

# FSC Cruising Section learning nights

Lecture notes

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## Provisional timetable

Note: Some topics are covered on board boat so sequence will be adjusted to suit weather.

Lecture no.	date	content	Topic no:
1		Role of skipper & crew. Anchoring. Pens	1, 2, 3
2		Rough weather. Rope work	4, 5
3		Weather forecasts. How sails work	6, 7
4		Basic navigation. Passage planning	8, 9
5		Use of radio.	10
6		Collision avoidance. Better navigation	11, 12

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# **1. The role of skipper and crew**

## **1.1 Fundamental rules**

Keep a good lookout.

Talk to the skipper - ask questions and give information.

Never shout unless it's noisy (then say "please"); and never swear.

The crew are supposed to be enjoying it – they are not slaves; it's a team.

## **1.2 What does the skipper do?**

Leadership: communication, planning and decision-making.

The skipper should NOT swear at the crew.

## **1.3 Differences between crewing and skippering**

When crewing you can "switch off" when off watch; the skipper can never switch off, except to sleep.

A crew should never instruct a skipper. A skipper will often instruct the crew.

The crew should be involved in decision-making; the skipper must make the decision.

The skipper will be the one to get up at night when there's a funny rattle from the rigging, but the crew might get the blame if you didn't tie something off properly!

## **1.4 What is expected of the crew**

Carry out designated tasks to the best of your ability.

Provide information to the skipper (weather, other boats etc.).

Tell the skipper if you don't feel confident about doing an allocated task.

Let the skipper know if you are feeling unwell. (let her/him know beforehand of any medical conditions that might affect your crewing ability – bad back, poor hearing etc.).

Anticipate the skipper's requests (this is a lot easier if you have been a skipper).

Offer suggestions when asked and when you really think you have a good idea.

## **1.5 What is expected of the skipper**

Let all the crew know what is being planned and why – not just the experienced ones.

Be receptive to suggestions.

Keep the peace – don't let disagreements grow and don't be the cause! ("Am I being reasonable?" If in doubt, ask the crew).

Boost confidence and ability of crew.

If your crew are more experienced than you, acknowledge it and pay extra attention to their comments but make your own decision.

Encourage your crew to ask questions. But let the crew know when you need to focus on a task.

Check everything the crew does – but don't destroy their confidence by micro-management.

### **Quiz: Role of skipper and crew**

1. You are crewing on a yacht and are at the helm when you notice a craypot 100m ahead. Do you:
  - a) Steer away from it
  - b) Hold your course and call the skipper
  - c) Hold your course
  - d) Do something else (what?)
2. The jib sheets are connected with a shackle instead of bowlines. Do you:
  - a) Do nothing
  - b) Ask the skipper why
  - c) Suggest changing it to bowlines
  - d) Just change it
3. You are feeling queasy whilst sailing, which has happened before. Do you:
  - a) Grin and bear it
  - b) Tell the skipper you are going to lie down in your bunk
  - c) Tell the skipper and ask advice
  - d) Ask to take over the helm
4. You are joining a yacht as crew, with a skipper and crew you have not sailed with before. You are preparing to set off on a 6 hour passage to Mandurah and ask the skipper to have a look at the passage plan. He says he doesn't do passage plans. Do you:
  - a) Go to the navigation station and make your own plan
  - b) Ask why he doesn't have a plan
  - c) Criticise him for not doing his job properly
  - d) Get off the boat

### **Homework**

#### **At home**

Find a willing victim to play the role of crew. Then, in an imaginary situation, tell them how you are going to come alongside a jetty on the leeward side (i.e. wind is blowing you off the jetty), and tell them what you want them to do. Then ask them for feedback on:

- a) Did they understand what is going to happen?
- b) Did they understand what their role was?
- c) Did they think it would be fun/dangerous/challenging, difficult etc.?

### **On the boat**

Walk around the deck and look at the various fittings etc. Work out what you would do if each one broke whilst sailing at night in 20knots breeze. Prepare a maintenance list as a result of your findings!

## **2. Getting in and out of the pen**

### **2.1 Fundamental rules**

Keep your hands and feet inboard- they are more expensive to repair than the hull if crushed. If you are asked to fend off, only do so above guardwire height, to avoid crushing.

Check with the skipper what the plan is, well beforehand.

Know what your jobs are.

### **2.2 Before leaving**

Make sure all warps are ready to be released quickly.

Check which way the wind will push the boat, so as to anticipate what will happen.

Know what your job is and how to do it.

Remember to disconnect the shore power cable.

### **2.3 During leaving**

Let the skipper know when your job is done e.g. "bow warps are clear!"

Let the skipper know if there is a problem e.g. "port bow rope is caught round the anchor".

Help the skipper by keeping an eye open for potential problems e.g. another boat leaving the same time as you.

### **2.4 Before arriving**

Check which way the wind will push the boat, so as to anticipate what will happen.

Know what your job is and how to do it.

### **2.5 During arriving**

Let the skipper know when your job is done e.g. "bow warps are on!"

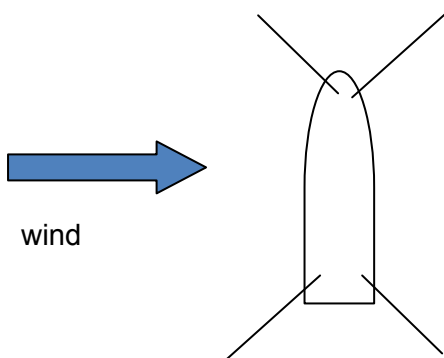
Let the skipper know if there is a problem e.g. "port bow rope is out of reach".

### **2.6 Tidying up afterwards**

Every boat is different, but there are lots of jobs you can do without being told e.g. put mainsail cover on, coil ropes into rope bags, lash tiller, put instrument display covers on.

**Quiz: getting in and out of the pen**

1. Your yacht is moored in the pen by 4 lines as shown below, with the wind blowing from the port side.



- a) Which line do you let go first?
  - b) Which line do you let go last?
2. You are given the task of letting go one of the stern lines. Just before you let go you notice it has chafed badly. Should you:
- a) Tell the skipper straight away
  - b) Say nothing
  - c) Tell the skipper once you are out of the pen
  - d) Tell another crew member
3. As you return to the pen the wind is coming from the starboard bow. The skipper asks you to attach the port bow rope first. Do you
- a) Do as you are asked
  - b) Ask why before doing anything
  - c) Ask which way the boat will be blown
  - d) Do something else (what?)
4. You have just tied up in the pen safely on a boat and crew you don't regularly sail with. Which of the following tasks is it reasonable for you to do without being asked:
- a) Coil and stow any rope tails
  - b) Put the kettle on
  - c) Turn off the seacocks
  - d) Lash the tiller/wheel
  - e) Put the mainsail cover on

## 3. Anchoring

### 3.1 Who does what?

This varies from boat to boat. Often the crew do the foredeck (let go the anchor). Sometimes they are given the helm so that the strongest person can do foredeck. Anchoring decisions tend to be made from information only available at the foredeck, so there is a strong case for the skipper doing the foredeck.

