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ST50 TRIDATA & REPEATER
Installation and Operation

Autohelm®

Contents

1. Specifications

The Tridata presents the three principal elements of navigation information in a single compact display head.

The information is displayed together on a large LCD divided into 3 sections:-

- Depth
- Speed
- Trip and Log

Each section has alternative displays which are selected using the SPEED, DEPTH and TRIP buttons.

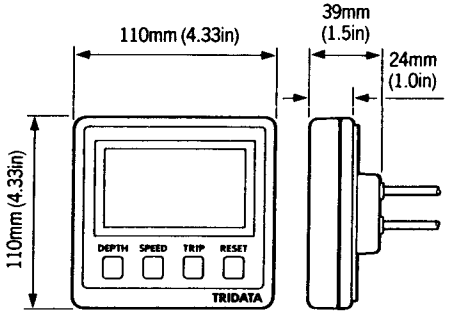
Trend arrows indicate significant changes in water depth.

Every Tridata Repeater has an N.M.E.A. 0183 output which transmits data available on the SeaTalk bus (see Section 8).

Specifications

- Power Supply
  - 11V to 16V DC
- Current Consumption
  50mA (Illumination off)
  175mA (at maximum Illumination)
- Operating Temperature
  - -0°C to +70°C
- Size
  - 110mm (4.33in) x 110mm (4.33in) x 24mm (1in) Overall depth 39mm (1.5in).
- Computer
  - 8 bit Intel Microprocessor + 8K Rom.
- Display
  - Custom 7 segment Liquid Crystal Display (LCD).
- Boat Speed
  - 0 to 60 knots (depending on transducer).
- Average Speed
  - 0 to 60 knots user resettable. Resets on powerdown.
- Maximum Speed
  - 0 to 60 knots user resettable. Resets on powerdown.
- Log
  - 0 to 999.99n.m., permanently stored.
- Trip Log
  - 0 to 999.99 n.m., user resettable. Resets on powerdown.
- Depth
  - 0.8 to 180 metres, (2.5 to 600 feet).
- Shallow Alarm
  - Audible and Visual, 2 minute inhibit, 1 to 10 metres (3 to 33 feet), user resettable, permanently stored.
- Deep Alarm
  - Audible and visual, 30 second auto cancel, sounds on crossing 3 to 120 metres (10 to 400 feet), user resettable. Resets and cancels on powerdown.
- Anchor Watch
  - Combined Shallow/Deep Alarm.
- Sea Temperature
  - -10 to 40°C (14 to 104°F).
- Timer
  - 0 to 10 hours countup.
  - 10 minute countdown.
  - 5 minute countdown.
- Illumination
  - 3 levels and OFF, user selectable.

2. Control Head Installation



2.1 Siting

The ST50 Tridate/Repeater instrument is designed for above or below deck installation.

Position where it is:

- Easy to read by the helmsman.
- Reasonably well protected from physical damage.
- At least 230mm (9in) from a compass.
- At least 500mm (20in) from radio receiving equipment.
- Accessable from behind to secure in place and run cables.
- Normally viewed straight on for best display legability.

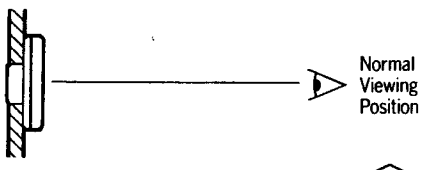
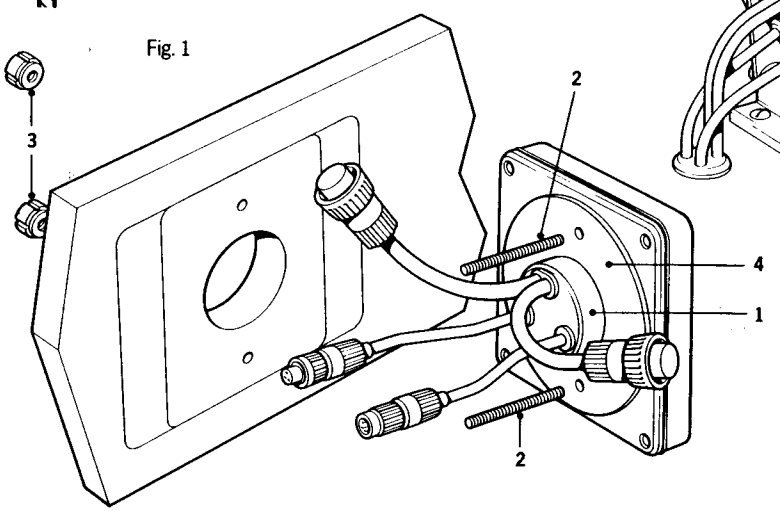


