

*Please read this manual carefully before setting-up and using your unit*

# **Seanet System (DST ROV Sidescan Sonar) Operator Manual**

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## Handling of Electrostatic-Sensitive Devices



### ATTENTION

### Observe Precautions For Handling Electrostatic Sensitive Devices

**Caution: Certain semiconductor devices used in the equipment are liable to damage due to static voltages.**

Observe the following precautions when handling these devices in their unterminated state, or sub-units containing these devices:

- Persons removing sub-units from any equipment using electrostatic sensitive devices must be earthed by a wrist strap via a 1M $\Omega$  resistor to a suitable discharge reference point within the equipment.
- Soldering irons used during any repairs must be low voltage types with earthed tips and isolated from the Mains voltage by a double insulated transformer. Care should be taken soldering any point that may have a charge stored.
- Outer clothing worn must be unable to generate static charges.
- Printed Circuit Boards (PCBs) fitted with electrostatic sensitive devices must be stored and transported in appropriate anti-static bags/containers.

F110.1

## Warranty Statement

**Tritech International Limited** herein after referred to as **TIL**

TIL warrants that at the time of shipment all products shall be free from defects in material and workmanship and suitable for the purpose specified in the product literature.

The unit/system warranty commences immediately from the date of customer acceptance and runs for a period of 365 days. Customer acceptance will always be deemed to have occurred within 72 hours of delivery.

**Note:** Any customer acceptance testing (if applicable) must be performed at either TIL premises or at one of their approved distributors unless mutually agreed in writing prior to despatch.

### Conditions:

**These include, but are not limited to, the following:**

- 1 The warranty is only deemed to be valid if the equipment was sold through TIL or one of its approved distributors.
- 2 The equipment must have been installed and commissioned in strict accordance with approved technical standards and specifications and for the purpose that the system was designed.
- 3 The warranty is not transferable, except or as applies to Purchaser first then to client.
- 4 TIL must be notified immediately (in writing) of any suspected defect and if advised by TIL, the equipment subject to the defect shall be returned by the customer to TIL, via a suitable mode of transportation and shall be freight paid.
- 5 The warranty does not apply to defects that have been caused by failure to follow the recommended installation or maintenance procedures. Or defects resulting from normal wear & tear, incorrect operation, fire, water ingress, lightning damage or fluctuations in vehicles supply voltages, or from any other circumstances that may arise after delivery that is out with the control of TIL.  
(**Note:** The warranty does not apply in the event where a defect has been caused by isolation incompatibilities.)
- 6 The warranty does not cover the transportation of personnel and per diem allowances relating to any repair or replacement.
- 7 The warranty does not cover any direct, indirect, punitive, special consequential damages or any damages whatsoever arising out of or connected with misuse of this product.
- 8 Any equipment or parts returned under warranty provisions will be returned to the customer freight prepaid by TIL
- 9 The warranty shall become invalid if the customer attempts to repair or modify the equipment without appropriate written authority being first received from TIL.
- 10 TIL retains the sole right to accept or reject any warranty claim.
- 11 Each product is carefully examined and checked before it is shipped. It should therefore be visually and operationally checked as soon as it is received. If it is damaged in anyway, a claim should be filed with the courier and TIL notified of the damage.

**Note:** TIL reserve the right to change specifications at any time without notice and without any obligation to incorporate new features in instruments previously sold.

**Note:** If the instrument is not covered by warranty, or if it is determined that the fault is caused by misuse, repair will be billed to the customer, and an estimate submitted for customer approval before the commencement of repairs.

F167.1

**STATUTORY COMPLIANCES**

**Compliance Notice – CE Mark**

**Declaration of Conformity (DoC)**

“Hereby, *Tritech International Limited* declares that this product is in compliance with the essential requirements and other relevant provisions of the Directive 1999/5/EC.”



This notice is based upon compliance of the product to the following directives and standards

- 73/23/EEC Low Voltage Directive with amendment 93/68/EEC
- 89/336/EEC EMC Directive with amendments 92/31/EEC and 93/68/EEC

**Waste Electrical and Electronic Equipment Directive (2002/96/EC - WEEE)**

*Tritech International Limited* is very aware of its responsibilities to the environment and to the sustainability of the resources of our planet. The European Commission has issued the above Directive in an effort to reduce the impact on the environment due to electronic appliances being committed to landfill after they have come to the end of their useful life.

When the appliance referred to in this manual is no longer serviceable, it **MUST NOT** be discarded by placing in landfill, dumping in the sea or incineration. **SEPARATE** collection is mandatory.

The owner of the appliance should either return it and its associated leads & accessories, if appropriate, to *Tritech International Limited* with a certificate of decontamination (we reserve the right to protect our staff from the effects of any contamination) or sent to an appropriate treatment or recycling agency.

Any goods manufactured after 08/2005 that fall within the scope of the WEEE Directive are marked as shown opposite and will have the date of manufacture and the manufacturer’s identification marks.






**Safety Statements**

	<b>NOTE</b> <i>Throughout the manual certain potential problems, or further information relating to the installation, maintenance, understanding or use of the apparatus will be highlighted to the operator by indications identified by the adjacent symbol and text.</i>
	<b>CAUTION!</b> <i>Throughout the manual certain safety or operational related comments and requirements will be highlighted to the operator by indications identified by the adjacent symbol and text.</i>
	<b>DANGER!</b> <i>Throughout the manual certain safety or operational related comments and requirements that could lead to injury or loss of life will be highlighted by the adjacent symbol and text.</i>

## Technical Support

**Contact your local agent or Tritech International Ltd**

	<b>Mail</b>	<b><i>Tritech International Ltd.</i></b> Peregrine Road, Westhill Business Park, Westhill, Aberdeen, AB32 6JL, UK
	<b>Telephone</b>	++44 (0)1224 744111
	<b>Fax</b>	++44 (0)1224 741771
	<b>Email</b>	support@tritech.co.uk
	<b>Web</b>	www.tritech.co.uk

**An out-of-hours emergency number is available by calling the above telephone number**

If you have cause to use our Technical Support service, please ensure that you have the following details at hand **prior** to calling:

- System Serial Number (if applicable)
- Fault Description
- Any remedial action implemented

Due to the expansion of equipment capabilities and the fact that new sub-modules are continually being introduced, this manual cannot detail every aspect of the operation.

The name of the organisation which purchased this system is held on record at *Tritech International Ltd*. Details of new software and hardware packages will be announced at regular intervals. Depending on the module, free upgrades will be offered in keeping with our policy of maintaining the highest levels of customer support.

