ST50 Plus Tridata & Repeater owner's handbook

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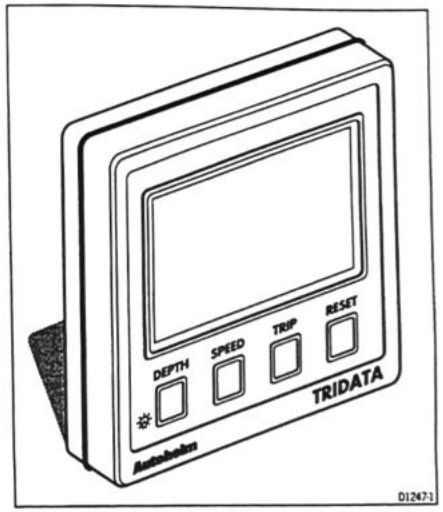

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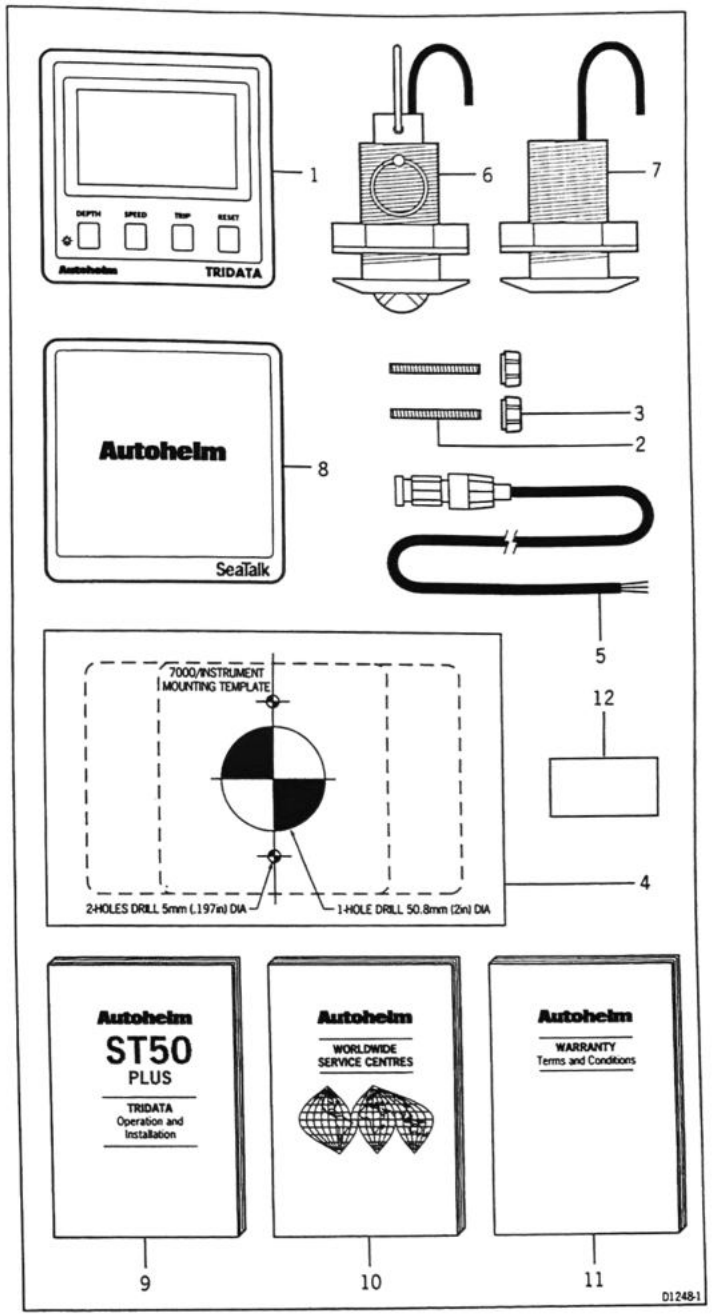
Package Contents

The following items are included in the ST50 Plus Tridata package:

1. ST50 Plus Tridata control head
2. Fixing studs (2 off)
3. Thumb nuts (2 off)
4. Fitting template
5. Power cable
6. Speed transducer (through hull) with 14m (45ft) of cable
7. Depth transducer (through hull) with 14m (45ft) of cable
8. Control head cover
9. Operation and Installation handbook
10. Worldwide Service Centre handbook
11. Warranty document
12. Security sticker

ST50 Plus Tridata and Repeater Operation and Installation Handbook



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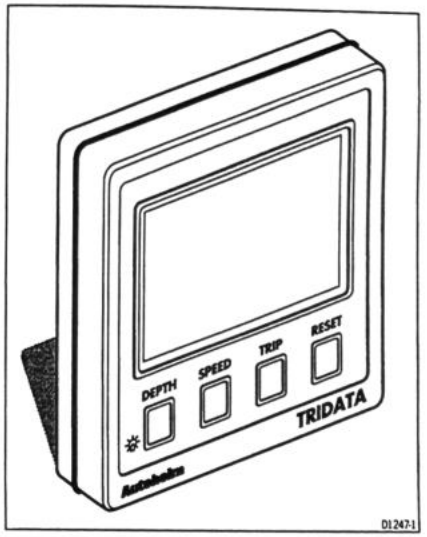
Introduction

The ST50 Plus Tridata is a multi-function instrument providing comprehensive speed, distance, depth, sea temperature and timing information.

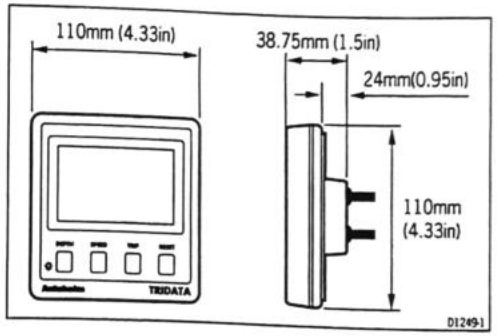
The instrument can be configured to operate as a master unit or a dedicated repeater. Settings such as log, speed, depth and temperature units are stored in permanent memory and retained even when the power source is disconnected. The log function can be calibrated automatically over a measured distance or by simple entry of a calculated calibration factor.

The ST50 Plus Tridata also incorporates a security feature to protect instruments mounted in vulnerable areas such as the cockpit, helm or mast.

Thank you for purchasing an Autohelm product. May we take this opportunity to wish you years of trouble free operation.



Chapter 1: Control Head Installation



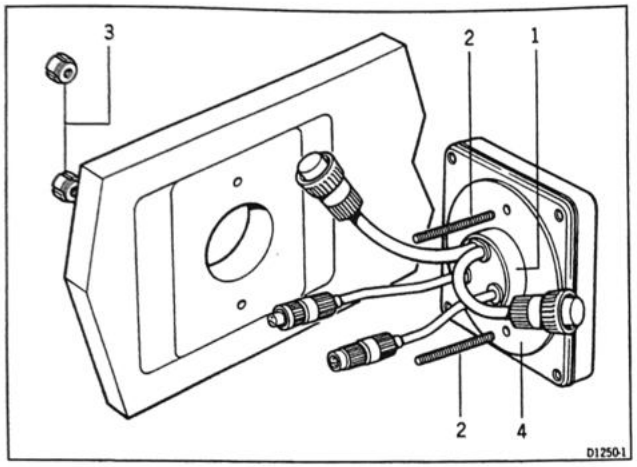
1.1 Siting

The ST50 Plus Tridata/Repeater is designed for above or below deck installation where it is:

- Easily read by the helmsman
- Protected against physical damage
- At least 230mm (9in) from a compass
- At least 500mm (20in) from radio receiving equipment
- Accessible from behind for ease of installation and cable running

Caution:
To prevent moisture forming on the display window, the ST50 Plus Tridata/Repeater 'breathes' through a small vent in the cable boss. Therefore, the control head must be sited where the rear case is protected from contact with water.

