

NATIONAL POWERBOATING WORKBOOK 9th Edition



Candidate's
Name

Bob Moffatt



Wet Paper

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by Bob Moffatt.

To comply with 2016 AMSA requirements and 2015 Yachting WA practical observation checklists. Contains major changes to safety regulations, eg, no more PDF or capacity label references, ski observer age to 13 years and minor improvements to text, photographs and illustrations

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Important marine safety web sites

QLD www.msq.qld.gov.au
NSW www.maritime.nsw.gov.au
VIC www.marinesafety.vic.gov.au
TAS www.mast.tas.gov.au
SA www.transport.sa.gov.au
WA www.transport.wa.gov.au/imarine

Important marine education web sites

www.qld.yachting.org.au
www.yachting.org.au
www.marineteachers.org.au
www.educationqld.gov.au
www.qcaa.edu.gov.au

WA Recreational Skippers Ticket (RST) and Practical Observation Checklist (POC) page references

| RST task | Title | POC | Title |
|----------|---|-----|---------------------------------|
| 1 | Operate the vessel safely | 1 | Launch a boat from a trailer |
| 2 | Check the boat is secure & suitable for use | 2 | Recover a boat onto a trailer |
| 3 | Conduct a safety briefing | 3 | Depart berth using springs |
| 4 | Motor prepared and started safely | 4 | Set anchor |
| 5 | Skipper advises of voyage plan and logs or | 5 | Raise anchor |
| 6 | Safely depart a berth | 6 | High speed manoeuvres |
| 7 | Safely retrieve a man overboard | 7 | Arrive at a berth using springs |
| 8 | Use a transit to steer a steady course | 8 | Safely retrieve a man overboard |
| 9 | Perform a controlled stop at 5 knots | | |
| 10 | Vessel is secured beside a berth | | |
| 11 | Skipper logs off | | |

Shore based topics - see worksheets

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INTRODUCTION

The skipper's general safety obligations (GSO)

- All boat owners and operators are responsible for safety and therefore should assess boating risks.

The most important maritime safety principal is for operators to meet the “general safety obligation” or GSO, which encourages boat owners to achieve the highest level of safety.

- Operators can achieve this obligation by ensuring their boat is:
 - safe,
 - properly equipped and crewed and
 - operated in a safe manner.

Examples

Ensuring the boat is safe

- Suppose a boat is overloaded and swamped by a freak wave and a passenger drowns. The law may find the operator negligent, declaring the boat was unsafe as it was unstable with so many people on board.

Ensuring the boat was properly equipped and crewed

- If passengers have never been in a boat before, it is the skipper's responsibility to show them how to use safety equipment and how it is used. The skipper could be prosecuted if someone drowns and it could be proven in court that no safety briefing was done.

Ensuring the boat is operated in a safe manner

- If a boat is lost for a period of time and it is shown the skipper was unable to read a chart, plot compass bearings and use a compass, that person may be found to have operated unsafely.

Risks with using boats

If you are going to undertake safe boating you need to understand the hazards and methods used to control these risks.

Hazards

A hazard is something with the potential to cause harm. Hazards that may be encountered in handling small power craft involve:

- the water (tides, waves, currents, turbulence, depth, distance)
- the waterway (buoys/beacons, channels, bottom obstructions, nearby bar, flooding or strong currents after rain, other boats)
- the engine (moving parts, hot exhausts, propeller)
- the fuel (mixing, spills, fire, explosion)
- the boat (loose equipment, sharp edges, rocking/rolling, sun heated metal seats)
- the boat trailer (winch, wheels, towing vehicle)
- the boat ramp (slippery, rocks, broken glass, other boats)
- dangerous marine creatures (crocodile, stingers, oysters)
- the environment (sun, wind, radiation, glare)

Some hazardous situations that could develop are outlined below.

Some hazardous situations

- Person overboard
- Capsize
- Sinking
- Running aground
- Large wake from a passing vessel
- Collision with another boat
- Striking a submerged object
- Deteriorating weather conditions (rain, wind, rough seas)
- Starting a motor while someone is in the water near the propeller
- Slipping on the boat ramp
- Incendiary devices (flares) being used
- Uncontrolled rapid winding of a winch handle
- Handling and mixing fuels fire (motor or fuel)
- Coming into shore - passenger jumps up and off boat to "help" and gets run over
- Anchor left on ribs of tinny and passengers ankle gets badly cut

| LIKELIHOOD | CONSEQUENCES | | | | |
|----------------|---------------|--------|----------|-----------|-----------|
| | Insignificant | Minor | Moderate | Major | Severe |
| Almost certain | Medium | High | High | Very High | Very High |
| Likely | Medium | Medium | High | High | Very High |
| Possible | Low | Medium | High | High | Very High |
| Unlikely | Low | Low | Medium | Medium | High |
| Rare | Low | Low | Medium | Medium | Medium |

Figure 4.1 One type of risk assessment table

Risks

Risk is the likelihood that harm will occur from exposure to the hazard. Figure 4.1 shows a table that is commonly used to determine the risk as either low, medium, high or very high, (note that some tables add extreme).

Control measures (safety precautions)

Control measures or safety precautions are actions that can be taken to reduce the potential of exposure to or removal from a hazard. They employ a six step process that employs elimination, substitution, isolation, using engineering, using administrative instructions and finally using personal protective equipment to reduce the risk of an accident.

The list is usually hierarchical, with elimination the most preferred, and issuing personal protection equipment - least preferred.

Modern control measures usually contain a combination at least two, with administrative instructions almost always included.

For example, a 25 hP outboard motor is a hazard when carrying it to the boat to mount it on the transom. The following sequence of control measures could be followed:

1. **Eliminate** the hazard. *Eg, Do not allow passengers to carry motors.*
2. **Substitute** the hazard with a lesser risk. *Eg, Use a 15 hp motor.*
3. **Isolate** the hazard. *Eg, Mount the outboard on the transom permanently.*
4. **Use engineering controls** - *Eg, Use a small hydraulic lift to position the motor when mounting.*
5. **Use administrative controls** - *Eg, Issue instructions - two passengers to carry the motor.*
6. **Use personal protective equipment** - *Eg issue gloves, steel capped shoes, high visibility shirts, protective overalls.*

So it's up to you as the skipper to determine the risks and put in place safety measures to reduce the risks. If you can show you did this, then the risk of breaching your GSO is significantly reduced. Let's look at the trailer and the boat ramp to see how these propose risks to boats.

The trailer and boat ramp

Trailers have winches to pull the boat out of the water and back onto the trailer and can be electrical or mechanical. New winches have straps that are resistant to corrosion however older winches have galvanised cable which are prone to corrosion and need checking.

The winch cable has a shackle and eye bolt which connects to the boat, as well as a safety chain to hold the boat on the trailer while being towed. One hazard is the rapid unwinding of the winch if the boat is attached to the winch cable as the boat is launched.

Trailer fittings

Other fittings shown on a trailer in Figure 5.3 include a jockey wheel to help move the boat and trailer around; lights, registration plates, rollers and runners to allow the boat to slide off; brakes, grease seals, springs, axle and U bolts. Tie down straps keep the boat on the trailer while towing.

The towing vehicle

This has a tow bar and tow ball. The trailer has a towing coupling that connects with the tow ball to allow sideways and up and down movement of the trailer while it is being towed (Figure 5.3). A safety chain prevents the trailer coming loose if this mechanism fails accidentally. Figure 5.2 shows a support bracket that can be used to support the motor when towing and a clove hitch can be used to secure small items in a boat.

A brake and indicator system from the car connects to trailer lights by an electrical socket which must be checked every time it's connected.

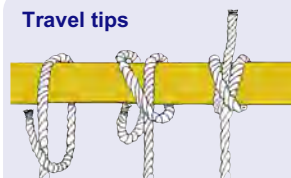
Wheel bearings need to be serviced at regular intervals according to the manufacturers handbook or just ask your dealer. It's a good idea to allow them to cool down before backing the trailer into the water.

Worksheet 1 is designed to summarise these points specific to launching the trailer and associated risks.



Figure 5.1 Check the lights and allow the bearings to cool.

Travel tips



A clove hitch can be used to secure small items in a boat.

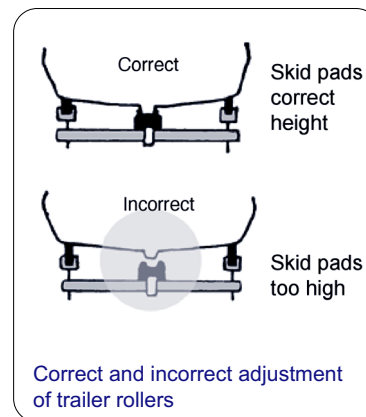
Use a bracket to support the motor - it stops the motor from bouncing up and down while towing and protects the tilt mechanism.



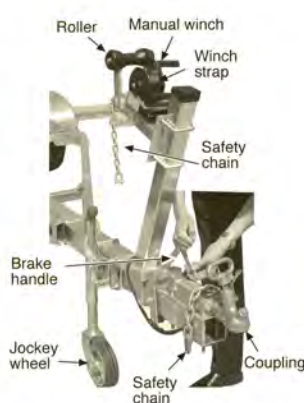
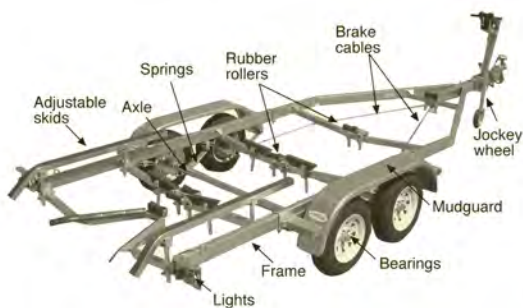
Figure 5.2 Travel tips

Winch safety

- Check the condition of the winch cable and replace repair broken strands.
- Keep the winch cable and components greased.
- Unwind the winch cable so that it is ready upon return.
- Inspect the winch cable for damage to avoid breaking under strain.
- Never stand in line with the winch cable in case it breaks.



Correct and incorrect adjustment of trailer rollers



New innovation - Retriever-mate

Reference
Whitfords Online catalogue

Figure 5.3 Parts of the trailer system

WORKSHEET 1 AT THE BOAT RAMP

Launching

Q1. Explain the following terms:

Hazard

Risk

Safety precautions (*Control measures*)



Q2. Identify any three hazards that could be found on the boat ramp in the photograph above.

Q3. Describe any five safety control measures you could use to reduce risks while using the boat ramp shown above.

Q4. Justify four winch safety tips.

Q5. Explain how to protect an outboard motor while towing on a trailer behind a car.

Q6. Identify the following safety features on the trailer using the list of terms below.

Roller, manual winch, winch strap, safety chain, coupling, brake handle, jockey wheel, safety chain to towing vehicle.

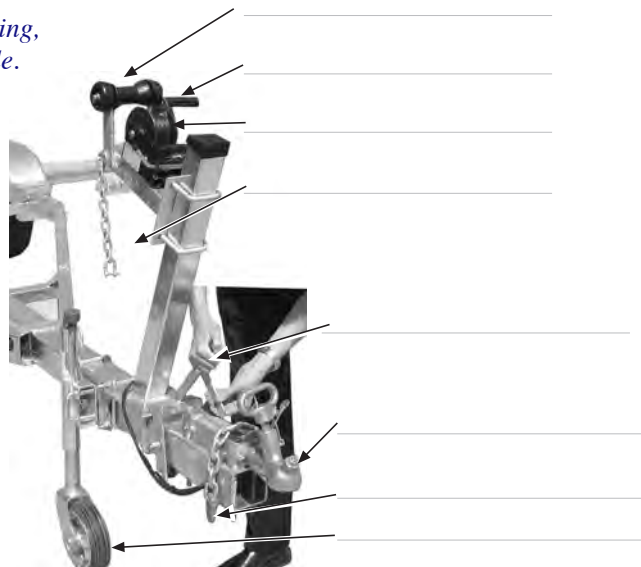
Q7. Suggest a care and maintenance procedure for the following parts of a trailer.

Winch

Lights

Bearings

Jockey wheel



CHAPTER 1 BOAT SYSTEMS

Hulls

Two common types of boating hulls, displacement and planing, are shown in Figure 7.1.

- A displacement hull is a type of hull that ploughs through the water, displacing a weight of water equal to its own weight.
- A planing hull allows a boat to glide over the water rather than ploughing through it.

Hulls are designed for the type of propulsion required so the motor power and weight on as vessel should never exceed the manufacturers design.

If this occurs the hull may break and cause the vessel to sink rapidly and you most certainly will breach your general safety obligation.

Parts and places

The hull is the main structural body or shell of the boat and is joined at the front of the boat to create a strong stem. At the other end it forms the transom - a flat, vertical aft end of a boat, which is strengthened with a plate onto which a outboard motor can be attached.

- The front of the boat is called the bow and the back the stern. The left side is port and the right side starboard, when facing forward.
- The helm is the place where a vessel is steered. It includes the rudder, steering wheel and tiller and can be at the stern as in the case of a dinghy or in the cockpit of a run-about.
- If the boat goes forward it is said to go ahead and astern if backwards.
- The keel is the part of a boat extending along the bottom of the hull from stem to stern. Other parts include cleats and bollards as shown in Figure 7.3 and 7.4.
- The freeboard is the distance from the gunwale to the water. Most often this will vary along the length of the boat and can even be the lowest point of the transom.
- The gunwale is the upper edge of a boat's side; the part of a vessel where hull and deck meet. (Pronounced "gunnel")
- Draft - The depth of the boat below the waterline; the amount of vertical distance a boat draws from its water line to the bottom of its keel.
- Beam - The transverse measurement of a boat at its widest point.
- Chine - The line of intersection between the topsides and the bottom of a boat. Hard-chined boats have this angle pronounced.

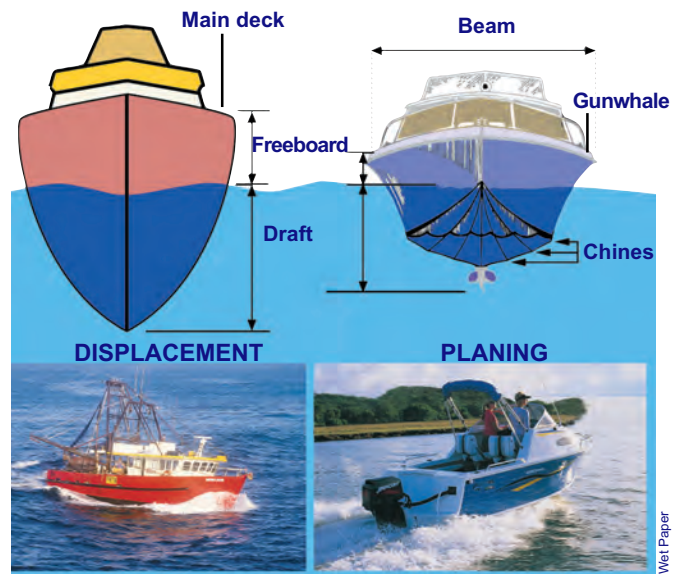


Figure 7.1 Displacement and planing hulls

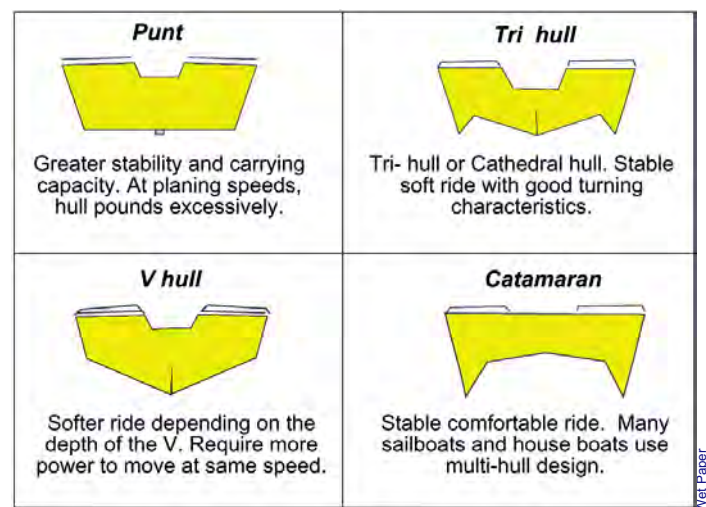


Figure 7.2 Different types of hulls and features



Figure 7.3 Cleats and bollards are found on a boat

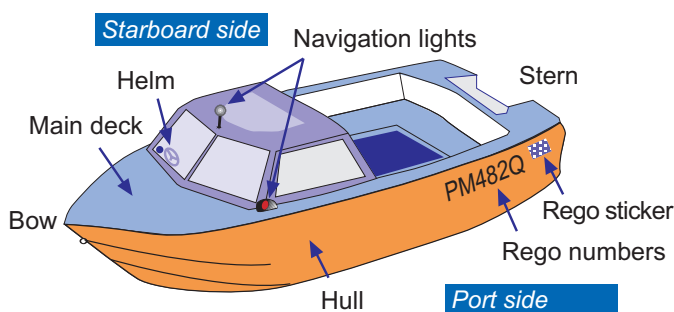
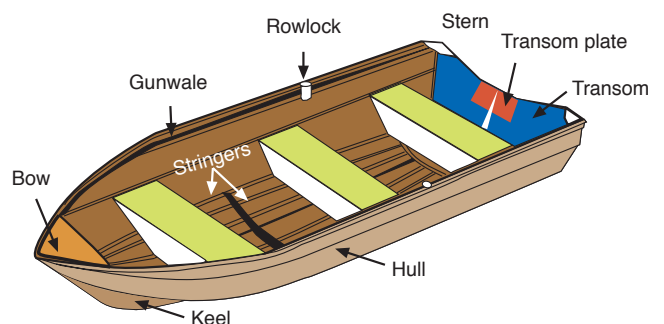


Figure 7.4 Parts and places on a boat



Flotation

Some boats float better than others when they fill with water. If there is not enough flotation, the boat will sink quickly. Additional flotation can prevent this.

- Basic flotation - the boat will remain afloat either by the bow or upside down (see Figure 8.1 left).
- Level flotation means the boat will remain in a level position (see Figure 8.1 right).

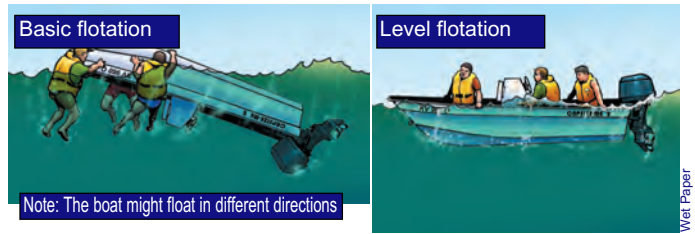


Figure 8.1 Basic and level flotation

Stability and freeboard

Stowage of all heavy items, positioning of passengers on board and water in the bilges all affect stability and seaworthiness. Figure 8.2 shows that if there is enough freeboard, an unstable object can fall overboard and the boat will right itself avoiding swamping.



Figure 8.2 Dinghy with enough freeboard to enable it to return to the upright position.

Overloading

Loading a boat also affects stability. An overloaded boat has reduced freeboard (see Figure 8.3) and can easily be swamped.

Builder's plate and vessel carrying capacity

All new recreational boats manufactured or imported into Australia must display an Australian Builders Plate (ABP). The plate provides the operator with information about the use and limitations of the boat including the maximum number on board, engine rating and performance. The plate in Figure 8.5 shows:

- Maximum outboard engine rating for which the boat has been designed and tested expressed in kilowatts or horsepower.
- Maximum number of persons on the boat as recommended by the boat's builder expressed in a whole number or in kilograms.
- Maximum load for the boat, as recommended by the boat's builder expressed in kilograms.



Figure 8.3 An overloaded boat has reduced freeboard

Capacity label

A capacity label as shown in Figure 8.4, must be permanently displayed and clearly visible near the helm if a builder's plate is not visible.

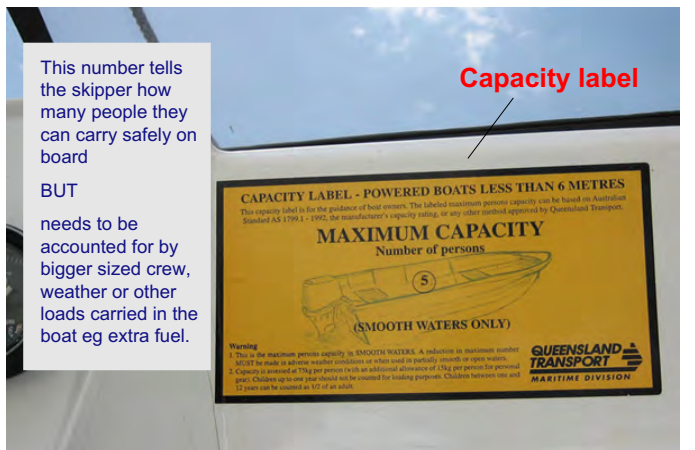


Figure 8.4 Capacity labels are designed to show the skipper how many people they can carry safely on board.

If the boat goes into exposed waters or rough conditions, as a general rule, the operator needs to reduce the number of people on board by one-third to increase stability.

1 The plate's title, Australian Builders Plate

2 The name of the boat's builder and either the Hull Identification Number (HIN) or the date built

3 Maximum outboard engine power rating for which the boat has been designed and tested, expressed in kilowatts or horsepower

4 Maximum outboard engine weight for which the boat has been designed and tested, expressed in kilograms

5 Maximum number of persons on the boat, as recommended by the boat's builder, expressed in a whole number and in kilograms

6 Maximum load for the boat, as recommended by the boat's builder, expressed in kilograms

7 For boats less than 6 metres in length there will be a buoyancy statement. Up until 1 July 2006, the terms used may be either 'level * flotation', 'basic flotation' or 'inadequate flotation'. After 1 July 2006, the term 'inadequate flotation' will no longer be allowed to be used

8 A warning statement that if alterations make the boat different to the builder's specifications the particulars on the Australian Builders Plate may be invalidated. The builder may also add other warning statements.

* See explanation above

Figure 8.5 Australian Builders Plate - note flotation can be either level or basic

Boats and where they can go

As part of your GSO you need to know how your boat is designed and where it can go. The following summary is a guide and will vary greatly with weather and sea conditions.

Punt

The most basic hull design is a punt as shown Figure 9.1.7. It has the greatest stability and greatest carrying capacity. For example, barges have this design. The hull is most suited for rivers and sheltered inland waters.

V-hull

V-hulls as shown in Figures 9.1.2 - 9.1.5, allow the hull to cut through the water. Generally the deeper the V, the softer the ride, the greater directional stability and ability to operate offshore. Deep V hulls are designed for offshore areas, crossing bars and in winds up to 20 knots.

Medium V shaped hulls are more suitable for wind up to 15 knots and waves up to a metre, whereas shallow V shaped hulls are suitable for estuaries, rivers and canals in forecasts with wind speeds up to 10 knots. Moderate and shallow V hulls are not designed to go over coastal bars.

Tri-hull or cathedral hull

The tri-hull or cathedral hull combines the advantages of the catamaran hull and the deep V hull.

This type of hull is stable, has a good ride, excellent turning manner but is expensive and complex to build. Tri-hull or cathedral hulls are designed for offshore areas, crossing bars and in forecasts with winds of up to 20 knots.

These basic designs can be summarised in the figures below remembering that manufacturers have a wide range of variations and your boat dealer can help you with your final choice.

STATE WATER LIMITS AND SAFETY

Each Australian State has a set of water types. These definitions determine where boats can go and what safety gear they need to carry. Consult your Government Marine Safety Web Site for details. In Queensland there is Smooth, Partially Smooth and Open Water situations, (Ref: inside back cover).

Catamaran

The catamaran hull was developed to maintain the ride of a deep V hull as well as the stability of a punt. The hulls supporting the boat are out wide providing stability and with deep V's make a comfortable ride. The tunnel between the hulls also creates a cushion of air softening the ride further. A disadvantage of the hull is that it turns flat increasing the chance of people being thrown out.

Catamaran hulls are designed for offshore areas, crossing bars and in forecasts with winds of up to 20 knots.

Displacement

These hulls will support a greater load but will go much slower. They are suitable for open bays, estuaries, rivers and canals in forecasts with wind speeds of up to 20 knots. They are not designed for bar crossings with steep waves.

Rigid inflatables

An inflatable is a boat where all the hull is inflatable while a rigid inflatable boat (or RIB) is where the bottom of the hull is made of aluminium or fibreglass and the sides an inflatable tube called the sponson. These have good stability, are lightweight and have excellent carrying capacity. The soft sides make for comfortable entry and exits and make the boat suitable for bar crossings and winds up to 20 knots.



Figure 9.1 Some hull types (Note: In training situations life jackets should be worn by all occupants)

WORKSHEET 2 BOAT PARTS AND HULL COMPLIANCE



Q1. Label the following parts of a boat on the diagram

Q2. Explain the terms freeboard and gunnel.

Q3. Explain why the motor power and weight on a vessel should never exceed the manufacturer's design.

Q4. Account for the need for sufficient freeboard on a vessel.

Q5. Explain how engine power contributes to the difference between planing and displacement hulls.

Q6. Compare the terms basic and level flotation as they apply to boat safety.

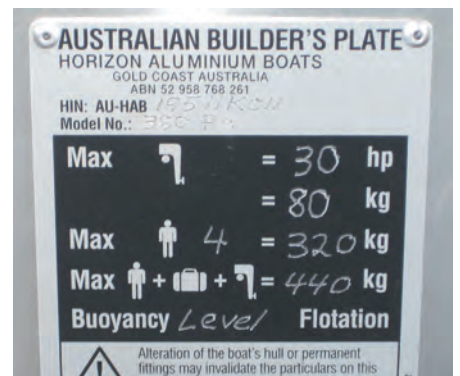
Q7. Identify which of the boats on page 7 you would take over a bar in a 1 metre sea.

Q8. Interpret the builder's plate shown in the figure opposite in terms of a fishing party that had an esky of ice and drinks for a group who wanted to go fishing for the day in sheltered waters.

a. Identify the max hp motor that can be attached to the transom.

b. Determine the number of adults and children the boat can carry.

Q9. Account for changes in loading for a boat with a capacity label as shown opposite.



Propulsion

Every power boat will need some type of motor or propulsion mechanism. Most boats under 6 metres will have some type of outboard. While larger boats with keels and motor cruisers will have inboards or stern drives as shown in Figures 11.2 and 11.4.

The propeller

Marine propellers work by converting power produced by your boat's engine into thrust. As a propeller rotates it draws water from ahead (the suction side) and pushes it out astern (the discharge side) as shown in Figure 11.1. It is this resulting force that propels your boat.

Prop types

Props can be either right or left handed and affect the direction a boat turns under low power. For example a right hand prop, as shown below, is one that turns to the right when viewed from behind.

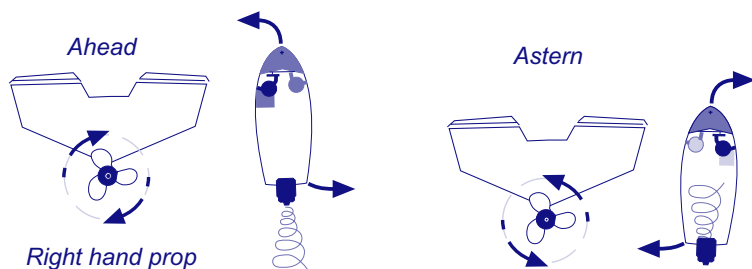


Figure 11.1 Propeller and exhaust

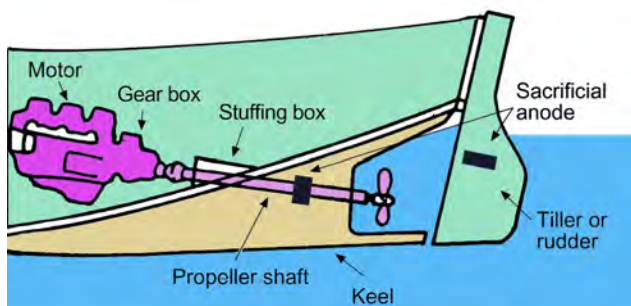


Figure 11.2 Inboard single shaft engine propulsion

Advantages and disadvantages of engine types

Inboard (Single or twin shaft driven)

With an inboard drive, the shaft, rudder and propellers are beneath the boat leaving the transom clear. The boat is propelled forward by the motor and propeller and steered as the water flows over the rudder.

- The inboard is popular with commercial vessels such as trawlers and larger ships that require power and manoeuvring ability at slow speeds. In these ships, inboards are usually diesel engines and are heavy and slow revving. However diesel fuel is safer than petrol and generally provides better economy in these vessels.

Outboard leg

Outboard legged motors or outboards can come in a range of sizes ranging from small electric trolling motors, to large petrol fuel injected engines, two or four stroke engines.

Here the propeller forces the boat forward and the boat changes direction as the steering swivels the leg from side to side. Under slow speeds, the propeller can also move the boat sideways. You will learn more of this in the boating skills that deal with *leaving and departing a dock*.

- Outboards move boats quickly and are easy to maintain. They suit a wide variety of small boats because they are light, powerful and can be stored with the boat. If they break down they can be transported easily to a service centre or taken indoors for repair.
- However outboard fuel is usually more expensive than diesel fuel.

Outboard leg stern driven

Stern drive motors consist of an engine mounted inboard and a drive unit mounted low on the transom as shown in Figure 11.4. The leg swivels about to provide easy steering while the propeller turns pushing the boat forward.

- Stern drives come in petrol or diesel and with the engine fitted inside the boat, they are more popular with larger vessels. The motor can be tilted up and down to provide trim while the boat is under way.
- However the motor is fixed and cannot be easily transported as a separate unit for maintenance or repairs.

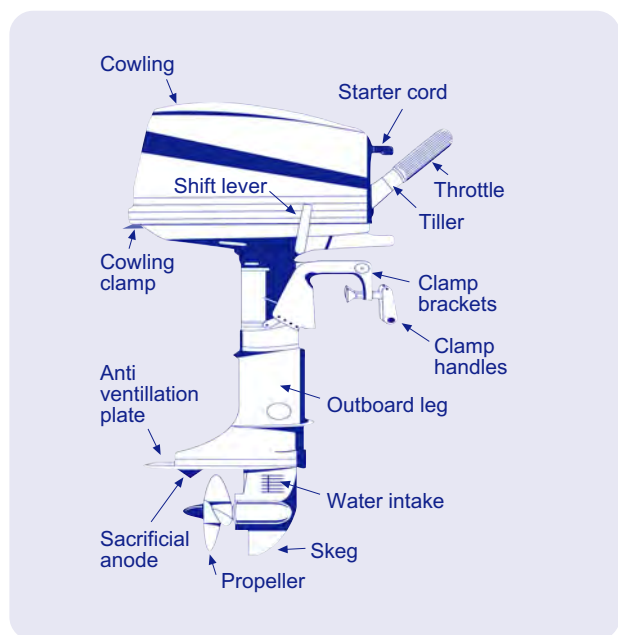


Figure 11.3 Outboard engine propulsion

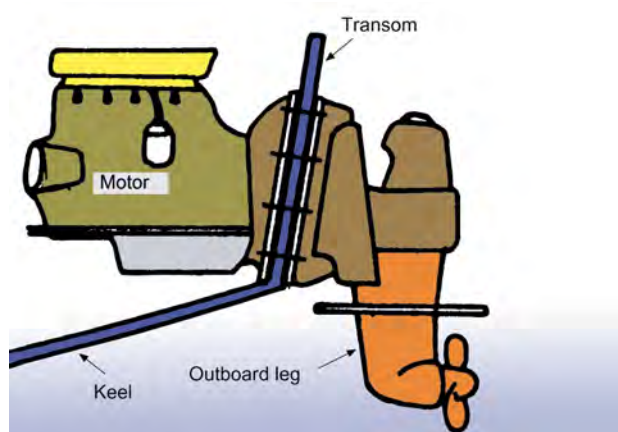


Figure 11.4 Stern drive propulsion

Read the manual

With all motors you MUST read the manual to see what type of motor you have (two or four stroke), whether unleaded, or diesel is used and to see when servicing is required. Failure to follow basic instructions will void your warranty and GSO.

Maintenance

Check the water intake and around the prop before leaving as it may be blocked by fishing line or plastic bags.

Outboard powerhead

Fuel is delivered from the carburettor to the pistons inside the powerhead, and compressed. The spark plug ignites the fuel, pushing the pistons up and down rapidly.

At the bottom of the pistons is a crankshaft which turns gears in a gear box which turns the propeller.

Inside the flywheel are a series of magnets which generate a magnetic field.

When these spin around the electrical coils, an electric current is generated. This passes through the electrical junction box and to the spark plug.

The powerhead or motor is located under a cover or cowling (Figure 12.2) which can be removed for servicing. This is connected to the leg containing the drive shaft and gear system which allows the propeller to turn in either direction.

Under the anticavitation plate is a water intake system which cools the motor. The anti-cavitation plate is there to prevent air being sucked down around the propeller (Figure 12.2).

Some new outboards have a multi-function tiller handle with indicator lamps, throttle control, trim and tilt switch and gear lever. Ref: *Google - multi-function outboard tiller*

Two and four stroke engines

Two-stroke engines need their crankcase for compression, therefore, a circulating oil system is not possible. Their lubrication is achieved by mixing oil with petrol in one of two systems.

Oil is either poured into the fuel tank and mixed by shaking or mixed as required by an oil injection pump known as the "Variable Ratio Oiling" VRO, (Figure 12.3).

Modern two-stroke engines are usually fitted with such precision blend systems. Diesel and four-stroke petrol engines are lubricated by oil circulation from the sump (crankcase).

Maintenance

Insufficient oil will cause the engine to overheat and eventually seize. Excessive oil will foul the spark plugs, cause smoky exhaust and heavy carbon deposits.

Both will cause engine failure. So the oil reservoir needs to be checked before each trip.

The required amount of oil per litre of petrol varies and the manufacturer's recommendations must be followed.

With oil injection systems, the Variable Ratio Oiling pump automatically adjusts and mixes the amount of oil required by the engine under different conditions and speeds.

- It may even be fitted with a no-oil alarm to warn the operator when the engine is receiving no oil.
- If the reservoir of the VRO pump runs dry during engine operation, the operator should stop the engine and refill it.

Hint: Paint the correct oil/petrol ratio on the fuel tank and use only the recommended two-stroke outboard motor oil.

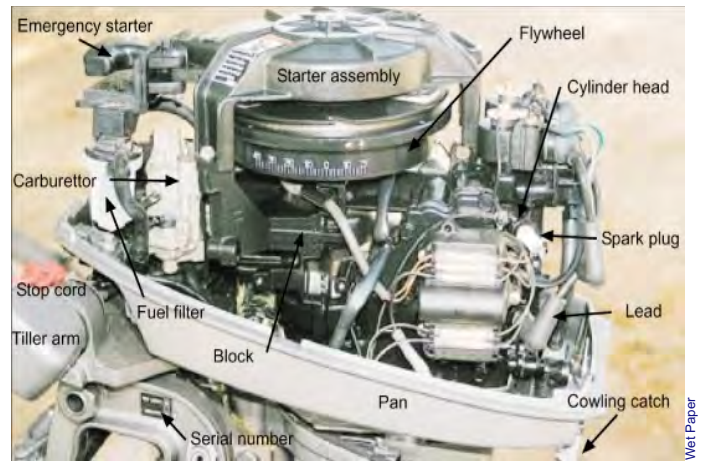


Figure 12.1 Parts of a 25 hp outboard motor

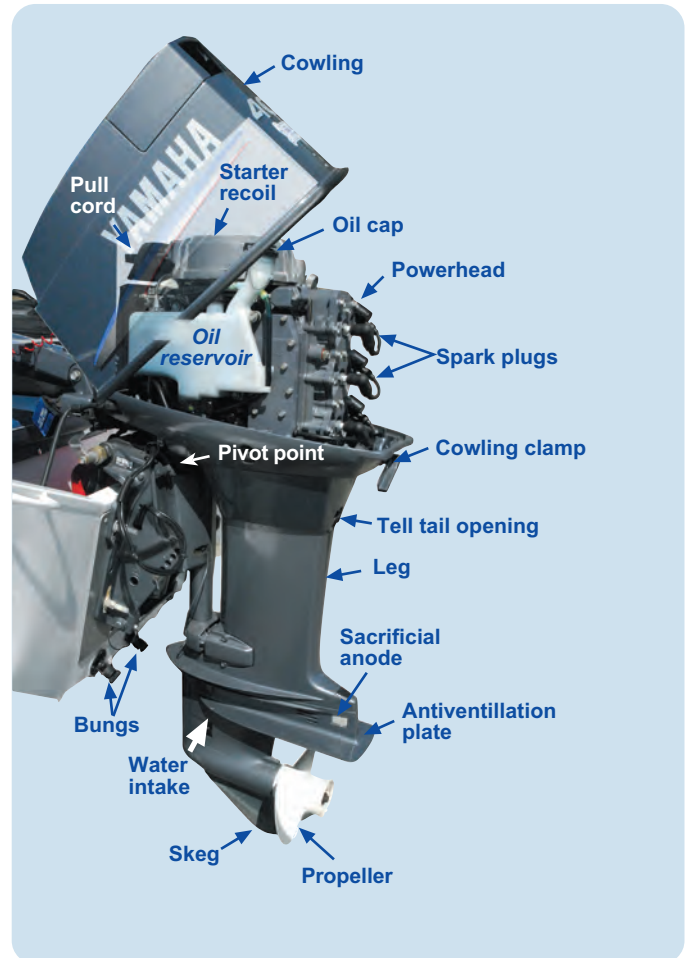


Figure 12.2 Parts of a larger outboard motor

Wet Paper

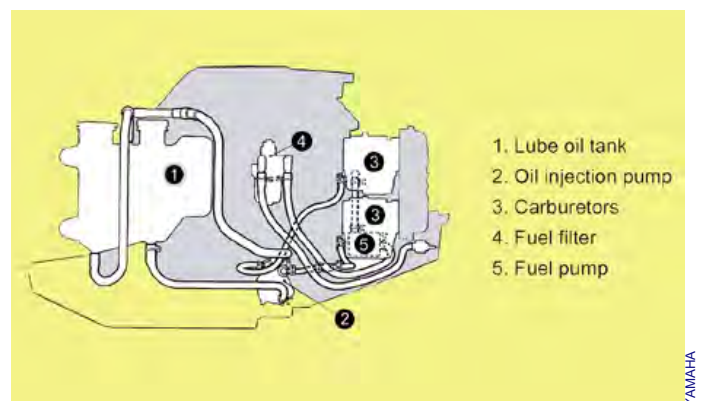


Figure 12.3 Variable Ratio Oiling

YAMAHA

Fuel and ignition

Figure 13.1 shows the fuel system for an outboard motor.

- For a two stroke motor, a mixture of fuel and oil and is stored in a plastic fuel tank. (Check manufacturer requirements.)
- A fuel line transfers the fuel to the motor and is connected at the side.
- A primer bulb with a one way valve is used to prime or fill the fuel line when the fuel line is first connected to the motor.
- An air vent on top of the fuel tank is opened to allow fuel to flow when the motor is running otherwise as the fuel is removed, a vacuum will occur in the tank and stop the fuel supply.
- A fuel filter in the fuel line is designed to screen out dirt and rust particles. The marine filter shown in the photograph opposite has been mounted on the transom. The bowl collects water and is drained by a plug at the base of the filter.
- Throttle and ignition can be in the cabin or on the tiller (Figures 13.1 and 13.2).
- In a boat with a throttle on the tiller, the engine is started manually with the choke applied when cold, and the starter cord pulled. The engine is then revved by turning the throttle.
- In a boat with forward controls, the engine is started with a choke that squirts a dose of fuel into the carburettor.

The safety "kill" switch and lanyard

This is located near the ignition or throttle and is attached to the boat skipper (usually at the belt or wrist).

- If the driver falls out of the boat, the power to the motor is cut and the boat will stop.



Safety lanyard

Steering and gears

Driving the boat with the helm on the transom

In this system the motor and tiller are combined and mounted on the transom of the boat as shown in Figure 13.3. Pull the tiller to the right (starboard) and the boat will turn to the left (port).

By turning the throttle, the boat will either speed up or slow down. By changing gears you can go either forward or reverse.

Driving the boat with forward controls

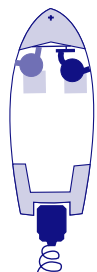
In this system the boat is steered with a steering wheel and a series of linkages and cables control the sideways movement of the motor. By turning the steering wheel to the left (port), the boat will move to the left.

In Figure 13.2, the throttle is mounted to the right of the steering wheel.

- Push the throttle into forward gear and the boat accelerates forward.
- Bring it back to the centre and the engine goes into neutral gear and, pull the throttle back and the engine will change into reverse gear.

Twin engines add a new dimension to steering as you will learn in docking and undocking in Chapter 3.

Throttle on the tiller
or helm at the stern



Forward
controls

Figure 13.4 Definitions

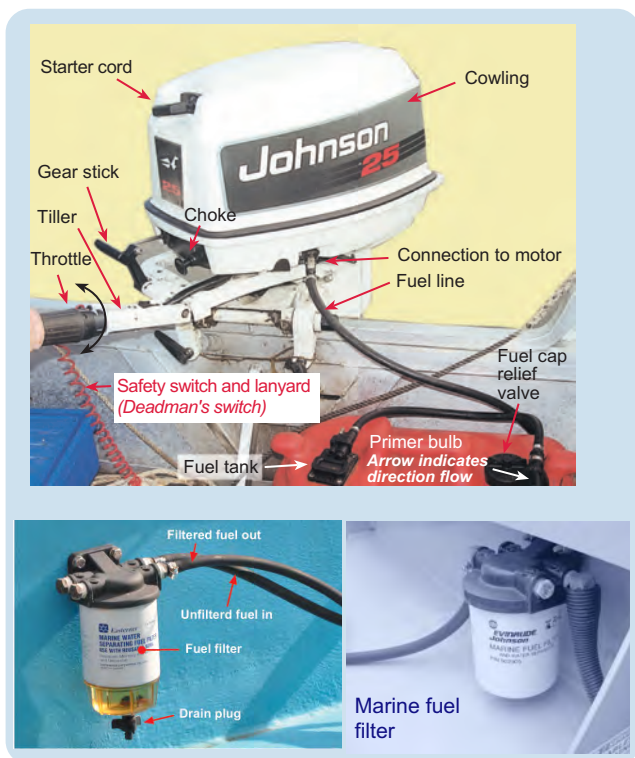


Figure 13.1 Helm at the stern and fuel filter

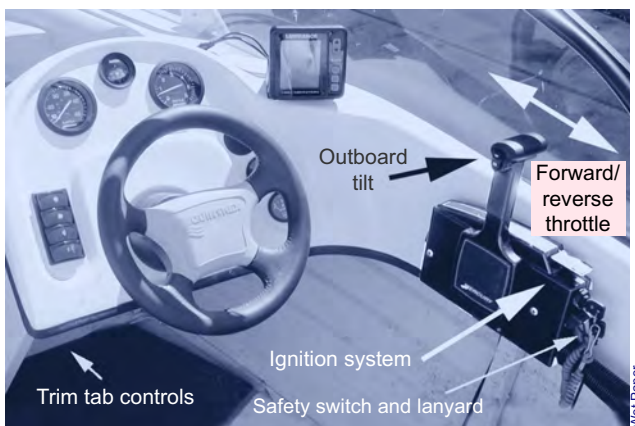


Figure 13.2 Forward controls



Figure 13.3 Pull the tiller to the right and the boat will turn to port.



Figure 13.5 Twin engine boat "on the plane". Turn the wheel to port and the boat turns to port.

Trimming the boat

Most recreational boats are designed to plane at a particular speed and weight distribution. However, as weight increases (due to additional fuel, passengers, or gear) and/or speed decreases, the stern settles down creating an inefficient, untrimmed condition.

As the boat pushes forward, it creates a “hill of water”. In this bow-high position visibility is limited and the hull bottom is pounded by the sea. In addition, due to significant hull drag fuel economy is poor.

Figure 14.1 shows the effects of tilting the motor on a tinny. On a boat with forward controls, trim tabs (Figure 14.2), enable a boat to overcome this “hill” and plane at speeds slower than designed planing speed. As the trim control is pressed, the stern rises, lowering the bow. Without touching the throttle, speed increases and optimum planing is achieved regardless of speed or weight distribution.

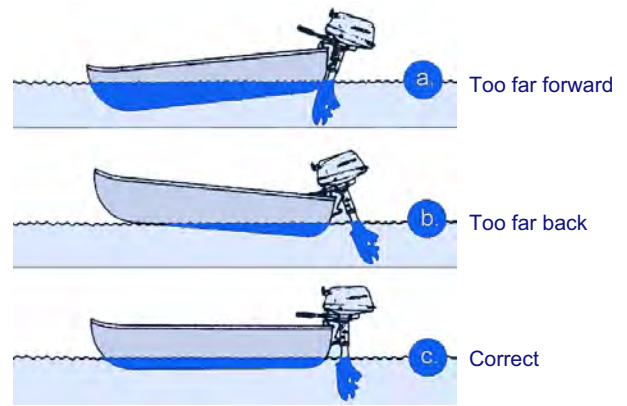


Figure 14.1 Adjustments for tilting the motor
Wet Paper

Tilting the motor

The motor can also be raised or lowered from a tilt switch on the throttle (Figure 11.2) or on some motors just under the cowling. This is important as the motor needs to be raised when the boat is launched from a trailer, or coming into a beach.

Cooling and ventilation systems

Inboard engines

For inboard engines, the importance of ventilation is vital to prevent explosions caused by the buildup of flammable gases. Essential operational procedures include making sure the ventilation system is clear of obstructions; if the boat is equipped with power ventilation, run it for a few minutes after refuelling or prior to starting your engine; if the boat is not equipped with power ventilation open the engine compartment and sniff for fumes; check all electrical wiring for shorts or sparking and fix any frayed or corroded wires.

Outboard engines

Most inboard and outboard motors are water cooled. In outboards, water enters through an intake point near the propeller and is directed to a water pump located in the lower unit. Water for cooling the power head is circulated by the water pump located on top of the gear case, and driven by the drive shaft between the engine and the gear case.

A typical pump as shown in Figure 14.3, consists of an impeller which is keyed to the drive shaft. From the pump the coolant passes through tubes or channels to the power head where operating temperature is thermostatically controlled.

Discharge is effected through an exhaust relief, main exhaust outlet and the tell tale. Upon starting a cold motor the thermostat is closed and prevents the water from circulating in the system. As the engine warms up, the thermostat opens allowing the whole of the power head to be cooled.

The tell tale

This is a small jet of water which spurts off the back of the motor under the cowling (Figure 14.3). It indicates that water is flowing through the engine and the impeller is operating. If you can't see water spurting out when you start the motor, check to see what is blocked. If it still does not appear, it is unwise to run the motor. In an inboard motor look for a wet exhaust.

Maintenance

If the motor has been run through mud or even worse sand, the impeller should be inspected for damage and replaced if worn. Otherwise it will fail, overheating the engine causing a breakdown just when you don't want it eg, crossing a bar.

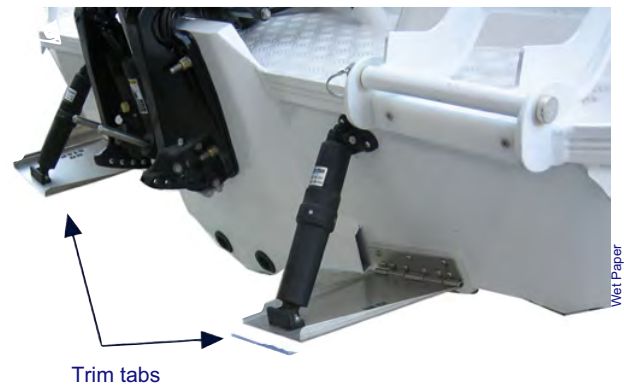


Figure 14.2 Trim tabs - controlled by hydraulics
Wet Paper

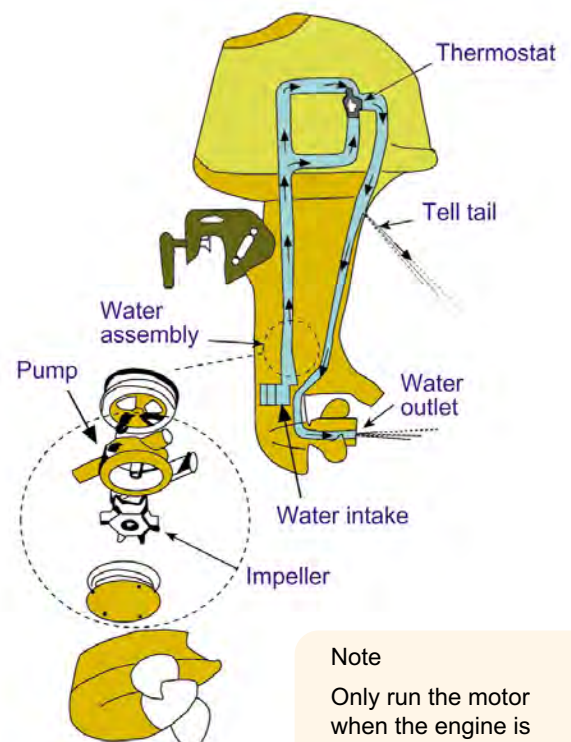


Figure 14.3 Outboard engine cooling system
Wet Paper

Note

Only run the motor when the engine is down in the water or water is connected and flowing into the water intake with ear muffs (see page 17).

Running a motor dry will damage the impeller.

Electrical

Marine batteries

Once a car starts, many electrical accessories shut down or are only used for short periods of time. However a boat's battery is used continually to run critical electrical systems such as the radio, GPS, console equipment, lighting and navigation instruments. A boat's battery is also used to start the motor and the bigger the motor, the more battery power will be required.

The number of batteries depends on the power needed to operate the boat. Two or more batteries can be connected in series (to increase the voltage) or parallel (to increase the amperage capacity, Figure 15.3).

Parallel connections (Figure 15.3)

A parallel connection is made by linking the positive and negative poles. This leaves the system voltage unchanged but increases its storage capacity. Generally an isolation switch is fitted and the batteries can be switched between each other. This system is common for boats with large motors (Figure 15.2). This will only work as a backup if both batteries are properly charged.

Safety and hazards

Testing is designed to tell us things we want to know about individual cells and batteries. You will want to know if the battery is in good condition and will hold a satisfactory charge.

If you check or carry a battery you **MUST** wear protective clothing and acid resistant gloves.

- Make sure also the electrolyte level is kept to the manufacturers specifications and cell caps are off when charging a wet cell battery (Figure 15.1).
- Battery acid will burn so never wipe your eyes if you spill the acid on your gloves. Acid splashes on any part of the body require irrigation with lots of water. Similarly, for acid spills inside or outside the vessel, the area should be irrigated with lots of water.
- Make sure the battery is in an acid proof container, securely tied down to stop it coming loose during your trip and the battery box is ventilated to stop the build up of flammable gases as shown in Figure 15.2.
- Electrical hazards can include shorting with the hull, frayed wiring that shorts out.
If using shore power, make sure the electrical work has been done by a licensed electrician and is maintained in top condition to protect you from being electrocuted.

- Dampness and dirt on the battery case can create a circuit between the terminals that will drain the battery.

New batteries

In modern gel and deep cycle batteries the manufacturer's recommendations must be followed to the letter. Reference: www.batteryworld.com.au

Gauges

The sound of an automatic bilge pump working is usually drowned out by the other sounds of a boat underway, so make sure the light is bright and easily visible at the helm.

The number and type of gauges will depend on your propulsion system, use and area of operation. Common gauges could include fuel, battery strength and fume detection.

Fuses and circuit breakers

Fuses (Figure 15.4), are used to protect delicate and expensive instrumentation such as radios and depth sounders. Circuit breakers can serve the same purpose but are used to prevent electric shock.

