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MiniPod Receiver

Operation Manual

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Revision History

Issue	Change No.	Reason for change	Date
1	n/a	First Issue	09/05/2019
2	2462	Addition of GPS Update Rate	22/12/2020
3	2571	New protocol release (V2.1.0.0)	08/03/2022
4	2738	RTK update full RTCM support (V2.2.1.0). BCN-201G Support	13/04/2023

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Thank you for choosing applied acoustics ltd as one of your equipment suppliers. We hope you experience many years of reliable operational use from our products.

modulus technology ltd carries out all technical support, servicing and repairs. If you have any technical issues with our products please contact the modulus technology team:

Tel: +44 (0)1493 416452

Email: techsupport@modulustechnology.com

Web: https://www.aaetechnologiesgroup.com/modulus-technology/

applied acoustic engineering Ltd has made every effort to ensure that the information contained in this manual is correct at time of print. However our policy of continual product improvement means that we cannot assume liability for any errors which may occur.

These written instructions must be followed fully for reliable and safe operation of the equipment that this manual refers to. applied acoustic engineering Ltd cannot be held responsible for any issues arising from the improper use or maintenance of equipment referred to in this manual or failure of the operator to adhere to the instructions laid out in this manual. The user must be familiar with the contents of this manual before use or operation.

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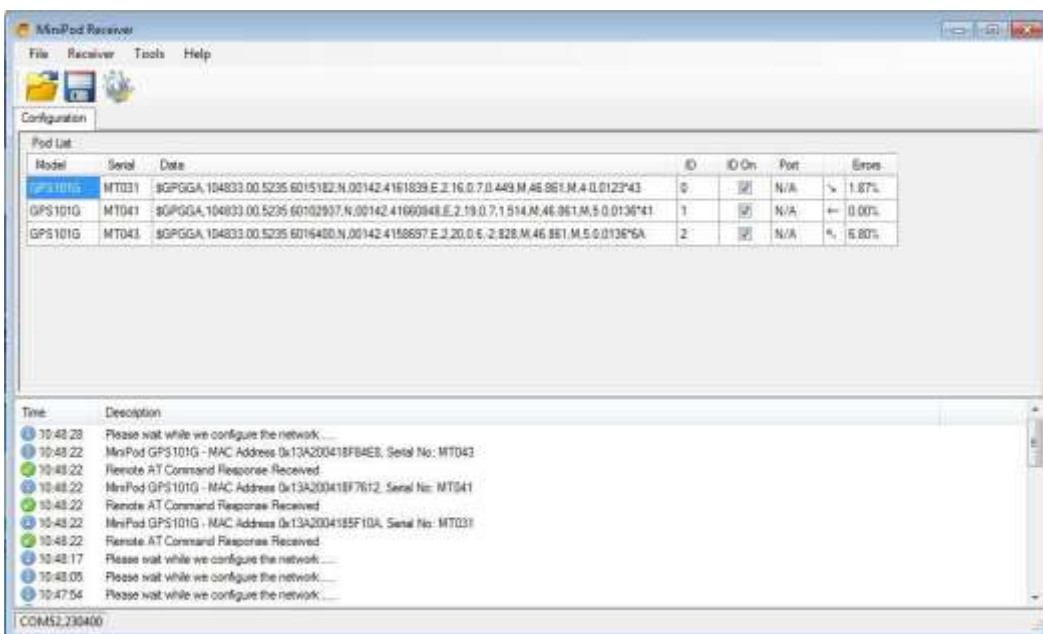## Introduction to the MiniPod Receiver

Overview

The MiniPod Receiver is a combined hardware and software solution to receive GNSS data from RF enabled MiniPod(s) and to send RTK corrections to the MiniPod for precise GNSS positioning.

MiniPod Receiver (RFR-101G)

MiniPod 101G

Mini Pod Receiver Software
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The MiniPod Receiver software, connected via a USB interface to a RFR-101G, receives the RF transmissions from connected MiniPod(s) and data sensors within or connected to the MiniPod. The windows based, MiniPod Receiver software, is used to display any received GNSS and AHRS data, this data can then be fed, either via Ethernet or serial interface, to the client navigation/ logging application.

If multiple MiniPod's are used, the output from each MiniPod can be prefixed with a unique numerical identifier to enable identification of the data or split across multiple serial outputs.

The system supports differential corrections, received via a PC serial port from an external source. These are then sent to each connected MiniPod to improve position accuracy via the RF network. The differential corrections may be input in either RTCM or CMR format.

Installation Instructions

Packing List

1. MiniPod RF Receiver [RFR-101G-7000]
2. USB 2.0 Cable Assembly [ELD050194]
3. MiniPod RF Receiver Cable, located inside lid. [RFR-101G-4000]
4. MiniPod RF Directional High Gain Antenna [EMD050040]
5. MiniPod RF Omni-directional Antenna [EMD050051]
6. MiniPod Flash Drive [SFT-MINIPOD-6006]
7. Antenna mounting hardware

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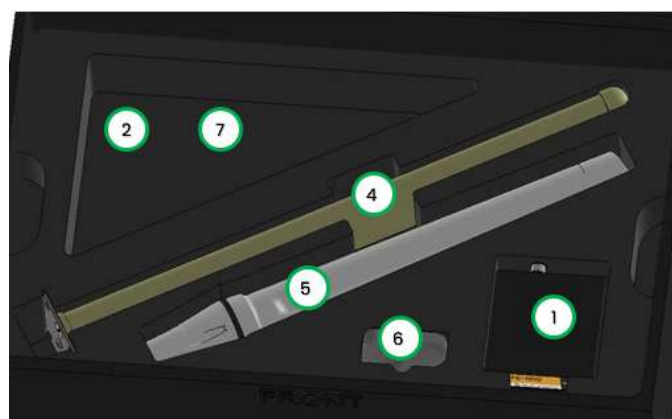
RFR-101G Receiver Connections

