

Distributed by
Raymarine

Any reference to Raytheon or RTN in this manual should be interpreted as Raymarine. The names Raytheon and RTN are owned by the Raytheon Company.

ST60 Depth Instrument Owner's Handbook

Document number: 81038-3
Date: 1st April 2001

Contents

Introduction	v
EMC conformance	v
Data inputs	vi
SeaTalk	vi
Stand alone operation	vi
Remote control	vi
Options	vii
Mounting options	vii
Depth transducers	vii
Parts supplied	viii
Chapter 1: Operation	1
1.1 Getting started	1
Calibration requirement	1
1.2 Normal operation	1
Depth measurement units	1
Displayed information	1
Alarms	2
Offsets	4
1.3 Display settings	4
Illumination	4
Contrast	5
1.4 Pop-up Pilot	5
1.5 Remote control	5
Chapter 2: Maintenance and Fault Finding	7
2.1 Maintenance	7
Servicing and safety	7
Instrument	7

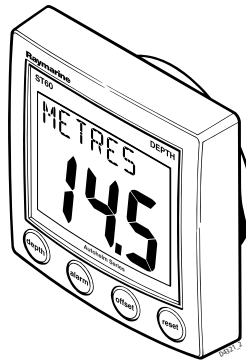
Transducer	7
Cabling	7
2.2 Fault finding	8
Preliminary procedures	8
Fixing faults	8
Chapter 3: Installation	11
3.1 Planning your installation	11
Site requirements	11
Transducer	11
Instrument	13
EMC guidelines	14
Suppression ferrites	15
Connections to other equipment	15
3.2 Procedures	16
Unpacking	16
Fitting the instrument	16
Surface mounting	16
Flush mounting	17
Fitting the low-profile bezel	17
Flush mounting procedure	19
Bracket mounting	20
Fitting transducer	20
Running transducer cable	21
Connecting instruments	22
Types of connection	22
Signal connections	22
Power supply connections	23
SeaTalk systems	23
Stand alone instruments	23

Chapter 4: Calibration	25
4.1 Introduction	25
EMC conformance	25
4.2 User calibration	25
Procedure	25
Depth units	27
Depth offset	27
Setting offset values	28
Shallow lock	28
Pop-up pilot	28
Leaving User calibration	28
4.3 Intermediate calibration	28
Leaving Intermediate calibration	29
4.4 Dealer Calibration	30
User calibration on/off	30
Response settings	30
Boat show mode	30
Factory defaults	32
Leaving Dealer calibration	32

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 Depth instrument. This instrument provides accurate depth information in either feet, metres or fathoms, on a high quality Liquid Crystal Display (LCD). The instrument is constructed in a rugged weather-proofed case to provide reliable performance, even under the most demanding conditions.



WARNING

Although the ST60 Depth 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. If a fault occurs that results in inaccurate depth readings or a loss of depth information, the vessel could run aground if undue reliance has been placed on the instrument. Always maintain a permanent watch and be aware of depth-change trends.

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 Depth instrument receives data from an appropriate depth transducer and/or a SeaTalk instrumentation system.

SeaTalk

SeaTalk enables a number of compatible instruments to operate as a single, integrated navigational system. Instruments in a SeaTalk system are linked by means of a single cable, which carries both power and data. Instruments can therefore be added to the system 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 via an appropriate interface, 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 provides data and control for the service it is providing to all other equipment on the SeaTalk network. A slave instrument is not directly connected to a transducer but repeats information provided by other masters in the SeaTalk network.

The ST60 Depth instrument can fulfil both master and repeater roles.

Stand alone operation

In Stand alone operation, the ST60 Depth instrument 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 Depth instrument can be controlled remotely by a SeaTalk Remote Keypad Unit, to provide instant remote access to the various display readouts.

Options

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.

Depth transducers

Various optional transducer types are available to suit different hull types and situations. Refer to *Chapter 3, Installation* for details.

