Tritech *Tritech*
International
Limited

DST SeaSprite Sonar

Operator & Installation Manual

DST
INSIDE

New Digital Sonar Technology with CHIRP for ultimate resolution

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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:

The warranty is only deemed to be valid if the equipment was sold through TIL or one of its approved distributors.

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.

The warranty is not transferable, except or as applies to Purchaser first then to client.

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.

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 outwith the control of TIL.

(**Note:** The warranty does not apply in the event where a defect has been caused by isolation incompatibilities.)

The warranty does not cover the transportation of personnel and per diem allowances relating to any repair or replacement.

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.

Any equipment or parts returned under warranty provisions will be returned to the customer freight prepaid by TIL.

The warranty shall become invalid if the customer attempts to repair or modify the equipment without appropriate written authority being first received from TIL.

TIL retains the sole right to accept or reject any warranty claim.

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

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SAFETY STATEMENTS

⚠️ **NOTE**	*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.*
⚠️ **CAUTION!**	*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.*
⚠️ **DANGER!**	*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.*

Technical Support & Software Upgrades

Contact your local agent or Tritech International Ltd

✉️	**Mail**	***Tritech International Ltd.*** Peregrine Road, Westhill Business Park, Westhill, Aberdeen, AB32 6JL, UK
☎️	**Telephone**	++44 (0)1224 744111
	Fax	++44 (0)1224 741771
💻	**Email**	support@tritech.co.uk
	Web	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)
- Serial Numbers of all scanning / profiling heads
- Software Revision Number
- Fault Description
- Any remedial action implemented

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.

PART 1. SOFTWARE INSTALLATION (WINDOWS 98/2000/XP)

> PC Hardware Requirements (Minimum):
> - *Pentium PC*
> - *32MB RAM (Windows 98), 128MB (Windows 2000/XP)*
> - *10MB Hard Disk Space (Installation)*
> - *Available COM Port (115.2kBaud capable)*
> - *16-Bit Colour Graphics Card at 800x600 Resolution*

1) Insert the 'SeaSprite Sonar' Installation CD into drive and run SETUP.EXE.

2) The Installation will place 2 shortcuts on the Desktop; i) SeaSprite Setup ii) SeaSprite Sonar.

3) The SeaSprite Sonar software is pre-configured to communicate with the Sonar via **the COM1 Port** @ **115,200** Baud, **8** Data, **No** Parity, **1** Stop.

4) Consult the SeaSprite Sonar software manual for operating instructions and details on how to re-configure COM Port assignment and telemetry settings.

PART 2. HARDWARE INSTALLATION

Power
The Sonar head should be powered from a clean DC Supply or Battery pack capable of supplying **9-50Vdc @ 2.2VA**. .
To reduce damage to the sonar head in the event of over voltage it is recommended that an appropriate fuse is included in the power supply connection.

Handling

⚠️ **CAUTION!**	The SeaSprite Sonar head is an oil-filled product and under NO circumstance should it be opened up or tampered with in any way. There are no user-serviceable parts or internal switches, which would necessitate disassembly.

⚠️ **CAUTION!**	The 'Seal Screw' should never be unscrewed as this may result in oil loss. The blue/yellow diaphragm on the top of the Sonar head is to allow for volume changes in the oil at different operating temperatures. This diaphragm should never be poked or stabbed with sharp instruments.

⚠️ **CAUTION!**	The Sonar may be lowered to depths of **NO MORE** than 750 metres.

⚠️ **CAUTION!**	The connector socket is not usable "open face" and should always be sealed with either a plug or the blanking-plug provided.

⚠️ **CAUTION!**	The 'AUX' Port should be blanked off at all times when not in use.

Please also refer to the point listed under the "Further Information" section, when handling or operating.

Communication protocol

The SeaSprite Sonar is supplied with two communication ports labelled "Main" and "Aux". All communication to the control PC on the surface should be via the "Main" port, while the "Aux" port is used for daisy chained communication links to other Tritech sensors such as the RS-485 Micron Echosounder altimeter.

The communication configuration of the "Main" and "Aux" ports are **FACTORY SET.** These are Software selectable comms (RS232, RS485) and should not be changed without first contacting Tritech.

The 4 option variants A-D are available

A=Main-485, Aux-485,
B=Main-232, Aux=485,
C=Main-485, Aux-232,
D=Main-232, Aux-232

In this example, the label shows that configuration A has been selected

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- The RS232 telemetry is Bi-directional, 3-wire (Tx, Rx and Gnd) between the Sonar head and the PC / Laptop RS232 COM Port. This may be via an RS232 Modem or Multiplexer.

- The RS485 telemetry is Half-duplex, 2-wire (RS485+ & RS485-) between the Sonar head and surface RS485 connection. Typically, the surface RS485 connection can be an RS485 serial COM Port installed in the PC or it can be an "RS485 to RS232" signal converter that is attached to the PC / Laptop's standard RS232 COM Port.
  The RS485 circuit inside the head has a factory supplied 150 ohm termination fitted, a matching 150 ohms may be fitted to the surface if the twisted pair length dictates.

By the above methods, the Sonar Head should be connected through to an available Serial COM Port on the PC / Laptop installed with the SeaSprite Sonar software.

Third Party Communication Devices

RS485 to RS232 converter

If a SeaSprite system is supplied configured RS485 it may be necessary to use an RS232 to RS485 converter to allow interface with a standard PC com port, as stated above.

- The converter must be capable of Half-duplex operation and able to support speeds of at least 115,200 baud.

- It is not recommended to use a unit, which is powered from the PC com port as this can reduce the maximum length of twisted pair, which the system will operate through.

- It is advised that the RS485 circuitry on the converter is optically isolated to protect both the PC and the converter from high voltages, which may become present in a fault condition on an ROV umbilical.

NOTES WHEN USING "ADAM 4520" RS232 TO RS485 CONVERTER

Tritech International recommends the use of the above converter. This device can be purchased from Tritech International Ltd if required. Contact Tritech Technical Support for details.
The Device is externally powered with an input range of 10-30VDC, we recommend the use of 24 volts.
Internal switches are used to set baud rate, their function is detailed on the external case of the unit.

CAUTION!	*IT IS IMPERATIVE THAT THE INTERNAL SWITCHES ARE SET TO MATCH THE SYSTEM BAUD RATE BETWEEN THE HEAD AND THE PC. CONSULT THE INTERFACE DOCUMENTATION ON THE SWITCH SETTINGS.*

Electrical connection

Whilst wiring up and connecting the converter, adhere to the following;

- RS485+ connects to Pin 1 of the SeaSprite Sonar head.

- RS485- connects to Pin 2 of the SeaSprite Sonar head.

NOTES WHEN USING "B&B ELECTRONICS 485OT9L OR 485OTLED" RS232 TO RS485 CONVERTER

This is a commonly used RS232 to RS485 interface that provides optical-isolation between the ports. The Device is externally powered with an input range of 10-30VDC, we recommend the use of 24 volts.

The internal switches and jumpers are used to select the baud rate and communications mode.

⚠️ **CAUTION!**	*IT IS IMPERATIVE THAT THE INTERNAL SWITCHES ARE SET TO MATCH THE SYSTEM BAUD RATE BETWEEN THE HEAD AND THE PC. CONSULT THE INTERFACE DOCUMENTATION ON THE SWITCH SETTINGS.*

JP1 should be set to "SD" for the Half-Duplex control method

For half duplex, RS485 operation at 115.2KBaud, we recommend the following set-up;

- Switches 1 to 4 off,
- Switches 5 to 8 on
- JP1 set to "SD"
- R21 fitted as 4.7KΩ.

Electrical connection

Whilst wiring up and connecting the converter, adhere to the following;

- TB1 Pin 2 (Labelled "TDB+") is RS485+ and connects to Pin 1 of the SeaSprite Sonar head.

- TB1 Pin 1 (Labelled "TDA-") is RS485- and connects to Pin 2 of the SeaSprite Sonar head.

NOTES WHEN USING USB TO RS232 COM PORT ADAPTERS

It is common for new laptops to be supplied without standard COM port hardware.
In this instance a USB to Serial adapter may be used to obtain a "virtual" COM port on such machines.
There are many different types of this adapter available on the market, however ***note the following prior to purchase…***

Because of the requirement to support half duplex operation, the timeout on the data link is critical.
This means that no delays can be introduced between the PC and the Head, and the strings sent must arrive complete.
Certain USB adapters buffer the data, which means the SeaSprite Sonar strings get broken up when passing through such adapters. When this is the case the following symptoms are common…
The Sonar head (Node2) can be detected in the "SeaSprite Setup" program, but when running the "SeaSprite Sonar" program the Sonar head is intermittent or does not scan.

If problems are experienced with the USB adapters, try first to load the system on a PC with a normal COM port to confirm that the Sonar head (and, if applicable, RS485 converter) are operational.

A proven USB serial adapter device can be purchased from Tritech International Ltd if required, contact Tritech Technical Support for details.

System Interconnect Cabling

The Standard Underwater Connector supplied is a Tritech 6-way connector, the wiring code is shown below including pin-outs for RS232/RS485 and power connections.


Connector
Face View
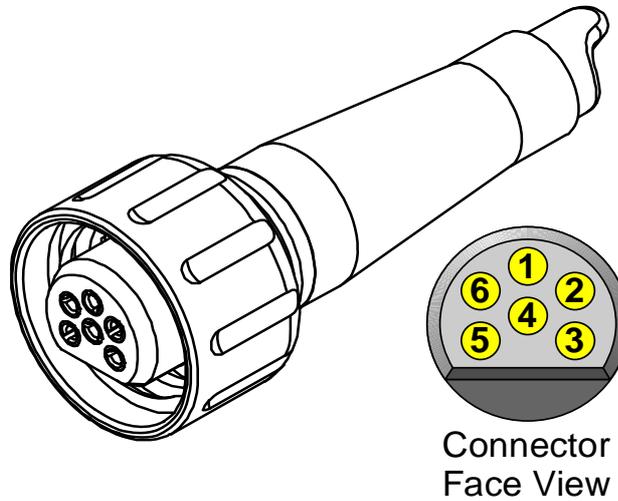
Pin Number	Cable Whip Colour	Wire Function
1	**Yellow**	RS485 Comms A or RS232 Comms TX
2	**Blue**	RS485 Comms B or RS232 Comms RX
3	**Red**	Supply Positive Voltage
4	**Black**	Supply Ground
5	**Green**	RS232 Comms Ground or Analogue Output (where applicable)
6	**Drain Wire** with Black 'Heat-shrink' Insulation	Earth

|	
⚠️ **NOTE**	Connectors should only be applied to the Sonar when the power supply is turned off. Before turning on the power supply, ensure the EARTH line is not connected to a positive potential (re Pin 4), as erosion damage to the housing may occur.
⚠️ **NOTE**	The SeaSprite series connector is NOT wet-mateable, and although limited electrical protection circuitry is provided within the SeaSprite units, direct exposure to water, when the unit is powered may cause erosion damage to the connector pins, or internal fuses to blow that may only be replaced by the factory. When either port is not in use, the blanking cap MUST be fitted!
⚠️ **NOTE**	The connector wiring information can be applied to both the "Main" or "Aux" communication ports. However, the function of pins 1, 2 and 5 depends on the capabilities, configuration and port of the device connected to.
⚠️ **NOTE**	The sonar head is protected against voltage surges on the power and comms. Lines using internal suppressers. Sustained over voltage will damage the head. To reduce risk it is strongly recommended that 100mA fuses be used in the comms. Lines and an appropriate fuse used in the power supply (e.g. 1A@12V or 500mA@24V)

