

Aids to Navigation

Toronto Brigantine
Grade II



Aids to Navigation

- What are aids to navigation?
 - any device external to a vessel specifically intended to assist navigators in determining their position or safe course, or to warn them of dangers or obstructions to navigation.
- Two main types:
 - Visual
 - Audio

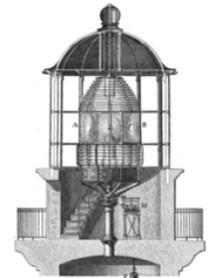
Visual Aids

- Lighthouses
- Beacons
- Buoys



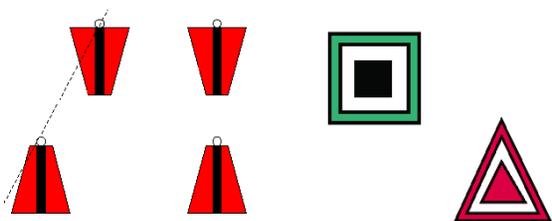
Lighthouses

- Used to mark ports, points of land and shoals
- Lighthouses used to be lit every night by the lighthouse operator
- All lighthouses in Canada are now automatic and don't require daily checks



Beacons

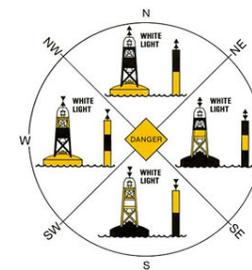
- Similar to a lighthouse but smaller
- Beacons mark channels, dangers to avoid and harbours
- Can be lit or unlit



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Bouys

- Bouys are floating markers that indicate channels, hazards and designated areas



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Channel Buoys

- The main channel buoys and day shapes are red and green
- “Red right returning” means you keep the red bouys are your right side (starboard) when heading into a port or upstream in a river
- This gets a little tricky in Georgian Bay
- **If in doubt ask**
- Bouys can be lit or unlit
- All official bouys will be marked on the chart



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Types of Channel Buoys

- Can and Nun buoys - unlit



Notice the shapes of the bouys

- Spar buoys – usually unlit



Notice the numbers

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More Buoys

- Pillar Buoys

- Green buoys are odd numbered
- Red buoys are even numbered
- Often have radar deflectors so that they can be easily picked up on radar

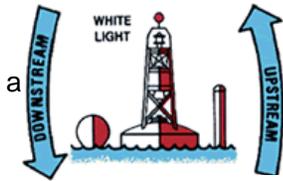


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More Buoys

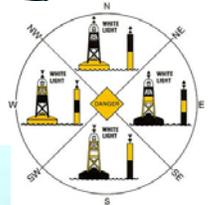
- Fairway Buoy

- Marks the beginning of a channel



- Cardinal Buoys

- Directional buoy
- If you see a north buoy it means that the buoy is to the north of the danger, so stay to the north of the buoy



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More Buoys

- Bifurcation

- Horizontal stripes
- Indicates a split in the channel - you can pass either side of it
- The preferred channel is indicated by the colour of the top stripe (in this example green – so you would generally treat it as a green buoy)



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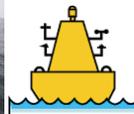


- Isolated Danger

- Found over a danger point in an otherwise navigable channel

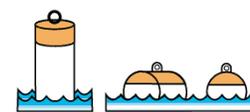
- ODAS Scientific Buoy

- Collects weather data and water quality information



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Even More Buoys



Mooring



Anchorage



Hazard



Caution



Control



Keep-Out

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Non-official buoys

- Marina buoys
- Cottage buoys (bleach bottles, sticks on rocks)
- Fishing buoys
- Wellhead buoys in Lake Erie
- Swimming Buoys
- Diving



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Lights

- Lights can be white, yellow, green or red
- Lights can be fixed or flashing
 - Flashing (~ once every four seconds)
 - Quick flashing (~ once per second)
 - Grouped (several flashes followed by dark)
 - Occulting (duration of light longer than dark)
 - Iso-phase (equal time on and off)
 - And the list goes on...



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Audio

- Fog signals on lighthouses
- Bells on Buoys
- Audio signals not as common with use of Radar and GPS



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Lights used to identify type of Vessel

- Sailing vessel: Port and Starboard side lights, white stern light
- Motor vessel < 50m: Port and Starboard side light, stern light, white steaming light
- Motor vessel > 50m: Port and Starboard side lights, stern light, one white steaming light on the after mast, one white steaming light on a forward mast (lower than after light)
- These are just three of the types of vessels and their lights. Fishing vessels, vessels towing, vessels pushing, vessels dredging, vessels with reduced manoeuvrability all have different lights. You will learn all about this in the next few years.



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Why do I need to know this?

- As a PO you will be taking the helm, often while the vessel is in buoyed channels, so you need to know what the different types of buoys look like
- You will be on bow watch and directing your watch to look for buoys and lights, so you need to know what to look for

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Right of Way

- What do you do when two vessels meet? How do you know which one has right of way?
- Well... International rules have been developed and must be followed by all vessels.

