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A Mariner's Guide to **PREVENTING COLLISIONS**

**International Regulations for Preventing Collisions at Sea, 1972;
including all amendments.**

Interpreted & fully explained for practical application



Capt. Yashwant Chhabra

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Inside front cover picture: Mrs. Seema Chhabra when on a ship transiting across Copenhagen, June 2009.

Inside back cover picture: Mr. Naveen Singh Pundir, on a vessel anchored off Hammerfest, March 2009.

Chartlets of Lights and Shapes: courtesy Anglo-Eastern Ship Management Ltd. & SUR International

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FOREWORD

I have known Capt. Yashwant Chhabra since 1994. His intimate association with maritime training & education, safety and quality management systems, and the HR management aspects of the shipping industry is indeed noteworthy.

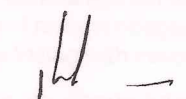
In this book, Capt. Chhabra has explained not only the interpretation of the collision prevention rules, but also their best practical application. The script is well linked to the STCW watchkeeping requirements, case studies, basic ship handling and the human element. The self examination test is well crafted to invoke the thinking process of the readers. This work is a substantial improvement on his previous book on the same subject and reflects on collision prevention in a fresh light.

I have often observed that in the certificate of competency examinations there is a lack of appreciation and proper application of the collision prevention rules. This conviction is further vindicated by the disturbing increase in collision incidents at sea. Clearly, there is an urgent need to address this concern, and I am pleased to note that this book is a sincere effort in that direction.

I am sure this work will impart an impetus to those concerned with the fields of maritime education, examination and management on board and ashore, to continuously improve the comprehension and application of the collision prevention regulations, which in turn will lead to enhanced safety at sea.

Besides Collision Prevention the Traffic Separation Schemes and Buoyage systems are lucidly explained in the book. In line with the latest requirements in shipping he has also included the relevance of management in prevention of collisions at sea.

I wish success to the author, publishers, and all users of this book.


 (Capt. M.M. Saggi)

Dedicated to my late Parents
Lt. Col. Harbans Lal Chhabra (MBBS) and Mrs. Nirmala Chhabra

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It is with immense gratitude that I acknowledge the support and help of:

My many teachers and colleagues, who have in many ways, obvious and at times unseen, moulded my thoughts and continue to fuel my quest for deeper knowledge. And the multitude of course participants whose curious minds have had me researching, often past civilized hours.

Dr. Narendra Singh (B.Sc, MBBS, MD), my lifelong guide and mentor, whom I wish to thank for having influenced my life since early childhood.

Capt. P.S. Barve, former Nautical Advisor to the Government of India, under whose guidance I participated in the Distance Learning Diploma programme of BITS Pilani from 1997 till 2004. He has also been my guide for this book on the interpretation and application of the Rules; the book also reflects many distance learning concepts. I remain grateful for his time, support and sound advice.

Capt. R.M.A. Mody, my Guru at sea and whom I fondly call Godfather, for his innumerable practical suggestions.

Mr. Tony Fernandez, my Guru ashore; the chapter on 'Leadership and Management' was written with his active involvement through several sessions.

Mr. S.K. Batra, topper and gold medallist from IIT Kharagpur, 1968. He taught me sciences way back in 1971 and has guided me ever since then; a special mention here not just for being the first person to encourage me to write but also for having reviewed most of this work from a non mariner's perspective and having made many significant suggestions.

Capt. Pradeep K. Chawla, Managing Director, QHSE and Training at Anglo-Eastern Ship Management and Capt. K. N. Deboo, Director and Principal AEMTC for encouraging and supporting this work.

Capt. Kiriti Guha, who passed on to me the best practical HR and management practices during the decade of working under his stewardship.

Mr. B.S. Teeka, who had appreciated the results of my navigational training in Executive Ship Management and who despite being a qualified engineer has also asked me to write on this subject.

My colleagues in Anglo-Eastern for their active involvement in the many debates and related research, Capt. Karamjit Singh Sodhi, Capt. Ravi Kulkarni, Capt. Tescelin Almeida, Capt. Sureen Narang, Capt. Prashant Gour, Capt. Anil Bhatia, Capt. Sriram Rajagopal, Capt. Gulraj Chhugani, Capt. Sanjay Mohan, Capt. Suneel Sule, Capt. Varun Rawat, Capt. Sanjiv Sehgal, Capt. M.R. Sriram and Capt. Deepankar Das.

My close friends and former colleagues Capt. S.S. Manjeshwar and Capt. N.K. Sah with whom I have had the most intense debates on these Rules when we started delving deeper into these subjects from 1995 onwards when working at Wallem Maritime Training Centre.

Capt. Kamal Chadha, the Managing Director of Marex Media Pvt. Ltd., and a friend of many summers, who has cast a careful eye on the final manuscripts and made several useful suggestions to help the work to final fruition. I remain obliged and thankful to him and his cooperative team, especially Shirish, Manish and Santosh for toiling with me on many a holiday and Seema Singh for proof reading the Rules.

I appreciate my wonderful wife Seema, not just for encouraging me to work on this book but also for her patience and support every time I have remained removed from the family working awkward hours, for helping me with net-based research, HR elements, proof reading and editing.

Our children, Anukriti, Ansh and Aakriti for assisting with the work from a young learners perspective.

The Almighty for keeping me in sound mind and health throughout.

Yashwant Chhabra
08 August 2011

The following books and publications have been referred to in the research associated with developing the explanations given in this book:

- ❖ Collision Avoidance Principles and Practice, Capt. Y. Chhabra, published by Bhandarkar Publications in October 2008.
- ❖ The Nautical Institute, various surveys and articles on 'International Regulations for Preventing Collisions at Sea', especially those of Capt. Roger Symns.
- ❖ Marine Resource Management concepts, The Swedish Club.
- ❖ A Guide to the Collision Avoidance Rules, A.N. Cockcroft and J.N.F. Lameijer.
- ❖ A Guide to Preventing Marine Casualties, especially the Collision. Mitsui Sumitomo Insurance Co. Ltd.
- ❖ Collisions and their causes, Capt. R.A. Cahill, published by The Nautical Institute.
- ❖ Handbook of the nautical Rules of the Road by Llana and Wisneskey.
- ❖ Managing Collision Avoidance at Sea, Capt. Gilbert W.U. Lee and Mr. Julian Parker, published by The Nautical Institute.
- ❖ U.S. Department of Homeland Security, United States Coast Guard, Navigation Rules.
- ❖ Marine Guidance and Information notes of The Maritime and Coastguard Agency of UK.
- ❖ Various information published and/or released by IMO, Flag States, Maritime bodies, Associations, Shipping Companies, P & I Clubs and court rulings including information available on the internet. The majority has been acknowledged in the text wherever quoted.

WAIVER NOTE

The Rules, Regulations and legislative requirements have been quoted in this book in good faith as per the latest information available only for the purpose of explaining the same.

The interpretation of the International Regulations for Preventing Collisions at Sea, 1972, as amended, and other legislation referred to combined with the advice on the best practical application is based on the authors understanding and perception based on his experience.

Neither the author, Capt. Yashwant Chhabra, nor the publishers of his work, Marex Media Pvt. Ltd., claim that the legislation quoted or the advice given in this book is perfect or free of any errors, though all efforts have been made to eliminate the same. And as such both cannot be held liable for any claims of any kind whatsoever for any failure whatsoever attributed to this work.

All readers and users of this book are advised to refer to IMO and/or Flag State publications for exact wordings of the law and their advice on any interpretations and/or expected best practice.

STUDY NOTES

- 1: The book is primarily designed as a self study guide to help educate fresh cadets and officers for certificates of competency examinations and also to serve as a reference book for all ranks, as well as teachers and examiners. A lot of mature level study work within the book has been placed inside boxes. **The contents in these boxes, the chapters on basic ship handling, leadership and management and self assessment test questions with a star, may be skipped by the beginners till after they have gained adequate sea experience.**
- 2: It is suggested that beginners highlight in their copies the words 'shall' and 'should' in red or orange, and the word 'may' in green; this will help analyse the meaning of the Rules to construe their aspects better, and help in their practical application at sea.
- 3: Updated Errata and Corrections are available on www.marexbulletin.com

Introduction to the "International Regulations for Preventing Collisions at Sea, 1972 as amended"

The presently applicable Rules explained in this book were adopted by the International Maritime Organization (IMO) in the '*Convention on the International Regulations for Preventing Collisions at Sea*' on 20th October 1972 which entered into force on 15th July 1977. They have been amended several times since then - in 1981, 1987, 1989, 1993, 2001 and last on 29th November 2007 [IMO Resolution A.1004 (25)] effective from 1st December 2009. There were earlier editions of these Rules too; the historical details about their evolution is a separate matter.

Courts usually refer to the Rules of this convention as '*COLREGS*'; this short form has been used in this book, of late '*IRPCS*' is being used as a more appropriate short form and has also been used in this book at places. These Rules have traditionally been, and continue to be referred to as 'ROR' (Rules of the Road), though there are no roads at sea, and are sometimes simply called 'Collision Rules', though they are and remain the '*International Regulations for Preventing Collisions at Sea*', meant for '*Preventing Collisions*'. The objective of this book is to educate the readers in understanding these Rules by way of interpretations, case studies and court rulings. Advice on best practices '*for Preventing Collisions*' by proper application of these Rules while navigating at sea remains an essential element of these explanations.

These Rules are an international convention by themselves and applicable to all vessels irrespective of their type or flag. Their applicability is stated and required by the STCW convention quoted below, '*STCW*', '*SOLAS*' and other regulatory requirements have been referred to and quoted with the explanations as and where relevant. The '*COLREGS*' or '*IRPCS*' have to be applied on board in conjunction with the '*watchkeeping arrangements and principles*' from the '*STCW Code*' and other Regulatory requirements for safe navigation and not in isolation.

STCW Code A-VIII/2, paragraph 10 states:

The master of every ship is bound to ensure that watchkeeping arrangements are adequate for maintaining a safe navigational watch. Under the master's general direction, the officers of the navigational watch are responsible for navigating the ship safely during their periods of duty, when they will be particularly concerned with avoiding collision and stranding.

And

STCW Code A-VIII/2, paragraph 13 states:

The officer in charge of the navigational watch is the master's representative and is primarily responsible at all times for the safe navigation of the ship and for complying with the International Regulations for Preventing Collisions at Sea, 1972, as amended.

Note: underlined text, here or later, is not part of the original legislation but meant to highlight the importance of the requirement underlined.

GENERAL ARRANGEMENT OF THE RULES

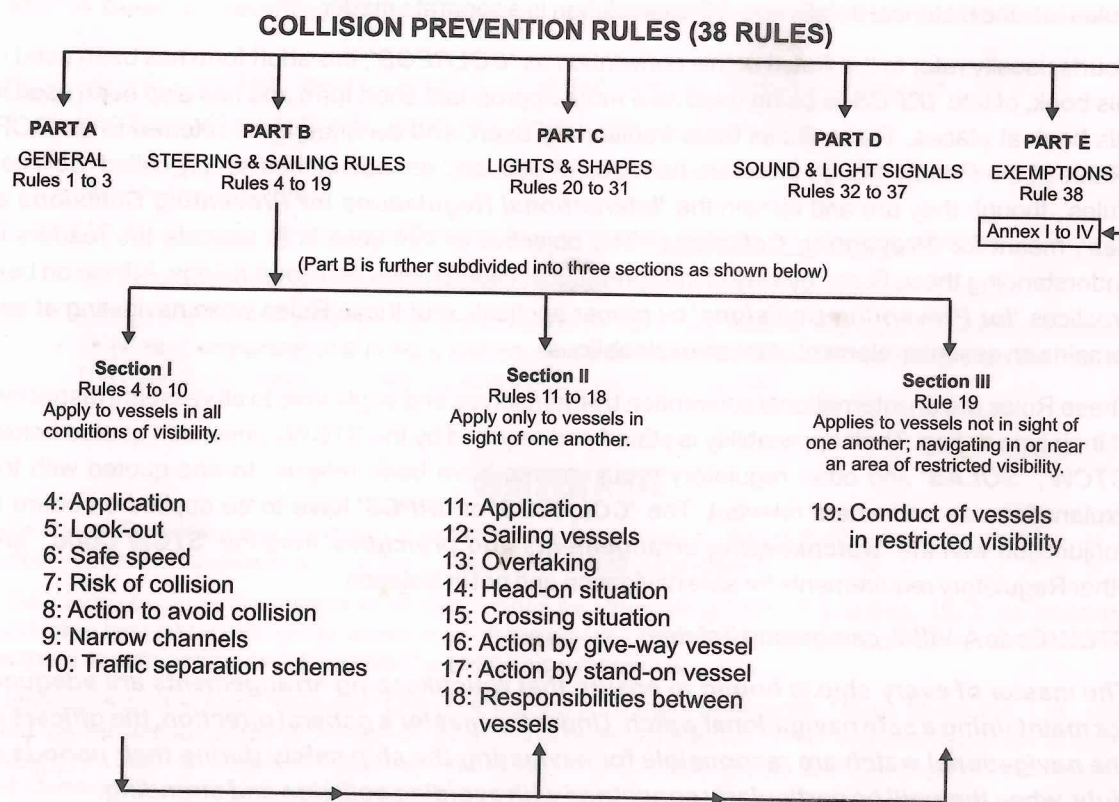
Since the layout, location and language of the Rules have an impact on their interpretation and practical application, it is important to understand these aspects. The Rules are divided into five parts, namely A, B, C, D and E followed by Annexes I to IV. Part B is further subdivided into three

sections I, II & III; the other Parts have no such subdivisions.

Annexes give detailed information on the technical requirements, standards and specifications of fittings and equipment. They also influence the way some of these Rules are interpreted and applied in practice.

The layout of the Rules is shown below:

The Rules are followed by Annexes I to IV, the details of which are given further below.



Part A, termed **'General'**, consists of Rules 1 to 3 on **'application'**, **'responsibility'** and **'general definitions'**.

Part B, termed **'Steering & Sailing Rules'**, contains Rules 4 to 19 which pertain to all collision prevention actions. Part B is further subdivided into three sections as shown above. This Part is considered the most important of the five Parts because all actions required for detecting, assessing and determining any **'risk of collision'** as well as **'any action to avoid collision'** should be executed in compliance with the Rules of this Part.

The three sections of part B are divided and their application based on the prevailing visibility whether vessels are **'in sight of'** or **not 'in sight of one another'**.

Part B section I contains Rules 4 to 10, applicable to vessels **'in any condition of visibility'**. This means **at all times** at sea without exception. It is important to note that Rules 4 to 10 continue to apply

fully with the Rules of Section II (Rules 11 to 18) and Section III (Rule 19). However, the requirements of Rule 13 on **'overtaking'** over ride all other Rules from 4 to 18.

Part B section II contains Rules 11 to 18 that only **'apply to vessels in sight of one another'**. In sight is defined in Rule 3(k) as **'vessels shall be deemed to be in sight of one another only when one can be observed visually from the other'**.

Part B section III on **'conduct of vessels in restricted visibility'** contains only Rule 19 applicable **'to vessels not in sight of one another when navigating in or near an area of restricted visibility'**. When Rule 19 gets invoked as per these conditions, Rules of Part B section I continue to apply as explained, but Rules of section II are not applicable as vessels are not **'in sight of one another'**. This is one of the two requirements stated for the activation of Rule 19, explained later.

Part C, termed **'Lights & Shapes'**, consists of Rules 20 to 31 and specifies the lights and shapes required to be exhibited by various types of vessels depending on their condition and/or activity.

Part D, termed **'Sound and Light Signals'**, consists of Rules 32 to 37 and specifies the sound and light signals that have to be complied with by different types of vessels in various circumstances and conditions.

Part E, termed **'Exemptions'**, consists only of Rule 38, which defines the various exemptions granted to older vessels with respect to complying with the requirements of the present set of Rules.

These 5 Parts are followed by 4 Annexes as follows:

ANNEX I: Positioning and technical details of lights and shapes.

ANNEX II: Additional signals for fishing vessels fishing in close proximity.

ANNEX III: Technical details of sound signal appliances.

ANNEX IV: Distress signals.

Although the English language has become the lingua franca of the world, the interpretation and the meanings of several words may sometimes get confusing and lead to misunderstandings. Though these Rules have officially been published in several languages by IMO, the final interpretations are usually based on the English text in case of any dispute with respect to their meaning; it is also because the vast majority of court judgements on collisions are delivered as per English law.

To achieve correct interpretation and understanding of these Rules and to enable their correct application at sea, it is important that the meanings of some of the important words are clear. The meanings and/or explanations of some of the commonly used words and abbreviations follow, some from the text of the Rules. Others may feature as part of the explanations.

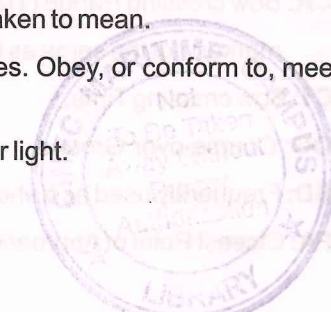
APPRAISAL: Evaluation, assessment, review, consideration and judgment.

CONSTRUING: The way something is interpreted and understood or taken to mean.

COMPLYING: Act in accordance with the Rules, commands, or wishes. Obey, or conform to, meet the terms.

DEEMED: Consider to be, to judge or consider something in a particular light.

EXCEPTIONAL: Unusual, extraordinary. Not something usual.



EXONERATE: Relieve from the wrongful act, pronounce not guilty of criminal charges. Absolve, forgive or pardon.

IMPEDE: Be a hindrance or obstacle to. Block, get in the way of, or hamper.

IMPEDIMENT: Something that interferes with or delays action or progress. Barrier, obstruction.

LOOK-OUT: Watch out, pay attention, be alert, be watchful, keep your eyes open, beware, take care.

MAY: Might, could. Gives an option to do or not to do. While *may* gives latitude or freedom to act within the meaning of these Rules, the responsibility of decision-making is not removed. This means that even in a 'May' situation there is a choice, 'to take action or not to take action', but it has to be with due thought and intention. 'May' does not give exemption from any Rule, requirement or an act. 'May' also is used to describe a choice, or is an expression allowing an act or activity.

MUST: Something which has to be done or complied with without exception. Should, be obliged to, have got to, ought to, be required to.

NAVIGATING: Travel through, pass through or traverse, find the way, follow a route.

NOTWITHSTANDING: Despite, in spite of, regardless of.

PROPER: Good, correct, appropriate, suitable, apt, fitting etc, and may also mean both efficient and effective.

PRUDENT or **PRUDENCE:** Careful and sensible. Act marked by sound judgment. Being careful, cautious, using good sense, applying farsighted forethought. Discretion applied in practical affairs.

SHALL: Expressing a strong statement, intention or order. Must be done or followed with no option to deviate.

Note: 'Shall' has been used 272 times in these Rules and 92 times in STCW Code A-VIII/2 paragraph, 1 to 51.

SHOULD: Something right, ought to be done or probable. 'Should' is used as a recommendation only in law but normally is expected to have the same force as 'shall'.

Note: These Rules do use this word 'should', but just thrice, in Rule 8(b), Annex I (8-b) and Annex III(e), while the STCW Code A-VIII/2 till paragraph 51 uses this word just once in paragraph 30.

WILL: Expressing a strong intention or claim about the future or inevitable events. Shall happen. The faculty by which a person decides on and takes action.

In addition, the full forms of some common marine abbreviations are given below; some may feature in this book too.

AIS: Automatic Identification System.

ARPA: Automatic Radar Plotting Aid.

BCR: Bow crossing Range (The closest range at which a target will cross the bows, or the heading marker, not the same as CPA).

BCT: Bow crossing Time.

COG: Course over Ground.

CBD: Frequently used as a short form for a '*vessel constrained by her draught*'.

CPA: Closest Point of Approach.

ECDIS: Electronic Chart Display and Information System.

ENC: Electronic Navigational Chart, (Usually Official Vector charts).

HDG: Heading.

INS: Integrated Navigation system.

ISM: International Safety Management (Code).

KTS: Knots (Speed in Nautical miles per hour).

MT: Metric Tonnes.

NM: Nautical miles.

NAVTEX: A device used for sending navigational warning in text by radio telex.

NUC: Frequently used as a short form for a '*vessel not under command*'.

OOW: 'Officer in charge of the navigational watch' or 'Officer on Watch'.

PPI: Plan Position Indicator, or simply the radar display screen.

PSC: Port State Control.

RADAR:

X-BAND: The smaller 3 cm band width used in Radars, preferred for detecting small targets and short ranges.

S-BAND: The bigger 10 cm band width used in Radars, preferred for long range scanning. Usually gives a better picture in bad weather and rain.

RAM: Frequently used as a short form for a '*vessel restricted in her ability to manoeuvre*'.

STCW: International convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978, as amended in 2010 and thereafter. Includes the Seafarers' Training, Certification and Watchkeeping Code (STCW Code).

TCPA: Time to the Closest Point of Approach.

TSS: Traffic Separation Scheme (s).

UTC: Universal Time Coordinated.

VDR: Voyage Data Recorder.

VHF: Very High Frequency radiotelephony system used for short range audible communication.

VRM: Variable Range Marker.

VTIS: Vessel Traffic Information System.

VTMS: Vessel Traffic Management System.

VTS: Vessel Traffic Services.

Rule 1

Application

- (a) These Rules shall apply to all vessels upon the high seas and in all waters connected therewith navigable by seagoing vessels.
- (b) Nothing in these Rules shall interfere with the operation of special rules made by an appropriate authority for roadsteads, harbours, rivers, lakes or inland waterways connected with the high seas and navigable by seagoing vessels. Such special rules shall conform as closely as possible to these Rules.
- (c) Nothing in these Rules shall interfere with the operation of any special rules made by the Government of any State with respect to additional station or signal lights, shapes or whistle signals for ships of war and vessels proceeding under convoy, or with respect to additional station or signal lights or shapes for fishing vessels engaged in fishing as a fleet. These additional station or signal lights, shapes or whistle signals shall, so far as possible, be such that they cannot be mistaken for any light, shape or signal authorized elsewhere under these Rules.
- (d) Traffic separation schemes may be adopted by the Organization for the purpose of these Rules.
- (e) Whenever the Government concerned shall have determined that a vessel of special construction or purpose cannot comply fully with the provisions of any of these Rules with respect to the number, position, range or arc of visibility of lights or shapes, as well as to the disposition and characteristics of sound-signalling appliances, such vessel shall comply with such other provisions in regard to the number, position, range or arc of visibility of lights or shapes, as well as to the disposition and characteristics of sound-signalling appliances, as her Government shall have determined to be the closest possible compliance with these Rules in respect of that vessel.

This Rule describes the application of these Rules. The International Maritime **'Organization'** (IMO) is a body of the United Nations referred to in paragraph 'd' of this Rule where all international maritime legislation is developed.

[QUIZ QS: WHEN WAS IMO ESTABLISHED? WHAT WAS THE ORIGINAL NAME OF THIS BODY? WHERE IS IT LOCATED?]

a: Defines the applicability that **'these Rules shall apply to all vessels'**. **'Vessel'** has a rather broad-spectrum definition stated in Rule 3(a) and covers all types of crafts from the largest ships to the tiniest rowing boat, be they civil or naval. **'High seas'** means open seas, coastal waters or waters far away from land; 'coastal waters' used here has no linkage with the territorial waters of any country. These Rules continue to apply to all vessels navigating in all waters connected with the **'high seas'** and **'navigable by sea going vessels'**. However, certain exemptions are given to this latter aspect by paragraph 'b' of this Rule.

b: Allows **'special rules'** to be **'made by an appropriate authority'** for specific areas and such Rules, if made, shall remain restricted only to the defined areas stated in this paragraph, **'roadsteads, harbours, rivers, lakes or inland waterways'**. These areas are only **'connected with the high seas and navigable by sea going vessels'**. The authority to make and implement

any such special rules is vested with the appropriate body in control of the area concerned.

The requirement that **'such special rules shall conform as closely as possible to these Rules'** is to eliminate the differences between any **'special rules'** and these Rules to bring about greater consistency between them which should help minimise confusion and related errors and thus reduce the potential for any accidents; mainly collisions. The US inland rules, for example, are generally similar to these International Rules but do differ substantially in places. The US Rules have not been described or explained in this book but are required to be referred to and observed in US Waters.

Only one set of Rules shall apply in any area. Demarcation boundaries are clearly defined to avoid any confusion. There is no option available to navigators to choose which Rules to follow; neither can the Rules be mixed to suit any individual preferences.

c & e: Contain details of special requirements that may be applied as per the defined criteria.

It is important that sailing directions, navigational charts and other relevant publications are consulted during the passage planning stage of an intended voyage to be aware of such special rules as well as any reporting requirements so that the same are complied with. For example, such special rules exist and are applicable in the inland waters of Japan and in inland waters within the US. The inland rules of the US begin to apply to all traffic when within 3 miles from the US Coast.

However, there is a distinct difference in the requirements stated in paragraphs 'c' & 'e' which sometimes gets confusing, these are explained first and paragraph 'd' is explained later.

c: Covers two aspects, (i) **'additional station or signal lights, shapes or whistle signals'** but restricted to **'ships of war or vessels proceeding under convoy'**.

And (ii) for **'fishing vessels engaged in fishing as a fleet'**, the points are similar but with a slightly lowered extent of application; the **'whistle signals'** clause is absent. The additional provisions cannot be applied to a single fishing vessel operating alone or independently and not forming part of **'a fleet'**. The provisions stated and required by all other Rules or requirements stated in these Rules shall not interfere with the operation of these **'special rules'**. The authority of making any such **'special rules'** vests with **'the Government of any State'**.

This paragraph 'c' further states that the characteristics of these **'additional station or signal lights, shapes or whistle signals'**, **'shall, so far as possible, be such that they cannot be mistaken for any light, shape or signal authorised elsewhere under these Rules'**. In other words, the characteristics of these additional systems should be so designed that they are distinctly different from whatever is prescribed and required by these Rules; this is to ensure that there is no confusion in identification and that the additional requirements are not mixed up with the normal requirements of these Rules.

Governments may prescribe special additional signals for their naval vessels; usually these requirements are universal and some are given below as stated in the US Code of Federal Regulations.

- *Man overboard lights (two pulsating all-round red lights in a vertical line).*
- *Aircraft warning lights (one all-round red light).*
- *Minesweeping station-keeping lights (two white limited-sector lights).*

- *Submarine identification light (intermittent flashing amber beacon - three flashes, one per second, followed by three-second off period).*

- *Convoy operations stern light (blue light in lieu of regular stern light).*

e: Applies to **'a vessel of special construction or purpose'** which is unable to comply with the provisions of these Rules for any reason, as may be determined by the Government of the flag state concerned, **'with respect to the number, position, range or arc of visibility of lights or shapes, as well as to the disposition and characteristics of sound-signalling appliances'**. The Government concerned can then approve alternate provisions in all these aspects, but here the Rule states **'as her Government shall have determined to be the closest possible compliance with these Rules in respect of that vessel'**.

This is the main difference between these two paragraphs of this Rule. Requirements developed under paragraph 'c' should have features which **'cannot be mistaken for any light, shape or signal authorised elsewhere under these Rules'** and these are **'additional'** to the requirements stated in these Rules, whereas the requirements developed to meet paragraph 'e' are in lieu of the requirements of these Rules or are alternate substitutes because the vessel concerned cannot comply with the prescribed standard.

Examples of **'a vessel of special construction or purpose'** include aircraft carriers: because of their unique construction, their side lights may be on the sides of the small superstructure which itself is situated on one side to allow for the large flight deck, the mast head lights would also be way off the vessels centre line and with substantially reduced horizontal separation. Some warships of over 50 metres in length may not carry the second masthead light, or the two may be placed much closer to each other both vertically and horizontally than as required by these Rules. Similarly, some research ships and supply vessels may be granted similar exemptions and submarines may have their masthead lights lower than the sidelights, especially the forward one. A submarine may, in addition, display an amber flashing light described above which is usually placed 2 metres above the aft masthead light to indicate its presence.

Hovercrafts are also usually covered under this category: these and other vessels operating on an air cushion are required to be fitted with an additional **'all-round flashing yellow light'** as per Rule 23(b), not because of their special construction alone but also due to the high speeds at which they operate.

Annex II contains details of **'additional signals for fishing vessels fishing in close proximity'** referred to in Rule 26(d), an activity which could be considered same as **'fishing vessels engaged in fishing as a fleet'**.

d: Clarifies that IMO only has the authority to adopt **'traffic separation schemes'**. The conduct of vessels in such officially declared or promulgated schemes is as per Rule 10 of these Rules explained later. All such schemes are usually marked on navigational charts but these may not contain all details, especially on the applicability of the schemes to different types of vessels. Full details should be studied from 'Ships Routeing', an IMO publication.

Rule 2

Responsibility

- (a) Nothing in these Rules shall exonerate any vessel, or the owner, master or crew thereof, from the consequences of any neglect to comply with these Rules or of the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case.
- (b) 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 the vessels involved, which may make a departure from these Rules necessary to avoid immediate danger.

Though these Rules are the law, this Rule emphasises that they are not statements of customary practice or recommended guidance but have to be complied with at all times. This Rule is considered one of the most important amongst all the Rules; not only does it define the authority and responsibility on the application of these Rules but also allows navigators the freedom to deviate from them if the circumstances so warrant by stating, **'which may make a departure from these Rules necessary to avoid immediate danger'**. This implies that be it strict compliance with the Rules or otherwise, if the situation is turning dangerous, the danger of collision is to be mitigated by all means, including deviating from the routine application of these Rules.

No one connected with the operation of any vessel can be exonerated for not complying with these Rules. In addition, the precautions, which may be required by way of the two factors given below, have to be applied in the day-to-day practice of these Rules, namely:

i: **'Ordinary practice of seamen'**: this small phrase has a very wide-ranging application and many a times may not be taken into account in the routine day-to-day working. Even though it follows the word **may** in **'may be required'**, it is of paramount importance in these Rules. This phrase has been interpreted to mean all practices, procedures, processes, systems and actions handed down through generations of seafaring and which have proved themselves successful for safe navigation. Such practices and procedures can also be described by the word **'tradition'**, handed down by word of mouth or practices followed on board and need not always be part of the present day documented management systems. In other words practices which have proved to be right in the past or will be expected to be correct by the logical application of **'common sense'** to seafaring. And:

ii: **'Special circumstances of the case'**: the judgement and discretion of the navigator is allowed for in deciding these. Though these Rules cover all kinds of the most likely situations of vessel types, traffic or encounters, they cannot possibly cover all possible situations. Whatever has not been explicitly covered by these Rules may be covered under this category and it is impossible to provide a definitive and complete list of all **'special circumstances'**. The importance of keeping **'look-out'** to determine **'special circumstances'** coupled with determining **'risk of collision'** are paramount for **'any action to avoid collision'** which may be contemplated or executed. The below stated examples should help understanding these two clauses and are only indicative of the situations where these clauses may be applied, this is not an exhaustive list.

- Taking into account the navigational hazards of shallow water and narrow channel effects that reduce the manoeuvrability of a vessel leading to a collision or even grounding. This

may include but not be limited to squat (reduction of under keel clearance), interaction between vessels and banking effects.