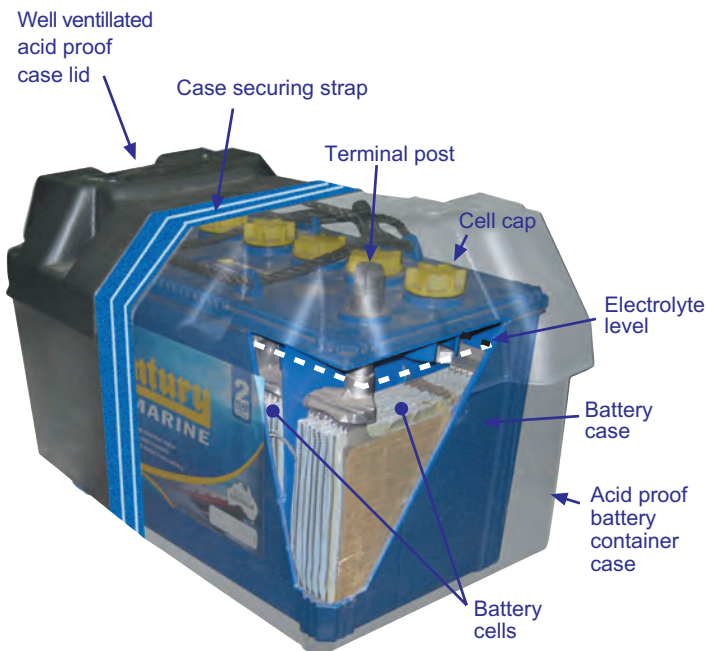


Figure 15.1 Stylised illustration of marine battery inside an acid proof case, showing features as described in text.
Wet Paper

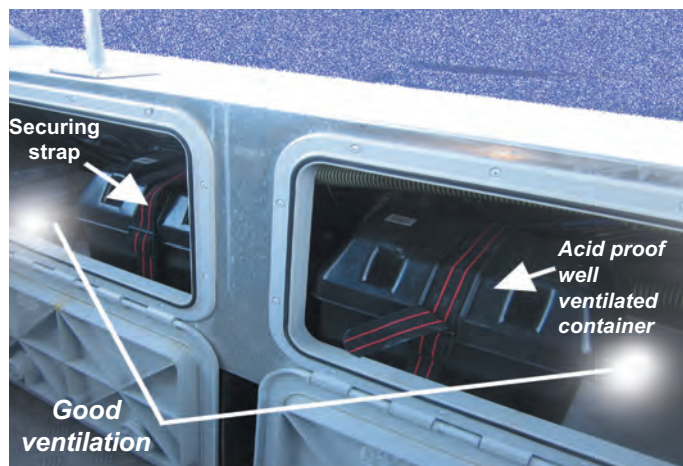


Figure 15.2 Battery stowage safety precautions
Bob Moffatt

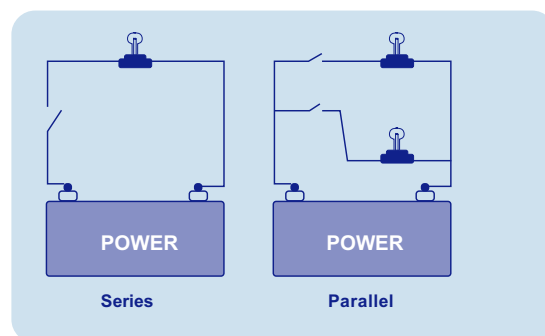


Figure 15.3 Series and parallel circuits
Wet Paper

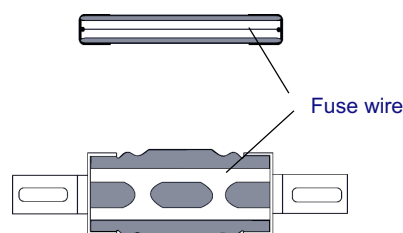


Figure 15.4 Types of fuse

WORKSHEET 3 ENGINES AND FUEL

Q1. Complete the the diagram opposite marking in the following parts of an outboard motor.

Cowling, throttle, tiller, clamp brackets, clamp handles, shift lever, outboard leg, anti-ventillation plate, water intake, skeg, propeller, sacrificial anode, cowling clamp.

Q2. Describe one advantage and one disadvantage of the following engine types:

Inboard: *Advantage:*

Disadvantage:

Outboard: *Advantage:*

Disadvantage:

Stern drive *Advantage:*

Disadvantage:

Q3. Indicate where each of the following are found on the diagram of the Johnson outboard opposite.

Starter cord, choke, connection to motor, fuel line, fuel cap relief valve, primer bulb, fuel tank, throttle, tiller

Q4. Explain what a "tell tail" does.

Q5. Describe why marine batteries are used to start engines.

Q6. Justify two maintenance requirements for modern engines.

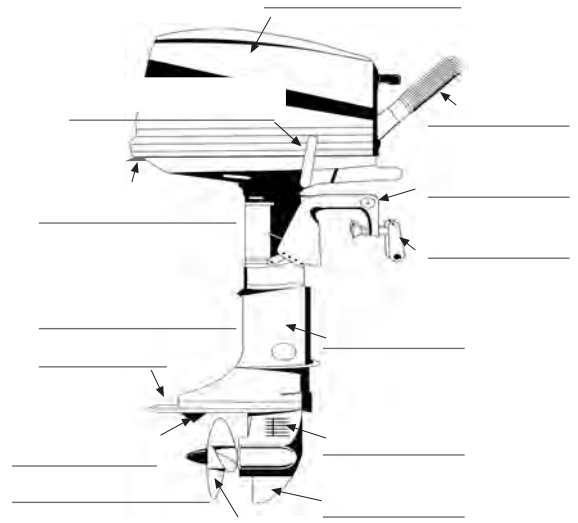
Q7. Describe the function of the safety lanyard.

Q8. Indicate where the following parts of the cooling system can be found on the diagram opposite.

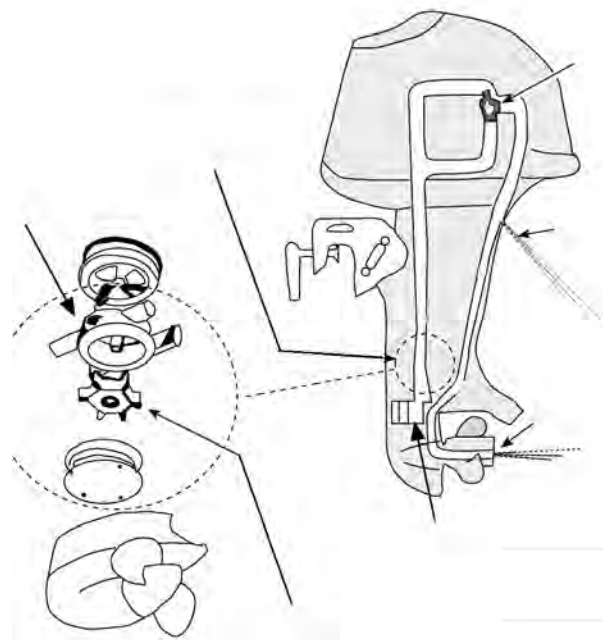
Pump, impeller, water intake, water outlet, water pump assembly, thermostat, tell tail.

Draw arrows in the illustration opposite to show the direction in which water travels.

Describe the function of the impeller and explain how it can become fouled.



Bob Moffatt



Berthing

Mooring lines and equipment need to be in good condition so that your boat remains where you left it.

The boat in Figure 17.1 is at a mooring which has been placed so that as the tide changes the boats will swing and not collide with other boats.

Mooring lines need rope that does stretch. Nylon is a good mooring line because it is incredibly strong, very stretchy, and resists the harmful effects of sunlight. Never moor at an aid to navigation. Apart for being illegal, it could damage the marker.

Berthing and spring lines

Berthing ropes are used to tie the boat to a jetty or pontoon. These include the bow line, stern line and spring line as shown in Figure 17.2.

A spring line is a pivot line used in docking, undocking, or to prevent the boat from moving forward or stern while made fast to a dock.

The term 'spring' comes from using these lines to 'spring' the boat away from the jetty. Nylon makes a good spring line because it doesn't come taut suddenly, but dissipates the load by stretching.

Fenders

Fenders are designed to protect the hull of the boat as well as secure it at a jetty as shown in Figure 17.3. Fenders are also used at pontoon and coming alongside other boats.

Regularity of checks and servicing

If the boat is left unattended it will need to be checked so see that it has not been stolen, damaged or affected by the weather.

Fasteners and fittings

A cleat is a fitting to which lines are made fast (Figure 17.3). They need to be fastened to the deck to withstand great strain while the boat is being tied up.

A cross bollard is usually stronger than a cleat and is found on the bow. Bollards are also found on shore jetties.

Welding and condition of lines

These must be checked to see if they are in good condition for the boat to be seaworthy (Figure 17.4). If not you could breach your general safety obligation (GSO).

Never moor to an aid to navigation such as a channel marker.



Figure 17.1 Boat at a mooring

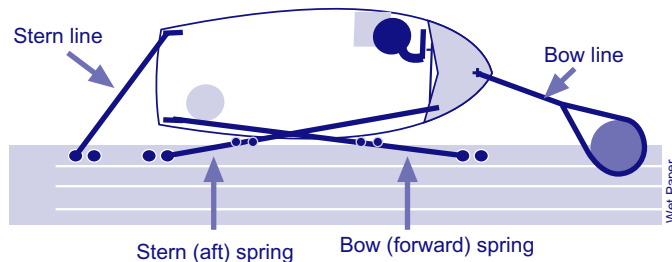


Figure 17.2 Mooring lines

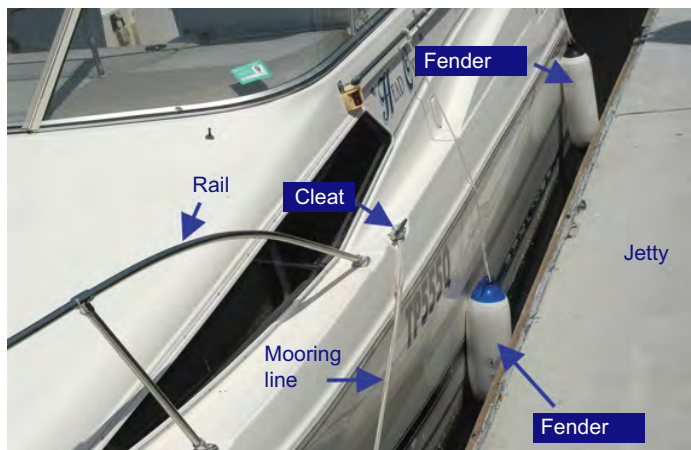


Figure 17.3 Boat at a jetty

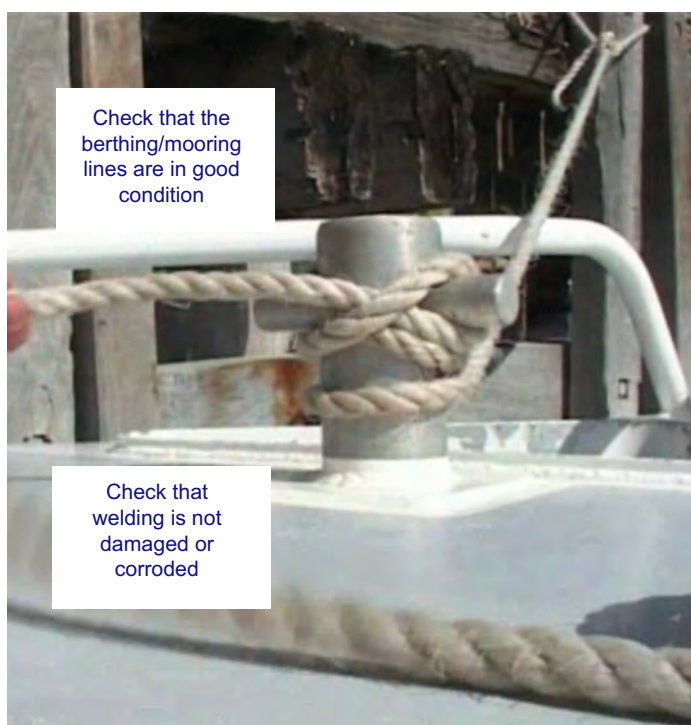


Figure 17.4 Check that the boat is secure and suitable for use

PRACTICAL TASK: Check that the boat is secure and suitable for use (see www.wetpaper.com.au - Resources)

In Western Australia a practical test is conducted. Here is a brief description of what the assessor will ask you and the competencies you are required to demonstrate.

You will be asked: "Please show me that your vessel is secure and your mooring lines and equipment are in good condition". You should move around the vessel and point out the condition of the mooring lines and the soundness of the mooring apparatus.

Competency criteria

1. Berthing/mooring lines are in good condition.
2. Berthing/mooring cleats, bits, etc are sound and secure.
3. Vessel is secured using the lines and cleats.

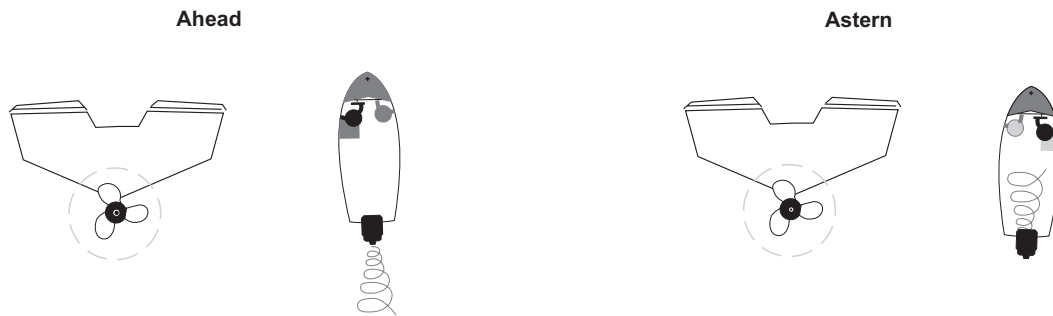
WORKSHEET 4 BERTHING AND STEERING

Q1. Describe the function of the spring line in docking.

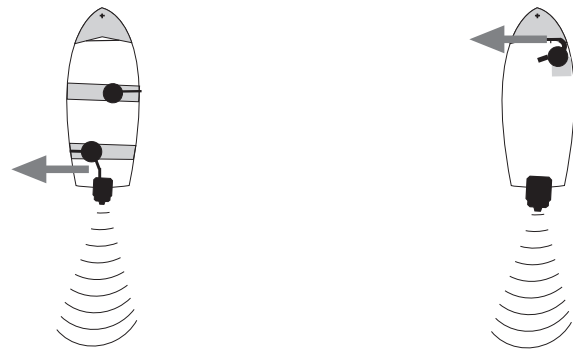
Q2. Justify the use of fenders on a boat.

Q3. Suggest what could happen if your boat was not in good condition.

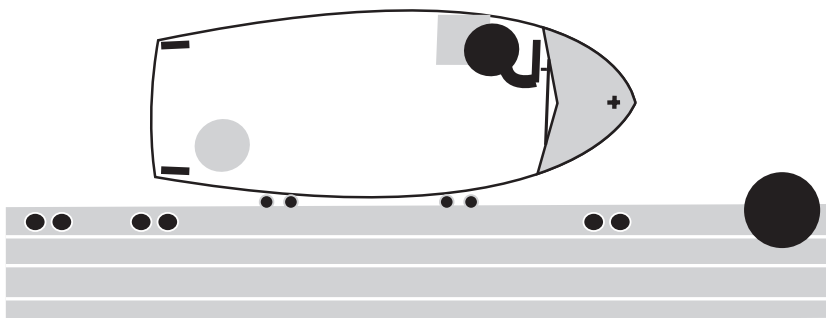
Q4. Indicate by means of arrows, the effect of a right handed prop in the diagram below.



Q5. Indicate by means of arrows, which way the bow will swing if the tiller or steering wheel is pulled or turned to the left in the diagrams opposite. Account for the difference.



Q6. Complete the diagram below to show the bow line, stern line, bow spring and stern spring lines.



Q7. Describe why nylon is used as a mooring line.

Q8. Describe how to tie off to a cleat (see page 38)



CHAPTER 2 PRE-TRIP CHECKS & MAINTENANCE

You must have a seaworthy boat to adhere to your general safety obligation. This chapter discusses some of these as well as some maintenance ideas for your GSO compliance.

Boat seaworthiness check

- Before operating any switches or engines, check for petrol and or liquid petroleum gas (LPG) odours. If such odours exist, fix the fault before you go out.
- Inspect the bilges. If there is more bilge water than normal, find and fix the fault.
 - When pumping bilges be aware of the environment as polluting the waterways is an offence.
 - Use marine absorbent pads, double bag and dispose of it in the garbage bin if you are unsure.
- Check that the self draining holes are clear and any ropes and lines are in good condition and stored ready for use.
- Run the motor in water or a set of rubber “ear muffs” placed over the water intake of the outboard motors with water running. Never run the motor dry or it will damage your impeller.
- Make sure the motor moves freely as you move the steering wheel and look for corrosion in fittings and cables. Check the trim and tilt mechanisms for correct operation.
- Check engine oil and coolant levels. Top up if required. Examine batteries and terminals and ensure connections are tight.
- Check that the navigation lights are working as you may have to come home in the dark.
- Test all electrics operating from the battery such as gauges, bilge pump, trim tilt etc.
- Check that the fire extinguisher is in good condition and ready for use.
- Make sure the oars are in good order, are secured and all gear is properly stowed and secured.
- Make sure you have up to date charts showing places where you can shelter if weather turns bad.
- Make sure you have essential tools to clean a spark plug, refit and clean battery and electrical terminals and remove and check your prop. Water repellent, a sharp knife, grease and a few rags are also useful, but if you are not a mechanic, leave the repairs to an expert.
- Check that you have all the safety gear and its serviceability for where you are going so you don't cop a fine
 - Common pieces of safety equipment that you would be expected to know about would include a marine radio, a bucket or bailer, anchor and chain, signalling mirror, torch, V Sheet, life jacket, water for everyone on board hand held compass, flares, paddles, first aid kit, chart, EPIRB, fire extinguisher.
 - All safety equipment must be properly stowed, easily accessible and in good working order.
 - Check expiry dates on EPIRBs and flares.
 - When cooking devices are installed, a fire extinguisher and blanket should be carried and stored within reach of the stove.
 - Know how to use all the safety equipment and know how to explain it in your safety briefing.
 - Safety equipment is discussed in detail in Chapter 4.

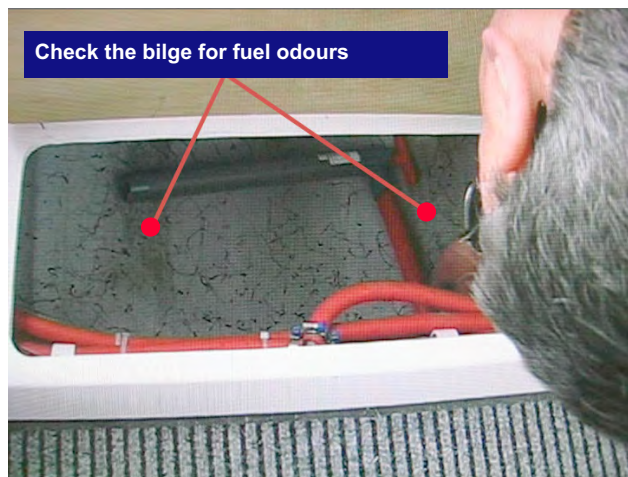


Figure 19.1 Check for petrol and or liquid petroleum gas odours.



Figure 19.2 Run the motor at home before you go.



Figure 19.4 Common safety equipment

- Check the berthing/mooring lines are in good condition and that cleats, bits, and all other fittings are sound and secure.
- Check that you have the bungs and they are in before you go out.
- Keep bilges dry and decks and drains clear.
- A good reference is <http://www.stjohn.org.au>
- Make sure people on board have any required medication and that they know how to administer it.
- Overloading is dangerous.
 - Consider the carrying capacity of the boat, heavy loads such as fish and tackle as well as extra fuel.
 - The skipper should ensure that the boat is in a 'seaworthy' condition and that it is used within designed limitations.
 - Stow all gear securely and distribute weight evenly to attain proper trim and no list.

Routine maintenance to ensure vessel seaworthiness

It is important to make sure that no cracks or damage have occurred since your last boat trip.

A careful inspection of the hull and fittings will determine if repairs are necessary.

Engine care

It is an old saying, but read the manual because the manufacturer will have many useful suggestions that are particular to the boat and motor you are operating.

- If you are NOT mechanically minded - have your boat checked and serviced every 6 months by a service centre.
- Make sure you keep records or service receipts you have maintained your vessel is good order to satisfy your general safety obligation.

Water pump

- Replace the impeller regularly, especially if you have been operating in the shallows and stirring up sand. Water pump impellers can deteriorate quickly.
- A water pressure gauge on motors 50 hp and over is an advantage.

Propellers

The bushing of the propeller can fail if it has hit sand or rocks. Older models have shear pins so carry spares.

- Keep shafts and props clean and in good working order and remove fishing line.

LPG

- Ensure all LPG installations are carried out by a licensed gas fitter and make sure cylinders are professionally checked when your boat is serviced.
- All LPG cylinders and appliances need to be fixed and in an upright position so they don't move. Ensure there is correct ventilation and that appliances have flame failure devices fitted (or approved reliable gas detection equipment).

Anchors

- Check that the appropriate anchors are in good condition and properly rigged, stowed and ready for use.
 - Inspect the shackles, chains and ropes for damage.
 - One safety hint with shackles is to tie the pin to the shackle with mousing wire to avoid losing anchor (Figure 20.4).
 - You can buy this wire from your boat shop.



Figure 20.1 Inspect the hull for damage.



Figure 20.2 You can buy marine first aid kits www.stjohn.org.au

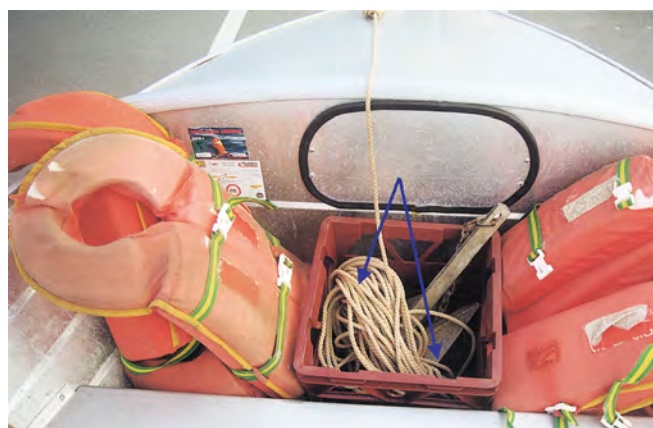


Figure 20.3 Check that the appropriate anchors are on board and safety gear stowed for easy accessibility



Figure 20.4 Shackles are moused whenever there is a chance of the shackle pin working loose.

Electrolysis and sacrificial anodes

When any joined two dissimilar metals are placed in seawater, an electric current is set up called electrolysis.

The sacrificial anode is usually zinc, which corrodes before aluminium. Sacrificial anodes are metal plates attached to outboards or other hull structures that prevent corrosion. The anode should be replaced if it becomes less than 60% of its original size (Figure 21.1).

Spark plugs

- Clean spark plugs regularly with a wire brush and check the gap or replace them with new ones (see Figure 21.2). Carry new ones in your tool kit.

Gearbox

- Snagged fishing line is a common cause of leaking gearbox seals and water in the gearbox will cause it to fail so check and change oil regularly.
- Check and service transmission and lower units according to the manufacturer's recommendations.

Fuel system

- Fuel defects are a common cause of engine problems so make sure you use fresh fuel.
- Check fuel filters and replace if they become clogged.
- Check that you have fresh fuel. Discard two stroke after 3 months and replace with a new mix.
- Carry spare fuel if required in the right container.

Battery

- A quick check of the battery levels is to see if the radio lights work. Check with your dealer if it is suitable for the area of operation.
- Check that the battery is tied down and the terminals are clean and tight.
- Check the water level regularly. Top up as necessary according to manufacturers specifications. Use distilled water for topping up if specified.
- Keep terminals and cable clamps corrosion-free. Use a wire brush or hot water to remove corrosion. Coat terminals with non-flammable terminal protectant to prevent future corrosion.

Safety with batteries

- Be careful of battery acid spills on hands and eyes and use protective personal equipment, eg, acid resistant gloves and clothing, when carrying batteries.
- Keep idle batteries fully charged. Leaving a battery even partially discharged leads to loss of capacity.
- Disconnect and remove the battery from the boat when not in use.

Advice on batteries

Your dealer or specialized retail shops such as Battery World can give you the best advice on how to keep your battery in top condition.

Reference: www.batteryworld.com.au

Electric circuits

- Keep all electrical systems clean and corrosion free by frequent inspection. Spray terminals and electrical connections with a corrosion-retarding agent.
- Check "kill switch" (safety lanyard) for serviceability.
- Check serviceability of bilge pump.
- Check that the navigation lights are working.

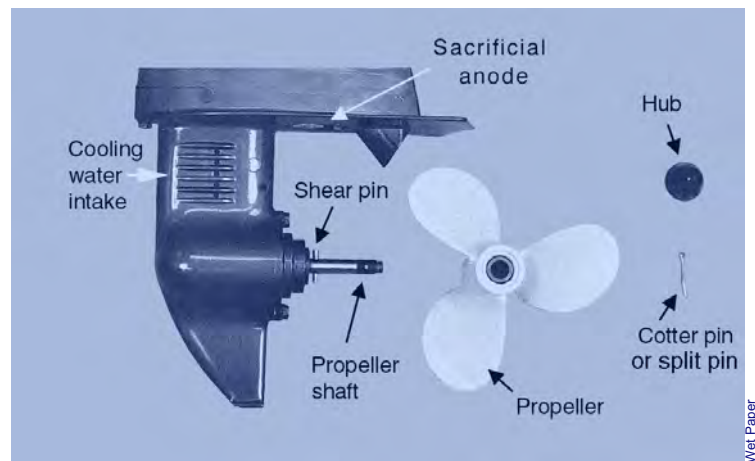


Figure 21.1 Parts of a propeller system on a small outboard



Figure 21.2 Check the spark plug gap and condition.



Figure 21.3 Make sure all fuel line connections are spotless.



Figure 21.4 Check fuel lines for any leaks.

Proper loading and stability checks

- A boat floats because the weight of water displaced pushing up is greater than the weight of the boat pushing down as shown in the figure opposite. However a boat can sink easily if its not stable.
- So a boat must have "positive stability" to be seaworthy.
- When you move around a boat, the centre of gravity changes. Notice how the arrows do not line up in the illustration to the right and if the centre of gravity is lower than the centre of buoyancy, the boat can tip allowing water to flood in. Also when getting into a small boat, try to step into the center and keep "one hand for yourself and one for the boat."
- When preparing for a trip, the skipper is responsible for assessing the load on board - both people and cargo, to maintain stability.
 - Heavy items should be stowed in a low and central place where they cannot move around.
 - Weight, including passengers, should be distributed evenly through the boat. Passengers who are also heavier than normal (ie 80 kg) should be positioned to avoid flooding over the transom.
 - The weight of extra fuel, water and provisions should be accounted for and if you experience rough conditions, secure the cargo.

Stability also means that there has to be enough freeboard to give the boat time to recover from sideways movement as it moves through the water.

- The overloaded tinny shown opposite would have little time to recover and is at risk of flooding.
- To enhance the problem of instability, the freeboard in many "tinnies", is measured from the top of the cut out section of the transom decreasing freeboard even further.

Free surface effect

- The free surface effect is one of several mechanisms which can cause a craft to become unstable and roll over (capsize). It refers to the tendency of liquids to slosh about in the vessel and becomes more significant in larger vessels.

Calculate how much fuel is required

Fuel consumption*

- Calculate your OWN burn rate at cruising speeds by completing a few short trips. For example:
 - Fill tank, operate for one hour and refill tank. Burn rate per hour = number of litres on the bowzer.

How much should I take? (1/3 out, 1/3 back, 1/3 reserve)

- Suppose your burn rate is 15 litres per hour.
- Calculate how far you are travelling one way (eg 40 nautical miles).
 - You estimate your time at 2 hours from a cruising speed of 20 knots given the weather forecast and tides.
 - So multiply your burn rate by the time taken (eg 15L/hr x 2hrs = 30 L).
- THEN multiply the answer x 3 (eg 30L x 3 = 90 litres).

* These figures are based on optimum speed and there may be cases where you travel at a higher RPM (Revs per minute, eg 5000) depending on sea state. This needs to be factored into your calculations and there are plenty of manufacturers web sites that give detailed graphs and information. Just "google - marine engine fuel consumption graphs" if you want to learn more about your individual motor or consult the operations manual.



Figure 22.1 If the centre of gravity is lower than the centre of buoyancy, the boat will tip and fill with water

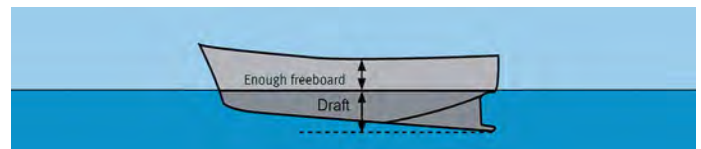
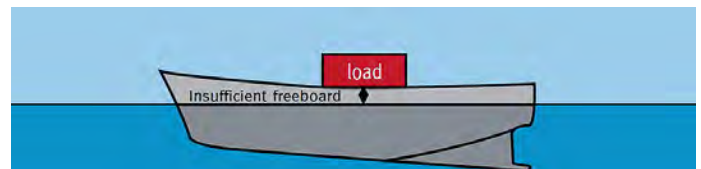


Figure 22.2 If the boat is overloaded it can be flooded

Wet Paper

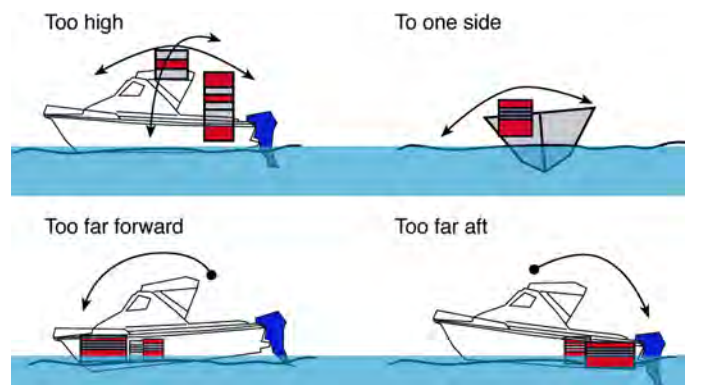


Figure 22.3 Effects of incorrect loading of vessel

Wet Paper



Wet Paper

Always use fresh fuel - check your instruction manual when to discard old fuel (eg some say for two strokes - discard after 3 months others say use additives)

Figure 22.4 Refuelling away from the boat in a well ventilated area

Fuel risks

Fire/explosion, burns, skin infections, death to others or pollution

Control measures (safety precautions and procedures)

- Remove tank from boat and fill at fuel station away from boat in a well ventilated area.
- Leave room in tanks to allow for expansion, refuel in a well ventilated space and wipe all spills.
- After trip, disconnect fuel lines and run carburettor dry.

Tell someone where you are going

Know your destination and how to get there and back. It is good idea to prepare a note to notify someone such as the VMR or Coastguard, a family member, neighbour, organisation or club. The following information is essential to help them find you if you don't come back on time.

- Trip details as well as departing and returning boat ramp/marina or berth
- Boat, car and trailer registration and description
- Number of persons on board
- Your contact mobile and radio call sign
- Estimated time of return

Know exactly where you are going

- Use a navigation chart to work out how to get there and how long it will take you to get back. Check the tides, tidal flow and bar conditions if applicable.
- Find out about any local dangers and special rules or regulations for the boating area you are operating in. A lot of information can be obtained from local signage, rescue groups or charts. Coastal navigation courses are essential if you are going offshore.

Check your radio and communications

You can do this with your local VMR or Coast Guard service. If you are logged on by radio, then don't forget to log on and off and if you change your plans let the people you logged on with know.

Prepare for emergencies

Being ready for an emergency means planning ahead, considering what could happen and taking control actions.

- Develop a safety plan so everyone knows what to do in case of an emergency.
- Having a marine radio to communicate with someone on shore will go a long way to solving problems.
- Make sure everyone knows how to put on a life jacket, swim or tread water. Always carry safety equipment so if something goes wrong you will still have options.

Stow the gear

Suitable clothing

- Avoid clothing that restricts your ability to move around the boat. Try to avoid clothing that will reduce buoyancy. Check how well you can swim in clothing or wearing a life jacket.
- Make sure all children wear a life jacket and that it is the right size (Figure 23.3).
- Remember to wear the right clothes to suit conditions, ie warm waterproof clothes in southern states, sunscreen and hats in tropics and to bring a water bottle and personal medications of required.

Check the weather

Check the weather, know what changes may occur and prepare plans in case conditions change rapidly.



Figure 23.1 Log in by radio or leave a note of trip details



Figure 23.2 Make sure you have up to date charts



Figure 23.3 PFD (A) above is useless as it will immediately come off in the water compared to PFD (B)



Figure 23.4 Wear the right clothes to suit conditions.

Housekeeping after every trip

- Wash down the exterior of the boat and motor and dry.
- Inspect for corrosion, cracks, wear and tear. Touch up with paint and wax.
- Check that the bungs are in good serviceable condition. Make sure the self draining holes are clear and grease the flaps if necessary.
- Ensure bilges are clean and dry.
- Keep the hull and decks clean and properly waxed.
 - Fibreglass should be cleaned with fresh water and non-abrasive soap.
 - If necessary use a soft brush to help remove debris caught in crevices.
 - Patch any cracks.
- Keep aluminium and stainless steel parts clean and polished with a good metal wax. Metals on boats corrode quickly, especially in salt water.
- Check all screws, bolts and other fittings to keep secure.
- Flush engine with fresh water to minimise the formation of deposits that can clog cooling passages. See your dealer for the best method for your motor.
- Take off the engine cover, check connections for sand, clean off the grime, and spray with water repellent.
- Clean the anchor, ropes, chain and shackles and check for corrosion.
- Keep the boat under cover or under a tarp to protect it from sun, rain, leaves, insects and general weather. Wooden plates on fibreglass transoms are notorious for rotting with rain water.

Spare parts and tools

Consult your engine handbook for any additional spares and tools that may be required. The following are suggestions for outboard and inboard motors.

| Spares | Tools |
|---|--|
| <ul style="list-style-type: none"> • Spark plugs • Replacement fuses • Fuel filters • Starter cord • Shear pins for propeller, spare nuts and bolts • Propeller • Spare fuel line • Spare bung • Spare oil and hydraulic fluid | <ul style="list-style-type: none"> • Engine manual • Pliers • De-watering spray • Spark plug spanner that fits (injector spanner) • Oil/fuel funnel • Propeller spanner • Gloves for handling hot materials |

Trailer safety and maintenance

Some suggestions are as follows. Your local garage mechanic or boat club can give you other ideas.

- Check the towing hitch, check the lights and make sure you wash salt water out of the bearings to prevent corrosion.
- Check the rollers, skid adjustments and winch strap. Check all wires and cables if trailer is ageing.
- Check bearings, tyre pressure, lights, jockey wheel and safety chains.
- Make sure the boat is tied on, the gear inside secure and the motor supported.



Figure 24.1 A bilge pump is located under the deck and can be operated manually or electrically.



Figure 24.2 Basic tools include spark plug spanner, multi-grips, screw driver, water repellent, fuel filter, emery paper, emergency starter cord

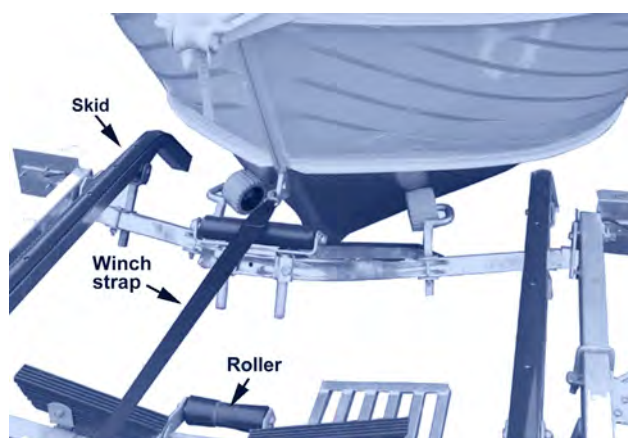


Figure 24.3 Check towing hitches, rollers, slides and corrosion.



Figure 24.4 Check the trailer and couplings.

WORKSHEET 6 ROUTINE MAINTENANCE

Q1. Identify one reason why you should read the manufacturer's handbook before using your motor.

Q2. Describe when should you replace old fuel in two and four stroke engines.

Q3. Explain how do you know your battery is in good working order.

Q4. Determine which of following spares is missing from the suggested tool kit for a boat in the table on the page opposite.
Spark plugs, replacement fuse, starter cord, shear pins for propeller, spare nuts and bolts, spare fuel line, spare oil and hydraulic fuel.

Q5. Describe routine maintenance that must be done on the following areas of your boat. Use the notes to give an example of each. Eg: Engine care - Manufacturers recommend a service once a year.

Hull

Water pump

Propellers

Gearbox oil

Fuel system

LPG

Batteries

Electrical system

Spark plugs

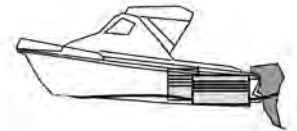
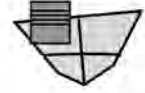
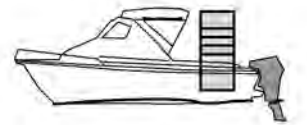
Pumps

General check of boat and after every trip

Safety equipment

Trailer

WORKSHEET 7 CHECK STABILITY, STOWAGE AND FUELING



Q1. Draw in the water line for the boats shown opposite to show how loading affects hull position.

Q2 Explain what the skipper must do to assess the load on board.

Q3. Determine what would happen to the boat in the photograph A below. Explain how freeboard is involved.



Q4. Explain why the boat in photograph B is correctly loaded.



Q5. Justify why you use fresh fuel.

Q6. Identify three safety precautions to reduce the chance of a refuelling accident.

Q7. Calculate how much fuel would be needed for a journey of 36 nautical miles if your vessel uses 0.75 litres of fuel per nautical mile.

Q8. Calculate how far you are travelling one way (eg 40 nautical miles) if your burn rate is 15 litres per hour. You estimate your time at 2 hours from a cruising speed of 20 knots given the weather forecast and tides.

Q9. Justify suitable clothing that should be carried or worn for a day's boating,

CHAPTER 3 BASIC SKILLS

Mount an outboard motor

Hazards

- Motor - drops on own or other crew members feet, back/body injured while lifting/ carrying motor to vessel, may fall off/fails during operation at sea, clamps may injure fingers
- Waves - Could move motor while mounting cause injury to fingers, incorrect trim could swamp vessel
- Boat ramp - may be slippery and you may fall while carrying the motor
- Fuel/anchor/safety lines - Crew may become entangled and falls over in boat

Control measures (safety precautions)

- Bend knees while picking up motor and ask for help if too heavy. If the motor is *greater than 18Kg*, it should be carried by two people.
- Screw the engine clamps on firmly and connect the safety chain to an appropriate attachment point on the motor so it won't fall off if the motor comes loose. This is indicated by the letter (a) in the Figure 28.1.
- Mount and centre the motor on the transom and connect the safety lanyard, ready for use as shown in Figure 28.2. Watch out for waves.
- Stow the fuel tank and line to prevent entanglement of crew and to maintain stability. Wear shoes or protective gloves. Select the correct trim.
- Stow the anchor, chain and lines in a box or compartment so crew will not injure their legs and feet.
- Stow PFDs and safety equipment in a place ready for use should an emergency occur but in a place (usually under the bow in a tinny) where it won't hinder crew from entering/leaving vessel. Wear protective footwear.
- Make sure the trim and tilt mechanism is adjusted so that when you mount the motor, it sits at the correct angles to allow for the boat's load.
- Connect fuel line (check for sand or gunk on end) and make sure the vent on the fuel cap is loose so the tank can breathe. Make sure the arrow on the bulb points towards the motor.

Conduct a safety briefing

To complete this skill you will have to move around the vessel pointing out all safety equipment and ensure the information is understood.

- Point out the different types of safety equipment carried, eg, if you are going offshore you will need to show the flares and EPIRB and how to use them.
- Identify the location where equipment can be found and confirm that everyone has understood you.
- Identify where you will be going for the day, the type of conditions they can expect, how long till the next toilet stop or the need for footwear or protection from elements.
- Remind crew about stability and safety. For example - inform passengers to never stand or sit on the bow of a boat while the boat is departing or leaving. You may want to remind all to stay seated safely and secure possessions before you take off.
- Keep the crew briefed during the voyage if conditions are changing, eg, increasing waves, you are changing direction, looks like its about to rain heavily.

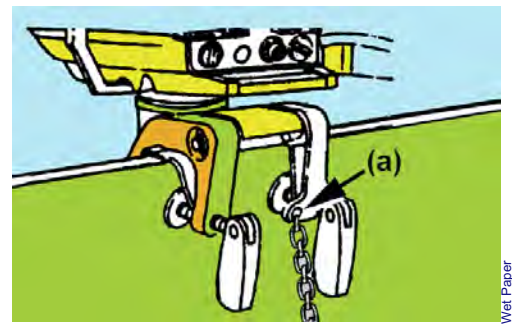


Figure 28.1 Mounting the motor on the transom plate



Figure 28.2 Outboard motor ready for starting



Figure 28.3 Look at the load and select the correct trim



Figure 28.4 Point out different types of safety equipment and where stored.

PRACTICAL TASK: Conduct a safety briefing (see www.wetpaper.com.au - Resources)

Using the web reference above conduct a safety briefing with the crew:

1. pointing out the different types of safety equipment,
2. identifying their location and
3. checking that the information is understood by all on board.



Launch and retrieve a boat

Hazards

- Trailer/towing vehicle - Goes off ramp while backing, crew slips while standing on the trailer
- Boat ramp - Crew slips on ramp or cuts feet
- Launching site - Glass, mud, reeds, logs, marine debris causes cut feet or entanglement
- Boat - Floats away and lost after launching, flooded while driving off (no bungs)
- Skids - Set too high and boat difficult to launch
- Winch handle - Spins quickly, cable breaks injures crew
- Mooring line - Not attached and boat floats away
- Other boats or vehicles - Person run over/injured on boat ramp
- Thieves - Towing vehicle stolen from carpark
- Brake and indicator lights - Left on while backing trailer in to water causing fuses to blow and corrosion to electrical wires
- Straps - Left off, boat comes off trailer at first turn out of carpark
- Handbrake - Not working, boat and trailer slide off boat ramp
- Beach - Crew stands up while coming in and knocked over bow when boat strikes beach
- Other boats and cars on the ramp - keep a eye out of people who cannot back trailers and other ramp users

Control measures (safety precautions)

- Ensure indicator and brake lights are disconnected before launching.
- Make sure your handbrake works and use a chock under the wheels if in doubt. Practice so you can back your trailer in a straight line.
- Each trailer will have its own mechanism for launching and you should discuss with your dealer or vendor the operating procedure.
Some trailers have tilt mechanisms, some have power winches, others have manual winches.
 - In trailers with hand winches, the boat may move off the trailer quickly. Always keep complete control of the boat as it enters the water. Be careful of a spinning winch handle.
 - Make sure there is a rope attached to the boat so it doesn't float away when launched.
- Make sure you don't slip on the ramp especially at low tide so make sure you wear protective footwear - many ramps have broken glass, sharp stones or oysters and barnacles.
- Remind crew about stability and safety. Never stand or sit on the bow of a boat while the boat is departing or leaving. Have all crew seated safely before you take off.
- Post a look out or be aware and lookout for other people, especially children on the boat ramp. Advise all crew to stay well clear until boat launched. Embark crew from safe place away from ramp.
- Don't forget to lock your car and secure your trailer before you leave.
- Check that the indicator and brake lights are working before you leave the carpark to go home.
- If the ramp is steep, the boat may enter the water rapidly causing water to enter the drive shaft housing through the exhaust chamber and damage the motor. The boat should be launched as slowly as possible.
- Make sure the boat moves up and down the trailer on the rollers and guides.
- If the boat is heavy, get someone to help you.
- **Make sure the bungs are in.**

Use and care of winches

- Beware of dangerous situations when the boat is being winched.
A lot of weight is controlled by a thin piece of cable which has to be maintained in good condition.

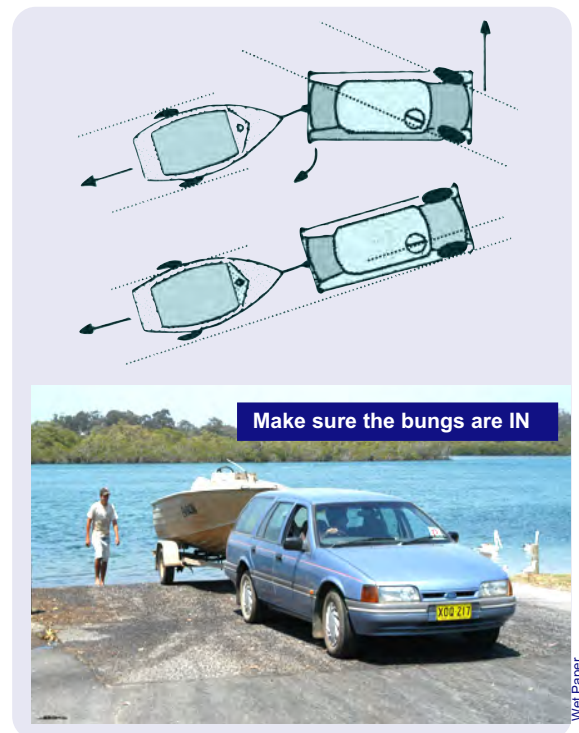


Figure 29.1 Backing



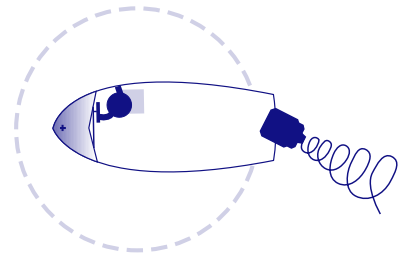
Figure 29.2 Correct launch of trailer

WORKSHEET 8 SAFETY BRIEFING, LAUNCH AND RETRIEVE A BOAT

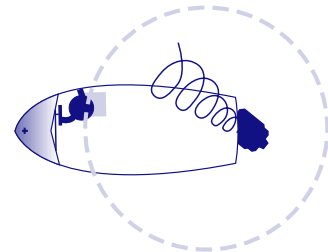
Q1. Describe four points you should cover in a safety briefing.

Q2. Justify this procedure under the general safety obligation.

Q3. Complete the pivot point diagram on the boats shown opposite from the diagrams on page 31. Explain how they differ when the boat is going ahead and astern.



Q4. Describe how you would retrieve a boat from the water, onto your trailer and back home. Identify safety procedures to avoid accidents to yourself and others.



Q5. Describe three practical things you could do on the boat ramp to avoid ramp rage. (Read the box below)

PRACTICAL TASK: Launch a boat from a trailer

- Prepare boat and trailer for launch
- Observe good ramp etiquette
- Launch boat
- Temporarily secure boat for loading
- Remove and pack the vehicle and trailer
- Depart the launch area



Ramp etiquette

Etiquette is the consideration of others. There are many things that make for a pleasant day's boating and many of these start at the boat ramp.

- When launching **make sure the bungs are in.**
- Get the boat into/out of the water and into the carpark as soon as possible so others can use the ramp.

- Get the boat ready in the carpark - make sure you have everything.
- Make sure the trailer tail lights are disconnected before you back the trailer into the water.
- Make sure everything you want is in the boat before you launch it.
- Prepare the boat for launch with the safety chain on winch.

- Let the bearings in the trailer wheels cool before backing into the water.
- Check the brakes and have a block to secure the towing vehicle when on the ramp and remove the block when finished.
- Have someone to assist you when the boat is in the water and you have to park the car.

Start and stop an outboard motor

Hazards

- Starter cord - Belting a crew member in the face while pulling, breaking cord by not taking up slack when pulling starter mechanism
- Sheer pin - Breaking or damaging gears by not dropping revs when engaging gears
- Motor - Flooding and then panicking and holding up lesson, burning out the motor by not checking the tell tail or by faulty gauge, wobbles due to incorrect mounting causing instability
- Fuel - Spills causing pollution, environmental damage
- Prop - Legs lacerated if standing beside outboard

Control measures (safety precautions)

Helm at the stern

(Note the numbers in brackets refer to Figure 31.2 and 31.3)

Consult the manufacturer's handbook for specific sequences for starting and stopping.



- Identify and describe how to stop the motor.
- Recall that when the motor is warm, the choke does not have to be used as it will flood the motor and make it harder to start.
- The motor needs to be in the water when started and know how to identify that the water pump is working.
- Check that the fuel line is connected securely and pump the fuel line bulb until reasonably firm [1], [2].
- Check the safety lanyard (kill switch) is on your wrist [3], the gear lever in neutral [4], the choke is on [5] and the throttle on "start" [6]. Note the gear lever may be on the side of the motor.
- Gently pull starter cord until it catches [7] (or turn the key in the ignition - Figure 31.2 and 31.3)
- Look behind you (so no-one gets belted in the mouth when you pull cord!)
- Take up the slack in the pull cord and pull firmly until motor starts. If motor does not start after a few pulls, turn the choke off and try again.
- As soon as the motor "kicks", turn off choke and drop revs.
- Check to see if water is coming out from the tell tail (shows water pump is operating).
- Refrain from changing gears when the motor is revving hard.
- If the motor does not start it may not be your fault and the following may be a problem:
 - Flooded carburettor and you may need to remove the fuel line and empty the carburettor by cranking the motor with the pull cord about 6 times and then replace the fuel line and start again.
 - Dirty spark plug - remove the plug and clean it.
 - No fuel getting through to carburettor and you may need to check for a kink in the fuel line or open the vent on the cap of the fuel tank.
 - Not enough fuel to the carburettor and you may need to pump the primer bulb.
 - Electrical or fuel problems and you may need to return the motor to repair shop.
- If the motor does start, but the boat goes nowhere, it may be
 - a broken sheer pin and you may need to remove the propeller and replace it.
 - if this is not the case you may have gear box problems and will have to return the motor to the repair shop.



Figure 31.1 Always start the motor from inside the boat.

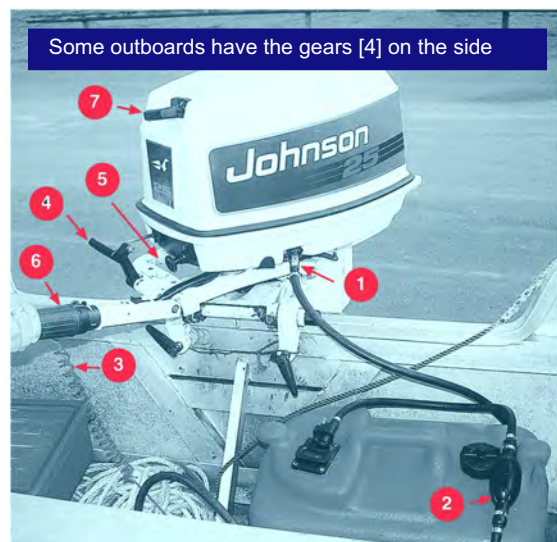


Figure 31.2 Starting sequence numbers



Figure 31.3 Follow manufacturer instructions for starting a boat.



Figure 31.4 Check the safety lanyard (kill switch) is on your wrist .

Control measures (safety precautions)

Forward controls

As mentioned earlier, consult the manufacturer's handbook for specific sequences before starting your motor.

1. Fuel system

- Check fuel ventilation (any fumes).
For inboards make sure the bilge is free of fuel vapour and the engine and gear box oil levels are correct.
- Check the fuel lines are open and connected.
- Make sure the bulb is primed and leak free.
- Check the fuel cocks are open.
- Check the fuel levels are adequate for the voyage plus a reserve.

2. Cooling system

- Check the coolant levels are correct (if fitted).
- Check the intakes are open and clear and raw water sea cocks are open.

Make sure the motor is not running when you do this.

3. Electrical system

- Check that the power is turned on.
- Check the kill switch (safety lanyard) is fitted.

4. Start-up

- Select neutral gear and check if safe to start ie no people in the water nearby.
- Turn the key to start the motor.
- Check the motor is running OK and the water pump is working.

Ask someone to check that water is coming out of an outboard legged motor in what is called the 'tell tail'.

Make a visual inspection keeping hands and arms well clear

- Monitor the motor for things like coolant temperature, oil pressure or unexpected changes in engine speed or sound.



Figure 32.1 You can see all this at www.wetpaper.com.au - Resources

PRACTICAL TASK: Motor is prepared and started safely (see www.wetpaper.com.au - Resources)

Using the web reference above, demonstrate in the vessel you are about to use, that:

1. The fuel system is ready for use by *checking ventilation (inboards); checking fuel lines are connected and open; and checking fuel levels are appropriate.*
2. The cooling system is operating by *checking coolant levels if fitted; and checks intakes are open/clear.*
3. The correct use of lanyard (*kill cord*)
4. The electrical system is working by *checking power is on.*

Then start the engine checking that

- the motor is in neutral and it safe to start
- Once the motor is started check that
- the motor and water pump are working satisfactorily.



Factors affecting manoeuvring

Transverse and axial thrust

The force from a propeller driving a boat forward or backwards is known as **axial thrust**.

The sideways force generated by a propeller is called **transverse thrust**. So the propeller propels the boat forward and sideways.

Most propellers are "right handed" meaning they rotate clockwise in forward gear when viewed from astern as shown in Figure 33.1. Such propellers tend to paddle the stern to starboard when going ahead and to port when going astern. This is known as the "paddle-wheel effect".

