Micron INS

Product Manual

0722-SOM-00001, Issue: 03

Outstanding Performance in Underwater Technology

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 a Warranty Statement at the end of the manual.

Tritech International Ltd can be contacted as follows:

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	Website	www.tritech.co.uk

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

1. The Serial Numbers of the product and any *Tritech International Ltd* equipment connected directly or indirectly to it.
2. Software or firmware revision numbers.
3. A clear fault description.
4. Details of any remedial action implemented.

Contamination

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

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

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

Warning Symbols

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

Note

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

Important

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

Caution

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

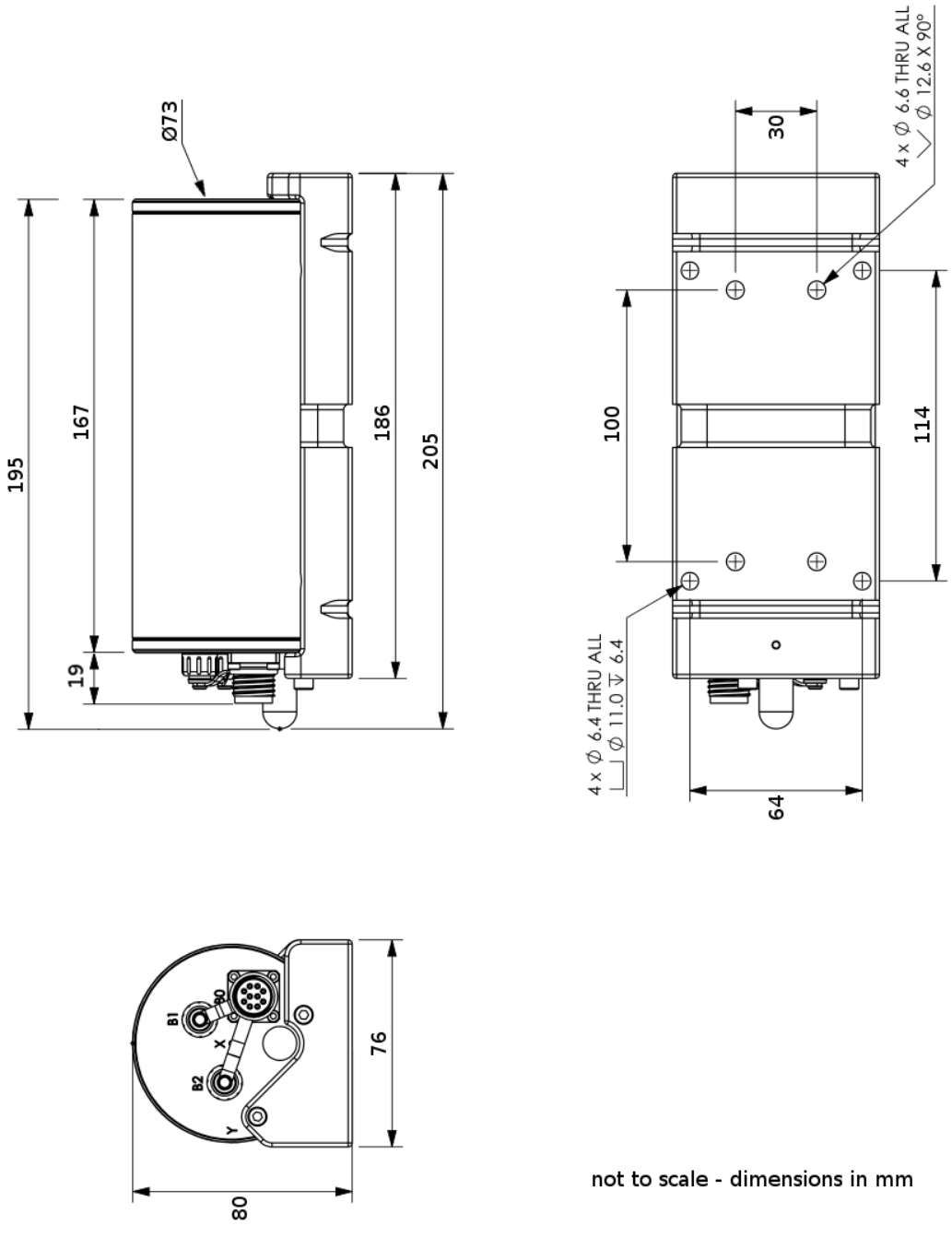
Warning

DANGER OF INJURY TO SELF OR OTHERS

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

1. Micron INS Specification

Dimensions Diagram



not to scale - dimensions in mm

Physical Specification

	Micron INS	Cradle
Weight in air	1.02kg	0.27kg
Weight in water	0.31kg	0.08kg
Material	Anodized Aluminium	Black Acetal copolymer
Depth Rating	500m	

Electrical and Communication

Input Voltage	20 - 30VDC
Power Consumption	7W (no additional sensors)
Communication Protocols	Ethernet or RS232
Connectors	2 x Tritech Micron 1 x Impulse Titan MKS(W)-307-FCR
Additional Sensors	RS232 (2x)

Positioning

Units	Relative: metres Absolute: Lattitude/Longitude
Resolution	0.01m
Accuracy (DVL aided)	0.7% distance travelled RMS
Unaided drift	7 nautical miles per hour
USBL improvement	3x

Heading

Static Accuracy	0.3° RMS
Dynamic Accuracy	0.75° RMS

Attitude

Range	Roll: ±180°, Pitch: ±90°
Accuracy	Less than 0.2° RMS

Acceleration

Range	±4g
Bias Stability	0.07mg

Depth

Range	500m
Accuracy	0.1% RMS

Velocity

Range	$\pm 10 m \cdot s^{-1}$
Accuracy (DVL Aided)	$0.2\%, \pm 0.001 m \cdot s^{-1}$

2. Introduction

The Micron INS is a very small, fully-integrated subsea Inertial Navigation System.

Micron INS can be deployed stand-alone or aided with a wide range of aiding sensors on the vehicle such as DVL, GPS or USBL.

Micron INS is supplied in a single subsea bottle equipped with integrated inertial, attitude and depth sensor. The system has a mounting bracket to aid vehicle integration.

In Seanet Pro, the Micron INS will be sent MicronNav USBL position updates and receive back a filtered, more precise position. This filtered position return is then plotted on the MicronNav UI chart, so providing more accurate vehicle tracking in Seanet Pro.

The Micron INS fuses input from all available navigation sources to produce a best estimate of current vehicle position and velocity. Internally there are three basic sensors: an Inertial Measurement Unit (IMU), a compass and a depth sensor. Stand alone, they will provide depth and heading information for a vehicle. When augmented with either a Doppler Velocity Log (DVL) or MicronNav USBL a full navigation solution becomes available. The IMU provides data at a much higher rate than is available from a DVL or USBL so it is used to smooth the navigation solution and update position between DVL or USBL measurements.

2.1. DVL as aiding sensor

Connecting a DVL to the Micron INS through the aiding sensor port incorporates velocity information in the navigation solution. The IMU provides data at a much higher rate than the DVL so in between DVL measurements the IMU is used to estimate velocity and position. This provides a smooth navigation solution that is update at over 20Hz.

DVL aided navigation yields a very smooth navigation solution because the measurement being made is vehicle velocity. Small measurement error will yield very little change in the navigation solution over a short time frame, but after a long period of time this error accumulates, so error is typically calculated as a fraction of distance travelled.

If absolute position accuracy is important, the system must have a continuous measurement of velocity from the starting location. A loss of bottom lock will result in a period of time without knowledge of velocity, and mean there is an undefined jump in the data. If a DVL is the only aiding sensor, the Micron INS holds position constant as long as bottom lock is lost and resumes calculating position from the point when bottom lock is regained.

2.2. USBL as aiding sensor

Providing USBL data to the Micron INS adds position data to the navigation solution. This not only provides an estimate of the vehicle position every time a measurement is made, but by comparing the last two measurements, the vehicle velocity can also be estimated. Using the velocity as well as a high rate IMU measurements to solve for vehicle motion, position is calculated between USBL pings.

USBL measures position and therefore error is greater over a short time span than with a DVL. However, a true measurement of position is made rather than inferring position from velocity travelled over time. This means that the error does not grow with time. The IMU allows for some correction of vehicle position by combining the expected motion based on measured accelerations with the USBL position, giving it a more accurate, smooth and stable navigation solution than with USBL alone.

The INS performs some checks on the USBL data before incorporating it into the navigation solution. One check is reasonableness of velocity. The INS calculates the velocity required to travel between the current and previous USBL ping. If the velocity is too large to be possible, that data point is rejected and the navigation engine continues calculating position based on the IMU and the last valid USBL points. If, however, there are 10 consecutive USBL pings that fail to pass the velocity check, the INS accepts the location as a valid new location and restarts navigation there.

3. Installation

3.1. Installing the Micron INS

Caution

Although the Micron INS is a rugged device, care should be taken when handling and installing it. Particular care should be taken to protect the sensor and connector assembly on the endcap.

Caution

Make sure unused connectors are fitted with an appropriate cap (with O-ring installed if necessary) prior to immersing the Micron INS in water.

3.1.1. Installing the MicronNav System

For the purposes of this manual the installation of the MicronNav System is considered to have been completed already.

For more details about how to install the MicronNav System please refer to the MicronNav System Manual (document reference: 0656-SOM-00001).

3.1.2. Installing the mounting bracket

Note
If possible the Micron INS should be installed away from anything with a significant magnetic signature (i.e., thrusters).

The supplied acetal mounting bracket should be installed in an appropriate location on the ROV ensuring that this position is measured from a datum point on the vehicle.

The Micron INS endcap is marked with points X, Y and Z to aid in alignment of the device. The Z point is located using the pin on the acetal bracket. This pin should be used as a reference when mounting the bracket to the ROV.

Once the bracket is fixed in position it should not be moved, any movement of the bracket will require the Micron INS to be recalibrated.

If desired it is possible to use the strapping points to further secure the Micron INS once installed:

3.1.3. Fitting the appropriate cable

Once the bracket is fixed into position it will be possible to determine the correct length of cable. See Section 3.2, “Wiring Specification” for details of pin-out and cables that are required.

3.1.4. Attaching the Micron INS

Note
The fitting of the Micron INS into the bracket can be quite tight.

First make sure that the screws on the bracket are screwed out and the Micron INS is aligned properly (the Z point should be in line with the pin on the base of the acetal bracket).

Insert one end first and then ease the other end into the bracket. Once both ends are in and the Micron INS is level against the bracket base, push it home.

If the Micron INS is installed correctly it should be flush with the base of the bracket and it should not be possible to rotate it at all.

Finally screw the two securing screws into the endcap of the Micron INS.

Note
If desired, additional tie-straps or zip-ties can be secured around the housing, using the grooves in the bracket to stop any sideways movement of the ties.

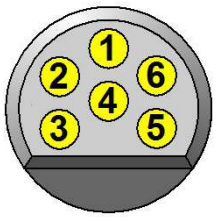
3.1.5. Connecting the cables

As a final step for installation, make sure that all cables are connected.

Caution
Make sure unused connectors are fitted with an appropriate cap (with O-ring installed if necessary) prior to immersing the Micron INS in water.

3.2. Wiring Specification

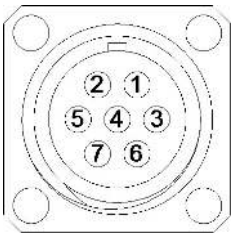
Pin-out Diagram and Cable



Micron Bulkhead
Face View

Tritech Micron Connector (x2)

Pin	Function
1	RS232 TX
2	RS232 RX
3	DC +
4	DC Ground
5	RS232 Ground
6	Earth



Impulse Titan MKS(W)-307-FCR

Pin	Function
1	DC +
2	0V
3	Earth
4	Ethernet TX +, RS232 RX
5	Ethernet TX -, RS232 TX
6	Ethernet RX+, RS232 Ground
7	Ethernet RX-

3.3. Software Installation

The Seanet Pro Windows software will be provided on an installation CD-ROM.

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

Note

The Micron INS is designed to be used as part of the MicronNav System so it will be necessary to install the MicronNav System Software.

