

A Working Paper on the suitability of the rules for lights for modern yachts

Prepared for the World Sailing Oceanic and Offshore Committee



Working Party

Chris Oxenbould - Chair
Stuart Carruthers - Vice Chair
Will Apold
Chuck Hawley
Stan Honey

Version: Final
23 September 2019

Table of Contents

1. Introduction	4
Statement of work	4
The working party	4
2. The importance of lights	4
3. Rules and Regulations	5
COLREGS	5
Racing Rules of Sailing	6
Special Regulations	6
International Standards and Certification	7
4. What do the regulations require?	8
Under sail	8
Power driven vessel	9
Visibility of lights	10
5. Discussion and Analysis	11
Compliance with COLREGS	12
General observation	12
Positioning of lights	12
Sailing vessel	12
Power driven vessel	13
Vertical sectors of visibility	15
Are the prescribed lights fit for purpose?	17
Warning of presence	17
Navigation lights at the top of the mast	17
Other aids	18
Options to improve lights	18
Flashing light at the top the mast	18
Duplicating navigation lights	19
Minimum visibility ranges	20
Other Issues	20
OSR and RRS reference to COLREGS	20
6. Findings and Recommendations	21
Recommendations	21
Lights	21
Other Issues	23

Appendices	24
Appendix 1 - Statement of Work	25
Appendix 2 - Working Party Short Resumes	28
Appendix 3 - Table of Recommendations	30
Appendix 4 - List of Acronyms	33
Appendix 5 - Draft World Sailing Safety Bulletin - Lights	35
Appendix 6 - Draft letter to IMO	38
Appendix 7 - Submission filed with WS for change to RRS 48.1	41
Appendix 8 - Submission filed with WS for change to OSR 3.72	42

1. Introduction

Statement of work

1. For several years, concern has been expressed over the utility of lights on offshore racing yachts as the boats have evolved to become bigger, faster and carry sail plans that can at times obscure the lights. The requirements of the Convention on the International Regulations for Preventing Collisions at Sea (COLREGS) may be inadequate for modern offshore racing yachts and arguably some boats do not comply with the current regulations when operating as a power-driven vessel (PDV).
2. At the World Sailing (WS) Annual Conference in November 2018 the Oceanic and Offshore Committee commissioned a working party (WP) to examine lights and their effectiveness. A statement of the work required was prepared by the chair of the committee, Stan Honey, and is attached at Appendix 1.

The working party

3. Stan Honey invited Rear Admiral Chris Oxenbould AO RAN (Rtd) to chair the working party and Stuart Carruthers to be the vice chair. Chuck Hawley was also invited to join the group and Stan Honey offered his own services.
4. A draft working paper was prepared and distributed for comment. Several iterations followed and two Skype conferences were convened. In addition an approach was made to a number of light manufacturers to address some of the issues that arose. The feedback was very helpful and incorporated into the evolving draft.
5. After the first draft of the paper a potential need to change the Offshore Special Regulations (OSR) was identified and Will Apold was invited to join the WP.
6. Brief resumes of the working party members are at Appendix 2.

2. The importance of lights¹

7. Lights provide one of the most basic and important contributions to safety at sea: they are simple, highly reliable and not dependent on an input from any other navigational aid. They are required to be displayed by all vessels between sunset and sunrise and in restricted visibility. Lights provide a means of indicating a vessel's presence, its type and employment as well as some indication of the vessel's course and aspect². They indicate to an observer whether they are on the port or starboard bow of the observed vessel or approaching from astern.
8. This information is very important in complying with the steering and sailing rules. Lights allow mariners to determine what actions should be taken to avoid collision with due regard to the observance of good seamanship.

¹Lights: the paper discusses what are commonly known as 'navigation lights' but in keeping with the terminology used in the international regulations the term 'lights' is generally used throughout the paper.

²Aspect is the orientation between something observed and the observer. A vessel's lights allow the observer to see the orientation of the observed vessel relative to own vessel and an indication of its course.

-
9. For sailing vessels with the ability to be driven by machinery there are two separate requirements for lights depending on whether the boat is sailing or is being propelled by machinery and operating as a PDV. Although the competition that WS administers is sailing, the boats being addressed in this paper are involved in offshore day/night events and are required by the regulations to have an engine. These boats are required to operate at night and, at times, as a PDV and should be fully compliant with COLREGS under both sail and power.
 10. In addition the WS Oceanic and Offshore Committee has responsibility for monitoring safety in offshore cruising as well as racing. Cruising boats frequently operate at night as PDVs.
 11. In recent years navigation aids such as Automatic Identification System (AIS) and marine radars with an Automatic Radar Plotting Aid (ARPA) have greatly assisted in maintaining a look-out. They are, however, aids and dependent on equipment being fitted that is not universally mandated. These systems can provide a high degree of precision but are also subject to the vagaries of electronic equipment operating in a challenging offshore environment.

3. Rules and Regulations

12. There is a hierarchy of rules and regulations that specify the requirements for lights to be exhibited on an offshore yacht.

COLREGS

13. COLREGS are administered by the International Maritime Organisation (IMO) and set out the steering and sailing rules to be followed by ships and other vessels at sea to prevent collisions. COLREGS also prescribe what lights should be exhibited and when.
14. The rules apply to *'all vessels upon the high seas and in all waters connected therewith navigable by seagoing vessels'*³. Generally maritime states have regulations in place to adopt these rules on internal waters⁴ or a set of closely aligned separate rules. *'The Rules concerning lights shall be complied with from sunset to sunrise...and shall, if carried, also be exhibited from sunrise to sunset in restricted visibility and may be exhibited in all other circumstances when it is deemed necessary.'* (Rule⁵ 20)
15. COLREGSs were adopted as a Convention of the IMO on 20 October 1972 and entered into force on 15 July 1977. They were designed to update and replace the Collision Regulations of 1960. The convention has been ratified by about 170 contracting states representing more than 99% of the gross tonnage of the world's merchant fleets.
16. The large number of IMO member states leads to a cumbersome amendment process. The IMO may convene a Revision Conference at the request of not less than one third of the Contracting Parties. Alternatively any amendment to the regulations proposed by a Contracting Party will be considered in the IMO but requires a two-thirds majority of the Maritime Safety Committee of the Organisation before taking further action. Such action

³ *Italics* are used throughout the paper to denote a direct quotation from the relevant reference document.

⁴ Waters landward of the baseline used to define territorial seas are defined as internal waters, over which the state has complete sovereignty

⁵ Rules quoted are rules from COLREGS unless otherwise stated

could include communicating the request to all Contracting Parties and Members of the Organisation at least six months prior to its consideration by the Assembly of the Organisation.

17. Eight relatively minor amendments have been made since the 1972 Convention was adopted by the IMO; amendments were made in 1981, 1987, 1989, 1993, 2001, 2007 and 2016. The last amendment concerning lights was in 1993 and dealt with their positioning. The Secretary General of the IMO is also able to issue exemptions to states for specific vessels unable to comply with the regulations. This right is exercised occasionally.

Racing Rules of Sailing

18. The Racing Rules of Sailing (RRS)⁶ govern the sport of sailing on the water. The rules are frequently reviewed and there are procedures to keep them current with changes in the sport. They are revised and republished every four years by WS. As a result of actions taken by the Racing Rules Committee and the WS Council during the Annual Conference, changes may be made to the RRS during the four-year period. These alterations are published as changes or corrections.
19. The RRS do have an overriding statement in the Preamble to Part 2 - *When Boats Meet*: *'When a boat sailing under these rules meets a vessel that is not, she shall comply with the International Regulations for Preventing Collisions at Sea (IRPCAS⁷) or government right-of-way rules.'* This is interpreted as only applying to the steering and sailing rules set out in Part B of COLREGS and does not include the fitting of equipment such as lights.
20. More specifically, RRS 48.1 states *'When safety requires, a boat shall sound fog signals and show lights as required by the IRPCAS or applicable government rules'*. The caveat, *'When safety requires'*, is unusual. The expectation is that whenever vessels are underway at night or in restricted visibility a risk of collision could exist with other vessels and safety would require boats to exhibit the lights prescribed in COLREGS or other applicable government rules, when so equipped.

Special Regulations

21. Most yachts competing in offshore races are strictly regulated. The WS Offshore Special Regulations (OSR), or separate national Special Regulations, govern offshore racing for monohulls and multihulls and stipulate structural features, yacht equipment, personal equipment and training.
22. Similar to the racing rules, the OSR are frequently reviewed and procedures are in place to ensure they remain current to reflect changes in the sport. The OSR is republished every two years⁸. WS Special Regulations Sub-Committee and other national authorities provide interpretations of any regulations when required.
23. OSR 3.27 relates to *'Navigation Lights'* and requires that a boat shall have lights *'mounted above sheerline and so that they will not be masked by sails or the heeling of the boat... having light intensity meeting COLREGS'*. The intensity of lights required in COLREGS

⁶ The current edition is The Racing Rules of Sailing 2017 - 2020

⁷ IRPCAS and COLREGS are synonymous abbreviations for the International Regulations for Preventing Collisions at Sea

⁸ The latest OSR edition is 2018-2019

has been interpreted as a wattage for incandescent bulbs for boats less than and more than 12m in length. A requirement for reserve lights that have '*the same specifications*' and '*can be powered independently*' is also specified.

International Standards and Certification

24. In support of the rules and regulations, there are a number of international standards in place to achieve compliance with COLREGS. They establish uniform criteria for the performance, construction and testing of lights for inland navigation, sea-going vessels and recreational vessels such as offshore yachts. Testing is required to determine luminous intensity, horizontal and vertical luminous intensity distribution, and the uniformity of the light output over the entire required radiation sector.
25. These standards include:
 - European Standard (EN) 14744:2005 - Inland navigation vessels and sea-going vessels - Navigation light,
 - International Organisation of Standards (ISO) 19009:2015 - Small Craft - Electric navigation lights - Performance of LED lights, and
 - American Boating and Yacht Council (ABYC) A-16 - Electric Navigation Lights.
26. There is also a well-established system of marine classification for promoting the safety of life, property and the environment at sea. This is primarily achieved through the establishment and verification of compliance with technical and engineering standards for the design, construction and life-cycle maintenance of primarily offshore ships and facilities, with some carryover to recreational vessels.
27. Twelve technically-based non-government organisations have formed an International Association of Classification Societies (IACS). The membership includes the American Bureau of Shipping, Lloyds Register and Bureau Veritas.
28. Supporting this structure are two very useful means that mark conformity with the prescribed standards. In Europe there is a Marine Equipment Directive (MED) that identifies the standard that has to be met. In the case of COLREGS and lights it is EN 14744:2005. This standard is widely accepted around the world. There are a number of Notified Bodies, including the international classification societies, who can certify that lights comply with the standard. This follows very comprehensive and rigorous testing of all parameters of the light by an independent third party testing laboratory. This conformity is marked on the light with a Wheelmark symbol and identifies the certifying body.
29. The EN 14744 standard requires that each navigation light shall be marked permanently in a position clearly visible even after installation onboard. As well as the approval Wheelmark other information required includes the range in nautical



Figure 1 - MED 'Wheelmark'

miles and the nominal wattage. If the light has the vertical light distribution only for motor boats the light will be stamped with a 'Three Bladed Propeller' stamp.

