

CYCA TWO-HANDED SPECIAL PURPOSE WORKING GROUP

FINAL REPORT

May 2022



CYCA Two-Handed Special Purpose Working Group:

- Past Commodore Kerry Roxburgh AM (Chair)
- Past Commodore and Life Member David Kellett AM
- Life Member Peter Shipway



CYCA Special Purpose Working Group

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DATE: 17 May 2022

PURPOSE

Final Report from the Two Handed Special Purpose Working Group (SPWG).

BACKGROUND

Our society is changing bringing with it changes in the balance between home life; the way we work and recreation. For sailing with its time demands this presents challenges, particularly in crew recruitment.

Our sport has witnessed increased popularity of short-handed sailing in many parts of the World and with the possible inclusion of short-handed sailing in the Olympics, the Cruising Yacht Club of Australia (CYCA) formed a Short-Handed Sub Committee in May 2018.

A survey to competitors conducted in September 2018 sought views on short-handed (4 crew plus auto pilot) sailing. The results of the survey indicated particular interest in Two Handed sailing.

Following a request from the CYCA Sailing Committee in February 2019, the CYCA Board approved investigation into Two Handed participation in the Rolex Sydney Hobart Yacht Race (RSHYR) 2020 and requested a Sub-Committee proposal be prepared.

By June 2019, after further investigation and risk assessment, as well as more consultation and a further survey, a detailed Two Handed proposal, prepared by the Sub-Committee and approved by the CYCA Sailing Committee was presented to the CYCA Board with the recommendation that a pilot program of a four race Two Handed series be conducted in conjunction with the 2019-20 offshore program, with a view to including a Two Handed Division in the 2020-21 Blue Water Point Score (including the RSHYR 2020).

A press release in July 2019 announced that a Two Handed Division would be included in the RSHYR 2020.



The first race of the Two Handed series to Botany Bay was conducted on 26 October 2019 with 6 starters, 4 competed in the second race to Port Hacking on 16 November 2019 and 4 again sailed in the third race to Newcastle on 15 February 2020.

The CYCA Sailing Committee in February 2020, approved the inclusion of Two Handed entries to start with the fleet/their appropriate division in the NSGCYR 2020 and in the RSHYR 2020 also approving requirements for Two Handed Crew eligibility.

In April 2020, the CYCA Sailing Committee raised concerns about crew qualification after the cancellation of races due to the COVID pandemic.

Following publication of the RSHYR 2020 Notice of Race, on 22nd July 2020 a meeting of some fully crewed owners raised concern regarding Two Handed eligibility for the Tattersall Cup (IRC Overall winner of RSHYR 2020).

On 5th November 2020 after much dialogue, the CYCA Board amended the RSHYR 2020 Notice of Race to remove the Two Handed entrants' eligibility from the IRC Overall results. This decision caused much division within the Club, some of it very unpleasant.

The RSHYR 2020 was cancelled on 20th December 2020 due to COVID.

The Notice of Race for the RSHYR 2021 was published in May 2021, with Two Handed yachts allowed to compete though not be eligible for the Club's most prestigious trophies including the IRC Overall and Line Honours victory.

In June 2021, the CYCA Board approved formation of a Two Handed Special Purpose Working Group (SPWG) to recommend within 12 months, on the eligibility of Two Handed yachts for the Overall trophies in CYCA races.

SPWG TERMS OF REFERENCE

1. Objective

To make a recommendation to the CYCA Board regarding the eligibility of Two Handed yachts being allowed to compete for the Club's most prestigious trophies such as the Tattersall Cup, Illingworth Cup, Peter Rysdyk Cup and Blue Water Pointscore Trophies.

2. Responsibilities

To hold consultation sessions, townhall meetings and individual discussions with stakeholders in an endeavour to form a consensus view at the CYCA on the Objective. It is anticipated that issues to be understood will include:

- Tradition of the Rolex Sydney Hobart Yacht Race and sailor participation in the CYCA Blue Water racing, fully crewed vs Two Handed;
- The adequacy of handicapping of two-handed boats, particularly regarding auto pilot sophistication;



- Auto pilot technology advances penetrating both mixed and Two Handed fleets;
- How other yacht clubs with two handed fleets have transitioned into two handed racing and their eligibility for competing for trophies within a fleet of fully crewed yachts.

3. Membership

- Kerry Roxburgh AM, Past Commodore (Chair)
- David Kellett AM, Past Commodore and Life Member
- Peter Shipway, Life Member

4. Term

Recommendation to be given to the CYCA Board prior to 1 July 2022 unless further time is requested by the SPWG. SPWG disbands when the work is completed.

RECOMMENDATIONS

The SPWG's unanimously recommend to the CYCA Board that:

1. Provided Two Handed entrants meet all relevant criteria as required by the NOR; and
 - They present a valid IRC and/or ORCi rating certificate; and
 - The output of their auto pilot required by the NOR is strictly limited to rotation only of the boat's stern ('aft') rudder(s)

they be eligible for and allowed to compete for the Club's most prestigious handicap trophies such as the Tattersall Cup, the Peter Rysdyk Cup, the Blue Water Pointscore Trophies and other IRC and ORCi handicap trophies; and

2. Any Two Handed entrants complying with all relevant criteria as required by the NOR, sailing with an unrestricted auto pilot are only eligible and allowed to compete in the Line Honours and PHRF divisions.

SPWG key issues to be understood, inputs, representations and research studies

1. Called for EOI's and engaged with relevant parties, receiving 69 responses.
2. Receipt of submissions and "representations" from 55 respondents, addressing these issues to be understood:
 - A. Two-handed entrants being allowed to compete for major trophies & and respecting the traditions of the CYCA?
 - B. Does the IRC handicap "level the playing field" especially with Two handed use of "auto pilot" and is there any "weight advantage"?
 - C. Experiences with "Auto pilot" utilisation and two handed safety



- D. Apart from the CYCA, what's happening at other OA's
 - E. Does it really matter to you?
- 3. Research into:
 - A. Rating Rules study – the IRC and the ORCi
 - B. The America's Cup
 - C. Auto Pilot – “deep dive” and practical demonstration sail
 - D. CYCA race results analysis
 - E. Other race results analysis
- 4. Progress reporting to the CYCA Board and its executive.
- 5. The SPWG “findings”
 - A. The “traditions” of the CYCA**
 - i. It was noted the cultural primacy of conventional “fully crewed” yachts
 - ii. that said, over its more than 75 year history the Club has embraced change and Two Handed sailing is a change that is recommended to be embraced
 - iii. as it progresses, and as it gains support, Two Handed yachts are already becoming an important class across the world
 - iv. upon reflection, the CYCA might have resisted admission of the Two Handed entrants to its offshore events in the first place; however having not done so there is a strong view the Club has done the right thing by admitting Two Handed entrants into the fleet, with a trial period (noting this was not the initial recommendation the Club had received)
 - v. the admission of Two Handed entrants into the RSHYR has not diminished the stature of the event and the CYCA should embrace Two Handed entries
 - vi. the SPWG anticipate growing support of Two Handed entries which will result in increased yacht numbers and the CYCA risk being left behind by rejecting their entries
 - vii. subject to limitation of auto pilot output, Two Handed boats with an IRC and/or an ORCi rating should be “allowed to compete for the Club's most prestigious (handicap) trophies”
 - B. Does the IRC and the ORCi fairly handicap two-handed entrants?**
 - i. research indicated that If a boat retains the same sails, ballast etc, the IRC and the ORCi make no adjustment to the rating between it sailing either fully crewed or Two Handed; that said
 - ii. ORCi does allow a favourable rating change for crew weight if requested/specified by the entrant
 - iii. neither IRC nor ORCi make any rating change for the use of auto pilots



- iv. the IRC has adopted a new rule for 2022 that aligns it to the CYCA ban on auto pilots for fully crewed entrants, as follows:

New Rule: IRC 15.2(d) *Boats shall not use stored power for steering unless specified by the Notice of Race*

Reference: https://ircrating.org/wp-content/uploads/2021/10/Proposed-IRC-Rule-Changes-for-2022-Tech-Comm_29_10_21_post-Congress.pdf

The SPWG note this new rule allows the Organising Authority to specify in the NOR the use and type of auto pilots as is now being recommended by the SWPG, namely *auto pilots are permitted for boats entered in the Two Handed handicap only. Auto pilots are restricted to the adjustment of the aft rudder(s) only*”.

C. Thoughts about auto pilot usage sophistication and Two Handed safety

- i. the current CYCA mandatory auto pilot requirements enhance safety for Two Handed entrants and they should be retained, however, these requirements should be reviewed periodically
- ii. a practical demonstration aboard a yacht with auto pilot (see Attachment 2.c) highlighted the complexities associated with Two Handed sailing and made it clear that the auto pilot was entirely “reactive”, having zero capacity to “pre-empt” anything including avoiding a collision
- iii. a deep dive into auto pilots was conducted (see Attachment 2.b) provided the SPWG with valuable guidance as to the sophistication of the various units and the effect of limiting the output from a unit irrespective of limiting its input.

D. Anything to learn from the race results at the CYCA and in other places?

- i. elsewhere Two Handed entry numbers are a growing and their fleet sizes are significant
- ii. the CYCA should follow the RORC/IRC lead (ie: The Fastnet Race) where Two Handed entrants are eligible to win their trophies equivalent of the Tattersall Cup. Research indicated that only once (in 2013) has a Two Handed entrant won the overall handicap (IRC) trophy in the Fastnet Race, for example.
- iii. Due to factors such as weather and sea state there is no statistical evidence to suggest Two Handed handicap winners are rating advantaged.

E. Thoughts about whether Two Handed entries ought to qualify?

Refer to Attachments 1.1 through 1.5 where all “unattributed representations” are recorded from 55 respondents comprising:

- i. 18 Two Handers
- ii. 18 Fully Crewed
- iii. 9 Race Management Committee Members
- iv. 8 Rating Agencies, Technicians & Equipment Suppliers
- v. 1 Media; and
- vi. 1 Various



F. The SPWG Observations

- i. Noted the importance of having more experienced crew sailing Two Handed entrants. The CYCA should continue with the requirements, already in its NOR
- ii. Supports the retention of the current CYCA requirement banning auto pilot on fully crewed entrants – as per the Racing Rules of Sailing #52.
- iii. In the RSHYR retain the requirement for Two Handed entrants to confirm their auto pilot is working at “Green Cape”
- iv. The IRC Rating Office advised *“We do have research items looking into crew number/weight and short-handed is part of the consideration. Recent results for offshore racing have reinforced our understanding that the general balance of reduction of crew vs reduction of weight is fairly well balanced. For inshore racing it may not be so well balanced, but there is not a lot of short-handed inshore racing.”*
- v. The ORCV advised it *“didn’t experience the same challenges as CYCA with Two Handed being welcomed”*
- vi. The recommendation to restrict the “auto pilot output” provides certainty regarding the sophistication of the auto pilots currently being used by the Australian Two Handed boats
- vii. It would be helpful if the CYCA were to conduct a review of the development of auto pilots again in 2024 and to make a clear statement that adopting the “restricted output recommendation” will be in force until this review is completed. Doing so provides a degree of certainty to the current Two Handed boat owners

ATTACHMENTS

1. Summary of unattributed “representations”
2. Research and “deep dives” into:
 - a. Rating Rules – the IRC and the ORCi
 - b. Auto Pilot – “Deep Dive”
 - c. Auto Pilot - demonstration sail
 - d. Statistical Analysis of the CYCA Race Results 2021
 - e. Other race results analysis

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Attachment 1

Two-Handed SPWG “Representations”

CYCA Special Purpose Working Group Report

Summary of unattributed
“Representations 2021-2022”

Attachment 1.1

Topic # 1

Group Representations

#1 – Two-Handed being allowed to compete for major trophies and respecting the traditions of the CYCA

Two Handers (18)

Good thing the Club was doing with the working group. The CYCA is the only club that excludes double handed entrants from competing for overall prizes for a Rolex race. The CYCA should allow DH entrants to compete on an equal basis with fully crewed boats for a few years and see what happens. If they start winning a disproportionate number of races, then maybe something needs to be done. The same logic should be applied to the TP52 fleet. The CYCA must uphold the longstanding primacy of conventional fully crewed yachts and retain the stature of the RSHYR - Sydney to Hobart is a successful brand and worthy of protection. In hindsight, the CYCA should probably have resisted the pressure to admit two-handers to its offshore events in the first place however, 2H will see yacht numbers increase for RSHYR, without bastardising fully crewed participants. "two handed racing offers is one of the most positive developments in offshore sailing in recent times and can be a way to increase the number of yachts participating in races. I am keen that the CYC embraces the full potential of this opportunity". ... hurdles should be taken away to attract more 2Hs. The CYCA could be seen as left behind should they not do the same excluding two-handed entries will eventually diminish the standing of the RSHYR. The CYCA is trying to solve a 'problem' for which there is no evidence of its existence.

There are benefits in promoting sailing in any form is a good thing for the Club and the sport. A WhatsApp 2H group quickly gained traction and the Club must embrace it asap. With an IRC handicap they should be able to be eligible for all trophies". A 2H winning the RSHYR would receive better media then what the Club is currently experiencing. Two-handed sailing is thrilling, participating in CAT4s and encourages more uptake. If two-handed was included it would not reduce the RSHYR stature and the CYCA "should embrace 2H" and " hurdles should be taken away to attract more 2Hs.

There are already too many divisions in the RSHYR. There are nine separate race categories each with up to 8 divisions for 2019 there were 22 separate divisions. A pathway into CAT2 and CAT3 is a great concept and keen to develop and assist with the pathway. inclusion is the biggest thing, say yes and work the rest out later. They (2H) should be included, one in all in, re-iterating how an auto pilot is handicapped over canting keels, stored power etc. The lobby group used the auto pilot as 'an excuse', not so much it being an advantage for 2H compared with fully crewed yachts having other unintended consequences down the line". From the safety point of view, two-handed entries utilise stored power necessitating operation of the motor for extended periods in a noisy environment that isn't conducive to human concentration on a sailing boat. technology advantages (ie canting keel, water ballast,

international fully crew etc). The double-handed entrants being financially is available to a broader group – sort of Corinthian class of RSHYR. "If the auto pilots were 'limited' then I can't see any handicap issues with a basic self-steering auto pilot ... the NoR could cap the level of sophistication of auto pilots for RSHYR (ie. all sheets need to be controlled by the crew). If fully crewed, you don't need an auto pilot". The WA sailors offered more support for those sailing two-handed. Sensible for the CYCA to have the RORC involved in these discussions, particularly with the progress of auto pilots into the future. Last year's (2020) reaction was a knee-jerk reaction from the Club without substance. All entrants should be able to use auto pilots and CYCA should also reinstate Rule 52. All yachts entered should be eligible, therefore 2H should be eligible, who wins the race wins the race, both line honours and Tattersall. He noted there are many divisions which can also be competed for. 2H should be embraced.

2H entries are growing in offshore racing, firmly believing 2H should be eligible for all major trophies. Was considering entering his fully crewed yacht as a 2H RSHYR entry, though after time realised it isn't suitable for racing... even though it has done a lot of long blue water sailing. 2H should be welcomed to the overall RSHYR and is in keeping with the advancement of the race and yachting technology already incorporated ie hydraulic motors for operating winches. Owners are moving to short-handed and 2H due to the difficulties of getting crew. Whilst I am an experienced fully crewed sailor/navigator - today I will speak also as an experienced two handed sailor. The culture of the CYCA is one where human beings, not machines compete against the elements so I have a warning about auto pilots. Their adoption might be the "thin edge of the wedge that may result in unintended consequences down the line". From the safety point of view, two-handed entries utilise stored power necessitating operation of the motor for extended periods in a noisy environment that isn't conducive to human concentration on a sailing boat.

Fully Crewed (18)

The CYCA has done a good job in keeping the balance of change and still keeping the tradition of the race. Tradition is important. RSHYR is an icon and should remain one. Whilst I support introducing new technology, there is a need to weigh up new technology and safety. Its becoming an 'arms race', too costly and too hard to compete. It's best to steer clear of things that increases the cost of sailing for the future of the sport. You don't want to take the fun out of RSHYR and autopilots remove this (fun). RSHYR is an endurance race and that's part of its tradition. I suggest 2H should have their own Division initially, transition them over a couple of years, though keep score as if they were eligible. This should provide comfort to other competitors and show devices don't overall influence the overall results. I am in full support of 2H being eligible in Tattersall. The public already struggle with understanding how a yacht that finished after the first yacht can win the race. For example a PHS handicap foiling yacht could enter and be eligible for Illingworth.

At the CYCA, tradition has progressed especially with changes due to safety – I think progress overtakes tradition and we must move with the times. If Fastnet are embracing auto pilots then we should too. I think 2H is good as it creates more yacht usage and with the 17 entries I support their inclusion in the RSHYR 2021. CYCA doing the pioneering with other AU clubs following, with little two-handed interest in Queensland. I am shocked at the advantages of water ballast vs crew (movable, variable displacement boat).

This also reduced the amount of sails due to water ballast... its extremely costly to sail at the 'front of the fleet' with crew costs. CYCA run one of the few CAT1 races in the world, RSHYR, which comes with incredible difficulties. I think the way the Club is going now is the correct way ie obtaining feedback from interested parties. I will sail 2H and would like to be eligible for the Tattersall.

The Club should continue to push the safety aspect and continue to have their own set of rules for RSHYR. Change and innovation is the life blood of any sport. However the mechanism of its introduction is crucial. We all want to see the sport success, particularly the RSHYR. Our concerns are manifold. If boats are rendered (or perceived to be rendered) uncompetitive in the RSHYR the long term ramifications for both the sport and this race could be profound. Sail boats should be human driven. will we end up having computers sailing the yacht? 2H is a huge growth worldwide, with logistics of organising crew be it amateurs or professionals being very difficult and time consuming. There are very few yachts being built across the world by Australian owners in the grand prix category ie 4 boats in the last decade, whilst Double-handed yachts are being embraced worldwide. Two-handed were being discussed prior or around 2018 and their being eligible due to these being eligible at similar races overseas. Short-handed (4 and below) were discussed in conjunction of the growth of two-handed. The view was if sailing with sufficient safety equipment and experience it would be safe so two-handed were included in other CYCA races to enable eligibility for their entry to RSHYR, to ensure experience, qualifications and sufficient safety equipment was required to meet the additional criteria to be eligible to enter the race. Leave 2H in a separate divisions or get rating authority to rate the difference between the two. 2H will get keel bulbs, water ballast, canting keel, or both which will expose IRC rating. Will we end up having computers sailing the yacht? If a good number of boats in the fleet need only 2 crew, are we making the sport elite? Then If you let shorthanded use autohelm, you may need to let all boats use it, offering a big saving on crew weight, plus food water and gear albeit reflecting on this, I'd like to see auto pilot only allowed in if you are two handed. The Club need to decide what tradition they we are trying to protect - compared with how the 'old school' has changed ie the every/regular Saturday sailing has changed due to the evolution of family demands, exampling children's Saturday sport, both parents working and these things have changed life in general and clubs need to cater for this change. I suggest there will be the growth area for sailing, being dedicate a day or weekend every 5-6 weeks – not the regular weekly Saturday racing. it would be an achievement for a 2H to win a RSHYR and he would be the first to shake their hands. Short handed (5-6 crew) is the growth area and these would be very powerful with auto pilot due to the weight advantages of less crew (128kg/person). Noted 2H is a growth area for sailing, with very few fully crewed boats been built in the last few years compared to smaller more affordable yachts. The Hobart race has maintained that heavy emphasis on overall, while The Fastnet with all manner of boats has moved away from overall, to divisional wins as the big thing. They are two different races now. Finally I need to talk about the "elephant in the room" - In 2005 canting keel 24hr motorised were allowed and not fully handicapped, by comparison the 2 handed auto pilot is the mouse in the room. My alternatives are - exclude stored power from Tattersalls for three things: canting keels / winches / autohelm but still allows stored power to change backstays OR allow current model auto pilots in for Tattersalls but review every year. We appear to have fallen behind Europe in the integration of two-handed competitors into club racing. The technological advances in two-handed sailing are both rapid and far-reaching, particularly in steering and autopilot technology. I think we need time to see how yachts perform against fully-crewed yachts. The time is not yet right for a two-handed entry to compete for the overall trophies. 2H will have both advantages and disadvantages and this will be a 'every dog has its day' scenario and over time it

all balances out. They said, I believe hand steering is still the better option than autopilots that should be allowed for everyone and 2H should be allowed to be eligible to win the major trophies. That said, on two handed entrants consider restricting auto pilot operation to rudder movement only. Asked why the CYCA have removed auto pilots from fully crewed whereas at other Club races such as Fastnet they all allowed saying I would like all yachts to have auto pilots so the RSHYR remains competitive, developing and moving with the times.