The rear case is fitted with a foam gasket to form a water-tight seal between the instrument and the selected installation face.



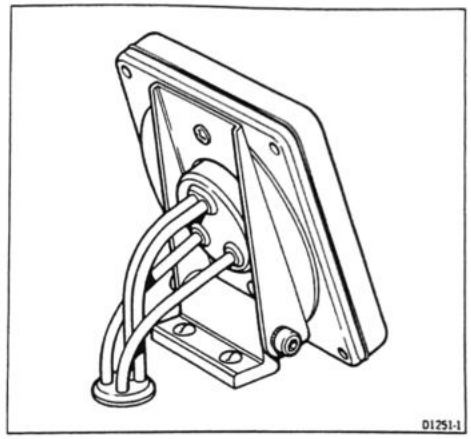
1 Cable boss **2** Fixing studs **3** Thumb nuts **4** Gasket

1.2 Mounting Procedure

1. Make sure that the selected location is clean, smooth and flat.
2. Apply the self-adhesive template (supplied) to the selected location and mark the centres for the fixing studs (2) and the cable boss (1).
3. Drill two 4mm (5/32in) clearance holes for the fixing studs (2) through the bulkhead. Remove the template.
4. Cut the clearance hole for the cable boss (1) using a 50mm (2in) diameter cutter.
5. Screw the two fixing studs (2) into the control head.
6. Pass the SeaTalk cable and transducer tails through the cable-boss (1) clearance hole.
7. Assemble the control head to the bulkhead and secure from behind using the thumb nuts (3).

Bracket Mounting

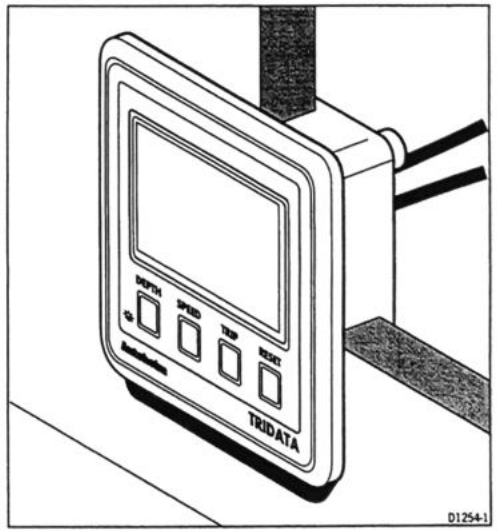
The ST50 Plus Tridata/Repeater can, as an alternative, be bracket mounted using the Autohelm Mounting Kit (Cat. No. D130).



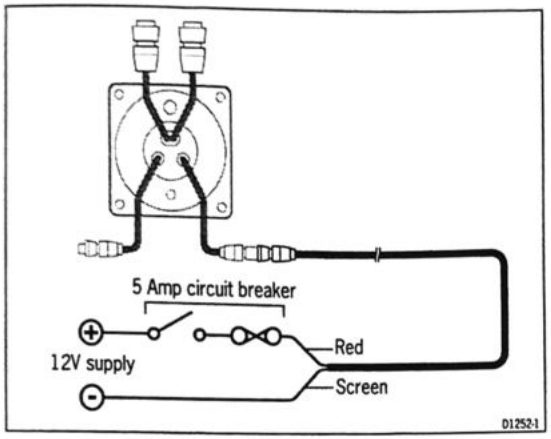
Note: Because the instrument breathes through the vent in the rear case, this bracket is for interior use only.

Flush Mounting

A flush mounting kit is available for installations where a flush mount is required or more desirable. Full installation instructions are provided with the kit (Cat. No. D183).



1.3 Power Supply (stand-alone operation)

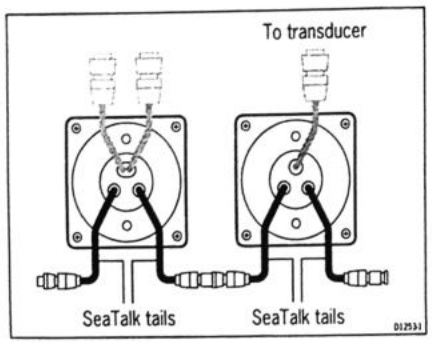


1. Connect the 2m (6ft) power supply cable directly to the distribution panel.
2. Cut the cable to length and connect the red wire to the +12V terminal and screen to the 0V terminal.
3. Cut back and insulate the yellow wire.
4. Protect the circuit with a 5A circuit breaker.

Longer runs to the power supply can be made using one of the SeaTalk Extension Cables.

1.4 Power Supply (SeaTalk operation)

All instruments in a SeaTalk system receive power and information from the SeaTalk bus. Each instrument has two SeaTalk connectors (3 pin) on 150mm (6in) tails. To supply power and information to the instrument simply plug the tails from adjacent instruments into the ST50 Tridata tails.

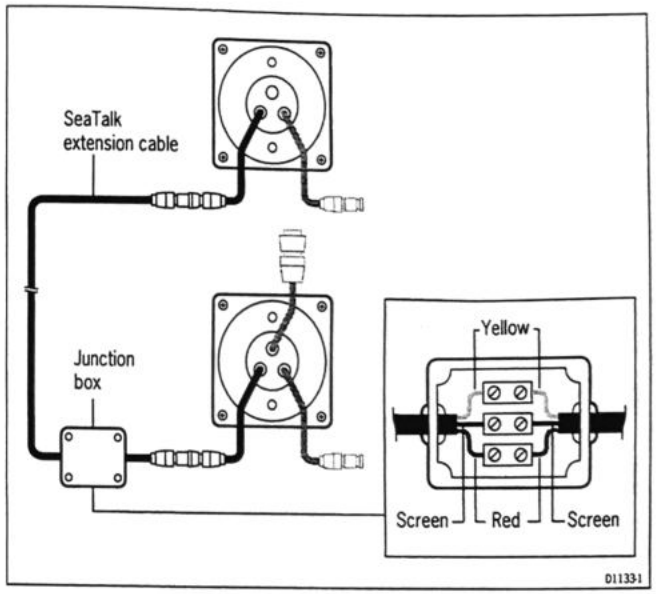


1.5 Connection of Separated Instruments

Separated instruments can be connected using one of the range of SeaTalk Extension Cables. These cables are supplied with a SeaTalk connector fitted to each end. A junction box can be used to join the cable if it is cut for easier routing or shortening.

If preferred, any 2 core, screened cable conforming to the following specification may be used instead of the SeaTalk cable.

- 22 AWG, 2 core screened cable with a minimum copper area of 0.5mm^2.