30. In the US, the Coast Guard (USCG) lists a number of laboratories that can similarly certify that lights used for recreational boats comply with ABYC A16 or equivalent. The lights must bear a permanent and indelible label listing the USCG approval and associated details. If the light is too small to include all information it is to be included on the packaging and the light marked 'USCG' followed by the certified range of visibility.
31. The European Union has a mutual recognition agreement with the USCG that approves each other's authorised products. An indelible Wheelmark symbol or USCG certification stamp signifies that the light is fully compliant with COLREGS.

4. What do the regulations require?

32. Part C of COLREGS - *Lights and Shapes*, specifies what lights all vessels are required to exhibit dependent on their size, mode of operation and nature of the voyage. Annex I contains positioning and technical details of lights and shapes.

Under sail

33. The light requirements for a sailing vessel are quite simple: a red sidelight on the port bow, a green sidelight on the starboard bow and a sternlight showing a white light over the arc astern not covered by the sidelights.
34. On a sailing vessel of less than 20m in length, COLREGS Rule 25(b) permits the sidelights and stern light to '*...be combined in one lantern carried at or near the top of the mast where it can best be seen*'. Rule 25(c) permits sailing vessels to '*exhibit at or near the top of the mast...two all-round lights in a vertical line, the upper being red and the lower green, but these lights shall not be exhibited in conjunction with the combined lantern...*'

Sailboats



Figure 2 - Sailboat Navigation Light Requirements - Under Power and Under Sail

-
35. There are also different arrangements permitted for sailing vessels less than 7m in length.
 36. COLREGS, Annex I does not specify any requirements for the vertical and horizontal positioning of the lights for a sailing vessel. There is, however, at Section 5 a requirement for sidelights on vessels of 20m or more in length to '*...be fitted with inboard screens painted matt black to achieve the horizontal cut-offs defined at Section 9 of this Annex*'. The matt black screens are also required on vessels of less than 20m in length, if necessary to meet the requirements of Section 9.
 37. Section 9 specifies the intensity of the lights in the horizontal sectors on either side of the prescribed sector to permit some transitional overlap from one arc to another. The intensities of sidelights in the forward direction '*shall decrease to reach practical cut-off between 1° to 3° outside the prescribed sectors*'.
 38. On the line 22.5° abaft the beam, the prescribed intensity of the sidelights and sternlight may be decreased by 50 percent from 5° within the prescribed sector to reach a practical cut-off not more than 5° outside the prescribed sector.
 39. There are also requirements specified in the vertical sector with a particular mention for sailing vessels to take into account the angle of heel. The fitted lights on a sailing vessel are to maintain the minimum intensity at all angles from 5° above to 5° below the horizontal and at least 50% of the minimum intensity from 25° above to 25° below the horizontal (Annex I, section 10 - See Figure 4).

Power driven vessel

40. When a sailing vessel is being '*propelled by machinery*' it is regarded as a PDV and lit accordingly. This requires the addition of a *masthead light*⁹. *A power-driven vessel of less than 12 metres in length may in lieu of the lights prescribed in paragraph (a) of this Rule - masthead light, sidelights and sternlight - exhibit an all-round white light, and sidelights' (Rule 23 (d)(i)).*
41. There are a number of restrictions regarding the vertical and horizontal positioning of *masthead lights* and sidelights. Section 5 (Screens for sidelights) of Annex I also remains in force.
42. Annex I of COLREGS requires that on a PDV:

Vertical positioning and spacing

- of more than 20m¹⁰ in length, the *masthead light* shall be '*at a height above the hull of not less than 6m, and, if the breadth of the vessel exceeds 6m, then at height above the hull not less than such breadth, so however that the light need not be placed at a greater height above the hull than 12m*' (Annex I, Section 2(a));
- of 12m but less than 20m in length, the *masthead light* '*shall be placed at a height above the gunwale of not less than 2.5m*' (Annex I, Section 2(c));
- of less than 12m in length may carry the *masthead light* '*at a height less than 2.5m above the gunwale. When however a masthead light is carried in addition to sidelights and a sternlight or the all-round light prescribed in Rule 23(d)(i) is carried*

⁹ To distinguish between a *masthead light* required by COLREGS and lights fitted at the masthead, the COLREG light is written in *italics*.

¹⁰ 20m used to be regarded as a big boat and quite rare. In the 2018 Rolex Sydney Hobart Yacht Race 16 (17.5%) of the 91 entries were 20m or longer.

in addition to sidelights, then such masthead light or all-round light shall be carried at least 1 metre higher than the sidelights.’ (Annex I, Section 2(d))

- the sidelights are to be lower than the *masthead light* and ‘*placed at a height above the hull not greater than three-quarters of the height of that of the ... masthead light. They shall not be so low as to be interfered with by the deck lights*’ (Annex I, Section 2(g));
- of less than 20m in length, ‘*the sidelights if in a combined lantern ... shall be placed not less than 1m below the masthead light*’ (Annex I, Section 2(h));

Horizontal positioning and spacing

- ‘*of 20m or more in length the sidelights shall **not** be placed in front of the forward masthead light. They shall be placed at or near the side of the vessel.*’ (Annex I, Section 3(b));
 - ‘*when only one masthead light is prescribed ... this light shall be exhibited forward of amidships; except that a vessel of less than 20m in length need not exhibit the light forward of amidships but shall exhibit it as far forward as practicable*’ (Annex I, Section 3(d));
43. Most boats will try to configure lights, as far as practicable, so the same sidelights and sternlight can be used when under sail or power. This can be achieved in some circumstances. However if, when sailing, sidelights are displayed in some form at the top of the mast, when operating as a PDV either:
- a second set of sidelights will be required for use below the *masthead light*, or
 - if less than 12m in length the *masthead light* or the prescribed all round light shall be carried at least 1m higher than the sidelights.

Visibility of lights

44. Within COLREGS, Rule 22 specifies visibility at the following minimum ranges for lights prescribed in Part C:

Light\Boat Length	<12m	12m to 20m	>20m but <50m
Sidelight	1 mile	2 miles	2 miles
Sternlight	2 miles	2 miles	2 miles
Masthead	2 miles	3 miles	5 miles
All-Round	2 miles	2 miles	2 miles

45. The greatest minimum range for a vessel under sail is 2 miles. Larger minimum ranges are required for *masthead lights* when operating as a PDV.
46. In prescribing the minimum ranges for the visibility of lights, COLREGS does not distinguish between a sailing vessel and a PDV. The prescribed ranges are purely dependent on the length of a vessel.
47. However, in vessels over 12m in length the *masthead light* has a greater range than the other lights that would be displayed by a sailing vessel. This could be based on the premise that a PDV travels faster than a vessel under sail and needs to provide greater warning of its presence. This is no longer necessarily the case but the rationale that a vessel travelling at higher speed needs lights with a greater visibility range is logical.

-
48. Of note the greatest minimum ranges for a navigation lighting in COLREGS is 6 miles for a *masthead light* on a vessel of 50m or more in length (e.g. the Cunard Line *RMS Queen Mary 2* - length 345m, displacement 79,287 tonnes, max speed 30 knots, cruising speed 26 knots). Vessels of this size only require sidelights and sternlights with a minimum range of 3 miles.
 49. At Annex I, Section 8, a luminous intensity of the light in candelas is listed to meet the range requirement for an assumed value of atmospheric transmissivity.
 50. The OSR provides a minimum power rating for incandescent bulbs in hull lengths of less than and more than 12m, presumably, to satisfy the minimum range requirement. The OSR does not make any allowance for the increased visibility required for the *masthead lights* of vessels over 12m and over 20m in length. The wattage requirement steps from 10 watts (W) to 25W and it may be that the higher-powered light meets the longest minimum range requirement of 5 miles.
 51. Modern light emitting diodes (LEDs) can achieve the required ranges with a lower wattage. Defining range by wattage is no longer useful.

5. Discussion and Analysis

52. The two principal issues relating to lights are:
 - do modern boats comply with the rules and regulations, and
 - do the lights required by the regulations remain fit for purpose?
53. In addressing these matters it is necessary to consider that many of the rules in COLREGS date back nearly 60 years. Generally, they have stood the test of time very well. During this lengthy period there have been significant changes in offshore racing yachts and technical advancements in light technology. The latest boats:
 - are generally bigger, lighter construction and faster, capable of sailing at speeds of 20 to 30 knots and more - not only the 30m boats but boats half that size are, at times, reaching similar speeds;
 - have different sail plans with genoas, asymmetric spinnakers and code zeroes¹¹ that potentially obscure the look-out and mask sidelights at night;
 - use modern light fixtures with LEDs as the light source. They are more precisely engineered to maintain the intensity and cut-off angles required in the prescribed horizontal and vertical sectors and use dramatically less power. LEDs are generally more robust and reliable than earlier incandescent lights and may have some inbuilt redundancy as well as some indication when the output degrades; and
 - have improved batteries and power supplies with much greater capacity and better means of recharging.
54. COLREGS now need to cater to a broader range of sailing vessels and equipment than existed when the regulations were initially conceived while remaining appropriate for boats at either end of this development spectrum.

¹¹ A Code Zero is a cross between a genoa and an asymmetrical spinnaker that was initially used for sailing close to the wind, generally, in light winds. More recently they are used in a broader variety of wind strength and angles and in combination with other headsails.