Race Management
Committee Member (9)

Noted two-handed is a worldwide trend that cannot be ignored, there is a high level of support for two-handed to compete. With the increase of two-handed sailing, with less people sailing, means the Club needs to be smart to attract more sailors – the fact is the larger crews do not actually come into the Club. If CYCA don't take it (two handers) up, then other clubs will. The CYCA should as if "its purpose is for more yachts or more participants?" I support the CYCA plan for two-handed to encourage entries across all racing/regattas controlled by the Club to progress to RSHYR. The ORCV didn't experience the same challenges as CYCA with 2H being welcomed. ... "ill-will was caused when 'elite' exclude the smaller, less able yachts and that yachts would not participate if they weren't able to win – even if it was nearly impossible" Victoria is a step ahead with two-handed due to the Osaka race (every 5 years).

I attribute 2H sailing growth, mostly to the difficulty of getting crew and the restriction put on by the Club can be circumnavigated – it seems unusual to discriminate against the 2H. That said, the Club needs to be respectful of the history of the race and be careful how to go forward. In 2018 a CYCA survey found there was interest in short-handed – both four and two-handed. Accepting two-handed entries in the Club's offshore sailing program commenced around 2018 due to the growing interest in two-handed. Club's executive observed at international regattas – particularly Rolex races growing interest in this category. In 2019 CYCA Board investigated, had working groups and conducted surveys of interest for either short-handed or two-handed - resolving to include two-handed in RSHYR. With many years on a Sailing Committee was always an advocate of 2H and having watched the world sailing scene. 2H is the fastest growing area of sailing worldwide. It is very good for grass roots, younger sailors, is competitive with IRC rating and is not stereo typed – the best sailor wins on the day. Might try 2H himself because finding crew (for fully crewed yachts) is difficult. A 2H winner of the RSHYR would be admired. If an Imoca came into RSHYR (for training purposes) to have them in our race would showcase the race to the world.

They should be allowed to win, believing they wouldn't. CYCA traditions are the people who win the race have sailed the best race, and this shouldn't be discouraged. There could be two divisions – single handed and fully crewed – if an Imoca had 6 crew they would be able to enter, noting Imocas sail in worse conditions than Hobart. IN CYCA racing you must have humans to drive your boat – in ocean racing you need helmsman and trimmers, and it would be sad to lose these. Given a choice, I would always choose fully crewed, primarily due to sail changes – I admire 2H sailors imaging it being very difficult and the requirement for more preparation time to change sails.

Rating Agencies, Technicians & Equipment suppliers (8)	<p>Two-handed is great for any event, even the cruisers enjoy sailing against 'gold plated' yachts. All sailors know the class results are the most important, though great for everyone to be together with the larger yachts and compare where they finish in the fleet. I have a concern about allowing auto pilots ie the sport becoming more and more a less test of skill. Concerned too of the amount of 'paid functionality' available, ie power winches etc though acknowledged further advancements can't be stopped. The CYCA needs to review the Coroner's report and realise things have changed since then ie satellite use now, GPS, etc and address that equipment has advanced sufficiently to allow crew as small as two compete. That said, do not introduce single-handed yachts in RSHYR. Contrasted the CYCA heritage of sail boats traditionally driven by humans, with the fundamentals of the America's Cup (fastest boat and best skilled sailors) - utilising AI simulator, challenge is the number of sailors and miniscule discrepancies on the race day, utilising 24/7 simulator providing outcomes enabling auto foil adjustment. utilise AI 'Deep Mind' where the America's Cup complexity is 3000, with AI 'Reinforcement Learning' (extremely expensive) - wouldn't be economical for CYCA racing. Design is biggest break through, with simulator enabling sailors to train supported by INEOS as primary sponsor (F1, Tour de France, America's Cup).</p> <p>The AC Mission / Team / Self with 1 second delays for AI as no real time data can be provided back to the yacht. One-way or Two-Way data sharing is vitally different, when the next America's Cup will allow more automation, with less crew. The AWS (cloud) broadcasting (Jim Ratcliffe) vision is to involve fans virtually by creating gaming opportunities. "It is a difficult for any yacht to win RSHYR and it would be a miracle, though exciting, if 2H were allowed to win Tattersall Cup. Yachts need to be steered by a human, auto pilots would likely be used only when doing 'personal' things. The Tattersall Cup has always been for crewed boats. A yacht with auto pilot shouldn't be eligible for Tattersall. The 2H should have their own division and trophy, and no doubt you should have an auto pilot for safety purposes. We are in a 'no win situation' here, the 2H should have their own trophy.</p> <p>Acknowledging auto pilots will improve in time and the rule around auto pilots and other technology needs addressing. Auto pilot on 2H yachts is a must for safety purposes. In the essence of RSHYR, there should be a focus on the systems being used for 2H entries to ensure they are adequately prepared (and experienced). The shorthanded market across the world is booming due to lack of and difficulties of crew. All clubs need to move forward with 2H as these fleets will increase and easier to get international crew to Australia."</p>
Media (1)	<p>The Sydney - Hobart is unique and has the freedom to set its own rules irrespective of international precedents. It has, after all, shown no reluctance to exclude multihulls. But the Club will probably now have to confront a simple choice: either it allows all entrants to use whatever autohelm they want – or none. Any other approach is likely to invite the difficulties and antagonisms of an uncomfortable compromise.</p>
Various (1)	<p>It was a smart decision for the CYCA to accept 2H entrants in its races and to transition for a couple of years before being eligible for "major trophies" – see how it all goes. 2H could be experimental before making them eligible for Tattersall ie 'test' the rating for a couple of years in their own division. This would show how a 2H would cope with a RSHYR. interest was due to the long term viability of the sport of sailing and concern of yachts being steered by a non-human/computer. Recounted his experience of recovering a man</p>

overboard and the advancements since then to assist with this issue. He felt one person will eventually go overboard on a 2H and is concerned for the Club and its safety obligations, saying the primary concern is the man-overboard and ensuring adequate training for 2H crews. In addition, concern is justified with 2H being eligible for major trophies whilst they have auto pilots not available to others.

Attachment 1.2

Topic # 2

Group Representations

#2 Does the IRC handicap “level the playing field” especially with Two Handed use of “auto pilot” and is there any “weight advantage”

Two Handers (18)

It's been an uneven playing field for many years already, with the 'expensive' boats winning since a small yacht won in 2014. Why stored power was allowed in RSHYR Two handed boats require no further handicapping beyond what already exists within the handicapping system we utilise? The IRC doesn't take into account number of crew or crew weight. 2H do not have an advantage, especially on a long race – to trim sails, sail straight etc is very difficult, even with an auto pilot. 2H have a significant disadvantage with only 2 persons doing the same functions of sailing as a fully crewed yacht. This is where the Club lost credibility as it is not handicapped by IRC! Was “frightened” by some of the advice in the CYCA Sailing Committee two-handed working group and felt you must have a lot of experience in 2H to sail in a Cat1 and Cat2, long haul races to be aware of what to expect in a RSHYR. Uses the auto pilot wherever possible and tactically ie using auto pilot to steer as he prefers to trim and investigate other tactics. It is an important, safety and integral tool for 2H. On the IRC handicap on short races (50 miles) 2H is less competitive vs fully crewed. On races over 150 miles they're more competitive due to less sail changes. In our WA fleets we sailed with larger yachts, though emphasised skill was still required and if weather conditions challenging. Depending on the yacht, for us having less weight didn't make any difference as our yacht is quite heavy (a racer/cruiser). I don't think crew weight is an issue for the JPK1080s. When an auto pilot is available to all vessels, regardless of the number of crew, any perception of advantage is eliminated. The IRC doesn't benefit smaller crews ie 2H if you've an IRC rating you should be eligible for major trophies. IRC handicapping struggles to capture all things and is currently the best in the world. if you've an IRC rating you should be eligible for major trophies. I don't believe IRC gives credit for all of the crew weight you are missing on the rail. The IRC rating is a disadvantage for 2H due to carrying less (crew) weight. Net net DH are at a disadvantage most of the time. IRC doesn't benefit smaller crews ie 2H. No substitute for crew weight and believed there is no advantage having an auto pilot. Less weight is not an advantage for 2H, particularly in super light winds, particularly to get the heel right. The IRC handicap is not providing allowance for adjustment of crew weights but it does balance out. The two-handers enjoy a significant displacement advantage. Short-handed yachts might have an inherent and unfair IRC rating advantage. ORCi are providing a two-handed certificate which accounts for crew weight and heavily penalised with water ballast. Under IRC handicapping, unless the Organising Authority specifically excludes the use of autopilots, any yacht, including fully crewed yachts may install an autopilot and use it while racing. All yachts should have auto pilots which would take out any advantage. Restricted auto pilot capabilities should be examined and the CYCA should investigate adopting the ORCi rating".

The CYCA should look to move to ORCi as some clubs are doing in Victoria. The demands from other activities ie. SKED on a 2H yacht balances out any weight advantage. Fully crewed should not have auto pilot, 2H need them for safety though to what extent. It is an 'arms race' (even for Corinthians) where everyone cannot compete equally and it is difficult to find where you draw the line.

You don't want RSHYR to become a race that does not include crews. I don't believe there is a case that 2H yachts have a handicap advantage. In reality, the 2H don't have an advantage due to the many factors, incl: changing sails, endurance and 'live weight' which can be moved around the yacht, enables larger sails and other relative advantages for fully crewed. On the IRC handicapping of two-handed entrants to as it were, "level the playing field" making these entrants eligible to compete for overall handicap places, I encourage two-handed entries in Club events, initially in their own division for 3-5 seasons as a trial period until sufficient data, practical experience and data is available. Then I point to the recently launched, 11th Hour with "auto pilots" with sensors capable of auto control of trim tabs and ride height. The IRC handicap formula takes account of crew weight and auto pilot and it treats "water ballast" favourably. Looking at what's ahead, do a deep dive into "Madintech". Also in the recent RSHYR 2021, on corrected time the two-handed entrant "Disko Trooper" was some 7 hours ahead of the rest of its divisional rivals due I suggest to a combination of both the skills; experience and training of its co-skippers and of planning, preparation and configuration of the boat they presented to the measurer that maximised its handicap (both IRC and ORCi).

Fully Crewed (18)

"IRC serving well to date. It was good in 2004 but it's become dated. There are some loopholes in the IRC rating which are exploited, including heavy sails that are legally bound on RSHYR NoR, though not captured in IRC rating. If auto pilots are rated IRC and meet safety standards then they should be able to compete... the IRC is very slow to implement a handicap for auto pilot. Yes there is an advantage of auto pilots and this is currently not recognised by either IRC or ORCi. Weight is a compounding factor for fully crewed yachts due to food, baggage etc which is now being reflected in the handicap. So I it wouldn't be equitable to race against a two-handed under the current IRC handicapping, but it only requires a few 'tweaks'." ORC the largest rating system in the world and more scientific than IRC. You can build a boat to ORC rating. IRC is opaque and doesn't yet show the ability to equitably rate. The IRC has to be given time to prove it does equitably rate 2H entries. Don't see IRC doing any rating adjustment (for auto pilot) at the moment. ORC treat some yachts that are incredibly well looked after, particularly 'tippy' boats with canting keel (long and narrow, therefore minimal stability) Alive, Wild Oats X which are more or less unbeatable in ORC rating. If a yacht had a legitimate rating certificate, then they should be eligible for main trophies - similar to a two-handed winning the Fastnet. However following the RSHYR 2021, I have changed slightly as to whether 2H should be eligible for major trophies. I now think 2H should be treated differently in SOPS to blue water races, with blue water the same way as RSHYR. I suggest a trial period is beneficial and this has generally been well supported. If the auto helm was 'dumbed down' it would be a way to progress two-handed in the 2020 RSHYR only. A lower level of auto pilot appeared acceptable at the time, though it had been (externally) suggested auto pilot firmware could be altered prior to completion of the race. it could be a safety issue for some yachts if a restricted auto pilot were prescribed.

The other option was to be 'open slather' though recognised this creates other issues with different levels of auto pilot sophistication

being used, dependent on budgets. Noted water ballast is currently being used for weight management and could be seen as an advantage for both fully crewed and 2H, knowing it assists with 'riding balance'. The technology of auto pilot is improving exponentially. These 2H yachts have evolved into highly specialised craft with specific hull forms, sail plans and systems. They are no longer simply a conventional yacht. Do we want to introduce this to ocean racing? If you moved to ORC it would be detrimental to the sport and would create a large change in the RSHYR fleet. ORC do look at crew weights, whereas IRC don't. 2H "hull stability, sail handling gear and highly sophisticated equipment. IRC has been a terrific rating system for the sport, though it ignores some things" particularly "crew weight, safety systems, provisions which can be a massive difference between fully crewed and two-handed. IRC needed to work on 150kg per person that makes a large difference, dramatically changing the speed of yachts.

IRC must take this into consideration when rating fully crewed v two-handed. RSHYR has a larger media following, than Fastnet. These are the two most successful races compared to The Pacific Cup and Newport to Bermuda. Reminded the SPWG of your support (at least two of you) to remove the stored power rule from the Hobart race allowing the privileged few a significant advantage over the fleet and race for all trophy's. Why not give 2H the same opportunity? IRC came to prominence in 1999, with only one boat able to sail under IRC. At this time I became curious in skippering my own boat and IRC is why I joined ocean racing. I wouldn't have the funds under other rating codes and it is the same today, particularly with 2H. Noted the IRC doesn't handicap water displacement. The IRC are limiting foiling which keeps them out of racing. So the Imocas won't win Tattersall because of handicap and they just want to get to the finish first. No stored power and a basic auto pilot is what we should be trying to do as this will increase participation again in sailing. Displacement is a problem of the rule due to IRC not dealing with it. "I have had firsthand experience racing fully crewed v 2 handed on IRC - my view is IRC is not fully handicapping 2 handed autohelms yet, but not too far off. I see auto pilot can give advantage, but not a significant advantage overall at this stage. At present a very good human will beat current available auto pilot, once conditions go beyond "champagne sailing conditions" which can be often in a Hobart." Writing auto pilots out of the race is the wrong way to go. Then water ballast is still allowed as it fits the rule, comparing carrying a water maker vs carrying water. I suggest any TP52 will do well (due to water ballast), even if not the best TP52. Not really across handicapping, though yachts with auto pilots may have an advantage, but that could simply be perceived as an advantage, recognising auto pilots were a necessity for safety in single and 2H yachts in long races. It will also be dependent on how well people tune an auto pilot ie yachts have the same 'box' though how well can they be operated. I am fine with auto pilots on 2H, but not for fully crewed.

My concern now is more with stored power and in time auto pilots will be allowed on fully crewed. I sail a fully crewed yacht and my concern is autopilots that are becoming very sophisticated with AI inputs. Yachts with auto pilots have an unfair advantage. They are very sophisticated therefore very difficult to enforce and police. Agree they can be detuned, though in reality it requires 'switching off' functionality that is not easy to enforce. Allowing auto pilot for the entire fleet would change the dynamics of the fleet. Going back to the introduction of IRC and how IMS was phased out, that was a good process. I only use autopilot on boat for deliveries, otherwise it is removed. They shouldn't be used for racing. On a two handed yacht limiting their auto pilot to just helm adjustment would dependent on ensuring the safety of those on board. I cannot see how we can have a level playing field at this time. I think we need to keep two-handed racing in a separate division and gather more race data. Modern yachts that never run square in the

165-170 degree aft range would gain an unfair advantage from the use of autopilots. Auto pilots on crewed boats could be dangerous as a sense of complacency can be developed and a temptation to run with fewer crew for a performance advantage. On two-handed yachts I suggest that auto pilot functionality be limited to operating the rudder only (no information provided). The IRC treats 2H fairly. Whilst some fully crewed believe they have a weight advantage as well as auto pilot advantage (though auto pilot is required for safety reasons), it all seems to balance out. Says fully crewed yachts shouldn't have auto pilots.

It's my view, the ORCI is a better rating system for 2H because IRC doesn't rate stability, only depth factor. That said, like The Fastnet a 2H should be allowed to win the race (ie Tattersall Cup) as they are competing under the same rating rule, just with less people. Also, 2H should be eligible for line honours, even if the yacht be an Imoca/foiling yacht – recognising this is a whole otherworld.

**Race Management
Committee Member (9)**

The 2020 NoR was released and concerns were raised of crew reduction from 6 to 5, and the introduction of two-handed having an advantage with auto pilots. Discussions were held with both fully crewed and two-handed crews. Weight and auto helm advantages were not discussed and no analysis was done on rating, but research suggested a two-handed yacht would possibly only win a Tattersall Cup once every 10 years. There was discussion with RORC asking whether all yachts should be allowed auto pilot technology. RORC advised they'd not had any queries before regarding auto pilots. It was suggested to have magnetic heading only. In October 2020 the CYCA Board advised two-handed would have their own trophy. Noted the RORC alert to advancement of technology agreeing it remains the best current rating. We consulted RORC about how they were handicapping yachts with auto pilots? RORC advised they didn't handicap differently, though did recognise that an autopilot could accommodate one less crew, therefore enhances performance. RORC say all yachts should be able to have auto pilot. The IRC two-handed certificate is based on the configuration, not the number of crew. The ORCV don't allow auto pilot. Everyone wants to steer, though thought if allowed few yachts would use auto pilot. it was very unlikely a two-handed would win Tattersall Cup. Fully crewed yachts sail with various amounts of crew depending on the weather forecast ie WO usually sails with six but changes crew numbers depending on forecast as this affects both the number and type of sails taken and number of crew. My view is if a 2H yacht sailed with more crew it would sail better than an auto pilot, they are not the right solution. Most IRC yachts race with maximum crew as it's advantageous. Imocas don't have an IRC rating, though some other yachts 'skim' ie Comanche and Rambler. Decision was made by Board to approve two-handed, then recanted after push back for two handers to not be eligible for main trophy - the matter of safety was not at issue. As a precedent, two-handed should be eligible for major trophies as there were earlier changes in technology on yachts ie canting keel, electric winch etc enabling less crew not addressed on "fully crewed" entrants. With this in mind two-handed should be eligible for major trophies. Perhaps some boundaries could be set as to the type of auto pilot permitted and these could be enabled for all yachts, not just two-handed. The IRC rating allows, electric winches, canting keels, water ballast and other technology and it enable boats of all sizes to race equally – this is the beauty of RSHYR. This is the fairest rating system at the moment. Double Handed ORCi certificate is a separate certificate to fully crewed ORCi certificate - If the only difference is crew weight, then ratings will be different between double handed and fully crewed certificates. Double handed crew weight must be in range 120-300kg declared. If not declared it will be taken as 170kg and rated for 170kg (and then cannot be exceeded, nor less than 120kg). Believes the 2H have a large weight advantage, though acknowledged an offset with only two persons that has it's disadvantages.

