SeaKing Sidecan Sonars

Towfish, SK150 and ROV Sidescan

0374-SOM-00013, Issue: 04

Tritech

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 744111
	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 towww.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

The SeaKing Sidescan family of sonars provide various methods for obtaining survey sonar data. The two Towfish and SK150 are both designed to be towed behind a vessel as it navigates survey lines, while the ROV mounted device is designed to be fitted to a remotely operated vehicle which is then used to perform the survey.

Electrically and acoustically the devices are very similar, the ROV model is merely shipped without a hydrodynamic tube and in three components (left/right transducer and electronics pod). The SK150 is a specially designed Towfish that can withstand higher pressures found in deeper water. For the ROV Sidescan, communication between the surface computer and the devices can be via RS232, RS485 or ARCNET protocols. The ROV mounted device can be combined with the *Tritech International Ltd* Subsea Junction Box which will allow other devices, such as the SeaKing or Hammerhead Sonar to be used on the same vehicle.

The introduction of the Seaking Interface Box has simplified the communications with the Seaking Sidescan range of products. The Seaking Interface Box uses RS485 and supplies 72VDC to provide a reliable solution for the long cables supplied with towed Sidescans.

All three devices are controlled using the *Tritech International Ltd* Seanet Pro control and display program and are capable of exporting to a variety of industry standard formats for use in post-processing survey packages. It is also possible to use the data in the *Tritech International Ltd* Sonar Image Tiler program in order to build up a complete picture of a survey site.

Part I

Specification

Tritech

Outstanding Performance in Underwater Technology

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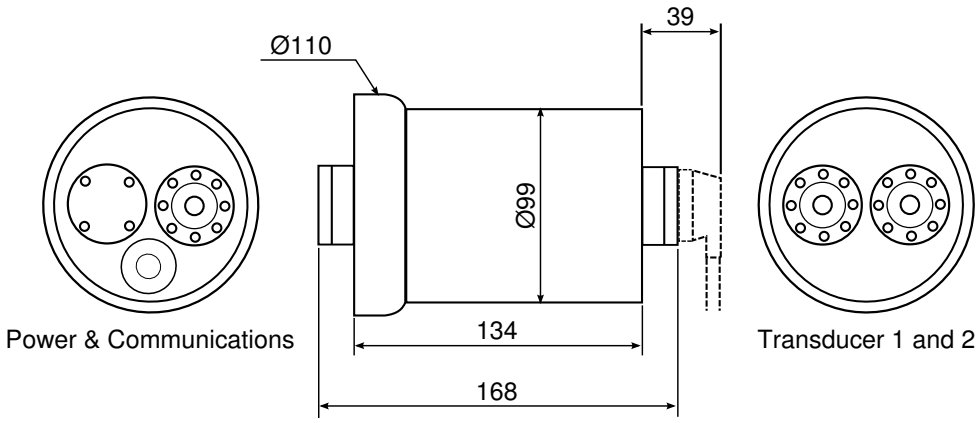
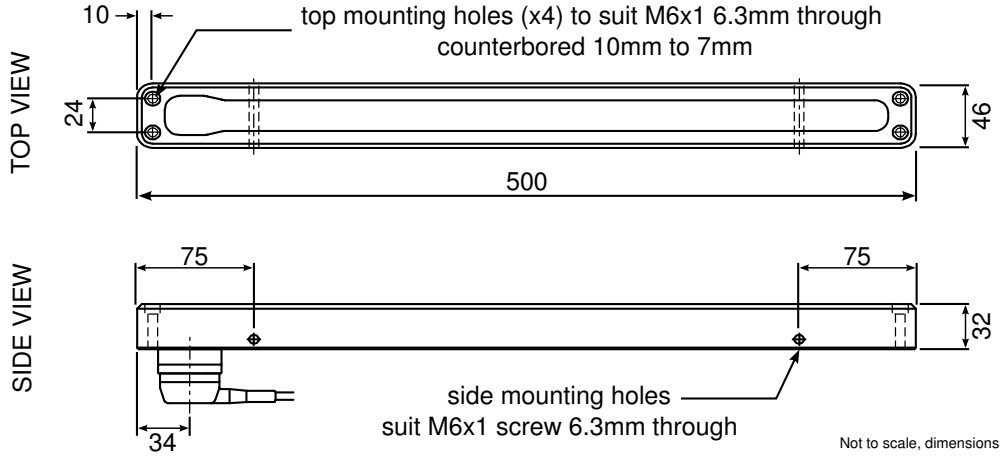
2. SeaKing ROV Sidescan

2.1. Dimensions of Electronics Pod



Not to scale, dimensions in mm.

2.2. Dimensions of Transducers



Not to scale, dimensions in mm.

2.3. Physical Properties

Property	Electronics Pod	Transducers
Weight in air	2.5kg	1.4kg (each)
Weight in water	1.6kg	0.54kg (each)
Depth rating	4000m	
Connector	Tritech 6-pin waterblock	

2.4. Electrical, Communication & Software

Power requirement	20 to 72V DC at 12W
Communication protocols	ARCNET, RS232, RS485
Communication rates	ARCNET: 156kbit·s^{-1}, 78kbit·s^{-1} RS232 & RS485: 115.2kBd
Software	Tritech Seanet Pro or low level direct command control
Data log format	Tritech V4Log as standard Export to XTF, TIFF, GeoTIFF and Google Earth KMZ via converter

2.5. Acoustic Properties

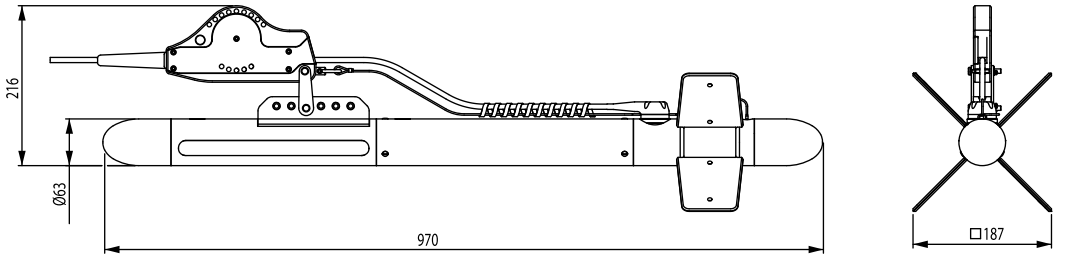
Frequency	325kHz	675kHz
Beamwidth	30° vertical, 1° horizontal	30° vertical, 0.5° horizontal
Maximum range	200m	100m
Pulse length	400µs	200µs
Source level	200dB re 1µPa at 1m	
Sensitivity	Better than 2µV rms	
Gain control	80dB	
Dynamic range	40dB (configurable)	
Sample rate	5 - 200µs	
Data resolution	4 - 8 bits (configurable)	

Note

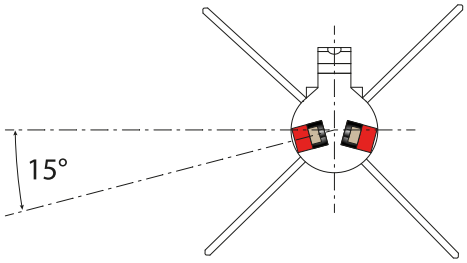
The ROV Sidescan is supplied as either a Low Frequency or High Frequency sonar and is not switchable.

3. SeaKing Towfish

3.1. Dimensions



Not to scale. Dimensions in mm.



Transducer Beam Centre

3.2. Physical Properties

Weight in air	7kg
Weight in water	4.1kg
Depth rating	40m
Materials	Alumnium body tube and stainless steel nose cone
Operating temperature	-10°C to 35°C
Storage temperature	-20°C to 50°C

3.3. Electrical, Communication & Software

Power	24V to 72VDC DC at 12W **(See note below)**
Communication protocols	ARCNET, RS485 (RS232 optional)
Cable	Standard 6.7mm diameter Kevlar re-inforced cable. Supplied in lengths of 100 and 150 metres.
Software	Tritech Seanet Pro ChesaPeake 'SonarWiz' real-time interface Low level direct access and control
Data log format	Tritech V4Log as standard Export to XTF, TIFF, GeoTIFF and Google Earth KMZ via converter

Note

See Section 6.3, “Power” for important information on the Towfish power requirements.

3.4. Acoustic Properties

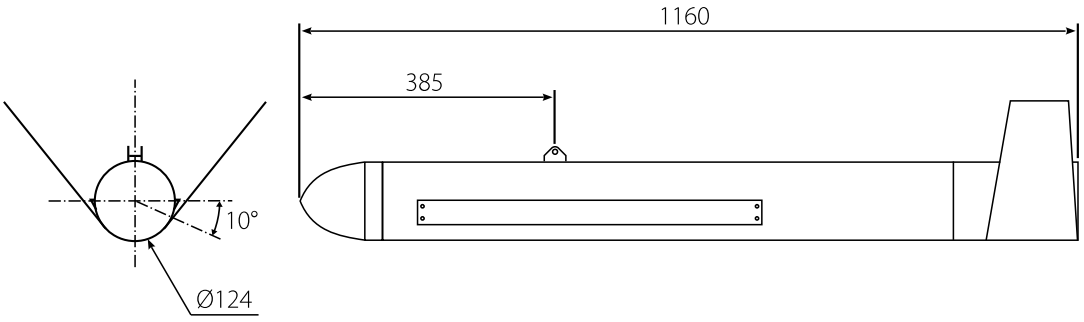
Operating frequency	325kHz	675kHz
Beam Centre Line	15° below horizontal	
Beamwidth	30° vertical, 1.7° horizontal	30° vertical, 1° horizontal
Pulse length	400µs	30° vertical, 1° horizontal
Range	200m	100m
Source level	200dB re 1µPa at 1m	
Gain control range	80dB	
Display dynamic range	40dB (configurable)	
Data resolution	4 - 8 bits (configurable)	
Receiver sensitivity	Better than 2µV rms	

Note

The SeaKing Towfish is supplied as either a High Frequency or Low Frequency sonar and is not switchable.

4. SeaKing Towfish SK150

4.1. Dimensions



Not to scale, dimensions in mm.

4.2. Physical Properties

Weight in air	25.5kg
Weight in water	15.5kg
Depth rating	120m
Materials	Polyester powder coated aluminium
Operating temperature	-10 to 35°C
Storage temperature	-20 to 50°C
Maximum towing speed	5 knots

4.3. Electrical, Communication & Software

Power requirement	36 to 72V DC at 12W
Communication protocols	ARCNET, RS485 (RS232 optional)
Connector	Tritech standard 6-pin waterblock
Cable	Wire armoured
Software	Tritech Seanet Pro or low level direct access and control
Data log format	Tritech V4Log as standard Export to XTF, TIFF, GeoTIFF and Google Earth KMZ via converter

4.4. Acoustic Properties

Operating frequency	150kHz
Beam Centre Line	10° below horizontal
Beamwidth	60° vertical, 1.4° horizontal
Maximum range	350m
Minimum range	0.4m
Range resolution	5 - 300mm
Source level	210dB re 1µPa at 1m
Pulse length	400µs
Bandwidth	40kHz

Part II

Installation

5. Installing the ROV Sidescan

5.1. Transducer Orientation

Caution

Although the sonar is rugged, it should be handled with care, particularly the connector and transducers.

The SeaKing ROV Sidescan sonar comprises two separate transducers which are connected wit interconnect leads to a dual channel electronics pod.

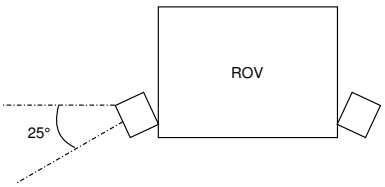


Figure 5.1. ROV Sidescan Installation Example

The transducers should be mounted at an ideal tilt angle of 25° below horizontal as indicated in Figure 5.1, “ROV Sidescan Installation Example”. This will reduce the length of the blind spot directly below and to each side of the vehicle (i.e., the areas which do not fall within the transmit beam coverage). With a 25° angle the ROV can be flown at a height of approximately 10% of the configured range.

To increase the maximum range the angle can be reduced to 10° and the ROV height above the seabed increased but doing so will increase the size of the blind area underneath the ROV. Targets may be missed if the ROV is flown directly over the top of them.

A guard can be fitted to the ROV to protect from impact damage but this must not overlap the transducer area or it may have an effect on the sonar image.

The electronics pod should be secured by clamping on the cylindrical body. 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 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 and 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.

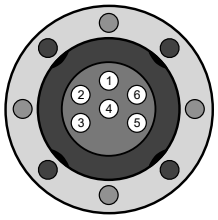
Note

The electronics pod does not need to be installed in a dry area and is rated against water ingress so can be placed anywhere on the ROV.

5.2. Communications

The SeaKing ROV Sidescan electronics pod is fitted with a maximum of four standard Tritech waterblock connectors. Two of these will be labelled PORT and STARBOARD and these should be used to connect to the transducers using a cable that is wired straight through (with a 1 to 1 wiring). The other two ports are MAIN which is for connection to the surface and optionally AUX which is for connecting auxiliary devices such as altimeters, oceanographic sensors and scanning sonars. The AUX port may be blanked off.

The MAIN connector and optional AUX connector are wired as follows:



Tritech Waterblock

Pin	Function	Cable colour
1	ARCNET A RS232 TX RS485 A	Yellow
2	ARCNET B RS232 RX RS485 B	Blue
3	DC +	Red
4	DC -	Black
5	RS232 Ground	Green
6	Earth/cable shield	cable screen

Note

If communicating using the ARCNET protocol it will be necessary to have resistors fitted at each end of the cable. For more details please refer to Appendix B, *ARCNET Termination* for more information.

Note

In order to establish RS485 communications, the electronics must have a CPUv6 and V6 COM PCB fitted. Please contact *Tritech International Ltd* if you require more information about the V6 COM PCB, or if you are unsure if your unit has this PCB fitted.

5.3. Power

The SeaKing Towfish range of sensors are designed to work over a smoothed DC power supply over the range specified in Chapter 2, *SeaKing ROV Sidescan*.

Caution

Never try to make the Towfish work over a longer cable by increasing the voltage above the maximum specified, doing so may cause permanent damage.

If using a rectified transformer PSU the output must have a filter capacitor of at least 470µF for each head that is being powered. The use of unregulated power supplies is not recommended.

If powering the head down a long lead or umbilical, the maximum recommended loop resistance of the power line must not exceed 10Ω for a single device. If other SeaKing devices are connected via the AUX port in a network then the loop resistance should be 5Ω for two devices and 3Ω for three devices.

If the supply voltage is less than the minimum specified in Chapter 2, *SeaKing ROV Sidescan* the Sidescan is unlikely to work correctly.

Ground Fault Monitoring Equipment

The power supply within all SeaKing devices includes an electrically isolated DC to DC converter front end with a small capacitive connection made to the sonar chassis. This should not noticeably affect any impressed current Ground Fault Interrupter (GFI) or Residual Current Devices (RCD).

6. Installing the Towfish

Note

The Towfish is supplied balanced for level flight in water. Do not add to or alter the parts as this may affect the hydrodynamic properties.

6.1. Cable and Strain Relief

Note

In order to have enough cable it is advisable to have at least 3m of cable for every 1m of operating depth. The cable should be re-inforced with Kevlar.

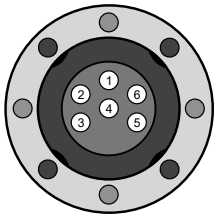
The SeaKing Towfish is fitted with a strain relief mechanism which is located in the tow arm by two cable clamps and attached by wire to the rear section. A side plate is fitted on the tow arm to secure the cable and strain relief in place. The tow arm is connected to the tow bar on the body using a pivot assembly and pivot pin which is designed to shear if the Towfish is subject to impact whilst under way. This will enable the Towfish to be recovered tail first and should prevent it from becoming entangled. Installation instructions can be found in Appendix A, *Towfish Assembly*

An acetal tail cone is screwed on the rear end which can be unscrewed to enable the removal of the safety wire and pin assembly.