Rules in Part B covering collision avoidance actions have no requirement stating that vessels should keep clear of a vessel **'at anchor'**, but this is always done as a matter of good seamanship and all vessels **'underway'** are expected to keep clear of vessels **'at anchor'**.

'At anchor', all vessels are required to exhibit lights and/or shapes as prescribed by Rule 30. However, there are some exemptions, **'a vessel engaged in fishing'** continues to exhibit lights and shapes as prescribed in Rule 26 even **'at anchor'** and not as prescribed by Rule 30. **'A vessel engaged in dredging or underwater operations, when restricted in her ability to manoeuvre'** - **'when an obstruction exists'** even when **'at anchor'** is required to exhibit only the lights and shapes prescribed by Rule 27(d) and not as prescribed by Rule 30.

Note: on seamanship practice: Passing close ahead of a vessel at anchor should always be avoided, as the tidal current will normally be flowing towards the stern of the anchored vessel. There have been many accidents where vessels or their tows when attempting to pass ahead of a vessel at anchor have misjudged the flow rate of the current and have drifted on to the anchored vessel and collided. It is a matter of common sense that a vessel at anchor cannot do much immediately to avoid a collision of this kind even if her watchkeepers have observed the developing situation. Passing too close from the sides may also induce interaction affects, so a safe distance should always be allowed for.

Consideration also has to be given to the fact that a vessel at anchor may not have her engines ready to instantly manoeuvre for avoiding collision, paying out of anchor cable to move out may take time and has limitations linked with the length of anchor cable available. Picking up anchor to move out is a rather lengthy and time consuming process, too slow to be of immediate help.

In 1989, I was on board a loaded oil tanker anchored in the Singapore waiting area, when the vessel suffered a collision with a buoy being towed across the harbour. The tug and the tow were attempting to pass ahead of and across the anchored vessel. The tug passed clear but the towed buoy made contact with the forward end of the vessel as it drifted downstream due to the current, creating a hole into the fore peak ballast tank just above the bulbous bow.

- A vessel proceeding to anchor should avoid anchoring in the way of normal traffic and keep well clear of other vessels at anchor. This is also reflected in Rules 9(g) and 10(g)
- Multiple vessel situations may make it impossible to fully comply with all the provisions of these Rules for collision avoidance actions; action required with respect to one vessel may conflict with the action required with respect to one or more of the other vessels.
- In restricted visibility, a vessel navigating without operational radars should rather stop than navigate relying on sound signals alone. A better option is that such a vessel should anchor, if possible, until the visibility improves. Both acts being **'ordinary practice of seamen'** or of common sense and **'observance of good seamanship'**.
- Vessels entering or leaving a slip may not be able to follow a steady course, similarly vessels proceeding stern-first for any reason would also fall under this category.
- Courts have held that when two vessels are approaching each other in a tidal river or channel

around a difficult bend, it should be the duty of the one having the tide against her to wait until the other has passed. Since Rules do not explicitly mention this aspect, this can be considered as derived from the *'ordinary practice of seamen'*. The reasoning for this is that it is relatively difficult for a vessel moving with the tide or current to be able to stop, as the flow of the current will cause her to keep moving, but the one going against the tide can practically stop in position and still be able to manoeuvre.

- Vessels *'underway'* but stopped and making no way through the water. Though a vessel should avoid stopping, especially in a high-traffic area, it has to be done sometimes. When drifting, her course and speed may not be readily obvious to other vessels and she may not be able to move out of the way of a fast oncoming vessel in good time.

Encountering a vessel *'underway'* but stopped can be tricky because the vessel stopped is *'underway'* and as such obliged to comply with these Rules for *'preventing collisions'*. The vessels course is usually taken as or understood to be the course being steered or the vessels heading and the application of COLREGS (or IRPCS) is based on the relative aspect between the vessels concerned. However, the course of a vessel stopped may not be obvious as her drift vector (speed and direction) may be quite different from her heading. Further, if she is a large vessel, she may not be able to move out of the way of a fast oncoming vessel in good time. As such, any encounter with a vessel *'underway'* but stopped requires caution, even if she is the one obliged to keep clear.

'In construing and complying with these Rules', in context to these Rules, it is the way the navigators concerned perceive the meaning of these Rules- or the way the design and operating features incorporated into any collision avoidance systems are understood for its operation, be it manual, semi or fully automatic. All these will influence the way the requirements are applied in practice. The apparent vagueness in the language of these Rules itself does lead to slightly differing interpretations and thus different methodologies in the levels of compliance or practical application. However, the Rule emphasises that *'due regard shall be had all dangers of navigation'*. This phrase has far reaching implications and the responsibility of taking *'all dangers'* into account rests with all concerned in the chain of management of the vessel's navigation, most important of them being the navigators who are applying the Rules in practice, and who are sometimes called the last line of defence.

'All dangers' could include dangers of grounding, stranding, presence of shallow water in the vicinity, the type and density of traffic in the vicinity which may impose some restrictions on the actions of other vessels in the near vicinity, and most importantly the weather conditions, which are very much a part of *'all dangers'* but are sometimes ignored when considering the application of these Rules. This term also includes all perils of the sea; a maritime voyage is still referred to as an adventure in law because of the uncertainties of the natural elements involved.

We all have heard the famous saying, *'to err is human, and to forgive divine'*. Unfortunately, these Rules do not allow any mercy as far as forgiveness goes, as emphasised: *'nothing in these Rules shall exonerate'*. After any accident or incident, the investigators find out the faults, the prosecution recommends the severest punishment for those blamed for the accident and courts generally award strict sentences. All this can be avoided by knowing and practicing the requirements of these Rules correctly and thereby *'preventing collisions'* from taking place.

'Limitations of the vessels involved' is again a broad-spectrum phrase and has to be decided by the navigators on a case-to-case basis. Any and all factors can be considered here, for example the manoeuvring characteristics of the vessel with respect to her size, draught, the under keel clearance, the available sea room, the prevailing weather, the vessels stability, the type and amount of traffic etc. Any of these may lead to the application of *'ordinary practice of seamen'* and/or *'by the special circumstances of the case'*.

This Rule concludes with a very important statement, *'which may make a departure from these Rules necessary to avoid immediate danger'*, the word *'may'* is of extreme importance. These Rules do not imply that as a routine anyone should depart from them just because it feels advantageous, the departure allowed by this Rule should really and necessarily be required. To invoke this departure, there has to be *'danger'*, it should be *'immediate'* and the *'departure'* or deviation from the Rules must be justifiable in the circumstances concerned. In fact, these Rules clearly imply that this is an expected duty of a vessel if she is in such a situation.

There are many court judgements implicating non-departure from the Rules a failure even though the vessel was a *'stand-on vessel'* and complied with the Rules and continued to *'keep her course and speed'* till it was too late, even though it was very clear that the *'give-way vessel'* was not showing any indications of taking action to avoid an imminent collision. The *'stand-on vessel'* therefore should have acted as expected by Rule 17 and acted in the most appropriate manner to avoid collision by using the authority given in this Rule. Prudent navigational practices should ideally prevent navigators from finding themselves in such situations, but accident statistics do prove otherwise. However, it is possible to prevent such situations from occurring with the correct and proper application of these Rules.

For example, assume a stiff bulk carrier heading into heavy seas and swell, when she meets a vessel crossing from her starboard side involving *'risk of collision'*, and when she is contemplating taking action as a *'give-way vessel'* in compliance with Rule 15, (stiff refers to stability, a vessel with a vary large GM and a large righting lever). The action being contemplated is to alter course substantially to starboard, but this action will bring the swell abeam; there is danger of heavy and/or synchronous rolling setting in, as well as extreme stresses on the hull. The navigators on this vessel may invoke Rule 2(b) and take such other action as may be considered best in the circumstances but not make a substantially large alteration of course to avoid the swell from getting on to their vessel's beam. However, any action taken should be in good time or well in advance so as not to cause any confusion as required by Rule 8. This is a hypothetical situation intended to invoke thinking on *'special circumstances'* which have not been defined in these Rules and thus can be applied in countless similar situations.

This Rule requires compliance with these Rules, but mere compliance is not enough. If too strict a compliance is leading to a *'risk of collision'* or to an *'immediate danger'*, then actions must be taken to the extent necessary to avoid such situations - even *'a departure from these Rules'*. In fact, it is a duty of the navigators to do so, the end objective being that all efforts should be made for *'preventing collisions'* by all possible means.

Rule 3

General definitions

For the purpose of these Rules, except where the context otherwise requires:

- (a) The word *vessel* includes every description of water craft, including non-displacement craft, WIG craft and seaplanes, used or capable of being used as a means of transportation on water.
- (b) The term *power-driven vessel* means any vessel propelled by machinery.
- (c) The term *sailing vessel* means any vessel under sail provided that propelling machinery, if fitted, is not being used.
- (d) The term *vessel engaged in fishing* means any vessel fishing with nets, lines, trawls or other fishing apparatus which restrict manoeuvrability, but does not include a vessel fishing with trolling lines or other fishing apparatus which do not restrict manoeuvrability.
- (e) The word *seaplane* includes any aircraft designed to manoeuvre on the water.
- (f) The term *vessel not under command* means a vessel which through some exceptional circumstance is unable to manoeuvre as required by these Rules and is therefore unable to keep out of the way of another vessel.
- (g) The term *vessel restricted in her ability to manoeuvre* means a vessel which from the nature of her work is restricted in her ability to manoeuvre as required by these Rules and is therefore unable to keep out of the way of another vessel.
The term *vessels restricted in their ability to manoeuvre* shall include but not be limited to:
 - (i) a vessel engaged in laying, servicing or picking up a navigation mark, submarine cable or pipeline;
 - (ii) a vessel engaged in dredging, surveying or underwater operations;
 - (iii) a vessel engaged in replenishment or transferring persons, provisions or cargo while underway;
 - (iv) a vessel engaged in the launching or recovery of aircraft;
 - (v) a vessel engaged in mine clearance operations;
 - (vi) a vessel engaged in a towing operation such as severely restricts the towing vessel and her tow in their ability to deviate from their course.
- (h) The term *vessel constrained by her draught* means a power-driven vessel which, because of her draught in relation to the available depth and width of navigable water, is severely restricted in her ability to deviate from the course she is following.
- (i) The word *underway* means that a vessel is not at anchor, or made fast to the shore, or aground.

- (j) The words *length* and *breadth* of a vessel mean her length overall and greatest breadth.
- (k) Vessels shall be deemed to be in sight of one another only when one can be observed visually from the other.
- (l) The term *restricted visibility* means any condition in which visibility is restricted by fog, mist, falling snow, heavy rainstorms, sandstorms or any other similar causes.
- (m) The term *Wing-In-Ground (WIG) craft* means a multimodal craft which, in its main operational mode, flies in close proximity to the surface by utilizing surface-effect action.

The definitions above have evolved in a long time, many deliberations and are important. The following explanations cover most of them; the others are self-explanatory.

a: '*Vessel*' covers everything used or capable of being used as a means of transportation on water, ships, non displacement craft, seaplanes and WIG craft etc. In effect, this means all kinds of crafts, powered or not, manned or unmanned, on their own or being towed. The type of vessel or the circumstances in which she is operating does not make any difference to this basic definition; all are vessels.

b: The term '*power-driven*' is straightforward, means '*propelled by machinery*', but a '*power-driven vessel*' may also be '*fishing*' or '*not under command*' or '*restricted in her ability to manoeuvre*'. All are covered by different definitions stated separately, but none alters their condition of being '*power-driven*' under this definition. As will be seen later in these Rules, the latter types of vessels are sometimes dealt with differently and not as simply as '*power-driven vessels*'.

A vessel propelled by oars, paddles, or other human or animal-powered means is not considered '*power-driven*' or covered by this definition.

c: '*sailing vessel*' very clearly means she is only using sails for navigational activities and '*propelling machinery, if fitted, is not being used*'.

d: Emphasises that the term '*vessel engaged in fishing*' is to be used only for vessels using fishing equipment '*which restrict manoeuvrability*', not otherwise. The navigators on board a '*fishing vessel*' have to judge this aspect and accordingly display the applicable signals prescribed in Rule 26 and Annex II. These vessels are given certain special rights and privileges by these Rules. The use of '*nets, lines, trawls*' is presumed to '*restrict manoeuvrability*' while the use of '*trolling lines*' not; lines may even extend a few miles at times.

Such vessels are anyway restricted in their manoeuvrability by this definition, have separate lights and shapes assigned exclusively for them and are thus not included in paragraph 'g' of this Rule '*vessels restricted in their ability to manoeuvre*'.

If '*fishing vessels*' are not '*engaged in fishing*' or are '*engaged in fishing*' in a manner which does not '*restrict manoeuvrability*', then they are not covered by this definition but by paragraphs 'b' or 'c' of this Rule depending if she is '*power-driven*' or '*sailing*'.

By Rule 26(a), '*a vessel engaged in fishing, whether underway or at anchor, shall exhibit only the lights and shapes prescribed in this Rule*'.

f: 'Vessel not under command'- often simply referred to as **'NUC'**- emphasises that any vessel, to be covered under this definition, should fulfil two basic criteria:

- (i) *Is unable to manoeuvre as required by these Rules to keep out of the way of another vessel and,*
- (ii) *The reasons for this are exceptional.*

'Exceptional' means something unusual, extraordinary and perhaps beyond the reasonable control of the operators. In other words, a vessel which is suffering from some disability that was neither predictable nor preventable. Though not stated, it is clearly implied that a vessel claiming **'NUC'** status should be underway, that is **'not at anchor, or made fast to the shore, or aground'**.

Some accepted examples of unusual and extraordinary situations are: a vessel which has a breakdown of her engines, steering systems, has lost her rudder and/or one of her propeller blades or the same are damaged to such an extent that have become ineffective, or it could be the loss of the propeller itself. Other examples are a vessel at anchor with her anchor not holding or a sailing vessel becalmed, which is in a situation when there is no wind. In addition, exceptionally bad weather may also be a reason to render a vessel **'NUC'** explained further below.

Adverse weather conditions are normally not accepted as **'exceptional'** and do not justify that a vessel declares herself **'NUC'** in heavy weather conditions. However, this situation cannot totally be ruled out; refer the hypothetical example of a bulk carrier in the second last paragraph of the explanations on Rule 2. Adverse weather conditions could be affecting all the vessels in the vicinity but not necessarily in the same manner. Other examples could be smaller vessels, or a vessel in danger of going into parametric rolling if she were to alter her course. Such situations are also linked with the **'ordinary practice of seamen'** or **'by the special circumstances of the case'** as explained with Rule 2.

A vessel, which has her propulsion and steering systems in working condition, should not declare herself **'Not Under Command'** or display the prescribed signals for the same. If simply stopped, for example awaiting commercial voyage orders, she remains **'underway'** by definition and remains obliged to comply with the applicable Rules for a vessel **'underway'**.

g: 'Vessel restricted in her ability to manoeuvre' is different from a **'vessel not under command'** though the Rules provide very similar rights and privileges to both of them. Even though these two types are required to show different lights and/or shapes, Rule 35(c) prescribes a common sound signal for them in restricted visibility. It is important that the differences between these two types are clear and that they are not confused with one another.

'The term "vessels restricted in their ability to manoeuvre" shall include but not be limited to: The list stated in the Rule is not exhaustive and any vessel **'which from the nature of her work is restricted in her ability to manoeuvre as required by these Rules and is therefore unable to keep out of the way of another vessel'** can be included under this clause.

Manoeuvrability is referred to as the capability of a vessel to change her course and/or the quantum and direction of speed. Restrictions in manoeuvring should be imposed **'from the nature of her work'**, the activity being done or the conditions created by such work, which are known and predictable, and not from the type of vessel involved. For example, a cable-laying vessel is not always entitled to this status because of her design: the status can be activated only when she is actually **'engaged'** in cable laying activity and **'restricted in her ability to manoeuvre as required**

by these Rules and is therefore unable to keep out of the way of another vessel'. Similarly a towing situation will not normally fall under this definition; this clause will apply only when the activity **'severely restricts the towing vessel and her tow in their ability to deviate from their course'** or actually **'restricted in her (their) ability to manoeuvre as required by these Rules and is therefore unable to keep out of the way of another vessel'** for the purpose of **'preventing collisions'**. When this is the case, the towing vessel and the tow should not only show the lights and shapes prescribed by Rule 24 for **'towing and pushing'** but also for **'restricted in their ability to manoeuvre'** as per Rule 27.

Some of the vessels covered by this Rule may be proceeding at high speeds, for example an aircraft carrier **'engaged in the launching or recovery of aircraft'** or naval vessels **'engaged in replenishment'** at sea.

Any vessel that has any kind of restrictions imposed on her to manoeuvre for reasons explained above is traditionally referred to as **'hampered'** - and they get certain privileges by these Rules. Vessels **'Not Under Command'** or **'Constrained by her draught'** are also usually referred to as **'hampered'**, a term not stated in these Rules but frequently used in practice.

A vessel engaged in an immediate rescue operation, for example in a manoeuvre to pick up a man overboard is not explicitly covered by paragraphs 'f' or 'g' of this Rule, There are also no past rulings on this aspect. However, by application of Rule 2, she should consider it prudent to claim privilege as a vessel **'restricted in her ability to manoeuvre'**. This would be well covered as a **'precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case'**.

When executing such an operation a vessels manoeuvring ability is reduced to a certain extent when taking a turn and even further when in the vicinity of the person being rescued. In fact not announcing the circumstances and/or exhibiting the appropriate signals including flag 'D' may be construed as a **'neglect'**.

h: 'Constrained by her draught' the Rules appear to leave it to the professional judgement and discretion of the navigator when a vessel should be declared **'constrained by her draught'**. Not just the under keel clearance, (the total depth of water less the maximum draught), but also the clearance from the sides of the channel, (the total width of the channel less the maximum breadth or width of the vessel), in which a vessel can navigate, have to be considered. The depth and width of available water, or rather lack of it, close to all side of a vessel determines the level of constraint. This is irrespective of the size of the ship. **'Available depth and width of navigable water'** are both applicable as a combined function.

If the under keel clearance is low but there is more than ample width of sea room available, then this alone will not justify a vessel to be considered **'constrained by her draught'**. Both the conditions must exist in conjunction and impose manoeuvring restrictions on the vessel concerned. In other words, if there is a reasonable width of deep enough water around to enable

a vessel to alter her course and manoeuvre for **'preventing collisions'**, she will not be justified in declaring herself as **'constrained by her draught'**.

These Rules do provide right of way to such vessels. Rule 18(d)(i) clearly requires most vessels to **'avoid impeding the safe passage'** of such a vessel and Rule 18(d)(ii) requires them to **'navigate with particular caution'**. Rules 28 and 35(c) respectively prescribe special lights, shapes and sound signals for them to enable them to warn others of their difficult situation. The requirements of Rules 9 on **'narrow channels'** allows certain privileges to these vessels by implication without directly naming them.

In certain areas special rules may apply, for example in Malacca Straits both the deadweight and draught of the vessel have been considered for declaring a vessel under this clause, but this may not be the case everywhere. Please also refer to the explanations given for Rule 1(b).

i: **'Underway'** is self explanatory and applicable if any one of the three clauses stated in the Rule is fulfilled by a vessel, that is not **'at anchor'** or **'made fast to the shore'** or **'aground'**. This is irrespective of whether the vessel concerned is making way (moving) through the water or not.

For example, it is common for vessels in some rivers to hold their position by putting their bows against the riverbank and applying nominal forward thrust to prevent movement over the ground with the flow of water. In this situation, the vessel is free to manoeuvre and thus still considered **'underway'** and not **'aground'**.

The term **'making way'** used in some of the Rules starting from Rule 26(b) is not specifically defined in these Rules and remains open to slightly differing interpretations. Rule 35 (b) appears to give the closest explanation in its phrase, **'a power-driven vessel underway but stopped and making no way through the water'**. To be **'making way'** a vessel has to be **'underway'** but not the other way around.

With the above, it seems the authors of these Rules meant that vessels **'stopped and making no way through the water'** are practically stopped in water relative to the surrounding water. They would still very much be **'underway'**, drifting and with no relative movement through the water. The best interpretation of this term **'making way'** would mean a physical movement of the vessel through water, or the vessel must have some relative speed through the water because of the use of her own propulsion, or having stopped the propulsion, then because of her own momentum, but not any movement through the water caused due to wind or movement over ground due to wind and/or current.

For example, a vessel making a speed of 3 knots through the water and heading directly against a water current also having a speed of 3 knots will be considered **'making way'** through the water even though she has '0' speed over the ground, assuming no wind. In comparison, another vessel stopped in water and drifting down with the current will be considered **'stopped and making no way through the water'**, even though she has considerable speed over ground.

The sound signals required to be given by a **'power-driven vessel'** in or near an area of restricted visibility, are different when she is just **'underway'** by Rule 35(a) versus when **'underway but stopped and making no way through the water'** by Rule 35(b) though both situations are covered by **'underway'**.

k: Clarifies that vessels shall be considered **'to be in sight of one another only when one can be observed visually from the other'**. This is important in the understanding and practical application of the requirements of Part B of these Rules pertaining to actions **'for preventing Collisions'**; Rules of section II of Part B only **'apply to vessels in sight of one another'** as stated in Rule 11.

Visual sighting can naturally take place only if the visibility is good enough for navigators on a vessel to be able to see the other vessels visually, by their eyes alone or with the help of binoculars. Detection by radar is excluded and the Rules do not refer to the prevailing visibility in numerical terms. Range of visibility is further restricted by the height of eye due to the curvature of the earth's surface.

l: **'Restricted visibility'** is fairly well defined, except for any numerical range. However, the list has been left open for inclusion of any other similar causes. At the first glance it appears that since the quoted list only covers various meteorological conditions the additional ones should also be similar by the statement **'any other similar causes'**. **'Similar'** implies conditions which restrict visibility and which could be from any source, not necessarily only meteorological; for example, smoke from any source which restricts visibility. Rule 19, the only Rule in Section III of Part B is only applicable to **'vessels not in sight of one another when navigating in or near an area of restricted visibility'**.

Do note that good or fair visibility is not defined but in section 8(a) of Annex II it is implied as the **'meteorological visibility of approximately 13 nautical miles'**.

Thick smoke had rolled into the Malacca Straits due to forest fires in Indonesia. Two tankers navigating through the smoke covered waters collided on 15th October 1977 just 2 miles south of Singapore resulting in the largest accidental oil spill in the area, estimated at about 28,000 metric tonnes of fuel oil. The investigation was done by the authorities in Singapore who concluded that 'restricted visibility' prevailed in the area at the time of the collision, caused by the smoke. The Masters and OOWs of both the vessels were jailed and fined for not complying with the requirements of Rule 19 of these Rules. In addition, the vessels operators, (that means the owners), were also fined. (Evolkos and Orapin Global collision).

m: WIG craft look like aircrafts but are not aircraft as they can only fly close to the surface of land or sea, the definition of a seaplane is not applicable to them, they also do not fit in to the definition of non-displacement crafts. A WIG craft has wings and cruises close above the land or water surface; it floats on a cushion of relatively high-pressure air between its wing and the earth's surface. WIG is an abbreviation of 'Wing In Ground' effect vehicle.

You may go to the IMO website http://www.imo.org/Newsroom/mainframe.asp?topic_id=757 or <http://www.se-technology.com/wig/> to learn more about WIG craft.



PART B

STEERING & SAILING RULES

Introduction

Part B of these Rules, named the '**Steering and Sailing Rules**' cover actions required to be carried out by vessels in all respects '**for preventing collisions at sea**'; that is from determining '**risk of collision**' to '**action to avoid collision**'.

This Part B is further subdivided into three separate sections I, II and III covering Rules 4 to 10, 11 to 18 and Rule 19 respectively, as explained in the introduction.

Rules 1 to 3 of Part A, especially the statements of Rule 2 '**construing and complying**' and '**ordinary practice of seamen**', are important and continue to apply throughout these Rules with respect to their interpretation, understanding and most importantly, their best practical application.

Each of the descriptive clauses in this Rule, or for that matter anywhere else in these Rules, do not state any numerical or mathematical values. Interpretations on the application of the requirements where the descriptive adjectives have to be transformed into numerical values do vary considerably and are usually based on any one or a combination of '**ordinary practice of seamen**', past court rulings, simulator based studies and most importantly, the practical experience of the navigators.

Rule 4

Application

Rules in this section apply in any condition of visibility.

'This section' means section I of Part B of these Rules comprising of Rules 4 to 10. These Rules apply at all times '**in any condition of visibility**', whether vessels are '**in sight of one another**' or not, in good or '**restricted visibility**', by day or at night, in all weather conditions, round the clock, and round the year to all vessels when they are navigating. Some of the aspects remain applicable even to vessels at anchor; refer STCW Code A-VIII/2, paragraph 51.

Rules in this section I are of a general nature on watchkeeping procedures and conduct of vessels with respect to '**preventing collisions**'.

Rule 5

Look-out

Every vessel shall at all times maintain a proper look-out by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision.

This short and apparently simple Rule on 'look-out' has many implications. The efficient functioning of 'look-out' is required in the application of almost all these Rules from determining 'risk of collision', the applicable situation and executing 'any action to avoid collision'. Almost all other navigational activities also depend on 'look-out', which forms the backbone of bridge watchkeeping.

The term 'look-out' features abundantly in the mandatory navigational watchkeeping requirements stated in the 'STCW Code A, section VIII/2', quoted in full in this book, and in most professional publications pertaining to marine navigation and collision prevention.

This Rule applies to all vessels whether underway or anchored. 'Shall at all times' highlights the need of continuous 'look-out' while 'sight and hearing' is self explanatory. The words 'proper', 'all available means' and 'appropriate' as used in this Rule neither define nor prescribe any required or acceptable standards for 'look-out' activities. Common sense and good seamanship, as explained earlier with Rule 2 and the guidelines stated in the STCW Code have to be applied in the practical application of this Rule.

'Proper' has been explained in the introduction and may also mean efficient, effective and reasonably continuous. 'Look-out' means watch out, pay attention, be alert, be watchful, keep your eyes open, use all your senses, beware and take care.

'All available means' is about all processes and equipment, internal or external, which can be used for the purpose of maintaining 'look-out', and is additional to 'sight and hearing' - 'at all times'. This may include but may not be limited to binoculars and telescopes, own radar, shore radar, ARPA, VHF, AIS, ECDIS, NAVTEX, VTIS or VTMS systems and navigational information or warnings from any of the presently existing or any future systems which can be considered capable of assisting in this function. Finally it is the analysis, interpretation and use of the information from all sources by the navigators 'to make a full appraisal of the situation and of the risk of collision' that will help them act to avoid any 'risk of collision'. Disregarding the use of any available equipment which can be used to maintain 'look-out' would mean non compliance of this Rule and of the requirement that 'the officer in charge of the navigational watch shall have full knowledge of the location and operation of all safety and navigational equipment on board the ship and shall be aware and take account of the operating limitations of such equipment'. (STCW Code A-VIII/2, paragraph 26)

'Prevailing circumstances' may vary, such as 'state of visibility', 'traffic density', 'state of wind, sea and current' and 'the presence of background lights'. In the open sea with negligible traffic, it has been often assumed that the intensity or continuity of 'look-out' may be reduced. Unfortunately, such assumptions have led to dangerous situations; even head-on collisions have taken place in the open sea in good visibility during daytime as the sole navigators of both vessels involved got busy with other work and inadvertently interrupted the continuity of 'look-out'.

Investigations into the causes of navigational accidents continue to show that the vast majority are due to the failure of keeping 'proper look-out', which is and remains the first essential element of good navigational watchkeeping practice for efficient, effective and accident free operations.

The end objective of this Rule is simply stated within the Rule, 'so as to make a full appraisal of the situation and of the risk of collision'. Unless the navigators maintain 'proper look-out', they will be unable to determine 'risk of collision' or apply the provisions of these Rules.

'Full appraisal of the situation and of the risk of collision' is the correct understanding of information from all available means seen, sensed or received by the navigator in control, be it data processed and displayed by the various instrumentation or inputs from other bridge team members. Only when situations are assessed and analysed correctly to achieve 'full appraisal' and if this points to a developing 'risk of collision' and/or a 'close-quarters situation', can 'any action to avoid collision' be carried out in compliance with these Rules.

All information from different sources, which contributes to the 'look-out' function, needs to be analysed and applied in practice. 'Look-out' does not mean information inputs by 'sight and hearing' alone which was the traditional method with its own limitations, but from 'all available means'. Navigators should use their knowledge and experience to judge and filter the information flow from all sources to consciously seek out important inputs, prioritise the analysis and corresponding actions depending on the circumstances. It is important that conflicting evidence is never suppressed or overlooked but verified, preferably from more than one source, whenever possible.

'Look-out' should primarily watch out for and report whatever appears to be of reasonable concern - not just what appears to present a 'risk of collision', but whatever may also affect safe navigation like risks of grounding, stranding or even change of weather etc. 'Look-out' should further watch out for people or craft in distress as well as activities taking place on board. For example, the course being steered, radar display, proper working of the various navigational equipment, monitoring the emergency alarms, keeping a watch on deck, the engine room exhausts, and even the correct usage of communication and radio equipment like correct selection of coast stations on the NAVTEX or setting of the correct area in the GMDSS system. The OOW must follow this requirement when alone and explicitly clarify these requirements, as relevant, to the person(s) on 'look-out' duty.

A vessel was reported to have transited the full Malacca Straits in 2005 and did not receive any weather or navigational warnings for the area. It was noticed much later that her NAVTEX receiver was set to manual selection of stations and the required stations had not been activated to receive transmissions. No one had changed the station selection.

Keeping a watch or 'look-out' on the performance of the automatic systems is also very important. A judge has rightly stated in a court verdict that automatic systems are very valuable inventions if properly used, but they may lead to disasters if left alone, or vigilance relaxed in monitoring their effectiveness and actions. 'It is the people operating the vessels on whom safety at sea depends, and they cannot make a greater mistake than to suppose that machines can do all their work for them'.

The duty to maintain a 'look-out' in all respects continues to apply to a vessel at anchor. In fact, there is nothing in these Rules or in the watchkeeping requirements in the STCW Code A-VIII/2 that relax the application of 'look-out' at any time.

A case I witnessed in 1978 as a cadet: On a voyage from Australia to India, in very good visibility and

calm open seas, the 2nd & 3rd officers became busy with the noon sight and noon calculations. There was no traffic in sight and none on the radar screen either, which had been put 'on' specifically for this duration; no other traffic had been sighted for days. The ship's rudder came stuck to one side, and by the time this was noticed, the vessel had already swung by a large amount. Subsequently, the engineers rectified the problem, and though no navigational mishap took place, this turned out to be a good lesson on the importance of continuous 'look-out'. The vessel was not fitted with an off course alarm and, being daytime, no extra person was present on the bridge for 'look-out' duty. In different circumstances, this may have resulted even an accident.