Therefore both skipper and crew need to know what happens at both ends of the boat.

### 3.2 Fundamental rules

Don't settle for an uncertain anchorage – you won't sleep.

It's not about the anchor, it's what you do with it that counts.

If in doubt, let all the chain out.

### 3.3 How does anchoring work?

A 10kg anchor can hold a 10,000kg boat in the same way that a small brick behind a car wheel can stop the car rolling downhill.

The anchor chain at the anchor must pull nearly horizontally, otherwise it will lift the anchor off the seabed.

Lots of chain is most important.

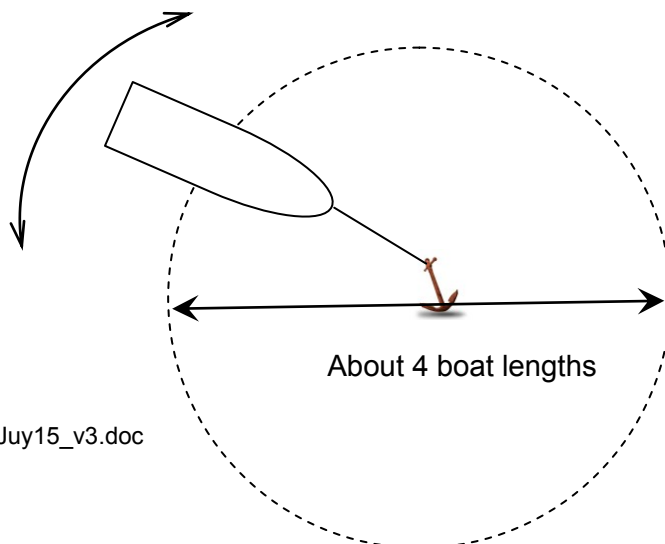
You should have at least two anchors, of different types. A fisherman style (Popeye's tattoo) is best for weed (seagrass) and worst for everything else. A plough or spade (Delta, Bruce, CQR, Danforth, Racnor etc.) is best for everything except weed.

### 3.4 Where to anchor

If you can see the bottom, pick a sandy patch (info on the chart will also tell you).

Choice of water depth depends on circumstances, try for at least 1m below the keel. If no idea what to choose, 4m depth is usually a good number. Remember to allow for depth changes due to tide.

As the wind swings (and it will) or the tide turns (and it will), the boat will swing in a circle of about 4 boat lengths diameter (more in deep water); make sure there are no boats or shallow patches in that circle.



Avoid anchoring with an obstacle behind you (e.g. beach, rocks, harbour wall) – if something goes wrong you have very little time before you are blown onto it.

### **3.5 Anchoring procedure**

Skipper works out the plan and tells the crew.

Agree on what hand signals to use between helm and bow.

If towing a dinghy, shorten its rope (the “painter”) painter so it can’t get round prop.

Look at the chart first, then motor around your chosen spot (a clear swinging circle, a sandy bottom).

Bring boat to a stop head to wind, let out chain to about 1.5 times depth.

As boat goes astern (windage, or engine in reverse), let the chain out gradually so that it will lie along the seabed in a straight line.

After letting out 3-4 times depth, stop the anchor chain. If boat continues astern, anchor is dragging. Pick it up and start again.

Once you have it holding, let out some more chain and put engine at half revs astern. Find a transit and check for 1 minute you are not dragging. If you are, pick it up and start again. *(What is a transit? Look roughly across the boat and find two stationary objects that are in line with each other e.g. a mooring buoy and a rock. If they stay in line then you are not moving. If the nearest one starts to move forward of the furthest one, then you are moving backwards i.e. your anchor is not holding, it is dragging over the sea bed.)*

Let final amount of chain out (5 times depth or 30 metres, whichever is greater. For rope, 7 times depth or 40m).

Take load off anchor winch by attaching snubber.

Put kettle on, have cup of tea, then check transit again. If dragging, let skipper know.

Hopefully he/she will pick up anchor and start all over again (better now than in middle of night or howling gale).

### **3.6 Putting out a second anchor**

If you just can’t get the anchor to hold and there is nowhere to go, or the anchorage is too crowded and there really is nowhere else to go, put two anchors out.

Lots of different ways. Simplest is to anchor on main anchor, then row out second anchor (anchor and all cable in dinghy, end tied to bow cleat of yacht) in direction about 60 degrees from main anchor direction.

Strongest person should row. (Usually easier to control rowing than with outboard) When you have rowed as far as the cable allows, let anchor down into water (mind your feet!).

Pull cable up tight at bow cleat of yacht. If dragging, start again.

With two anchors out, go on deck when wind (or tide) changes, to adjust cables so they don’t wrap around keel/rudder/prop.



To recover two anchors, do it all in reverse. Get in dinghy and pull yourself along the second cable. Hopefully when cable reaches vertical, anchor can be lifted into dinghy. This all takes time, so start doing all this about an hour before you plan to leave.

### **3.7 Weighing anchor**

If you are worried about being able to pull all that chain back in, get someone to help you.

Check no other boat on top of your anchor. If there is and they won't move...problem (attend advanced sailing course for solutions).

Plan departure route through moorings, reefs etc. Make sure the helm knows which direction to steer to get to deep (safe) water.

Motor gently up to the anchor as the cable is wound in.

Once cable is vertical, if it is hard to pull up then let wind drift boat back, using its weight to pull anchor out.

If anchor won't come out, you have a problem; let cable back out and have a think.

#### **Quiz: anchoring**

1. Which of the following make for a potentially unsafe anchorage:

- a) Weedy seabed
- b) Lee shore
- c) No other yachts at anchor
- d) More than 10m water depth

2. You plan to anchor in a crowded bay. There is a nice sandy patch in 5m water, with the nearest yacht 50m downwind of your chosen spot. Is there enough room to anchor?

3. You have deployed your anchor and are motoring in reverse to dig it in, but it is dragging. You should:

- a) Increase reverse revs
- b) Decrease reverse revs
- c) Retrieve the anchor and start again
- d) Let more chain out

4. You are retrieving your anchor ("weighing anchor") in fairly windy conditions and there is too much load on it to pull it in (if a manual winch you haven't the strength; if an electric winch the motor doesn't have enough power). What do you do?:

- a) Wait for the wind to die
- b) Use the engine to motor up to the anchor
- c) Connect the anchor chain to a bigger winch in the cockpit
- d) Let all the chain go overboard and pick it up later.

## 4. Working with ropes

### 4.1 Fundamental rules

A rope under load is a dangerous thing.

A rope moving quickly is a dangerous thing.

### 4.2 Coiling, cleating and throwing

Coiling is not just for neatness, it allows the rope to pay out quickly without snarling.

When coiling a rope ready for throwing, split the coil in two (one coil to stream, one to catch).

How to cleat: round turn, two figures of eight (turns, not the knot), then a half hitch.

Avoid having a load on the last part of the cleated rope because it is then very difficult to undo the rope. Why? Because the end to undo is taking all the load.

### 4.3 Using winches

Every winch and its use is different.

Almost all winches turn clockwise.

Never let your fingers get between the rope and the winch – ouch!

