

# Manual

## Navico TP10 Tillerpilot

For service and advice please contact the main Simrad dealer in your country of residence.

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## I General

### I.1 Introduction

The Simrad Tillerpilot TP10 is a self contained automatic pilot suitable for a wide variety of tiller steered sailing yachts up to 10M (34 Ft) in length.

It is capable of providing reliable and accurate steering performance under a variety of different conditions with minimal current consumption.

The TP10 has been designed so that it is very simple to operate, using only five keys to access all functions.

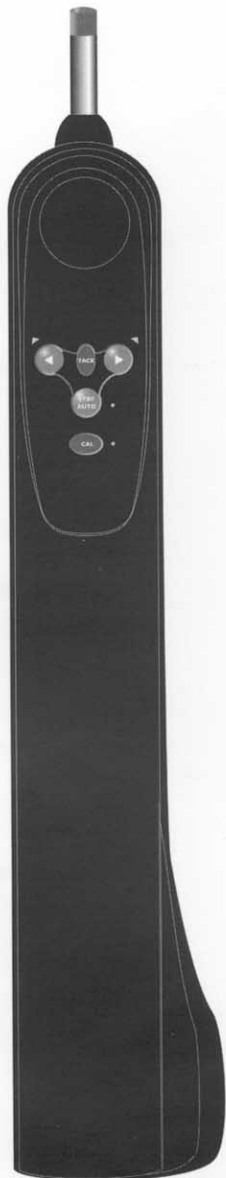
To ensure the best results from your Tillerpilot it is essential that the unit is installed correctly. Please read this manual thoroughly before attempting installation and use.

### Thank you for choosing Simrad

If you are pleased with your Tillerpilot we hope you will be interested in our range of marine electronic equipment, which is manufactured to the same high standards as the Tillerpilot. Please contact your nearest Simrad Agent for a catalogue showing our increasing range of high tech navigational instruments, GPS, Chart Plotters, autopilots, Radar, Fishfinders and VHF radio sets.

Simrad operate a policy of continual development and reserve the right to alter and improve the specification of their products without notice.

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Tillerpilot TP10

## 1.2 Technical Summary

### TILLERPILOT TP10 SPECIFICATIONS

Drive System	M10 drivescrew
Operating Stroke	250mm (10in)
Supply Voltage	12v DC (10v-16v)
Power Consumption (Typical)	0.06A (Standby) 0.5A (Auto)
Lock-to-lock time	6.9 secs (no load) 8.0 secs (20Kg load)
Max Thrust	65Kg (143lbs)
Mounting	Starboard as default (Can be reversed)



**Fig 1.1 - Tillerpilot dimensions**

## 2 Operation

### 2.1 General

The keypad of the TP10 has been designed to be as simple and intuitive to operate as possible. Using only five keys (Fig 2.1) it is possible to perform precise course adjustments and navigational functions.

The unit powers up in Standby Mode, indicated by a flashing LED next to the **STBY AUTO** key (Fig 2.2). The two direction LEDs above the Port and Starboard keys are always dimly lit, which provides night illumination for the keypad. All functions are confirmed by a “beep” and visually by the LEDs. Thus, the status of the unit can always be confirmed at a glance.

### 2.2 Autopilot Mode

While in Standby Mode, the pushrod can be manually driven in and out by pressing the arrowed **Port** and **Starboard** keys, which allows “power steering” of the vessel.

To engage Autopilot Mode, simply press the **STBY AUTO** key, and the Tillerpilot will lock onto the current course. The LED next to this key will stop flashing and remain permanently lit as long as the pilot is in Autopilot Mode (Fig 2.3). To lock the pilot onto the desired course, either steer the correct course and then engage the autopilot, or engage the autopilot and then adjust the heading until the correct course is being sailed (see section 2.3). If the **STBY AUTO** key is pressed and held, the pilot will beep a second time and lock onto the previously used heading (this feature will not be available if the unit has just been switched on).

### 2.3 Adjusting Course

While in Autopilot Mode, precise course adjustments can be easily made. By pressing either the **Port** or **Starboard** key once, a 1° course adjustment will be made in the specified direction. This is confirmed by a single beep, and the relevant Port or Starboard LED will flash once. By pressing and holding the key, 10° course adjustments will be made, confirmed by a double beep and a double flash of the Port or Starboard LED (Fig 2.4).