A. RS232 SeaSprite Sonar ("Main" Port):

Communications between the SeaSprite Sonar "Main" port and the PC serial port is 3-wire RS232. Configuration is as follows;
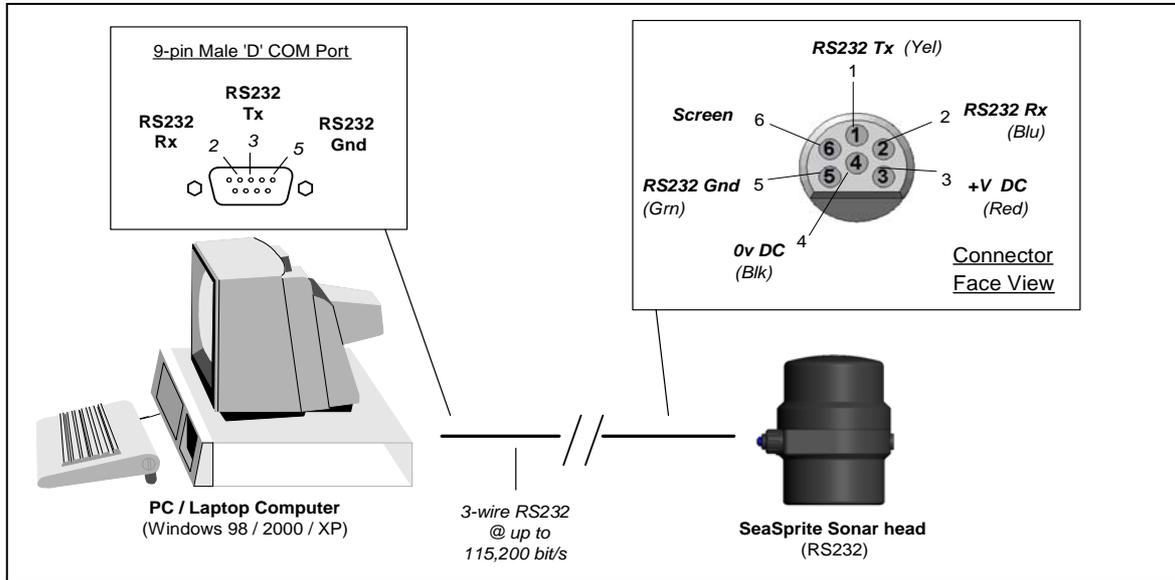

Depending on the type of conductors used, the RS232 may only drive up to 20 metres of copper cabling. For longer cable lengths it is necessary to run through a repeater or converter, or switch to optical fibre with an RS232 telemetry option.

A method to operate the (RS232) SeaSprite Sonar head over longer cable lengths would require a pair of RS232 to RS485 converters installed surface and subsea;
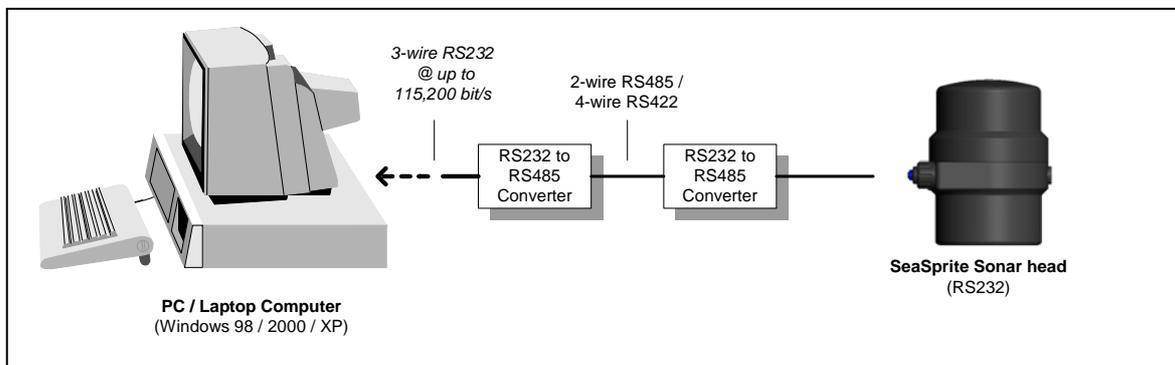
NB: Select converters with an optically isolated RS485 interface, to protect the PC serial port.

NOTE

SUMMARY
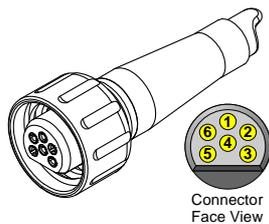
- **Pin 1** on the Sonar 6-pin "Main" connector port is the RS232 Tx that should be connected to the RS232 Rx on the PC serial port.
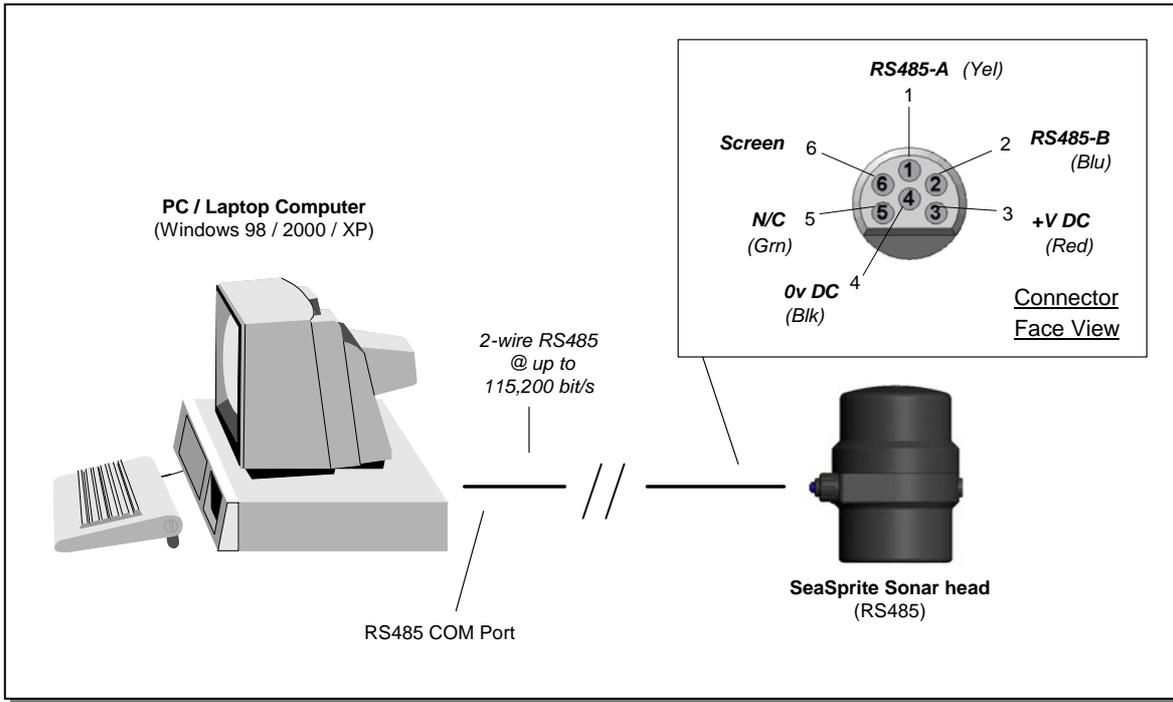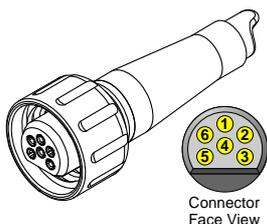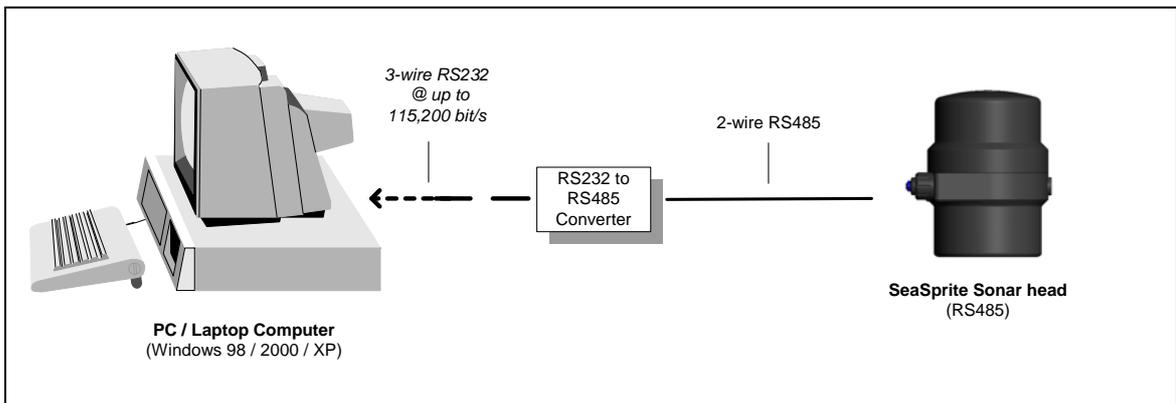
- **Pin 2** on the Sonar 6-pin "Main" connector port is the RS232 Rx that should be connected to the RS232 Tx on the PC serial port.

- **Pin 5** on the Sonar 6-pin "Main" connector port is the RS232 Gnd. This should be connected to the RS232 Common Gnd on the PC serial port.

Connector Face View

B. RS485 SeaSprite Sonar ("Main" Port):

For the RS485 telemetry option, this can run directly over a twisted pair cable of typical length up to as much as 1km. The first option would be to run the telemetry straight into the PC but for this an RS485 Serial Comms card would need to be fitted inside the PC;

Alternatively, the RS485 SeaSprite Sonar can be connected to the PC RS232 Port via an RS485 to RS232 external converter;

SUMMARY

- **Pin 1** on the Sonar 6-pin "Main" connector port is the RS485 + that should be connected to the RS485 + on the PC RS485 serial port or signal converter box.

- **Pin 2** on the Sonar 6-pin "Main" connector port is the RS485 - that should be connected to the RS485 - on the PC RS485 serial port or signal converter box.

Further Information

General
- The SeaSprite Sonar head is an oil-filled product and under NO circumstance should it be opened up or tampered with in any way. There are no user-serviceable parts or internal switches that would necessitate disassembly.
- The 'Seal Screw' should never be unscrewed as this may result in oil loss. The yellow diaphragm on the top of the Sonar head is to allow for volume changes in the oil at different operating temperatures. This diaphragm should never be poked or stabbed with sharp instruments.
- The Sonar may be lowered to depths of NO MORE than 750 metres.

Connector
- The connector socket is not usable "open face" and should always be sealed with either a plug or the blanking-plug provided.
- The 'AUX' Port should be blanked off at all times when not in use.
- Care should be taken when mating the connector, with either a plug or a blanking-plug, to ensure both mating ends are clean and dry.
- Special attention should be given to checking the O'ring for dirt. The O'ring is located under the lock-ring on both the plug and the blanking plug.
- When mating the connector, first locate the plug on its 'D' profile, push together as far as possible and then tighten the lock-ring. The action of tightening the lock-ring draws the two mating ends fully together.
- The connector lock-ring needs only to be finger tight. The use of any tools to tighten the lock-ring further is not necessary and could result in damage to the connector.

Telemetry
- The SeaSprite Sonar head should be programmed to communicate at a default Baud Rate of 115,200 @ 8 Data, No Parity, 1 Stop. This can be re-configured through the Setup program *(consult Appendix A)*.
- It is recommended that a Baud Rate of 57,600 or above be maintained wherever possible to provide enough system bandwidth to operate the Sonar at its maximum resolution.
- For the RS232 telemetry option, if a direct RS232 cable is to be used then this will have a limit of typically 10 to 15 metres in length. Otherwise, a modem with fibre optic interface should be used to increase telemetry distances.
- To prevent damage to the PC / Laptop it is best to use an RS232 / RS485 Serial Port (or Signal Converter) that has optically isolated inputs for protection.
- The 'Aux' Port will be factory configured to RS-485, ready for attachment of the RS-485 Micron Echosounder. It may be possible to connect other serial devices to the 'Aux' port – contact Tritech Technical Support for further information.

