

## 16 Chart 1 - Symbols, Abbreviations, and Terms

### GENERAL

- A. Chart Number, Title, Marginal Notes
- B. Positions, Distances, Directions, Compass

### TOPOGRAPHY

- C. Natural Features
- D. Cultural Features
- E. Landmarks
- F. Ports
- G. Topographic Terms

### HYDROGRAPHY

- H. Tides, Currents
- I. Depths
- J. Nature of the Seabed
- K. Rocks, Wrecks, Obstructions
- L. Offshore Installations
- M. Tracks, Routes
- N. Areas, Limits
- O. Hydrographic Terms

### AIDS AND SERVICES

- P. Lights
- Q. Buoys, Beacons
- R. Fog Signals
- S. Radar, Radio
- T. Services
- U. Small Craft Facilities

### ALPHABETICAL INDEXES

- V. Index of Abbreviations
- W. International Abbreviations
- X. List of Descriptors

## Nautical Charts

By

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**“Mind your P’s and Q’s”**

**1 nautical mile = 1 minute of latitude**

## 2 Agencies and Publications

### Agencies

National Oceanic and Atmospheric Agency (**NOAA**), National Ocean Service (**NOS**), US Coast and Geodetic Survey produces all the coastal charts associated with the US.

[chartmaker.ncd.noaa.gov/](http://chartmaker.ncd.noaa.gov/)

Department of Defense, National Imagery and Mapping Agency (**NIMA**) produces foreign charts.  
[www.nima.mil/poc/public.html](http://www.nima.mil/poc/public.html)

The British Admiralty (**BA**) in the UK produces a world-wide charts

[www.hydro.gov.uk/](http://www.hydro.gov.uk/)

Private chart producers such as Imray,  
[www.imray.com/imray.html](http://www.imray.com/imray.html)

### Supporting Publications

**Chart 1** defines all symbols and notation used on NOS and NIMA charts. It is based on the standards set by the International Hydrographic Organization (IHO). An outline of Chart 1 appears on page 16.

**Light List (USCG)** presents physical details of all lights used in US coastal waters.

**Coast Pilot (NOS)** provides detailed navigation information and text for numbered notes on charts.

**Local Notice to Mariners (USCG)** weekly source for local maritime information.

**Notice to Mariners (NIMA)** weekly source for all corrections to charts.

**Pilot Charts (NIMA)** are small-scale charts of oceans with weather and routing information.

## Chart Prep Continued 15

9. Circle fixed visual nav aids in pencil and highlight in **yellow**. Label them with an easily spoken name. Do cover critical information.
10. Circle navigation hazards, such as unlit buoys, highlight in **pink**, label.
11. Triangle radar nav aids, highlight in **orange**, label.
12. Identify shipping lanes for merchant ships and, if you can do so without cluttering the chart, highlight them in yellow.
13. Fold in fourths, right over left and bottom over top. Label in lower right corner with name and number. Immediately above/below the label, list the next chart along the N/S track.
14. Chart current date: \_\_\_\_\_
15. Most current edition: \_\_\_\_\_
16. Chart updated through Notice to Mariners:  
Number \_\_\_\_\_ Date \_\_\_\_\_  
Midshipman \_\_\_\_\_  
Nav/AOIC \_\_\_\_\_ OIC \_\_\_\_\_

## 14 Chart Preparation Checklist

- Chart Number** \_\_\_\_\_
1. Sounding Units:  
Feet / Fathoms / Meters \_\_\_\_\_
  2. Highlight sounding datum in **orange**.
  3. Vessel's draft in sounding units  
(7.5 ft = 2.3 m = 1.25 fathoms) \_\_\_\_\_
  4. Vessel's draft rounded up (D) \_\_\_\_\_
  5. Risk factor (R)  
(Exp=1, Med=2, Beg=3) \_\_\_\_\_
  6. Safe depth = D \* R \_\_\_\_\_
  7. Safe contour depth  
(first contour line > safe depth) \_\_\_\_\_
  8. Highlight the safe contour line with **dark blue**.  
With dark blue, **single hash** the shoal areas, and **cross hash** steep areas and danger areas where no room for error exists.

**When annotating chart take care not to cover important information.**

## Projection and Scale 3

Nautical charts represent three dimensions of a marine environment:

Latitude 00-90° N/S of equator  
Longitude 000-180° W/E of prime Meridian  
Depth Soundings in feet, fathoms, or meters

**Chart projection** is the method of mapping a spherical surface onto a flat surface. The two projections in common use are:

**Mercator:** projects sphere onto a cylinder, rectangular grid, longitude distances vary, shortest distance between two points (great circle or rhumb line) is curved on large areas, distance measured by latitude, best for large scale.

**Gnomonic:** projects sphere onto tangent plane, longitude lines straight and converging at poles, latitude lines are curved, shortest distance between two points (great circle or rhumb line) is straight, best for small scale.