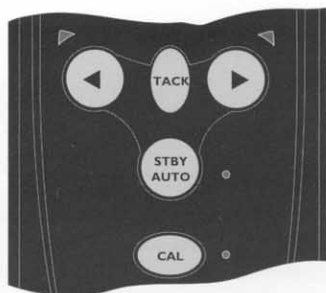


Fig 2.1 - TP10 Keypad

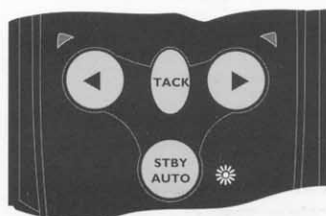


Fig 2.2 - Standby Mode



Fig 2.3 - Engaging Autopilot Mode



Fig 2.4 - Course adjustment to Port

## 2.4 Autotack

The Tillerpilot has a built-in autotack facility, allowing easy tacking of the vessel when single or short handed. An autotack is only possible when in Autopilot Mode

To initiate autotack, press and hold the **Tack** key, followed by either the **Port** or **Starboard** key, depending on which direction you wish to tack (Fig 2.5). The Tillerpilot will then tack the vessel through 100° in the selected direction.

The autotack is confirmed by a long beep, with the relevant Port or Starboard LED flashing during the course change.

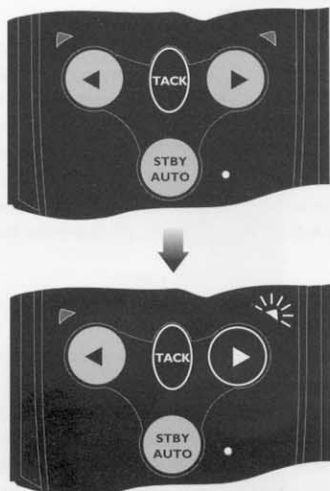


Fig 2.5 - Initiating Starboard autotack

## 2.5 Tiller Movement (Gain)

The Tillerpilot will apply adjustments to the tiller in order to compensate for heading variations, the amount of movement being proportional to the heading error detected by the compass unit. The amount of movement is set by the **Gain** (sometimes referred to as the rudder ratio).

Fig 2.6A shows the effect of setting the Gain too low: the vessel takes a long time to return to the correct heading. Fig 2.6B shows the ideal setting, where errors are quickly corrected. Fig 2.6C illustrates the effects of setting the Gain too high, which causes the vessel to oscillate around the correct heading. Excessive Gain (Fig 2.6D) creates a tendency to instability of course, leading to increasing error.

To adjust Gain, please refer to section 3.2.

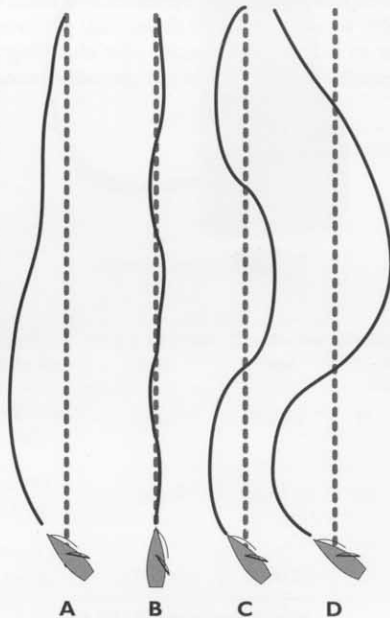


Fig 2.6 - Effects of Gain setting

## 2.6 Seastate

In rough weather, more variations in heading will be detected by the Tillerpilot due to the heavy seas yawing the vessel. If no account of this was taken, then the Tillerpilot would be overworked, causing unnecessary strain on the unit and excessive drain on the batteries. All Simrad Tillerpilots will continuously monitor corrections applied to the tiller over the course of a voyage, and allow a "dead band" within which the boat can go off course without corrections being made. The dead band is automatically set and updated by the Tillerpilot to give the best compromise between course holding and battery consumption. However, this can be manually set if so desired. To manually adjust the Seastate, please refer to section 3.4.

## 2.7 Autotrim

Under differing conditions a tiller bias (sometimes known as standing helm or rudder trim) is applied in order to steer a straight course. An example is when sailing close hauled where the vessel will normally pull into the wind, and the helmsman applies a standing helm to leeward in order to maintain course. The amount of this standing helm varies according to factors such as strength of wind, boat speed, sail trim and amount of sail set. If no account of these were taken, then the vessel would tend to veer off course, or pull round head to wind if sailing close hauled.

