

## CHAPTER FIVE.

### CHARTS.

An ordnance survey map is familiar to us all. A similar detailed mapping of the sea is called a Chart. Charts are made on various scales, from one sheet covering most of the world to a similar sheet covering one small harbour, (known as a harbour plan). Charts are made according to a mathematical projection, that is to say, as the earth's surface is curved it can only be shown upon a flat surface by projecting it, and this involves distorting it in some way.

There are basically two different types of navigational charts issued by the Admiralty, the difference being in the method of projection. These two projections are called the Mercator and the Gnostic projections, the latter being used for large scale charts covering small areas. The Admiralty publish a chart catalogue covering the whole of the world's surface and listing the charts covering the various areas.

The charts can be roughly divided into three main groups;

- 1/ general charts on a small scale covering large area.
- 11/ coastal charts of larger scale, and
- 111/ detailed charts of harbours and estuaries, etc.

A 'home' section of this chart catalogue covering the British Isles and the N.W. coast of Europe as far as the Kiel Canal is issued separately.

Each chart is known by a name and number and it is wise to always quote them both when ordering. Approximately 4,000 British Admiralty charts are published to span the world. Various other specialised charts such as magnetic variation, track charts and tidal stream atlases are also available. Most large chandlers stock a selection of charts and will be able to order what ever they do not stock.

British Admiralty charts are now being republished with depths and heights in metres, and it is expected that all charts for home waters will have been revised within the next five years. On these charts extensive use is made of colour, an invaluable aid for quick reference. The nautical mile and its relation to the Cable are unaltered. Ten cables still equals one sea (or nautical) mile. The Admiralty, however, have adopted a new length for the Nautical Mile of 6,076.115 feet, and this is equivalent to 1,852 metres. This small change from 6,080 feet makes no practical difference as far as we are concerned.

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## COASTAL NAVIGATION—CHARTS

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● **Chart Corrections.** Charts issued by Admiralty Chart Agents/Depots are corrected to date of issue for New Editions, Large corrections and Small corrections.

● **Admiralty Notices to Mariners** give details of small corrections to be made to charts—permanent, temporary and preliminary. Permanent corrections should be entered in violet waterproof ink on the chart

Temporary corrections should be entered in pencil.

Notices to Mariners may be seen at HM Customs offices. Arrangements for corrections may be made through Chart Agents.

● **Chart Symbols and Abbreviations** are detailed in Admiralty Chart No. 5011.

● **Chart Sizes.** The larger the scale, the greater the accuracy and amount of information given. Use the largest scale chart available

● **Soundings.** The unit of soundings (Metres) is given under the Chart Title. Where Fathoms are used, soundings are usually shown in Fathoms and Feet under eleven fathoms: depths of more than 21 are always given in whole metres, whereas depths of less than 21 are given in metres and decimetres e.g. 5.3 which means 5.3 metres.

● **Chart Datum** the reduction level for soundings is given in the tidal information table or under the title.

● **Drying Heights:** Underlined figures on banks or rocks which uncover are given in METRES ABOVE CHART DATUM, unless otherwise stated — 2 6 1

Heights. All other heights (lights etc) are given in METRES AND DECIMETRES ABOVE MEAN HIGH WATER SPRINGS, unless otherwise stated and are shown: 1 6, 0 6 e.g. dries 1.6m

● **Scale.** A Sea Mile is the length of a minute of Latitude AT THAT PLACE (i.e. on that parallel) A CABLE is 1/10th of a Sea Mile.

● **Depth Contours** (called 'Fathom Lines' on older charts) Depth Contours are drawn in fine firm lines, broken in places where there are figures indicating the depth in metres.

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## INFORMATION FROM CHARTS.

The following can be discovered from studying a good Chart :

1. Land features. Only the features that are going to be of any use to the navigator are shown. For example, towers, church spires, hills etc.
2. Light houses. Lighthouses along a particular stretch of coastline all have different characteristics so that one may not be confused with another.
3. Depths. All depths are given below Chart Datum, (see 4 overleaf) and the units are stated under the title. The legend 'DEPTHS IN METRES' is printed in colour outside the top and bottom borders of the chart. In places where there is no appreciable tide, depths are given below sea level. Depths of more than 21 are always given in

whole metres, where-as depths of less than 21 are given in metres and decimetres, e.g. 5<sub>3</sub> which means 5.3 metres.

