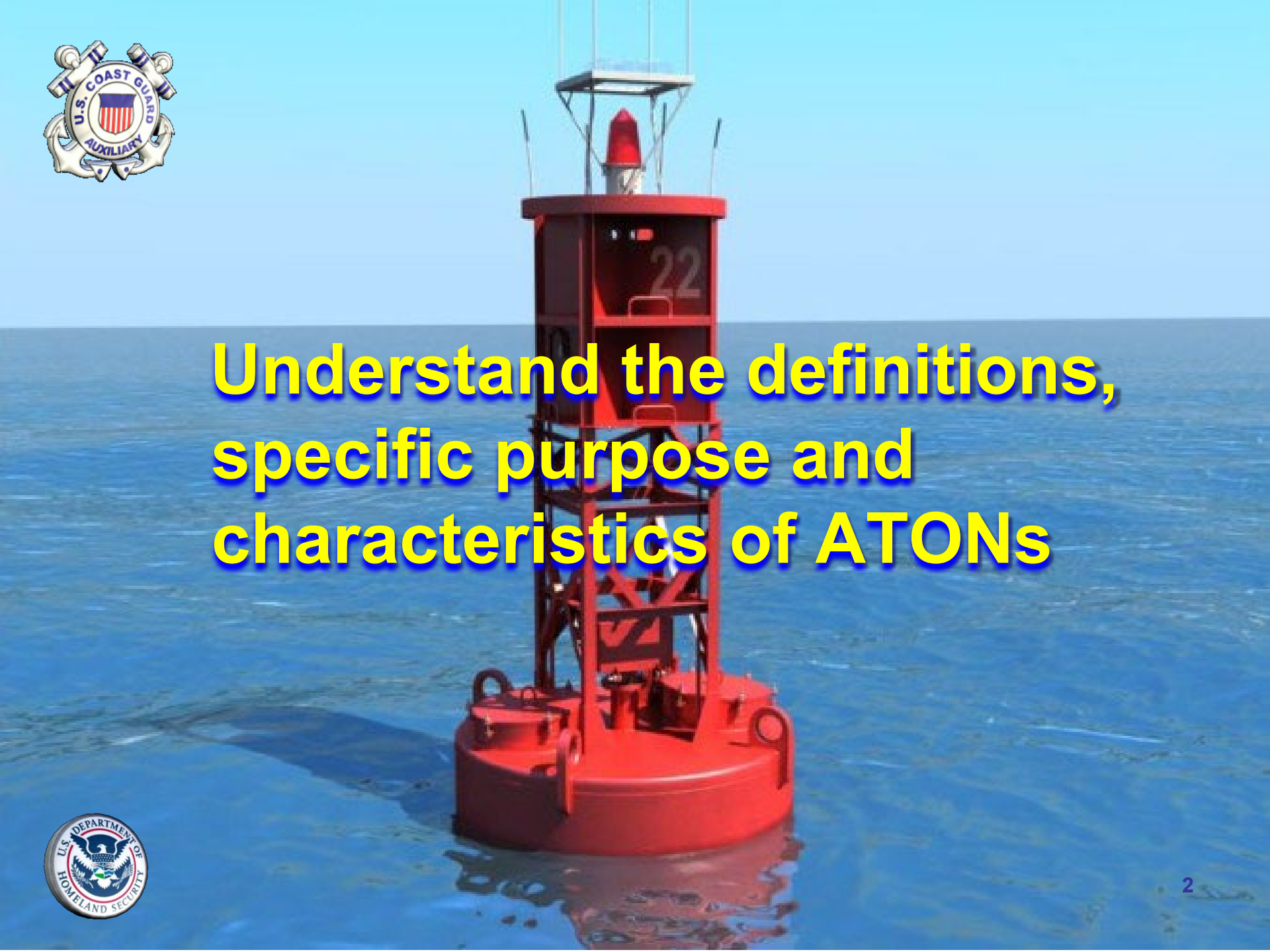
U.S. Coast Guard Auxiliary
District 7

FEDERAL SHORT-RANGE AIDS TO NAVIGATION

ATON

D7NS 30001

2023



Understand the definitions, specific purpose and characteristics of ATONs

Operational Objectives

1. A high level of **professionalism** required on the part of the NS team member

2. A high level of **quality** to increase the credibility of our NS Program.

3. **Accurate, complete, timely reports** to the Coast Guard

Aids to Navigation

Any device, external to a vessel, intended to assist navigators to:

- Determine their position
- Determine a safe course
- Warn them of dangers or obstructions to navigation

TERMINOLOGY

ATON – FEDERAL SHORT-RANGE AID TO NAVIGATION

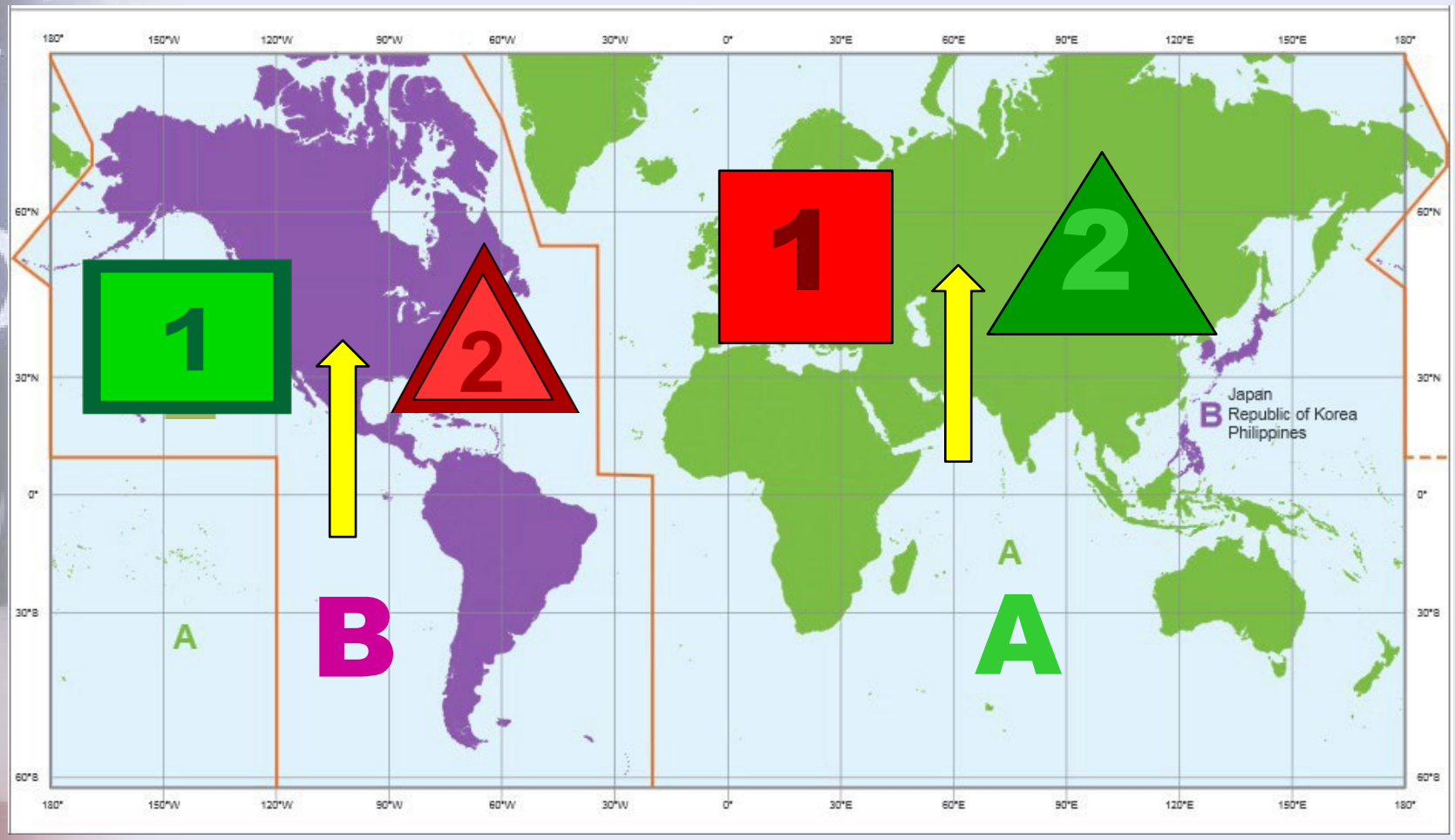
PATON – PRIVATE AID TO NAVIGATION.

5

International Association of Lighthouse Authorities IALA

- The International Association Lighthouse Authorities (IALA) was formed in 1957 as a non-government, non-profit, technical association to provide a framework for aids to navigation authorities, manufacturers and consultants from all parts of the world to work with a common effort to:
  - Harmonize standards for aids to navigation systems worldwide;
  - Facilitate the safe and efficient movement of shipping and enhance the protection of the maritime environment.

IALA REGIONS A and B



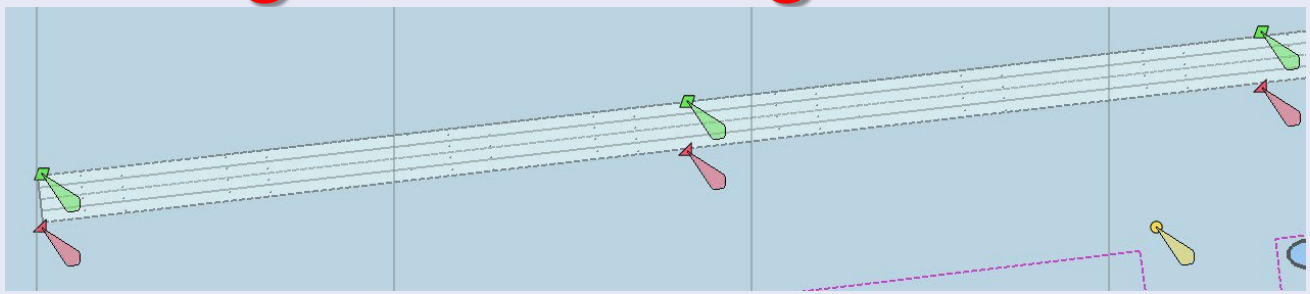
US Marking System

A Lateral System using a simple arrangement of:

1. colors,
2. numbers,
3. shapes,
4. light colors and patterns,

to show on which side an aid should be passed when proceeding in the Conventional Direction of Buoyage.

