NovAtel Application Suite
User Manual

NovAtel Application Suite User Manual

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Warranty

NovAtel Inc. warrants that its GNSS products are free from defects in materials and workmanship, subject to the conditions set forth on our web site: novatel.com/products/novatel-warranty-and-return-policies.

Return Instructions

To return products, refer to the instructions found at: novatel.com/products/novatel-warranty-and-return-policies.

Proprietary Notice

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Customer Support

NovAtel Knowledge Base

If you have a technical issue, visit the NovAtel Support page at novatel.com/support. Through the *Support* page, you can contact Customer Support, find papers and tutorials or download current manuals and the latest firmware.

Contact Information

Log a support request with NovAtel Customer Support using one of the following methods:

Log a Case and Search Knowledge:

Website: novatel.com/support

Log a Case, Search Knowledge and View Your Case History: (login access required)

Web Portal: https://novatelsupport.force.com/community/login

E-mail:

support.novatel@hexagon.com

Telephone:

U.S. and Canada: 1-800-NOVATEL (1-800-668-2835)

International: +1-403-295-4900

Chapter 1 NovAtel Application Suite

The NovAtel Application Suite is set of computer based tools used to configure, monitor, troubleshoot and update NovAtel receivers.

NovAtel Application Suite runs on a Windows® 10 based computer and communicates to the receiver using a serial, USB or Ethernet connection.

1.1 Install NovAtel Application Suite

The latest NovAtel Application Suite software is available from the NovAtel web page. To install NovAtel Application Suite:

1. Download the NovAtel Application Suite installation file from the NovAtel web page: novatel.com/products/firmware-options-pc-software/novatel-application-suite.
2. Once downloaded, open the installation file to start the installation wizard.
3. Follow the wizard to install NovAtel Application Suite.

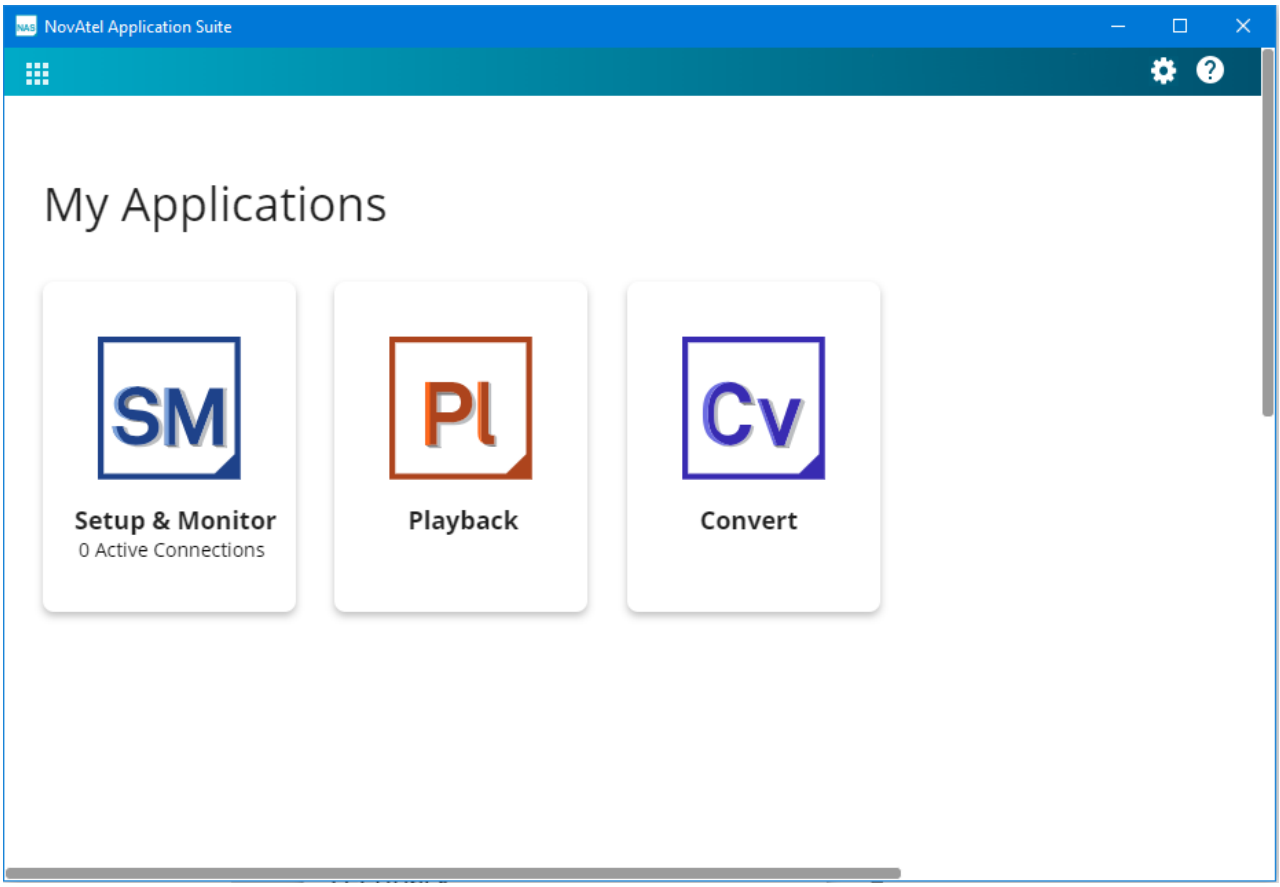
1.2 Launch NovAtel Application Suite

When NovAtel Application Suite is installed, a NovAtel Application Suite icon is added to the desktop and the Windows Start menu (NovAtel Inc\NovAtel Tools Suite).

To launch NovAtel Application Suite, click the NovAtel Application Suite icon. The Welcome window displays when NovAtel Application Suite is opened.

1.3 Welcome Window

The Welcome window is the first window that appears after NovAtel Application Suite starts.



From the Welcome window you can access all of the tools available in the NovAtel Application Suite. To open one of the tools, click the button for the tool.

- Setup & Monitor

  The Setup & Monitor tool is used to configure the receiver and monitor receiver status. See **Setup & Monitor** on page 12.

- Playback

  The Playback tool is used to review the data saved in a log file using the Playback interface. See **Playback** on page 130.

- Convert

  The Convert tool is used to convert NovAtel logs contained in a file from one format to another. See **Convert** on page 135.

If there are any recently accessed receivers or playback files, the receivers or playback files are shown in the *Recent Activity* section. To access a receiver or open a playback file in the Recent Activity section, click the icon for the receiver or file.

1.3.1 NovAtel Application Suite Menus

Three menus are available at the top of all NovAtel Application Suite windows.

1.3.1.1 Application Menu

The Application menu ( ) is in the top left corner of the window. Use this menu to switch between tools available in NovAtel Application Suite.

1.3.1.2 Settings Menu

The Settings menu ( ) is in the top right corner of the window. Use this menu to change the window settings for NovAtel Application Suite and access additional information.

Check For Updates

Check for application updates for the NovAtel Application Suite. If an update is available, a dialog box appears which provides an option to update NovAtel Application Suite.

Language

From the Language options, you can select the language used for the NovAtel Application Suite user interface. The languages available for NovAtel Application Suite are English and Russian.

Theme

From the Theme option, you can select the color scheme used for the NovAtel Application Suite user interface. The themes available are Light and Dark.

Quit

Quit NovAtel Application Suite.

1.3.1.3 Help Menu

The Help menu ( ) is in the top right corner of the window. Use this menu to access information about NovAtel Application Suite.

NovAtel Application Suite Help

Open the help file for NovAtel Application Suite.

Contact Support

Open the NovAtel Application Suite support page on the NovAtel website.

Feedback

Open a dialog box to send feedback about NovAtel Application Suite to NovAtel.

About

View information about NovAtel Application Suite including the NovAtel Application Suite version number.

Chapter 2 Setup & Monitor

The Setup & Monitor tool is a graphic interface that allows you to configure and monitor a NovAtel receiver.

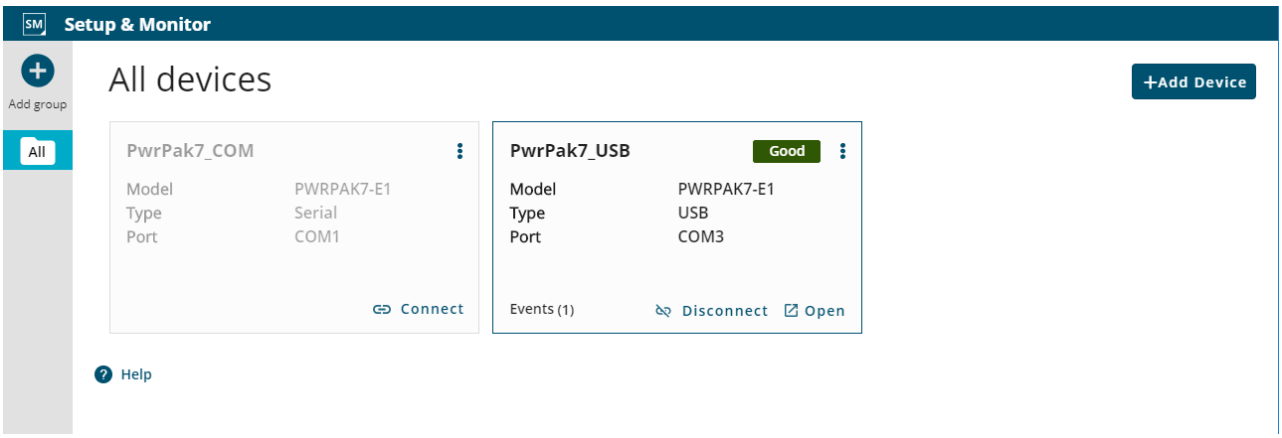
To use Setup & Monitor with a receiver, the receiver must be physically connected to the computer running Setup & Monitor using a serial, USB or Ethernet connection. For information about making the physical connection, refer to the OEM7 Documentation Portal (docs.novatel.com/OEM7).

The communication parameters used to communicate with the receiver must also be defined in Setup & Monitor. See **Devices Window** below for information about defining and saving the communication parameters.

To start Setup & Monitor, click the **SM** icon on the *NovAtel Application Suite* main window.

2.1 Devices Window

Before a Setup & Monitor session can be started with a receiver, a Device must be added for the receiver on the *Devices* window. A Device contains the connection type and communication parameters used to communicate with a receiver.



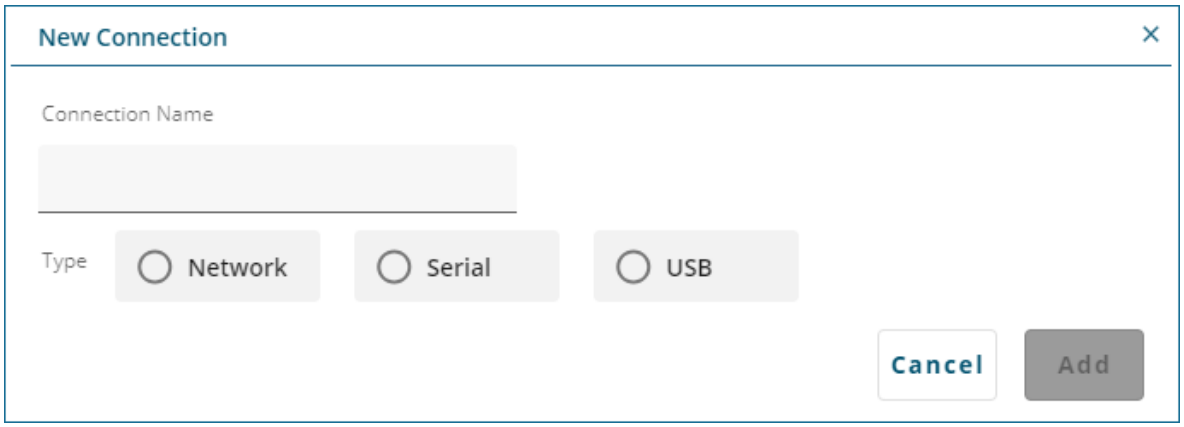
The Devices window contains all of the Devices defined in Setup & Monitor. From this window, Devices can be added, edited, deleted and sorted. The Devices are used to start a connection with the receiver and open the Status and Configuration windows for the receiver.

2.1.1 Add a Device – Serial Connection

This type of Device is used for a receiver that is connected to the Setup & Monitor computer using a serial (COM) port.

1. Click the **Add Device** button.

   The New Connection dialog box opens.

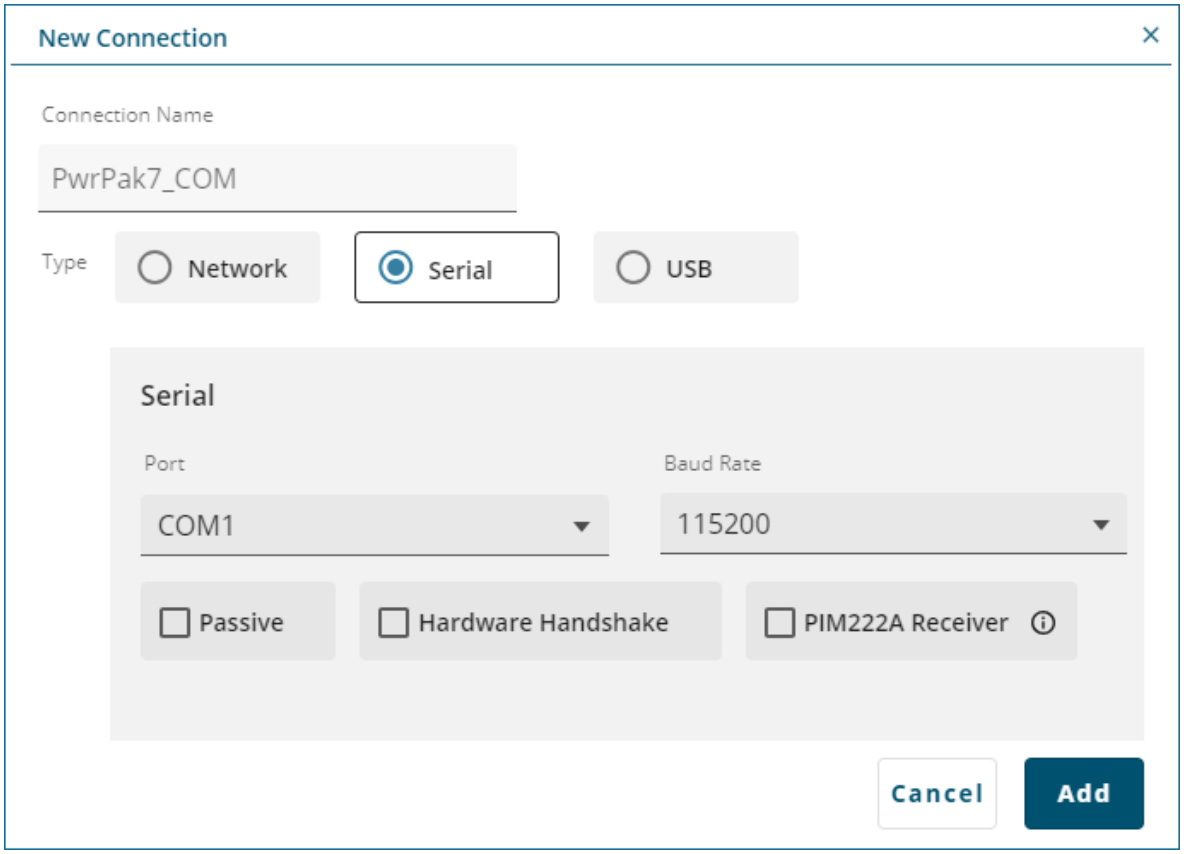


2. In the *Connection Name* box, enter a name for the Device.

   This name is used to identify this Device on the *Devices* window and on the *Status* and *Configuration* windows. Note that when sorting the entries on the *Devices* window, this is the name by which Setup & Monitor sorts the Devices.

3. Click the **Serial** button.

   The *New Connection* dialog box expands to show the serial connection parameters.



4. Click the **Port** drop menu and select the COM port the computer uses to connect to the receiver.
5. Click the **Baud Rate** drop menu and select the baud rate used to communicate with the receiver.

   If *Auto* is selected, Setup & Monitor will establish a connection at the highest baud rate available.

Baud rates higher than 115,200 bps are not supported by standard PC hardware. Special PC hardware may be required for higher rates, including 230400 bps and 460800 bps.

6. Use the **Passive** option to enable or disable Passive mode. Passive mode is used to avoid disruptions to logging or port configurations.

   If the **Passive** option is selected, Setup & Monitor attempts to communicate with the receiver at the specified baud rate. The baud rate selected must match the baud rate configured on the receiver COM port. The AUTO baud rate option can not be used when Passive is enabled.

   If the **Passive** option is cleared, signal breaks are sent over the COM port and the receiver is configured to communicate at the specified baud rate. If Passive is disabled, all previously requested logs on that port will be stopped

7. Use the **Hardware Handshake** option to enable or disable hardware handshaking.

   If the **Hardware Handshake** option is selected, the computer will use the CTS and RTS hardware signals to control data flow.

   If the **Hardware Handshake** option is cleared, the computer does not use the CTS and RTS signals.

Not all receiver ports support the CTS and RTS signals. Do not enable hardware handshaking unless the receiver port supports CTS and RTS and handshaking is enabled on the receiver port.

If the new Device is a PIM222A receiver, you must enable the **PIM222A Receiver** option to ensure the correct communication parameters are set.

8. Click the **Add** button.

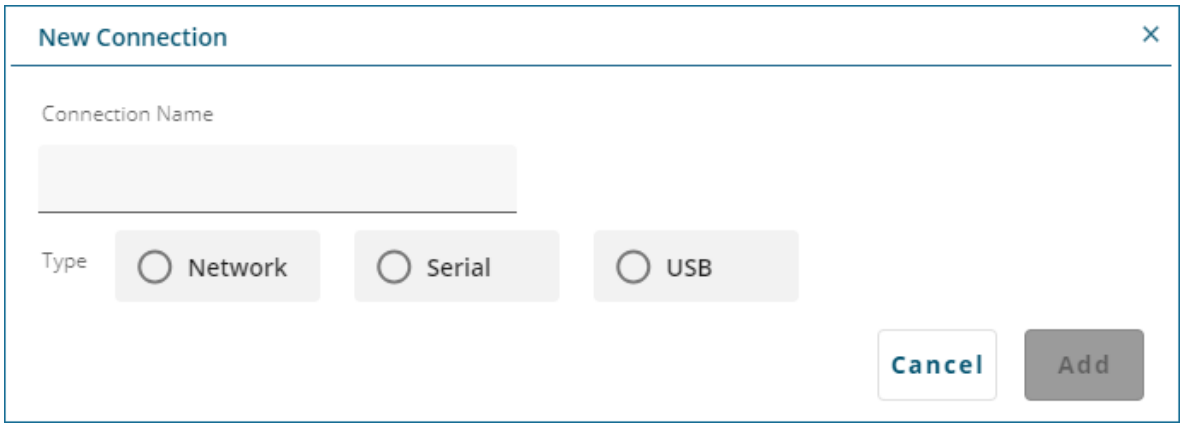
   A new Device labeled with the name entered in the *Connection Name* box is added to the *Devices* window.

2.1.2 Add a Device – USB Connection

This type of Device is used for a receiver connected to the Setup & Monitor computer using a USB port.

1. Click the **Add Device** button.

   The *New Connection* dialog box opens.

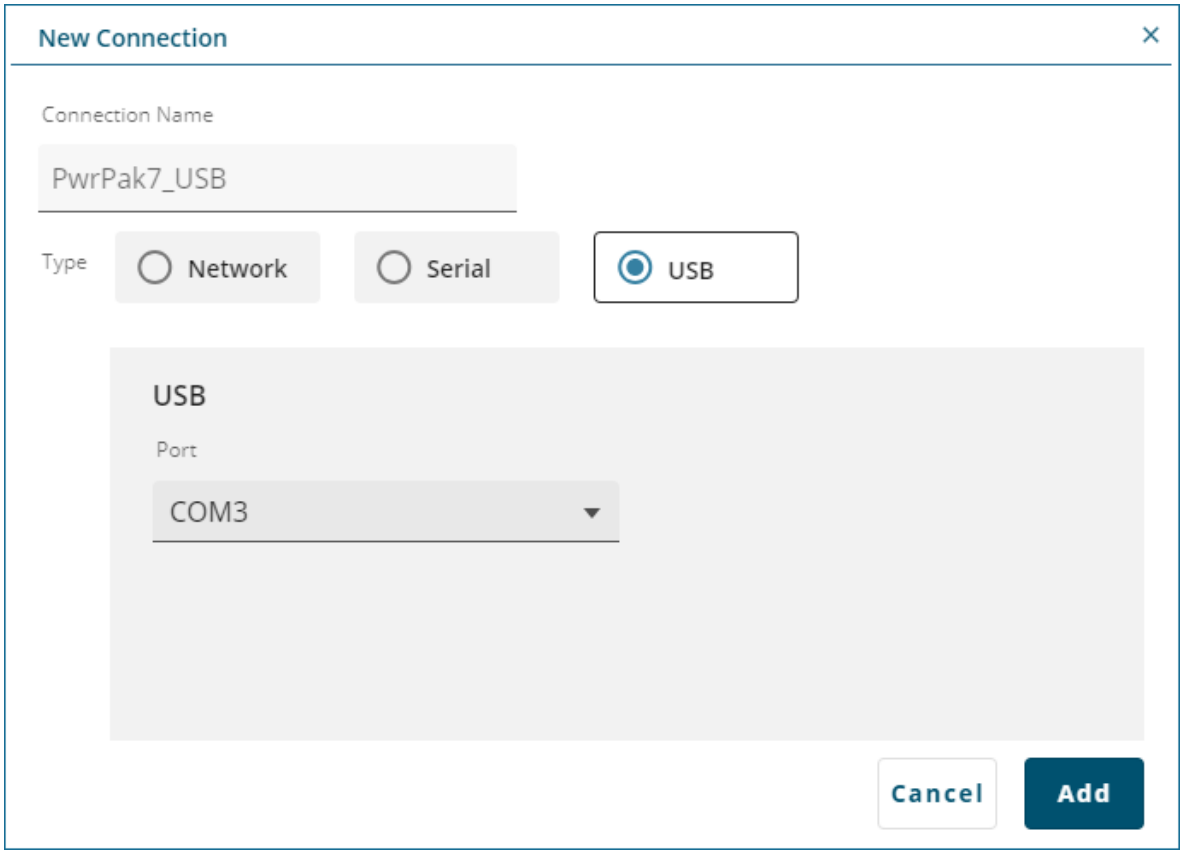


2. In the *Connection Name* box, enter a name for the Device.

   This name is used to identify this Device on the *Devices* window and on the *Status* and *Configuration* windows. Note that when sorting the entries on the *Devices* window, this is the name by which Setup & Monitor sorts the Devices.

3. Click the **USB** button.

   The *New Connection* dialog box expands to show the USB parameters.



4. For each USB connection, the NovAtel USB drivers create three virtual COM ports. Click the **Port** drop menu and select the virtual COM port used for this receiver.

5. Click the **Add** button.

   A new Device labeled with the name entered in the *Connection Name* box is added to the *Devices* window.

2.1.3 Add a Device – Ethernet Connection

This type of Device is used for a receiver connected to the Setup & Monitor computer using an Ethernet port.

1. Click the **Add Device** button.

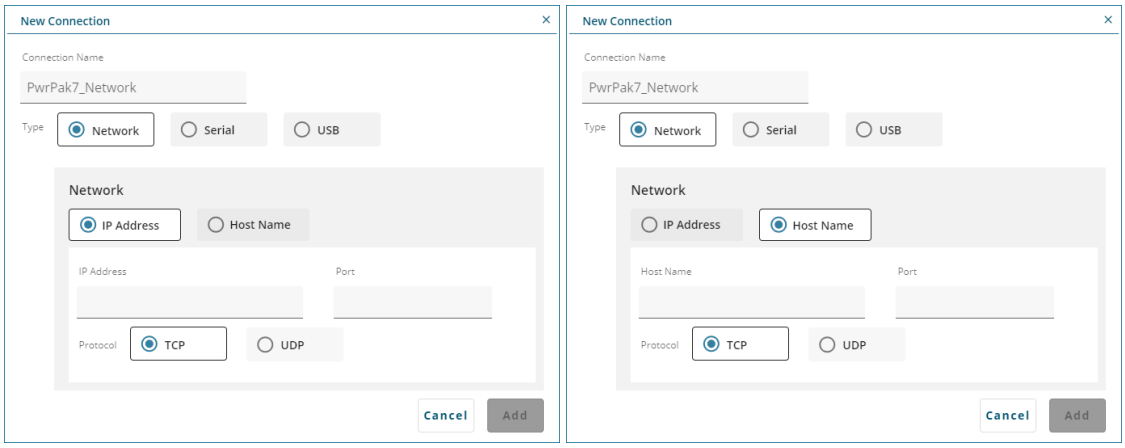
   The *New Connection* dialog box opens.

2. In the *Connection Name* box, enter a name for the Device.

   This name is used to identify this Device on the *Devices* window and on the *Status* and *Configuration* windows. Note that when sorting the entries on the *Devices* window, this is the name by which Setup & Monitor sorts the Devices.

3. Click the **Network** button.

   The *New Connection* dialog expands to show the network connection parameters.



4. If specifying the connected device by its IP address, click the **IP Address** option and enter the IP address of the receiver in the **IP Address** box.

   If specifying the connected device by its host name, click the **Host Name** option and enter the host name of the device in the **Host Name** box.

5. In the **Port** box, enter the port used to communicate with the receiver.

   The default ports are 3001 to 3007.

6. Click the button (**TCP** or **UDP**) for the protocol used for communication with the receiver.

> TCP is the default for ICOM ports.

7. Click the **Add** button.

   A new Device labeled with the name entered in the *Connection Name* box is added to the *Devices* window.

2.1.4 Open/Close a Connection

A connection to the receiver must be established before Setup & Monitor can be used to monitor or configure the receiver.

To connect to the receiver, click the **Connect** button. The device box changes to show *Disconnect* and *Open* buttons.

To close a connection, click the **Disconnect** button. The device box changes to show the *Connect* button.

2.1.5 Open the Status and Configuration Windows for a Device

When Setup & Monitor has a connection to the receiver, the *Status and Configuration* windows for the receiver can be viewed. To open the Status and Configuration windows, click the **Open** button..

See **Status and Configuration Window** on page 20 from more information.

2.1.6 Change the Communication Parameters of a Device

To change the communication parameters Setup & Monitor uses to connect to a receiver:

1. Click the menu button ( ) on the Device to change.
2. Click **Edit Device**.
3. Change the communication parameters to match the new settings required to connect to the receiver.

2.1.7 Delete a Device

To delete a Device:

1. Click the menu button ( ) on the Device to delete.
2. Click **Delete Device**.

   A confirmation dialog box appears.
3. Click the **Yes** button.

2.1.8 Group the Devices

When Setup & Monitor is installed, the **ALL** group is the only group available. This group contains all of the Devices added to Setup & Monitor.

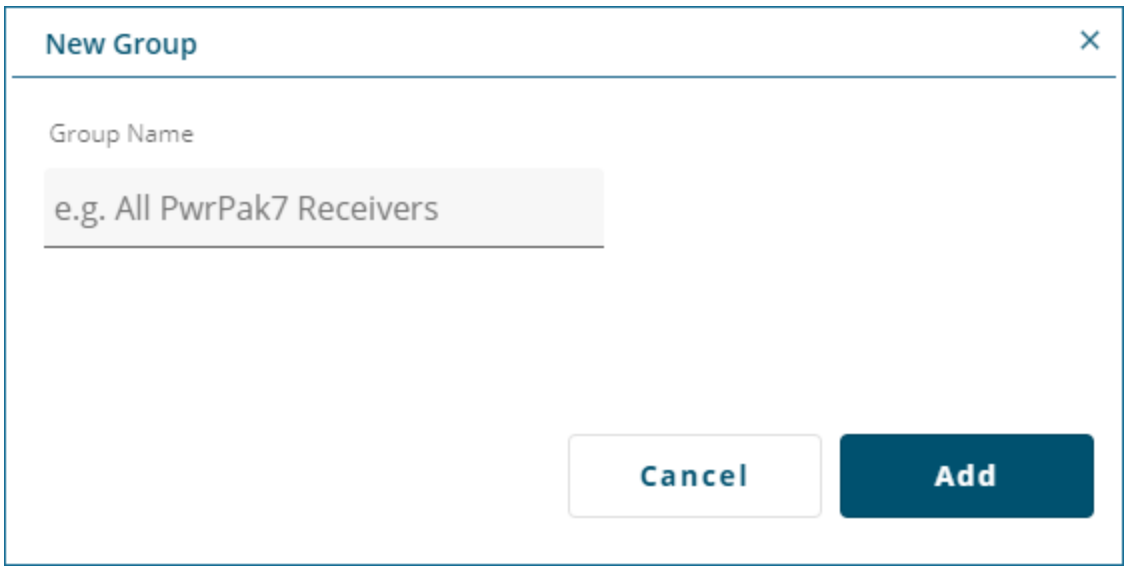
The added Devices can be organized into additional groups to make it easier to find Devices or to put similar Devices in a single location.

2.1.8.1 Add a Group

To add a group:

1. Click the button.

   The *New Group* dialog box displays.



2. In the **Group Name** box, enter a name for the group.
3. Click the **Add** button.

The *Devices* window changes to show the new group and a new group icon (folder icon) is added to the left side of the window.

2.1.8.2 Open a Group

All of the groups available on the *Devices* window are shown on the left side of the Devices window. Each group is represented by a folder icon (e.g.).

To open a group, click the folder icon for the group. The Devices window changes to show only the devices that are in the selected group.

2.1.8.3 Add a Device to a Group

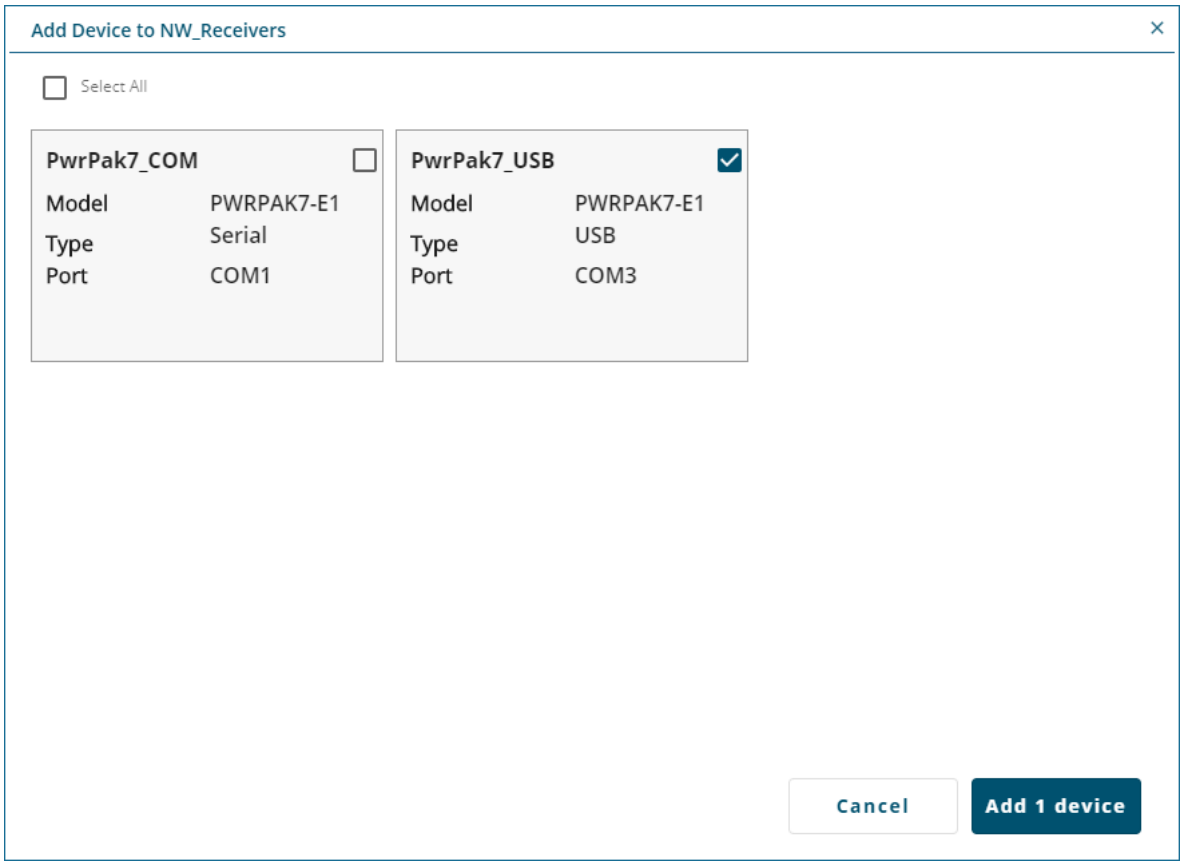
To add a Device to a group:

1. Click the folder icon for the group.

   The *Devices* window changes to show the Devices currently in the group.

2. Click the **Add Device** button.

   A dialog box appears showing the Devices available to add to the group.



3. Select the check box for each Device you want to add to the group.

   To select all available Devices, select the **Select All** check box.
4. Click the **Add x Device** button.

2.1.8.4 Remove a Device from a Group

To remove a Device from a group:

1. Click the folder icon for the group.

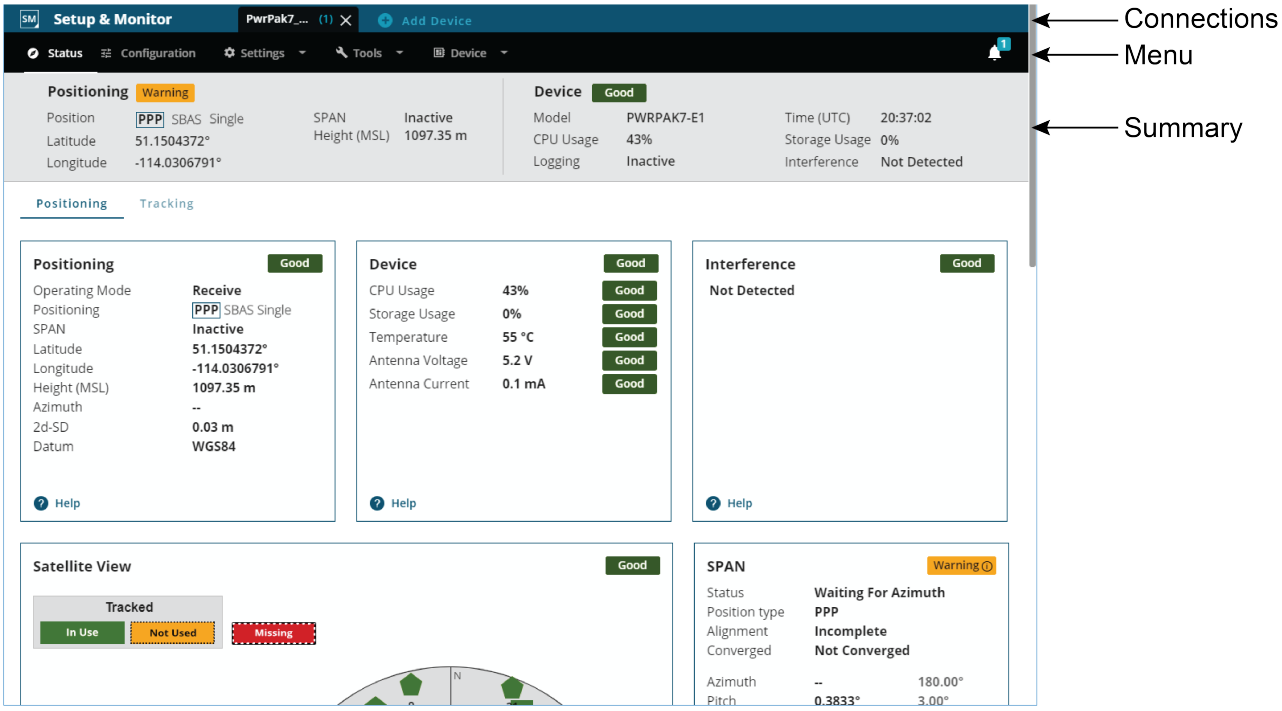
   The *Devices* window changes to show the Devices currently in the group.
2. Click the menu button (⋮) on the Device to remove.
3. Click **Remove from Group**.

   A confirmation dialog box appears.
4. Click the **Yes** button.

Removing a Device from a group does not delete the Device from Setup & Monitor. To delete a Device from Setup & Monitor, see **Delete a Device** on page 17.

2.2 Status and Configuration Window

When a connection to a receiver is opened, the Status and Configuration window is displayed. From this window, all of the status and configuration windows for the receiver can be accessed.



If there are any current status events for the receiver, notification boxes for the events will temporarily appear on the right side of the window. To view these events later, use the *Events* menu. See **Events** on page 46.

2.2.1 Connections Bar

The *Connections* bar appears at the top of all of the Setup & Monitor windows. This bar shows all the Devices to which the computer currently has a connection.

The Device that is currently being viewed is black. To view a different Device, click the tab on the Connections bar for that Device.

To close a connection, click the **X** button on the Device tab.

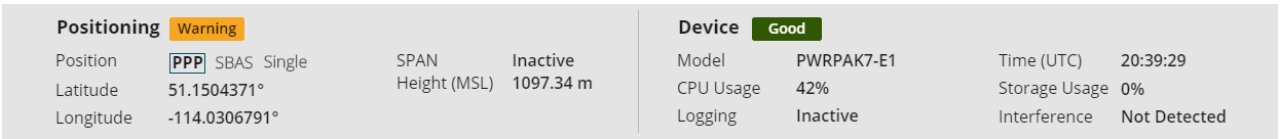
To add a new device, click the **+** button on the *Connections* bar. The *New Connection* dialog box appears. See **Devices Window** on page 12 for information about adding a device.

2.2.2 Menu Bar

The **Menu** bar provides access to other tools and settings available in Setup & Monitor. For information about the Menu, see **Menu** on page 22.

2.2.3 Summary Bar

The Summary bar provides status information about the receiver.



Status Indicator

A colored bar with text indicates the status of the summary information shown.

Colour	Text	Description
Green	Good	The receiver is functioning and there are no warnings or errors.
Amber	Warning	The receiver is functioning, but there is one or more issues that may require attention.
Red	Error	An issue is preventing the receiver from functioning. The Error state will remain until the situation is resolved.

If the receiver has a warning or error, check the status boxes on the *Status* tab. An amber or red dot appears on the status box where more information about the warning or error can be found. See **Status Window** on page 47 for more information.

Position

The *Position* field shows all of the positioning types configured on the receiver. The positioning type that is currently being used to calculate the position is highlighted in a box.

Latitude

The *Latitude* field shows the latitude of the calculated position in degrees.

Longitude

The *Longitude* field shows the longitude of the calculated position in degrees.

SPAN

The *SPAN* field shows the status of SPAN GNSS+INS technology.

Height

The *Height* field shows the height above mean sea level of the calculated position in metres.

Model

The *Model* field shows the receiver type.

CPU Usage

The *CPU Usage* field shows the amount of receiver computing (CPU) power currently being used.

Logging

The *Logging* field shows the status of logging to the computer or the receiver's internal memory.

Time

The *Time* field shows the current UTC time.

Storage Usage

The *Storage Usage* field shows the amount of receiver internal memory that has been used.

Interference

The *Interference* field indicates if the receiver has detected interference in the GNSS signal.

2.2.4 Menu

The Setup & Monitor menu is available on all Setup & Monitor windows. It provides access to other Setup & Monitor windows and settings for the Setup & Monitor interface.

Click a menu item to access the options available.

2.2.4.1 Status

Click **Status** to display the Status window. See **Status Window** on page 47 for more information.

2.2.4.2 Configuration

Click **Configuration** to display the Configuration window. See **Configuration Window** on page 62 for more information.

2.2.4.3 Settings

Networking

Click **Networking** to open the *Networking* window.

From the *Networking* window, you can edit the Wi-Fi client, Ethernet and Wi-Fi Hotspot parameters for the receiver. For information about the networking parameters, see **Networking** on the next page.

Displays

Click **Displays** to open the *Vehicle Setup* window. See **Vehicle Setup** on page 26 for more information.

2.2.4.4 Tools

Terminal

Click **Terminal** to open the *Terminal* window.

The *Terminal* window provides an interface to the receiver's command line interface. From the command line interface, you can access the entire suite of OEM7 commands and logs. For more information about the *Terminal* window, see **Terminal** on page 28.

Interference Toolkit

Click **Interference Toolkit** to open the *Interference Toolkit* window.

The Interference Toolkit is a feature that monitors, quantifies and removes interference sources to prevent interference from impacting receiver performance. For more information about the *Interference Toolkit* window, see **Interference Toolkit** on page 29.

2.2.4.5 Device

The options on the **Device** menu provide access to additional information about the receiver and preform actions on the receiver.

Details

Click **Details** to open the *Details* window.

From the *Details* window you can view information about the receiver hardware and enabled software options. For information about the *Details* window, see **Details** on page 41.

Storage

Click **Storage** to open the *Storage* window.

From the Storage window you can manage the log files stored on internal memory. For information about the *Storage* window, see **Storage** on page 44.

Update

Click **Update** to open the *Update* window.

From the *Update* window you can load new software on to the receiver. For information about the *Update* window, see **Update** on page 45.

Restart

Click **Restart** to open the *Restart* page.

The **Restart** page provides two restart options.

- **Factory Reset**
  Click the **Factory Reset** button to set the receiver configuration parameters back to factory defaults and restart the receiver.
- **Restart**
  Click the **Restart** button to restart the receiver without changing configuration parameters.

To erase all LUA scripts on the receiver, select the **Remove LUA Scripts on restart** option before clicking **Factory Reset** or **Restart**.

2.2.4.6 Help

Click **Help** to open the NovAtel Application Suite help.

2.2.4.7 Events

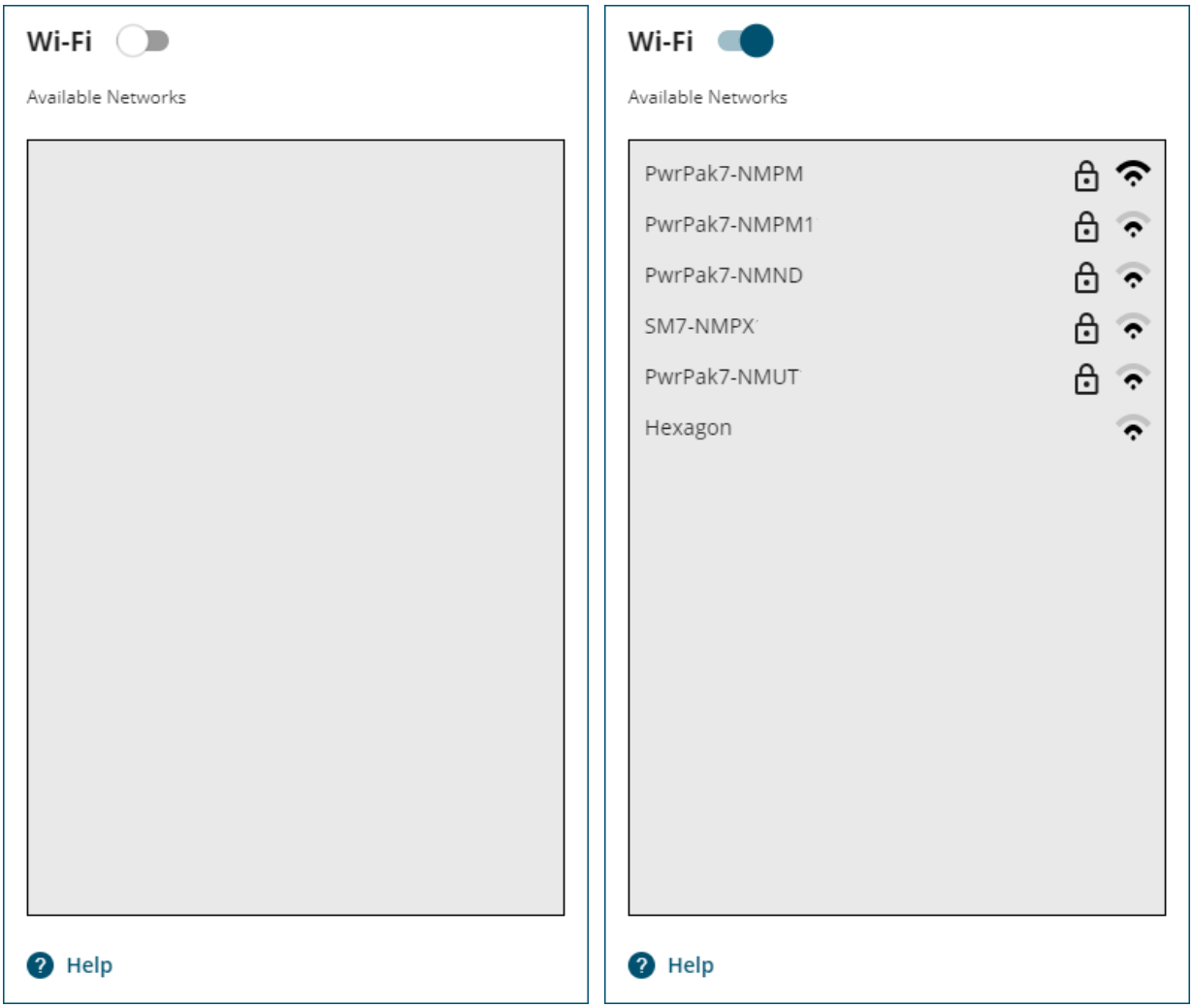
The *Events* menu is available only on the *Status* window. From the *Events* menu, you can view the events (warnings, errors or status messages) that apply to the receiver. For information about the *Events* menu, see **Events** on page 46.

2.2.5 Networking

Use the *Networking* window to configure the Wi-Fi and Ethernet interfaces on the receiver. Setup & Monitor only shows the interfaces that are available on the receiver.

2.2.5.1 Wi-Fi

Use the *Wi-Fi* tile to configure the receiver to connect to a Wi-Fi access point.



Off/On

Set the Wi-Fi switch to **On** ( ) to enable the Wi-Fi client on the receiver.

Set the Wi-Fi switch to **Off** ( ) to disable the Wi-Fi client.

Available Networks

The Available Networks box displays the Wi-Fi access points (hotspots) the receiver has detected.

Click the access point to which you want the receiver to connect. If the access point is secured, and this is the first time the receiver has attempted to connect, an access dialog box appears. Enter the user name and password for the selected Wi-Fi access point and click **Connect**.

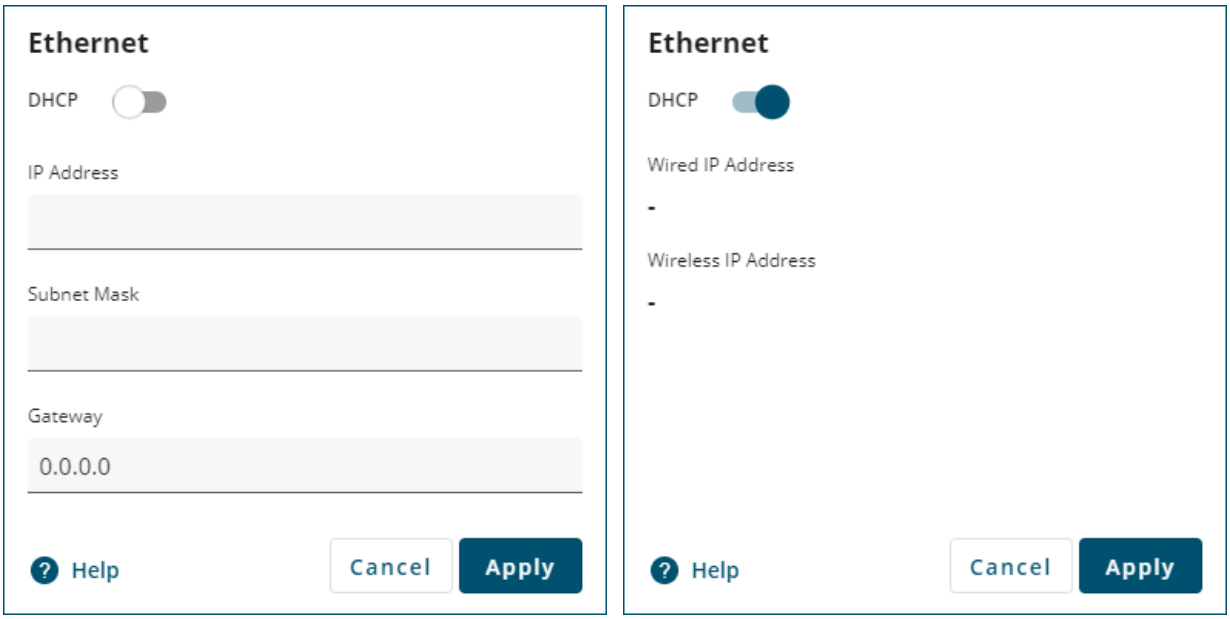
When the receiver makes a connection to an access point, the connection details are stored on the receiver. Up to four access points are stored on the receiver. When the receiver gets into range of a stored access point, it will automatically connect.

To remove an access point from receiver memory:

1. Click the **X** button on the access point. A dialog box appears.
2. Click **Yes**.

2.2.5.2 Ethernet

Use the *Ethernet* tile to configure the Ethernet interface on the receiver.



If the receiver is connected to a network that uses DHCP:

1. Set the *DHCP* switch to **On** ( ) to enable DHCP.
2. Click the **Apply** button.

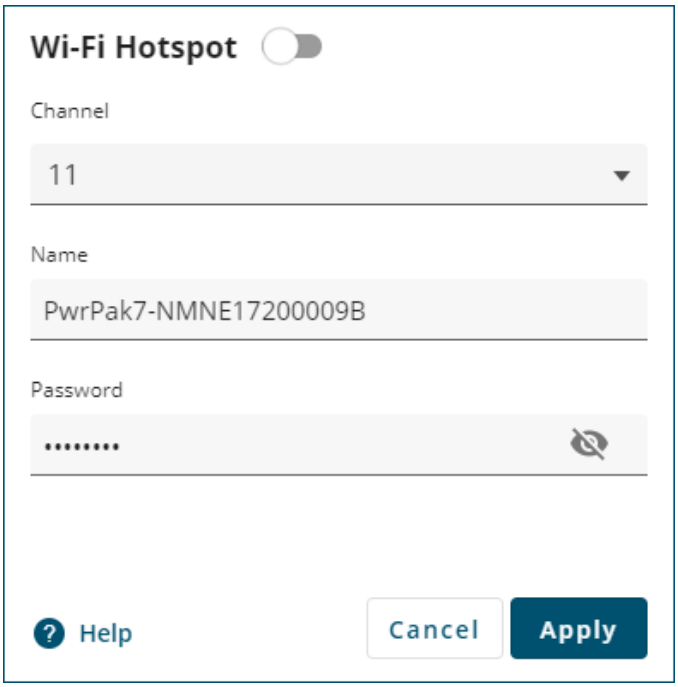
   The *IP Address* field displays the IP address assigned to the receiver.

If the receiver is being configured to use a static IP address:

1. Set the *DHCP* switch to **Off** ( ) to disable DHCP.
2. In the *IP Address* box, enter the IP address for the receiver.
3. In the *Subnet Mask* box, enter the subnet mask for the receiver.
4. In the *Gateway* box, enter the IP address of the gateway.
5. Click the **Apply** button.

2.2.5.3 Wi-Fi Hotspot

Use the Wi-Fi Hotspot tile to configure the receiver to function as a Wi-Fi hotspot (access point). Wi-Fi capable devices, such as the device used to run Setup & Monitor (Web), can then access the receiver using Wi-Fi.



Wi-Fi Hotspot
Use the *Wi-Fi Hotspot* switch to enable or disable the Wi-Fi hotspot hosted by the receiver.

Channel
This parameter sets the 802.11 channel that the Wi-Fi hotspot uses.

To change the 802.11 channel used, click the *Channel* drop list and select the channel to use.

Name
This parameter is the SSID that the receiver broadcasts from the Wi-Fi hotspot.

To change the SSID, click the *Name* box and enter the new SSID. The SSID can be up to 33 characters long.

