Micron Sonar

Product Manual

0650-SOM-00003, Issue: 03

Tritech

Outstanding Performance in Underwater Technology

A Moog Inc. Company

Table of Contents

Help & Support

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

Tritech International Ltd can be contacted as follows:

	Mail	*Tritech International Ltd* Peregrine Road Westhill Business Park Westhill, Aberdeenshire AB32 6JL, UK
	Telephone	++44(0)1224 744 111
	Email	tritech-support@moog.com
	Website	www.moog.com/tritech

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

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

2. Software or firmware revision numbers

3. A clear fault description

4. Details of any remedial action implemented

Contamination

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

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

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

Warning Symbols

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

Note

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

Important

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

Caution

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

Warning

DANGER OF INJURY TO SELF OR OTHERS

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

1. Introduction
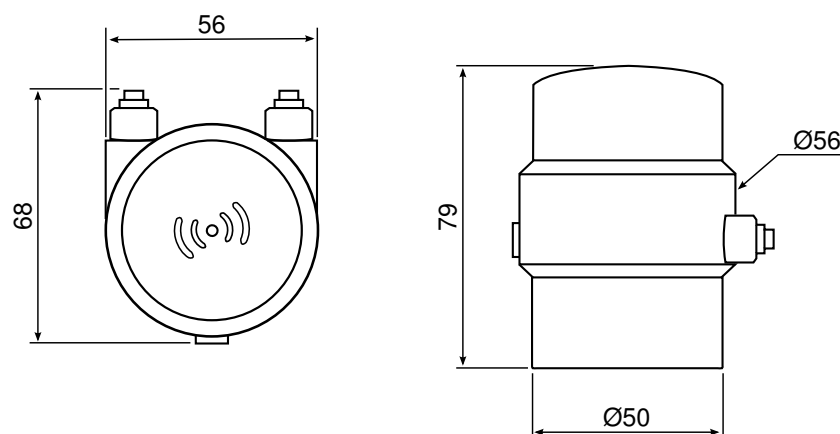
Designed specifically for very small and low cost ROVs the *Tritech International Ltd* Micron sonar is an extremely compact 360° imaging sonar.

Despite the small package, the Micron sonar has many features often found in much larger units, such as digital CHIRP technology, variable speed and range and either RS485 or RS232 connectivity.

As a part of the Micron range of products the Micron sonar is also able to integrate with other Micron subsea sensors produced by *Tritech International Ltd* such as the MicronNav USBL system or the Micron Echosounder.

2. Specification

2.1. Dimensions

Not to scale, dimensions in mm.

2.2. Physical Properties

Weight in air	324g
Weight in water	180g
Depth rating	750m standard, 3000m optional
Operating temperature	-10 to 35°C
Storage temperature	-20 to 50°C

2.3. Acoustic Properties

Operating frequency	CHIRP centred on 700kHz
Beamwidth	35° vertical, 3° horizontal
Maximum range	75m
Minimum range	0.3m
Scan sectors	Variable up to 360°
Step speed	3 speed options (controlled through software) "Normal" will produce the best resolution at a slower speed. "Fast" and "Very Fast" are useful for searching for objects.

2.4. Electrical, Communications & Software
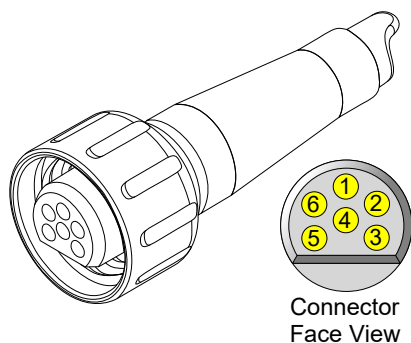
Power requirement	12 - 48V DC at 4W
Maximum cable length	1000m using RS485
Communication protocols	RS485 (twisted pair), RS232
Surface control	Computer using standard serial port, SeaHub or USB-RS232/RS485 converter
Control software	Tritech Seanet Pro, Micron software or low-level command protocol
Software features	True acoustic zoom, instant reversal, image measurement, inverted head operations

2.5. Pin-out Diagram & Cable Specification

Caution

The Micron series connector is **not** wet mateable and direct exposure to water when the unit is powered will cause damage.

Connector
Face View

Pin	Wire Colour	Function
1	Yellow	RS485 A RS232 TX
2	Blue	RS485 B RS232 RX
3	Red	DC +
4	Black	DC ground
5	Green	RS232 ground
6	cable sheath	earth

3. Installing the Micron

Caution

The Micron sonar head is an oil filled product and should not be opened or tampered with in any way. There are no user-serviceable parts or internal switches which would necessitate disassembly.

Caution

The seal screw on the front of the sonar 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.

3.1. Mounting

Optimal Orientation

Always mount the Micron sonar as close to true vertical as possible in relation to the trim position of the vehicle. The front filling plug and LED should be aligned with the natural direction of travel of the vehicle. Errors in the head alignment can give rise to unreliable results.

Note

The operation LED is the "zero" position and relates to the "12 o'clock" on the sonar display.

If mounted in a non-zero position then it is possible to correct the rotation using the `Rotation Offset` in software (see Section 7.3.16, "Sonar Setup").

Mounting Material and Suitable Brackets

All dimensions are in millimetres.

Figure 3.1. Mounting Holes on Micron Range

Caution

Avoid clamps with metal alloys containing copper such as brass or bronze.

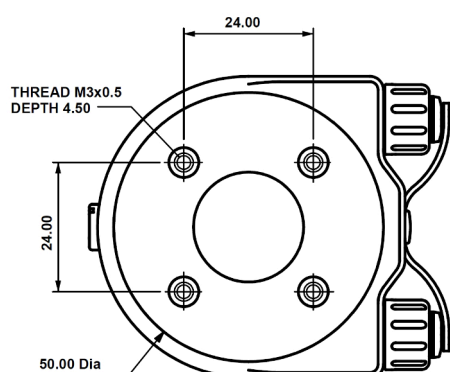Non-metallic clamps should always be used where possible to prolong the life of the unit and prevent any galvanic corrosion effects. If metallic clamps are used they should be electrically insulated from the sonar body by means of rubber or plastic strips or mount brackets of at least 3mm thickness and extending at least 3mm beyond the clamp boundary. They should also be painted or lacquered with at least three coatings.

The Micron sonar can be mounted with a clamp around the body (the bottom half of the sonar) or can be mounted using the holes on the base as detailed in Figure 3.1, "Mounting Holes on Micron Range".

Caution

Under no circumstance should a clamp be used on the transducer (top half) of the Micron.

3.2. Power

Caution

Unused connector sockets should be sealed against water ingress with the provided blanking cap.
When mating the connectors ensure that both plug and socket are completely dry.

The sonar head is protected against voltage surges on the power and communication lines using internal suppressors. Sustained over voltage will damage the head. To reduce the risk of damage due to over-voltage it is recommended that 100mA fuses are used in the communication lines and appropriate fuse is used in the power supply (e.g., 1A at 12V or 500mA at 24V).

Power can be applied from a rectified transformer PSU and 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 specified in Chapter 2, *Specification*, in power on/off and running conditions.

Note

Devices that connect to the auxiliary port, such as the Micron Echosounder, can draw power from the same supply through the internal wiring of the Micron.

If using with a SeaHub it is possible to power the Micron from the SeaHub using a combined power and data cable (port C or D). Please refer to the SeaHub manual for details of the port pin-out diagram or contact *Tritech International Ltd* who can provide a ready made cable.

If using an RS232 connection from a computer or if the sonar is mounted to an ROV it will be necessary to construct a cable with an appropriate Micron connector on one end and power/data on the other end. Contact *Tritech International Ltd* for an appropriate cable whip.

Caution

Never try to make the Micron sonar work down a long cable by increasing the PSU output voltage above the maximum specified voltage.

3.3. Communications

Caution

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

3.3.1. Port Layout

Note

For pin-out diagrams and cable specification refer to Chapter 2, *Specification*.

The Micron sonar is supplied with two communications ports labelled MAIN and AUX. All communication to the control computer on the surface should be via the MAIN port, while the AUX port is used for daisy chained communication links to other *Tritech International Ltd* sensors such as the Micron Echosounder.

The communication configuration of the ports are factory set (although they can be changed in software see Section 8.1, "Baud Rate & Communication Protocol"). The factory setting is written on the label attached to the Micron, and can also be obtained from the original build record.

Any combination of protocols (RS232 and RS485 only) are possible.

MAIN	AUX	Label Example
RS485	RS485	
RS232	RS485	
RS485	RS232	
RS232	RS232	

Note

If the settings are changed through software it is important to keep a record of the changes, otherwise it can be difficult to re-connect to the sonar.

3.3.2. RS232 Characteristics

The RS232 telemetry is bi-directional, 3-wire (TX, RX and ground) with a maximum speed of 115.2kBd.

The connection between the sonar and the control computer RS232 COM port. Typically this is a DE-9 port or via a DE-9 to USB converter (if the computer has no native RS232 ports, such as in modern laptops). It is also possible to connect via an RS232 modem or multiplexer.

Maximum cable length

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

It is possible to connect over a longer cable by using a pair of RS232 to RS485 (or RS422) converters and only using the RS232 connection over short ranges near the sonar head and control computer.

3.3.3. RS485 Characteristics

The RS485 telemetry is half-duplex, 2-wire with a maximum speed of 115.2kBd.

Typically the surface RS485 connection is an RS485 serial COM port installed in the computer (usually desktop computers) or can be an RS485 to RS232 signal converter.

Note

The RS485 circuit inside the Micron has a factory supplied 150Ω termination resistor fitted. A matching resistor may be fitted to the surface side if the twisted pair length requires it.

Maximum cable length

The RS485 protocol is capable of a maximum of 2000m using high quality twisted pair cable.

3.4. Serial Converters

3.4.1. RS485 to RS232 Converters

It is possible to convert the Micron sonar between RS232 and RS485 (see Section 8.1, "Baud Rate & Communication Protocol"), but in order to do this a connection to the Micron must first be established.

Note

The *Tritech International Ltd* SeaHub device can provide a configurable RS232 or RS485 to USB converter and can be used to program and communicate with the Micron sonar, for more details of the SeaHub please refer to the SeaHub manual.

In order for the converter to work it must be capable of:

• Half-duplex operation.

• At least 115.2kBd speed.

• Externally powered (to reduce the chance of electrical interference from a DE-9 (COM port) powered device).

• Optically-isolated to protect both the computer and converter from high voltages which may become present in a fault condition.

Adam 4520

Tritech International Ltd recommend the Adam 4520 RS232 to RS485 converter. This can be purchased from *Tritech International Ltd* if required.

The Adam 4520 is externally powered with an input range of 10-20V DC and a maximum of 24V is recommended.

Internal switches are used to set the baud rate and should be set according to the instructions on the case. It is important to match the baud rate of the sonar and control computer.

Refer to Chapter 2, *Specification* for the correct wiring to the Micron.

B&B Electronics 485OT9L or 485OTLED

This interface provides optical isolation between the ports. It is externally powered with an input range of 10 to 30V DC. An input voltage of 24V DC is recommended.

The internal switches and jumpers are used to select the baud rate and communication mode and the documentation supplied with the device should be referred to in order to ensure that the correct settings are used.

Refer to Chapter 2, *Specification* for the correct wiring to the Micron.

