

**LOOKING AFTER  
AND SAILING  
A MIRROR DINGHY**

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## Looking After your Mirror

There are certain steps you should always take in looking after your Mirror which save you time and money in the long run, and help keep your boats performance at its highest level.

1. Looking after the hull of your boat is very important to ensure that your Mirror is moving through the water as quickly as possible. Never drag your boat up the beach as this can cause the hull serious damage with sand and rocks scratching the surface of the boat. Not only does this somewhat diminish the appearance of your boat, it is not good for boat speed. Carrying the boat or using a trolley is a much better alternative.
2. Washing your boat down with fresh water after you have been sailing is a good idea if you want to save money on boat maintenance. (boat fittings corrode easily)
3. Rolling up your sails helps to preserve them keep them in shape. Try to avoid crumpling them up and creasing them. Do NOT FOLD.
4. Remove the bungs and ports after you have sailed to ensure there is no water inside the tanks, and leave them out whilst the boat is being stored to prevent heated air expanding in the tanks which puts pressure on the fibreglass seams which can cause them to leak.
5. Ensure all the water is removed from inside the boat whilst being stored, because with wooden boats the water will be absorbed into the hull making it heavier, and eventually causing the wood to rot.
6. Store your boat either in a dry shaded place, or with a cover over it to protect paint and varnish.
7. Always replace faulty gear as soon as possible and keep an eye on ropes and wires which have started to fray.
8. Check the forestay wire is not frayed, as a spinnaker can easily be ripped on the sharp exposed wires of a fraying forestay.

# Boat set up

1. Rig tension
2. Measuring rig tension
3. Mast rake

There are many factors which effect the speed of your Mirror which can be measured and adjusted very easily such as mast rake and rig tension.

1. When you put up your mast and pull the forestay tight, you are actually putting on the rig tension. Rig tension is basically the amount of force pulling the mast forward locking it in position. If the mast is loose and allowed to move around, the centre of effort changes, which is the total effort of the wind on the sails, and if this is out of balance with the centre board and rudder the performance of the boat will greatly deteriorate.
2. A measurement can be made using a tension gauge on one of the side stays, however these gauges can be expensive. If you do not own a tension gauge and can borrow one for a few minutes set up your mast, place a few turns in the tack line (rope on the end of the forestay) and pull the mast forward at the same time as pulling the tack line tight tying it off when the required tension has been achieved, then mark the tack line with a waterproof marker so the same settings can be reproduced next time you set up your mast. On the other hand many sailors still rely on good judgement when setting their rig tension, using the same technique for applying the required tension the side stay is plucked producing a note of sorts, recognisable by the more experienced sailor. (NB **It is hard to get a note from a slack side stay**).

Rig tensions vary greatly from boat to boat, however an approximate tension which is commonly used is ~20.

- 3 Mast rake is a measure of how far back the mast leans, and is established by measuring the distance between the centre of the gaff halyard sheave at the top of the mast to the top of the transom. The mast rake effects the angle that the boat can point when sailing close hauled, relative to the speed the boat can achieve down wind. In general, the further back the mast is raked the higher the point, and the further forward the mast is raked, the lower the angle you can point. However when the mast is raked further forward downwind performance is improved.

## How to measure mast rake

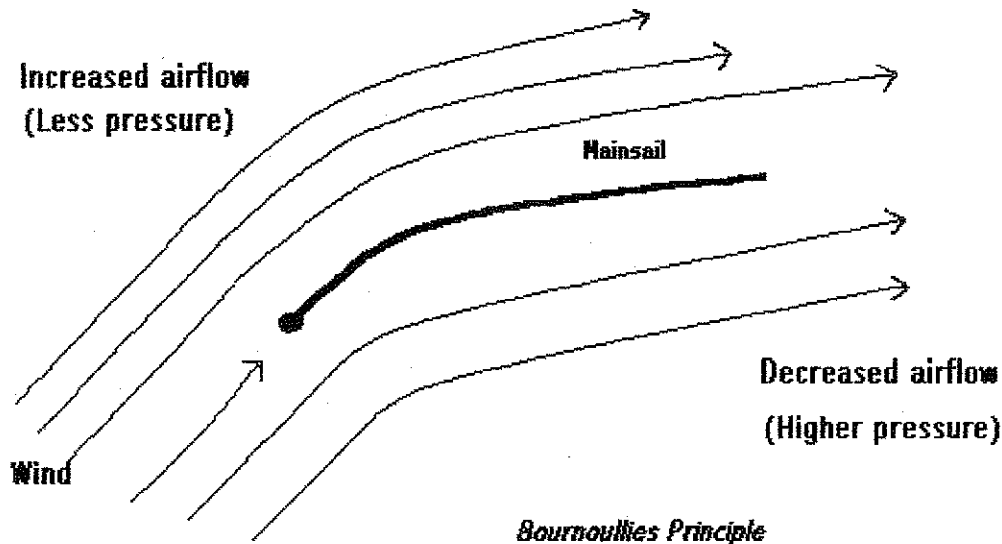
It is very simple to measure the mast rake of a Mirror. Rig up your mast (make sure the rig tension is correct) and simply use a tape measure to measure the distance from the centre of the gaff halyard sheave at the top of the mast to the top of the transom. ***The ideal mast rake is any where between 3.630M and 3.700M.*** You will know if your mast rake is set too far back when you are out on the water, as you will experience what is called weather helm. If you have too much weather helm the boat tries to round up into the wind all the time and you are continuously fighting the tiller to keep on course. The mast rake is set properly when the

skipper does not feel the adverse effects of weather helm, and if the tiller is let go of the boat will gradually (and safely) round up into the wind and luff.