Password
This parameter is the password that Wi-Fi clients must enter to access the receiver's Wi-Fi hotspot.

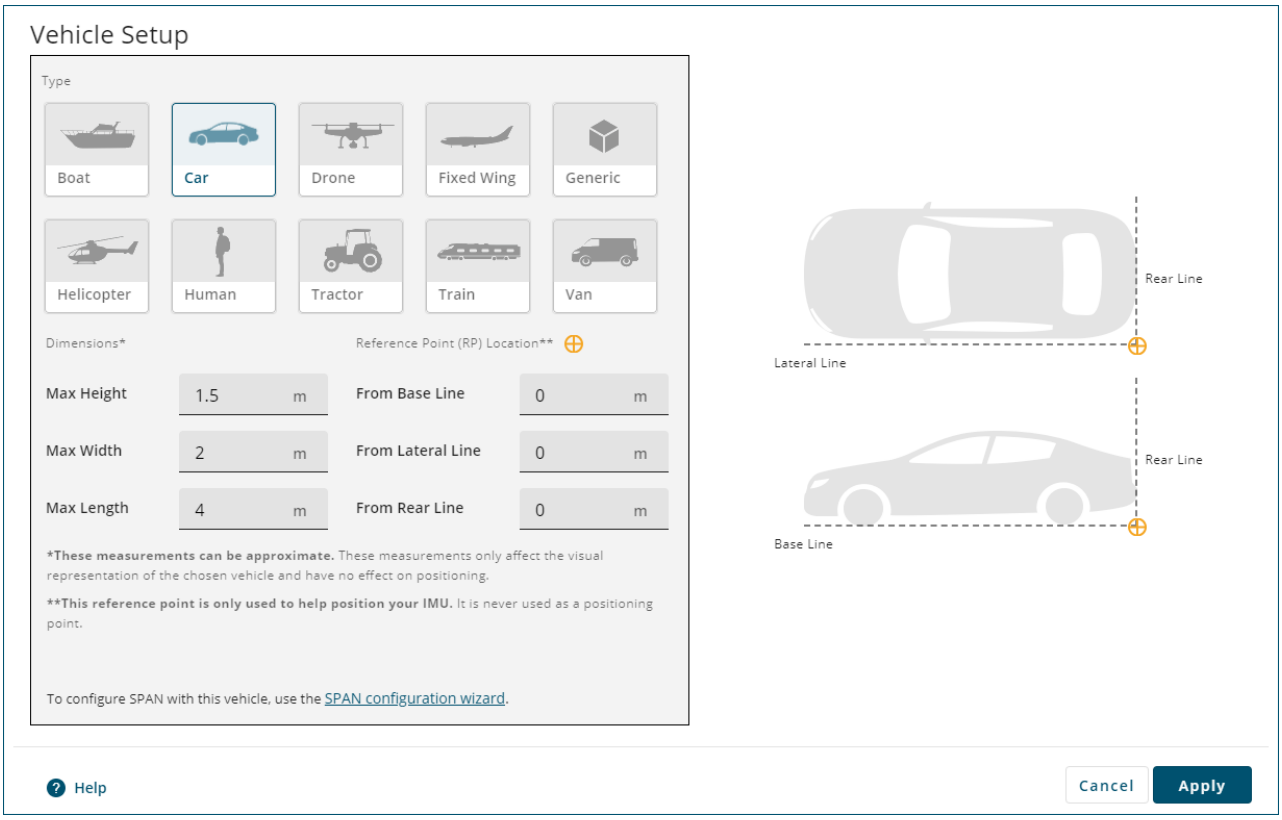
To change the password, click the *Password* box and enter the new password. The password must be a 8 to 64 characters long.

Click the **Apply** button to save the Wi-Fi Hotspot changes to the receiver.

2.2.6 Vehicle Setup

Use the *Vehicle Setup* window to configure the vehicle reference point. The vehicle reference point is used when configuring SPAN.

The Vehicle Setup window is only available on receivers with an internal IMU (CPT7, CPT7700, PwrPak7-E1, PwrPak7D-E1, PwrPak7-E2, PwrPak7D-E2 or SMART7-S) or receivers connected to a SPAN compatible IMU.



2.2.6.1 Type

Click the **Type** button for the vehicle type that best suits the vehicle on which the SPAN system is installed. The graphic representations of the vehicle and the default values in the *Dimensions* fields will change.

2.2.6.2 Dimensions

The *Dimensions* fields define the size of the vehicle in which the SPAN system is installed.

These fields are used to properly scale the visual representation of the vehicle. They are not used in the position solution.

Max Height

The maximum height of vehicle in metres.

Max Width

The maximum width of the vehicle in metres.

Max Length

The maximum length of the vehicle in metres.

2.2.6.3 Reference Point (RP) Location

The *Reference Point (RP) Location* is used on the *SPAN Configuration* window to show where the IMU is located in the vehicle.

These fields are used only to show the location of the IMU on the *SPAN Configuration* window. They are not used in the position solution.

The values entered for the Reference Point (RP) Location must be within the maximum dimensions defined for the vehicle.

From Base Line

Enter the distance from the Base Line to the Reference Point in metres.

From Lateral Line

Enter the distance from the Lateral Line to the Reference Point in metres.

From Rear Line

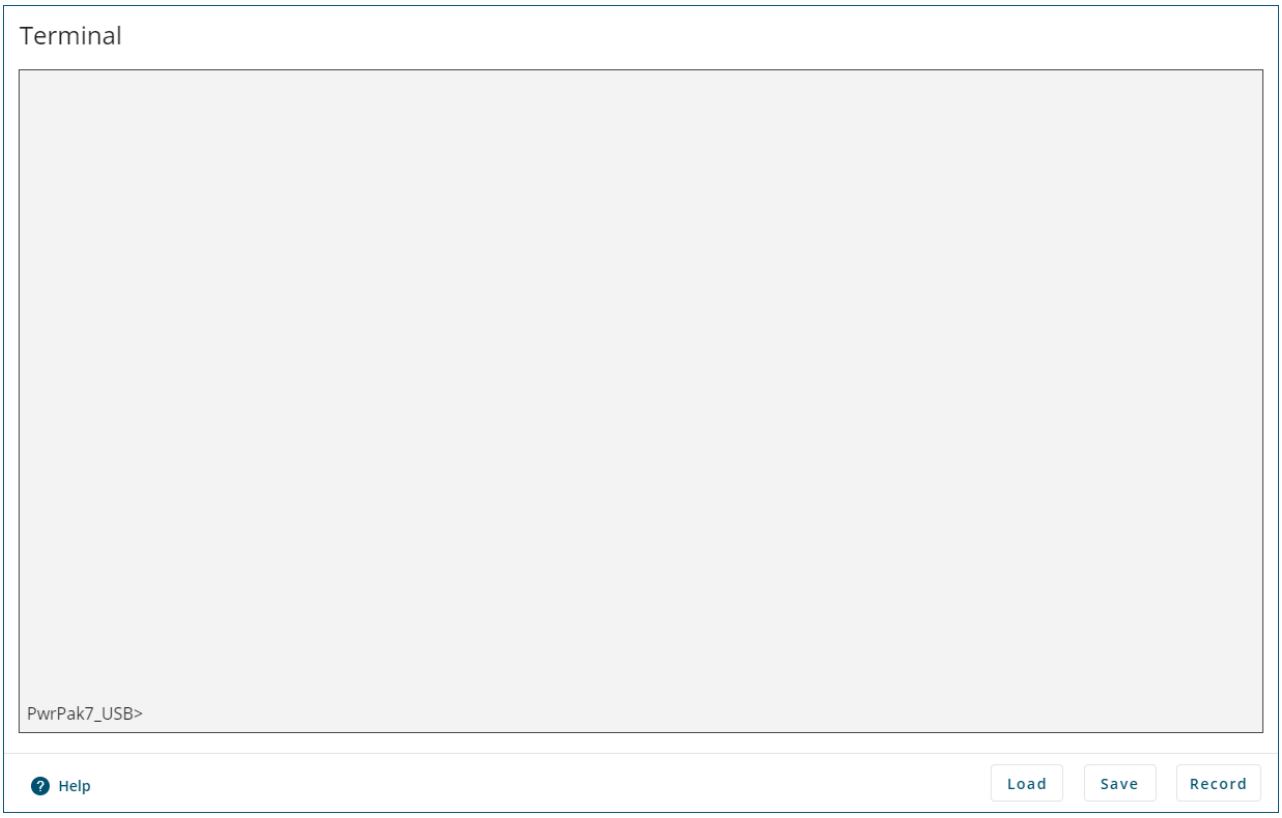
Enter the distance from the Rear Line to the Reference Point in metres.

When values are entered into the Reference Point Location fields, the Reference Point location shown on the graphic changes.

After the vehicle setup is complete, click the **SPAN configuration wizard** link to access the **SPAN Configuration** on page 96 window.

2.2.7 *Terminal*

Use the *Terminal* window to send commands to the receiver and display any receiver acknowledgments and outputs.



To enter a command:

1. Type the command and press **ENTER**.

For information about the commands available and commands parameters, refer to the OEM7 Documentation Portal (docs.novatel.com/OEM7).

To re-issue a command:

1. Use the Up and Down arrow keys on the keyboard to select the command to re-issue.
2. Press **ENTER**.

Three buttons are also available on the *Terminal* window.

Load

The **Load** button is used to run a set of commands stored in a file on the computer. A typical use of this command is to load a common configuration on to the receiver. To load a command file:

1. Click the **Load** button.

   The *Open* dialog appears.
2. Navigate to the folder that contains the command file and select the file.
3. Click the **Open** button.

   The commands in the file are sent to the receiver.

Save

The **Save** button is used to save the commands issued in the current session of the terminal to a file. To save the contents of the *Terminal* window to a file:

1. Click the **Save** button.

   The *Save File* dialog box appears.
2. Navigate to the folder where the command file will be stored
3. Enter a name for the file in the *File name* box.
4. Click the **Save** button.

Record

The **Record** button is used to record all activity in the Terminal starting when the button is clicked. To record a Terminal session:

1. Click the **Record** button.

   All activity on the Terminal starts to be recorded.
2. After the Terminal activity to be recorded is finished, click the **Stop** button to stop recording.

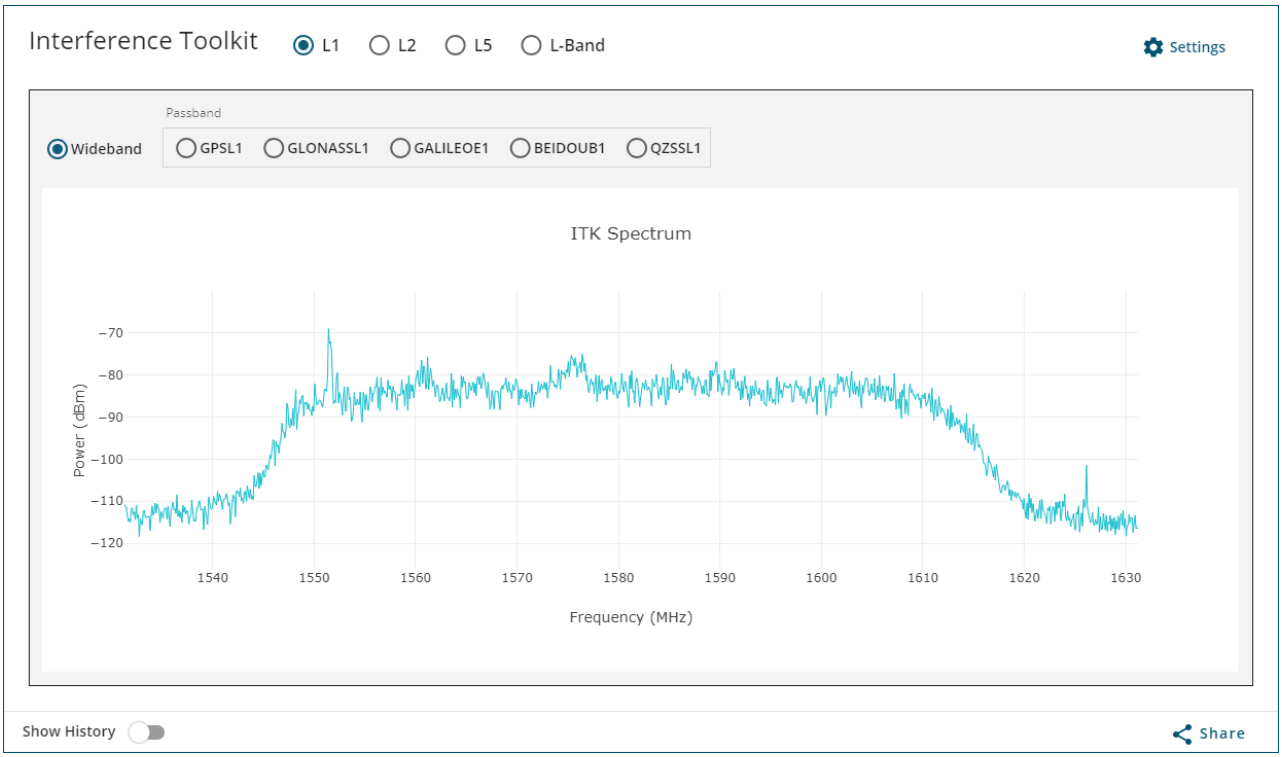
   The Save file dialog box appears
3. Navigate to the folder where the recording file will be stored
4. Enter a name for the file in the *File name* box.
5. Click the **Save** button.

2.2.8 Interference Toolkit

The Interference Toolkit (ITK) feature monitors, quantifies and removes interference sources to prevent interference from impacting receiver performance.

Using the Interference Toolkit, you can monitor the Radio Frequency (RF) spectrum in a range of frequencies around the GNSS signals that are being received by the OEM7 receiver. If an interference signal is detected,

information about the interference is displayed on the *Interference* status tile. To open the Interference Toolkit window, click the **Tools** menu and then click **Interference Toolkit**.

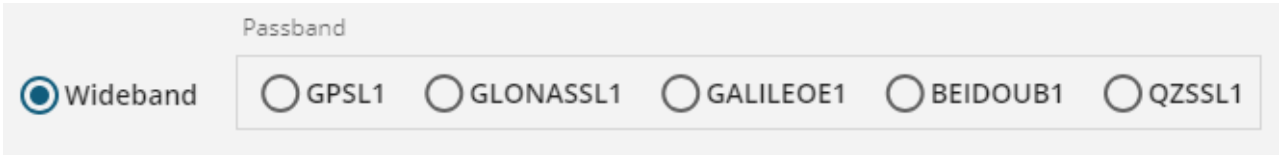


Due to the high volume of data, a higher bandwidth medium, such as USB or Ethernet, is recommended when monitoring signals using the Interference Toolkit.

When the *Interference Toolkit* window is opened, a plot that shows the detected power level of all of the frequencies in the selected band is shown. This is a dynamic plot that changes based on the signal received by the receiver. If there is an interference signal in the band, it will appear as an unexpected spike in the received power level.

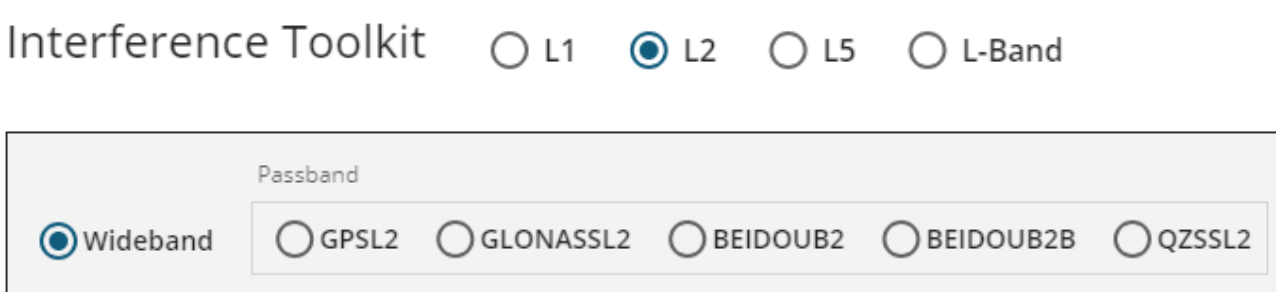
2.2.8.1 Change the Frequencies Viewed

When the *Interference Toolkit* window is opened, the window shows a plot of the wideband L1 signal. This plot shows the detected power level of all of the frequencies in the L1 band. To view the plot of a specific signal within the band, click the button for the signal in the *Passband* box (for example, GPSL1).



The plot changes to the set of frequencies specific to the selected signal (GPS L1 in this example).

To view of a different frequency band, click the tab for the desired band (for example, L2).



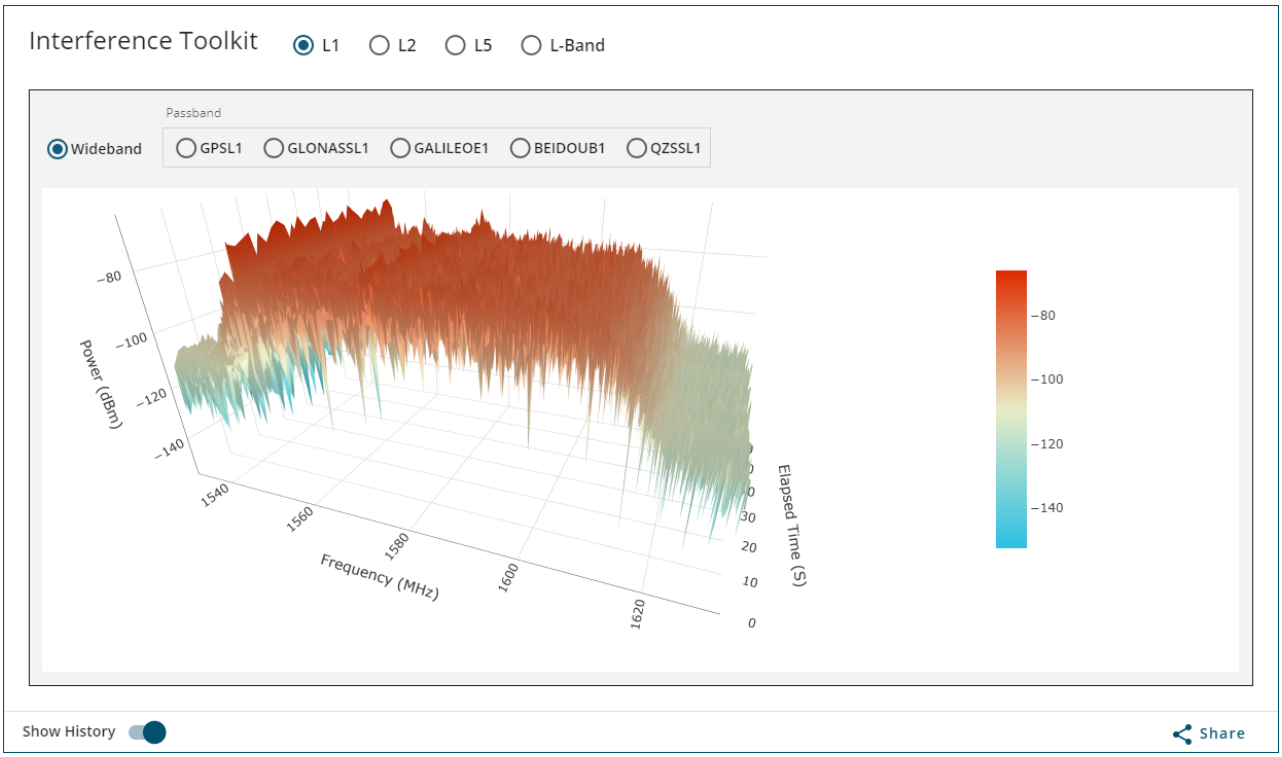
The plot changes to show the received power levels of the frequencies in the selected band (L2 in this example).

2.2.8.2 Display Options

There are several buttons on the *Interference Toolkit* window that change how the plot is shown.

Show History

The Show History plot shows a rolling history of the detected power levels.



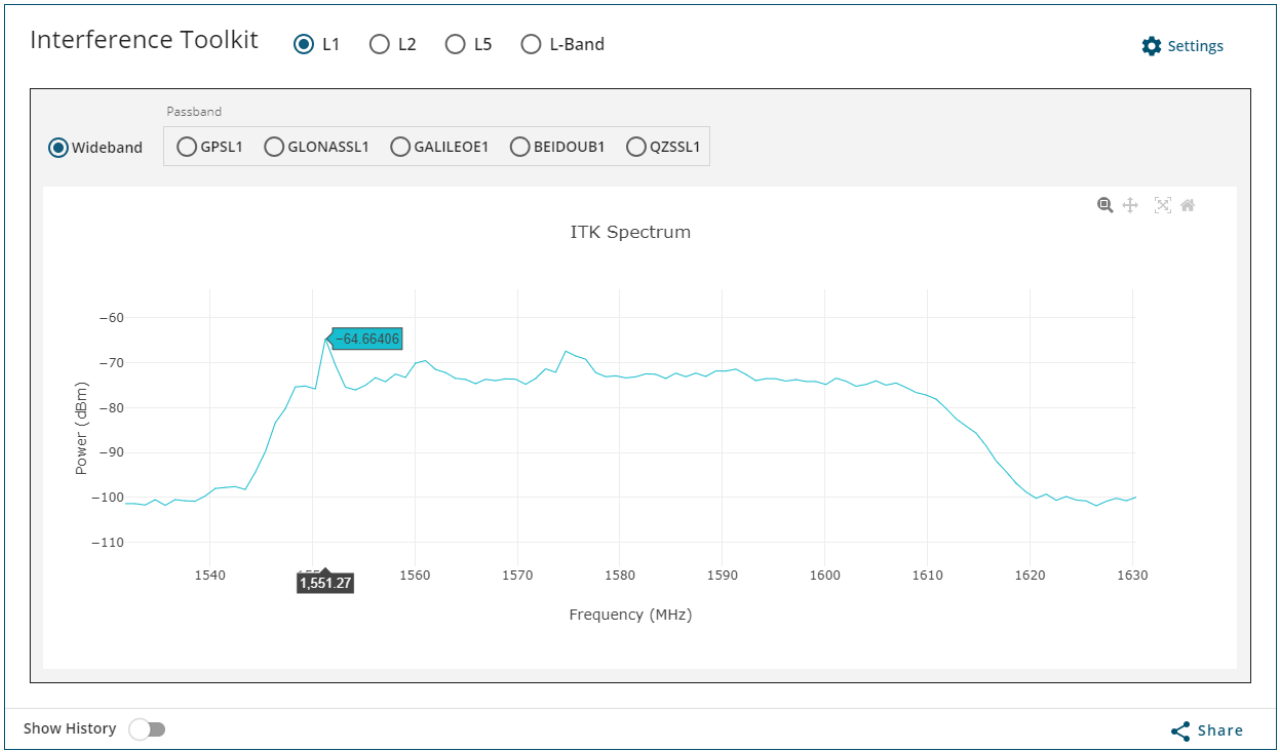
The Show History plot can be rotated by clicking and dragging the plot.

When the **Show History** option is on ( ), the frequency plot shows a rolling history of the detected power levels.

When the **Show History** option is off ( ), the plot shows the currently detected power levels.

Display Buttons

When the mouse pointer is moved over the frequency plot, the power level (blue) and frequency (dark gray) of the signal at that location are shown.



As well, several buttons appear at the top of the frequency plot. The functions of these buttons are described in the following table.

Icon	Name	Available on	Description
	Zoom	Real Time Plot History Plot	Use this button to zoom in on an area of the plot. 1. Click the button. 2. Click and drag to select an area of the plot. The zoom level changes to show the selected area. On the History Plot, the plot zooms as the mouse is dragged.
	Pan	Real Time Plot History Plot	Use this button to move around in the plot. 1. Click the button. 2. Click and drag on the plot to move the plot.
	Turntable Rotation	History Plot	Click the button to rotate the plot.
	Reset axes	Real Time Plot	On the real time plot, click the button to change the zoom level to the default value.
	Reset camera to default	History Plot	On the history plot, click the button to change the zoom level and orientation of the plot to the default values.

Save a Copy of the Plot

A copy of the plot currently being viewed can be saved to a file or copied to an application, such as a word processor.

To save the plot to a file:

1. Click the **Share** button.
2. Click **Save graph as image**.
3. Navigate to the folder in which the plot will be saved.
4. Enter a name in the *File name* box.
5. Click the **Save** button.

To copy the plot to another application:

1. Click the **Share** button.
2. Click **Copy graph to clipboard**.
3. Open the application, such as a word processor.
4. Paste the image.

2.2.8.3 Enable HDR Mode

The High Dynamic Range (HDR) mode enables special signal processing to remove distortions from the spectrum, providing a cleaner signal. This optimizes the Automatic Gain Control (AGC) to prevent interfering signals from drowning out the GNSS signals. HDR mode works well against wide band and out-of-band interferers. HDR mode can be combined with bandpass and notch filters, but does draw more power.

To disable HDR mode:

1. Click the **Settings** menu.
2. Set the **Enable HDR Mode** option to off ( ).

To enable HDR mode

1. Click the **Settings** menu.
2. Set the **Enable HDR Mode** option to on ( ).

2.2.8.4 Filters

If an interference signal is present, the Interference Toolkit can reduce or eliminate the impact on GNSS tracking using the programmable bandpass or notch filters.

If there are any filters active, a button for the filter is shown above signal plot.

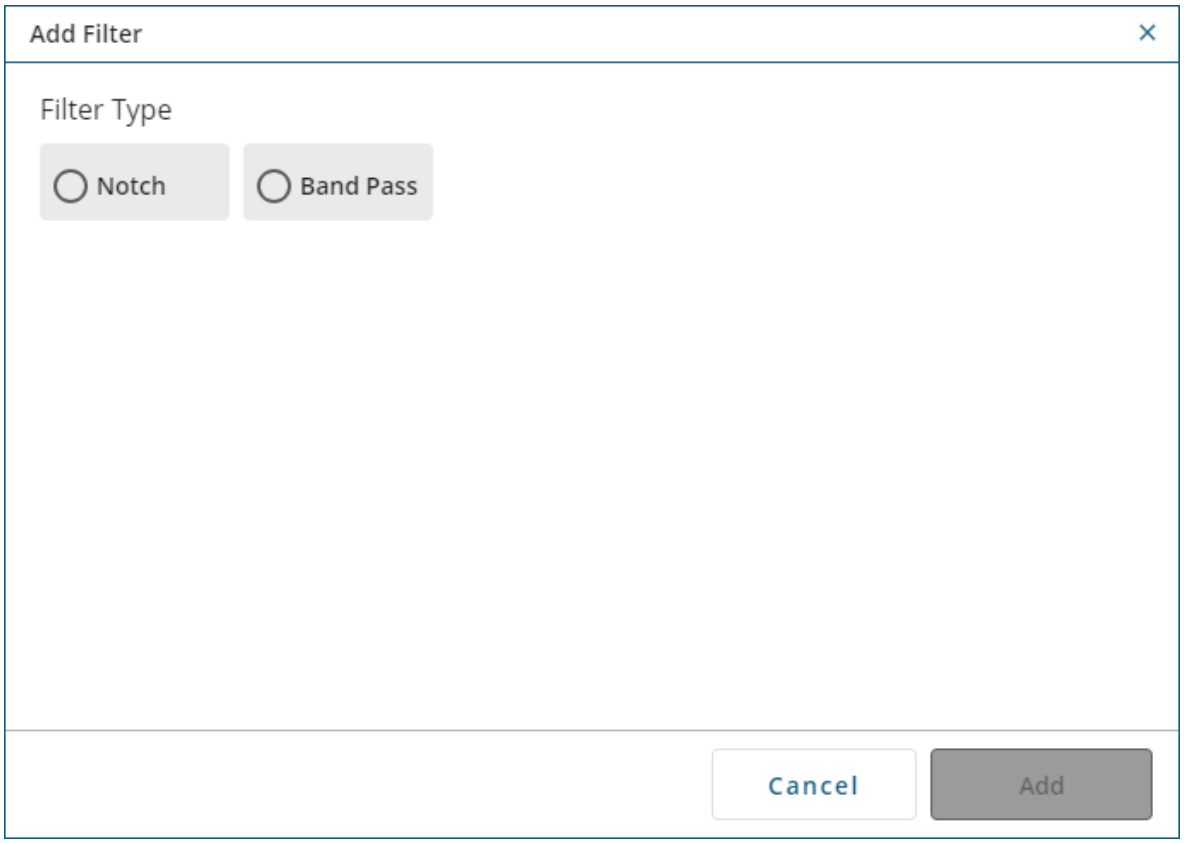
Notch Filter

The Interference Toolkit notch filter reduces the signal power in a narrow frequency band. This type of filter is useful for reducing the signal power of a single, narrow band interference signal. Note that the narrowest possible filter should be used to maintain the maximum amount of overall signal power.

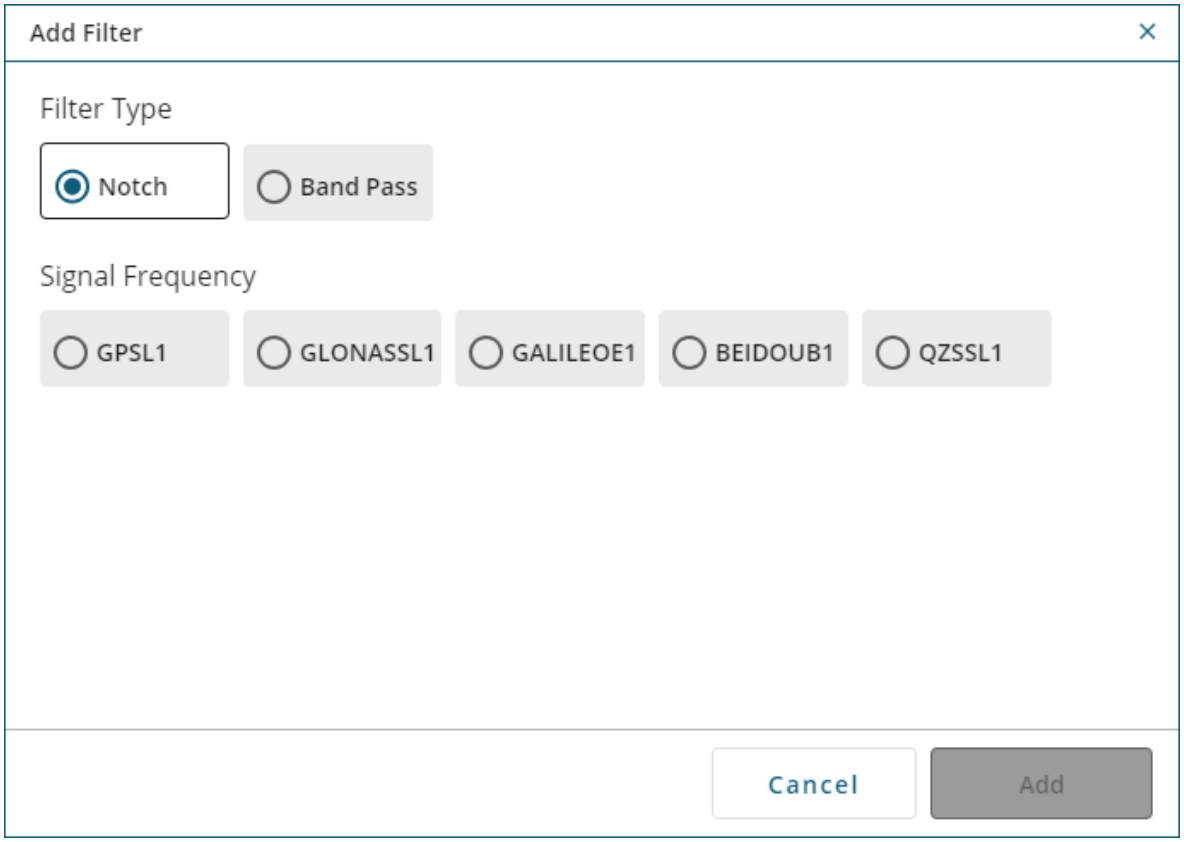
To add a notch filter:

1. Click the **Settings** menu.
2. Click the **Add Filter** link.

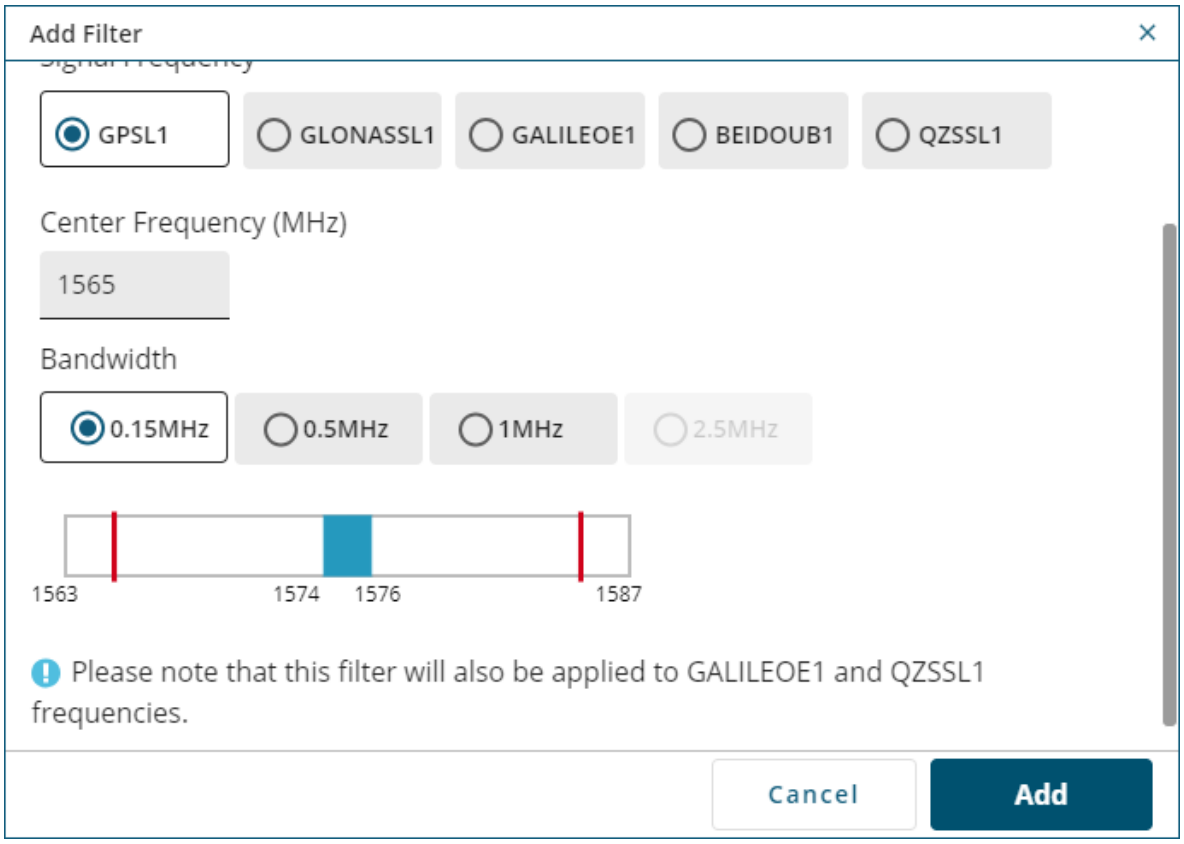
   The *Add Filter* dialog box appears.



3. Click the **Notch** button.

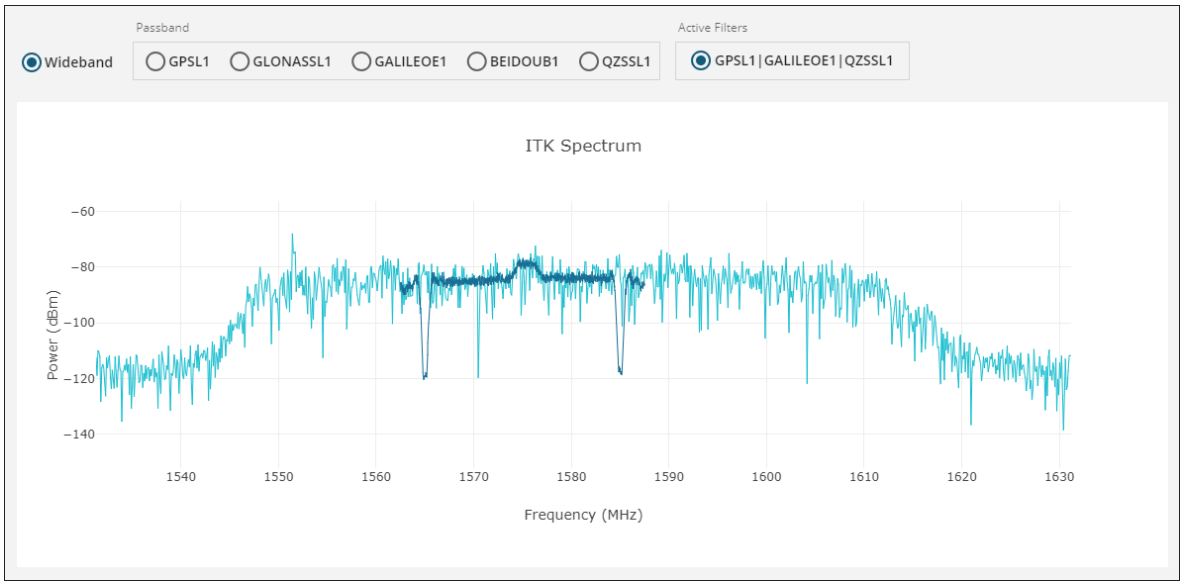


4. Click the button for the GNSS signal to which the filter will be applied.



5. Enter the center frequency for the filter in the **Center Frequency** box.
   - The frequency selected must be in the range shown on the frequency bar. For the example shown above, the value must be between 1563 and 1587 MHz.
   - The selected frequency can not be within the central frequencies, represented by the blue bar. In this example, the frequency cannot be between 1574 and 1576 MHz.
6. Click one of the **Bandwidth** buttons to the select the bandwidth for the notch filter.
   - Select the narrowest bandwidth that will remove the interference signal.
   - Two notch filters are added which are equal distance from the center frequency. The configured filter is represented by red bars on the frequency bar.
7. Click the **Add** button.

   A box for the new filter is added to the **Settings** menu, a new button for the filter is added to the *Interference Toolkit* window and the filtered signal is shown on the ITK Spectrum plot.



When the filter button is selected, the filtered signal is updated.

When the filter button is not selected, the unfiltered signal is updated.

Bandpass Filter

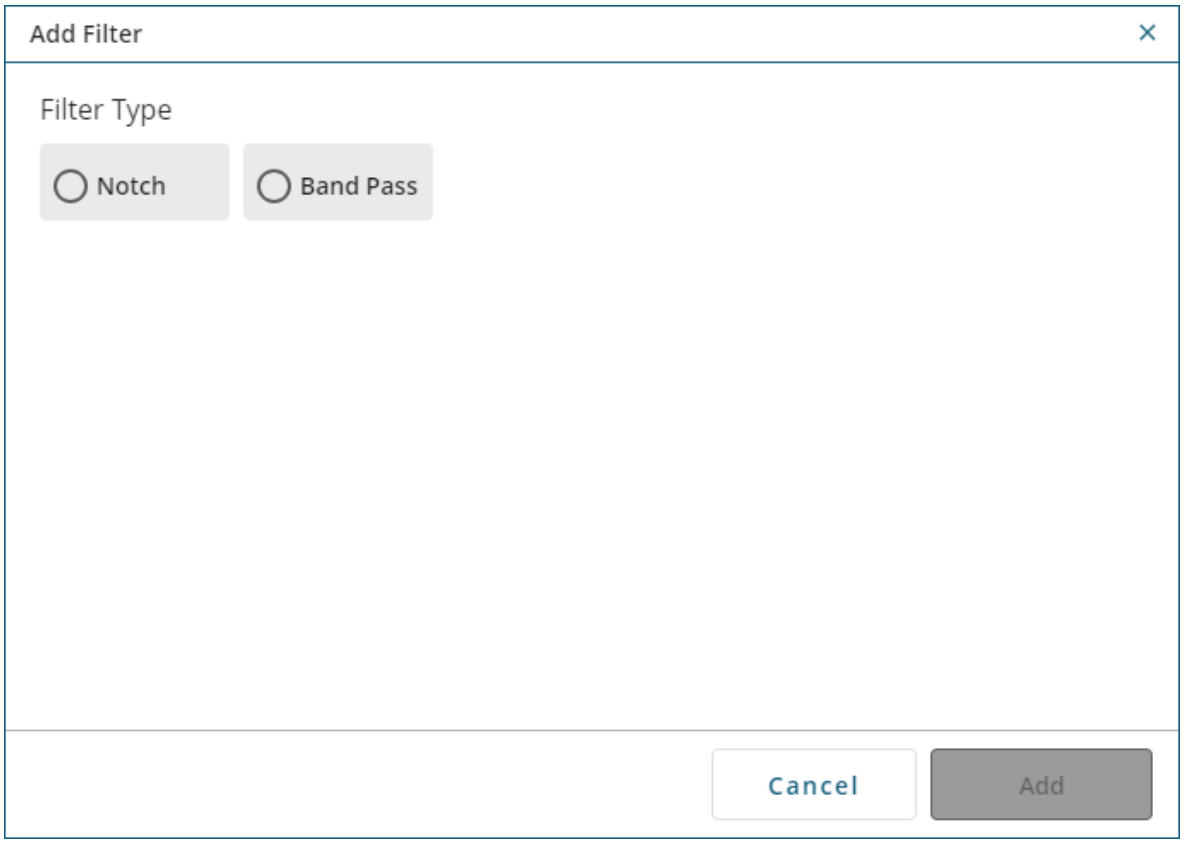
The Interference Toolkit bandpass filter reduces the signal power of all incoming signals at the upper and lower end of the GNSS signal band starting at the configured cut-off frequency. This type of filter is good for reducing single or multiple interference signals at the edges of the signal band.

When a bandpass filter is applied to the signal, the upper and lower ends of the signal band are filtered out to reduce the signal power of the interference signal.

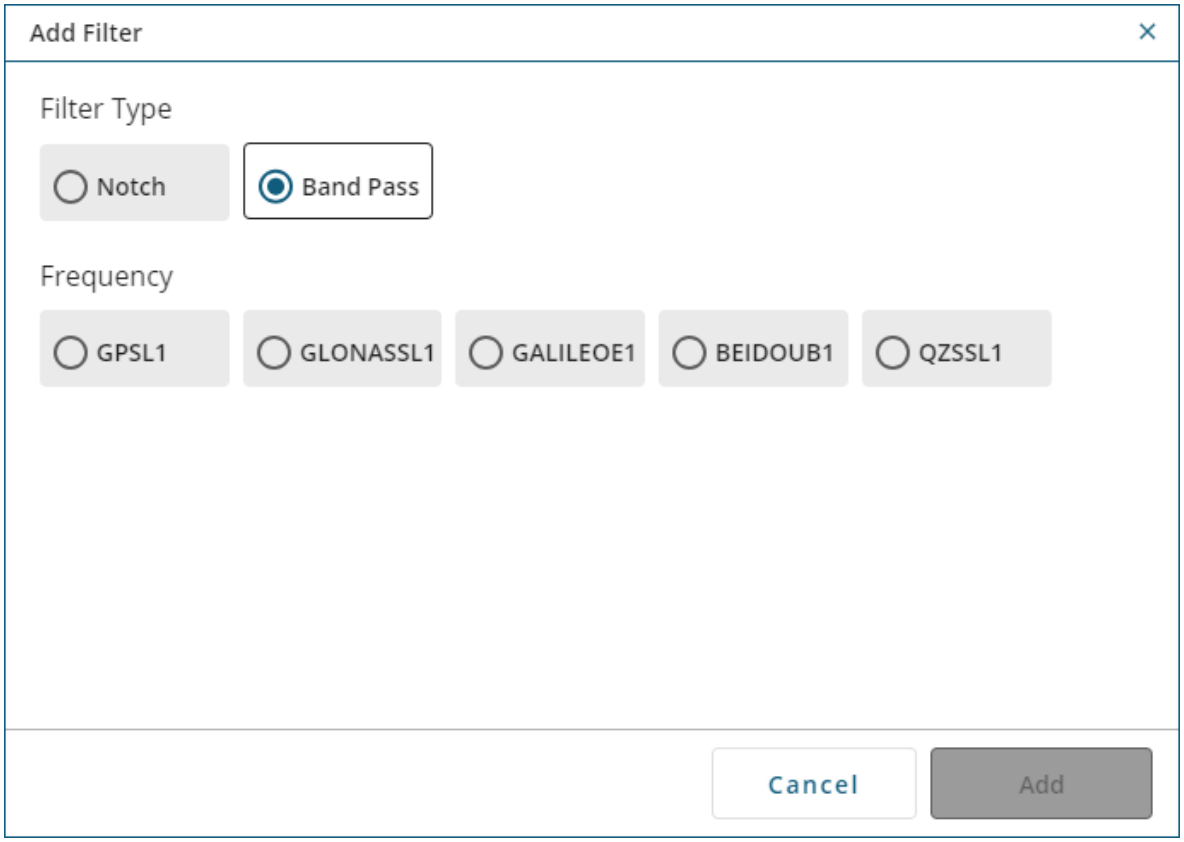
To add a bandpass filter:

1. Click the **Settings** menu.
2. Click the **Add Filter** link.

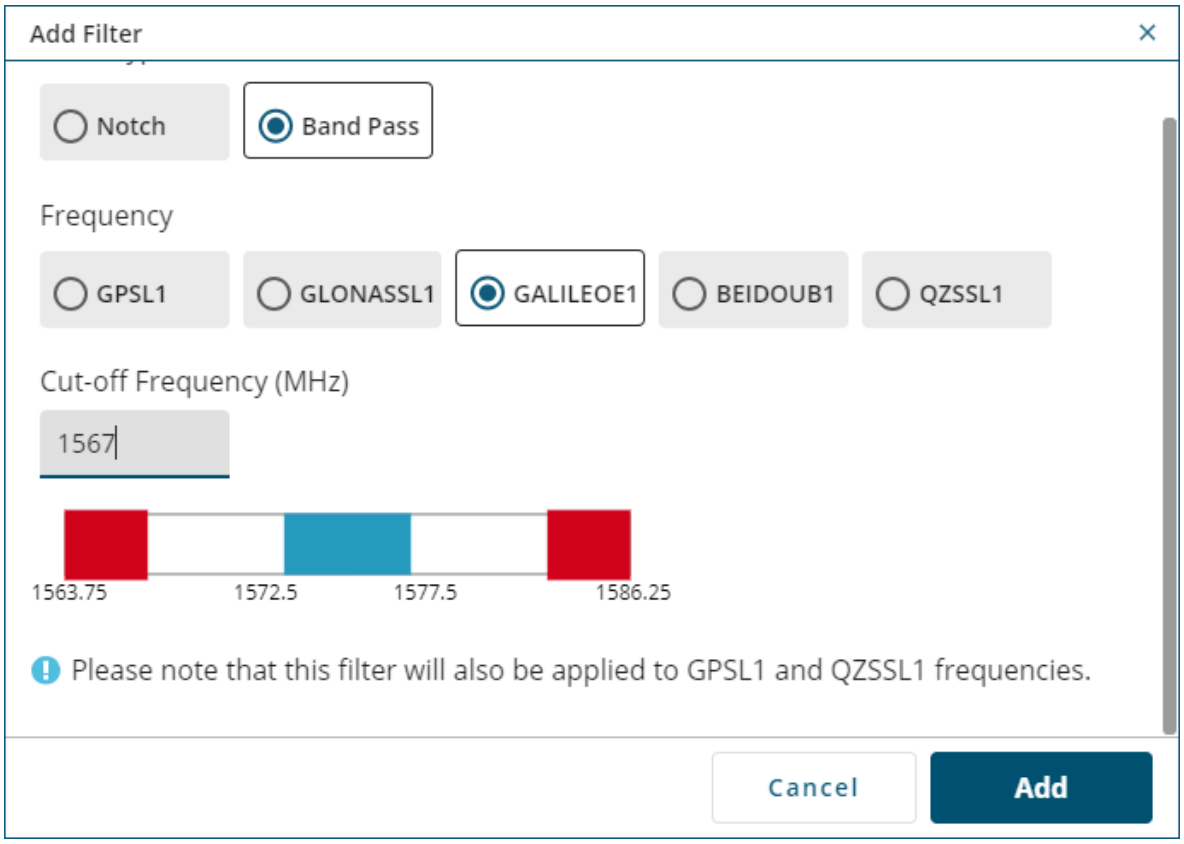
   The *Add Filter* dialog box appears.



3. Click the **Band Pass** button.

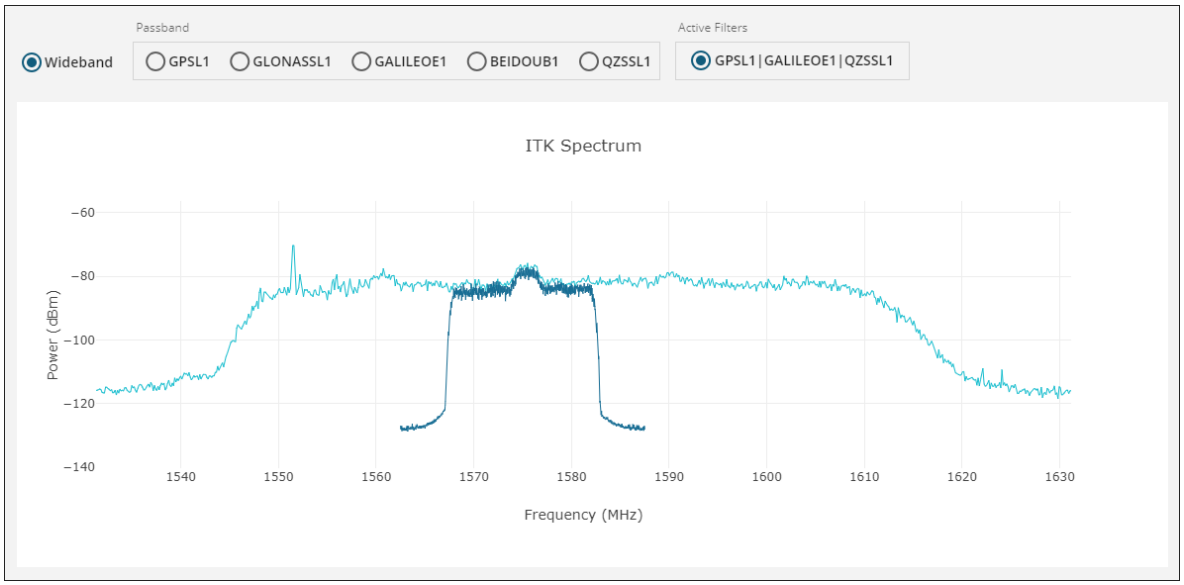


4. Click the button for the GNSS signal to which the filter will be applied.



5. Enter the cut-off frequency for the filter in the **Cut-off Frequency** text box.
   - The frequency selected must be in the range shown on the frequency bar. For the example shown above, the value must be between 1563.75 and 1586.25 MHz.
   - The selected frequency can not be within the central frequencies, represented by the blue bar. In this example, the frequency cannot be between 1572.5 and 1577.5 MHz.
   - Two band pass filters are added which are equal distance from the center frequency. The configured filter is represent by red bars at the upper and lower end of the frequency bar.
6. Click the **Add** button.

   A box for the new filter is added to the *Settings* menu, a new button for the filter is added to the *Interference Toolkit* window and the filtered signal is displayed on the ITK Spectrum plot.



When the filter button is selected, the filtered signal is updated.

When the filter button is not selected, the unfiltered signal is updated.

Activate/Deactivate a Filter

When a filter is activated, the filter is applied to the incoming signal. To activate a filter:

1. Click the **Settings** menu.
2. Set the **Active** button to on ( ).

   The filtered signal and a button for the filter appear on the *Interference Toolkit* window.

