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IMCO

MARITIME BUOYAGE SYSTEM

1 Member Governments were informed by SN/Circ.105 of 15 June 1981 that the Maritime Safety Committee, at its 44th session, adopted the buoyage system attached to the resolution adopted by the IALA Buoyage Conference, Tokyo, 1980.

2 Attached hereto is a description of the Buoyage System kindly provided by the International Association of Lighthouse Authorities (IALA).

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IALA

International Association of Lighthouse Authorities

maritime buoyage system

CONTENTS

First edition: November 1980

International Association of Lighthouse Authorities

MARITIME BUOYAGE SYSTEM

HISTORICAL BACKGROUND

As recently as 1976 there were more than thirty different buoyage systems in use world wide, many of these systems having rules in complete conflict with one another. This resulted in a situation particularly confusing at night when a mariner could be unexpectedly confronted by a light, the meaning of which was not clear. Such confusion was especially dangerous when the unidentified light was marking a new and as yet uncharted danger, such as a recent wreck. This left the mariner in doubt as to his proper course of action leading him to make a wrong and perhaps disastrous decision.

There has always been disagreement over the way in which buoy lights should be used since they first appeared towards the end of the 19th century. In particular, some countries favoured using red lights to mark the port hand side of channels and others favoured them for marking the starboard hand.

Another major difference of opinion revolved around the principles to be applied when laying out marks to assist the mariner. Most countries adopted the principle of the Lateral system whereby marks indicate the port and starboard sides of the route to be followed according to some agreed direction. However, several countries also favoured using the principle of Cardinal marks whereby dangers are marked by one or more buoys or beacons laid out in the quadrants of the compass to indicate where the danger lies in relation to the mark, this system being particularly useful in the open sea where the Lateral buoyage direction may not be readily apparent.

Over the years, many attempts were made to solve these differences of opinion but without success. The nearest approach to international agreement on a unified system of buoyage was reached at Geneva in 1936. Unfortunately, this Agreement, drawn up under the auspices of the League of Nations, was never ratified due to the outbreak of World War II. The Agreement proposed the use of either Cardinal marks or Lateral marks but separated them into two different systems. It also provided for the use of the colour red on port hand marks and largely reserved the colour green for wreck marking.

At the end of World War II many countries found their aids to navigation destroyed and the process of rehabilitation had to be undertaken urgently. In the absence of anything better, the Geneva rules were adopted with or without variation to suit local conditions and the equipment available. This led to wide and sometimes conflicting differences particularly in the crowded waters of North Western Europe.

Much of the North and South American continents and some countries of the Pacific continued to favour "red to starboard" and used only a Lateral system of buoyage.

The whole unsatisfactory situation was well known to IALA, and as long ago as 1965, the Association set up an international Technical Committee to examine the problem and to suggest a solution.

There were three basic problems facing the Committee:

i) the need to retain existing equipment as far as possible to avoid undue expense.
ii) how were the colours green and red to be used when marking channels?
iii) the need to combine the Lateral and Cardinal rules.

Attempts to bring complete unity had little success. Fresh impetus was given to the task of the Committee by a series of disastrous wrecks in the Dover Strait area in 1971. These wrecks, situated in one lane of a traffic separation scheme, defied all attempts to mark them in a way all could readily understand.

To meet the conflicting requirements, it was thought necessary as a first step to formulate two systems, one using the colour red to mark the port hand side of channels and the other using the colour red to mark the starboard hand side of channels. These were called System A and System B respectively.

The rules for System A which included both cardinal and lateral marks were completed in 1976 and agreed by the Inter-Governmental Maritime Consultative Organization (IMCO). The introduction of the System began in 1977 and its use has gradually spread throughout Europe, Australia, New Zealand, Africa, the Gulf and some Asian countries.

The rules for System B were completed in early 1980 and these were felt to be suitable for application in the countries of North, Central and South America, Japan, Korea and the Philippines.

The rules for the two Systems were so similar that the IALA Executive Committee felt able to combine the 2 sets of rules into one, known as "The IALA Maritime Buoyage System". This single set of rules allows Lighthouse Authorities the choice of using red to port, or red to starboard, on a regional basis, the two regions being known as Region A and Region B.

To achieve this single set of rules and to meet the needs of Region B countries, it was proposed to make certain small additions to the agreed System A rules. These additions were of minor nature and did not make any significant change to the System A buoyage already in course of introduction.

At a Conference convened by IALA in November 1980 with the assistance of IMCO and the International Hydrographic Organization (IHO), the Lighthouse Authorities from 50 countries and the representatives of 9 International Organisations concerned with aids to navigation met, and agreed to adopt the rules of the new combined System. The boundaries of the buoyage regions were also decided and illustrated on the map annexed to the rules. The Conference also underlined the need for cooperation between neighbouring countries and with Hydrographic Services in the introduction of the new System.

Thus the IALA Maritime Buoyage System will, for the first time, help the Mariner of any nationality to fix his position and avoid dangers without fear of ambiguity. This is indeed an important and positive contribution to safety of life and property at sea.

International Association of Lighthouse Authorities

MARITIME BUOYAGE SYSTEM

GENERAL PRINCIPLES OF THE SYSTEM

Within the IALA Buoyage System there are 5 types of marks which may be used in combination. The mariner can easily distinguish between these marks by readily identifiable characteristics.

Lateral marks differ between Buoyage Regions A and B as described below, whereas the other 4 types of mark are common to both regions.

LATERAL MARKS

Following the sense of a 'conventional direction of buoyage', Lateral marks in Region A utilize red and green colours by day and night to denote the port and starboard sides of channels respectively. However, in Region B these colours are reversed with red to starboard and green to port.