Power LED

RF Antenna
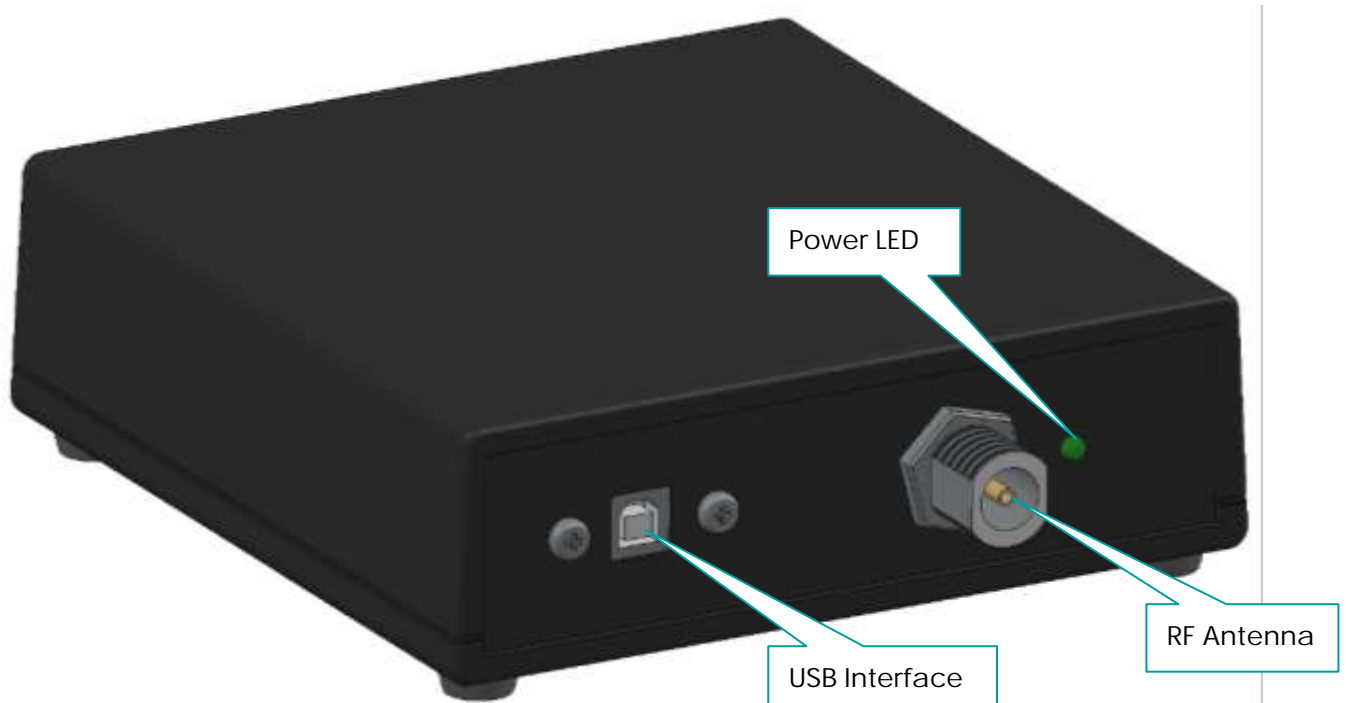
USB Interface

The RFR receiver should be connected to the computer running the application by the USB interface, once properly connected the Power LED will illuminate. The RF receiver cable RFR-101G-4000 should have one end connected to the RFR Box and the other should be connected to the desired antenna.

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Positioning of RF antenna

Connect the selected antenna, dependent on application to the RFR-101G via the RF Receiver Cable.

The RF antenna should be mounted at the highest point of the vessel, as practical to do so, and face towards the target with an unobstructed line of sight. Objects around the antenna may cause interference with the signals and result in errors.

It may be necessary to tilt the antenna towards the MiniPod's for optimum performance. Other commercial Wi-Fi antennas are available and can be used with our system however the antenna's supplied should be adequate for the majority of setups.

Please refer to the appendix for the antenna beam plots as supplied standard.

Ensure the MiniPod BCN-101G internal antenna is in alignment with directional RFR receiver antenna

MiniPod Alignment

The MiniPod(s) must be installed with the antenna label (shown below) pointing towards the RF Antenna to ensure reliable transmission of RF data.