If the fins hit a hard object they are designed to slide out and are secured by an elastic cord which prevents them from being lost. This elastic cord has a loop in one end and the safety wire should be passed through this loop before being secured with the tail cone and pin assembly.

6.2. Communications

The SeaKing Towfish is fitted with a standard Tritech waterblock connector. This is a 6 pin connector and is wired as follows:



Tritech Waterblock

Pin	Function	Cable colour
1	ARCNET A RS232 TX RS485 A	Yellow
2	ARCNET B RS232 RX RS485 B	Blue
3	DC +	Red
4	DC -	Black
5	RS232 Ground	Green
6	Earth/cable shield	cable screen

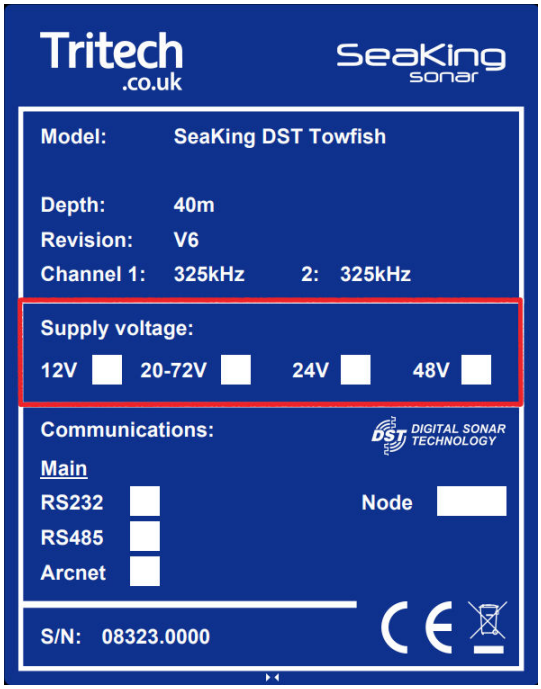
Note

If communicating using the ARCNET protocol it will be necessary to have resistors fitted at each end of the cable. For more details please refer to Appendix B, *ARCNET Termination* for more information.

6.3. Power

The towfish has recently been updated to run on a 24-72VDC power supply. This allows it to be used with the new Seaking Interface Box which supplies 72VDC. The newer built towfish are backwards compatible with all other Tritech topside units. Previous towfish were fitted with 36VDC DCDC converters and not compatible with the Seaking interface box.

In order to ascertain the voltage your towfish runs at please read the label on the body. It will be marked with the voltage required to run the unit.



Warning

The label must be marked for 20-72VDC in order to work with a Seaking Interface Unit. If not then serious damage will occur to the Towfish.

If in any doubt about the voltage range that your Towfish requires then please contact *Tritech International Ltd* using the details in Help & Support in referencing the serial number of your unit.

The SeaKing Towfish range of sensors are designed to work over a smoothed DC power supply over the range specified in Chapter 3, *SeaKing Towfish*.

Caution

Never try to make the Towfish work over a longer cable by increasing the voltage above the maximum specified, doing so may cause permanent damage.

If using a rectified transformer PSU the output must have a filter capacitor of at least 470µF for each head that is being powered. The use of unregulated power supplies is not recommended.

If powering the head down a long lead or umbilical, the maximum recommended loop resistance of the power line must not exceed 10Ω.

If the supply voltage is less than the minimum specified in Chapter 3, *SeaKing Towfish* the Towfish is unlikely to work correctly.

Ground Fault Monitoring Equipment

The power supply within all SeaKing devices includes an electrically isolated DC to DC converter front end with a small capacitive connection made to the sonar chassis. This should not noticeably affect any impressed current Ground Fault Interrupter (GFI) or Residual Current Devices (RCD).

7. Installing the SK150

Note

The SK150 is supplied balanced for level flight in water. Do not add to or alter the parts as this may affect the hydrodynamic properties.

7.1. Cable and Strain Relief

Note

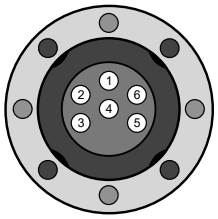
In order to have enough cable it is advisable to have at least 3m of cable for every 1m of operating depth. The cable should be re-inforced with Kevlar.

The main towing point is secured to the body with nylon fasteners which will shear when subjected to excessive pulling pressure. Also the bow pin on the tow cable mounting shackle will shear when excessive pulling pressure is applied.

If the fins hit a hard object they will break off and can be easily replaced on recovery of the SK150.

7.2. Communications

The SeaKing Towfish is fitted with a standard Tritech waterblock connector. This is a 6 pin connector and is wired as follows:



Tritech Waterblock

Pin	Function	Cable colour
1	ARCNET A RS232 TX RS485 A	Yellow
2	ARCNET B RS232 RX RS485 B	Blue
3	DC +	Red
4	DC -	Black
5	RS232 Ground	Green
6	Earth/cable shield	cable screen

Note

If communicating using the ARCNET protocol it will be necessary to have resistors fitted at each end of the cable. For more details please refer to Appendix B, *ARCNET Termination* for more information.

Note

In order to establish RS485 communications, the electronics pod must have a CPUv6 and V6 COM PCB fitted. Please contact *Tritech International Ltd* if you require more information about the V6 COM PCB, or if you are unsure if your unit has this PCB fitted.

7.3. Power

The SeaKing Towfish range of sensors are designed to work over a smoothed DC power supply over the range specified in Chapter 4, *SeaKing Towfish SK150*.

Caution

Never try to make the Towfish work over a longer cable by increasing the voltage above the maximum specified, doing so may cause permanent damage.

If using a rectified transformer PSU the output must have a filter capacitor of at least 470µF for each head that is being powered. The use of unregulated power supplies is not recommended.

If powering the head down a long lead or umbilical, the maximum recommended loop resistance of the power line must not exceed 10Ω.

If the supply voltage is less than the minimum specified in Chapter 4, *SeaKing Towfish SK150* the SK150 is unlikely to work correctly.

Ground Fault Monitoring Equipment

The power supply within all SeaKing devices includes an electrically isolated DC to DC converter front end with a small capacitive connection made to the sonar chassis. This should not noticeably affect any impressed current Ground Fault Interrupter (GFI) or Residual Current Devices (RCD).

Part III

Seanet Pro Software Suite

8. Overview of the Seanet Software Suite

The Seanet Pro software suite is a set of programs which enables complete control of all the *Tritech International Ltd* sonar equipment. The programs are available individually from www.tritech.co.uk.

Seanet Pro	This is the main program for controlling and displaying the sonar data. The program allows data from multiple sources, such as GPS, altimeter, scanning and side-scan sonars, to be displayed on one screen. It is also possible to log the sonar data and store it on the computer hard drive.
Seanet Setup	This is included as part of Seanet Pro and it is not possible to install it separately. Using this program it is possible to re-configure the sonar by changing communication protocols or baud rates. It is also possible to choose which serial port the sonar is connected to if there are multiple ports on the computer.
Seanet DumpLog	In order to process SeaKing Sidescan log files it may be necessary to convert them into another format and the Seanet DumpLog utility is designed to allow conversion between the standard Seanet Pro (.v4log) format and other industry standard formats.

9. Installing Seanet Pro

Note

The hardware must not be connected to the PC prior to or during software installation.

If any Seanet software is already installed on the PC this must be removed correctly using Windows `Control Panel` - `Add or Remove Programs` (or `Programs and Features` in Windows 7) prior to starting the software installation.

Note

The latest version of Seanet Pro can be obtained from www.tritech.co.uk

Insert the `Seanet Pro` installation CD into the PC CD-ROM drive - if autorun is enabled a dialog will appear with installation options. If autorun is disabled then run the `Setup.exe` from the CD.

When the installation program starts, click `Next` to continue.

Read the license agreement and if you agree to its terms select the `YES` option and click `Next` to continue.

Confirm the installation destination directory (by default `C:\Program Files\SeanetV2` but if you wish to change this click the browse button and select an alternative directory), click `Next` to continue.

Installation will then copy files onto your computer and make entries in the Windows Registry, this process may take several minutes. If any anti-spyware software is running this may warn you that registry changes are being made, allow any changes to be made if prompted. Once files are copied you will be prompted to restart the PC (if you wish to defer the restart select `No`), click `Finish` to continue.

If the installation has been successful two new icons will have been created on the desktop for Seanet Pro and Seanet Setup.

10. Seanet Pro

10.1. Basic Operation

The SeaKing Sidescan sonars have 2 transducers fitted in a port and starboard arrangement. The display software can display both or either one of these channels. The transducers are fired in a "ping-pong" mode, i.e., the port transducer fires and receives a return signal and then the starboard transducer fires (if using a modern DST sonar the transducers can be configured to fire simultaneously using the `Sidescan` option under `Application Tools`).

The Sidescan echo return data may be displayed with time marks and text labelling and the software has the option to output the data to a thermal plotter via a parallel port interface.

To set up Seanet Pro for use with a SeaKing Sidescan first launch `Seanet Pro` and then navigate to the `Applications` menu and select `Application Wizard`. In the configuration wizard which presents itself, select `Add Application` then click `Next` and choose `Sidescan` from the list. The rest of the wizard allows customisation of the layout.

Once the software is configured and data is being received the display will be built up as the sonar is moved forward through the water. A typical display is shown in Figure 10.1, “Sidescan Sonar Data in Seanet Pro”

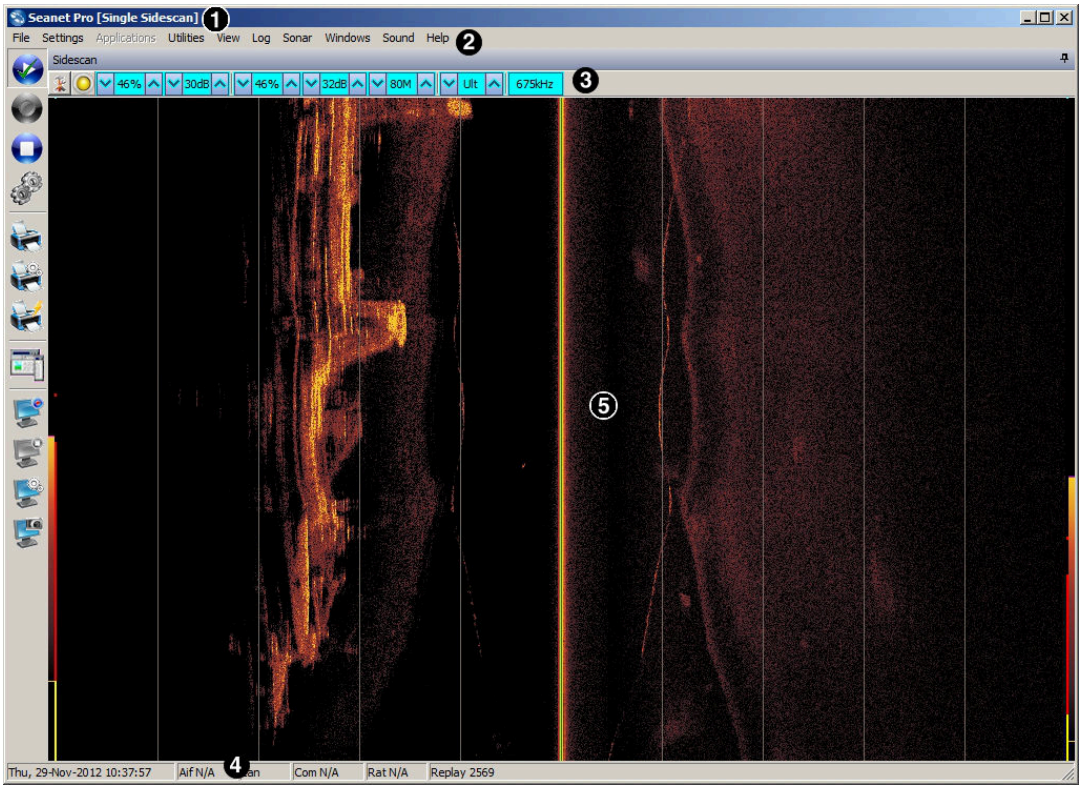


Figure 10.1. Sidescan Sonar Data in Seanet Pro

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.

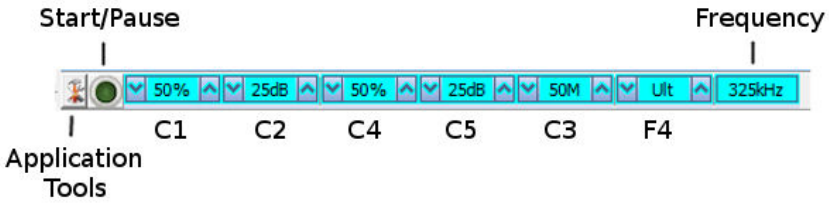
3. `Settings Bar` - this is where the Sidescan can be controlled and configured. The settings bar is on top of every display window for each device that is connected to the system. It includes a Tools Setup button, status indicator (pause/go) and RAT dials and buttons

4. `Status Bar` - this part of the screen is used to display system status information, logging status/progress and job specific information.

5. `Sensor Display Area` - this part of the screen is where the main Sidescan data is displayed. Other pertinent data such as range scale, cursor and status messages pertaining to the Sidescan may also be displayed within this area

10.2. Settings Bar

These controls are displayed on the Sonar Settings bar. Each button has a function on the RAT as described:

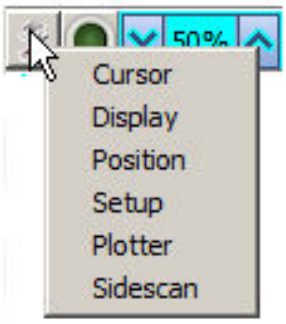


Note

On the RAT, F1 - F3 and F5 - F7 are not used.

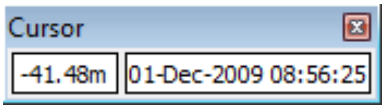
Sonar Gain (C1, C4)	This sets the sonar receive gain as required - typically this is around 20% but can be varied according to water and target conditions.
Contrast (C2, C5)	This sets the display contrast between hard and soft targets. It can help to find small features in a generally featureless situation or exclude clutter from a heavily featured seabed.
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 (and may require a slower vehicle speed if the the Sidescan is being towed).
Resolution (F4)	Resolution toggles through 4 preset sampling periods over the pulsed range. `Lo` resolution produces the least samples and gives the lowest resolution. The number of samples is increased from `Med`, `Hi` through to `Ult`. Usually a Lo or Med resolution are used for very fast tow speeds where more scan-line updates are required giving coarser detail. Hi or Ult should be used for detailed examination of targets at a slower tow-speed.
Frequency	On the sidescan sonars this is for information only and cannot be changed.

10.3. Application Tools



Cursor

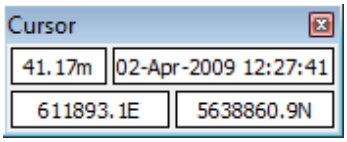
Adds the cursor position panel to the sonar display, displays the `Range` and `Time`.



Move the mouse pointer over the Sidescan waterfall display to update the cursor position giving Range to pointer and Time of scan-line that the pointer is positioned over.

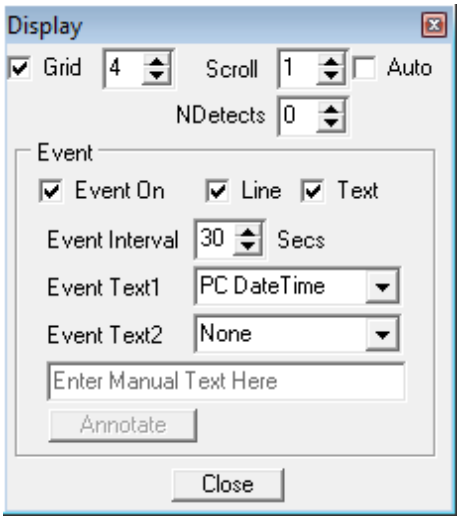
Note

If the system has real-time GPS position and heading data input, the panel will extend to additionally display the target coordinates.