A modified Lateral mark may be used at the point where a channel divides to distinguish the preferred channel, that is to say the primary route or channel which is so designated by an Authority.

CARDINAL MARKS

Cardinal marks indicate that the deepest water in the area lies to the named side of the mark. This convention is necessary even though for example, a North mark may have navigable water not only to the North but also East and West of it. The mariner will know he is safe to the North, but must consult his chart for further guidance.

Cardinal marks do not have a distinctive shape but are normally pillar or spar. They are always painted in yellow and black horizontal bands and their distinctive double cone top-marks are always black.

An aide-memoire to their colouring is provided by regarding the topmarks as pointers to the positions of the black band(s):
Topmarks pointing upward: black band above yellow band
Topmarks pointing downward: black band below yellow band
Topmarks pointing away from each other: black bands above and below a yellow band
Topmarks pointing towards each other: black band with yellow bands above and below.

Cardinal marks also have a special system of flashing white lights. The rhythms are basically all "very quick" (VQ) or "quick" (Q) flashing but broken into varying lengths of the flashing phase. "Very quick flashing" is defined as a light flashing at a rate of either 120 or 100 flashes per minute, "quick flashing" is a light flashing at either 60 or 50 flashes per minute.

The characters used for Cardinal marks will be seen to be as follows:
North: Continuous very quick flashing or quick flashing
East: Three "very quick" or "quick" flashes followed by darkness
South: Six "very quick" or "quick" flashes followed immediately by a long flash, then darkness
West: Nine "very quick" or "quick" flashes followed by darkness.

The concept of three, six, nine is easily remembered when one associates it with a clock face. The long flash, defined as a light appearance of not less than 2 seconds, is merely a device to ensure that three or nine "very quick" or "quick" flashes cannot be mistaken for six.

It will be observed that two other marks use white lights. Each has a distinctive light rhythm which cannot be confused with the very quick or quick flashing light of the Cardinal marks.

ISOLATED DANGER MARK

The Isolated Danger mark is placed on a danger of small area which has navigable water all around it. Distinctive double black spherical topmarks and Group flashing (2) white lights, serve to associate Isolated Danger marks with Cardinal marks.

SAFE WATER MARKS

The Safe Water mark has navigable water all around it but does not mark a danger. Safe Water marks can be used, for example, as mid-channel or landfall marks.

Safe Water marks have an appearance quite different from danger marking buoys. They are spherical, or alternatively pillar or spar with a single red spherical topmark. They are the only type of mark to have vertical stripes (red and white). Their lights, if any, are white using isophase, occulting, one long flash or Morse "A" rhythms.

SPECIAL MARKS

Special marks are not primarily intended to assist navigation but are used to indicate a special area or feature whose nature may be apparent from reference to a chart or other nautical document.

Special marks are yellow. They may carry a yellow "X" topmark, and any light used is also yellow. To avoid the possibility of confusion between yellow and white in poor visibility, the yellow lights of Special marks do not have any of the rhythms used for white lights.

Their shape will not conflict with that of navigational marks, this means, for example, that a special buoy located on the port hand side of a channel may be cylindrical, but will not be conical. Special marks may also be lettered or numbered to indicate their purpose.

NEW DANGERS

It should be specially noted that a "new danger" which is one not yet shown in nautical documents, may be indicated by exactly duplicating the normal mark until the information is sufficiently promulgated. A "new danger" mark may carry a Racon coded Morse "D".

International Association of Lighthouse Authorities

MARITIME BUOYAGE SYSTEM

RULES

1. GENERAL

1.1. Scope

This system provides rules which apply to all fixed and floating marks (other than lighthouses, sector lights, leading lights and marks, lightships and large navigational buoys) serving to indicate:

1.1.1. The lateral limits of navigable channels.

1.1.2. Natural dangers and other obstructions such as wrecks.

1.1.3. Other areas or features of importance to the mariner.

1.1.4. New dangers.

1.2. Types of marks

The system of buoyage provides five types of marks which may be used in combination:

1.2.1. Lateral marks, used in conjunction with a "conventional direction of buoyage", generally used for well defined channels. These marks indicate the port and starboard sides of the route to be followed. Where a channel divides, a modified lateral mark may be used to indicate the preferred route. Lateral marks differ between Buoyage Regions A and B as described in Sections 2 and 8.

1.2.2. Cardinal marks, used in conjunction with the mariner's compass, to indicate where the mariner may find navigable water.

1.2.3. Isolated Danger marks to indicate isolated dangers of limited size that have navigable water all around them.

1.2.4. Safe Water marks to indicate that there is navigable water all around their position, e.g. mid-channel marks.

1.2.5. Special marks not primarily intended to assist navigation but to indicate an area or feature referred to in nautical documents.

1.3. Method of characterising marks

The significance of the mark depends upon one or more of the following features:

1.3.1. By night, colour and rhythm of light.

1.3.2. By day, colour, shape, topmark.

2. LATERAL MARKS

2.1. Definition of "conventional direction of buoyage"

The "conventional direction of buoyage", which must be indicated in appropriate nautical documents, may be either:

2.1.1. The general direction taken by the mariner when approaching a harbour, river, estuary or other waterway from seaward, or

2.1.2. The direction determined by the proper authority in consultation, where appropriate, with neighbouring countries. In principle it should follow a clockwise direction around land masses.

2.2. Buoyage Regions

There are two international Buoyage Regions A and B where lateral marks differ. These buoyage regions are indicated in Section 8.