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Two vessels meet head on

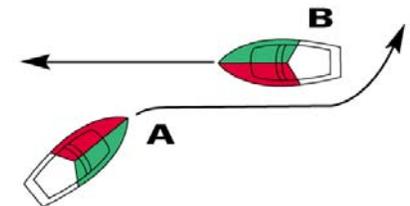
- When two vessels meet head on, both should alter course to starboard
- Vessels should try to stay on the starboard side of the channel where possible



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Vessels crossing paths

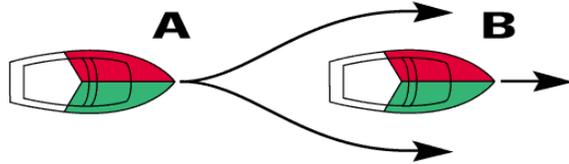
- Vessel A sees Vessel B's port side
- Vessel B sees Vessel A's starboard side
- When you see a vessel's starboard side (green side light) you have right of way
- In this example Vessel A must keep clear of vessel B



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Overtaking

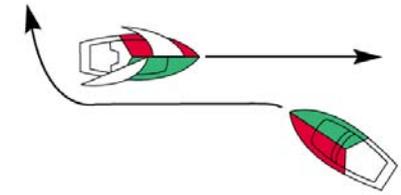
- A vessel being overtaken has right of way
- Vessel A must keep clear of vessel B



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Sailing Vessels

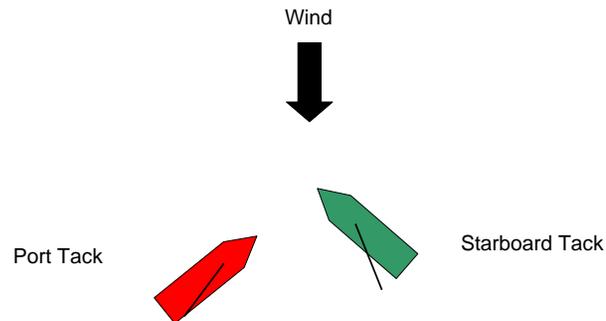
- Sailing vessels have right of way over power vessels
- If a power vessel is less manoeuvrable the sailing vessel should give them right of way
- Just because we have right of way on paper doesn't mean we should exercise that right (don't play chicken with a freighter)



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Sailing Vessels

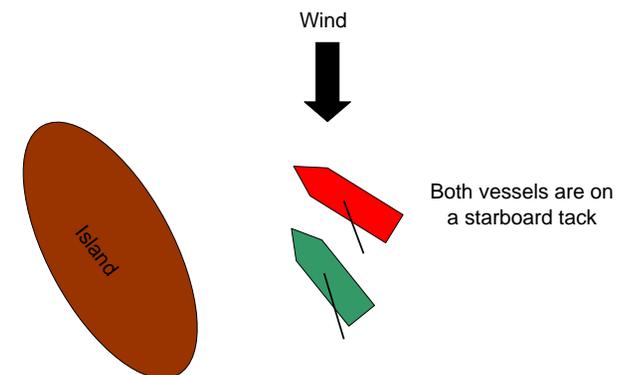
- Starboard Tack has right of way



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Sailing Vessels

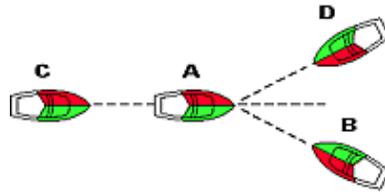
- Leeward vessel has right of way



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Toronto Harbour on a good day

- Who has right of way, A or C?
- Who has right of way, A or B?
- Who has right of way, A or D?
- Who has right of way, D or B?



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Why do I need to know about right of way?

- You will be at the helm in busy harbours and channels so it is good to know the basics
- You will not be making the decisions in a potential collision situation, but it is always good to be able to anticipate what is going to happen

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Principles of Navigation

- Know your speed, know the direction you are traveling
- Traditional nav and modern electronic equipment use the same principles to find out where you are – taking bearings off of known objects
 - This could be taking three bearings off of three islands with a sextant
 - Or the GPS taking bearings off of multiple satellites

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Basics tools of Navigation

- What kind of tools do we need?

- Chart
- Parallel rules
- Dividers
- Station pointers
- Sextant
- Compass
- Clock
- A means of measuring the vessels speed
- Pencil and eraser
- Logbook



