

ST60 Steering Compass Instrument

Owner's Handbook

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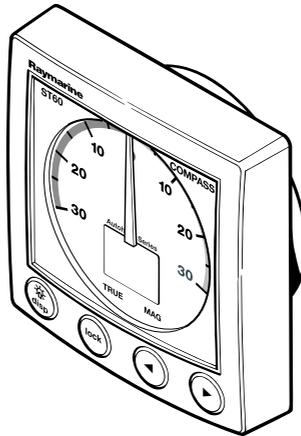
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Introduction

Thank you for purchasing a Raymarine product. We are sure your ST60 instrument will give you many years of trouble-free operation.

This handbook describes how to install and use the Raymarine ST60 Steering Compass instrument. This instrument gives:

- True/Magnetic Course Heading.
- Current or Locked Heading.
- Course Over Ground (COG).
- Average Heading.



WARNING

Although the ST60 Steering Compass instrument is designed to give accurate and reliable performance, it should serve only as an aid to navigation and should never lead to the erosion of good seamanship. Always maintain a permanent watch and be aware of situations as they develop.

The ST60 Steering Compass instrument is constructed in a rugged weather proofed case. It provides a sensitive and stable, combined analogue and digital display, to deliver accurate information under even the most demanding conditions.

The ST60 Steering Compass provides Compass Heading, shown in digital form (numerals) plus (when in Locked mode) Steering Course Error to $\pm 30^\circ$ deviation of locked course heading, shown in analogue form (pointer). The Steering Compass can be used either as a stand-alone unit, or as part of an integrated SeaTalk instrumentation system.

EMC conformance

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

Their design and manufacture conforms to the appropriate Electromagnetic Compatibility (EMC) standards, but correct installation is required to ensure that performance is not compromised.

Data inputs

The ST60 Steering Compass receives data either from an associated Flux Gate Compass transducer and/or from a SeaTalk instrumentation system.

SeaTalk

SeaTalk enables a number of compatible instruments to be interconnected and operate as a single, integrated navigational system.

Power and data in a SeaTalk system are fed via a single cable, so that instruments can be connected by plugging them into the network. SeaTalk is flexible enough to adapt to any number of compatible instruments without requiring a central processor. SeaTalk can also communicate with non-SeaTalk equipment, using the internationally-accepted National Marine Electronics Association (NMEA) protocol.

In a SeaTalk system, each instrument can be either a master or dedicated repeater unit. A master instrument is directly connected to a transducer (the device that provides the raw data) and has control of all other equipment on the SeaTalk network. A slave instrument is not directly connected to a transducer but repeats information provided by other equipment in the SeaTalk network.

Stand alone operation

In Stand alone operation, the ST60 Steering Compass is connected only to the relevant transducer and does not display information from, or provide information to, any other instruments.

Remote control

When connected to SeaTalk, the ST60 Steering Compass can be controlled remotely by a SeaTalk Remote Keypad Unit, to provide instant remote access to the various display readouts from the ST60 range of equipment.

Mounting options

If you do not want to surface mount your ST60 instrument, options are available for:

- Flush mounting. If you have ordered the flush mounting option a low-profile bezel and four fixing screws are also provided.
- Bracket mounting.

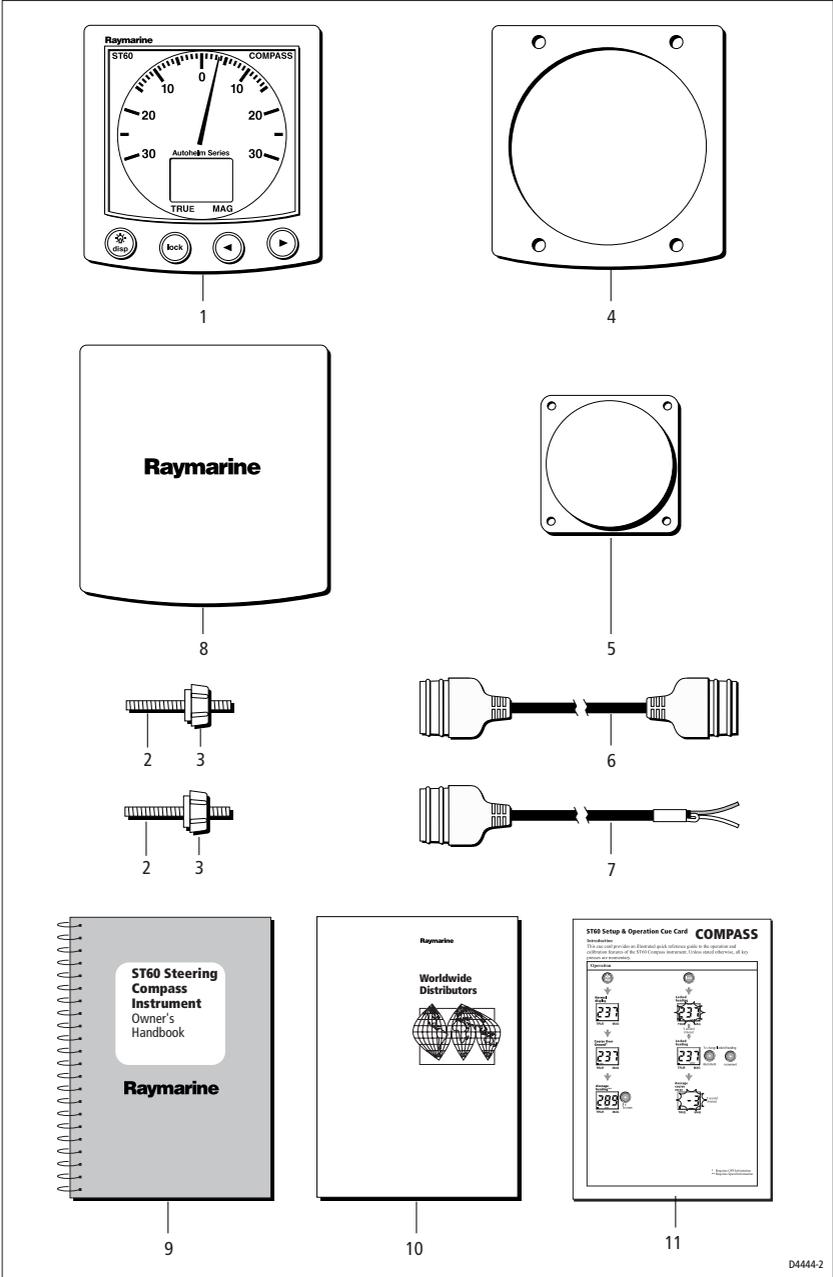
Parts supplied

Unpack your ST60 instrument and check that the following items are present:

- Item 1, ST60 Steering Compass instrument with standard bezel.
- Item 2, Fixing studs (2).
- Item 3, Thumb nuts (2).
- Item 4, Gasket
- Item 5, Fluxgate Compass transducer
- Item 6, SeaTalk interconnection cable.
- Item 7, Power cable.
- Item 8, Instrument Cover.
- Item 9, Owner's Handbook. The Warranty document and mounting templates are included in this Handbook.
- Item 10, Worldwide Service Centre Handbook.
- Item 11, Cue Card.

Spare spade terminals are also provided, to re-terminate the transducer cable if it has to be cut to facilitate installation.

Note: *The above packing list is for an ST60 Steering Compass system. Where an instrument is purchased separately, the Fluxgate Compass transducer is not included.*



Chapter 1: Operation

1.1 Getting started

This handbook describes how to operate, maintain and install the Raymarine ST60 Steering Compass instrument. The Steering Compass instrument shows both compass heading and steering indication. Where GPS or similar positioning data is available from another instrument, Course Over Ground (COG) can be calculated and used to provide a true course display.

Calibration requirement

The ST60 Steering Compass instrument is calibrated to factory (default) settings when first installed and must therefore be calibrated before use, in accordance with the procedures in *Chapter 4, Calibration*, to ensure optimum performance on your vessel.

Do NOT use the instrument until the calibration procedures have been satisfactorily completed.

If the CAL legend on the digital display flashes for the first 30 seconds after any power up, use the appropriate procedures in *Chapter 4, Calibration* to:

1. Apply the factory defaults.
2. Carry out the linearisation procedure.

Displayed information

The information displayed on the ST60 Steering Compass instrument is presented in two forms. Compass heading is shown in digital form (numerals) and steering indication is shown in analogue form (pointer).