Rating Agencies,
Technicians &
Equipment suppliers (8)

"In principle with the IRC you can have two certificates, 1 x fully crewed and 1 x two-handers, and recent results offshore reinforce their understanding that the general reduction of crew vs the reduction of weight is fairly well balanced". "The short-handed certificate will be clearly identified and shall only vary from the primary certificate in respect of the mainsail width, the headsail dimensions, the single furling headsail allowance, the use of stored power (SPA), the STL & spinnaker pole/bowsprit, the number of spinnakers and any moveable ballast and variable ballast". Addressing auto pilot, there is a new IRC rule for 2022 namely 15.2(d) that Boats shall not use stored power for steering unless specified by the Notice of Race, where Autopilots are restricted to adjust the rudder(s) to adjust heading only". The best recommendation should be that the only moving part an auto pilot can adjust would be the stern rudder/s. Noted the IRC recent change of rule, at 1 January 2022 that (1) fully crewed are not allowed auto pilots, and (2) 2H class are permitted auto pilots for rudder use only to adjust heading with New Rule: 15.2(d) Boats shall not use stored power for steering unless specified by the Notice of Race. This change is to specifically allow organisers to specify in the NoR the use and type of autopilots as you have suggested. For example: "Autopilots are permitted for double handed class only. Autopilots are restricted to adjust the rudder(s) to adjust the heading only." No push back in Europe to two-handed yachts using autopilots, though still eligible for the main trophy. "Very surprised to see how quickly this two-handed dispute rose with RSHYR. Its hard to prove any advantage and more likely there was a slight disadvantage to two-handed with IRC handicapping. I understand the IRC rating only changes when there is a different configuration, though doesn't handicap on crew numbers. The ORCi rule does handicap crew weight. A human sailor can steer better than today's autopilots (this will change). I think it is easy to write a rule that says that you can't use motion, gyro-compass, or turn-rate sensors as an input to your autopilot. A 2H with an autopilot is at an advantage. Experienced sailor feedback is that the auto pilot was better than how they could steer. All Fastnet yachts can use auto pilots, whereas CYCA only allow 2H to use autopilots. Possibly the IRC didn't think, when they bought in the auto pilots and that its sophistication would become so advanced. That said, you can buy heading sensors which provide different capabilities, to turn off these 'built in sensors' could virtually be impossible. The problem is that many inexpensive electronic compass sensors are "strap-down". So a boat using their stock Ray Marine or Garmin autopilot with its stock compass, even in magnetic course mode, may unknowingly be cheating because most recent magnetic compass sensors incorporate inertial rate and attitude sensors within the compass sensor. An easier to understand place to have a rule would be to only allow magnetic course mode to be used in the autopilot, e.g. can't have the pilot steer by the wind... at least a magnetic-course only rule would be easy for all sailors to understand so it would be must less likely for a boat to unknowingly cheat. One could imagine a rule prohibiting the use of "high-performance" inertial sensors but that becomes hard for folks to determine and is a hard line to draw as inexpensive MEMS sensors have rapidly improving performance. On my 2H I think my weight for genset/batteries/fuel is about 1 tonne. Then hydraulics, hoses, fuel, pumps etc. account for another tonne. Less weight is not advantageous for 2H. I estimate a short-handed sailor would steer 85%, and auto pilots (15%) do not provide any advantage. Technology should be embraced saying if you ran an auto pilot for more than 80% of the time it would not be capable of winning. Auto pilots are delayed – reactive, not proactive and therefore not advantageous and not as efficient as a human. You can restrict the H5000 to two settings - magnetic or wind angle headings.

Media (1)

To be fair to all competitors, a revised Notice of Race might need to make these changes:

1) The 'minimum crew' rule could be amended to allow two crew for all entrants.

2) Autohelm could be permitted on fully crewed yachts.

If a rating adjustment is unworkable, could there be an equitable solution in restricting the capacity of autohelm during races to 'maintain a heading' only?

That might seem to be technically feasible but, in practice, impossible to police."

Various (1)

Currently 2H sailors would be disadvantaged in RSHYR.

Attachment 1.3

Topic # 3

Group Representations

#3 Experiences with “Auto pilot” utilisation and two handed safety

Two Handers (18)

Couldn't understand why the auto pilot was such an issue - used auto pilot on compass heading only. Some people feel 2H not safe though they need to be more experienced and compliment each other, a lot of qualifying races to lead into a major race. 2H crews should have a lot experience together – qualifying should be crew and yacht, and Sydney/Gold Coast a good qualifier. Extensive experience in working for and with the Coroners Court. Safety is germane to all aspects of your enquiry. in some specific yachting incidents the Coroner would ask whether an autopilot was available to the vessels captain. Autopilots are device which enhances the safety of all vessels and should be available for use on all fully crewed and two handed boats. Believes professional sailors inclusion will be interesting, particularly if they go too hard early. Concerned if limiting use to compass only – particularly in a change of wind direction. Auto pilots have the same concerns for both 2H and fully crewed. No known benefit available for both fully and 2H. Our Garmin standard auto pilot is good in some conditions and average in most condition, only used as a 'third set of hands' when changing sails. Suggest define the level of auto pilot allowable. 2H require a lot of experience in this form of sailing (ie have completed a minimum number and type of events)..... use the auto pilot minimally, it is a battery drain, and hand steering is better and more attentive, It is good whilst fetching, though it uses the rudder a lot ie over correcting and the hand is smoother.

The Club had done outstandingly well regarding everything about safety, particularly for 2H, though felt more offshore racing should be experienced prior to RSHYR (open water, time to be rescued, extreme conditions). Auto pilots are used differently on a 2H vs fully crewed. The efficiency of an autopilot is quite good but only with very high tech and high end systems (\$\$\$\$). The normal systems that most of us sail with are not as good as a human. But even the very high end system is far outweighed by the lack of sail handling ability for a doublehanded team and the fact that each crew has so many things to do. No way a doublehanded boat is sailed through an entire race at the same efficiency as a crewed boat. A fully crewed would use it due to it steering the boat better – assuming it had a very sophisticated auto pilot. Favourable for all yachts use auto pilot (fully and two-handed with) possible use restrictions. "only uses auto pilot when changing sails & person can steer better than an auto pilot. Used it a lot particularly when sailing solo - good for safety reasons." Don't think auto pilot "can they steer better than a person - hands on wheel' is better than an auto pilot particularly in a following sea and certain breezes where it could actually be dangerous. couldn't see a 2H with an auto pilot winning a major trophy, as a manned helmsman would always be better. He felt it a disadvantage for a fully crewed yacht. Fully crewed could sail with one less person if using an auto pilot ... limit the number of sensor compass heading and apparent wind, disable other

technology and be the same rule for all yachts. auto pilots are used differently on a 2H vs fully crewed. A fully crewed would use it due to it steering the boat better – assuming it had a very sophisticated auto pilot, the capability of sensors would be more sophisticated. autopilot at the moment which is a little challenging. Man overboard is very problematic for two-handed... the only time they use auto pilot on "Local Hero" is during sail changes & possible headsail tweak. The CYCA "had done outstandingly well regarding everything about safety, particularly for 2H. Suggested the AO consider requiring (when not in enclosed waters) all 2H crew and:

1. to be clipped on at all times when on deck
2. always wear an EPIRB
3. be banned from going up the mast
4. auto pilot should be same rules for both 2H and fully crewed entries.
5. 2H yachts to confirm it is working when passing Green Cape.
6. Suggested ... define the level of auto pilot allowable.

Uses auto pilot on short races for sail changes with longer racing dependent on sea state and wind conditions. Needs perfect sailing conditions to use auto pilot, the exception not the norm. Current auto pilot isn't able to steer the boat in unsettled conditions. Agree that at Green Cape a two hander must check in with RRV to advise auto helm was working prior to crossing Bass Strait. Having sailed a lot with auto pilots I know auto pilot requires a lot of information and they also require constant adjustment depending on the conditions. Overseas, the OA limit the budget for auto pilot/data equipment. I don't think a RSHYR fleet have the resources for an America's Cup type tech race at this stage. Auto pilot could be allowed for the entire fleet and some yachts could have, in the future, very advanced technology (AI) and if so there would need a form of 'limitation' of use. For example, a limit to rudder capability only would be fine with any 'all singing and dancing' auto pilot yachts having a division of their own and/or line honours. As to whether as a practical solution auto pilot operation might be restricted to either operation of the rudder(s) only and/or utilisation of an "approved list" I suggest it would be difficult to enforce operation of the rudder only. With so many different auto pilot model configurations available we should "worry about their operation with a "gyro compass" and the H5000 for example.

Fully Crewed (18)

Fully crewed yachts should always be hand-steered. Introducing auto pilots is a major issue for the sport. Auto pilot should not be allowed for all yachts. Auto pilots better at steering at the end of race, not the beginning. I am not that interested in auto pilot technology - sailing should be the skill of the crew and auto pilots shouldn't be allowed at all in fully crewed yachts. Auto pilot is required for safety reasons on two-handed, as I have concerns if crossing Bass Strait in two-handed depending on weather and I ask should there be different levels of certification? Transitioning from 6 to 5 and now two crew was curious, though noting 2H must be highly experienced sailors. Other technology ie water ballast, canting keels, power winches and their uses were possibly not discussed properly at the time of introduction. - not recognising the influence on the sport of sailing saying "auto pilots are detrimental to the future of the sport. We can't have different performance enhancing equipment for one group and not others, however you need auto pilots for 2H for safety reasons ... they shouldn't be allowed for fully crewed. Auto pilot on fully crewed is not good for the sport

and it will become a 'technical war', rather than having skilled sailors and the fundamentals of sailing itself. I agree with the CYCA decision exclude auto pilot on fully crewed entrants although auto pilot properly constructed and installed would be safer on two handed entries. interesting how advanced current 'off the shelf' (auto pilot) models are already. Possible to source auto pilot models that could be reviewed to be allowed – consider setting a \$ budget, specify which auto pilots and technology are allowed in a race that wouldn't provide an advantage to the boat, though still provide safety. Perhaps the best way to go about it, ie approved capability though noting auto pilots can be adjusted whilst sailing therefore there is a level of trust (similar to use of engine). For 2022 have restrictions on auto pilots and from there it will be an evolution. My auto pilot experience has come to be way of default and actually took it off for the race due to it's weight. Then used it on return trips and often with 2 crew when I realised the benefits of it. Yes you can limit auto pilots to wind angle and compass heading. There has been a huge shift in the way the sport has become with chart plotters now becoming a deck screen. With trackers you can now see all the yachts and I see the role of navigator is a disadvantage for 2H. I have done a 2H without auto pilot which was immensely difficult. I moved to sailing short-handed under IRC rules, and has sailed with eight for RSHYR and six in other races. if 2H have auto pilots they should be course and/or wind direction. On safety and compliance, there is a French 'Oscar' detection system with limited auto pilot capabilities. As fully crewed boats have dedicated helmsman, navigators, limit auto pilots to 2H only. Two handed yachts must have a higher stringency requirement and suggested to run a course/s (Jen White). Yes it is fine for two-handed to have auto pilot due to safety requirements. Another scenario could be a 5 person crew with auto pilot - what about that - auto pilot with medium crew size (5-6) could be a valid argument to increase participation. In fact all yachts should have auto pilots to protect the integrity of the fleet. A yacht needs to qualify first, then ensure the crew, particularly two-handed, have demonstrated they are also adequately qualified to meet safety requirements. For example the disability sailor in Los Angeles not allowing him to participate in a two handed yacht race due to rescuing a man overboard issue. "As auto pilots don't have eyes, they can't adjust to bad waves coming either in hard offshore upwind or downwind. So, a good helmsman will beat an auto pilot in those tough conditions. But in easy 'vmg' downwind flatter sea; and same upwind in calmer conditions, yes, I see they could be as good as a top helmsman, and they don't get distracted / tired/ don't need food or water. ...just sail to exact inputted G56 parameters. Scare mongering in my view, re the latest product coming out of IMOCA / FRENCH programs being better than the best human helmsman. Maybe one day they will find a way to develop eyes and be proactive about big bad waves coming. But not there yet. I have not had a lot of auto pilot experience. Safety wise, its a double edged sword. You use them if the crew isn't up to it, injured / too tired / seasick. BUT may there be too much reliance on auto pilot in heavy weather and again they don't see huge waves coming, and if they break down, then what?" Auto pilot is not faster than a person driving a boat so I cannot see how a boat sails faster with an auto pilot. A 'closed loop control system' is legal to use now and these work in conjunction with the PLC system. He felt the auto pilots are in the same 'family', they are acceptable on 60 and 100 ft yachts, then why isn't auto pilot acceptable on 2H? Though not the same, it is still an automated control. Overall not well aware of the progress with auto pilots. I think auto pilots for a monohull don't make that much difference. My yacht doesn't work without people on the rail and my experience is people sail yachts better than an auto pilot.

Race Management Committee Member (9)	<p>Noted with the growth in single-handed sailing around the world, it was difficult to argue why two-handed should not race in blue water regattas, noting the CYCA have one of the strictest safety criteria in the world and would be able to manage any potential weather issues. Two-handed sailing is significantly different to short-handed ie yachts must be set up differently, crew must have different and better experience, safety, stability and construction is way more advanced then in 1998. On the Osaka - 70%-80% hand-steer, always hand steer down-wind running, rather than auto pilot. You cannot sail a two-handed safely without an auto pilot. The OA "could limit the type of auto pilot - they will continually improve for years. Both "two-handed sailor must have the same level of skills (co-skippers) in every aspect" with "PFDs stowed on deck" emphasising the OAs needed "additional safety considerations for two- handed." Self-steering has come a long way, though you'd need the most sophisticated self-steering system to better someone on the wheel! Sophisticated auto pilots will steer better, exemplifying SailGP queried if you categorise what auto pilots can do (their output). I do agree 2H need an auto pilot to enable manoeuvres safely ie sail changes, though will steer the boat themselves as standard auto pilots are unable to do well. Noted Imocas are put on a particular/set angle, which wouldn't be suitable in a RSHYR. For fully crewed standard auto pilots would be OK, whereas a \$500k auto pilot is different as one of these would allow a cut in the number of (professional) crew due to its capabilities.</p>
Rating Agencies, Technicians & Equipment suppliers (8)	<p>"Studying auto pilots for fully crewed yachts for the last few years, around two years ago the RORC noticed fully crewed use of auto pilots increased - due to not being able to get crew, the cost of crew and crew wanting to get more involved in actual sailing, not be 'rail meat'. The result is discussions within the RORC technical group, looking at canting keels, flying rudders, auto winches and other technology, and how to rate these in the future. The IRC believed auto pilots, has as yet, not produced a faster yacht". So far 11 fully crewed yachts have been interviewed from a cross-section of budgets and they all preferred to 'hand steer' as auto pilots are only useful for sail changes and manoeuvres." The capabilities of today's auto pilot advising current compasses can also monitor wind, pitch and roll and generally have 12 sensors. Compasses also use wind algorithms to sense wind gusts, enabling auto pilots to 'listen and learn' from the entire vessel ie auto-learning for all the various forms of sailing ie inshore and offshore, with AI learning built-in the more 'miles' the better the autopilot. Autopilots are focused on safety to enable yachts to stay afloat and cope with all aspects of weather. This is a "massive advantage", the gear on a two-handed is no different to any other. Heading sensors sense pitch and role, whereas the motion sensor is mast focused, therefore pre-empts the influence of wind gusts to the yacht. Inertia capabilities are also continually being advanced. eg \$25k compass can have an autopilot plug-in. Autopilot was a massive advantage, particularly when you take into consideration the weight savings and software is updated every couple of months. Contrast this with The America's Cup that sees foiling as the way sailing (wind surfing) is heading which enables the flight control using sensors and how best to use these, with/without AI technology. The AC is keen to create a glamorous, peak event to enable feeder events and growth in the sport of sailing, with significant delineation between software and AI. With auto pilot there was no safety advantage on fully crewed yacht, though there could be on two-handed, particularly for man overboard. A stronger 2H safety method is in the roller furling sails, mainsails with slides and hanks on headsails technology. Auto pilot when power reaching has advantage for fully crew, due to helmsman not being able to see. If fully crewed yachts were allowed auto pilots they could attract a 3sec/mile penalty, he doubted very few fully crew yachts would accept this penalty (equated to circa. 20 minutes in a RSHYR). In summary a good auto pilot is helpful for two-handed as can allow sailor to trim and do other things on the yacht. This depending on the nature of the race.</p>

The more reaching the better use of an auto pilot ie it would be used less in a RSHYR. To avoid a collision, it's critical to keep watch on all surrounding boats. Radar is a good back-up. Heel Compensation - the physical output of this function is adjustment only through the rudder - as are all the functions from my B&G Auto Pilot. For Heel Compensation, B&G H 5000 uses a number of sensors on the boat – the compass - heading, the rate of turn, the pitch and the roll. From the wand on the top of the mast – its wind speed and direction, from the paddle wheel transducer – it's the boat speed and then through various algorithms it calculates the data to adjust only the rudder accordingly. You just can't activate the auto pilot as "set and forget". During changeable conditions the autopilot needs to be adjusted. It's just too dangerous to have the auto pilot set to drive the boat hard when 1 or 2 crew are up forward. If the auto pilot makes a mistake, the consequences could be disastrous. Accordingly, there is always a "loss of time" during manoeuvres. Whilst there is not much real 2H data available for the last 10-years, a father/son who won The Fastnet overall. There is the Middelsea/Rolux races that are beginning to embrace 2H. Then there was the 18th finisher in The Fastnet who were professional sailors - showing how hard it is to win on IRC sailing 2H. An auto pilot will steer better than a normal helmsman... it doesn't have fear, doesn't get tired etc. Look at the Imocas capabilities which are amazing. So far as settings are concerned, auto pilots can be set to only use certain G60 things. This could be specified but it's an 'honesty' system (same as turning on the motor).

Media (1)

Auto pilots steer better than humans under most conditions. There are too many situations during a long offshore race that require the combined efforts of at least two fit sailors.

Various (1)

The feedback to date is you're unable to safely sail a 2H yacht without an auto pilot. Noted auto pilots are a computer and they do everything for the boat, including tracking where other yachts are and believes it has a great advantage over yachts without auto pilots.