Red Right Returning from the sea



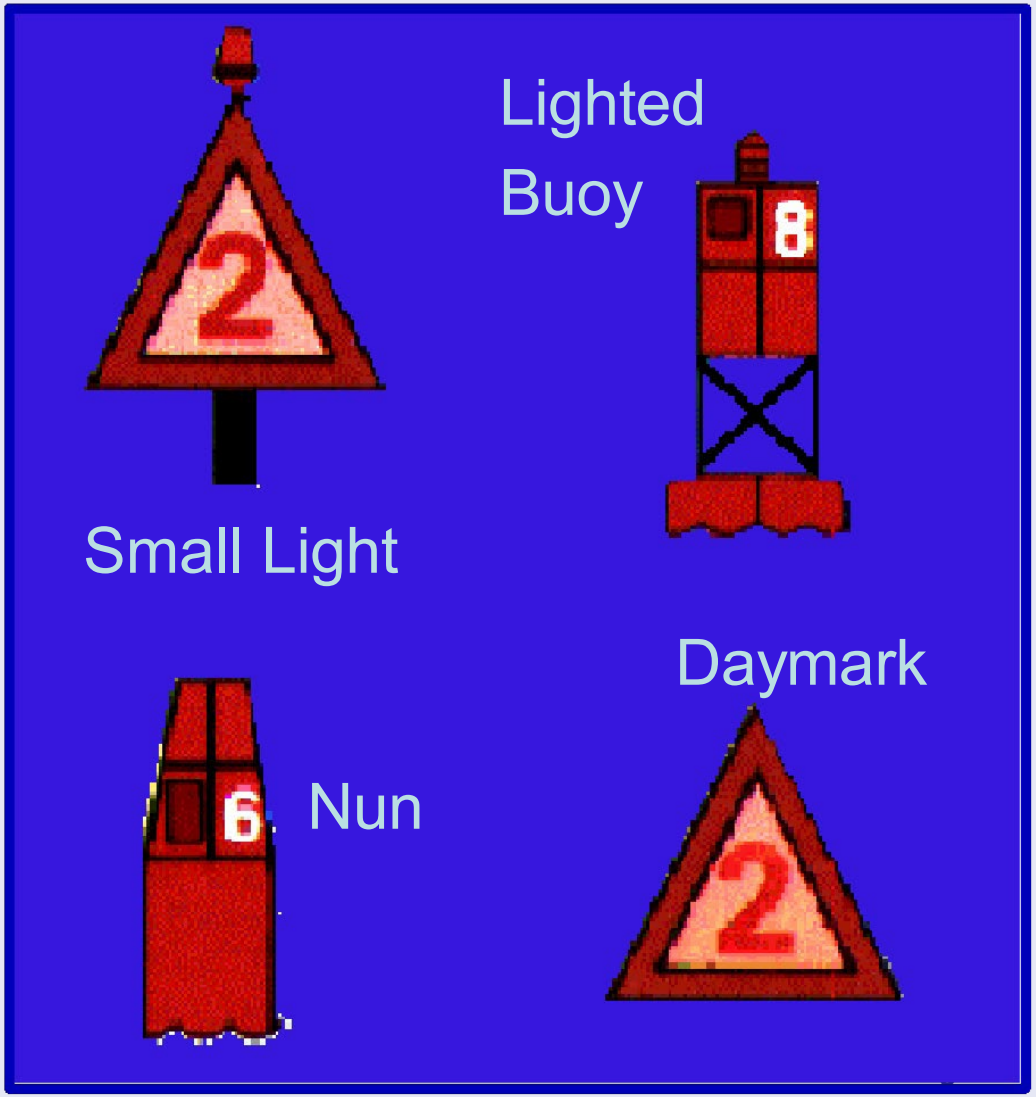
Starboard Lateral Marks

Color: Red

Shape: Triangular or conical—nuns.

Character: Even Numbers

Light: Red



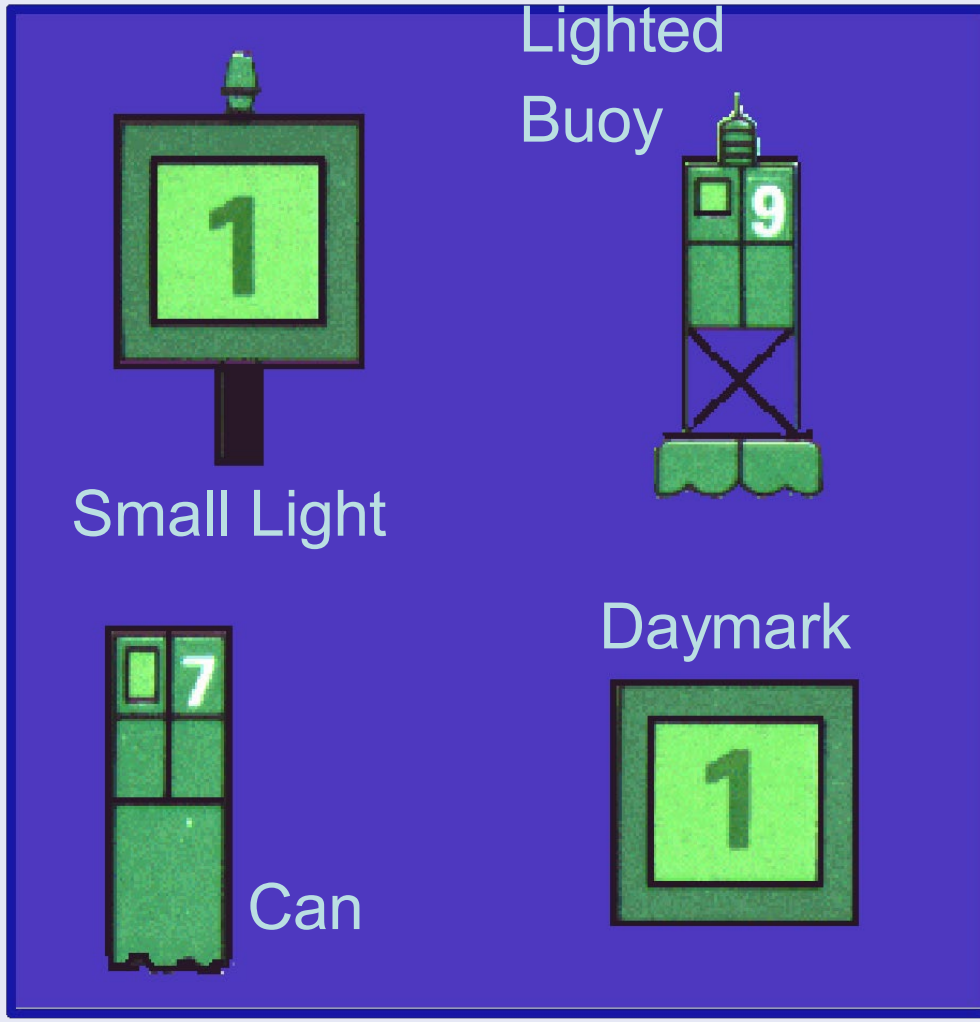
Port Lateral Marks

Color: Green

Shape: Square / Cans

Character: Odd Numbers

Light: Green



ATON Chart Symbols

Paper (raster) chart:

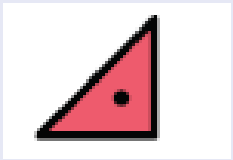
ATON Chart Symbols

Paper (raster) chart:

ECDIS (ENC) chart:

- **"Paper chart"**

- **Simplified display**

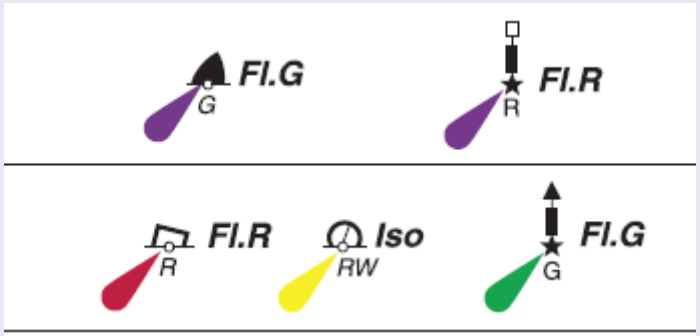


Proprietary charts (e.g. Navionics):

ATON Chart Symbols

Color and classical ENC versions

Color versions may fill in buoy symbols with buoy color and slash for light may be light color instead of magenta



Definition of a Buoy

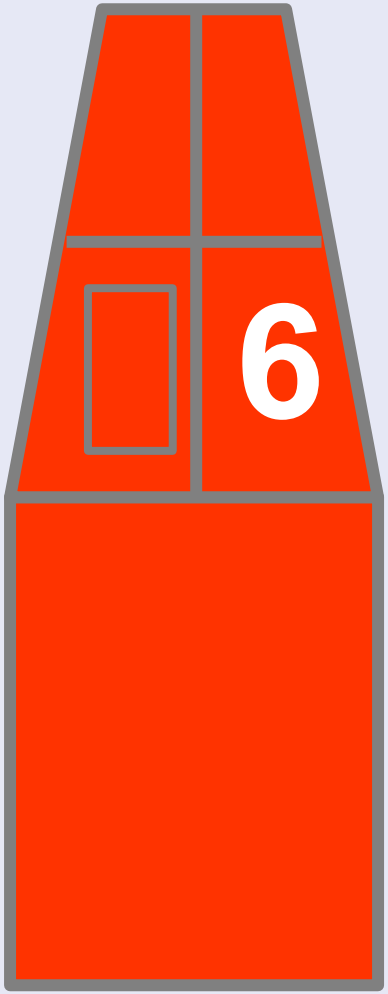
Any unmanned, floating aid to navigation that is moored to the seabed. (***May be lighted or unlighted***)

Nun Buoy

Conical shape

White Number

Red Retro



Paper Chart Symbol

R N"6"

ENC Chart Symbols

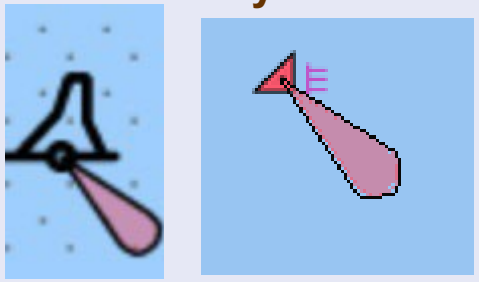
"6"

Lighted Red Buoy

Paper Chart Symbol

R "2" Fl R 6s

ENC Chart Symbols



"2" Fl R 6s

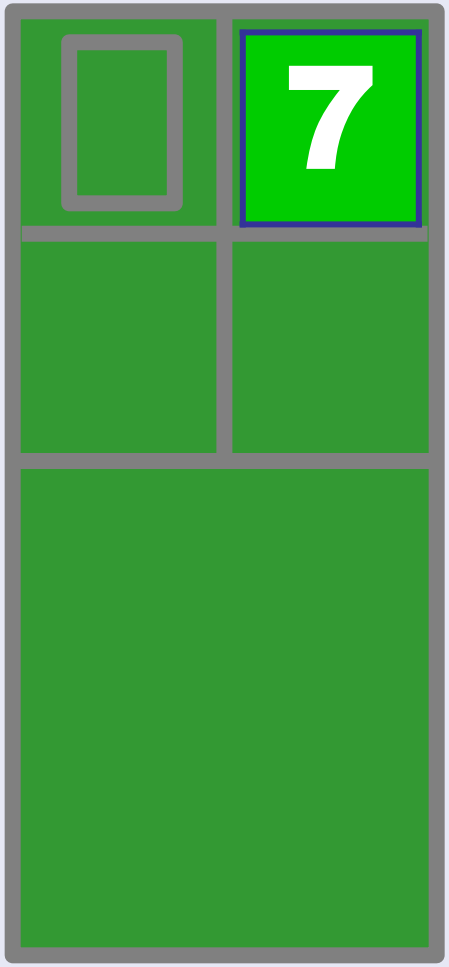
Can Buoy

Can Shape

It should have a **white** number

Green

Retro



Paper Chart Symbol

G C"7"

ENC Chart Symbols

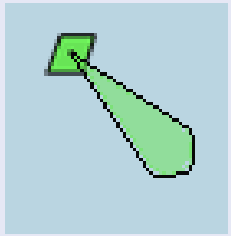
"7"

Lighted Green Buoy

Paper Chart Symbol

G "3" Fl G 4s

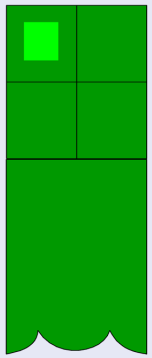
ENC Chart Symbols

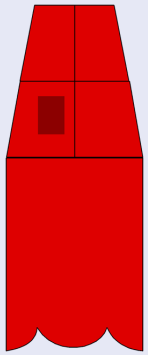


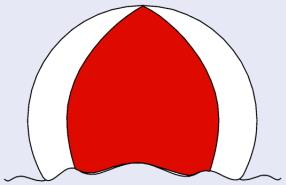
"3" Fl G 4s

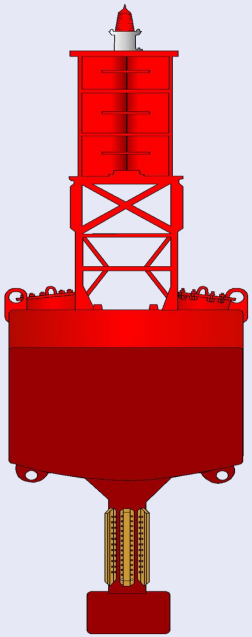
Ocean Buoys

- consist of unlighted cans, nuns, and spheres, as well as sound buoys and standard lighted pillar buoys.