When a filter is deactivated, the filter is not applied to the incoming signal. To deactivate a filter:

1. Click the **Settings** menu.
2. Set the **Active** button to off ( ).

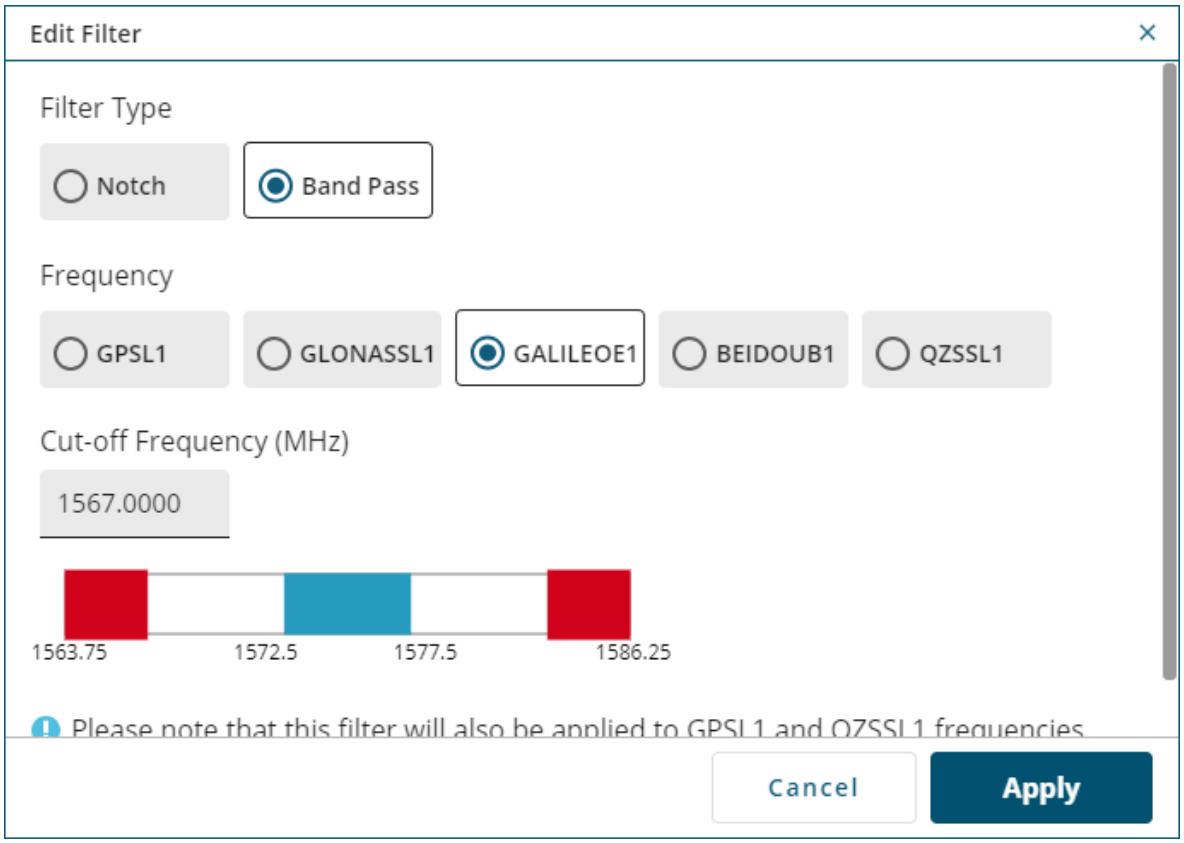
   The filtered signal and the button for the filter are removed from the *Interference Toolkit* window.

Edit a Filter

To edit a filter:

1. Click the **Settings** menu.
2. Click the menu button ( ) on the filter to edit and click **Edit Filter**.

   The *Edit Filter* dialog box appears.



3. Change the filter parameters to the desired settings.
4. Click the **Apply** button.

Delete a Filter

To delete a filter:

1. Click the **Settings** menu.
2. Click the menu button (⋮) on the filter to delete and click **Delete Filter**.

2.2.8.5 Advanced Settings

The Advanced Settings configure the parameters used to generate the plot.

> Decreasing the Update Rate or increasing the Spectrum Resolution will impact receiver idle time. The idle time should be monitored to prevent adverse effects on receiver performance.

> The Advanced Settings are not available when connected to the receiver using a serial connection.

Update Rate (Secs)

This parameter sets the spectrum update rate in seconds. It determines how quickly the plot is updated.

The update interval is limited by the FFT size chosen. For 32k, the minimum update period is 0.1 seconds and for 64k, the minimum update period is 0.2 seconds.

Spectrum Resolution (K)

This parameter sets the frequency resolution of the spectrum.

Time Averaging (Secs)
This parameter sets the time averaging window in seconds. 0 means no time averaging.

Detection Sensitivity (Bins)
This parameter sets the integration window size of FFT samples. 1 means no integration.

To reset the Advanced Settings to the default values, click the **Restore Settings Defaults** button.

2.2.9 Details

Use the *Details* windows to view information about the receiver.

2.2.9.1 Device

The *Device* tile provides information about the receiver.

Serial Number
This is the serial number for the receiver enclosure. For example, for a PwrPak7 this is the serial number for the entire PwrPak7.

Wi-Fi Receiver
This is the model number for the Wi-Fi radio in the receiver.

Wi-Fi Software Version
This is the version of the software running on the Wi-Fi radio in the receiver.

Region
This is the regulatory region the Wi-Fi radio has been configured to comply with.

2.2.9.2 GNSS

The *GNSS Card* tile provides information about the GNSS receiver card (e.g. OEM7700). For enclosure style receivers, such as PwrPak7, the information is about the receiver card in the PwrPak7.

Serial Number

This is the serial number for the receiver card.

Model Number

This is the model number for the receiver card. The model indicates the receiver's current model functionality.

Hardware Version

This parameter provides information about the receiver card hardware. The hardware version is in the format of **P**-**R**, where:

P = hardware platform

R = hardware revision

Example: OEM7720-1.00

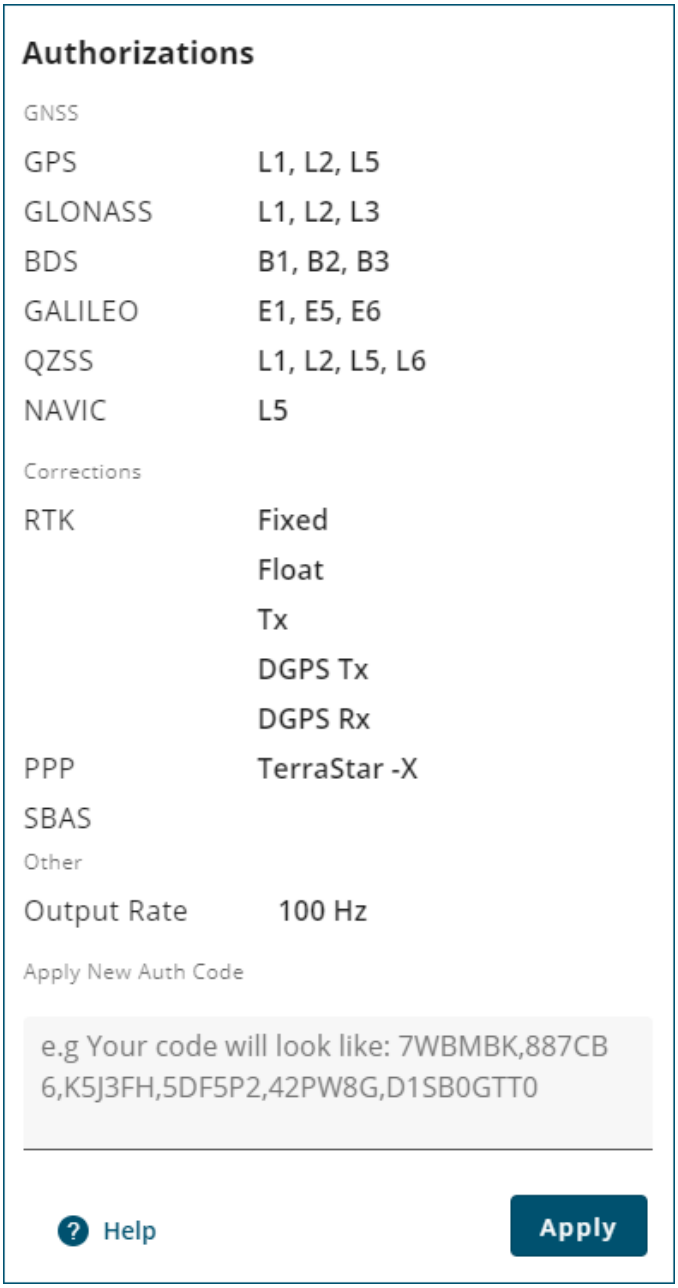
Software Version

This is the version of software (firmware) that is running on the receiver card.

Boot Version

This is the version of boot code running on the receiver card.

2.2.9.3 Authorizations



The *Authorizations* tile provides information about the functionality enabled on the receiver. The information shown varies depending on the receiver model number and any Auth Codes installed on the receiver.

An Auth Code (authorization code) enables additional functionality on the receiver, such as access to additional constellations or positioning modes. The *Authorizations* tile can be used to add new Auth Codes, and thus new functionality, to the receiver.

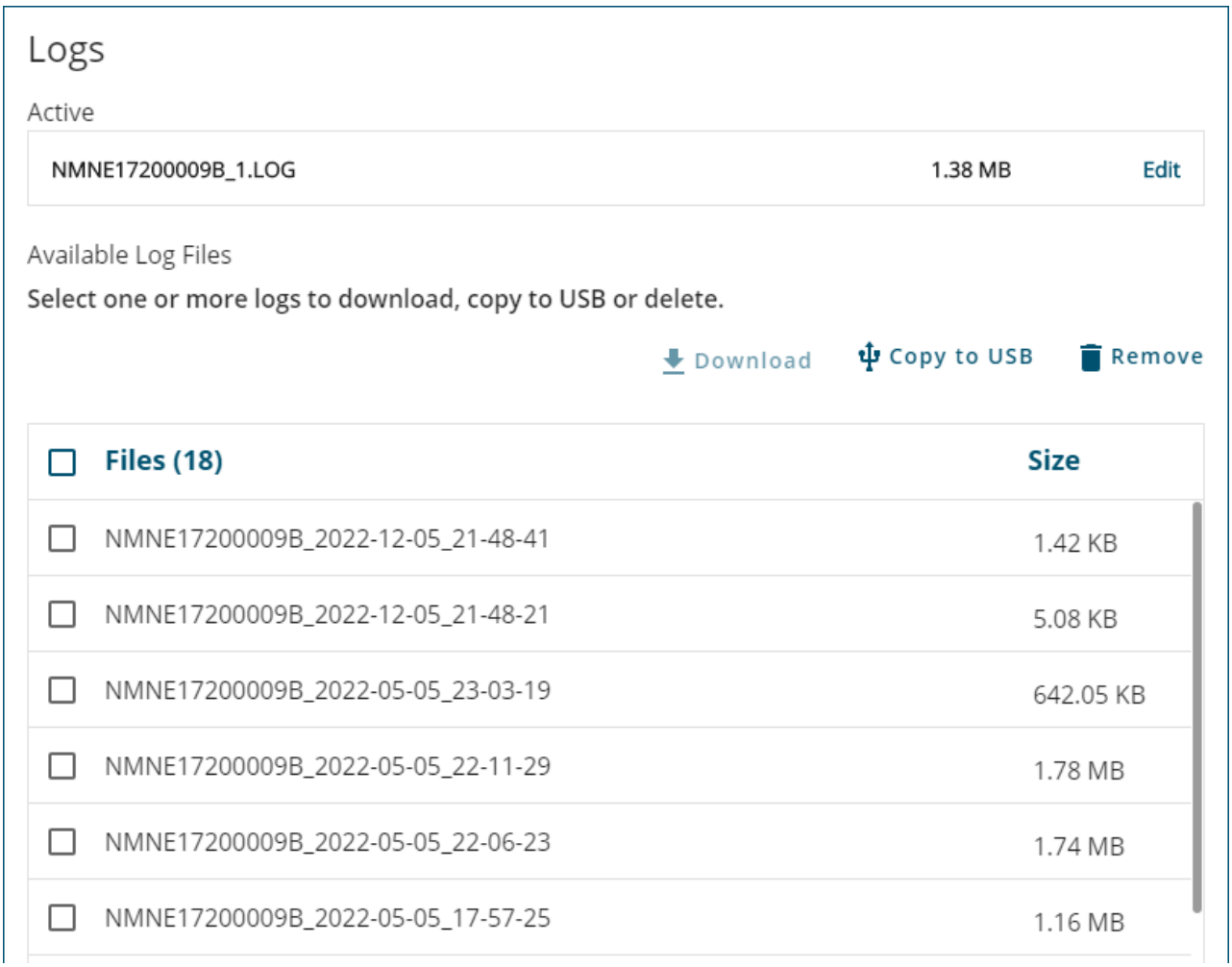
To add an Auth Code:

1. Obtain the new Auth Code from NovAtel Sales or your local NovAtel dealer.
2. Enter the new Auth Code in the *Apply New Auth Code* box.
3. Click the **Apply** button to save the changes to the receiver.

   The receiver will restart when a new Auth Code is applied.

2.2.10 Storage

Use the *Storage* window to manage the log files saved on the receiver's internal storage.



2.2.10.1 Edit Active Log File

To edit the active log file, click the **Edit** link beside the active log file. The *Logging* configuration window displays. Make any changes required to the messages being stored in the active log file.

If you click the **Stop All** button on the *Logging* configuration window, the log file will be closed and added to the *Available Log Files* list.

2.2.10.2 Download

Log files stored on the receiver's internal memory can be downloaded on to the computer running NovAtel Application Suite. To download files:

1. Click one or more of the log files in the **Available Log Files** box to select it.

   To select all of the log files stored on internal memory, click the **Files** option.
2. Click **Download**.
3. Navigate to the folder on the computer where the file will be saved.
4. Click the **Save** button.

2.2.10.3 Copy to USB

Log files stored on the receiver's internal memory can be copied to a storage device connected to the receiver's USB Host port (Transfer port on PwrPak7). To copy files to a USB device:

1. Connect a storage device, such as a USB memory key, to the receiver's USB Host port.
2. Click one or more of the log files in the *Available Log File* box.

   To select all of the log files stored on internal memory, click the **Files** option.
3. Click **Copy to USB**.

2.2.10.4 Remove

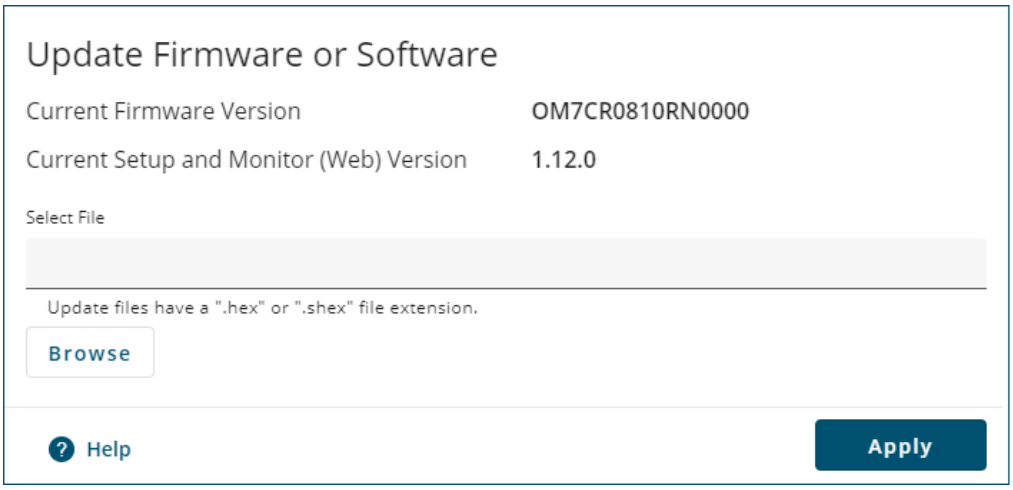
To delete log files from the receiver's internal memory:

1. Click one or more of the log files in the *Available Log Files* list.

   To select all of the log files stored on internal memory, click the **Files** option.
2. Click **Remove**.

   A confirmation dialog displays.
3. Click **Yes** to delete the log file

2.2.11 Update



Use the *Update* window to view the software currently loaded on the receiver and to load new software onto the receiver.

The Current Firmware Version field shows the version of the software loaded on the receiver. The Current Setup and Monitor (Web) Version field shows the version of the Setup & Monitor (Web) software loaded on the receiver.

The new software must be copied onto the computer used to run NovAtel Application Suite before starting this procedure.

To load new software on the receiver:

1. Click the **Browse** button.

   The *Select File* dialog box appears.

2. Navigate to the folder in which the new software to load is stored and select the software file.

   The selected file appears in the *File name* field.

3. Click the **Open** button.

   The Update window appears with the name of the selected file in the *Select File* field.

4. Click the **Apply** button

After the new software is loaded, the receiver will restart.

2.2.12 Events

From the *Events* menu, you can view the current events on the receiver and a history of the events that have occurred since the last receiver restart.

Current

The *Current* tab shows all of the warning, errors and status messages that currently apply to the receiver.

To view the events that currently apply to the receiver, click the **Events** menu.

Historic

The *Historic* tab shows all of warning, errors and status messages that have occurred on the receiver since the last receiver restart.

To view a history of the events that have occurred on the receiver, click the **Events** menu and then click **Historic**.

Limit Display

The Limit Display option sets the maximum number of events to show on the Events menu.

To change the number of events that can display, click the **Limit Display** drop menu and select the maximum.

Filter

Use the Filter button ( ) view only the events of a specific severity. To filter the events, click the Filter button ( ) and select the event severity to view.

Save

Use the Save button ( ) to save the event history of a file. To save the event history:

1. Click the Save button ( ).

   The Save File dialog box appears.

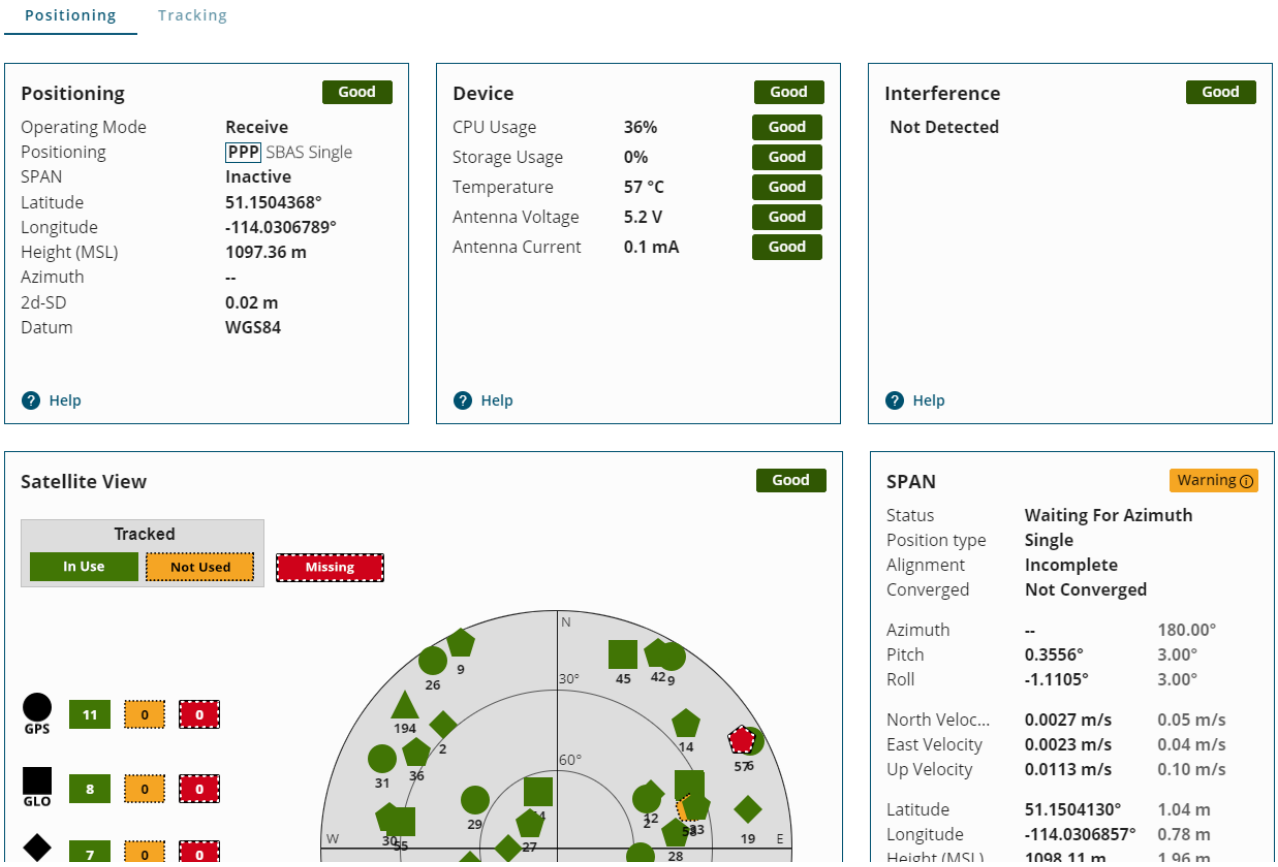
2. Navigate to the folder in which the event history file will be saved.
3. Click the **Save** button.

Clear

Use the Clear button ( ) to remove events from the event history. To clear events:

1. Click the Clear button ( ).
2. Select the type of event to clear.
3. Click the **Clear** button.

2.3 Status Window



The *Status* window provides access to all the status information available for the receiver. The status information is organized onto several tiles.

- **Positioning Status** on the next page
- **Satellite View** on page 51
- **Ports Status** on page 52
- **Logging Status** on page 52
- **Device Status** on page 53
- **Interference Status** on page 55
- **ALIGN Status** on page 55
- **SPAN Status** on page 56
- **Radio Status** on page 57
- **Satellite Tracking** on page 58

The tiles available vary depending on the type of receiver and the software features enabled.

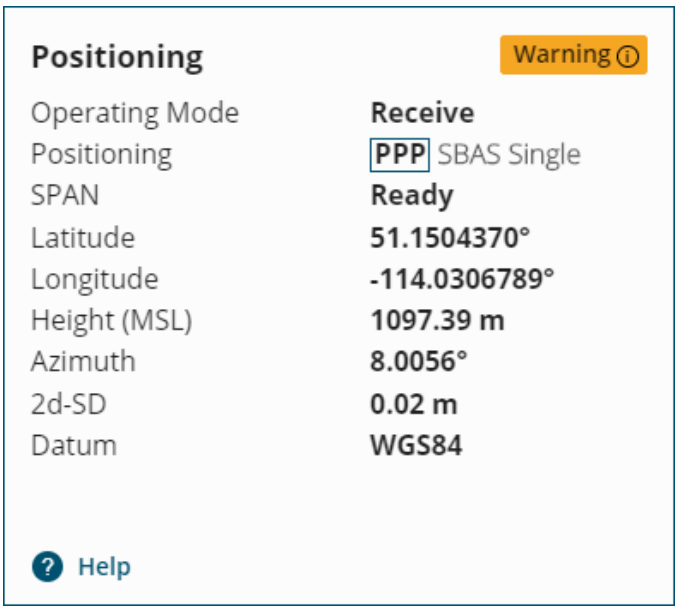
There are two pages on the *Status* window. To change the page being viewed, click either **Positioning** or **Tracking**. The *Satellite Tracking* tile is on the *Tracking* page. All other tiles are on the *Positioning* page.

Each tile has a color coded bar with text to indicate the overall status of the information on that tile.

Colour	Text	Description
Green	Good	The receiver is functioning and there are no warnings or errors.
Amber	Warning	The receiver is functioning, but there are one or more issues that may require attention.
Red	Error	An issue is preventing the receiver from functioning. The Error state will remain until the situation is resolved.
Gray	Off	The feature has been disabled or has not yet been configured.

2.3.1 Positioning Status

The *Positioning* tile displays information about the position calculated by the receiver.



Operating Mode

The receiver operating mode.

- **Transmit**

  The receiver is configured as a base station, but is not yet transmitting corrections. A base station receiver generates differential corrections and sends that data to rover receivers. The receiver can operate as an RTK base station.

- **Transmit (FIXEDPOS)**

  The receiver is configured as a base station, has determined its fixed position and is transmitting corrections.

- **Receive**

  The receiver is configured to receive GNSS correction data from an RTK base station, an RTK network, a correction service such as TerraStar, or from SBAS to calculate a more accurate position.

- **Standalone**

The receiver is configured to calculate a position using observed GNSS data only. This is the default operating mode.

Position

The positioning type used to calculate the position.

This field shows all of the position types configured on the receiver. The position type being used is highlighted with a green box.

- **None**

  A position solution has not been calculated.

- **Single**

  A GNSS code based position is being calculated without the use of any correction sources. This is the default positioning type.

- **SBAS**

  A GNSS code based position is being calculated using corrections provided by an SBAS system, such as WAAS.

- **FIXEDPOS**

  The fixed position of the receiver has been configured in the receiver, but the receiver is not configured as an RTK base station.

- **PPP**

  A carrier based position is being calculated using corrections provided by TerraStar or Oceanix.

- **RTK**

  A carrier based position is being calculated using the Real Time Kinematic (RTK) method. If the Operating Mode is Transmit, this receiver is acting as the base station and is providing corrections to a rover receiver. If the Operating Mode is Receive, this receiver is acting as the rover receiver and is receiving corrections from a base station.

SPAN

SPAN is a GNSS+INS navigation technology that provides a reliable position, velocity and attitude solution.

- **Off**

  SPAN IMU type is not configured.

- **Inactive**

  SPAN IMU type is configured and the *Inertial Solution Status* is any status other than INS_SOLUTION_GOOD.

- **Ready**

  The *Inertial Solution Status* is INS_SOLUTION_GOOD and the INS position type is any status other than INS positions.

- **Aiding**

  The *Inertial Solution Status* is INS_SOLUTION_GOOD and the INS position type is any status of INS positions.

Latitude

Latitude of the receiver position in degrees.

Longitude

Longitude of the receiver position in degrees.

Height

The height above mean sea level of the receiver in metres.

Azimuth

Left-handed rotation around the z-axis in degrees clockwise from North. (0° to 359.99°)

This is the inertial azimuth calculated from the IMU gyros and the SPAN filters.

Azimuth is available only if SPAN is active.

Heading

Heading in degrees clockwise from North. (0° to 359.99°)

Heading is determined from the positions of two GNSS antennas. This can be antennas connected to two ALIGN capable receivers configured to communicate with each other or a dual antenna receiver such as the PwrPak7D or OEM7720.

Heading is available only on ALIGN capable receivers.

- If ALIGN is not configured, this field displays **--**.
- If ALIGN is configured and Heading data is not available, this field displays **--**.
- If ALIGN is configured and Heading data is available, this field displays the Heading in degrees.

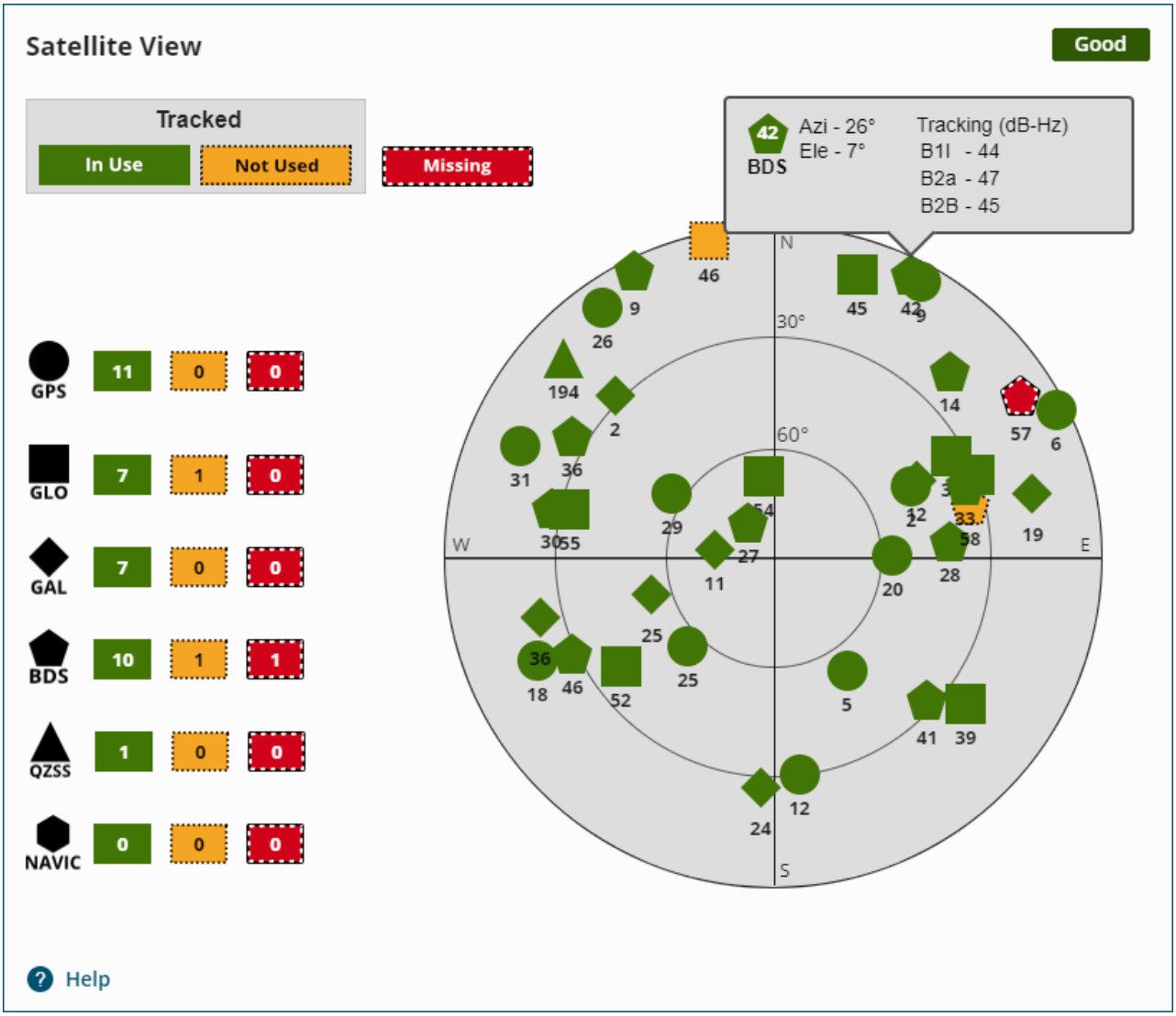
2d-SD

The horizontal standard deviation of the position.

Datum

The datum in which the Latitude, Longitude and Height are reported. The default is WGS84.

2.3.2 Satellite View



The *Satellite View* tile displays each satellite the receiver is tracking in graphical format. Concentric circles from 0° to 90° represent elevations from the horizon to directly overhead.

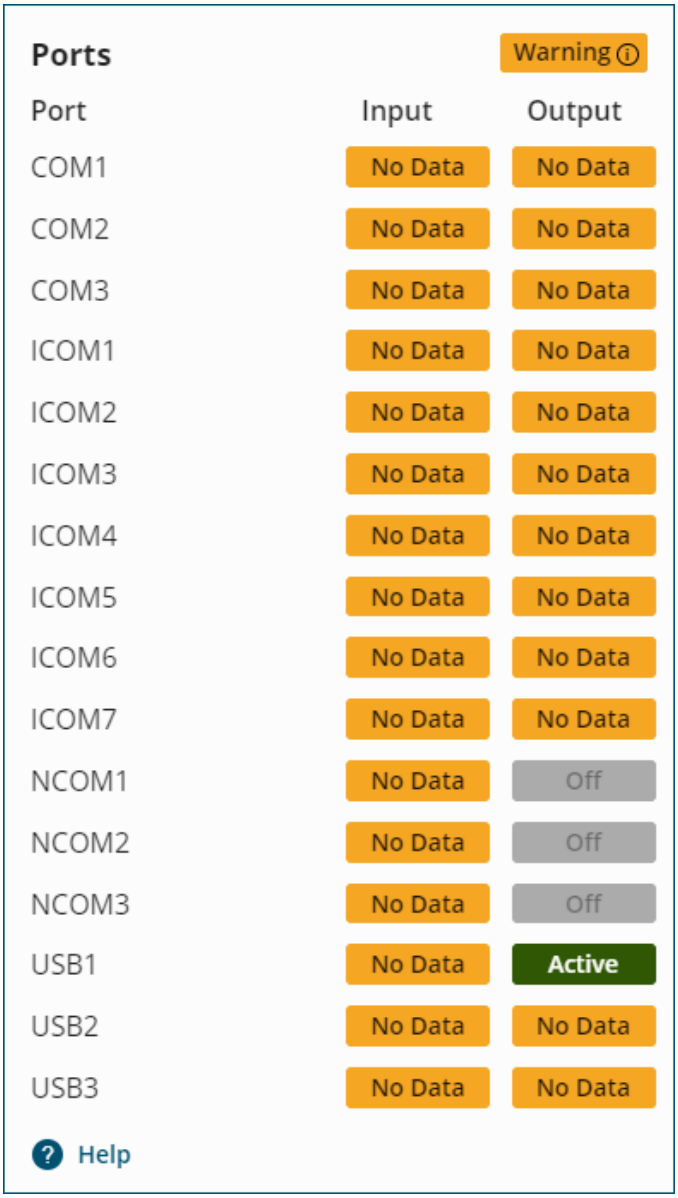
The satellites being tracked are represented with icons according to their satellite system. The PRN of the satellite tracked appears below the Satellite icon.

- If the Satellite icon is green, the satellite is used in the positioning solution.
- If the Satellite icon is amber, the satellite is being tracked but is not used in the positioning solution.
- If the Satellite icon is red, the satellite is missing.

A legend on the *Satellite View* tile identifies the icon used for each GNSS system and the number of satellites used in the solution, the number tracked but not used and the number missing.

To view information about a specific satellite, click on the Satellite icon. A pop up box displays PRN, azimuth, elevation and tracking information about the satellite.

2.3.3 Ports Status



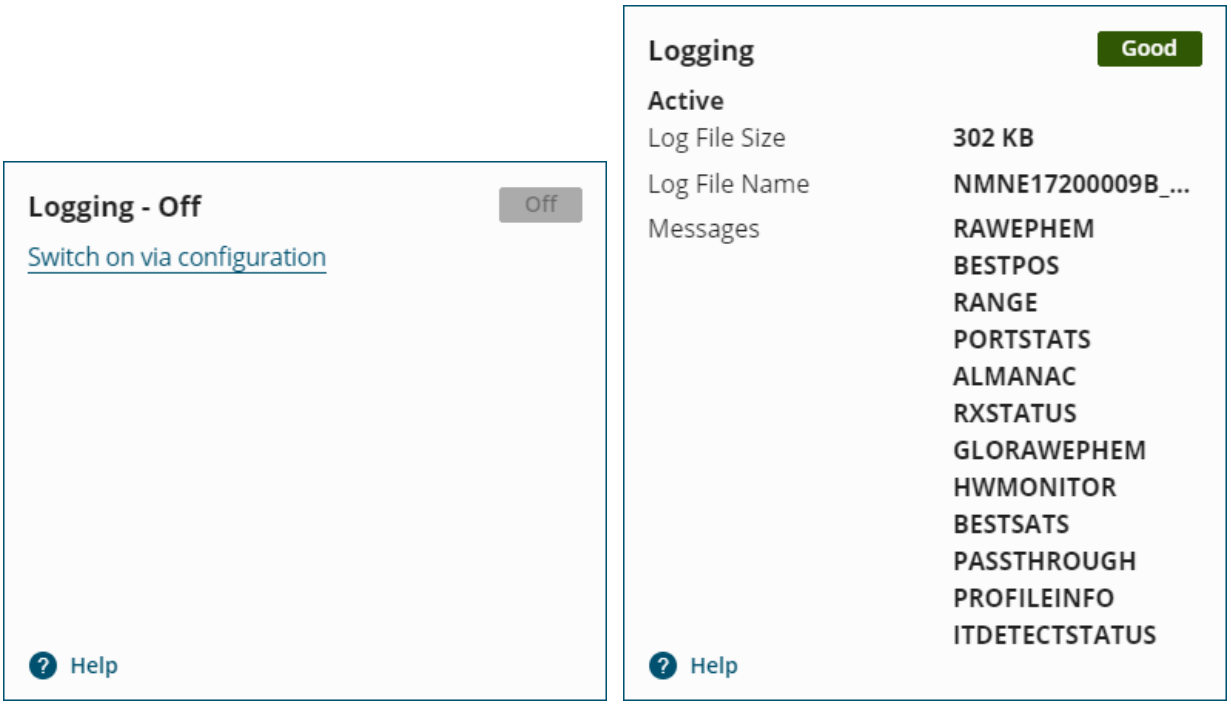
The *Ports* status tile displays the communication ports available on the receiver and indicates if the port is configured to receive messages (Input), send messages (Output) or both.

- Green – Configured and active
- Amber – Configured and not active
- Red – Error. An issue is impeding port function.
- Gray – Not configured

If the status dot on the *Ports* title is gray, no ports are configured.

2.3.4 Logging Status

The *Logging* status window displays the current status of logging to the internal memory of the receiver. This window is applicable only to receivers with internal storage, such as the PwrPak7 and CPT7.



Status
The status of internal logging.

Active if logging information is being stored on the receiver's internal memory.

Logging-Off if logs are not being stored on internal memory.

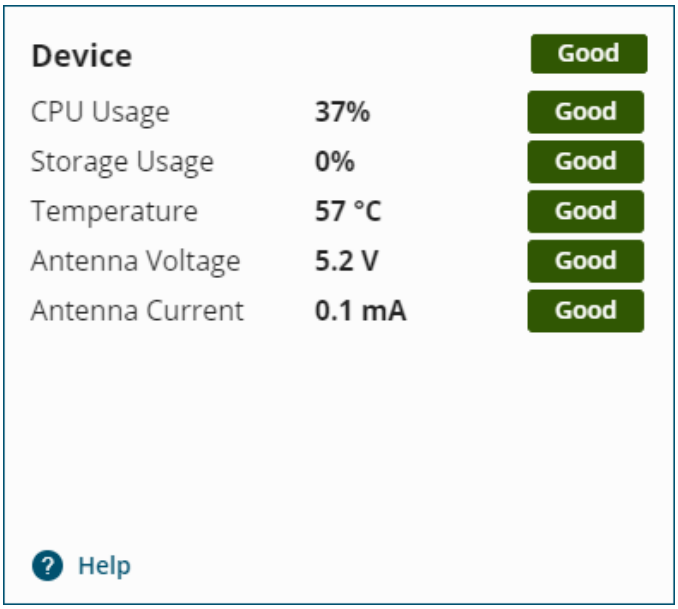
Log File Size
The size of the file on internal memory in which logs are being stored.

Log File Name
The name of the file in which logs are being stored.

Messages
The logs that are being stored in the log file.

2.3.5 Device Status

The *Device* tile provides hardware status information about the receiver. The color of the icon beside each parameter indicates the status of the parameter: Green = OK, Yellow = Warning, Red = Error.



CPU Usage
The percentage of computing power currently being used by the receiver.

Storage Usage
The amount of internal storage used by the receiver.

Temperature
The approximate temperature of the PCB surface near critical components of the receiver.

Antenna Voltage
The voltage provided by the receiver to the GNSS antenna.

Antenna Current
The amount of current being drawn by the active antenna (mA).

2.3.6 Interference Status

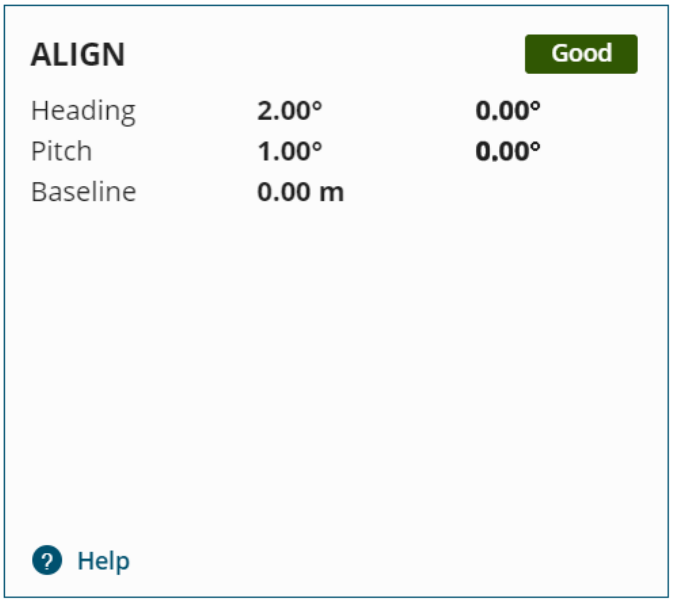
The *Interference* status tile displays whether the receiver has detected interference in the received GNSS signal.

If interference is detected, the *Interference* tile displays the signals in which interference is being detected. To view more information about the interference, or to configure a filter to mitigate the interference, use the **Interference Toolkit** on page 29.

2.3.7 ALIGN Status

The *ALIGN* tile provides position information about the ALIGN solution.

Two ALIGN capable receivers, or a dual antenna receiver, are required to use ALIGN.



Heading

The heading in degrees from true north. (0° to 359.99°)

To the right of the heading value is the standard deviation of the heading in degrees.

Pitch

The pitch in degrees. (±90)

To the right of the pitch value is the standard deviation of the pitch in degrees.

Baseline

The baseline length is the distance between the two GNSS antennas in metres.

For ALIGN Heading models with position access, this field is -1.

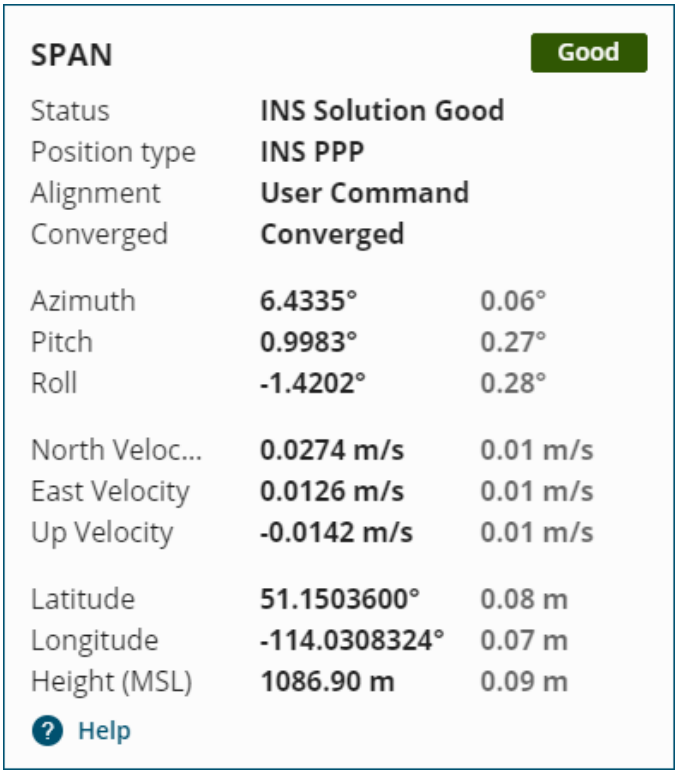
For ALIGN Heading models without position access, this field is only the decimal portion of the baseline in metres.

For ALIGN Relative Positioning models receiving corrections from a master with a fixed position, this field is -1.

For ALIGN Relative Positioning models receiving corrections from a master in moving baseline mode, this field is the complete baseline length in metres.

2.3.8 SPAN Status

The *SPAN* tile shows position information from the SPAN solution.



Status

The current status of the SPAN solution.

Position Type

The position type used to calculate the position.

Alignment

Alignment Indication status. The status can be Incomplete, Static, Kinematic, Dual Antenna, User Command and NVM Seed.

Converged
Status of the INS solution convergence. This field can be Converged or Not Converged.

Azimuth
Left-handed rotation around the z-axis in degrees clockwise from North. This is the inertial azimuth calculated from the IMU gyros and the SPAN filters.

To the right of the azimuth value is the standard deviation of the azimuth in degrees.

Pitch
Right-handed rotation from local level around the x-axis in degrees.

To the right of the pitch value is the standard deviation of the pitch in degrees.

Roll
Right-handed rotation from local level around the y-axis in degrees.

To the right of the roll value is the standard deviation of the roll in degrees.

North Velocity
The velocity in a northerly direction. A negative (-) value implies a southerly direction. The velocity is in m/s.

To the right of the north velocity value is the standard deviation of the velocity in m/s.

East Velocity
The velocity in an easterly direction. A negative (-) value implies a westerly direction. The velocity is in m/s.

To the right of the east velocity value is the standard deviation of the velocity in m/s.

Up Velocity
The velocity in an up direction. A negative (-) value implies a downward direction. The velocity is in m/s.

To the right of the up velocity value is the standard deviation of the velocity in m/s.

Latitude
The latitude of the receiver position in degrees.

To the right of the latitude value is the standard deviation of the latitude in metres.

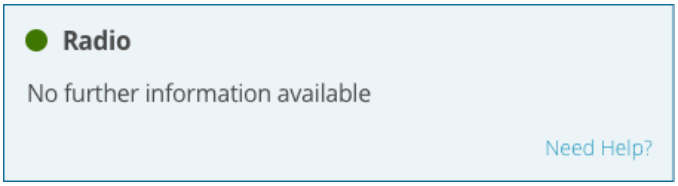
Longitude
The longitude of the receiver position in degrees.

To the right of the longitude value is the standard deviation of the longitude in metres.

Height (MSL)
The height above mean sea level of the receiver position in metres.

To the right of the height value is the standard deviation of the height in metres.

2.3.9 Radio Status



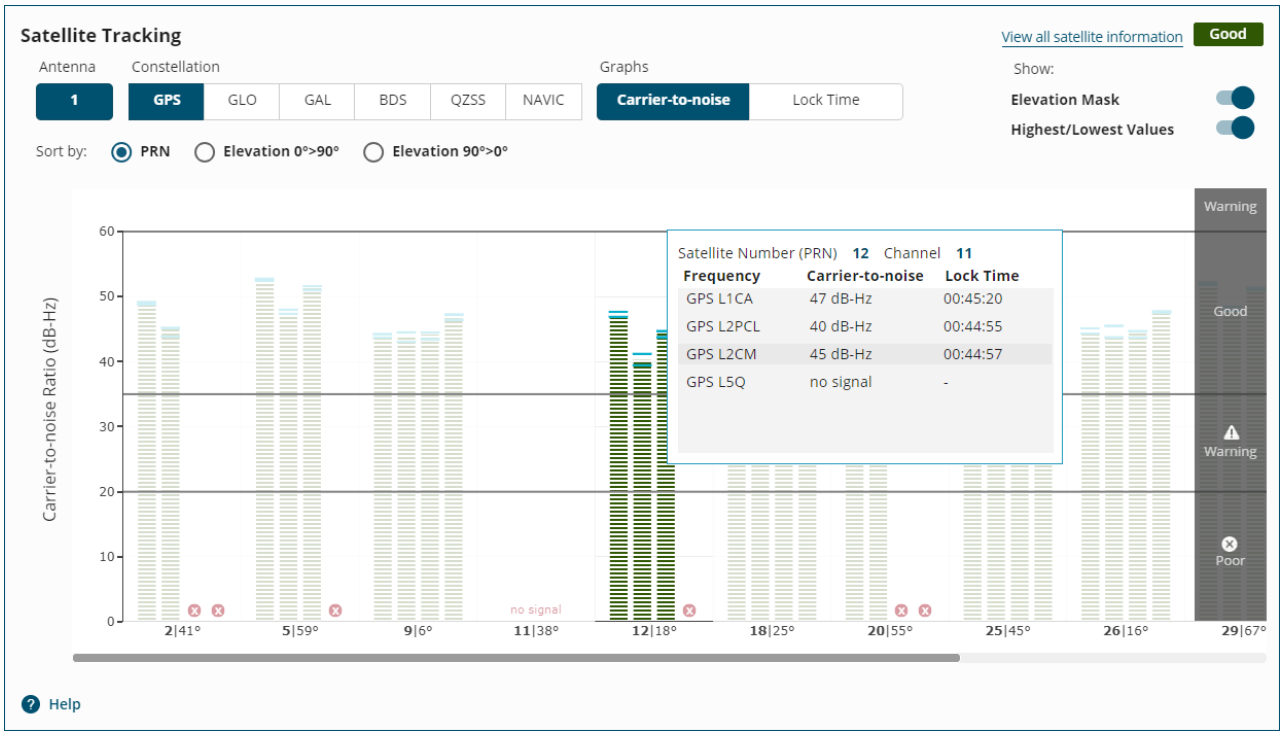
The *Radio* tile provides the operating status of radio module.

Colour	Text	Description
Green	Good	The radio is functioning and there are no warnings or errors.
Amber	Warning	The radio is functioning, but there are one or more issues that may require attention.
Red	Error	An issue is preventing the radio from functioning. The Error state will remain until the situation is resolved.
Gray	Off	The radio has been disabled or has not yet been configured.

This window is available only on systems with an external transmission radio connected.

2.3.10 Satellite Tracking

The *Satellite Tracking* tile displays the carrier to noise ratio and lock time for the GNSS signals the receiver is tracking. This tile is on the *Tracking* page of the *Status* window.



2.3.10.1 Antenna

On dual antenna receivers, the information on the *Satellite Tracking* tile is from either the primary GNSS antenna or secondary GNSS antenna.

To view the tracking information from the primary GNSS antenna, click the **1** button.
To view the tracking information from the secondary GNSS antenna, click the **2** button

On single antenna receivers, only the **1** button is available.

2.3.10.2 Constellation

The graphs on the *Satellite Tracking* tile display tracking information from the satellites of a single constellation (e.g. GPS). The button of the constellation currently being viewed is dark. To change the constellation being viewed, click the button for the constellation.

2.3.10.3 Graphs

There are two graphs available on the *Satellite Tracking* tile: Carrier-to-Noise and Lock Time.

Carrier-to-Noise

To view the *Carrier-to-Noise* graph, click the **Carrier-to-noise** button.

The *Carrier-to-Noise* graph displays the current carrier-to-noise ratio values for all of the satellites (PRNs) being tracked for the currently selected constellation and antenna. A carrier-to-noise bar is shown for each of the frequencies available on the PRN. If there are no frequencies being tracked for the PRN, the text "no signal" is shown for the PRN. If there are more PRNs tracked than can be shown on the tile, a scroll bar appears at the bottom of the graph.

The status of the signal is indicated by the color of the carrier-to-noise bar.

Green	Good
Yellow	Warning
Red	Poor

A legend for the carrier-to-noise status is shown on the right side of the graph. To hide or show the legend, click the arrow button on the legend.

Lock Time

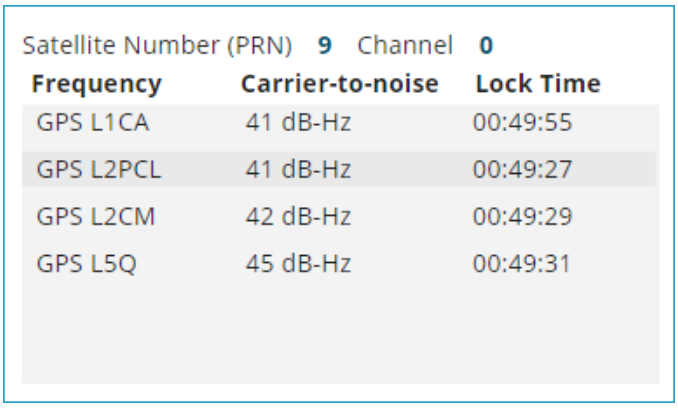
To view the *Lock Time* graph, click the **Lock Time** button.

The *Lock Time* graph displays the number of seconds of continuous tracking for all of the satellites (PRNs) being tracked for the currently selected constellation and antenna. A lock time bar is shown for each of the frequencies available on the PRN. If there are no frequencies being tracked for the PRN, the text "no signal" is shown for the PRN. If there are more PRNs tracked than can be shown on the tile, a scroll bar appears at the bottom of the graph.

A legend for the lock time status is shown on the right side of the graph. To hide or show the legend, click the arrow button on the legend.

View Satellite Details

To view details about a specific satellite, hover the mouse pointer over one of the signals bars. A pop up window appears showing information for the frequencies tracked on that satellite. The signal that the mouse pointer is over is highlighted.



