



MiniPod Receiver Operation Manual



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Revision History

Issue	Change No.	Reason for change	Date
1		First Issue	09/05/19
2	2462	Addition of GPS Update Rate	22/12/20

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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.

1. Introduction to the MiniPod Receiver

Overview

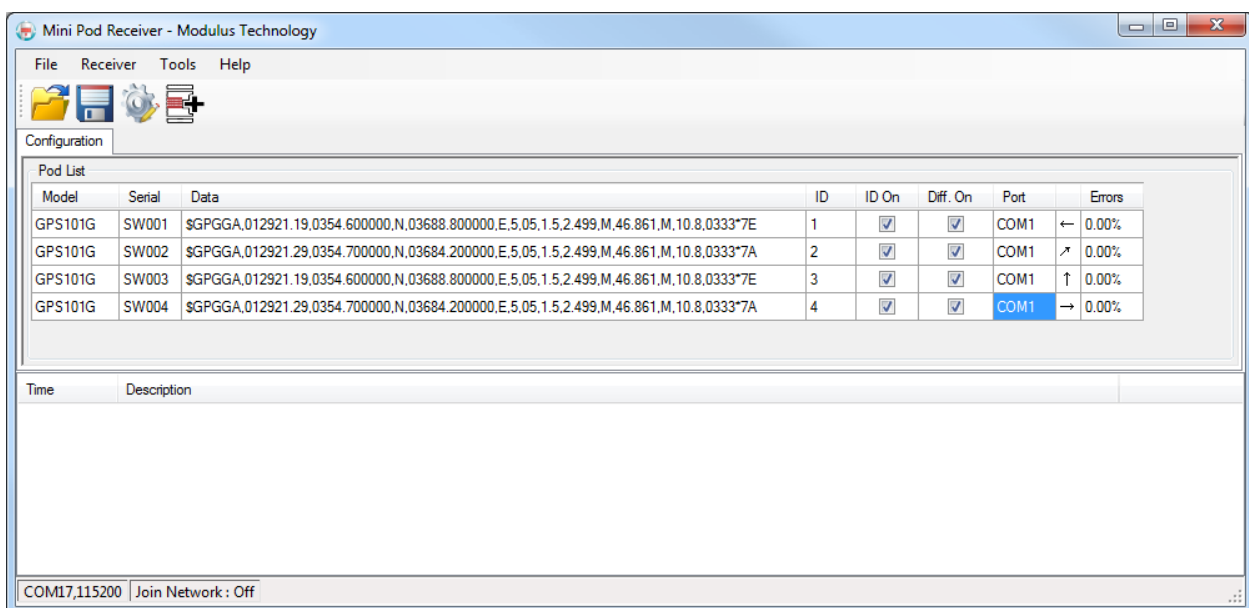
The MiniPod Receiver is a hardware and software solution to receive GPS data from RF enabled MiniPods.



MiniPod Receiver (RFR-101G)



MiniPod 101G



Mini Pod Receiver Software

The MiniPod Receiver software, connected via a USB interface to a RFR-101G, receives the RF transmissions from connected MiniPods and the GPS receiver within the MiniPod. The windows based, MiniPod Receiver software, is used to display any received GPS data, this data can then be fed, either via Ethernet or serial interface, to the client navigation / logging application.

If multiple MiniPods are used, the output from each MiniPod can be prefixed with a unique numerical identifier to enable identification of the GPS data.

