

Dynamic (on the water) Mainsail Twist Control

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Go-Fast Techniques

Full sized racing yacht crews use a combination of sheet tension, vang tension and traveler adjustments to optimize mainsail trim and twist. They can shift gears, for acceleration, for top end speed, and power up or depower the main in response to wind gusts. On model yachts, trips to shore are usually necessary to make adjustments. However, a radio controlled method can provide on-the-water mainsail trim and can effectively duplicate what on-board racing crews do to go fast. This can be accomplished by setting up and using programmable mixes that are available on most of the computer radios that are being used today. It can also be done manually, by adjusting the sails in and out, but not with the speed, precision, repeatability and combinations possible by using the features of the modern programmable transmitter. Developed and used initially on a Victoria, it has proven to equally effective on other classes as well.

The basic computer radio requirement is a 6-channel transmitter with at least two programmable mixes. The primary function is to increase twist to depower the main during wind gusts, to minimize heel and excessive helm, and to effectively “change gears” when acceleration is important. The secondary function is to reduce twist and power up the main to point higher, to attack a competitor, or fetch a mark.

The “G” Switch

The primary function is performed, by the “Gear” channel and switch (named “G” switch for short) while the secondary function is performed by the “Aux” channel and switch (named “P” switch for short). The Gear channel/switch is ideally suited to perform the

primary function, since it is generally located on the same side of the transmitter as the sail control channel and is left hand operated. Both functions take advantage of the boom offset, at the gooseneck, to increase twist as the sheet is eased or decrease twist as the sheet is tensioned. (Note: the boom offset is the distance the boom's gooseneck is set back from the aft end of the mast. This offset causes differential movement of the boom by effectively lengthening the boom as the sheet is tensioned and decreasing the length of the boom as the sheet is eased. Increasing the boom length tightens the leech, reducing twist, while decreasing the boom length loosens the leech, and increases twist. See photo below). To implement the functions, the transmitter is programmed to ease the sheets, a pre-determined amount, when the "G" switch is operated. The programming required is radio manufacturer specific, but to set this up, the "Gear" channel is mixed into the sail control channel. The Gear channel is the master channel and the sail control channel is the slave. A 10 percent mix (about a 10-degree movement) is a good place to start fine-tuning to a specific boat. Channel trim in addition to mix percentage changes, can also be used for fine tuning. The normal sailing position of the switch is toward the Skipper (up). When needed, the switch is moved away from the Skipper (down) to ease the sheets. Some of the ways to use the "G" switch during a race are: A) Switch down immediately as the boat is hit with a wind gust. Since the apparent wind moves aft, during a gust, immediately easing the sheets trims to the new apparent wind, reduces rounding up, heel/side slip, and maintains speed. Switch up to normal, as the gust subsides. B) Move the switch down (more twist low gear) during the entire starting sequence when acceleration is important. The switch is then returned to its normal (less twist high gear) position, after the start, or as appropriate. C) Switch down while tacking to accelerate, and then back to normal when appropriate. D) Switch down, as a low gear, open leech/slot wind finder, in extremely light air. Switch normal, to high gear, as the boat begins moving and gains sufficient speed.

The “P” Switch

It is a commonly used performance technique to trim in the sheet manually, from its normal position, to perform what is called vang sheeting. When class allowed, a spring-loaded compression vang is highly recommended to maximize the effect of the boom offset. The compression vang allows the boom to be lowered as well as moved toward the centerline of the boat. Also, newer technology flat leech model yacht racing sails respond the best to “G” and “P” switch techniques and provide the most control of leech twist. For the “P” switch, the idea is to sheet in a specific amount to slightly over trim the sails and tighten the leech on the main, which will allow the boat to sail higher for short distances. It may be then possible to fetch a mark or escape a wind shadow. The “Aux” switch, on the right hand side of 6-channel computer transmitters, can be programmed, using another separate programmable mix, to perform this secondary function far more quickly and repeatably, without tying up the trim control from it’s primary use. This secondary function is programmed the same way as before, except the Aux. channel is the master channel and the sail control channel is the slave. The normal switch position is down, away from the Skipper. To enable pointing, the “P” switch is moved up, toward the Skipper, to sheet in a specific programmed amount. Five percent movement is a good place to start the fine-tuning process. After the need for extra pointing is over, the “P” switch is returned to the normal position. A secondary use of the “P” switch is to remove sheet line stretch, in heavy air conditions, without the need to adjust trim settings.

Combinations of both switches can also be used as well, limited only by the programmable mixes available and the creativity of the Skipper. For example, some Skippers that sail boats that allow a separate jib trim servo use programmed mode switches, so that the main and jib can be controlled separately. That is, the main is

eased, but the jib position is unchanged during “G” switch operation, as one possibility. Of course, other modes and optional responses can be programmed simultaneously, limited only by the programmable mixes available.

