

**ALTEN x RAY MARINE**  
**PERSONAL LEARNINGS- DOCUMENTATION AND REPORT**

**CONTENTS**

S.NO	TITLE	PAGE NUMBER
1.	ROLE RESPONSIBILITIES AND METHODOLOGIES	2
2.	BOAT INDUCTION	3
3.	SECONDARY PORTS CALCULATION	6
4.	ESSENTIAL NAVIGATION AND SEAMANSHIP TRAINING	9

**NOMENCLATURE**

LTD	Low tide depth
HTD	High tide depth
HTT	High tide time
LTT	Low tide time
Buoys	Indicators/ like signs for boats
MHWS	Mean high water springs
IALA	International association of lighthouse authorities
EPIRB	Emergency position indication radio beacon
CD	Chart datum
GNSS	Global navigation satellite systems
VHF	Very high frequency
SOG	Speed over ground
COG	Course over ground
DTW	Distance to waypoint
XTE	Cross track error
BTW	Bearing to waypoint
ETA	Estimated time of arrival

## **1. ROLES RESPONSIBILITIES AND METHODOLOGIES**

Test creation- JIRA platform. Test can consist of test cases or test cycles. Cases are independent of future and past test executions and consists of numerous test scripts. Cycles provide data on past test executions and outcome.

Test execution- Play button is started before every test execution to record the duration of testing.

Bug creation- This has all details of any issues that may occur outside the definition of done for each project. This should have all details of- device types, apps, bundle version, display systems used, simulator connections, AIS connection, radar, transducer, and any external devices.

Power cycle- to run a full system shut down and back up to ensure smooth and uninterrupted running of functionality even after shutting down. Data is not deleted.

Settings reset- to simply reset the settings the device is tested in, and this does not delete the data stored.

Factory reset- resets the devices including data in the system is erased.

Manual testing- ensuring device functionality and the hardware works to the expectations. Regression, smoke, field, trial, S&R, functionality testing.

## 2. BOAT INDUCTION

### Briefing:

Ray marine boat- with radar fitted, axioms and LH4 installed.

Skipper seat, co-skipper seat, benches along with testing desk for engineers, engines- twin turbo engine, power supply- 12 batteries, cables and network connections for engineers, life jacket storage, toilets, kitchen, rest room, cushion for seats, air fly or air deck also with steering wheels, fenders to avoid the boat from damage- like a balloon defenders on the sides, charts (nautical, compass, protractor, wind and depth book per time), heater for boat.

### Safety checks:

3fs- fire, flood, fall (someone off the boat)

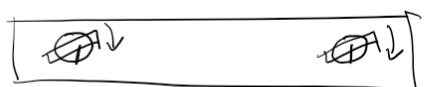
Fire- extinguishers all around the seating of the boat

Flood- emergency exits or 3 points of indication, life jackets- tools inside it (manual to blow, automatic salt capsule that inflates by itself, helmet), raft boats- also thermal tube based automatic as well as manual to drop the raft boats.

Fall- one person points to them while the skipper steers the boat, if you fall- never try to swim as they will come to you and must hold the cold shocks, no choice.

### Starting the boat:

At the centre



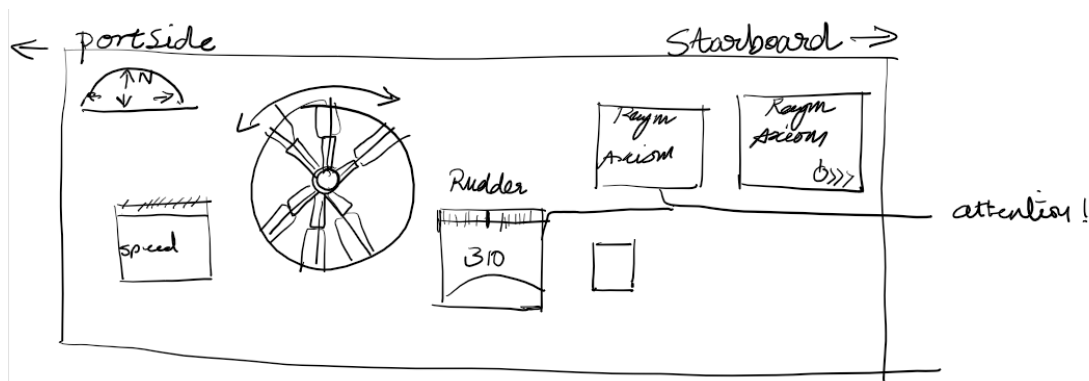
(engines - has key in them)