The latest version of the software is also available from www.tritech.co.uk

4. Configuration Options

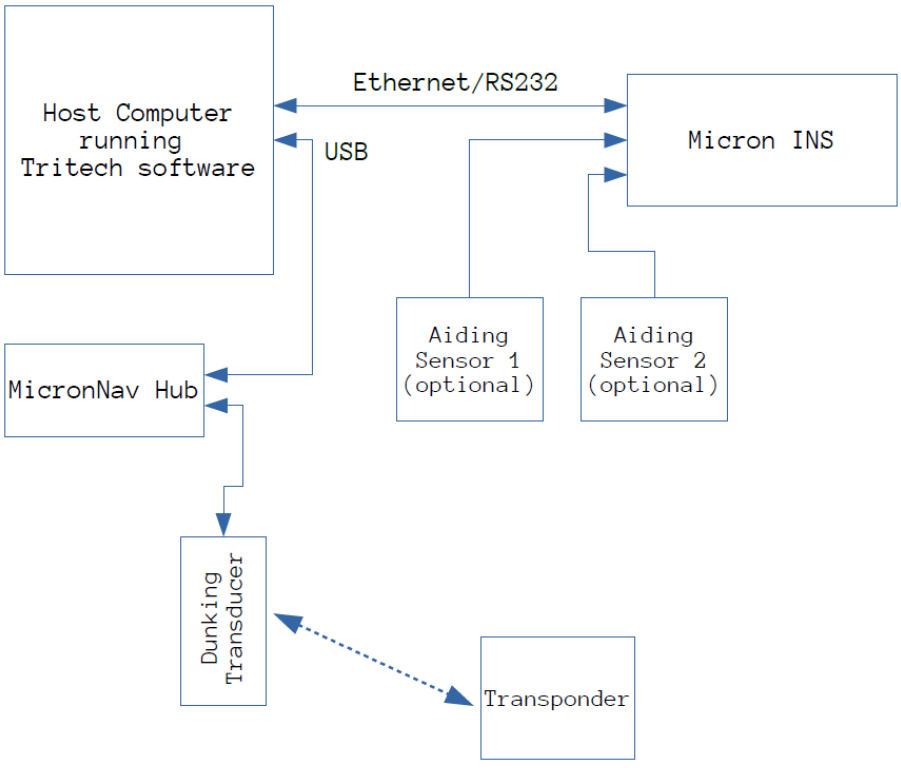
Overview of the system

The Micron INS is designed to work alongside a Tritech MicronNav System and can be supplied as either an Ethernet device or RS232 device.

As an Ethernet device it will be connected directly to the host computer (or through an existing IT infrastructure).

As an RS232 device it can either be connected directly to the computer or through a Micron Sonar (with or without an attached Responder).

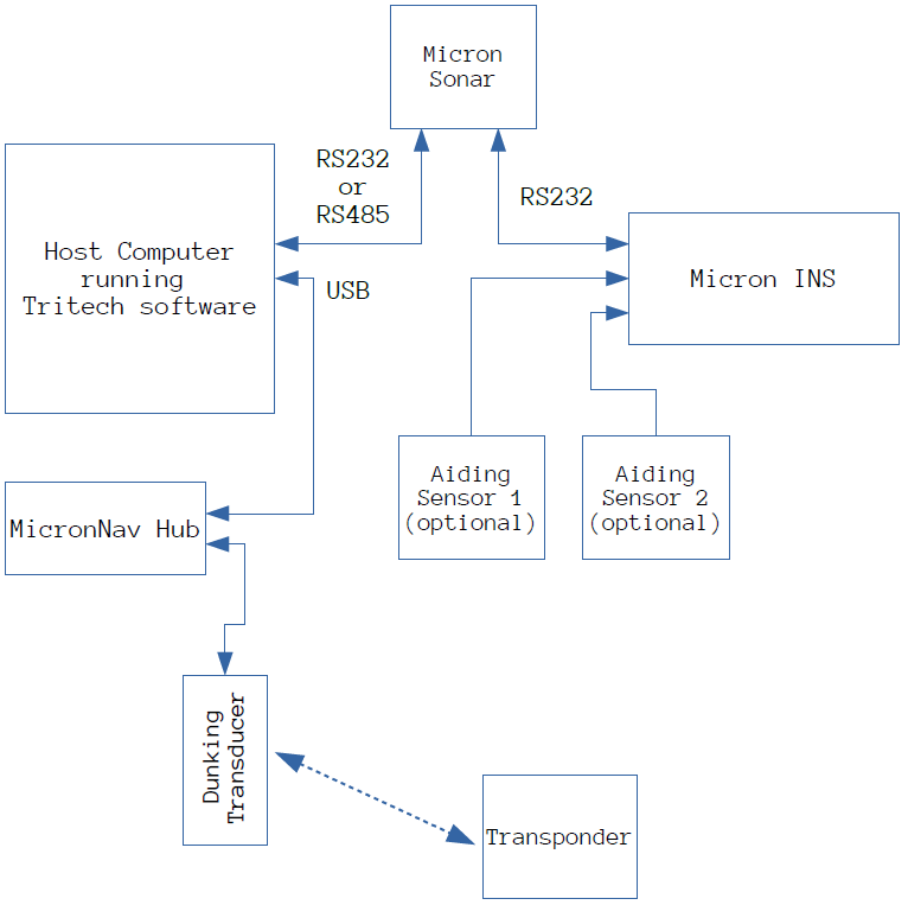
4.1. Micron INS Connected Directly to the Computer



Note

If connecting using RS232 make sure that the port is capable of 57.6kBd. Connection can be made through a spare serial port on the MicronNav hub or directly into any DE9 RS232 port (or by using a USB to DE9 converter).

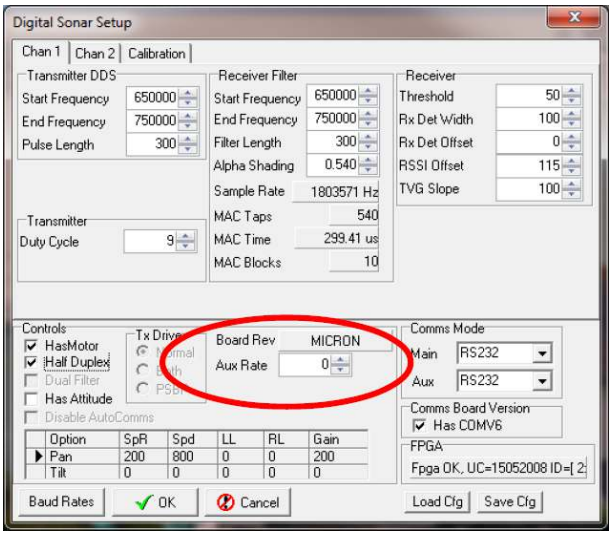
4.2. Micron INS Connected through a Micron Sonar



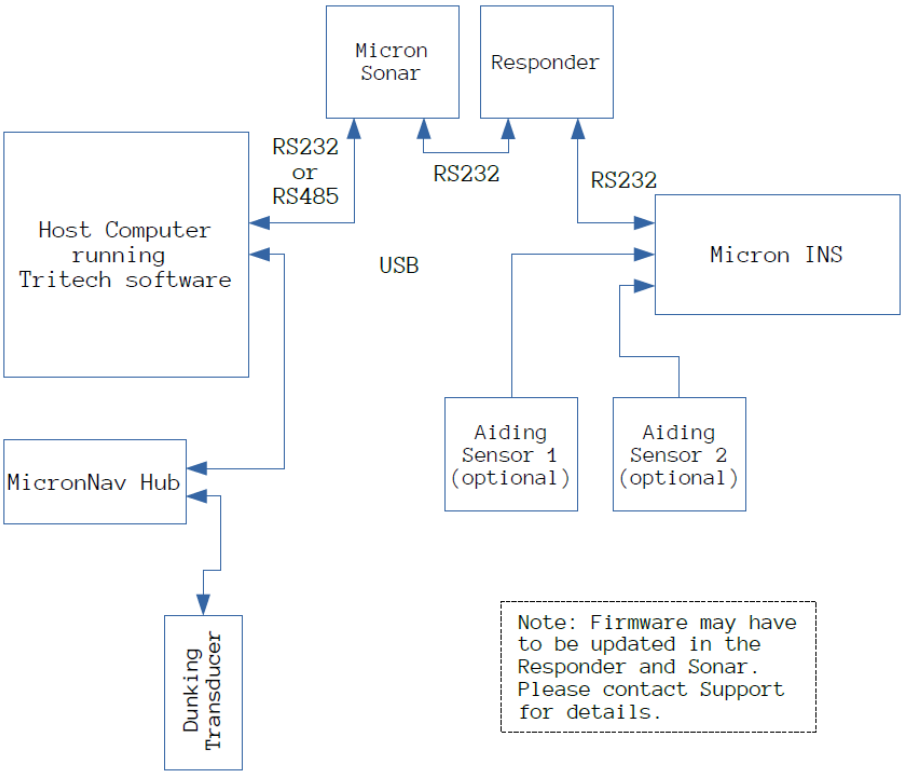
Note

The AUX port of the Micron sonar should be configured to match the communication protocols of the main port of the Micron INS (i.e., 57.6kBd).

While setting up the Micron Sonar make sure that the “Aux Rate” setting is set to 0 to ensure maximum throughput for the Micron INS data as shown.
For full details of how to set up the Micron Sonar refer to the Micron Sonar Product Manual (document reference: 0650-SOM-00003)



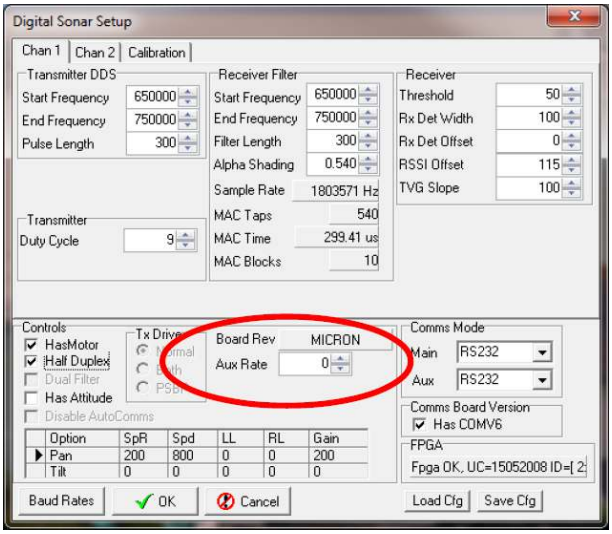
4.3. Micron INS Connected through Micron Sonar and Responder



Note

The AUX port of the Micron sonar should be configured to match the communication protocols of the main port of the Micron INS (i.e., 57.6kBd).

While setting up the Micron Sonar make sure that the “Aux Rate” setting is set to 0 to ensure maximum throughput for the Micron INS data as shown.
For full details of how to set up the Micron Sonar refer to the Micron Sonar Product Manual (document reference: 0650-SOM-00003)



5. Operation

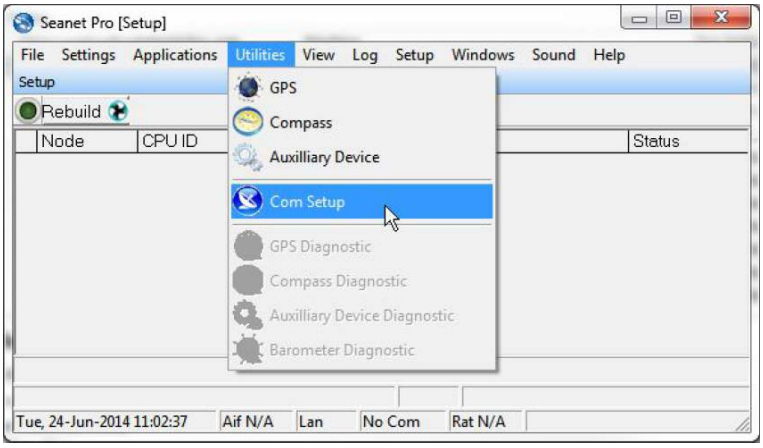
Caution

The Micron INS must not be operated in air during hot conditions for periods in excess of 30 minutes (i.e., above an ambient temperature of 30°C, in direct sunlight). Doing so may cause the Micron INS to overheat which could result in system damage.

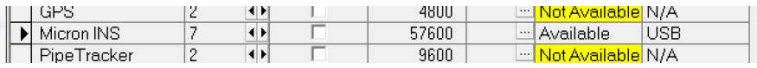
5.1. Connecting using RS232

To connect a Micron INS using serial RS232 first make sure that the computer has an available serial port (or use a USB to DE9 converter) and that it is properly configured in Windows.
The Micron INS should be connected and powered.

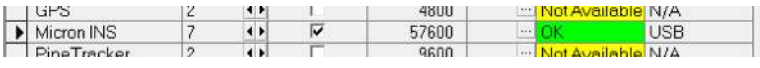
Launch “Seanet Setup” and then select “Com Setup” from the “Utilities” menu as shown in Figure 5.1. Seanet Setup Dialog.



In the “Channel Setup” dialog that is presented locate the entry in the left-hand column for “Micron INS”. Cycle the “COM Port” using the arrows until the “Status” says “Available”.



Make sure that the baud is set to 57600 and then check the “Enabled” box. The status should change to “OK” (the baud can be changed using the ellipsis button in the “Settings” column).



Once the Micron INS is connected Seanet Setup can be closed and Seanet Pro launched.

Note
Unlike Tritech sonars and other devices, the Micron INS will not appear in the Seanet Setup “Node Table”.

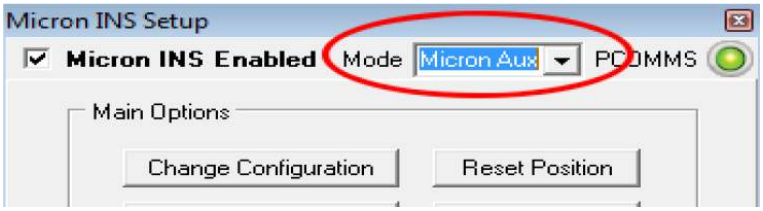
5.2. Connect using Ethernet

Note
To connect the Micron INS via Ethernet it will be necessary to configure the network settings for Windows. For appropriate instructions refer to Appendix B. Setting the computer IP address in Windows 7.

