

Welcome

Congratulations on having chosen a Raymarine ST70 Pilot Controller. This gives you easy access to the important information you need to make your boating experience both safe and enjoyable.

ST70 provides an adaptable, daylight-viewable color display that you can customize to clearly show exactly what you want.

No more, no less.



This Operating Guide

This Operating Guide tells you how to use an ST70 pilot, and describes how to switch on the pilot, set it up and display the data you want, to best suit your style of operation.

This guide assumes that the pilot has been prepared for use in accordance with the Commissioning Procedures in the *ST70 Autopilot Controller / SmartPilot X Commissioning Instructions*.

Note: *ST70 products include instruments and pilot controllers. This guide gives user instructions for the pilot controller only. Information on using the ST70 Instrument is given in separate documentation accompanying the instrument.*

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Important Information



WARNING: Product installation & operation

This equipment must be installed and operated in accordance with the Raymarine instructions provided. Failure to do so could result in personal injury, damage to your boat and/or poor product performance.



WARNING: Navigational safety

Although we have designed this product to be accurate and reliable, many factors can affect its performance. Therefore, it should serve only as an aid to navigation and should never replace common sense and navigational judgement. Always maintain a permanent watch so you can respond to situations as they develop.



WARNING: Ensure Commissioning Procedures have been completed

If the ST70 Commissioning procedures have not been completed, your instrument could be displaying misleading information. Before using ST70, ensure that the Commissioning Procedures (in the *ST70 Autopilot Controller / SmartPilot X Commissioning Instructions*) have been successfully carried out.

EMC conformance

All Raymarine equipment and accessories are designed to the best industry standards for use in the recreational marine environment.

The design and manufacture of Raymarine equipment and accessories assures compliance with the appropriate Electromagnetic Compatibility (EMC) regulations, but correct installation is required to ensure that performance is not compromised.

Information

The information in this guide is valid for ST70 Instruments and systems which have been installed and commissioned in accordance with the correct Raymarine procedures. Relevant documents are:

- ST70 Instrument User Reference Manual (contains commissioning, maintenance & troubleshooting procedures).
- ST70 Instrument Installation Manual.
- SeaTalk NG Reference Manual.

Handbook information

To the best of our knowledge, the information on in this operating guide was correct when it went to press. However, Raymarine cannot accept liability for any inaccuracies or omissions.

In addition, our policy of continuous product improvement may change specifications without notice.

Therefore, Raymarine cannot accept liability for any differences between the product and the information in this guide.



Waste Electrical and Electronic (WEEE) Directive


The WEEE Directive requires the recycling of waste electrical and electronic equipment.

Whilst the WEEE Directive does not apply to some of Raymarine's products, we support its policy and ask you to be aware of how to dispose of this product.

The crossed out wheeled bin symbol, illustrated above, and found on our products signifies that this product should not be disposed of in general waste or landfill.

Please contact your local dealer, national distributor or Raymarine Technical Services for information on product disposal.

Switching on your ST70 Pilot

To switch on your ST70 pilot, hold down  for 1 second.

The pilot powers up and shows the page that was displayed when the power was last switched off.

Note: If power to a system to which ST70 pilot or instrument is connected is switched centrally (e.g. from a central circuit breaker), the on/off condition of each individual instrument or pilot when system power is applied reverts to what it was when the system power was last switched off. See the ST70 Autopilot Controller User Reference Guide for system power protocol.


Important

Do not use the pilot until it has been commissioned as described in the *ST70 Autopilot Controller / SmartPilot X Commissioning Instructions*.

If you power up and a **CHOOSE LANGUAGE** page is displayed, the pilot has not been commissioned since it was installed, so you need to carry out the commissioning procedure before using the pilot.

Switching off an ST70 Pilot when in Standby

You can only switch off your pilot when in Standby mode.

If you are in Auto mode, press  to go to Standby mode.

To switch off your ST70 pilot, hold down  for 1 second, to display the count-down popup, then continue to hold down  until the display counter reaches zero. At that point:

- The display goes blank.
- The pilot power down is complete.