3.4.2. USB to DE-9 Adapters

It is common for new computers to be supplied without a DE-9 port for serial communication, in this instance a USB to DE-9 adapter may be used to obtain a virtual RS232 COM port on the computer.

Note

The *Tritech International Ltd* SeaHub can provide such an adapter. Please refer to the SeaHub manual for more information.

There are a wide variety of DE-9 to USB adapters available but not all are suitable for use with the Micron products. The data link to the Micron depends on a half duplex operation and as such the timeout on the data is important. Some USB adapters buffer the data which means the Micron sonar strings are broken up when passing through. When this is the case the sonar head can be detected in the `Micron Setup` (or `Seanet Setup`) program but when running the sonar scan the head is intermittent or does not scan at all.

If problems are experienced with the USB adapter first try to load the system on a computer with a normal DE-9 port (if one is available) to confirm that the sonar head are operational.

Note

A proven USB adapter can be purchased from *Tritech International Ltd* if desired.

4. Installing the Software

The Micron Sonar can be operated by either the Micron Software or Seanet Pro. The Micron Software is a simple and easy to use application specifically designed for use with the Micron Sonar and Micron Echosounder. Seanet Pro is a more complex program which can operate all of the sensors produced by *Tritech International Ltd* so may be more useful if the Micron is integrated into an ROV with other sensors.

Caution

Do not install Seanet Pro at the same time as the Micron Software - the two programs cannot coexist on the same computer.

4.1. Micron Software

Note

If Seanet Pro is already installed it should be removed prior to installing the Micron Software.

Note

The Micron software is not compatible with Window 8 or later.

Installing from the Internet

The latest version of the Micron Software is available from www.moog.com/tritech

For Windows XP and later the latest version should be selected for download. If using a Windows 98 computer Micron Software versions later than 2.1 will not work so it will be necessary to download version 2.1.

Once downloaded it is simply a case of double-clicking on the executable file and following the on-screen instructions to install it on the computer.

4.2. Seanet Pro

Installing from the Internet

Note

If the Micron Software is already installed it should be removed prior to installing Seanet Pro.

The latest version of Seanet Pro is available from www.moog.com/tritech. It may be necessary to log in to obtain the software and if a user name and password is required, please contact *Tritech International Ltd* for instructions.

Once the file has been downloaded it is simply a case of double-clicking on the executable file and following the on-screen instructions to install it on the computer.

5. Operating Principles

On installation of the sonar on a vehicle, it can be tested in air by powering up the system and observing that the LED illuminates as the head scans through the ahead direction.

As with any active sonar, the Micron sonar heads 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 beam. 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 Micron sonar is supplied with one operating frequency, typically 700kHz, although DST heads use CHIRP frequencies centred on this value.

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 sonar 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 equally spaced in range. If they persist, reduce the gain.

When searching for objects, hold the vehicle heading as steady as possible to stop the image blurring. Sit on the seabed if necessary.

Depending on water depth and vehicle depth, there may be ring like echoes. These can be caused by surface or seabed direct reflections and may be difficult to avoid.

Experience with the sonar will enable the operator to be able to quickly and effectively set the "Gain" and "Threshold" controls to give as even a background as possible, without swamping the display, and maximise the performance capabilities of the head. The threshold control is used to mask out any unwanted clutter caused by the weaker returns.

There are 4 range resolutions available, selected from the Main Menu. As the resolution is increased from Low to Medium to High to Ultimate, the sonar display will show better resolution, but at a lower scan speed. Use of a lower resolution will give faster scan speed, but with coarser detail. When searching for smaller targets close by, select a higher resolution mode. When searching for large targets at long range use a lower resolution.

6. Operation with Seanet Pro

⚠️ **Caution**

Do not install Seanet Pro at the same time as the Micron Software - the two programs cannot coexist on the same computer.

6.1. Main Screen

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

The Seanet Pro screen display shown below is a Gemini, SeaKing & Bathymetric application, although the view will vary depending on the applications chosen, each application will have a similar layout.
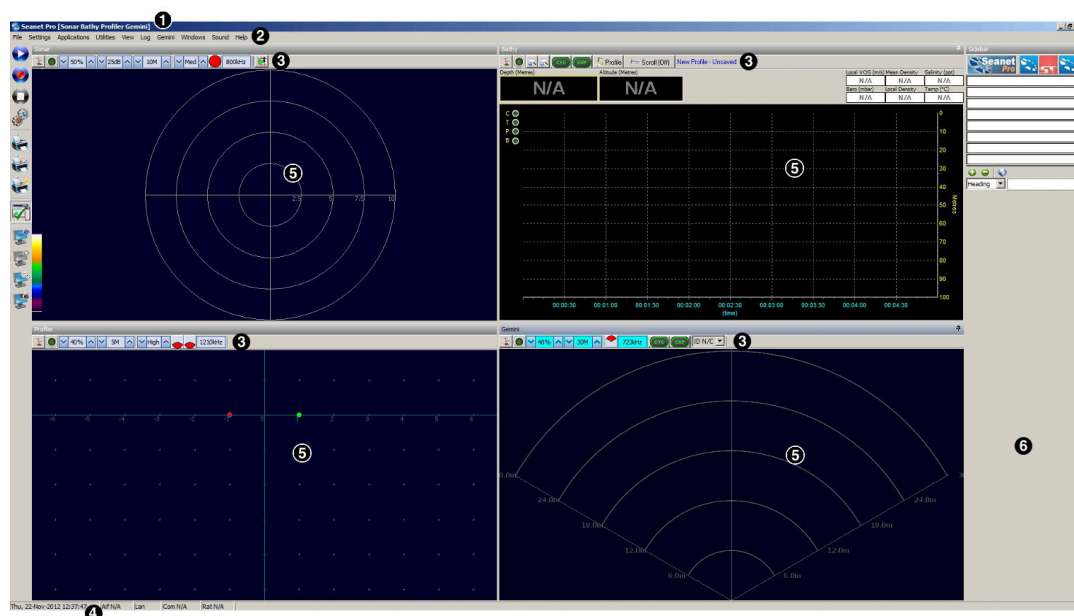
Figure 6.1.

The main areas of the display are:

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

2. `Menu Bar` This is where system set-up functions can be accessed. Printing, Application selection, Colour Scheme setup and Logging are some of the features that can be accessed in this screen area.

3. `Settings Bar` This is where the Sensor can be controlled and configured. The Settings bar is on top of every display window for each device that is connected to the system. It includes a Tools Setup button, Led indicator (Pause/Go) and RAT dials and buttons

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

5. `Sensor Display Area` This part of the screen is where the main Sensor data is displayed. Other pertinent data such as Range Scale, Cursor and status messages pertaining to the Sensor may also be displayed within this area - Refer to the manual section provided with each Sensor for further details of its display area.

6. `Sidebar` This is where Serial input data and user text can be displayed. This bar can be placed on the Left or Right hand side with RHS the default setting. The operator can choose to have this bar visible or not and it can also be folded away.

6.2. Sonar Settings

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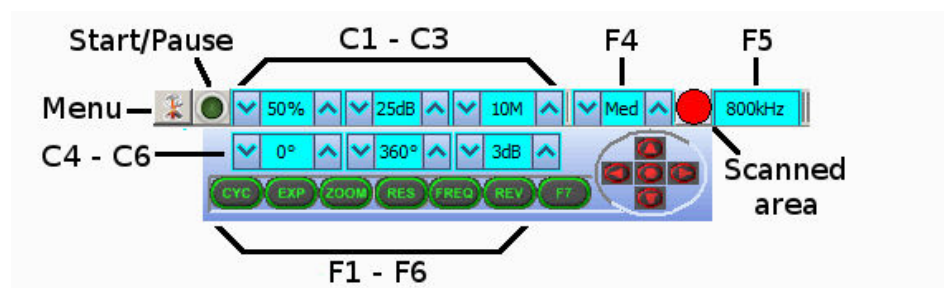

Figure 6.2.

Note

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

Sonar Gain (C1)	This sets the sonar receive gain as required – typically this is around 50% but is varied according to water and target conditions and user preference.
Contrast (C2)	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.
Sector Scan Direction (C4)	This is used to set the centre of the scanned sector particularly useful when using a narrow sector width to concentrate on a particular feature. A well positioned, narrow sector will allow faster scan updates than a wide sector.
Sector Scan Width (C5)	This sets the width of the scanned sector. Typically this will be adjusted according to the required seabed coverage.
Display Sensitivity (C6)	This sets the display sensitivity threshold. A low setting will effectively remove very low level returns from being displayed which may include (soft) seabed backscatter whereas a higher setting will start to remove higher amplitude echoes which may include objects of interest.

|	
	It is normal to keep this at a low setting of no more than 5dB to remove low level 'noise'.
CYC (F1) - Cycle Window	This can be used when one of the display windows is maximised using the Expand (F2) button and will cycle between the Sonar display windows. Also use the F1 button to switch focus between the display windows. The optional RAT controller will switch its control to the display that has the focus. Note: clicking on a display with the mouse pointer will also switch focus to that display.
EXP (F2) - Expand Window	This will maximise the current display window that is in focus. Either click on a display window to switch focus to it before expanding, or press the Cycle (F1) button to switch focus to a display window.
ZOOM (F3)	This will toggle the Acoustic Zoom window on/off. This draws a zoom box on the display positioned by the cursor. This control is also toggled via Application Tools - Acoustic Zoom. The Zoom window size and magnification can then be adjusted in 'Zoom Setup' in the Application Tools.
RES (F4) – Sonar Resolution	Resolution toggles through preset step sizes for the sonar scanning. Available step sizes is dependant on the sonar being used. Smaller angles give a higher resolution picture but slower scan speeds. Usually a Lo or Med resolution is used for tracking moving targets and Hi or Ult for detailed examination of static targets.
FREQ (F5) - Sonar Frequency	This toggles between the channels available on the sonar. For a single frequency sonar unit this control will be inactive and will lock to indicate the operating frequency of the sonar.
REV (F6) - Reverse Scan Direction	This allows the operator to instantly reverse the scan direction without waiting to reach the end of the scanned sector.
Sector Quick Select	This group of 5 buttons in the bottom right of the control allows the user to make a quick selection of a full 360° scan or 180° forward, back, left or right. The display view is changed automatically and the appropriate sector width and direction set.

6.3. Main Menu

Figure 6.3.

1. `Print` Output screenshot to printer.

2. `Screen` Capture Screen to AVI or save screen to Bitmap/Tiff.

3. `Exit` Used to exit program.
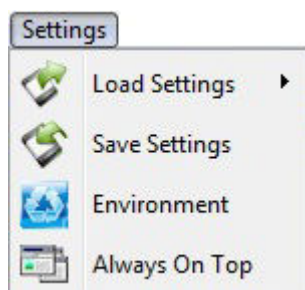
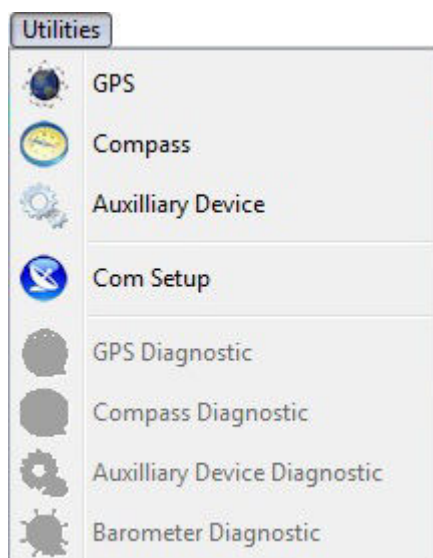

Figure 6.4.

