SeaKing Profiling Sonar

Product Manual

0374-SOM-00002, Issue: 04

Tritech

Outstanding Performance in Underwater Technology

A Moog Inc. Company

Table of Contents

Help & Support

First please read this manual thoroughly (particularly the Troubleshooting section, if present). If a warranty is applicable, further details can be found in the Warranty Statement, 0080-STF-00139, available upon request.

Tritech International Ltd can be contacted as follows:

	Mail	*Tritech International Ltd* Peregrine Road Westhill Business Park Westhill, Aberdeenshire AB32 6JL, UK
	Telephone	++44(0)1224 744 111
	Fax	++44(0)1224 741 771
	Email	support@tritech.co.uk
	Website	www.tritech.co.uk

Prior to contacting *Tritech International Ltd* please ensure that the following is available:

1. The Serial Numbers of the product and any *Tritech International Ltd* equipment connected directly or indirectly to it.

2. Software or firmware revision numbers.

3. A clear fault description.

4. Details of any remedial action implemented.

Contamination

If the product has been used in a contaminated or hazardous environment you *must* de-contaminate the product and report any hazards *prior* to returning the unit for repair. *Under no circumstances should a product be returned that is contaminated with radioactive material.*

The name of the organisation which purchased the system is held on record at *Tritech International Ltd* and details of new software or hardware packages will be announced at regular intervals. This manual may not detail every aspect of operation and for the latest revision of the manual please refer to www.tritech.co.uk

Tritech International Ltd can only undertake to provide software support of systems loaded with the software in accordance with the instructions given in this manual. It is the customer's responsibility to ensure the compatibility of any other package they choose to use.

Warning Symbols

Throughout this manual the following symbols may be used where applicable to denote any particular hazards or areas which should be given special attention:

Note

This symbol highlights anything which would be of particular interest to the reader or provides extra information outside of the current topic.

Important

When this is shown there is potential to cause harm to the device due to static discharge. The components should not be handled without appropriate protection to prevent such a discharge occurring.

Caution

This highlights areas where extra care is needed to ensure that certain delicate components are not damaged.

Warning

DANGER OF INJURY TO SELF OR OTHERS

Where this symbol is present there is a serious risk of injury or loss of life. Care should be taken to follow the instructions correctly and also conduct a separate Risk Assessment prior to commencing work.

1. Introduction

A SeaKing Profiler System is made up from the Profiler, the *Tritech International Ltd* Seanet Pro control and display software and either a Surface Control Unit (SCU) or SeaHub. This manual deals with the Profiler and any specific aspects of Seanet Pro that are necessary to get a system working. For more details of Seanet Pro please refer to the Seanet Pro Software Manual and further details of the SeaHub or SCU can also be found in their respective manuals (all current manuals are available on www.tritech.co.uk).

The Seanet Pro software is Windows based and provides control of the complete range of profilers that *Tritech International Ltd* produce. It is also possible to display multiple devices within Seanet Pro and as such two or more Profilers can be networked together and displayed on one computer.

The SeaKing Profiler is typically configured to communicate with the SCU or SeaHub using the ARCNET LAN telemetry protocol. This is the standard protocol that is used in all SeaKing devices and provides a high bandwidth at a default communications rate of $156\text{kbit}\cdot\text{s}^{-1}$. It is also possible to reconfigure sensors to communicate at a lower rate or using serial protocols (such as RS232 or RS485).

The SeaKing DFP has the following features:

Scan rate	The heads can achieve a very fast scan rate which gives faster target acquisition.
Dual Frequency Operation	The SeaKing DFP can use up to two operating frequencies - one giving long range target acquisition characteristics and the other giving shorter range, higher definition, profiling capability.
Protected transducer	The SeaKing devices have a rigid plastic boot, and offer protection of the transducer head.
Electrical Connection	The SeaKing uses a *Tritech International Ltd* 6 pin waterblock but can be fitted with an alternative connector on request.

Communication Protocols

Units fitted with a V6 COM PCB are capable of communicating on ARCNET, RS232 and RS485. Units fitted with earlier revisions COM PCB will only be able to communicate on ARCNET or RS232. If you are unsure which COM PCB is fitted to your unit, please contact *Tritech International Ltd* for assistance.

2. Specification

2.1. Dimensions
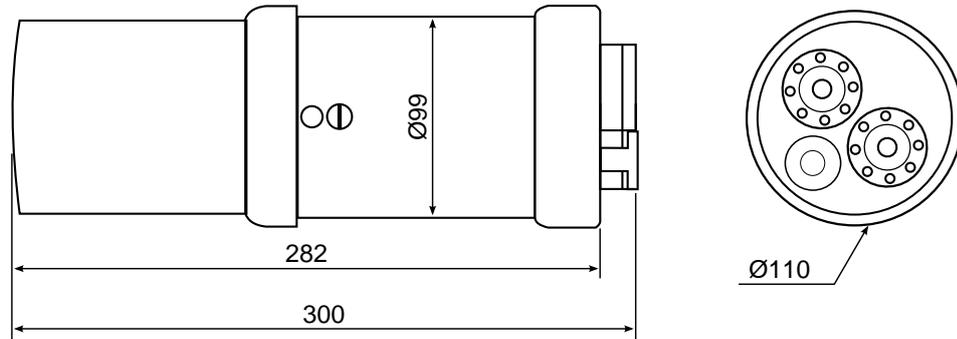
Not to scale, dimensions in mm.

2.2. Acoustic

Property	High frequency	Low frequency
Operating frequency	1.1MHz	600kHz
Beamwidth	1° conical	2° conical
Maximum range	40m	80m
Pulse length	20 - 200µs	
Minimum range	0.3m	
Scan resolutions	0.45°, 0.9°, 1.35° 1.8°	
Source level	210dB re 1µPa at 1m	
Scanned sector	Up to 360°	
Continuous 360° scan?	Yes	
Sector offset mode?	Yes	
Timing resolution	1mm	

2.3. Physical

Physical	
Weight in air	3.5kg (aluminium)
Weight in water	1.7kg (aluminium)
Materials	Boot: Acetal copolymer Body tube: Anodised aluminium alloy (6Al4V Titanium optional)
Depth rating	4000m
Temperatures	Operating: -10 to 35°C Storage: -20 to 50°C

2.4. Electrical and Communication

Electrical and Communications	
Power requirement	20 to 72V DC at 8W AUX port voltage equal to Main port supply
Communication protocols	ARCNET, RS485, RS232 (single head only)
Communication rate	ARCNET: 156kbit·s^{-1}, 78kbit·s^{-1} RS232 & RS485 : 115.2kBd
ARCNET line driver	1500m at 156kbit·s^{-1} 2500m at 78kbit·s^{-1}
ARCNET isolation	Transformer Isolated 1500V
Connector options	Tritech 6-pin (standard) Others available on request

3. Installation

3.1. General Overview

The SeaKing heads are supplied with a waterblock fitted to the device and as standard a proprietary connector usually referred to as the "Tritech 6-Way Connector". Other connectors are available and various lengths of test cable can be supplied with the connector. For more details contact *Tritech International Ltd*.

The waterblock is fastened to the body tube of the head, and provides a 4000m rated pressure bulkhead. This will protect the electronics from water ingress in case the connector is damaged or not fitted correctly. The connector may be disconnected from the heads by unscrewing the four securing screws.

Note

It is not necessary to remove the waterblock when removing the connector. While the connector is removed from the head, the blanking plugs supplied should be fitted to prevent the ingress of dirt or moisture.

3.2. Seanet Pro Software

The Seanet Pro Windows software will be provided either on an Installation CD-ROM (for SeaHub interface to user computer) or pre-installed on the Seanet SCU.

For the CD Installation, if Setup does not auto-run on disc insertion, run the SETUP.EXE file from the disc to start the installation.

3.3. Installing the Profiler Head

Caution

Although the profiler heads are rugged, they should be handled with care, particularly the connector and transducer.

The heads should be secured by clamping on the cylindrical body section such that the transducer is unimpeded and not shielded. A guard can be fitted

over the head to protect from impact damage but this must not overlap the transducer area or it may have an effect on the profiler image.

⚠️ **Caution**

It is important that no clamping force is applied to the boot.

The clamp should be applied centrally to the aluminium body tube and should not be over-tightened. Any metallic clamps should be electrically insulated from the profiler body by means of rubber or plastic strips or mount brackets of at least 3mm thickness and extending at least 3mm beyond the clamp boundary to reduce any galvanic corrosion effect. Non-metallic clamps are preferable: if metallic clamps are used they should be painted or lacquered with at least two or three coatings.

⚠️ **Caution**

Avoid any metal alloys containing copper such as brass or bronze.

Care should be taken to mount profiler heads to ensure that they are mounted as close to the true horizontal as possible in relation to the trim position of the vehicle. The front filling plug and red LED should be aligned at right angles to the natural direction of travel of the vehicle (i.e., facing downward for a seabed profile). Errors in the head alignment can give rise to unreliable results.

3.3.1. SeaKing Communication Configuration

⚠️ **Caution**

The power should be turned off before making a connection between the sonar head and surface controller (SCU or SeaHub).

ℹ️ **Note**

The Seanet SCUv5 and SeaKing heads cannot be used with AIF cards as used in earlier WINSON based SCU-3 systems. They must be used with SeaKing AIF ARCNET cards (AIFV3/V4). The Series 2 Sonar, Profiler and devices heads cannot be directly used with SeaKing and Seanet systems. For upgrade options please contact *Tritech International Ltd*

The Profiler head may form part of an ARCNET multi-drop, network of sensors that are normally interfaced to the Surface Unit through the internal AIF interface PCB (installed in the SCU) or external SeaHub serial interface module.

Normal communications with the Profiler head is via a customised version of the ARCNET network system and requires a good quality balanced twisted

pair cable. It is possible to interface the ARCNET to wide band multiplexer systems - contact *Tritech International Ltd* for details.

Note

For an ARCNET connection termination resistors need to be fitted at each end of the umbilical. Refer to Appendix A, *ARCNET Termination*

Note

There is a single-head RS232 option built into SeaKing heads but this is not multi-drop (i.e., multiple heads cannot be used simultaneously in this mode). An RS485 option is also available in later models which allows for the operation of multiple heads provided each had has its own communication link (it is not possible to daisy-chain or ping sync RS485 heads together).

Refer to the Seanet Pro and Seanet SCU manuals for more information on serial RS232/RS485 configuration and baud setup.

3.3.2. Subsea Sensor Electrical Installation

If using a rectified transformer PSU, the output of the PSU must have a filter capacitor of not less than 470µF, for each head being powered. If an unregulated PSU is used, then make sure that the voltage value measured at the head is in the range 20-36v DC, in power on/off and running conditions. If powering the head(s) down a long lead or umbilical, the maximum recommended loop resistance of the power line must not exceed 10ohm for one head, 5ohm for two heads, and 3ohm for three heads. If the supplied voltage is less than 20V DC the profiler head may not operate correctly.

Caution

Never try to make SeaKing profiler work down a long cable by increasing the PSU output voltage above 36V DC.

3.3.3. Ground Fault Monitoring Equipment

The power supply within SeaKing subsea devices includes an electrically isolated DC-DC converter front-end, There is a small capacitive connection to the profiler chassis which should not noticeably affect any impressed current ground fault indicator (GFI) equipment.

3.3.4. Waterblock Pin-out Diagram
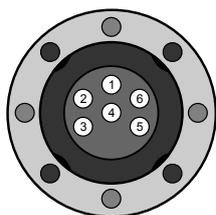
Tritech Waterblock

Pin	MAIN port	AUX port	Cable colour
1	RS232 TX ARCNET A RS485 A	RS232 RX ARCNET A RS485 A	Yellow
2	RS232 Rx ARCNET B RS485 B	RS232 TX ARCNET B RS485 B	Blue
3	+DC Power		Red
4	-DC Power		Black
5	Dual Head Sync/ RS232 Ground		Green
6	Earth/cable shield		cable screen

i

Note

For information regarding the setup of the various communications protocol, please refer to *0374-SOM-00003*.

3.3.5. Dual Head Profiler Setup

The dual head option is only usable with heads operating in **ARCNET**. There is no way to synchronise the heads when using the RS232 or RS485 protocols.

i

Note

If operating in a Master/Slave configuration, pin 5 can be linked within the interconnect cable (i.e., from the Master `MAIN` port to the Slave `MAIN` port). This will allow the Master profiler to take control of the Slave profiler in order for the signals to the surface to be properly synchronised.

For a dual head installation, the `MAIN` connector port on each profiler head should be connected to a common communications pair (pins 1 & 2) and common supply and ground (pins 3 & 4) from the subsea junction box.

