Section 1: Vessel Handling

Section Contents Page

Section learning outcome

Learning outcome 1

On completion of this learning outcome the learner will be able to manoeuvre a power driven vessel of less than 12 metres in length in various conditions of tide and weather to carry out operations of small commercial vessels in sheltered and inshore waters.

Assessment Criteria:

- Explain the differing manoeuvring characteristics of a small power driven vessel with regard to:
  - effects of displacement and planning hulls
  - outboard and inboard engines
  - stopping distance
  - response to rudder movements at varying speeds
  - transverse thrust of propeller
  - single propeller and twin propeller propulsion units
- List precautions to be taken and explain actions to counter the effects of external conditions on manoeuvring a vessel including:
  - tidal streams
  - confined waters
  - poor visibility
  - heavy weather conditions including strong winds, high sea state, heavy swells and surf
  - proximity to other vessels that are berthed, at anchor, underway but stopped, or underway and making way particularly large vessels
  - crossing a river entrance bar

- Manoeuvre a vessel to let go and weigh anchor demonstrating:

  briefing requirements for crew

  preparations for letting go

  manoeuvring to let go and lay out cable

  an ability to assess when a vessel "has its cable" or the anchor is holding

  an ability to recognise when an anchor is dragging manoeuvres to shorten in cable and weigh anchor

  procedures for securing the anchor for sea

  a knowledge of the different types of anchors and their se

  a knowledge of the factors to be considered in choosing an anchorage

- Manoeuvre a vessel to berth and cast off from alongside a wharf demonstrating:

  briefing requirements for crew

  safety requirements onboard

  correct manoeuvring actions for the prevailing conditions of wind and tide

- Manoeuvre a vessel to come to and slip from a buoy or pick up a mooring demonstrating:

  briefing requirements for crew

  safety requirements onboard

  correct manoeuvring actions for the prevailing conditions of wind and tide

- Manoeuvre a vessel to take another small vessel in tow demonstrating:

  briefing requirements for own crew and master of the other vessel

  safety requirements and preparations towing vessel and vessel being towed

  correct manoeuvring actions for the prevailing conditions and types of vessels to approach the other vessel, pass and take up the tow and subsequently release the tow

Conditions:

Assessment will include written and/or oral tests and practical assessment tasks

in the workplace

on board a vessel of appropriate size and power in survey

in a simulated environment

on a training vessel

You could be asked to demonstrate your knowledge and practical skills in:

Manoeuvring a vessel to berth, unberth or anchor.

Manoeuvring a vessel to pick up a person overboard

Manoeuvring a vessel to moor at a buoy

Towing a vessel

Section introduction

In this section we will examine the factors that affect the manoeuvring characteristics of a vessel and the difference between the manoeuvring characteristics of various types of vessels with differing propulsion. You will then further examine how to manoeuvre a vessel to berth, unberth, moor, and anchor a vessel.

Section learning sequence

- Manoeuvring Characteristics.
- Effects of External Forces on Vessel Handlling
- Handling
- Anchoring
- Berthing/Unberthing
- Securing a Buoy
- Towing

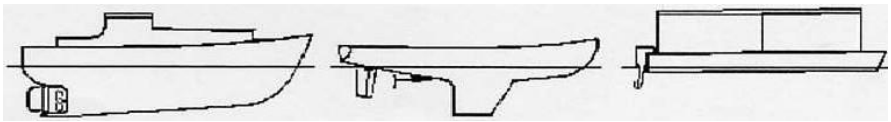
1.1 Manoeuvring Characteristics

To carry out safe and satisfactory manoeuvres at close quarters requires a knowledge of the handling qualities built into a craft and a sound understanding of the basic techniques for making the best use of these qualities.

Many design features will affect the handling of any craft, the most important are:

The underwater profile
The windage effect of hull and superstructure
The rudder or steering device
The size and efficiency of the propeller or propulsion device

The underwater profile



Three profiles are shown in the above sketches.

The craft on the left, a displacement motor vessel, has a long straight keel and a large wetted surface. Such a craft will hold its course well, will respond slowly to the helm and be little effected by windage.

The craft in the middle, a yacht, has a deep yet short keel concentrating the wetted area midships. Such a craft will be easy to deviate from her course and respond readily to the helm. It will also be little effected by windage.

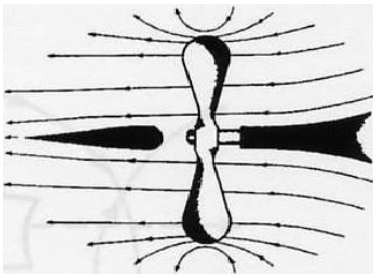
The third vessel is of light displacement, flat bottomed with little wetted surface area. It will not respond well to the helm and be adversely effected by windage.

The longitudinal point around which a vessel turns is known as its' pivot point. The pivot point of a vessel is largely determined by its' underwater shape. For most small vessels with inboard engines it is about 0.33 of the length of the vessel from the bow.

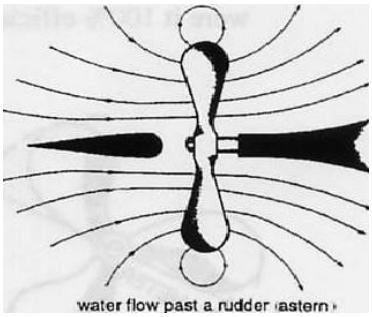
The rudder

A rudder operates by deflecting the water flowing over its surface. Its effectiveness is governed by the surface area (size), the speed of the water passing over it and the angle of deflection.

The angle of deflection is controlled by the helm setting to a maximum of *35* to 40 degrees.



water flow past a rudder ahead,



water flow past a rudder astern

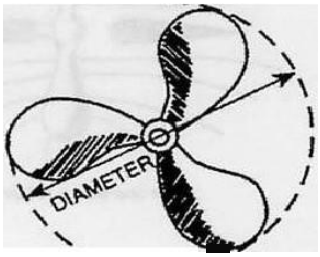
Vessels that travel at low speeds will require a large rudder to handle well. Those that travel at high speed generally have small rudders and will respond well to the helm at speed, at low speed the rudders will have little effect and response to the helm will diminish.