The details pop up window is available on the *Carrier-to-Noise* graph and the *Lock Time* graph.

2.3.10.4 Show

Elevation Mask

When the **Elevation Mask** option is enabled ( ) , satellites below the configured elevation mask for the constellation have a gray bar at the top of the graph. The gray bar has the text "Below X Mask" where X is the elevation mask for the constellation.

When the **Elevation Mask** option is disabled ( ) , the gray bar is not shown.

Highest/Lowest Values

When the **Highest/Lowest Values** option is enabled ( ) , marks are added to each signal bar to indicate the highest and lowest Carrier to Noise values recorded in the last 30 seconds.

When the **Highest/Lowest Values** option is disabled ( ) , the highest and lowest marks are hidden.

The **Highest/Lowest Values** option is available only on the *Carrier to Noise* graph.

2.3.10.5 Sort By

The information on the Satellite Tracking graphs can be sort by PRN or satellite elevation.

PRN

Select this option to sort the graph by satellite PRN number in ascending order.

Elevation 0°>90°

Select this option to sort the graph by elevation angle starting with 0° (horizon).

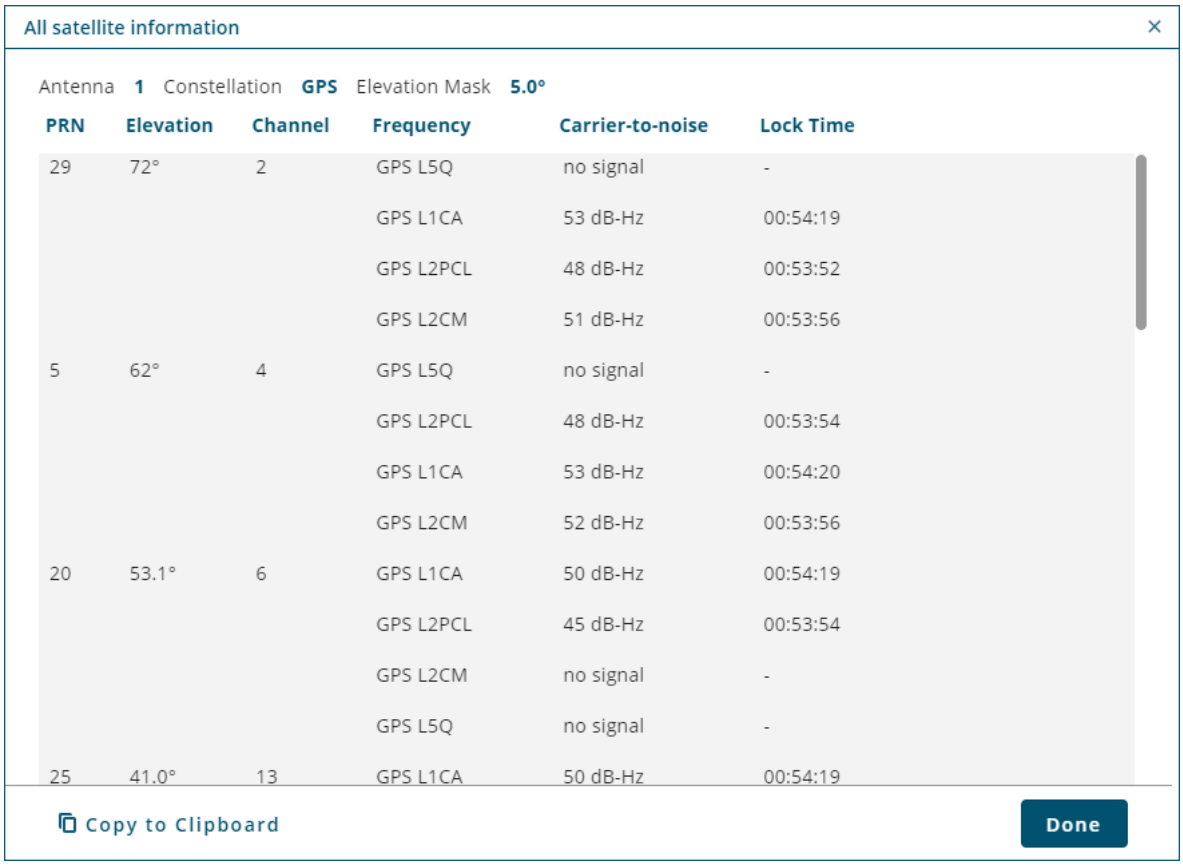
Elevation 90°>0°

Select this option to sort the graph by elevation angle starting with 90° (directly overhead).

2.3.10.6 View all satellite information

To view the satellite tracking information for all of the satellites in a constellation:

1. Click the button for the constellation to view (e.g. GPS).
   For dual antenna receivers, also click the button for the antenna.
2. Click the **View all satellite information** link.
   The *All satellite information* dialog box appears.



This dialog box shows the PRN, Elevation, Channel, Frequencies available, Carrier-to-Noise ratio and Lock Time for each satellite tracked from the selected constellation. It also shows the Elevation Mask set for the constellation.

3. To copy the satellite information to another application, click the **Copy to clipboard** link. The information can then be pasted into any application that can accept CSV formatted information.
4. When finished viewing the information, click the **Done** button to close the dialog box.

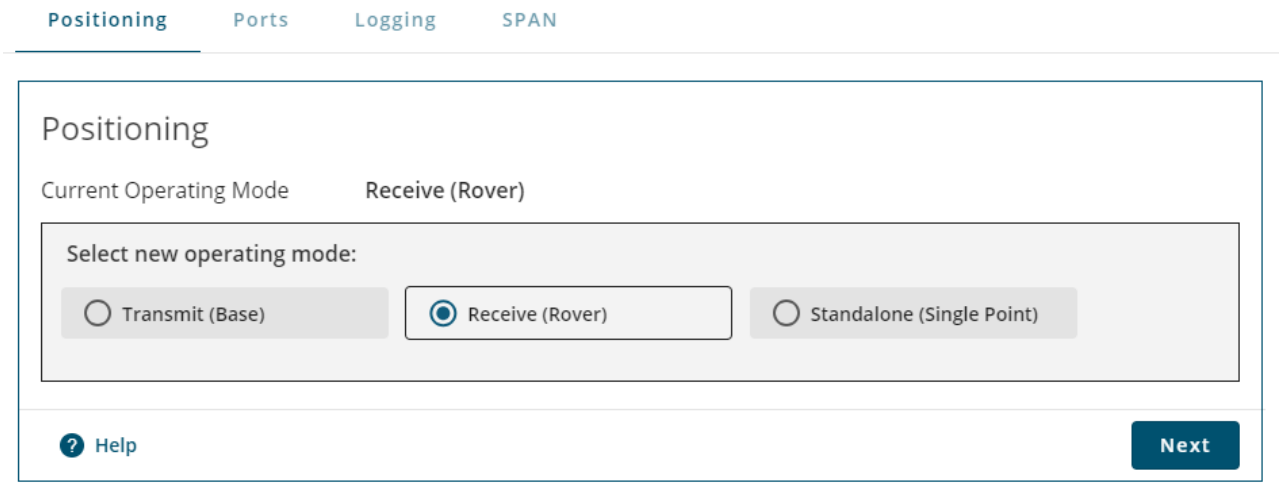
2.3.10.7 Status Indicator

The status indicator shows the overall satellite tracking status of the receiver.

Green	The receiver is tracking five or more satellites and the *GNSS Tracked Status* field in the *RXSTATUS* log is set to 0.
Yellow	The receiver is tracking five or more satellites and the *GNSS Tracked Status* field in the *RXSTATUS* log is set to 1.
Red	The receiver is tracking 4 or less satellites **or** the *GNSS Tracked Status* field in the *RXSTATUS* log is set to 2.

2.4 Configuration Window

The *Configuration* window provides access to all of the configuration parameters available for the receiver.



The configuration parameters are organized onto several configuration tabs.

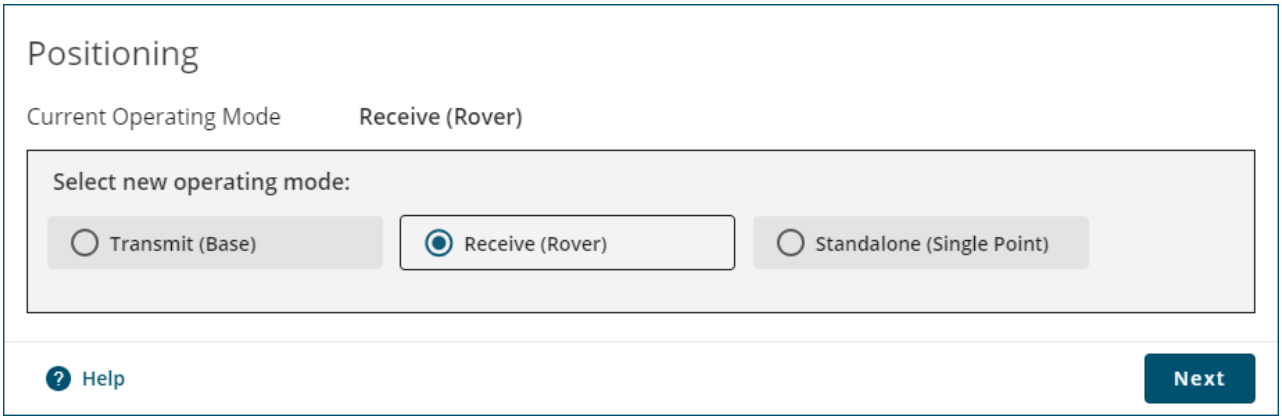
- **Positioning Configuration** below
- **Ports Configuration** on page 78
- **Logging Configuration** on page 85
- **ALIGN Configuration** on page 93
- **SPAN Configuration** on page 96
- **Radio Configuration** on page 103

To view all of the parameters on a configuration tab, click the Configuration tab.

The configuration tabs available on the *Configuration* window varies depending on the type of receiver and the software features enabled.

2.4.1 Positioning Configuration

Use the *Positioning* tab to change the positioning method the receiver uses to calculate a position. This tab is also used to set whether the receiver sends or receives corrections.



The **Current Operating Mode** displays the current receiver configuration.

To change the positioning mode, click one of the three buttons to select a new operating mode and then click the **Next** button.

- **Transmit (Base)** below

  Click this button to configure the receiver as a base station receiver. A base station receiver generates differential corrections and sends that data to rover receivers.

- **Receive (Rover)** on page 71

  Click this button to configure the receiver as a rover receiver. A rover receiver uses correction data received from either a base station receiver, an SBAS system or TerraStar to calculate a more accurate position.

- **Standalone (Single Point)** on page 77

  Click this button to configure the receiver to calculate a position using observed measurements only. No correction data will be used to improve position accuracy. This is the default mode for a receiver.

2.4.1.1 Transmit (Base)

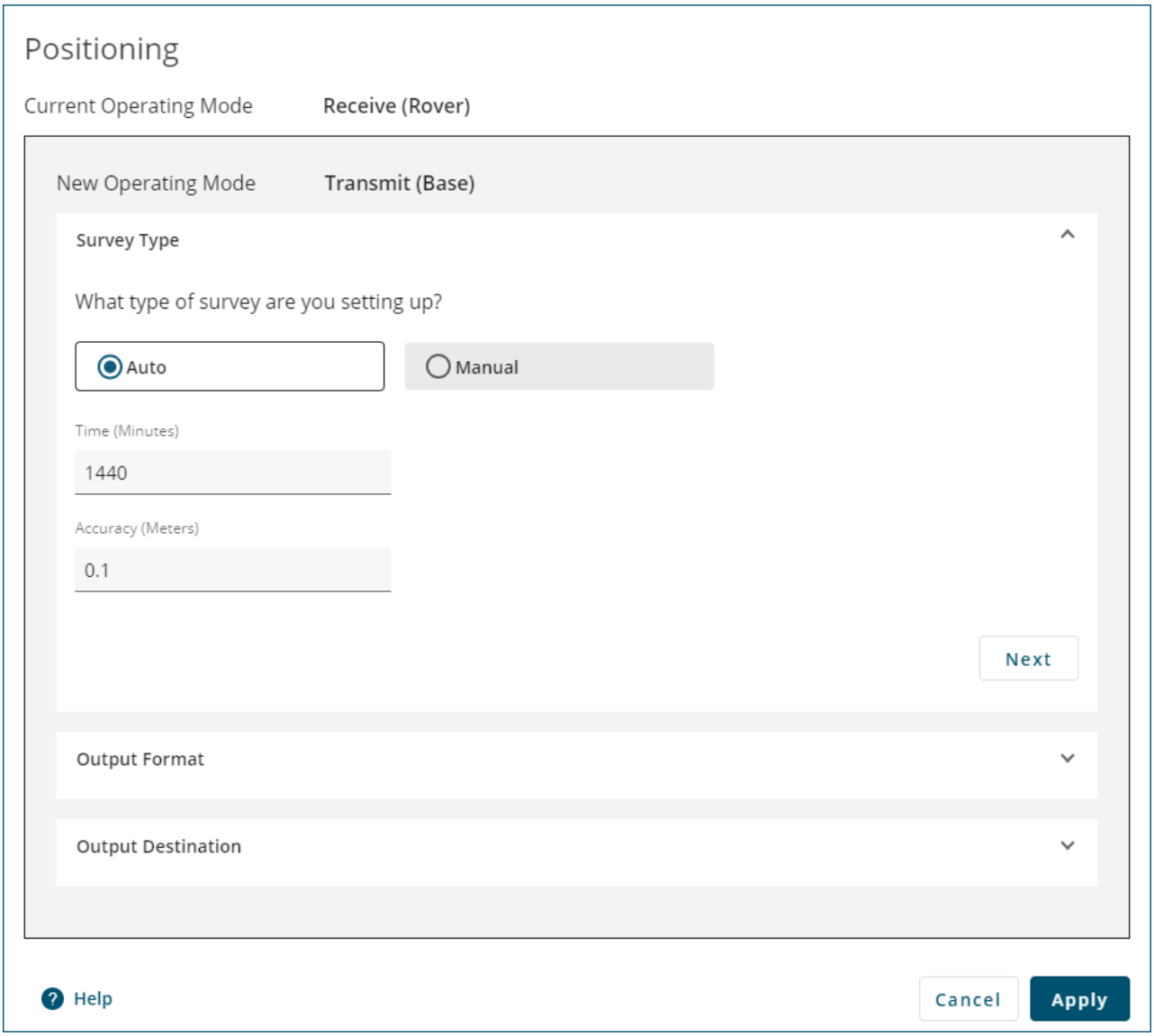
After clicking **Transmit (Base)** and the **Next** button, the *Positioning* window changes to show the Transmit options.

To configure the receiver to transmit corrections, set the parameters for Survey Type, Output Format and Output Destination.

Survey Type

The GNSS position calculated by a receiver is located at the phase center of the GNSS antenna. A receiver acting as a base station must know the location of the GNSS antenna phase center accurately to generate accurate differential correction data for the rover receiver. If the GNSS antenna is installed in a location with a well known position, use the Manual option to enter the position of the GNSS antenna phase center into the receiver. If the GNSS antenna is not installed in a well known position, use the Auto option to have the receiver calculate the antenna position.

Auto



The Auto option uses position averaging to determine the position of the GNSS antenna phase center. The position averaging starts when the Positioning configuration is applied. The position averaging continues until a specified accuracy level is met or until the specified survey time expires. When position averaging is complete, the averaged position is saved as the fix position for the base station. This fix position is then used when calculating differential corrections for the rover.

The calculated base station position is in WGS84.

On subsequent power ups or resets, the receiver uses position averaging to determine if the base station has moved. The average position calculated is compared to the saved fix position. If the average position is within tolerance, the receiver assumes it has not moved and uses the previously saved fix position. If the average position is outside of the tolerance, the receiver assumes it has moved and will continue calculating a position average until the accuracy level is met or until the specified survey time expires.

Click the **Auto** button to show the auto survey options.

Time

Enter the maximum amount of time allowed for the receiver to perform an automatic survey. The allowable time range and default value depends on the type of receiver.

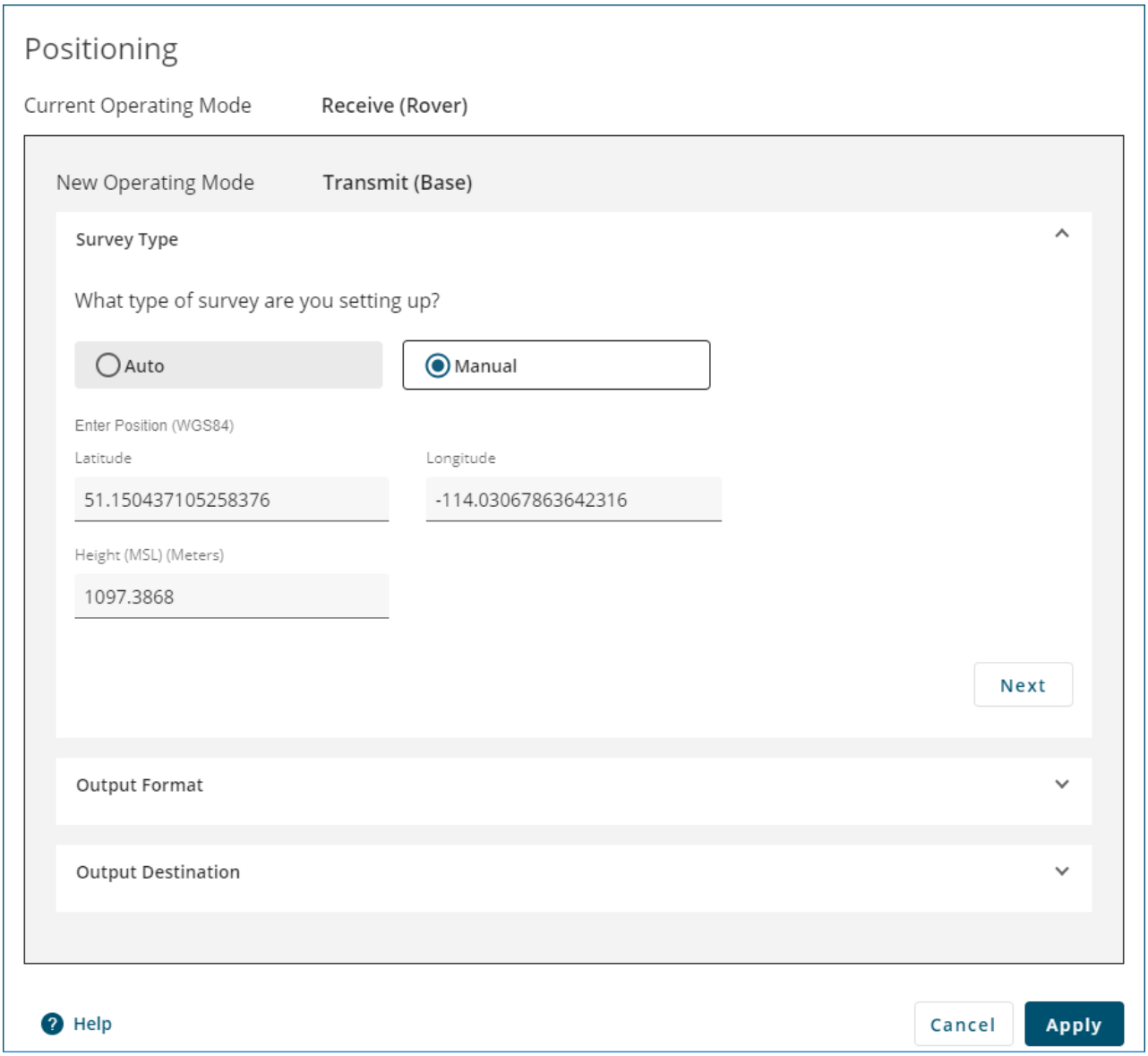
Receiver Family	Time Range	Default
OEM7	1 to 6000 minutes	1440 minutes
OEM6	10 to 6000 minutes	1440 minutes
OEMStar	0.6 to 6000 minutes	0.6 minutes

Accuracy

Enter the desired horizontal standard deviation in metres. Accuracy can be a value from 0 to 100 metres. For OEM7 and OEM6, the default is 0.1 metres. For OEMStar, the default is 0 metres.

After setting the Survey Type parameters, click the **Next** button to show the Output Format parameters.

Manual



Use the Manual option to set the fix position of the base station receiver. The position entered using the Manual option should be as accurate as possible. The receiver uses this position to generate the differential correction data, so the accuracy of this position directly impacts the accuracy of the differential corrections sent to the rover receiver.

Click **Manual** to show the fix position options.

Latitude

Enter the latitude of the GNSS antenna phase center. The latitude can be -90 to +90 degrees where a '**-**' sign denotes south and a '**+**' sign denotes north.

Longitude

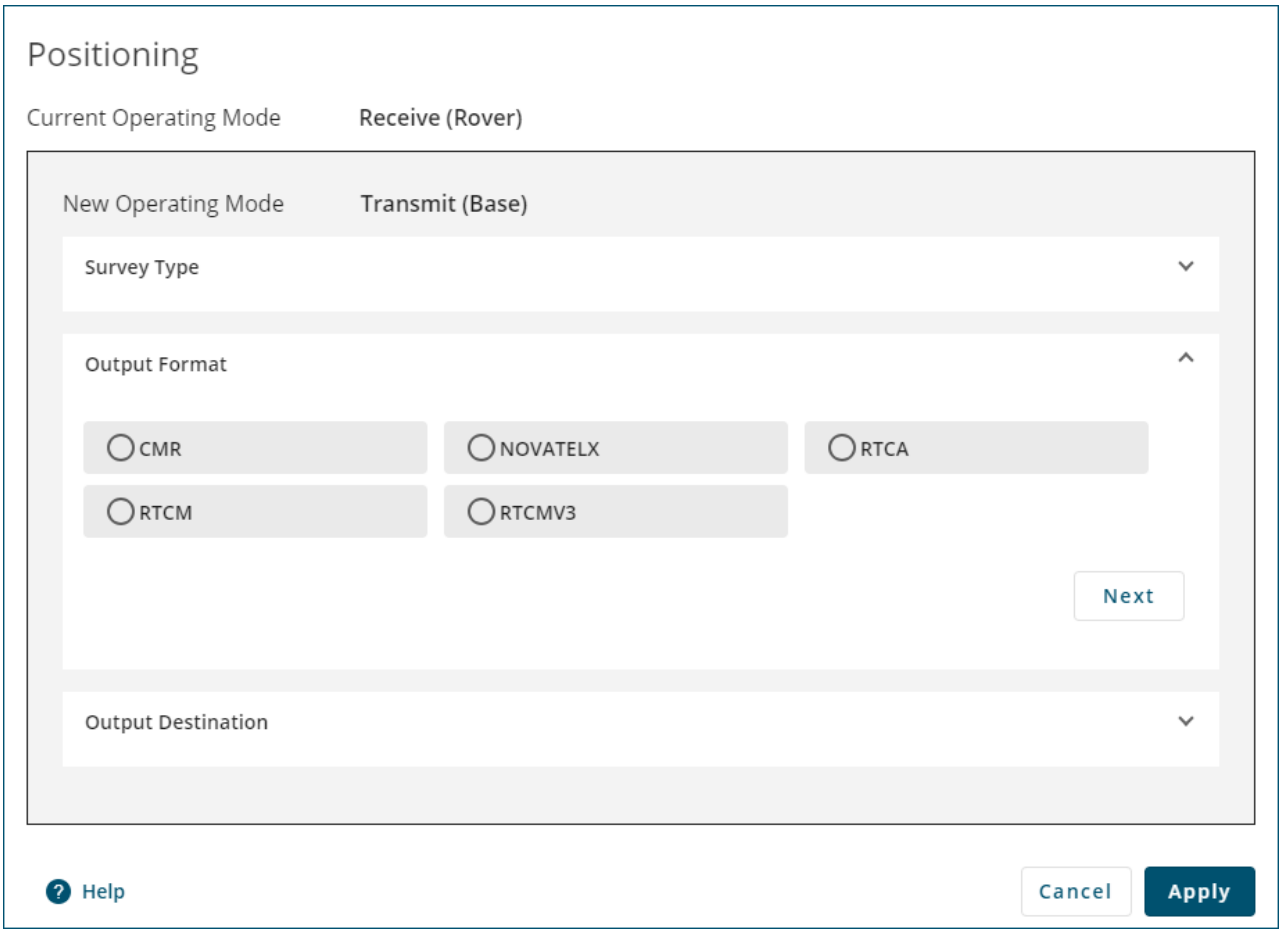
Enter the longitude of the GNSS antenna phase center. The longitude can be -360 to +360 degrees where a '**-**' sign denotes west and a '**+**' sign denotes east.

Height

Enter the height of the GNSS antenna phase center above Mean Sea Level (MSL). The height can be -1000 to +20000000 metres.

After setting the Survey Type parameters, click the **Next** button to show the Output Format parameters.

Output Format



Use the Output Format parameters to set the message format the receiver uses for the differential corrections messages sent to the rover receiver.

CMR
The receiver sends differential correction messages in CMR format.

NOVATELX
The receiver sends differential correction messages in NOVATELX format.

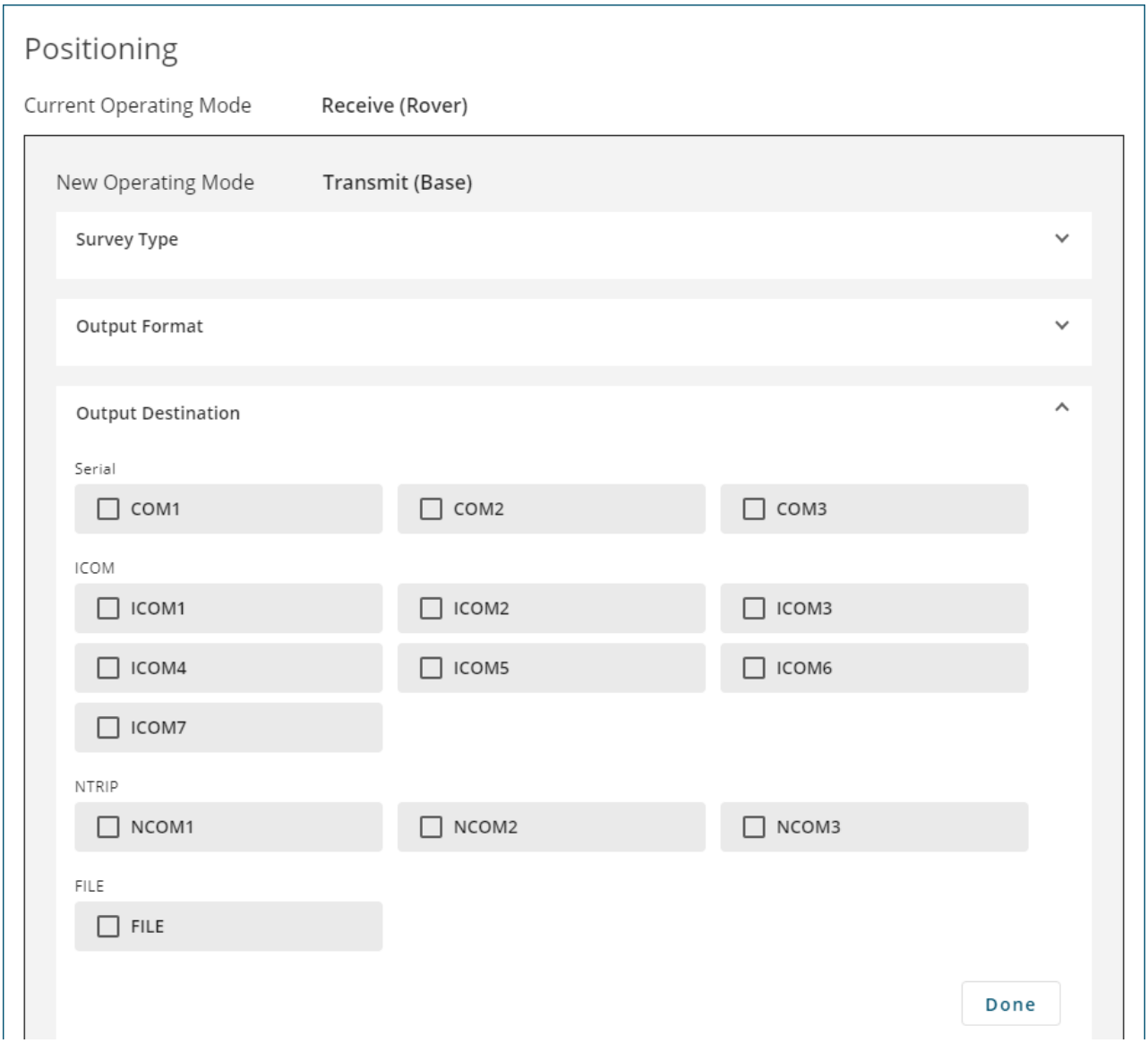
RTCA
The receiver sends differential correction messages in RTCA format.

RTCM
The receiver sends differential correction messages in RTCM format.

RTCMV3
The receiver sends differential correction messages in RTCM Version 3.0 format.

Click the button for the message format to use and then click **Next**.

Output Destination



The Output Destination is the communication port, or ports, through which the receiver sends differential corrections to the rover receiver.

Serial

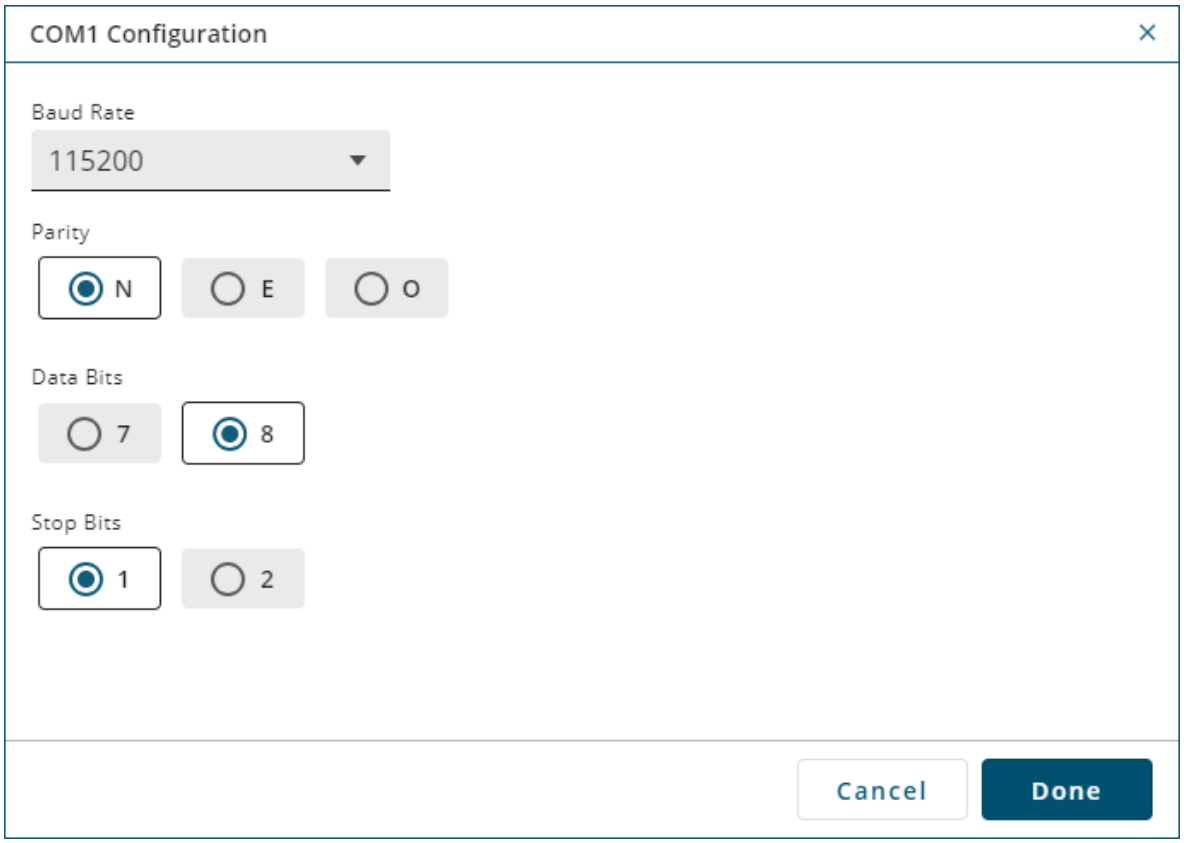
Click the COM buttons to select the serial ports used to send differential corrections. The number of COM ports available varies depending on the type of NovAtel receiver.

When a COM button is selected, the button changes to show a settings icon. Set the serial communication parameters to match the parameters used by the device to which the receiver is communicating.

To change COM port communication parameters:

1. Click the settings icon ( ).

   The *COM Configuration* window appears.



2. Click the **Baud Rate** drop list and then click the baud rate (bps) used by this serial port. The default baud rate is 9600.
3. In the **Parity** field, click **N**, **E** or **O** to select the parity used by this serial port.

   N = No parity, E = Even parity, O = Odd parity

   The default parity is N (No Parity).
4. In the **Data Bits** field, click **7** or **8** to select the number of data bits used for each data message transmitted. The default is 8 bits.
5. In the **Stop Bits** field, click **1** or **2** to select the number of stops bits used for each data message transmitted.
6. After setting the communication parameters, click the **Done** button to save the new settings.

ICOM

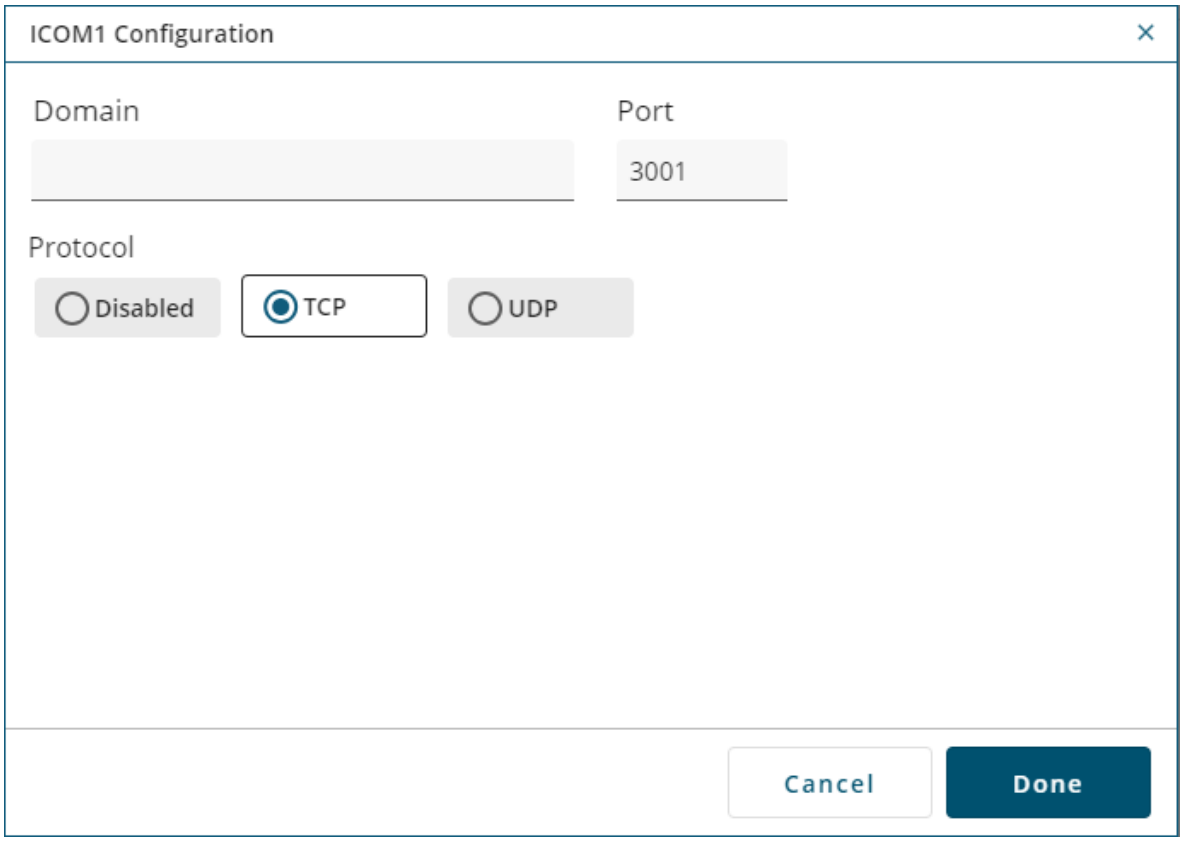
Click the ICOM buttons to select the network ports used to send differential corrections over the receiver's Ethernet connection.

When an ICOM button is selected, the button changes to show a settings icon. Click the settings icon to change the communication parameters used for the ICOM port.

To configure an ICOM port

1. Click the settings icon ( ) and set the communication parameters used for the ICOM port.

   The *ICOM Configuration* window appears.



2. In the **Domain** box, enter the hostname or IP address of the device
3. In the **Port** box, enter the TCP/UDP port number used by this ICOM port.
4. Click one of the following buttons to select the protocol used by this ICOM port.
   - **Disabled** – Disable this ICOM port.
   - **TCP** – Use raw TCP on this port.
   - **UDP** – Use raw UDP on this port.
5. After setting the communication parameters, click the **Done** button to save the new settings.

NTRIP

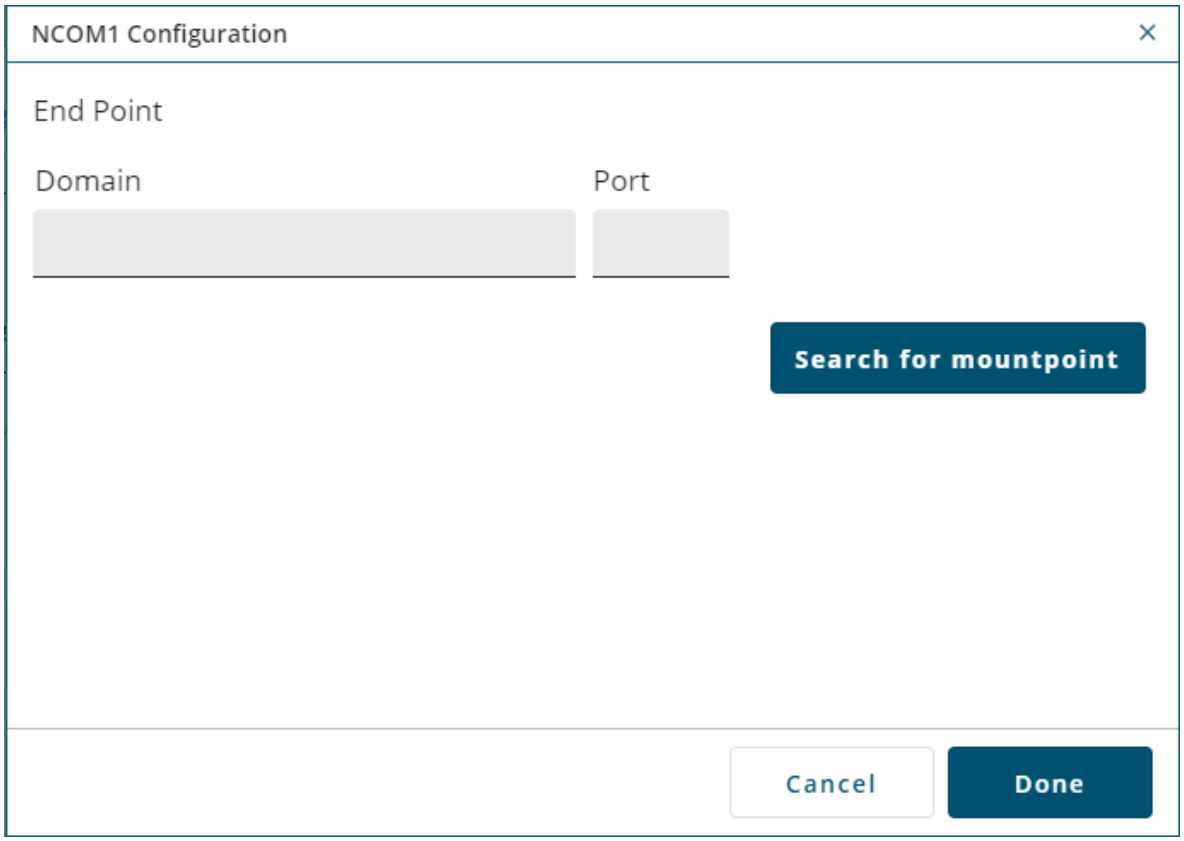
Click the NCOM buttons to select the network ports used to send differential corrections. Network ports are used when the receiver is acting as an NTRIP server. The receiver must have an Ethernet connection to use NCOM ports.

When an NCOM button is selected, the button changes to show a settings icon. Click the settings icon to change the communication parameters used for the NCOM port.

To configure an NCOM port:

1. Click the settings icon ( ).

   The *NCOM Configuration* window appears.



2. In the **Domain** box, enter the hostname or IP address of the Endpoint.
3. In the **Port** box and enter the TCP/UDP port number of the Endpoint.
4. Click the **Search for mountpoint** button.
5. Click the **Mountpoint** drop menu and click the mountpoint to use.
6. Click the **Username** box and enter the login user name. The username can be up to character 30 characters long.
7. Click the **Password** box and enter the login password. The Password can be up to 30 characters long.
8. After setting the communication parameters, click the **Done** button to save the new settings.

File

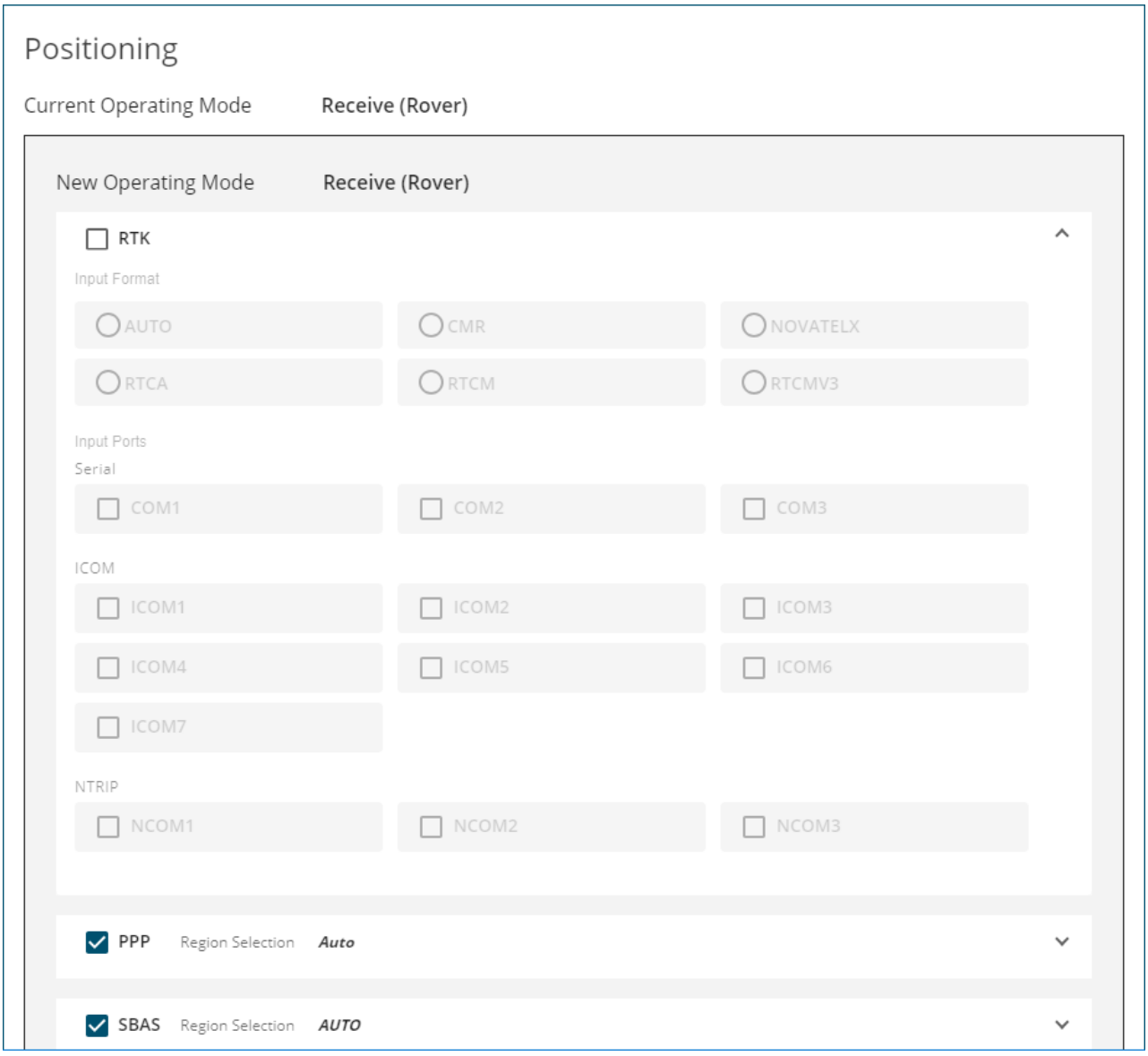
Click the **FILE** button to save the differential corrections to a file.

When Output Destination ports have been selected, click **Done**.

When all of the Transmit parameters have been set, click **Apply**.

2.4.1.2 Receive (Rover)

After clicking **Receive (Rover)** and **Next**, the Positioning window changes to show the receive operating modes options.



The receiver can be configured to receive three types of corrections: RTK, PPP and SBAS.

RTK

To use RTK corrections, the receiver must have a communications link to an RTK base station. Use the *Input Format* and *Input Ports* pages to configure the receiver as an RTK rover.

To enable RTK, select the **RTK** checkbox and configure the Input Format and Input Ports settings.

To disable RTK, clear the **RTK** checkbox.

Input Format

Use the Input Format parameters to set the message format for the differential corrections message received from the RTK base station.

Auto

Set the receiver to automatically detect the format of the incoming RTK corrections.

CMR

Set the receiver to accept RTK correction messages in CMR format.

NOVATELX

Set the receiver to accept RTK correction messages in NOVATELX format.

RTCA

Set the receiver to accept RTK correction messages in RTCA format.

RTCM

Set the receiver to accept RTK correction messages in RTCM format.

RTCMV3

Set the receiver to accept RTK correction messages in RTCM Version 3.0 format.

VERIPOS

Set the receiver to accept PPP correction messages over IP.

Click the button for the message format to use.

Input Ports

The Input Ports set the communication port, or ports, through which RTK correction messages are received.

Serial Ports

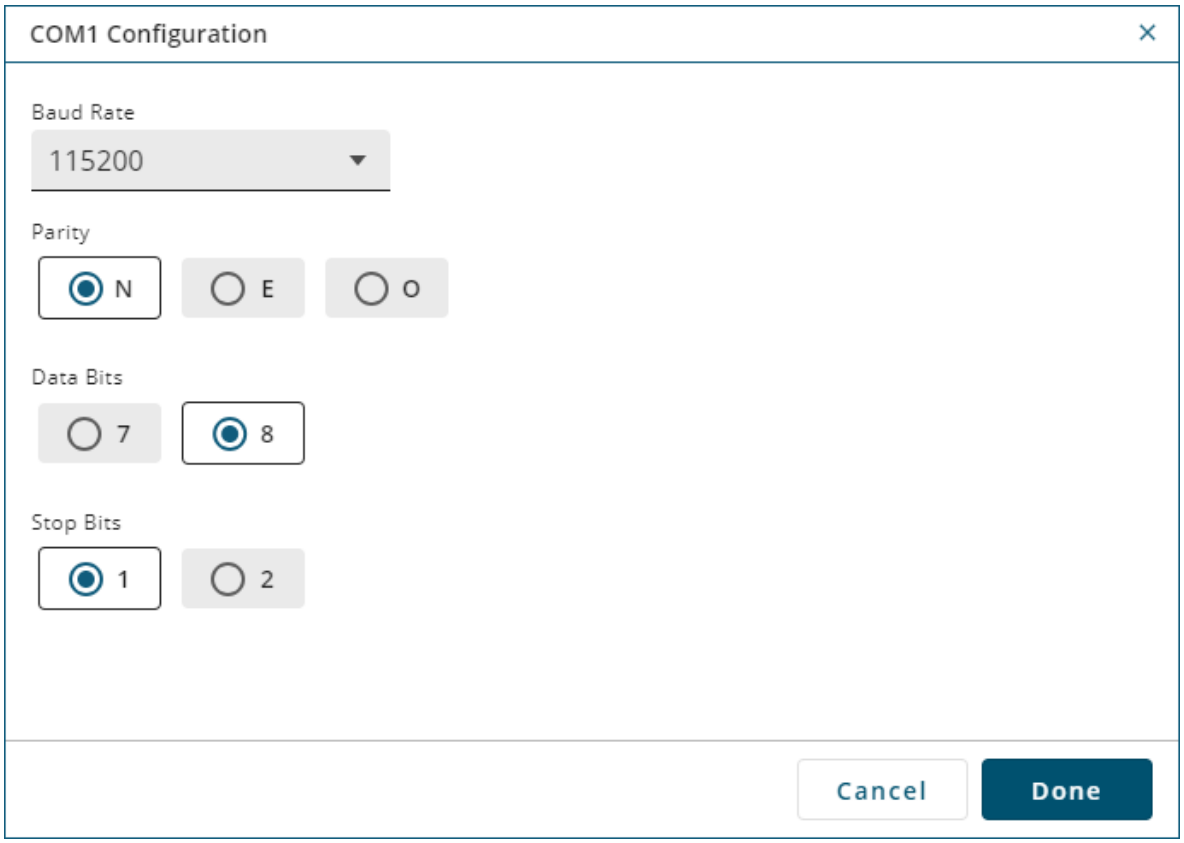
Click the COM buttons to select the serial ports used to receive RTK corrections. The number of COM ports available varies depending on the type of NovAtel receiver.

When a COM button is selected, the button changes to show a settings icon. Set the serial communication parameters to match the parameters used by the device to which the receiver is communicating.

To change COM port communication parameters:

1. Click the settings icon ( ).

   The *COM Configuration* window appears.



2. Click the **Baud Rate** drop list and then click the baud rate (bps) used by this serial port. The default baud rate is 9600.
3. In the **Parity** field, click **N**, **E** or **O** to select the parity used by this serial port.

   N = No parity, E = Even parity, O = Odd parity

   The default parity is N (No Parity).
4. In the **Data Bits** field, click **7** or **8** to select the number of data bits used for each data message transmitted. The default is 8 bits.
5. In the **Stop Bits** field, click **1** or **2** to select the number of stops bits used for each data message transmitted.
6. After setting the communication parameters, click the **Done** button to save the new settings.