The importance of a continuous 'look-out' can be gauged from the following quoted from the STCW Code; the requirement goes to the extent to state that the OOW shall not even visit a separate chartroom unless the continuity of 'look-out' can be maintained. Though applicable to vessels with a separate chartroom, the implication of this Rule points to the need of a continuous and uninterrupted 'look-out' function, which is considered critical for all aspects of safe navigation, and which automatically includes all activities related to 'preventing collisions'.

It is of special importance that at all times the officer in charge of the navigational watch ensures that a proper lookout is maintained. In a ship with a separate chartroom, the officer in charge of the navigational watch may visit the chartroom, when essential, for a short period for the necessary performance of navigational duties, but shall first ensure that it is safe to do so and that proper lookout is maintained. (STCW Code A-VIII/2, paragraph 32)

Not too long ago a vessel navigating on the western end of the English Channel failed to answer VHF calls from the shore based traffic regulatory control system who were calling the vessel to inform her that she appeared to be deviating out of the traffic lane she was required to be in. When no reply was received from the vessel for a reasonable time, a coast guard helicopter was sent across to check. It reported that they could not see anyone on the bridge and were unable get any response to VHF or visual signalling calls. As the helicopter circled the vessel a few times, its sound alerted some of the people on board the vessel who went up on the bridge; It turned out that the 2nd Officer was busy on the communication console fitted in a separate Radio Room with various noon messages to several parties in their own different formats, having left the guard zone activated on the ARPA to give an alarm for any traffic (a dangerous practice). However, little did he realise that sound reception from any of the bridge equipment inside the Radio Room was poor and he had lost track of time while working on the messages, and also with what was happening outside or that the vessel was moving out of its 'traffic lane'. There was no one carrying out the 'look-out' function while the 2nd Officer was working in the Radio Room. Apart from the unwanted embarrassment the incident caused to all concerned, the vessel was later fined for this violation.

Court verdicts on the interpretation and application of this Rule have not given a firm answer about the best location of the person on 'look-out' duty. Right forward has been the preferred location by tradition, the old crows nest, so that not only can the person hear sound signals from other vessels without any disturbance of the internal sounds generated by machinery or normal bridge operations, but can perhaps see ahead better; next has been on the bridge wings. Factors against the 'crows nest' position are that the person is not available immediately to assist the bridge team, the risk of communication failure between the person and the bridge and the fact that modern vessels are rarely equipped with a 'crows nest'. Deciding the sufficiency of 'look-out', the number of people deployed and/or their positioning is a practical matter not really defined or prescribed in any Rule. The number

of people available on board for the task, the sea area a vessel is in, the traffic density, the type of vessel and the overall noise levels at various locations etc. are all factors that need to be considered when deciding the application of 'look-out' in practice. The 'look-out' activity should be reasonable and adequate to fulfil the minimum requirements of 'sight and hearing' and in line with the 'ordinary practice of seamanship'. Variance of the circumstances between day and night also requires consideration. During day and in good visibility, a vessel can be seen visually at a much greater distance than at night when the sighting distance is linked with the range of visibility of the lights exhibited. Masthead lights of a vessel 50 metres or more in length are required to have a minimum visible range of only 6 nautical miles and for those less than 12 metres just 2 miles, stated in Rule 22.

The **STCW Code A-VIII/2** paragraphs 14 to 16, (quoted in full further below), prescribe more detailed requirements on 'look-out' for navigational watchkeeping. One of the most important aspects is that the person performing 'look-out' functions should not be given any other task that may interfere with this activity, and that the helmsperson shall not be considered a 'look-out' when steering except on some very small vessels. And '**the officer in charge of the navigational watch may be the sole look-out in daylight provided.....**' means that the discretion to have the OOW alone on watch and also acting as the sole 'look-out' is available only during 'daylight' after taking into account the listed circumstances and conditions. By reverse interpretation, it clearly implies that an OOW shall not be the 'sole look-out' outside the 'daylight' hours or at night, defined as the duration between sunset and the next morning sunrise. At night, there has to be an additional appropriately qualified person in addition to the OOW carrying out 'look-out' functions, and should be physically present on duty. The person on 'look-out' duty should not leave the position for any reasons like going for fire rounds, coffee/smoke breaks or to wake up relief staff, etc. '**Appropriately qualified ratings**' is a requirement stated in **STCW Code A-VIII/2 paragraph 18** for persons performing the 'look-out' function and their qualification is governed by **section II/4 of the STCW convention**, the latter is not quoted in this book.

Below is an abridged abstract of the grounding accident of the 'Svendborg Guardian'. This is to highlight the 'look-out' aspect along with dangers of fatigue and ineffective communications, though this is not a collision accident. The full report, which is very interesting, can be seen on the following website:

http://www.atsb.gov.au/publications/investigation_reports/1995/MAIR/pdf/mair82_001.pdf

Note: Regulation II/1.9 on 'look-out' referred to in this report is from the International Convention on Standards of Training, Certification and Watchkeeping for seafarers, 1978. This legislation was the one in force at the time of the accident.

The Australian Transport Safety Bureau, from where this report has been taken contains many others and there are several other similar sites available on the internet, for example the U.S., UK, European and the French. <http://www.atsb.gov.au>, www.nts.gov, www.maib.gov.uk, www.emsa.europa.eu, and www.beamer-france.org.

The Danish vessel *Svendborg Guardian* sailed from Townsville at about 2000 on 23rd June 1995 on a voyage to Kiunga, on the Fly River, Papua New Guinea. The ship had been on this service since 1988. At about 0400 on 24th June, the ship failed to make a course alteration off Brook Islands and maintained a straight course to run aground south off Murdering Point, Queensland,

at about 0600 hrs. The ship was towed off the ground on 24th June evening.

Conclusions

These identify the different factors contributing to the accident and should not be read as apportioning liability or blame to any particular organisation or individual. The vessel grounded as a result of a number of factors that combined to contribute to the grounding:

1. There was nobody on the bridge for a period of almost five hours with the ship effectively out of control.
2. The bridge was unmanned because the Second Mate left the bridge shortly after 0105 and failed to return because he fell asleep.
3. The Second Mate was suffering from extreme fatigue as a result of poor quality sleep from 18th to 23rd June and decided not to sleep after the ship left Townsville. This decision, prompted by his desire to watch a rugby league match on TV rather than ensure he was as fit as possible to keep his watch, displayed inexperience and irresponsibility.
4. There was no look-out stationed on the bridge, and the ship was not equipped with any other system to alert the Master or the crew in the event of the OOW being incapacitated or otherwise not able to perform his/her duties.
5. The absence of a look-out made the accident inevitable once the Second Mate had fallen and remained asleep, because there was nobody to rouse the Second Mate, call the Mate or summon the Master.
6. The Master, Mate and Second Mate were all fatigued to a significant degree.
7. The new Master in command from 24th June had ordered that a seaman should act as look-out during the hours of darkness. This instruction was not complied with possibly due to a misunderstanding and a lack of effective communications in the form of written notification, and because of the entrenched practice of the officers to keep the watch alone during the night.
8. The Owner's standard instructions did not give clear direction to the ship's masters to comply with the STCW Convention requirements.
9. The habitual practice of not posting a look-out should have been detected by the ship operators and rectified.

To highlight the vital importance of 'look-out' in navigational watchkeeping, some of the requirements of the STCW Code as applicable to 'look-out' are quoted below.

STCW Code A-VIII/2, Part 4-1, paragraphs 14, 15 & 16:

Lookout:

14. A proper lookout shall be maintained at all times in compliance with Rule 5 of the International Regulations for Preventing Collisions at Sea, 1972, as amended and shall serve the purpose of:

- .1 maintaining a continuous state of vigil by sight and hearing, as well as by all other available means, with regards to any significant change in the operating environment;
- .2 fully appraising the situation and the risk of collision, stranding and other dangers to navigation; and
- .3 detecting ships or aircraft in distress, shipwrecked persons, wrecks, debris and other hazards to safe navigation.

15. The lookout must be able to give full attention to the keeping of a proper lookout and no other duties shall be undertaken or assigned which could interfere with that task.

16. The duties of the lookout and helmsperson are separate and the helmsperson shall not be considered to be the lookout while steering, except in small ships where an unobstructed all-round view is provided at the steering position and there is no impairment of night vision or other impediment to the keeping of a proper lookout. The officer in charge of the watch 'MAY' be the sole lookout in daylight provided that, on each such occasion:

- .1 the situation has been carefully assessed and it has been established without doubt that it is safe to do so;
- .2 full account has been taken of all relevant factors, including, but not limited to:
 - state of weather,
 - visibility,
 - traffic density,
 - proximity of dangers to navigation, and
 - the attention necessary when navigating in or near traffic separation schemes;
 - and
- .3 assistance is immediately available to be summoned to the bridge when any change in the situation so requires.

The statement 'the officer in charge of the watch may be the sole lookout 'in daylight' in paragraph 15 quoted above clearly states that this is allowed 'in daylight' only provided the conditions described so allow.

Without doubt, the inputs from the radar have increasingly become a major contributor as well, and it is an important element amongst 'all available means' for the 'look-out' function. The **STCW Code A-VIII/2** defines the minimum usage of radar; paragraph 28 establishes the all-important link between the use of radar and compliance with these Rules. Though these requirements define the minimum compulsory requirements on the use of radar and the need to 'carry out radar practice', they place no restriction that the radar should not be used at other times. It is important that the navigators use their discretion judiciously to use radar as a navigational aid and as one of the 'all available means' for 'lookout'. The **STCW Code** also requires fair weather practice to be carried out to make the navigators familiar with and master the use of radar equipment.

Some P & I clubs, as part of their risk management and risk reduction techniques, and some Companies as part of their bridge procedures, recommend or require that one, two or all Radars

should continuously be used at all times when the vessel is at sea, underway or at anchor.

Apart from the clear requirements stated in the *STCW Code* or any requirements by the management systems, Rules 6, 7 and 19 of these Rules imply on the use of radar. Of these Rules 6 and 7 in this Section I of Part B apply at all times, and Rule 19, the only Rule in Section III of Part B, 'applies to vessels not in sight of one another when navigating in or near an area of restricted visibility'.

The tools available to assist navigators in maintaining 'look-out' will continue to develop. The continued exploitation of microprocessor technology may make available new means for maintaining 'look-out'. Whatever changes the future may bring, Rule 5 will continue to require that the person(s) controlling the vessel know the benefits and limitations of 'all available means' and to be able to use them to exploit all their capabilities for maximum benefit.

"In determining that the composition of the navigational watch is adequate to ensure that a proper lookout can continuously be maintained, the master shall take into account all relevant factors," (Extract from *STCW Code A-VIII/2*, paragraph 17)

.2 traffic density, and other activities occurring in the area in which the vessel is navigating. (*STCW Code A-VIII/2*, paragraph 17.2)

[SELF STUDY EXERCISE: READ THROUGH AND UNDERSTAND PARAGRAPH 16 FROM THE *STCW CODE A-VIII/2*. HOW MANY FACTORS ARE LISTED UNDER THIS PARAGRAPH? MAKE A NOTE AND COMPARE WITH THE OTHER REQUIREMENTS STATED IN THESE EXPLANATIONS OF RULE 5.]

Prior to taking over the watch, relieving officers shall satisfy themselves as to the ship's estimated or true position and confirm its intended track, course and speed, and UMS controls as appropriate and shall note any dangers to navigation expected to be encountered during their watch. (*STCW Code A-VIII/2*, paragraph 21)

5.3 the presence and movement of ships in sight or known to be in the vicinity. (*STCW Code A-VIII/2*, subparagraph 22.5.3)

[TASK: READ PARAGRAPHS 32, 35, 42, 45, 46 AND 51 FROM THE *STCW CODE A-VIII/2* AND SEE THE USAGE OF THE TERM 'LOOKOUT' AND ITS IMPORTANCE.

HOW MANY TIMES HAS THIS TERM BEEN USED IN THE *STCW CODE A-VIII/2*?

TASK: READ PARAGRAPHS 18, 28, 37, 38, 39, 44 AND 45 FROM THE *STCW CODE A-VIII/2* TO LEARN THE REQUIREMENTS ABOUT THE PROPER USE OF RADAR IN PRACTICE.

SOLAS Chapter V, Regulation 22 defines the requirements for visibility from a navigating bridge. This was amended by IMO Resolution MSC.201 (81) which became effective from 1st July 2010.

The amendment addresses any increased blind sectors or reduced horizontal fields of vision resulting from ballast water exchange operations which have to be taken into account by the Master before determining that it is safe to proceed with the exchange. Extracts from this Regulation on Navigation bridge visibility are given below:

1 *Ships of not less than 55 m in length, as defined in regulation 2.4, constructed on or after 1 July 1998, shall meet the following requirements:*

- .1 *The view of the sea surface from the conning position shall not be obscured by more than two ship lengths, or 500 m, whichever is the less, forward of the bow to 10° on either side under all conditions of draught, trim and deck cargo;*
- .2 *No blind sector caused by cargo, cargo gear or other obstructions outside of the wheelhouse forward of the beam which obstructs the view of the sea surface as seen from the conning position, shall exceed 10 degrees. The total arc of blind sectors shall not exceed 20 degrees. The clear sectors between blind sectors shall be at least 5 degrees. However, in the view described in .1, each individual blind sector shall not exceed 5 degrees;*
- .3 *The horizontal field of vision from the conning position shall extend over an arc of not less than 225 degrees that is from right ahead to not less than 22.5 degrees abaft the beam on either side of the ship;*
- .4 *From each bridge wing the horizontal field of vision shall extend over an arc at least 225 degrees that is from at least 45 degrees on the opposite bow through right ahead and then from right ahead to right astern through 180 degrees on the same side of the ship;*
- .5 *From the main steering position the horizontal field of vision shall extend over an arc from right ahead to at least 60 degrees on each side of the ship;*
- .6 *The ship's side shall be visible from the bridge wing. (continues further till 9.4, the rest is not quoted here).*

2 *Ships constructed before 1 July 1998 shall, where practicable, meet the requirements of paragraphs 1.1 and 1.2. However, structural alterations or additional equipment need not be required.*

3 *On ships of unconventional design which, in the opinion of the Administration, cannot comply with this regulation, arrangements shall be provided to achieve a level of visibility that is as near as practical to that prescribed in this regulation.*

4 *Notwithstanding the requirements of paragraphs 1.1, 1.3, 1.4 and 1.5, ballast water exchange may be undertaken provided that:*

- .1 *the master has determined that it is safe to do so and takes into consideration any increased blind sectors or reduced horizontal fields of vision resulting from the operation to ensure that a proper lookout is maintained at all times;*
- .2 *the operation is conducted in accordance with the ship's ballast water management plan, taking into account the recommendations on ballast water exchange adopted by the Organization; and*
- .3 *the commencement and termination of the operation are recorded in the ship's record of navigational activities pursuant to regulation 28.*

Guidelines for ballast water exchange are stated in IMO Resolution MEPC.124(53) adopted on 22 July 2005. The following extracts from this resolution which address navigational safety and lookout aspects are quoted below, underlined text is only to further highlight a requirement:

5.4 *The procedures, advice, and information in the Ballast Water Management Plan, may include but is not limited to the following:*

- .6 *forward and aft draughts and trim, with particular reference to bridge visibility, slamming, propeller immersion and minimum forward draft;*

- .11 *admissible weather conditions;*
- .12 *weather routing in areas seasonably affected by cyclones, typhoons, hurricanes, or heavy icing conditions;*

5.5 *During ballast water exchange sequences there may be times when, for a transitory period, one or more of the following criteria cannot be fully met or are found to be difficult to maintain:*

- .1 *bridge visibility standards (SOLAS V/22);*
- .2 *propeller immersion; and*
- .3 *minimum draft forward.*

5.7 *In planning a ballast water exchange operation that includes sequences which involve periods when the criteria for propeller immersion, minimum draft and / or trim and bridge visibility cannot be met, the Master should assess:*

- .1 *the duration(s) and time(s) during the operation that any of the criteria will not be met;*
- .2 *the effect(s) on the navigational and manoeuvring capabilities of the ship; and*
- .3 *the time to complete the operation.*

5.8. *A decision to proceed with the operation should only be taken when it is anticipated that:*

- .1 *the ship will be in open water;*
- .2 *the traffic density will be low;*
- .3 *an enhanced navigational watch will be maintained including if necessary an additional look out forward with adequate communications with the navigation bridge;*
- .4 *the manoeuvrability of the vessel will not be unduly impaired by the draft and trim and or propeller immersion during the transitory period; and*
- .5 *the general weather and sea state conditions will be suitable and unlikely to deteriorate.*

BRIDGE NAVIGATIONAL WATCH ALARM SYSTEM (BNWAS)

SOLAS Chapter V Regulation 19 was amended by Resolution MSC 282(86) at IMO on 5th June 2009. This requires that BNWAS is to be installed on all ships of over 150 Gt and all passenger ships irrespective of size constructed after 1st July 2011. For all other vessels the system will become mandatory between this date and 1st July 2014.

The purpose of BNWAS is to monitor bridge activity and detect operator disability, which could lead to marine accidents. The system monitors the awareness of the OOW and automatically alters the Master or other qualified OOW if for any reason the OOW becomes incapable of performing watch duties. In effect the device would be a deterrent against breaks in look-out functions which are critical for safety of navigation.

[QUIZ QS: DOES THE NAVTEX SYSTEM WORK IN AUSTRALIA OR BRAZIL? IF NOT, WHAT ARE THE ALTERNATE SYSTEMS AVAILABLE?]

[TASK: REFER TO LOOK-OUT ASPECTS GIVEN ON PAGE 274.]

Rule 6

Safe speed

Every vessel shall at all times proceed at a safe speed so that she can take proper and effective action to avoid collision and be stopped within a distance appropriate to the prevailing circumstances and conditions.

In determining a safe speed the following factors shall be among those taken into account:

(a) By all vessels:

- (i) the state of visibility;
- (ii) the traffic density including concentrations of fishing vessels or any other vessels;
- (iii) the manoeuvrability of the vessel with special reference to stopping distance and turning ability in the prevailing conditions;
- (iv) at night the presence of background light such as from shore lights or from backscatter of her own lights;
- (v) the state of wind, sea and current, and the proximity of navigational hazards;
- (vi) the draught in relation to the available depth of water.

(b) Additionally, by vessels with operational radar:

- (i) the characteristics, efficiency and limitations of the radar equipment;
- (ii) any constraints imposed by the radar range scale in use;
- (iii) the effect on radar detection of the sea state, weather and other sources of interference;
- (iv) the possibility that small vessels, ice and other floating objects may not be detected by radar at an adequate range;
- (v) the number, location and movement of vessels detected by radar;
- (vi) the more exact assessment of the visibility that may be possible when radar is used to determine the range of vessels or other objects in the vicinity.

This Rule is divided into two parts; the first applicable to all vessels at all times, the latter to vessels with an operational radar. Placed in section I of Part B, this Rule applies in *'any condition of visibility'* or at all times. *'All vessels'* means any vessel irrespective of her type or activity, *'power-driven'*, *'sailing'*, *'fishing'*, *'restricted in their ability to manoeuvre'* or *'constrained by their draught'* etc. The Rule applies to any vessel the moment she falls under the category *'proceed'*; a vessel *'underway'*, if she is stopped and not proceeding or is at zero speed through the water, would naturally not fall under the category *'proceed'* or be subject to comply with the requirements of this Rule.

It may appear that even a **'vessel not under command'** would also stand covered by this Rule if she were proceeding. While these Rules do grant such a vessel many direct and implied privileges, none directly allows her or any other vessel any exemption from the requirements of **'safe speed'**.

On the other hand, since a **'vessel not under command'** by definition **'is unable to manoeuvre as required by these Rules and is therefore unable to keep out of the way of another vessel'**, it is clearly implied that she would also be unable to comply with any of the requirements of **'these Rules'** which would automatically include **'safe speed'**.

'Shall at all times' stated at the very beginning means that this Rule has to be complied with at all times without any exception and implies that all **'prevailing circumstances and conditions'** should be monitored regularly in relation to the listed as well as any unlisted factors as may be relevant. As best judged, a vessel's speed should be changed immediately as necessary to always maintain her at **'safe speed'**. The prime objective of the Rule is **'that she can take proper and effective action to avoid collision'**. The two terms **'proper and effective action'** are closely interlinked in this Rule, the former being the condition required to enable performance of the latter **'action'**.

In case of need, the officer in charge of the navigational watch shall not hesitate to use the helm, engines and sound signalling apparatus. However, timely notice of intended variations of engine speed shall be given where possible or effective use made of UMS engine controls provided on the bridge in accordance with the applicable procedures. (STCW CODE A-VIII/2, paragraph 29)

All bridge orders shall be promptly executed. Changes in direction or speed of the main propulsion units shall be recorded, except where an Administration has determined that the size or characteristics of a particular ship make such recording impracticable. The officer in charge of the engineering watch shall ensure that the main propulsion unit controls, when in the manual mode of operation, are continuously attended under stand-by or manoeuvring conditions. (STCW CODE A-VIII/2, paragraph 65, performing the engineering watch)

Further to paragraphs 29 and 65 of the **STCW Code A-VIII/2** quoted above, it must be borne in mind by all navigators that these Rules (IRPCS) do not always give any firm advice on the preferred **'action to avoid collision'** in the varying situations described under separate Rules. However, full freedom for taking any action as may be considered necessary in the circumstances is allowed as stated later in Rule 8 on **'action to avoid collision'**. Such action may at times be to change a vessel's speed; a vessel should always proceed at **'safe speed'** to enable this action to be executed.

Though not written or required by any Rule, it has been traditionally practiced that any change made to a vessel's speed are done in consultation and with due approval of the Master. This may cause undue delay in taking action and could be interpreted as a breach of the requirements of these Rules. The freedom of deciding and executing any changes to the vessel's speed so as to always maintain it **'safe'** should ideally rest with the OOW with no restrictions of any kind whatsoever.

Navigators are known to be reluctant to reduce speed of their vessel's, as they give more attention to factors that support a higher cruising speed to maintain a vessel's ETA, (estimated time of arrival), usually for commercial purposes than to factors that point to the need to slow down for safety and **'to avoid collision'**. It is very important that due consideration is given to all factors suggesting a change in speed, since **'a close-quarters situation'** may develop rapidly. Navigators should be free to make speed changes, if required, without having first to notify another person or seek permissions (for example, the master or any engineer).

'Proper and effective action to avoid collision', the word **'proper'** has been discussed with Rule 5 on **'look-out'**. However, in this Rule, **'proper'** also describes the **'speed'** that a vessel is proceeding in conjunction with **'safe'**, though in the Rule the word **'safe'** alone has been used to define speed. **'Effective action'** means action taken to achieve the desired result, which is to **'avoid collision'**. A vessel must be moving slow enough to be able to control its forward motion but in other circumstances fast enough for the rudder to remain effective, especially in channels where use of the rudder should be able to counteract any banking or interaction affects.

All vessels including a **'stand-on vessel'** should be at **'safe speed'** to be ready to act even for the most unexpected situation. Compliance with Rule 2 requirements could sometimes be such as to make it almost mandatory to **'make a departure from these Rules necessary to avoid immediate danger'**. Rule 17(b) requires a **'stand-on vessel'** to act if **'risk of collision'** becomes extreme, and this should still be **'proper and effective'**. Though Rule 17 initially requires a **'stand-on vessel'** to **'keep her course and speed'** even after **'risk of collision'** has been established, too high a speed may place a **'stand-on vessel'** in a dangerously awkward position.

'Action to avoid collision' in differing situations is prescribed later in sections II & III of Part B. However, ways of determining **'risk of collision'** and implementing any **'action to avoid collision'** are prescribed in this section I of Part B itself. This Rule 6 is about **'safe speed'**, which means a speed that would enable a vessel to take the required **'action to avoid collision'** expected of her efficiently with emphasis on **'be stopped within a distance appropriate to the prevailing circumstances and conditions'**.

The six factors listed in paragraph 'a' of this Rule **'shall be among those taken into account: By all vessels'** in determining **'safe speed'**. These are the minimum that have to be considered but there could also be other factors that may influence this decision, even though not listed in this Rule. No mathematical formulae are prescribed wherein numbers pertaining to the various factors can be punched in and **'safe speed'** obtained. All aspects have to be accounted for in judging and deciding **'safe speed'**, which is at best a subjective or a qualitative assessment and not a quantitative one. The result arrived may vary depending on the individual views of the navigators, their perception of the existing circumstances, their respective judgements and all this in turn would also depend on their experience. However, analysis of the results arrived at by different people show that the vast majority are within a rather narrow spectrum, even though the analysis remains subjective as explained.

The six factors applicable to all vessels at all times are essentially self-explanatory but each has several implications, explained below, each one is important.

The term **'safe'** is a difficult word to explain in simple terms- it essentially means freedom from any harm or damage through accidents. **'Safe'** is also used as a relative term when describing or comparing different activities or similar activities carried out in varying manners or conditions: safer or less safe or not so safe, etc. Its use with the word **'speed'** implies that whatever **'speed'** is decided, after having taken into account all the factors, listed or not, is reasonably **'safe'** in the circumstances. The end objective of this Rule applicable to all vessels is, **'so that she can take proper and effective action to avoid collision and be stopped within a distance appropriate to the prevailing circumstances and conditions'**.

Though the explanations that follow primarily refer to power-driven vessels, they are applicable to all vessels. When applied to sailing vessels, the direction and strength of the prevailing winds automatically become a point to be considered.

(a) By all vessels:

i: 'Visibility' means the visual range at which objects are visible, in practice means objects on or close to the sea surface. **'The state'** means the range and clarity of **'visibility'** and could further be extended to define the state of metrological and other factors affecting **'visibility'**. The latter could include the direction of sunlight and its blinding effects, such that objects lying in the direction from where the sunlight is being received may not be sighted. Also, smoke from any source, the type of ship the navigators are on, their height above sea level, the layout of the navigating bridge and the positioning of the funnel and any deck gear like cranes and/or deck cargo. The latter may create blind sectors for both visual and radar scanning and interfere with the keeping of **'proper look-out'**.

The better the visibility the earlier the possibility of visual detection of any object, and so more the time available to analyse the situation, as also more time available to plan and execute any **'action to avoid collision'**, if required, and **'in ample time'**, (from Rule 8 a).

Early detection by Radar also allows more time and is not affected by the state of visibility.

The range of visibility is of prime consideration in collision avoidance- for detection, analysis and action, and several court rulings have also referred to this aspect. A judge in a 1933 ruling had observed that a vessel **'should be able to stop within its limits of visibility'**. Stop is to bring the vessels movement through water to nil as an **'action to avoid collision'**, this being an available option and an important one too. Such rulings have transformed into an unwritten **'half-distance Rule'** which has evolved in court rulings discussed at the end along with the case study of the collision between 'Tricolor' and 'Kariba', but this is not binding as explained later.

However, Rule 8(c) states **'alteration of course alone may be the most effective action to avoid a close-quarters situation'**. As such this is the first choice for any **'action to avoid collision'** as discussed later with Rule 8 and linked to a vessels manoeuvring characteristics and capabilities.

ii: 'Traffic density' is simple, if there is no other traffic the possibility of **'risk of collision'** with another vessel is also non-existent and obviously no need of any **'action to avoid collision'**. On the other hand, if **'traffic density'** or concentration of vessels is high, then vessels should navigate with extra caution, as the frequency of meeting other traffic is higher including those with whom **'risk of collision'** may develop.

Monitoring of other vessels in high traffic density will also require a more alert **'look-out'**.

When **'in sight of one another'**, almost all vessels are required to keep clear of **'a vessel engaged in fishing'** as per Rule 18.

An almost regular assessment and analysis of the positions and movement of all vessels in the vicinity needs to be done to determine **'risk of collision'**, and where required, prompt and swift actions executed **'to avoid collision'**. The speed a vessel is proceeding at will have a direct impact on these aspects. The emphasis on **'fishing vessels'** is due to their nature of work and their unpredictable behaviour: a **'vessel engaged in fishing'** may work in groups and may make sudden and abrupt changes in her course and/or speed.

'Safe speed' also implies a speed sufficiently slow to comply with Rule 8(e), **'if necessary to avoid collision or allow more time to assess the situation, a vessel shall slacken her speed or take all way off by stopping or reversing her means of propulsion'**.

iii: 'Manoeuvrability of the vessel' is about the way a vessel behaves with respect to the efficiency and effectiveness in turning, stopping, reducing speed or even increasing speed or any combination thereof linked to the time and distance parameters for any of these actions.

The manoeuvring characteristics depend on many factors; the type of vessel and its size, design, loaded or in ballast, momentum, the power and type of the main propulsion systems, (propulsion power : displacement ratio), further linked to the type and efficiency of the steering systems. The parameters are further subject to the **'prevailing conditions'** of weather and sea. In addition, any time delay factors of the propulsion systems to respond to any change of propulsion power ordered, like reducing, stopping increasing or reversal of direction also affect the manoeuvrability of the vessel. The depth and width of water also have a large effect on the manoeuvrability of any vessel and very much a part of the **'prevailing conditions'**. Though all these are subjects of separate detailed studies on ship handling, they all have a direct impact in the practical implementation of these Rules.

'Stopping distance' and time for a vessel to stop vary considerably when propulsion is stopped versus when it is reversed vary in loaded, ballast or intervening conditions. Use of rudder cycling, zigzag turns or just turning the vessel full turn around can be used for a faster reduction of speed if required, depending on the available sea room and the proximity of other traffic or navigational hazards-these actions are normally more efficient and effective in initially reducing a vessels speed as compared to a crash reversal of propulsion. The chapter on basic

ship handling refers to some of these in more detail and explains why turning a vessel normally remains the most effective and efficient action.

Turning is not just about the time required for the action to be activated, carried out and concluded but importantly the advance, transfer and tactical diameter distances. These vary from vessel to vessel, differ in loaded/light conditions and on conventional vessels depend on the amount of rudder used, not on the engine speed. The advance and tactical diameter distances of most vessels remain almost the same at different speeds in deep waters and calm seas, provided the propulsion speed remains unchanged during the turn and it is executed at a constant rudder angle.

Navigators should be fully aware of the manoeuvring characteristics of their vessels.

The experience of each officer of the navigational watch, and the familiarity of that officer with the ship's equipment, procedures, and manoeuvring capability. (STCW CODE A-VIII/2 paragraph 17.7)

Officers of the navigational watch shall know the handling characteristics of their ship, including its stopping distances, and should appreciate that other ships may have different handling characteristics. (STCW CODE A-VIII/2, paragraph 30)

iv: 'At night the presence of background light' is not exactly but something similar to the blinding effects of sunlight. At night, background lights from any source would interfere with the vision of the navigators, the degree of interference depending on their intensity. This in turn will have a detrimental effect on visual **'look-out'** and may not allow lights of other vessels or navigational aids to be sighted. The Rule only states **'such as from shore lights'** but similar background lights may also originate from other external sources like accommodation lights of other ships if not properly shut off, large concentration of vessels engaged in fishing which at times use search lights or ships lying at anchor with their deck lights working or pleasure craft and passenger ships where open decks usually are and at times even the exterior hull may be illuminated.

'Backscatter of her own lights' means the glare caused by the various lights of a vessel itself, for example the accommodation lights and in some metrological conditions even the ships own navigational lights.