Resolving problems

In the unlikely event that you experience problems using your ST70 pilot, refer to the troubleshooting procedures in the ST70 Autopilot Controller User Reference Guide.

If you need further assistance, please visit the Customer Support area of our web site at:

www.raymarine.com

As well as providing a comprehensive Frequently Asked Questions section and servicing information, our web site gives e-mail access to the Raymarine Technical Support Department and details of the locations of Raymarine agents, worldwide.

Telephone help line

If you do not have access to the world wide web, please call our help line.

In the USA, call:

- +1 603 881 5200 extension 2444

In the UK, Europe the Middle East or the Far East, call:

- +44 (0) 23 9271 4713 (voice)
- +44 (0) 23 9266 1228 (fax)

Help us to help you

When requesting service, please quote the following product information:

- Equipment type.
- Model number.
- Serial number.
- Software version.
- Hardware version.

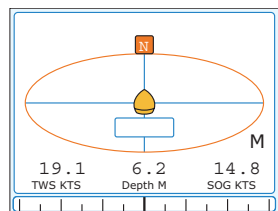
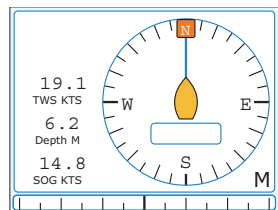
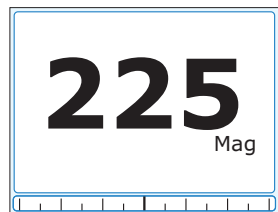
You can find out this information by running the **About Display** diagnostic function (described in the ST70 Autopilot Controller User Reference Guide).

Use these instructions to select the pilot view you want.

Selecting a view

Displaying the pilot views

1. With any operational page displayed, press and hold **MENU** to display Heading View.
2. Press and hold **MENU** again to display 2D - Compass Rose View.
3. Press and hold **MENU** again to display 3D - Isometric View.



Changing the pilot view

1. Press and hold **MENU** to cycle through the different views.
2. Release the **MENU** button when the view you want is displayed.

continued ...

Selecting a pattern

Different patterns are available depending on whether the system is set up for power boat or fishing boat. There are no sailboat patterns.

1. Go to Main Menu

With any operational page displayed, press **MENU** to display the **Main Menu**, then use **<** or **>** to scroll to the **Patterns** option.

Press **ENTER** to show the **Patterns** menu.

Select option

At the **Patterns** page, use **<** or **>** to scroll to the pattern you want.

Press **ENTER** to select the pattern.

Pattern 1 (Fishing boat only)

Selecting **Pattern 1** will select the most frequently used pattern of the most recent 10 patterns used.

Use **<** and **>** to scroll to **Pattern 1** and press **ENTER**.

Pattern 2 (Fishing boat only)

Selecting **Pattern 2** will select the second most frequently used pattern of the most recent 10 patterns used.

Press **MENU**, then use **<** and **>** to scroll to **Pattern 2** and press **ENTER**.

All Patterns

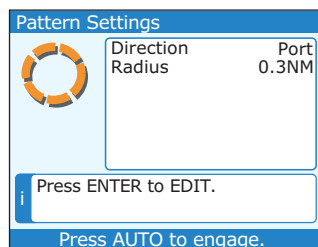
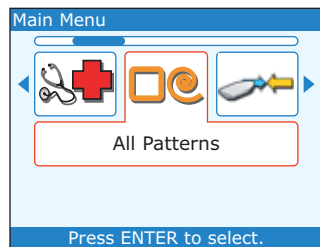
Press **MENU**, then use **<** and **>** to scroll to **All Patterns** and press **ENTER**.

Use **<** and **>** to scroll to the required pattern, then press **ENTER** to edit or **CANCEL** to exit.

When you select a pattern, the settings for that pattern will be displayed. You can change the settings.

When the settings are as you require, press **AUTO** to engage the pilot and start the pattern.

The preset patterns and the settings you can specify are:



Pattern

Settings

Circle

Direction (port or starboard) and radius

Zigzag

Direction (port or starboard), Angle and Length

Cloverleaf

Direction (port or starboard)
Radius

continued ...

