

HANDPROGRAMMER HP5000

FOR USE WITH THE NAVICO
TILLERPILOTS® TP5000/TP5500 AND WHEELPILOT® WP5000.

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The Handprogrammer HP5000, is an advanced hand controller for use with Tillerpilots TP5000/TP5500 or Wheelplot WP5000. It has many features, which enhance and optimise the autopilot performance to your requirements. These include facilities for programming bearing to waypoints, changing course by any amount, course dodge, tacking, off course alarm, man-over-board function, plus many programmable parameters. It is also possible to provide correction for the autopilot's compass to allow correlation of the heading display to your ship's compass.

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The HP5000 plugs directly into the remote socket of the Tillerplot (ensure the weatherproof cap is refitted to the socket when the HP5000 is unplugged). If other accessories are to be used in conjunction with the Tillerplot and handprogrammer then an interface box JB5000 will be required.

The unit is supplied with a cradle for convenient mounting of the unit when not in the hand. For security reasons it is advisable to stow the unit safely away after use.

It is important to read the instruction manual before use in order to understand the simple logical protocol used for operation.

1 OPERATING & DISPLAY PROTOCOL

1.1 STANDBY/AUTO

There are two conditions in which the autopilot can operate.

● Standby

The autopilot and handprogrammer are powered up but no automatic steering takes place. If the tillerplot pushrod is connected to the tiller then the boat's heading will be indicated on the HP5000 display. Manual control of the vessel is possible from the handprogrammer using the Tillerplot as power steering. A number of other parameters may be programmed or adjusted in the standby condition. Illumination of the handprogrammer display can only be switched on or off in the standby condition.

● Auto

Automatic steering takes place. The vessel steers relative to compass heading or wind, depending on user selection. Various methods are available to change the heading being steered including tacking, course dodge and steering to a new bearing to waypoint. If a radio navigation receiver has been interfaced to the Tillerplot system then automatic correction for off-track error is possible, which provides compensation for drift.

There are five modes of operation possible with the **HP5000**.

- **Compass**

The power-on mode of the plot is compass and in the standby condition. Magnetic heading is shown on the top display. If no other accessories are fitted to the Tillerplot system, and you do not require alteration of any of the programmable features then only the compass mode will need to be used.

- **Wind**

Wind operation may only be selected if a windvane **WV3** or **WD200** has been interfaced to the Tillerplot system (refer to Tillerplot Owners Manual). This mode can be selected from either the standby or auto condition. When selected the top display shows relative wind angle to the vessel. The bottom display shows the legend **WIND**.

- **NMEA**

This mode can only be selected if a radio navigation receiver has been interfaced via the junction box **JB5000**. It can also only be selected when previously operating under autopilot in the compass mode. It is essential to have previously programmed into the **HP5000** (in **CAL** mode) the data format (**NMEA 180, 182 or 183**) used by your radio navigation interface.

When the **NMEA** mode has been selected the vessel will automatically change heading until the vessel is on track between two waypoints as programmed into your radio navigation receiver. Refer to the **JB5000** Instruction Manual for further information.

- **Set**

This mode can be accessed at all times. Change of autopilot gain, seastate, and off course alarm angle is possible, and this mode also allows programming of bearing to waypoint memories plus programming of the vessel's speed (used for **NMEA** mode and man-overboard functions if a **Navico Log DL200** is not interfaced). All parameters have been factory preset with default values. Refer to Section 4 for further details.