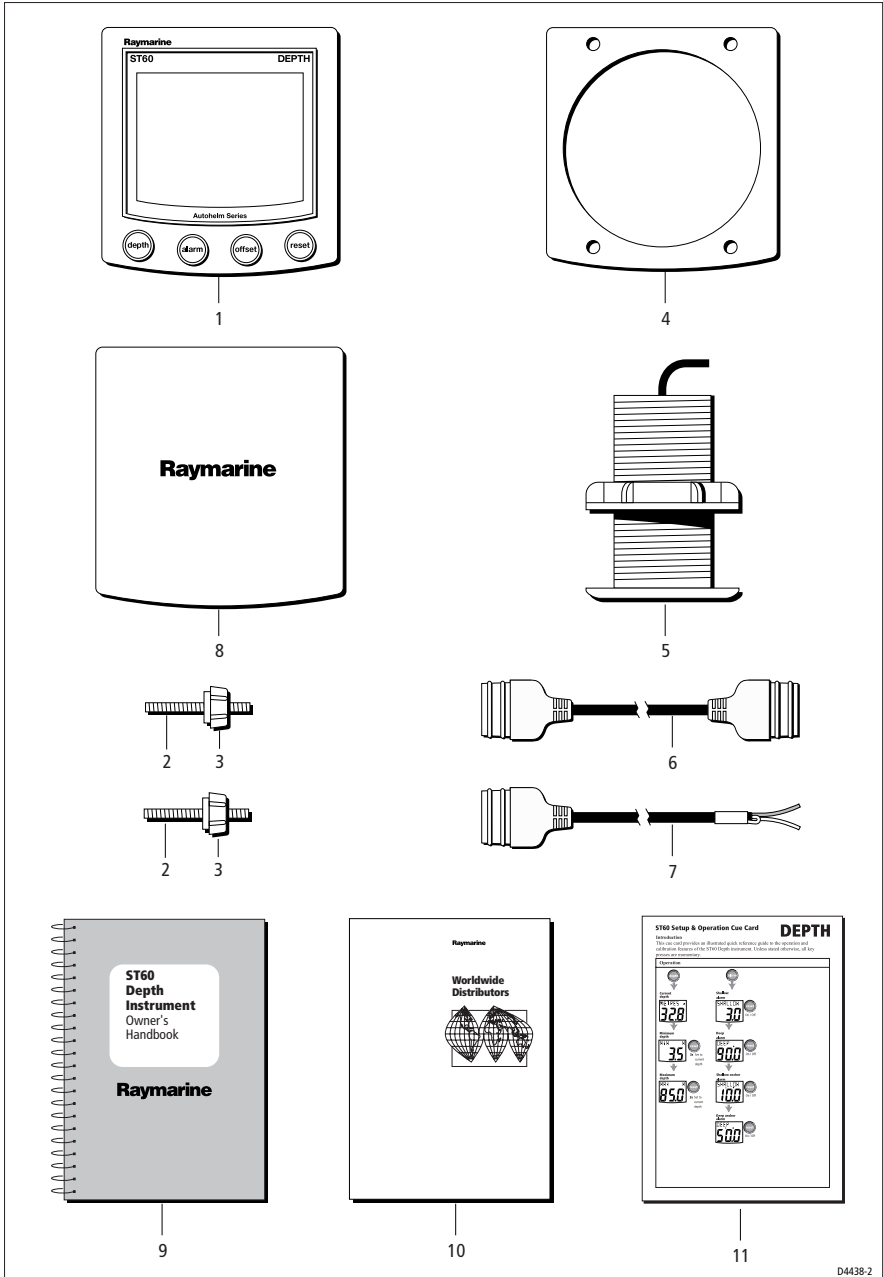
Parts supplied

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

- Item 1, ST60 Depth instrument fitted with standard bezel for surface mounting.
- Item 2, Fixing studs (2).
- Item 3, Thumb nuts (2).
- Item 4, Gasket.
- Item 5, Depth transducer.
- Item 6, SeaTalk interconnection cable.
- Item 7, Power cable.
- Item 8, Instrument Cover.
- Item 9, Owner's Handbook. A Warranty document and fitting 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 Depth system. Where an instrument is purchased separately, a transducer is not included.*



Chapter 1: Operation

1.1 Getting started

This handbook describes how to operate, maintain and install the Raymarine ST60 Depth instrument.

Calibration requirement

The 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.

1.2 Normal operation

Use the flow charts in this Chapter to operate your ST60 Depth instrument. The flow charts show the sequence of key presses and displays for the various operating tasks. All key presses are momentary unless otherwise stated.

Depth measurement units

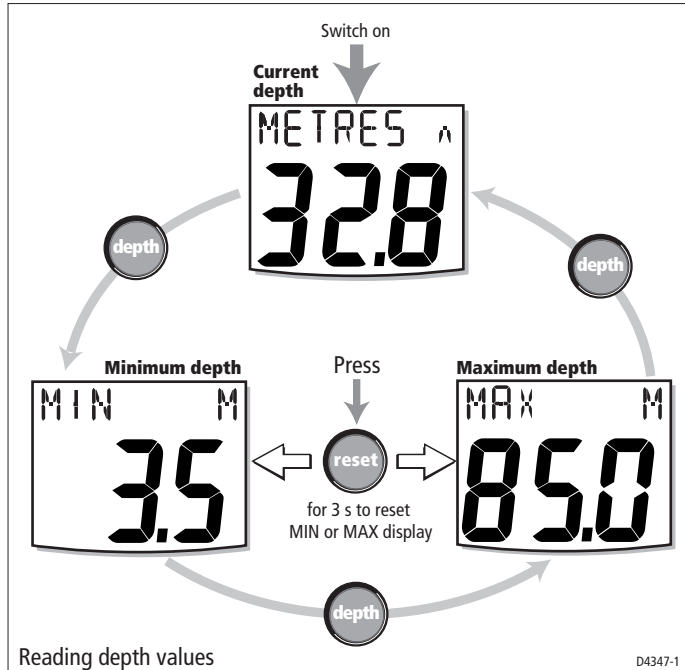
The depth measurement units can be either feet, metres or fathoms. The required units are selected during user calibration (see *Chapter 4, Calibration*).

Displayed information

When first switched on, your ST60 Depth instrument shows the current depth. The instrument memorises the minimum and maximum depth values encountered during the period it is switched on, and these can be recalled at any time (see the *Reading depth values* flow chart).

The display will always revert to the current depth display after 8 seconds.

You can reset the MIN and MAX values by pressing the **reset** key for three seconds.



The current depth display provides depth-trend indicator arrows to show whether the depth is increasing or decreasing. A rising sea-bed is shown by an up arrow and a lowering sea-bed by a down arrow.

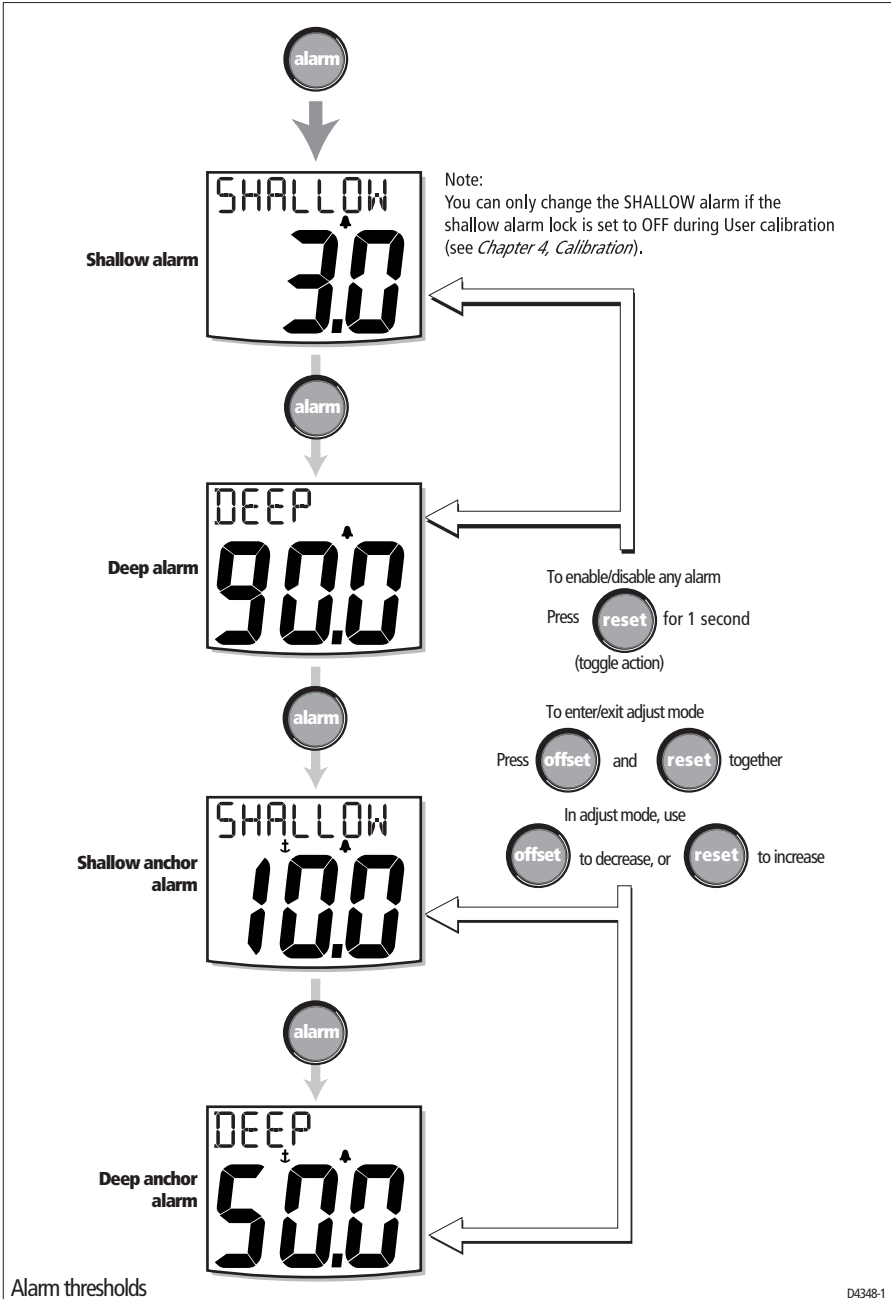
If there is no depth signal from the transducer for more than 30 seconds, the last known depth is displayed and LAST flashes at the top of the screen. If depth information is not received from the transducer or from SeaTalk, then dashes are displayed.