Single screw outboards

With one propeller, the bow will tend to move (or cant) in the opposite direction to the stern as shown in Figure 33.1 (Note that left handed propellers will move the stern and bow in the opposite direction).

Twin-screw outboards

With two propellers (or twin-screw boats) the propellers will be counter-rotating with the starboard right-handed and the port left-handed. Therefore, when both engines are going ahead or astern the sideways or "paddle-wheel effect" is cancelled. If one engine is going forwards and one astern, the bow will be canted around by the forward power, and the stern canted around by the stern power, turning the boat quickly (known as "turning around short").

The boat can also be made to move side ways off or towards a jetty, or the boat can be spun around in a small space (Figure 33.2).

Outwards rotating propellers allow the boat to turn very efficiently and they are generally easy to manoeuvre. Inward rotating propellers result in a boat that is more difficult to turn short around but, when used properly, may assist a boat to "walk" sideways.

Single and twin shafted vessels

As a boat gets up to speed, transverse thrust will not be a major consideration as the rudder, across which the propeller is throwing a stream of water (axial thrust), will generally override this (Figure 33.3).

At low speeds the rudder does not have a propeller induced stream flowing over it and transverse thrust may dominate steering. Effective manoeuvring requires experience in the application of transverse thrust.

Lags in the helm and throttle response

A vessel does not respond instantly to the wheel or throttle. The time between the two is called a lag and the duration will vary among different vessels. This lag needs to be anticipated.

A lag in helm response is known as an "advance". This is a segment of a turn in which the vessel travels forward after a helm instruction and before the vessel moves off its course line.

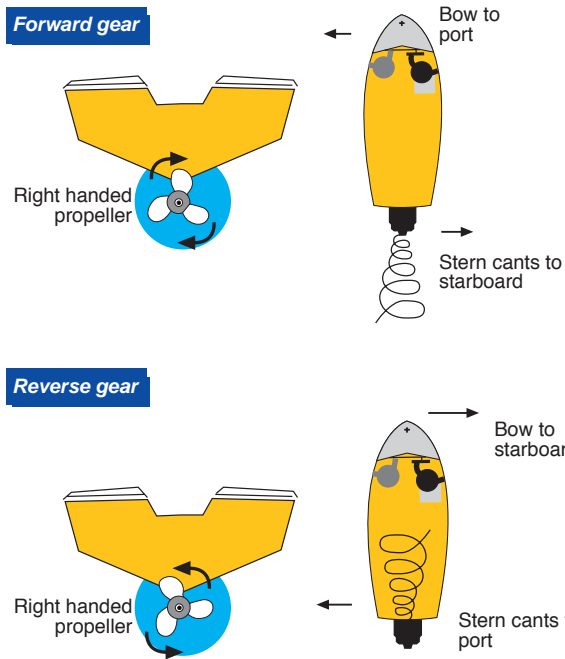


Figure 33.1 Transverse thrust
Wet Paper

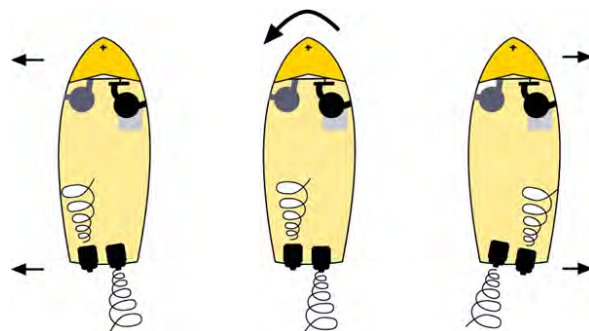


Figure 33.2 Transverse thrust on twin-screw boats
Wet Paper

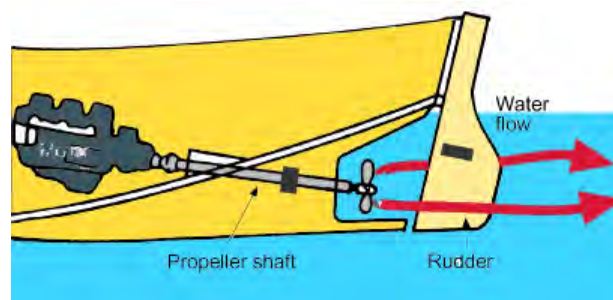
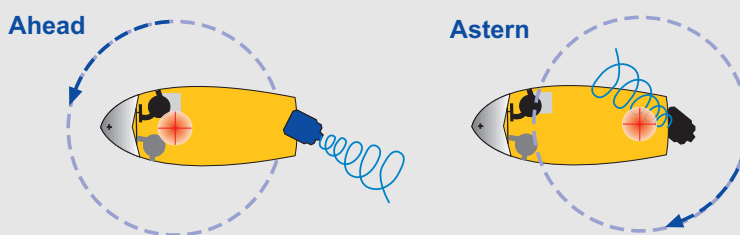


Figure 33.3 Single shafted vessel
Wet Paper

Pivot points

When going ahead a boat has "rear wheel" steering. Because of this, the pivot point within the boat, and around which the boat turns, is located well forward of amidships. This means that the bow cannot be turned unless there is room for the stern to move in the opposite direction so you cannot steer a boat forwards away from the dock.

- To move the bow sideways will require a much larger movement of the stern in the opposite direction.
- When turning forwards, the stern of the boat will swing much more widely than the bow.
- In reverse, the pivot point is usually slightly aft of amidships. Because of this, the bow will follow the stern quite well in reverse and may often be easier to "reverse park" in tight situations.



Depart a beach

Hazards

- Prop - Lacerated legs standing beside motor, damage to prop by incorrect use of gears, Damage to seagrass and environment
- Motor - jumps up on reversing affecting stability
- Other boats - Collision with another boat
- Boat - Crew injured by taking off too fast
- Waves - Enter boat over transom causing flooding
- Sandbank or mud - grounding, damage to impeller

Control measures (safety precautions)

- Judge the wind and tide and lower the motor so that the prop and water intake are in the water.
- Instruct one of the crew to hold the bow while the motor is started while all others board the boat.
- Check to see if water is coming out of the tell tail, when the motor is started.
- Instruct the person holding the boat to push you off.
- Lower the motor further, keep it neutral and instruct the person aft to check the water depth.
- Drop the revs, wait a few seconds and place the gears into reverse.
 - point the motor in the direction you wish to go and accelerate slowly astern.
 - control your speed to avoid water splashing into the boat.
- Select forward and accelerate away obeying local regulations and rules.
- Practise increasing and decreasing revs so that you “get the feel” of the motor, and steering to port and to starboard so that you get the feel of the motor acting as a rudder.
- The skipper talks while monitoring the condition of the vessel and its surroundings. Get in the habit of always warning the crew of your intentions.
- Accelerate the boat so that the bow rises and then falls as you gather speed.
- Identify that often all or most of the power in the engine is required to get the boat on the plane.

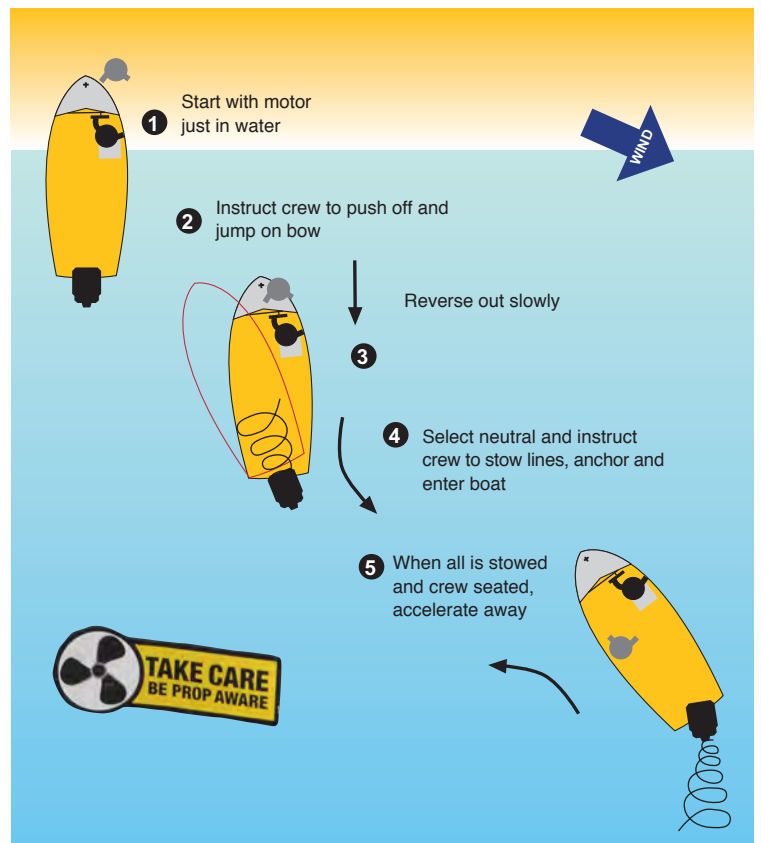


Figure 34.1 Leaving a beach

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Figure 34.2 Point the motor in the direction you wish to go on reverse

Wet Paper

PRACTICAL TASK: Recover a boat into a trailer

- Prepare boat and trailer for recovery
- Bring the trailer to the waters edge
- Observe good ramp etiquette
- Secure the boat to the trailer
- Move to the boat wash area
- Prepare the boat and trailer for travel
- Roadworthiness check: safety chains, brakes, lights, boat secure



Wet Paper

Return to a beach

Hazards

- Mud/rocks - damage to prop and impeller from striking. Environmental damage/pollution fuel in the water
- Other people in the water - Injury to others in water
- Boat and beach - Crew seriously injured while jumping out of boat approaching shore, misjudging the depth and being run over by bow, crew injury caused sudden jolting or things moving about
- Prop - Lacerations to legs
- Motor - Does not turn off when raised out of the water, revs high, causes panic

Control measures (safety precautions)

- No one is to be standing up or bow riding on the way in.
- Judge the wind and tide and determine dangers and hazards during approach and landing of crew.
- Come in slowly keeping a lookout for water depth or monitor depth on a depth sounder. Tilt motor keeping prop in water, and forward ahead until very close to shore. Cut motor, raise to maximum tilt and warn crew of impending stop. When the boat has completely stopped, warn crew of hazards and instruct them to disembark.

Speed limits and safe distances

Each State has specific rules for speed limits and safe distances as you approach swimmers on shore. You should check your State's web site for these.

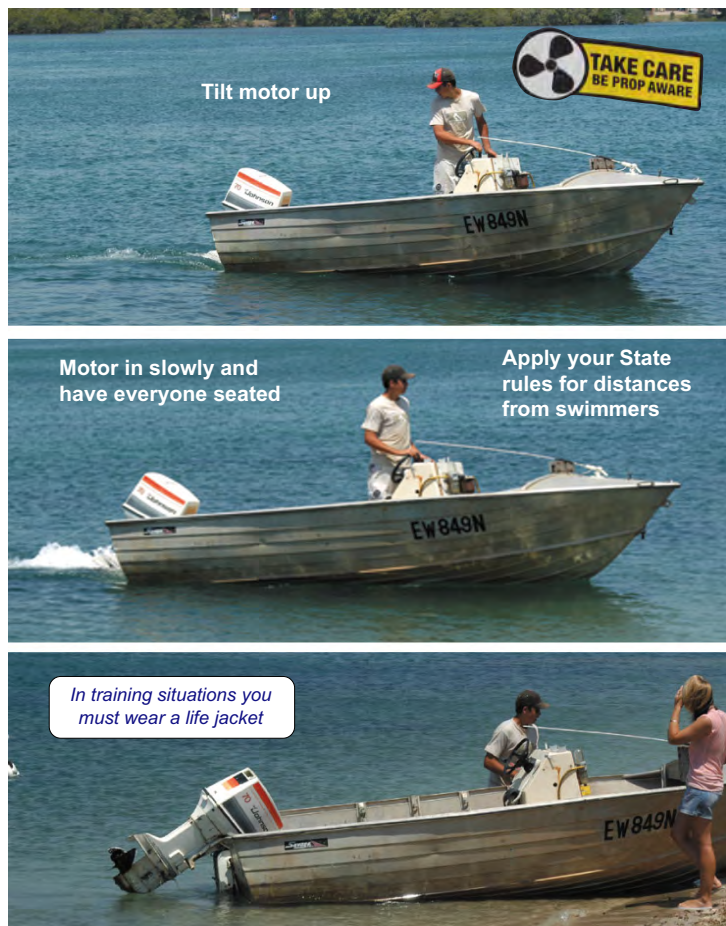


Figure 35.1 The outboard tilt controls on the throttle handle allow the motor to be raised as the boat approaches the shore.

PRACTICAL TASK: Use a transit to steer a steady course (see www.wetpaper.com.au - Resources)

You must demonstrate your ability to record and communicate the vessel's course using transit of landmarks or navigational aids.

Safe speed

All vessels must travel at a safe speed at all times. This cannot be expressed as a maximum or minimum number of knots because it varies with local rules and conditions. The skipper must continually assess the safety of the vessel's speed. A safe speed is one at which the vessel can be stopped to avoid any danger which arises suddenly. In judging safe speed the skipper must consider visibility, other vessels, navigation hazards, wind, waves and currents as well as manoeuvrability of the vessel and age of children on board.

Exercising minimum control speed

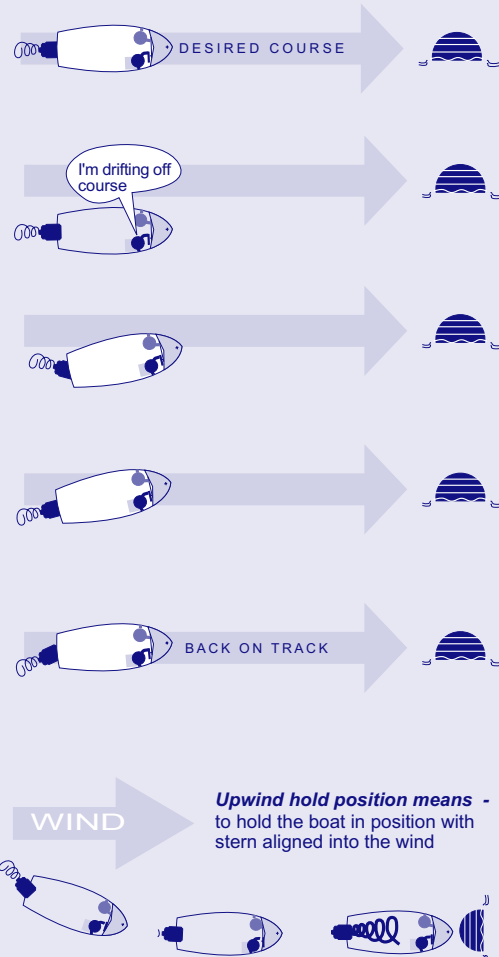
Minimum control speed is the slowest speed at which you can operate and still maintain steering control. Typically, this is less than the speed produced when the engine is in gear and the throttle is set at idle rpm, and is accomplished by the use of intermittent power. With the throttle at idle rpm, shift from neutral to forward and back to neutral. This produces a short, gentle pulse of power to maintain steering control. Repeat this.

Holding position

There are two methods for holding position:

Bow into Waves: Since the bow will usually have a tendency to turn away from the wind, you will have to compensate for this by periodically shifting into forward gear and making slight steering corrections to bring the bow back into the wind. Because the bow wants to turn downwind, it is usually easier to hold position with the stern into the wind, provided the waves don't come over the transom.

Reversing into the wind: When reversing up into the wind or downwind, use minimum control speed. When backing towards the wind the combination of windage and pivot point will help you hold course.



Drive a boat on the plane

Complete a figure of eight with U and S turns

Hazards

- Other boats - Collision with another boat
- Boat - External injury to crew from losing balance and falling over
- Waves - Flooding, crew injury caused by things moving about eg anchors, fishing gear
- Sandbanks, rocks, reefs - Damage to hull running aground or striking submerged object
- Plastic bags, fishing line - Fouling of prop, plastic clogging water intake and engine failure
- Sun, rain, wind fog - Loss of visibility causing collision

- Determine the conditions of tide, wind and area of operation before starting, maintain the vessel's stability and direction, manage the crew and passengers. Consult local charts and be sure of special markers. Be aware of the sun, wind, rain as it affects visibility.
- Maintain a proper lookout and monitor engine performance.
- Engage forward gear by dropping the revs, waiting a few seconds and select forward gear. Then sit or stand in a comfortable position with one hand firmly on the throttle and another on the gunwale.
- When it is safe to do so and after warning crew, increase speed so the bow rises and then falls to make the boat plane as shown in Figure 36.1.
- Warn your crew of on coming wash or changing sea conditions and what you are going to do to maximise stability.
- Look all around to see you have space to safely make the manoeuvre and make a wide arc.
- Minimise your wash. When travelling past moored vessel, it is common courtesy to minimise your wash. People might be boiling water or moving about and wash can cause injuries.

Figure of eight, S turns control measures (safety precautions)

- Keep the boat on the plane in a wide arc.
- Decelerate at the start of the turn so you can feel the chine of the boat gripping the water.
- Cross the wash and hang on tightly. Slow a little to ride over the waves. Identify the two sets of wash in the water.
- Keep the boat on the plane. Look over your shoulder again and make a second turn to complete the Figure of 8.

PRACTICAL TASK: High speed manoeuvres

- Check that it is safe, no interference to other vessels and water users
 - Advise crew of what you are about to do
 - Bring vessel on to plane
- Check that it is safe, no interference to other vessels and water users
 - Advise crew of what you are about to do
 - Perform U turn
- Check that it is safe, no interference to other vessels and water users
 - Advise crew of what you are about to do
 - Perform S-turn
- Check that it is safe, no interference to other vessels and water users
 - Advise crew of what you are about to do
 - Perform Figure of 8
- Check that it is safe, no interference to other vessels and water users
 - Advise crew of what you are about to do
 - Bring vessel off the plane



Figure 36.1 Correct seating for on the plane

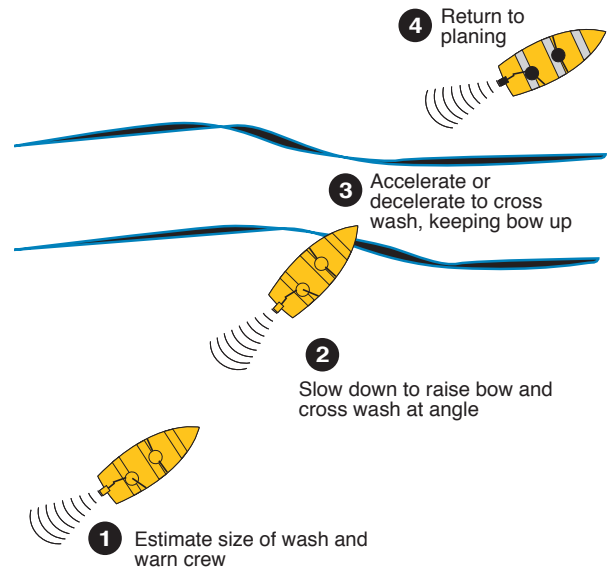


Figure 36.2 Crossing a larger wash

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Figure 36.3 Figure of 8

Wet Paper

Depart from a dock

Hazards

- The dock - Injured fingers and hands, hull damage collision with dock
- Propeller - Fouled by lines or plastic in water
- Boat - Crew injured by taking off too fast, colliding with dock
- Other vessels - Collision with another vessel
- Lines - Can become entangled

Control measures (safety precautions)

- Use fenders, spring lines to prevent damage
- Skipper informs crew what to do, informs passengers
- All passengers remain seated during operation (body inside boat)

Tied up alongside

A small boat may only need a bow line and a stern line and these may need to be lengthened to allow for tides. A larger boat should add a bow and stern spring lines to ensure greater security (Figure 37.1).

Departing (unberthing)

When you drive a car the frictional force of the tyres grip the road making manoeuvring straight forward. In water, the major manoeuvring grip, is from the propeller.

To successfully complete this task you will need to brief the crew and passengers on what is to happen, allocate lines or fenders and caution about hands being trapped between boat and berth.

Before making your manoeuvre, ensure it will not interfere with other boats – look around. Generally it is easier to reverse away from a berth. It is often difficult to get the bow off a berth while moving ahead because the stern swings when the rudder or engine movements are used for steering.

Outboard leg - outboard or sterndrive motor (Figure 37.2)

- Tell the crew what you are going to do and if handling lines to watch the gap between them and the dock.
- With the motor in neutral, turn the wheel fully away from the berth, this points the propeller in the direction the stern will go in reverse. Put the motor in reverse and apply very little throttle. Unless wind or current is pushing the vessel onto the berth, the stern will move out and the bow will not scrape on the berth. If the boat is being pushed on, you may need to straighten the wheel a little as the vessel moves astern, this will protect the bow from hitting the berth.
- Once the bow of the vessel is clear of the jetty and while still in reverse, turn the wheel fully toward the berth, this will straighten the vessel by swinging the stern towards the berth and the bow away from the berth.
- When the vessel is parallel to the berth turn the wheel in the direction you wish to go and engage forward propulsion.

Twin screw - (Figure 37.3)

Departing a dock with a twin screw vessels is best done entirely with the engines and wheel amidships.

- When swinging the stern out, go forward on the engine further from the berth, and astern on the engine closest to the berth.
- Once the stern has swung out far enough to clear any obstacles, go astern on both engines.
- Once the bow of the vessel is well clear of the jetty, go forwards on the engine closest to the berth.

When the vessel is pointing in the direction you wish to go, engage forward on both engines.

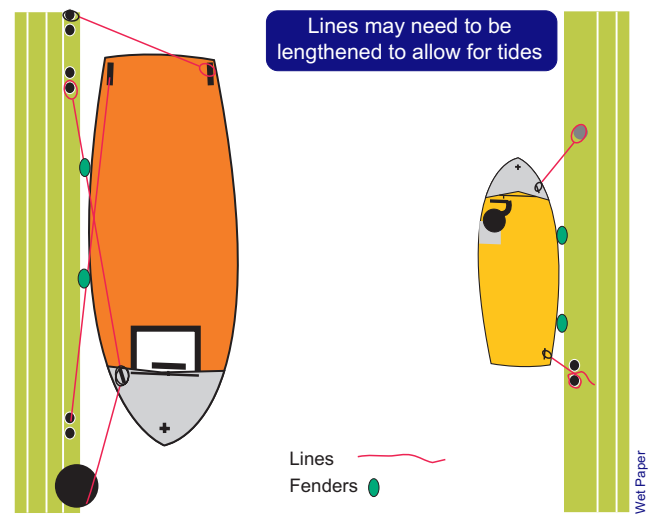


Figure 37.1 Securing with mooring lines

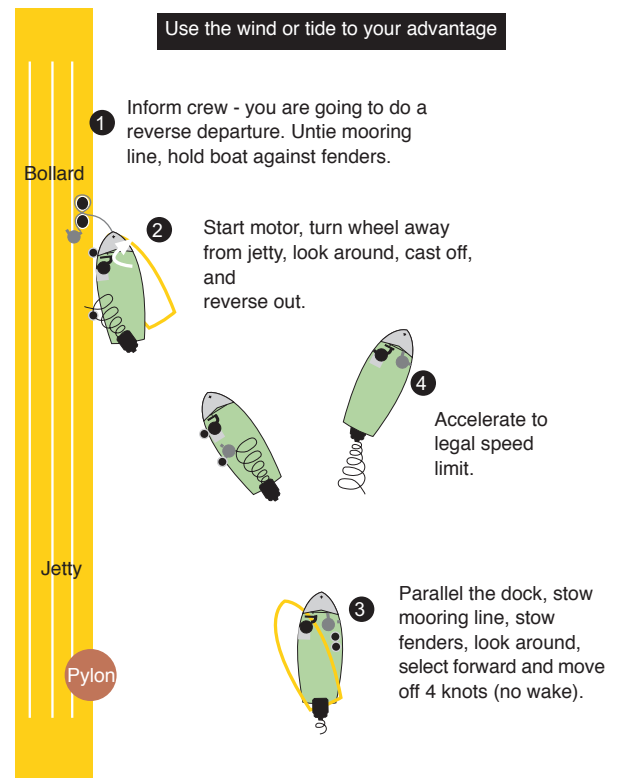


Figure 37.2 Leaving a dock with an outboard leg

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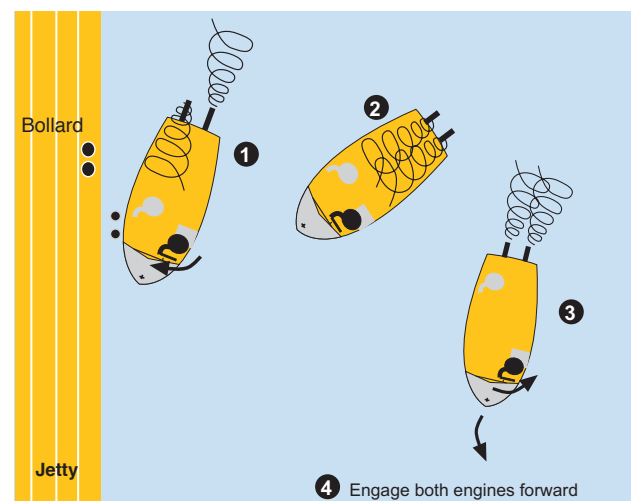


Figure 37.3 Depart a dock twin screw

Wet Paper

Inboard motors

Single shaft (Figure 38.1)

The single shaft's rudder needs a flow of water over it before it will turn the boat. Therefore releasing the lines and going astern will usually not be very successful, particularly if wind or current is pushing the vessel into the berth.

The most common method uses a spring line as shown in Figure 38.1. Note that these manoeuvres are suitable if wind/tide is not pushing boat on to wharf.

- Remove all berthing lines except a spring line leading aft from well forward. Consider putting a fender between the berth and the shoulder of the bow.

Turn the wheel fully towards the berth. Put the motor into forward gear and apply a small amount of throttle. The vessel will try to move forward but the spring will stop it.

There is now a good flow of water past the rudder, so the stern will swing away from the berth. The vessel also tends to pivot around the bow's shoulder. You will need progressively more power, the stronger the wind/tide forcing the boat against the wharf.

- When the stern is pointing well away from the berth, put the motor in neutral, release the spring line, turn the wheel away from the berth, and reverse out.
- Once the bow of the vessel is clear of the jetty and while still in reverse, turn the wheel fully towards the berth, this will straighten the vessel by swinging the stern towards the berth and bow away from the berth.
- When the vessel is parallel to the berth, turn the wheel in the direction you wish to go and engage forward gear.

Twin shaft (Figure 38.2)

Departing a dock with a twin screw vessel is best done entirely with the engines as shown in Figure 38.2. These manoeuvres are suitable if wind/tide is not pushing boat on to wharf.

- When swinging the stern out, go forward on the engine further from the berth, and astern on the engine closest to the berth.
- Once the stern has swung out far enough to clear any obstacles, release the spring and go astern on both engines.

Going ahead against the spring line with a little more power will bring the stern out in stronger winds.

- Once the bow of the vessel is well clear of the jetty, go forwards on the engine closest to the berth.

When the vessel is pointing in the direction you wish to go, engage forward on both engines.

Wind and tide

These manoeuvres are suitable if wind/tide is not pushing boat on to wharf. Further reading - docking in style www.yachtsurvey.com/docking.htm

These manoeuvres are suitable if wind/tide is not pushing boat on to wharf.

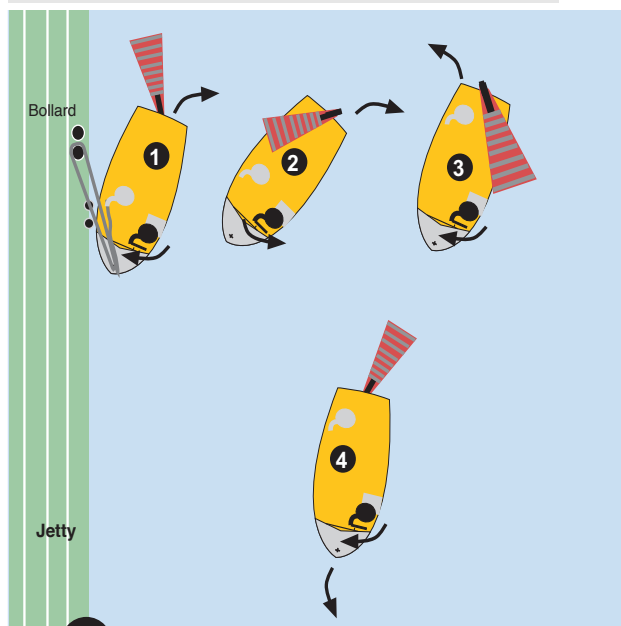


Figure 38.1 Depart a dock single shaft

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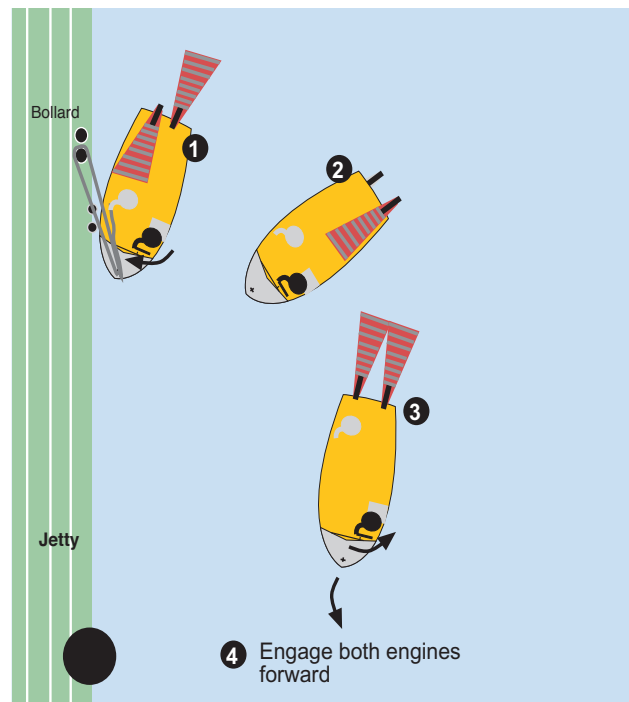


Figure 38.2 Depart a dock twin shaft

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PRACTICAL TASK: Safely depart a berth (see www.wetpaper.com.au - Resources)

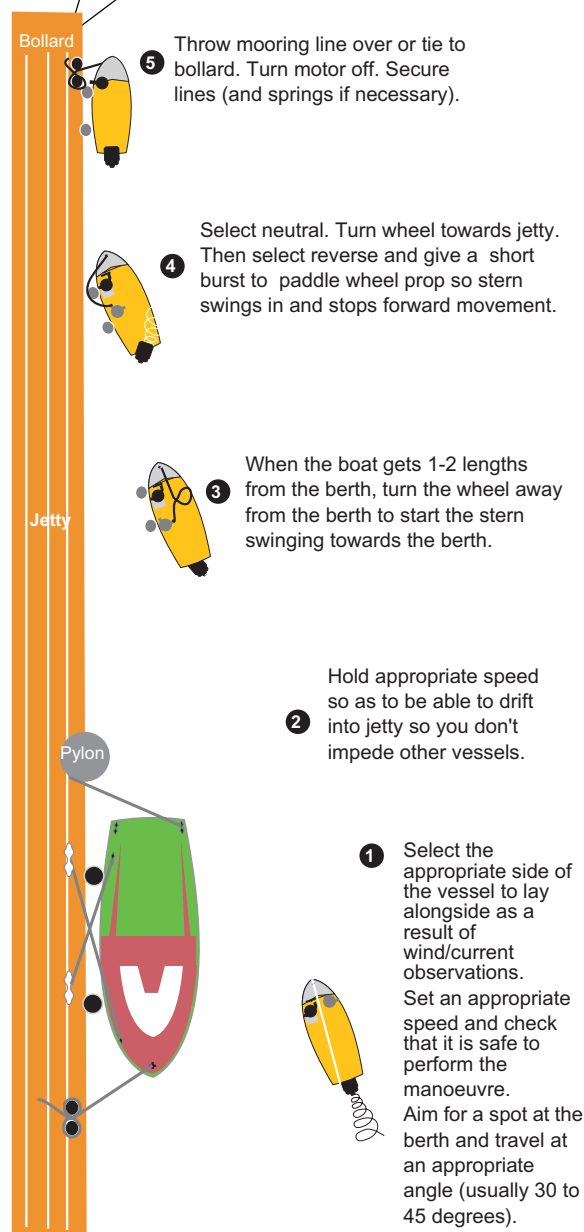
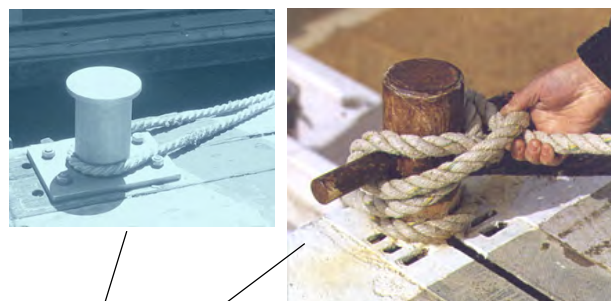
1. Checking that it is safe to perform the manoeuvre.
2. Allowing for wind and current during departure.
3. Departing the berth with little or no impact to the berth.
4. Not impeding any other vessels.
5. Using appropriate revs.
6. Demonstrating smooth and timely use of gears.
7. Mooring lines are stowed/replaced/secured.



Dock at a jetty

Outboard leg (Figure 39.1)

- Advise crew to keep fingers off the gunwale and impending wake from own boat at dock.
- Identify the correct place in a marina to moor a vessel obeying regulations.
- Approach a dock at an angle of about 30 - 45 degrees. If the wind is blowing you off the dock, approach at a shallower angle.
- At 1 - 2 boat lengths, slow to a minimum controllable speed by using intermittent power.
- Line up two items to tell if the boat is maintaining the desired track and adjust heading as necessary and at one-two lengths go to neutral.
- Position the motor towards the dock. At slow speed in neutral the helm has little effect, so as you turn the motor towards the dock the boat continues in a straight line.
- At 1/2 a boat length apply a brief burst of power astern to swing the stern towards the dock to bring the boat to a complete stop.
- Throw a mooring line over a bollard or tie up to the jetty and use a boat hook or paddle to fend off the jetty.



PRACTICAL TASK: Depart berth using springs

- Check that it is safe, no interference to other vessels and water users
 - Aft spring secured, back to the boat for quick release
- Bow and stern lines released
 - Outboard engine/helm turned towards berth
 - Slow ahead to move stern away from berth
 - Gear neutral
 - Outboard engine/helm turned away from berth
- Check that it is safe, no interference to other vessels and water users
 - Slow astern to move boat away from berth
 - Turn and position boat as appropriate
 - Move ahead on desired course
 - Stow mooring lines

PRACTICAL TASK: Arrive at berth using springs

Single or twin screw propeller

- Check that it is safe, no interference to other vessels and water users
- Approach berth at 30-45 degree angle
- Approach at appropriate speed
- When bow within reaching distance of jetty, stop the boat
- Secure aft spring adjacent to "shoulder" of the boat
- Turn outboard away from berth
- Slow ahead until alongside
- Stop the boat
- Secure stern and bow lines

Fixed shaft propeller

- Check that it is safe, no interference to other vessels and water users
- Approach berth at 30-45 degree angle
- Approach at appropriate speed
- When bow within reaching distance of jetty, stop the boat
- Secure aft spring adjacent to "shoulder" of the boat
- One crew to step onto berth with stern line
- Secure forward spring back to the boat
- Engine to idle reverse
- Use stern line to pull stern of boat alongside
- Secure stern and bow lines

Figure 37.1 Docking - no wind or tide

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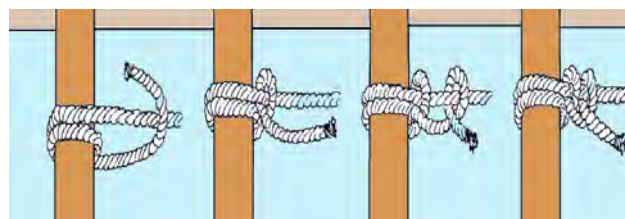


Figure 39.2 Tying to a post - Round turn and two half hitches

Wet Paper

Inboard motors

Single shaft (Figure 40.1)

Most single engine vessels have a clockwise rotation propeller. For these boats the port side is easier to put alongside because the stern tends to kick to port when the engine is going astern. The opposite applies to anticlockwise rotation propellers. This description assumes a clockwise (sometimes called right-handed propeller).

Set your approach angle according to wind/tide (steeper for onshore, shallower for offshore). Approach as for outboard leg manoeuvre. The difference is that the rudder will still steer the boat at slow speed.

- When you are 2-3 boat lengths off engage neutral and coast in.
- At one and a half boat lengths steer away from wharf to get boat's bow turning.
- At half a boat length apply astern power until the boat stops completely, straightening the helm at the same time. The vessel will now come alongside. Once the stern is alongside, the vessel can be secured with the appropriate mooring lines.

Twin shaft (Figure 40.2)

Almost always a vessel with twin shafts (a twin screw vessel), has the propellers outward turning. This means that moving ahead or astern, it is set up to give the best engine assistance with turning.

Twin screw vessels give you great manoeuvrability, and the only limitation that they have is that, just like single screw, the bow stays more or less motionless while the stern does all the turning. A great advantage with twin shaft vessels is that they have a short turning circle and no preference for putting one side or the other alongside.

- Make a slow approach, similar initially to a single shaft vessel.
- With the engine closest to the berth ahead and the outer engine astern, use the short turning ability to pull the starboard stern alongside.

Tying to a cleat

- First make a full turn around the base of the cleat.
 - Follow with two figure of eights.
 - Finish with a full turn.
- If you intend staying for a while replace the full turn with one half hitch.

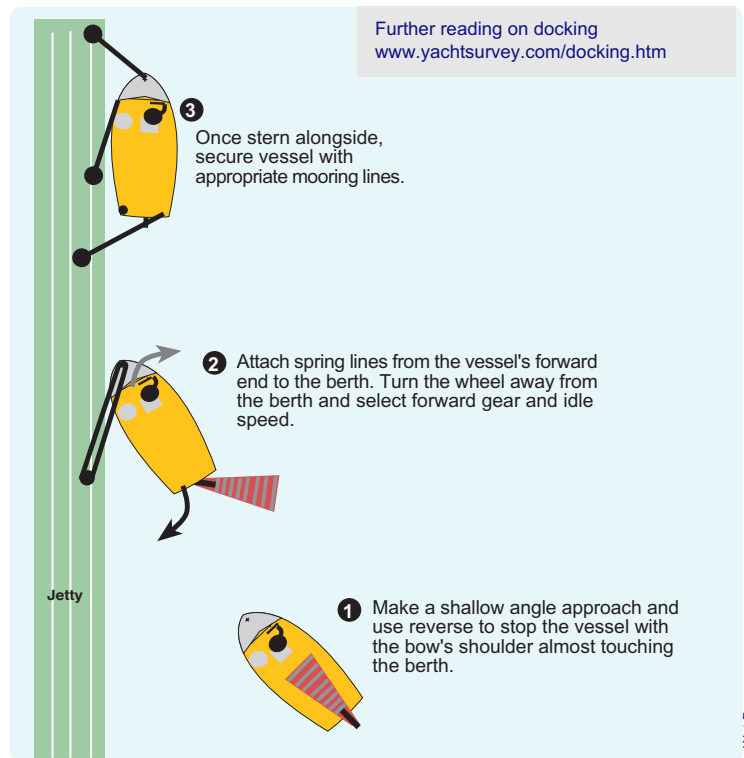


Figure 40.1 Docking - single shaft

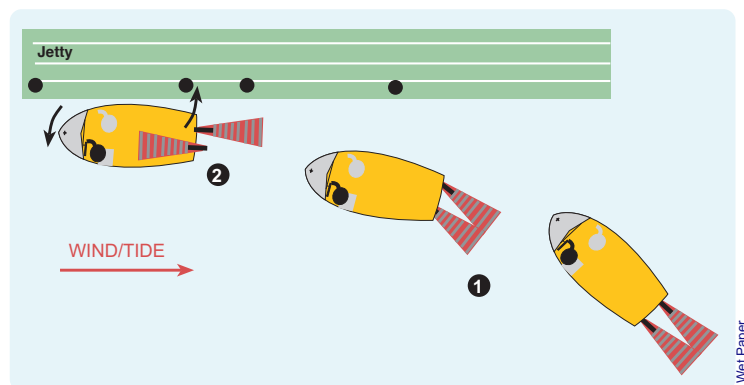


Figure 40.2 Docking - twin shaft



Figure 40.3 Tie to a cleat

PRACTICAL TASK: Vessel is secured beside a berth

1. Checking that it is safe to perform the manoeuvre.
2. Not impeding other vessels.
3. Selecting the appropriate side of the vessel to lay alongside as a result of wind/current observations.
4. Approaching the berth at the appropriate speed. Approaching the berth at the appropriate angle.
5. Demonstrating smooth and timely use of gears. Using appropriate revs.
6. Arriving at the berth with little or no impact to vessel and structure.
7. Securing the vessel appropriately with mooring lines.

Web page reference

<http://www.wetpaper.com.au> - Resources



Moor at a buoy

Hazards

- Waves - Cuts or bruising from falling over in boat or into water
- The boat - Injury to crew from collision
- Boat hook - Striking crew with boat hook
- Propeller - Fouling with mooring lines

Control measures (safety precautions)

If you are travelling to a mooring it is necessary to assess the weather and tides before departure.

Weather - You will need this to determine how waves and wind speed and direction will determine your approach.

Tides - You will need to know the amount of water under the boat as well as the tidal flow and direction.

Mooring

Mooring means coming up to an object in the water; docking is coming alongside a marine structure.

Mooring may be necessary if no berth is available or you are in an environmentally sensitive situation, eg Marine Parks require that no anchors be used to avoid coral damage.

Moorings typically have a large buoy that is attached to an anchor on the bottom with chain. The driver should approach the mooring with it on his side of the boat to keep it in sight throughout the manoeuvre.

Approach at minimum control speed from a position downwind of the buoy, or down current if stronger.

- Approach a buoy in the forward gear slowly into the wind and waves or the current, whichever is the stronger.
- Engage reverse so that the boat stops when close to the buoy.
- Continue to use reverse to check the rate of progress of movement of the boat.
- Instruct a crew member to pick up a buoy with a boat hook or similar device, or if you are by yourself, disengage gears and move to the bow and pick up the buoy yourself.

Maintenance requirements

- Mooring lines should be checked for wear and tear.
- Check you position to see if the mooring has come loose.

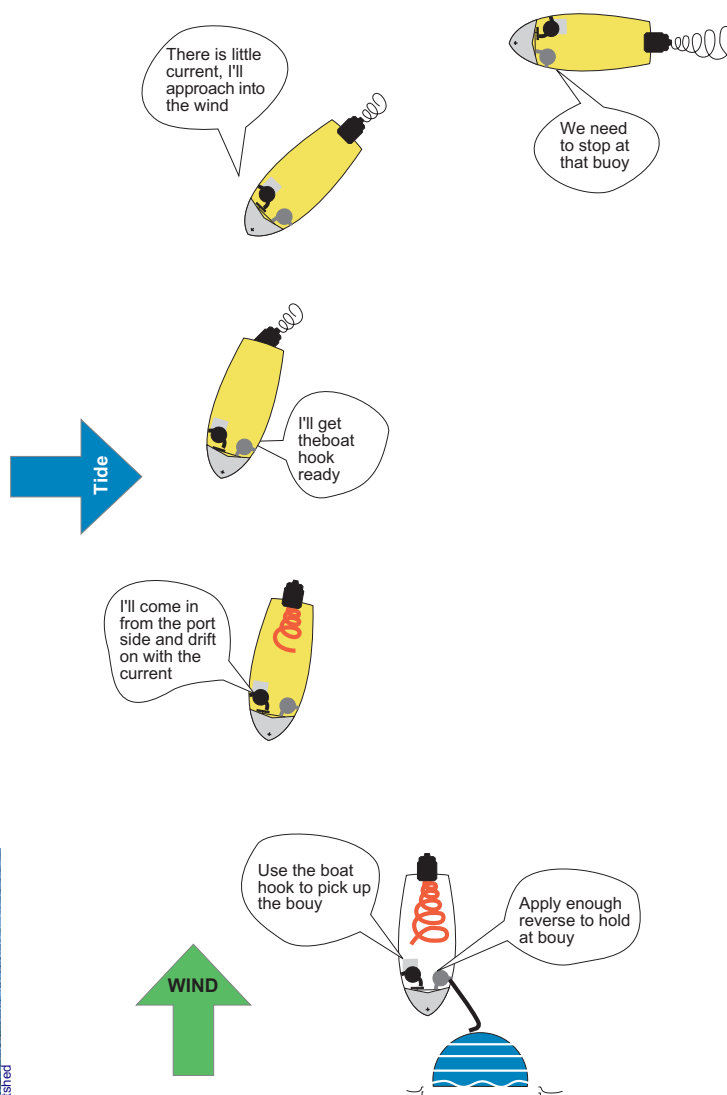


Figure 41.2 Mooring or picking up a buoy

Illustration Bob Moffatt, Photograph Marine Education Boatshed



Figure 41.1 Boat at a mooring



WORKSHEET 9 BOATING SAFETY

Q1. Complete the table below by identifying two hazards and describing suitable control measures (*safety precautions*) for the skills listed in the first column.

| Skill | Hazard | Control measure (<i>safety precaution/s</i>) |
|-----------------------------|------------------------|---|
| Eg: Mount an outboard motor | 1 Waves 2 Boat ramp | Move to a place where there are no waves or mount motor on the beach Wear shoes, work in pairs for support |
| Mount an outboard motor | | |
| Launch and retrieve a boat | | |
| Start an outboard motor | | |
| Depart a beach | | |
| Return to a beach | | |
| Depart a dock | | |
| Dock at a jetty | | |
| Moor at a buoy | | |

Q2. Describe how to drive a boat on the plane and then perform a U turn, S turn and Figure of eight. Identify the hazards and describe the safety precautions you would use.

PRACTICAL TASK: Operate the vessel safely

During the entire assessment and performance of all tasks, applicants must obey the relevant rules, regulations and good order practices and ensure the vessel is safe and is safely operated within the rules and regulations.

Competency criteria

1. Minimises the impact of the vessel on others and the environment.
2. Applies the procedures, rules and regulations.
3. Ensures the vessel carries all the required safety equipment.
4. Monitors the vessel and people on board.
5. Demonstrates good seamanship skills for weather conditions.

CHAPTER 4 SAFETY EQUIPMENT

The general safety obligation (GSO) requires all boat owners and operators to make sure the boat is safe, appropriately equipped and crewed, and operated in a safe manner. Here are some legal issues for consideration.

- Equipment **MUST** be able to be found in a timely manner (Qld).
- Boats requiring registration must carry the regulated safety equipment.
- Additional safety equipment recommended in the State regulations should also be carried to satisfy the GSO.
- This allows boat owners and operators to choose the equipment best suited for the type of boat and intended voyage.
- When deciding what to take on board, remember your obligation – if you fail to carry a piece of equipment that could have helped to prevent an accident, you could be prosecuted.

Stowage

- The owner or master must give each person on board information about where the safety equipment is kept.
 - The **CREW** must know where the jackets and safety equipment is located.
 - The **SKIPPER** can receive an infringement notice if the crew cannot locate safety equipment in a timely manner.
- Items such as flares, torches or first aid kits, that can be affected by water must be kept in water tight containers like the one shown in the photograph below where the hatch is closed when the boat is underway.
- Other safety items such as anchors and lines should be stowed so as not to cause potential hazards while the boat is in motion.
- Life jackets or PFDs must be stored where they are clearly visible or kept in a place readily accessible and indicated by a clearly visible sign with a white background marked with the word 'life jackets' in red letters or a red background with white letters.
- Wearing personal flotation devices is strongly recommended in any emergency situation:
 - At the first sign of bad weather, at night, when visibility is restricted, when boating in unfamiliar waters or alone; or
 - When operating in a following sea, by persons who are poor swimmers or when boating alone.

Serviceability

- Safety equipment needs to be serviceable. So check for wear and tear and repair or replace so that it will work.
 - If life jackets are ripped torn or faded they are no longer serviceable and should be discarded.
 - One way to look after life jackets is to **NOT** use them as seat cushions.

Life jackets State requirements

These are different and are determined by the State water limits. For example in Victoria, all occupants of certain vessels are required to wear a specified PFD (see table for PFD types) at times of heightened risk when under way and when in an open area of the vessel (see State web sites).

In Queensland it is compulsory to wear a PFD when crossing the designated coastal bars in open boats less than 4.8 metres. See www.msq.qld.gov.au for definitions and laws.

New laws in New South Wales has meant that there are many options for boating activities, vessel types and situations that require different life jackets. In some cases kayaks and canoes are involved. See www.lifejacketwearit.com.au

Chapter 7 discusses National and State regulations in greater detail.



Bob Moffatt

**UNDER 4.8 m - UNDER 12 - UNDERWAY
LIFE JACKET COMPULSORY**



Bob Moffatt

**SAFETY EQUIPMENT LOCATION BECOMES
OBSCURED WHEN HATCH IS CLOSED**



Wet Paper



Bob Moffatt

Life jackets/personal flotation devices (PFDs)

NB: Your State web site will tell you the special regulations

Here are some important general points to remember about life jackets to fulfil your GSO.

- Life jackets should be accessible at all times; if they aren't visible to passengers you must clearly sign where life jackets are stowed.
 - The sign must have the words 'life jacket' in red text on a white background or white text on a red background.
 - They must be kept in good condition.
 - They must fit the wearer – ill-fitting life jackets won't meet the safety equipment requirement.
 - Do not use life jackets as a cushion.
 - Make sure you know how to put them on quickly.
 - Life jackets should be marked correctly to ensure they comply with standards.

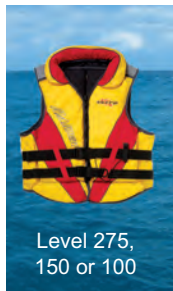
Life jackets/PFDs must comply with standards

For a life jacket to comply with a particular standard, certain information required under that standard must be displayed.

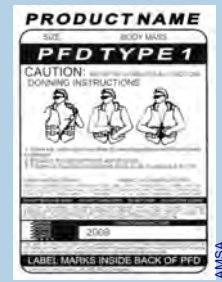
- The current standard for life jackets is Australian Standard 4758 (AS 4758). This standard has replaced Australian Standard 1512–1996, Australian Standard 1499–1996 and Australian Standard 2260–1996.
- You do not have to upgrade your current life jacket under the old standards – they will still be acceptable for use as long as they are in good condition. AS 4758 has a different rating system than the previous standards.

For use in smooth, partially smooth and open waters

- To comply with Australian Standard 4758 it must be marked 'Level 100', 'Level 150' or 'Level 275'.
- To comply with Australian Standard 1512–1996 it must be marked 'PFD type 1'.
- Not to be used by personal watercraft (PWC) riders, skiers or people being towed.



Example of 2008 AS 4758 label



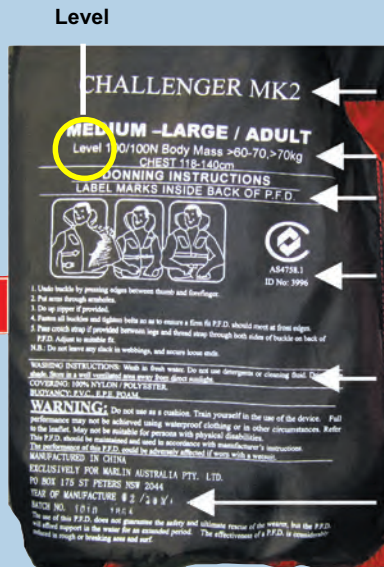
Example of 1996 AS 1512 label

| Under standard AS 4758 | Under previous standards |
|--------------------------|---------------------------|
| Level 275 | Coastal life jacket |
| Level 150 | |
| Level 275 | PFD type 1 (AS 1512-1996) |
| Level 150 | |
| Level 100 | |
| Level 50 | PFD type 2 (AS 1499-1996) |
| Level 50 special purpose | PFD type 3 (AS 2260-1996) |

Note: The levels stands for newtons of buoyancy (N) and is the amount of force or upthrust provided by a life jacket in water



STANDARDS AND LOGOS



- ← PFD type, model identification
- ← Intended weight and chest size
- ← Illustrated donning instructions
- ← Standards symbol
- ← Instructions for care and storage
- ← Manufacturer's name, date of manufacture, batch number

CONSIDERATIONS WHEN SELECTING A PFD

For use in smooth and partially smooth waters

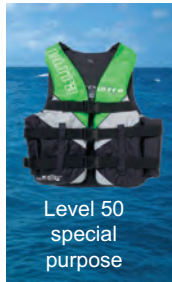
- To comply with Australian Standard 4758 it must be marked 'Level 50'.
- To comply with Australian Standard 1499-1996 it must be marked with 'PFD type 2'.
- Keeps you afloat but does not have a collar to keep the head above water.
- Can be used by skiers or people being towed in smooth or partially smooth waters.
- Can be used by PWC riders in smooth and partially smooth waters or beyond those waters.