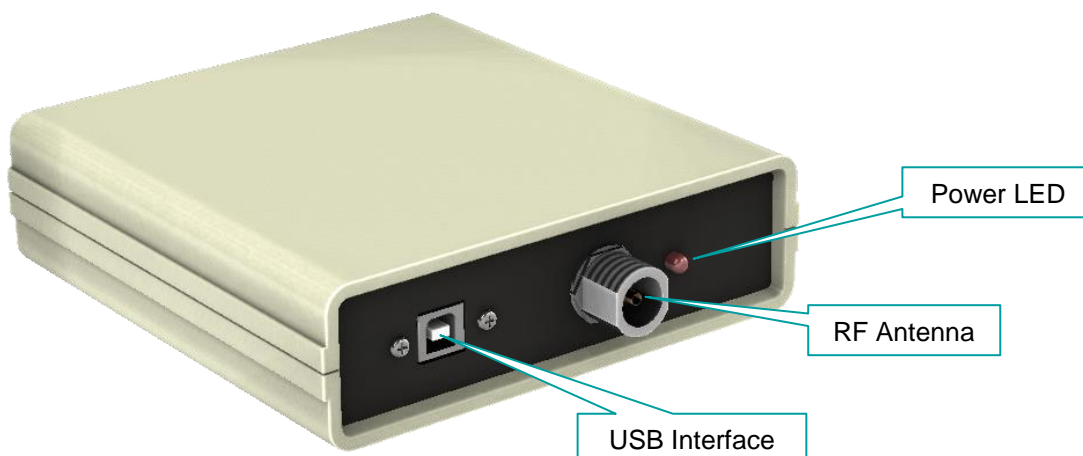
The system supports differential corrections (received via a PC serial port). These are then sent to each connected MiniPod to improve position accuracy. The differential corrections may be input in either RTCM V3 or CMR format.

2. Installation Instructions

Packing List

- MiniPod RF Receiver [RFR-101G-7000]
- USB 2.0 Cable Assembly [ELD050194]
- MiniPod RF Receiver Cable [RFR-101G-4000]
- MiniPod RF High Gain Antenna [EMD050040]
- MiniPod Software Support Disc [BCN-101G-8006]

Installation / Alignment



Positioning of RF antenna

Connect the High Gain Antenna 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.



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

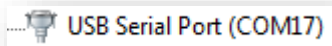
MiniPod Alignment

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



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)

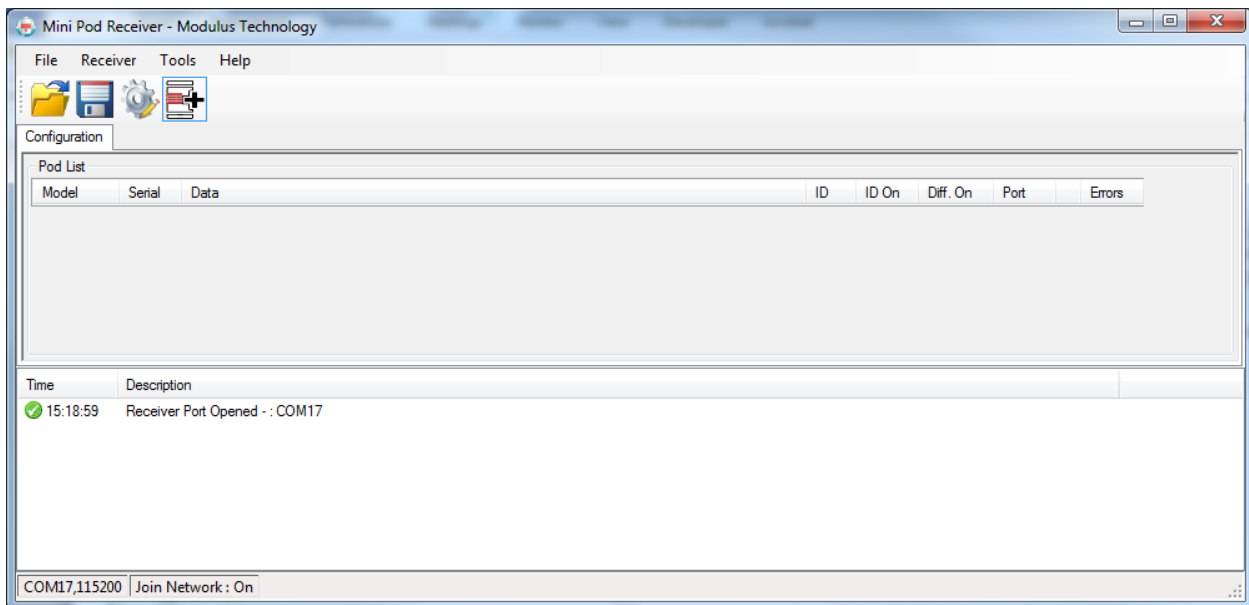


Install the 'MiniPod Receiver' software by running the 'Setup.exe' package supplied