Pin 5 of the connector is allocated as a `Dual Head Sync line` on the profiler. The pin 5 of the Master Profiler head must link through to the pin 5 of the Slave profiler head to enable `Scan and Ping Synchronisation` between heads. The pin 5 line of the profilers MUST be isolated and not linked through to the pin 5 of any other devices such as sonar or bathymetric bottles that are attached to the same network.

Note

If using the dual Profilers with a *Tritech International Ltd* SeaHub or SCUv5 it is possible to link pin 5 at the surface and use standard cables instead. Refer to the SeaHub or SCU manual for further details.
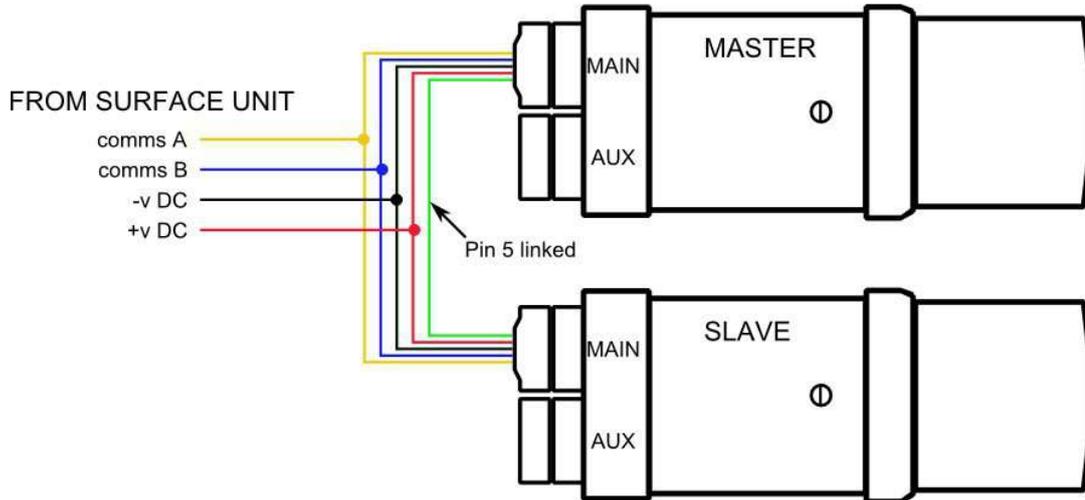
Note

Wire colours shown correspond to standard *Tritech International Ltd* 6-pin connector and cable.

3.3.6. Using two Profilers with RS232 or RS485

When using RS232 or RS485 it is still possible to use two Profilers, but each must have their own communications channel to the topside controller (i.e. a dedicated COM Port for each unit).

Seanet Pro must then be set to use the Profilers in the `Free Run` mode. See the section called "Setup" for more details.

4. Operation

4.1. Basic Principles

On completion of installation of the Profiler(s) on a vehicle, they can be tested in air by powering up the system and observing that the red LED illuminates as the head scans through the ahead direction.

The Profiler heads can be run in Single or Dual head modes. The head has a minimum lockout range of 0.3 metres and will not display returns below this range. The lockout value can be adjusted from the `Setup` option in the `Application Tools` menu (right-click on the sonar screen).

Each head will have a separate node number in Seanet Pro (typically 20 for "Master" and 21 for "Slave") - the head that is programmed with the lowest node number of the pair is the Master or controlling head. If a head is enabled and is not physically connected, an error status message will flash on-screen to inform the operator that a profiler head has not been detected so unconnected heads should be disabled to prevent interruptions.

A synchronisation link is setup between a dual head pair on pin 5 line. When pin 5 is linked, the Master head is responsible for taking control of the pair and establishing Scan and Ping syncs if these have been configured during head setup.

There are 4 range resolutions available; Low, Medium, High and Ultra, selected from the Profiler Settings bar. As the resolution is increased from Low to Medium to High to Ultra, the Profiler display will plot more points within the scan, therefore use of a lower resolution will give faster scan speeds, but at a lower level of detail.

4.2. Seanet Pro Software

4.2.1. Main Screen

The Seanet Pro application can be run from the `Programs` group in the Windows `Start` menu or from the desktop by double clicking on the shortcut icon.

The Seanet Pro screen display shown below is a Dual Profiler setup
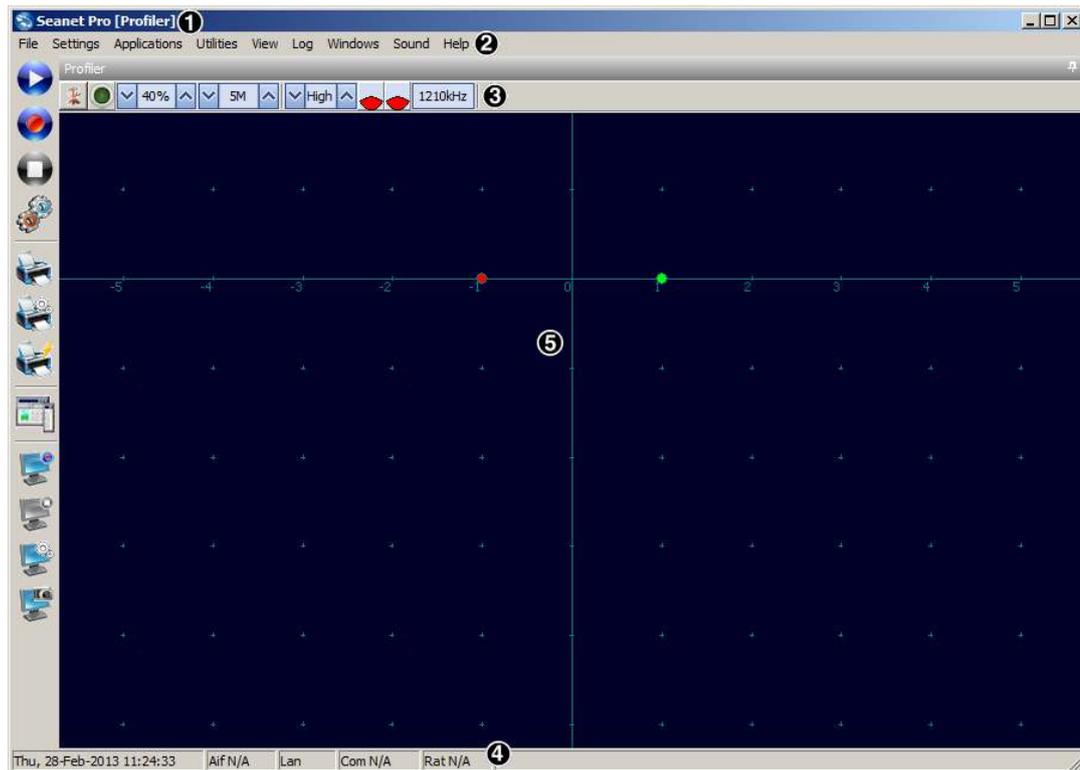
The main areas of the display are:

1. `Display Header` This part of the screen is used for system/software identification.

2. `Menu Bar` This is where system set-up functions can be accessed. Where a menu item is relevant to a particular task it will be referenced in this manual, otherwise a full description of each menu is available in the Seanet Pro online help.

3. `Settings Bar` This is where the Profiler can be controlled and configured. The settings bar is on top of every display window and includes a Tools Setup button, Pause/Go Indicator and mimic of the RAT dials and buttons

4. `Status Bar` This part of the screen is used to display system status information, typically the AIF card interface status, Logging status/progress and Job specific information.

5. `Sensor Display Area` This part of the screen is where the main Sensor data is displayed. Other pertinent data such as Range Scale, Cursor and status messages pertaining to the Sensor may also be displayed within this area. If using dual profilers the Master Profiler will be displayed in red and the Slave Profiler in green.

4.2.2. Profiler Settings

The Profiler head controls are displayed on the Sonar Settings bar. When a RAT is used or screen cursor is moved over the Sonar Settings bar, a pop-up control panel will appear which will display the remaining controls. These mimic the positions of the rotary controls (C1 to C5) and function buttons (F1 to F7) on the RAT. Adjustments may be made using the RAT or the on screen controls using the pointer device.
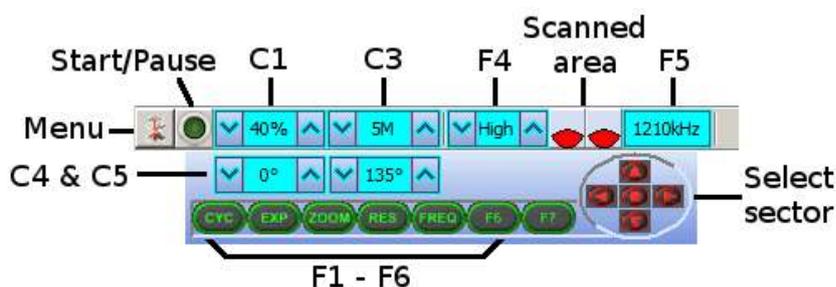
Note

F1, F2 are not applicable in single window applications, F7 and C2 are not used.

Sonar Gain (C1)	This sets the sonar receive gain as required – typically this is around 25-40% but is varied according to water and target conditions and user preference.
Range (C3)	This sets the maximum range the sonar will scan. Long ranges are scanned more slowly than short ranges due to the limit imposed by the velocity of sound in water.
Sector Scan Direction (C4)	This is used to set the centre of the scanned sector and is particularly useful when using a narrow sector width to concentrate on a feature of the seabed. A well positioned and narrow sector will allow faster scan updates than a wide sector.
Sector Scan Width (C5)	This sets the width of the scanned sector. Typically this will be adjusted according to the required seabed coverage.
CYC (F1) - Cycle Window	This can be used when one of the display windows is maximised using the Expand (F2) button and will cycle between the Sonar display windows. Also use the F1

button to switch focus between the display windows. The optional RAT controller will switch its control to the display that has the focus. Note: clicking on a display with the mouse pointer will also switch focus to that display.

EXP (F2) - Expand Window	This will maximise the current display window that is in focus. Either click on a display window to switch focus to it before expanding, or press the Cycle (F1) button to switch focus to a display window.
ZOOM (F3)	This will toggle the `Zoom` window on/off. This draws a zoom box on the display which can be positioned by the cursor. This control is also toggled using the `Zoom` option in the `Application Tool` menu. The zoom window size and magnification can be adjusted in `Zoom Setup` from the `Application Tools` menu.
RES (F4) – Sonar Resolution	Resolution toggles through preset step sizes for the Profiler with smaller angles giving a higher resolution scan but at slower speed. For the available resolution refer to Chapter 2, *Specification*.
FREQ (F5) - Sonar Frequency	This toggles between the channels available on the Profiler. There are low and high frequency channels; high frequency provides better resolution of a target, while low frequency is provided to obtain longer ranges and penetrate acoustically through murky or cluttered water. Each channel shares direction, width and range but they have separate settings for gain.
REV (F6) - Reverse Scan Direction	This allows the operator to instantly reverse the scan direction without waiting to reach the end of the scanned sector.
Select sector	This group of 5 buttons in the bottom right of the control allows the user to make a quick selection of a full 360° scan or 180° forward, back, left or right. The display view is changed automatically and the appropriate sector width and direction set.

4.2.3. Seanet Setup

To set up the Seanet Pro system for use with a SeaKing Profiler the following basic procedure should be followed *(these points are expanded below)*:

1. Connect the Profiler to the computer via a SeaHub or directly into the SCU (external power to the head is required at this point).

2. Obtain the COM port number which corresponds to the port which is being used.

3. Configure Seanet Setup to use the correct COM port number (if using a SCU this should already be configured).

4. Verify that the Profiler is displayed in Seanet Setup (and update firmware if necessary).

If using a dual Profiler setup it is advisable to connect each individually to verify that they are working before operating them together. This also gives the opportunity to change any conflicting node numbers (refer to Section 4.2.4, "Re-Programming Nodes").

All the ports on the SCU or SeaHub are assigned a COM port number (even when they are operating in ARCNET mode). These numbers are usually 3 to 7 on a SCU (although this may vary depending on the hardware present), on a SeaHub the port numbers will be automatically assigned when the SeaHub is connected and they could be any number.

> **i** **Note**
>
> To check the list of COM ports or to assign new numbers use the Windows Device Manager - instructions for doing this should be included in the Windows Help system.

Once the COM port number is known start `Seanet Setup` by clicking on the desktop icon or through the `Start` menu. Navigate to the `Utilities` menu and select `Com Setup`.