On right side

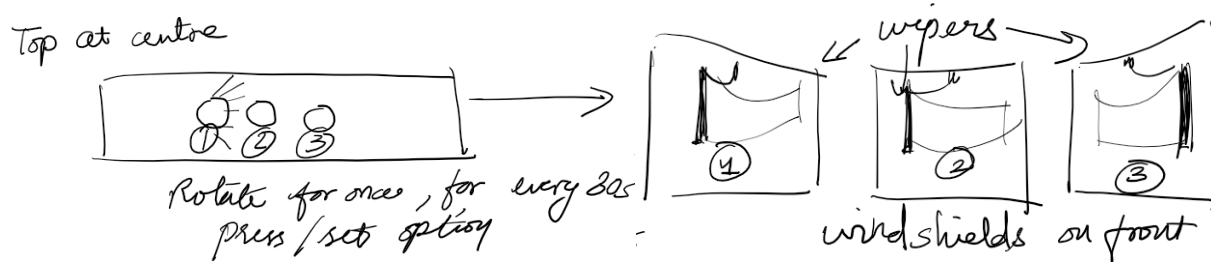


even on these switches for wind and speed probably.

### Understanding while driving:



In case of water splash on wind shield:

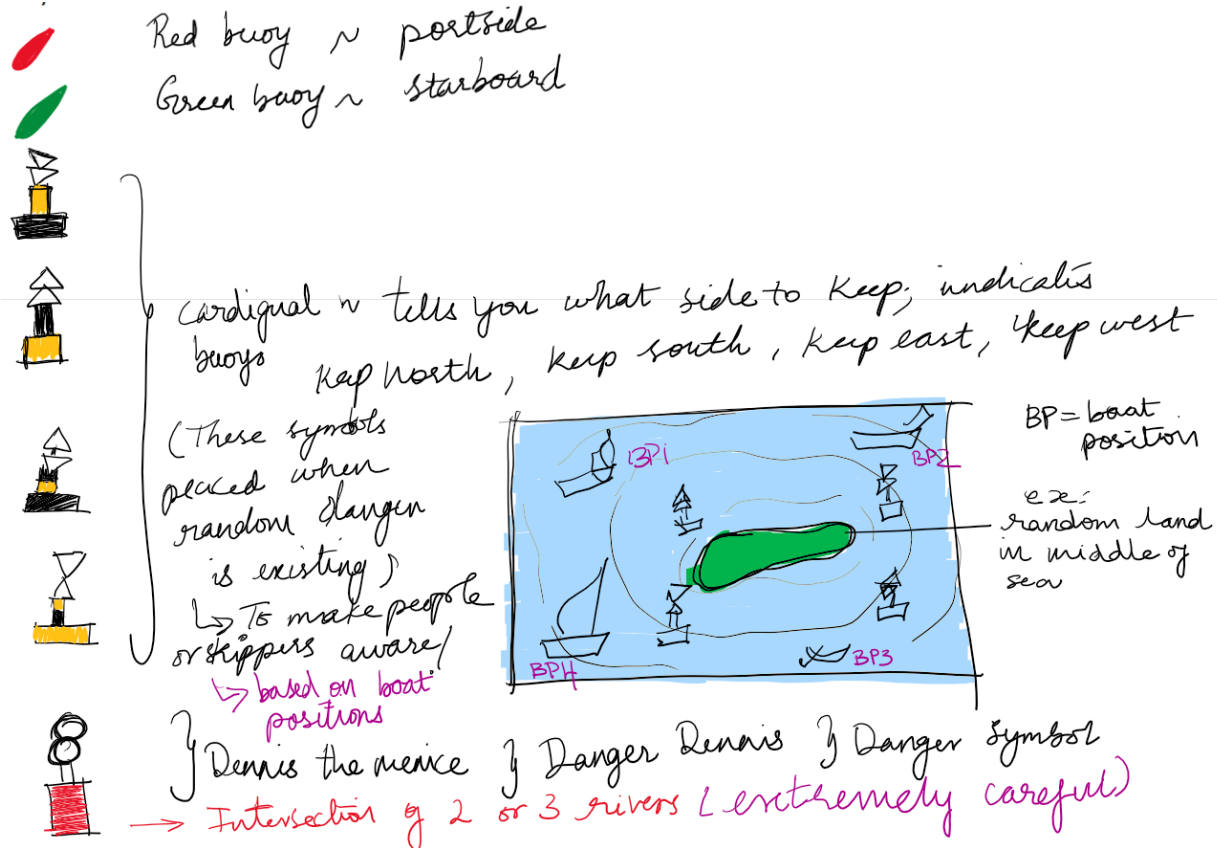


### Charts (maps in car language), symbols, buoys:

Various charts for varied places- hamble, Solent, France, etc. Wind and chart books- numbers by itself indicate the depth without tides added at that instance of time and is correct. Use wind and tides booklet and date and time to estimate the tide. If number underlined, then the number must be added to tide or wind values mentioned in that book. When moon and sun aligned tides less, not aligned higher tides. Time, tide, wind, wind direction, date is important.