Level 50

For use in smooth waters

- To comply with Australian Standard 4758 it must be marked 'Level 50 special purpose'.
- To comply with Australian Standard 2260-1996 it must be marked with 'PFD type 3'.
- May be a specified buoyancy wet suit.
- For use in smooth waters and only where the user is likely to be in the water for a short time.
- Can be used for skiers or people being towed in smooth waters.
- Can be used by PWC riders in smooth waters.



Level 50 special purpose

Inflatable PFD's

- Inflatable life jackets are approved equipment and must complete with the same standards that are applied to foam life jackets. They must be gas inflated and not rely on oral inflation only.
- Inflatable life jackets used on a recreational boat must show an expiry date and be serviced by the manufacturer or authorised service centre according to the manufacturers service requirements.
- Alternatively where the manufacturer has established a documented service program the owner or master can service the PFD themselves provided they can produce documented evidence showing adherence to the service program.

Coastal and SOLAS

- These jackets have more flotation than a PFD type 1. They are bulky life jackets designed to keep the body afloat for long periods.
- They have reflective tape, a whistle and light to attract attention.
 - These jackets are designed for commercial boats and recommended to be carried by boats operating long distances offshore.

PFDs on children

- When choosing a PFD for a child (over 12 months of age), care must be taken to ensure it fits properly and the child will not slip out of it when in the water.
- If you are under 12 and the vessel is under 4.8 m and underway, you **MUST** wear a life jacket.

Further information at

Your State's Marine Safety Web site



PFD 1
Level 275,
150 or 100

PFD 2
Level
50

PFD 3
Level 50
special
purpose



INFLATABLE PFD
Levels 150 upwards

The outer cover expands to reveal a inflation bladder with high visibility markings and signal whistle



COASTAL PFD
Level 275 or 150



SOLAS
Level 275 or 150

SAFETY GEAR
Each State is **different** so
consult your State Marine
Safety Web Site



EPIRB's

- An EPIRB is a *emergency position indicating radio beacon*.

When activated in a life-threatening situation, assists rescue authorities in their search to locate those in distress.

- EPIRBs are designed to float in the water for up to 48 hours to optimise the signal to a satellite.
- 406 MHz EPIRBs are manufactured as either those that provide an encoded (GPS) location or those that do not. In those that do, the satellite system can calculate a beacon's location, but locating a distress site is usually much faster if the beacon signal provides a GPS location.
- A HexID or Unique Identity Number (UIN) is the unique code programmed into each 406 MHz distress beacon and transmitted when the beacon is activated. This is shown in the photograph opposite.

Use and activation

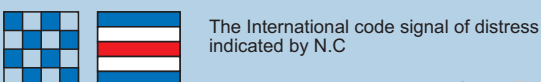
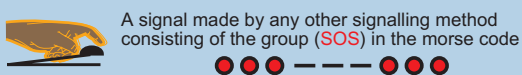
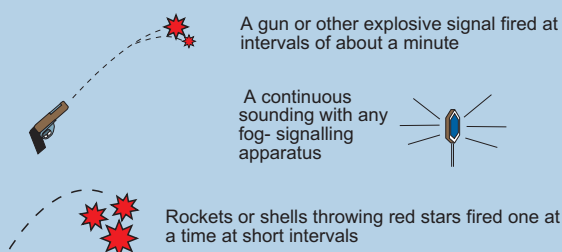
- EPIRB's should only be used when there is a threat of grave and imminent danger. This is discussed further in the Chapter 8.
- **Stowage:** In a boat, an EPIRB should be stowed in its mounting bracket where it is visible and easy to access in an emergency or in a grab bag along with flares, a torch or strobe and other safety equipment.
 - Water activated EPIRBs should always be stowed in their brackets correctly when not in use.
- **Batteries:** EPIRB batteries need to be replaced before the expiry date noted on the label of the beacon. This will ensure that the beacon will transmit for the minimum time required once activated. The manufacturer or its agent should service batteries.



Registration

- EPIRBs have to be registered with AMSA (Australian Maritime Safety Authority): www.amsa.gov.au/beacons
- Documentation is required and a sticker is sent in the mail. This must be attached to the EPIRB.
 - Note that the expiry date is not the service date for the EPIRB.
 - When registering a distress beacon, this code must be included on the registration form as it is the only code that links the individual distress beacon to the registration database.
 - Without the HexID the beacon cannot be registered.
- For the latest information on EPIRB coding and decoding see: www.amsa.gov.au/beacons

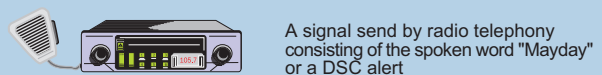
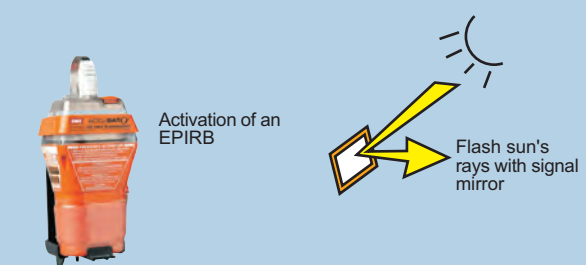
Distress signalling



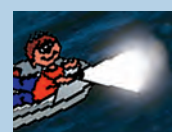
Flames or smoke on the vessel (as from a burning tar barrel, oil barrel etc.)



Distress Signals (Merchant Ship Search and Rescue Manual)



Rocket parachute flare or a hand flare



Flashing torch



Slowly and repeatedly raising and lowering arms outstretched to each side

Personal items

- A hat that does not blow off, sunnies and sunscreen are essential for Australian conditions.
 - Make sure the sunscreen is not out of date as it is less effective after many years in a boat.
 - Make sure the water is fresh and not in a plastic bottle.
 - Carry two litres per person per day in summer.
 - Insect repellent, spare clothing and a first aid kit are essential if taking children.
 - Plastic container with minimal packaging will minimise rubbish. Avoid chip packets and lolly wrappers as they easily blow away.



Fire fighting equipment

- Every boat with fuel aboard should carry at least one dry-powder fire extinguisher, mounted in an easily accessible and dry position. Check the fill gauge and shake regularly to stop the powder compacting. Remember all gear used on boats is subject to corrosion and can deteriorate quickly so check regularly and spray with water repellent anti – corrosion agent.
- Fires are discussed further under emergencies in Chapter 8.



Signalling equipment

- A torch is essential for emergency signalling. Don't forget to take spare batteries.



V sheet


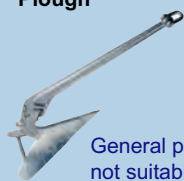






- A V sheet is one of the simplest ways to attract attention and indicates to other boaties that assistance is required.



Anchor, rope and chain

- The type of anchor system selected depends on the size of the boat, the area of operation and your State's regulations.
 - For boats under 5 metres, the cable can be 2 metres of chain plus rope.
 - For boats over 5 metres you need to check your States safety table.
- A simple rule for vessels under 5 metres is 1m of chain for every 1 m of boat.
- The figure below shows some anchors and their suggested suitability of use.

ANCHOR TYPES

| | | | |
|--|--|---|--|
| <p>Danforth</p>  <p>General purpose, not suitable for reefs.</p> | <p>Plough</p>  <p>General purpose, not suitable for reefs.</p> | <p>Bruce</p>  <p>Good holding power</p> | <p>Sacca</p>  <p>Good holding power</p> |
| <p>Grapnel</p>  <p>Folding type</p> | <p>Reef</p>  <p>Specific purpose for reefs</p> | <p>Sea</p>  <p>For use in rough weather</p> |  |

Pumping and bailing

- On smaller vessels, a 2 metre length of rope (a lanyard) attached to a bucket is recommended to remove water from waves that splash into the boat.
- On larger vessels a bilge pump is used to remove water from the bottom of the boat.
- Some States regulations specify a pump capacity in litres per minute, eg, Queensland.

Oars

- On smaller vessels a set of oars is recommended. Check that they are stowed correctly and are in good condition.

Flares

- Flares are used to attract attention in a distress situation. They should be stowed in a safe and preferably dry place on board ideally in water tight containers.

Red flares and orange smoke signals

- Flares and signals, as shown below, are ignited by:
 - Reading the instructions, unscrewing a cap, pulling a tab up and out quickly and holding the flare to leeward as shown in the figures below.
 - These flares are visible by aircraft for about 8 nautical miles at night and 4 nautical miles during the day.

Parachute flares

- Parachute flares are usually fitted with a firing mechanism located underneath the bottom cap.
 - These flares are visible for about 20 nautical miles at night and a lesser distance during the day.

Notes:

- Out of date flares can be disposed of at Fire Stations, Coast Guard and VMR bases.
- Consider having a set of gloves in your tool kit for hand protection if flares are required.
- Flares must not exceed their expiry date.



PUMPING/BAILING EQUIPMENT



FOR VESSELS UNDER 6 METRES



FLARES ARE COMPULSORY



RED FLARE



ORANGE SMOKE SIGNAL

WORKSHEET 10 SAFETY EQUIPMENT

Q1. Identify the letters A - F in Figure 1 below and explain why they are necessary markings on a life jacket

Q2. Explain your responsibilities under your general safety obligation for the items in Figure 2 below.

Q3. Explain how the information in the label in Figure 3 below helps determine when and where a life jacket needs to be taken.

Q4. Account for the differences in the life jackets A-C shown in Figure 4 below.



CHAPTER 5 THE BOATING RULES

International rules

These rules are part of the International Regulations for the Prevention of Collisions at Sea (1972) COLREGS and apply to ALL vessels.

Vessel definitions and terms

- The word *vessel* includes every description of watercraft including non-displacement craft, seaplanes used or capable of being used as a means of transport on water.
The length of a vessel also determines what lights and safety gear she must carry.

EVERY DESCRIPTION OF WATERCRAFT CAPABLE OF A MEANS OF TRANSPORT



- The term *vessel under way* means the vessel is not at anchor, aground, tied up at the dock or tied up at the shore.

UNDERWAY AND MAKING WAY



- The term *power driven* means it is driven by a motor.

POWER DRIVEN VESSEL



Bob Moffatt

- The term *vessel constrained by her draft* is one which has to manoeuvre within a designated shipping channel or she will run aground

CONSTRAINED BY HER DRAFT

When displaying three all round lights in a vertical line or a cylinder



TWR

- The word *sailing vessel* means any vessel under sail, provided that a motor, if fitted, is not being used for propulsion.

SAILING VESSELS



JOHN GREENWAY

- The term *vessel engaged in fishing* means the boat has fishing gear that restricts its manoeuvrability

FISHING VESSEL



Bob Moffatt

- Vessels are said to be *in sight of one another* when they can be seen with the naked eye.
- The term *vessel not under command* means the vessel is unable to abide by the rules and cannot get out of your way due to exceptional circumstances.
- The term *restricted visibility* means you cannot see other vessels because of fog, mist, snow, sand or heavy rain.

RESTRICTED VISIBILITY



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- The term *vessel restricted in her ability to manoeuvre* applies to one which is working on a task that restricts her movement. Some examples could include:
 - a vessel towing, mine clearing, laying surveying or submarine cables, transferring cargo, picking up navigation marks, engaged in launching or recovery of aircraft, replenishment of stores or transferring cargo or passengers. Eg, the vessel dredging as shown in the photograph on the inside front cover.

RESTRICTED IN ABILITY TO MANOEUVRE



Bob Moffatt

Responsibility (Rule 2)

- It is the responsibility of the skipper to know the international rules and he or she cannot be excused for failing to know or adhere to them.

Proper lookout (Rule 5)

- This means that you should constantly look out and listen for any other vessel or obstruction. You must use all available means to look out (including hearing, and sound). When available, other specialised equipment such as thermal imaging (FLIR), broadband radar as well as web based ship tracking systems (eg, AIS) should be used.
- Be particularly careful, especially in bad weather, restricted visibility, in darkness, at anchor, when sleeping or when the sun is shining into your eyes.



Bob Morfitt

Safe speed rule (Rule 6)

- At all times you must proceed at a safe speed so as to avoid collision and be able to stop in an appropriate distance. You must take into consideration:
 - the state of visibility,
 - traffic density (including fishing or other vessels),
 - manoeuvrability and draft of the vessel,
 - at night the presence of background light and the state of the sea,
 - your ability to manoeuvre in wind and current.
- Always keep a safe distance. Generally the faster the speed - the greater the distance.

Risk of collision (Rule 7)

- You must at all times use all available means to determine if there is a risk of collision. This can be done by estimating the speed and bearing of the other boat.
 - Such a risk shall be deemed to exist if the compass bearing of an approaching vessel remains steady while range is decreasing or does not appreciably change.
 - Risk may exist even when an appreciable bearing change is evident, when approaching a very large vessel, vessel in tow or when approaching a vessel at close range.

Action to avoid a collision (Rule 8)

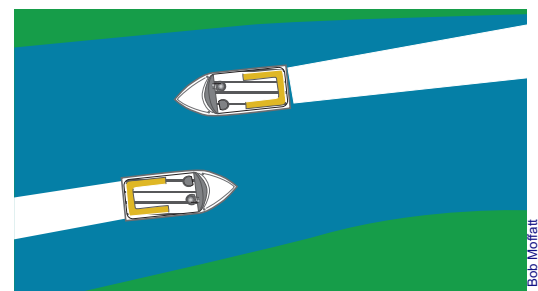
- Any action to avoid a collision shall be positive, in ample time and with due regard to the observance of good seamanship.
 - This allows the other vessel to see your action and take this into account when determining their action.

Rivers and channels (Rule 9)

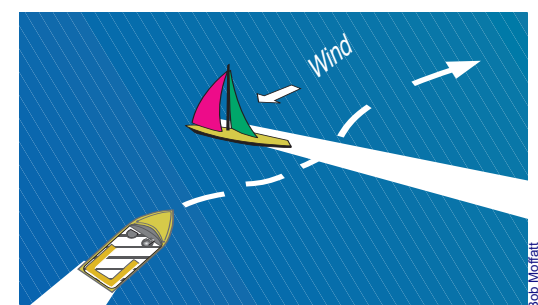
- When navigating in narrow channels, all boats should travel on the starboard side or right hand side of the channel and pass oncoming boats on the port side.
 - vessels less than 20 m shall not impede the passage of a vessel which can only safely navigate in a narrow channel.
 - avoid anchoring in narrow channels.

When power meets sail, row boats, ferries or craft under tow

- The power boat as shown below, must give way to sailing boats, row boats, ferries and craft under tow.
 - This rule does not give a sailing vessel the right to hamper the safe passage of a power driven craft in a channel where the power craft can only navigate inside such channel.



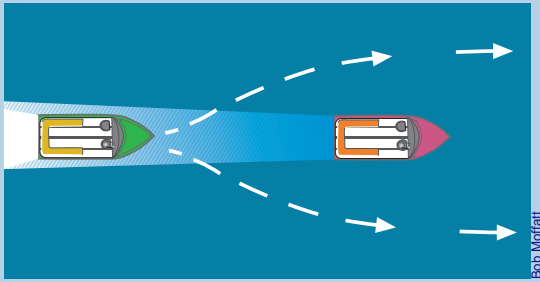
Bob Morfitt



Bob Morfitt

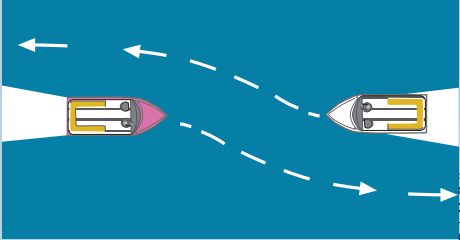
Overtaking (Rule 13)

- An overtaking vessel must keep clear of other vessels and pass on either side whichever is safe.



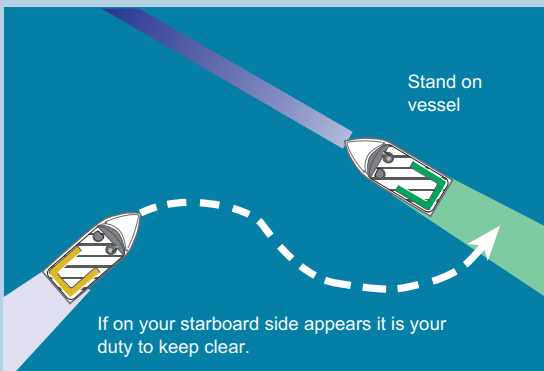
Approaching bow of another boat (Rule 14)

- When two power boats are approaching head on or nearly head on, each must alter course to starboard and **pass port to port**.



Power driven boats crossing (Rule 15)

- When a vessel is crossing your bow from *starboard to port* you should stop or reduce speed and pass behind the stern.
- When a vessel is crossing your bow from *port to starboard* you should maintain course and speed as **you are the stand on vessel**.
 - If the other vessel does not give way, you should take all action to avoid collision.

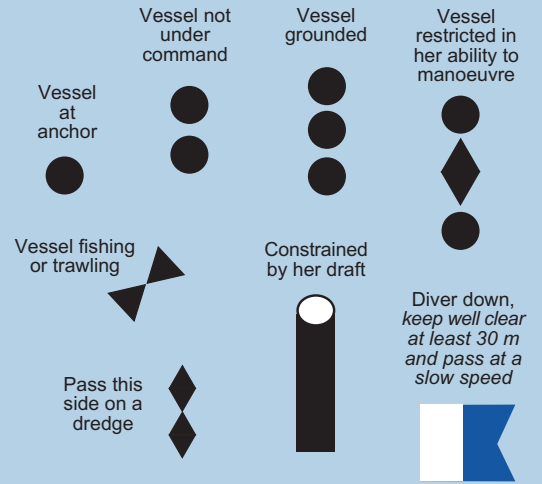


Action by give-way vessel (Rule 16)

- The vessel giving way shall keep well clear.

Day shapes

The day shapes shown opposite are used to indicate to other vessels the type of activity on board or in close vicinity of the vessel.



Action by stand-on vessel (Rule 17)

- The stand on vessel shall maintain course and speed until it is obvious that the other vessel is not giving way as shown below.
 - The stand-on vessel should then take whatever action as is necessary to avoid collision.



Responsibilities between vessels (Rule 18)

- Power driven vessels under way shall keep out of the way of a vessel sailing, engaged in fishing, constrained by her draft, restricted in her ability to manoeuvre, not under command or at anchor.

The give way to all below you hierarchy

- Sea planes
- Power
- Sail
- Commercial fishing
- Constrained by their draft
- Restricted ability to manoeuvre
- Not under command



At anchor or aground

Slow to the gazetted speed and make sure your wash does not hamper activities of people aboard anchored or aground vessel.

Restricted visibility (Rule 19)

- This rule applies to vessels not in sight of each other when visibility is poor.
 - Reduce to a safe speed, have engines ready for manoeuvring, turn on navigation lights, sound signals if appropriate, post additional lookouts and navigate with extreme care. Have respect for the prevailing conditions.

Buoyage system A

Australia uses the internationally recognised uniform coding system of navigation marks known as the International Association of Lighthouse Authorities (IALA) Buoyage System "A" which applies to all vessels at sea.

This system uses the following makers.

- Lateral, cardinal, isolated danger, safe water and special marks.
- Marks shaped as cans, cones, spheres, pillars or spars.

Lateral marks

- These indicate port and starboard hand sides of the channel and are positioned in well established channels.
- The port mark is coloured red and has the basic top shape of a can as shown in Figure 54.2.

At night the port buoy shows a red light and flashes to any of the sequences shown in Figure 54.3.

- The starboard mark is green and has the basic conical top shape.
- At night the starboard buoy shows a green light and flashes to any of the sequences shown in Figure 54.3.

Direction of buoyage

Where there may be doubt, the direction of buoyage is indicated by the symbol in Figure 54.1.

Heading into port

Upon entering port, the port hand mark (red) should be passed on your vessel's port side as shown by boat A in Figure 54.1.

Leaving port

When departing a port the port hand buoy (red) should be passed on the vessel's starboard side as shown by boat B in Figure 54.1.

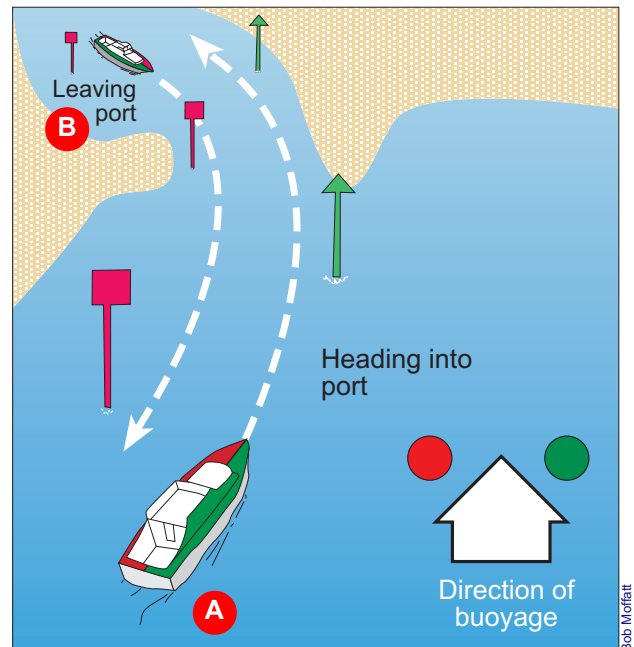


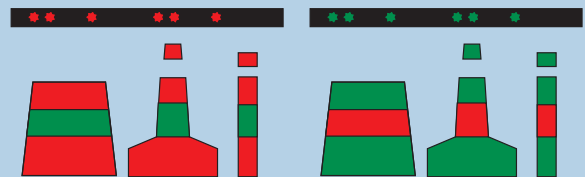
Figure 54.1 Rules for heading into and leaving port

Preferred channel marks

If you see what looks like a red marker with a green stripe through it, the "preferred" is to starboard.

Similarly a green mark with a red stripe through it means the "preferred" is to port.

Preferred channel to starboard Preferred channel to port



TAFE NSW

Wet Paper

Figure 54.2 Lateral marks

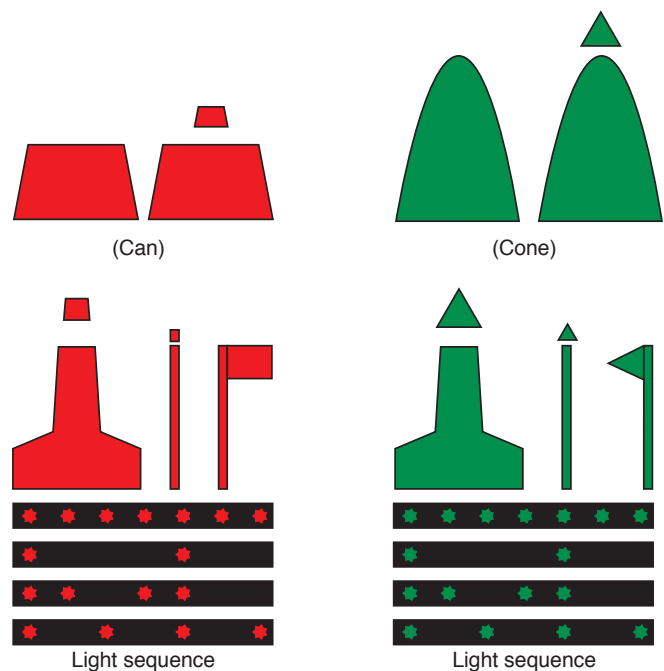


Figure 54.3 Lateral marking system including light sequences

Wet Paper

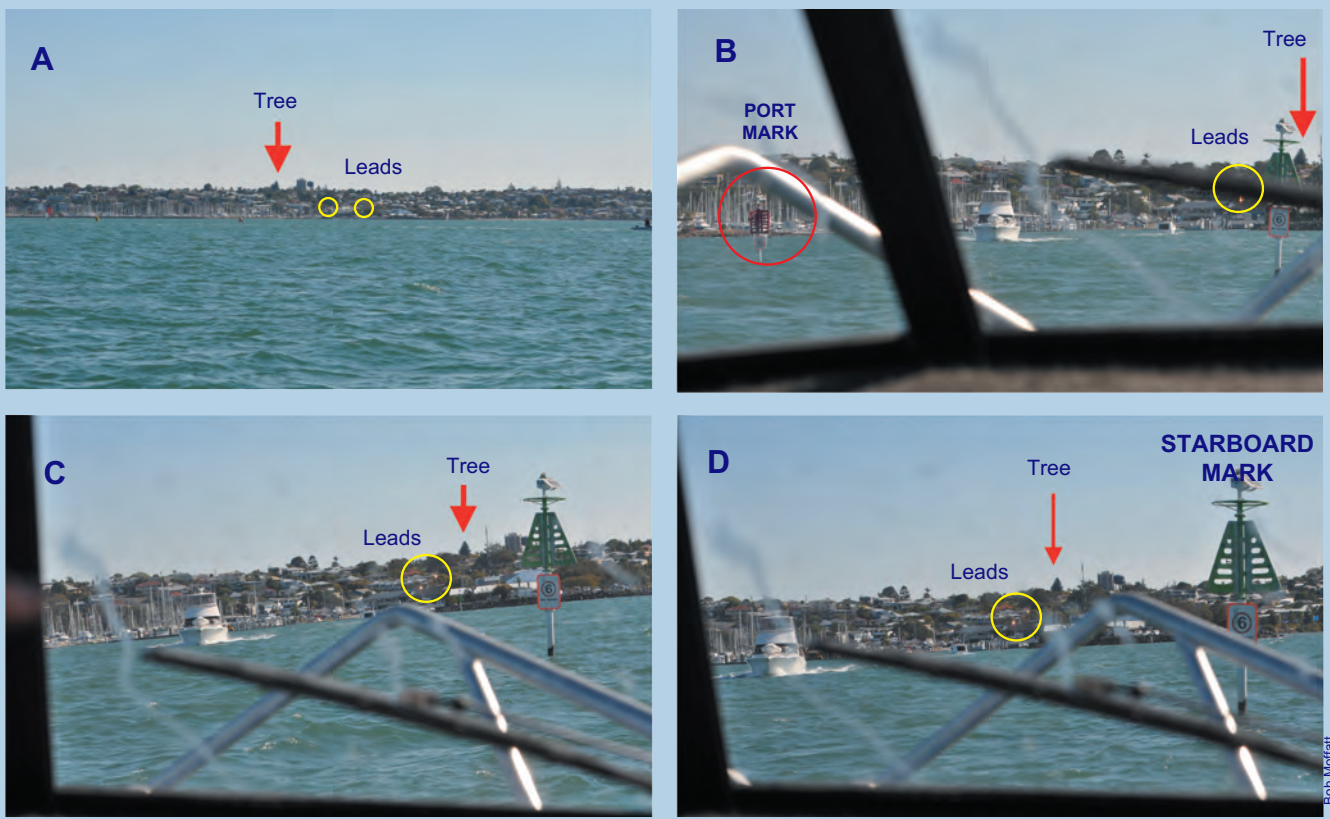


Figure 55.1 Example of what it looks like to enter a port from the helm of a small craft

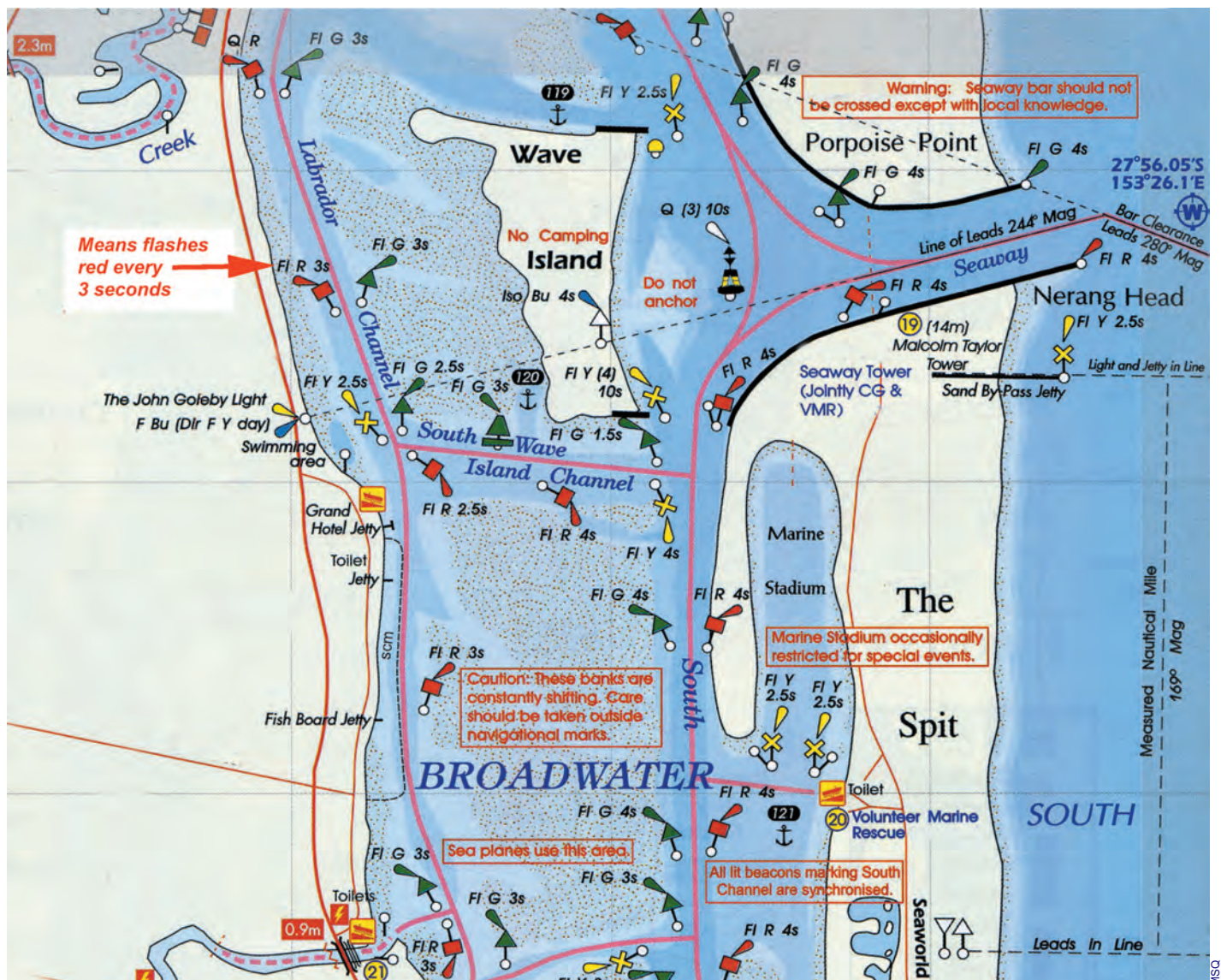


Figure 55.2 Example of a local chart with buoys, beacons and marks (Note the change in buoyage direction at Wave Island)

WORKSHEET 11 THE BOATING RULES

Q1. Identify with a circle the port and starboard marks in the photograph to the right. Describe which side you should pass.



Q2. Justify Rule 5 - Proper lookout.

Q3. A vessel that was fishing, suddenly approaches from your starboard bow. Describe and justify your actions.

Q4. The approaching vessel does not alter its heading. Describe the action you take under Rule 8 to avoid collision.

Q5. State Rule 6 - Safe speed rule and describe how it applies to the situation in the photograph above.

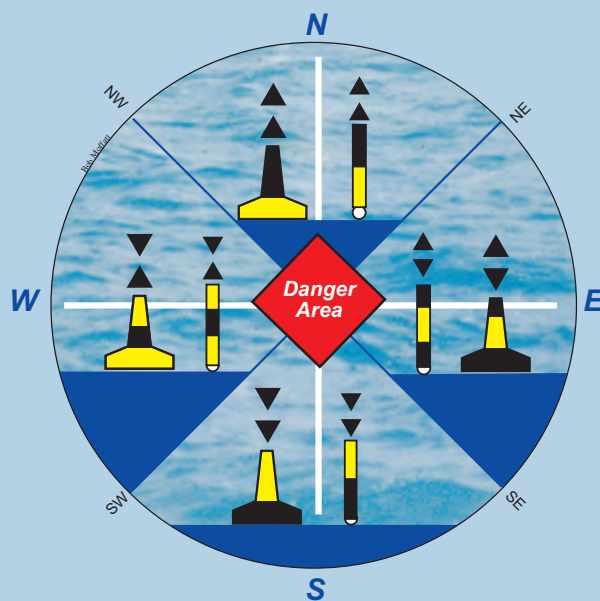
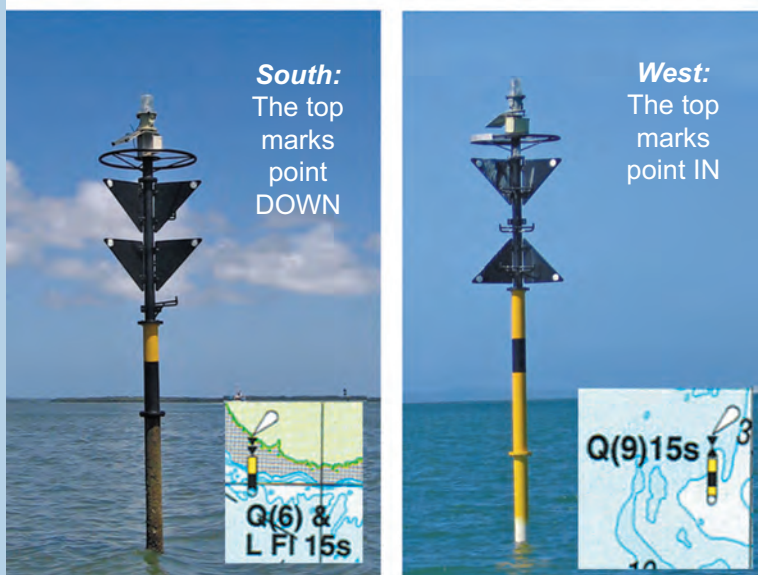
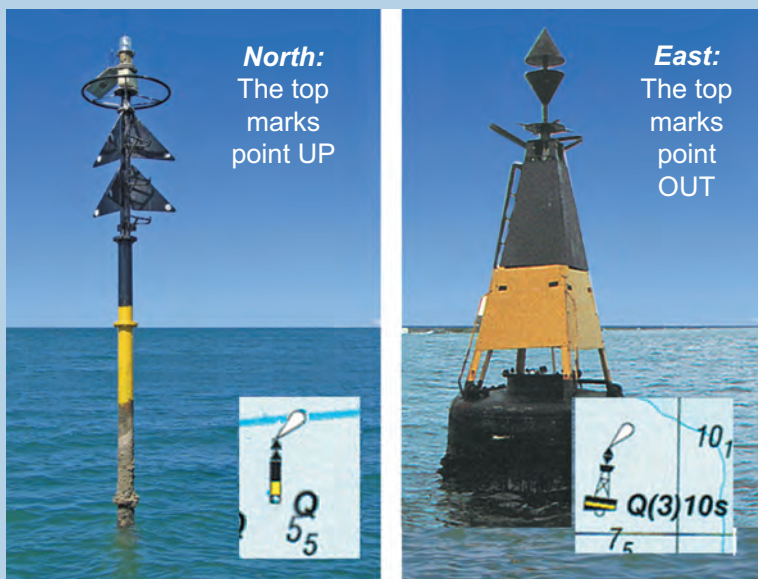
Q6. State Rule 17- Action by the stand-on vessel.

Q7. Draw arrows to show which way the boats should travel in Figures 1 - 3 below.

| | | |
|------------------------|------------------------|------------------------|
| <p>Figure 1</p> | <p>Figure 2</p> | <p>Figure 3</p> |
|------------------------|------------------------|------------------------|

Cardinal marks

- A cardinal mark indicates where safest water may be found and is used in conjunction with a compass as shown in the figures and photographs below.



During the day

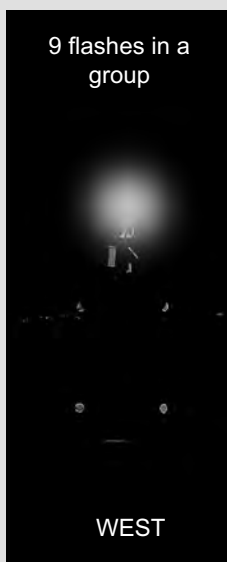
During the day, the colour scheme can be remembered by noting that the black segment is positioned where the cones point.

North: The top marks point UP

South: The top marks point DOWN

East: The top marks point OUT

West: The top marks point IN



At night

At night a white light flashes in a sequence that indicates the type of mark. The flashes in clockwise order are:

North

Uninterrupted continuous flash

South

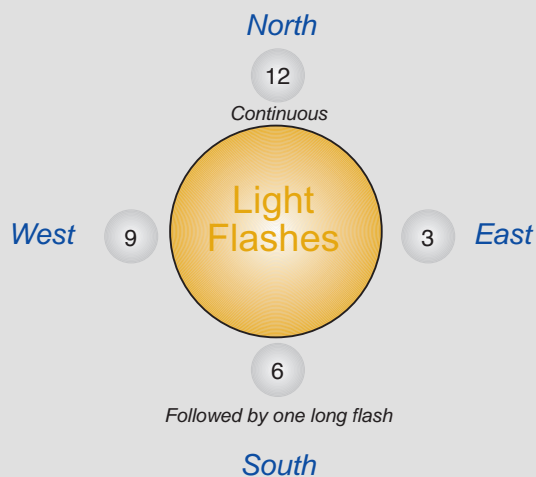
6 flashes in a group plus one long

East

3 flashes in a group

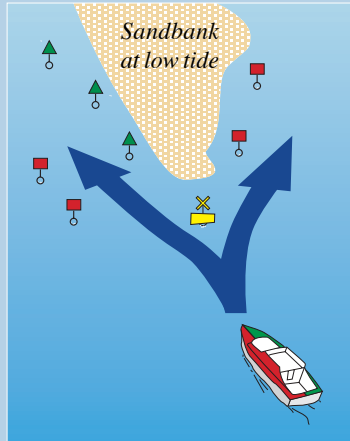
West

9 flashes in a group



Special marks

- These indicate a special feature such as a cable, outfall pipe, recreational diving area, ground marks or define a channel within a channel.
- Generally they are used where no other mark can be, so the top of the mark carries a single yellow cross.
- At night these show a yellow light with any light sequence (other than that used for the white lights or cardinal, isolated danger and safe water marks).
- After consulting the chart, the special mark in the illustration to the right was one marking two different channels.
- The lateral marks then define these channels so as you approach you have a choice to avoid the sand bank at low tide.

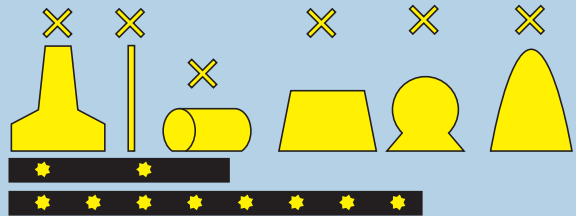


SPECIAL MARK NAVIGATION



Bob Moffatt

When you see a special mark - consult your chart.



Isolated danger marks

These designate an isolated danger of limited extent which has navigable water all around it. For example an isolated shoal, rock or wreck.

These marks are black with one or more horizontal red bands. The top mark has two black spheres positioned vertically and clearly separated.

The light comprises a white flash showing groups of two flashes.

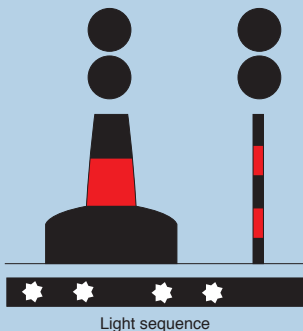
The best way to remember this is by associating the two flashes with the two spheres.



Lisa Taylor



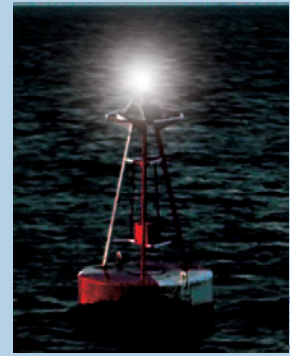
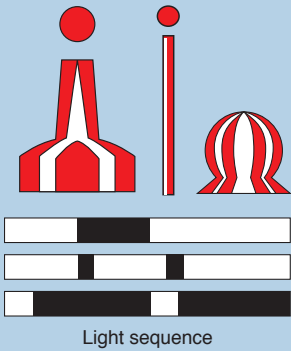
TAFE NSW



Light sequence

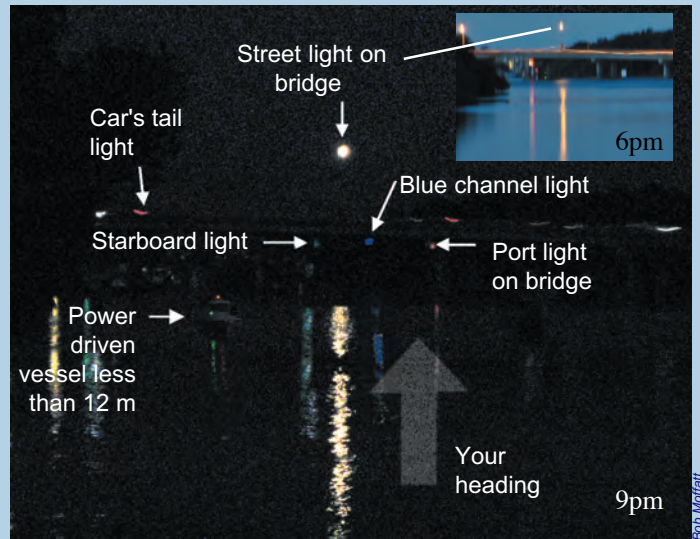
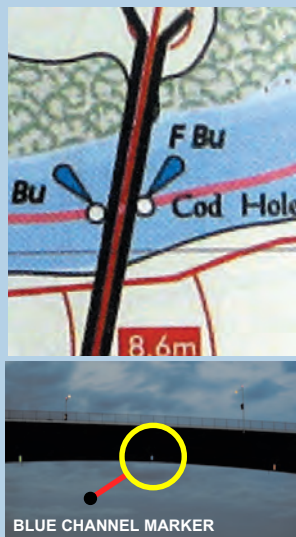
Safe water marks

- These are painted with red and white vertical stripes and have one red ball on the top.
 - They indicate that there is safe water beyond this point and are usually found at the end of a channel or when entering a port.
- At night they flash with a white light followed by a period of darkness.
- Beacons with spheres mean you can navigate all around the mark.



Middle channel marks

- In some states, fixed blue lights on a bridge are often used as leads to indicate the centre of a channel.
 - In other states red and green lights are used to indicate open or closed channels.
- The photograph to the right shows the blue channel markers on a Bridge.



Emergency wrecks

- There has to be a way to quickly mark if a wreck is a shipping hazard as it obviously will not appear on a chart for some time.
- The emergency wreck marking buoy is designed to provide high visual and in some cases radio aid to assist in navigation.
- It is placed as close to the wreck as possible or in a pattern around the wreck.
- Information is then placed **THAT** night on the **Notice to Mariners** section of the State Government Marine Safety Web Site.



Notice to mariners

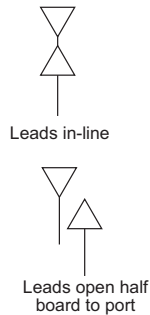
- Changes to shipping are contained in the notices to mariners which is also uploaded each night to State web sites. Common notices include:
 - Navigation warnings and hazards (such as aids to navigation which may have been destroyed, missing or unlit).
 - Changes to the uniform buoyage system (which assists with the correction and updating of marine charts).
 - Navigation depths (necessary when navigating in channels with depth restrictions).
 - Any other works which may affect the safe navigation of vessels in coastal waters and ports (such as dredging operations and construction works).



Other navigation directives

Lead lights

- Leads marked on a chart are used to guide boats into port or through restricted channels in waterways.
- If following leads, keep them open "half a board" to starboard so that you stay on the starboard side of the channel and turn where the solid line ends.



Sector and directional lights

- These are also on charts to help you navigate inshore waters.
- A directional light may only show a small arc, eg, 70 degrees and is similar to a leading light.
- A sector light has different colours as shown in the illustration opposite.
- It is essential to consult the chart for information regarding these lights.

Speed limit signs

- These can be buoys floating in the water or signs attached to navigation markers.

Waterski/PWC restriction signs

- These indicate where water skiing, PWC or jet skiing is prohibited.

Cable crossings

- Often telecommunications companies run extremely expensive cables along the seabed.



- To protect these, warning signs like the one shown opposite are erected on shore to advise no anchoring or dredging.

Anchorage

- The little red anchor on the yellow background in the illustration opposite shows how anchorage are marked on a chart.



Boat ramp signs

Datum checking - fixed points at boat ramps

- Some Governments are erecting signs at boat ramps to assist people in checking their GPS.
- It is advisable to switch the unit on and select the correct chart datum before departing. Many boat ramps have signs showing datum points.

Marine reserves

- These signs will show protected species, zones with navigation co-ordinates, closed seasons and marine environment protection information.

VMR/Coast Guard services

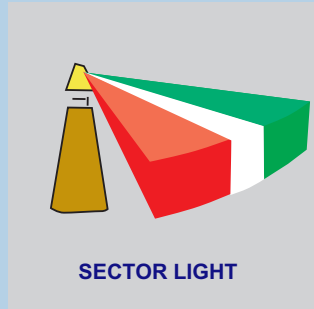
- The call sign and name of the local marine rescue service is shown with contact details and what and when the service is offered.

Water ski areas

- These will show designated zones and hours of operation, along with penalties for infringements.



LEADS AND LEADING LIGHTS



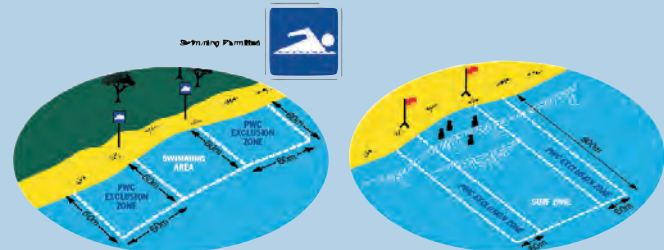
4 knots
about 7km/hr
or fast walking
speed



8 knots
about 15km/hr
or fast jog


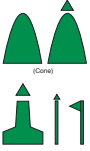





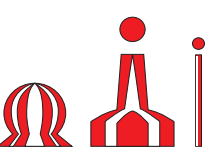
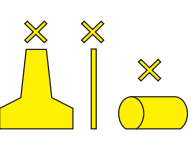







PERSONAL WATER
CRAFT
PROHIBITED
BEYOND
THIS POINT
PENALTIES APPLY



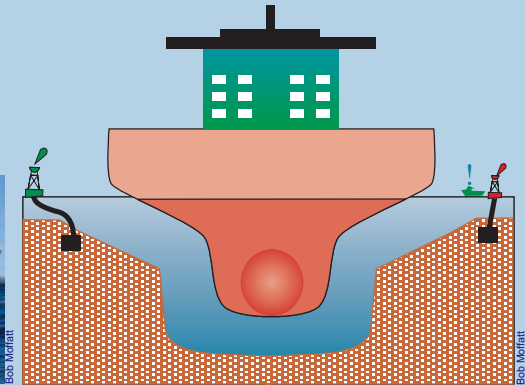
WORKSHEET 12 NAVIGATION MARKS AND SIGNALS

Complete the table below to identify the marks, flags and lights shown in the first column.

| Beacon | Day shape | Side to pass | Colour | Light colour | Flashing sequence |
|---|---|--|--|--------------|----------------------------|
| <p>Example</p>  <p>Port lateral mark</p> | Can | When going into port pass on port side | Red | Red | Various Check the chart |
|  | | | | | |
|  | | | | | |
|  | | | | | |
|  | | | | | |
|  | | | | | |
|  | | | | | |
|  | | | | | |
|  | | | | | |
|  | <p>You see a blue light under a bridge. What does this mean?</p> <p>_____</p> | <p>What do these flags mean?</p>  <p>_____</p> |  <p>_____</p> | | |
|  | <p>It is night time and you see two leads flashing as follows. What should you do and why?</p> <p>_____</p> |  | <p>It is night time and you see this light. What does it mean?</p> <p>_____</p> | | |

Large ships in rivers and channels

- Large ships depending on their speed and load can take up to two nautical miles to stop. Their ability to see smaller vessels close to their bow is very limited.
- Power driven vessels, sailing vessels and fishing vessels shall not impede the passage of a ship (must give way) and should pass astern ships which can only safely navigate within a shipping channel.
- Large ships with the bridge at the stern will have a large blind spot for several hundred metres in front of the bow. This blind spot extends much further forward if deck cargo or containers are carried.



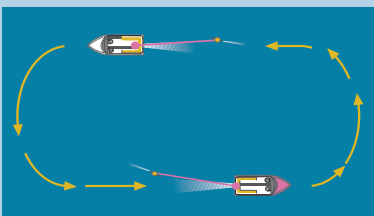
- Large ships at maximum draft have minimal under keel clearance and can only manoeuvre within the designated shipping channel as shown above. When in a swing basin or alongside a berth, ships are accompanied by tugs and other vessels. Keep well clear.

Water skiing rules

- Apart from ensuring the skier is wearing the correct PFD, the safety actions required of a skipper require a competent observer on board, 12 years or older who should be watching the skier or towed person at all times.
 - The observer's job is to immediately alert the driver if the skier falls, or
 - if the skier signals, and should be familiar with the skiing signals as shown in the illustrations opposite.

Water skiing safety obligations

- An unlicensed driver CANNOT drive a boat used for water skiing.
- As skiers are included in the vessel's carrying capacity, the number of skiers a boat can tow is as many as the carrying capacity label states and is safe, including driver and observer.
- A PFD 2 or PFD 3 appropriate to the area of operation, must be worn whilst skiing. PFD 1's must NOT be worn as there is risk of serious neck injury.
- Skiing is permitted wherever it is safe to do so, provided it is not signed as prohibited.
- When skiing in narrow rivers and creeks it is common practice to travel in an anti-clockwise pattern.



Start: Nod the head



Turns: Palm vertical, curving motion of hand in direction required.



Faster: Open palm facing up - motion upwards or nod head if both hands are in use.



Whip off: Point to direction and then give quick circular motions with hand.



Slower: Open palm facing down - motion downwards or shake head if both hands are in use.



Stop: Hand up with fingers outstretched - policeman style.



Speed required: Use the number of fingers required. Thus, 23 — first two fingers then three fingers.



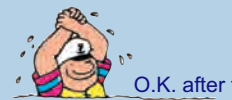
Back to beach: Point with downward swing of the arm.



Cut motor: Finger drawn across throat in cutting motion.



Speed OK: Arm up raised with thumb and forefinger making an "O" - the O.K. signal.



O.K. after fall: After a fall, skier should clasp hands over head if unhurt, until seen by the boat driver.

WARNING: When towing a surfer or people on a tube, make sure you allow enough room for the turn. Tragic deaths have occurred recently because the driver flipped the people being towed onto the bank killing them instantly.

Lights and vessel activities*

These rules are part of the International Regulations for the Prevention of Collisions at Sea (COLREGS).

Lights and shapes (Rule 20)

- All vessels used at night or in periods of restricted visibility must carry lights so that the vessel can be seen.
 - This enables vessels at sea to identify other types of vessels, where they are, and the direction they are travelling.
- The figures and photographs on this and the following pages illustrate these points.

Definitions of lights (Rule 21)

This rule defines the types of lights.

- The *masthead light* is a white light placed over the fore and aft centre-line of the vessel showing an unbroken light over an arc of the horizon of 225 degrees and so fixed as to show the light from right ahead to 22.5 degrees abaft the beam on either side of the vessel as shown above.
- Sidelights* mean a green light on the starboard side and a red light on the port side each showing an unbroken light and over the arc of the horizon of 112.5 degrees and so fixed as to show the light from right ahead to 22.5 degrees abaft the beam on its respective side.
 - In a vessel of less than 12 metres in length the sidelights may be combined into one lantern carried on the fore and aft centre-line of the vessel as shown above.
- The *stern light* means a white light placed as nearly as practical to the stern showing an unbroken light over an arc of 135 degrees and so fixed to show the light 67.5 degrees from right aft on each side of the vessel.
- A *towing light* is similar to the stern light except it is yellow.
- An *all round light* is made so that it can be seen all round the vessel.
- A *flashing light* means a light that is flashing at regular intervals of 120 flashes or more per minute.
- Lights are constructed and positioned on the boat at definite angles so that an observer can determine which direction the vessel is approaching.