1.6 Ring Connection

Installations with a large number of instruments on a SeaTalk bus may require a second ring-main connection to the power supply breaker to prevent excessive voltage drops. Whether a second ring main is required can be determined from the following:

Cable run upto 10m (33ft)

Single connection: 13 instruments maximum

Second connection: 26 instruments maximum

Cable run upto 20m (66ft)

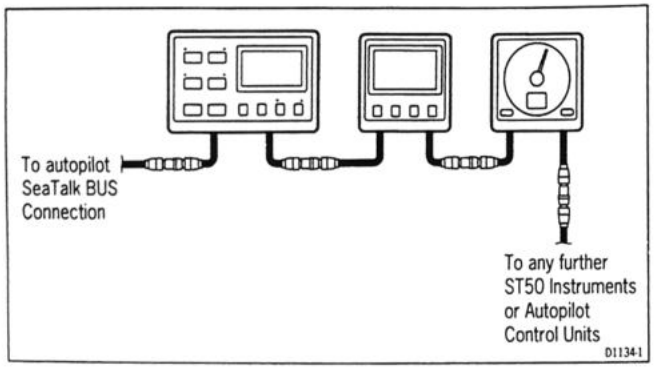
Single connection: 7 instruments maximum

Second connection: 13 instruments maximum

The second ring-main should be connected to the spare lead on the last instrument in the chain and directed back to the circuit breaker.

1.7 Connection to SeaTalk Compatible Autopilots

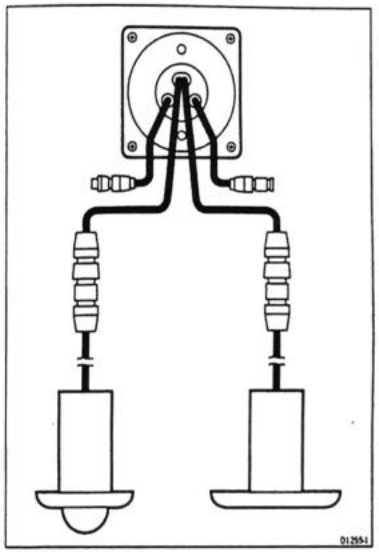
If the installation includes a SeaTalk compatible Autopilot the ST50 Plus instruments may be connected to the SeaTalk bus at any point. No independent connection to the 12V power supply is necessary as the instruments receive power from the Autopilot course computer.



Chapter 2: Transducer Installation

2.1 Connection to the Control Head

The ST50 Plus Tridata is supplied with depth and speed transducer cable tails and connectors. These cable tails plug into the mating connectors fitted to the 14m (45ft) depth and speed transducer cables.



2.2 Transducer Selection

The type of speed transducer used is dependent on the hull material. The following list shows the appropriate transducer for hull type.

Transducer Type	Hull Material
Speed	
Z092 Through Hull Plastic:	GRP (Glass Reinforced Plastic), Steel and Aluminium
Z116 Through Hull Bronze:	Wood
Depth	
Z091 Through Hull Plastic:	GRP (Glass Reinforced Plastic), Steel and Aluminium
Z118 Through Hull Bronze:	Wood
Z120 Retractable through hull:	GRP (Glass Reinforced Plastic), Steel and Aluminium

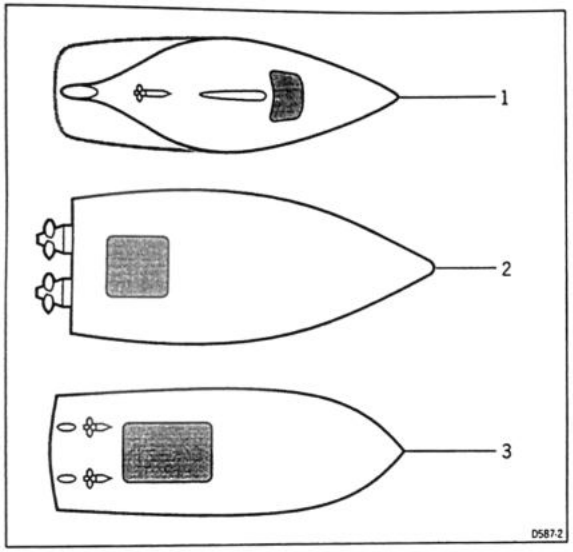
2.3 Transducer Installation

All transducers are supplied with detailed installation and maintenance instructions.

These instructions, together with the following notes, should be read thoroughly before attempting to install the transducer.

Siting

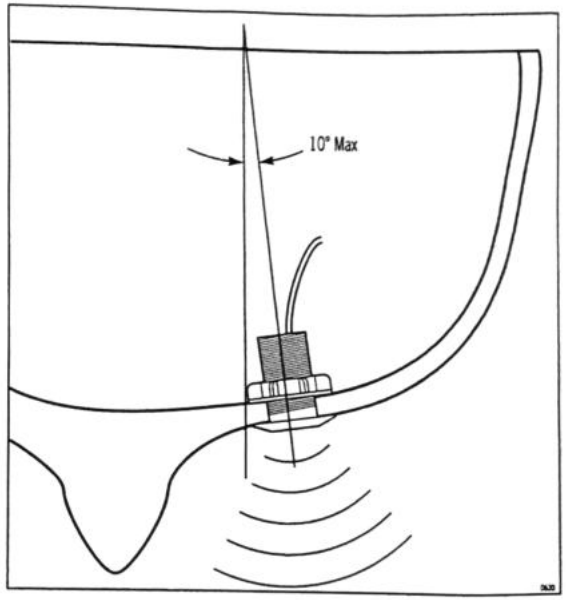
For accurate speed and depth readings, the transducers should be sited within the shaded clear flow areas.



1 Sail **2** Planning power **3** Displacement power

The transducers should also:

- be ahead of the propellers (10% W.L. length minimum)
- be at least 150mm (6in) away from the keel (ideally ahead of the keel if a sailing yacht)
- be as near as possible the centreline of the vessel
- be clear of other through-hull fittings or projections
- have sufficient clearance inside the hull to fit the nut
- have 100mm (4in) of headroom to allow for withdrawal
- (depth transducer) be within 10° of vertical, fore, aft and athwartships.



Cabling

1. Run the cables back to the control head.

Note: Avoid fluorescent lights, engines, radio transmitting equipment etc. as these may cause interference. Also, keep the transducer cable clear of bilges and secure at regular intervals.

2. Fit the transducer and instrument cable connectors together. To lock the connectors, push and rotate the ring on the transducer cable connector towards the instrument connector.

Chapter 3: Fault Finding and Maintenance

3.1 Fault Finding

All Autohelm products are, prior to packing and shipping, subjected to comprehensive test and quality assurance programmes. However, if a fault arises with the ST50 Plus Tridata, the following table will help to identify the probable cause and provide the most likely cure.

Fault	Cause	Action
Instrument display blank.	No supply.	Check supply. Check cabling and security of SeaTalk connectors. Check fuse/breaker. Return unit for repair.
Instrument displays 'CODE SET'	The 'Code Lock' feature has been set.	Enter correct code number.
No speed or temperature information.	Transducer cabling problem.	Check cabling and security of transducer connector.
No speed information.	Transducer paddlewheel fouled.	Clean paddlewheel.
No exchange of information between SeaTalk instruments.	SeaTalk cabling problem.	Check security of SeaTalk connectors. Disconnect instruments one by one to isolate faulty unit.
Failure of a group of instruments in SeaTalk chain.	SeaTalk cabling/connector problem.	Check security of SeaTalk connectors and non-functioning units.
Depth reading flashes continuously (depth greater than 3 feet).	Transducer cable/connector problem.	Check cabling and security of transducer connector.
Depth reading flashes while underway.	Aerated water Boat wakes Prop wash etc.	Normal reading will return when clear of disturbed water.

