Unit ***35***

AIDS TO NAVIGATION
BUOYAGE SYSTEMS

Basic terms

• aids to navigation - buoy • spoil ground • radar reflector • ground tackle of a buoy • buoyage system • lateral system • cardinal system • Uniform Lateral System • IALA = International Association of Lighthouse Authorities • Sailing Directions • Coast Pilots

• marks: *cardinal m., lateral m., isolated danger m., safe water m., special m., topmark, pillar-shaped m., spar shaped m.*

Contents:

1. **Aids to Navigation**
2. **Types of Aids to Navigation**
3. **Buoys and buoyage systems**
4. **Light Buoys (LB)**
5. **IMO SMCP 2001 - Buoys**
6. **Racons**

Aids to Navigation

Aids to Navigation are placed along coasts and navigable waters as guides to mark safe water and to assist mariners in determining their position in relation to land and hidden dangers. Each aid to navigation is used to provide specific information.

A **navigational aid** (also known as aid to navigation, ATON, or navaid) is any sort of marker which aids the traveler in navigation; the term is most commonly used to refer to nautical or aviation travel. Common types of such aids include lighthouses, buoys, fog signals, and day beacons.

According to the glossary of terms in the US Coast Guard Light list, an Aid to Navigation is any device external to a vessel or aircraft specifically intended to assist navigators in determining their position or safe course, or to warn them of dangers or obstructions to navigation.

Several aids to navigation are usually used together to form a local aid to navigation system that helps the mariner follow natural and improved channels. Such aids to navigation also provide a continuous system of charted marks for **coastal piloting**. Individual aids to navigation are used to mark landfall from seaward, and to mark isolated dangers.

Mariners **must NOT rely** on buoys alone for determining their position. Storms and wave action can cause buoys to move.

ATONs in the US

Unlike the roads and highways that we drive on, the waterways we go boating on do not have road signs that tell us our location, the route or distance to a destination, or of hazards along the way. Instead, the waterways have AIDS TO NAVIGATION (or ATONs), which are all of those man-made objects used by mariners to determine position or a safe course.

These aids also assist mariners in making a safe landfall, mark isolated dangers, enable pilots to follow channels, and provide a continuous chain of charted marks for precise piloting in coastal waters. The U.S. Aids to Navigation System is intended for use with nautical charts, which provide valuable information regarding water depths, hazards, and other features that you will not find in an atlas or road map.

The term "aids to navigation" includes buoys, day beacons, lights, lightships, radio beacons, fog signals, marks and other devices used to provide "street" signs on the water. Aids To Navigation (*AtoNav*) include all the visible, audible and electronic symbols that are established by government and private authorities for piloting purposes.

The term *Aids to Navigation* must not be confused with the term *NAVAIDS* (navigation aids) as the latter refers to navigational equipment on board ship. For clarity and in accordance with terminology used by the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), the systems provided by lighthouse authorities are described as "aids to navigation (AtoN)", to differentiate their provision from the equipment carried on board ships for navigational purposes, which are referred to as navigational aids (Navaids).

Types of Aids to Navigation

The term "aids to navigation" encompasses a wide range of floating and fixed objects (fixed meaning attached to the bottom or shore), and consist primarily of:

- **Buoys** - floating objects that are anchored to the bottom. Their distinctive shapes and colors indicate their purpose and how to navigate around them.
- **Beacons** -Which are structures that are permanently fixed to the sea-bed or land. They range from structures such as light houses, to single-pile poles. Most beacons have lateral or non-lateral aids attached to them. Lighted beacons are called "LIGHTS", unlighted beacons are "DAYBEACONS".

Both Buoys and Beacons may have lights attached, and may have a sound making device such as a gong, bell or horn. Both Buoys and Beacons may be called "marks".

A **marine aid to navigation *(AtoN)*** may be defined as a signal deliberately placed to provide mariners with information. The signal may be:

- Visual
- Sound
- Electro magnetic (radio) IALA maritime buoyage system

A station may be defined as a point on the earth's surface defined by geographic coordinates. The following are the categories:

- Land (a fixed station accessible by land)
- Offshore (a fixed station only accessible by boat or helicopter)
- Floating (Light Vessels, Light Floats, Large Automatic Navigation Buoys, Buoys)

Several AtoN may be exhibited or transmitted from a single station and may comprise one or a number of the following AtoN:

- A **Daymark** and/or **Topmark** (including pole marker beacons, withies, perches)
- **Warning Notices** e.g. notice boards which may or may not be illuminated
- **Leading Mark** (one of at least two separate daymark structures that provide a leading line)
- **Main light**
- **Sector light** (intensified or unintensified arc of visibility and/or colour either as part of the main light or provided in addition to the main light, in which case the term subsidiary light is commonly used)
- **Auxiliary light** (a light of noticeable less intensity than the main light(s))
- **Precision Direction Light** (a light visible over a very narrow angle to indicate a direction to be followed)
- **Leading Light** (one of at least two lights, which are situated on at least two separate structures that provide a leading line)
- **Emergency light** (a light introduced upon the failure of lights, operated by a completely separate power supply, which may be of noticeable less intensity than the Main Light(s))
- **Fog Signal**
- **Racon**
- **Radar Target Enhancer**
- **Loran C** (and other **radio navigation systems**)
- Differential **GPS** Signals †
- Automatic Identification Systems (**AIS**)

Buoys and buoyage systems

Buoys, [bɔɪ] (UK), [bu:ɪ] (US), are floating marks used mainly for navigational purposes to mark a channel, bank, shoal, spoil ground, etc. Buoys came generally into use in the late 15th or early 16th century. They also assist the navigator to a limited degree in the determination of the ship's position. Therefore many buoys are now fitted with radar reflectors. They are attached to the seabed by means of a chain cable secured to ground tackle.





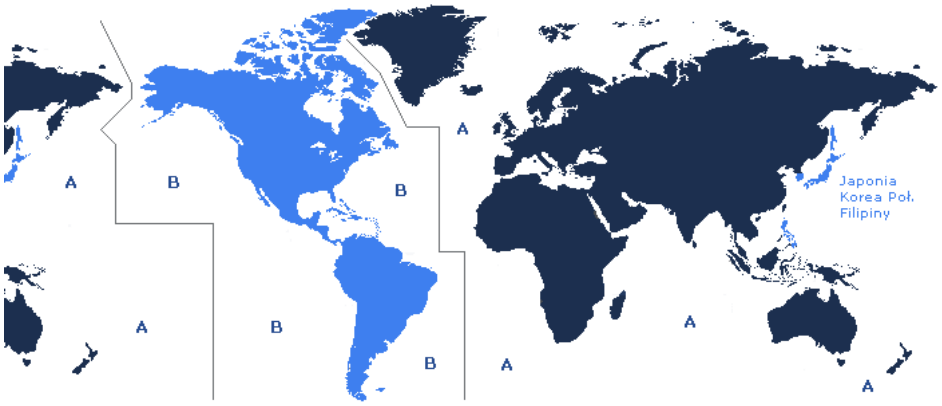


There are **two general systems** of buoyage in use throughout the world - the *lateral* and the *cardinal* system. In the lateral system, the location of each buoy or beacon indicates the direction of the danger relative to the course that is to be followed. In the cardinal system the location of each buoy indicates the approximate true bearing of safe water from the danger that it marks. The cardinal system is best suited for marking offshore rocks, shoals, islets and other dangers in the open sea.
In the Uniform Lateral System, adopted in 1936, black buoys with green or white lights are used to mark the right side of a channel and red buoys with red or white lights are used for left-side markings.

Today, almost all maritime nations use the **Uniform Lateral System**, with same local variations, to mark their coasta1 waters and navigable rivers. In most western European waters (Atlantic and Mediterranean coasts) the **IALA Combined Cardinal and Lateral System** is used. It combines Latera1 marks for well-defined channels (with A and B system of buoyage), Cardina1 marks for use with the mariner's compass, Isolated Danger marks, Safe Water marks, and Special marks.
Prior to entering unfamiliar piloting waters to ascertain the system of buoyage in use, the navigator must always consult the applicable volume of the **Sailing Directions** or **Coast Pilots**.

During the IALA conference in November 1980 two navigation marking systems, ie the **System A** (red colour for the left hand of the ship) and the **System B** (red colour for the right hand of the ship), were combined into one - the **IALA System**.

In the IALA System the regional (of the systems A and B) principle of painting of the lateral signs was maintained. The countries that accepted the red colour for the left hand lateral sings were included in the region A. The countries that use the green colour for the left hand lateral signs were included in the region B. In the both regions, the fairway direction is the one leading from the sea (when a different manner is used than an adequate notice is provided).