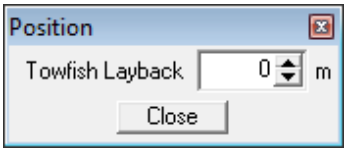
Display

Controls all the display options.



`Grid`	Display the set number of range lines.
`Scroll`	Zoom the waterfall plot on the time axis (i.e., accommodates different vehicle speeds). `Auto` auto-adjust scroll from incoming vehicle speed data.
`NDetects`	Number of detects.
`Event On`	Toggle display event on/off.
`Line`	Toggle event line on/off.
`Text`	Toggle event text on/off.
`Event Interval`	Set a time interval of 1-60s between events. This is not applicable to "Manual Text" events.
`Event Text`	Text1 is displayed on the left and Text2 is displayed on the right. Choose from: • None (no event text displayed) • PC DateTime (current date and time from the control computer) • Manual Text (enter text via the text box and click the `Annotate` button) • Remote Text (from a serial "Aux" device configured through the `Utilities` menu and `Aux Device`) • GPS E/N (Easting/Northing from a GPS) • GPS Lat/Lon (Latitude/Longitude from a GPS) • GPS UTC Time

Position



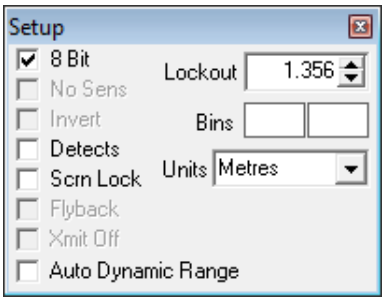
Sets the lay-back offset (in metres) which is the distance between the Sidescan sonar and reference datum (i.e., GPS receiver).

Note

This is only applicable to towed Sidescan sonars, the Towfish and SK150.

Setup

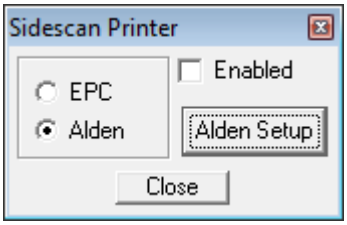
Sets various options to control the display of the Sidescan data.



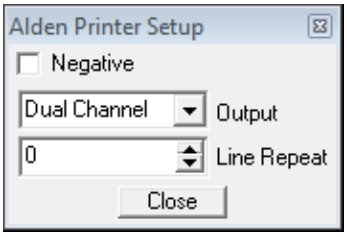
8 bit	Usually checked. Selects the intensity sampling of sonar data, if un-checked the intensity will be set at 4 bit.
Detects	Paint the leading edge of strong targets on the screen, used to emphasise sub-bottom layers.
Scrn Lock	Locks the number of range "bins" sampled to the screen resolution. This over-rides the `Resolution` (F4) control.
Lockout	Sets a minimum lockout range for the detects (always in metres).
Units	Waterfall display range units (metres, feet, fathoms or yards).
Auto Dynamic Range	This will auto adjust the display contrast and sensitivity whilst the Sidescan is running. Auto adjustment occurs periodically.

Plotter

This is for printout to a parallel port EPC or Alden thermal plotter.



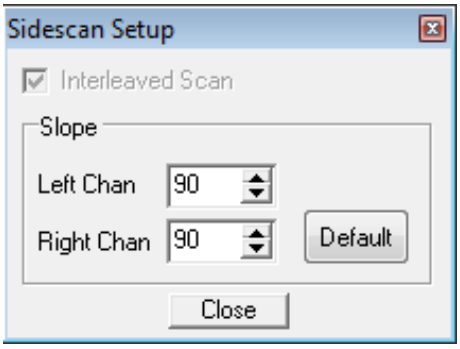
`EPC/Alden`	Select the desired printer and then tick the `Enabled` tick-box to open the parallel port connection.
`Alden Setup`	When Alden is selected this button will become active. Click this button to setup the Alden interface.



`Negative` inverts greyscale output. `Output` allows the left, right or both channels to be chosen as the output. `Line Repeat` stretches the printout by repeating line printouts (0 = off).

Sidescan

This is where the Sidescan channel settings are configured.



Interleaved Scan	This button becomes enabled when a DST Sidescan is connected. The DST Sidescan has capability to fire both channels at the same time (as opposed to in "ping-pong" mode) and this control enables simultaneous firing.
Slope	Applies a Time Variable Gain adjustment to the received signal returns to account for through-water attenuation of the transmit pulse.

Note

When the `Interleaved Scan` mode is enabled, the DST Sidescan reverts to "ping-ping" operation as opposed to "ping-pong". This doubles the quantity of data being transmitted to the surface with a larger overhead on the Sidescan plotting function. To run in this mode a modern computer (at least a Pentium 4) is required to cop with the increase in data. If the CPU activity reaches 100% it will be necessary to disable `Interleaved Scan`.

10.4. Dynamic Range and Sonar Rx Indicator

Figure 10.2.

The dynamic range bar is the A/D sample window (with 64-colour mapping) for the Sonar receive signal (which extends from 0 to 80dB).

To the right of the dynamic range bar is the Sonar receive signal strength indicator (Yellow = Average amplitude over scan-line, Red = Maximum amplitude echo for scan-line).

Normally the sampling window should not need to be adjusted from its default position (as shown on the left). However, if used properly, adjusting the sample window can produce better quality imaging.

The dynamic range bar can be adjusted to change Sonar display contrast and sensitivity. Adjustment is made using the left and right mouse buttons.

Contrast adjustment	Right-click on the bar and whilst holding down the right button, move the mouse up/down to increase/decrease the size of the bar. The sampling window can be any size between a range of 9 - 25dB. Decrease the size of the sampling window to increase the sonar display contrast. Ideally the control should be set somewhere in the centre of the allowed range (16 - 18 dB) to give the best results under most conditions. Select a high value to reduce the contrast of the sonar display.
Sensitivity adjustment	Left-click on the bar and whilst holding down the left button, move the mouse up/down to decrease/ increase the Sensitivity of the Sonar receiver. Decreasing the Sensitivity will produce a more saturated display with greater weak-return content. Increasing the Sensitivity will omit background noise and low level returns seen at the receiver

The sonar receiver will accept a return signal in the region of 0 - 80dB. The dynamic range controls are used to adjust the position of a sampling window within the 0-80dB dynamic range band of the receive signal. An idealised representation of the sample window is shown:

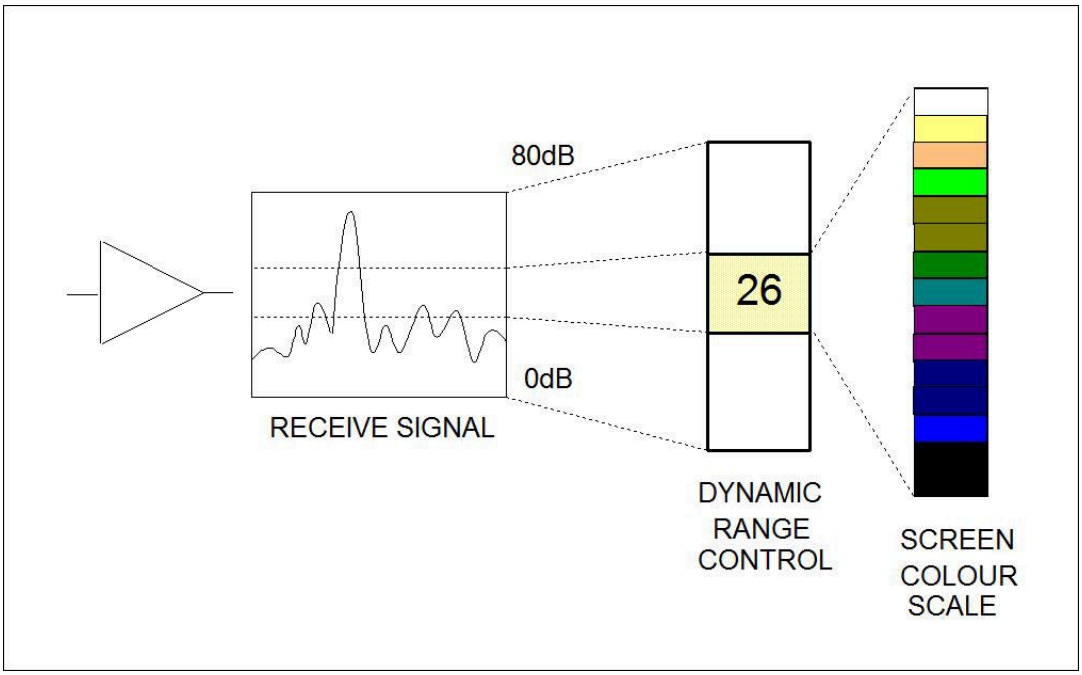


Figure 10.3.

11. Seanet Dumplog

Note

The latest version of Seanet Dumplog is available from www.tritech.co.uk. This section applies to version 2.20 of the software.

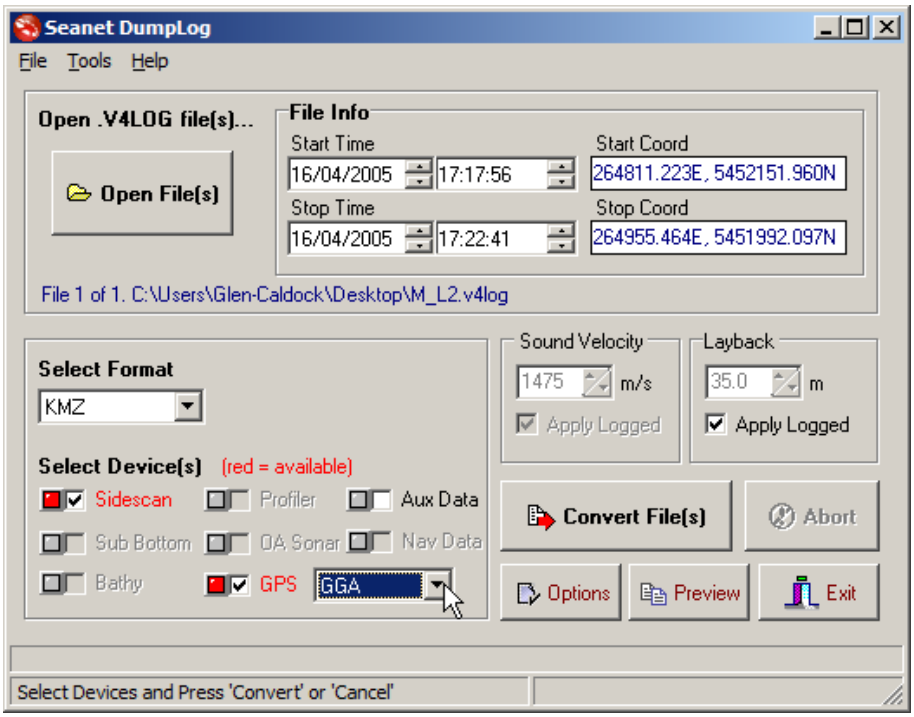
11.1. Overview of Process

Seanet Dumplog is a tool for converting *Tritech International Ltd* standard Seanet log files with the filename extension of `.v4log` into other industry standard formats. The process of conversion is as follows:

1. Acquire a log file from Seanet Pro.
2. Launch Seanet Dumplog and load the previously recorded log file.
3. Select the sonar type that has been used (in this case Sidescan) and if any GPS data is present.
4. Select the desired output image format (e.g., TIFF or GeoTIFF).
5. Click on the `Options` button and configure any specific options for the output, such as the colour to use.
6. Click on the `Convert File(s)` button and the process will start. After the conversion a prompt will appear to name and choose the location of the save file.

11.2. Application Window

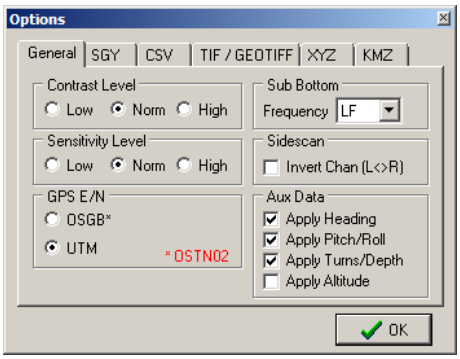
The Seanet Dumplog utility is a simple application and most of the functions are available on a single screen as shown below.



11.3. Options Dialog

For advanced configuration and control of the output it is sometimes necessary to use the Options dialog. This is split into six tabs with each tab relating to the different output formats available.

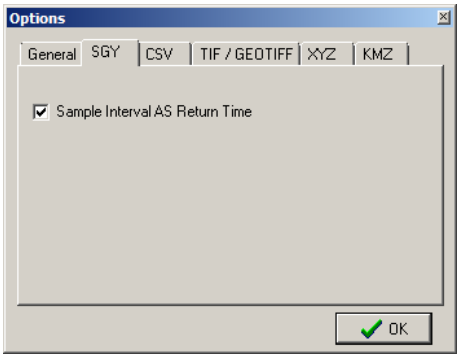
General



The option relevant to the sidescan sonar on this tab is `Invert Chan (L<>R)`. This will swap the Port and Starboard channels over to create a mirror image if desired.

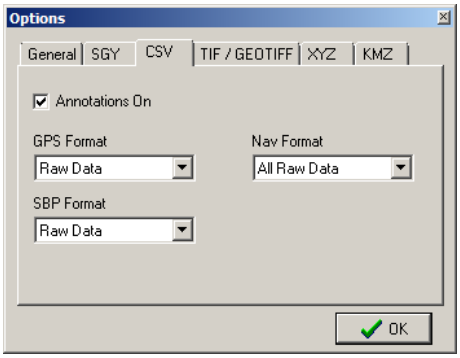
The `Sensitivity Level` can also be altered to compensate for a very noisy sonar scan which contains many returns.

SGY



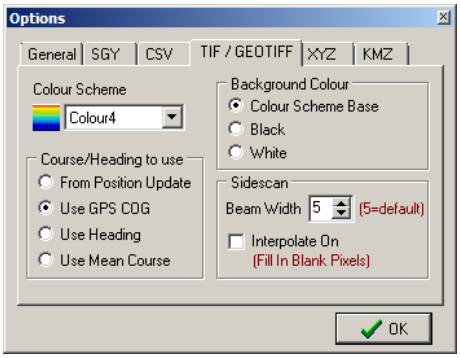
This tab is not relevant to Sidescan data.

CSV



The `GPS Format` drop-down list can be used to configure GPS data (if it is present in the log file). In the list `Raw Data` outputs the GPS data as it was recorded and `UTC, E, N` outputs in UTC format with Easting and Northing position.

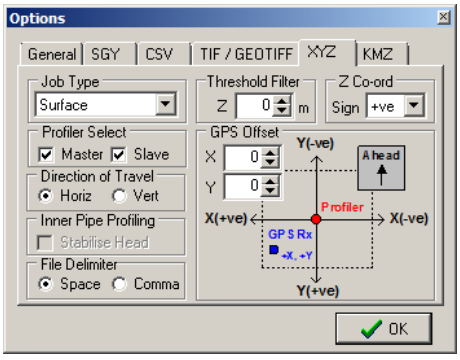
TIF/GEOTIFF



These are the options for configuring the output of the Sidescan as images.

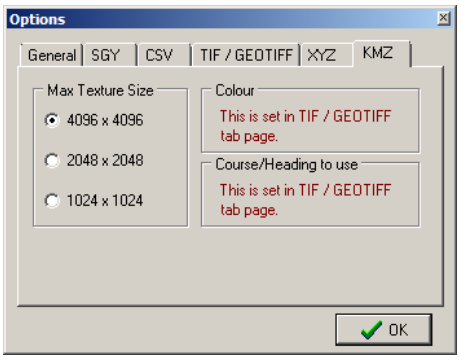
The selections made here will also determine how the `KMZ` output is formatted as well.