1. `Load/Save Settings` Save and Load the current display and device settings (up to 8 can be saved).

2. `Environment` Used to enter environmental parameters such as system Velocity Of Sound.

3. `Always On Top` Main Screen is Always on Top of Windows desktop.
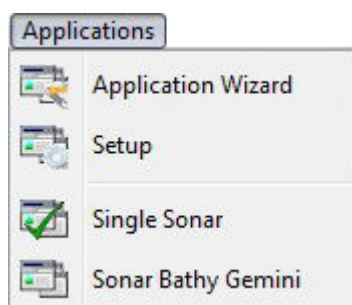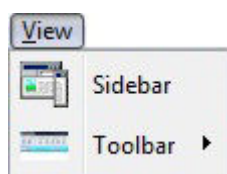

Figure 6.5.

This Menu Item will only be present in Seanet Pro and not from running Seanet Setup from the desktop icon. Application examples include `Single Sonar`, `Sonar Profiler` and `Sonar Bathy Profiler`. There is also an `Application Wizard` available at the top of the list which can be used to create user applications for required device combinations.
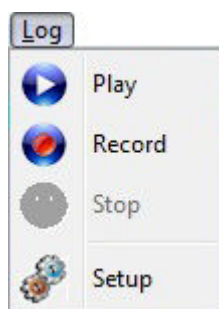
Figure 6.6.

1. `GPS` Pop-up Form to display GPS data received through a COM port.

2. `Compass` Pop-up Form to display Compass data received through a COM port.

3. `Auxiliary Device` Pop-up Form to display Aux Device data (i.e. Digiquartz Pressure Sensor or PA/NMEA Altimeter data) received through a COM port.

4. `Com Setup` Configure and Enable COM ports for various serial inputs/devices including GPS, Pipetracker, Barometer and Compass.

5. `GPS Diagnostic` Terminal window for viewing received serial data.

6. `Compass Diagnostic` Terminal window for viewing received serial data.

7. `Auxiliary Device Diagnostic` Terminal window for viewing received serial data.

8. `Barometer Diagnostic` Terminal window for viewing received serial data.

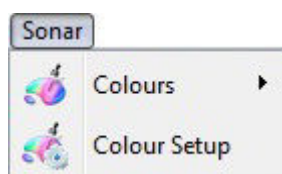
Figure 6.7.

1. `Sidebar` Enable/Disable the Sidebar. Note: In certain applications, i.e. 'Sonar Video', the Sidebar will be opened and docked to the blank ¼ window panel filler.

2. `Toolbars` There are several toolbars containing shortcut buttons which can be displayed in the Menu Bar area or docked to the sides of the Display Area. For details see the "Toolbar Shortcut Buttons" section.

Figure 6.8.
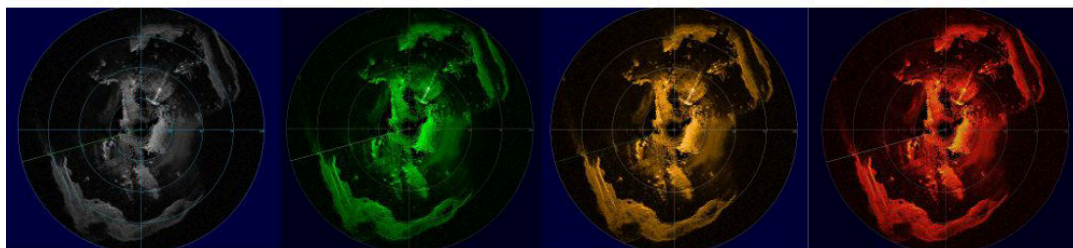
1. `Play` Use to play back recorded log data (follow the on screen display).

2. `Record` Use to record Sonar data (follow the on screen display).

3. `Stop` Stop recording and/or Auto Logging.

4. `Setup` Select file options for recording log files (Follow the on screen display).

Figure 6.9.

Sonar (this will be renamed for other devices, e.g., `Sidescan`, `Profiler`, `Bathy`)

1. `Colours` Use to select a saved colour scheme.

2. `Colour Setup` Use to configure the existing colour scheme or create a new colour scheme.

Some examples of colour schemes that are available by default:

Figure 6.10.

Figure 6.11.

Windows (only functional in multi-Sensor Applications)

1. `Cycle F1` Cycle to the next Display Window (can also be done using the F1 key).

2. `Zoom F2` Enlarge the current Display Window to fill the window, click again to display all the Display Windows (can also be done with the F2 key).

3. `Sonar` Switch focus to Sonar Display window.

4. `Sidebar` Will be replaced with name of another Sensor in a Multi-Sensor Application.

Figure 6.12.

The `Sound` menu enables an acoustic representation of the visuals presented on the Main Screen of the Seanet Pro application. Clicking on `Setup` allows configuration of how this sound is represented.
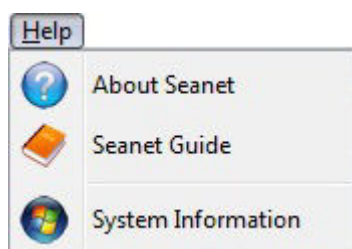
Figure 6.13.

1. `About Seanet` Gives details of program and version number.

2. `Seanet Guide` Seanet Help file.

3. `System Information` Gives information of computer resources in use.

6.4. Measurement Tool

By left button clicking and dragging on the Sonar display window (or Acoustic Zoom window) an elastic band is laid for range and position measuring of targets.

Dx, Dy = Cartesian co-ordinates of current pointer position relative to Sonar.

Rng, Brg = Polar position of pointer relative to where elastic band was laid.

> ### Note
>
> The range units used are those selected in the Setup menu.

6.5. 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.

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

Figure 6.14.

The sonar receiver will accept a return signal in the region of 0 - 80dB. The dynamic range controls are used to adjust the position of a sampling window within the 0-80dB dynamic range band of the receive signal. An idealised representation of the sample window is shown:
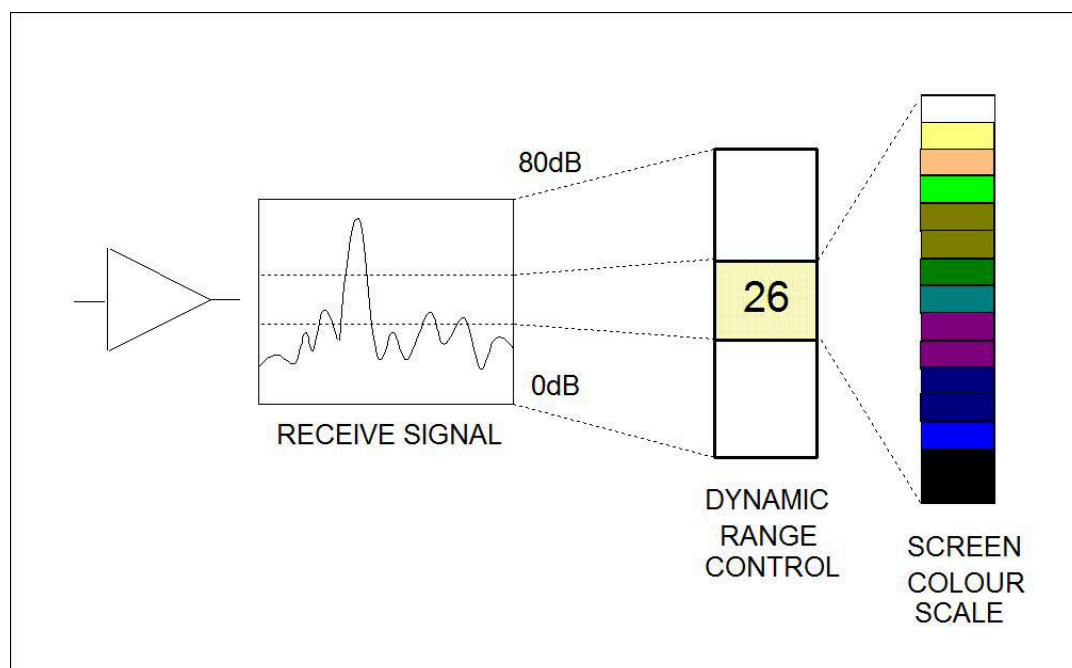
Figure 6.15.

6.6. Application Tools

6.6.1. Markers

Figure 6.16.

Adds A and B markers onto the sonar display, the range and bearing to each marker & separation and relative bearing are shown.

Click on the symbol to deploy on the `Marker` panel and that marker symbol 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 to the position required.

Figure 6.17.

When both markers are dropped on the display, a line will be drawn which connects them. The 'Delta' Range and Bearing at the bottom of the panel indicates separation and angle between both Markers.
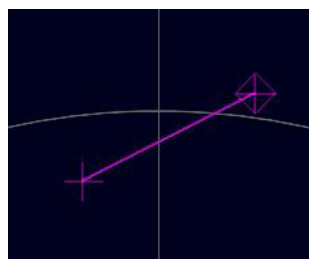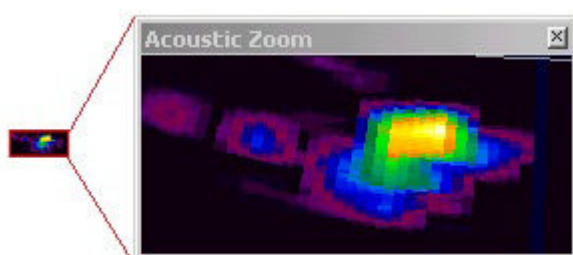
There are 4 sets of Markers that can be implemented; A-B, C-D, E-F, G-H. The operation of each set is the same as A-B described above.

6.6.2. Acoustic Zoom

Figure 6.18.

`True Sonar Zoom` mode draws a zoom box on the display positioned by cursor. The sonar will take more samples in the area of the zoom box for target magnification.

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

The `Size` shows the screen zoomed area (red outline) as a percentage of the `Acoustic Zoom` display window.

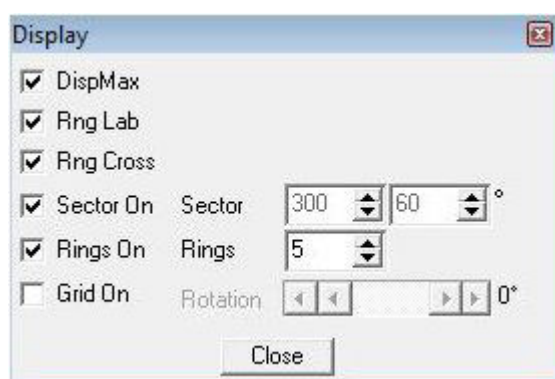The `Factor` shows the number of zoomed range bins for each normal range bin. For instance, a `Factor` of 4 will take four times the number of samples within the zoomed area than will be taken outside the zoomed area.

6.6.3. Position

Used to move and size the Sonar PPI display in its display window.

Centre X/Y - Adjust X & Y centre position of the display, Radius - Size the display.

6.6.4. Display

Figure 6.19.

Sets up sonar display options.

DispMax – Tick to expand sonar display vertically to fit window. If un-ticked will expand horizontally.

RngLab – Switch the Range Labels On / Off.

Rng Cross, Rings On, Rings, Grid On - Display Grid line options.