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3.2 Maintenance

Instrument

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

Chemical and abrasive materials must not be used to clean the ST50 Plus Tridata/Repeater instrument; if it is dirty, clean with a soft, damp cloth.

Transducer

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

Cabling

Examine all cables for chafing or damage to the outer shield and, where necessary, replace and resecure.

Advice

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

Chapter 4: Operation

As it leaves the factory the ST50 Plus Tridata is set to:

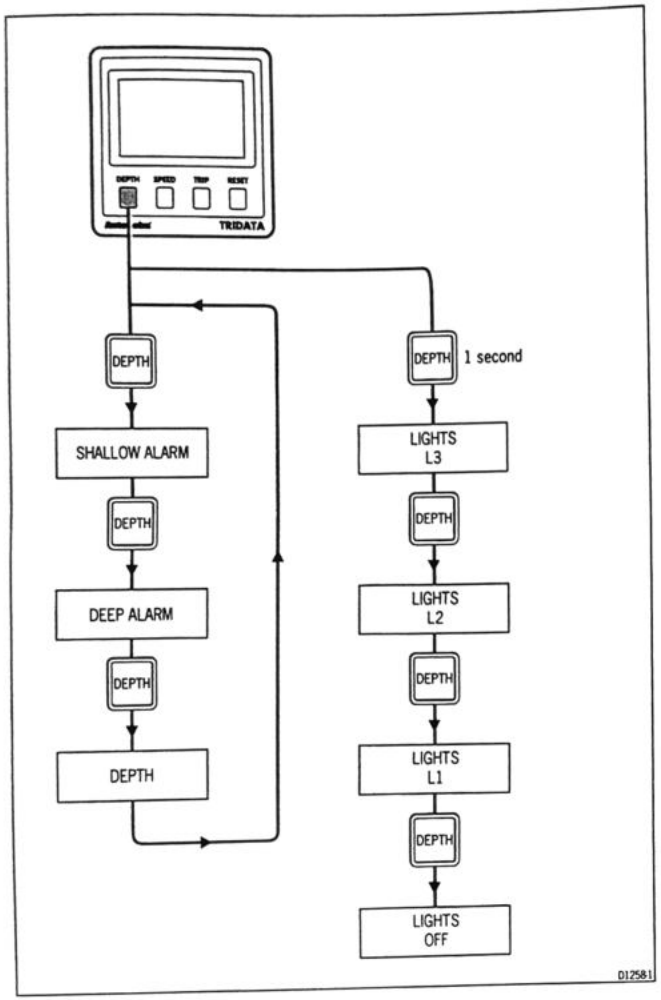
- display speed in knots
- display depth in feet
- display distance in miles
- master mode
- 'CODE Lock' switched off

Other factory default settings are:

- shallow alarm set at 10 feet (disabled)
- deep alarm set at 100 feet (disabled)

These settings can be changed in calibration, Chapter 6.

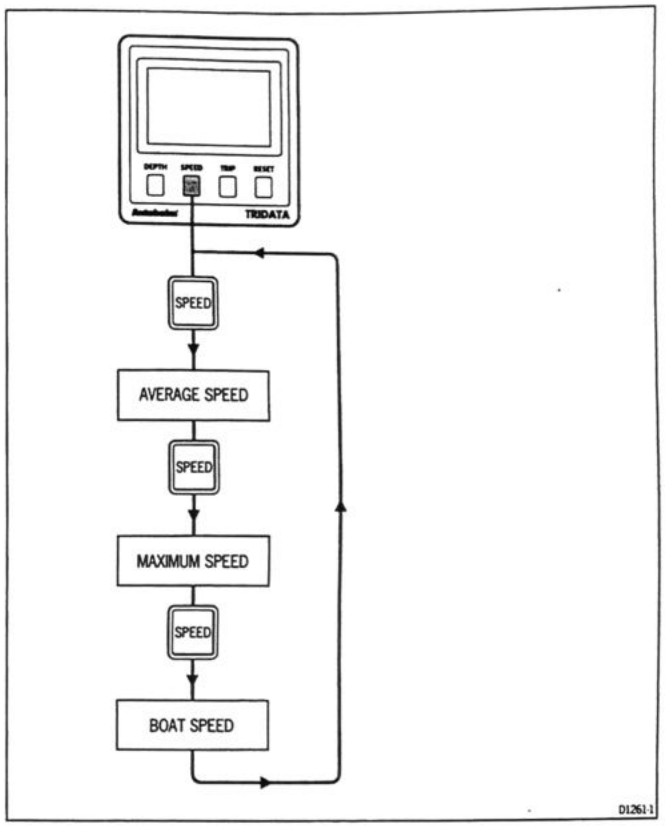
4.1 Depth Key



Depth Key Notes

The lights, shallow alarm and deep alarm displays will return to normal 8 seconds after the last key press.

4.2 Speed Key



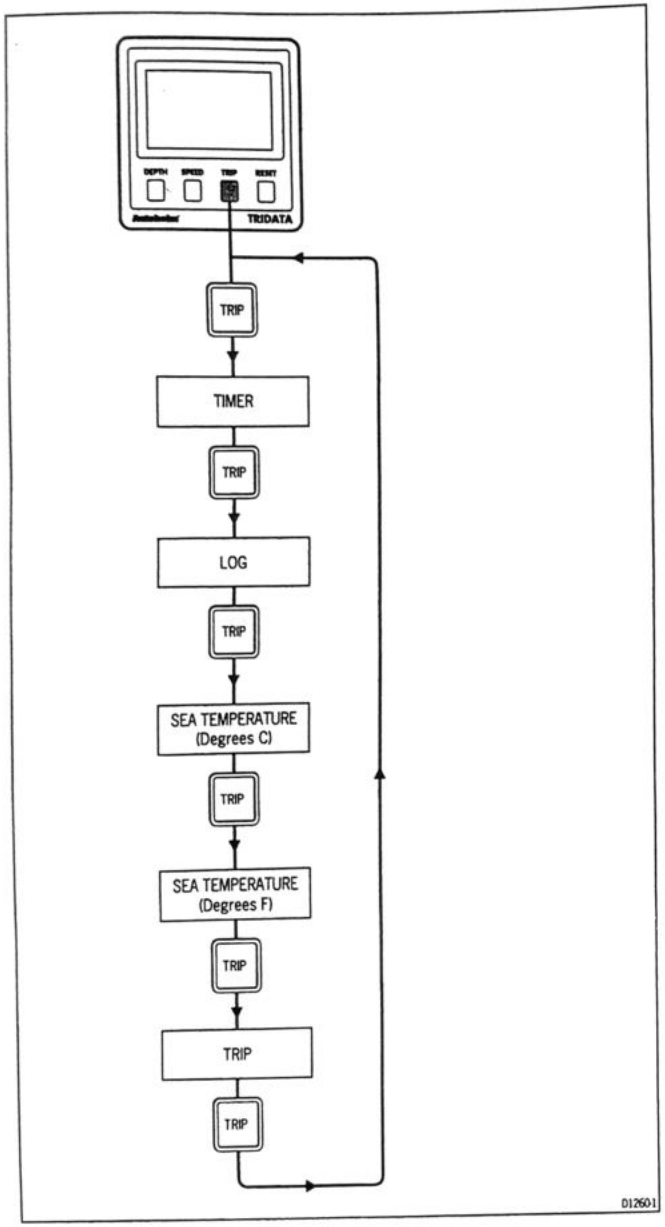
Speed Key Notes

The average and maximum speed displays are updated by pressing **RESET** momentarily.