XYZ



This tab is not relevant to Sidescan data.

KMZ



For output to Google Earth KMZ format use the `TIFF/GEOTIFF` tab to control the image background colour and palette.

Use this tab to choose the image resolution.

Part IV

Image Tiler Software

Tritech

Outstanding Performance in Underwater Technology

A Moog Inc. Company

12. Introduction

The Tritech Sonar Image Tiler is designed to allow sonar images to be stitched together into a single larger image or mosaic. This allows mapping or surveying work to build up a complete picture of the seafloor in important areas such as harbour floors, wreck sites or around underwater structures such as bridge and platform supports.

Note

This manual applies to software version 1.3

Hardware & Software Requirements

- A laptop, PC or SCU running Seanet Pro *OR* a computer running the offline DumpLog utility and a previously recorded Sidescan log file.
- Positional data either from an external GPS/USBL linked into Seanet Pro or from a manually entered `World Position` for the sonar installation.

13. Installation

The installer file for the Sonar Image Tiler can be found on the Tritech Software USB or downloaded from: www.tritech.co.uk

Note

The screenshots shown are provided for illustration purposes. The Tritech Software USB version may differ from that shown in the following images.

The installation USB will autorun on insertion, first select the `Product Software and General Software Utilities` button to open the correct section:

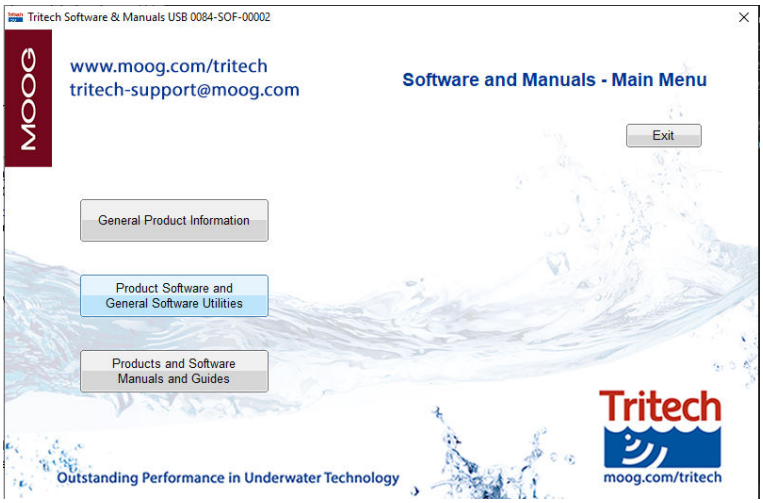


Figure 13.1. Sortware and Manuals - Main Menu

Next, select the `Sonar Image Tiler` from the `Seanet Pro Software Suite` button to begin the software installation.

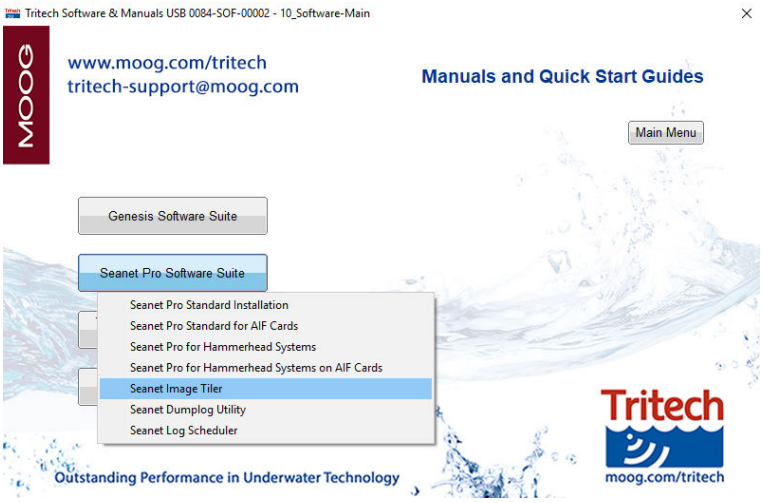


Figure 13.2. Select Seanet Image Tiler

Note

If installing from the Internet an executable file called `ImageTilerSetup.exe` will be downloaded. Run this file and follow the on-screen instructions.

Upon installation a program icon will be created on the Windows desktop and a `Tritech Image Tiler` folder will be added to the Windows Start menu.

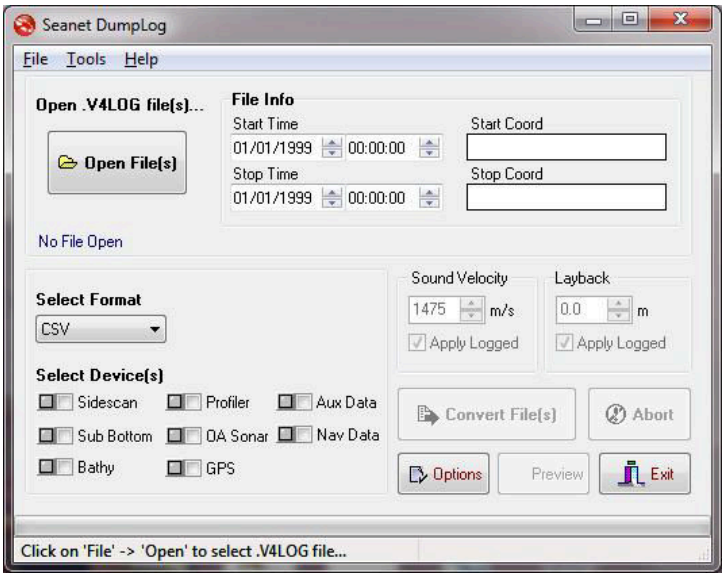
Figure 13.3. Desktop Icon

14. SeaKing Sidescan Image Capture

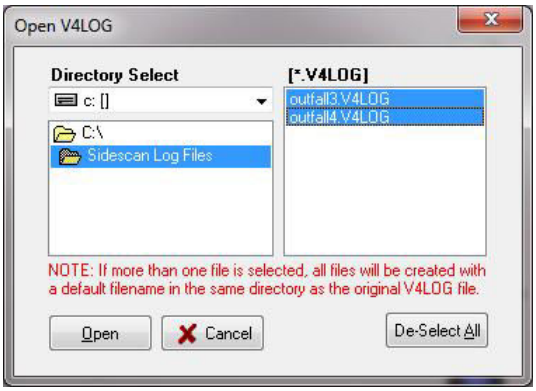
The Sidescan and GPS data first has to be recorded into a log file (`.v4log`) using Seanet Pro. This log file is then opened in the DumpLog offline utility program and a GeoTiff output is created. This GeoTiff output will also contain a World File assuming that there is valid GPS data within the log file.

For the latest version of the DumpLog utility please visit: www.tritech.co.uk

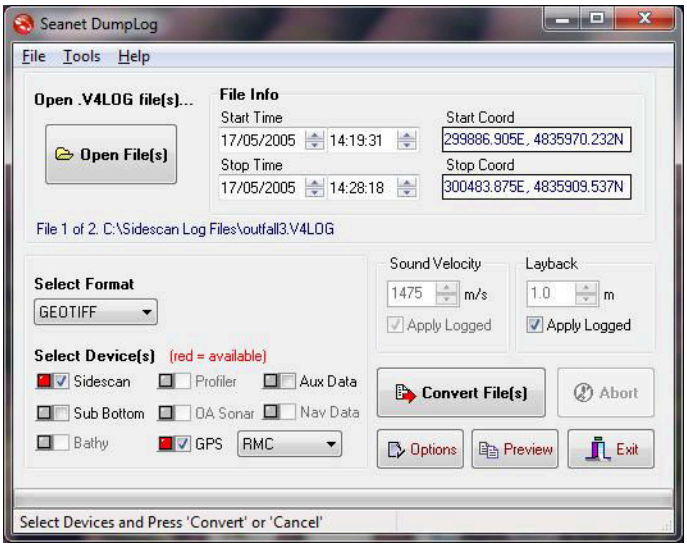
Run DumpLog and click on `Open File(s)`



Select the log file or files that are to be converted.



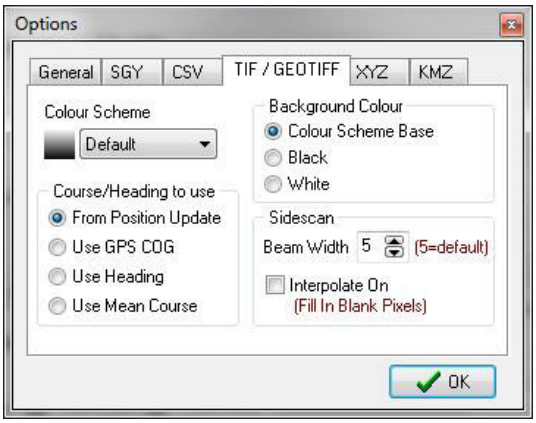
Select the `GEOTIFF` output format and then tick the `Sidescan` and `GPS` device boxes as shown below:



Note

If the indicators next to the `Sidescan` or `GPS` boxes are not illuminated red after opening the log file it indicates that there is no matching data. If this is the case it will not be possible to create a GeoTiff and World File output for use with the Image Tiler.

There are several TIF and GeoTiff settings that can be altered by clicking on `Options` and selecting the `TIF/GEOTIFF` tab page.

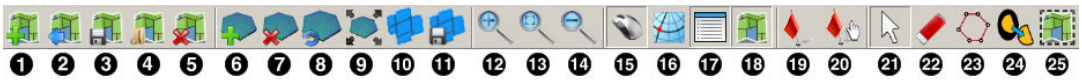


The main settings are for a `Colour Scheme` to be applied to the output sidescan imagery and a choice of methods to apply heading/course correction to the output file. The `Beam Width` sets the width of each scan line which can help with gaps that may occur, particularly when cornering.

Once setup is complete click on `Convert File(s)` to create the output. This will create `.TIF` (GeoTiff image) and `.TFW` (World File) files which can then be imported into the Sonar Image Tiler.

15. Software Functions

15.1. Toolbar



❶ Import chart
❷ Export as image
❸ Save project
❹ Load project
❺ Clear project
❻ Add tile
❼ Delete all tiles
❽ Reset all tiles
❾ Resize tile
❿ Create mosaic
⓫ Save mosaic
⓬ Zoom in
⓭ Fit to screen
⓮ Zoom out
⓯ Toggle coordinates dialog
⓰ Toggle coordinate system dialog
⓱ Toggle tile list dialog
⓲ Toggle chart
⓳ Show markers
⓴ Move marker
㉑ Pan tool
㉒ Erase tool
㉓ Area erase tool
㉔ Remove tile background
㉕ Export area

15.1.1. Project Controls

Import/Create Chart

For creating a blank chart or importing a previously created chart. For more information on this function please see Section 16.2, “Create the Background Chart”.

Export As Image

If an area is selected this button will export the selected area. If no area is selected the whole chart will be exported.

For details of the supported file format please refer to: Section 17.2, “Saving Images or Mosaics”.

Note

The markers will be embedded into the image file and if the image is loaded again it will no longer be able to modify or hide them. If exporting the image to use again as a chart the markers should first be hidden (see Section 15.7, “Using Markers”).

Save Project

The first time this is pressed it opens a dialog to name and then save the current state of the chart, tiles and markers as an XML file. Using this option allows the project to be loaded later and the markers or tiles moved or hidden.

Subsequent presses of the button will not prompt for a filename and instead save over the existing project - to save under a different name navigate to the `File` menu and select `Save Project As...`.

Note

If the tiles have been moved or rotated away from their original positions it will no longer be possible to restore them after the Project has been saved, i.e., the new "original" position which they will be returned to when they are "reset" will be the position which they were in when the `Save Project` button was pressed.

Load Project

For loading a previously saved Project file. The files are only generated by the Sonar Image Tiler and are in XML format.

For details of the supported file format please refer to: Section 17.3, “Project Files”.

Clear Project

Removes any loaded data and clears the workspace. Any unsaved data will be lost.

15.1.2. Tile Controls

Add Tile

Opens a dialog to load an image tile. Image tiles must be in the correct format and have an associated world file.

For details of the supported file format please refer to: Section 17.1, “For Loading Tiles”.

Delete All Tiles

Removes all the tiles from the chart. Any unsaved changes will be lost

Note

To delete a tile individually use the `Tile List` as detailed in Section 15.6, “Tile List Dialog”.

Reset All Tiles

Resets all the tiles using the position, orientation and size from when they were first loaded.

If the tiles were loaded as part of a project then they will be reset to the original state that they were when the project was saved.

Note

To reset a tile individually use the `Tile List` as detailed in Section 15.6, “Tile List Dialog”.

Resize Tile

Tiles can be resized individually using this tool. When the tool is enabled each tile will show a thin red outline with anchors at the corners and side midpoints. The mouse pointer will change to arrows indicating the available resize direction when it is positioned above the resize points. Click, hold and drag to resize the tile. The corner anchors maintain aspect ratio while it is resized whereas the side anchors allow the image to be stretched.

Create Mosaic

This will stitch all the *visible* tiles together into a single image. If only some of the tiles are to be included the remaining ones should be hidden from view using the `Tile List` as detailed in Section 15.6, “Tile List Dialog”.

Save Mosaic

Saves the newly created mosaic as an image with an accompanying world file which can then be loaded as a tile for future Projects.

Using the `Save Mosaic` function has the advantage over `Create Mosaic` in that it does not alter the tiles within the project so they can still be modified if desired. The newly created mosaic is in a completely separate file.

For details of the supported file format please refer to: Section 17.2, “Saving Images or Mosaics”.

15.1.3. Zoom

The zoom controls allow the user to `Zoom In` on an area of the screen by using the button  or by scrolling the mouse wheel forward.

Similarly, zooming out can be accomplished using the `Zoom Out` button  or scrolling the mouse wheel backwards.

The view can be reset so as the chart fits into the window by pressing the `Fit To Screen` button 

15.1.4. View/Hide Controls

These controls are the same as those found in the `View` menu and allow the different dialogs to be shown or hidden from the workspace.

The background chart can be hidden to allow better viewing of the individual tiles by selecting the `View/Hide Chart` button: 

For more detail on the functionality of the dialogs refer to Section 15.5, “Information Dialogs” and Section 15.6, “Tile List Dialog”.

15.1.5. Markers

Using these buttons the markers can be shown, hidden or moved. For a full description of the use of markers see Section 15.7, “Using Markers”

15.1.6. Tile Manipulation

Pan Tool

The pan tool is the default operation and allows the current viewpoint to be moved around by clicking and holding the left mouse button - useful if zoomed in or using a very large chart.

When this tool is selected and the mouse pointer is hovered over the tile handles the functionality will change to that of move a single tile or rotate the tile (depending on where the mouse pointer is located).

Note

This tool does not alter the *position* of the chart - it simply changes the visible portion on the screen.

Erase Tool

Note

This action cannot be undone. To restore the original tile the tile has to be deleted and then added afresh.

This tool allows parts of the sonar tile to be removed manually as if using an eraser. To remove a section of sonar tile select this tool then click and drag the left mouse button over the desired area. When this tool is active the mouse cursor should change to an eraser.

If multiple tiles are overlapping the erase tool will work on the uppermost tile only but if a portion is already erased the eraser will start to erase the tile below as well. To avoid accidentially erasing the wrong tile, it is recommended that the tiles that are not being worked on are disabled or hidden using the `Tile List` (see Section 15.6, “Tile List Dialog”).

Area Erase Tool

Note

This action cannot be undone. To restore the original tile the tile has to be deleted and then added afresh.