Pattern	Settings
Spiral	Direction (port or starboard) Radius Radius Increment On Heading Radius On Heading Increment
Circle against heading	Direction (port or starboard) and Distance
Figure of eight	Direction (port or starboard) and Radius
Pattern Search	Direction (port or starboard) Width Height Increment Width Increment Height
Box Search	Direction (port or starboard), Width, Height
180° Turn	Direction (port or starboard) and Radius

The Dodge feature allows you to leave your current mode and go to Standby in order to temporarily change course.

Once you have changed course you have the choice of continuing on the new course or returning to your previous heading.

If your ST70 pilot is not connected to a compatible course computer, pressing **DODGE** will simply take the pilot to Standby.

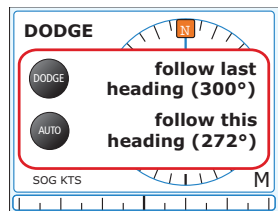
Using Dodge in Auto mode

When in Auto mode, press **DODGE**. (requires a dodge compatible chartplotter).

The DODGE popup will appear over whichever pilot view you have currently selected.

Once you have finished steering manually you can:

- Press **DODGE** to return to the previous heading, or
- Press **AUTO** to continue on your new heading.



Using Dodge in Track mode

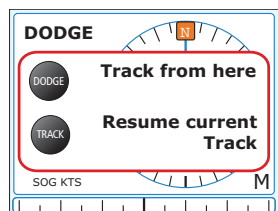
When in Track mode, press **DODGE**.

The DODGE popup will appear over whichever pilot view you have currently selected.

Once you have finished steering manually you can:

- Press **DODGE** to track from here to the next waypoint, or
- Press **AUTO** to return to the previous track.

Note: The Dodge when in Track mode feature is only available on compatible multifunction displays.

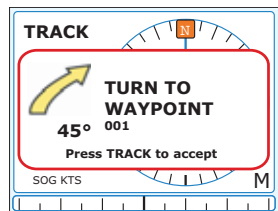


The Track mode feature enables you to instruct the pilot to steer to a series of waypoints, comprising of a route generated by a chartplotter.

Using Track

Start with the SmartPilot in AUTO mode and your chartplotter following a route.

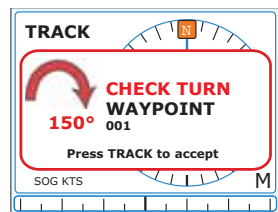
1. Press **TRACK** to enter Track mode.
2. Wait for the warning to sound.
The display will show the bearing to the next planned waypoint and the direction in which the boat will turn to reach this waypoint.



3. If it is safe for the boat to turn onto the new course, press the **TRACK** button. The SmartPilot will turn the boat onto the new course, and the display will show the heading required to achieve the required track.

Note: The rate of turn when in Track mode is set using the TURN RATE calibration setting. Adjust this as appropriate for optimum comfort. If the boat is more than 0.3 nm from the track, the Large Cross Track Error warning will sound.

As you approach each waypoint, at the preset arrival circle, an alarm will sound and the Track popup will be displayed:



Press **TRACK** to accept the new heading or **CANCEL** to return to the previous screen.

Skipping a waypoint

If you want to advance to the next waypoint **before** you have arrived at the target waypoint, you can skip a waypoint by pressing **TRACK** for 1 second. The display will then show the Waypoint Advance screen for the next waypoint. Check it is safe to turn, then press **TRACK** to turn the boat towards the next waypoint.

Using Dodge while in Track mode

In Track mode you still have full control from the keypad. You can make a dodge maneuver by pressing **DODGE**. Refer to "Using Dodge in Track mode" on page 9.

Leaving Track mode

You can leave Track mode at any time by:

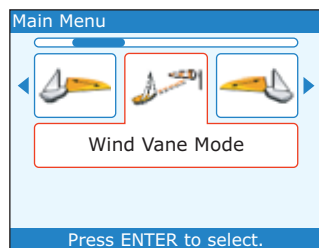
- pressing **AUTO** to return to Auto mode.
- pressing **STANDBY** to steer manually in Standby mode.