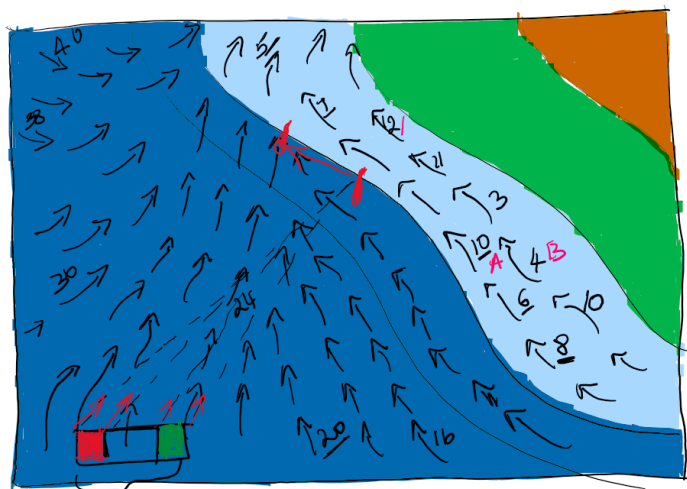
**Buoys-** if the water released or if stream of water noticed behind the buoy or in front of it, indicates the direction of tides.

### Buoys:





yellow buoy for racing



- A - Depth = 4 ft
- B - Depth = 10 + (increase in the water level due to tides and astronomical science)  
ex: 10 + 4 = 14 ft at given instance of time and date (approximate or approximate values)

### My experience and thoughts:

A good opportunity for understanding the actual use of the Ray marine tech. I used the Ray marine devices to navigate myself. I required the heading vector, the waypoints, the buoys when I couldn't see them on water, I used the screens then, the radar for testing purposes, dock sensor uses, and more. A good learning.

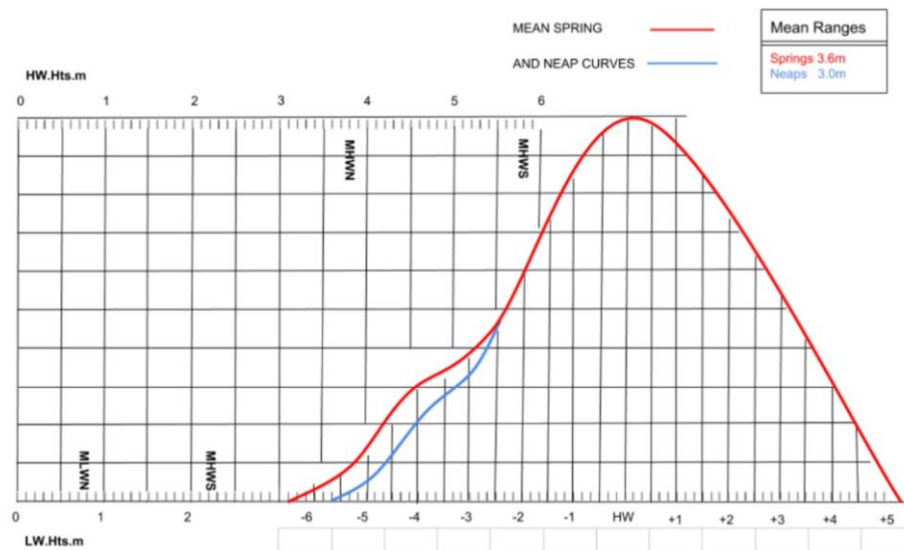
## 2. SECONDARY PORTS CALCULATION (taught by Adam Travell):