Compliance with COLREGS

55. In assessing compliance with COLREGS the WP reviewed the rules and regulations and conducted a desktop study on the positioning of lights on offshore racing yachts, under sail and when operating as PDVs.
56. As part of the study a series of questions regarding compliance with COLREGS was prepared and put to several light manufacturers. As expected, the research revealed all certified lights are subjected to rigorous third party testing and complied with the arcs of visibility and luminous intensities in COLREGS. Some other points of interest are:
- lights certified to EN 14744:2005 and ISO 19009:2015 have a luminous intensity at least 25% greater than the minimum required by COLREGS. ABYC A-16 lights have a luminous intensity of at least the minimum range prescribed by COLREGS,
 - with modern light fittings, both incandescent and LEDs, arcs of visibility are defined by the construction of the light fixture (optical lens and physical cut-offs) and are not dependent on external screens,
 - the LED generates the colour; filters are not normally used in commercial products using LED technology,
 - LED light fixtures are often smaller, more waterproof and more robust than previous generation small boat fittings designed for incandescent bulbs. The fixture does not need to be designed to be opened to replace the incandescent bulb,
 - some manufacturers are transitioning to a common vertical profile for the light so they may be used by both sailing and non-sailing vessels. The light distribution either meets or exceeds the requirements of COLREGS for either class of vessel, and
 - glare that might impact the night vision of crews on deck is restricted by the vertical and horizontal cut-offs and light construction with no light emitted outside the designed arcs.

General observation

57. As with most recreational activities, there is a very wide variety of products available on the yachting market. This is the clear case with navigation lights. At the reputable end of the market there is a high level of regulation and certification that produces good quality products that comply with COLREGS. At the other end there are a number of products that do not meet the standards and some are even marketed as 'Not Approved'
58. Safety at sea is dependent on compliant products and this is important for the sport of sailing. Lights marked with the European MED Wheelmark or USCG stamp or other acceptable certification have been subjected to a rigorous testing regime ensuring compliance with COLREGS and are recommended for use on all boats.
59. Due to the difference in vertical light distribution profiles, lights marked with a European MED 'Three Bladed Propeller' should **not be fitted** to a sailing boat.

Positioning of lights

Sailing vessel

60. Traditional racing yachts were equipped with sidelights fitted to the bow pulpit or embedded in the hull at the bow and had a sternlight aft. Very few vessels displayed the

optional red over green lights and some combined the lights in one lantern at the top of the mast.

61. Typically a modern offshore racing yacht will have a bowsprit from which an asymmetric spinnaker or code zero can be set. These sails and some genoa/pulpit arrangements are likely to mask side lights on a pulpit or anywhere else above the sheerline close to deck level. In addition the lights are likely to reflect off the sails and impact the crew's night vision, degrading the lookout.
62. Generally the top of the mast is the best position to exhibit lights when under sail as it overcomes the masking and reflection problem as well as providing a longer detection horizon¹². New LED lights with more compact, precisely engineered fittings, lower power consumption and no need for periodic bulb replacement are well suited to be placed at the top of the mast. Consequently sailboats, with non-rotating masts, are shifting to use LED lights at the masthead.
63. The configuration of lights at the top of the mast can be achieved with a single tricolour fitting that exhibits the red, green and white lights over their respective arcs. Rule 25(b) permits a combined lantern with sidelights and sternlight on vessels less than 20m in length.
64. Sailboats of 20m in length and over are not permitted to combine the sidelights and sternlight in a single fitting. These boats, however, also place sidelights at the masthead and can do so provided they are separate lights and conform to the arcs of visibility set out in COLREGS, Annex I, Sections 9 and 10 - horizontal and vertical sectors. Such an arrangement could incorporate a sternlight at the masthead (the Volvo Ocean 65 Class for example) or it could be positioned at the stern of the boat. Some offshore racers prefer the sternlight at the top of the mast to reduce the light from the sternlight being reflected off the wake. There is no restriction for the horizontal or vertical spacing of the sternlight from other lights.
65. The WP considers that given current practices the restriction of not being able to use a combined lantern/tricolour/bicolour fitting on vessels 20m in length and over is an anomaly. If changed to allow vessels up to 50m in length to use a combined lantern carried at or near the top of a non-rotating mast, it would permit vessels 20m to 50m in length to use the tricolour and bicolour fittings that are currently available and certified. The current arrangement uses custom made fittings and as a combined unit at the masthead are not subjected to the same level of conformity testing.
66. The only part of the light arrangements on a modern sailing boat when under sail that does not comply with COLREGS is that matt black screens (Annex I, Section 5) are not fitted to modern sidelight fittings. They are no longer required to achieve the horizontal light sectors prescribed in the rules.

Power driven vessel

67. When operating as a PDV, most offshore racing yachts have a *masthead light* that is fitted to the forward face of the mast at a height that complies with COLREGS Annex I and also meets the requirement to be forward of amidships. This position is vulnerable to damage from overlapping headsails and the light fittings are often fitted with surrounding guards.

¹² This discussion on lights at the top of the mast is only applicable to boats with a fixed, non-rotating, mast. Boats with rotating masts require special arrangements to comply with COLREGS. In the 2019 Rolex Fastnet Race an estimated 24 boats, about 6%, of the fleet had rotating masts. These comprised multihull and International Monohull Open Class Association (IMOCA) boats.

Such an arrangement however can cause damage to sails and a few sailing vessels do not have a *masthead light* fitted (the Farr 40 Class are an example).

68. Vessels less than 12m can overcome the problem by using an all-round white light at the top of the mast in place of the *masthead light* and sternlight but to comply with COLREGS the all-round light must be at least 1m higher than the sidelights. A short 1m spar with an all-round light above the sidelights would not be practical at the top of the mast of a racing yacht and none have been observed. An alternative second set of sidelights therefore needs to be placed at least 1m lower than an all-round white light at the top of the mast and used in place of the sidelights at the top of the mast when under power. The all-round white light could also be used separately as an anchor light. The lower set of sidelights could be fitted either near deck level or as a bicolour fitting on the mast at least 1m below the all-round white light. This latter arrangement is fitted on some modern production boats less than 12m in length.
69. If a boat uses a *masthead light* and has sidelights fitted to the top of the mast for use when sailing, the sidelights will not be lower than the *masthead light* on any length of yacht. Again a second set of sidelights are required at a lower level than the *masthead light* for use in place of the sidelights at the top of the mast when under power. These are usually placed on the bow pulpit and this complies with COLREGS for a boat less than 20m in length. Boats of 20m or more in length are **not** permitted to have the sidelights forward of the *masthead light* (Annex I, Section 3(b)).
70. Some modern yachts and production boats over 20m in length do have a second set of sidelights near deck level but forward of the mast for use when operating as a PDV. This arrangement has not been challenged over many years. The non-compliance does not appear to raise any safety issue and it is a permitted configuration for boats up to 20m in length.
71. The practicality of fitting sidelights abaft the mast for use under power is problematic. Items outboard of the mast are exposed and get flogged by clew rings and sheets when under sail. This is a very vulnerable position for fittings on a sailboat and it would be difficult to maintain a sidelight fitting in that area.
72. If sidelights abeam or aft of the mast were used under sail they would be masked by more sail combinations than if the sidelights were on the bow pulpit which are only covered by sails tacked on the bowsprit and some genoa arrangements. A sidelight abeam of the mast above the sheerline would illuminate the inside of headsails and the bow wave, reducing night vision for the crew and the effectiveness of the look-out.
73. The WP considers the fitting of sidelights abaft the mast on a modern offshore racing yacht to be impractical.
74. Another problem has been observed with some boats including some earlier production boats, less than 20m in length, that have their sidelights and sternlight in a combined lantern/tricolour fitting at the top of the mast. Some of these boats do not have a lower set of sidelights beneath the *masthead light* or at least 1m below an all-round light where it is permitted. They only have lights for a sailing boat and are non compliant when operating as a PDV.
75. The table at Figure 3, provides a matrix of some current alternative situations for different lengths of boats, sail and light combinations. Only situations 1 and 3 are considered compliant. Situations 2,4 and 6 are non-compliant and situations 5 and 7 are considered impractical.

Situati on	Length	Uses Masking Headsails	Sidelights at the top of the mast	Sidelights at Deck Level Fwd of ML*	Sidelights at Deck Level Aft of ML*
1	< 20m	✗	✗	✓	-
2	< 20m	✓	✓	✗	-
3	< 20m	✓	✓	✓	-
4	> 20m	✗	✗	✓	-
5	> 20m	✗	✗	-	✓
6	> 20m	✓	✓	✓	-
7	> 20m	✓	✓	-	✓

Figure 3 - Table of Sidelights Situations for PDVs
(Colours: *Green* compliant, *Red* non-compliant, *Yellow* impractical)

ML abbreviation for Masthead Light (COLREGS)

✗ - not used/fitted ✓ - used/fitted

76. The WP considers that the current prohibition that prevents vessels over 20m in length from having their sidelights forward of the *masthead light* should be relaxed and only apply to vessels 50m or more in length. Such a relaxation would still require very large sailing vessels, small ships more than 50m, to be lit conventionally with sidelights close to the maximum beam. At the same time it would accept the impracticality of placing sidelights abaft the mast on a modern racing yacht.
77. The issues created by over-lapping headsails, the masking of lights and compliance for an offshore racing yacht as a PDV could be largely overcome through:
- placing the sidelights at the top of the mast when they are likely to be masked while sailing,
 - using a second lower set of sidelights in lieu of the sidelights at the top of the mast when operating as a PDV,
 - relaxing the restriction for vessels over 20m or more in length to 50m before being required **not** to exhibit sidelights forward of the *masthead light*, and
 - relaxing the requirement for any vessel to have inboard screens on sidelights.

Vertical sectors of visibility

78. The vertical sectors of visibility differ between a sailing vessel (Annex I, Section 10) and other vessels. The different vertical profiles could require different lights for sailing vessels and non-sailing vessels.
79. A light prescribed for all vessels other than sailing vessels (represented in Figure 4 as a 'Motorboat') will not meet the requirements for a sailing vessels. If fitted these lights may not be visible at all angles relative to a sailing boat when it heels beyond 7.5°. The lights prescribed for a sailing vessels (represented in Figure 4 as a 'Sailboat'), however, can, be used on a sailing vessel when either sailing or operating as a PDV.