Note: *The TRUE and MAG indicators flash for 8 seconds after power is switched on. This is a function of the remote control system and can be ignored if remote control is not being used.*

Digital display

The digital display shows various course information:

- True/Magnetic Course Heading, or

- Locked Heading, or
- Course Over Ground (COG), or
- Average Heading.

Pointer

In locked mode, the analogue pointer shows any course error between the current heading and the locked course, up to a maximum $\pm 30^\circ$ deviation. In unlocked mode, the pointer always indicates zero.

Note: *When power is first switched on, the Steering Compass starts in unlocked mode.*

Use with Sea Talk autopilot

If the ST60 Steering Compass forms part of a system which includes a Sea Talk autopilot operating in Auto, Vane or Track mode, the ST60 Steering Compass is forced to operate in Auto mode.

In Auto mode the ST60 Steering Compass acts as a slave display to the autopilot, with the autopilot's locked heading displayed on the ST60 Steering Compass digital display and the analogue pointer showing the autopilot course error. In this mode, all ST60 Steering Compass key functions, except illumination, are disabled.

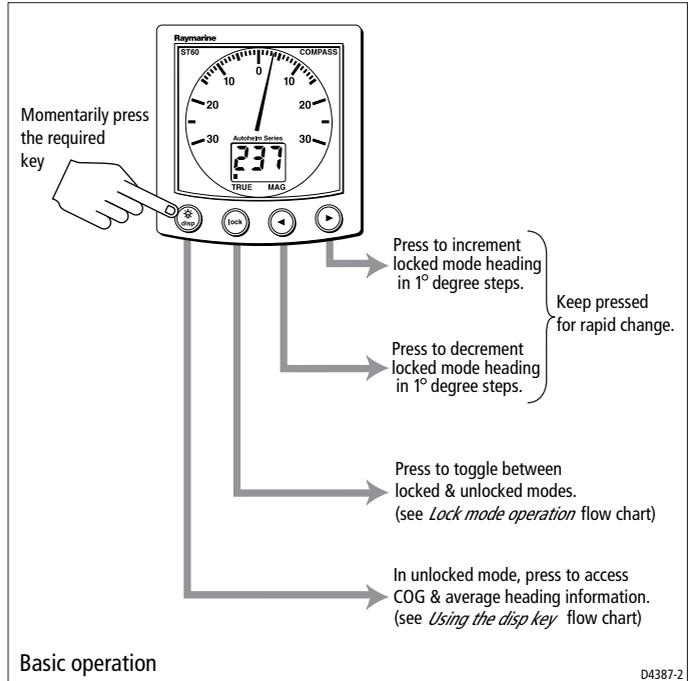
1.2 Normal operation

Use the *Basic operation* and *Using the disp key* flow charts in this Chapter to operate your ST60 Steering Compass instrument. The flow charts show the sequence of key presses and displays for the various operating tasks. All key presses called for in the flow charts are momentary, unless otherwise stated.

The displayed heading is either TRUE or MAG(netic) as indicated by a black square marker adjacent to the corresponding legend.

The ST60 Steering Compass has three modes of operation:

- Unlocked - displays live course data
- Locked - displays course data and live course deviation data
- Auto - displays autopilot course data and live course deviation data



Unlocked mode

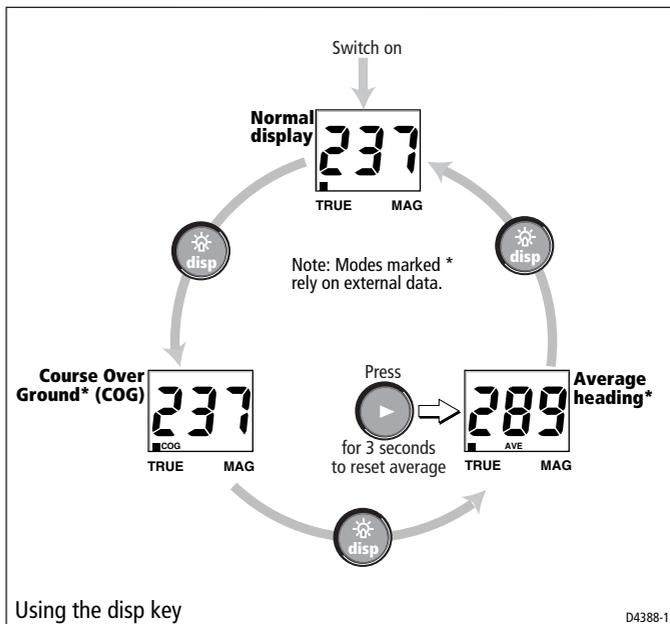
The Steering Compass always powers-up in the unlocked mode. The current heading is displayed on the digital display (true or magnetic) and the analogue pointer indicates zero. Momentarily press the **lock** key to switch to locked mode.

Course over ground (COG)

Press the **disp** key to select COG. Provided you have GPS or similar positioning data on the SeaTalk system, the ST60 Steering Compass displays your course over the ground. If such data is not available the digital display shows “----”.

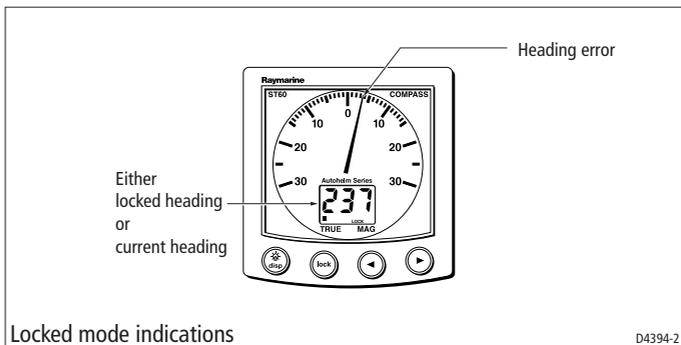
Average heading

Press the **disp** key again from the COG display to temporarily display the current calculated Average Heading. You can reset the average value by pressing the **>** key for 3 seconds when the Average heading screen is displayed.



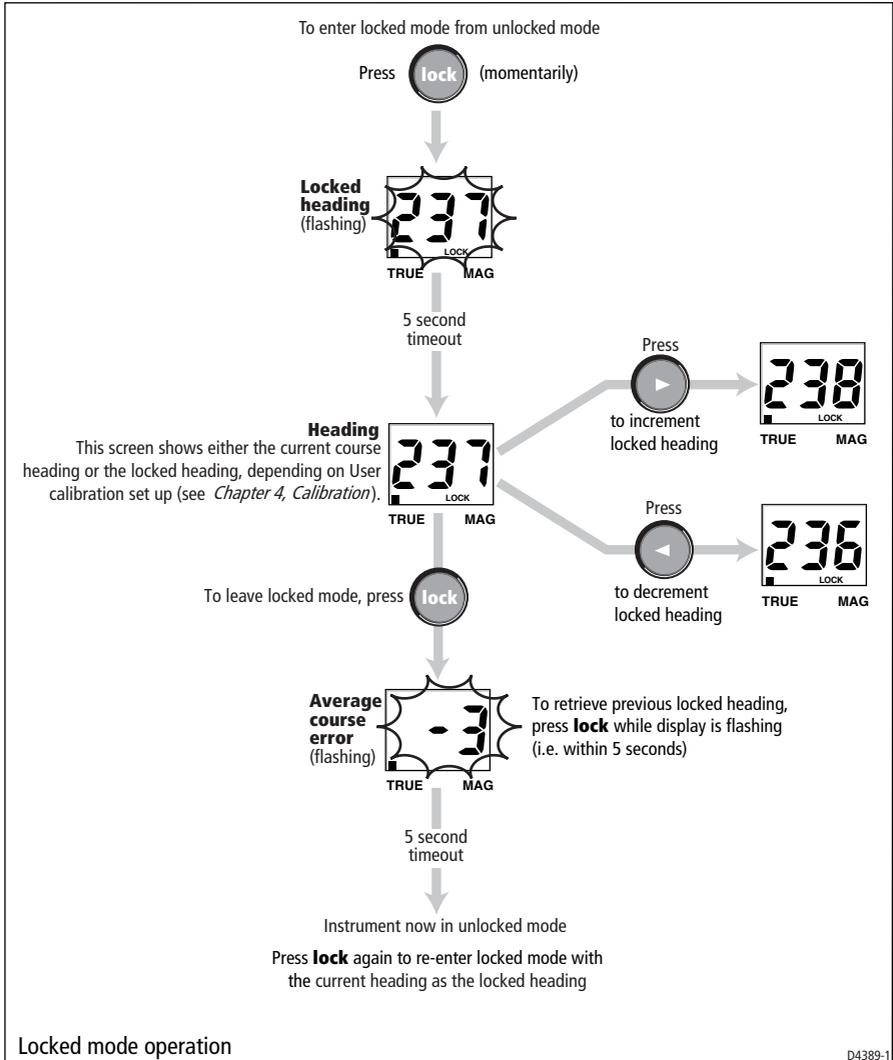
Locked mode

Locked mode enables you to define a fixed (locked) heading then calculates any deviation from this locked heading. The digital display shows heading information and the pointer shows the difference between the locked heading and the pointer shows the difference between the locked heading and the actual course being steered, i.e. heading error.



