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# Data Transfer with the Micron Nav System

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## 1. Version History & Amendment Details

Revision	Date	Author	Description
01	19/05/2016	Paul McMaster	Initial release
02	15/10/2018	Paul McMaster	Updated for latest Seanet Pro version

## 2. Abbreviations & Acronyms

Aif	Ancillary Interface
ASCII	American Standard Code for Information Interchange
Aux	Auxiliary
.bin	AVR (Microcontroller) firmware file
COM	Communications
DC	Direct Current
DLL	Dynamically Linked Library
FPGA	Field Programmable Gate Array
ID	Identifier
.mcs	FPGA firmware file
Nav	Navigation
PC	Personal Computer
RX	Receive
TX	Transmit
UART	Universal Asynchronous Receiver Transmitter
USB	Universal Serial Bus
USBL	Ultra Short Base Line

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### 3. Introduction

The Micron Nav USBL Head and Micron Nav Hub are normally used with Micron Modem (acting in transponder or responder mode) to provide a USBL positioning solution.


In some applications, it is desirable to dynamically reconfigure the same hardware to transfer user data. To support these applications, Tritech have added data transfer (modem) options to the Micron Nav system.

At the outset, it is important to consider the distinct operating modes that USBL positioning and Modem systems operate in:

- In a USBL positioning system, the transponder / responder remains silent until it is instructed to reply. For a Micron Modem acting as a transponder, this instruction comes in the form of an acoustic interrogate command matching its Transponder ID. For a Micron Modem acting as a responder, this instruction comes in the form of an ASCII 'p' character received on its COM port.
- In a Modem system, the modem remains silent until it has received some data bytes on its COM port. In the Micron Modem system, the threshold is set at 4 bytes, with an optional timeout to pad with NULL characters and transmit if fewer characters are received. There exists the possibility that both the Surface Modem and Subsea Modem could begin transmitting simultaneously if data is received simultaneously, and the user system design should minimise the probability of this occurring since neither message will be correctly received.

A multi-node system requiring both modes to be interleaved in time, requires a higher level supervisory protocol to be in place. The design and implementation of this is the user's responsibility and is outside the scope of this document.

Typically, a user application mixing the two modes will only use the Seanet Pro software application for configuration. In normal use, a user developed software application together with the Micron Nav DLL will instead be used. See document 0656-SDS-00001 for further details of the Micron Nav DLL.

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#### 4. Minimum Software / Firmware Versions Required

The table below lists the minimum software and firmware versions that are required to support data transfer functionality in the Micron Nav system.

Item	Minimum Version
Seanet Pro software	2.24 (Build 548)
Micron Nav Hub AVR <a href="#">.bin</a> file	SeaHubNav100V210.bin
Micron Nav Hub FPGA <a href="#">.mcs</a> file	SeaHubV3.mcs
Micron Nav Hub Daughter Board FPGA <a href="#">.mcs</a> file	SEANAV106.mcs
USBL Head MiniAttSen <a href="#">.bin</a> file	MiniAttSenV5.bin
Micron Modem <a href="#">.bin</a> file	MiniModemV9.bin

All Items must be updated. It is not possible to only selectively update some items, as unpredictable behaviour will result.

The following equipment will be required to complete the update process:

- Windows PC
- Micron Nav Hub, USBL Head and Micron Modem
- USB A-B cable (for PC → Micron Nav Hub connection)
- +24VDC power supply and Micron Modem RS232/power breakout lead
- Magnet

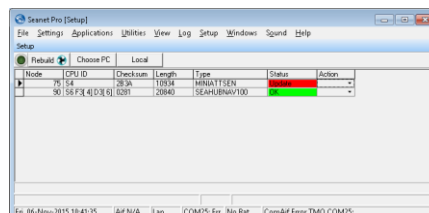
The update process for each item is described below.

##### 4.1. Seanet Pro software


4.1.1. Download and install the latest version of Seanet Pro from the Tritech website (<https://www.tritech.co.uk/support-software>).

4.1.2. Start Seanet Pro and select Applications -> Setup.

4.1.3. Confirm that both types 'MINIATTSSEN' and 'SEAHUBNAV100' are displayed in the node table. Note: the status may be red, this indicates an update is required.