Fig. 1



Note: The back cover is designed to breath through a duct in the cable boss to prevent moisture accumulation.

2.2 Mounting Procedure (Fig. 1)

The mounting surface must be smooth and flat.

- Use the template provided to mark the centres of the two fixing holes and central boss.

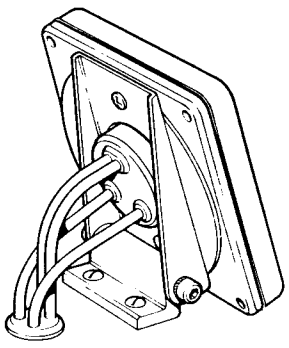
Note: Adjacent units should have a 6mm (1/4in) separation to allow room for the protective covers.

- Drill to 4mm (5/32in) diameter.
- Use a 50mm (2in) diameter cutter to drill the hole for the central boss **1**.
- Screw the two fixing studs **2**, into the back cover.
- Pass the cable tails through the central hole and secure the instrument with the thumb nuts provided **3**. (A sealing gasket **4** is already attached to the back cover).

Bracket Mounting (Fig. 2)

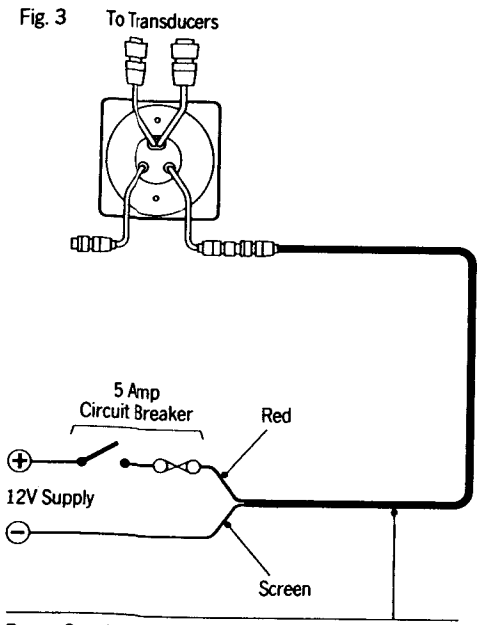
As an alternative to surface mounting, a bracket mounting kit (Cat. No. D130) is available to allow the Instruments to be bracket mounted.

Fig. 2



2.3 Power Supply (Fig. 3)

Fig. 3



Power Supply Cable	
2m (6ft)	
Red	+12V
Screen	0V

Most installations only require one connection to the 12V power supply.

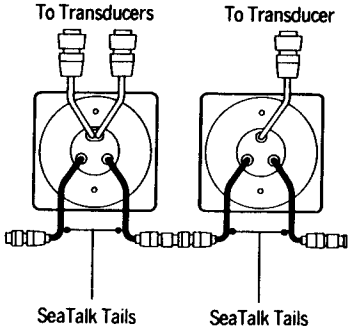
This is connected to the first SeaTalk Instrument using the 2 metre cable supplied.

Plug the connector into the instrument and lead the other end back to the vessel's distribution panel. Cut the cable to length, connect directly to the distribution panel and protect with a 5A circuit breaker. Connect the red wire to +12V and the screen to 0V. The yellow wire should be cut back and insulated.

Longer runs to the power supply can be made using the SeaTalk Extension Cable (Cat. No. D131) which is 9m (30ft) long.