Sector On, Sector – Display a Sector overlay with left and right angular limit adjustment (in degrees).

Rotation – Rotational offset to correct Sonar heading – (Disabled for Gemini Sonar).

6.6.5. Installation

Figure 6.20.

This configures the location of the Sonar in the real world and enables the Geo-referencing of sonar targets on the sonar display.

From Fixed Position	If there is no GPS input, select this option and input the Sonar position in Latitude and Longitude co-ordinates (DegMin or DegMinSec format). A Heading input will also be applied, else a zero degree heading is applied. If present it is also possible to set the fixed position from the USBL or GPS input so that they can be disconnected and the position will remain persistent – simply click the appropriate button "Set Fixed from GPS" or "Set Fixed From USBL"
From GPS Position Updates	If a GPS input is active, select this option. A Heading input will also need to be active for the Geo-referencing to be functional.
From USBL Position Updates	If a USBL input is active, select this option. A Heading input will also need to be active for the Geo-referencing to be functional.
From Marker Positions	This function requires an application with `Sonar` and `Nav` displays loaded (e.g., by selecting

Settings→Applications→Sonar Nav). The chart of the Nav display is used to obtain the Marker position references to be used in this function. If a Nav chart is not used then the Marker positions must be manually entered in the Sonar display.

Offset (GPS RX to Sonar)

X and Y position offsets should be entered if there is any offset between GPS receiver and Sonar (e.g. for a ship hull mounted system). Or, for an ROV mounted sonar, if the GPS position updates are the position of a sub/vehicle then this offset may apply for the separation between a beacon/transponder and the sonar.

Heading

Use this option to select the source of the heading data. If using a sonar which contains an internal heading and compass device or if the compass is connected to the Aux port of the sonar select Internal/Aux Compass. If the compass device has been connected through a COM port on the SCU or PC, or if a USBL system is in use then select Ship/USBL Compass. If the sonar is mounted to an ROV and both the ROV and support vessel have a compass it is possible to switch to the ROV compass by selecting Sub/ROV Compass.
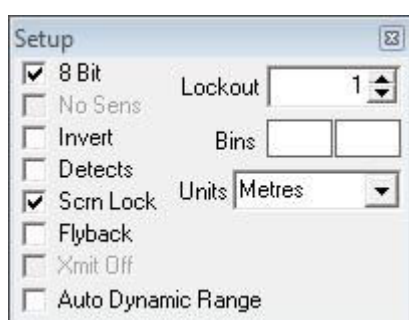
Once position and heading data are present, the Cursor display will be extended to provide position co-ordinates when the mouse cursor is moved around the sonar plotter.

Note

There must be active sonar data, as well as position and heading data, for the position co-ordinates to be reported.

6.6.6. Setup

Figure 6.21.

8 Bit

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

No Sens

Must be off (grayed out as shown) for normal use to synchronise angular head alignment.

Invert

Swaps the display from left to right. Enable if mounted with Sonar boot down.

Detects

Paint the leading edge of strong targets on the screen (only applicable to certain models of sonar).

Scrn Lock	Locks the number of range bins sampled to the screen resolution.
Flyback	Sets the sector scan to flyback instead of scan back. Normally off.
Xmit Off	This option is not available under normal operation. It is a diagnostics level tool that will switch off the Sonar transmitter for test purposes.
Auto Dynamic Range	This will auto adjust the Display Contrast and Sensitivity whilst the Sonar is scanning. Auto adjustment occurs at the end of each full sonar scan.
Lockout	Sets a minimum range for the Detects (always in metres).
Bins	This is the number of samples taken over the current scan-line.
Units	Select the display range units. Options are Metres, Feet, Fathoms & Yards.
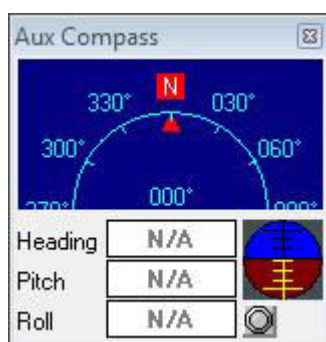
6.6.7. Interpolate

Figure 6.22.

Applies interpolation between adjacent samples on the Sonar display. Blends out contrast and 'blockiness' on lower ranges and resolutions.

6.6.8. Auxiliary Compass

Figure 6.23.

Sonar heads fitted with an Auxiliary (AUX) port can connect a serial RS232 or RS485 compass. The compass string (such as from a TCM-2 or CDL Gyro) includes Heading, Pitch and Roll data which is then displayed in the Aux Compass pop-up form. Ensure that the correct compass is selected in the Installation dialog.

6.6.9. Overlay

Figure 6.24.

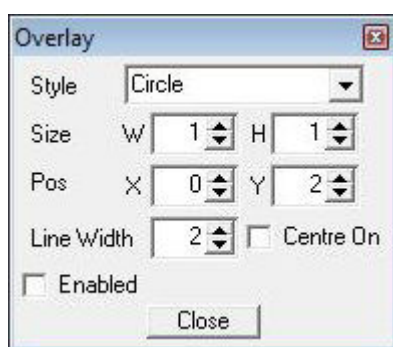When enabled, this option can be used to place and size an overlay shape or outline onto the Sonar display canvas.

Style   Select the type of shape from; Circle, Rectangle. Triangle.

Size   Set the Width and Height of the shape.

Pos   Move the Shape with X, Y position offset from display origin.

Line Width   Line width.

Centre On   Enable centre marker (+) for the shape.

7. Operation with Micron Software

Caution

Do not install the Micron Software at the same time as Seanet Pro - the two programs cannot coexist on the same computer.
The Micron software is not compatible with Windows 8 or newer software.
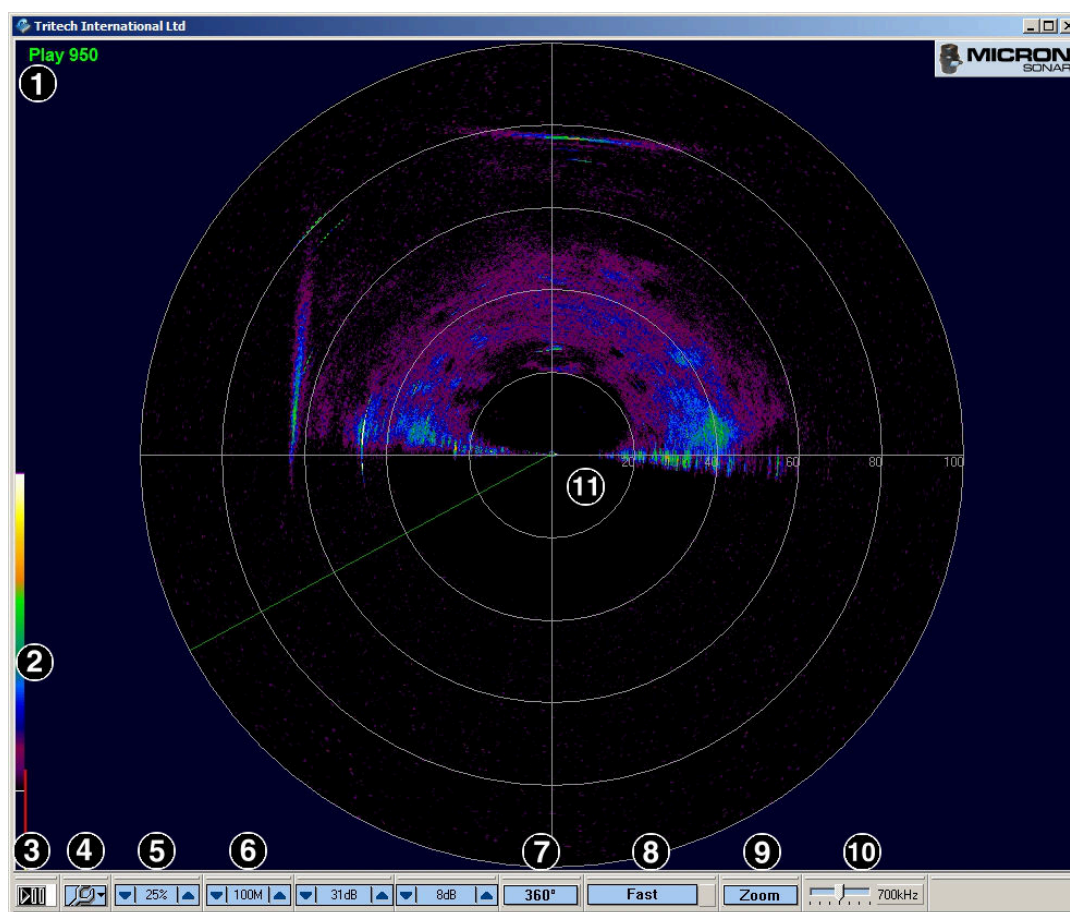
Note

This manual applies to version 3.1 of the Micron Software.

7.1. Main Screen

The Micron Software main screen is as follows:

1. Sonar status area - in this case it indicates that the software is playing a log file, will also show communication errors such as `Timeout`.

2. Dynamic range and sonar RX indicator - this sets the contrast between hard and soft targets. Usually set to user preference, it can help find small features in generally featureless terrain, or exclude clutter from a heavily featured seabed.

3. Sonar pause button

4. Setup menu - when this button is clicked a menu will appear where the sonar and display settings can be configured.

5. Sonar gain - sets the sonar receive gain (0 to 100%). Typically around 20% but is varied according to water conditions and user preference.

6. Range scale - sets the maximum range (2 to 100m) the sonar will scan. Long ranges are scanned more slowly than short ranges.

7. Scan sector - 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°, 90° and 45°.

8. Speed/resolution - 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. `Fast` or `Very Fast` settings are useful for searching for objects but will result in reduced image resolution.

9. Toggle zoom - turns on or off a zoom box on the display which can 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`.

10. Transmit frequency - this is fixed and displays the sonar transmit frequency.

11. Sonar display

7.2. Basic Controls

The sonar can be started or paused using the button in the bottom left of the screen. The button has three states:

  The button is disabled whenever the sonar is not connected or telemetry with the sonar has not yet been established.

  The sonar is active and scanning. The button is now active and can be pressed to pause the sonar.

  The sonar is paused. Clicking the button will start the sonar scanning.

Double-clicking anywhere on the sonar display will immediately reverse the scan direction.

7.3. Setup Menu

The `Setup Menu` is accessed by clicking on the button:

The `Setup Menu` allows complete control and configuration of the Micron Software.

7.3.1. About

States information such as the software program version, company contact details and available computer memory.
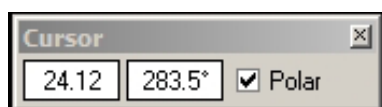
7.3.2. AlwaysOnTop

Select this function to bring the Micron display to the front of the Windows desktop. This will place the sonar display on top of other open applications.

7.3.3. Cursor On

Adds the cursor position panel to the sonar display.

7.3.4. Cursor Reporting

Outputs a serial string from a selected COM port on each click of the mouse button on the sonar display. The Left/Middle/Right mouse button can be used to click anywhere on the sonar display, such as a target, which will then output a serial string and the `Range` and `Bearing` point information of that target.

For the configuration of the serial string see Section 7.3.17, "Com Port".