*Tritech International Ltd* can only undertake to provide software support for systems loaded with Operating System and Tritech Seanet software in accordance with the instructions given in the System Re-installation section of this manual. It is the customers responsibility to ensure the compatibility of any other package that they may choose to load unless with the prior consent of *Tritech*.

## **SECTION 1**

### **1.1 GENERAL OVERVIEW**

The system consists of SeaKing ROV Sidescan Sonar unit and ‘Seanet’ control and display software. The unit will be controlled via an AIF card or SKIM-100 module on the surface\*.

Now with Digital Sonar Technology (DST) using CHIRP pulses the SeaKing sensors are setting new standards for range resolution. CHIRP started life in the world of radar, standing for Compressed High Intensity Radar Pulse. It has been readily adapted for use in the world of subsea acoustics but had previously only been used in very expensive sidescan and sub-bottom systems. Trittech are therefore proud to bring these benefits to the ROV market.

The ‘Seanet’ software is Windows® based and will run best on a display of resolution 800x600 or 1024x768 with 16-bit / 32-bit colour resolution.

The Sidescan Sonar unit is configured to communicate with the AIF / SKIM-100 using the ARCNET LAN telemetry protocol. This is the standard protocol that is used in all SeaKing devices and provides high bandwidth at a default communications rate of 156kBaud. The ARCNET LAN is a 2-wire terminated link, installed between the AIF / SKIM-100 and Sensor head(s). A good twisted pair of up to 1.5km in length can be used for this link to handle the ARCNET default transmission rate of 156kBaud. It is possible to re-configure AIF / SKIM-100 and Sidescan to communicate at the lower rate of 78kBaud. This would achieve communications over longer cable lengths although this would be to the detriment of system bandwidth.

The ARCNET 2-wire link must be suitably terminated with resistors fitted between the twisted pair at the cable end points. This is described in more detail later in this document.

### **1.2 ROV SIDESCAN SPECIFICATION**

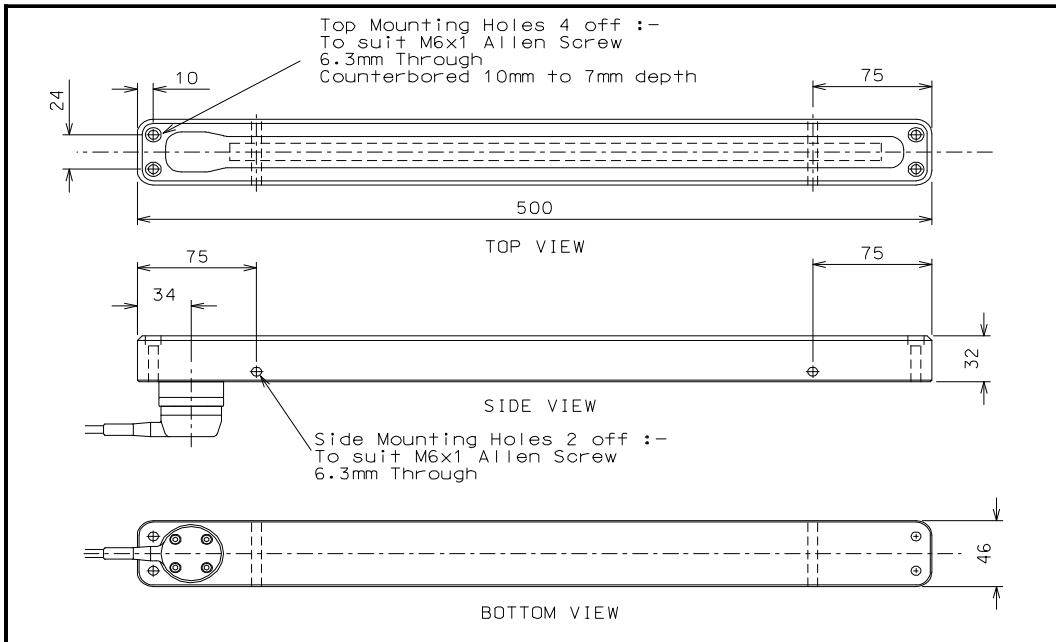
Transmitter Source Level	208dB re 1µPascal.m
Transmitter Pulse Length	50-200 µs
Receiver Sensitivity	2mV R.M.S.
Gain Control Range	80 dB
Display Dynamic Range	40 dB
Data Sampling Rates	5-200 µs
Data Resolution	4-8 bits
Power Requirements	30VDC, 5 Watts
Power Range	12 VDC to 36 VDC
Comm’s protocols	ARCNET multidrop
Data rates	156.25 kBaud
Cable Connector	Tritech 6pin
Towfish cable type	Kevlar re-inforced

#### **1.2.1 SeaKing 675 kHz**

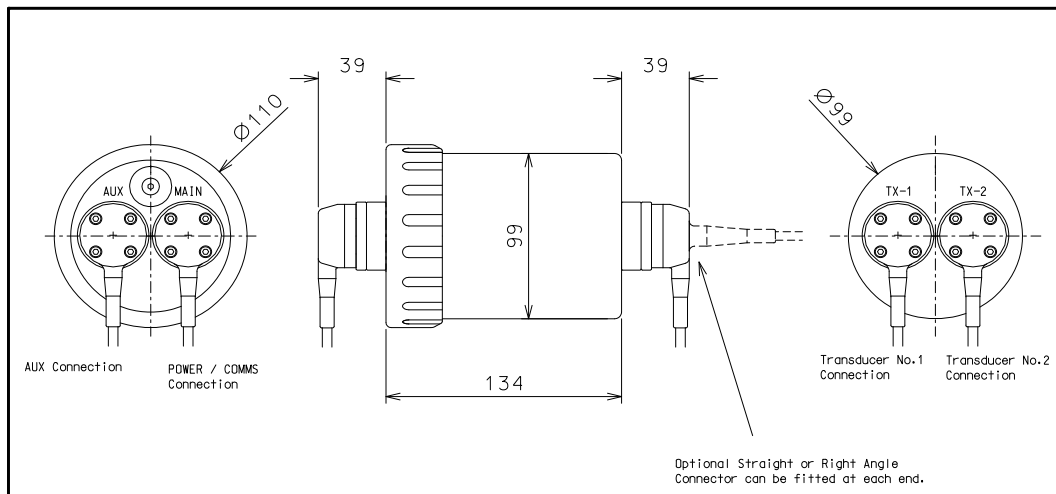
Frequency of Operation	675 kHz
Bandwidth	30 kHz
Beam Width (Standard)	0.45°
Beam Height	50°
Beam Centre Line	25° below horizontal

### 1.2.2 SeaKing 325 kHz

Frequency of Operation	325 kHz
Bandwidth	15 kHz
Beam Width (Standard)	0.65°
Beam Height	50°
Beam Centre Line	25° below horizontal



**Fig. 1.1 SeaKing ROV Mounted Sidescan - Transducer Assembly (x2)**



**Fig. 1.2 SeaKing ROV Mounted Sidescan – Electronics Housing**

## SECTION 2

### 2.1 INSTALLATION & CONFIGURATION DETAILS

The DST ROV Sidescan Sonar Unit comprises of two separate transducers which are connected with interconnect leads to a dual channel electronics pod. The transducer arrays are available in different configurations for various beam shapes.