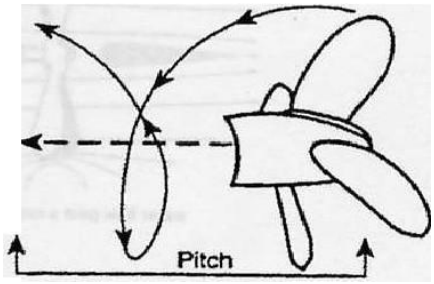
The rudder is generally placed directly astern of the propeller. When forward power is engaged the propeller 'pumps• water over the rudder surface increasing its efficiency and steerage. When power astern is engaged the propeller 'sucks' water from astern with minimal flow past the rudder as the propeller thrust goes towards the bow. This is why the rudder is more effective when propelling ahead than astern. If astern propulsion is applied while the vessel is moving forward, water movement around the rudder will be confused and the rudder will probably have no effect at all.

The propeller

The correct term for the propeller is the screw propeller. As the propeller turns it screws its way through the water and draws the boat along. The power created by this action is called axial thrust.

You will commonly hear the size of propellers referred to as two figures, eg 300 x 250. The *first* figure refers to the overall diameter (300 mm in this case), the second to the pitch (250 mm). The term 'pitch' describes how far that propeller would draw the vessel forward (or astern) in one revolution were it 100% efficient.





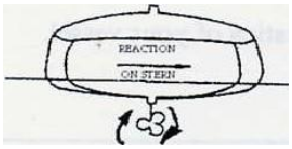
Propellers can be made for engine and gearbox combinations that turn the shaft in either direction. They are described as either right or left handed. Looking from astern a right banded propeller turns in a clockwise direction for forward power and anti-clockwise for astern. For a left banded propeller the opposite applies.

The propeller rotates and draws us along using axial thrust and produces a side effect called transverse thrust, also known as paddle wheel effect or prop walk. Transverse thrust is caused by the increase in water pressure and density with depth making the propeller blades more efficient at the bottom of their rotation. The water flow to the blades at the top of the rotation may also be adversely effected by hull form and obstructions.

Transverse thrust has the effect of trying to tum the vessel. A right handed propeller will 'walk' the stern of a vessel to starboard and the bow will swing to port when forward power is applied. A helmsperson automatically corrects for this by applying a small helm adjustment. In the same vessel when power astern is engaged the stem will 'walk ' to port and the bow swings to starboard. Adjustments to the helm will not counteract this.

Remember: The direction of 'walk' and bow swing will be the opposite for a left handed propeller. Transverse thrust is most noticeable when power is first applied. It ismore noticeable when going astern than ahead.

BOW SWINGSTOPORT



STERN SWINGS TO STARBOARD WHEN GOING AHEAD

STERN SWINGS TO STARBOARD WHEN GOING ASTERN

The effect of transverse thrust with a right handed propeller going ahead and astern is the opposite of a left handed propeller.

The propeller/gearbox combined with the available power will decide how the vessel will respond to the throttle. High speed vessels with a small diameter heavily pitched fast spinning propeller and vessels designed for towing with a large diameter moderately pitched slow spinning propeller will normally respond well to the throttle. Vessels designed to steam economically will normally react poorly to the throttle getting underway and stopping slowly.

Outboard engines steer well ahead and astern when in gear with no effecti ve steering in neutral. Twin outboards have some similar characteristics to twin screws.

Written Activity1

Describe the manoeuvring characteristics of your vessel.

_____

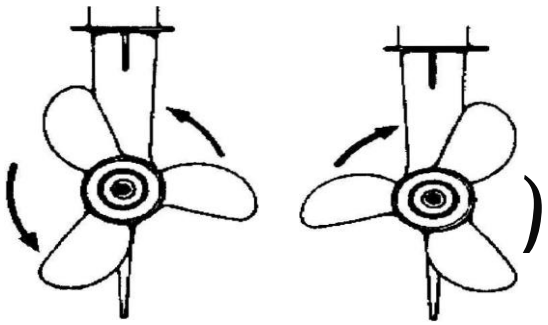
_____

_____

_____

Twin Screw Vessels

In twin engined vessels the propellers are normally counter rotating. That is, the starboard hand propeller is normally right handed and the port propeller left banded.



There are numerous benefits of having twin propellers, those that effect vessel handling are listed below:

Extremely manoeuvrable

Steering without a rudder

Negating transverse thrust

Manoeuvreability

Due to the configuration of the propellers it possible to tum a twin screw vessel around more easily than one with a single screw. To carry out this manoeuvre engage ahead on one engine and astern on the other. Then adjust the throttles, a few more revs are generally required on the astern engine to prevent forward progression. This action would cause the vessel to tum on the spot.

Steering without a rudder

Whether going ahead or astern a twin screw vessel may be steered by adjusting the revolutions and/or gear of each propeller.

Negation of transverse thrust

When both engines are engaged either ahead or astern each negates the transverse effect of the other and the vessel should track straight. Transverse thrust still exists and can be used to advantage in vessel manoeuvring.

You can estimate how you would expect a vessel to perform from a visual inspection, only with practice and experience will you get a feel for that particular vessels manoeuvring characteristics. For this reason it is essential to observe someone else while they are manoeuvring the vessel and also practice under the supervision of a person who is familiar with the handling characteristics of that vessel.

12 Effects of External Forces on Vessel Handling

121 Wind

The hull and superstructure of an vessels act as a sail. The effect is most noticeable when beam on to the wind and a light displacement vessel with little wetted area is going to be effected more than a displacement vessel with large wetted area.

This area exposed to the wind is known as the "windage area" and a large superstructure either forward or aft will affect handing by creating excessive windage' in that area.

The angle between the ships' head and its course through the water, attributed to the wind, is known as "leeway". Leeway is commonly observed by noting the difference between the vessels' wake and the course steered.

The effect of the wind varies according to the windage area of the vessel and it is important for you as the Master to be familiar with the effect of the wind on your vessel in various conditions of loading.

Written Activity 2

Identify your vessel's. windage area. Describe the effect windage has on manoeuvring your vessel whilst berthing and turning abreast.

Current

Tidal streams and currents move a body of water in a particular direction. In a close manoeuvring situation, such as berthing or picking up a buoy, by approaching into (stemming) the tidal stream or current the vessel will have greater manoeuvreability at slow approach speeds (due the flow of water past the rudder) and a shorter stopping distance.

If the current or tidal stream is in the same direction as the approach, the vessel will have poor steerage at slow approach speeds and increased stopping distances, with a resultant increase in transverse thrust. However, if the current is from abeam it would again cause problems preventing the vessel from coming alongside the berth or bringing the vessel alongside at an increased speed.

The wind and current will always have an effect on your vessel and will need to be taken into consideration in all aspects of a voyage. Learn, where possible, to use them to your advantage especially when berthing, unberthing, anchoring, picking up or leaving a buoy.