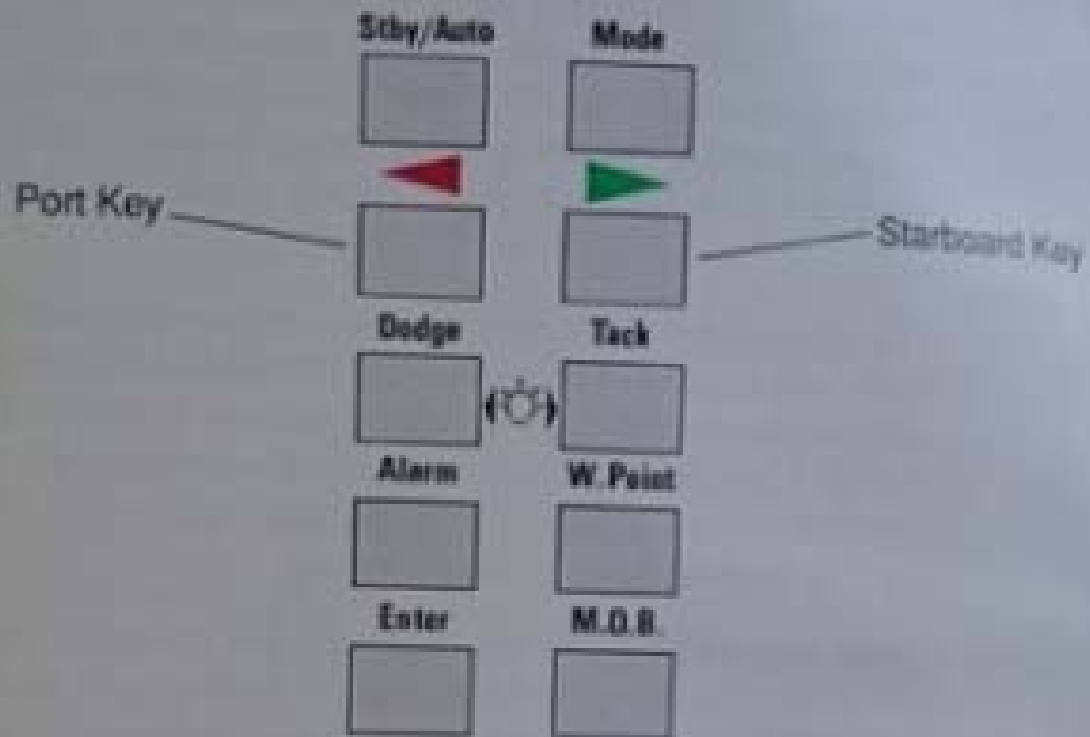
- **Cal**

This mode can only be accessed from the standby condition. This mode allows calibration of dodge angle, tack angle (for compass

tack), tack rate, the compass, and selection of NMEA data format. All parameters have been factory preset with default values. Refer to Section 5 for further details.

1.3 KEYPAD LAYOUT

The keypad is arranged in a 2 column x 5 row configuration. Each key is slightly recessed in order to prevent accidental operation. Every key stroke is confirmed by a reassuring "beep". Only one key should be pressed at a time, except when switching the display illumination on or off.



Important note: When using the handprogrammer HP5000 it is important to note that the controls on the Tillerpilot remain operative.

This has been deliberately designed as a safety feature so that emergency action can be taken immediately from the Tillerpilot.

All changes of condition, eg: compass to wind or standby to auto requested by the handprogrammer are confirmed by the Tillerpilot indicator and all commands given to the Tillerpilot are updated on the HP5000 display.


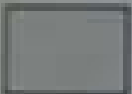




A large backlit liquid crystal display confirms the status of operation of the autopilot. The top display confirms the compass heading or relative wind angle. The centre display generally indicates intended changes to heading before being actioned and the bottom display confirms the mode or function being used. In addition to the three rows of display there are a number of legends which also confirm the status of various functions.


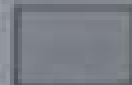
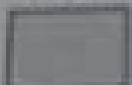
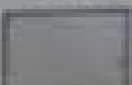
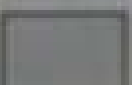


2.1

KEY OPERATION FROM STANDBY CONDITION.

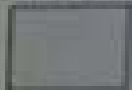
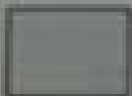
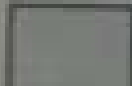
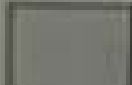

Note: All key strokes indicated assume the previous condition to be standby.