ICOM

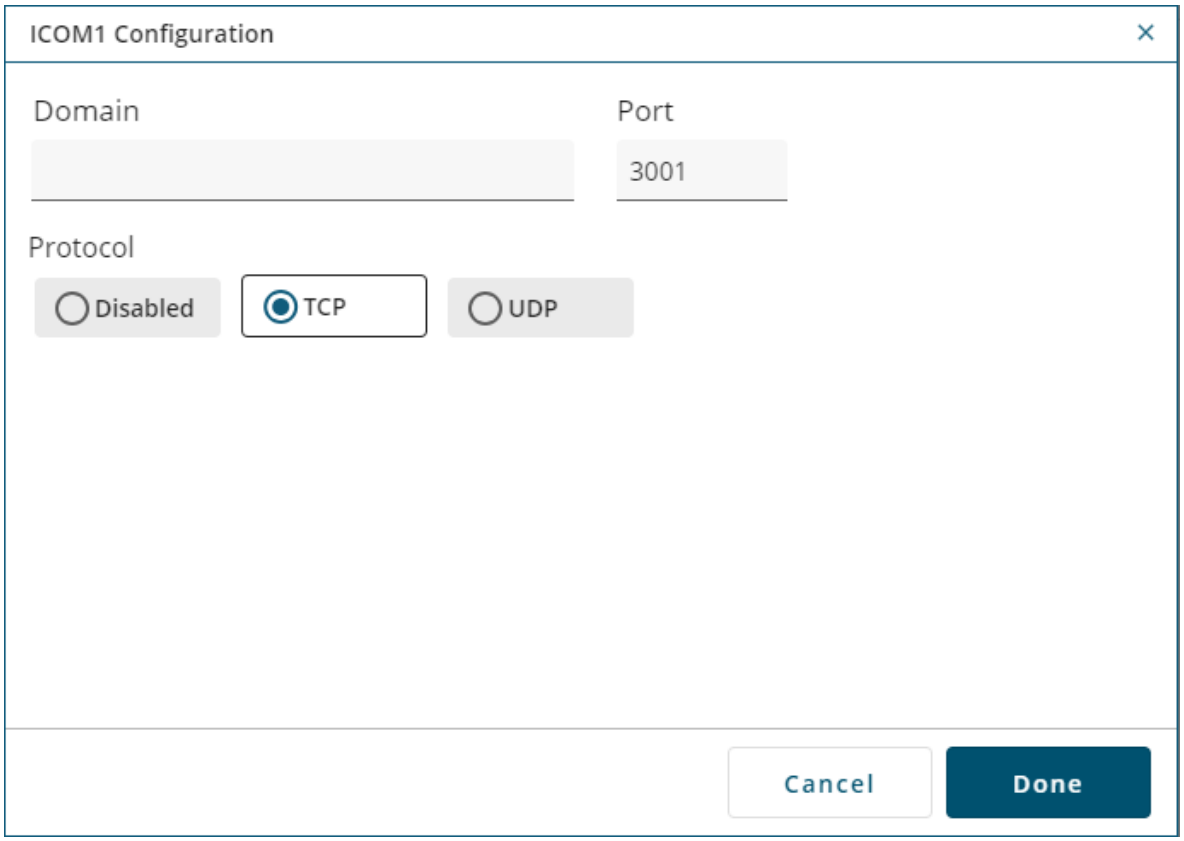
Click the ICOM buttons to select the network ports used to receive differential corrections over the receiver's Ethernet connection.

When an ICOM button is selected, the button changes to show a settings icon. Click the settings icon to change the communication parameters used for the ICOM port.

To configure an ICOM port

1. Click the settings icon ( ) and set the communication parameters used for the ICOM port.

   The *ICOM Configuration* window appears.



2. In the **Domain** box, enter the hostname or IP address of the device
3. In the **Port** box, enter the TCP/UDP port number used by this ICOM port.
4. Click one of the following buttons to select the protocol used by this ICOM port.
   - **Disabled** – Disable this ICOM port.
   - **TCP** – Use raw TCP on this port.
   - **UDP** – Use raw UDP on this port.
5. After setting the communication parameters, click the **Done** button to save the new settings.

NTRIP

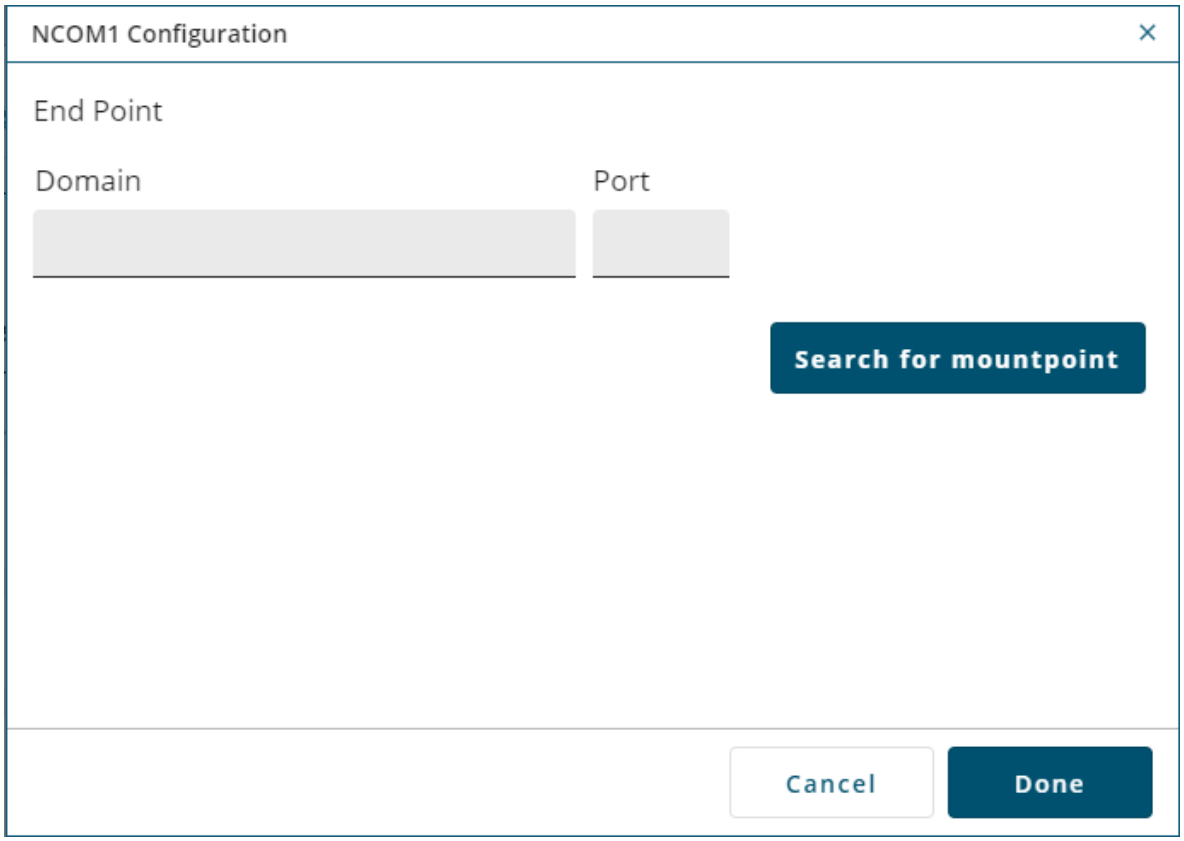
Click the NCOM buttons to select the network ports used to receive differential corrections. Network ports are used when the receiver is acting as an NTRIP client. The receiver must have an Ethernet connection to use NCOM ports.

When an NCOM button is selected, the button changes to show a settings icon. Click the settings icon to change the communication parameters used for the NCOM port.

To configure an NCOM port:

1. Click the settings icon ( ).

   The *NCOM Configuration* window appears.



2. In the **Domain** box, enter the hostname or IP address of the Endpoint.
3. In the **Port** box and enter the TCP/UDP port number of the Endpoint.
4. Click the **Search for mountpoint** button.
5. Click the **Mountpoint** drop menu and click the mountpoint to use.
6. Click the **Username** box and enter the login user name. The username can be up to character 30 characters long.
7. Click the **Password** box and enter the login password. The Password can be up to 30 characters long.
8. After setting the communication parameters, click the **Done** button to save the new settings.

PPP

To use PPP positioning, a subscription to a correction service (TerraStar or Oceanix) is required. To obtain a subscription, contact your local NovAtel sales representative. The NovAtel product serial number (PSN) is needed to obtain a subscription.

To enable PPP positioning:

1. Select the **PPP** checkbox.
2. Select the button for the L-Band beam to use.

   If **Auto** is selected, the receiver searches for multiple L-Band beams on the L-Band channels. If the receiver position is known, the selection criteria is a ranking of granted access L-Band beams by descending elevation angle. If the receiver position is not known, the selection criteria is a ranking of granted access L-Band beams in the order they appear in the stored beam table.

To disable PPP positioning:

1. Clear the **PPP** checkbox.

SBAS

To enable SBAS positioning on the receiver, select the **SBAS** checkbox and select the appropriate region on the *Region Selection* window.

To disable SBAS positioning, clear the **SBAS** checkbox.

Auto

The receiver automatically determines the satellite system to use based on the receiver's position and prevents the receiver from using satellites from outside of the service area.

EGNOS

The receiver uses only EGNOS satellites.

GAGAN

The receiver uses only GAGAN satellites.

MSAS

The receiver uses only MSAS satellites.

QZSS

The receiver uses only QZSS SAIF signals.

WAAS

The receiver uses only WAAS satellites.

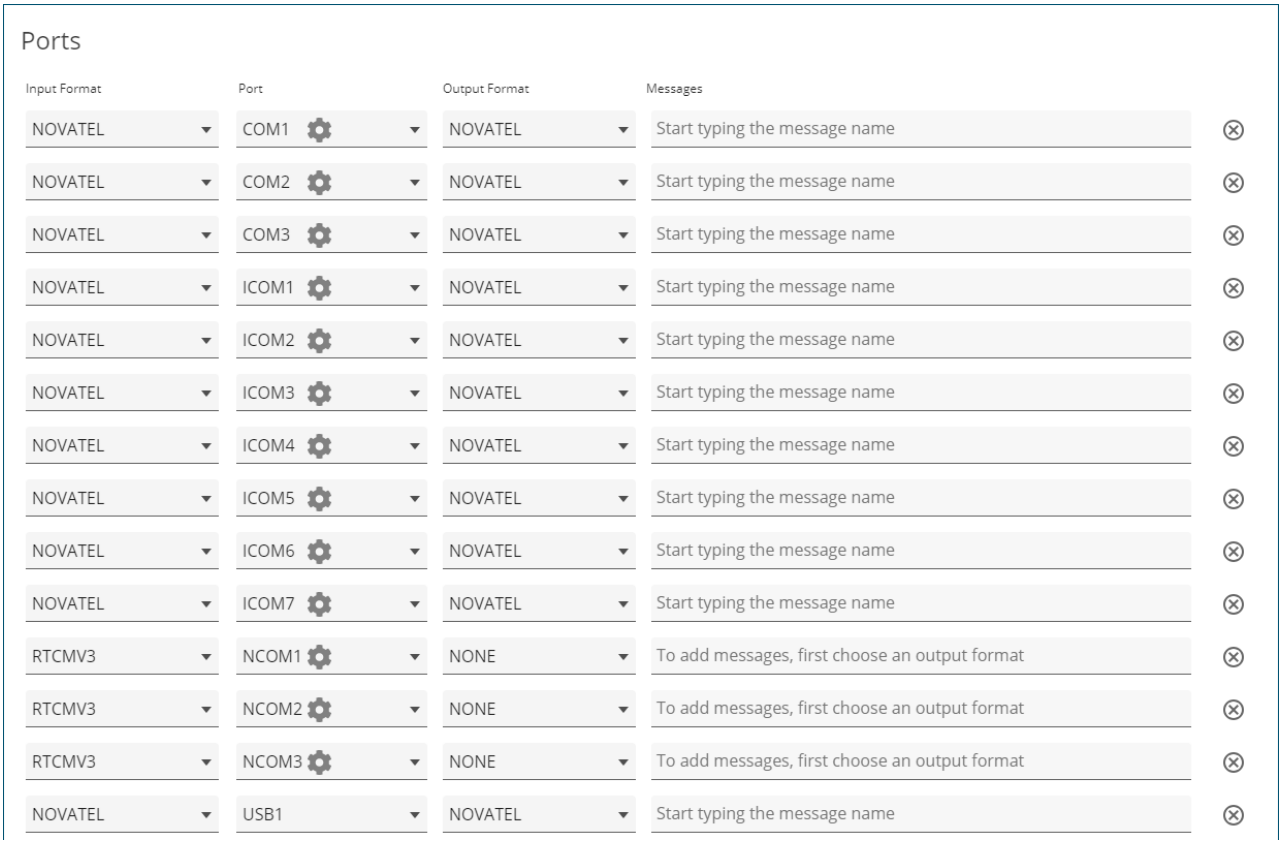
Click the **Apply** button to save the configuration on the receiver.

2.4.1.3 Standalone (Single Point)

Click **Standalone (Single Point)** and then **Next** to configure the receiver to use standalone mode to calculate the position.

Click the **Apply** button to save the configuration on the receiver.

2.4.2 Ports Configuration



Click the *Ports* tab to open the *Ports* configuration window. The communication ports that are currently configured are listed on the Ports page. Ports that are not listed can be configured by clicking the '+' icon.

Use the *Ports* configuration window to configure the communication ports on the receiver. The *Ports* configuration window is also used to configure the logs that are output from a specific communications port.

To add a port, set the Input Format, Port, Output Format and Messages parameters for the blank entry. To edit a port, change the parameters of an existing port configuration.

2.4.2.1 Input Format

The input format sets the type of message the port will accept. To set the input format, click the **Input Format** drop menu and select the format to use.

Auto

Set the port to automatically detect the format of the incoming RTK corrections.

CMR

Set the port to accept RTK correction messages in CMR format.

NONE

Disable input on the port.

NOVATEL

Set the port to accept NovAtel commands.

NOVATELX

Set the port to accept RTK correction messages in NOVATELX format.

RTCA

Set the port to accept RTK correction message in RTCA format.

RTCM

Set the port to accept RTK correction messages in RTCM format.

RTCMV3

Set the port to accept RTK correction messages in RTCM Version 3.0 format.

VERIPOS

Set the port to accept PPP correction messages over IP.

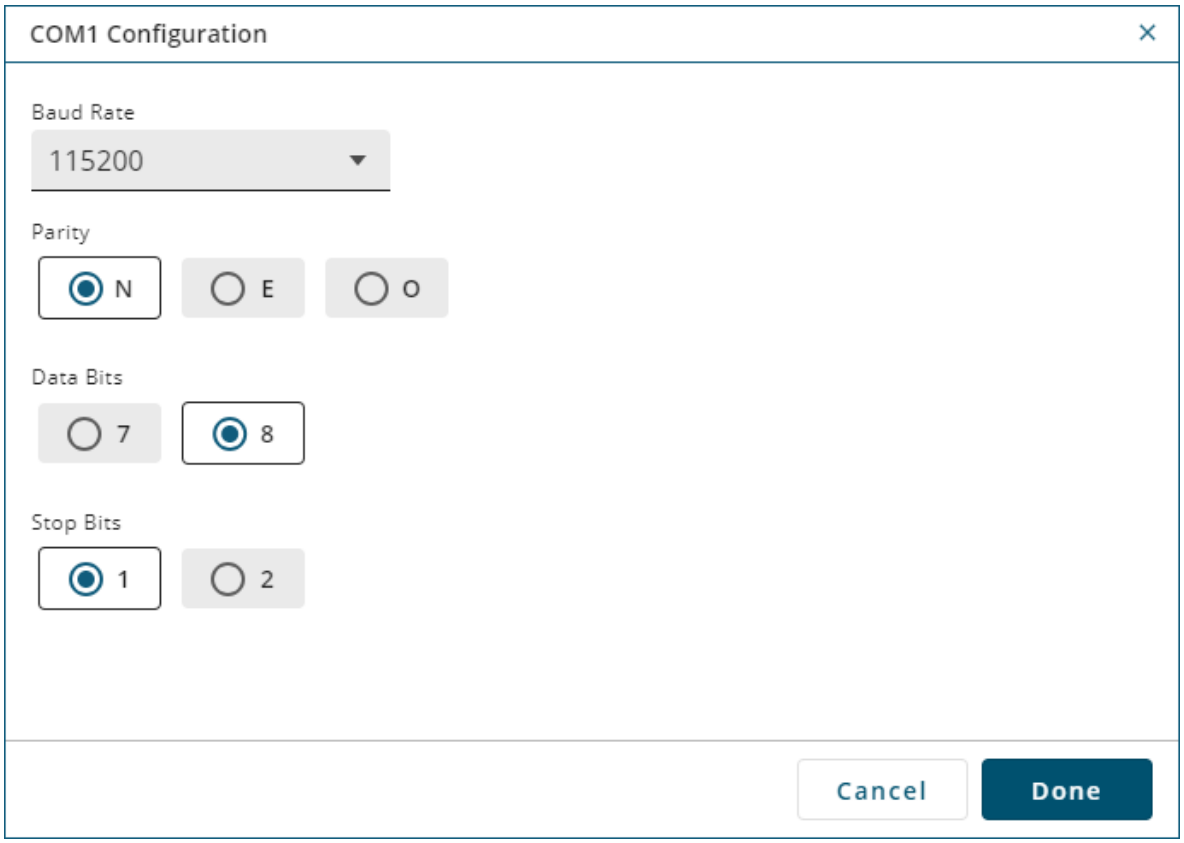
2.4.2.2 Port

There are several types of communication port that can be configured.

COM port

A COM port is a serial communication port. The number of COM ports available varies depending on the type of receiver. To add a COM port configuration:

1. Click the **Port** drop menu and select the COM port to configure.
2. Click the settings icon ( ) and set the communication parameters to match the device connected to the port.



3. Click the **Baud Rate** drop list and then click the baud rate (bps) used by this serial port. The default baud rate is 9600.
4. Click **N**, **E** or **O** to select the parity used by this serial port.

N = No parity, E = Even parity, O = Odd parity

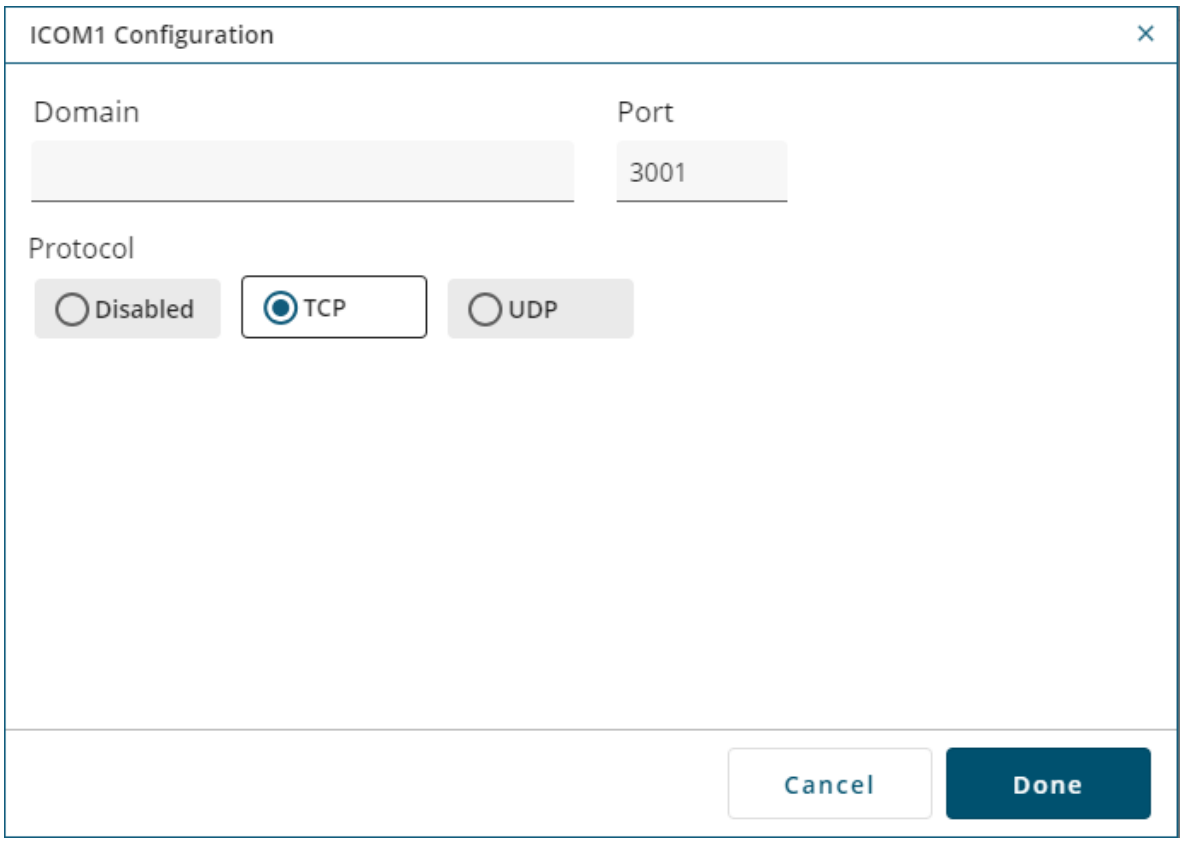
The default parity is N (No Parity).

5. Click **7** or **8** to select the number of data bits used for each data message transmitted. The default is 8 bits.
6. Click **1** or **2** to select the number of stops bits used for each data message transmitted.
7. After setting the communication parameters, click the **Done** button to save the new settings.

ICOM

ICOM ports are virtual ports used for Ethernet or Wi-Fi connections. To add an ICOM port:

1. Click the **Port** drop menu and select the ICOM port to configure.
2. Click the settings icon (⚙) and set the communication parameters used for the ICOM port.



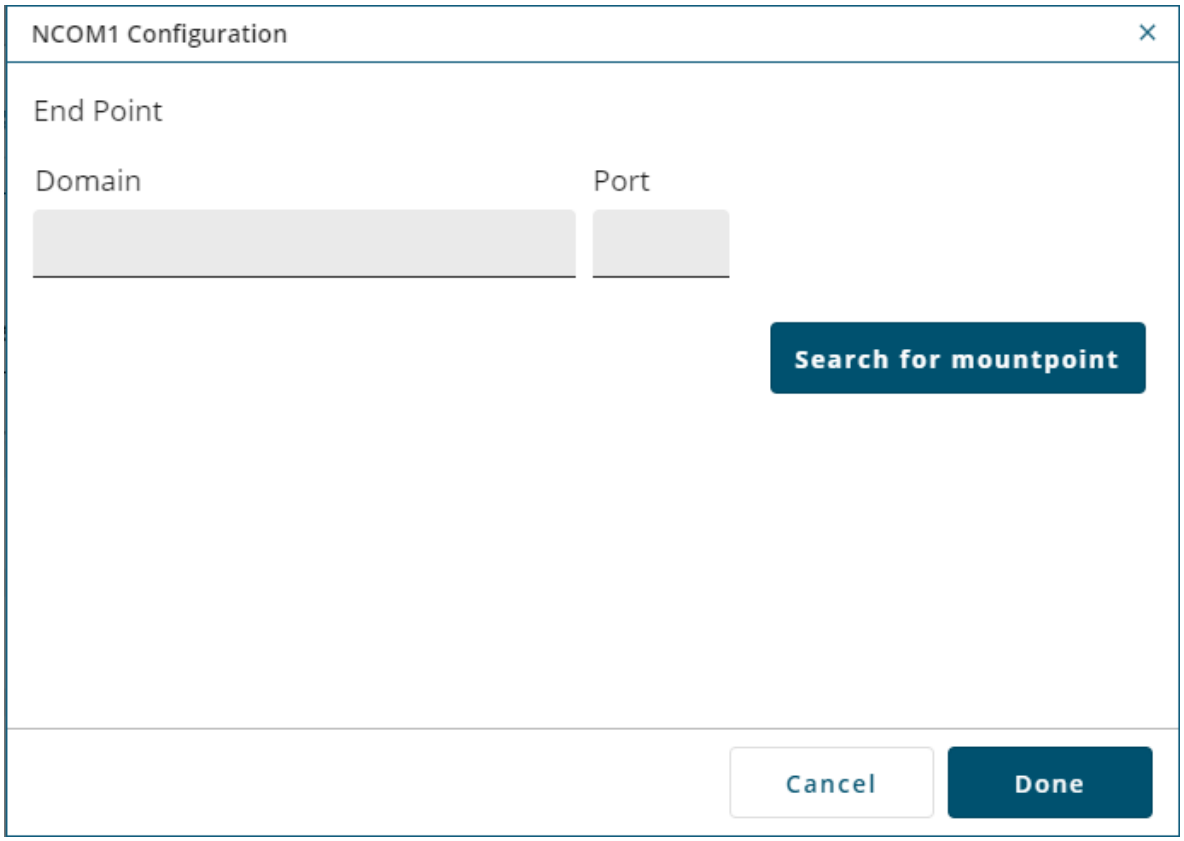
3. In the **Domain** box, enter the hostname or IP address of the device
4. In **Port** box, enter the TCP/UDP port number used by this ICOM port.
5. Click one of the following buttons to select the protocol used by this ICOM port.
   - **Disabled** – Disable this ICOM port.
   - **TCP** – Use raw TCP on this port.
   - **UDP** – Use raw UDP on this port.
6. After setting the communication parameters, click the **Done** button to save the new settings.

NCOM

Network ports are used when the receiver is acting as an NTRIP server or client. The receiver must have an Ethernet connection to use NCOM ports.

To add a NCOM port:

1. Click the **Port** drop menu and select the NCOM port to configure.
2. Click the settings icon ( ) and set the communication parameters used for the NCOM port.



3. In the **Domain** box, enter the hostname or IP address of the Endpoint.
4. In the **Port** box, enter the TCP/UDP port number of the Endpoint.
5. Click the **Search for mountpoint** button.
6. Click the **Mountpoint** drop menu and click the mountpoint to use.
7. In the **Username** box, enter the login user name. The username can be up to character 30 characters long.
8. In the **Password** box, enter the login password. The Password can be up to 30 characters long.
9. Click the **Done** button.
10. After setting the communication parameters, click the **Done** button to save the new settings.

USB

A USB port is used to communicate with a device using a USB cable. To add a USB port, click the **Port** drop menu and select one of the USB ports.

2.4.2.3 Output Format

The output format sets the type of message the port will send. To set the output format, click the **Output Format** drop menu and select the format to use.

CMR

Set the receiver to send RTK correction messages in CMR format.

NMEA
Set the port to send NMEA format logs.

NONE
Disable output on the port.

NOVATEL
Set the port to send NovAtel logs.

NOVATELX
Set the receiver to send RTK correction messages in NOVATELX format.

RTCA
Set the receiver to send RTK correction messages in RTCA format.

RTCM
Set the receiver to send RTK correction messages in RTCM format.

RTCMV3
Set the receiver to send RTK correction messages in RTCM Version 3.0 format.

2.4.2.4 Messages

The *Messages* box shows the logs being sent out of this port.

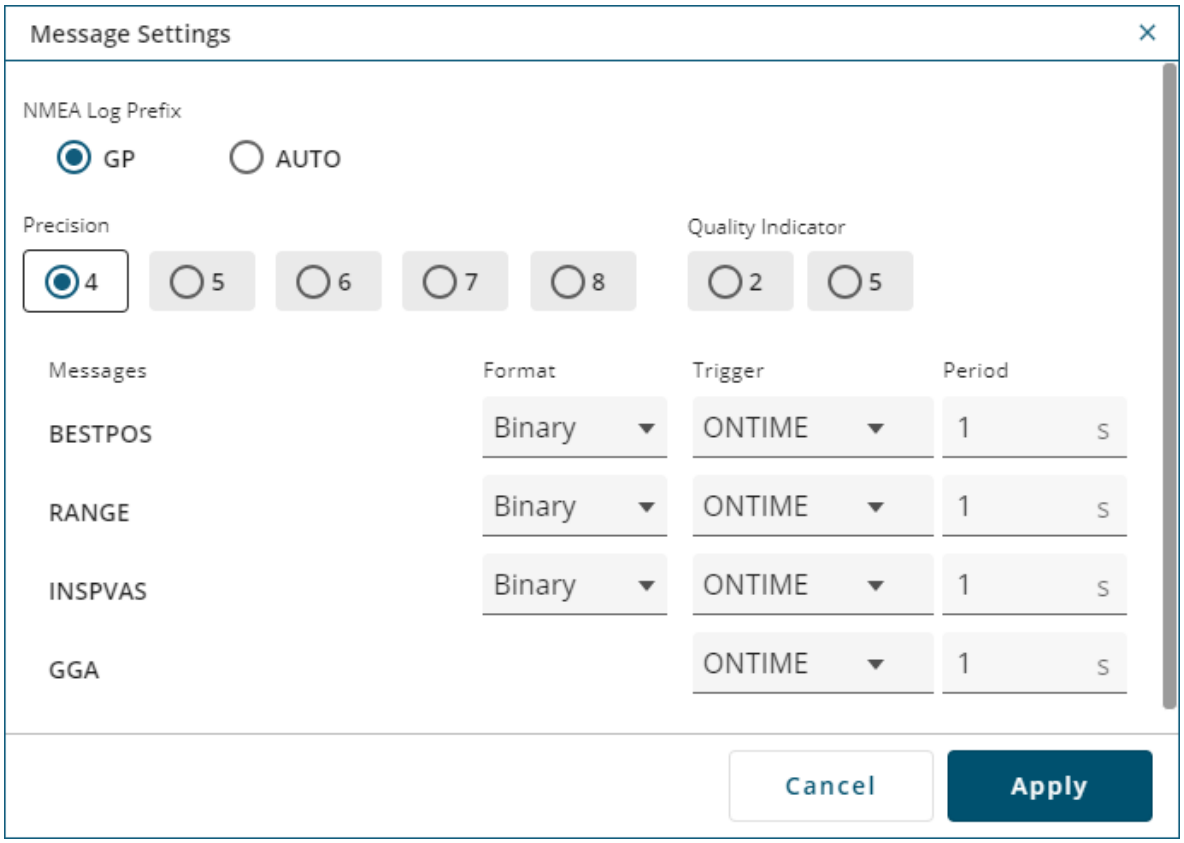
To add a log:

1. Click the *Messages* box and start typing the name of the log to add.
   A list of logs that start with the letters typed appears.
2. Click the name of the log to add.

Message Settings

To edit the collection parameters of the log:

1. Click the settings icon (⚙).
   The *Message Settings* dialog box appears.



2. Adjust the setting for the log.

   To change the logging settings for a log, select the parameter from the drop menus beside the log.

   Format

   Click **ASCII**, **Binary** or **Abbr ASCII** to select the format in which this log is generated.

   Trigger

   The trigger determines when the log is generated. Only triggers valid for the log are shown.

   - **ONTIME**

     Outputs the log at a regular interval. The number of seconds between log generation is set in the Period option.
   - **ONCHANGED**

     Outputs the current message and then continues to output when the message is changed.
   - **ONCE**

     Outputs the current message. If no message is currently present, the next message is output when available.
   - **ONNEW**

     Does not output the current message, but outputs when the message is updated (not necessarily changed).

   The triggers available depend on the log type.

Table 1: Log Type Triggers

Type	Recommended Trigger	Illegal Triggers
Synch	ONTIME	ONNEW, ONCHANGED
Asych	ONCHANGED or ONCE	–
Polled	ONCE or ONTIME	ONNEW, ONCHANGED

Period

The log period (for ONTIME trigger) in seconds.

Valid values for the high rate logging are 0.01, 0.02, 0.05, 0.1, 0.2, 0.25 and 0.5. For logging slower than once per second, any integer value is accepted.

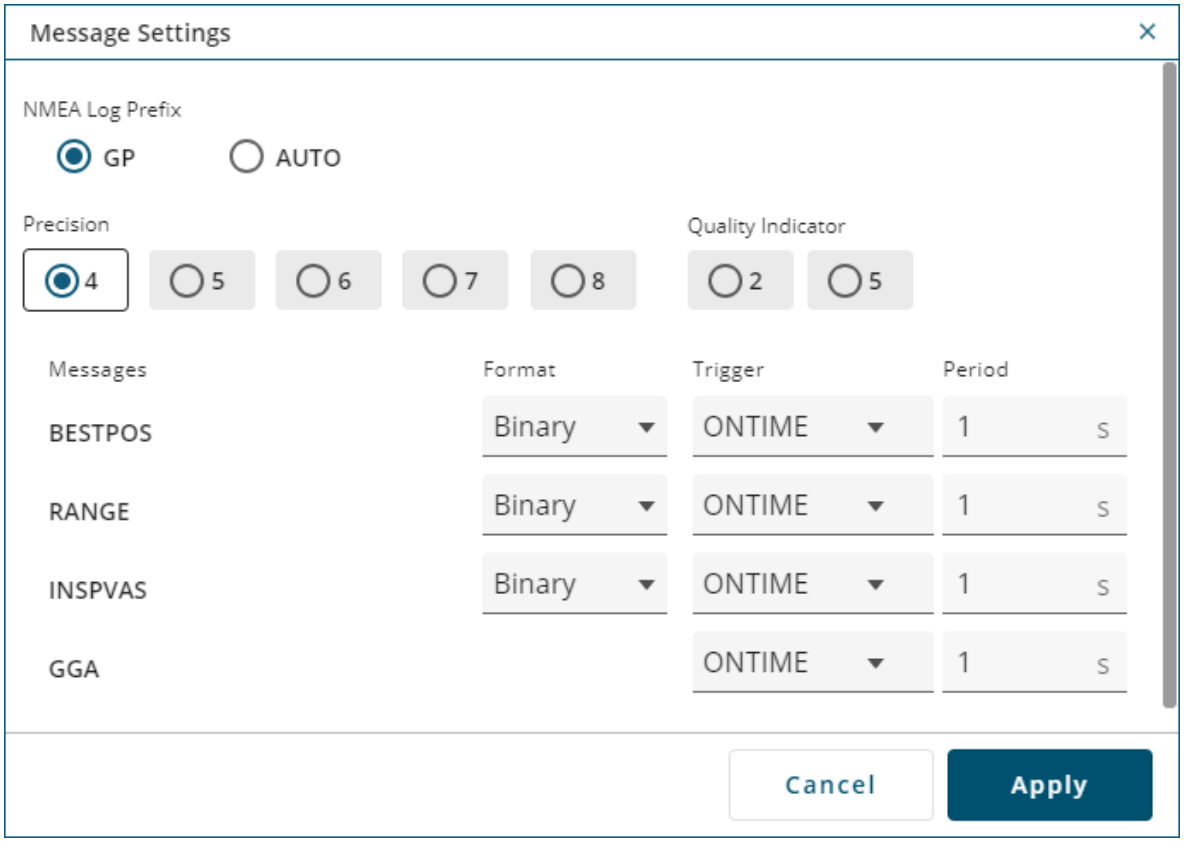
If the value entered is lower than the minimum measurement period, the value will be rejected.

3. Repeat these steps to adjust the message settings for each log being collected.
4. Click the **Apply** button to save the changes for all of the logs.

Message Settings NMEA Logs

To edit the collection parameters of a NMEA log:

1. Click the settings icon ( ).
   The *Message Settings* dialog box appears.



2. Select the **NMEA Log Prefix** option for this log.
   - **GP**

     The NMEA log will have prefix of GP and the NMEA log will include information only about the GPS satellites, even when the receiver is tracking multiple constellations.
   - **Auto**

     The NMEA log prefix changes as per the constellations enabled on the receiver. When there is one constellation in the solution and SPAN is disabled, the NMEA Talker ID is output as: GP for GPS, GL for GLONASS, GA for Galileo, and GB/BD for BeiDou. If more than one constellation is in the solution, the prefix is GN with the exception of GPGSV.
3. If *Auto* was selected as the *NMEA Log Prefix*, select the **BeiDou Log Prefix**.
   - Select **GB** to use the current NMEA ID for BeiDou.
   - Select **BD** to use the legacy NMEA ID for BeiDou.

The BeiDou Log Prefix field is not available for OEM6 receivers.

4. Click one of the **Precision** buttons to select the number of decimal places used for the latitude and longitude values in this log.

The Precision field is not available for OEM6 receivers.

5. Click one of the **Quality Indicator** buttons to select the quality indicator that will be used for this log.
6. Click the **Trigger** drop menu and select the trigger used for the log.
7. Enter the log **Period** in seconds.

   Valid values for the high rate logging are 0.01, 0.02, 0.05, 0.1, 0.2, 0.25 and 0.5. For logging slower than once per second, any integer value is accepted. If the value entered is lower than the minimum measurement period, the value will be rejected.
8. Set the Trigger and Period for each NMEA log.
9. Click the **Apply** button to save the changes for all of the logs.

To remove a log from this port, click the **X** icon on the button for the log.

Click the **Apply** button to save the configuration on the receiver.

2.4.3 Logging Configuration

Use the *Logging* configuration window to set the logs that will be saved on the computer running NovAtel Application Suite or the receiver's internal storage.

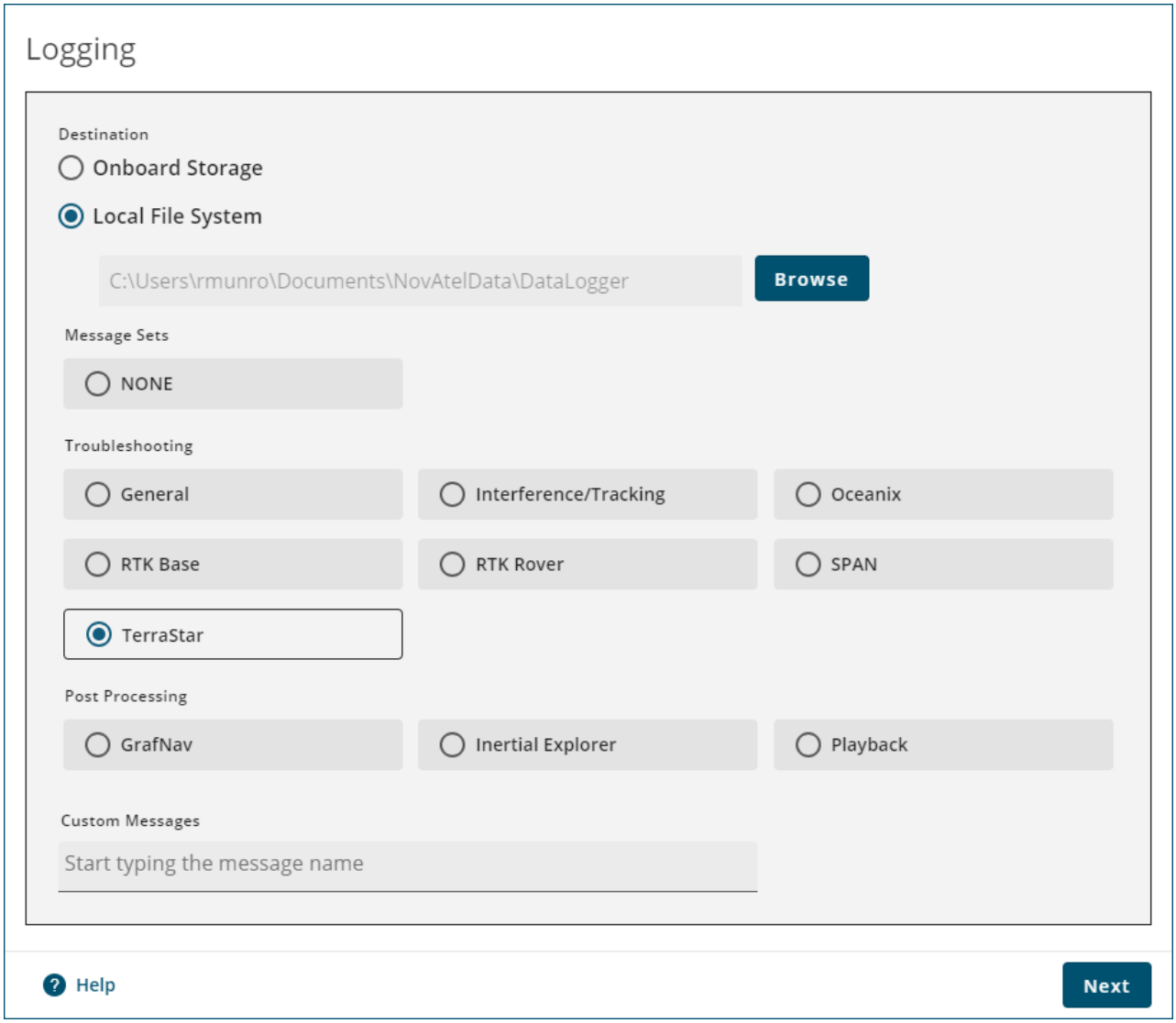
Use the *Ports* configuration window to configure the logs that will be output from a specific port.

2.4.3.1 Logging to the NovAtel Application Suite computer

NovAtel Application Suite can be used to save logs on a storage device in the computer used to run NovAtel Application Suite.

The Local File System option is available for all OEM7 receivers.

Click the *Logging* tab to open the *Logging* window.



To configure the logs to be saved to the computer running NovAtel Application Suite:

1. Click **Browse**.

   The Open Folder dialog box appears.
2. Navigate to the folder in which you want to store the logs.

   The default folder is: *<Current User APPDATA>/Documents/Novatel Data/DataLogger/*.
3. Click **Select Folder**.

   The *Logging* configuration window appears with the path name of the selected folder displayed in the *Local File System* box.
4. In the *Message Sets* section, click the button for one of the message sets. The logs contained in the selected message set will be collected.

5. To add other logs, click the *Custom Messages* box and start typing the name of the log. A list of logs with names that start with the typed letters appears.
6. Click the name of the log to add it to the logs collected.
7. Repeat steps 5 and 6 for each log to add.
8. Click **Next**. A dialog box appears.

The **Next** button is disabled until a Message Set other than *None* is selected or logs are entered in the *Custom Messages* box.

9. If you want to collect the logs with the current message settings, click **Start** to start collecting logs.

   If you want to change the message settings for the logs, click **Edit Optional Settings**. The *Optional Settings* page appears.
10. Adjust the Optional Settings as required. See the following sections for information about the settings.
11. Click **Start** to start collecting logs.

Message Sets

The Logging page has several *Message Sets*. A Message Set is a group of logs recommended for a specific purpose. When a Message Set is selected, all of the logs in the set are added to the list of logs to save on the receiver's storage device.

None

No logs are selected to be saved. This is the default Message Set.

ALIGN

The recommended logs to collect for troubleshooting issues with the ALIGN heading feature.

General

A set of logs useful for troubleshooting issues on the receiver.

Interference/Tracking

The recommended logs to collect for troubleshooting issues with interference and tracking incoming GNSS signals.

Oceanix

The recommended logs to collect for troubleshooting issues when using Oceanix corrections to generate a PPP position.

RTK Base

The recommended logs to collect for troubleshooting issues when the receiver is acting as an RTK base station.

RTK Rover

The recommended logs to collect for troubleshooting issues when the receiver is acting as an RTK rover.

SPAN

The recommended logs to collect for troubleshooting issues when the receiver is part a SPAN GNSS+INS system.

TerraStar

The recommended logs to collect for troubleshooting issues when using TerraStar corrections to generate a PPP position.

GrafNav

The recommended logs to save when the data collected will be post-processed using Waypoint GrafNav software.

Inertial Explorer

The recommended logs to save when the data collected will be post-processed using Waypoint Inertial Explorer software.

Playback

The recommended logs to collect if you plan to review or analyze the collected data using the Playback feature.

Rinex

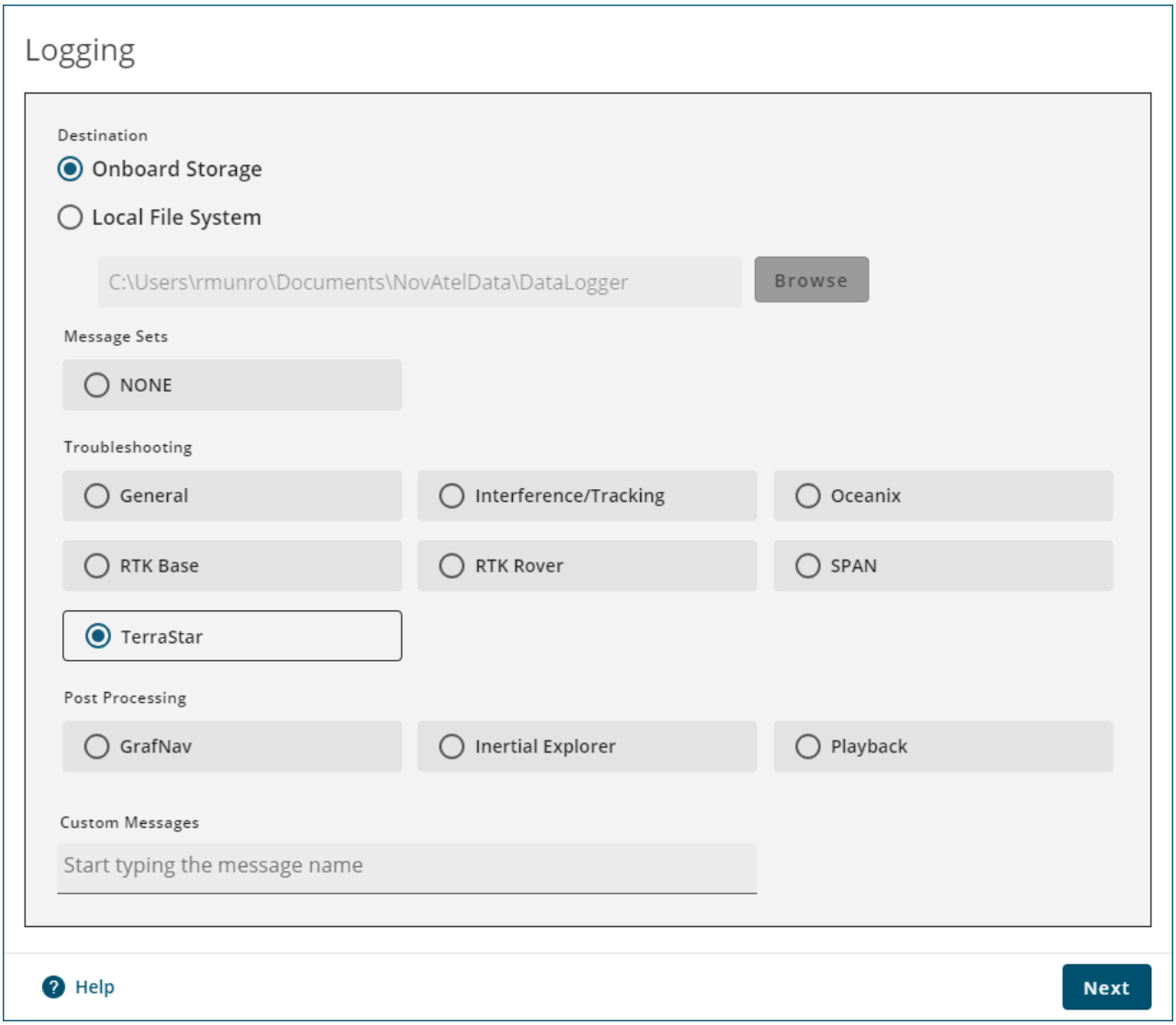
The recommended logs to collect a complete set of RINEX data from a NovAtel receiver.

2.4.3.2 Logging to the Receiver Internal Storage

NovAtel Application Suite can be used to save logs on to the receiver's internal storage.

The Onboard Storage option is available only on receivers with internal storage, such as the PwrPak7 family of receivers.

Click the *Logging* tab to open the *Logging* window.



To configure the logs to be save on internal storage:

1. Ensure the Onboard Storage option is selected.
2. In the *Message Sets* section, click the button for one or more message sets. The logs contained in the selected message sets will be collected.
3. To add other logs, click the *Custom Messages* box and start typing the name of the log. A list of logs with names that start with the typed letters appears.
4. Click the name of the log to add it to the logs collected.
5. Repeat steps 3 and 4 for each log to add.
6. Click **Next**. A dialog box appears.

> The **Next** button is disabled until a Message Set other than *None* is selected or logs are entered in the *Custom Messages* box.

7. If you want to collect the logs with the current message settings, click **Start** to start collecting logs.

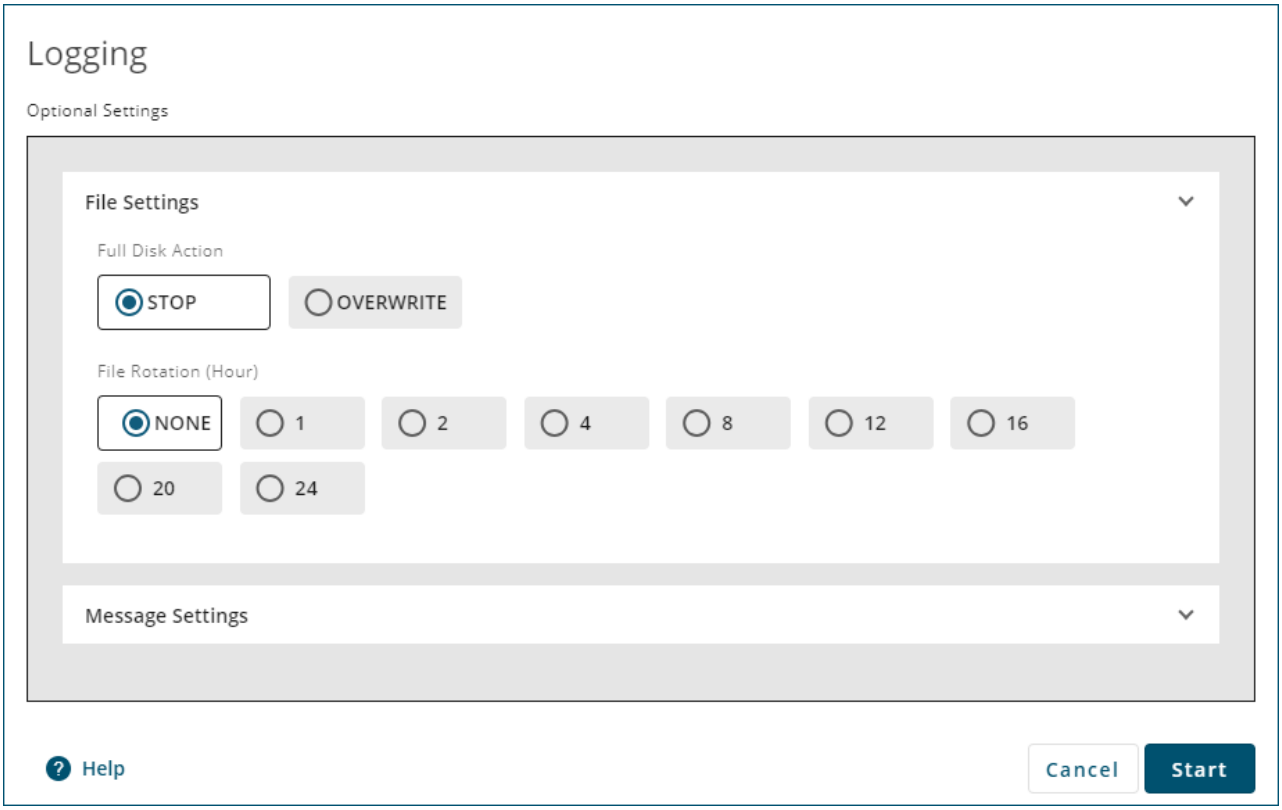
If you want to change the message settings for the logs, click **Edit Optional Settings**. The *Optional Settings* page appears.

8. Adjust the Optional Settings as required. See the following sections for information about the settings.
9. Click **Start** to start collecting logs.

2.4.3.3 Optional Settings

The Optional Settings window has two tabs: *File Setting* and *Message Settings*.

File Settings



The File Settings configure how the receiver handles the files in which the logs are stored.

Full Disk Action

The Full Disk Action options determine how the receiver acts when the file storage device is full.

- **STOP**

  The receiver stops logging when the file storage device has 1 MB of free space or less.
  When logging to the computer running NovAtel Application Suite (local computer), logging stops when the disk space is less than 10 MB.

- **OVERWRITE**

  The receiver deletes the oldest log file when the file storage device has 10 MB of free space or less.
  When logging to the local computer, the oldest log file is deleted when there is 10 MB of disk space or less.
  To be deleted, the log file must have the default naming scheme, exist in the current logging folder and be created by this receiver.