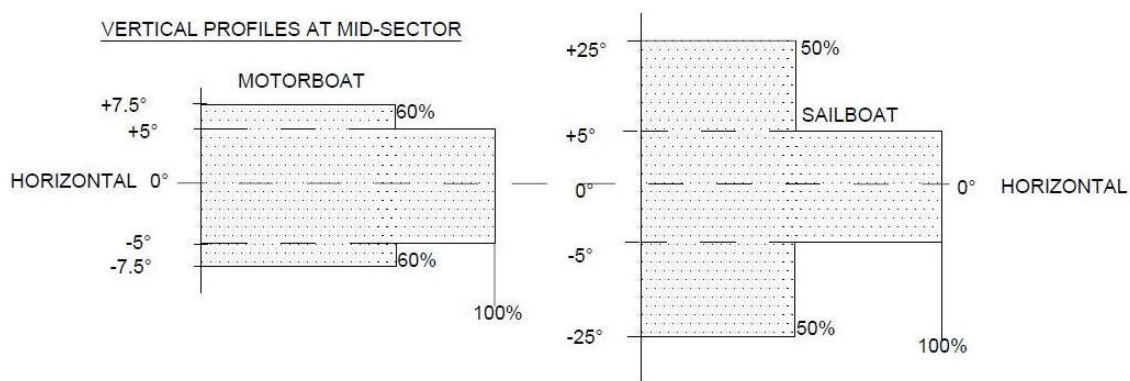


Figure 4 - COLREGS Annex I, Section 10 - Vertical Sectors

80. The different profiles does create a potential problem when lights are replaced or updated to LEDs and the US Coast Guard has issued a Marine Safety Alert 02-19 in March 2019 drawing attention to the situation.
81. Discussions with light manufacturers reveal that many of the LEDs on the market are now produced using a common vertical profile. The light is exhibited over the extended vertical arc, from 5° to 25° above and below the horizontal that is required for sailing vessels with at least 60% of the prescribed luminous intensity. The increase in luminous intensity from 50% to 60% being required for a very small part of the vertical sector (5° to 7.5° above and below the horizontal) that is required for non-sailing vessels. These lights can be used by either a sailing vessel or a non-sailing vessel as they meet or exceed the requirements of COLREGS. They are marketed as being suitable for either sailboats or power boats with either a certified range or being suitable for vessels of a designated length.
82. The common profile with increased vertical distribution is unlikely to create glare problems on non-sailing vessels and has the following advantages:
 - reduces the possibility of the wrong light being fitted to a sailing vessels, and
 - reduces the necessary range of products for manufacturers.
83. The EN 14744 and ISO19009 standards require lights that have the vertical light distribution for powered craft or motorboats to be marked with a symbol or identification. The EN standard describes the symbol as a 'Three Bladed Propeller'.
84. As a separate matter the vertical sector for a sailing vessel should be reviewed. Modern offshore racing yachts with wide beams, hard chines and large sail areas frequently sail at angles of heel exceeding 25°. This could mean that lights built precisely to COLREGS requirements on these boats would not be seen over all of the prescribed horizontal sector when heeled in excess of 25°.
85. One manufacturer stated that they 'over shine' quite a bit in the vertical sector probably by at least 10°. This means some current lights could be visible at 35° above and below the horizontal but at a reduced luminous intensity, possibly in the order of 30% of the designed intensity at the horizontal. Of note the designed intensity of the ISO 19009: 2015 and EN 14744:2005 certified lights exceed the luminous intensity specified in COLREGS by at least 25%. In practical terms a light rated with a 3 mile range could be seen at 2 miles at 35° above or below the horizon.

-
86. Existing lights could be exempt from any change to the vertical profile as most older boats do not sail at greater angles of heel than 25° and some manufacturers already provide a broader vertical profile. Any revised requirement could apply from a nominated future date.

Are the prescribed lights fit for purpose?

87. In assessing whether the current lights are effective, the WP considered: the warning provided of a boat's presence, the placement and character of some lights and the contribution made by other navigation aids.

Warning of presence

88. One of the gravest risks in offshore yacht racing is a collision with either another competitor or another vessel at sea. This risk is greater at night or in restricted visibility where situational awareness is more challenging. The risk is even further exacerbated in congested areas such as the Straits of Dover, Gibraltar or Singapore; or large fishing fleets; or in crowded harbours. In all these circumstances many vessels are meeting and passing at relatively close distances.
89. In the practice of good seamanship, vessels need to 'be seen' so that appropriate and timely actions can be taken to avoid collisions in accordance with the steering and sailing rules. When interviewing crews in the VOR, they reported occasions when they startled the crews on vessels, particularly in congested waters, as they approached and passed without warning. There are many anecdotes from other sailors of similar experiences.
90. A single red, green or white light that has a range of only 1 or 2 miles to comply with the minima specified provides short warning of a boat's presence, especially if travelling at high speed. Judging a boat's aspect is difficult from a single light and it is hard to estimate the range of an LED. High speeds can create a situation where the range closes very quickly and the relative velocity and collision avoidance is confusing to assess.
91. The duration of the warning time is dependent on the quality of the look-out, the actual visibility range of the lights and the closing speed of the two vessels. Speed, light intensity and early visual detection are important variables. Modern offshore racing yachts are capable of travelling up to two to three times the speed of sailboats when COLREGS first came into effect. This has significantly reduced the warning time.

Navigation lights at the top of the mast

92. The advent of genoas, asymmetric spinnakers and code zeros have compounded the collision avoidance problem through restricting the visual look-out and masking sidelights, greatly reducing their visible range. This is acknowledged in the OSR with the requirement for lights to be fitted '*so that they will not be masked by sails and the heeling of the boat*'. It is important that this regulation is observed.
93. As discussed earlier in this Section, this has led to positioning sidelights at the top of the mast and these lights maybe up to 30m above the waterline creating a further problem. Crews have reported that other boats are not looking for lights at this height. This is especially the case with large boats sailing close to other vessels in congested areas or in harbour. When there is little ambient light and possibly dark sails the boats are difficult to see. Even smaller boats with a tricolour at the masthead express concern that they are not visible to other boats when there are a lot of background lights in a harbour. There

may be some engine noise or other ancillary noises that are made when sail trimming on a boat but often there is little warning of the boat's presence in these circumstances.

94. Some VOR crews reported switching on their deck lights to draw attention to their presence. The glare, however, reduced their night vision and the lights could only be used sparingly.

Other aids

95. Clearly there is a role for AIS and radar to improve the look-out and increase the available warning time. The most effective look-out consists of several overlapping layers - visual, AIS, radar and other aids - so that a failure of a single layer does not allow a vessel close-by to remain undetected.
96. Yacht radar has mixed results in picking up small contacts at reasonable ranges and can be difficult to use. AIS does require the other vessel to be fitted with an AIS transponder but it is not compulsory for all vessels to have this equipment fitted and operating. All vessels are required to have some form of lights to assist being seen and they need to be effective. Visual confirmation from observing lights remains very important to verify data from other navigation aids and assist with situational awareness.

Options to improve lights

97. The Working Party formed the view that the warning provided by a single red, green or white light on an offshore racing yacht travelling at speeds of up to 30 knots and more, is barely sufficient. When required, the presence of the boat should be enhanced as a warning and an anti-collision measure.

Flashing light at the top the mast

98. The fitting of an all-round flashing white light at the top of the mast is suggested as a possible means to enhance a boat's visibility at night. This is not a new idea and has been used in the past by singlehanded sailors, including Sir Robin Knox Johnston over 30 years ago.
99. The flashing light would not need to be exhibited all the time. It could be an optional light activated by the Person in Charge¹³ (PIC) of the boat when considered necessary in some situations. This could be when offshore at night or in restricted visibility in the vicinity of other vessels and travelling at high speed - there are a number of circumstances where it would be a seamanlike precaution.
100. The flashing light would need to be constructed with a restricted vertical sector that prevented the light interfering with the night vision of the crew on deck. Further the duty cycle of the flashing light needs to be sufficiently low so as not to obscure other lights at the top of the mast or to be confused with any other light or aid to navigation. Many yachts already have an all-round white light at the top of the mast for use as an anchor light. All that may be required is the fitting of a flashing mechanism and this is already available from some manufacturers.

¹³Person in Charge (PIC). A technical term defined in OSR 1.02, with the onerous sole and inescapable responsibility for the safety of the boat and all persons onboard. The PIC is colloquially known as the 'Skipper'.

-
101. COLREGS Rule 36 - *Signals to attract attention*, makes specific provision '*if necessary to attract attention of another vessel*'. This is the intent of the proposal. There are a number of relevant provisos:
- the light '*cannot be mistaken for any signal authorised elsewhere in these rules*',
 - '*cannot be mistaken for any aid to navigation*', and
 - '*the use of high intensity intermittent or revolving lights, such as strobe lights, shall be avoided*'.
102. The only single flashing lights required by COLREGS are in Rule 23: a flashing yellow light on an air-cushion vessel and a high intensity all-round flashing red light on a wing-in-ground craft. There are some other flashing lights used by appropriate authorities as special rules, supplementing COLREGS.
103. While flashing lights are used as aids to navigation, the movement of an offshore racing yacht, the height of the light above the water and in most cases (other than if used in a harbour) where the vessel is sighted, would eliminate the boat being mistaken as an aid to navigation. In any case the situation would be quickly resolved by the other lights displayed by the boat and its movement.
104. With respect to the lights to be avoided. COLREGS at Rule 21 defines a flashing light as '*a light flashing at regular intervals at a frequency of 120 flashes or more per minute*'. The main difference between a flashing light and a strobe light, under COLREGS, is the frequency. A flashing light by definition operates at about 2 hertz (Hz) or cycles per second, whereas most strobes operate above 10Hz and at these higher frequencies can cause dizziness and other issues. In common understanding, another difference between a strobe light and a flashing light is the duty cycle. Strobes are generally understood to have a virtually instantaneous flash, dating from the use of xenon strobes. Flashing lights may have low duty cycles, but there is a discernible duration to the flash.
105. One concern expressed about the acceptance of a flashing white light was that it could be interpreted as a distress signal. However, a flashing light, other than SOS, is not listed with the Distress Signals at Annex IV of COLREGS. In more general use a flashing white light is regarded as a signal to attract attention.
106. There appears to be no reason why a flashing white light could not be fitted at the top of the mast and used at the discretion of the PIC.

