SAIL IN ASIA

ZERO TO HERO

Student Handbook

Updated: April 2020

International Yacht Training®
WORLDWIDE

CONTENTS

COURSE OVERVIEW

The ZERO TO HERO course is a fourteen days introduction to sailing designed for beginners. The aim is to build the candidates' nautical knowledge to competently take on the duties of a bareboat skipper on board a bareboat yacht, in daylight hours, within sight of land.

Upon completion, the students may be eligible to undertake the IYT Yachtmaster Coastal Certificate, when they have acquired the requisite mileage (experience).

Theoretical Topics

Parts of the Boat and vocabulary: Bow, stern, hull, rig and ancillary equipment. (Basic knowledge of terms).

How a Sail Works: Simple sail theory. Wind flow, telltales and trim.

Boat Handling: Understanding points of sail, how to stop a boat and come ashore/alongside. Anchoring mooring and MOB, Berthing and leaving a berth, handling in confined areas with and against cross currents

Responsibilities of a Skipper: Navigational duties.

Chartwork: Types of charts, symbols, navigational techniques, plotting, tides and currents, position fixing, instruments and electronic aids.

Compasses and Magnetism: Compass types and use, variation, deviation and applying error.

Buoyage: Pilotage, IALA areas A&B, Lateral and Cardinal buoyage systems.

Collision Regulations: International obligations, collision regulations, responsibility, definitions, signals, lights and shapes, outline of steering and sailing rules 4-19.

Taking over a vessel: Hull and rig checks, machinery and systems checks, instrument checks, safety equipment checks

Meteorology: Sources of information, personal observation, weather patterns, sea and land breezes, cloud types and formations, precipitation and fog. Modern Apps for better forecasting.

Pilotage and passage planning: Pilot books, almanacs and information sources, passage planning considerations, navigating a coastal passage, passage strategy, port regulations, pilotage plans

Tides and Currents Theory: Causes, tidal heights, Springs and Neaps, ebb and flood, almanacs, tide tables, tidal atlas, tidal diamonds, primary/secondary ports.

COURSE OVERVIEW

Practical Topics

Rigging a Boat: Preparing a boat to sail, rigging and hoisting jib and mainsail. Understanding of halyards and sheets.

Sailing Skills: Sailing on all points of sail, tacking, gybing and stopping the boat.

Knots and Rope work: Basic knots and rope work (Reef, bowline, sheet bend, clove hitch).

Mooring: A safe and controlled approach and attachment to a mooring or buoy.

Safety: Understanding the risks and dangers involved in the sport. MOB under sail and engine. Personal Safety, Yacht Safety and Sailing Safely at sea. IRPCS knowledge.

Engines: How to start and stop outboard engines safely and in control.

Taking over a vessel: Hull and rig checks, machinery and systems checks, instrument checks, safety equipment checks, fuel and water capacity. Operational Checklist!

Safety Brief: Charts and publications, meteorology information sources, MOB techniques.

Boat handling skills: Tacking and gybing, picking up a mooring buoy under power or sail, reefing the sails. Anchoring skills and considerations.

Passage Plan/Short Passage: Prepare a short passage plan, selecting an anchorage, navigation, heavy weather preparation and tactics, action in restricted visibility, negotiating a harbour entrance, collision regulations on passage.

Responsibilities of Captain/Skipper: Communication with crew, delegation of crew

Seamanship General deck work, ropes, knots and splices, care and use of lines

Vessel Handling: Anchoring, mooring and MOB, berthing and leaving a birth, handling in confined areas, handling with and against cross currents

SAFETY

Start out Safe

A Well prepared skipper should have an **Operational Safety Checklist** to check and plan their passage:

- Pre-departure check list
- Engine Checks - Oil, water, electrical, mechanical checks
- Safety equipment – Full safety Equip?
- What to do in the event of **Man Overboard –** MOB?
- Fire procedure – Fire Equipment
- Emergency drills – Crew capability?
- Sea Cocks and pumps – Effective?
- Heads (toilet) – Working and briefing
- Weather and Tides – Pre-planned and up to date.
- **Plan, Plan, Plan** – it's the law!

Personal Safety

A crew must be briefed about personal equipment that gives them safety cover. Clothing appropriate to weather conditions and footwear that ensures no broken toes or bad lacerations. A life jacket should be fitted to each crewperson before bad weather or night sailing. A good skipper ensures all the following is covered in this briefing.

- Dress Appropriately
- Dry Bag
- Fit your lifejacket
- Wear sailing gloves
- Protect your skin
- Drink water
- Rehydration salts
- Polarized Sunglasses
- Good Knife
- Waterproof Torch
- Multitool (Leatherman)
- Footwear

SAFETY

Boat Safety Equipment

On board your boat you should have a plan of the location of all safety equipment.

Weather

Before Embarking on a passage a well-prepared Skipper will check:

- Weather Forecast
- Weather Warnings
- Storm Fronts
- Pressure systems
- During a passage the skipper must monitor weather conditions and cloud cover/colour
- Being caught out in a storm is not a good place to be. Be close to shelter if possible.
- Using Apps on a tablet is vital in this day and age. We recommend you use a large area forecast for distance sailing and a local area App for coastal sailing Windy covers this function, as does Wind Guru

Being caught in a storm is normally about bad planning, risk taking or going racing. Being 'Risk' averse is the sign of a good skipper. Planning is essential!

SAFETY

What to do in the event of a fire?

A well-prepared skipper should check the Emergency Muster Plan. The fire extinguishers must be appropriately selected for the type of fire. Electrical fires need CO2 etc

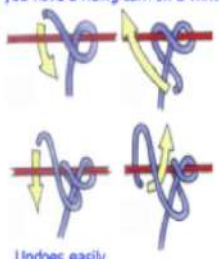
In the event of fire:

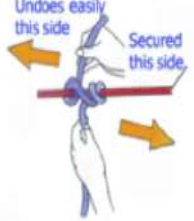
- Raise the alarm!! Shout FIRE!!
- Try to extinguish if safe to do so **with correct extinguisher**
- Isolate if you can't (shut doors, starve the fire of oxygen)
- Get the crew on deck in lifejackets

If you cannot extinguish the fire send a **Mayday** message and prepare to abandon ship.

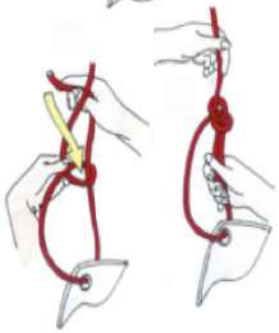
Useful Knots on a Yacht

Rolling Hitch
Used for towing small boats in a
or taking the strain off a line, -
you have a riding turn on a winch

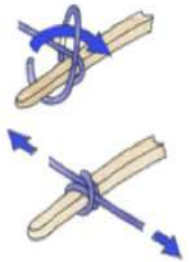




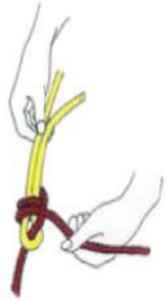
Bowline
The most useful sailor's knot. Used for attaching sails to sheets , for mooring lines and safety lines.



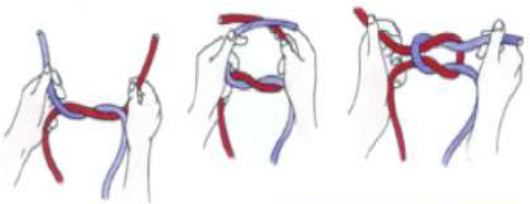
The Clove hitch
Used for attaching fenders to guardlines and for lashing the tiller securely.



The Double sheet bend.
Double byte on the rope ensures firm grip. Same use as for sinle sheet bend.



The Reef Knot - Used for shortening sail on a 'reefed yacht'.



Single sheet bend
A knot used to join two ropes of different thickness

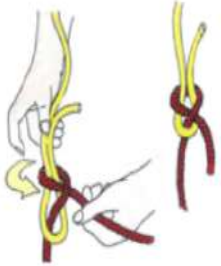
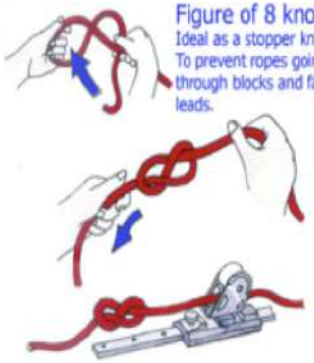
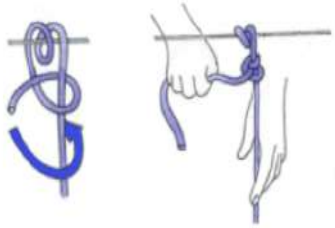
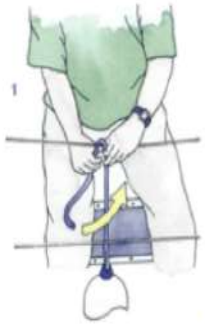


Figure of 8 knot
Ideal as a stopper knot. To prevent ropes going through blocks and fair-leads.



Round turn and two half hitches.
Used to tie a dinghy up to a ring, an eye, or a line. Useful for many applications but be aware it can be difficult to undo when under tension.





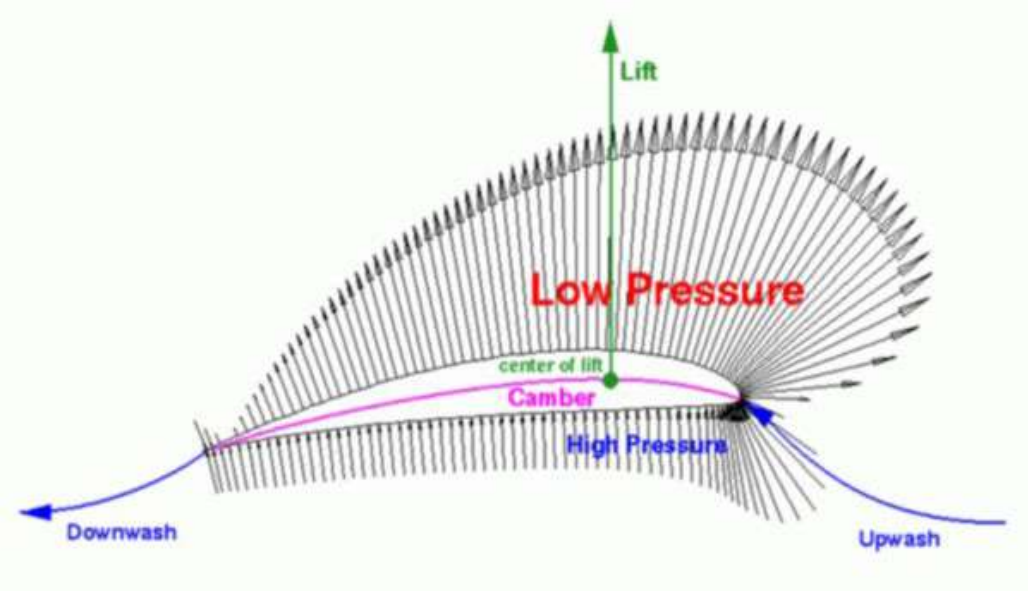
Good sailors know the knots'.

HOW A SAIL WORKS

When properly trimmed for sailing up wind a sail's leading edge points into the wind. The wind flow over the sail creates **lower pressure** on the convex side of the sail and higher pressure on the concave or (windward) other side. (Boats get sucked along not pushed along by the wind)!

Like an airplane wing the sail "lifts", or moves, toward the lower-pressure zone, pulling the boat along with it. This works because the sail isn't a flat sheet of cloth, instead it is curved much like a airplane wing. The curvature is built-in by the sailmaker, through careful cutting and sewing of the panels that make up the sail.

Not all of the lift developed by a sail moves the boat ahead. In fact since the direction of lift is roughly at right angles to the sail, much of it tries to pull the boat sideways. This creates leeway. The shape of the hull and keel creates a high resistance to the sideways force, therefore the boat moves ahead and only slightly to the side (typically 5°-10°).



How much of the total lift acts to pull the boat forward and how much sideways depends on the "point of sail," the angle between the boat and the wind: closer to the wind leads to more sideways movement, because the sail is trimmed in closer to the centreline of the boat.

This effect is much stronger when the wind flow smoothly over the sail. When sails flap, or the tell-tales move, this is a indication that the wind is not flowing smoothly over the sail. This is why keeping the sails filled with wind and the tell-tales flowing smoothly is so important when we are sailing.

POINTS OF SAIL

"Point of sail" refers to **the angle of the sailboat relative to the direction of the wind**. Different terms are used for the different points of sail, and the sails must be trimmed (pulled in or let out) to different positions for different points of sail.

The diagram below shows the basic points of sail for different boat directions relative to the wind. Here, the wind is blowing from the top of the diagram (think of it as due north or 12 o'clock). A yacht cannot sail directly into the wind. We call this the '**no-go zone**'.

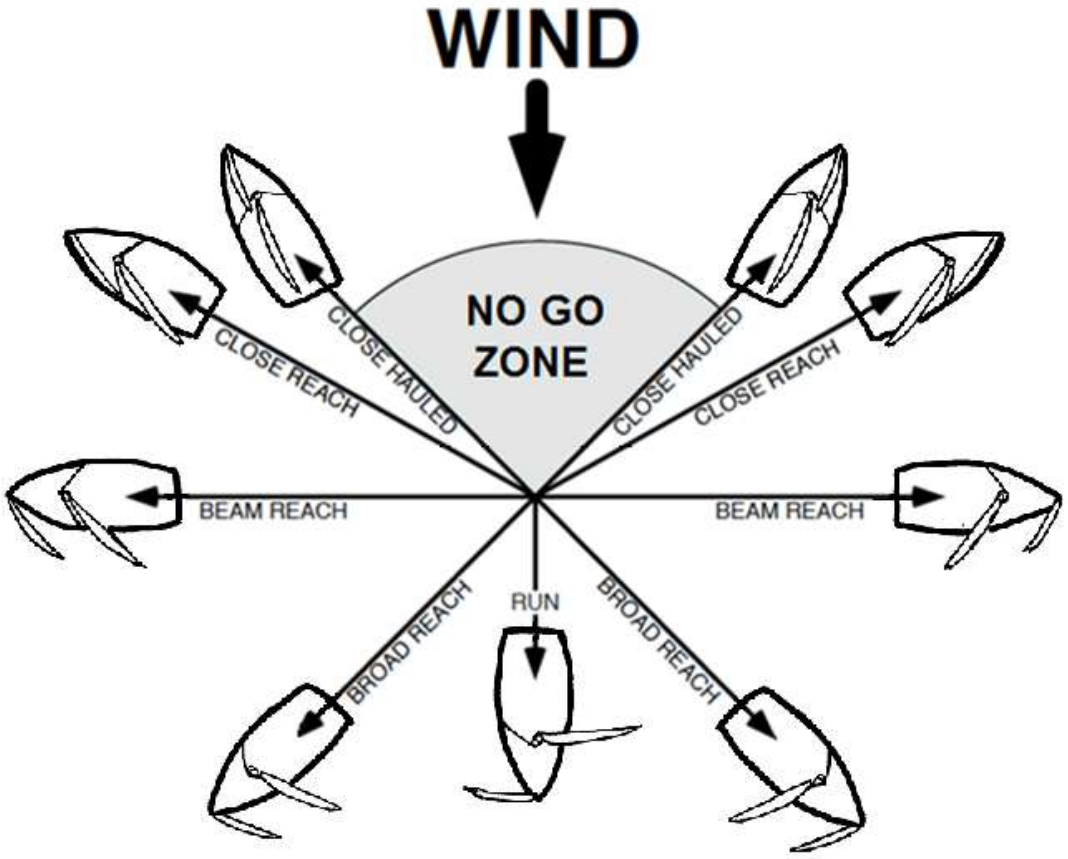
A sailboat sailing on the closest possible angle to the wind on either side (toward the northwest or northeast, 11 o'clock or 1 o'clock) is known as **close hauled**, as the sails are pulled in as tight as they can be.

Sailing directly across the wind (due west or due east, 3 o'clock and 9 o'clock) is called a **beam reach**, with the wind at 90 degrees to the boat's direction.

Anywhere between close hauled and a beam reach is known as a **close reach**.

Sailing off the wind (either to the southwest or southeast, 4 to 5 o'clock or 7 to 8 o'clock) is called a **broad reach**.

Directly downwind (due south or 6 o'clock) is called a **run**.

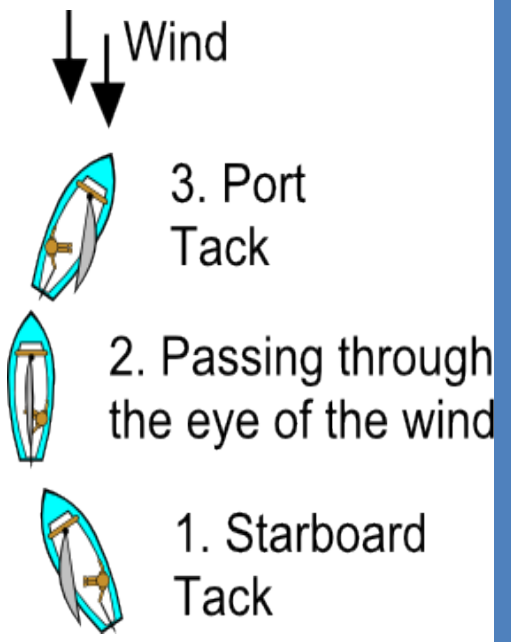


TACKING AND GYBING

Tacking or **coming about** is a sailing manoeuvre by which a sailing vessel (which is sailing approximately into the wind) turns its bow through the wind so that the direction from which the wind blows changes from one side to the other.

Tacking Procedure:

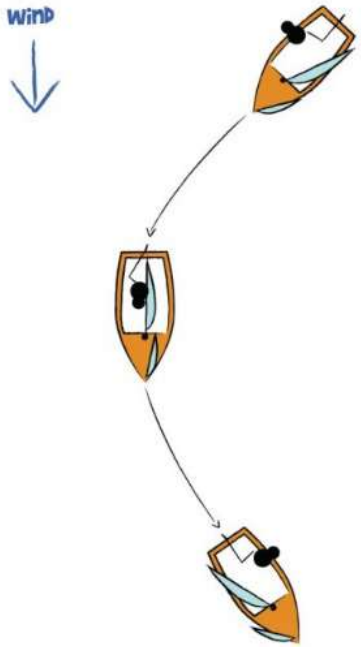
1. Make sure the area is clear
2. Find a target
3. Move body back, move tiller behind body
4. "Ready to tack?" "Ready!"
5. Push away on tiller (slowly and with small movements), "Tacking."
6. Watch boom, step across, keeping centre of gravity low, eyes focused in front and on the turn's progress
7. Find your new sitting position
8. Find target and straighten up



A **jibe** or **gybe** is a sailing manoeuvre whereby a sailing vessel reaching downwind turns its stern through the wind, such that the wind direction changes from one side of the boat to the other.

Gybing Procedure:

1. Make sure the area is clear
2. While on a Broad Reach, find a Training Run by watching when the jib collapses on itself
3. Find a target
4. Move across the boat and find new sitting position
5. "Ready to Gybe?" "Ready."
6. Push the tiller away from you (slowly and with small movements), "Gybing."
7. Watch the boom come across, as it does, pull the tiller into the middle of the boat and find the target.



MOORING

Before Mooring:

- Planning: know wind, tide, location, what mooring is anchored to, traffic, weather, possible dangers

- Communication: designate roles to crew, relay network (if noisy), hand signals understood, tools they will use

- Sufficient personnel and competent personnel

Coming onto the Mooring:

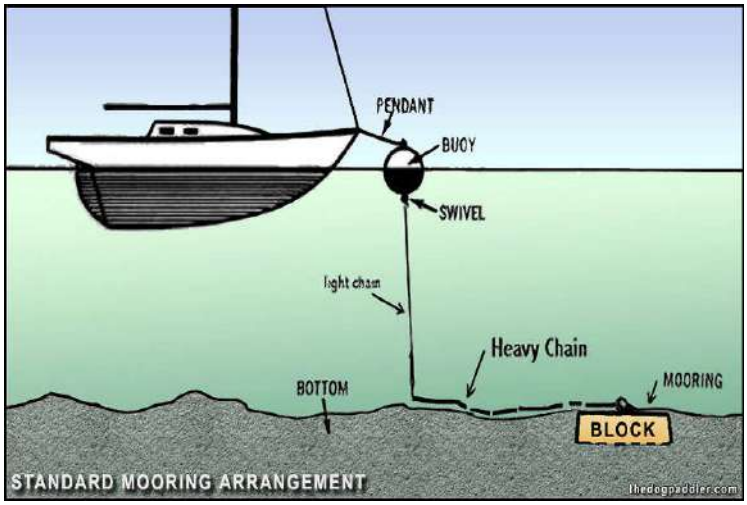
- Plan route and communicate with crew their roles

- Come onto mooring pointing into the strongest element (wind, current), slow speed, apply throttle when necessary

- Once within safe distance go to neutral (defined by crew on foredeck giving information, direction and how far away the mooring buoy is), crew hooks mooring lines, tie off safely

- Turn off engine

Leaving the Mooring:



- Plan route and communicate to crew their roles

- Check engine is working and goes into gear, communicate with crew when last line comes off

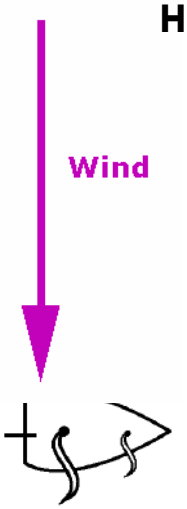
- Let wind take you away, reverse away, or pull mooring lines to the beam and release (whichever method is safest)

- Once clear begin motoring

HEAVING TO

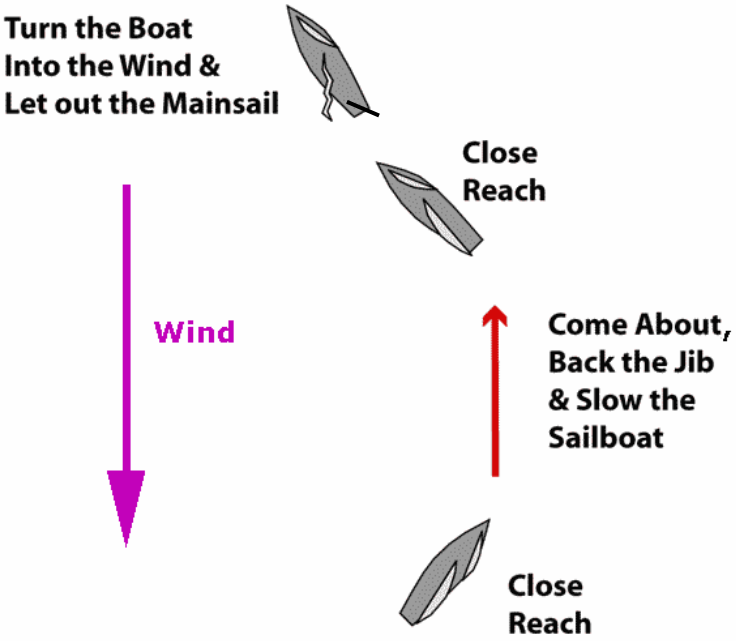
When heaving-to, the forward motion of the boat is slowed, the bow of the boat is turned through the wind but the jib is not released on the windward side (the jib is backed). The mainsail is then eased out and the boat is now turned towards the wind. Two opposing forces now exist. The jib pushes the boat away from the wind but the rudder pushes the boat into the wind. Thus, the boat comes to a near standstill, drifting slowly to leeward.)

Hove To



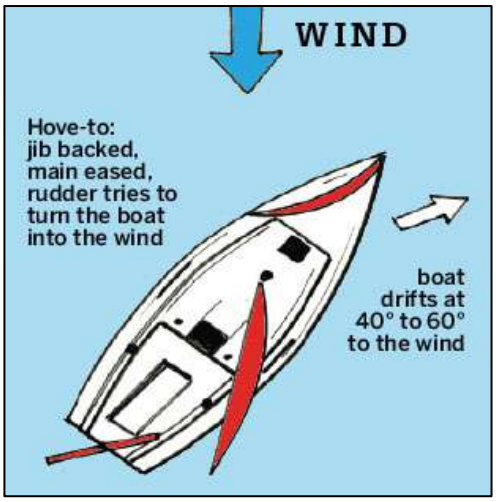
Slow your boat by releasing sails. Sit the boat at 90 degrees to the wind. Release jib sheet and main sheet completely. Straighten rudder.

Hove To (Jib Aback)



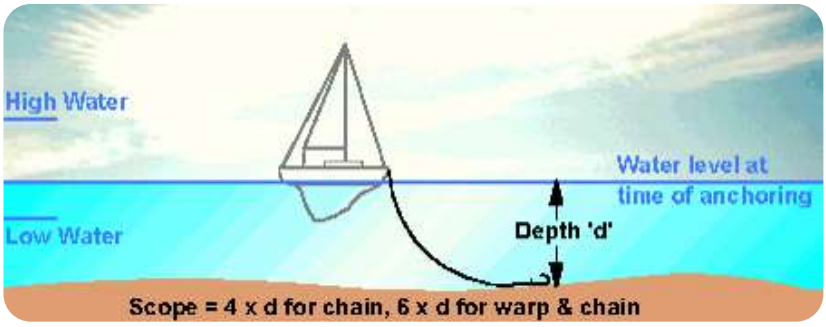
Steps of Heaving To (jib aback):

1. Move to close reach,
2. Tack into the wind, do not release the jib,
3. Let out the main sheet,
4. Push the tiller to the leeward side,
5. Wait for the boat to slow and begin feathering.
6. Let the vang (kicker off) too!
7. Enjoy a drink/snack, fix whatever needs fixing, pick up MOB or do some navigation and chart work.



ANCHORING

1. **Look**: Depth, how much scope(4x depth if you have only chain, 6x depth if you have rope and chain), tide (height and direction),
2. **Check Wind**
3. **Location** (holding, natural obstructions and dangers, boats, your boats radius of movement)
4. **Boat into Wind**
5. **Drop Anchor**
6. Start to **Reverse**
7. When chain stops, reverse with more power to dig it in.
8. Engine to **neutral** and **turn off**.
9. Check position by taking a **transit**



Crew Responsibilities when dropping anchor:

1. Prepare anchor (check chain/rope, make sure it is well attached, make sure knots are tight and winch is working),
2. Set on deck the correct amount of scope for anchoring, making sure the line is not fouled,
3. Drop anchor, making sure you are clear of the anchor line,
4. Once anchor is set, feel for vibrations/dragging.

Crew Responsibilities when picking up anchor:

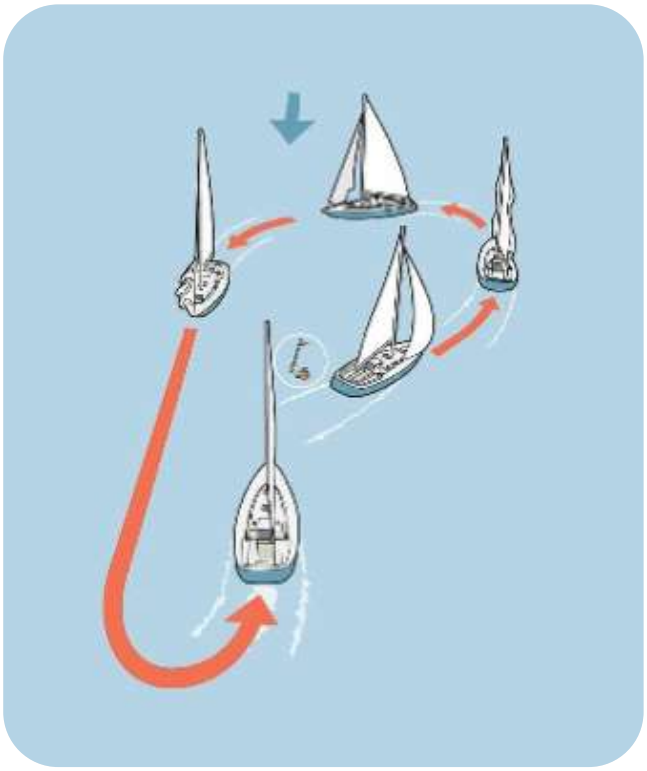
1. While the helmsman slowly motors forward toward the chain, use the winch to bring in line, or pull in the line by hand.
2. If there is too much strain, tie off on cleat, so that the line isn't pulled back into the water.
3. Good communication with helmsman as to the direction of the chain, and where it is sitting in relation to the boat (forward, over, behind).
4. Once anchor is in sight, communicate that to helmsman. Once on deck, stow the anchor and line.

Danforth Anchor | Plow Anchor | Bruce Anchor | Fisherman's Anchor

MOB UNDER ENGINE

In the unfortunate incidence that you have a Man Overboard situation you should always act quickly and calmly to rescue the person.

- Shout, “Man Overboard!!” to alert crew and passengers
- Skipper appoints person to watch and point at MOB at all times
- If near, throw danbuoy/life ring to MOB
- Press MOB on GPS
- If sailing, turn on engine, and pull main into the middle of the boat, roll head sail or drop
- Circle back, so that you are downwind of the MOB, staying at least 10 meters away from MOB at all times
- Once sufficiently downwind, turn into wind, and begin motoring towards MOB
- Upon approach, slow speed until you are almost stopped near MOB, skipper will designate pick up side, stop engine!!!
- Pick up MOB on leeward side by the stays. Use main halyard to retrieve MOB
- Treat MOB for shock, and, or wounds



DINGHY CHECKS & OPERATION

Dinghy Checks:

1. Inflatable tubes full and no punctures
2. Bung in
3. 2 Paddles
4. Anchor
5. Fuel
6. Fuel line is connected on either end and primed
7. Pump
8. Bailer
9. Kill cord
10. Engine on and secured
11. Engine Intake and outtake are not obstructed
12. Prop is secured and clear

Start Procedure:

1. Perform checks
2. Survey water/surf conditions(if big, launch using paddles), people
3. Once safely away from shore, lower engine and start
   - 3a. Make sure fuel is connected
   - 3b. In neutral, choke is open, small amount of throttle
   - 3c. Kill cord is not yet on wrist
   - 3d. Check you are clear to pull start cord, use left hand to pull start (sitting so the engine is on your left),
4. Once started or begins to turn over, TURN OFF CHOKE.
5. Put on kill cord
6. Make sure painter is secured
7. Keep a sharp lookout for swimmers, obstructions(lines, plastic bags, buoys)

Trouble Shooting:

1. No Fuel
2. Fuel Line not connected
3. Oil
4. Water in engine
5. No kill cord
6. Carburettor flooded
7. Not in neutral when trying to start

OUTBOARD ENGINES

START PROCEDURE:

- Check fuel is connected, in neutral gear, choke is open, small amount of throttle

- Kill cord is not yet on wrist

- Check you are clear to pull start cord, use left hand to pull start

- Pull starter cord once, TURN OFF CHOKE, and pull starter cord again at the same time as giving throttle.

- Put KILL CORD on wrist

- Put in gear and motor forward when ready

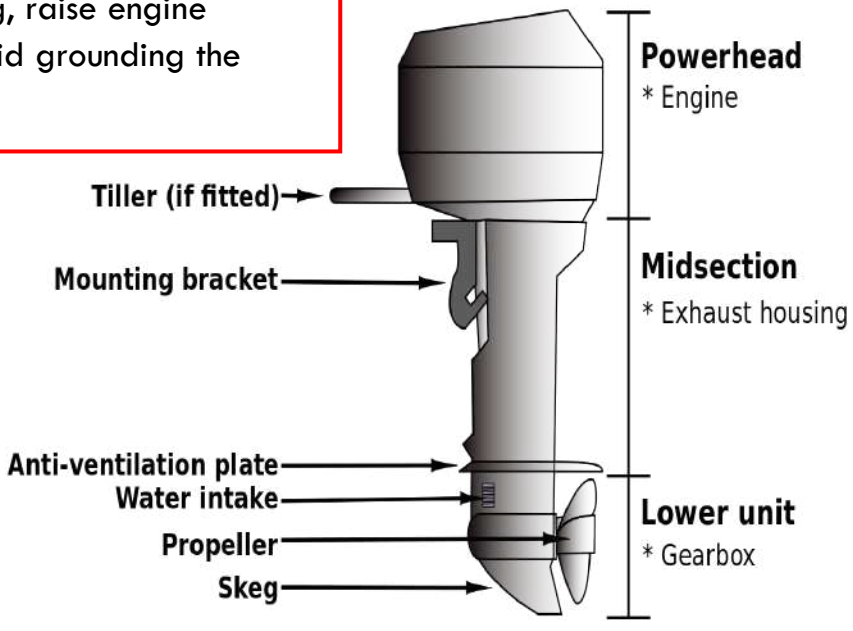
STOP PROCEDURE:

- Make sure you are safely moored, or you have steering capabilities under sail.

- Check engine is in neutral, and throttle idling

- Push red button until engine stops

- In the case of a beach landing, raise engine before hitting the beach to avoid grounding the prop.



TOWING

Towing a dinghy

Firstly, when taking a dinghy with you for a trip it is important to remember it is always better to place the dinghy on the foredeck of your yacht if possible. If the boat is fitted with davits this means you can hoist the dinghy out of the water.