7.3.5. Markers On
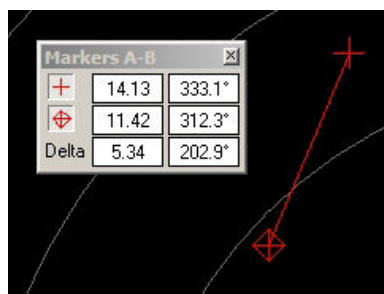
Adds a `Markers A-B` dialog to the screen where to markers can be selected/de-selected and moved using the mouse. When a marker is first selected it appears on the origin of the sonar scan and if it is subsequently de-selected it will lose any of its positional data. When both markers are selected a line is drawn between them and the relative distance and bearing between them is shown.

7.3.6. Echosounder Chart

Used to display the altitude data from a Micron Echosounder connected to the Micron Sonar auxiliary port. The graphical chart which is shown is in addition to the altitude text box display.

More details about the use of the Micron Echosounder can be found in Section 8.2, "Adding a Micron Echosounder".

7.3.7. Video Panel

Enables the Video Input preview window. If the computer is installed with a video capture card then the input from its source (i.e., composite camera input) can be displayed in the preview window.

More details about the use of video with the Micron can be found in Section 8.5, "Video".

7.3.8. GPS Input

Enables the GPS dialog to display position data from a GPS input string.

More details about the use of a GPS can be found in Section 8.4, "GPS Input".

7.3.9. Log

Opens a sub-menu with options to `Play` or `Record` the sonar data. Both options will open a file chooser dialog to either name the new log file (for recording) or locate an existing file. Log files are recorded in .v4log format.

7.3.10. Print

Opens up a sub-menu with the following options:

Quick Print On	This option has two effects, when printing `To File` a bitmap will be saved to the Log directory. The bitmap will be given the current time as the filename.
	When printing `To Printer` then the `Print Setup` dialog box will not appear and the default printer with default settings will be used.
Setup Printer	Opens a dialog to select the default printer and configure print options.
To File	When selected and the screen is printed it will be saved to a file instead of being sent to the printer. If `Quick Print On` is turned *off* then a file chooser dialog will present itself in order that the new image might be given a name and location.
To Printer	When selected the screen is printed to the physical printer attached to the computer (or network). The printer must be correctly set up in Windows in order to work. If `Quick Print On` is turned *off* then a dialog will open prompting selection and configuration of the desired printer.

7.3.11. Title Bar

This is used to edit the text that is displayed on the title bar (top) of the sonar display.

7.3.12. Colours

Used to select from several preset colour schemes for the sonar display.

7.3.13. Language

Select the language to use.

Currently this is limited to UK or US English and French.

7.3.14. Units

Select the units for the sonar range labelling and cursor co-ordinates.

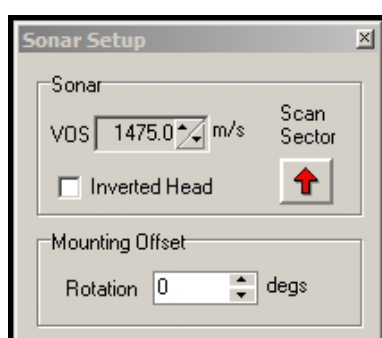Metres (metric) and Feet (Imperial) are the available options.

7.3.15. Zoom Setup

Sets the size and magnification factor of the zoom box.

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

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

7.3.16. Sonar Setup

Sets various head options for the sonar.

`VOS` is used to enter a Velocity of Sound value that will be applied in the sonar display.

`Inverted Head` swaps the display from left to right. Enable this if the sonar is mounted with the transducer boot down.

`Scan Sector` is used to select the scanning sector when the display is in 180° sector view. There are 4 sectors indicated by the arrow positions ('up' = forward, 'right' = starboard, 'left' = port and 'down' = aft).

`Rotation` is used to correct the display. In cases where the sonar is not mounted with the sonar operation LED in the ahead or "zero" position, the `Rotation` offset can be adjusted to correct for any alignment discrepancy. For example, if the Micron is mounted with the operation LED at 90° to the ahead angle a positive or negative 90° offset will be required. Whether it is positive or negative will depend on the side to which the operation LED is turned.

7.3.17. Com Port
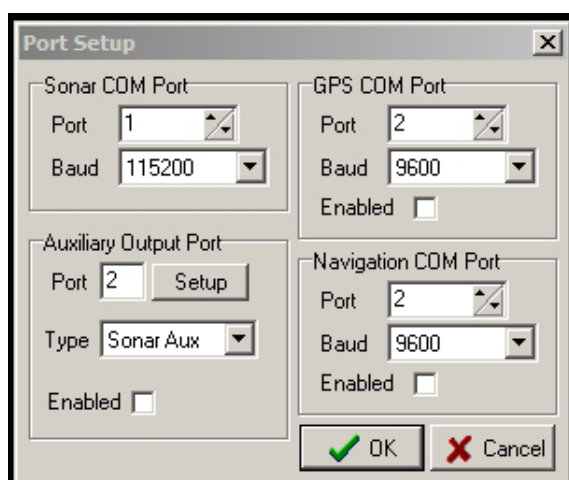
Select and configure the computer COM ports that the Micron, optional GPS and optional auxiliary device output (or cursor reporting output) will be connected to.

The `Sonar COM Port` has two settings. `Port` which is the number of the port to which the sonar is connected (port numbers are assigned by Windows). `Baud` is used to set the COM port baud rate to match the setting of the Micron sonar head. The factory default setting for the sonar is 115200Bd.

The `Auxiliary Output Port` is the port that is used to send the sonar auxiliary port data, such as that from a Micron Echosounder, to another computer. The port number selected here is also used for the `Cursor Reporting` string (see Section 7.3.4, "Cursor Reporting"). The `Auxiliary Output Port` has three options:

Port   Select the COM port number that the sonar auxiliary port and/or `Cursor Reporting` data is to be output on.

Type   Sets the type of data to be output on the port. Options are: `Sonar Aux`, `Cursor` or `Aux + Cursor`.

Enabled   Enables the output of data. If a Micron Echosounder is connected and `Sonar Aux` or `Aux + Cursor` are selected from the list data will begin outputting immediately on the selected COM port as soon as the dialog window is closed. Cursor output will only occur when the mouse button is pressed.

`GPS COM Port` is used to select the input from an external GPS device. For more information please see Section 8.4, "GPS Input"

7.4. Dynamic Range and Sonar RX Indicator

The dynamic range bar is the analogue to digital 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. However, if used properly, adjusting the sample window can produce better quality imaging. The dynamic range bar can be adjusted to change sonar display contrast and sensitivity. Adjustment is made using the left and right mouse buttons.

Contrast adjustment

Right-click on the bar and whilst holding down the right mouse 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 to 25dB. Decrease the size of the sampling window to increase the sonar display contrast.
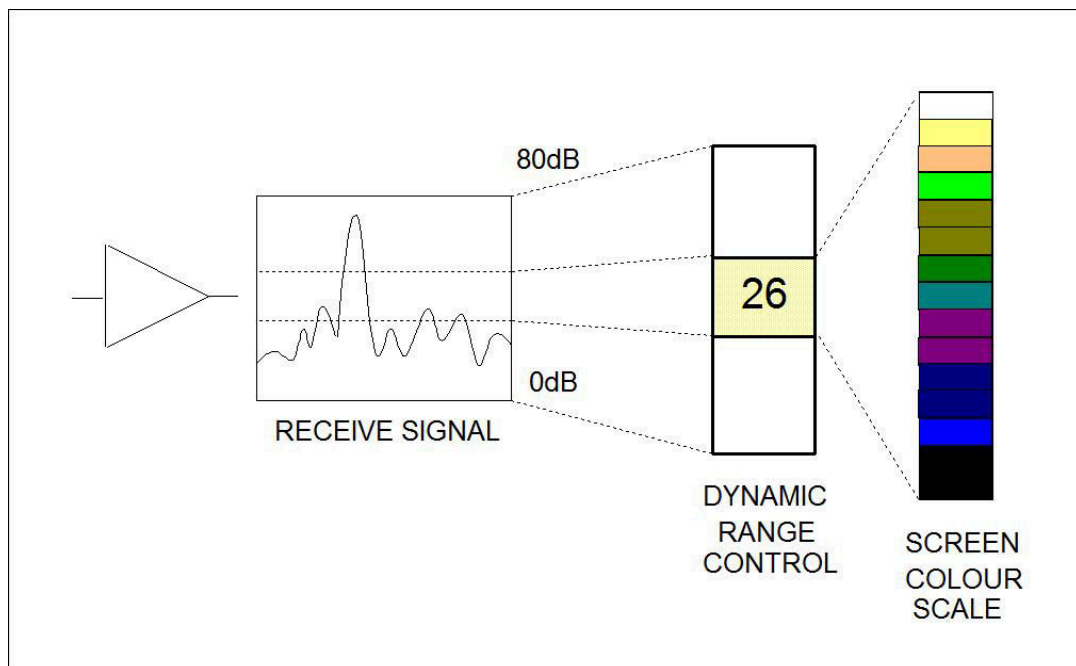
Ideally the control should be set somewhere in the centre of the allowed range (16 to 18dB) to give the best results under most conditions. Select a high value to reduce the contrast of the sonar display.

Sensitivity

Left-click on the bar and whilst holding down the left mouse button, move the mouse up/down to decrease/increase the sensitivity of the sonar receiver.

Increasing (move the bar down) the sensitivity will produce more saturated display with greater weak-return content and decreasing (move the bar up) the sensitivity will omit background noise and low level returns seen at the receiver.

The sonar receiver signal will accept a return signal in the region of 0 to 80dB. The dynamic range controls are used to adjust the position of the sampling window within the 0 to 80dB dynamic range band of the receive signal.

8. Configuration

Note

These sections use the `Seanet Setup` program to control and configure the Micron sonar. The same functionality is available if the Micron Software has been installed, however, it will be called `Micron Setup`.

Since both `Seanet Setup` and `Micron Setup` form part of the Seanet software suite, not all of the controls will be relevant to use with the Micron and they will include options for other devices such as GPS and Profiling sonars.

8.1. Baud Rate & Communication Protocol

Note

A rate of 57.6kBd or higher should be maintained where-ever possible to provide enough bandwidth to operate the sonar at maximum resolution.

Note

The default communication settings are 115.2kBd with 8 data bits, no parity and 1 stop bit.

8.1.1. Baud Rate

This should only be necessary to communicate over a longer RS232 serial cable (greater than 10m) installed between the PC and the Micron sonar head 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 Micron sonar head, which involves setting the COM port settings within the `Seanet Setup` program to match those within the Micron sonar head. It may be necessary to use a short serial cable to first communicate with and re-program the Micron sonar before it is then installed on the longer cable or modem system.

Note

In the screen shots presented there are several different devices listed. This is the default operation of `Seanet Setup` and the other devices can be ignored. For connecting to a Micron, make sure that the device type is **Aif**.