The Micron INS is factory set to use the IP address of 192.168.2.70 so the computer should be set to work on the same domain (i.e., 192.168.2.xxx)

5.3. Connecting through the Micron Sonar or Responder

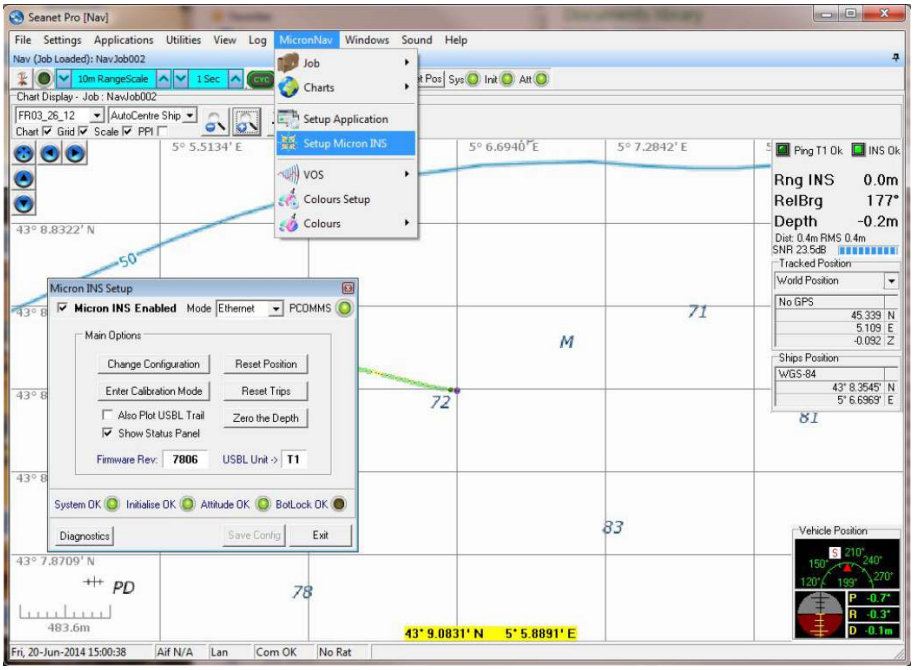
To connect through another Micron device it will be necessary to make sure that the “Mode” is set to “Micron Aux”:



Note
Ensure that a Seanet Pro application that includes both “Nav” and “Sonar” is selected. A sonar window must always be present in Seanet Pro for the Micron Aux connection to be enabled and working. If the Sonar is not required to be used then it can be paused by clicking on the status indicator on its setting bar.

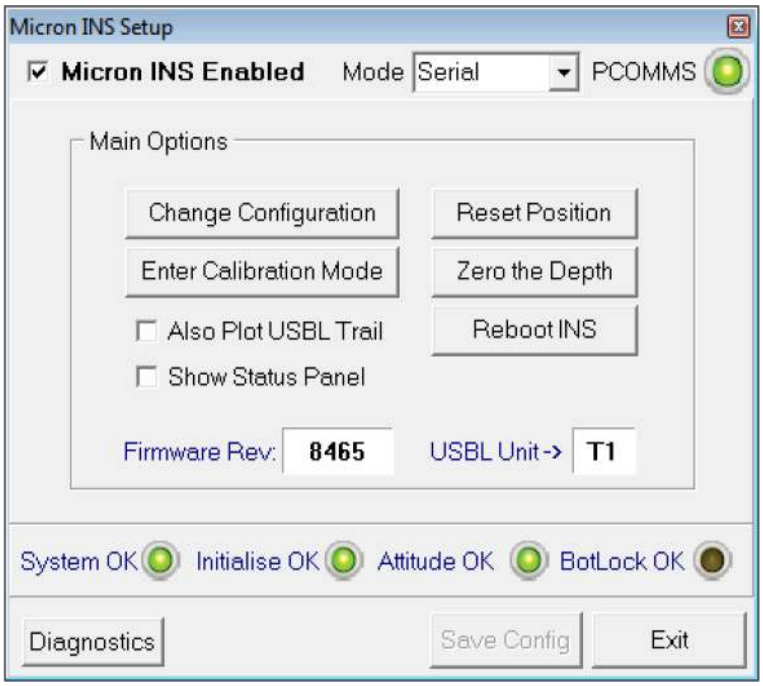
5.4. Enable the Micron INS

To enable the Micron INS interface in Seanet Pro, this is done through the “Nav” application (which provides the user interface for the MicronNav USBL control and display).



The configuration for the Micron INS is done through the “Micron INS Setup” dialog which is launched from the “MicronNav” menu by selecting “Setup Micron INS” as shown in Figure 5.5. Enable Micron INS.

5.5. The Micron INS Setup Dialog



Reset Position

This will reset the Micron INS position from the last MicronNav USBL position it received. This should be performed at the start of a mission to give the Micron INS an initial starting point.

Reset Trips

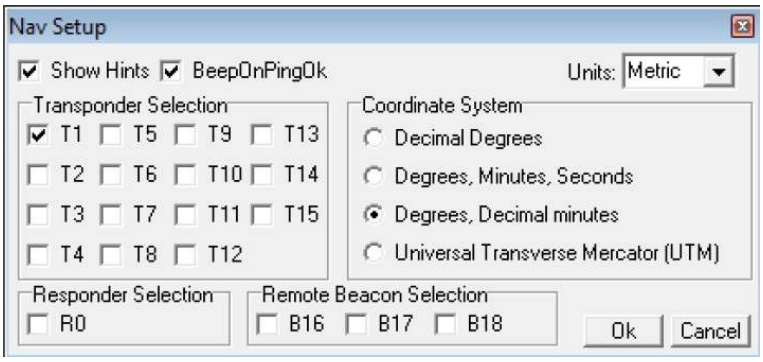
The odometer feature is currently not active so this button currently has no function.

Zero the Depth

This sets the bias on the INS depth sensor to the current depth by applying the current pressure as the surface level pressure. This should be performed when the system is on deck before the dive.

Also Plot USBL Trail

When the Micron INS is enabled, it will attach itself to the first Responder/ Transponder in the Nav Setup list (to see this list, choose “Setup Application” from the “MicronNav” menu).



In the case shown in Figure 5.7. MicronNav Setup, the Micron INS will marry with the T1 Transponder. Before the Micron INS is initialized the Nav chart will plot on the T1 sub trail. Once the INS is initialized, the T1 USBL position will then be sent to the Micron INS and a smoothed position returned. This INS smoothed position is plotted on the chart and an INS sub trail maintained in place of the T1 sub trail.

If “Also Plot USBL Trail” is enabled then both the T1 and INS sub trails will be plotted on the chart.

Note

If a 2nd USBL device was connected, e.g. T2 then it will be plotted regardless of the “Also Plot USBL Trail” setting. The T2 position

updates are not associated with the INS system in this case. It is always the lowest USBL unit ID that is assigned to the Micron INS, so T2 is greater than T1 and will not be assigned. If, however, R0 and T1 are enabled, then R0 will be assigned to the Micron INS and T1 will be independent.

Show Status Panel

This will display a Micron INS status panel on the Micron Settings Bar:

The status panel includes a button to enable/disable the INS as well as a button to reset the position. These correspond to the check box and button in the Micron INS Setup dialog. The 3 main status indicators (System OK, Initialization OK and Attitude OK) are also displayed.

Firmware Revision

This displays the revision of the firmware currently installed inside the Micron INS. This revision number will be displayed once initialization is complete.

USBL Unit

This is the USBL Unit ID that is associated with the Micron INS. The first Responder/Transponder ID in the Nav Setup list will be assigned. The value will be updated once initialization is complete and the USBL device is active.

Note
R0 will be displayed as default until initialization is complete.

Status Indicators

These will be updated constantly when the Micron INS is connected and enabled and are as follows:

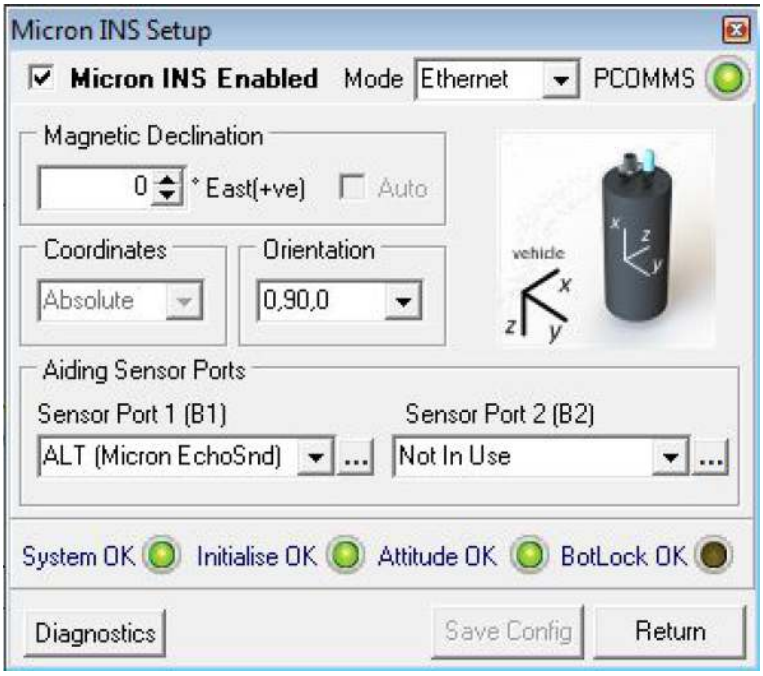
PCOMMS	This will illuminate green when the Micron INS has completed boot up and is communicating over the Ethernet or RS232 link to the host software.
System OK	The Micron INS embedded processor and software has checked out and are OK.
Initialize OK	The internal sensors and connectors of the Micron INS have successfully initialized.
Attitude OK	The attitude sensor is powered and is operational.
BotLock OK	The DVL Bottom Lock is good. This option will require a DVL to be connected to one of the auxiliary sensor ports.

5.6. Change the Configuration

To change the configuration of the Micron INS (including configuration of any connected auxiliary sensors) it will be necessary to launch the Seanet Pro program and choose “Setup Micron INS” from the “MicronNav” menu.

Once the Micron INS is properly connected it will be possible to click on the “Change Configuration” button to set up the system.

Note
If the “Change Configuration” button is greyed out it means that the system has not properly connected to the Micron INS. Make sure that the “Mode” is set correctly for the device being used (Serial or Ethernet) and the PCOMMS indicator is green.



Magnetic Declination

Set a manual correction value for magnetic declination for a True North reference.

Coordinates

“Relative” or “Absolute”

This corresponds closely to the Seanet Nav settings. If the Nav Job setting for Platform is set to “Mobile” and there are active GPS position updates then the Tracked Position in the Nav panel will be forced to a “World Position”, for example:

This will in turn fix the Micron INS Coordinates setting to “Absolute”.

If the Platform setting is set to “Fixed” then the MicronNav Tracked Position can be set to “Relative” or “World Position”. When it is set to “Relative” then this will set the Micron INS Coordinates to “Relative” and relative USBL positions will be sent to the INS and a relative INS position returned.

Orientation

This allows the orientation of the MicronNav to be configured with respect to its mounting on the vehicle frame of reference. The vehicle reference convention is:

+X = Vehicle Forward +Y = Vehicle Starboard +Z = Vehicle Down

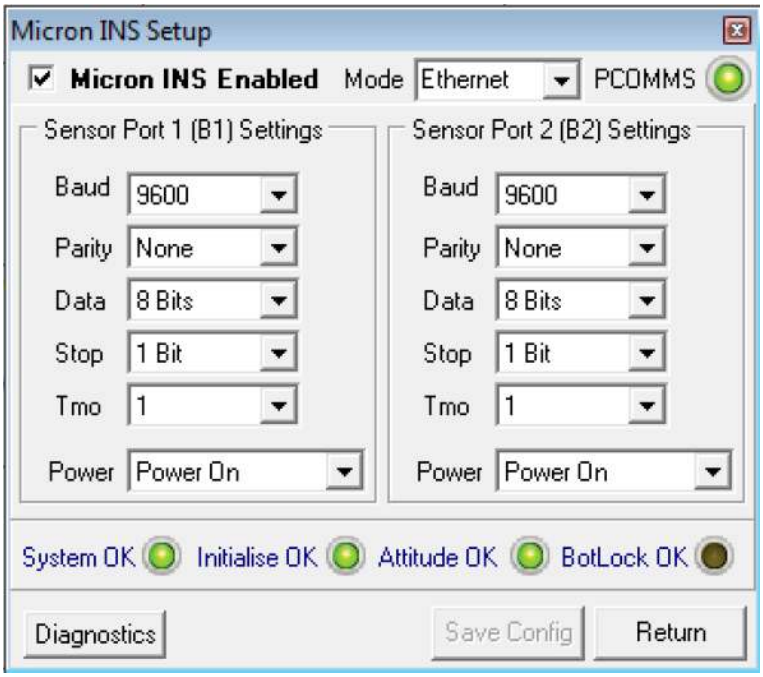
Note
The orientation should be configured prior to attempting sensor calibration.

Aiding Sensor Ports

There are two ports fitted to the Micron INS that are designed to accept a variety of sensors that can aid with the navigation system. These ports are software configurable with options to configure the type of device connected and also the power and port settings.