If you do have to tow the dinghy behind you, remember:

- Always use a fairly long rope
- Multiple ropes are better for extra security
- Always leave the outboard engine up when underway
- Ensure engine is securely fastened to the back of the dinghy and is tied on
- Never leave anything loose in the dinghy as there is a good chance you may lose it
- Ensure fuel tank is not leaking and the breather valve is closed.

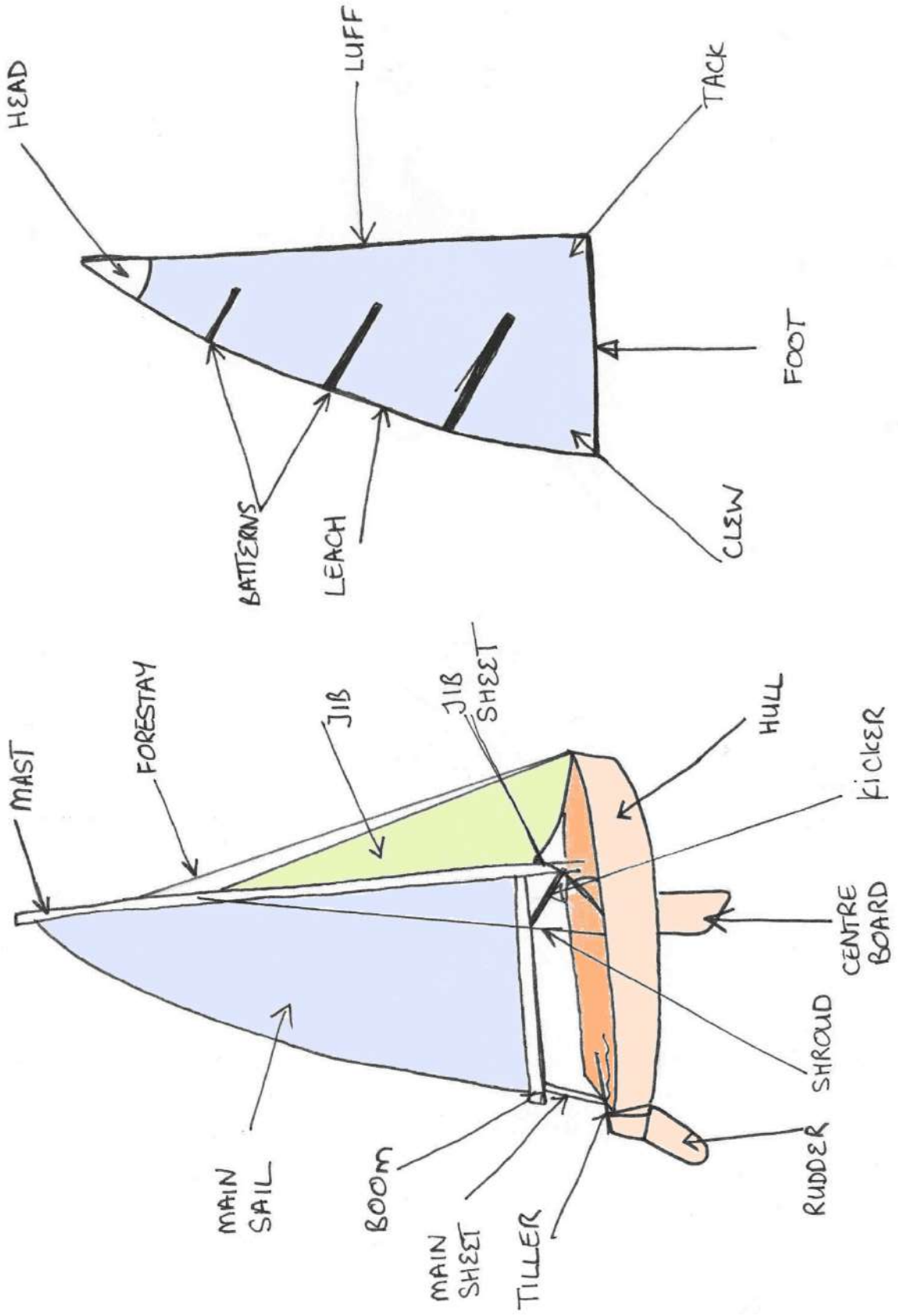
When tying the dinghy to the back of the boat there are several different ways you can do it.

Use double lines one from either side of the yacht.

Use a bridle to help spread the weight and ensure dinghy travels straight when underway

Or lift the dinghy slightly onto the back of the yacht and tie securely

PARTS OF A BOAT



GLOSSARY

- **Apparent Wind** - The wind felt on a boat (the result of true wind and wind produced by the boat's own motion).
- **Bear Away** – To move the direction of the sailboat away from the wind.
- **Bearing** - A compass direction to a point (such as a waypoint ahead).
- **Beat** - To sail close to the wind (as noun: point of sail close to the wind).
- **Beam Reach** - The point of sail with the wind coming straight across the beam (from 90°).
- **Broad Reach** – The downwind point of sail between a beam reach and a run.
- **Chart** - A nautical map showing depths, buoys and underwater characteristics.
- **Course** - The compass direction in which the boat is being steered.
- **Close Hauled** - The point of sail as close to the wind as possible.
- **Dead Reckoning** - Navigation and determination of the boat's position based on its direction, speed, and time.
- **Ease** - To let out a mainsheet or jib sheet (when adjusting a sail).
- **Ebb Tide** - The outgoing or falling tide (opposite of Flood tide)
- **Fix** - The boat's position on a chart determined by taking bearings on two or more fixed objects (or as determined by a GPS unit).
- **Flood Tide** - The incoming or rising tide (opposite of Ebb tide)
- **Gybe (or Jibe)** - To turn the boat downwind across the wind, with the sails moving from one side to the other.
- **Head Up** - To turn closer to the wind (see Luff Up).
- **Heading** - The compass course being steered.
- **Heel** - The sideways tipping of the boat due to the wind's effect.
- **Kill Cord** – The safety tether between the stop switch on an engine and the helm's wrist or foot.

GLOSSARY

- **Knot** - A unit of speed (for the boat or the wind) equal to one nautical mile per hour; a nautical mile is 1.15 miles.
- **Lee (or Leeward)** - A directional term referring to downwind, such as the lee/leeward side of the boat.
- **Leg** - A (usually straight) section of a boat's overall course (in a race or when sailing to a particular destination).
- **Luffing** - A shaking or flapping of the front edge of a sail (the luff) when the sail is let out too far for the course being steered or point of sail.
- **Luff Up** – To move the direction of the sailboat towards the wind (see Head Up).
- **Make Fast** - To secure (such as tying off a line).
- **Nautical Mile** - See Knot.
- **Offshore** - Direction of wind from land towards the water.
- **Onshore** - Direction of wind from the water toward the land.
- **Painter** – A rope tied to a dinghy or speedboat to secure it to other boats, moorings or pontoons.
- **Pinching** - Sailing too close to the wind when close-hauled.
- **Plane** - The boat lifts and sails fast over the surface of the water.
- **Plot** - On a nautical (paper or electronic) chart, to draw in the boat's position and course.
- **Point of Sail** - The direction the boat is pointing relative to wind direction.
- **Reach** - A course sailed across the wind, such as a beam reach.
- **Route** - A term used in chart plotters designating a planned course through a series of waypoints.
- **Rules of the Road** - Navigation laws specifying which boat must give way to another to prevent collision or accident.

GLOSSARY

- **Run** - The point of sail directly downwind with the wind astern.
- **Tack** - To turn the boat upwind and across the wind, with the sails moving from one side to the other.
- **Tender** - A dinghy used with a larger boat.
- **Training Run** – This is a Point of Sail between a Broad Reach and a Dead Run. This is when a gybe takes place!
- **Trim** - In general, to adjust the angle of a sail for greatest efficiency; more specifically, to pull in on the sheet (trim in vs. let out).
- **True** - With directions, true north is straight up on the chart, as opposed to magnetic north.
- **True wind** - The direction and strength of the wind not relative to the boat's motion, as opposed to Apparent Wind.
- **Waypoint** - A point marked on a nautical chart (paper or electronic) to assist with navigation (such as when plotting a route through a channel).
- **Windward** – As opposed to the lee/leeward side, windward refers to the side closest to the wind.

TOPICS CHECKLIST

Theoretical Topics

Points of Sail	
Parts of a Sail	
How a Sail Works	
Wind Awareness	
Parts of a Boat	
Outboard Engines	
Towing	
Basic Sailing Terminology	

Practical Topics

Ropework & Knots	
Leaving the Mooring	
Manoeuvring Under Engine	
Hoisting Sails Underway	
Sailing on all Points of Sail	
Tacking	
Gybing	
Heaving To	
Reefing / De-reefing Underway	
Man Overboard Under Engine	
Picking Up a Mooring	
Anchoring	
Dinghy Checks and Preparation	

CHARTS AND CHARTWORK

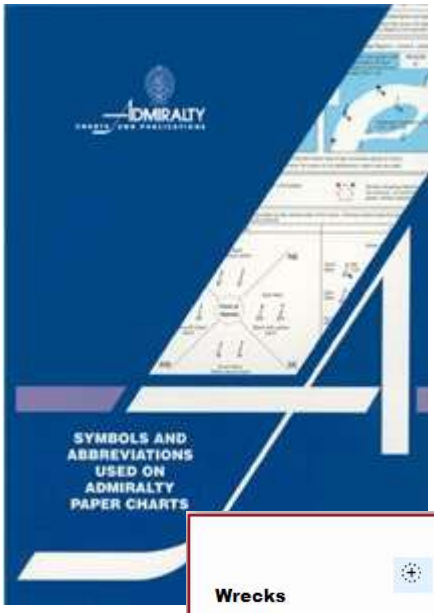


Chart Symbols

All Charts contain symbols that are internationally standardized. Though you should be familiar with commonly used symbols and light signatures, the sheer number of symbols makes it impossible to remember them all. The **5011 Chart Symbols and Abbreviations** is one of the most important documents a navigator has. It is used to decipher the various symbols found on a nautical chart. It is also available as an App for phone or tablet for a fee (see QR code below).

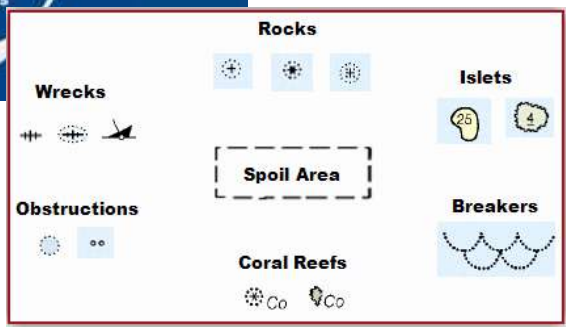
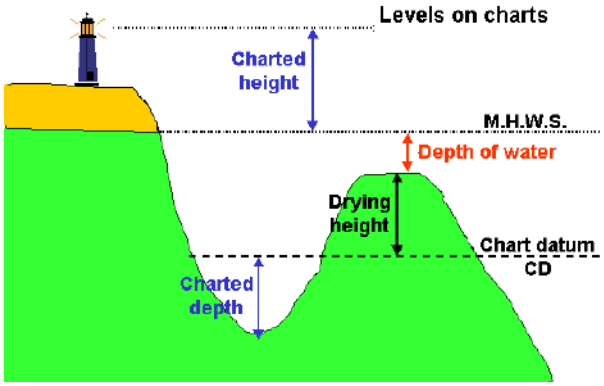
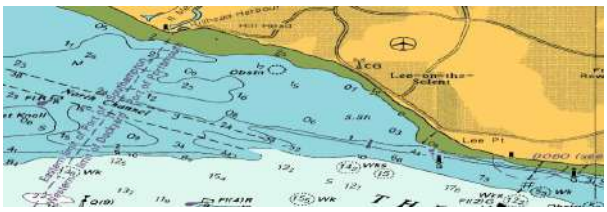


Chart Datum

Chart Datum is the reference point for all depths on a chart. It can be the lowest astronomical tide on record – the theoretical minimum. On some charts however, it is the mean lowest low tide – the average of the lower of the two low tides in a day. As this is not the theoretical minimum, it is important to know what your chart datum is set to, to avoid running aground.



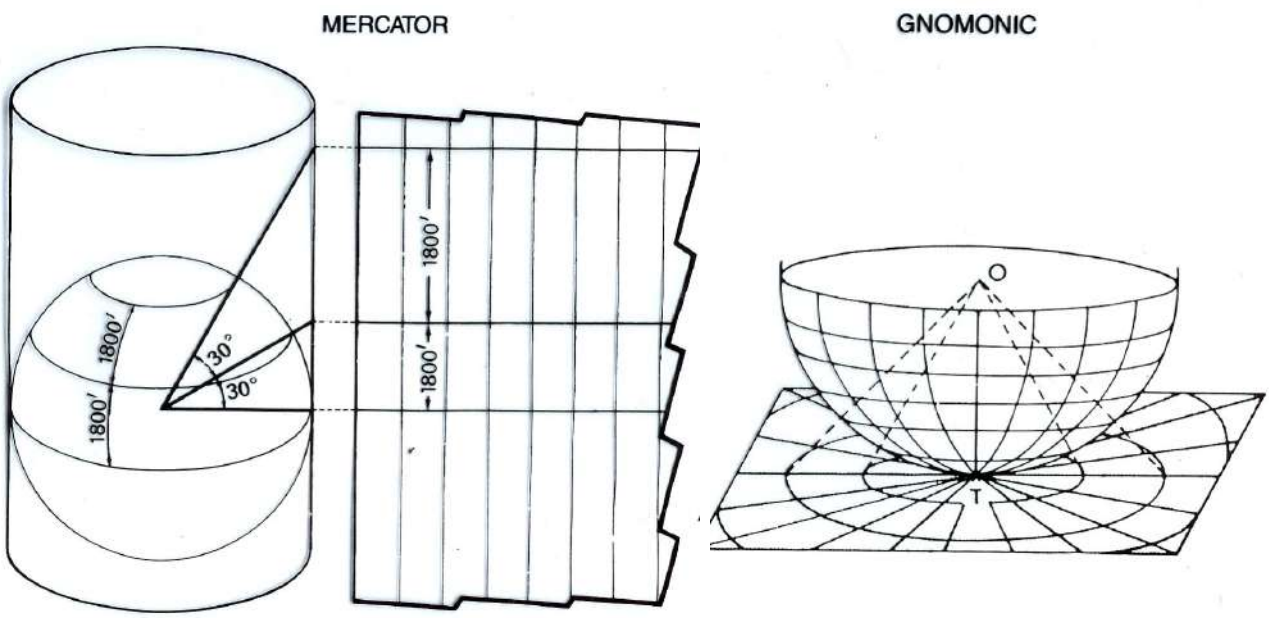
On a chart, the zero contour line is the line between green and dark blue.



CHARTS AND CHARTWORK

Chart Projection

Projections are a means of representing a 3D object on a 2D surface.



Mercator Projections

Project light from the center of a sphere onto a cone
Most commonly used with large scale maps
Advantage is a straight line will always be at the same heading
Disadvantage – A straight line may not be the shortest route over long distances and as you near the poles
Transverse for long coastlines North to South

Gnomonic Projections

Light is projected through the globe onto the chart at the pole.
Gnomonic projections give the shortest routes
Used for long ocean voyages
A straight line on this type of chart *is* the shortest distance and approximates a great circle route

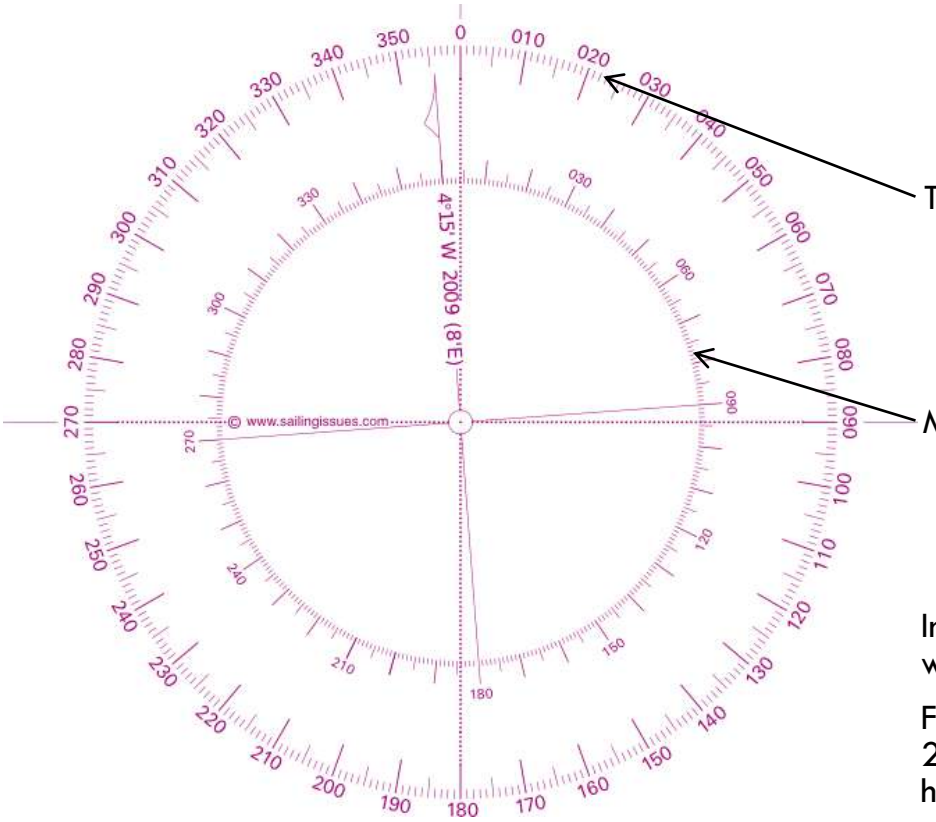
Horizontal Datums

Over time cartographers have been busy producing their own charts. This has made any type of conformity very difficult and hundreds of datum points are in existence. The standard datum WGS 84 was finally adopted and all UKHO and Imray charts now use this datum (or one that is compatible).
Check charts when taking over a vessel and if necessary make the appropriate adjustments on the GPS for the chart.

CHARTS AND CHARTWORK

The Compass Rose

The compass rose tells us the **difference** between True North and Magnetic North for each chart.



TRUE North (Outer)

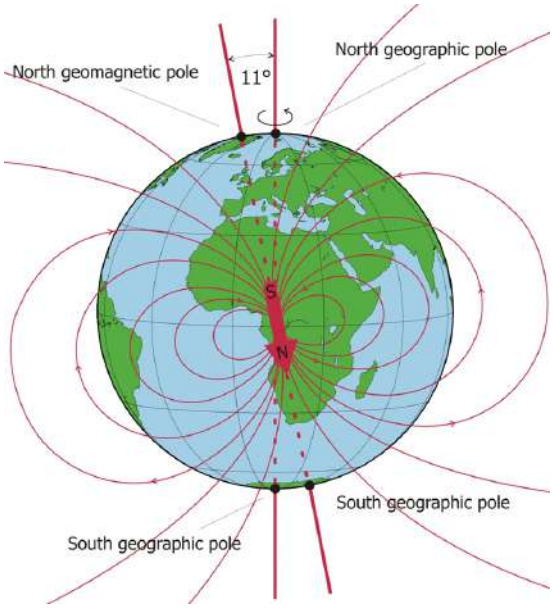
MAGNETIC North (Inner)

In 2009 the difference was 4° 15'W.

For every year since 2009 Magnetic North has moved 8'E.

Magnetic Variation

The difference between True North and Magnetic North is called **Variation**.



The origin of Magnetic North is moving all the time. The location of True North remains the same: the North Pole.

We must factor this **VARIATION** into our navigational calculations in order to be accurate.

CHARTS AND CHARTWORK

The Log

The word **Log** has two distinct meanings that can sometimes cause confusion:

The **Ship's Log** is a written record of the ship's journey and the details of its route, updated hourly. As shown below. This is a mandatory document for a crew to complete, for a yacht on passage.

Sail in Asia Journey Planner From... Ao Yon ..... To.. Ban Tha Chin Date 06.DEC.2011

Time	Course Steered	Deviation on heading	Variation	TRUE Course	Log Reading	Tide Rate	Tide Set	HW	Leeway	Boat Speed	Wind Direction	BARO	GPS COG	GPS SOG	Position of Yacht Latitude	Position of Yacht Longitude	Remarks
1000																	leave Mooring
1015	040°	4° W	0°	036°	1.2	220°	1.5K			6	E	1005			7°47.5	98°24.8	after course
1045	325°	5° W	0°	320°	4.2	220°	1.5K			6	E	1005			7°50.1	98°26.4	after course
1100					6.4												pilotage

Engine	Safety	Electronics	Weather	Tidal Info	Passage Plan	Pilotage		Victualing		Fuel		CG 66	Paper Work		Above Decks	Below Decks	Watches	
✓	✓	✓	E 12 RAIN	✓	✓	✓	✓	✗	✗	✓	✓							

TIDAL INFORMATION

TIME							0730	0830	0930	1030	1130	1230	1330
Phuket	6 - HW	5 - HW	4 - HW	3 - HW	2 - HW	1 - HW	HW	1 HW	2 HW	3 HW	4 HW	5 HW	6 HW
1/12s													
Tidal info	6 - HW	5 -HW	4 -HW	3- HW	2 -HW	1- HW	HW	1 HW	2 HW	3 HW	4 HW	5 HW	6 HW
Tide Rate							0	0.5	1.0	1.5	1.5	1.0	0.5
Tide Set							220°	220°	220°	220°	220°	220°	220°
TIME													
Secondary	6 - HW	5 - HW	4 - HW	3 - HW	2 - HW	1 - HW	HW	1 HW	2 HW	3 HW	4 HW	5 HW	6 HW
1/12s													
set/rate													

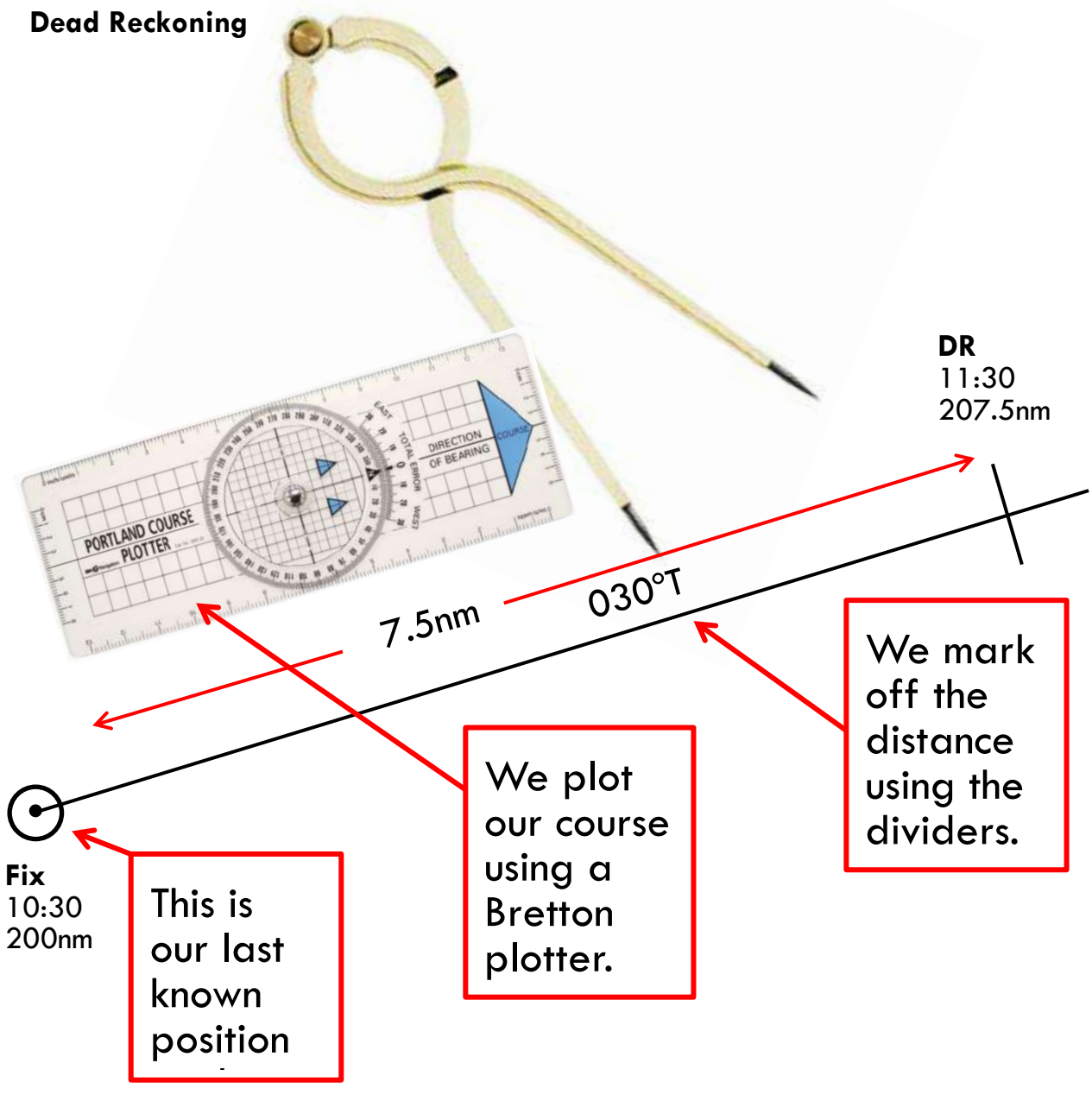
Standard Po	Ht (m)	Time	Date
HW	2.4	0730	06/12
LW	1.5	1330	06/12
HW			
LW			
Secondary	Ht(m)	Time	
HW			
LW			

The **Electronic Log** is an electronic device installed in the ship to measure speed and depth. The paddle wheel is calibrated by the electronics and records your speed as you sail thru the water. A plug can be put in when the yacht is in a harbour or marina to stop the paddle wheel getting covered in barnacles.

CHARTS AND CHARTWORK

In navigation, **Dead Reckoning** is the process of calculating your current position by using a previously determined position, and advancing that position based upon your speed over time (from the Log) and course (from the Compass).

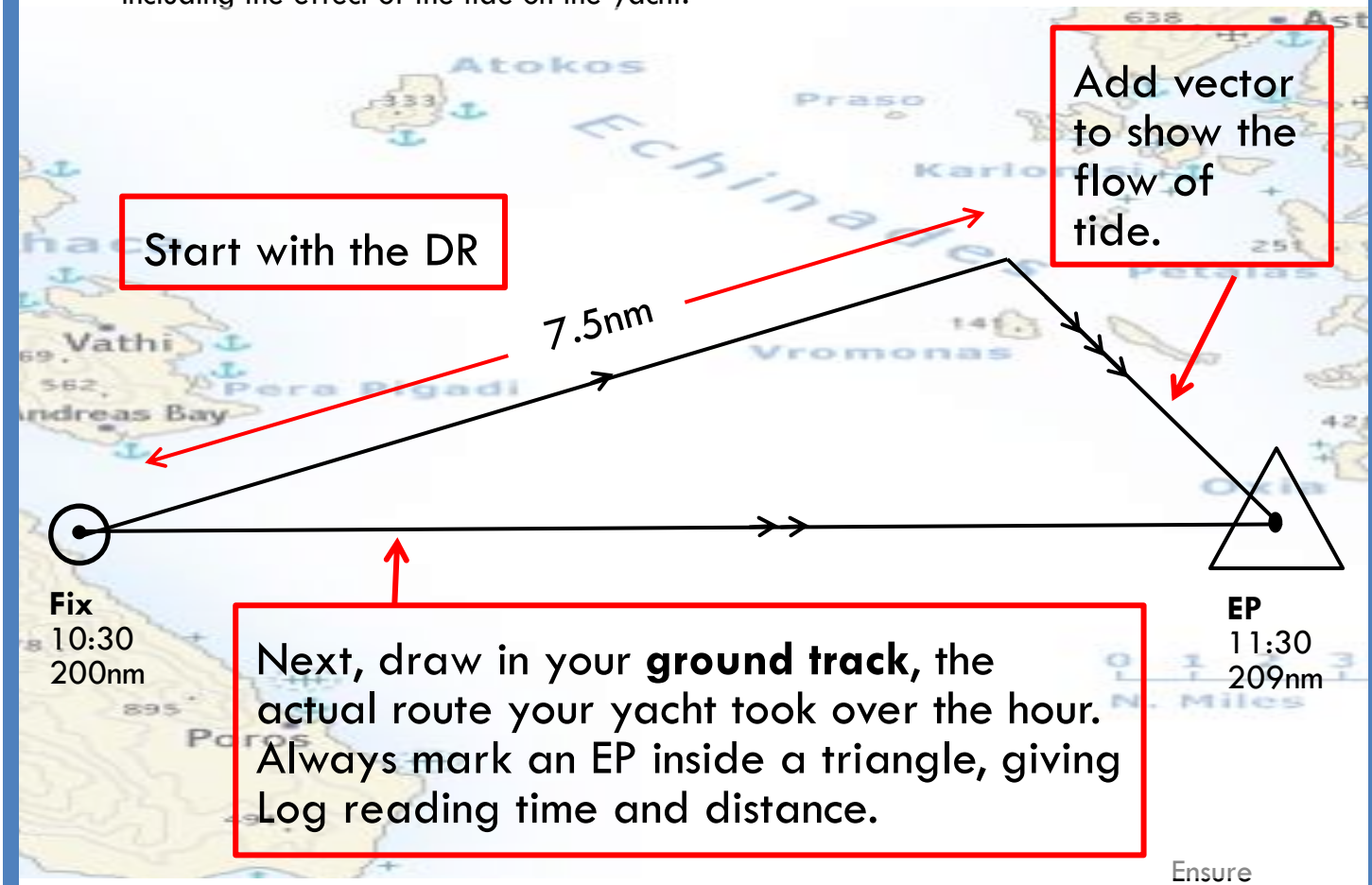
Dead Reckoning



However, if the first fix is inaccurate, the new DR will also be inaccurate. It also ignores the effect of the tide. For this reason to gain a more accurate fix we use what is known as an **Estimated Position**.

CHARTS AND CHARTWORK

Estimated Positions (EPs) take **Dead Reckonings** (DRs) and improve their accuracy by including the effect of the tide on the yacht.



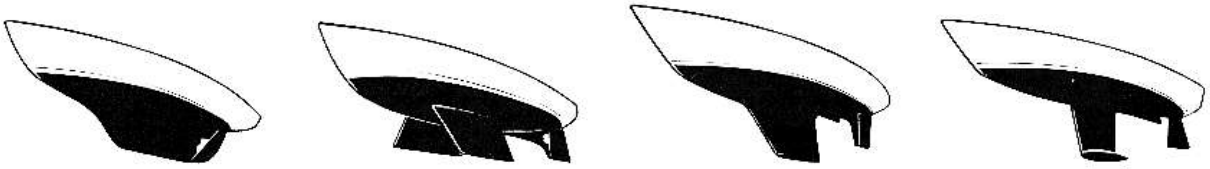
Ensure you correctly label the EP and give all the required information.

- 1 arrow for the **Water Track** ——→
- 2 arrows for the **Ground Track** ——→→
- 3 arrows for the **Tidal Stream** ——→→→

EP WITH LEEWAY

What is leeway?

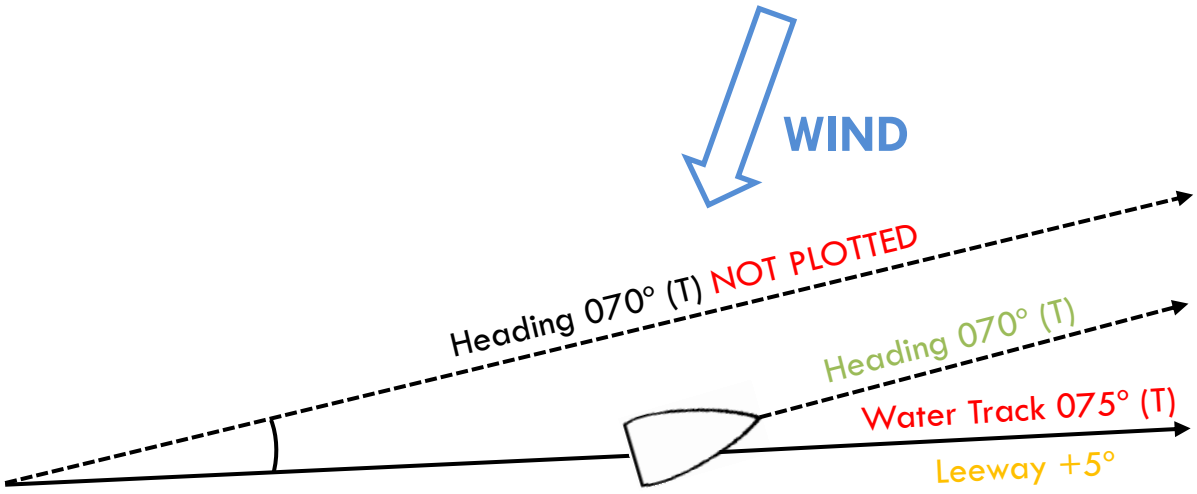
Leeway is the sideways effect of the wind on the yacht. As navigators, we must factor this effect into our calculations and chartwork. The amount of sideways slippage will depend on the keel shape of the yacht you are sailing.