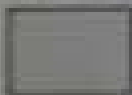
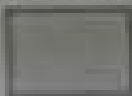
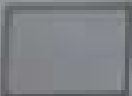
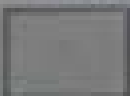
Key	Function
Stby/Auto 	Engages automatic pilot operation, locking on to the previously shown compass heading or relative wind angle, on the top display.
Mode 	Refer to Section 2.5.
	Tillerpilot pushrod moves in direction to steer to port (ie: push rod retracts for starboard mounted Tillerpilot and extends for port mounted Tillerpilot). The push rod moves while the key is held depressed. This allows positioning of the pushrod prior to engagement onto the tillerpin. Once engaged it allows power steering from a remote position which is extremely useful in controlling the vessel in confined waters.
	Tillerpilot pushrod moves in direction to steer to starboard (ie: pushrod extends for starboard mounted Tillerpilot and retracts for port mounted Tillerpilot). The push rod moves whilst key is held depressed.
Dodge 	No function.
Tack 	No function.

Key	Function
<p>Dim Back</p> 	<p>Switches the display illumination on or off. The illumination legend on the display confirms the on status.</p> <p>Note: Both keys are pressed together.</p>
<p>Alarm</p> 	<p>Switches the off course alarm on or off. The alarm legend on the display confirms the on status. Refer to Section 2.3.</p>
<p>W. Point</p> 	<p>Shows the bearing to waypoint on the middle display for waypoints 0-9. The waypoint number increments for each press of the W.point key. Waypoints 1-9 can be preprogrammed with bearings via the set mode (refer to Section 4).</p> <p>Bearing to waypoint 0 is not preprogrammed in memory but can be immediately adjusted using the port or starboard keys and will be remembered unless altered, or the HP5000 disconnected. If no further key is pressed within 5 seconds the display will revert to the normal standby display.</p> <p>If the displayed bearing to waypoint is required as the autopilot course then press the enter key.</p> <p>If a radio navigation receiver has been interfaced and is sending data for bearing to waypoint (NMEA 182 and 183 formats only) then the initial value for bearing to waypoint 0 will be this bearing. It can however be changed by the port or starboard keys if required. Each time bearing to waypoint 0 is selected then the bearing to waypoint as given by the radio navigation receiver will be displayed.</p>
<p>Enter</p> 	<p>Engages autopilot operation, locking onto the compass heading or course change indicated on the centre display. Examples of use include locking onto previously used autopilot course, and locking onto a bearing to waypoint.</p>
<p>M.O.B.</p> 	<p>Man Overboard Key - see Section 2.4.</p>

Note:

All key strokes indicated assume the previous condition to be auto.

Key	Function
Stby/Auto 	Tillerplot reverts to standby condition in the compass mode.
Mode 	Refer to Section 2.5.
	Plans a course change to port, indicated by the number of degrees on the centre display. Use this key to increment the course change displayed, use the > key to decrement. Note: hold key depressed to speed up display change. To utilize the planned course change press Enter.
	Plans a course change to starboard, indicated by the number of degrees on the centre display. To utilize this course change press Enter.
Dodge 	<p>The word Dodge appears on bottom display. If no further action taken within 5 seconds this display clears down. If followed by pressing port or starboard key then a dodge is implemented in that direction by the preprogrammed amount (refer Section 5). The amount of dodge is confirmed by the centre display.</p> <p>To resume the original course press Dodge again.</p> <p>To maintain the dodge course as the new autopilot course press Enter. This function affects both compass and wind mode.</p>