Start with one or two turns, then as load increases add one or two extra turns.

Don't put the handle in til you need it (otherwise you can't get those extra turns on).

To take a rope off a winch, usually you ease it out gradually until most of the load is off it, and only then do you take the turns off, always keeping your fingers clear of the winch.

You might get a "riding turn" (one turn has gone under another) when winding the winch; let skipper know immediately as it effectively locks the rope, stopping the procedure. This is when you need to know how to tie a rolling hitch.....

### 4.4 Knots

You don't need to know lots of fancy knots, just when to use each knot. There is no such thing as a bad knots, just the wrong knot for a given circumstance.

- Figure of eight – to stop a rope accidentally going through a block or fairlead.
- Round turn and two half hitches – use when you might have to undo the rope under load.
- Double sheet bend – for joining two ropes together.
- Bowline – a secure knot, but cannot be undone under load.
- Rolling hitch is a very useful knot to learn – it ties one rope anywhere onto another when they have to be in line – see "using winches".

Avoid clove hitch and reef knot, except in certain circumstances.

**Quiz: working with ropes**

1. Which of the following knots are suitable for tying the dinghy to your boat:
  - a) Bowline
  - b) Round turn and two half hitches
  - c) Rolling hitch
  - d) Double sheet bend
  - e) Clove hitch
2. Which of the following knots are suitable for tying two lengths of rope together:
  - a) Bowline
  - b) Round turn and two half hitches
  - c) Rolling hitch
  - d) Double sheet bend
  - e) Clove hitch
3. True or false:
  - a) Most winches turn clockwise
  - b) Ropes should usually be coiled clockwise
  - c) A rope should be made fast on a cleat clockwise
  - d) A halyard should be coiled from the free end to the fixed end

## 5. Rough weather

### 5.1 Fundamental rules

Anticipate it, then deal with it, then plan for it getting worse.

You will survive! Just keep clear of land if it is really bad – running for shelter requires planning, knowledge and a bit of luck.

Always have a plan B e.g. an accessible harbour of refuge.

Always wear a harness and clip on (this is true for all conditions except flat calm).

### 5.2 How do you know when it's (too) rough?

Just because it's windy doesn't mean there's a problem – comfort is a better indicator.

Identify what worries you, then develop a strategy.

It is usually too rough for the people on board before it is too rough for your boat.

Practice reefing, moving on deck etc. whilst clipped on in mild conditions.

### 5.3 Preparing yourself and your crew

Keep warm and dry.

Organise warm food and rest before it gets worse.

Keep a good lookout, both to the horizon and around the deck.

The skipper must rest, so the crew should do all but the most difficult jobs.

If starting to feel seasick, ask for a simple job on deck that keeps you looking at the horizon (e.g. steering or looking for landmarks or changes in weather).

### 5.4 Preparing the boat

Reef early, especially when sailing downwind.

Stow everything, close hatches, vents etc.

Plot position, do advanced navigation so you can spend less time below when it's rough.

If a change of course is required in rough weather, it is usually safer to tack than to gybe if the mainsail is up.

### **Quiz: Rough weather**

1. You should wear a harness and be clipped on:

- a) After dark
- b) In winds over 25 knots
- c) In flat calm
- d) If sailing with fewer than 4 crew

2. the wind has increased and the boat is heeling over too much. You should:

- a) Furl the headsail a bit
- b) Reef the main
- c) Ease the sheets out
- d) Put the motor on
- e) Do nothing

3. You plan to sail from Mandurah to Bunbury ( about 10 hours) on a good yacht with 3 experienced crew and one novice. The forecast is for winds SW 15-20knots.

- a) Do you stay or go?
- b) If the forecast was E20-30, should you stay or go?

4. You are at sea with the wind increasing to 25 knots, as expected. You should

- a) Take an anti-seasickness pill
- b) Put the kettle on
- c) Keep all crew below if not busy
- d) Head for safety

### **Homework**

#### **At home**

Plan how you are going to do the following in rough weather with the skipper/navigator/cook seasick:

- a) Navigate
- b) Gybe
- c) Heat some food safely

#### **On the boat**

Practice reefing the main and setting the storm jib:

- a) In the pen when it is very calm
- b) In daylight at sea
- c) At night

Now do it all whilst wearing harness and tether.

## **6. Weather forecasts**

### **6.1 A note on terminology**

Wind direction is named by the direction it is blowing *from* e.g. a south-west wind is blowing from the south-west. (Unfortunately this is the opposite convention to ocean currents).

### **6.2 Fundamental rules**

A forecast is only an estimate, it will never be exactly right.

If in doubt, believe the forecast.

Always write the forecast down if it is from a radio or phone (develop a shorthand).

### **6.3 Comparing sources of information**

Build your knowledge by comparing forecasts with what was subsequently recorded.

Looking at the sky can give you 6 hour forecast, but not much more.

Try to find at least two independent forecasts.

The longer ahead the forecast, the less reliable it is. They are generally good up to 3 days, useful up to 7 days.

### **6.4 What is important?**

How far ahead do you need to know the weather?

Is this anchorage sheltered in the forecast wind changes?

Swell is more dangerous than wind on the WA coast. Luckily it can be forecast more accurately and further ahead than wind.

### **6.5 When you weren't expecting this.....**

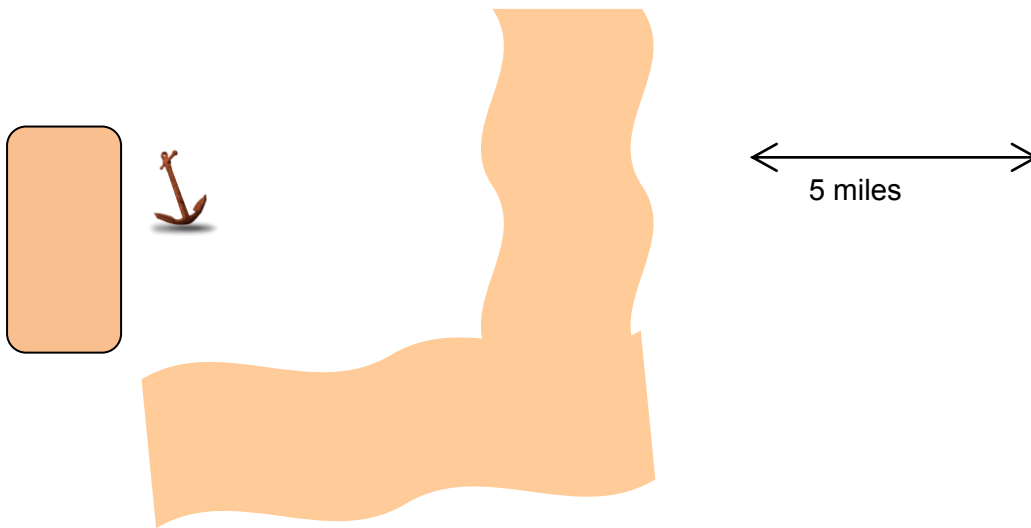
Easterlies are much more gusty than sea breeze (off Perth) so they can catch you out.