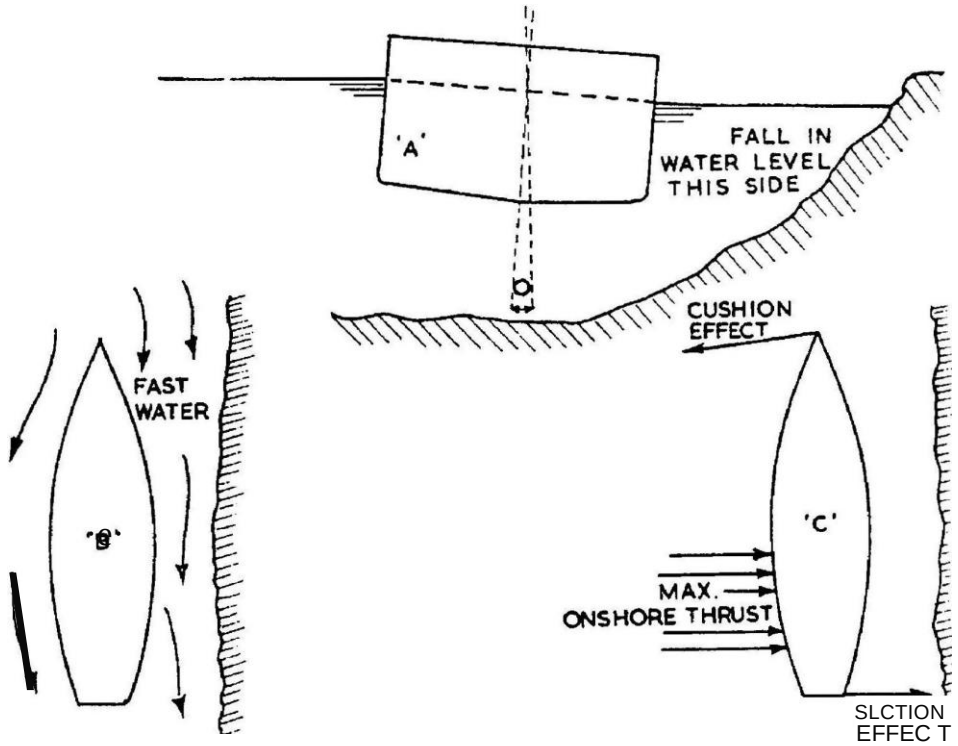
122 Confined Waters

The motion of a ship causes an increase in water pressure at the bow and stern and a reduction in pressure amidships. Interaction occurs when the normal flow of water around the bull is restricted by the influence of a nearby external source such as a breakwater, dredged channel, shallow water or by the close passage of another vessel (interaction between vessels is dealt with in section 1.2.5).

In shallow water, vessels may experience significant changes in manoeuvring characteristics including loss of rudder effect, changes in transverse thrust or, most noticeably a reduction in vessel speed accompanied by a change in trim. The change in trim to a vessel may be by the head or by the stern depending on the hull form of the vessel. This change of trim is commonly known as 'Squat' (Shallow Water Effect, or Smelling the bottom) and has the effect of increasing draft when this is least desirable. Vessels with fine hull lines will squat by the stem and a barge shaped vessel will tend to squat by the head.

Squat can be reduced by the reduction of speed, as this reduces the speed of the water passing below the hull, reducing the intensity of the low pressure area under the vessel and therefore the vessel does not "sink" as much into the low pressure area.

When operating in proximity of breakwaters, dredged channels or steep banks allowances need to be made for the effects of Interaction. The bow and stern of the vessel will be repelled whilst the body of the vessel will be attracted to the obstruction. This creates little problem if the obstruction is continuous and you can travel in the middle of the channel created, all the forces balance. If it is not continuous or you must travel on one side you will need to compensate for these effects.



1.2.3 Poor Visibility

When operating in or near an area of restricted visibility you must navigate with extreme caution, taking into account the factors considered in the International Collision Regulations and best practice of seamanship.

1.2.4 Heavy Weather Handling

Ideally a vessel at sea should avoid heavy weather conditions, this is often not possible. If adverse weather is expected or encountered action should be taken to ensure the safety of the vessel, passengers and crew.

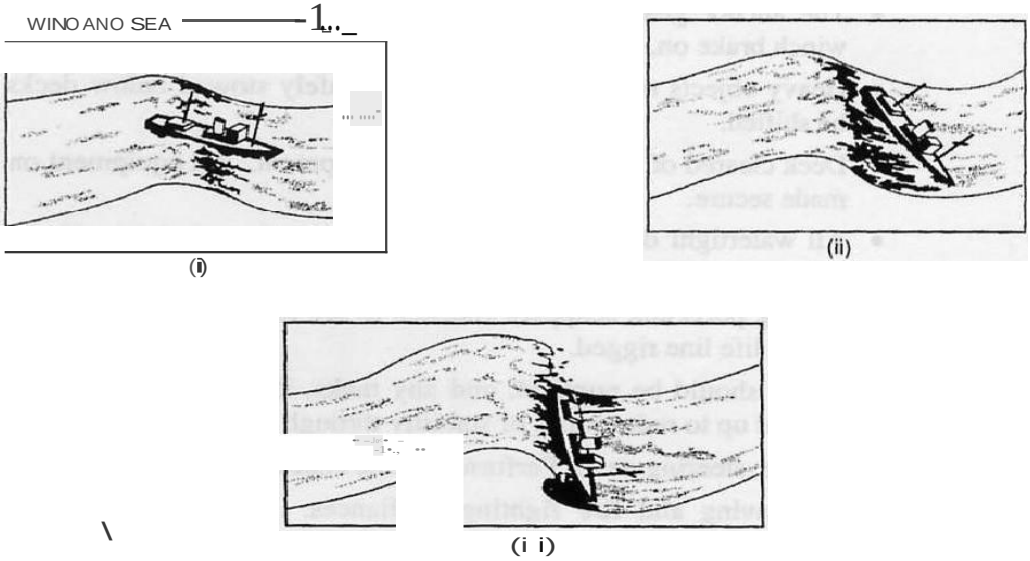
A prudent ship's Master should be aware of the vessel's sea handling ability, knowledge of the vessel's stability, how to handle the vessel in adverse weather conditions and steps to take to prepare the vessel for heavy weather.

Check:

- The anchor gear to see that the anchor is secured, the stopper fitted, winch brake on, spurling pipe and any other openings made watertight.
- Heavy objects or cargo that could be safely stowed below decks should be shifted.
- Deck cleared of any loose debris or equipment. All equipment on deck is made secure.
- All watertight doors, hatch covers and openings to below deck secured and water tight.
- Freeing ports and scuppers checked to see they are free and working and a deck life line rigged.
- Bilges should be pumped, and any tanks, if possible, either emptied or pressed up to reduce loss of stability through "free surface" effect.
- Engine, steering gear. Perform routine checks and maintenance.
- Lifesaving and firefighting appliances ready. Have flares, grab bag and lifejackets on hand.
- Put position on chart and report to a shore station with a radio check.
- Have a meal and prepare simple food for later.