4. Datum. As has already been explained, the sea rises and falls, therefore, depth is not constant, hence Chart Datum. See Diagram 9.
5. Depth Contours are lines joining points of equal depth. (Called 'Fathom lines' on older charts).
6. Heights. Heights other than drying heights are given in metres above M.H.W.S. (mean high water springs), except in places where there is no appreciable tide, where such heights are referred to sea level. Drying heights are given in metres and decimetres above Chart Datum and underlined thus 16 06 etc.
7. Danger. Foul ground for example, remains of wreck or other debris where it would be unwise to anchor.
8. Type of sea bed or bottom.
9. Tints and colours. The land tint is buff and drying area are green. The 10 metre contour is edged on the inside with a narrow blue ribbon, and all sea areas contained within the 5 metre contour are blue.
10. Chart Symbols. For a full understanding of all symbols used in British Admiralty charts reference should be made to Admiralty Chart No. 5011 now published in book form. This gives full details of every symbol and abbreviation used and should be included in the equipment of everyone who takes their navigation seriously.
11. Tidal stream and current information. A limited amount of information on tidal streams is shown on a chart. There are two ways of showing these streams;
  - i) by arrows which show the general direction in which the stream normally sets and sometimes








































# List of Chart Symbols.

## COASTAL NAVIGATION—DANGERS

● The Coastal Navigator should readily be able to identify the symbols and abbreviations for "DANGERS" shown on Charts.

### DANGERS



(Based on Admiralty Chart 5011)


	o(12) Above-water Rock which does not cover (with elevation above M.H.W.S. or where there is no tide above M.S.L.)		
	† (3) Drying rocks which cover and uncover (with height above datum of soundings)		
	⊕ Rock wash at the level of chart datum.		
	† Rock with 2 metres or less water over it at chart datum, or a rock over which the depth is unknown, or rock ledge on which depths are known in general to be 2 metres or less.		
	R Shoal sounding on isolated rock.		
	Depth, at chart datum, to which an obstruction has been swept by wire drag.		
	Wreck showing any portion of hull at level of Chart Datum.		
	† Partially or wholly submerged wreck over which the depth is unknown.		
	* Wreck over which the exact depth is unknown but thought to be more than 16 metres; or a wreck over which the depth is thought to be 16 metres or less, but which is not considered dangerous to surface vessels capable of navigating in the vicinity.		
	Foul The remains of a wreck or other foul ground, no longer dangerous to surface navigation, but to be avoided by vessels anchoring, trawling, etc.		
	† Wreck over which the exact depth is unknown but thought to be 28 metres or less, and which is considered dangerous to surface navigation.		
	† Wreck over which the exact depth of water is known		
	Overfalls and tide-rips	 B <sup>h</sup> Bank	 Pos <sup>n</sup> Position
	Eddies	 Sh. Shoal	 (D) Doubtful
	Kelp	 Rf <sup>n</sup> Reef	 Rep <sup>d</sup> Reported
	Coral Reef which does not cover	 L <sup>e</sup> Ledge	 Obst <sup>n</sup> Obstruction
	Visible wreck (On large scale plans)	 W <sup>t</sup> Wreck	 Br <sup>s</sup> Breakers
	Dangerous wreck of which masts and funnel are visible. (On large scale plans)	 Dr. Dries	 Cov. Covers
	(Mast and Funnel) (Mast 5 <sup>ft</sup> ) (Funnel 7 <sup>m</sup> )	 Cov. Covers	 Limiting danger line
		 Uncov Uncovers	 (P.A.) Position approx.
		 (P.D.) Position doubtful	 (E.D.) Existence doubtful
		 Unexam <sup>d</sup> Unexamined	 Discol <sup>d</sup> Discoloured

† This symbol and abbreviation is obsolescent

\* Where the depth over a wreck exceeds 16 metres, or a wreck is otherwise considered non-dangerous, the corresponding symbol is generally given on the largest scale chart only.