In the `Channel Setup` dialog which is now displayed find the entry labeled `Aif` (it is the first entry by default) and click on the `Enabled` check box. Once the `Aif` device is enabled, click on the right arrow in the `COM Port` column to advance the COM port to the correct value (see Figure 4.1, "Channel Setup Dialog" for an example from a SCU). Once the correct value is selected the `Status` column will turn green and be labelled "OK" and the `Type` column will display the port identifier (e.g., "ScuA" for port A on a SCU or "SeaHubA" if a SeaHub is being used). The `Channel Setup` dialog can now be closed.
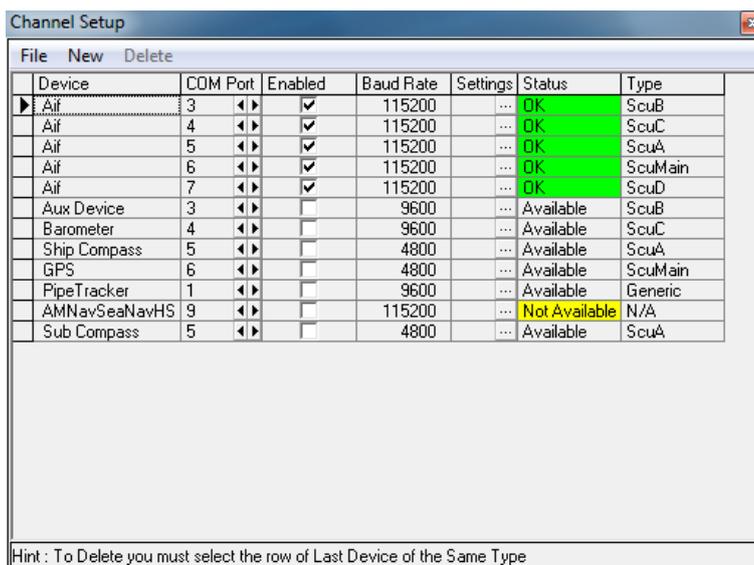
Figure 4.1. Channel Setup Dialog

Once the COM port is correctly configured the Profiler should connect and start communicating with the surface controller, the status indicator LEDs on the front of the SCU or SeaHub should show that communication is taking place.

The main display area of the Seanet Setup application should now show the status of the Profiler, and if any firmware update is required (as shown in Figure 4.2, "Seanet Setup with SeaKing Profiler").
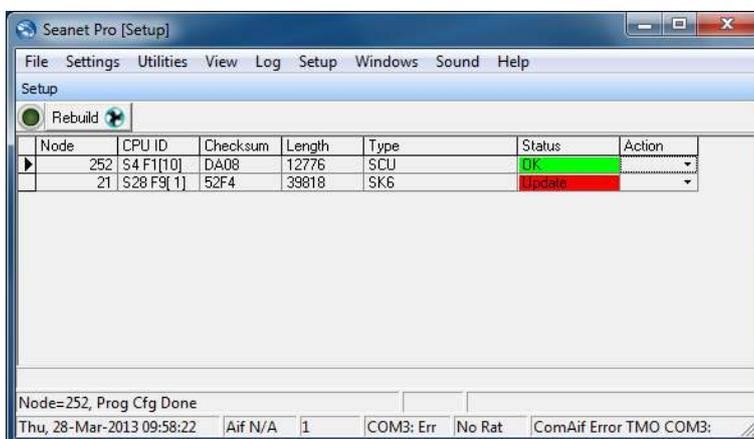

Figure 4.2. Seanet Setup with SeaKing Profiler

At this point Seanet Setup can be closed and the main Seanet Pro application can be started.

If the Profiler is Not Displayed

The first thing to check is that the communication protocols match those used by the head and this is done using the drop-down menu from the surface controller (i.e., node 252 for a SCU). Under the `Action` column click the arrow to bring up the menu and select `Setup`.

This will bring up a setup dialog which will allow the communication protocols for the different ports to be altered. Make sure that the ports match the settings used by the profiler and click `OK`. After a short delay the node table will be rebuilt. If the Profiler is still not present it may be necessary to change the Baud rate of the port.
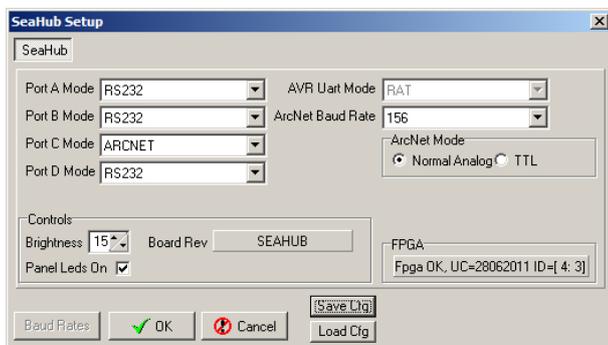

Figure 4.3. Communication Mode Selection on a SeaHub

To change the Baud rate go to the `Utilities` menu and click on `Com Setup` which will bring up the `Channel Setup` dialog. From within this dialog select find the row that corresponds to the port which is being used and click on the button in the `Settings` column. A dialog will appear showing the available Baud rates.

4.2.4. Re-Programming Nodes

In some cases it may be necessary to update the software program installed within a Profiler or to change its node number. This may be the case particularly when subsea sensors are introduced from another system, hired or taken from a spares pool.

After the node table is rebuilt in Seanet Setup, the `Status` column of each node should appear as status `OK`. This will confirm that whatever is programmed into that node is at the same software version as that contained in the Seanet Pro program that is loaded onto the computer. If the Status box appears with status `Update`, then it means that the node will need to be re-programmed to match the software version of the current version of Seanet Pro.

⚠️ **Caution**

Only re-program nodes over short lengths of test cable (1m lengths are available from *Tritech International Ltd* if not already supplied with the Profiler at time of purchase). Longer cables increase the risk of the data becoming corrupted in transit and could result in the sonar head becoming unusable after the update.

To Re-Program a Node
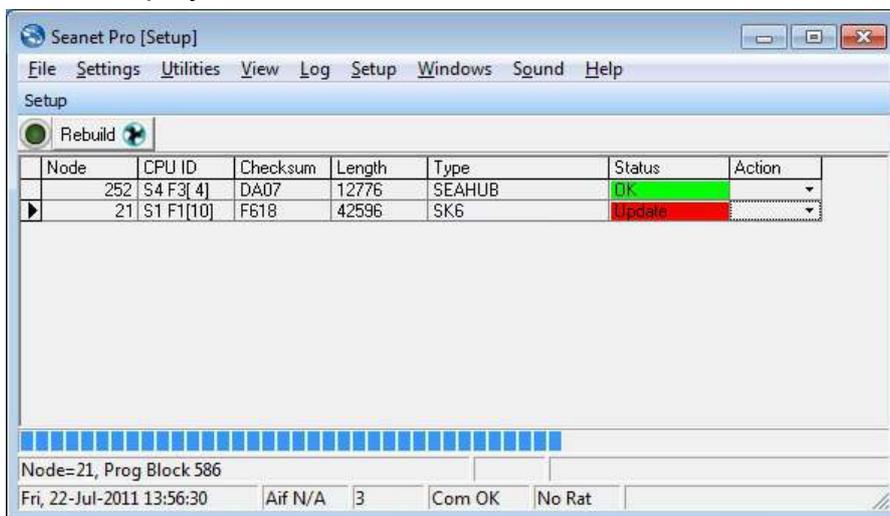
1. Open the `Seanet Setup` program and wait for a few seconds for the nodes to build.

2. Click on the `Action` column for the node that has `Status` of `Update` and then select `Program`.
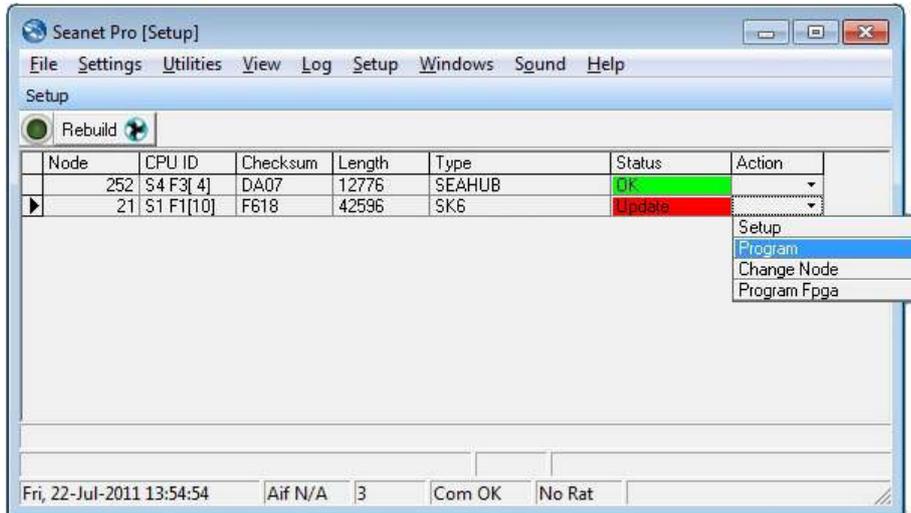
3. Then click on `OK` to confirm the re-program operation
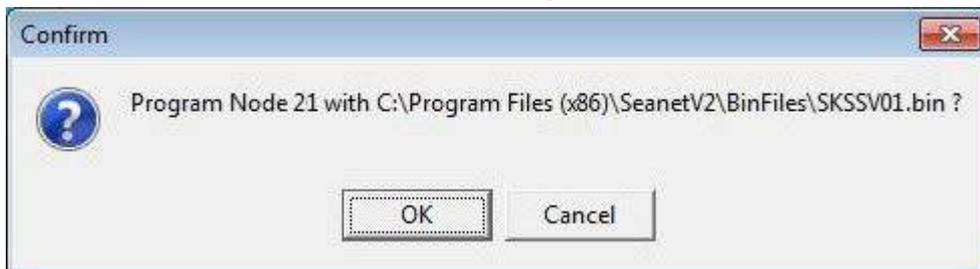
4. The current software program will be downloaded into the node and this will be displayed on the download status bar indicator.

5. Wait until the download has completed and until the table has been rebuilt. The node status should change from `Update` to `OK` to indicate that the download has been completed.

To Change a Node Number

Note

The different types of device are programmed with different ranges of node numbers and these devices will not operate if a node value is selected which is out of this range. For a full list of ranges for different *Tritech International Ltd* devices please refer to the Seanet Pro manual (document reference: 0706-SOM-00001).

Node ranges:

`20 - 29`   SeaKing DF Profiler

`252`   SCUv5 or SeaHub

`254`   SKIM-100 Interface Box (obsolete)

`255`   ARCNET Interface Card (ISA or PCI AIFV4 card in a PC)

Changing node numbers is useful for running a Profiler application when 2 heads are connected that originally have the same node number (factory supplied pairs should already be set up as master and slave). To reprogram a node the Profiler heads to have the node number re-programmed should be connected by itself and then follow the procedures outlined here to change its node number.

Caution

Only re-program nodes over short lengths of test cable (1m lengths are available from *Tritech International Ltd* if not already supplied with the sonar head at time of purchase). Longer cables increase the risk of the data becoming corrupted in transit and could result in the sonar head becoming unusable after the update.

1. Open Seanet Setup and wait for a few seconds for the nodes to build.

2. Click on the `Action` column for the node that requires its node number to be changed (node 21 in this case) and then select `Change Node`.
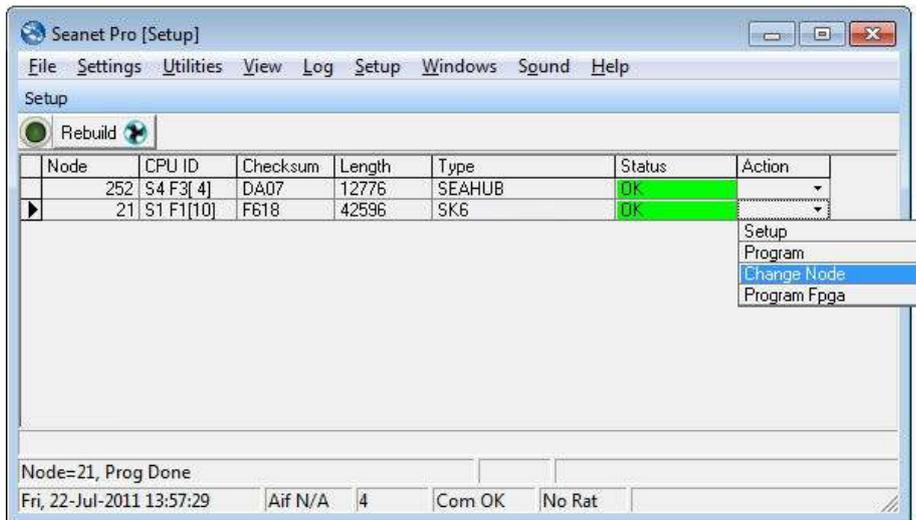
3. Enter the new node number to be programmed into the device.
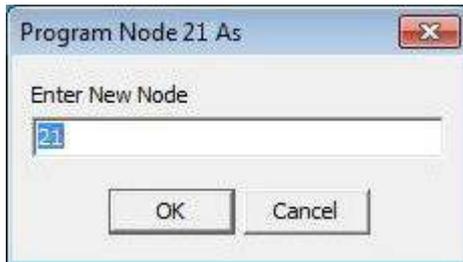
4. Then click on `OK` to confirm the re-program operation.