While most of the functions described can be performed manually by moving the sail control stick, the speed, repeatability and precise response of using a switch, for a measured response, is an obvious advantage. Many races have been won by using the “G” switch alone. While the fleet lost to weather during gusty conditions, boats using the “G” switch held their line and were able to lay the mark, or make fewer tacks. Most modern programmable-based transmitters (even some 5 channel transmitters can be programmed for just using a “G” switch) have the capability, so why not use that to make on the water trim possible, and go fast!

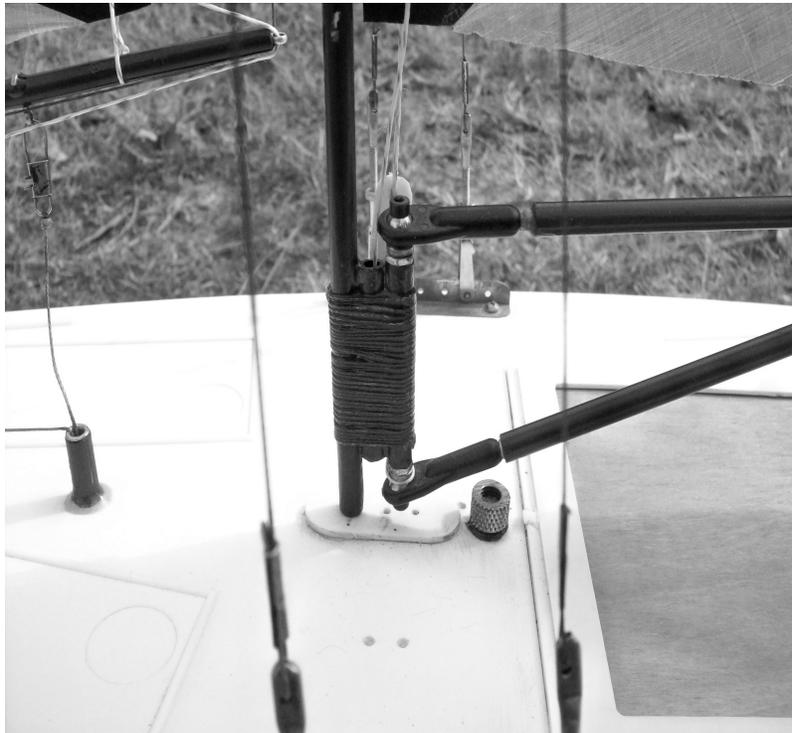


Fig #1 "G" Switch



Fig #2 "P" Switch

Fig #3 Offset gooseneck



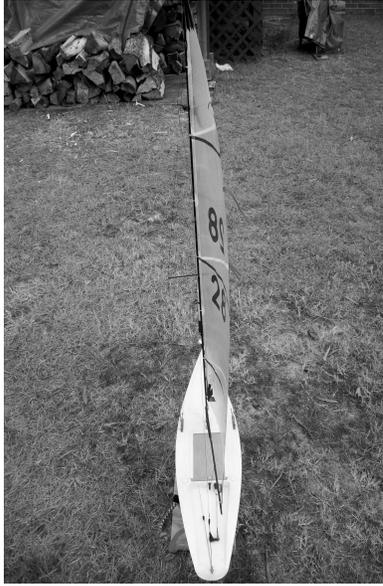


Fig # 4 "G" Switch normal

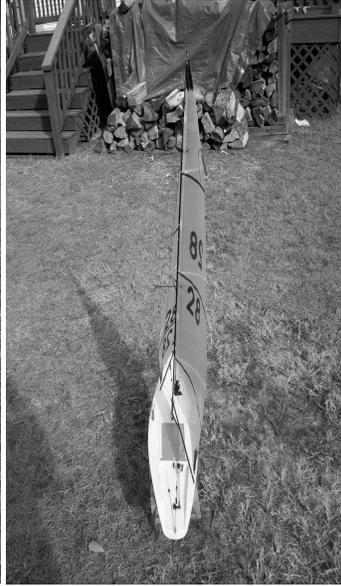


Fig #5 "G" switch operated

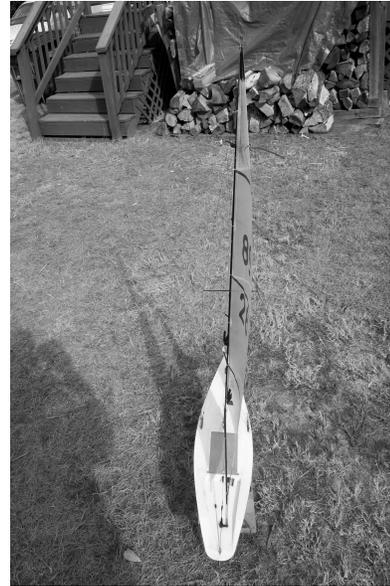


Fig #6 "P" switch operated