Please see the MiniPod manual for further information BCN-101G-8002

Software Installation

Prior to installing the software on the Windows PC, please connect the RFR-101G into a USB port of the PC and then wait for windows to install the required driver. Once installed the device will be shown in the windows device manager as a 'USB Serial Port' (FTDI driver)
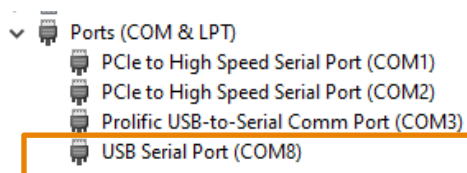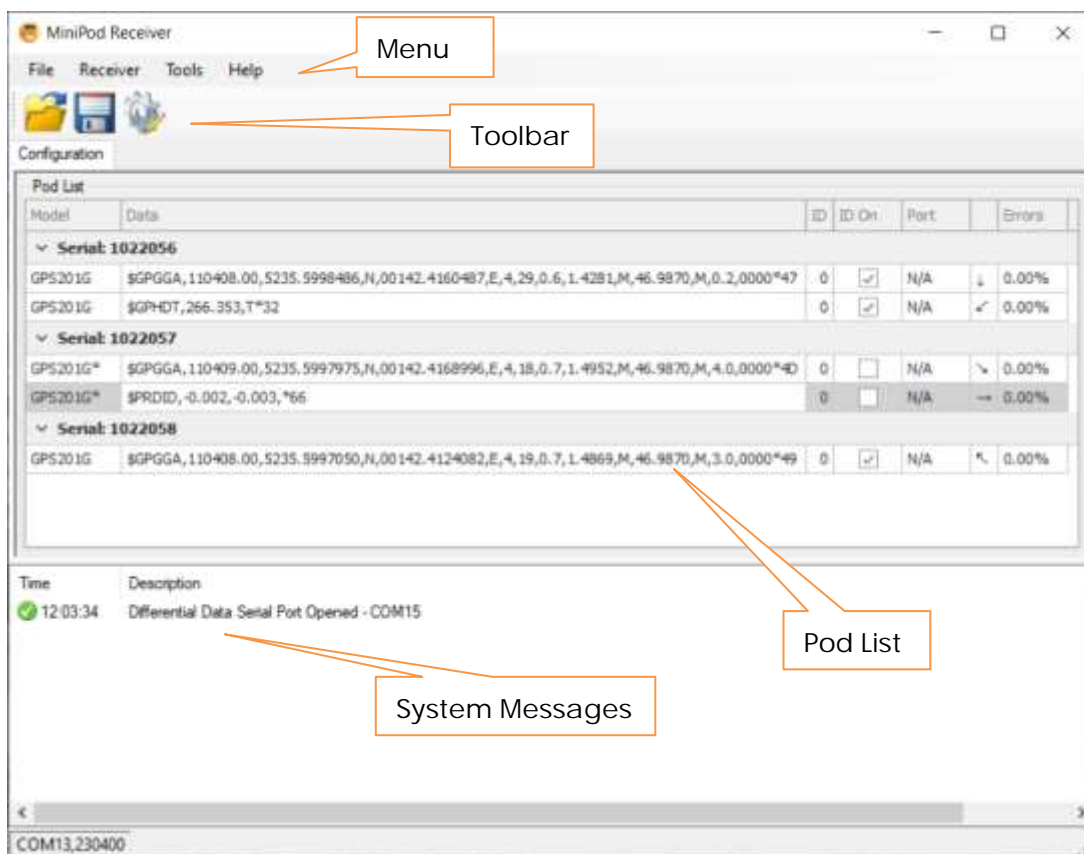
Install the 'MiniPod Receiver' software by running the 'Setup.exe' package supplied

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Software Operation

Main Display

The main display consists of the menu, a toolbar, a pod list area and a system message area.

The menu will allow you to navigate round the application for added options and functionality.

The toolbar has links to open a configuration, save the configuration and to change the individual MiniPod settings.

The Pod List will display all connected MiniPod's on a network we recommend a limit of 8 MiniPod's should be connected on any 1 network however this is dependent on data update rates, number of data strings and corrections being sent as there is a limited bandwidth for the wireless.

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All system messages will be displayed in a window timestamped this should be monitored for any errors that may occur.

Initial Configuration

When the software is run for the first time the following screen will be displayed
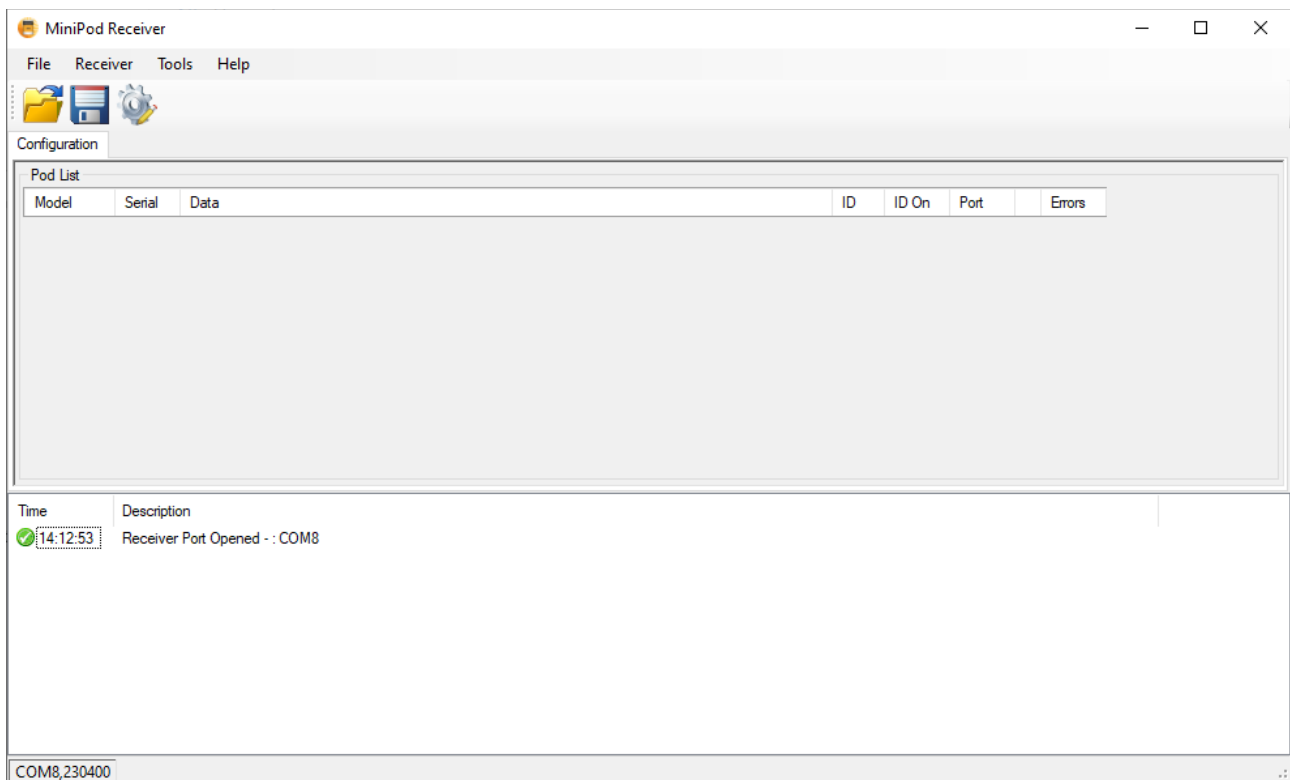
The software will continually search for MiniPod's that are connected to the same network as the RFR-101G. When found each MiniPod will be displayed.