Following to the division into the IALA System regions, marine maps contain respective notice, ie the "IALA System Region A" or the "IALA System Region B".

The International Association of Lighthouse Authorities (IALA) buoyage system 'A'. uses five different types of marks to distinguish safe navigation:

- lateral
- cardinal
- isolated danger
- safe water
- special.

All marks within the IALA system are distinguished by:

- Shape
- Colour
- Top mark
- Light

IALA BUOYAGE SYSTEM A

LATERAL MARKS

Used generally to mark the sides of well defined navigable channels

PORT HAND MARKS
Light: Colour — red
Rhythm — any





Direction of Buoyage



STARBOARD HAND MARKS
Light: Colour — Green
Rhythm — any

OTHER MARKS

ISOLATED DANGER MARKS
Use: to mark a small isolated danger with navigable water all around
Light: Colour — white
Rhythm — group flashing (2)



SAFE WATER MARKS
Use: Mid-channel or landfall
Light: Colour — white
Rhythm — isophase, occulting or 1 long flash every 10 secs.

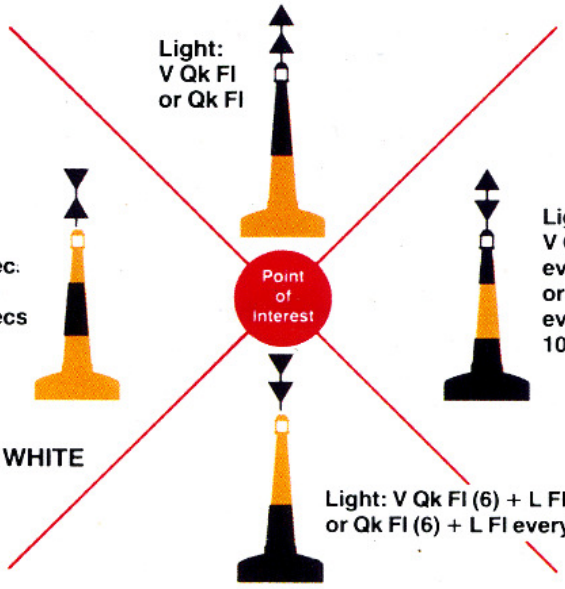


SPECIAL MARKS Any shape permissible
Use: of no navigational significance
Light: Colour — yellow
Rhythm — different from any white lights used on buoys



CARDINAL MARKS

Used to indicate the direction from the mark in which the best navigable water lies, or to draw attention to a bend, junction or fork in a channel, or to mark the end of a shoal.

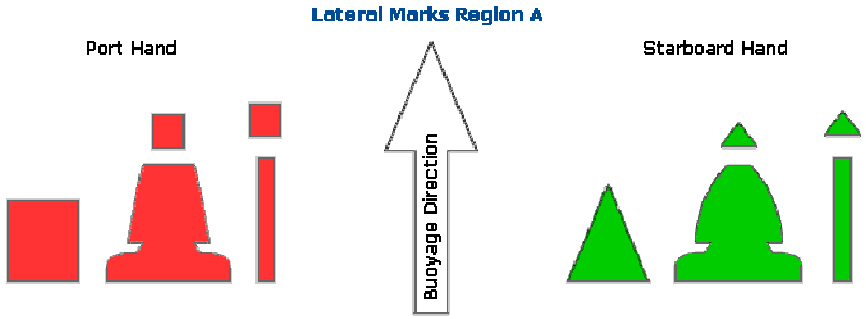


LIGHTS: ALWAYS WHITE

A guide produced by TRINITY HOUSE Lighthouse Service

1. Lateral Buoys and Marks

The location of **lateral buoys** defines the borders of channels and indicates the direction. Under IALA A red buoys mark the port side of the channel when returning from sea, whereas under IALA B green buoys mark the port side of the channel when sailing towards land. Red buoys have even numeration plus red lights and green buoys have odd numeration plus green lights. Lateral lights can have any calm phase characteristic except FL (2+1).

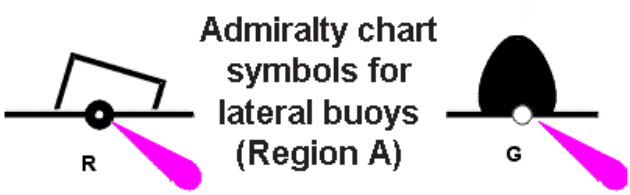


Generally, when two channels meet one will be designated the preferred channel (i.e. most important channel). The buoy depicted on the right indicates the preferred channel *to starboard* under IALA A. The light phase characteristic is R FL (2+1):

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The buoy depicted on the left indicates the preferred channel *to port* under IALA A. These buoys are marked with the numerations of both channels. The light phase characteristic is G FL (2+1):



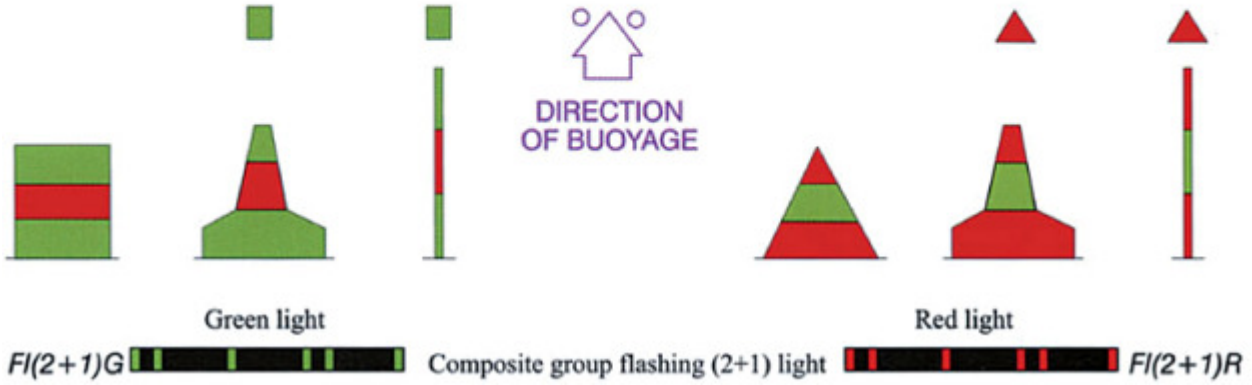


Preferred channel to starboard

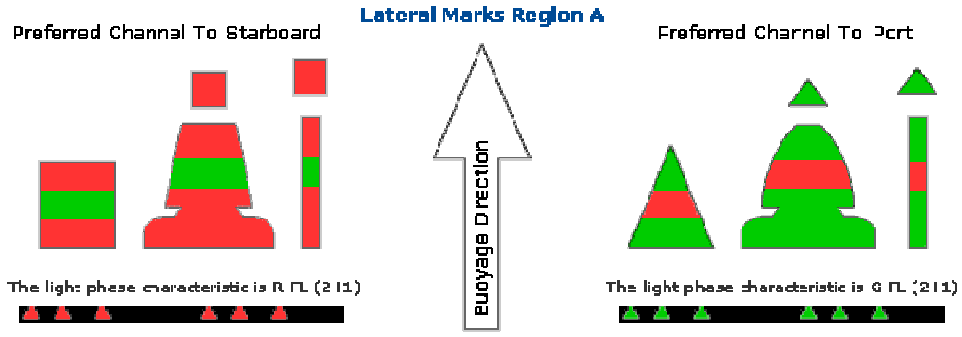
Colour: Green with one broad red band.
Shape: Can, pillar or spar.
Topmark (when fitted): Single green can.
Retroreflector: Green band or square.

Preferred channel to port

Colour: Red with one broad green band.
Shape: Conical, pillar or spar.
Topmark (when fitted): Single red cone point upward.
Retroreflector: Red band or triangle.



Modified Lateral Buoys and Marks for the Region B



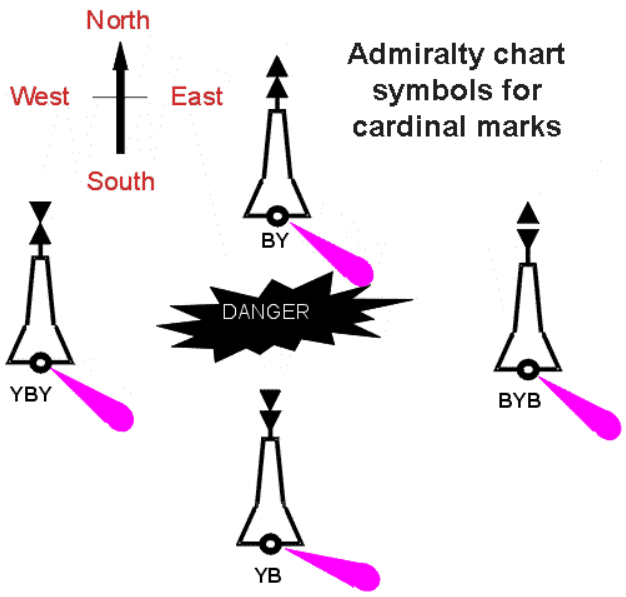


Port hand lateral pillar mark.