The Tillerpilot continuously monitors the average course error and applies a bias to the tiller to compensate until the optimum condition is reached. This bias or standing helm is applied gradually, so as not to upset the normal performance of the Tillerpilot. Thus, it may take up to a minute or so to fully compensate after changing tack. Once optimum trim is reached, the pilot will still monitor for changes in the prevailing conditions and update the trim accordingly.



### 3 Configuration

#### 3.1 Porthand Mounting

Although the Tillerpilot is factory preset for Starboard side mounting, it is possible to reconfigure it for mounting on the Port side of the cockpit, to facilitate easy installation on most types of yacht.

With the power off, hold down the **CAL** and **TACK** keys and switch on the power. Either the Port or Starboard LED will illuminate, depending on the current mounting configuration. Press the **PORT** key to select Port side mounting. The Port LED only will remain illuminated to indicate selection. Confirm selection and exit to Standby Mode by pressing **CAL**. (Fig 3.2).

To select Starboard mounting, repeat the above procedure, but press the **Starboard** key instead of **Port**.

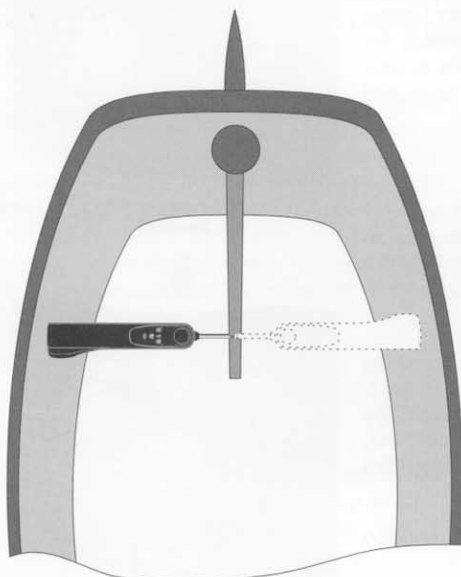


Fig 3.1 - Starboard and Port mounting options



Fig 3.2 - Configuring for Port mounting

### 3.2 Calibration Mode

To adjust the Gain and Seastate settings of the Tillerpilot (refer to sections 2.5 & 2.6), it is necessary to enter Calibration Mode, which can be done whilst the Tillerpilot is in either Standby or Autopilot Mode.

Press and hold the **TACK** key, followed by the **CAL** key (Fig 3.3). The Starboard green LED will illuminate to indicate that the pilot is in Gain Mode. To toggle between Gain and Seastate Mode, press the **TACK** key (Fig 3.4). The Port red LED will illuminate to indicate Seastate Mode.

### 3.3 Adjusting Gain

When Gain Mode is selected (indicated by the Starboard green LED illuminated), the Cal LED will flash and a repeated sequence of beeps will be heard. The number of flashes and beeps in the sequence indicates the level of the Gain setting.

To increase the Gain press the **Starboard** key the required number of times, to a maximum level of 9 (Fig 3.5). To decrease the Gain press the **Port** key the required number of times, to a minimum level of 1.

For example, if the Gain was set at 4 (indicated by a sequence of four flashes of the Cal LED and four beeps), and the Gain needed to be increased to 7, pressing the **Starboard** key three times would adjust the Gain accordingly. The Cal LED would then flash seven times and seven beeps would be heard.

### 3.4 Adjusting Seastate

When adjusting Seastate (indicated by the Port red LED illuminated), the Seastate level is indicated by the number of audible beeps and flashes of the Cal LED. No beeps or flashes of the Cal LED indicates that the Tillerpilot is set to automatic seastate (see section 2.6).

To switch from Manual to Auto Seastate and increase the Seastate level, press the **Starboard** key the required number of times to a maximum level of 9. To decrease the Seastate press the **Port** key the required number of times, to a minimum level of 0 - which will switch the Tillerpilot back to Auto Seastate.

To confirm Gain/Seastate settings and return to Standby Mode, press the **CAL** key.