2.4 Connection to Adjacent Instruments (Fig. 4)

Fig. 4



All instruments receive both power and information from the SeaTalk bus. Each instrument has two SeaTalk connectors (3 pin) on short 150mm (6in) tails to allow adjacent units to simply plug together.

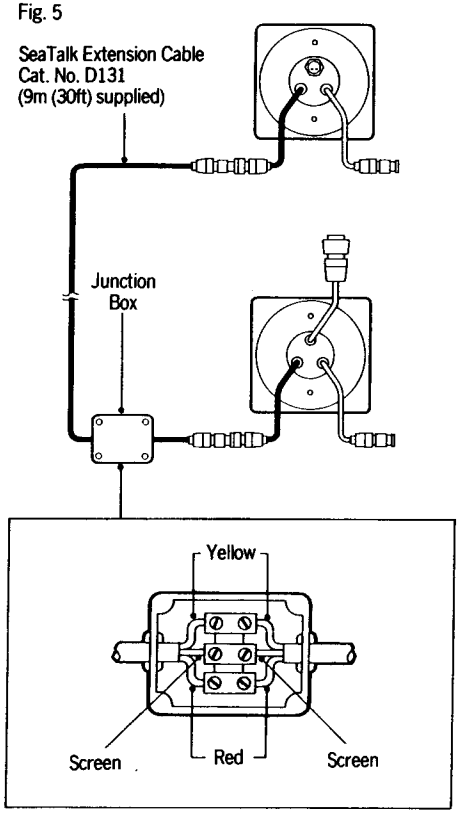
2.5 Connection to Separated Instruments (Fig. 5)

Separated instruments are connected using the SeaTalk Extension Cable (Cat. No. D131). This is supplied with a SeaTalk connector fitted to each end and with a junction box to rejoin the cable if it is cut to ease routing or for shortening.

If preferred, any 2 core screen cable which has the following specification may be used in the place of the SeaTalk cable.

	Minimum Copper Area	AWG
Screen	0.5mm^2	22
2 Cores	0.5mm^2	22

Fig. 5



2.6 Ring Connection

Installations with a large number of instruments on the SeaTalk bus may require a second ring main connection to Power Supply to avoid excessive voltage drops. This can be checked using the table below:-

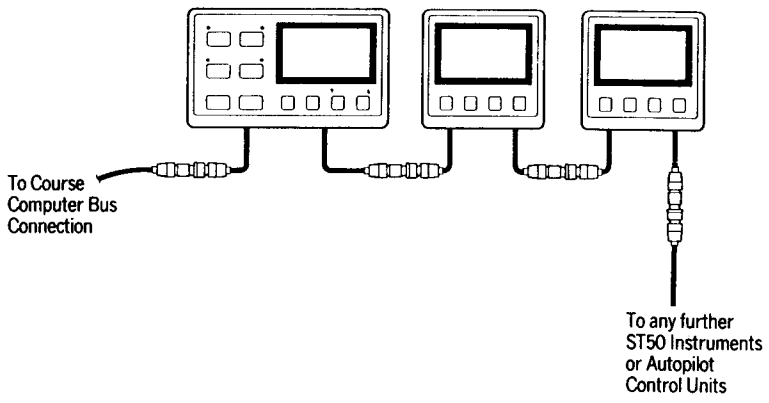
SeaTalk Cable Lenth	Max. Number of Units	
	Single Connection	Second Connection
Up to 10m (33ft)	13	26
Up to 20m (66ft)	7	13

The second connection should be made to the spare lead on the last instrument and led back to the circuit breaker.

2.7 Connection to SeaTalk Compatible Autopilots (Fig. 6)

If the vessel's installation includes a SeaTalk Compatible Autopilot the ST50 instruments may be connected into the SeaTalk bus at any point. No separate connection to the 12V power supply is necessary as the instruments will receive power via the bus from the autopilot course computer.