Centerline Ballast Keel | Bilge Keel | Fin Keel | Fin-and-Bulb Keel

A longer keel yacht will only slip 5-10°, whilst a bilge keel yacht can slip up to 20°.

We must factor in the effect of leeway into our navigation but we do not plot Leeway on the chart:



WATER TRACK = **Heading** + or – **LEEWAY**

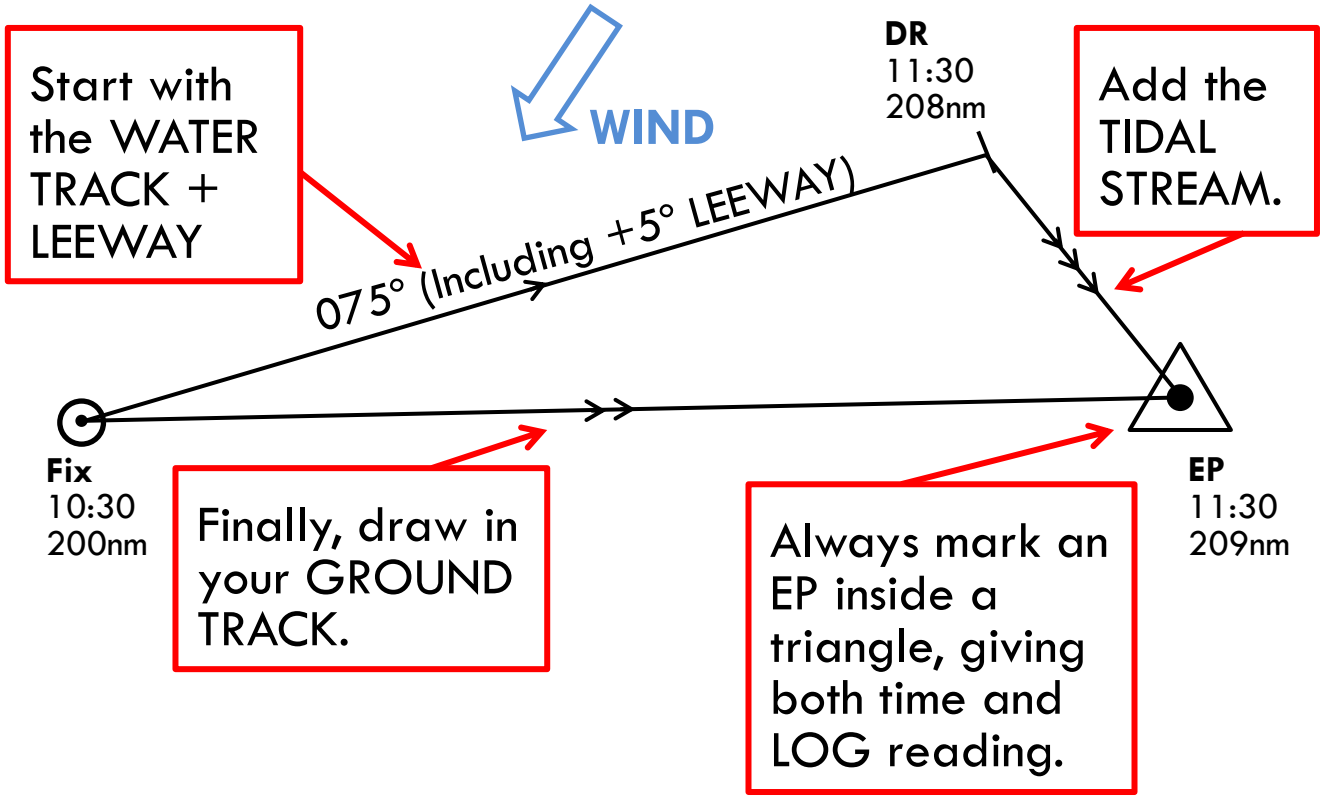
Water Track is plotted on the chart not Heading!

EP WITH LEEWAY

Before we draw the first line of our EP (the WATER TRACK), we factor in the effect of leeway.

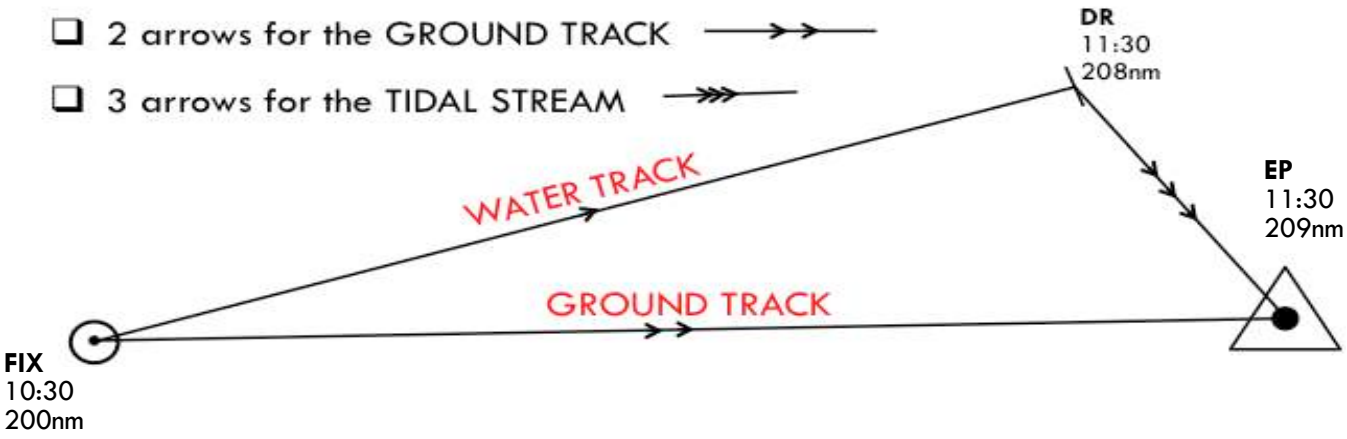
For example, if the wind is blowing from the NE at 15kts, we **adjust our WATER TRACK** by adding 5°.

<u>Only once we have made this adjustment</u> do we plot our WATER TRACK on the chart.



Remember to ensure you correctly label the EP and give all the required information.

- ❑ 1 arrow for the WATER TRACK →
- ❑ 2 arrows for the GROUND TRACK →→
- ❑ 3 arrows for the TIDAL STREAM →→→



COMPASSES

Compasses on Yachts

A MAGNETIC COMPASS can be found in two places on a yacht:

The STEERING COMPASS, usually mounted in the cockpit on or parallel to the fore and aft centerline of the vessel. Used to steer a course or to take bearings for charting purposes. A **Lubber Line** is located on the fixed part of the compass to enable accurate reading of a course or bearina.

The HAND BEARING COMPASS, used as a means of fixing your position. The hand bearing compass also provides a quick way to check whether the vessel's steering compass is subject to deviation.

True or Magnetic?

However, North on your chart and North on your compass may not be the same. We call this discrepancy **Variation**.

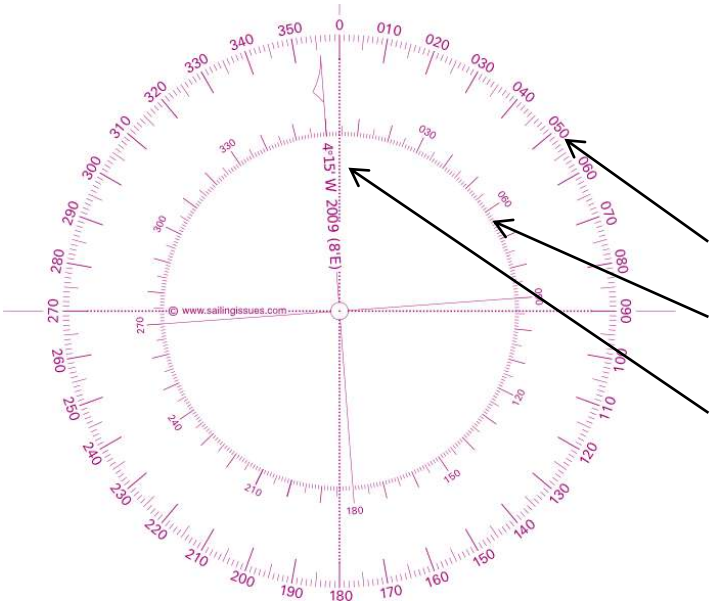
The difference between True North (on your chart) and Magnetic North (on your compass) will vary depending on where you are in the world.

True North does not move; it is the North Pole.

Magnetic North is continually changing its position every year. This information is given to navigators on the **Compass Rose**.

COMPASSES

The Compass Rose



The compass rose tells us the **difference** between TRUE North and MAGNETIC North for each chart.

TRUE North (Outer)

MAGNETIC North (Inner)

In 2009 the difference was 4° 15'W for this chart.

For every year since 2009, MAGNETIC North has moved 8'E on this chart.

Q: So, what is the VARIATION for 2015?

A: Its six years since 2009, therefore…8'E per year X 6 years = 48'E. Next, we deduct 48'E from 4°15'W…So VARIATION in 2015 is **3°27'W**.

Deviation

Deviation is caused by ferrous objects and materials on the yacht which affect the compass. It can be caused by the following objects:

- Engine
- Steel Emergency Tiller
- Binnacle Mounting
- Electric and Electronic Components and Wiring
- Radios
- Cockpit Speakers
- Binoculars

Deviation is not static; it changes as the direction of the boat changes.

This Deviation can be plotted onto a graph or chart that enables us to know the amount on each heading, and correct our route accordingly. This is known as a **Deviation Table**.

COMPASSES

We use simple Mnemonics (an aide memoire) to help the navigator to calculate the correct True bearing to put on a chart or the Correct Magnetic bearing to give to the helm to steer the boat.

CADET (Compass to True conversion)

Since there is a difference between your **compass** (Magnetic) and your **chart** (True), how do we account for this?
When converting from Compass to True, we use the mnemonic: C-A-D-E-T

From **COMPASS → TRUE** we ADD EAST (or – West)

Example: **Variation** = 6° East
Compass Heading = 020°C (Compass)
020°C + 6° = 026°T (True)

Example: **Variation** = 9° WEST
Compass Heading = 327°C
327°C - 9° = 318°T

TAWC (True to Compass conversion)

However, when we are navigating we may wish to plot a route on the chart (True) and convert that to a compass bearing.
When converting from True to Compass, we use the mnemonic: T-A-W-C

From **TRUE → COMPASS** we ADD WEST (or – East)

Example: **Variation** = 3° West
True Course = 090°T (True)
090°T + 3° = 093°C (Compass)

Example: **Variation** = 6° EAST
True Course = 157°T
157°C - 6° = 151°C

True north – The direction to the geographic North Pole

Magnetic north – The direction to the 'magnetic' North Pole.

Compass north – The direction towards which the compass actually points.

Variation – The angle between the direction of true north and magnetic north.

Deviation – The angle between magnetic north and compass north.

POSITION FIXING

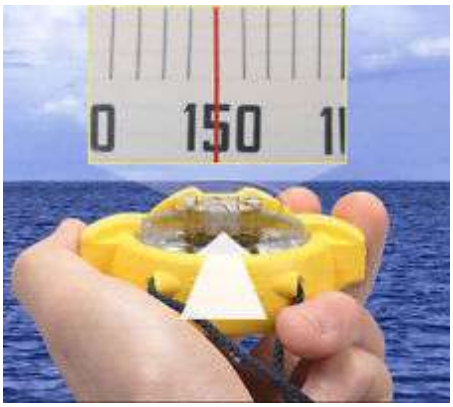
Taking a Bearing

A **Hand Bearing Compass** is used to take magnetic compass sightings on easily observed landmarks to ascertain the bearing of this object from the yacht.

By taking regular sightings we can establish our position on the chart, to *some* degree of accuracy. These sightings are known as **Fixes.**

The navigator needs the following:

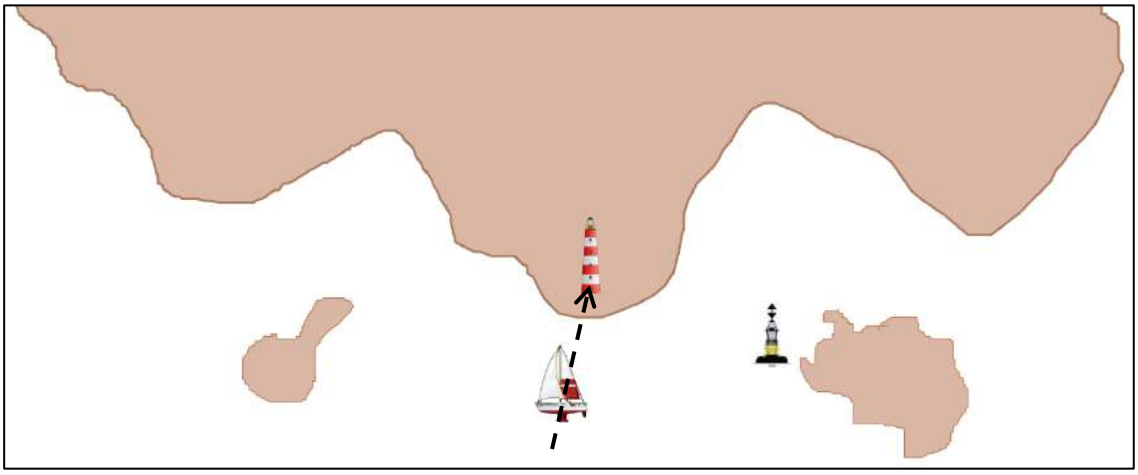
- A notebook and pencil
- A hand bearing compass
- Identifiable landmarks
- Reasonably flat seas



POSITION FIXING

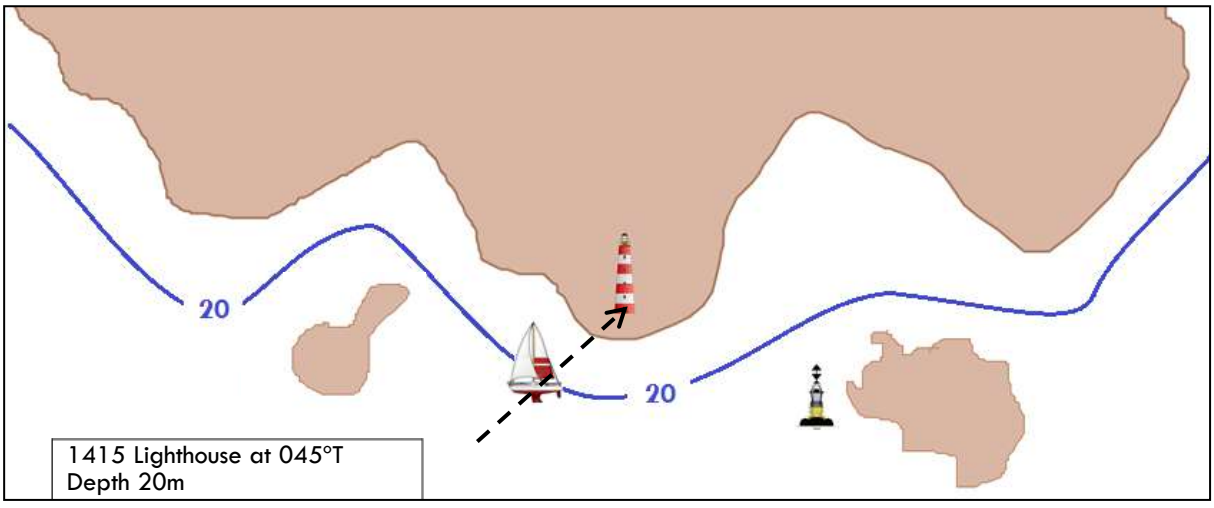
Line of Position

A Line of Position involves taking one fix on a stationary object.



Fix with Bearing and Sounding

Another way we can confirm our position is with some degree of accuracy is by using our depth sounder

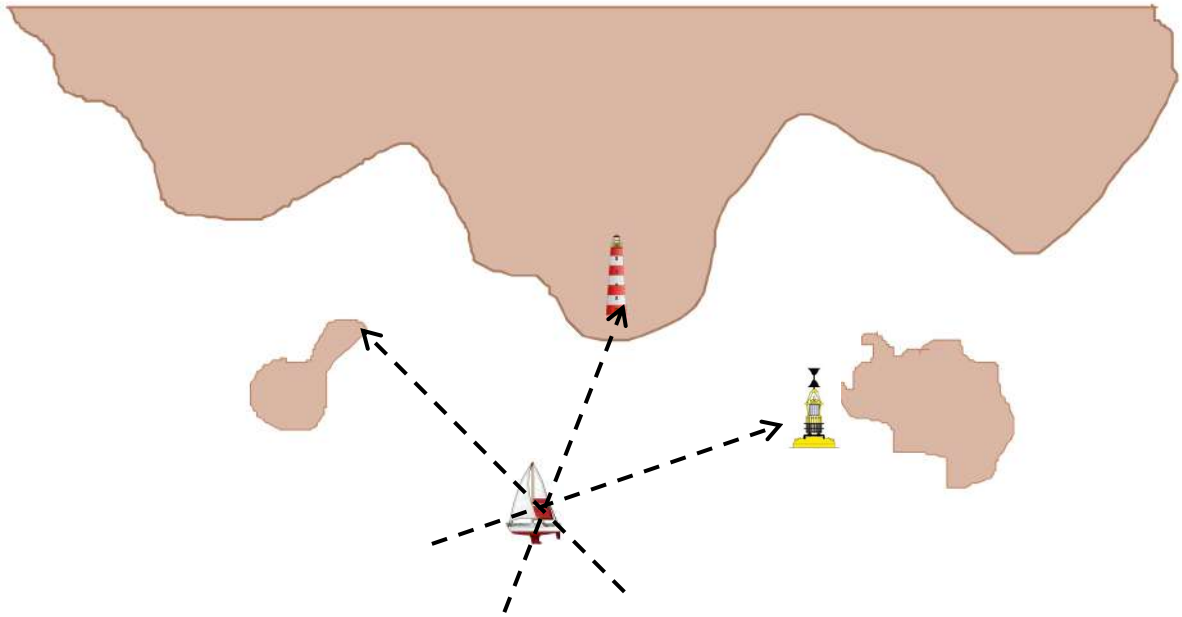


Take a bearing on an object, and use the depth contours on the chart to confirm your location.

POSITION FIXING

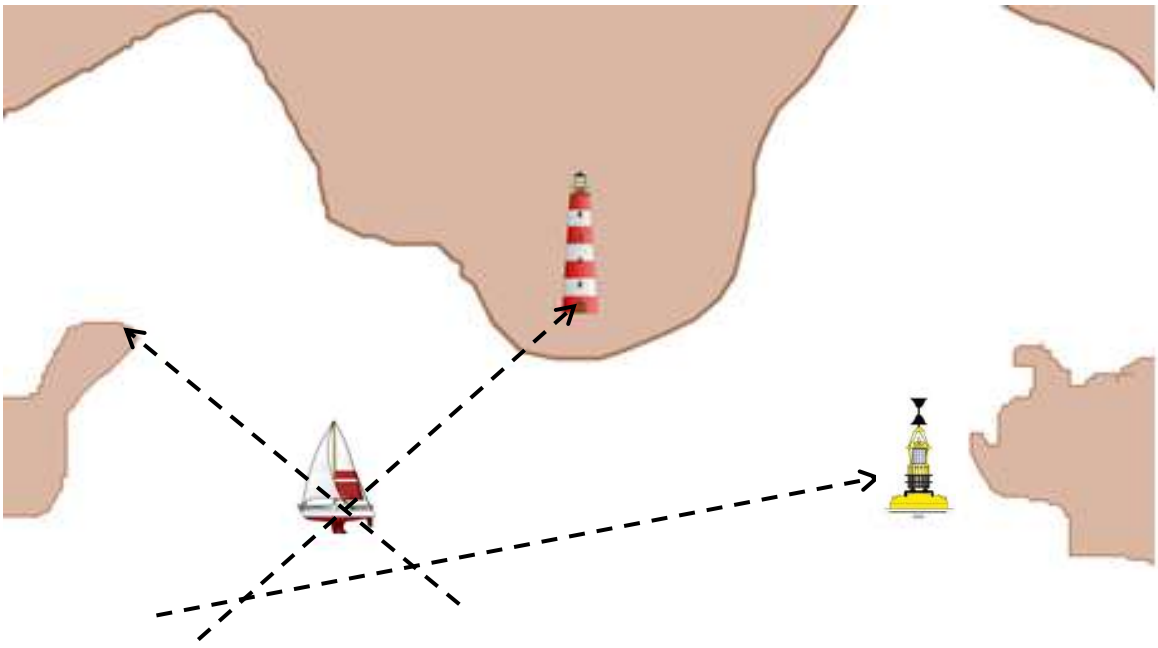
Three Point Fix

A **Line of Position** doesn't give our exact position, just our position on a line. So we take **three** bearings to improve our accuracy. This is called a **Three Point Fix.**



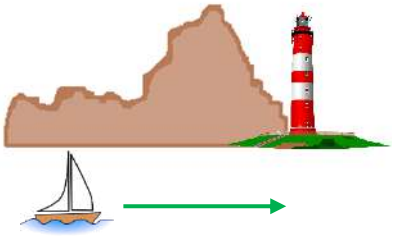
Cocked Hat

Our Three Point Fix may not always be entirely accurate. This can be caused by inaccurate readings on the compass, or taking too long to make your bearings. This is called a **Cocked Hat.** As we are unsure of our exact location, we plot our position at the **closest point to danger.**



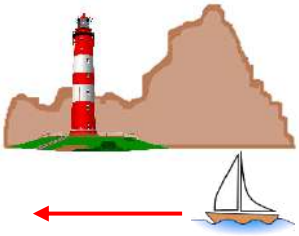
POSITION FIXING

Transit



Nearing the TRANSIT.
Turn to STARBOARD.

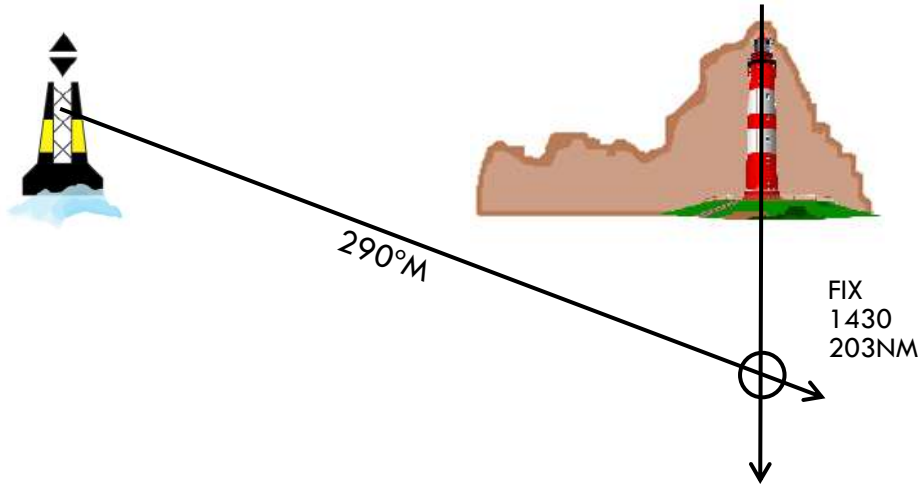
On the TRANSIT. LINE OF POSITION confirmed.



Nearing the TRANSIT.
Turn to PORT.

Transit and Bearing

We can combine a TRANSIT with a LINE OF POSITION to improve its accuracy.



Step 1:
Keep the mountain and lighthouse in transit.
Draw this line on the chart.

Step 2:
Add another bearing using the East Cardinal mark, giving you your location along the transit line. (Bearing = 290°M)

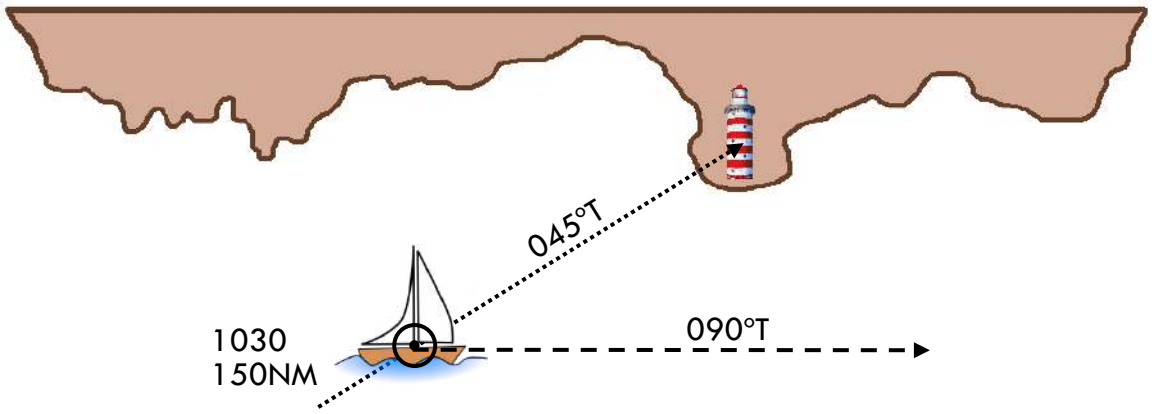
POSITION FIXING

Running Fix

A running fix, employed when only one object for a fix is visible, is obtained from two separate bearings taken of the same object, combined with the direction and distance travelled by the vessel.

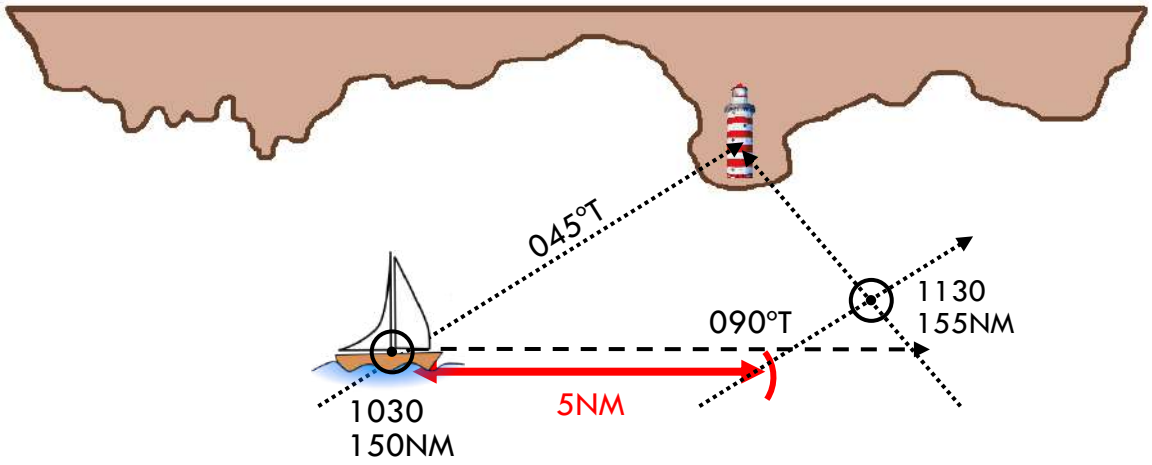
Step 1: Take a bearing on an object.

Step 2: Plot your heading on the chart. It doesn't matter where you place this line along the bearing.



Step 3: One hour later, take a second bearing on the lighthouse. Mark this bearing on the chart

Step 4: Using the dividers, measure the distance you have travelled, deduced by boats speed and the time between the two bearings. In this example, the yacht has been travelling at 5 knots for 1 hour, therefore covering 5NM between the two bearings.



Step 5: Redraw first bearing from the end of the dividers and mark your time, location, and log on the chart.

TIDES

Tides are the movement of water around the coast caused by the gravitational effect of the Moon, and to a lesser extent the Sun.

Spring tides are especially strong tides (they do not have anything to do with the season Spring). They occur when the Earth, the Sun, and the Moon are in a line and therefore the gravitational forces of the Moon and the Sun both contribute to the tides [Fig. 1]. Spring tides occur during the full moon and the new moon. They result in a very high tide and a very low tide and therefore have a large tidal range [Fig. 3].

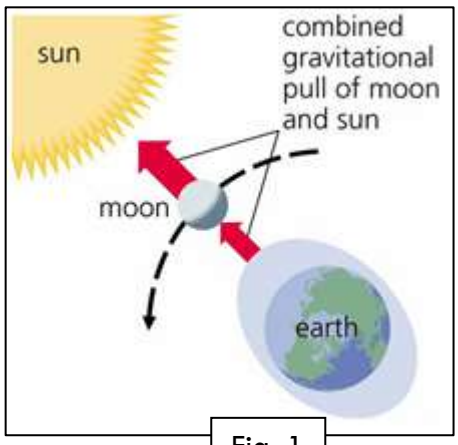
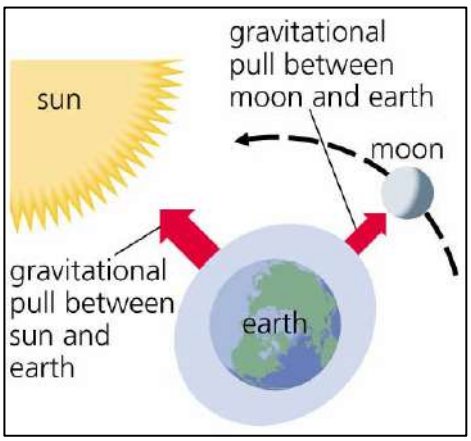
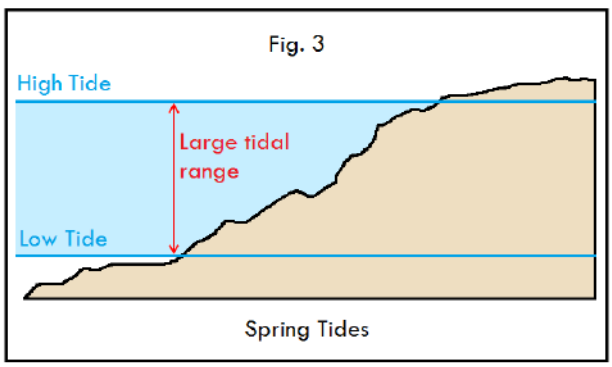


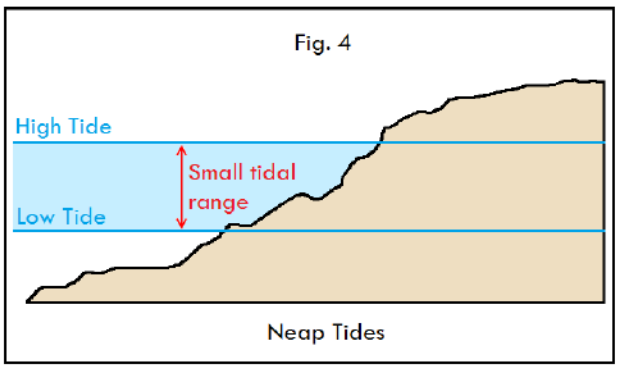
Fig. 1



Neap tides are especially weak tides. They occur when the gravitational forces of the Moon and the Sun are perpendicular to one another (with respect to the Earth), and are working in different directions [Fig. 2]. Neap tides occur during quarter moons. They result in low high tides and high low tides and therefore a small tidal range [Fig. 4].

Figures 3 and 4 give an indication of the difference between the tidal range of a spring tide and the tidal range of a neap tide.