Remember the forecast is just the most likely scenario, not the only one. Experience will help you work out the next most likely scenario.

If the forecast is seriously wrong you need to call a shore station to get an update.

Wind usually sounds stronger in the pen and it always seems windier when it is cloudy.

### Quiz: Weather forecasts



1. You are intending to anchor behind the island shown above. In which wind directions is the anchorage:
  - a) Uncomfortable
  - b) Unsafe
2. You have left FSC for Hillarys in a light easterly. The forecast is for easterly winds with an afternoon SW sea breeze. It is now 1100, you are 5 miles offshore and it is flat calm. What is going to happen next?
  - a) You are just going to have to motor all the way to Hillarys
  - b) The easterly will return soon
  - c) The SW sea breeze will arrive soon
  - d) The forecast is wrong and the wind might come from many directions
3. You plan to sail from FSC to Mandurah tomorrow (about 6 hours passage time). One forecast gives E10-15 becoming SW15-20; another forecast gives SE15-20 becoming SW25-30
  - a) Which forecast do you believe?
  - b) What should you do: go, stay or is there another option?

### Homework

Record the forecast, then compare it next day with what happened. Keep a mental note of how different it was, and try to work out why it was different.

Make a 6 hour prediction from your own observations (sky, sea, current conditions), then compare with the forecast, then with what actually happened.

## 7. How the sails work

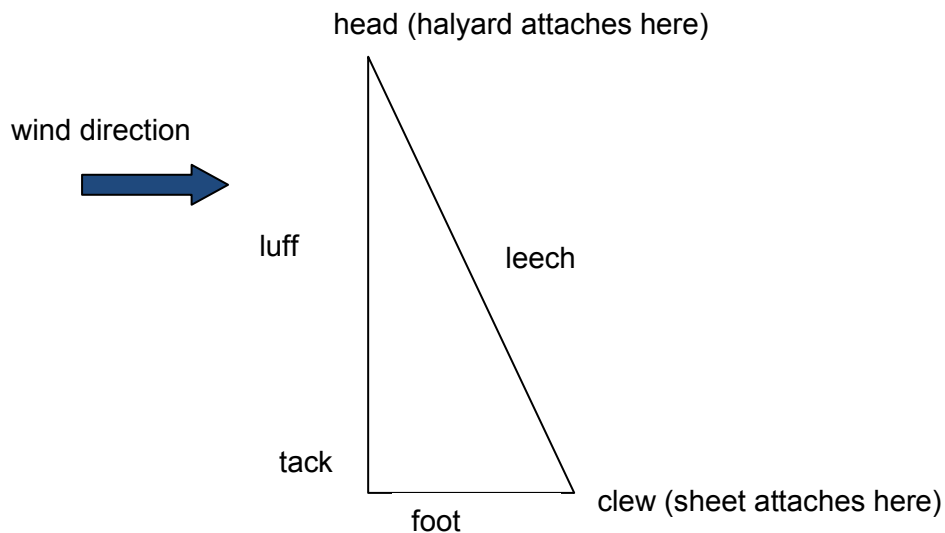
### 7.1 Fundamental rules

A sail full of wind has more force than a flapping sail, even though a flapping sail is louder.

To slow a boat down or stop it heeling, let go of the sheets.

Most sails have three corners and two ropes:

- the head at the top, connected to the halyard (rope);
- the clew at the lower aft corner, connected to the sheet (the other rope) and
- the tack at lower forward, usually shackled to the boat.



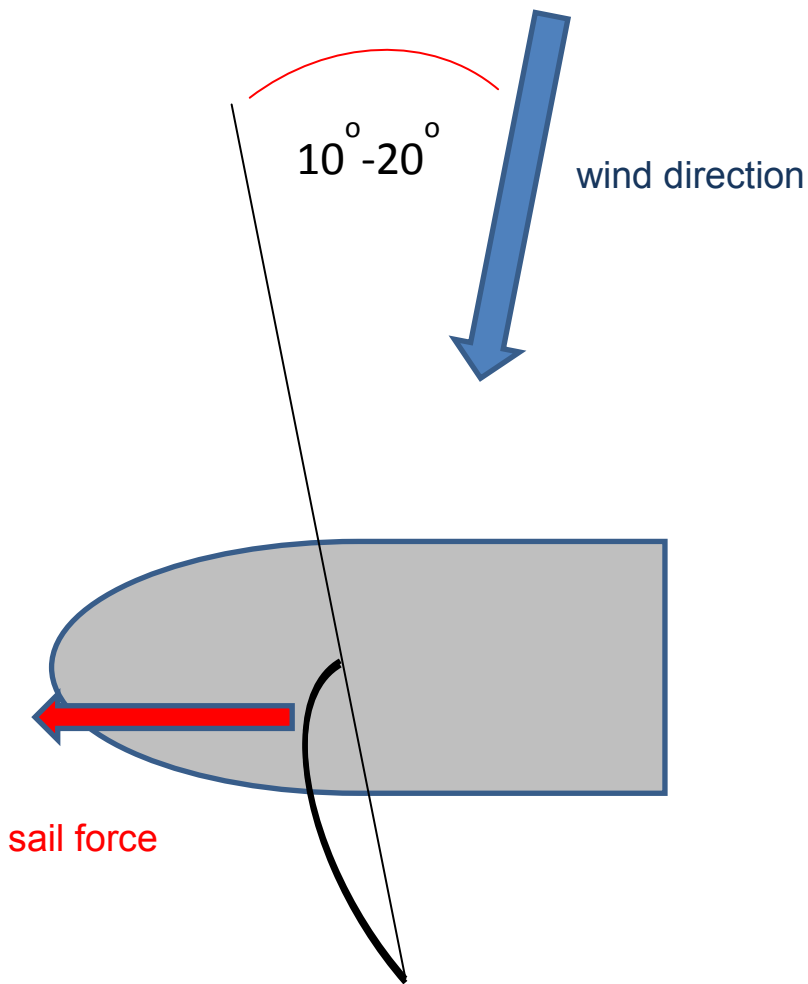
### 7.2 The direction the sail force acts

Imagine the sail as a flat sheet of paper. The sail force acts perpendicular to the paper, at the centre of the paper.

Therefore if the sails are pulled in tight so they are nearly fore-and-aft, the force will be acting almost sideways, across the boat. This will push the boat sideways and heel it over, rather than pushing it forwards.

If the sails are eased out so they are more across the boat, the force will be pointing mainly forwards, so less heeling effect.