If heavy weather is expected to be encountered the vessel should be prepared. First check the anchor gear to see if the anchor is snug in the hawse pipe or securely positioned. If available, the stopper fitted, winch brake on, spurling pipe and any other openings made watertight. Any heavy objects or cargo that could be safely stowed below decks should be shifted. Deck cleared of any loose debris or equipment or made secure. All watertight doors, hatch covers and other openings to below deck secured and water tight. Freeing ports and scuppers checked to see they are free and working and a deck life line rigged. The bilge should be pumped, and any tanks, where possible, either emptied or pressed up to reduce loss of stability through the "free surface" effect. Check engine, steering gear, life saving and fire fighting appliances. Put position on chart and report to a shore station with a radio check.

If encountering heavy weather and rough seas is unavoidable, it should be remembered that rough seas not only make the vessel uncomfortable, but can also cause extreme structural damage, often the first and most convenient action is to slow down the vessel's speed or change course, particularly if the seas are on the stern or quarter. Taking a big sea head on, or a point or two off the bow results is the safest way of handling the situation. Running before heavy seas is dangerous because the hull is lifted by stem and you can lose steerage and power often leading to a situation where the vessel is "broached" or even capsized. Also when running before heavy seas there is the possibility of the vessel being "pooped " or swamped by a following sea, which can lead to broaching or capsizing.



BROACHING

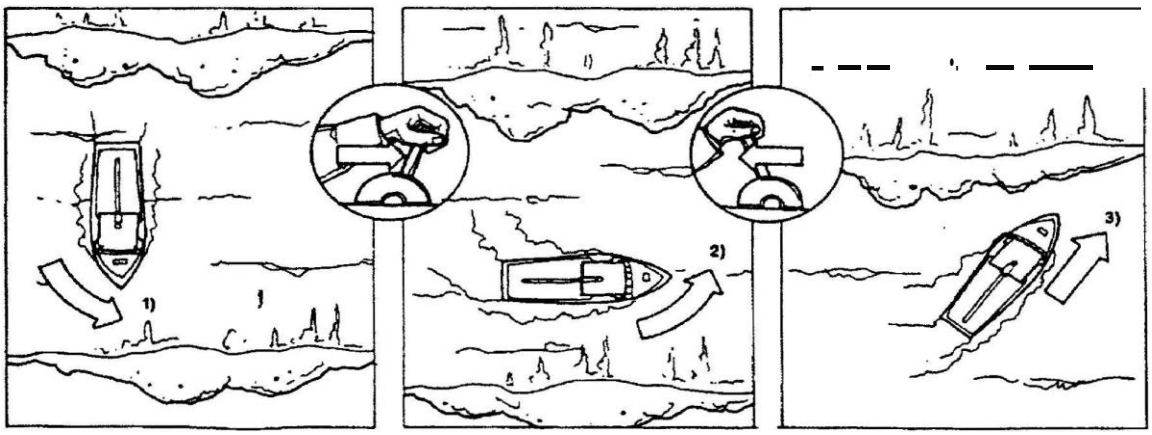
POOPING

Boarding And Quartering Seas

When the sea is on the bow, the vessel rolls and pitches simultaneously, and the resistance of the vessel's headway reduces the angle of roll. When the vessel runs with the sea however, the roll increase because there is less resistance forward, and because the wave runs past the vessel more slowly and stays in contact longer. The result is a pronounced roll and pitch and the possibility of heavy seas being taken over the stem. Because the sea is traversing the vessel from astern, the rudder is less effective, and the vessel may be slewed across the waves and broach. The added weight of water from boarding seas can produce the danger of a capsize.

Turning In Heavy Weather

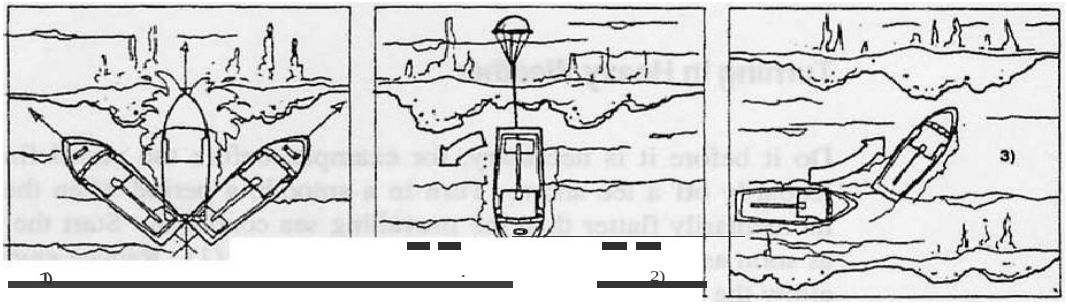
Do it before it is necessary, for example, before the vessel finds itself in jeopardy off a lee shore. Tum in a smooth period when the waves are momentarily flatter than the prevailing sea condition. Start the manoeuvre as soon as the wave crest has passed the vessel (1). Reduce engine speed to allow the sea to pass quickly. Tum the wheel hard over and tum the vessel in the trough between the crests. Try to turn fast enough so you are head-to the next wave. Apply power to complete the turn quickly but don't gather too much headway (2). Reduce speed as soon as the vessel is nearly head- to-weather (3).



Don't turn when there is water on deck. Prudence dictates turning well before damage or loss of stability dictates. A stem trawler with a ramp may have to tum to weather before other vessel types because the sea will run up the ramp and break on the deck. High bulwarks ordinarily make it comfortable to work, but become a water trap in these conditions. Freeing ports must be kept clear.

Heavy Weather Handling

Taking the seas on the port or starboard bow lessens some of the pitch (1). At the right speed, going to weather is safer than having the weather abeam or astern. If there is sufficient room. speed can be reduced until only steerageway is maintained, and the vessel is "hove-Lo" or jogging with the seas at an angle to the bow. When the conditions warrant, reduce speed and let the swells roll by, or even use a drogue or sea anchor (2). Avoid the trough except in an emergency. When you are moving broadside to the waves, turn the wheel momentarily to take larger crests on the windward bow, then return to course when conditions permit (3).