TIDAL HEIGHTS

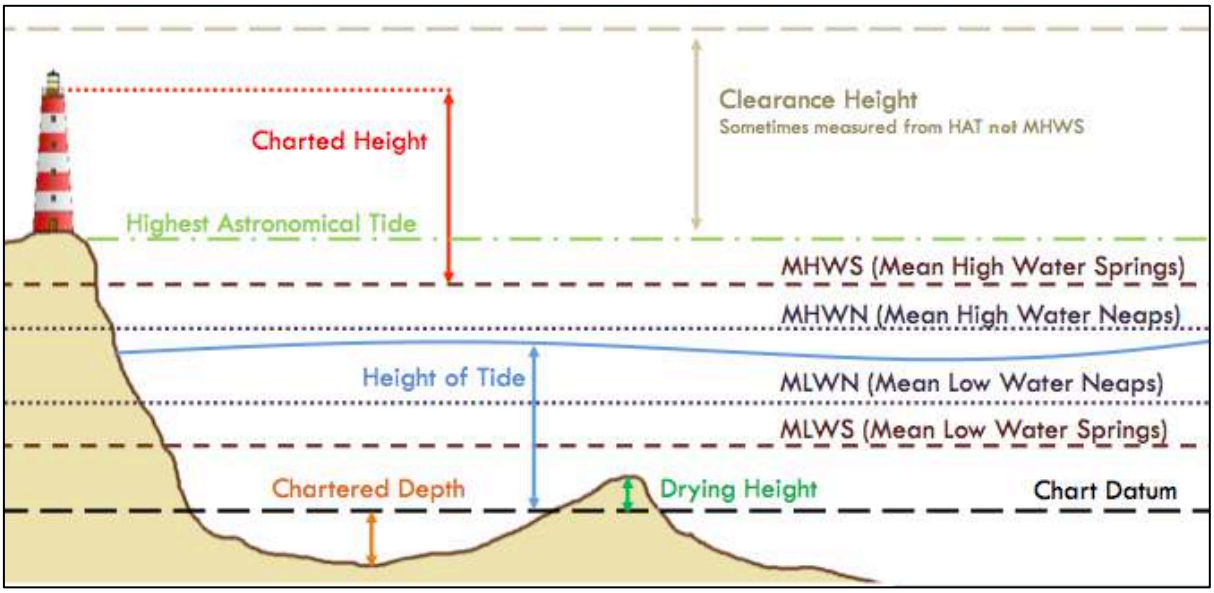
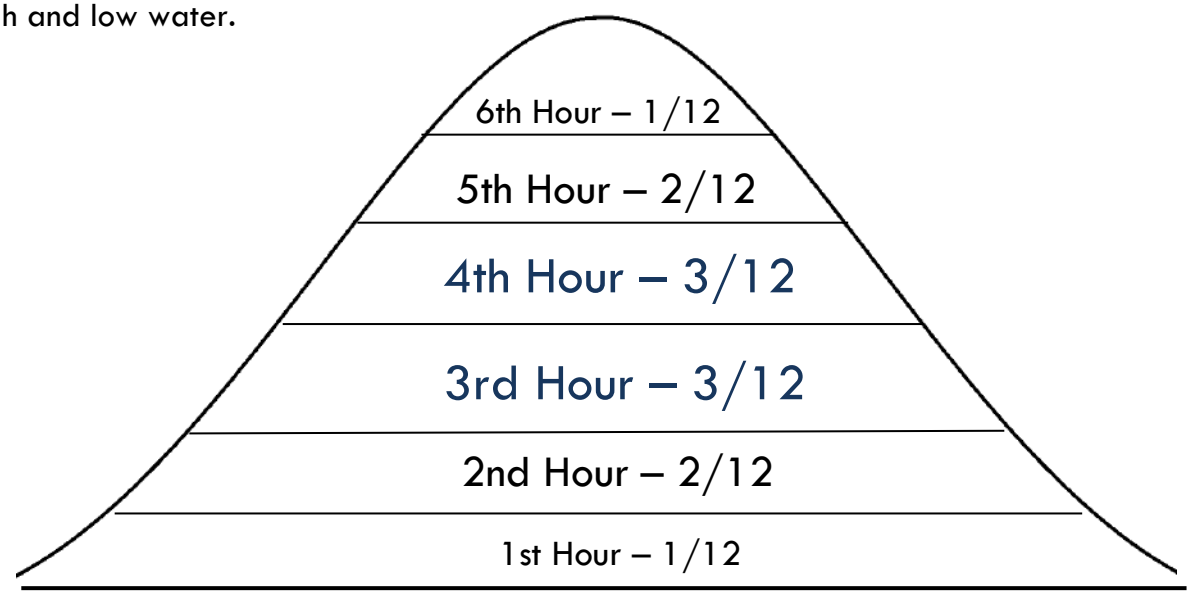


Chart Datum is the tidal reference for high water and low water at a **standard port.** Chart Datum is the lowest astronomical tide (LAT) on record. Drying heights on a chart are usually green while charted depths are blue or white. Chartered heights all relate to the highest astronomical tide on record(HAT) on modern charts. Mean High Water Springs (MHWS) is the old reference point for heights.

The Rule of Twelfths

As the tide flows in to an estuary or major harbour, (FLOOD) or flows out (EBB), the speed at which the water moves will vary over the 6+ hour period. The Rule of Twelfths allows the skipper to **approximate** the volume and speed of the water for each hour of tide.

At the time of high water and low water, tidal speeds are at a minimum as the tidal current changes direction. The tide increases in both volume and speed in each of the three hours after high and low water.



TIDAL HEIGHTS

The Tide Table

Tide Tables are produced by the maritime authority in each country. This extract is from Thailand. They give us information on the following:

The **Standard Port** to which the information refers. In this extract, the standard port is **Ko Thaphao Noi (Phuket)**

Date: November 2014. When using tide tables, ensure you find the correct standard port and select correct month and date.

Time in hour: (24Hr)

Tidal Height: in metres

Moon Phase: is also indicated by a symbol in the date column.

เกาะตะเภาน้อย (ภูเก็ต) 299

Ko Thaphao Noi (Phuket)

ละติจูด (Lat) 07° 49' 54" น.(N) ลองจิจูด (Long) 98° 25' 30" อ.(E)

พฤศจิกายน ๒๕๕๗ November 2014

วันที่ DATE	เวลา HOURS 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	สูงของน้ำเป็นเมตร HEIGHTS OF WATER IN METERS																							
1	2.0	2.2	2.4	2.6	2.7	2.7	2.6	2.3	2.1	1.8	1.6	1.5	1.6	1.7	1.9	2.2	2.4	2.5	2.6	2.5	2.4	2.1	1.9	1.8
2	1.7	1.8	1.9	2.2	2.4	2.6	2.7	2.7	2.5	2.2	1.9	1.6	1.4	1.4	1.5	1.8	2.1	2.4	2.7	2.8	2.8	2.6	2.3	2.0
3	1.7	1.5	1.5	1.7	2.0	2.4	2.7	2.8	2.8	2.7	2.3	1.9	1.5	1.2	1.2	1.4	1.7	2.1	2.5	2.9	3.0	3.0	2.7	2.3
4	1.8	1.4	1.2	1.3	1.6	2.0	2.4	2.8	3.0	3.0	2.7	2.3	1.8	1.3	1.0	1.0	1.3	1.7	2.3	2.8	3.1	3.2	3.1	2.7
5	2.2	1.6	1.2	1.0	1.1	1.5	2.0	2.5	3.0	3.1	3.1	2.7	2.2	1.7	1.1	0.9	0.9	1.3	1.8	2.5	3.0	3.3	3.4	3.1
6	2.6	2.0	1.4	1.0	0.8	1.1	1.5	2.1	2.7	3.1	3.2	3.0	2.6	2.1	1.4	1.0	0.8	1.0	1.4	2.1	2.7	3.2	3.5	3.4
7 ○	3.0	2.4	1.7	1.1	0.8	0.8	1.1	1.7	2.3	2.9	3.2	3.2	2.9	2.4	1.8	1.3	0.9	0.8	1.1	1.7	2.3	2.9	3.4	3.5
8	3.3	2.8	2.2	1.5	1.0	0.7	0.9	1.3	1.9	2.5	3.0	3.2	3.1	2.7	2.2	1.6	1.1	0.9	1.0	1.4	1.9	2.6	3.1	3.4
9	3.4	3.1	2.5	1.9	1.3	0.9	0.8	1.1	1.6	2.1	2.7	3.0	3.1	2.9	2.5	2.0	1.4	1.1	1.0	1.2	1.7	2.2	2.8	3.2
10	3.4	3.2	2.8	2.2	1.6	1.1	0.9	1.0	1.3	1.8	2.3	2.7	3.0	2.9	2.7	2.2	1.7	1.3	1.1	1.2	1.5	2.0	2.5	2.9
11	3.2	3.2	3.0	2.5	2.0	1.5	1.1	1.0	1.2	1.6	2.1	2.5	2.8	2.8	2.7	2.4	2.0	1.6	1.3	1.3	1.4	1.8	2.2	2.6
12	2.9	3.1	3.0	2.7	2.2	1.8	1.4	1.2	1.3	1.5	1.9	2.2	2.5	2.7	2.7	2.5	2.2	1.9	1.6	1.4	1.5	1.7	2.0	2.4
13	2.7	2.9	2.9	2.7	2.4	2.1	1.7	1.5	1.4	1.5	1.7	2.0	2.3	2.5	2.6	2.5	2.4	2.1	1.9	1.7	1.6	1.7	1.9	2.2
14 ☾	2.4	2.6	2.7	2.7	2.5	2.3	2.0	1.7	1.6	1.6	1.7	1.9	2.1	2.3	2.4	2.4	2.4	2.3	2.1	2.0	1.8	1.8	1.9	2.0
15	2.2	2.3	2.5	2.5	2.5	2.4	2.2	2.0	1.8	1.7	1.7	1.7	1.9	2.0	2.2	2.3	2.4	2.4	2.3	2.2	2.1	2.0	1.9	1.9
16	2.0	2.1	2.2	2.3	2.4	2.4	2.4	2.3	2.1	1.9	1.8	1.7	1.7	1.8	1.9	2.1	2.2	2.4	2.5	2.5	2.4	2.2	2.1	2.0
17	1.9	1.9	1.9	2.0	2.2	2.4	2.4	2.5	2.4	2.2	2.0	1.8	1.7	1.6	1.7	1.8	2.1	2.3	2.5	2.6	2.6	2.5	2.3	2.1
18	1.8	1.7	1.7	1.8	2.0	2.2	2.4	2.6	2.6	2.5	2.2	2.0	1.7	1.5	1.5	1.6	1.8	2.1	2.4	2.7	2.8	2.8	2.6	2.3
19	1.9	1.6	1.5	1.5	1.6	2.0	2.3	2.6	2.7	2.7	2.5	2.2	1.8	1.5	1.3	1.3	1.5	1.9	2.3	2.7	2.9	3.0	2.9	2.6
20	2.2	1.7	1.4	1.2	1.3	1.6	2.1	2.4	2.7	2.9	2.8	2.5	2.1	1.6	1.3	1.2	1.3	1.6	2.0	2.5	2.9	3.1	3.1	2.9
21	2.5	1.9	1.4	1.1	1.1	1.3	1.7	2.2	2.6	2.9	3.0	2.8	2.4	1.9	1.4	1.1	1.0	1.3	1.7	2.3	2.8	3.2	3.3	3.2
22 ●	2.8	2.2	1.6	1.1	0.9	1.0	1.4	1.9	2.4	2.8	3.0	3.0	2.7	2.2	1.7	1.2	1.0	1.0	1.4	1.9	2.5	3.0	3.4	3.4
23	3.1	2.6	2.0	1.3	0.9	0.8	1.1	1.5	2.1	2.6	3.0	3.1	2.9	2.5	2.0	1.5	1.1	0.9	1.1	1.5	2.2	2.8	3.3	3.5
24	3.3	3.0	2.4	1.7	1.1	0.8	0.8	1.2	1.7	2.3	2.8	3.1	3.1	2.8	2.4	1.8	1.3	1.0	1.0	1.2	1.8	2.4	3.0	3.4
25	3.5	3.2	2.7	2.1	1.5	1.0	0.8	1.0	1.4	1.9	2.5	2.9	3.1	3.0	2.7	2.2	1.7	1.2	1.0	1.1	1.4	2.0	2.6	3.1
26	3.4	3.3	3.0	2.5	1.9	1.3	1.0	0.9	1.1	1.5	2.1	2.5	2.9	3.0	2.8	2.5	2.1	1.6	1.2	1.1	1.3	1.7	2.2	2.7
27	3.1	3.3	3.2	2.8	2.3	1.8	1.3	1.0	1.0	1.3	1.7	2.2	2.6	2.8	2.9	2.7	2.4	2.0	1.6	1.3	1.3	1.5	1.9	2.3
28	2.7	3.0	3.1	3.0	2.6	2.2	1.7	1.3	1.2	1.2	1.5	1.8	2.2	2.5	2.7	2.7	2.6	2.3	2.0	1.7	1.5	1.5	1.7	2.0
29 ☽	2.3	2.6	2.8	2.9	2.8	2.5	2.1	1.7	1.4	1.3	1.3	1.5	1.9	2.2	2.4	2.6	2.6	2.6	2.4	2.1	1.8	1.7	1.6	1.7
30	2.0	2.2	2.5	2.7	2.7	2.6	2.5	2.2	1.8	1.6	1.4	1.4	1.5	1.8	2.1	2.3	2.5	2.6	2.6	2.5	2.2	2.0	1.8	1.7

สูงของน้ำทำนายเป็นเมตรเหนือระดับน้ำลงต่ำที่สุด HEIGHTS OF WATER PREDICTED IN METERS ABOVE THE LOWEST LOW WATER

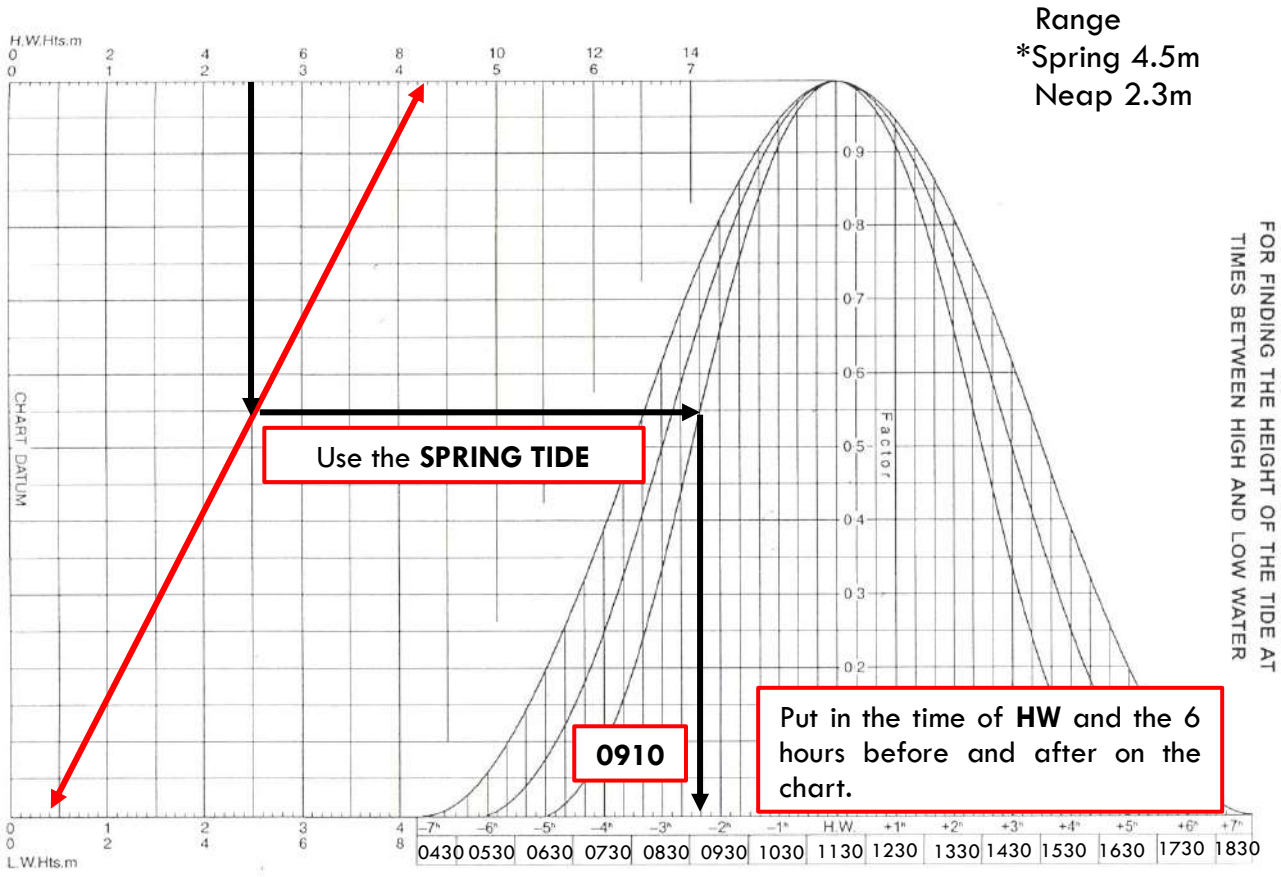
คำนวณโดย กรมอุทกศาสตร์ กองทัพเรือ

TIDAL HEIGHTS

Tidal Bell Curve

The tidal bell curve allows you to figure out how much tide there will be at a certain time. This is useful when passage planning when the harbour or anchorage you are planning to enter has tides that are lower than your draft.

1. The nautical almanac tells Us HW Is **4.3m** and LW Is **0.4m**.
2. The range Is 4.3m–0.4m = 3.9m on a spring tide
3. As the range is 3.9* we should use the spring range line of the bell curve. (If our range was for example 0.7 we would use the neap range line as this is closer to 0.3)
4. Your yacht needs 2.5m depth to clear a sand bar. What time will this be?



Answer: Follow the black line from **top of graph** to diagonal redline, the tidal gradient that day, across to the SPRING TIDEand then down to The Time Line.

At 0910 there is at least 2.5m of water above chart datum (the zero reference). Any time after 0930 should have more than enough clearance for the yacht. (Build in a safety factor)

TIDAL STREAMS

As the tide flows in (**flood**) or flows out (**ebb**), it can affect the position, direction and speed of a sailing boat. Understanding tide also means understanding this tidal stream. The tidal stream can help you forward [Fig.1], slow you down [Fig. 2] or cause you to deviate from your set course. If you are fighting the tide you may appear to be sailing forward, but actually you may not be moving or may even be moving backwards!

Fig. 1

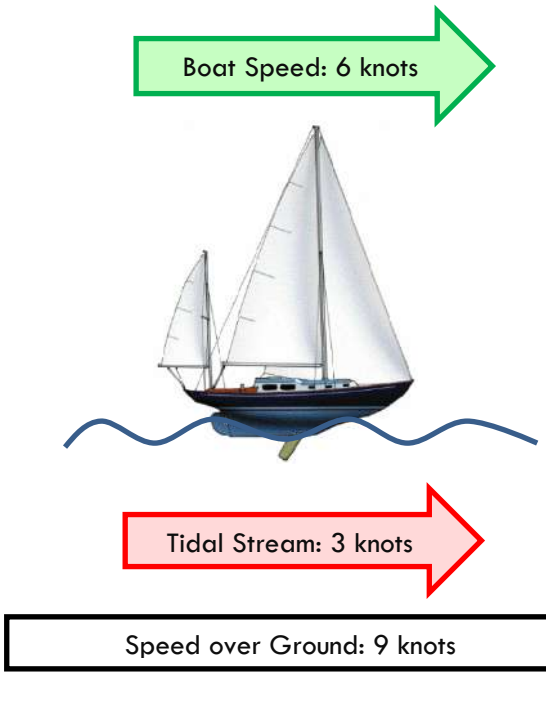
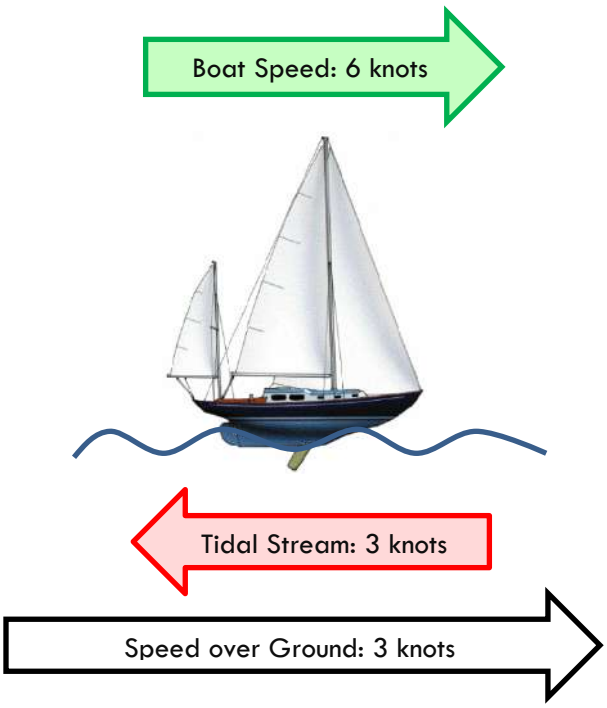
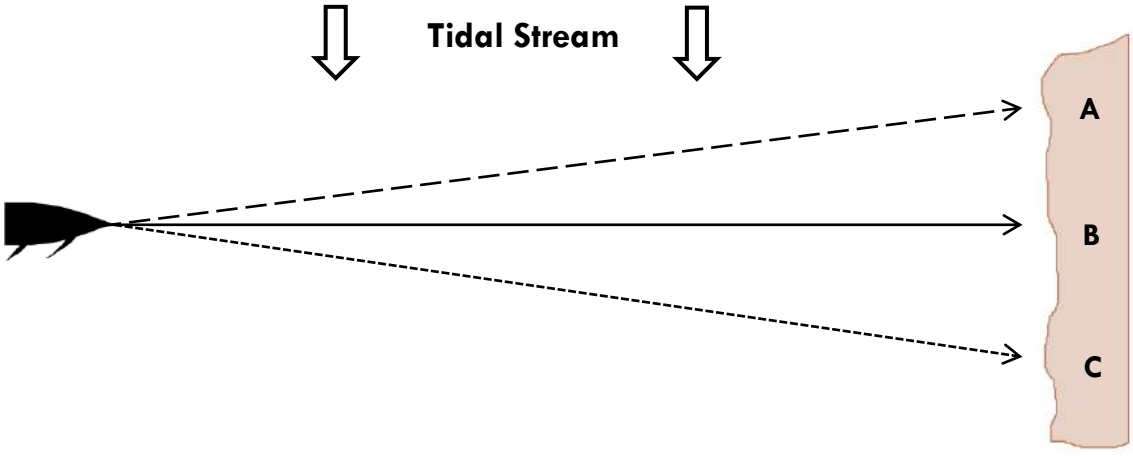


Fig. 2



When sailing across the tide the helmsman needs to compensate for the effect it will have on the boat. In the example below, if the boat wishes to arrive at Point **B**, it must sail for Point **A**. If it does not, it will end up at Point **C**.



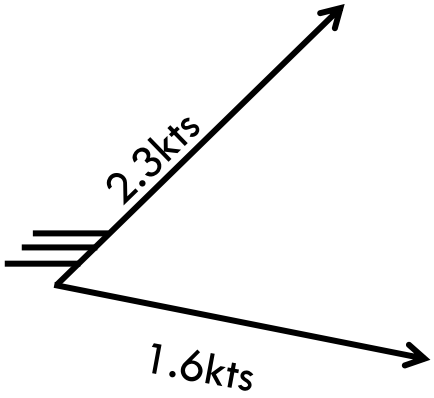
TIDAL STREAMS

Tidal Vectors

Nautical charts in Thailand give the tidal information using **Tidal Vectors.** They tell us the direction (Set) and the speed (Rate) of the tide in a given area on the chart.

The arrow with the fletching indicates the **Flood** tide.

The arrow without the fletching indicates the **Ebb** tide.



N.B. The Rates indicated on tidal vectors **only** refer to the 3/4th hour of a **Spring Tide.** If you want a different hour or a **Neap** tide you must adjust accordingly.

Tidal Diamonds

Nautical charts produced in England and across Europe give the tidal information using **Tidal Diamonds**.

Standard Port DOVER

		A 50 42'.3N 0 26'.5E		B 50 53'.0N 1 00'.0E			C 51 01'.0N 1 10'.0E		
Hours		Dir	Sp	Dir	Sp	Np	Dir	Sp	Np
Before HW	6	248	0.8 0.4	213	1.6	0.9	224	0.9	0.5
	5	067	0.5 0.3	214	2.1	1.2	239	1.0	0.6
	4	068	1.9 1.0	215	1.8	1.1	235	1.1	0.6
	3	071	2.6 1.5	213	0.9	0.5	242	0.6	0.4
	2	069	2.3 1.3	*Slack*			*Slack*		
	1	068	1.2 0.6	033	0.8	0.5	052	0.6	0.3
HW		067	0.1 0.1	032	1.5	0.8	049	1.2	0.7
After HW	1	248	0.9 0.5	031	1.9	1.1	049	1.3	0.7
	2	247	1.4 0.8	030	1.7	1.0	056	1.0	0.5
	3	251	1.8 1.0	031	1.2	0.6	054	0.5	0.3
	4	253	1.7 1.0	032	0.4	0.2	*Slack*		
	5	250	1.6 0.9	211	0.4	0.2	219	0.4	0.2
	6	249	1.2 0.7	212	1.3	0.7	217	0.8	0.4

They refer to a specific point on the chart, indicated by a letter **[F]** and the **LAT.** and **LONG.**

The first column gives us the SET.

The second column gives us the RATE in a SPRING TIDE.

The third column gives us the RATE in a NEAP TIDE.

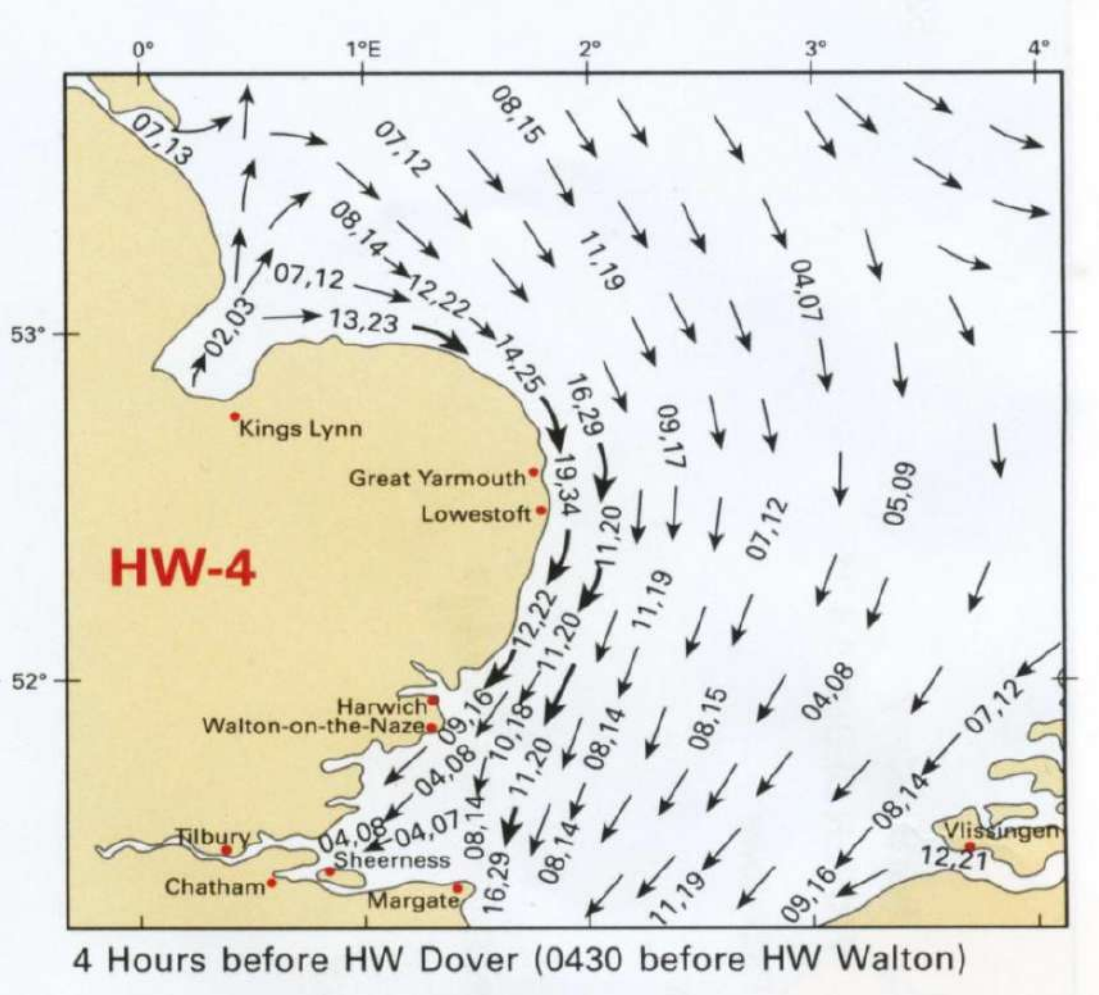
TIDAL STREAMS

Tidal Stream Atlas

A **Tidal Stream Atlas** gives us the **RATE** and **SET** of the tide for a given area at various hours before and after **High Water.** They refer to a **Standard Port.** In this case, Dover.

In the example below:

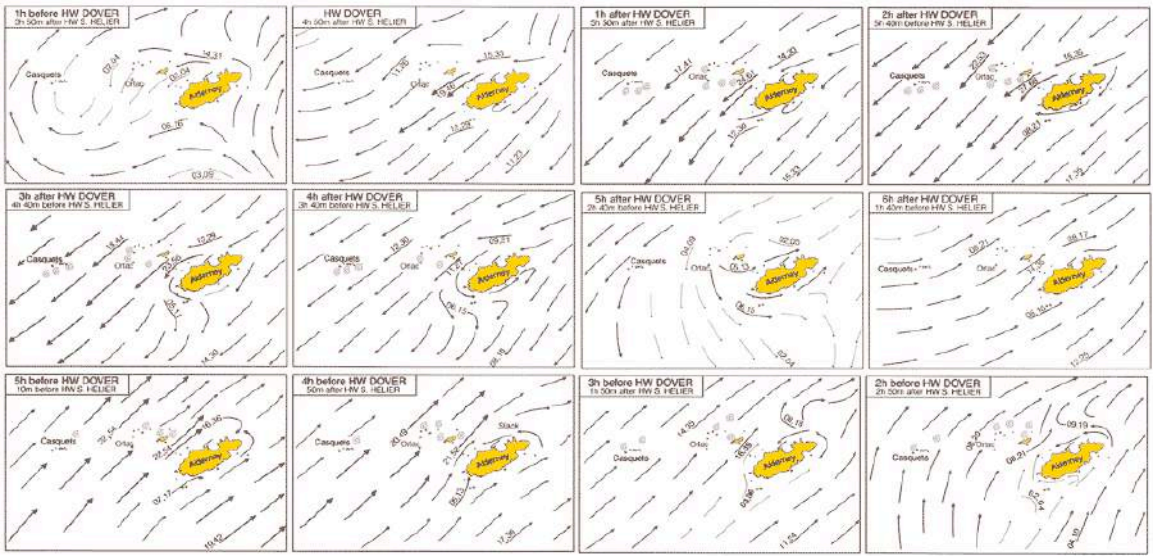
- The tidal stream depicted is in the 3rd and 4th hour before High Water
- The direction of the arrows gives us the **SET** (the direction of the flow)
- The numbers give us the **RATE** (the speed) for example **09,17**
- The **09** refers to neap tides
- At -4HW on a 'neap', the tide flows at 0.9kts.
- The **17** refers to spring tides.
- At -4HW on a 'spring', the tide flows at 1.7kts.



TIDAL STREAMS

Tidal Gates

A tidal gate is an area of coastal water where the tidal stream is significant. This makes progress in a given direction difficult or impossible at specific times. A good navigator will always plan to arrive before the tide changes (the gate closes).



Races, Rips and Overfalls

When the tide is forced around any headland, over shallows or where a channel is constricted, it often produces a tidal race which can cause overfalls.

Most charts mark dangerous overfalls and tide rips with a series of wavy lines and a note describing at what state of the tide they are most dangerous.

Often the dangerous area will be in one position on the flood tide and in another on the ebb.

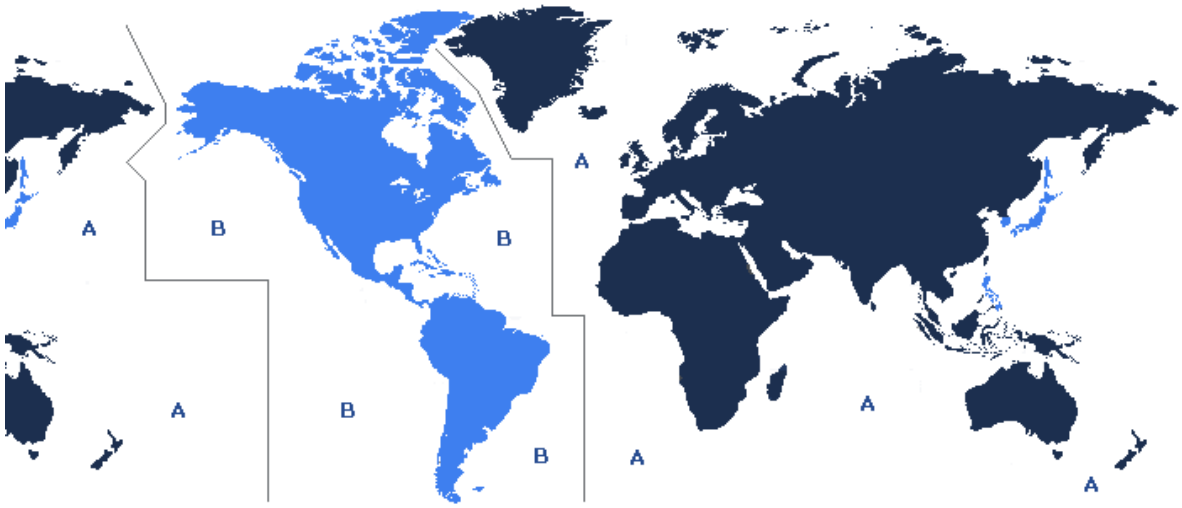
The overfalls often occur as the fast tide flows over an uneven seabed causing turbulence and upwelling down tide.

IALA BUOYAGE

Established in 1957, IALA (International Association of Marine Aids and Lighthouse Authorities) is a non-profit international technical association. IALA provides nautical expertise and advice. There are two IALA systems based on geographical location. Sail in Asia teaches IALA System A which applies to Region A.