The default network channel is 12. This can be changed in the options window

Once all required MiniPod's have been connected, the Pod List will show the data received from each pod, however the Model Number and Serial Number data for each MiniPod will be blank (as shown below).

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Pod List						
Model	Serial	Data	ID	ID On	Port	Errors
		$GPGGA,104527.98,5235.5996055,N,00142.4294336,E,1,05,2.8,114.829,M,46.861,M,,*65	0	☑	N/A	↓ 0.00%
		$GPGGA,104528.00,5235.60180034,N,00142.41646934,E,2,07,1.6,6.276,M,46.861,M,4.0,0136*42	1	☑	N/A	↓ 0.00%
		$GPGGA,104528.00,5235.6012340,N,00142.4163317,E,2,09,1.4,-11.335,M,46.861,M,4.0,0136*53	2	☑	N/A	↓ 0.00%

To get the Model Number and Serial Number of each connected MiniPod, select 'Get ID's' from the Tools menu. Please note you may have to repeat the Get ID's process more than once to get data from all connected pods, depending on data rates

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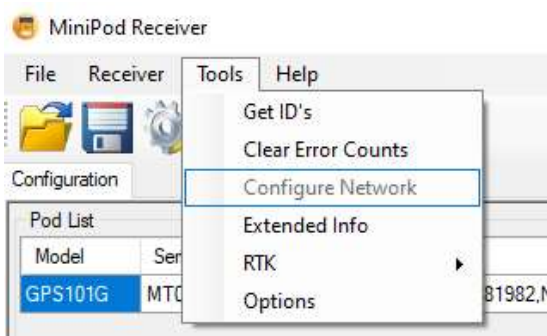
When this process is complete the Pod List should look similar to that shown below
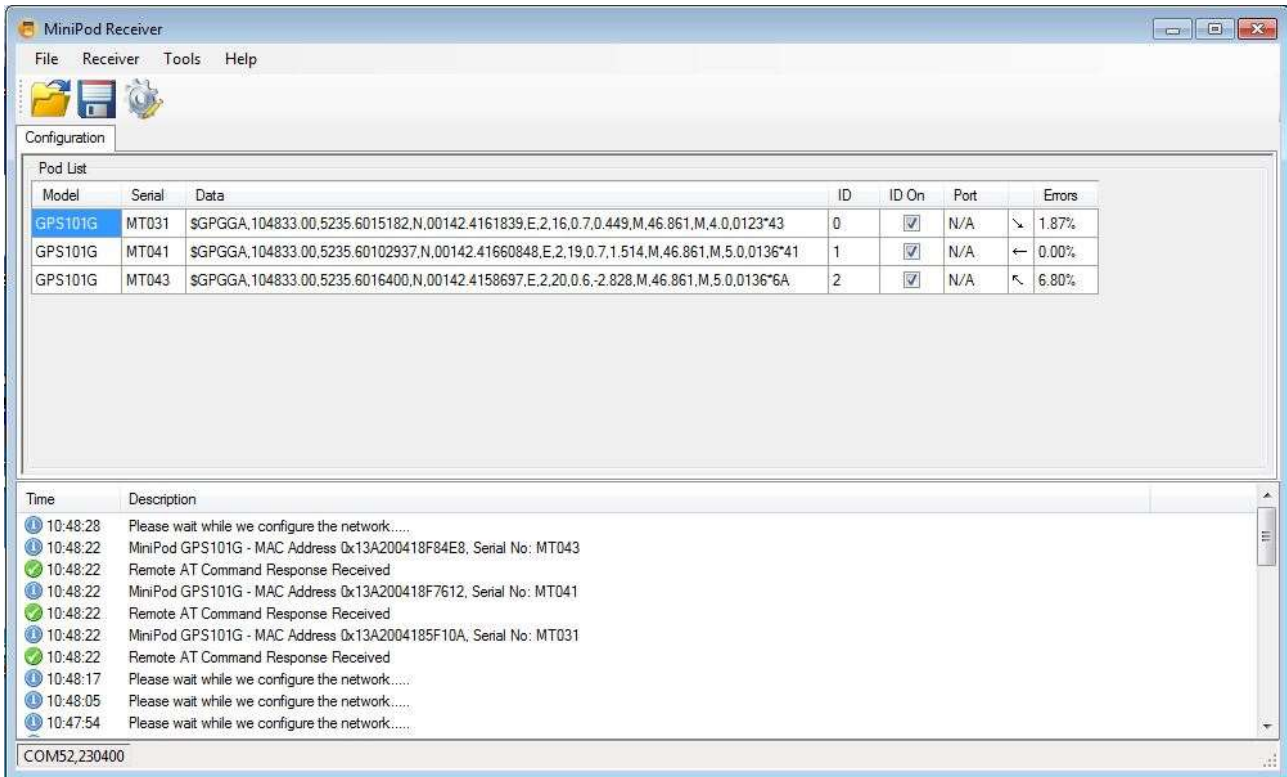
i The software must be restarted after initial configuration to ensure correct operation

Once the above process has completed, the software must be shut down and then restarted to ensure all connected pods are set up correctly for reliable operation.

The MiniPod receiver software will go through a network configuration process you should not make changes until this is complete.

The following message will be displayed in the system messages.

✔ 14:18:04   MiniPod network configuration completed

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Normal Operation

Each time the software is launched, the system will allow any connected pods to stabilise RF data transmissions, which may initially result in checksum errors. Once all the connected pods have stabilised, the network will be configured. Information will be displayed in the message window to confirm this.

Pod List

This pod list area will display data and statistics from any pod currently connected to the network. The following information is displayed for each connected MiniPod.

Model

The model number of the connected MiniPod.

Serial

The serial number of the connected MiniPod.

Data

The data message(s) received from the connected MiniPod.