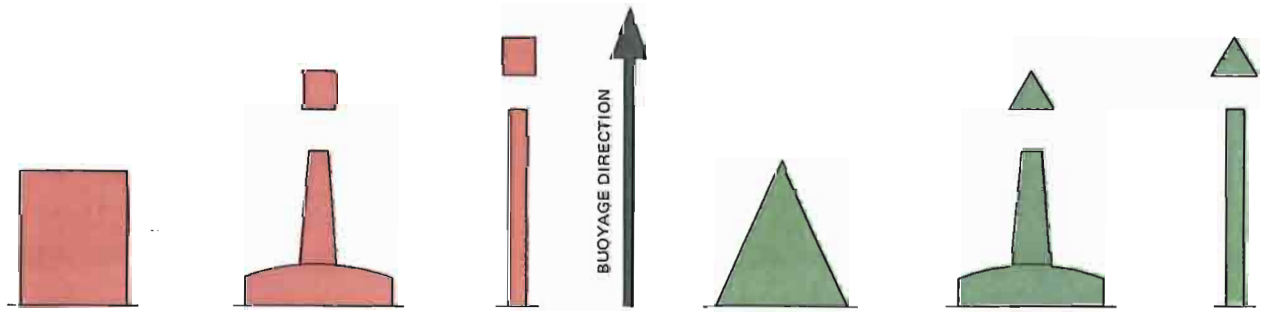
2.3. Description of Lateral Marks used in Region A

2.3.1. Port hand Marks

Colour :	Red
Shape (Buoys) :	Cylindrical (can), pillar or spar
Topmark (if any) :	Single red cylinder (can)
Light (when fitted) :	
Colour :	Red
Rhythm :	Any, other than that described in section 2.3.3.

2.3.2. Starboard hand Marks

Colour :	Green
Shape (Buoys):	Conical, pillar or spar
Topmark (if any) :	Single green cone, point upward
Light (when fitted) :	
Colour :	Green
Rhythm :	Any, other than that described in section 2.3.3.



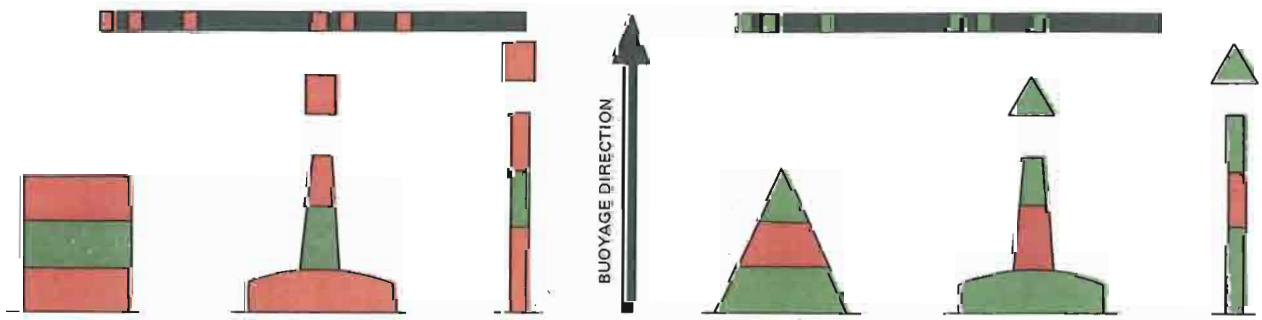
2.3.3. At the point where a channel divides, when proceeding in the "conventional direction of buoyage", a preferred channel may be indicated by a modified Port or Starboard lateral mark as follows:

2.3.3.1. Preferred channel to Starboard :

Colour :	Red with one broad green horizontal band
Shape (Buoys) :	Cylindrical (can), pillar or spar
Topmark (if any) :	Single red cylinder (can)
Light (when fitted) :	
Colour :	Red
Rhythm :	Composite group flashing (2 + 1)

2.3.3.2. Preferred channel to Port :

Colour :	Green with one broad red horizontal band
Shape (Buoys) :	Conical, pillar or spar
Topmark (if any) :	Single green cone, point upward
Light (when fitted) :	
Colour :	Green
Rhythm :	Composite group flashing (2 + 1)



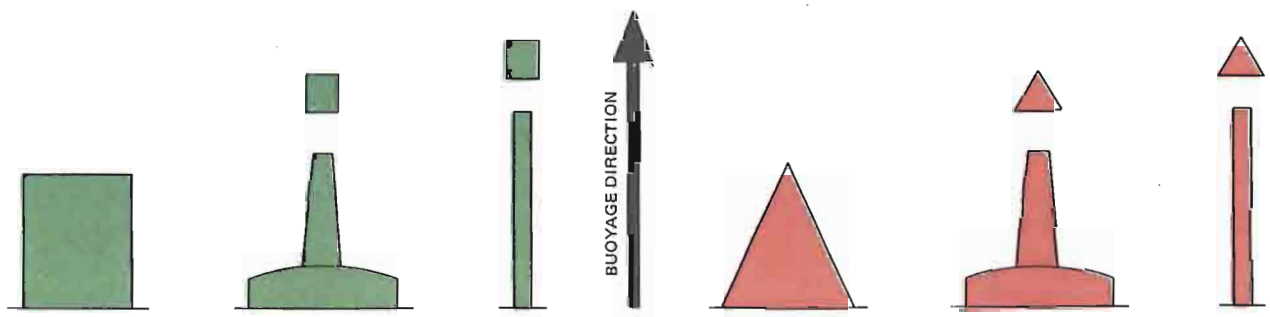
2.4. Description of Lateral Marks used in Region B

2.4.1. Port hand Marks

Colour :	Green
Shape (Buoys) :	Cylindrical (can), pillar or spar
Topmark (if any) :	Single green cylinder (can)
Light (when fitted) :	
Colour :	Green
Rhythm :	Any, other than that described in section 2.4.3.