Visibility of lights (Rule 22)

The distances these lights can be seen is:

For small vessels (less than 12 metres)

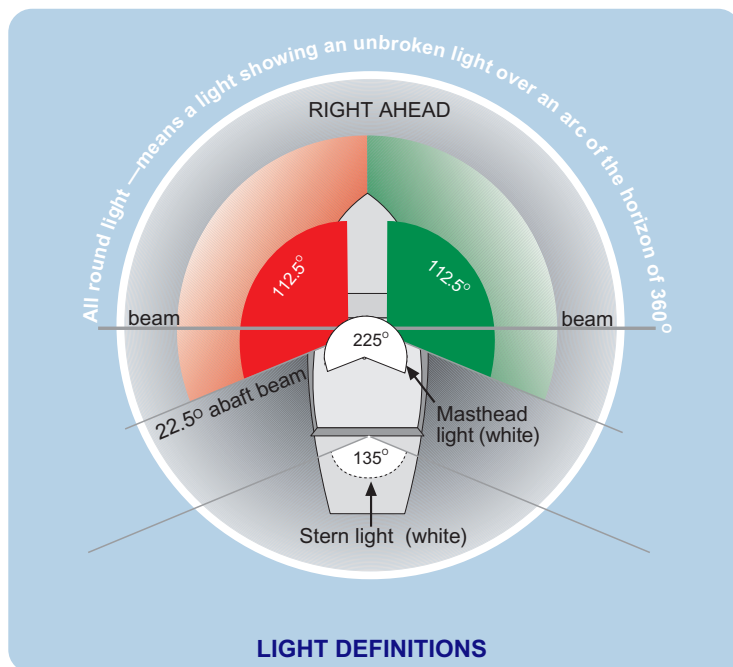
- Masthead light - 2 nautical miles
- Sidelights - 1 nautical mile
- Stern and towing lights - 2 nautical miles
- Any other lights - 2 nautical miles

For vessels (12 to 50 metres)

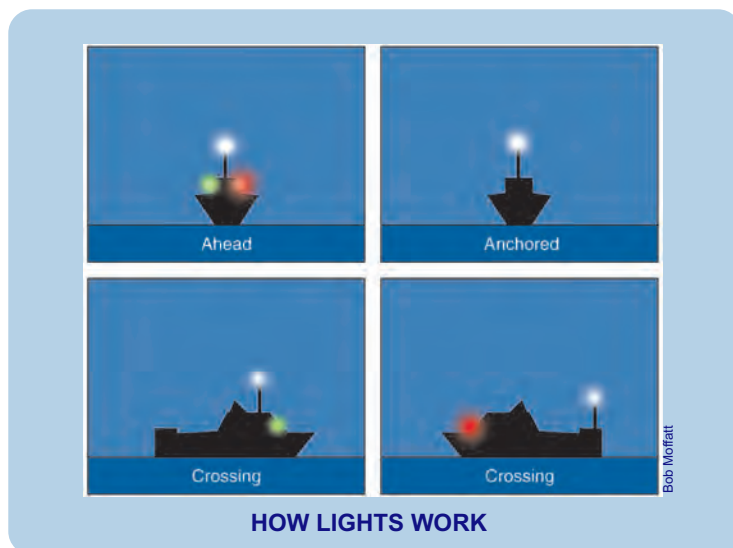
- any light - 2 nautical miles (except where the length of the vessel is less than 20 metres - a masthead light visible for 3 nautical miles)

For vessels (50 metres or more)

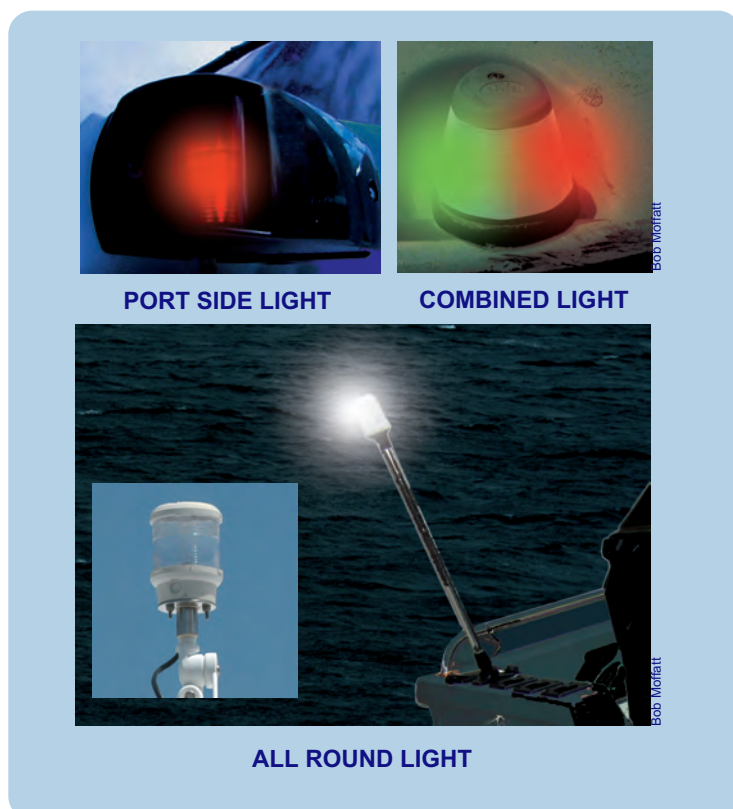
- Masthead light - 6 nautical miles, Sidelights - 3 nautical miles, Stern and towing lights - 3 nautical miles and any other lights - 3 nautical miles.



Bob McFerratt



Bob McFerratt



Bob McFerratt

For power driven vessels under way

Most power driven vessels of less than 12 metres in length exhibit an all-round light and side lights. Side lights can be combined as the one shown below. If you are unsure as to the correct fitting of your lights, you can contact your State Marine Safety Regional Office.



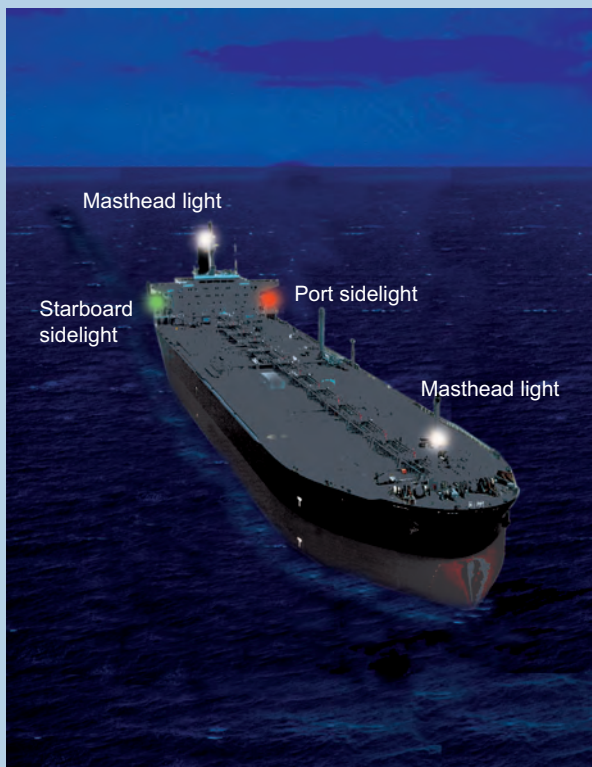
POWER DRIVEN LESS THAN 12m

From the COLREGS

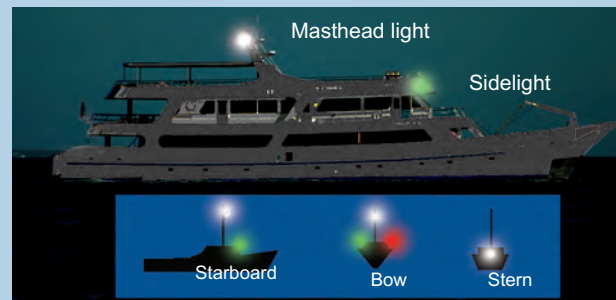
- (a) A power-driven vessel underway shall exhibit
 - (i) a masthead light forward;
 - (ii) a second masthead light abaft of and higher than the forward one; except that a vessel of less than 50 metres shall not be obliged to exhibit such light but may do so.



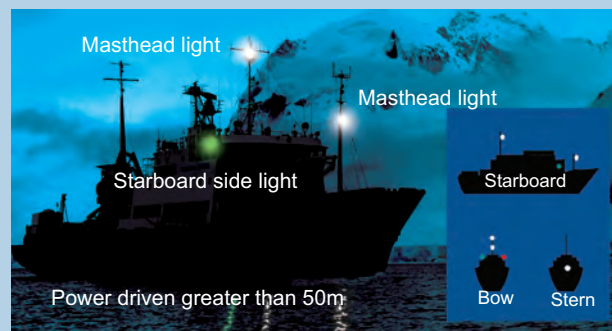
POWER DRIVEN



POWER DRIVEN > 50m

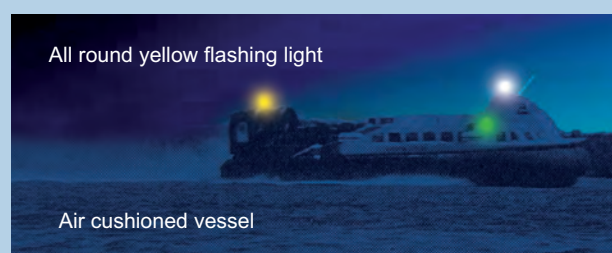


POWER DRIVEN > 20m BUT < 50m



POWER DRIVEN > 50m

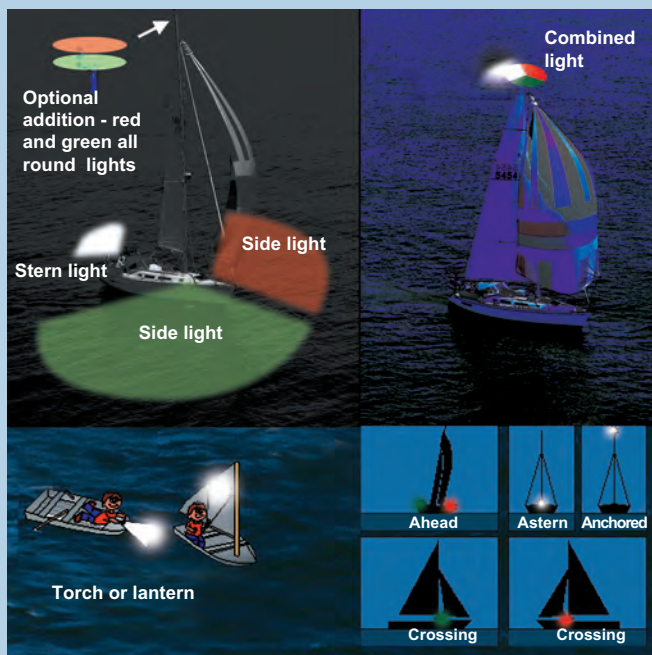
- (b) An air-cushioned vessel when operating in the non-displacement mode, shall in addition to the lights as prescribed in (a) above, exhibit an all round flashing yellow light.



AIR CUSHIONED VESSEL

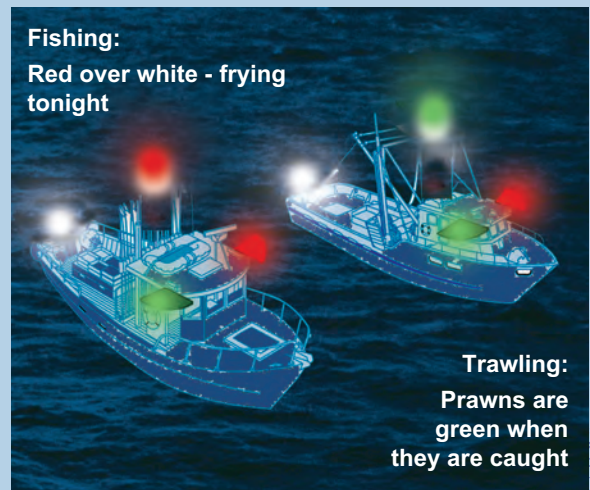
Sailing vessels under way and vessels under oars (Rule 25)

- While being driven (even with sails up), a sailing vessel must display the lights of a powered vessel.
- Boats < 7 m in length
 - The lights required for sailing vessels or
 - A torch or lantern showing a white light ready to display in order to avoid collision.
- Boats > 7 m and < 20 m can show a combined light at or near the top of the mast that incorporates sidelights and stern light or
 - separate side lights and a stern light.
- More than 20 m - side and stern lights and in addition a combined red and green all round light.



Fishing vessels (Rule 26)

- This rule is to enable you to see commercial fishing vessels at night.
 - **Commercial vessels** either fish by means of long lines, poles or nets, or trawl by means of nets that move along the ocean floor and are hauled up from time to time.
 - A vessel engaged in fishing shall display lights as follows:
 - If trawling - two all round lights in a vertical line, the upper green and the lower white, or a shape consisting of two cones with their apexes together in a vertical line one above each other.
 - A masthead light behind and higher than the green light but if less than 50 metres in length need not do so.
 - If under way sidelights and a stern light.
- Small craft should keep away from all commercial fishing vessels.



Vessels restricted in their ability to manoeuvre (Rule 27)

The term *vessel restricted in her ability to manoeuvre* applies to one which is working on a task that restricts her movement.

Dredges

- Dredges are located in shallow waterways from time to time and will indicate which side to pass by green lights at night or two diamonds during the day.
 - Remember - "diamonds are a girls best friend in the day and green means go this side at night".



Dive boats

- A dive flag warns others that scuba divers or snorkellers are in the area. Its use may be required by law.
- The flag must fly from the dive boat or float in the immediate area.
- During night diving, a boat must show the three lights for Rule 27 as shown.



Navigation at night and times of poor visibility

Important points to remember

- It is difficult to judge distance at night.
- Not all navigation hazards have lights eg oyster leases.
- Background lighting on shore can be confusing.
- All boats in approved moored areas are required to show lights.
- A safe speed is one at which sufficient action can be taken to avoid a collision.



Isolated danger mark sunrise:

All you can see are the two spheres. Swing the vessel to starboard and you will see nothing.

It is recommended that if your vessel is travelling into the sun, you follow the restricted visibility rule ie;

Reduce to a safe speed, have engines ready for manoeuvring, turn on navigation lights, sound signals if appropriate, post additional lookouts and navigate with extreme care.

Anchored vessel: Showing a white allround light blended in with city lights.



Dredge: Showing which sides to pass.

Flags in common use

- Flags are used to communicate important information

- Flag A is the code for:



I have a diver down, keep well clear at least 30 m and pass at a slow speed

- The two flags R over Y mean to slow down and pass with no wash as there is a vessel engaged in activities where a wash could cause danger

For example - the crane on the barge below.



Boats at anchor

(Rule 30)

- Boats less than 50 metres in length must display an all round white light where it can best be seen at anchor.
- Boats over 50 metres should display two anchor lights - the higher one towards the bow.



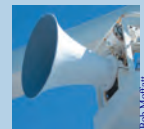
BOATS AT ANCHOR

- Anchor lights must be displayed from sunset to sunrise and if you are in a busy area use other lights eg cabin (except for navigation).

Sound signals

(Rule 32)

- 1 short blast** I am altering course to starboard (right).
- 2 short blasts** I am altering course to port (left).
- 3 short blasts** I am operating engines astern (reversing or stopping).
- 5 short blasts** I am unsure of your actions or intentions, or doubt whether sufficient action is being taken to avoid collision.


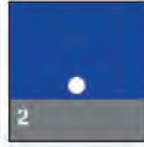















In restricted visibility

- 1 long blast** - Power driven vessel underway.
- 1 long and 2 short** - sailing, fishing, working boats underway.

WORKSHEET 13 LIGHTS, FLAGS AND RULES

Q1. Identify the following navigation lights, safety marks and signals.

| | | | | |
|--|--|--|--|--|
|  1 | |  2 | |  3 |
|  4 | |  5 | |  6 |
|  7 | |  8 | |  9 |
|  10 | |  11 | |  12 |
|  13 | |  14 | |  15 |

Q2. Describe the difference between lights T2, T4 and T6 shown opposite? (Read the notes on markers on page 68)



Q3. On the illustration opposite:

a. Circle the cardinal mark and indicate where safe water can be found.

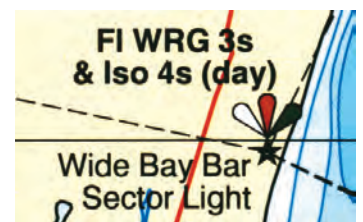
b. What bearing is the line of the leads and how can you distinguish between them?

c. Circle a port light that flashes 9 times every 15 seconds. How is this indicated on the chart?

d. Circle an anchorage and a starboard light that flashes green every 6 seconds.

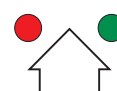


Q4. Using the chart on page 68, locate the light in the illustration to the right. Identify what type of light is it, where is it found and what colour is it from 25°48'S, 153°06'E on the chart?



| | |
|----------------------|-----------------------------|
| Type: | Where found: |
| Colour north of WP2: | Colour at WP2: |
| Colour south of WP2: | Colour if viewed from land: |

Q5. Describe what this symbol indicates, where is it found and what is it used for.



CHAPTER 6 TRIP PLANNING

Main features of a weather chart

Weather is the most important consideration in designing a trip plan.

Sources of weather information

- The most accurate information on weather forecasts for your local area is the Bureau of Meteorology web site - www.bom.gov.au
 - The best source of information is from the BOM website through your local VMR and AVCG stations.
- As the weather bureau records changes in the weather, information is relayed to transmission towers, where it is beamed on VHF or 27 Mhz frequencies.
- Because of the dependence of small boats on the weather, special forecasts are issued for pleasure boating on the Marine & Ocean section of the Bureau of Meteorology web site - affectionately know as "the BOM site" - www.bom.gov.au
- Australia is dominated by high and low pressure systems that are associated with storms, cyclones, fronts and ridges some of which are summarised in the weather map shown below.

High and low pressure systems

- Winds blow out of highs anticlockwise, and into lows clockwise.
- High [H] and low [L] pressure systems move from west to east at various speeds.
- High pressure systems are found further north in winter allowing low pressure systems to sweep over southern Australia creating dangerous boating.

Isobars, pressure gradients and wind strength

- Isobars are lines that join places of the same atmospheric pressure. When high and low pressure systems squeeze together, a pressure gradient forms.

Hazards that large waves cause

- Large waves caused by strong winds can cause flooding, swamping, making the boat unstable, cargo moving, passengers falling over, becoming seasick and so on.
- Chapter 9 discusses some ways to cope with these conditions.

Weather associated with highs and lows

- Winds tend to blow out of a high pressure system and rotate anticlockwise tending to produce fine stable conditions.
- In winter low pressure can cross the land and then form into systems that whip up strong winds and rough seas which can last for days.
- High pressure systems bring the trade winds to North Queensland and can blow for many weeks.

Troughs and ridges

- A ridge is an elongated area of high pressure extending out from a high. A ridge of high pressure is about to pass over southern Queensland on the map shown to the right and will bring about a change in wind direction and possible rain.
- A trough is an elongated area of low pressure, extending south from a low. There is a trough over Perth on the map shown to the right.

Weather associated with troughs and ridges

- A weak ridge extending out from a high usually means fine weather with ideal boating conditions.
- A trough of low pressure usually is associated with rain. In summer troughs of low pressure called the monsoon sweep over Northern Australia

FIVE VITAL CHECKS

1. Warnings current for your boating area.
2. Weather conditions affecting safe navigation and comfort.
3. Wind conditions.
4. Wave conditions.
5. Tide times.

MARINE AND OCEAN SECTION

MEAN SEA-LEVEL PRESSURE ANALYSIS

Storm surges

As storms and cyclones approach land, their winds whip up the sea and push a bank of water towards the coast.

Cyclones have caused storm surges of 2–5 metres. If these storm surges occur at high tide, they can cause massive flooding of low-lying coastal areas.

Fronts

All trip plans should take into consideration approaching fronts.

- A front is formed when a body of air of one temperature meets a body of air of another temperature.
 - A front is indicated on a surface chart by a line with either points or knobs along it.
 - High clouds are often the first sign that a cold front is approaching. As the front gets closer altostratus and altocumulus (middle height) clouds may be seen. These clouds are typical of slow moving cold fronts.

Weather associated with fronts

- A cold front is usually preceded by rain and warm air and then as the front moves through strong winds followed by cold air.
- Violent summer storms can also create dangerous weather situations involving lightened and strong winds.
 - If you are able to, see if you can get under a bridge, into the lee of an island or make landfall, secure your vessel and seek shelter.

Land and sea breezes

- A **land breeze**: During the cool of the night air above the sea, being warmer than that above the land, begins to rise; and the cooler air moves seaward to replace the warm sea air.
- A **sea breeze**: During the heat of the day air above the land warms, and becoming less dense, begins to rise. The air above the sea, being cooler and more dense replaces, the air on the land.
 - This is why we have offshore winds and more favourable boating conditions early in the morning.

Effect of forecasting on trip planning

- Its is not recommended you go boating with forecast winds greater than 25 knots or if there is a predicted change in the weather for the worse.

Boating tips for avoiding heavy weather conditions

- Regularly monitor available sources of weather information (marine radio, broadcast band radio or mobile phones with internet access).
- Find out the local factors that influence sea conditions (including those for coastal bars).
- Know where to reach safe shelter (protected shore, harbour or lee of an island) and have alternate plans.
- Be flexible - change your plans (destination and route) if necessary and tell whoever holds the voyage plan but if conditions deteriorate, put on lifejackets.

Wind against tide

- If the wind blows against the tide, steeper wave conditions can be expected and your trip will be slowed.
- However if the wind blows with the tide, wave heights are smaller as shown in the Figure opposite.

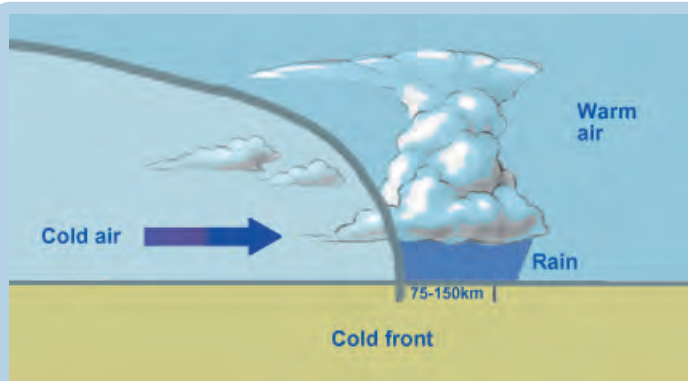
Cyclones

- Lows bring strong winds, rough sea and in summer can develop into cyclones.
- As storms and cyclones approach land, their winds whip up the sea and push a bank of water towards the coast called a storm surge. The BOM site has a good description of this.



A BOATING WEATHER FORECAST

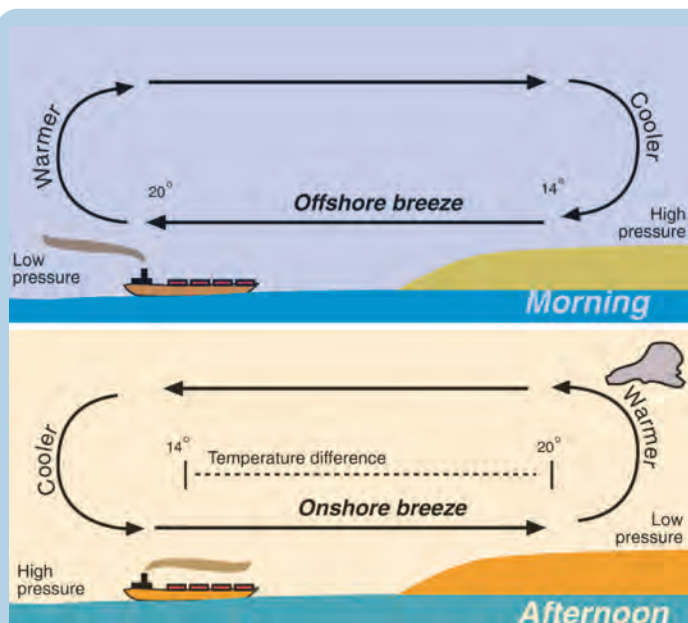
Australian Bureau of Meteorology



Signs of deteriorating weather include darkening lowering clouds, increasing wind strength, white caps and changing sea state

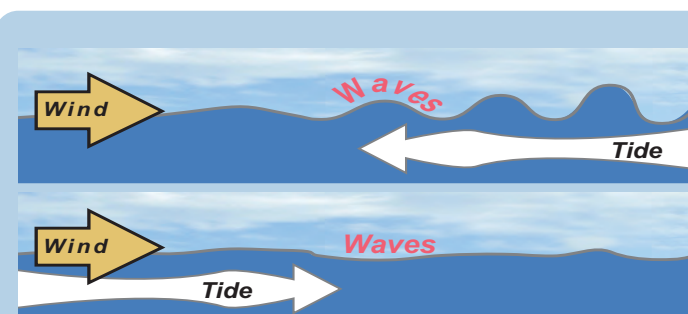
A COLD FRONT

Bob Moffatt



Offshore and Onshore breezes

Bob Moffatt



WIND OVER TIDE

Bob Moffatt

Tides

Sources of tidal information

- Newspapers, radio and television broadcasts all will give tidal information. However the most accurate information is from the internet - www.bom.gov.au. The Bureau of Meteorology web site can do tidal calculations for most coastal areas in Australia.

Basic causes of tides

Daily tides

- The gravitational attraction exerted by the Sun and the Moon helps produce tides. The figure opposite shows that each day the tide height will be 50 minutes later as a result of the movement of the moon. It also shows two high tides each day, with one higher than the other. This is caused by the slight difference in gravitational pull by the moon as well as the coastline's geomorphology.

Spring and neap tides

- Spring tides occur where the Earth, Moon and Sun are in a straight line. The gravitational pull of the Sun and the Moon are combined and the tides are at their highest. These tides occur when the Moon is in full or new Moon phases as shown.
- During a first-quarter Moon and again at the last quarter Moon phase, the Sun is at right angles to the Moon. Their separate gravitational pulls cancel each other out and produce a smaller high tide and a higher low tide. This is a neap tide. The tidal range between high tide and low tide is small during a neap tide.

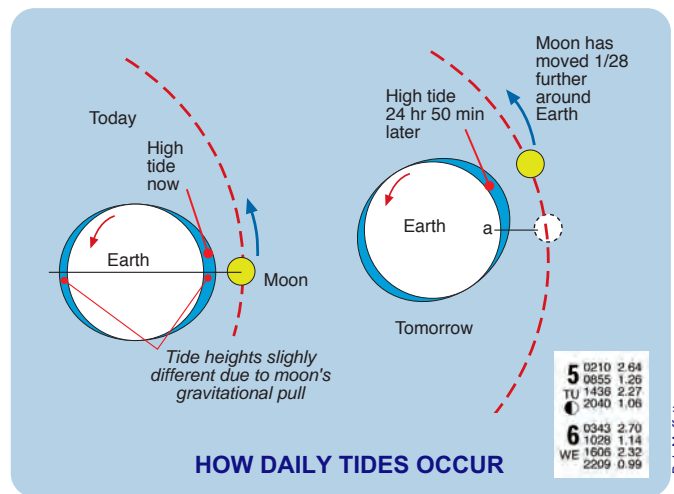
Chart datum and high and low tides

- Depths printed on charts are called soundings which have been reduced from a common level known as the chart datum point. The figure below shows a sounding of 1m and how it relates to the sea floor.
- This datum point is the lowest astronomical tide (LAT) or the lowest low water spring tide.
- These are therefore close to the minimum depth in the area and the height of the tides must be calculated to predict a real depth.
 - If low tide depth 0.8 of a metre and the chart depth is 1 m, then at low tide there is 1.8 metres between you and the sea floor.

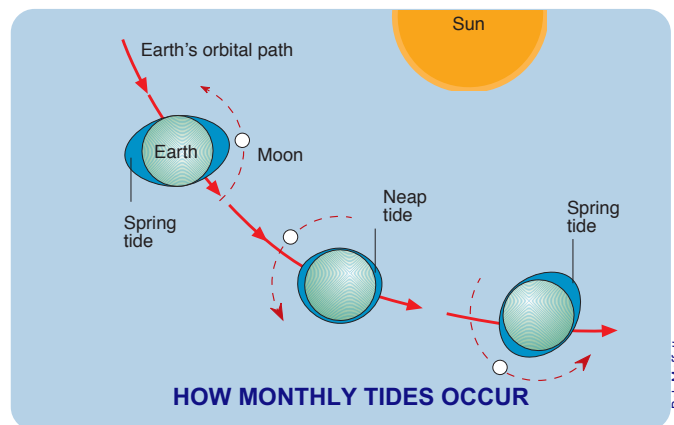
TIDAL PREDICTIONS FOR AUSTRALIA

Additional information:
 Australian Baseline Sea Level Monitoring Project
 South Pacific Sea Level and Climate Monitoring Project
 Sea Level Forecasts
 National Tidal Centre

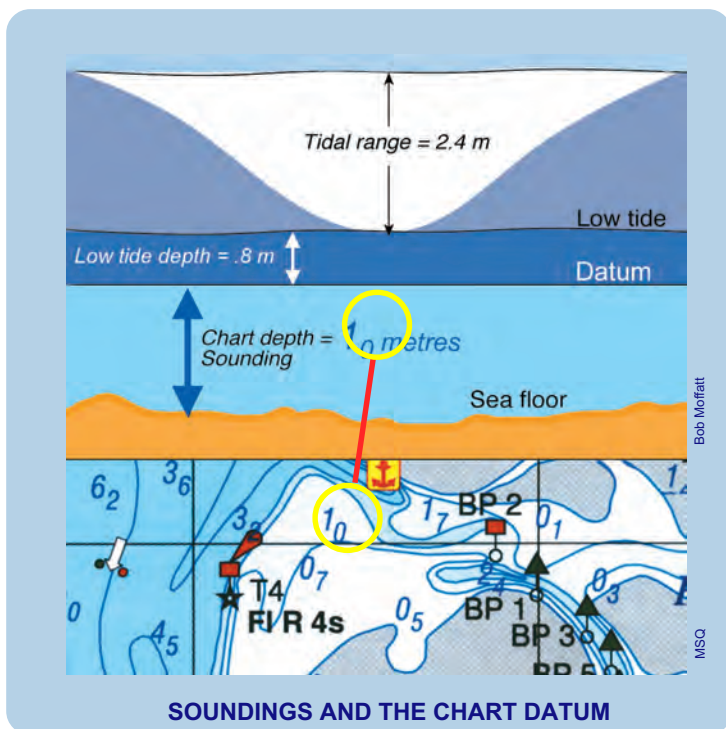
Australian Bureau of Meteorology



Bob Moffatt



Bob Moffatt



Bob Moffatt

MSC

- **Tides** are heights and affect the depth of water at a place on an hourly, daily and monthly basis.
 - **Tidal streams** are horizontal water flows that result from tides.
 - They affect courses and the duration of a passage and are shown on a chart using tidal diamonds. These indicate the speed and bearing of the tidal flow during each hour of the tidal cycle.
 - Read more about tides at www.icsm.gov.au/tides
- THE DIFFERENCE BETWEEN TIDES AND TIDAL STREAMS**

Calculate depth of water under a boat

Step 1 Calculate the tidal range

- Tide height and tidal range: The tidal range is the difference between high and low tides for a given place on the Earth's surface.

Step 2 Use the rule of 1/12's

Use the Rule of Twelfths - see figure opposite

- If the tidal range is 6 m and you want to find out how much the tide has fallen 3.5 hours after high water, an approximate answer is as follows:

| | | | |
|--|---|------|---|
| In the first hour: The tide falls $1/12 \times 6$ | = | 0.5 | m |
| In the second hour: The tide falls $2/12 \times 6$ | = | 1.0 | m |
| In the third hour: The tide falls $3/12 \times 6$ | = | 1.5 | m |
| The half hr tide falls $1/2 \times 3/12 \times 6$ | = | 0.75 | m |

So the total fall in 3.5 hours = 3.75 m

Step 3 Do the maths*

- Add the chart depth, the low tide water depth and the rise in tide due to the rule of twelfths.

Worked example

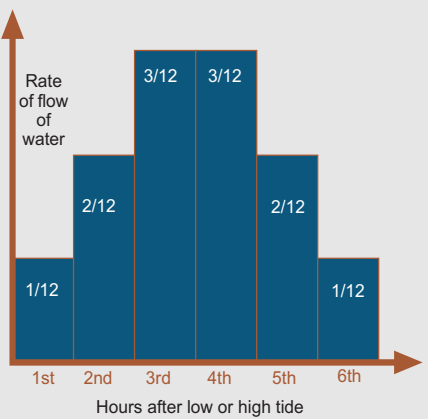
- There is a low tide of 0.8 metre at 6 am, and high tide of 3.2 metres at 12 noon and your chart depth is 1 metre.
 - How much water is under your boat at 8 am ?

The rule of twelfths is used as a guide to determine tidal height.

- The formula works on the rate at which the height of water changes between the tides - called the tidal range.

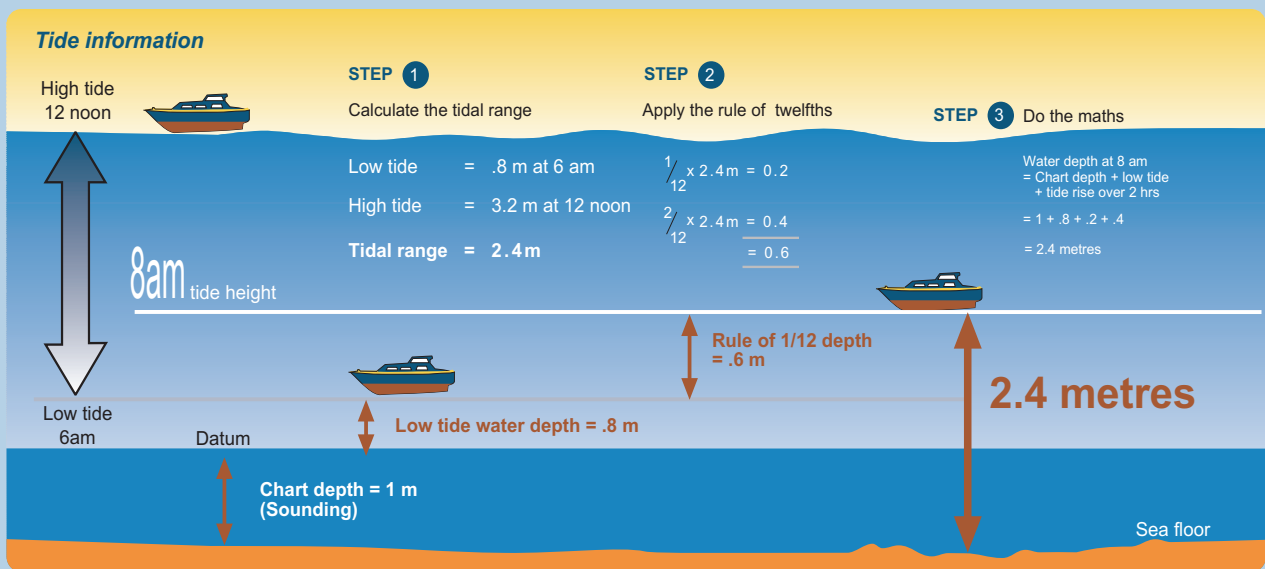
- The calculations are as follows:

- In the **first and sixth hour** the height will drop by $1/12$ each hour
- For the **second and fifth hour** the height will drop $2/12$ each hour
- During the **third and fourth hours** it will drop $3/12$ each hour



RULE OF TWELFTHS

Bob Moffatt



Bob Moffatt

WATER DEPTH UNDER YOUR BOAT*

If your boat's draft was 1.2 metres you would add this to the above calculations

Tidal calculations and the internet

- For secondary places, or *non-standard ports*, the tide heights and times can be calculated.
 - The page over gives a traditional calculation based on secondary ports, tidal planes, columns and rows.
 - Information these days is also available on mobile phones and web sites.
- The BOM site has tidal predictions for all of Australia.



There are any number of apps and web sites that will give you tidal information and do calculations

TIDES AT SECONDARY LOCATIONS - using the internet

Navigation

- At sea, where there are no visual indicators, it is easy to lose all sense of direction. Navigation equipment like charts, compass, radar and satellite position systems are needed to keep a boat on course, particularly in restricted visibility.
- At the most basic, a chart, watch and compass will enable you to plot a course. By noting the compass direction while heading out, you can tell the distance travelled by the speed of the boat and the time taken.

How long will it take?

A boat travelling at one knot will take one hour to travel one nautical mile. So how long will it take to travel 12 nautical miles at 6 knots? Using the magic triangle opposite, place finger over time and divide distance by speed.

ie $12/6 = 2$ hours

Lines of latitude

- These are the horizontal lines on a chart indicated by degrees north or south of the Equator, for example - 25°47'S to 25°54'S.

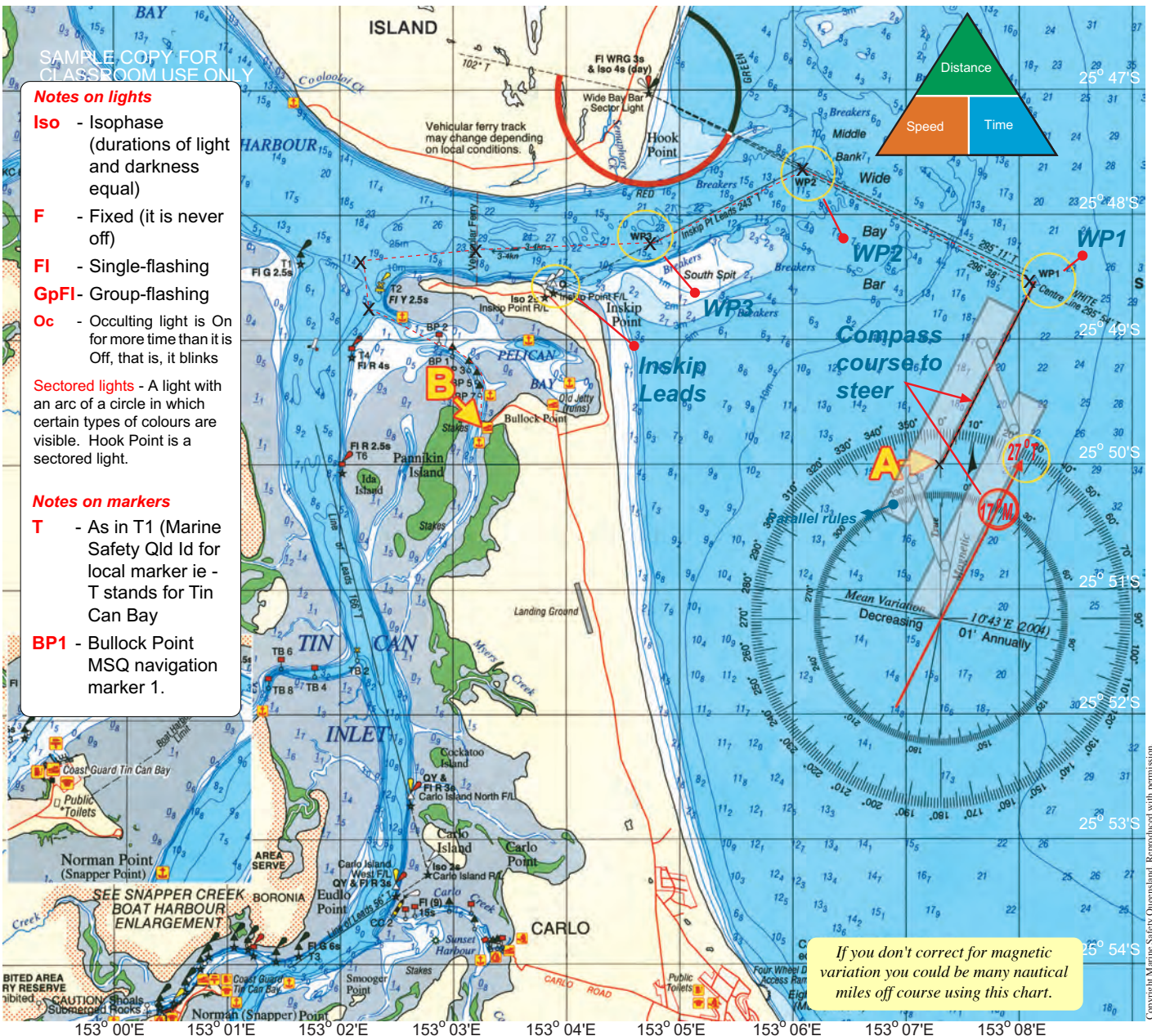
One nautical mile = 1.852 km
 One minute of latitude = one nautical mile

Lines of longitude

- These are the vertical lines on a chart indicated on the chart below ranging from 153°00'E to 153°08'E.

Plotting a course

- Suppose you are at **A** (25°50'S and approx. 153°07'E) on the chart below and you wanted to get to **B** Bullock Point boat ramp.
 - Take a pencil and plan a course as shown below. You want to make use of the known waypoints on your GPS to take you over the bar and then use the lateral marks to navigate the narrow channels in Pelican Bay.
 - Place a parallel rule over your desired course to WP1 then carefully move the rule over the compass rose to read a True bearing of 27°T. Subtract the 10° variation.
 - The compass course to steer your boat to WP1 is about 17° accounting for the 10° 50' variation since 2004.
 - Steer your boat on this compass bearing till the latitude and longitude of WP 1 comes up on your GPS.
 - Then use it, the sectored light, the Inskip Leads and all other navigation means available to get to **B**



WORKSHEET 14 PASSAGE PLANNING

Q1. Circle the buoyage direction symbol, a port lateral marker, a special mark and tick a starboard lateral marker in the chart below between 25°47'S and 25°50'S.

Q2. Identify the latitude and longitude of the ISO 2s light at Inskip Point and write it on the line below.

Q3. Identify the chart variation and write it on the line below.

Q4. Explain the term waypoint. Give an example. Circle and shade WP3.

Q5. You have a 4.3 m estuary run-about and want to go for a days boating in Pelican Bay. Identify what would be the best source of information for your trip.

Q6. Calculate how far is it from Bullock Point jetty in Pelican Bay, to the anchorage at Coolooloi Ck on North Island.

Q7. Explain why Pelican Bay is a good anchorage.

Q8. You are at 25°52'S, 153°08' E and wish to anchor overnight at Pelican Bay.

Chart a safe course to anchorage. (Your boat draws 1m of water and it is low tide).

Q9. You have a 4.3 m estuary run-about and want to go for a days boating in Pelican Bay. The forecast is for a 15-20 knot northerly with the chance of an afternoon thunderstorm. A swell of 1.5 m is expected.

Chart a safe days trip including an anchorage for lunch. The tidal range is 2.2 metres for the day.



GPS navigation system use and limitations

It is recommended that GPS users undertake navigation and GPS courses currently offered by both Volunteer Marine Rescue (VMR) and the Australian Volunteer Coast Guard before using a GPS for the first time.

GPS stands for Global Positioning System which is composed of satellites above the earth.

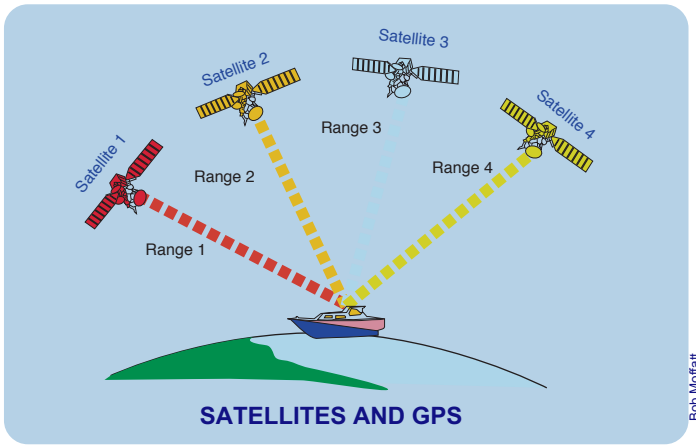
- These satellites are spaced in orbit so that at any time a minimum of six satellites will be in view to users anywhere in the world. Satellites continuously broadcast position and time data to users throughout the world.
- Using a portable or hand-held receiver unit that receives data from the closest satellites, the GPS unit triangulates the data to determine the unit's exact location (typically in latitude and longitude), elevation, speed, and time.
- However where a car's GPS will say to you, "At the next intersection turn right"; a marine GPS will not.

Operation of a chart plotter

- GPS units contain a chart plotter that provides a variety of functions too numerous to mention in these notes. As a starting point, it is recommended that GPS users undertake navigation and GPS courses currently offered by both Volunteer Marine Rescue (VMR) and the Australian Volunteer Coast Guard.
- However from the photograph to the right, you can see the boat's position on a nautical chart as well as other chart features, latitude and longitude, ships heading as well as depth. A plotter also runs software that allows you to easily locate your position and plot courses.

Waypoints

- Waypoints are sets of coordinates that identify a position at sea. Special symbols then show these points on the chart as shown in the illustration of the Wide Bay Bar opposite.
 - For example, you might want to cross this bar to avoid the South Spit breakers at the mouth of the bar.
 - The chart shows WP1 with true bearings on the Wide Bay Sector Light and WP2 with true bearings to the leads in the trees at Inskip Point camping ground.
 - If set correctly, you can use your GPS to safely navigate the bar provided that you use ALL other navigating means available to you. For example;
 - *Local knowledge, notice to mariners,*
 - *Notes from the Tin Can Bay Coastguard,*
 - *Tide tables, chart, compass, sector light,*
 - *Inskip Point leads, weather forecast and proper lookout.*




Bob Moflatt



Bob Moflatt

Check your chart between waypoints especially if you are travelling in a straight line.




Waypoint 2: Gives you the true bearing to the inskip leads which can be seen in the trees in Inskip Point

Waypoint 1: Gives true bearings to Waypoint 2.


WAYPOINTS ON A CHART


Bob Moflatt

MSO



Check your chart between waypoints especially if you are travelling in highway mode





Don't use the wrong chart datum or you could end up on the rocks or a breakwater

Bob Moflatt

Suitability of the chart plotter

- The screen in the photograph to the right shows a boat entering port with the:
 - Direction of buoyage
 - Port and starboard markers
 - Cardinal marks, coastal features, soundings and the depth of water under the keel.
- However a GPS is not a substitute for sound watch keeping and navigational practices and should be used only in conjunction with other aids to navigation.
 - Skippers should still maintain a proper lookout while the vessel is underway to identify any approaching hazards.

Use and abuse of zoom

- It is recommended that you zoom to the largest available accurate chart scale. If the zoom recommended exceeds the accuracy scale limit then a warning message is displayed on the screen.

Be aware of cheap imports

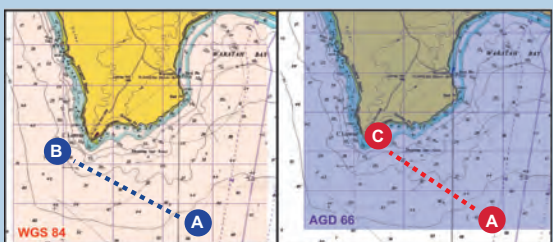
- Some cheap imports may have used cheap labour to interpret key chart features.
 - Soundings and chart features may be different to official charts.

GPS positions can change from day to day

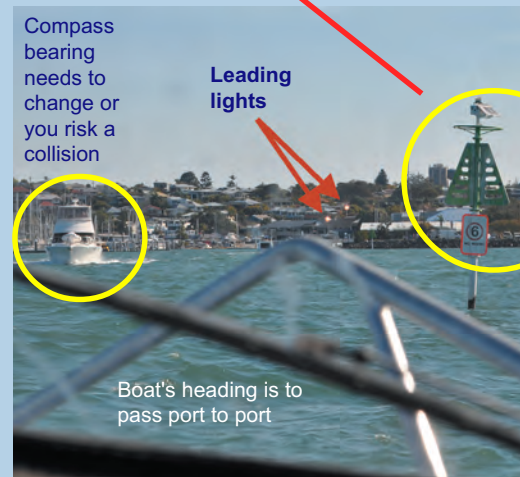
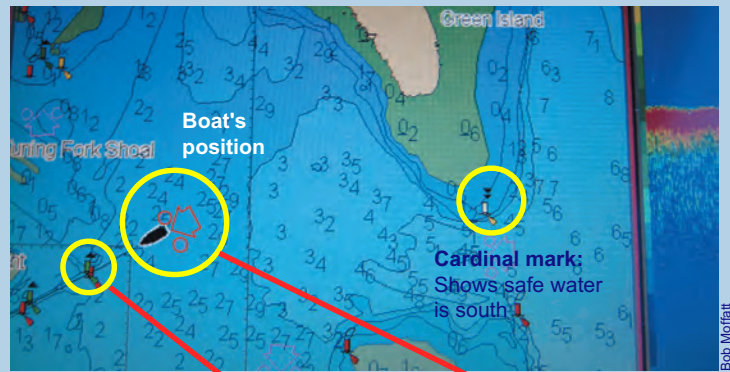
- The photograph of a chart plotter below, shows the inaccuracy of a GPS on a charter boat over 3 weeks.

Datum checking - fixed points at boat ramps

- It is advisable to switch the unit on and select the correct chart datum before departing. Many boat ramps have signs showing datum points. GPS units require time to initialize, and the master needs time to assess the accuracy of the position information prior to starting the voyage.
 - The accuracy of GPS units can be compromised by power failures or poor electrical connections.
 - Always ensure your electrical charts are updated with supplier upgrades. When going to a waypoint in a straight line, check what is in between your boat's initial location and the waypoint.
 - The figure below shows a GPS image of a track around a headland from A-B. One chart uses a datum called WGS 84 and the other AGD 66 (an out of date datum).
 - Use the wrong datum and you end up on the headland.



ALWAYS USE WGS 84



Direction of buoyage: Shows direction to pass lateral marks

Starboard mark and advisory sign: Keep leads slightly apart so you know you are travelling down the starboard side of a channel

GPS summary

Here is a summary of the main points on GPS limitations and use

- You must always maintain a proper lookout and safe speed
- Check that you datum is set to WGS 84
- Allow time for you GPS to initialise and note the number of satellites it acquires
- Verify your position with a chart and coastal features
- Be aware of power failures and poor electrical connections
- Make sure your chart and GPS are up to date with system upgrades
- Check your chart between waypoints especially if you are travelling in a straight line
- Be aware of areas under construction or development

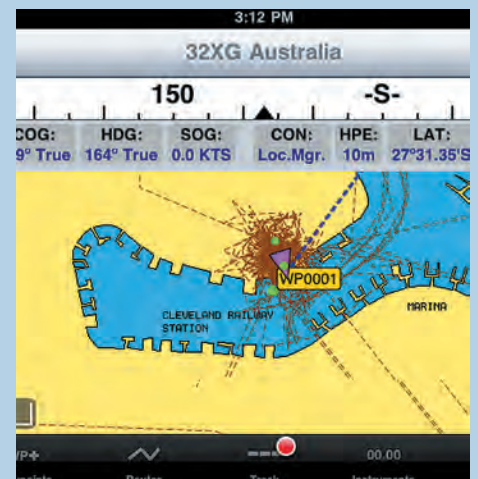
Reference

www.hydro.gov.au

The photograph opposite shows the inaccuracy of a GPS on a charter boat over a 3 week period. According to the owners Derrick & Jenny Baan from Bayside Boat Licensing:

"It is like a time lapse photo where at times the vessel may 100m away from its pontoon, some days it is on the other side of the canal, sometimes on the land and other times on the other side of the street."

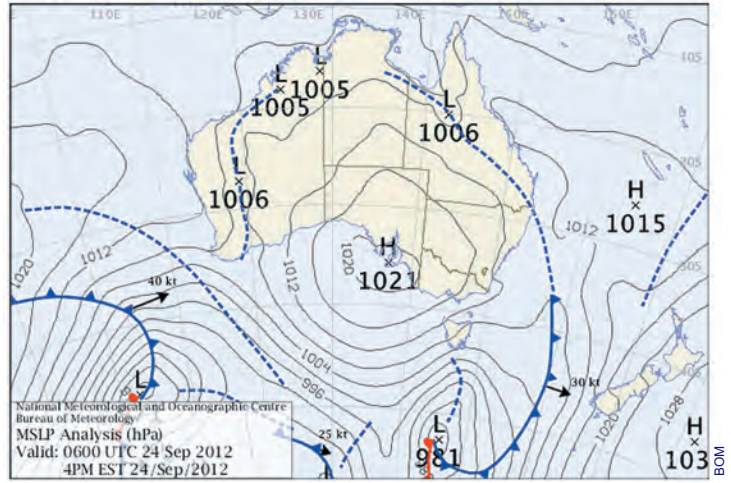
Why not try this on your boat to see how your GPS varies?



WORKSHEET 15 WEATHER AND PASSAGE PLANNING

Q1. Identify the following on the weather map opposite
Trough of low pressure, ridge of high pressure, hectopascals, pressure gradient, high pressure system, low pressure system, low pressure trough, cold front.