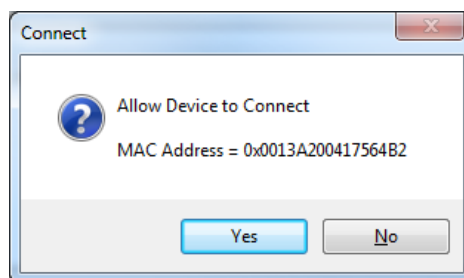
3. Software Operation

Initial Configuration

When the software is run for the first time the following screen will be displayed



At first run, no MiniPods are approved to connect to the receiver. Therefore, when a new MiniPod attempts to connect to the receiver, the following prompt will be displayed



If the MAC address displayed matches the MAC address (as printed on the MiniPod Label) of a MiniPod that you wish to receive data from then press 'Yes'. Once approved, this MiniPod will be added to an 'Approved' list. You will no longer be prompted when this MiniPod connects in the future.

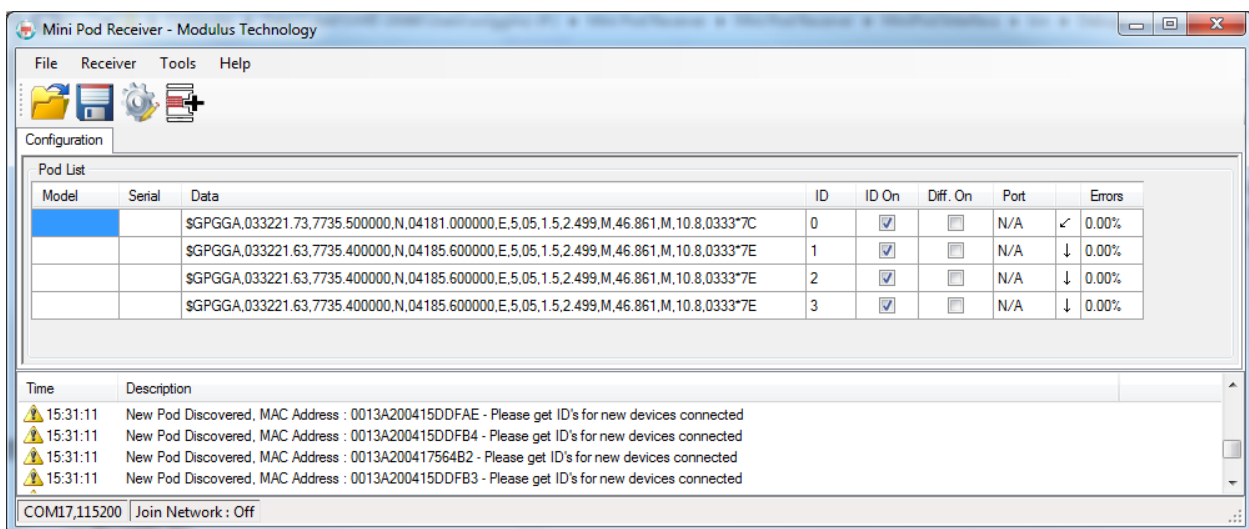
If you do not recognise the MAC address displayed then press 'No', this device will then be added to a 'Blocked' list. The MiniPod will be removed from the network if it attempts to reconnect in the future.

If not all the MiniPods connect press the 'Network Joining' button to allow other MiniPods to join the network, this will allow 60 seconds for any remaining MiniPods to Join the Network'.