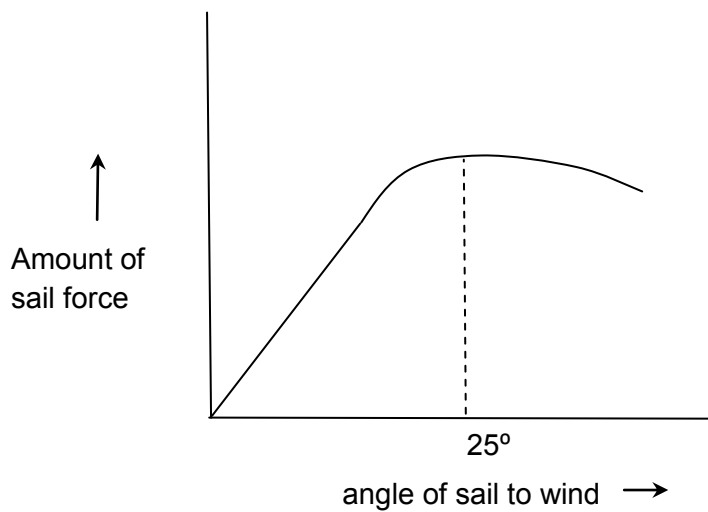




### 7.3 What changes the amount of force?

Biggest effect is from the angle of the sail to the wind. If the sail is in line with the wind (like a flag), the force is almost nil. (This is an angle of zero).

As the angle between the sail and the wind increases up to about 25 degrees, the force increases proportionally.



If the angle between the sail and the wind is more than about 25 degrees, the force stays about the same.

A sail with a big belly (“fullness” or “camber”) will produce more force than a flat sail.

#### **7.4 Trimming the sail**

This section is all about how much to let the sheet in or out.

From the above analysis, consider a beam wind (i.e. coming from the side of the boat) as an example: if the sail is let out then it is at a small angle to the wind so will not generate much force, but whatever force is generated will be in a useful direction i.e. forwards.

Conversely, if we pull the sail in hard it will be at a large angle to the wind so it will generate lots of force, but it will be mostly sideways i.e. not very useful.

Luckily there is an ideal angle most of the time. Let the sail out until the front edge (the luff) starts to flap or “luff”. Then pull it back in just enough so that it is not flapping – easy!

#### **7.5 Tell-tales**

Tufts of wool or ribbon are often attached to the front edge (the luff) of a headsail and rear edge (the leech) of a mainsail, to help get the sheet adjustment exactly right. They are called tell-tales.

##### **Headsail**

On the headsail they are in pairs on both sides at 4 or 5 different heights up the luff.

- If the sail is trimmed perfectly then all the tell-tales stream horizontally.
- If the leeward tell tales are not horizontal, ease the sheet out.
- If the windward tell tales are not horizontal, pull the sheet in.

In practice you can't get them all exactly right at the same time, so get the best average you can.

##### **Mainsail**

On a mainsail they are in singles, not pairs, at 4 or 5 different heights up the leech.

- If the sail is trimmed perfectly then the bottom ones are streaming horizontally but the very top one is occasionally flicking out of view on the other side of the sail.
- If many of the tell tales are out of view behind the sail, ease the sheet out.
- If all the tell tales are visible and horizontal, try pulling the sheet in until the top tell tale is just going out of view occasionally.

Again you will end up having to get the best compromise you can, and combine it with the other indicator of not letting the front part (the luff) of the sail flap.

**Quiz: How the sails work**

1. The back edge of the sail is called the:

- a) Luff
- b) Clew
- c) Leech
- d) Tack

2. Which of the following are indicators of how the sail is trimmed:

- a) Luff
- b) Tell tales
- c) Halyard
- d) Foot

3. The leeward (outside) tell tales on the headsail are dropping down. You should:

- a) Pull the sheet in
- b) Ease the sheet out
- c) Tighten the halyard
- d) Move the jib car aft

4. The front edge of the mainsail is flapping. You should:

- a) Pull the sheet in
- b) Ease the sheet out
- c) Tighten the halyard
- d) Ease the outhaul

## 8. Basic navigation

### 8.1 What does the crew do?

Nothing if you don't want to and it's not an emergency, but it is much better to get involved so that you can take over if you have to (e.g. skipper is seasick).

If you want to do chart work or put entries in the log, check with the skipper first (they can be a bit precious about it, because the log book is a legal document). If not OK, bring your own log book (notepad) and a chart. Having your own chart at home is useful for planning and preparation anyway.

Skipper should (gently) encourage crew to get involved with navigating.

### 8.2 Fundamental rules

Never rely on just one source of information. Make sure at least two out of these agree: GPS, compass, depth sounder, eyeball.

When closing the coast, if in doubt about where you are, stay out to sea until you have better information – it might be less comfortable than harbour, but it is safer than going on the rocks.

Minimum chart work required is to record your latitude and longitude from the GPS into the log book every 2 hours (more often if close to coast). Then, if the electronics fail, you can at least plot on the paper chart where you were a short time ago.

On the WA coast it is usually the swell that makes a harbour approach dangerous, not the wind.

### 8.3 GPS and chart plotters

When travelling from one waypoint to the next, zoom the display right in to ensure the track is clear of dangers.

Most chart plotters do not show all the detail until you zoom in... there might be rocks under you! It is usually easier to see dangers on a paper chart.

When approaching land, don't get mesmerised by the chart plotter – get your head out of the boat and look around you.

You are never exactly where you think you are: you are somewhere near your "position". GPS might be accurate to a few metres, but charts are not.

Don't rely on getting out of a bay by following your track in, unless it is an emergency. Boats have gone aground doing this – the plotter had glitches in the software.

Practice relating what you see to what is marked on the chart.

### 8.4 Eyeball navigation

Identify two objects on the coast that are on the chart e.g. lighthouse, navigation buoy, which are very roughly at right angles to each other. The distance you are off the coast is about 1.5 times the distance between the two objects. If the angle between them is 60 degrees, your distance off the coast is the same as the distance between the two objects.

If you can't see the compass, use the sun – it's east in the morning, north at midday, and west in the evening.

Transits are the most accurate form of navigation (what is a transit? See Anchoring section). Look for them on the chart, then write them down where you can see them e.g. on the cockpit bulkhead.

Look down as well as out – colour of water and shape of waves can tell you things. Shallow water is often paler or browner. Be alert, not alarmed – you can sometimes see the bottom in 10m of water.

Learn to recognise distances e.g. how far off can you see a person on the beach? If Rottneest light is one finger high, how far away is it?

## 8.5 The compass

Know your compass markings. Some have the numbers in tens e.g. “30” means 300 and “15” means 150. Some compasses have the yacht's heading on the side of the card, and the reciprocal course on the top – confusing! In either case, do a reality check by comparing with your estimated direction from the sun.



Never put anything within half a metre of the compass. Steel and magnets have a huge effect on a compass, and they are in many portable things e.g. torches, radios.

To steer a given compass course, don't get glued to the compass. Point the boat roughly in the right direction, line up a cloud or similar with something on the boat (shroud, stanchion etc.). This is a steering transit. Check what the compass reads, adjust your steering transit if necessary (e.g. pick a new cloud), then steer to your transit, not the compass. Keep checking the compass every minute or two though; clouds move!

For simple get-you-home navigation, don't worry about “deviation” and “variation”; they're only a couple of degrees around Perth. (See later section “Better Navigation” to learn more).

## 8.6 Safe sailing depths

Safe depth depends on wind, tidal height and most important of all, swell.

In very calm conditions, have at least 0.5m below your keel.

In low-moderate swell, allow at least 2.5m below your keel.