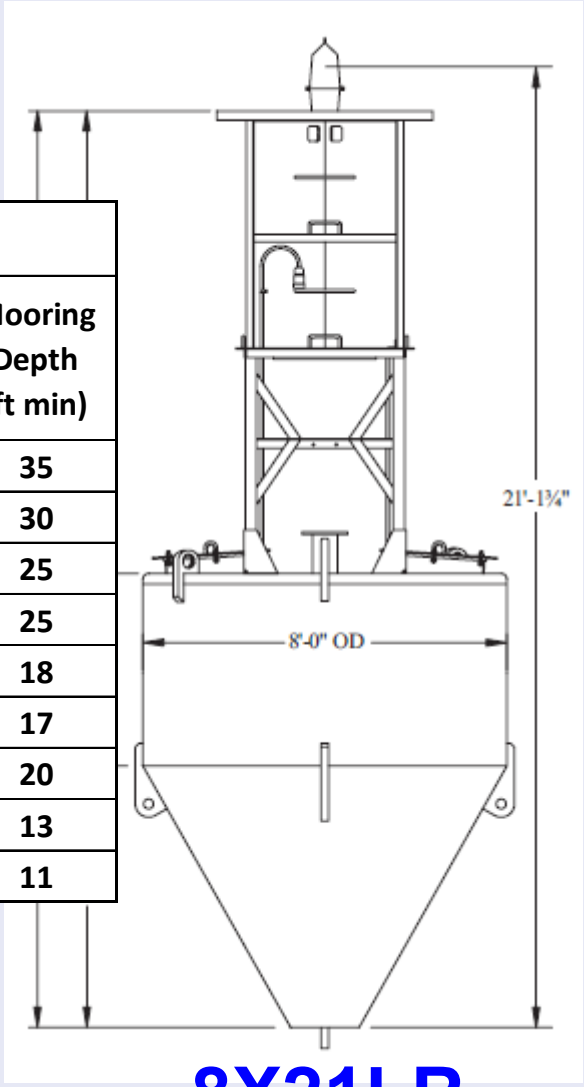






Standard Lighted Buoys

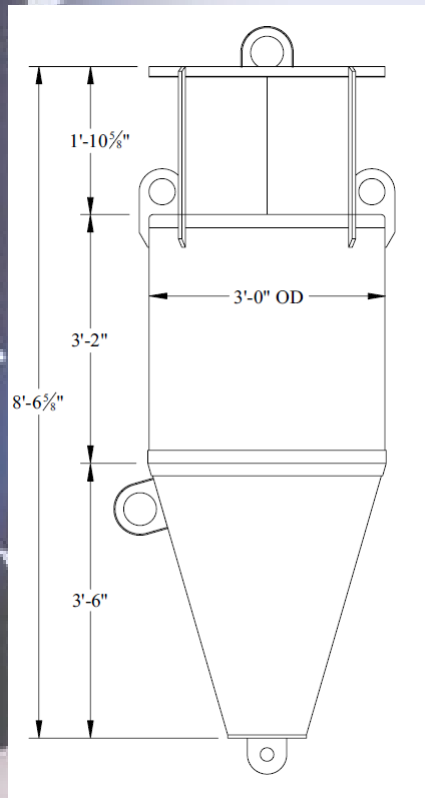
STANDARD LIGHTED BUOYS						
Type	Diameter	Height	Weight (lb)	Draft	Focal Height of Lamp	Mooring Depth (ft min)
9X35LWR	9' - 0"	35' - 5½"	18,500	15' - 10"	20' - 7"	35
9X32LR	9' - 0"	31' - 9"	17,500	11' - 7"	21' - 2"	30
8X26LR	8' - 0"	25' - 3¼"	11,800	10' - 4"	15' - 11"	25
8X26LWR	8' - 0"	25' - 3¼"	12,100	10' - 5"	15' - 10"	25
8X21LR	8' - 0"	10' - 1¾"	13,900	7' - 9"	13' - 4"	18
7X17LR	7' - 0"	15' - 11"	7,800	5' - 6"	11' - 5"	17
6X20LR	6' - 0"	18' - 9½"	6,500	9' - 0"	10' - 9"	20
5X11LR	5' - 0"	10' - 8 5/8"	3,000	3' - 9"	8' - 0"	13
3.5X8LR	3' - 6"	7' - 2 11/16"	1,500	2' - 9"	5' - 7"	11



8X21LR

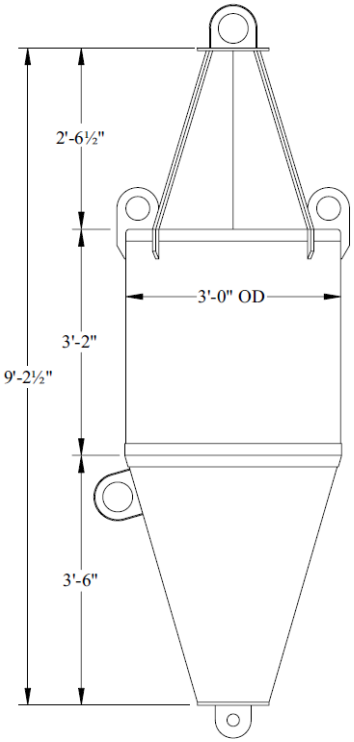
COMDTINST M16500.3A
AIDS TO NAVIGATION MANUAL - TECHNICAL

Standard Unlighted Buoys



STANDARD UNLIGHTED BUOYS

Type	Diameter	Height	Weight (lb)	Draft	Mooring Depth (ft min)
1CR	5' - 0"	18' - 8 5/8"	6,100	8' - 7"	15
1NR	5' - 0"	10' - ½"	6,000	8' - 4"	15
2CR	4' - 0"	13' - 8"	2,800	6' - 3"	15
2NR	4' - 0"	14' - 6½"	2,600	6' - 1"	15
3CR	3' - 0"	8' - 6 5/8"	1,200	4' - 4"	10
3NR	3' - 0"	9' - 2½"	1,175	4' - 4"	10
4CR	2' - 3"	9' -3"	465	5' - 0"	10
4NR	2' - 3"	10' - 5¼"	470	5' - 0"	10
5CR	2' - 0"	8' - 8¾"	710	5' - 1"	10
5NR	2' - 0"	9' -10¼"	710	5' - 1"	10
6CR	1' - 6"	7' - 3"	160	3' - 10"	6
6NR	1' - 6"	8' - 8½"	165	3' - 10"	6



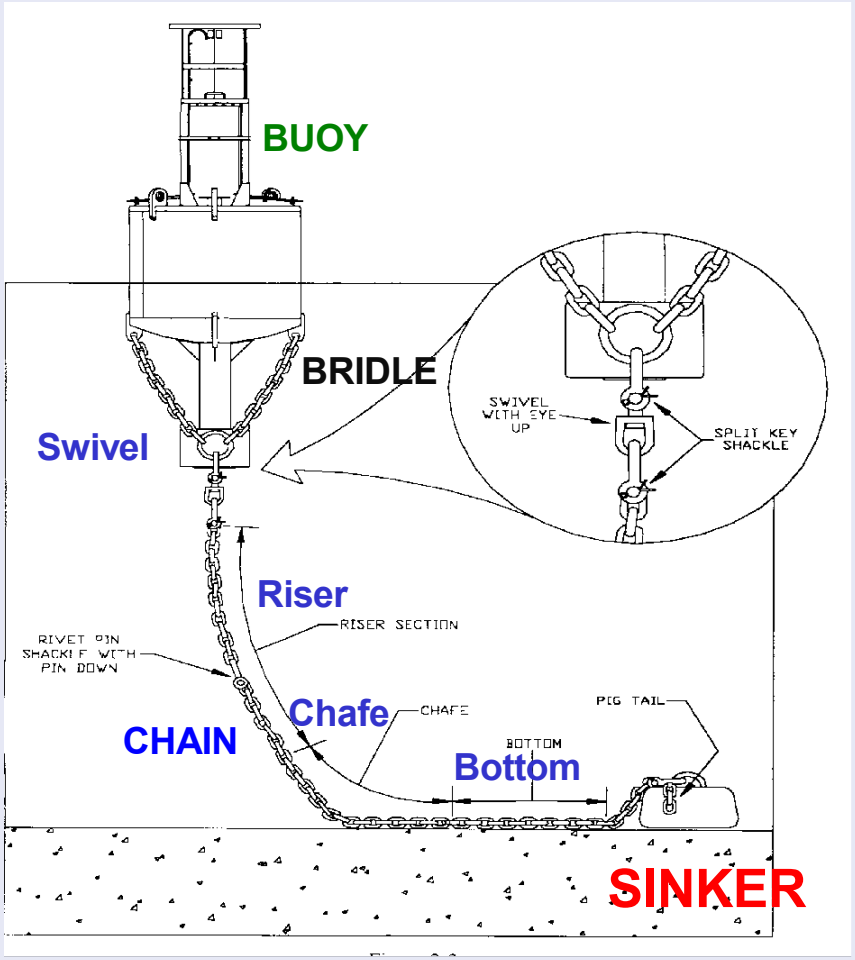
3CR

COMDTINST M16500.3A
AIDS TO NAVIGATION MANUAL - TECHNICAL

3NR

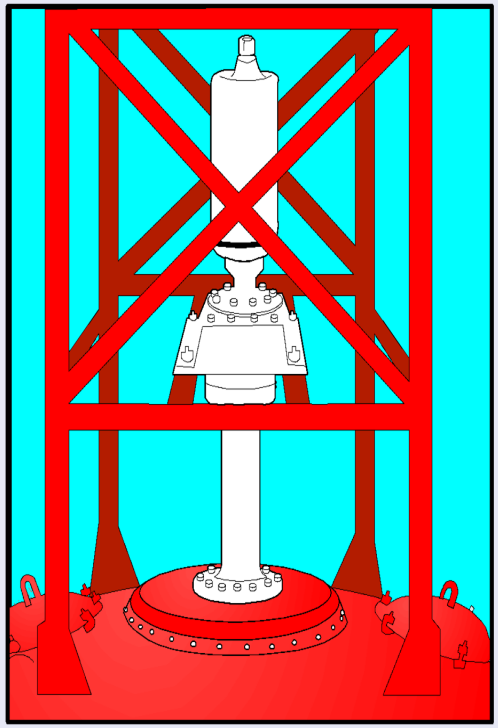
Buoy Moorings

- Chain connects the buoy to the sinker.
- Bridle distributes the load and minimizes heel angle
- The location of the **SINKER** is the Assigned Position of the BUOY



Whistle Buoy

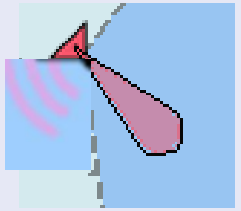
- Whistle is made of cast bronze and mounted inside the cage.
- As air is forced through the whistle it makes the familiar drone sound.



Paper Chart Symbol

R "2" Fl R 2.5s
WHIS

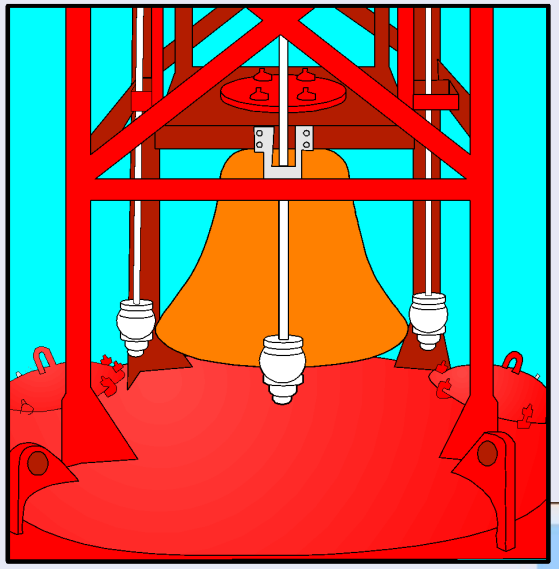
ENC Chart Symbols



"2" Fl R 2.5s

BELL Buoy

- Bells – used on lighted and unlighted buoys and are made of a copper silicon alloy.
- External tappers impact the fixed bell when wave motion causes the buoy to roll.