Fig. 6

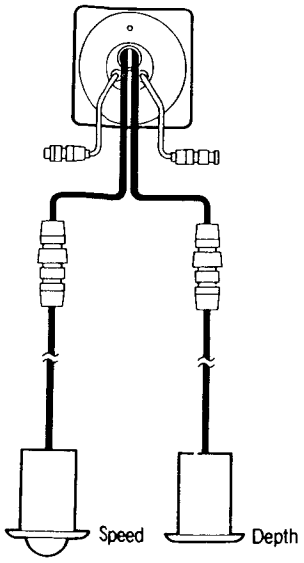


3. Transducer Installation

3.1 Connection to Instrument

Each ST50 Tridata has two transducer cable tails with connectors. Each transducer is supplied with 14m (45ft) of cable and the connectors fitted on the ends simply plug into the instrument cable tails (Fig. 7).

Fig. 7



3.2 Transducer Selection

The speed and depth transducers are selected depending on the hull material:-

Hull Material	Transducer	
	Speed	Depth
GRP, Steel Aluminium	Z092 Through Hull Plastic	Z091, Through Hull Plastic
Wood	Z116 Through Hull Bronze	Z118, Through Hull Bronze

3.3 Speed Transducer

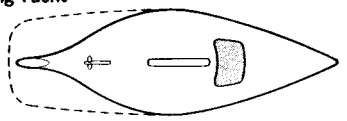
In all cases read the instructions supplied with the transducer completely before proceeding with the installation.

Installation of the through hull type is described below.

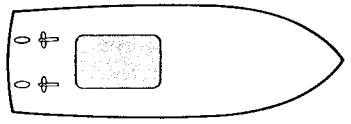
Siting (Fig. 8)

Fig. 8

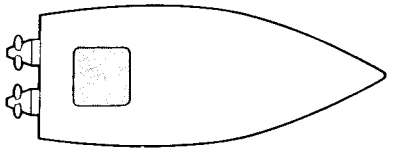
Sailing Yacht



Semi Displacement



Planing



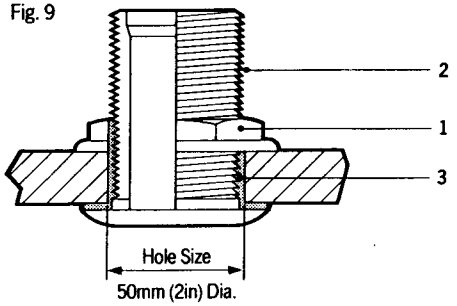
For accurate readings the transducer should be positioned within the shaded area indicated where it will be in clear flow.

- Be ahead of propellors (10% W.L. length min.).
- Be at least 150mm (6in) from the keel (in a sailing yacht ideally ahead of the keel).
- Be near the centreline.
- Be clear of other through hull fittings or projections.
- Have sufficient clearance inside the hull to allow the nut to be fitted.
- Have 100mm (4in) headroom above the through full fitting to allow it to be withdrawn.

Installation (Fig. 9)

- Drill a 3mm (1/8in) pilot hole in the selected position and check both inside and out that the siting is good.
- Use a 50mm (2in) diamter cutter to drill the hole from the outside.
- Emery to remove burrs and roughen the surface to provide a good key. Clean inside and outside the hull removing any grease with a weak solvent cleaner or household detergent.

Fig. 9



- Remove the paddlewheel assembly and nut from the through hull fitting **2** and apply sealing compound **3** to the mating flange and up the thread 6mm (1/4in) greater than the hull thickness.
- Assemble the through hull fitting making sure that the arrow points forward. **Do not overtighten the nut 1.**
- Remove excess sealing compound.
- Insert blanking plug ready for launch.
- Check for leaks immediate the vessel is launched. Recheck within 8 to 24 hours.

Cabling

- Route the cable back to the instrument.
- Avoid running the cable close to fluorescent lights, engine, radio transmitting equipment etc. as these may cause interference.
- Keep the cable clear of the bilges and secure at regular intervals.