Note: Average speed cannot be reset on the Tridata Repeater.

The average and maximum speed displays will return to normal 8 seconds after the last key press.

4.3 Trip Key



Trip Key Notes

Timer

The count-up, 10 minute and 5 minute countdown timers are started as follows.

Count-up timer

With the timer legend displayed, momentarily press **RESET** to start the timer.

10 minute countdown timer

With timer legend displayed, press **RESET** for 1 second to access the 10 minute timer. To start the timer, press **RESET** momentarily.

5 minute countdown timer

With timer legend displayed, press **RESET** for 1 second to access the 10 minute timer and then press **RESET** again for 1 second to access the 5 minute timer. To start the timer, press **RESET** momentarily.

Freeze timers

To freeze the timer display, press **RESET** momentarily. Although the display has been frozen the timer continues to count in the background.

To return to the 'live' timer display, press the **RESET** key once again.

Reset timer

The 5 and 10 minute timers are reset by pressing **RESET** for 1 second. The count-up timer is reset as follows:

- Press **RESET** for 1 second to select the 10 minute timer.
- Press **RESET** again for 1 second to select the 5 minute timer.
- Finally, press **RESET** for 1 second to return to the count-up timer.

Timer alarms

The following alarms will sound when the 5 and 10 minute timers are running:

- double beep every minute
- beep three times at 30 seconds to zero
- beep every second from 10 seconds to zero
- beep twice when the timer reaches zero and begins to count-up.

Note: The timer operates globally. That is, if you freeze the timer on the Tridata the timer will be frozen on all other units with a timer facility.

You can, once the 5 or 10 minute countdown timer has been activated, return to one of the main displays. The timer will continue to operate in the background.

These alarms can be switched off if required (refer to para. 6.1, Initial Calibration for procedures).

Trip

Trip distance is cleared by pressing **RESET** for 3 seconds. During this period the current trip distance will flash until it is zeroed.

Chapter 5: CODE Lock Security

The ST50 Plus range incorporates an anti-theft feature called 'CODE Lock'. Designed to protect individual instruments or complete systems in vulnerable areas, 'CODE Lock' is a four digit number that you programme into the permanent memory of a selected 'master' instrument.

Note: A 'master' instrument is a digital unit on which the code number can be entered, and then, if part of an integrated system, transmitted to other ST50 Plus instruments.

This facility means that, should a CODE Locked instrument be removed from the vessel without your permission, it cannot be operated without the four digit security number.

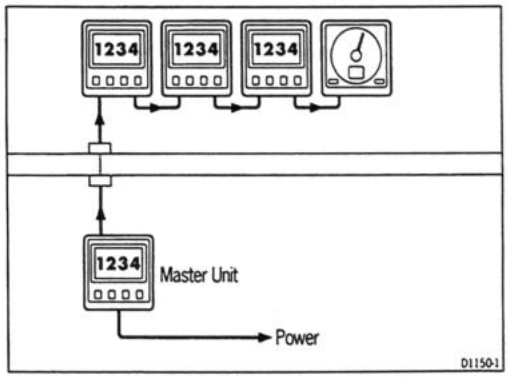
'CODE Lock' can be used in one of three modes:

Mode 1: Off

As it leaves the factory 'CODE Lock' is set to off. In this mode the instrument will operate normally when it is switched on, however, the unit will not be protected by the anti-theft feature.

Mode 2: 'CODE Lock' Once-Only Entry (page 23)

This mode is designed for systems with a digital ST50 Plus instrument in a safe, below-decks location. This instrument can then be used as a 'master' to enter the four digit code number and, when the power is switched on, automatically transmit the code to all the instruments in the system. The advantage of this mode is that, with the master safely below deck, code entry via the keypad is a once-only operation on installation.

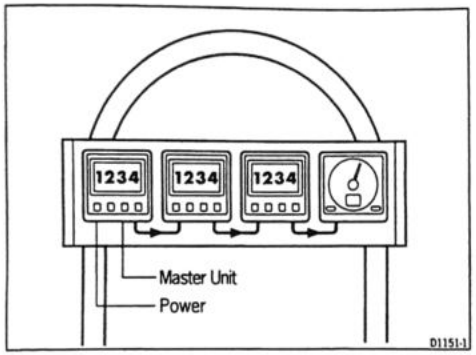


Once 'CODE Lock' is set the system will operate normally as soon as the power is switched on. In other words, the 'CODE Lock' security number is invisible.

Mode 3: 'CODE Lock' input at Power-On (page 24)

In the 'Power-On mode', the ST50 Plus is configured so that you have to enter the four digit number on a 'master' digital instrument every time the system is switched on. **Until this number is entered the instrument(s) will not operate.**

This mode is particularly useful when you are unable to position a 'master' instrument below decks and, therefore, all the vessels valuable instrumentation is left in a vulnerable area.



Should a CODE Locked instrument be removed from the system, it will not operate until the correct four digit security number is entered or received.

If your selected master instrument fails for any reason, the security code number can be entered via another ST50 Plus instrument in the system. However, until another instrument is set as a master or the existing master is replaced, the security code will have to be entered every time the system is switched on.

Note: A warning sticker is provided with each instrument. If you have set 'CODE Lock', position this warning sticker in a prominent location to deter potential thieves.

Setting Up the Security Code

When the ST50 Plus Tridata is switched-on for the first time the security feature is set to off. To turn the 'CODE Lock' feature on, proceed as follows:

Once Only Entry

	Action	Display Shows
1	Press and DEPTH and SPEED together for 4 seconds	CAL after 2 seconds and CAL and software version after 4 seconds
2	Press DEPTH twice	CAL CODE OFF
3	Press SPEED	'_ _ _ _'
4	Press TRIP or RESET to select first number	1 _ _ _
5	Press SPEED to accept number	1' _ _ _
6	Press TRIP or RESET to select second number	1 2 _ _
7	Press SPEED to accept number	1 2' _ _
8	Press TRIP or RESET to select third number	1 2 3 _
9	Press SPEED to accept third number	1 2 3' _
10	Press TRIP or RESET to select fourth number	1 2 3 4
11	Press SPEED to accept code	'1 2 3 4'
12	Press SPEED	'S'
13	To exit CODELOCK, press DEPTH and SPEED together for 2 seconds	Normal operation, eg. speed and depth displays

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Note: If you wish to cancel the code or change the number, simply re-enter and accept the current number.

Your Code Number

For future reference, enter your chosen code number into the following box.

For obvious reasons, please store this handbook in a safe place.

Operation

Once only 'CODE Lock' entry is invisible once it has been set.

On Power-Up

	Action	Display Shows
1	Press and DEPTH and SPEED together for 4 seconds	CAL after 2 seconds and CAL and software number after 4 seconds
2	Press DEPTH twice	CAL CODE OFF
3	Press SPEED	'_ _ _ _'
4	Press TRIP or RESET to select first number	1 _ _ _
5	Press SPEED to accept number	1'_'_ _
6	Press TRIP or RESET to select second number	1 2 _ _
7	Press SPEED to accept number	1 2'_'_
8	Press TRIP or RESET to select third number	1 2 3 _
9	Press SPEED to accept third number	1 2 3'_'
10	Press TRIP or RESET to select fourth number	1 2 3 4
12	Press SPEED to accept code	'1 2 3 4'
13	Press SPEED	'S'
14	Press SPEED	CAL CODE SET
15	To exit CODELOCK, press DEPTH and SPEED together for 2 seconds	Normal operation, eg. speed and depth displays

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Note: If you wish to cancel the code or change the number, simply re-enter and accept the current number.