Attachment 1.4

Topic # 4

Group Representations

#4 Apart from the CYCA, what's happening at other OA's

Two Handers (18)

My ORCV two-handed experiences in three Melbourne to Osaka races; the Bermuda Race; the Pacific Cup and Cowes Week where the inclusion of the two-handed fleet in the overall handicap results was "the thin edge of the wedge" that could have "unintended consequences" with "crews becoming passengers" (rather than sailing the boat). In WA the West Coast Race had both two-handed and overall prizes, with two-handed on performance handicapping - not IRC. Two handed, both co-skippers should have CAT1 experience. The OA has the right to accept or not depending on experience. In WA you need to do a CAT3 to participate in a CAT2 with an age limit of 18-years. The only CAT1 race in WA is to Bali with all others CAT2. We should follow the lead of the other jurisdictions (eg RORC and JOG in the UK) that allow autopilots for everyone." treating auto pilot "as just another piece of sailing technology like intelligent chart plotters, race routing software.... It's the ORCV who have raced combined fleets for many years treating both fleets as 'equals - we should be following the RORC with approx. 90 2H yachts competing in Fastnet 2019. There are also two-handed Fastnet results with the New York to Bermuda allowed two-handed eligible for major trophies. CYCA should compare the RSHYR race categories against Fastnet & NY/Bermuda where they have a vastly reduced number of categories. No knowledge of other 2H racing at other clubs other than the father/son winning Fastnet a few years ago. The Fastnet has 6 separate race categories (IRC, Two Handed, IMOCA 60, Class 40, MOCRA Multi and Multi – Open) Newport - Bermuda has 7 separate race categories (St David's Lighthouse, Finisterre, Gibbs Hill Lighthouse, Two Handed, Open, Super Yacht, Multi). Up to 7 divisions in St Davids, 3 divisions in Finisterre, 2 divisions in Gibbs Hill Lighthouse, 2 Divisions in Two Handed. Two Handed yachts compete in IRC against all IRC rated yachts as well as having their own Division. 17 separate Divisions in total – average 4 yachts/division. 2H racing "is not restricted to the Fastnet race. Across Europe and in America two handed fleet sizes are expanding rapidly with five major yacht manufacturers (Jeanneau, Beneteau, J - Boats, JPK and Dehler) all producing yachts specifically designed for two handed racing. There is limited experience with other clubs other than short-handed with Sydney Amateurs which was very 'relaxed' environment." The 2017 Melbourne Hobart had approx. 17 2H entries, as a pre qualifier for Osaka race. I sat on short-handed association for a short time and even then there was some reluctance to include 2H which was a shame, though it's been taken up faster in Melbourne, NZ and Europe. In Europe, 2H sailing is far more advanced than Australia.

Fully Crewed (18)

"Yes, in the most recent 2021 Bruny Island Race, a race involving all conditions heavy / light upwind, running reaching. My conclusion fully crewed v 2 handed is it's very hard to beat them, but the gap isn't insurmountable ... I would like to see their IRC pushed up a bit!" I have not had a lot of auto pilot experience. Safety wise, its a double edged sword. You use them if the crew isn't up to it,

injured / too tired / seasick. BUT may there be too much reliance on auto pilot in heavy weather and again they don't see huge waves coming, and if they break down, then what?" My interest was sparked when 2H was considered for Paris Olympics and was to compete for the mixed crew. CYCA has to gather race results data to evolve a handicap that is equitable across all yacht handicaps. The Fastnet has 19% of entries for this year, noting the growth of two-handed in Europe, though with only two crew the number of sailors is not actually producing a massive growth in the sport. Data is required to evolve a handicap that is equitable across all yacht handicaps. I have no knowledge on data of other club's 2H races and their results, though we should look at statistics from The Fastnet and races in US. I suggest Sandringham YC would have some 2H results data on the Osaka race and the Rudder Cup for Melbourne/Launceston.

Race Management Committee Member (9)	Safety issues drove what the enablers were for eligibility to enter RSHYR and achieve CAT1. Prominent 2H sailors, both internal and external, had been contacted for a verbal Q&A. the outcomes for two handed inclusion ie maximum length, certain experience and safety items aboard. Handicapping was based on RORC, (IRC) though CYCA stated auto pilots were necessary for two-handed entries, acknowledging there was only two crew. There wasn't a clarification of what an auto pilot actually was. Auto pilots should be allowed for all the fleet – based on RORC – though required 18 months lead time. However two handed must have an auto pilot for safety and accountability. There is a lot of 2H in Europe with the Middlesea results. Also the Pacific Cup has 2H, though very few other races have mixed fleets. The French are mad 2H and solo sailors, and there will be a lot more 2H in the future. Then there are many mini-transats though they're not rated well with IRC.
Rating Agencies, Technicians & Equipment suppliers (8)	Have competed in both TransPac and Pacific Cup. Two- handed yachts are eligible and have contributed to the fleet and accepted by everyone. In TransPac, two-handed hasn't been competitive whereas Pacific Cup the two-handed yachts were more serious and better prepared (yachts sailed with and without auto pilot). In the Pacific Cup two-handed have won 2-3 times, once without an auto pilot on a smaller yacht. SH sailed the same yacht two handed and with four crew and felt sailed better with 4 crew. Approximately 32 two-handed competitors in a race, with Fastnet having around 110 two-handed entries" equating to >20% of the fleet. I have done only 8-10 races 2H from 25 – 175 miles, primarily under local US PHRF rating rules. His experience is only winning one race under perfect conditions, all others a fully crewed yacht won primarily due to more hands on the deck. The reality is I need many days at sea with this auto pilot to even start to get it near its capacity. In France, the guys on the Ultim's, IMOCA, Class 40, Figaro and Mini transat boats spend months and years sorting out their autopilot and boat! Whilst there is not much real 2H data available for the last 10-years, a father/son who won The Fastnet overall. There is the Middelsea/Rolux races that are beginning to embrace 2H. Then there was the 18th finisher in The Fastnet who were professional sailors - showing how hard it is to win on IRC sailing 2H. Data on 2H results was discussed with Fastnet an example, noting the Fastnet fleet would have declined if not for 2H yachts ie less than 200 from the actual over 250 this year.
Media (1)	No information provided
Various (1)	No information provided

Attachment 1.5

Topic # 5

Group Representations

#5 Does it really matter to you?

Two Handers (18)

I probably wouldn't enter if not eligible to win, though it's unlikely a two-handed would win and very expensive to participate in RSHYR coming from Perth.

1. Wouldn't "lose any sleep" if didn't qualify for the overall IRC trophy - just want to race.
2. Not concerned regarding the major trophies, more concern for the sport of sailing"
3. Tattersall Cup out of my realm and currently content to compete in two-handed class, acknowledging other top-end yachts would prefer to be eligible but the overarching feeling was to have fun sailing
4. Happy to simply finish a RSHYR" though "two-handed yachts should be eligible to win major trophies" noting they are "all are rated under the same IRC handicapping system ... they should be eligible"
5. We desire to sail offshore and are committed to doing so. The Sydney to Hobart can be divided similarly into two categories" ... there are "the GP boats which are mostly long, very fast and crewed by professionals or semi professionals" then there are "the bulk of the fleet. Some boats are old, some are new, the bulk of the crew could best be described as mature, or maturing, they are mostly amateur, they love our sport" with a desire to "win the Tattersall Cup, Illingworth Cup, Peter Rysdyk Cup and the Blue Water Pointscore."
6. If a yacht has IRC rating it should be eligible to win the Tattersall. Many yachts have won the Tattersall with far more sophistication than an auto pilot.
7. Am concerned to not win major trophies" suggesting in the RSHYR there be "a transition period for 2H as a demo fleet.
8. I care a lot about being eligible to win the major trophies and it matters a lot and disenfranchises two-handed entries.
9. My realistic view of contending for Tattersall Cup, though at the moment happy to be in the race – no one enters a race thinking they may not win.
10. "I was disappointed when the 2H were revoked from RSHYR eligibility".

Didn't care about being eligible for the major trophies – simply wants to race with his son and am not concerned about the limitations imposed on auto pilots. Yes - 2H should be included in the eligibility for major trophies. To me, yes it does matter – the 2H should NOT be eligible for the overall handicap win because they are required to have an auto pilot. Also the ban for autopilots on fully crewed yachts should remain. Yes - embrace the two-handed entries, with auto-pilot for both safety and as a development class for a trial period (3-5 seasons) confine them to their own class. Gather, analyse and interpret the data. In the meantime - revisit the

multi-hull exclusion and in the trial period maintain the "fully crewed" ban on auto pilot. The current 2H entries would benefit from the RSHYR experience gaining sea miles; ocean racing under heavy and various conditions; the Race Committee would be able to assess entries and their relevant experience and the 2H would have a higher level of safety and a stronger discipline.

Fully Crewed (18)

I embrace the major trophies. 2H is good for the sport and participation. It is an incredible chance to increase participation and I hope people's spirits are not dampened by the current environment. I like innovation and wants to see a 2H win.... never bet against self-interest in sailing. Including an Imoca or similar yachts for the Illingworth would be a spectacle, that said America's Cup has gone too far and is simply now an "arms race". It would be a high achievement for a 2H to win.

1. if auto pilots had limited inputs, then it would not matter to me if the 2H entrants were eligible for the major trophies. That said I think this (limitation) would be difficult to supervise and subsequently they should not be eligible.

2. applauded the WG and thanking them for their efforts" going on to say "YES" it does matter .. If 2H entrants are eligible to win overall - they should have their own division, with appropriate recognition, from which data can be derived to then allow refining of handicaps and restrictions for the future. I wouldn't care if two-handers won Its the best yacht that should win the race which is why we have a rating rule. Though it must be achieved equitably, so I support the current two-handed yachts not being eligible for major trophies unless their auto pilots are 'dumbed down'.

Talking about unrestricted Imocas and the Illingworth, I do not have a problem at all. They would need plenty of room on the start line due to their 'wings'! "The weekend warriors, like myself, may become depressed by a sport where technology decides the winner. So we need a 'grand prix' division for these sorts of boats, including two-handed crews and fully crewed boats with maximised technology. The character and culture of the RSHYR would be changed entirely if an IMOCA yacht were to win Line Honours." I do care who is eligible for the major trophies and 2H should be allowed to win these. I have concerns about the influence of 'flight control system' yachts and these should be monitored (ie crew should sail yachts) so that its about the skill of both crewing and steering a yacht. Not concerned if 2H being eligible for the trophies – it was just another hurdle to overcome. Its great if great the Club has continued ocean racing and that it promotes all levels of sailing. He didn't want the tradition of RSHYR 'thrown out'... the first issue is simply getting to Hobart. It (RSHYR) needs to keep its tradition and classes - the winner will most likely be a 'state of the art' yacht. I am currently torn as to whether the 2H should be eligible to win the major trophies, though concerned on where the advances in auto pilot may go. line honours is a little different to a handicapped winner (saying the Tattersall should always be a 'traditional' yacht). The RSHYR is a difficult race with a fully crewed yacht let alone 2H. It's a difficult decision to extend eligibility to 2H, or other advanced yachts in the future ie Imoca or multi-hulls (should they have a compliant rating). I am very much into tradition, so was upset that the Club races finishes are not at Rushcutters Bay. Strongly say there is the need to encourage sailing, therefore need to promote 2H. Our sport needs to grow and we need a lot more people sailing, therefore smaller, less expensive yachts will become the normal. Only one yacht less than 40' has won the race in the last 30 years, prior to that it was more frequent. We need an equitable rule so that the small yachts don't get 'beaten up' by the big players. The Club needs to look after the 'small guys' not just the 'top end'. Two people on a boat won't beat one with 15 crew, though a foiling yacht is a different issue and how do you protect the "Tattersall Cup" if they participate?

Race Management Committee Member (9)	Yes I do care the 2H should be eligible, it is the essence of RSHYR, and all sailors should be able to win if you sail well. I would be upset if say a \$500k auto pilot yacht beat my helmsman. That said, it is a very important thing to get this 2H thing right. I have no issues with the CYCA decisions to date and was simply wanting to be informative. Supports the decision to include two-handed to a max. length of 60' and the rest evolved from there. Two handed need to be an integrated, not a stand-alone, the overall outcome was to increase the RSHYR entries. 2H was to be a 'pilot' but due to Noumea being cancelled the 'pilot' did not occur – support a crawl, walk, run' process. I am more concerned with 'electronic assist' on yachts, not the amount of crew. The RSHYR is self-regulating - ie the longer you take the more weather patterns are experienced. For example Wild Oats may experience two weather patterns, with slower yachts experiencing multiple patterns. Being scored in fleet and as a two-handed I would really care. Otherwise I don't really mind as the divisions are going to become more and more different (with the advance of technology and design), it creates fun and interest in the sport. The fleet winner will be whimsical due to the great variance of yachts. Allowing auto pilot for fully crewed okay if you introduced let's say a 3sec/mile penalty the fully crewed most likely would not use the auto pilot.
Rating Agencies, Technicians & Equipment suppliers (8)	If I wasn't eligible to win the race – I wouldn't even enter. I applaud the working group for taking it seriously - it's not life and death though I understand the complexities of the issue" - quoting Dennis Connor "don't bet against anyone with a vested interest" going on to say "I hadn't enjoying sailing in a long, long time before I started sailing again in two-handed". "No complaints had been received by RORC for either two-handed or auto pilots within the last 5-years ... it is more likely to be a positive response in UK and Europe due to the skills of sailing two-handed – particularly in longer races." It's a negative to limit someone not to win a race outright and all entrants should be eligible to win major trophies. The criteria to enter RSHYR as a 2H must be very stringent. Yes I do think the 2H doesn't 'fit' in with the rules (fully crewed yachts, men on the rail etc).
Media (1)	... the desired objective is to somehow find ways of including the two-handers on an equal basis within the fleet of conventionally crewed yachts then, to be fair to all competitors.
Various (1)	No information provided



Attachment 2.a – Rating Rules – IRC & ORCi

CYCA Special Purpose Working Group Report

Date	17 May 2022
Purpose	Report to the Two Handed Special Purpose Working Group
By	David Kellett AM

IRC

With the co-operation of Dr Jason Smithwick, Director of Rating, RORC Rating Office.

Q. Is IRC looking in to the difference of crew weight between fully crewed and double handers?

A. IRC have research items looking into crew number/weight and short-handed is part of the consideration. Recent results for offshore racing have reinforced the understanding that the general balance of reduction of crew vs reduction of weight is fairly well balanced. For inshore racing it may not be so well balanced, but there is not a lot of short-handed inshore racing.

Q. Is IRC looking in to any rating change for yachts using auto pilot?

A. The 2022 research agenda does not include looking in to any rating change for yachts using auto pilot at this time, but are always considering developing areas of the sport and have produced internal papers on automatic control in general.

Q. Does IRC intend to change their view on allowing auto pilot across the entire fleet?

A. There is a new rule for 2022 as follows:

15.2(d) Boats shall not use stored power for steering unless specified by the Notice of Race.

This is detailed on page 3 of the link: https://ircrating.org/wp-content/uploads/2021/10/Proposed-IRC-Rule-Changes-for-2022-Tech-Comm_29_10_21_post-Congress.pdf

This change is to specifically allow organisers to specify in the NoR the use and type of autopilots. For example: "Autopilots are permitted for double handed class only. Autopilots are restricted to adjust the rudder(s) to adjust the heading only."

With any NoR rule you have to be careful to not restrict non-manual sail handling, canting keel mechanisms etc.

Q. Can a boat hold two rating certificates?

A. A **boat** may additionally hold a separate short-handed certificate. This short-handed certificate shall be valid only for racing in classes, or divisions of classes, for no more than 2 **crew**, included in a Notice of Race. When specified in a Notice of Race, **boats** holding short-



handed certificates, and *racing* in a short-handed class or division, may also be scored in the overall results of the race. The short-handed certificate will be clearly identified and shall only vary from the primary certificate in respect of, **mainsail widths**, headsail and flying headsail dimensions, single furling headsail allowance, the use of stored power, SPA, STL, SPL, **spinnaker pole/bowsprit**, number of spinnakers and flying headsails, **moveable ballast** and **variable ballast**. A **boat** holding a shorthanded certificate shall use that certificate for races for no more than 2 **crew**.

Q. Is there any rating difference between the same yacht in fully crewed configuration, to a double handed configuration, assuming the same sail configuration?

A. The rating formulation does not change between fully crewed and double handed, it is simply an opportunity for a configuration change. There are scientific and empirical reasons for this.

Q. Are auto pilots rated in any way?

Autopilots are not rated in IRC. The IRC Technical Committee are working on an IRC rule change, that steering devices may only be used when specifically permitted by the NoR.

To clarify:

IRC and the formulation is jointly owned by RORC and UNCL clubs and the rating development is through the IRC Technical Committee (TC) with representatives and expertise proposed by both clubs, it is not for RORC alone to consider a proposal. The IRC TC has the following considerations within IRC and RORC Racing.

- Autohelms are developing at a very fast rate and within RORC the experience and evidence is that their use and ability is exaggerated except in solo racing such as the Vendee Globe, saying that, we understand that they will continue to develop and their uptake and regular use may increase and therefore the situation will be monitored.
- An autohelm can range from a simple compass bearing analogue system right up to multiple sensors and digital AI learning ability. Rating the ability of an autohelm is almost an impossible job and this may be passing the buck on to measurers and rating teams who will not know one black box from another. Event organisers will also have difficulty policing their use and as with many other areas within our sport we have to rely on self-declaration and self-policing with good rules.
- In IRC we rate the best speed potential for a boat and on that basis, we do not rate the ability of the crew, for example there is no professional crew rating consideration. Rating autohelms may go against that ethos.
- Autohelms may be useful for short-handed offshore racing, but are of little use for short course day racing. An owner would have to regularly amend their certificate on that basis.
- We will be looking at the IRC Rules in particular to make it clear that it is the event organiser who may chose, to allow autohelms in accordance with Racing Rules of Sailing rule 52. We will also be looking at the idea of rating automatic systems, and this may include autohelms, flying rudder angle, canting keels, foil angle etc.



IMOCA

Q. Are IMOCA 60 foiling yachts rated in IRC?

A. IMOCA 60s have rated in IRC in the past. A new rule has been released regarding foiling yachts that limits vertical lift to 30% of boat weight by limiting foil lifting area. The latest data suggests that the new generation IMOCA60s may have trouble fitting into this requirement but can adjust to reduce the foiling capability.

Q. Would the IMOCA 60 with side foils pass the Category 1 stability requirement?

A. The IMOCAs are permitted to race in OSR Category 2 for the Rolex Fastnet Race in their own class. This is based on the IMOCA class requirements for stability being equivalent to OSR Category 2 requirements which are the same as Category 1 when considering ISO STIX, AVS and righting energy.

CLASS 40

Autopilots;

- The Inertial navigation systems must be available as a standard product (available on catalogue) and at a public price of less than €7,000 ex-VAT
 - Elements of the automatic pilot product line, namely the calculator, processor, electronic hub, power control unit, computer software and adjoining licences. Each of these elements must be available as a standard product (available on catalogue). This set-up must not exceed a public price of €20,000 ex-VAT.
Within this amount, the software licences required to operate the automatic pilot are deemed to be included. The other elements such as the displays, sensors other than the inertial navigation system and the rams are not included in the calculation. The term 'electronic unit' is understood to mean any device used to collect and use the data from the various sensors.
 - No element of the backup pilot can be more expensive than its equivalent on the main automatic pilot.

ORCi

Questions (DBK – 23 March 2022):

1. *If a boat presents in the same configuration, sails, stability, crew weight, etc. does the rating change between fully crewed and double handed.*
2. *Can an owner elect to sail with a designated crew weight, say 2 x 84kg instead of the ORCi calculated weight for fully crewed and receive an adjustment to their rating?*
3. *Is there any research being done on the effectiveness of auto pilots and are there any plans to rate auto pilots in ORCi.*
4. *Are auto pilots allowed in fully crewed ORCi racing.*

Answers:

1. *If a boat presents in the same configuration, sails, stability, crew weight, etc. does the rating change between fully crewed and double handed?*
 - Double Handed ORCi certificate is a separate certificate to fully crewed ORCi certificate.
 - Both DH and FC certificates may co-exist. ORC 303.5 (see below) refers to allowing only 1 x FC and 1 x DH at same time.
 - If only difference is crew weight, then ratings will be different between DH and FC, and shown on respective DH and FC certificates.
 - DH crew weight must be in range 120-300kg declared. If not declared it will be taken as 170kg and rated for 170kg (and then cannot be exceeded, nor less than 120kg).
2. *Can an owner elect to sail with a designated crew weight, say 2 x 84kg instead of the ORCi calculated weight for fully crewed and receive an adjustment to their rating?*

Yes, see answer to 1. above. Must be in conformance as in 1. above.