Maintenance

- Keep the O-rings on both transducer and plug well covered with lubricant such as Vaseline.
- Antifoul the outside of the through hull fitting flange, the exposed end of the plug assembly, and the paddle after first removing any fouling with a stiff brush. The paddle is pre-antifouled and need not be coated for the first season.
- Always replace the transducer with the plug whenever the vessel is being hauled out or left for long periods.

3.4 Depth Transducer

In all cases read the instructions supplied with the transducer completely before proceeding with the installation.

The installation procedure for the through hull depth is the same as for the speed transducer. However the following additional points should be noted:-

Siting

- The transducer must be within 10° of vertical both fore and aft and athwartships.

Installation

- Before assembling the transducer to the hull first pass the cable through the hole in the hull and through the nut.

Cabling

- Avoid running the transducer cable close to other signal cables as it may cause interference. This includes the speed transducer cable. Generally 0.2m (8in) clearance will be sufficient.
- The depth transducer cable length (including Triducers) must not be shortened as this will affect performance. Excess cable should be coiled.

Maintenance

- Clean the external transducer face with a stiff brush and protect with a single coat of antifouling.

4. Fault Finding

All Autohelm products are subject to a comprehensive test procedure prior to packing and shipment. In the unlikely event that a fault does arise the following check list should help cure the problem.

Fault	Cause	Action
Instrument Display Blank	No Supply	Check Supply Check Cabling and security of SeaTalk Connectors Check Fuse/Breaker Return ST50 Tridata for repair
No Speed or Temperature Information	Transducer Cabling Problem	Check Cabling and security of Transducer Connectors
No Speed Information	Transducer Paddle Wheel fouled	Clean Paddle Wheel
No exchange of information between SeaTalk Instruments (i.e. illumination) levels).	SeaTalk Cabling Problem	Check security of SeaTalk Connectors. Remove Instruments one by one to isolate faulty unit
Failure of a group of Instruments in the SeaTalk Chain	SeaTalk Cabling/Connector Problem	Check security of SeaTalk Connectors between functioning and non-functioning Instruments
Depth reading continuously flashes (Depth greater than 3 feet)	Transducer Cable/Connector Problem	Check cabling and security of Transducer Connector
Depth reading flashes whilst underway	Aerated water Boat wakes Prop wash etc.	Normal reading will return when clear of disturbed water

5. Maintenance

5.1 Control Head

- In certain conditions, condensation may appear on the window. This will not harm the instrument, and can be cleared by switching on the illumination to the brightest level.
- Never use any chemical or abrasive materials to clean your ST50 Tridata/Repeater Instrument. If the instrument becomes dirty wipe clean with a damp cloth.

5.2 Through Hull Transducers

- Periodically check the through-hull fitting for leaks.
- Keep the O-rings of the Speed/Log transducer and plug well covered with vaseline ensuring plug is always attached to transducer, ready for immediate use.
- Always replace the Speed/Log transducer with the plug whenever the vessel is being hauled out or left for long periods.
- Frequently check Speed/Log transducer for fouling or damage.
- Clean the outside of the through hull fitting flange, or external transducer face with a stiff brush and protect with a single coat of anti-fouling. Clean the paddle-wheel and exposed end of Speed/Log transducer plug and apply single coat of anti-fouling.

  The paddle is pre-anti fouled and need not be coated for the first season.

5.3 Cabling

- Avoid running cables through bilges where possible and secure any coiled lengths at regular intervals.
- Avoid running cables close to fluorescent lights, engine, radio transmitting equipment etc.
- Check cabling for chafing or damage to outer casing, replace where necessary and re-secure.

Advice

Should any difficulties arise, please consult Nautech Product Support Department in the U.K. or your own National Distributor who will be able to provide expert assistance.

6. Operation

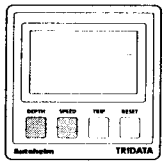
The ST50 Tridata/Repeater instruments can be used as individual modules or connected to other instruments to provide a fully integrated instrumentation system that can be linked to any of the Autohelm SeaTalk compatible autopilots. The Repeater can provide NMEA 0183 data to navigation receivers, chart plotters or to other navigational equipment.