Paper Chart Symbol

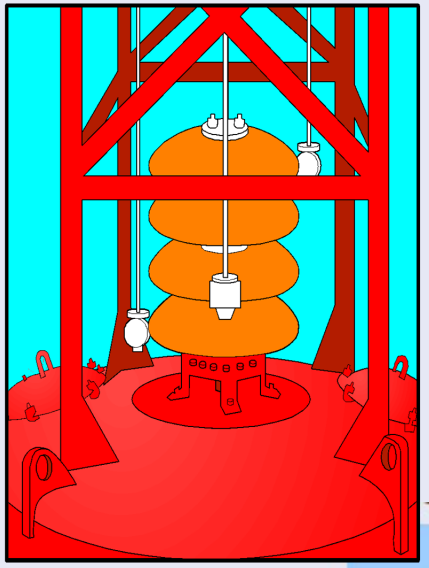
R "2" Fl R 2.5s
BELL

ENC Chart Symbols

"2" Fl R 2.5s

GONG BUOY

- Gongs - used on lighted & unlighted buoys and are made of a copper-silicon alloy.
- External tappers impact the fixed gongs as the buoy rolls.
-
- Each gong emits a different tone distinguishing gong from a bell.



Paper Chart Symbol

R "2" Fl R 2.5s GONG

ENC Chart Symbols

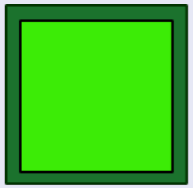
"2" Fl R 2.5s

Definition of a Beacon

- Any fixed aid to navigation located on a shore or marine site.

- Lighted beacons are called Lights.

- Unlighted beacons are called
- Daybeacons or Daymarks.



Dayboard

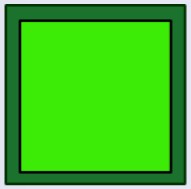
The daytime identifier of an aid to navigation presenting one of several colors, shapes, numerals or letters.

Shape may be square, triangle, rectangle, diamond, or octagon.

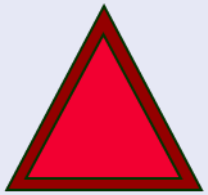
COMDTINST M16500.3A
AIDS TO NAVIGATION MANUAL - TECHNICAL

Dayboard

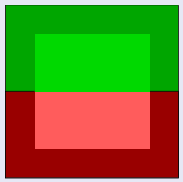
The letter in the Light List structure column refers to the shape or purpose of the dayboard.



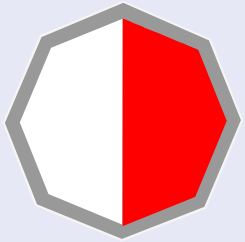
S-Square



T-Triangle



J-Junction / Preferred Channel



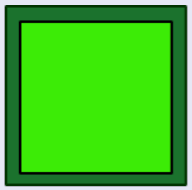
M-Mid Channel Safe Water

K-Range

N-No laterial Significance

Dayboard

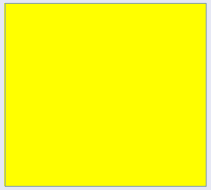
The subsequent letter(s) in the Light List structure column refer to the color(s) of the dayboard.



G - Green

R-Red

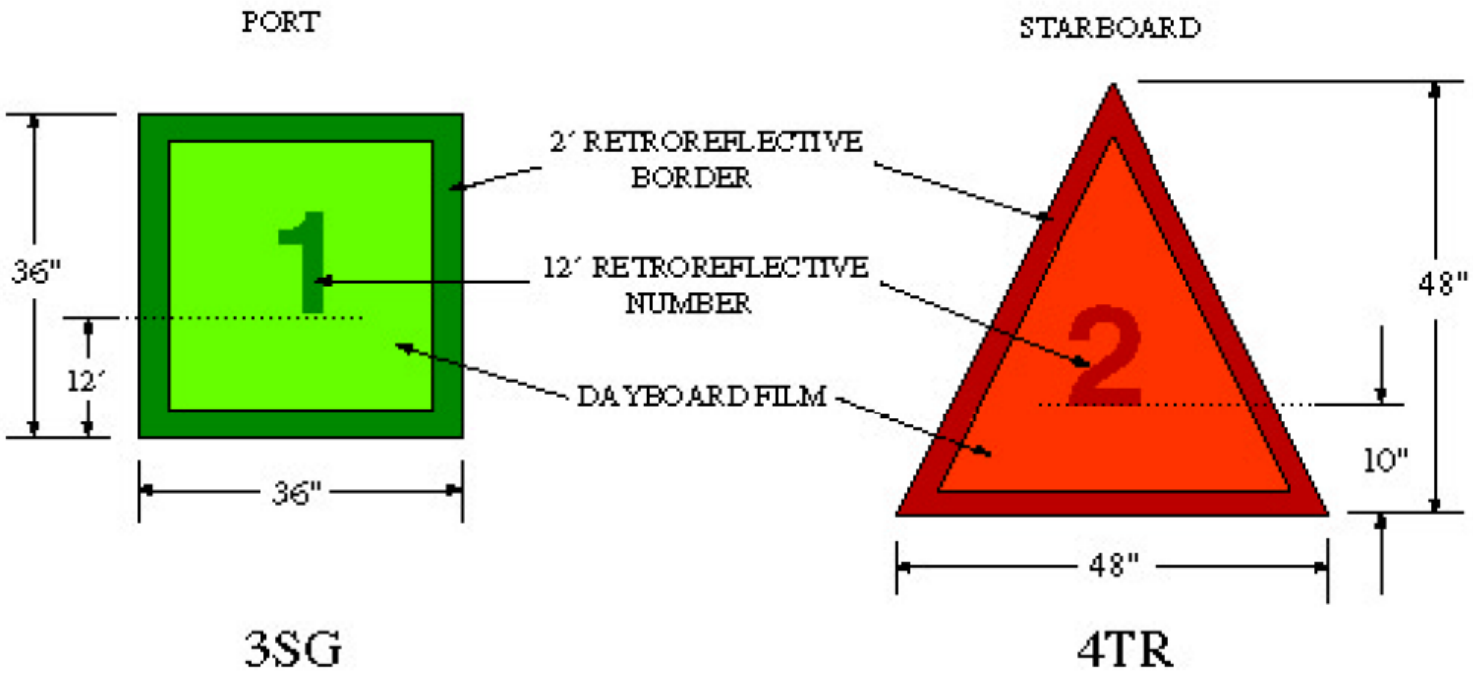
W-White



Y-Yellow

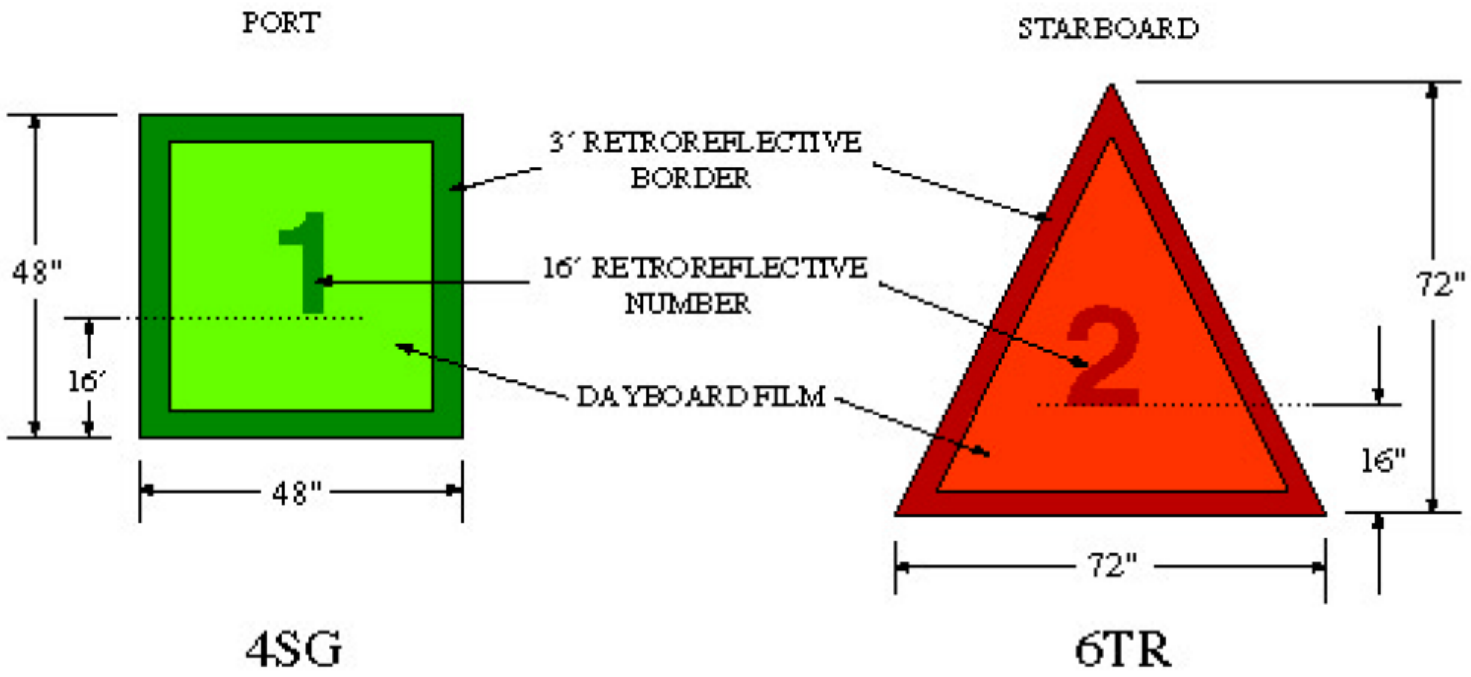
General Use Port and Starboard Marks

System: General Use.
Function: Laterally significant port and starboard marks.
Nominal Range: 1 nm.
Additional Data: For three numerals on a 3SG, use 8-inch characters at a height of 14 inches from the base. For three numerals on a 4TR, use 8-inch characters at a height of 12 inches.