When the SmartPilot is in Wind Vane mode it uses the wind angle as the primary heading reference. As changes in the true or apparent wind angle occur, it adjusts the locked heading to maintain the original wind angle.

Selecting Wind Vane mode

You can select Wind Vane mode from either Standby or Auto mode:

1. Steady the boat onto the required wind angle.
2. Press **MENU**, then use < and > to select Wind Vane mode and lock the current wind angle. The display shows the locked heading (e.g. 128°) and the wind angle (e.g. WIND 145P indicates an wind angle of 145° to port).
3. The SmartPilot will then adjust the boat's heading to maintain the locked wind angle.



Adjusting the locked wind angle

You can adjust the locked wind angle by using the **-1**, **+1**, **-10** and **+10** buttons to change course. For example, to bear away by 10° when the boat is on a starboard tack:

- press **-10** to turn the boat 10° to port – the locked wind angle and locked heading will both change by 10°.
- the autopilot will then adjust the locked heading as required to maintain the new wind angle.

Note: Because turning the boat affects the relationship between the true and apparent wind angles, you should only use this method to make minor adjustments to the wind angle. For major changes, return to Standby mode, steer onto the new heading, then reselect Wind Vane mode. Refer to the ST70 Autopilot Controller User Reference Guide for the procedure for changing the wind reference between True and Apparent.

Leaving Wind Vane mode

You can leave Wind Vane mode by:

- pressing **AUTO** to return to Auto mode.
- pressing **STANDBY** to return to manual control.


You can change the brightness of the screen, and the color scheme to use.

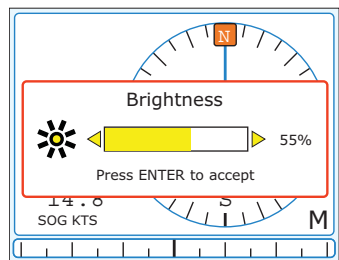
Brightness

Use these instructions to set the screen brightness to the level you want.

Quick Set Up

To quickly change the screen brightness:

- Press and release  to display the brightness adjust popup.
- Use < or > to set the required screen brightness.
- Press **ENTER** to accept the new brightness setting and return to your operational page.



Alternative method

1. Go to Main Menu

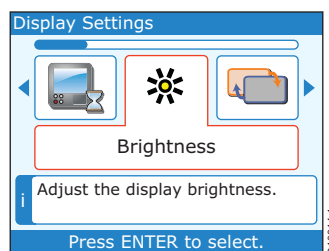
With any operational page displayed, press **MENU** to display the **Main Menu**, then use < or > to scroll to the **Display Settings** option.

Press **ENTER** to show the **Display Settings** menu.

2. Select option

At the **Display Settings** page, use < or > to scroll to the **Brightness** option.

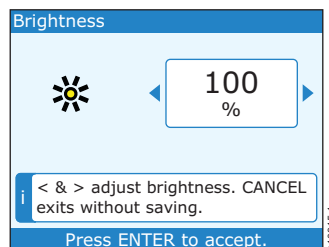
Press **ENTER** to display the **Brightness** setup box.



3. Set level

Use < or > to set the screen brightness, as required.

Press **ENTER** to save the selection and return to the **Display Settings** menu.



Returning to normal operation

To return to normal operation from the **Display Settings** menu:

- Press **CANCEL** to return to the **Main Menu**.
- Press **CANCEL** again to return to your operational page.

Choosing colors

Use these instructions to set the screen colors for optimum viewing. You can choose from three daytime and three night-time settings. If you have other compatible pilots or instruments installed, these settings will be applied to them at the same.

1. Go to Main Menu

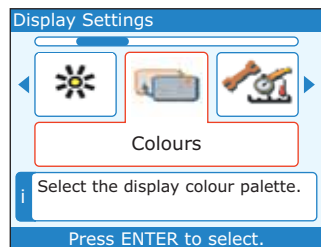
With any operational page displayed, press **MENU**, to display the **Main Menu**, then use **<** or **>** to scroll to the **Display Settings** option.