Mechanical Mounting

The SeaSprite may be gently gripped by a 50mm diameter clamping mechanism around the bottom part of its housing.
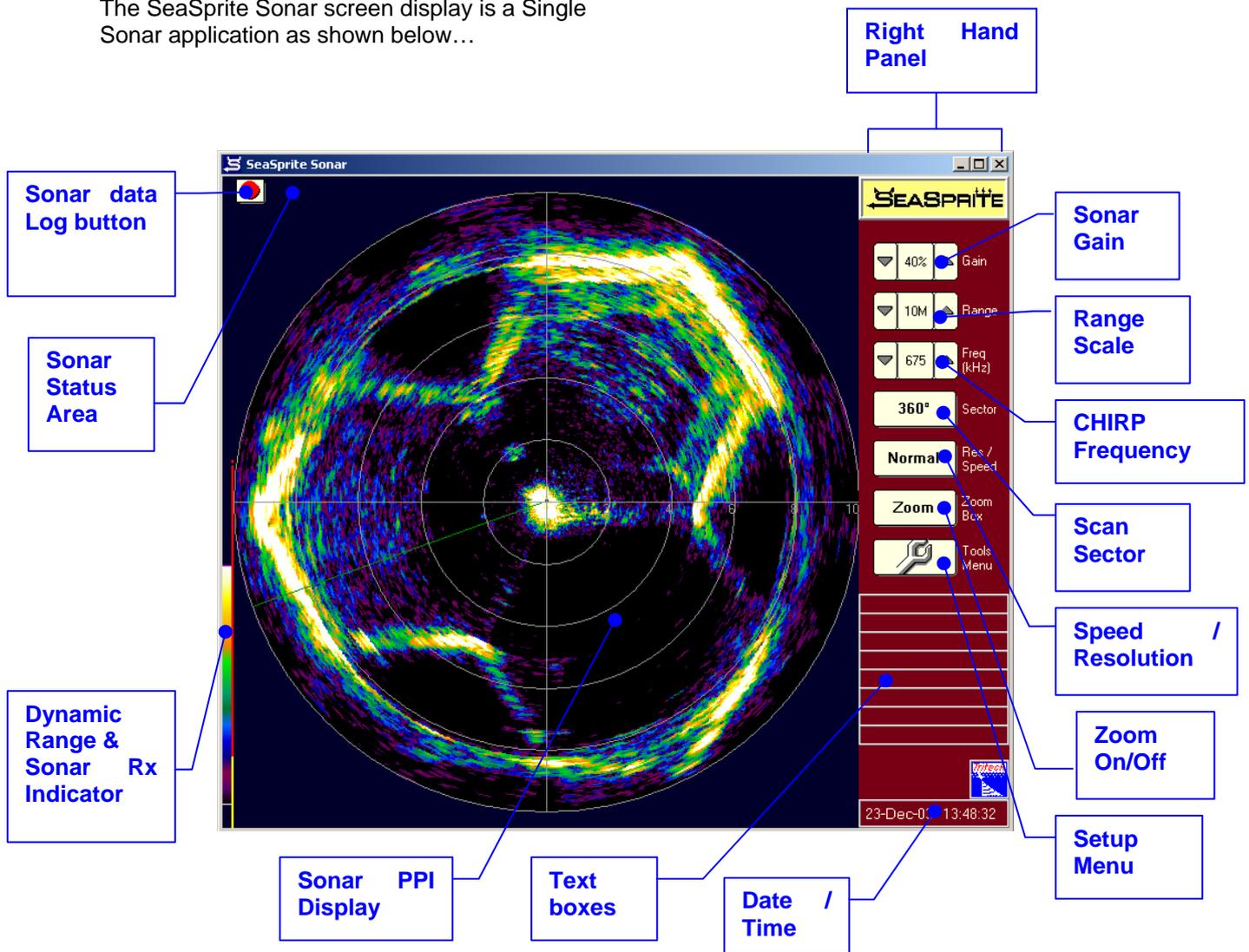

50.00 Dia
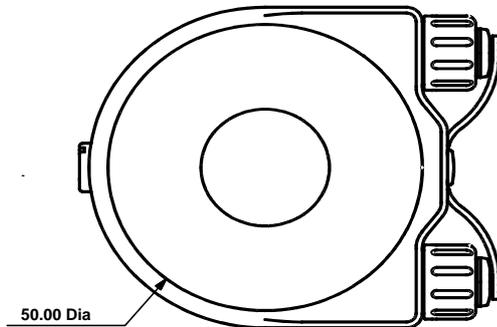
Dimensions are in millimetres.

Specification

Operating Frequency	Chirp: Centre frequency of 700 KHz
Beam width, vertical	30°
Beam width, horizontal	3°
Range Settings	From 5m (6.5ft) to 100m (320ft)
Scan Sectors	User selectable up to 360° continuous
Step Speed	Hi-Res, Normal and Highspeed
True Acoustic Zoom	Yes
Instant Reversal	Yes
Image Measurement	Yes
Inverted Head Operation	Yes
Power Requirements	9V - 50V @ 2.2VA DC
Data Communication	RS485 (twisted pair), RS232 (via modem up to 115Kbps)
Communication Requirements	Maximum cable length 1000 meters (using RS485)
Topside Control	Customer supplied PC or Laptop using standard serial comms port. Windows 98, 2000 or XP operating system.
Software	Tritech SeaNet(OEM) display
Maximum diameter	56mm (2.20 inches)
Maximum height	74.5mm (2.93 inches)
Weight in air	Mk1 290g (10.25 ounces) Mk2 330g (11.6 ounces)
Weight in water	Mk1 145g (5.12 ounces) Mk2 185g (6.6 ounces)
Operational Depth	Mk1 500m (1,460ft) Mk2 750m (2460ft)
Operating Temperature	-10°C to +35°C
Storage Temperature	-20°C to +50°C

SEASPRITE SONAR APPLICATION

The **SeaSprite Sonar** 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 SeaSprite Sonar screen display is a Single Sonar application as shown below…

Right Hand Panel

Sonar data Log button

Sonar Status Area

Sonar Gain

Range Scale

CHIRP Frequency

Scan Sector

Speed / Resolution

Dynamic Range & Sonar Rx Indicator

Zoom On/Off

Setup Menu

Sonar PPI Display

Text boxes

Date / Time

MAIN FUNCTION BUTTONS

There are 7 buttons / controls on the right hand panel of the screen display. These are used to configure the Sonar and to set-up the screen layout;

Setup Menu button

When this button is clicked a Popup menu will appear where the Sonar and display settings can be configured via a number of menu items. These will be explained later.

Sonar Gain button

This sets the sonar receive gain (0 – 100%) as required – typically this is around 20% but is varied according to water and target conditions and user preference.

Range Scale button

This sets the maximum range (5m – 100m) 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.

Transmit Frequency button

This is set at the CHIRP Sonar transmit pulse frequency of 700KHz

Scan Sector button

This sets the width of the scanned sector. Typically this will be adjusted according to the required seabed coverage. There are several sector settings including 360°, 180°, 135° and 90°.

Speed / Resolution button

This button will toggle through 3 preset settings, which will vary the Sonar scan speed and image detail. Use the 'Normal' settings in most cases, which will produce the best resolution. However, toggle to 'Fast' or 'Very Fast' settings if a higher scan speed is required. In normal operations, select 'Normal' for detailed examination of static targets where a slower scan update will not pose a problem. Select 'Fast' if a fast scan update is required at the cost of a little image detail. The 'Very Fast' setting will produce the lowest resolution and image quality but will produce the fastest scanning.

Zoom On/Off button

Toggles a zoom box on the display, which can then be positioned by the cursor. This is a true acoustic zoom magnifier that will give more image detail in the area surrounded by the zoom box. The Zoom window size and magnification can be adjusted in the 'Setup Menu'.

Dynamic Range / Contrast slider

This is on the left hand side of the Sonar display and sets the 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. More details concerning the usage of this control can be found in later pages of this manual.
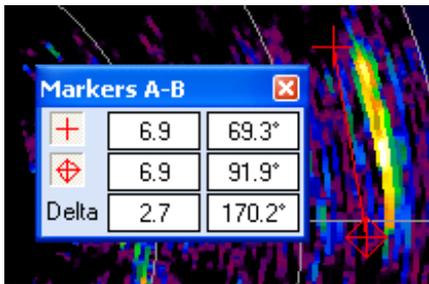
SETUP MENU
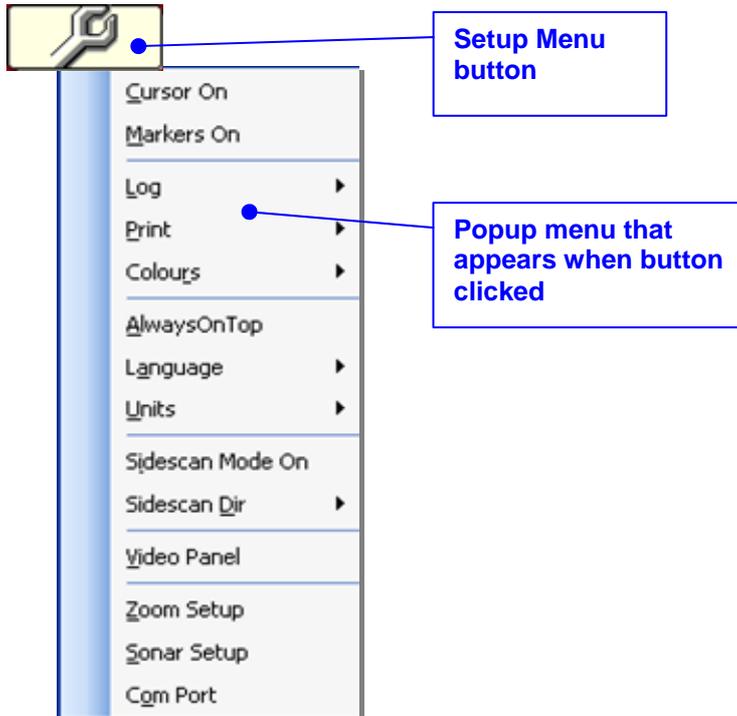
Cursor On – **Adds the cursor position panel to the sonar display.**

'Polar' – Check <u>on</u> to display co-ordinates in Polar or <u>off</u> to display co-ordinates in Cartesian format.

Markers On – **Adds A (+) and B (⊕) markers under left button control. The range and bearing to each marker & separation and relative bearing are shown.**

Select A or B marker icon on the 'Markers A-B' panel and that

Marker will be dropped at the Origin (0,0) on the Sonar display.

Then, pick up the Marker using the Left mouse button and drag it

over the Sonar display.

When both Markers are dropped on the Sonar display, a line will be drawn which connects them.
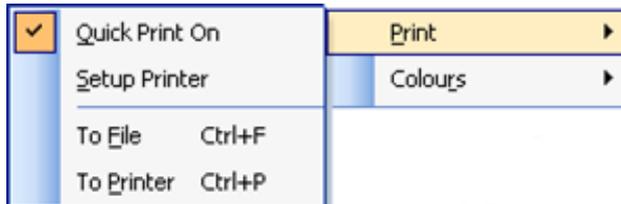
Log…

Play – Use to play back recorded log data.

Follow the on screen display.

<u>Record</u> – Use to record Sonar data.
Follow the on screen display.

<u>Show Rec Button</u> – Display the Log button (🔴) on Sonar display top-left.

Print…

Quick Print On – This has 2 effects;

When printing 'To File' then a bitmap will be saved to the Log directory with bitmap name having time format.
When printing 'To Printer' then Print Setup dialog box will not appear and default printer and it's settings are chosen.

<u>Setup Printer</u> – Select and set-up the Windows Printer.

To File – Print screen to a bitmap file. When 'Quick Print On' = Off, a dialog box will appear allowing the user to select file path (Log directory) and bitmap name.

To Printer – Print to Windows Printer. When 'Quick Print On' = Off, a set-up dialog will appear allowing the user to select printer and set it's options before printing.