ID

The ID number that will be prefixed to the selected MiniPod's data, sent out of the serial port and/or over ethernet

ID On

If selected, the ID will be prefixed to the output.

Diff. On

If selected, and differential corrections are being received, the corrections will be transmitted to the seleced MiniPod's GPS receiver to improve positional accuracy.

Port

The name of the output serial port that the selected pods data will be sent to. The data output baud rate is fixed the same across all ports and can be configured from the options menu
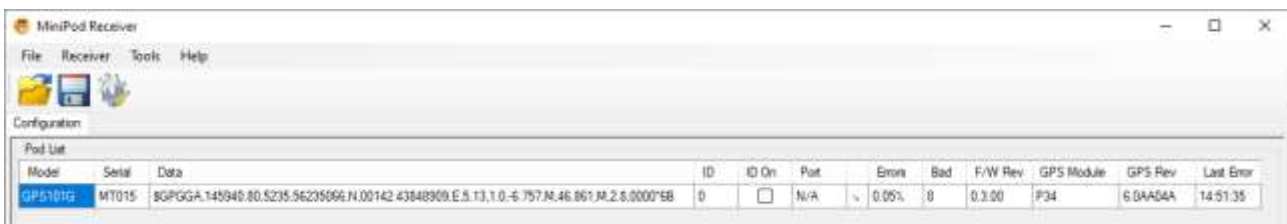
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Errors

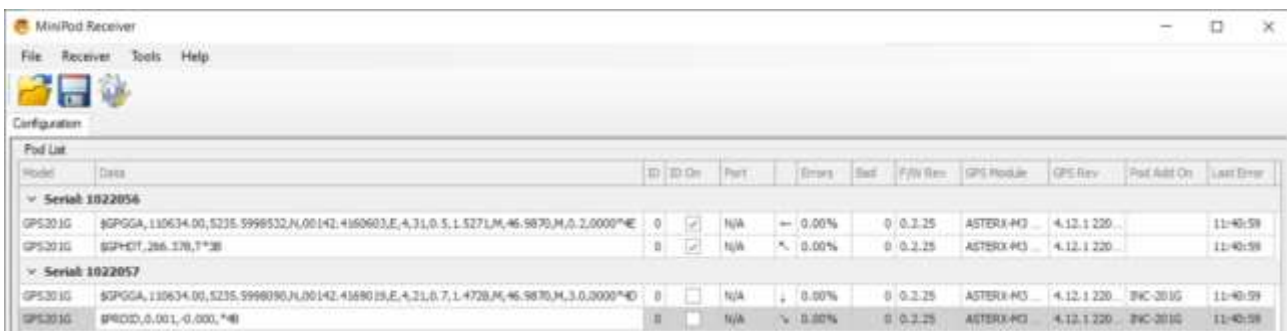The percentage of data messages received from the connected MiniPod that were invalid.

Extended Info

The Pod List information can display extra information, by selecting 'Extended Info' from the 'Tools' menu. If selected, three extra columns will be displayed for each connected pod.

101G

201G with Inclinometer I/P add on.

Note: Add on only interrogated at RFR-101G initialisation, therefore re-start software to initialise Inclinometer add on powered on with RFR-101G software running.

Bad

A count of invalid messages received from each connected MiniPod.

F/W Rev

The firmware revision running on the connected MiniPod.

GPS Module

The fitted module model number will be displayed

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GPS REV

The current installed firmware on the GPS module will be displayed.

Last Error

The time of the last invalid message received from the connected MiniPod.

Modifying MiniPod Configuration

To configure output options, 'double click' on the required MiniPod in the Pod List.
Alternatively, highlight the MiniPod in the pod list and press the 'Edit Selected Pod'
on the toolbar.
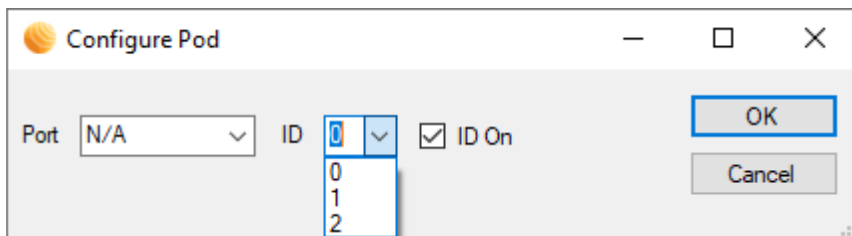
The GPS data received from each MiniPod may be sent out of either the same, or
differentserial ports, as specified by the user. If the same serial port is specified for more
than one pod, an ID (selected by the user) may be prefixed to the GPS data transmitted.
This enables identification of the MiniPod that the GPS data originated from. The ID is
also prefixed to the UDP data transmitted.
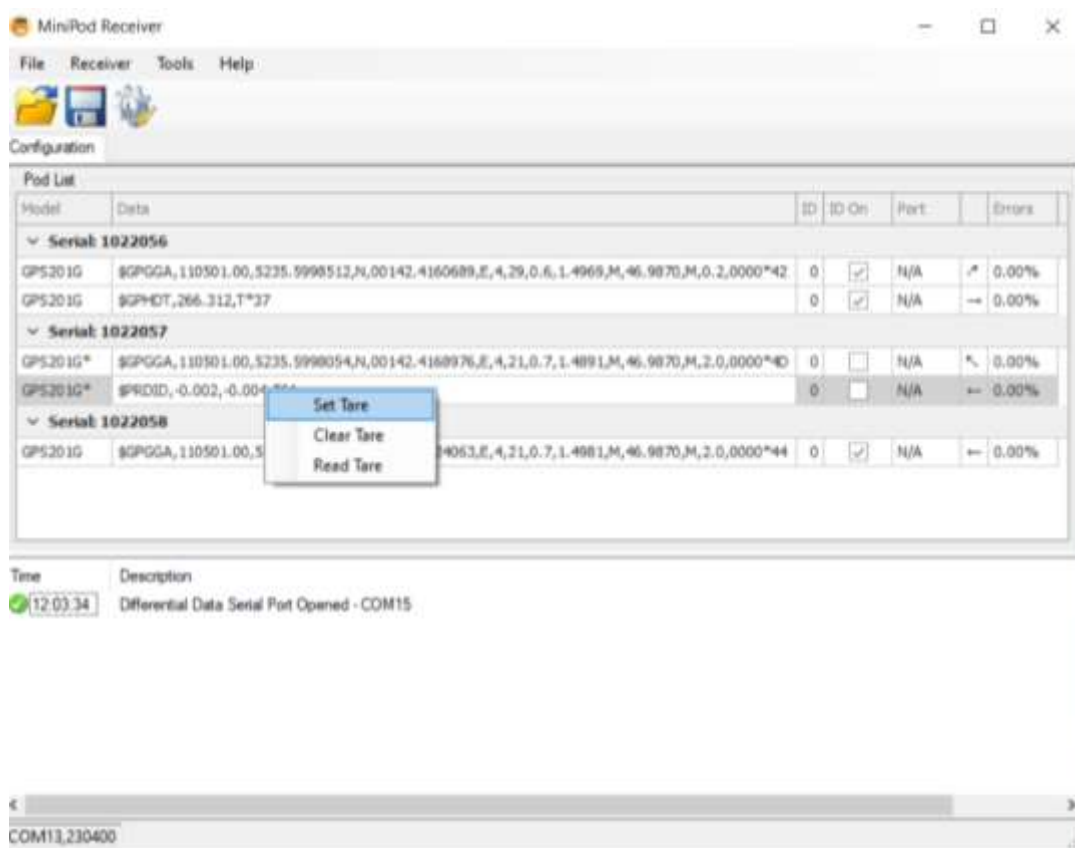