Alarms

An alarm condition occurs if:

- The depth is less than the SHALLOW or SHALLOW anchor threshold.
- The depth is more than the DEEP anchor threshold.
- The DEEP threshold value is crossed, with the seabed rising or falling.

An alarm condition is indicated by an audible beep and a flashing alarm symbol on the display. The display will also show the relevant caption, either SHALLOW or DEEP, and for anchor alarms an anchor symbol.



When the instrument is operating as a master, you can check the alarm thresholds and if necessary set them up (see *Alarm thresholds* flow chart). To do this, use the alarm key to select the required alarm threshold, then:

- To enable or disable the alarm, press the **reset** key for 1 second. If an alarm is disabled, the associated screen shows an OFF legend.
- To change the value of the alarm threshold, press the **offset** and **reset** keys together to enter adjust mode, then use these keys individually to set the required value.

Offsets

Depths are measured from the transducer to the sea bed. However, offsets to the actual distances measured can be applied during calibration (see *Chapter 4, Calibration*), so that the displayed depth reading represents either the depth from the keel or the depth from the waterline (W/L).

To see the offsets applied on your vessel, press the **offset** key. If the instrument is operating as a master, the display will show the size of the offset (either positive or negative) and the appropriate legend:

- When the offset is a positive value, the legend W/L is displayed.
- When the offset is a negative value, the legend KEEL is displayed.
- When the offset is zero, the legend OFFSET is displayed. With zero offset applied, the displayed depth reading is measured from the transducer.

1.3 Display settings

Illumination

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

1. Hold down the **depth** key for approximately one second, to enter the illumination-adjust mode.
2. There are four preset illumination levels. Momentarily press the **depth** key to cycle through the these levels until you reach the level you want.

3. Press any other key to leave the illumination-adjust mode.

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

Contrast

To adjust the display contrast:

1. Enter the illumination-adjust mode as described above.
2. Hold down the **depth** key for a further two seconds approximately, to enter the contrast-adjust mode.
3. There are four preset contrast settings. Momentarily press the **depth** key to cycle through the these settings until you achieve optimum display quality.
4. Press any other key to leave the contrast-adjust mode.

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

1.4 Pop-up Pilot

A Pop-up Pilot facility enables instruments connected to SeaTalk to constantly monitor any changes to the autopilot mode and to the course settings. If one of these parameters changes, the new value is immediately displayed on the ST60 instrument for 5 seconds, after which time the display reverts to the previous display.

This facility can be enabled or disabled during User calibration (see *Chapter 4, Calibration*).

1.5 Remote control

When it is connected to SeaTalk, the ST60 Depth instrument can be controlled remotely with a SeaTalk Remote Keypad Unit. Remote control of an instrument is indicated by a REMOTE legend on the display, to indicate that the keypad has control.

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

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 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 abrasive materials to clean the instrument.

Transducer

Refer to the Installation and Maintenance instructions supplied with the transducer.

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 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.

Fixing faults

All Raymarine products are subjected to comprehensive test and quality assurance programmes prior to packing and shipping. However, if a fault occurs, the following table may help to identify and rectify the problem.

Fault	Cause	Remedy
Display blank	No power supply	Check power supply. Check SeaTalk cabling and connector security Check fuse/circuit breaker
No transfer of information between SeaTalk instruments (e.g. illumination levels)	SeaTalk cable or connector fault	Check security of SeaTalk connectors. Check condition of SeaTalk cables. Isolate faulty instrument by disconnecting instruments one by one.
Failure of a group of SeaTalk instruments	SeaTalk cable or connector fault	Check the security of SeaTalk connectors between functioning and non-functioning instruments

continued

Fault	Cause	Remedy
LAST flashing or dashes displayed continuously (depth greater than 3 ft)	Transducer cable or connector fault	Check the condition of the transducer cable and the security of the connections.
LAST flashes when under way	Aerated water due to boat wakes, propeller wash etc.	Ensure reading stabilises when clear of disturbed water.

If you are unable to rectify a problem, contact the Raymarine Product Support Department or your own National Distributor, for assistance.

Chapter 3: Installation

This chapter describes how to install the ST60 Depth instrument, and associated depth transducer. The transducer is fitted in the hull of the vessel and is connected to the rear of the instrument. The actual type of transducer depends on the type of hull in which it is to be installed.

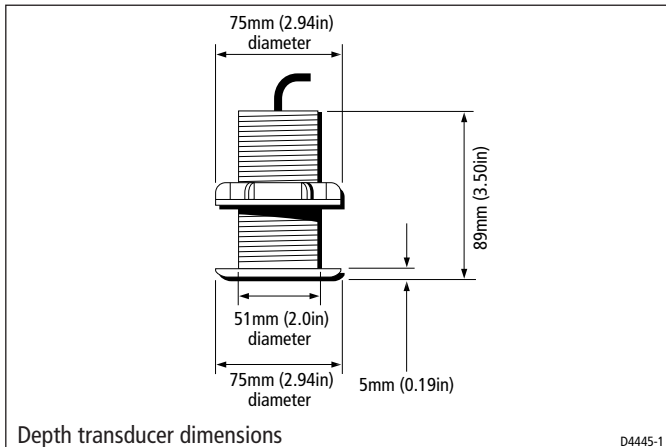
For advice, or further information regarding the installation of this equipment, please contact the Raymarine Product Support Department or your own National Distributor.

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* (below) are satisfied.