Duplicating navigation lights

107. When sidelights are fitted at the top of the mast for use when sailing, a second set of sidelights need to be fitted below the *masthead light* or all-round white light for use when operating as a PDV. This second set may be fitted near deck level and most probably on the bow pulpit. There might even be two sternlights: one at the top of the mast and one near deck level.
108. To overcome issues of lights not being seen at the top of the mast, notably in congested waters, both sets of navigation lights could be exhibited at the same time. These would be very specific and limited circumstances - such as a large compact fishing fleet or a night finish in a dark harbour with many spectator craft and possibly a background of confusing shore lights. These are the circumstances where crews in the past have used deck lights and degraded their own look-out.

-
109. The additional lights could supplement the flashing white light at the masthead, if fitted, or be used on their own. They would provide the PIC another option in dealing with a challenging scenario.
 110. Lights at deck level are more likely to be seen by other vessels close-by with a low height of eye. There is a possibility that the low sidelights might be masked by sails in some circumstances but the translucent glow through the sail could still provide some warning at close range.
 111. Arguably the duplication of the lights is permitted under *Part C - Lights and Shapes* Rule 20 *Application* and Rule 36 *Signals to Attract Attention*. The principle of duplicating lights is authorised at Annex I, Section 9(b)(ii) to prevent some all-round special duty lights from being obscured by masts or other structures. The fitting of duplicated 'towing' or 'restricted in their ability to manoeuvre lights' is relatively common on tugs and other support vessels.
 112. The intent of using the extra set of lights is also closely aligned to *Part A - General* Rule 2(b) *Responsibility*: '*In construing and complying with these Rules due regard shall be had to all dangers of navigation and collision and to any special circumstances, including the limitations of vessels involved, which may make a departure from the Rules necessary to avoid immediate danger.*'

Minimum visibility ranges

113. Intuitively there is a case to increase the minimum visible ranges to take account of the higher speeds. However, caution is necessary not to overemphasise the situation based on the prescribed minimum ranges. The minimums are set at low levels. There is a logical consistency between the prescribed ranges, the types of light and the lengths of vessels.
114. Two major conformance standards already increase the minimum luminous intensity by at least 25%. Also noting the modest ranges prescribed in COLREGS for extremely large and fast vessels, there would appear to be little scope to increase the minimum range of lights for offshore racing yachts.
115. Such a change should only be considered as part of a wholesale revision of visibility ranges by the IMO. This would need to follow a detailed study of the range required to provide appropriate warning given the potential speeds involved, the capability of modern lights and what allowance should be given to the contribution made by other navigation aids.
116. If WS thought the situation for an offshore racing yacht, a non-commercial recreational vessel, was significantly different to commercial vessels and their level of regulation, the minimum ranges prescribed in the OSR could be increased. This is not considered necessary by the WP.

Other Issues

OSR and RRS reference to COLREGS

117. In producing this paper the WP noted some minor issues with the reference to COLREGS in the OSR and RRS. These were discussed at Section 3 and have been included in the recommendations.

6. Findings and Recommendations

118. The WP's examination of the suitability of lights for modern yachts has revealed a high degree of compliance with COLREGS under sail. There has been a commendable attempt to modify lights within the bounds of COLREGS as the boats have changed and technical improvements have emerged over the past 60 years. There are, however, some areas that need to be addressed for sailing vessels when operating as a PDV and other minor recommendations.
119. The principal reference document is COLREGS. As explained at Section 3 the process of amending these regulations is complex and inevitably takes considerable time. The recommendations following have been made to work within COLREGS as far as practicable and fall into two areas:
- Actions to be taken by WS - these are matters that can be implemented through amending the OSR or RRS. They also include some items that may require broader dissemination to offshore sailors; and
 - Action requested of IMO - these are items that recommend some amendment of COLREGS. The matters are relatively minor and do not identify any major imminent safety concern, they could be considered in due course as part of any routine review of COLREGS.
120. A table of the recommendations is at Appendix 3. A draft letter to IMO listing the relevant recommendations is at Appendix 6.
121. As part of its work the WP has come across a number of issues that may not be well appreciated by all sailors. The WP considers there would be benefit in WS using its media resources to promulgate as widely as practicable the findings of the paper. A draft Safety Bulletin on Lights is attached at Appendix 5.

Recommendations

122. The following recommendations are made:

Lights

- a. Use of certified light fittings

(Paragraphs 24-31, 57-59)

Noting that although lights are manufactured in a well regulated environment supported by appropriate ISO, European, USCG and other national standards there is a wide diversity in the quality of products on the recreational market. Reputable products are subject to rigorous testing mainly by independent third parties and are certified to comply with COLREGS. Some products are marked (MED Wheelmark or USCG stamp) to certify conformity.

Promulgate the recommendation to use lights that are certified by an appropriate international or national body as conforming with COLREGS.

Action: Safety Bulletin

b. Exhibiting lights at the top of the mast

(Paragraphs 60-66)

Noting that although not permitted by COLREGS Rule 25(b) to have sidelights and sternlight *combined in one lantern fitted at or near the top of the mast*, some sailing boats 20 metres or more in length do exhibit sidelights at the top of the mast and possibly a sternlight as separate light fittings and in doing so comply with COLREGS Annex I.

Propose to IMO that sailing vessels 20m to 50m in length be permitted to combine the sidelights and sternlight in one lantern carried at or near the top of a non-rotating mast, permitting the use of tricolour or bicolour fittings certified to conform with COLREGS.

Action: Request to IMO, Safety Bulletin

c. Light fittings and use of inboard screens in the horizontal sector

(Paragraphs 36, 56, 66)

Noting that with the construction of modern light fitting and associated certification there is no need for sidelights to *be fitted with inboard screens painted matt black* to delineate the prescribed horizontal sectors;

Propose to IMO that the requirement for matt black painted inboard screens for sidelights should be removed from COLREGS - Annex I, Section 5.

Action: Request to IMO

d. Sidelights for a PDV

(Paragraphs 40-43, 67-77)

Promulgate to boats who exhibit sidelights from the top of the mast when sailing that there is a requirement to have a second set of sidelights below the *masthead light*, or all-round white light where permitted, when operating as a PDV.

Action: Safety Bulletin

e. Placing of sidelights for a PDV greater than 20m in length

(Paragraphs 67-77)

Noting COLREGS Annex I, Section 3(b) requires that on a vessel of *20m or more in length the sidelights shall not be placed in front of the forward masthead light* and that the WP considers it impractical to fit sidelights abaft the mast on an offshore racing yacht of 20m or more in length;

Propose to IMO that COLREGS be amended so that the restriction not to have the sidelights forward of the *masthead light* on a vessel 20m or more in length be relaxed, and only required on vessels of 50m or more in length.

Action: Request to IMO

f. Vertical profiles of lights for sailing vessels

(Paragraphs 39, 78-86)

Noting that the lights prescribed for use on a sailing vessel, with an extended vertical sector 25° above and below the horizontal, have a different vertical profile to non-sailing vessels. The lights prescribed for a non-sailing vessels should not be used on a sailboat as their arc in the vertical sector is only 7.5° above and below the horizontal and they may not be seen when the boat is heeled beyond 7.5°. Some manufacturers are producing lights with a common vertical profile suitable for both sailing and non-sailing vessels that meets or exceeds the extended arcs and prescribed percentages of luminous intensity.

Propose to IMO that any review of COLREGS considers amending Annex I, Section 10 to prescribe a common vertical profile for sailing and non-sailing vessels. Furthermore in doing so extend the expanded vertical sector for cuts-off from 25° to 35° above and below the horizontal, as modern era sailing vessels often sail at greater angles of heel than 25°. Existing lights should be exempt from any modified vertical profile as most older boats do not sail at greater than 25° of heel and many lights are currently manufactured with a broader vertical profile than required by COLREGS. The revised requirement should apply from a nominated future date.

Action: Safety Bulletin, Request to IMO

g. An all-round flashing white warning light at the top of the mast

(Paragraphs 98-106)

Promulgate that an all-round white flashing light at the top of the mast to warn other vessels of a sailing boat's presence is permissible within COLREGS and demonstrates good seamanship in certain circumstances.

Action: Safety Bulletin, Inform IMO

h. Use of duplicated navigation lights

(Paragraphs 107-112)

Note that when boats are fitted with two sets of sidelights and possibly sternlights, at the top of the mast and near deck level, there may be occasions to exhibit both sets of lights at the same time in an attempt to make the boat more visible to other near vessels.

Action: Safety Bulletin, Inform IMO

Other Issues

i. RRS linkage with COLREGS

(Paragraphs 18-20)

Amend RRS 48.1 to strengthen the linkage with COLREGS by deleting the words 'When safety requires' and replacing them with 'When so equipped'.

Action: Submission for WS to change RRS 48.1 - see Appendix 7.

j. OSR linkage with COLREGS

(Paragraphs 21-23, 50-51)

Amend OSR 3.27 to align more fully with COLREGS and its requirements by including: 'Lights shall be carried that conform to the International Regulations for Preventing Collisions at Sea (Part C and Technical Annex I) and shall be exhibited as required by those regulations.', allowing a grace period of three years. Delete 3.27.2 completely and its references to prescribed wattages for incandescent bulbs.

Action: Submission to WS to change OSR 3.27 - see Appendix 8

Appendices

1. Statement of Work
2. Working Party - Short Resumes
3. Table of Recommendations
4. List of Acronyms
5. Draft Safety Bulletin - Lights
6. Draft Letter to IMO
7. Submission filed with WS for change to RRS 48.1
8. Submission filed with WS for change to OSR 3.27

FUTURE WORKING PARTIES

Navigation Lights – IRPCAS – RRS 48.1

A paper by Stan Honey, Chair Oceanic and Offshore Committee, 18 October 2018

The Oceanic and Offshore Committee, and International Regulations Commission should consider setting up a working party on navigation lights. If formed, Rear Admiral Chris Oxenbould AO RAN (Rtd) has offered to chair it. Stuart Carruthers, chair of the International Regulations Commission would sensibly be a vice chair. Stan Honey and Chuck Hawley have offered to serve.

The IRPCAS regulations are out of date with respect to racing sailboats over 20m. A significant percentage of offshore racing sailboats that are over 20m in length are equipped in violation of the current IRPCAS requirements for running lights, both when under sail and under power. It will likely be time consuming, frustrating, and maybe impossible to update the IRPCAS, but given that the problem is most acute on offshore racing yachts, the responsibility sensibly falls to World Sailing, specifically its Oceanic and Offshore Committee and International Regulations Commission. There is background below on the problem and on possible recommendations that might come out of such a working party.