A waterblock connector is fastened to the electronics pod, and provides a 4000metre rated pressure bulkhead. The 6-way underwater connector is secured to the waterblock (fitted to the body tube) using four cap screws; this connects to the pins on the PSU/COMMS PCB. An O-ring seals the connector to the waterblock.

The SEAKING Sidescan systems have the facility for the Gain and Time Variable Gain (TVG) slope to be set-up from the Surface Control Unit, to specific user requirements.

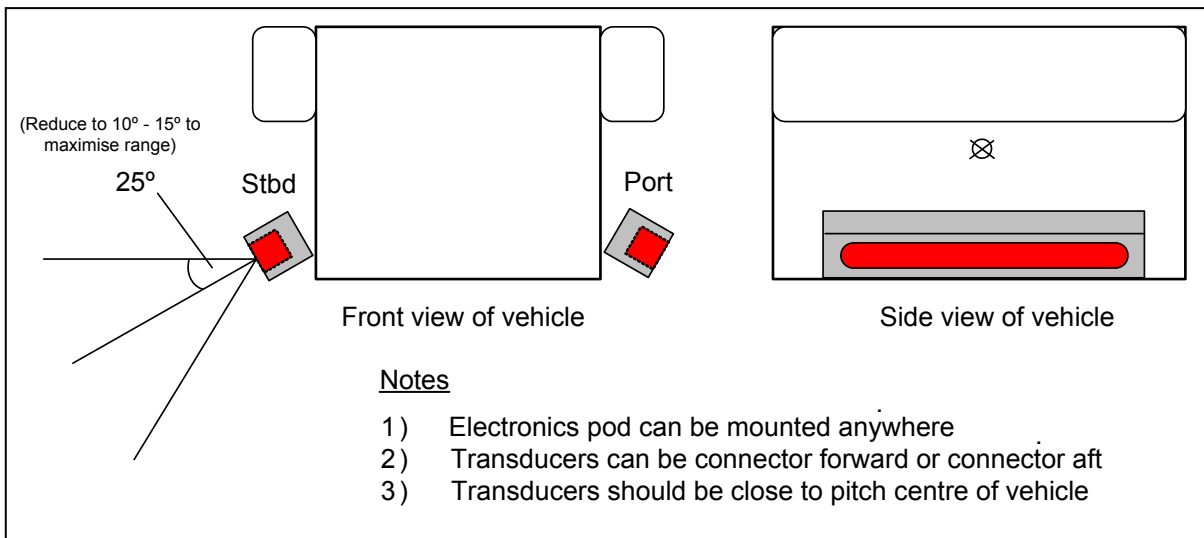


Fig. 2.1 SeaKing ROV Mounted Sidescan Installation

The Port and Starboard transducers should be mounted at an ideal Tilt Angle of 25 degrees below horizontal (as indicated in Fig 2.1). This will reduce the length of the “blind spot” directly below and to each side of the vehicle which do not fall within the transmit beam coverage. With the transducers mounted at a 25 degree Tilt Angle, the Sidescan can be flown at a suggested height of around 10% of the configured Range Scale.

To increase the maximum range capability, apply a combination of reducing the Tilt Angle to between 10 to 15 degrees below horizontal and/or flying the vehicle at a raised height of between 10 to 20% of the configured Range Scale. Applying either of these methods will of course increase the length of the blind spot and so near targets underneath the vehicle may resultantly be missed.

The SEAKING Sidescan transducers are each supplied with their own colour coded waterblock connector and interconnect cable to the electronics pod. The electronics pod has its own water block connector and is supplied with a cable tail to connect to the customers system. Depending on the specification of the system, this cable will either need to be terminated to a suitable connector appropriate to the operators equipment, or may be supplied with a cable assembly to one or more additional connectors.

The waterblock is fastened to the electronics pod, and provides a 4000metre rated pressure bulkhead. This will protect the electronics from water ingress in case the connector is damaged or

not fitted correctly. The connector may be disconnected from the heads by unscrewing the four securing screws and removing the connector from the waterblock.



***It is not necessary to remove the water block when removing the connector or taking the pod apart. When the connector is removed from the head, the blanking plugs supplied should be fitted to prevent the ingress of dirt or moisture.***

### 2.1.1 Seanet Software

The **SEANET** Windows® software will be provided either on an Installation CD (for SKIM-100 interface to user PC/Laptop) or pre-installed on the Seanet SCU.

For the CD Installation, if Setup does not auto-run on disc insertion, run the SETUP.EXE file from the disc to start the installation. Details for installing or re-installing software onto the Seanet SCU can be found in the System section of the manual.

## 2.2 INSTALLING THE SIDESCAN TOWFISH



***Although the SeaKing ROV Sidescan is rugged, it should be handled with care, particularly the connector and transducer heads.***

If the SeaKing ROV Electronics bottle is to be secured to an underwater vehicle or like, then the clamping should be on the cylindrical body section. Also, mount the Transducer heads as shown in an earlier diagram such that the transducer face (with coloured plastic covering) is unimpeded or shielded. Any metallic clamps should be electrically insulated from the body by means of rubber or plastic strips or mounting brackets of at least 3mm thickness and extending at least 3mm beyond the clamp boundary to reduce any galvanic corrosion effect. Non-metallic clamps are preferable; if metallic clamps are used (especially if they are other than aluminium) they should be painted or lacquered with at least two or three coatings. Brass or bronze materials should be avoided unless they have aluminium content as their copper content may cause serious corrosion problems when in proximity to aluminium components.

### 2.2.1 SeaKing Communication Configuration

The ROV Sidescan may form part of an ArcNet multi-drop, network of sensors that are normally interfaced to the Surface Unit through the internal AIF interface PCB (located in slot 7 of the SCU) or external SKIM-100 serial interface module. Full details of all the connections are contained in the main System manual.

Normal communications with the ROV Sidescan is via a customised version of the ARCNET network system and requires a good quality balanced twisted pair cable. It is possible to interface the ARCNET to wide band multiplexer systems, contact Trittech for details.