Key	Function
<p>Tack</p> 	<p>The word Tack appears on bottom display. If no further action taken within 5 seconds the display clears down. If followed by pressing port or starboard key then a tack is implemented in that direction at a preprogrammed rate (refer Section 5).</p> <p>In the compass mode the tack will be at a preprogrammed angle (refer Section 5).</p> <p>In the wind mode the tack will turn the vessel to the same apparent wind (provided it is between 30° and 70°) on the opposite tack. Note: for a compass tack no information is available re the wind direction. It is therefore essential for the user <u>not</u> to implement a tack in the wrong direction.</p> <p>When tacking in wind mode no action will be taken if the vessel is locked onto a course of more than 70° to wind, or if a tack in the wrong direction is requested.</p>
<p>Alarm</p> 	<p>Turns the off course alarm on or off, depending on its state. The alarm legend on the display confirms the on status.</p>
<p>W. Point</p> 	<p>Operates in the same manner as from the Standby condition. Refer to Section 2.1.</p>
<p>Enter</p> 	<p>Used to enter the centre display as a course change or new heading to steer by autopilot.</p>
<p>M.O.B.</p> 	<p>Refer to Section 2.4.</p>

This feature allows the vessel's current heading to be compared with the vessel's heading at the time of engaging the alarm. This is particularly useful when steering relative to wind as changes in magnetic heading due to wind changes will be detected. The alarm will sound if the vessel is more than the programmed angle away from the memorised heading for longer than 20 seconds. Refer Section 4 for programming.

MAN OVERBOARD FUNCTION

This feature is intended to help navigate back to the location of a man-over-board. It is therefore essential to engage its operation immediately the incident occurs.

It is important to understand that the information is derived only from the Tillerpilot's built-in compass and ships log (or default speed entered in the set mode - refer to Section 4 - if a Navico DL200 is not interfaced) and it is not related to any other man overboard function that may be independently provided by a radio navigation receiver. It cannot account for wind drift.

Operation

Press the M-O-B key and hold in until a second "beep" is heard (after about one second). The display confirms with M-O-B on the bottom display.

The top display will show the bearing to steer back to the point at which the man-over-board key was pressed. The centre display indicates distance from the point at which the man-over-board key was pressed.

The Tillerpilot will automatically take the standby condition, ie: no autopilot operation is possible. This is for safety reasons. Use the port and starboard keys to steer the vessel.

Distance and heading are continuously integrated to establish the correct range and bearing to the incident spot. On returning to within 0.01 Nm an alarm will sound but the range and bearing will continue to update.

To exit the M-O-B function press the stby/auto key.

2.5 SELECTING A DIFFERENT MODE

The Mode key works in the same way from both the standby and auto conditions. For each press of the key the next valid mode in the following sequence will be displayed on a flashing display.

Compass - Wind - NMEA - Set - Cal - Compass, etc.

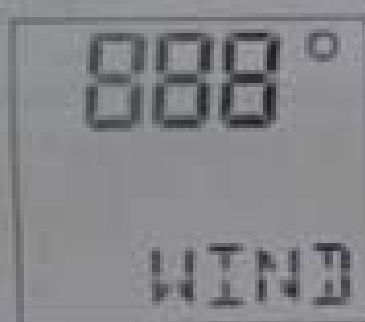
To lock onto a selected mode the Enter key must be pressed.

The mode is indicated by the bottom display, except in the compass mode for which the normal compass standby or auto display flashes.

If the enter key is not pressed within 5 seconds of the mode being displayed (flashing) then the display will revert to the previously used mode.

Examples of mode display.

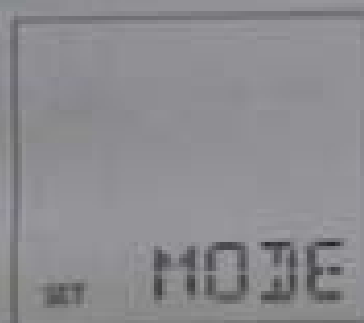
Wind
Mode



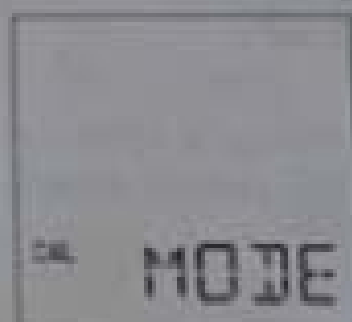
NMEA
Mode



Set
Mode



Cal
Mode



- Note:**
- The wind mode is only available if a wind vane is connected.
 - The NMEA mode is only available if a Radio Navigation Receiver is interfaced and can only be enabled from the auto mode.
 - The Cal mode can only be accessed from the standby condition.