5. The current software program will be downloaded into the node and this will be displayed on the download status bar indicator.

6. Wait until the download has completed and the table automatically rebuilds. Press the `Rebuild` button to rebuild the list and confirm that the node is showing correctly.

4.2.5. Changing System Settings

General Setting Information

Serial COM port settings or baud rates can be changed from several locations in the Seanet Setup program.

The AIF Interface settings can be viewed or changed by navigating to the node and selecting the `Action` column and then clicking on `Setup`.

The dialog opened will depend on which device is connected, below are examples for the settings accessed for a SeaHub and also an AIF card.
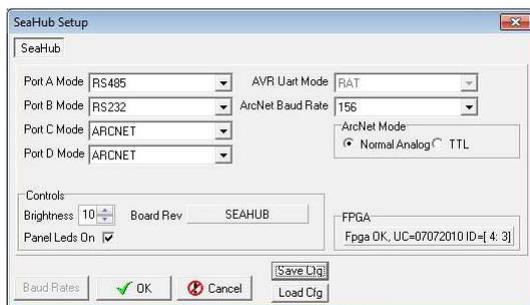
This is a SeaHub although SCUv5 settings are very similar. Note that `Baud Rates` is greyed out and cannot be accessed - this is changed from the `COM Setup` dialog as described later.
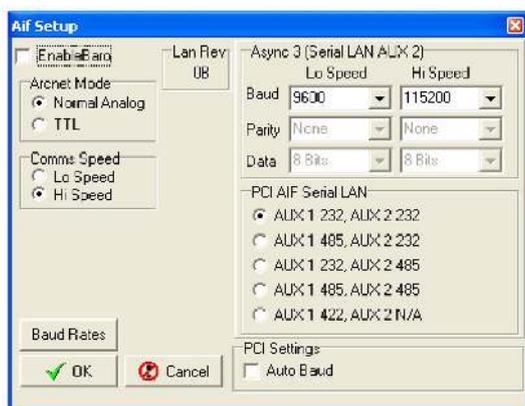
This is the dialog box for a PCI AIF card equipped SCUv4 or for an PCI AIF card installed into a PC.

The `Setup` menu has 3 items as previously described and can be used to change settings on the AIF card, a Gemini sonar, if one is connected, or the Bin Files settings.

The `Utilities` menu includes `COM Setup` for configuring serial I/O devices, such as GPS or pipetracker string inputs. This is also where the baud rates for SeaHub and other interface devices can be accessed and changed.

Configuring a COM Port for 3rd Party Devices

To display (and log) available serial device data, such as GPS data, along with the sensor data, a serial COM port must be enabled and configured for this purpose. In the following example, an NMEA 0183 type GPS message is to be received through COM1.

1. Open the Seanet Setup program by clicking on the Seanet Setup desktop shortcut.

2. Click on the `Utilities` menu and then select `Com Setup`.

3. The Channel Setup panel will be displayed with options to enable and configure COM Ports for available devices. For instance, to setup COM 1 for GPS input, first ensure that the Enabled check-box is ticked (as shown below). Set the Baud Rate and ensure that the Status displays 'Available' (else select another COM Port).
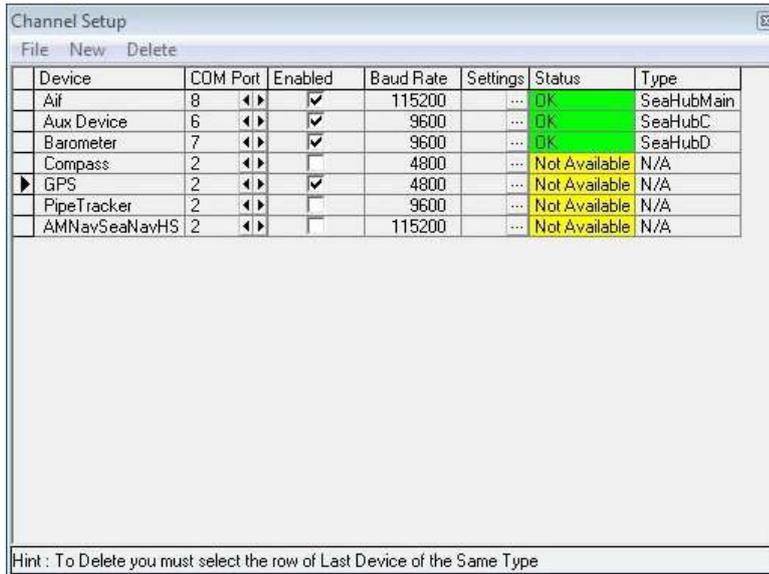
- `USB` is the USB to serial converter

- `SeaHubxxx` SeaHub port ('A'..'D', 'Main', 'Aux')

- `Generic` Legacy COM Port and other

4. Then, click on the `Settings` ellipsis button (…) to open the Communication Settings panel to configure the port. The COM Port number and Baud rate can also be viewed or changed.
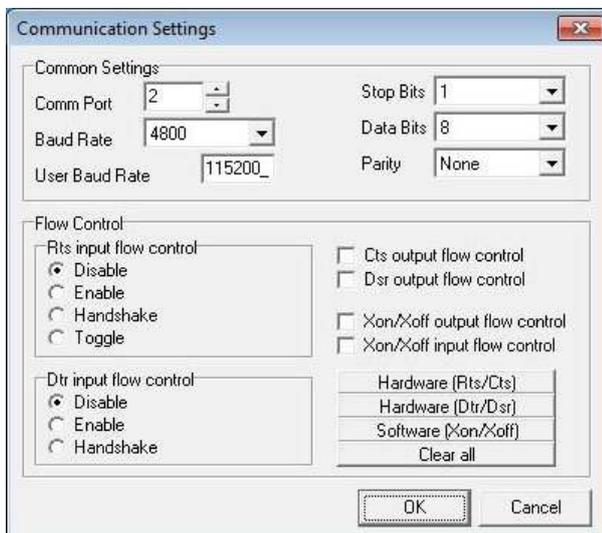
Only `Comm Port` and `Baud Rate` should need to be changed.

4.2.6. Application Tools

To get to the `Application Tools` menu either right-click on the Profiler display or click on the menu icon next to the RAT mimic (🎋)

Cursor
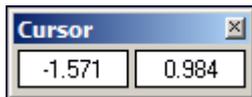
The `Cursor` tool reports the X and Y position from the origin. The units of the reported figure are the same units as used throughout the Profiler application and are set using the `Setup` tool.

Markers
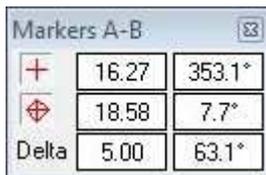
Adds A and B markers onto the sonar display, the range and bearing to each marker (from the origin) their separation distance and relative bearing are shown.

To deploy a marker click on the symbol on the `Markers` panel and that marker symbol will be dropped at the origin (0, 0) on the Profiler display. Then, pick up the marker using the left mouse button and drag it to the position required.

Note

De-selecting and then re-selecting the marker symbol in the `Markers` panel will clear any positional data and move the marker back to the origin.
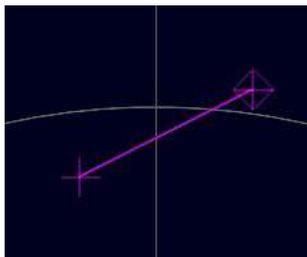
When both markers are dropped on the display, a line will be drawn which connects them. The 'delta' range and bearing at the bottom of the panel indicates separation and angle between both markers.

Zoom
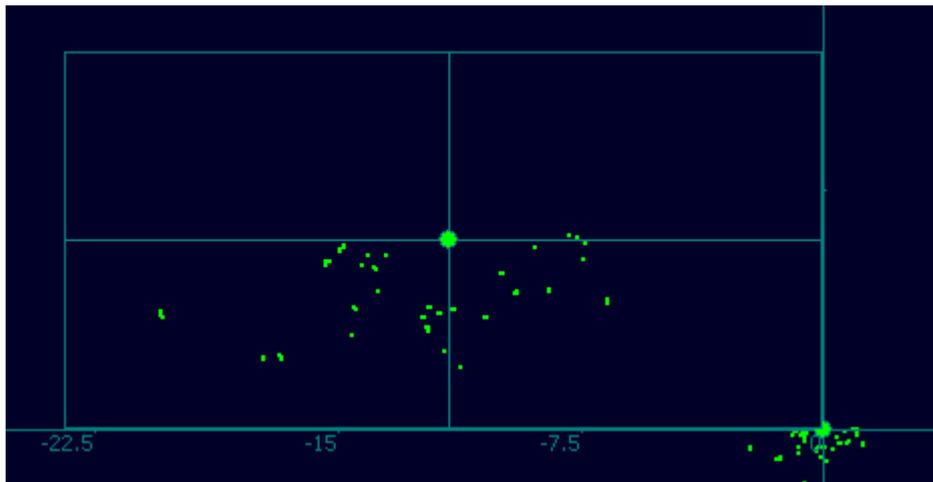
Zoom mode draws a zoom box on the display which can be positioned by the mouse pointer.

Zoom Setup sets the size and magnification factor of zoom box.

The Size shows the screen zoomed area as a percentage of the Zoom display window.

The Factor shows the number of zoomed range bins for each normal range bin.

Position

Used to move and size the profiler display, origin and head indicators (red for Master Profiler, green for Slave Profiler). For more information please refer to Section 5.4, "Offsets".
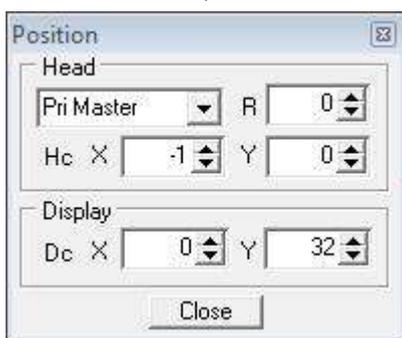
Head   Select the Profiler to be moved (e.g., Pri Master) from the drop-down and then set the X, Y and R position offsets for that head (for a full description of offsets refer to Section 5.4, "Offsets").

Display X/Y   Moves the display origin

Display
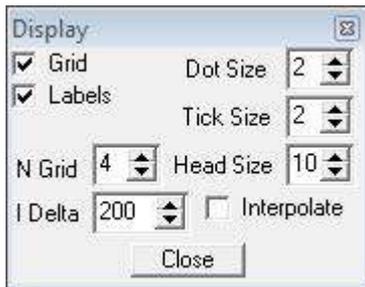
Grid   Display the cross-hair grid.

Labels   Range labels on or off.

Dot Size   The size of the profile points.

Tick Size   The size of the grid cross-hairs.

Head Size   Size of the profile head indicators (Red for master and Green for Slave).

N Grid   The number of grid cross-hairs to display.

I Delta, Interpolate   These controls will interpolate and add points between adjacent points in the profile to help outline the target/object. The `I Delta` value is a gating filter (in mm) which is applied to only add interpolated points when the 2 adjacent points are within range of each other.

Setup
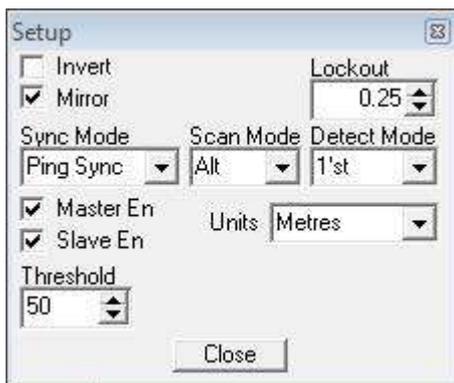
Invert   Swaps the display from left to right. Enable if Profiler mounted with boot towards rear of vehicle.

Mirror   Dual Head Profiler control. The Slave head will have reverse `Scan Mode` of Master head and also vertically mirrored `Sector Scan Direction`.