If the swell is up at an entrance, hold off and count the frequency of waves breaking. If it breaks at all within 5 minutes, it is risky. If it breaks more often than 1 in 10 waves, it's dangerous.

When entering a crowded or confined anchorage or harbour, make sure you know where the deep (safe) water is. You need to head that way if the engine stops.

### **Quiz: Basic navigation**

1. You should write your position down in the ship's log book every:

- a) Half-hour
- b) Hour
- c) Two hours
- d) It depends (on what?)

2. You are sailing to a waypoint that you entered into your chart plotter. As you zoom in, you notice a symbol  $\oplus$  marked on the screen about 1 mile ahead and  $\frac{1}{4}$  mile to leeward of your intended path. Do you:

- a) Do nothing – it is not a navigation hazard
- b) Alter course to windward to increase clearance to  $\frac{1}{2}$  mile
- c) Wake the skipper and ask what to do
- d) Alter course to pass to leeward of the thing.

You should measure distances on a chart using the scale:

- a) Along the top of the chart
- b) Along the bottom of the chart
- c) Along the side of the chart
- d) Work it out from the scale give non the chart (e/g/ 1:30,000)

4. You are approaching an anchorage and you estimate the sell is about 2m. What information do you need in order to decide if it is safe to proceed.?

### **Homework**

#### **At home**

Plot a course that circumnavigates Rottneest. How far off West End should you stay? (what does that depend on?). How do you know if you are clear of the reefs east of Parker Point? Can you take a short cut inside Kingston Reef marker?

#### **On the boat**

Plot your position by taking bearings of three objects. Compare your plot with what your GPS tells you. Which one is correct?

Estimate your distance from various objects (lighthouse, hill etc.) then compare with distance measured on chart. (You can do this at home too).

## **9. Passage planning**

### **9.1 Fundamental rules**

Plan according to the abilities and expectations of your crew – enjoy where you are as much as where you are going.

Always have a plan B, and a Plan C.

Share your plan with the crew and seek their views.

### **9.2 What time should I leave?**

It's really the wrong question – you should plan by asking “what time should I arrive?”

Never, ever, **ever** be driven by a shore commitment that requires you to arrive by a certain time.

.... So always allow extra time, and have a plan B.

Learn how long your boat's passages take in different conditions (rule of thumb: 4kn for 30footer, 5kn for 35ft, 6kn for 40 ft. All for well-sailed boat using engine when required. 25% slower for windward work).

For a passage more than 24 hrs, consider a 2-3 hr shakedown sail then anchor for lunch/dinner.

For a passage of several days, try to make the first leg less than 18 hrs. This will identify any problems with boat, crew or stores before getting far away from home.

Try to arrive in daylight for anchorages, with sun high to avoid glint. Harbours with good nav lights can be easier to approach at night. Make use of a full moon for advanced planning.

### **9.3 But I don't like going to windward**

Get used to it! About two-thirds of time at sea is spent going to windward, and at least it's more comfortable than rolling downwind.

Learn from racers how to tune the boat and how to develop a strategy for a windward leg.

Use the engine to help if your boat doesn't sail well to windward (but beware some engines don't like heeling!).

### **9.4 Using the weather forecast**

If a wind shift during the voyage is forecast, sail slightly towards the new wind direction.

Identify a weather window for the voyage (i.e. a period of good weather), but expect it to shorten.

### **9.5 About 1-3 days before departure**

Stock up with food, fuel (incl. stove), water, clothing and batteries.

Collect and study weather forecasts.

Do navigation – enter waypoints, plot courses, prepare lights list, safe angles etc.

Do safety check of essentials (sails, mast, rigging, rudder, radio, engine).

Keep crew informed of plans and expectations.

### **9.6 About 1-3 hours before**

Check weather, adjust plans accordingly. Share this with the crew.

If everyone is tired when arriving on board, review the departure time.

Work out watch system with crew.

Stow everything, give crew a “seek and find” checklist.

Draw a mud map of the passage showing course, dangers, significant headlands etc. and pin it on a bulkhead for all to see.

### **Quiz: Passage planning**

1. Which of the following should you do an hour before leaving:

- a) Put waypoints into plotter
- b) Buy food
- c) safety briefing with crew
- d) Check the forecast

2. Which of the following should you do a day before leaving:

- a) Put waypoints into plotter
- b) Buy food
- c) safety briefing with crew
- d) Check the forecast

3. You plan to sail from Busselton to Fremantle (about 18 hours) on a good yacht with 3 experienced crew and one novice. The forecast is for winds SW 15-20knots.

- a) Do you stay or go?
- b) If the forecast was E20-30, should you stay or go?

4. For the trip in question 3, assuming the wind is steady when is a good time to leave Busselton:

- a) 0400
- b) 1000
- c) 1600
- d) 2200

### **Homework**

#### **At home**

Plan an imaginary passage for 3-4 days ahead e.g. Fremantle- Bunbury. Review your plan with any forecast changes. Plot your course as if you were actually sailing in the recorded conditions (assume some typical boat speed and tacking angles. Compare the outcome with



your plan, and consider what changes to your plan you might have made as the voyage progressed.

### **On the boat**

Do it all thoroughly for a short trip e.g. Rottneest, Rockingham.

## **10. Using the radio**

### **10.1 Fundamental rules**

Listen before transmitting – wait your turn.

Be brief – it's not a phone call.

Only use the radio under the supervision of a qualified person, unless it's an emergency.

If the boat or a person's life are at risk, call for help the best you can. Don't worry if you break some of the rules.

"Over" means I have finished talking and am listening for your reply.

"Out" means I have finished talking and am no longer listening.

"Clear" means I have finished using this channel.

"Standing By" means I am waiting for you to reply, but realise it could be a few minutes.

### **10.2 Getting the radio ready**

Turn the set on and make sure there is power to it – there may be more than one switch.

Turn the volume up til you hear something.

Turn the squelch button down til it hisses, then turn it back up so it is just not hissing.

Select channel you are going to call on, then listen to check it's clear (if not, wait).

Know where the "Press To Talk" (PTT) button is and how to use it.

### **10.3 Logging on and logging off (with a sea rescue group)**

Prepare a cheat-sheet of what you are going to say, put it by the radio.

Select channel, wait for your turn then call and wait for response.

If no acknowledgement within 10 seconds (count to 10, don't guess), call again.

If still no response, check the power button is set on "high", not "low".

If you know you are going to be late, call them and revise your ETA (Estimated Time of Arrival).

**DON'T FORGET TO LOG OFF!!!** (stick those words by the cabin padlock, beer fridge and kettle).

### **10.4 Calling another boat**

Work out which channel you are going to call them on and which channel you expect to go to.

Wait, 3 seconds then, if the channel is clear, call: "<their boat name>, <their boat name>, this is <your boat name>, < your boat name> on Channel xx, over".

When they reply, they might tell you which channel to go to. If so, respond saying “going to channel xx and listening”. This avoids confusion as to who should transmit first on the new channel.

If they don't advise a channel to switch to, you do in your response” can you go to Channel xx and listen for me; over”.