† The criterion for dangerous wrecks was changed from 16 metres to 20 metres in 1960, and from 20 metres to 22 metres in 1963. The depth which applies to any particular chart may be deduced from its date of publication, or from the date of the last new edition.

also gives its rate in knots. An arrow indicating ebb stream is shown thus:  and one showing flood is shown thus: 

ii) By diamond shapes , with a letter within. By referring to a table on the chart under the column headed by the letter found in the diamond will be found the compass heading and speed of the tide for each hour before and after high water. Two readings are recorded. The larger of the two being spring tides and the lesser one being neap tides.

12. **Compass Rose.** This is a compass drawn on a chart. They are drawn True  $0^{\circ}$  to  $360^{\circ}$  very large and clear with a small line with half an arrow head reaching out from the centre of the rose pointing to the magnetic north. The amount of annual variation with the year of publication will be shown.
13. **Buoyage.** Navigational buoys are used to show dangers such as sandbanks, which are forever shifting. There are two systems of buoyage - the LATERAL and CARDINAL. The lateral is used in U.K. Waters and in the tidal waters of many other countries while the cardinal system is more commonly used in areas where there exist a large number of offshore islands, rocks or shoals, and the shape of a particular buoy is governed by its true bearing from the danger.

With the Lateral system the character of the buoys used is governed by the direction of approach i.e. a port hand buoy must be left to port when entering a channel or going with the flood stream. In other words, buoys marking the limits of channel and fairways are located so that the meaning is positive when entering a harbour, river or estuary from seaward. When proceeding to seaward the meanings are reversed. A new IALA Buoyage system will be introduced in United Kingdom waters between 1st April 1977 and 31st December 1980 in four stages. This system known as System A is explained in some detail overleaf. Concurrently

with the introduction of this system, a 'conventional buoyage direction' around the coast of the United Kingdom will replace the present practice whereby buoyage is established with regard to the main direction of the flood tide. So far as the coasts of England and Wales are concerned the main alteration is the reversal of the present direction of buoyage on the east coast of England, north of Orfordness. The present practice whereby the direction of buoyage in rivers and estuaries is from seawards inwards will remain unchanged.

Buoys are identified by shape, colour, pattern, top-mark, light, radar, whistle gong, bell, name/number. If numbered porthand buoys show evens, starboard show odds. Remember a buoy may get out of position, be removed or sunk, and the light or sound system may not be working. The main varieties of lights found on buoys are Fixed, Flashing or Occulting. Fixed light is on permanently. Flashing light is one whose period of darkness exceeds the period of light. Occulting light is one whose period of light exceeds the period of darkness. Lights may also be coloured RED, GREEN or WHITE. An example Gp.Fl.(2) 10 sec. 20M is a light that gives two white flashes in quick succession - followed by an interval of darkness - every 10 seconds. The 20M means that it is visible on a clear night 20 miles away from the observer whose eye is 15 ft. above sea level.

I.A.L.A. SYSTEM 'A' In 1975 there were more than thirty different buoyage systems in use world wide, many of these systems having rules in complete conflict with one another. Attempts to bring complete unity had little success until a series of disastrous wrecks in the Dover Strait area in 1971. This prompted the International Association of Lighthouse Authorities (I.A.L.A.) to formulate two sets of rules. One uses the colour red to mark the port hand side of channels and includes both Cardinal and Lateral marks. The other uses the colour red to mark the starboard hand side of channels and utilizes only Lateral marks. These two sets of rules are known as follows . . . .

SYSTEM A The combined Cardinal and Lateral system  
(Red to Port)

SYSTEM B Lateral system only (Red to starboard)

The rules for System A are now complete and have been agreed by the Inter-Governmental Maritime Consultative Organisation, (IMCO)

The essential principle of System A is that all types of marks may be used in combination. The canoeist can easily determine whether a mark is Lateral, Cardinal or otherwise by readily identifiable characteristics.