This tool erases polygonal-shaped sections from the sonar image tile. To use it select the tool then click (and release) on the sonar tile, move the mouse and click again to add another point (the points will be joined by a red line). Keep adding points until the desired shape has been constructed and then double-click to close the area (i.e., the last added point will be joined to the first point with a straight line). When the area is closed the polygon that is created will be automatically deleted from the tile and the red outline will also disappear. While this tool is active the mouse cursor will change to a cross-hair with polygon shape.

All visible tiles that intersect with the defined polygon will have a section deleted. To make sure that some tiles are preserved, first hide them from view - see Section 15.6, “Tile List Dialog”.

Crop Background

Note

This action cannot be undone. To reset the tile, it must be deleted and added again as if it is new.

To control the amount of sonar data displayed in a tile the automatic background removal tool uses an intelligent algorithm to determine unwanted sections and remove them from the tile. Unwanted background pieces are those that are typically around the edge of the sonar scan and do not add any detail to the images. In general, acoustic shadows around areas of high intensity should be kept as they add detail and context to the image.

15.1.7. Image Export Area

The Image Export Area selection tool enables restricted areas of the workspace to be exported to an image file. The mouse pointer will change to a cross-hair for more accurate selection. To use, simply draw a box around the area to be exported and then press the `Export As Image` button ( )

Note

Only when this button is enabled will the selection be used as the export area, otherwise the entire chart will be used.

15.2. Moving tiles

The `Pan Tool` button has to be selected for this function to work.

When the mouse pointer is over the centre of the tile it will change to a hand icon. Hold down the mouse button to drag the tile and position it correctly.

15.3. Rotating tiles

The `Pan Tool` button has to be selected for this function to work.

A tile can be rotated by selecting and moving the rotation lever (see Figure Figure 15.1, “Rotating the Tile”). The mouse pointer will change to show a hand with rotation arrows when it is positioned above the end of the lever. Holding the mouse button down and dragging in a circular motion will rotate the tile:

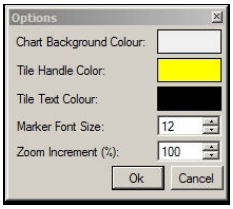
Figure 15.1. Rotating the Tile

The amount of rotation will be displayed in the `Tile List` panel (which can be displayed using the `View` menu and selecting `Tile List`).

Tile List

	N°	Latitude	Longitude	Rot(°)	Opac(%)
☑	1	56° 57' 34.3" N	2° 11' 59.9" W	318.38	50
☑	2	56° 57' 35.5" N	2° 12' 3.8" W	173.57	50

The colour of the rotate handle can be changed by navigating to the `Tools` menu and selecting `Options`



15.4. Mosaic of Tiles

To create a mosaic of tiles it will be necessary to have multiple tiles together within a single geographic region. It will not be possible to create a mosaic if the tiles are very far apart, likely as a result of having an incorrect or corrupt world file which results in their incorrect placement.

Creating a mosaic is a simple process, first arrange the tiles as desired and hide tiles that are not going to be included in the final mosaic, then press the mosaic button on the toolbar ( ) which will start the mosaicking process. An example of this is presented in Figure 15.2, “Mosaicking Tiles”.

Note

The mosaicking process is irreversible and will result in a new tile created which cannot be split into the original tiles. To restore the original tiles they will have to be re-loaded.

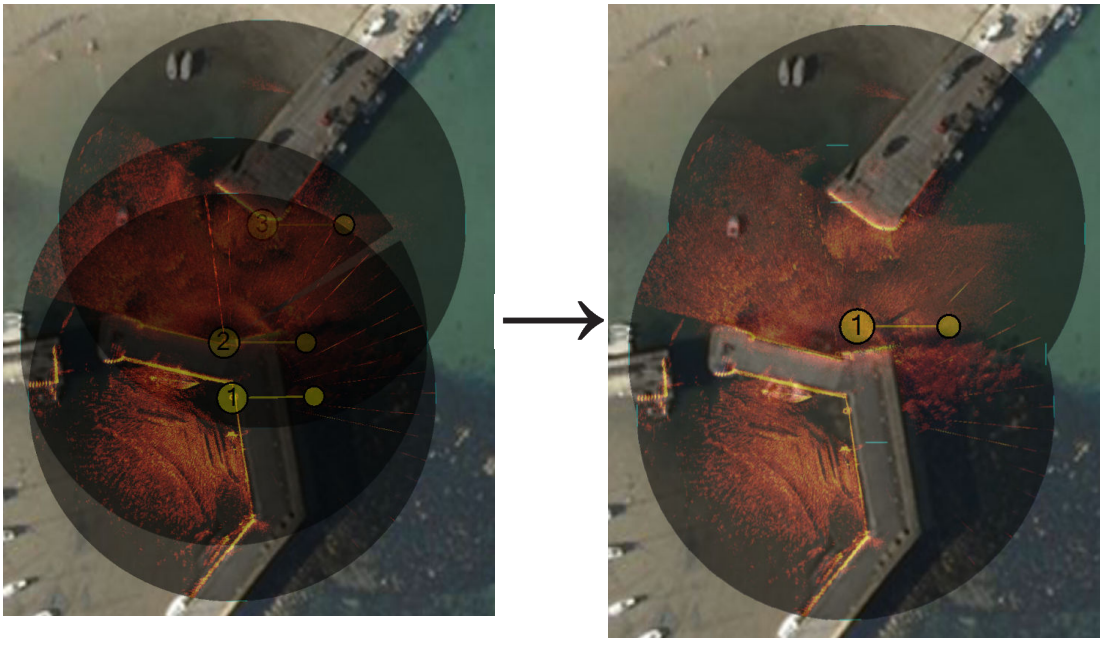


Figure 15.2. Mosaicking Tiles

Note

If `Save Mosaic` is pressed instead the output will not be on the screen but to a file so a file chooser dialog will present itself.

15.5. Information Dialogs

There are also three information panels accessible from the toolbar or the View menu: the tile list; mouse position; and the coordinate system used. Both the tile list and the mouse view display the position of tile centres or mouse pointer, respectively, using the selected coordinate system.

Coordinate System

The Coordinate System display can be viewed and controlled by selecting the button  or using the View menu and select Coordinate System option. This allows the user to choose between using Decimal Degree, Degrees and Decimal Minutes, Degrees, Minutes and Seconds and Universal Transverse Mercator (UTM). Selecting one of these options automatically updates the display in the both the Mouse Position and Tile List display panels.

Mouse Coordinates

The Mouse Coordinates display is also controlled from the View menu and View button collection  . It shows the mouse position in the context of the chosen coordinate system.

15.6. Tile List Dialog

The Tile List panel can be made visible using the View menu and selecting the Tile List option.

Alternatively the Tile List can also be viewed using the button:  .

Action on Multiple Tiles

By holding down the shift key on the keyboard it is possible to select multiple tiles in the Tile List and move them up/down the layers together, show/hide them as a group or delete/reset multiple tiles in one go.

Saving the tile will only work on one tile at a time.

Layering tiles

Layering the tiles determines the order in which they are displayed, i.e., tile 1 is displayed in front of tile 2. The order can be changed by moving tiles up and down in this list, either as individual tiles or in groups.

Note

If centre marks or rotation handles obscure one another interaction will occur using the lowest numbered (corresponding to the topmost) tile so it may be necessary to re-order the tiles to gain access to the handles.

Click on the row containing a tile to highlight it and then press either the *UP* or *DOWN* arrow to bring the image forward or backward on the display by one layer.

Multiple tiles can be moved in one go by selecting each one and holding down the `control` key on the keyboard (or by selecting a span using the `shift` key). Once selected the tiles can be dragged as a group by holding down the mouse button and moving up or down the list to re-order them.

The tiles will be automatically renumbered with the lowest number being the first one displayed.

The tiles can also be controlled using a menu that is accessible by clicking on the tile entry in the list with the right mouse button. Using this method the tile can also be moved immediately to the front or the back of the display stack.

Save Selected Tile

Saving a tile will export it with a new world file so that any changes that have been made to the position or orientation can be preserved.

Delete Selected Tiles

Deleting a tile will permanently remove it from the display. Any changes made to it will be lost.

If multiple tiles are selected when this button is pressed they will all be deleted.

Reset Selected Tiles

Resetting a tile changes the tile location, orientation and size to the coordinates and rotation value contained in the world file that was originally used to load the tile. Any subsequent movements or rotations that have been made are lost.

If multiple tiles are selected when this button is pressed they will all be reset.

Note

If a project has been loaded the tile will be reset to the orientation *when the project was loaded*. The process of saving the chart and tiles as a project removes the original tile data so the only way to restore the original tile would be to delete it and reload it.

Show/Hide Selected Tiles

Tiles are hidden by de-selecting the check box to left of the tile number.

If multiple tiles are selected when this button is pressed they will all be shown/hidden.

15.7. Using Markers

The Image Tiler has the ability to import a marker file which has been saved from Seanet Pro (marker files have the extension ".mrk") or from a CSV text file (full details of the marker files are in Appendix E, *Marker Files*).

First create the marker file from the chart in the MicronNav application in Seanet Pro. Then open the marker file by navigating to `Import Marker File` from the `Tools` menu.

The imported markers will be overlayed on top of the chart:

The positions of the markers is shown next to the location. Markers can be hidden using the button on the toolbar:  .

To move a marker first select the move marker button () and then click on the marker and drag it to the new location.

Note

If markers are displayed and `Export as Image` is selected they will be merged with the background. If the chart is to be used again it will not be possible to move or remove the markers. For this functionality the chart should be saved without the markers or with them hidden. If `Save Project` is selected the chart, tiles and markers are all saved as individual entities and can be interacted with as normal.

16. Creating the Mosaic Image

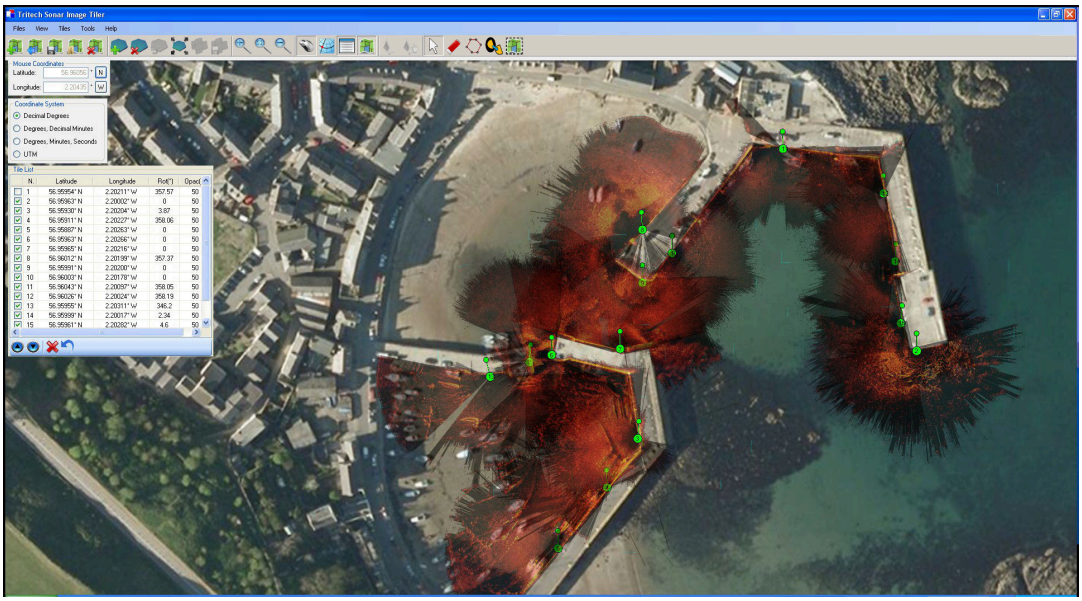


Figure 16.1. Completed Mosaic

A mosaic as shown in Figure Figure 16.1, “Completed Mosaic” can be created with the Sonar Image Tiler using a background chart, and sonar image tiles with their associated world files. The user must first set a background to place the image tiles. This background is called a "chart"; although if an actual survey chart is not available a blank canvas can be used. There is also the option to use the first added tile as a reference. All image tiles and background chart or blank canvas require geo-referencing. This is done during the creation of the chart by entering `Position Co-ordinates` for the top-left corner and a chart `Width` and `Height`.

With a background chart in place the sonar image tiles can then be loaded and any position or rotation corrections made. The entire chart and tiles, or a selected area, can be exported as an image file and a (separate) world file.

This chapter is organised into sections explaining the process of creating a mosaic, the tools available to the user, and also exporting an image or saving the project.

Note

`Load Project` allows a previously created chart, collection of tiles and markers to be loaded for further editing or for selecting an area to be exported as a bitmap.

16.1. Overview of Process

Prior to starting the mosaic process it is necessary to obtain the following:

- An image with GPS data in an associated world file to use as a background. Or appropriate GPS coordinates and geographical dimensions sufficient to encompass all of the sonar image tiles if creating the chart manually.
- A set of sonar image tiles from a Seanet Pro session which include GPS data in accompanying world files.

Given data already created using Seanet Pro the process for tiling images into a mosaic is as follows:

1. Create a chart: either from an image, import a previously created chart or create a blank chart from GPS data.

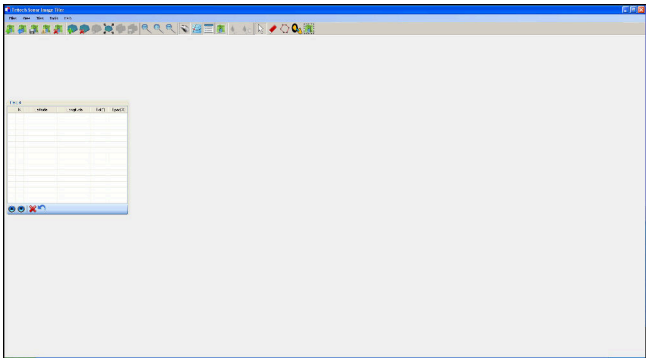
2. Load sonar image tiles onto the chart.

3. Manipulate the image tiles to the correct position (if required).

4. Either export the resulting mosaic as a bitmap (with world data) or save as a project (containing a chart and a collection of tiles) to work on again later.

16.2. Create the Background Chart

The Sonar Image Tiler starts with a blank screen:



First create a chart background onto which the sonar image tiles will be placed. If Seanet Pro is running on the PC and has a chart configured as part of its `Nav` application then you can select it using the `Files` menu and `Open Seanet Chart` option. If no Seanet chart is available click on the `Import/Create Chart` button to set up a new chart background.

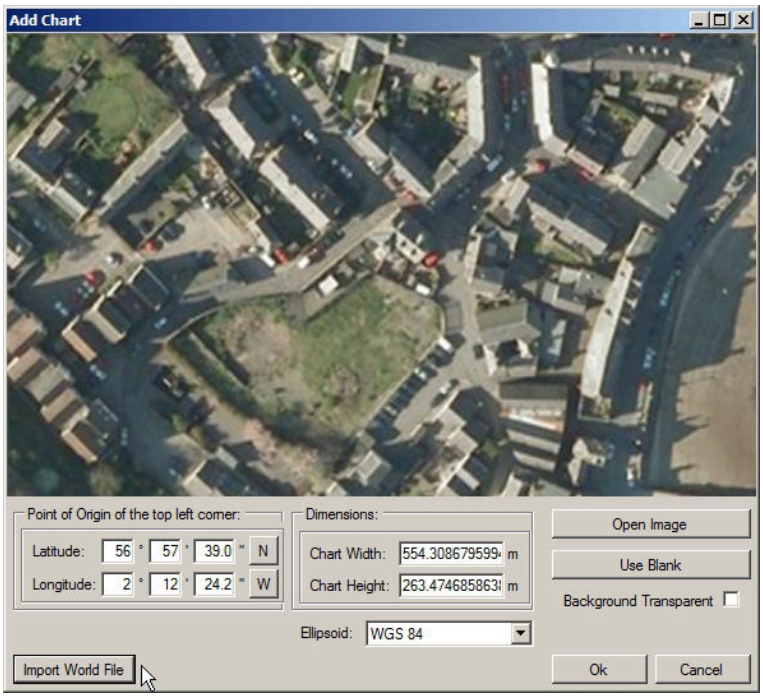
Note

It is also possible to use the first tile as the chart background - see below for the procedure for adding tiles. This tile cannot be moved or rotated and acts as the fixed reference point for other tiles.