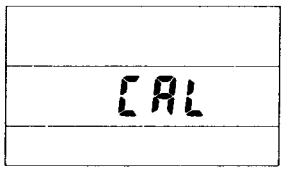
6.1 Set Up

The ST50 Tridata is set up in the factory with:-

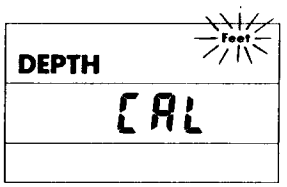
- Depth displayed in feet.
- Keel/Waterline offset set to 0.
- Shallow alarm set to 10 feet.
- Deep alarm set to zero.

- Push and hold down for 2 seconds **Depth** and **Speed** together to select calibration mode.

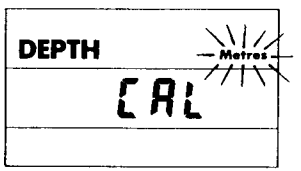




6.1.1 Measurement - Unit Selection

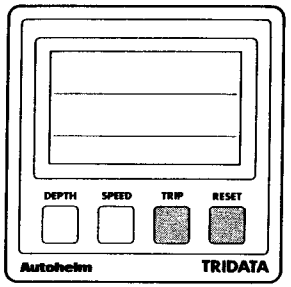


- Push **Reset** to change display units between Feet and Metres.

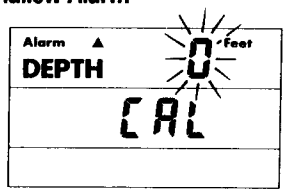


6.1.2 Alarm/Offset Set-up

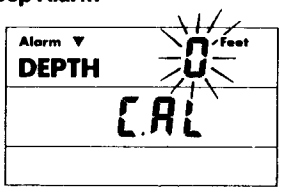
- Push **Depth** to select the alarm or offset required.
- The selected value is adjusted using **Reset** (▲) to increase, **Trip** (▼) to decrease. 1 second hold down for fast scroll.



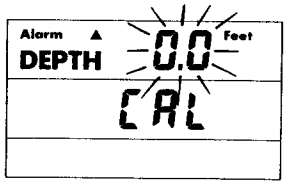
● Shallow Alarm



● Deep Alarm



● Offset



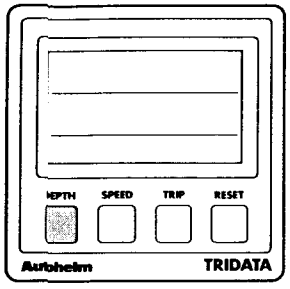
▲ = Waterline (increases displayed depth).
▼ = Keel (decreases displayed depth).
Note: Feet or Metres displayed according to calibration selection.

- To switch alarms offset value to 0 (as illustrated).
- Push and hold down for 2 seconds **Depth** and **Speed** together to exit calibration mode and store the alarm, offset and unit selection values.

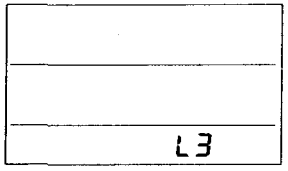
Note: The ST50 Tridata Repeater will automatically display depth in the units selected on the main ST50 Tridata.

6.2 Illumination

Control of illumination levels is common to all ST50 Instrument Modules. The control is always selected using the left-hand push button.



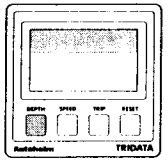
- Push and hold down the **Depth** button for 1 second to switch ON (if OFF), or to display current illumination level (if already on).



- Push **Depth** button within 8 seconds to select required illumination level.*
  - L3 High
  - L2 Medium
  - L1 Low
  - L0 Off

*Display returns to previous status after 8 seconds.

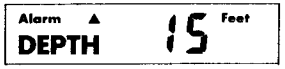
6.3 Display Sequence: DEPTH (Tridata and Repeater)



- **Depth in Feet**

DEPTH

- **Shallow Alarm Setting***



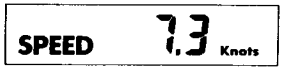
DEPTH

- **Deep Alarm Setting***

Note: Deep alarm is only displayed when set. Feet or Metres displayed according to calibration selection.