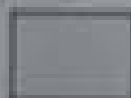
A few examples are now illustrated to confirm the operation sequence involved. For each example the initial conditions follow on from the previous example. Clear indication is given of key strokes required and resulting display.

The Tillerpilot and handprogrammer are powered up, and the Tillerpilot connected to the tiller. The vessel's current heading is 300°.

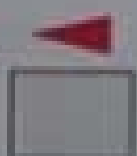


Autopilot operation is required on the current heading.

Stby/Auto

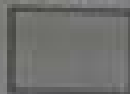


A course change of 50° to port is required after passing a mark.



The mark has now been passed and the course change command is given.

Enter



Manual control of vessel is now required.

Note: Use port and starboard keys to steer the vessel.

Stay/Auto



Vessel has now manually been steered to a new heading of 20°.



Autopilot operation required but on previous course (ie: 250°).

Enter



A dodge to starboard is required.

Dodge



(Note: the amount of dodge has been pre-programmed. This can be set between 10° and 90°).



Direction key to be pressed within 5 seconds.



The current course (after dodge) is entered as autopilot course).

Enter

C
S
E
270°
APT

New autopilot course of 200° is planned.

W. Point

C
S
E
270°
APT
200°
WPT 3

Use port and starboard keys to set the course.

The new course as planned above is now entered as the autopilot course.

Enter

C
S
E
200°
APT

Back to manual steering again

Stby/Auto

H
D
G
200°
200°
STBY

Use port and starboard keys to steer the vessel.

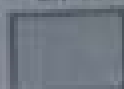
Engage wind mode - standby condition

Mode

050°
WIND

Wind mode now entered. Wind is from 50° to starboard.

Enter



050°

WIND

Manually steer to 30° starboard wind



030°

WIND

Engage autopilot in the wind mode.

Stby/Auto



030°

AUTO

WIND

Go to opposite tack

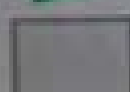
Tack



030°

AUTO

TACK



030°

AUTO

WIND

These examples are by no means exhaustive, but are intended to assist with understanding of the operation of the HP5000.

This mode can be accessed whilst in Standby or Auto and allows certain parameters to be preset and retained in memory by the Handprogrammer. (To select this mode refer to Section 2.5.)

In this mode the bottom display indicates the parameter selected and the second display confirms the amount of this parameter. This can be adjusted using the Port and Starboard keys, and must be followed by a single press of the Enter key in order to memorise this new value.

● Gain

Press Dodge key to select. The value can be set between 1 and 9 and has been factory preset to 5. Refer to Tillerpilot Manual for explanation of Gain.

● Sea State

Press Tack key to select. Factory preset to automatic (confirmed by "auto" on the display). The seastate can be set between 1° and 15° and automatic. The seastate provides a "deadband" in which the Tillerpilot allows the boat to steer without course corrections being made.

Under most circumstances it is advisable to leave the seastate in the factory preset state of automatic.

● Off Course Alarm

Press Alarm key to select. The value can be set between 10° and 90° and has been factory preset to 20°.

● Bearing to Waypoint Memories

Press W.point key. The display prompts with "WPT 1" allowing the setting of the first bearing to waypoint. When the required bearing to waypoint has been selected and entered the display will prompt with "WPT 2".

If you do not wish to change a particular bearing to waypoint then press the W.point key again to step onto the next waypoint number.

● Speed of Vessel

Press MOB key to select. The value can be adjusted between 1

and 30 knots, and has been factory preset to 5 knots. The value of speed set is only used if a Navico log (DL200) has not been interfaced to the Tillerplot system, and is used to calculate distance run. This information is used by the NMEA and MOB functions.

