CHAPTER SEVEN

OUTBOARD MOTOR AND BOAT MAINTENANCE

GENERAL

7.01 Every FRB outboard motor comes with the manufacturer's operator manual. This chapter does not deal with specific outboard maintenance. It only aims to cover general principles. For specific detail refer to the operators manual Likewise, the tool kit issued will be sufficient for general maintenance. For other faults, the motor must be taken to the appropriate outboard motor dealer FRB crews are not marine mechanics, and must not tamper with the motors. Life could depend on proper servicing.

7.02 **OUTBOARD MOTOR TERMS**

a. **Angle Adjustment Pin Rod** - This allows the motor to be set at different angles so that the trim of the boat can be varied.

b. **Anti-Cavitation Plate** - The plate positioned above the propeller to prevent cavitation

c. **Clamp Screws** - These secure the motor by the stern brackets to the transom.

d. **Exhaust Relief** - The two holes in the shaft below the pump indicator are for dispersal of excessive exhaust fumes.

e. **Fuel Connector** - The point at which the fuel line is connected to the motor.

f. **Fuel Line** - The hose linking the fuel tank to the motor.

g. **Motor Rest** - The frame or projections on the motor head allowing the motor to be laid down when removed from the boat.

h. **Motor Shaft** - The section of motor below the engine, ending at the propeller region.

i. **Priming Bulb** - The bulb on the fuel line used to pump fuel from the tank and inject fuel into the carburettor for starting.

j. **Shift Lever** - The gear selection lever for forward, neutral and reverse.

k. **Skeg or Skid** - Provides directional stability and protects the propeller.

l. **Tiller Handle** - The arm used for steering and throttle control.

m. **Stern Brackets** - The brackets for placing the motor on a boats transom.

n. **Tilt Grip** - The grip on the motor cover for tilting the motor forward.

o. **Tilt Lock** - The lever which allows the motor to tilt or to be locked in position.

p **Twist Grip Throttle** - The moving part on the end of the steering arm to govern the speed of the motor

q. **Water Pump Indicator** - The outlet which allows a steady discharge of water to pass through, indicating the correct functioning of the cooling system.

PARTICULAR KNOWLEDGE

7.03 All crew members must be proficient in:

a. installation of a motor on a boat,

b. knowledge of names and functions of the parts of a motor;

c fuel mixing;

d. starting procedures;

e. motor angle adjustment;

f. fault finding;

g emergency starting procedures; and

h. basic maintenance of the motor.

MOTOR MOUNTING

7.04 Transom heights vary from boat to boat. Outboard motors come in long and short shaft varieties. The motor fitted must be appropriate to the transom height.

7.05 Motors must be mounted on the transom within the allowed vertical tolerance or performance will be effected. If the propeller is too near the surface it results in an air/water mix at the propeller, causing slippage and over revving which is known as cavitation.

INSTALLATION

7.06 Lift the motor on to the transom and align the leg of the motor with the keel of the boat. Tighten the clamp screws and check regularly.

7.07 A safety chain must be attached. The chain must be of 8mm diameter or greater, and should be attached to a strong point in the boat and a strong point on the motor, preferably to a safety chain bracket attached to the pivot bolt (see Fig 7:1). No free play should be left in the chain in order to prevent the motor jumping off the transom and kicking up to injure the crew.