Background or backscattered lights can have a direct and severe detrimental effect on the efficiency and effectiveness of visual **'look-out'**, reducing both range and clarity of sighting lights of other vessels and/or navigational aids. The reduced sighting range is dependent on the degree of interference this in turn will reduce the time available to analyse the situation and act if required. A proportional decrease in speed may thus be required to maintain a vessel at **'safe speed'** in such conditions. The STCW Watchkeeping Code also refers to these aspects as quoted below.

When deciding the composition of the watch on the bridge, which may include appropriately qualified ratings, the following factors, inter alia, shall be taken into account:

.2 Weather conditions, visibility and whether there is daylight or darkness. (STCW CODE A-VIII/2, paragraph 18.2)

The relieving officer shall ensure that the members of the relieving watch are fully capable of

performing their duties, particularly as regards their adjustment to night vision. Relieving officers shall not take over the watch until their vision is fully adjusted to the light conditions. (STCW CODE A-VIII/2, paragraph 20)

Note: This will also apply when any one walks out from a lighted chart room into a dark bridge at night and it is for this reason chart room or other lights in the wheelhouse, but outside the navigating bridge are always kept at low illumination intensity during hours of darkness.

v: 'The state of wind, sea and current' refers to the effects of prevailing weather on the manoeuvring of a vessel.

Sea state is due to the prevailing wind, and swell is from weather disturbances elsewhere; both are technically separate terms. They can exist in isolation or together; their individual characteristics direction and effects also vary. There may be swell and no sea (as there is no wind), and vice versa.

The wind effect on a car carrier with a shallow draught and a very large freeboard area would be different from a loaded tanker with deep draught and low freeboard. The relative direction between the vessel and the wind and/or the swell also matter. Sea and swell could invoke rolling and/or pitching, a certain amount of drift, restrict manoeuvrability and impose restrictions on the propulsion machinery operating parameters. If dangerous rolling and/or pitching is experienced then vessels should change their propulsion power and/or their course to cope with or get out of such situations. Synchronous rolling and parametric rolling are terms used for such conditions and are a combined function of various components, the length, width and stability of the vessel and the relative direction, length and height of the waves being encountered.

'Proximity of navigational hazards' means any and all factors that can be hazardous to safe navigation: other traffic, shallow waters, shoals, wrecks, land or anything else that can be, or contribute to, hazards of navigation.

All the above can impose restrictions on the vessel's ability to manoeuvre, usually restricting her from turning due to limited sea room but sometimes also from changing her speed. Weather aspects have been discussed earlier in the explanations following Rules 2 and 3.

vi: 'Draught in relation to the available depth of water' is about under keel clearance (UKC). If the UKC is large, a vessel will manoeuvre as normally expected of her. However, when the UKC is low, the water displaced by the vessel's movement through the water is not filled in immediately, creating a vacuum effect. The hydrodynamic forces created in such situations induce a suction effect on the vessel that not only pulls her bodily down to compensate for the vacuum or the low pressure created by the displaced water, but also has an extremely detrimental effect on the vessels normal manoeuvring behaviour. A vessel becomes rather sluggish to manoeuvre when experiencing squat and all the various effects are referred to simply as squat effects.

Normally when the UKC reduces from large values and drops to an amount equal to the vessels draught, squat effects start showing and increase gradually in a parabolic pattern as the UKC drops to half the draught, increasing rapidly thereafter as the UKC further reduces. Squat effects have been explained in more detail in the chapter on basic ship handling; their study will help in better understanding the implications of this subparagraph of this Rule.

'Available depth of water' also applies to the depth of water in the vicinity. If the depth of the surrounding waters is low, a vessel cannot go towards such areas without the risk of running aground. Depths restrict sea room as explained with 'proximity of navigational hazards'.

(b) Additionally, by vessels with operational radar:

Paragraph b of this Rule is about additional factors to be considered in determining 'safe speed' by vessels with an operational radar(s).

Neither this Rule, nor any other Rule in IRPCS clearly states when radar should be used. Its use is implied in Rule 5 on 'look-out'; it is referred to here in this Rule 6 and in Rule 7 on 'risk of collision' and finally in Rule 19 (d) on 'conduct of vessels in restricted visibility'. All these references point to the fact that use of radar is actually desired and accepted by these Rules as an important tool for collision prevention.

STCW CODE A-VIII/2 clearly specifies the minimum use of radar. This has already been referred to in the explanations of Rule 5. While this minimum defined usage must be complied with, nothing restricts the usage of radar at other times and it is recommended that radar(s) should be used whenever deemed necessary. The fitment of radar and ARPA systems is governed by the SOLAS convention; which automatically implies that the same should be used.

'Operational radar' means the radar is actually in use for any of its intended functions. If radar is in use, then the factors listed in paragraph 'b' of this Rule have to be considered and taken into account in determining 'safe speed'.

It must be borne in mind by navigators that use of radar or any other electronic devices is considered an aid to navigation and that a wide variety of equipments exist with varying levels of capabilities. Wherever required by law, all radars should comply with the minimum technical specifications and performance standards set by IMO. However, some vessels not requiring radar by law may have sets fitted on board with very basic features and not necessarily complying with IMO criteria. Radar is an aid, and an aid is not a substitute for the human sensory systems or the analytical ability of the human mind. (Even NASA's Challenger has always been manually guided, controlled and landed in its last long leg of its re entry return flight, not by computer controlled automation, the sensors and computers only providing all the required inputs. Studies by NASA have shown that modern computer controlled automation is still not a good enough substitute for the human brain).

Radar systems may fail to detect small targets, especially small wooden boats. Bearing and range data obtained from radar may have some errors. Change of course and/or speed by targets and change of radar bearings may not reflect immediately on the radar and this may lead to a higher rate of error in determining 'risk of collision' as compared to visual bearings. ARPA systems also take time to analyse the changes in the course and/or speed of the targets and the predictions are reasonably accurate only if the bodies are on a steady course and speed, IMO performance criteria allow for up to 3 minutes for analysis and calculating predictions. Notwithstanding any technical and performance related limitations, radar over the years has proved to be of immense help in navigation

and in the application of these Rules for 'preventing collisions'. However, the competence and experience of the navigators using radar(s) cannot be undervalued since the assimilation of data provided by the radar, its interpretation and subsequent application to 'any action to avoid collision' all depend on the navigators' skills. The radar controls should be properly set and the efficiency of the radar sets for optimum performance should be checked and maintained by all means such as the use of performance monitors or by manual tuning devices.

It should be borne in mind that watching the radar screen continuously causes screen fatigue, or stresses similar to when watching a TV or a computer screen for too long.

At times, especially in congested traffic and/or restricted visibility when radar is used as the primary or main collision avoidance tool, its use is emphasised in a 1962 Ruling by Mr. Justice Hewson. "When reliance is placed on the radar, it cannot be too strongly emphasised that a continuous radar watch should be kept by one person experienced in its use."

"High speeds at collision cause much greater damage than low speeds. High speeds before collision give less time to appreciate properly the development of the situation. Therefore, if radar is relied upon it must be properly used. If you rely upon the extended and accurate look-out that is provided by radar to justify immoderate speed, you must be careful to see that you use your radar properly and with seamanlike prudence upon the indications and inferences that are given by it, or may be drawn from data supplied by it. (Mr. Justice Hewson, 1963)"

Note: The older version of these Rules used the term 'moderate speed' which is now replaced by 'safe speed', and is also better defined in the present Rules, as such the reference to immoderate speed in the above quoted court verdict was based on the older edition of the Rules.

There are two basic types of marine radar systems, the 'X' and 'S' band systems.

The X-band, also called the 3 cm radars, send out short high-frequency pulses, yielding a very sharp and detailed image of the surrounding area. However, these have a limited range and are affected by rain and sea clutter.

The S-Band, also called the 10 cm radar, packs a lot of power into their low frequency but long wavelength signals and is able to look into and beyond the weather. They can detect objects at further ranges, are less affected by rain or sea clutter, but may not provide a display picture as sharp as the X-band radars.

In short, the larger the wavelength the lesser the effect of sea clutter, better the detection of targets but less sharp the radar picture.

i: 'The characteristics, efficiency and limitations of the radar equipment'. Characteristics of radar systems include many differences especially between the 'X' and 'S' band radars explained above. Efficiency would be the sensitivity of detecting targets and the range at which they are picked up coupled with the various display and analysing features.

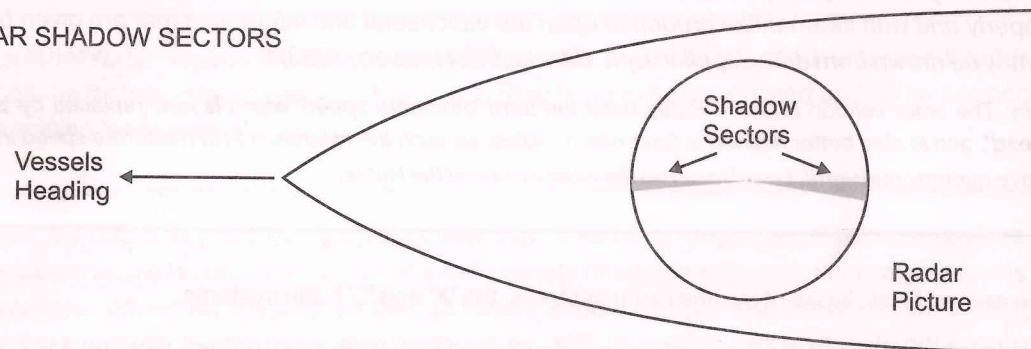
Limitations of the equipment can be many: starting up time, interference due to weather or other radars, shadow and blind sectors, the possibility that smaller targets, especially those made of poor

radar reflecting materials like wood or synthetic materials like fibre glass and ice, may not be picked up or displayed at long ranges or get obscured due to sea or rain clutter. Further the probability of false echoes, the range scale in use, the range and/or bearing accuracy, target discrimination aspects and the effects of manual sea and/or rain clutter or automatic clutter controls on the sensitivity of the radar systems all add up for the limitation aspects. The use of clutter control unwanted echoes, but they also tend to fade echoes of real targets and in general must be used with caution with reference to the performance capabilities of the radar in use. The interfering effects of other equipment feeding in or taking information from the radar also has to be accounted for.

Most radar systems usually incorporate built in ARPA systems and these have a time lag in determining the way a target is moving based on the input data. If the target(s) or own vessel change their course and/or speed, the predictions will not be accurate till both are steady on their new course and speed for some time, this may take up to 3 minutes.

To ensure that known radar shadow or blind sectors are scanned, changing the vessel's course by amounts equal to or slightly more than the shadow sectors for short durations at regular intervals, is considered prudent practice in the proper usage of radar. Should something go wrong, the failure of not doing so might be held against the navigators on the grounds that best navigational practice were not being followed.

RADAR SHADOW SECTORS



[TASK: READ AND UNDERSTAND THE DIFFERENCE BETWEEN SEA, RAIN AND AUTO CLUTTER, HOW THEY WORK AND IN WHICH WAY EACH OF THEM MAY BE USED?]

ii: *'Any constraints imposed by the radar range scale in use'* means that the range scale in use has a direct effect on the overall efficiency and effectiveness of the radar systems. At a small range it is a large scale picture but even in the off centred mode the range of radar *'look-out'* is still reduced. If long range is selected it is like using a small scale chart: everything appears small. Long range allows early detection of targets and a better overall assessment of the situation, but small targets and/or those with weak radar wave reflection characteristics may not be detected due to weak returning echoes and as such may not show on the radar display screen or the PPI at all. Short range scales usually provide good resolution and enable detection of small targets; long range scales sacrifice detail to display a larger range and allow early detection. There are both positive and negative aspects for both the extremes and navigators should decide the optimum range scale to be used, keeping in mind that changing the range scale is considered a necessary act for proper radar operations.

[TASK: READ PARAGRAPH 38 OF STCW CODE SECTION A-VIII/2 ON RANGE SCALES.]

In a radar picture, the range and bearing accuracy of targets may also be affected by the range scale in use. However, the ARPA or electronic readouts should not be affected by the range in use. Navigators must exercise caution when seeing and analysing data of targets acquired on ARPA. If the targets pass very close to each other, target swap may take place: that means the number or alphabet assigned to identify the targets leaps across the targets and the observer looking at the data window will see a totally different data/prediction than what was there before the swap. It is a prudent practice to confirm that the data being seen is of the intended target on the display. This may or may not affect targets showing or take place on ECDIS systems, depending on whether the ECDIS totally takes all inputs from the radar or assigns its own reference tags.

Having an ECDIS or an ECS on board vessels is not yet a mandatory requirement though their use is approved if fitted. ECDIS systems become mandatory in a phased manner from 1st July 2012 for new ships till 1st July 2018 for existing ships. Most ECDIS systems have an option of being interfaced with the radars, exchange information and display the same in different display layers, also referred to as radar overlay. The operator can thus use the ECDIS system to see the radar picture on the same screen, but, as a matter of caution, this may interfere with the viewing clarity of the navigational data being shown on the ECDIS system and vice versa. The navigational data may automatically take priority of display over radar information at times. Navigators should exercise caution when using an ECDIS system to replicate the radar picture on it.

Whenever necessary, two or more radar sets should be put in operation on different range scales to avoid changing scales frequently. In such cases, it may also be considered to use one exclusively for *'preventing collisions'* and the other for position fixing and monitoring to reduce any chance of confusion between the bridge team members. If there are more than two sets in use, the bridge team members should decide on their optimum usage to gain maximum benefit.

Speed through water must be used as the input for the ARPA system used for *'preventing collisions'*. This is a requirement for vessels over 10'000 gross tonnage and upwards stated in Regulation 19, paragraph 2.8.1 of SOLAS Chapter V, *'an automatic radar plotting aid connected to a device to indicate speed and distance through water'*.

[TASK: AS PER THE ABOVE PARAGRAPH OF SOLAS, WHAT IS THE MINIMUM NUMBER OF TARGETS AN ARPA SYSTEM MUST BE ABLE TO PLOT AUTOMATICALLY?]

iii) *'The effect on radar detection of the sea state, weather and other sources of interference'* is essentially about echoes returned by the sea itself, called sea clutter which can hide the echoes of real targets. Weather conditions also affect radar performance like low heavy rain bearing clouds and/or rain itself that will reflect the radar waves and show as patches on the radar PPI, obscuring real targets. Other sources of interference can be many, like other radars in the vicinity or false or multiple echoes etc. The navigators have to account for all these in assessing the dependability they can place on the radar and decide, on this basis, the required *'safe speed'* at which their vessel should proceed when using radar for *'preventing collisions'*.

The reasons for the radar not being able to detect targets have been discussed earlier and sometimes may be because the radar itself is weak, that means that its transmission is so weak that the reflected echoes fade off before being received back, or the internal amplification systems are not working well, as such the need to carry out performance checks as stated earlier. If targets are not detected at an adequate range, their assessment cannot be done in good time to **'determine if a close-quarters situation is developing and/or risk of collision exists'** and if any **'action to avoid collision'** is required.

iv) **'The possibility that small vessels, ice and other floating objects may not be detected by radar at an adequate range'** have been explained with Rule 5, in the beginning of this explanation on paragraph 'b' and also after subparagraph 'b-i' thus not repeated here.

v) **'The number, location and movement of vessels detected by radar'** is also to do with the workload of the navigators, the task of detecting, observing, analysing and keeping a track of the targets till they have passed clear, especially those which have or may have had a **'risk of collision'** or passing too close for comfort. Judgement and decision making depends on the workload which in turn depends on the **'number, location and movement of vessels'** in the vicinity.

Though the radar and ARPA may give all the information, the human mind has limitations and can get saturated or overloaded when there is too much information to analyse; the navigator's concentration can be locked on some of the information while missing other data. These factors depend on the time available: the faster the speed the less the time available, hence consideration should be given to these aspects when determining **'safe speed'**. If the number of vessels in the vicinity is fewer and they are spaced farther away, or they are moving in directions well away and will pose no **'risk of collision'**, the situation may not impose any restrictions on the speed. However, if the number of vessels in the vicinity is large and at closer range, the vessel should be at a speed which gives the navigators on board sufficient time to assess the situation and any changes. The implication of these Rules clearly is on slower speeds to allow for time, not just for making assessments but for executing **'any action to avoid collision'** too.

vi) **'The more exact assessment of the visibility that may be possible when radar is used to determine the range of vessels or other objects in the vicinity'** is implying that assessment of visibility by visual determination is fraught with errors. If there are any vessels or objects visible in the vicinity, their range can be accurately determined by radar to allow a **'more exact assessment of the visibility'**. Compliance with requirement of subparagraph 'a-i' of this Rule on **'state of visibility'** can be better done if the visibility is known correctly, which can be easily determined by radar.

In concluding the explanations of this Rule, the reluctance of Masters and navigating officers to reduce the speed to **'SAFE'** has been held not only against them as a wilfully committed wrong act, but also against the shore based management of companies in case of a collision at sea. In many cases, various logs and reports made to the shore based management have been checked as part of the investigations. In some, it was found that the shore-based management had not reviewed the information and detected the errors, or having done so, had not taken any, or had taken ineffective corrective or preventive actions, leading to legal action even against the shore staff. In one such case the navigation log abstract sent from the vessel to the shore based management office showed visibility as poor but the corresponding speed entries as well as the engine room log entries indicated that the vessel did proceed at full speed and

the engines not placed in a state of readiness. Non-compliance by the vessel with these Rules and the watchkeeping requirements of the STCW Code was confirmed and legal action initiated against all concerned because it was established that the shore management had not taken cognisance of these reports or reacted to correct the same.

In a judgement about a collision in restricted visibility conditions when a vessel collided with another lying at anchor, the court of appeal judge upheld the lower court judgement holding the ship owner guilty and had stated, *"A primary concern of a ship owner must be safety of life at sea. That involves a seaworthy ship, properly manned, but it also requires safe navigation. Excessive speed in fog is a grave breach of duty, and ship owners should use all their influence to prevent it. In so far as high speed is encouraged by radar, the installation of radar requires particular vigilance of owners"*. It is also worth mentioning that the certificates of competency of the master and the navigating officer on watch of the vessel underway were also suspended for some time as punishment towards not correctly complying with the requirements.

The implication of this Rule is that the higher the speed, the lesser the time available to detect traffic, analyse the same and react to it, and vice versa. The larger the vessel, the greater the momentum and that much longer the distance she will carry on travelling even after her propulsion is stopped or even reversed. Reversal of propulsion is normally not immediately possible and remains debatable as far as day to day practical implementation is concerned; the technical and operational limitations of the machinery involved makes it difficult to reverse propulsion immediately. These aspects vary from engine to engine, the type of system and its working parameters, and these details must be known to the navigators of the vessel they are serving on. Reversal of engines is discussed in more detail in the chapter on basic ship handling.

Navigators must always be able to justify that the speed at which they are navigating their vessel is reasonably **'safe'** as per the provisions of this Rule as applied in the existing circumstances, be it full sea speed or down to near stopped. Steerage can be maintained at very low speeds even if the propulsion power is cut to zero by using short propulsion kicks to maintain a vessel on her course, or to change her heading as may be necessary.

Many years ago, two very large laden tankers had a minor collision off Tobago near the edge of a tropical rain squall. One of them had just passed through the heavy rain. Both vessels had been proceeding at full sea speed and detected each other when just less than 2 miles away. At the subsequent enquiry it was held that both the vessel's had not made proper and effective use of their radar's and both were proceeding at excessive speed which was not considered safe in the prevailing conditions of visibility.

There are many other similar cases on record of collisions caused due to improper use of the radar or failure to detect smaller targets, especially in rough sea conditions or rain/snow squalls when they were hidden in clutter and were not sighted visually. In all such cases, repeatedly, it was concluded that the vessels concerned were at too high a speed vis-à-vis the prevailing visibility, weather and sea conditions. This will also apply to detection of ice: it is common knowledge that ice is a poor radar reflector and may not be detected until too close, sometimes as close as 3 to 4 nautical miles. As such, too much or over reliance should not be placed on the radar and the same used with caution as an aid to navigation only.

The following details of the collision between 'Tricolor' and 'Kariba' are very interesting not just about this Rule but on the overall application of these Rules for collision prevention. These two vessels that collided had no risk of collision between them initially; the risk existed between Kariba and another vessel 'Clary'; Clearly the visibility was not good, therefore the lessons learnt from this case study can be used in practice for preventing collisions at sea.

*Just after 0200 hrs on 14th December 2002, three vessels were navigating off the coast of Dunkerque, France and were approaching an intersection in a Traffic Separation Scheme (TSS). The Kariba and the Tricolor were proceeding westward on the East-West branch of the TSS, with the Kariba ahead and the Tricolor some distance behind and about one-half mile to the north of the Kariba. Because the Kariba was sailing at about 16 knots and the Tricolor at 17.9 knots, the Tricolor was gradually overtaking the Kariba and, had the ships maintained their courses, the Tricolor would have passed the Kariba on its starboard side with about one-half mile between them. The Clary, meanwhile, was moving northward on the North-South branch of the TSS at 13 knots, on a collision course with the Kariba. The collision occurred when both vessels were about to enter into the North-South shipping route through the English Channel. Clary did not take **'any action to avoid collision'**; Kariba altered towards Tricolor and struck her on the port side. Tricolor, a car carrier, quickly took on water, then capsized and sank within 30 minutes: all the people on board managed to abandon the vessel safely and were rescued. The third vessel, the Clary, was said to have embarrassed the navigation of Kariba causing Kariba to turn into Tricolor, ram her, and sink her. The Tricolor was travelling from Zeebrugge to Southampton, the Kariba was on a voyage from Antwerp en route to Le Havre.*

*The wreck of Tricolor was immediately marked by buoys but within two days, on 16th December, a German cargo vessel Nicola, proceeding in ballast, struck her wreck. Tugs pulled the cargo ship from the wreck on the same day. However, on Wednesday, 1st January 2003, the wreck of the Tricolor was struck again. This time, the Turkish tanker Vicky, which was carrying 77,000 tons of gas oil, hit the wreck. This highlights not just the importance of maintaining **'look-out'** but also to be aware of navigational warnings issued regularly: the details of the wreck and the buoy marking the same had been announced repeatedly through various navigational warnings.*

Following extracts from the judgement delivered on 21st May 2008 should help you analyse the situation and learn for it to prevent similar problems in future:

The Kariba, the Tricolor and the Clary - committed navigational errors that caused the Kariba and the Tricolor to collide and the Tricolor to capsize and sink. On January 4, 2006, after a bench trial, this Court found the Kariba 100% liable for the collision. The Kariba's owner and various owners of lost cargo appealed, and on July 6, 2007, the Second Circuit held that all three vessels were liable for the collision and remanded the matter to this Court to allocate percentages of liability among them. For the reasons set forth below, and with guidance from the Court of Appeals, this Court now finds that the Kariba was 63% liable for the collision, the Clary 20% liable and the Tricolor 17% liable.

Other issues on remand are whether the Tricolor's speed was a proximate cause of the Collision. For the reasons set forth below, this Court holds that the Tricolor's speed was a proximate cause of the collision.

In sum, the Tricolor is culpable for two unsafe acts, unsafe overtaking and excessive speed, which together violated four COLREGS. The Tricolor's overtaking violated COLREGS 13 and 16, the Tricolor's speed violated COLREGS 6 and 19(b). Moreover, each of the Tricolor's unsafe acts was a cause of the collision and will be counted in the allocation of liability below.

On safe speed, COLREG 6 requires that "every vessel shall at all times proceed at a safe speed so that she can take proper and effective action to avoid collision and be stopped within a distance appropriate to the prevailing circumstances and conditions," and COLREG 19(b) provides that "every vessel shall proceed at a safe speed adapted to the prevailing circumstances and conditions of restricted visibility." The Circuit held that, as a matter of law, the Tricolor's speed of 17.9 knots was not a safe speed "under conditions of heavy fog, in a TSS known for its traffic congestion, and with the knowledge the Kariba was on a collision course with the Clary."

This question of whether the Tricolor's unsafe speed was a proximate cause of the collision hinges entirely on whether the Tricolor, had it not been proceeding at an unsafe speed, would have been able to stop soon enough to avert or mitigate the harm of the collision. In other words, the question hinges not on the factor of the Tricolor's speed in isolation, but whether that speed reflected an inability to stop, or slow, in time to avoid the Kariba's abrupt abaft-the-beam turn.

*The Circuit left unanswered the question of what would have constituted a safe speed, but suggested that "a court might usefully consult the half-distance Rule for frame of reference." Under the half-distance Rule, a safe speed is "a speed permitting [the vessel] to stop within half the distance the lookout could see ahead." [citing *Union Oil Co. v. The San Jacinto*, 409 U.S. 140 (1972)]. In other words, "the vessel's speed should be sufficiently slow to enable her to stop within half the limit of visibility." Here, Captain Knutsen stated in his trial declaration that visibility was less than a mile on the night of the collision. Accordingly, under the half-distance Rule, a safe speed would have allowed the Tricolor to stop within a half-mile's distance. The Tricolor's maneuvering characteristics show that at Full Sea Speed, or 17.5 knots, the Tricolor would need about 1.02 miles to stop. The Tricolor was proceeding at a slightly faster speed, at 17.9 knots. Had it been proceeding at Full Ahead, or 11.2 knots, however, the Tricolor could have stopped within half a mile. Therefore, a safe speed under the half-distance Rule would have been 11.2 The Tricolor argues extensively that its speed was not a proximate cause under the logic of *Berry v. Sugar Notch Borough*, 191 Pa. 345 (1899). Specifically, the Tricolor reasons that its speed could not have been a proximate cause because it did not increase the risk that the Kariba would make an abrupt turn to starboard. While the district court found this line of cases to have some merit, the Second Circuit explicitly charged me with determining whether the Tricolor's speed was a proximate cause, "notwithstanding" *Berry* and its progeny. The Circuit clearly set forth the standard for determining whether the Tricolor's speed was a proximate cause, separate and apart from whether the speed increased the likelihood that the Kariba would make its fateful turn.*

The Circuit, however, observed that while stopping distance is a “major factor for considering whether a speed was safe,” a court also must consider additional factors such as visibility, sea conditions, traffic and the vessels' capabilities. Nevertheless, given the restricted visibility and heavy traffic that night, this Court will suppose for the moment that a safe speed would not have exceeded 11.2 knots.

Next, it must be determined whether a safe speed of 11.2 knots would have permitted the Tricolor to slow or stop in time to avoid the collision. The CD simulation prepared by Captain Boyce demonstrates that, if Captain Knutsen had decreased the Tricolor's speed to 11.2 knots once he realized that the Kariba and the Clary were on a collision course, the Kariba and the Tricolor would not have collided. Captain Knutsen testified that he became aware of the other two ships' collision course by 2:04:38 a.m. If at 2:05 a.m., he had started to decrease the Tricolor's speed from 17.9 knots to 11.2 knots, which conservatively would have required about 638.1 seconds, the simulation shows that the Kariba, after making its starboard turns, would have passed in front of the Tricolor, with no collision. Therefore, had the Tricolor reduced her speed to 11.2 knots, the collision would not have occurred.

While the Tricolor does not identify a safe speed, it argues that the half-distance Rule is inapplicable here because this Rule is customarily used when vessels are approaching one another head-to-head, and not moving parallel to one another, as here. The Tricolor also argues that the Rule is less relevant where vessels operate advanced radar equipment, as here. These arguments are moot, however. Even disregarding the half-distance Rule, had the Tricolor reduced its speed to only 16 knots, the speed of the Kariba, the Boyce simulation demonstrates that the collision would not have occurred, assuming that the Kariba steadied on its course after making its abrupt turn to starboard instead of stopping. (The Kariba put on the brakes only because Captain Kamola realized it was going to ram into the Tricolor; if the Tricolor had reduced its speed to 16 knots, beginning at 2:05 a.m., there would have been no need for the Kariba to stop.) Therefore, even if the Tricolor had reduced its speed to 16 knots to match the Kariba's speed, so that she was no longer overtaking the Kariba, she could have avoided the accident.

The full text of the judgement may be seen on the internet and is available on the link <http://www.hklaw.com/File.aspx?id=2677&inline=1>

The above court ruling may appear scary but legal cases can become a major headache for the vessels owners, managers and most of all for the navigators in control of navigational activities. In this case, the visibility was restricted or very poor and the application of Rule 19, discussed in depth later, may have prevented the collision. The so called 'half-distance Rule' referred to in the judgment is not an existing Rule anywhere in the present legislation but has been used in court cases as a base or an argument to determine '*safe-speed*'. Once such an example or argument used in a court sustains through a judgement, it usually becomes a sort of a standard which can be referred to in future court cases by any other court even if in another country, since these Rules apply universally across the world. Notwithstanding the use of Radar, as late as in 2008, the courts have felt that the range of visual visibility remains one of

the most important criteria in determining '*safe-speed*'. However, the court has used the comment, "*a court might usefully consult the half-distance Rule for frame of reference*". This implies that this is something not necessarily binding in all situations. Another court ruling of 1933 stated earlier with the explanation of Rule 6(a)(i) is repeated to highlight this aspect again, a vessel '*should be able to stop within its limits of visibility*'.

[TASK: SEARCH THE INTERNET TO RESEARCH AND STUDY MORE ON THIS UNFORTUNATE ACCIDENT AS WELL AS THE REMOVAL OF THE WRECK OF THE ILL FATED 'TRICOLOR'. DO YOU FIND ANY SIMILARITIES WITH THE JANUARY/FEBRUARY 1971 ACCIDENTS WHICH TOOK PLACE OFF U.K. AND STATED AT THE END OF RULE 10.

ONE OF THE WEBSITE IS <http://www.tricolorsalvage.com>]

Rule 7

Risk of collision

- (a) Every vessel shall use all available means appropriate to the prevailing circumstances and conditions to determine if risk of collision exists. If there is any doubt such risk shall be deemed to exist.
- (b) Proper use shall be made of radar equipment if fitted and operational, including long range scanning to obtain early warning of risk of collision and radar plotting or equivalent systematic observation of detected objects.
- (c) Assumptions shall not be made on the basis of scanty information, especially scanty radar information.
- (d) In determining if risk of collision exists the following considerations shall be among those taken into account:
 - (i) such risk shall be deemed to exist if the compass bearing of an approaching vessel does not appreciably change;
 - (ii) such risk may sometimes exist even when an appreciable bearing change is evident, particularly when approaching a very large vessel or a tow or when approaching a vessel at close range.

To recompile, Rule 2 ends with the remark *'to avoid immediate danger'*- danger includes *'risk of collision'*. Rule 5 requires the navigator *'make a full appraisal of the situation and of the risk of collision'*; Rule 6 states that they take *'proper and effective action to avoid collision'* and the next Rule 8 is on *'action to avoid collision'*. These Rules repeatedly refer to the dangers or *'risk of collision'* and the prime need for *'preventing collisions'*.

Rule 7 describes the practices to be followed by the navigators of all vessels to determine *'risk of collision'*. Naturally and logically, any action to *'avoid collision'* should be after having determined that *'a close-quarters situation is developing and/or risk of collision exists'*. Once this is confirmed, timely or otherwise, it triggers the application of many other Rules that may need to be applied by the navigators depending on *'the prevailing circumstances and conditions'*.