Colours – Use to select from several preset colour schemes for the Sonar display.
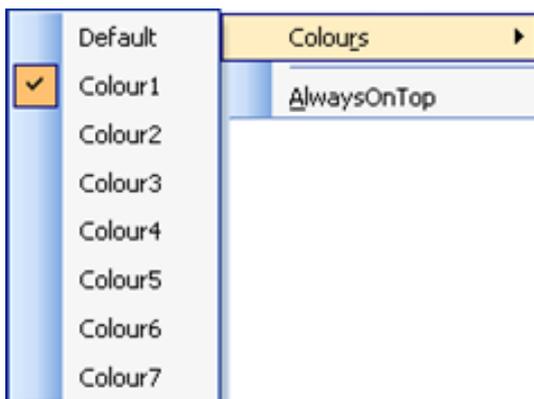
AlwaysOnTop – Select this function to bring the SeaSprite display to the front of the Windows desktop. This will place the Sonar display On Top of other open applications.

Language – Select from several international languages. Currently only UK and US English are available.

Units – Select the units for the Sonar Range labelling and cursor co-ordinates. Metres and Feet are the available options.

Sidescan Mode On – The Sonar can be set to operate in a Sidescan mode whereby the transducer is fixed to "stare" at one position and collect scanline data to either (but not both) side of the vehicle. The surface display window will switch from a 360 degree PPI Imaging window into a Waterfall display when Sidescan Mode is enabled.

Sidescan Dir – This sets the **Stare** position of the transducer to either **Left** (= Port, in transducer up mounting) and **Right** (= Starboard). This can be toggled in real-time but only Port or Starboard can be scanned and displayed at any one time.

Video Panel – This toggles a Video Panel which displays the video from a camera connected through a Video Capture Device or USB connection. The Video Panel can be positioned to float on top of the Sonar display or it can be docked to any edge of the Sonar form. More details on the Video connection and configuration can be found in Appendix C, at the end of this document.

Zoom Setup – Sets the size and magnification factor of zoom box.

Size - shows the normal display screen zoomed area as a percentage of the zoom display window.

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

＊A 'Bin' is a binary range sample taken over the current Sonar scan-line. The more 'Bins' that are sampled over the scan-line then the better the Sonar Range Resolution. In the Zoom box, the Factor will set a multiplier for the number of Bins in the Zoomed area that is above the number sampled in the main Sonar display area. For instance if there were 10 Bins taken over 1m (Bin sampling period = 0.1m) in the main Sonar display area, then a Factor of 4 would set 40 Bins to be sampled per 1m in the Zoom area. The result is an increase in Range Resolution by a factor of 4 within the Zoom area.

Sonar Setup – Sets various head options.
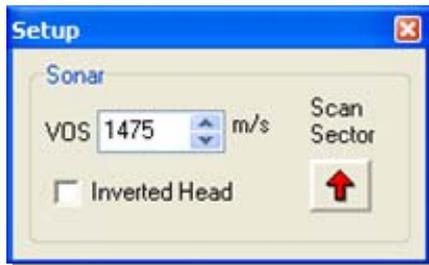
> **VOS** – used to enter a **V**elocity **O**f **S**ound value that will be applied in the Sonar display.
>
> **Inverted Head** - swaps the display from left to right. Enable if mounted boot up.
>
> **Scan Sector** – Use this control to select the scanning sector when the display is in a 180 degree sector view. There are 4 sectors indicated by the arrow position; Up = forward, Right = Starboard, Left = Port, Down = Aft.

Com Port – Select and configure the COM port that the SeaSprite Sonar will be connected to on the PC/Laptop *.
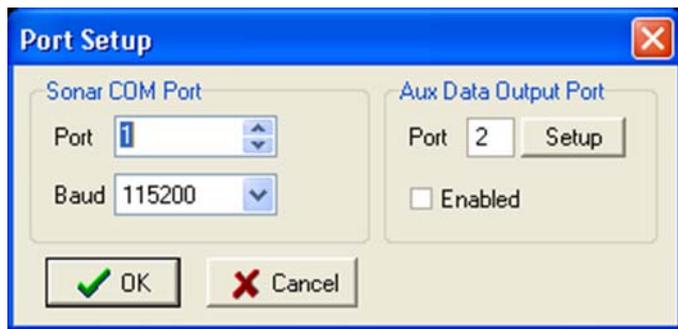
> **Port** – select the COM Port number that the Sonar head is connected to.
>
> **Baud** – Set the COM Port baud rate to match the setting of the SeaSprite Sonar head. The default factory setting for Sonar is 115,200 baud.

* For 'Aux Data Output Port' details, see the 'Outputting Micron Echosounder Data from a Surface COM Port' section later in this manual.

OTHER CONTROLS :-

Sonar Log Button

This has 3-states;

Grey: The button is disabled whenever the Sonar is not connected, or telemetry with the Sonar has not yet been established, or during Log playback.

Red: The Sonar is active and scanning. The button is now active and can be de-pressed to Log the Sonar data.

Flashing Red/Grey: The Sonar data is currently being logged. Click on the Log button to stop the logging.
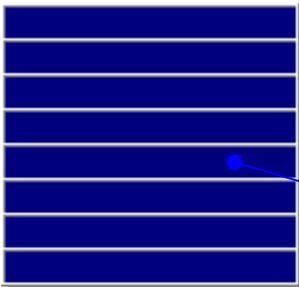
Instant Scan Reversal

Double click on the icon at the top of the Right-hand panel to instantly reverse the scan direction of the Sonar. The default icon is the SeaSprite logo…

SEASPRITE

**Double-click to switch the Sonar scan direction**

Text Entry Boxes

There are 8 Text Entry boxes which each can display 17 text characters (includes spaces). These can be used for displaying job information or company contact details.

Double-click to enter text

To write some text into the boxes, double-click on a box to open the Textbox Editor and then type some text using a keyboard.

Edit TextBox3

SOME TEXT

✗ Cancel   ✓ OK
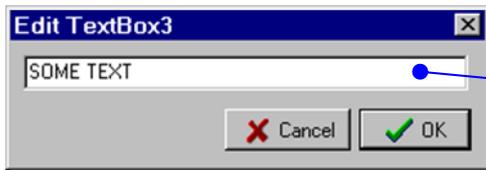
TextBox Editor

Date / Time display

05-Feb-2003 15:42:28

Displays the PC System Clock Date and Time. This can be adjusted in Windows.

Right-Hand Panel Minimise

Double click on the Right-Hand Panel background to minimise the panel and bring the Sonar display up to full screen.

When minimised, the panel will appear as an 'ellipsis' button (⋯) in the bottom right of the screen. Click on this button to maximise the panel once more in order to review and change Sonar settings.

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 **hold**ing 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 **hold**ing down the left button, move the mouse up/down to decrease/increase the Sensitivity of the Sonar receiver. Increasing the Sensitivity (move bar down) will produce a more saturated display with greater weak-return content. Decreasing the Sensitivity (move bar up) will omit background noise and low level returns seen at the receiver
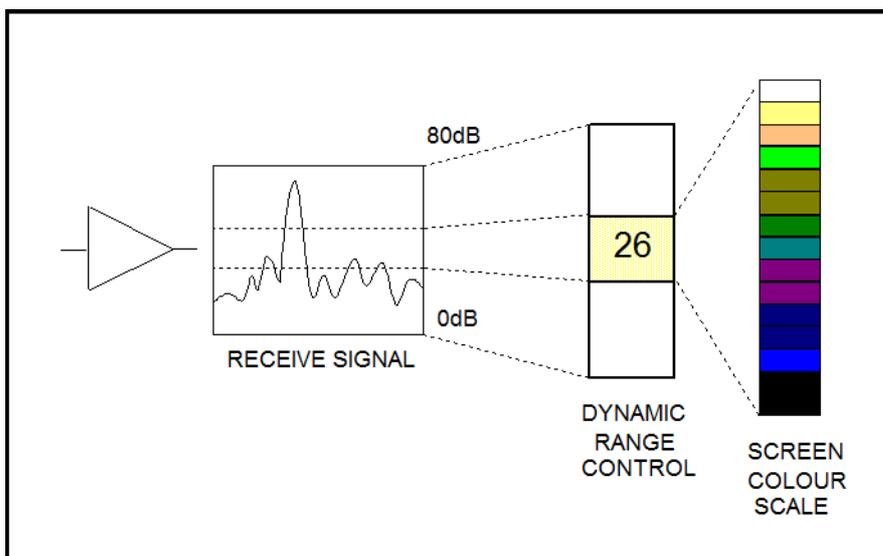
The sonar receiver will accept a return signal in the region of 0 - 80dB. The dynamic range controls are used to adjust the position of a sampling window within the 0-80dB dynamic range band of the receive signal.

- Idealised representation of A/D Sample window

CHIRP TECHNOLOGY

CHIRP is an acronym for **Compressed High Intensity Radar Pulse**.

CHIRP techniques have been used for a number of years above the water in many commercial and military RADAR systems. The techniques used to create an electromagnetic CHIRP pulse have now been modified and adapted to commercial acoustic imaging sonar systems. Tritech International Limited has now introduced CHIRP as its core acoustic engine for all its new range of Digital Sonar Technology (DST) sonars.

To understand the benefits of using CHIRP acoustic techniques, we need to analyse the limitations using conventional monotonic techniques. An acoustic pulse consists of an on/off switch modulating the amplitude of a single carrier frequency.
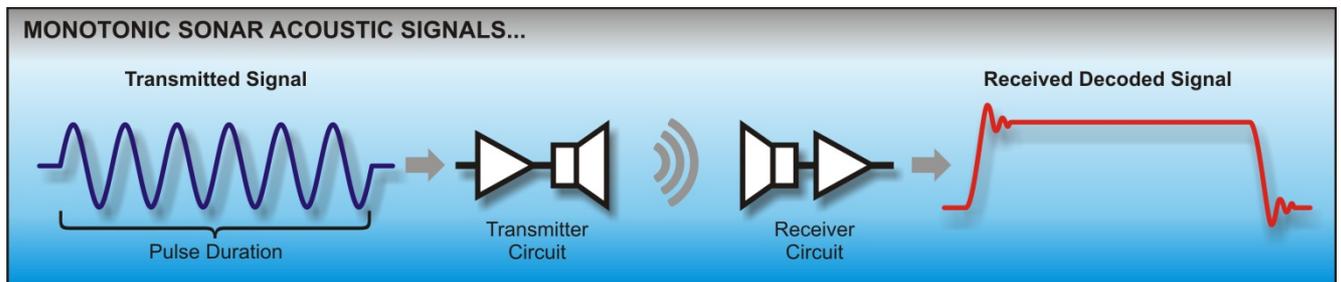
The ability of the acoustic system to resolve targets is determined by the pulse length; this, however, has its drawbacks. To get enough acoustic energy into the water for good target identification and over a wide variety of ranges, the transmission pulse length has to be relatively long. The equation for determining the range resolution of a conventional monotonic acoustic system is given by:
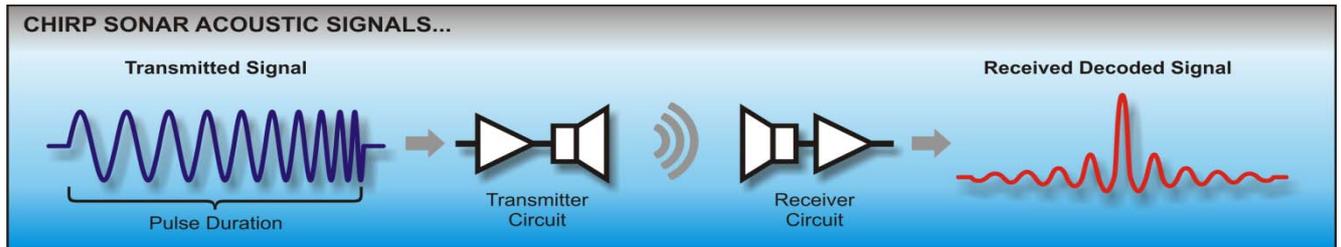
Range resolution = (pulse length x velocity of sound) / 2