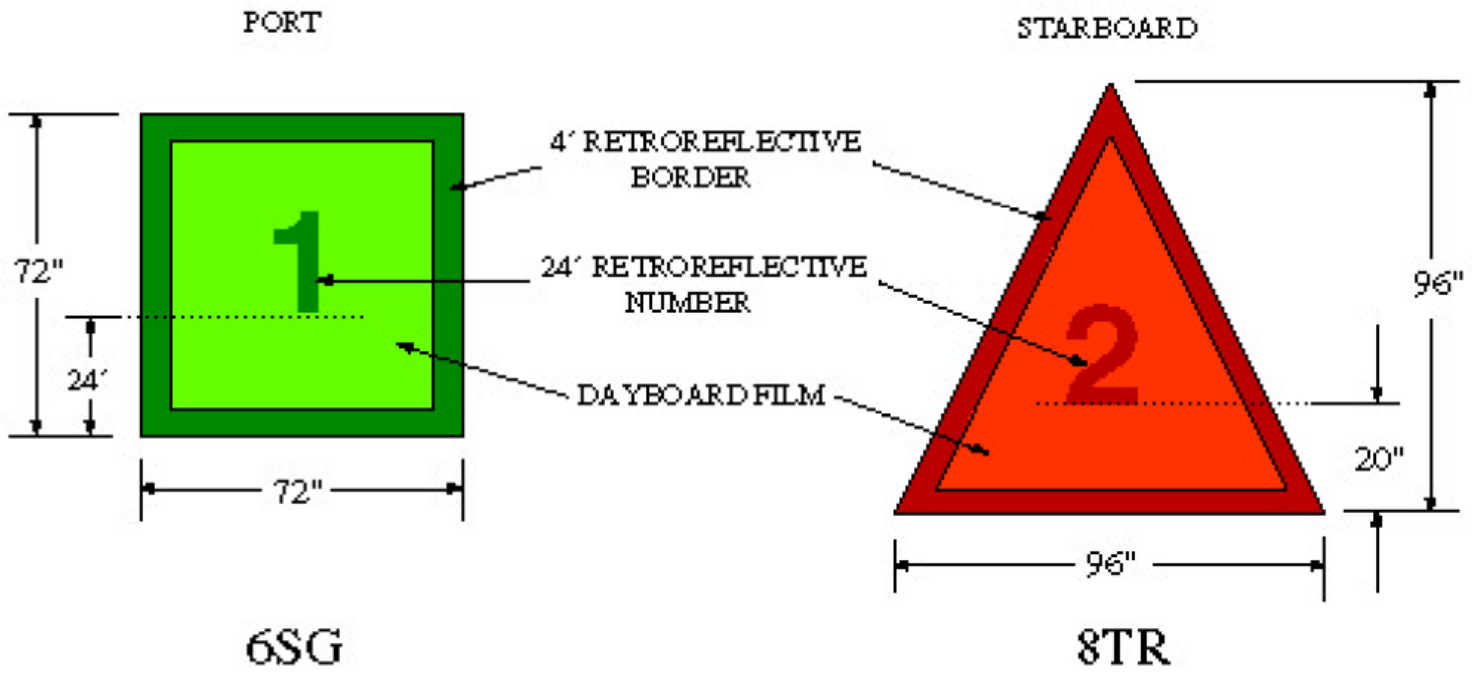
General Use Port and Starboard Marks

System: General Use.
Function: Laterally significant port and starboard marks.
Nominal Range: 2 nm.
Additional Data: For three numerals on a 4SG, use 12-inch characters at a height of 18 inches from the base. For three numerals on a 6TR, use 12-inch characters at a height of 12 inches.



General Use Port and Starboard Marks

System: General Use.
Function: Laterally significant port and starboard marks.
Nominal Range: 3 nm.
Additional Data: For three numerals on a 6SG, use 16-inch characters at a height of 28 inches from the base. For three numerals on an 8TR, use 16-inch characters at a height of 14 inches.

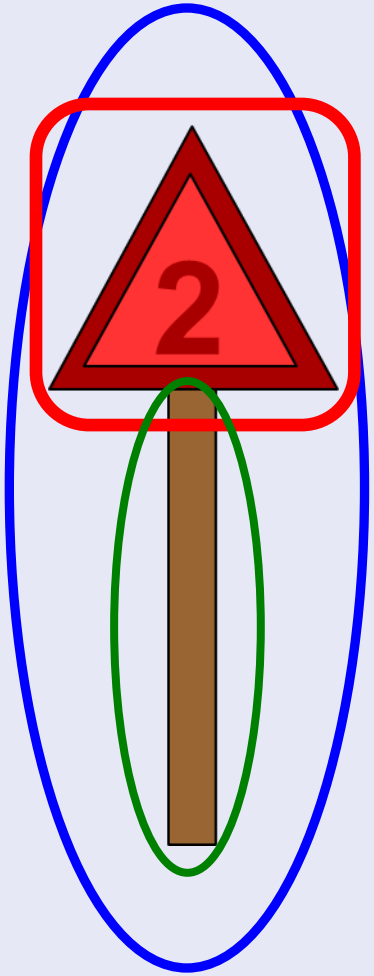


Beacon Structures

Single Pile

“TR on pile”

(**T**riangle – **R**ed)



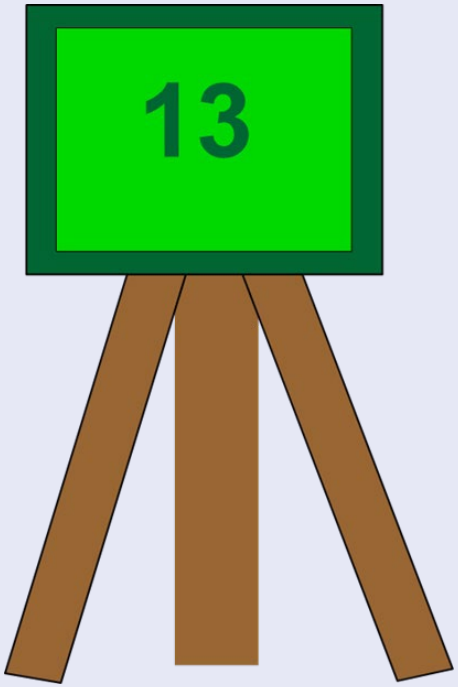
DAYBOARD

DAYBEACON

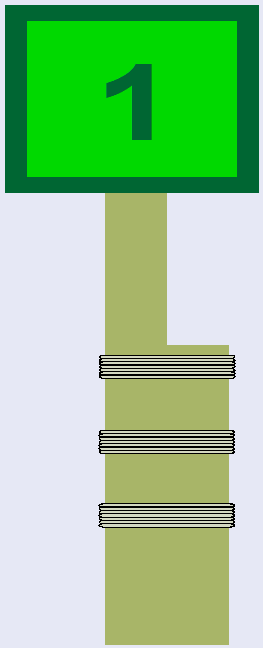
PILING

Beacon Structures

Dolphin
3 or more piles



Dolphin
Cluster pile

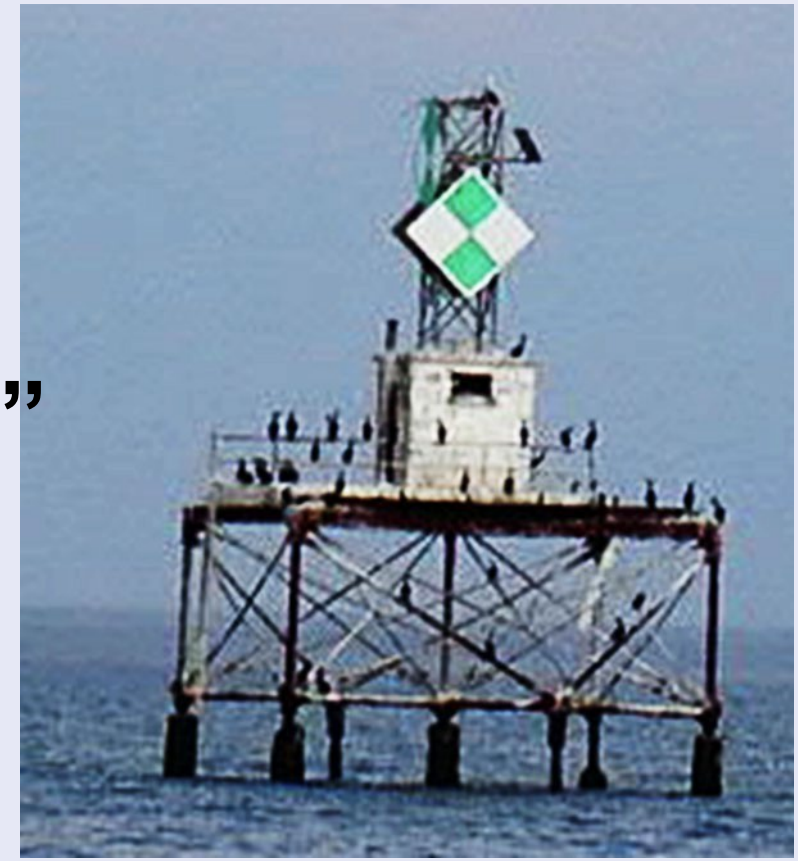


“SG on dolphin”

Beacon Structures

Platform

"GW on platform"



Red Daymark

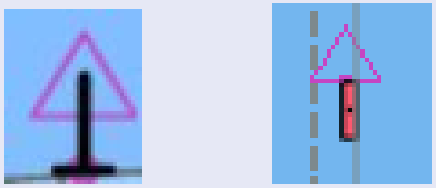
Red retro-reflective tape around the edges

Number is same color as edge tape

Paper Chart Symbol

R “2”

ENC Chart Symbols



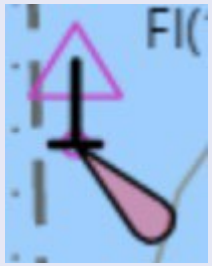
“2”

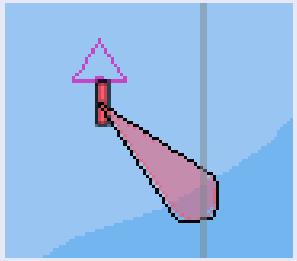
Red Daymark on Dolphin (Lighted)

Paper Chart Symbol

R "4" Fl R 2.5s

ENC Chart Symbols



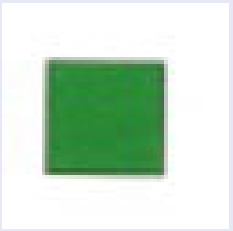


"4" Fl R 2.5s

Green Daymark

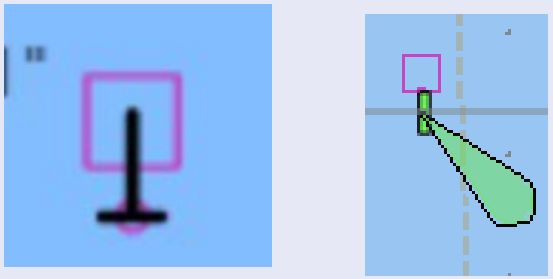
It should have a contrasting **GREEN** number, with green retro around the sides.

Paper Chart Symbol



G “3”

ENC Chart Symbols



“3”

Preferred Channel

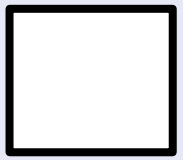
Purpose: Marks junctions/bifurcations

Color: Red & Green horizontally banded (top color is preferred channel)

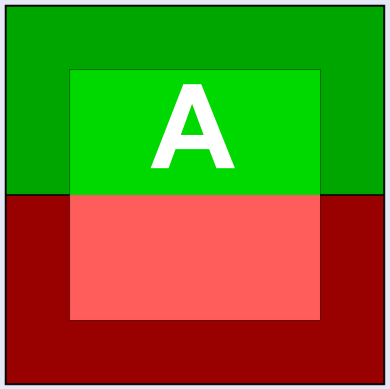
Shape: Same as preferred channel (uppermost band is preferred channel)

Character: Letter not number.

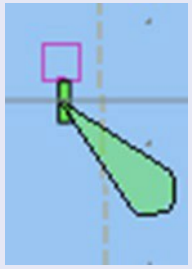
Paper Chart Symbol



RG "A"



ENC Chart Symbols



"A"

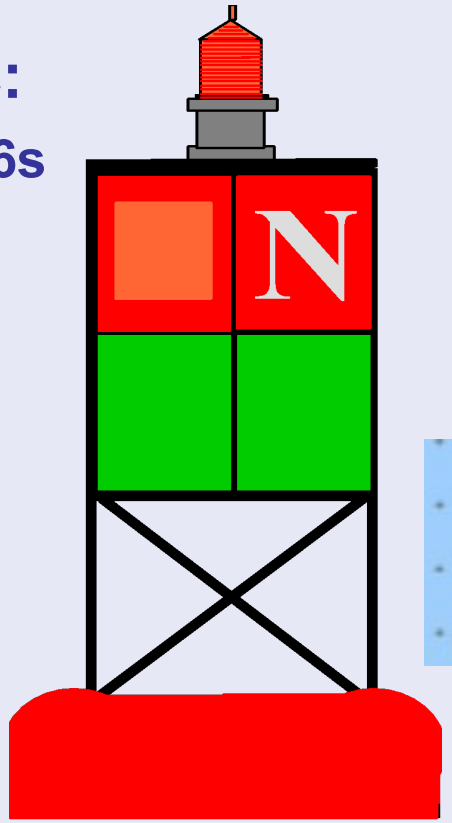
Preferred Channel

Purpose: Marks junctions/bifurcations

Light: Same color as uppermost band.