Use the drop-down list to select the device that is connected or select “Not In Use” to disable the port.

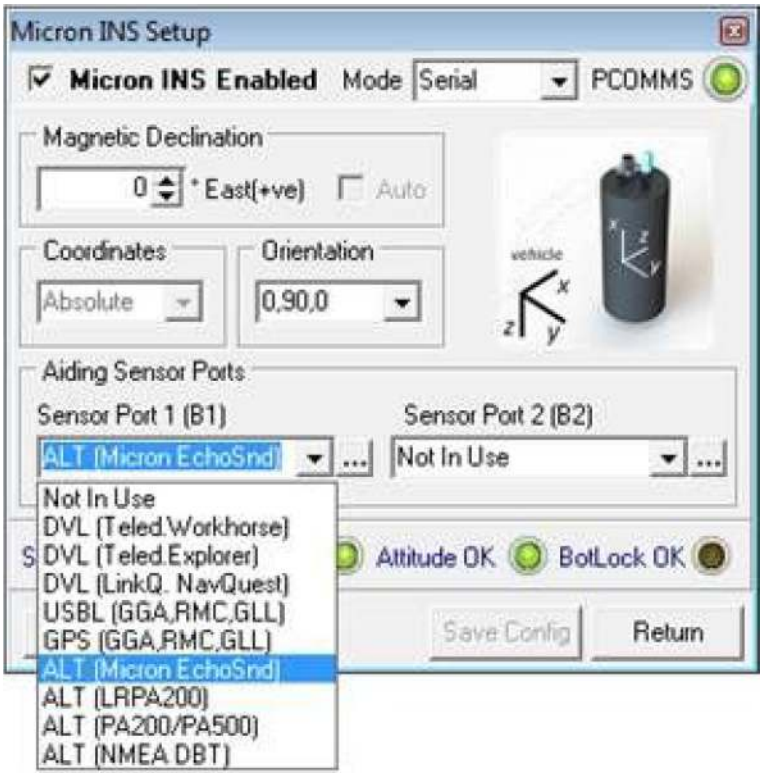
The ellipsis button to the right of the drop down list will open the Sensor Port settings (either button will open the same page):



Click on the “Return” button once any changes have been made.

Compatible Strings

Sensor Code	Type	Description	String
0x0001	DVL	Teledyne Workhorse	PD6
0x0002	DVL	Teledyne Explorer	PD6
0x0003	DVL	LinkQuest NavQuest	PD6
0x0004	USBL	Navigation Position	GGA, GSA, GSV, RMC, and/or GLL
0x0005	GPS	GPS	GGA, GSA, GSV, RMC, and/or GLL
0x0006	Alt	Tritech Micron Echo Sounder	ASCII 3P2, e.g. “123.45m<CR><LF>” ASCII 2P3, e.g. “12.345m<CR><LF>” ASCII 3P3, e.g. “123.456<CR><LF>"
0x0007	Alt	Tritech LRPA200	ASCII 3P2, e.g. “123.45m<CR><LF>” ASCII 2P3, e.g. “12.345m<CR><LF>” ASCII 3P3, e.g. “123.456<CR><LF>"
0x0008	Alt	Tritech PA200/PA500	ASCII 3P2, e.g. “123.45m<CR><LF>” ASCII 2P3, e.g. “12.345m<CR><LF>” ASCII 3P3, e.g. “123.456<CR><LF>"
0x0009	Alt	NMEA 0183 DBT	$PADBT,006.009,f,001.83,M,001.001, F*35<cr><lf>



Aiding Sensor Power

The power to the aiding sensor can be set to either “Power On” or “Power Off”.

Choose “Power Off” if the sensor has its own power supply.

When configured to “Power On” a voltage will be present on the Aiding Snesor Port which is:
1. B1 Power out = Vin (PCOMMS voltage input). This is unless the unit has been ordered with the factory fixed 5V option (this will be noted on the Build Sheet supplied with the unit and only applies to B1).
2. B2 Power out = Vin (PCOMMS voltage input).

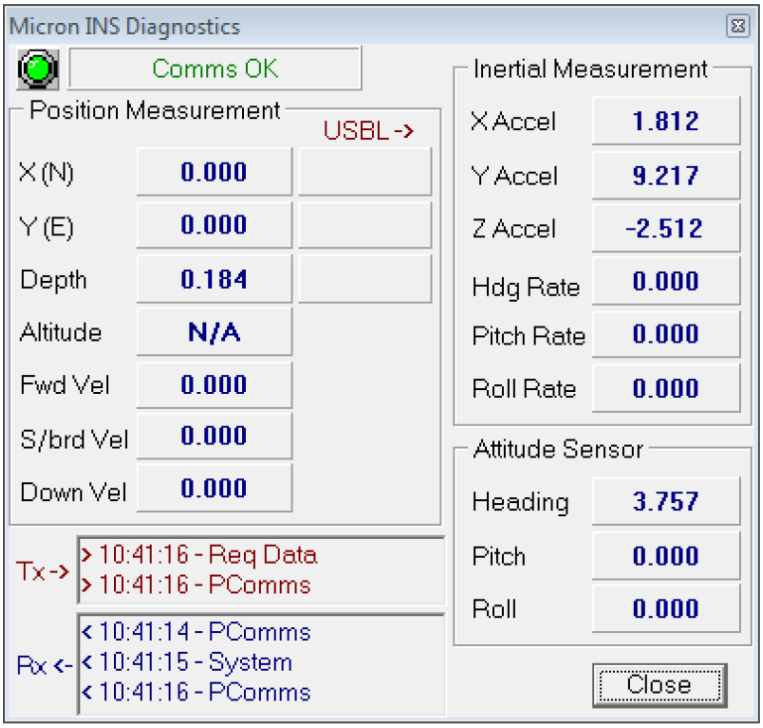
Ensure that the input voltage is capable of powering both Micron INS and any connected aiding sensors when using the pass through power option.

Saving the Configuration

Once any changes have been made the “Save Config” button will be active and should be clicked before pressing “Return” to go back to the main page of the Micron INS Setup dialog.

5.7. Diagnostics

The “Diagnostics” button will open the “Micron INS Diagnostics” dialog and from here it is possible to see the data that is being sent/received and the values held by the measurement devices:



6. Pre-Dive Check List

1. Visual check of Micron INS to ensure no physical damage nor water ingress to connectors. Integrity check of cabling.

2. Check of system Configuration Options (see Chapter 4, *Configuration Options*) before installing.

3. Ensure Seanet Pro is installed and an appropriate Application selected from the main menu to match the configuration (e.g. “Sonar Nav”).

4. Ensure other devices such as MicronNav and Sonar have been configured correctly if these are being used in the system. Details for configuring these devices will be found in the operator manuals supplied with these units.

5. Ensure the Installation guidelines (see Chapter 3, *Installation*) have been followed during the installation of the Micron INS to the vehicle. Ensure the unit power and current draw matches the Specification details (see Chapter 1, *Micron INS Specification*).

6. Once installed, follow Section 5. Operation to start communicating with the unit under control of Seanet Pro. The Micron INS Diagnostic page (See Section 5.7, “Diagnostics”) can be opened to check that communications to the unit and all sensor outputs are good. If on deck, at this stage it will not be possible to verify with MicronNav position updates being sent to the unit.

7. Change the Configuration of the Micron INS to satisfy the operating requirements under which it will be used; e.g.

   a. Apply Magnetic Declination correction for the Heading output

   b. Select Relative or Absolute positioning mode

   c. IMPORTANT: Ensure that the Orientation setting matches the actual alignment of the Micron INS to the vehicle frame.

   d. Configure any Aiding Sensor device inputs (communications and power)

8. Next, with the Micron INS connected, powered and configured, perform a calibration of the unit whilst it is mounted on the vehicle. See Chapter 7, *Calibration*.

9. After Calibration, check the HPR data from the Micron INS is axially aligned correctly – e.g. perform a verification on Heading, Pitch and Roll movement whilst spinning/rolling the vehicle.

10. Before the first dive, zero the depth whilst on deck and then reset the position once the vehicle enters the water and the Micron INS starts receiving good USBL position data from the MicronNav USBL sensor – see Chapter 5, *Operation*

7. Calibration

Note

To enable calibration the Micron INS must be able to be rotated 360° around its heading plane.
The orientation should be configured prior to attempting sensor calibration. See Section 5.6, “Change the Configuration”.

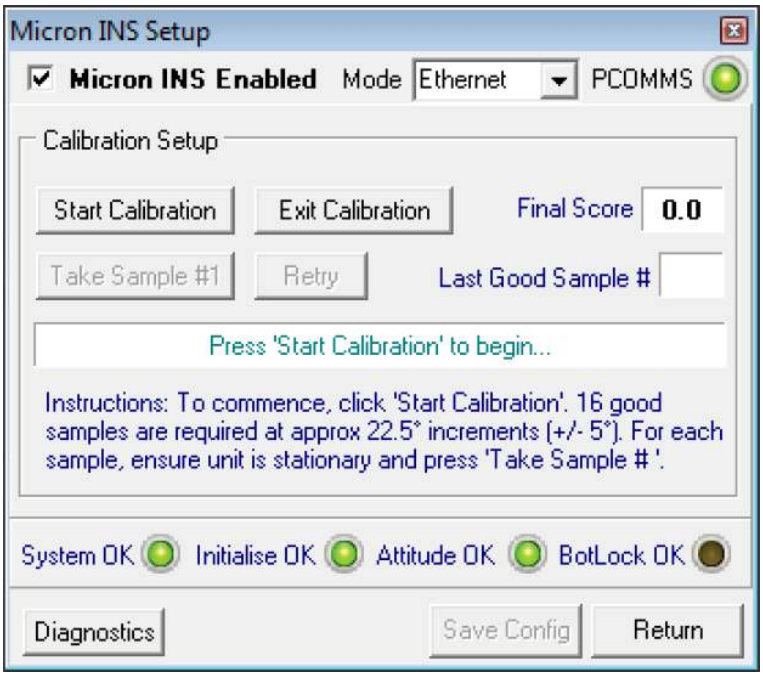
Once the Micron INS is detected by Seanet Pro and has been fully installed on the vehicle it will be necessary to calibrate it through Seanet Pro.

To do so open the “Micron INS Setup” dialog by clicking on “Setup Micron INS” from the “MicronNav” menu.

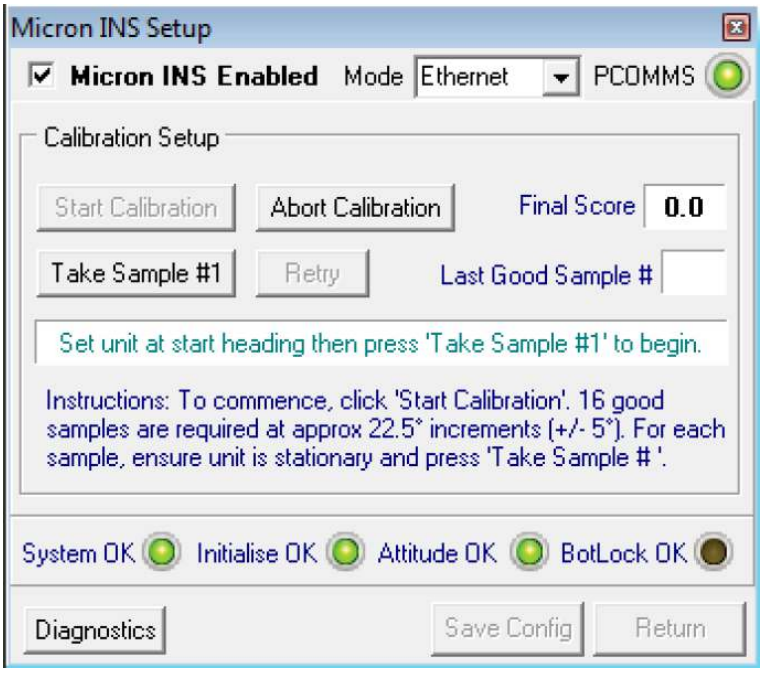
Once the Micron INS is properly connected it will be possible to click on the “Enter Calibration Mode” to start calibration.

Note

If the “Enter Calibration Mode” button is greyed out it means that the system has not properly connected to the Micron INS. Make sure that the “Mode” is set correctly for the device being used (Serial or Ethernet) and the PCOMMS indicator is green.



To begin calibration click on the “Start Calibration” button, this will enable the “Take Sample #” button.



Align the Micron INS with the first calibration position (typically 0°) and then click on the “Take Sample #” button to take the first sample. This will take several seconds to complete and once completed the “Take Sample #” button will increment to the value of 2 for the second sample to be taken. The “Last Good Sample #” box will display to inform the unit has one good sample stored.

If the sample was unsuccessful, the “Retry” button will become enabled after several seconds and the sample can be re-attempted.

Otherwise, proceed to rotate the Micron INS by 22.5° and then take the second sample.

Note

The Micron INS should be rotated in increments of 22.5° and the “Take Sample #” button pressed each time until all 16 samples have been taken.

A “Score” between 0 and 2 is required for the Micron INS to be ready for deployment.

8. Maintenance

8.1. After Using the Micron INS

Make sure that after using the Micron INS that it is washed down with fresh water and check for any signs of obvious damage. Pay particular attention to the connector and sensor end cap and free any organic matter which has become trapped.