Preferred channel to starboard mark.

2. Cardinal Buoys



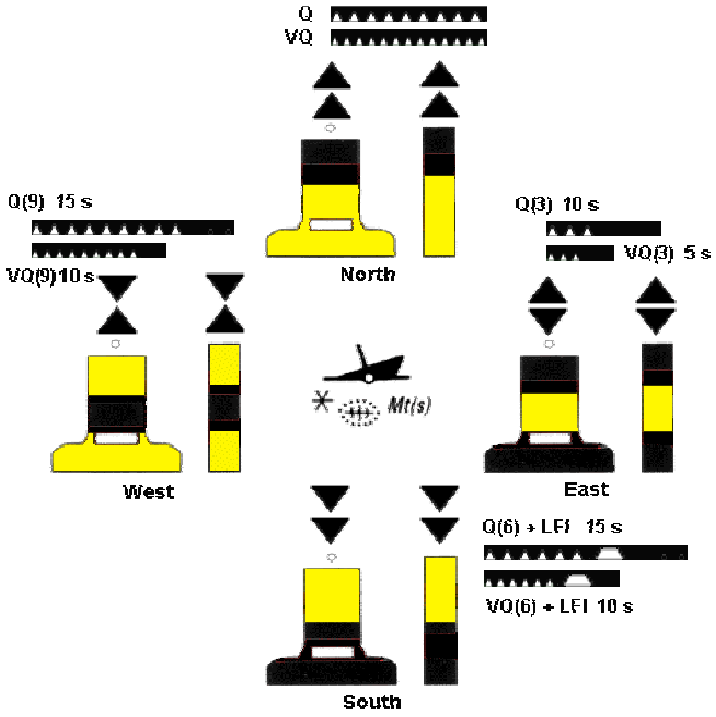








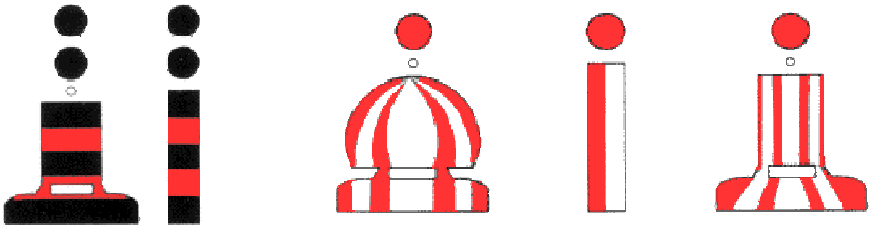
The four cardinal buoys indicate the safe side of a danger with an approximate bearing. For example, the West cardinal buoy has safe water on its West and the danger on its East side. Notice the 'clockwise' resemblance of the light phase characteristics. The topmarks consist of two black triangles placed in accordance with the black/yellow scheme of the buoy. When a new obstacle (not yet shown on charts) needs to be marked, **two** cardinal buoys will be used to indicate this 'uncharted' danger. The cardinal system is identical in both the IALA A and IALA B buoyage systems.



Cardinal Buoys indicate that the deepest water occurs at the side of the mark's name. They are placed to the north, south, east or west from the hazard. The cardinal buoys have mainly the shape of columns or poles. They are painted in horizontal, yellow and black stripes, and their topmarks (two cones) are painted black. The arrangement of cones at the top is an indication of the black stripe (or stripes) position on the buoy:

- cones with tops up: the black stripe is above the yellow one,
- cones with tops down: the black stripe is under the yellow one,
- cones with bases towards one another: the black stripes above and below the yellow one,
- cones with tops towards one another: the black stripe with the yellow stripes above and below.

3. Marks indicating Isolated dangers

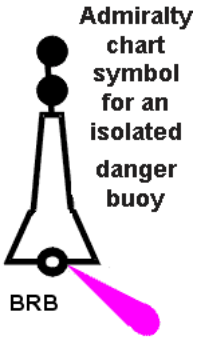


Marks indicating Isolated dangers are placed directly over minor obstacles around which the water is navigable. The have shapes of columns, poles or other, however, they are difficult to confuse with the cardinal buoys. They are black with horizontal red stripes. The topmarks consists of two black spheres one above the other. The light is white - a group flash light Fl(2) with two flashes in a group.

This type of buoy indicates the position of an isolated danger, contrary to cardinal buoys which indicate a direction away from the danger. The light (when present) consists of a white group flash: Fl(2).







4. Marks indicating Safe water

IALA buoyage system A safe water marks indicate that there is navigable water all around the mark for example mid channel or landfall buoy.

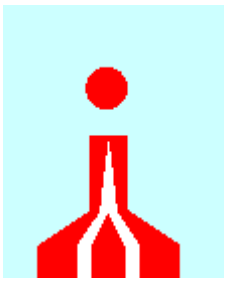
Safe water mark features:

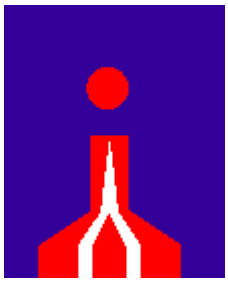
- colour - red and white vertical stripes

- top mark - a single red sphere
- light - exhibits a white light, isophase, occulting, or single long flash every 10 seconds



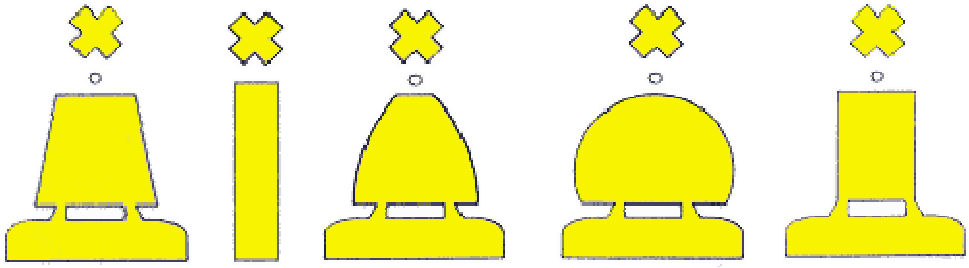
Single flash and a single sphere association may help you to remember its characteristics.





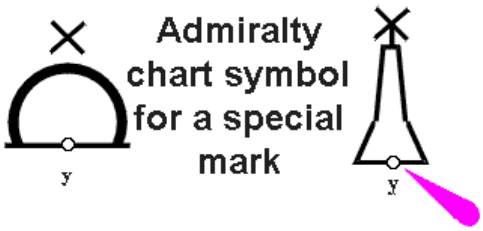


5. Special Buoys and Marks



These buoys have no actual navigation purpose. Most of the time these yellow buoys indicate areas used by navies or pipelines or surfing. IALA buoyage system A special marks indicate a special area or feature such as traffic separation marks, spoil, ground marks, cable or pipe lines marks including outfall pipes. They can also define a channel within a channel, for example a channel for deep draught ships in a wide estuary where the limits of the channel for normal navigation are marked by red and green lateral buoys.





Light Buoys (LB)

Light Identification

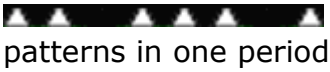
During daytime identification of navigation aids is accomplished by observing: **location**, **shape**, **colour scheme**, **auxiliary features** (sound signals, RACON, RC, etc) or **markings** (name, number, etc).

During the night, we use the features of the navigation aid's **light** to both identify it and ascertain its purpose. There are three features to describe the light:

Colour: Either white, red, green or yellow. If no colour is stated in the chart, default is white.

Period: The time in seconds needed for one complete cycle of changes.  The arrow indicates the 10 second period of this flashing light 'Fl(3) 10 s'.

Phase characteristic: The particular pattern of changes within one complete cycle (hence, within one period). Below are the most common types:

- **Fixed (F)**
   This light shines with an unblinking and steady intensity and is always on. In this example a yellow fixed light is shown.
- **Flashing (Fl)**:
   The duration of the light is always less than the duration of the darkness. The frequency does not exceed 30 times per minute.
- **Quick Flashing (Q)**:
   Again, the duration of quick flash is less than the darkness. The frequency is at least 60 times per minute.
- **Very Quick Flashing (VQ)**:
   Also here, the duration of very quick flash is less than the darkness. The frequency is at least 100 times per minute.
- **Interrupted Quick Flashing (IQ)**:
   Like Quick Flashing with one moment of darkness in one period.
- **Isophase (Iso)**:
   This Light has equal duration between light and darkness. A period consists of both a light and a dark interval. Also called Equal Interval (E Int).
- **Group Flashing (Gp Fl(x+x))**:
   This is actually a combination of two patterns in one period. In this example the first 2 flashes followed by the pattern of 3 flashes result in 'Gp Fl(2+3)'.
- **Occulting (Occ)**:
   Occulting is the opposite of flashing, the light is more on then off.