Site requirements

Transducer

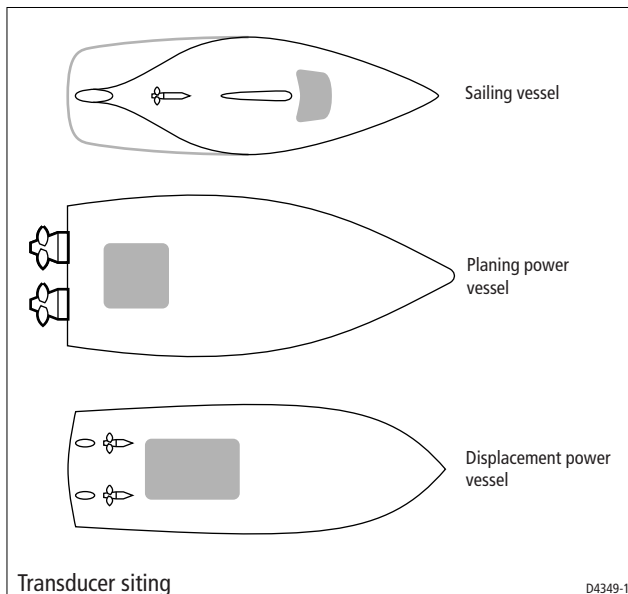


The transducer types required for the various hull types are as follows:

Hull material	Transducer type
Glass reinforced plastic (GRP)	M78713 Through hull plastic M78718 Retractable through hull
Steel	M78713 Through hull plastic M78718 Retractable through hull
Aluminium	M78713 Through hull plastic M78718 Retractable through hull
Wood	M78714 Through hull bronze M78919 Retractable through hull

Other transducer types are also available for specific requirements. For further details, contact your local Raymarine dealer.

For accurate depth readings the transducer should be sited within the clear water flow areas indicated by the shaded areas in the following diagram.

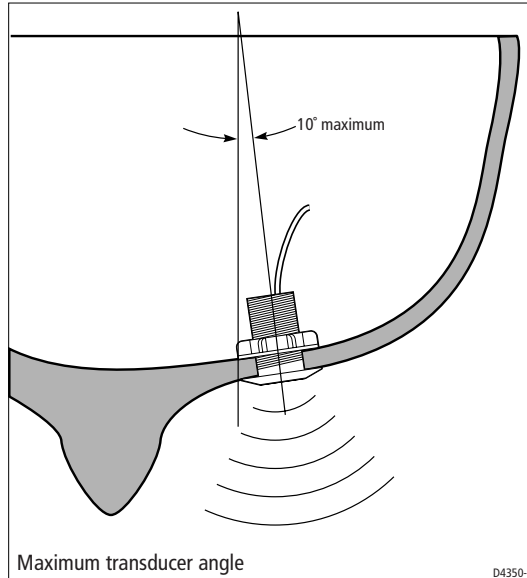


The transducer should also:

- Be ahead of the propellers (by a minimum of 10% of the water line length).
- Be at least 150 mm (6 in) away from the keel (ideally ahead of the keel if a sailing yacht).
- Be as near as possible to the centre line of the vessel.

- Be clear of other through-hull fittings or projections.
- Have sufficient clearance inside the hull to fit the nut.
- Have 100 mm (4 in) of headroom to allow for withdrawal.
- Be within 10° of the vertical, forward, aft and athwart ships.

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



Instrument

CAUTION:

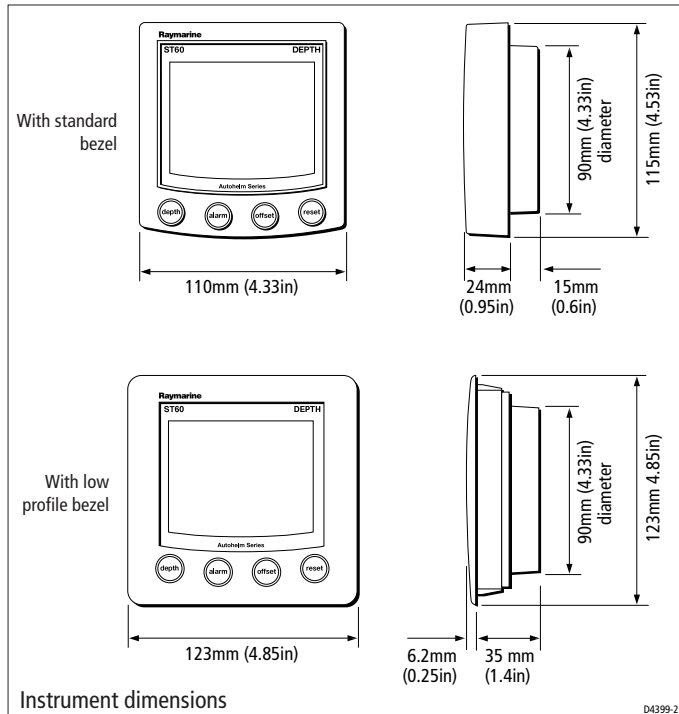
The presence of moisture at the rear of the instrument could cause damage either by entering the instrument through the breathing hole or by coming into contact with the electrical connectors.

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.
- It is protected against physical damage.

- It is at least 230 mm (9 in) from a compass.
- It is at least 500 mm (20 in) from radio receiving equipment.
- There is reasonable rear access 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:

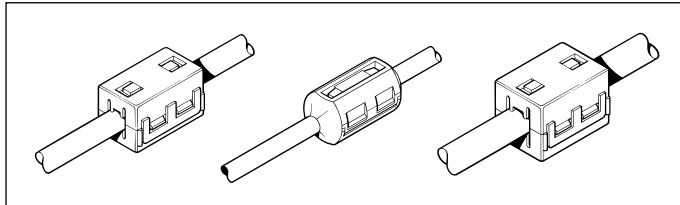
- All Raymarine equipment and cables connected to it should be:
 - At least 1 m (3 ft) from any equipment transmitting or cables

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.
- Raymarine specified cables should be used at all times. Cutting and rejoining these cables can compromise EMC performance and so must 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 depth transducers and the ST60 Depth instrument. 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 Depth 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.

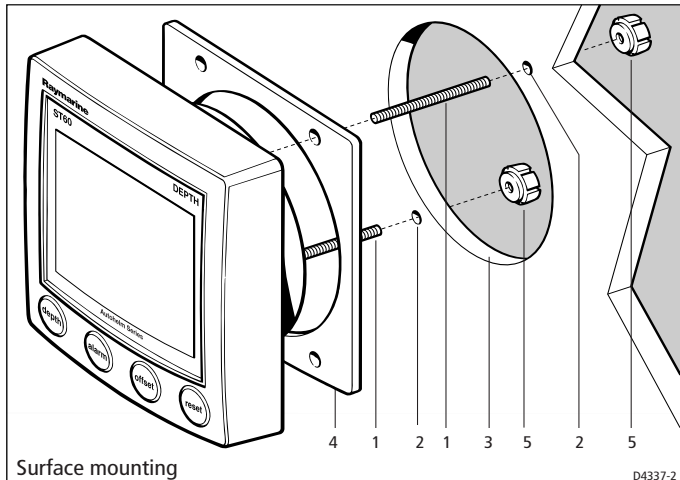
The ST60 instruments can also be mounted behind a panel with just the instrument dial and keys visible.