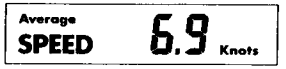
6.4 Display Sequence: SPEED (Tridata and Repeater)

- **Boat Speed**



DEPTH

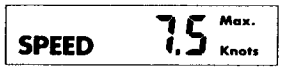
- **Average Speed***



- Push **Reset** to reset (not Repeater).
- Average speed is calculated over a maximum 24 hour period after reset and then flashes.

DEPTH

- **Maximum Speed***

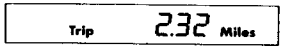


- Push **Reset** to reset.

* Display returns to current water depth or current boat speed display after 8 seconds.

6.5 Display Sequence: TRIP (Tridata and Repeater)

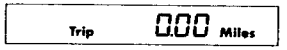
- **Trip Distance**



- Push **Reset** for 4 seconds to reset (not Repeater).

TRIP

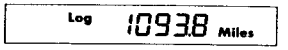
- **Timer**



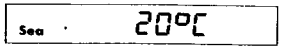
- Push **Reset** to start/stop/reset.
- Push **Reset** for 1 second to select 10 minute countdown.
- Push **Reset** for 3 seconds to select 5 minute countdown.

TRIP

- **Log**



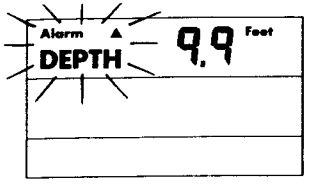
- **Sea Temperature**



DEPTH

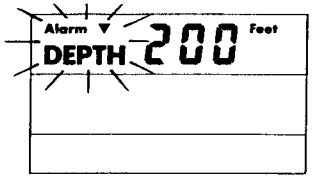
6.6 Alarms (Tridata and Repeater)

- **Shallow Alarm**
  - Sounds when depth falls below the selected value.



  - Push **Depth** to silence alarm. If the alarm condition still exists after 2 minutes the alarm will sound again.

- **Deep Alarm**
  - Sounds when depth crosses the selected value (can be increasing or decreasing).



  - Push **Depth** to silence and switch off alarm. If left the alarm will automatically switch off after 30 seconds.

See Section 6.1.2 – Set up for setting up the shallow and deep alarms.

- **Loss of Signal**
  If the instrument loses the return echo the last depth signal will flash. It is usually due to aeration in the water and should not persist.

7. Log Calibration: (Tridata only)

As supplied all ST50 Instrument Modules are tested and calibrated to factory standards.

It is important that before using this instrument for navigational purposes the following log calibration procedures are carried out for your specific installation.

There are two methods of log calibration.

- Manual Calibration – allows a calculated log calibration factor to be entered manually.
- Automatic Calibration – allows a known distance to be set up on Tridata and up to four measured runs to be completed. The log calibration factor is automatically calculated.

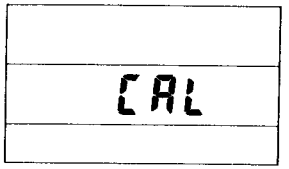
7.1 Manual Calibration Procedure

- Calculate Correction Factor (F)

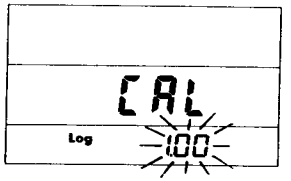
$$F = \frac{\textbf{Known} \text{ distance}}{\textbf{Measured} \text{ distance}}$$

Known distance
– from a chart.
Measured distance
– as recorded on Tridata allowing for tidal flow as required.

- Push and hold down for 2 seconds **Depth** and **Speed** together to select calibration mode.



- Push **Speed** to display to log calibration factor.