Lockout	Sets a minimum range (in metres) from the transducer where echoes will be ignored. Effectively, this is a blanking radius on the Profiler Display area. There are separate Lockouts for Low and High Frequency channels.
Sync Mode – `Free Run`, `Scan Sync`, `Ping Sync`	Set to `Free Run` for Single Profiler operation. When running a Dual head, enable the Synchronisation controls to Sync scans of Master and Slave Profiler Heads. The Synchronisation controls are; `Scan Sync` – Start scans of Master and Slave at same time, `Ping Sync` – Start scans at same time then ping Master and Slave one after the other until end of scan. `Scan Sync` produces faster scanning, but `Ping Sync` will eliminate any potential cross acoustic interference between the two heads.
Scan Mode – `Right`, `Left`, `Alt`	Scan `Right` is anti-clockwise from Left Limit, looking into rear (connector) end of Profiler. Scan `Left` is clockwise from Right Limit. Both these Modes will produce a transducer flyback to Start Limit at end of each scan. Scan `Alt` will alternate the Left and Right with no Transducer flyback thus producing faster scanning. If `Mirror` control is enabled then the Slave head will do the opposite of the control and scan in the reverse direction to the Master head.
Detect Mode – `1st`, `Normal`, `Max`	`1st` return will plot the first echo that is received over the receiver threshold level. `Normal` will plot the strongest echo that is received whilst `Max` will plot the furthest echo which can produce better profiles when operating through cluttered water.
Master En / Slave En	Switch the Master and Slave Profiler Heads on or off.
Units	Profiler Display Area and cursor co-ordinates in Metres, Feet, Fathoms or Yards.
Threshold	This is an 8-bit (0-255) Receiver A/D Threshold level setting. It sets the detect

level for the receive echoes (0-80dB) and should nominally be set to around 50. Reducing the Threshold value will result in back scatter and generally lower amplitude echo returns being detected and used in the plotting of the profile. Conversely, increasing the Threshold may also reduce the affects of back scatter. Note: Try changing the `Detect Mode` before altering this control setting.

Pipetracker

Display panel for serial data input via TSS Pipetracker.

Lat / Vert   The Lateral and Vertical Position data from the Pipetracker serial message.

Alt   The Altitude data from the Pipetracker serial message.

Bur   The Burial data from the Pipetracker serial message.

The COM Port for the Pipetracker message input is configured using the `Com Setup` dialog which is launched from the `Utilities` menu. In the dialog find the device labelled `Pipetracker` and use the arrows in the `COM Port` column to select the correct port. Once the port is selected the status will change from `Not Available` to `OK`.

i

Note

In the `Com Setup` dialog it may be necessary to click on the ellipsis (`...`) button to configure the COM port so that the settings match those used by the Pipetracker.

Pipe Setup
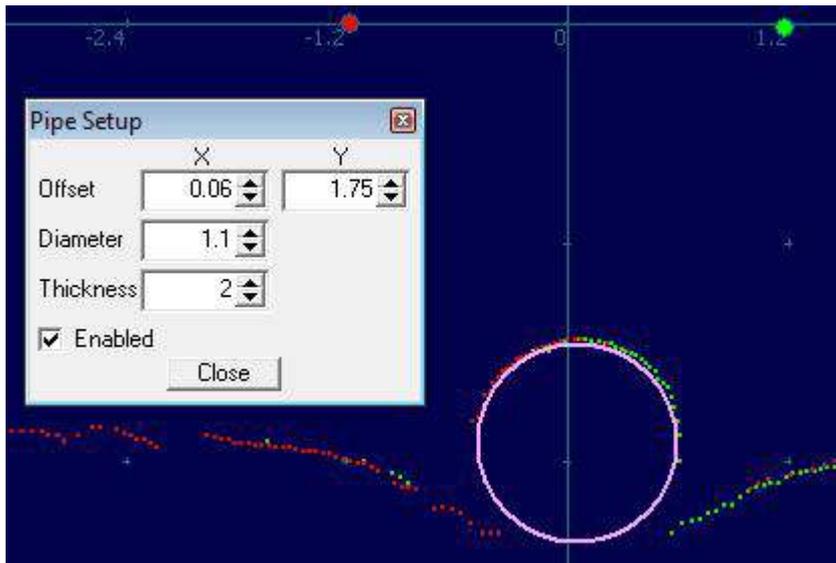
Using serial TSS Pipetracker data input, this will configure a simulated pipe overlay for display on the Profiler plot.

Offset (X,Y)	Position the pipe with reference to the 0,0 origin on the Profiler Cartesian display (in metres).
Diameter	This is the Diameter of the simulated pipe overlay (in metres).
Thickness	This is the wall thickness of the simulated pipe overlay.
Enabled	Tick this box to display the simulated pipe on the Profiler Cartesian display.

Roll Correction
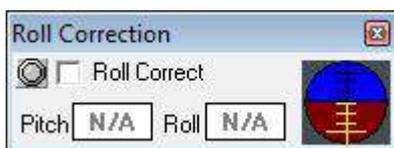
This will display and apply pitch & roll data from the *Tritech International Ltd* Attitude Sensor (Node 60) or can be configured to apply a compatible input string received through a serial port.

Roll angle corrections are applied relative to the pivot point (or centre of rotation) for the vessel/vehicle that is experiencing the roll. This results in roll corrected profiles as follows.

For serial input data, compatible strings include:

TCM2	`$C123.4P12.3R12.3T12.3X123.4Y123.4Z123.4E000*FF<CR><LF>`

NMEA TRO	`$-TRO,x.xx,a,y.yy,b*kk<CR><LF>`
NMEA TRH	`$-TRH,x.xx,a,y.yy,b,z.zz,c*kk<CR><LF>`
CDL1	`H123.4P+123.45R+123.45T00.0D00000.0B00.0FR<CR><LF>`
MDL	`H0750P-0019R-0022<CR><LF>`
Digilog	`H0750P-0019R-0022E<CR><LF>`
CDL MicroTilt	`P+12.34R+12.34<CR><LF>`

A serial port can be configured by selecting `Com Setup` from the `Utilities` menu, and then enabling an `Attitude Sensor` device (it may be necessary to select one from the `New` menu if it is not already listed). In the `Com Setup` dialog the correct COM port can be selected using the arrows in the `COM Port` column and the port configured using the ellipsis (...) button. Once correctly configured the `Attitude Sensor` should be enabled by ticking the check-box in the `Enabled` column.

The attitude data can also be brought in from a compass device which is configured in exactly the same way as the attitude sensor except in `Com Setup` the correct device will be either `Sub Compass` or `Ship Compass`. Once a compass is configured and enabled it should be selected from the `Utilities` menu by clicking on `Compass`. The `Compass` pop-up will be displayed on the screen and it will be necessary to tick the `Compass is Global Attitude` check-box to globally pass the attitude data to the Profiler application(the `Compass` pop-up does not need to be visible and can be closed).
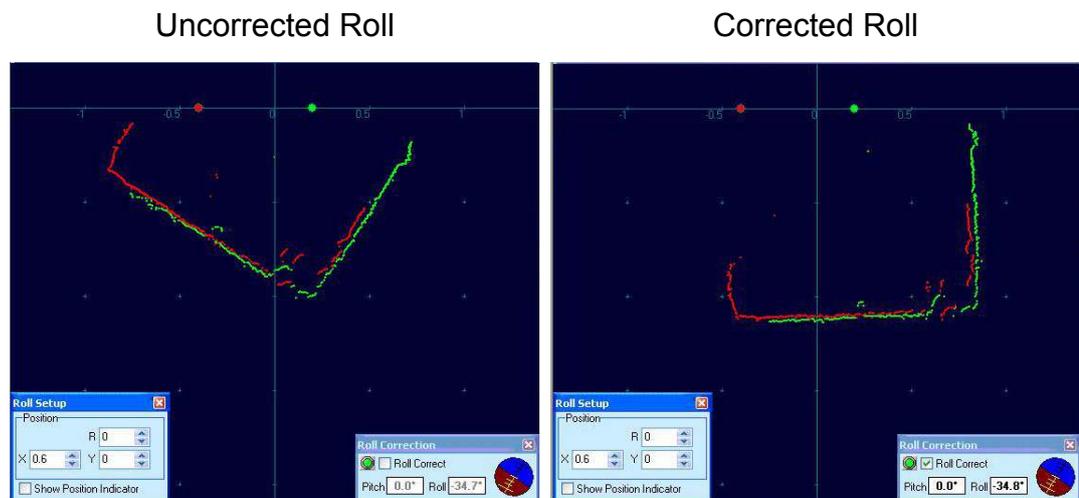
Figure 4.4. Profiler Roll Correction Example

Roll Setup
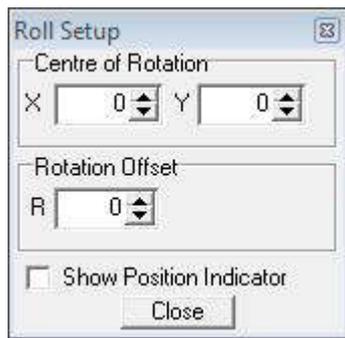
In this dialog, there are several settings to be configured:

Centre of Rotation X, 'Y'	Sets the X,Y co-ordinate position offset which is relative to the Profiler display datum (= origin 0,0).
Rotation Offset R	A Roll Sensor alignment offset to correct for any slew that may result when the Roll Sensor is mounted off-centre.
Show Position Indicator	Toggles display of the Centre of Rotation position indicator (O) on the Profiler display.

Overlay

This will display an overlay on the Profiler screen which can be used to mark/ highlight a particular area or object in the area. The Overlay can also be used as a Gating Zone for the Gate Alarm function.
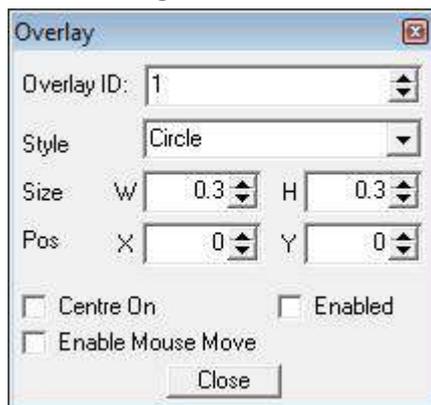
ID	Up to 4 overlays are selectable (IDs = 1,2,3 & 4).
Style	Is the desired shape; Circle (or ellipse), Rectangle and Triangle are the available options.
Size	Width & Height of the Overlay.
Position	X & Y Position of the Overlay on the Profiler screen.

Enabled	Check-box to display the Overlay on the Profiler display.
Enable Mouse Move	Should be ticked to drag/move the position of the Overlay on the display using the left mouse button. It is recommended this be disabled during operations to prevent inadvertent movement through accidental mouse operations.
Centre On	Simply marks the centre of the Overlay which may be useful if lining up with any particular target or the Profiler position.

An example of the three different types of overlay is shown:

Mean Altitude

Note

For a full description of Mean Altitude refer to Section 5.1, "Mean Altitude".

Gate Alarm

Note

For a full description of Gate Alarm refer to Section 5.2, "Gate Alarm".

Attitude

This will display the pitch and roll data from an external attitude sensor.

5. Software Features

5.1. Mean Altitude

5.1.1. Overview

From Seanet Pro V2 onwards, there is facility to calculate a mean altitude value from the Profiler data points of a single or dual head scan. Data points from the Master, Slave or both heads in a dual head pair can be applied in the mean altitude calculation.

The mean altitude (or mean seabed) calculation will include only seabed coverage and not trench coverage that falls within the Profiler scan coverage. For this scan coverage, the scan size and position can be adjusted using the direction and width controls on the RAT controller. A typical dual head Profiler arrangement will be as shown in Figure 5.1, "Dual Head Profiler Example".
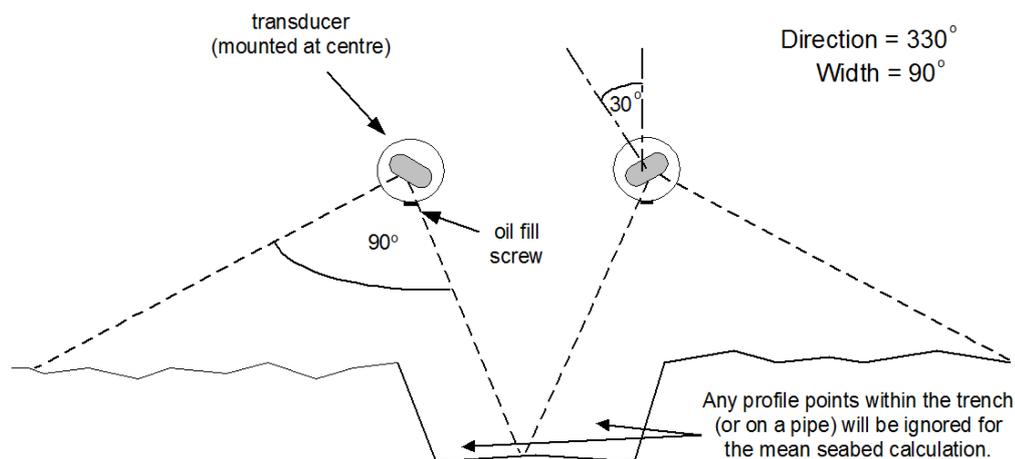

Figure 5.1. Dual Head Profiler Example

> **Note**
>
> The `Mirror Slave` Profiler control is enabled in order to achieve the above direction and scan packet orientation. This control will counter the scan direction of the slave with respect to the master Profiler.