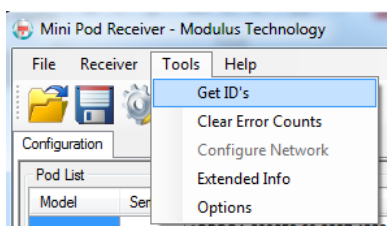


If all MiniPods have not connected after 3 attempts please check MiniPod Settings via RS232 and ensure RF communication is enabled.
 Refer to 'MiniPod GPS Receiver Operation Manual' [BCN-101G-8002]

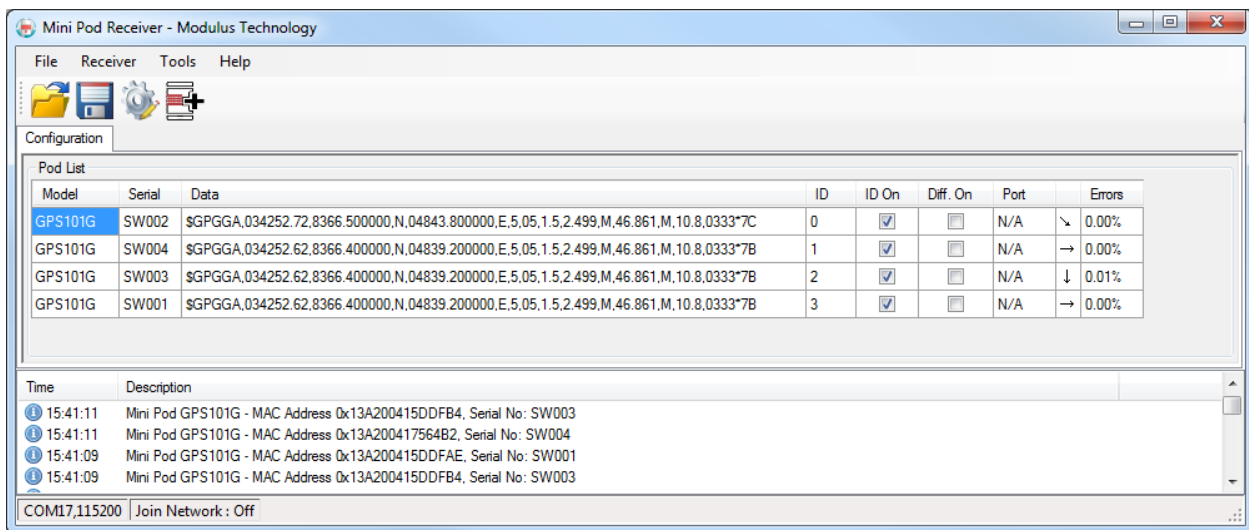
Once all required MiniPods have been connected, the Pod List will show the data received from each pod, however the Model Number and Serial Number data for each MiniPod will be blank (as shown below).



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.



When this process is complete the Pod List should look similar to that shown below



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.

After initial configuration, the system will not be configured to output any of the received GPS data.

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.

Main Display

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

The screenshot shows the 'Mini Pod Receiver - Modulus Technology' application window. It features a menu bar (File, Receiver, Tools, Help) and a toolbar with icons for file operations and configuration. The main area is divided into two sections: 'Pod List' and 'System Messages'.

Pod List

Model	Serial	Data	ID	ID On	Diff. On	Port	Errors
GPS101G	SW001	\$GPGGA,035559.02,9152.900000,N,01016.600000,E,5,05,1.5,2.499,M,46.861,M,10.8,0333*7D	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	N/A	→ 0.00%
GPS101G	SW002	\$GPGGA,035559.12,9153.000000,N,01021.200000,E,5,05,1.5,2.499,M,46.861,M,10.8,0333*74	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	N/A	→ 0.00%
GPS101G	SW003	\$GPGGA,035559.12,9153.000000,N,01021.200000,E,5,05,1.5,2.499,M,46.861,M,10.8,0333*74	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	N/A	↘ 0.00%
GPS101G	SW004	\$GPGGA,035559.12,9153.000000,N,01021.200000,E,5,05,1.5,2.499,M,46.861,M,10.8,0333*74	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	N/A	→ 0.00%