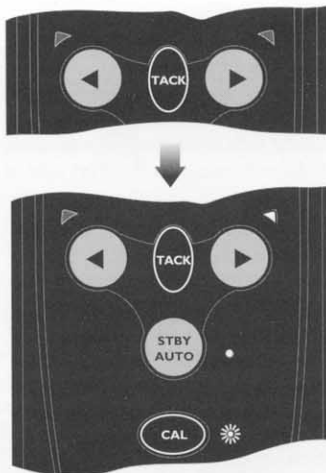


Fig 3.3 - Entering Adjust Mode



Fig 3.4 - Toggling between Adjust Gain and Seastate



Fig 3.5 - Increasing Gain level

## 4 Installation

### 4.1 Fitting Tillerpilot

The Tillerpilot TP10 is a very sophisticated piece of equipment, and therefore in order for it to function to its full capabilities, it is essential that it is installed correctly. Please read this section thoroughly before attempting installation and use.

The Tillerpilot should be installed so that it is level (horizontal - Fig 4.2 over), and 90° to the tiller when it is amidships and the pushrod is in the midstroke position (Fig 4.3 over). The pilot is factory preset to be mounted on the Starboard side as shown, but this can be reconfigured for Port side mounting (see section 3.1).

The dimensions given in Figs 4.2 & 4.3 (over) should be adhered to as far as possible, especially Fig 4.2. Some tolerance on the distance from tiller stock (Fig 4.3 dimension) is permissible, but the Tillerpilot may require a Gain adjustment to compensate (see section 3.3). If the dimension given in Fig 4.2 is not practical for the vessel to which it is to be fitted, a range of fitting accessories are available to facilitate correct installation. Please refer to section 5.5.

The Tillerpilot houses an internal fluxgate compass, and should therefore be mounted away from sources of magnetic interference, such as the vessel's steering compass. The minimum safe distance is 1M (3Ft).

The Tillerpilot is mounted using a supplied tiller pin and mounting cup, which allows the unit to be fitted and stowed easily.

To fit the tiller pin, drill a 6.3mm (1/4 in) hole in the tiller (ensure that this is on the centreline of the tiller and is vertical). Drill to a depth that allows only the top 18.0mm (3/4 in) to protrude. Fix in place using an epoxy adhesive.

To fit the mounting cup, drill a 12.7mm (1/2 in) hole into the cockpit seat and mount so that only the flange protrudes. Ensure that the cup is a tight fit (use an epoxy adhesive), and is supported over its entire depth. If necessary, reinforce the underside of the cockpit seat with hardwood or marine plywood.

**NOTE -** Due to the high loads exerted, do not fit the Tillerpilot to the mounting cup and pin until the adhesive has completely set.