### Why secondary port calculations?

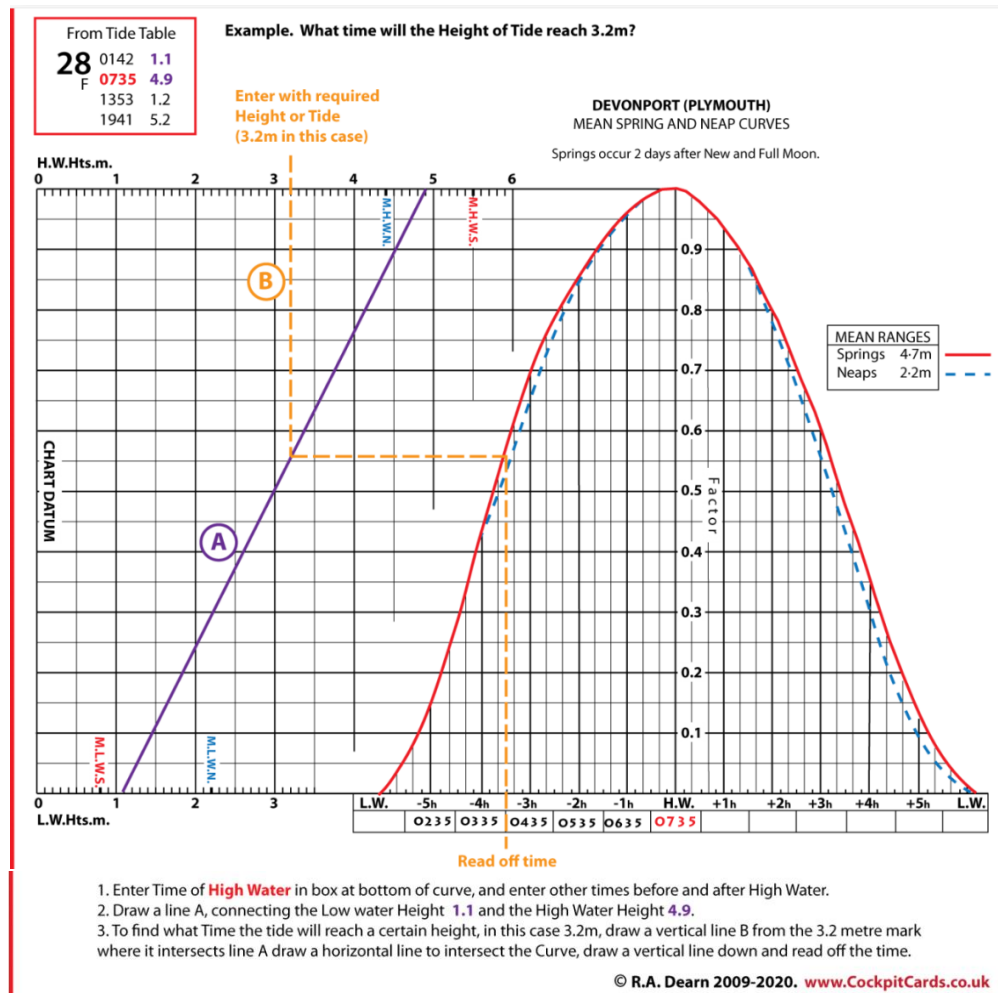
It is easier to find standard ports as all required data is provided. But smaller ports next to standard ports do not have all such as high tide or low tide times and depths. But the secondary ports have correction levels for the depths and times that could be applied on standard port data to acquire exact details for better sailing/ boat journey. It is good to have the skills to calculate this rather merely rely on electronics data. And that is why it is essential.

### What are required to carry out the secondary port calculations?

Tidal graphs- that indicates LTD, HTD on the left and HTT with few hours before and after the HTT along with graph tidal wave curves on the right. It could look like something shown in the picture below.



**Figure 2.1:** Tidal curve graphs for finding depth and time.



**Figure 2.2:** An example [Tidal Curves - cockpitcards.co.uk](http://Tidal Curves - cockpitcards.co.uk)

### What are the steps involved in finding the details for secondary ports?

For example: I found the data of HTD, LTD, HTT, and LTT for the secondary ports of West Mersea, Faslane, Gills Bay, Amlawch. The standard ports for these were Walton-on-the-Naze, Greenock, Wick, Holy Head for the date January 1, 2024. The steps I used were:

- Select the secondary ports and note the correction data for the depths and times accordingly.
- Note the standard ports and find the tidal charts for the same.
- For the selected date, find the HTD, LTD, HTT, LTT (if the chart suggests LWT instead of HWT on the right side, use the appropriate data).
- Apply the correction by using graphs. Draw linear line connecting the 2 points on the graph followed by vertical lines on the HTD, LTD, HTT, LTT- this should intersect with the linear graph and the horizontal values are the corrected and required for deciding on the boat journey.
- This is a rough idea but happy to demonstrate the calculations with explanations.

### My experience:

It was interesting to learn, and another skill added to my brain bucket.