- **Alternating (AL)**:
   An alternating light changes colour. This special purpose light is typically used for special applications requiring the exercise of great caution. In this example ALT.WG is shown, alternating between green and white.
- **Morse "U" (Mo (U))**:
   This light shows two flashes and a longflash, which is equivalent to the letter "U" in Morse code.
- **Long-Flashing (LFL)**:
   This light has one long flash in a period. A long flash is at least 2 seconds long.

llI/3.2 - *NA VIGATIONAL WARNING INVOLVING*

3.2.1 - Land- or sea-marks

3.2.1.1 - Defects

... (charted name of light/buoy) ... (position) ***unlit.***
... (charted name of light/buoy) ... (position) ***unreliable***.
... (charted name of buoy) ... (position) ***damaged***.
... (charted name of light) ... (position) ***destroyed***.
... (charted name of buoy) ... (position) ***off station***.
... (charted name of buoy) ... (position) ***missing***.
Fog signal at ... (charted name of light) ... (position) ***inoperative***.

3.2.1.2 *Alterations*

... (charted name of light/buoy) ... (position) ***changed to ...*** (full characteristics).
... (charted name of light/buoy) ... (position) ***temporarily changed to ...*** (full characteristics).
... (charted name of buoy) ... (position) ***temporarily removed*** (when appropriate). ... (charted name of light) ... (position) ***temporarily discontinued*** (when appropriate).

3.2.1.3 - *New and moved*

... (charted name of light/buoy) ... (full characteristics) ***established in position ... .*** ... (charted name of light) ... (full characteristics) ***re-established in position ... .***
... (charted name of light/buoy) ***moved ...*** (in miles and decimal miles) ... (direction) ***to position ... .***

3.2.2 - *Drifting objects*

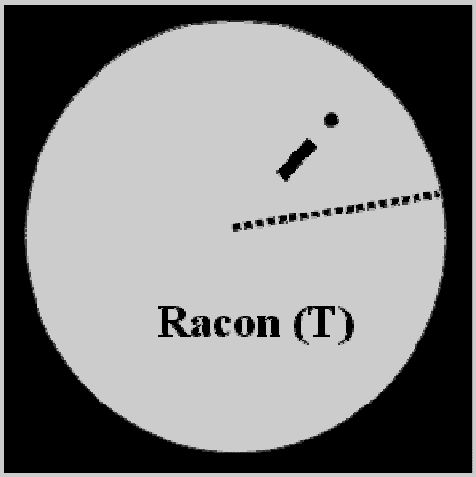
Superbuoy adrift in vicinity ... (position) ***at ...*** (date time if known).
Hazardous mine adrift in vicinity ... (position) ***at ...*** (date time if known).
Unlit derelict vessel adrift in vicinity ... (position) ***at ...*** (date time if known).
... number) ***containers adrift in vicinity ...*** (position) ***at ...*** (date time if known).

Racons

Some navigation marks are fitted with a Racon; this is a Radar transponder beacon. When it receives a radar pulse from a ship, it transmits a return signal, which appears on the ship's radar screen as a letter in the Morse code, emanating from the radar echo of the buoy. The signal letter is often written beside the buoy on the chart.



The 3 & 10 cm refers to the wavelengths of the radar set that the racon responds to. An example of a racon is the LCW buoy on Chart 3 at 46°02.78'N 05°57.58'W.



Link to Trinity House website

Colour

Under the 'A' system, if you are heading in the direction of the arrow you will have green buoys to starboard and red buoys to port.

A. Comprehension & vocabulary

A.1 Read the initial text on Aids to Navigation *and complete the following sentences:*

1. Aids to Navigation are placed as guides to .....
   and to .....
2. In the US an aid to navigation is a device ……..
   intended to …… or to …….
3. Aids to Navigation help the navigator ..…….
4. Such aids also provide ……
5. . Individual aids to navigation are used to mark .....
   and .....
6. Seafarers should not rely on buoys because
   ……..
   ……

A2. Read the text on ATONs in the US and supply the missing terms:

(IALA, waterways, hazards, safe, landfall, navigational aids, NAVAIDS, piloting, day beacons, AtoNav, electronic)

ATONs in the US

Unlike the roads and highways that we drive on, the _____ we sail or go boating on do not have road signs that tell us our location, the route or distance to a destination, or of _____along the way. Instead, the waterways have AIDS TO NAVIGATION (or ATONs), which are all of those man-made objects used by mariners to determine position or a _____ course.

These aids also assist mariners in making a safe _____, mark isolated dangers, enable pilots to follow channels, and provide a continuous chain of charted marks for precise _____ in coastal waters.

The term "aids to navigation" includes buoys, _____, lights, lightships, radio beacons, fog signals, marks and other devices used to provide "street" signs on the water. Aids To Navigation, or _____, include all the visible, audible and _____ symbols that are established by government and private authorities for piloting purposes.

The term *Aids to Navigation* must not be confused with the term _____ as the latter refers to navigational equipment on board ship. For clarity and in accordance with terminology used by the International Association of Marine Aids to Navigation and Lighthouse Authorities (_____), the systems provided by lighthouse authorities are described as "aids to navigation (AtoN)", to differentiate their provision from the equipment carried on board ships for navigational purposes, which are referred to as _____ (Navaids).

A3 Read the text on Buoys and buoyage systems and find and mark (underline) the answers to the following questions:

1. What are buoys used to mark?

2. When did the first buoys come into use?
3. How are buoys attached to the seabed?
4. What are the two systems of buoyage today?
5. What does the location of a buoy in the lateral system indicate?
6. What does the location of a buoy in the cardinal system indicate?
7. What system is used in most European countries? (study and discuss the map of the world and the buoyage systems)
8. What do black and red buoys mark in the Uniform Lateral System of buoyage?
9. What should the navigator do when entering unfamiliar pilotage waters?
10. What are pilotage waters?
11. Discuss the meaning of the terms: *bank, shoal, spoil ground*
12. What is a *racon* and its characteristics? (consult the picture and the accompanying text)
13. What is the difference between *buoys, beacons* and *daymarks*?

A.4 Insert the missing terms:

• flashes • cone • quadrant • buoyage • red • green light
• white • can • lateral • port • starboard • conical • spar • red
• cone • top • cardinal • mark

The IALA A-System of buoyage

The essential feature of IALA Maritime Buoyage System A is red for 1._____ -hand and green for 2. _____ -hand buoys. The 3._____ buoys, which indicate the port and starboard-hands of well defined channels, are painted 4. _____ port-hand buoys and green for stbd-hand buoys. A port-band buoy is 5. _____ -shaped and has a can as a 6. _____ mark, and the starboard buoy is 7. _____ in shape and bas a 8. _____ as a top mark.
By night the port-hand buoy is distinguished by its 9. _____ light and a stbd-hand buoy by its 10. _____ . A buoy used to indicate the direction of deeper water relative to it is called a 11. _____ buoy. Such buoys are pillar or 12. _____ buoys in combinations of black and yellow colours with black double-13. _____ topmarks. A cardinal buoy exhibits a 14._____ light, the characteristics of which are based on a group of very quick 15. _____ . This distinguishes it first as a cardinal 16._____ *(S,* W, N, E) and then indicates its 17. _____ . This system of 18. _____ was introduced in N-W Europe in phases from 1977 to 1981.