***The 'ARCNET' does require termination resistors to be fitted at each end of the umbilical. Normally this is supplied fitted within the D connector at the surface, and is left for the user to fit at the subsea end in a convenient 'J' box. This is the easiest system to adopt when using multiple sensors on the network. However if just one device is in use it may be more convenient to fit the resistor inside the subsea unit. Devices fitted with a termination resistor should be appropriately labelled, but the user can perform a check by measuring the resistance between pins 1 and 2 on the water block connector.***

The SEANET SCU and SEAKING heads cannot be used with RS-232 / RS-485 AIF Cards as used in earlier WINSON based SCU-3 systems. They must be used with SeaKing AIF ArcNet Cards (AIFV3/V4).

Conversely, RS-232/RS-485 Series 2 Sonar, Profiler and other heads cannot be directly used with SEAKING/SEANET systems. Contact Tritech or local agent for details.

An optional RS-232 interface can be provided to allow telemetry connection through a fibre optic system capable of 115kbaud transmission. The RS-232 interface is available in the guise of an RS-232 to ARCNET 'converter' PCB that is installed in a dry pod on the vehicle. Alternatively, an intelligent 4000m pressure rated Junction Box will provide the RS-232 interface to the network of SeaKing ARCNET devices.



***There is a single-head RS-232 option built into SeaKing heads but this is not multi-drop.***

### **2.2.2 Subsea Sensor Electrical Installation**

The SeaKing range of Subsea Sensors are designed to work from a smoothed DC power supply of 18v-36v DC (Absolute Maximum 36v DC).

If using a rectified transformer PSU, the output of the PSU must have a filter capacitor of not less than 470µF, for each head being powered. If an unregulated PSU is used, then make sure that the voltage value measured at the head is in the range 18-36v DC, in power on/off and running conditions. If powering the head(s) down a long lead or umbilical, the maximum recommended loop resistance of the power line must not exceed 10Ω for one head, 5Ω for two heads, and 3Ω for three heads. If the supplied voltage is less than 18v DC the head may not operate correctly.



***Never try to make SeaKing sensor heads work down a long cable by increasing the PSU output voltage above 36v DC.***

### **2.2.3 Ground Fault Monitoring Equipment**

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

### 2.2.4 Sonar Head Subsea Interconnect Cabling

The Underwater Connector supplied is Tritech 6-way. The wiring code for the ROV version is shown below.



The numbers shown relate to all schematic diagrams, (not a DIN style format). Ignore any moulded numbers by the pins.

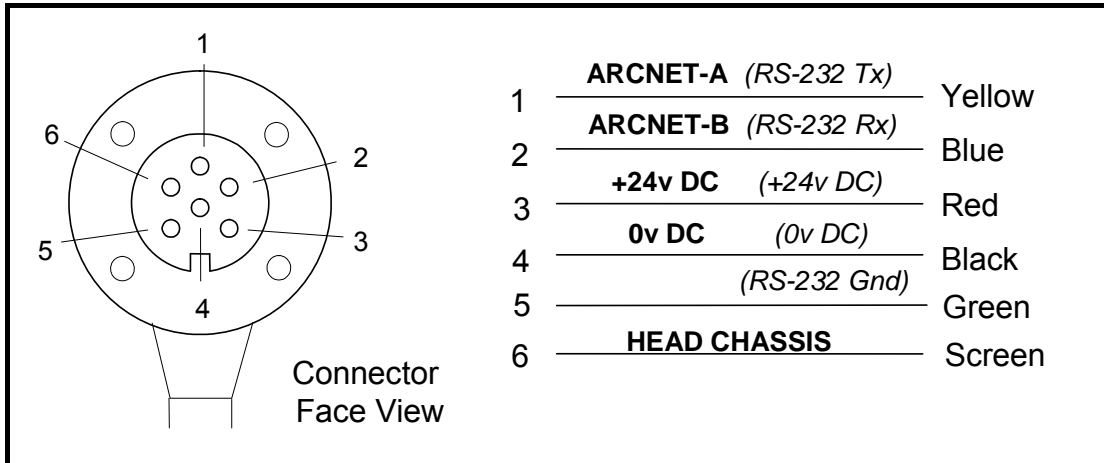


Fig 2.2 Tritech 6-Way Underwater Connector - Wiring Configuration

Pin-outs for optional single-node RS-232 communications are shown in italics.

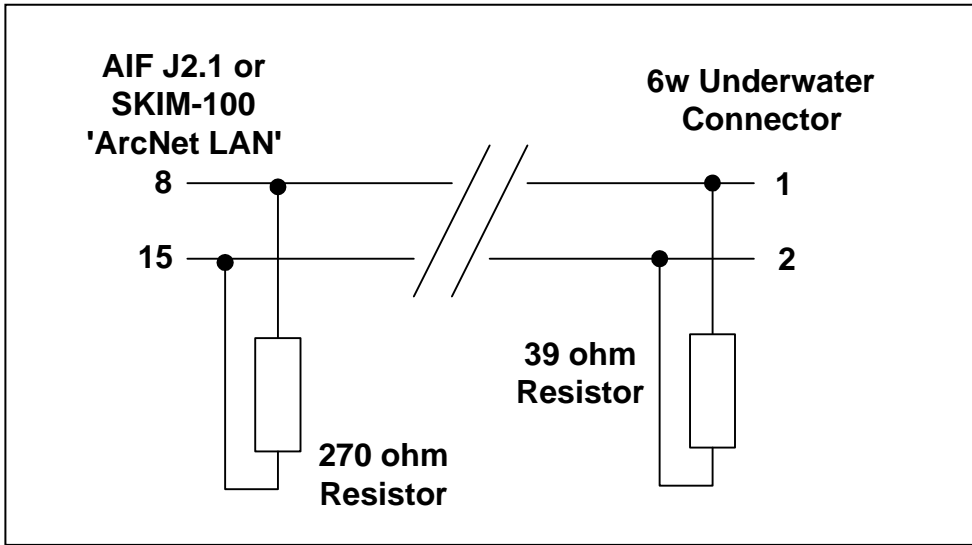


Refer to the document “Seanet Pro Sensor Communication Manual” for more information on RS232 configuration and baud setup.

### 2.2.5 ArcNet Line Termination

The ArcNet communication link normally requires termination resistors to be installed at each end of the umbilical cable. These resistors are fitted between each line of the twisted pair and will normally have been installed when supplied.

For twisted pair cables, two termination resistors should be installed, one at either end of the cable. At the surface AIF / SKIM-100 connection point, a **270 ohm** resistor should be fitted inside the 15-way 'D' connector casing. At the subsea end of the cable, a **39 ohm** resistor should be fitted – this will normally be installed within a yellow waterblock adapter on the 6-pin connection point to the Sidescan Towfish unit.



