (including all boards with variable radius	7.0%	5.0%	4.0%	4.0%

Texel includes a penalty of up to 5% for foils that are long in relation to hull length. See Board correction notes above.

### Power Factor

The SCHRS power factor is

$(HM / RM)^{.1}$  subject to a maximum of 1.027 and a minimum of 0.983.

HM refers to heeling Moment and RM to righting moment.

To keep a rating coherence in the rating list 2017 for the very small boats we used 0.983 instead 0.981

The Texel power factor is

$(HM/RM)^{.11}$  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 otherwise ignores hull shape.

Texel has no equivalent adjustment.

### Weight of the crew

Both Texel and SCHRS make different assumptions on crew weight based on length, crew numbers and sail area. These assumptions have a significant impact on the rating figures.

For SCHRS<sup>3</sup>:  $WC = 67kg + (Rated\ Length\ (L)\ in\ excess\ of\ 5m \times 10)$  capped at 75kg. (Single handed)

For Texel:

LOA boat <= 4.00 m:	65kg
LOA boat <= 4.80 m:	70 kg
LOA boat > 4.80 m:	75 kg

If the total sailarea >= 11 m<sup>2</sup>, than for crew one-man boats always take 75 kg.

### Change the gap between SL16 and HC16 spi

Over the last three years the SL16 has started to outperform the HC16 spi. This is at least partly due to a shift into the SL16 by some of the top youth teams. Also more top HC16 teams are using the version without spi.

We think that the choice of Nacra 15 instead SL16 for the World Sailing Youth Championship goes to move the better young sailors from SL16 to the Nacra 15 with as consequence a lower performance of the SL16 against HC16 spi and the Nacra 15. We are recommending to wait and see

<sup>3</sup> 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))))

HC16 spi versus SL16	SL16	HC16 spi	Gaps	Gaps in %
Ratings SCHRS 2016	1,139	1,146	0,007	0,61%
Ratings on average performances 2016	1,120	1,136	0,016	1,43%
Ratings SCHRS 2017 "new heart"	1,140	1,143	0,003	0,26%

## 1. Gap between the Dart 18 and Dart 18 cat boat.

**Background:** The Dart 18 English and French Associations have been complaining in 2015 that the Dart 18 cat boat (with one person and no jib) needs to be rated more harshly against the standard Dart 18. They are recommending a difference of 1 - 2%.

**Research:** We therefore examined 98 races where the Dart 18 solo and Dart 18 double were mixed and confirmed that this conclusion is supported by the data. The grid below shows that the Dart 18 solo is outperforming. In practice, it is 1.98 % slower than the Dart 18 double but the rating makes it 1.07% slower in 2016. The rating planned for 2017 keeps the same gap of 1.07% which is in line with the wishes of the Dart 18 Classes.

Comparison of rating gap between SCHRS 2016 and performances ratings					
	D18 double	D18 solo	Gaps	Ecart	Time/ h
Ratings SCHRS 2016	1,213	1,226	0,013	1,07%	00:00:38
Ratings on performances 2016	1,213	1,237	1,237	1,98%	00:01:11
Ratings SCHRS planned for 2017 "New heart"	1,217	1,230	0,013	1,07%	00:00:38

## Impact of the "Heart transplant" on the SCHRS ratings 2017 for the target boats

- Target boats of the C1 GROUP (Catamarans with dagger boards)  
On the table below we can see that the "Heart transplant" planned for 2017 has a very low impact (under 1%) on the SCHRS rating of the target boats of the C1 Group.

Impacts of the heart change on the ratings of the C1 Group main boats	A-Class	A-Classic (straight or constant curve)	Flying Phantom Foiler	Formul a 16 double	Formul a 18	Goodal I Viper Double	Nacra 17 Olympi c	Nacra 20 Carbon	Nacra 20 Carbon FCS	Spitfire
Dagger boards	Foils	Const. curve	Foils	Straight	Straight	Straight	Const. curve	Const. curve	Foils	Straight
SCHRS ratings 2016	0,981	1,002	0,890	1,003	1,000	1,035	0,993	0,875	0,856	1,041
Draft SCHRS ratings 2017	0,981	1,002	0,895	1,011	1,000	1,039	0,996	0,879	0,858	1,044
Differences	0,000	0,000	0,005	0,008	0,000	0,004	0,003	0,004	0,002	0,003
Impact in %	0,00%	0,00%	0,56%	0,80%	0,00%	0,39%	0,30%	0,46%	0,23%	0,29%

- Target boats of the C3 GROUP (Catamarans without daggerboards)  
As we can see the "Heart transplant" will have a low influence (under 1%) on the SCHRS rating of the target boats of the C3 Group.

Impacts of the heart change on the ratings of the C3 Group main boats	Dart 18	Dart 18 Cat boat	Hobie 16	Hobie 16 Spinnaker	SL16	SL15,5-KL15,5	Sprint cat boat
Without dagger boards							
SCHRS ratings 2016	1,213	1,226	1,191	1,146	1,139	1,222	1,397
Draft SCHRS ratings 2017	1,217	1,230	1,193	1,143	1,141	1,225	1,402
Differences	0,004	0,004	0,002	-0,003	0,002	0,003	0,005
Impact in %	0,33%	0,33%	0,17%	-0,26%	0,18%	0,25%	0,36%

These two tables show that the replacing of VTVB by the new heart formula confirm that the ratings obtained with this new module are very close to the SCHRS ratings 2016 and present no difficulty to be applied in 2017.