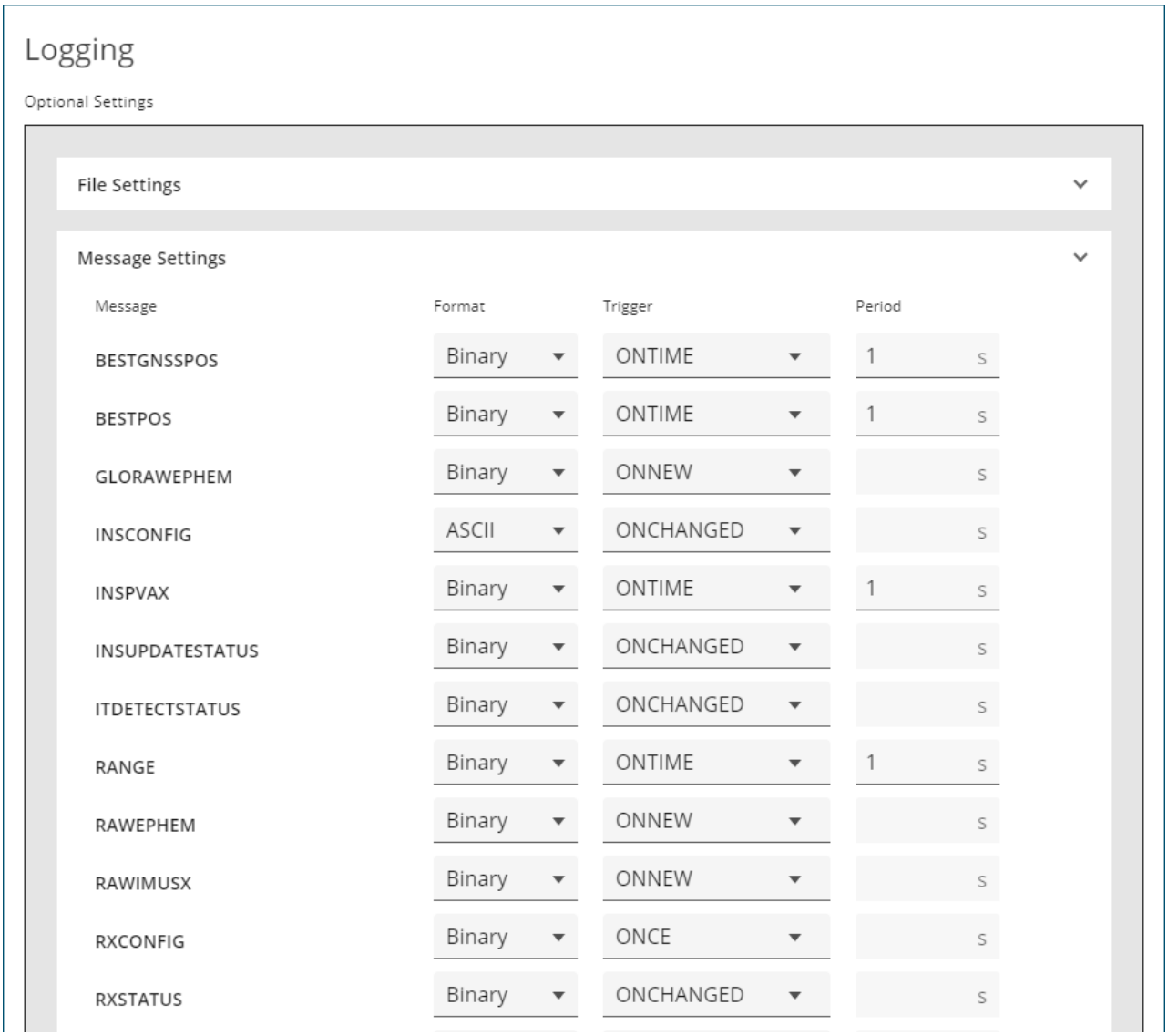
File Rotation

The File Rotation options determine when the receiver closes the current log file and start storing logs in a new file. There is no data loss when the receiver changes log files and individual logs within the file are not spread between log files.
When logging to the local computer, NovAtel Application Suite closes the log file.

To enable File Rotation, click one of the numbered buttons to select the number of hours that a log file is kept open.

To disable File Rotation, click **None**.

Message Settings



The Message Settings tab lists the logs being saved to the file storage device.

To change the logging settings for a log, use the drop menus and text box beside the log.

Format
Click **ASCII**, **Binary** or **Abbr ASCII** to select the format in which this log is generated.

Trigger
The trigger determines when the log is generated.

- **ONTIME**

  Outputs the log at a regular interval. The number of seconds between log generation is set in the Period option.

- **ONCHANGED**

  Outputs the current message and then continues to output when the message is changed.

- **ONCE**

  Outputs the current message. If no message is currently present, the next message is output when available.

- **ONNEW**

  Does not output the current message, but outputs when the message is updated (not necessarily changed).

The triggers available depend on the log type.

Table 2: Log Type Triggers

Type	Recommended Trigger	Illegal Triggers
Synch	ONTIME	ONNEW, ONCHANGED
Asych	ONCHANGED or ONCE	–
Polled	ONCE or ONTIME	ONNEW, ONCHANGED

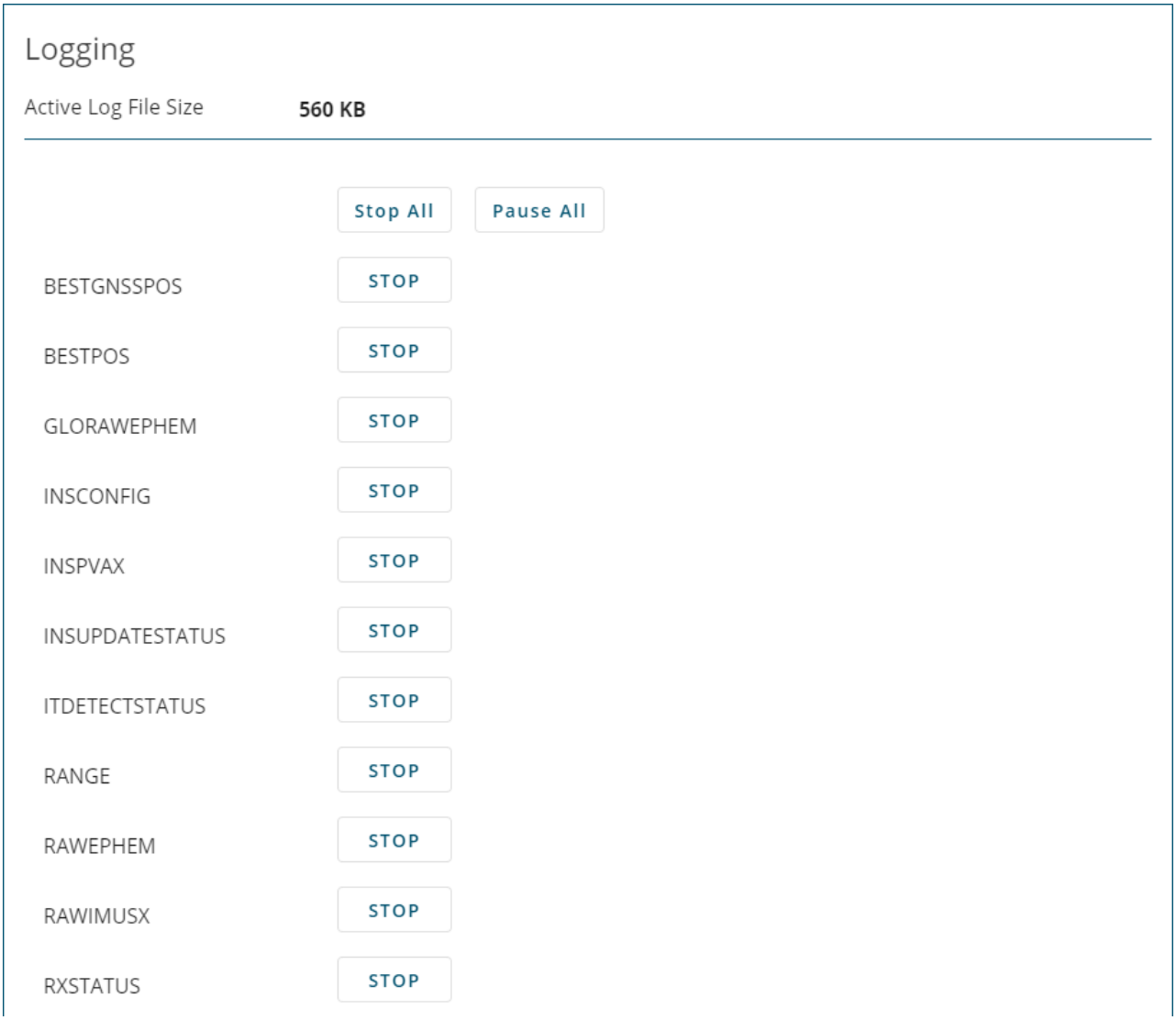
Period

The log period in seconds (for ONTIME trigger).

Valid values for the high rate logging are 0.01, 0.02, 0.05, 0.1, 0.2, 0.25 and 0.5. For logging slower than once per second, any integer value is accepted.

If the value entered is lower than the minimum measurement period, the value will be rejected.

2.4.3.4 Logging Active



If logging to a storage device is already active, the *Logging Configuration* page shows the size of the active log file and the list of logs being collected.

If logging to NovAtel Application Suite computer, the Destination field is displayed indicating that log files are being stored to the Local File System. Clicking the **Open** button will open the folder in which the log file is stored.

To stop collecting a log, click **Stop** beside the log.

To stop collecting all logs, click **Stop All**.

To temporarily suspend the collection of logs, click **Pause All**. Click the button again to resume logging.

2.4.4 ALIGN Configuration

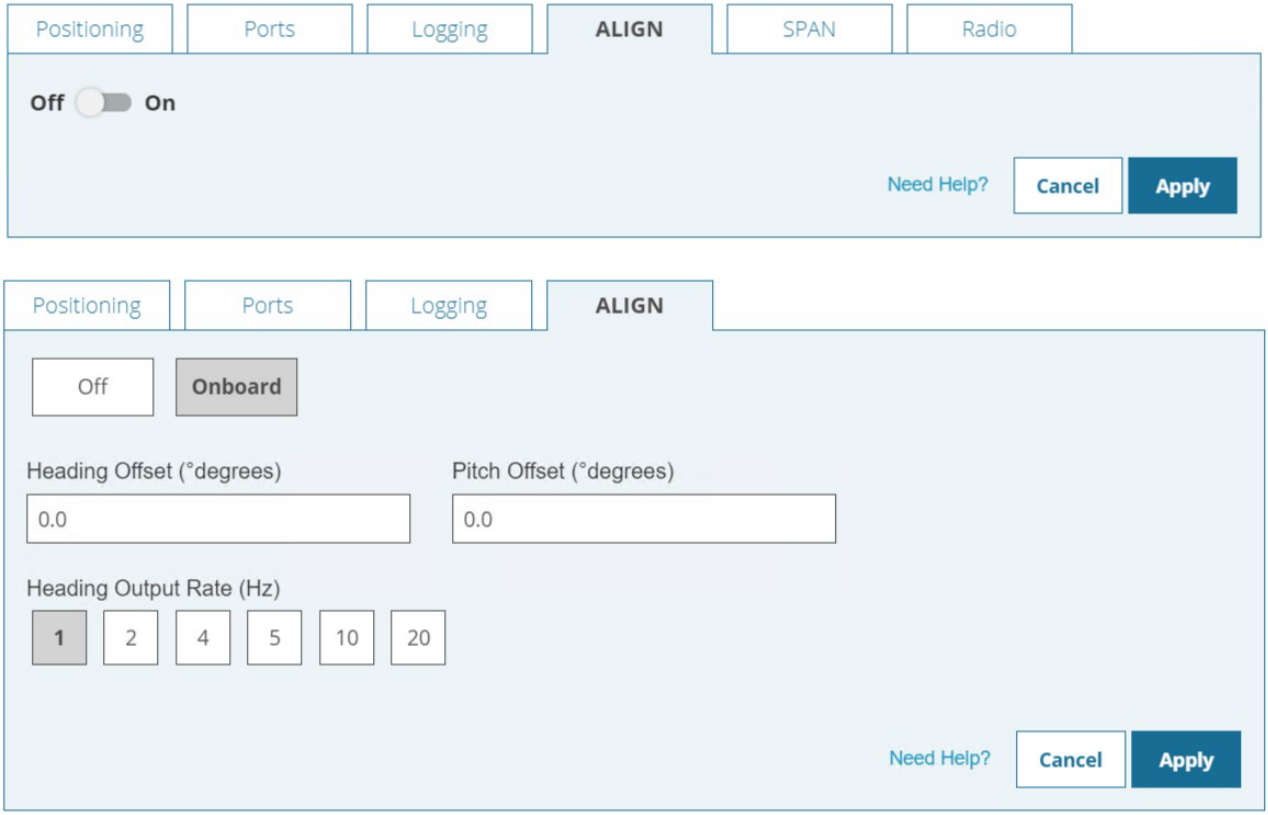
ALIGN technology combines two or more receivers to generate high precision heading and pitch angles between two receivers for real-time navigation.

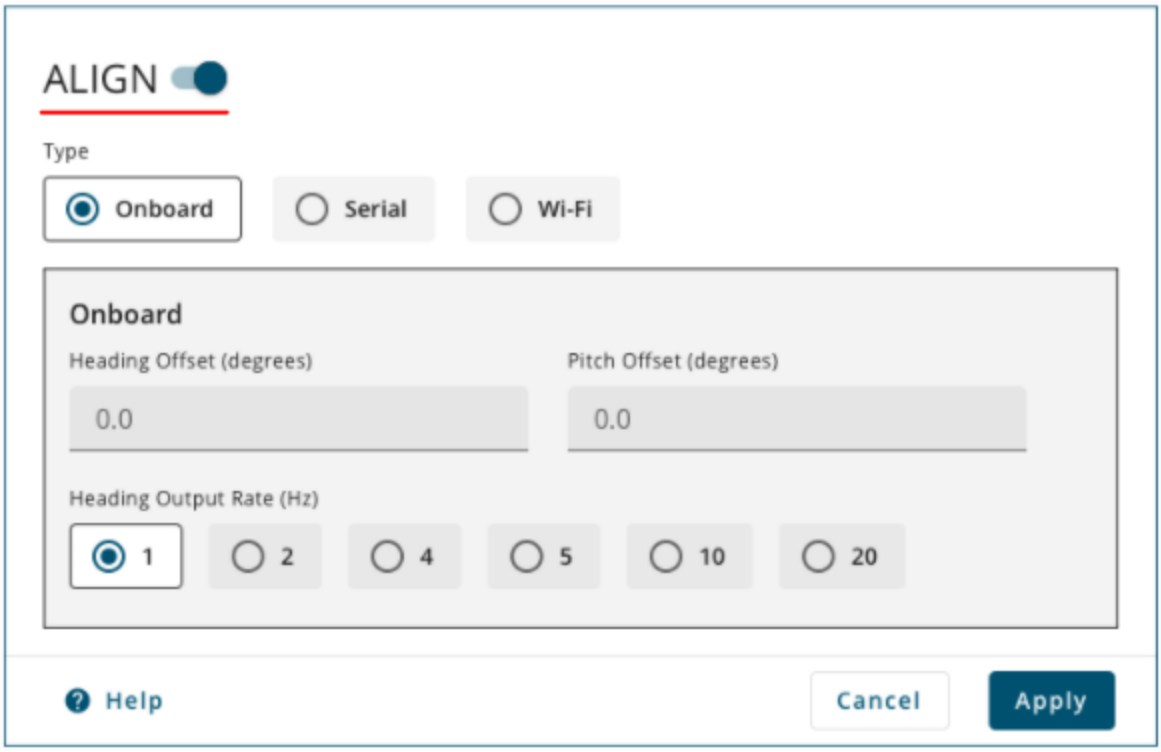
Use the ALIGN configuration window to enable ALIGN on a dual antenna receiver or set up an ALIGN master station with an ALIGN capable rover receiver for applications that require heading output. The ALIGN configuration should be run from the ALIGN rover receiver.

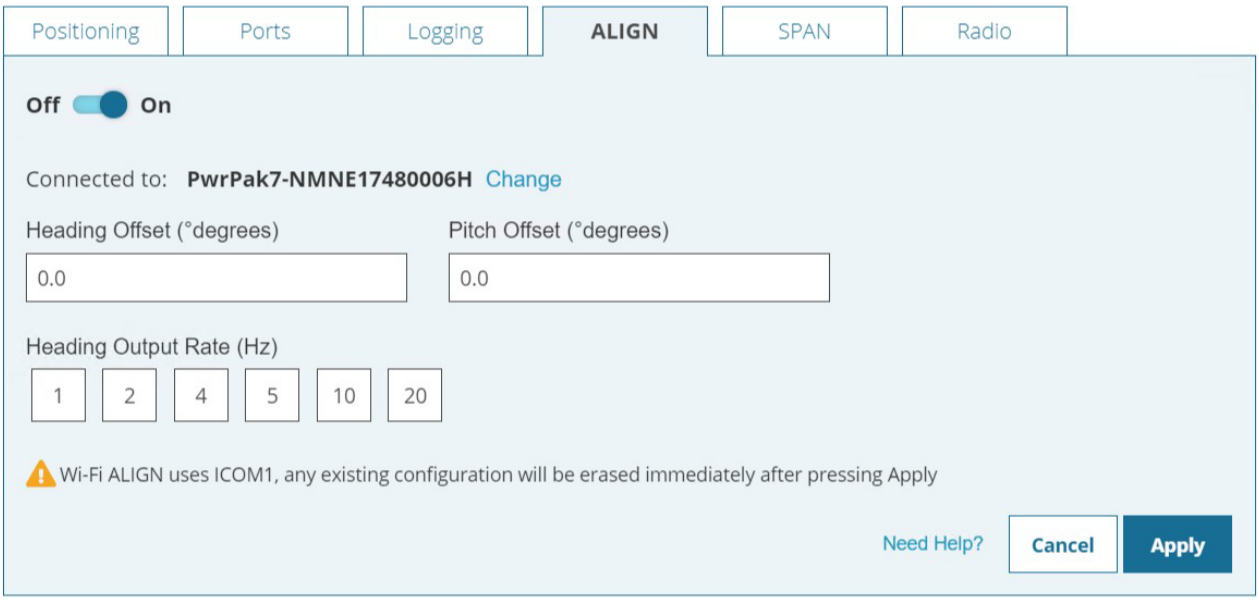
Dual antenna receivers, such as the OEM7720, PwrPak7D, PwrPak7D-E1, PwrPak7D-E2 and CPT7, can provide an ALIGN solution without additional receivers or configuration.

A dual frequency capable GNSS antenna is required to use ALIGN.

Click the *ALIGN* tab to open the *ALIGN* configuration window.
The content on the *ALIGN* configuration window varies depending on the type of receiver and how the rover receiver is connected to the master receiver.







ALIGN Switch

Set the ALIGN switch to On ( ) to configure the receivers to pass ALIGN messages and enable ALIGN. If ALIGN is already enabled, set the ALIGN switch to Off ( ) to disable ALIGN.

On dual antenna receivers, the *Type* options appear below the ALIGN switch.

- Click the **Onboard** option to calculate an ALIGN solution using the two GNSS antennas connected to the receiver.
- Click the **Serial** option to use the COM2 serial port to pass ALIGN messages between the rover and master receivers.

- Click the **Wi-Fi** option to use a Wi-Fi connection to pass ALIGN messages between the rover and master receivers.

Connected to

Displays the name of the receiver with which ALIGN messages are exchanged.

To connect to a different receiver, click **Change** and select the master receiver to connected to.

This option is available only if a Wi-Fi connection is used to exchange ALIGN messages and the master and rover receivers are both Wi-Fi capable receivers.

Heading Offset

Enter a value in the **Heading Offset** box to add an offset, in degrees, to the heading value displayed on the ALIGN status page and the heading logs (HEADING2 and GPHDT).

The receiver determines heading based on the relative location of the two GNSS antennas. This offset is used to align the heading determined by the receiver with the forward motion of the vehicle.

Pitch Offset

Enter a value in the **Pitch Offset** box to add an offset, in degrees, to the pitch value displayed on the ALIGN status page and the heading logs (HEADING2 and GPHDT).

The receiver determines pitch based on the relative location of the two GNSS antennas. This offset is used to align the pitch determined by the receiver with the pitch of the vehicle.

Heading Output Rate

Click one of the numbered buttons to set the rate (in Hz) at which heading data is output. The default is 10 Hz.

After setting the ALIGN parameters, click the **Apply** button to save the configuration on the receiver.

2.4.5 SPAN Configuration

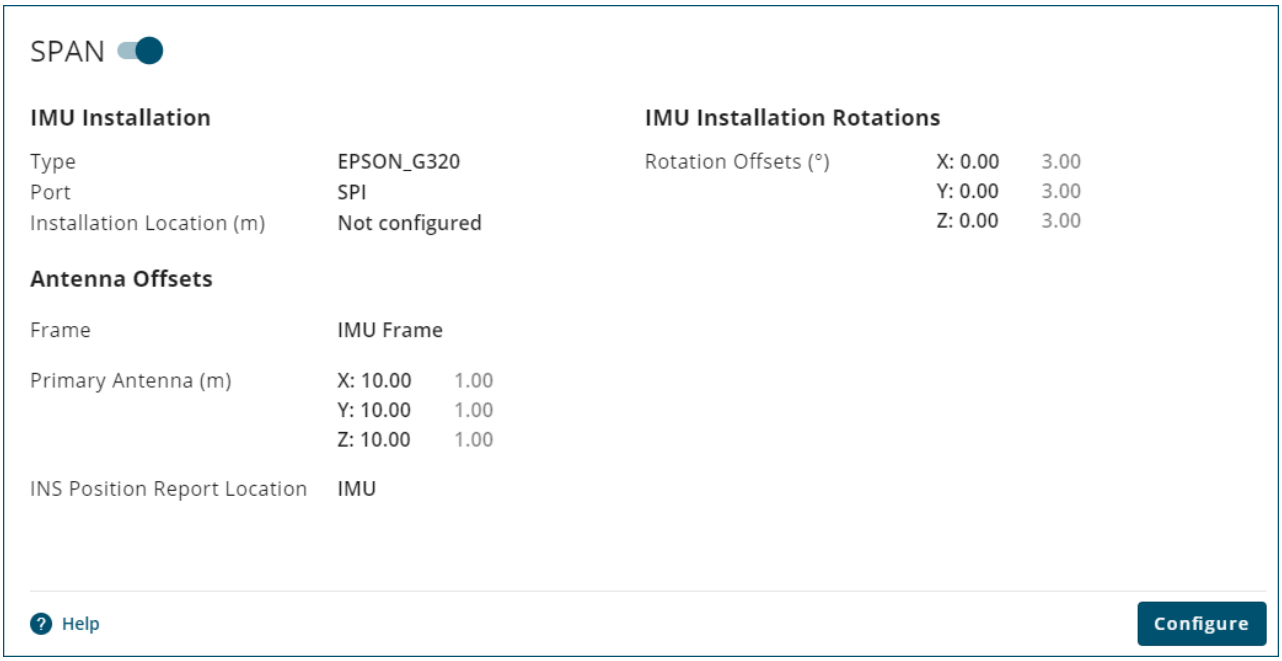
Use the SPAN configuration window to configure SPAN GNSS+INS technology on the receiver.

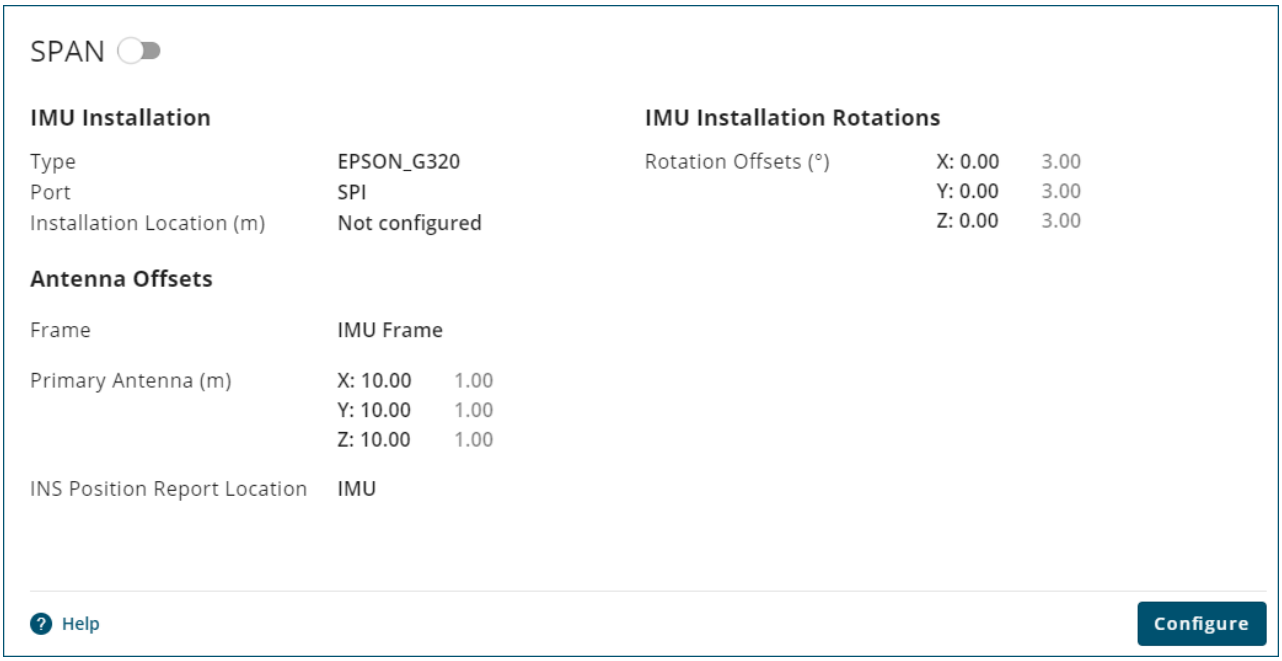
To use SPAN, the receiver must have an internal IMU (CPT7, CPT7700, PwrPak7-E1, PwrPak7D-E1, PwrPak7-E2, PwrPak7D-E2 or SMART7-S) or be connected to a SPAN compatible IMU.

A dual frequency capable GNSS antenna is required to use SPAN.

Click the *SPAN* tab to open the *SPAN* configuration window.

The *SPAN* configuration window shows the **SPAN** switch and the current SPAN configuration.

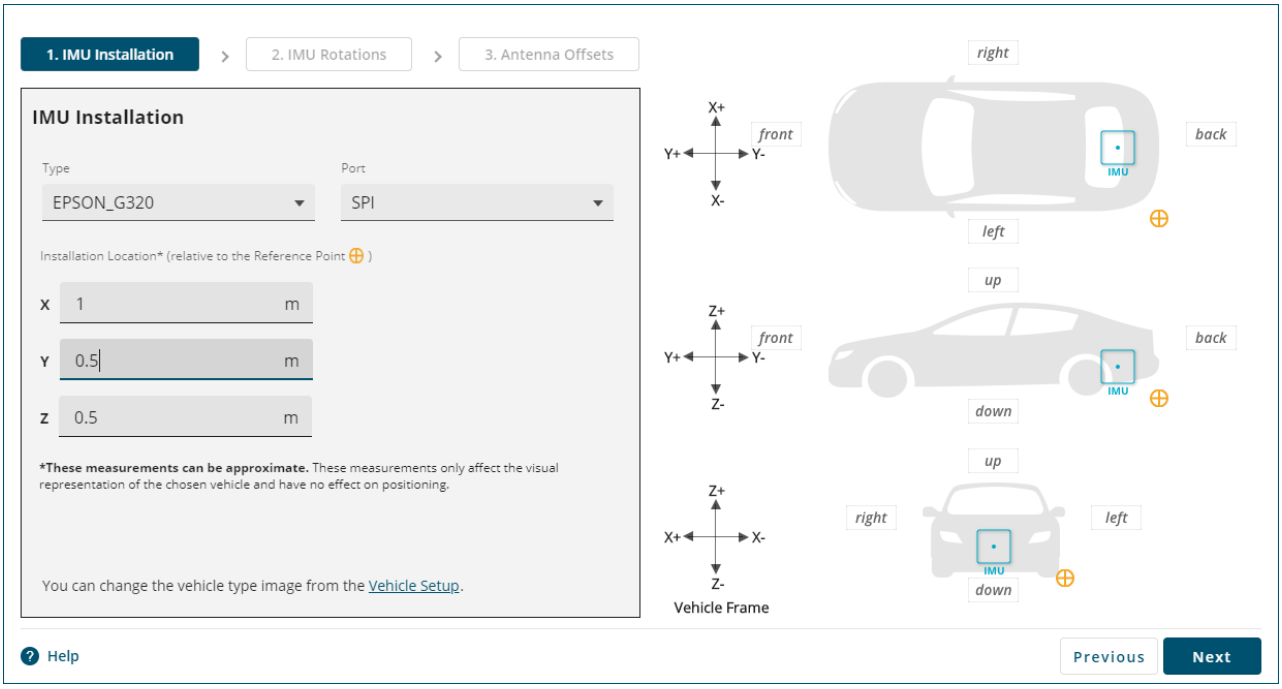




Click the **SPAN** switch to enable ( ) or disable ( ) the SPAN configuration.

To change the SPAN configuration, click the **Configure** button. The *IMU Installation* window opens.

2.4.5.1 IMU Installation



For receivers with an internal IMU (e.g. CPT7, CPT7700, PwrPak7-E1, PwrPak7D-E1, PwrPak7-E2, PwrPak7D-E2, SMART7-S), do not change the IMU Type or Port. The correct IMU Type and Port are configured at the factory.

Type

Click the *Type* drop menu and click on the IMU connected to the receiver.

The Vehicle Setup graphic displays after the IMU type is selected. To change the Vehicle Setup graphic or Reference point, see **Vehicle Setup** on page 26.

Port

Click the *Port* drop menu and click on the communication port to which the IMU is connected.

X

Enter the distance along the vehicle frame X axis from the Reference Point to the IMU.

Y

Enter the distance along the vehicle frame Y axis from the Reference Point to the IMU.

Z

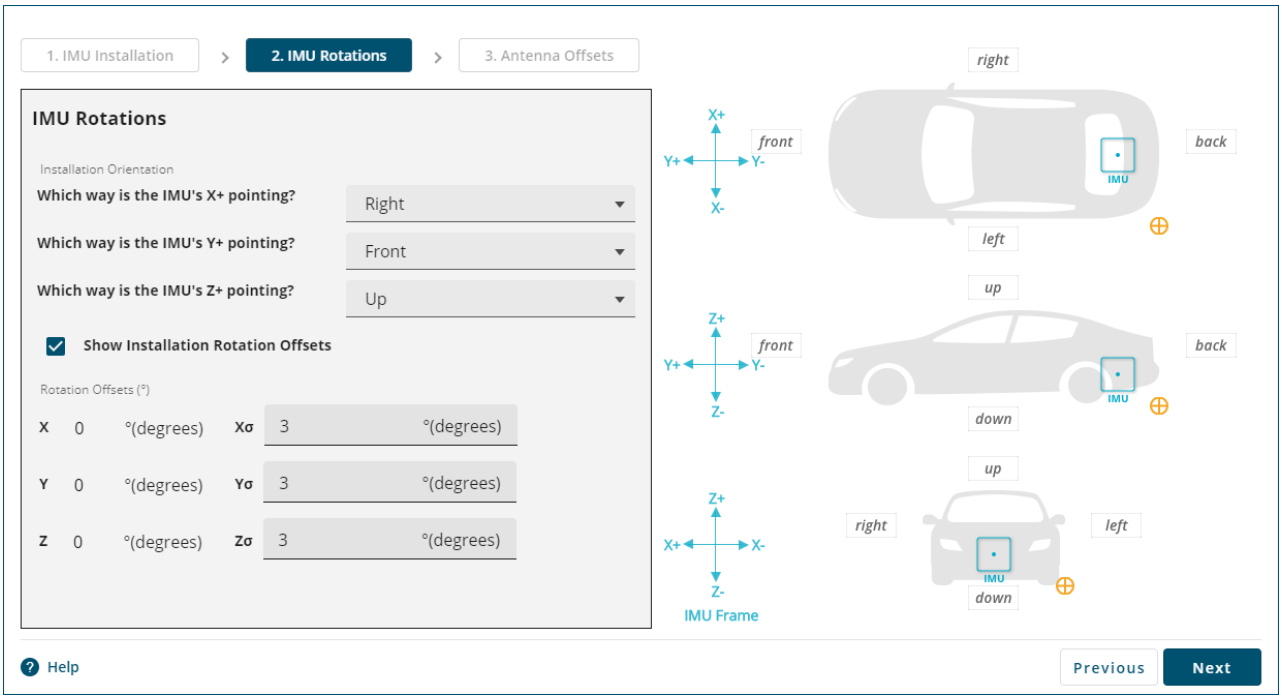
Enter the distance along the vehicle frame Z axis from the Reference Point to the IMU.

The values entered for X, Y and Z are used only to locate the IMU on the Vehicle Setup graphic. These values are not used for the position solution.

The IMU installation location can also be changed by clicking on the IMU icon in the Vehicle Setup graphic and dragging the IMU to the correct location.

Click **Next**. The *IMU Rotations* tab opens.

2.4.5.2 IMU Rotations



Which way is the IMU's X+ pointing?

Click the drop down menu and select the direction the X+ axis of the IMU is pointing relative to the vehicle frame (as shown in the Vehicle Setup graphic). The X+ axis of the IMU is shown on the enclosure of the IMU or receiver.

Which way is the IMU's Y+ pointing?

Click the drop down menu and select the direction the Y+ axis of the IMU is pointing relative to the vehicle frame (as shown in the Vehicle Setup graphic). The Y+ axis of the IMU is shown on the enclosure of the IMU or receiver.

Which way is the IMU's Z+ pointing?

Click the drop down menu and select the direction the Z+ axis of the IMU is pointing relative to the vehicle frame (as shown in the Vehicle Setup graphic). The Z+ axis of the IMU is shown on the enclosure of the IMU or receiver.

Only two IMU axes need to be selected. After two IMU axes are configured, NovAtel Application Suite automatically selects the correct third axis direction.

The IMU frame axes shown on the Vehicle Setup graphic are updated based on the IMU directions entered.

Show Installation Rotation Offsets

Select this option to show the IMU Rotation Offsets.

IMU Mapping (OEM6 receivers only)

This field displays the IMU Mapping value for the IMU rotations configured.

Rotation Offsets (°)

The values in the **X**, **Y** and **Z** boxes are the IMU Rotation Offsets, in degrees, of the current IMU rotation configuration. These values are view only.

The values in the **Xσ**, **Yσ** and **Zσ** boxes are the default values for the standard deviation of the IMU Rotation Offsets in degrees. These values can optionally be changed to the anticipated standard deviation values for the installation.

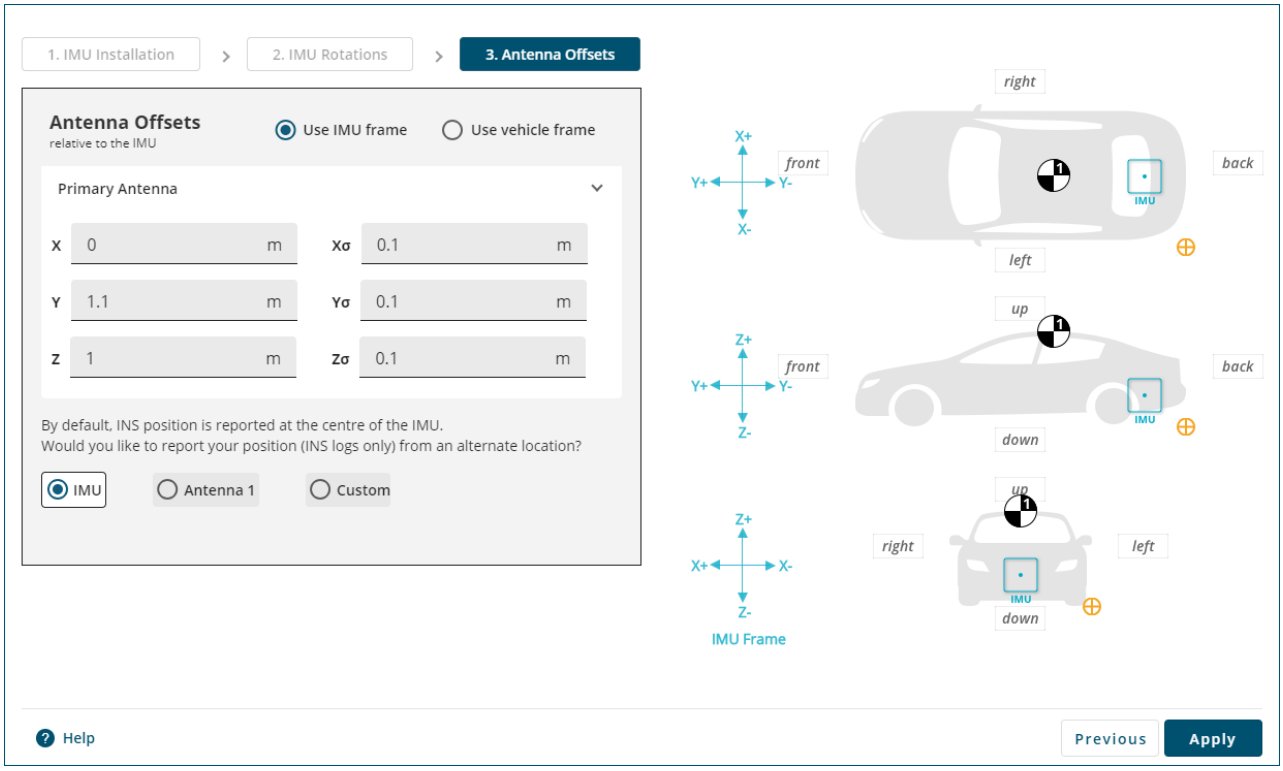
Click **Next**. The *Antenna Offsets* tab opens.

2.4.5.3 Antenna Offsets

For OEM7 receivers, the antenna offsets can be entered relative to the IMU frame or the vehicle frame. For OEM6 receivers, the antenna offsets can be entered relative to the IMU frame.

Antenna Offsets in IMU Frame

Select the **Use IMU frame** option to enter the antenna offsets relative to the IMU Body frame.



Primary Antenna

The Primary Antenna offset is the three dimensional distance from the IMU to the GNSS antenna. The primary antenna offsets are required for all SPAN systems.

In the **X**, **Y** and **Z** boxes, enter the distance, in metres, from the IMU center of navigation to the GNSS antenna phase center. The offsets are measured in three directions, X axis, Y axis and Z axis, relative to the IMU Body frame. The direction of the IMU Body frame axes are shown in the Vehicle Setup graphic.

In the **Xσ**, **Yσ** and **Zσ** boxes, enter the offset standard deviation in metres. The standard deviation settings are optional.

The measurements for the offsets should be done as accurately as possible, preferably to within millimetres especially for RTK operation. Any error in the offsets will translate into an error in the INS position.

Large standard deviations can lead to an inaccurate position solution. Therefore, it is highly recommended to measure translation offsets as accurately as possible and to manually enter translation offset standard deviations that reflect that accuracy.

Secondary Antenna

If the SPAN system supports two GNSS antennas, the secondary antenna offset parameters are shown.

In the **X**, **Y** and **Z** boxes, enter the distance, in metres, from the IMU center of navigation to the phase center of the secondary GNSS antenna. The offsets are measured in three directions, X axis, Y axis and Z axis, relative to the IMU Body frame. The direction of the IMU Body frame axes are shown in the Vehicle Setup graphic.

In the **Xσ**, **Yσ** and **Zσ** boxes, enter the offset standard deviation in metres. The standard deviation settings are optional.

To view the secondary antenna on the Vehicle Setup graphic, select the **Show Antenna** option.

Antenna Offsets in Vehicle Frame

Select the **Use vehicle frame** option to enter the antenna offsets relative to the vehicle frame.

Primary Antenna

The Primary Antenna offset is the three dimensional distance from the IMU to the GNSS antenna. The primary antenna offsets are required for all SPAN systems.

In the **X**, **Y** and **Z** boxes, enter the distance, in metres, from the IMU center of navigation to the GNSS antenna phase center. The offsets are measured in three directions, X axis, Y axis and Z axis, relative to the vehicle frame. The direction of the vehicle frame axes are shown in the Vehicle Setup graphic.

In the **Xσ**, **Yσ** and **Zσ** boxes, enter the offset standard deviation in metres. The standard deviation settings are optional.

The measurements for the offsets should be done as accurately as possible, preferably to within millimetres especially for RTK operation. Any error in the offsets will translate into an error in the INS position.

Large standard deviations can lead to an inaccurate position solution. Therefore, it is highly recommended to measure translation offsets as accurately as possible and to manually enter translation offset standard deviations that reflect that accuracy.

Secondary Antenna

If the SPAN system supports two GNSS antennas, the secondary antenna offset parameters are shown.

In the **X**, **Y** and **Z** boxes, enter the distance, in metres, from the IMU center of navigation to the phase center of the secondary GNSS antenna. The offsets are measured in three directions, X axis, Y axis and Z axis, relative to the vehicle frame. The direction of the vehicle frame axes are shown in the Vehicle Setup graphic.

In the **Xσ**, **Yσ** and **Zσ** boxes, enter the offset standard deviation in metres. The standard deviation settings are optional.

To view the secondary antenna on the Vehicle Setup graphic, select the **Show Antenna** option.

Position Center for INS Logs

The position and velocity information in the INSPVA, INSPOS, INSVEL, INSATT, and INSSPD logs, along with their short header and extended versions, can be output relative to the IMU, primary antenna, secondary antenna or a custom location.

IMU

Select this option to set center of the position and velocity information to the IMU center of navigation. IMU is the default option.

Antenna 1

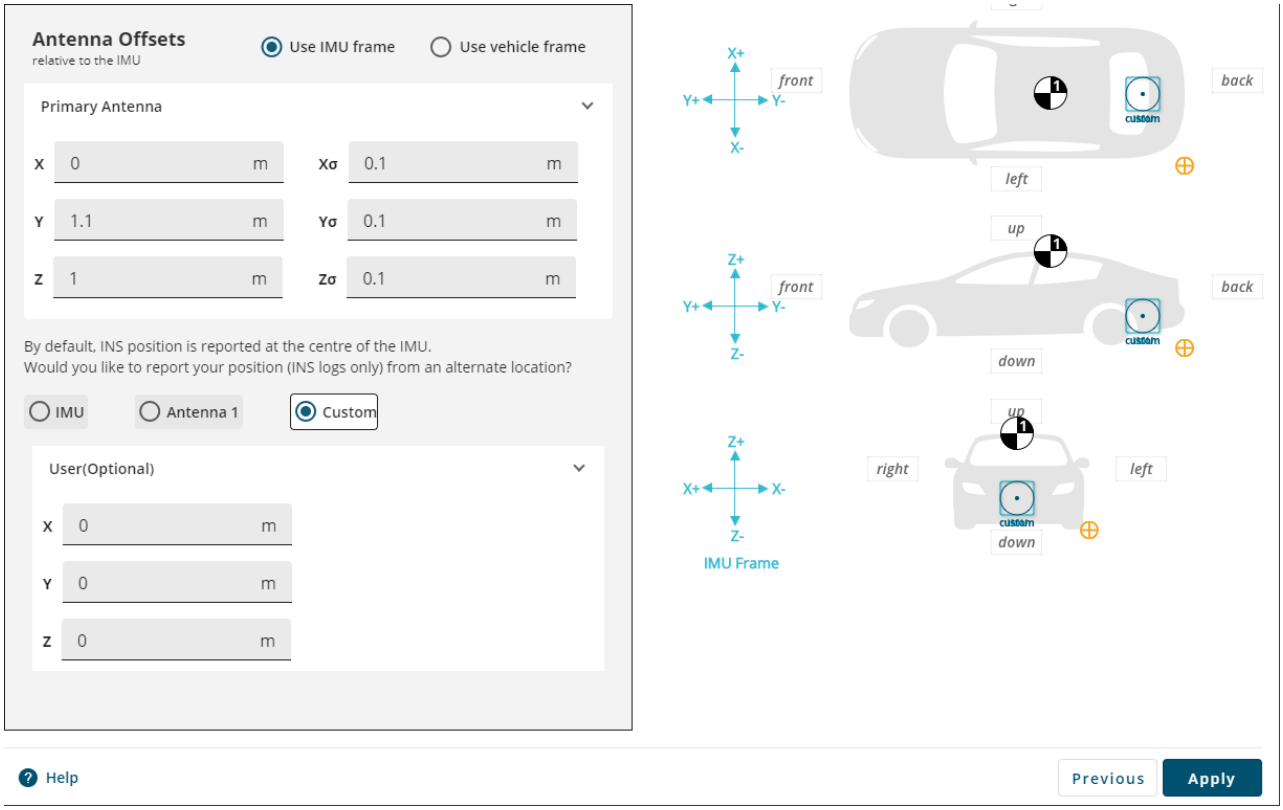
Select this option to set the center of the position and velocity information to the primary GNSS antenna phase center.

Antenna 2

Select this option to set the center of the position and velocity information to the secondary GNSS antenna phase center.

Custom

Select this option to set the center of the position and velocity information to a custom location. When this option is selected, *Custom* offset parameters are shown.

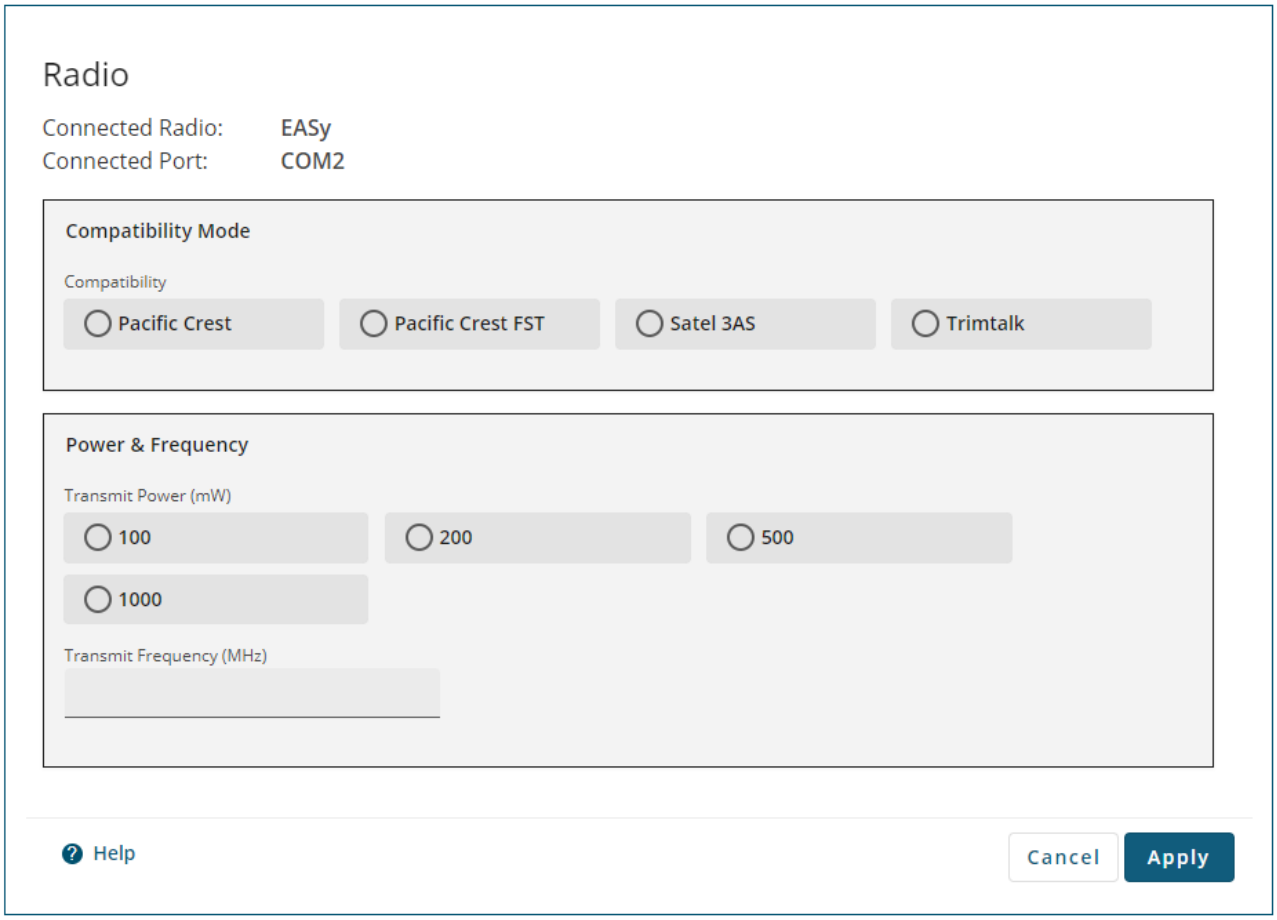


In the **X**, **Y** and **Z** boxes, enter the distance, in metres, from the IMU center of navigation to the custom location. The offsets are measured in three directions, X axis, Y axis and Z axis, and are relative to either the IMU Body frame (if the **Use IMU frame** option is selected) or the vehicle frame (if the **Use vehicle frame** option is selected).

The custom location is displayed on the Vehicle Setup graphic.

Click **Apply** to save the changes to the receiver.

2.4.6 Radio Configuration



Use the *Radio* configuration window to configure the radio connected to the receiver.

The settings on the *Radio* configuration window are saved on the radio module, not on the receiver.

Do not interrupt power while the radio is being configured.

Click the *Radio* tab to open the *Radio* configuration window.

If the radio has not been configured, the **Detect Radio** button displays. Click the **Detect Radio** button. If the receiver finds a radio, the *Radio* configuration window displays the type of radio detected and the configuration parameters for that radio.

Connected Radio

Displays the type of radio connected to the receiver.

Connected Port

Displays the communication port to which the radio is connected.

The compatibility mode settings vary depending on the radio module installed.

2.4.6.1 Compatibility Mode (450 MHz)

1. Click the button for the *Compatibility* (protocol) that the radio will use.
   The Modulation options appear.
2. Click the button for the modulation the radio will use.
   The Link Rate options appear.
3. Click the button for the link rate, in bps, the radio will use.
   The Channel Spacing options appear.
4. Click the button for the channel spacing the radio will use.
   The FEC options appear.
5. Click the button to enable or disable Forward Error Correction (FEC).

2.4.6.2 Power & Frequency (450 MHz)

1. Click one of the *Transmit Power* buttons to select the power at which the radio transmits.
2. In the *Transmit Frequency* box, enter the transmit frequency, in MHz, the radio will use. The valid frequency range is 403 MHz to 473 MHz.
3. Click the **Apply** button to save the changes to the radio.

2.4.6.3 Compatibility Mode and Transmit Power (900 MHz)

1. Click one of the *Compatibility Mode* buttons to select the protocol the radio will use.
2. Click one of the *Transmit Power* buttons to select the power at which the radio transmits.
3. In the *Channel* box, enter the channel number the radio will use.
4. Click the **Apply** button to save the changes to the radio.

2.5 PIM222A

When connected to a PIM222A receiver, the tiles available on NovAtel Application Suite are different than the tiles available for other receivers. The following sections describe the tiles available for the PIM222A.

2.5.1 Positioning Status

The *Positioning* tile displays information about the position calculated by the receiver.

Position
The positioning type used to calculate the position.

This field shows all of the position types configured on the receiver. The position type being used is highlighted with a green box.

- **Single**

  A GNSS code based position is being calculated without the use of any correction sources. This is the default positioning type.
- **RTK**

  A carrier based position is being calculated using the Real Time Kinematic (RTK) method.

Latitude
Latitude of the receiver position in degrees.

Longitude
Longitude of the receiver position in degrees.

Height
The height above mean sea level of the receiver in metres.

2d-SD
The horizontal standard deviation of the position.

Course Over Ground

Actual direction of motion over ground with respect to True North, in degrees.

Azimuth
Left-handed rotation around the z-axis in degrees clockwise from North. This is the inertial azimuth calculated from the IMU gyros and the SPAN filters. Azimuth is available only if SPAN is active.

Pitch
Right-handed rotation from local level around the x-axis in degrees.

Roll
Right-handed rotation from local level around the y-axis in degrees.

Speed
Speed over ground in km/h.

North Velocity
The velocity in a northerly direction. A negative (-) value implies a southerly direction. The velocity is in m/s.

East Velocity
The velocity in an easterly direction. A negative (-) value implies a westerly direction. The velocity is in m/s.

Up Velocity
The velocity in an up direction. A negative (-) value implies a downward direction. The velocity is in m/s.

2.5.2 Device Status

CPU Usage
The percentage of computing power currently being used by the module.

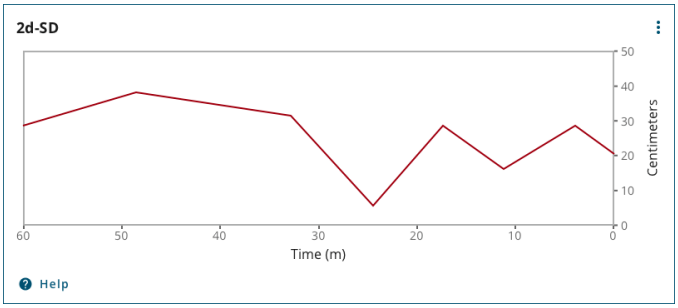
Temperature
The approximate temperature of the module.

