

Talkin'bout

the mainsheet

For a newcomer to PT's, a walk around a fleet will bring the quick realisation that all PTs are not set up the same way.

This article is the first in a series which should help to explain to the uninitiated the variations in PT rigs and the possible advantages and disadvantages of the different systems used. It is intended as a guide only, as different skippers will swear by the systems they use and if it works for you, do it. We'll begin the series with the accelerator, i.e. the mainsheet.

The Rope

The first thing that might be noticed is the different thicknesses of rope used for mainsheets. Thicknesses generally range from 6 to 12mm diameter with 8 to 10mm being the more common. The thicker the rope, the larger the blocks (pulleys) need to be. The thinner the rope the easier it runs through the blocks, but the better the quality of the skipper's gloves need to be. If a ratchet block is used to take some of the mainsheet load, this needs to be a good one too if thin rope is used.

There are a number of different types of rope in use for mainsheets. The two most common are single braided and double braided. Single braided rope has a looser feel to it and is a bit softer on the hands. However, over time it tends to swell, meaning that (for example) a 10mm rope can become a 12mm rope, and this can increase friction through the mainsheet blocks. Double braided rope feels firmer and is more stable diameter wise. However, it can be a little harder on the hands and is more inclined to slip through ratchet blocks when under heavy loads.

Recently there have been more exotic types of rope appearing on some boats, and time will tell if these are a better option.

The Ratio

The PT uses a rear-beam mounted mainsheet traveller, so this determines the general location of the major part

of the mainsheet system. There is usually a 5-purchase system at the rear beam (i.e. 5 runs of rope between the boom and the traveller) as this makes sheeting in hard in strong breezes relatively easy. A 4-purchase system requires more effort to pull on tight but uses just over a metre less rope. A 6-purchase system requires less effort but adds a similar amount of rope. When turning from a reach or run onto a beat, less rope to pull in is good. Less rope on the deck and around the ankles is also good.

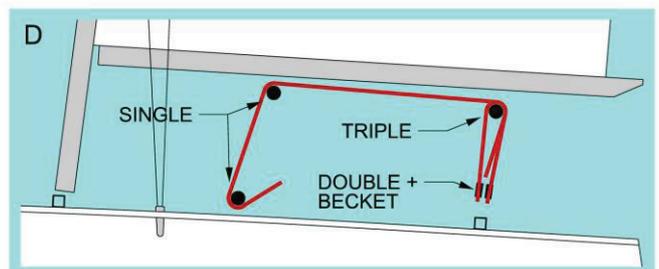
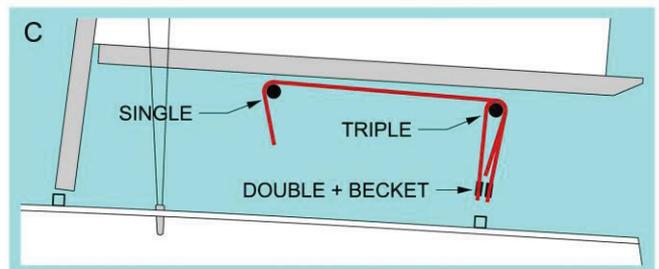
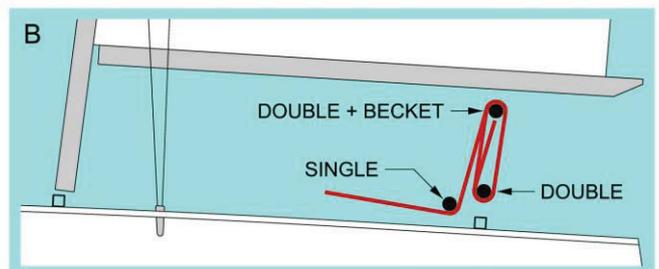
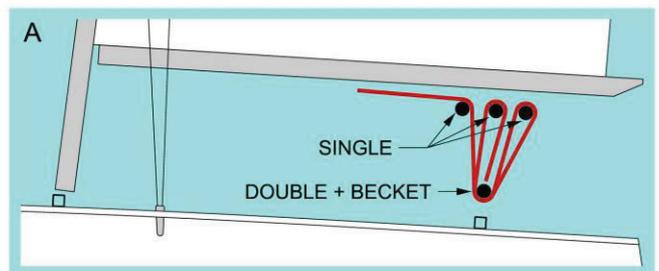
The Configuration

The system of blocks used at the rear beam is usually one of two arrangements; a double block on the traveller and either a double or triple block on the boom; or the same arrangement on the traveller with multiple blocks on the boom (see System A below).

Advantage of single block arrangement:- A slight reduction in weight over the multi-block setup.

Disadvantage:- Bunching of the mainsheet, which can increase friction when adjusting the system while running and reaching in light winds.

Moving forward from the main component of the system, three arrangements are commonly used to lead the mainsheet to the skipper (see B, C and D below)



Advantages of System B:- A slightly shorter mainsheet: a clear deck when tacking; no rope along the boom to get hung up on when tacking and gybing.

Disadvantages:- A tendency for the skipper to be pulled backwards along the deck by the sheet in rough weather; an unbalanced feel on a beat when trying to look forward with both arms pulling toward the stern; no assistance for the upper body from the pull of the mainsheet when hiking.

Advantages of System C:- A clear deck when tacking; significant upper body assistance when hiking.

Disadvantages:- Slightly less purchase on the boom than System D; the elevated angle of the mainsheet from the boom to the hand may feel awkward; the tail of the mainsheet could be hard to reach if the sheet is accidentally released in strong conditions; a tendency to unintentionally pull the boom towards you when sheeting in on in light weather.