Region A
Europe, Australia, New Zealand, Africa, the Gulf and the Asian countries.

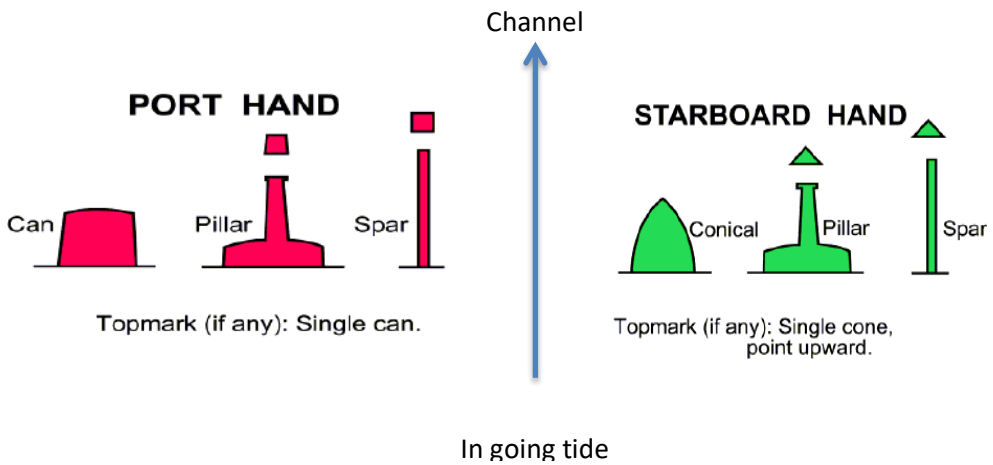
Region B
The whole of the Americas, Japan, South Korea and the Philippines.



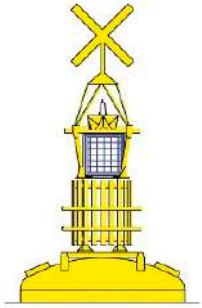
Lateral Marks

When entering a port or harbour, the LATERAL MARKS ensure you stay in the required channel. The System A Lateral Buoyage system is set in relation to the ingoing tide as seen below

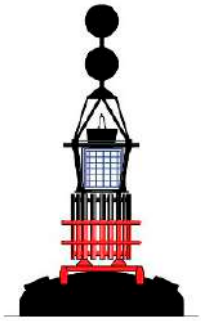
System A



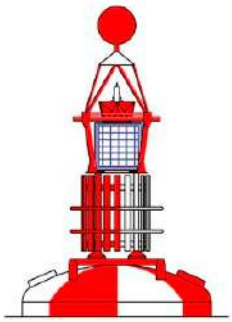
Lateral Marks Continued



Special Mark



Isolated Danger



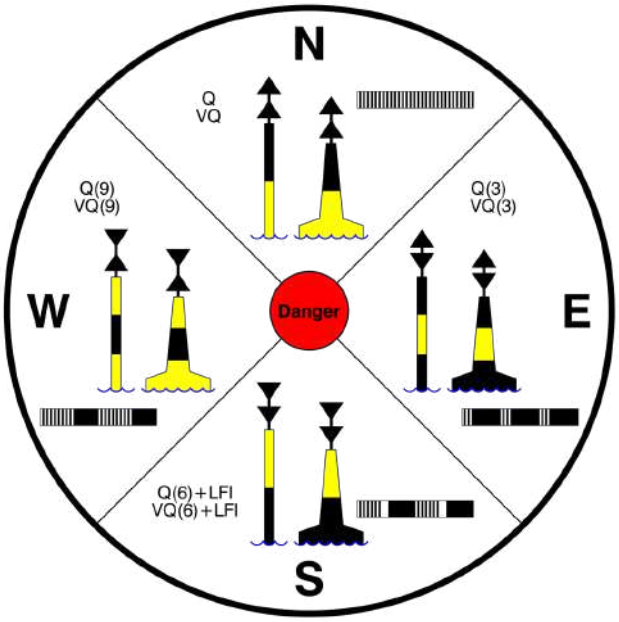
Safe Water Mark

Emergency Wreck

Cardinal Marks

Indicate the direction in which a particular danger lies, and the side on which it is safe to pass.

For Example: A North cardinal lies to the north of the danger, and the clear water is to the north of the buoy.

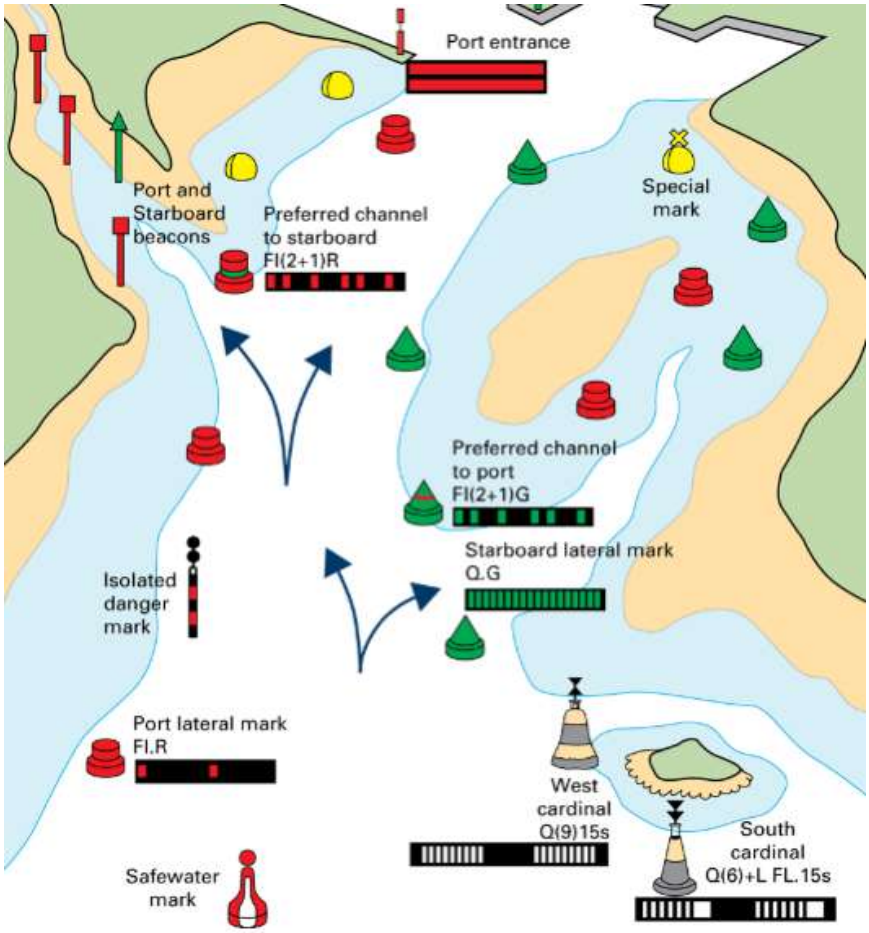


IALA BUOYAGE

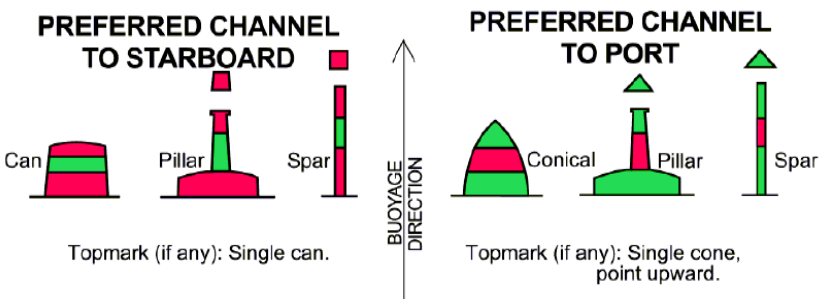
Harbour Approach

You will be expected to identify, understand and respond to buoyage that you see.

- What marks can you identify in the image?
- Is your route safe?
- What decisions must you make?



Preferred Channel Marks: On entering an anchorage, port, harbour or bay there may be more than one route the watchkeeper or skipper can take. IALA have developed Preferred Channel Markers to indicate the preferred route into the anchorage.

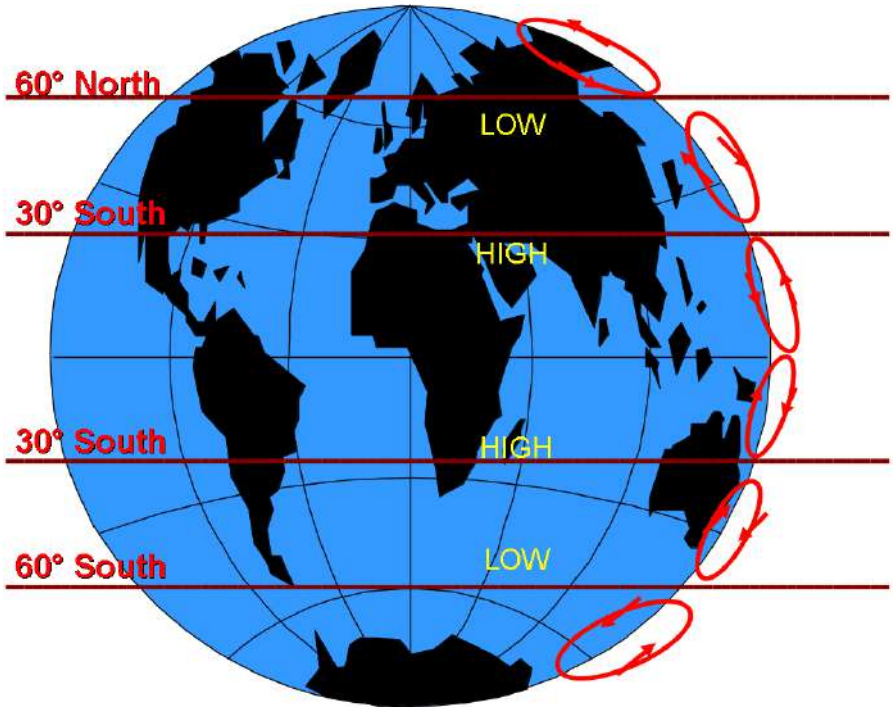


METEOROLOGY

Understanding Weather

- The sun heats the earth's surface
- The heating effect differs on different surfaces: water, vegetation, rock (absorption/reflection)
- This causes differing air temperatures above those surfaces
- HOT air rises causing lower air pressure
- COLD air falls causing higher air pressure
- Where the two meet there is meteorological activity - cloud, wind, rain: ***WEATHER***

Global Air Pressures



Uneven solar heating and the Coriolis Effect create circular air flows as shown here.

This results in areas of high & low pressure.

This is the basis of global weather patterns.

METEOROLOGY

Wind Patterns

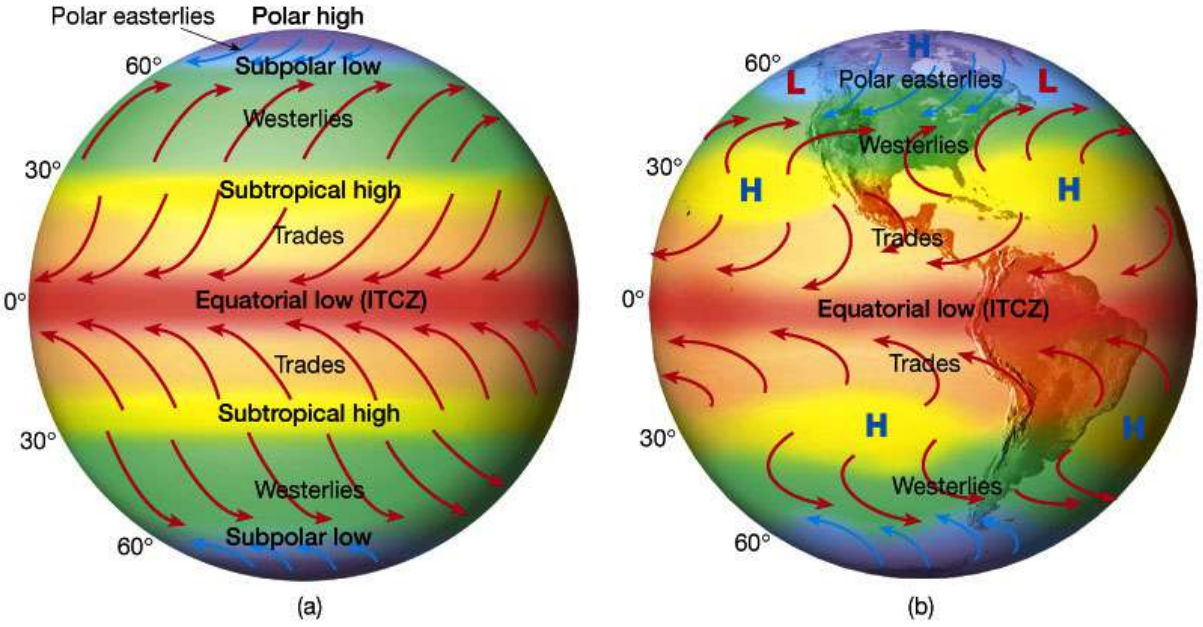
Northern Hemisphere

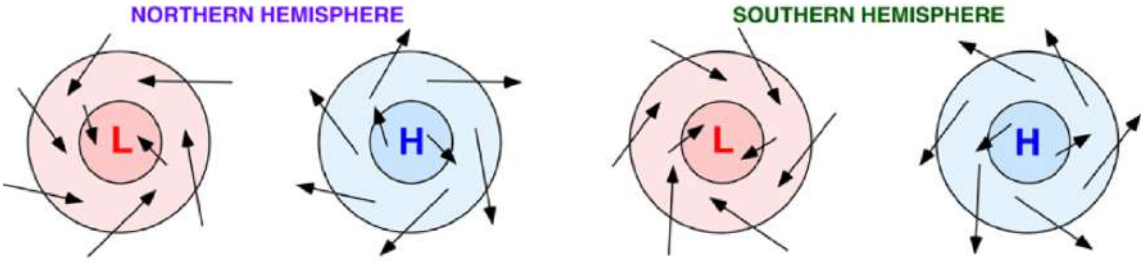
- Low Pressure - Winds flow anti-clockwise towards the centre of the low-pressure system.
- High Pressure - Winds flow clockwise away from the centre of the high-pressure system.

Southern Hemisphere

In the southern Hemisphere the winds follow the same patterns however in the opposite direction.

- Low Pressure - Clockwise
- High Pressure - Anti-clockwise



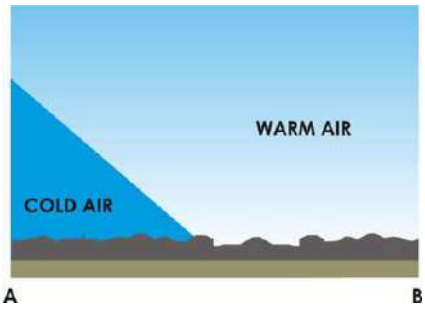


METEOROLOGY

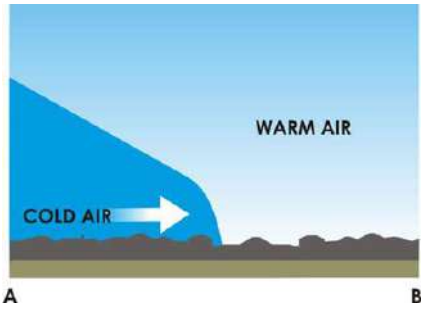
Formation of a Depression

Changes in weather are caused by the interaction of cold and hot air masses.

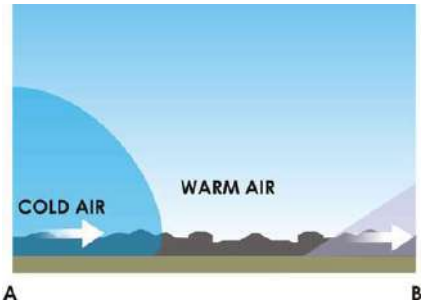
1. When they meet they do not mix. The cold air moves below the hot air as it is denser.



2. As the cold front advances it undercuts the hot air, moving it towards the centre of the depression.

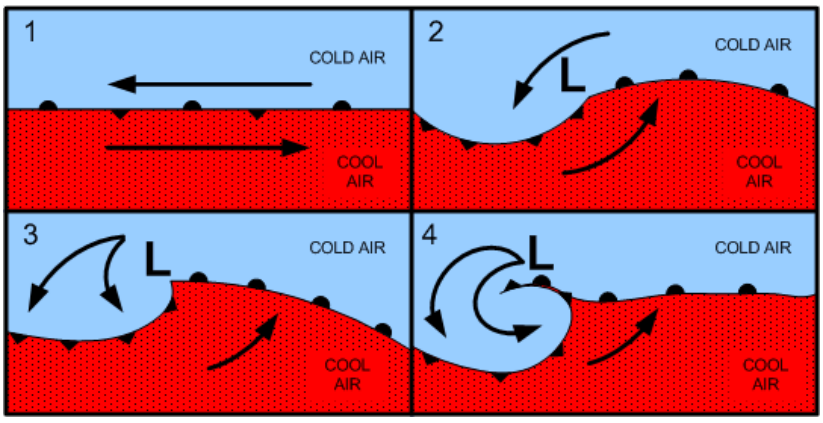


3. The cold front moves quicker than the warm front and will soon develop into an occluded front.



Viewed from above, the development of a front looks like this:

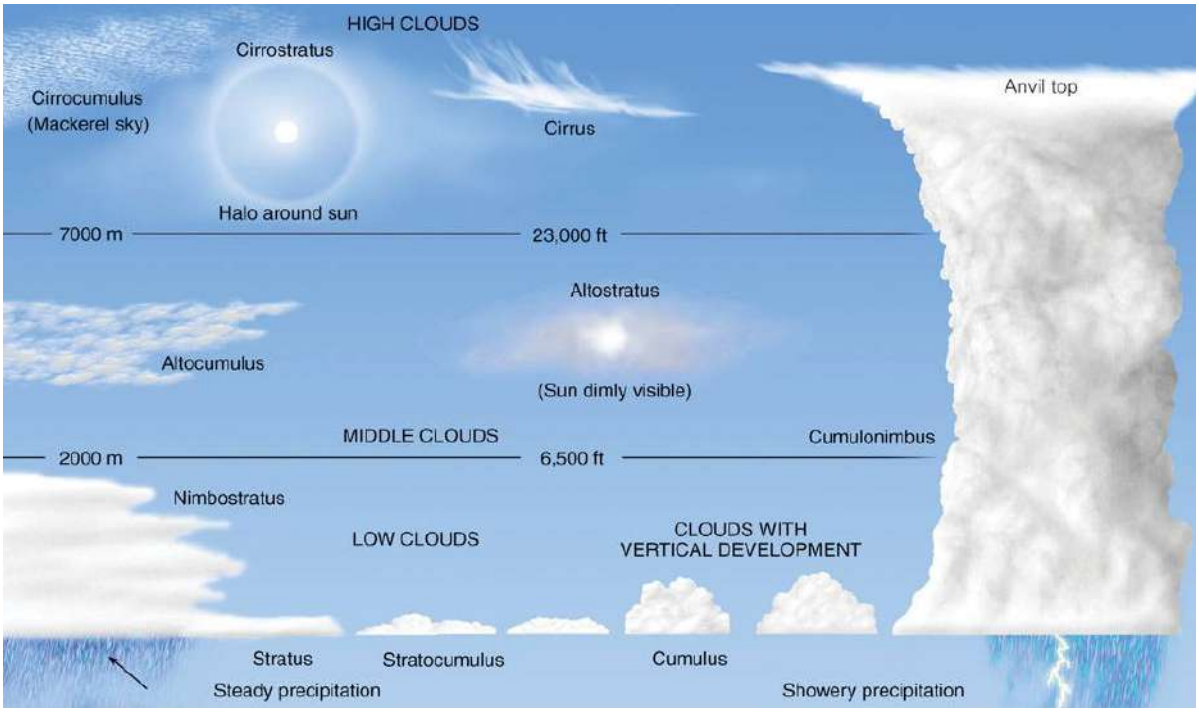
The rotation of the earth causes depressions to develop in a counter-clockwise fashion in the Northern Hemisphere.



METEOROLOGY

Types of Cloud

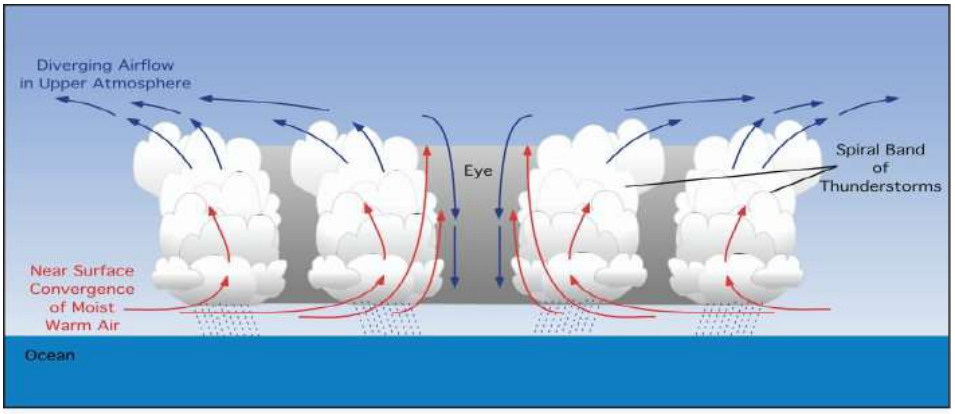
Clouds are formed by the condensation of water in the atmosphere. The height of cloud determines its shape and its risk of precipitation.



Formation of a Hurricane or Typhoon

Hurricanes or typhoons form during the summer months when the sun heats large areas of ocean. They tend to form 7°-11° north or south of the equator. Warm, moist air rises from the ocean (27-29°C) and is moved by circular winds created by the rotation of the earth, also known as the Coriolis Effect.

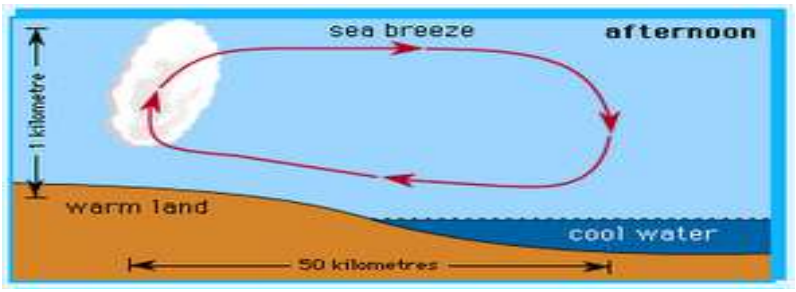
This warm air rises and thunderstorms occur. When winds exceed 39mph, a tropical storm has developed. When the winds reach 74mph a hurricane or typhoon is born.



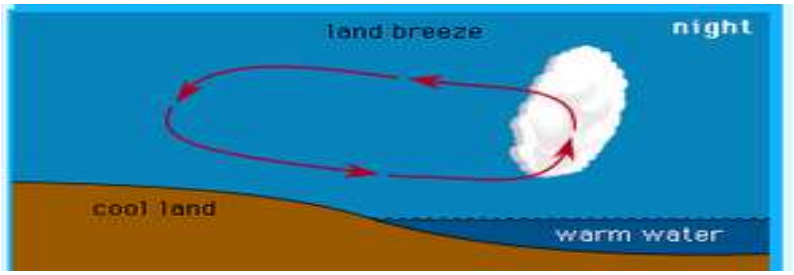
METEOROLOGY

Land and Sea Breezes

During the day, the Sun heats the land and causes an area of relatively low pressure, therefore cooler air is pulled in from the ocean.



During the night, the land cools quickly, but the water retains its temperature, therefore the process of the sea breeze is reversed.

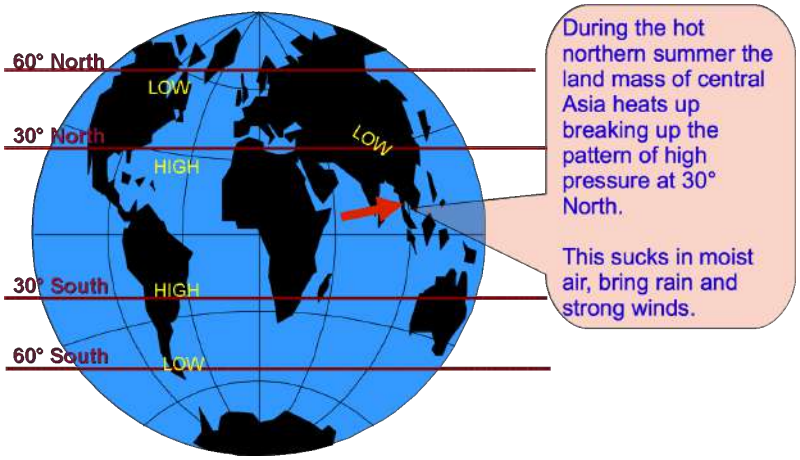


Terms used to describe wind

Wind direction typically doesn't simply reverse its direction. Instead, it usually rotates around in either a clockwise direction, a **veering wind**, or an anti-clockwise direction, a **backing wind**. If you are in the middle of a depression, the wind is often hard to predict. If this is the case, the wind is referred to as **cyclonic**.

Monsoon Seasons

Monsoon Seasons are caused by the same factors that create land and sea breezes, but on a much larger scale.



METEOROLOGY

Monsoon Seasons in South East Asia

There are two monsoon seasons in South East Asia. The South-West monsoon and the North-East monsoon.

The South-West Monsoon Season

The SW monsoon season is the wet season in Thailand. It occurs between May and October. This is cause by the Asian landmass being warmer than the ocean. As the air above China heats up, cooler, heavier air rushes in from the Indian Ocean.

This causes;

- Squally weather with sudden, short-lived high winds and rain
- Prevailing winds from the South West
- Monsoon rains

The North-East Monsoon Season

The NW monsoon season is the dry time of year. It occurs between November and April. It is caused by the Indian Ocean becoming warmer than the Asian landmass and the land loses its heat in the winter. Cool, dry air from China replaces rising warm air above the ocean.

This causes;

- Very little precipitation with few or no clouds
- Prevailing winds from the North East
- Steady winds

WEATHER AT SEA

The Beaufort scale

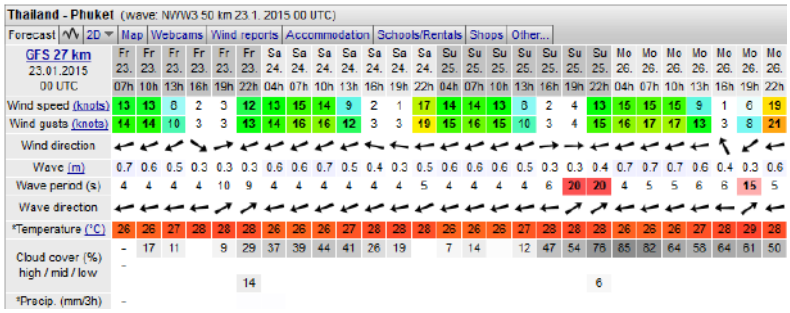
Scale Number	Wind Speed mph	Wind Name	Noticeable Effects of Wind on Land	Noticeable Effects of Wind on Sea
0	<1	CALM	Smoke rises vertically.	Sea is mirror smooth.
1	1-3	LIGHT AIR	Direction shown by smoke drift, but not by vanes.	Small wavelets like scales, but no foam crests.
2	4-7	LIGHT BREEZE	Wind felt on face. Leaves rustle. Wind vane moves.	Waves are short and more pronounced.
3	8-12	GENTLE BREEZE	Leaves and twigs in motion. Wind extends a light flag.	Crests begin to break. Foam has glassy look.
4	13-18	MODERATE BREEZE	Raises dust and loose pages. Moves small branches.	Wave caps are longer. Many whitecaps.
5	19-24	FRESH BREEZE	Small trees in leaf begin to sway.	Waves more pronounced. Foam crests all over.
6	25-31	STRONG BREEZE	Large branches move. Phone wires whistle.	Larger waves form. Foaming crests more extensive.
7	32-38	MODERATE GALE	Whole trees in motion.	Sea heaps up. Foam begins to flow in streaks.
8	39-46	FRESH GALE	Twigs break off. Progress generally impeded.	Waves increase visibly. Foam in dense streaks.
9	47-54	STRONG GALE	Slight structural damage. Chimney pots removed.	Waves increase visibly. Foam blown in dense streaks.
10	55-63	WHOLE GALE	Trees uprooted. Considerable structural damage.	High waves with overhanging crests. Great foam patches.
11	64-75	STORM	Damage widespread around hurricane edges.	Waves so high that ships hidden in troughs. Air full of spray.
12	>75	HURRICANE	Devastation.	Devastation.

WEATHER AT SEA

Bareboat skippers should principally have meteorological information about their local sailing area (coastal sailing). This is mainly the daily forecast, but can also be extended to a week-long, regional, or global forecast.

In general, the skipper would want information on the following:

- ❑ Wind Strength
- ❑ Wind Direction
- ❑ Precipitation
- ❑ Sea State
- ❑ Air Pressure
- ❑ Temperature
- ❑ Cloud Cover
- ❑ Seasonal Changes



Weather Forecasts

Weather forecasts are essential in planning a safe passage. They are available from a variety of sources.

- Internet (Wind Guru, Weather 4D, GRIB Files, and Windy)
- Navionics™
- Local Radio
- National Radio (Shipping forecast)
- Marina Office
- National Meteorological Office
- INMARSAT
- NAVTEXT

GRIB FILES are the standard data format of the World Meteorological Organization. They are available to download and contain raw data based on the World's collected meteorological information.

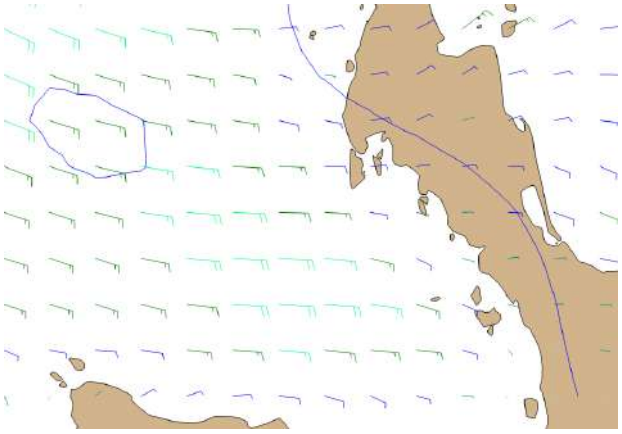
The direction of the arrows corresponds to the direction of the wind.

½ feather = 5kts

1 feather = 10kts

1 ½ feathers = 15kts

2 feathers = 20kts



WEATHER AT SEA

Format of Shipping Forecast

Shipping forecasts are issued daily by the UK MET Office and broadcast on Radio 4, three times a day. They use a specific format and terminology that skippers should know, and issue their information in the following order:

1. Gale Warning
2. General Synopsis
3. Sea Area Forecasts
4. Weather – Wind – Visibility
5. Coastal Station Reports
6. Wind
7. Significant Weather
8. Visibility in miles or metres
9. Pressure
10. Tendency

Terms Used in Forecasts

Wind:

Veering Wind: Wind is changing its direction and is moving clockwise from 0°.

Backing Wind: Wind is changing its direction and is moving anticlockwise from 359°.

Cyclonic: Considerable change in wind direction as a depression passes through an area.

Time:

Imminent: Within 6 hours of the time of issue.

Soon: Between 6-12 hours of the time of issue.

Later: More than 12 hours from the time of issue

Visibility:

Good: More than 5 miles.

Moderate: Between 2-5 miles.

Poor: Between ½ mile – 2 miles.

Fog: Less than 1000m.

Sea State:

Smooth: Wave height is less than 0.5m.

Slight: Wave height is between 0.5m – 1.25m.

Moderate: Wave height is between 1.25 – 2.5m.

Rough: Wave height is between 2.5m – 4m.

Very Rough: Wave height is greater than 4m.