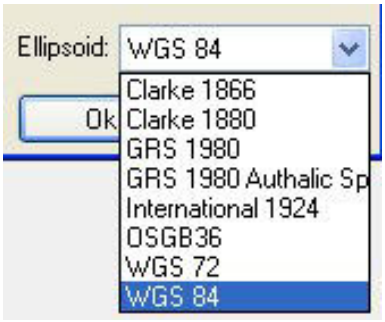
In the `Add Chart` dialog box there are three options for adding or creating a chart. The user can select to use an image with associated world file; an image with manually entered position and scale; or a blank chart with manually entered position data. These options are explained further in the following sections.

16.2.1. Image with World File

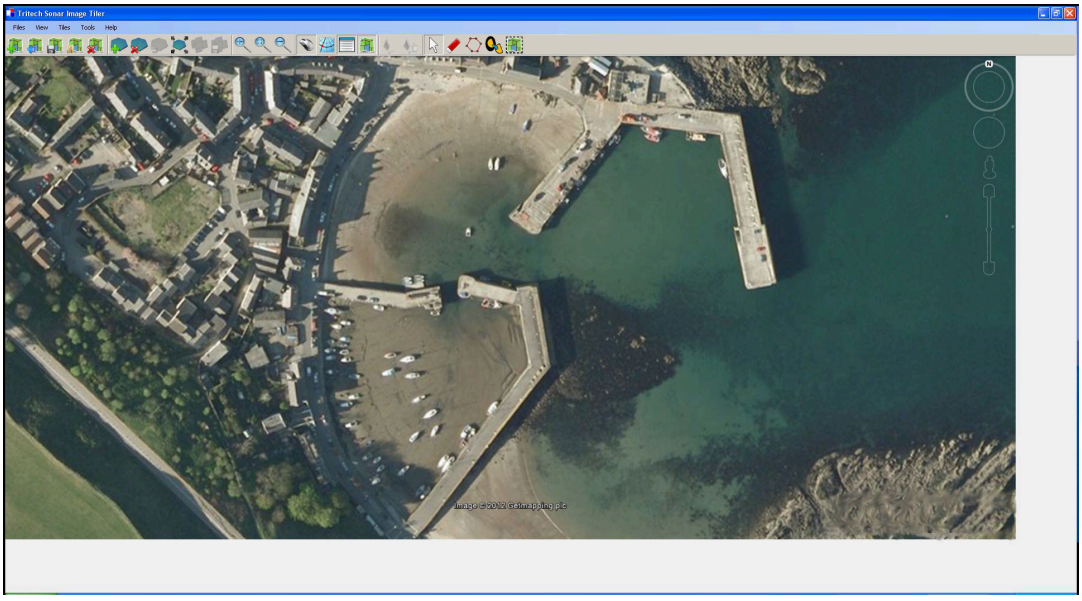
Select `Import World File` for the `Open World File` dialog and select the appropriate world file. The format of the world file can be either .bpw (bitmap), .jgw (jpeg), .tfw (tiff) or .wld (generic/CAD).



The world file format for `x` and `y` co-ordinates can either be in Eastings/Northings (E/N) or Longitude/Latitude (L/L). If co-ordinates are in E/N then a `Zone` will need to be entered and a reference `Ellipsoid` selected (for definition of latitude, longitude and elevation).

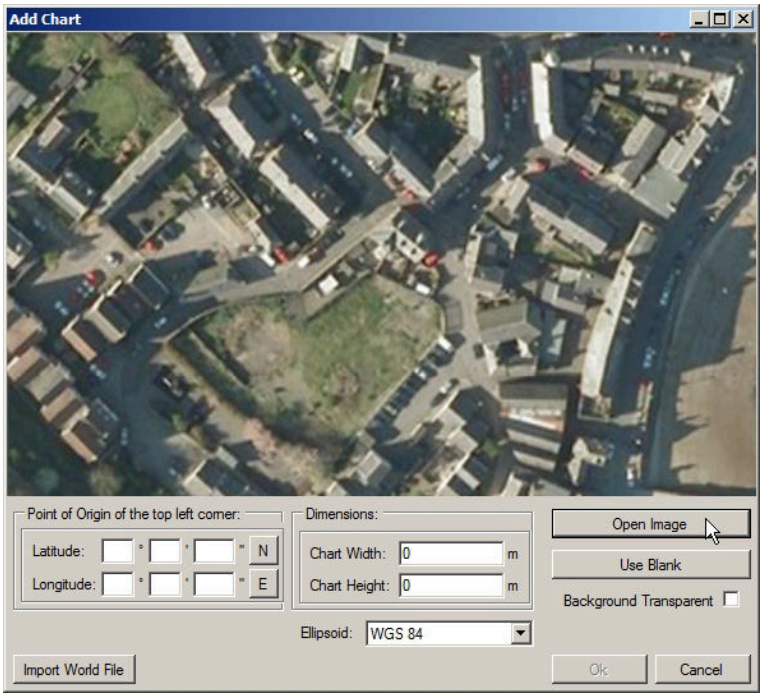


Verify chart parameters are correct and click `OK` to confirm and load this chart onto the display.



16.2.2. Image with Manual Positional Data

First, select `Open Image` button to bring up the `Open Chart` dialog and select the required chart image. The image format can either be .bmp (bitmap), .jpg (jpeg) or .tif (tiff).



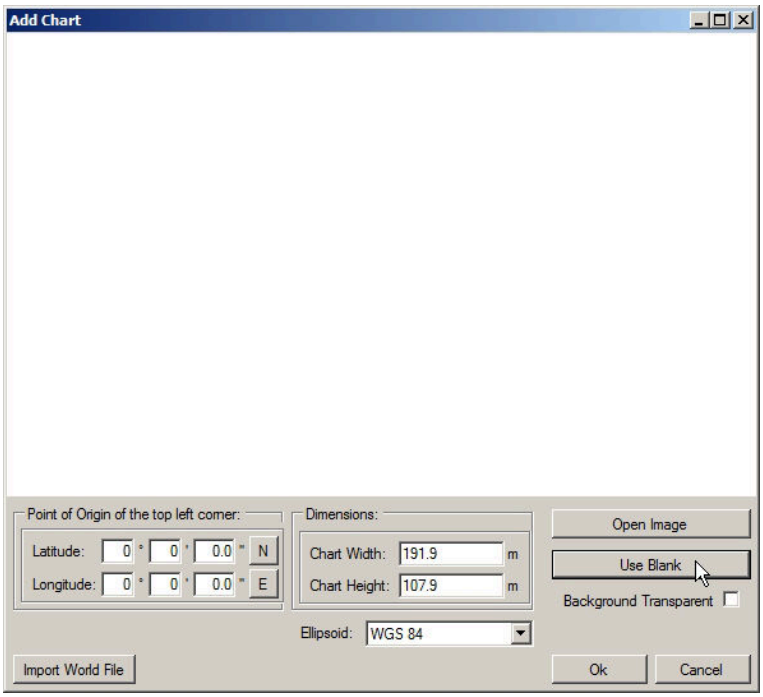
Note

Where an associated world file (matching name) is detected in the same folder as the selected image the chart parameters will automatically be loaded.

Next, enter the `Point of Origin` co-ordinates and the chart `Dimensions`. If the Universal Transverse Mercator (UTM) coordinate system is used a reference `Ellipsoid` will also have to be selected at this point (the default is WGS84 (World Geodetic System 1984)).

16.2.3. Blank Chart

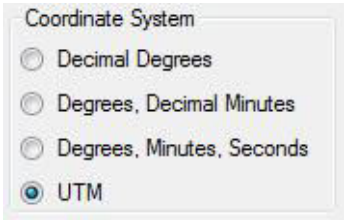
Select `Use Blank` to create a blank image for the chart background. A default width and height will be set.



The `Point of Origin` co-ordinates and the chart `Dimensions` will have to be set. If UTM then also select a reference `Ellipsoid` at this point (the default is WGS84).

16.2.4. Co-ordinate System

When creating charts the `Point of Origin` co-ordinates will be in the format that is currently selected in the `Coordinate System` panel. To change this select `Cancel` and navigate to the `Coordinate System` control (if this is not visible go to the `View` menu and select `Coordinate System`).



16.3. Add Image Tiles

Once the chart background has been loaded sonar image tiles can be added. Tiles must be within the same geographic area of the chart background.

Either click on the `Add Tile` icon,  or add the tile through the `Tools` menu and `Add Tile` option.

- A dialog enabling searching and adding of images is shown. The images can be in .bmp (bitmap), .jpg (jpeg) or .tif (tiff) formats. **A matching world file is required in the same folder or the image will not load.**
- The tile will be added on top of the chart if the geographic co-ordinates are within the background area.

- Simply repeat these steps to add further tiles.

Note

Several files can be added at the same time by holding down the `Ctrl` key whilst selecting the images.

16.4. Manipulate Image Tiles

The position information for tiles is dependent on the settings when the tile scans were created.

If the imported position is incorrect the tiles can be repositioned on the chart at any point after they have been added to provide a more accurate mosaic. There are several repositioning functions available: moving, rotating, and resizing. As well as tools to alter the appearance of shadows in tiles: automatic cropping of unwanted shadows, manual eraser, and area erase.

For full details of the possible ways to manipulate the tiles please refer to Chapter 15, *Software Functions*

16.5. Save the Project

`Save Project` allows the chart to be saved as a chart and a collection of tiles (and any markers) so it can be loaded for editing at a later date. The user is prompted for a file name, with the file type being XML.

16.6. Exporting the completed mosaic as an image

Charts can either be exported whole or areas can be selected and saved. To export the entire image simply select `Export as Image` from the `Files` menu. This will then display a dialog prompting for the desired location and name of the file. This output image will have an associated world file so it can be imported into other software packages with the geo-referencing intact.

Note

If there is an area selected on the chart, clicking `Export as Image` will only save what is contained within the selection region. The format of the saved chart will depend on the format of the input chart (i.e., a `.bmp` input will generate a `.bmp` output).

To create an output image using the `Selection Tool` follow these steps:

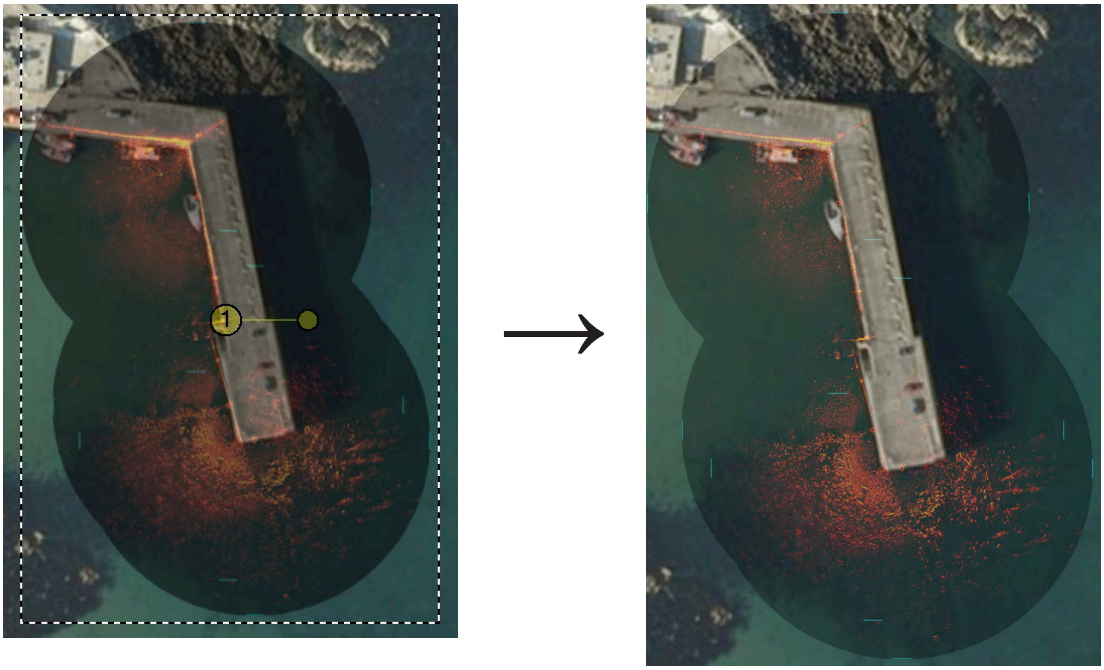
First click on the `Image Export Area` button: 

Using the left mouse button click and hold anywhere on the chart and then drag the cursor across the screen to create a selection area.

Click on the `Files` menu and go to `Export as Image`. Enter a filename and select the desired file type (.jpeg, .bmp or .tiff) then click `Save`. A world file will be created with the same filename as the image file.

Note

There will also be a `.kmz` file created. This is a Google Earth file format and will allow the image to be viewed in Google Earth.



Selection area within dotted line

Output image

Note

It is also possible to output just the tiles (i.e., without the background chart) by clicking on the `Save Mosaic` button: 

17. Supported File Formats

17.1. For Loading Tiles

In order to correctly position the images each image tile file should be accompanied by an equivalent "world file" which contains positional data. This data should come from a GPS linked into Seanet Pro. If a GPS is available Seanet Pro will automatically create a world file with the correct data when a `Snapshot` is taken.

The following file formats are supported:

Image Type	World File
.bmp	.bpw
.jpeg/.jpg	.jgw
.tiff/.tif	.tfw
.png	.pgw

Note

The image file and world file should have the same filename (i.e., `sonar.bmp` and `sonar.bpw`).

Note

The image tiles have to be saved from the latest version of Seanet Pro; if an older version is used they will not open in the Sonar Image Tiler. If in doubt, remove the current version of Seanet Pro and either download the latest version from www.tritech.co.uk or re-install from the USB which contained the Image Tiler installation program.

17.2. Saving Images or Mosaics

Saving an image can either be the whole chart (with any visible tiles or markers), a marked out section or a mosaic of tiles either way the supported formats are:

.bmp Bitmap image

.kmz Google Earth format

.png Portable Network Graphic

Note

The Sonar Image Tiler will automatically create at matching world file for the saved image.

17.3. Project Files

The Sonar Image Tiler uses a customised XML format for saving and loading projects. These project files will preserve any tile data or marker data so that they can be manipulated again at a later stage or transferred to another computer for editing.

Note

Due to the fact that the project files contain the data for all the tiles, if the project has many tiles it can result in the production of large XML files.

17.4. Marker Files

Two different marker file types are supported both of which are in CSV format but with different filename extensions and different complexity:

.mrk Seanet Pro full length marker files.

.csv A shortened version of the Seanet Pro format.

Note

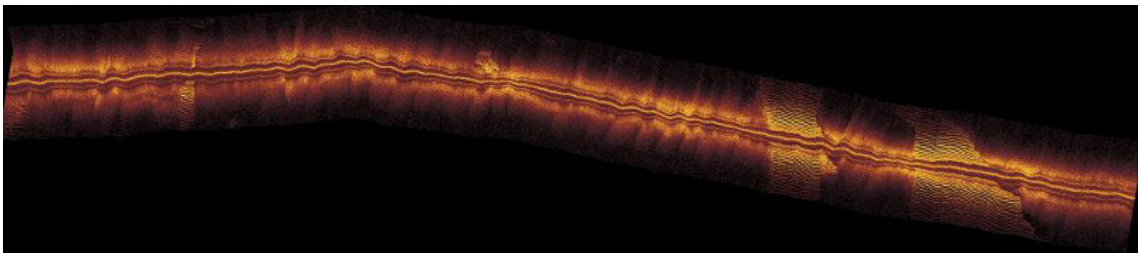
For full details of the marker file formats please see Appendix E, *Marker Files*.