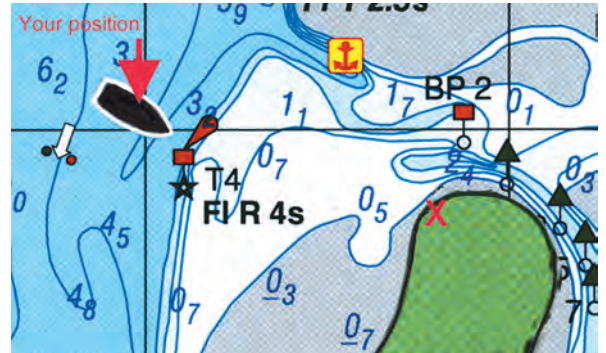
Q2. Compare three features of high and low pressure systems in Australia.



Q3. Summarise six main points on GPS limitations and use.

Q4. You wish to come ashore at Point X, from your position in the chart opposite and it is right on low tide. The tidal range is approx 3 metres and your boat draws 1 m.

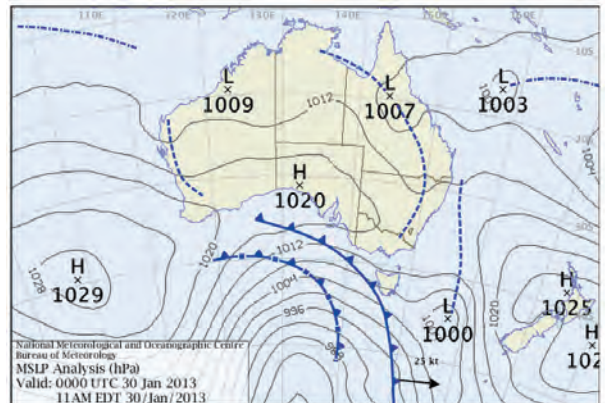
Calculate how long will you have to wait? (You have arrived at low tide).



Q5. Identify the following in the photograph of the GPS screen opposite.
Boat's position, south cardinal mark, direction of buoyage symbol, starboard mark.



Q6. Justify a voyage plan for a day's boating in your local area for the weather map opposite with consideration of crew and vessel capabilities.



WORKSHEET 16 CALCULATE A COMPASS COURSE

The chart below, shows a typical chart with a compass rose and places to go.

Suppose you are in a bay just north west of Carlisle Island and you want to go Coffin Island - 4 nautical miles away. You calculated that by knowing a nautical mile is a minute of latitude and this was measured from the side of the chart.

The simple phrase - “cup of tea”, lets you work out all compass courses from a chart that tells you the magnetic variation as shown in Figure 77.1.

From Figure 77.2 the variation in the compass rose is shown as 8° east.

The true to compass - easterly subtract rule applies and by using a set of parallel rules, a true bearing of 322 °T is found.

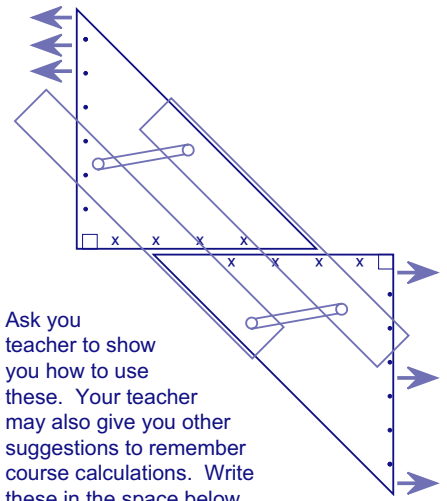
Therefore when planning a course to Coffin Island, your boat should be steered on a course of 314 °.

Q1. Identify the true bearing from A to B by using a set of squares and circle the answer in the compass rose (Your teacher will show you how).

Q2. Identify the chart variation and determine from the cup of tea rule above, if you subtract or add.

Q3. Determine the course to steer by a compass which is not affected by any magnetic field.

- Cup oft e a
- Compass to true easterly add
- Compass to true westerly subtract
- True to compass easterly subtract
- True to compass westerly add



Ask you teacher to show you how to use these. Your teacher may also give you other suggestions to remember course calculations. Write these in the space below.

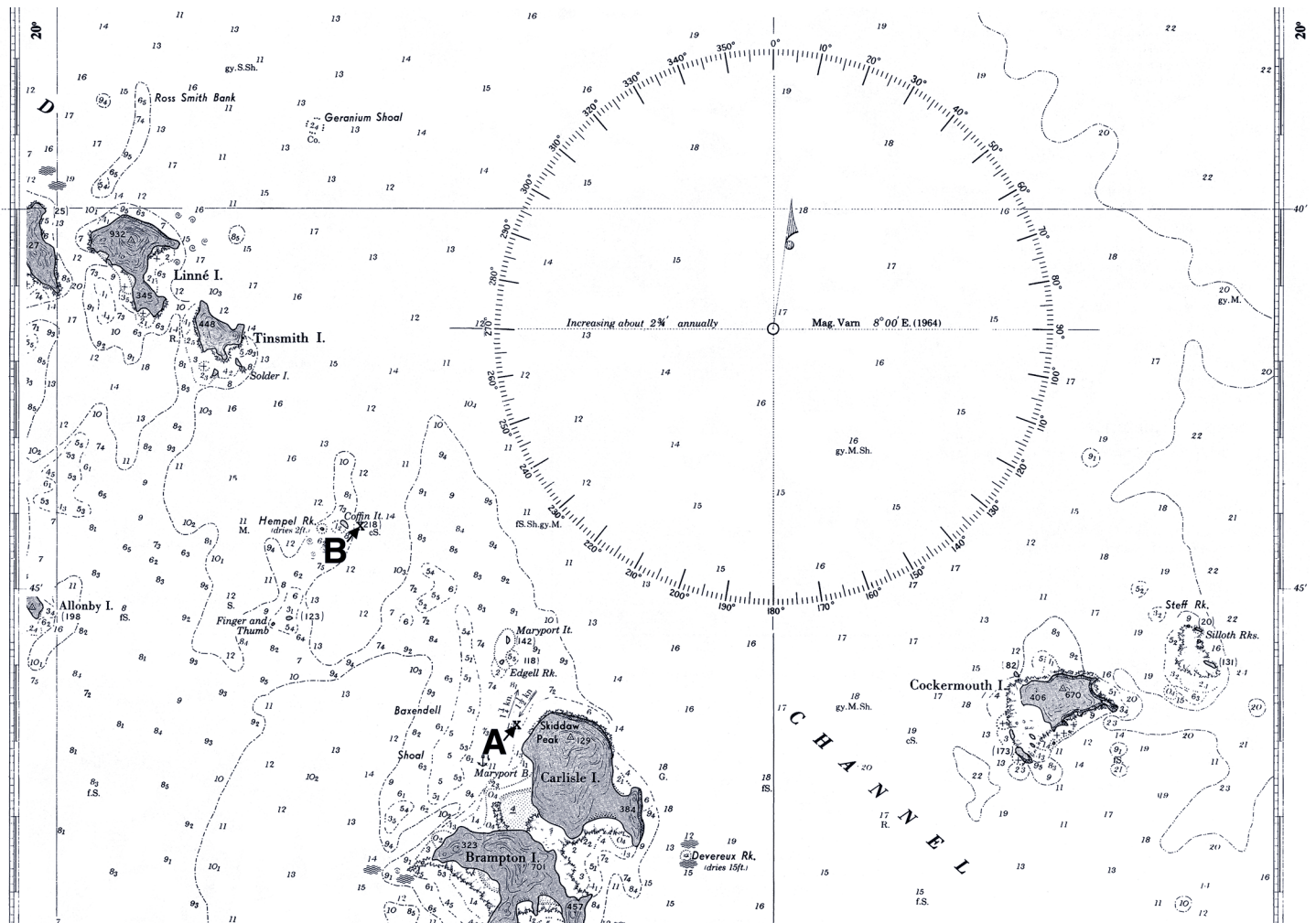


Figure 77.2 Practice chart - Error East, Compass least

Figure 77.1 Compass to true easterly add

WORKSHEET 17 TIDES AND PASSAGE PLANS

AUSTRALIA OUTER HARBOUR
 LAT 25° 57' S LONG 153° 04' E
 TIMES AND HEIGHTS OF HIGH AND LOW WATERS

The next two questions refer to the tidal information opposite.

Q1. Identify the tide heights am and pm for the standard port of Outer Harbour on the 19th July.

Q2. Estimate the height of the tide at 3 pm on the same day at Edgell Rock on the chart opposite if the tidal range was 4 m and the time of high tide was 1 pm. Depth of water at low tide is 2 m. What rule is used in this calculation?

Q3. Explain why the tide heights are different for the same day.

Q4. Estimate the depth of water under your boat in Maryport Bay. If a low tide of 1 m is at 6 am, and high tide of 4 m is at noon and your chart depth is 1.7m, how much water is under your boat at 8 am?

Q5. Explain the difference between a tide and a tidal stream.

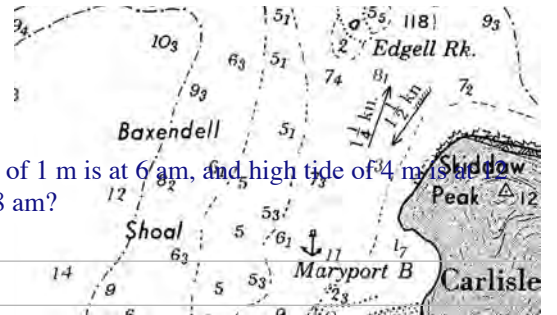
Q6. Identify and circle the tidal streams on the chart of Carlisle Is above.

Q7. Explain how this tidal stream could affect the passage of a craft from the anchorage at Maryport Bay to Edgel Rock.

Q8. Describe where is the most accurate information can be found. How could you test the reliability of phone apps in predicting tidal information.

Q9. Describe the effect of wind over tide.

| JUNE | | | | JULY | | | |
|---------|------|---------|------|---------|------|---------|------|
| Time | m | Time | m | Time | m | Time | m |
| 1 0427 | 0.73 | 16 0518 | 1.07 | 1 0505 | 0.45 | 16 0530 | 1.03 |
| SA 1628 | 0.27 | SU 1104 | 4.41 | MO 1050 | 4.96 | TU 1116 | 4.36 |
| 2242 | 6.06 | SU 1706 | 0.84 | MO 1701 | 0.11 | TU 1717 | 0.86 |
| | | ● 2322 | 5.50 | ○ 2315 | 6.27 | ● 2331 | 5.39 |
| 2 0515 | 0.64 | 17 0551 | 1.15 | 2 0555 | 0.36 | 17 0559 | 1.07 |
| 1059 | 4.98 | MO 1135 | 4.30 | TU 1140 | 4.96 | WE 1144 | 4.32 |
| SU 1712 | 0.28 | MO 1734 | 0.97 | TU 1750 | 0.15 | WE 1745 | 0.94 |
| ○ 2327 | 6.11 | 2353 | 5.37 | | | 2359 | 5.28 |
| 3 0603 | 0.64 | 18 0621 | 1.26 | 3 0002 | 6.23 | 18 0625 | 1.13 |
| 1148 | 4.86 | 1205 | 4.18 | MO 0643 | 0.36 | 1212 | 4.29 |
| MO 1758 | 0.39 | TU 1802 | 1.12 | WE 1230 | 4.91 | TH 1814 | 1.07 |
| | | | | 1839 | 0.32 | | |
| 4 0014 | 6.04 | 19 0022 | 5.21 | 4 0050 | 6.03 | 19 0027 | 5.14 |
| TU 0654 | 0.71 | WE 0650 | 1.37 | TH 0731 | 0.46 | FR 0653 | 1.20 |
| 1240 | 4.69 | WE 1235 | 4.07 | TH 1322 | 4.79 | FR 1243 | 4.22 |
| 1845 | 0.60 | 1831 | 1.30 | 1929 | 0.60 | 1845 | 1.25 |
| 5 0102 | 5.85 | 20 0052 | 5.02 | 5 0140 | 5.71 | 20 0056 | 4.94 |
| 0746 | 0.83 | TH 0722 | 1.48 | FR 0821 | 0.63 | SA 0723 | 1.30 |
| WE 1335 | 4.52 | TH 1309 | 3.96 | FR 1417 | 4.65 | SA 1317 | 4.13 |
| 1938 | 0.88 | 1904 | 1.51 | 2021 | 0.95 | 1919 | 1.48 |
| 6 0157 | 5.58 | 21 0127 | 4.81 | 6 0233 | 5.31 | 21 0130 | 4.70 |
| 0843 | 0.96 | FR 0759 | 1.59 | SA 0915 | 0.82 | MO 0800 | 1.40 |
| TH 1437 | 4.39 | FR 1351 | 3.85 | SA 1518 | 4.54 | SU 1400 | 4.04 |
| 2037 | 1.17 | 1945 | 1.75 | 2122 | 1.31 | 2001 | 1.73 |
| 7 0257 | 5.30 | 22 0209 | 4.58 | 7 0333 | 4.90 | 22 0212 | 4.44 |
| 0945 | 1.03 | 0845 | 1.68 | 1015 | 0.97 | 0845 | 1.50 |
| FR 1545 | 4.36 | SA 1445 | 3.78 | SU 1628 | 4.51 | MO 1457 | 3.99 |
| 2146 | 1.41 | 2038 | 1.98 | 2236 | 1.58 | 2100 | 1.95 |



WORKSHEET 18 TIDES IN SECONDARY LOCATIONS

Q1. Calculate the tide heights and times for Inskip Point (Page 68), a non-standard port some distance from Outer Harbour for the 1st July by using the steps below.

Step 1:

Step 2:

Step 3:

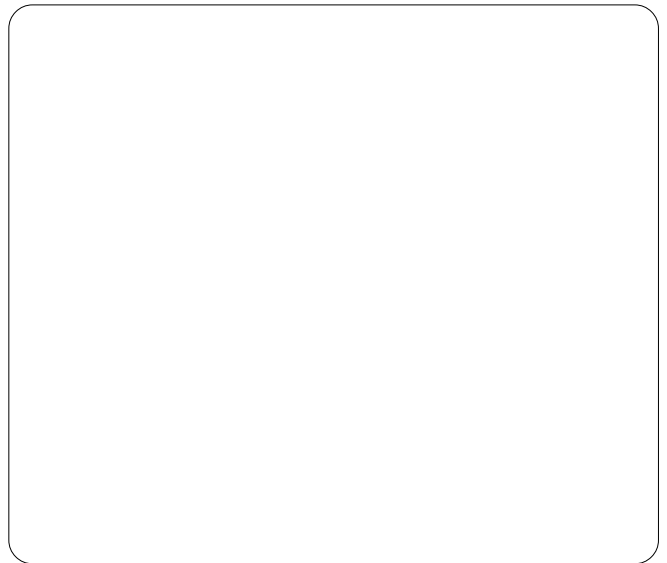
Step 4:

Step 5:

Step 6:

Step 7:

- Step 1** Copy the information for the standard port (Outer Harbour) into Column A. This shows the times for the low and high tides for the day.
- Step 2** Write time difference for Inskip Point in Column B.
- Step 3** Add Column A and B to get the tide times for Inskip Point.
- Step 4** In Column D copy the tide heights for Outer Harbour for the 1st July.
To calculate the tide heights for Inskip Point we need to use the following from Table 2:
 - the ratio from column 9 (which is 0.8)
 - the adjustment from column 10 (which is 0.47)
- Step 5** In column E, multiply the ratio from Table 2 by the Height of tide Outer Harbour from (Outer Harbour).
- Step 6** In column F add the adjustment from Table 2 to the value you calculated in Column E.
- Step 7** Column G then has the tide heights for the secondary port.



Q2. Identify where you would launch your boat on the chart on page 68. Draw a mud map in the box above.

Tidal Planes for Secondary Places
Height Above Local Low Water Datum

TABLE 2

| PLACE | Average Time Difference | | MHWS | MHWN | MLWN | MLWS | AHD | ML | Ratio | Constant |
|---------------|-------------------------|-----------|------|------|------|------|------|------|-------|----------|
| | High Water | Low Water | | | | | | | | |
| | 1 | 2 | | | | | | | | |
| Outer Harbour | H.M | H.M. | m | m | m | m | m | m | | |
| Burnett Heads | Standard Port | | 2.5 | 1.9 | 0.8 | 0.2 | 1.35 | 1.34 | | |
| Boonlye Point | +1 09 | +0 57 | 2.9 | 2.4 | 1.1 | 0.5 | | 1.74 | 1.09 | +0.27 |
| Burrum River | -0 05 | -0 05 | 2.6 | 2.0 | 0.6 | 0.0 | | 1.28 | 1.18 | -0.31 |
| Elbow Point | +0 35 | +0 05 | 1.9 | 1.5 | 0.7 | 0.3 | | 1.10 | 0.69 | +0.17 |
| Inskip Point | +0 10 | -0 35 | 2.4 | 2.0 | 1.1 | 0.7 | | 1.55 | 0.80 | +0.47 |
| Maryborough | +1 57 | +3 00 | 3.0 | 2.4 | 0.4 | 0.0 | 1.29 | 1.44 | | |

| OUTER HARBOUR JULY | |
|-----------------------|------|
| Time | m |
| 0336 | 0.14 |
| 1002 | 2.85 |
| 1621 | 0.13 |
| 2213 | 2.15 |

| Column A | Column B | Column C | Column D | Column E | Column F | Column G |
|---------------------|-------------------------|---------------------|------------------------------|--|------------------------------------|---------------------------|
| Time Outer Harbour | Difference from Table 2 | Time Inskip Point | Height of tide Outer Harbour | Calculations for height of tide Inskip Point | | Inskip Point Tide Heights |
| 1 | 2 | 3 | 4 | Ratio from Column 9 5 | Adjustment from Column 10 6 | 7 |
| LOW 0336 | -35 mins | LOW 0301 | 0.14 m | .8 X 0.14 m = -0.11 m | .47 .47 + 0.11 m | LOW = 0.58 m |
| HIGH 1002 | + 10 mins | HIGH 1012 | 2.85 m | .8 X 2.85 m = 2.28m | .47 .47 + 2.28 m | HIGH = 2.75 m |
| LOW 1621 | -35 mins | LOW 1546 | 0.13 m | .8 X 0.13 m = 0.10 m | .47 .47 + 0.10 m | LOW = 0.57 m |
| HIGH 2213 | + 10 mins | HIGH 2223 | 2.15 m | .8 X 2.15 m = 1.72 m | .47 .47 + 1.72 m | HIGH = 2.19 m |

CHAPTER 7 REGULATIONS

National standards and regulations

The Australian Maritime Safety Authority (AMSA) is the agency that is responsible for marine safety standards in Australia. Ref.: www.amsa.gov.au. For example an AMSA registration sticker for an Emergency Position Indicating Radio Beacon (EPIRB) must be affixed to the EPIRB (See Chapter 4).

Skipper's general safety obligation

The general safety obligation of a skipper is nationally recognised as a maritime principle based on achieving the highest level of safety by ensuring:

- a boat is safe,
- properly equipped and crewed, and
- operated in a safe manner.

Failure to do this means you can be prosecuted.

How to avoid this

These four simple rules will keep you well equipped.

1. Make sure your boat is safe

- safely loaded and balanced,
- everything is working well and complies if you have to defend yourself in court,
- if you lend your boat out and the navigation lights don't work and there is an accident, you could be liable for prosecution.

2. Make sure your boat is properly equipped

- safety gear, lights, seats,
- provisions, emergency equipment,
- if your boat gets inspected by the water police and the flares are out of date, you will cop a fine.

3. Make sure your boat is properly operated

- licensed crew,
- don't exceed your level of confidence,
- skiing at night might be fun, but if an accident occurred you would be liable for prosecution.

4. Make sure you plan for emergencies

- monitor the weather and tides at all times,
- have a good plan B for the simple things that could go wrong, eg, engine failure or accidents.
- if you are involved in an accident it has to be reported (different times for different States),

You also have a duty of care to your vessel, your crew, other boats, people who live beside waterways and the passengers you take.

Australian Builders Plate (ABP)

The national standard for the Australian Builders Plate for recreational boats is overseen by the Australian Recreational Boating Safety Committee,

The ABP is found on all new Australian and imported recreational boats including owner built boats.

The main features have been discussed in Chapter 1 however a summary is outlined in Figure 80.2 below.

PFD's

All PFDs need to have markings identifying them as complying to the Australian Standard (See Chapter 4).

- For a life jacket to comply with a particular standard, certain information required under that standard must be displayed.
- The current standard for life jackets is Australian Standard 4758 (AS 4758). This standard has replaced Australian Standard 1512-1996, Australian Standard 1499-1996 and Australian Standard 2260-1996.
- You do not have to upgrade your current life jacket under the old standards – they will still be acceptable for use as long as they are in good condition. AS 4758 has a different rating system than the previous standards.

| Under standard AS 4758 | Under previous standards |
|-------------------------------------|------------------------------|
| Level 275 Level 150 | Coastal life jacket |
| Level 275 Level 150 Level 100 | PFD type 1 (AS 1512-1996) |
| Level 50 | PFD type 2 (AS 1499-1996) |
| Level 50 special purpose | PFD type 3 (AS 2260-1996) |

Figure 80.1 Life jacket compliance details.



Figure 80.2 Australian Builders Plate summary

Fire extinguishers and flares

All fire extinguishers (Figure 81.1) have to be checked and the charge level certified by a date. Flares have expiry dates and must be replaced when they expire.

MARPOL

The MARPOL Convention is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes.

It is a combination of two treaties adopted in 1973 and 1978 respectively and updated by amendments through the years. More details:-

<http://www.imo.org>

For the recreational boat owner garbage, drainage bilge, fuel, oil and sewage are the main applications of MARPOL.

Garbage **The dumping of ANY garbage is an offence**

Garbage means all kinds of victual, domestic and operational waste, including plastics, generated during the normal operations of the boat and must be disposed of on shore.

This does not include fresh fish and parts of fresh fish or the release of small amounts of food for fish feeding.

The general rule is no discharge overboard. It should be stowed on board and disposed of responsibly once you are back on shore. No plastics (synthetic ropes, fishing lines, nets or bags) should be thrown overboard.

Some tips to prevent this include:

- Eat all the foods off your plate before washing up - minimises on dish washing liquid and reduces grease.
- Encourage others to do the right thing so you don't destroy what you came to enjoy; you only have to travel overseas to see how lucky we are.
- Pack your boat for minimal rubbish; for example sugar in a re-sealable water proof plastic container instead of sugar in a disposable bag.
- Avoid plastic bags on board - they can clog the intake around the prop as well as kill marine life.
- Stow tangled fishing line with the garbage as it kills bird life.

Oil and chemicals

The dumping of oil is an offence

These can end up in waterways from maintenance procedures, accidents or deliberate dumping. Oil products include petrol, diesel, two stroke oil, motor oil, gearbox oil or hydraulic oil. Chemical products include cooling system additives, cleaning agents, degreasers, acids and paints.

All boat owners need to manage the use and disposal of outboard oil and chemicals properly. Some suggestions to reduce accidental pollution include:

- when refuelling, insert the nozzle into the filler before starting the pump. Always turn the pump off and ensure the flow has stopped before removing the nozzle,
- watch breathers for signs of blow-back or overflow,
- avoid overfilling your fuel tank - allowing 2% for expansion,
- plug scuppers and block freeing ports during refuelling,
- use absorbents to clean waste oil from your bilge and phosphate free detergents and repair oil and fuel leaks,
- when painting your boat's hull, use the right paint for the job and be sure to follow the application instructions carefully,



Figure 81.1 Fire extinguisher compliance details
Wet Paper

- don't throw anything overboard, including cigarette butts,
- store petrol, diesel, two stroke, hydraulic and gearbox oils so they don't leak ,
- avoid discharging residue after cleaning out the bilge water,
- avoid washing rubbish down the drain - it ends up back in the ocean - use a bag and the bin.

Ship-sourced sewage

In Australia sewage is prohibited from being discharged in any marina, canal or designated area under local state laws.

The best solution to sewage is to have a holding tank installed on your boat so that when you get back to the marina, you can pump it out. Portable camping toilets also provide the convenience where public toilets cannot be found.

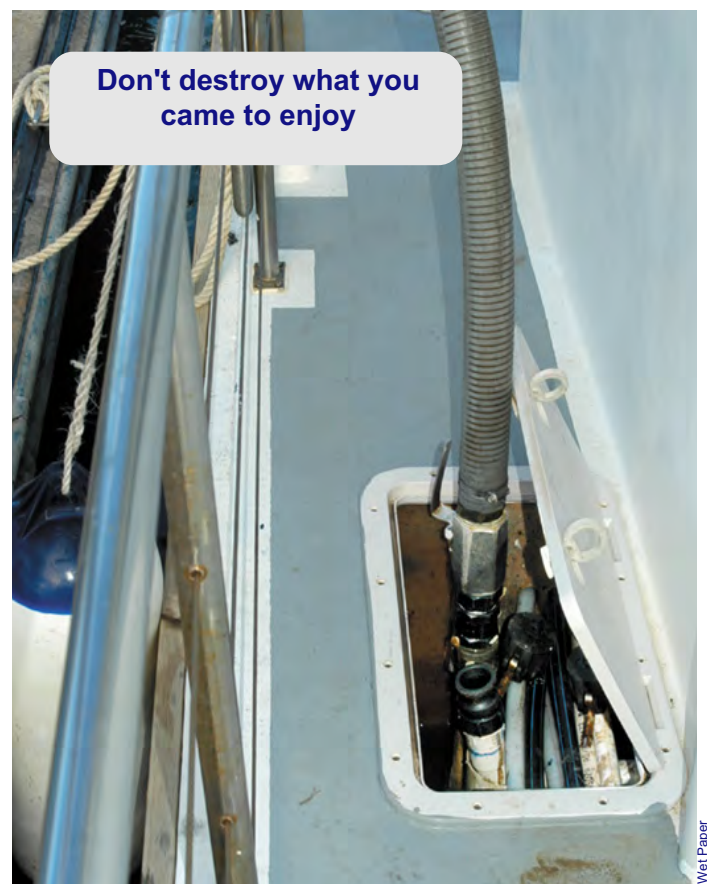


Figure 81.2 Pumping out sewerage at dockside from holding tank

State regulations

The web sites shown opposite will supply the latest information on the regulations that affect you as a boat owner and operator. Regulations are usually under the following headings:

Forms, licence or ticket, vessel identification, annual registration, sale and purchase, trailer, State water limits, safety requirements, marine incidents, blood alcohol and drugs, noise, marine parks, pollution and exotic weeds.

New laws in New South Wales has meant that there are many options for boating - See www.lifejacketwearit.com.au

Forms

On the web sites in Figure 83.1 there will be forms to download. For example in NSW the following are available:

Initial Boat Registration; Transfer Registration; Commercial Vessel Registration; Recognition of Registration (Interstate/Overseas visitors); Registration Label; Registration Numbers; Personalised Vessel Registration; Safety Label; Safety Equipment Table; Hull Identification Number (HIN); Boat Registration Forms; Boat Registration Fees; Change of Address; Online Renewal Payment.

Marine licence/ticket

Each Australian State has their own requirement which can be found at the web sites listed for each State. In all states you can get either your licence through a private provider or on line. Some states require a logbook eg TAS and NSW. Figure 83.2 shows an example of the WA Recreational Skippers Ticket.

Vessel and trailer identification

Numbers and letters

Boat registration is usually associated with a boat with a motor. The N and Q at the end of the boat registration in Figures 83.3 and 83.4 indicate the boat is registered in New South Wales and Queensland as a recreational vessel. In Western Australia every recreational boat that has a motor, or can be fitted with one, must be registered with the Department of Transport.

Some boats are exempt and some non powered craft are required to be registered so the best way is to check the web sites in Figure 83.1.

Boat codes and HIN's

In some states, eg WA, a boatcode provides the means to identify a boat using its Hull Identification Number (HIN) in order to deter theft and dishonest sales practices.

Annual registration

In some states boat registration label is used to identify that the owner has paid the required fees. These are usually charged annually and are used by Governments to raise revenue to improve boating facilities.

State water limits

Each State web site defines areas of operations where different types of equipment needs to be carried (See Figure 83.1 for sites). For example:

- Queensland, waters are defined as smooth, partially smooth or beyond partially smooth (see inside back cover). You can find these in brochures from Queensland Transport offices, the tide table or on the web www.msq.qld.gov.au
- New South Wales, "Enclosed waters" means any port or inland waters eg creeks, rivers, lakes estuaries, harbours and dams. "Open Waters" are all other waters eg offshore.
- Victoria identifies Coastal offshore > 2nm from coast, coastal inshore <2nm from coast, Enclosed (Bays and Estuaries) and Inland (Rivers and Dams).
- In South Australia there are protected, semi and unprotected waters.
- In Western Australia protected waters are lakes, rivers, inlets and estuaries, then areas of operation either 0-2, 2-5 or over 5 nautical miles from the mainland shore.

Discharge of boating safety obligation

To discharge your safety obligation as a skipper an RMDL holder must ensure the boat is safe, properly equipped and operated in a safe manner.

State Government web sites

Qld: www.msq.qld.gov.au

NSW: www.maritime.nsw.gov.au

Victoria: www.transportsafety.vic.gov.au

SA: www.sa.gov.au

WA: www.transport.wa.gov.au

Figure 83.1 State Government web sites



Figure 83.2 WA Recreational Skippers Ticket



Figure 83.3 A logbook required for NSW licence



Figure 83.4 Recreational boat registration

Safety equipment

Safety equipment required by each State is shown below. All other details can be found on the States Marine Safety web site.

Stowage of safety equipment

The owner or master must give each person on board information about where the safety equipment is kept. Information may be given orally, in a demonstration or printed on a sign. Persons on board must know where the safety equipment is kept and be able to locate it in a timely manner.

Life jackets

Life jackets or PFDs must be clearly visible while a person is on board; or kept in a place readily accessible and indicated by a clearly visible sign with a white background marked with the word 'life jackets' in red letters or a red background with white letters.

Everyone on board the boat must wear an appropriate size and type of PFD during a bar crossing.

Owner of the vessel

The owner of a recreational boat must verify that a person who is to be the master of the boat holds an appropriate licence to operate that boat. Towing people such as skier behind a boat Apart from ensuring the skier is wearing the correct PFD, the safety actions required of a skipper require a competent observer on board, 12 years or older who should be watching the skier or towed person at all times.

| QUEENSLAND Safety equipment requirements by regulation | | | |
|---|---|---------------------------------------|---|
| Equipment | Smooth Water | Partially Smooth Waters | Open Waters |
| 406 MHz EPIRB (Emergency Positioning Indicating Radio Beacon) Must be registered with AMSA and registration sticker attached | | | All boats (including nonregistrable) operating in these limits when more than 2 nautical miles from land. |
| SIGNALLING DEVICE e.g waterproof buoyant torches, fluorescent light, lanlen and cyalume stick | All boats between sunset and sunrise. | All boats between sunset and sunrise. | All boats between sunset and sunrise. |
| PFD'S / LIFEJACKETS One of the appropriate size for each person (12 months & over) on board, except if the person is wearing an inflatable diver jacket and wet suit. | PFD types 1, 2 or 3. Except in rivers, creeks or streams, waters contained within revetments if the boat has grab lines/rails and a certificate of positive flotation | PFD types 1 or 2 | PFD type 1 |
| FIRE FIGHTING EQUIPMENT Capable of extinguishing a fire quickly | All boats over 5m | All boats over 5m | All boats over 5m |
| V SHEET | | All boats | All boats |
| FLARES | | 2 red hand held and 2 orange flares | 2 red hand held and 2 orange flares |

| VICTORIA Minimum safety equipment requirements for mechanically powered craft | INLAND (rivers, lakes & dams) | ENCLOSED (bays, and estuaries) | COASTAL INSHORE (<2nm from coast) | COASTAL OFFSHORE (>2nm from coast) |
|--|-------------------------------|--------------------------------|-----------------------------------|------------------------------------|
| PFD (per person on board/towed) | Type 1, 2 or 3 | Type 1 | Type 1 | Type 1 |
| Approved Fire Extinguisher | √ | √ | √ | √ |
| Waterproof buoyant Torch | 1 | 1 | 1 | 1 |
| Anchor and chain or line or both | | 1 | 1 | 1 |
| Baler (if no electric or manual bilge pumping system) | 1 | 1 | 1 | 1 |
| Bucket with lanyard (can also double as a baler) | 1 | 1 | 1 | 1 |
| Bilge pump – electric or manual (if vessel has covered bilge or closed under floor compartments) | 1 | 1 | 1 | 1 |
| Pair of oars with rowlocks or pair of paddles (if vessel is up to and including 4.8 metres) | 1 | 1 | 1 | 1 |
| Hand held orange smoke signals | | 2 | 2 | 2 |
| Hand held red distress flares | | 2 | 2 | 2 |
| Lifebuoy (if vessel more than 8m but less than 12m in length) | 1 | 1 | 1 | 1 |
| Lifebuoy (if vessel more than 12m in length) | 2 | 2 | 2 | 2 |
| Dinghy or life raft (if vessel more than 12m in length) | | | 1 | 1 |
| Compass | | | | 1 |
| Marine radio Operator Certificate required if carrying VHF | | | | 1 |
| Red star parachute distress rocket | | | | 1 |
| 406 MHz EPIRB. Must be registered with AMSA | | | | 1 |

Speed limits

In boating areas maximum speed limits apply. Check your State Web site for details.

Noise

People who live on boats generally like to get to sleep early as they may have to sail with an early tide. Noise also disturbs wildlife and as a general guideline for all boats including PWC's the maximum level for engines is 85 dB at 30 metres away. Local laws now control curfews and noise. Details about these can be found from State Government Environmental Agencies.

Avoiding infringements

There are penalties for infringements of the boating laws. The bigger the infringement, the bigger the fine.

Local regulations change

Some examples of rules that can change include:

- Local rules such as water ski areas and fishing zones;
- Specific areas for pollution management;
- Safety gear and designated use;
- Navigation for ferries and bridges.

Compulsory and recommended

Most States have a list of compulsory and recommended equipment. Its always better to carry more than the required amount if your trip include an extended plan.

USE WEB REFERENCES ON THE INSIDE COVER FOR THE LATEST REGULATIONS

| QUEENSLAND Safety equipment recommendations | | | |
|---|--|--|--|
| Equipment | Smooth Water | Partially Smooth Waters | Open Waters |
| NAVIGATION and Marine Radio Eg Navigation chart or map, liquid damped compass, or other direction finding equipment | All boats | All boats | All boats |
| PUMPING BAILING Under 5 m suitable bailing equipment, 5-8m Bilge pump 45 L per min, Over 8m, 70 L per min | All boats | All boats | All boats |
| ANCHORING Under 5 m cable chain or rope. Over 5m Cable can be chain of 2m at least to anchor and rope | Under 5m 1 Anchor with 18m cable 5-8m 1 anchor with 27m cable Over 8m - 2 anchors with 37m cable | Up to 8 m 1 Anchor with 27m cable over 8m - 2 anchors with 37m cable | Up to 8 m 1 Anchor with 27m cable over 8m - 2 anchors with 37m cable |
| DRINKING WATER Sufficient for everyone on board for the trip quickly | All boats | All boats | All boats |
| Manual propulsion Oars and paddles | Under 6m | Under 6m | Under 6m |

| NSW Safety equipment requirements | | |
|--|-----------------|---------------|
| EQUIPMENT | ENCLOSED WATERS | OPEN WATERS |
| PFD (Approved Type 1, 2 or 3) | 1 per person | |
| PFD Type 1 | | 1 per person |
| Anchor and chain/line | 1 | 1 |
| Bucket/Bailer (vessel with open bilges) or Bilge Pump (vessels with covered bilges) | 1* | 1* |
| Magnetic compass | | 1 |
| Distress signal - orange hand held distress flare | | 2 |
| Distress signal - red hand held distress flare | | 2 |
| 406MHz EPIRB (required if two nautical miles or more offshore) | | 1 |
| Fire bucket (if no bailing bucket carried suitable for fire fighting) | 1 | 1 |
| Fire extinguisher (vessels with electric start, electric motors, gas or fuel stoves) | 1* | 1* |
| Map/chart of area (paper not electronic) | | 1 |
| Marine radio (required if two nautical miles or more offshore. (Operator Certificate required if carrying VHF) | | 1 |
| Paddle or oars/rowlocks in vessels under 6 metres unless a second means of propulsion is fitted | 1 | 1 |
| Safety Label | 1 | 1 |
| Sound signal (air horn/whistle/bell) | 1 | 1 |
| V Sheet (orange) | | 1 |
| Drinking water | | 2L per person |
| Waterproof buoyant torch | 1 | 1 |

Boating accidents and incident reports

Any accident or incident must be reported to the state waterways regulatory authority. This is generally within 24 - 48 hours and the appropriate forms completed.

Common reportable incidents

(Note these are Qld regulations)

A marine incident is classified as an event causing or involving:

- the loss of a person from a ship
- the death of, or grievous bodily harm to, a person caused by a ship's operations
- the loss or presumed loss or abandonment of a ship
- a collision with a ship
- the stranding of a ship
- material damage to a ship

Blood alcohol limit

The skipper must have a blood alcohol limit of less than 0.05, the same rules as on the road. The skipper is also responsible for the safety of the passengers and should be responsible for their alcohol consumption.

Skippers of recreational boats should also be aware that, when their boat is anchored, it may still be considered to be used for navigation, and the blood alcohol limit applies.

| Safety equipment required Western Australia | Protected Waters lakes, rivers inlets and estuaries except Lake Argyle | 0-2 Nautical Miles from the mainland shore | 2-5 Nautical Miles from the mainland shore | Over 5 Nautical Miles from the mainland shore |
|---|--|--|--|---|
| Recreational skippers ticket The skipper of a recreational vessel, powered by a motor greater than 6hp (4.5kw) must hold a RST | ✓ | ✓ | ✓ | ✓ |
| Bilge pump or bailer All vessels must carry a bilge pump. Vessels under 7 metres may carry a bailer in lieu of a bilge pump. | ✓ | ✓ | ✓ | ✓ |
| Fire extinguisher Vessels with an inboard engine or carrying hydrocarbon heating or cooling appliances must carry an approved fire extinguisher | ✓ | ✓ | ✓ | ✓ |
| Anchor and line An efficient anchor and line must be carried | — | ✓ | ✓ | ✓ |
| Life jacket A life jacket bearing the label PFD Type 1 or the Australian standard AS152 or AS 4758 — Level 100 (or higher) must be carried for every person on board | — | ✓ | ✓ | ✓ |
| EPIRB (in date) A 406 MHz EPIRB registered with AMSA bearing the standard AS/NZS 4280.1 must be carried if proceeding more than 2 nautical miles from the mainland shore | — | — | ✓ | ✓ |
| Parachute flares A minimum of two parachute flares must be carried if operating more than 5 nautical miles from the mainland shore or more than 1 nautical mile from an island located more than 5 N miles from the mainland shore | EXAMPLE | — | — | ✓ |
| Marine radio A marine radio must be carried if operating more than 5 nautical miles from the mainland shore or more than 1 nautical mile from an island located more than 5 N miles from the mainland shore. The radio can be 27MHz VHF | — | — | — | ✓ |

USE WEB REFERENCES ON THE INSIDE COVER FOR THE LATEST REGULATIONS

The limit does not change unless the boat is securely moored in a marina, to a jetty or wharf or on a swing mooring.

In Victoria there is a zero level for a person under the age of 21. Check your State regulations for the most current rules.

Marine Parks

Australia has created a system of marine national parks and smaller marine sanctuaries. These parks and sanctuaries now protect part of Australia's coastal waters, safeguarding important marine habitats and species, significant natural features, cultural heritage and aesthetic values. There are also regulations that apply to commercial and recreational fishing as well as the protection of dolphins and whales on migratory routes from Antarctica.

For information on regulations see your State's Marine Parks web site, Marine Safety Office or fishing tackle shop. Here are some web references that may help as well, or just google marine park regulations for your State.

www.environment.gov.au/coasts

www.environment.nsw.gov.au

www.gbrmpa.gov.au

Heritage wrecks

Any ship that sank more than 75 years ago is protected by State and Commonwealth regulations and protected zones have been declared around fragile and historic Australian shipwrecks.

It is an offence to enter an historic ship protected zone which includes anchoring on or removing objects from the wreck.



Figure 85.1 Marine park sign in Queensland

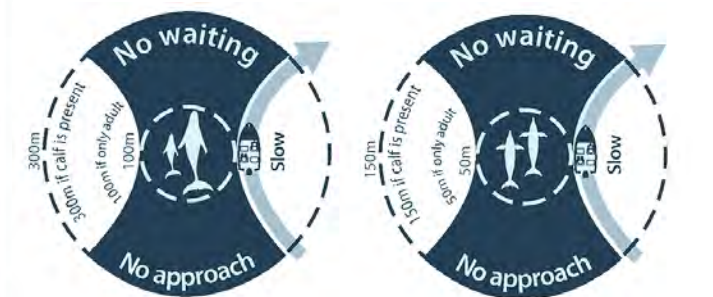


Figure 85.2 Example of safe distances for whales (L) dolphins (R) in Victoria

Victorian Marine Parks

Transfer of exotic weeds

Aquarium plants and exotic weeds can enter the sea from waterways and homes so remove all plant fragments from trailers and propellers, put in a plastic bag and dispose of in the household rubbish. Marine incidents can be reported to State Government department EPA offices or the police.

WORKSHEET 20 COMPLYING WITH YOUR STATE REGULATIONS

Q1. Identify the type of licence or ticket required in your State to operate a powerboat and the conditions imposed on it.

Q2. Describe the speed limits for your State and the variations that may apply in your local area.

Q3. Identify the requirements for boat registration and identification in your State.

Q4. Identify the water limits in your State and those in your immediate area.

Q5. Explain how far do you have to stay away from swimmers in your State.

Q6. Identify the reportable incidents for your State and when they have to be reported.

Q7. Account for the boat safety equipment for your State the table below.

| Item | Required | Details of water limits |
|---------------------------|----------|-------------------------|
| Bilge pump | | |
| Fire extinguisher | | |
| Anchor | | |
| Life jacket | | |
| Flares red/orange | | |
| Flares parachute | | |
| Pumping/bailing equipment | | |
| Navigation equipment | | |
| Drinking water | | |
| Manual propulsion | | |
| EPIRB | | |
| Other | | |
| | | |

WORKSHEET 21 YOUR BOAT'S COMPLIANCE



Summarise the equipment and labelling for your boat in your State in the box below.

State

Vessel's name

Registration numbers, size, visibility and location

Registration label location and expiry date

Call sign (if radio fitted)

Carrying capacity label or builders plate location and number of people the boat can carry

Range of vessel (where the design will allow the boat to go and the type of crew required)

Fuel tank volume and maximum range

Safety equipment on board, location (how stowed for easy access), condition and expiry dates (if applicable)

Emergency contacts

Maintenance tasks to be carried out, on what, when and by whom

CHAPTER 8 EMERGENCIES

Make an emergency stop

(or controlled stop at 5 knots)

Hazards

- The vessel - Losing control and swamping or flooding vessel, crew injury caused by things moving about, personal injury
- Waves - Person overboard, swamping vessel over transom
- Other vessels - Collision, persons overboard, hull damage
- Objects in the water - Hull damage

Control measures (safety precautions)

- Make sure everything is secure so nothing comes loose to injure you're crew.
- Warn crew of your intentions and do not perform the skill until there is no chance of a collision with another boat.

This does not work well in all boats. In some it is easier just to cut the power, eg, in multi-hulled boats.

- Keep one hand on the throttle and the other on the steering wheel at all times.
- Where the helm is mounted on the stern, keep one hand on the throttle and one on the gunwale.
- All occupants should be in their seats and have a secure grip on the boat.
- As a boat rolls in a tight turn, it always slides sideways. There is a risk in some boats of the boat's wake coming over the transom.

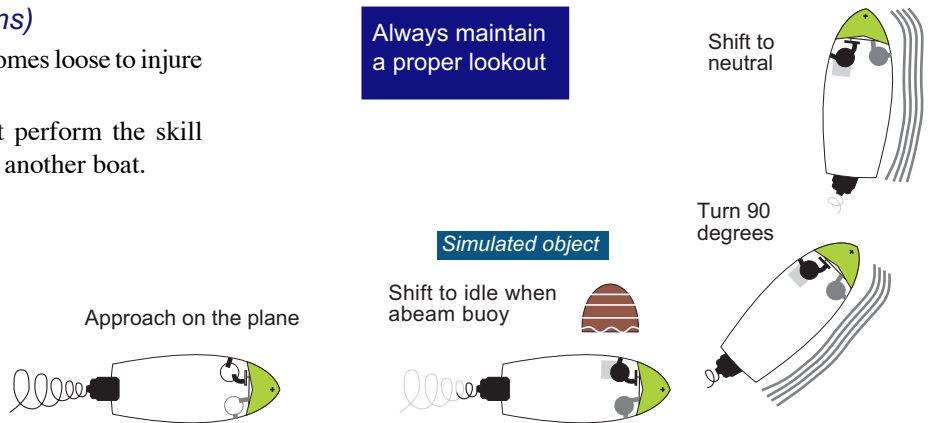
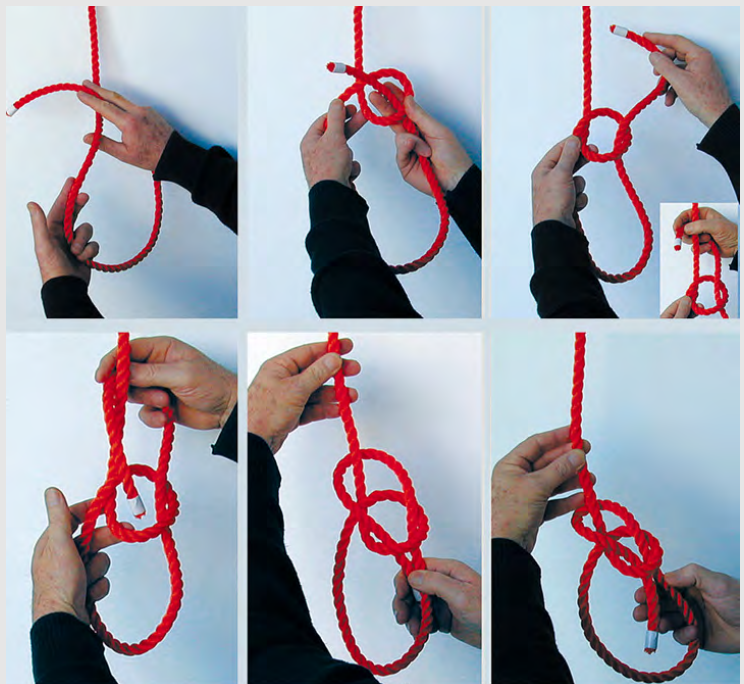


Figure 88.1 Emergency or controlled stop
Wet Paper

PRACTICAL TASK: Tie a bowline

Tie a bowline in a length of rope

- This knot can be used for making a loop for a mooring, attaching warps to boats, tying equipment in a boat, or just for making a loop at the end of a rope that will not slip.
- To tie this knot, take a loop in the rope end (sometimes called a *rabbit hole*). Now pass the free end up through the loop (sometimes called *up the rabbit hole*).
- Then pass the free end around the rope end (or *around the tree*) and finally back through the loop (*back through the rabbit hole*).
- If you are going to use the knot for throwing around a pylon, make the loop big enough to throw it around the pylon.
- Don't forget to secure the mooring line to a strong fitting on the gunnel ie a cleat or cross bollard, before throwing the mooring line.



PRACTICAL TASK: Perform a controlled stop at 5 knots

Using the web reference below, demonstrate to your examiner that you can perform a controlled stop at 5 knots by

1. Checking that it is safe to perform the controlled stop.
2. Shouting an appropriate warning to crew.
3. Reducing engine revs and engaging neutral.
4. Engaging reverse using appropriate revs to stop vessel.
5. Stopping the vessel within two boat lengths.

Web page reference

<http://www.wetpaper.com.au> - Resources



Towing

This involves making a towing bridle with a bowline.

Notes

- Knots used in this activity will be under great strain, so its best to tie to the strongest part of the vessel.
A small cleat would be of little use under strain.
- In towing, the bowline is a knot that under strain and needs to be undone easily.
- You **must** have knife at the ready to cut the tow rope in case of emergency.

WARNING: When towing a surfer or people on a tube, make sure you allow enough room for the turn. Tragic deaths have occurred recently because the driver flipped the people being towed onto the bank killing them instantly.

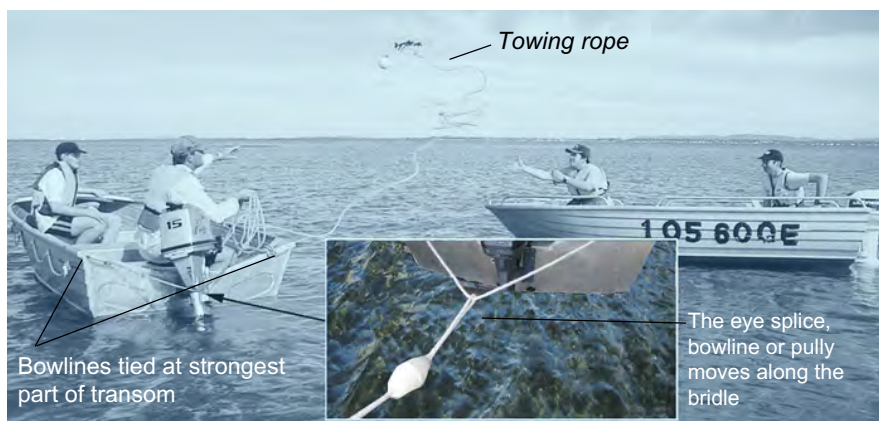


Figure 89.1 An improvised towing bridle made up of approx 1.5m rope tied at strongest part of transom corner and a bowline at the end of a towing rope.

Hazards (safety precautions)

- Towing line - Wraps around prop of towing vessel damages motor, could break causing sudden instability in both vessels
- Waves - Swamping of either boat from wash from other vessels
- Bridle - If not working correctly, vessel could be broached
- The boat and lines - Hands or fingers crushed while tying bowline to secure a vessel

Control measures (safety precautions)

- Take about 1.5 m of rope, and thread a pulley through the rope to make a bridle. If a pulley is not available, take one end of the towing rope and tie another bowline, (Figure 89.2), so it can traverse the bridle during towing.
- Now secure each end of the 1.5 m rope (the bridle) to the strongest part of each side of the transom with another bowline.
- Now coil the rope and throw your towing line to the other vessel.
- Warn passengers of risks and monitor towline at all times.
Try to avoid being in line with the tow line under strain. If it breaks it can whip back. Use the knife to cut the tow if either vessel endangers the other, eg one is sinking, broaching.
- Position the weight towards the stern in the boat being towed to avoid broaching.
- Towing should be at a slow speed depending on conditions. The towing vessel must have an observer watching the vessel being towed.
- Leave the motor down to help steer the boat and provide a little drag thereby keeping the tow line taut.
- You **must** have knife at the ready to cut the tow rope in case of emergency.



Figure 89.2 Bowline secures other boat

Safety note

You **must** have knife at the ready to cut the tow rope in case of emergency.

Sailing boats

Tow the same as a power boat, but use the mast low down, near the deck or base to attach the tow line.

Wrap the line around the mast twice with a lighterman's hitch.

Do not tie off as you may have to let go at any time.

Reference:

<http://www.animatedknots.com>

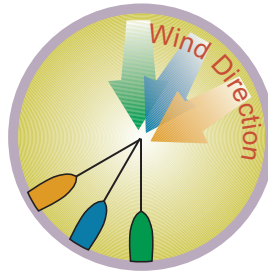


Figure 89.3 Towing

Anchoring

Hazards

- Seafloor - Environmental damage to seagrass beds, coral, anchor drags/breaks - loss of boat, entanglement causing crew injury or person overboard
- Other boats - Damage to other boats in anchorage
- Anchor chain, ropes - Burns, cuts, abrasions to hands



Be aware that the boat will swing downwind of current from the anchor.

Allow swinging room when anchoring.

Control measures (safety precautions)

- Identify a safe place in accordance with prevailing and forecast conditions and in accordance with relevant legislation, regulations and rules.
- Select the right anchor from those in Figure 90.3. For most tinnies and smaller vessels, you have a choice of a rock pick or a danforth (mud or sand).
- Lower, set and monitor the anchor according to prevailing conditions.
- Assess the conditions of wind, wave and current to determine the most favourable approach.
- Estimate the swing circle of the vessel with regard to prevailing and anticipated conditions and considering water depth, wind and current conditions (Figure 90.1).
- Identify marks on your anchor rope that denote length.
- Determine the depth and bottom conditions and calculate the amount of rope to lay out.