Operation

To enter locked mode (see the *Locked mode operation* illustration), press the **lock** key. The current heading is applied as the locked heading and flashes for 5 seconds, after which time the heading display shows either the locked heading or the current heading, depending on what has been set up during User calibration, as the normal display in locked mode (see *Chapter 4, Calibration*).



In locked mode you can use the < and > keys as necessary to change the locked heading.

To leave locked mode press the **lock** key. The average error flashes on the digital display for 5 seconds. If the average course steered has been to port of the locked heading, the display shows - ; if the average course steered has been to starboard, a positive value is displayed. If you press the **lock** key again within this 5 second period, you re-enter locked mode with the previously stored heading as the locked heading.

The average course error is reset to zero whenever the locked heading is changed.

Auto mode

The auto mode is activated automatically when the ST60 Steering Compass instrument is connected to a SeaTalk compatible autopilot.



Whenever the autopilot is engaged, the heading set by the autopilot is displayed on the digital display and the analogue pointer displays the autopilot's course error.

Note: *In Auto mode, all ST60 Steering Compass key functions, except illumination, are disabled.*

1.3 Display illumination

When the instrument is first powered up, the display illumination is set to its lowest (courtesy) level, to facilitate access to the keys.

To adjust the level of display illumination:

1. Hold down the **disp** key for approximately one second, to enter the illumination-adjust mode.
2. There are four preset illumination levels from L0 to L4. Momentarily press the **disp** key to cycle through these levels until you reach the level you want. The selected level is transmitted to all other instruments on the Sea Talk bus.
3. Press any other key to leave the illumination-adjust mode.

Note: *The digital display will return to normal operation 7 seconds after the last key press.*

1.4 Remote control

When connected to SeaTalk, the ST60 Steering Compass can be controlled remotely with a SeaTalk Remote Keypad. Remote control of an instrument is indicated by flashing TRUE/MAG indicators on the ST60 Steering Compass digital display.

Details on how to use the remote control facility can be found in the *SeaTalk Remote Keypad Owner's Handbook*.

1.5 Operating hints

Steering sense

When the analogue pointer indicates an off course error, steer the vessel in the direction you want the pointer to move.

Man overboard/reciprocal course

If the vessel is turned through 110° or more when the ST60 Steering Compass is in lock mode, the ST60 Steering Compass automatically locks to the reciprocal of the original course (180° from the original). The digital display shows the reciprocal course and the pointer shows the course error from the reciprocal course.

The reciprocal course function is reversible, so that a second similar turn would lock onto the original locked course.

Note: *The Man overboard/reciprocal course feature is not available when operating in Auto mode.*

Chapter 2: Maintenance and Fault Finding

2.1 Maintenance

Servicing and safety

- Raymarine equipment should be serviced only by authorised Raymarine service engineers. There are no user-serviceable parts in any Raymarine product.
- Some products generate high voltages, and so never handle the cables/connectors when power is being applied to the equipment.
- Always report any EMC related problem to your nearest Raymarine dealer. We will use any such information to improve our quality standards.

When requesting service, please quote equipment Type, Model Number and, if possible, Software Release Issue. The Software Release Issue can be ascertained by means of the Intermediate Calibration facility, see *Chapter 4, Calibration*.

Instrument

Certain atmospheric conditions may cause condensation to form on the inside of the instrument window. This will not harm the instrument and can be cleared by increasing the illumination setting to Level 3.

Periodically clean your ST60 instrument with a soft damp cloth. Do NOT use chemical and/or abrasive materials to clean the instrument.

Cabling

Examine all cables for chafing or other damage to the outer shield and, where necessary, replace and re-secure.

2.2 Fault finding

Preliminary procedures

Changes in the electronic environment may adversely affect the operation of your ST60 Steering Compass equipment. Typical examples of such changes are:

- Electrical equipment has recently been installed or moved aboard your vessel.
- You are in the vicinity of another vessel or shore station emitting radio signals.

If you appear to have a problem, first ensure that the EMC requirements (see *Chapter 3, Installation*) are still being met before further investigating the problem.

Fault location

All Raymarine products are subjected to comprehensive test and quality assurance programmes prior to packing and shipping. If a fault arises with the ST60 Steering Compass instrument, the following table may help to identify the probable cause and provide the most likely cure.

Fault	Cause	Remedy
Display blank	No power supply	Check power supply. Check SeaTalk cabling and connector security Check fuse/circuit breaker
Displayed heading differs from that shown in vessel's card compass.	Deviation present.	Check for presence of large iron masses in vicinity. If none present, carry out re-calibration, see <i>Chapter 4 Calibration</i> .
No transfer of information between instruments or a group of instruments (e.g. illumination levels).	SeaTalk cabling fault	Check security of SeaTalk connectors. Check condition of SeaTalk cables. Isolate faulty instrument by disconnecting instruments one by one.

Chapter 3: Installation

This chapter describes how to install the ST60 Steering Compass instrument and associated Fluxgate Compass transducer. The transducer cable is connected to the rear of the instrument.

For advice, or further information regarding the installation of these products, please contact the Raymarine Product Support Department or your own National Distributor.

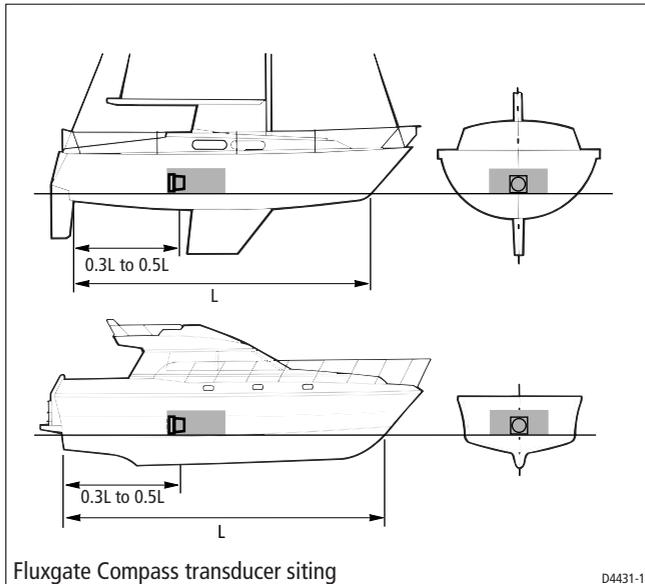
3.1 Planning your installation

Before starting the installation, spend some time considering the best positions for both transducer and instrument, such that the *Site requirements* and the *EMC Guidelines* are satisfied.

Site requirements

Transducer

For optimum performance, the Fluxgate Compass transducer should be positioned as near as possible to the pitch/roll centre of the vessel, as shown in the following illustration.



The Fluxgate Compass transducer must also be sited:

- At least 0.8 m (2 ft 6 in) away from the vessel's steering compass to avoid deviation in both compasses.
- On a bulkhead below deck.

Note: *On steel vessels the Fluxgate Compass transducer can be mounted above deck. When mounted above deck, performance may be impaired due to increased motion.*

- To allow reasonable access for installation and servicing.
- Away from any equipment or other installation which may shield the transducer or otherwise disturb the earth's magnetic field, e.g. large ferrous or magnetic items, communications equipment or cabling.
- On a vertical mounting surface. Where necessary, make up a suitable non-ferrous wedged packing piece to provide the necessary vertical surface.