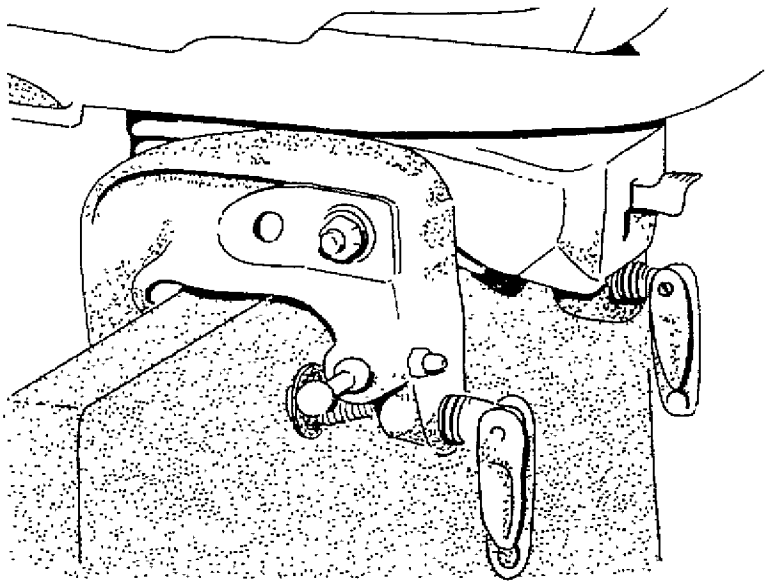

Figure 7:1

7.08 It is, however, strongly recommended that all FRBs have their motors bolted through the transoms.

7.09 Secure the fuel tank in a position where sufficient fuel line allows for ease of movement and operation. Some fuel tanks have an air vent screwed on to the fuel tank cap. This must be opened before operating and then closed when not in use.

7.10 Ensure that the fuel line connection is clean and functioning correctly This is checked by connecting the fuel line to the tank and squeezing the fuel line primer bulb until resistance is felt.

7.11 **FUEL MIXING**

Check the motor Operator's Manual for the correct fuel-oil mixture.

MOTOR ANGLE ADJUSTMENT

7.12 The outboard motor drive thrust comes from one point of the transom, and unless the outboard is fitted in such a way that the thrust pushes the boat directly ahead, the vessel will be hard to steer. A slight downward or upward component in the thrust will cause the boat to trim bow down or bow up respectively. This may cause excess fuel consumption, loss of performance and will give a hard ride. In fast water the boat will be dangerous as it will be difficult to control. The boat must be trimmed to float on its designed water line with the motor perpendicular to the water when the boat is planing at speed

7.13 Necessary adjustment is made by placing the adjusting rod in the appropriate holes in the stern bracket and locking the retaining clip into position. The results of adjustment are:

a propeller moved forward, bow trims down; and

b. propeller move aft, bow trims up.

MOTOR OPERATION

7.14 STARTING PROCEDURES

The starting procedures must be practised until it is instinctive both day and night, and in adverse and emergency situations. Check the operators manual to ascertain the starting procedure.

7.15 LAST MOTOR OPERATION

On completion of operations for the day 'close down' and store the motor in accordance with the manufacturer's instructions.

7.16 FAULT FINDING

A fault finding sequence will be found in the Operators Manual. Photocopy this trouble 'check-chart', seal it in a plastic cover and carry it in the boat tool kit. A glance at the chart, when in trouble may assist in locating the problem.

7.17 MAINTENANCE OF THE MOTOR

The Owner/Operator handbook provides the necessary guide to motor maintenance. Items to constantly check are:

a. spark plugs (clean, test and replace if necessary);

b. fuel pump filter;

c. lubrication of grease points and check of oil level in gearbox,

d. idle speed adjustment;

e. carburettor adjustment,

f. propeller and operation (check shear pins or rubber clutch, whichever applicable and check the propeller for damage); and

g. forward control cables etc, where fitted.

7.18 EMERGENCY STARTING

All outboard motors have provision for emergency starting. Details of emergency starting procedures can be found in the operators handbook.

7.19 THE COOLING SYSTEM

Outboard motors are cooled by water. Water enters the system through an intake and is directed to the water pump located in the lower unit. From the water pump the water passes to cool the engine and exhaust system before discharging through the exhaust outlet.

7.20 FRB motors have a thermostat which by either recirculating water within the head, or by bypassing the head until operating temperature is reached, maintain optimum engine operating temperature.