## Sail Adjustment

### How the sail works

The basic sail, that is the mainsail and the jib, work on the same principle as an aeroplane wing. The side closest to the wind has more pressure than the side away from the wind because the air has further to travel, and so travels faster. Bernoulli's principle states that a fluid accelerates from a high pressure to a low pressure area and thus the combination of these two pressures creates a force acting from windward to leeward which enables a plane to climb, or a boat to be pushed forward. The jib also effects the main as the wind it channels flows over the leeward side of the main which increases the amount of air flow and decreases the pressure on that side of the sail which in turn increases the speed of the boat.



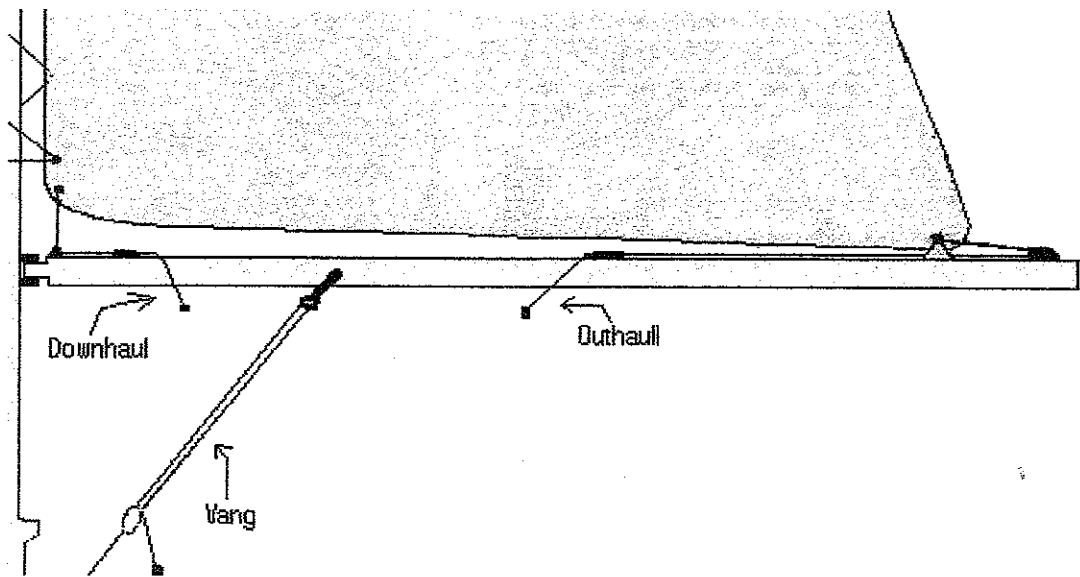
The shape of the mainsail can be adjusted quite dramatically by trimming the sail. The standard methods of adjusting a mainsail are by the out haul, down haul (Cunningham), and vang.

### The out haul:

The out haul adjusts the foot of the sail, increasing or decreasing the depth and power of the sail in different conditions.

### The down haul:

The down haul adjusts the luff of the sail and causes the mast and gaff to bend back which loosens the leach.



### **The vang:**

The vang which is a rope or wire attached to the boat and the boom, adjusts the leach of the sail and prevents the boom from rising on runs and reaches.

It is also directly associated with the twist in the sail. This twist causes the air to be channelled from one side of the sail to the other.

However, when the wind strength increases the twist can become too great and de-power the sail. To control this boats have a vang which when pulled on, decreases the amount of twist by pulling down the boom and sail closing the leach. In light airs the twist decreases allowing the wind to flow across the sail, this is when the vang is let off.

The tension of the **vang**, **downhaul** and **outhaul** depend upon the conditions of the wind.

**For light airs:** In order to keep the boat moving, the outhaul should be pulled on so that the sail is flat. This is so that the little wind there is, can flow across the sail without stalling. (You can tell if a sail is stalling if the leach ribbons are not flying. When the sail is set correctly they should fly 50% forward, 50% back.) There should be virtually no vang to increase twist and no down haul.

**Medium airs:** In medium conditions generally, the out haul should be let out so that the sail is deeper to get more power. The vang can be pulled on a little to keep the boom from kicking up, and a little down haul to take the creases out of the sail.

**Heavy airs:** In heavy conditions the out haul should be pulled on to decrease power, the vang to decrease the twist (however if you are very over powered you can let the vang off to decrease power) and downhaul should be pulled on.

# Boat Trim

There are many simple ways in which you can make a boat move faster which involve the skipper and crew simply moving a little more forward in the boat, or sitting on the side of the boat that little bit further out.