In a conventional Tritech system the smallest pulse length is 50 micro seconds and velocity of sound in water (VOS) 1500 metres/second (typical). Therefore our range resolution = 37.5mm. This result effectively determines the range resolution (or ability to resolve separate targets) of our monotonic acoustic imaging system.
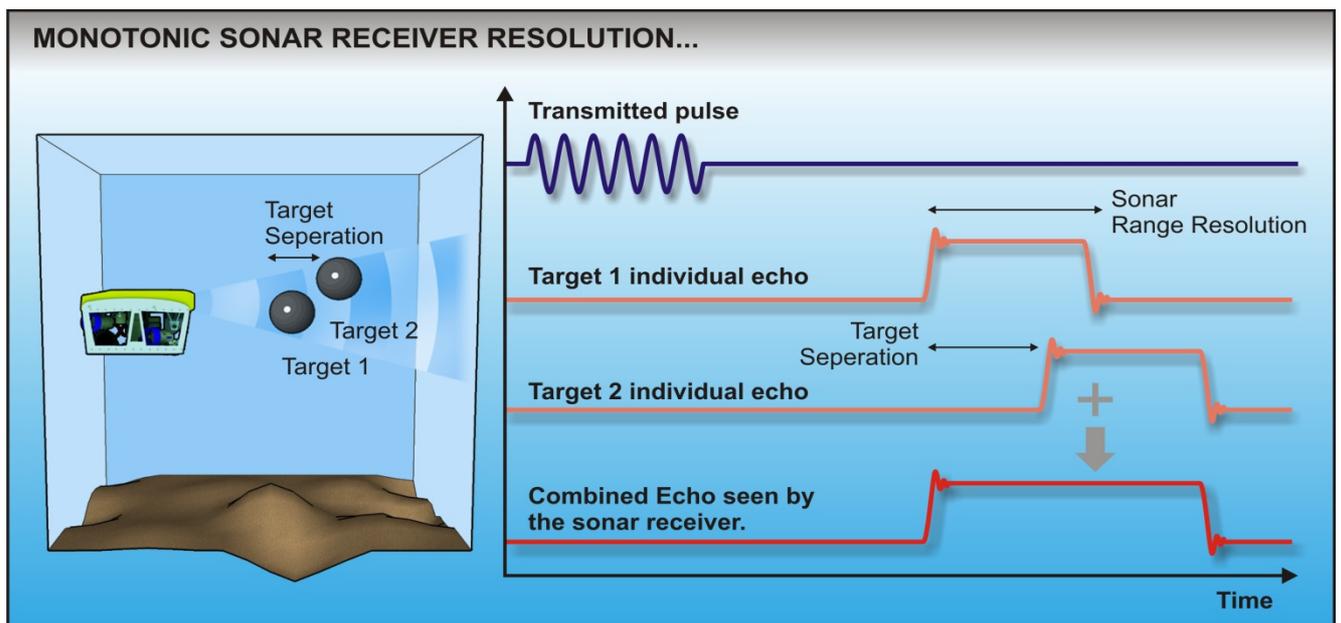
Using the example above, if two targets are less than 37.5mm apart then they cannot be distinguished from each other. The net effect is that the system will display a single large target, rather than multiple smaller target

CHIRP signal processing overcomes these limitations. Instead of using a burst of a single carrier frequency, the frequency within the burst is swept over a broad range throughout the duration of transmission pulse. This creates a 'signature' acoustic pulse - the sonar knows what was transmitted and when. Using 'pattern-matching' techniques, 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 now the bandwidth of the CHIRP pulse. Now the range resolution is given by:

Range resolution = (2 x velocity of sound) / bandwidth

The bandwidth of a typical Tritech CHIRP system is 100kHz.

With velocity of sound in water (VOS) 1500 metres/second (typical), our new range resolution = 7.5mm... **a theoretical improvement by a factor of 5!**

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.
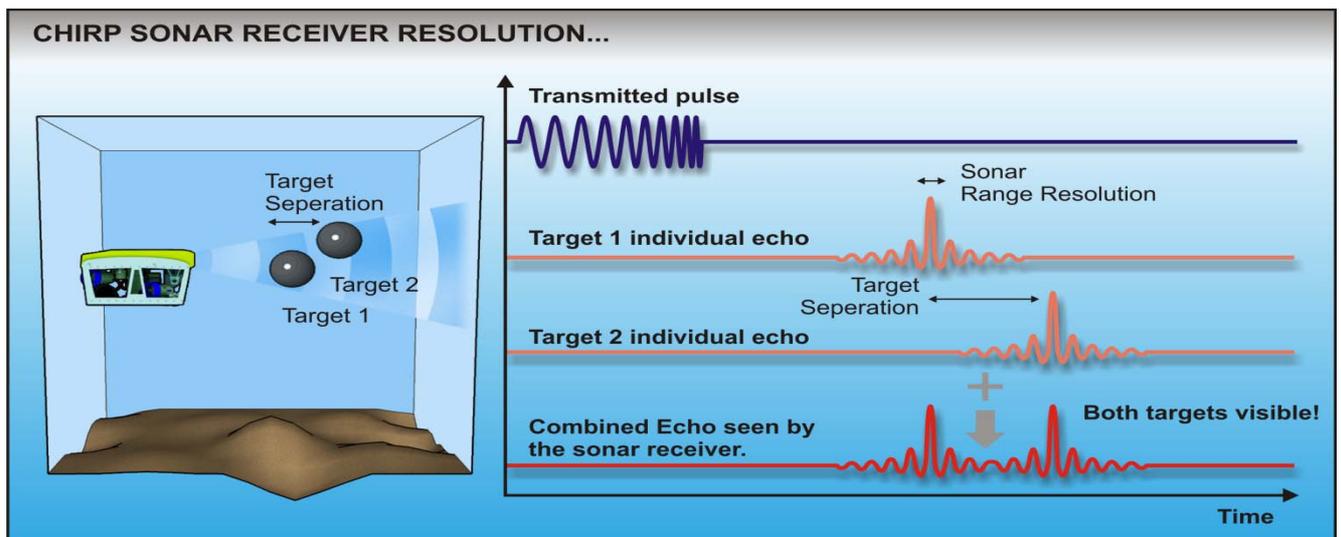
The response from the 'pattern-matching' algorithms in the sonar results in the length of the acoustic pulse no longer affecting the amplitude of the echo on the sonar display. Therefore, longer transmissions (and operating ranges) can be achieved without a loss in range resolution.

Additionally CHIRP offer improvements in background noise rejection, as the sonar is only looking for a swept frequency echo, and removes random noise or out-of-band noise.

Sonar Status

Various error codes are reported in the Sonar Status Area. These help the user determine any faults with equipment or cabling, as a guide to making any corrections or replacements.

Sonar Status

Status Codes are as follows…

'**Centre**'	:	The transducer is not passing through the Ahead position at the correct sequence point. Physical damage internal to the Boot is the most likely cause of this.
'**Timeout**' /	:	There is no communication with the Sonar head. Check that the cable wiring is okay, that the Sonar is powered and the correct COM Port and baud rate are configured in the Tools Menu.
'**Log xxx k**'	:	This is displayed when the log record facility is ON and shows the current size of log file.
'**Play xxx**'	:	This is displayed when the log play facility is ON and shows the current record number within the log file for reference.

Customising the Icons

The icons are displayed on the top and bottom of the Right-hand Panel display and can be edited to include customer's own logo or other icons. The default icons are…

There is a choice of replacing either of the 2 default icons, which have been stored in the SeaSprite software's working/install directory.

The working/install directory will have been selected during the software installation and as default will be **C:\Program Files\SeaSprite\.**

The 2 default icons are named; '**ICON1.JPG'** (SeaSprite Logo) and '**ICON2.ICO'** (Tritech Logo).

It is possible to replace the **ICON1.JPG** with a single Jpeg or Bitmap image. To do this, first delete the existing ICON1.JPG and place in the directory either a Jpeg (**ICON1.JPG**) or Bitmap (**ICON1.BMP**) image. There is no limit to the number of colours used in these images but the maximum size must be kept within **128x50** pixels.

Also, the **ICON2.ICO** file can be replaced by creating a **32x32 icon** of the same name and replacing the default copy that is in the working/install directory.

Additionally, any of the 2 icons can be deleted from the directory, which will exclude them from the display.

⚠️ **NOTE**	if, within the working/install directory, there are 2 images of name "Icon1.Bmp" and "Icon1.Jpg" then (with priority) only one will be loaded onto the desktop; Jpeg is first and then Bitmap.

MAINTENANCE

Head maintenance

Wash down with fresh water each time a unit is recovered from the water, paying particular attention to the boot and connector areas.
Although units are designed for a wide temperature range it is best to avoid temperature extremes for long periods and protect units from bright sunlight.

Repairs are by major unit change out which may involve reprogramming a head. In these cases instructions will be supplied.

It is recommended that usage logs are maintained and that the heads are returned to vendor at 4000-hour intervals for routine inspection/replacement of slip rings, compensation oil and O-ring seals

Underwater cables are not normally within the scope of supply, but will also require regular inspection.

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.

Computer

The PC / Laptop computer should be loaded with a standard version of Windows 98 / 2000 or XP. If for any reason it is necessary to reload the Sonar system this should be done using the CD supplied. Follow the set-up dialog during installation.

The Sonar software can be reloaded as follows…

1)   Insert the Sonar CD into the CD ROM drive.

2)   Browse the CD ROM drive and run Setup.exe from the root. Follow the on screen directions. This will automatically install the Sonar software to the Program Files directory on the C:\ drive.

3)   The Registry retains any user-configured changes. When Setup.exe is run the registry will be set back to a factory default setting.

4)   Shortcut(s) will automatically be created on the Windows Desktop to run the Sonar software and any utility programs that may have been supplied.

To Remove the Sonar software, use "Settings\ControlPanel" from the Windows Start Menu…

1)   Run Add/Remove Programs and select SeaNet.

2)   Follow the on screen directions and choose Uninstall from the options.

3)   On completion all the above installation will be removed, including the Registry settings and Desktop Shortcuts

4)   The Screen resolution should be set to maximum 1024x768 at either 16-bit or 32-bit colours. A resolution of 800 x 600 is optimal for display purposes.

APPENDIX A: SEASPRITE SETUP PROGRAM

Important: The Setup program forms part of the SeaNet software suite, which includes control and display of other, multiple devices such as Sidescan, Profiler and Bathy. This Setup utility therefore includes options such as Sound, GPS, TCM-2 that are only available with other displays in the SeaNet suite and not intended for SeaSprite OEM software which is a Sonar only program.

Changing Seasprite Sonar Baud Rate
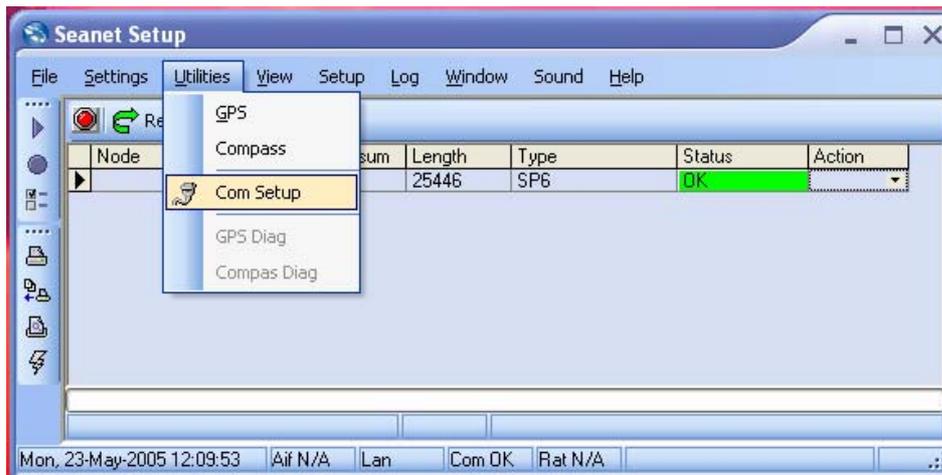
The system has been factory set and should not need to be altered in most circumstances. However, there may be times when the Baud rate may need to be changed to satisfy field requirements. These changes can be made from the **SeaSprite Setup** Program;

There are only 2 areas within the Setup program that will need to be entered for SeaSprite Sonar operation…

1. The '**Utilities**' – '**Com Setup**' menu item (shown above) is used to change the Settings of the Surface computer COM Port. This needs to be configured correctly to initially communicate with the SeaSprite Sonar so that new Baud Rate settings can then be downloaded to the Sonar head.