Press **ENTER** to show the **Display Settings** menu.

2. Go to Colors select box

At the **Display Settings** menu, use **<** or **>** to scroll to the **Colours** option.

Press **ENTER** to display the **Colours** select box.



3. Select option

At the **Colours** select box, use **<** or **>** to select the color scheme that best suits your current viewing conditions.

Press **ENTER** to save the selection and return to the **Display Settings** menu.



Returning to normal operation

To return to normal operation from the **Display Settings** menu:

- Press **CANCEL** to select the **Main Menu**.
- Press **CANCEL** again to return to your operational page.

When an ST70 pilot is connected to SeaTalk^{ng} or SeaTalk², you can use it to select the units in which data is displayed throughout the system. A range of imperial, metric and nautical units is available.

Use the procedure on this card to choose the units you want.

Choosing data units

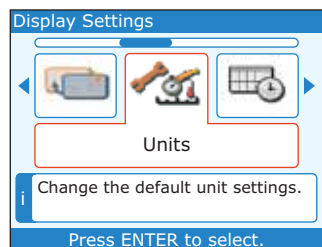
1. Select Main Menu

Press **MENU** to display the **Main Menu** then use **<** or **>** to scroll to **Display Settings**.

Press **ENTER** to display the **Display Settings** menu.

2. Initial actions

At the **Display Settings** menu, use **<** or **>** to scroll to the **Units** option.

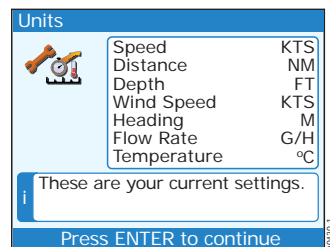


3. Units summary

Press **ENTER** to show a summary of the Units currently applied.

Press **ENTER** to select the second **Units** summary page.

If you do not want to change any units, press **CANCEL**.



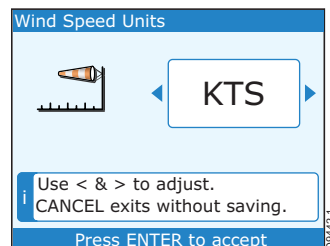
4. Units select menu

If you want to change any of the units, press **ENTER**, to go to the **Units** select menu.

5. Select the units you want to change

Use **<** or **>** to scroll to the required data type (e.g. **Wind Speed Units**)

Press **ENTER** to go to the **Units** edit box.



6. Set the units

Use < or > to scroll to the required units.

Press **ENTER** to save your setting and return to the **Units** summary page.

Press **ENTER** to select the second **Units** summary page.

Press **ENTER** to go to the **Units** select menu.

If you want to set other units, repeat steps 5 and 6.

Returning to normal operation

When you have finished setting the units and the **Units** select menu is displayed:

- a. If necessary, use < or > to scroll to the **Continue** option.
- b. Press **ENTER** to return to your operational page.

If your ST70 pilot is not receiving GPS data, you can use this procedure to specify the local time as your system time.

Set the time

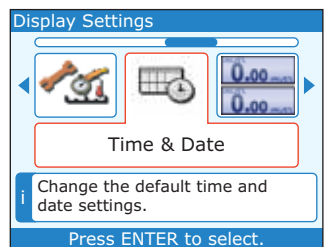
1. Go to Main Menu

Press **MENU** to display the **Main Menu** then use **<** or **>** to scroll to **Display Settings**.

Press **ENTER** to display the **Display Settings** menu.

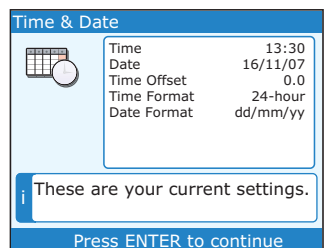
2. Select Time & Date

At the **Display Settings** menu, use **<** or **>** to scroll to the **Time and & Date** option.



3. Time & Date summary

Press **ENTER**. A summary of the time and date information is then displayed.