A.5 Add the missing word (IALA system A). After having done this task, work in pairs (one student only has the picture of a buoy and asks his classmate to describe the buoy or helps him by asking questions about the features of the buoy (e.g. colour, type of buoy, topmark, light):

****

Port Marks

Colour: _____
Type of buoy: conical with spar
Topmark: _____

Light: _____ (colour)



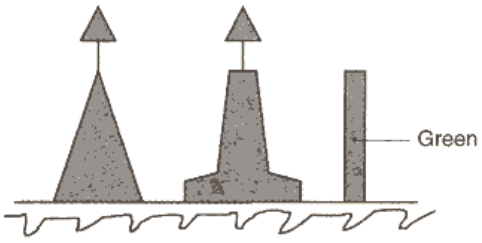


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Starboard Marks

Colour:
Type of buoy: _____ with spar
Topmark: A _____ cone with apex up
Light: _____ (colour)

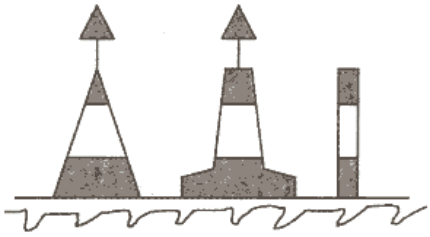




****

Main Channel to Port

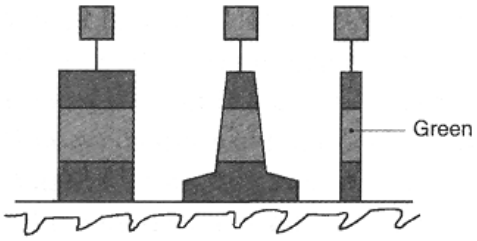
Colour: _____ with one wide horizontal band
Type of buoy: _____ with spar
Topmark: a green _____ with vertex up
Light: _____ (colour)



****

Main Channel to Starboard

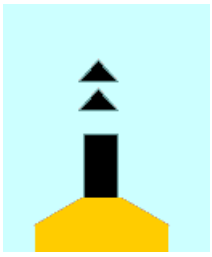
Colour: _____ with one green horizontal _____
Type of buoy: Cylindrica1, with _____
Topmark: A green _____
Light: _____ (colour)

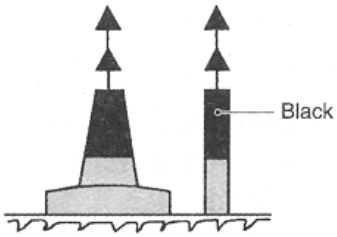


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North Cardinal Mark

Topmark: _____ double cone with vertexes (points) up
Colour: Black over _____
Type of buoy: _____ or pillar
Light: _____ (colour)



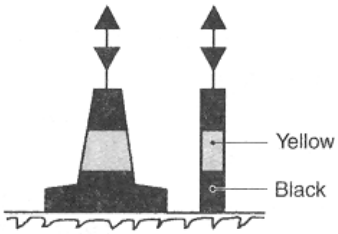


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East Cardinal Mark

Topmark: Black double- _____ with bases together
Colour: _____ with one yellow horizontal band
Type of buoy: _____ or _____
Light: _____ (colour)

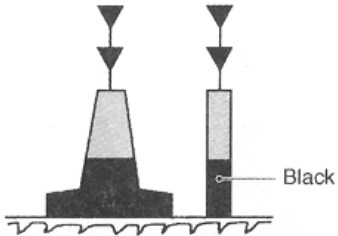




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South Cardinal Mark

Topmark: _____ double-cone with _____ down
Colour: _____ over black
Type of buoy: _____ or pillar
Light: White in _____



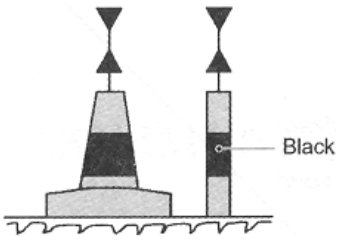


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West Cardinal Mark

Topmark: _____ double- _____ with _____ together
Colour: _____ with one black horizontal band
Type of buoy: spar or _____
Light: _____ in _____



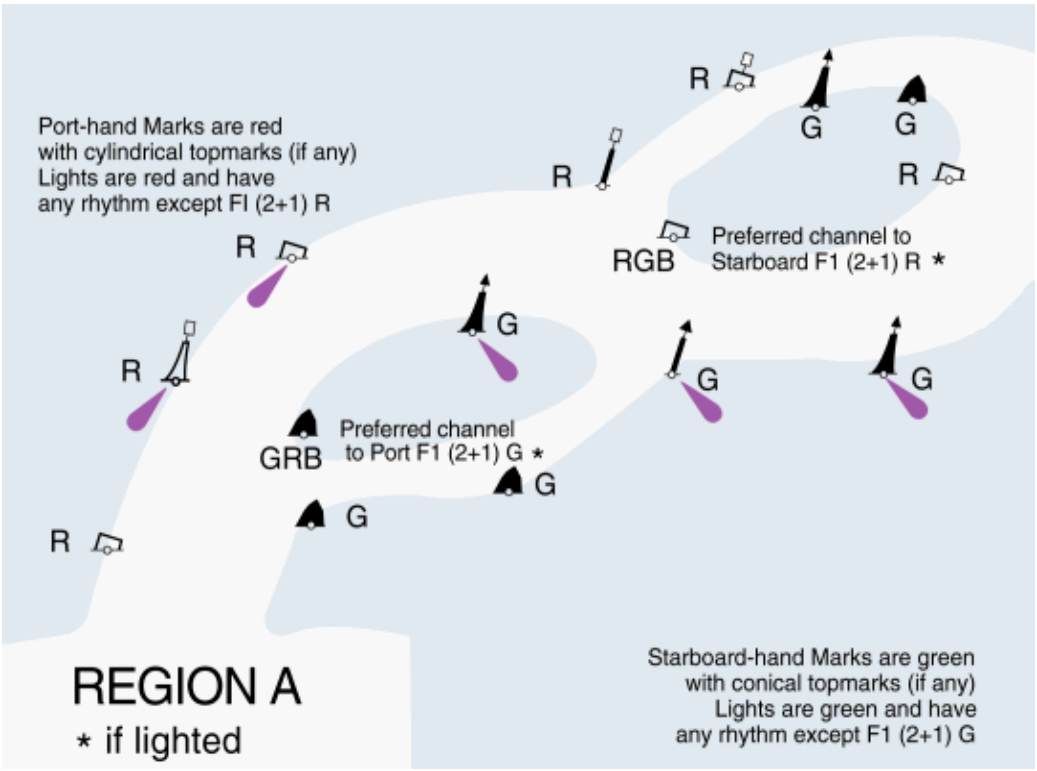


A.6 Match the term on the left with the appropriate definition on the right:

1. Fixed (F)	**A.** This Light has equal duration between light and darkness. A period consists of both a light and a dark interval. Also called Equal Interval (E Int).	1-
2. Flashing (Fl):	**B.** the opposite of flashing, the light is more on then off.	2-
3. Very Quick Flashing (VQ):	**C.** This light shines with an unblinking and steady intensity and is always on. In this example a yellow fixed light is shown.	3-
4. Isophase (Iso):	**D.** The duration of the light is always less than the duration of the darkness. The frequency does not exceed 30 times per minute.	4-
5. Occulting (Occ):	**E.** This light changes colour. This special purpose light is typically used for special applications requiring the exercise of great caution. In this example ALT.WG is shown, alternating between green and white.	5-

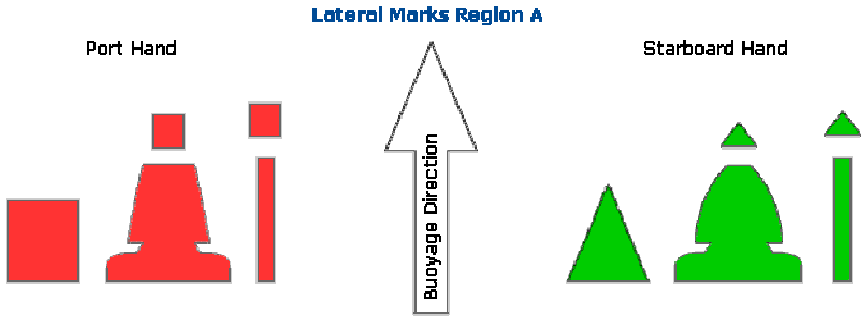
6. Alternating (AL):	**F.** This light has one long flash in a period. A long flash is at least 2 seconds long.	6-
7. Long-Flashing (LFL):	**G.** the duration of very quick flash is less than the darkness. The frequency is at least 100 times per minute.	7-

A.7 You are the OOW on board a big ship. Follow the picture below (Region A) and describe the buoys and marks you can see on your port and starboard side as you navigate from the south-west to the north-east.



A.8 Supply the missing information (consult the text on* Lateral Buoys and Marks*):

The location of **lateral buoys** defines the borders of _____ and indicates the _____. Under IALA A red buoys mark the _____ side of the channel when returning from sea, whereas under IALA B green buoys mark the port side of the channel when sailing towards land. Red buoys have _____ numeration plus red lights and green buoys have _____ numeration plus green lights. Lateral lights can have any calm phase _____ except FL (2+1).