Several rules have been set to distinguish seabed from trench coverage. There is also a filter that will remove spurious profiler points from the calculation.

There are several options and parameters that can be applied in the mean altitude calculation. These are configured in the `Mean  Altitude` setup

dialog. To open the `Mean  Altitude` dialog right-click on the Profiler application main screen and select `Mean Altitude`.

i **Note**

If the option does not appear in the popup menu list then it may be hidden – contact *Tritech International Ltd* for details on how to enable this option.

In the derivation of the mean altitude value, each Profiler data point is first measured and returned as a return path time. The system VOS (configured from `Settings` option in the `Environment` menu) is then applied to this time value to convert it into a slant range, which is the distance to the seabed at the current angle of incidence. Using this polar data value, a range is calculated and, if valid, is applied in the final mean altitude calculation (to be valid, the range must be non-zero and within the `Filter Gating` restrictions).

When the mean altitude facility is enabled, the calculation is displayed in text format on the Profiler application toolbar. The text box will only be visible when mean altitude is enabled and the calculation is valid. There is also the option to plot a reference line on the Profiler application to indicate the mean altitude level.
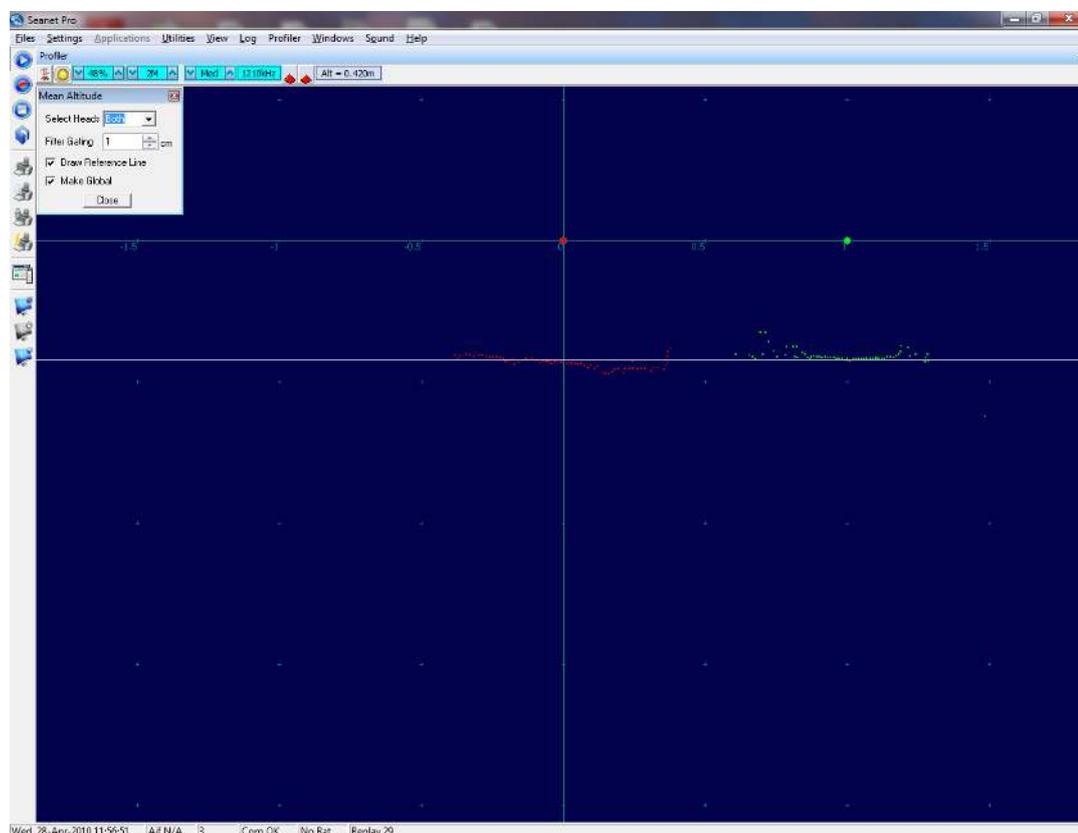

Figure 5.2. Mean Altitude Reference Line

5.1.2. Mean Altitude Operation

The mean altitude calculation will function with a single or dual head Profiler system.

ℹ️ Note

If a 4-head profiler system is employed and displayed as `Quad Profiler`, the 1st pair will normally be used for the mean altitude calculation.

All valid data points within the Profiler scan packet(s) will be passed into the mean altitude calculation, however, a set of rules will remove data points that fall within trench coverage so that only seabed returns are used in the calculation. Non-valid data points will not be included and these include zero values and points outside a boundary determined by the value of a `Filter Gating` parameter.

The following rules apply:

• Any null (zero) data points within the scan packet will not be included in the calculation.

• If the current data point exceeds a calculated mean altitude by ± the `Filter Gating` value, this current data point will not be included in the final calculation. This will eliminate any spurious points and spikes from the final mean altitude value.

• In a dual head operation, if at any time one of the Profilers is disabled or is not producing data then a mean calculation will still be produced using the data from the functional head.

• If there are no valid data points then a zero value is produced and the mean altitude text display and reference line are held at the last non-zero value.

5.1.3. Mean Altitude Setup and Operating Notes
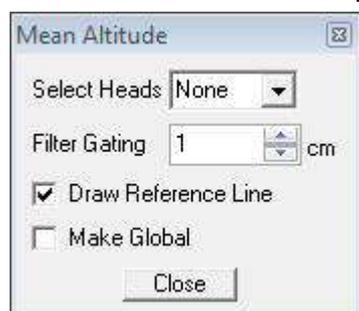
Select Heads   This sets which Profiler heads are to be used
                                    for the mean altitude calculation. `Both` heads

in a pair can be applied, otherwise there is option to select a `Master` or `Slave` head for single head operation or `None` to switch off mean altitude calculation. There is also option to apply a `Global` mean altitude value which has been calculated by another Profiler head set (e.g., from another set of heads in a 2nd Profiler application on the display).

Filter Gating

This is a filter to remove spurious or noise points from the scan. This control can be adjusted between 1 and 500cm. For example, with a setting of 10cm, if the range of a point is greater than 10cm away from its neighbouring point then it will be excluded from the mean altitude calculation. The mean altitude algorithm will look for trends of data and will remove a sequence of points that represent a trench or pipe outline. The `Filter Gating` is applied above this to remove spurious points only.

Draw Reference Line

Enable/Disable the drawing of the reference line on the Profiler application main screen. The colour of this line is configured in the `Profiler Colour Setup` dialog, accessible from the `Colour Setup` in the `Profiler` menu. The `Overlay2` colour is used for the reference line.
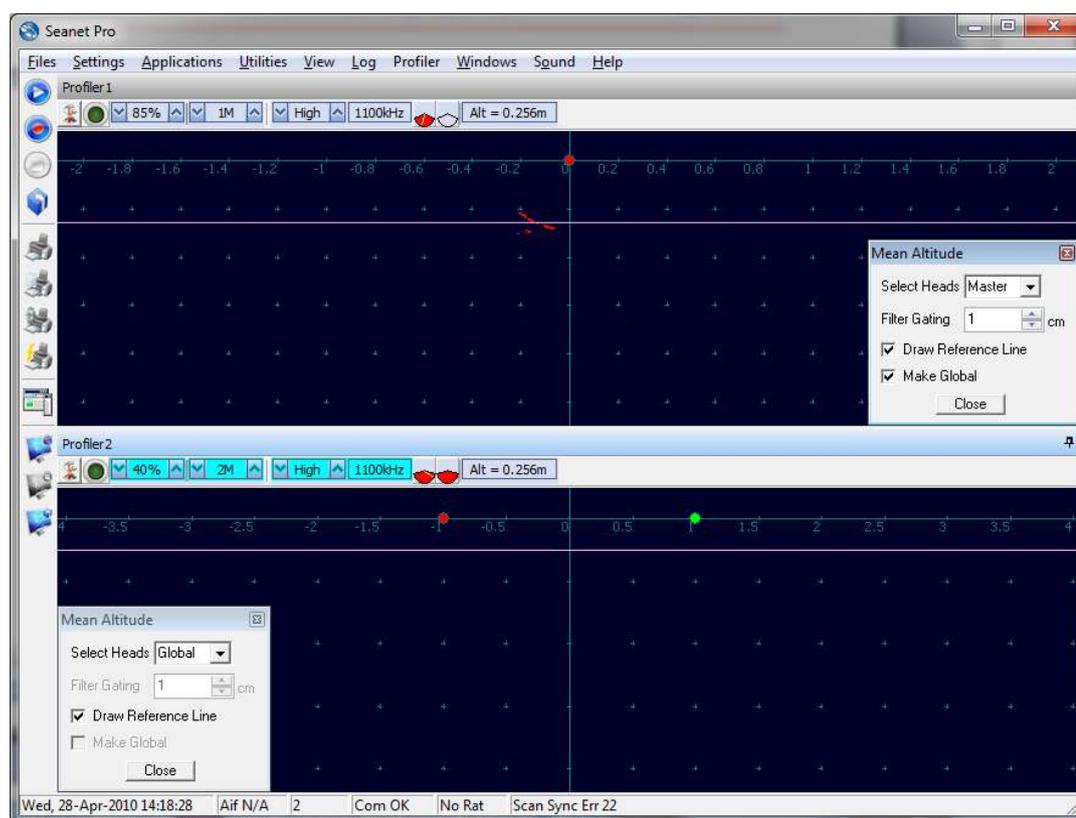
Make Global

When this is enabled, a Global Mean Altitude value is updated within Seanet Pro. This value may then be picked up by other Profiler or Imager applications (see Example 5.1, "Global Mean Altitude with Two Profiler Applications" and Example 5.2, "Global Mean Altitude with Profiler and Sonar Applications".

## Using Dual Profilers for Mean Altitude calculation

If a dual head Profiler system is used to calculate mean altitude then it is very important that the Profiler heads are time synchronized. If the heads are not synchronized, they will both calculate a separate mean altitude value. Refer to Section 5.3, "Synchronisation" for further details.

Example 5.1. Global Mean Altitude with Two Profiler Applications

- The Top Profiler form has been configured to calculate a Mean Altitude value and then use this value as the Global Mean Altitude (= 'Make Global') which other forms can pick up and apply.

- The Bottom Profiler form has been configured to apply the Global value (calculated from the Top form) and draw a reference line. The text box display will be automatic.

Example 5.2. Global Mean Altitude with Profiler and Sonar Applications
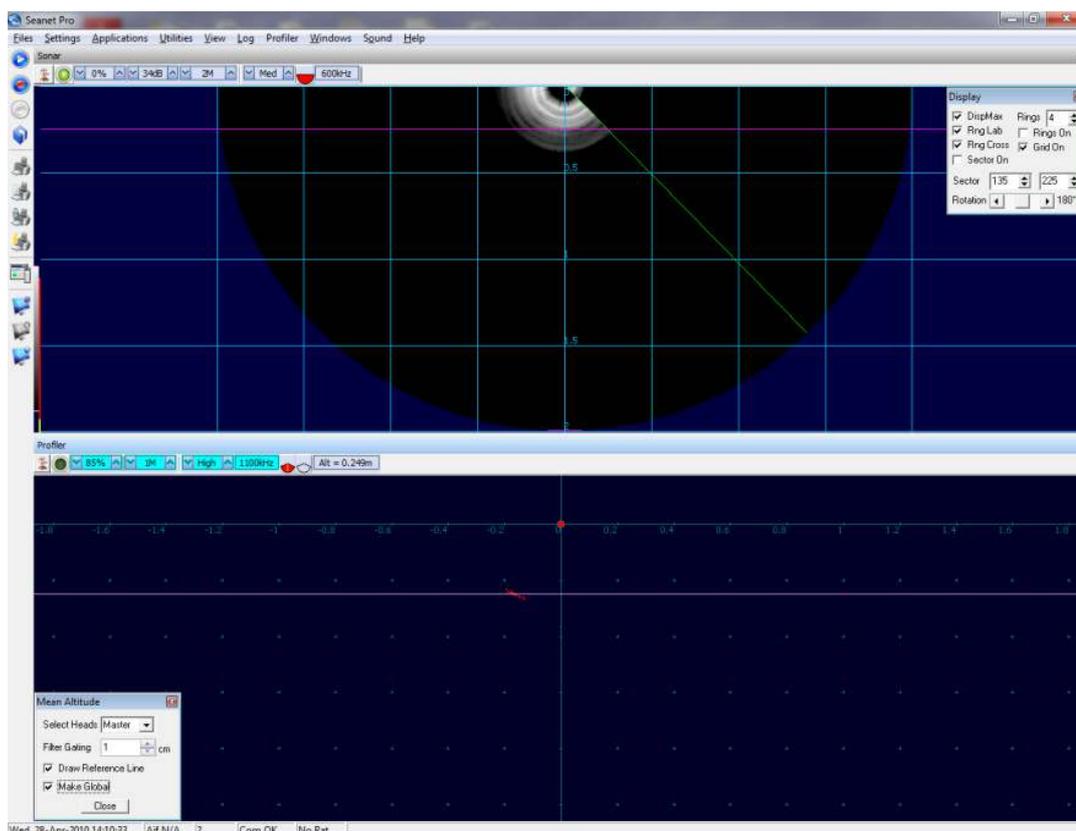
- The Bottom Profiler form is calculating Mean Altitude which has been made Global.