7.21 Cooling systems on FRB motors show a water discharge through the exhaust outlet or through a "telltale" to indicate the circulation of water through the cooling system.

7.22 On starting the motor, check that water is being discharged from the outlet. NEVER RUN A MOTOR OUT OF THE WATER. THIS WILL NOT ONLY CAUSE OVERHEATING BUT WILL ALSO SERIOUSLY DAMAGE THE WATER PUMP. If water is not being discharged, stop the motor immediately and locate the cause which could be:

a. weeds blocking the water intake;

b. plastic bags blocking the intake;

c mud or debris blocking the intake;

d. motor not deep enough into the water; or

e. damaged or faulty water pump.

7.23 FLUSHING AND CLEANING OF MOTOR

Manufacturers of outboards specify that internal flushing of motors with fresh water is no longer necessary. As FRBs are required to operate in conditions far worse than those envisaged by the manufacturers, FRB crews are still required, at the end of a days operation (especially when operating in muddy, weedy or salt water), to flush the motor internally, wash the external parts and wipe them dry Clean fresh water must be used.

7.24 THE POWER TRAIN

The power head delivers power to a drive shaft which in turn drives a propeller shaft through a gear box located in a streamlined housing in the lower leg. The power is transmitted to the propeller which imparts thrust to the water.

7.25 PROPELLERS

An outboard motor propeller moves through the water in a similar manner to a wood screw through wood. Propellers are rated by the following:

a. **Diameter** - The distance through a circle described by the blade tips The correct propeller diameter is determined by motor design, especially by horsepower and gear ratio and this should not be changed from manufacturers recommendation.

b **Pitch** - The distance travelled forward by one revolution of the propeller. Propeller pitch is like the gear ratio in a car and should be individually selected to suit boat design and usage. Too little pitch will cause a motor to overspeed which will cause motor damage. Too much pitch will overload the motor and reduce performance (see Fig 7:2).

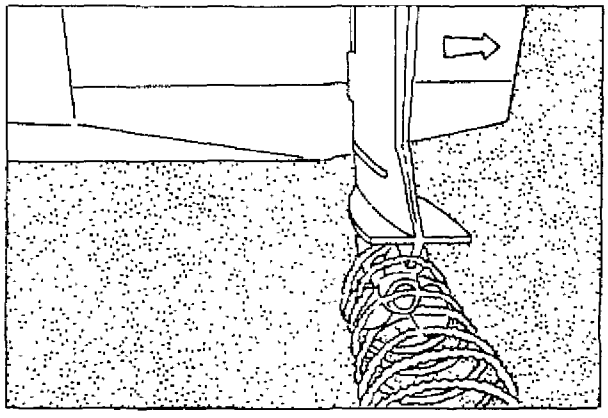

Figure 7:2

c. **Number of Blades** - Propellers of the same diameter and pitch may have a different number of blades.

PROPELLER CARE AND REPLACEMENT

7.26 Any unusual or excessive vibration in the motor may be caused by a badly bent or nicked propeller which must be replaced.

7.27 A spare propeller must always be carried as part of boat equipment.

7.28 Many propellers have an inbuilt shock absorber, to minimise propeller damage and also to reduce the possibility of shearing the pin when the propeller strikes an object. If a shear pin or propeller becomes damaged, it can easily be replaced.

7.29 Before installing a new propeller or shear pin, remember to put some special outboard grease on the propeller shaft. Also, be sure that the shift lever is in the Neutral position to prevent injury should the motor accidently start.

7.30 Some models dont utilise shear pins. The propeller is splined to the propeller shaft and a live rubber safety clutch gives on impact, then resumes running but only at low power. The propeller will then need to be replaced as soon as possible.