Generally, when two channels meet one will be designated the _____ channel (i.e. most important channel). The buoy depicted on the right indicates the preferred channel *to* _____ under IALA A. The light _____ characteristic is R FL (2+1):

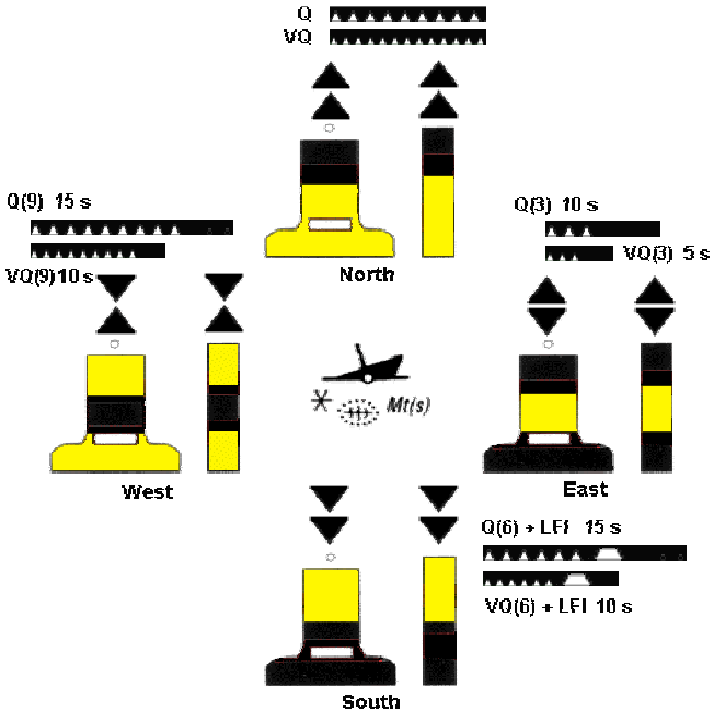
.

The buoy depicted on the left indicates the preferred _____ *to port* under IALA A. These buoys are marked with the numerations of both channels. The light phase characteristic is G FL (2+1):



A.9 Supply the missing information (consult the text on Cardinal Buoys*):*

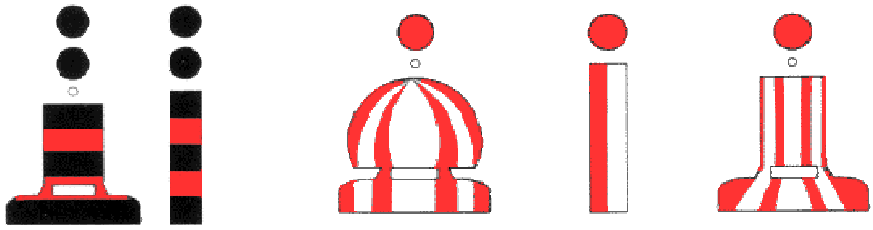
The four cardinal buoys indicate the _____ side of a danger with an approximate bearing. For example, the West cardinal buoy has safe water on its West and the _____ on its East side. Notice the 'clockwise' resemblance of the light phase characteristics. The_____ consist of two black triangles placed in accordance with the black/yellow scheme of the buoy. When a new obstacle (not yet shown on charts) needs to be marked, **two** cardinal buoys will be used to indicate this _____' danger. The cardinal system is identical in both the IALA A and IALA B _____ systems.



Cardinal Buoys indicate that the _____ water occurs at the side of the mark's name. They are placed to the north, south, east or west from the _____. The cardinal buoys have mainly the shape of columns or poles. They are painted in horizontal, yellow and black _____, and their topmarks (two cones) are painted _____. The arrangement of cones at the top is an indication of the black stripe (or stripes) position on the buoy:

- cones with tops _____: the black stripe is above the yellow one,
- cones with _____ down: the black stripe is under the yellow one,
- _____ with bases towards one another: the black stripes above and below the yellow one,
- cones with tops towards one another: the black _____ with the yellow stripes above and below.

A.10 Supply the missing information (consult the text on Marks indicating Isolated dangers):



Marks indicating Isolated dangers are placed directly over minor _____ around which the water is navigable. They have _____ of columns, poles or other, however, they are difficult to confuse with the cardinal buoys. They are _____ with horizontal red stripes. The topmarks consists of two black _____ one above the other. The light is white - a group _____ light Fl(2) with two flashes in a group.

This type of buoy indicates the position of an isolated danger, contrary to _____ buoys which indicate a direction away from the danger.

A.11 Insert the missing word by translating it into English (IMO SMCP 2001) - Buoys

IMO STANDARD MARINE COMMUNICATION PHRASES

llI/3.2 - *NA VIGATIONAL WARNING INVOLVING*

3.2.1 - Land- or sea-marks

3.2.1.1 - Defects
... (charted name of light/buoy) ... (position) _____ ***(bez svijetla).***
... (charted name of light/buoy) ... (position) _____ ***(nepouzdana).***
... (charted name of buoy) ... (position) _____ ***(oštećena).***
... (charted name of light) ... (position) _____ ***(uništena..***
... (charted name of buoy) ... (position) _____ ***(izvan pozicije).***
... (charted name of buoy) ... (position) _____ ***(nestala)*** .
Fog signal at ... (charted name of light) ... (position) _____ ***(ne radi)*** .

3.2.1.2 *Alterations*
... (charted name of light/buoy) ... (position) _____ ***(privremeno promijenjeno/a u) ...***
... (charted name of light) ... (position) _____ ***(privremeno obustavljeno/a)*** (when appropriate).
3.2.1.3 - *New and moved*
... (charted name of light/buoy) ... (full characteristics) _____ ***(postavljena na poziciji) ... .*** ... (charted name of light) ... (full characteristics)... (charted name of light/buoy) _____ ***(premješteno/a) ...*** (in miles and decimal miles) ... (direction) _____ ***(na poziciju) ... .***

3.2.2 - *Drifting objects*

Hazardous mine _____ ***(pluta) in vicinity ...*** (position) ***at ...*** (date time if known).
Unlit _____ ***(napušteni brod) adrift in vicinity ...*** (position) ***at ...*** (date time if known).

A.12 The chunks (i.e. groups of words) in two sentences(2 and 3) in the text below have been jumbled. Put them in the right sequence. (see Notices to Mariners No. 3)

(1) Following review of the aids to navigation in the approaches to Bideford, two additional lighted buoys are to be established as below. (2) *indicate / the positions given / the buoys will be established / where it is currently anticipated that /*. (3) They will however be positioned to best advantage after final survey when they are laid. (4) *by a further notice to mariners / will be advised/ once they have been established / the exact positions of deployment/* .

A.13 The words of the sentences below have been jumbled. Put the in the right sequence. The first word is also the first word of the complete sentence. (Consult the Notices to Mariners)

1. Wave to actuated discontinued whistle be.
2. The buoy lighted been marking discontinued the wreck has.
3. During GPS planned trials jamming the DGPS signal from the lighthouse transmitted unreliable may be.
4. The new with light conical fitted an increased established range buoy has been now.
5. A green will topmark no fitted longer be.
6. No given will further notice be.

B. Grammar

B.1 Supply the right prepositions:

Remembering always the direction 1. _____ the flood stream, conical buoys must be 2. _____ the starboard-hand, can buoys must be kept 3. _____ the port hand, and spherical buoys mark the ends 4. _____ middle grounds. There are only two colours 5. _____ a conical buoy: black, or black and white checks. There is also the conical buoy with a spar structure and this usually carries a light, bell or whistle and often marks the entry 6. _____ a harbour or estuary. It is also painted black. The can buoys, to be kept 7. _____ the port band, are painted red, or red and while.

B.2 Supply the adjective in brackets in the right place:

The following assumptions are inherent in the provision of AtoN (***general***):

- Reliance is not placed on a AtoN. (***single***)
- AtoN will continue to be required for the foreseeable future for position fixing and for confirmation of position/orientation, looking carefully at the mix to provide the correct balance between traditional AtoN and new radionavigation systems. (***visual***)
- Overall, it is envisaged there will be a gradual reduction across the spectrum of traditional AtoN and components, which they support, as a result of improved shipboard Navaid equipment fits and the availability of systems (***alernative***) However, it is currently envisaged that major changes are to come into effect for a number of years. (***unlikely***)
- light need exceed 24 miles nominal range. (***no***)
- Fog signals are provided for hazard warning purposes only.
- aids (such as buoys and light floats) shall not be relied upon for position fixing purposes, (unless the positions of these are capable of being monitored by a Vessel Traffic Service (VTS) or other means are in place to provide a warning to the mariner that the buoy/light float is off station. (***floating***)
- buoys and beacons should not be deployed in areas where there is a significant risk of vessels colliding with the AtoN station at night. (***unlighted***)

B.3 Put the verb in brackets into the right place:

All lighted navigation aids either **major** or **minor lights**, where major lights for key navigational points along seacoasts, channels and harbour and river entrances **(are), (are used).**

These lights are normally in lightships, lighthouses and other permanently installed structures, both high intensity and high reliability of the lights **(are placed), (providing).**

Major lights then in primary lights , i.e. very strong, long range lights used for the purpose of making landfalls or coastal passages and secondary lights **(are subdivided).**

Shorter range lights for example at harbour and river entrances **(are found).**

Important details of primary lights in a reference called the Light **List (can be found)**.