- The Top Imaging (Sonar) form will automatically pick up the Global Mean Altitude. If it's Sonar has been configured for downward scanning (i.e. the Display – Rotation offset value is set to 180 degrees), then a Mean Altitude reference line will automatically be drawn.

5.2. Gate Alarm

5.2.1. Overview

The gate alarm function is a feature that can be used to monitor the position of the Profiler data points. One or more overlays can be positioned on the Profiler display to act as a gating zone. If any configured number of Profiler data points fall inside/outside this gating zone then an alarm is activated to warn the user.

The on-screen alarm will activate the PC speaker and at the same time, the alarm text "Warning" will be displayed on the Profiler display.

A remote alarm message can also be configured for transmittal via a serial port. This is configured using the Seanet RemV4 utility.

5.2.2. Configuring the Alarm

ℹ️ **Note**

To configure the alarm, it is necessary to first configure an overlay - refer to the section called "Overlay" for instructions on how to create and configure an overlay.

Once the overlay is correctly configured and displayed on the screen an alarm can be set using the `Gate Alarm` dialog which is accessed by right-clicking on the main Profiler display area and selecting `Gate Alarm`.
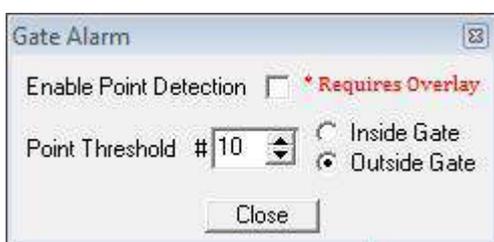
`Enable Point Detection`	When selected this will enable the alarm function.
`Point Threshold #`	This sets the number of points that are allowed outside/inside the gate before an alarm is triggered.
`Inside Gate/Outside Gate`	Choose which side of the boundary line of the overlay is set to trigger the alarm.

5.2.3. Configuring the Remote Alarm (RemV4)

A remote alarm can be configured so that if the Profiler goes into alarm on the local computer it also sends a serial string to another machine. The configuration is done using the Seanet RemV4 program which will is installed automatically alongside Seanet Pro.
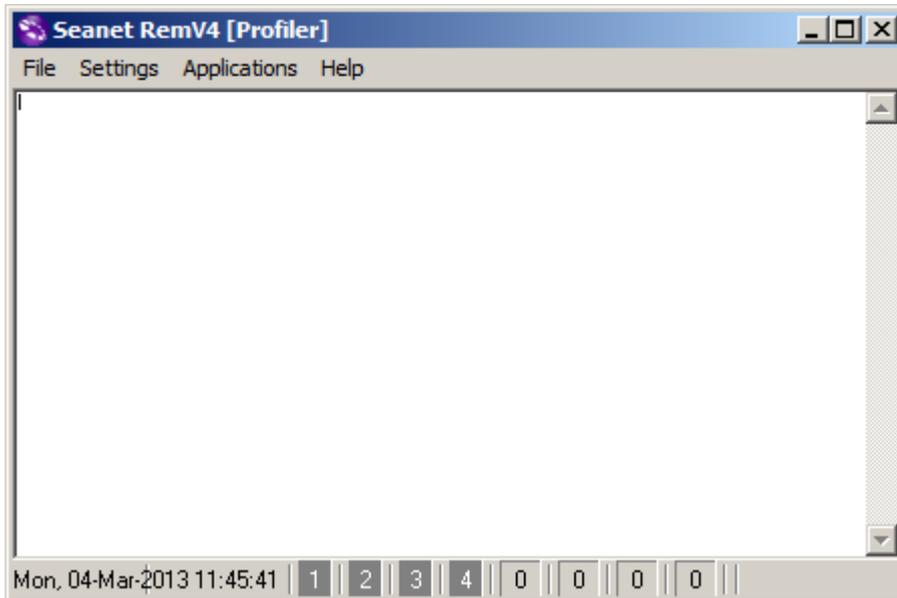
ℹ️ **Note**

The Seanet RemV4 program is launched by right-clicking on the RemV4 icon on the Windows taskbar and selecting `Open Seanet RemV4`.

Note

Seanet Pro must be running at the time that Seanet RemV4 is configured. Data is passed from Seanet Pro to inform the RemV4 utility which devices are operating.

To configure the remote alarm a channel will need to be set for the output message, the channels are set using the `Remote Channel Setup` dialog which is accessed from the `Settings` menu (in RemV4).

In the `Remote Channel Setup` dialog, select the correct COM port using the left/right arrows in the `COM Port` column and then do any required configuration by clicking on the elipsis button (`...`). Once the COM port is correctly configured click on the `Enabled` check-box and close the dialog.

Next open the `Remote SKV4` dialog from the `Applications` menu to enable the alarm messages. The gate alarm is sent via slot 2 (`PROFILER20`), so it is necessary to select `Output 1` from the `Configure` column using the drop-down list for slot 2 as shown:
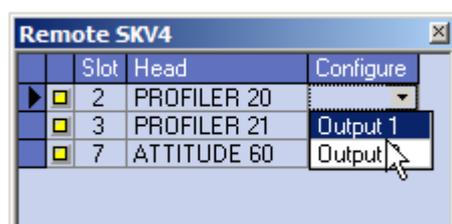
This will launch the output configuration dialog named `Slot 2, Output 1`:
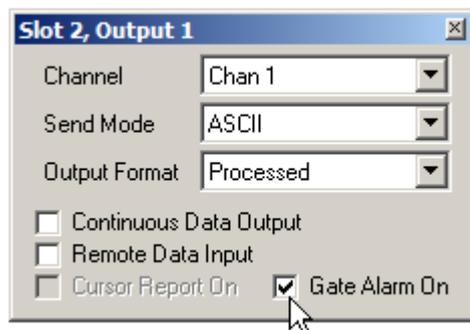
Within this dialog it will be necessary to select the `Channel` which was previously configured and then click on `Gate Alarm On` to enable the alarm to be transmitted over the COM port (when the alarm is activated in Seanet Pro an ASCII string will be sent out).

> **ⓘ** **Note**
>
> Do not set `Continuous Data Output` unless the full data string from the Profiler is also to be sent out on the same COM port as the alarm message.

5.2.4. Remote Alarm String Format

The transmitted Alarm message is a serial ASCII string with the following format:

```
%M0026022530120707620000100008000012<CR><LF>
```

%M0026022530	Message Header {&M = Fixed Header String, 0026 = Number of bytes in message (in hexadecimal), 02 = RemV4 slot number, 25 = fixed device type of Profiler (in hexadecimal), 3 = Ignore, 0 = Ignore}.
12070762	Time of Alarm (hhmmssdd = Hours,Min,Sec,DeciSec).
0	Alarm Mode selected (0 = Outside Gate, 1 = Inside Gate).
00010	Point Threshold (number of points used in alarm threshold, as configured in Seanet Pro).
00080	Total Number of points in profile.
00012	Number of Points (from the total) that are outside the gating zone.

<CR> = Carriage Return and <LF> = Line Feed

5.3. Synchronisation

If running a dual head system it is important to set the synchronisation of the Profilers correctly. The synchronisation is set using the `Setup` dialog which is accessed by right-clicking on the main window and selecting `Setup` and then `Sync Mode`.
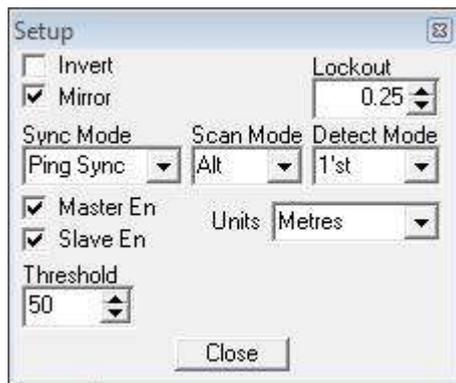
Scan Sync

If running a dual head system, this mode is the minimum that should be selected. The `Scan Sync` control will ensure that both master and slave Profilers start their sweep at the same time. This is important to ensure they are always scanning at the same point along the trench.

This synchronisation mode will ensure accurate mean altitude readings being derived from the averaging of both Profiler scans.

Ping Sync

This is a 2nd level of synchronisation that, in addition to `Scan Sync`, will force both Profilers to ping at interleaved intervals. This control is normally enabled in cross-profiling applications, i.e., where the scans overlap in the middle, where there may be cross acoustic interference between the pings of both Profilers. When `Ping Sync` is enabled the master will ping first followed by the slave followed by the master and so on until the scan/sweep of each head is completed.

Note

In applications where there is enough separation/distance between the mounting positions of master and slave heads and where the

scans do not overlap then `Scan Sync` can be chosen instead to speed up the profiling.

5.4. Offsets

Offsets are applied in the Profiler application by selecting `Position` from the `Application Tools` menu (or by right-clicking on Profiler main screen).
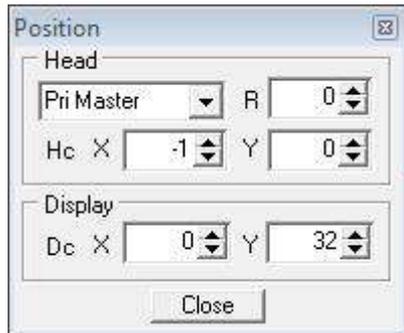
There are separate offsets for Master and Slave Profiler heads.

Rotational (`R`) Offset

The Profiler(s) should be mounted with the LED and fill screw on the housing facing directly downwards. If there is any angular imperfection with this mounting then this should be corrected using the R offset. These corrections will be accounted for in the calculation of mean altitude.

Vertical (`Y`) Offset

It will be necessary to produce a mean altitude calculation that is relative to a particular point on the vehicle/platform (for example, the skid). If the Profiler(s) are mounted above this point then this height difference should be calculated and entered as the `Y` offset. This should be performed for both Profilers as they may be mounted at different heights. The `Y` offset will be included in the calculation of Mean Altitude.

Horizontal (`X`) Offset

Sets the distance from the centre of the vessel for each Profiler head. Required to obtain an accurate profile of the seabed which takes into account the vessel beam (if the Profilers are mounted at the widest point).

i

Note

For the purposes of a mean altitude calculation, only the R and Y offsets are relevant.

6. Maintenance

6.1. After using the profiler

Make sure that after using the profiler head that it is washed down with fresh water and check the unit for any signs of obvious damage. Pay particular attention to the transducer head and free any organic matter which has become trapped. Once the unit is clean; dry thoroughly and place in storage container.

6.2. If storing the profiler for extended periods

Make sure that the profiler is completely dry (if necessary leave to air-dry before stowing). Pack into storage container along with several pouches of silica gel.

6.3. SeaKing regular maintenance

General Guidelines

> ⚠️ **Caution**
> It is essential to have a regular maintenance schedule so that any defects arising from corrosion or erosion can be spotted early and corrected before they cause severe damage to the unit. It is recommended that the unit is annually serviced and can be returned to *Tritech International Ltd* for this purpose

Competent, trained, personnel can perform regular preventative maintenance on these units. Contact *Tritech International Ltd* for more details on the training courses available.

Servicable Items

The standard Tritech SeaKing unit has several user serviceable items, all located on the connector endcap.