*Fig. 2.3 SeaKing Communication Wiring Diagram*

### 2.3 USING THE ROV SIDESCAN SONAR

On completion of installation of the Sidescan, it can be tested in air by powering up the system and observing that there are no communication errors on the display.

As with any acoustic sonar, the Sidescan only show echoes of objects that reflect sound back to the sonar transducer, such that hard shiny surfaces are sometimes only seen when they are at right angles to the sonar head and rough seabed textures can blot out smaller targets completely. The plan view also does not show how high an object is, unless a shadow is cast, in which case the length of the shadow is related to the height of the object, its range, and the height of the sonar head.

The SEAKING DST Sidescan Sonar is normally supplied with one of two operating frequencies, typically 325 kHz and 675 kHz. The lower 325 kHz frequency is capable of detecting large targets at ranges in excess of 200 metres. The higher 675 kHz frequency has a narrow beam and shorter (100m) range for more detailed images of closer targets.

Interpretation of sonar data develops with experience. Sonar reflections of isolated small objects give no indication of shape or attitude. Man made structures, such as platforms or rock walls tend to have regular patterns that are easier to identify. Using a sonar head is rather like looking at a world made of shiny black plastic, in the dark, with only a narrow torch beam for illumination. Remember that when close to large objects, or in a depression in the seabed, that the viewing range may be severely limited. Very strong reflectors may give multiple echoes along a bearing line, and are identified by being equispaced in range. If they persist, reduce the "Gain".

When searching for objects, hold the vehicle/vessel heading as steady as possible to stop the image blurring.

Experience with the sonar will enable the operator to be able to quickly and effectively set the "Gain" and "Contrast" controls to give as even a background as possible, without swamping the display, and maximise the performance capabilities of the head. Separate controls are available for Port and Starboard transducers. Although normally the settings would be the same, under some conditions (e.g. sloping seabed) different settings may be needed from port to starboard.

## SECTION 3

### 3.1 GENERAL INFORMATION & OPERATING DETAILS

The ROV Sidescan comprises Electronics block with connection for 2 transducers to be fitted on Port and Starboard sides of vehicle/vessel. The surface display software may display both or either one of these transducer channels. For the DST Sidescan, the Port and Starboard transducers fire at the same instance or they can be set to fire both channels in a "Ping Pong" mode. In "Ping Pong" mode, the firing order is for Port to Ping first and at the completion of the Ping sequence (transmit and receive) the Starboard will then fire its Ping. This order will then continue with Port and Starboard firing at separate intervals and in tandem with each other. The Sidescan echo return data may then be displayed with time marks and text labelling. The software has option to output the data to a thermal plotter (EPC / Alden) via the parallel port interface.

The ROV Sidescan is available in either of 2 frequencies; 325kHz for longer range work or 675kHz for shorter range, higher resolution imaging. The electronics are contained within the body tube in dry air at one atmosphere pressure. The sonar body is machined from aluminium alloy, and has a hard-anodised coating.



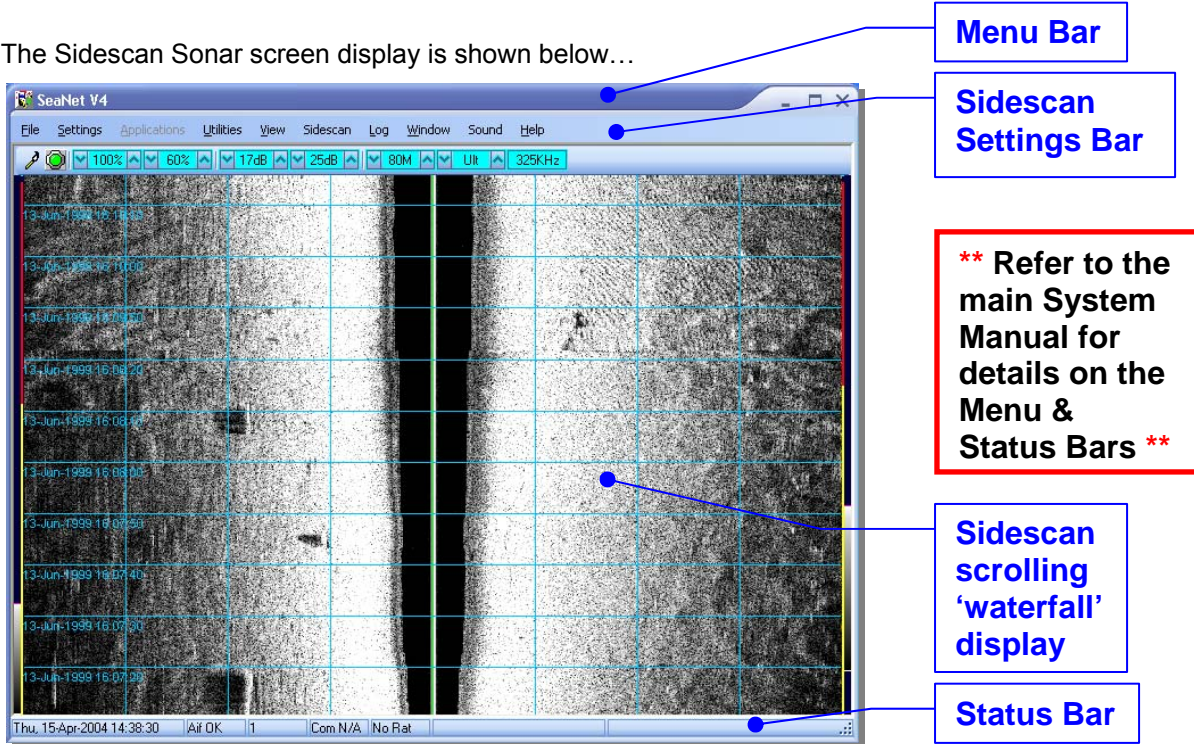
***A Waterblock adaptor is fastened to the body tube of the Electronics bottle and provides a 4000metre rated pressure bulkhead. The 6-way underwater connector is secured to the waterblock fitted to the bottle using four cap screws, this connects to the pins on the internal PSU/COMMS PCB. An O-ring seals the connector to the waterblock.***

### 3.2 SIDESCAN APPLICATION DISPLAY

The **Seanet Sidescan** application can be run from the 'Programs' group in the Windows 'Start' menu or from the desktop by double clicking on the shortcut icon as shown below...