Once the Micron INS is clean, dry thoroughly.

8.2. If Storing the Micron INS

Make sure that the Micron INS has been completely cleaned and dried.
It can be removed from the bracket and the bracket left in place on the ROV.
Pack into an appropriate storage container along with several pouches of silica gel (or similar).

There are no user-serviceable parts inside the Micron INS and it should not be dismantled for any reason.

In light usage as long as the Micron INS is washed thoroughly with clean fresh water after every used and dried before storage then no further maintenance is required.

If the Micron INS 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 Micron INS to to be checked thoroughly or for any worn parts to be replaced and will allow long-term trouble free operation.

9. Using the External Computer Data Link

The Micron INS data can be made available for use by third party software packages, running on an external PC, via the REMV4 program that is packaged with Seanet Pro.

The following output strings are currently available:

- Tritech proprietary strings:
  - INS Raw
  - Full Data
  - NAV Solution
  - Attitude Data
  - Velocity Data
- Third party strings:
  - Currently none support, but may be subject to request

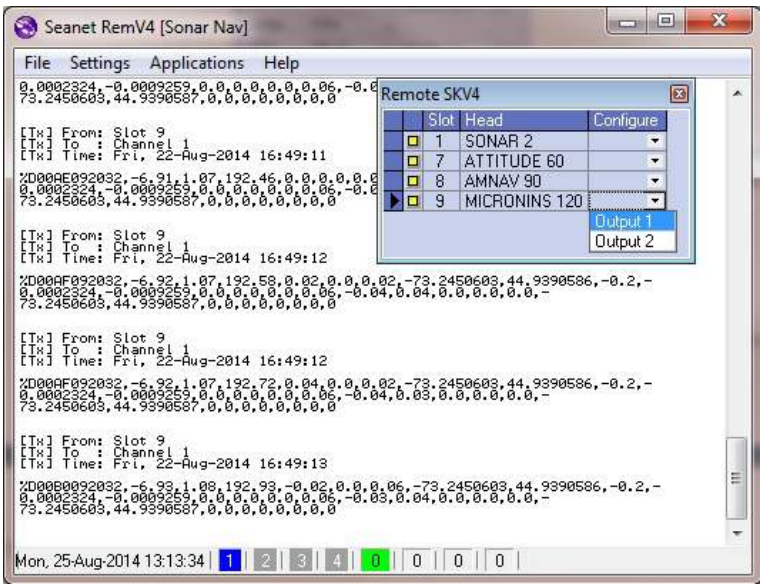
9.1. Setting the REMV4 string output

Note
Up to 2 Output strings can be selected which can be outputted on the same COM port, or differing ones.

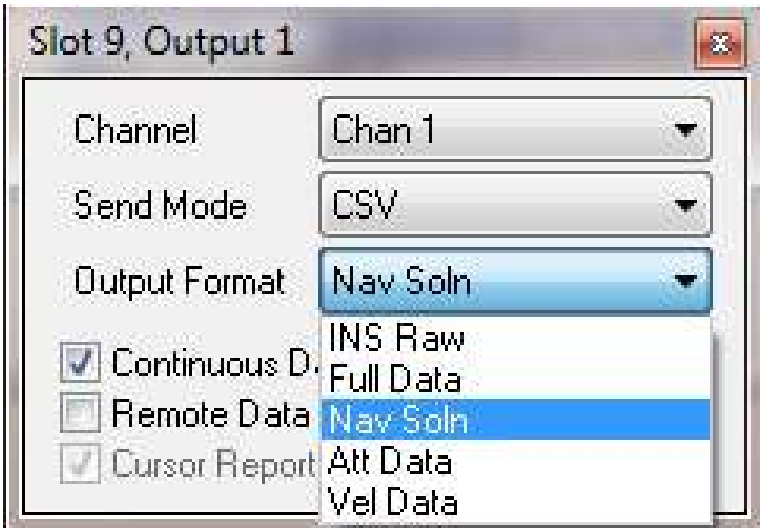
To select the output string format in REMV4:

Ensure ‘Seanet Pro’ is opened and has an Application containing ‘Nav’ in the name running. This will ensure the Slot list (‘Applications’ – ‘Remote SKV4’) of RemV4 is built with the Nav slot (=8) and Micron INS slot (=9) listed.

Click on the ‘Configure’ drop-down button for the Micron INS item (Slot 9) and select ‘Output 1’ as shown below. N.B. Up to 2 Output strings can be selected which can be output on same or different COM port(s).

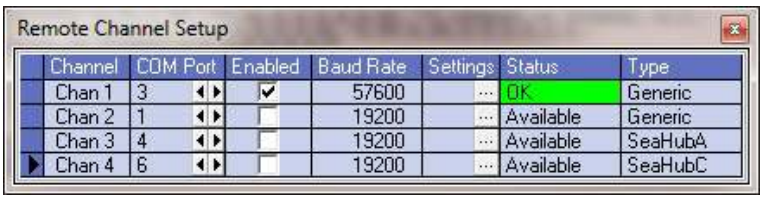


The Output 1 page will open:



- Set the Channel (Chan 1.. Chan 4) for the output string. Note: A COM port will later be configured for this Channel.
- Set the 'Output Format' of string that is required (the drop-down list showing the 4 available strings is shown below).
- Some Output Formats have different 'Send Mode' options (e.g. ASCII, Binary, Hex, CSV) which may also need to be configured.
- Ensure 'Continuous Data Output' is enabled.

Close the 'Output 1' page with the 'X' button on the top-right of the page. Open the 'Remote Channel Setup' page ('Settings' – 'Channels') and configure the Channel that was selected in the step above.



Note
A Baud Rate of 57,600 or 115,200 Baud will be required to ensure no buffering of INS data occurs

9.2. List of Current String Formats

9.2.1. INS Raw

The 'INS Raw' data message is an exact match of the data message that is transmitted by the Micron INS unit over its PCOMMS communications link to Seanet Pro. The format of this message is described in the Micron INS Interface Control Document, which is available for users wishing to develop their own INS application interface. This document can be requested from Tritech.

Note: Not all raw INS messages will be forwarded using this option, only those with pertinent INS solution data (and not Status / Comms messages). For brevity, the relevant information from the Interface Control Document is shown below.

PCOMMS General Message Structure									
HEAD								DATA	TAIL
CRC	SUB	ID	DST	SEC	SEQ	REV	NTX	Data	EOM
10 Bytes								[NTX] Bytes	1 Byte

The following Raw INS messages will be forwarded using this string format option:

Serial COM Port and Ethernet interfaces

Vel_data is software selectable

- 'STAT_Nav_soln" (Message ID = 0x021B, NTX = 240)
  The DATA portion of this message is as follows:

0x21B STAT_Nav_soln			
Byte	Type	Scale	Value
0-7	double	1	Roll [Degrees]
8-15	double	1	Pitch [Degrees]
16-23	double	1	Heading [Degrees]
24-31	double	1	Roll Rate [Degrees / Second]
32-39	double	1	Pitch Rate [Degrees / Second]
40-47	double	1	Heading Rate [Degrees / Second]
48-55	double	1	Longitude [Degrees]
56-63	double	1	Latitude [Degrees]
64-71	double	1	Depth [Metres]
72-79	double	1	Relative Northing [Metres]
80-87	double	1	Relative Easting [Metres]
88-95	double	1	Relative Northing Velocity [M/Sec]
96-103	double	1	Relative Easting Velocity [M/Sec]
104-111	double	1	Depth Velocity [Metres / Second]
112-119	double	1	Relative Northing Acceleration [M/Sec^2]
120-127	double	1	Relative Easting Acceleration [M/Sec^2]
128-135	double	1	Depth Acceleration [M/Sec^2]
136-143	double	1	Speed Over Ground [M/Sec]
144-151	double	1	Course Over Ground [Degrees]
152-159	double	1	Altitude [Meters]
160-167	double	1	Initial Longitude [Degrees]
168-175	double	1	Initial Latitude [Degrees]
176-183	double	1	Attitude OK [Boolean]
184-191	double	1	Depth OK [Boolean]
192-199	double	1	Altitude OK [Boolean]
200-207	double	1	GPS OK [Boolean]
208-215	double	1	USBL OK [Boolean]
216-223	double	1	Relative Position OK [Boolean]
335-231	double	1	Absolute Position OK [Boolean]
232-239	double	1	Bottom Lock OK [Boolean]

Example: 251 byte binary (only) message = 10 Byte header, followed by 240 Data bytes, with <LF> terminator.
Hex:

```
“D9 83 00 1B 02 00 10 00 01 F0 46 C2 DC E4 81 FC 18 C0 EC 2D 08
2D 8D F5 C9 BF AF CC DE 75 73 AE 67 40 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 82 4F A0 FD 8E
4F 52 C0 26 43 6E CF E8 76 46 40 CB BB F6 02 F3 D3 C1 BF 4C 1B
33 55 3D 89 2C BF DC 53 23 B8 9F EB 2F BF 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 F2 F6 3A 25
A9 66 C5 BF AA EC DC A6 07 6D C8 BF 00 A2 4E 60 62 EA A1 3F 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 33 33 33 33 33 3F
8F 40 DB C4 C9 FD 8E 4F 52 C0 B5 67 A9 CF E8 76 46 40 00 00 00
00 00 00 F0 3F 00 00 00 00 00 00 F0 3F 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 0A″
```


- STAT_Vel_data (Message ID = 0x020F, NTX = 64)
  The DATA portion of this message is as follows:

0x020F STAT_Vel_data			
Byte	Type	Scale	Value
0-7	Bit packed double	1	Velocity Status
8-15	double	1	INS X Velocity [Metres /Second]
16-23	double	1	INS Y Velocity [Metres / Second]
24-31	double	1	INS Z Velocity [Metres / Second]
32-39	double	1	Heading Rate [Degrees / Second]
40-47	double	1	Pitch Rate [Degrees / Second]
48-55	double	1	Roll Rate [Degrees / Second]
56-63	double	1	Unix Time of Measurement [Seconds]
Example: 75 byte binary (only) message = 10 Byte header, followed by 64 Data bytes, with <LF> terminator. Hex: “EA 82 00 0F 02 00 10 00 01 40 00 00 00 00 00 00 F0 3F 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 AB 1C FF CA 6B B3 D1 40 0A”			

Micron AUX Port interface

Vel_data and Att_data are software selectable

- STAT_Full data (Message ID=0x0205, NTX=72)
  The DATA portion of this message is as follows:

0x0205 STAT_Full_data			
Byte	Type	Scale	Value
0-7	Bit packed double	1	Latitude [Degrees]
8-15	double	1	Longitude [Degrees]
16-23	double	1	Depth [Metres]
24-31	double	1	Altitude [Metres]
32-39	double	1	Heading [Degrees]
40-47	double	1	Pitch [Degrees]
48-55	double	1	Roll [Degrees]
56-63	Bit packed double	1	Navigation Status
64-71	double	1	Unix Time of Measurement [Seconds]
Example: 83 byte binary (only) message = 10 Byte header, followed by 72 Data bytes, with <LF> terminator. Hex: "C2 80 00 05 02 00 10 00 01 48 26 43 6E CF E8 76 46 40 82 4F A0 FD 8E 4F 52 C0 3D 8B 3E E0 87 BD C1 BF 33 33 33 33 33 3F 8F 40 8D FB 31 DD C1 B0 67 40 56 49 C9 27 E6 43 C8 BF B9 6E 8A 29 F3 F6 18 C0 00 00 00 00 00 40 52 40 99 A7 BC 1B A8 3E CB 40 0A"			

- STAT_Vel_data (Message ID=0x020F, NTX=64)
  The DATA portion of this message is as follows:

0x020F STAT_Vel_data			
Byte	Type	Scale	Value
0-7	Bit packed double	1	Velocity Status
8-15	double	1	INS X Velocity [Metres/Second]
16-23	double	1	INS Y Velocity [Metres/Second]
24-31	double	1	INS Z Velocity [Metres/Second]
32-39	double	1	Heading Rate [Degrees/Second]
40-47	double	1	Pitch Rate [Degrees/Second]
48-55	double	1	Roll Rate [Degrees/Second]
56-63	Bit packed double	1	Unix Time of Measurement [Seconds]
Example: 75 byte binary (only) message = 10 Byte header, followed by 64 Data bytes, with <LF> terminator. Hex: "EA 82 00 0F 02 00 10 00 01 40 00 00 00 00 00 00 F0 3F 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 AB 1C FF CA 6B B3 D1 40 0A"			

- STAT_Att_data (Message ID=0x0207, NTX=56)
  The DATA portion of this message is as follows:

0x0207 STAT_Att_data			
Byte	Type	Scale	Value
0-7	double	1	Heading [degrees]
8-15	double	1	Pitch [degrees]
16-23	double	1	Roll [degrees]
24-31	double	1	Heading Rate [Degrees/Second]
32-39	double	1	Pitch Rate [Degrees/Second
40-47	double	1	Roll Rate [Degrees/Second]
48-55	Bit packed double	1	Attitude Status
Example: 67 byte binary (only) message = 10 Byte header, followed by 56 Data bytes, with <LF> terminator. Hex: “16 81 00 07 02 00 10 00 01 38 A2 19 79 DD C1 A5 69 40 7F 05 7A 3D 2C 99 D4 BF F9 F5 36 68 C5 83 18 C0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 F0 3F 0A”			