There must also be a viable route for the transducer cable to be routed to the instrument.

Instrument

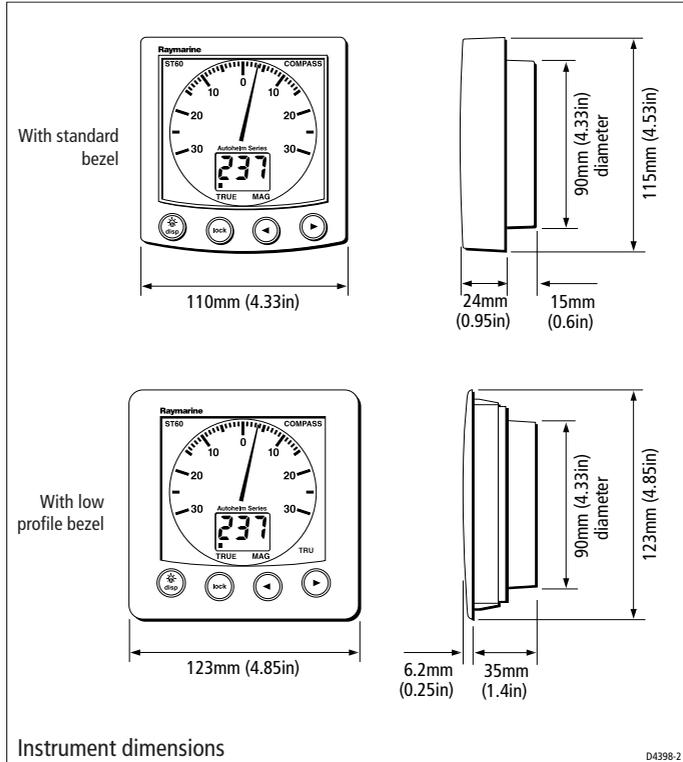
CAUTION:

The presence of moisture at the rear of the instrument could cause damage either by entering the instrument through the breathing hole or by coming into contact with the electrical connectors.

ST60 instruments can be fitted either above or below deck, provided the rear of the instrument is sited where it is protected from contact with water.

Each instrument must also be positioned where it is:

- Easily read by the helmsman.
- Protected against physical damage.
- At least 230 mm (9 in) from a compass.
- At least 500 mm (20 in) from radio receiving equipment.
- Reasonably accessible from the rear for installation and servicing.



EMC guidelines

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

Their design and manufacture conforms to the appropriate Electromagnetic Compatibility (EMC) standards, but correct installation is required to ensure that EMC performance is not compromised. Although every effort has been taken to ensure that they will perform under all conditions, it is important to understand what factors could affect the operation of this product.

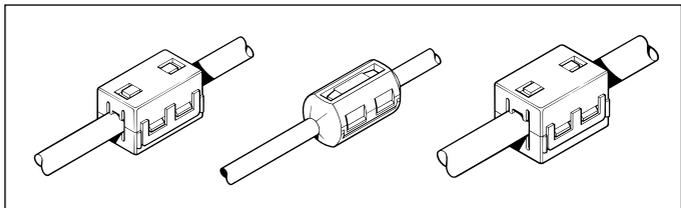
To minimise the risk of operating problems:

- All Raymarine equipment and cables connected to it should be:
 - At least 1 m (3 feet) from any equipment transmitting or cables carrying radio signals, e.g. VHF radios, cables and antennas. In the case of SSB radios, the distance should be increased to 2 m (7 ft).

- More than 2 m (6 ft) from the path of a radar beam. A radar beam can normally be assumed to spread 20 degrees above and below the radiating element.
- The equipment should be supplied from a different battery than the one used for engine start. Voltage drops below 10 V in the power supply to our products can cause the equipment to reset. This will not damage the equipment, but will cause the loss of some information and can change the operating mode.
- Genuine Raymarine cables should be used at all times. Cutting and rejoining these cables can compromise EMC performance and so should be avoided unless doing so is detailed in the installation manual.
- If a suppression ferrite is attached to a cable, this ferrite should not be removed. If the ferrite has to be removed during installation it must be reassembled in the same position.

Suppression ferrites

The following illustration shows the typical range of suppression ferrites fitted to Raymarine equipment. Always use the ferrites specified by Raymarine.



Connections to other equipment

If your Raymarine equipment is going to be connected to other equipment using a cable not supplied by Raymarine, a suppression ferrite **MUST** always be fitted to the cable close to the Raymarine unit.

3.2 Procedures

As it is not possible to describe procedures for all possible installation scenarios, the procedures given here describe the broad requirements for installing an ST60 Steering Compass instrument and its associated Fluxgate Compass Transducer. Adapt these procedures as appropriate, to suit your individual requirement.

CAUTION:

Where it is necessary to cut holes (e.g. for cable routing and instrument mounting), ensure that these will not cause a hazard by weakening critical parts of the vessel's structure.

Unpacking

Unpack your ST60 instrument and check that the items described in *Introduction* are present.

Each ST60 instrument is supplied with a standard bezel for surface mounting. Optional mounting kits are available for flush mounting and bracket mounting the instrument. If you have ordered the flush mounting option, a low-profile bezel and four fixing screws are also provided.

Fitting the instrument

The ST60 Steering Compass instrument can be installed using one of a number of different mounting options:

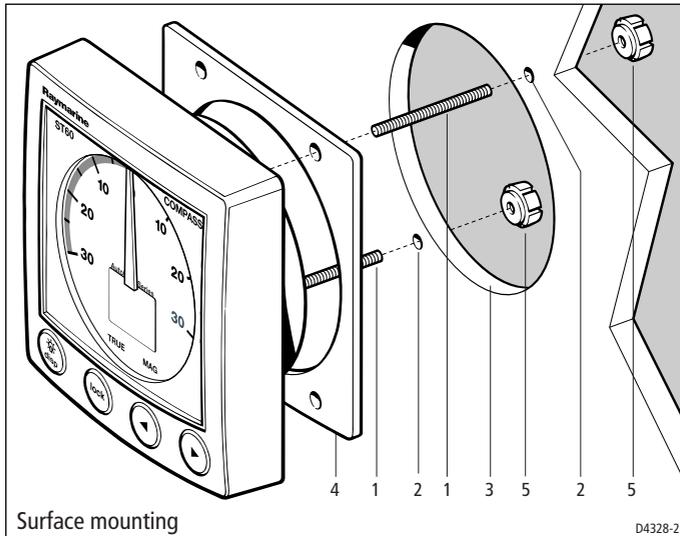
- Surface Mounting. Gives a profile of approximately 24 mm.
- Flush Mounting. Gives a profile of approximately 6 mm.
- Bracket Mounting.

The ST60 Steering Compass instrument can also be mounted behind a panel with just the instrument dial and keys visible.

Surface mounting

To surface mount your ST60 instrument (see the *Surface mounting* illustration):

1. Ensure that:
 - The selected location is clean, smooth and flat.
 - There is sufficient space behind the location to accommodate the rear of the instrument and connectors.
2. Apply the surface mount template (supplied at the rear of this handbook) to the selected location and mark the centres for the fixing studs (1) and the aperture (3) that will take the rear casing of the instrument.



3. Drill out the two 5 mm fixing stud clearance holes (2).
4. Cut out the clearance hole (3) then remove the template.
5. Peel off the protective sheet from the self-adhesive gasket (4) then stick the gasket into position on the rear of the instrument.
6. Screw the two fixing studs into the threaded sockets on the rear of the instrument.
7. Mount the assembled instrument, studs, bezel and gasket into the panel. Secure from behind with the thumb nuts (5).

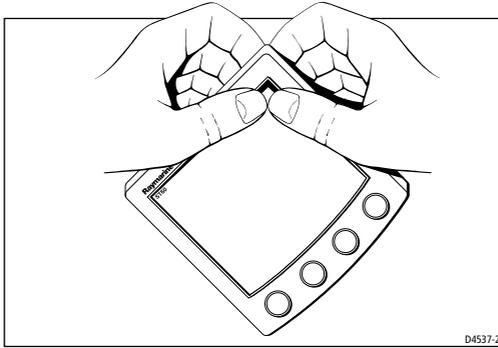
Flush mounting

The Flush Mounting Kit uses a low-profile bezel to reduce the fitted profile of the instrument to approximately 6 mm above the panel fascia.