5 CAL MODE

This mode can be accessed only whilst in standby and allows certain calibrations to be made. To select this mode refer to section 2.5.

In this mode the bottom display indicates the parameter selected and middle display confirms the amount of this parameter. It can be adjusted using the Port and Starboard keys and must be followed by a single press of the Enter key in order to memorise this new value.

● Dodge Angle

Press Dodge key to select. The value can be set between 5° and 90° and has been factory preset to 20°. Refer to Section 2.2 for explanation of Dodge.

● Tack Angle

Press Tack key to select. The value can be set between 90° and 140° and has been factory preset to 100°. This angle is the amount of tack used when operating from compass - it does not affect operation when under windvane control.

● Tack Rate

Press Alarm key to select. The value can be set between 4° and 30° per second, and has been factory preset to 30°/S. This controls the rate of application of heading change to the Tillerplot when tacking in wind mode (under wind mode the tacking is automatically to the same apparent wind angle but on the opposite tack).

● Compass Calibration

Press W point key to select. The bottom display prompts with the word "steer". The middle display prompts with "000°".

The compass display can be calibrated to correspond to your ship's steering compass. It is necessary to have the Tillerplot connected to the tiller and be using the Port and Starboard keys to steer the vessel.

Steer the vessel until the ship's compass indicates 0°. Press Enter. The display will now prompt with "steer 45°". Again, steer to 45° as indicated by your ship's compass and press Enter. The display now prompts with "steer 90°". Carry on as indicated above until headings 90, 135, 180, 225, 270 and 315 have been entered.

These values will now be used to calibrate the tillerplot compass as displayed on the Handprogrammer.

Note:

It is essential to carry out compass calibration in calm water. The Tillerplot should be connected to the tiller. Use the port and starboard keys to steer the vessel.

Always steer a straight course before entering a compass calibration value.

If you only want to alter one particular calibration value just stop over the values not required by pressing W.point until the required heading is reached. Then press Enter once you have steered this particular heading.

Should there be a discrepancy of more than $\pm 30^\circ$ to the required heading then the Handprogrammer will not accept this value. On pressing Enter an alarm will sound and the word "Error" will display for 5 seconds.

● **NMEA Format**

Press MOB key. If a navigation receiver is connected to the Tillerplot system then the format of data needs to be set (this depends on the navigation receiver). Formats NMEA 180, NMEA 182 and NMEA 183 can be selected using the Port and Starboard keys. The mode is factory preset to NMEA 180.

The NMEA format required depends on the radio navigation receiver. Refer to the manufacturer of this receiver for further information.

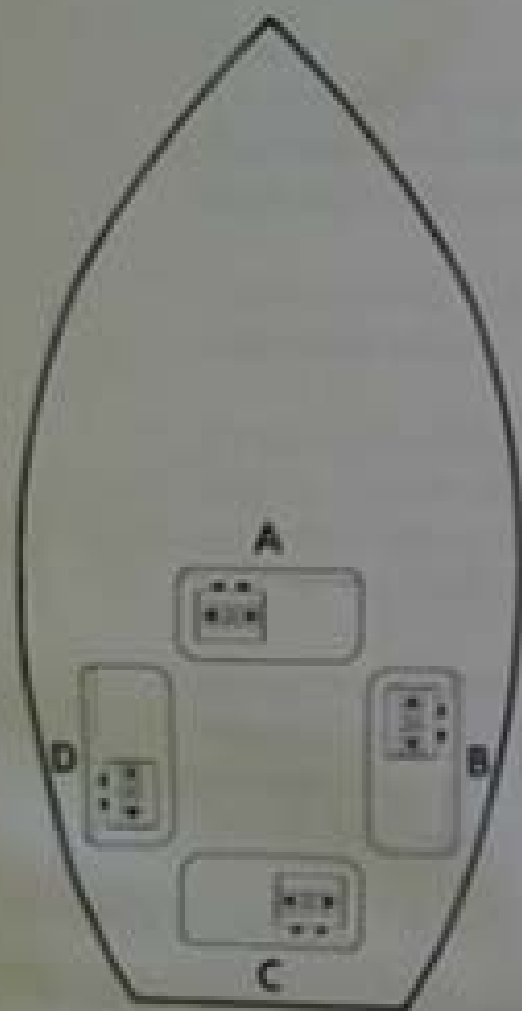
8.