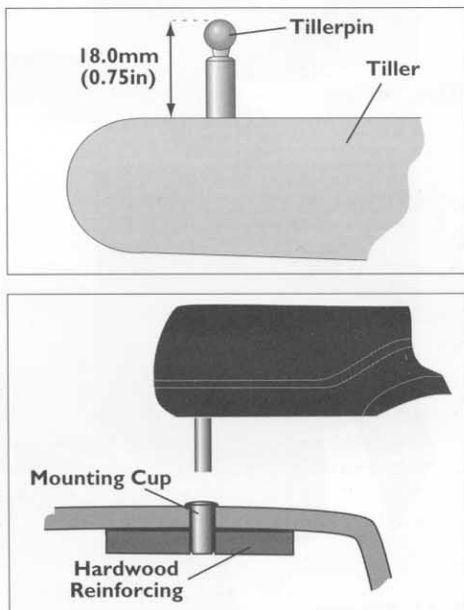


Fig 4.1 - Tillerpin & mounting cup

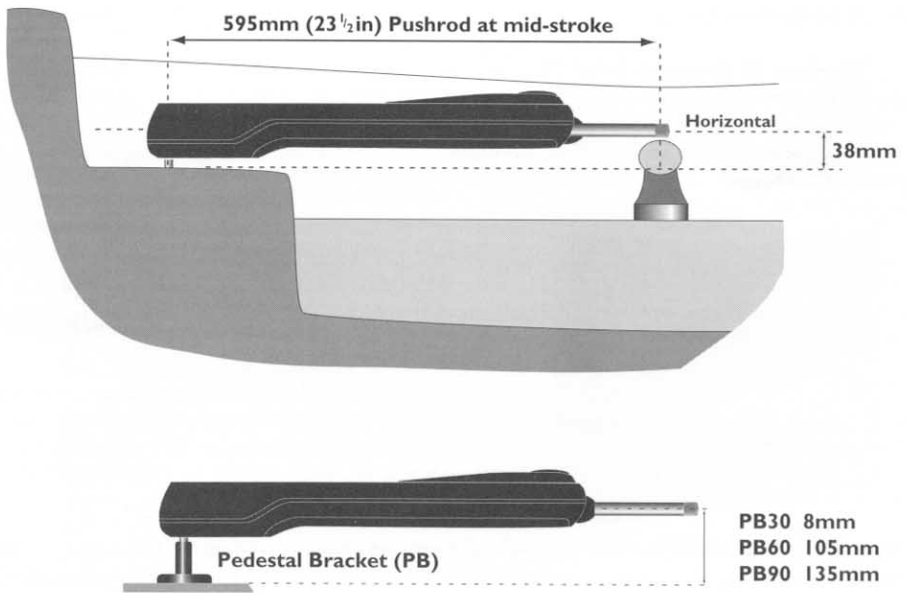


Fig 4.2 - Installation, cross section

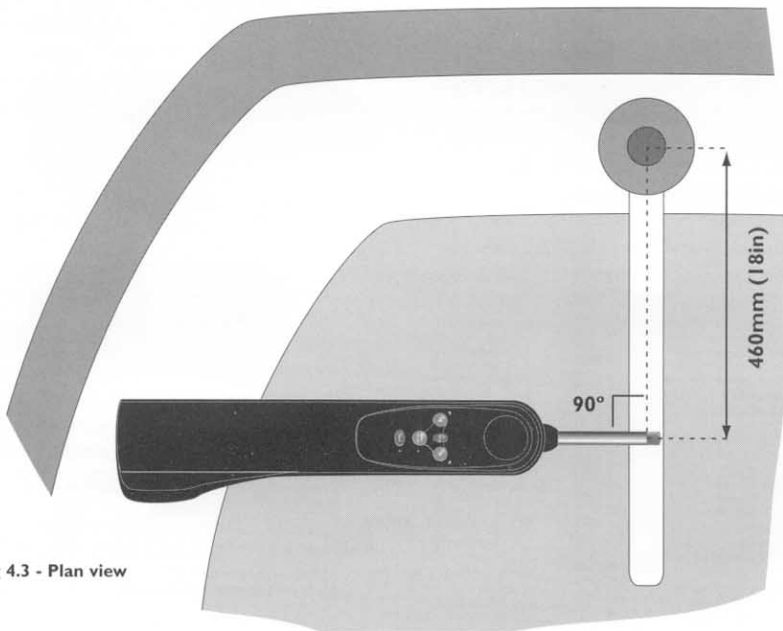


Fig 4.3 - Plan view

## 4.2 Electrical Installation

The Tillerpilot TP10 operates from a 12v DC supply, and is connected to the supply by two wires. Although the cable is supplied with bare ends, it is recommended that a good quality waterproof plug and socket is fitted for maximum reliability. A suitable plug and socket set is available as an optional accessory. See section 5.5 for more details.

Wire to the electrical supply as follows -

Wire Colour	
Brown	+12v DC
Blue	0v

\* Use a suitable gauge cable for the run from the socket to the supply (see Fig 4.5).

\* Connect to the vessel's switch panel via a 10 Amp fuse or breaker.

\* Do not fit other electronic or electrical equipment to this cable, or "tap into" the supply from a nearby cable - always wire each piece of equipment to its own breaker in the electrical panel.

\* Ensure all connections are well made. Poor contact will result in loss of thrust from the Tillerpilot and slower speed of response.

\* If in any doubt, employ a qualified engineer to install the equipment.