3. *Is there any research being done on the effectiveness of auto pilots and are there any plans to rate auto pilots in ORCi.*

No research at present but they are allowed, subject to NoR/SIs. See ORC 204:

204 Manual Power

RRS 52 is modified. Non-manual power may be used for:

- a) canting keel, water ballast and any hydrofoil.
- b) halyards, sheets to trim clew of a sail or a boom, backstay, vang or outhaul.
- c) use of an auto pilot when prescribed by the Notice of Race and/or Sailing Instructions.

4. *Are auto pilots allowed in fully crewed ORCi racing:*

Yes, subject to NoR/SIs. See answer to 3. above.

Relevant rule excerpts

ORC Rating Systems 2022.pdf available at

<https://www.orc.org/rules/ORC%20Rating%20Systems%202022.pdf>

102 Crew Weight

102.1 The maximum crew weight may be declared by the owner.

102.2 If the maximum crew weight is not declared it shall be taken as default calculated to the nearest kilogram as follows:

$$CW = 25.8 \cdot LSM0^{1.4262}$$

102.3 Minimum crew weight may be applied by the Notice of Race and Sailing Instructions and shall be calculated as follows:

$$\text{Minimum CW} = \text{Maximum CW} - (\text{the greater of: } 25\% \text{ of Maximum CW or } 85 \text{ kg})$$

102.4 The possibility of extending crew position beyond the IMS sheerline is taken into account through CEXT factor in accordance with ORC Sportboat Class Rules.

200 Crew Weight and Position

200.1 The weight of all crew members on board while racing weighed in light street clothes shall not be:

- a) greater than the maximum crew weight as defined in 102.1 and 102.2
- b) smaller than the minimum crew weight as defined in 102.3, when applied by the Notice of Race and Sailing Instructions.

301.3 An ORC Double Handed certificate may be issued from the data needed for ORC International or ORC Club certificate and shall apply for crews made of two persons as follows:

- a) an ORC Double Handed certificate may co-exist at the same time with a fully crewed ORC International or ORC Club certificate
- b) an ORC Double Handed certificate shall have clear notification if it is generated from ORC International or ORC Club measurements
- c) Crew weight for an ORC Double Handed certificate may be declared as prescribed in 102.1 but may only be in the range of 120 – 300 kg. If not declared, it shall be taken as 170 kg. Minimum crew weight as defined in 102.3 shall not apply for an ORC Double Handed certificate.

303.5 A boat shall have only one valid certificate at any one time. The valid certificate shall be only the one issued last.

204 Manual Power

RRS 52 is modified. Non-manual power may be used for:

- a) canting keel, water ballast and any hydrofoil.
- b) halyards, sheets to trim clew of a sail or a boom, backstay, vang or outhaul.
- c) use of an auto pilot when prescribed by the Notice of Race and/or Sailing Instructions.

ORC Race Management Guide 2022.pdf available at

<https://www.orc.org/rules/ORC%20Race%20Management%20Guide%202022.pdf>

2.3 Notice of Race:

...

b) *Changes to the ORC rules* – several ORC rules may be amended by the NoR in accordance with RRS 87 as follows:

- i) Minimum crew weight - ORC certificates define a Maximum crew weight where the weight of all crew members weighed in light street clothes shall not be greater than the number recorded on the certificate. This shall always apply, and therefore shall not be amended by the NoR. There is also a Minimum crew weight that is recorded on the certificate, but this shall be applied only when specified by the NoR and Sailing Instructions. See ORC Rules 102.3 and 200.1(b) for more details.

2.4 Handling rating certificates

2.4.1 ORC Rating Systems provides the following types of certificates issued only by an established national Rating office:

- a) *ORC International* – for a completely measured boat
- b) *ORC Club* – where measurement data may be measured, declared by the owner, or obtained from any other source, including photos, drawings, designs, data from identical or similar boats.
- c) *ORC Double Handed certificate* – may be issued from the data needed for ORC International or ORC Club certificate and shall apply for crews made of two persons.

2.4.2 (Handling rating certificates)

...

e) *Owner's declared values*

- i) Crew weight is an important factor affecting the boat's performance and is considered in the VPP rating calculations. The crew shall not be heavier than the Maximum value recorded on the certificate. The maximum value may be declared by the owner. If not declared, it will be calculated as default according to the size of the boat. And if the NoR or Sailing Instructions specify, then the crew weight shall not be less than the Minimum shown on the certificate.

CREW	
Maximum	1,013
Minimum	700 "other applied"



Attachment 2.b – “Auto Pilot” Deep Dive

CYCA Special Purpose Working Group Report

Date	9 May 2022
Purpose	Report to the Two Handed Special Purpose Working Group
Prepared By	Craig Neil

This paper is to provide the Special Purpose Working Group (SPWG) at the CYCA with information relating to Auto Pilots and related technologies.

The Auto Pilot Deep Dive - Terms of Reference:

On behalf of the SPWG to conduct a “deep dive study” (situation analysis) into and report by 30 November 2021 on:

1. the different categories of auto pilot sophistication that are currently available and in current use by both Two Handed and fully crewed entrants in CYCA events
2. whether it's feasible to limit auto pilot capability to for example limiting rudder(s) operation only to maintaining heading and wind only
3. what known advances into auto pilot equipment are currently being explored by leading equipment providers, that may become available this decade to CYCA race entrants
4. any other auto pilot advances the SPWG should be aware of
5. whether it's possible to prescribe that auto pilot must be disconnected from auto adjustment of everything except the rudder(s)

This information has been collated in late 2021 and it should be considered that technology evolves quickly, by the time this information is put into practice it will more than likely be surpassed. Having said that, we believe that a line can be drawn in the sand using the information gathered in this report and this can/should be updated on an annual basis

We have focused on the current technologies available in Australia however, there are other technologies available internationally. We have used data collected from surveys by the CYCA about the Australian 2 handed fleet and focused on the technologies currently in use.

The information has been obtained by:

- Searching the internet
- Talking to marine electricians
- Talking to users of Auto pilots
- Talking to manufacturers of Auto pilots
- Surveys from the 2 handed fleet in Australia.
- Talking to some owners/skippers in the 2HD.
- Engaging software architects
- Test sail on “Shearwater” with a B&G H5000 unit installed (see Attachment 2.c)



Types of Auto Pilots:

1. 1) Wind vane - The wind vane is an older style of auto pilot and should not be used in modern day offshore sailing as it is considered too dangerous.
2. 2) Electronic Auto Pilots.

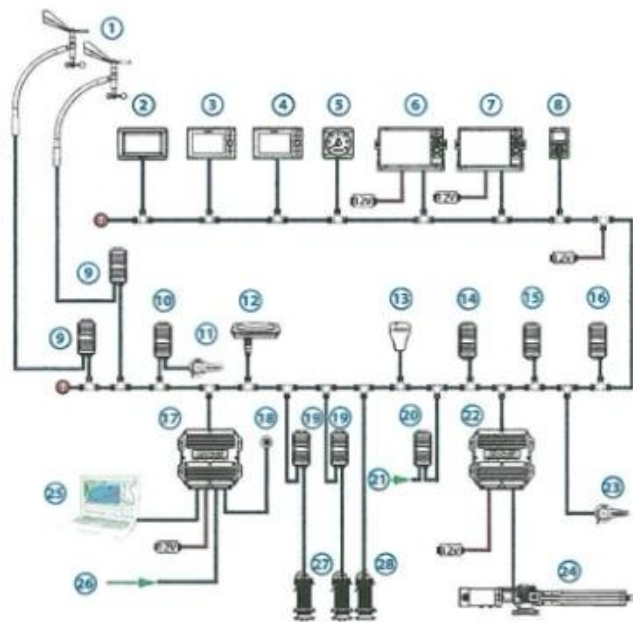
For its purpose the remaining document will focus on electronic Auto Pilots.

What makes up an electronic Auto Pilot:

- Motorised arm that attaches to the steering or rudder stock.
- Connection to the yachts instrumentation control system.
- Connection to a compass or Gyro device.
- Connection to wind instruments
- Connection to rudder sensor
- Connection to auto pilot computer (Normally separate computer)
- Software
- Advanced artificial intelligence software.
- Cloud connectivity.
- Connection to winches, to the traveller, to jib cars and to foils (Advanced)
- Connection to sensors – in the hull, on sails, in the rudder(s), the keel, the mast(s), the bow sprit, the winches, the traveller, the outhaul, the halyards, the forestay, the backstay, the wind vain, the log, the barometer, any foils, the depth sounder and the radar.



Image of what makes up an auto pilot:



No.	Description	No.	Description
1	Fwd & Aft vertical masthead unit	15	Motion sensor
2	HV Display	16	Alarm module
3	Graphic display	17	H5000 CPU
4	Race display	18	Man Overboard Button - MOB
5	Analogue display	19	Analog module
6	Zeus series MFD	20	Analog module
7	Zeus series MFD	21	Analog sensor *
8	H5000 Pilot controller	22	H5000 Pilot computer
9	Analog module	23	Rudder reference unit
10	Analog module	24	Hydraulic ram
11	Mast rotation sensor	25	Deckman via serial port
12	Precision-9 compass	26	NMEA 0183 Tx / Rx
13	GPS	27	Port & Starboard speed sensor
14	Barometric sensor	28	Depth sensor
29	Micro-C Terminator	29	12 Volt DC power supply

→ Note: * See analog expansion for more information on type and quantity of devices

System examples | H5000 Operation Manual

Compass and Gyros:

There are many types of compasses and Gyro systems, all yachts have a compass but as we get into autopilot systems, we start to use more advanced compass technologies.

The flux gate compass has been used primarily in autopilot systems but in the last few years we have started to see more accurate gyro compasses used for better accuracy. The fluxgate compass was sensitive to other metallic items on a yacht such as the engine and rigging.



With today's new autopilot systems, we are seeing electronic gyro style compasses being installed which are not as subjective to interference from magnetic fields or metallic devices. These gyro devices range from an electronic device that still uses magnets for an "off the shelf" price of around \$4000. There are high end systems that are very accurate and have no sensitivity whatsoever to metallic devices made by Quadrans, these gyros cost around \$30,000AUD. We currently know of three boats using this type of gyro in the existing Australian fleet.

The purpose of the gyro system is to give very accurate instrumentation readings, including additional information encompassing "the pitch", "the Yaw" and "the roll". With this information the autopilots can adjust the rudder for varying wind and sea conditions and make the boat a lot faster.

Software:

More advanced auto pilot technologies also incorporate the use of artificial intelligence (machine learning) software and with the information from advanced gyros these Autopilots can anticipate the boats movements. This software can also extend into very advanced methods of steering that are far more accurate than a human, these systems also "never get tired". It is these technologies that give a boat a real steering advantage over a human in race conditions.

The advancement of AI technologies in sailing is happening quickly. The capabilities are developed overseas by advanced technology companies and initially used on the IMOCA and Volvo racing fleets. When proven, the technology is then sold to companies such as B&G to be commoditised on yachts all over the world. The software and advanced algorithms become part of their "off the shelf" offering.

The time taken from development to actual usage in the general market is extremely quick and this will only become quicker over time. We will see the use of AI expand across other brands of Auto Pilots and the continual improvement with the bands using it now.

We currently have the higher end of the Australian 2HD using the B&G H5000. This auto pilot computer has AI technologies as standard on the Autopilot computer.

If we take this a step further, we see boats like the IMOCA's and new Volvo's using technology developed by companies like Madintec, Nokia and Bell labs. This level of AI along with connectivity to other moving parts, can sail the boat without a human having to trim sails, move jib cars, travellers, move ballast, adjust rake, backstays and the software pretty much moves any physical moving part.

The latest versions of software also enable weather to be downloaded, routing to be determined whilst it considers sea state and adjusts to wave heights and wave frequency - all of this and the crew certainly never has to touch the helm.

Sailing with autopilots today:

It is a common practice in these new yachts using auto pilots that after a tack or jibe the crew spend time adjusting the Autopilot to improve the boats performance.

The pages below are taken from the B&G H5000 Autopilot user manual in 2022 ("Off the Shelf") and show an example of the systems advanced tuning capabilities.



APPENDIX A: H5000 Pilot - Menu Structure

MENU				VALUE		
Response				Perf 1		
				Perf 2		
				Perf 3		
				Perf 4		
				Perf 5		
Sailing	Wind Mode			Auto		
				Apparent		
				True		
	Gust Response	Enable		On / Off		
		Gust Minimum		1 - 10		
		Response Rate		1 - 10		
		TWA Response		0 - 5		
	TWS Response	Enable		On / Off		
		Response Rate		1 - 10		
	Tack Time		2 - 50 seconds			
	Tack Angle		50 - 150 degrees			
Heel Compensation	Enable		On / Off			
	Response Rate		1 - 10			
Steering	Auto Response			Off		
				Economy		
				Normal		
				Sport		
	Recovery			Off		
				Narrow		
				Medium		
				Wide		
	Limits	TWA Minimum		110 - 165 degrees		
		TWA Maximum		110 - 165 degrees		
		Bear Away Max		1 - 20 degrees		
		Cruising Speed		2 - 50 knots		
		Rudder Limit		10 - 45 degrees		
		Off Course		5 - 35 degrees		
		Low Boat Speed		0.0 - 3.0 knots		
Speed Source	Manual		0 [auto] - 25 knots			
Installation	Commissioning	Dockside	Rudder Feedback	Internal Frequency		
				Internal Voltage		
				Internal Current		
				External		
			Boat Length	6 - 50 meters		
			Drive Voltage	12 Volts		
				24 Volts		
			Rudder Calibration	Set Port End		
				Set Starboard End		
		Set Mid-Point				
		Rudder Test				
			Sea Trial	Auto Tune		
				Rudder Gain		0 - 4
Auto Trim				10 - 800 seconds		



Installation (cont.)			Counter Rudder		0.5 - 16
			Adapt	Enable	On / Off
			Mid-Point		
	Rudder Drive	Drive Voltage			12 Volts
					24 Volts
		Drive Engage			Auto
					Clutch
		Motor Output			10 - 100 %
		Rudder Deadband			Auto
				Manual	
	Manual Deadband			0.1 - 4.0 degrees	
	Reset Pilot				Yes / No
	Source Selection				Auto Selection
					Compass
					Navigation
					Position
					Boat Speed
					Apparent Wind Angle
					True Wind Angle
					Heel Angle
Setup	Display	Day Mode	Red Backlight		On / Off
			Inverse Display		On / Off
			Contrast		1 - 10
		Night Mode	Red Backlight		On / Off
			Inverse Display		On / Off
			Contrast		1 - 10
		Lighting Group			Local
					Network
					1
					2
				3	
				4	
	Alarm buzzer				On / Off
	Language				English
German					
French					
Spanish					
Italian					
Dutch					
Swedish					
			Norwegian		
Local	Reset		Yes / No		
	Advanced Mode	Enable	On / Off		
Key Beeps	Enable			On / Off	
Software Information					



Remote assistance:

In today's around the world racing events the yachts are in regular contact with the shore support crew. The yacht's information is shared with the support crew and weather analysis, routing and best set ups are discussed. I'm not sure if the shore crew can adjust the yacht or even sail the boat remotely, but you would assume this capability does exist.

Connection to cloud via Sat phone is how this is achieved, and this is permissible in the "around the world" races today. Whilst it's not on the Terms of Reference of the SPWG, this raises the challenge for regulating/restricting "outside assistance" through communication of data from a competitor for remote data analysis, onboard trim and of course settings for communication from a competitor for "in cloud" data analysis and transmission of results back to the competitor to assist in trim and course settings.

The Current State in Australia:

Types of Auto Pilots available in Australia (Not All):

Brands, Model, SW version, Capabilities Raymarine smart pilot
 Raymarine ST6001
 Raymarine Evolution P70

 Raymarine SPX 30
 Lecomble & Schmitt Linear drive.
 Simrad
 Garmin
 B&G Triton (Base level)
 B&G 5000 (Advanced)
 Lewmar
 NKE Gyro Pilot
 La Rochelle – Madintec MADBRAIN (Very advanced AI)
 Robertsons
 Coursemaster
 Furuno Nav pilot
 More brands, SW versions, Models and SW capabilities to be added to list

Current 2HD fleet technologies used (source CYCA survey 2020):

BOAT	AUTOPILOT
Abracadabra	Coursemaster CM950
Alex	Raymarine ST6002
Apriori	Raymarine E70096
Ariki Tai	Furuno Navpilot 700
Charlie's Dream	Raymarine SmartPilot ST6002
Cole Walker 2024	B&G H5000
Galaxy III	Raymarine ST6001
Kayimai	Raymarine Evolution Autopilot P70
Kraken	Lecomble & Schmitt 40ST16 Linear Drive
Maverick	B&G H5000
Mister Lucky	B&G H5000



Mistral (Hugh Ellis as owner)	B&G H5000
Sidewinder	B&G H3000
Sweet Chariot IV	Raymarine SPX 30

Can an Auto Pilot be governed to wind and heading (rudder angle) only – (ie: disconnecting auto adjustment of everything except the rudder(s))?

An auto pilot can be set in a “heading mode” that will steer the boat towards the heading to the best of its ability. Often this heading cannot be achieved because of sail configuration and trim.

“Wind mode” can also be set and the boat will steer to the best performance given the wind conditions. In either of these settings the AI software does assist with the rudder(s) angle adjustments.

Extracts from the communication below suggests that an easier rule could be to only allow magnetic course mode to be set. This makes sense but if the auto pilot is integrated into the instruments and uses AI it would be difficult to police. Even if declarations are signed, the modern-day auto pilots will rely on data from instruments including *compasses and the AI software would consistently improve performance.*

“.....it is easy to write a rule that says that you can’t use motion, gyro-compass, or turn-rate sensors as an input to your autopilot. The problem is that many inexpensive electronic compass sensors are “strap-down” (i.e. non-gimballed, and/or “rate-stabilized” and so include inertial attitude and turn-rate sensors. So a boat using their stock RayMarine or Garmin autopilot with its stock compass, even in magnetic course mode, would unknowingly be cheating because most recent magnetic compass sensors incorporate inertial rate and attitude sensors within the compass sensor.

An easier to understand rule would be to only allow magnetic course mode to be used in the autopilot, e.g. can’t have the pilot steer by the wind. Of course an autopilot that was integrated/interfaced to the instruments would be capable of steering by the wind but we’re a self-policing sport in lots of ways, and at least a magnetic-course only rule would be easy for all sailors to understand so it would be much less likely for a boat to unknowingly cheat.” – source: Stan Honey.

Power consumption:

With an auto pilot connected there is an increase in power consumption. This can be overcome by:

- Charging batteries more frequently.
- Installing additional battery capacity that can add weight (fixed or moveable).
- Installing renewable power generation such as wind turbines. solar panels or an auxiliary generator that with fuel can also add weight; or
- a combination of all the above.

Weight:

The weight of the Auto Pilot computer, plus Gyro compass and the hardware required to connect to the rudder only is around 25kgs, not including the weight of the generator, it’s fuel and any batteries

What is the best way forward?

With the rapid advancement of technology, one observation is the CYCA keep remain alert on what systems are available and allowed for eventual inclusion in its Notice of Race (NoR). The best way would be to maintain a list of Auto Pilot systems available and with this develop an approved list including the versions of software. This might



extend to the instrumentation computer itself as a means of preventing the software being moved. This list can be updated each year and gives control to the Organising Authority (OA).