18. Example: Using Sidescan Image Tiles

Several `.v4log` files have been created in Seanet Pro that contain SeaKing Sidescan and GPS NMEA data. Each file contains the sidescan data for one track from a lawnmower style survey. GeoTiff files (and corresponding world files) were created using the DumpLog utility and these file-sets were added/imported into the Image Tiler application as sonar image tiles.

The files used for this example were as follows:

GeoTIFF file: `Outfall3.TIF`
World File: `Outfall3.TFW`



Outfall3.TIF image, ©Cawthron

Contents of Outfall3.TFW:

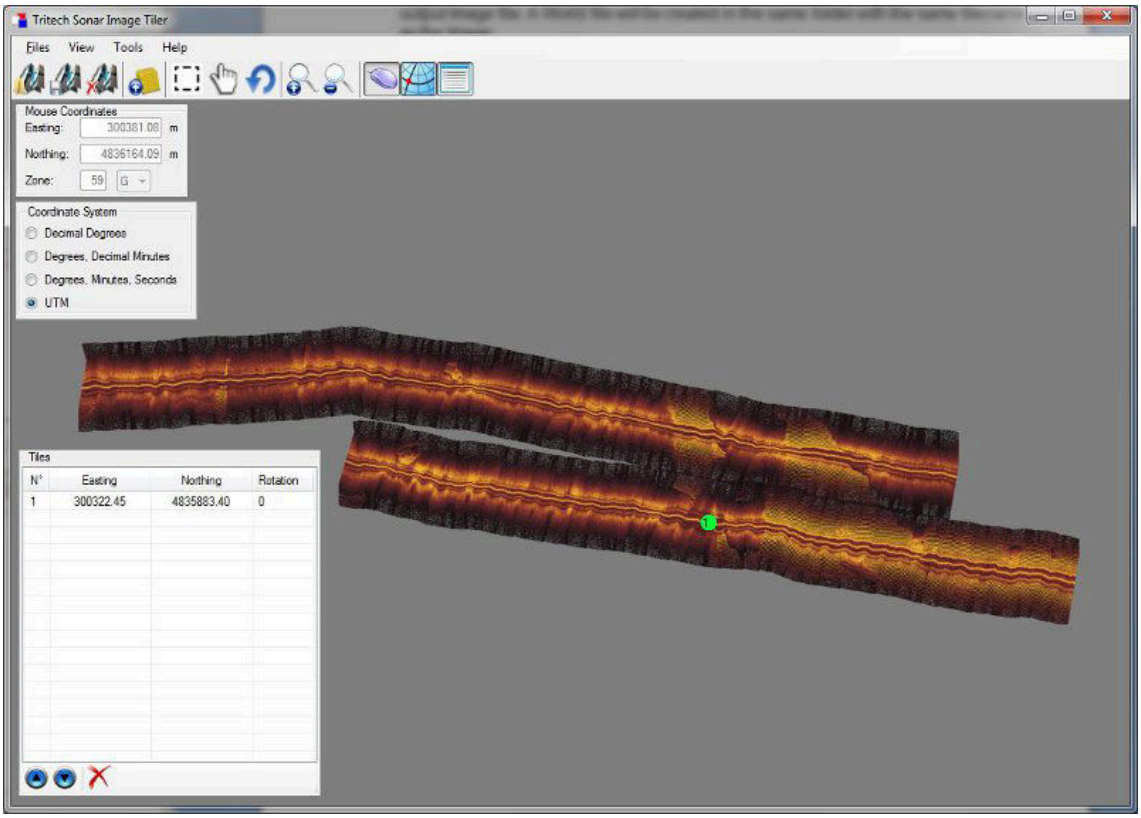
```
0.0121457489878543
     0
     0
     -0.121457489878543
     299883.8970386512
     4836012.20188229
```

Outfall4.TIF image ©Cawthron

Contents of Outfall4.TFW:

```
0.0121457489878543
     0
     0
     -0.121457489878543
     300067.466645638
     4835950.35472915
```

The TIF and TFW file sets were imported into the Sonar Image Tiler using the `Add Tile` button. The first tile imported was used as the reference background image. Further tiles were added and repositioned.



With the image tiles added an area was highlighted using the `Selection Tool` and the area was saved to file using the `Export Chart as Image` button. The saved image mosaic appears as follows:

Sidescan Images provided courtesy of Cawthron, New Zealand (image shows mega ripples of sand off the coast of Foveaux Strait near Bluff)

Part V

Service and Maintenance

19. Maintenance

19.1. After each use of the equipment

Prior to removing any active data link to the sonar head the unit must first be fully powered down.

Make sure that after using the sonar head that it is washed down with fresh water and check the unit for any signs of obvious damage.

Once the unit is clean; dry thoroughly and place in the storage container.

Note

If the unit is fitted to an ROV it is advisable to remove from its fitting and wash both with fresh water and dry both thoroughly prior to re-assembly. This will prevent the build up of corrosive salts in any crevices between the sonar and mounting bracket.

19.2. Storage of Equipment

If storing the equipment for extended periods make sure that it is completely dry (if necessary leave to air-dry before stowing).

Pack into storage containers along with several pouches of silica gel. The original packing containers contain specific foam cut-outs for the storage of the equipment so wherever possible they should be re-used. The foam will absorb moisture so if the cases are allowed to get wet they should be dried thoroughly prior to stowing equipment in them.

Any supplied cabling is jacketed with polyurethane which is resistant to corrosion but if it is intended to store the reel for an extended period without use then it is advisable to un-reel the cable and dry its entire length. This will also give the opportunity to inspect the cable for any damage which has occurred during use.

19.3. SeaKing regular maintenance

General Guidelines

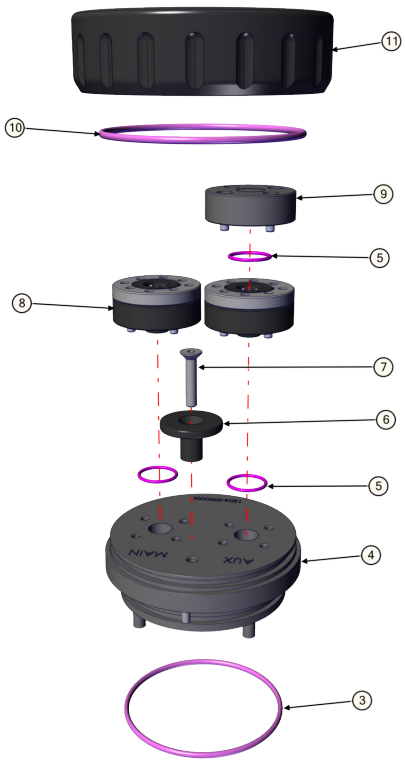
Caution

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).

19.3.1. 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.

19.3.2. 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

19.4. Software Maintenance

The operating system required on the computer is Microsoft Windows and should have appropriate anti-virus or protection software installed.

If it becomes necessary to reload the system software it is advisable to download the latest version of Seanet Pro from www.tritech.co.uk. If no Internet connection is available the supplied CD-ROM (or USB) should be used to re-install the software.

Note

Prior to installing the software make sure that Windows and any required drivers for the computer are fully installed and working.

To ensure that the system remains secure and error free it is recommended that no extra software other than is absolutely necessary (such as anti-virus software) is installed on the computer.

If the sonar has been supplied with a Tritech SCU then the operating system can be re-initialised using the provided USB memory stick. Please refer to the SCU manual for more details (*document reference: 0581-SOM-00002*).

Note

A regular backup schedule for any important log files should be in place for the computer since re-initialisation may erase the hard drive contents.

Appendix A. Towfish Assembly

A.1. Fitting the Fins and Tow Cord to the Towfish

This details the process of fitting the fins and tow cord to the SK675 and SK325 towfish.

1 Locate the aft end of the Towfish and the Delrin endcap.

2 Slide the red bungee for the fins over the endcap.

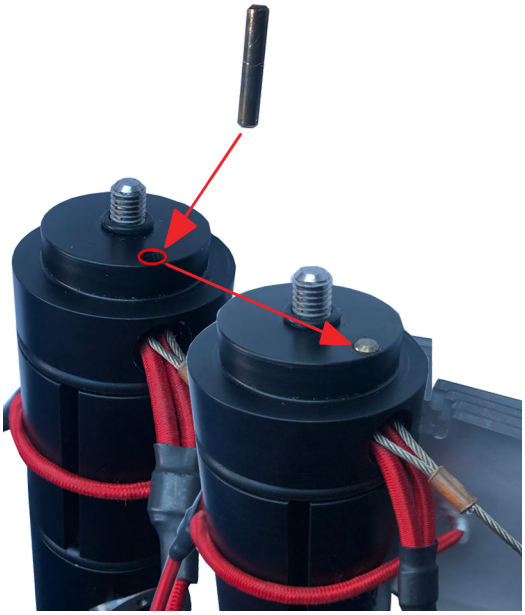
The fins do not need to be located properly at this time.

3 Unscrew the endcap to reveal the hole for the brass pin.

The brass pin will either be in the hole or supplied in the box.

4 Place the red bungee cord in first towards the fore of the fish, and the steel cord to the rear of the fish, then slide the brass pin in to hold the two parts.

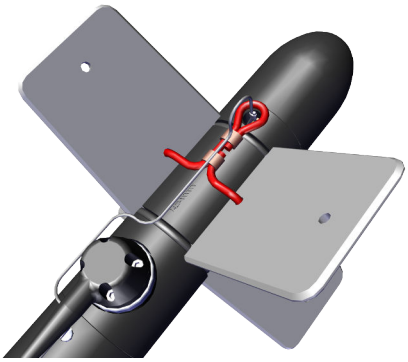
Tip: You may want to apply some Molykote 111 to the red bungee cord to allow the pin to slide in smoothly.



5 The fins can then fitted to the slots on the body as per the image to the right.

6 There is an alternate method where the steel wire is fed through the loop in the to fin assembly.

This is also a valid method of assembly.



A.2. Strain Relief Device Fitting

The strain relief is clamped to the cable, this ensures that tow forces are directed through the mount point on the towfish rather than the connector bulkhead. In crash situations it also prevents damage to the Towfish by placing it in a recovery position.

The process is detailed below:

Note
The only tool required is a 3mm Allen Key.

1 Measure out one metre from the Tritech connector on the Towfish Cable, then tape the metre mark for reference.

The strain relief is setup for a failure, when the shear pin breaks there should be no strain on the Tritech cable. The steel cable must take the strain.

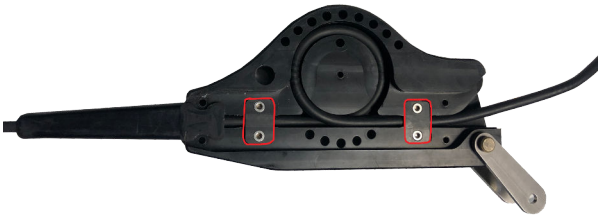
2 Locate the 5 retaining bolts on the strain relief and unscrew to remove the cover plate. The allen heads require a 3mm Allen key

3 Remove the two cable compression points and place the one metre mark at the front compression point. The clamp will cover the tape marker when fitted.

4 Then loop the cable round the internal pivot.

This is essential to the strain relief.

5 Screw on the two compression points to secure the cable.



6 Then the cover can be reattached.

And example below of a completed towfish:

20. Troubleshooting

Continuous status Timeout 10 message

No communication with the device

(In this case the Node number of the device is 10). 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 internal damage is suspected, contact *Tritech International Ltd* for service and repair options.

No seabed sonar targets observed

Sonar at incorrect height above seabed.

Ensure that the head is positioned sufficiently close to the seabed. The optimum height from seabed is 10% of the working range.

No seabed sonar targets observed (alt.)

One, or more, of the following software controls may be incorrect: Gain, Dynamic range or Threshold.

Adjust Gain, Dynamic range and Threshold controls to obtain imagery onscreen.

Appendix B. ARCNET Termination

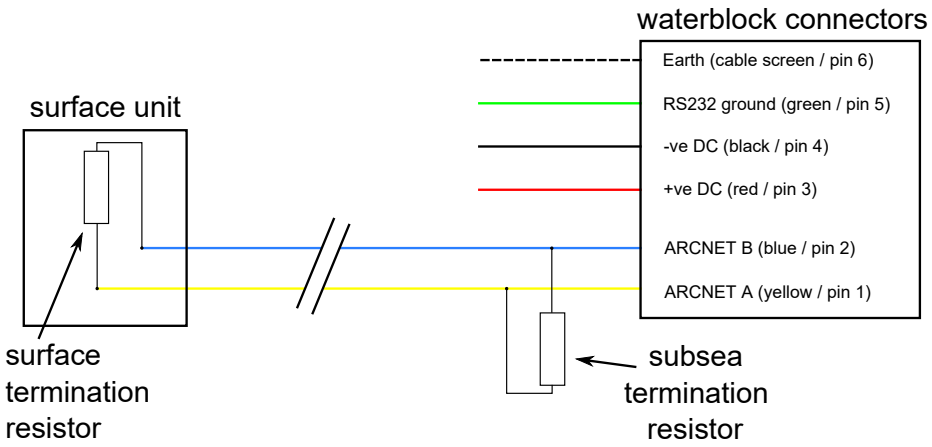
Depending on the cable length the ARCNET communication link requires a termination resistor to be installed at each end of the umbilical cable. Normally this is supplied fitted within the ARCNET cable DA-15 or within the SCU/SeaHub at the surface and is left for the user to fit at the sub-sea end in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

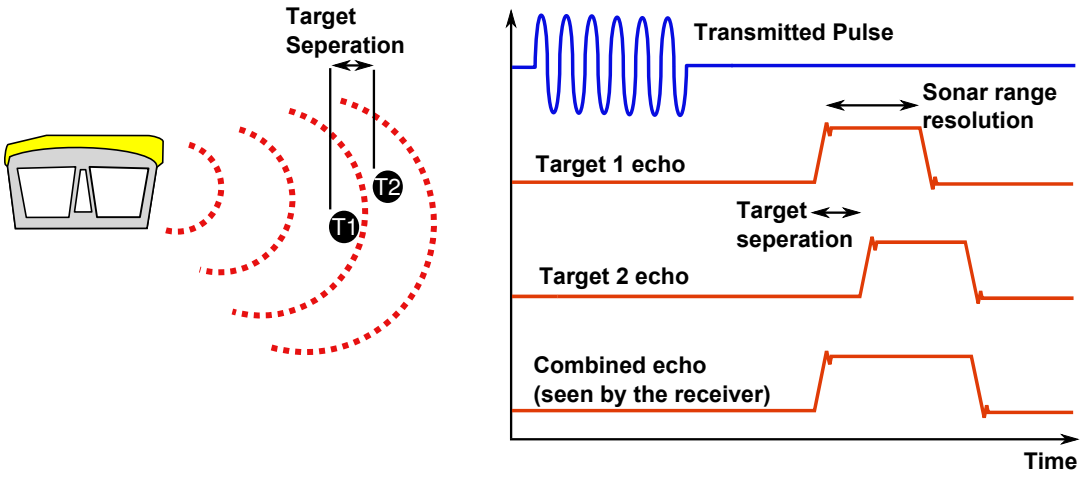
Note

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 C. CHIRP Signal Processing

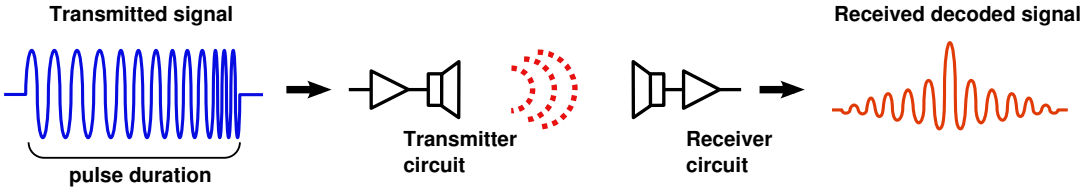
There are several advantages of *Tritech International Ltd* Digital Sonar Technology (DST) which allows the use of CHIRP signal processing technology to improve the images generated by the sonar.