Figure 90.1 Be aware that the boat will swing downwind of current from the anchor.
Wet Paper

Setting an anchor

- Set an anchor by:
 - Motoring up into the wind or tide just ahead of your chosen spot, lower the anchor.
 - Laying out the required length until the anchor strikes bottom (Figure 90.4).
 - Setting out at least 5 times the distance to the bottom.
 - Securing your anchor line to a cleat.
 - Motoring gently in reverse so the anchor digs in.
- Checking to see if you are moving by:
 - lining up and keeping two points in transit; feeling the anchor rope.

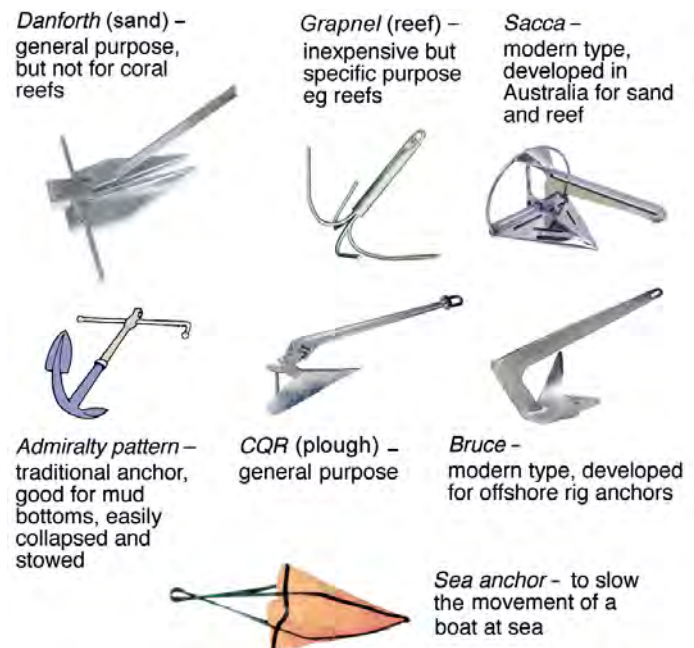
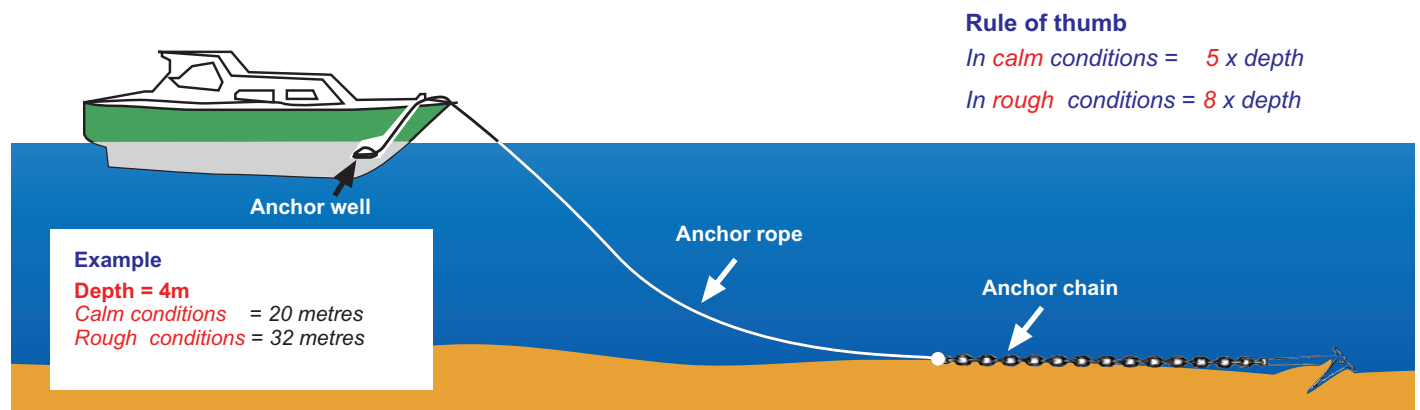


Figure 90.2 Anchor types
Wet Paper

Note: If chain is used instead of rope, the amount needed is reduced.



Rule of thumb

In calm conditions = 5 x depth

In rough conditions = 8 x depth

Figure 90.3 Anchoring calculations

Wet Paper

- In a crowded anchorage, always anchor in a similar fashion as the boat next to you or the two boats may drift into each other.
- Legislation - Check charts for places where you can anchor. Most use the symbol shown above to mark where you can anchor.

Good anchorage

- A good anchorage is protected from wind and waves and swells, enough depth at low tide along the full swing of the anchor and line and enough space along the full swing for a change in tide and a good bottom which will hold an anchor.
- A double sheet bend is a useful knot to use when joining anchor ropes of different sizes (Figure 91.1).
- On a reef edge, make sure that as the tides comes in your anchor does not swing free. See Figure 91.3.



Figure 91.1 Anchorage symbol and double sheet bend



Raising the anchor

Control measures (safety precautions)

- Raise the anchor by
 - Motoring up to it, feeding the rope into the anchor locker as you get closer.
 - Dislodging the anchor by giving it a strong pull or a small push forward with the motor.
- Always use the stem (or strongest part of the boat) when using engine power and never the stern (you will sink the boat).
- Use the anchor windlass system on a larger boat.

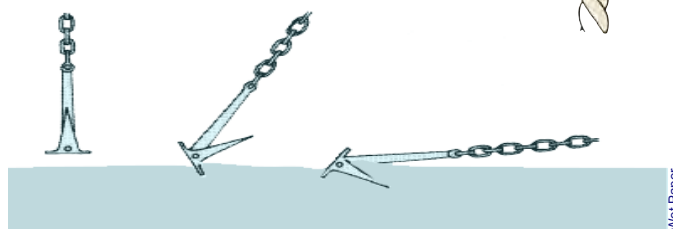


Figure 91.2 How an anchor works

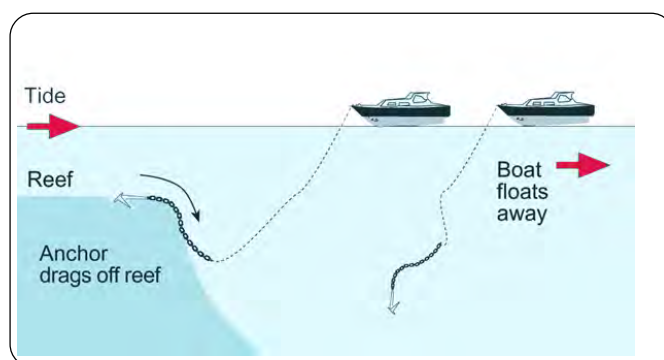


Figure 91.3 Be careful of anchors on reefs

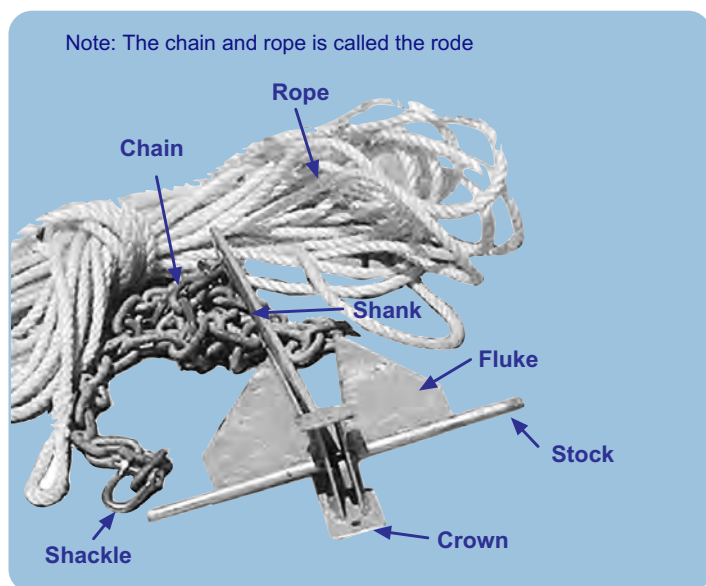


Figure 91.4 Inspect the shackles, chain and ropes for damage.

Wet Paper



Figure 91.5 Anchor windlass and anchor system on larger boat

Wet Paper

Wet Paper

Marine Safety Queensland

PRACTICAL TASK: Set anchor

- [] Approach to stop, appropriate to wind, tide and location of any obstructions
- [] Direct crew to lower anchor and chain - not "throw"
- [] As anchor reaches the bottom, commence slow stern to lay out chain
- [] Stop and have anchor line secured at appropriate depth, considering factors such as wind, tide, sea state and obstructions
- [] Slow astern again to test anchor secure

PRACTICAL TASK: Raise anchor

- [] Move slow ahead towards anchor position
- [] Have the crew
 - [] Guide helm to anchor position using signals for direction and stop
 - [] Recover anchor line as the vessel moves forward
- [] When over the anchor, bring the rest of the line, chain and the anchor to the side of the vessel
- [] Check that the anchor is free of sediment before bringing aboard and clean if necessary
- [] Secure the anchor and stow the chain and line
- [] Move the boat clear of the area

Rescue a simulated man overboard

Hazards

- Other boats - Collision (in a narrow channel)
- The boat - Losing control and swamping/flooding vessel
- Boat hooks, props - Injury cause, lines fouling propeller, crew injury caused by things moving about

Control measures (safety precautions)

- If possible turn the tiller or wheel so as to swing the stern away from the person and throw something that floats into the water to mark the spot.
 - If this happens at night throw a waterproof torch overboard.
 - If a GPS is available, press the “man overboard” button.
- Instruct the crew to watch and continue to point to “the person” all the time until rescue is complete.
- Turn the boat around safely and head back towards “the person” and nominate your approach side. Allow at least three boat lengths.
- When nearing “the person” bring the boat up into the wind (or into the current if it is stronger than the wind).
- Once you have contact with “the person” in the water cut the motor. If this could endanger the vessel then go into neutral and don't cut the motor (the type of situation that determines this action is a lee shore, bar crossing, very rough weather or if there is a problem in restarting the motor).
 - If the boat is a small dinghy, retrieve “the person” over the stern, so as to avoid capsizing the boat.

If conditions permit - turn off the motor. If not care should be taken not to injure “the person” with the prop.
 - For other boats retrieve “the person” at the side of the boat.

If there is difficulty getting “the person” on board rig a rope (the anchor line will do if nothing else is available) by tying it onto the boat at bow or stern and allowing the bight to fall into the water where it can be used as a step to assist recovery.

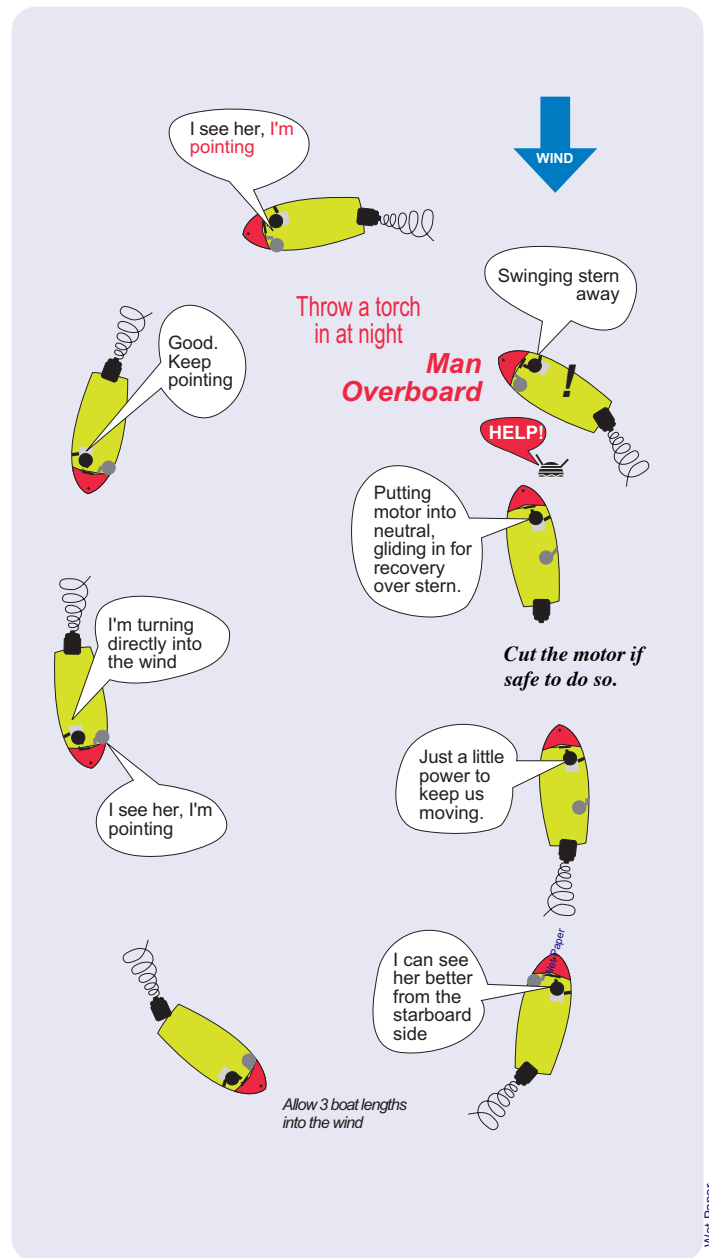


Figure 92.1 Simulated person overboard

PRACTICAL TASK: Safely retrieve man overboard

You need to understand how to manoeuvre the vessel competently to retrieve a simulated ‘man overboard’. After checking that it is safe to do so the assessor will throw overboard an object (buoy) to which you *must respond* and perform a retrieval of the object (with boat hook) using a ‘man overboard’ procedure.

Recommended practical assessment

Competency criteria

1. Turns the vessel towards the ‘man overboard’.
2. Simulates the throwing of a flotation aid.
3. Ensure a visual watch is maintained on the ‘man overboard’.
4. Completes turn so as to retrieve person from down wind/current.
5. Approaches at an appropriate speed.
6. Stops vessel down wind/current of ‘man overboard’.
7. Stops engine before retrieving ‘man overboard’.
8. Retrieves the ‘man overboard’.

Web page reference

<http://www.wetpaper.com.au> - Resources



WORKSHEET 22 ANCHORING

Q1. Describe four factors that make for a good anchorage.

Q2. Describe how to drop and raise an anchor.

Q3. Describe how to anchor in a crowded anchorage to prevent damage to other boats.

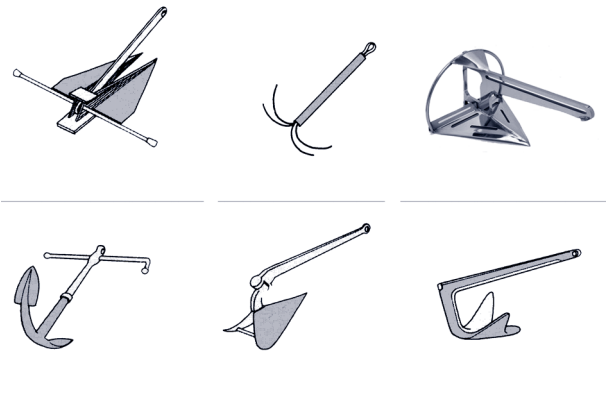
Q4. Identify how much anchor warp would you use in the situation opposite.



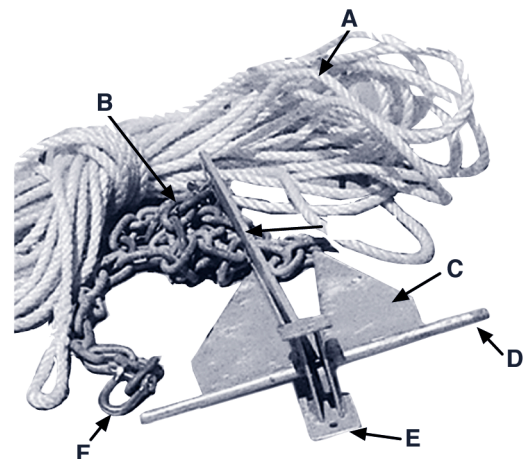
Depth 7 m
2 m tidal range
Moderate wind conditions
Wave height 1 m
Freeboard 1m

Q5. Identify the anchors shown in the illustration to the right and complete the information below.

| Anchor name | Use |
|-------------|-----|
| | |
| | |
| | |
| | |
| | |
| | |



Q6. Identify the parts of the anchor A - F in the diagram opposite.



Q7. Explain why shackles are moused.

WORKSHEET 23 FIRE FIGHTING

Read the information in the box below, then answer the following questions.

Q1. Describe four basic steps in using a fire extinguisher.

Q2. Explain what should you do if a fire occurs on a small boat.

Q3. Identify four common causes of fire on boats.

Q4. Explain what should you do if you see a boat on fire.

Fight a fire

Common causes of fire

- Engine backfiring in air laden with combustible vapour.
- Hot exhaust pipe igniting adjacent to combustible materials.
- On inboard boats, fuel lines can leak or rupture and spray fuel over hot exhausts.
- Spontaneous combustion of oil rags in badly ventilated compartments.
- A spark caused by static electricity during refuelling.
- Fuel vapours collecting in the bilge due to spillage during refuelling.
- Leaking LPG which is heavier than air and will find the lowest point in the boat - usually the bilge.
- Short-circuiting and overloading the electrical system.

Control measures (safety precautions)

- Have the correct fire extinguisher on your boat - your dealer will advise you of this.
- Keep the bilge and engine room clean and free of rags, newspapers and combustible materials.
- Regularly check that engine rooms are properly ventilated.
- Use only appliances such as stoves and heaters that are approved for marine.
- Never use cigarette lighters or matches while searching in lockers - use a battery powered torch.
- Check fuel systems at regular intervals for leaks and spillage.
- Any spare petrol should be carried in approved containers.
- Check the electrical system regularly for faults and keep all components clean as possible.

Emergency drill examples

- If a fire occurs on a small boat - quickly anchor the boat and jump overboard and swim away from the boat.
- If you hear an audible alarm on a bigger boat, eg a V8 petrol inboard engine, and see smoke coming from under the engine hatch you should turn the engine and the fuel supply off as a first course of action and then assess the situation.

Fighting a fire



- Raise the alarm (to others on board and to rescue association).
- Try to remove one of the elements in the fire triangle shown above.
- Manoeuvre the boat to operate with the least wind (generally downwind).
- If a burning object can be safely moved, get it over the side quickly.
- Shut off fuel lines and gas lines as soon as possible as these may collapse and add to the fire.
- If an outboard catches fire, flood the cowling with water from your bucket and if possible remove cowling and put out fire

LPG gas leaks and fires

- LPG is the most dangerous substance on boats if not handled correctly. Leakages cause suffocation and explosions.
- In the event of fire, remove LPG cylinders from the heat source or try to keep the cylinder cool by spraying water on it. If flames threaten to engulf the cylinder - evacuate the boat.
- Safe LPG gas practices include turning off all gas appliances when leaving the boat, check that appliance cocks are closed before opening the cylinder valve, turn the gas off at the cylinder before turning off the appliance, know the smell of LPG, check gas for cylinder gas leaks with bubbles of detergent water, install a gas detector.

Helping another boat on fire

- Be very careful of boats on fire and leave the fighting of fires to the experts. If you need to become involved maintain the safety of yourself and your crew as a first priority.

Electric installations

- Frequent fires and explosions on boats occur due to short circuiting. A check once a year by a qualified electrician is a good idea.

WORKSHEET 24 DEAL WITH ENGINE FAILURE

Read the information in the box below, then answer the following questions.

Q1. Identify three things that could happen if your cooling system became clogged.

Q2. Explain what could be wrong if your motor runs irregularly or misses.

Q3. Explain what could be wrong if your motor does not start.

Q4. Propose two things that could happen if your propeller was damaged,

Deal with engine failure

Re-read pages 13-17, as well as the following information and answer the questions below.

Outboard trouble-shooting chart

- Learn to distinguish the sound of a vessel not running normally by talking to other boaties and your local dealer
- Anchor your boat before attempting to carry out on water repairs
- Work under a waterproof cover to stop the ignition from getting wet

- Use the table below to identify engine failure causes if the motor,
 - does not start,
 - runs irregularly or misses,
 - starts momentarily and cuts out,
 - does not idle properly,
 - speed is faster /slower than normal,
 - does not develop normal boat speed,
 - overheats.
- Identify situations when to take it to the repair shop.

- A Motor does not start
- B Runs irregularly or misses
- C Starts momentarily and cuts out
- D Does not idle properly
- E Motor speed faster than normal
- F Motor speed slower than normal
- G Does not develop normal boat speed
- H Motor overheats

* Inspection should be performed by an authorised dealer

Note:

Replace two stroke fuel after three months and all other fuel after 6 months



| A | B | C | D | E | F | G | H | Possible cause |
|---|---|---|---|---|---|---|---|--------------------------------------|
| • | | • | | | | | | Fuel tank empty or vent screw closed |
| • | | | • | | | | | Motor is cold |
| • | | • | | | | | | Fuel line is not connected |
| • | • | • | • | | • | • | • | Fuel line pinched or kinked |
| • | • | • | • | | • | • | • | Fuel filter(s) in need of cleaning * |
| • | • | • | • | | • | • | • | Air leak in fuel system * |
| • | | • | • | | | | | Low speed mixture screw mal-adjusted |
| | | | • | • | • | • | | Wrong oil in fuel mixture |
| | • | | • | • | • | • | | Wrong petrol in fuel mixture |
| | | | • | • | • | • | | Not enough oil in fuel mixture |
| | • | | • | • | • | • | | Too much oil in fuel mixture |
| • | | | | | | | | Motor flooded |
| • | • | | • | • | • | • | • | Spark plugs fouled or defective |
| | • | | • | • | • | • | • | Wrong type spark plugs |
| • | | | | | | | | No spark * |
| • | • | • | • | | • | • | • | Weak spark or intermittent spark * |
| | | | | | • | • | • | Water pump failure * |
| | | | | | • | • | • | Cooling system clogged * |
| | | | | | • | • | | Propeller damaged |
| | | | | | • | • | | Tilt angle not correctly adjusted |
| | | | | | • | • | | Boat improperly loaded |
| | | | | | • | • | | Transom too low |
| | | | | | • | • | | Transom too high |
| | • | | | | • | • | • | Excessive spark advance * |
| | | | | | • | • | | Insufficient spark advance * |
| | | | | | • | • | • | Propeller of wrong pitch or diameter |

Courtesy Mainer Outboards

Use a radio

By law if you have a VHF radio fitted you are required to attend a marine radio course or sit a written test to obtain a marine radio operators certificate of proficiency (VHF or open).

Marine radios

Small boat operators use radios to obtain up-to-date weather forecasts, report arrival and departure times if going out to sea, listen to fishing details, communicate with shore stations and other vessels and listen to radio broadcasts advising of overdue vessels at sea.

VHF sets

This is the preferred radio for short range communications due to their better performance over 27MHz but require the operator to have a licence. All large boats and an increasing number of smaller boats monitor the emergency Channel 16. A marine radio is normally left on Channel 16 to receive incoming calls or monitor distress signals.

Frequencies

Areas with large boating populations usually have marine rescue stations monitoring Channels 16 and 67 on a 24 hr basis. Weather information is regularly broadcast on Channel 67. Most areas have a local 'chat' frequency or a common use re-broadcast frequency and Channel 73 is often used for this purpose.

Radio courses

These can be done at most VMR's, Coast Guards, TAFE's or on line, for example:

www.vhfradioonline.com

Controls

The following are the general controls that are found on most, but not all, radio transceivers.

- Channel selector. This control is used to select the channel or frequency that you wish to transmit or receive on.
- On/off and volume control. Turns the equipment on or off and controls the volume of signals coming from the loudspeaker.
- Squelch or mute control. Stops the constant and annoying background hiss or roar from the receiver. The correct setting is so that the hiss or roar just cannot be heard. Further rotation of this control will progressively desensitise the receiver.
- ISC switch. When activated it combines with a built in automatic noise limiter to eliminate electrical interference.
- Dual watch - found on most VHF receivers. On operation it will permit a listening watch on two different VHF channels. A light emitting diode (LED) will come on in some receivers when this control is operational.

Radio maintenance

- Battery fully charged and in good condition (see also page 10).
- Battery terminals clean and leads intact.
- Radio leads securely fixed to the battery.
- Antennae and microphone plugged in properly.

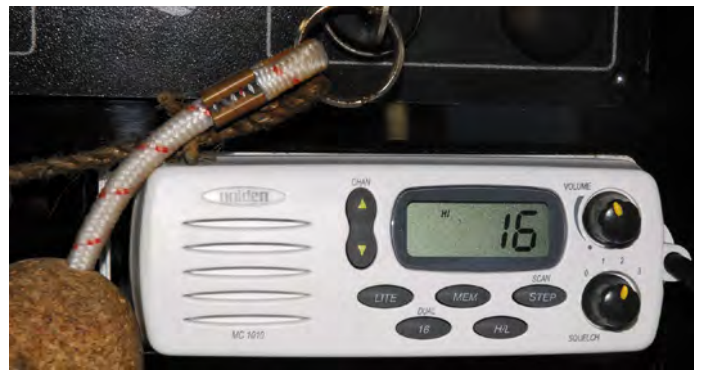


Figure 96.1 VHF sets are recommended these days due to their better performance (Photo courtesy UNIDEN)

27 MHz sets

27 MHz sets are so called because all of their channels are in the 27 megahertz band. The range of these sets is between 6 to 30 nautical miles but this can be reduced if one station is behind an island or atmospheric conditions are bad.

Since 27 MHz sets are extremely unreliable due to their low power VHF sets are preferred. If using a 27MHz set the quality of the antenna is important. Poor performance of a radio can often be attributed to a poor quality or badly adjusted radio antenna and interference from the motor.

Example of a radio check

Example of a radio check. Call on channels 16 or 88. Note in areas of poor reception say station identification three times

- Redcliffe Coast Guard, Redcliffe Coast Guard, this is Reef Seeker, Reef Seeker (OVER)
- Reef Seeker this is Redcliffe Coast Guard please switch to Channel 73.
- Redcliffe Coast Guard, this is Reef Seeker Reef Seeker, am going out boating today and wanting a radio check (OVER)
- Reef Seeker this is Redcliffe Coast Guard your signal strength is FOWER to FIFE (OVER)
- Redcliffe Coast Guard, this is Reef Seeker Reef Seeker, thank you (OUT)
- Reef Seeker this is Redcliffe Coast Guard (OUT)

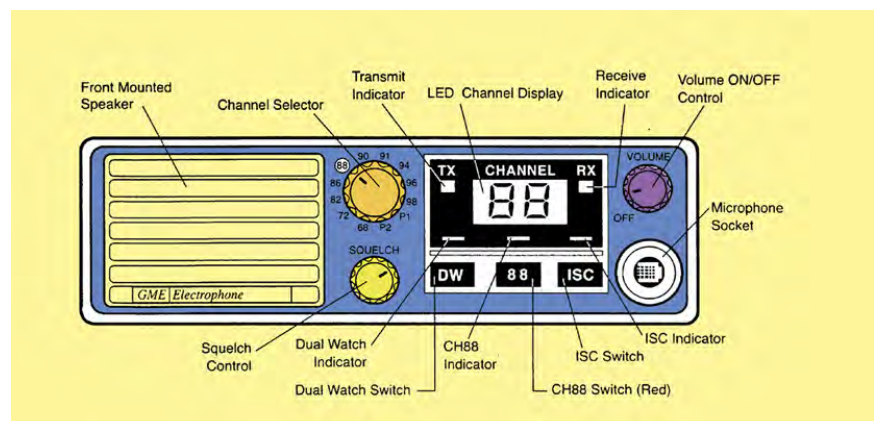


Figure 96.2 Common controls and functions (courtesy GME electrophone)

Radio use rules

- Keep your radio tuned to Channel VHF 16 or 27.88MHz.
 - You make a call on VHF 16 or 27.88MHz and then respond to the station change as requested.
 - When you hear a call acknowledge and then ask the caller to change to a working channel for your local area. You can get this information from your local VMR station.

This time has been reserved internationally as the time for the time a vessel in distress repeats calls.
- Listen before transmitting and follow the local area protocols.
- Do not transmit unnecessarily or allow children to play with the radio.
- Always use your call sign and the name of your boat for identification.
- Avoid interfering with other stations.
- For non distress messages, ask to switch to a "working channel" once you have contacted the other station.
- For distress messages, stay on channel VHF 16 or 27.88MHz or as directed by the local marine radio station.
- Keep your message brief and clear.
- Stop transmitting when requested to do so by a coast station.

Log on/off

By now you would have left a note as part of your predeparture routine, and its time to log on with the local voluntary marine rescue group by radio.

Log on by radio

Many VMRs have marine clubs where members pay a registration fee in case rescues are required.

As part of the registration many of the boat's details are kept and the description below is often shortened.

It is also a good idea to visit your local VMR and discuss their watchkeepers log.

Example

Here is an example - Call on channel 16 (VHF) or channel 88 (27MHz).

- *VMR 448 Mackay, VMR 448 Mackay, this is Tubby, Tubby. (OVER)*

VMR 448 Mackay, will come back and ask you to change to channel 73

- *VMR 448 Mackay, VMR 448 Mackay, this is Tubby Victor Lima One, Two, Three, Four, Tubby Victor Lima One, Two, Three, Four. Travelling to Saint Bees Island for days fishing Full tank of fuel. ETR one zero decimal three zero hours. 2 adults, 3 children on board. (OVER)*

VMR 448 Mackay will say you are logged in

- *VMR 448 Mackay, VMR 448 Mackay, this is Tubby, Tubby ROMEO to that (OUT).*

| PHONETIC | | Spoken as |
|----------|-------------|--------------|
| A | ALPHA | Al fa |
| B | BRAVO | Brah vo |
| C | CHARLIE | Char lee |
| D | DELTA | Dell tah |
| E | ECHO | Eck oh |
| F | FOXTROT | Foks trot |
| G | GOLF | Golf |
| H | HOTEL | Hoh tell |
| I | INDIA | In dee ah |
| J | JULIETT | Jew lee ett |
| K | KILO | Key loh |
| L | LIMA | Lee mah |
| M | MIKE | Mike |
| N | NOVEMBER | Novem ber |
| O | OSCAR | Oss cah |
| P | PAPA | Pah Pah |
| Q | QUEBEC | Keh bek |
| R | ROMEO | Rohme oh |
| S | SIERRA | See air rah |
| T | TANGO | Tang go |
| U | UNIFORM | You nee form |
| V | VICTOR | Vik tah |
| W | WHISKEY | Wiss key |
| X | X-RAY | Ecks ray |
| Y | YANKEE | Yank key |
| Z | ZULU | Zoo loo |
| 0 | Zero | |
| 1 | Wun | |
| 2 | Too | |
| 3 | Thuh-ree | |
| 4 | Fo-wer | |
| 5 | Fi-yiv | |
| 6 | Six | |
| 7 | Se-ven | |
| 8 | AIT | |
| 9 | Niner | |
| | DAY-SEE-MAL | |

Figure 97.1 Phonetic alphabet - used when transmissions are unclear

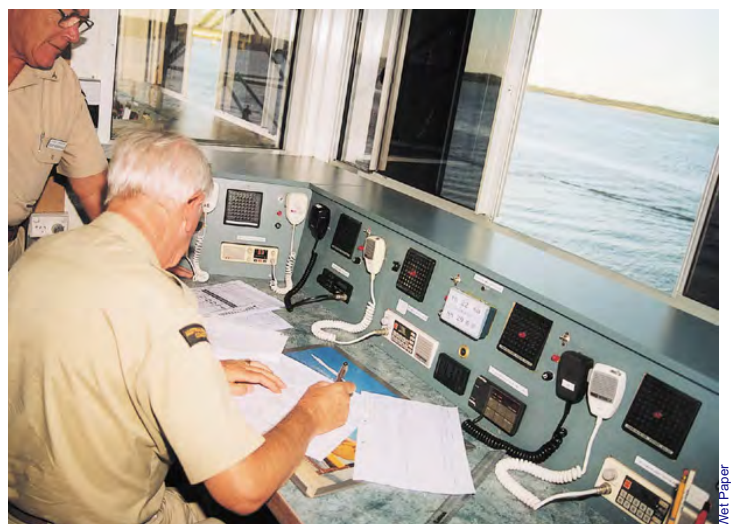


Figure 97.2 Log in to a VMR association

Distress signal - Mayday

A Mayday call denotes an emergency involving grave and imminent danger to life or a vessel. If a shore station fails to respond to the call, you should attempt to relay the message and render any assistance.

An example of a Mayday message could be:

MAYDAY. MAYDAY. MAYDAY.
This is Sea Witch Victor Lima One,
Two, Three, Four...Sea Witch Victor
Lima One, Two, Three, Four...This
is Sea Witch Victor Lima One, Two,
Three, Four...
MAYDAY. This is Sea Witch Victor
Lima One, Two, Three, Four...

Position 20 degrees 18 minutes
south, 150 degrees 23 minutes east.
Hull holed. Sinking. Four adults on
board. Abandoning into liferaft.
OVER.

MAYDAY Sea Witch VL1234, Sea
Witch VL1234, Sea Witch VL1234
This is
Mackay Radio VZ6789, Mackay Radio
VZ6789, Mackay Radio VZ6789
Received MAYDAY
in position 20 degrees 18 minutes
south, 150 degrees 23 minutes east.
Acknowledge you are abandoning to
liferaft.
Have you activated EPIRB?
Over



Figure 98.1 Example of a MAYDAY call

Wet Paper

Urgency signals - Pan Pan

An urgency signal indicates that the station sending it has a very urgent message to transmit concerning the safety of a ship or aircraft, or the safety of a person.

Urgency messages are sent on all distress frequencies and are identified by the words.

PAN PAN - PAN PAN - PAN PAN -

Note the following sequence:

- Pan Pan (three times)
- Hello all stations (three times)
- This is (name of vessel three times)
- Urgency message details (once).

The urgency message and the message following should be sent on distress frequencies (except for long messages or medical messages which should be sent on working frequencies).

- The message may be addressed to a particular station or to all stations.
- If addressed to all stations, the station sending the message must cancel it with the same identification when action is no longer necessary.

Safety signals - Securite

Safety signals are used when a station wants to pass information concerning safety such as navigational warnings or weather warnings and are identified by the word

SECURITE (spoken three times as SAY-CURE-E-TAY)

Here is an example of a safety signal:

Note the following sequence:

- Securite (three times)
- Hello all stations (three times)
- This is (once)
- Name of vessel (three times)
- Indication of channel, safety message follows - change channels
- Safety message, then out.

PRACTICAL TASK: Skipper advises of voyage plan, logs on and off

Demonstrate to your examiner that you can, in writing or verbally give correctly the vessel's name, registration number or call sign and how to advise of a safe return.

1. Vessel's name.
2. Registration number or call sign.
3. Departure point, time and estimated time of return.
4. Destination and trip intentions.
5. Number of persons on board.
6. Amount of fuel carried.

Web page reference

<http://www.wetpaper.com.au> - Resources



Note: If the vessel has no marine radio you may have to use either a mobile phone or write out a note and hand it to the instructor.

WORKSHEET 25 USE A RADIO

Q1. Identify the licence required to operate a marine radio.

Q2. Describe the frequencies a marine radio uses for distress and calling.

Q3. Quote an example of a radio check with a local VMR.

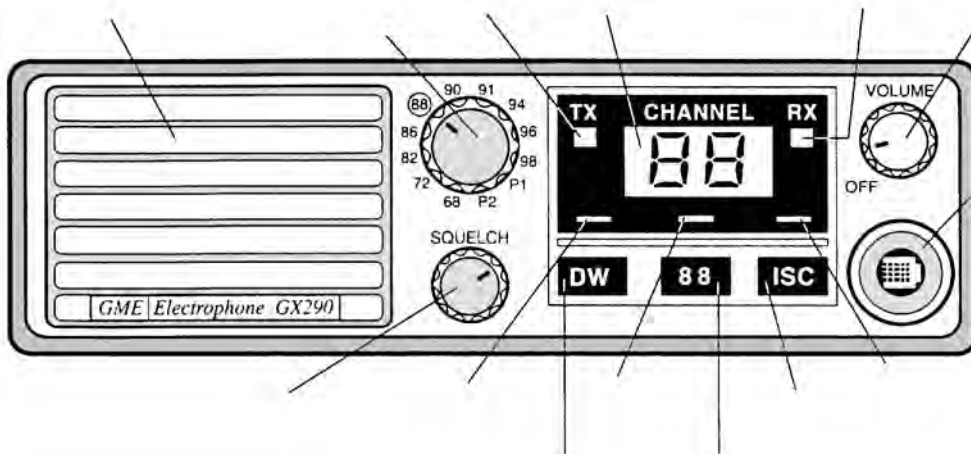
Q4. Explain when is a MAYDAY call is used and how is it different from a PAN PAN and SECURITE.

Q5. Quote a mayday call from the information on the previous page.

Q6. Explain why VHF sets are preferred over 27MHz sets.

Q7. Explain why it a bad idea only to rely on a mobile phone for emergency communications.

Q8. Identify some common controls and functions of the radio shown below.



WORKSHEET 26 ACTIVATE

SIGNALLING DEVICES

Read page 44, the information in the box opposite and answer the questions below.

EPIRBs

Q1. Explain what an EPIRB is and when should it be activated.

Q2. Describe which EPIRBs will not be supported after 2009.

Q3. Identify the correct EPIRB to buy after 2009.

Q4. Explain how do to activate a 406 Mhz EPIRB.

Q5. Explain why is it inadvisable to dispose of an EPIRB in the garbage bin.

Q6. Explain the significance of the terms - HexID and UIN.

Flares and other signalling devices

Read page 45-46 and answer the questions below.

Q1. Explain what a V sheet is and how should it be used.

Q2. Explain what parachute flares are and when should they be used.

Q3. Describe how to ignite a hand flare and when it should be used.

Q4. Identify which type of flare should be used at night and day.

How to activate

406 Mhz Manual type - make sure the EPIRB is vertical. Break the tamper seal and switch on. After three minutes a red light will flash indicating the EPIRB is transmitting.

Use

EPIRBs should only be used as a last resort. First use other communications or signalling equipment.

In the event of an emergency, communication should first be attempted with others close by using radios, phones and other signalling devices. Mobile phones can be used but should not be relied upon as they can be out of range, have low batteries or become water-damaged.

Expiry dates

EPIRBs have expiry dates and should not be kept past these.

Accidental activation

The most important thing to do is to switch off the beacon and notify the Australian Rescue Coordination Centre as soon as possible by calling 1800 641 792 to ensure a search and rescue operation is not commenced.

There is no penalty for accidental activation.

Storage

Store EPIRBs in an accessible place .

Note

Under new 2012 regulations, the Australian Maritime Safety Authority registration sticker for an Emergency Position Indicating Radio Beacon (EPIRB) must be affixed to the EPIRB.

Deal with a capsized, flooding or grounding

Capsize and flooding

A boat can be swamped if it has a low freeboard (area above the waterline). A low freeboard can be caused by overloading, incorrect load distribution or waves. If a boat capsizes;

- Make sure you can account for everyone.
- Have everyone on board put on their life jackets (if not already).
- Instruct people to grab hold of anything that is floating and stay with the boat.
- Attempt to turn the boat upright by grabbing the keel and rolling it towards you.
 - As the boat turns, grab hold of the gunwale and continue to roll the boat until it is upright.
 - Instruct all crew to get back on board and attempt to bail it out or paddle it to shore and above all never leave the boat.

Abandon ship

If this occurs, everyone must be wearing a PFD lifejacket before entering the water. Then huddle together, maintain body heat and use as little energy as possible while awaiting rescue.

- The distress signal MAYDAY needs to be sent.
- Your EPIRB if carried, must be activated.
- Distress flares are let off only if they are likely to be seen.
- It is essential to stay with the boat unless there is an uncontrollable fire or the boat sinks.
- The HELP (heat escape lessening posture) minimizes the heat loss from the head, sides of the chest and groin areas as shown in Figure 101.4. If you are wearing a PFD1, you need to lean back on your head support to stop rolling face down.
 - If you can find anything that floats, hang on to it.

If you entwine your legs as shown in Figure 101.4, heat loss can also be reduced. Above all you need to maintain your spirits and conserve your energy.

Hypothermia

Treatment

- If possible, remove the patient from the elements and into dry shelter. Remove any wet clothing and replace with warm, dry clothing or blankets and warm the patient gradually to avoid the onset of dangerous heart rhythms.
- If the patient is able, encourage them to drink warm liquids, monitor the patient and seek medical help.

Grounding

Be aware that as you travel through shallow waters you may need to tilt up the motor to avoid grounding.

- If grounded, don't try to dig your way out with your motor as this will clog the intake vents and ruin the impeller in the cooling system or may break the prop.

It's best to try to get yourself off by using an oar or similar device.

If as a last resort you feel the need to get out and push, be aware of possible dangers including broken glass, rusted iron and if operating a vessel in Northern Australia, skippers should check for crocodiles and stingers.

- Also check your hull to see if it has been damaged and your prop to see if it has been fouled before setting off again.



Figure 101.1 Find something that floats to hang on to

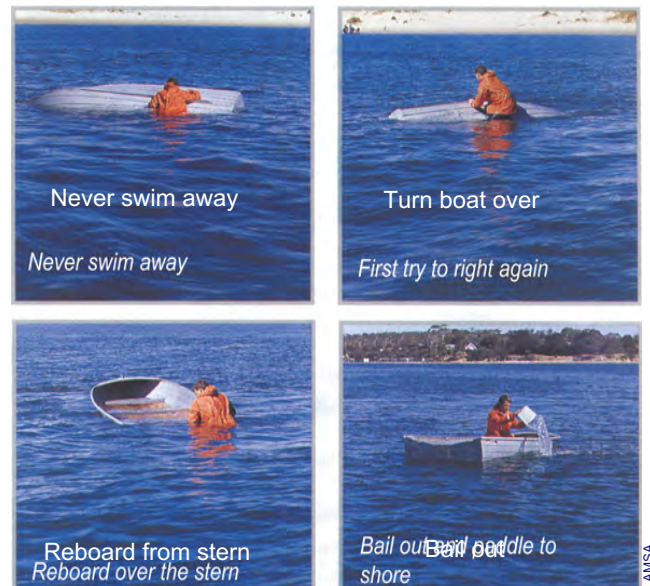


Figure 101.2 Dealing with capsized



Figure 101.3 Life raft drill



Figure 101.4 HELP and Huddle positions to avoid hypothermia

WORKSHEET 27 CAPSIZED, FLOODED OR GROUNDED BOAT



Q1. Describe how to right the capsized boat in the figure opposite. Explain safety procedures you would put in place if this happened offshore.

Q2. Describe what instructions you will give your crew if you had to abandon ship.

Q3. Describe what actions you should undertake to avoid hypothermia as an individual and as a group.

Q4. Describe how to treat a person suffering from hypothermia.

Q5. Describe what you should do if your boat becomes grounded.

Q6. Describe what you should do if your boat becomes flooded with water. Describe the suggested requirements for your State.

Q7. List any 6 signals used to indicate an emergency. (See page 44).

Basic first aid

Acknowledgement is made of the Royal Life Saving Society Swimming and Life-saving Manual and the Queensland Department of Health's Web Site which were used as a source of information for this section.

Nothing can replace a first aid certificate and the notes given here are designed to highlight first aid you may need while boating.

It is recommended you do a first aid course from an accredited provider such as the Australian Red Cross, TAFE, St. John Ambulance or Royal Life Saving.

Sea sickness

Several ways of minimising seasickness include:

- Avoid alcohol and heavy rich foods before and during the trip.
- Focus on the horizon and not on the water.
- Stay in the fresh air and on deck away from the fumes.
- Keep occupied - nibble on dry biscuits or fruit. Some people say ginger, wrist bands or patches help.
- Use medication (be guided by your chemist).

The best advice is to say - *Its easier to stay well than it is to get sick.*

Shock

The INITIAL signs and symptoms of shock include;

- Pale appearance;
- Cold clammy skin;
- Altered breathing - rapid and shallow;
- Rapid, weak pulse;
- Faintness;
- Nausea/vomiting;
- Shaking and trembling.

The signs and symptoms of SEVERE Shock include:

- Deterioration of the level of consciousness;
- Thirst;
- Blue lips and fingertips (cyanosis).

Treatment

- Monitor the casualty's breathing and pulse regularly. If the casualty becomes unconscious, place them in the Lateral position.
- Reassure the casualty.
- Raise the casualty's legs above the level of the heart (unless they are fractured).
- Apply splints for fractures.
- Dress wounds or burns.
- Keep the casualty warm.
- Give NOTHING by mouth. You can moisten the lips but DO NOT give any food or drink to the casualty.

Cuts

- Wash the cut thoroughly and inspect if any foreign materials are still in the wound.

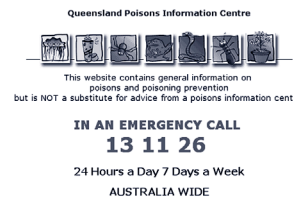
A painful but practical way to remove small pieces of coral or grit is with a toothbrush.

- Apply a drying antiseptic such as betadine (check if they are allergic first) and cover the wound with a sterile dressing.

You must keep up to date

Keep up to date by reviewing your first aid training at either St. John Ambulance Association, Red Cross, Surf Life Saving Association, The Royal Lifesaving Council, your local ambulance service or any accredited rescue service provider.

<http://www.health.gov.au>



All government web sites have up to date information on first aid

Bleeding

Lacerations can occur from knife wounds, coral or rock cuts, glass or boat propellers.

The best way to stop bleeding is:

- Apply pressure - use a towel or anything to stop bleeding.
- Elevate the bleeding area and rest the patient.

Actions

- Control the bleeding by pressure, elevation and rest.
- Clear the area of skin around the laceration and apply a sterile dressing.
- Those with broken skin should check their tetanus injection records.
- Large cuts may require stitching.
- Superficial foreign matter should be removed, but anything deep should be left to a doctor.
- Treat for shock if necessary.
- Try at all times to wear gloves or avoid contact with blood.

Burns

The best way to relieve pain is cool the burned area with cold running water. Do not break blisters or apply lotions, ointments or creams.

Action

- DRSABCD (see page 101).
- Cool burned area under cold running water.
- Cover burn with a sterile non stick dressing.
- Transport the patient to a doctor or hospital.

Scalds

These could be caused from cooking spills on boating trips.

- Cool the burned area with cold water for 10 minutes. If no water is available, remove thick clothing unless stuck to the skin.

Flames

- Smother the flames with a blanket or piece of clothing.
- Lie the patient on the ground.
- Douse the burned area with cold water for several minutes.
- Remove clothing not sticking to the skin and cover the burned area with a nonstick dressing.

Hypothermia

This can be very dangerous (see Figure 104.1). If possible, remove the patient from the elements and into dry shelter.

- Remove any wet clothing and replace with warm, dry clothing or blankets.
- Warm the patient gradually to avoid the onset of dangerous heart rhythms. If the patient is able, encourage them to drink warm liquids, monitor the patient and seek medical help.

Seasickness

These days a variety of medicines can be used to try to correct this interpretation by the brain.

Seasickness pills, patches which are worn behind the ears or acupuncture pressure points on the wrists can be used in some cases.

If you think you will be seasick take some medication before you go to sea. Remember - *its better to stay well than get sick.*

Marine stingers

Further information Surf Life Saving Australia
(02) 9300 4000 slsa.com.au

In tropical waters*

* Generally north of Bundaberg in Queensland and Geraldton in Western Australia.

- Remove the patient from the water and restrain if necessary.
- Call for help (dial 000).
- DRSABCD and commence CPR as necessary.
- Liberally douse the stung area with vinegar to neutralise invisible stinging cells - do not wash with fresh water.
- If vinegar is unavailable, pick off any remnants of the tentacles (this is not harmful to the rescuer) and rinse sting well with seawater (not freshwater).
- Seek medical assistance with rapid transport to hospital.

In non-tropical waters

- Keep the victim at rest and under constant observation.
- Do not allow rubbing of the sting area.
- Pick off any remaining tentacles with fingers (a harmless prickling may be felt).
- Rinse the stung area well with seawater to remove any invisible stinging cells.

The next steps are dependent on the type of stinger.

For non-tropical Bluebottle stings

- Place the victim's stung area in hot water (no hotter than the rescuer can comfortably tolerate).
- If the pain is unrelieved by the heat, or if hot water is not available, apply cold packs or wrapped ice.

For other non-tropical minor jellyfish stings

- Do not wash the sting with fresh water.
- Apply cold packs or wrapped ice for pain.
- If local pain is unrelieved by these treatments, or generalised pain develops, or the sting area is large (half of a limb or more), or if the patient appears to be suffering an allergic reaction to the sting, seek urgent medical help (dial 000 or get a surf lifesaver or lifeguard).

Spines

- For deep spines it would be best to see a doctor and have them professionally removed.

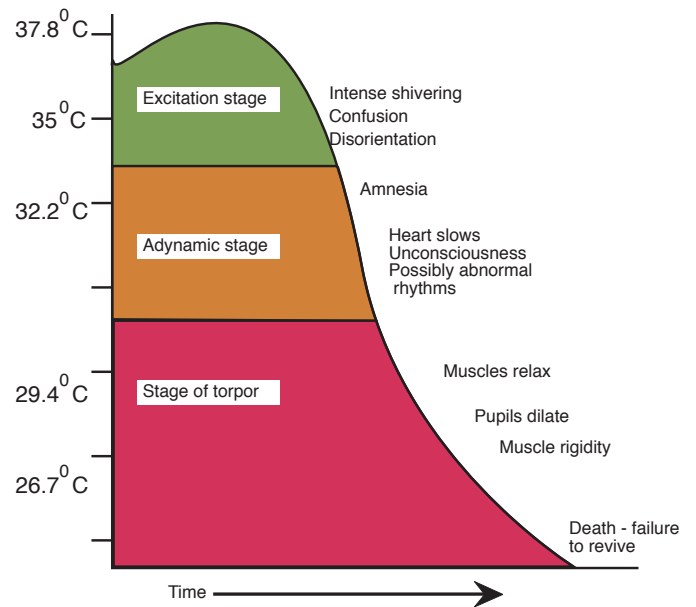


Figure 104.1 Hypothermia can be very dangerous
Wet Paper



Figure 104.2 Australian Bluebottle

- One other method is to use a sterile razor blade and shave the skin down until the top of the spine is visible. Then try to get the razor into the spine and flick out.

Blue-ringed octopus and cone shells

- For suspected blue-ringed octopus and cone shell stings or bites, call 000 for an ambulance, use the pressure-immobilisation technique, and have the patient taken immediately to the emergency department of the nearest hospital.
- Then, use a wide bandage, pantihose or other suitable material. Apply bandage over the area, bandage from the toes/fingers back up over the envenomated area and over the joint, immobilise the limb by using a splint or a sling.

Use another bandage to secure the splint, do not wash the area - any residue venom may be used for identification purposes, commence rescue breathing if necessary.

Stonefish and scorpion fish

- For suspected stonefish or scorpion fish accidents, call 000 for an ambulance. The use of hot water at about 45 degrees has been recommended to ease the pain.

Then have the patient taken immediately to the emergency department of the nearest hospital.

Call triple zero (000) in an emergency

ask for ambulance, stay with the person and resuscitate



1 Check for Danger

Ensure safety for yourself, bystanders and casualty.
If safe, remove casualty from water as soon as possible.

6 Start Compressions

Adults – place heel of hand in centre of chest. Place other hand on top of first.
Children 1 – 8 years – place heel of hand in centre of chest.
Infants <1 year – place 2 fingers in centre of chest. Compress 1/3 depth of chest. Compress 30 times.



2 Check Response

Can you hear me?
Open your eyes.
What's your name?
Squeeze my hand.

7 Position the airway

Adults and children – tilt head backward. Place one hand on the forehead and use the other hand to lift the chin.
Infants <1 year – do not tilt head. Place one hand on the forehead and use the other hand to support the chin.



3 Send for help NOW call triple zero (000)

Phone for an ambulance.
Remain calm while answering the questions:
- exact location of the incident
- phone number you are calling from
- what has occurred.
Follow the instructions from the ambulance service.

8 Start breaths

Adults and children – seal nose and give 2 breaths into mouth.
Infants <1 year – give 2 breaths into mouth and nose. Watch for chest to rise.



4 Clear Airway

If water or vomit is present in mouth, roll casualty on side, tilt face downwards and clear mouth with your fingers.

9 Repeat breaths & compressions

Repeat 30 chest compressions and 2 breaths.
Continue until ambulance arrives or person regains consciousness or it becomes impossible for you to continue.



5 Check for normal Breathing

Look and feel for rising and falling chest.
Listen and feel for breath sounds.
If the patient is not breathing normally, commence resuscitation.

10 Attach a Defibrillator as soon as available. Follow the prompts

If injured person shows signs of recovery, roll onto side and check if they are breathing.
Reassure the person and bystanders.



Learn first aid. Contact www.ambulance.qld.gov.au or 13 QGOV (13 74 68).