2.4.2. Starboard hand Marks

Colour :	Red
Shape (Buoys) :	Conical, pillar or spar
Topmark (if any) :	Single red cone, point upward
Light (when fitted) :	
Colour :	Red
Rhythm :	Any, other than that described in section 2.4.3.



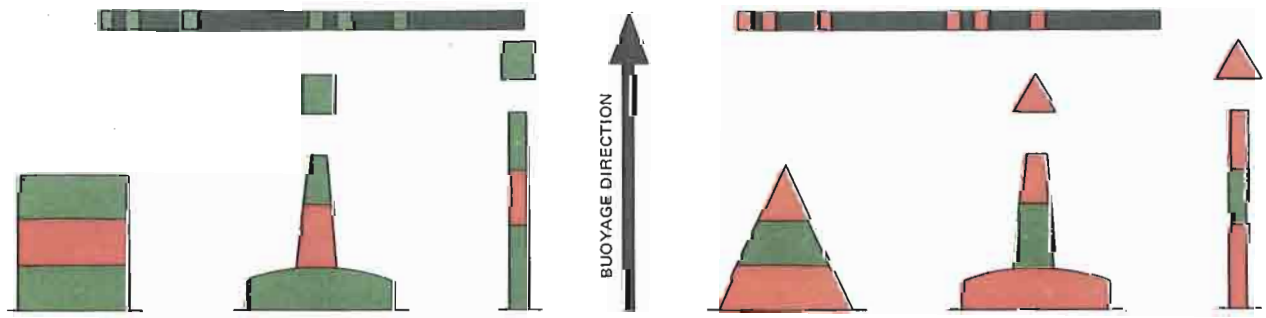
2.4.3. At the point where a channel divides, when proceeding in the "conventional direction of buoyage", a preferred channel may be indicated by a modified Port or Starboard lateral mark as follows:

2.4.3.1. Preferred channel to Starboard :

Colour :	Green with one broad red horizontal band
Shape (Buoys) :	Cylindrical (can), pillar or spar
Topmark (if any) :	Single green cylinder (can)
Light (when fitted) :	
Colour :	Green
Rhythm :	Composite group flashing (2+1)

2.4.3.2. Preferred channel to Port :

Colour :	Red with one broad green horizontal band
Shape (Buoys) :	Conical, pillar or spar
Topmark (if any) :	Single red cone, point upward
Light (when fitted) :	
Colour :	Red
Rhythm :	Composite group flashing (2+1)



2.5. General Rules for Lateral Marks

2.5.1. Shapes
Where lateral marks do not rely upon cylindrical (can) or conical buoy shapes for identification they should, where practicable, carry the appropriate topmark.

2.5.2. Numbering or lettering
If marks at the sides of a channel are numbered or lettered, the numbering or lettering shall follow the "conventional direction of buoyage".

3. CARDINAL MARKS

3.1. Definition of Cardinal quadrants and marks

3.1.1. The four quadrants (North, East, South and West) are bounded by the true bearings NW-NE, NE-SE, SE-SW, SW-NW, taken from the point of interest.

3.1.2. A Cardinal mark is named after the quadrant in which it is placed.

3.1.3. The name of a Cardinal mark indicates that it should be passed to the named side of the mark.

3.2. Use of Cardinal Marks

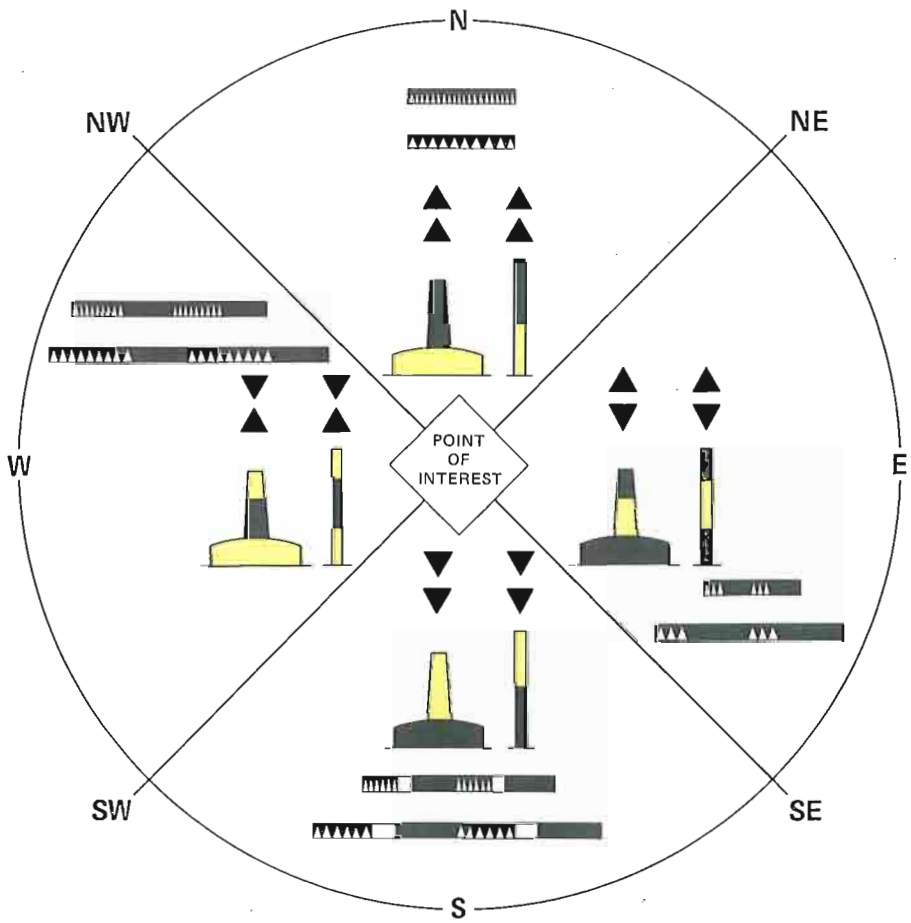
A Cardinal mark may be used, for example:

3.2.1. To indicate that the deepest water in that area is on the named side of the mark.

3.2.2. To indicate the safe side on which to pass a danger.

3.2.3. To draw attention to a feature in a channel such as a bend, a junction, a bifurcation or the end of a shoal.

3.3. Description of Cardinal Marks



3.3.1. North Cardinal Mark

Topmark[a] :	2 black cones, one above the other, points upward
Colour :	Black above yellow
Shape :	Pillar or spar
Light (when fitted) :	
Colour :	White
Rhythm :	VQ or Q

3.3.2. East Cardinal Mark

Topmark[a] :	2 black cones, one above the other, base to base
Colour :	Black with a single broad horizontal yellow band
Shape :	Pillar or spar
Light (when fitted) :	
Colour :	White
Rhythm :	VQ(3) every 5s or Q(3) every 10s

3.3.3. South Cardinal Mark

Topmark[a] :	2 black cones, one above the other, points downward
Colour :	Yellow above black
Shape :	Pillar or spar
Light (when fitted):	
Colour :	White
Rhythm :	VQ(6) + Long flash every 10s or Q(6) + Long flash every 15s

3.3.4. West Cardinal Mark

Topmark [a] :	2 black cones, one above the other, point to point
Colour :	Yellow with a single broad horizontal black band
Shape :	Pillar or spar
Light (when fitted):	
Colour :	White
Rhythm :	VQ(9) every 10s or Q(9) every 15s

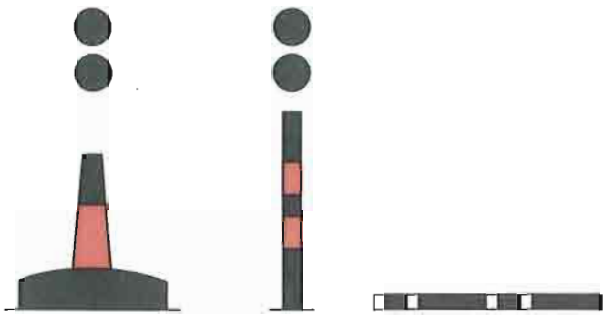
4. ISOLATED DANGER MARKS

4.1 Definition of Isolated Danger Marks

An Isolated Danger mark is a mark erected on, or moored on or above, an isolated danger which has navigable water all around it.

4.2. Description of Isolated Danger Marks

Topmark [b] :	2 black spheres, one above the other
Colour :	Black with one or more broad horizontal red bands
Shape :	Optional, but not conflicting with lateral marks; pillar or spar preferred
Light (when fitted) :	
Colour :	White
Rhythm :	Group flashing (2)



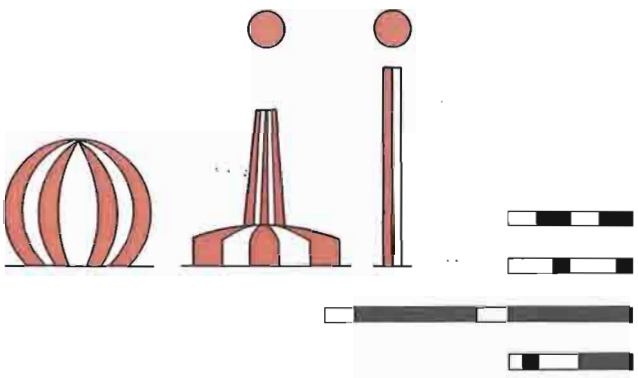
5. SAFE WATER MARKS

5.1. Definition of Safe Water Marks

Safe Water marks serve to indicate that there is navigable water all round the mark; these include centre line marks and mid-channel marks. Such a mark may also be used as an alternative to a Cardinal or a Lateral mark to indicate a landfall.

5.2. Description of Safe Water Marks

Colour :	Red and white vertical stripes
Shape :	Spherical ; pillar or spar with spherical topmark
Topmark (if any) :	Single red sphere
Light (when fitted) :	
Colour :	White
Rhythm :	Isophase, occulting, one long flash every 10s or Morse "A"



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[a] The double cone topmark is a very important feature of every Cardinal mark by day, and should be used wherever practicable and be as large as possible with a clear separation between the cones.

[b] The double sphere topmark is a very important feature of every Isolated Danger mark by day, and should be used wherever practicable and be as large as possible with a clear separation between the spheres.

6. SPECIAL MARKS

6.1. Definition of Special Marks

Marks not primarily intended to assist navigation but which indicate a special area or feature referred to in appropriate nautical documents, for example:

6.1.1. Ocean Data Acquisition Systems (ODAS) marks.

6.1.2. Traffic separation marks where use of conventional channel marking may cause confusion.

6.1.3. Spoil Ground marks.

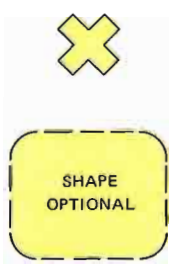
6.1.4. Military exercise zone marks.