Rules in Part B Sections II and III describe the various types of situations which may be encountered and the expected *'action to avoid collision'* from vessels *'in sight of one another'* or *'to vessels not in sight of one another when navigating in or near an area of restricted visibility'* respectively.

In a simple sequence, the steps for *'preventing collisions'* are as follows.

- 1) *'Look-out'*;
- 2) Determination of *'risk of collision'*, and if it exists, then;
- 3) Application of the relevant Rules to avoid the *'risk of collision'*.

This Rule 7 is about a detailed analysis of all relevant information from any source to determine *'risk of collision'*. Rule 5 on *'look-out'*, in comparison, is more to do with the collection of data. Do note that both these Rules start with *'every vessel shall'* and contain the phrase *'all available means*

appropriate to the prevailing circumstances and conditions'. Rule 5 ends with the requirement *'to make a full appraisal of the situation and of the risk of collision'*. This Rule 7 is about doing *'a full appraisal of the situation'* to determine *'risk of collision'*.

This Rule applies at all times as per Rule 4. However, there have been some court rulings in the past saying that this Rule on *'risk of collision'* should not apply at very long ranges especially when the speed of approach between vessels is low. Arguments in court cases regarding the range at which these Rules apply have not ended in any firm judgement. The Rules in this section -or anywhere else for that matter- have neither defined nor given even the slightest hint or indication of any numerical or mathematical limits about their application except Rule 25(f). Rule 1(a) states *'these Rules shall apply to all vessels upon the high seas and in all waters connected therewith navigable by seagoing vessels'*. By this clause alone, all the Rules apply to all vessels at all times irrespective of range. However, going by Rule 2 (a), and the latter part of the phrase *'precaution which may be required by the ordinary practice of seamen'*, it is a matter of common sense and logic that this or any other Rule should apply to vessels in the vicinity of each other and not on opposite sides of the globe.

'Risk of collision' is a combination of the relative speed of approach and the time it will take for the vessels or bodies to get dangerously close. Determining *'risk of collision'* is an analysis of the vectors of the bodies concerned. If the vectors meet at the same point at the same time when projected forward in time it signifies that they will make contact. This also applies to vessels that are moving on a particular course at a certain speed or having a vector. If they continue on their paths, and would make contact with each other, as explained, it means they have *'risk of collision'*. At sea the implied bodies are vessels *'underway'* by this Rule, but there could also be *'risk of collision'* with other fixed or floating objects, those not moving have a zero vector and lie in the projected path of the other. Do note that contact with fixed objects like bridges is technically called an *'allision'*; this is vessel contact with a fixed object, but that does not make any difference to the determination of the *'risk of collision'*. One school of thought is that a vessel at anchor is also considered a fixed object and any contact with her is sometimes termed as an *'allision'*, usually in USA. However, this is not universally accepted and the traditional view remains that a vessel at anchor is not a fixed object since she is afloat.

The closest range of approach is perhaps the most important element in deciding *'risk of collision'*. A collision occurs when the range decreases to zero, but *'risk of collision'* may exist even when the projected range of closest approach is somewhat greater than zero. A very close passing, say within one vessel length, could certainly be considered as a condition involving *'risk of collision'*; more on this is explained later.

'Risk of collision' does not usually arise suddenly like the light from an on-off switch, but rather increases or decreases gradually, like the light from a dimmer switch, and save for some vessels making a sudden and abrupt change of movement like in the Tricolor and Kariba collision explained with Rule 6, there should usually be reasonable time to determine the same if *'proper look-out'* is being maintained.

There will be a difference in deciding the *'risk of collision'* when in open sea situations where vessels are likely to continue on the same course and speed for considerably long durations versus harbour channels or rivers with bends where course changes may be frequent and the situations between vessels changing rather rapidly. In such channels, the conduct of vessels is governed by Rule 9 so that frequently changing tracks do not lead to confusion in determining the rather rapidly changing situations and application of the concerned Rules.

By paragraph 'a' of this Rule, determination of *'risk of collision'* has to be carried out by every vessel. Though not stated, it is implied and is a matter of *'ordinary practice of seamen'* or basic common sense that this requirement applies at sea or in other navigable waters when the vessels are underway and may also apply to vessels at anchor too, *'if the master considers it necessary, a continuous navigational watch shall be maintained at anchor'*. (Extract from STCW Code A VIII/2, paragraph 51)

'All available means' is a repetition of the words used in Rule 5, so are the words *'appropriate'* and *'prevailing circumstances and conditions'* and mean the same as explained earlier. *'All available means'* would include any and all systems, humans or machines and any combination thereof whether internal on board the vessel or external, listed in these Rules or not and information or signals from other vessels or shore based systems. All human sensory and mental systems can also be very much included as part of this clause, while the list of machinery can be endless- existing or future equipment. Most have been listed in the explanation of Rule 5 on *'look-out'*. Any such lists are only indicative at best and not exhaustive.

At this point, it will be worth mentioning about Automatic Identification Systems (AIS) now fitted on board most vessels. These can display numerous data about other vessels in the vicinity, the data being picked up directly by the transmissions made by AIS systems fitted on the vessels concerned. AIS uses radio transponders in much the same way as the mandatory aircraft T-CAS (collision avoidance system) uses Mode-S radar transponders to transmit information from each aircraft to other aircrafts and air traffic controllers. In the case of the shipboard AIS systems, the information transmitted could include the vessel's identity, type, dimensions, draughts, navigation status, GPS/DGPS position, course, speed, rate of turn, voyage destination and even details of the cargo on board. AIS thus presents a lot of navigational and vessel traffic information about other vessels in the vicinity to the bridge team. AIS systems on board, using the transmitted information from other vessels and own ships inputs, can analyse the data of the other vessels to give similar information like predictions from ARPA systems like the time and range of passing (CPA and TCPA) etc. AIS systems are still undergoing a standardisation transition and many commercial models are in use with substantial differences between them.

The idea of using AIS to improve situational awareness towards, *'preventing collisions'* was originally initiated by SAAB of Sweden.

Though IMO resolution of 1998 on performance standards for an AIS states amongst its usage *'in ship-to-ship mode for collision avoidance'*. Navigators need to exercise great caution here: although the AIS may be helpful in providing a lot of information, its predictions are as good as the data received from the vessels detected, which in turn depends on the accuracy of the inputs made by those vessels into their AIS systems. The use of AIS as an effective device to

determine *'risk of collision'* or to act as an aid to *'avoid collision'* is yet to be proved *'fail safe'*. Information received from AIS should be used with extreme caution and not relied upon in totality, see the later resolution of IMO issued in 2001 stated below.

Extracts from IMO resolution A.917(22) adopted in 2001 on the use of AIS are quoted below. Even the IMO has stated in paragraph 39 of this resolution that use of AIS for anti-collision may be recommended in future.

USE OF AIS IN COLLISION AVOIDANCE SITUATIONS:

39. ***The potential of AIS as an anti-collision device is recognized and AIS may be recommended as such a device in due time.***
40. ***Nevertheless, AIS information may be used to assist in collision avoidance decision making. When using the AIS in the ship-to-ship mode for anti-collision purposes, the following cautionary points should be borne in mind:***
 - .1 ***AIS is an additional source of navigational information. It does not replace, but supports, navigational systems such as radar target-tracking and VTS; and***
 - .2 ***the use of AIS does not negate the responsibility of the OOW to comply at all times with the Collision (prevention) Regulations.***
41. ***The user should not rely on AIS as the sole information system, but should make use of all safety-relevant information available.***
42. ***The use of AIS on board ship is not intended to have any special impact on the composition of the navigational watch, which should continue to be determined in accordance with the STCW Convention.***
43. ***Once a ship has been detected, AIS can assist in tracking it as a target. By monitoring the information broadcast by that target, its actions can also be monitored. Changes in heading and course are, for example, immediately apparent, and many of the problems common to tracking targets by radar, namely clutter, target swap as ships pass close by and target loss following a fast manoeuvre, do not affect AIS. AIS can also assist in the identification of targets, by name or call sign and by ship type and navigational status.***

Though AIS is helpful in identifying and tracking vessels in the vicinity and providing instant information about them and unlike the ARPA, it does not suffer any time delays. However, the information depends on the accuracy of the data transmitted by the AIS fitted on the vessels concerned, which in turn is dependent on various inputs from the system fitted on board. AIS systems also do not suffer the common problems radar systems are associated with, like shadow sectors, clutter, radar interference, false targets and target swap, the latter may occur on ARPA systems when targets pass close to each other.

The AIS as such remains another aid to navigation; it may not be fitted on all ships and is not expected to have any significant impact on navigational watchkeeping which still continues to be governed by the provisions in the *'STCW'*, *'IRPCS'* (these Rules) and the *'SOLAS'* conventions.

Navigators should keep in mind the clause *'all available means'* that has been discussed earlier. If an AIS system is fitted but is not used at all, then, should something go wrong, lawyers would argue that its use may have prevented the accident. In fact, such questions are already beginning to surface in some recent court cases.

[TASK: To study errors of AIS and ECDIS systems please research www.panbo.com and <http://www.nautinst.org/ais/reportedProbs.htm>]

In paragraph 'a', the most important statement with extremely far reaching consequences is **'if there is any doubt such risk shall be deemed to exist'**. **'Any doubt'** about the existence of a risk of collision should be deemed to mean that **'risk of collision exists'**. A **'doubt'** about the possibility of **'risk of collision'** may arise from any source and for numerous reasons, including the location and apparent movement of a vessel or any object sighted visually or detected on radar or AIS or seen on an ECDIS system. If the apparent situation invokes a feeling of suspicion that it may entail **'risk of collision'** even before being analysed, then **'such risk shall be deemed to exist'** and should automatically activate further actions for a more thorough analysis of the situation and deployment of applicable Rules to avoid the risk.

b: The SOLAS convention governs the fitment of radar equipment, the performance standards which are as per the norms published separately by IMO and the minimum use governed by STCW Code A-VIII/2 as explained earlier with Rule 5. However, nothing restricts the use of radar at other times.

'Proper' has been discussed with Rule 5, except that now the term is used about the use of radar equipment. **'If fitted and operational'** has been explained earlier, including the minimum usage criteria, with Rule 5. It is not necessary that radar should be on and operating at all times even if fitted especially in open waters and/or in good visibility. Traditionally, navigators have been able to determine **'risk of collision'** and take **'action to avoid collision'** long before radar was invented and these Rules still reflect this traditional practice, although the number and size of vessels has increased over the years. No doubt, the availability and use of radar makes watchkeeping much easier, but radar legally still remains an aid to navigation. Notwithstanding this, navigators remain free to use the radar and any other equipment as may be needed at anytime. However, it is recommended that they remain familiar with the basic principles of determining **'risk of collision'** both in theory and in practice.

If the radar is in use, its use should be **'proper'**, keeping in mind its capabilities and limitations, both technical and operational as explained earlier, especially with Rule 6(b). **'Long-range scanning'** assists in detecting targets well in advance so that proper assessments can be made. Changing the radar scale usually also changes the pulse repetition frequency on most radar sets and thus enhances the probability of target detection by radar. Radar coverage usually extends well beyond the visible range even in good visibility, though both may have restrictions depending on the height of the eye or the height of the radar antenna above the water surface. Any target detected on the radar screen by an OOW, or by the radar itself (automatic acquiring), should be analysed to check if it poses any **'risk of collision'**. This determination should be done by **'radar plotting or equivalent systematic observation'**. Radar plotting can also be done manually on the radar screen itself using the old reflection plotter with soft glass marking pencils or on radar plotting sheets; the latter is still a requirement in some companies and considered a good practice. The **'equivalent systematic'** systems can be the various types of ARPA systems usually inbuilt in radar systems, although there may still be some external stand-alone ARPA units interconnected with the radar. ARPA systems can track several targets simultaneously and provide their data and predictions. The ARPA, ECDIS and AIS systems can all usually be interlinked with each other. In such interlinked systems, the radar

screen can display ECDIS and/or AIS information or the ECDIS can display the radar picture, targets and AIS data all superimposed on its basic display. However, it must be kept in mind that the basic intent of this Rule is that detected targets must be analysed to verify if they pose any **'risk of collision'**. The longer the range at which this task is accomplished, the better it will be to enable an overview of the situation, obtain **'early warning of risk of collision'**, allow more time and sea room to decide and execute the applicable **'action to avoid collision'**.

Radar has developed into one of the most important navigational equipment for many navigational tasks including **'preventing collisions'** and may form part of new integrated bridge systems. However, even the most sophisticated and efficient radar system, as of now, should not be expected to be regarded as a substitute for the human eye (in good visibility) and other sensory systems; this fact should always be kept in mind during navigational watchkeeping. Although the benefits of radar are many and outside the scope of this book, it remains a valuable and reliable aid to navigation and should be exploited to its full potential, keeping in mind its various limitations.

'Detected objects' means any and all objects fixed or floating which may pose a **'risk of collision'**, not just vessels alone, and any object detected on the radar must be analysed for **'risk of collision'**. If it is a fixed object or a buoy and there is **'risk of collision'** with it, then the vessel detecting the object would be required to keep clear as only she can take **'action to avoid collision'**. There is no specific Rule for such situations except to apply the guiding principles of Rule 2.

'Radar plotting' implies that the activity is done by a person competent in the task and that bearings and distances of the targets are being plotted manually or by other equivalent methods and that the plot is being carefully evaluated to **'obtain early warning of risk of collision'**.

It is for the navigators to choose the type of Radar display and the type of vectors, but with COLREGS/IRPCS essentially being based on the relative aspect(*), own ships speed through water should be used for manual or automatic plotting, the latter usually using ARPA. Ground stabilised displays are likely to give an incorrect picture of the scenario, wrong aspects and even wrong future predictions that may lead to incorrect analysis of the situation and **'action to avoid collision'**. Relative vectors instantly indicate **'risk of collision'** and this should be kept in mind when looking at and analysing vectors. Please refer the two circulars issued by Bahamas and Marshal Island flag administrations on the proper use of ARPA included in this book.

(*): *Relative aspect means the relative bearing of a target from own vessel, using the right ahead direction of own vessels fore-and-aft line as the zero reference point. As you will learn in these Rules later, not only do you need to be aware of the aspect of another vessel from your vessel but a target vessel would also need to determine its aspect or relative direction from your vessel to judge the situation and, based on that, the application of the relevant collision prevention rule and associated actions. The application of many collision prevention Rules are based on the relative positions or aspect between the vessels concerned; this will get clear as you study the Rules pertaining to expected best 'action to avoid collision' in the various situations later.*

'Equivalent systematic observation' is not clearly defined. Apart from the explanation given above, even a proper record of the bearings and distances taken and recorded regularly at frequent intervals by an observer who may analyse the situation just by this data alone without resorting to any plot, may at times, still be acceptable as fulfilling this requirement provided that the observer had no means to plot the data or the **'prevailing circumstances'** did not allow the same, for example in an area of high traffic density or in heavy weather. If the information on the radar is monitored carefully and regularly,

then it can be detected with reasonable accuracy which targets will pass clear and those like leading to **'close-quarters'** or **'risk of collision'** situations. Navigators should focus their attention on the latter targets not passing well clear while keeping track of the others till they are **'finally passed and clear'**.

c: 'Scanty' means very little, less, scarce, insufficient or inadequate. If the input data is not correct or complete, then logically the result based on such data will also not be correct and this may well be the starting of an error chain leading to wrong judgements, wrong decisions and may even lead to an accident (collision). Cross checking of information from more than one source whenever possible plus observation of several readings with repeated analysis to check the consistency of results are the basics of practical management, so that error chains can be detected and corrected in time. This applies as much to **'preventing collisions'** as to navigational watchkeeping or anything else in life.

'Scanty information' may lead to wrong inferences and **'assumptions'** based on **'scanty information'** can be rather dangerous. A special caution has been stated in these Rules for **'scanty radar information'**. The limitations of the radar equipment and the errors they are prone to have been explained earlier. In addition, any input errors like a wrong compass heading or the speed input to the radar/ARPA may lead to wrong analysis and predictions. Ultimately, it is left to the navigators to analyse the quality of the information, use their knowledge and experience to analyse and judge its reliability to arrive at sound and effective conclusions and related actions. Please note the emphasis on the word **'shall'** in this paragraph of the Rule: **'Assumptions SHALL not be made.'**

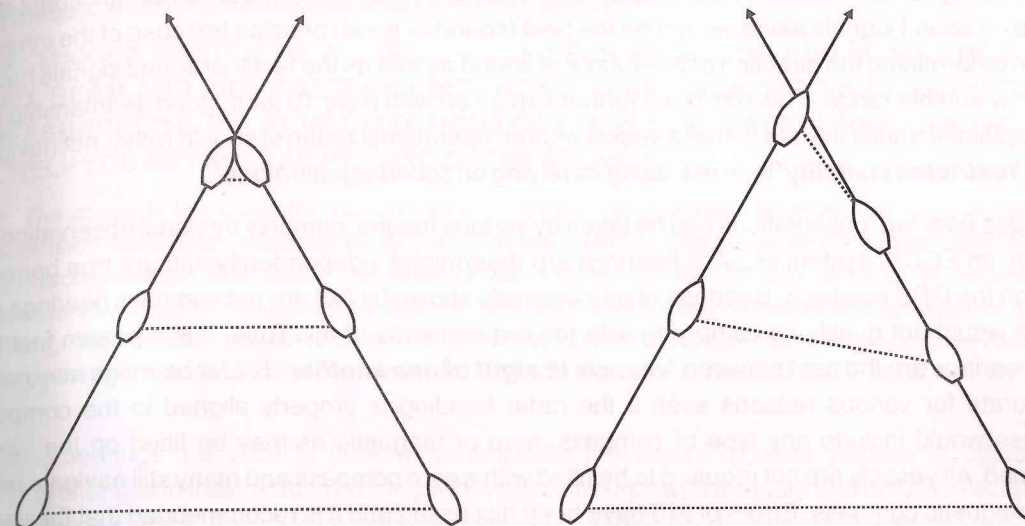
Although this Rule requires the full and proper use of radar, it also warns against over relying on the same. Distances magnify small errors, and errors may also be induced because the target vessel may not always maintain a steady **'course and speed'**. Many collisions and allisions have occurred because **'action to avoid collision'** was based on such faulty assumptions.

d: While paragraph 'a' of this Rule makes an overriding statement **'if there is any doubt such risk shall be deemed to exist'**, this paragraph goes further to describe the way **'risk of collision'** should be determined. By using the phrase **'among those taken into account'**, the Rule implies that other means may also be employed for the task, but as a minimum the **'following considerations shall be among those taken into account'**. Although this paragraph is further divided into two subparagraphs 'i' and 'ii', essentially there is only one important factor given in subparagraph 'i' while the latter subparagraph contains the precaution to be exercised when practically implementing this important factor.

d (i): 'Such risk shall be deemed to exist if the compass bearing of an approaching vessel does not appreciably change.' Earlier, **'risk of collision'** has been explained in terms of vectors. The procedure to determine **'risk of collision'** as stated in this subparagraph is another approach to analyse the vectors that can be easily practiced on board. If the **'compass bearing'** between any two objects is constant and the range is decreasing, it is indicative of the vectors of the two bodies moving in such a manner that they will meet in future at the same time and at the same position. The **'compass bearing'** denotes this line of approach between the two vessels (or bodies) concerned, the decreasing range confirming that the two are **'approaching'** each other and will make contact at the time depending on their relative speed of approach.

Unlike relative bearings explained above, compass bearings are measured from the North direction of the compass, which is referred to as 000°, and counted clockwise until 359°, 360° being the same as 000°.

Dotted line indicates compass bearing between the two vessels



Risk of collision exists when the compass bearing does not change

Risk of collision does not exist when compass bearings change appreciably

The word **'approaching'** in this subparagraph means getting closer; this would obviously apply to an object or a vessel in the vicinity. Even if on a steady **'compass bearing'** but not **'approaching'**, a vessel/object may not pose any **'risk of collision'**, she/it may be at a steady range or even moving away. The line of approach determined by the **'compass bearing'** gives the first warning signal of an impending **'risk of collision'** if it remains steady or almost steady. **'Approaching'** has to be interpreted in a relative sense as the other vessel may be **'approaching'** your own vessel or vice-versa with the range between the vessels decreasing along a steady line of approach. Under such conditions, the two will ultimately make contact or collide if they **'keep'** their **'course and speed'**. If it is a fixed object or even a buoy or a vessel stopped or at anchor, then it would be your own vessel **'approaching'** the vessel or body concerned.

The Rules do not specify the various methods that may be employed to determine the range of the objects, leaving it to the navigators to choose the best systems available. Radar is the most convenient and frequently used equipment for an accurate analysis as of date but AIS systems may provide the required information with ease, if there is one fitted on the other vessel/object. Change of range is readily apparent to and can easily be determined by the naked eye also. Visual **'look-out'** and determination of **'risk of collision'** by visual analysis has been the basic tradition of navigation since ancient times and is still considered part of good watchkeeping practices, inputs from various electronic equipment still being only aids to navigation, though this may change with time. This fact remains valid and true as of now. However, radar is valuable in clear weather also after a target has been sighted visually, being better able to analyse the data and predict the future projections than the human eye and compass bearings alone.

By virtue of its placement in Part B section I, the requirements of Rule 7 apply at all times. But for vessels **'not in sight of one another when navigating in or near an area of restricted visibility'** they shall **'determine if a close-quarters situation is developing and/or risk of collision exists by radar alone'**. However, other instruments that source primary information from the radar may be used, for example ECDIS systems. AIS does provide fairly reliable information, provided AIS is fitted and operating on all vessels in the vicinity with correct inputs. If the radar is not functional then reliance on sound signals alone will not be the best (sound or good) practice because of the inherent errors in determining the direction of the source of sound as well as the fact that sound signals have a rather low audible range. This has been further explained with Rule 19 later; good seamanship has been explained earlier in Rule 2, that a vessel without operational radar(s) should rather not navigate at all in **'restricted visibility'** than risk doing so relying on sound signals alone.

'Compass bearing' observations can be taken by various means, primarily by visual observation, by radar, by an ECDIS system etc. AIS bearings are determined independently and are true bearings based on the GPS positions. Bearings of other vessels shown by AIS are not compass bearings and as such would not qualify as complying with the requirements of this Rule. It is a proven fact that visual bearings are the best between **'vessels in sight of one another'**. Radar bearings may not be as accurate for various reasons even if the radar heading is properly aligned to the compass. Compass would include any type of compass, gyro or magnetic as may be fitted on the vessel concerned. All vessels are not required to be fitted with a gyro compass and many still navigate using only a magnetic compass. Errors of AIS have been discussed and it is recommended that the use of AIS should be the last choice for this purpose, and if used, extreme caution should be exercised until these systems grow and prove their perfection in times ahead. *In my recent experience while sailing as Master between February 2009 and February 2010, I have observed some of the information being transmitted by other vessels from their AIS systems to be in error on several occasions. In one case, the gyro heading was wrong by almost 100°; probably because the initial input may have been fed in wrong and thereafter no one verified or corrected it. As such, relying blindly on AIS is and can be very dangerous.*

In practice, be careful not to use and/or rely on relative bearings to determine **'risk of collision'**. Relative bearings are relative with respect to the point of reference as explained earlier; for the purpose of this subject, they are with respect to the fore-and-aft direction of the vessel the navigator is on. However, as explained, the relative bearing or relative position between vessels is the methodology used in these Rules for the determination of various types of situations and any associated **'action to avoid collision'** whenever there is any **'risk of collision'** involved.

Different terminologies and systems may be used to define relative bearings, as the height of a person may be measured in metres, centimetres, or feet and inches. The traditional way of measuring and describing relative bearings has been using points; the horizon around the vessel is divided into 32 points each of 11.25° and the presence of any object is measured by 'the number of points', on the 'port' or 'starboard' bow, 'abeam' or 'abaft the beam'.

Some navigators prefer to simply use degrees to indicate the relative direction of any object. Two versions are normally used, one measuring from right ahead as 0° to right aft as 180° going down port or starboard from right ahead; some navigators tend to prefix 'red' and 'green' in place of 'port' and 'starboard' respectively. The other version is to use the same concept of counting, right ahead being 0° measuring clockwise in degrees until 360° degrees which is same as 0°. In this 0° is 'right ahead',

90° 'starboard beam', 180° 'right astern' and 270° the 'port beam'.

Another concept is to view the area around the vessel as a clock, right ahead being the 12 'O' clock position, right aft being '6', starboard and port beams being '3' and '9' respectively.

Before communicating, bridge team members should first clarify and agree to the concept they are all going to use to avoid any misunderstandings during navigation.

[TASK: MAKE A SKETCH OF A VESSEL AS IF SEEN FROM TOP AND MARK THE RIGHT AHEAD, BEAM AND RIGHT ASTERN DIRECTIONS. THEN MARK THE VARIOUS PATTERNS OF MEASURING THE RELATIVE DIRECTIONS OF THE VESSEL AS EXPLAINED ABOVE. THIS WILL HELP YOU GET A CLEAR PICTURE OF THE ABOVE.]

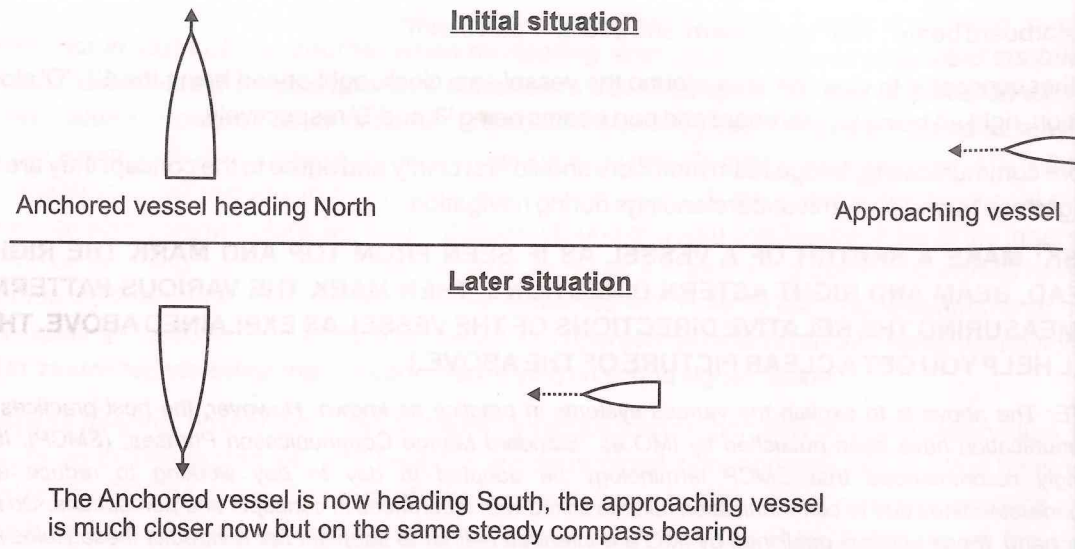
NOTE: The above is to explain the various systems in practice as known. However, the best practices of communication have been published by IMO as "Standard Marine Communication Phrases" (SMCP). It is strongly recommended that SMCP terminology be adopted in day to day working to reduce any misunderstandings due to communication failures linked with differences in concepts and perceptions. On the other hand, these phrases published by IMO are intended neither to supplant nor contradict these Rules nor supersede the International Code of Signals or the ITU Radio regulations. The IMO SMCP is not included in this book.

If relative bearings are used to determine horizontal movement of other vessels or objects by observing changes in their relative bearings, this can be fraught with dangers and may give extremely misleading indications. Any change in the own vessels heading (or direction) will automatically bring the same quantum of change in the relative bearing of the object concerned, though the true or compass bearing may not have changed at all. A changing relative bearing of an object does not necessarily mean that its actual line of approach established by the compass (or true) bearing is changing. A change in the relative bearing of an object can create a false impression that there is no **'risk of collision'**. This is described below with some simple examples.

Assume you are on a vessel at anchor, heading North and from a long distance (say 8-10 miles) a service boat is approaching slowly, say at a speed of 8 to 10 knots; the tidal stream direction has just commenced changing. Initially the approaching vessel is on a compass bearing of 090° and on your vessels starboard beam. After half an hour or so your vessel has swung around with the tide by 180° and is now heading South, the relative bearing of the approaching boat has also changed by the same amount and she is now on your vessel's port beam, but her compass bearing is still the same, 090°. See the diagrams on the following page showing this.

In both the cases, the compass bearing of the approaching boat remains 090° but her relative bearing from the vessel at anchor has changed by 180°, from being 090° or on the starboard beam to 270° or port beam, but the **'risk of collision'** has remained unchanged as depicted by the line of approach which is the steady compass bearing.

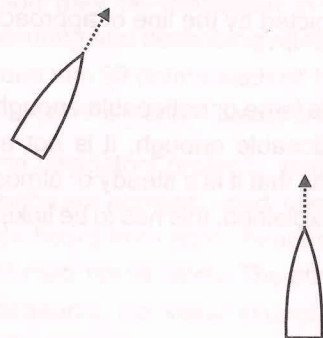
The Rule states **'does not appreciably change'**. **'Appreciable'** means large or noticeable enough. It therefore follows that if the change in bearing is not large or noticeable enough, it is not an appreciable change and is thus a matter of concern because this means that it is a steady or almost steady compass bearing indicative of **'risk of collision'**. However, as explained, this has to be linked with **'approaching'**.



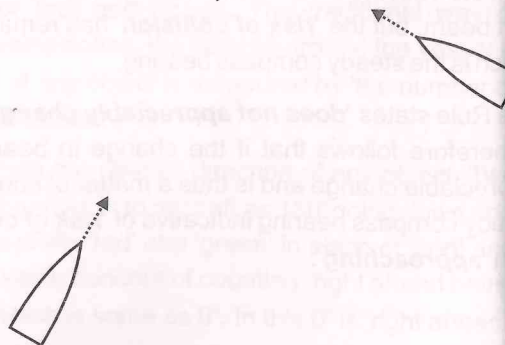
In maintaining their consistency of using descriptive adjectives open to differing interpretation depending on the situations, the Rules have not given any numerical limits but have used **'appreciably'** to explain the change of compass bearings in determining **'risk of collision'**. A steady **'compass bearing'** of an **'approaching'** object is a firm confirmation of **'risk of collision'**. However, how much and how fast the bearing should change to confirm that there is no **'risk of collision'** is for the navigators to decide. The **'appreciably'** aspect thus depends not on the circumstances and conditions alone but on the way the navigators judge the situation, which in turn depends on the understanding of the concepts coupled with their actual practical experience. The range between the vessels, their speed, their direction of movement and their relative aspect from each other would be some of the important factors in considering the situation. The longer the range and closer the direction of movement or heading, the slower the rate and quantum of change of bearings would be between vessels to indicate the fact that the other vessel is indeed passing clear.

In the first situation shown below, assuming the vessel ahead has a slightly faster speed, the range would be increasing slowly and though there is no **'risk of collision'** because the range is increasing change in bearing would be very slow. In the second situation shown below, assuming the vessels are moving at similar speeds, the change in bearing would be rather rapid in the position shown, indicating no **'risk of collision'**.