System Message Area

The system will display various informational warning and errors messages in this area.
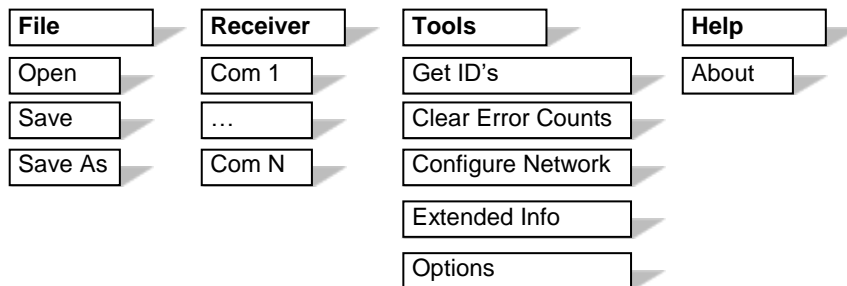
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BCN-201G INC Tare Function

The BNC-201G allows the user to connect a perpiheral, the INC-201G inclinometer supports a remote tare function to allow the user to soft reset the values.

Right click on the INC-201G to enable the context menu –

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Menu

File	Receiver	Tools	Help
Open	Com 1	Get ID's	About
Save	…	Clear Error Counts	
Save As	Com N	Configure Network	
		Extended Info	
		Options	

File

The pod configuration for the currently connected pods can be saved to a file. The saved settings include ID, ID On, Diff. On and Output Port. This saved file can then be recalled for future operations.

Receiver

The serial port that the receiver is connected to can be selected. However, the correct receiver serial port should be automatically selected on start up.

Tools

- Get ID will call all the identification details from the connected mini pods and populate the Pod list.
- Clear Error counts will reset the error details located in the pod list.
- Configure Network will set the relevant delays for the MiniPod(s) that are connected.
- Extended info toggles the extra pod list column on/off
- Options will take you into the program options menu as explained on the following page.

Help

About will bring up the following menu which shows the current software version of the application followed by the serial number of the RFR-101G and Network Port that it is broadcasting across (if enabled). The link at the bottom will take you to the applied acoustic website where contact details for help and support can be found.

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About MiniPod Receiver   ✕

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MiniPod Receiver
Copyright © Applied Acoustic Engineering Ltd 2018 - 2022
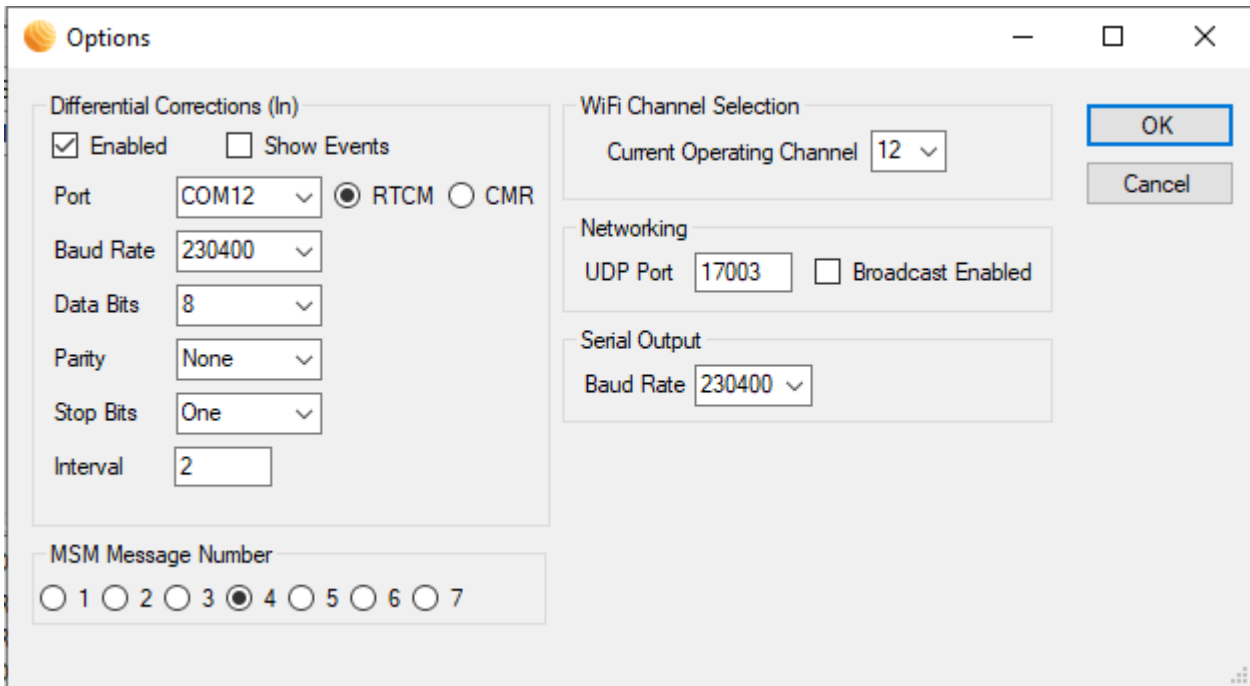
Software Version
V2.2.1.0