Module Input Voltage
Supply voltage being provided to the module.

2.5.3 2d-SD

The *2d-SD* tile provides a graph of the horizontal position standard deviation over time.

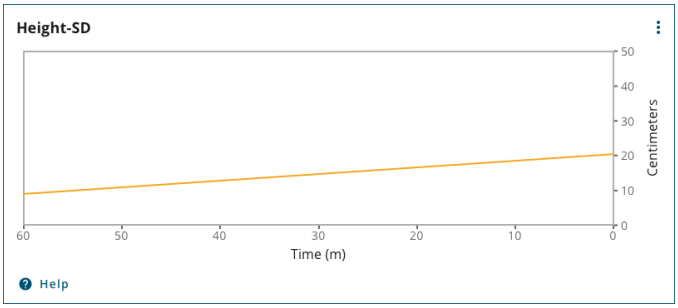
The Y-axis scale can be can be configured to 5 cm, 10 cm, 50 cm, 1 m, or 5 m. The default scale is 5 cm.



2.5.4 Height-SD

The *Height-SD* tile provides a graph of the ellipsoidal height standard deviation over time.

The Y-axis scale can be can be configured to 5 cm, 10 cm, 50 cm, 1 m, or 5 m. The default scale is 5 cm.



2.5.5 Satellite View

The *Satellite View* tile displays each satellite the receiver is tracking in graphical format. Concentric circles from 0° to 90° represent elevations from the horizon to directly overhead.

The satellites being tracked are represented with icons according to their satellite system. The PRN of the satellite tracked appears below the Satellite icon.

- If the Satellite icon is green, the satellite is used in the positioning solution.
- If the Satellite icon is amber, the satellite is being tracked but is not used in the positioning solution.

A legend on the *Satellite View* tile identifies the icon used for each GNSS system and the number of satellites used in the solution.

To view information about a specific satellite, click on the Satellite icon. A pop up box displays PRN, azimuth, elevation and tracking information about the satellite.

2.5.6 Positioning Configuration

On a PIM222A receiver, positioning configuration is applied at one time. Enter all of the applicable positioning configuration parameters, described in the following sections, and then click the **Apply** button.

NMEA Interface Mode
When the PIM222A COM port is in NMEA interface mode, NovAtel Application Suite is not able to retrieve the existing configuration. A message is displayed to indicate that the current configuration is not known and the parameters on the Positioning Configuration window are filled with suggested default values.

2.5.6.1 RTK

To use RTK corrections, the receiver must have a communications link through the COM2 port to an RTK base station. Use the *RTK* tile to configure the PIM222A to receive RTK corrections.

Input Format
Displays the format of the incoming RTK messages.

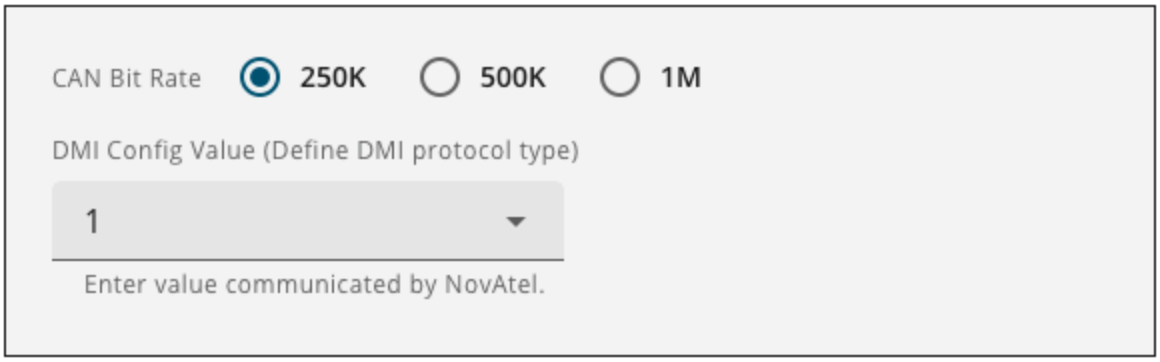
Input Port
Select the port through which RTK corrections are received.

Enable PIMTP wrapper
Select this option to receive the RTCMV3 messages that are wrapped in a PIMTP format message.

Clear this option to receive raw RTCMV3 messages.

2.5.6.2 CAN Configuration

Use the *CAN Configuration* tile to set the parameters the PIM222A needs to communicate on the CAN bus.



CAN Bit Rate

Select the bit rate that is used on the CAN bus to which the PIM222A is connected.

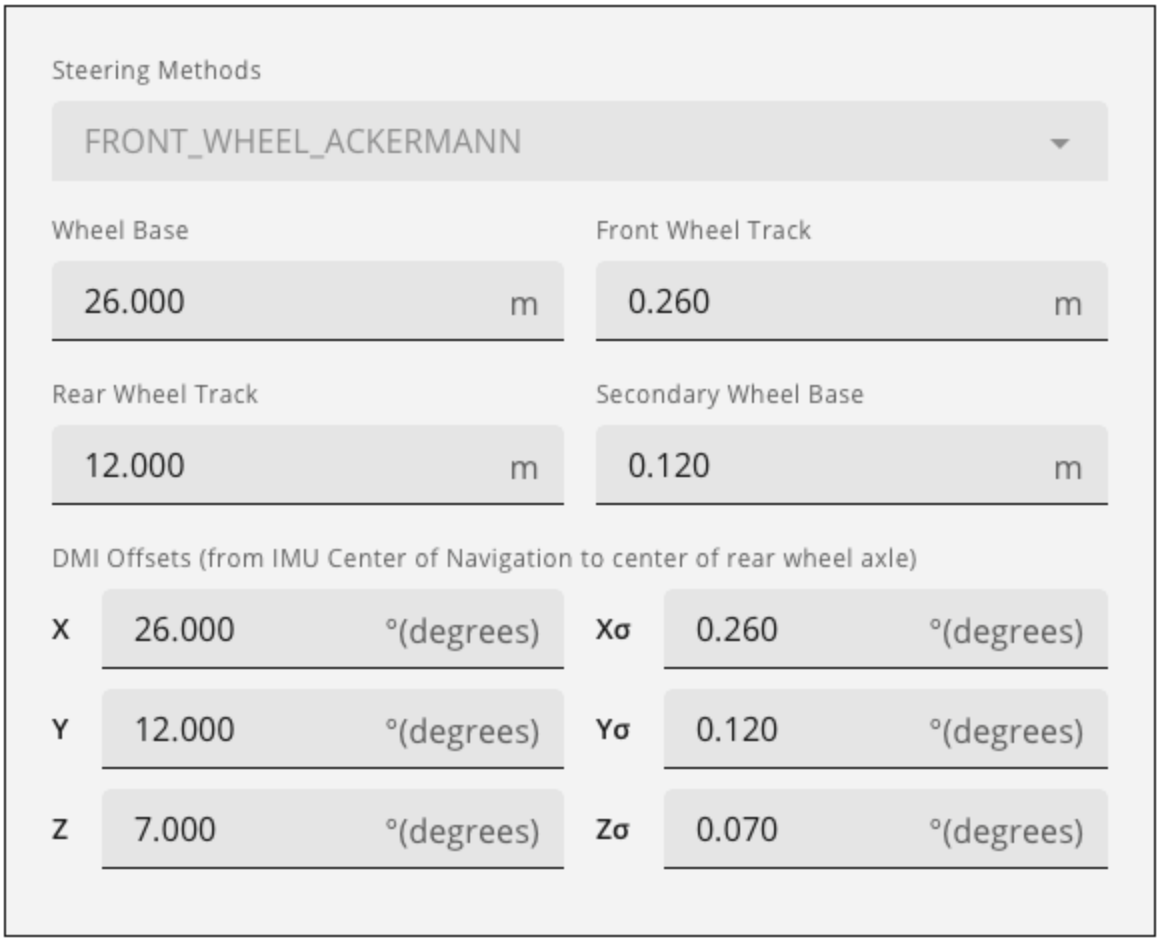
DMI Config Value

Select the DMI Config Value for DMI connected to the PIM222A.

Please contact Hexagon A&P Application Engineering for supported DMI Configuration number details.

2.5.6.3 Vehicle Parameters

Use the *Vehicle Parameters* tile to set the parameters of the vehicle in which the PIM222A is installed.



Steering Methods

Click the drop down menu and select the steering method used by the vehicle.

Wheel Base

Enter the wheel base of the vehicle in metres.

Front Wheel Track

Enter the front wheel track in metres.

Rear Wheel Track

Enter the rear wheel track in metres.

Secondary Wheel Base

Enter the secondary wheel base of the vehicle in metres.

DMI Offsets

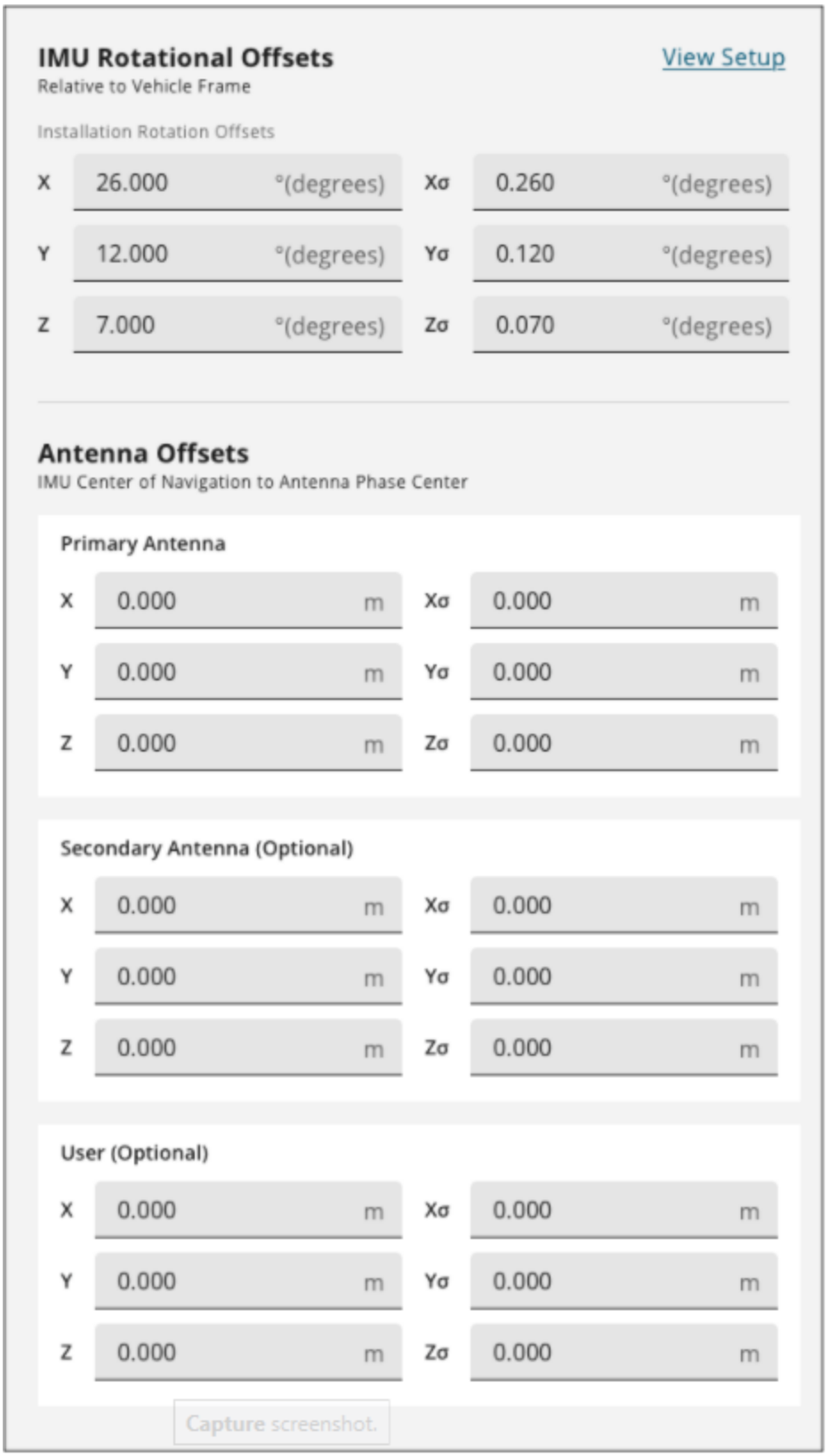
In the **X**, **Y** and **Z** boxes, enter the distance, in metres, from the IMU center of navigation to the center of the rear axle. The offsets are measured in three directions, X axis, Y axis and Z axis, relative to the IMU Body frame.

In the **Xσ**, **Yσ** and **Zσ** boxes, enter the offset standard deviation in metres. The standard deviation settings are optional.

2.5.6.4 SPAN

Use the *SPAN* tile to configure SPAN GNSS+INS technology on the receiver.

A dual frequency capable GNSS antenna is required to use SPAN.



Installation Rotation Offsets

The Installation Rotations are the differences in orientation between the IMU Body Frame (typically marked on the IMU enclosure) and the vehicle frame. In the vehicle frame, Z is always considered to be upwards, Y is forward through the direction of travel, and X is to the right.

The order of rotations is Z-X-Y and all rotations are right handed.

In the **X**, **Y** and **Z** boxes, enter the rotations, in degrees, from the IMU Body Frame to the vehicle frame.

In the **Xσ**, **Yσ** and **Zσ** boxes, enter the rotation offset standard deviation. The standard deviation settings are optional.

Primary Antenna

The Primary Antenna offset is the three dimensional distance from the IMU to the primary GNSS antenna. The primary antenna offsets are required for all SPAN systems.

In the **X**, **Y** and **Z** boxes, enter the distance, in metres, from the IMU center of navigation to the GNSS antenna phase center. The offsets are measured in three directions, X axis, Y axis and Z axis, relative to the IMU Body frame.

In the **Xσ**, **Yσ** and **Zσ** boxes, enter the offset standard deviation in metres.

The measurements for the offsets should be done as accurately as possible, preferably to within millimetres especially for RTK operation. Any error in the offsets will translate into an error in the INS position.

Large standard deviations can lead to an inaccurate position solution. Therefore, it is highly recommended to measure translation offsets as accurately as possible and to manually enter translation offset standard deviations that reflect that accuracy.

Secondary Antenna

If the SPAN system has a second GNSS antenna, set the *Secondary Antenna* offset parameters.

In the **X**, **Y** and **Z** boxes, enter the distance, in metres, from the IMU center of navigation to the phase center of the secondary GNSS antenna. The offsets are measured in three directions, X axis, Y axis and Z axis, relative to the IMU Body frame.

In the **Xσ**, **Yσ** and **Zσ** boxes, enter the offset standard deviation in metres.

User

If the SPAN system has another device for which the relative location is needed by the SPAN system, set the *User* offset parameters.

In the **X**, **Y** and **Z** boxes, enter the distance, in metres, from the IMU center of navigation to the location of the device. The offsets are measured in three directions, X axis, Y axis and Z axis, relative to the IMU Body frame.

In the **Xσ**, **Yσ** and **Zσ** boxes, enter the offset standard deviation in metres. The standard deviation settings are optional.

2.5.7 Logging Configuration

Use the *Logging* configuration window to enable saving log to the computer running NovAtel Application Suite. Only the logs configured to be output on the connected port are saved.

To enable logging to the NovAtel Application Suite computer:

1. Set the **Logging** option to on ()
2. Click **Browse**.

   The Open Folder dialog box appears.
3. Navigate to the folder in which you want to store the logs.
4. Click **Select Folder**.

   The *Logging* configuration window appears with the file name of the selected folder displayed.
5. Click **Apply** to start collecting logs.

To disable logging to the NovAtel Application Suite computer, set the **Logging** option to off ().

2.5.8 Details

The *Details* tile provides information about the receiver.

Hardware Version
Version of the PIM222A module.

Firmware Version
Version of the firmware loaded on the PIM222A module.

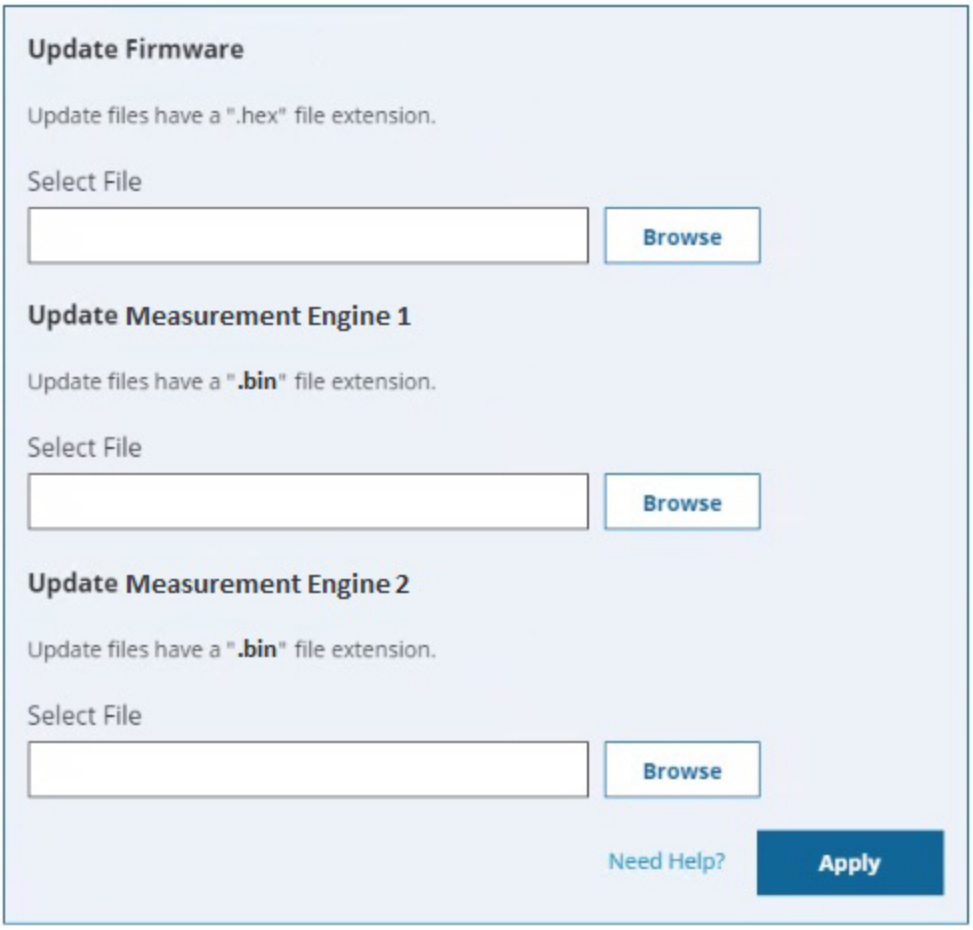
Boot Version
Version of the boot code loaded on the PIM222A module.

PSN
Product serial number for the PIM222A module.

Model Number
Model number of the module.

2.5.9 Update Firmware

Use the *Update* window to load new software onto the receiver.



The new software must be copied onto the computer used to run NovAtel Application Suite before starting this procedure.

To load new software on the receiver:

1. Click the **Browse** button for the firmware component to be updated.
   - **Update Firmware** – updates the main PIM222A firmware.
   - **Update Measurement Engine 1** – updates the TeseoV Measurement Engine 1
   - **Update Measurement Engine 2** – updates the TeseoV Measurement Engine 2

   The *Select File* dialog box appears.
2. Navigate to the folder in which the new software to load is stored and select the software file.

   The selected file appears in the *File name* field.
3. Click the **Open** button.

   The Update window appears with the name of the selected file in the *Select File* field.
4. Click the **Apply** button

After the new software is loaded, the receiver will restart.

2.5.10 Terminal

Use the *Terminal* window to send commands to the receiver and display any receiver acknowledgments and outputs.

To enter a command:

1. Enter the command and click **RETURN**.

Only the **Restart** and **Update_get**/**Updateget** commands can be sent to the PIM222A from the *Terminal* window.

To re-issue a command:

1. Use the Up and Down arrow keys on the keyboard to select the command to re-issue.
2. Press **ENTER**.

Three buttons are also available on the *Terminal* window.

Load
Click **Load** to load a list of commands from a file to the receiver and automatically execute those commands.

Save
Click **Save** to save the commands issued in the current session of the Terminal to a file.

Record
Click **Record** to begin recording all activity in the Terminal. Click again to stop recording. A prompt to Save the recording to a file displays.

2.6 G-III Reference Receiver

The computer running NovAtel Application Suite can connect to a G-III Reference Receiver using the Maintenance port, Data port or Monitor port. When connected to a G-III Reference Receiver, the tiles available on NovAtel Application Suite are different depending on which port the NovAtel Application Suite computer is connected to and the G-III Reference Receiver state.

Port	G-III Reference Receiver in Operating Mode	G-III Reference Receiver in Configuration Mode
Maintenance (serial port)	N/A	Configuration view
Data (Ethernet)	Operating view	Configuration view
Monitor (Ethernet)	Operating view except Terminal and Reset screens	N/A

2.6.1 Operating View

The Operating view is the default screen when the NovAtel Application Suite computer is connected to the Data port and the G-III Reference Receiver is in Operational mode. The Operating view is the only view available when the NovAtel Application Suite computer is connected to the Monitor port.

2.6.1.1 Summary Bar

On Operating view screens, the Summary bar provides the following status information about the G-III Reference Receiver.

Positioning

The *Positioning* status indicator shows the state of the Solutions tile status indicator.

Latitude

The *Latitude* field shows the latitude of the receiver in degrees.

Longitude

The *Longitude* field shows the longitude of the receiver in degrees.

Height

The *Height* field shows the ellipsoidal height of the receiver in metres.

Device

The *Device* status indicator shows the state of the Device tile status indicator.

Model

The *Model* field shows the receiver type.

Logging

The *Logging* field shows the status of logging to the local receiver.

Time (GPS)

The *Time (GPS)* field shows the current GPS week number and the number of milliseconds from the beginning of the GPS week.

State

The *State* field shows the G-III Reference Receiver state.

2.6.1.2 Status Window

The *Status* window has two tabs: *Positioning* and *Tracking*. The *Positioning* tab contains the *Solutions*, *Device*, *Satellite View*, *Logging* and *ACG* tiles. The *Tracking* tab contains the *Satellite Tracking* tile.

Solutions Tile

The *Solutions* tile shows the position and clock information for the G-III Reference Receiver.

Latitude

The latitude of the receiver position in degrees.

Longitude

The longitude of the receiver position in degrees.

Height

The ellipsoidal height of the receiver in metres.

Datum

The datum used by the receiver. The G-III Reference Receiver always uses WGS84.

Clock Model

The status of the clock model. This field can be Not Computed or Computed.

Clock Offset

The receiver clock offset in µs.

Clock Offset SD

The receiver clock offset standard deviation in µs.

Clock Drift

The receiver clock drift in µs/s.

Signal Type

The signal type from which the clock model was computed. This field can be GPS L1 C/A, Galileo E1 or Unknown (not computed).

Table 3: Solutions Tile Status Indicator

Indicator Color	Status
Red	*With a proper fix position*: Clock model is not computed (receiver is not tracking enough satellites). *Without proper fix position or an invalid fix position*: A FIX POSITION is not entered in CONFIGURATION state and/or the clock model is not computed (receiver is not tracking enough satellites).
Amber	The position is not fixed.
Green	The status of the clock model is *Computed* and the position is fixed.

Device Tile

The *Device* tile displays information about the G-III Reference Receiver.

State
The receiver operating state.

Mode
The receiver operating mode.

Software Attenuation
The software attenuator setting.

IOMaster – CPU Usage
The percentage of idle time available on the IOMaster card.

IOMaster – Temperature
The board temperature of the IOMaster card (°C).

DSPC – CPU Usage
The percentage of idle time available on the DSPC card.

DSPC – Temperature
The board temperature of the DSPC card (°C).

RFCC – Temperature
The board temperature of the RFCC card (°C).

RFDC – Temperature
The board temperature of the RFDC card (°C).

Table 4: Device Tile Status Indicators

Indicator	Indicator Color	Status
Overall	Red	At least one of the individual Device status indicators is red.
	Amber	At least one of the individual Device status indicators is amber and none are red.
	Green	All of the individual Device status indicators are green.
CPU	Red	CPU usage for the card is above or equal to 90%.
	Amber	CPU usage for the card is between 70% and 90%.
	Green	CPU usage for the card is less than 70%.
Temperature	Red	The temperature monitoring warning bit for the card is set.
	Green	The temperature monitoring warning bit for the card is not set.

Satellite View Tile

The *Satellite View* tile displays each satellite the receiver is tracking in graphical format. Concentric circles from 0° to 90° represent elevations from the horizon to directly overhead.

The satellites being tracked are represented with icons according to their satellite system. The PRN of the satellite tracked appears below the Satellite icon.

A legend on the Satellite View tile identifies the icon used for each GNSS system, the number of satellites used in the solution and the number of satellites tracked but not used.

To view information about a specific satellite, click on the Satellite icon. A pop up box displays PRN, azimuth, elevation and tracking information about the satellite.

Table 5: Satellite View Status Indicators

Indicator	Indicator Color	Status
Satellite Icon (PRNs)	Amber	The tracking status of the satellite is not *directedfpdll* or *pdll*.
	Green	The tracking status of the satellite is *directedfpdll* or *pdll*.

Indicator	Indicator Color	Status
Satellite View Tile status indicator	Red	*With a proper fix position*: Clock model is not computed (receiver is not tracking enough satellites). *Without proper fix position or an invalid fix position*: A FIX POSITION is not entered in CONFIGURATION state and/or the clock model is not computed (receiver is not tracking enough satellites).
	Green	At least four PRNs have a status of green.

Logging Tile

The *Logging* tile displays the status of logging to the NovAtel Application Suite computer.

If logging to the NovAtel Application Suite computer is active, the log file name, log file size and the messages that are currently being logged are displayed.

The Logging tile status indicator is always green.

AGC Status Tile

The *AGC* tile displays the Automatic Gain Control (AGC) data for the G-III Reference Receiver.

The AGC data for a single DSPC card is displayed on the tile. To view the AGC information for another DSPC, click the button for the DSPC card to view. For example, to view the AGC data for DSPC2, click the **DSPC2** button.

To view additional AGC information, click the **View Frequency Information** link. A text box appears below the AGC graph with the following information.

AGC Word
The AGC status word.

Pulse Width
The VARF pulse width.

Modulus
The VARF modulus.

Noise Floor
The calculated noise floor.

% Pulses Blanked
The ratio of samples blanked over the previous second.

DC Offset

The A/D DC offset estimate (samples).

Active Flag
Indicates if the card is controlling the AGC for this frequency.

Bin Skew
Indicates if Bin Skew is present.

AGC Calibration
Indicates whether AGC calibration is Coarse or Fine.

ADC Range
Indicates which 3 bits of the 8-bit ADC output are currently being used by the receiver.

Noise Floor Calculation Method
Indicates whether the method of Noise Floor Calculation is AGC or Post Correlation.

Bin Count Overflow
A flag identifying when more than 1 bin was filled with 1023+ samples.

Rail Gain
A flag identifying when the VGA is railed high/low for 3+ consecutive seconds.

Bins Not Full
A flag identifying when all the bins contain 1 or more but less than 1023 samples.

Bins Empty
A flag identifying when all the bins are empty.

Table 6: AGC Status Tile Indicator

Indicator Color	Status
Red	Either one of these conditions is met: • AGC Pulse Width = 0 or 1000 • Railed Gain = 1 The status indicator will be red if any of the RF paths meet one of the above conditions.
Amber	The conditions to be red are not met and one of these conditions is met: • AGC Pulse Width is > 900 or AGC Pulse Width < 100 • Bin Skew = 1 • Bins Not Full = 1 • Bins Empty = 1 The status indicator will be amber if none of the RF paths meet the criteria to be Red and at least one of the RF paths meet one of the conditions above.

Indicator Color	Status
Green	All of the following conditions are met: • AGC Pulse Width <= 900 or AGC Pulse Width >= 100 • Bin Skew = 0 • Railed Gain = 0 • Bins Not Full = 0 • Bins Empty = 0 The status indicator will be green only if all of the available RF paths meet the above conditions.

To copy the AGC Status information to another application, click the **Copy to clipboard** link. The information can then be pasted into any application that can accept CSV formatted information.

Satellite Tracking Tile

The *Satellite Tracking* tile displays the carrier to noise ratio and lock time for the GNSS signals the receiver is tracking. This tile is on the *Tracking* page of the *Status* window.

Constellation

The graphs on the *Satellite Tracking* tile display tracking information from the satellites of a single constellation (e.g. GPS). The button of the constellation currently being viewed is dark. To change the constellation being viewed, click the button for the constellation.

Graphs

There are two graphs available on the *Satellite Tracking* tile: Carrier-to-Noise and Lock Time.

2.6.2 Carrier-to-Noise

To view the *Carrier-to-Noise* graph, click the **Carrier-to-noise** button.

The *Carrier-to-Noise* graph displays the current carrier-to-noise ratio values for all of the satellites (PRNs) being tracked for the currently selected constellation. A carrier-to-noise bar is shown for each of the frequencies available on the PRN. If there are no frequencies being tracked for the PRN, the text "no signal" is shown for the PRN. If there are more PRNs tracked than can be shown on the tile, a scroll bar appears at the bottom of the graph.

The status of the signal is indicated by the color of the carrier-to-noise bar.

Green	Good
Amber	Warning
Red	Poor

A legend for the carrier-to-noise status is shown on the right side of the graph. To hide or show the legend, click the arrow button on the legend.

2.6.3 Lock Time

To view the *Lock Time* graph, click the **Lock Time** button.

The *Lock Time* graph displays the number of seconds of continuous tracking for all of the satellites (PRNs) being tracked for the currently selected constellation. A lock time bar is shown for each of the frequencies available on the PRN. If there are no frequencies being tracked for the PRN, the text "no signal" is shown for the PRN. If there are more PRNs tracked than can be shown on the tile, a scroll bar appears at the bottom of the graph.

A legend for the lock time status is shown on the right side of the graph. To hide or show the legend, click the arrow button on the legend.

2.6.4 View Satellite Details

To view details about a specific satellite, hover the mouse pointer over one of the signals bars. A pop up window appears showing information for the frequencies tracked on that satellite. The signal that mouse pointer is over is highlighted.

The details pop up window is available on the *Carrier-to-Noise* graph and the *Lock Time* graph.

2.6.5 Show

Elevation Mask

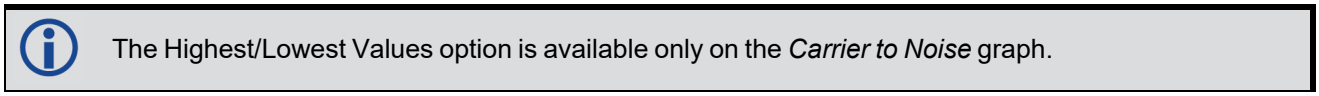
When the **Elevation Mask** option is enabled, satellites below the configured elevation mask for the constellation have a gray bar at the top of the graph. The gray bar has the text "Below X Mask" where X is the elevation mask for the constellation.

When the **Elevation Mask** option is disabled, the gray bar is not shown.

Highest/Lowest Values

When the **Highest/Lowest Values** option is enabled, marks are added to each signal bar to indicate the highest and lowest Carrier to Noise values recorded in the last 30 seconds.

When the **Highest/Lowest Values** option is disabled, the highest and lowest marks are hidden.



2.6.6 Sort By

The information on the *Satellite Tracking* graphs can be sort by PRN or satellite elevation.

PRN

Select this option to sort the graph by satellite PRN number in ascending order.

Elevation 0°>90°

Select this option to sort the graph by elevation angle starting with 0° (horizon).

Elevation 90°>0°

Select this option to sort the graph by elevation angle starting with 90° (directly overhead).

2.6.7 View all satellite information

To view the satellite tracking information for all of the satellites in a constellation:

1. Click the button for the constellation to view (e.g. GPS).
2. Click the **View all satellite information** link.

   The *All satellite information* dialog box appears.

   This dialog box shows the PRN, Elevation, Channel, Frequencies available, Carrier-to-Noise ratio and Lock Time for each satellite tracked from the selected constellation. It also shows the Elevation Mask set for the constellation.
3. To copy the satellite information to another application, click the **Copy to clipboard** link. The information can then be pasted into any application that can accept CSV formatted information.
4. When finished viewing the information, click the **Done** button to close the dialog box.

Table 7: Satellite Tracking Status Indicator

Indicator Color	Status
Red	*With a proper fix position*: Clock model is not computed (receiver is not tracking enough satellites). *Without proper fix position or an invalid fix position*: A FIX POSITION is not entered in CONFIGURATION state and/or the clock model is not computed (receiver is not tracking enough satellites).
Green	At least four PRNs have a status of green.

2.6.7.1 Details

To access the *Details* window, click the **Device** menu and then click **Details**.

Receiver Version Tile

The *Receiver Version* tile shows the version information of all of the cards in the G-III Reference Receiver.

Ethernet Status Tile

The *Ethernet Status* tile shows the Ethernet status of the ETHA (DATA) port.

2.6.7.2 Logging Configuration

The *Logging* window is used to configure the messages that are logged to the NovAtel Application Suite computer.

To access the *Logging* window, click the **Configuration** tab.

The *Configuration* tab is available only when the NovAtel Application Suite computer is connected to the DATA port on the G-III Reference Receiver.

If the G-III Reference Receiver is in Operational mode when the *Logging* window is accessed, a message appears at the top of the *Logging* window from which you can choose to change the G-III Reference Receiver to Configuration mode. If you click the **Restart** button, a Reset command is sent to receiver and after reset, Configuration Mode view is displayed.

To configure the logs to be saved to the computer running NovAtel Application Suite:

1. Click **Browse**.

   The *Open Folder* dialog box appears.
2. Navigate to the folder in which you want to store the logs.

   The default folder is: <Current User APPDATA>/Documents/Novatel Data/DataLogger/.
3. Click **Select Folder**.

   The Logging configuration window appears with the path name of the selected folder displayed in the *Local File System* box.
4. In the **Message Sets** section, click the button for one of the message sets. The logs contained in the selected message set will be collected.
5. To add other logs, click the **Custom Messages** box and start typing the name of the log. A list of logs with names that start with the typed letters appears.
6. Click the name of the log to add it to the logs collected.
7. Repeat steps 5 and 6 for each log to add.
8. Click **Next**. A dialog box appears.
9. If you want to collect the logs with the current message settings, click **Start** to start collecting logs.

   If you want to change the message settings for the logs, click **Edit**. The *Optional Settings* page appears.
10. Adjust the Optional Settings as required.
11. Click **Start** to start collecting logs.

Message Sets

The *Logging* window has several Message Sets. When a Message Set is selected, all of the logs in the set are added to the list of logs to save on the NovAtel Application Suite computer.

All Logs

This message set contains the following logs:

- AGCINFOB
- ALLSQMIB
- ALLSQMQB
- ALMANACB
- CARDSTATUSB
- CORRDATAB
- CORRLOCATIONB
- ETHSTATUSB
- EXCEPTIONDATAB
- MEASUREMENTDATAB
- RANGEB
- RAWFRAMEDATAB
- RAWGPSSUBFRAMEWPB
- RAWWAASFRAMEWPB

- RXCOMMANDSB
- SATPOSB
- TIMESOLUTIONB
- VERSIONB

All (Legacy)

This message set contains the following logs:

- ALLSQMIB
- ALLSQMQB
- RANGEB
- RAWGPSSUBFRAMEWPB
- RAWWAASFRAMEWPB

All (G-III)

This message set contains the following logs:

- AGCINFOB
- ALMANACB
- CARDSTATUSB
- CORRDATAB
- CORRLOCATIONB
- ETHSTATUSB
- EXCEPTIONDATAB
- MEASUREMENTDATAB
- RAWFRAMEDATAB
- RXCOMMANDSB
- SATPOSB
- TIMESOLUTIONB
- VERSIONB

G-III Standard

This message set contains the following logs:

- AGCINFOB
- ALMANACB
- CARDSTATUSB
- CORRDATAB
- CORRLOCATIONB
- ETHSTATUSB
- EXCEPTIONDATAB
- MEASUREMENTDATAB

- RAWFRAMEDATAB
- RXCOMMANDSB
- SATPOSB
- TIMESOLUTIONB
- VERSIONB

Measurement

This message set contains the following logs:

- ALLSQMIB
- ALLSQMQB
- CORRDATAB
- CORRLOCATIONB
- MEASUREMENTDATAB
- RANGEB
- TIMESOLUTIONB

SQM

This message set contains the following logs:

- ALLSQMIB
- ALLSQMQB
- CORRDATAB
- CORRLOCATIONB

Satellite Navigation Data

This message set contains the following logs:

- ALMANACB
- RAWFRAMEDATAB
- RAWGPSSUBFRAMEWPB
- RAWWAASFRAMEWPB
- SATPOSB

Status

This message set contains the following logs:

- AGCINFOB
- CARDSTATUSB
- ETHSTATUSB
- EXCEPTIONDATAB
- RXCOMMANDSB
- VERSIONB

Playback

This message set contains the following logs:

- AGCINFOB
- CARDSTATUSB
- ETHSTATUSB
- MEASUREMENTDATAB
- RXCOMMANDSB
- SATPOSB
- TIMESOLUTIONB
- VERSIONB

2.6.7.3 Restart

To Restart the G-III Reference Receiver, click the **Device** menu and then click **Restart**.

The G-III Reference Receiver resets and then enters Configuration mode.

The Restart option is available only when the NovAtel Application Suite computer it connected to the Data port on the G-III Reference Receiver.

2.6.7.4 Terminal

Use the Terminal window to send commands to the G-III Reference Receiver and display any receiver acknowledgments and outputs.

To enter a command:

1. Type the command and press **ENTER**.

To re-issue a command:

1. Use the Up and Down arrow keys on the keyboard to select the command to re-issue.
2. Press **ENTER**.

When the G-III Reference Receiver is in Operational mode, an option is provided to switch to Configuration mode.

When the G-III Reference Receiver is in Configuration mode, an option is provided to switch to Operation mode.

The *Terminal* window is available only when the NovAtel Application Suite computer it connected to the Data port on the G-III Reference Receiver.

2.6.8 Configuration View

If the G-III Reference Receiver state is *Configuration* and the NovAtel Application Suite computer is connected to the Data port, the Configuration Mode view is the default view.

If the NovAtel Application Suite computer is connected to the Maintenance port, the Configuration Mode view is the default view irrespective of whether the receiver state is Operational or Configuration.

When connected to the Maintenance port, only the Receiver Version information on the Device window is available. All other data is shown as “NA”.

The *Terminal* window is the default window in Configuration View. From this window you can send commands to the G-III Reference Receiver and display any receiver acknowledgments and outputs.

Also available in Configuration View are the

- *Logging* window – see **Logging Configuration** below
- *Details* window – see **Details** on page 123
- *Restart* option – see **Restart** on the previous page

2.6.8.1 Logging Configuration

The *Logging* window is used to configure the messages that are logged to the NovAtel Application Suite computer.

To access the *Logging* window, click the **Configuration** tab.

If the G-III Reference Receiver is in Operational mode when the *Logging* window is accessed, a message appears at the top of the *Logging* window from which you can choose to change the G-III Reference Receiver to Configuration mode. If you click the **Restart** button, a Reset command is sent to receiver and after reset, Configuration Mode view is displayed.

To configure the logs to be saved to the computer running NovAtel Application Suite:

1. Click **Browse**.

   The *Open Folder* dialog box appears.
2. Navigate to the folder in which you want to store the logs.

   The default folder is: <Current User APPDATA>/Documents/Novatel Data/DataLogger/.
3. Click **Select Folder**.

   The Logging configuration window appears with the path name of the selected folder displayed in the *Local File System* box.
4. In the **Message Sets** section, click the button for one of the message sets. The logs contained in the selected message set will be collected.
5. Click **Next**. A dialog box appears.
6. If you want to collect the logs with the current message settings, click **Start** to start collecting logs.

   If you want to change the message settings for the logs, click **Edit**. The *Optional Settings* page appears.
7. Adjust the Optional Settings as required.
8. Click **Start** to start collecting logs.

Message Sets

The *Logging* window has two Message Sets. When a Message Set is selected, all of the logs in the set are added to the list of logs to save on the NovAtel Application Suite computer.

None

No logs are selected to be saved. This is the default Message Set.

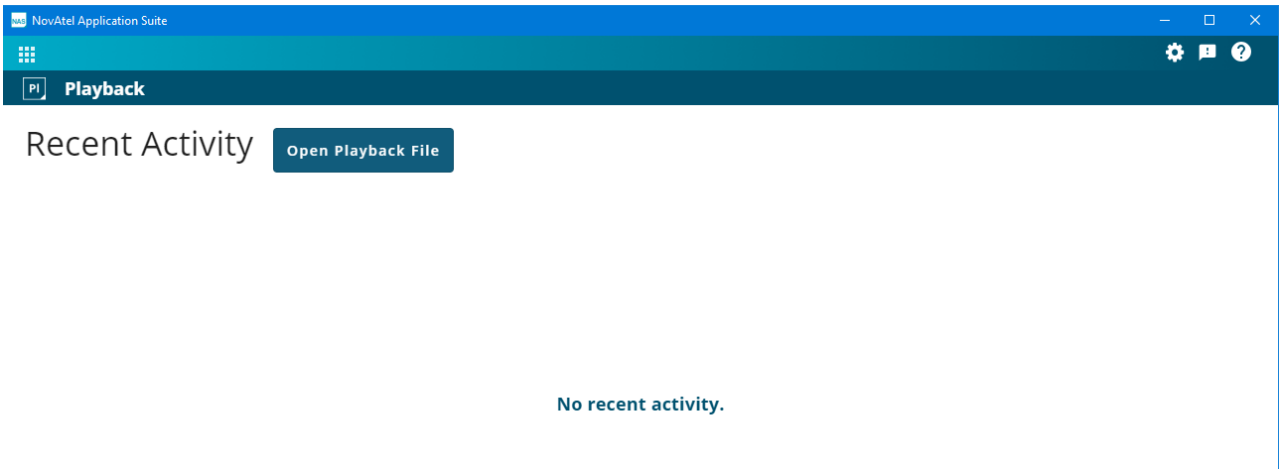
Troubleshooting

This message set contains the following logs:

- CARDSTATUSB
- ETHSTATUSB
- EXCEPTIONDATAB
- RXCOMMANDSB
- VERSIONB

Chapter 3 Playback

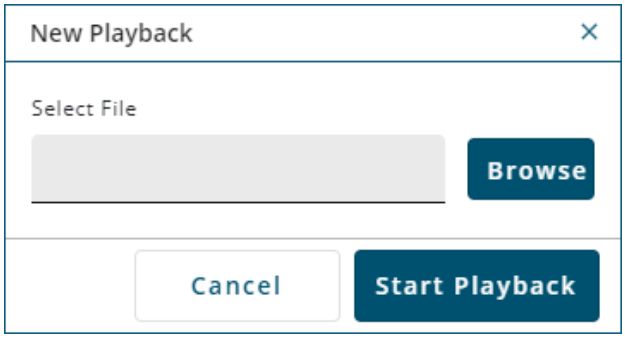
Playback allows you to view the information stored in a log file using the Playback interface.



To start viewing a log file, the file must be loaded into Playback. To load a file:

1. Click the **Open Playback File** button.

   The New Playback dialog box opens.



2. Click the **Browse** button.

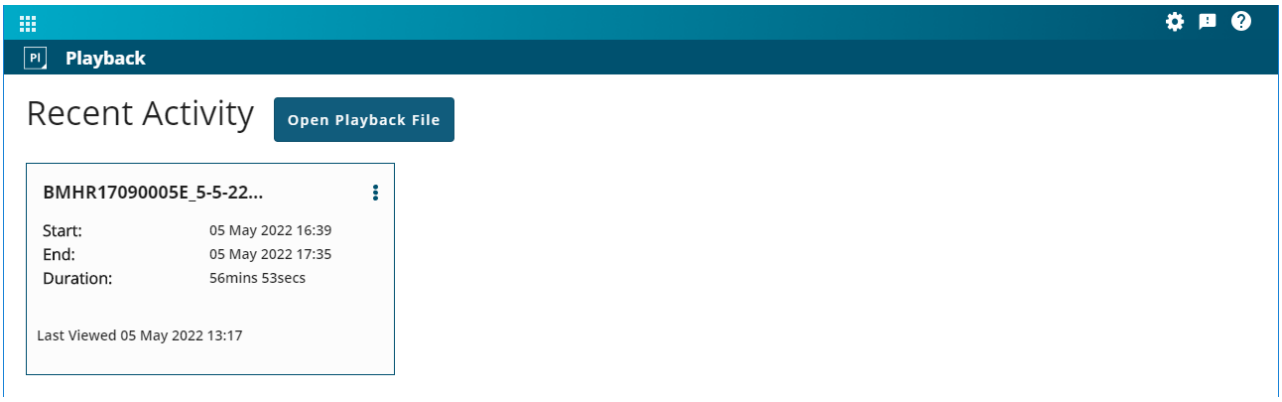
   The Open File dialog box appears.

3. Navigate to the folder that contains the log file to load and select the file.
4. Click the **Open** button.
5. Click the **Start Playback** button.

   The Playback window changes to show the viewing window. See **View a File In Playback** on the next page.

3.1 Recent Playback Activity

If there are any recently accessed playback files, the Playback window changes to show the recent files.

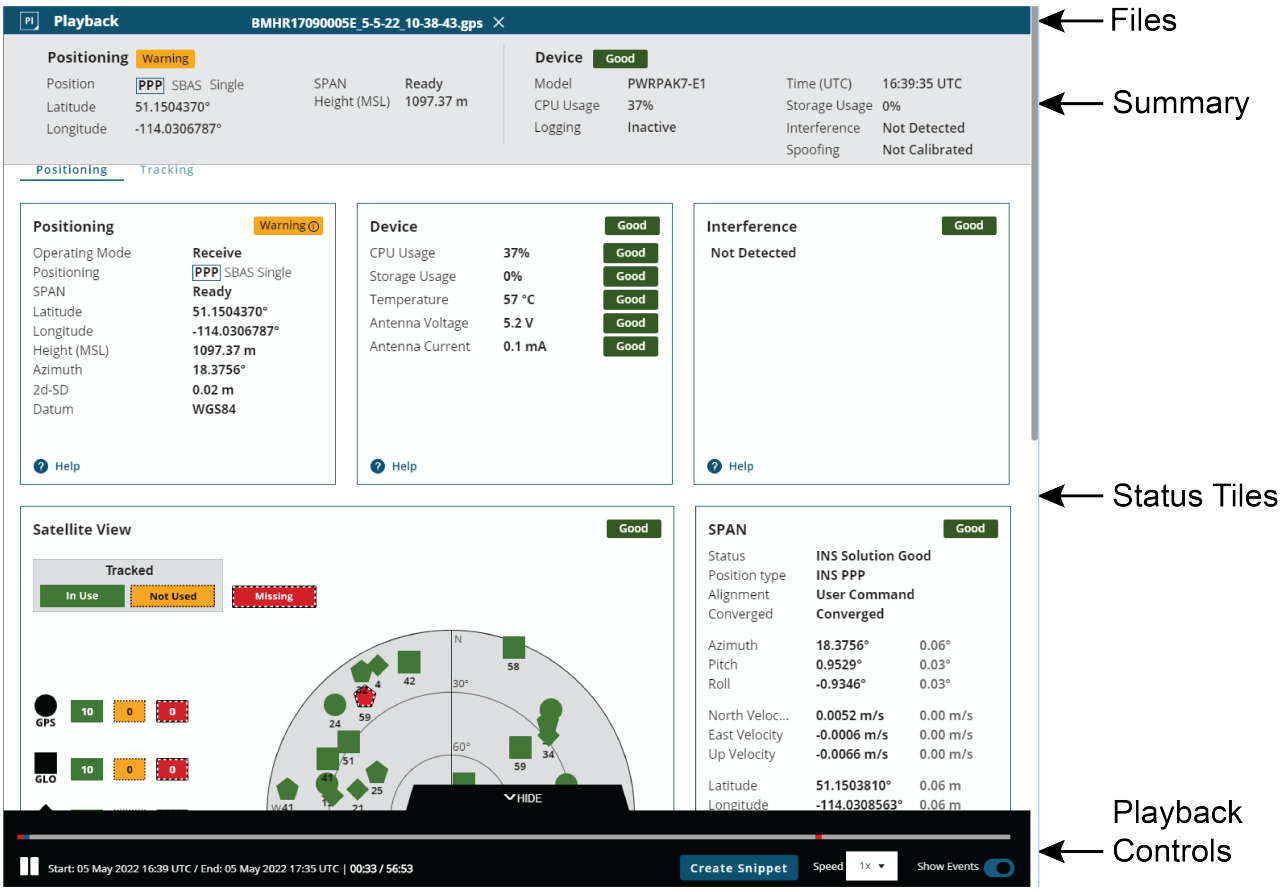


To open a recent playback file, click the icon for the playback file.

To open a playback file not shown, use the **Upload Playback File** button.

3.2 View a File In Playback

When a file is loaded, the Playback window changes to show the information stored in the loaded log file.



3.2.1 Files Bar

The *Files* bar appears at the top of the Playback window. This bar shows the file names of all of the log files currently loaded into Playback.

The log file that is currently being viewed is black. To view a different log file, click the tab on the Files bar for that log file.

To close a log file, click the **X** button on the log file tab.

3.2.2 Summary Bar

The Summary bar provides status information about the receiver. As the log file is played back, the information on the Summary bar changes to show the status of the receiver at the current point within the log file.

Status Indicator

A colored bar with text indicates the status of the summary information shown.

Colour	Text	Description
Green	Good	The receiver is functioning and there are no warnings or errors.
Amber	Warning	The receiver is functioning, but there is one or more issues that may require attention.
Red	Error	An issue is preventing the receiver from functioning. The Error state will remain until the situation is resolved.

If the receiver has a warning or error, check the status tiles. An amber or red dot appears on the status tile where more information about the warning or error can be found.

Position

The *Position* field shows all of the positioning types configured on the receiver. The positioning type that is currently being used to calculate the position is highlighted in a box.

Latitude

The *Latitude* field shows the latitude of the calculated position in degrees.

Longitude

The *Longitude* field shows the longitude of the calculated position in degrees.

SPAN

The *SPAN* field shows the status of SPAN GNSS+INS technology.

Height

The *Height* field shows the height above mean sea level of the calculated position in metres.

Model

The *Model* field shows the receiver type.

CPU Usage

The *CPU Usage* field shows the amount of receiver computing (CPU) power currently being used.

Logging

The *Logging* field shows the status of logging to the receiver's internal memory.

Time

The *Time* field shows the current UTC time.

Storage Usage

The *Storage Usage* field shows the amount of receiver internal memory that has been used.

Interference

The *Interference* field indicates if the receiver has detected interference in the GNSS signal.

3.2.3 Status Tiles

The status tiles show the information that is stored in the log file. As a file is played back, the information on the status tiles changes to reflect the information at the current point in the log file.

For descriptions of the status information shown on the tiles, refer to the following:

- **Positioning Status** on page 48
- **Satellite View** on page 51
- **Ports Status** on page 52
- **Logging Status** on page 52
- **Device Status** on page 53
- **Interference Status** on page 55
- **ALIGN Status** on page 55
- **SPAN Status** on page 56
- **Radio Status** on page 57

The tiles available vary depending on the type of receiver and the software features enabled.

Each tile provides a color coded dot to indicate overall status of the information on that tile.

Colour	Text	Description
Green	Good	The receiver is functioning and there are no warnings or errors.
Amber	Warning	The receiver is functioning, but there are one or more issues that may require attention.
Red	Error	An issue is preventing the receiver from functioning. The Error state will remain until the situation is resolved.
Gray	Off	The feature has been disabled or has not yet been configured.

3.2.4 Playback Controls

The controls for viewing a log file are at the bottom of the Playback window.

3.2.4.1 Viewing the Log File

To start viewing a log file, click the play button (▶). As the file is played back, the information on the Playback windows changes.

- The Summary bar shows the status information at the current point in the log file.
- The status tiles show position information at the current point in the log file
- The progress bar shows the current point in the file.
- The Date/Time field shows the time the information at the current point in the log file was collected.

The speed at which the file is played back can be changed. To change the playback speed, click the **Speed** drop menu and select a playback rate.