2. Clicking on '**Setup**' – '**Aif Card**' will open the 'Aif Setup' pop-up panel with settings for the Aif (Acoustic interface) card. In the case of the SeaSprite system, the Acoustic interface is via a COM port. Always ensure that the 'Enabled' check-box is checked / ticked to enable the COM port. This is only applicable for communicating with the SeaSprite Sonar through the Setup program and does not affect the main SeaSprite display program.

Configuring New Baud Rates

This should only ever be necessary to communicate over a longer RS232 serial cable (>10metres), installed between the PC and the SeaSprite Sonar head (or signal converter) or over a modem system that can only handle lower rates. In this event, the Baud Rate should be kept as high as possible to give enough system bandwidth for the Sonar head to operate at full speed and resolution.

The first step is to communicate with the SeaSprite Sonar head, which involves setting the COM Port settings within the Setup program to match the SeaSprite head's Baud rate and COM port connection.
It may be necessary to use a short serial cable to first communicate with and re-program the SeaSprite Sonar head before it is then installed on the longer cable or modem system.

First change the COM Port Baud Rate to match current Sonar settings…

⚠️ **NOTE**	*N.B. The Setup program default will be COM1 @ 115.2K which matches the SeaSprite display software defaults.*

   a)   Click on the **Utilities** menu item and select **Com Setup** from the drop-down list.

   b)   The **Channel Setup** panel will appear as follows. Click on the '**Settings**' ellipsis ('**…**') to open the **AifSetupForm** to change the **Baud** setting.
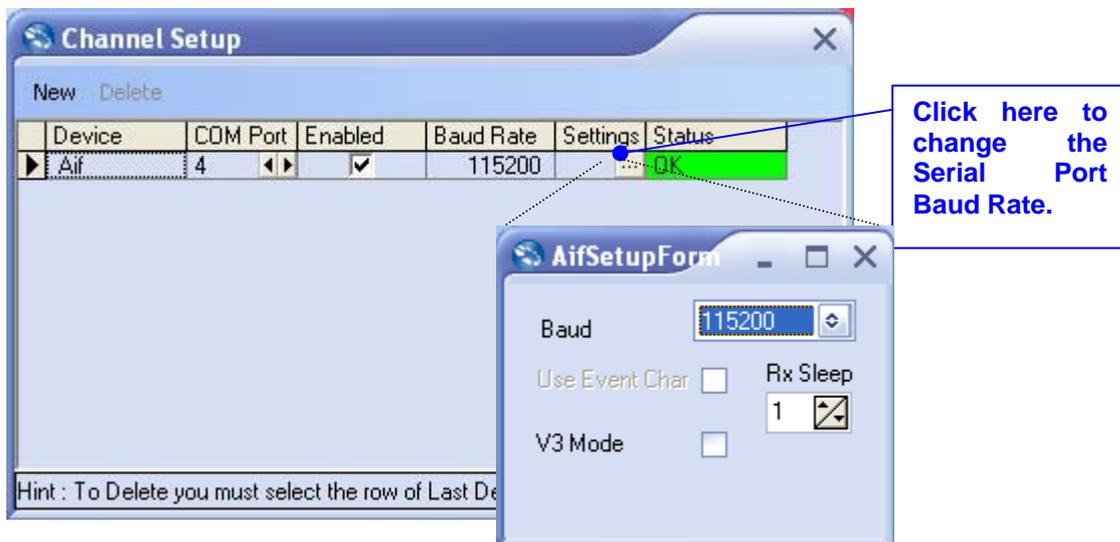
   c)   Ensure that 'V3 Mode' is disabled,'Use Event Char' is greyed out and disabled and 'Rx Sleep' = 1.

   d)   Close the Form via the 'X' button for settings to be applied.

**Then, if necessary, change the PC's Serial COM Port**

   e)   In the **Channel Setup** panel (shown above), change the '**COM Port**' to match the SeaSprite port connection. Also ensure that the '**Enabled**' check-box is checked / ticked.

   f)   Close down the Channel Setup by clicking on the 'X' button on the top-right. New settings will be saved and applied.

To Program the new Serial Baud Rate into Sonar…

a)   First ensure that the SeaSprite Sonar head (Node 2) is detected and displayed in the Setup program table…

b)   Click on the **Action** column for Node 2 and then select **Setup**, as shown…
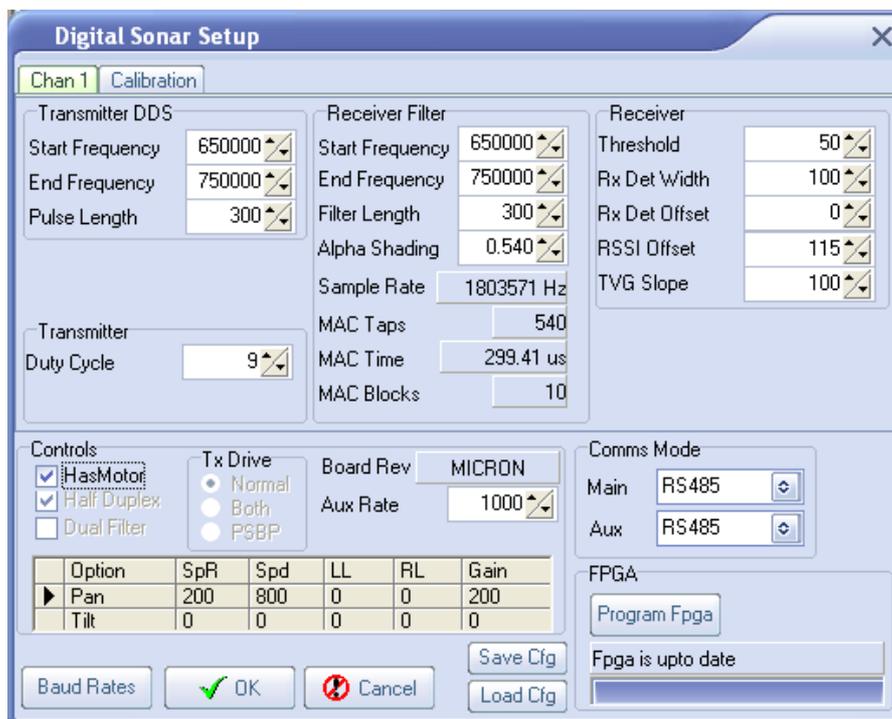
| NOTE	*NB: The settings for the Chirp Sonar are factory set and cannot be changed by the user. The Comms Mode is also factory set and should not be changed.*

c)   Then Click on the **Baud Rates** button in the next panel to open the **Comms Setup** panel…
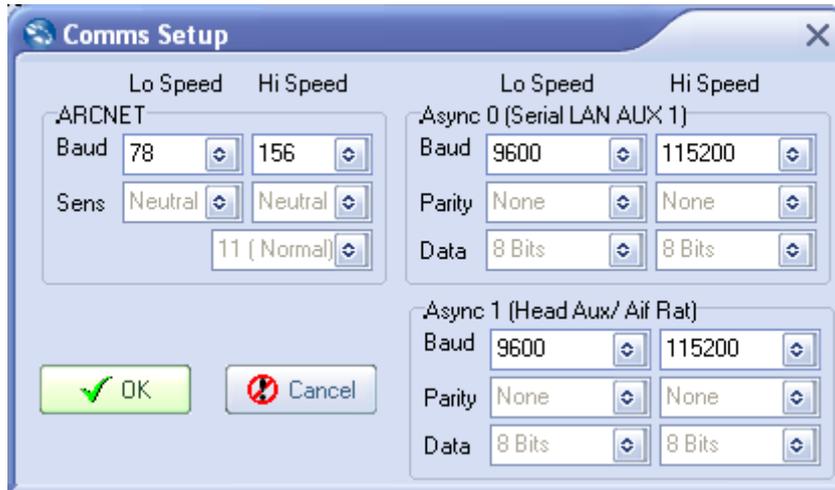
d)   The **Async 0 (Serial LAN)** -> **Hi-Speed** column is the setting that needs to be altered. It will be at the factory default 115200 Baud setting. Change this to the desired Baud Rate then click **OK**.

e)   Then, **OK** the next panel and the new Baud Rate will be programmed into the SeaSprite Sonar. This will only take several seconds.

f)   Close the Setup Program and re-open the **SeaSprite display software**. Change the Baud rate of the PC COM Port to match the new SeaSprite sonar settings. This is performed in **Tools Menu** – **Com Port**.

Additional Sonar Setup information.

This screen displays the computed ADC calibration value along with a quality factor. This is factory set and this page is read only.
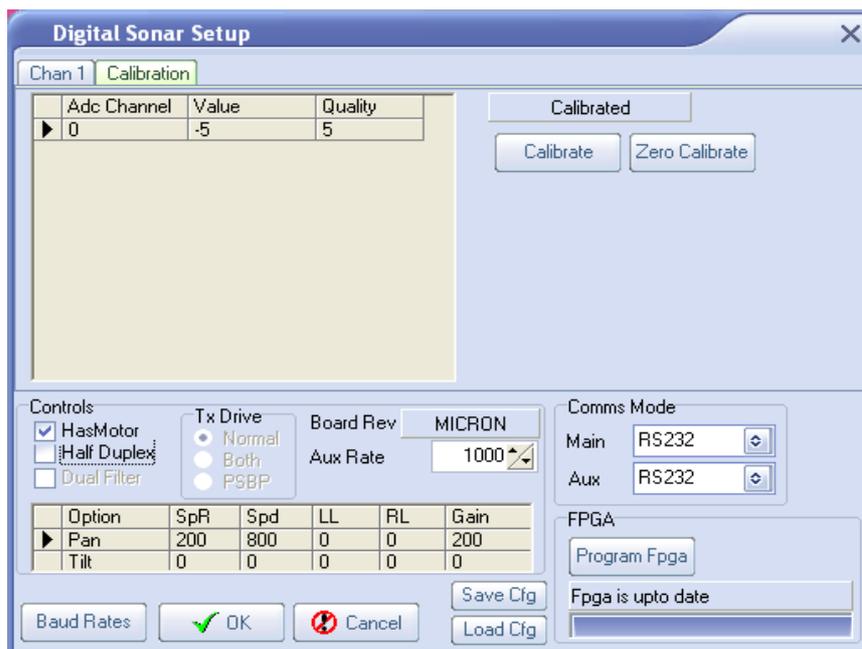
APPENDIX B: CONNECTING RS-485 MICRON ECHOSOUNDER TO 'AUX' PORT

⚠️ **NOTE**	The SeaSprite 'Aux' port will be factory configured to RS-485 at a Baud Rate of 115.2kBaud. This is the mode that is required to connect the RS-485 Micron Echosounder.

INTRODUCTION

The Auxiliary port on the SeaSprite can be used to connect an RS-485 Micron Echosounder for purpose to provide Altitude data on the surface Sonar display. This altitude data will be logged alongside Sonar data and so be displayed during log file playback.

The Micron Echosounder benefits from Tritech's unique Digital Sonar Technology (DST) using CHIRP signature pulses to allow accurate height above seabed measurements (+/- 5mm) through reduced range resolutions (+/- 1mm).