Change the COM Port Baud Rate

- Click on the `Utilities` menu item and select `Com Setup`

- The `Channel Setup` dialog will appear. Click on the `Settings` ellipsis ('...') to open the `AifSetupForm`:
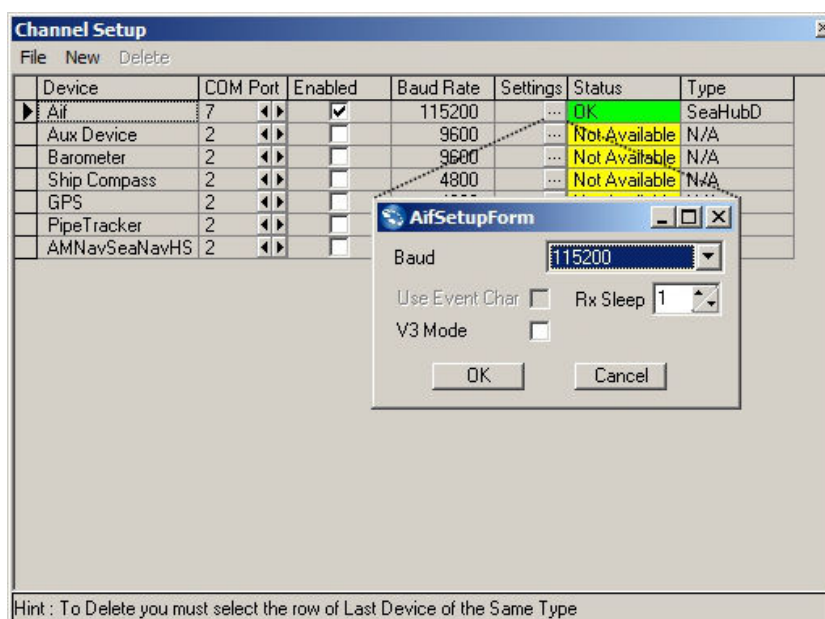
- Set the `Baud` to the desired setting.

- Ensure that `V3 Mode` is disabled and `Rx Sleep` is set to 1 (`Use Event Char` should be greyed out).

- Close the dialog window using the 'x' in the top right and the settings will be applied.

Change the PC Serial COM Port

If necessary change the COM port by clicking left or right on the arrows in the `COM Port` column in the `Channel Setup` dialog shown above.

Also make sure that the `Enabled` check box is selected.

If the Micron has been connected properly it will display as "OK" in the `Status` column.

Note

The screen shot shows a Micron that is connected through a SeaHub and so the `Type` is "SeaHubD" (i.e., SeaHub port D). If the Micron is connected directly it should show "Micron".
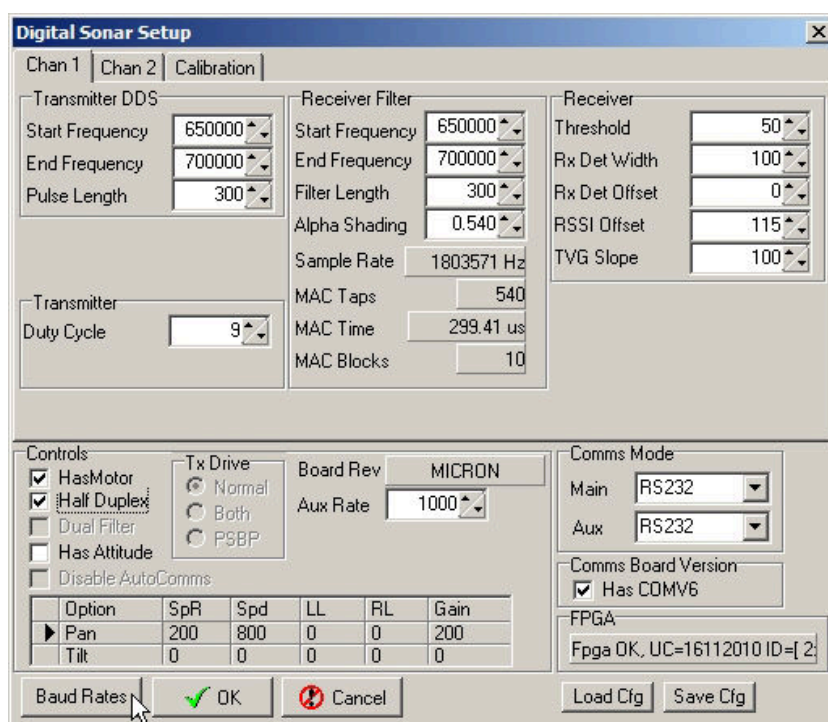
Program the New Baud Rate into the Micron

First ensure that the Micron sonar head (node 2) is detected and shows a status of "OK".

Click on the `Action` menu and select `Setup` as shown:
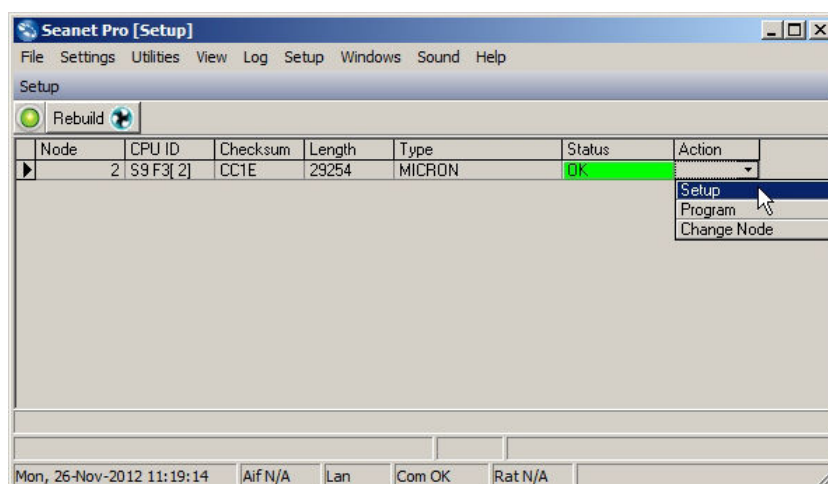
A warning dialog will present itself. Click `OK` and the `Digital Sonar Setup` dialog will be shown:
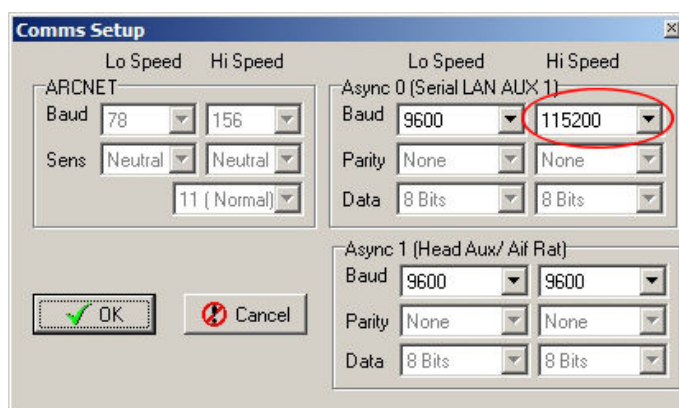

> ## (i) Note
>
> Make sure that the tab on the top left is set to `Chan 1`.

Click on `Baud Rates` to bring up the `Comms Setup` dialog:

The `Async 0 (Serial LAN AUX 1),Hi Speed` is the only entry which should be changed.

> ⚠️ **Caution**
>
> Do not alter any of the `Lo Speed` settings, these are used by *Tritech International Ltd* for recovery of the sonar in the event of a communication problem.

Once the correct settings have been applied click `OK` to exit the `Comms Setup` dialog and then `OK` again to exit the `Digital Sonar Setup` dialog. The new settings will be programmed into the sonar and it will reset in several seconds.

> ℹ️ **Note**
>
> Once the new baud rate is programmed into the Micron it will disappear from the node table. To reconnect, open the `Com Setup` dialog and alter the computer baud rate, as detailed at the start of this section.
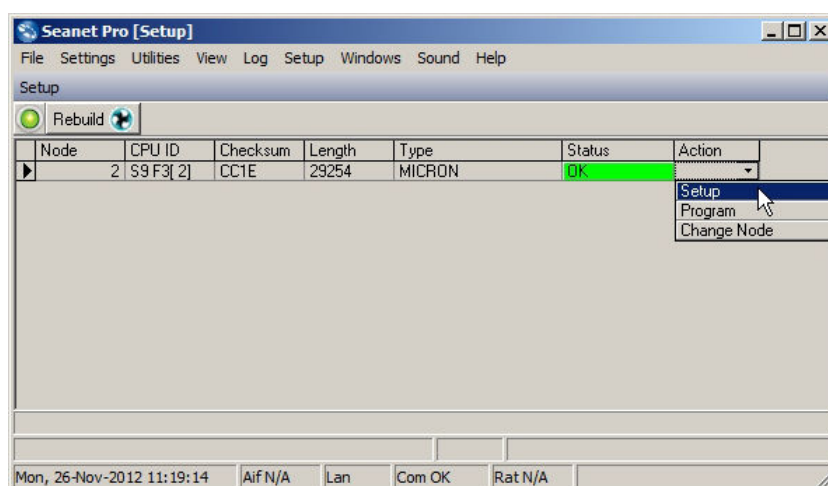
8.1.2. Communication Protocol

> ℹ️ **Note**
>
> Before proceeding with the configuration process, make sure that hardware is available to communicate with the Micron using the desired communication protocol.

First ensure that Micron sonar head (node2) is detected and displayed in the node table with a status of "OK", and then click on `Setup` from the `Action` column:

This will bring up the `Digital Sonar Setup` dialog. Locate the `Comms Mode` section in the lower right-hand corner and alter the `Main` or `Aux` ports of the Micron sonar as required.
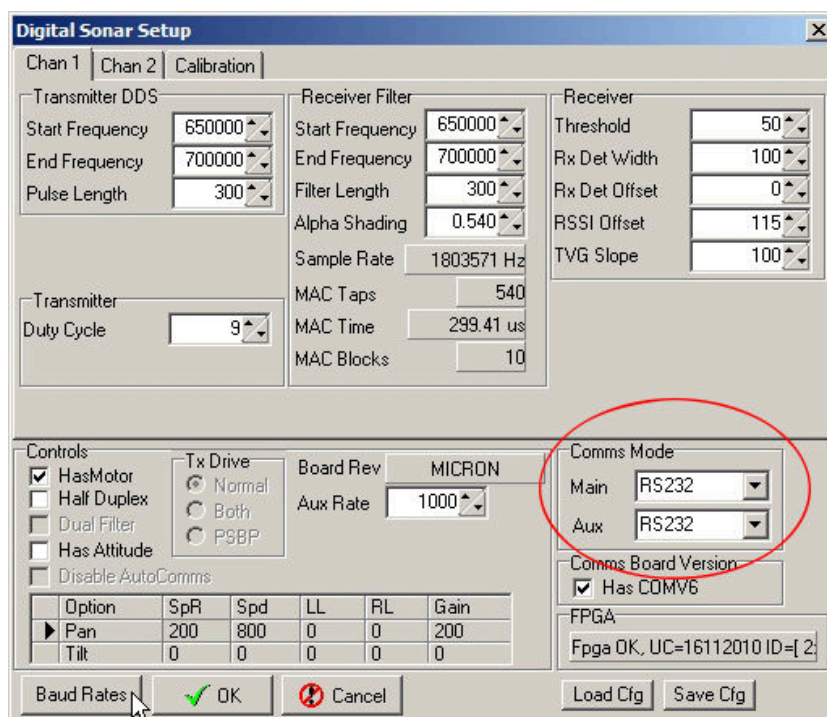
Once the new protocols have been selected, click on the `OK` button to apply the settings. If the `Main` port has been altered then the sonar will no longer be reachable and will have to be connected to the port or device that is using the new protocols.