Sec: West Mersea SP: Walton-on-the-Naze

HT (T)	LT (T)	HT (D)	LT (D)
19:34	13:16	3.7	0.7
+ 1:20	+ 1:31	+0.6	+0.1
19:54	13:47	4.3	0.8

SP: Greenock Sec P: Faslane (Marp)

HT (T)	LT (T)	HT (D)	LT (D)
20:02	13:25	3.2	1.1
+00:03	+0:03	+0.1	+0.9
20:05	13:28	3.3	2.0

Sec P: Gills Bay SP: Wick

HT (T)	LT (T)	HT (D)	LT (D)
19:10	00:38	3.1	1.2
-1:50	-3:20	+0.7	+0.6
18:50	07:08	3.8	1.8

Sec P: Amble Sec P: Holyhead

HT (T)	LT (T)	HT (D)	LT (D)
18:15	12:00	4.9	2.0
+00:10	+00:28	+1.45	+0.5
18:25	12:28	6.35	2.5

Figure 2.3: My work on finding secondary port data.

### Other resources/ secondary reading:

1. [UK Tidal Curve Downloads \(poseidon-marine.co.uk\)](http://poseidon-marine.co.uk)
2. [Real-time data – UK National Tide Gauge Network | National Tidal and Sea Level Facility \(ntsif.org\)](http://ntsif.org)



### 3. ESSENTIAL NAVIGATION AND SEAMANSHIP TRAINING

#### Chart training:

Chart- nautical term use for sea navigation.

- Key terms and notices- chart title; unit or scale that says 1:100000 i.e. 1cm equals 100000cms in real life; notes on the area; chart number; land- yellow; cover and uncovered by tide- green, shallows- dark blue; deeper areas- light blue; deepest- white; symbols and abbreviations on abbreviation booklet or almanac; compass for magnetic variation.
- Almanac- tidal and harbour information.
- Chart 5011- booklet that has symbols and abbreviations used on Admiralty charts.
- Logbook- record important navigation information such as boat's progress, weather conditions and positions which should be recorded regularly.
- Tidal stream atlas- information on the direction and strength of tidal streams for each tidal hour.



- Lines of equal depth- worst case depth and rarely falls below that limit.



- Depth.



- Underlined number- drying heights of seabed exposed to low water.



- Number in brackets- heights above the mean high-water springs.



- Small and large number indicates a decimal point in between.

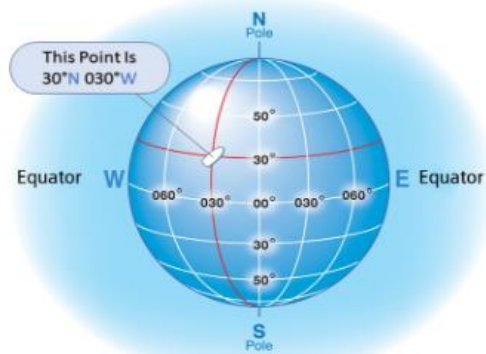


- Church.

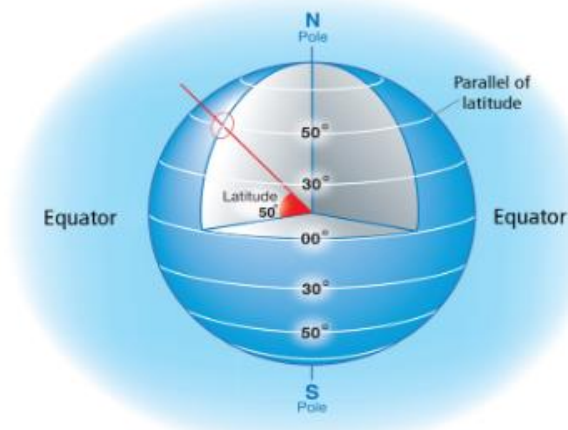


- Anchor point.

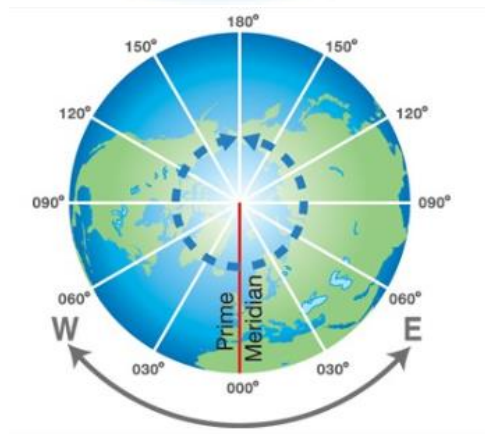
- Latitude- for distance and vertical; longitude- for position only and never distance and it is horizontal.



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### Buoyage training:

Purpose- to avoid accidents. 2 systems- IALA 'A' and IALA 'B'.