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 book) 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).



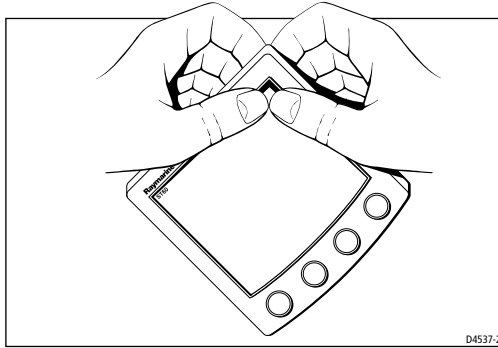
Flush mounting

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.

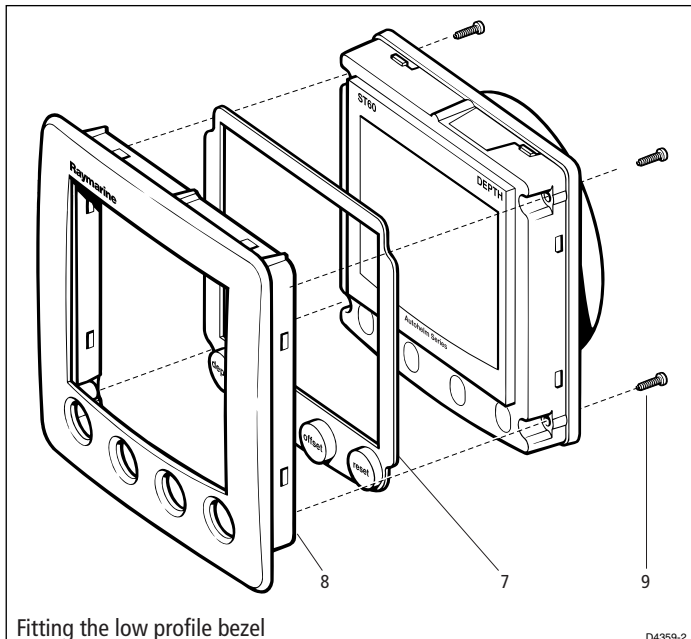
Fitting the low-profile bezel

In order to flush-mount your ST60 instrument, you must first 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

D4359-2

CAUTION:

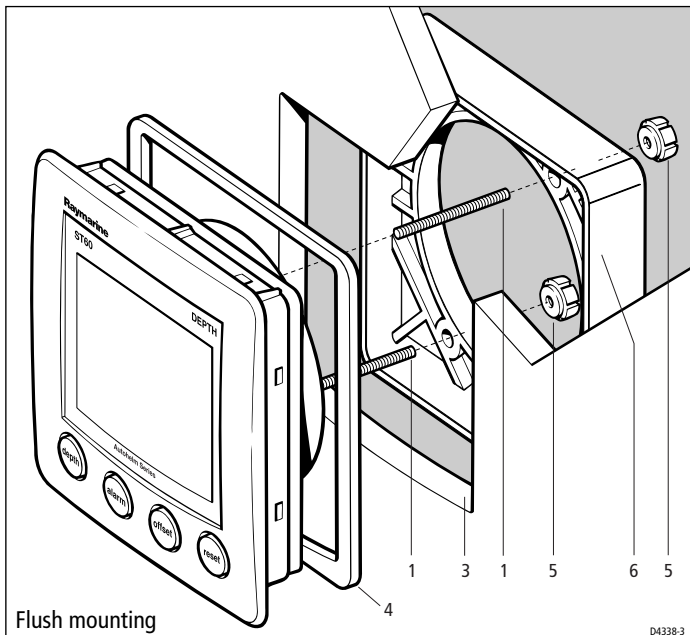
It is essential that only screws of the correct size are used to secure the instrument to the bezel. Failure to observe this caution could result in damage to both the instrument and the bezel.

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 thickness.
 - The selected location is clean, smooth and flat.
 - There is sufficient space behind the selected location to accommodate the rear of the instrument and connectors.



3. Apply the flush mount template (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 in 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

The ST60 Depth system is supplied, with a through-hull depth transducer.

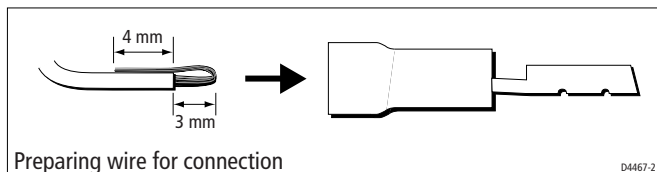
The depth transducer is supplied with detailed instructions for installation and maintenance. Before attempting to install the depth transducer, read these instructions and the *Site requirements* for transducers described in this Chapter.

Once you are satisfied you can meet all the installation requirements, install the transducer in accordance with the accompanying installation instructions.

Running transducer cable

Each transducer type has a 14 m (45 ft) cable fitted with spade terminals for connection to the ST60 Depth instrument. The manner in which you run the cable 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.
- Do not route the cable through bilges.
- Wherever possible, route the cable away from fluorescent lights, engines, radio transmitting equipment, as these may cause interference.
- 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 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.



Observing the above guidelines, run the transducer cable to the ST60 Depth instrument.

Connecting instruments

Types of connection

The ST60 Depth instrument, can be connected:

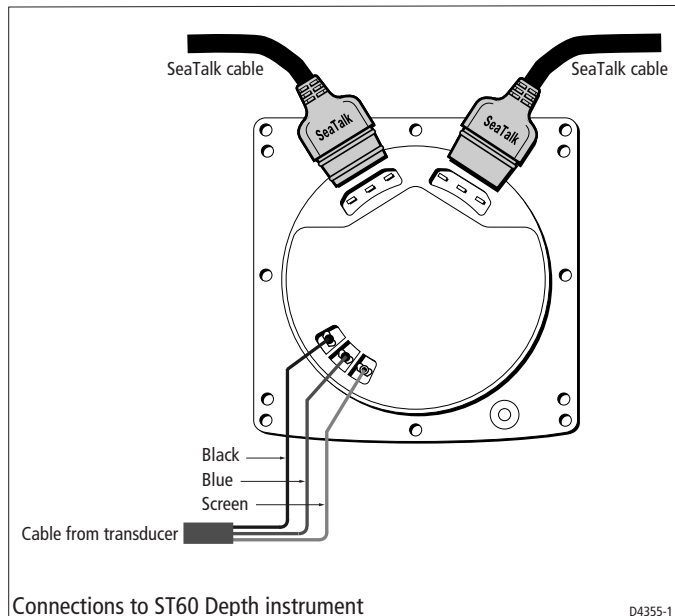
- As a stand-alone, master instrument connected directly to the depth transducer.
- As a SeaTalk repeater.

If instruments are connected to SeaTalk, 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 Depth instrument* illustration).