There information about pedestals etc. can be found which not in the chart **(is included).**
Minor lights on the other hand are likely within harbours, along channels and rivers **(to be found).**

These have a low to moderate intensity and sometimes isolated dangers **(mark).**

B4. Supply the missing article where required (a , an, the or 0):

Attempts to establish _____ international uniform system of buoyage have never met with success. _____ system proposed in 1936 under the auspices of ____ League of Nations might have succeeded had not World War II intervened before a sufficient number of maritime States had ratified _____ system. _____ buoyage system adopted for ____ British waters was based on the 1936 proposals. ____ system called the 'lateral system' is based on knowledge of _____ direction of the main stream of flood. ____ sides of ____ channels are marked by buoys described as 'starboard hand' or 'port hand', these terms denoting ____ side that would be on _____ mariner's right-hand or left-hand, respectively, when going with ____ main flood stream or approaching _____ harbour from seaward.

B4. Supply the missing preposition:

Starboard-hand buoys are conical _____ shape; painted black or _____ black-and-white chequers; a top mark (if fitted) of a black cone or a black diamond; and a light (if one is carried) _____ one, three or five white flashes.

Port-hand buoys are can-shaped; painted red or _____ red-and-white chequers; a top mark (if fitted) or a red can or red T; and a light (if one is carried) _____ two, four or six white flashes.

Middle-ground buoys, which mark the ends _____ middle grounds, are spherical _____ shape. The lights they may exhibit are either white or red and distinctive, so that there is no uncertainty as _____ which side they must be passed. In cases _____ which the main channel lies _____ starboard (when proceeding _____ the main flood stream), or when channels are _____ equal importance, middle-ground buoys are painted _____ red-and-white horizontal bands. _____ cases

in which the main channel lies _____ port (when proceeding with the main flood stream) they are painted _____black-and-white horizontal bands. When top marks are carried, if the main channel lies to starboard (when proceeding _____ the direction _____ the main flood stream) the outer end middle-ground buoy is marked with a red can and the inner end _____ a red T. If the main channel lies _____ port, the outer end top mark_____ a middle-ground buoy is a black cone and the inner end a black diamond. If the channels are _____ equal importance, the outer and inner end buoys are marked _____ a red sphere and a red St. George's Cross, respectively.

C. Writing skills

***C.1** Use the following questions as guidelines to summarize the reading text:*

1. What are the main uses of buoys?
2. Which buoyage systems are used today?
3. What does a buoy indicate in the Lateral System?
4. What does it indicate in the Cardinal System?
5. How are buoys used in the Uniform Lateral System?
6. What is the most recent system of buoyage in use?
7. Which marks are used in the IALA Buoyage System?
8. What must a navigator do when entering unfamiliar pilotage waters?

Supplements

1. Abbreviations - Buoyage

Abt.	About
Alt.	Alternating
Amb.	Amber
Aux.	Auxiliary
Bear'g(s)	Bearing(s)
Betw'n	Between
Blk.	Black
Bl.	Blast(s)
Brkwtr.	Breakwater
Br.	Bridge when already been spelt in full
B.W.H.S.	Blk. And Wh. Horiz. Stripes
B.W.V.S.	Blk. And Wh. Vert. Stripes
Comm.	Commencing
Cheq.	Chequered
Con.	Conical
Chann.	Channel
Circ.	Circular
Dir. Lt.	Direction Light
Dist. Sigs.	Distress Signals
Dur.	During
Diamd.	Diamond
Diaph.	Diaphone
E.	East
E. Car.	East Cardinal
E. F. Horn	Electric Fog Horn
Fix.	Fixed
F. Fl.	Fixed and Flashing
F. Gp Fl.	Fixed and Group Flashing
Fog Det'r Lt.	Fog detector Light
Fl.	Flash(es), Flashing
Ft.	Foot, Feet
Giv.	Gives, Giving
Grn.	Green
Gp.	Group
Hd.	Head
Ho.	House
Harb.	Harbour
IALA	International Association of Lighthouse Authorities
Iso.	Isophase

Isl.	Island
Inn.	Inner
Lifebt.	Lifeboat
L. Fl.	Long Flashing (a flash at 2 seconds or more)
Lt(s)	Light(s)
Ldg.	Leading
m.	metres
Ml(s)	Miles
Mk.	Mark
Mo.	Morse Code Fog Sig.
Nr.	Near
N	North
N Car.	North Cardinal
Occ.	Occulting
Out.	Outer
Or.	Orange
Occasn(y)	Occasionally
Obsc.	Obscured
Pt.	Point
Prev.	Previous
Pierh'd	Pierhead
Racon	Radar Responder Bn.
Ra. Refl.	Radar Reflector
R.C.	Non-directional Radio Beacon
Ro Bn.	Radio Beacon
Rlwy(s)	Railway(s)
R.T.	Radio Telephone
R.W.H.S.	Red and White Horizontal Stripes
S	South
S. Car.	South Cardinal
S.D.S.	Special Distress Sig.
Stf.	Staff
Str(s)	Stripe(s)
Sq.	Square
Stmr.(s)	Steamer(s)
Spher.	Spherical
Sect.	Sector
Sig.(s)	Signal(s)
Thro.	Through
Triang.	Triang(le)ular
Tyfon	Fogtyfoon
(U)	Unwatched
Vert.	Vertical(ly)

Vis.	Visible
Vi.	Violet
V. Qk. Fl.	Very Quick Flashing (100 or 120 flashes per minute
W	West
W. Car.	West Cardinal
Wh.	White
W/T	Wireless
X	Diagonal Cross
Yd(s)	Yard(s)

2. Abbreviations / Acronyms

AIS Automatic Identification System
AtoN Aids to Navigation
DETR Department of the Environment Transport and the Regions
DGPS Differential Global Positioning System
GLA General Lighthouse Authority
GPS Global Positioning System
HA Harbour Authority
HDPC Harbours Docks and Piers Clauses Act
IALA International Association of Marine Aids to Navigation and Lighthouse Authorities
IMO International Maritime Organisation
IOS Inspector of Seamarks
LLA Local Lighthouse Authority
MSA Merchant Shipping Act
MTBF Mean Time Between Failures
MTTR Mean Time To Restore Navaids Navigational aids (shipborne)
NCR Normal Conditions Restored
SACs Special Areas of Conservation
SOLAS Safety of Life at Sea
TH Corporation of Trinity House
THLS Trinity House Lighthouse Service
VTS(s) Vessel Traffic Service(s)

2. NOTICE TO MARINERS

NOTICE TO MARINERS
No.7/08 C4

OAZE BANK LIGHTED BUOY

Date : On or about 11th April, 2008

Amendment : To be moved 032° x 415 metres to Latitude 51° 29'.36N., Longitude 00° 56'.95E.

Movement to be effected consequent upon a recent survey.

No further notice will be given.

2.
1 Amendment : Wave actuated whistle to be discontinued.

2 Amendment (1) : Further to Trinity House Notice to Mariners 11/08 F2 dated 14th April, 2008. The positions of deployment of the two new buoys are as follows:-
1.1. Station : Grey Sand Hill Lighted Buoy.

Position : Latitude 51° 03'.653N., Longitude 04° 12'.156W.
1.2. Station : Crow Point S Lighted Buoy.

Position : Latitude 51° 03'.582N., Longitude 04° 11'.556W.

Amendment (2) : In addition, the Outer Pulley Lighted Buoy has been moved 25 metres to a new assigned position of
Latitude 51° 04'.338N., Longitude 04° 12'.920W.

3 Amendment : Following review of the aids to navigation in the approaches to Bideford, two additional lighted buoys are to be established as below. The positions given indicate where it is currently anticipated that the buoys will be established. They will however be positioned to best advantage after final survey when they are laid. The exact positions of deployment will be advised by a further notice to mariners once they have been established.

4 Amendment: During planned GPS jamming trials the DGPS signal transmitted from the lighthouse may be unreliable.

5 Amendment : The lighted buoy marking the wreck has been discontinued.

Former Position: 270° about 200 metres from the wreck

Notice is hereby given to all concerned in the ship and the cargo that consequent upon the discontinuance of the buoy marking the wreck, the Corporation of Trinity House has relinquished possession of the wreck under sections 252 and 253 of the Merchant Shipping Act 1995.