Wheelpilot Installation

The WP5000 requires various parameters to be set on installation (refer to WP5000 Manual). These can be programmed from either the WP5000 itself or more easily by the HP5000.




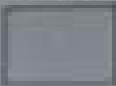


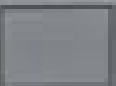


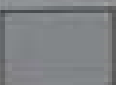
To access the "Installation" mode first enter the calibration mode as previously explained. Then hold in the enter key and press the stby/auto key followed by the mode key.

The bottom display confirms with the word INST.



Relative angle of WP5000 control unit to boat: see table opposite

- A : Set Angle = 0°
- B : Set Angle = 90°
- C : Set Angle = 180°
- D : Set Angle = 270°

Key Operation in the Install Mode.	
Key	Function
Dodge 	<p>ANGLE : Use the  and  keys to set the relative angle of the WP5000 control to the boat. See diagram opposite.</p> <p>This will ensure the correct reading of heading is given on the Handprogrammer. Press enter to memorise this value.</p>
Tack 	<p>BACKLASH : Use the  and  keys to programme the amount of backlash as detected at the ships wheel, entered in 10° increments (maximum 140).</p> <p>Press enter to memorise this value.</p>
Alarm 	<p>TURNS : Use the  and  keys to programme the appropriate number of turns of the wheel corresponding to full port rudder to full starboard rudder. This can be set in half turn increments between 1 turn and 5 turns.</p> <p>Press enter to memorise this value.</p>
Stby/Auto 	<p>Cancels the install mode and reverts operation back to the standby mode.</p>

Important Note re Use with Tillerpilot TP5000 and TP5500

The following note affects units with a Serial Number prior to *xx2500* (where *xx* is a two letter code).

The HP5000 is supplied to communicate with a TP5000. If it is connected to a TP5500 it will be necessary to carry out the following procedure once only.

Connect the Tillerpilot to the ship's 12 Volt supply and switch on. Hold the top two keys of the HP5000 in and connect the HP5000 to the Tillerpilot. Hold keys in until the standby display is established (after about 3 seconds).

NOTE 1: To convert back to interface with a TP5000 hold the bottom 2 keys in whilst following the above procedure.

NOTE 2: Failure to make this adjustment will not prohibit operation but may make manual steering from the hand remote appear to "jitter".

NOTE 3: For use with TP5000/5500 with Serial Number *xx2500* and above, and with the WP5000 there is no need to carry out the above procedure.

Symptom	Probable Cause	Remedy
Word "ERROR" appears occasionally on bottom display.	An external influence eg: voltage spike, has corrupted the data transfer between the autopilot and HP5000.	Provided the display is only momentary then no action is required
Word "ERROR" appears continuously.	Cable disconnected.	Check connections in JB5000 (if fitted).
Able to select WIND mode without a wind vane being connected.	Selected within 10 seconds of power-up. Electrical noise on the voltage supply.	Normal. Do not use wind mode if vane not connected. If normal operation of autopilot is unaffected then no remedial action is required. Otherwise take action to eliminate the source of noise.

There are no user serviceable parts in your hand programmer, and the Warranty is void if the unit is opened by unauthorised personnel.

The instrument 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 date of purchase. If the original packing is not available, cushion well; the shock loading of freight handling can be very different from the marine environment for which the instrument is designed.

If a fault occurs outside the country of purchase, return the unit to the official NAVICO 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 may be replaced free of charge.

A list of official NAVICO distributors and service centres is available upon request.

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