First situation



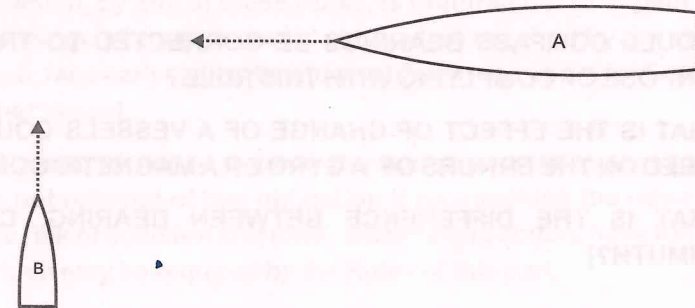
Second situation



[TASK: YOU SHOULD ATTEMPT AN EXERCISE USING GRAPH PAPER AND DRAW TRUE VECTORS OF VESSELS MOVING IN VARIOUS DIRECTIONS AND WORK OUT THE CHANGE IN THE BEARING BETWEEN THEM TO UNDERSTAND THE ABOVE BETTER.]

d (ii): This subparagraph cautions that **'even when an appreciable bearing change is evident'**, it alone may not be a firm indication that there is no **'risk of collision'**, **'particularly when approaching a very large vessel or a tow or when approaching a vessel at close range'**.

If an object, even a vessel, is at long range, it is still like taking a bearing of a point object. Even if the vessel is presenting her beam profile, there will be negligible difference in the bearing of her bow and/or stern. However, if the same vessel is at close range, there will be substantial difference in the visual bearings of her bow/stern. It may happen that the bearings of the point of reference are changing appreciably but that **'risk of collision'** remains intact because of the very close range. It must be understood that this will invariably happen at very close ranges and it could be any object or a vessel, and when the length of the object being analysed is large - **'very large vessel or a tow'**, it may happen that one end of the long object is being observed and appears to be passing clear and will actually pass clear with associated appreciable change of **'compass bearing'**, but the other end may not be passing clear even though its bearing will also be changing rapidly. For example, the compass bearings of the bows of an approaching vessel taken from the bridge wing located towards the aft end of a vessel indicates that the compass bearings are changing rapidly, then it can be concluded that a collision is probably not set up between the bridge wing and the other vessel's bow. However, this may not apply to the bows of the observing vessel and the stern of the passing vessel, as shown below.



In the above figure, assume both vessels are moving, if any one reference point is taken on 'A' by 'B' then that point on 'A' would be showing a rapid change of bearing, but since the range is very low, this alone will not be indicative that **'risk of collision'** does not exist with all points of 'A'. As may be clearly evident in the above figure, the forward end of 'A' may pass clear but the aft end is not likely to.

Two vessels proceeding on parallel courses at an acceptable and safe range, even with a steady **'compass bearing'** between them, have no **'risk of collision'** as they are not **'approaching'** each other. This explains the practical application of the Rules by common sense. All the factors explained are interdependent and must be considered as a whole and in the context of the circumstances. There can be innumerable situations encountered and all can be analysed by applying the requirements of these Rules.

This and other Rules discussed earlier clearly imply that actions required to determine **'risk of**

collision should be made as early in time as possible to assess the situation, plan *'action to avoid collision'* if required, execute the same and keep monitoring the results till the *'risk'* is mitigated successfully. All elements pertaining to *'any action to avoid collision'* are covered in the following Rule 8.

In determining *'risk of collision'*, several observations should be made at short and regular intervals to reduce the chance of any error. A small error in taking a bearing at long range may lead to incorrect conclusions, especially when relying on radar bearings. When vessels are *'in sight of one another'* visual compass bearings are considered the best method and their accuracy superior to radar bearings, the latter being prone to many types of errors. Caution should be exercised when making visual observations if the vessel is rolling and/or pitching, especially if using the magnetic compass as it may not be steady in such circumstances.

The following from the *STCW Code* further clarifies the above.

The officer in charge of the navigational watch shall take frequent and accurate compass bearings of approaching ships as a means of early detection of risk of collision and shall be in mind that such risk may sometimes exist even when an appreciable bearing change is evident, particularly when approaching a very large ship or a tow or when approaching a ship at close range. The officer in charge of the navigational watch shall also take early and positive action in compliance with the applicable International Regulations for Preventing Collisions at Sea, 1972, as amended and subsequently check that such action is having the desired effect. (STCW CODE A-VIII/2, paragraph 43)

[QUIZ:

- 1: SHOULD COMPASS BEARINGS BE CORRECTED TO TRUE BEARINGS FOR THE PURPOSE OF COMPLYING WITH THIS RULE?
- 2: WHAT IS THE EFFECT OF CHANGE OF A VESSELS COURSE (HEADING) AND/OR SPEED ON THE ERRORS OF A GYRO OR A MAGNETIC COMPASS?
- 3: WHAT IS THE DIFFERENCE BETWEEN BEARING, COURSE, HEADING AND AZIMUTH?]

Rule 8

Action to avoid collision

- (a) Any action to avoid collision shall be taken in accordance with the Rules of this part and shall, if the circumstances of the case admit, be positive, made in ample time and with due regard to the observance of good seamanship.
- (b) Any alteration of course and/or speed to avoid collision shall, if the circumstances of the case admit, be large enough to be readily apparent to another vessel observing visually or by radar; a succession of small alterations of course and/or speed should be avoided.
- (c) If there is sufficient sea-room, alteration of course alone may be the most effective action to avoid a close-quarters situation provided that it is made in good time, is substantial and does not result in another close-quarters situation.
- (d) Action taken to avoid collision with another vessel shall be such as to result in passing at a safe distance. The effectiveness of the action shall be carefully checked until the other vessel is finally past and clear.
- (e) If necessary to avoid collision or allow more time to assess the situation, a vessel shall slacken her speed or take all way off by stopping or reversing her means of propulsion.
 - (i) A vessel which, by any of these Rules, is required not to impede the passage or safe passage of another vessel shall, when required by the circumstances of the case, take early action to allow sufficient sea-room for the safe passage of the other vessel.
 - (ii) A vessel required not to impede the passage or safe passage of another vessel is not relieved of this obligation if approaching the other vessel so as to involve risk of collision and shall, when taking action, have full regard to the action which may be required by the Rules of this part.
 - (iii) A vessel the passage of which is not to be impeded remains fully obliged to comply with the Rules of this part when the two vessels are approaching one another so as to involve risk of collision.

This Rule describes neither the type of vessels involved nor the required *'action to avoid collision'* in any particular situation; that is all covered in subsequent Rules. When executing *'any action to avoid collision'*, the fundamentals of this Rule become applicable immediately. It is important to understand the essential guidelines of this Rule because these directly influence the practical efficiency and effectiveness of *'any action to avoid collision'* irrespective of the situation, the type of action executed or the applicable Rules.

Before studying this Rule it may be good to reconcile some important requirements stated so far in these Rules: Rule 2 states *'comply with these Rules'*, uses the terms *'any precaution which may be required by the ordinary practice of seamen'* and *'all dangers of navigation and collision'*. Rule 5 states so as to *'make a full appraisal of the situation and of the risk of collision'*, Rule 6

states *'proper and effective action to avoid collision'*, Rule 7 adds that vessels shall *'determine risk of collision exists'* and use the radar *'to obtain early warning of risk of collision'*.

a: This Rule requires that *'any action to avoid collision shall be taken in accordance with the Rules of this Part'*. *'This part'* means part B of these Rules comprising Rules 4 to 19.

'Shall, if the circumstances of the case admit' echoes the basic principle on the application of these Rules. It is for navigators to decide the best action(s) possible in compliance with these Rules, their timing, quantum and implement them in practice depending on the *'prevailing circumstances'*. Obviously, the actions decided and executed may differ on a case-to-case basis. Even Rule 2 on *'responsibility'* highlights *'neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case'*. The *'prevailing circumstances'* may sometimes have a detrimental effect on the proper and/or full implementation of the requirements of these Rules in letter and spirit. This Rule allows leeway for any such restrictions, for example presence of other traffic or lack of safe navigable waters which may not allow a *'give-way vessel'* to act in *'ample time'*.

'Any action to avoid collision' should be *'positive'*, that is constructive, helpful, affirmative, optimistic and encouraging towards *'prevention collisions'*. Not negative or such that the action may not be successful or that no action is taken at all.

'Made in ample time' means earlier rather than later, so that actions contemplated and executed are efficient, effective and successful in *'preventing collisions'*, the desired end result. *'Effective'* implies passing at a safe distance as is also stated later in paragraph 'd' of this Rule. This is also linked to the manoeuvring characteristics of a vessel, the time factors to execute any manoeuvre, the time required to cover the distance parameters of advance, tactical diameter and reducing speed or taking all way off. *'Due regard to the observance of good seamanship'* is similar to *'ordinary practice of seamen'* used in Rule 2, and means actions based on common sense and sound logic. This also means actions that have stood the test of time, having been practically successful and handed down as the cumulative experience of best practices accumulated through time. The final realisation of the practical aspects stated in this book, or in any other publication, can only be developed through live experience and hands on exposure in real life, like cycling, driving or swimming.

This paragraph tells navigators to act early and do more than the absolute minimum necessary to *'avoid collision'*, while always allowing a generous margin of safety both in time and distance.

b: *'Any action to avoid collision'* stated in paragraph 'a' can either be an *'alteration of course'* or a change of *'speed'* or any combination thereof. *'Any action'* in compliance with these Rules *'shall, if the circumstances of the case admit, be large enough to be readily apparent to another vessel observing visually or by radar'*. *'Circumstances'*, in the real sense, can vary as explained earlier; *'readily'* is not defined in numerical limits and may be subject to varying interpretations but implies that all other vessels in the vicinity are able to sense and detect the action taken, judge the intentions of a vessel taking action and reasonably predict the expected outcome. The onus of deciding the timing and/or quantum of action is on the vessel executing *'any action to avoid collision'* so that it is *'readily apparent'* to *'another vessel'*; the latter means not only the vessel concerned for which *'action to avoid collision'* is being executed but all vessels in the vicinity. *'Alteration of course and/or speed'* automatically includes the rate of action. If a large action is intended but is implemented very slowly, it is unlikely to be *'readily apparent to another vessel'*, which is very

important and quite logically required by this Rule.

It is of vital importance for any *'stand-on vessel'* involved in a developing *'close quarters'* and/or *'risk of collision'* situation that it should be able to determine rather quickly if *'any action to avoid collision'* is being initiated and executed by a *'give-way vessel'*. If the *'give-way vessel'* appears to be *'not taking appropriate action in compliance with these Rules'* then the *'stand-on vessel'* is required to *'take action to avoid collision by her manoeuvre alone'* in compliance with Rule 17(a)(ii). *'Readily apparent'* applies to any action(s) *'to avoid collision'*. This should include, by *'observance of good seamanship'*, actions taken in compliance with Rule 2; *'departure from these Rules necessary to avoid immediate danger'*, or even actions taken to avoid other *'dangers of navigation'*.

Combining *'ample time'* from paragraph 'a' and *'readily apparent'* from this paragraph 'b', *'any action to avoid collision'* should be taken as early as possible, be of a large quantum and executed as rapidly as circumstances best allow. It should ensure that there is no doubt left in the minds of the navigators of the other vessel(s) in the vicinity about the intent and intended outcome of the actions.

Rule 5 on *'look-out'* states, *'by sight and hearing as well as by all available means'* and requires every vessel to *'make a full appraisal of the situation'* and Rule 6 on *'safe speed'* requires an assessment of *'traffic density'*. Rule 19 'd' applicable only *'to vessels not in sight of one another when navigating in or near an area of restricted visibility'* requires that *'a vessel which detects by radar alone the presence of another vessel shall determine if a close-quarters situation is developing and/or risk of collision exists'*. In addition, Rule 17 *'action by stand-on vessel'*, though applicable only *'to vessels in sight of one another'*, requires a *'stand-on vessel'* to take *'action to avoid collision - as soon as it becomes apparent to her that the vessel required to keep out of the way is not taking appropriate action in compliance with these Rules'*. To fulfil all these requirements including those of *'ordinary practice of seamen'* and any other similar requirements stated or implied by the Rules any *'action to avoid collision'* should always be *'readily apparent'* to other vessels in the vicinity.

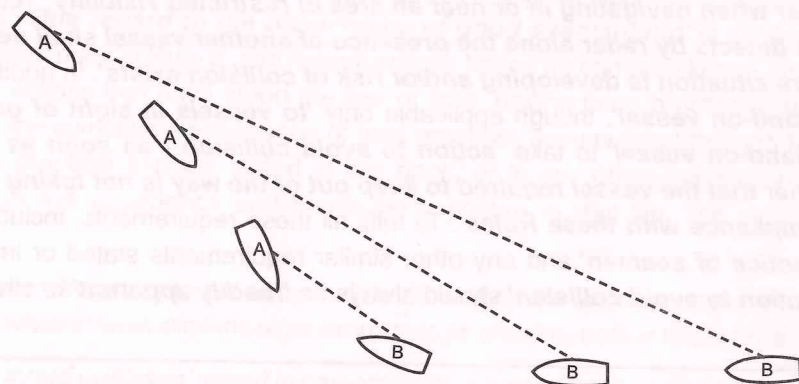
'Visually or by radar' covers the two most important elements by which *'look-out'* functions are performed and which would be the first to detect changes in course and/or speed of other vessels in the vicinity. *'Large enough to be readily apparent'* may be summed up in that *'any action to avoid collision'* is substantially *'large'* to let other vessels in the vicinity know instantly by being obvious to their *'look-out'*.

Although AIS devices may be of assistance in this task, they do not feature in these Rules by name yet as have still been left out in the very recent revisions, perhaps for the reasons explained earlier with Rule 7. Their use, as of any other aid to navigation, can only be considered as implied since the Rules do not impose any restrictions on equipment which may be used to advantage for *'preventing collisions'*.

'A succession of small alterations of course and or speed should be avoided'. This is straightforward: if a series of small alterations are done, or are carried out very slowly, they may not be readily apparent to another vessel at all or she may remain confused about the actions being undertaken. This would be more so in **'restricted visibility'** or in case of a series of small speed changes, since changing speed usually takes longer to implement than altering course and also requires larger sea-room especially on bigger/heavier vessels. **'Small alterations'** directly go against the requirements of **'readily apparent'**. A series of **'small alterations'** may not be apparent even by **'radar plotting or equivalent systematic observation'**. Between the two, **'alteration of course alone'** is perhaps a better choice and is recommended in paragraph 'c' of this Rule itself. It is also considered a superior action from ship handling principles as it is fast, requires less sea room, and is usually expected to be **'readily apparent'** if **'substantial'** and carried out rapidly. (Please refer to the explanations on turning circles and stopping distances of vessels in the chapter on basic ship handling).

'An appreciable bearing change' of another vessel at a large range does not necessarily mean, by itself, that there is **'no risk of collision'** or that it has been eliminated. It is prudent practice to observe the present and expected passing range also and not just monitor compass bearing alone, as shown in the example below based on an actual collision in restricted visibility conditions.

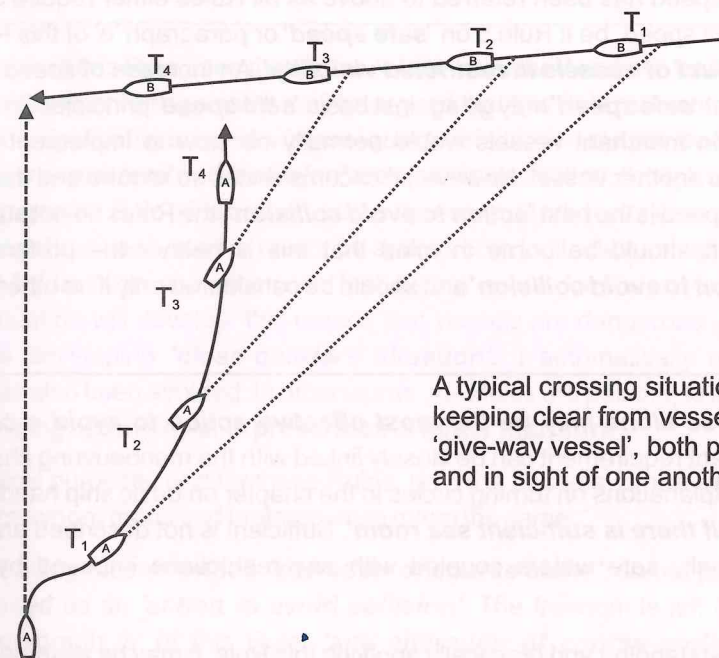
Two vessels 'A' and 'B' shown below were navigating in restricted visibility, not in sight of one another and both acted to **'take avoiding action in ample time'** as required. However, they both made a series of small course alterations and, even though the compass bearings between them apparently changed, **'risk of collision'** was not averted and the two collided as shown, **'a succession of small alterations'** created misunderstanding and confusion.



The quantum of **'any action to avoid collision'** which may be considered **'large enough'** or **'substantial'** so that it is **'readily apparent'** to another vessel is not mathematically defined in the Rules. However, analysis of research data done by way of experiments and tests on simulators and practical experience shows the following:

In good visibility **'in sight of one another'**, even a small course alteration, say 10°, is likely to be **'readily apparent to another vessel observing visually'**, but this may not be the case if monitoring is being done by **'radar alone'**, using and relying only on the radar in practice is not recommended unless a vessel is in **'restricted visibility'**. This does not mean that such a small

course change is recommended for **'preventing collisions'**; this small amount may be just sufficient to **'avoid collision'** with a vessel in a **'head-on situation'** if carried out at sufficiently long range, but not at medium or lower ranges or when altering course to **'avoid collision'** with another vessel on the starboard side especially one abaft the starboard beam in a **'crossing situation'**. In a **'crossing situation'**, the initial alteration of course to starboard should be as to change the heading to aim for passing clear of the stern of the other vessel and may be as large as 120° at times, this will get clear after studying Rule 15. As the other vessel moves, the vessel taking action can turn back gradually but ensuring she is always heading to pass clear astern of the vessel crossing from her starboard side, and maintain the minimum required CPA, or keeping the latter on her port bow till she is clear or ensuring that the other can see only her red sidelight. The sketch below depicts this and is referred to again with Rule 15.



A typical crossing situation vessel 'A' keeping clear from vessel 'B' as the 'give-way vessel', both power-driven and in sight of one another

In **'restricted visibility'** and dependent on **'radar alone'**, course alterations should be large, preferably 60° or more so that they are **'readily apparent'** to **'another vessel observing by radar'**. Some experts, while confirming these figures for **'restricted visibility'**, further recommend that at any time **'an alteration of course'** should never be less than 30° to be **'readily apparent'**, **'if the circumstances of the case admit'**. Having quoted these figures based on various data and experiences, the Rules themselves remain silent on numerical values except stating **'alteration of course alone'** as the preferred action in Rule 8(c).

Comparatively, alterations of speed, if undertaken, will be slow to implement and may not be **'readily apparent'** to other vessels as explained. For example, a vessel that decides to change her speed from full to half ahead will not have her speed fall down to half ahead immediately. At lower speeds, the rate of change will be even slower, like going from half to slow ahead.

To ensure that speed changes are **'readily apparent to another vessel observing visually or by radar'**, if circumstances like safe navigable sea room or other traffic in the vicinity do not allow an **'alteration of course alone'**, then the speed changes should be as rapid as possible. It would be prudent to bring the vessels propulsion power down to zero or near zero immediately to allow for a rapid decrease in speed, even applying astern propulsion if necessary. Once the speed has reduced substantially, ahead propulsion may be resumed at low power. This fast rate of decrease of speed action should normally **'be readily apparent to another vessel'**. However, keep in mind that this may still be a rather slow act on a large and heavy vessel, for example, a loaded VLCC or a large loaded bulk carrier. Astern propulsion effectiveness is weak in comparison to the ahead propulsion and is generally in 50% to 80% of the latter.

Only a reduction of speed has been referred to above as all Rules either require or generally point to a reduction of speed, be it Rule 5 on **'safe speed'** or paragraph 'e' of this Rule itself or Rule 19(e) on **'conduct of vessels in restricted visibility'**. An increase of speed by a vessel already proceeding at **'safe speed'** may go against basic **'safe speed'** principles. In addition, an increase in speed on merchant vessels would normally be slow to implement and not be **'readily apparent'** to another vessel. However, if circumstances so require and the navigators feel that increasing speed is the best **'action to avoid collision'**, the Rules do not state anything against the same. It should be borne in mind that this is neither the preferred nor the recommended **'action to avoid collision'** and should be considered only if no other options are found feasible.

c: 'Alteration of course alone may be the most effective action to avoid a close-quarters situation'. This important requirement can be closely linked with the manoeuvring characteristics of vessels, (refer to the explanations on turning circles in the chapter on basic ship handling), though a rider has been placed **'if there is sufficient sea room'**. Sufficient is not described and would mean the area of navigationally safe waters coupled with any restrictions imposed by traffic in the immediate vicinity.

For the purpose of understanding and practically applying this Rule, it may be assumed that the term **'close-quarters'** has the same implication as **'risk of collision'** and both terms mean the same. Discussions on this term have been placed inside the box for higher studies but make no difference in the way this Rule is interpreted, understood and complied with.

[TASK: BEFORE READING FURTHER, STUDY TURNING CIRCLES, ESPECIALLY THE REQUIREMENTS OF ADVANCE, TRANSFER AND TACTICAL DIAMETER ALL IN THE CHAPTER ON BASIC SHIP HANDLING.]

The efficiency and effectiveness of course alterations (turning) versus speed changes have been explained in the basic ship handling chapter and it should be quite clear that **'an alteration of course alone'** is easier to achieve, is effective, does not need much sea room and fulfils all requirements of this paragraph of this Rule. Further and most importantly, an **'alteration of course alone'** also fulfils the requirement of paragraph 'b' of this Rule by being **'readily apparent'** if it is **'large enough'** or **'substantial'**. The availability of safe navigable sea room must be verified each and every time before **'an alteration of course alone'** is undertaken.

'Good time' is synonymous with the clause **'ample time'** explained earlier and implies an action taken early in time. **'Substantial'** is not mathematically defined but means large, extensive, sizeable, considerable, significant, ample and generous. In other words, it is the opposite of small and opposite of the clause **'a succession of small alterations of course and or speed should be avoided'**. Only a substantial action would be effective and **'readily apparent'** to other vessels in the vicinity.

The action taken should be such that it **'does not result in another close-quarters situation'**. This is quite logical, as an action to avoid any developing **'close-quarters'** or **'risk of collision'** situation with one vessel should not result in a similar condition developing with any other vessel in the vicinity.

Any **'Close-quarters situation'** should always be avoided where possible, except perhaps in rivers, harbours, and other waterways where these appear unavoidable, but in reality the navigational activities in such cases are controlled differently unlike in open seas, and in **'narrow channels'** are governed by Rule 9.

This paragraph of this Rule uses the clause **'close-quarters'** and not **'collision'** which is to be avoided, or to be guarded against. It may be argued that this Rule recommending **'alteration of course'** is only applicable to avoid a **'close-quarters'** situation but not **'collision'**. Actually both the terms **'close-quarters'** and **'collision'** are close to each other, though only this paragraph of Rule 8 and thereafter Rule 19(d and e) use the former. At all other places in these Rules, only the word **'collision'** has been used to prescribe actions both for its determination and avoidance. It is accepted by tradition and otherwise that before actual **'collision'** takes place a **'close-quarters'** situation will develop: this means that vessels are dangerously close. If navigators can avoid a developing **'close-quarters situation'**, it automatically means that **'risk of collision'** has also been avoided. In other words, the Rules are pointing to a proactive approach of taking avoiding action similar to **prevention is better than cure**.

For all practical purposes and for these Rules, both the phrases **'close-quarters'** and **'risk of collision'** are synonymous and tantamount to mean the same.

The Rules, having recommended **'alteration of course alone'**, do not prohibit a vessel from changing speed as an **'action to avoid collision'**. The freedom is left to the navigators as stated in paragraph 'b' of this Rule: **'any alteration of course and/or speed to avoid collision'**. However, from a ship handling viewpoint, when altering course on a conventional vessel, if a vessel's speed is reduced during turning it results in an increased turning circle taking her closer to danger. The reverse will happen if the speed is increased. *(This is because of the shifting nature of the pivot point, which tends to shift aft with reduction in speed or negative acceleration reducing the effective turning lever between the pivot point and the rudder, and reduced thrust force on the rudder. This has been explained in the chapter on basic ship handling)*. When altering course for **'preventing collisions'**, it is strongly recommended that a vessel's propulsion power not be reduced during a turn; if possible, an increase in propulsion power will help in achieving a faster and shorter turn.

'Close-quarters' is different from the projected meeting point or point of contact of the extended vectors of vessels as explained with Rule 7 on **'risk of collision'**. **'Safe distance'** used in paragraph 'd' of this Rule later or the term **'well clear'** used in Rule 16 both appear to imply the same meaning but appear different from the term **'close-quarters'**. Lord Justice Willmer in

1961 had remarked about the term '**close-quarters situation**' by saying, it leaves open to argument what is meant by the phrase.

As mentioned earlier, the projected closest-point-of-approach between two vessels remains the prime factor in assessing '**risk of collision**', which for all practical purposes, is said to exist when this projection indicates a figure between zero or '**collision**' and the minimum desired CPA or cut off limit of '**close-quarters**' range. A CPA closer than the maximum outer limit of a vessels turning circle or closest safe passing domain may be considered as the minimum cut off limit of '**close-quarters**' range.

Limits of area around a vessel where a vessels bow wave and/or stern wake may endanger another vessel, especially small vessels may also be considered as the limit of '**close-quarters**' range. Master's and OOW's have been held guilty in law for damages caused by these factors.

Capt. Glen Aroza, Indian national and master of the Panama flag vessel 'TOSA', has been detained in Taiwan since 17th April 2009 along with the 2/O from Bangladesh who was the OOW and a Filipino seaman, who was on 'look-out' duty at the time.

It was first alleged that the 'TOSA' had collided with a Taiwanese fishing trawler in international waters killing two fishermen. When inspections of the hulls of the trawler and 'TOSA' revealed no physical contact between them, it was then alleged that the 21.6 meters long and 100 ton trawler capsized due to the wake of 'TOSA'. The case is still going on at the time of publication of this book, Capt Aroza was released after sustained legal and political efforts of many especially The Company of Master Mariners of India and arrived back in India on 1st October 2010.

Rules in US Title 33 CFR 164.11 contain clear guidelines about a vessels wake. Vessels over 1600 Gross Tons are specifically required to set their speed with consideration for damage that might be caused by their wake. Though vessels under 1600 GT are not specifically addressed, they are required to operate in a prudent matter in compliance with these or the equivalent inland Navigation Rules of US, so as not to endanger life, limb, or property (46 USC 2302).

Marine Guidance Note, MGN 369 (M+F) on 'Navigation In Restricted Visibility' published by the Maritime and Coastguard Agency of U.K. in July 2008 has the following interpretation about this term:

"Similar to 'safe speed', a 'close-quarters situation' depends on the particular circumstances and closing speeds of the vessels involved. Manoeuvring characteristics, visibility, weather, traffic density and restricted or open waters will all have an influence on determining at what distance a close-quarters situation begins to exist. A close-quarters situation is not to be confused with a risk of collision which begins at an earlier point in time".

This interpretation sums up the above explanations and that '**a close-quarters situation**' will always first take place followed by '**collision**', though its limits remain variable. If any organisation recommends a minimum safe passing range with other traffic then this range should be used as the minimum cut off range to define '**close-quarters**', provided it is more than the maximum outer limit of a vessels turning circle.

d: 'Any action to avoid collision' should be such that it leads to passing the other vessel(s) at '**a safe distance**', and this range is to be decided by the navigators on board depending on the circumstances. In open waters, the expected '**safe distance**' would naturally be large but in '**narrow channels**' or congested waters with heavy traffic a lower '**safe distance**' margin is usually accepted. In the latter situations, the number of people forming the bridge team is usually higher than in open sea; this may be coupled with greater alertness levels and perhaps slower ship speeds. However, when accepting lower margins, precautions should be exercised not to allow the passing range to drop so low that interaction between vessels creates a dangerous situation. If this cannot be avoided, as in '**narrow channels**', then bold use of propulsion and rudder should normally be able to counteract any adverse interaction affects. In addition, allowance should be made for dangers associated with shallow water effects due to low clearances from the bottom or sides of any channel, all combined and referred to as squat.

Maintaining compliance with Rule 6 on '**safe speed**' also helps complying with the above. Some companies and/or operators are known to recommend minimum safe passing ranges expected during navigation though this is not stated in these Rules.

The objective of taking '**action to avoid collision**' is to enable passing at a '**safe distance**'. Checking the '**effectiveness of the action**' is the basic concept of any management activity. To quote the famous PDCA cycle of Dr. Deming, the guru of modern quality management concepts, the four stages of management are PLAN-DO-CHECK-ACT. Check is to verify the effectiveness and act is to correct the actions so that the same is as per and within the limits of the intended plan. The actions taken should be monitored for their effectiveness '**until the other vessel is finally past and clear**'.

The onus to decide the safe passing distance is primarily on the '**give-way vessel**', which is required to '**take early and substantial action to keep well clear**' as per Rule 16, since a '**stand-on vessel**', '**shall keep her course and speed**'. However, as per Rule 17 (a)(ii), a '**stand-on vessel**' may act '**as soon as it becomes apparent to her that the vessel required to keep out of the way is not taking appropriate action in compliance with these Rules**'. However, she shall act if she is too close as per Rule 17(b). In such cases a '**stand-on**' vessel acting to prevent a collision may not be in a condition to decide and/or implement much on safe passing distances since she would be trying to avert an impending accident '**by her manoeuvre alone**'. It is for these reasons that a '**stand-on vessel**' must not wait too long to act, and when executing '**any action to avoid collision**' should continue to comply with all the requirements of this Rule 8.

In case of a '**head-on situation**' described in Rule 14, each of the two vessels becomes a '**give-way vessel**'. Further, when Rule 19 in section III of part B of these Rules gets activated for '**vessels not in sight of one another when navigating in or near and area of restricted visibility**', the '**give-way**' or '**stand-on**' rules do not apply as they are applicable only '**to vessels in sight of one another**' but both vessels are obliged to take '**action to avoid collision**'.

e: This paragraph has an absolute requirement emphasised by '**shall**'- that propulsion systems being used by a vessel are readily available for use '**if necessary**' to reduce, slacken, or relax the vessel's

speed or to bring her to dead stop in water by **'stopping or reversing her means of propulsion'**. Rule allows freedom of these actions in two distinct and clearly defined circumstances:

1: **'if necessary to avoid collision'** and 2: **'allow more time to assess the situation'**.

As explained earlier with Rule 6 on **'safe speed'**, and in the explanation box of paragraph 'b' of this Rule, lower speeds are required and/or implied by these Rules. This Rule also replicates the same spirit: **'a vessel shall slacken her speed or take all way off'**. The Rules have thus clearly stated their preference for speed to be lowered or brought down as **'action to avoid collision'**. In circumstances when the preferred **'action to avoid collision'**, that is **'an alteration of course alone'**, is not possible, vessels are required to reduce speed as per this Rule. This is also required by Rule 19(e), **'shall reduce her speed to the minimum at which she can be kept on her course'**, though this is applicable in different circumstances.