Power supply connections

SeaTalk systems

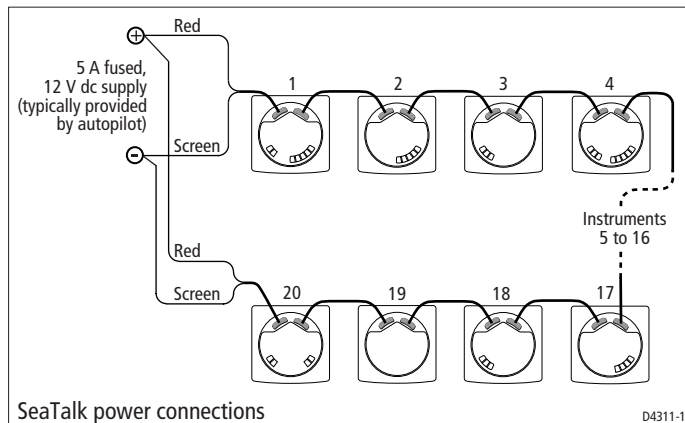
CAUTION

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



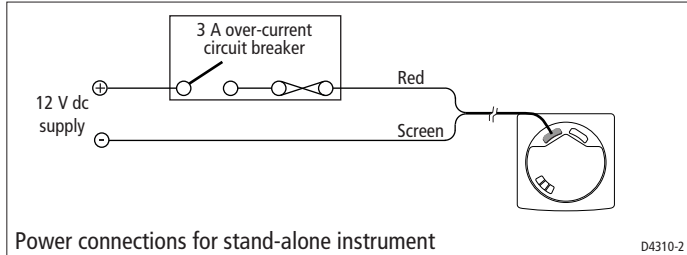
Stand alone instruments

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 Depth 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. Adjustment instructions are given as applicable.

Note: The procedure for setting alarm threshold levels is given in Chapter 1, Operation.

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 enable you to:

- Set the required units for depth readings.
- Set the offset for depth readings, i.e. determine whether depth readings are from the keel of the vessel or from the water line.
- Lock the shallow alarm.
- Turn the pop-up pilot function on or off.

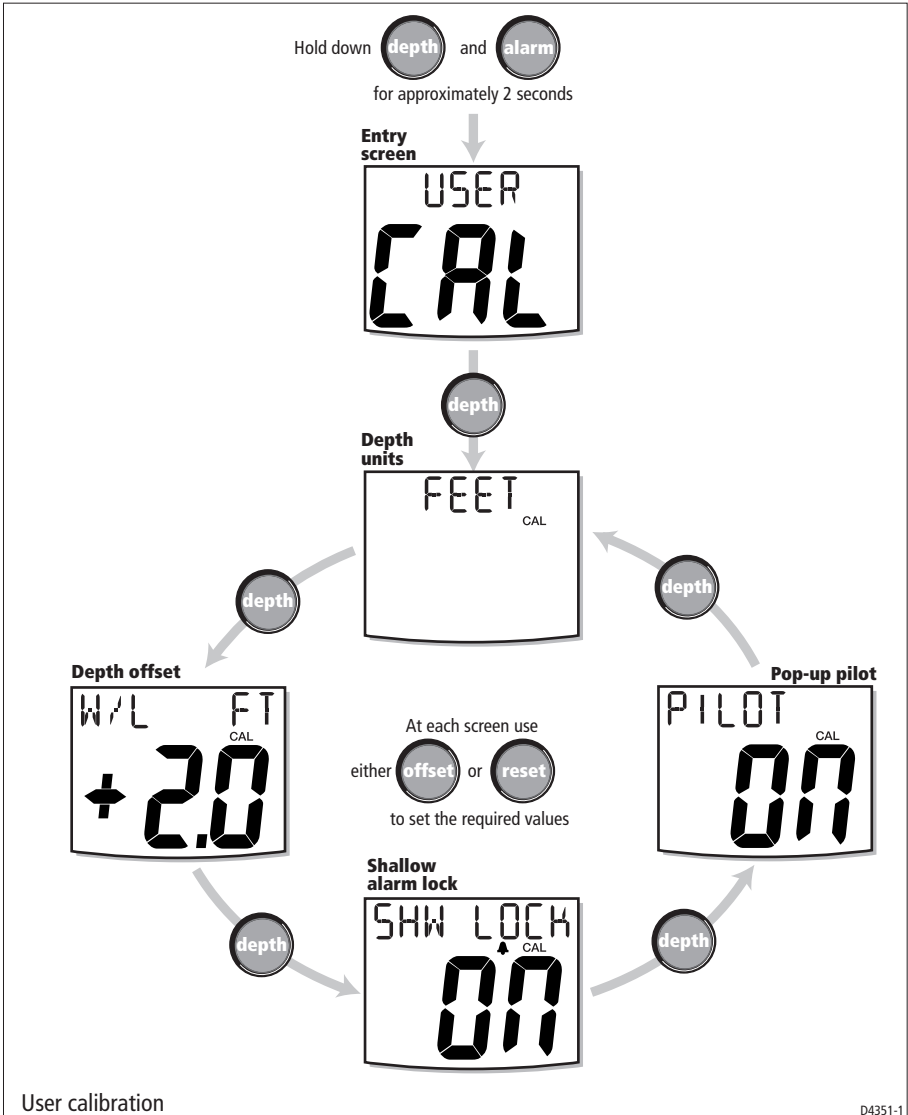
Procedure

To carry out a User calibration:

1. Power up the ST60 Depth instrument.
2. Press the **depth** and **alarm** keys for approximately 2 seconds so that the User calibration entry screen is displayed.

Note: The User calibration entry screen will time out to the main display after 7 seconds.

- Referring to the *User calibration* diagram and information in this Chapter, carry out the calibration procedure. Use the **depth** key to cycle from screen to screen and the **offset** and **reset** keys to set the required values at each screen.



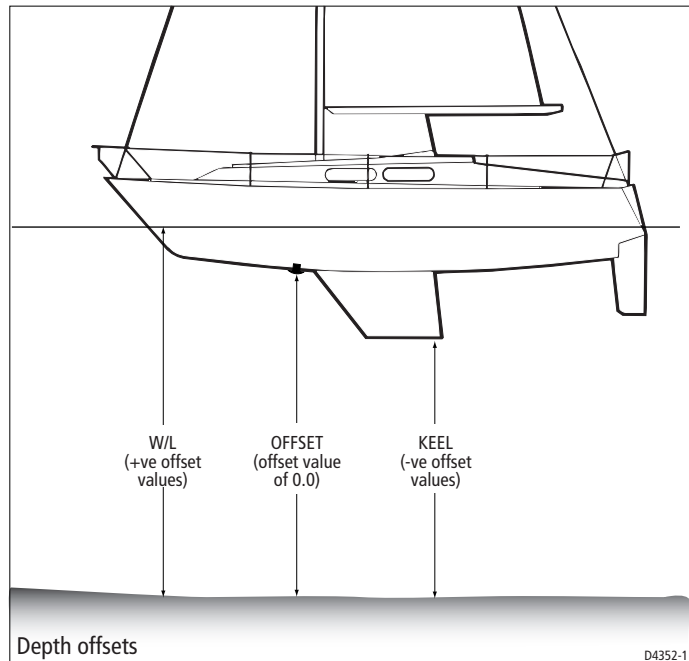
Depth units

You can set the units in which depth information is displayed to be either FEET, FATHOMS or METRES.