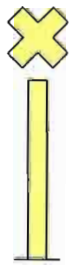
6.1.5. Cable or pipeline marks.

6.1.6. Recreation zone marks.

6.2. Description of Special Marks

Colour :	Yellow
Shape :	Optional, but not conflicting with navigational marks
Topmark (if any) :	Single yellow 'X' shape
Light (when fitted) :	
Colour :	Yellow
Rhythm :	Any, other than those described in sections 3, 4 or 5





6.3. Additional Special Marks

Special marks other than those listed in paragraph 6.1 and described in paragraph 6.2 may be established by the responsible administration to meet exceptional circumstances. These additional marks shall not conflict with navigational marks and shall be promulgated in appropriate nautical documents and the International Association of Lighthouse Authorities notified as soon as practicable.

7. NEW DANGERS

7.1. Definition of New Dangers

The term "New Danger" is used to describe newly discovered hazards not yet indicated in nautical documents. "New Dangers" include naturally occurring obstructions such as sandbanks or rocks or man made dangers such as wrecks.

7.2. Marking of New Dangers

7.2.1. "New Dangers" shall be marked in accordance with these rules. If the appropriate Authority considers the danger to be especially grave at least one of the marks shall be duplicated as soon as practicable.

7.2.2. Any lighted mark used for this purpose shall have an appropriate Cardinal or Lateral VQ or Q light character.

7.2.3. Any duplicate mark shall be identical to its partner in all respects.

7.2.4. A "New Danger" may be marked by a racon, coded Morse "D" showing a signal length of 1 nautical mile on the radar display.

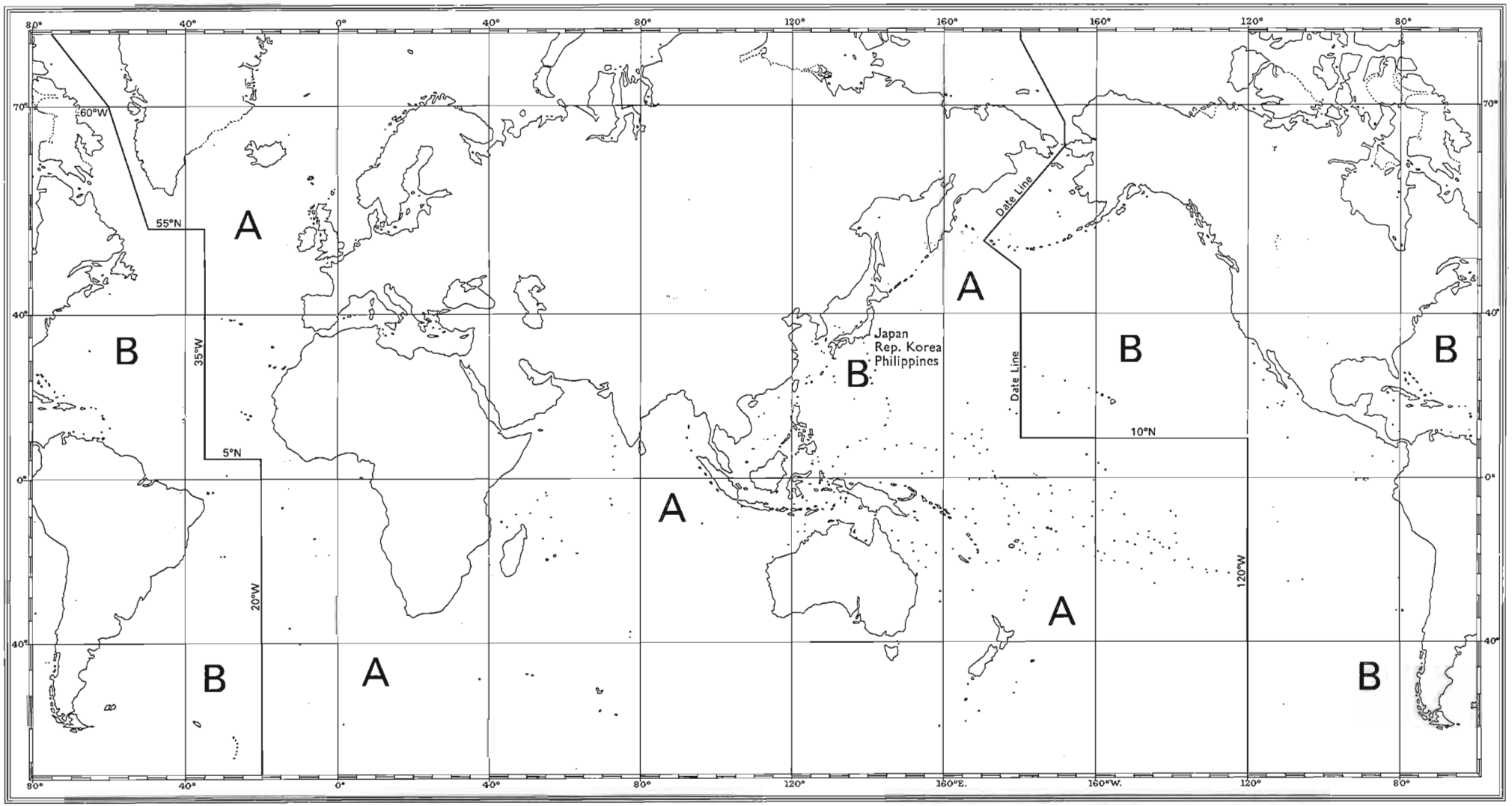
7.2.5. The duplicate mark may be removed when the appropriate Authority is satisfied that information concerning the "New Danger" has been sufficiently promulgated.