### Chart Scales

Large scale	Small area	More detailed
Small scale	Large area	Less detailed

### Chart Series

Sailing Charts	<1:600,000 (small scale)
General Charts	1:150,000-1:600,000
Coast Charts	1:150,000-50,000
Harbor Charts	>1:50,000 (large scale)

## 4 Vertical Chart Datum

Charts attempt to report a realistic minimum depth, taking tidal variations into account. The largest variation in depth is due to spring and neap tides as summarized in the following table:

	Low Tide	High Tide
Spring Tide	Lowest	Highest
Neap Tide	Highest	Lowest

A **datum** is any a reference point from which other measurements may be made. Three vertical or depth datums are in common use:

**Lowest Astronomical Tide (LAT):** The theoretically lowest depth to be expected. Developed by British Admiralty (BA) and adopted by the International Hydrographic Organization (IHO). Used by BA and some NIMA charts. Not used by NOAA/NOS.

**Mean Lower Low Water (MLLW):** Used where there are two tides per day, and this is the average of the lower of the two tides. The actual water depth can be lower than the charted depth.

**Mean Low Water (MLW):** Average of all low tides. Not often used. Least conservative method.

**LAT < MLLW < MLW**

**Soundings** may be in feet, fathoms, or meters.

## Cardinal and Other 13

**Cardinal Marks** – point to safe direction to pass. Danger is on opposite side.

Shapes - Pillar (P) or Spar (S)

Color: black and yellow combination

Top marks:

▲▼▼▲ North South West East

▲▼▲▼ BY YB YBY BYB

Lights Q Q(6) Q(9) Q(3)

If used, light is white. They are Q or VQ and grouped to match the number pointed to by the hand of a clock.

**Seldom used in Region B**

**Safe Water Marks (Mid-Channel Buoys)** – water in area is safe.

Shapes - sphere (SP), Pillar (P), or Spar (S)

Top mark - optional red ball

Color - red and white vertical stripes

If used, light color is white

May use Iso, Oc, Fl 10s, **Mo (A) is common**

**Isolated Danger** – danger immediately below.

Shapes: Pillar (P) or Sphere (SP) preferred

Top marks - two black balls if practicable

Color - horizontal black and red

If used, light color is white group flashing Fl (2)

**Special Marks** – yellow with yellow lights. Top mark is yellow X. Can have most any shape.

## 12 Lateral (Channel) Marks

**Colors** – normally red or green. Red is kept to starboard when entering from the sea.

### Shapes

Green Can (C), Pillar (P), or Spar (S)  
Red Nun, (N), Pillar (P), Spar (S), Cone

**Light Indication** – is made by a magenta dot at the base of the symbol or by a magenta exclamation point as is done for lights.

**Flashing Pattern** – can be anything except that used for preferred channel which is group flashing Fl (2+1). The most common pattern is a single flash (Fl) or a quick flash (Q). When used on a channel mark, quick flash indicates a bend in the channel, e.g., Q R “16” and Q G “11”

**Numbers** – are assigned beginning at the seaward side as the harbor is entered. Red buoys always have even numbers. If numbered, green buoys are always odd. Only channel buoys have numbers.

**Preferred Channel Buoys** – have red and green horizontal stripes and similar in shape to channel marks. The topmost color indicates the preferred channel direction.

RG Preferred channel to port  
GR Preferred channel to starboard

The light color matches the top color of the buoy and always has a group flashing of Fl (2+1).

## Horizontal Chart Datum 5

Surface features are plotted on a LAT/LONG grid by determining a reference point or horizontal datum and figuring out the location of everything else relative to that reference point. Historically, every country used a different datum for their maps and charts. In the United States, the North American Datum of 1927 was in wide use for 60 years, but it has been replaced by the World Geodetic System (WGS). The WGS brings all the datums of the world into sync. As a result the maps of each individual country are probably a tiny bit less accurate, but now all the maps and charts of the world mesh together. The most current WGS survey is 1984 and is called WGS84 or simply WGS. Most nautical charts use this horizontal datum.

The major issue with horizontal accuracy is the accuracy of the latitude and longitude grid. That is, is the grid laid down on the surface of the chart accurately? In general the accuracy of objects relative to each other is usually quite good. This is particularly a problem when taking GPS fixes. The GPS fix may be very precise, but if the LAT/LONG grid is not accurate, the plotted fix will not match the chart.

When using GPS, it is essential to make sure your GPS is using the same horizontal datum as your charts, usually WGS84.

## 6 Notation and Typography

### Sounding Units

Meters     Subscripts indicate tenths of a meter  
Fathoms    Subscripts indicate feet  
Feet        Also called Imperial units

**Drying heights** - rocks and objects that uncover at low tides. Numbers are UNDERLINED and are height ABOVE chart datum.