8.2. Adding a Micron Echosounder

8.2.1. Connecting the Echosounder

The Micron Echosounder can be connected to the Micron Sonar auxiliary port and can provide altitude or distance measurement which is displayed alongside the sonar data on the computer screen.

It is also possible to output the altitude data as a string from a spare computer serial port, see Section 8.3, "COM Port Data Options".

To connect an Echosounder an interconnect cable with a micron connector at both ends is required. This will connect from the Micron Sonar `AUX` port to the Micron Echosounder `MAIN` port.

Note

The interconnect cable should be wired straight through, i.e., with a 1 to 1 wiring (the pin-out is the same as the Micron Sonar so refer to Chapter 2, *Specification*).

The Echosounder will draw power through the Micron Sonar and it has the same voltage range as the Micron Sonar.

8.2.2. Operating Modes

When connected to the Micron Sonar auxiliary port, the Micron Echosounder should be configured in a free-running output mode.

If supplied for use with a Micron Sonar the Micron Echosounder will be pre-configured to free-running mode using the RS485 protocol and will be set for `Zero No Echo` (i.e., if there is no return the Echosounder will output a zero), 3P3 and 115.2kBd (with 8 data bits, no parity and 1 stop bit). This mode cannot be changed in the field. If a Micron Echosounder is to be re-configured for use with a Micron Sonar, please contact *Tritech International Ltd* for details.

There are various data string output modes that can be configured in the Micron Echosounder which are all compatible with the Micron Sonar.

3P2

```
xxx.xxm<CR><LF>
```

`xxx.xx` = range in metres to 2 decimal places

`m` = units label for metres

`<CR><LF>` = carriage return and line feed terminators.

3P3

```
xxx.xxxm<CR><LF>
```

`xxx.xxx` = range in metres to 3 decimal places

`m` = units label for metres

`<CR><LF>` = carriage return and line feed terminators.

NMEA $DBT

```
$PADBT,xxx.xx,f,yyy,yy,M,zzz.zz,F*hh<CR><LF>
```

`xxx.xx` is the range in feet

`yyy.yy` is the range in metres

`zzz.zz` is the range in fathoms

`hh` is an 8-bit checksum

`<CR><LF>` = carriage return and line feed terminators.
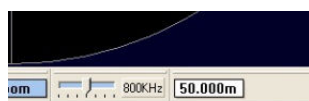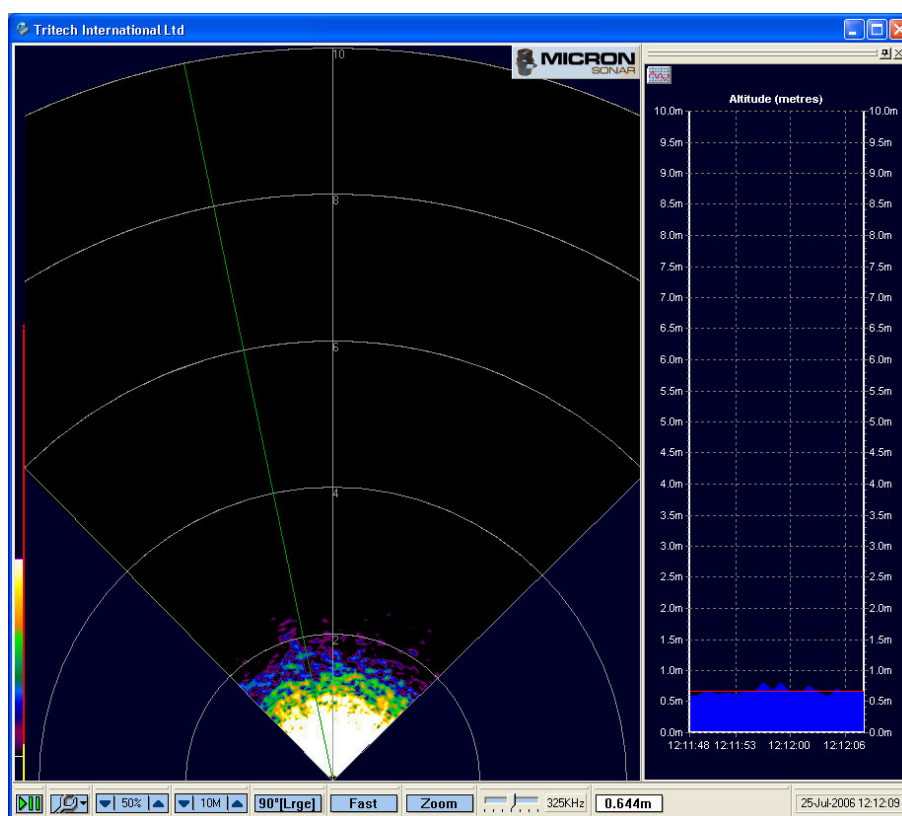
Note

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

8.2.3. Altitude Display

The free-running altitude data output from the Micron Echosounder will be forwarded to the surface between sonar data packets. At the surface altitude data will be displayed on the settings bar at the bottom of the sonar display window.
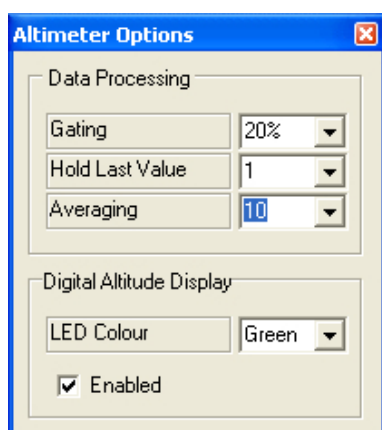
The altitude can also be displayed as a graphical chart by opening the `Echosounder Chart`:

This chart can be docked on to the side of the window (as shown) or picked up and moved by clicking on the bar at the top of the chart and dragging it with the mouse. The chart display will auto-range depending on the value of the current altitude data. The maximum range for the Echosounder is 50m and the chart will change its range between values of 0-10m, 0-30m and 0-50m.

In the top left corner of the chart is the `Chart Setup` button. Clicking on this opens up the `Altimeter Options` dialog where there are several settings that can be changed.

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, for example with the 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.

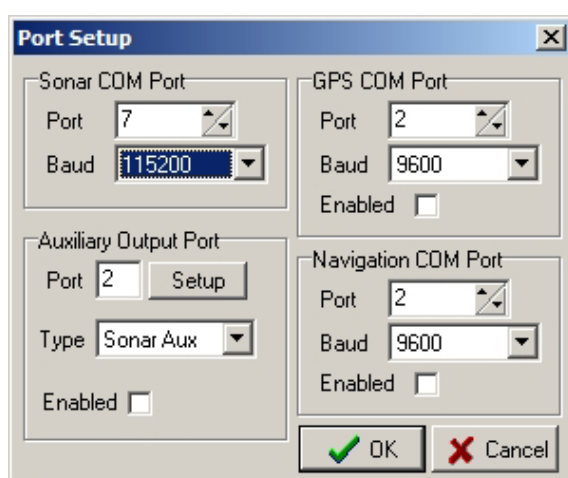| Hold Last Value	Select how long the last valid value should be held onto.
	If an altitude reading falls out of the gating range of the previous reading then we can hold onto the last good altitude for a specified number of readings or until a reading within the gating range is received. If `Hold Last 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.
LED Colour	Sets the colour of the digits in the LED altitude display.
Enabled	Enables the digital altitude display, the LED display will appear at the base of the chart when enabled.

8.3. COM Port Data Options

Note

To output data on a computer serial port as described in this section (typically a DE-9 port or USB to DE-9 converter) the Micron Software will have to be installed on the computer.

8.3.1. Output Echosounder Data

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 Section 7.3, "Setup Menu").

`Com Port` will open the `Port Setup` dialog:


In the `Auxiliary Output Port` section, click on `Setup` to configure the COM port number and baud rate for the output altitude string. Once configured, tick the `Enabled` check box to open the port for the altitude data output. Ensure that the `Type` is set to `Sonar Aux` if outputting only Echosounder data (set to `Aux + Cursor` if cursor reporting is also required).

The output altitude string will be in the raw format as transmitted by the Echosounder - see Section 8.2.2, "Operating Modes".
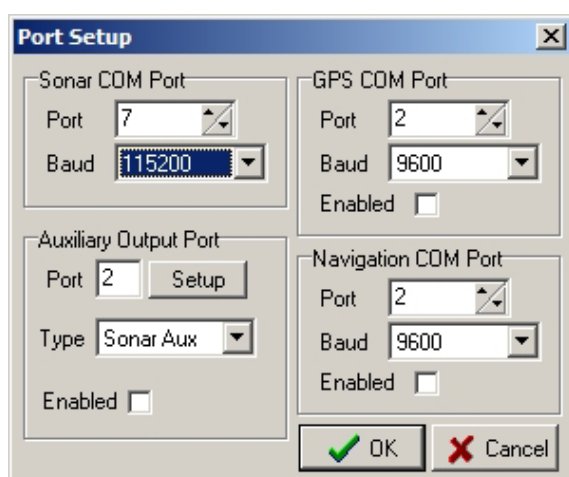
8.3.2. Cursor Reporting

The `Cursor Reporting` option enables the target position data to be sent to a remote, serially linked computer.

In the `Setup` menu it is possible to select which mouse button will be used to trigger the serial string:
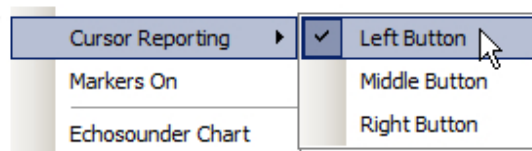
By clicking on the sonar display window with the selected mouse button the range and bearing position of the mouse pointer is sent to the remote computer via the allocated COM port. To report on the position of a particular target on the sonar display, hover the mouse pointer over the target and click with the mouse button to activate an output string.

To configure a COM port and enable `Cursor Reporting` serial output click on the `Com Port` menu item in the `Setup` menu. The `Port Setup` dialog will present itself:

In the `Auxiliary Output Port` section, clicking on the `Setup` button will allow configuration of the COM port and baud rate. If outputting only cursor data, set the `Type` to `Cursor` otherwise set it to `Aux + Cursor`.

8.3.3. Cursor Reporting with Markers

The `Cursor Reporting` function can be linked with the operation of the `Markers`. If both markers A and B are dropped onto the sonar display then it is possible to acquire both the absolute position of the moved marker (for instance marker A) as well as its position relative to the other marker.

Note

Using this 2 marker operation the appropriate sections of the `Cursor Reporting` output string become active, otherwise they are 00000.

8.3.4. Cursor Reporting String Format

The data string that is output for the `Cursor Reporting` feature is:
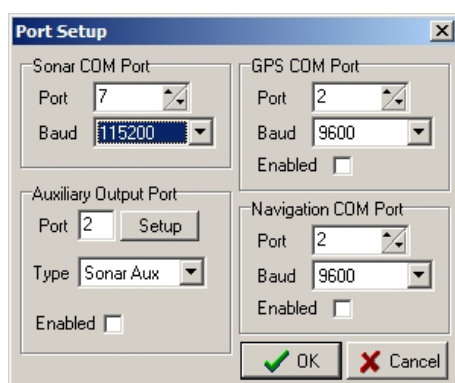
```
%M002D012200001IP+rrrrr+bbbbbIP+nnnnn+ppppp<CR><LF>
 ❶            ❷        ❸ ❹    ❺       ❻ ❼    ❽       ❾          ❿
```

❶   `%M`, message identifier.
❷   `002D0122000`, slot reply header (should always be this value).
❸   `01`, button identifier (left = "00", right = "01", middle="02").
❹   `IP`, data type (IP = Integer/Polar).
❺   `+rrrrr`, range from origin in decimetres.
❻   `+bbbbb`, bearing from origin in 1/10ths of a degree.
❼   `IP`, data type (IP = Integer/Polar).
❽   `+nnnnn`, range from + marker in decimeters.
❾   `+ppppp`, bearing from + marker in 1/10ths of a degree.
❿   `<CR><LF>`, carriage return and line feed terminators.