In monotonic (single frequency burst) sonar, the range resolution is determined by the length of the transmitted pulse. The smaller the pulse, the greater the resolution achievable and vice-versa. The smallest pulse length is typically 50 micro seconds and velocity of sound in water is approximately 1500 metres/second which gives a range resolution of 37.5mm. This result determines the ability to resolve separate targets.



Using the example above, if two targets are less than 37.5mm apart then they cannot be distinguished from each other. The net effect is that the system displays a single large target, rather than multiple smaller targets.

CHIRP signal processing overcomes these limitations by sweeping the frequency within the burst over a broad range of frequencies throughout the duration of transmission pulse. This creates a signature acoustic pulse - the sonar knows what was transmitted and when. Using pattern matching technology, it can now look for its own unique signature being echoed back from targets.



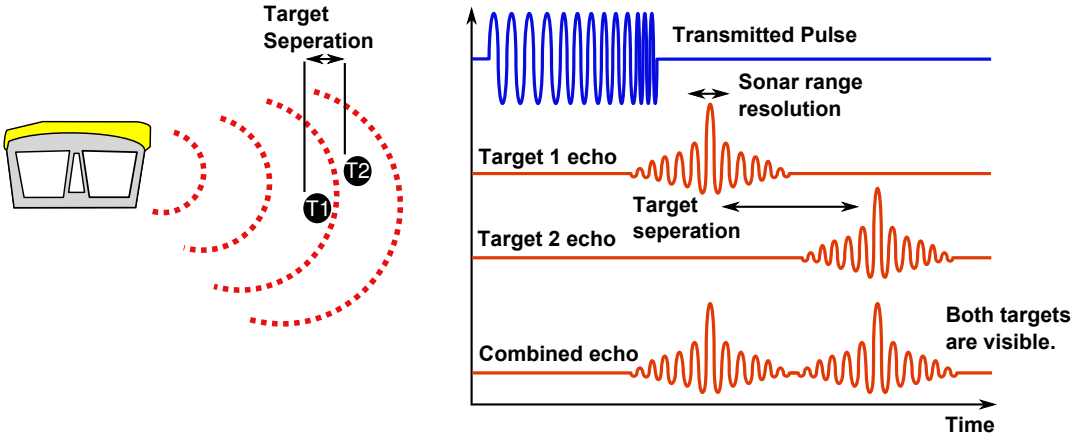
In a CHIRP system, the critical factor determining range resolution is the bandwidth of the CHIRP pulse which means the range resolution is given by:

$$\text{Range resolution} = \frac{\text{velocity of sound}}{2 \times \text{bandwidth}}$$

The bandwidth of a typical *Tritech International Ltd* CHIRP system is 50kHz.

With velocity of sound in water of 1500m/s this gives a new range resolution of 15mm.

This time, when two acoustic echoes overlap, the signature CHIRP pulses do not merge into a single return. The frequency at each point of the pulse is different, and the sonar is able to resolve the two targets independently.



The response from the pattern-matching algorithms in the sonar means that the length of the acoustic pulse no longer affects the amplitude of the echo on the sonar display. Longer transmissions (and operating ranges) can be achieved without a loss in range resolution.

CHIRP gives additional improvements in background noise rejection, as the sonar is only looking for a swept frequency echo and can remove random noise or out-of-band noise.

Appendix D. V6 COM PCB Reset

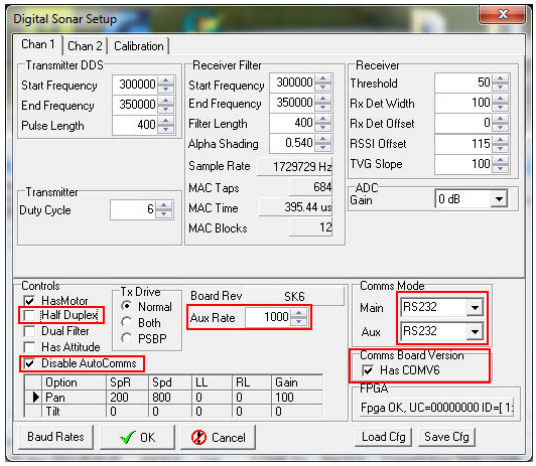
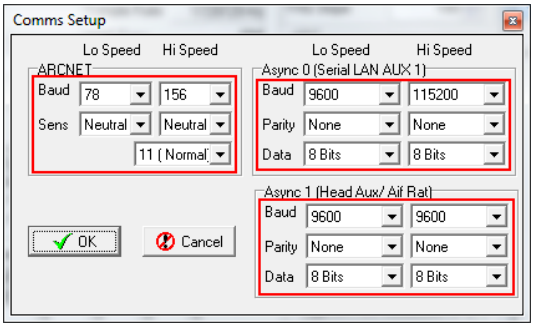
In the unlikely event that communication to a SeaKing becomes impossible, units fitted with a V6 COM PCB can be reset to a pre-determined standard using the magnetic reset function

The default values that will be applied to the SeaKing unit for the magnetic reset are as follows:

Item changed	Default value	Item changed	Default value
Main Port Comms	RS232	Aux Port Comms	RS232
Main Port Baud (Hi/Lo)	115200 / 9600	Aux Port Baud (Hi/Lo)	9600 / 9600
Main Port Parity (Hi/Lo)	None	Aux Port Parity (Hi/Lo)	None
Main Port Data-bits (Hi/Lo)	8	Aux Port Data-bits (Hi/Lo)	8
ARCNET Baud (Hi/Lo)	156 / 78	Half-Duplex	False
ARCNET Sens (Hi/Lo)	Neutral	Aux. Comms rate	1000ms
ARCNET Timeout	11 [Normal] (ET3)	Disable AutoComms	True
		COMV6 Fitted	True

Note

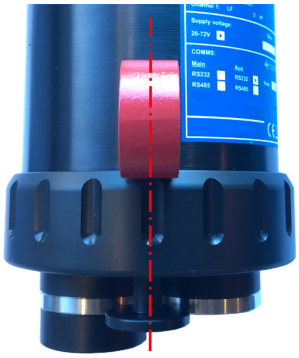
The Hammerhead Sonar defaults to *AutoComms* upon reset. This means that when it is reset it will cycle thorough all possible communication protocols and baud rates until communication is established.

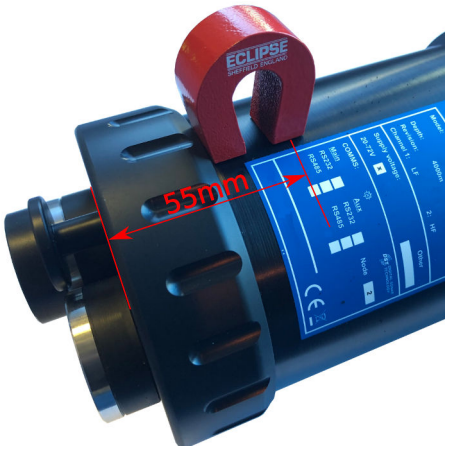
Main setup changes	Baud rate changes
	

Within the standard SeaKing accessory kit there is a strong magnet supplied specifically for this purpose.

In order to complete the reset process, the following steps will apply:

1. Ensure an RS232 COM Port is available, has been enabled within Seanet Pro and is set for 115200 Baud.
2. Using an appropriate test cable, connect the Sonar to a suitable power supply and topside control unit but do not apply power yet.
3. Place a magnet onto the reset point and apply power to the unit. Do not remove the magnet until the unit has fully powered up for 5 seconds.





Note

The internal reset hall effect is south sensitive. This means that the magnet should be orientated as per the image above with the *SE* side of the *ECLIPSE* logo over hall effect.

4. Remove the magnet and power down the Sonar
5. Power up the Sonar
6. The Sonar should now be visible within the Node table of Seanet Pro. Enter the node `Setup` page and adjust the operation of the unit to suit.

The unit can now be re-configured to the desired communications. Please refer to the *Arcnet and Serial Communications Manual - 0374-SOM-00003* for more information, or contact *Tritech International Ltd*.

Appendix E. Marker Files

Seanet Pro includes the facility to lay a series of markers to label and track objects, points of interest and way positions. These markers can be saved to file for the purpose to re-load at a later date, to form part of a report or for use with the Sonar Image Tiler program.

There are two formats of marker file:

1. A full, comma separated file format with the filename extension `.mrk`
2. A shortened, comma separated format with the filename extension `.csv`

Full Marker File Format (.mrk extension)

This is the format that is native to Seanet Pro and includes full details of the marker configuration. The file is in an ASCII Comma Separated format and contains the following fields:

Index	Value	Description
1	ID	This is a unique string ID. It comprises a 2 letter header ("mk") followed by a DateTime code. Any unique string value is acceptable.
2	Group	This is unused and should be set to 0.
3	X Coordinate	For the .mrk file this will always be output in UTM Easting.
4	Y Coordinate	For the .mrk file this will always be output in UTM Northing.
5	Altitude	This is UTM Altitude and is currently unused.
6	UTM Zone Parallel	Zone latitudinal letter (e.g. 'C' through 'X').
7	UTM Zone Meridian	Zone longitudinal number (e.g 1 through 60).
8	UTM Ellipsoid	Ellipsoid code (0 = Airy, 1 = Australian National, 2 = Bessel1841, 3 = Clarke 1866, 4 = Clarke 1880, 5 = Everest, 6 = GRS80, 7 = International 1924, 8 = Modified Airy, 9 = WGS84).
9	Point Size	Applies to Circle, Square & Triangle shape types only, otherwise set to 0.
10	Date & Time	Date & Time in English(GB) Locale. Format is "dd/mm/yyyy hh:mm:ss"
11	Shape Type	0 = Circle, 1 = Square, 2 = Triangle, 3 = Sonar Range, 4 = Preset Image (see Image Info below).
12	Shape Colour	Applies to Circle, Square and Triangle shape types only, otherwise set to 00000000 (32 bit RGBA).
13	Font Inner Colour	Applies to Comment Text (32 bit RGBA).
14	Font Outer Colour	Applies to Comment Text (32 bit RGBA).
15	Marker Bitwise	Bit 1 = Show Marker, Bit 2 = Show Coordinates, Bit 3 = Show Comment Text (i.e. 00000111 = Show All).
16	Image Info	Presets = Red Flag, Blue Flag, Green Flag, Buoy, Anchor, Rock, Danger, POI, ViewPort, Sonar, Diver, Wheel, Comment or MLO Alternatively can be full path and name of an image file (e.g. 'C:\Image1.bmp').
17	Comment	Comment text.

For example, the following two markers would produce a two line .mrk file as shown:


```
mk41149.5595988657,0,548699.614997778,6313221.96999907,-5.3544902067987E-76,V,30,9,0,
   28/08/2012 13:25:51,4,00000000,00FFFFFF,00000000,7,Red Flag,Possible Wreck Site
mk41149.5605201736,0,548724.213265236,6313198.87994614,-5.3544902067987E-76,V,30,9,0,
   28/08/2012 13:27:48,4,00000000,00FFFFFF,00000000,7,Rock,WARNING! ROCKS
```

Shortened Marker File Format (.csv extension)

This file format is a more concise and usable format, particularly for loading a pre-defined target list into Seanet Pro. The file is in an ASCII Comma Separated format and contains the following fields:

Index	Value	Description
1	ID	This is a unique string ID. It comprises a 2 letter header ("mk") followed by a DateTime code. Any unique string value is acceptable.
3	X Coordinate	For the .csv file, will be in coordinate system used in Seanet (either Longitude or UTM Easting).
4	Y Coordinate	For the .csv file, will be in coordinate system used in Seanet (either Latitude or UTM Northing).
17	Comment	Comment text.
11	Shape Type	0 = Circle, 1 = Square, 2 = Triangle, 3 = Sonar Range, 4 = Preset Image (see Image Info below).
16	Image Info	Presets = Red Flag, Blue Flag, Green Flag, Buoy, Anchor, Rock, Danger, POI, ViewPort, Sonar, Diver, Wheel, Comment or MLO Alternatively can be full path and name of an image file (e.g. 'C:\Image1.bmp').
10	Date & Time	Date & Time in English(GB) Locale. Format is "dd/mm/yyyy hh:mm:ss"

For example, the following two markers would produce a two line .csv file as shown:


```
mk41149.5595988657,-2.1991799999203,56.9600300036883,Possible Wreck Site,4,Red Flag,
   28/08/2012 13:25:51
mk41149.5605201736,-2.19877999992026,56.9598200036882,WARNING! ROCKS,4,Rock,
   28/08/2012 13:27:48
```


Glossary

.bmp	The standard filename extension for bitmap images.
.kml	The standard filename extension for a Keyhole Markup Language file which contains georeferencing data. This file will either be incorporated within a `.kmz` file or requires an accompanying image file (with the same file name) to be valid. Used by Google Earth.
.kmz	The standard filename extension for a compressed file containing the Keyhole Markup Language file (`.kml`) and image file. For storing georeferencing data and images in a single file. Used by Google Earth.
.mrk	The standard filename extension for marker files exported from Seanet Pro, saved as a text file in tabular format with table cells separated by commas.
.png	The standard filename extension for Portable Network Graphics - a bitmapped image format employing lossless compression.
.tiff or .tif	The standard filename extension for Tagged Image File Format.
.v4log	The standard file format used by Seanet Pro log files.
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
CPU	Central Processing Unit, the processor of a computer.
CSV	Comma Separated Value - a text file in tabular format with table cells separated by commas, usually given the filename extension `.csv` but this can vary depending on the application.
DA-15	A 15 pin D shaped connector used mainly for the ARCNET connection on the SCU and SeaHub.
DC	Direct Current
DST	Digital Sonar Technology
GeoTiff	A public domain standard file format which allows georeferencing information to be embedded into a TIFF (Tagged Image File Format) image, uses the filename extension `.tif` or `.tiff`.
Google Earth	A virtual globe, map and geographical information program, originally called EarthViewer 3D prior to being acquired by Google Inc. in 2004.
GPS	Global Positioning System.
JPEG or JPG	Joint Photographics Expert Group - a compression method and file format for image files, files can be stored with either `.jpeg` or `.jpg` file extensions
Kevlar	Poly-paraphenylene terephthalamide high strength, light weight, material branded and sold as Kevlar by DuPont.

NMEA	National Marine Electronics Association - a USA based standards association responsible for overseeing electrical and data communications standards between marine devices (due to become the IMEA or International Marine Electronics Association in 2012).
PC	Personal Computer
PSU	Power Supply Unit
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.
ROV	Remotely Operated Vehicle
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.
Sidescan	A sonar that is typically towed behind a boat or mounted to the side of an ROV which takes a series of narrow sonar images that are joined together to form strips. Typically used for survey work.
Tritech waterblock	The 4000m depth rated connector developed by *Tritech International Ltd* for their subsea equipment.
TX	Transmit (data)
USB	Universal Serial Bus.
USBL	Ultra Short Base Line (positioning system)
UTC	Coordinated Universal Time (time data closely related to Greenwich Mean Time (GMT)).
UTM	Universal Transverse Mercator coordinate system - a 2-dimensional Cartesian coordinate system to give locations on the surface of the Earth.

WGS84

World Geodetic System (1984 revision) - a standard for use in cartography, geodesy and navigation and used as the reference coordinate system by GPS devices.

world file

A file used by the Tritech Sonar Image Tiler program which is designed to accompany an image file and contains geo-referencing data. The file format will have different extensions depending on the format of the image file:

Image type	World file extension
.bmp	.bpw
.jpg or .jpeg	.jgw
.tif or .tiff	.tfw
.png	.pgw

XML

Extensible Markup Language. A markup language and file format that is designed to be both human and machine readable.