Reduction of speed **'by stopping or reversing her means of propulsion'** may be readily possible on a small vessel with small engines, but is a cumbersome process on big vessels because of their sheer momentum and/or the technical limitations of the large propulsion systems. Though propulsion can usually be stopped instantly, there are technical limitations involved in reversing them. In any case, the larger a vessel's displacement and the lower her propulsion power, the longer she will carry herself in water by momentum. (These aspects are explained in detail in the chapter on basic ship handling). As explained, do remember that speed changes are not likely to be **'readily apparent'** to other vessels as compared to large course changes, especially on their radars. This requirement stated in paragraph 'b' of this Rule.

f: NOTE: Beginners should skip reading these explanations on paragraph (f) of this Rule. They should study the same after having done all the Rules till Rule 19 so that the cross references are clearer.

This paragraph was added to this Rule in 1989 primarily to clarify the term **'shall not impede'**. Similar terms are used in Rule 9 (b), (c) and (d), Rule 10 (i) and (j) and in Rule 18 (d-i), (e) & (f-i) of this Part B. Any vessel directed **'not to impede'** should keep clear of or navigate in such a manner that the other vessel she is required to keep clear of will get a clear passage and not be hindered by this vessel. Large vessels are normally sluggish to manoeuvre effectively, experience great difficulty in keeping clear of vessels and are at a substantial disadvantage with respect to smaller vessels in confined waters with limited safe navigable sea room. It appears that it is because of these factors that several Rules require other vessels to keep clear of the larger vessels.

'Shall not impede' applies even before any **'risk of collision'** actually exists and the vessel directed **'not to impede'** is required to take early action to avoid such a risk from even developing.

This Rule creates an impression that the vessel required **'not to impede'** is to act like a **'give-way vessel'** and the one whose passage is not to be impeded like a **'stand-on vessel'**. The expected actions of a **'give-way vessel'** and a **'stand-on vessel'** are described in Rules 16 and 17 respectively. A vessel required **'not to impede'** is to keep clear in all circumstances, even before **'risk of collision'** develops. However, if **'risk of collision'** does develop, the vessel whose passage is not to be impeded is also now required to take **'action to avoid collision'**, but in compliance with these Rules as she would normally do in areas where the clause **'not to**

'impede' does not apply. This requirement is similar to the actions required of a **'stand-on vessel'**. It should be noted that while Rule 8 applies in **'any condition of visibility'** or at all times, Rules 16 and 17 are applicable only to vessels **'in sight of one another'**.

This Rule thus places the responsibility of keeping clear on both the vessels should **'risk of collision develop between them'**, similar to the requirements stated in Rule 17. Each subparagraph is further explained individually.

(i) **A vessel which, by any of these Rules, is required not to impede the passage or safe passage of another vessel shall, when required by the circumstances of the case, take early action to allow sufficient sea room for the safe passage of the other vessel.**

This subparagraph very clearly places the obligation to keep clear on a vessel which is required by any of these Rules, as stated before. **'Not to impede the passage or safe passage of another vessel'** by taking **'early action to allow sufficient sea-room for the safe passage of the other vessel'**, **'when required by the circumstances of the case'**. In other words, a vessel required **'not to impede'** is obliged to **'take early action'** to even prevent a **'close-quarters'** and/or **'risk of collision'** situation from developing. She must keep clear and **'allow sufficient sea-room for the safe passage of the other vessel'**.

Only for understanding this Rule, a vessel required **'not to impede'** may be considered like or similar to a **'give-way vessel'** and **'keep well clear'** as stated in Rule 16.

'When required by the circumstances of the case' clause highlights situations where such action may be required as well as provides an escape clause when circumstances may not allow **'early action'** and/or the desired quantum of action. For example, a small vessel is not able to observe from a reasonable distance away the day signals of a deep draught vessel **'constrained by her draught'** in a **'narrow channel'** and because of this does not take action in good time. This clause also becomes applicable in **'restricted visibility'** conditions.

The end objective is that a vessel required **'not to impede'** should act and execute her action long before **'risk of collision'** actually develops.

(ii) **A vessel required not to impede the passage or safe passage of another vessel is not relieved of this obligation if approaching the other vessel so as to involve risk of collision and shall, when taking action, have full regard to the action which may be required by the Rules of this part.**

This Rule clearly states that a vessel required **'not to impede'** shall retain her obligation to keep clear in case an encounter with another vessel is leading **'to involve risk of collision'**. This is irrespective of any other Rules which may otherwise prescribe this vessel to **'stand-on'** in the situation concerned.

'Have full regard to the action which may be required by the Rules of this part' means regard to any normal **'action to avoid collision'** required by any of the Rules of this Part B, that is Rules 4 to 19. If **'risk of collision'** does develop a vessel required **'not to impede'** should take into account the expected normal **'action to avoid collision'** by both the vessels involved in the situation and should act in conformity with the same when taking action to keep clear. Or, if she had been the **'stand-on vessel'** in the situation, then she should take such action as will not hinder the action expected of the other vessel just in case the latter has to act. This means that

she takes such avoiding action which she normally would have executed had the *'not to impede'* clause not been applicable. This may also be considered taking action *'with due regard to the observance of good seamanship'*. This is because if a vessel whose *'passage or safe passage'* is not to be impeded finds that the vessel required *'not to impede'* is not taking any action or not taking sufficient and/or proper *'action to avoid collision'*, she (the former) is then required to take suitable *'action to avoid collision'* as per subparagraph 'iii' of this Rule. This action is also required by Rule 17, when vessels are *'in sight of one another'*.

A vessel required *'not to impede'* should in general act in compliance with these Rules when keeping clear to avoid even the development of *'risk of collision'* and not take any conflicting action which may further jeopardise the situation or embarrass the actions of any other vessels.

(iii) A vessel the passage of which is not to be impeded remains fully obliged to comply with the Rules of this part when the two vessels are approaching one another so as to involve risk of collision.

Initially a vessel *'not to be impeded'*, *'shall keep her course and speed'* so that she can maintain her *'passage'* or *'safe passage'*. She should keep a good *'look-out'* to watch out for the actions of the vessel which is required *'not to impede'*, and observe if she is actually keeping clear or not.

This subparagraph applies as soon as it appears to the vessel *'not to be impeded'* that the vessel required *'not to impede'* is not taking any action, (or substantial or in good time), to keep clear and a *'close-quarters'* and/or *'risk of collision'* is developing. In this case, a vessel *'not to be impeded'* should now also take *'action to avoid collision'* and *'remains fully obliged to comply with the Rules of this part'*. *'This part'* means Rules of Part B.

When read in conjunction with the previous subparagraph 8(f)(ii), a vessel required *'not to impede'* as well as the vessel *'not to be impeded'*, are both obliged to and expected to take *'action to avoid collision'* if they reach this situation and their actions should be in compliance with the requirements of these Rules. For the purpose of understanding of this Rule only, both vessels may now be described as each having become a *'give-way vessel'*, irrespective of the conditions of visibility.

Two different situations are given below to clarify this Rule 8(f).

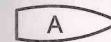
1: When a small *'power-driven vessel'* (or a *'sailing vessel'*) inside or approaching a *'narrow channel'* detects or gets to know of a large *'power-driven vessel'* *'navigating within'* the said *'narrow channel'*, the former shall *'take early action to allow sufficient sea-room for the passage of'* the large *'power-driven vessel'* to enable her to pass at a *'safe distance'*, or not even allow the development of a *'close-quarters'* and/or *'risk of collision'* situation.

In this scenario, assume that the two vessels involved are, one a small *'power-driven vessel'* (less than 20 m in length), inside or approaching a *'narrow channel'* and the other a rather large *'power-driven vessel'*, *'navigating within'* the *'narrow channel'*. Both are *'in sight of one another'*. A *'close-quarters'* and/or *'risk of collision'* situation begins to develop. If the *'narrow channel'* and *'not impede'* aspects were not there, then normal collision prevention Rules would apply and one or both of them would be required to take *'action to avoid collision'*. However, by Rules 9(b) and 8(f) the small *'power-driven vessel'* is obliged to *'not impede the passage of any other vessel navigating within a narrow channel or fairway'* except when the latter is

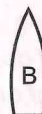
being overtaking. (*Note: Rule 13 on overtaking over-rides any other requirements stated in Rules 4 to 18*). Hence, other than when the large *'power-driven vessel'* is overtaking, the small *'power-driven vessel'* should act in good time and ideally not allow the development of any *'risk of collision'*. However, if *'risk of collision'* develops, she should do whatever she can to keep clear. As per subparagraph 'ii' of this Rule she should *'have full regard to the action'* expected of the large *'power-driven vessel'* for preventing collision as *'may be required by the Rules of this part'* and should take such actions that will not embarrass or jeopardise the expected actions of the large *'power-driven vessel'*.

[TASK: ANALYSE THE ABOVE EXAMPLE ASSUMING IT IS A SAILING VESSEL APPROACHING FROM OUTSIDE.]

2. In this example, consider *'two power-driven vessels are crossing so as to involve risk of collision'* in good visibility and *'in sight of one another'* as shown below; of them, 'A' is navigating inside a narrow channel. As per Rule 15, 'A' should be the *'give-way vessel'* and remains so even now as per Rule 8(f)(iii) though she is inside the *'narrow channel'*. However, by Rule 9(d) coupled with Rule 8(f)(ii), 'B' should have initially kept clear and not impeded the passage of 'A' and still continues to retain her obligation to keep clear.



(A heading 090°, can safely navigate only within the narrow channel shown.)



(B heading 000°)

'A', which would have been the sole *'give-way vessel'* in open waters, can now *'safely navigate only within such channel or fairway'* and thus should *'keep her course and speed'*. 'A' should continue to watch if 'B', as required by this Rule, is taking action to keep clear or not. If for any reason it appears to 'A' that 'B' is not taking any or is taking insufficient action and that a *'close-quarters'* and/or *'risk of collision'* situation is developing, then 'A' is obliged to act as per the

Rules of this part B of these Rules to avoid collision. In the circumstances shown, the best action by 'A' may appear to be to reduce speed substantially, as she cannot alter course towards either side without the risk of running aground.

Having explained the requirements of these three subparagraphs, the requirements of this Rule may again be summed up as:

A vessel which is required *'not to impede the passage or safe passage of another vessel'* by any of these Rules remains obliged to take early action to keep clear, not allow a *'close-quarters'* and/or *'risk of collision'* situation to develop and *'allow sufficient sea-room for the safe passage of the other vessel'*.

Should this *'not to impede'* vessel fail to act to keep clear and *'risk of collision'* develops; she still remains obliged to act to keep clear. She should however, take such *'action to avoid collision'* so as not to embarrass or hinder the expected or anticipated actions which the other vessel may now take in compliance with these Rules of part B to avoid collision so as to avoid conflicting actions between the vessels.

If *'risk of collision'* develops, a vessel whose passage is *'not to be impeded remains fully obliged to comply with the Rules of this part'*. She is now required to take *'action to avoid collision'* in compliance with these Rules as she would normally do in open waters where *'not to impede'* would not apply. In effect, while both vessels are now obligated to stay out of the way by the application of one Rule or another, the prime responsibility to keep clear continues to rest on the one directed *'not to impede'*.

Prior to 1989, when this paragraph 'f' did not exist in these Rules, the IMO guidance on *'shall not impede'* explained that when practicable, keep so far out of the way of the other vessel so that *'risk of collision'* will just not develop. However, if *'risk of collision'* did develop because the vessel directed to keep clear did not do so, steering and sailing Rules would apply as normal. This meant that *'shall not impede'* wherever stated, would no longer be valid if *'risk of collision'* did actually develop. This was not a good solution as it gave rise to conflicting actions and vessels directed *'not to impede'* many a times would simply disregard this requirement and take no action to keep out of the way if they were the *'stand-on'* vessels in any situation concerned. The other vessel would anyway have to keep clear by virtue of becoming a *'give-way'* vessel should *'risk of collision'* develop. As such, vessels required *'not to impede'* were not even breaching the requirements of these Rules from a legal viewpoint.

To clear this anomaly, Rule 8(f) was added to these Rules in 1989; it drastically changed the earlier official IMO guidance which is no more relevant or applicable. As per Rule 8(f), the impeding vessel now continues to have a duty to stay out of the way in all circumstances, whether *'risk of collision'* develops or not, and she does not gain the *'stand-on vessel'* status even *'if in sight of one another'*.

The requirements apply in all conditions of visibility since this Rule is placed in section I of Part B of these Rules. The requirements of this Rule act as additional features to the other requirements of these Rules for collision avoidance, or in other words, clarify and complement the same.

Rule 9

Narrow channels

- (a) A vessel proceeding along the course of a narrow channel or fairway shall keep as near to the outer limit of the channel or fairway which lies on her starboard side as is safe and practicable.
- (b) A vessel of less than 20 m in length or a sailing vessel shall not impede the passage of a vessel which can safely navigate only within a narrow channel or fairway.
- (c) A vessel engaged in fishing shall not impede the passage of any other vessel navigating within a narrow channel or fairway.
- (d) A vessel shall not cross a narrow channel or fairway if such crossing impedes the passage of a vessel which can safely navigate only within such channel or fairway. The latter vessel may use the sound signal prescribed in Rule 34(d) if in doubt as to the intention of the crossing vessel.
- (e)
 - (i) In a narrow channel or fairway when overtaking can take place only if the vessel to be overtaken has to take action to permit safe passing, the vessel intending to overtake shall indicate her intention by sounding the appropriate signal prescribed in Rule 34(c)(i). The vessel to be overtaken shall, if in agreement, sound the appropriate signal prescribed in Rule 34(c)(ii) and take steps to permit safe passing. If in doubt she may sound the signals prescribed in Rule 34(d).
 - (ii) This Rule does not relieve the overtaking vessel of her obligation under Rule 13.
- (f) A vessel nearing a bend or an area of a narrow channel or fairway where other vessels may be obscured by an intervening obstruction shall navigate with particular alertness and caution and shall sound the appropriate signal prescribed in Rule 34(e).
- (g) Any vessel shall, if the circumstances of the case admit, avoid anchoring in a narrow channel.

The terms *'narrow channel'* and *'fairway'* are not defined clearly, neither in these Rules nor anywhere else. However, being so frequently used, it was perhaps felt that these terms did not need to be defined. *'Narrow'* depends on the type of vessel, and keeping safe margins from the sides and bottom of the channel. Usually, *'a narrow channel'* or *'fairway'* marked in or near ports depends on local customs and conditions of available sea-room. Alternatively, because of restricted depths, port infrastructure or reserved anchorage spaces etc., a clear corridor is kept marked for vessels to navigate in, whether or not marked by buoys, beacons, other navigational marks or leading lights.

'Narrow channels' or *'fairways'* may also exist in the open sea due to depth restrictions or due to offshore structures and activities, like oil rigs and platforms, where safety corridors have been marked for vessels to navigate in. Normally, *'narrow channel'* is used to describe a channel where the surrounding depth or proximity of land naturally imposes a navigable restriction, even if it is a dredged channel, whereas *'fairway'* is used to describe more open waters, including dredged

channels, which are used to route vessels away from navigational hazards like oil platforms, mines even smaller vessels. The terms may sometimes be interchanged; as such, do not let them be of a major concern but be guided by the information provided on charts and/or associated supporting publications.

Courts have been referred to in deciding if an area was *'a narrow channel'* or not. Sometimes a 1 mile wide channel was held not to be *'a narrow channel'* but a 2 mile wide channel accepted as one. An Australian court has ruled that the provisions of this Rule should only apply to channels less than 1 nautical miles in width. However, these Rules are silent on the numerical aspects. Normally, a *'channel'* or marked *'fairway'* which restricts the navigable sea room would fall under the term *'narrow channels'*. The guidelines issued by US authorities state, *'a waterway is deemed a narrow channel by the practical and traditional uses of that waterway (usually a court determination) or it can be specified by the Secretary in Title 33 CFR part 89.25'*.

As per Rule 1(a), this Rule 9 shall apply to any *'narrow channel or fairway'* connected with *'the high seas and in all waters connected therewith navigable by seagoing vessels'*, except if there are any local rules contrary to this authorised by Rule 1(b). However this Rule 9 will not apply to *'traffic separation schemes'* where the requirements of Rule 10 become applicable, even though the *'traffic lanes'* may at times be *'narrow'* or appear as a *'fairway'*.

For example, the application of this Rule differs in the inland waters of the United States which state *'a power-driven vessel travelling down-bound with a following current shall have the right-of-way over an up-bound vessel in the Great Lakes, Western Rivers, and those waters specified by the Secretary'*.

The terms *'shall not impede'* and *'impedes'* have been used in this Rule; these have been explained earlier with Rule 8(f).

a: This paragraph is simple and applies to all vessels when *'proceeding along the course of narrow channel or fairway'*. The vessel concerned *'shall keep as near to the outer limit of the channel or fairway which lies on her starboard side as is safe and practicable'*.

This requirement is applicable whether there is traffic approaching from the other direction or not. As the depth of the channel decreases from the middle towards the sides, a vessel with a deeper draught would naturally remain a little closer to the centre than one with a shallow draught. Vessels also need not frequently change course every few metres just to maintain themselves to the extreme starboard side since they are required to remain *'as near to the outer limit', 'as is safe and practicable'*. Navigators should use all navigational equipment and techniques to help them navigate their vessels in compliance with this Rule through *'a narrow channel or fairway'*, especially if restricted visibility is being encountered.

The Rule does not restrict vessels using a *'narrow channel'* from leaving the same, for example to cross it to go to a berth. If obliged to cross a *'narrow channel or fairway'*, a vessel must comply with the requirements of Rule 9(d).

Sailing vessels may, because of the wind direction, find it not *'practicable'* to keep to the outer limit; however, they should then ensure compliance with Rule 9(b) explained later.

Vessels proceeding in opposite directions in narrow channels with bends enroute will be constantly changing their headings and their relative or true directions from each other leading to confusion and

the normal application of these Rules would be impossible. These vessels may appear to be *'head-on'* at one time or *'crossing'* a bit later or even appear as if they are moving away etc. However, since each is required to comply with this Rule 9(a), they cannot be considered to be covered by any other Rule with respect to *'preventing collision'* due to the constantly changing scenario and the rather limited sea room. In a 1948 judgement on a collision which took place in *'a narrow channel'*, Mr. Justice Willmer had ruled, *"I have no hesitation in saying that as between a vessel coming up and a vessel going down, approaching each other in that way in a narrow channel, the narrow channel Rule, and the narrow channel Rule only, is the Rule which has to be applied."*

b: Requires any *'vessel of less than 20 m in length or a sailing vessel'* not to *'impede the passage of a vessel which can safely navigate only within a narrow channel or fairway'*.

Hence any vessel less than 20 m in length and all sailing vessels, when getting to know of *'a vessel which can safely navigate only within a narrow channel or fairway'*, must *'not impede'* her passage. That is, take early and substantial action to allow sufficient and safe sea-room for her passage. The Rules are silent on the means and parameters to be adopted to identify vessels which can *'safely navigate only within a narrow channel or fairway'*. This is left to a large extent on the judgement of the navigators of these small and sailing vessels. They would need to take into account both the depth and the width of the channel and watch out for and keep clear of vessels that appear to be restricted, especially those indicating any restrictions; for example, *'a vessel constrained by her draught'* indicating her condition by lights, shapes or sound signals.

In other words, this Rule gives sort of a first right of passage to non-sailing vessels that are over 20 m in length and *'which can safely navigate only within a narrow channel or fairway'* by directing vessels less than 20 m in length and sailing vessels to keep clear. Vessels required *'not to impede'* should take early action, keep well clear and not allow any *'risk of collision'* to develop as required by Rule 8(f) explained earlier.

c: Requires any *'vessel engaged in fishing'*, defined in Rule 3(d), to stay out of the way of *'any other vessel navigating within a narrow channel or fairway'*, not just those *'which can safely navigate only within a narrow channel or fairway'* as required by paragraph 9(b). A *'vessel engaged in fishing'* thus must also keep clear of any *'power-driven vessel'* or a *'sailing vessel'* when they are *'navigating within a narrow channel or fairway'*.

Do note that in this case the requirements of Rule 18 (a) and (b) will not apply; these state different responsibilities for *'any action to avoid collision'* if these vessels meet outside a *'narrow channel or fairway'*.

'Navigating' is a fairly general term and would apply irrespective of the direction of movement of *'any other vessel'*.

By implication, *'fishing vessels'* are therefore permitted to fish in a *'narrow channel or fairway'* since this Rule says nothing on prohibiting fishing within the same. However, fishing may be carried out if a *'narrow channel or fairway'* is not being used by any other vessel, or if *'fishing vessels'* are well clear of the vessels concerned, or can promptly vacate the *'narrow channel or fairway'* immediately to allow any other vessel to pass with a safe margin.

As explained earlier with Rule 8(f), in case a *'vessel engaged in fishing'* fails to keep clear for any reason and *'a close-quarters situation'* and/or *'risk of collision'* develops, the other vessel will also be obliged to take *'action to avoid collision'* as per the Rules of Part B of these Rules, the *'vessel engaged in fishing'* continuing to retain her obligation to keep clear too.

d: Prohibits all vessels from crossing *'a narrow channel or fairway'*, *'if such crossing impedes the passage of a vessel which can safely navigate only within such channel or fairway'*. All the requirements of Rule 8(f) continue to apply in such cases as explained earlier.

A vessel restricted to the *'narrow channel or fairway'* - *'may use the sound signal prescribed in Rule 34(d) if in doubt as to the intention of the crossing vessel'*, that is sound *'at least five short and rapid blasts on the whistle'*.

The Rule here says that this sound signal *'may'* be used. However, Rule 34(d) referred to requires its use in case of doubt and states *'shall immediately'* for the use of this signal. The *'may use'* advice may thus be considered a reminder only and not necessarily contradicting the requirement of Rule 34(d).

It is clear that this Rule does not prohibit vessels from crossing a *'narrow channel or fairway'*. The essence of the requirement is that they should not impede the *'passage of a vessel which can safely navigate only within such channel or fairway'*. The onus of deciding which vessel can or cannot *'safely navigate only within such channel or fairway'* appears to be left to the judgement of the navigators on board a vessel intending to cross the *'narrow channel or fairway'*; not always an easy task.

It appears that the main purpose of this Rule is to reduce the number and frequency of vessels crossing *'narrow channels or fairways'*, some of them being dangerous crossings that have led to collisions in the past. This also encourages smaller vessels to stay clear of *'narrow channels or fairways'* if they can navigate outside the same, or requires them to wait to cross until the route is clear of other vessels.

e: Defines the procedures for overtaking *'in a narrow channel or fairway when overtaking can take place only if the vessel to be overtaken has to take action to permit safe passing'*. This Rule gets linked with the requirements of Rule 13 on *'overtaking'* and Rule 34(c) on *'manoeuvring and warning signals'* as stated in this Rule itself. The procedure prescribed in subparagraph (i) of this Rule is self explanatory.

Do note that since this Rule does not use the word *'impede'*, the requirements of Rule 8(f) do not apply to overtaking situations described in this paragraph.

Subparagraph (ii) of this Rule states *'does not relieve the overtaking vessel of her obligation under Rule 13'*. Only if vessels are *'in sight of one another'*, Rule 13 applies and it states *'notwithstanding anything contained in the Rules of part B, sections I and II, any vessel overtaking any other vessel shall keep out of the way of the vessel being overtaken'*.

If any vessel overtaking can pass safely and overtake within *'a narrow channel or fairway'* without requiring the vessel to be overtaken to take any action *'to permit safe passing'*, then obviously the requirements of this paragraph will not apply though Rule 13 will still remain applicable.

The method of communication described is by way of sound signals; *'the vessel intending to overtake shall indicate her intention'* of overtaking and the side she intends to overtake from. The vessel to be overtaken, *'if in agreement'* with the proposal, shall *'sound the appropriate signal'* - *'and take steps to permit safe passing'*.

Rule 9(e)(i) further states that if the vessel to be overtaken *'is in doubt'*, which may include that the navigators on board feel it is not safe to do so or for any other factors which create a doubt, then *'she may sound the signals prescribed in Rule 34(d)'*. Similar to subparagraph (d) of this Rule, *'may'* has been used here too. However, Rule 34(d) referred to requires its use in case of doubt and states *'shall immediately indicate such doubt by giving at least five short and rapid blasts on her whistle'*. The explanation for *'may sound'* remains the same as given earlier for subparagraph (d) of this Rule.

Both the above subparagraphs (d) and (e) of this Rule 9, by virtue of this Rule being placed in section I of Part B, apply in *'any condition of visibility'*, whereas the sound signals required by Rule 34(c) are applicable to vessels only *'when in sight of one another'*. Since Rules 9(d) and 9(e) refer to Rule 34(d) and 34(c) respectively and do not state anything to the contrary, the application of sound signals would be as prescribed in the latter Rules, that is to vessels *'in sight of one another'*.

Similarly the requirements of subparagraph (ii) of this Rule, *'does not relieve the overtaking vessel of her obligation under Rule 13'* shall apply only if vessels are *'in sight of one another'*.

The above requirements will reduce risks of collisions, especially due to interaction between vessels when large vessels proceeding along *'a narrow channel or fairway'* may overtake other vessels. A *'vessel to be overtaken'*, should by *'good seamanship'*, move as far *'as is safe and practicable'* away from the side of the *'narrow channel or fairway'* from which the *'vessel intending to overtake'* intends to pass and may also reduce speed. This would be to allow as great a passing distance as possible to ensure safe passage with minimum interaction effects and time duration between the vessels.

f: This Rule applies to all vessels *'nearing a bend or an area of a narrow channel or fairway where other vessels may be obscured by an intervening obstruction'*, and directs them to *'navigate with particular alertness and caution'*. This may even be considered a reminder towards *'look-out'* by all means and *'proceed at a safe speed'*.

These Rules remain silent on which vessel is required to take *'any action to avoid collision'*, if so required. If the vessels are keeping to their starboard side as per Rule 9(a), they should anyway pass clear of each other. However, when transiting a bend, local Rules may clearly require, but more usually it is considered a precaution required by *'good seamanship'* and this has been stated in the inland Rules of the US stated earlier and in some court rulings also, that a vessel stemming the tide should wait until the other has passed clear. In any case any bend must be rounded *'with particular'*

alertness and caution regardless of whether an approaching vessel is present or her sound signal has been heard or not. For **'any action to avoid collision'**, navigators should decide on a case-by-case basis keeping in mind **'ordinary practice of seamen'**, **'observance of good seamanship'** and **'special circumstances of the case'**.

'A vessel nearing a bend or an area of a channel or fairway where other vessels may be obscured', **'shall sound the appropriate signal prescribed in Rule 34(e)'**. That is **'shall sound one prolonged blast. Such signal shall be answered with a prolonged blast by an approaching vessel that may be within hearing (range) around the bend or behind an intervening obstruction'**.

Having said **'navigate with particular alertness and caution'** this Rule does not prescribe **'any action to avoid collision'**. **'Ordinary practice of seamen'** and **'observance of good seamanship'** may thus be applied for such situations as given in Rules 2(a) and 8(a) respectively, **'special circumstances of the case'**, again from Rule 2(a).

g: 'Avoid anchoring in a narrow channel' applies to all vessels at all times. **'Anchoring in a narrow channel'** is obviously not a good practice and may obstruct or impede the safe passage of other vessels, though the Rule refrains from using these or any other explanatory words.

Additionally, the Rule does not totally prohibit a vessel from **'anchoring in a narrow channel'**, but strongly requires that this not be done by saying, **'shall, if the circumstances of the case admit, avoid'**. In other words, a vessel shall **'avoid anchoring in a narrow channel'** except when compelled by pressing circumstances, which she can justify.

If a vessel does find it necessary for any reason to anchor in a narrow channel, she should try to do so in a position where she will not be an obstruction to other vessels navigating through the narrow channel and remain anchored for the shortest possible time.

This Paragraph is silent on **'fairways'**. However, for practical purposes, it is recommended that the spirit of this Rule also be applied to **'fairways'** if it is ever required to anchor in one. Do refer to the warning cautions and instructions given on the charts and related publications.

Rule 9 does not have anything on a vessel entering **'a narrow channel or fairway'** with the intention of proceeding in the same. Rule 2(a) may apply in such circumstances as per the following extract from a court verdict.

The Rule of good seamanship for a vessel entering a main channel is that she should do so with caution and not hamper traffic already navigating in it. Vessels already in it, as well as those about to enter it, should behave reasonably. It does not appear to me that the vessel in the channel has a complete right of way, and she must not hog the river regardless of the reasonable aspirations of other vessels. (Mr Justice Hewson, 1962)

Rule 10

Traffic separation schemes

- This Rule applies to traffic separation schemes adopted by the Organization and does not relieve any vessel of her obligation under any other rule.
- (a) This Rule applies to traffic separation schemes adopted by the Organization and does not relieve any vessel of her obligation under any other rule.
 - (b) A vessel using a traffic separation scheme shall:
 - (i) proceed in the appropriate traffic lane in the general direction of traffic flow for that lane;
 - (ii) so far as practicable keep clear of a traffic separation line or separation zone;
 - (iii) normally join or leave a traffic lane at the termination of the lane, but when joining or leaving from either side shall do so at as small an angle to the general direction of traffic flow as practicable.
 - (c) A vessel shall, so far as practicable, avoid crossing traffic lanes but if obliged to do so shall cross on a heading as nearly as practicable at right angles to the general direction of traffic flow.
 - (i) A vessel shall not use an inshore traffic zone when she can safely use the appropriate traffic lane within the adjacent traffic separation scheme. However, vessels of less than 20 m in length, sailing vessels and vessels engaged in fishing may use the inshore traffic zone.
 - (ii) Notwithstanding subparagraph (d)(i), a vessel may use an inshore traffic zone when *en route* to or from a port, offshore installation or structure, pilot station or any other place situated within the inshore traffic zone, or to avoid immediate danger.
 - (e) A vessel other than a crossing vessel or a vessel joining or leaving a lane shall not normally enter a separation zone or cross a separation line except:
 - (i) in cases of emergency to avoid immediate danger;
 - (ii) to engage in fishing within a separation zone.
 - (f) A vessel navigating in areas near the terminations of traffic separation schemes shall do so with particular caution.
 - (g) A vessel shall so far as practicable avoid anchoring in a traffic separation scheme or in areas near its terminations.
 - (h) A vessel not using a traffic separation scheme shall avoid it by as wide a margin as is practicable.
 - (i) A vessel engaged in fishing shall not impede the passage of any vessel following a traffic lane.
 - (j) A vessel of less than 20 m in length or a sailing vessel shall not impede the safe passage of a power-driven vessel following a traffic lane.