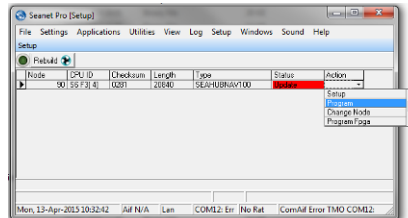


4.1.4. Once all the programming steps below are complete the status of both 'SEAHUBNAV100' and 'MINIATTSSEN' should be green and displaying 'OK'.

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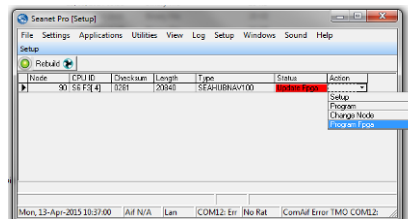
#### 4.2. Micron Nav Hub AVR .bin file

If the Status of the 'SEAHUBNAV100' is red and displaying 'Update' then the Micron Nav Hub AVR .bin file needs updating. Select 'Program' from the drop down menu under Action to update this.



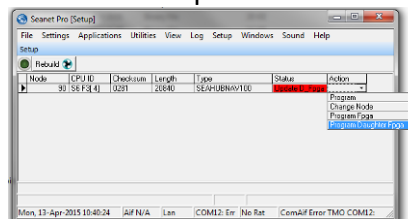
#### 4.3. Micron Nav Hub FPGA .mcs file


If the Status of the 'SEAHUBNAV100' is red and displaying 'Update Fpga' then the Micron Nav Hub FPGA .mcs file needs updating. Select 'Program Fpga' from the drop down menu under Action to update this.



#### 4.4. Micron Nav Hub Daughter Board FPGA .mcs file

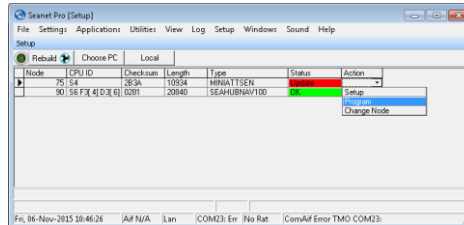
If the Status of the 'SEAHUBNAV100' is red and displaying 'Update D\_Fpga' then the Micron Nav Hub Daughter Board FPGA .mcs file needs updating. Select 'Program Daughter Fpga' from the drop down menu under Action to update this.



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#### 4.5. USBL Head MiniAttSen .bin file

If the Status of the 'MINIATTSEN' is red and displaying 'Update' then the USBL Head MiniAttSen .bin file needs updating. Select 'Program' from the drop down menu under Action to update this.



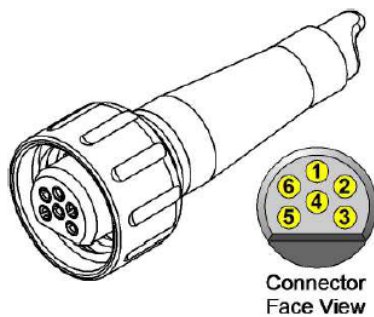
#### 4.6. Micron Modem .bin file

4.6.1. Connect the Micron Modem to a suitable break out lead connected to a DC Power supply capable of supplying 24VDC at 30mA and an RS232 serial port (either on a computer or on the Micron Nav Hub). See the diagram below for the connector pin-out.



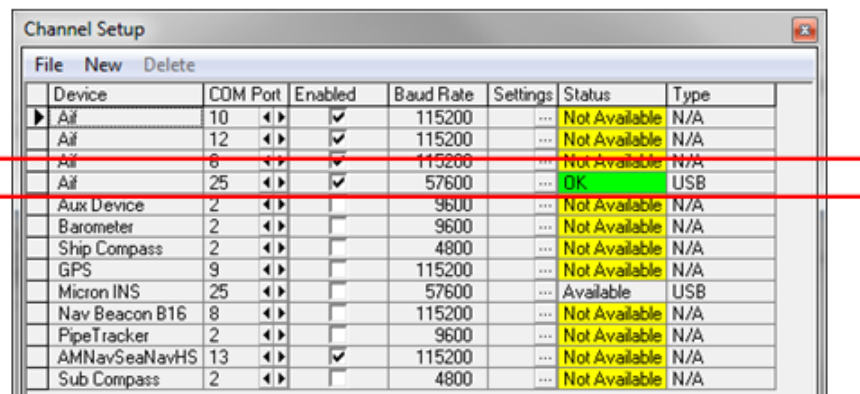
#### Caution

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




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

4.6.2. In Seanet Pro, select Utilities > Com Setup and set one of the Aif devices to the COM Port that the Micron Modem is connected to at a Baud Rate of 57600. Make sure that the Enabled checkbox for this port is checked.