Navigation Lights

- Facts Found by Admiral Oxenbould, Chuck Hawley, and Stan Honey, as part of a recent project for the Volvo Ocean Race.
 - Annex I of IRPCAS requires that:
 - the steaming light on vessels over 20m shall be not less than 6m above the uppermost continuous deck
 - In this note I use the term “steaming light” because on sailboats the light is only used when under power. The “steaming light” is generally mounted on the front of the mast, i.e. not at the masthead, but note that in the IRPCAS the term used for this light is “masthead light”.
 - the sidelights are to be lower than the steaming light and not greater than 3/4 of the height of the steaming light
 - the sidelights on vessels over 20m shall not be placed in front of the steaming light, (nearly all offshore sailboats over 20m violate this)
 - the sidelights on vessels over 20m shall be placed at or near the side of the vessel, (nearly all offshore sailboats over 20m violate this archaic requirement).
 - One could argue that pulpit mounted sidelights are actually on the side of the vessel, but this interpretation of the rule is a stretch given the above IRPCAS requirement that sidelights not be in front of the steaming light.
 - the sidelights on vessels over 20m require screen boards, painted matt black (nearly all sailboats over 20m violate this archaic requirement)

-
- The masthead is the only location on a modern ocean racer where sidelights can be mounted where they will never be blocked by sails.
 - Tricolor lights, i.e. red/green sidelights and white stern light, combined into one lantern for use at the masthead, are permitted in IRLCAS 25 but restricted to sailing vessels of less than 20m in length.
 - Many racing boats over 20m in length, mount their sidelights at the masthead to avoid them being blocked by sails (e.g. genoas, spinnakers, code zeros). These boats work around the restriction against combined sidelight lanterns and tricolor lanterns, by having multiple lanterns, red/green/sometimes white, mounted adjacent to one another at the masthead. This work-around should not be necessary, and still doesn't make the installation entirely compliant with IRLCAS rules (above).
 - Possible Recommendations to update IRLCAS for sailing vessels:
 - * Eliminate the obsolete requirement for screen boards. Modern LED running lights maintain very precise lit arcs without screen boards.
 - * Eliminate the requirement that sidelights be mounted near the side of sailing vessels, and eliminate the prohibition against sidelights being mounted in front of the steaming light.
 - ◆ Many offshore sailboats over 20m violate these two rules, and mount their lower set of sidelights on the bow pulpit.
 - ◆ A lower set of sidelights is of course required for use when under power, when they need to be used in conjunction with a steaming light on the mast.
 - * Allow sidelights in a combined lantern, or sidelights & sternlight in a combined lantern (e.g. tricolor), to be mounted at the masthead of any size sailing vessel.
 - ◆ On a modern ocean racer, the masthead location is the only location where sidelights will never be blocked by sails.
 - ◆ The prohibition in the IRLCAS may exist because old combined lanterns could not accurately control the lit arc of the lights. Modern LED lights achieve very precise lighting arcs.

Training and Education regarding IRLCAS and lights

- Using both deck sidelights and masthead sidelights when under sail
 - * Masthead sidelights are visible at all azimuths, but are sometimes overlooked by nearby vessels because of the height of the lights. We should recommend that ocean racers consider lighting both their bow pulpit mounted sidelights in addition to their masthead sidelights when under sail, when there is nearby traffic. The bow pulpit sidelights may be obscured by sails, but they still help.
 - * Some sailors incorrectly believe that it is against IRLCAS to light multiple sets of sidelights simultaneously. We should communicate to sailors that this approach is IRLCAS compliant and seamanlike when under sail with nearby traffic.
- Attention Lights

-
- * Many sailors incorrectly believe that IRLCAS prohibits the use of a white flashing light at the masthead in addition to running lights. We should communicate via our educational materials that a white flashing “attention” light at the masthead is permitted, sensible, and seamanlike when in an offshore situation where one wants make one’s vessel more visible.
 - * IRLCAS at Rule21 defines a flashing light as ‘a light flashing at regular intervals at a frequency of 120 flashes or more per minute.’
-

Appendix 2 - Working Party Short Resumes

Rear Admiral Chris Oxenbould AO RAN (Rtd) - Chair

Chris Oxenbould had a distinguished career of over 37 years in the Royal Australian Navy, in which he specialised as a navigator and gained substantial command experience. On retiring from the Navy in 1999 he worked with the New South Wales Government in positions including the Chief Executive of Newcastle Port Corporation 2001-04 and CEO of NSW Maritime, the state's maritime regulator, from 2004-08.

Chris has been an active sailor for most of his life, competing in 10 Sydney to Hobart races and several seasons of offshore racing out of Sydney and a season in England. He was Chair of the Sydney Hobart Yacht Race Committee in 2000 and 2001, Chair of the Flinders Islet Inquiry in 2009 and the VOR Independent Reports into the Stranding of Vestas Wind in 2015 and Ocean Racing at Night in Areas of High Vessel Traffic Density in 2018. He worked with Stan Honey and Chuck Hawley on the two VOR reports. Chris is a former chair of Australian Sailings's National Safety Committee (2011-16).

Stuart Carruthers - Vice Chair

Stuart Carruthers joined the RYA in January 2005 as the Cruising Manager. He took up sailing at an early age and has been passionately fond of the sport ever since. He has sailed and raced extensively in many parts of the world including most of the European and North Mediterranean coastline and as a boat owner has acquired a detailed knowledge of the many issues which are of concern to the recreational boating sector.

Stuart is a Chartered Marine Engineer and is registered as Eur Ing with FEANI. Apart from his technical responsibilities, he takes a keen interest in regulatory matters that affect the recreational sector. He chairs the World Sailing International Regulations Commission and is a member of its Oceanic and Offshore Committee. He frequently represents World Sailing at the International Maritime Organisation on a number of committees and sub committees. He is a member of the European Recreational Craft Directive (RCD) Experts Group and a number of its related sub committees.

Above all, Stuart is committed to the ethos of the RYA which embraces the need for self-reliance, safety and proper training. He currently races a Hawk 20.

Stan Honey

As part of a career in navigation, digital mapping, and computer graphics, Honey led the development of the yellow first-down line widely used in the broadcast of American football, the "K-Zone" baseball pitch tracking and highlighting system, the tracking and highlighting system used in NASCAR, and the LiveLine system used in the 34th and 35th America's Cups. Honey has earned three Emmy's for technical innovation in sports broadcast.

Stan has wide experience as a professional navigator, having navigated ABN AMRO to first place in the 2005-2006 Volvo Ocean Race and having navigated Groupama 3 in setting the Jules Verne record for the fastest circumnavigation of the world in 2010. He has won line-honours or set records in all of the major oceanic passages and races. These efforts include 25 TransPacific races and 10 TransAtlantic races or record passages. Honey was awarded the

2010 US Sailing Yachtsman of the Year Award, and was named to the US National Sailing Hall of Fame in 2012. Stan chairs the World Sailing Oceanic and Offshore Committee.

Prior to co-founding Sportvision in 1998, Stan Honey worked as Executive VP Technology for News Corporation from 1993 through 1998. In 1983, Honey co-founded ETAK Inc., the company that pioneered vehicle navigation systems and digital street mapping which was sold to News Corporation in 1989 and is now part of TomTom. From 1978 to 1983 Honey worked as a research engineer at SRI International in the fields of Over-The-Horizon radar, underwater optical sensors, and radio positioning systems. Stan is an inventor on 8 patents in navigation and digital mapping technology and 21 patents in tracking and television special effects.

Chuck Hawley

Chuck Hawley is a lifelong sailor, having sailed extensively on boats ranging from ultralight 24 footers to the 125 foot catamaran PlayStation. He's competed in two Singlehanded TransPacific races, including a 2nd overall finish in his Olson 30.

He has applied the lessons learned from sailing across both the Atlantic and Pacific Oceans into hundreds of videos and articles on safety and seamanship. This knowledge has also led to the development of improved safety gear, technical clothing, anchors, and marine electronics for the boating industry.

Chuck is a nationally known speaker on marine safety, and Chair of the US Sailing Safety at Sea Committee for six years, a past member of the US Sailing Board of Directors, as well as being an Instructor Trainer for US Powerboating. During his work at US Sailing, he was instrumental in developing the Safety Equipment Requirements for racing sailboats in the U.S. that rapidly became the standard for U.S. offshore and coastal races. He also developed an online course Safety at Sea course, thus making the training more widely available in the U.S.

Chuck worked for West Marine for 30 years and held senior positions in marketing, merchandising, stores, and internet divisions. He is currently a product development consultant and develops technical and educational videos for marine industry. He lives in Santa Cruz, CA with his wife Susan and is a partner in an Alerion Express 38 Yawl.

Will Apold

Will is an Engineer by training and for 25 years was President of an engineering design company specialising in aquaculture and food processing. For the last 15 years, he has been actively involved in the development and construction of wind farms and solar installations producing renewable energy for thousands of households in Canada.

Will literally grew up on the water as he sailed with his merchant marine father and mother all around the world for the first 5 years of his life. Will has always enjoyed the sport of sailing and being on the sea in all conditions. Once he saved sufficient money, Will's first purchase was a wooden sailboat and he started racing and cruising in Nova Scotia. As time passed, the boats and distances got larger. Will has competed in many offshore and oceanic races and holds records in 2 of them.

Currently, Will is Chair of the Offshore Special Regulations Committee of World Sailing, a member of Sail Canada's Offshore Committee, a member of the Cruising Club of America and over the years has held Flag positions at his local yacht club.