MICRON ECHOSOUNDER POWER REQUIREMENTS

The RS-485 Micron Echosounder has the same input supply voltage range as the SeaSprite Sonar head which is 12-50V. The Micron Echosounder can be powered from the 'Aux' port of the SeaSprite Sonar. This supply will be drawn directly from the input supply to the SeaSprite 'Main' Port.
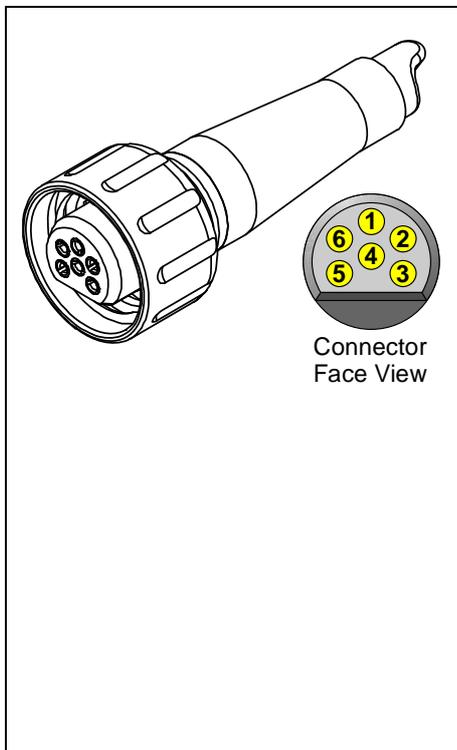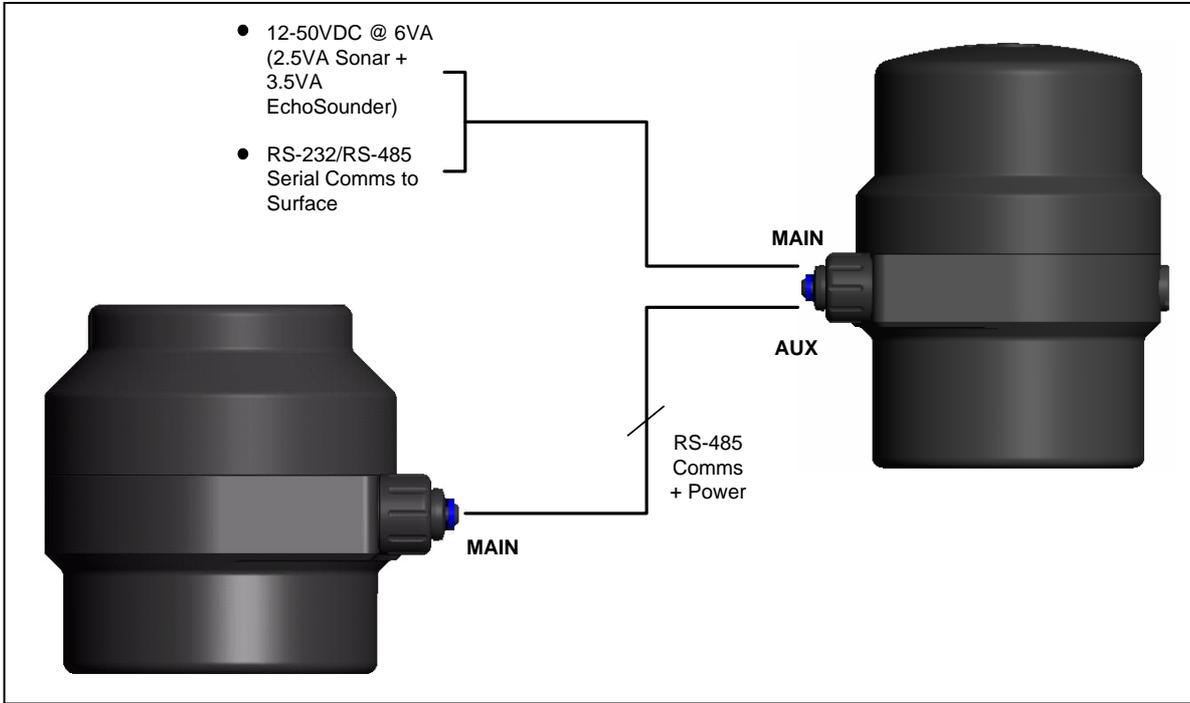
CONNECTOR WIRING DETAILS

The Micron Echosounder connector is a Tritech 6-way "Micron" connector, the same type that is fitted to the SeaSprite Sonar head. The connector wiring details for the RS-485 Comms are as follows;

Connector Face View
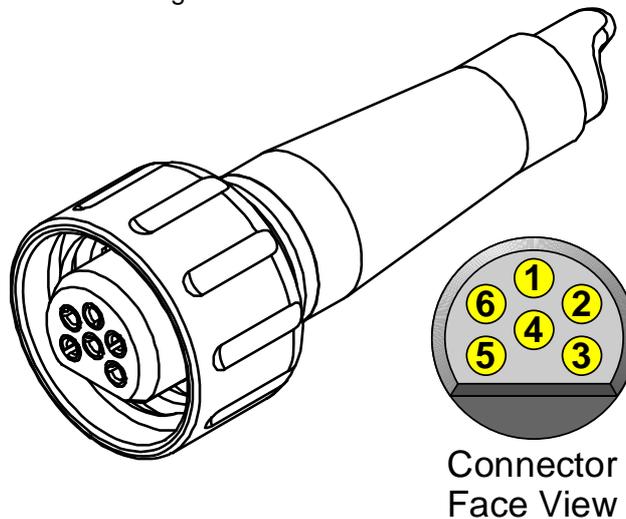
Pin Number	Cable Whip Colour	Wire Function
1	**Yellow**	RS485 Comms A
2	**Blue**	RS485 Comms B
3	**Red**	Supply Positive Voltage
4	**Black**	Supply Ground/RS232 Ground
5	**Green**	Supply Ground/RS232 Ground
6	**Drain Wire** with Black 'Heat-shrink' Insulation	Earth

INTERCONNECT CABLE DETAILS

For the connection of the Micron Echosounder to the SeaSprite 'Aux' Port a double-ended 6-way "Micron" interconnect cable is required. This needs to be a "one-to-one" wired cable.

- 12-50VDC @ 6VA (2.5VA Sonar + 3.5VA EchoSounder)

- RS-232/RS-485 Serial Comms to Surface

MAIN

AUX

RS-485 Comms + Power

MAIN

Connector Face View

SUMMARY

- **Pin 1** on the SeaSprite Sonar 6-pin 'Aux' connector port is the RS485 + that should be connected to the RS485 + (Pin 1) on the Micron Echosounder 'Main' Port.

- **Pin 2** on the SeaSprite Sonar 6-pin 'Aux' connector port is the RS485 - that should be connected to the RS485 – (Pin 2) on the Micron Echosounder 'Main' Port.

- **Pin 3** on the SeaSprite Sonar 6-pin 'Aux' connector port is the DC Power Supply that should be connected to DC Input (Pin 3) on the Micron Echosounder 'Main' Port.

- **Pin 4** on the SeaSprite Sonar 6-pin 'Aux' connector port is the DC Supply Ground that should be connected to the DC Ground (Pin 4) on the Micron Echosounder 'Main' Port.

- **Pin 5** on the SeaSprite Sonar can be left disconnected – On the SeaSprite this is the RS-232 Ground line which is internally shorted to Pin 4.

- **Pin 6** on the SeaSprite Sonar 6-pin 'Aux' connector port is the Earth that can be connected through to the Earth (Pin 6) on the Micron Echosounder 'Main' Port.

MICRON ECHOSOUNDER OPERATING MODES

When connected to the SeaSprite Sonar 'Aux' Port, the Micron Echosounder should be configured in a Free-Running Output mode.

⚠️ **CAUTION !**	***When supplied for SeaSprite Aux Port use, the Micron EchoSounder will be factory preset for this mode of operation. This is a free-running mode that is set to RS-485, Zero No Echo, 3P3 at 115200Baud (8 Data, No Parity, 1 Stop bit). This mode cannot be changed in the field. Contact Tritech for more details.***

There are various data string output modes that can be configured in the Micron Echosounder which are all compatible with the SeaSprite 'Aux' port connection. These include:

1. **3P2** = "**xxx.xxm<cr><lf>**"

   where; "*xxx.xx*" is range in metres to 2 decimal places,
   "*m*" is units label for metres,
   <cr><lf> is Carriage Return and Line Feed terminators.

2. **3P3** = "**xxx.xxxm<cr><lf>**" *(factory preset mode)*

   where; "*xxx.xxx*" is range in metres to 3 decimal places,
   "*m*" is units label for metres,
   <cr><lf> is Carriage Return and Line Feed terminators.

3. Serial **NMEA $DBT** message = "**$PADBT,xxx.xx,f,yyy.yy,M,zzz.zz,F*hh<cr><lf>**"

   where; "*xxx.xx*" is range in feet,
   "*yyy.yy*" is range in metres,
   "*zzz.zz*" is range in fathoms,
   "hh is an 8-bit checksum computed by Exclusive-OR'ing of the character,
   <cr><lf> is Carriage Return and Line Feed terminators.

The default Baud Rate of the Micron Echosounder output is 115kBaud (8 data, 1 stop, no parity).

NOTE: No analogue output is available from the Echosounder when connected to the Micron Sonar auxiliary port.

SURFACE ALTITUDE DISPLAY

The free-running Altitude data output from the Micron Echosounder, as received at the SeaSprite Sonar 'Aux' port, will be forwarded to the surface (between Sonar data packets). At the surface, the Micron Echosounder Altitude data will be displayed on the Right hand panel of the Sonar display window. The Altitude display box will auto-appear on detection of the Altitude data.
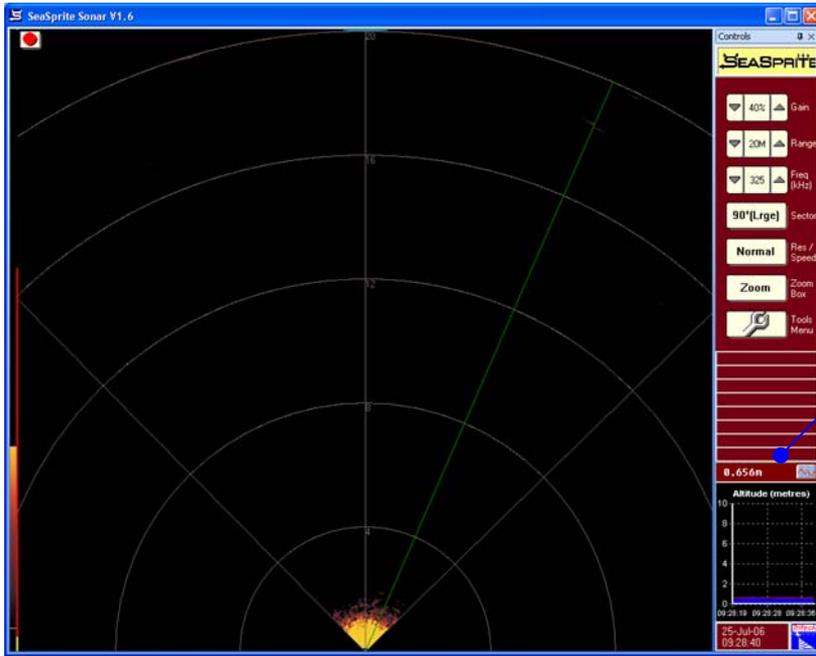
Display of current Free-Running Altitude Data Output from Micron Echosounder.

ECHOSOUNDER DISPLAY AND SURFACE OUTPUT OPTIONS

The altitude data from the Micron Echosounder will be displayed in a Text box and also be charted in the following graphical Chart display…
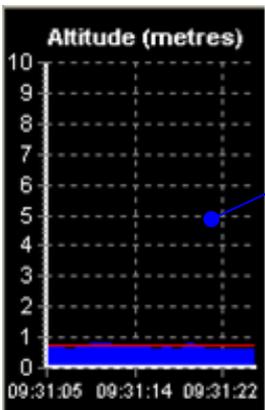

Scrolling altitude chart. Displays current altitude (solid blue) and average altitude (red line).

The chart display will auto-range depending on the value of the current altitude data. The maximum range for the Micron Echosounder is 50m and the chart will auto-range between values of 0-10m, 0-30m and 0-50m.

The Text box and Chart display will only appear when there is active altitude data from a connected Aux Micron Echosounder. To the right of the Altitude Text Box is the Chart Setup button as shown below…

0.602m   **Chart Setup button.**

Click on the Chart Setup button to open the Altimeter Data Processing options.