7.31 **PROPELLER MAINTENANCE**

The propeller in use is subject to frequent damage. The maintenance necessary to ensure proper propeller performance is as follows:

a. File away any minor burring.

b. If a propeller is damaged, dented or out of shape to any degree, arrange for repair and balancing. Ensure there is a spare propeller, drive pin, propeller nut and cotter pin available before using the boat

MOTORS DROPPED OVERBOARD

7.32 An outboard motor may be lost overboard at any time if either:

a. the clamps are loose; or

b. the stern bracket or transom breaks.

7.33 When a motor is dropped overboard, the procedure under the headings NOT RUNNING, RUNNING, and IN SALT WATER should be followed except that if sand has entered the motor, no attempt at starting should be made until it has been fully serviced.

7.34 If the motor is not retrieved immediately and is recovered only after an extended submersion followed by a delay in having it serviced, the power head should be submerged in clean fresh water, to prevent oxidation until it can be serviced.

7.35 **MOTOR NOT RUNNING**

a. Recover the motor from the water immediately, if possible.

b. Remove the engine cover and wash the motor in clean water.

c Disconnect the spark plug leads and remove the spark plugs. **Caution**. Detach rubber spark plug lead covers and ground spark plug lead terminals by attaching them to the motor block so as to avoid electric shocks.

d. Expel as much water as possible by pulling the starter handle several times with the motor in the upright and then in the inverted position Pour a small amount of oil through the spark plug hole of each cylinder and pull the starter handle several times to distribute the oil.

e. Remove the pull start assembly and flywheel.

f. Wipe the magneto dry with a clean cloth, being sure that no water stays between the breaker points.

g. Drain the carburettor and fuel filters

h. With the carburettor high speed needle removed, connect the fuel line to the motor and the tank (presuming of course, that the tank did not go into the water). Squeeze the primer bulb so that the fuel mixture will be forced through the fuel line and out of the high speed needle orifice.

i. Reassemble the parts removed and follow the starting instructions. Liberally spray with de-watering fluid (WD 40 or similar).

j. If the motor fails to start, remove the spark plugs again, to see if water is present between the electrodes. Blow out any water from between the electrodes and reinstall, or replace with new ones. If the motor fails to start, have it serviced immediately. To minimise damage, the motor must be started or serviced within 2 or 3 hours of recovery.

7.36 **MOTOR RUNNING**

Follow the same procedures as for motor dropped overboard NOT RUNNING. However, if there is any binding when the flywheel is rotated (by pulling the starter handle), it may indicate a bent connecting rod and no attempt should be made to start the motor. It must be serviced immediately.

7.37 **IN SALT WATER**

Follow the same procedures as motor dropped overboard NOT RUNNING. However, have it serviced as soon as possible, even if it can be started, as salt water can cause excessive corrosion of internal parts.

7.38 **REACTION PROCEDURE**

The following procedures should be adhered to should a motor go overboard:

a. Drop anchor immediately and get the way off the boat so that it stops as near as possible to where the motor disappeared.

b. Mark the spot. Bubbles or mud will, for a while, indicate where the motor disappeared. Throw a spare life jacket with line and weight attached over to mark the spot.

c. Call for assistance from any other boats in the area.

d Try to locate the motor with grapples, or by any other means available.

e. In shallow water it may be possible to recover the motor immediately but in deep water, divers may have to be used.

7.39 The most important factors in successful recovery of a motor are rapid reaction and the crews ability to obtain a good 'fix' on the point where the motor disappeared.

GENERAL MAINTENANCE

7.40 Each unit must prepare and implement a planned maintenance programme to ensure the outboard motor is at all times ready for use and will provide safe efficient operation,as required under hazardous conditions.

7.41 Outboard motor general maintenance is carried out by the crew and no particular mechanical ability is required. Crew members should be aware of their limitations and not go beyond the bounds of user maintenance or their ability.

7.42 Maintenance routines should be carried out each month, if a boat has not been used, or after each use. Where a motor is used frequently, or is subject to hard usage, the requirement for maintenance will increase In addition to general maintenance carried out by crew members, the motor should be inspected and serviced by a qualified outboard motor mechanic at least annually or more often where use dictates.