Lateral marks utilize red or green colour by day and night to denote Port or Starboard side of channels in the sense of the new "conventional direction of buoyage".

Cardinal marks indicate that the deepest water in the area lies to the named side of the mark. Cardinal marks are easily distinguished by day by their double cone top-marks and black and yellow colouration, and by night by their distinctive very quick or quick flashing white light rhythms.

There are two other marks that are aids to navigation. Each has a distinctive white light rhythm which cannot be confused with the very quick or quick flashing lights of the Cardinal marks.

- One is the Isolated Danger mark erected on a danger of small area which has navigable water all round it.
- The other is the safe water mark which also has navigable water all round it but does not mark a danger. (used for example as mid-channel or landfall mark).

There is also a Special mark which differs in that it is not primarily intended to assist navigation but is used to indicate a special feature or area whose nature may be apparent from reference to a chart. A Special mark is yellow with an optional yellow 'X' top-mark. Any light is also yellow.

The new marks of System A are being introduced in agreed stages from April 1977 onwards, starting at the Greenwich Meridian in the English Channel and spreading throughout Europe and beyond. The timetable has been arranged to allow the Hydrographic Services the capacity to keep pace with the necessary chart changes.

## BUOYAGE (1)

Buoys marking the units, of channels and fairways are located so that the meaning is positive when proceeding with the MAIN FLOOD STREAM or when ENTERING A HARBOUR, RIVER OR ESTUARY FROM SEAWARD. Thus, Port-hand buoys are positioned on the left hand side of a channel when entering from Seaward. Starboard-hand buoys mark the right of the channel. When proceeding to Seaward, reverse the meanings.

Main Flood Stream directions are given in Manuals and Almanacs. Briefly, it is Southerly for the East Coast, Easterly for the Channel and Western Approaches, Northerly for the West Coast of U.K. and Ireland.

BUOYS are identified by shape—COLOUR and PATTERN—TOPMARK—LIGHT—RADAR—WHISTLE—GONG—BELL—NAME/NUMBER. If numbered, Porthand buoys show evens, Starboard-hand show odds.

Caution. A buoy may get out of position, be removed or sink. The light or sound-signal may not be working.

### ADMIRALTY CHART SYMBOLS & ABBREVIATIONS

o .	Position of buoy or beacon	
	Light buoy	
	Bell buoy	
	Gong buoy	
	Whistle buoy	
	Can buoy	
	Conical buoy	
	Spherical buoy	
	Spar buoy	
H.S.	Horizontal stripes	
V.S.	Vertical stripes	
Cheq.	Chequered	
W. White	Y. Yellow	
B. Black	G. Green	Oy. Grey
R. Red	Or. Orange	Bl. Blue
	Mooring buoy	
	Mooring buoy with telegraphic & telephonic communications	

The position of a Light Vessel, Buoy, or Beacon is the centre of the Base, and is usually indicated by a small circle

In the case of two-colour buoys each colour is indicated below the appropriate symbol, the colours being shown in alphabetical order.

	**High Focal Plane or Pillar buoy
	Spindle buoy
	Buoys with topmarks
	Barrel buoy
	Light float
	Firing Danger Area buoys
	Wreck buoy
	Telephone or Telegraph buoy
o . † † † † † † † †	Beacons
o B <sup>n</sup>	Beacon, in general
	Beacon tower
	Perch
Ref.	Reflector

\*\*When exceptionally it is necessary to distinguish the markings more definitely the following variations will be used for horizontal, vertical, or chequered buoys:—



† This symbol and abbreviation is obsolescent.

‡ The abbreviation B<sup>n</sup> is normally shown with each beacon symbol

\* For Automatic Bell Buoys period and number of strokes shown thus:—Bell (2) 90 sec.