Sea Anchors

The sea anchor or drogue can be deployed in many situations, for example, in deep water where the conventional anchor is impractical. It can be used to slow the progression of the vess,eJ in a distress situation , or when a vessel is being driven faster than the wave train in a following sea. When streamed from the bow in heavy weather (heaved to) it will keep the bow into the wind and waves, easing the stress on the vessel and creating a degree of comfort for those on board.

In the situation of a sea anchor being needed, but one not being available, suitable substitutes can be created using such material as: bundles of nets or bags, or short lengths of wood, tied in such a way it can be deployed! to retard the vessels progression.

The sea anchor when deployed from the vessel's bow or stern should have enough scope so that the vessel and the sea anchor will not be on subsequent wave crests at the same time.

1.2.5 Interaction between Vessels

The pressure fields of two vessels in close proximity on the same or opposite headings will interact and require corrective action to maintain course. The large suction zone around the longer of the two vessels may be the dominating factor in Interaction between vessels of significantly different size. This may present a very dangerous situation for the smaller vessel, particularly if it is overtaking.

Factors that increase the risk of interaction are, high speed, large size vessel, narrow channel and shallow water. The pressure waves that create Interaction are proportional to the square of the vessel speed, thus the effects of all forms of interaction can be instantly reduced by reducing speed. In some cases consideration will have to be given to the loss of steering control associated with speed reduction.

Overtaking vessels should avoid passing too close in open waters when there is room to manoeuvre, and be particularly cautious in narrow channels when overtaking or being overtaken.

1.2.6 Crossing a River Bar

A bar is an accumulation of sand or silt at the entrance of a river or a lake. The build up could occur due to a current running across the mouth of the river or entrance of the lake, depositing sand across it. Or also the possibility that a river depositing silt at its mouth where it meets the sea.

This may be the result of a natural battle between the ocean trying to close the opening and the flow from the inlet trying to keep it open, or the result of a river depositing silt at its mouth.

Bars cause the waves to get steeper and in some cases break as they get to the bar. For this reason it is important to take a number of precautions and manoeuvre the vessel with extreme caution over a bar. Crossing bars should be avoided if the wind and waves are in opposition as may occur during strong land breezes or offshore winds, rough weather or ebb (outgoing) tides.

If you intend to cross the bar for the first time ensure that you check with the local authorities who would be able to give additional information regarding the safest passage over the bar or the peculiarities of it and the best crossing time.

When approaching the bar keep a good lookout for changes in the water colour, the bluer the water, the deeper it is. Breakers or waves that are steeper at one section of the wave front indicates shallow water.

If you intend to cross a bar, even one that you are familiar with, check with the local authorities for the latest condition report and weather.

When crossing the bar the following factors need to be amongst those taken into consideration:

- Advise Coast Guard or authorities of intentions
- Ensure all loose gear is stored and secured.
- Minimise the trim of the vessel
- Before approaching the bar test engines (both ahead or astern) and steering.
- While approaching the bar keep a close lookout for depth of water, smallest waves, where the breakers are etc.
- Monitor the wave pattern waiting for a larger than normal set of waves.
- Increase power of the vessel to catch up with the bigger set of waves and position the vessel above the crest of the wave (ensure the vessel does not "surf" down the face of the wave).

If crossing against the incoming waves:

- Motor slowly to the breaking waves looking for the area where the waves break last or even better, not at all. Wait for a flatter than usual stretch of water and motor through.
- If there seems no respite in the waves slowly power through each oncoming wave ensuring that you are not going to fast over each wave as this would cause the vessel to "bottom out" if it pitches heavily.

- If possible make the crossing with the waves slightly on the bow so that the vessel gently rolls over the crest of each wave.

Commercial Vessel Bar crossings. The following rules exist for commercial vessels crossing coastal bars:

- The Master must possess a bar endorsement on his Certificate of Competency
- Day time crossing only
- Wind strength below 20 knots
- Wave height below 2 metres
- Life Jackets to be worn by all on board
- All persons in an open area of the vessel

1.3 **Anchoring**

After selecting of an appropriate anchoring position and ensuring that the bitter end of the anchor rope/chain is secure the following procedure may be adopted:

- Plan your approach to the position heading into the wind or the tidal stream.
- Prepare the anchor for letting go by removing chocks or lashings. Test the windlass and if necessary lower the anchor over the bow keeping it clear of the water. This position is known as a-cock-bill. The anchor is now ready to veer (under power) or disengage the clutch if the cable is to be surged.
- Check your echo sounder to reconfirm the depth, check your position.
- Stop engines.

If your vessel does not develop a slight sternway, give a short burst astern on the engines.

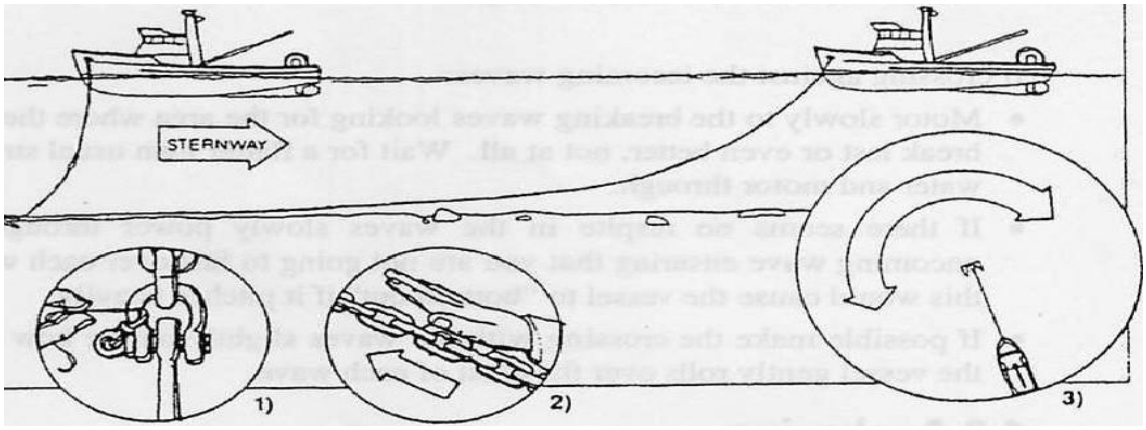
Let go the anchor. Let the cable run out freely until it reaches the bottom.