BOAT MAINTENANCE

7.43 A most necessary part of the care and maintenance of a FRB is the cleaning after each use and at regular intervals during storage. The cleaning procedure for a typical aluminium hull is as follows:

a. Hose down the hull with clean, fresh water to remove dirt or salt and to soften stains, rubbing down with a soft brush or cloth will assist.

b. Using a soft scrubber and detergent, scrub the hull to remove stains. Do not overscrub antiskid patches or abuse the paintwork.

c Suds should be hosed off with fresh water and excess water drained from the boat.

7.44 CORROSION

While requiring comparatively little maintenance, aluminium hulls are subject to corrosion. Any light surface corrosion on a well cleaned hull will usually cause only minor discolouration.

7.45 HULL INSPECTION

The cleaning of a boat will provide an opportunity to inspect the hull. All fittings should be checked for operation and security. Watch out for cracked welds, popped rivets, dents, distortions and scratches in the paint work. All defects should be noted and rectified as soon as possible.

7.46 NEW FITTINGS

Where a new fitting is attached to a hull, care must be taken that metals are insulated by a nonconductive gasket of neoprene rubber or similar material. Care must be taken to ensure that the hull member to which any fitting is attached is capable of withstanding any load likely to be generated in use.

7.47 PAINTING

For identification purposes, all FRBs should be painted inside and out with yellow recognition gloss. The first step in painting the boat is to remove all the old loose or flaking paint. Then sandpaper and thoroughly wash the surface. To prepare the surface for good paint adhesion, an etch-primer combination should be used, followed by a layer of undercoat having the same base as the final coat chosen. The final coat should be a vinyl, alkali or epoxy resin base, all of which are excellent for aluminium. Do not use any paint that has a copper, lead or mercury base. These metals cause the destructive action of electrolysis to the aluminium. The boats paintwork should be retouched when scratched.

7.48 HULL REPAIRS

Where an aluminium hull suffers major damage or distortion, it will require repair by a skilled tradesman using specialist equipment. Some minor repairs are within the capabilities of local units and crew members. Minor dents, can be carefully taken out using a rubber mallet. Bolts, nuts and screws which have worked loose or been lost can be replaced using non-corrosive stainless steel replacements.

STORAGE

7.49 Prior to any long term storage, all equipment should be removed from the boat and thorough inspection made of the hull. All materials likely to cause corrosion (batteries, nails, chemicals etc.) should be cleaned from the bilges or any corner into which they may have slipped.

7.50 When the inspection is complete, the hull should be thoroughly cleaned and dried.

7.51 The boat should be stored in a building on a properly adjusted trailer or cradle and covered by a tarpaulin or boat cover. If indoor storage is not possible, it is advisable to store the boat with the bow elevated and the bungs removed, to allow drainage.

CHAPTER EIGHT

LAUNCHING AND RECOVERY

INTRODUCTION

8.01 Where possible FRBs should be launched and recovered at properly constructed boat launching ramps These, however, may not always be available. In the absence of a boat ramp, any gently sloping bank or beach which will safely bear the weight of the towing vehicle and or trailer may be used.

LAUNCHING CONSIDERATIONS

8.02 FROM A PREPARED SITE

Check the launch site for debris and sudden drops Check that the ramp is safe and that the water is deep enough to allow for safe launching.

a. **Uncertain Ground** - If uncertain of the ground, in order to avoid bogging the towing vehicle, it is sometimes advisable to uncouple the trailer and manhandle it to the waters edge. Care must be taken to avoid rolling the trailer into the water. If launching over very muddy or boggy ground, the boat could be removed from the trailer and either carried or pulled into the water.

b. **Vertical Banks** - When there is neither a boat ramp nor suitable beach, it is possible to launch over a low vertical bank, providing sufficient manpower is on hand.