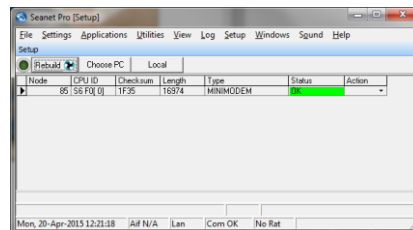


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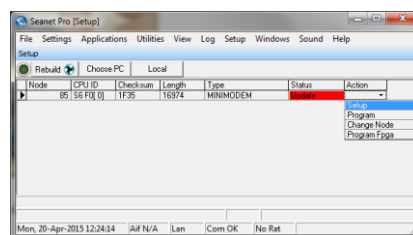
4.6.3. Apply power to the Micron Modem whilst holding a magnet to the side of the housing as shown:




4.6.4. In Seagnet Pro, select Applications > Setup. The 'MINIMODEM' type should now appear in the SeaNet Pro node table (Note: the status may be red, this indicates an update is required). If this does not happen try turning the magnet round to use the other pole and cycling the power (the magnetic sensor is uni-polar).



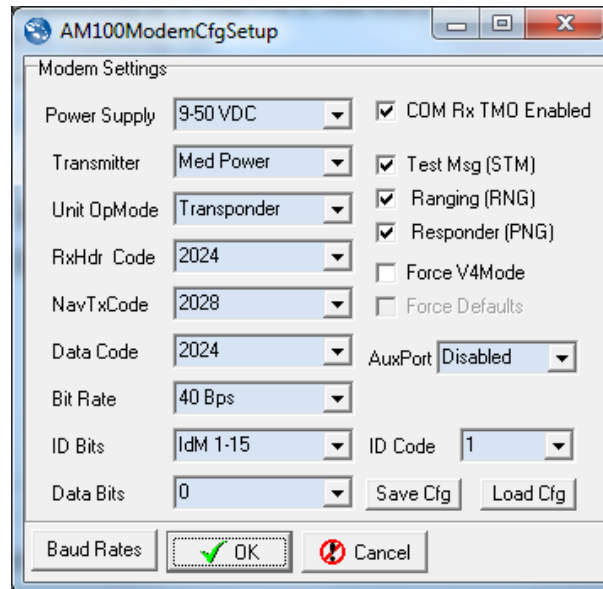
4.6.5. If the Status of the 'MINIMODEM' is red and displaying 'Update' then the Micron Modem .bin file needs updating. Select 'Program' from the drop down menu under Action to update this.



4.6.6. Once the programming is complete, cycle the power to the Micron Modem whilst holding a magnet to the side of the housing as in step 4.6.3. The Status of the 'MINIMODEM' should be green and displaying 'OK'.

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4.6.7. Select 'Setup' from the drop down menu under Action. The following dialog will now be displayed:



4.6.8. Set the ID Code as required for transponder mode. The Unit OpMode setting sets the Unit Type.

4.6.9. Click OK, and confirm that 'Node=85, Prog Cfg Done' appears on the status bar at the bottom of the SeaNet Pro window to confirm that the Micron Modem has been configured correctly.

4.6.10. Cycle the power to return the Micron Modem to normal operation. The Micron Modem will now disappear from the node table in Seagnet Pro Setup.

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## 5. Operation

### 5.1. Micron Modem

The Micron Modem will only accept RS232 commands on the Main Port when the unit is idle, i.e. not waiting for 4 characters to be accumulated in the input buffer.

By waiting >2s, the input buffer will automatically be flushed, guaranteeing that RS232 commands will be accepted. Alternatively this can be managed by keeping tight control over how many characters are sent to the unit and making sure it's a multiple of 4 before issuing an RS232 command. The Micron Modems will pad unused characters with NULL after the 2s timeout and transmit 4 characters acoustically.