Depth offset

Depths are measured from the transducer to the sea bed. However, you can use the depth offset screen to apply offsets to this distance, so that the displayed depth reading represents either the depth from the keel or the depth from the water line (W/L). In order to do this, you need to know the vertical separation between the transducer position and:

- The bottom of the keel. This requires a negative offset.
- The water line. This requires a positive offset.



The legend at the top of the Depth offset screen reflects the value you set up, i.e. W/L for positive offsets, KEEL for negative offsets and OFFSET for zero offset.

Setting offset values

WARNING:

The use of incorrect offset values could result in misleading depth information being displayed with a consequent risk of running aground.

Use the **offset** (decrement) and **reset** (increment) keys to set the required offset value.

If you want to display the actual depth reading from the transducer, set a value of 0.0.

If you want to apply a W/L (water line) offset or a KEEL offset, adjust the displayed reading until the correct offset value is shown (positive for W/L; negative for KEEL).

Shallow lock

When set to on, prevents inadvertent alteration to the shallow depth alarm setting.

Note: The procedure for setting alarm threshold levels is given in Chapter 1, Operation.

Pop-up pilot

Switches the pop-up pilot function on and off.

Leaving User calibration

Hold down the **depth** and **alarm** keys for 2 seconds, to save your settings, exit User calibration and resume normal operation.

4.3 Intermediate calibration

The intermediate calibration screens enable you to:

- View the instrument software version number.
- Set the instrument status - either MASTER or REPEATER. This feature is particularly useful in preventing interference when using another product (e.g. a fishfinder) that operates at 200 kHz.

To access the Intermediate calibration screens, hold down the **depth** and **alarm** keys for approximately 4 seconds.

To set the instrument status:

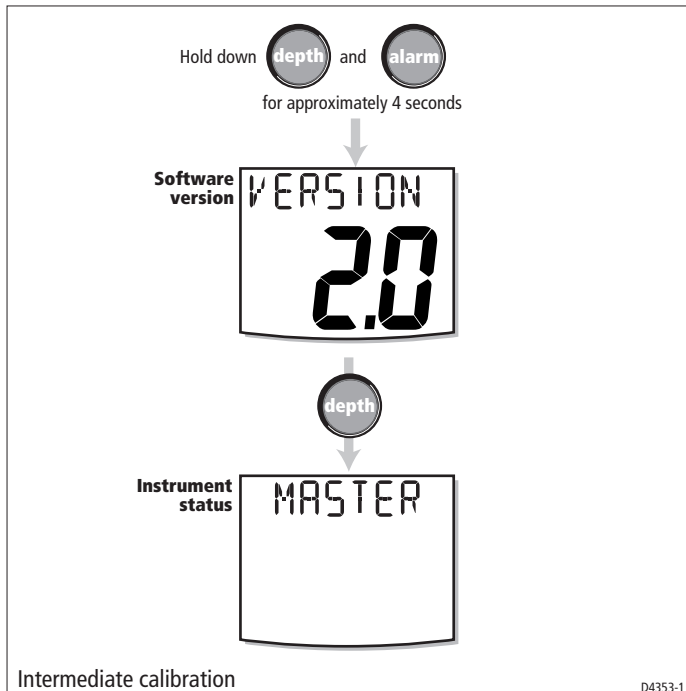
1. Press the **depth** key to select the Instrument status screen.
2. Press the **offset** and **reset** keys simultaneously to enter adjust mode, then press either **offset** or **reset** to set the required status.

Note: *You must not allocate more than one MASTER depth instrument in any system.*

3. Press the **offset** and **reset** keys simultaneously again, to leave the adjust mode.

Leaving Intermediate calibration

Hold down the **depth** and **alarm** keys for 2 seconds to save your settings, exit Intermediate calibration and resume normal operation.



4.4 Dealer Calibration

The Dealer calibration procedure (see *Dealer calibration* diagram) enables the following parameters to be set:

- User calibration on/off.
- Depth 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 **depth** and **alarm** keys together for approximately 12 seconds, to select the Dealer calibration entry page. Momentarily press the **offset** and **reset** keys to proceed with the calibration, then use the **depth** key to proceed from screen to screen as calibration progresses.

User calibration on/off

Use either the **offset** or **reset** key to set the User calibration either ON or OFF as required. With OFF selected, User calibration and Intermediate calibration are both disabled. This feature is particularly useful for use on charter vessels, in preventing unwanted alteration of calibration settings.

Response settings

The depth response value determines the frequency at which information is updated. A low number provides a smooth response and a high number a much livelier response.