c. **Public Boat Ramps** - When using public boat ramps, park well clear of the ramp to prepare the boat for the water. This then permits others to use the ramp and avoid delays.

d. **Trailer Attachments** - All trailer attachments likely to be affected by immersion should be removed from the trailer before launching.

e. **Bungs** -Bungs and drain plugs must be checked and secure.

f. **Boat Equipment** - Stow all equipment to ensure it will not be damaged or create a hazard during the launching operation. Check that the radio is correctly fitted and operational.

g. **Motor** - Prepare the motor for starting. Lock it in the tilt position to avoid the skeg striking the bottom on launching.

h. **Fuel** - Check fuel tank contents, fuel lines and that there are no fuel leaks.

i. **Tie Downs** - Remove the tie down strap and loosen the winch cable but leave the boat attached to the cable.

8.03 FROM AN IMPROVISED SITE

The following factors must be considered before launching from an improvised site:

a. It is always much safer to launch a FRB from a prepared launch site rather than from an improvised launch site.

b The urgency of the task might dictate that it is a better proposition to launch a boat at a prepared site and travel 10 km to the scene of the operation. On the other hand, if the scene of the operation is 40 to 50 km from a prepared launch site then obviously it is quicker to transport by road and launch at an improvised site closer to the area of operation.

c. Fuel usage over long distances and the operational range of the FRB will often determine the acceptability of a launch site.

d. The availability of a 4WD vehicle. Nearly all launches from improvised sites necessitate the use of a 4WD and at the very minimum, a winch or Tirfor.

e Is vehicle access to the area of operations possible

LAUNCHING USING A VEHICLE.

8.04 FROM A PREPARED SITE

When reversing, all normal precautions for safe driving should be observed, and care must be taken on slippery, sloping surfaces near the water. Reverse, if possible, to your right hand side so that you can always see where you are going. (see Fig 8:1).

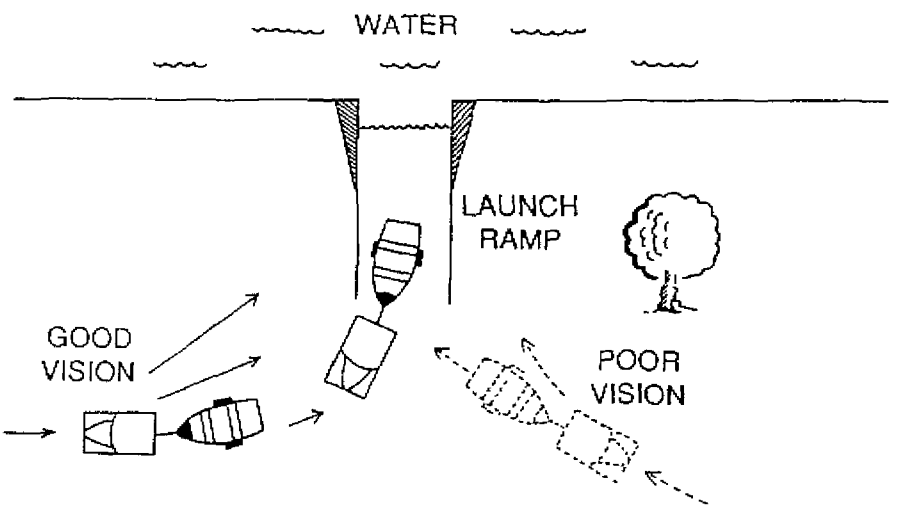

Figure 8:1

a. **Wheel Bearings** - When moving the trailer into the water it should not be necessary to allow the trailer wheel bearings to submerge. Cold water entering warm wheel bearings is a major factor in trailer wheel bearing failure, particularly if immersed in salt water.

b. **Hand Brake** - When the trailer is in sufficient depth of water, stop the vehicle, switch off the motor, apply the hand brake and engage first gear

c. **Painter** - Ensure a painter (bow line) is attached to the boat and is held by one of the crew.