System Messages

Time	Description
15:49:56	Mini Pod network configuration completed
15:49:56	Please wait while we configure the Mini Pod network
15:49:55	Please wait while Mini Pods Stabilise
15:49:54	Please wait while Mini Pods Stabilise
15:49:53	Please wait while Mini Pods Stabilise
15:49:52	Please wait while Mini Pods Stabilise
15:49:51	Please wait while Mini Pods Stabilise
15:49:50	Please wait while Mini Pods Stabilise
15:49:49	Please wait while Mini Pods Stabilise
15:49:48	Please wait while Mini Pods Stabilise
15:49:47	Please wait while Mini Pods Stabilise
15:49:46	Please wait while Mini Pods Stabilise
15:49:45	Please wait while Mini Pods Stabilise
15:49:45	SW003 - Checksum Invalid
15:49:45	SW003 - Checksum Invalid
15:49:42	SW004 - Checksum Invalid

COM17,115200 Join Network : Off

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 GPS data message received from the connected MiniPod.

ID

The ID number that will be prefixed to the selected MiniPods 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 selected MiniPod's GPS receiver to improve positional accuracy.

Port

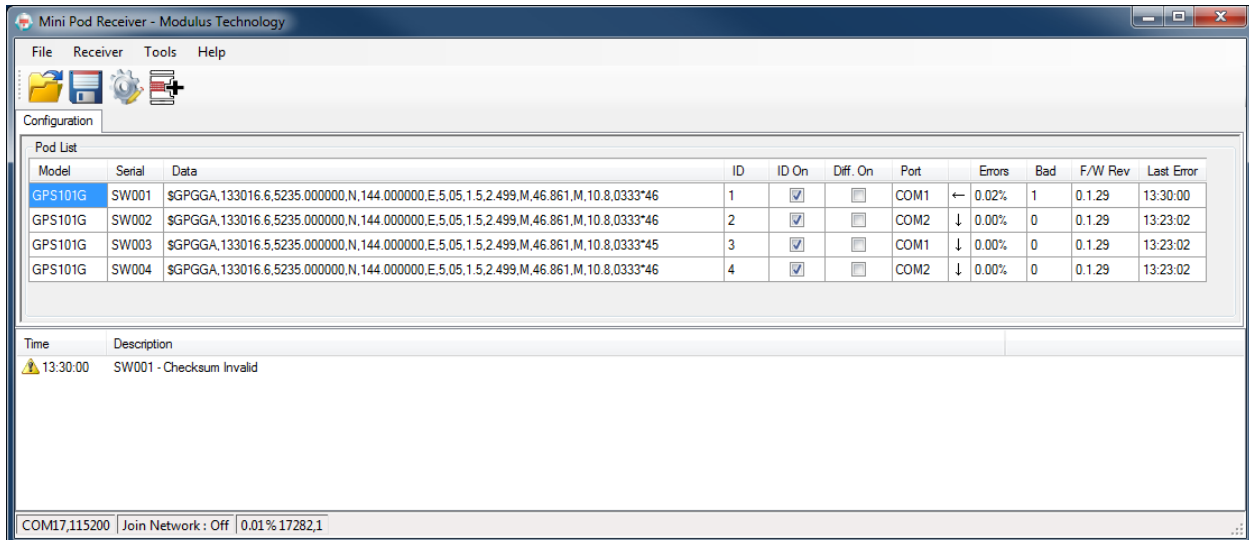
The name of the output serial port that the selected pods data will be sent to. The serial port communication speed is fixed at 115200,8,N,1

Errors

The percentage of GPS 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.



Bad

A count of invalid messages received from each connected MiniPod.

F/W Rev

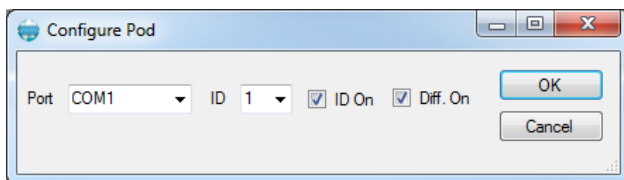
The firmware revision running on the connected MiniPod.