Advantages of System D:- Some assistance to the upper body when hiking; slightly more purchase on the boom than the other systems; the tail of the mainsheet is always reachable at a central point on the deck.

Disadvantages:- Requires the longest mainsheet; the deck block has to be avoided when tacking; additional fittings (weight).

If using system C or D, it is desirable to have some form of guide fitted to the boom to prevent the mainsheet from sagging between the front and rear blocks during a tack or gybe and removing the skipper from the boat.

Nylon webbing is generally attached to the boom midway between the blocks to support the rope.

Running the mainsheet internally between these blocks has been tried, but it does create friction issues.



System D

The Blocks

The thinner the mainsheet, the smaller the mainsheet blocks can be (refer to the manufacturer's spec's), and size equates to weight. Light is good.

Blocks come in basic axle, and ball bearing varieties. Ball bearing types run more freely and therefore perform better and feel easier to use. As might be expected though, they are also more expensive. Basic blocks probably won't stop you winning races, but as this is the

main sail adjustment that you will be playing with throughout the race, good blocks are a good investment.

Your hands will thank you if you have an effective ratchet block in the system. Ratchet blocks are fitted with "teeth" that grip the rope, and a locking system that only lets the sheave turn in one direction, thus holding the mainsheet and taking load off the skipper. Some only operate when manually switched on, while others lock automatically when under pressure, then unlock when sheet pressure is released. Automatic versions are preferable.

The further that the rope turns around the ratchet block, the more effective the block is. It also operates more effectively the closer to the skipper it is, as the load on the mainsheet is less at that end of the system. As a compromise, it is usually mounted on the deck or as the first block on the boom.

Some blocks perform better than others and performance will vary with the choice of rope. Test other skippers' combinations to determine what works best for you. Good ratchet blocks can be pricey.

The Block Hangers

There are a number of ways to attach the mainsheet blocks to the boom, including metal or webbing straps, saddles, and adjustable racks. Whatever system is adopted, the rules state that their location must not be altered whilst racing.

As well as adjusting the angle of the sail and the tension of the sail leach, the mainsheet can also apply forward pressure to the mast at the gooseneck. The further astern of the traveller the blocks are mounted on the boom, the greater the thrust applied to the mast. The resultant mast bend can be a good or bad thing depending on the amount of bend and the cut of the sail. More mast bend flattens the sail and eases the leach.

The angle between the hangers and the traveller reduces and then reverses as the boom rotates to leeward, therefore the angle should be optimal at the setting for beating upwind in a moderate breeze. Generally, having the hangers closer to vertical above the traveller for the normal upwind setting may be the desirable option, as this allows effective leach control when sheeted on hard and any extra mast bending required to flatten the sail can be induced with the lower forestays. Check with the sailmaker to see how much mast bend he allowed for when designing the sail that you have.

Hanger racks or sliding tracks allow experimentation with hanger position or the adoption of different settings to suit specific conditions. However, these are not in common use. What matters most is that the mast is not overloaded at the gooseneck, as this can damage the mast track or permanently bend the mast.



Sliding block hanger

Cleats

Some skippers use a mainsheet cleat, and some don't. They have their good points and they have their bad points. The most important feature of any mainsheet cleat must be that **IT RELEASES EASILY IN ANY CONDITIONS FROM ANY ANGLE!!!** It is embarrassing capsizing upwind in a gust because the cleat couldn't be released while hiking frantically to hold the boat down.

If going with a cleat, it must be mounted on a rigid, swivel base. Cleats that float around in space will eventually get you. If the cleating angle is wrong, it will be a pain to get the rope into it, and if the uncleating angle is wrong, you will swim. A happy compromise angle can be elusive. I noted at the recent International series that some of the Kiwi boats had very long arms on their cleat mounts. This reduces the change in angle required to uncleat the rope. Good thinking!

Advantages of mainsheet cleats:- Less stress on the arms and hands; it leaves a hand free to make other adjustments when necessary.

Disadvantages:- It may cleat unintentionally, leading to a capsize; it may fail to release when required, leading to a capsize; it may attack the knees while tacking; they tend to be heavy.

An alternative to a central cleat are cleats mounted at the gunwale adjacent to the shrouds. These may be a bit safer to use upwind but will be unreachable off the wind. Realistically, however, there is usually too much sail adjusting to be done on a reach to need a cleat, and cleating on a reach in a decent breeze is just asking for trouble.



NZ mainsheet and traveller cleats

The Traveller

The important thing here is that the traveller car moves freely and that the skipper can operate it easily from all sailing positions. The adjustment cleat(s) is usually located centrally at the rear beam, but can also be brought forward to various locations.

Another important consideration is the skipper's ability to get his or her bum over the end of the rear beam, in order to sit on the rear deck when on a downwind screamer, and get back again without leaving some portion of their clothing or anatomy on the end of the track. Low profile tracks and bum-friendly end stops help greatly in achieving this.

According to the class rules the traveller track has to be straight, but there are "high" tracks, low profile tracks, tracks mounted on the back of the rear beam and split tracks mounted either side of the beam. The rules say the track mustn't be longer than the top of the beam.

Making the track as long as possible is good as it allows the mainsheet to control the leach tension on wider reaches before the vang needs to be applied (thus losing the ability to rotate the mast). The introduction of separate rotation control systems has reduced the significance of this point.

The end stops on the track can take a hiding. Therefore, it is essential that they are robust (while not doing damage to the traveller car, or your bum) and are solidly attached to the track or beam.

Next time we'll talk about **the downhaul**.

Ralph 