Your Code Number

For future reference, enter your chosen code number into the box below.

For obvious reasons, please store this handbook in a safe place.

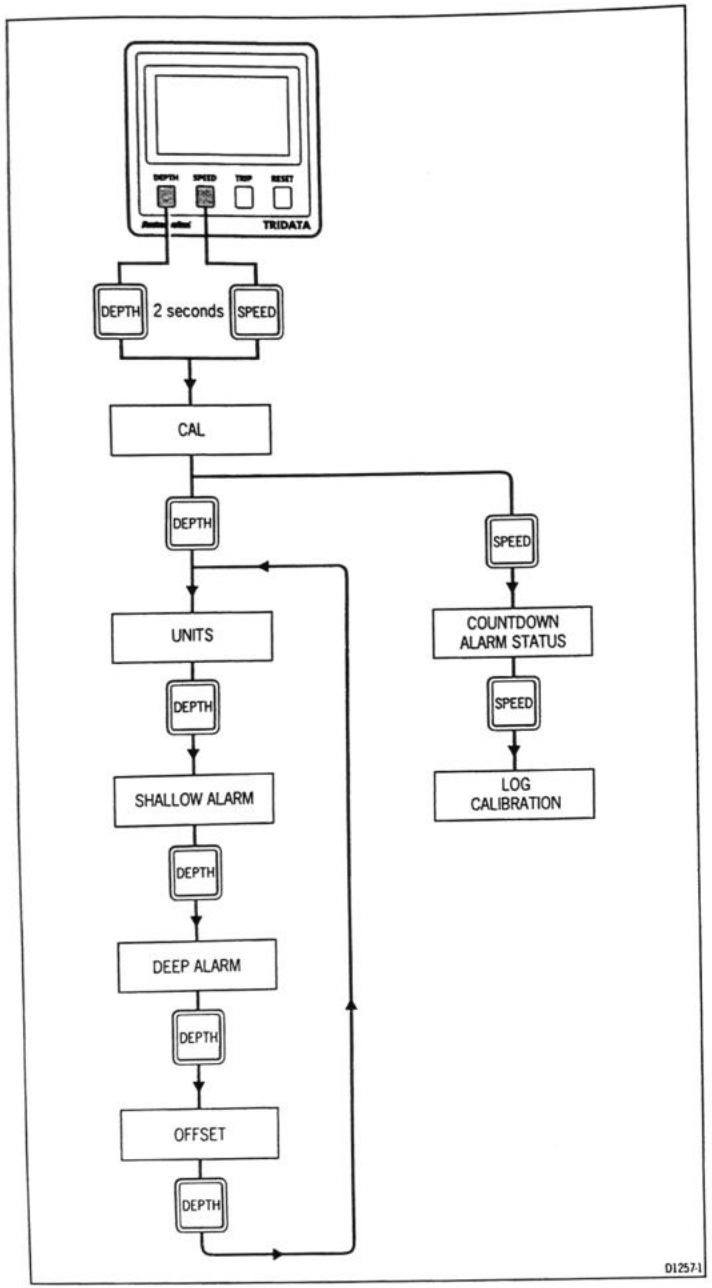
Operation

When the unit is powered on you are prompted to enter the code number. To enter the number, carry out actions 3 to 12 above and press **SPEED.**

Chapter 6: Calibration

As it leaves the factory the ST50 Plus Tridata is set to display speed in knots, distance in Nm and depth units in feet. These settings, together and other navigational features, can be changed (e.g., feet to metres) as described in this section.

6.1 Initial Calibration



Initial Calibration Notes

Units

Press **RESET** to toggle the depth units between feet and metres.

Shallow Alarm

Use the **TRIP** or **RESET** keys to set the required shallow depth alarm.

Deep Alarm

Press the **TRIP** or **RESET** keys to set the required deep alarm.

Note: The shallow and deep alarms are enabled by pressing the **SPEED** key.

Offset

The offset, keel or waterline, is set using the **TRIP** or **RESET** keys.

Negative figure = keel offset
Positive figure = waterline offset

Countdown Alarm Status

The countdown alarms can be turned on or off using the **RESET** key:

E1 = Alarm on (enabled)
E0 = Alarm off (disabled)

Log Calibration

Refer to section 6.2 for complete details on setting log calibration.

Exit Initial Calibration

To exit initial calibration and store the new settings, press **DEPTH** and **SPEED** together for 2 seconds.

6.2 Log Calibration

The ST50 Plus Tridata should not be used for navigational purposes until the speed transducer paddlewheel has been calibrated to the vessel. This is a simple operation that can be carried out automatically over a measured distance or by manually entering a calibration factor.

Automatic Calibration

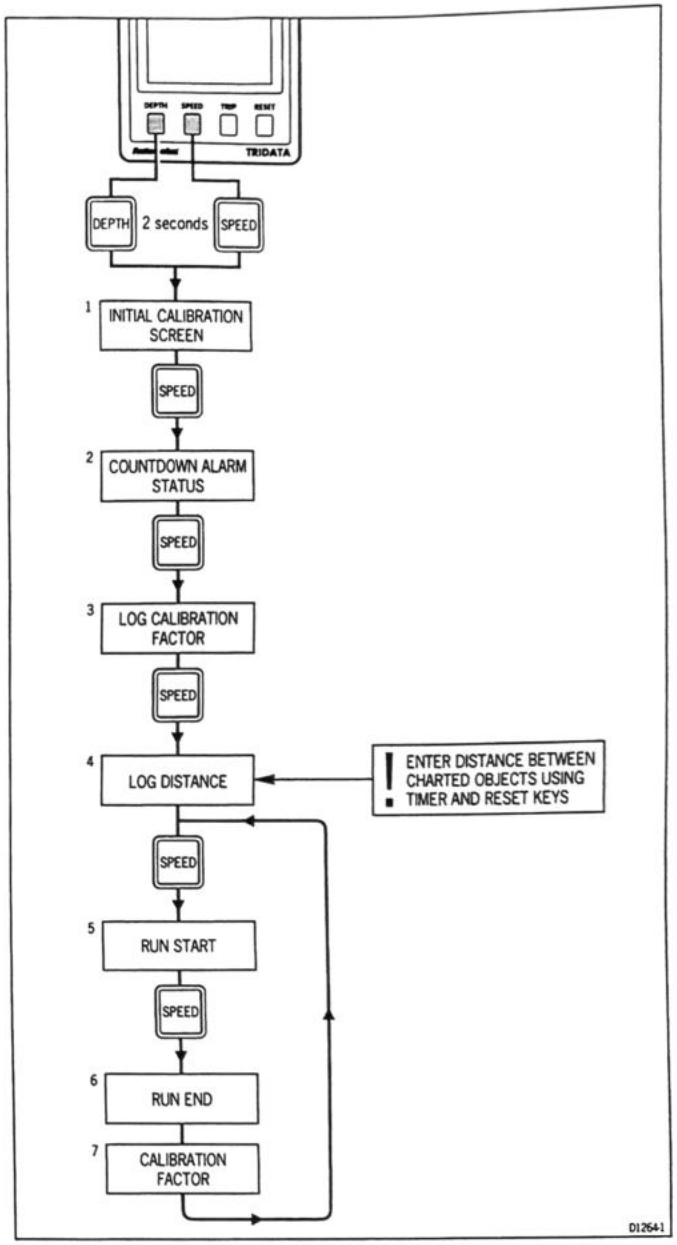
Automatic calibration should be carried out when tidal flow is at a minimum. Locate an easily identified, marked and measured distance on a chart and enter this distance into the instrument (**4**).