Mariners are advised that at the time the lighted buoy was discontinued the clearance depth over the wreck was 2.3 metres LAT

6 Amendment : Navigation light arc of visibility is now as follows and not as previously advertised:-

Green 180.5 deg - 258.5 deg (78deg)
White 258.5 deg - 261.5 deg (03 deg)

Red 261.5 deg - Shore.
Characteristics to remain otherwise unaltered

7. Amendment : Moved to a revised permanent assigned position in
Latitude 51° 29'.593N., Longitude 01° 07'.111E

8. E. MID GROUND LIGHTED BUOY

Amendment : Moved 247 deg x 380 metres to Latitude 51 deg 27'.750N.,
Longitude 02 deg 54'.985W.

Movement effected consequent upon a survey.

No further notice will be given.

By Order,

Captain D. Glass,

9. SEVEN STONES LIGHT VESSEL (ALL Vol.A 0020)
Latitude 50 deg 03¢.616N., Longitude 06 deg 04'.337W. (WGS 84 Datum)

Date : On or about 27th October, 2007.
Amendment: The existing Light vessel to be withdrawn and a replacement Light Vessel to be established, as follows:-
Red hull: Light tower amidships: Fl (3) 30 seconds: nominal range 15 miles carried at a height of at least 12 metres above the water line: exhibited during the hours of darkness and in periods of reduced visibility, as follows:-

Flash : 0.5 second
Eclipse : 4.5 seconds
Flash : 0.5 second
Eclipse : 4.5 seconds
Flash : 0.5 second
Eclipse : 19.5 seconds

Total : 30.0 seconds

Fog signal giving 3 blasts of 2 seconds duration every 60 seconds.

Racon, as follows:-

Type : Agile Frequency
Code : Morse “O”
Nominal Range : 10 miles
Frequency : X band 9320 MHz to 9500 MHz S band 2920 MHz to 3100 MHz

Display period : On 20 seconds.
Off 40 seconds.

Total 60 seconds.

Mariners are advised that the above date differs to that previously advertised in Trinity House Notice to Mariners No.40/2007 E4 dated 1st August, 2007.

9. Amendment : The lighted buoy marking the wreck has been discontinued following complete removal of the wreck

10. SOUTHWOLD LIGHTHOUSE (ALL Vol.A 2272)
Latitude 52° 19'.632N., Longitude 01° 40'.886E.

Date : On or about 24th September, 2007

Amendment : For a period of about 3 weeks, the light and daymark may be partially obscured by scaffolding & sheeting during daylight. There will be no apparent alteration to visibility of the light during nightime.

11. Further to Trinity House Notice to Mariners N0 31/07 dated 5th June 2007.

The General Lighthouse Authorities are establishing a new Enhanced Loran (eLoran) station in Cumbria, UK (approximate coordinates are Latitude 54° 54'.65N. Longitude 003° 17'.23W). System verification and calibration will start on or around 1 October and the broadcast signal will be "blinked" meaning that user receivers should not use the signal. The station will be declared fully operational around 1 December when the "blink" will be removed so that user receivers can use the signal. Existing Loran receivers may require software upgrades from their equipment suppliers to use the new signal.

The signals from Cumbria will be pulsed, with a Group Repetition Interval of 6731 (67,310 micro seconds) and an Emission Delay of 27,300 microseconds. The signals will be modulated with Eurofix data messages with the facility to broadcast both differential Loran corrections and Universal Co-ordinated Time parameters.

Maritime Users are strongly encouraged to use LORAN as a navigational input system to back-up the widespread use of GPS.

All radio navigation systems are susceptible to interference (including jamming) and environmental effects, which can adversely affect their availability. The GLAs strongly advise that no single aids to navigation system should be used in isolation and that users should use all alternative means available to cross check the information received.

The General Lighthouse Authorities are committed to the future of eLORAN as offering a terrestrial radionavigation system without the vulnerability to interference of GPS, and are keen to hear feedback from the user community on the performance of eLORAN.

12. AIS AS AN AID TO NAVIGATION

Mariners are advised that on or about 28th September 2007, AIS will be transmitted as an Aid to Navigation at the following Stations:-

NAME----------STATION TYPE---------POSITION (WGS 84)----------MMSI NUMBER

CROMER---------Lighthouse----------Lat 52°55'.482N., Long 001°18'.990E-----992351015

ORFORDNESS---Lighthouse----------Lat 52°05'.033N., Long 001°34'.459E-----992351016

When observed on the Minimum Keyboard Display (MKD), the minimum carriage requirement for SOLAS vessels, for each Aid to Navigation the mariner will see:-

MMSI number
Name
Position
Bearing and distance from observer

Mariners using certain Radar and Electronic Chart Displays may see a symbol on the display and on interrogation, as a minimum, the above information will be available.
If displayed, the screen symbol for an AIS AtoN is a diamond shape.

Currently there is a variance on information that will be displayed by different manufacturers on Electronic Chart and Radar equipment.

Paper charts will have an amendment applied with AIS, written in magenta, adjacent to the AtoN.

By Order,

Captain D. Glass,

Director of Navigational Requirements.

Trinity House,
London EC3N 4DH
4th September, 2007

13. Further to Trinity House Notice to Mariners No.33/07 G3, the new buoy with an increased light range has now been established. A green conical topmark will no longer be fitted.

14. WRECK
FIRST WORLD WAR SUBMARINE
Latitude 50 deg 57'.841N., Longitude 01 deg 21'.622E (WGS 84 Datum)

Mariners are advised that commencing on Monday 6th August, 2007 a diving survey will be carried out in the immediate vicinity of the above position, being the site of the wreck of a First World War submarine.

The site lies within the SW bound lane of the Dover Strait Traffic Separation Scheme, south of the Varne Bank.

The survey is expected to take 4 days, subject to sea and weather conditions. During these operations the Trinity House Vessel GALATEA will be stationed over the wreck and MV MAIR will act as a guardship, stationed south of the Varne Bank in the SW bound lane of the Dover Strait TSS.

Regular Broadcasts on the progress of the works will be made through the Channel Navigation Information Service (CNIS), at Dover.

Mariners are requested to give the site and the vessels conducting the operations a wide berth.

15. STONES LIGHT VESSEL (ALL Vol.A 0020)
Latitude 50 deg 03¢.616N., Longitude 06 deg 04'.337W. (WGS 84 Datum)

Date : On or about 20th October, 2007.

Amendment: The existing Light vessel to be withdrawn and a replacement Light Vessel to be established, as follows:-

Red hull: Light tower amidships: Fl (3) 30 seconds: nominal range 15 miles carried at a height of at least 12 metres above the water line: exhibited during the hours of darkness and in periods of reduced visibility, as follows:-

Flash : 0.5 second
Eclipse : 4.5 seconds
Flash : 0.5 second
Eclipse : 4.5 seconds
Flash : 0.5 second
Eclipse : 19.5 seconds

Total : 30.0 seconds

Fog signal giving 3 blasts of 2 seconds duration every 60 seconds.

Racon, as follows:-

Type : Agile Frequency
Code : Morse "O"
Nominal Range : 10 miles
Frequency : X band 9320 MHz to 9500 MHz S band 2920 MHz to 3100 MHz

Display period : On 20 seconds.
Off 40 seconds.

Total 60 seconds.

16. SUNK PRECAUTIONARY AREAS & TRAFFIC SEPARATION SCHEMES

The following alterations to aids to navigation were effected on 30th June, 2007, as part of the new IMO recognised Traffic Separation Schemes "In the Sunk area and northern approaches to the Thames Estuary" implemented w.e.f. 0000 1st July, 2007.

1. Changes to characteristics and moves of existing aids to navigation.

1.1 Station : Sunk Light Vessel (ALL Vol.A 2170).

Amendment : Moved 98° 6.94 nautical miles to
Latitude 51° 50'.100N., Longitude 01° 46'.020E., name changed to "Sunk Centre" and Racon code changed to Morse 'C'. Characteristics remain otherwise unchanged.

1.2 Station : Kentish Knock Lighted Buoy.

Amendment : Moved 177° 830 metres to
Latitude 51° 38'.085N., Longitude 01° 40'.429E.

1.3 Station : S. Inner Gabbard Lighted Buoy.

Amendment : Moved 191° 1.33 nautical miles to
Latitude 51° 49'.922N., Longitude 01° 51'.892E.

1.4 Station : N. Galloper Lighted Buoy.

Amendment : Moved 117° 781 metres to
Latitude 51° 49'.837N., Longitude 01° 59'.993E.