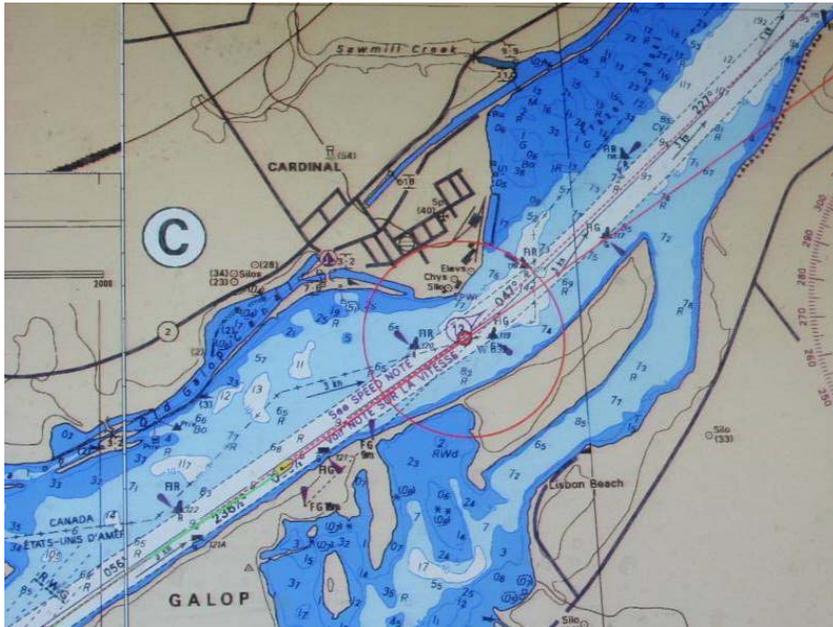
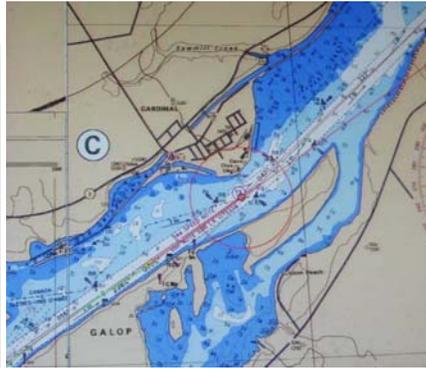
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Nav equipment that is nice to have

- GPS
- Radar
- Electronic charts



These two pictures were taken in the same place, at the same time. Can you see how the Radar image corresponds to the electronic chart?



Why do I need to know this?

- Navigation is cool!
- You may get the opportunity to do some simple navigation in the summer, so it good to understand the basics.

Radios

- Boats carry radios in order to communicate with one another
- The most common radio for short distance voice communication (< 50nm) is the VHF (Very High Frequency) radio
- Some boats also carry HF (High Frequency) and/or MF (Medium Frequency) radios, or satellite communication systems depending on their area of operations



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Radio Channels

- VHF radios have multiple channels. Some examples of channel designations:
 - Ch 16 is the international Safety, Distress, and Calling channel. One radio should always be monitoring Ch 16
 - Ch 09 is used in the US for pleasure craft calling, but this is not typically monitored by commercial boats
 - Ch 68 is used by Canadian marinas
 - Chs 06 & 08 are used for communication between commercial craft
 - Chs 69, 71, & 72 are used for communication between pleasure craft
 - Chs 10, 11, 12, 13, & 14 are used by VTS (Vessel Traffic Services)
 - Ch 17 is used by pilot boats, and for port operations
 - Canadian weather can be found on Chs 21b & 83b

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Radio Terms

- There are five things that you should always be listening for on the radio:
 1. Mayday
 - A Mayday situation is one in which a vessel, aircraft, vehicle, or person is in grave and imminent danger and requires immediate assistance
 2. Pan-Pan
 - A Pan-Pan indicates an urgent situation of a lower order than a "grave and imminent threat requiring immediate assistance", such as a mechanical breakdown or a medical problem
 3. Sécurité
 - A Sécurité indicates a message about safety, such as a hazard to navigation or weather information
 4. Your vessel's name
 - When you hear your own vessel's name on the radio, it usually means someone is trying to contact you (or talking about you)
 5. All Stations
 - Someone is calling all vessels within radio range
- Some of these terms come from French words – do you know which ones and what they mean?

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Examples of Radio Calls

1. MAYDAY, MAYDAY, MAYDAY, this is Kajama, Kajama, Kajama. Position 45 37 North 076 43 West. We are on fire and sinking. We require immediate assistance. 146 people on board. Over.
2. PAN-PAN, PAN-PAN, PAN-PAN, this is Prescott Coast Guard Radio. There is a report of an overturned vessel at position 44 12 North 082 50 West with three people in the water. All mariners are requested to keep a sharp lookout, report all findings and assist where possible. This is Prescott Coast Guard Radio out.
3. Sécurité, Sécurité, Sécurité, the sailing vessel Challenge, Challenge, will be inbound Toronto West Gap in five minutes time. Concerned traffic may call on channels 16 or 12.
4. Pathfinder, Pathfinder, the Playfair, Playfair on channel 16.
5. All Stations, All Stations, All Stations, this is Sarnia Coast Guard Radio. An updated weather forecast has been received for Southern Lake Huron. For details listen to the continuous marine broadcast. Sarnia Coast Guard Radio out.

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Radio Calls

- If you hear a radio call and you suspect that the Officer of the Watch does not, try and remember:
 1. Who the call was directed to
 2. Who the call came from
 3. The circumstances surrounding the call (ie: Mayday, Pan-Pan, Sécurité, routine call, etc)
 4. The channel that the call was placed on
 5. The channel to switch to for follow-up information (if applicable)

Why do I need to know about Radios?

- As a PO you might be at the helm or conning a trainee and hear something on the radio which the Watch Officer misses.
- You may get the opportunity to use the radio under the supervision of your Watch Officer.