Appendix 3 - Table of Recommendations

Recommendations

No	Recommendation	Action by World Sailing	Action requested of IMO
	LIGHTS		
1	Use of certified light fittings Recommend the use of lights that are certified by an appropriate international or national body as conforming with COLREGS.	Safety Bulletin	To Note
2	Exhibiting lights at the top of the mast Propose to IMO that sailing vessels 20m to 50m in length be permitted to combine the sidelights and sternlight in one lantern carried at or near the top of a non-rotating mast.	1. Request to IMO 2. Safety Bulletin	In due course consider change to COLREGS
3	Use of screens in the horizontal sector Propose to IMO that the requirement for matt black painted screens should be removed from COLREGS Annex I, Section 5.	Request to IMO	In due course consider change to COLREGS
4	Sidelights for a PDV Promulgate to boats who exhibit sidelights from the top of the mast when sailing that there is a requirement to have a second set of sidelights below the <i>masthead light</i> , or all-round white light where permitted, when operating as a PDV..	Safety Bulletin	To note

No	Recommendation	Action by World Sailing	Action requested of IMO
5	<p>Placing of sidelights for a PDV (>20m)</p> <p>Propose to IMO that COLREGS (Annex I, Section 3(b)) be amended so that the restriction not to have the sidelights forward of the <i>masthead light</i> on a vessel 20m or more in length is relaxed and only required on vessels of 50m or more in length.</p>	Request to IMO	In due course consider change to COLREGS
6	<p>Vertical profiles of lights</p> <p>Propose to IMO that any review of COLREGS considers amending Annex I, Section 10 to prescribe a common vertical profile for sailing and non-sailing vessels. Furthermore in doing so extending the expanded vertical sector for cut-off from 25° to 35° above and below the horizontal, as modern era sailing vessels often sail at greater angles of heel than 25°.</p>	Request to IMO	In due course consider change to COLREGS
7	<p>An all-round flashing white light</p> <p>Promulgate that an all round flashing white light at the top of the mast to warn other vessels of the sailing vessels presence is permissible within COLREGS and demonstrates good seamanship in certain circumstances.</p>	<p>1. Safety Bulletin</p> <p>2. Inform IMO</p>	To note

No	Recommendation	Action by World Sailing	Action requested of IMO
8	<p>Use of duplicated navigation lights</p> <p>Note that when boats are fitted with two sets of sidelights and possibly sternlights, at the top of the mast and near deck level, there may be occasions to exhibit both sets of lights at the same time in an attempt to make the boat more visible to other near vessels.</p>	<p>1. Safety Bulletin</p> <p>2. Inform IMO</p>	To note
	OTHER ISSUES - OSR and RRS		
9	<p>RRS linkage with COLREGS</p> <p>Amend RRS 48.1 to strengthen the linkage with COLREGS by deleting the words ‘When safety requires’ and replacing them with ‘When so equipped’.</p>	Submission to WS for a change to RRS 48.1	Nil
10	<p>OSR linkage with COLREGS</p> <p>Amend OSR 3.27 to align more fully with COLREGS and its requirements by including: ‘Lights shall be carried that conform to the International Regulations for Preventing Collisions at Sea (Part C and Technical Annex I) and shall be exhibited as required by those regulations.’, allowing a grace period of three years. Delete 3.27.2 completely and its references to prescribed wattages for incandescent bulbs.</p>	Submission to WS for a change to OSR 3.27	Nil

Appendix 4 - List of Acronyms

List of Acronyms

ABYC	American Boating and Yachting Council
AIS	Automatic Identification System
Annex I	Annex to COLREGS - Positioning and Technical Details of Lights and Shapes
ARPA	Automatic Radar Plotting Aid
COLREGS	International Regulations for Preventing Collisions at Sea 1972
EN	European Standard
Hz	hertz (cycles per second)
IACS	International Association of Classification Societies
IMO	International Maritime Organisation
IMOCA	International Monohull Open Class Association
ISO	International Organisation of Standards
IRPCAS	an alternative abbreviation for the International Regulations for Preventing Collisions at Sea 1972
LEDs	Light emitting diodes
nm	nautical mile (1,852 metres)
m	metres
MED	Marine Equipment Directive (European)
ML (Figure 3)	<i>Masthead Light</i> as required by COLREGS
OSR	World Sailing Offshore Special Regulations
PDV	Power-driven vessel
PIC	Person in Charge of the boat
RRS	World Sailing Racing Rules of Sailing

USCG	United States Coast Guard
VOR	Volvo Ocean Race
W	watts - a measurement of power
WP	Working Party
WS	World Sailing

Appendix 5 - Draft World Sailing Safety Bulletin - Lights

WORLD SAILING OCEANIC AND OFFSHORE COMMITTEE

SAFETY BULLETIN

NAVIGATION LIGHTS

Routine Review

1. At the World Sailing Annual Conference in November 2018 the Oceanic and Offshore Committee commissioned a working party to examine navigation lights and their effectiveness. Some concern had been expressed over the utility of lights on offshore yachts as the boats have evolved to become bigger, faster and carry sail plans that can at times obscure the lights.
2. The working party closely reviewed the requirements of the Convention on the International Regulations for Preventing Collisions at Sea (COLREGS) and studied the trends in modern offshore yachts. Generally they found a high degree of compliance in boats when sailing while noting some non-compliances when boats were operating as power-driven vessels (PDVs)
3. A working paper was produced and is available at **(to be completed)**. A number of proposals have been forwarded to the International Maritime Organisation (IMO) for consideration in due course.

COLREGS

4. Part C of COLREGS - Lights and Shapes, specifies what lights vessels are required to exhibit and Annex I contains positioning and technical details of lights and shapes. Most sailors are familiar with the main Parts of the regulation. Details of the Annex are not generally as well known or understood and some of the requirements are quite intricate.
5. The specifications for a sailing vessel are straight forward with little mention in Annex I. One issue that has emerged with bigger boats of 20m or more in length is the restriction on exhibiting lights combined in one lantern at or near the top of the mast (Rule 25(b)). This position is favoured for lights on a modern boat as it is clear of masking sails and prevents lights being reflected by the sails and degrading the crew's look-out. The restriction precludes boats 20m or more in length using tricolour or bicolour fittings. Some boats 20m or more in length are overcoming the issue by using two or three separate fittings at the top of the mast.
6. The lights for a sailing boat operating as a PDV are more problematic and there are a number of restrictions listed in Annex I. These include:
 - the addition of a masthead light and where it can be placed or if less than 12m in length an all-round white light as permitted in Rule 23(d)(i);
 - sidelights are to be lower than the masthead light (Annex I, 2(g));
 - boats less than 20m in length with sidelights in a combined lantern are to fit the sidelights at least 1m lower than masthead light (Annex I, 2(h));

-
- boats more than 20m in length shall **not** place the sidelights forward of the masthead light (Annex I, 3(b));
 - boats less than 12m in length using an all-round white light are to exhibit the sidelights at least 1m below the all-round white light (Annex I, 2(d)); and
 - different vertical profiles for sailing vessels with an expanded vertical sector 25° above and below the horizontal (Annex I, 10(b)). Sailing vessels are unable to use lights for non-sailing vessels that are marked with a 'Three Bladed Propeller' when certified using EN 14744:2005.
7. The main consequence is if a boat exhibits sidelights from the top of the mast when sailing, a second set of sidelights will be required lower than the masthead or all-round white light, used when operating as a PDV.

Enhancing Visibility

8. An issue raised by the working party was the adequacy of the visibility of a modern ocean racer when sailing at speeds up to 30+ knots, displaying only a single red, green or white light, possibly from the top of the mast. Within COLREGS it is permissible to display an all-round flashing white light from the top of the mast to attract attention and warn other vessels of a yacht's presence. In certain situations such as congested waters or shipping lanes this would be a display of good seamanship.
9. If a boat is fitted with two sets of sidelights and possibly sternlights, one at the top of the mast and one near deck level there may be some situations where it would also be sound seamanship to display both sets of lights at the same time. The aim being to provide warning of the boat to other vessels nearby who may not be looking-out at the height of the mast. Some consider the simultaneous use of two sets of sidelights and sternlights to be in violation of COLREGS. It is permitted for all-round lights (Annex I Section 9(b)(ii)) and routinely done by commercial vessels, such as tugs, when no single set of lights will be visible from all relative bearings. The practice demonstrates good seamanship when appropriate.

Offshore Special Regulations

10. Following the review the Offshore Special Regulations are to be amended to provide a more clearly defined link with COLREGS - 'Lights shall be carried that conform to the International Regulations for Preventing Collisions at Sea (Part C and Technical Annex I) and shall be exhibited as required by those regulations.'
11. The change will have a grace period of three years to assist implementation.

Proposal to IMO

12. World Sailing has made a number of minor proposals to the IMO to consider in its next review of COLREGS. These address:
- allowing sailing vessels 20m to 50m to display sidelights and sternlight in a single combined lantern at or near the top of the mast; (Rule 25(b))
 - allowing sailing vessels 20m to 50m to have sidelights forward of the masthead light (Annex I, Section 3 (b));
 - deleting the requirement for inboard screens on sidelights to delineate the prescribed horizontal sector (Annex I, Section 5);

-
- recommending a common vertical profile for lights on a sailing vessel and non-sailing vessel and extending the expanded vertical sector from 25° to 35° above and below the horizontal (Annex I, Section 10). The proposal is that existing lights for sailing vessels would be exempt from the changed vertical profile and the new requirement should apply from a nominated future date;
 - advising IMO of the possible use of an all-round flashing white light at the top of the mast to warn other vessels of a sailing boat's presence; and
 - advising IMO of the possible use of both sets on sidelights and sternlights, when fitted, to enhance the boat's visibility in some congested situations.

Things to Check

13. As a safety check you should ensure:
 - if you are fitted with sidelights at the top of the mast for use when sailing that you have a second set of sidelights below the masthead or all-round light, if permitted, for use when operating as a PDV; and
 - all light fittings are certified by an appropriate international or national body as conforming with COLREGS.
14. You may also wish to consider whether an all-round flashing white light at the top of the mast would be prudent for the type of sailing you are involved with and the waters on which you sail.