If this approach is adopted, areas to be addressed in the NOR would include:

1. Auto pilots may only be connected to the rudder(s) and not have the ability to operate any other equipment such as winches, jib cars, foils, ballast, sensors, or any other moving part of the yacht
2. Over time, as Auto pilot technology becomes more advanced and instrumentation systems appearing on the CYCA authorised list grow, only the published software versions on the authorised list may be used, with no modifications permitted
3. Use of artificial intelligence may be permitted but only if incorporated in the Auto pilot and only connected to the rudder(s)
4. External connections to cloud or any other device able to control the Auto pilot's operation of the rudder(s) during a race is prohibited.
5. Auto pilots are to be stand-alone devices and only operated within the vessel and within the capabilities of the manufacturer's software and the approved software version.
6. No external party should be able to receive information from the yacht's computers during a race

Conclusion:

The more practical alternative would be to simply restrict operation of the auto pilot to operating the rudder(s) angle only, whilst the CYCA should remain alert on what systems are available and developing a list of Auto Pilot systems available and with this developing an approved list of Auto pilots and software versions for eventual inclusion in the NOR.



Attachment 2.c – “Auto Pilot” demonstration sail

CYCA Special Purpose Working Group Report

Date	21 October 2021
Purpose	Report to the Two Handed Special Purpose Working Group
Courtesy of	Guido Belgiorno-Nettis



Shearwater is a unique custom Frers cruiser-racer with twin rudders, lifting keel and hybrid power.

The SPWG & Craig Neil take a closer look.....

Background notes courtesy of Yachting World's Crosbie Lorimer 2 July 2019

Guido Belgiorno-Nettis – businessman, engineer, arts patron and yachtsman – chose the name Shearwater for his latest creation.

Belgiorno-Nettis, whose sailing accomplishments includes six Farr 40 Australian National Championship wins and a World Champion title in 2011, commissioned Mani Frers, of the famed Frers yacht design dynasty, to create his yacht. “We liked each other immediately,” said Frers, adding: “I already had been thinking about designing this sort of boat.”

Onboard demonstration sail on board “Shearwater” featuring the B & G H5000 Auto Pilot.

1. Provided valuable insights about the complexities associated with installation, setting up and operation of the B&G H5000 (including loading software upgrades). It performed best when set to “Wave” and “Current” with targets, but not so well for BSP, TWA, Heel or AWA
2. Demonstrated the fact that whilst the H5000 Auto pilot was continually adjusting its memory to suit the conditions, it only operated the boat’s twin rudders. All other adjustments on the yacht were decided and made manually (many being servo assisted)
3. Gave us a good understanding of the advantages and limitations of autopilot in use and it’s almost constant need for monitoring at sea
4. Reinforced the safety aspects of Auto pilot especially whilst two crew are hoisting/reefing/lowering a mainsail and whilst hoisting; rolling and lowering headsails
5. Drew our attention to the significant demands for electric power and additional weight (amounting to 1/6th of dry weight), associated not only for the Auto pilot itself but with the electric winches and other onboard equipment - including heavy generators; fuel and batteries (not to mention solar cells)
6. When engaged, the Auto pilot operated well in settled conditions but was prone to “confusion” in rougher and/or gusty weather. Set to “AWA” the boat seemed to sail at its best, sailing on (real time) wind without pre-empting any change in conditions



7. Highlighted the need for crew to almost constantly watch and manually adjust the Auto pilot settings
8. Also highlighted the need for regular manual tidying up of sheets to avoid lock-ups and to avoid collisions
9. It was quite clear the Auto pilot operation was entirely “reactive”, having zero capacity to “pre-empt” anything including avoiding a collision
10. Demonstrated that unless we were close up to its display and in bright sunlight, it was quite difficult to read the Auto pilot digital displays

In summary, initially setting up the Auto pilot was complex. Then with all functions turned on the Auto pilot needed human monitoring, demanding time and technical skills to customise its fit out to suit each particular yacht. Once optimised, the B & G H5000 unit worked very well indeed.



Attachment 2.d – Statistical Analysis of the CYCA Race Results 2021

CYCA Special Purpose Working Group Report

Date	13 May 2022
Purpose	Report to the Two Handed Special Purpose Working Group
	Statistical Analysis of the CYCA Race Results 2021
Findings	<p>A detailed statistical analysis has been undertaken of the 2021 Rolex Sydney Hobart, Cabbage Tree Island Race, Flinders Island Race and Bird Island Race (and discrete parts of those races) to identify whether any inference could be drawn that either the IRC or the ORCi rating systems fails to fairly rate either two-handed boats or fully crewed boats relative to the other such that either is advantaged.</p> <p>My conclusion is that the analysis could not provide a basis to conclude that either rating system advantages one of those classes against the other, for the reasons that:</p> <ul style="list-style-type: none"> • it was not possible to exclude a number of other random variables that impacted the results, most particularly prevailing weather and current; • the number of boats that finished was too small to allow meaningful comparisons to be made with a sufficient degree of confidence; and • the courses sailed in the prevailing weather conditions did not include, across the entire fleet, appropriate proportions of upwind, downwind and reaching components. <p>Those factors mean that a statistical analysis alone cannot support a decision to include or not include two-handed boats as eligible for the Tattersall Cup and that a decision would need to be made in the absence of statistical support either way.</p> <p>Reference should be made to the attached detailed report for the full analysis.</p> <p>I recommend that the same analysis be undertaken at the end of the 2022/23 season and following seasons. Whilst such an analysis of our long races will likely be impacted again by other random variables, there may be occasions where some inference can be drawn from all or part of a race to the effect that one or other rating system fails to fairly rate either two-handed boats or fully crewed boats relative to the other.</p> <p>On behalf of the Special Purpose Working Group:</p> <p>Martin James – CYCA Past Commodore and Life Member</p>



Release authority	For inclusion in the SPWG Final report to the CYCA Board
Attachments	<p>Report to the Two handed SPWG dated 7 March 2022, updated on 13 May.</p> <p>Extracts of the spreadsheet referred to in that report comprising the following:</p> <ul style="list-style-type: none"> • Consolidated line honours results • Consolidated IRC overall handicap results • Consolidated Overall IRC Corrected Time Graph – Place & TCF • Consolidated IRC Division 4 handicap results • Consolidated Division 4 IRC Corrected Time Graphs – Place & TCF • Consolidated ORCi overall handicap results • Consolidated Overall ORCi Corrected Time Graphs - Place & TCF • Consolidated ORCi Division 3 handicap results • Consolidated Division 3 ORCi Corrected Time Graphs – Place and TCF

MEMORANDUM

To: Kerry Roxburgh, David Kellett, Peter Shipway
From: Martin James
Date: 7 March 2022 (updated 13 May)
Subject: RSHYR and BWPS - Results Analysis

This memorandum summarises the conclusions I presented at our meeting last week as to whether, based on the results of the 2021 Rolex Sydney Hobart and the preceding three BWPS races, there is any inference that can be drawn that either of the current IRC or the ORCi¹ rating systems fails to fairly rate boats sailing two handed relative to those sailing fully crewed such that the former is advantaged, or vice versa.

Methodology

For the purposes of the analysis I created a set of corrected time results for the RSHYR that consolidated the two handed elapsed and corrected times with the fully crewed times. In those results I reversed out the redress granted to *Ichi Ban* and the penalty applied to *Celestial*.

For the Bird Island, Flinders Island and Cabbage Tree Island races the consolidated results are publicly available. They needed no adjustments for penalties and redress. A strict comparison of two handed with fully crewed results in those races is affected by the later start time for the two handed boats. However, given the weather conditions at the start of each race and the short delay I have taken the view that its impact on the analysis is unlikely to be material.

To identify whether any inference could be drawn from the results my analysis examined them in the following three groupings:

- Overall corrected times for each rating category for each of the four races.
- For RSHYR, the division 4 corrected times for IRC and the division 3 corrected times for ORCi. This was on the basis that based on their TCFs all two handed boats were in those divisions, the spread of time correction factors was less than for overall and if all boats were sailed equally well you would expect that those boats would generally be in more similar weather conditions compared to the full fleet.
- The top half (by placing) of the respective overall and divisional handicap results, on the assumption that those boats would most likely include the most competitively designed and sailed boats. This approach was similar to that adopted by Gordon Marshall in his 1982 paper² comparing time on distance

¹ ORCi is relevant to the analysis as it is open for CYCA to change the rating category used to determine the winner of the Tattersall Cup to ORCi from IRC.

² A Report on Handicapping, Gordon Marshall, Offshore October/November 1982, p12

against time on time handicapping, although its application here resulted in very small samples.

In addition, I looked at discrete parts of the RSHYR (a race within a race, if you like) that might minimise the impacts of random variables that affected the other groupings over the entire race distance.

Spreadsheet

I worked with a spreadsheet that contains the consolidated overall and relevant divisional RSHYR results for both IRC and ORCi, and the consolidated line honours results. Extracts of that spreadsheet are at the end of this memorandum.

Below each overall and divisional set of corrected time results there are some very basic statistical outcomes comparing average corrected times, standard deviations and spread. Below those are two scatter diagrams showing the two handed boats and the fully crewed boats with the horizontal axis based on placing or TCF and the vertical axis based on corrected time (in seconds).

Observations

The question of whether under either rating system two handed boats or fully crewed boats are advantaged as against the other is a test of whether well designed and well sailed boats in either category have an equal chance or opportunity to place well in the results. In a handicap fleet the question thus becomes whether the relative time correction factors were appropriate to provide all boats with that equal opportunity to figure well in the results.

As with any statistical analysis it is critical that corrected time results (that reflect the impact of the relative time correction factors when applied against elapsed times) are not impacted by variables other than that which is sought to be tested. That is why an analysis of racing results for a purpose such as this is notoriously difficult as it needs both sufficient boats racing (to create enough data points) and them doing so in conditions which are free from random variations in factors that may impact differently on the elapsed times for different boats, such as differences experienced by boats in wind speed and direction, current speed and direction and sea state.

Conclusions

My conclusion is that the 2021 RSHYR and other BWPS races do not provide a basis to conclude one way or the other that either rating system advantages one category of boat over the other in that it makes it more likely that a boat of that category will be well placed in the results, for the following reasons:

- Most fundamentally, the random variables of weather and current played a very significant role in all four races and that of itself prevents us drawing any meaningful inference in relation to the adequacy of rating. This was accentuated in the three BWPS races prior to the RSHYR by the time at which a particular boat commenced the second leg, and in the RSHYR, as usual, by the time that boats arrived at Tasman Island and then the Iron Pot.

A review of the races of the boats that placed well in the consolidated results showed that they put their boats in the best positions to optimise their course

to the finish in their forecast conditions, and these decisions played a significant role in the outcomes. They tended to avoid extensive times parked or making little progress (acknowledging that in time on time handicapping, periods parked or going slowly favours the lower rated boats over the higher rated boats – and as you can see from the scatter diagrams the two handed boats are grouped toward the lower end of time correction factors). In the RSHYR the conditions experienced by the boats at each end of the fleet and in the middle differed markedly after the first 12 hours or so and thus comparisons seeking insights as to their ratings are lost in a fog of other factors (most particularly wind speed and direction differences, and some lengthy periods of going nowhere experienced by some boats).

- We lacked sufficient boats finishing all four races to allow an analysis that provides outcomes in which we could have a sufficient degree of confidence.

The 2021 RSHYR started with 88 boats but then had a high attrition rate with only 50 boats finishing, the smallest finishing number for many years. Moreover, whilst 10 two handed boats finished only 7 of them competed in IRC and 9 in ORCi.

The Cabbage Tree Island Race ended up with a larger finishing number of boats (60), whilst the other two BWPS races had less. However, the number of finishing two handed boats was smaller again than in the RSHYR (6 in each race and each of IRC and ORCi), again impacting adversely on being able to draw meaningful conclusions.

For a decision as momentous as that you are addressing it is indeed appropriate to look for evidence that, to the extent that they play a part in the results, the rating systems are doing all that they can to ensure that all well sailed boats, whether two handed or fully crewed, are afforded an equal opportunity to do well. That first is a question is as to whether the rating systems seek to properly take the differences between two handed boats and fully crewed boats into account insofar as they bear upon potential performance in a variety of wind conditions.³ That should then be backed up by an analysis of how that plays out on the race course in Australian conditions.

Examining the results of races in which both two handed and fully crewed boats compete is likely to be statistically valid only where variables of weather and tide have no or no material impact, and the courses sailed include upwind, downwind and reaching components. CYCA's long ocean races are unlikely to provide the answers that we seek – it is more likely that we would get something meaningful for a statistical analysis in our short offshore and round the buoys racing. Indeed, that was the basis for Gordon Marshall's analysis in 1982 – the Pan Am Clipper Cup in that year did have the conditions that allowed for a reasonable statistical analysis. Tellingly, he largely ignored the Round The State Race for the same reasons that our 2021 long ocean races provide no insight on the ratings question you posed to

³ This is necessarily about the matters that can be rated, including taking into account factors such as crew weight induced impacts on righting moment and displacement, for example. It is not about matters that can't be rated such as the competence of crew, or the relative abilities of a person or an autopilot as a helmsperson.

me based on a statistical analysis.⁴ I am not advocating that we don't do an analysis on every race in which a mixed fleet competes; we should as part of ensuring that we have the best information at our disposal when deciding the Tattersall Cup question and reviewing the position in the years ahead.

⁴ For the sake of completeness I note that if we disregarded all the reasons that we should ignore any statistical analysis of the RSHYR, the full fleet, the divisional and the top half analyses would all tend to support the proposition that the fully crewed boats enjoyed a slight rating advantage over the two handed boats on both IRC and ORCi.

Rolex Sydney Hobart 2021 - Consolidated Line Honours				(NB. Penalty and redress reversed)	
Place	Name	Owner	Finish Time	Elapsed Time	Type
1	Black Jack	Peter Harburg	2021-12-29 01:37:17	02:12:37:17	RP 100
2	LawConnect	Christian Beck	2021-12-29 04:11:44	02:15:11:44	Jaun-K 100
3	SHK Scallywag	Seng Huang Lee	2021-12-29 04:30:52	02:15:30:52	Dovell 100
4	Stefan Racing	AUS 80 Pty Ltd	2021-12-29 15:20:47	03:02:20:47	Botin 80
5	Whisper	David Griffith	2021-12-29 15:51:30	03:02:51:30	JV 62
6	Ichi Ban	Matt Allen	2021-12-29 16:45:29	03:03:45:29	Botin 52
7	Celestial	Sam Haynes	2021-12-29 17:02:43	03:04:02:43	TP 52
8	Smuggler	Sebastian Bohm	2021-12-30 00:14:54	03:11:14:54	JV TP52
9	Quest	Craig Neil	2021-12-30 04:46:37	03:15:46:37	TP 52
10	Mayfair	James Irvine	2021-12-30 12:15:33	03:23:15:33	Rogers 46
11	Maritimo	Bill Barry-Cotter	2021-12-30 14:43:24	04:01:43:24	Schumacher 54
12	Chutzpah	Bruce Taylor	2021-12-30 15:36:01	04:02:36:01	Caprice 40
13	Pretty Woman	Richard Hudson & David Beak	2021-12-30 16:15:48	04:03:15:48	IC 45 Mod
14	MRV	Damien King	2021-12-30 16:18:23	04:03:18:23	Frers 61
15	Hartbreaker	Antony Walton	2021-12-30 17:51:15	04:04:51:15	Reichel Pugh 46
16	LCE Old School Racing	David Elliott	2021-12-30 18:34:16	04:05:34:16	DK 46
17	Highly Sprung	Mark Spring	2021-12-30 19:55:20	04:06:55:20	Beneteau First 45
18	Carrera S	Gerry Cantwell	2021-12-30 20:00:01	04:07:00:01	Marten 49
19	Sidewinder	Rob Gough	2021-12-30 20:12:00	04:07:12:00	Akilaria RC2
20	Oroton Drumfire	Will Vicars	2021-12-30 20:50:49	04:07:50:49	Hoek TC78
21	Cinquante	Kim Jaggar	2021-12-30 23:00:10	04:10:00:10	Sydney 38
22	Secret Mens Business 1	David De Coster & Sally Armati	2021-12-31 00:11:01	04:11:11:01	Murray 42
23	Wings	Ian Edwards	2021-12-31 00:35:29	04:11:35:29	Dehler 46
24	Love & War	Simon Kurts	2021-12-31 01:24:44	04:12:24:44	S&S 47
25	Disko Trooper_Contender Sailcloth	Jules Hall	2021-12-31 03:01:42	04:14:01:42	J/99
26	Solera	Stuart Richardson	2021-12-31 03:05:40	04:14:05:40	Elliott 1350 Tourer
27	Midnight Rambler	Ed Psaltis	2021-12-31 03:58:58	04:14:58:58	Sydney 36
28	Eve	Steve Capell	2021-12-31 06:24:57	04:17:24:57	Swan 65
29	Supernova	Alex Seja & Felicity Nelson	2021-12-31 07:34:34	04:18:34:34	Sydney 36

30	Flying Cloud	David Myers	2021-12-31 07:35:11	04:18:35:11	Beneteau First 40
31	She's The Culprit	The Culprit Syndicate	2021-12-31 07:39:23	04:18:39:23	Inglis/Jones 39 Mod
32	Fruit Salad 3	Mark Drobitko	2021-12-31 08:45:02	04:19:45:02	Beneteau First 40
33	B52	Daniel Farmer	2021-12-31 10:54:22	04:21:54:22	Murray 41
34	Dodgeball	Leith Group Developments	2021-12-31 11:44:21	04:22:44:21	Beneteau First 40.7
35	Salt Shaker	Peter Franki	2021-12-31 11:57:37	04:22:57:37	Sydney 36
36	Joker on Tourer	Grant Chipperfield	2021-12-31 11:57:50	04:22:57:50	Elloitt 1250 Tourer
37	Wild Oats	Brett Eagle, Marc Skjellerup & Gordon Smith	2021-12-31 12:35:05	04:23:35:05	Farr 43
38	Speedwell	Colin Geeves	2021-12-31 14:36:20	05:01:36:20	Beneteau 34.7
39	Rum Rebellion	Shane Connelly	2021-12-31 14:37:00	05:01:37:00	J/99
40	White Bay 6 Azzurro	Shane Kearns	2021-12-31 14:55:55	05:01:55:55	S&S 34
41	Flying Fish Arctos	Flying Fish Online	2021-12-31 15:16:09	05:02:16:09	McIntyre 44
42	Navy One	Royal Australian Navy Sailing Association	2021-12-31 18:27:39	05:05:27:39	Beneteau First 40
43	Euphoria II	Marc Stuart and Richard Combrink	2021-12-31 18:28:03	05:05:28:03	Beneteau First 42
44	Bowline	Ian Roberts	2021-12-31 19:29:48	05:06:29:48	Beneteau First 44.7
45	Flat White	Jen Linkova	2021-12-31 19:53:38	05:06:53:38	Radford 12.2
46	Crux	Carlos Aydos	2021-12-31 20:47:10	05:07:47:10	S&S 34
47	Luna Blue	David Watson, John Turnbull & Andrew Silk	2021-12-31 22:11:36	05:09:11:36	Beneteau First 45
48	Reve	Kevin Whelan	2022-01-01 00:21:53	05:11:21:53	Beneteau First 45f5
49	Local Hero	Mark Ayto	2022-01-01 04:04:11	05:15:04:11	BH 36
50	Solveig	Anne Lawrence	2022-01-01 08:40:45	05:19:40:45	Halvorsen 36