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

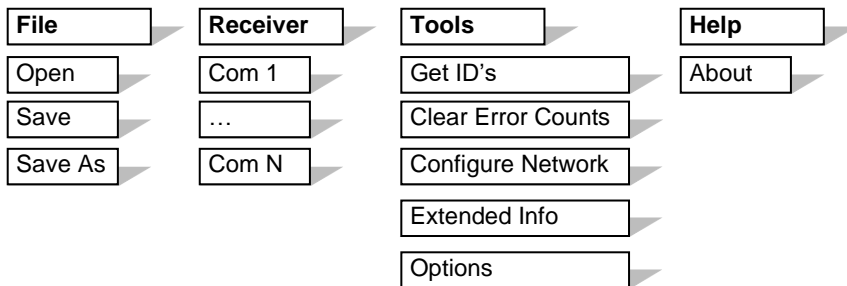


The GPS data received from each MiniPod may be sent out of either the same, or different serial ports, as specified by the user. If the same serial port is specified for more than one pod, an ID (selected by the user) may be prefixed to the GPS data transmitted. This enables identification of the MiniPod 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.

Menu



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

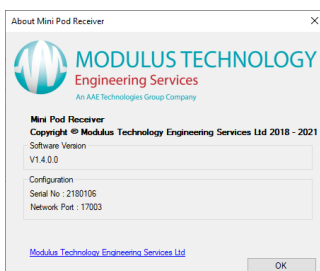
The serial port that the receiver is connected to can be selected. However, the correct receiver serial port should be automatically selected on start up.

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 Mini-Pods 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 Modulus Technology website where contact details for help and support can be found.



Program Options

Configure Serial Ports

Differential Corrections
☐ Enabled ☐ Show Events
 Port: COM1 ☒ RTCM ☐ CMR
 Baud Rate: 9600
 Data Bits: 8
 Parity: None
 Stop Bits: One

WiFi Channel Selection
 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☒ ☐
 Current Operating Channel: 25

Networking
 UDP Port: 17003 ☐ Broadcast Enabled

GPS Update Rate
☒ 10Hz ☐ 5Hz ☐ 1Hz

OK Cancel

Differential Corrections

The MiniPods are able to receive differential corrections as RTCM or CMR improving the accuracy of GPS position.

Under the section to the left, comport settings can be amended to reflect which port differential corrections are input on to the user's PC. The correct format must be selected and the enabled box checked. When Show Events is ticked you will get a screen similar to the below.

You must check 'Diff. On' on each MiniPod in order to use the corrections supplied.

Mini Pod Receiver - Modulus Technology

File Receiver Tools Help

Configuration

Pod List

Model	Serial	Data	ID	ID On	Diff. On	Port	Errors
GPS101G	MT029	\$GPGGA,101614.50,5235.573382,N,00142.450723,E,5,11,2.7,245,M,46.861,M,0.0,5.0333,45	0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	COM62	0.03%

E,5 in the GPGGA string shows that corrections are being used.

Time **Description**

- 11:16:14 RTCM 1012 Sent
- 11:16:14 RTCM 1004 Sent
- 11:16:12 RTCM 1012 Sent
- 11:16:12 RTCM 1004 Sent
- 11:16:10 RTCM 1012 Sent
- 11:16:10 RTCM 1004 Sent
- 11:16:09 RTCM 1005 Sent
- 11:16:08 RTCM 1012 Sent

COM81,115200 Join Network : Off

These messages will not show if 'Show Events' is left unchecked.

WiFi Channel Selection

The WiFi channel selection box will selected as channel 25 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

Note: Channel 25 is default due to being less likely to conflict with other devices.

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.

GPS Update Rate

Once the MiniPods have stabilised the GPS update rate can be set for all MiniPods by checking the corresponding frequency box. This will change the update rate wirelessly during operation.

4. 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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