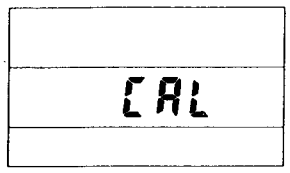
- Calculate the new log calibration factor.
  = Displayed calibration factor x **F** (minumum 0.25, maximum 1.50).
- Adjust the displayed calibration factor using **Reset** to increase and **Trip** to decrease (1 second hold down for fast scroll).
- Push and hold down for 2 seconds **Depth** and **Speed** together to exit calibration and store the new log calibration factor.

7.2 Automatic Calibration Procedure

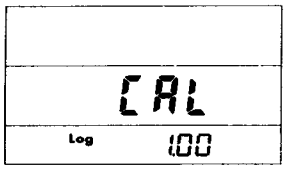
- Select an easily identified marked measured distance on a chart.
- Carry out the calibration when tidal flow is least.
- Complete a minimum of two runs (one in each direction) to cancel tide.

Procedure

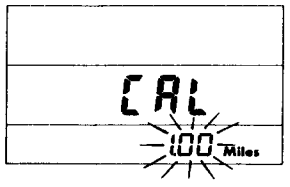
- Push and hold down for 2 seconds **Depth** and **Speed** together to select calibration mode.



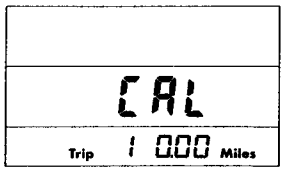
- Push **Speed** to select log calibration.



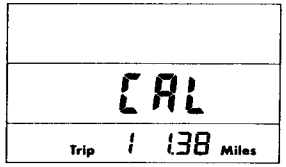
- Push **Speed** to display distance.

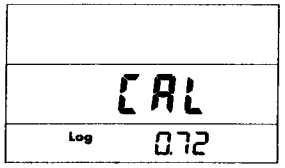


- Adjust the displayed distance using **Reset** to increase, **Trip** to decrease, until it equals the marked measured distance (minimum 0.25, maximum 2.50 miles).
- At the start of the measured run push **Speed**. Trip display shows run number and measured distance.



- Push **Speed** at the end of the run. Trip display shows recorded distance for that run, and after 5 seconds the log calibration factor for all completed runs.





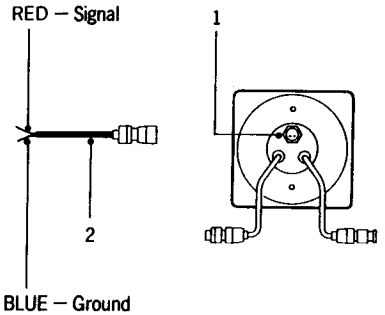
- Repeat the last two stages to run the measured distance in the opposite direction.
- If required, repeat the last two stages for up to 2 more calibration runs over the measured distance.
- Push and hold down for 2 seconds **Depth** and **Speed** together to exit calibration and store the new log calibration factor.

Note: If the calibration factor is not within 0.25 to 1.50 a mistake has been made in the calibration sequence and the previous calibration factor will be retained when exiting calibration mode.

8. Connection to other Marine Equipment

The ST50 Tridata can only be connected to other products in the "SeaTalk" range. However the ST50 Tridata Repeater can communicate with other onboard Marine Electronic equipment using the NMEA 0183 protocol.

A 1m (3ft) NMEA Interface cable **2** 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 Tridata Repeater has an NMEA 0183 data output connector **1**. If available on the SeaTalk bus the following information will be transmitted every 1 to 2 seconds:-

Sentance	Content	Instrument Required on SeaTalk Bus
VWR	Apparent Wind Speed (Knots) and direction.	ST50 Wind
DBT	Depth of Water below the Transducer (Feet).	ST50 Depth or ST50 Tridata
HDM	Magnetic Heading	ST50 Steering Compass
HSC	Locked Magnetic Heading	SeaTalk Autopilot (Operating in Locked Mode)
VHW	Water Speed (Knots)	ST50 Speed or ST50 Tridata
MTW	Water Temperature (°C)	ST50 Speed or ST50 Tridata

Note: Compass Heading is not transmitted as part of the VHW sentance.