Notes: 20% of the boats that finished were 2-handed boats

58.8% of the 2-handed boats finished

56.3% of the fully crewed boats finished

Rolex Sydney Hobart 2021 - Consolidated IRC						(NB. Penalty and redress reversed)	
Cat Place	Div	Div Place	Name	Elapsed Time	TCF	Corrected Time	Corr. Time (secs)
1	1	1	Celestial	03:04:02:43	1.398	106:18:41	382,721
2	0	1	Ichi Ban	03:03:45:29	1.404	106:21:52	382,912
3	4	1	Love & War	04:12:24:44	1.018	110:21:49	397,309
4	4	2	Disko Trooper_Contender Sailcloth	04:14:01:42	1.007	110:47:55	398,875
5	4	3	White Bay 6 Azzurro	05:01:55:55	0.932	113:38:26	409,106
6	0	2	Whisper	03:02:51:30	1.52	113:47:05	409,625
7	1	2	Smuggler	03:11:14:54	1.373	114:18:00	411,480
8	4	4	Midnight Rambler	04:14:58:58	1.031	114:25:24	411,924
9	3	1	Highly Sprung	04:06:55:20	1.122	115:28:43	415,723
10	3	2	Cinquante	04:10:00:10	1.094	115:58:01	417,481
11	0	3	Black Jack	02:12:37:17	1.948	118:05:26	425,126
12	4	5	Crux	05:07:47:10	0.925	118:12:08	425,528
13	2	1	Chutzpah	04:02:36:01	1.204	118:42:53	427,373
14	2	2	Maritimo	04:01:43:24	1.219	119:07:29	428,849
15	4	6	Supernova	04:18:34:34	1.04	119:09:33	428,973
16	2	3	Pretty Woman	04:03:15:48	1.203	119:24:50	429,890
17	2	4	LCE Old School Racing	04:05:34:16	1.185	120:21:42	433,302
18	1	3	Quest	03:15:46:37	1.372	120:25:48	433,548
19	4	7	Speedwell	05:01:36:20	0.992	120:37:58	434,278
20	2	5	Mayfair	03:23:15:33	1.268	120:47:19	434,839
21	4	8	Salt Shaker	04:22:57:37	1.018	121:06:06	435,966
22	2	6	MRV	04:03:18:23	1.224	121:33:04	437,584
23	3	3	Wings	04:11:35:29	1.14	122:39:15	441,555
24	4	9	Dodgeball	04:22:44:21	1.034	122:46:35	441,995
25	3	4	Eve	04:17:24:57	1.085	123:03:22	443,002
26	4	10	Rum Rebellion	05:01:37:00	1.012	123:04:34	443,074
27	4	11	Fruit Salad 3	04:19:45:02	1.067	123:30:21	444,621
28	3	5	Secret Mens Business 1	04:11:11:01	1.154	123:41:24	445,284
29	4	12	Flying Cloud	04:18:35:11	1.08	123:45:12	445,512
30	0	4	LawConnect	02:15:11:44	1.98	125:07:38	450,458

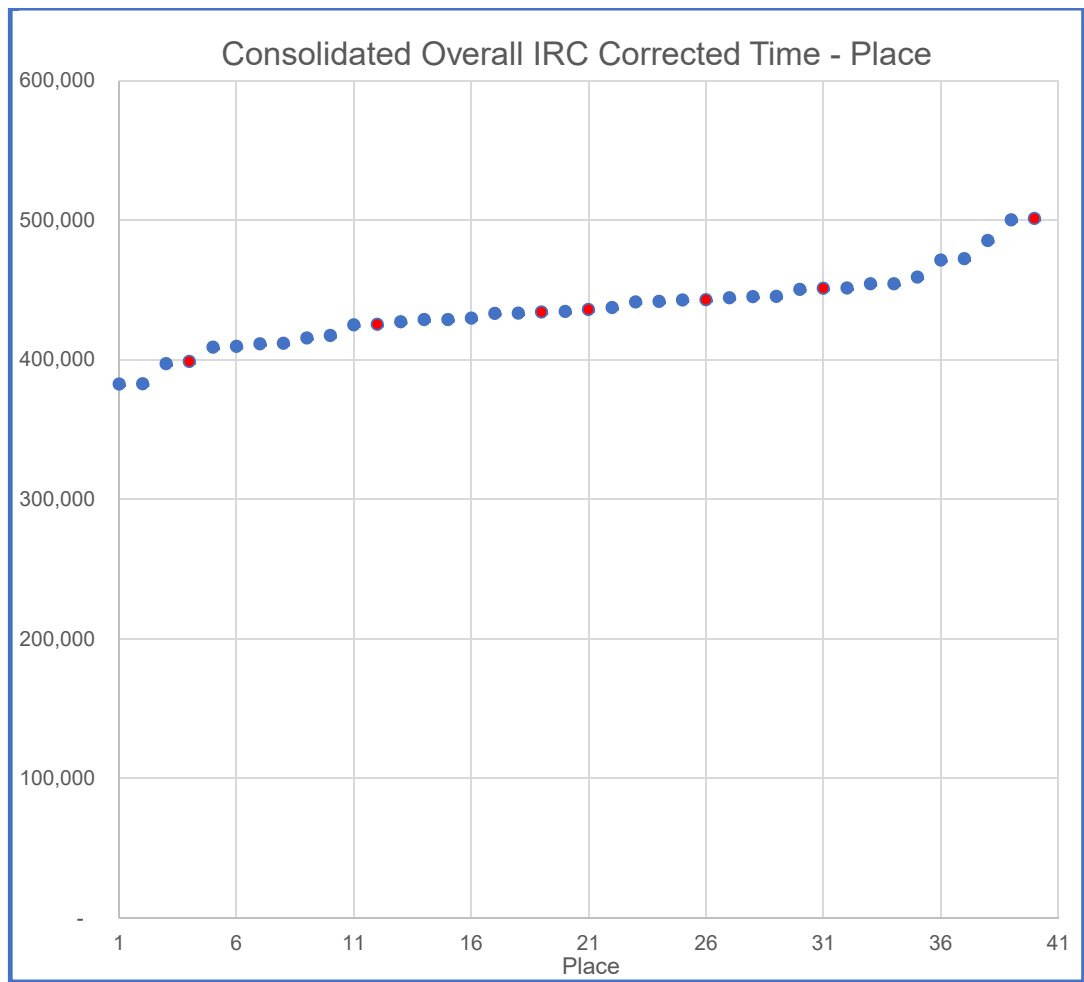
31	4	13	Euphoria II	05:05:28:03	0.999	125:20:31	451,231
32	4	14	Wild Oats	04:23:35:05	1.049	125:26:40	451,600
33	0	5	SHK Scallywag	02:15:30:52	1.988	126:16:00	454,560
34	2	7	Oroton Drumfire	04:07:50:49	1.216	126:16:40	454,600
35	2	8	Carrera S	04:07:00:01	1.239	127:37:02	459,422
36	4	15	Solveig	05:19:40:45	0.938	131:01:09	471,669
37	0	6	Stefan Racing	03:02:20:47	1.766	131:17:45	472,665
38	4	16	Navy One	05:05:27:39	1.075	134:52:13	485,533
39	3	6	Bowline	05:06:29:48	1.099	139:01:11	500,471
40	4	17	Local Hero	05:15:04:11	1.031	139:15:25	501,325

All IRC

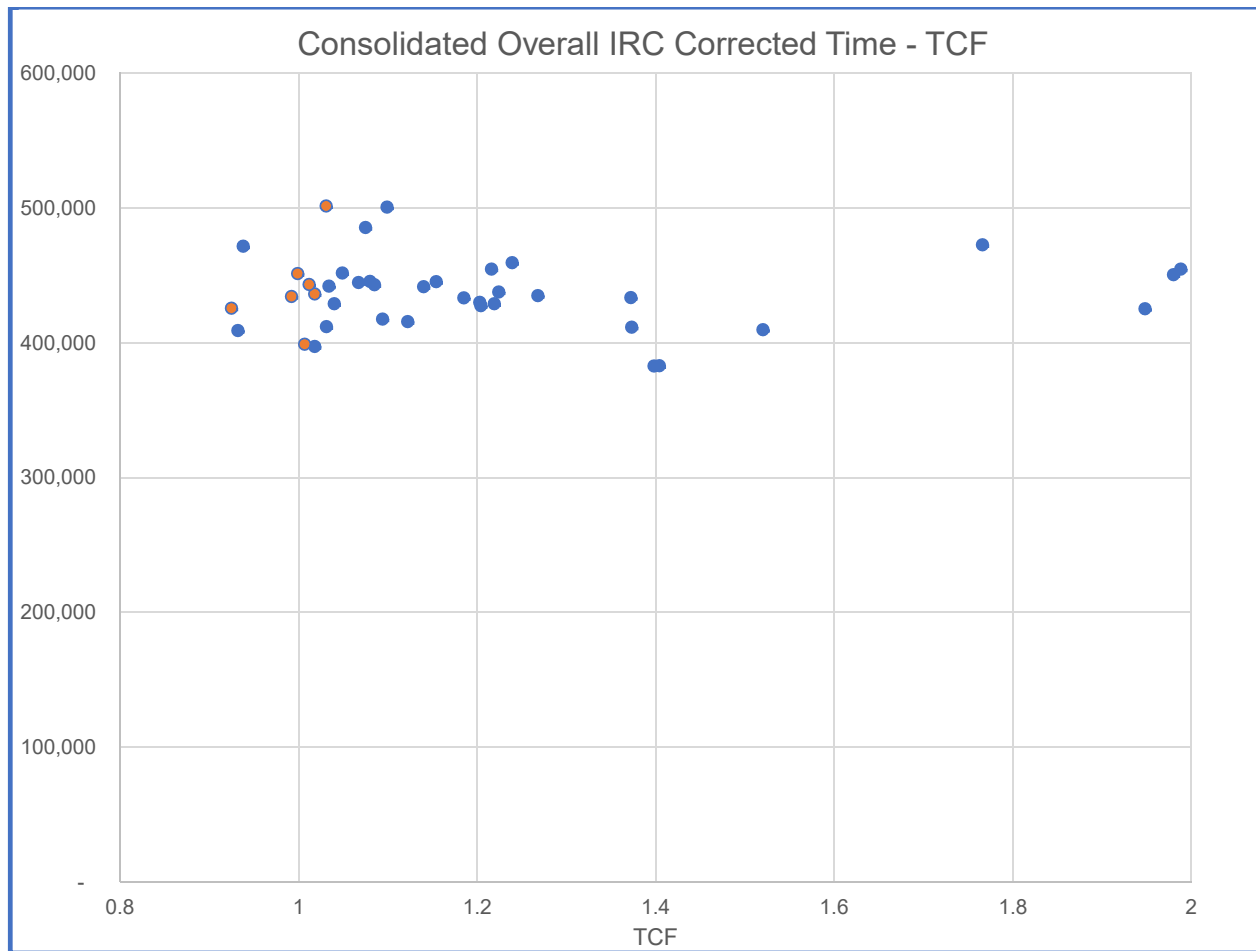
Average all	436,775
Ave. Fully Crewed	435,779
Average 2-H	441,468
SD all	26,531
SD Fully Crewed	25,901
SD 2-H	28,862
Spread all	31.0%
Spread Fully Crewed	30.8%
Spread 2-H	25.7%

Top 21 IRC

Average Top 21 all	417,849
Ave. Top 21 Fully Crewed	416,481
Average Top 21 2-H	423,662
SD Top 21 all	16,073
SD Top 21 Fully Crewed	16,045
SD Top 21 2-H	14,849
Spread Top 21 all	13.9%
Spread Top 21 Fully Crewed	13.6%
Spread Top 21 2-H	9.3%



Key: Blue is fully crewed boats and red is 2-handed boats



Key: Blue is fully crewed boats and red is 2-handed boats

Rolex Sydney Hobart 2021 - Consolidated IRC Division 4					
Place	Name	Elapsed Time	TCF	Corrected Time	Corrected Time (secs)
1	Love & War	04:12:24:44	1.018	110:21:49	397,309
2	Disko Trooper_Contender Sailcloth	04:14:01:42	1.007	110:47:55	398,875
3	White Bay 6 Azzurro	05:01:55:55	0.932	113:38:26	409,106
4	Midnight Rambler	04:14:58:58	1.031	114:25:24	411,924
5	Crux	05:07:47:10	0.925	118:12:08	425,528
6	Supernova	04:18:34:34	1.04	119:09:33	428,973
7	Speedwell	05:01:36:20	0.992	120:37:58	434,278
8	Salt Shaker	04:22:57:37	1.018	121:06:06	435,966
9	Dodgeball	04:22:44:21	1.034	122:46:35	441,995
10	Rum Rebellion	05:01:37:00	1.012	123:04:34	443,074
11	Fruit Salid 3	04:19:45:02	1.067	123:30:21	444,621
12	Flying Cloud	04:18:35:11	1.08	123:45:12	445,512
13	Euphoria II	05:05:28:03	0.999	125:20:31	451,231
14	Wild Oats	04:23:35:05	1.049	125:26:40	451,600
15	Solveig	05:19:40:45	0.938	131:01:09	471,669
16	Navy One	05:05:27:39	1.075	134:52:13	485,533
17	Local Hero	05:15:04:11	1.031	139:15:25	501,325

All Div 4

Average all	439,913
Ave. Fully Crewed	438,824
Average 2-H	441,468

SD all	27,439
SD Fully Crewed	22,399
SD 2-H	28,862

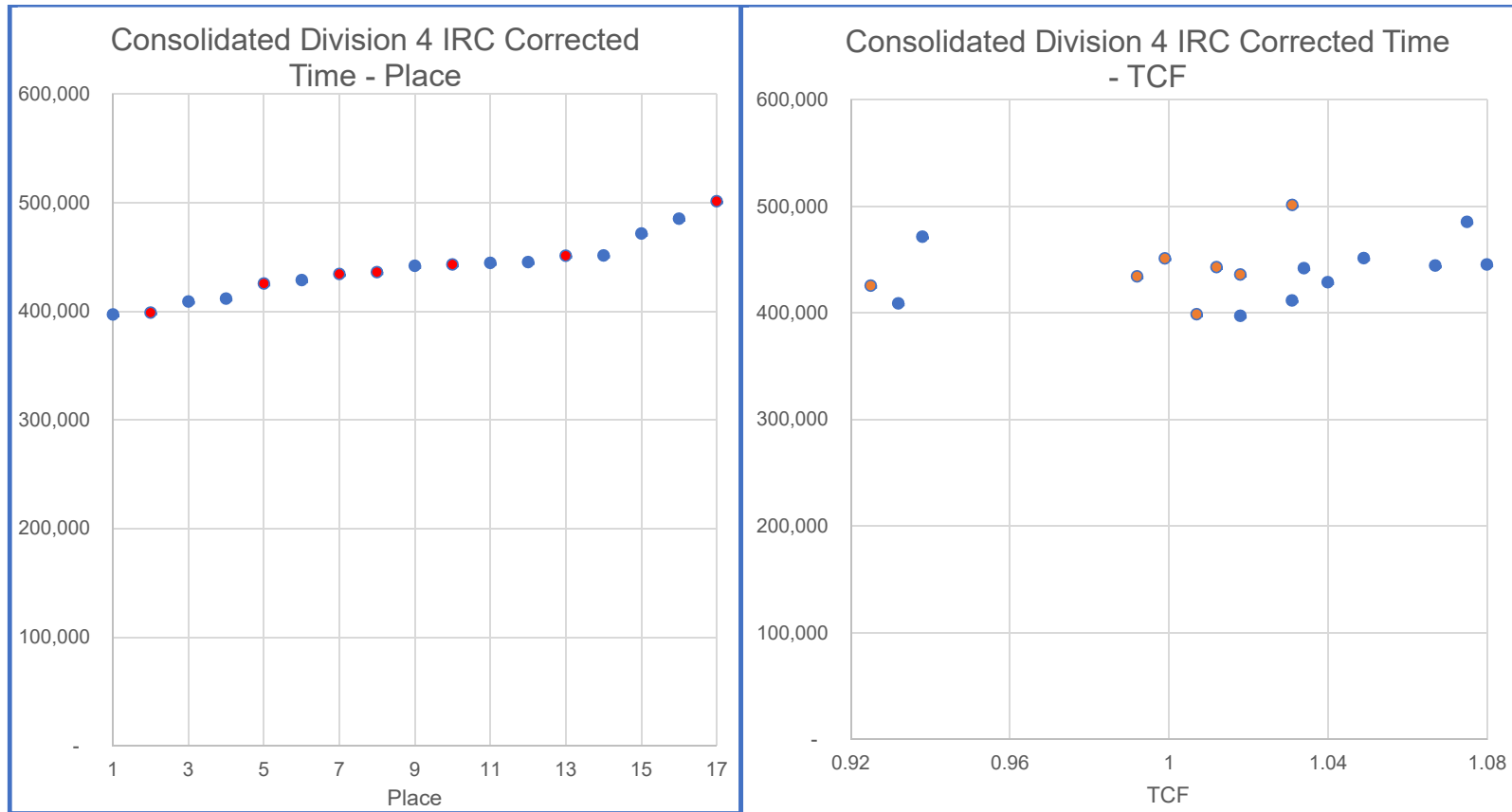
Spread all	26.2%
Spread Fully Crewed	22.2%
Spread 2-H	25.7%

Top 8 Div 4

Average Top 8 all	417,745
Ave. Top 8 Fully Crewed	411,828
Average Top 8 2-H	423,662

SD Top 8 all	14,466
SD Top 8 Fully Crewed	11,316
SD Top 8 2-H	14,849

Spread Top 8 all	9.7%
Spread Top 8 Fully Crewed	8.0%
Spread Top 8 2-H	9.3%



Key: Blue is fully crewed boats and red is 2-handed boats

Rolex Sydney Hobart 2021 - Consolidated Overall ORCi						(NB. Penalty and redress reversed)	
Cat place	Div	Div Place	Name	Elapsed Time	TCF	Corrected Time	Corr. Time (secs)
1	3	1	Disko Trooper_Contender Sailcloth	04:14:01:42	1.0531	115:52:15	417,135
2	1	1	Celestial	03:04:02:43	1.5483	117:44:27	423,867
3	3	2	Love & War	04:12:24:44	1.0961	118:49:50	427,790
4	3	3	White Bay 6 Azzurro	05:01:55:55	0.9775	119:11:19	429,079
5	1	2	Ichi Ban	03:03:45:29	1.5771	119:28:41	430,121
6	3	4	Crux	05:07:47:10	0.9638	123:09:37	443,377
7	2	1	Highly Sprung	04:06:55:20	1.2178	125:20:19	451,219
8	3	5	Cinquante	04:10:00:10	1.1828	125:22:48	451,368
9	1	3	Whisper	03:02:51:30	1.6826	125:57:24	453,444
10	1	4	Black Jack	02:12:37:17	2.0851	126:24:06	455,046
11	1	5	Smuggler	03:11:14:54	1.5429	128:26:38	462,398
12	3	6	Supernova	04:18:34:34	1.127	129:07:38	464,858
13	3	7	Salt Shaker	04:22:57:37	1.0882	129:27:09	466,029
14	2	2	LCE Old School Racing	04:05:34:16	1.2807	130:04:56	468,296
15	2	3	Maritimo	04:01:43:24	1.3334	130:18:15	469,095
16	2	4	Chutzpah	04:02:36:01	1.3218	130:19:47	469,187
17	3	8	Joker on Tourer	04:22:57:50	1.0965	130:26:38	469,598
18	3	9	Speedwell	05:01:36:20	1.0738	130:34:48	470,088
19	2	5	Pretty Woman	04:03:15:48	1.3171	130:44:23	470,663
20	3	10	Rum Rebellion	05:01:37:00	1.0793	131:15:39	472,539
21	2	6	Mayfair	03:23:15:33	1.3896	132:22:20	476,540
22	1	6	Quest	03:15:46:37	1.5187	133:18:25	479,905
23	3	11	Euphoria II	05:05:28:03	1.0658	133:43:24	481,404
24	2	7	Secret Mens Business 1	04:11:11:01	1.2483	133:47:50	481,670
25	3	12	Eve	04:17:24:57	1.183	134:10:15	483,015
26	3	13	Flying Cloud	04:18:35:11	1.173	134:24:35	483,875
27	3	14	Dodgeball	04:22:44:21	1.1348	134:44:43	485,083
28	2	8	MRV	04:03:18:23	1.3595	135:00:25	486,025
29	3	15	Wild Oats	04:23:35:05	1.1398	136:18:10	490,690
30	2	9	Oroton Drumfire	04:07:50:49	1.3276	137:52:02	496,322