8.4. GPS Input

There is an option to display and log GPS data from an incoming NMEA type data string. 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 Section 7.3, "Setup Menu").

`Com Port` will open the `Port Setup` dialog:

Under the `GPS COM Port` section select the computer serial port number and baud rate that correspond to the port which is receiving the GPS input. Once these have been set, ensure that `Enabled` has been ticked.

To display the GPS data click on the `GPS Input` menu item in the `Setup` menu:
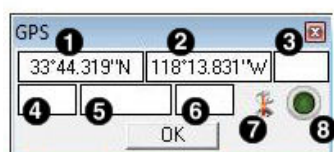
1. `Latitude or Easting`

2. `Longitude or Northing`

3. `Zone`

4. `Course Over Ground`

5. `Speed Over Ground`

6. `Heading`

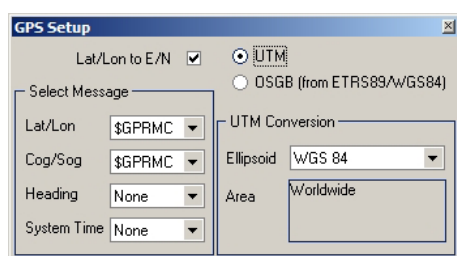7. `GPS Input` is used to select and configure the GPS input messages.

8. `Diagnostics` flashes green when there is an incoming GPS packet.

The `GPS Setup` dialog allows configuration of the signal type and is where the NMEA 0183 message type can be selected:

The `GPS Setup` dialog contains 5 drop-down menus for selecting NMEA 0183 message types for Latitude/Longitude, COG/SOG, Heading and setting System Time.

It is possible to set the system time via any of the listed NMEA messages and this will update the system clock. This is beneficial if Log Data containing both Sonar and GPS position data is to be post-processed.

The right-hand side of the `GPS Setup` panel includes the option to convert and display the incoming positions in Easting/Northing format using a UTM conversion. There is also the facility to select the particular Ellipsoid to apply in the UTM conversion equation.

8.5. Video

If the computer is installed with a video input capture card then its source can be displayed alongside the sonar data on the Micron Software display. This makes it possible to view camera images on the same screen as the sonar image updates.

The `Video Panel` is enabled in the `Setup` menu. When enabled the `Video Input` panel will initially appear as a floating panel which can then be moved about the screen or it can be docked to the side or top/bottom of the sonar window. It is also possible to re-size the video panel but it will always maintain a 4:3 aspect ratio.

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.

The video setup button at the top left of the `Video Input` window has two options:

Source   Sets the video capture device via a drop-down list. The list will display all capture devices installed on the computer (including any "web cams" installed on laptops).

Configure   Configure various settings for the selected source including brightness and contrast.

9. Maintenance

Caution

The Micron sonar head is an oil filled product and under no circumstances should it be opened or tampered with in any way. There are no user-serviceable parts or internal switches which would necessitate disassembly.

9.1. After each use of the equipment

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

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

Note

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

9.2. Regular maintenance

There are no user serviceable parts inside the sonar and it is not necessary to take it apart for any maintenance tasks.

A regular inspection routine should be established to ensure that the sonar head, particularly stress points such as the connectors, does not have any damage.

If the system is in regular use, or submerged routinely for extended periods, it is advisable to arrange for an annual service to be carried out by *Tritech International Ltd*. This service will enable the equipment to be checked thoroughly or for any worn parts to be replaced and will enable long-term trouble free operation of the sonar. For details of the servicing options available contact *Tritech International Ltd*.

9.3. Storage of Equipment

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

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

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

9.4. Software Maintenance

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

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

Note

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

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

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

Note

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

Appendix A. CHIRP Signal Processing

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

In monotonic (single frequency burst) sonar, the range resolution is determined by the length of the transmitted pulse. The smaller the pulse, the greater the resolution achievable and vice-versa. The smallest pulse length is typically 50 micro seconds and velocity of sound in water is approximately 1500 metres/second which gives a range resolution of 37.5mm. This result determines the ability to resolve separate targets.
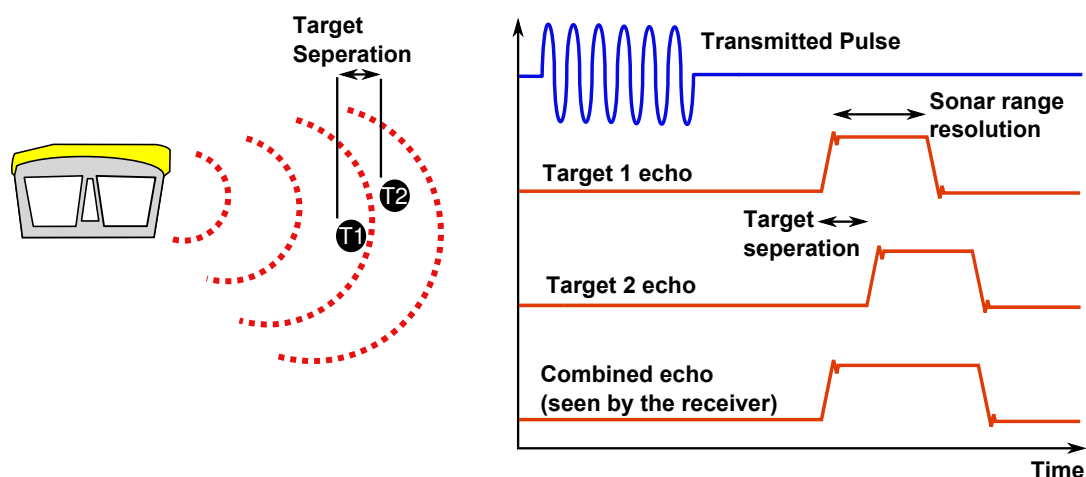
Using the example above, if two targets are less than 37.5mm apart then they cannot be distinguished from each other. The net effect is that the system displays a single large target, rather than multiple smaller targets.

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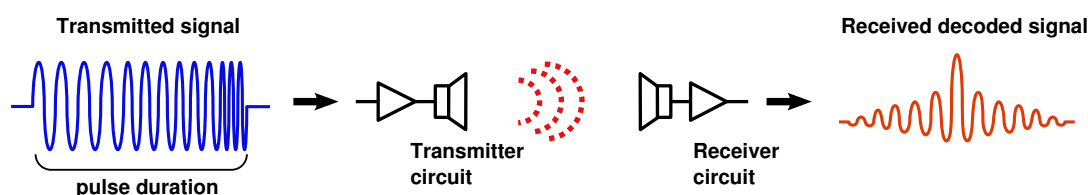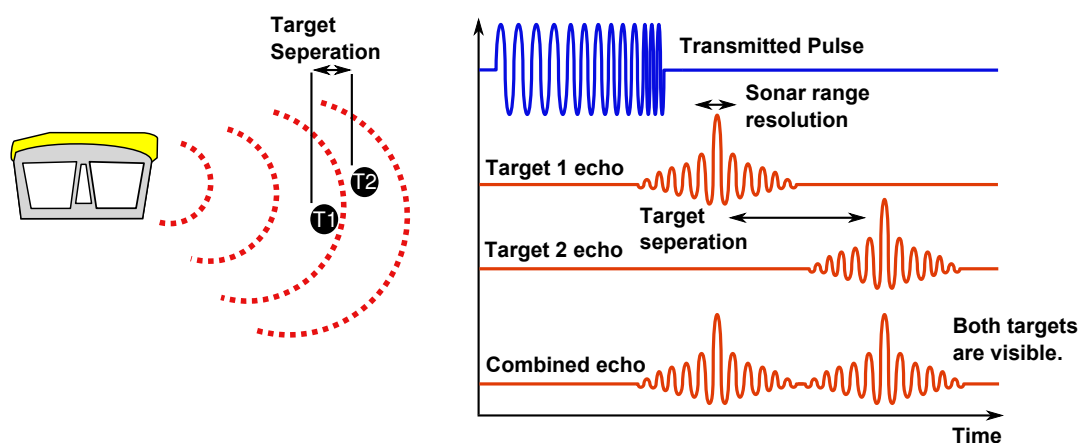

In a CHIRP system, the critical factor determining range resolution is the bandwidth of the CHIRP pulse which means the range resolution is given by:

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

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

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

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

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

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

Glossary

.v4log	The standard file format used by Seanet Pro log files.
CD-ROM	Compact Disc - Read Only Memory
CHIRP	Compressed High Intensity Radar Pulse - a technology for improving image resolution initially used in radar systems but also adapted to sonar devices.
COM	Short for "communications". When used in the context of computers typically it refers to the Microsoft Windows® designation of a serial communications port (in this instance it may be given a number, "COM3", for example). In the context of sonar hardware it can be used to refer to the circuit board that controls the communication to the surface.
dB	Decibel - a logarithmic unit that indicates the ratio of a physical quantity, usually power or intensity, predominantly used in acoustics, electronics and control theory.
DC	Direct Current
DE-9	A 9 pin D shaped connector commonly used for serial communications on computers.
DST	Digital Sonar Technology
GPS	Global Positioning System.
LED	Light Emitting Diode
MicronNav	An Ultra Short Baseline (USBL) system for location and tracking of ROVs, divers, etc. Consists of the MicronNav 100 surface control unit (similar to the SeaHub but with different functionality) a "dunking transducer" which is mounted on the vessel/dockside under the waterline and a responder which is mounted on the ROV or Hammerhead tripod.
NMEA	National Marine Electronics Association - a USA based standards association responsible for overseeing electrical and data communications standards between marine devices (due to become the IMEA or International Marine Electronics Association in 2012).
PC	Personal Computer
PSU	Power Supply Unit
ROV	Remotely Operated Vehicle
RS232	Traditional name for a series of standards for serial binary data control signals.
RS485	A standard for defining the electrical characteristics of drivers and receivers for use in a balanced digital multipoint system (also known as EIA-485).
RX	Receive (data)
SCU	Surface Control Unit - a specially manufactured computer which is rack mountable and capable of processing the data from the sonar

	equipment running either Windows® XP Embedded or Windows® 7 and Seanet Pro or Gemini software.
SeaHub	An alternative to using a Seanet SCU, this device connects to a laptop or PC via USB interface, essentially this takes the signal from the sonar (in RS232, RS485 or ARCNET) and converts it into a signal suitable for the USB port of the computer.
Seanet Pro	The software supplied by *Tritech International Ltd* which is capable of running all the sonar devices.
TX	Transmit (data)
USB	Universal Serial Bus.
USBL	Ultra Short Base Line (positioning system)
UTM	Universal Transverse Mercator coordinate system - a 2-dimensional Cartesian coordinate system to give locations on the surface of the Earth.