Note: The measured distance should, ideally, be between 1 and 2.5 Nm/Miles

Proceed from object 1 to object 2 (measured distance), pressing the **SPEED** key at the start and finish of the run (**5** and **6**). The calibration factor is calculated and displayed at the end of each run (**7**).

Repeat the run over the measured distance in the opposite direction. Once again the calibration factor will be displayed. This represents the average for the two runs. A further two runs can be made if required. **Don't forget to store the log calibration factor.**

Note: The log calibration range is from 0.25 to 2.00. Calibration factors outside of this range cannot be stored.



Note: Once you have completed the runs, store the calculated calibration factor by pressing **DEPTH** and **SPEED** together until the displays returns to normal mode (approximately 2 seconds).

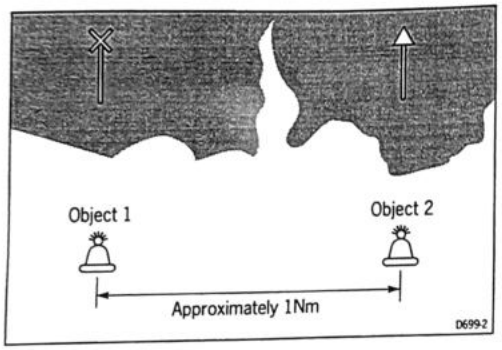
Manual Log Calibration

The following calculation must be used when carrying out Manual Log Calibration:

F (Correction Factor) = **Known** Distance/**Measured** Distance

The **Known** distance is the distance between two charted objects (e.g., two buoys).

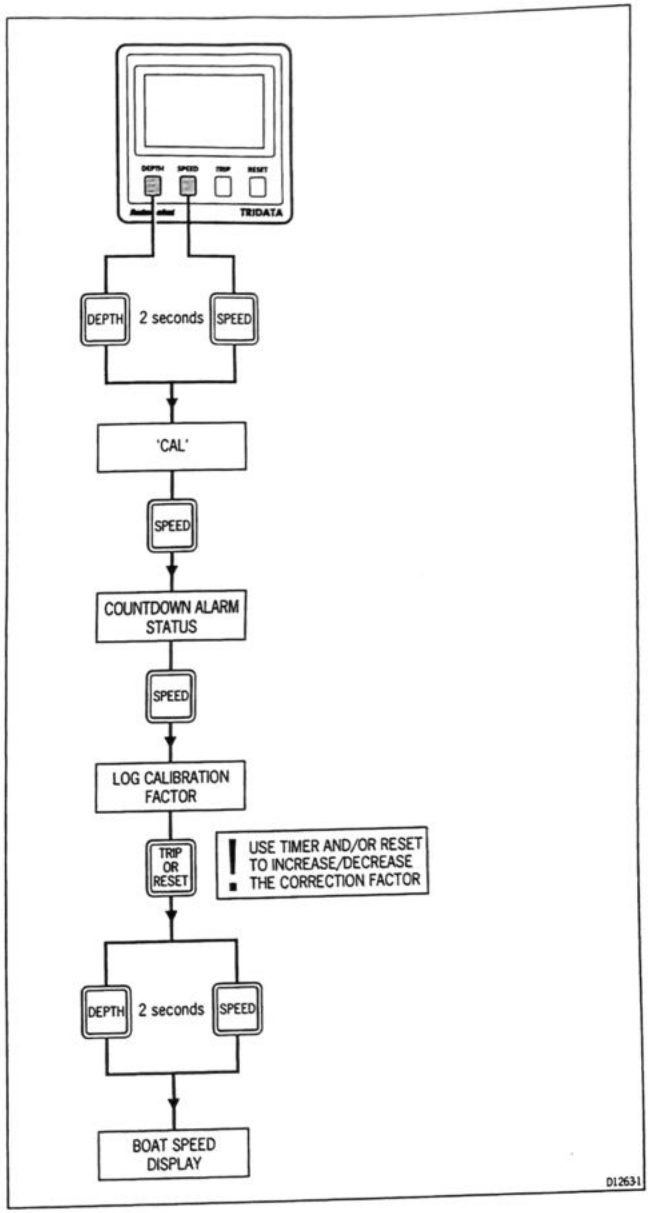
The **Measured** distance is the distance recorded by the speed instrument, allowing for tidal flow.



To obtain the correction factor (**F**) proceed from object 1 to object 2 and then object 2 to object 1. The measured distance in each case must be noted, added together, and then divided by 2 to obtain the average distance.

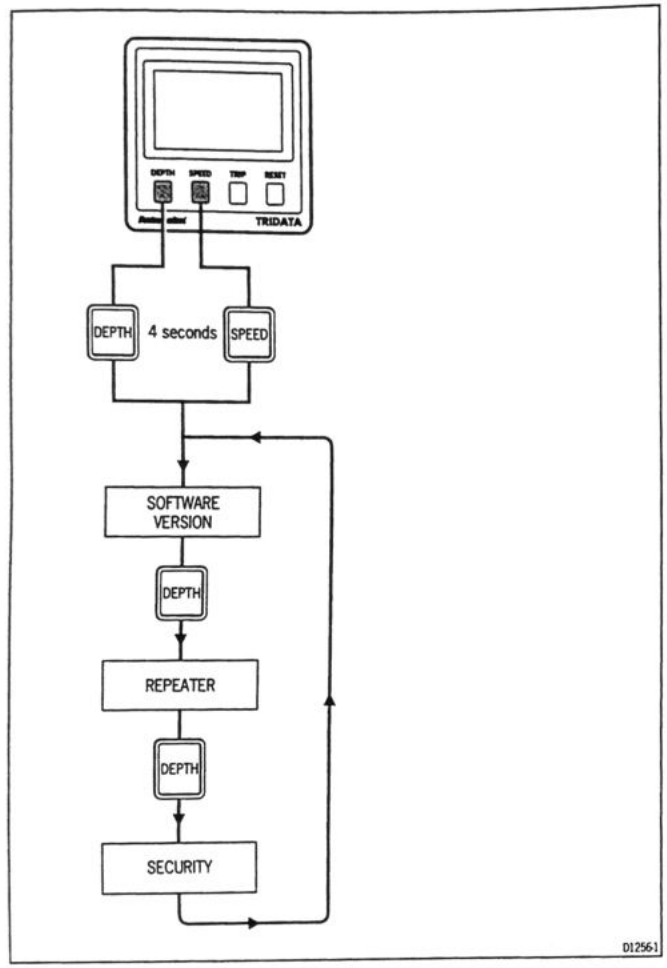
To obtain the correction factor, divide the known distance by the average distance. Once the correction factor has been calculated it can be entered into the instrument as described in the flowchart on the following page. **Do not forget to store the correction factor.**

Note: The log calibration range is from 0.25 to 2.00. Calibration factors outside of this range cannot be stored.



Note: The correction factor must be saved once it has been entered. This is achieved by pressing **DEPTH** and **SPEED** together until the display returns to its normal mode (approximately 2 seconds).