### **10.5 How to answer a call**

If you hear your boat name or call sign on the radio and you didn't catch their name, reply:

“Station calling <your boat name> please repeat your name and call sign, over”

Once you know who it is, decide what channel you should talk on then say:

“< their boat name> this is <your boat name> please go to Channel xx, over”.

Wait to get their reply confirming, then go to Channel xx, listen to ensure xx is clear, then call them.

i.e. This is the mirror image of being the boat initiating the call as per section 10.4 above.

### **10.6 Mayday and Pan-Pan**

Mayday is for serious danger. Pan-Pan is for a problem you can't solve yourself, that could lead to danger. They are both a bit like phoning for an ambulance.

#### **When should I send a Mayday?**

If you are not sure it's a Mayday situation and it's your decision, send one anyway then apologise later if it turns out OK. It's serious if you think it's serious.

Only the skipper can order a Mayday to be issued (unless she/he is out of action of course).

#### **How do I send a Mayday?**

Get the information out in order of importance (write it down before you broadcast if possible; it will calm you down):

- “Mayday” ( say it three times)
- Who you are (three times)
- Where you are (once)
- What the problem is (sinking, fire, MOB) (once)
- How many on board. (once)
- “I require immediate assistance” (or whatever it is you do need) “over”

Don't bother waiting for a clear channel, just blast your message out – you need help!

If there is no reply try again; if still no reply, try another channel.

### **10.7 How to sound professional**

NEVER say “over and out”. It is self-contradictory rubbish (see section 10.1 definitions).

Work out your Estimated Time of Arrival (ETA) before logging on.

Know the phonetic alphabet (Alpha Bravo Charlie etc.), for your call sign at least.

### **Quiz: Using the radio**

1. When calling another yacht you should
  - a) Give you call sign first
  - b) Give their call sign first
  - c) Always use low power
  - d) Give your position
2. You call a sea rescue group and get no response. This could be because:
  - a) You are using the wrong channel
  - b) The power setting is on low
  - c) The boat is pointing away from their antenna
  - d) The squelch setting is not right
3. The VHF channel you are most likely to get VN6DI( Fremantle Sea Rescue) on is:
  - a) 72
  - b) 73
  - c) 77
  - d) 16
4. In a Mayday call you should include:
  - a) Boat name
  - b) Position
  - c) Amount of fuel
  - d) Number of Persons on Board (POB)
  - e) Home port

### **Homework**

Learn the phonetic alphabet

Learn the full Mayday procedure – write it down on a card and laminate it.

Practice using the Press-To-Talk button (PTT).

# 11. Collision avoidance

## 11.1 Fundamental rules

Always have a plan B.

Take early, clear action so that you don't need plan B

## 11.2 Basic rules

Under power:

- Overtaking boat should keep clear.
- Drive on the right.
- If two boats meet at right angles, if he is on your starboard side, you have to go behind him ( i.e. you turn so as to be driving on the right).

Under sail:

- Overtaking boat keeps clear.
- port tack keeps clear of starboard tack.
- If on same tack, boat to windward keeps clear.
- Power doesn't always give way to sail.

## 11.3 Anticipating trouble

Act early and decisively, so that you don't end up close to another vessel.

If in any doubt about being able to cross another vessel, go behind.

Keep a good lookout – scan the full horizon every few minutes, especially when distracting things are happening (e.g. lunch, reefing sail, dolphins)

The two main blind spots are under the headsail and over your shoulder.

## 11.4 Close quarters

Look over your shoulder before turning or slowing down.

Go as slowly as you can without losing steerage.

If it is starting to look crowded or ugly, find an escape route (your plan B) and buy yourself time and space.

At night time, look up – ships' lights and yacht masthead lights are very high when close.

Give the helmsperson a chance – keep out of her/his field of vision.

If you are going to hit something, keep your arms and legs out of the way – boats are cheaper to repair than people.

**Quiz: collision avoidance**

1. You are under motor and a ship is approaching from your port beam ( i.e. at right angles to you). You should:

- a) Hold your course
- b) Turn to starboard
- c) Turn to port
- d) Stop

2. You are under sail on port tack and another yacht is to windward of you sailing a slightly lower course i.e. converging. You should:

- a) Hold your course
- b) Turn to starboard
- c) Turn to port
- d) Stop

3. The Collision Regulations require you to “keep a proper lookout”. List three directions/locations/circumstances where you are at risk of not complying.

4. At night a green light with white above it appears on your port side on a constant bearing whilst you are motor-sailing. You should:

- a) Hold your course
- b) Turn to starboard
- c) Turn to port
- d) Stop

**Homework**

Learn the collision regulations and different lights displayed by ships and boats. (type “colregs” into your internet search engine).

## 12. Better Navigation

### 12.1 What you already know

In the previous session on “get you home” navigation you learned how to plot your position on a chart and how to measure the compass bearing from one location to another.

### 12.2 Don't we already know how to work out the course to steer?

You already know how to get the bearing of an object from a chart but there are some small corrections that need to be applied.

#### The Rule of 1 in 60

This rule helps us decide how accurate we need to be. The “rule of 1 in 60” states that a  $1^\circ$  change in angle results in a 1 mile offset over 60 miles.

If you are sailing on a passage about 60 miles long e.g. roughly Mandurah to Bunbury, then if you are  $1^\circ$  out in the course you calculated you should steer, you will end up 1 mile offset to one side of your destination (either east or west depending in which way the error was).

### 12.3 Where does the compass really point?

#### Variation

All charts are drawn with north pointing towards the top (this is called True north) .A compass is a magnet so it points to Magnetic north . The difference in bearing (angle) between True north and Magnetic north is called magnetic VARIATION. It is about  $2^\circ$ W off Fremantle

#### Deviation

A magnet gets deflected if there is a lump of steel next to it. e.g. the engine, or a radio . So the direction the compass points will be deflected by these things.

The difference in bearing (angle) between where your compass should point and where it actually points is called DEVIATION. It is usually about  $2^\circ$  or  $3^\circ$  and can be East (to the right) or West (to the left).

In summary ,a bearing or a course can be defined in three different ways:

- relative to True north
- relative to Magnetic north
- relative to Compass north

### 12.4 Leeway: your boat does not always travel in the direction it is pointing

A lot of the time the boat does not go in quite the direction it is pointing, it slips sideways to leeward (the side away from the wind). This sideways slip is called LEEWAY

Leeway angle varies with a lot of things, but is typically between  $5^\circ$  and  $10^\circ$ .

The important thing to remember is that it always pushes the boat to leeward, so in order to correct for it when working out a course to steer, you will have to know/predict which way the

wind will be blowing for your voyage then steer the boat UPWIND of where you want to get to.

## 12.5 Ocean currents and tides

Luckily in this part of the world we don't have strong tides or ocean currents, so we can usually ignore their effects. But in other places they are very important.

Ocean currents are caused by winds blowing steadily over large areas of ocean for weeks and months. Their average speed and direction is very predictable

Ocean currents have unpredictable local swirls and eddies in them which cause variations of speed and direction across distances of a few miles and time spans of a few days.