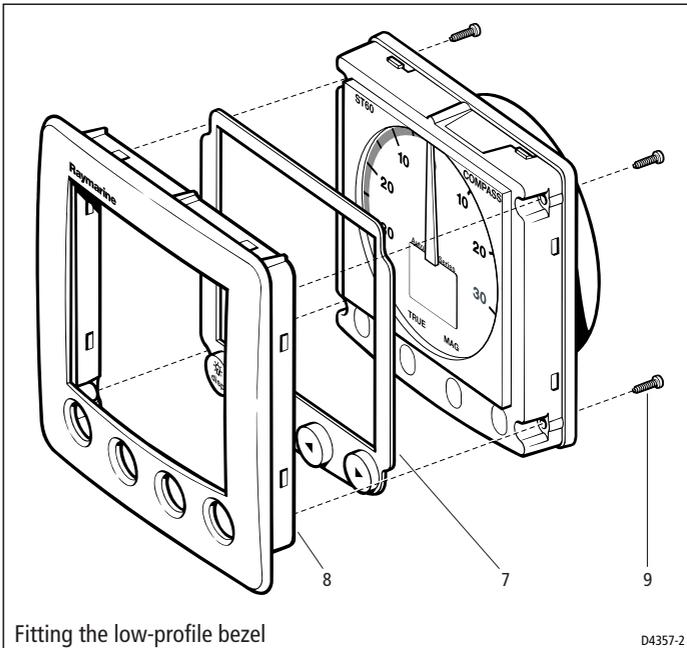
Fitting the low-profile bezel

In order to flush-mount your ST60 instrument, replace the standard bezel with the low-profile bezel as follows:

1. Hold the instrument in both hands with the display towards you.
2. Using both thumbs, gently press an upper corner of the instrument from the bezel, then remove the bezel from the instrument. Retain the rubber keypad which is released when the bezel is removed.



3. Referring to the *Fitting the low-profile bezel* illustration, place the instrument face upwards on a flat surface and place the rubber keypad (7) in position around the display window (i.e. so that each key outline is located over its associated key on the instrument).
4. Snap the low-profile bezel (8) in position over the instrument, so that the rubber keys are correctly located in the holes on the bezel.



Fitting the low-profile bezel

CAUTION:

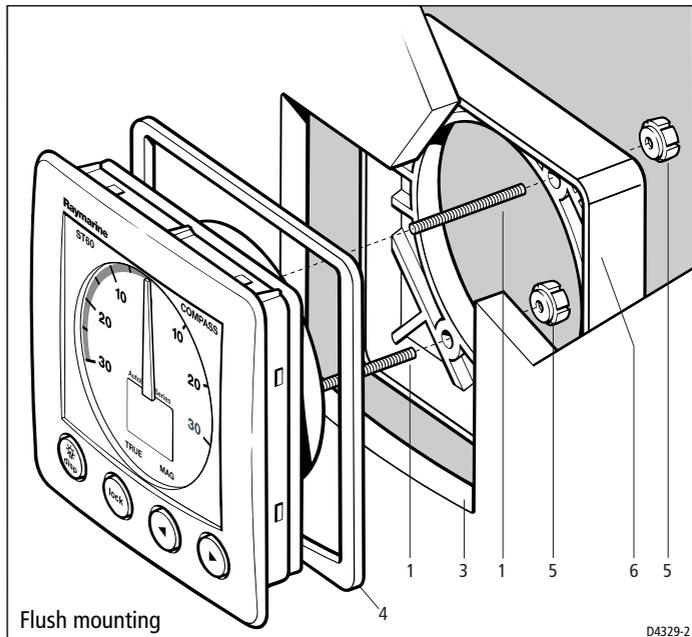
It is essential that only screws of the correct size are used to secure the instrument to the bezel. Failure to observe this caution could result in damage to both the instrument and the bezel.

5. Using the four, self-tapping screws (9) provided, secure the instrument and bezel together. Fit the screws from the rear of the instrument and tighten them sufficiently to secure the instrument and bezel together. **DO NOT OVERTIGHTEN.**

Flush mounting procedure

Flush mount your instrument (see the *Flush mounting* illustration) as follows:

1. Assemble the ST60 instrument and low-profile bezel as described under *Fitting the low-profile bezel*.
2. Ensure that:
 - The panel on which you intend to mount the instrument is between 3 mm and 20 mm thick.
 - The selected location is clean, smooth and flat.
 - There is sufficient space behind the location to accommodate the rear of the instrument and connectors.



3. Apply the template flush mount (supplied at the rear of this handbook) to the selected location and mark out the aperture into which the assembled instrument and bezel will sit.
4. Cut out the aperture (3) for the assembled instrument and bezel and remove the template.
5. Peel off the protective sheet from the self-adhesive gasket (4) then stick the gasket into position on the rear of the bezel.
6. Screw the two fixing studs (1) into the threaded sockets on the rear of the instrument.
7. Mount the assembled instrument, studs, bezel and gasket into the panel.
8. Locate the flush mount bracket (6) onto the fixing studs and secure the assembly to the panel with the thumb-nuts (5).

Bracket mounting

A Control Unit Mounting Bracket (Part No. E25009) enables you to mount your ST60 instrument in locations where other forms of mounting are impractical. Although this provides a useful alternative method for securing your instrument, it is only suitable for use in positions where the instrument will not be exposed to water.

To bracket mount your ST60 instrument, do so in accordance with the Control Unit Mounting Bracket *Instruction Sheet*.

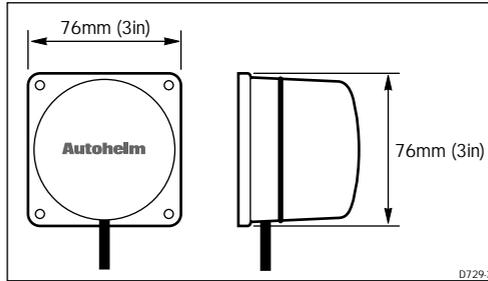
Fitting transducer

If you are fitting an ST60 Steering Compass instrument and wish to use it as a stand alone instrument, you need to fit a Fluxgate Compass transducer.

Note: *If the ST60 Steering Compass is to form part of a system which includes a SeaTalk autopilot, the ST60 Steering Compass instrument does not need its associated Fluxgate Compass transducer to operate as a slave to the autopilot. However, if the Fluxgate Compass transducer is fitted, the instrument will operate as a master.*

Installation

Determine a suitable position for the Fluxgate Compass transducer, as described under *Site requirements*.



If you are not sure of the magnetic suitability of the chosen location, carry out a survey of the site as follows:

1. Temporarily fix a simple hand bearing compass at the intended location.
2. Swing the vessel through 360° while at the same time observing differences between the hand bearing compass and the vessel's main steering compass.
3. If there are no differences, greater than 10° on any heading, then the site is suitable for the Fluxgate Compass transducer.

Using the self-tapping screws provided, mount the Fluxgate Compass transducer vertically on a suitable bulkhead, so that the connecting cable is downmost.

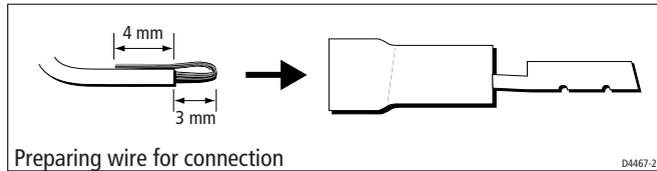
Running transducer cable

General

The manner in which you run the cable from the Fluxgate Compass transducer will depend on the locations of the transducer and instrument. The following guidelines are provided:

- If the cable has to be fed through the deck, always use a proprietary deck gland.
- Where cables are fed through holes, always use grommets to prevent chafing.
- Secure long cable runs so they do not present a hazard.
- The transducer cable is fitted with spade connectors for direct connection to the rear of the instrument. However, it may be necessary to remove these to facilitate installation e.g. if you want incorporate a junction box in the cable run or if the cable has to be

routed through narrow apertures. Extra spade connectors are provided, to replace any that are removed when running the cable. In order to ensure a secure connection when fitting spade connectors, fold back the wire strands as shown in the following illustration, before inserting the wire in the spade connector. Ensure the wire strands do not extend beyond the rear of the spade connector insulation.