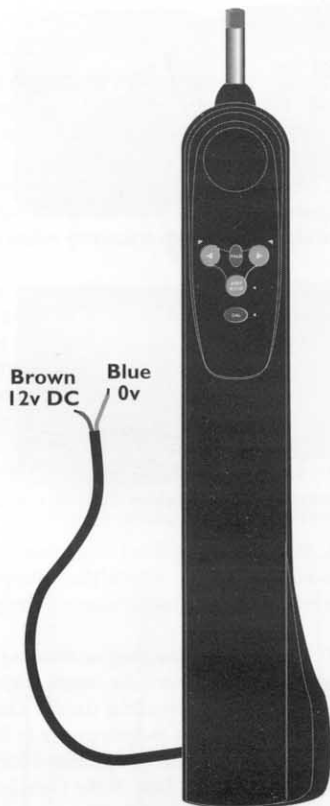


Fig 4.4 - TP10 Wiring

Length of Cable Run	Cross Section Area	Conductor Type	AWG
Under 4M (13Ft)	1mm <sup>2</sup>	32/0.2	18
4-7M (23Ft)	1.5mm <sup>2</sup>	30/0.25	15
7-12M (39Ft)	2.5mm <sup>2</sup>	50/0.25	13

Fig 4.5 - Cable selection table

## 5 Appendix

### 5.1 Advice On Operation

The Simrad Tillerpilot when used correctly can maintain as good a course, on most points of sail as a skilled helmsman, with the advantage that they never lose concentration where a human may begin to show lapses of concentration after as little as ten minutes.

There are certain circumstances however, where a human pilot has the advantage in being able to anticipate events which no autopilot can sense, typically in a heavy following sea. The following advice should improve efficiency when sailing using Tillerpilot:

1. When sailing close to the wind, it is easy to forget to trim the mainsail, allowing excessive weather helm to build up. Where a human helmsman would quickly complain, the autopilot will struggle on, and the boat will be sailed less efficiently. While a human normally likes to feel some weather helm, this is not necessary for the functioning of the Tillerpilot. Power consumption, wear and drag will be greatly reduced if the mainsail is freed or reefed a little sooner than normal when sailing manually.
2. It is also advisable when sailing close hauled to set a course a few degrees free of that normally sailed under manual control, to avoid luffing into the wind.
3. When running dead downwind, a human pilot can see visual signs warning him if the boat is about to gybe, which the Tillerpilot cannot sense. Therefore, when under autopilot it is advisable not to sail as close to the gybe as you may do when sailing manually.
4. When broad reaching or running fast, particularly with quartering waves, a helmsman will naturally apply periodic larger angles of helm than when beating or sailing slowly. This is the equivalent of increasing rudder Gain, and it may be a good idea to adjust the Gain on the Tillerpilot. Many people prefer to find a compromise setting which is used for all sailing, but with practice it can be optimised for different conditions e.g. low for motoring in a calm sea or high for running fast. If the Gain is set too low, the boat will yaw because insufficient rudder is applied in time; if the gain is too high, the boat will continually overcorrect on each deviation, increasing power consumption.
5. The Tillerpilot is a highly advanced piece of equipment - as such, it is a valuable aid to enjoyable sailing. However, it would be a mistake to become complacent. As with all electronic navigational equipment, it is an **aid** to navigation and should not be used as a substitute for conventional navigational practice. **Remember - Maritime Law\* requires that you keep a good look out at all time.**

## 5.2 Auto Compass Calibration

Although the Tillerpilot internal compass is extremely accurate, for long distance sailing it may be necessary to calibrate the compass, to compensate for any deviations caused by objects surrounding it on board the vessel.

With the vessel motoring along slowly (2-3 knots) in calm conditions and the Tillerpilot in Standby Mode, press the **Starboard** key a number of times to induce a slow clockwise rotation of the vessel. Press and hold the **TACK** key, followed by the **Port** and **Starboard** keys simultaneously to enter Auto Compass Calibration Mode (Fig 5.1). The Port and Starboard LEDs will both light. Allow the vessel to turn through a minimum of 1¼ turns (450°) in approximately two minutes, during which time the flux-gate compass will automatically calibrate itself.

If the rate of turn or the boat speed is too high, the Port LED will flash (Fig 5.2) indicating that it is necessary to either slow the boat or decrease the angle of turn. If the rate or turn or boat speed is too slow the Starboard LED will flash, indicating that it is necessary to either increase the boat speed or increase the angle of turn. A short beep will indicate that the calibration has been successful, and the Tillerpilot will return to Standby Mode. If the calibration has been unsuccessful after a period of four minutes, a long beep will sound. Try again carefully following the above directions.