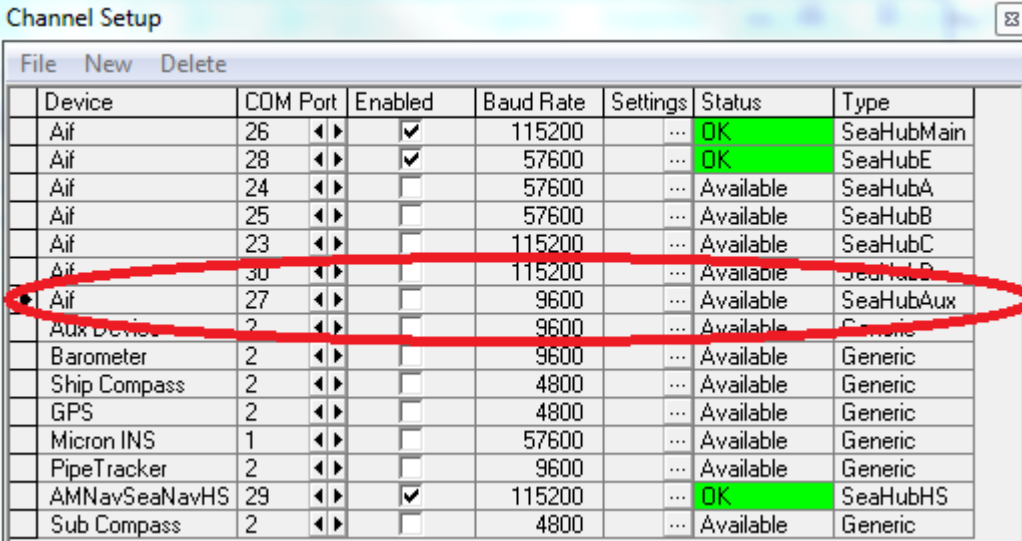
The supported command set in the Micron Modem is:

Command	Function
<code>%MS\n</code>	Sets the unit type as Modem Master (Surface).
<code>%SL\n</code>	Sets the unit type as Modem Slave (Subsea).
<code>%RE\n</code>	Sets the unit type as Responder.
<code>%TR\n</code>	Sets the unit type as Transponder.
<code>%VQ\n</code>	Queries the version and unit type. This is replied to with the version number and unit type e.g. <code>%VR09TR\n</code>

When changing the unit type, there is a delay of approximately 0.3s while the unit re-initialises and is able to operate in the new mode.

## 5.2. Micron Nav Hub / USBL Head

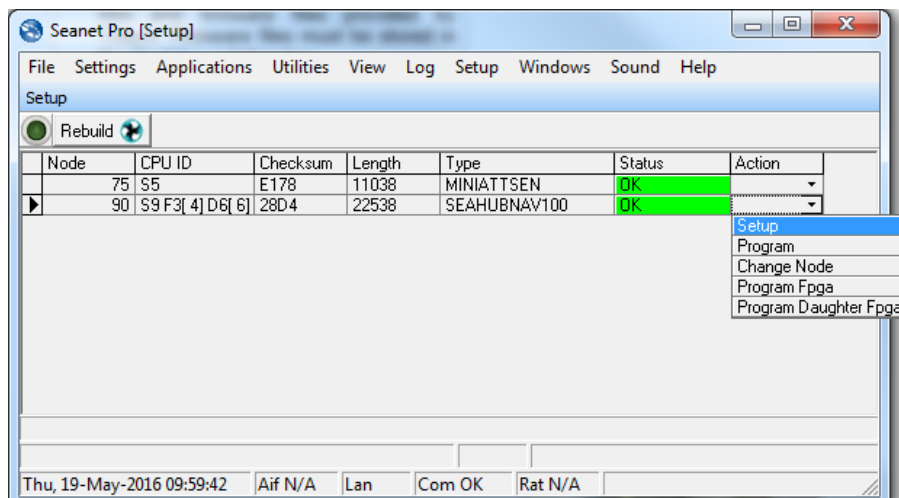
The Micron Nav Hub includes an Aux Port which is normally not used. This port can be viewed in Seanet Pro -> Utilities -> Com Setup, providing that an Aif device has previously been assigned to that COM port number:




Device	COM Port	Enabled	Baud Rate	Settings	Status	Type
Aif	26	<input checked="" type="checkbox"/>	115200	...	OK	SeaHubMain
Aif	28	<input checked="" type="checkbox"/>	57600	...	OK	SeaHubE
Aif	24	<input type="checkbox"/>	57600	...	Available	SeaHubA
Aif	25	<input type="checkbox"/>	57600	...	Available	SeaHubB
Aif	23	<input type="checkbox"/>	115200	...	Available	SeaHubC
Aif	30	<input type="checkbox"/>	115200	...	Available	SeaHubD
Aif	27	<input type="checkbox"/>	9600	...	Available	SeaHubAux
Aux Device	2	<input type="checkbox"/>	9600	...	Available	Generic
Barometer	2	<input type="checkbox"/>	9600	...	Available	Generic
Ship Compass	2	<input type="checkbox"/>	4800	...	Available	Generic
GPS	2	<input type="checkbox"/>	4800	...	Available	Generic
Micron INS	1	<input type="checkbox"/>	57600	...	Available	Generic
PipeTracker	2	<input type="checkbox"/>	9600	...	Available	Generic
AMNavSeaNavHS	29	<input checked="" type="checkbox"/>	115200	...	OK	SeaHubHS
Sub Compass	2	<input type="checkbox"/>	4800	...	Available	Generic

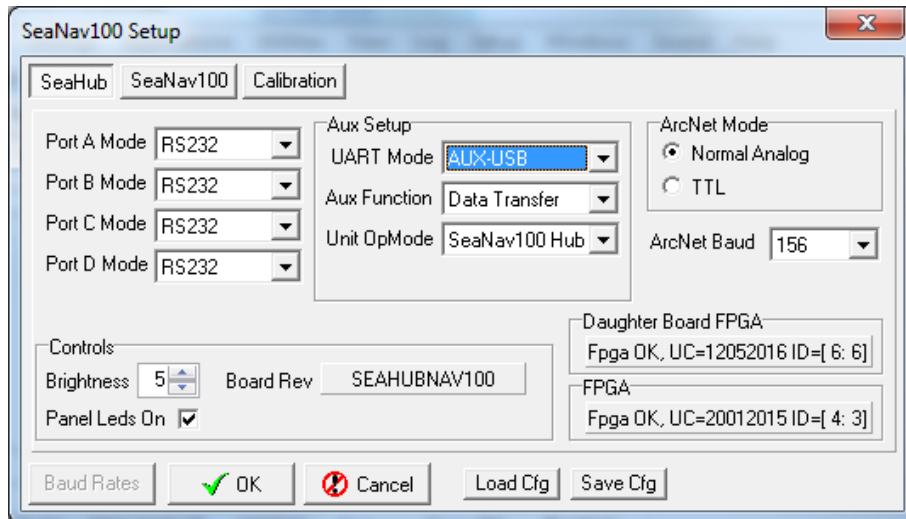
The Micron Nav Hub Aux Port is available to Windows as a generic COM port, and is the port which will be used for data transfer. In Seanet Pro -> Utilities -> Com Setup, make sure that the Enabled checkbox for this port is NOT checked; this will ensure that this port remains free for the user's application to connect to. The Baud rate to be used in the user's application is 9600 Baud.

The Micron Nav Hub must now be configured to set up data transfer. In Seanet Pro -> Applications -> Setup, select 'Setup' from the drop down menu under Action for the SEAHUBNAV100 (Node 90):



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The following dialog will now be displayed:



In the Aux Setup section, select UART Mode **AUX-USB**, and Aux Function **Data Transfer**. Note that this will disable the RAT (Remote Access Terminal) port on the front of the Micron Nav Hub, since the internal comms channel is reassigned to support Data Transfer.

The Unit OpMode setting sets the Unit Type. If **Surface Modem** or **Subsea Modem** are selected, then any attempted ping commands from the Seonet Pro Nav Application, or indeed the user's own application using the Micron Nav DLL, will be ignored.

Click OK to save the settings to the Micron Nav Hub. There will be a delay of a few seconds while the Micron Nav Hub re-initialises with the new settings.

Note that these settings are stored in the Micron Nav Hub, and will move with the hardware rather than with the PC running the Seonet Pro software.

The supported command set on the Aux Port for the Micron Nav Hub / USBL Head is:

Command	Function
<code>%NH\n</code>	Sets the unit type as Micron Nav Hub.
<code>%MS\n</code>	Sets the unit type as Modem Master (Surface).
<code>%SL\n</code>	Sets the unit type as Modem Slave (Subsea).
<code>%VQ\n</code>	Queries the version and unit type. This is replied to with the version number and unit type e.g. <code>%VR10NH\n</code>

Note that the modem special commands 'png' & 'rng' are not supported in the Micron Nav Hub / USBL Head.