Connecting the instrument

Introduction

The ST60 Steering Compass instrument can be connected to SeaTalk as a repeater instrument.

The ST60 Steering Compass instrument can also be connected:

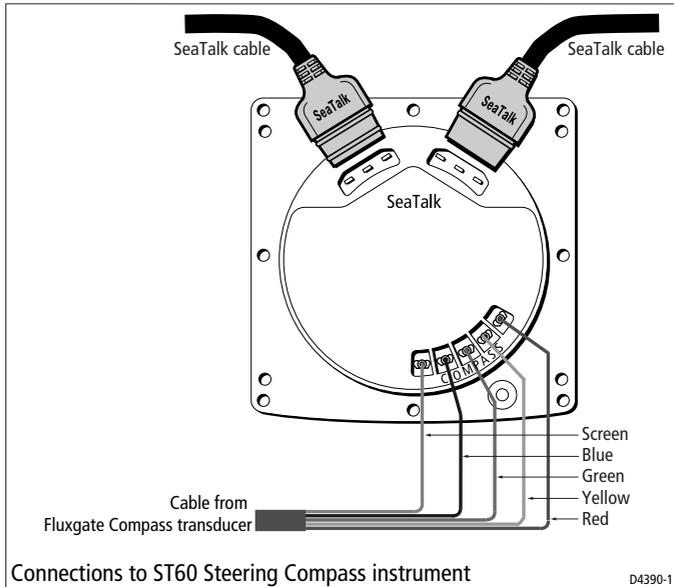
- As a stand-alone instrument connected directly to the Fluxgate Compass transducer.
- To fulfil both slave (repeater) and master roles by being connected both to the Fluxgate Compass transducer and to SeaTalk.

Instruments connected to SeaTalk derive their power directly from SeaTalk and no separate power connection is necessary. Where a SeaTalk system includes an autopilot, the power for the system is provided by the autopilot.

A range of Raymarine SeaTalk extension cables is available to connect separated instruments. These cables are supplied with a SeaTalk connector fitted to each end. A junction box can be used to join cables.

Signal connections

Make the necessary connections to your ST60 instrument (see the *Connection to ST60 Steering Compass instrument* illustration).



Power supply connections

SeaTalk systems

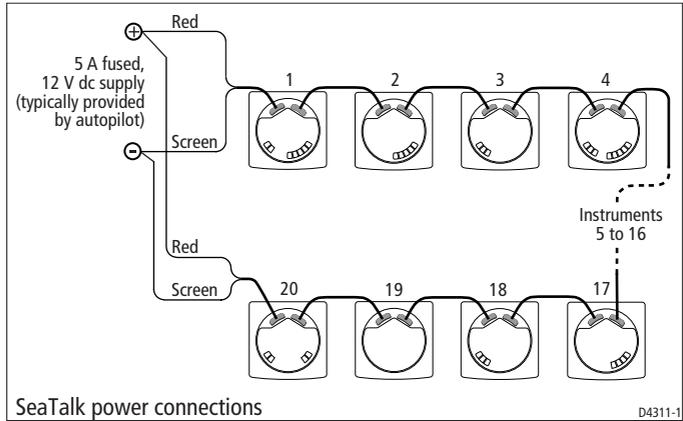
CAUTION

When instruments are connected to SeaTalk, ensure that the power supply for the SeaTalk 12 V line is protected by a 5 A fuse.

Systems with a large number of instruments on the SeaTalk bus may require connections to the power supply from each end of the system ('ring-main' style), to maintain sufficient voltage throughout the system.

This requirement depends on the total length of the cable run and the total number of instruments in the system, as follows:

Cable run	No. of instruments	Power connections
Up to 10 m	13 maximum	1
	26 maximum	2
Up to 20 m	7 maximum	1
	13 maximum	2

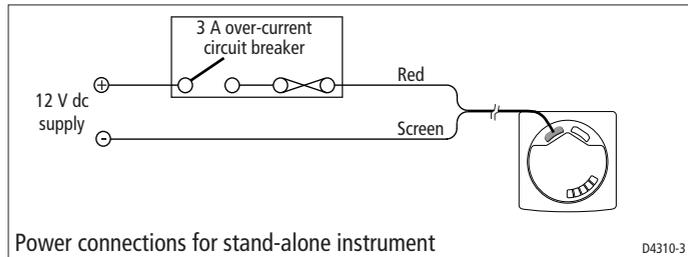


Stand alone instruments

Stand-alone instruments are not connected to SeaTalk and therefore need to be connected to an alternative 12 V power source. Power cables are available in 2 m and 9 m lengths.

To fit a power cable:

1. Run the cable from the instrument to a suitable 12 V dc power source.



2. If the cable has not already been trimmed at the power supply end:
 - a. Cut the cable to length and trim back an appropriate amount of the outer sheath.
 - b. Cut back and insulate the yellow wire.
3. Connect the screen to the power supply 0 v terminal.
4. Connect the red wire via a 3 A over-current circuit breaker to the power supply +12 V terminal.

Chapter 4: Calibration

4.1 Introduction

The ST60 Steering Compass instrument is set up with factory-programmed default settings, so in order to optimise the performance of the instrument on board a particular vessel, the procedures in this Chapter must be carried out immediately after the completion of installation and before the equipment is used for navigational purposes.

Where practicable, the calibration procedures are presented diagrammatically to show the sequence of key presses and the resulting displays. If a parameter is adjustable, adjustment instructions are given at the appropriate point on the diagram.

EMC conformance

- Always check the installation before going to sea to make sure that it is not affected by radio transmissions, engine starting etc.
- In some installations, it may not be possible to prevent the equipment from being affected by external influences. Although this will not damage the equipment, it can lead to spurious resetting action, or momentarily may result in faulty operation.

4.2 User calibration

The User calibration procedures (see the *User calibration* flow chart) enable you to carry out:

- Linearisation and heading alignment.
- Locked heading display selection.
- Variation setting.
- True/Magnetic display selection.

Note: *User Calibration is possible only if it is enabled (default) in Dealer Calibration.*

To carry out a User calibration:

1. Hold down the **disp** and **lock** keys together for approximately 2 seconds to select the Calibration entry screen.
2. Use the **disp** key to cycle from screen to screen and use the **<** and **>** keys to set the required values at each screen.

Linearisation

The Fluxgate Compass transducer must be linearised to compensate for deviation. Linearisation should be carried out in calm conditions, preferably in flat water.

Note: *If linearisation has already been performed, press the **disp** key momentarily to bypass the linearisation process and carry on to the Heading alignment screen without disturbing the current deviation settings.*

When the Linearisation screen is first selected, the outer segments of the LCD cycle to indicate that linearisation has started.

To proceed with the linearisation, slowly turn the vessel in a circle, so that the speed is kept below 2 knots and so that it takes at least 3 minutes to complete 360°. If the vessel is turning too quickly, the buzzer will sound and a SLO message will flash on the digital display. If this occurs, slow down the vessel's rate of turn.

Keep turning until the digital display shows a flashing heading value. Linearisation is now complete and the digital display now advances automatically to the Heading alignment screen.

Note the analogue pointer reading which shows the amount of deviation corrected. If this reading exceeds 15°, the Fluxgate Compass transducer should be re-sited.

Heading alignment

Carry out heading alignment as follows:

1. Align the vessel with a known bearing; preferably a transit bearing.
2. Use the < and > keys to adjust the value on the ST60 Steering Compass digital display until it corresponds to the known bearing.

Lock mode

The locked mode screen enables you to select which heading is selected as the normal operating display in locked mode. This can be either:

- The locked or 'fixed' heading.