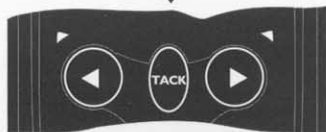
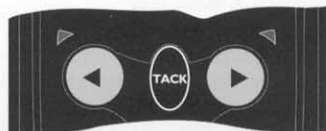


Fig 5.1 - Auto Compass Calibration

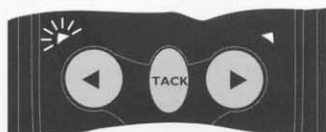


Fig 5.2 - Rate of turn too fast

## 5.3 Fault Finding

Symptom	Probable Cause	Remedy
When engaged, the pilot immediately applies a large helm angle and increases course error.	* Tillerpilot is configured for Porthand setting but installed on Starboard side (or vice versa).	* Refer to section 3.1.
After functioning normally course is suddenly lost and the Tillerpilot goes into Standby Mode.	* Power interrupted briefly, or low voltage. * Cable from battery to socket too small. * Intermittent connection.	* Increase size of cable. * Check all connections. * Charge batteries. * Uprate batteries.
Helm is hard over and alarm is continuously on.	* Steerage way insufficient to control course, or sails are aback. Pulsing is a correct safety feature when tiller is at full travel.	* Reset the vessel on course and re-engage pilot.
Power supply is live, but pilot is not on.	* Pilot is wired incorrectly.	* Check wiring of pilot (see section 4.2).

## 5.4 Service & Warranty

Your Tillerpilot should seldom need servicing, but will benefit from an application of silicone or Teflon grease to the pushrod and connectors each season.

The unit is guaranteed for 12 months from date of retail sale. If it is necessary to have the unit repaired, return it carriage prepaid to the agent in the country of purchase with a copy of the receipted invoice showing the date of purchase. Where possible, return all the components unless you are certain that you have located the source of the fault. If the original packing is not available, ensure that it is well cushioned in packing; the rigours of freight handling can be very different from the loads encountered in the marine environment for which the unit is designed.

If a fault occurs outside the country of purchase, return the unit to the official Simrad agent in the country of use. The appointed agent will rectify the fault and make a charge for labour, return carriage and packing. Any component that has failed under the terms of the warranty will be replaced free of charge.

A list of official worldwide Simrad dealers is included with this unit.

## 5.5 Spares and Accessories

The following spare parts can be ordered from your local authorised Simrad Service Agent. Please quote the relevant part number when ordering.



**E02648**

Tiller Pin



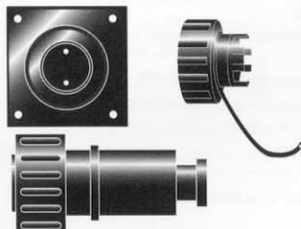
**E00111**

Push Rod End



**E00099**

Mounting Cup



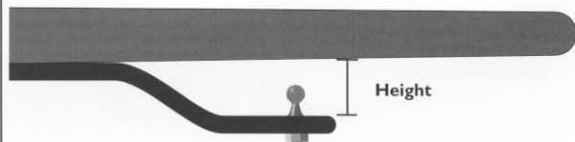
**SKT100**

TP10  
Waterproof  
Socket Set



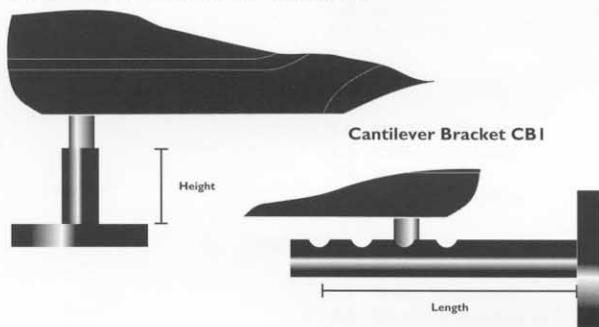
### Tiller Brackets

Part No.	Height
TB30	30mm (1.18")
TB60	60mm (2.36")
TB90	90mm (3.54")
TB120	120mm (4.72")



### Pedestal & Cantilever Brackets

Part No	Height / Length
PB30	30mm (1.18")
PB60	60mm (2.36")
PB90	90mm (3.54")
CBI	135-240mm (5.31-9.44")



### Push Rod Extensions

Part No.	Length
PRE30:GY	30mm (1.18")
PRE60:GY	60mm (2.36")
PRE90:GY	90mm (3.54")
PRE120:GY	120mm (4.72")
PRE150:GY	150mm (5.90")
PRE300:GY	300mm (11.81")