Light Characteristic:

Composite Gp Fl (2+1) 6s



Paper Chart Symbol

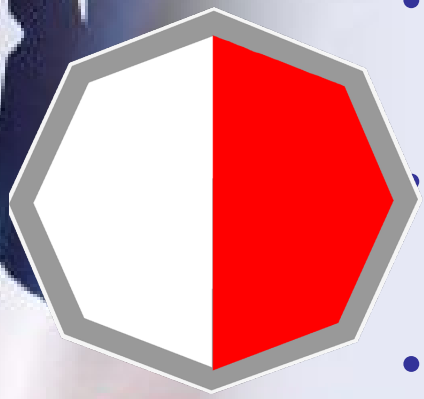
RG "N"
Fl (2+1) R 6s

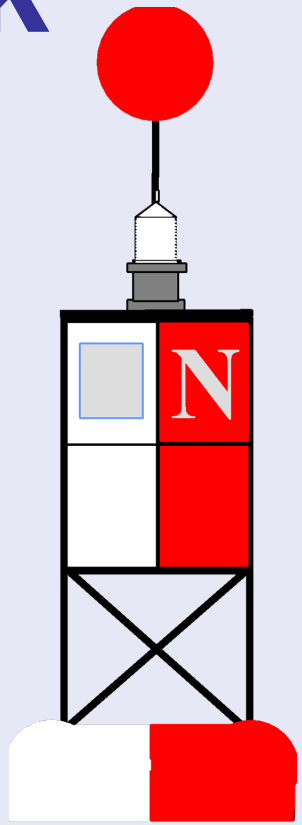
ENC Chart Symbols

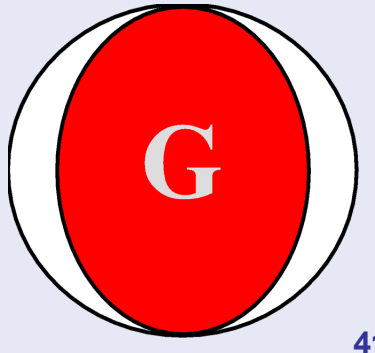
"N" Fl (2+1) R 6s

Safe Water Mark

- **Purpose:** **Indicates navigable water all around the mark.**
- **Located seaward of marked channel**
- **Description:**
  - **Color:** **Red** and **White** vertically striped.
  - **Shape:** Sphere or Buoy with Topmark.
  - **Character:** **White** letters (ex. "NC" North Channel)
  - **Light Color:** **White**: **Mo(A)**





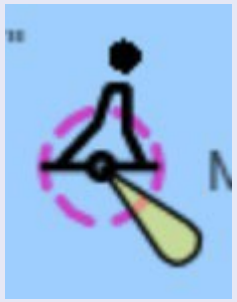


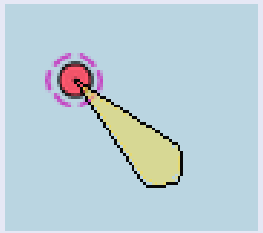
Lighted Safe Water Mark

Paper Chart Symbol

RW "PE"
Mo (A)

ENC Chart Symbols

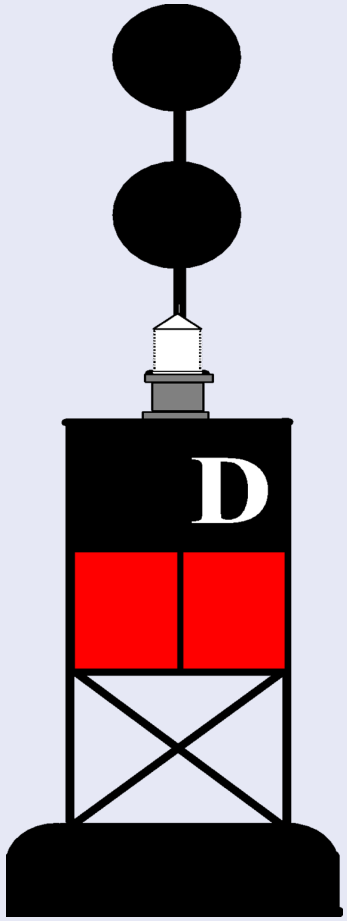




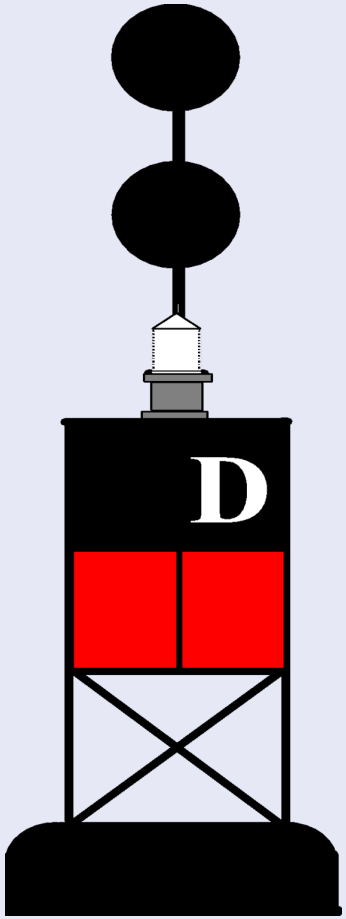
"PE" Mo (A) W 8s

Isolated Danger Mark

- **Purpose**: **Marks isolated dangers or obstructions that can be passed on all sides**
- **Description**:
  - **Color:** Black and Red horizontal bands
  - **Shape**: Buoy with two black top marks
  - **Character:** White Lettering – no numbers
  - **Light:** White
  - **Top mark** is two round shapes
  - **Light Characteristic**: **Gp Fl (2) 5s**



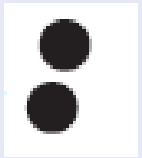
Isolated Danger Mark



Paper Chart Symbol

BR "D"
Fl (2) 5s

ENC Chart Symbol



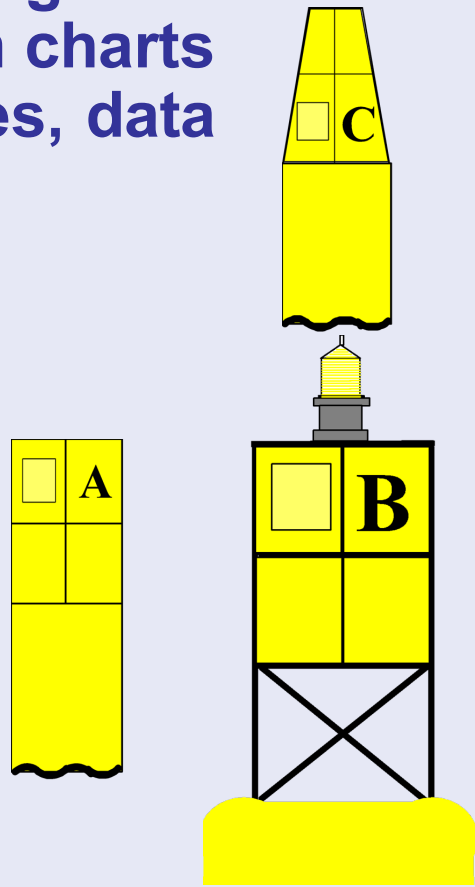
"D" Fl (2) W 5s

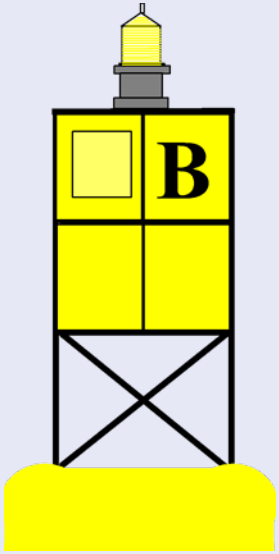
Special Purpose Aids

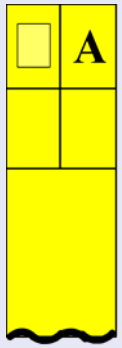
Purpose: **Not intended to assist safe navigation but to indicate special areas marked on charts (anchorages, traffic separation schemes, data gathering, etc)**

Description:

- **Aid Color: Yellow.**
- **Aid Shape:** Various.
- **Characters:** Black lettering, no numbers.
- **Light Color: Yellow**
- **Light Characteristic: Fixed, Flashing** (except **Mo A, 2+1, Qk)**

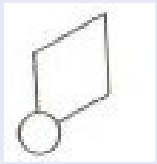




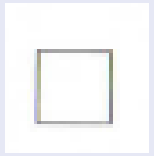


Paper Chart

Y "B" Fl Y

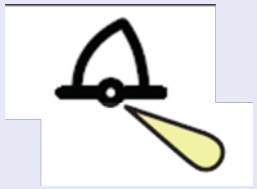


Y C "A"



Y "A" Bn

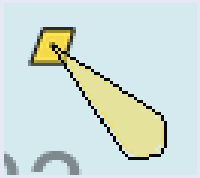
ENC Chart

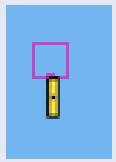


"B" Fl Y

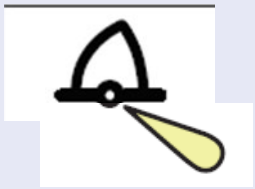
"A"

"A"





Y “B” Fl Y



“B” Fl Y

Regulatory and Information Marks

Diamond - Danger Buoy……

Circle - Restricted Operations

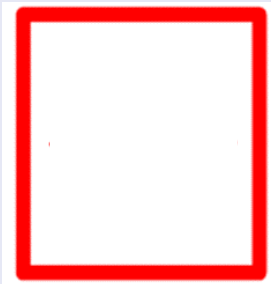
Speed limit or no wake……

Diamond with Cross –

Exclusion Buoy – no vessels…….

Square - Directions for the boater

- Bridge Signs……



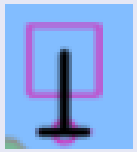
Regulatory and Information Marks

- These aids are often not charted.
- Precise location is not usually an issue.
- If these aids are in the navigable channel this is a reportable discrepancy.
- These are non-lateral aids.
- They are normally Private (PATON).

DANGER

Paper Chart Symbol

ENC Chart Symbols

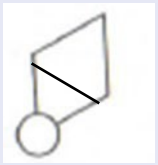


Restricted Operations - Minimum Wake

To be a legal Regulatory sign, it must have the Permit number across the bottom!

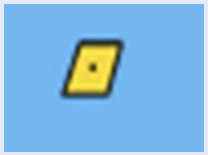
Exclusion Area - No Anchoring

Paper Chart Symbol



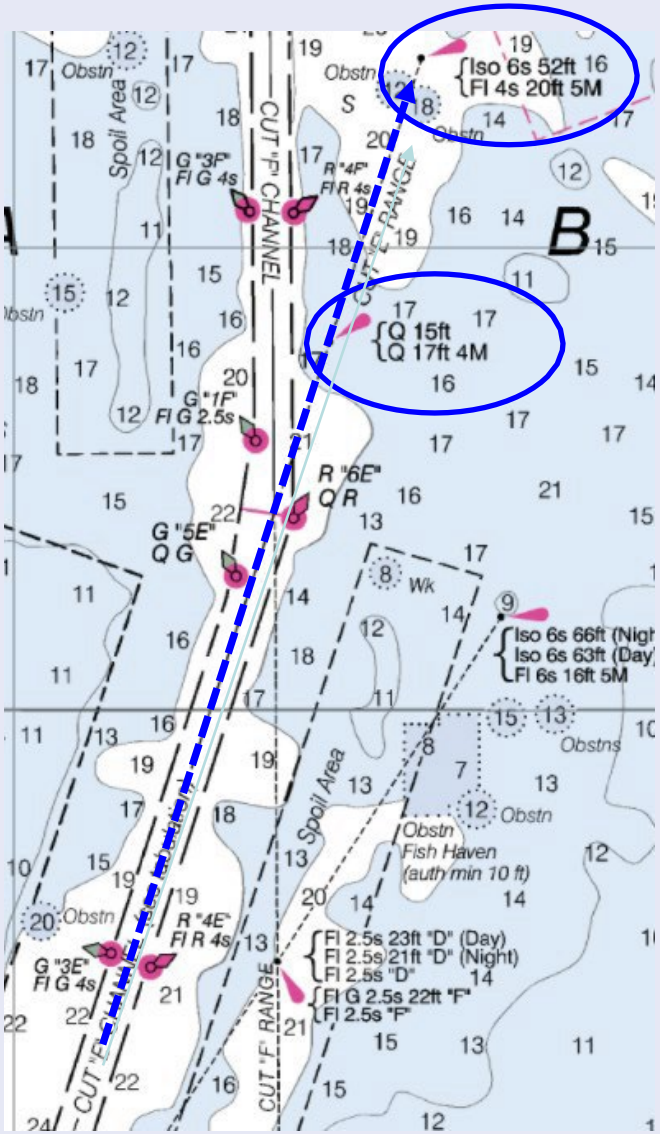
W Or

ENC Chart Symbol



Ranges

A pair of beacons placed so that when they appear aligned the viewer is in the center of the channel.