Configuration
Serial No : 0101010
Network Port : 17003

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Options

Differential Corrections

The RFR-101G is able to send the MiniPod(s) differential corrections in RTCM or CMR format to improve their positional accuracy.

Comport settings can be amended to reflect which port differential corrections are being received on the PC. Select the correct format and check the enabled box to enable transmission of corrections.

When Show Events is ticked the log window will display the RTCM message sent as below.

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Within the GGA message the positional quality can be monitored to provide feedback that the corrections are being applied by the MiniPod(s).

5 –   indicates RTK Float and corrections are being applied, standard 101G accuracy.

4 –   indicates RTK Int and corrections are applied with the position converged.
(101G RTK Option required, 201G Standard.)

2 –   SBAS corrections.

1 –   standalone GPS.
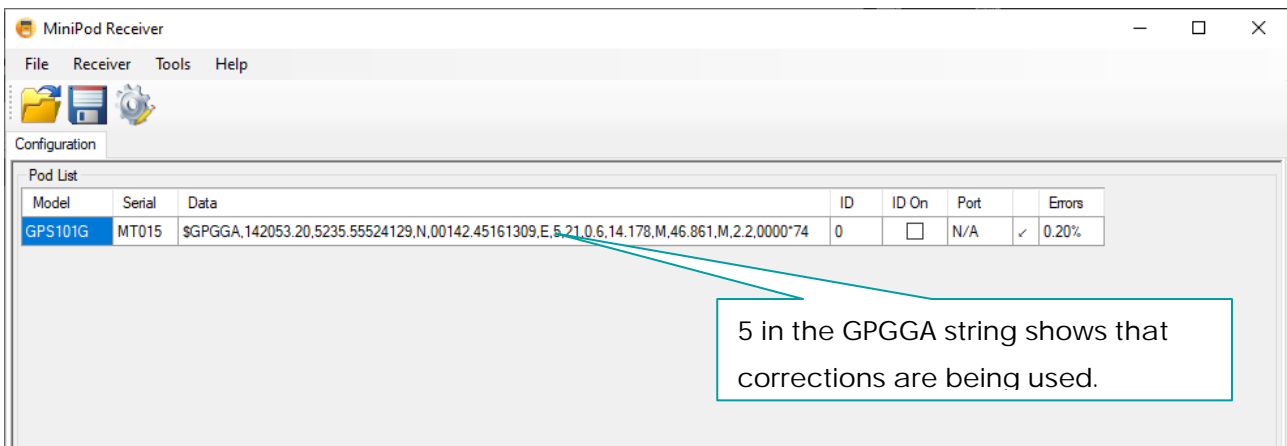
RTK Message Filter Options

In addition to setting the MSM message type / group to send to the MiniPods the user can select individual RTCM message IDs to filter out and not send to the pods using the Ignore list function and Send All list functions. When using these functions enable show events to monitor the messages and status. The user should only disable messages not required for the local area.