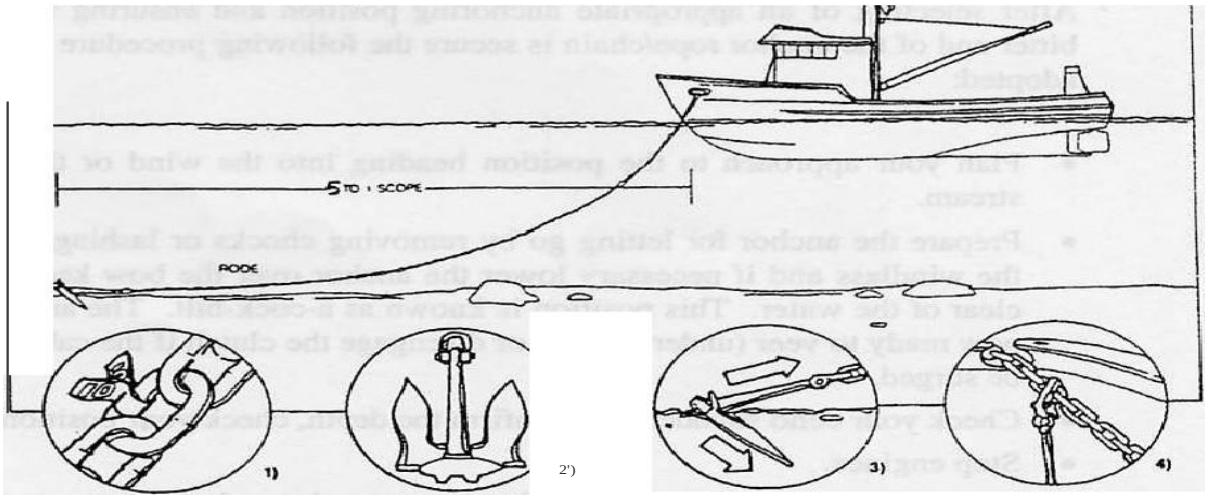
Apply the brake slowly reducing the speed the cable is paid out so as to ensure that it does. not "pile up" at the bottom.

When the final required length of cable has been deployed secure the brake.

Wat.ch the cable as the vessel is "brought up" or "has its cable". This is a critical stage, because as the cable takes the weight of the vessel it is important to observe the cable. If the anchor cable shudders or goes slack and tightens again it indicates that the anchor has dragged om the bottom. The cable should go taut and then slack again in a smooth fashion indicating that the anchor has held.

Watch the cable for a couple of minutes to ensure that the anchor does not drag. A small amount of stern power may be required to ensure that the anchor has 'set'.


STERNWAY
1)
2)
3)


5 TO 1 SCOPE
RODE
1)
2')
3)
4)

Weighing Anchor

Before commencement of weighing anchor, ensure you have a capable person forward. The vessel should be manoeuvred forward to take the weight of the anchor and cable. When the cable/rope is "up and down" commence heaving anchor. Have the deck hose ready to wash down the anchor if the vessel is not fitted with an anchor wash. The person forward should watch the anchor and cable come up to ensure it is not entangled. As soon as the anchor is clear of the water and the person forward sees that the anchor is clear, inform the wheel house and the vessel may then proceed.

Securing the Anchor for Sea

When the anchor is securely housed in the hawse pipe:

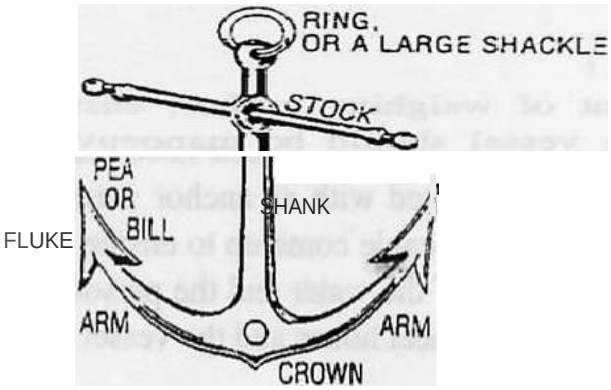
- Tighten the brake.
- Take the windlass out of gear.
- Put the "Riding Chock" or "Bower Stopper" in position.
- Secure the "Devils Claw" to the anchor chain.
- Position the metal guard plate over the spurting pipe.
- Seal the spurting pipe by cementing the plate in position.

Selecting an Anchorage

The following factors should be amongst those taken into consideration when choosing a safe anchorage:

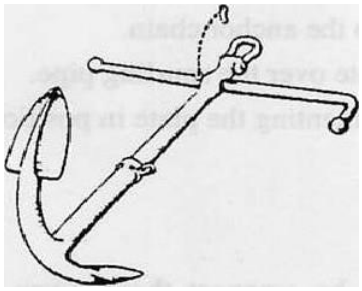
- Does the area provide shelter from the prevailing and expected winds
- It must be easily accessible
- Sufficient swinging room
- Sufficient depth of water at all levels of tide.
- Good holding ground if intending to anchor.
- Distance of the safe anchorage from your present position.
- Estimated Time to reach the anchorage in the prevailing conditions
- is it in the likely path of a storm
- effect of a storm surge in the anchorage
- any submarine cables or ordinance areas that make the haven unsafe.

Consult the chart of the area you are operating in and with your Master's assistance determine a safe anchorage and an alternative.

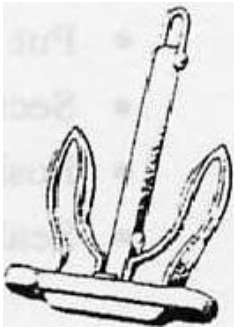


Parts of an Anchor

Types Of Anchors

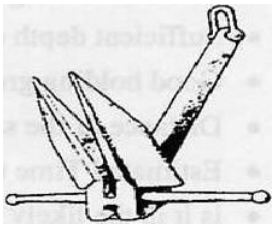


Admiralty or Kedge
Until the DANFORTH and CQR.it was considered to have the greatest holding power. One disadvantage was that in shallow water, vessel may sit on the fluke

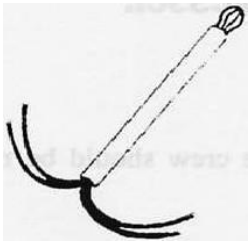


Stockless
Has the advantage that it can be heaved home in the hawse pipe. Holding power less than the Admiralty.

CQR
Excellent holding power.
Hard to stow.



Danforth
Good close stowing



Reef or Grapnel
Practical for use on reef. Not suitable for general purpose use.

Practical Activity

Understudy tile master of your vessel for a number of anchoring operations and when you and the master are confident of your progress carry out the operation under supervision of the master/facilitator. Keep a log of all the checks carried out and the procedure followed.

The key competencies addressed by this activity are working with others as a team, organising information and using technology.

Written Activity 3

Describe how you would anchor your vessel.