WEATHER AT SEA

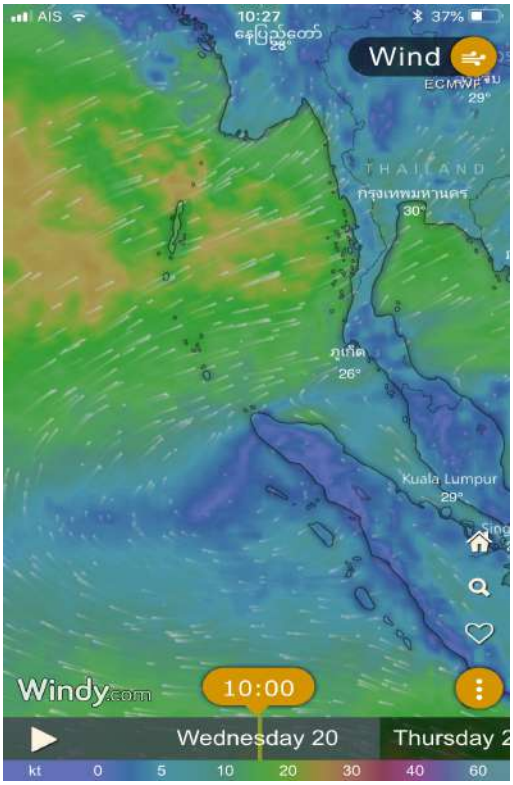
Conduct in Restricted Visibility

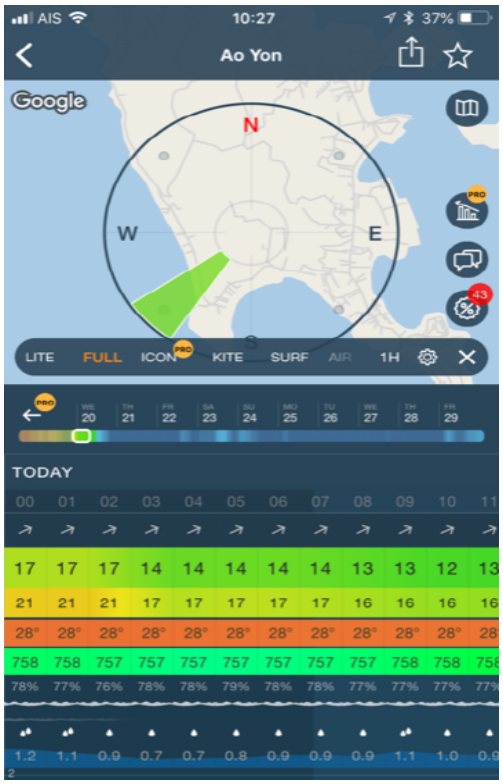
In the wet monsoon season, we get many squalls that cause **whiteouts**. These are conditions of very low visibility caused by heavy rain. In these conditions, as well as in fog, it is important to follow several safety precautions:

1. ready engine
2. use fog signals (-..)
3. maintain silence
4. fix position and find a safe bearing
5. post a look-out
6. slow speed
7. put on life jackets
8. use AIS, radar, etc.…
9. turn on navigation lights
10. ready white collision flare

Weather Apps we recommend

We suggest you review the weather Apps Windy (Blue) and Windy (brown). This gives you the facility to look over a wide area or a local area for passage plans





TOPICS CHECKLIST

Theoretical Topics

Chartwork	
Understanding the Compass	
Position Fixing	
Tides, Heights and Streams	
IALA Buoyage	
Meteorology	
IRPCS	
Passage Planning and Pilotage	

Leaving the Mooring	
Manoeuvring Under Engine	
Hoisting / Reefing and Managing Sails Underway	
Sailing on all Points of Sail	
Eye ball navigation and Running a log.	
Basic Heave To / Jib Aback Heave To	
Man Over Board Under Engine / sail	
Picking Up a Mooring	
Anchoring	

IRPCS

The **International Regulations for Preventing Collisions at Sea 1972** (**Colregs**) are published by the International Maritime Organisation (the IMO) and set out, among other things, the "rules of the road" or navigation rules to be followed by ships and other vessels at sea to prevent collisions between two or more vessels.

This Imray Rules and Signals App is a great source of information and is supplemented with a further App, Lights and Shapes that gives a student, learning material and short questions with answers.

Fundamental Rules

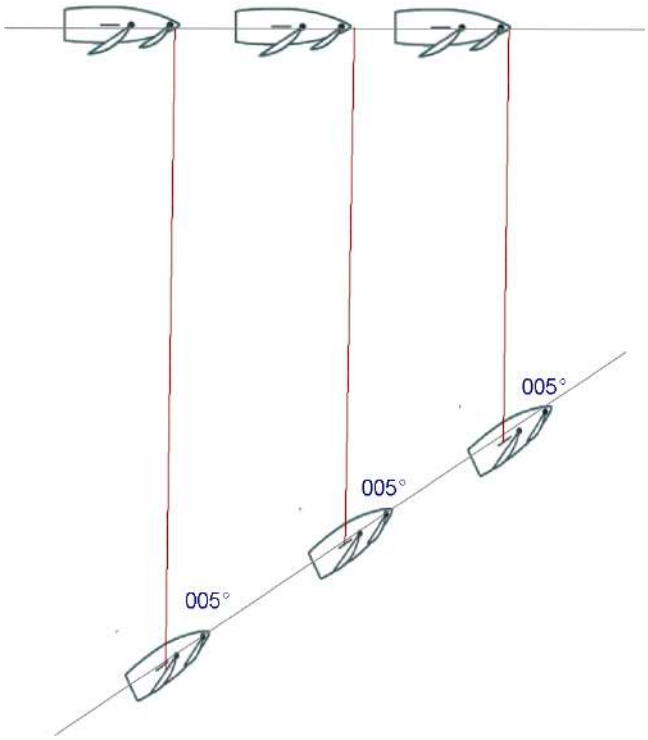
- **Keep a watch –** by all appropriate means (look, listen, radar, AIS)
- No-one has **'right of way'**
- One vessel is the **give way**, the other is the **stand on** vessel. Both remain responsible to avoid a collision
- **Travel at a safe speed** for the conditions
- In a narrow channel **keep to starboard** (right)
- **GIVE WAY** vessel must take **early and substantial action**
- **STAND ON** vessel must **maintain course and speed** until it is clear the other vessel is not taking action and only then take avoiding action

Risk of Collision

When there is deemed to be a risk of collision

- One vessel is the **give way** vessel.
- The other is the **stand on** vessel

If there is a **CONSTANT BEARING** between the two vessels which are approaching each other there is a **risk of collision.** (Rule 7)



IRPCS

Sailing Rules

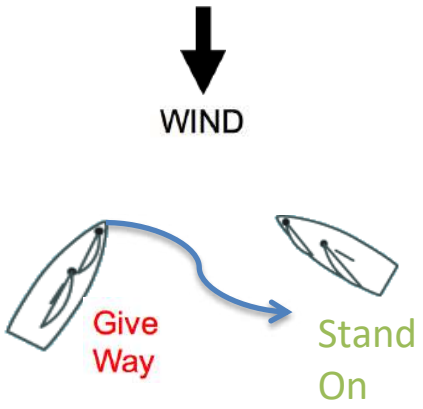
Under Sail – Rule 12

Starboard Tack Rule

Wind on the Starboard side of the vessel -

Starboard tack boat is the stand on vessel.

Port tack boat is the give way vessel.



Under Sail – Rule 12

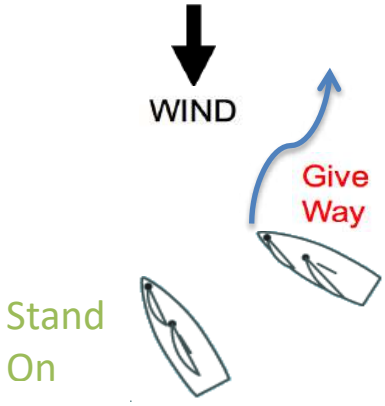
Windward Rule

The boat nearest the wind is the Windward boat.

The boat furthest from the wind is the Leeward boat.

Leeward boat is the stand on vessel.

Windward boat is the give way vessel.



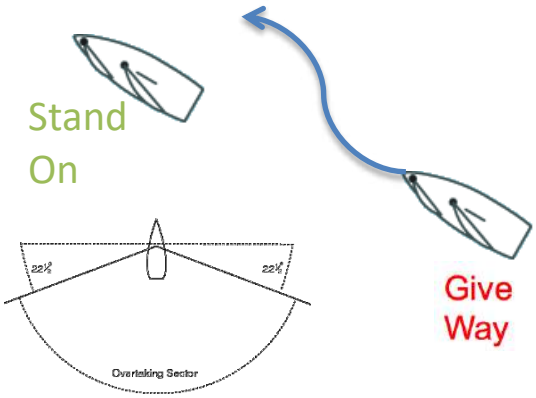
Under Sail or Power

Applies to power or sailing vessels.

The vessel being overtaken is the stand on vessel.

The overtaking vessel is the give way vessel. (Rule 13)

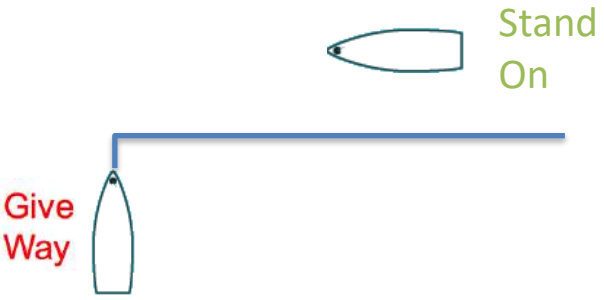
Overtaking is defined as coming from more than 22.5° abaft the beam (the angle a stern light becomes visible).



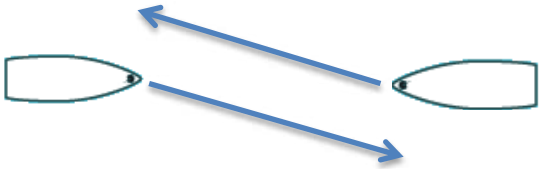
IRPCS

Under Power

Vessels meeting at an angle but <u>not</u> when one is overtaking the other: give way to vessels on your **Starboard** bow. (Rule 15)



Vessels meeting head on – <u>both</u> turn significantly to **Starboard** and pass Port to Port. (Rule 14)

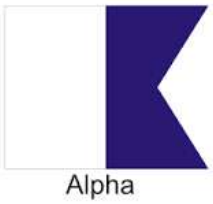


Shapes and Sounds

Rule 27e - Vessel engaged in diving operation

Fog Signal

Efficient sound signal at intervals not exceeding 2 mins



Rule 25e - Vessel motor sailing

Fog Signal

At Intervals not exceeding 2 mins

- If making way ——— (long)
- If not making way ——— ———

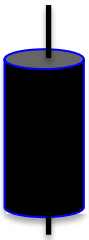
IRPCS

Rule 28 - Power driven vessel constrained by draught

Fog Signal

At Intervals not exceeding 2 mins

Long/short/short



Rule 27 - Power driven vessel Restricted ability to manoeuvre

Fog Signal

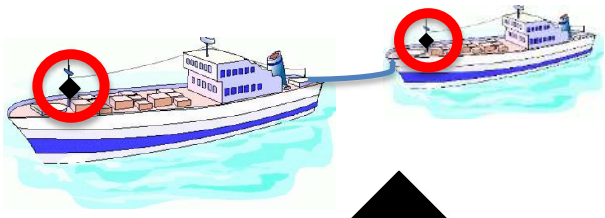
At Intervals not exceeding 2 mins

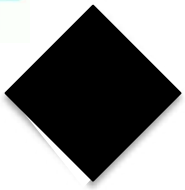
Rule 24 - Vessel towing and tow. Length of tow more than 200m

Fog Signal

At Intervals not exceeding 2 mins

- Towing vessel
- Towed vessel

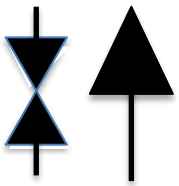


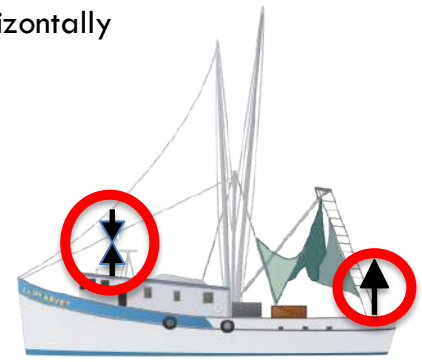


Rule 26 - Fishing Vessel gear extending more than 150m horizontally

Fog Signal

At Intervals not exceeding 2 mins



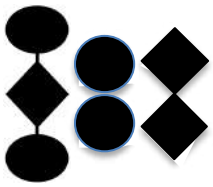


IRPCS

Rule 27d - Carrying out underwater operations (Restricted ability to manoeuvre)

Fog Signal

At Intervals not exceeding 2 mins



Rule 30 - Vessel at Anchor

Rapid bell at Intervals not exceeding 1 min
If over 100m followed by rapid gong
May also sound MORSE A on whistle

Rule 27 - Vessel not under command

Fog Signal
At Intervals not exceeding 2 mins

Rule 30 - Vessel aground

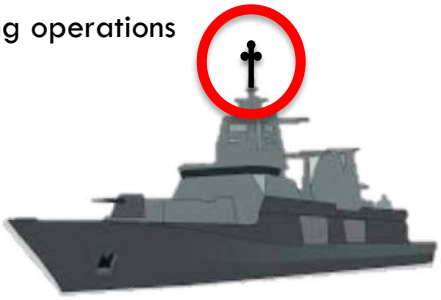
3 bell strokes + rapid ringing + 3 bell strokes (+ gong if 100m plus)
At Intervals not exceeding 1 min
May also sound Morse R on whistle

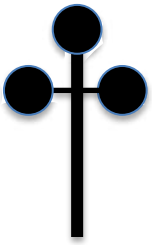
IRPCS

Rule 30 - Vessel engaged in mine clearing operations

Fog Signal

At Intervals not exceeding 2 mins

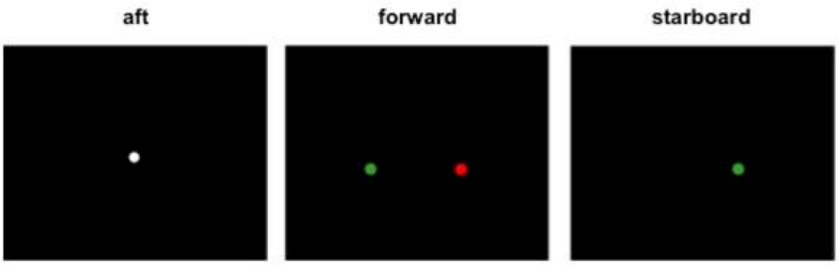




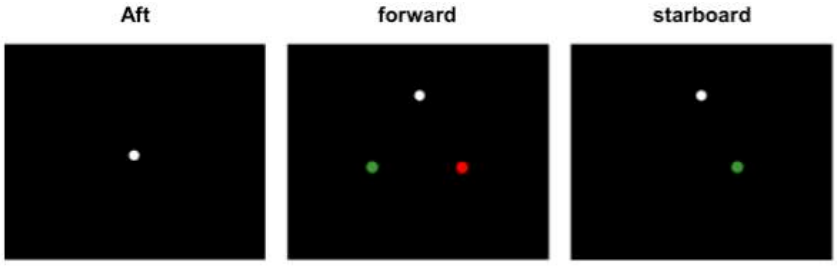
Lights

Sailing vessels

(Under 20 meters a combined all-round mast light can be used)

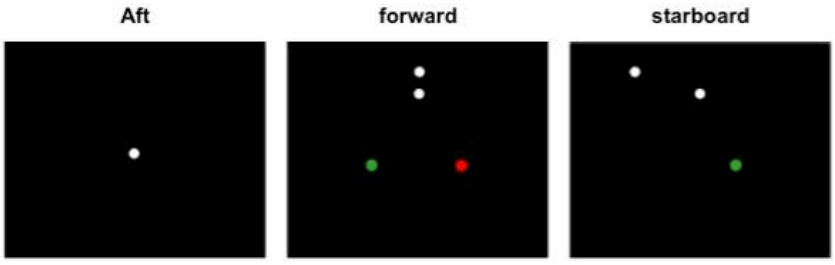


Power vessel <50m



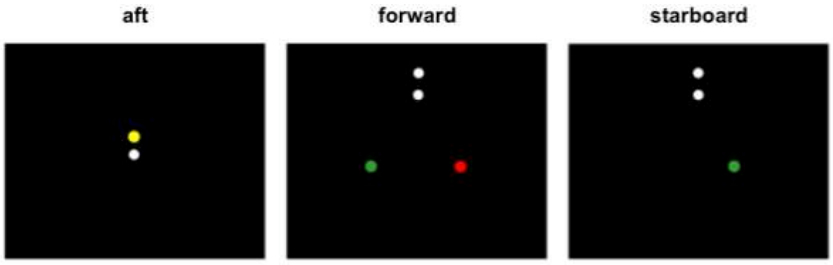
Power vessel >50m

When seen from forward it is impossible to distinguish this from a towing vessel < 50m with tow < 200m



Towing Vessel < 50m (tow < 200m)

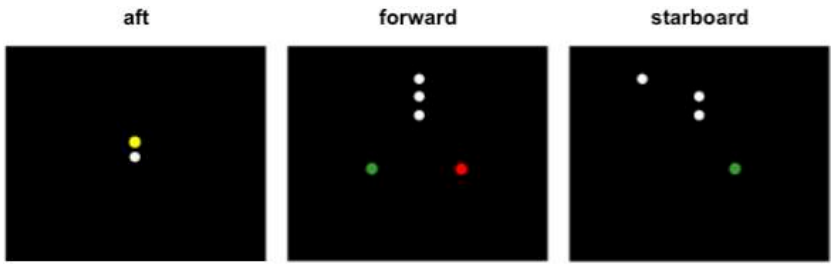
When seen from forward it is impossible to distinguish this from a power vessel > 50m (or a power vessel < 50m showing the optional second masthead light)



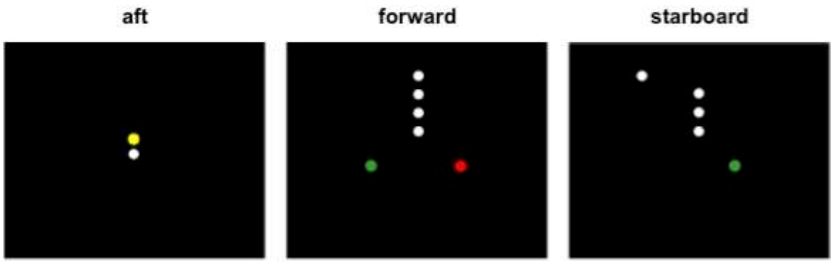
IRPCS

Towing Vessel > 50m (tow < 200m)

When seen from forward or aft it is impossible to distinguish this from a towing vessel < 50m with a tow > 200m

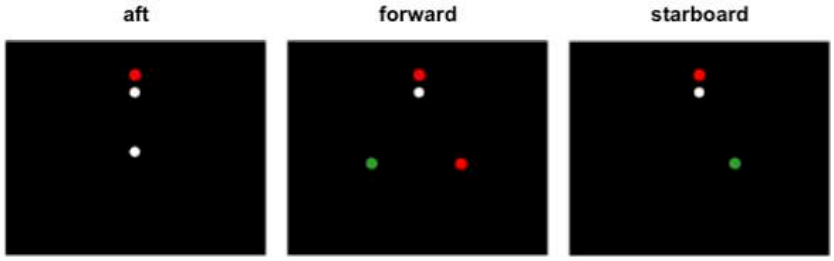


Towing Vessel < 50m (tow > 200m)



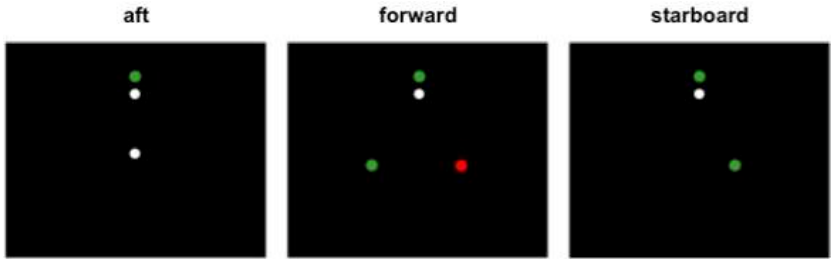
Fishing Vessel

Memory Aid: "Red Over White = Fishing at Night"



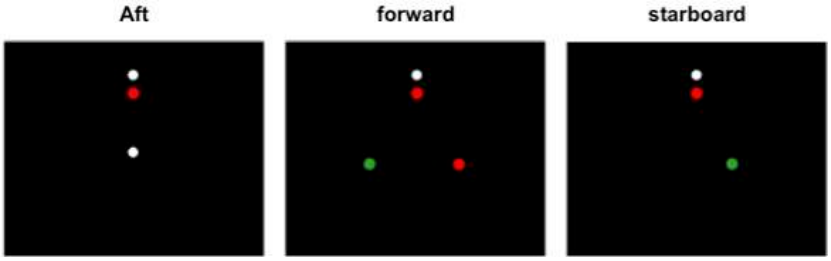
Trawling Vessel

Memory Aid: "Green Over White = Trawling at Night"



Vessel engaged in pilotage duties

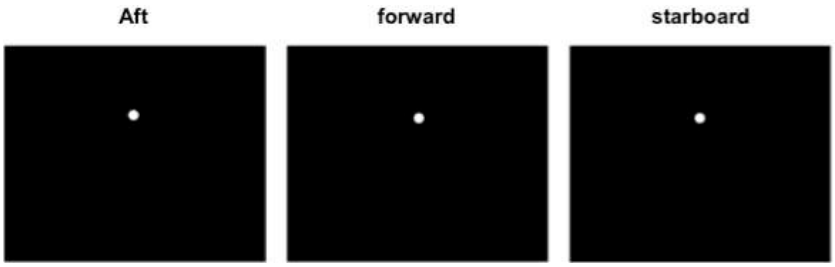
Memory Aid: "White over Red = Pilot Ahead"



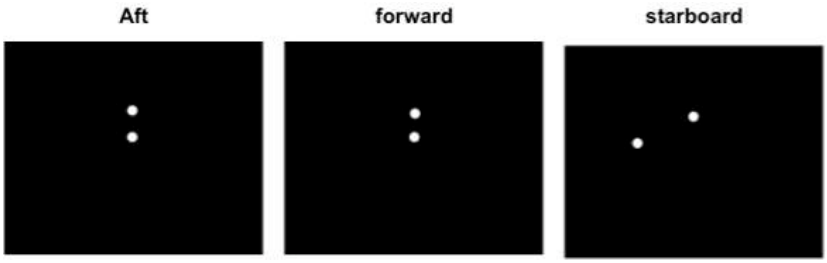
IRPCS

Vessel < 50m At Anchor

Remember, it is impossible to tell in many cases when only a single white light is seen - what this may mean (stern light? vessel at anchor? distant vessel where only the masthead light is visible over the horizon? etc...)

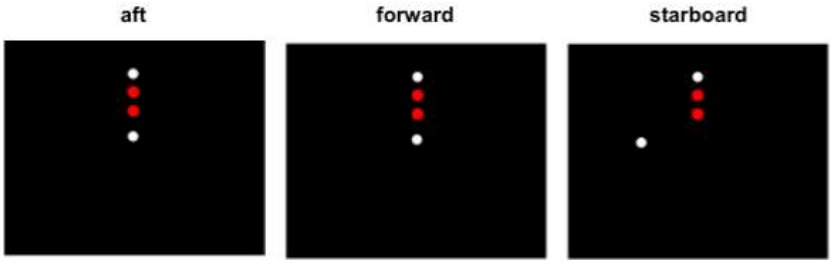


Vessel > 50m At Anchor

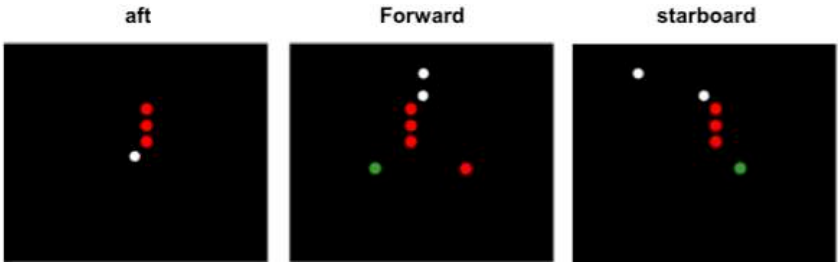


Vessels Not Under Way - Vessel Aground

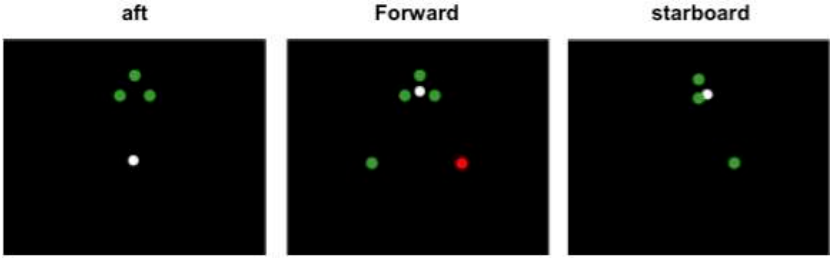
Since the rule does not specify exactly where the two red lights should appear in relation to the anchor light they may appear either above or below the forward anchor light.



Vessel Constrained by her Draft



Vessel engaged in mine clearance operations



COURSE TO STEER

As Bareboat Skippers, we will be expected to plan our route ahead of time, calculating the effect of tide before we have sailed the leg, rather than after.

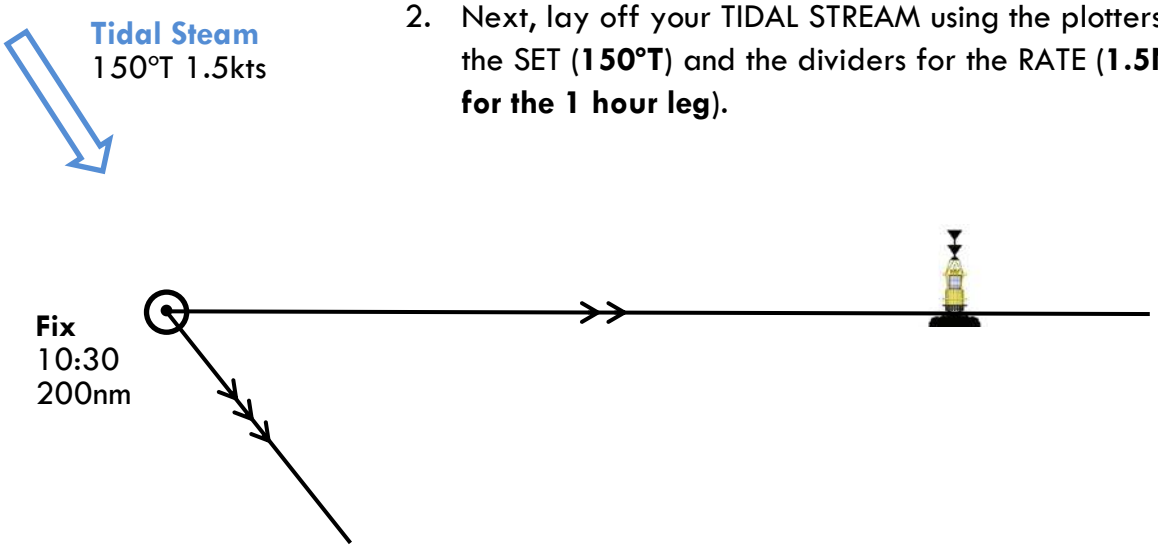
To do this we calculate a Course to Steer.

This navigational method compensates for the effect of tide prior to sailing the leg, and is therefore a safer and more accurate practice

Estimated Positions tell us where we were and where we are now.	Course to Steer tells us where we want to go and where we will be.

1. First, draw your GROUND TRACK, **extending the line past your destination.**

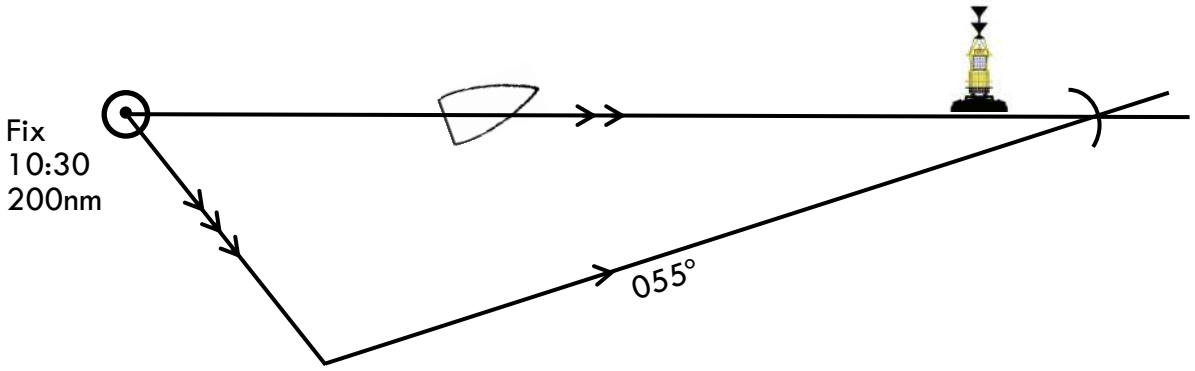
2. Next, lay off your TIDAL STREAM using the plotters for the SET (**150°T**) and the dividers for the RATE (**1.5NM for the 1 hour leg**).



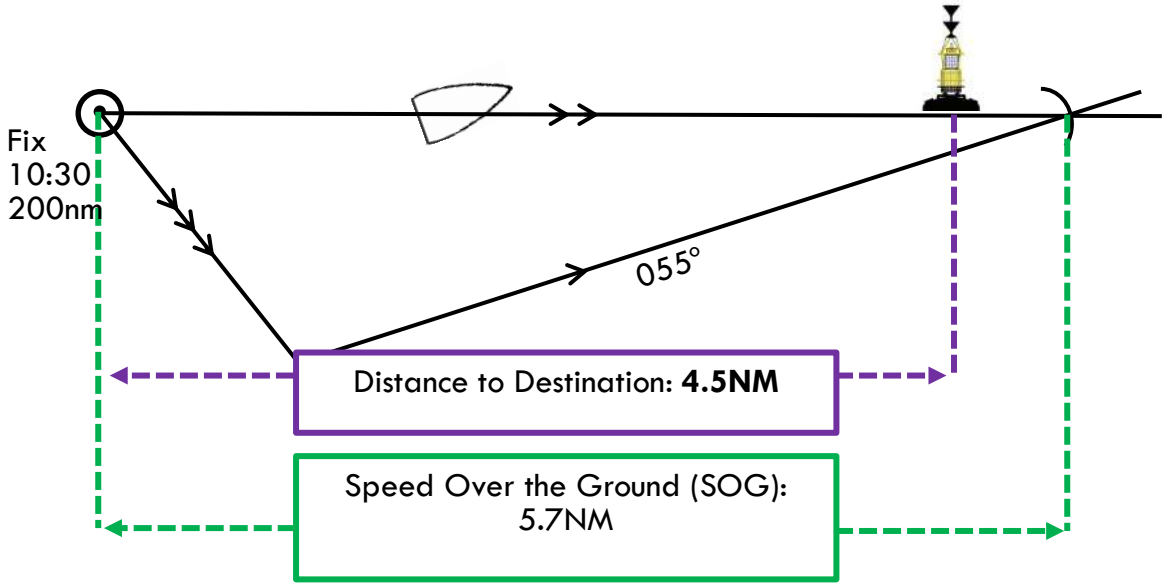
3. Next, use the DIVIDERS to measure one hour's journey.
   At 5kts this will be 5NM. Mark this from the end of the tidal stream to the point where it crosses your ground track. This is your water track and Course to Steer.

4. Measure the angle of your water track. If you steer this course, you will travel along the ground track. This is your Course to Steer (CTS).

COURSE TO STEER



5. However, in 1 hour you will have passed your target. So, we should calculate how long it will take to get to the South Cardinal.



Duration of Passage = (x ÷ y) X 60

(4.5 ÷ 5.7) X 60 = 47 minutes

10:30 + 47mins = **11:17** Estimated Time of Arrival

PASSAGE PLANNING

Why Plan?

- A requirement under the SOLAS convention
- First introduced in 1914 in response to the sinking of the Titanic
- Requirement for recreational passage plans introduced in 2005
- Helps ensure a safe and enjoyable journey
- Makes a skipper's life less stressful
- Ensures that all the information you may need to navigate safely is available in one place when you need it

SOLAS

On July 1st 2002 a new International regulation came into force affecting all leisure vessels. It was a new chapter, Chapter V, in SOLAS (Safety of life at Sea) regulations. Part of this chapter requires skippers to plan their passage.
Skippers must consider the following:

- Weather
- The tides
- Limitations of vessel
- The crew
- Navigation hazards
- Contingency plan (Plan B)
- Leaving Information ashore

Elements of a passage plan

- Objective - Where are you going, when and how far?
- Weather forecast and tidal predictions
- Constraints - tidal gates, access to ports and marinas, Immigration etc.
- Navigation - Approximate route plan. Plan B and C
- Relevant publications and electronics - Charts, Pilots, Almanac, Laptop, Ipad, Tidal stream atlas. Chart 5011
- Crew and vessel capabilities
- Supplies/Provisions/Fuel/Water
- Leaving information ashore
- Pilotage plans

PASSAGE PLANNING

Planning Method

- Gather weather, tidal and other information for entire trip
- Establish departure time
- Plot approximate courses, main places for course changes and navigational aids
- Estimate duration at an achievable speed: considering hazards, tidal & weather conditions
- Identify port(s) of refuge and gather required information about them
- Course to steer will be calculated on the day not at this stage

Constraints

- Constraints on departure, eg crew not available
- Plan FORWARD from departure time
- Constraints on arrival, eg locks, harbour access
- Plan BACKWARDS from arrival time
- Passage constraints, eg tidal gates, naval operations
- Plan from middle out to meet mid-passage constraints

If more than one constraint then plan appropriate waiting periods or diversions.