### Soundings Contour Vs. Spot

Spot        Actual location where sounding made  
Contour    An approximate line of constant depth  
              Different font slant and thinner

### Typography

Vertical     Fixed     Topographic    Beacons  
Slanted     Floating   Hydrographic   Buoy

All Caps    Exact location  
Initial Caps   Approximate location

### Position Accuracy (NOAA)

Exact (Caps)	< 10 ft	Circle with dot
Approximate	< 100 ft	Circle w/o dot
Position Approx	100-300 ft	PA
Position Doubtful		PD
Existence Doubtful		ED

**Dotted lines** – used to encircle potentially dangerous objects like rocks, fish havens, and wrecks.

## Buoys and Beacons 11

### Fixed Vs. Floating

Buoys        Float  
Beacons     Fixed to the ground or seabed

**Five types of marks** defined by International Association of Lighthouse Authorities (IALA).

Lateral	Channels, relative direction
Cardinal	Safe passage, compass direction
Isolated Danger	Placed on top of danger area
Safe Water	Any safe water, e.g., mid channel
Special	Military, cables, etc.

**IALA Regions:** two regions exist depending upon whether red is kept to port or starboard upon returning from sea.

IALA A	Red to port	Europe, Asia
IALA B	Red starboard	US, SA, Carib

### IALA Region B – US, SA, and Caribbean

#### “Red Right Returning”

<b>“Even red nuns have odd green cans”</b>			
Even	Red	Nuns	Triangle
Odd	Green	Cans	Square

## 10 Buoy Characteristics

Color	R, G, W, Y, RG, GR, RW
Shape	C=Can, N=Nun, SP=Sphere, P= Pillar, S=Spar
Name	Enclosed in Quotes "CY"
Light pattern	Fl, Q, LF, etc
Light color	R, G, W, Y
Light period	In seconds
Sound signal	WHIS (Whistle), BELL, GONG, HORN, SIREN, GUN

### Colors

R	Keep to starboard when entering from sea
G	Keep to port when entering from sea
W	Not a lateral (channel) mark
Y	Special mark
RG	Junction, preferred channel to port
GR	Junction, preferred channel to starboard
RW	Red/white vertical stripe (RWVS) – safe water mark
BR	Bifurcation
BR	Isolated danger

### Electronic Chart Terminology

**Raster Charts** – based on scanned photo of original chart.

**Vector Charts** – the objects on the chart are actually drawing at appropriate coordinates.

## Seabed, Rocks, Tracks 7

### Common Seabed Symbols (J)

S	Sand	Cb	Cobbles
Si	Silt	Co	Coral
Sh	Shells	Co Hd	Coral head
St	Stones	Cy, Cl	Clay
S/M	Sand over mud	M	Mud
So	Soft	P	Pebbles
G	Gravel	Wd	Weed
Gr	Grass	Rk, rky	Rock, Rocky

### Rocks, Wrecks, Obstructions (K)

Rk	Rock
Wk	Wreck
Obstn	Obstruction
Hk	Hull wreck
Masts	Masts wreck

### Tracks and Routes (M)

Separation zones	– magenta shaded areas
Mandatory direction of flow	- solid arrow
Recommended direction of flow	– dotted arrow
Maritime limit	– dashed line
COLREGS demarcation line	– dashed line
International boundaries	– dashed “+”s
Restricted area	– dashed “T”s pointed toward area

## 8 Light Notation (P)

**Light Notation** – Lights are indicated by a magenta flare or exclamation point. They can have up to seven identifying characteristics. Any of the characteristics can be omitted if not needed or not applicable. For example, if no color is specified, a light is assumed to be white.

### F C P H R N E

- F Phase pattern (Fl, Oc, Iso, Q, Mo(A))
- C Color (if none, white is assumed)
- P Period in seconds
- H Height (feet or meters)
- R Range visible (nautical miles M)
- N Name (enclosed in quotes)
- E Extra info such as sounds HORN

### Examples

- Horn Point Fl 6s 6M “HP”
- Spider Light Fl 4s 40ft 7M
- Tolly Point Fl G 4s 15ft 4M “1AH”
- Thomas Pt Fl 5s 43ft 11M HORN
- Bloody Pt Fl 6s 54ft 7M HORN (Sep – Jun)
- Castle Hill Iso R 6s 40ft 12M HORN
- Point Judith Oc (1+2) 15s 65ft 16M HORN

**Sector Lights** – show a different color depending upon the direction from which the light is viewed. Generally, the white sector marks the safe fairway.

## 9 Phase Patterns (P)

Lights in Section P are major lights such as lighthouses and very large beacons. Lighted buoys or beacons are covered in Section Q of Chart 1.

**Flashing** – light duration shorter than dark duration

- Fl Single flashing  
\* \* \* \* \*
- Fl (3) Groups flashing  
\*\*\* \*\* \*
- Fl (2+1) Composite group flashing  
\*\* \* \*\* \*
- LF1 Long flashing

**Occluding** – light duration longer than dark duration

- Oc Single occulting
- Oc (2) Group occulting
- Oc (2+3) Composite group occulting

**Isophase** – light duration equals dark duration

**Quick** – 50-79 flashes per min, usually 50 or 60

- Q Continuous quick
- Q (3) Group quick
- IQ Interrupted quick

**Very Quick** – 80-159 per min, usually 100 or 120

- VQ Continuous very quick
- VQ (3) Group very quick
- IVQ Interrupted very quick

**Morse Code “A”**

- Mo (A) Morse Code “A”  
● — ● — ● —