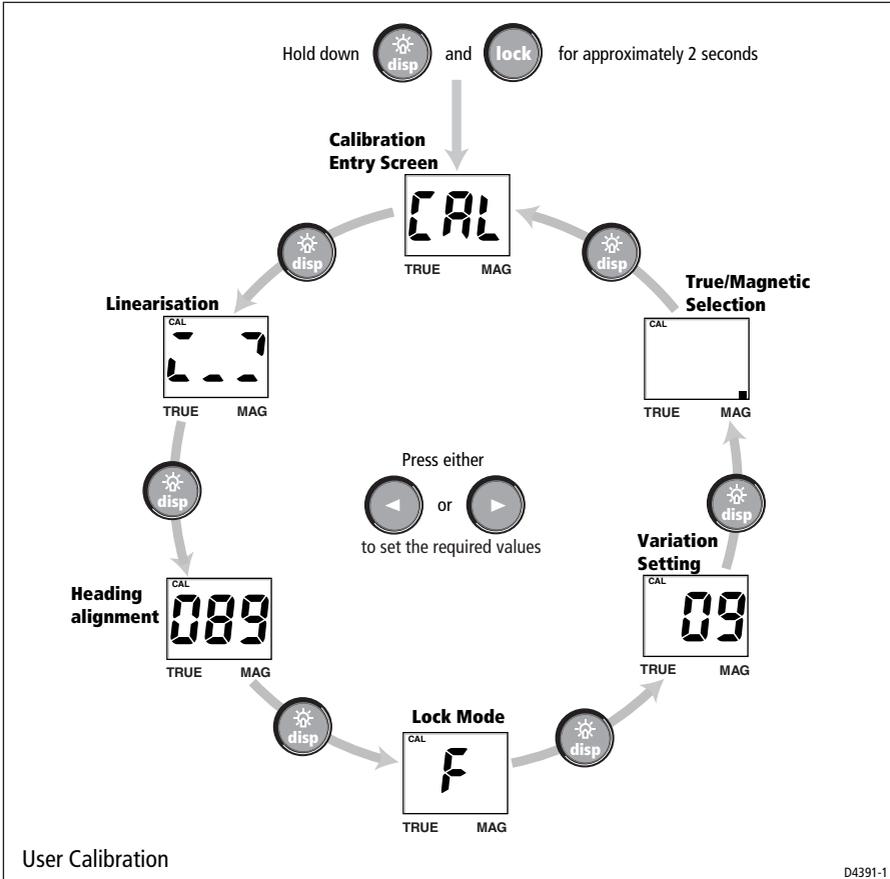
or

- The live or 'current' heading.

Use the < and > keys as necessary, to select the required heading.

Select:

- F for Fixed heading.
- C for Current heading.



Variation setting

A positive value indicates easterly and a negative value westerly. If the variation has not been set, or the data is not available, the digital display shows a series of dashes.

Changes to variation must be accepted before a TRUE heading can be made, see *True/Magnetic Selection*.

If the ST60 Steering Compass instrument is connected to SeaTalk and a value for variation is present on SeaTalk (e.g. from an autopilot), this is accepted as the value for the instrument. If a value is not present on SeaTalk, or if the instrument is not connected to SeaTalk, use the < and > keys to set the appropriate value.

True/magnetic selection

Use this option to select either MAG(netic) or TRUE as the heading display default (indicated by the black square adjacent to either MAG or TRUE, as appropriate).

If the Steering Compass is used in a system without a SeaTalk compatible Autopilot, or the Steering Compass is being used independently, set the digital display to MAG.

True headings cannot be displayed if variation data is not available.

Leaving User calibration

Press the **disp** and **lock** keys for 2 seconds, to save your changes, exit User calibration and return to normal operation.

4.3 Intermediate calibration

The Intermediate calibration procedures (see the *Intermediate calibration* flow chart) enable you see:

- Software version number.
- Master/Repeater status.

To access the intermediate calibration information, hold down the **disp** and **lock** keys together for approximately 4 seconds.

Software version number

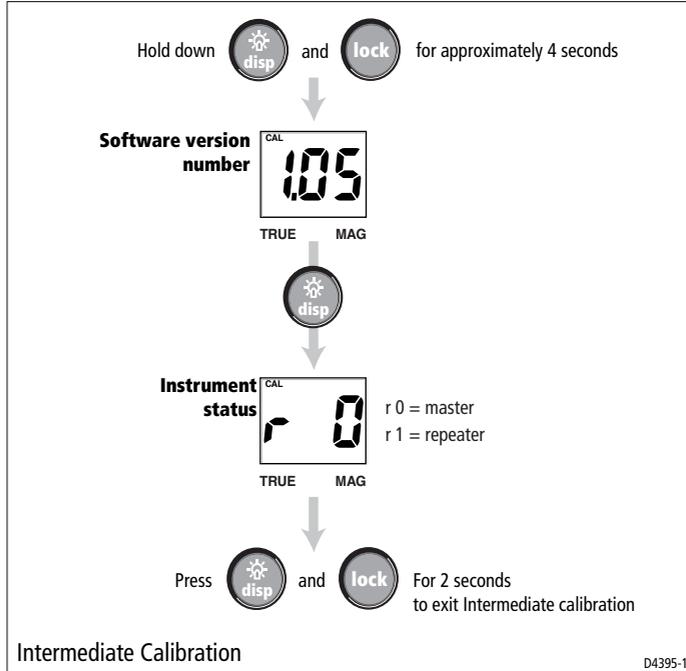
This screen shows the Software Version number. This information is normally required when requesting parts or repairs.

Master/repeater status

Press the **disp** key from the Software Version Number screen to enter the Master/Repeater Status screen.

The display shows either:

- r0 to indicate a master instrument, i.e. connected to a transducer or
- r1 to indicate a repeater instrument, i.e. using data from SeaTalk.



Leaving Intermediate calibration

Press the **disp** and **lock** keys for 2 seconds, to exit Intermediate calibration and return to normal operation.

4.4 Dealer calibration

Dealer Calibration enables the following parameters to be set:

- User calibration on/off.
- Pointer response.
- Heading display response.
- Boat show mode on/off.

Dealer calibration also gives access to the Factory defaults screen. This enables you to re-apply the factory settings if you want to reset the instrument to a known operating condition.

To commence Dealer calibration, hold down the **disp** and **lock** keys together for approximately 12 seconds to select the Dealer calibration entry screen (see *Dealer calibration* flow chart). Then press the **<** and **>** keys simultaneously, to start the calibration sequence.

Calibration on/off

Controls access to the User calibration. Access can be either enabled (UC1) or disabled (UC0), as required.

Use the **<** and **>** keys to set the value you want.

Note: *If the access to User calibration is disabled, then only the software version screen will be available in Intermediate calibration; the instrument status screen will not be displayed.*

Pointer response

The pointer response value determines how the analogue pointer responds to changes in data inputs. The higher the value, the more sensitive the pointer to data changes. The range is from P1 to P15.

Use the **<** and **>** keys to set the value you want.

Heading display response

The heading display response value determines how the digital display responds to changes in data inputs. The higher the value, the more sensitive the display to data changes. The range is from d1 to d15.

Use the **<** and **>** keys to set the value you want.

Boat show mode

CAUTION:

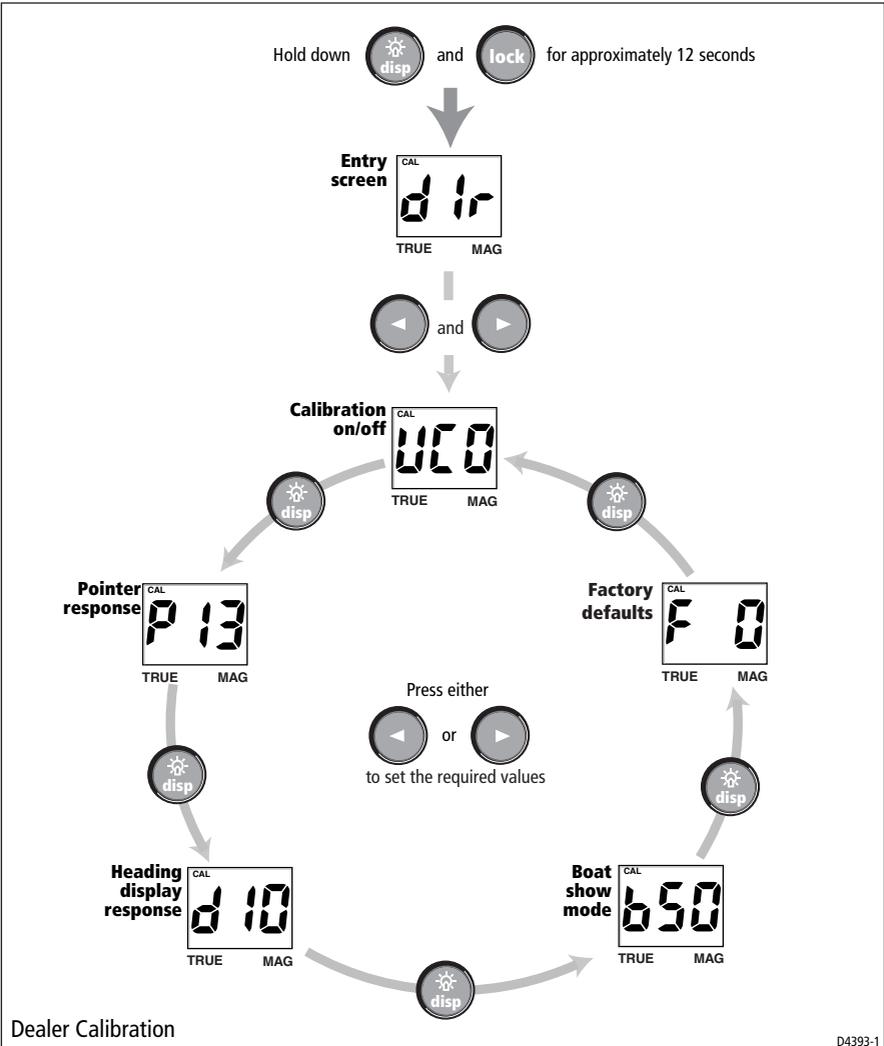
DO NOT enable this mode. It must be used for demonstration purposes only.