Exploded view diagram	Item	Part Number	Description
	3	S01037	Body O-ring
	4	S01204 ASSY	Connector Endcap
	5	S00009	0161-16 O-ring
	6	S01252	Endcap puller
	7	S01299	M5x25 Endcap puller screw
	8	S00987	Waterblock
	9	S01182 ASSY	Pressurised blanking cap
	10	S01038	Retaining O-ring
	11	S01023	Retaining ring
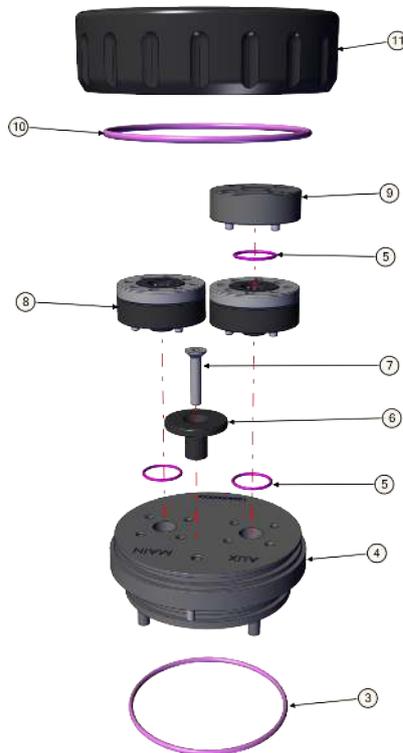
Note

The part numbers expressed are subject to change.

Note

Alternative configurations may have additional serviceable items, if in doubt please contact *Tritech International Ltd* to establish the correct service routine.

The o-ring seals should be regularly inspected, cleaned and lubricates with the appropriate greasing compound. The body of the unit should also be inspected for any obvious signs of corrosion, especially in mating surfaces (such as the waterblock).

6.3.1. Disassembly of the SeaKing unit

Warning

In the unlikely event that the subsea housing has suffered water ingress at depth there may be internal pressurization. This could forcibly eject the end-cap when the lock ring is removed.

If wishing to dismantle the unit, for any reason, due care and attention should be taken to prevent damage or injury.

Important
The steps outlined here will expose sensitive electronic equipment and so appropriate steps should be taken to prevent any static discharge occurring which may harm the equipment.

Caution
Servicing of the SeaKing unit should only be carried out by competent personnel in a dry, clean environment with full ESD precautions.

Service tools required

• Clean absorbent wipes

• Silicon grease MS-111 lubricant (or equivalent)

• A M3 Allen Key or Hex driver

• A 5.5mm spanner, or nut spinner

• A small nose flush plier, or M2.5 spanner

Procedure

1. Rinse the unit and connector in fresh water and dry with absorbent wipes

2. Using the M3 Allen key, loosen each of the retaining screws of the Pressurised blanking cap (if present)

3. Using the M3 Allen key, loosen each of the retaining screws of the MAIN and AUX (if present) waterblocks. Each screw should be loosened by a quarter turn in order to prevent damage to the screw threads.

4. Remove the connector endcap locking ring

5. Using the endcap puller, pull the connector endcap off the unit

6. The electronics block will then slide out of the housing attached to the connector endcap.

7. On the top of the electronics block, use the 5.5mm spanner to carefully remove the two retaining nuts and the short nose flush pliers to remove the two bullet posts

8. In turn, remove each PCB and each set of four stand off posts underneath until only the PCB closest to the endcap remains – the COM PCB

9. Remove the last PCB and then unscrew the four guide posts from the connector endcap

Once fully disassembled, inspect the various o-ring seals and sealing surfaces for signs of damage and corrosion. Pitting and corrosion within an o-ring sealing area can cause a unit to lose integrity and lead to water ingress and significant damage.

Waterblock O-Ring   **Endcap O-Ring**

The highlighted areas on the images above are the critical sealing areas that should have no signs of corrosion. Corrosion in these areas will necessitate the replacement of the connector endcap.

6.3.2. Reassembly of the SeaKing unit

Important

The steps outlined here will expose sensitive electronic equipment and so appropriate steps should be taken to prevent any static discharge occurring which may harm the equipment.

Caution

Servicing of the SeaKing unit should only be carried out by competent personnel in a dry, clean environment with full ESD precautions.

Service tools required

• Clean absorbent wipes

• Silicon grease MS-111 lubricant (or equivalent)

• A M3 Allen Key or Hex driver

- A 5.5mm spanner, or nut spinner

- A small nose flush plier, or M2.5 spanner

Procedure

1. Carefully clean all parts and check for damage.

2. Inspect o-ring seals and replace if necessary.

3. Screw in the four guide posts onto the connector endcap

4. Fit the COM PCB and a set of four stand off posts

5. Refit each PCB and set of stand off posts

6. On the top most PCB, locate the two hexagonal pictures on the PCB

7. Using the 5.5mm spanner secure the retaining nuts at these locations

8. Using the short nose flush pliers, fit the bullet post at the remaining points

9. Carefully insert the electronics block back into the Body tube, ensuring that the dowel pin on the connector endcap lines up with the recess point on the Body tube

10. Fit the connector endcap locking ring

11. Using the M3 Allen key, fit the MAIN and AUX (if applicable) waterblocks. Each of the waterblock screws should be tightened, in turn, by a quarter turn until the waterblock is flush and level to the connector endcap

12. Using the M3 Allen Key, fit the Pressurised blanking cap (if applicable) either directly onto the AUX port, or on the AUX waterblock if it not to be used.

13. Visually inspect the unit to ensure that all surfaces have mated correctly

7. Troubleshooting

Continuous Status `Timeout 20` *message*

This indicates that there is no communication with the device flagged – in this case the Node number of the device is 20 (= Master Profiler). Check the power and communications links to the sonar head for continuity and for correct polarity, voltage and ensure that the power supply can provide sufficient current to power all devices.

If a cable flood is suspected, then the conductors will need to be insulation tested; the sonar heads and Seanet SCU (or SeaHub) must be disconnected.

Status `Centre Err 21` *message*

In this case, the message indicates a fault with Node 21 (Slave Profiler).

The head has lost its bearing during the scan. This may be a result of a sudden knock or collision that may have damaged the transducer and/or stepper motor shaft. The transducer will correct its bearing at the end of the scan but if the error message is repeated then there has been damage to the transducer or stepper motor.

Profiler head rotates but no profile given or targets observed

Check the gain control is responding and not set at a minimum. Check that the Profiler head(s) mounting position is correct with the LED and filling screw pointing down.

Appendix A. ARCNET Termination

Depending on the cable length the ARCNET communication link requires a termination resistor to be installed at each end of the umbilical cable. Normally this is supplied fitted within the ARCNET cable DA-15 or within the SCU/SeaHub at the surface and is left for the user to fit at the sub-sea end in a convenient junction box or by use of a special waterblock.

The purpose of these terminations is to attenuate any electrical interference or "reflections" which may occur due to an impedance mis-match and the overall aim is to improve signal quality and negate any effects which might otherwise be felt by other sources of impedance such as from the cable itself.

The diagram below shows best practice to use when installing termination resistors on an ARCNET network of *Tritech International Ltd* sonar products.

Note

A special yellow waterblock is available from *Tritech International Ltd* which contains an in-line impedance of 39Ω which will enable quick and easy installation of the subsea termination resistor.
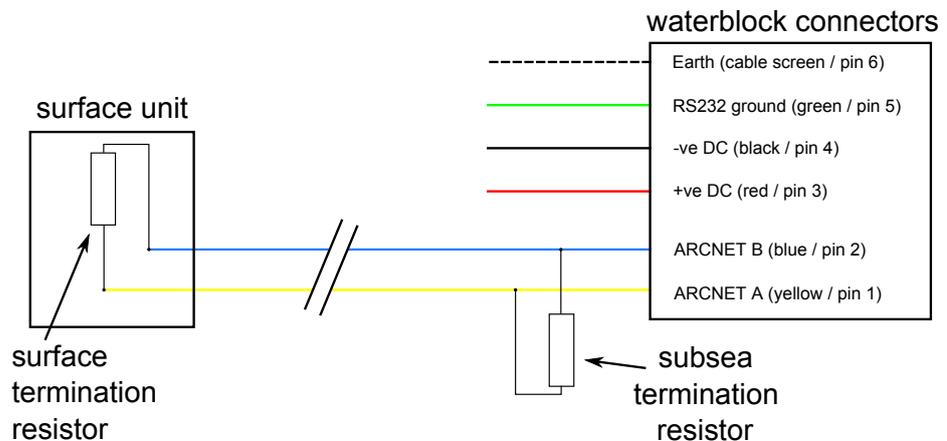
Cable length	Termination		Baud rate setting
Less than 100m	Single 39Ω subsea resistor		Normal baud rate
100-1200m	270Ω at surface and 39Ω subsea		Normal baud rate
1200-2500m	270Ω at surface and 39Ω subsea		Half baud rate

Note

If there is more than one sensor connected then the sub-sea resistor should be fitted at the junction box or splice of the cable.

Appendix B. SeaKing Sonar & Profiler Connector Options

The SeaKing sonar can be fitted at the factory with a variety of connector options to allow quick and easy integration into an existing network or sonars or other ROV equipment. For more details contact *Tritech International Ltd*.

Head part no.	Sonar Type	Depth Rating	Frequency (kHz)	Connector
04127	SSK DFP, V5	4000m	580, 1210	Tritech 6 pin
06332	SSK DFS, V6	4000m	325, 675	Tritech 6 pin
07525	SSK DFS, V6	4000m	325, 675	Burton Seaconn 5506-1508
08540	SSK DFS, V6	6800m	385, 725	Burton Seaconn 5506-1508
07525B	SSK DFS, V6	4000m	325, 675	Burton Seaconn 5506-1508
06756	SSK DFP, V5	4000m	580, 1210	Burton Seaconn 5506-1508
06731	SK DFP, V5	6800m	580, 1200	Burton Seaconn 5506-1508
08652	SSK DFS, V6	4000m	325, 675	Burton Seaconn 5506-1508
08803	SK DFS, V6	6800m	385, 725	Burton Seaconn 5506-1508
07578	SSK DFS, V6	4000m	325, 675	Schilling SeaNet
08348	SSK DFS, V5	4000m	325, 675	SubConn BH8M
07765	SSK DFS, V6	4000m	325, 675	SubConn BH6M
09177	SK DFS, V6	6800m	385, 725	SubConn BH6M
08768	SK DFS, V6	6800m	325, 675	SubConn MCBHRA5M
08761	SK DFS, V6	6800m	385, 725	DG O'Brien 128
SK = SeaKing, SSK = Super SeaKing, DFS = Dual Frequency Sonar, DFP = Dual Frequency Profiler				

Glossary

AIF	Originally "Acoustic Interface" but also used to refer to "ARCNET Interface" in which case it can refer to either the interface port on a SeaHub or SCU or to the expansion card available for installation into a computer.
ARCNET	Attached Resource Computer NETwork - a network protocol similar to Ethernet but with the advantage of working over much longer ranges.
ASCII	American Standard Code for Information Interchange - a character encoding scheme originally based on the English alphabet.
CD-ROM	Compact Disc - Read Only Memory
DA-15	A 15 pin D shaped connector used mainly for the ARCNET connection on the SCU and SeaHub.
DC	Direct Current
LAN	Local Area Network
LED	Light Emitting Diode
PC	Personal Computer
PCI	Peripheral Component Interconnect - used to refer to both the transfer bus and the socket for expansion cards within a computer.
RAT	Remote Access Terminal - the detachable front part of the Tritech Surface Control Unit (SCU) computer. Provides an alternative to using a keyboard and mouse.
RS232	Traditional name for a series of standards for serial binary data control signals.
RS485	A standard for defining the electrical characteristics of drivers and receivers for use in a balanced digital multipoint system (also known as EIA-485).
RX	Receive (data)
SCU	Surface Control Unit - a specially manufactured computer which is rack mountable and capable of processing the data from the sonar equipment running either Windows XP Embedded or Windows 7 and Seanet Pro or Gemini software.

SeaHub
:   An alternative to using a Seanet SCU, this device connects to a laptop or PC via USB interface, essentially this takes the signal from the sonar (in RS232, RS485 or ARCNET) and converts it into a signal suitable for the USB port of the computer.

SeaKing
:   A specific sonar produced by *Tritech International Ltd* but also refers to the family of sonar equipment manufactured by *Tritech International Ltd* comprising of the SeaKing, SeaKing DST scanning and profiling sonars and the Hammerhead survey sonar.

Seanet Pro
:   The software supplied by *Tritech International Ltd* which is capable of running all the sonar devices.

Seanet RemV4
:   A program developed by *Tritech International Ltd* that runs alongside Seanet Pro and provides remote survey or logging computers with access to data from various devices on the host computer.

Tritech waterblock
:   The 4000m depth rated connector developed by *Tritech International Ltd* for their subsea equipment.

TX
:   Transmit (data)

VOS
:   Velocity of Sound

WINSON
:   Sonar control software produced by Tritech that predates Seanet Pro and was used to control the Series-2 family of devices.