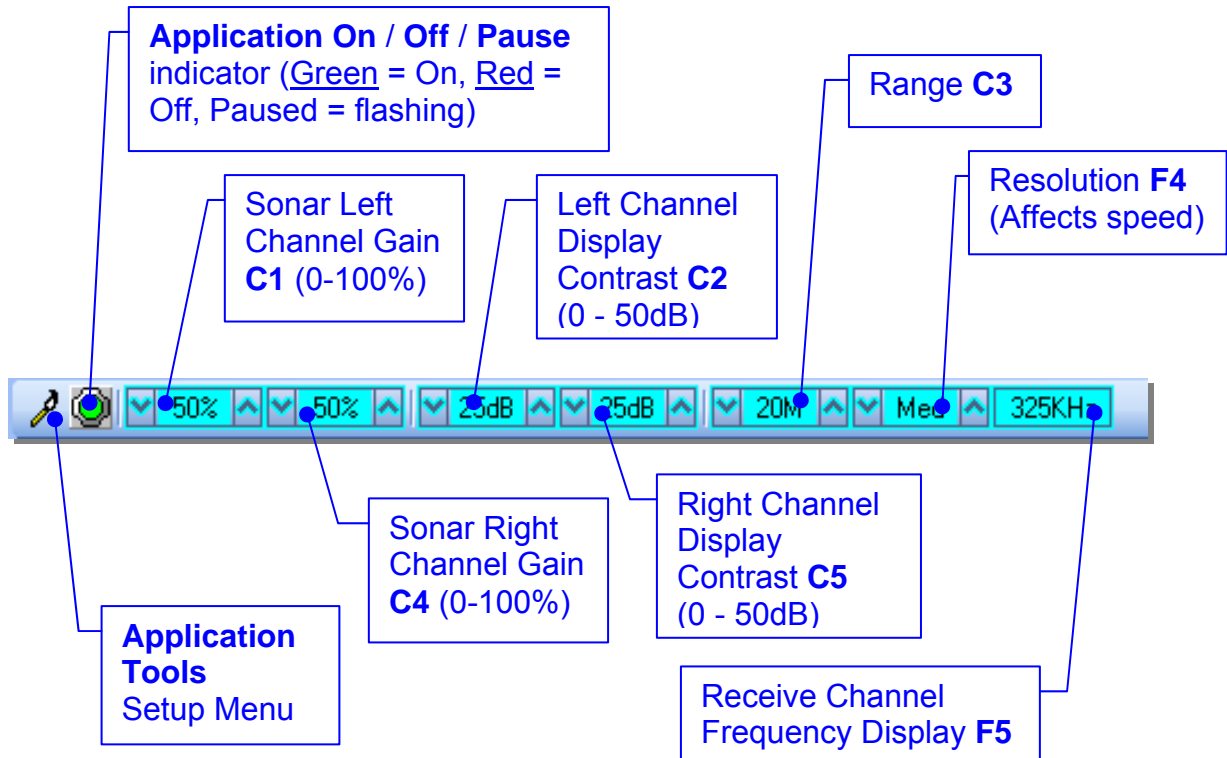
The Sidescan Sonar screen display is shown below...



The screenshot shows the Seanet V4 application window. The interface includes a menu bar at the top with options: File, Settings, Applications, Utilities, View, Sidescan, Log, Window, Sound, Help. Below the menu bar is a settings bar with various parameters: 100%, 60%, 17dB, 25dB, 80M, UI, 325KHz. The main display area shows a 'waterfall' plot of sidescan sonar data with a grid overlay. The y-axis of the plot is labeled with timestamps from 13-Jun-1999 16:08:30 to 13-Jun-1999 16:07:20. A status bar at the bottom displays: Thu, 15-Apr-2004 14:38:30, Air OK, 1, Com N/A, No Rat. Callout boxes point to the Menu Bar, Sidescan Settings Bar, Sidescan scrolling 'waterfall' display, and Status Bar. A red-bordered box contains the text: \*\* Refer to the main System Manual for details on the Menu & Status Bars \*\*.

### 3.2.1 Sidescan Settings

These controls are displayed on the Sidescan Settings bar. Adjustments may be made using the optional RAT controller (Control buttons C1 - C5 and Function buttons F1 - F6) or the on-screen controls using the pointer device.



#### Sonar Gain (C1, C4)

This sets the sonar receive gain as required – typically this is around 20% but is varied according to water and target conditions and user preference.

#### Contrast (C2, C5)

This sets the display contrast between hard and soft targets. Usually set to user preference, it can help find small features in 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.

**Function buttons F1 - F3 and F5 - F7 are not currently used.**

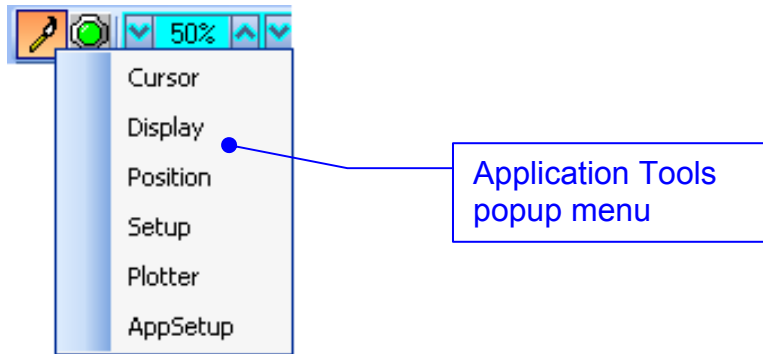
#### Resolution (F4)

Resolution toggles through 4 preset sampling periods over the pulsed range. **Lo** resolution produces the least samples ('Bins') and gives the lowest resolution. The number of samples is increased from **Med & Hi** through to **Ult**. Usually a Lo or Med resolution is used for very fast tow speeds where more scan-line updates are required giving coarser detail. Hi or Ult should be used for more detailed examination of targets at a slower tow-speed.

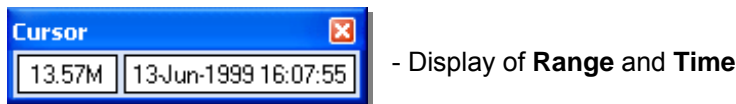
### 3.2.2 Application Tools

Click on the Tools icon on the left on the Sidescan Settings Bar to open the popup menu which includes all the Application Tools.

N.B. The popup menu can also be accessed by a right button click on the Sidescan waterfall display.