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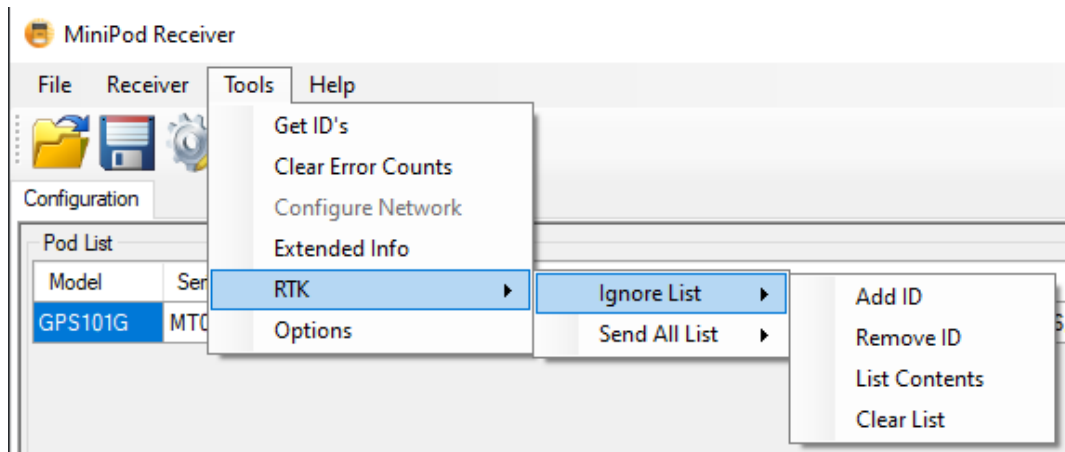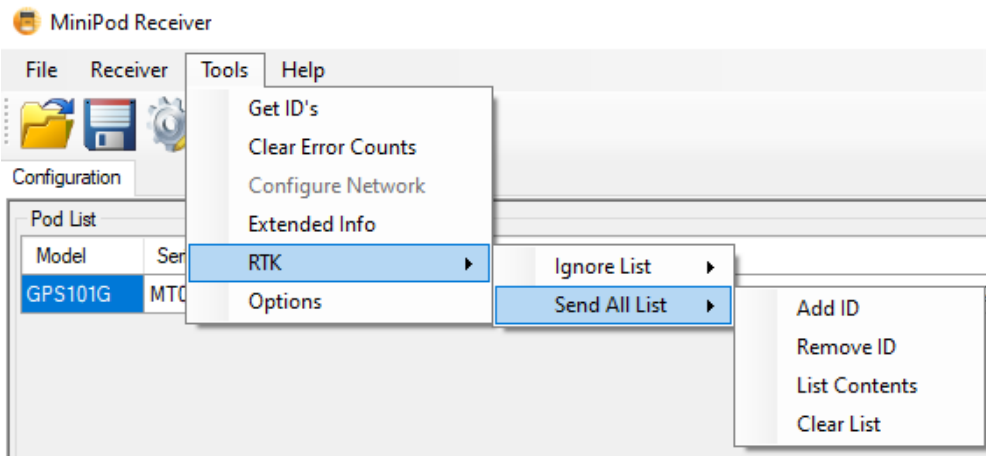
Adding a message to the ignore list:
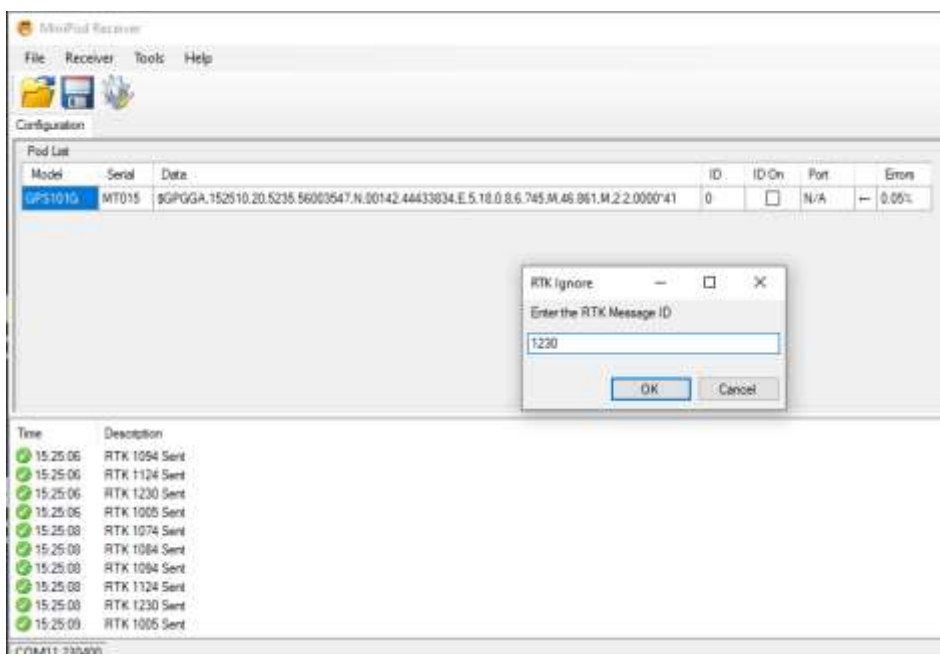
Events show message 1230 not sent to MiniPod(s).

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WiFi Channel Selection

The WiFi channel selection box will selected as channel 12 default this may be amended in order to change the frequency band of operation depending on the environment. The below table shows the frequencies of operation;

Decimal	Hex	Frequency	SC mask	WiFi Conflict
11	0x0B	2.405GHz	0x0001	Overlaps Ch 1
12	0x0C	2.410GHz	0x0002	Overlaps Ch 1
13	0x0D	2.415GHz	0x0004	Overlaps Ch 1
14	0x0E	2.420GHz	0x0008	Overlaps Ch 1
15	0x0F	2.425GHz	0x0010	Overlaps Ch 6
16	0x10	2.430GHz	0x0020	Overlaps Ch 6
17	0x11	2.435GHz	0x0040	Overlaps Ch 6
18	0x12	2.440GHz	0x0080	Overlaps Ch 6
19	0x13	2.445GHz	0x0100	Overlaps Ch 6
20	0x14	2.450GHz	0x0200	Overlaps Ch 11
21	0x15	2.455GHz	0x0400	Overlaps Ch 11
22	0x16	2.460GHz	0x0800	Overlaps Ch 11
23	0x17	2.465GHz	0x1000	Overlaps Ch 11
24	0x18	2.470GHz	0x2000	Overlaps Ch 11
25	0x19	2.475GHz	0x4000	No Conflict
26	0x1A	2.480GHz	0x8000	No Conflict

Networking

This section enables the toggling on/off of broadcasting across Ethernet as well as allowing the UDP Port to be changed.
The checkbox must be ticked to enable broadcasting.

Serial Output

The baud rate for the serial output can be selected here, please make sure that the baud rate is suitable for the data speed.

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End of Life Recycling / Disposal

Within the UK, all electronic components and batteries must be taken for separate collection at the end of their working life under the Waste Electrical and Electronic Equipment (WEEE) Regulations 2013 and Waste Batteries and Accumulators Regulations 2009 respectively. The AAE Technologies Ltd group (AAE Tg) of companies as UK manufacturers will responsibly dispose of any returned end of life AAE Tg components/batteries through registered/approved recycling schemes. In order to prevent uncontrolled waste disposal and promote recycling, please contact Technical Support for a RMA number and return any end of life items (if safe to do so) carriage paid by the sender to our UK head office.

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Applied Acoustic Engineering Limited is a leading company in the design and manufacture of a wide range of subsea navigation and positioning products, and marine seismic survey equipment.

The extensive product range includes the innovative USBL tracking system, Easytrak, a variety of positioning and release beacons and seismic sub-bottom profiling equipment for offshore geotechnical and seabed analysis.

All products use acoustics, underwater sound waves, in location, positioning, navigation and data acquisition applications.

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