Electronics

- Using electronics can be a fast and affective way of planning a passage
- When using a chart plotting device or app it is important to ensure you have planned your route carefully and have studied for any potential hazards
- Always remember electronics are great until they stop working or run out of battery
- Always have your plan drawn on a chart and consider the difference in datum between GPS and chart

PASSAGE PLANNING & PILOTAGE

Planning Your Passage

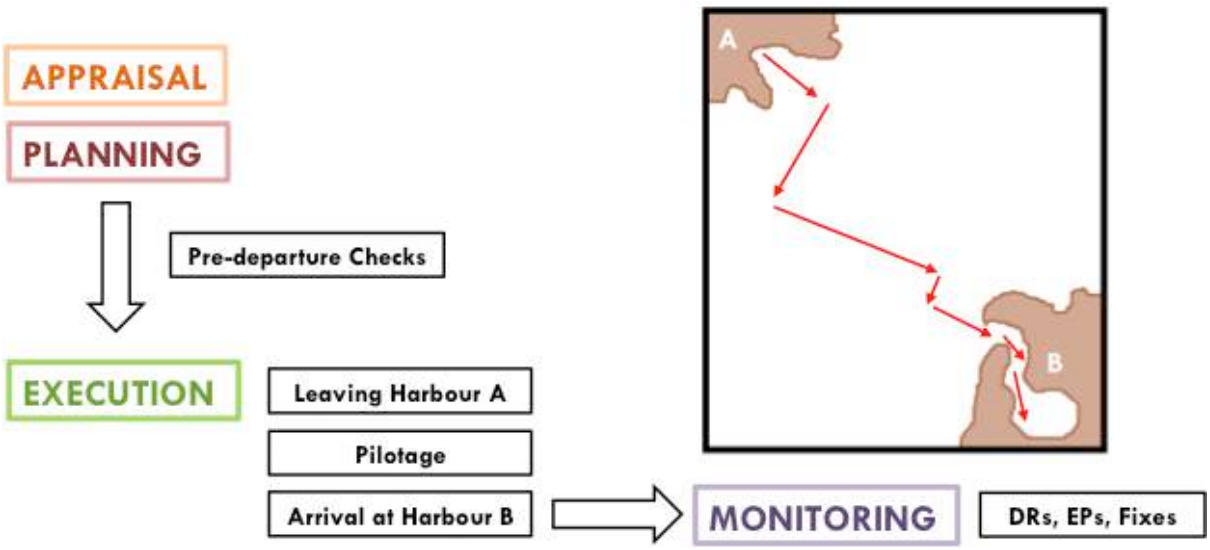
APPRAISAL
Creating a detailed mental and chart-based model of how the voyage will proceed. Gather and consider all relevant information: charts, weather, tides, almanacs etc.

PLANNING
Produce a detailed plan of your route on your chart, plotter, or iPad, factoring in the weather, tides, buoyage, pilotage and Plan B. Communicate this to your team.

EXECUTION
It is the Skippers responsibility to treat the plan as a "Living Document". Delegate roles to the crew and execute the intended plan accordingly.

MONITORING
Regular checks and monitoring of the progress of the vessel along its planned route. Fixes, DRs, EPs, Ship's Log, and updating the chart. All crew must be able to confirm their location.

A good passage plan gives a detailed description of the vessel's intended passage from START to FINISH.



PASSAGE PLANNING & PILOTAGE

Planning Your Passage

APPRAISAL **PLANNING**

As Bareboat Skippers, it is your legal and moral obligation to plan your passage well in advance. A good skipper should:

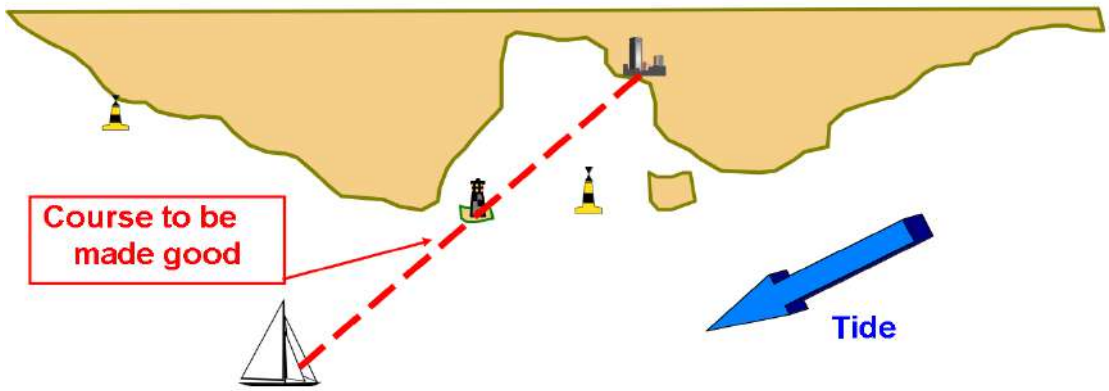
- ✓ **Organize crew –** How many, how experienced, strengths and weakness?
- ✓ **Study the weather –** Seasonal changes, what is to be expected?
- ✓ **Navigation Equipment –** Charts, *Navionics*, pilot books, almanacs, tidal atlases.
- ✓ **Plan B –** A second option in the event of an emergency.
- ✓ **Victualing –** Organize sufficient food and provisions for the crew and the length of trip.
- ✓ **Boat Checks –** Ensure the boat is in good working order and that you carry spares.
- ✓ **Communications –** Internet, radio, EPIRB, SART, VHF, mobile phones, batteries.
- ✓ **Dangers –** Be aware of potential threats to the boat.

PASSAGE PLANNING & PILOTAGE

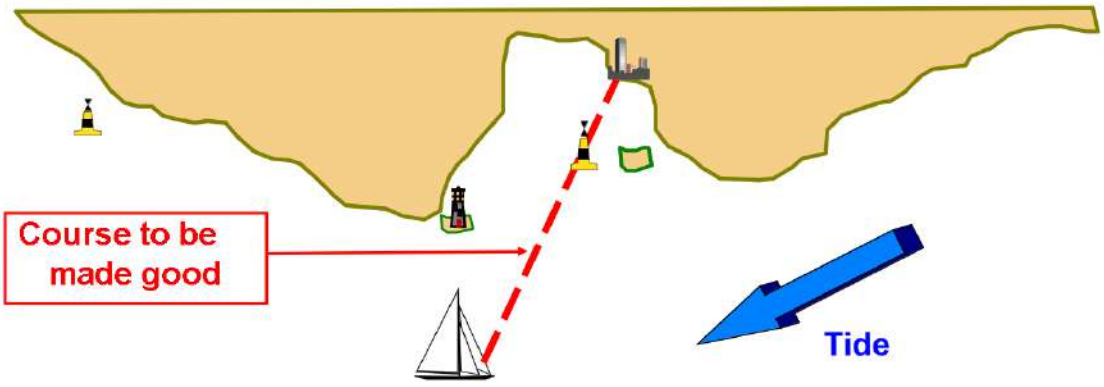
Course Shaping

EXECUTION

When entering, or leaving, a PORT or HARBOUR, the tide may alter your course. Use a TRANSIT to ensure you stay on course.



Get on any natural transit and steer into tide to stay on it



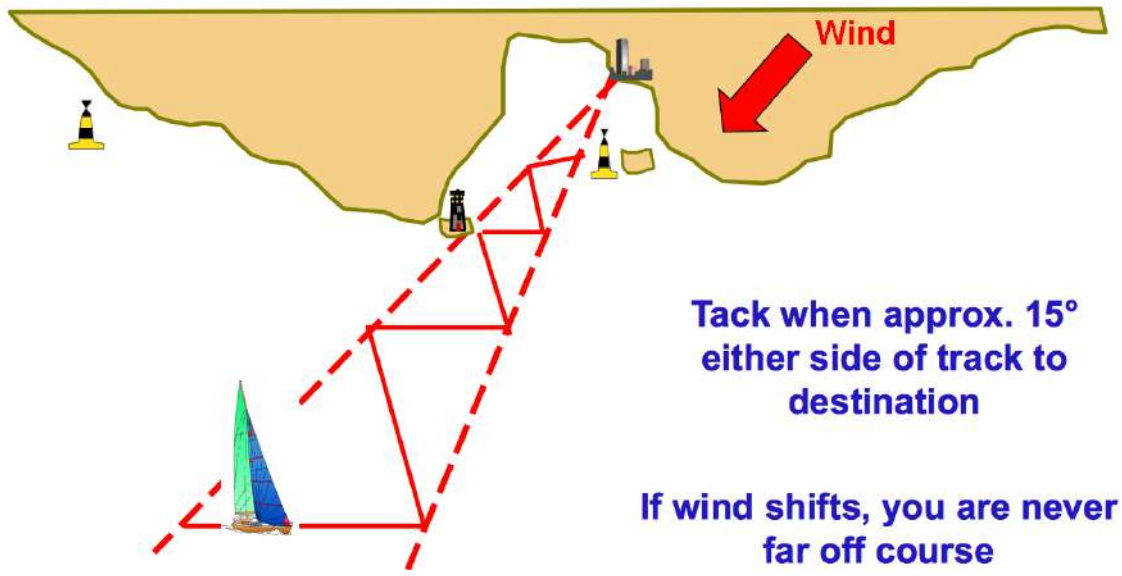
When close enough to see, transfer to more appropriate transit until out of tide

PASSAGE PLANNING & PILOTAGE

Harbour Approach

EXECUTION

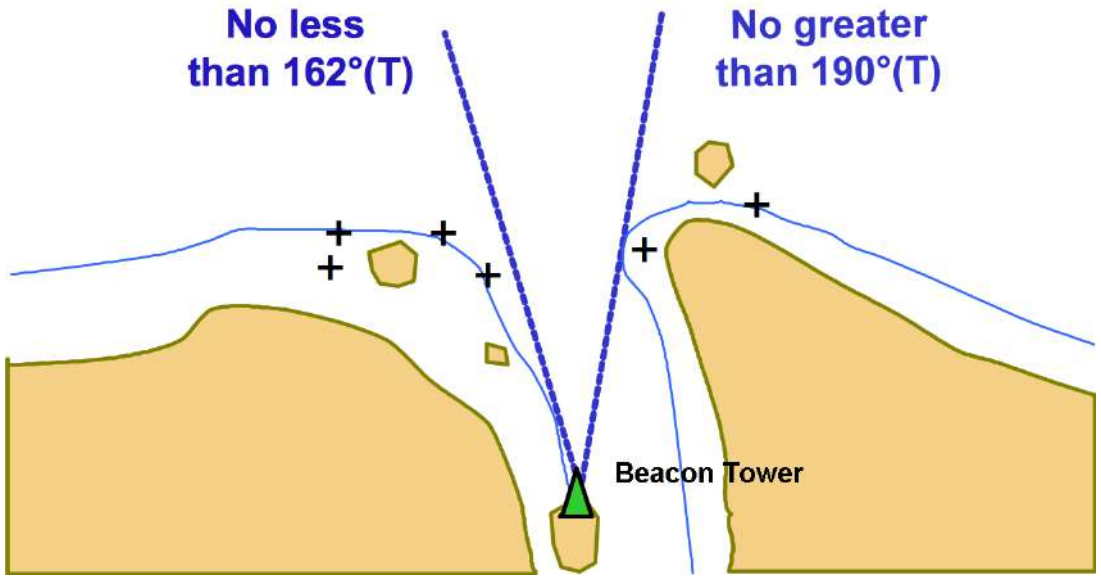
If the wind is coming from the harbour, it will be necessary to TACK into the anchorage. In this case, use CLEARING LINES to ensure you don't deviate course.



Clearing Bearings

EXECUTION

If there are HAZARDS either side of a channel entrance, take CLEARING BEARINGS to avoid crossing into their path. Stay within these constraints to avoid the dangers.

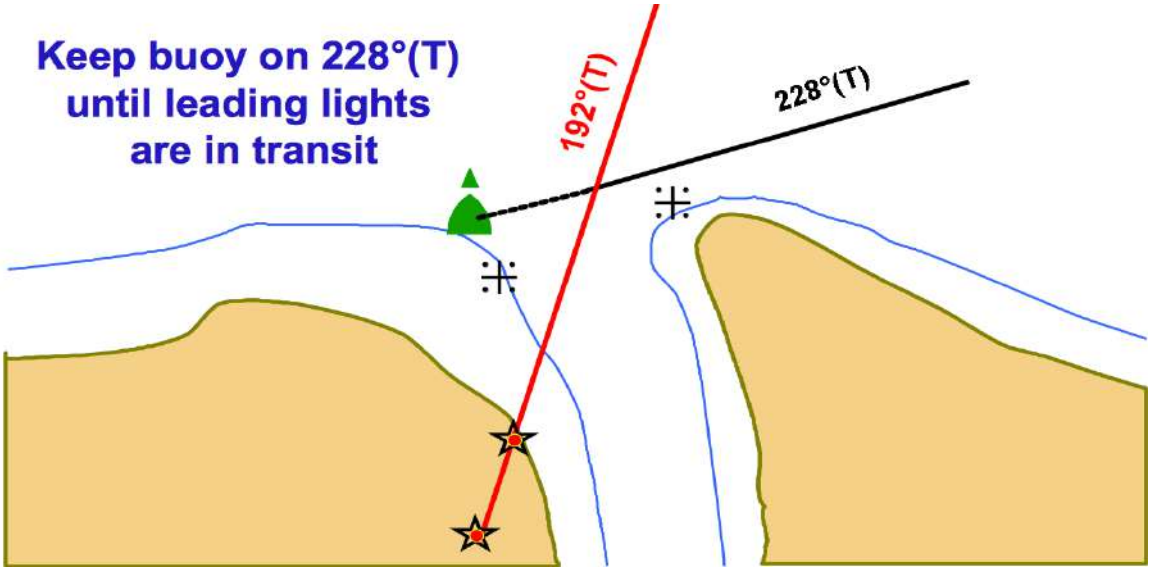


PASSAGE PLANNING & PILOTAGE

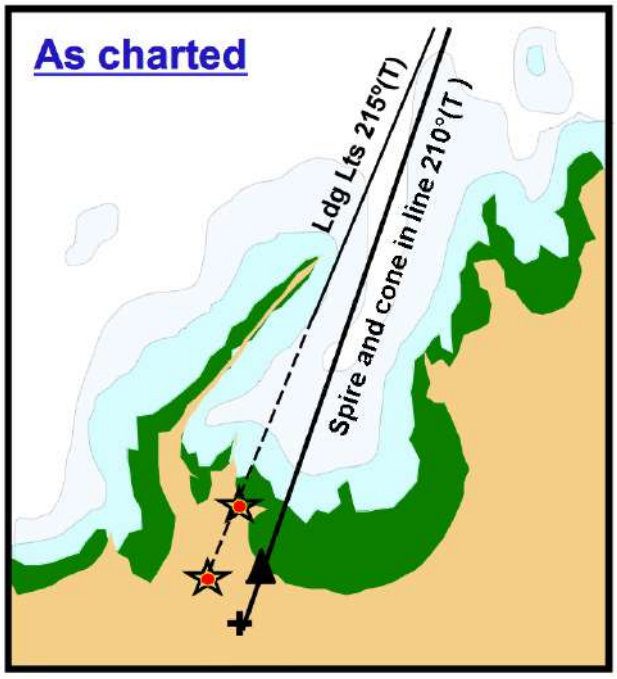
Leading Lines & Lights

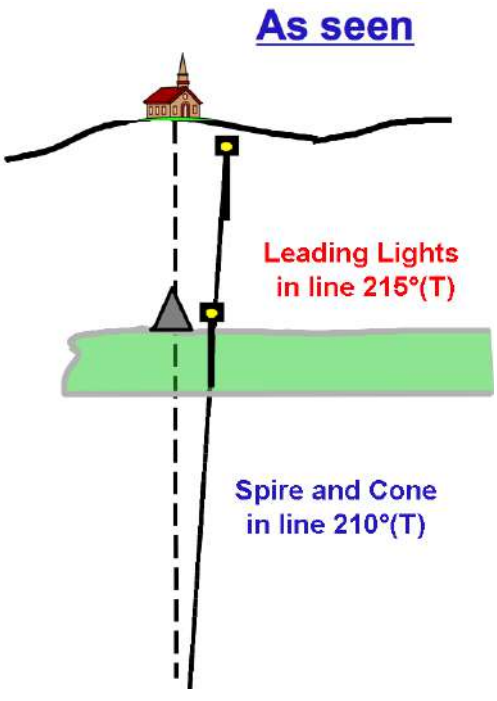
EXECUTION

LEADING LINES & LIGHTS are a transit that will lead the vessel through hazards to safety. The bearing 192°T passes between the rocks and onto a safer route.



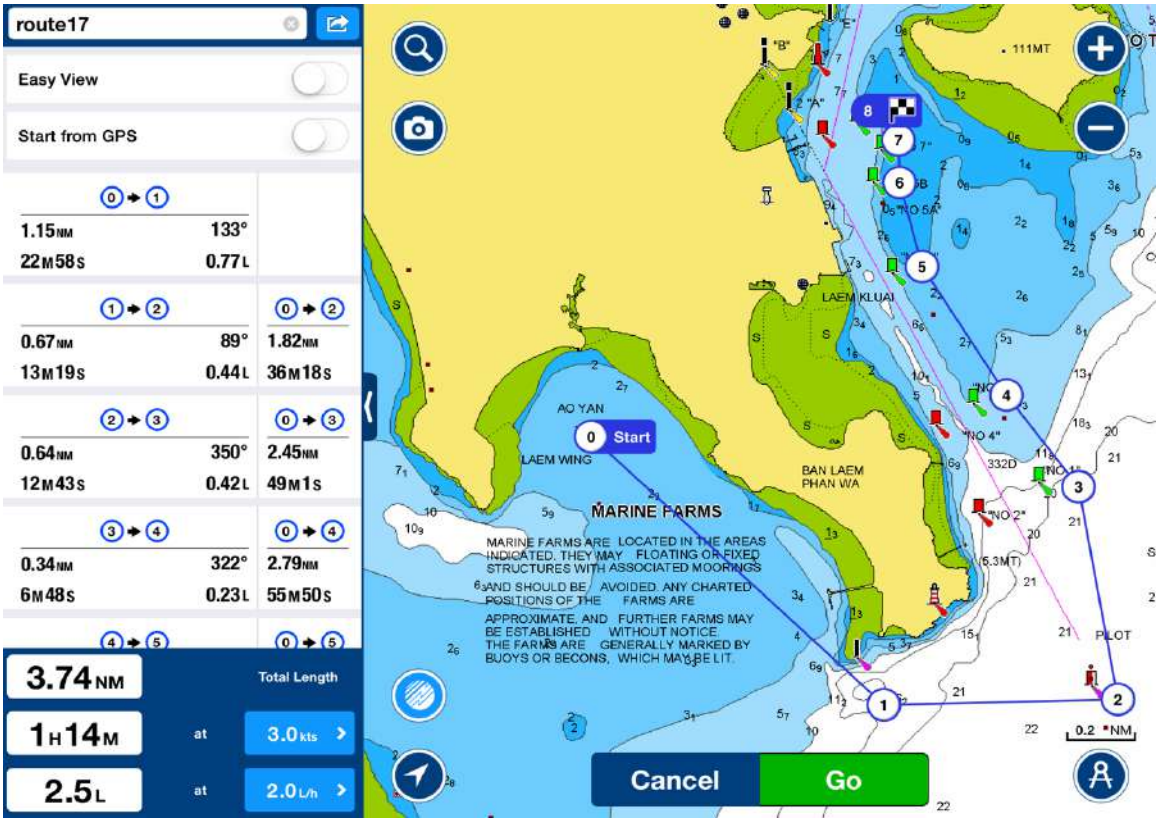
POSITION LINES can be used in conjunction with LEADING LIGHTS to ensure a safer approach.





PASSAGE PLANNING & PILOTAGE

EXECUTION



Navionics Chart Plotter Software

If you have an electronic Tablet, Smart Phone, or iPad you will be able to download an App that has tremendous power for navigation, weather information, tidal information, and route planning. This App is called Navionics.

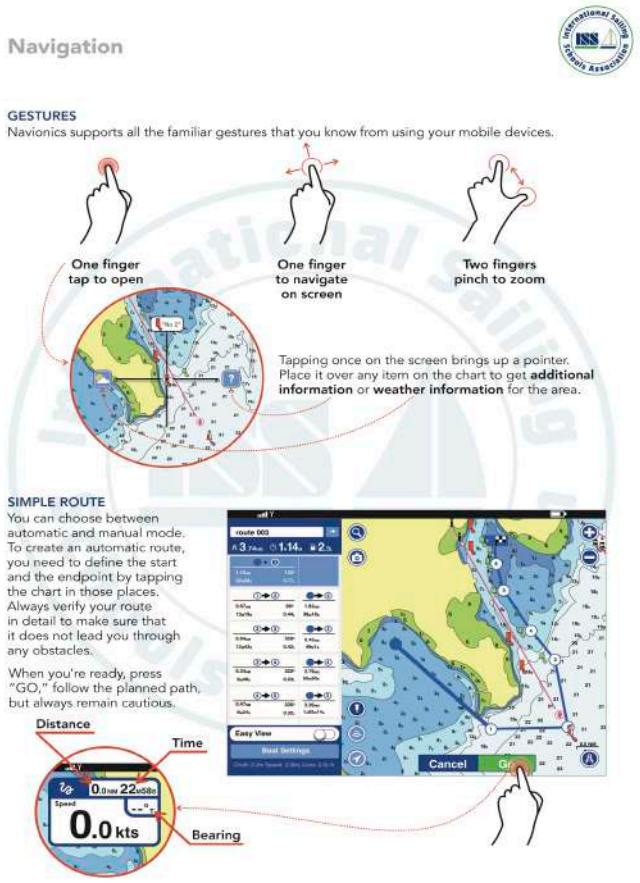
In the photo above you can see a route plan of a yacht which wishes to leave Ao Yon Bay and travel to the Phuket Harbour Basin. Each leg of the journey has a bearing (heading) and Distance. The total route can be photographed and printed and used for Passage Making or Pilotage.

The cost of this App is about US $50-70 but it covers a huge area of the world. (Different areas may be selected online). What is particularly useful is that it has a GPS facility for Smart electronic devices such as iPads with 4G capability.

Navionics has a night screen light level adjustment and can be easily charged using a ships 12v DC supply. The tablet or phone should however be protected from the elements. Plotters are the future of navigation on yachts as they are easily updated when in Wi-Fi range but can be relied on to give accurate positions when you are hundreds of nautical miles offshore.

'THE BASICS FUNCTIONS'

Finger tip navigation is now making our sailing planning and harbor approaches so straight forward. The navigator can pre-prepare Pilotage plans and Routes before even going on the water. The navigator can check Weather and Tidal Information at a glance and thus make the skippering of a vessel so much safer, and with precision night or day.



Features that make Navigation easy

- Another feature that's available is getting Tidal Information and Current information too in Europe (not in SE Asia).
- The Weather Forecast can also be obtained if you are attached to wifi or local 4G network (usually on certain tablets and wifi's only).
- Finally the best part of the app is I believe the PRICE. It allows you to buy powerful Navigation Software for iPad or Tablets for about 1/3 the price of a dedicated Chart Plotter. Some would argue, with not quite as much functionality, but ideal for most Keelboat Skipper owners!
- The App also allows the navigator to find out the height of tide at any time of the nearest Standard Port.
- The European Navionics Charts also have Tidal stream information on them – again with reference to a nearby Standard Port.
- DON'T FORGET TO PUT YOUR TABLET IN A WATERPROOF CASE!

The experienced Navigator will find this software navigation package, to be an invaluable source of information and this is of course, complemented with an IPad or tablet that can hold a host of other marine information, vital to good seamanship.

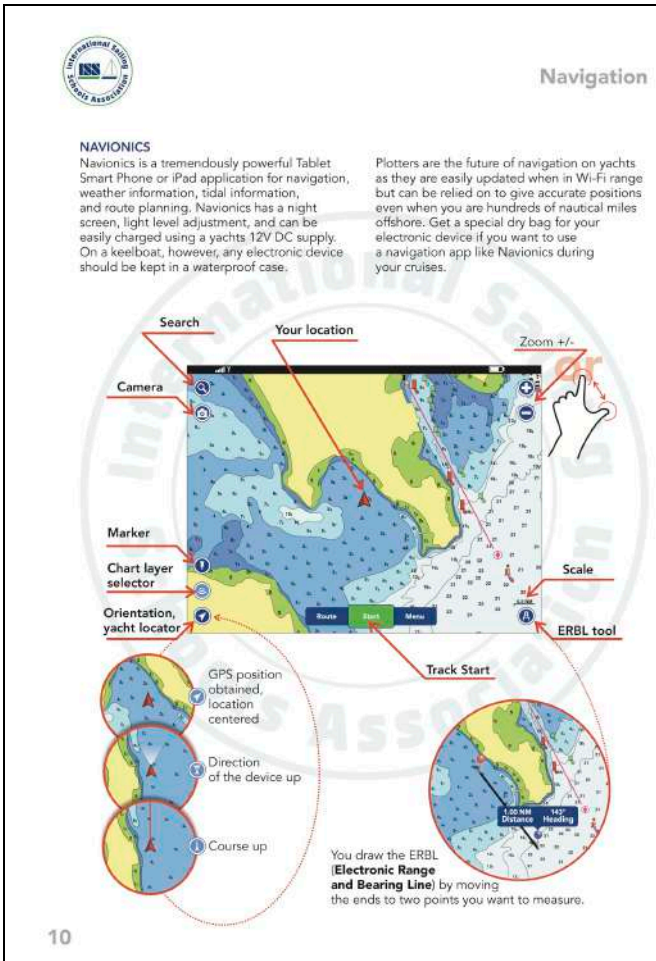
* Thanks to Rafal Kandar for providing the Navionics Graphics for the pages

NAVIONICS SOFTWARE

Traditional sea charts have now been overtaken by modern chart plotters using electronic charts.

The pros and cons are summed up below:

1. Sea Charts are expensive and difficult to store.
2. They are easily damaged
3. They are difficult to add amendments to.
4. They are only one scale.
5. They need large storage space.
6. In some areas of the world they can be quite inaccurate



Navionics Major benefits over charts.

- You can buy a system like Navionics for roughly the price of two or three old charts.
- The charts are multi layered and of very different scales. Zoom in and Pan Out easily.
- Moving from one scale to another is really simple and vectorised charts can reveal more or less imagery in layers you select..
- The symbols on the Navionics chart are almost the same as the symbols on an old style chart. However the HMO UK have produced another publication called the **5012 Electronic Symbols and Abbreviations** to reveal any symbol that the Navigator is unsure of.
- The electronics chart have some very useful tools. The **ERBL** (Electronic range and Bearing line is located on the bottom screen and is opened by simply touching it and the drawing the ends to the two points you want to measure from.
- Another Tool is the **FIND THE BOAT** icon, bottom left of the screen.

The Navionics system makes navigation so easy!

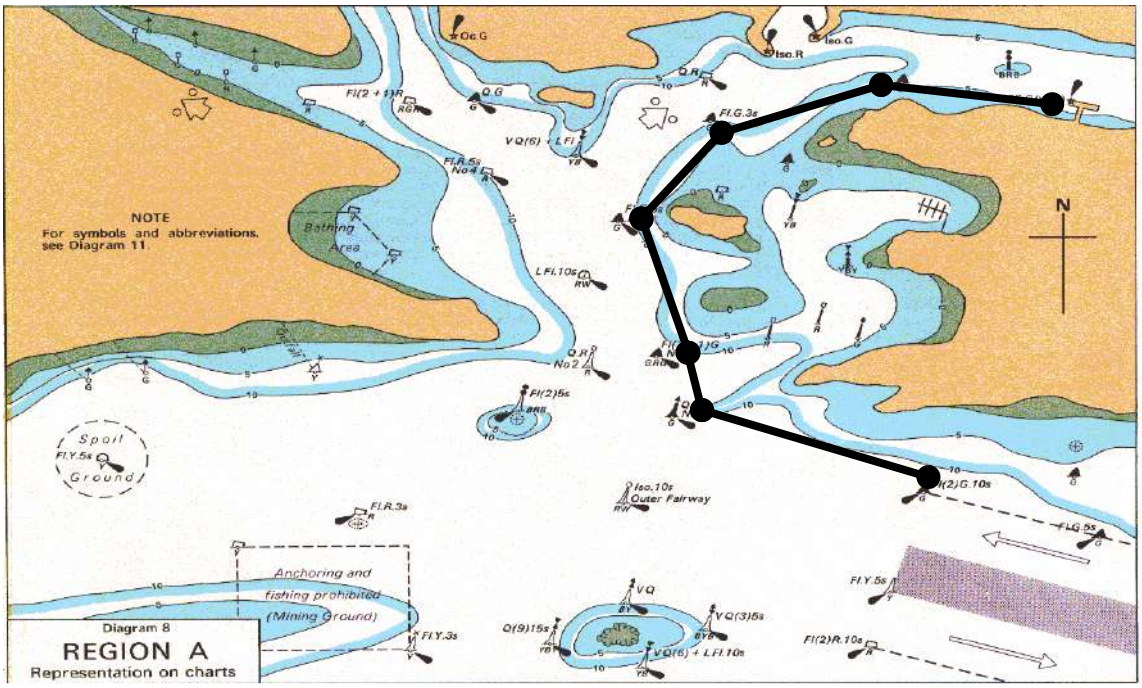
- If you want to set a route you go to routes and set **MANUAL.** This allows you to put your finger on the screen and locate a series of way points which all connect and which allows the navigator to form a route. Every leg of the course is set out on a table with bearing and distance. Its so easy! To activate a route just press **GO.**

IALA BUOYAGE AND PILOTAGE

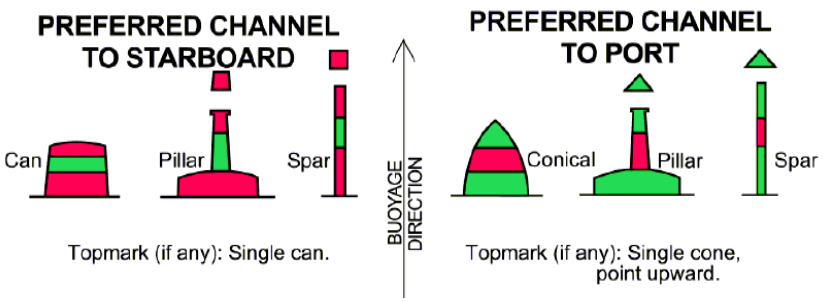
We can use a **Pilotage Plan** to safely enter a harbour, day or night.
Each leg can be jotted on a notepad for easy navigation on deck, including the distance and bearing for each leg.

Include in each leg of your plan:

- ✓ Bearing (Compass)
- ✓ Distance
- ✓ Dangers and Risks
- ✓ Buoys (Colour & Number)



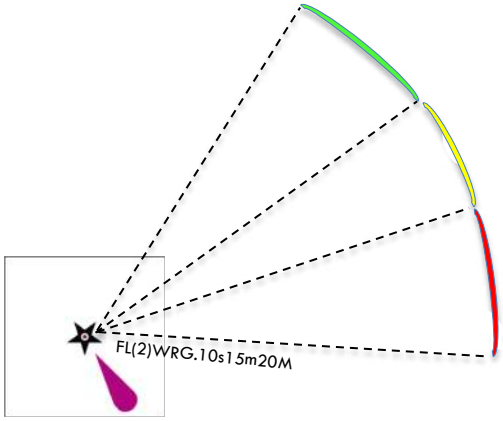
Preferred Channel Marks: On entering an anchorage, port, harbour, or bay there may be more than one route the skipper can take. IALA have developed Preferred Channel Markers to indicate the preferred route into the anchorage.