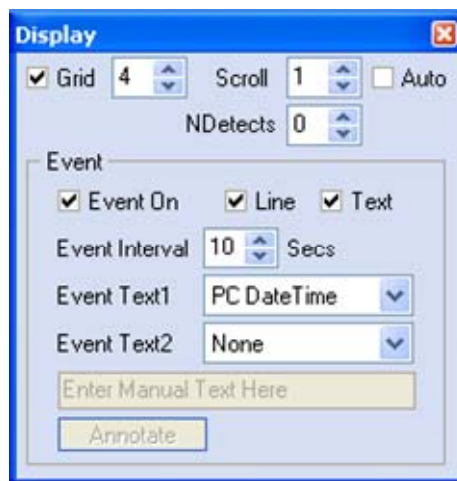
↳ **Cursor** – Adds the cursor position panel to the sonar display.



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.

N.B. If the system has real-time GPS position and heading data input, the panel will extend to additionally display the target co-ordinates (Lat/Lon or E/N).

↳ **Display** – Sets up Sidescan waterfall 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 (see 'Setup').

**'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 1-60secs between events. This is not applicable for 'Manual Text' events.

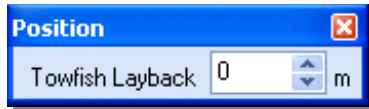
**'Event Text1'** – Select an event type from the list. Options are...

1. None (no event text displayed)
2. PC DateTime (current date and time from scu/pc)
3. Manual Text (enter text via edit box and click 'Annotate' button)
4. Remote Text (from serial 'Aux' device through Seanet 'Utilities' -> 'Aux Device' menu)
5. GPS E/N (from serial 'GPS' device through Seanet 'Utilities' -> 'GPS' menu)
6. GPS Lat/Lon (As 'GPS E/N' except data is Latitude/Longitude, not Eastings/Northings)

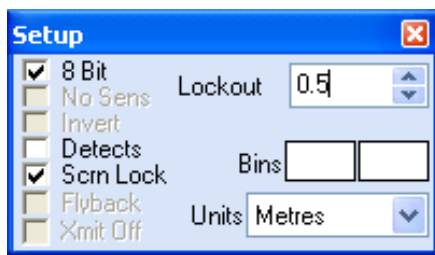
7. GPS UTC Time (from serial 'GPS' device through Seagnet 'Utilities' -> 'GPS' menu)

'Event Text2' – As 'Event Text1' except text is plotted on the opposite side of the display. This provides the option of plotting two separate event texts together.

↳ **Position** – Enter a layback (in metres) between GPS receiver and ROV Sidescan for correction of position input data.



↳ **Setup** – Sets various Towfish options.



**8 bit** – Usually checked. Selects the intensity sampling of sonar data (4-bit or 8-bit).

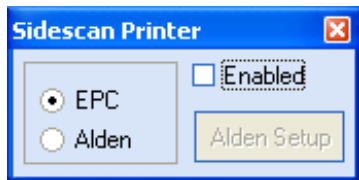
**Detects** - Paint the leading edge of strong targets on the screen. To emphasise sub-bottom layers.

**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).

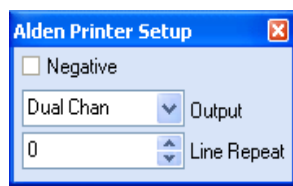
**Units** – Waterfall display Range units (Metres, Feet, Fathoms, Yards).

↳ **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 on this button to setup the Alden interface.

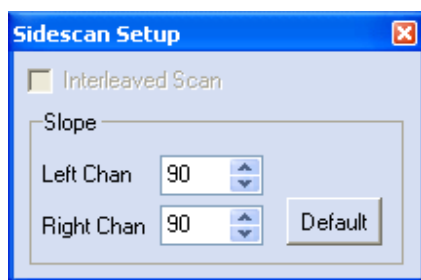


**Negative** – invert greyscale output.

**Output** – Dual Channel or Left or Right Channel.

**Line Repeat** – stretches printout by repeating line printouts (0 = off).

↳ **Sidescan** – 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 ping-pong) which is enabled by this control.

**Slope** – Applies a Time Variable Gain adjustment to the received signal returns to account for through-water attenuation of the transmit pulse.



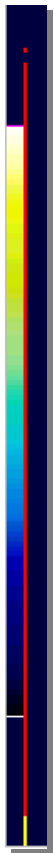
When the 'Interleaved Scan' mode is enabled, the DST Sidescan reverts to ping-ping operation (as opposed to ping-pong). This doubles the quantity of data being

**NOTE**

transmitted to the surface with a larger overhead on the Sidescan plotting function. To run 'Interleaved Scan', especially with an RS-232 Sidescan, the surface control unit should be fitted with a CPU of suitable specification. A Pentium 4 or greater will be required and for any specifications below this then 'Interleaved Scan' may need to be disabled if the CPU activity reaches 100%.

↳ **AppSetup** – The Application 'Hints' popup boxes can be enabled/disabled here. Also, the available menu items (described above) for the application are listed.

### 3.2.3 Dynamic Range and Sonar Rx Indicator



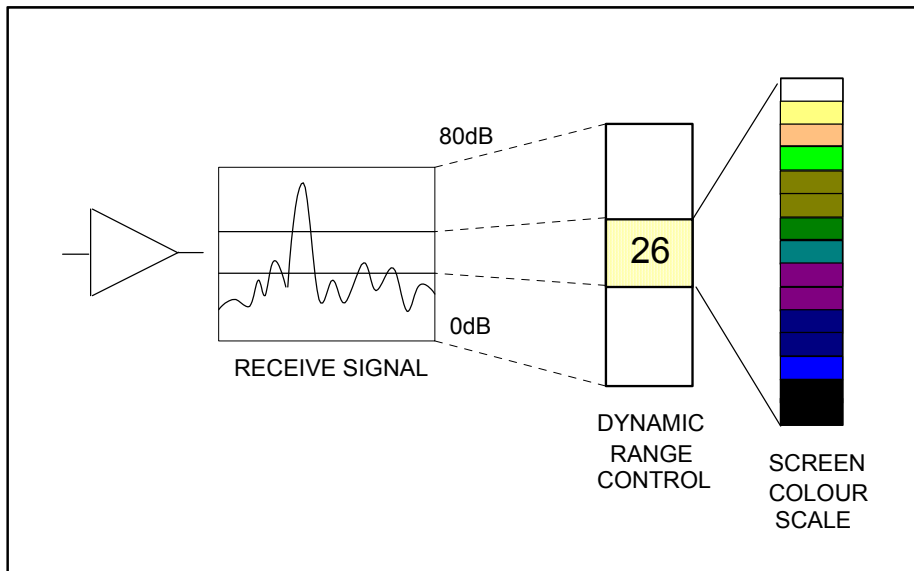
The dynamic range bar is the A/D sample window (with 64-colour mapping) for the Sonar receive signal (which extends from 0 to 80dB).