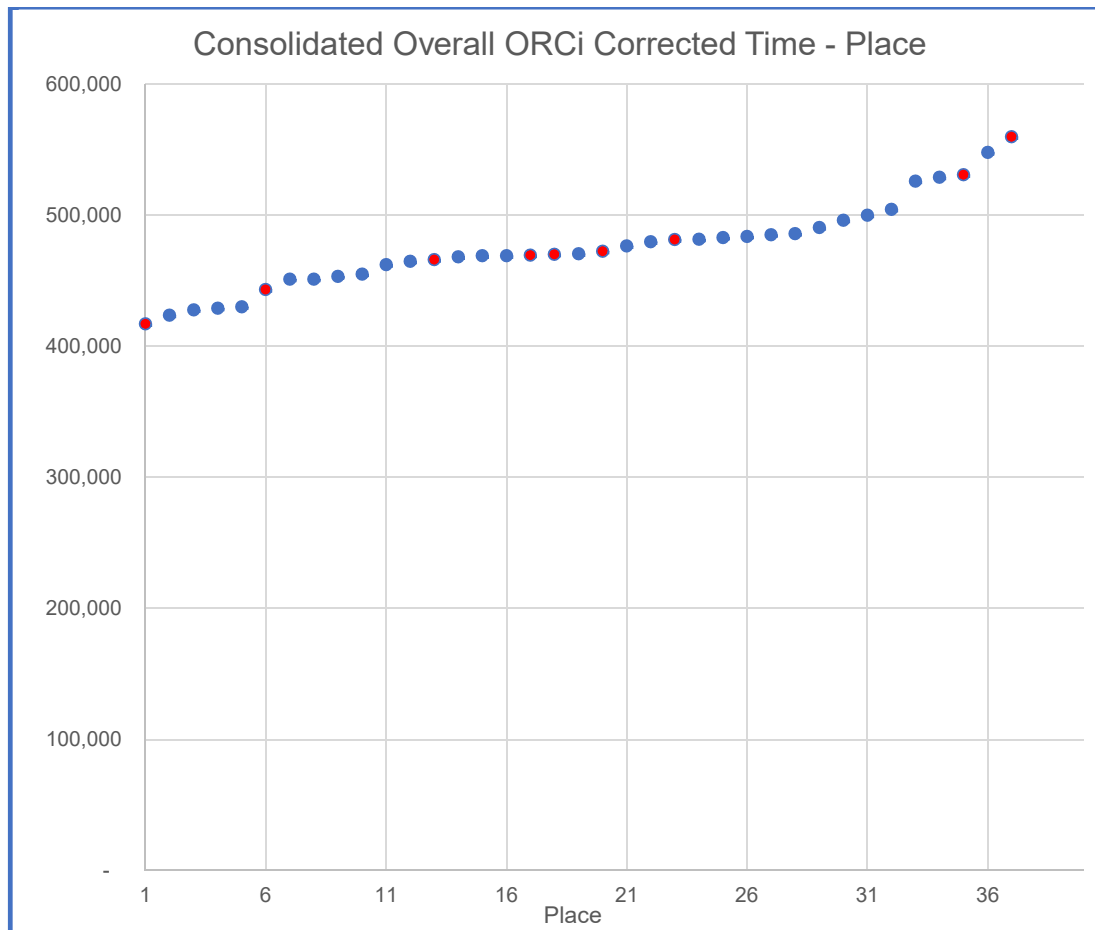
31	2	10	Carrera S	04:07:00:01	1.3484	138:53:08	499,988
32	2	11	Hartbreaker	04:04:51:15	1.3898	140:10:02	504,602
33	3	16	Navy One	05:05:27:39	1.1649	146:08:58	526,138
34	1	7	SHK Scallywag	02:15:30:52	2.3141	146:58:44	529,124
35	3	17	Local Hero	05:15:04:11	1.0918	147:28:09	530,889
36	1	8	Bowline	05:06:29:48	1.2034	152:13:34	548,014
37	3	18	Flat White	05:06:53:38	1.2257	155:32:02	559,922

All ORCi

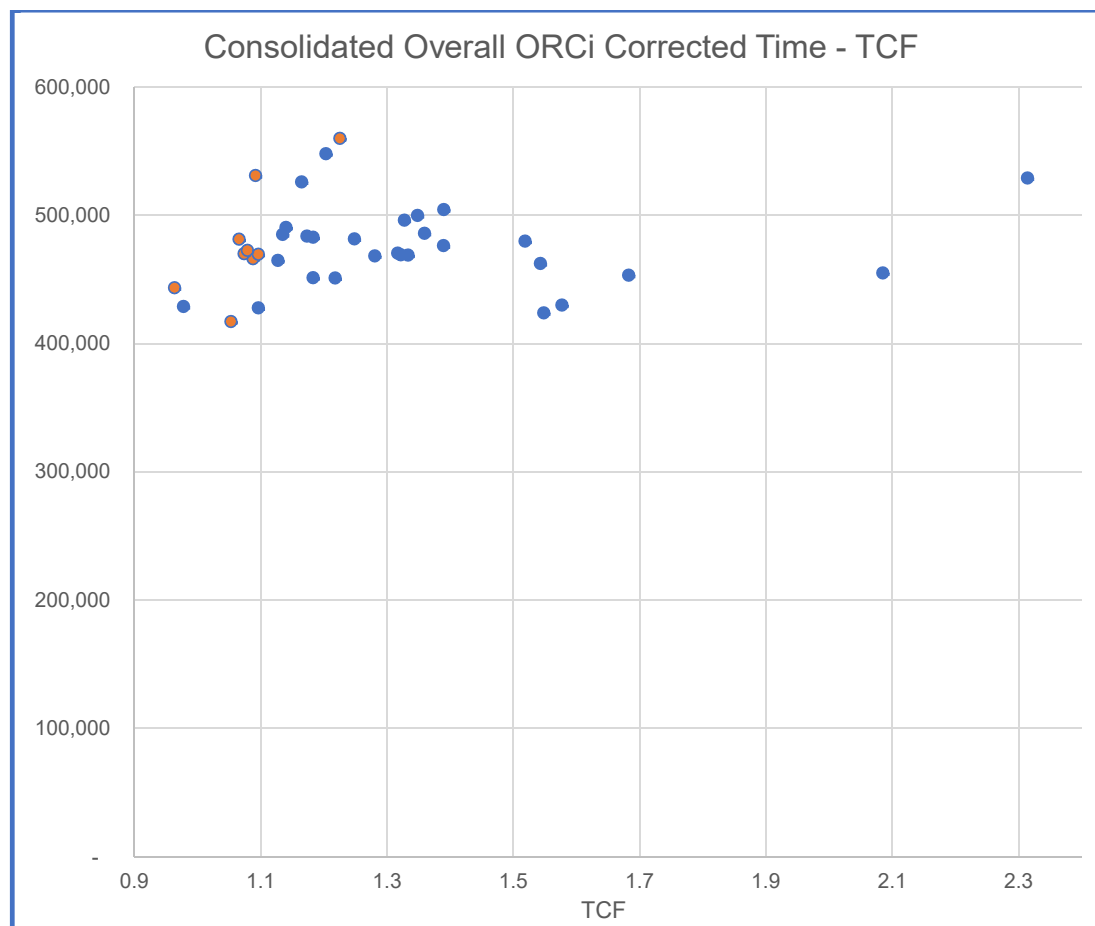
Average all	475,903
Ave. Fully Crewed	474,908
Average 2-H	478,998
SD all	32,754
SD Fully Crewed	29,798
SD 2-H	40,443
Spread all	34.2%
Spread Fully Crewed	29.3%
Spread 2-H	34.2%

Top 19 ORCi

Average Top 19 all	452,245
Ave. Top 19 Fully Crewed	451,888
Average Top 19 2-H	453,245
SD Top 19 all	17,758
SD Top 19 Fully Crewed	16,624
SD Top 19 2-H	20,571
Spread Top 19 all	12.8%
Spread Top 19 Fully Crewed	11.0%
Spread Top 19 2-H	12.7%



Key: Blue is fully crewed boats and red is 2-handed boats



Key: Blue is fully crewed boats and red is 2-handed boats

Rolex Sydney Hobart - Consolidated ORCi Division 3					
Div Place	Name	Elapsed Time	TCF	Corrected Time	Corr. Time (secs)
1	Disko Trooper_Contender Sailcloth	04:14:01:42	1.0531	115:52:15	417,135
2	Love & War	04:12:24:44	1.0961	118:49:50	427,790
3	White Bay 6 Azzurro	05:01:55:55	0.9775	119:11:19	429,079
4	Crux	05:07:47:10	0.9638	123:09:37	443,377
5	Cinquante	04:10:00:10	1.1828	125:22:48	451,368
6	Supernova	04:18:34:34	1.127	129:07:38	464,858
7	Salt Shaker	04:22:57:37	1.0882	129:27:09	466,029
8	Joker on Tourer	04:22:57:50	1.0965	130:26:38	469,598
9	Speedwell	05:01:36:20	1.0738	130:34:48	470,088
10	Rum Rebellion	05:01:37:00	1.0793	131:15:39	472,539
11	Euphoria II	05:05:28:03	1.0658	133:43:24	481,404
12	Eve	04:17:24:57	1.183	134:10:15	483,015
13	Flying Cloud	04:18:35:11	1.173	134:24:35	483,875
14	Dodgeball	04:22:44:21	1.1348	134:44:43	485,083
15	Wild Oats	04:23:35:05	1.1398	136:18:10	490,690
16	Navy One	05:05:27:39	1.1649	146:08:58	526,138
17	Local Hero	05:15:04:11	1.0918	147:28:09	530,889
18	Flat White	05:06:53:38	1.2257	155:32:02	559,922

All Div 3

Average all	475,160
Ave. Fully Crewed	471,322
Average 2-H	478,998

SD all	35,722
SD Fully Crewed	29,783
SD 2-H	40,443

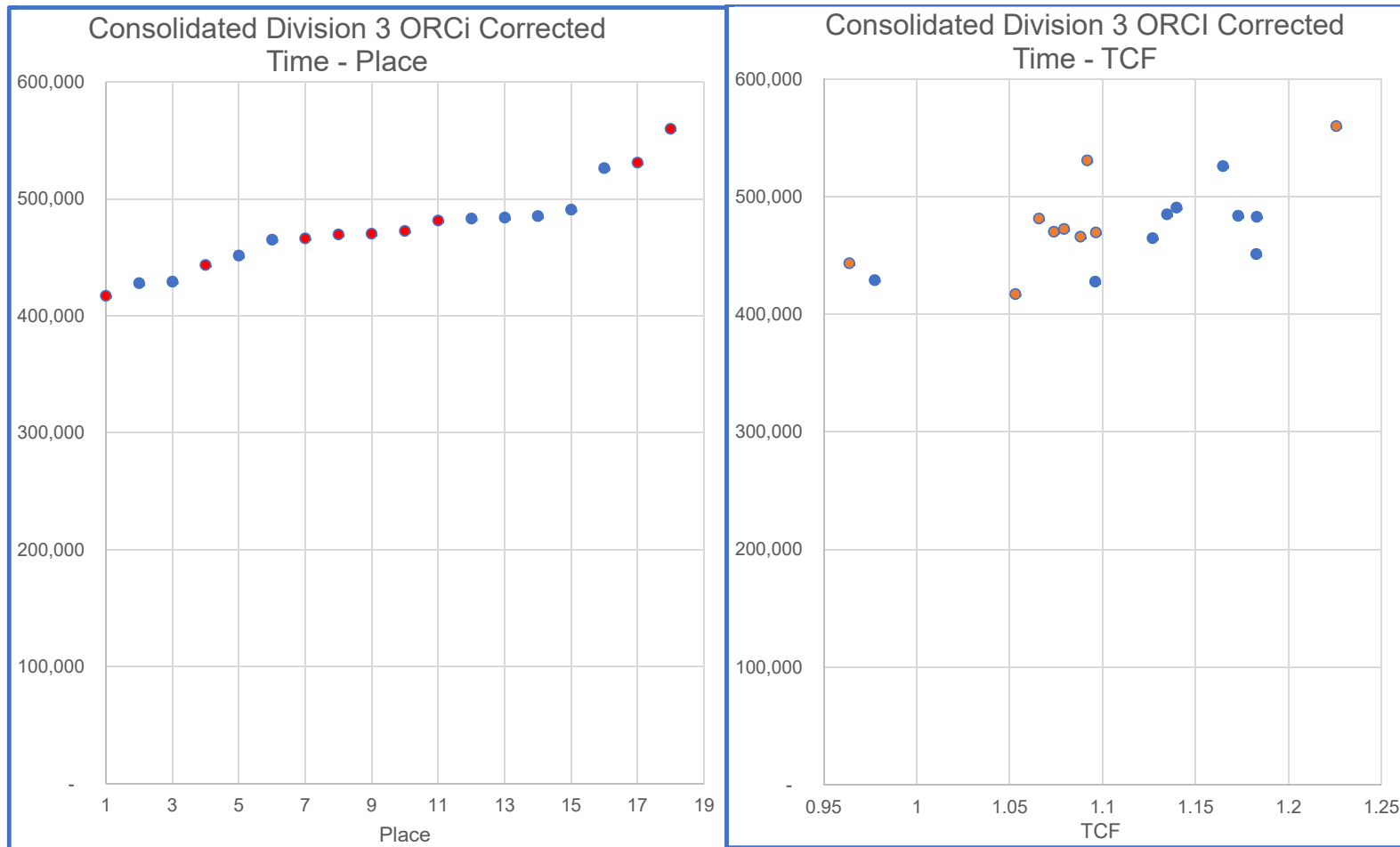
Spread all	34.2%
Spread Fully Crewed	23.0%%
Spread 2-H	34.2%

Top 9 Div 3

Average Top 9 all	448,814
Ave. Top 9 Fully Crewed	443,274
Average Top 9 2-H	453,245

SD Top 9 all	19,176
SD Top 9 Fully Crewed	15,594
SD Top 9 2-H	20,571

Spread Top 9 all	12.7%
Spread Top 9 Fully Crewed	8.7%
Spread Top 9 2-H	12.7%





Attachment 2 e - Statistical Review of Other Race Results

CYCA Special Purpose Working Group Report

Date	5th May 2022
Purpose	Report to the Two Handed Special Purpose Working Group
	Other Race Results <ul style="list-style-type: none"> • FASTNET RACE 2007 – 2021 • CARRIBEAN 600 2015 – 2021 • MIDDLE SEA RACE 2010 – 2021 • RORC SEASON 2021
Findings	<p>A statistical review has been made of the above races to identify whether any inference may be drawn that the IRC rating systems fails to fairly rate either two-handed boats or fully crewed boats relative to the other such that either is advantaged.</p> <p>The conclusion is that the review does not infer the IRC rating system advantages either fully crewed or two handed yachts, either way against each other.</p> <p>Weather and current would always play a large part in determining handicap results along with the abilities of the crews. Therefore I recommend that the same analysis be undertaken at the end of the 2022/23 season and in the following seasons.</p> <p>On behalf of the Special Purpose Working Group:</p> <p>Peter Shipway – CYCA Life Member and member of this Special Purpose Working Group</p>
Release authority	For inclusion in the SPWG Final report to the CYCA Board
Attachments	<p>Placings from which the results data was sourced are shown in the following pages.</p> <ul style="list-style-type: none"> • FASTNET RACE 2007 – 2021 • CARRIBEAN 600 2015 – 2021 • MIDDLE SEA RACE 2010 – 2021 • RORC SEASON 2021

RORC FASTNET RACE RESULTS

Double Handed -v- Fleet Comparison - IRC

Double Handers included in overall fleet

YEAR	Total Entries	Double Handed Entries	Fleet Finishers	DH Finishers	% of DH Entries to Total Entries	Top 3 DH Placing on Handicap
2007	271	24	51	2	9%	17, 27
2009	277	30	266	29	11%	72, 76, 80
2011	278	35	247	26	13%	39, 45, 58
2013	298	45	287	45	15%	1, 26, 41
2015	309	54	296	51	17%	4, 5, 10
2017	312	57	288	50	18%	23, 36, 42
2019	331	64	278	47	19%	6, 29, 38
2021	262	56	181	35	21%	16, 17, 24

Carribean 600 - Fleet Analysis

Double Handed -v- Fleet Comparison - IRC

Double Handers included in overall fleet

Year	Total Entries	Double Handed Entries	Fleet Finishers	DH Finishers	% of DH Entries To Total Fleet	Top 3 DH Placing on Handicap
2015	56	2	50	2	4%	22, 24,
2016	54	2	43	1	4%	35,
2017	60	0	0	0	0%	
2018	57	1	30	0	2%	
2019	52	3	42	2	6%	32, 38,
2020	58	2	54	2	3%	31, 36,
2021	54	2	48	2	4%	24, 43

ROLEX MIDDLE SEA RACE

Double Handed -v- Fleet Comparison - IRC

Double Handers included in overall fleet

Year	Total Entries	Double Handed Entries	Fleet Finishers	DH Finishers	% of DH Entries to Total Fleet	Top 3 DH Placing on Handicap
2010	73	3	59	2	4%	54, 56
2011	68	1	63	1	1%	61
2012	76	6	62	3	8%	50, 55, 60
2013	92	12	89	11	13%	34, 47, 51
2014	118	15	49	4	13%	04, 05, 29
2015	102	8	82	5	8%	37, 44, 49
2016	95	10	79	8	10%	33, 40, 54
2017	95	7	32	2	7%	22, 24
2018	115	9	87	5	8%	29, 41, 50
2019	90	15	74	9	17%	37, 45, 50
2020	41	6	34	4	15%	13, 16, 29
2021	105	11	81	6	10%	10, 17, 28

RORC Season 2020-2021

Double Handed -v- Fleet Comparison - IRC

Double Handers included in overall fleet

Race	Length N.Miles	Total Entries	Double Handed Entries	Fleet Finishers	DH Finishers	% of DH Entries to Total Entries	Top 3 DH Placing on Handicap
Morgan Cup	100	67	22	57	20	32%	06, 08, 10
Cherbourg	110	24	10	22	10	42%	02, 04, 07,
Myth of Malham	110	122	38	112	36	31%	10, 12, 13,
Cowes - Dinard	150	110	31	96	28	28%	09, 11, 13,
De Guingard Bowl	160	71	19	67	18	27%	04, 05, 07,
Channel Race	160	78	28	76	28	36%	01, 02, 03,
Fastnet	675	262	56	181	35	21%	16, 17, 24,
Castle Rock	90	31	12	29	12	38%	03, 05, 08,



Reference Material & Resources

CYCA Special Purpose Working Group Report

Reference Materials

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Resources

CYCA material:

- Two-handed Sailing Discussion Paper – July 2019
- Two-Handed Overall Win Eligibility – August 2019
- Sailing Program 2020-2021

Double-Handed sailing – supplementary submission to CYCA Special Purpose Working Group, David Jordan July 2021

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