- IALA 'A'- Europe, Australia, New Zealand, Africa, Russia, Asia.
- IALA 'B'- North, south, and central America, Caribbean, Canada, Japan, Philippines.



- Lateral mark- channel into and out of harbour



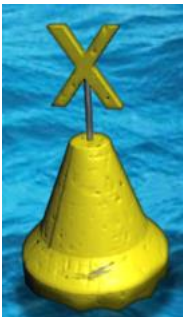
- Cardinal mark- danger



- Safe water mark- safe to boat



- Isolated danger- small island or wreck or rock

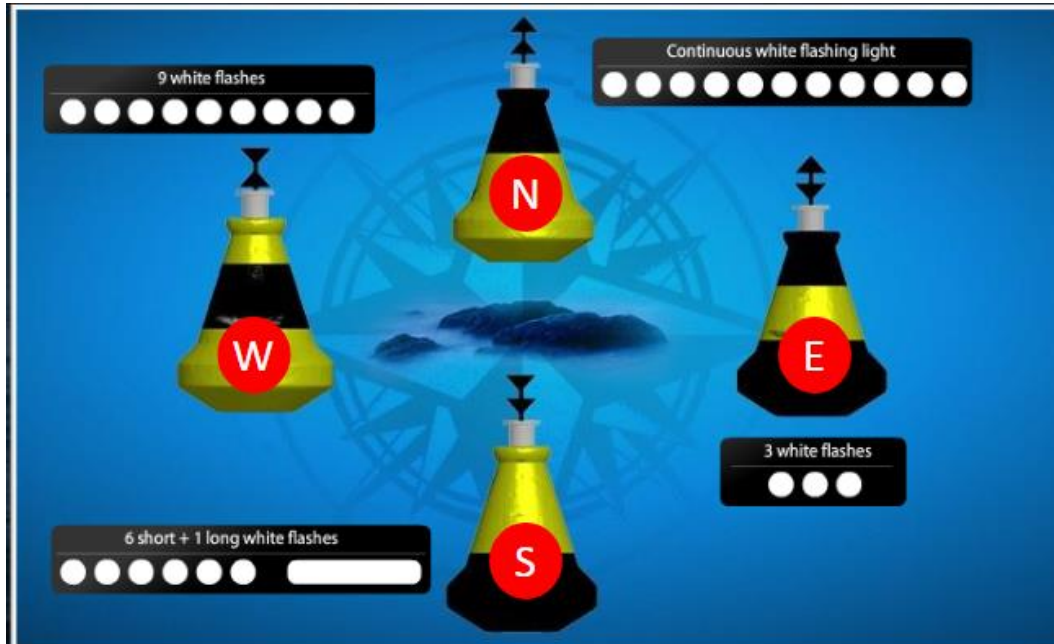


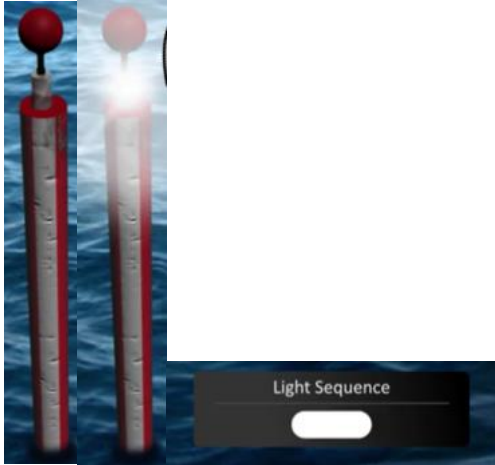
- Special mark- racing

#### Lights:



- FI- flashing lights

- **G-** green
- **5s-** beginning of flash to beginning of next flash (5 second interval exists)





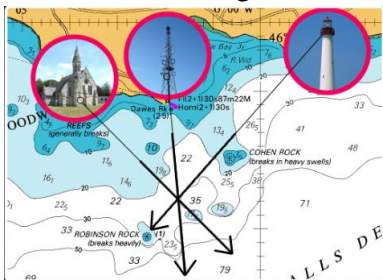
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Standard	IALA 'A'	IALA 'B'
Pictorial representation		
Shape	Port (left)- <b>can</b> and starboard (right)- <b>cone</b>	Port (left)- <b>can</b> and starboard (right)- <b>cone</b>
Colour	Port (left)- <b>red</b> and starboard (right)- <b>green</b>	Port (left)- <b>green</b> and starboard (right)- <b>red</b>
Top mark	Port (left)- <b>can</b> and starboard (right)- <b>cone</b>	Port (left)- <b>can</b> and starboard (right)- <b>cone</b>
Light	Port (left)- <b>red</b> and starboard (right)- <b>green</b>	Port (left)- <b>green</b> and starboard (right)- <b>red</b>

### Navigation training:

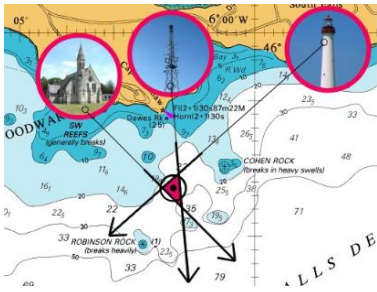
Purpose- if the electronics crash, it is important to know how to navigate as basics.