d **Trailer Tilt** - The boat can be pushed off the trailer into the water. If fitted, the trailer tilt will assist in this operation.

e. **Parking** - At this stage the towing vehicle can be driven away and parked Ensure the towing vehicle is parked well above likely flood or tide heights

8.05 **FROM AN IMPROVISED SITE**

Once it has been decided to launch the FRB at an improvised site, the following procedure should apply.

a. The first consideration is to conduct a thorough inspection of the area: Choose a spot where the bank is least steep, or the lowest part of the bank and the surface is more even (not over wash aways, etc) If you are able to reverse back or lower the boat trailer to the waters edge, check to see if the ground is firm under the waters surface, so that the trailer does not catch or sink on one side during launching or recovery. Clear any obstacles away from the intended launch site e.g. logs, large rocks etc. the less hazards the better

b. Once the site has been inspected and prepared, the next step is to launch the boat. For this operation a minimum of two persons is required, and preferably three. One to operate the 4WD vehicle and one to observe the progress of the trailer and issue any corrective instructions.

c. If three persons are available, one to drive, one observing from the port quarter of the boat trailer and the Coxswain walking alongside the driver of the vehicle passing on instructions to the driver. At no time during launching, must anyone stand or get behind the boat or vehicle in case of failure of the vehicles brakes, the boat trailer breaking away from the tow vehicle or loss of traction by the tow vehicle.

d. Once the trailer wheels are at the waters edge, the person or persons not in the vehicle can tilt the trailer and launch the boat. During launching and retrieval of FRBs, the driver of the vehicle must not wear a seat belt. (If the seat belt is worn and the vehicle slips back into deep water, it may hamper the escape to safety of the driver). The driver of the vehicle must stay in the vehicle at all times during launching and recovery.

e. To reduce the chance of rolling or slipping back any further than required, chock the wheels of the tow vehicle. Always launch, the boat at right angles to the waters edge.

LAUNCHING FROM AN IMPROVISED SITE WITHOUT A VEHICLE

8.06 If the bank is too steep to use a vehicle, it may be necessary to lower the boat and trailer to the waters edge with the aid of a winch. Area preparation is carried out as for a vehicle launch.

8.07 **PROCEDURE**

Back the FRB and trailer to the edge of the launch site, chock the wheels of the trailer then disconnect it from the tow vehicle. Secure the winch to the trailer. While one person operates the winch, another person moves with the boat and trailer down the bank, making any alterations to the boats direction as necessary. When the trailer has reached the waters edge, launching can be effected by tilting the trailer and allowing the boat to slide off into the water with the following precautions

a. Never disconnect the trailers winch cable from the boat, when launching down steep inclines, until the boat is ready to be launched.

b. Never step over a winch cable or rope while it is under tension.

c. Use gloves when handling steel wire rope.

d. Use a log, bag etc. to prevent cable from dragging or cutting into the top edge of the bank

e. It may be necessary to extend the length of the winch cable by use of additional cordage or steel wire rope.

f. Very steep launch sites In most cases, when launching FRBs down vertical, or near vertical inclines, it can be made easier by sliding the FRB off the trailer and lowering it over the edge with the aid of ropes and/or winches Care must be taken not to let the progress of the boat get out of hand:

(1) At no time must anyone be between the boat and the water.

(2) If the motor is fitted always launch the boat with the motor in the tilt position, to prevent fouling.

HAZARDS OF IMPROVISED LAUNCH SITES

8.08 SAND

It is virtually impossible to launch a FRB from dry sandy areas without the aid of a 4WD vehicle Even with a 4WD it may be necessary to lower the pressures in the tyres, boat trailer included. The main factor to remember when operating (driving) in sand is do not spin the wheels. Once the wheels start spinning, the vehicle may become bogged. Clearing sand away from in front of the wheels and/or winching are usually the options available in these circumstances.