EXTRACT FROM ADMIRALTY CHART 5011

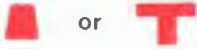


# LATERAL SYSTEM OF BUOYAGE

## CHANNEL MARKS

### PORT HAND BUOYS

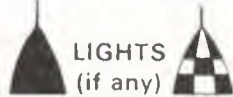
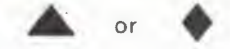
Top Marks



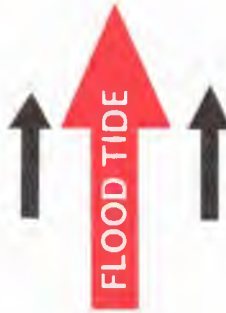
LIGHTS (if any)  
WHITE FLASHES (EVEN) 2, 4 or 6  
or RED 1, 2, 3 or 4

### STBD HAND BUOYS

Top Marks



LIGHTS (if any)  
WHITE FLASHES (ODD) 1, 3 or 5



## MIDDLE GROUND MARKS

### INNER



Leave to Port



Pass EITHER Side



Leave to STBD



### OUTER

### Landfall Buoys



Shape as for Channel marks  
Light—Flashing

### Mid-Channel Buoys



Shape, Topmarks,  
Lights distinct from Channel buoys

### Isolated Danger Buoys



Topmark optional  
Light (if any)  
Flash R or W

## LATERAL SYSTEM OF BUOYAGE

### Outfall and Spoil Ground Buoys



Marks sewers and dredger dumping area. Lights usually Red. Shape varies

### Quarantine Buoy



Indicates anchorage for ships awaiting pratique. Shape varies.

### Telegraph Buoy



Marks submarine cable — Do not anchor in vicinity. Shape varies. Any Shape.

### Danger Zone Buoy



Marks bombing/Firing Range limits. Shape varies.

### Watch Buoy



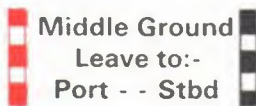
For Lt. Vessel to check position. Any shape.

### Mining Ground Buoy

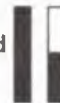


Marks dummy minefields.

Spar Buoys: Fulfil functions similar to buoys and channel marks. Colours usually similar.



Stbd Hand



Isolated  
Danger



# LATERAL SYSTEM OF BUOYAGE

## Wreck Vessels, Buoys and Spars

To be passed on the PORT HAND



To be passed on the STARBOARD HAND



To be passed on EITHER SIDE



## Other Buoys

**Pillar Buoy.** Has a tall lattice-work (see Landfall buoys). Light is thus higher than on other buoys and this is referred to as "High Focal Plane"

**Dan Buoy.** Used to mark submerged fishing nets.

**Mooring Buoys.** Any shape. Keep a careful watch for them at night in harbour or anchorages.

**Water Ski Area Buoys.** The ski area is frequently well marked with distinctive small plastic buoys, brightly coloured.

# I.A.L.A. BUOYAGE

## LATERAL MARKS

PORT  
HAND  
MARKS

Light:  
Colour - red  
Rhythm - any



Navigable  
Channel



Direction of Buoyage



STARBOARD  
HAND  
MARKS

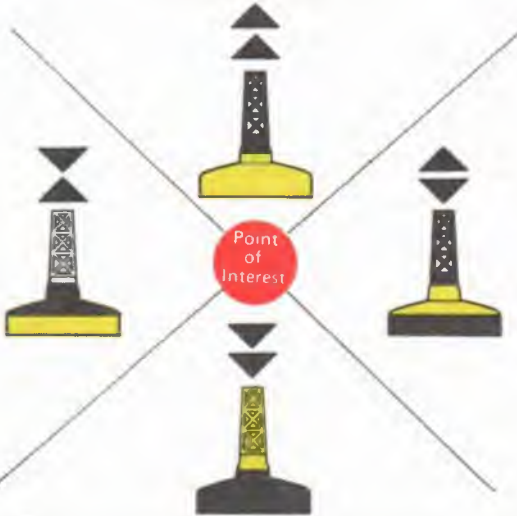
Light:  
Colour - green  
Rhythm - any



## CARDINAL MARKS

Light: V Qk Fl or Qk Fl.

Light: V Qk Fl (9)  
every 10 seconds  
or Qk Fl (9)  
every 15 seconds.



Light: V Qk Fl (3)  
every 5 seconds  
or Qk Fl (3)  
every 10 seconds.