- Echo sounder- measures depth of water beneath boat.
- True- true to north pole. Also known as true north. Lat=90 degrees.
- Magnetic- deviation to the true based on magnetic compass. This is also called magnetic north.
- Variation- this change in true and magnetic bearing.



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Three-point fix- point of intersection is the position of boat.



- Cocked hat- the intersection point is not always perfect. It gives a triangle instead called cocked hat and the centre of the hat is the approximate position of the boat.
- Passing close to beacon or buoy- this could be considered as current position.



- Transits- 2 or more chart objects lined up same as the boat.
- Distance- use divider on the latitude scale. 1 minute of latitude equals 1 nautical mile and 1 degree of latitude equals 60 nautical miles.

### Safety training:

To be safe during the journey and keep the crew aware in case of emergencies.

Required- life jacket and how to use it; safety line; man overboard situation and handling as well as needed equipment for use; flares; gas safety; communications; fire safety; first aid; heads; safety harness; cold and hot weather protection; EPIRB.

### Anchoring training:

- Position- sheltered from wind and tidal streams must be weak for better anchoring. Mindfulness around the rocks is required.
- Before journey- check tidal streams and wind/ weather forecast.
- Anchor holding- take bearing of a fixed object and must not move. If changing, the boat is moving.



- Raising anchor- move boat slowly towards chain as the direction in which the chain is lying will indicate position of anchor. If chain not visible, someone from bow shall guide. By the time anchor lifts, bow of boat must be directly above.

- Do NOT anchor in area for coral and conservation of endangered species.

### Tides training:

Occurrence of tides- the gravitational pull creates a bulge of tides. When sun and moon aligned, the gravitational pull is high, the tidal waves are called spring tide. When the sun and moon are NOT aligned, the gravitational pull is not as great as when they are aligned, the tides are called neap tides.

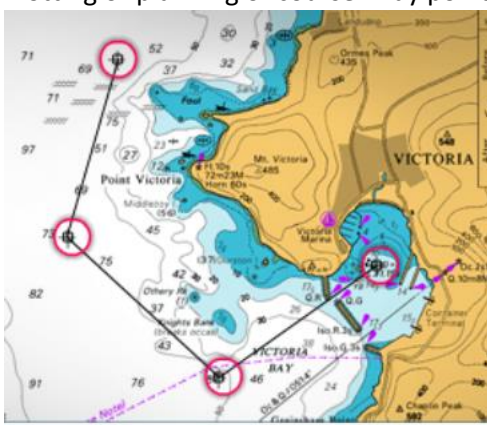
Chart datum- tides fall rarely below this point. This is essential for clearance and space for draught.

Tidal charts and tidal curve graphs were used to find the tidal time and depth as required.

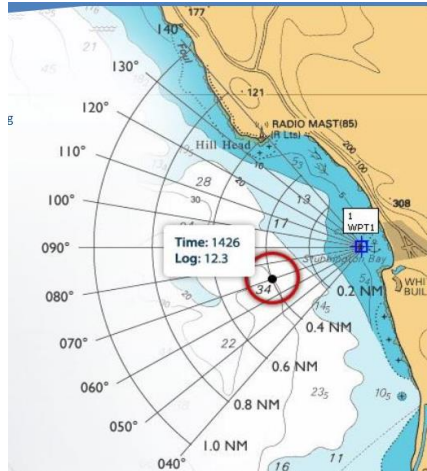
Secondary ports rely on standard ports data.

### Electronic navigation training:

- GNSS- valuable data and information acquired. Calculates your distance from various satellites in orbit. Using these distances, it can work out the position and the direction of movement.
- American- GPS.
- Russia- GLONASS
- Back up- charts and using latitudes for distances.
- COG- your travel position over ground.
- SOG- actual speed of the boat.
- DTW- current location from a user defined position.
- BTW- bearing from current position to user defined position.
- XTE- how far your track on passage from departure to the waypoint.
- ETA- estimation of time of arrival.
- Plotting or planning of course- way points near buoys or beacons for easy identification and spot.