9.2.2. Full Data

The ‘Full Data’ data message contains all the main sensor data values that are returned from the INS within the STAT_Full_data message, as defined the Micron INS Interface Control Document. The output message will include a message header and be in the following format, in accordance with the proprietary RemV4 output protocol.

```
“%D” + SlotReplyHdr + ‘Full Data’ INS Data Structure + <CR><LF>
```

SlotReplyHdr Data Structure (sent in hexadecimal format)		
Data Description	**Data Range**	**Data Types**
Total Number of Bytes in Message in Hex (including Command and Reply codes)	NB	CARDINAL
Slot Number (range “01” to “0C”)	SlotN	SLOTN
Generic Device Type	SourceTypes	SOURCEN
Data Reply Mode (0=ASCIIText, 1=Hex, 2=Binary, 3=CSV)	0,1,2 or 3	DIGIT
Send Velocity Data = 4, Send Attitude Data = 3, Send Nav Solution Data = 2, Send Full Data = 1, Send INS Raw Data = 0	0, 1, 2, 3 or 4	DIGIT
Example: Byte Count = Hex 0066 (102) Slot = 09 = MicronINS Sourcetype = 32(Hex 20) = (Micron Nav system component) Data reply mode is ASCIIText Send data = 1 = Full Data ALWAYS Hex e.g., “0066092001”		

‘Full Data’ INS Data Structure		
Data Description	**Data Range**	**Data Types**
Co-ordinate Mode (0=Relative, 1=Absolute)	0 or 1	BOOLEAN
Latitude, in degrees (Absolute) or X, in metres (Relative)	-90.0 to 90.0 (Abs) / -999.9 to 999.9 (Rel)	REAL
Longitude, in degrees (Absolute) or Y, in metres (Relative)	-180.0 to 180.0 (Abs) / -999.9 to 999.9 (Rel)	REAL
Depth, in metres	0 to -9999.9	REAL
Altitude, in metres	0 to 99.99	REAL
Heading, in degrees	0.0 to 359.99	REAL
Pitch, in degrees	-180.0 to 180.0	REAL
Roll, in degrees	-180.0 to 180.0	REAL
Nav Status: System Okay	0 or 1	BOOLEAN
Nav Status: Initialised Okay	0 or 1	BOOLEAN
Nav Status: Attitude Okay	0 or 1	BOOLEAN
Nav Status: Bottom Lock Okay	0 or 1	BOOLEAN
Example: Latitude = 44.9341943, Longitude = -73.2456636, Depth = 0.13 metres, Altitude = 0,45 metres, Heading = 189.44 degs, Pitch = -0.22 degs, Roll = -6.24 degs, Sys Ok, Init Ok, Att Ok, No Bottom Lock. ASCIIText = “%D00660920011+4.49342E+01-7.32457E+01-1.32459E-014.52361E-011.89420E +02-2.10471E-01-6.24832E+001110<CR><LF>” CSV = “%D004A092031,1,44.9341943,-73.2456636,-0.13,0.0,189.44,-0.22,-6.24,1,1,1,0<CR><LF>”		

9.2.3. NAV Solution

*Important:*Not fully available in Micron Aux – only some fields will be filled in.

The ‘Nav Solution’ data message contains all the main sensor data values that are returned from the INS within the STAT_Nav_soln message, as defined the Micron INS Interface Control Document. The output message will include a message header and be in the following format, in accordance with the proprietary RemV4 output protocol.

```
“%D” + SlotReplyHdr + ‘Nav Soln’ INS Data Structure + <CR><LF>
```


SlotReplyHdr Data Structure (sent in hexadecimal format)		
Data Description	**Data Range**	**Data Types**
Total Number of Bytes in Message in Hex (including Command and Reply codes)	NB	CARDINAL
Slot Number (range “01” to “0C”)	SlotN	SLOTN
Generic Device Type	SourceTypes	SOURCEN
Data Reply Mode (0=ASCIIText, 1=Hex, 2=Binary, 3=CSV)	0,1,2 or 3	DIGIT
Send Velocity Data = 4, Send Attitude Data = 3, Send Nav Solution Data = 2, Send Full Data = 1, Send INS Raw Data = 0	0, 1, 2, 3 or 4	DIGIT
Example: Byte Count = Hex 0066 (102) Slot = 09 = MicronINS Sourcetype = 32(Hex 20) = (Micron Nav system component) Data reply mode is ASCIIText Send data = 2 = Nav Solution ALWAYS Hex e.g., “011E092002”		

'Nav Soln' INS Data Structure		
Data Description	**Data Range**	**Data Types**
Co-ordinate Mode (0=Relative, 1=Absolute)	0 or 1	BOOLEAN
Roll, in degrees	-180.0 to 180.0	REAL
Pitch, in degrees	-180.0 to 180.0	REAL
Heading, in degrees	0.0 to 359.9	REAL
Roll Rate, in degrees/second	-999.99 to 999.99	REAL
Pitch Rate, in degrees/second	-999.99 to 999.99	REAL
Heading Rate in degrees/second	-999.99 to 999.99	REAL
Longitude, in degrees or Y, in metres (Relative)	-180.0 to 180.0 (Abs) / -999.9 to 999.9 (Rel)	REAL
Latitude, in degrees or X, in metres (Relative)	-90.0 to 90.0 (Abs) / -999.9 to 999.9 (Rel)	REAL
Depth, in metres	0 to -9999.9	REAL
Relative Northing, in metres (Absolute only)	0 to 10,000,000	REAL
Relative Easting, in metres (Absolute only)	0 to 1,000,000	REAL
Relative Northing Velocity, in metres/second	-999.99 to 999.99	REAL
Relative Easting Velocity, in metres/second	-999.99 to 999.99	REAL
Depth Velocity, in metres/second	-999.99 to 999.99	REAL
Relative Northing Acceleration, in metres/second^2	-99.99 to 99.99	REAL
Relative Easting Acceleration, in metres/second^2	-99.99 to 99.99	REAL
Depth Acceleration, in metres/second^2	-99.99 to 99.99	REAL
Speed Over Ground, in metres/second	0 to 99.99	REAL
Course Over Ground, in degrees	0.0 to 359.99	REAL
Altitude, in metres	0 to 99.99	REAL
Initial Longitude, in degrees or Y, in metres (Relative)	-180.0 to 180.0 (Abs) / -999.9 to 999.9 (Rel)	REAL
Initial Latitude, in degrees or X, in metres (Relative)	-90.0 to 90.0 (Abs) / -999.9 to 999.9 (Rel)	REAL
Attitude OK	0 or 1	BOOLEAN
Depth OK	0 or 1	BOOLEAN
Altitude OK	0 or 1	BOOLEAN
GPS OK	0 or 1	BOOLEAN
USBL OK	0 or 1	BOOLEAN
Relative Position OK	0 or 1	BOOLEAN
Absolute Position OK	0 or 1	BOOLEAN
Bottom Lock OK	0 or 1	BOOLEAN

Example:
Roll = -6.433 degs, Pitch = -0.006 degs, Heading = 189.343 degs, Roll Rate = 0.0 degs/sec, Pitch Rate = 0.0 degs/sec, Heading Rate = 0.0 degs/sec, Longitude = -73.2456636, Latitude = 44.9341943, Depth = 0.13 metres, Relative Northing = 0.0005 metres, Relative Easting = 0.0006 metres, Relative Northing Velocity = 0.0 m/s, Relative Easting Velocity = 0.0 m/s, Depth Velocity = 0.0 m/s, Relative Northing Acceleration = -0.132 m/s^2, Relative Easting Acceleration = -0.163 m/s^2, Depth Acceleration = 0.027 m/s^2, Speed Over Ground = 0.0 m/s, Course Over Ground = 0.0 degs, Altitude = 0.0 metres, Initial Longitude = -73.2456637, Initial Latitude = 44.9341943, Attitude OK, Depth OK, Altitude OK, GPS OK, USBL OK, Rel Pos OK, Abs Pos OK, Bottom Lock OK
ASCIIText = "%D011E0920021-6.43327E+00+6.63923E-03+1.89343E+02+0.00000E+00+0.00000E+00+0.00000E+00-7.32457E+01+4.49342E+01-1.26655E-01-5.06136E-04-6.23978E-04+0.00000E+00+0.00000E+00+0.00000E+00-1.32059E-01-1.63424E-01+2.69686E-02+0.00000E+00+0.00000E+00+0.00000E+00-7.32457E+01+4.49342E+0100000000<CR><LF>"
CSV = "%D00AD092032,1,-6.43,0.01,189.34,0.0,0.0,0.0,-73.2456636,44.9341943,-0.13,-0.0005061,-0.000624,0.0,0.0,0.0,-0.13,-0.16,0.02,0.0,0.0,0.0,-73.2456637,44.9341943,0,0,0,0,0,0,0<CR><LF>"

9.2.4. Attitude Data

The ‘Attitude Data’ data message contains all the main sensor data values that are returned from the INS within the STAT_Att_data message, as defined the Micron INS Interface Control Document. The output message will include a message header and be in the following format, in accordance with the proprietary RemV4 output protocol.

```
“%D” + SlotReplyHdr + ‘Att Data’ INS Data Structure + <CR><LF>
```

SlotReplyHdr Data Structure (sent in hexadecimal format)		
Data Description	**Data Range**	**Data Types**
Total Number of Bytes in Message in Hex (including Command and Reply codes)	NB	CARDINAL
Slot Number (range “01” to “0C”)	SlotN	SLOTN
Generic Device Type	SourceTypes	SOURCEN
Data Reply Mode (0=ASCIIText, 1=Hex, 2=Binary, 3=CSV)	0,1,2 or 3	DIGIT
Send Velocity Data = 4, Send Attitude Data = 3, Send Nav Solution Data = 2, Send Full Data = 1, Send INS Raw Data = 0	0, 1, 2, 3 or 4	DIGIT
Example: Byte Count = Hex 0057 (87) Slot = 09 = MicronINS Sourcetype = 32(Hex 20) = (Micron Nav system component) Data reply mode is ASCIIText Send data = 3 = Attitude Data ALWAYS Hex e.g., “0057092003”		

‘Att Data’ INS Data Structure		
Data Description	**Data Range**	**Data Types**
Co-ordinate Mode (0=Relative, 1=Absolute)	0 or 1	BOOLEAN
Heading, in degrees	0.0 to 359.99	REAL
Pitch, in degrees	-180.0 to 180.0	REAL
Roll, in degrees	-180.0 to 180.0	REAL
Heading Rate, in degrees/second	-999.99 to 999.99	REAL
Pitch Rate, in degrees/second	-999.99 to 999.99	REAL
Roll Rate, in degrees/second	-999.99 to 999.99	REAL
Attitude OK	0 or 1	BOOLEAN
Example: Heading = 189.294 degs, Pitch = -0.113 degs, Roll = -6.321 degs, Heading Rate = 0.0 degs/sec, Pitch Rate = 0.0 degs/sec, Roll Rate = 0.0 degs/sec, Attitude OK ASCIIText = “%D0057092003+1.89294E+02-1.13290E-01-6.32050E+00+0.00000E+00+0.00000E+00+0.00000E+000<CR><LF>” CSV = “%D002E092033,189.3,-0.11,-6.32,0.0,0.0,0.0,0<CR><LF>”		

9.2.5. Velocity Data

The ‘Velocity Data’ data message contains all the DVL derived sensor data values that are returned from the INS within the STAT_Vel_data message, as defined the Micron INS Interface Control Document. The output message will include a message header and be in the following format, in accordance with the proprietary RemV4 output protocol.

```
“%D” + SlotReplyHdr + ‘Vel Data’ INS Data Structure + <CR><LF>
```

SlotReplyHdr Data Structure (sent in hexadecimal format)		
Data Description	**Data Range**	**Data Types**
Total Number of Bytes in Message in Hex (including Command and Reply codes)	NB	CARDINAL
Slot Number (range “01” to “0C”)	SlotN	SLOTN
Generic Device Type	SourceTypes	SOURCEN
Data Reply Mode (0=ASCIIText, 1=Hex, 2=Binary, 3=CSV)	0,1,2 or 3	DIGIT
Send Velocity Data = 4, Send Attitude Data = 3, Send Nav Solution Data = 2, Send Full Data = 1, Send INS Raw Data = 0	0, 1, 2, 3 or 4	DIGIT
Example: Byte Count = Hex 002F (47) Slot = 09 = MicronINS Sourcetype = 32(Hex 20) = (Micron Nav system component) Data reply mode is ASCIIText Send data = 4 = Velocity Data ALWAYS Hex e.g., “002F092034”		