Altimeter Options

Data Processing

Gating	20%
Hold Last Value	1
Averaging	20
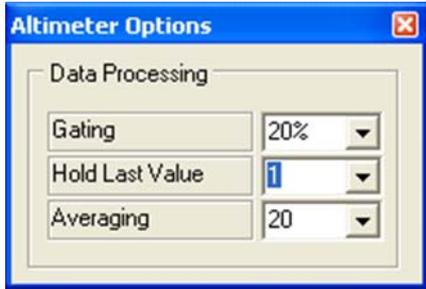
Data Processing Options

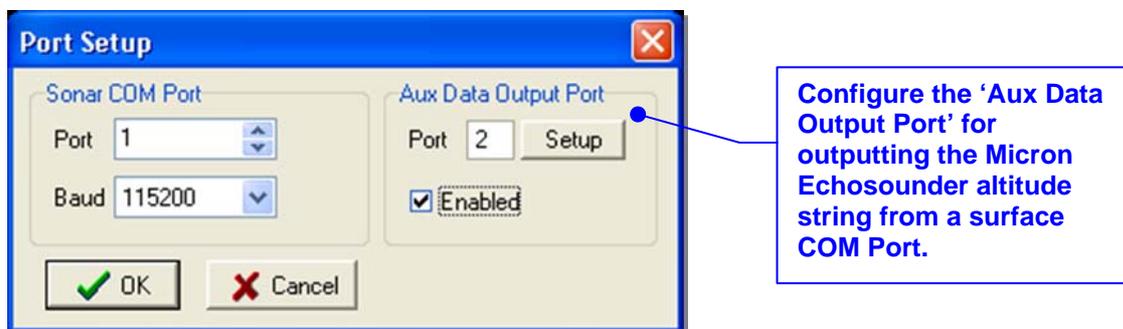**Gating** – Select what percentage to use for the gating range of an altitude reading.
The gating range is calculated as +/- gating of the last altitude reading (i.e. for gating set at 20%, the gating range is +/- 20% of the last altitude reading). If the next altitude reading falls out of this range then it is regarded as invalid and the previous altitude reading is used.

Hold Last Value – Select how long you should hold onto the last valid altitude reading.
If an altitude reading falls out of the gating range of the previous reading then we can hold onto the last good altitude for a specified number of readings or until a reading within the gating range is received. If 'Hold Last Value' is set to 0 then the Chart ignores gating ranges and regards all altitude readings as valid.

Averaging – Select how many data samples to use when calculating the average altitude of the altimeter. Outputting Echosounder Data from a Surface COM Port

In addition to displaying the Micron Echosounder altitude data on-screen, there is also the option to forward the altitude string to another computer via a surface serial link. To configure this option, a COM Port must first be allocated and enabled for this purpose. This configuration is performed by clicking on the 'Com Port' menu item in the Setup menu (see earlier). This will open the following dialog box…

Port Setup

Sonar COM Port
Port 1
Baud 115200

Aux Data Output Port
Port 2   Setup
☑ Enabled

✓ OK   ✗ Cancel

Configure the 'Aux Data Output Port' for outputting the Micron Echosounder altitude string from a surface COM Port.

In the 'Aux Data Output Port' panel, click on the 'Setup' button to configure the COM Port number and Baud Rate for the output altitude string. Once configured, tick the 'Enabled' check-box to open that Port for the altitude data output.

The output altitude string will be in the raw format as transmitted by the Micron Echosounder. Refer to the 'Micron Echosounder Operating Modes' section for a description of the string formats.

APPENDIX C : VIDEO INPUT DISPLAY

If the PC is installed with a Video Capture Card then its video source can be displayed alongside the sonar data on the SeaSprite software display. It therefore makes it possible to view camera images on the same screen as the sonar image updates.

The video frames can be logged at the same time as the Sonar data for later playback. Note: There must be active Sonar data or else the video data will not be logged.
The video is logged into a separate Video Log file (.AVI) that is given the same filename as the Sonar Log file (.V4Log). Thus, when the Sonar log is opened the software will immediately scan the folder for a video file of the same filename. During playback, the video log file is time sync'ed with the Sonar log file.
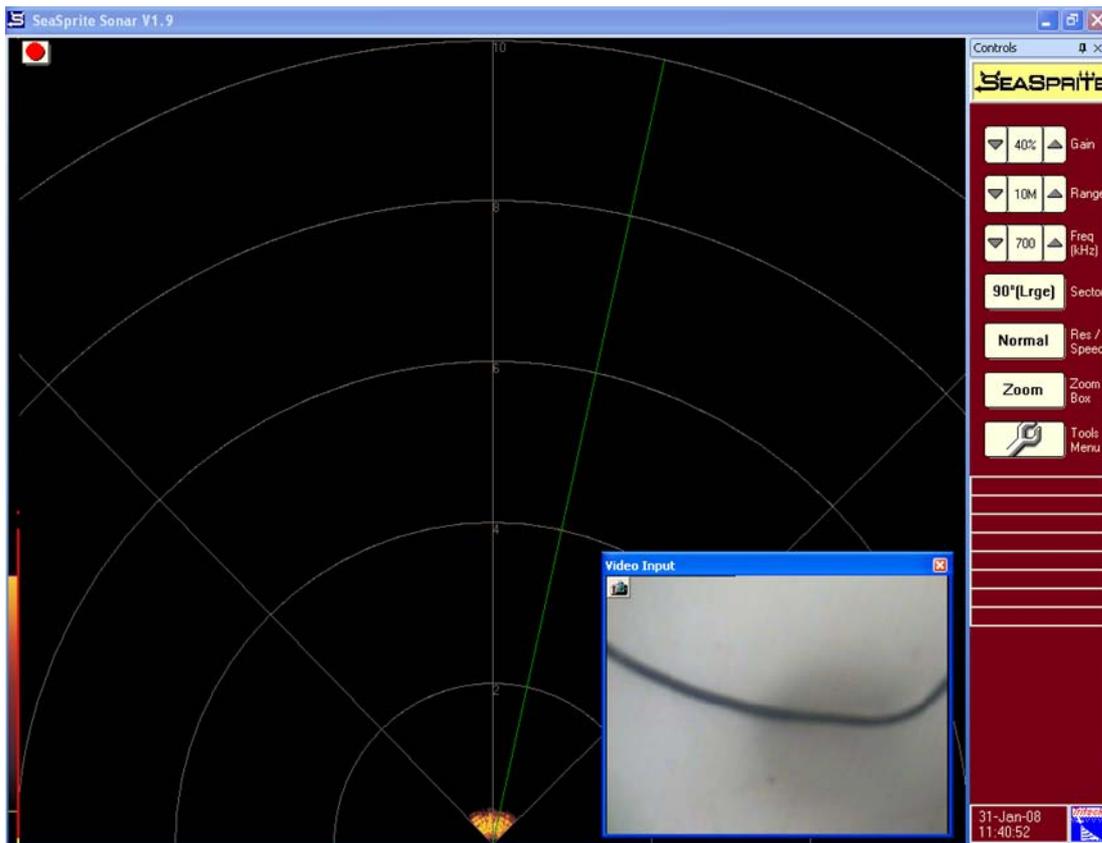
The Video Panel is enabled in the Tools menu. When enabled, the 'Video Input' panel will initially appear as a floating panel which can then be moved about the screen (as shown above) or it can be docked to the Left/Right/Top/Bottom of the Sonar window. When the Micron software is closed down or the Video Panel is disabled, its floating/docked position will be retained for the next time it is opened. Within the Video Input panel, the video overlay can be re-sized and will always maintain a 4 x 3 aspect ratio.
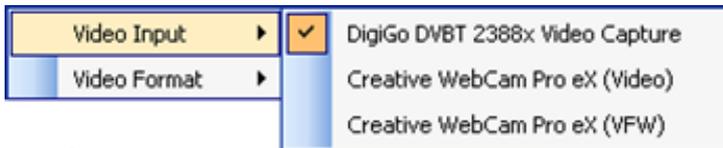
 In the Top-Left corner of the Video Input panel is the Video Setup button as shown below…

Video Setup button.

Click on the Video Setup button to display the pop-up options...

Video Input – This is used to select the Video Input device. This device can be a video capture card or a USB connected camera.


Video Format – This sets the preview and capture video resolution for the selected Video Input device. The list of available resolutions is dynamically built for each capture device according to the available resolutions exposed through it's driver.
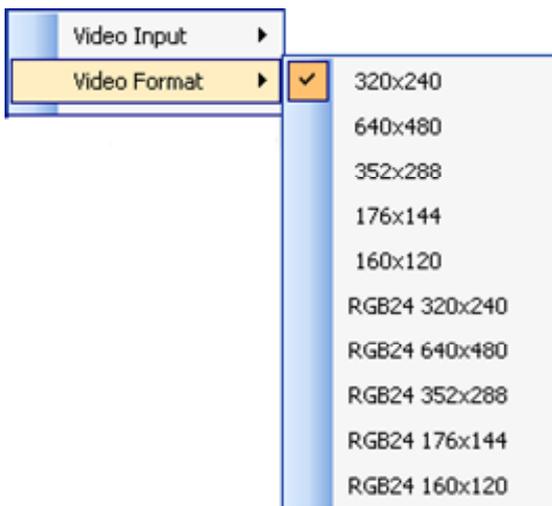

Video Source – Sets the Video Capture device via a drop-down 'Source' list. The list will display all capture devices installed on the PC.
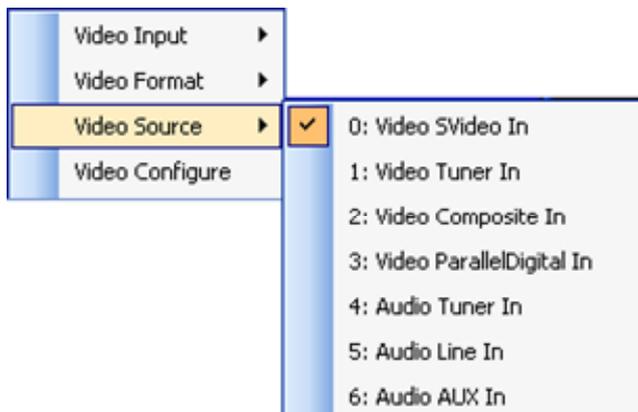
Video Configure – Configure various settings for the selected Video Input device. This will vary according to the type and model of device. For instance, some devices may have configuration settings to set the type of video signal (PAL, NTSC, etc) and associated settings such as brightness and contrast.
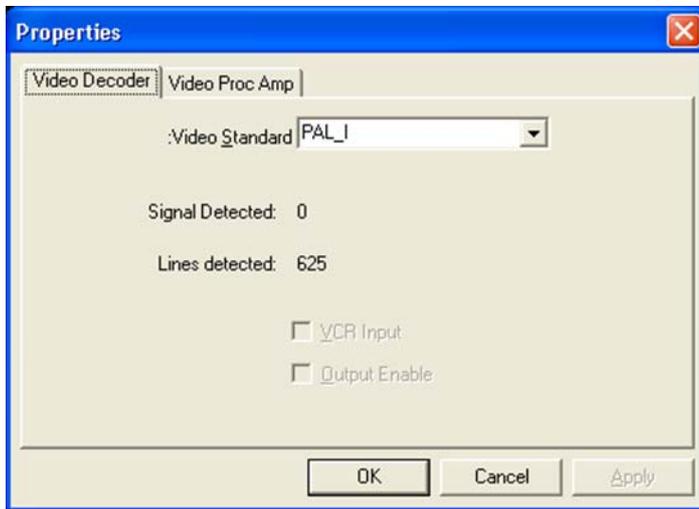
Log Options – This sets Logging options for the video.
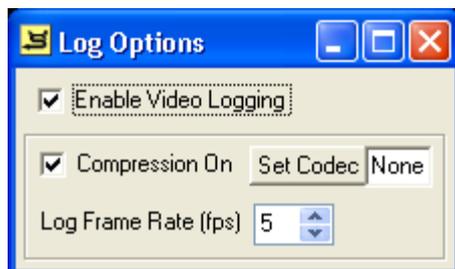
Enable Video Logging – This needs to be enabled to log the Video. Otherwise, only the Sonar data will be logged.

Compression On – Select whether the video is logged to a compressed file format which can reduce .AVI file sizes considerably.

Set Codec – If Compression On is enabled, the video codec is selected via this button. If set to 'None' then file will be uncompressed.

Log Frame Rate – Set the number of frames per second that's logged to the video file.