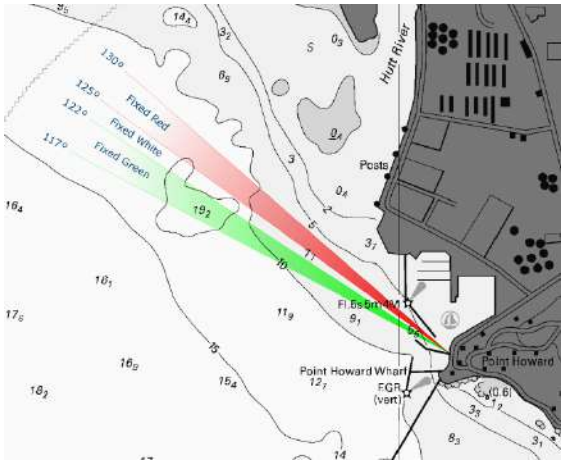


IALA BUOYAGE AND PILOTAGE

Pilotage – Sectored Lights

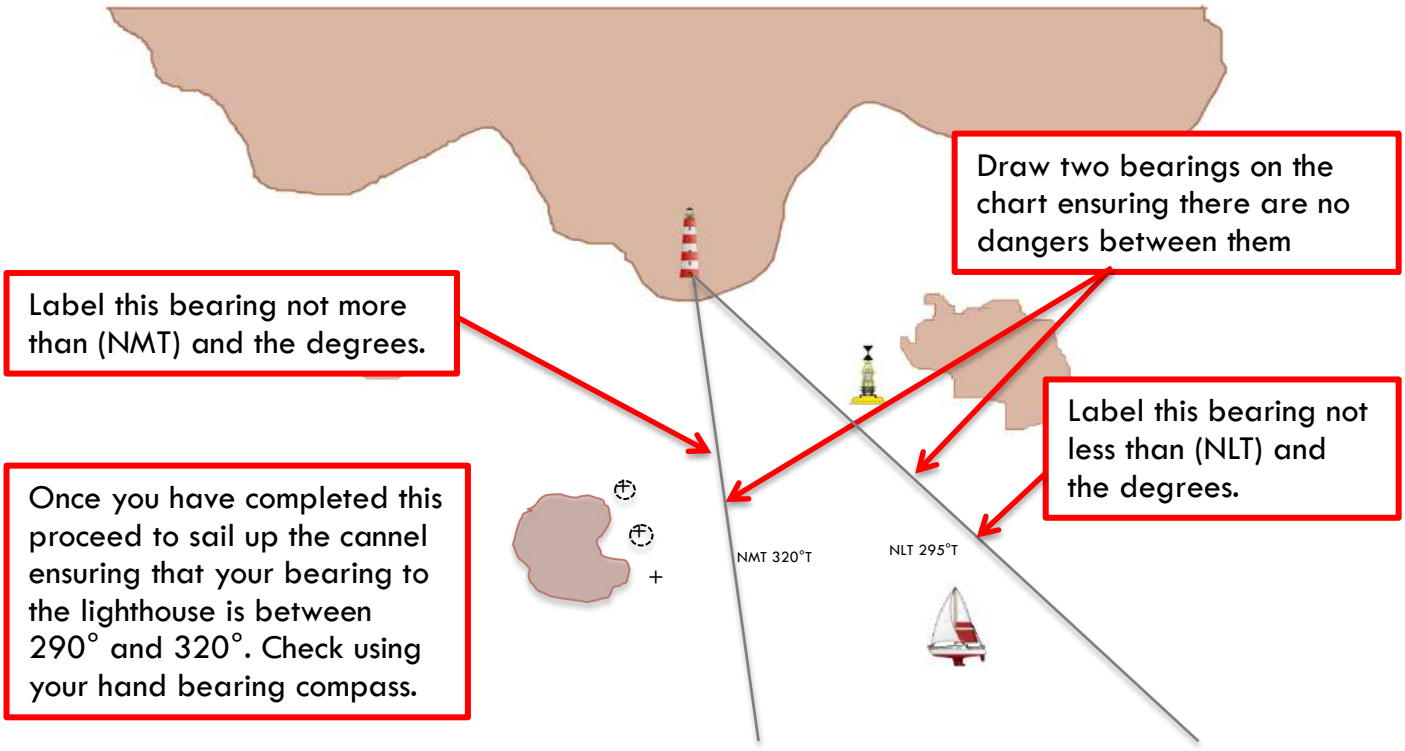
Sectored lights are used to aid navigation when approaching a channel or harbour. The light sequence will be shown on the chart, however sectored lights usually consist of a red section, a white section, and a green section.





Pilotage – Clearing Bearings

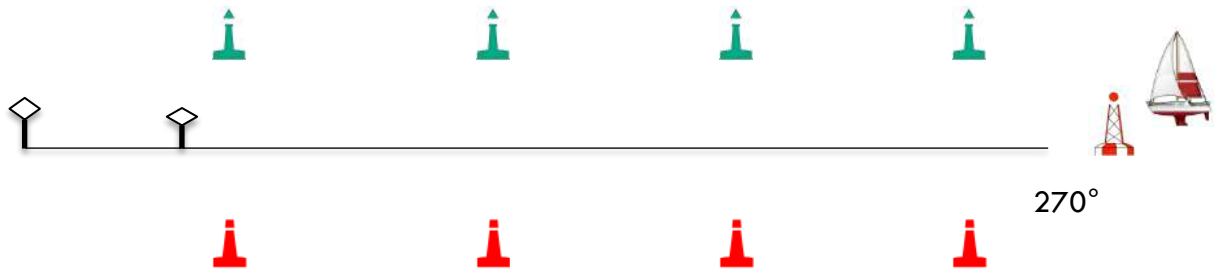
We can use clearing bearing to help us navigate through narrow channels between islands or hazards.
To produce clearing bearings, we need a prominent point to take two bearing from.



IALA BUOYAGE AND PILOTAGE

Pilotage – Leading Bearings and Leading Marks

Leading Bearings and Leading Marks are used to guide larger ships up the centre of a channel from the safe water buoy. Leading Bearings will be shown on most charts, and also in smaller pilotage charts in the Almanac.
During the day Leading marks are large white posts usually with a shape on the top. At night, these marks show yellow lights with the sequence shown on the chart.

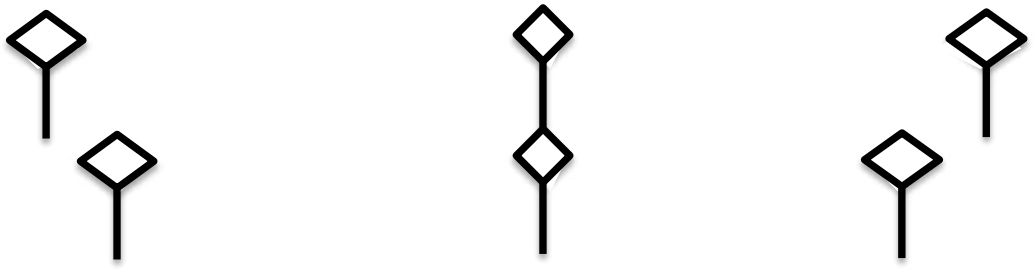


Pilotage – Entering a fairway to a marina or harbour

The keelboat navigator should enter a harbour with care. The IALA lateral system of buoyage is set for commercial craft -ferries and ships. When entering a harbour the good navigator has already planned his approach and has made a pilotage plan! Ideally on Navionics which will give clear directions and bearings from mark to mark. The navigator wants to enter the fairway close by the starboard marks and 'buoy hop', up the channel.

Following leading marks is a risky business in a busy harbour, as it means travelling up the middle of the fairway. The IRPCS must be adhered to and small vessels are a menace to large vessels. Switch on your vhf radio to give yourself a further source of information.

If you see this alignment you are on the port side of the channel.	If you see this alignment you are in the centre of the channel.	If you see this alignment you are on the starboard side of the channel.



OPERATIONAL CHECKLIST

The vessel you are using is in sound condition and has the full inventory as recommended by the MCA Code of Practice, for small commercial vessels.

As a Bareboat Skipper (in training) you should implement the operational process below to ensure safe use of the vessel. Familiarise yourself with the vessel and her equipment. Sail in Asia has provided you with the following checklist to ensure this is possible.

1. As Watchkeeper you must complete the following:

- Preparing a Passage Plan (if appropriate)
- Obtain an up to the minute Weather Forecast
- Navigation Equipment (Charts etc)
- Safety Equipment Checked - Location of all safety equipment
- Complete pre-departure process (Customs and Immigration)

2. Pre Departure Check Lists (Skipper and Navigator)

- Above Deck
- Below Deck
- Engine and Starting
- Generator Checks
- VHF Radio Check
- Rig Checks
- Safety checks for the vessel

3. The Crew Briefing

- Personal Safety briefing
- Boat Safety Plan
- Action to be taken in an emergency
- How to stop and start the engine
- Location of sea cocks
- Fire Brief
- Action to take in a MOB situation
- How to use the heads
- Where VHF is and how to use it.

OPERATIONAL CHECKLIST

Pre Departure Checks

Conduct all checks before departure.

Above Deck Checks:

- Sails and spars
- Rigging
- Winches and handles
- Blocks and running gear
- Clutches and cleats
- Guardrails
- Jack stays
- Tiller and extension
- Sheets, lines and halyards
- MOB life ring with light
- Anchor and anchor winch
- Engine throttle control lever
- Life-raft attached correctly

Below Deck Checks:

- Batteries (electrolyte level, terminals and voltage)
- Bilge (Ensure dry) Check Bilge pumps and float switches
- Safety equipment (lifejackets, harness lines, first aid, fire extinguishers, flares, Vhf, Navigation equipment, spare anchor, spare lines, fenders, tools and spare parts, EPIRB, SART, torches, fog horn, bungs, bucket, day shapes.
- Ensure everything stowed safely ready for going to sea
- Hatches are closed and secure
- Engine and gearbox (See below for checks)
- Electronics (GPS- chartplotter, VHF, nav lights, radar AIS, bilge pumps, water pump, Instruments)
- Heads
- Galley equipment and cooker
- Sea cocks and hoses
- Fresh Water tanks and fuel tank levels

OPERATIONAL CHECKLIST

Engine checks:

- Batteries (electrolyte level, terminals, wiring and voltage)
- Engine Mounting is secure
- Engine bilge is dry from oil and water
- Belts are tight and free from damage
- All Hoses in good condition and securely fastened
- All electrical connections are clean and secure
- Fresh water header tank is topped up with coolant.
- Engine oil and gearbox oil level is correct and oil is not black
- Raw water seacock is open and hoses secure
- Fuel tank filled and fuel valve open
- Primary Fuel filter/Water strainer doesn't have water at bottom.
- Engine housing for damage

Engine and Generator start procedure:

- Observe for obstructions around stern of vessel
- Throttle lever in Neutral
- Turn on ignition
- Start with key or button
- Ensure cooling water and exhaust gases are being expelled at stern
- Observe electronics panel for warning lights or alarms
- Check ahead and astern gears
- Leave engine to warm up
- Check for leaks on all cooling, fuel, oil and exhaust system

Provisioning check:

- Water and drinks
- Food and snacks. Enough for 100% of Passage + 20%
- Grab bag prepared
- Medical supplies
- Adequate clothing for any weather conditions

OPERATIONAL CHECKLIST

Before leaving port, remember:

- Weather Forecast and tidal information
- Crew List and relevant documents
- Passage Plan
- Contact relevant authorities (Harbour master, Immigration, Customs)
- Leave information ashore

When returning to port, remember:

- Boat correctly moored and fendered
- Fuel and water tanks refilled
- Rinse boat with fresh water
- Sails dried and stowed
- Safety equipment dried and stowed
- Tidy all lines, sheets and halyards
- All electrics turned off and batteries off (Cover instruments)
- Check no water in the bilge
- Check seacocks closed
- Check fuel system and turn off fuel valve
- Fridge left open to air
- Lock hatches and washboard

FIRST AID AT SEA

First Aid Preparation

A good skipper is always prepared. He/she or another person on the crew should have some knowledge of first aid. One-day course are available at most good sailing schools.

First Aid Kit

It is important to have a comprehensive first aid kit on board every boat. Your first aid kit should include the following as a minimum:

Item	Quantity	Item	Quantity
Micropore Tape, 2.5cm x 5m	2	Scopaderm TTS patches	4
Nin-stick dressings, 10cm x 10cm	10	Stugeron tablets, 15mg	10
Triangular bandage, 90cm x 127cm	4	Eye drops	1
Wound dressing, No.8	4	Piriton tablets, 4mg	20
Antiseptic wipes	10	Non-steroidal anti-inflammatory tablets	30
Waterproof plaster, (assorted sizes)	20	Dental kit	1
Elastoplast Strapping, 7.5cm rolls x 5m	3		
Scissors	1		
Safety pins	4		
Non-sterile examination gloves (pairs)	5		
Steristrips	1 pack		
Tubegauz finer dressing and applicator	1		
Splints	2		
Eye pad dressing	2		
Anthisan cream, 30g tube	1		
Calpol (for children)	100ml		
Paracetamol Tablets, 500mg	20		

In an Emergency

When there is a medical emergency onboard the captain or member of crew can put in a Pan Pan (not life-threatening) or Mayday (life-threatening) call for help. Even if you require medical advice a Pan Pan call can be made.

Head Injuries

Head injuries can be common on boats. It is important to be able to identify the symptoms of concussion.

- Headache or “pressure” in head.
- Nausea or vomiting.
- Balance problems or dizziness, or double or blurry vision.
- Bothered by light or noise.
- Feeling sluggish, hazy, foggy, or groggy.
- Confusion, or concentration or memory problems.
- Just not “feeling right,” or “feeling down”.

FIRST AID AT SEA

Bleeding

Minor scrapes, cuts and bruising are easily treated.

1. Wear gloves and other barriers to protect yourself and patient from disease transmission.
2. If necessary, control bleeding with direct pressure.
3. Thoroughly wash wound with water to remove all dirt and particles.
4. Cover wound with a non-adhesive dressing and bandage securely.
5. Check wound daily for signs of infection.

Serious bleeding requires specialty medical treatment as soon as possible. A Mayday call should be placed if the casualty is gushing blood. While waiting for medical treatment the following can be done to try and reduce blood loss.

1. Wear gloves and other barriers to protect yourself and patient from disease transmission.
2. Place a clean cloth, or a sterile dressing, over the wound and apply direct pressure. If a dressing or cloth is not available, use a gloved hand.
3. While applying direct pressure on wound, place a pressure bandage over the sterile dressing.
4. If bandage becomes blood-soaked, place another clean cloth, or dressing, on top and bandage in place.
5. Continue to apply direct pressure.
6. Do not remove blood-soaked bandages as blood clots in the dressing help control bleeding. Add bandages as necessary.

Burns

Minor Burns

1. Wear gloves and other barriers to protect yourself and patient from disease transmission.
2. Flush or soak burn in cool water for at least 10min. If possible, remove jewelry, watched belts or constricting items from the area before it begins to swell.
3. Cover area with a sterile (non-fluffy) dressing and bandage loosely.
4. Check burn daily for signs of infection.

FIRST AID AT SEA

Major Burns

A Mayday call should be placed as soon as possible for a major burn. While waiting for emergency response the following can be done to help the casualty.

1. Wear gloves and other barriers to protect yourself and patient from disease transmission.
2. Help the patient lie down but ensure the burnt area does not come into contact with the ground.
3. Douse the burnt area with cold liquid for at least 10 minutes. Continue cooling the area until pain is relieved.
4. Carefully remove clothing from around the burnt area and remove any constricting items before swelling begins.
5. Cover burns with a sterile dressing or other non-fluffy material available. Clingfilm could also be used if applied lengthways.
6. Continue to monitor the patient until emergency response arrives.

Hypothermia

Hypothermia is a condition in which exposure to cold air and/or water lowers body core temperature. The symptoms include shivering, lethargy, stumbling, slurred speech, and loss of memory. The victim progressively develops a cold pale skin, slow breathing, and a slow weak pulse, leading to collapse and unconsciousness.

1. Your first aim is to prevent further heat loss. Get the casualty out of the sea and out of the wind.
2. Get the casualty to the warmest spot on board and turn on all the heating. As soon as possible strip off all wet clothing, if necessary by cutting it off. Do not rub the skin to dry it, but dab it dry with a towel.
3. If the casualty is conscious get them into warm dry clothing, give them lots of warm sweet drinks and allow them to rest in a warm sheltered spot. If you have no other means of providing warmth get close enough to transfer body heat.
4. If the casualty is unconscious take off all their wet clothing and put them in a sleeping bag. Make sure they are in the recovery position and won't suffocate.
5. If the boat will take time to warm up, get into the sleeping bag with the casualty. (Wear tight clothing to speed up transfer of heat.)

ENGINES

Marine Diesel Engines

Require the following:

- Clean fuel
- An airtight fuel system
- Regular maintenance

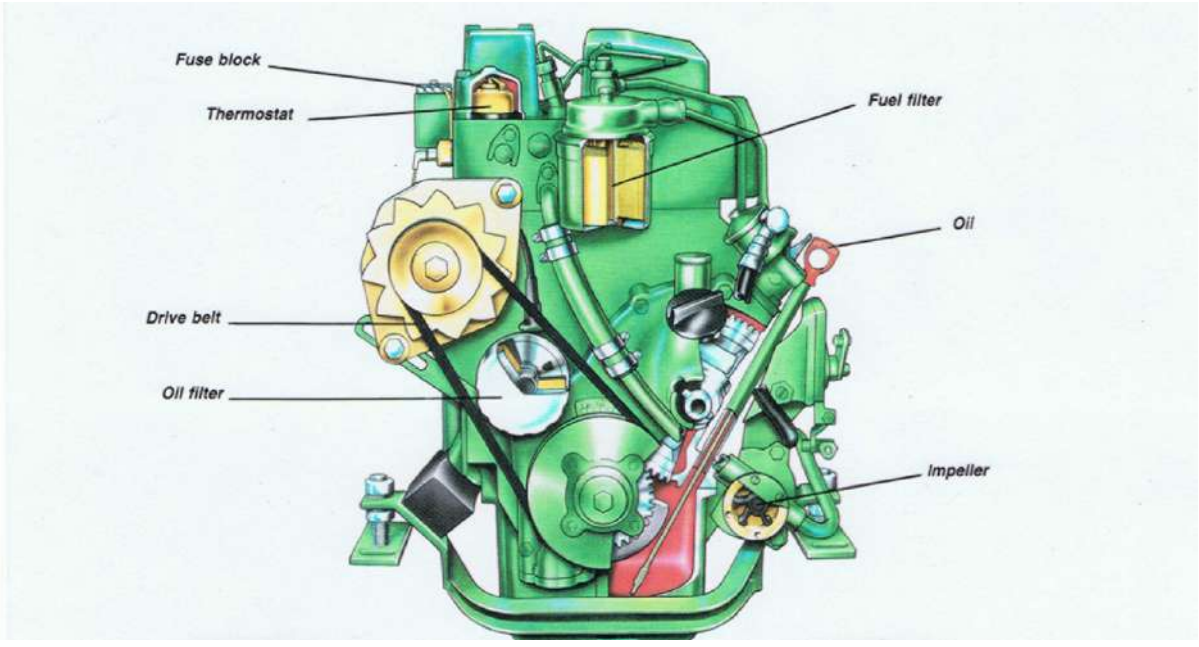
A skipper should inspect the engine prior to each departure.

He or she should be able to do minimal maintenance or repairs.

Spare parts and tools should be carried on the boat for the basic service elements of the engine.

Pre Departure Check List:

- Visual inspection of engine for leaks
- Fan belts
- Oil level in Engine - dipstick markings
- Oil level in Gear Box - dipstick markings
- Raw sea water strainer
- Fresh water reservoir
- Engine bed check - for water or oil
- Prop shaft and coupling - visual inspection
- Fuel filters - water?
- Battery voltage



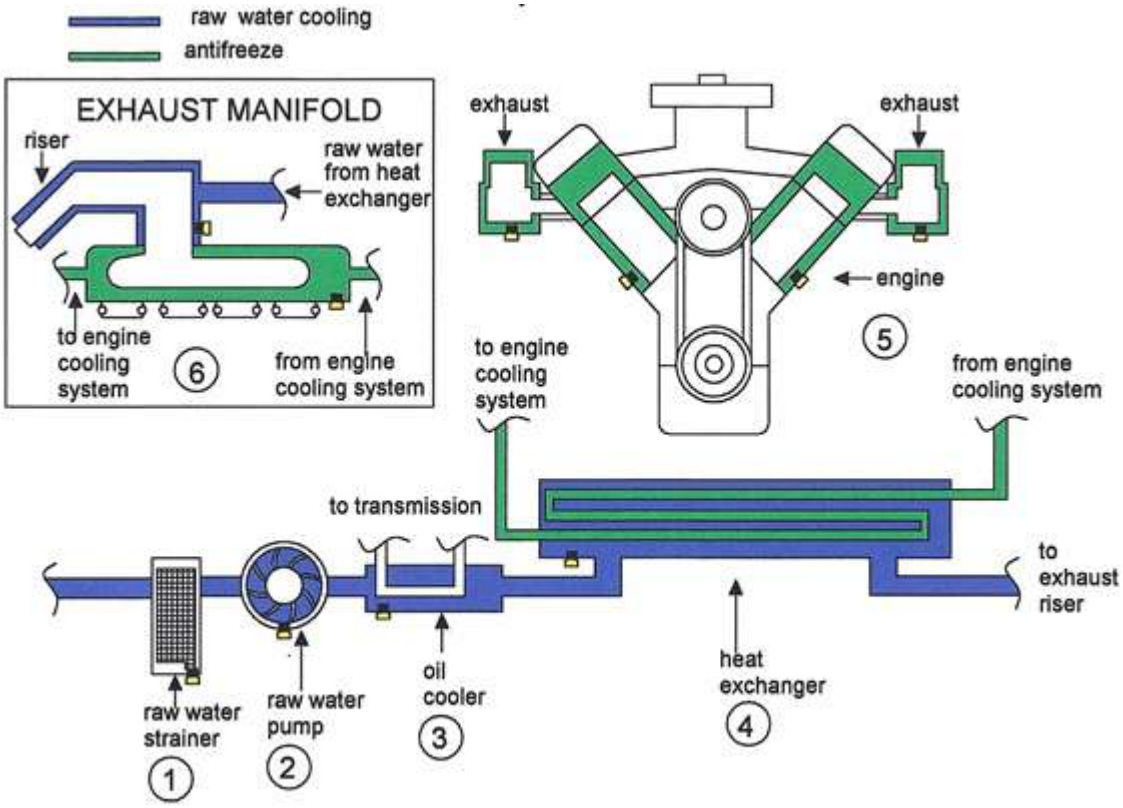
ENGINES

Cooling System

A diesel engine may have:

A simple Raw Water (sea water) cooling system or both a Raw Water and Fresh Water system. It is important to maintain the system to ensure the engine does not overheat. Always ensure that there is seawater coming out of the exhaust after starting the engine.

Full Loop Cooling System

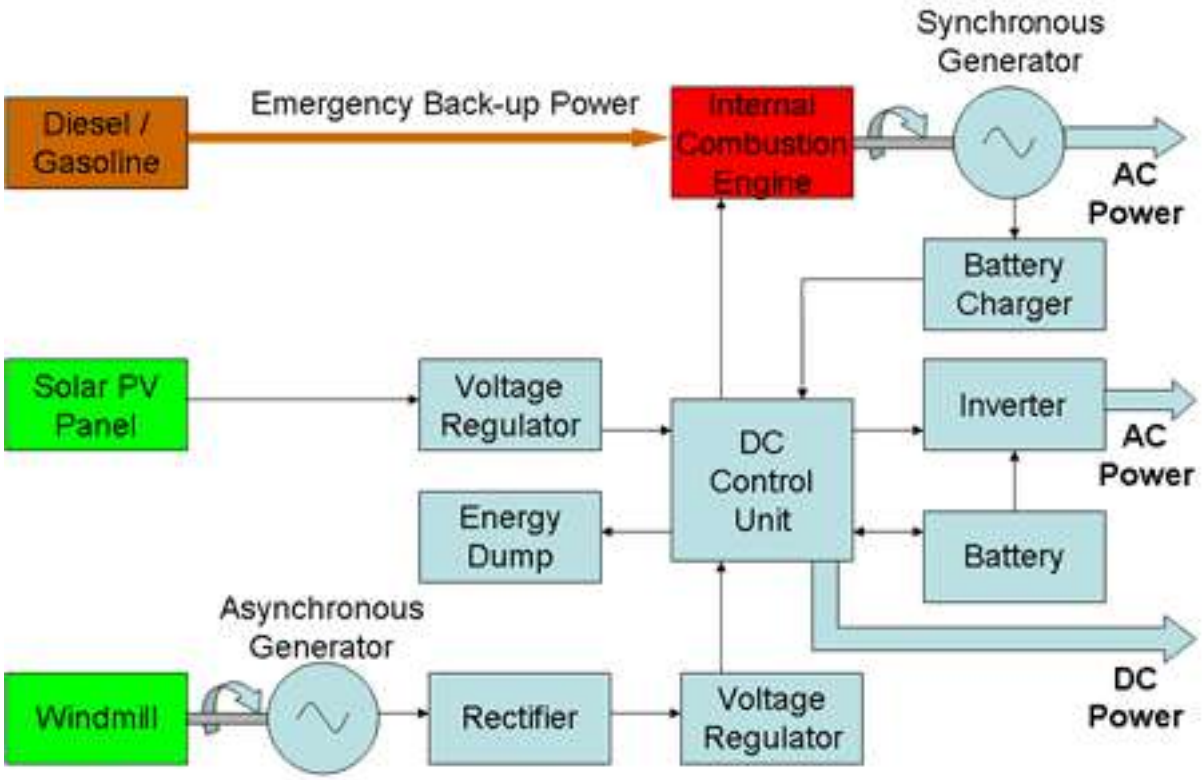


ENGINES

Electrical System

A boat electrical system is composed of several elements:

- Producers of electricity to charge batteries - alternators, solar panels, generators
- Storage media - batteries
- Consumers of electricity - engine, electronics, pumps, windlass



ELECTRONICS

Know Your Systems

The modern yacht is fitted with several sensors and instruments with display units. The major instruments on a yacht are:

- GPS
- Depth Sounder
- Log
- Electronic Compass
- Wind Sensor
- VHF Radio
- Satellite phone
- AIS
- Radar
- Chart Plotter
- Auto Pilot

GPS – Global Positioning System

Handheld or mounted GPS devices are a must for any sailing boat today.

They provide reliable position fixing using lat./long. Co-ordinates provided by 27 satellites orbiting the earth.

Waypoints for a route can be entered and distance/bearing from the boat to the destination are calculated in real-time and displayed on the device.

Depth Sounder

Depth sounders are fitted under the hull or are handheld. They can display the depth in meters or feet of the sea beneath the hull.

If fitted under the hull, they need to be calibrated to either the bottom of the hull or the surface of the sea.

The sensor should be regularly cleaned of barnacles.

On a new boat, inquire about the calibration of the sounder to avoid confusion.

ELECTRONICS

Electronic Log

The modern yacht is fitted with low power instruments that record depth and speed.

The Speed/Log records the water track speed. It is wired to the main ship computer and then to the multi display in the cockpit.

The small wheel can get clogged and it should be carefully checked and be cleaned weekly.

Electronic Compass

The Electronic Compass display complements the standard magnetic compass but does not replace it.

It is mostly used in conjunction with the auto-pilot for keeping a bearing based on a compass course.

It can be calibrated to display True or Magnetic course.

Wind Sensor

Mounted at the top of the mast is the wind sensor that monitors the speed of the wind and its direction.

The display monitor can display the Apparent Wind or True Wind speed in knots.

In addition the display monitor can display the wind direction.

An auto-pilot can also steer a course based on the wind speed monitored by this device.

ELECTRONICS

VHF Radio
Marine radio transmitting and receiving on a radio frequency range between 156.0 and 162.025 MHz

Use Channel 16 to monitor or send distress signals (Mayday and Pan Pan)

Can be mounted with antenna or hand held

Only operates with a radius of about 10-20 NM depending on the height of the antenna (range is 1.23 times the root of antenna height in feet).

Satellite Phone
Satellite phones are becoming more prevalent on boats and are starting to replace Single Band radios.

Allow for two-way voice and data communication anywhere in the world.

Small form factor and low power consumption.

Automatic Identification System (AIS)
AIS stands for Automatic Identification System, the international automated collision-avoidance system.

Commercial ships are required to carry both an AIS transmitter and receiver.

Leisure boats should have an AIS receiver.

AIS receivers will display information about ships in the vicinity and their course/speed and possibly the risk of collision.

I-Pad/Tablet
These devices can be used to access navigational, pilotage, weather information all over the world by accessing the internet or by installing software such as 'Navionics'.

ELECTRONICS

Radar

Radar allows visibility at night or when there is fog. It shows ships, land and other objects in the vicinity.

Radars can also detect squalls.

Radars allow for position fixes using bearing and distance to objects and land when there is no visibility.

Comes with an antenna mounted on the mast and a display unit.

Chartplotter

Chart plotters are multi-function devices with built-in digital maps of specific sailing areas.

In conjunction with GPS, they allow the skipper to set waypoints, routes, keep track of the ships course.

Chart plotters allow for sailing regions to be zoomed to and display details not normally found on paper charts.

Small screen size can however hinder danger zones.

Autopilot

The Autopilot is a great addition to a vessels instruments.

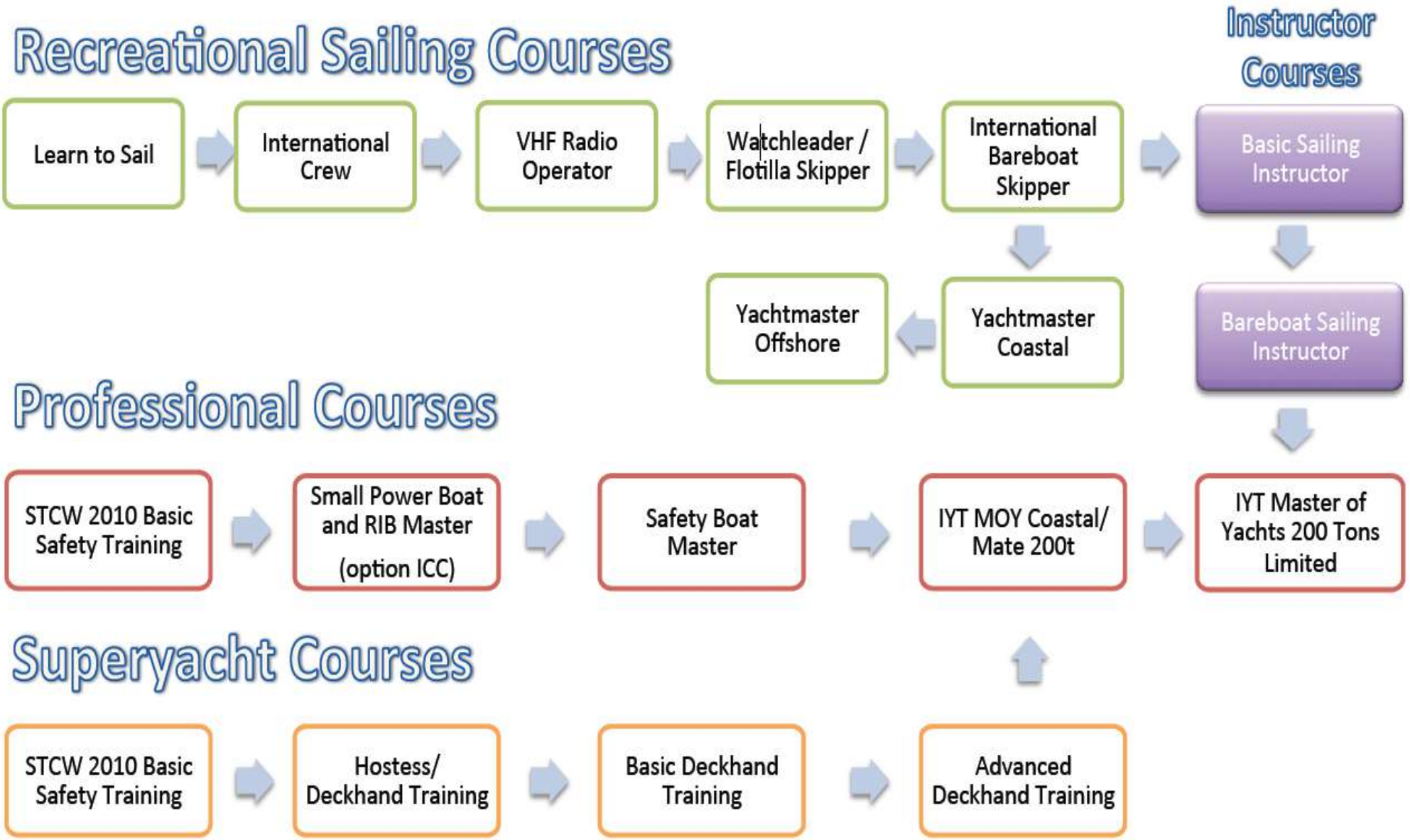
The autopilot can steer the boat automatically based on a waypoint, a compass course, a wind direction.

It comprises a hydraulic arm and an electronic control system.

Autopilot does not replace the helmsman.

Can be used in conjunction with a GPS and a radar when the helmsman needs to rest and no other crew can steer the boat.

IYT COURSE FRAMEWORK



TOPICS CHECKLIST

Theoretical Topics

Taking over a vessel	
Understanding Basic Instruments	
Pilotage and passage planning	
Vessel handling	
Engines	
Chartwork	
Collision Regulations	
Safety and First Aid at Sea	

Practical Topics

Vessel Check-out	
Responsibilities of Captain/Skipper	
Seamanship	
Vessel Handling	
MOB	
Reefing underway	
Nautical Commands	
Safety and Management of the Yacht	

This is to certify that the student _____ has an understanding of the above topics and has achieved the level of Bareboat Skipper.

_____ **Instructor** _____ **Date**

SAIL IN ASIA

Name _____ Student Number _____ E mail Address. _____

Date	Yacht Name / Type	Day activity / Role	Weather Conditions	Brief Details, Including Crew Position And / Duties	New skills learned	Skippers/ Owners Signature

SAIL IN ASIA

Name _____ Student Number _____ E mail Address. _____

Date	Yacht Name / Type	Day activity / Role	Weather Conditions	Brief Details, Including Crew Position And / Duties	New skills learned	Skippers/ Owners Signature

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