8. INTERNATIONAL BUOYAGE REGIONS A AND B

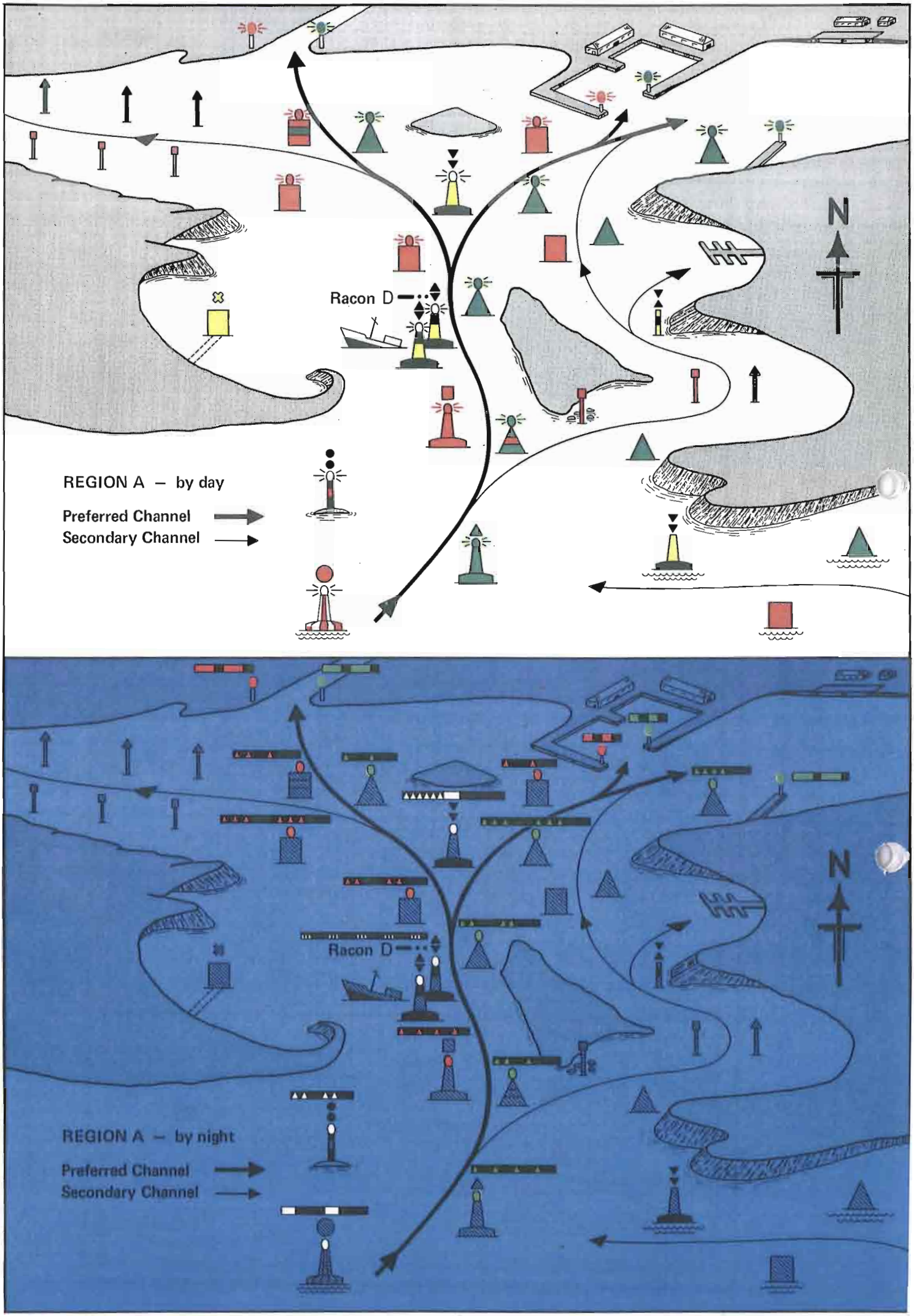
There are two international Buoyage Regions A and B where Lateral marks differ as described in Section 2. The geographical divisions of these two Regions are indicated in the Annex which will, if necessary, be updated from time to time.