‘Vel Data’ INS Data Structure		
Data Description	**Data Range**	**Data Types**
Co-ordinate Mode (0=Relative, 1=Absolute)	0 or 1	BOOLEAN
Aiding DVL X Velocity, in metres/second	-999.99 to 999.99	REAL
Aiding DVL Y Velocity, in metres/second	-999.99 to 999.99	REAL
Aiding DVL Z Velocity, in metres/second	-999.99 to 999.99	REAL
Heading Rate, in degrees/second	-999.99 to 999.99	REAL
Pitch Rate, in degrees/second	-999.99 to 999.99	REAL
Roll Rate, in degrees/second	-999.99 to 999.99	REAL
DVL Velocity OK	0 or 1	BOOLEAN
DVL Bottom Lock OK	0 or 1	BOOLEAN
Example: X Velocity = 1.5438 m/sec, Y Velocity = 0.0432 m/sec, Z Velocity = 0.0024 m/sec, Heading Rate = 0.0283 degs/sec, Pitch Rate = 0.0074 degs/sec, Roll Rate = 0.0105 degs/sec, Velocity OK, Bottom Lock OK. ASCIIText = “%D0058092004+1.54380E +00+4.32000E-02+2.40000E-03+2.83000E-02+7.40000E-03+1.05000E-0211<CR><LF>” CSV =“%D002F092034,1.54,0.04,0.0,0.03,0.01,0.01,1,1<CR><LF>”		

9.2.6. REMV4 Data Types

Data Type	Binary Mode	Hex Mode	ASCII Text Mode
REMCH			":"
REPCH			"%"
BOOLEAN	Nibble	"b"	"0" or "1"
DIGIT	Nibble	"n"	Any Digit "0" to "9"
CHAR	<byte>	<byte>	Any printable ASCII
SHORTCARD	<byte>	"Nn"	"000" to "255"
SHORTINT	<byte>	"Nn"	"-128" to "+128"
CARDINAL	<LSB><MSB>	"MmLl"	"00000" to "65535"
INTEGER	<LSB><MSB>	"MmLl"	"-32768" to "+32767"
LONGCARD	<LSB><.><.><MSB>	"Mm....Ll"	"0000000000" to "4294967296"
LONGINT	<LSB><.><.><MSB>	"Mm....Ll"	"-2147483648" to "+2147483647"
REAL	<LSB><.><.><MSB>	"Mm....Ll"	"-9.99999E-37" to "+9.99999E+37"
LONGREAL	<LSB>,6*<><MSB>	"Mm.....Ll"	"-9.99999999E-307" to "+9.99999999E+307"
TIME	<C><S><M><H>	"HhMmScCc"	"HHMMSSCC"
DATE	<D><M><Y>	"DdMmYyyy"	"DDMMYYYY"
SLOTN	<1..12>	"Nn" ("01" to "0C")	"01" to "12"
SOURCEN	<0..99>	"Nn" ("00" to "63")	"00" to "99"
DEVICEN	<0..99>	"Nn" ("00" to "63")	"00" to "99"
NODEN	<1..15>	"Nn" ("01" to "63")	"01" to "99"

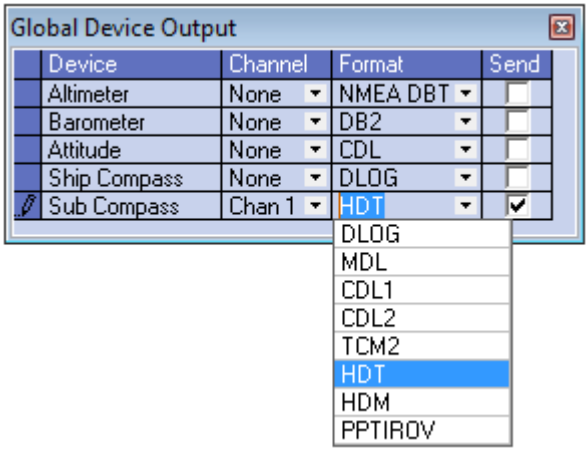
9.3. Other Output Options

9.3.1. Outputting the INS Attitude Data using Globals

The INS Attitude data will be available as Global Sub Compass data and can be output using the 'Global Device Output' options. The procedure to do so is as follows:

- In REMV4, click on 'Applications' – 'Global Device Output'

- This will open the Global Device Output page
- For the ‘Sub Compass’ device, set an output Channel (as described earlier in this document) and ensure that the ‘Send’ tick box is enabled.
- Next, select the output string Format that is required to be output.

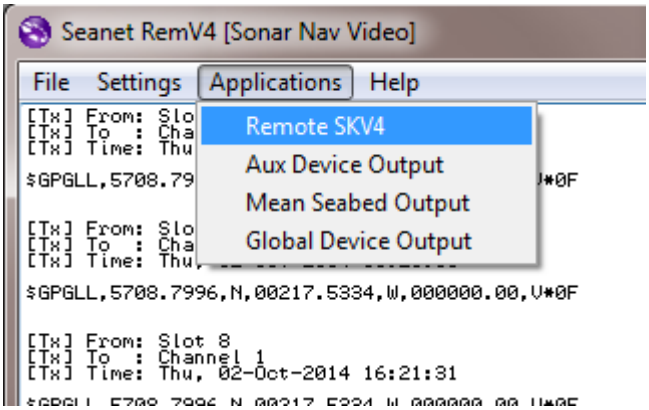


- Finally, close the page using the red cross button (on top right). The selected string Format will now be output on the selected Channel.

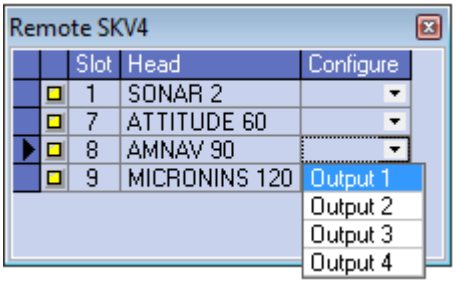
9.3.2. Outputting the INS Position Data using AMNav90

The INS Position data can also be output through the AMNAV 90 slot (slot 8):

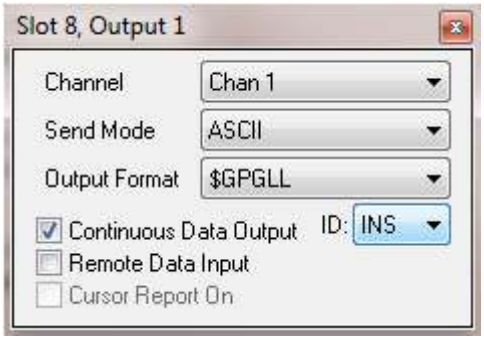
- In REMV4, click on ‘Applications’ – ‘Remote SKV4’



- This will open the Remote SKV4 page.
- For the AMNAV 90 slot (8), click on the Configure drop-down list and select an Output.



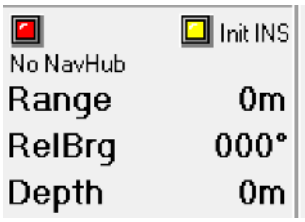
- This will open the Output page where the Format of string can be selected. Most of these string formats have a Unit ID field and the INS unit ID will appear as a value of 19. Also, for the string formats that do not contain a Unit ID field (e.g. $GPGGA, $GPRMC, $GPGLL) the INS output can be selected from the ID: drop-down list.



10. Troubleshooting

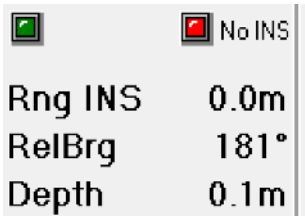
10.1. INS Status Indicator

Status "Init INS"



This means that the Micron INS has been powered and is undergoing its initialization with the surface. The Micron INS has an embedded computer and can take up to a minute for it to boot up its operating system and prepare internal sensors for operation. In Ethernet mode, the “Init INS” indicator should appear around 30 seconds after power up. It will take a subsequent 30 seconds or so before it has fully rebooted and communicated its configuration details with the surface (Seanet Pro). When communicating to the Micron INS with its serial mode, the Init INS will take slightly longer to be displayed (around 50 seconds) as the unit has to be fully booted before serial communications can take place.

Status "No INS"



If this is displayed then the Micron INS has either not been connected or not fully powered/ booted. After initial power on, the Micron INS will take up to a minute to boot and so the “No INS” state will be displayed for a period of time until communications can be established. Communication can only occur once the embedded computer has had time to fully initialize. If “No INS” is displayed for 1-1.5 minutes after power on then this can indicate a fault with the connection or configuration of the device or communications link.

Status Cycles Between "No INS" and "Init INS"

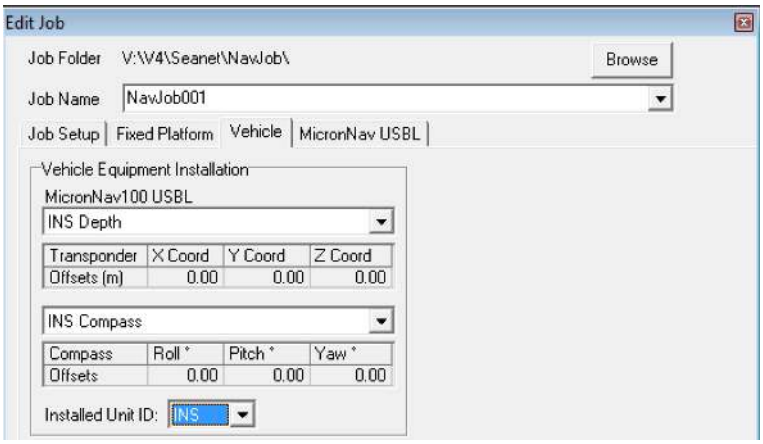
If this occurs whilst using the Micron INS with its serial communications option, it can mean that the wrong baud rate has been selected for the Micron INS

device in the “Channel Setup” (see Section 5.1, “Connecting using RS232”) or there is a bad RS232 link. Check ground references, cable integrity, isolations and maximum cable length for the baud rate chosen.

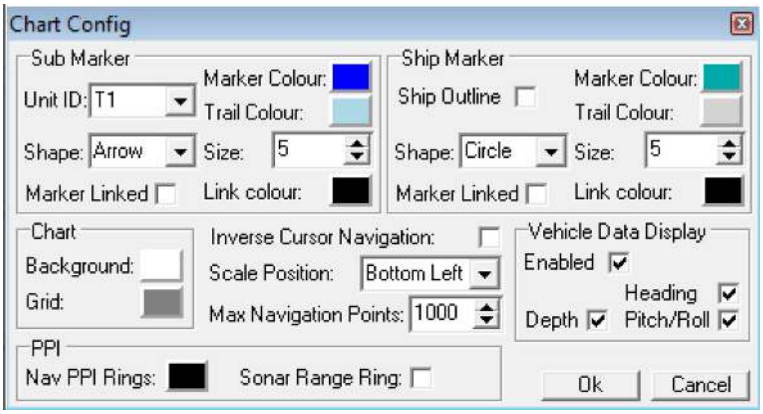
10.2. Display of HPR and Depth Information from Micron INS

The Micron INS will output this data from its integral MRU and Pressure sensors. These can be viewed in the “Vehicle Position” display which may first need to be configured.

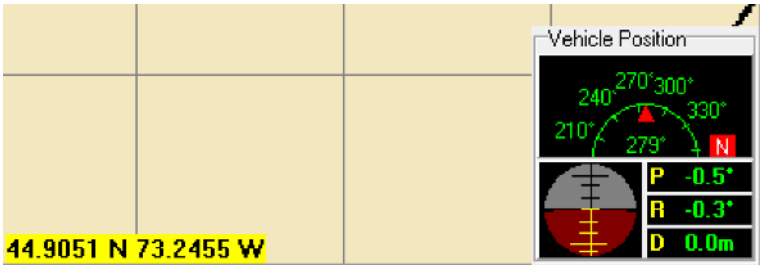
First ensure that the Nav Job has been configured correctly (i.e., select “ROV” in the dropdown list from the “Job Setup” tab and “INS” from the drop down list in the “Vehicle” tab):



Then, in the “Chart Configuration” (right-click on the chart and select “Configuration”), ensure that the “Vehicle Data Display” is “Enabled” and select the data types to be shown:



This will display the data in the bottom-right of the chart window:



10.3. No Micron INS Data When Connected Through Micron Sonar AUX Port

First ensure that the Micron Sonar AUX port is configured to RS232 and 57.6kBd. Also ensure that the Micron Sonar has its “Aux Rate” set to zero (see 3.4. Micron INS Connected Through Micron Sonar and Responder) which means it will poll for AUX data immediately in between pinging.

Also ensure that the interface cable connecting the Micron INS (PCOMMs port) to the Micron Sonar (AUX Port) is wired correctly and not damaged. The Micron Sonar will pas through its input power onto its AUX port for powering the Micron INS. Ensure this is in the voltage range that the INS requires and that the supply has a suitable current rating to power everything.

Finally, check that the Seanet Pro application has a Sonar display window included and that the Sonar is operational. If the sonar has no communications with Seanet Pro, which requires a display window to be active the Application, then the Micron INS communications will not be passed through.

10.4. No Communication With The Micron INS Over Ethernet

The Micron INS is configured with the IP Address of 192.168.2.70. Ensure that the Ethernet adapter or Hub to which is connects is in the same subnet. Ensure that the Ethernet cabling does not exceed recommended maximum lengths (maximum usually100m, more typically should not exceed 80m). Check the wiring as described in 2.10. Pin-out Diagram and Cable and also ensure there is no damage to the cabling. Ensure that any firewall enabled on the computer allow Seanet Pro to connect through the device.