Ranges

Some have tricolored dayboards as well as lights

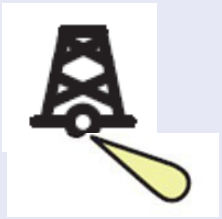
Paper Chart

Fl R 2.5s 17ft

Iso R 6s 50ft

ENC Chart

X Channel Range Rear Light
Fl R 2.5s6m



X Channel Range Rear Light
Iso R 6s10m

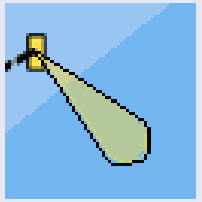
Range Marks

Paper Chart Symbol

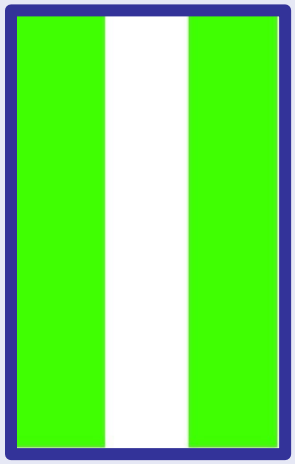
Q 22ft

ENC Chart Symbols

Tampa Bay Cut A Channel Range
Rear Light Q(1)W 1s10m



Range Dayboards

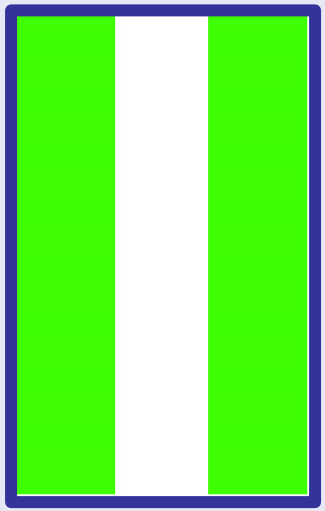


Description:

Aid Color: They will have colored panels equal in size with vertical stripes.

Aid Shape: Rectangle with tall side up.

KGW = Range, Green, with a White Stripe.



Colors (Red/Green/White) are chosen to stand out against the predominant background color

WRECK MARKS

Purpose: To alert the mariner to wrecks.

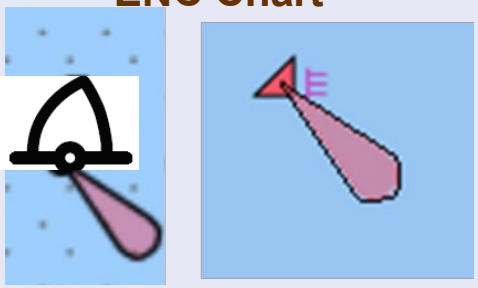
Description:

- ***Color***: Appropriate to side of channel.
- ***Shape***: Appropriate to side of channel.
- ***Light***: Same as buoy color. ***Quick Flashing*** (unless aid is a preferred channel aid)
- ***Lettering:*** **White "WR"**, numbered in sequence with channel **(WR2).**

Paper Chart

"2WR" QR

ENC Chart

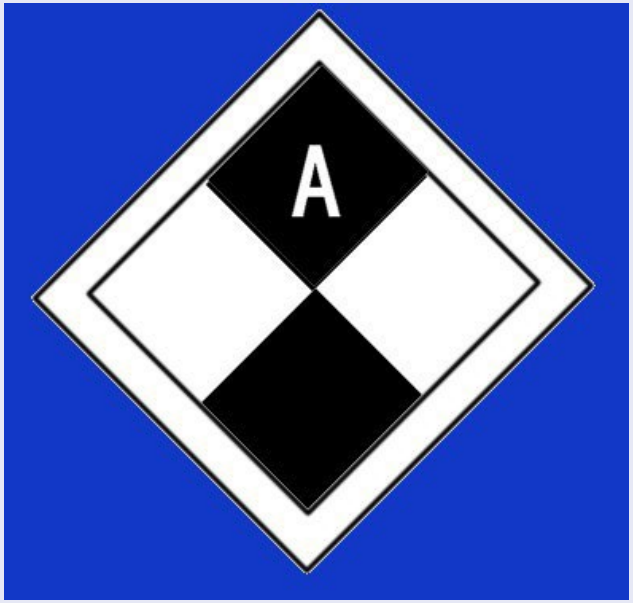


"2WR" QR

LOCATION MARK

Some markers will have no lateral significance.

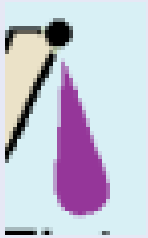
They are not designed to indicate the channel but rather, to help you determine where you are.



LOCATION MARK

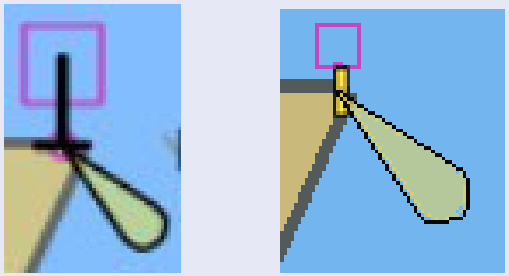
NR on pile

Paper Chart Symbol



Fl(1)W 4s

ENC Chart Symbols



Fl(1)W 4s

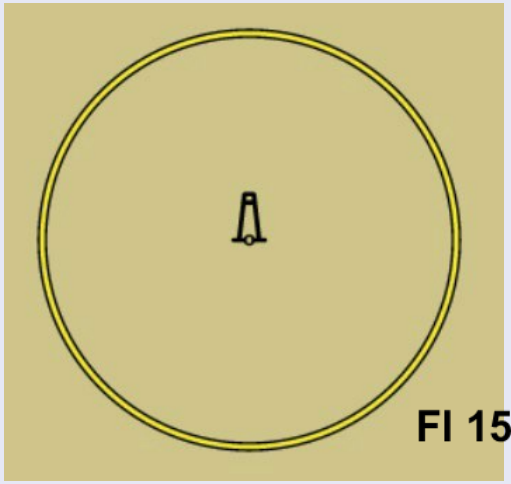
Light Structures

Major lighthouses are named: e.g. Sanibel Light.

Paper Chart Symbol

Fl 15s 85ft 13M

ENC Chart Symbol



Fl 15s 85ft 13M

85 ft is the height of the light above Mean Sea Level
13M means the luminous range of the light is 13 nautical miles

Light Structures

Minor lights (on buoys & beacons) use LED bulbs

- Available in required colors
- Pattern is programmable
- Intensity drops with time
- Service life 8-12 years

Self-contained 2nm range LED suitable for use on PATONs

Light Patterns

Fixed (F) – continuous, unblinking light

Flashing (Fl) – light duration shorter than darkness. Frequency not greater than 30 per minute.

Quick Flashing (Q) – light duration shorter than darkness. Frequency is at least 60 per minute.

Very Quick Flashing (VQ) – light duration shorter than darkness. Frequency is at least 100 per minute.

Interrupted Quick Flashing (IQ) – like quick flashing but having a brief, extended darkness period.

Isophase (Iso) – Light has equal duration between light and darkness. Period consists of both light and dark interval. Also called Equal Interval (E Int).

Group (GP) – Group of 2 or more flashes with longer dark interval

Light Patterns (cont.)

Composite Group Flashing (Fl (2+3) – Combination of two patterns in one period, i.e. 2 flashes followed by three flashes.

Occulting (Occ) – Opposite of flashing – light is on more than it is off.

Alternating (AL) – Alternating light changes color. Special purpose light for situations requiring significant caution. Example shows AL.WG…alternating white and green light.

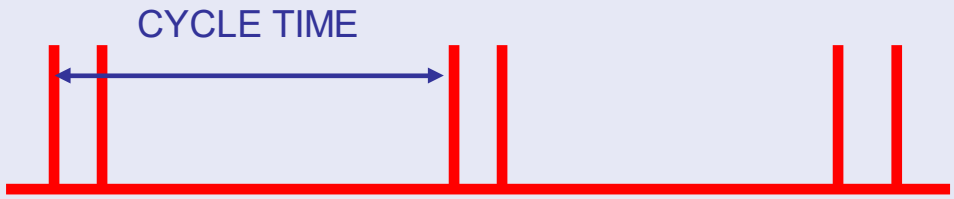
Morse (Mo) – Morse code light signal. Example is Morse "U" which is two short flashes followed by one prolonged flash then a period of darkness. Shown as (Mo(U)) on charts.

Long Flashing (LFL) – One long flash in a period with lighted period of at least 2 seconds.

Understanding Light Patterns

Learn how to time a light.

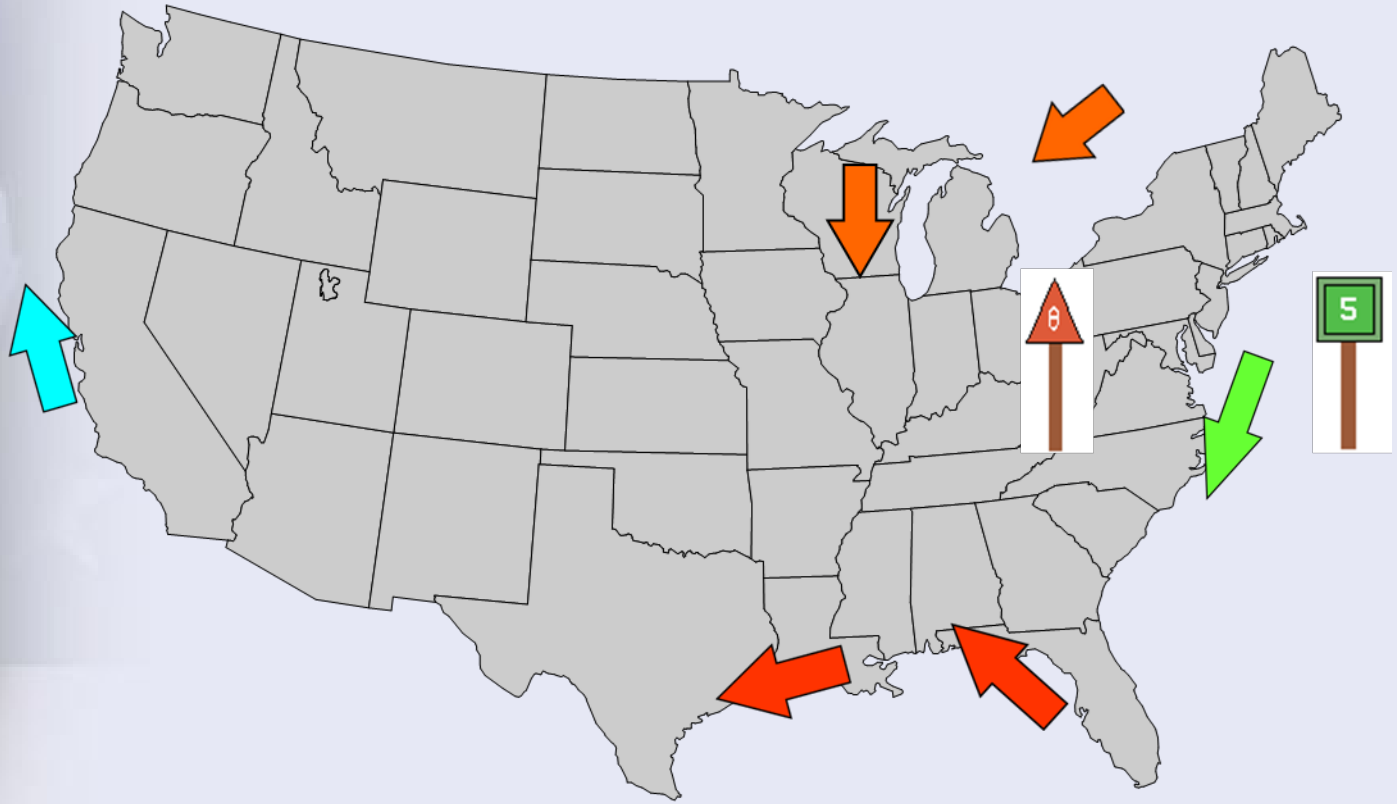
1. **Time multiple light cycles.**
   - For example, 40 seconds for a 4 sec cycle.
2. **Divide the time by the number of cycles.**