Appendix 6 - Draft letter to IMO

Mr. Kitack Lim
Secretary-General
International Maritime Organisation
4 Albert Embankment
London SE1 7SR
United Kingdom

Dear Secretary-General

1. Following the World Sailing Annual Conference in November 2018 the Oceanic and Offshore Committee commissioned a working party to examine navigation lights and their effectiveness. Some concern had been expressed over the utility of lights on offshore yachts as the boats have evolved to become bigger, faster and carry sail plans that can at times obscure the lights.
2. The working party closely reviewed the requirements of the Convention on the International Regulations for Preventing Collisions at Sea (COLREGS) and studied the trends in modern offshore yachts. Pleasingly they found a high degree of compliance in boats when sailing while noting some non-compliances when boats were operating as power-driven vessels (PDVs)
3. Importantly no immediate safety concerns were uncovered. As expected given the longstanding nature of COLREGS and the significant changes that have taken place with offshore racing boats, there are a few minor matters that could be addressed during the next routine review of the Regulations.
4. Part C - Lights and Shapes - Rule 25(b) - Sailing Vessels Underway. Rule 25(b) permits sailing vessels of less than 20m in length to combine the sidelights and sternlight in one lantern carried at or near the top of the mast. This position to exhibit lights is favoured on a modern ocean racer as the visible arcs of lights are clear of the sails which prevents the lights being masked or reflecting off the sails and degrading the look-out of the crew. The lights also have a longer detection horizon from the height at the top of the mast. Some boats exceeding 20m in length overcome the restriction by having the sidelights and at times the sternlight, at the top of the mast but as single individual fittings. While this arrangement is deemed permissible within COLREGS it prevents vessels over 20m in length using the precisely engineered and certified tricolour or bicolour fittings. The proposal is to amend Rule 25(b) to permit sailing vessels less than 50m in length to combine the sidelights and sternlight in a single fitting carried at or near the top of the mast.
5. Annex I, Section 3(b) - Horizontal positioning and spacing of lights. Section 3(b) requires sailing vessels of 20m or more in length to **not** place the sidelights in front of the forward masthead light when operating as a PDV. This would require these vessels to position the sidelights abaft the mast. World Sailing's Offshore Special Regulation 3.27.1 requires navigation lights to be 'mounted above sheerline and so that they will not be masked by sails or the heeling of the boat'. The area abaft the mast and above the sheerline is very vulnerable on an offshore racer 20m or more in length. Items outboard of the mast are exposed and get flogged by clew rings and sheets when under sail. Maintaining a sidelight fitting in this area would be very difficult and the working party considered it would be

impractical. Normally boats would place sidelights for use when operating as a PDV on the bow pulpit and this is permissible for a boat up to 20m in length. The proposal is to relax the restriction to only apply to vessels 50m or more in length. Such a relaxation would still require very large sailing vessels, small ships of 50m or more in length, to be lit conventionally with sidelights close to the maximum beam.

6. Annex I, Section 5 - Screens for sidelights. This section requires the sidelights of vessel of 20m or more in length to be fitted with inboard screens painted matt black to delineate the horizontal sectors of the lights. The screens can also be required on vessels less than 20m in length. This requirement reflects the arrangements necessary with earlier navigation lights. Modern fittings do not require screens and the arcs are precisely defined by the lamp construction and are certified through a rigorous third party process. The proposal is to remove the requirement for inboard screens on sidelights while retaining the requirement for the lights to be visible over the horizontal and vertical sectors prescribed at Annex I, Sections 9 and 10.
7. Annex I, Section 10 - Vertical Sectors. The lights prescribed for use on a sailing vessel have a different vertical profile to non-sailing vessels with an extended vertical sector 25° above and below the horizontal to cater for the normal angles of heel of sailing vessels. Some modern navigation lights are produced by manufacturers with a common vertical profile that meets or exceeds the requirements of COLREGS and can be used on both sailing and non-sailing vessels. In addition modern offshore racing yachts with wide beams, hard chines and large sail areas frequently sail at angles of heel exceeding 25°, the current cut-off angle. This could mean that lights on these boats may not be seen over the specified horizontal sector when heeled in excess of 25°. The proposals are to prescribe a common vertical profile for sailing and non-sailing vessels and increase the expanded vertical sector to 35° above and below the horizon. Furthermore it is proposed that existing lights would be exempt from the change.
8. In addition the working party looked closely at the adequacy of the warning provided by the prescribed navigation lights. They acknowledged that there are some circumstances in congested waters where more warning of a sailing boat's presence might be required. The review determined that it would be permissible for a sailing vessel to display an all-round flashing white light from the top of the mast and in certain circumstances this would demonstrate good seamanship. The initial proposal is to promulgate the opportunity among offshore racing yachts and based on feedback determine what action might be taken.
9. Similarly, when yachts exhibit sidelights and possibly a sternlight from the top of the mast, they are required to have a second set of sidelights normally near deck level for use when operating as a PDV. In usual circumstances only one set of lights would be displayed. When sailing in some rare highly congested situations, such as a dense fishing fleet or a night finish in a harbour with a large spectator fleet it may be prudent seamanship to display both sets of sidelights and possibly a second sternlight. Experience is that many of the boats nearby may not be looking-out at the height of the top of the mast and may not see the sailing boat only fitted with lights at the top of the mast.
10. Arguably this would be permissible within Rule 20 and Rule 36 as it is unlikely the lights would be mistaken, impair or confuse the distinctive character of other lights specified in the rules. Of note the duplication of some all-round lights is permitted in Annex I, Section 3(b)(ii) if the single light is obscured by masts and other structures. Duplicated lights are commonly displayed by tugs or vessels restricted in their ability to manoeuvre. If this was not agreed Rule 2(b) would support a departure from the rules in a near-extremis situation.

-
11. Should IMO require further information or explanation regarding this request, the most appropriate point of contact would be Stan Honey, Chairman of the World Sailing Oceanic and Offshore Committee. He can be contacted at stan@honeynav.com .
 12. World Sailing looks forward to ongoing close cooperation with the IMO in addressing these matters.

Yours sincerely

Kim Andersen
President of World Sailing

Appendix 7 - Submission filed with WS for change to RRS 48.1

Racing Rules of Sailing

Rule 48.1

A submission from the Chairman of the Oceanic and Offshore Committee

Purpose or Objective

To clarify that boats that are equipped with navigation lights must use them as required by IRPCAS 20(b), from sunset to sunrise, and 20(c) from sunrise to sunset in restricted visibility.

Proposal

Change rule 48.1 as follows:

48.1 ~~When safety requires~~ **When so equipped**, a boat shall sound fog signals and show lights as required by the *International Regulations for Preventing Collisions at Sea (IRPCAS)* or applicable government rules.

Current Position

As above.

Reasons

1. The current wording of rule 48.1 can be interpreted that a boat does not need to show their navigation lights if not required for safety, i.e. if there are no other vessels in the vicinity. This may date from long ago when navigation lights took significant electrical power and sailboats routinely turned them off when there was no nearby traffic. Now that LED lights draw very little power, boats that are equipped with navigation lights should use them as required by the IRPCAS (see IRPCAS rule 20(b) and (c)). The RRS cannot change IRPCAS and should not attempt to do so.
2. This submission does not suggest that the RRS require the carrying of navigation lights and fog signals, that is best handled by the IRPCAS themselves for all vessels underway between sunset and sunrise, racing or not. Requirements for carrying navigation lights are sometimes also imposed by the event organizing authority, often via the Offshore Special Regulations.
3. By stating, "when so equipped" we avoid creating a problem within the RRS for small boats that happen to finish a race after sunset. Such boats will still violate IRPCAS, however.
4. This submission results from work by the Navigation Lights Working Party of the Oceanic and Offshore Committee, chaired by Rear Admiral Chris Oxenbould AO RAN (Rtd).

Appendix 8 - Submission filed with WS for change to OSR 3.72

Offshore Special Regulations

OSR 3.27 Navigation Lights

A submission from the Chairman

Purpose or Objective

To align more fully with COLREGS and its requirements

Proposal

Amend the regulation as follows:

	3.27	Navigation Lights
**	3.27.1	<u>that conform to the International Regulations for Preventing Collisions at Sea (Part C and Technical Annex I) and shall be exhibited as required by those regulations.</u>
**	3.27.1 3.27.2	mounted above sheerline and so that they will not be masked by sails or the heeling of the boat
**	3.27.2	having light intensity meeting COLREGS. When incandescent bulbs are used the minimum power rating shall be:
**	3.27.2 a)	For LH less than 12 m (39'-4"), 10 W
**	3.27.2 b)	For LH 12 m (39'-4") and greater, 25 W
MoMu0,1,2,3	3.27.3	reserve lights having the same specifications as above, and that can be powered independently
**	3.27.4	spare bulbs (not required for LED)

Current Position

	3.27	Navigation Lights
**	3.27.1	mounted above sheerline and so that they will not be masked by sails or the heeling of the boat
**	3.27.2	having light intensity meeting COLREGS. When incandescent bulbs are used the minimum power rating shall be:
**	3.27.2 a)	For LH less than 12 m (39'-4"), 10 W
**	3.27.2 b)	For LH 12 m (39'-4") and greater, 25 W

MoMu0,1,2,3	3.27.3	reserve lights having the same specifications as above, and that can be powered independently
**	3.27.4	spare bulbs (not required for LED)

Reasons

Recommendation from the Oceanic and Offshore Committee's Working Party 'A Working Paper on the suitability of the rules for lights for modern yachts':

49. The OSR provides a minimum power rating for incandescent bulbs in hull lengths of less than and more than 12m, presumably, to satisfy the minimum range requirement. The OSR does not make any allowance for the increased visibility required for the *masthead lights* of vessels over 12m and over 20m in length. The wattage requirement steps from 10 watts (W) to 25W and it may be that the higher powered light meets the longest minimum range requirement of 5 miles.

50. Modern light emitting diodes (LEDs) can achieve the required ranges with a lower wattage. Defining range by wattage is no longer useful.

OSR linkage with COLREGS

(Paragraph 21-23, 49-50)

Amend OSR 3.27 to align more fully with COLREGS and its requirements by including: 'Lights shall be carried that conform to the International Regulations for Preventing Collisions at Sea (Part C and Technical Annex I) and shall be exhibited as required by those regulations.', allowing a grace period of three years. Delete 3.27.2 completely and its references to prescribed wattages for incandescent bulbs.

The WP's examination of the suitability of lights for modern yachts has revealed a high degree of compliance with COLREGS under sail. There are, however, some areas that need to be addressed for offshore racing yachts when operating as a power-driven vessel (PDV), particularly in regard to sidelights. Boats who exhibit sidelights from the top of the mast when sailing require a second set of sidelights below the masthead light when operating as a PDV. A boat less than 12m in length may use an all-round white light and sidelights in place of the masthead light and sternlight but it is to be placed at least 1m higher than the sidelights.

Information

IRPCS

Part C Lights and Shapes (Rules 20-31)

Rule 20 states rules concerning lights apply from sunset to sunrise. Rule 21 gives definitions.

Rule 22 covers visibility of lights - indicating that lights should be visible at minimum ranges (in nautical miles) determined according to the type of vessel.

Rule 23 covers lights to be carried by power-driven vessels underway.

Rule 24 covers lights for vessels towing and pushing.

Rule 25 covers light requirements for sailing vessels underway and vessels under oars.

Annexes

The COLREGs include four annexes:

Annex I - Positioning and technical details of lights and shapes