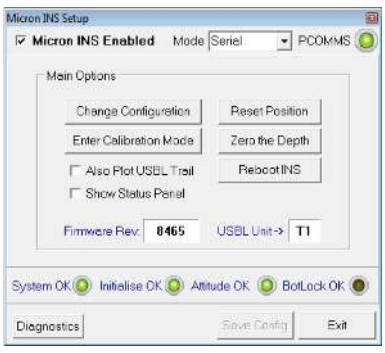
10.5. Micron INS position not visible on the chart

First check that the Status Indicator is displaying “INS OK” which will mean that it is communicating and has completed initialization. Also check that the Micron INS is enabled (see 5.4. Enable the Micron INS).

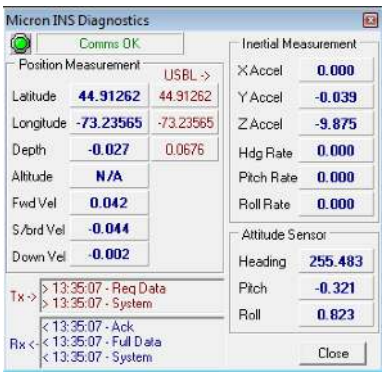
The next step is to check that the Micron INS is being sent USBL position updates from the MicronNav:

1. Ensure that the MicronNav Responder/Transponder is pinging and that the USBL position updates are active. Consult the MicronNav operator manual for more details on installation and troubleshooting.

2. Open the “Micron INS Setup” page and ensure that the correct USBL Unit as been auto-assigned:



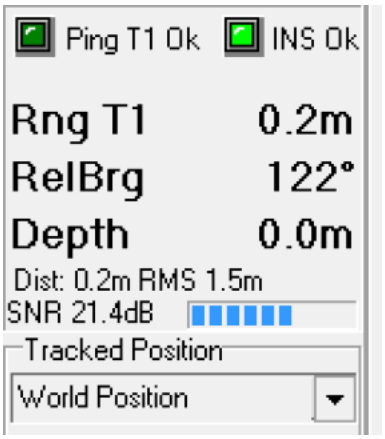
3. Next check that the USBL Position updates are being sent to the Micron INS. Click on the Diagnostics button in the “Micron INS Setup” page



4. Check that the Latitude, Longitude and Depth values being returned from the INS are valid and in the same range as the USBL down positions. If not, click on the “Reset Position” button in the “Micron INS Setup” page (or MicronNav settings bar, if enabled to be displayed there).

5. If the labelling of the “Micron INS Diagnostics” page reads X, Y and Depth then the system is configured in Relative mode:

   To revert to World/Absolute mode, ensure that the MicronNav panel drop-down is set to “World Position”:



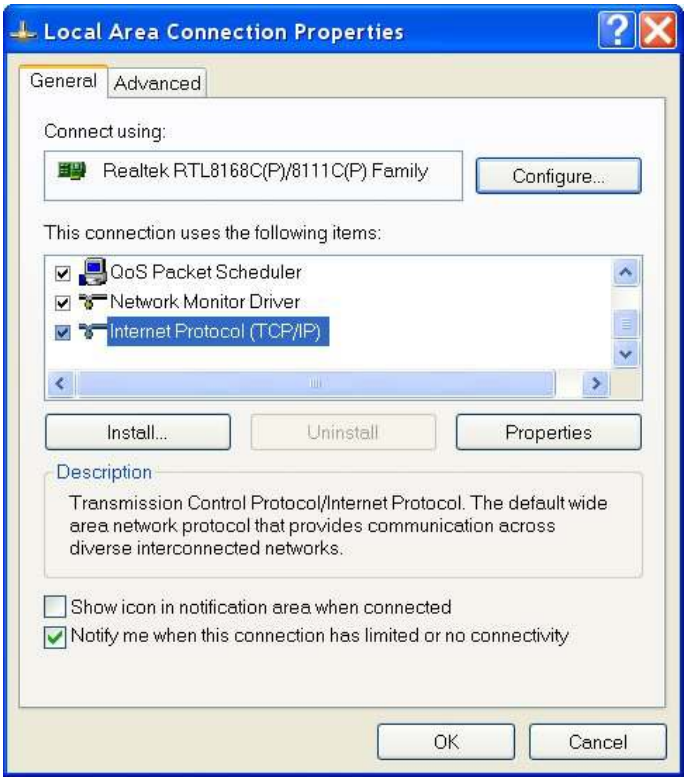
Appendix A. Setting the computer IP address in Windows XP

The following instructions apply to a computer running Windows XP, though the sequence for other operating systems will be similar.

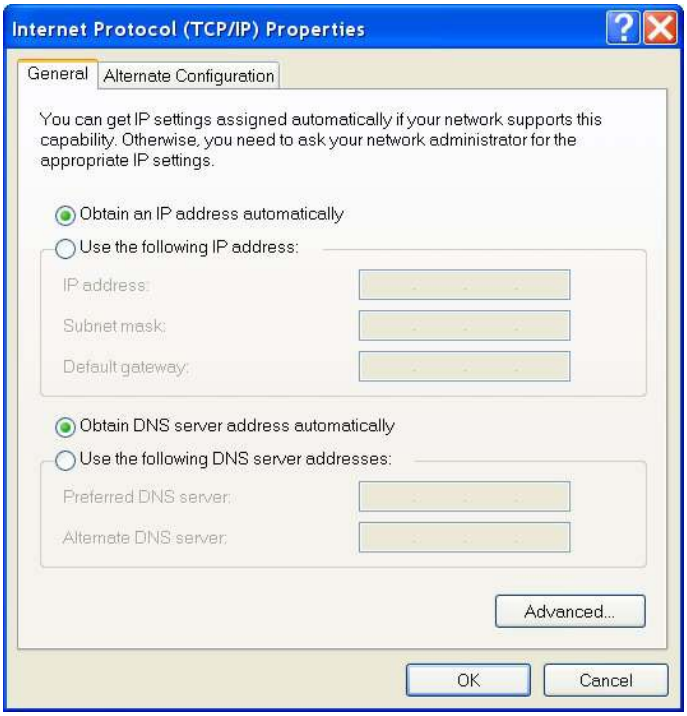
If the computer is connected to a network already, disconnect it from that network.

From the Start Menu select Control Panel. From the Control Panel Explorer window that opens, double click on Network Connections. From the list of available network connections that opens, double click on the Ethernet connection which will be used to connect to the Gemini Sonar.

Click the Properties button on the dialog which opens. This will open a dialog which looks like this:

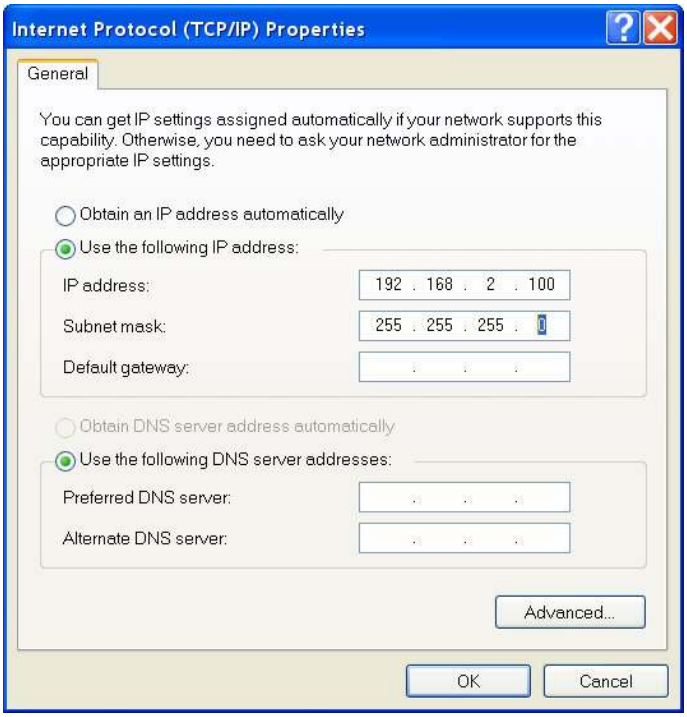


Scrolling the "This connection uses the following items" box will reveal an item titled "Internet Protocol (TCP/IP)". Click this item to select it, and then press the Properties button. The following dialog should open:



Make a note of the settings as currently used by the computer; these will be needed to restore the computer to any existing network. Refer to the appropriate section of this manual for the correct IP address to use.

The following screenshot shows the dialog after those changes have been made:

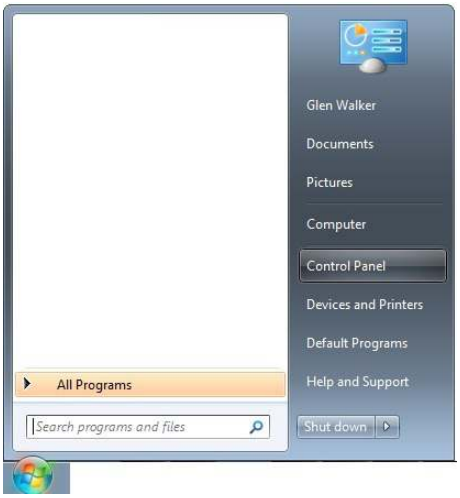


Appendix B. Setting the computer IP address in Windows 7

The following instructions apply to a computer running Windows 7, though the sequence for other operating systems will be similar.

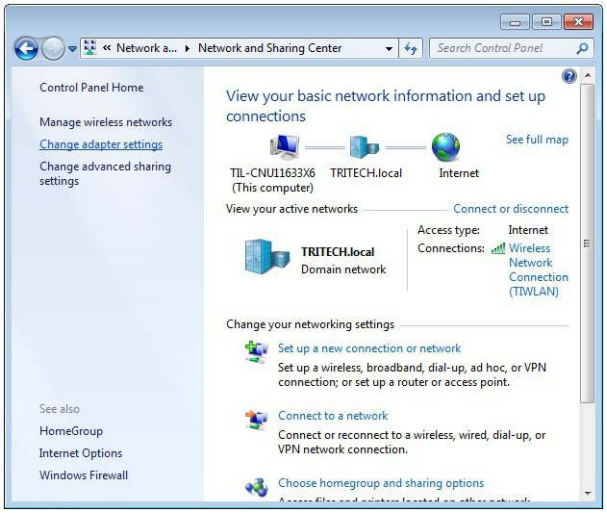
Disconnect the computer from any existing network.

First click on the Start Menu and select `Control Panel`.



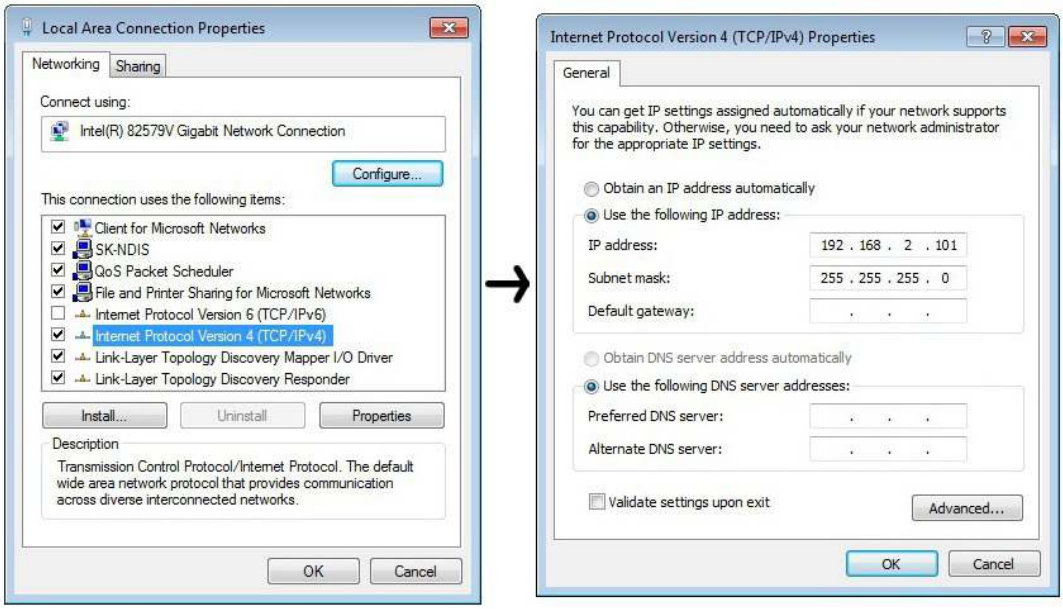
Under `Network and Internet` click on `View network status and tasks`.

This will bring up the `Network and Sharing Center` which allows configuration of any networks on the computer. Click on `Change adapter settings` on the left-hand pane.



A list of attached network devices should now present itself. Find the one which the sonar is to be connected to and double-click on it.

The `Local Area Connection Properties` dialog should be displayed. Find the entry labelled `Internet Protocol Version 4 (TCP/IPv4)`, select it and then click on the `Properties` button.



In the properties dialog which opens there will either be `Obtain an IP address automatically` or `Use the following IP address` selected. If an IP address is already present, make a note of it before changing any values since it will be needed if the computer is ever restored to the previous network. Refer to appropriate section of this manual for the correct IP addresses to use.

Glossary

GPS	Global Positioning System.
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.
Seanet Pro	The software supplied by *Tritech International Ltd* which is capable of running all the sonar devices.
USBL	Ultra Short Base Line (positioning system)