Light: V Qk Fl (6) + LFl every 10 seconds or Qk Fl (6) + LFl every 15 seconds.

LIGHTS: Always white.

## 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 - isophasic, occulting or  
1 long flash every 10 seconds.



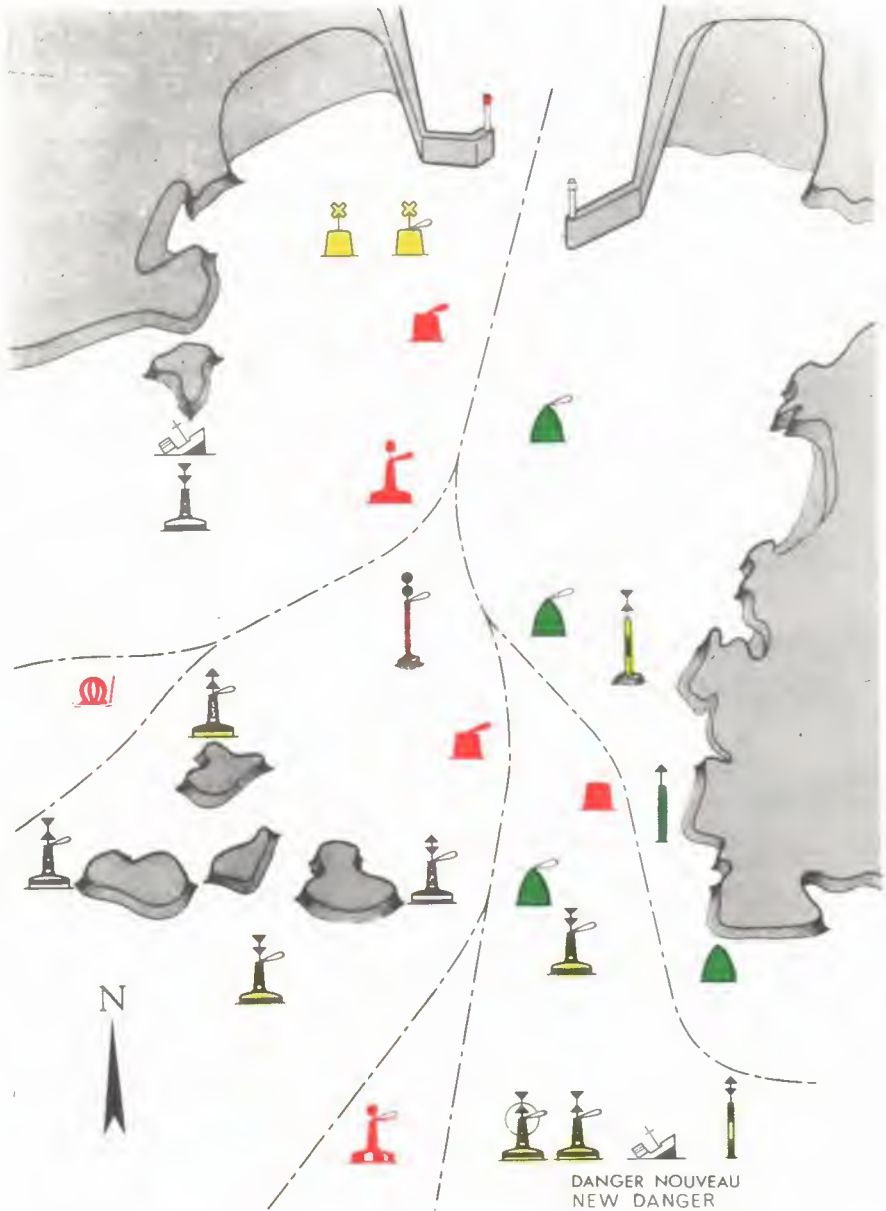
SPECIAL MARKS

Use: Of no navigational significance.  
Light: Colour - yellow.  
Rhythm - different from other white  
lights used on buoys.

Any shape  
permissible



# I.A.L.A. BUOYAGE



I.A.L.A. BUOYAGE