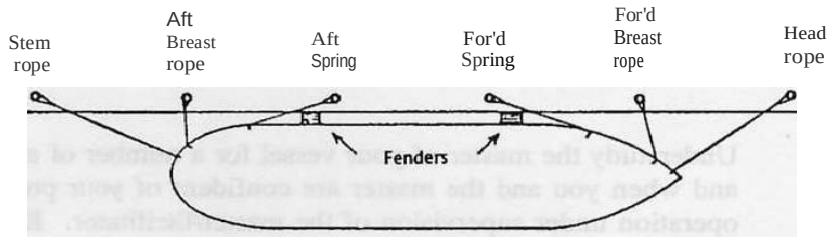
14 Berthing/Unberthing a vessel.

1.4.1 Briefing Cirew

Well before he vessel is to berth the crew should be made aware of the following;

- Which side alongside.
- Positioning of fenders
- Number and position of ropes to be made ready
- Sequence of mooring ropes to be made fast.
- Check all unnecessary gear is secure
- Check all passengers seated
- Check all passengers notified to keep limbs inboard

Mooring Terms



The bow line runs through the fairlead or bow chock. The stem line runs through the after fairlead or chock. These lines should be run well along the wharf or berth and hold the vessel in.

Breast lines may be run perpendicular from the bow, midship or quarter to keep the vessel from moving away from the wharf or berth.

Spring lines run from the bow and stem to stop ranging, (fore and after movement of the vessel).

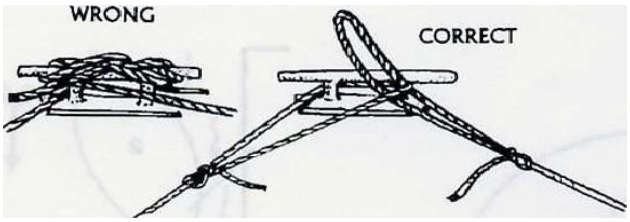
When securing alongside attention must be paid to the range of the tide, at high tide leave enough slack to ensure the lines do not part as the tide falls. Mooring lines should be checked at each turn of the tide. Use only lines with eyes spliced onto tbe shore end so the line can be. tended on board. Avoid sharp bends in the mooring lines where they pass through fairlead or chocks, use some form of anti-chafing gear around the bends.

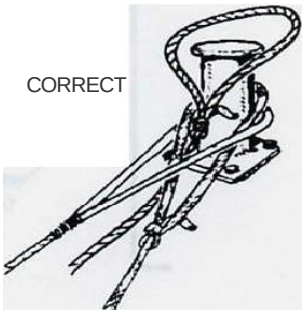
Securing the Line Inboard

There are many forms of fittings for this purpose, on large vessels the most common are bitts, in smaller vessels we use cleats, stag born bollards or sampson posts, in all cases first take two full turns of the line around the base before the line is secured with figure eights.

Dipping the Eye

If two bights or eye splices are to be placed over the same bollard, the second should lead up through the eye of the first so that either can be removed independently.





Snubbing a Line on a Cleat or Bitts

Never try to hold a vessel without taking turns of the tine around the fitting. Stand well back out of the bight of the line and at 90 degrees to the angle of pull.

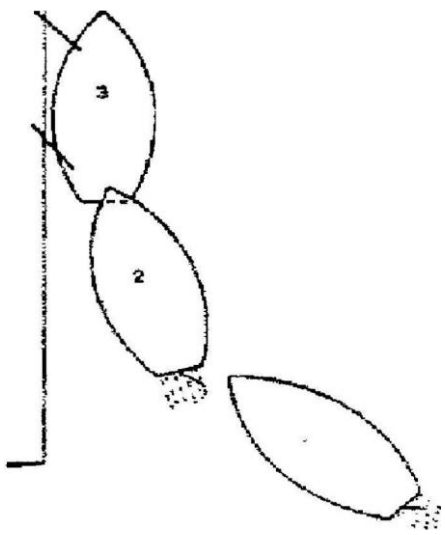
Spring Lines

Learn how to use the spring lines, bow or stem, for manoeuvring the vessel in and out of tight spaces. They can be used to spring a vessel onto or off a wharf or berth, to clear other vessel or when being warped around the end of the berth.

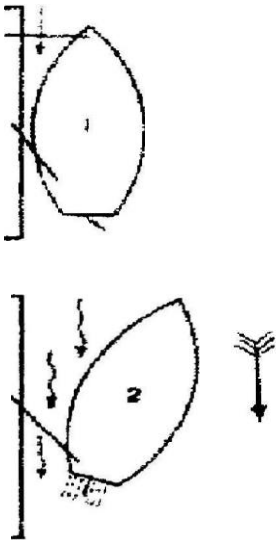
Mooring lines should be checked frequently for signs of wear or fatigue. When not in use lines should be correctly stowed and protected from the weather and direct sunlight.

Unless there are very pressing reasons such as wind, tide, or berthing space, a vessel should always be berthed taking advantage of transverse thrust_ That is port side to for a vessel with a right handed propeller.

Before berthing check astern and ahead controls for operation. Approach the berth with sufficient speed to ensure positive steering, at an angle of around 20 to 30° with the bow heading for the far end of the berth. When the bow has nearly reached the required position full starboard helm should be applied then the forward way checked with a firm burst of astern power. This will swing the stern in towards the berth, and bring the craft neatly alongside. See sketch below.



Berthing



Leaving the Berth

It is difficult, if not dangerous, to try to berth on the weather side of a jetty or pontoon if the wind is strong. Under these conditions it is desirable to seek a berth on the lee side.

Equally difficult is to come into a berth travelling in the same direction as a strong tidal stream or current. If this is attempted the engine driving astern has to take off the way of the vessel and provide speed astern through the water equal to the tide or current. The craft should be turned to approach the berth stemming the tide or current. If this is not possible mooring ropes may be required to hold the bow to the berth as you turn the rudder away from the berth and give the engine a short sharp burst ahead. This will cause the stern to pushed towards the berth while the bow is kept in position by the mooring rope.

Practical Activity

Understudy the master of your vessel for a number of berthing operations and when you and the master are confident of your progress carry out the operation under supervision of the master/facilitator. Keep a log of all the checks carried out, the procedure followed and crew briefing.

The key competencies addressed by this activity are working with others as a team, organising information and using technology.

15 Securing to a buoy.

The advantages of mooring to a buoy over anchoring are:

- You do not need to worry about the anchor holding ground
- A much smaller swinging circle and.
- You can expect it to be more secure than any anchor.

A standard mooring buoy has a large eye at the top to which you may secure your chain or wire as described below. However, many smaller moorings have a securing warp permanently shackled to the buoy or mooring chain.