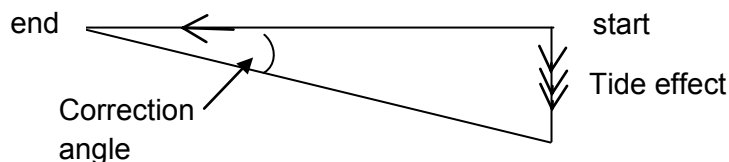
Tides are caused by the gravitational effect of the sun and moon. They change strength and direction every hour and every few miles, but are very predictable.

Currents due to tides are usually called tidal STREAMS in order to distinguish them from ocean CURRENTS.

### How we deal with them in navigation

The key to understanding how ocean currents and tidal streams affect your course to steer is to appreciate that it is the entire body of water that is moving.

On graph paper (or the chart), draw a line representing your boat speed and direction. From your starting point, draw the tidal stream (or ocean current) strength and direction. Then join up the ends to make a triangle. This last line is the course you have to steer to overcome the tidal effect .



If the tide changes every hour, you have to draw a new triangle for every hour and the correction may change.

## 12.6 Doesn't the chart plotter do all this for us?

Every plotter will display the bearing to your waypoint (destination) and most plotters give you the choice of displaying it as a True bearing or a Magnetic bearing.

They do not usually apply corrections for Deviation.

They do not usually give you corrections for tide, current or leeway; these are hidden behind two related readouts - "COG" and "Heading".

COG stands for Course Over Ground; this is the path your boat is travelling over the ground (the sea bed).

The "Heading" number can mean a lot of different things depending on the plotter and how it has been set up.



Any difference between the bearing displayed for COG and Heading could be due to leeway, or tidal stream, or ocean current, or it might even be due to compass deviation depending on where the plotter is getting its information from.

So the plotter does give us some information that is related to Course to Steer, but it is very difficult to interpret. Better to use pencil and paper!

**Quiz: Better navigation**

1. On a 30 mile passage you unintentionally steer  $4^\circ$  West of your intended course. You will be off track at your destination by:

- a) 1 mile
- b) 2 miles
- c) 3 miles
- d) 4 miles

2. You want to sail on a course of  $270^\circ\text{M}$  and your compass has a deviation of  $4^\circ\text{W}$ . You should steer a compass course of:

- a)  $266^\circ$
- b)  $270^\circ$
- c)  $274^\circ$
- d)  $278^\circ$

3. You are sailing south from Hillarys to FSC at 6 knots in a SE breeze. The direct course is  $180^\circ\text{C}$  and there is no ocean current or tidal stream. You estimate you will make  $6^\circ$  leeway. You should steer a course

- a)  $174^\circ\text{C}$
- b)  $176^\circ\text{C}$
- c)  $180^\circ\text{C}$
- d)  $186^\circ\text{C}$

4. On the same passage as in question 3 above, you are told there will be a mysterious ocean current flowing at 1knot to the east. You will need to apply a correction of

- a)  $1^\circ$  West ( i.e. a bigger number)
- b)  $1^\circ$  East ( i.e. a smaller number)
- c)  $10^\circ$  West
- d)  $10^\circ$  East

## **13. Using the engine**

### **13.1 Fundamental rules**

Make sure water is coming out of the exhaust.( it is somewhere near te back of the boat)

Every boat has a slightly different start and stop process – learn it.

Unlike a car, boat engines have only 3 gears – forward, neutral and reverse.

### **13.2 Pre-start checks**

Check you have enough fuel.

Check there is no oil or fuel in the bilge (if there is, there is a problem with the engine).

Make sure there are no ropes trailing in the water (they can get caught in the prop).

Check cooling water seacock (the valve) is open (do you know which way is open?).

Check electrics/battery switch are on.

If there is an exhaust seacock, check it is open.

Check the engine stop lever is pushed back in if there is one (see item 5 below).

### **13.3 Starting process**

Put engine out of gear, with some throttle (revs), just like most cars.

Turn ignition key until engine starts, just like a car.

If it turns over but doesn't start after 3-5sec, stop and check everything is right (just like a car).

Then have another go. Do not keep cranking the engine for more than 5 seconds; pause 5 seconds between attempts, to give the batteries a chance to recover from the effort.

If it doesn't start after 5 attempts then you haven't got a working engine (but you do need a mechanic!).

### **13.4 General operation**

Keep a regular eye on the exhaust to ensure the cooling water is still coming out.

If the engine noise changes, let the skipper know. If it is loud or nasty, throttle right back.

Don't let rope tails fall over the side, even from the foredeck.

Avoid steering through weed patches – they can clog up the water intake and/or wrap round the prop.

When coming in to anchor or moor with a dinghy on tow, shorten the dinghy rope (painter) so that it can't get round the prop when you go in reverse.

### **13.5 Stopping the engine**

Put engine into neutral gear (not absolutely critical).

Most boats are different from a car – do NOT just turn the key off. There should be either a STOP button or a lever you pull. Do this until the engine stops turning, then push the lever back in (see item 13.2 above).

Only turn the key to OFF after the engine has completely stopped.

Check with skipper if she/he wants seacocks and batteries left on or turned off.

Log off with coast station if you are logged on.

### **13.6 Using an outboard motor**

Again, they are all different; learn how to start and stop it before casting off.

Check there is fuel, that the fuel valve is on and the breather valve on the tank top is unscrewed.

If there is a choke, put it in the correct setting (varies).

Put gear lever in neutral if there is one, then apply some throttle.

Put “dead man” chord round your wrist and make sure it is fitted to engine correctly.

Pull cord or hit start button. If it doesn't start after 4 tries, check everything again.

If it doesn't start after another 3 tries you have probably “flooded” the engine (the cylinder is now full of too much fuel). Sit and wait 5 minutes for it to evaporate before trying again.

If it still doesn't work it is time to practice your rowing skills.

(Note: some small outboards don't have gears – they are permanently in forward gear so you are off straight away!)

Once engine is going, adjust the choke (varies and takes practice).

Don't run the engine with the prop out of the water for more than a couple of seconds – it relies on the prop being submerged for drawing cooling water in. (However, some new outboards are air-cooled, so this rule doesn't apply to them)

To stop the engine there is usually a stop button you push. If you can't find it, turn the fuel valve off and the engine should stop in about 20 seconds.

#### ***Quiz: using the engine***

1. Which of the following procedures/process is different on most boat engines compared with most cars:

Starting the engine

Stopping the engine

Using reverse gear

Keeping the engine cool

2. You have just started the engine and you notice there is no water coming out of the exhaust. You should

a) Stop the engine

b) Wait 30 seconds to see if anything changes

- c) Ask the skipper why there is no water coming out
- d) Carry on as normal

3. You have cranked the engine over 4 times and it still won't start. Which of the following could be the cause of the problem:

- a) Lack of fuel
- b) Lack of cooling water
- c) Low battery
- d) Weed round the prop

4. You have started the outboard and set off for shore. 20 seconds later it stops and won't re-start. Which of the following could be the cause of the problem:

- a) Run out of fuel
- b) Breather valve not open
- c) No cooling water
- d) Fuel valve not open
- e) Weed round prop