Ensure that Boat Show Mode is set to bS0 (disabled). If necessary, use either the **<** key or the **>** key to achieve this.

Factory defaults

You can use this screen to reset the operating parameters to the factory default values. If you want to apply the factory defaults, ensure the display shows F1, but if you want to retain the values you have set up, ensure that the display shows F0. Use the < and > keys to make the required selection.

The values you have selected will be applied when you exit this screen.



Leaving Dealer calibration

Hold down the **disp** and **lock** keys for 2 seconds, to save your changes, exit Dealer calibration and resume normal operation.

ST60 Surface Mount Template

TOP

Drill 5mm (3/16in) diameter



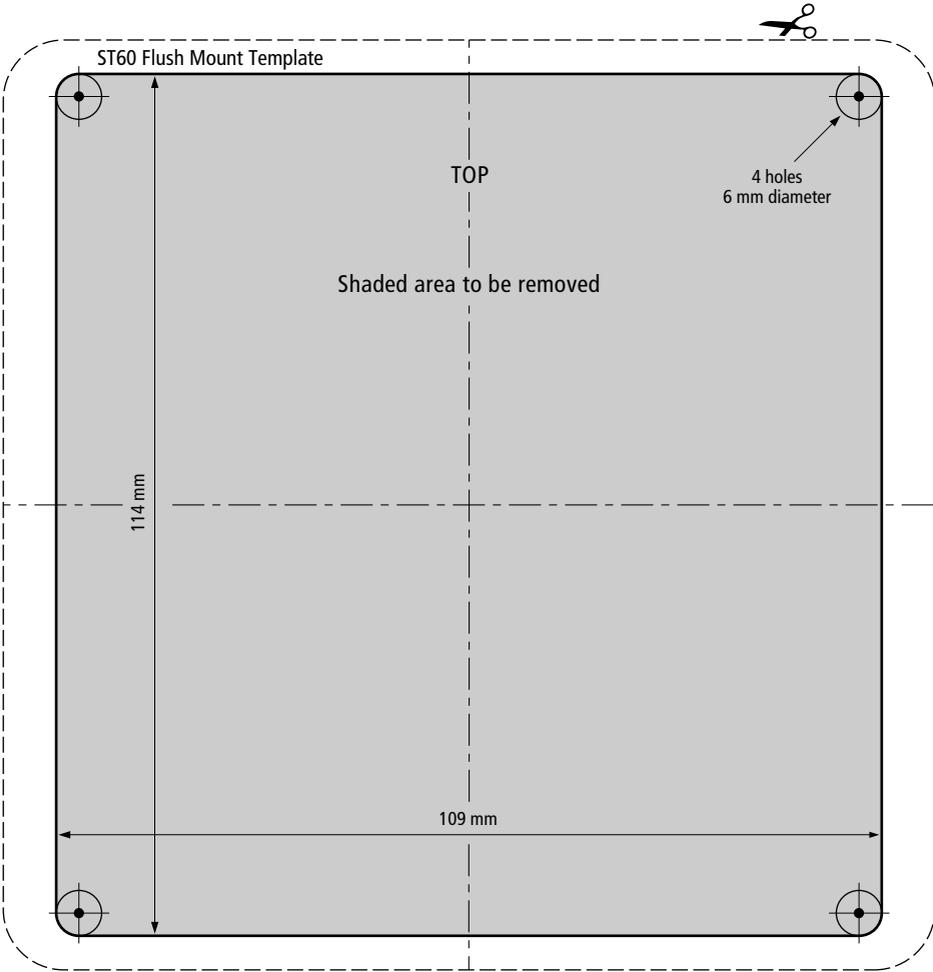
Machine hole
90mm (3.54in)
diameter

Shaded areas to be removed



Drill 5mm (3/16in) diameter

D4436-1



Limited Warranty Certificate

Raymarine warrants each new Light Marine/Dealer Distributor Product to be of good materials and workmanship, and will repair or exchange any parts proven to be defective in material and workmanship under normal use for a period of 2 years/24 months from date of sale to end user, except as provided below.

Defects will be corrected by Raymarine or an authorized Raymarine dealer. Raymarine will, except as provided below, accept labor cost for a period of 2 years/24 months from the date of sale to end user. During this period, except for certain products, travel costs (auto mileage and tolls) up to 100 round trip highway miles (160 kilometres) and travel time of 2 hours, will be assumed by Raymarine only on products where proof of installation or commission by authorized service agents, can be shown.

Warranty Limitations

Raymarine Warranty policy does not apply to equipment which has been subjected to accident, abuse or misuse, shipping damage, alterations, corrosion, incorrect and/or non-authorized service, or equipment on which the serial number has been altered, mutilated or removed.

Except where Raymarine or its authorized dealer has performed the installation, it assumes no responsibility for damage incurred during installation.

This Warranty does not cover routine system checkouts or alignment/calibration, unless required by replacement of part(s) in the area being aligned.

A suitable proof of purchase, showing date, place, and serial number must be made available to Raymarine or authorized service agent at the time of request for Warranty service.

Consumable items, (such as: Chart paper, lamps, fuses, batteries, styli, stylus/drive belts, radar mixer crystals/diodes, snap-in impeller carriers, impellers, impeller bearings, and impeller shaft) are specifically excluded from this Warranty.

Magnetrons, Cathode Ray Tubes (CRT), TFT Liquid Crystal Displays (LCD) and cold cathode fluorescent lamps (CCFL), hailer horns and transducers are warranted for 1 year/12 months from date of sale. These items must be returned to a Raymarine facility.

All costs associated with transducer replacement, other than the cost of the transducer itself, are specifically excluded from this Warranty.

Overtime premium labor portion of services outside of normal working hours is not covered by this Warranty.

Travel cost allowance on certain products with a suggested retail price below \$2500.00 is not authorized. When/or if repairs are necessary, these products must be forwarded to a Raymarine facility or an authorized dealer at owner's expense will be returned via surface carrier at no cost to the owner.

Travel costs other than auto mileage, tolls and two (2) hours travel time, are specifically excluded on all products. Travel costs which are excluded from the coverage of this Warranty include but are not limited to: taxi, launch fees, aircraft rental, subsistence, customs, shipping and communication charges etc. Travel costs, mileage and time, in excess to that allowed must have prior approval in writing.

TO THE EXTENT CONSISTENT WITH STATE AND FEDERAL LAW:

(1) THIS WARRANTY IS STRICTLY LIMITED TO THE TERMS INDICATED HEREIN, AND NO OTHER WARRANTIES OR REMEDIES SHALL BE BINDING ON RAYMARINE INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

(2) Raymarine shall not be liable for any incidental, consequential or special (including punitive or multiple) damages.

All Raymarine products sold or provided hereunder are merely aids to navigation. It is the responsibility of the user to exercise discretion and proper navigational skill independent of any Raymarine equipment.

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Stick barcode label here

Purchased from

Purchase date

Dealer address

Installed by

Installation date

Commissioned by

Commissioning date

Owner's name

Mailing address

This portion should be completed and retained by the owner.