4. Select time offset

With the summary page displayed, press **ENTER** to display the **Time & Date** menu.

Use **<** or **>** to scroll to the **Set time offset** option.

Note: If you want to change the time or date format, use the procedure described in the ST70 Autopilot Controller User Reference Guide.

ST70 Pilot – clocks

Setting the correct local time

Card **9** continued

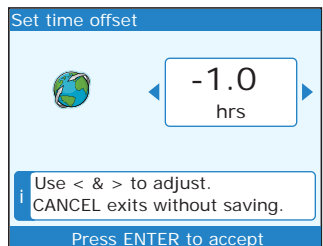
5. Set time offset

Press **ENTER** to display the **Set time offset** setup box.

The time offset is the difference in time between GMT (time at Longitude 0°) and local time.

Use < or > to set the appropriate time offset for your area.

Press **ENTER** to accept the value and display the **Time & Date** summary page.



Returning to operational page

With the **Time & Date** summary page displayed, press **CANCEL** to return to the **Display Settings** menu.

Press **CANCEL** to return to the **Main Menu**.

Press **CANCEL** to return to your operational page.

Alarm indications

A range of alarm functions are available, to alert you to particular events.

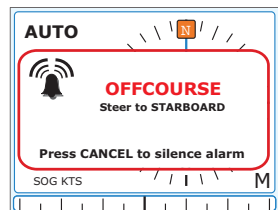
When an alarm occurs, a popup box is displayed and an audible alarm indication may sound. The popup identifies the reason for the alarm.

If an alarm occurs

To silence the alarm, press **CANCEL**.

Alarm events

The following alarm functions are supported by the ST70, although they may not all be applicable to your system.



Alarm	Description	Action
Calibration required	The pilot has not been fully calibrated. This will appear for a few seconds after initial power-up.	Self-cancelling. Change mode.
Off course	Vessel is off course by more than the predetermined limit. May appear in Auto, Track and Wind Trim modes.	Change mode. Change course. Reduce heading error.
Route complete	Indicates completion of a route, when in Track mode.	Change mode.
Large Cross Track Error	The cross track error (XTE) is greater than 0.3nm. May appear when in Track mode or when entering Track mode from any other mode.	Change mode. Data flagged as valid.
Loss of waypoint data		
Wind shift	Apparent wind angle has changed by more than 15 degrees.	Change mode. Change course. Reduction in change of wind angle.
Auto release	Safety alarm.	
Auto release (SD)	Safety alarm.	
Drive stopped	Safety alarm. A rudder stall condition has persisted for more than a predetermined time, and power has been removed from the drive unit. May appear in Auto, Track and Wind Trim modes.	Change mode. Reversal of drive demand.
Seatalk 1 fail	Safety alarm.	
Seatalk 2 fail	Safety alarm.	
EEPROM corruption	Safety alarm.	
No pilot	Safety alarm.	
No compass	Safety alarm.	

continued ...

Alarm	Description	Action
Rate gyro fault	Safety alarm.	
Current limit	Safety alarm.	
Rudder feedback unit fault	Safety alarm.	
Autolearn fail 1 (not carried out)	Safety alarm.	
Autolearn fail 2 (manual intervention)	Safety alarm.	
Autolearn fail 3 (compass or drive error)	Safety alarm.	
Autolearn fail 4	Safety alarm.	
Autolearn fail 5	Safety alarm.	
Autolearn fail 6	Safety alarm.	
Turn rate too high	Safety alarm. Indicates an excessive turn rate when calibrating the fluxgate compass. May appear in Calibration mode.	Change calibration stage. Reduce turn rate.
Low battery		
No navigation data	Absence of one of the following: Compass (Auto, Track and Wind Trim modes). XTE (Track mode). Wind angle (Wind Trim mode)	
MOB		
Pilot start up		
Waypoint advance	Indicates change of waypoint when in Track mode.	Change mode. Accept new waypoint/leg.
Waypoint advance Turn to port		
Waypoint advance Turn to starboard		
No wind data		
No speed data		
Drive short		
Clutch short		
Solenoid short		