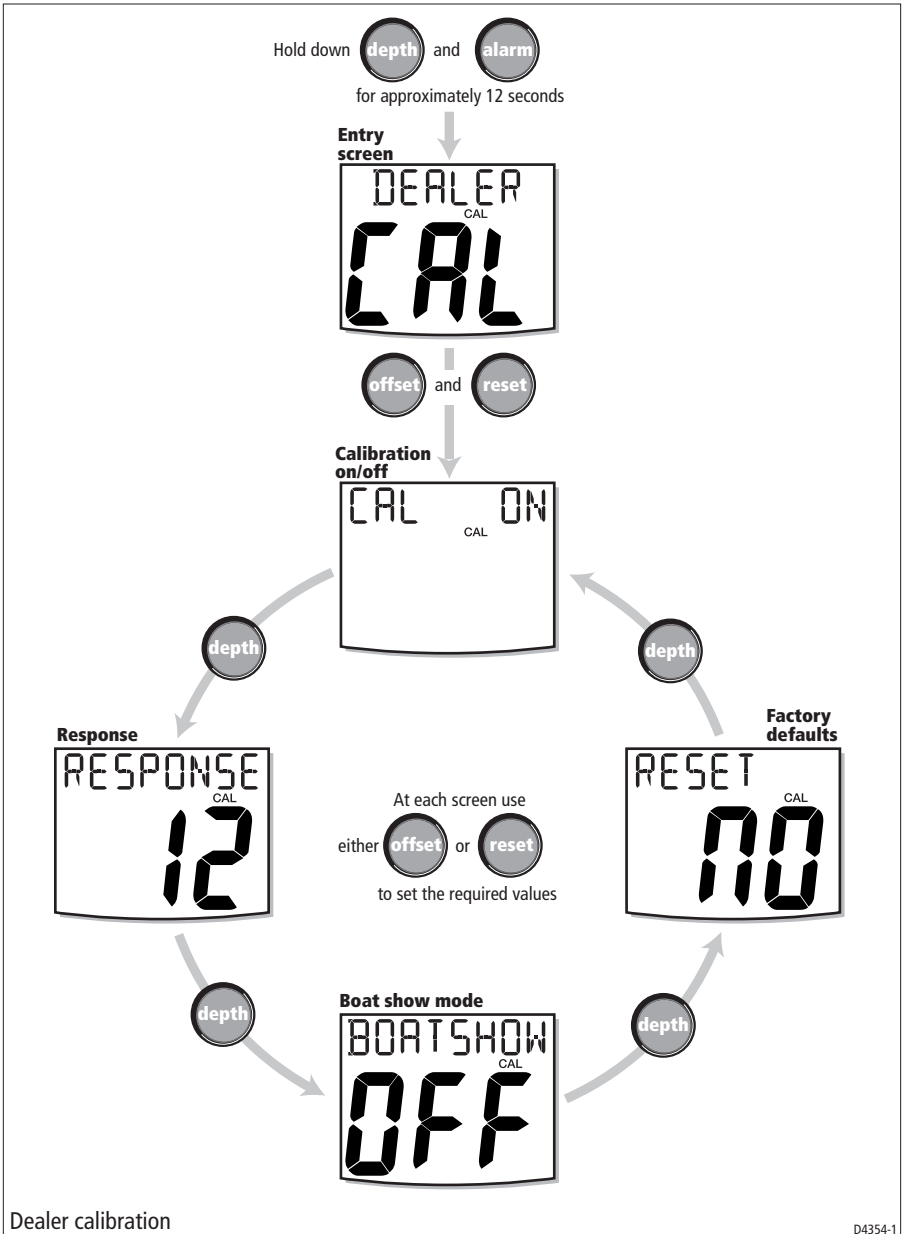
Use the **offset** (decrement) and **reset** (increment) keys to set the required value. Response values are from 1 to 15.

Boat show mode

CAUTION:

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

Ensure that the Boatshow Mode is set to OFF. If necessary, use the **offset** or **reset** 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 **YES**, but if you want to retain the current values, **ensure that the display shows NO**. Use the **offset** and **reset** keys to make the required selection.

If you have selected **YES**, the factory defaults will be applied when you exit this screen.

Leaving Dealer calibration

Hold down the **depth** and **alarm** keys for 2 seconds to save your settings, exit Dealer calibration and resume normal operation.

ST60 Surface Mount Template

TOP

Drill 5mm (3/16in) diameter



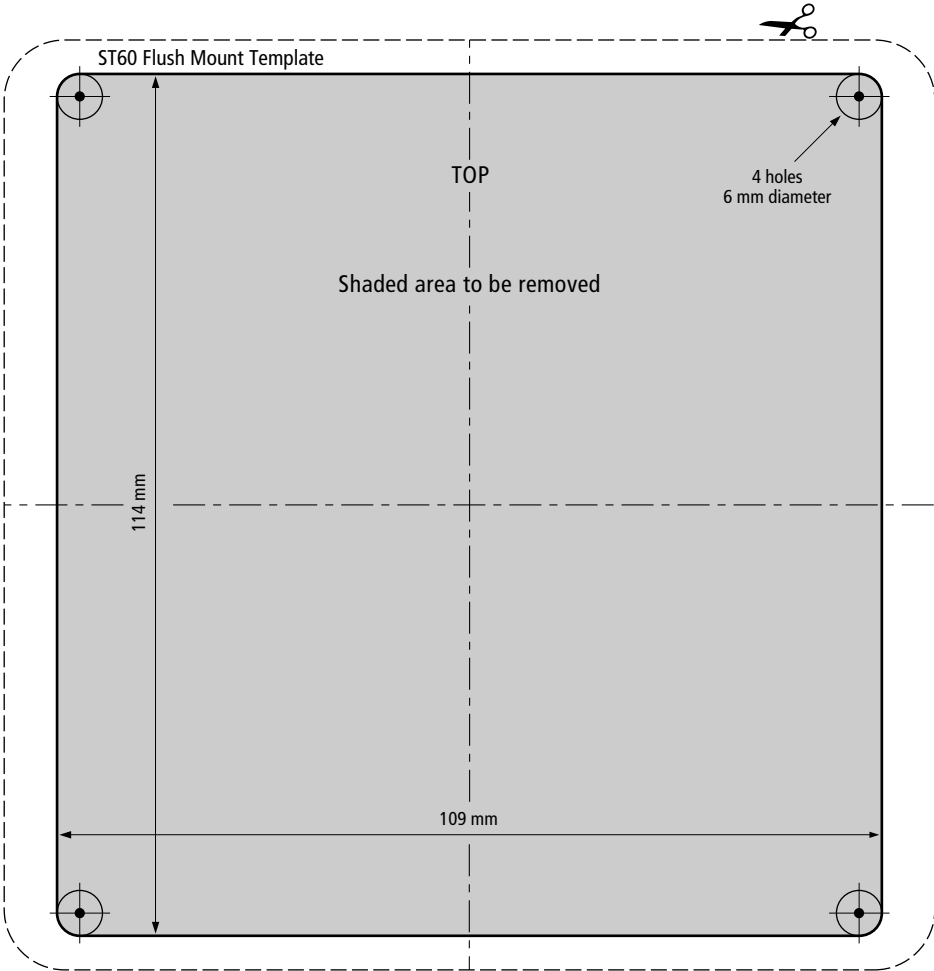
Machine hole
90mm (3.54in)
diameter

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.

Raymarine

Factory Service Centers

United States of America

Raymarine Inc
22 Cotton Road, Unit D
Nashua, NH 03063-4219, USA

Telephone: +1 603 881 5200
Fax: +1 603 864 4756
www.raymarine.com

Sales & Order Services

Telephone: +1 800 539 5539 Ext. 2333 or
+1 603 881 5200 Ext. 2333

Technical Support

Telephone: +1 800 539 5539 Ext. 2444 or
+1 603 881 5200 Ext. 2444
Email: techsupport@raymarine.com

Product Repair Center

Telephone: +1 800 539 5539 Ext. 2118

UK, Europe, Middle East, Far East

Raymarine Ltd
Anchorage Park, Portsmouth
PO3 5TD, England

Telephone: +44 (0)23 9269 3611
Fax: +44 (0)23 9269 4642
www.raymarine.com

Customer Support

Telephone: +44 (0)23 9271 4713
Fax: +44 (0)23 9266 1228

Email: techsupport@raymarine.com

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.