## Draft SCHRS rule changes for 2017:

To adapt the SCHRS rules to the catamaran market which is low for the new catamarans of competition, we propose to replace the paragraph B.1.1 Production boats 2016 by the text below:

A production boat belongs to a registered class or to a registered type.

The qualification of registered class or registered type requires the following conditions:

1. A minimum of 5 boats should have been built all with the same measurements as in C2 below.
2. There should be published class rules (effective for new types after 01/06/2001) which include all the data listed in C2.
3. The boat should be (or have been) available to the wider public for purchase.
4. The boat should have been presented to the nautical press

Non production boats can still be rated using individual certificates.

C.3.5 Rating (or Time Dividing Factor)

**R = Constant / (L<sup>0.325</sup> x A<sup>0.41</sup> / W<sup>0.3</sup>) x PF x (1 - BC) x SH**

1.111 is the value of the constant

In red color the draft of the "heart formula" shared with Texel

## Specific Classes

### Formula 16 classes:

On December 2nd 2016 we received an email from Antoine MEUNIER, Secretary of International F16 Class association, who ask us to change the Formula 16 data to reflect the rule changers voted in on November 24th 2016.

The main evolutions concern:

- Weight 119 single/123 sloop kg, instead 104 - 107 kg
- Center board length under hull 1060mm instead 1100mm
- Mainsail head length 980mm instead 950mm

### Bimare X16 Fplus 125kg:

During this year, we received eleven Certificate of measurement requests concerning the Bimare X16 Fplus> 125kg which is a boat with aluminum beams instead of carbon beams and with weights = or> 125kg.

To avoid a confusion with the Bimare X16 Fplus in the SCHRS 2017 list, Valerio Petrucci sent an email dated December 3rd confirming that the official name of the new version of this boat is: **BIMARE-F16**.

### ERPLAST New cat 12

We received a letter dated December 5<sup>th</sup> 2016 from ERPLAST – Manufacturer of NEWCAT 12 and NEWCAT 12 Racing which authorizes the SCHRS to delete these models which are obsolete of the SCHRS rating list 2017

### SCHRS derivatives

Other handicap systems “borrow” from SCHRS where they have no data of their own. Sometimes this is done incompletely with anomalous results. SCHRS needs to step up communication with these systems. We need to consider whether they should be asked not to use SCHRS numbers at all unless they adopt them wholesale rather than piecemeal.

The **Portsmouth Yardstick** system publishes figures for 10 classes as below. SCHRS “PY lookalikes” are used to handicap the others.

Class Name	No. of Crew	Rig	Spinnaker	Number	Change from '15	Races	Notes
A CLASS	1	U	0	684	3	61	
CATAPULT	1	U	0	890	0	126	
CHALLENGER	1	U	0	1150	0	89	
DART 16	2	S	0	906	-4	20	
DART 18	2	S	0	814	0	300	
FORMULA 18	2	S	A	693	0	37	
HURRICANE 5.9	2	S	A	698	-1	266	SX CONFIG
SPITFIRE	2	S	A	712	0	147	
SPRINT 15	1	U	0	931	-2	559	FORMERLY DART 15
SPRINT 15 SPORT	1	S	0	894	4	120	FORMERLY DART 15

We and are recommending that the conversion factor from SCHRS to PY be increased from 675 to 678 because that number provides a best fit between the two systems on a weighted average basis. Bob Carter has helped the SCHRS technical committee on this point.

The correlation between SCHRS handicaps and PY is very high – an encouraging result considering the differences in the two systems.

### Governance

The governance structures for Texel and SCHRS will continue unchanged.

### The SCHRS World Council comprises:

Jean-Claude Rouves (Chairman)  
 Pierre-Charles Barraud (France)  
 Olivier Bovyn (France)  
 Mark Schneider (USA)

Colin Whitehead (South Africa)  
Brian Chapman (Australia)

**The SCHRS Technical committee comprises:**

William Sunnucks (Chairman)  
Jason Smithwick (ISAF technical director)  
David Chivers (UK measurer)  
Andrew Gallagher (Ireland)  
Olly Harris (UK, Naval Architect)  
Simon Longstaff (UK)  
Geoff Balfre (Webmaster)  
Will Rottgering (USA)

**SCHRS measurers.**

In 2016, we had the pleasure of designating Mrs Carla Schiefer (USA) and M.Antoine Meunier (France) as "Official SCHRS Measurers"

**Conclusion**

The changes to 2017 ratings are remarkably small considering the significant change to the formula. The only boats to be given a harsher rating outside 1% range are to some small cats such as Hobie Teddy that are very rarely raced.

The biggest winner is the F16s, but this is due to a change to the minimum weight rather than the formula.

These changes have been comprehensively considered and I hope you can support them.

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