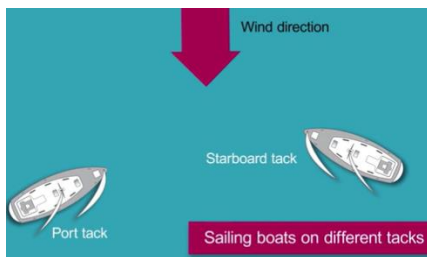
- Way point web - easy to use and plot while on course.

### Rules of the road:

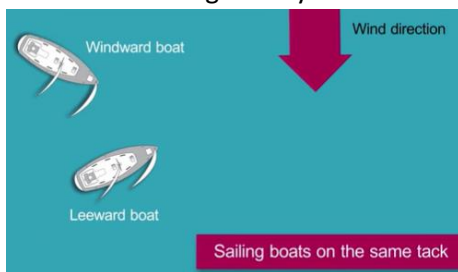
Purpose- to avoid collisions.

Steady bearing- if object nearing when stead bearing, potential for collision.

### Sailing boat rules:



- Boats on different tracks- port side boat must give way. Port vessel is **'give way vessel'** and starboard vessel is **'stand on vessel'**. Give way vessel can pass behind or slow down to give way.



- Boats on same track- windward boat is the give way vessel.

### Power driven rules:

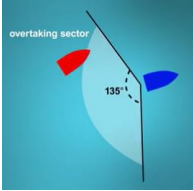


- Head on rule- 2 boats heading on, should alter to starboard.

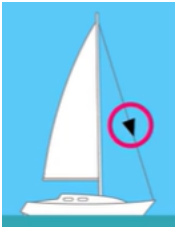




- Crossing rule- give way to boats on starboard. If you are 'give way boat', alter course to go behind or slow down.



- Overtaking rule- overtaking boat must be given way and boat being overtaken should keep steady course.



- Sails is down- meaning power driven or uses motors or engines.

#### Dry shapes:



- Ball- anchored boat and must steer around the boat.



- Downward pointing cone- yacht with sails up and using engine/ power driven.



- Diver down flag (or Code A flag)- to show divers in the water.

#### Sound signals:

One short blast horn- altering course.

Two short blast horn- altering course to port.

Three short blast horn- engine in reverse. Could mean they are just slowing down and not necessarily reversing.

Five short blast horn- unsure of other boat's intentions.

**Weather training:**

Keep track of local weather forecast- check TV, forecast at the marina or harbour office, VHF, apps on phones.

**The Beaufort scale:**

- Smooth or slight- force 1-3; wind speed to 1-10 knots; wave height of 0-0.9 meters.
- Slight or moderate- force 3-5; wind speed to 7-12 knots; wave height of 0.9-2.5 meters.
- Rough- force 6 and above; wind speed 21 knots and above; 4 meters.

**Wind direction:**

- Backing- changing in anti-clockwise direction.
- Veering- changing in clockwise direction.

**Visibility:**

- Good- visible more than 5 miles.
- Moderate- visibility between 2 to 5 miles.
- Poor- visible for 1000 meters to 2 miles.
- Fog- visible less than 1000 meters.

**Time of weather change:**

- Later- more than 12 hours from forecast.
- Soon- between 6 to 12 hours from forecast.
- Imminent- within next 6 hours from forecast.

Sea breeze- land heated by the sun and heats the air above it which rises. The cooler air above the sea comes in and fills the low pressure above the land. This creates demanding sailing and uncomfortable power boating conditions.

Land breeze- at night, the air above the land cools faster than the air above the sea. The breeze flows from land to sea at a force 2-3 but more near mountains. Weaker than sea breeze but need to be aware near mountains.

**Pilotage:**

Keep track- dangers, landmarks, shipping regulations, channels for VHF radio, direction and distance, pilotage aids.

Purpose- for best plan to reach destination while marking key features to be aware of during the course.

**Passage planning:**

Purpose- to prevent getting lost.

### Checks:

- Crew planning and briefing.
- Select the chart that should be used during the journey and create passage plan.
- Consider the navigation and distance, tidal depth and streams, journey time, and weather.
- Safety equipment checks.
- Information to others regarding your journey is essential.

### Personal experience and review:

It was unexpected that I would be given a course as I had just joined. My most favourite part of the course was the chart training where I got to learn the navigation basics using the divider, true and magnetic readings, using 3 points, and web for finding the current location were interesting. Buoyage was something that I already knew and learnt when I went down for the boat induction. I did make a few silly mistakes at some of the tests but thoroughly enjoyed the course.

### My work on practice charts:

