

# Restricted visibility: In Search of a Solution

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THIS ARTICLE FIRST APPEARED IN THE JOURNAL OF NAVIGATION (VOLUME 59, Nº 2, MAY 2006) AND ITS COPYRIGHT IS RETAINED BY THE ROYAL INSTITUTE OF NAVIGATION

In order to avoid a collision it has clearly been proved that for most seafarers there exist just a set of possible situations known as head-on, crossing and overtaking, while ignoring in a general way the behaviour they should carry out when their vessel is in condition of restricted visibility. It is obvious that the existence of two different manoeuvre methods in relation to the prevailing visibility makes the navigator get confused. But

there is still more. With the arrival of AIS, the present drawing up of paragraph d) of Rule 19 leaves the seafarer in a state of total uncertainty when deciding the appropriate manoeuvre, so its amendment must be dealt with the maximum priority. The following paper tries to find a solution to the dilemma, even though this does not imply a radical change in the general conception that a mariner may have of collision avoidance.

## KEY WORDS

1. COLREGS 2. ARPA 3. AIS

**1. INTRODUCTION.** For some considerable time now the topic of the current application of the International Regulations for Preventing Collisions at sea has been a matter of vigorous debate (Syms, 2003a). Moreover, case law, the MARS reports and anecdotal evidence all indicate that many of the basis principles of collision avoidance are improperly understood. (Stitt, 2002). One of the last reports has been carried out by Captain Syms inside the

scope of the Nautical Institute. His conclusions have revealed the existing distance between what the Rules determine and what actually happens when navigators put them into practice. Concepts such as “not impede”, the interpretation of Rule 10, and above all, the conduct of vessels in restricted visibility, go unnoticed among mariners. Personally, I have carried out different reports on this subject and from all the dark aspects of the Rules, I would

especially highlight the interpretation of Rule 19 (in special its paragraph d), which is ignored by a great number of seamen of different origins and levels of training. Captain Syms himself concludes in his report that approximating to an 80 per cent misunderstanding of the poor visibility rule (Syms, 2003b, p 8). At sea things do not happen spontaneously, so if we identify the problem, we will be able to approach it in search of an effective solution.

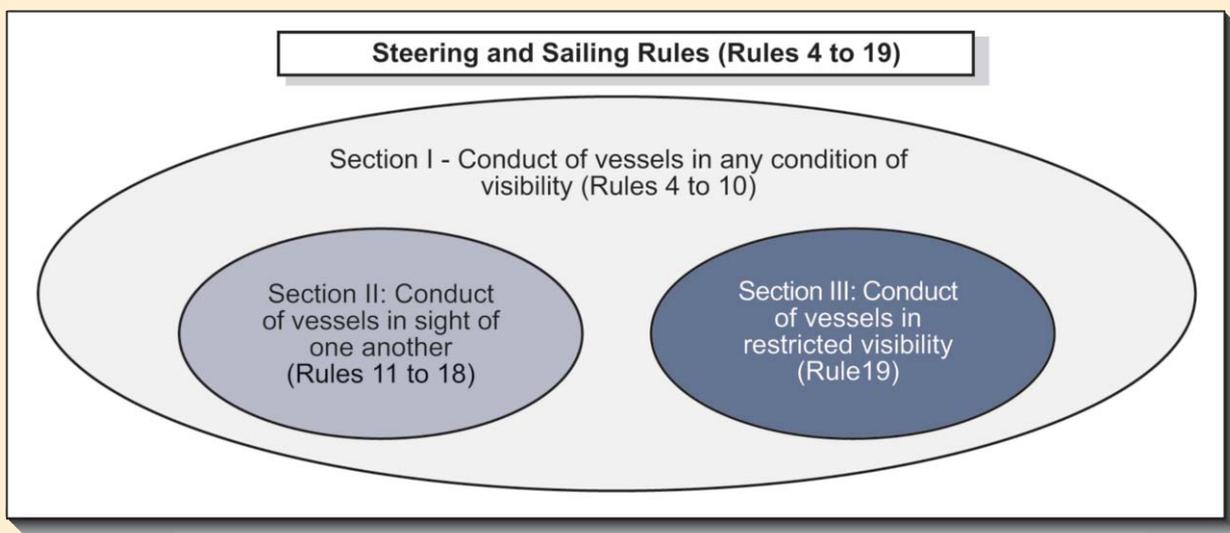


Figure 1. COLREGS Part B - Steering and Sailing Rules

## 2. MANOEUVRE METHODS TO AVOID A COLLISION.

As it has been pointed out at the beginning of this paper, the conflict has its origins in the coexistence inside the COLREGS of two different methods to avoid collisions. It is necessary the presence of a variable that will accurately determine which of them must be used, being that variable the prevailing visibility at the moment. According to it, a different behaviour is established depending whether the involved vessels can be seen with the eyes or they cannot, as it is considered that there exists no other better tool to avoid collisions than the human sight, provided that the observer is fully qualified and has enough experience to interpret what he is seeing.

Figure 1 describes the present structure of the COLREGS' Part B, Steering and Sailing Rules, which is divided into three sections:

- A first section applicable to any condition of visibility (rules 4 to 10 included).
- A second section applicable to vessels in sight of one another (rules 11 to 18 included).
- A third section applicable to vessels not in sight of one another when navigating in or near an area of restricted visibility (it has got just one rule, number 19).

According to this classification, a vessel shall comply with section I at any event, as well as the concepts included either in section II or in section III, depending on the visibility; but what she shall never do is applying sections II and III at the same time, a widely extended mistake, as it has already been mentioned.

*2.1 Conduct of vessels in any condition of visibility.* There are a set of rules that shall be complied regardless of the prevailing visibility. We are talking about concepts such as the proper look-out, safe speed, risk of collision, and the actions taken to avoid collisions. According to Cahill in applying these concepts there is one infallible principle that should always govern: is the action or manoeuvre one intends to follow

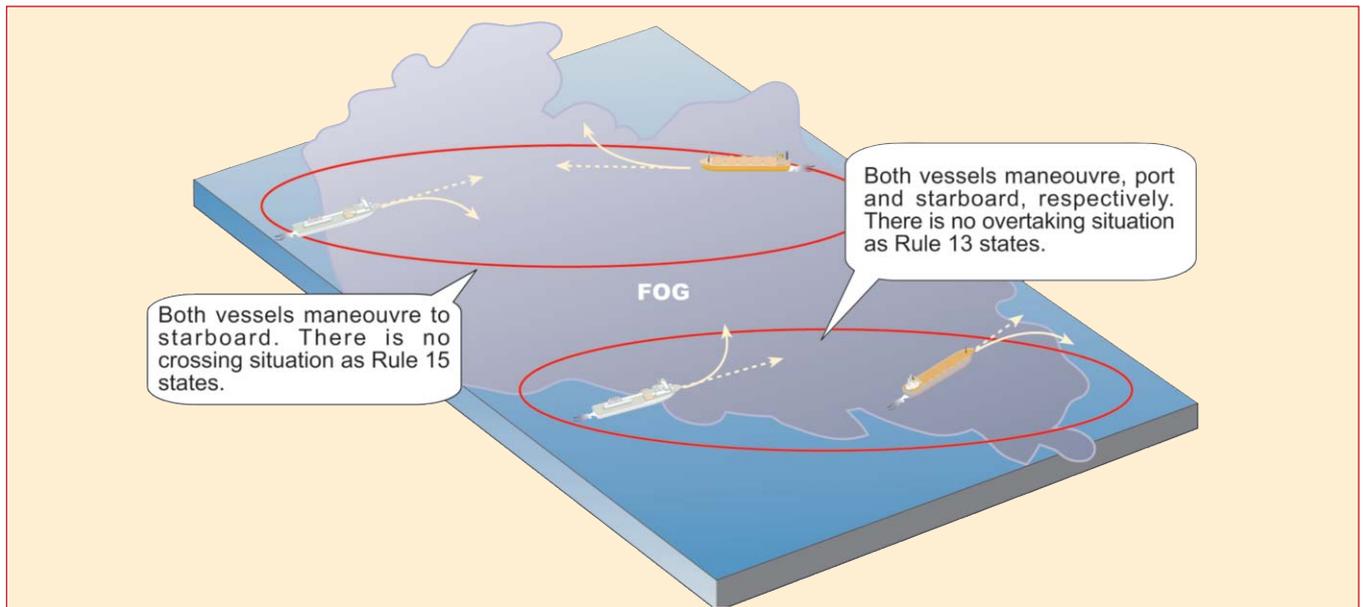
or execute likely to increase or decrease the risk of collision? (Cahill, 1983). Section I also includes the behaviour along the course of a narrow channel or fairway, and in a traffic separation scheme, as in such situations there will be good visibility some days, whereas on other occasions you will hardly see further the stem.

*2.2 Conduct of vessels in sight of one another.* When the vessels are in sight of one another, the COLREGS determine a sequence of privileges depending upon a number of factors. The first determines whether one of the involved vessels finds herself in an inferior position when manoeuvring. This way, Rule 18 forces a power driven underway to keep out of the way of a vessel engaged in fishing. But when it is considered that the vessels are in the same conditions to start an avoiding action, the Rules divide the horizon into three sectors, where a set of rules known as head-on, crossing and overtaking, are applied; these mentioned rules have a specific behaviour, for instance, the vessel which has the other on her starboard side, shall keep out of the way. It is important to point out that the COLREGS consider that the vessels find themselves in those situations according to the visual aspect they are observed with, but never in reference to an apparent vector crossing on the ARPA screen. And this happens, not only because when the present Collisions Regulations were negotiated the use of ARPA was hardly extended among the vessels, but also because any mistake in the initial data introduced in the radar tracking system can originate significant variations in the real course and speed of tracked targets.

*2.3 Conduct of vessels in Restricted Visibility.* The manoeuvre method previously described is drastically altered when the navigator does not have the most accurate tool for avoiding a collision: his eyes. Under such circumstances, the Rules use a method based on the way a vessel has of detecting the other's presence. Thus, if the detection is carried out by means of radar,

and a close-quarters situation is developing and/or risk of collision exists, the own ship shall take avoiding action regardless of the bearing the other one approaches from. That is, there is neither head-on, crossing and overtaking, nor stand-on or give way vessel, because such situations are considered in section II, and in order to undertake them, it is essential the visual observation that allows us to distinguish the lights of the other vessel as well as the category it belongs to. The manoeuvres stated in Rule 19 d) are mainly based on a change of course, although the use of the engine is not excluded (Figure 2). Nevertheless, in case a vessel detects forward of her beam another one by the ear, that is, because she listens to her fog signals, or when for any reason a close-quarters cannot be avoided, the COLREGS state that in such situation she shall reduce her speed to the minimum, even she shall if necessary take all her way off. Due to the range of the sound signals and its unpredictable propagation, it would be quite dangerous to keep the present speed, as well as to undertake a blind alteration of course when the course of the other vessel has not been ascertained (Cockcroft and Lameijer, 1996, p141), as, among any other consequences, it could make the vessel cross completely. It is important to highlight, that whether in restricted visibility or when the vessels are in sight of one another, all the collision avoidance is undertaken without the need of radio communication between vessels (Weber, 1995). In origin, only in those overtakings carried out along the course of a narrow channel or fairway the COLREGS determine a sound signal exchange.

Finally, the present drawing up of paragraph d) says: "A vessel which detects by radar **alone** the presence of another vessel...". It is obvious that with the arrival of AIS, the detection is not carried out by radar exclusively. So, which manoeuvre should be undertaken when, for instance, the detection is carried out by radar and AIS simultaneously? A new example of COLREGS' ambiguity that must be solved as soon as possible.



**Figure 2. According to the interpretation of paragraph d) of Rule 19, in case the radars of both vessels display a close-quarters situation, both vessels shall take avoiding action.**

### 3. THE NEVER-ENDING CONTROVERSY.

So far we have described the behaviour stated in the COLREGS. It must be recognised that the Steering and Sailing Rules have their logical sense and fit to the good seamanship. However, it is not difficult to prove that what was foreseen in due time does not agree with the usual practice undertaken on board. One of the essentials of the Collisions Regulations is that they should, so far as possible, eliminate doubt in the minds of the navigator using them (Cooper, 2001, p479). For many years, I have been doing specialized workshops and tests directed to professional seafarers, whose results agree with the last studies carried out by Captain Syms. However, the real motive of the present paper is the result of a later experiment, which I think it is quite significant. The first part of my study consisted in the realization of a four situation test, with four options each, to professional seafarers of different training and experience, going from masters and pilots to officers with one of two years' experience at sea. The tests, 102 in total, were carried out in the Centro de Seguridad Marítima Jovellanos, in workshops with shipping companies and in the Nautical School of Gijón. The pilot corporation of Barcelona sent the tests back by fax. It is important to

point out that in Spain nautical studies belong to the category of university ones, equivalent to an engineering. In the test the Own Ship sails in condition of restricted visibility of three cables and a close-quarters situation is developing with another vessel (Figure 3). In each situation, the OS encounters just one vessel. To the targets approaching from port, 82% of interviewed answered that at first they kept course and

speed; this option increases till 93% when the other vessel is approaching from starboard or port quarter. In other words, most of them really think they are either in a crossing or overtaking situation, where it is the other vessel the one which must undertake the manoeuvre. To sum up, Rule 19 despite being part of the COLREGS for some decades still remains a mystery to a significant number of the world's seafarers



**Figure 3.- Summary of the four described situations.**

(Syms, 2003b, p10). But the really surprising aspect is that I decided to repeat the experience, but on this occasion with students from the last year of the Nautical School in Gijón, (24 pupils in total), who had just finished their simulator trainings to get the Radar Observer Automatic Plot (ARPA) certification. 85% of them had similar answers to those of a professional who has been sailing for more than ten years. Though we may not like recognize it, there seems to be an intrinsic logic that leads the navigator to ignore paragraph d) of Rule 19, regardless of his training and experience; which forces us to reconsider the real cause of this behaviour.

#### 4. A REASONABLE EXPLANATION.

So, as it has clearly been proved there exists complete disagreement between what the COLREGS state and what seafarers really carry out, it is inevitable to think over the following question: Are the Rules inadequate or modern sailing practices hamper their right application? A very important aspect I think it should be taken into account is that if after presenting some of the mentioned situations to a group of professional navigators, they are properly told the reason why the Rules state the manoeuvres of Rule 19, most of them agree with the text and they simply answer that if they had chosen the other option was just because they thought they had been taught in that way. Of course, firstly the problem lies in the fact that perhaps in many nautical schools it is not paid enough attention to the teaching of the COLREGS, by limiting the students to learn the Steering and Sailing Rules by heart, in order to pass an exam, but as these rules are interpretative, misunderstandings are quite likely to happen. We must think that whenever the future officer stands on watch, he will spend four hours (even six!) reading between the COLREGS' lines. Moreover, I think this misinterpretation could be reinforced with the use of the ARPA. In good visibility the ARPA is the main aid most vessels have to analyse and solve traffic situations. The OOW sees reflected on the screen crossing, overtaking, or

heading-on targets and he acts according to the traffic situation. In restricted visibility it happens the same, but now there exists a mayor dependency of the ARPA, as this equipment together with AIS, are the unique aids they have to avoid collisions, if we admit that sound signals give much less information and they cannot be heard further than 2 miles. In both circumstances, good and poor visibility, the screen display is practically the same. So the OOW is again in front of a screen which shows echoes, sometimes crossing, overtaking, or heading-on, and he instinctively wonders why not using the head-on, crossing and overtaking rules that produce quite good results in condition of good visibility and which are, moreover, quite accurate, to the contrary of what it is stated in paragraph d) of Rule 19, where instead of saying positively what must be done, it is stated what must be avoided. The fact is that the seafarer, like most people, loves accurate and simple things.

#### 5. IS IT POSSIBLE TO ELIMINATE SECTION III?

Considering what it has been described, we face the following dilemma: either we modify the content of the Rules so that it adapts to what seafarers interpret, or we try mariners to be the ones who can better interpret the COLREGS by giving the Rules a minimum didactic sense. Because it is not the Rules that prevent collisions, it is people on board who are responsible for making them work. Hence, the Rules ought to be clear in their interpretation and operation to the average mariner. (Stitt, 2002, p 420). Quite logically, the first temptation would be to try to unify the two manoeuvre methods into just one, and specifically, extending the head-on, crossing and overtaking situation to the condition of restricted visibility, just as most navigators claim. In relation to this, Syms says: If dual action is so wrong and so inimical to the conceptual basis of the COLREGS, why have we seen fit to incorporate it in the "not in sight" condition? (Syms, 2003b, p8). So, is it possible to eliminate section III? The main difficulty would be to ignore the variable that has led to the

establishment of these two manoeuvre methods: the visibility, or what is the same, the possibility of seeing the other vessels visual aspect. Some people think that AIS could be the technological bridge that can solve the problem. Functionally, AIS is identical to light signals albeit applying VHF technologically rather than "colour and aspect" to transmit information from one ship to another (Harding, 2002, p440), with the advantage that it is not affected by the condition of atmospheric visibility. But though it is a great aid and a hopeful advance, there are a set of handicaps that prevent the problem from being solved completely. Among others, we can name the following mentioned by other authors:

- Position, course and speed over ground will normally provided solely by the GPS. As a consequence, ARPA information (stabilized over the sea) and AIS information (stabilized over ground) will not be the same. In other words, navigator will have two information courses with different data for the same target vessel. (Ramsvik, 2004, p15). An independent system from radar may have its benefits but the possibility of conflicting and confusing information either imposed on the radar or independently displayed, has the potential for disastrous consequences (Graveson, 2004, p341).
- Like the initial radar sets, some AIS equipment is not particularly user friendly (Stitt, 2004, p168). Moreover, it can bring some mistakes which are characteristic of the GPS technology, and we should not forget that the decision-making would be based on an automatic system of data emission, which could be inaccurate.
- Whereas radar is notionally capable of seeing everything in its area of coverage, a transponder can only reveal data about vessels in which the equipment is fitted and properly functioning. (Hadley, 1999, p7). Since not all vessels are equipped with AIS, this would force us to establish two different rules: one for vessels detected by means of AIS



and another for those vessels that are not equipped with AIS. So instead of just one problem we would have two. Another possibility of extending the head-on, crossing and overtaking situations could be the modification of Rule 17, in the sense of forcing the stand-on vessel to take action to avoid collision in restricted visibility as soon as it becomes apparent to her that the vessel required to keep out of her way is not taking appropriate action in accordance with the Rules. One advantage of this solution is that it adapts to a great extent to what seafarers declare they really do in this situation. However, there would be other quite important aspects to solve. In addition to shortening the three sections into just one, and eliminating Rules 4, 11, and 19, Rule number 18, Responsibilities between Vessels, would also have to be modified, a not very easy task to do. At present, this rule shall be applied when the vessels can see the lights and shapes of the others because when they are in restricted visibility, they only know if the other vessel is limited to undertake an avoiding action when hearing her fog signal, a prolonged one followed by two short blasts, or by means of AIS information. As we have already mentioned not all vessels are equipped with AIS and the sound signals in restricted visibility can unfortunately be heard in just short distances. Moreover, they give much

less information than the corresponding lights and shapes. In conclusion, if we want to eliminate section III, we must rewrite the Rules completely, something that could be at least embarrassing but not impossible.

#### 6. A LESS DRASTIC SOLUTION.

On the hypothesis that the interpretative misunderstanding arises from the reading of the text, a less drastic possibility would consist of a new drawing up of section III. To do so, it must be assumed that not only for the professional with years of experience but also for the pupils who has just finished the COLREGS' study, the distinction of two manoeuvre methods in relation to visibility goes practically unnoticed. It is quite possible that this may happen because the COLREGS lack of didactic sense at all, so all effort should be focused on solving this gap, task that must be carried out accurately. In this context, the first step must be directed to highlight the importance of section III. At present, this section has just one rule, to the contrary of section I and II, which have seven and eight respectively. It is precisely this meanness of the legislator when joining the precepts applicable in restricted visibility in just one rule, what leads the reader to think that Rule 19 is an additional one, having precepts that only reinforce the concepts of section I and II. The proposal for the new drawing up of section III is the following:

### Section III- Conduct of Vessels in Restricted Visibility

#### Rule 19 Application

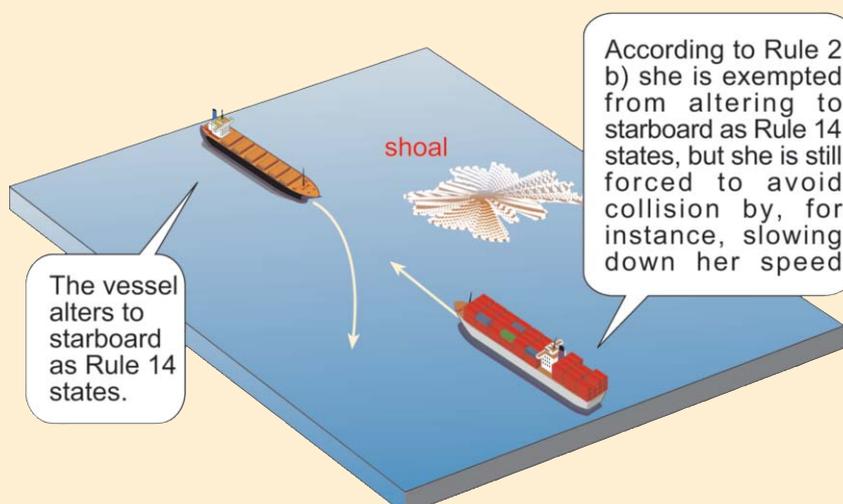
**This section applies to vessels not in sight of one another when navigating in or near an area of restricted visibility.**

With the conversion of paragraph a) of Rule 19 in an independent one, the importance of section III is emphasized; Moreover, it is in concordance with the structure of the rest of the Steering and Sailing Rules, because section I as well as section II have a rule that clearly specify when they must be applied (rules 4 and 11, respectively).

#### Rule 20 Close-quarters situation

**A vessel which detects by radar or AIS the presence of another vessel shall determine if a close-quarters situation is developing. If so, she shall take avoiding action, provided that when such action consists of an alteration in course, shall undertake the following:**

- i. An alteration of course to starboard for a vessel forward of the beam, other than for a vessel being overtaken by starboard side;
- ii. An alteration of course that keeps her away from a vessel abeam or abaft the beam.



**Figure 4.** Some authors think that Rule 2 gives answer to all special circumstances, and, in order to avoid ambiguity, expressions such as *“if the circumstances of the case”* and *“so far as possible”* can be eliminated from the rest of the rules.

In relation to paragraph d) in the original text of Rule 19, AIS has been added so that the application of the rule can still be effective. The expression “and/or risk of collision” has been deleted for the simple reason that close-quarters situations do include a risk of collision. In restricted visibility, in the open sea, a close-quarters situation is generally considered to begin to apply at a distance of at least 2 miles in any direction forward of the beam as this is the typical range of audibility for the whistle of a large vessel in still conditions (Cockcroft and Lameijer, 1996, p132). So before two vessels collide, a close quarters situation will have already developed. The expression “so far as possible” is also deleted, as these kind of sentences do nothing but mislead the reader, and it must be understood that Rule 2 includes the principle that seafarer may make a departure from the Rules in special circumstances (Figure 4). In this sense, Stitt says that additional vague phrasing is unhelpful and is likely to do nothing other than cause further confusion, particularly in the minds of less experienced watch-keepers, or provide a spurious argument to anyone seeking to justify a totally inappropriate manoeuvre (Stitt, 2002, p427). An example to follow is Rule 14, which eliminates expressions such “if the circumstances of the case admit”, which turns it into a simple rule, easy to operate and effective (Belcher, 2002) But the most important aspect of this modification lies in that to the contrary of original Rule 19, now it is stated what the vessel must do, instead of what she mustn't do. In fact, the

manoeuvres are the same, but drawn up in a positive way.

### Rule 21 Speed reduction

**Except where it has been determined that a risk of collision does not exist, every vessel which hears apparently forward of her beam the fog signal of another vessel, or which cannot avoid a close-quarters situation with another vessel forward of her beam, shall reduce her speed to be the minimum at which she can be kept on her course. She shall if necessary take all her way off and in any event navigate with extreme caution until danger of collision is over.**

Nothing to add to this rule, which is no more than the conversion of paragraph e) of the present Rule 19 in an independent one. Consequently, the rest of the rules must be enumerated again.

Take note that paragraphs b) and c) have been eliminated of the original text. In present paragraph b) it is stated that every vessel shall proceed at a safe speed adapted to the prevailing circumstances and condition of restricted visibility, what it is already properly expressed in Rule 6, so keeping it sounds redundant, as the reader has the feeling that he is always reading the same. In paragraph b) it is also stated that a power-driven vessel shall have her engines ready for immediate manoeuvre, and we do believe this concept must be applied in any situation, not just in restricted visibility. As far as the present paragraph c)

that says every vessel shall have due regard to the prevailing circumstances and conditions of restricted visibility when complying with the rules of section I, it is also redundant, as this principle is mentioned in rules 5, 6, 7 and 8, and in any case its importance should be highlighted in them. Provided accuracy isn't lost, simplification is the best didactic tool.

**7. CONCLUSION.** As it can be noticed, the proposed amendment does not establish engine or course actions different to the original ones, but what they seek is to make its understanding easier. This way, we do neither discredit the sense of the Steering And Sailing Rules, nor the good practices acquired for decades, we simply reinforce them and with the inclusion of the term AIS, they are updated. To tell the truth they are not the only needed amendments; among others we may happen to include the acronyms ARPA, VHF, VTS in section I. It still remains the problem of the HSC too. There have always been doubts to modify the COLREGS. It is argued that seafarer is by nature opposed to changes, and that there exist countries with a minimum training level, that do not recycle their seafarers and so, they would not adapt to the possible introduced changes. But this attitude would be ridiculous, leaving the security of human life and the preservation of the environment at the hands of the mere immobility or market speculation. Haven't we learnt anything since the Doña Paz or Atlantic Empress collisions? ●●●

### ACKNOWLEDGEMENTS

English version M<sup>a</sup> Victoria Peña. Drawings by Gonzalo Pérez.

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