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.

- 1) **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.
- 2) **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.

Fig. 3.1 Idealised representation of A/D Sample window

### 3.2.4 CHIRP Technology

In monotonic (single frequency burst) sonar's, the range resolution is determined by the length of the transmitted pulse. The smaller the pulse is, the greater the resolution achievable and vice-versa.

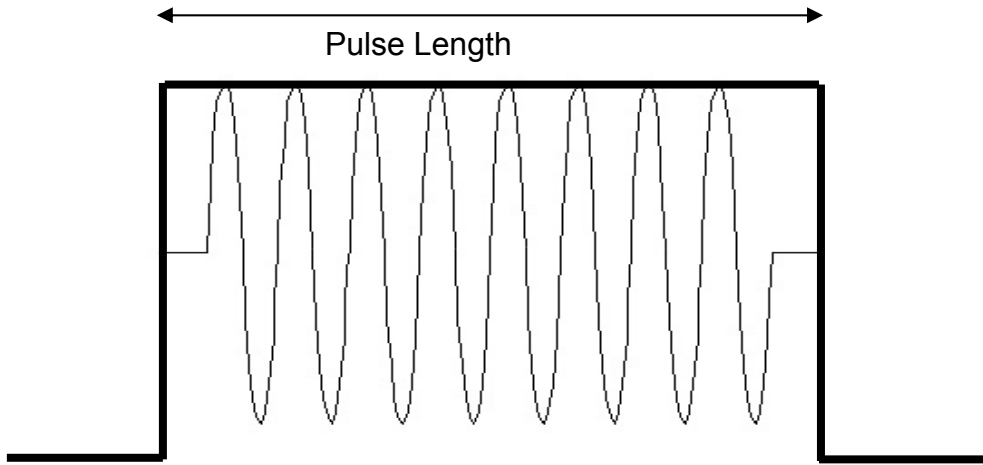


Figure 1

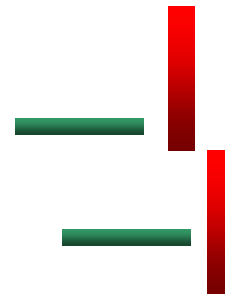
#### Example 1 Monotonic Sonar

Single frequency acoustic pulse



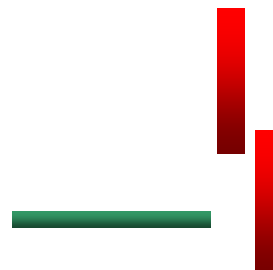
Tx Pulse →

Two simulated targets



← Rx Pulses

Net effect.....



In this example the two targets are interpreted as a single large target by the sonar.

By introducing CHIRP technology the range resolution can be improved by 'sweeping' the pulse using a start and stop frequency. Now the range resolution of the system is proportional to the bandwidth (difference between the start and stop frequencies). Using this technique creates a unique pulse signature that dramatically improves range resolution. Theoretically an improvement by a factor of 5 over typical monotonic systems is possible, more noticeable at shorter ranges.

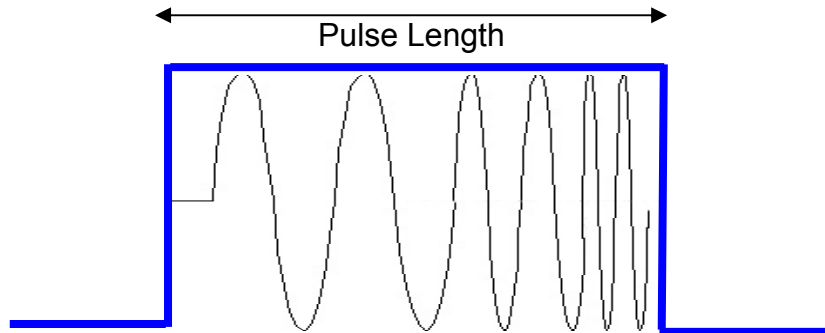


Figure 2

F1 (Start frequency)

F2 (Stop frequency)

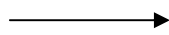
### Example 2 CHIRP DST Sonar

The CHIRP pulse is represented pictorially by 4 colours to demonstrate the concept; in reality, there are an infinite number of frequencies available.

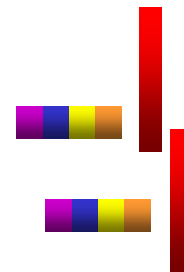
CHIRP pulse



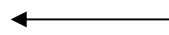
Tx Pulse



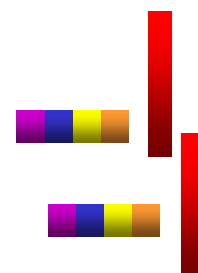
Two simulated targets



Rx Pulses



Net effect.....



In this example the unique signature of the CHIRP pulse signature allows two separate targets to be interpreted by the sonar.

## SECTION 4

### 4.1 MAINTENANCE OF THE SEAKING HEADS

#### 4.1.1 Cables

The cables are high quality with low halogen jackets which should provide long service life without problems. Care should be taken to ensure that they are properly sited during installation to avoid movement and fatigue, but otherwise no maintenance is required.

If a cable flood is suspected, then the conductors will need to be insulation tested; the subsea electronics and SCU must be disconnected.



**CAUTION!**

*This is especially critical if a cable insulation tester is used to check resistance between conductors, as serious damage to the units will occur if the correct procedure is not followed.*

#### 4.1.2 Sidescan Unit

There are no user-serviceable parts in the transducers and electronics pod and no components requiring routine maintenance.

It is recommended that the units be rinsed down with fresh water after each dive and especially if the unit is not going to be used for extended periods. Although the anodised aluminium components are very resistant to corrosion, using fresh water is a simple way of minimising the chance of corrosion.

Wherever possible, avoid any prolonged exposure to extreme climatic and weathering conditions to reduce any ageing effects on the protective boot and connectors.

### 4.2 TROUBLESHOOTING

Symptoms:

#### **1. Continuous Status "Timeout 10" message.**

This indicates that there is no communication with the device flagged – in this case the Node number of the device is 10. Check the power and communications links to the Towfish unit for continuity and for correct polarity, voltage and ensure that the power supply can provide sufficient current to power all devices. If necessary refer to the service section to check that the head internal fuses have not blown

If a cable flood is suspected, then the conductors will need to be insulation tested; the Towfish head and Surface Unit must be disconnected.



**CAUTION!**

*This is especially critical if a cable insulation tester is used to check resistance between conductors, as serious damage to the Scanning/Profiling heads and SEANET SCU will occur if the correct procedure is not followed.*

#### **2. Other Status Messages.**

Refer to the System section of the manual.