IALA MARITIME BUOYAGE SYSTEM

Buoyage Regions A and B, November 1980



ANNEX


Racon D
N
REGION A – by day
Preferred Channel
Secondary Channel
Racon D
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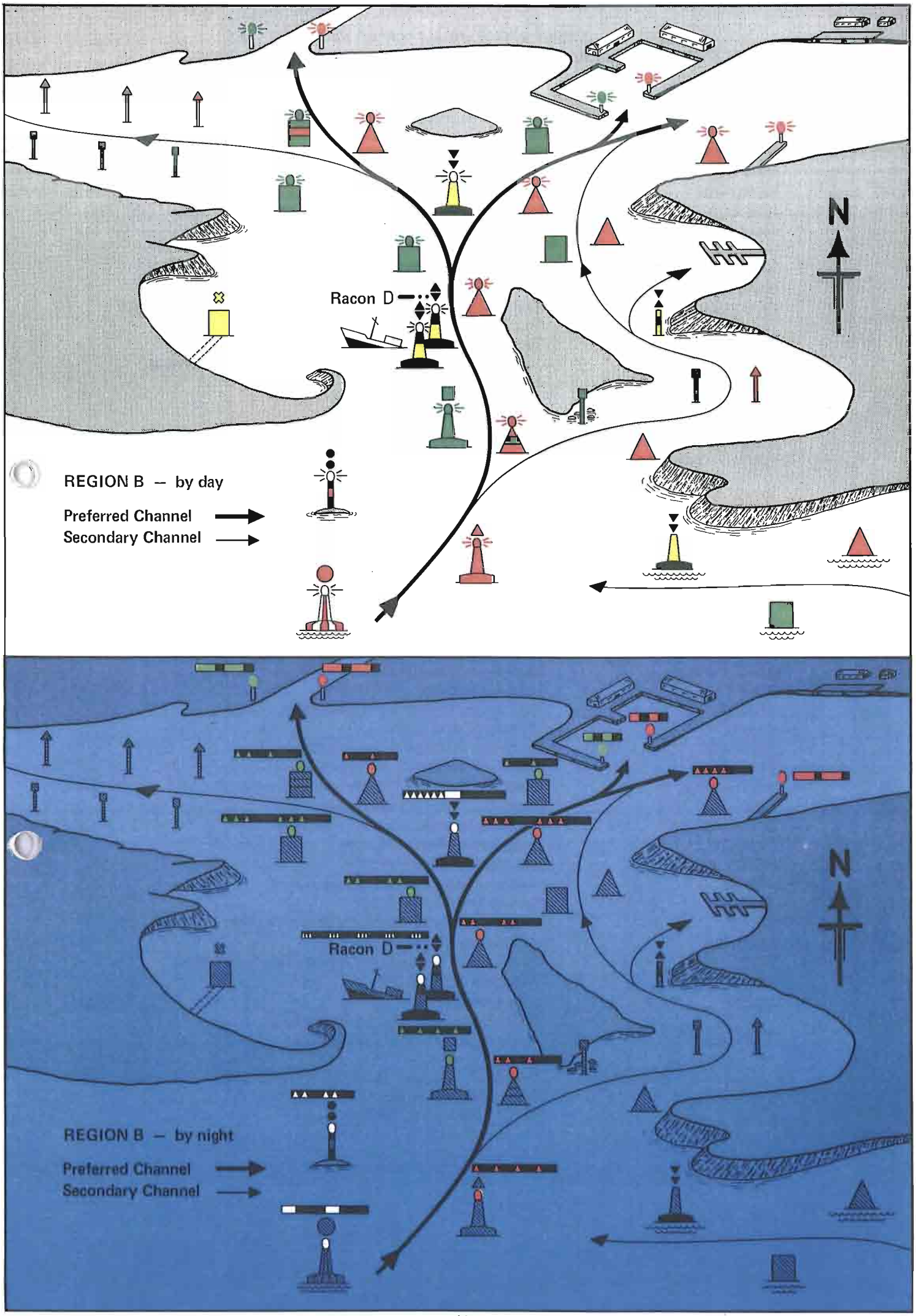
REGION A – by night
Preferred Channel
Secondary Channel


Racon D
N
REGION B – by day
Preferred Channel
Secondary Channel
Racon D
N
REGION B – by night
Preferred Channel
Secondary Channel

Organisations represented on the IALA "Technical Committees for the Regional Harmonization of Buoyage"

COMMITTEE "A"

BELGIUM	Bestuur van het Zeewezen en van de Binnenvaart
CANADA	Canadian Coast Guard
DENMARK	Farvandsdirektoratet
FINLAND	Merenkulkuhallitus
FRANCE	Service des Phares et Balises
Federal Republic of GERMANY	Bundesverkehrsministerium
GERMAN Democratic Republic	Seehydrographischer Dienst der Deutschen Demokratischen Republik
IRELAND	Commissioners of Irish Lights
NETHERLANDS	Directoraat General van het Loodswezen, de Betonning, Bebakening en Verlichting
NORWAY	Kystdirektoratet
POLAND	Urzad Morski w Gdyni
SWEDEN	Sjöfartsverkets Centralförvaltning
UNITED KINGDOM	Trinity House Northern Lighthouse Board
U.S.A.	U.S. Coast Guard
U.S.S.R.	ГЛАВНОЕ УПРАВЛЕНИЕ НАВИГАЦИИ И ОКЕАНОГРАФИИ

Chairmen of the Committee:
Captain R.N. Mayo (Trinity House)
Captain J.E. Bury (Trinity House)
Mr. O. Gredal (Denmark)

COMMITTEE "B"

ARGENTINA	Servicio de Hidrografia Naval
BOLIVIA	Servicio de Hidrografia Naval
BRAZIL	Diretoria de Hidrografia e Navegaçâo
CANADA	Canadian Coast Guard
CARICOM	Caribbean Community Secretariat
CHILE	Instituto Hidrografico de la Armada
COSTA RICA	Ministerio de Obras Publicas y Transportes
CUBA	Instituto Cubano de Hidrografia
ECUADOR	Instituto Oceanografico de la Armada
FRANCE	Service des Phares et Balises
HONDURAS	Empresa Nacional Portuaria
JAPAN	Japanese Maritime Safety Agency
KOREA	Korean Embassy in Japan
MEXICO	Direccion General de Señalamiento Maritimo
PANAMA	La Autoridad Portuaria Nacional
PERU	Direccion de Hidrografia y Navegacion de la Marina
PHILIPPINES	Philippine Coast Guard
U.S.A.	U.S. Coast Guard
VENEZUELA	Direccion de Hidrografia y Navegacion Instituto Nacional de Canalizaciones

Chairmen of the Committee:
Captain J. Mahoney (Canadian Coast Guard)
Mr. G. Smith (Canadian Coast Guard)
Mr. N.F. Matthews (IALA)