6.3 Intermediate Calibration



- To exit intermediate calibration and store the new settings, press **SPEED** and **TRIP** for 2 seconds.

Note: Except for the countdown alarm status display, initial calibration cannot be accessed when the unit is configured as a repeater.

Intermediate Calibration Notes

Master/Repeater Selection

The ST50 Plus Tridata is factory set as a master unit - normally connected to speed and depth transducers. It can, however, be set to repeat speed and depth related information received via the SeaTalk bus:

0 = master mode
1 = repeater mode

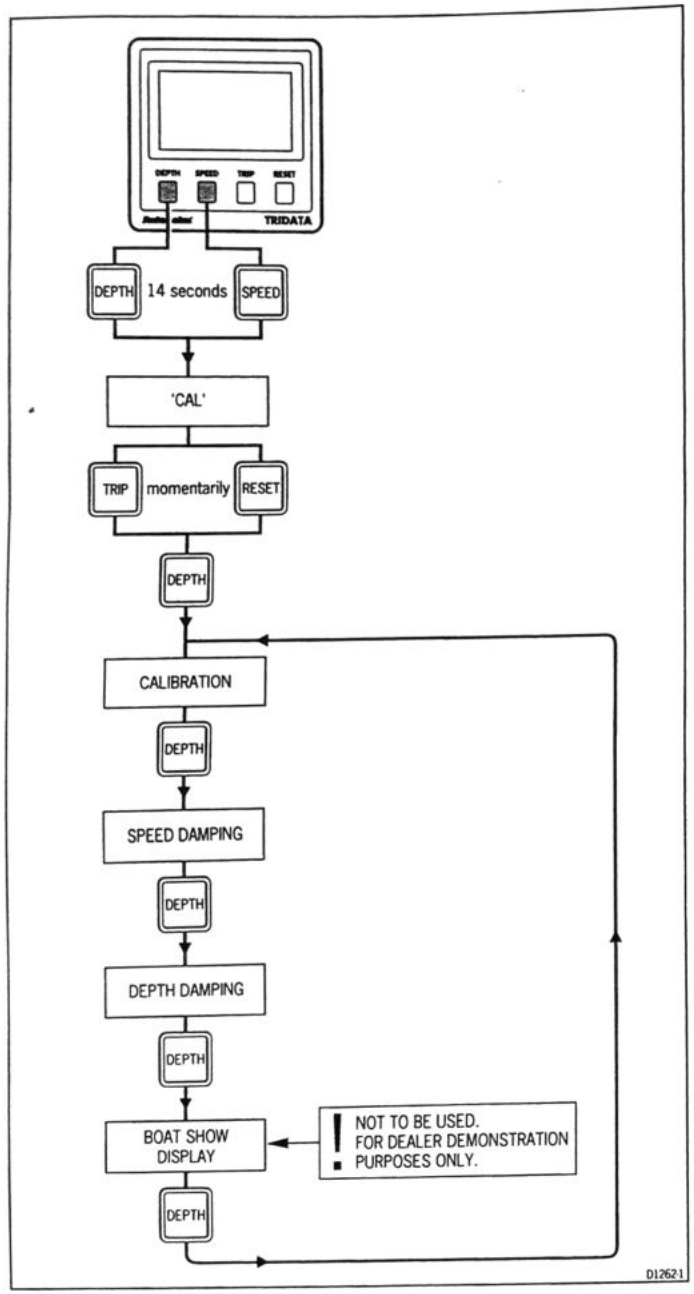
The following functions are not available when set to repeater mode:

- Log calibration
- Trip distance reset
- Average speed reset

Security Code

Full details on the 'CODE Lock' security feature are given in Chapter 5.

6.4 Extended Calibration



Extended Calibration Notes

All of the extended calibration screens are adjusted using the **TRIP** and/or **RESET** keys.

Calibration

Calibration allows you to protect your selected settings against accidental change. When lock is enabled the initial and intermediate calibration settings cannot be modified.

C1 = Calibration unlocked, i.e. normal access

C0 = Calibration locked, i.e. no access

Once locked, calibration can be unlocked by entering extended calibration and selecting calibration unlocked.

Speed and Depth Damping

Damping adjusts the rate at which these displays are updated. The damping range is 1 to 15 seconds, with the factory default set at 4 seconds.

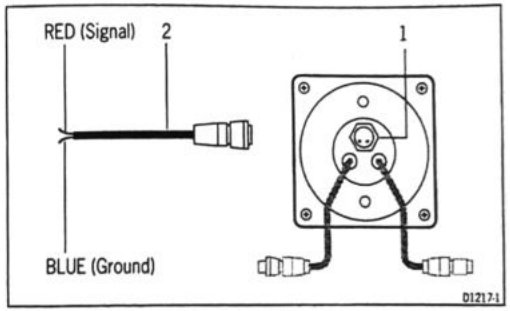
Depth damping is displayed as 'F' and speed damping as 'A'.

Caution:
The 'Boat Show' mode is a dealer demonstration program only. Under no circumstances must this program be engaged when this unit is installed on-board your vessel. The display must, therefore, be left set to 'S0'.

Chapter 7: Connection to other Marine Equipment

The ST50 Plus Tridata can only be connected to other SeaTalk products. However, the ST50 Plus Tridata Repeater can communicate with other onboard marine electronic equipment, using the NMEA 0183 protocol.

A 1m (3ft) NMEA interface cable is supplied with every repeater unit. The red wire should be connected to the signal input. Up to two NMEA 0183 receivers may be connected to each repeater with NMEA output.



The ST50 Plus Tridata Repeater has an NMEA 0183 data output connector. The following information will be transmitted every 1 to 2 seconds if it is available on the SeaTalk bus.

Sentence	Content	Instrument Required
VWR	Apparent Wind Speed (Knots) & direction	ST50 Plus Wind
DBT	Depth of Water below the Transducer (Feet)	ST50 Plus Depth or Tridata
HDM	Magnetic Heading	ST50 Plus Steering Compass
HSC	Locked Magnetic Heading	SeaTalk Autopilot (Lock Mode)
VHW	Water Speed (KNots)	ST50 Plus Speed or Tridata
MTW	Water Temperature (Deg.C)	ST50 Plus Speed or Tridata
VTG	Course & Speed over Ground	Navigation Receiver
GLL	Latitude & Longitude	Navigation Receiver
BWC	Bearing & Distance to Waypoint	Navigation Receiver

T140-1

Chapter 8: General Specification

Dimensions:	110 x 110mm (4.33 x 4.33in)
Power supply:	10 to 16V
Power consumption:	50ma (normal) 100ma (illumination on)
Temperature range:	0 to 70 deg.C
Speed through water:	0 to 99.9 Kts
Trip distance:	0 to 999 Nm
Log:	0 to 9999.9 Nm
Average speed:	0 to 99.9 Kts
Maximum speed:	0 to 99.9 Kts
Sea Temperature:	-10 to +40 °C (14 to 104°F)
Units:	Software programmable
Repeater capability:	Software programmable
Illumination:	3 levels plus off
Manual log calibration:	0.25 to 2.00 (correction factor)
Transducer speed range:	0.8 to 40 Knots
Depth range:	0 to 600 ft. (0 to 180 m)
Shallow alarm:	3 to 33ft (1 to 10m)
Deep alarm:	10 to 400ft (3 to 120m)
Minimum depth:	Reset on power up