- (k) A vessel restricted in her ability to manoeuvre when engaged in an operation for the maintenance of safety of navigation in a traffic separation scheme is exempted from complying with this Rule to the extent necessary to carry out the operation.
- (l) A vessel restricted in her ability to manoeuvre when engaged in an operation for the laying, servicing or picking up of a submarine cable, within a traffic separation scheme, is exempted from complying with this Rule to the extent necessary to carry out the operation.

International Maritime Organisation (IMO), is the organisation referred to in paragraph 'a'.

'Traffic separation schemes', called *TSS* henceforth both for singular or plural use, are among the most important of the many routeing measures adopted by IMO to separate opposing streams of traffic. Their purpose is to improve safety of navigation in areas of high traffic density like crowded sea lanes, approaches to busy ports, in convergent areas, areas where freedom of movement is curtailed due to restricted sea-room and areas where obstructions to navigation exist. Analysis of the collision statistics in relation to application of conventional Rules showed that the Rules alone were not being effective in preventing collisions in such areas; this led to the development and imposition of *TSS* by IMO. IMO defines *TSS* as 'a routeing measure aimed at the separation of opposing streams of traffic by appropriate means and by the establishment of traffic lanes'. A *TSS* is distinct and separate from a 'narrow channel or fairway' and so are the Rules applicable to them; they may or may not include 'a narrow channel' within them.

A *TSS* is adopted by the IMO after a country (or countries) submits a proposal to IMO and is a long process. Navigational charts are obliged to show the schemes adopted by IMO, and they may also show other locally adopted schemes; the latter, if shown, will normally be remarked accordingly. The IMO publishes 'Ships' Routeing' which contains details of standards applicable to any *TSS* as well as lists with diagrams and coordinates of all adopted *TSS*. New editions are published from time to time and it is important that the latest edition is used along with updated charts and sailing directions to ensure that the latest information is available. The latter will usually be updated for any new schemes being introduced. The IMO publication does not contain details of any experimental *TSS* undergoing trials, though the same will be made known to the vessels through T & P notices and other means like flag state circulars.

Some governments are known to have adopted, within their territorial waters, similar *TSS* which may not have been adopted by IMO or even differ from the IMO adopted standards; navigators should consult the above publications to ensure that they are familiar with these, especially with regard to any differences. For example, off the coast of Japan several such *TSS* exist, most recommended by the Japanese Captains Association but not adopted by IMO. The requirements of this Rule do not legally apply to such schemes. However, in line with 'the ordinary practice of seamen', it will be prudent to comply with them.

Navigators must keep in mind that use of a particular *TSS* in full or in part may be declared mandatory for use by all traffic or by certain type of vessels by size or those carrying dangerous, oil or chemical cargoes as specified and must be complied with. On the other hand, requirements may be imposed requiring some specified type of vessels to keep away from the coast by a specified minimum distance in some places, in which case if a *TSS* is inshore of the minimum specified range, vessels should not use the same, keeping well clear of it.

The IMO publication 'Ships' Routeing' is divided into Parts 'A' to 'H'. Part 'B' contains details of all applicable 'TSS' but details of mandatory requirements are contained in Part 'G' which should be studied in detail and independently since there is little cross referencing between the various Parts of this publication. Other Parts of the publication and passage planning charts, especially those published by the counties in the vicinity of a *TSS* may contain more detailed advice on the requirements, these should be consulted for voyage planning and its execution.

[TASK: STUDY THE LATEST EDITION OF SHIPS' ROUTEING INTRODUCTION AND PART 'A' GENERAL PROVISIONS ON SHIPS ROUTEING TO GET FAMILIAR WITH THE SAME. ALSO LIST THE DETAILS OF THE CONTENTS OF ALL THE PARTS 'A' TO 'H' AND GET FAMILIAR WITH THE SAME.]

Note: Latest edition of Ships' Routeing in use is of 2010 as at the time of publication of this book.

a: Clarifies that the requirements of this Rule only apply 'to traffic separation schemes adopted by the Organisation' and not to schemes which may have been adopted or recommended locally as explained above.

'Does not relieve any vessel of her obligation under any other Rule' clarifies that requirements of all Rules continue to apply within a *TSS* in all respects - be it the determination of 'risk of collision' or execution of any 'action to avoid collision' or the display of 'lights and shapes' and the use of 'sound and light signals'. For example, a 'power-driven vessel' within a *TSS* following a 'traffic lane' is not relieved of her obligation to keep out of the way of another 'power-driven vessel' crossing the *TSS* and approaching from her starboard side (crossing as per Rule 15), involving 'risk of collision' if they are 'in sight of one another'. 'In or near an area of restricted visibility', in a similar situation, for 'vessels not in sight of one another', then both would need to act preferably as per Rule 19(d). In other words a vessel following a *TSS* gets no right of way.

b: A vessel is said to be 'using a traffic separation scheme' when she is within the outer limits of the scheme, is neither 'crossing' the scheme nor 'engaged in fishing' within a 'separation zone' as per subparagraph 'e-ii' of this Rule. This requirement applies to all vessels; the only exemption granted is to a 'vessel restricted in her ability to manoeuvre' defined in Rule 3(g), but only in certain conditions as stated in paragraphs 'k' and 'l' of this Rule.

These Rules also do not restrict fishing within a *TSS* and this is an important aspect to keep in mind, though paragraph 'i' of this Rule requires 'a vessel engaged in fishing shall not impede the passage of any vessel following a traffic lane'. The requirement for vessels not using a *TSS* is as per paragraph 'h' of this Rule which requires that 'a vessel not using a traffic separation scheme shall avoid it by as wide a margin as is practicable'.

The requirements for vessels using a *TSS* are simply stated in this paragraph 'b' of this Rule subdivided into three subparagraphs as follows.

b-i: Is obviously stating 'proceed' or move with the flow, as per the recommended direction of movement within the 'appropriate traffic lane in the general direction of traffic flow for that lane'. A vessel proceeding in the wrong or opposite direction in a 'traffic lane' will be in violation of this Rule, will mess up the movement of all other vessels following the recommended direction of movement and also increase probability of 'risk of collision'.

There have been a few cases where vessels have actually proceeded in wrong directions and have

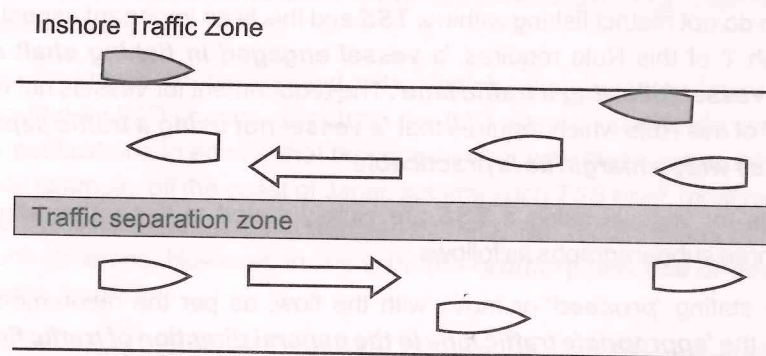
been heavily fined, including personal fines on the navigators. The reasons have been many, from simple human error to having missed the *TSS* during voyage planning or in its execution to not being aware of a newly commissioned *TSS* as the charts and/or publications were obsolete and/or not updated.

b-ii: 'Keep clear of a traffic separation line or separation zone' is intended to give greater effect to the separation of opposing streams of traffic but does not define or recommend any minimum margins. The Rule uses the phrase *'so far as practicable'* placing the discretion of minimum clearance margins on the navigators, who when deciding should keep in mind the requirements stated in Rule 2, *'precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case'*.

Boundaries of a *TSS* are usually not marked by buoys, or, unlike roads and highways on land they also cannot have white or yellow lines marking them. This requirement to keep safe clearance margins is to do with an old principle of safe navigation, *'to err towards the safer side'*.

If a vessel proceeds on a course near the edge of a *'traffic lane'*, she risks drifting accidentally into the opposite lane of oncoming traffic if she suffers from any inaccuracy, however small, for example in position fixing. She may even create a doubt in the other vessels in the vicinity whether she is actually using the *TSS* or not.

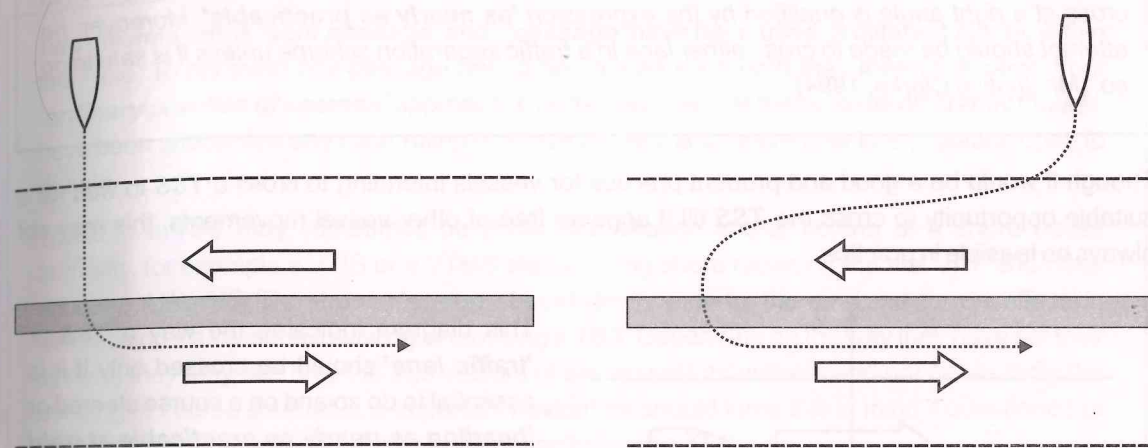
It is important that vessels proceeding along *'traffic lanes'* keep clear of the outer limit which lies on their starboard side, particularly if this line separates the lane from an inshore zone which is likely to contain traffic moving in the opposite direction. On the edge of the lane *'two power-driven vessels'* when *'meeting on reciprocal or nearly reciprocal courses'* would each be required to *'alter her courses to starboard'* in compliance with Rule 14. This would take them into the opposite lane and perhaps directly against other incoming traffic, not just making it difficult for them to return to their correct lane but increasing *'risk of collision'*. The following diagram depicts this danger for the two shaded vessels, one inside the *TSS* and the other inside the inshore traffic zone.



b-iii: Requires vessels to *'normally join or leave a traffic lane at the termination of the lane'*. However, should they need to join or leave in between at any other point within the extreme boundaries of a *TSS*, this is not prohibited, but in this case vessels should do so *'at as small an*

angle to the general direction of traffic flow as practicable'. This is to align such a vessel as close as possible with the *'general direction of traffic flow'* so that she can easily join in the same, that her intentions are clear to other vessels following the *TSS* and to differentiate her from one which may be crossing the *'traffic lane'*. The requirements for a vessel intending to or *'crossing'* a *TSS* follow in paragraph 'c' of this Rule.

Sometimes a vessel may require crossing one *'traffic lane'* to join an opposite one, she must cross the first lane at a heading of right angles, allowed by the next paragraph 'c' and then join the next at as small an angle as possible. At times it may become necessary to join the first lane itself if heavy traffic does not allow a safe crossing and thereafter take a 'U' turn, as shown below.



c: The initial requirement stated is *'a vessel shall, so far as practicable, avoid crossing traffic lanes'*. To comply a vessel may go around *'traffic lanes'* but not through them. This is not always practical especially if a vessel has to go around a very long *TSS*. To allow for such situations, the Rule contains a waiver to this recommendation, *'but if obliged to do so'*. This means that when a vessel cannot comply with the initial recommendation, she may go ahead and cross a *'traffic lane'*, but when doing so *'shall cross on a heading as nearly as practicable at right angles to the general direction of traffic flow'*. *'Heading'* means true heading.

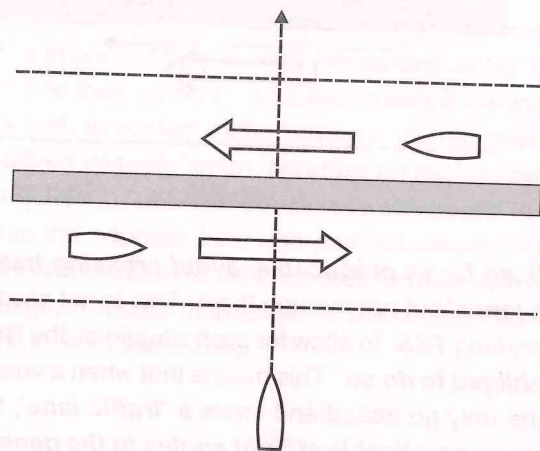
It is important to note and understand that the Rule states *'heading as nearly as practicable at right angles'* and not course made good, this requirement remains applicable irrespective if there are other vessels transiting through a *TSS* or not. *'As practicable'* allows for minor deviations from an absolute right angle heading, for example a sailing vessel may not be able to achieve this due to the prevailing wind direction or a vessel may make minor adjustments of the course steered to avoid any dangers on the way during the act of crossing. However, if a vessel crossing a *TSS* has to take *'any action to avoid collision'*, or having nearly completed her act of crossing a *'traffic lane'* is turning to join the opposite *'traffic lane'*, then obviously this recommendation will not apply.

Sailing vessels if fitted with *'propelling machinery'* or engines as usually referred to, if *'crossing'* a *TSS* should preferably use the same to enable them cross faster and maintain their heading at right angles especially if the wind direction is not favourable. Sailing vessels not using their *'propelling*

machinery, where fitted, and crossing a *TSS* at awkward angles have had their navigators prosecuted for breach of these Rules where court judgements have stated that the navigators had not followed **'ordinary practice of (prudent) seamanship'**, the courts having added 'prudent'.

A vessel crossed one lane of a *TSS* steering an oblique course far away from the required **'heading as nearly as practicable at right angles to the general direction of traffic flow'** as she was intending to join the next traffic lane which she had to do so at **'as small an angle'** as possible. During her initial transit she was involved in a collision. The judgment blamed her for breach of the Rules, **'the obligation in Rule 10(c) applies to vessels crossing any traffic lane whether the purpose of crossing it is to cross the next lane or to join it. Of course the obligation to cross at a right angle is qualified by the expression 'as nearly as practicable'. Moreover, no attempt should be made to cross either lane in a traffic separation scheme unless it is safe to do so. (Mr. Justice Clarke, 1994).**

Though it would be a good and prudent practice for vessels intending to cross a *TSS* to wait for suitable opportunity to cross the *TSS* till it appears free of other vessel movements, this may not always be feasible in practice.



This diagram indicates the way a *TSS* **'traffic lane'** should be crossed only if it is essential to do so and on a course steered **'heading as nearly as practicable at right angles to the general direction of traffic flow'**. Not only this clearly indicates a crossing vessel's intention to other vessels in the vicinity, when the course steered **'heading'** is **'at right angles'** or perpendicular to the **'general direction of traffic flow'**, it also takes the least time to cross the **'lane'**.

[TASK: COMBINE THE ABOVE WITH CHART WORK AND ASSUME A VESSEL IS DOING SPEED OF 10 KNOTS THROUGH WATER AND IS CROSSING A TSS WHICH IS ALSO 10 MILES WIDE, A CURRENT OF 5 KNOTS IS FLOWING ALONG THE DIRECTION OF THE TSS.

WORK OUT WHERE THE VESSEL WILL REACH AND IN HOW MUCH TIME IF SHE STEERS COURSE AT THE REQUIRED RIGHT ANGLES REQUIRED BY THIS RULE? ALSO, IS SHE WISHES TO MAKE GOOD A COURSE AT RIGHT ANGLES, THEN WHAT COURSE SHOULD SHE STEER AND HOW LONG WILL SHE TAKE TO CROSS THE TSS NOW?

YOU MAY CONSIDER REVISING VECTORS OR THE CHAPTER ON COUNTERACTING CURRENTS FROM CHART WORK BEFORE ATTEMPTING THE ABOVE.]

A vessel crossing a *TSS* is likely to disturb the normal traffic flow within the lanes and increase the probability of **'risk of collision'** with other vessels. If **'risk of collision'** develops between vessels within a *TSS*, the Collision Prevention Rules from this Part B of these Rules shall apply to **'any action to avoid collision'** as they normally would have, had the vessels not been in a *TSS* - this requirement is clearly stated in paragraph 'a' of this Rule.

Sailing vessels and small vessels less than 20 m in length **'shall not impede the safe passage of a power-driven vessel following a traffic lane'**, as stated in paragraph 'j' of this Rule. **'A vessel engaged in fishing', 'shall not impede the passage of any vessel following a traffic lane'** as per paragraph 'i' of this Rule. These requirements would not apply to vessels crossing a *TSS* as they are not **'following a traffic lane'** but crossing the same.

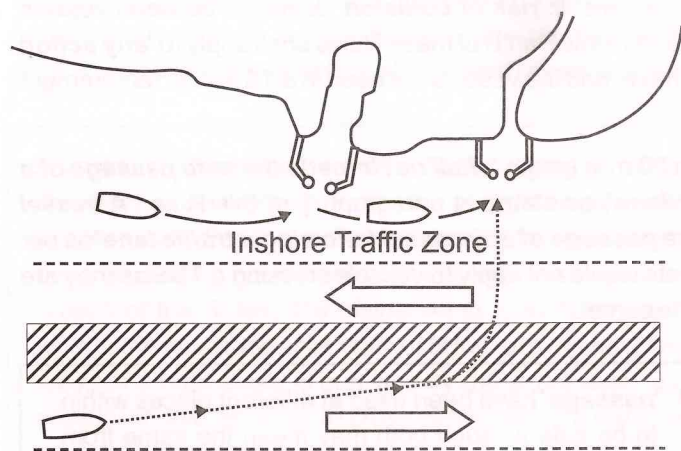
Two different terms **'safe passage'** and **'passage'** have been used at different places within this Rule. To my mind any passage has to be safe as such both may mean the same from **'ordinary practice of seamen'** approach. Courts may interpret these terms differently though, have been unable to find any clear ruling on these two terms so leave their interpretation open to debate.

Traffic in a *TSS* may sometimes be under surveillance and/or control of a shore based authority, for example a VTIS or a VTMS station using shore radar, directional VHF and other equipment like AIS. The shore operators should ideally allow for the wind and current effects in determining if a vessel is following or crossing a *TSS*. Depending on the way they have set their system, they may see only the true vectors of the vessels' movement and not necessarily her heading or course steered. It is important navigators should keep this in mind if questioned or charged about their intentions when navigating through a *TSS*.

'd: Inshore traffic zone' is the designated sea area between the landward boundary of a *TSS* and the adjacent coast intended for coastal traffic. Such zones may be relatively narrow and would become dangerous if traffic density is high within them, which would happen if through traffic were allowed to navigate through them. Their prime purpose is to keep coastal shipping traffic away from the through traffic which should pass via the main traffic lanes of a *TSS*. The segregation between **'inshore traffic zone'** and adjacent **'traffic lanes'** of a *TSS* reduces traffic density within an **'inshore traffic zone'**, **'risk of collision'** and also the anxieties often felt in areas of heavy traffic density.

It is not mandatory for vessels to use a *TSS*, if they choose not to, then they **'shall avoid it by as wide a margin as is practicable'**, in accordance with paragraph 'h' of this Rule, and pass well outside the scheme. However, when an **'inshore traffic zone'** has been adopted as part of any *TSS*, through traffic vessels are required to either use the designated **'traffic lane'** or stay well away even from the **'inshore traffic zone'**. If an **'inshore traffic zone'** exists on both sides of a *TSS*, then obviously through traffic has to use the **'traffic lanes'** within the *TSS* as required by subparagraph 'd-i' - **'a vessel shall not use an inshore traffic zone when she can safely use the appropriate traffic lane within the adjacent traffic separation scheme'**.

'However, vessels of less than 20 m in length, sailing vessels and vessels engaged in fishing may use the inshore traffic zone'. This waiver is perhaps to do with the size and type of vessels which often require being near the coast.



In addition to the above vessels, subparagraph 'd-ii' further adds that 'a vessel may use an inshore traffic zone when en route to or from a port, offshore installation or structure, pilot station or any other place situated within the inshore traffic zone'. This is to allow ease of passage to vessels on coastal trade as well as to those providing services within the 'inshore traffic zone'. This clearly implies that through traffic is still prohibited from using an 'inshore traffic zone'.

This paragraph 'd' also allows any vessel to enter an 'inshore traffic zone' - 'to avoid immediate danger'. Danger is not defined but could be any emergency on the ship or to the people on board, the cargo or any danger to the vessel or to the navigation in general for which a vessel may need to go into or pass through an 'inshore traffic zone'. This implies that a vessel may enter an 'inshore traffic zone' for the purpose of 'preventing collisions', since 'risk of collision' is clearly a danger for any vessel, or to proceed to a port of refuge because of an emergency on board.

e: Traffic lanes within a TSS or any adjacent 'inshore traffic zone' are usually separated by a 'separation zone' to allow safe sea margins between vessels, which within a TSS are for traffic proceeding in opposite directions. Where the available sea-room is less, a 'separation line' may instead be used.

This Rule requires that any vessel 'shall not normally enter a separation zone or cross separation line' but allows vessels carrying out the following two activities an exception from the 'normally' applicable requirement, that is to:

- (1) 'A crossing vessel', means a vessel crossing a TSS as authorised by paragraph 'c' of this Rule, explained earlier.
- And,
- (2) 'A vessel joining or leaving a lane'. This means the traffic lane of a TSS and the action authorised by subparagraph 'b-iii' of this Rule, as explained earlier.

In addition to the above two conditions, vessels are further exempted from the restrictions imposed by this Rule in the following two situations stated as:

- (i) 'in cases of emergency to avoid immediate danger';
- And,
- (ii) 'to engage in fishing within a separation zone'.

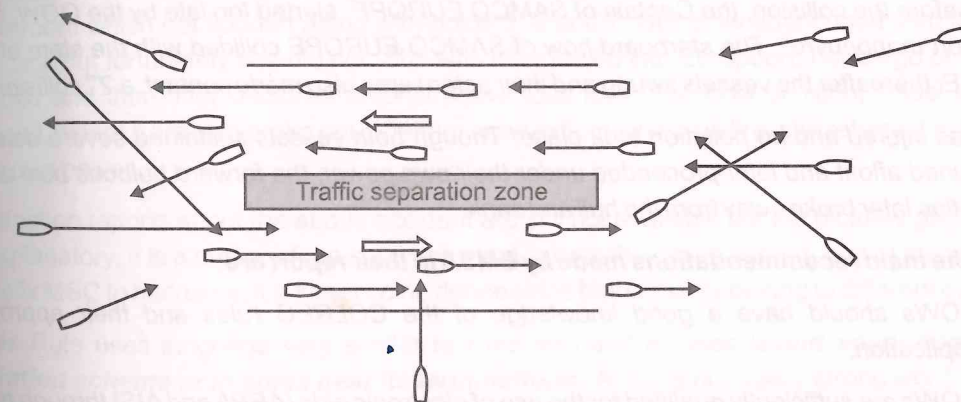
The right to deviate in an emergency is similar to subparagraph 'd-ii' of this Rule, 'to avoid immediate danger'.

A 'vessel engaged in fishing', allowed to use an 'inshore traffic zone' by subparagraph 'd-i' of this Rule, is granted further freedom to enter 'separation zones' to engage in fishing by this Rule. Like any other vessel, a 'vessel engaged in fishing' should also follow all the requirements of 'crossing', 'joining or leaving' or 'proceed' in a 'traffic lane' as described earlier. However, within a 'separation zone' they are free to move in any direction, but 'ordinary practice of seamen' would dictate that they should not proceed against the 'general direction of traffic flow' when at the boundary of any 'separation zone'; this will also ensure that their nets remain clear of the adjacent traffic lanes. The latter requirement is stated later in paragraph 'i' of this Rule.

f: 'A vessel navigating in areas near the terminations of traffic separation schemes shall do so with particular caution'.

The reasons for the establishment of TSS have been described in the beginning. As all vessels are proceeding 'in the general direction of traffic flow for that lane', the relative rate of approach between them is slow allowing more time for the navigators to assess the situations and take 'action to avoid collision' if so required. It is an accepted fact that TSS have been proved very successful in achieving their objectives, and this is reflected in their growing numbers. Though they have reduced the probability of 'risk of collision' within them, rather unfortunately, the probability of collisions outside their immediate end limits continues to remain relatively high.

The diagram below is to depict the flow of traffic inside and outside a typical TSS; it is quite clear that complex situations may exist outside their extreme end limits.



Large numbers of vessels with multi directional movements, converging and diverging traffic all originating from or heading for their desired 'traffic lane' leads to complex movement patterns, both in direction and in speed. Navigators should exercise extreme caution when navigating their vessels near the outer extremities of any TSS. Statistics continue to show that vessels are more vulnerable to collisions in these areas than within a TSS. Even though normal collision prevention Rules apply both outside and inside a TSS, in approaches to and near the outer ends of a TSS complex movement patterns and rapidly changing situations sometimes make things difficult.

Locations where several TSS meet and complex traffic patterns are expected are usually designated as 'precautionary areas', especially near some port approaches and busy intersections. 'Precautionary area' is defined as 'a routing measure comprising an area within defined limits where ships must navigate with particular caution and within which the direction of traffic flow may be recommended'.

This Rule simply makes it clear that navigators should navigate their vessels with utmost caution near the ends of any *TSS*, even where a **'precautionary area'** may have been established. The emphasis on **'shall'** in this Rule is important.

The following two recent collisions highlight the risks associated in areas outside the ends of any *TSS* and even in a controlled **'precautionary area'**.

1: On 8th December 2007, the VLCC 'Samco Europe' and the container vessel 'MSC Prestige' collided at 0247 hours local time in light traffic conditions and ample sea room. The VLCC was heading for the inbound traffic lane, while the container vessel had passed well clear of the outer limit of the 'Bab El Mandeb' *TSS* on the South Eastern end of the Red Sea. The detailed report may be viewed at <http://www.emsa.europa.eu/end185d007d003d002d004d002.html>. However; the gist from this report is given below.

On Friday 7 December 2007, at 2347 UTC, French flag VLCC 'SAMCO EUROPE' fully loaded with crude oil and Panama flag container ship 'MSC PRESTIGE' collided 16 NM East South East of the 'Bab el Mandeb' *TSS* in good visibility and calm weather conditions.

SAMCO EUROPE was steering a course of 300° towards Ain Sukhna (Red sea) at 16.3 knots and MSC PRESTIGE was steering 101° bound for Port-Louis (Mauritius) at a speed of 24 kts. SAMCO EUROPE had MSC PRESTIGE on her portside bow, they were 7 miles apart when MSC PRESTIGE started to alter her course slowly to her starboard. SAMCO EUROPE then started to alter her course slowly to her port. Despite VHF contacts, the two OOW's failed to coordinate their actions. A few seconds before the collision, the Captain of SAMCO EUROPE, alerted too late by the OOW, tried a "hard to port manoeuvre". The starboard bow of SAMCO EUROPE collided with the stem of MSC PRESTIGE; thereafter the vessels swung and their astern area also made contact, a 2nd collision.

No one was injured and no pollution took place. Though both vessels sustained severe damage, they remained afloat and later proceeded under their own power, the forward bulbous bow area of MSC Prestige later broke away from the hull and sank.

Some of the main recommendations made by EMSA in their report are:

- OOWs should have a good knowledge of the COLREG rules and their appropriate application.
- OOWs are sufficiently qualified for the use of electronic aids (ARPA and AIS) through regular sessions on bridge simulators.
- The promotion by IMO of development of sophisticated "e-Navigation" equipment must be accompanied by appropriate and frequently updated training.
- Masters to ensure that in case of difficulty, officers on watch, particularly the less experienced, will not hesitate to call them on time, thus enforcing their standing orders unwaveringly.
- EMSA has reservations about the systematic use of VHF. That is in some particular situations VHF may be of no effective assistance, especially when an officer of the watch tends to exert influence on the officer of the watch of the other vessel. COLREG rules are sufficient to be enforced "in silence".

NOTE: Other reports about this accident reveal that the OOW's of both vessels had probably not noticed the other vessel till just before action to avoid collision was initiated by them when the vessels were about 7 miles away. Verbal communication by VHF of discussing and agreeing on action to avoid collision is believed to have caused severe misunderstandings between the OOW's. The OOW on MSC PRESTIGE never called the Master, while the OOW of SAMCO EUROPE called him just moments before the collision.

The situation, as it appears, was perhaps a border line between a **'head-on' (nearly reciprocal courses)** and **'crossing'** as such the alteration of course to port by the OOW of SAMCO EUROPE, albeit due to misunderstanding caused by verbal communication on VHF in deciding **'action to avoid collision'**, is believed to be in grave violation of these Rules. Difference between UTC & local time is 4 hours.

[TASK: BASIS THE ABOVE INFORMATION ANALYSE THE ABOVE ACCIDENT WITH RESPECT TO THE REQUIREMENTS OF AND LEVEL OF COMPLIANCE WITH RULE 8.]

2: On 29th August 2009, the Panama flag container vessel 'MSC NIKITA' and the Isle of Man flag general cargo vessel 'NIRINT PRIDE' collided at the intersection point of the outward shipping lane and the shipping lane for the Southbound traffic outside Rotterdam, also called the 'roundabout', in good weather conditions.

The 32629 GT 'MSC NIKITA' was on a voyage Skaw to Antwerp and the 8861 GT 'NIRINT PRIDE' had sailed out of Rotterdam bound for Bilbao (Spain), just before collision she had cleared the Hook of Holland.

As a result of the collision 'MSC NIKITA' suffered a large hole to her starboard side in way of the engine room which got flooded along with holds 5, 6 and 7. Her crew abandoned ship fearing she would sink but fortunately she did not. She was later towed into Europoort, her cargo of containers unloaded and thereafter declared a constructive total loss. The bow of 'Nirint Pride' was totally damaged, where a fire also broke out. After her crew extinguished the fire, she returned to Rotterdam on her own power.

Investigation reports about the above accident are still not available but the pictures given later are self explanatory. It is a matter of dramatic irony that in both the cases quoted, one of the vessels has the prefix MSC to her name; it is sheer coincidence since both vessels belong to different owners.

g: This Rule uses language very similar to Rule 9(d) and advises **'avoid anchoring in traffic separation scheme or in areas near its terminations'**. Avoid is not a very strong word, but before this **'shall'** has been used to emphasise the requirement. However, immediately thereafter, an escape clause has also been added - **'so far as practicable'**, allowing a vessel to anchor in these areas, perhaps in compelling and pressing circumstances which can justify the act.

However, there have been cases where vessels, because of machinery problems or otherwise, have anchored in a *TSS*, but coastal authorities have ordered them to or had them towed away to safer locations to ensure safety of navigation of other traffic; as such, the escape clause does not necessarily allow an absolute right to deviate from the basic directive of this Rule.

If a vessel anchors in a **'traffic lane'**, she will not only cause confusion for other vessels but she may also obstruct their path leading to chaos and increased **'risk of collision'**, not just with her but amongst other vessels too. In addition, an anchored vessel will swing depending on the combined effect of wind and current and is likely to point in directions way away from the **'general direction of traffic flow'**, adding to the confusion.

A vessel anchored within a *TSS*, or even a vessel stopped but underway in a *TSS*, is hazardous and a