The procedure outlined below is to moor to a standard buoy, if yoU1 moor to a smaller buoy, the approach to the buoy remains the same. The main difference being you can reach the warp with a boat hook or similar device and then drop it over the bits.

The first step in mooring to a standard buoy is to put a person onto the buoy, this will normally mean putting the dinghy in the water or bring the vessel alongside the buoy and put the person across.

You can now steam gently up to the buoy, stop with the bow alongside. Make sure your approach is up-wind or into the tidal stream. While you hold the vessel in position pass out a pick-up wire or rope, one end of which is secured on the forward bitts. This pick-up rope is passed through the eye of the buoy and back on board where it is secured.

This rope or wire will now hold you close to the buoy while you pass out and secure the mooring chain or wire that will be shackled to the buoy.

Don't forget to retrieve the person off the buoy.

The ship can now be allowed to fall back onto the main wire by slacking off the pick-up rope. (The pick-up rope should be left in place if your stay is not of long duration as you will use it in getting away from the buoy. Allow it to lie completely slack).

Leaving A Buoy.

To leave the buoy the reverse of the mooring procedure must be adopted. The vessel is about to proceed and is lying back on her cable or wire that is shackled to the ring of the buoy.

Put a person on the buoy and if the pick up rope was removed, pass the pick-up rope or wire exactly as you did when tying up to the buoy.

Bring the ship close up to the buoy so that the weight is taken off the mooring chain/wire. You can do this with main engines or by taking the weight on the pick up wire/rope.

With weight now taken off the main mooring wire/chain it can easily be unshackled by the person on the buoy.

Retrieve the person off the buoy.

Let go of the pick up rope.

As the vessel moves astern the pick up rope will be drawn through the eye of the buoy and clear of it allowing the vessel to proceed out of the mooring.

Practical Activity

Understudy the master of your vessel for a number of mooring operations and when you and the master are confident of your progress carry out the operation under supervision of the master/facilitator. Keep a log of all the checks carried out and the procedure followed.

The key competencies addressed by this activity are working with others as a team, organising information and using technology.

1.6 Towing

With the master's obligation to render all assistance as may be possible to a vessel in distress, the occasion may arise for you to provide a tow or be towed. Remember by law the only time you can refuse to give assistance is if it is impractical or places your vessel or crew in danger

In all other cases, to avoid any legal complications, before providing a tow or being towed, determine with the other party, a place of safety to be towed to, and payment, if any.

The following factors must be amongst those considered before taking another vessel in tow:

Does the exercise pose a danger to your crew or vessel?

Duration of the voyage.

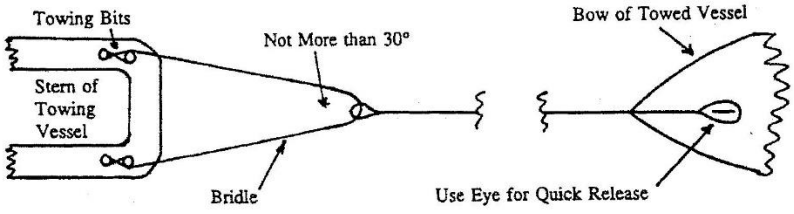
Whether you have sufficient fuel allowing for the additional drag.

The effect of the delay to your own vessel.

The power of your engines.

Notify the owners and insurers of your vessel.

In the event of being towed or towing establish contact, with the other vessel and establish who can supply the strongest and most efficient towing gear, preferably rigged as shown in the sketch. When the most efficient towing arrangement is rigged, the next thing is to pass over the tow, this may call for a degree of thought with particular emphasis on safety. The circumstances and weather conditions may govern this, it may be as simple as coming alongside the other vessel or as complicated as floating or transferring a messenger line prior to connecting the tow.



Tow rope at lease 20 mm diameter. Length of tow lines 3 times towing vessel's length.

During the tow contact must be maintained either by radio or prearranged signals and a visual watch should be kept on the tow. Remember the vessel being towed is in charge. The appropriate lights and shapes required by the collision regulations should be displayed.

It is possible to assist a vessel in calm water or confined conditions, by simply coming alongside the other vessel and making fast with bow, stern and spring lines. The two vessels must be positioned so that the propulsion and steering gear of the assisting vessel are well aft of the other vessel and in clear water, in this manner even larger vessels can be assisted and manoeuvred. Using this method of towing in confined waters gives the towing vessel better control over the tow.

If towing in heavy weather ensure that you use a long and heavy towing cable which should sag in the water. This prevents the movement of either vessel from jerking the towing cable reducing the chance of it parting. Also:

- Ensure the towing cable is not chafing against a sharp structure.
- Grease the cable at the point of contact with the vessel.
- Ensure that the tow cable can be released in an emergency under all conditions of load.
- If the towed vessel is manned use its steering gear.

To reduce yawing or sheering by the towed vessel:

- Stream a sea anchor behind the vessel being towed
- Rig a large sail or awning, either at the bow or the stern of the towed vessel.
- Trim it by stern by transferring weights.
- Alter course and/or speed.
- Increasing speed tends to correct a yaw directly caused by list.
- Decreasing speed tends to correct a yaw produced by adverse trim.
- Set the towed vessel's rudder at an angle to counteract the sheer.

Practical Activity

Understudy the master of your vessel for a number of towing operations and when you and the master are confident of your progress, carry out the operation under supervision of the master/facilitator. Keep a log of all the checks carried out and the procedure followed and the briefing of the crew as required.

The key competencies addressed by this activity are working with others as a team, organising information and using technology.

Practical Activities

Access a vessel in survey and practice the methods of berthing and unberthing a vessel using the transverse thrust of the vessel to benefit and to disadvantage.

Berth and unberth the vessel using mooring ropes to assist the process.

Manoeuvre the vessel to determine the direction of rotation of the propeller.

Small Ships Manual. Chapter on Management of Vessels in Heavy Weather.

Australian Boating Manual. Chapter on boat Handling.

Feedback

It is essential at this stage to carry out all practical activities on the vessel with the express permission and supervision of your master or facilitator.

When carrying out the manoeuvre do not single mindedly think of completing the manoeuvre but analyse the process and the associated factors that must be considered while doing so.

Section Summary

We have looked at the theory behind vessel handling and also the practical demonstration as to how these manoeuvres are carried out. It is essential to have a thorough knowledge of the preceding section as the Coxswain 'sjob is primarily that of safe vessel handling in conjunction with the various other aspects.

Check your progress

Analyse "Squat" how does this phenomenon occur and what are its effects?

Also consider how the effects of squat can be reduced.

2 What factors must be considered when choosing a safe anchorage?

3 Explain transverse thrust and the effect that it has on a left handed single screw vessel.