## **1. Keeping the boat flat (safer sailing)**

One very easy way of increasing your boat speed is simply keeping the boat flat especially in heavy conditions. Because of the shape of the Mirror, it is very slow to sail it leant over to one side, except when the conditions are very light. Therefore to increase your speed, you must HIKE! (ie lean out) This of course does involve some level of fitness, and as in most sports, the fitter person has an advantage.

## **2 Where to sit?**

Where the skipper and crew sit is also very important. In heavy conditions, the skipper and crew want to be sitting right next to each other on the gunnel, approximately level with the thwart (the seat). In medium conditions the skipper sits where he or she is comfortable and the crew keeps the boat level. In light conditions the mirror sails well if allowed to heel over. This involves the skipper sitting on the thwart or deck, and the crew either crouching on the floor, or also sitting on the thwart. It is also important in light conditions to sit well forward in the boat. This lifts the transom further out of the water and thus reduces drag and increases speed.

## **3 Down breeze sailing**

Sailing down wind (running) is not a time to slack off completely, there are many steps which can be taken to improve performance. The centre board should be raised approximately half way (it helps if a pen line is drawn on the centre board on the beach to indicate the half way mark) as it is not needed to prevent the boat slipping sideways. The spinnaker can be hoisted and this is also a good time to open the self bailer if the wind is strong enough. When reaching the centre board can be raised approximately one quarter of the way up.

## **4 Light weather sailing**

In light weather it is important not to make any rapid body movements as this can stop the boat moving all together. Make sure that you sponge out any water in the boat as this too greatly slows the boat down as does any other extra weight. Another common mistake in light weather sailing is over sheeting. Remember to let the jib and main off that little bit extra in the light breezes.

## **5 Heavy weather sailing**

In heavy breezes keeping the boat flat is very important, this is easier said than done as the boat capsizes very easily when you are not completely sure what your doing (and sometimes when you do know what your doing!!). The boat really needs to be set up for strong winds before leaving the beach, this is where rig tension needs to be at its tightest, and the jib at its lowest. The mainsail should be flattened by a combination of tightening the outhaul, pulling on the downhaul and applying vang tension after that best way to prevent a capsize is to simultaneously ease the sails and head up into the breeze whilst hiking out as hard as you can.

## 6 The Spinnaker

When sailing on a reach or run, the spinnaker greatly adds to the speed of the boat. It is important to raise the spinnaker as quickly as you can, this may take some practice and also be able to drop it as quickly as you can.

- **Spinnaker chutes/bags:** Lightweight chutes fitted to the port side of the boat are generally favoured for quickly launching and stowing the spinnaker, however in lighter breezes stowage bags fitted inside the forward cockpit bulkhead can present some advantages over chutes. Once the spinnaker is up the crew sets the pole height, and trims the sail.
- **How to set the pole:** It is very easy to find how to set the pole. You simply pull the pole around till it is approximately 90° to the wind.
- **How to set the pole height:** To achieve the correct pole height, the crew simply adjust the height until the two bottom corners are level.
- **How to trim the spinnaker:** To trim the spinnaker, the crew simply lets out the sheet until the front edge begins to roll.

# Glossary

**Sailing close hauled.** (**Pointing**) (**Sailing to windward**) Sailing as close as possible towards the direction of the prevailing wind. This is desirable as it lessens the time and distance the boat will have to travel from point A to point B.

**Port** Left (When facing the bow)

**Starboard** Right (When facing the bow)

**Windward** The side of the sail or boat closest to the wind

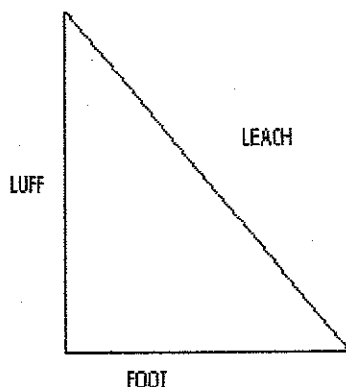
**Leeward** The side of the boat or sail furthest away from the wind.

**Main sail** The principle sail of a yacht. Usually the largest sail.

**Jib** Triangular sail in front of the mast which is also known as the **headsail**. The jib helps channel more pressure onto the main, this means that the jib and the main work together and so must be set to compliment each other(slot).

**Spinnaker** (**Kite**) A sail used by some yachts when they are sailing with the wind behind them (down wind) to increase their speed. The spinnaker is the principle sail down wind.

## Parts of a sail



**Slot** The space between the jib and the main is known as the slot. This is viewed from behind and it is beneficial to have the slot even.

**Twist** The speed of the wind close to the surface of the water is slower than that above it because the rough surface of the water causes turbulence in the air. This effect means less pressure is applied to the bottom of the sail than the top causing it to twist. This twist causes the air to be channelled from one side of the sail to the other. When more pressure is applied, the twist increases and air spills out of the back depowering the sail. This can be



prevented by pulling the vang on which tightens the leach, reducing the twist.

- Vang** Adjusts the twist of the sail
- Downhaul** Adjusts the luff of the sail
- Outhaul** Adjusts the depth of the sail, which increases or decreases it's power.

References:

Mirror Racing

(Guy Wilkins, Fernhurst Books)