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Queensland
Government

WORKSHEET 28 EMERGENCY PLANNING

Q1. Complete the following pieces of emergency information and telephone numbers for your local area.

Local VMR call sign: _____ Emergency poisoning: _____
 Local police telephone: _____ Emergency advice: _____
 Common area of operation: _____ Approx time to boat ramp: _____
 Other important information: _____

Q2. Outline plans for the following boating emergencies in the table below:

- a. Your car and trailer are missing when you go to get it from the car park.
- b. The prop gouges a 25 mm laceration in your friend's leg from the ankle to the knee.
- c. You are crabbing in bare feet, 3 nautical miles from the boat ramp and you stand on a stonefish.
- d. Your Grandfather complains of severe chest pains 6 nautical miles from the boat ramp.
- e. Your motor breaks down 2 hrs from return.
- f. Your boat collides with another vessel and is flooded with water from a hole in the hull.
- g. Your boat collides with another vessel and your friend get knocked overboard.
- h. Your fishing mate has forgotten sun protection and gets seasick.
- i. You have just left and your friend has left his bag behind under a tree.

| Emergency | Proposed plans |
|-----------|-------------------------|
| <i>a.</i> | _____ _____ _____ |
| <i>b.</i> | _____ _____ _____ |
| <i>c.</i> | _____ _____ _____ |
| <i>d.</i> | _____ _____ _____ |
| <i>e.</i> | _____ _____ _____ |
| <i>f.</i> | _____ _____ _____ |
| <i>g.</i> | _____ _____ _____ |
| <i>h.</i> | _____ _____ _____ |
| <i>i.</i> | _____ _____ _____ |

3. Describe one thing you could do to communicate the cessation of an emergency to appropriate personnel.

Q4. Outline boat emergency plans for situations A - C below.

A. Emergency planning for engine failure.

The situation - You and two friends are out for a day's fishing past Middle Harbour. You are about 2 nautical miles out when your motor fails. You have all the correct safety gear and a VHF radio. There are boats in the distance.

- i. List and describe three (3) things that you will do in order of priority, to ensure your safety and ultimate rescue. Give reasons for each action.

Plans and reason/s

- ii. List three reasons why your motor may have failed.

B. Emergency planning - Bad weather predicted

The situation - The afternoon arrives after a great clear sunny morning. You notice the sky is becoming black on the horizon and there are large puffy clouds above the black sky. It is two hours to return.

- i. Describe how you would prepare for your return journey.

Plans and reason/s

- ii. What plans would you make for getting your family safely off the boat and into the car if a hailstorm hit at the boat ramp?

Plans and reason/s

C. Emergency planning - stowage and access to emergency equipment

- i. How do you know what safety equipment is to be carried/worn/used in accordance with state/territory legislation and weather and light conditions?

- ii. Complete the table below by identifying how you would stow the safety items for easy access and how to make sure they are in good working order. Note for column 3, choose from the numbers 1 - 9 from the Column 3 key box below.

| | ① | ② | ③ | ④ |
|------|------|--------------------------------|---------------------------------------|---|
| Item | Name | How to stow for ease of access | How to check if in good working order | |
| 1. | | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | | | | |
| 7. | | | | |
| 8. | | | | |
| 9. | | | | |
| 10. | | | | |
| 11. | | | | |
| 12. | | | | |
| 13. | | | | |
| 14. | | | | |
| 15. | | | | |

Column 3 key

How to stow numbers

Choose a number to answer the questions for column 3

1. Locked in a box
2. Mounted at the helm
3. In lockers or under bow of boat
4. In crate to allow water to drain
5. In safety grab bag
6. In crate with safety grab bag, out of packets
7. Stowed in cabin or tied to seats
8. Stowed in cabin in watertight container
9. In cockpit so can get to when driving.

WORKSHEET 29 FIRST AID AND RESCUE

Q1. Describe how would you help the family in the Figure 108.1.

Q2. Describe one good piece of advice to passengers on seasickness.

Q3. Describe how should you treat a coral cut.

Q4. Describe what you should do if the prop has just gouged a deep laceration in your friend's leg.

Q5. Describe what you should do if you find someone in the water suffering from severe hypothermia.

Q6. Describe the treatment for nontropical Bluebottle stings.

Q7. What should you do to relieve the pain for someone who has been stung by a jellyfish in tropical waters.

Q8. Describe how to navigate a vessel at high speed (For Yachting Australia candidates).



Figure 108.1 V sheet on a disabled boat

WORKSHEET 30 HANDLE ADVERSE CONDITIONS

Summarise how to handle adverse conditions head on, side on and stern on.

CHAPTER 9 ADVANCED SKILLS

Handle adverse conditions

Some hazards

- Boat - Losing control and swamping/flooding/grounding vessel, person overboard, capsize. spun around rapidly
- Waves - Crew injury caused by things moving about, lightning, hail, waves, loss of visibility, things flying through the air
- Shore line - Damage to hull, boat fittings, loss of safety equipment
- Wind - Losing control and swamping/flooding/grounding vessel, person overboard
- Motor - Flooded, prop damaged
- Crew - Being hit by bow when jumping off in surf

Control measures (safety precautions)

- The skill required in rough weather handling is very similar to crossing a wash.
 - A planing boat does not handle well in rough weather and is in danger of swamping.
 - If caught in rough weather in a small dinghy head for the nearest windward shore, beach the boat and wait for better weather.
- If a storm approaches with lightning seek shelter under a bridge or on land in a vehicle
 - If this is not possible you will have to handle each wave as if you were crossing a large wake keeping the bow up at all times as outlined in the figure below.
 - Look for wind indicators that may cause wave size to increase.
 - Don't allow waves to hit a boat on its beam.
 - Advise the crew to sit on the floor of the boat, check life jackets, prepare to be swamped, revise emergency drills and bail water out.
- Seek advice from your local marine rescue service on additional control measures.

The following factors can affect the handling of a boat

- Power unit, propeller type and hull design.
- Wind blowing against the superstructure of small lightweight boats.
- Conditions of loading, sea conditions.
- Weather, tide, current, waves and swell.
- Tides can be affected by winds, particularly along very shallow coastlines and if the wind blows against the tide, steeper wave conditions can be expected and your trip will be slowed.

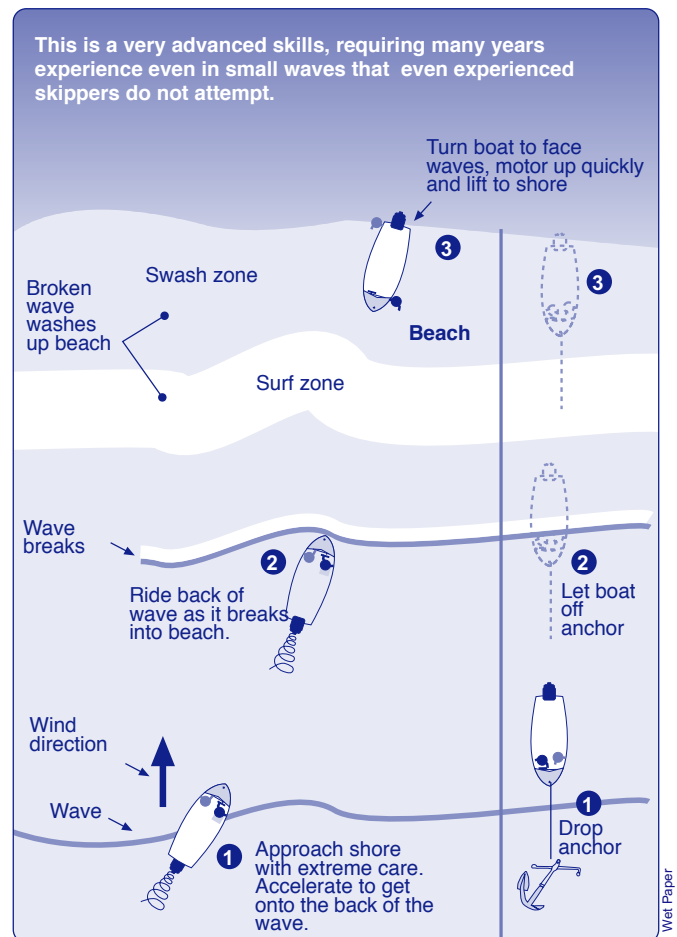


Figure 109.1 Landing on a beach with surf can be dangerous

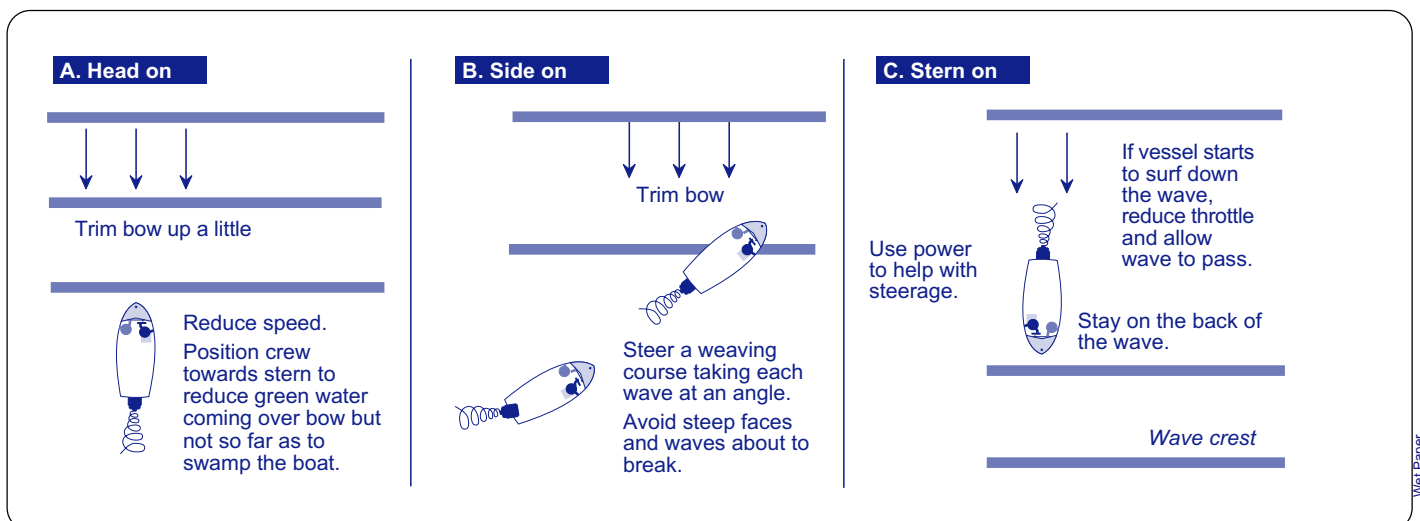


Figure 109.2 Handling adverse conditions

Cross a bar

When going out

1. At the bar entrance, wait and observe the break pattern.
2. Gently power over the first wave.
3. Aim for “the saddle” or unbroken section of the wave and change course if necessary.
4. Go through the saddle and make for the next wave.
5. Keep power on between waves.
6. Do not apply too much power over waves as this gets craft airborne. Throttle back if necessary.
7. Once through the break move quickly out to sea.
8. When clear of the bar watch for any large waves that may form. While going out observe a lead line for when you return.

Go out a few times with an experienced skipper for the area. Advise VMR you are about to cross. Always wear an approved PFD when crossing a bar. Check that your motor responds perfectly to throttling back and forth.

When coming back (see Figures below)

9. Work out the time between sets and wave heights.
10. Throttle onto the last wave of a set.
11. Continue on till you approach the back of the wave.
12. Ride the back of the wave.
13. Continue on the back of the wave as it breaks.
14. Maintain speed and do not accelerate until over the wave when it has finished breaking.
15. Run into port once clear of the bar.

Reference DVDs and web site available on bar crossings

www.abcboating.com

www.clubmarine.com.au



Figures and text reproduced courtesy NSW TAFE

Figure 110.1 Hazards and conditions when navigating a bar (from Safe Boating in Australia by Neil and Young)

GLOSSARY

Further terms can be found at
www.marine waypoints.com

A

Abaft - Behind or aft of. Towards the stern relative to some other object or position.

Abaft the beam - Any direction between the beam and the stern, more behind a vessel than in front of it.

Abeam - At right angles to the boat, or beside, the boat; on the beam.

Aboard - Passengers or crew safely accommodated on the boat.

Aft - Towards or at the stern. To move aft is to move to the back of the boat.

Aground - When the hull or keel is touching the seafloor or the shore line.

Ahead - In front of the vessel (opposite of astern). To drive in forward direction.

All-round Light - A light showing an unbroken light over an arc of the horizon of 360 degrees. Used when anchoring.

Amidships - Midway between the bow and the stern. Also midway between port and starboard sides.

Anchor light - A white light, usually on the masthead, visible from all directions, used to indicate that a vessel is anchored.

Anchor Warp - Consisting of chain and/or rope that connects the anchor to the boat.

Anchorage - A sheltered place suitable for anchoring in relation to the wind.

Astern - Towards the stern (opposite of ahead). To drive a boat in reverse.

B

Backspring - A spring line from the stern of a boat to prevent backward movement.

Beacon - A lighted or unlighted fixed aid to navigation that serves as a signal or indication for guidance or warning.

Beam - The transverse measurement of a boat at its widest point.

Beam Sea - A situation in which waves strike a boat from the side, causing it to roll unpleasantly.

Bearing - A compass direction in compass points or degrees.

Beaufort Wind Scale describes wind speed based mainly on observed sea conditions from 1 - 12.

Bilge - The very lowest part of a boat's interior where water is likely to collect. This water is called bilge water.

Blue channel marker - Fixed blue light used to mark the centre of a channel usually on bridges.

Bollard - A large solid post on a wharf for securing mooring lines.

Bow - The front part of the boat

Bow Line - A docking line leading from the bow.

Bow Spring Line - A bow line used in docking and undocking to prevent the boat from moving forward while tied up at the dock or jetty.

Bung - A plug inserted in a hole at the base of the transom to let bilge water out.

Buoy - (1) A floating object employed as an aid to navigation. (2) An anchored float for use as a mooring - a mooring buoy.

Buoyancy - The capacity for floating.

C

Call Sign - A group of letters and numbers used for identification of your boat.

Cast Off - To let go of a line; to leave a jetty or a mooring; to untie or loosen a rope or line.

Cavitation - Loss of effective propeller thrust (caused by the blades cutting across the water sucked along by the propeller, instead of working in it).

Chart - A representation on a plane surface of the spherical surface of the earth. The equivalent of a map for use by navigators.

Chart Datum - The water level used to record data on a chart. Usually the lowest low tide water level. It is the level below which depths on a chart are measured.

Chine - The line of intersection between the topsides and the bottom of a boat. Hard-chined boats have this angle pronounced.

Cleat - A fitting around which ropes are made fast.

Coaming - A low vertical lip or raised section around the edge of a cockpit to prevent water on deck from running below.

Cocked Hat - The small triangular space found at the intersection of lines of position on a chart when a ship's position is determined by taking three bearings.

Cold Front - The line of intersection of warm and approaching cold air accompanied with strong winds and rain.

Compass Course - The direction of a ship's heading as read on a compass.

Compass Error - The amount the compass is deflected from the true direction by variation from the chart (magnetic) and deviation (from metallic influences in the boat).

Course - The compass direction in which a boat is being steered.

Cowls - Scoop like devices used to direct air in to ventilate a boat.

D

Davit(s) - A small crane that projects over the side of the boat to raise or lower objects (such as smaller boats) from or to the water.

Day beacon - A fixed navigation aid structure, visible during the day. Used in shallow waters upon which is placed one or more daymarks.

Dead Ahead - A position directly in front of the boat.

Dead Astern - A position directly aft or behind the boat.

Deck - A permanent covering over a compartment, hull or any part of a ship serving as a floor.

Deep V - Refers to the shape of a boat's hull looked at from the bow or stern. A deep V hull is usually good at cutting through rough waves at high speeds.

Depth Sounder - An instrument used to measure the distance to the bottom.

Deviation - Differences between the compass reading and an actual magnetic direction caused by magnetic forces in the vicinity of the compass eg, masses of metal, speaker magnets, etc.

Dinghy - A small open boat. Sometimes used as a tender to a larger boat.

Displacement Hull - A type of hull that ploughs through the water, displacing a weight of water equal to its own weight.

Distress Signals - Any signal that is used to indicate that a vessel is in distress and needs help eg, EPIRB, flares, smoke, audible alarms, V sheets, etc.

Dock - The act of taking the boat to the pier or jetty to secure it.

Draft - The depth of the boat below the waterline; the amount of vertical distance from a boat's water line to the bottom of its keel.

Drift - Movement of slower boats, when not under power, or when being pushed sideways while under power (also called leeway).

E

Ebb, Ebb Tide - When the tide goes out.

Echo Sounder - An electrical depth sounder or fish finder that uses sound echoes to locate the depth of objects in water.

EPIRB - Emergency Position Indicating Radio Beacon. An emergency device that uses a radio signal to alert satellites or passing aeroplanes to a vessel's position.

F

Fend Off - To prevent contact with an object while bringing the ship alongside.

Fender - A protective cushion of durable material hung from the sides of a boat to protect it from rubbing or chafing against a jetty or another boat.

Fixed Light - A navigational light with a steady beam of light, having no intervals of darkness.

Flashing Light - Used to describe a light that blinks on and off, where the period of light is shorter than the period of darkness separating the flashes.

Flotation

The ability of a boat to float when filled with water. Basic flotation - the boat will remain afloat either by the bow or upside down. Level flotation means the boat will remain in a level position.

Following Sea - A sea with waves approaching from the stern of the boat. The waves also moving in the same direction as the vessel.

Forecast - A weather prediction.

Foul Ground - A place not suitable for anchoring.

Fouled - Any piece of equipment that is jammed, clogged, entangled, or dirtied.

Fouled Anchor - An anchor which has become entangled with some object.

Freeboard - The distance from the gunwale to the water. Most often this will vary along the length of the boat. In tinnies where the transom has been cut out for the motor, the freeboard will be from the lowest point.

G

Give-Way Vessel - The vessel which must yield to the "Stand-on Vessel" in meeting, crossing, or overtaking situations.

Global Positioning System (GPS) - A navigation system using satellite signals to fix a position with great accuracy.

Grapple Anchor - Small multi-pronged anchor used on dinghies and small boats to hold onto rock.

Ground - To touch bottom.

Ground Tackle - A collective term for the anchor, anchor rode (line or chain), and all the shackles and other gear used for attachment.

Gunwale - The upper edge of a boat's side; the part of a vessel where hull and deck meet. (Pronounced "gunnel")

H

Hatch - A hinged or sliding opening in the deck, providing people with access to the cabin or space below.

Head - A marine toilet or the compartment containing a toilet.

Heading - Direction in which ship's bow is pointing at any one time.

Helm - The place from which a vessel is steered.

Helmsman - The person who steers the boat.

Hull - The main structural body or shell of the boat.

Hypothermia - A life-threatening condition where there is loss of core body heat.

I

International Regulations - Navigation rules governing all waters.

Isobars - Lines drawn on a weather map joining regions of equal pressure.

K

Knot - The speed of one nautical mile (6,076 feet or 1,852 metres) per hour.

L

Land Breeze - A wind moving from the land to the sea due to temperature changes during a 24 hour period.

Landmark - A fixed reference point that can be used for navigation.

Lanyard - A short line used to attach one thing to another.

Latitude - The distance north or south of the equator measured and expressed in degrees. The equator is 0° and the north and south poles are 90°.

Leading Marks - When the two marks or lights are lined up they indicate the centre of the channel.

Lee - The side of a ship, or a shore location, sheltered from the wind.

Lee Shore - A shore that wind blows onto; it is advisable to stay well off a lee shore in a storm.

Leeward - Direction away from the wind.

Leeway - The sideways movement of a boat caused by either wind or current, usually unwanted.

Life Jacket - A device used to keep a person afloat. Also called a PFD or personal flotation device.

Lifebuoy, Life Ring - a circular donut-shaped buoy designed to support a person in the water.

Line - Rope used aboard a vessel. A particular line generally derives its name from the object it affects.

Longitude - Imaginary lines drawn through the north and south poles on the globe used to measure distance east and west of the prime meridian at Greenwich, England (designated as 0°).

Lookout - A person designated to watch for other vessels and hazards.

M

Magnetic Bearing - A bearing taken from a compass.

Magnetic Course - The course of a vessel after magnetic deviation has been considered, but without compensation for magnetic variation.

Magnetic Deviation - Also called compass error which is the difference between the reading of a compass and magnetic north due to errors (caused by material in the boat, eg metals, magnetic fields and electrical fields near the compass).

Magnetic North - The direction to which a compass points. Magnetic north differs from true north because the magnetic fields of the planet are not exactly in line with the north and south poles.

Magnetic Variation - The difference between magnetic north and true north, measured as an angle. Magnetic variation is marked in the compass rose of a chart.

Make Way - Moving through the water under power or sail.

Masthead Light - a white light that is visible for an arc extending across the forward 225° of the boat.

MAYDAY - An internationally recognized distress signal used on a radio to indicate a life threatening situation.

Moor - To attach a boat to a mooring, jetty, dock, post, anchor, etc.

Mooring - An anchor or weight, permanently attached to the sea floor, with a buoy on the surface, used to hold the boat in a certain area.

Mooring Line - A line used to secure a boat to an anchor, dock, or mooring.

N

Narrows - Small passages along the coastline.

Nautical Mile - A minute of latitude measured from the side of the chart.

Navigable Water - Water of sufficient depth to allow a boat to travel through it.

Navigation - The art and science of determining the position of a boat and the course needed to safely and efficiently move the boat from place to place.

Navigation Lights - Required lights on a boat to help others determine its course, position and what it is doing. A boat underway should have a red light visible from its port bow, a green light on the starboard bow and a white light at its stern. Other lights are required for vessels under power, fishing, towing, etc.

Navigational Aid - Any object that a navigator may use to find his position eg markers, buoys, beacons etc.

Notices to Mariners - Periodic publications containing details of any alterations to charts, to keep them up to date.

O

Oarlock - A device to attach oars to a rowboat, allowing the operator to row rather than paddle the boat.

Occulting Lights - A navigational light which turns on and off in a regular pattern, but is on more than it is off, so the period of light is longer than the period of darkness.

Offshore Wind - Wind blowing from off the shore.

Outboard - A detachable engine mounted on a boat's stern.

Overboard - In the water outside of the vessel.

P

Painter - Line tied to the bow of a boat for use in towing or tying up.

PAN PAN - Urgent message used on a radio to indicate a situation which is NOT immediately life threatening.

Parachute Flare - An emergency signal flare that will float down on a parachute after launch to improve its visibility.

Personal Flotation Device (PFD) - Also called a life jacket.

Phonetic Alphabet - Alphabet used to make sure that a letter is understood.

Pilotage - The act of navigating a vessel when land is near and the water is relatively shallow.

Pitch - The rise and fall of the bow of a vessel proceeding through waves. Also the distance advanced by a propeller in one revolution.

Plane, Planing - To make a boat rise slightly out of the water so that it is gliding over the water rather than ploughing through it.

Pressure gradient - Isobars on a weather chart that are close together.

Prevailing Winds - The typical winds for a particular state/area and time of year.

Propeller - Sometimes called a screw.

Punt - A small flat bottomed boat square at either end.

Proper lookout - You should constantly look out and listen for any other vessel or obstruction. You must use all available means to look out.

Q

Quick Flashing Light - A navigational aid with a light that flashes about once per second.

R

Rail - The edge where the deck joins the hull or the railing around the deck.

Right of Way - The right to maintain a course according to the Rules of Navigation.

Rope - When rope comes aboard a boat it is called line.

Ropes and cables -

Cables and all other ropes on board must be in good condition.

Rope requires protection from abrasion, chafe, and dirt, and while heat and UV rays will cause synthetic fibre ropes to deteriorate, water will cause natural fibre rope to rot.

Care of rope

This starts with the way it is drawn from a coil or unwound from a spool. Rope is manufactured by a series of twisting processes which causes it to develop a tendency to kink if not handled correctly. When taking rope from a spool always allow the spool to revolve and never take it from over the flanged ends.

Rope supplied in a coil should be drawn vertically from the centre of the coil in a manner which allows the rope (if right-hand lay) to unwind anticlockwise from the centre. A tip here is to run it through a block located somewhere above the centre of the coil.

After cutting off the length required it is good practice to prevent the ends from fraying by applying a sailmaker's (preferred) or common whipping as shown in Figure above. Natural fibre rope will always require to be whipped and although an alternative on synthetic rope is to simply melt the end, a proper whipping is more effective.

Storage

The best method of storage is, after removing any knots, to coil the rope and hang it in a light airy place away from any heat and not in direct sunlight.

Tying knots

There are plenty of web sites today to show you how to splice rope and tie knots. For example www.animatedknots.com or just google - how to tie knots

Rules of the Road - The rules concerning which vessel has the right of way if there is a possibility of collision between two or more boats.

Run Aground - To drive a boat into shallow water and hit the bottom stopping the boat.

S

Scope - The ratio of the length of an anchor line, from a vessel's bow to the anchor, to the depth of the water.

Sea Anchor - A device used to slow down a boat, hold its bow into the sea in heavy weather, and reduce the boat's drift downwind. Acts like a parachute in the water.

Sea Breeze - Cool air that blows ashore caused by the air inland heating up.

Sea Level - The average level of the oceans, used when finding water depths or land elevations.

Seamanship - The art and skill of boat handling.

Seaworthiness - Statement on the condition of the vessel that is going to sea.

Secondary Port - A port that is not directly listed in the tide tables but for which information is available as a difference from a nearby standard port.

Sector - An arc of a circle in which certain types of navigational lights known as sector lights are visible.

SECURITE - Less urgent radio message such as a navigational hazards (eg large log in channel).

Shackle - U-shaped fitting closed with a pin across the open ends, the pin sometimes being threaded at one end and sometimes held in place with a cotter pin.

Shear Pin - A safety device, used to fasten a propeller to its shaft. It breaks when the propeller hits a solid object, thus preventing further damage.

Sidelights - Green and red lights on the starboard and port sides of the boat required for navigation at night to be visible through an arc of 112.5°, beginning from directly ahead of the boat to a point 22.5° abaft of the beam.

Sounding(s) - Depth measured on a chart above the chart datum.

Spring Line - A line leading forward or aft to prevent a boat from moving ahead or astern.

Squall - A sudden and violent gust of wind often accompanied by rain.

Stability - The tendency in a boat to keep an upright position or to return.

Stand-on Vessel - One that has the right-of-way and should maintain her course and speed during a crossing or overtaking situation, unless a collision appears imminent.

Starboard - The right side of the boat when facing forward.

Stern - The back part of a boat.

Stern Line - A line running from the stern of the boat to a dock or jetty when berthed.

Swinging the Compass - The act of checking for magnetic deviation.

Swinging Circle, Swinging Room - The distance a boat can move around its anchor.

Symbols - Marks of identification.

T

Tachometer - A gauge that measures engine revolutions per minute.

Tender - A small dinghy or launch used to transport crew and equipment from shore to a larger boat.

Tidal Range - The difference in depth between high and low tide.

Tide - The periodic regular rise and fall of water in some areas due to the pull of the sun and the moon approximately every 6 hours.

Tide Table - A publication predicting the time and height of high tide and low tide. Also found on the internet.

Tiller - A handle for turning a boat's rudder or an outboard motor to steer the boat.

Transom - The flat, vertical aft end of a boat.

True Course - A course steered by the compass that has been corrected for variation and deviation.

Trough - A trough of low pressure is indicated by isobars extending outwards from an area of low pressure. It is associated with a trough line.

Turn - Complete encirclement of a cleat or bollard.

U

Underway - Moving off. Not made fast to the shore or bottom.

Unseaworthy - The state or condition of a boat when it is not in a proper state of maintenance.

V

V-Bottom - A hull with the bottom section in the shape of a "V."

W

Wake - The path a boat leaves behind it when moving through the water.

Wash - Broken water at bow of a vessel making way.

Water Ski rules

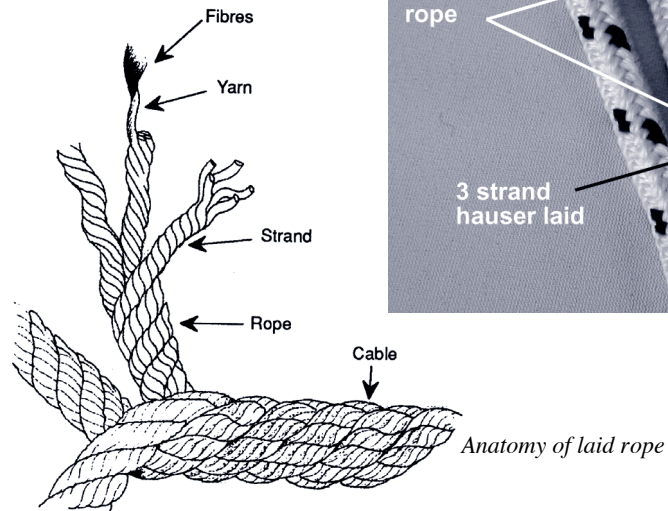
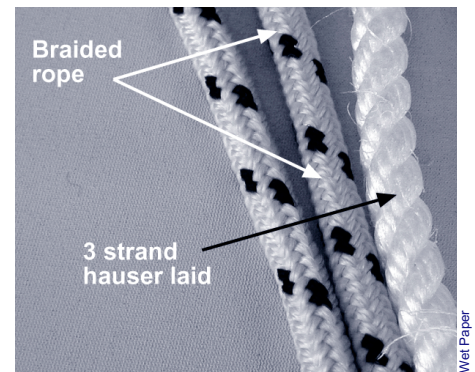
Way - A boat's movement through the water.

Waypoint - A charted feature or chosen position on a chart.

Wide Berth - To avoid something by a large distance.

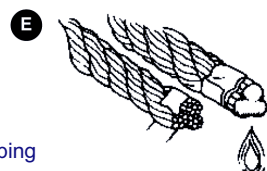
Windward - Towards the wind. Opposite of leeward.

Two types of rope

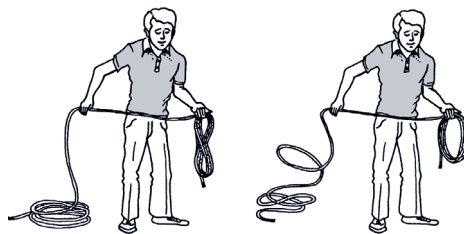


Two types of rope (see above)

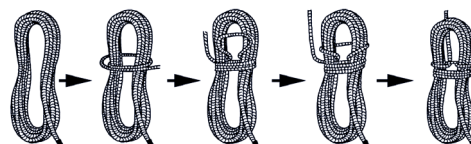
Laid rope strands will be twisted over each other and can be easily untwisted for splicing or finishing. Braided ropes are made from yarns that are plaited together. Wikipedia has a good discussion on rope types and use.



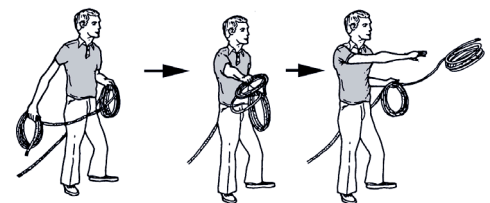
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Your RMDL

By completing the information below you will have satisfied the criteria necessary to obtain your Recreational Marine Drivers Licence (RMDL). Your instructor will test your theory and practical skills to verify your competence.

A sample practical task checklist detailing all the criteria is available at www.msq.qld.gov.au

From time to time, Boatsafe Information Bulletins (BIBs) are issued by Maritime Safety Queensland which may alter these details.

Wet Paper will send out errata sheets to take on board these changes, and alter this form in the next print run.

If you don't drive a boat for some years after you obtain your RMDL, a refresher course is highly recommended.

Medical fitness disclosure statement

Statement by Licence Candidate

Completed by candidate

I, (insert family and given name in block letters)

.....
 declare that I, have / do not have (delete as required) a medical condition or other impairment that may prevent the discharge of my general safety obligation to operate a recreational vessel or personal watercraft safely under the Transport Operations (Marine Safety) Act 1994.

I understand that it is an offence under the Transport Operations (Marine Safety) Act 1994 to state in a document that I know will be given to the chief executive, the General Manager or an officer of the Department of Transport and Main Roads information that I know is false or misleading. Maximum penalty 200 penalty units.

.....
 Date

.....
 Signature of licence candidate

Time in training vessel - Transfer total to the other side when complete.

Completed by candidate

Use the table below to log the time you spend in your training vessel to become competent to drive that vessel. Transfer total to other side when complete.

| Date | Time in | Time out | Total | Vessel's Name | Date | Time in | Time out | Total | Vessel's Name |
|------|---------|----------|-------|---------------|------|---------|----------|-------|---------------|
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Theory questions completion record

Completed by school BTP

Worksheets 1 - 30 test the candidates ability to competently discharge their boating safety obligation. The candidate is required to sign on page 112 that they have completed these worksheets, corrected their mistakes and state that the work is their own. If there are any doubts or irregularities, the school BTP will comment here.

School BTP comment:

.....
 S/BTP Initial:

Course evaluation (Rate the course elements from A (highest) to E (lowest)).

Completed by candidate

| Theory element | A | B | C | D | E |
|--------------------------|---|---|---|---|---|
| Ch 1 Boat systems | | | | | |
| Ch 2 Pre-trip checks etc | | | | | |
| Ch 3 Basic skills | | | | | |
| Ch 4 Safety equipment | | | | | |
| Ch 5 Boating rules | | | | | |
| Ch 6 Trip planning | | | | | |
| Ch 7 Regulations | | | | | |
| Ch 8 Emergencies | | | | | |
| Ch 9 Advanced skills | | | | | |

| WA RST Practical assessment | | | RST Task | C | NYC |
|-----------------------------|---|-----|----------|---|-----|
| RST Task | C | NYC | Task 6 | | |
| Task 1 | | | Task 7 | | |
| Task 2 | | | Task 8 | | |
| Task 3 | | | Task 9 | | |
| Task 4 | | | Task 10 | | |
| Task 5 | | | Task 11 | | |

Candidates comment:

FILE THIS COPY AT SCHOOL

This form subject to MSQ Audit
 Records to be kept for 3 years

It is no longer necessary to send this page to Yachting Qld. All that is required is to complete the spreadsheet issued to the school BTP from Yachting Queensland and email this to btp@qldyachting.org.au

For any issues, please ring YQ on (07) 3393 6788

SCHOOL TRAINING RECORD

Enrolment date: _____

It is no longer necessary to send this page to Yachting Qld. All that is required is to complete the spreadsheet issued to the school BTP from Yachting Queensland and email this to btq@qldyachting.org.au
For any issues, please ring YQ on (07) 3393 6788



Family name

Given name/s

School or address

Candidates date of birth

Answers to theory test version

| | (a) | (b) | (c) | (d) |
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Student verification

Student ID or Drivers licence number and issuing State

I certify that

| | |
|----------------------|----------------------|
| <input type="text"/> | <small>State</small> |
|----------------------|----------------------|

- I have completed the time I have spent in a training vessel (page 111), corrected the mistakes I have made and understand the answers to the questions as indicated in my National Powerboating Workbook.
- I certify also that during my BoatSafe course I had the practical assessment tasks listed below demonstrated to me and was then given sufficient opportunity to practice these tasks and to demonstrate basic proficiency.
- I certify that the information on pages 111 and 112 is my own and is true and correct.

| | |
|----------------------|----------------------|
| <input type="text"/> | <input type="text"/> |
| Student signature | Date |

Practical assessment results

As per BoatSafe Jan 2012 competency standard pages 14 and 15

- Task 1: Leave and return to launching facility or berth
- Task 2: Bring a recreational vessel alongside a floating object
- Task 3: Moor and anchor a recreational vessel
- Task 4: Manoeuvre a recreational vessel underway
- TOTAL TIME IN TRAINING VESSEL - from page 111 HRS

Statement of competency number

From the book issued by Yachting Queensland

Registration of vessel

In which majority of practical test took place

Assessment schedule (✓)

Schedule A (MAP or Marine Studies/Science Course)

.....

Assessor verification

BTP Name _____

Provider number _____

I certify that I have examined the candidates workbook and the tasks and questions identified on pages 111 and 112 have been completed.

Overall result (✓)

Competent

Not yet competent

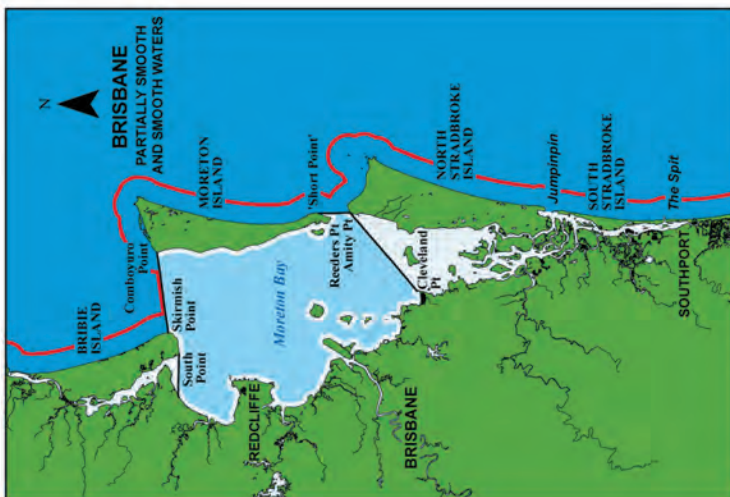
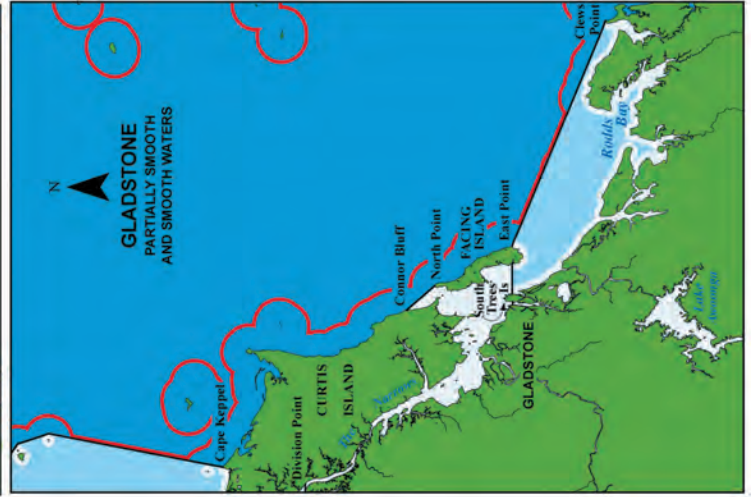
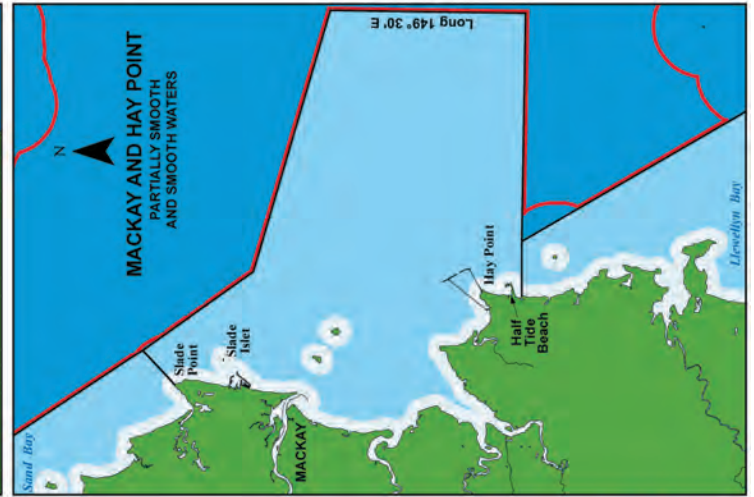
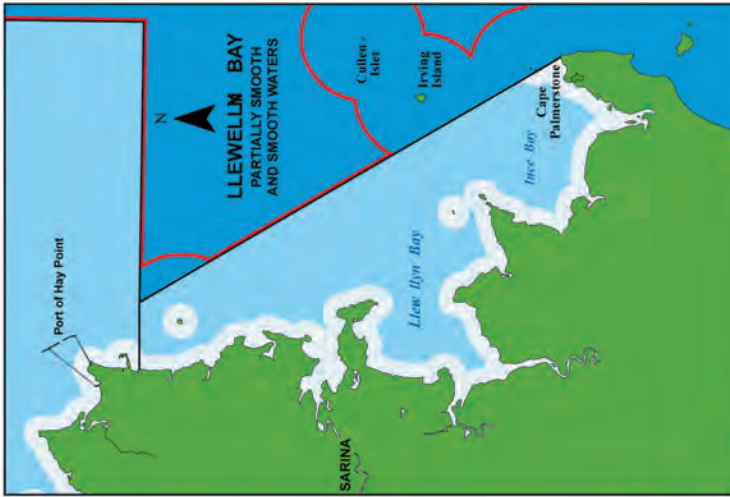
.....
Signature Date

FILE THIS COPY AT SCHOOL
This form subject to MSQ Audit *Records to be kept for 3 years*

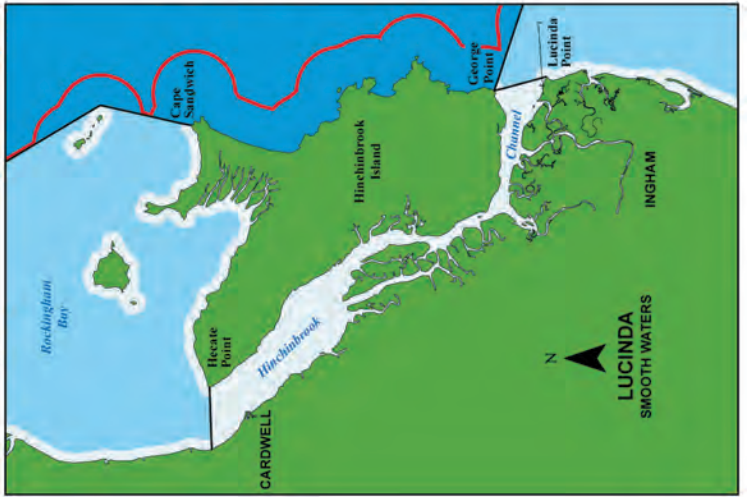
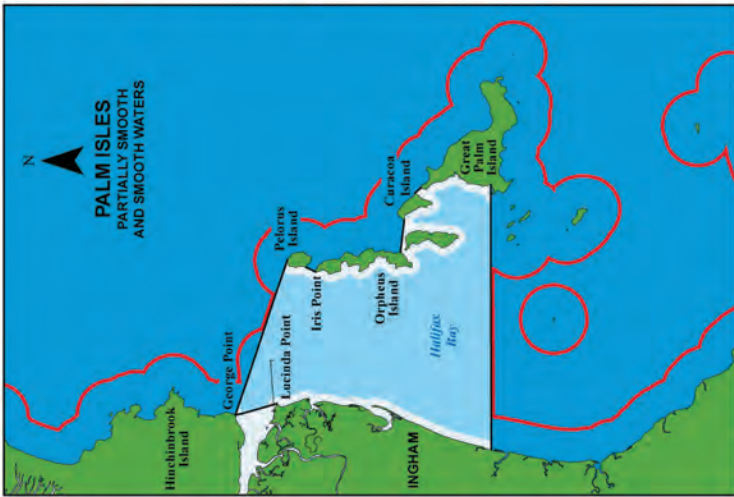
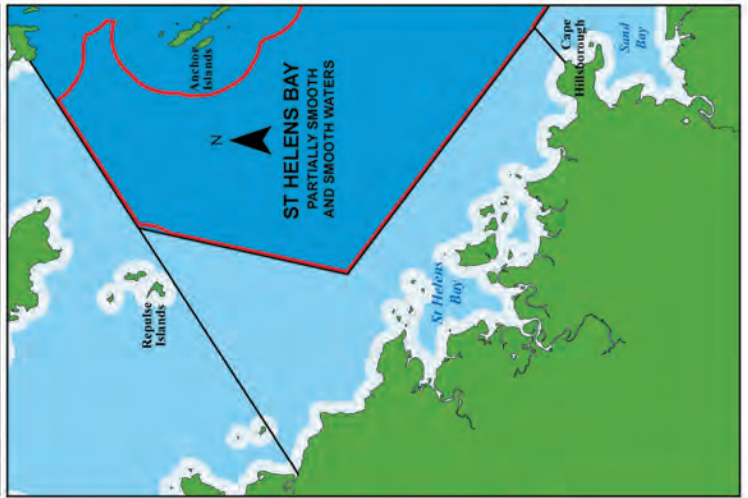
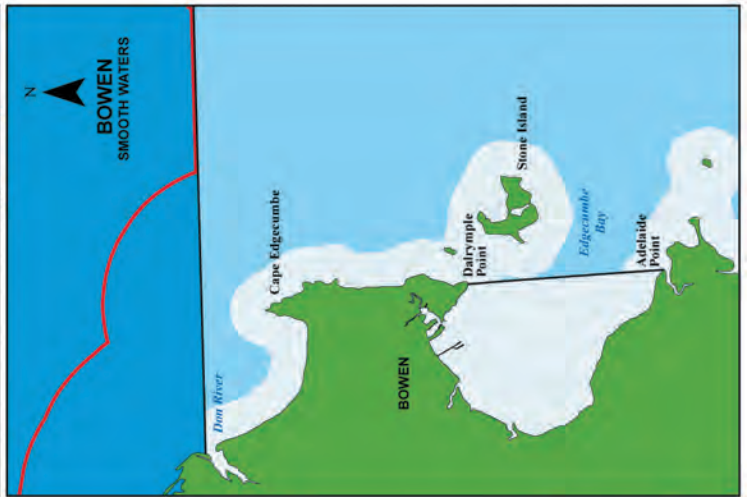
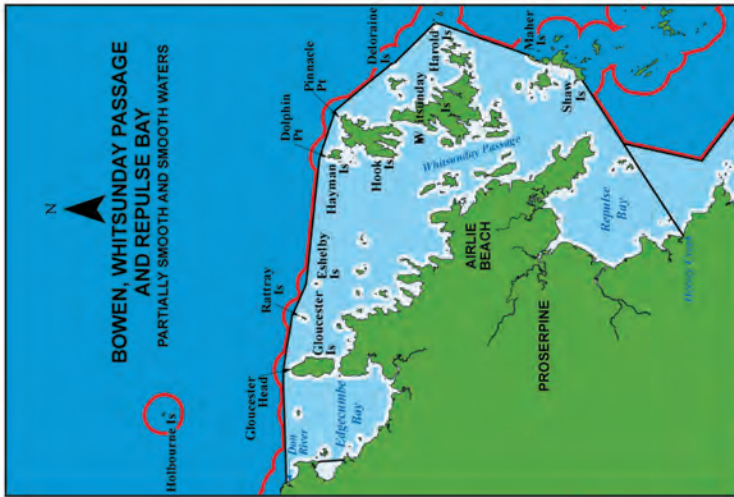
WATER SAFETY LIMITS (QLD ONLY)

Legend

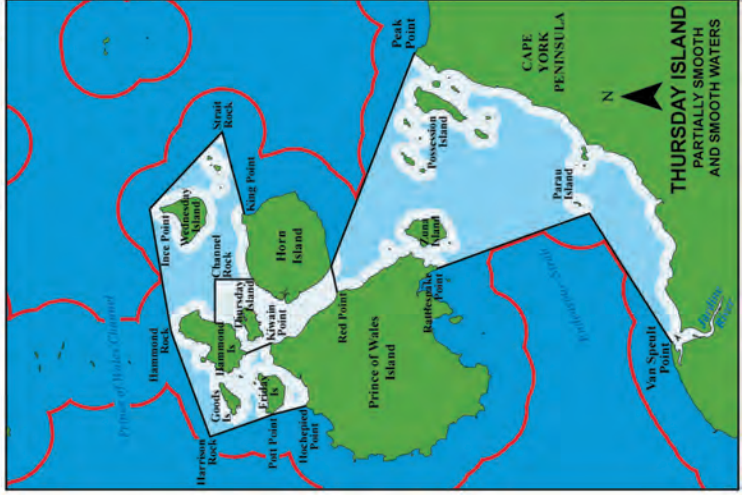
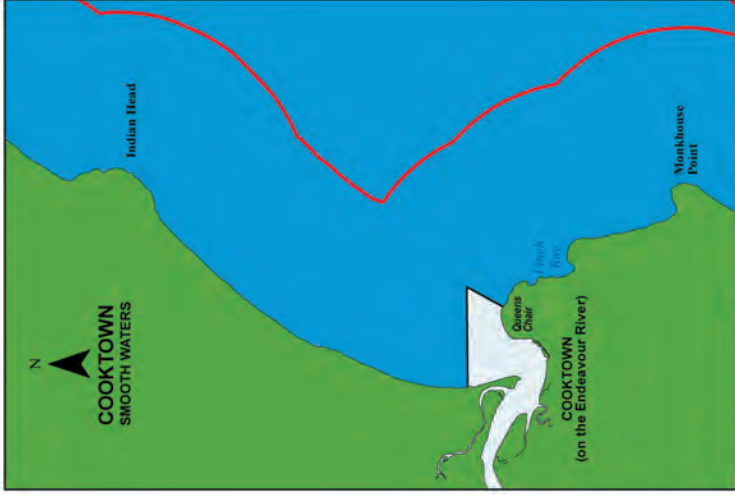
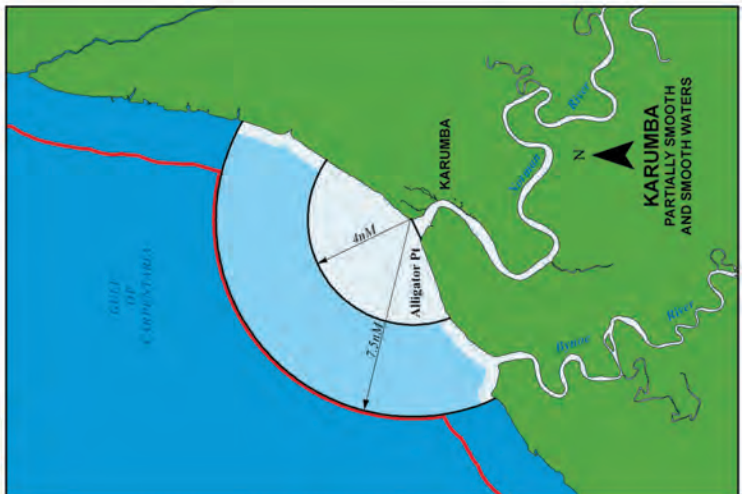
- smooth waters
- partially smooth waters
- open waters
- the red line designates limits beyond which EPIRBs must be carried.

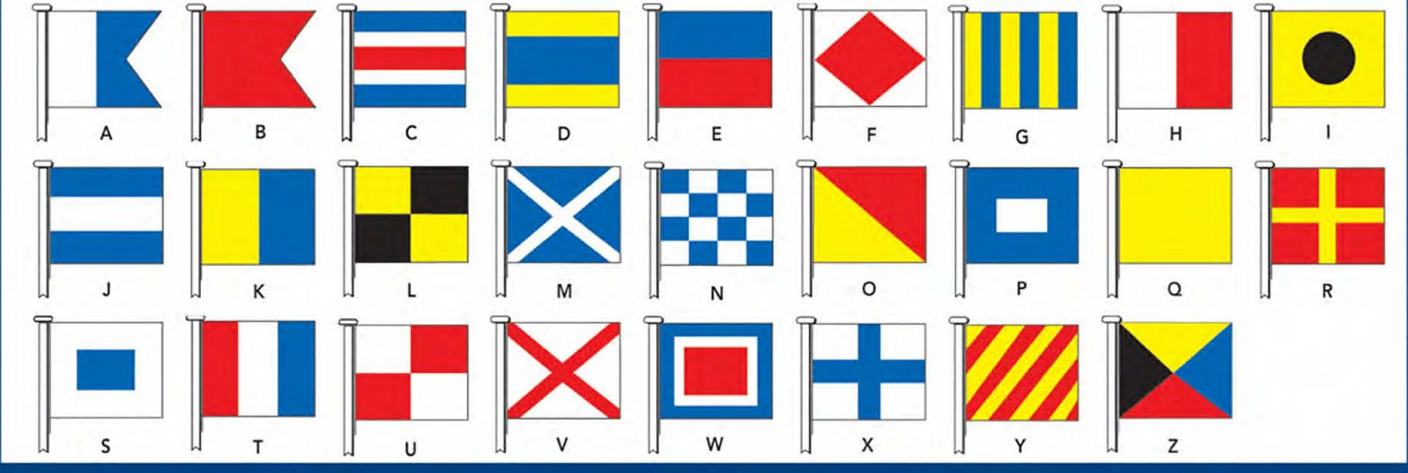


Legend
 smooth waters partially smooth waters open waters the red line designates limits beyond which EPIRBs must be carried.



Legend
 smooth waters partially smooth waters open waters the red line designates limits beyond which EPIRBs must be carried.





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