Intracoastal Waterway ICW

- Begins in Atlantic City, New Jersey.
- Goes south to the Florida Keys.
- Then north along the west coast of Florida.
- Then west along the Gulf of Mexico to Brownsville, Texas, in a clock wise direction around the United States.

Intracoastal Waterway (ICW)

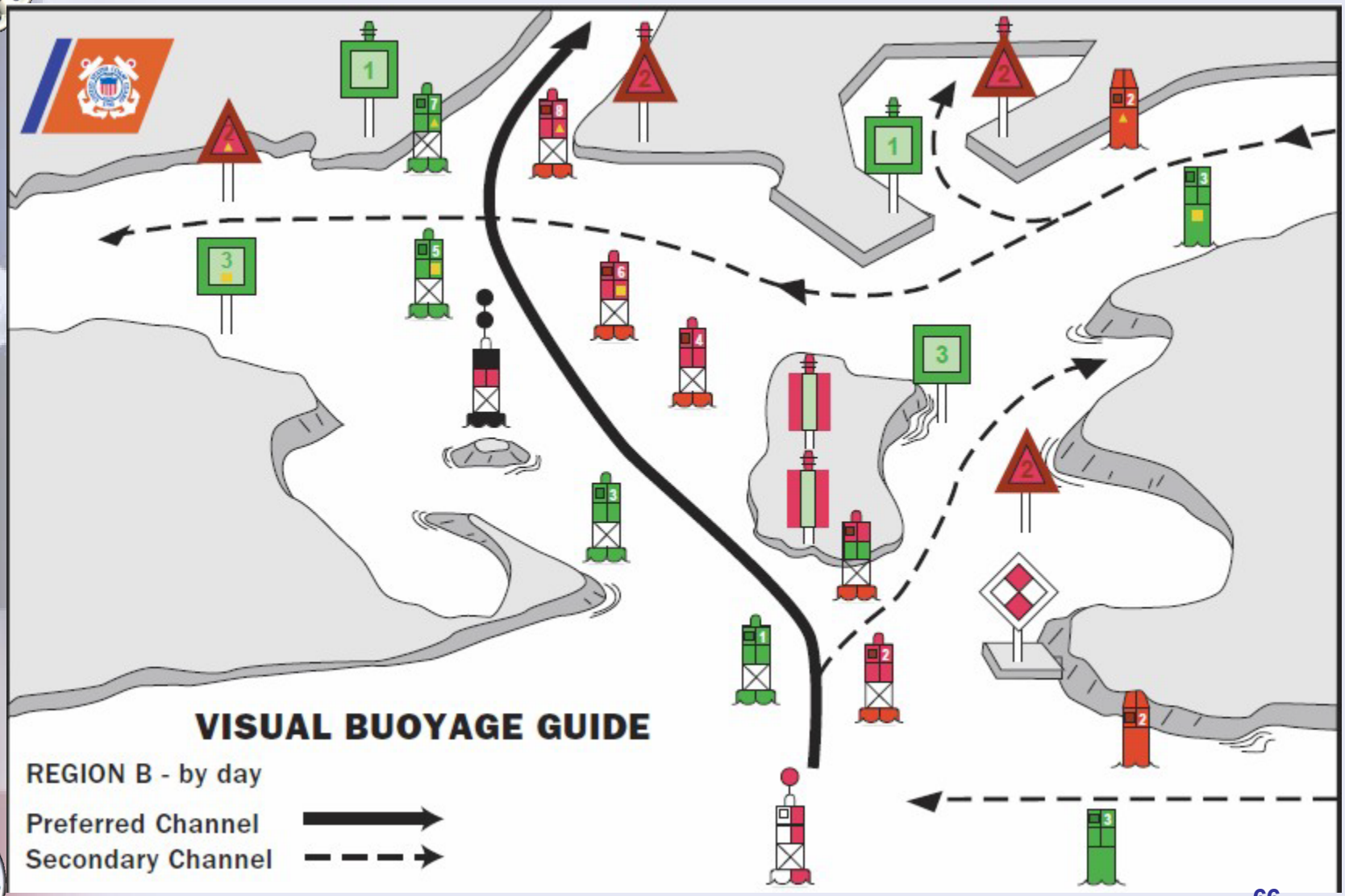


The **RED** lateral aids are on the mainland side.

Red Daymark/ Minor Light with ICW Mark

Green Daymark/ Minor Light with ICW Mark

Dual Purpose Marks



Dual Purpose Marks

Are found on **cans** and **nuns** in the **ICW** when a harbor channel intersects.

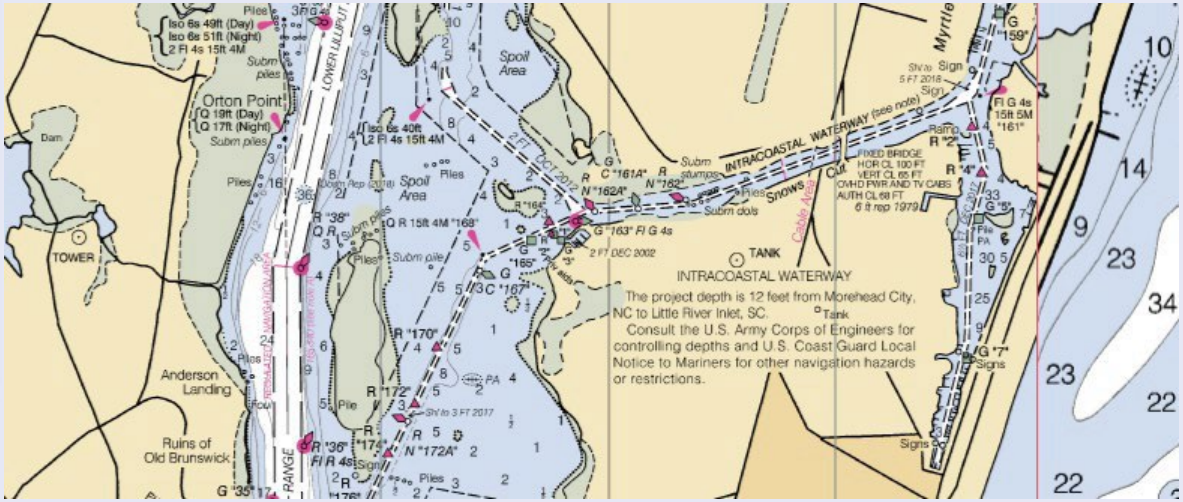
Sometimes a ***yellow triangle***  appears on a **can** or square dayboard or a ***yellow square***  appears on a **nun** or triangle dayboard. The buoy has dual purpose.

In the **ICW**, follow the ***yellow marks***.

When following the harbor channel, use the **RED-RIGHT-RETURNING** rule.

Dual Purpose Marks

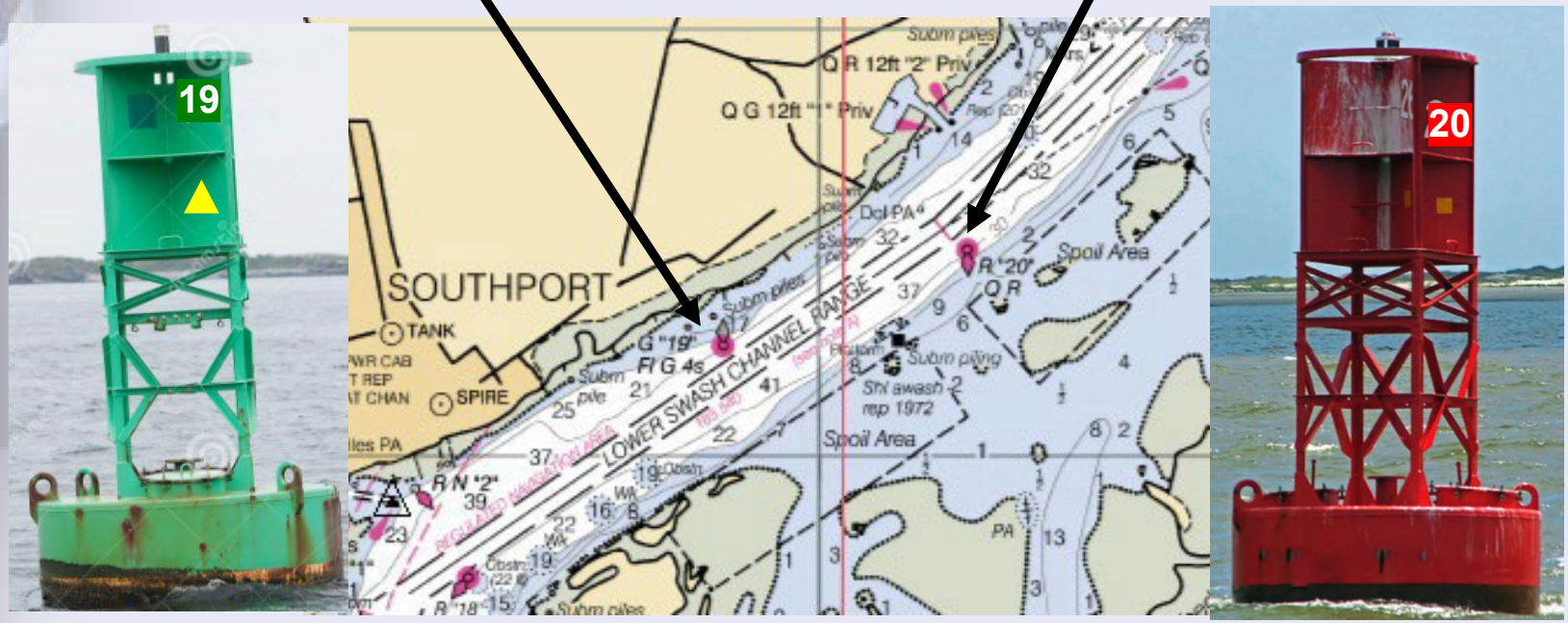
West of Carolina Beach, NC (Latitude 34° 03'N) the ICW enters the Cape Fear River. From there to Southport, where it branches off, the ICW runs in the opposite direction to the inbound shipping channel



Dual Purpose Marks

30480 Cape Fear River Channel Lighted Buoy 20
Fl R 4s Red with yellow square

30475 Cape Fear River Channel Lighted Buoy 19
Fl G 4s Green with yellow triangle




Questions?
WE
Save Lives
US COAST GUARD AUXILIARY