8.09 MUD

Greatly increases the hazards of launching from improvised sites. Crew members must use great care when operating on steep muddy slopes, as the loss of footing which could result in one or more personnel in the water or some one being run over by the trailer or vehicle. Vehicles do not have the same traction in muddy conditions which may result in the vehicle having to be secured to a tree or some form of anchor.

8.10 CROSS WINDS

May require the aid of a person holding a rope tied to the stern cleat and standing on the upwind side of the boat to keep the boat in line with the trailer until fully launched

8.11 ONSHORE WAVE ACTION

On lake or sea launches, when the wind and wave action is directly onto the launch site, care must be taken that waves do not wash over the boat and swamp it.

8.12 Listed above are some of the major hazards that can be encountered during launching from improvised sites. No matter what the hazard may be, remember that it is better to slow down and launch smoothly rather than make haste and damage the boat.

MOTOR STARTING

8.13 PRE-START CHECKS

The coxswain should board the boat and carry out final checks prior to starting including: (Consult the operator handbook for motor pre start checks.)

a. **Leaks** - Ensure there are no leaks, particularly in the area of the bungs and drain plugs.

b. **Trim** - The trim of the boat is checked and corrected where necessary

8.14 START UP

When satisfied that the boat, its equipment and the motor are ready for safe operation, the coxswain can start up. Ensure:

a **Propeller Clearance (smooth water)** - The boat is moved into deeper water stern first with the crewman steadying the bow. When in water deep enough for the skeg and propeller to clear the bottom, the coxswain lowers the motor to the run position, and starts the motor.

b. **Water Pump Indicator** - When satisfied that the motor is running smoothly and after ensuring the water pump indicator has a flow of water, the coxswain orders the crewman aboard.

c. **Push Off** - On being ordered aboard the crewman pushes the boat toward deeper water at the same time as boarding. The coxswain then engages reverse gear and moves the boat clear of the shore.

d. **Propeller Clearance (rough water)** - If launching into rough water or into surf it is often necessary to keep the bow of the boat into the waves. In this case the crew turn the bow towards the waves and move into deeper water.

The crewman boards the boat, ships the oars. The coxswain boards the boat and prepares the motor for starting. The crewman rows out into deeper water and the coxswain starts the motor once sufficient depth is obtained. The coxswain then engages forward gear and moves the boat clear of the shore.

RECOVERY

8.15 FROM A PREPARED SITE

On completion of an operation the boat may be recovered to the boat trailer in the following manner:

a. **Winch Wire** - The winch wire should be run out to the end of the trailer and hooked to the chassis. The outboard motor should be tilted.

b. **Reverse** - The trailer is reversed into the water, taking care not to submerge wheel bearings.

c **Hook On** - The crewman moves the boat to the rear of the trailer and rests the bow on the rear roller, then hooks the winch wire to the bow eyelet.

d. **Wind In** - While the crewman steadies the boat, the winch is wound in with the pawl engaged, using the trailer tilt if necessary.

e. **Stem Posts** - After the bow is secure against the stem post, the trailer can be towed clear of the boat ramp.

f **Attachments** - Light fittings, boat tie downs and motor supports are fitted and the trailer is prepared for road towing.

g. **Drain** - Remove the bungs so that bilge water can drain out.

h. **Equipment** - Stow and prepare all equipment for road travel.

8.16 FROM AN IMPROVISED SITE

a. Generally, a boat is recovered from an improvised site in the same manner in which it was launched, i.e. if the trailer was lowered down the bank by means of a winch, then it is usually recovered using the trailer and winch There are exceptions but the above is generally the rule. All precautions should be observed during recovery, because there is more tension on the rope or cable during recovery than there is during launching. Again, do not stand behind the boat and do not step over cables under tension.

b. Once the boat is on level ground again, check the trailer wheels, if necessary, secure the boat, pack equipment and prepare for road towing.