To pause playback, click the pause button (❚❚).

To replay a log file, click the replay button ( ).

3.2.4.2 Events in the Log File

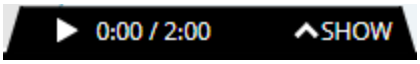
If an event occurred on the receiver while the log file was being collected, the event will be shown on the progress bar. Errors are shown as red dots, warning are shown as amber dots and status messages are shown as white dots.

To view more information about an event, click on the event in the progress bar. A dialog box appears providing the event message and the time the event occurred.

Events on the progress bar can be shown or hidden. To show the events, set the **Show Events** option to on ( ). To hide the events, set the **Show Events** option to off ( ).

3.2.4.3 Hide the Playback Controls

To hide the Playback controls, click **Hide**. The Playback Controls change to show only the Play/Pause buttons and the playback progress in time.



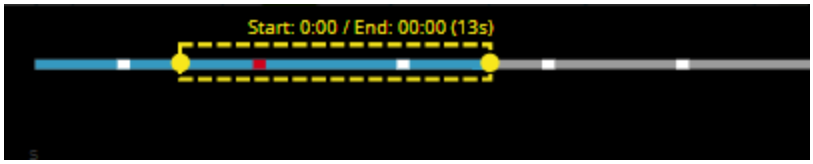
To show the full Playback controls, click **Show**.

3.2.4.4 Save a Snippet

A snippet is a portion of the log file that is extracted and saved to a separate file. To save a snippet:

1. Click the **Create Snippet** button.

   The snippet selection tool appears on the progress bar.

   The amber box indicates the portion of the log file that will be saved.
2. Use the handles at the end of the snippet tool to adjust how much of the log will be included in the snippet.
3. Click the **Save Snippet** button.

   The *Save Snippet* dialog box appears.
4. Navigate to the folder in which the snippet will be saved.
5. Enter a name for the snippet file in the *File name* box.
6. Click the **Save** button.
7. To save the file and view the newly created snippet in Playback, click the **Yes** button. The New Playback dialog box appears. Click the **Start Playback** button.

   To save the file only, click the **No** button.

Chapter 4 Convert

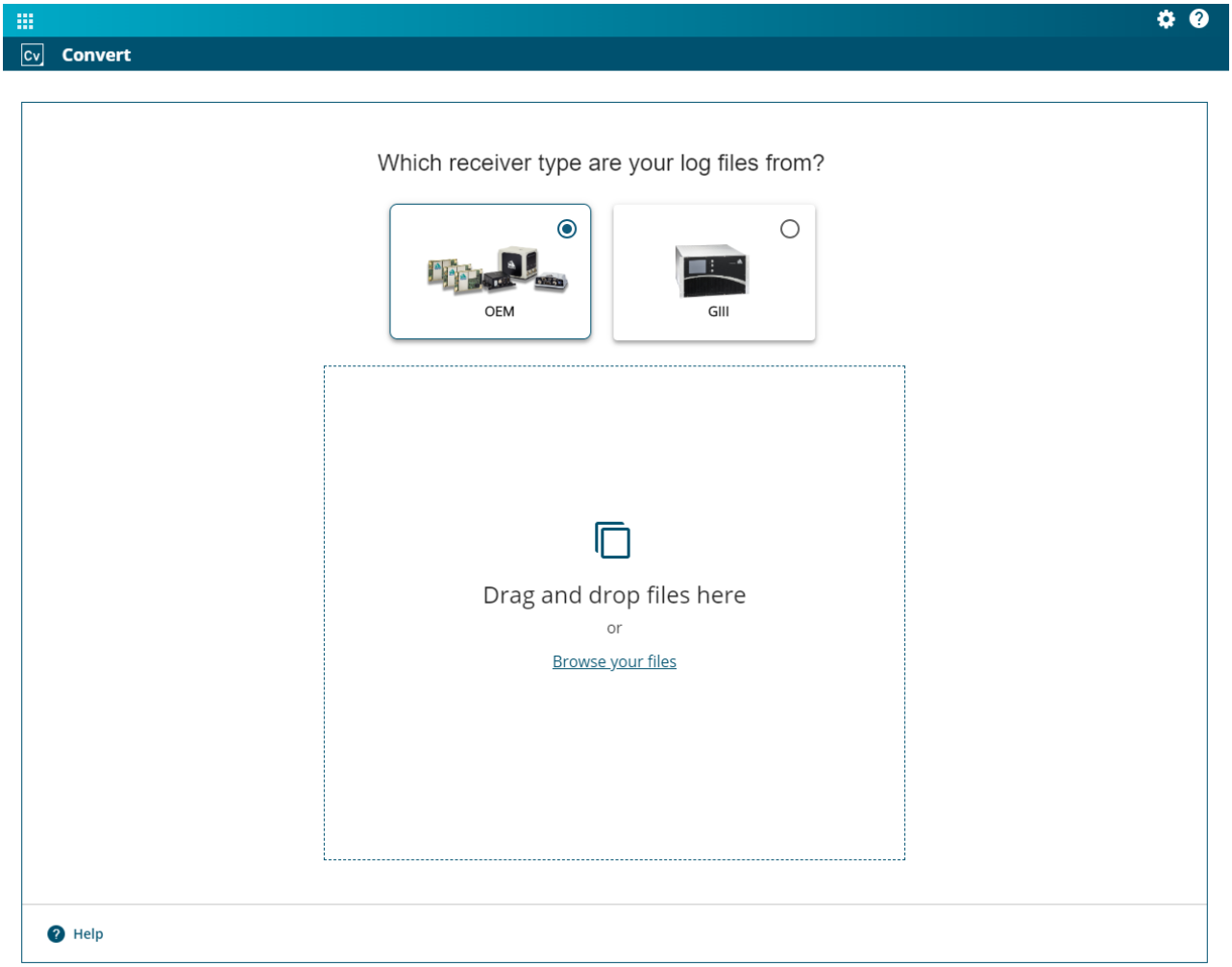
The Convert tool is a graphic interface that converts NovAtel logs from one format to another.

For OEM6 and OEM7 receivers, Convert accepts ASCII, BINARY and ABBREVIATED ASCII formats and converts them to ASCII, BINARY, ABBREVIATED ASCII, RINEX or KML formats.

For G-III Reference Receivers, Convert accepts ASCII and BINARY formats and converts them to ASCII format.

4.1 Start Convert

To start Convert, click the **Cv** icon on the *NovAtel Application Suite* main window. The Convert window displays.



Files requiring conversion need to be opened in Convert, refer to **Open Files in Convert** below for details.

4.2 Open Files in Convert

Files can be opened in Convert using drag and drop or the *Browse your files* buttons.

To open files using drag and drop:

1. Select the type of receiver the logs are from.

   Click **OEM** if the logs are from an OEM7 or OEM6 receiver.

   Click **GIII** if the logs are from a G-III Reference Receiver.
2. Use Windows to navigate to the folder that contains the file or files to convert.
3. Drag and drop the files into the *Get Started* box on the Convert window.

   The Convert window shows the number of files to be opened and the progress of the files being read.

To open files using the Browse your files button.

1. Select the type of receiver the logs are from.

   Click **OEM** if the logs are from an OEM7 or OEM6 receiver.

   Click **GIII** if the logs are from a G-III Reference Receiver.
2. Click the **Browse your files** button.
3. Navigate to the folder that contains the file or files to convert.
4. Select the file or files and click **Open**.

   The Convert window shows the number of files to be opened and the progress of the files being read.

After the Convert opens the file or files, the *Output Settings* window displays.

Convert supports the following G-III Reference Receiver variants.

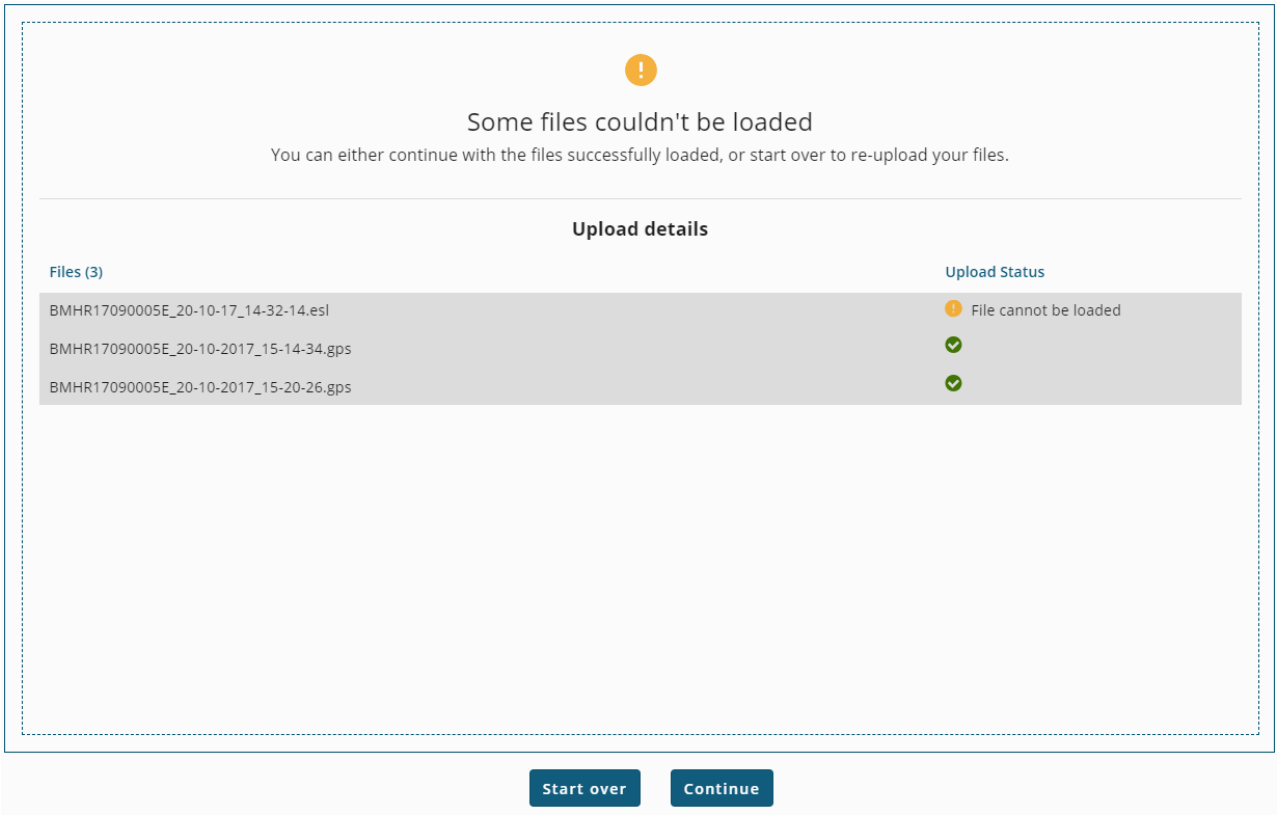
- WAAS G-III Reference Receiver
- IRIMS G-III Reference Receiver
- QZSS G-III Reference Receiver
- KASS G-III Reference Receiver
- EGNOS V3 RIMS Multi-Constellation Receiver
- KUS G-III Reference Receiver

4.2.1 Invalid Files

When opening a file, Convert checks the contents of the file to ensure the file contains valid GNSS data. If a file contains information that is not valid GNSS data, it is considered an invalid file and Convert will not load the file.

If all of the files to be opened are invalid, Convert displays a message to indicate the files cannot be loaded. Check the files to see if they contain valid GNSS data and then try to open them again, or open different files.

If some of the files are valid and some are invalid, Convert displays the list of files to be opened and indicates which files are valid and which are invalid.

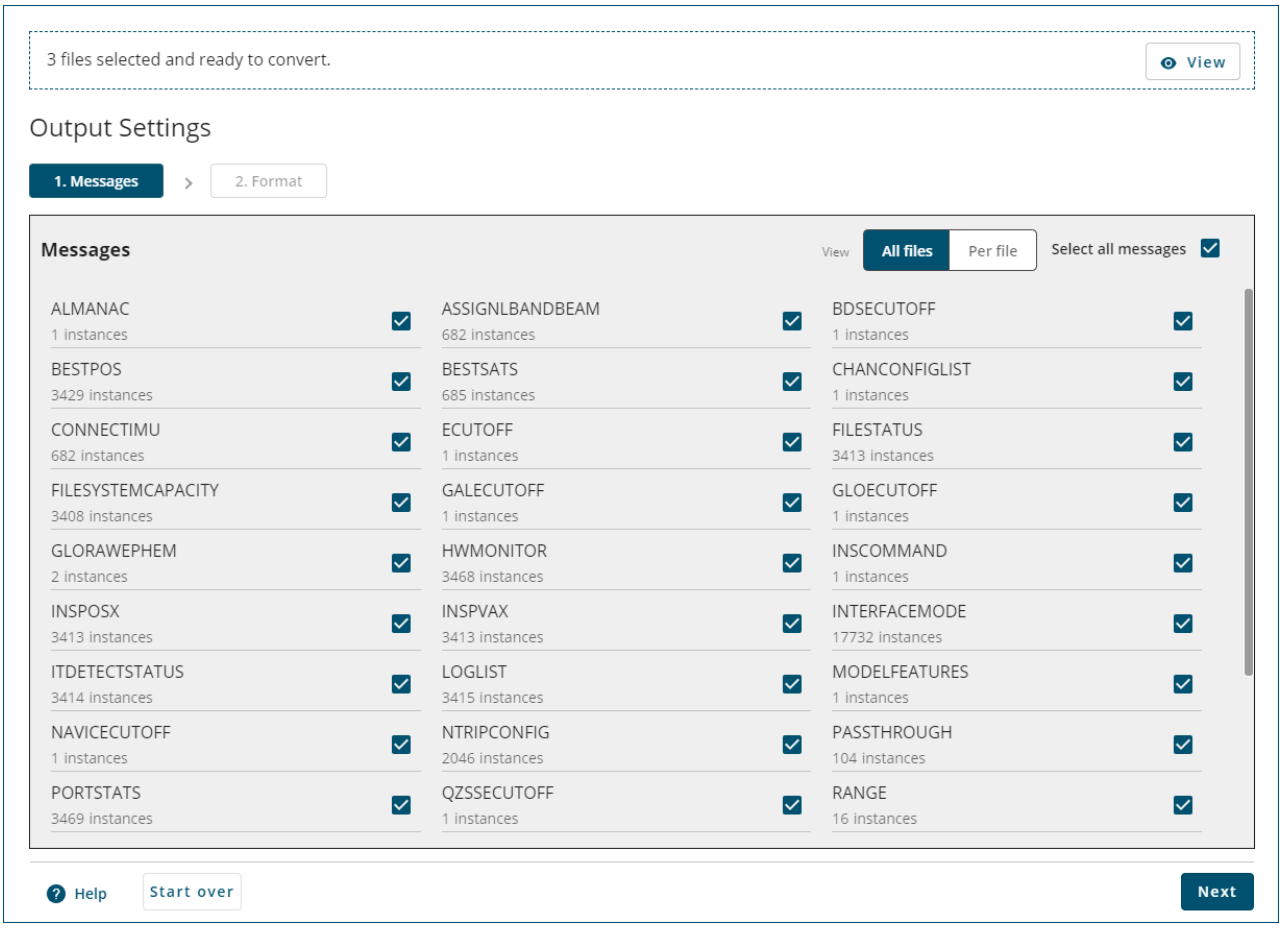


To open the files that are valid and exclude the invalid files, click the **Continue** button. The *Output Setting* window displays.

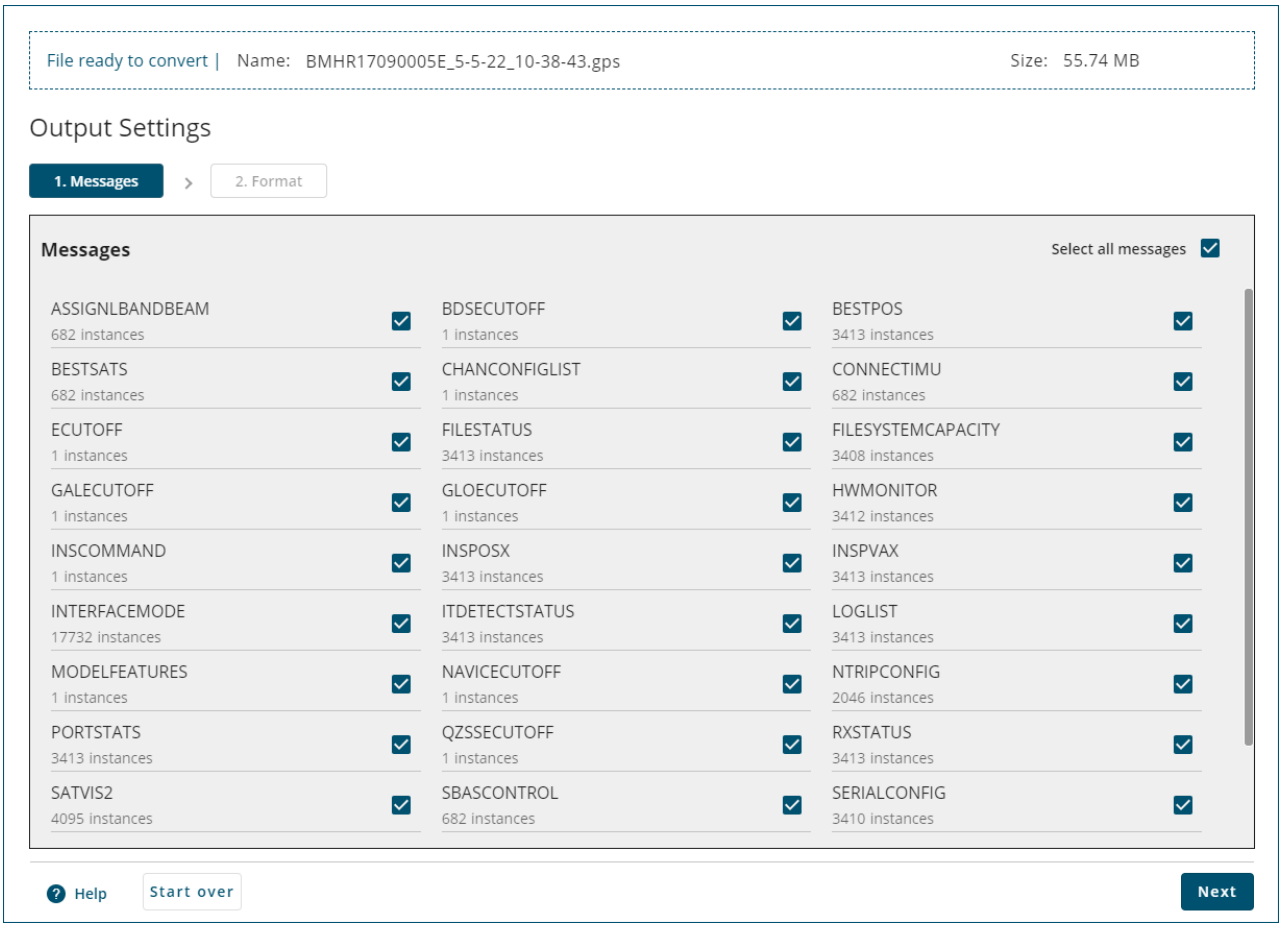
To stop opening the current list of files and try opening other files, click the **Start over** button.

4.3 Output Settings Window

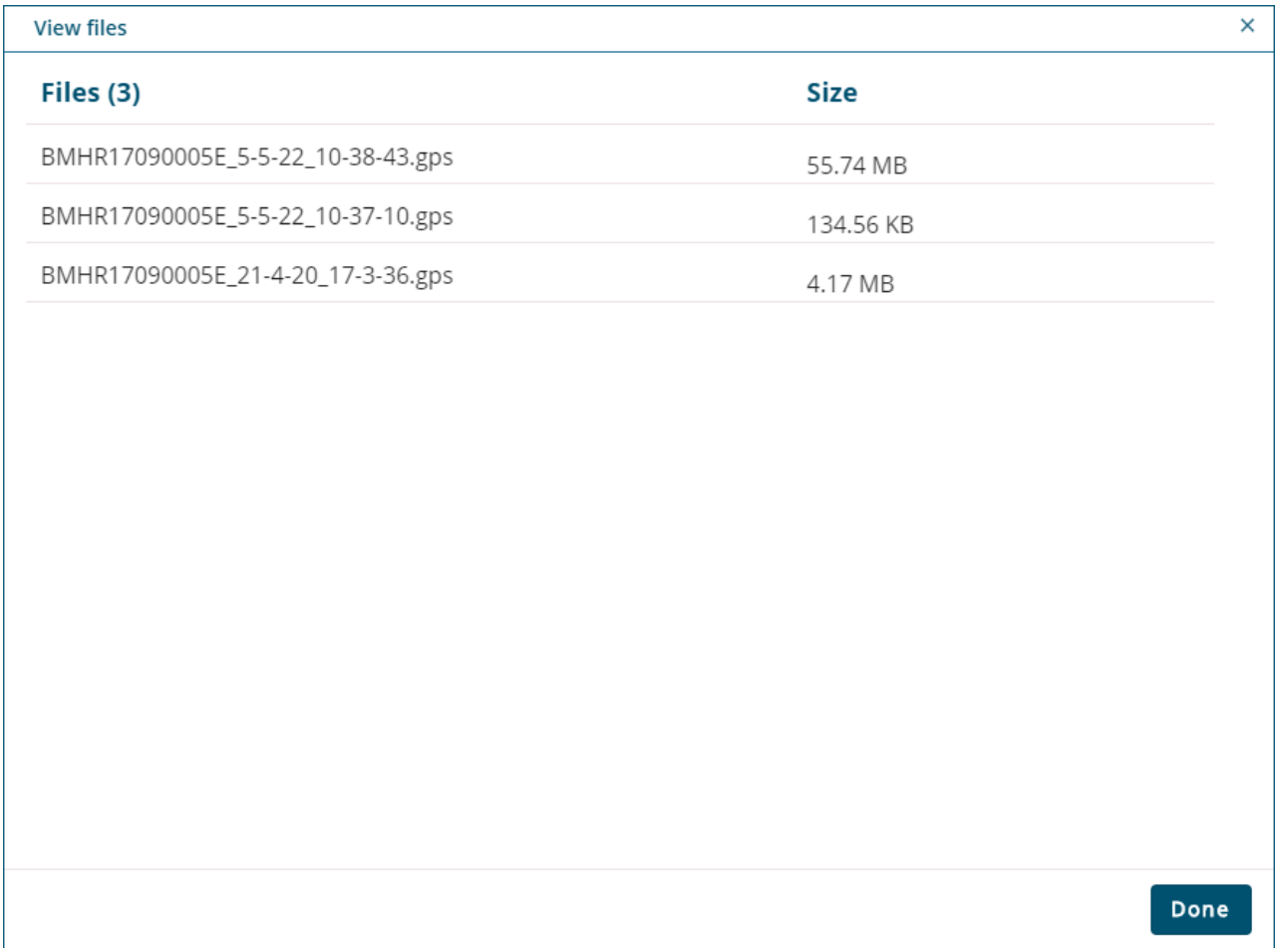
The *Output Settings* window displays information about the opened files and the messages (logs) contained within the opened files. From this window, the messages to convert are selected and the conversion parameters are configured.



If a single file was opened, the box at the top of the *Output Settings* window displays the file name and size of the file.



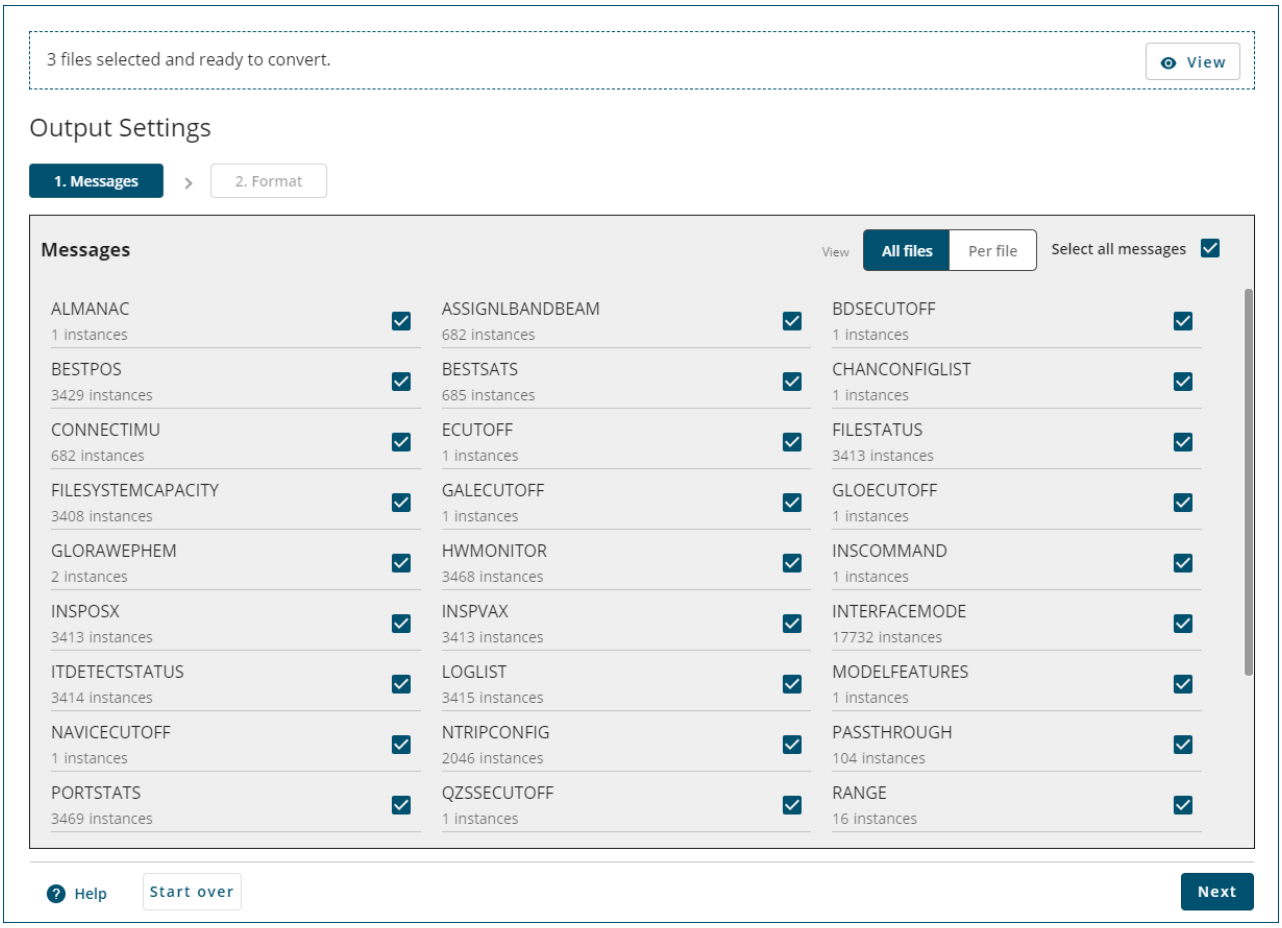
If multiple files were opened, the box at the top of the *Output Settings* window displays the number of files opened. To view the file name and size of all of the opened files, click the **View** button.



If you want to change the files opened, click the **Start over** button to return to the *Getting Started* window and select other files.

4.3.1 Output Settings – Messages

The *Messages* tab of the *Output Settings* window shows the logs available in the opened files.



The *Messages* tab displays the name of each log found in the opened files. Below the name of each log is the number of times that log was found in the opened files.

When the check box beside the log name is selected (☑), all of the logs with that name will be converted into the new format. When the check box beside the log name is cleared (☐), none of the logs with that name will be converted into the new format. To select all of the logs in the opened files, select (☑) the **Select all message** option.

For RANGECMP, RANGECMP2, RANGECMP3 and RANGECMP4 logs, the log can be decompressed into the RANGE log format when the file is converted. To change the compression settings for these logs:

1. Click the Settings button (⚙).
   The *Message Settings* box opens.
2. Select the **Yes** option to decompress the log into a RANGE log format.

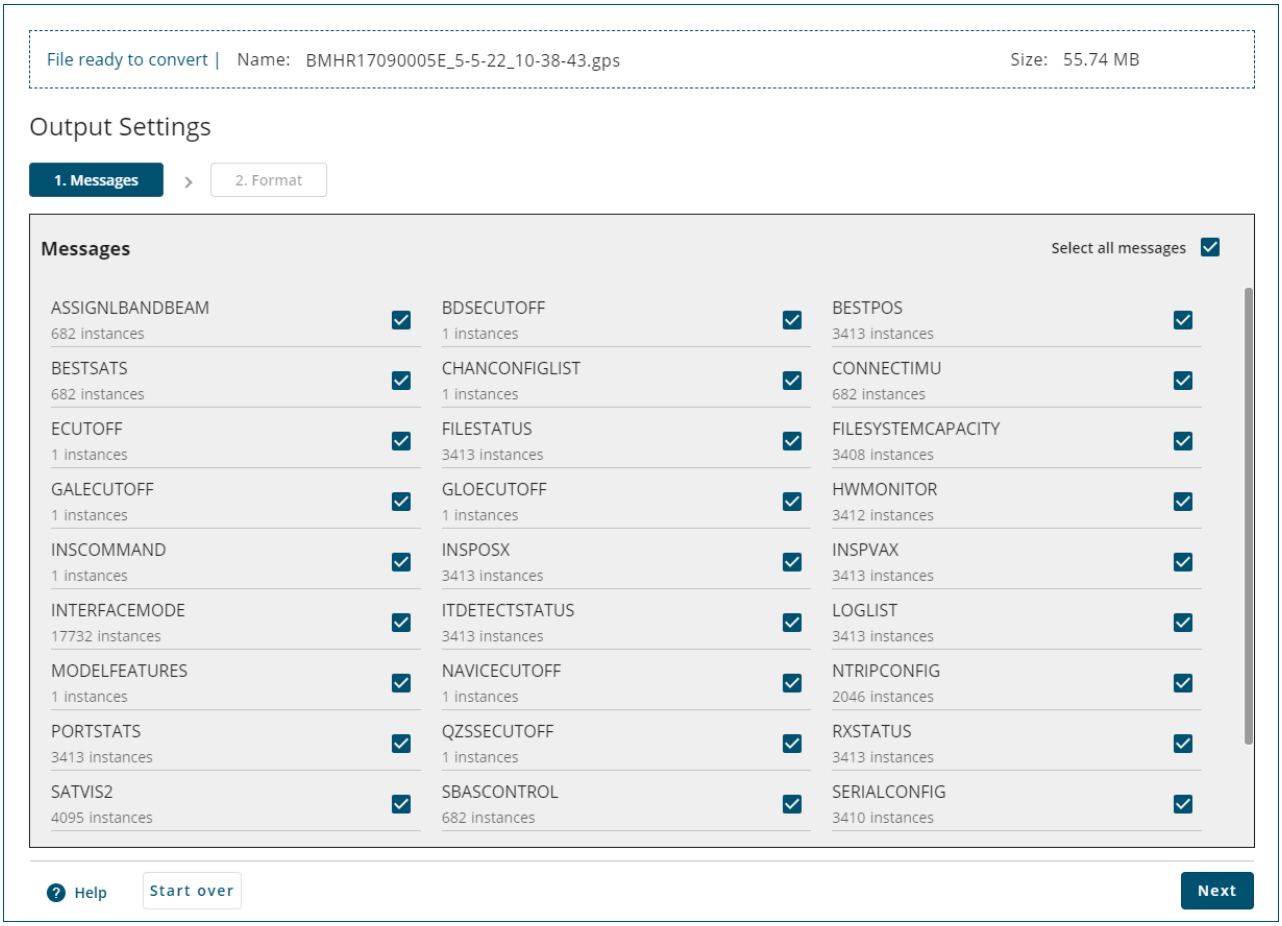
   Select the **No** option to leave the log in its current compression format.
3. Click the **Apply** button.

   The *Message Settings* box closes and the Decompression setting shown below the log name is updated to the new setting.

For the G-III Reference Receiver, only the following messages are supported: AGCINFOB, ALMANACB, CARDSTATUSB, CORRDATAB, CORRLOCATIONB, ETHSTATUSB, EXCEPTIONDATAB, FACTORYDATAB, MEASUREMENTDATAB, RAWFRAMEDATAB, RXCOMMANDSB, SATPOSB, TIMESOLUTIONB, and VERSIONB.

4.3.1.1 Single File Open

When a single file is open, the *Messages* tab shows all of the logs found in the file.

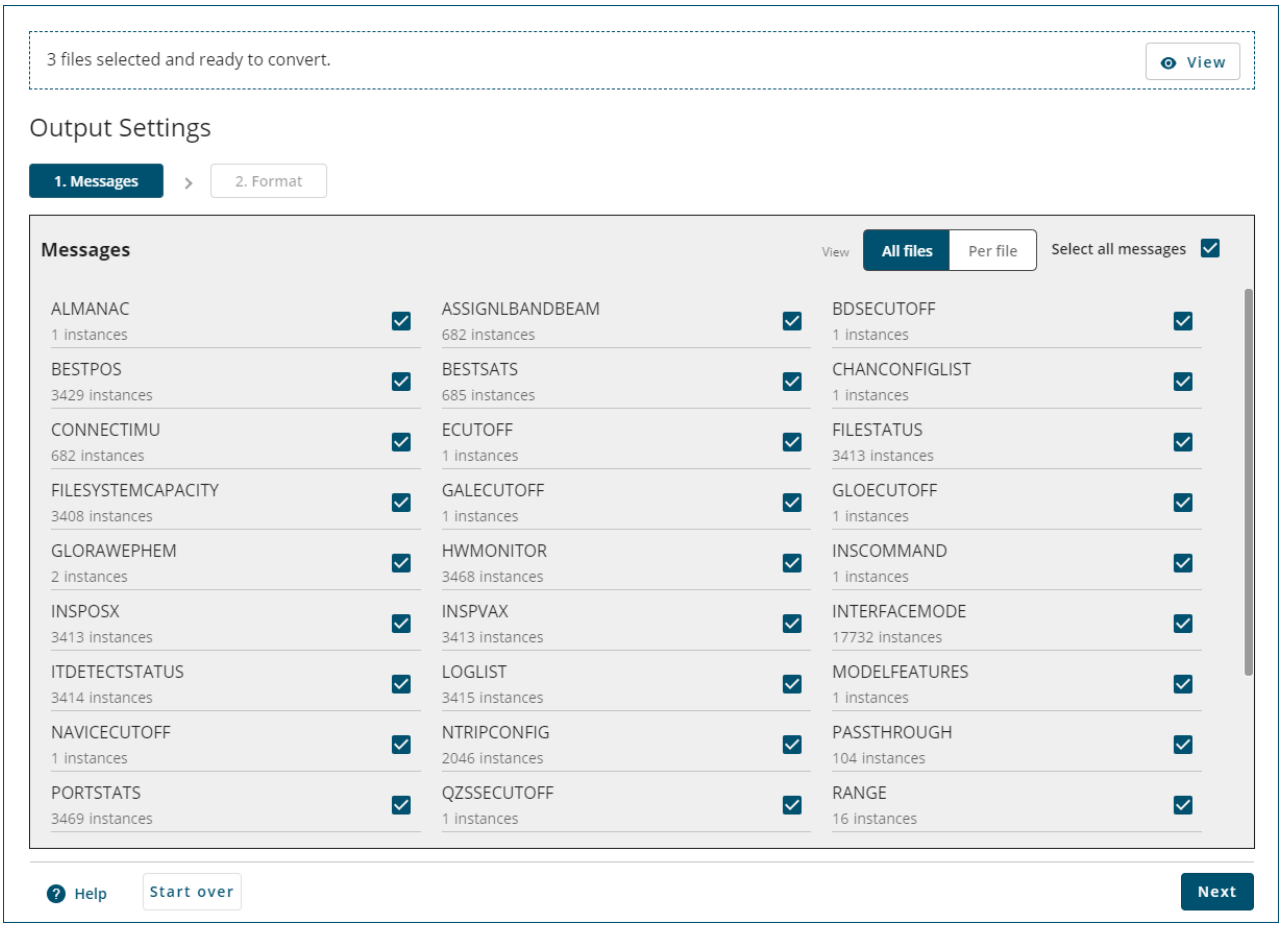


When the logs to be converted are selected, click the **Next** button. The *Format* tab displays.

4.3.1.2 Multiple Files Open

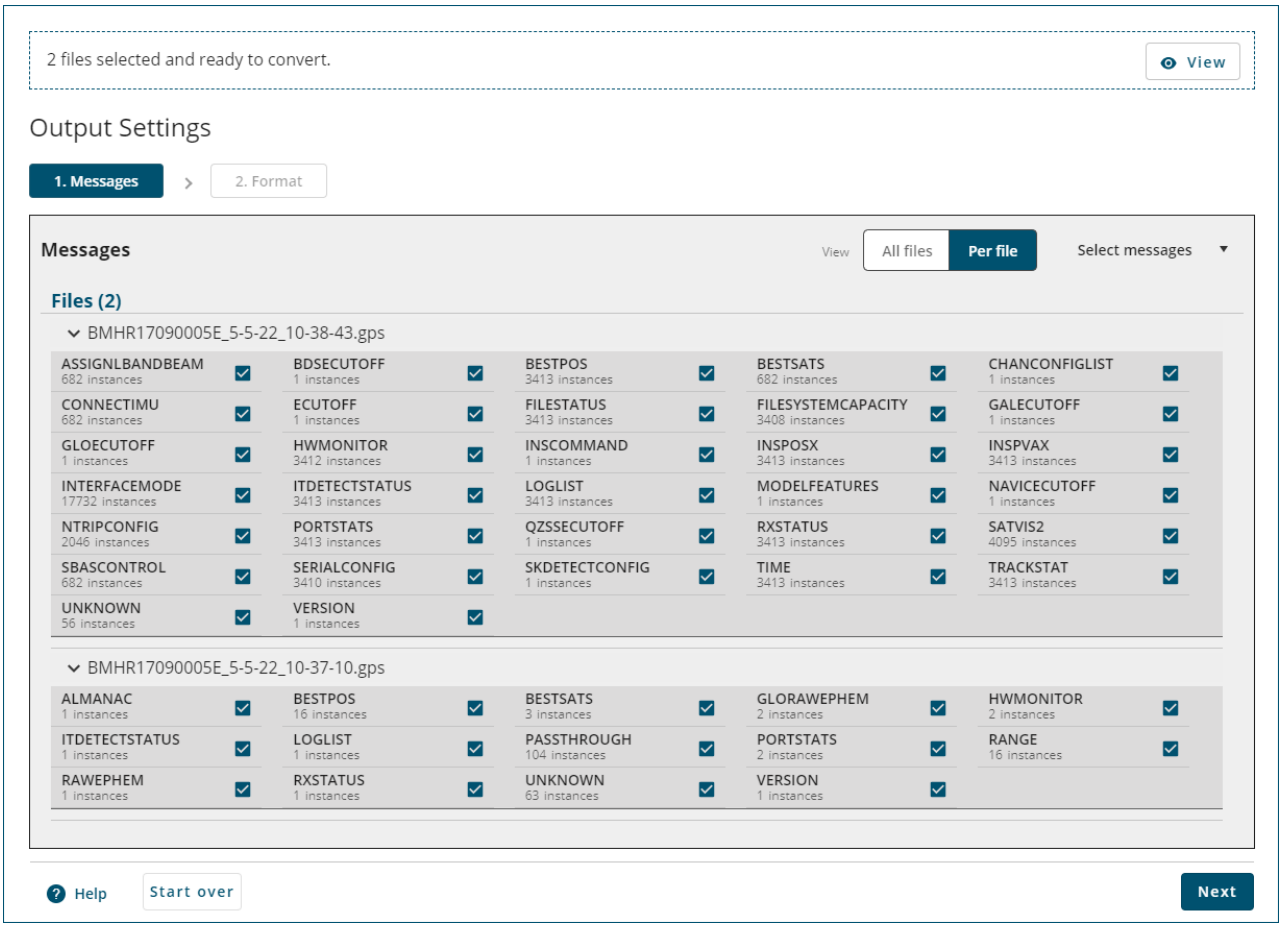
When multiple files are open, the *Messages* tab can be viewed in *All files* or *Per file* view.

To view the *Messages* tab in *All files* view, click the **All files** button.



In *All Files* view, the *Messages* tab shows the logs found in all of the files organized by log name. When a log is selected or cleared using the check box beside the log name, the selection applies to all instances of the logs in all of the source files.

To view the *Messages* tab in *Per file* view, click the **Per file** button.



In *Per file* view, the *Messages* tab shows the logs found organized by the file in which the log exists. In this view, a specific log name can appear several times on the *Messages* tab if it is found in more than one file. When a log is selected or cleared using the check box beside the log name, the selection applies only to the logs contained in the file in which the selection is made. This allows a log (for example, BESTPOS) in one file to be converted, while the same log in a different file is not converted.

To select or clear the check boxes for a log in all of the source files, use the **Select messages** drop menu.

When the logs to be converted are selected, click the **Next** button. The *Format* tab displays.

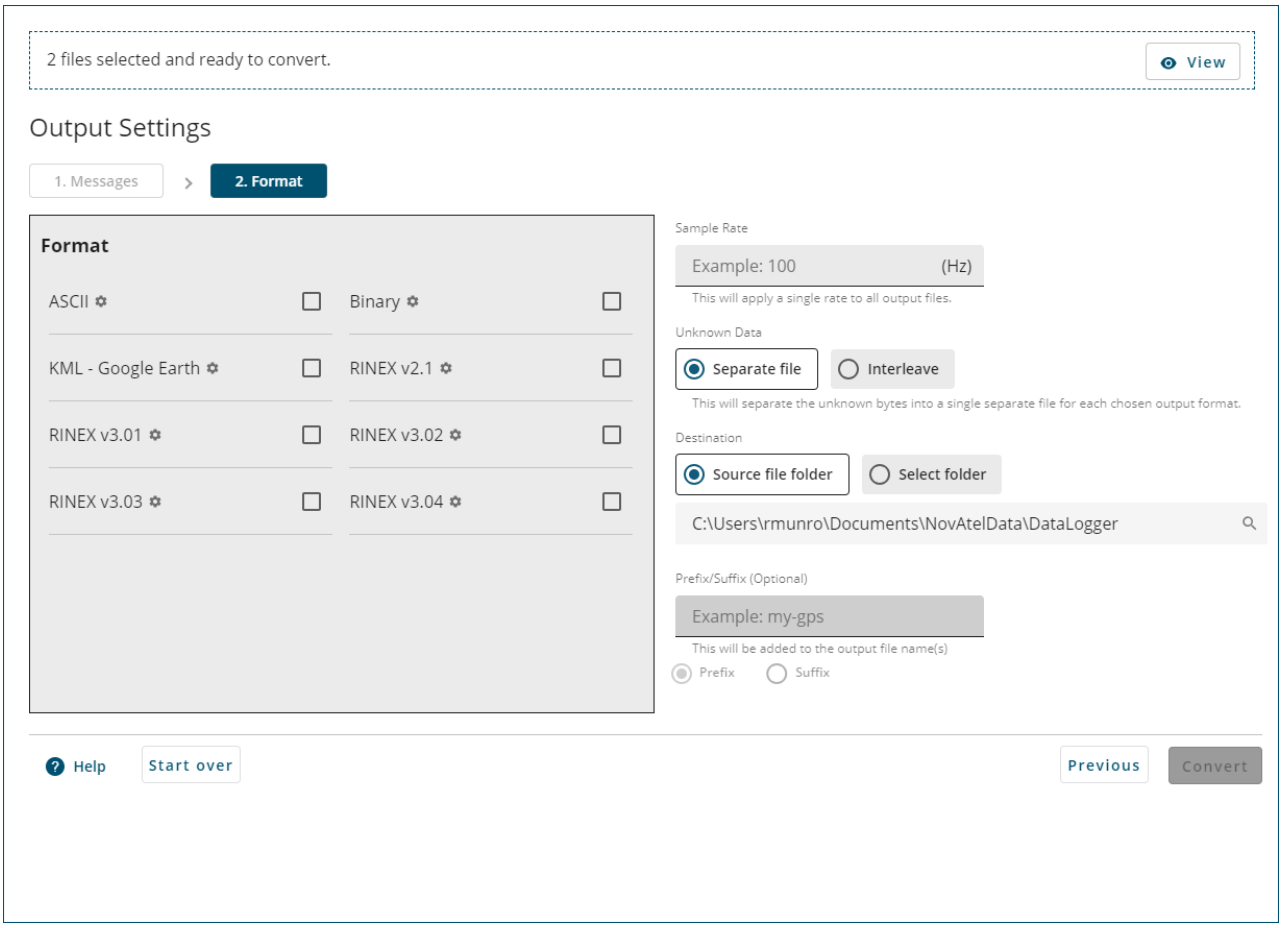
Notes

In the *Per file* view, the RANGE compression and decompression settings can also be set per file. When the compression and decompression settings are set per file, Convert provides a confirmation box to allow you to confirm or cancel the per file setting. If the per file settings are confirmed, the text **Set per file** is shown below the log name on the **Messages** tab.

If a message selection or RANGE compression setting is changed in the *All files* view after a per file setting is made, Convert provides a confirmation box to allow you to confirm or cancel the global setting.

4.3.2 Output Settings – Format

The *Format* tab provides access to the parameters used to convert the messages.



4.3.2.1 Time Interval

When a single file is loaded, the log information to convert can be filtered based on a time interval. To set the time period, use the handles on the slider to set the start and end times. As the sliders are moved, the Start or End times shown below the slider are updated. Only logs within the specified time period will be converted.

The Time Interval field is not available if there are multiple source files.

4.3.2.2 Format

In the *Format* box, select the checkboxes of the formats to which the logs will be converted.

The Convert button is disabled until at least one format is selected.

Conversion to KML format is not supported on all logs.

The following position logs can be converted to KML format: BESTPOS, MATCHEDPOS, RTKPOS, MARKPOS, MARK2POS, MARK3POS, MARK4POS, PSRPOS, PPPPOS, PDPPOS, ROVERPOS, BESTGNSSPOS, MASTERPOS and INSPOSX.

The following velocity log can be converted to KML format: BESTVEL.

File Splitting

If converting the logs to ASCII, BINARY, ABBREVIATED ASCII or KML - Google Earth format, the size of a log file converted can be managed by splitting the output file based on file size, log type or time.

To split the output file:

1. Click the Settings button ( ) beside the selected format to which the logs are being converted.

   The *Format Settings* dialog box displays.
2. Select the **Enable File Splitting** checkbox.
3. Select the method by which the output file will be split.
   - Select **Logs** to create a separate file for each log type converted. Each output file is appended with the name of the log.
   - Select **Size** and enter the maximum file size of the converted output file (in MBs) to split the output files by file size.

     If the maximum size is reached, Convert will create multiple output files when converting the log file. A suffix ("_Part1", "_Part2", etc.) is added to the name of the output files to indicate the order of the files.
   - Select **Daily (UTC)** to create a separate file for each day. The date is added to the name of the output files.
   - Select **Time** and enter the maximum time length (in seconds) to split the output files by time.

     If the length of the file exceeds the time entered, Convert will create multiple output files when converting the log file. A suffix ("_Part1", "_Part2", etc.) is added to the name of the output files to indicate the order of the files.
4. Click the **Apply** button.

RINEX Settings

If converting the logs to one of the RINEX formats, the file settings for the output file can be configured.

To configure the RINEX file settings:

1. Click the Setting button ( ) beside the RINEX format to which the logs are being converted.

   The *Format Settings* dialog box displays.
2. To configure Convert to create the resulting RINEX output files as kinematic when converting from other formats, select the **Force kinematic data flag** checkbox.
3. To enable Hatanaka compression of the output files, select the **Use Hatanaka compression** checkbox.
4. To configure the UTC offset from GPS, click the **UTC Offset** field and enter the UTC time offset.
5. To add comments to the RINEX header, select the text boxes in the *Header Information* box and enter the information in the text boxes.
6. Click the **Apply** button.

4.3.2.3 Sample Rate

The number of logs to be converted can be reduced by specifying a sample period that is less than the measurement rate recorded in the input file. For example, if RANGE data is logged at 100 Hz (logged every 0.01 s), it means that there are 100 RANGE logs every second. Specifying a sample rate of 2 Hz, means that only the data at every half second (i.e. 2 logs a second) is converted, thereby reducing the number of RANGE logs in the converted file.

To enter a sample rate, click the *Sample Rate* and enter a value in Hertz.
If no value is entered, no data sampling is done and all of the selected logs are converted.

The specified sample rate is applied to all of the logs being converted.

4.3.2.4 Unknown Data

Select one of the Unknown Data options to determine how Convert manages any information in the file that is not recognized as a log.

Interleave	Information not recognized as a log is included in the file and labeled UNKNOWN.
Separate file	Information not recognized as a log is stored in a separate output file.

The Unknown Data options are enabled only if the log file has unknown data selected.

4.3.2.5 Destination

The *Destination* parameters determine the folder in which the converted files are stored.

Source file folder

Select this option to save the converted files in the same folder as the input files. The converted files will be saved in the following folder structure:

```
InputFile/Source/TimeStamp/Format/FileName
```

where:

`InputFile` = the folder in which the input files are stored

`Source` = the name of source file being converted

`TimeStamp` = the date and time when the file was converted

`Format` = the data format the file was converted to (ASCII, BINARY, ABBREV, KML or RINEX)

`FileName` = the file name of the converted data with the extension *ascii*, *binary*, *abbrev* or *rinex* depending on the format.

Select folder

Select this option to save the converted files in the folder specified in the text box. To specify the folder, click the search icon and select the folder from the dialog box.

The converted files will be saved in the following folder structure:

```
SelectedFolder/Source/TimeStamp/Format/FileName
```

where:

`SelectedFolder` = the folder specified in the text box

`Source` = the name of source file being converted

`TimeStamp` = the date and time when the file was converted

`Format` = the data format the file was converted to (ASCII, BINARY, ABBREV ASCII, KML or RINEX)

`FileName` = the file name of the converted data with the extension *ascii*, *binary*, *abbrev* or *rinex* depending on the format.

ABBREV = Abbreviated ASCII.

4.3.2.6 Prefix/Suffix

Use the *Prefix/Suffix* parameters to add a string to the output file name.

To add a prefix or suffix:

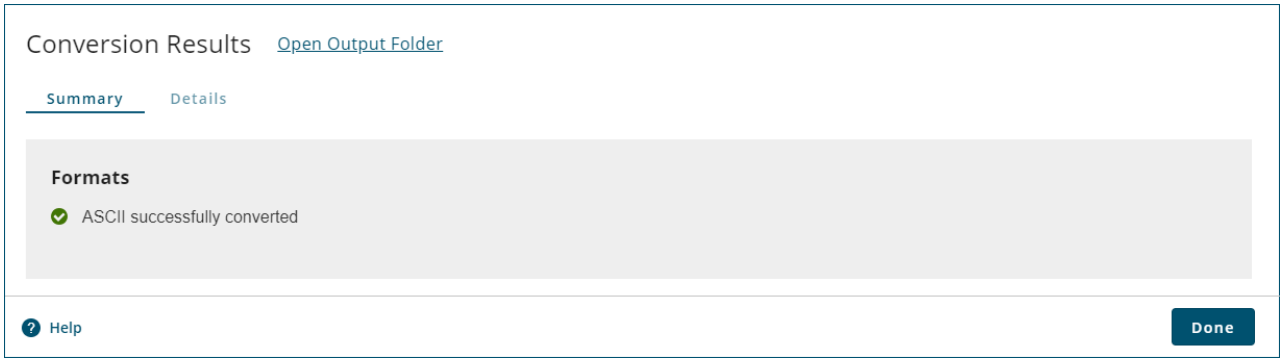
1. Click the text box and enter the text to add to the file name.
2. Select the **Prefix** option to add the text to the start of the file name.

   Select the **Suffix** option to add the text to the end of the file name.

When the Format parameters have been set, click the **Convert** button to start converting the files.

4.4 Conversion Results

The *Conversion Results* window provides information about the status of the file conversion.



To view the conversion results, click **Open Output Folder**.

Time Interval

The *Time Interval* tile shows the portion of the file that was converted based on the time interval settings configured in the *Output Settings* window.

This tile is only available when a single file is converted.

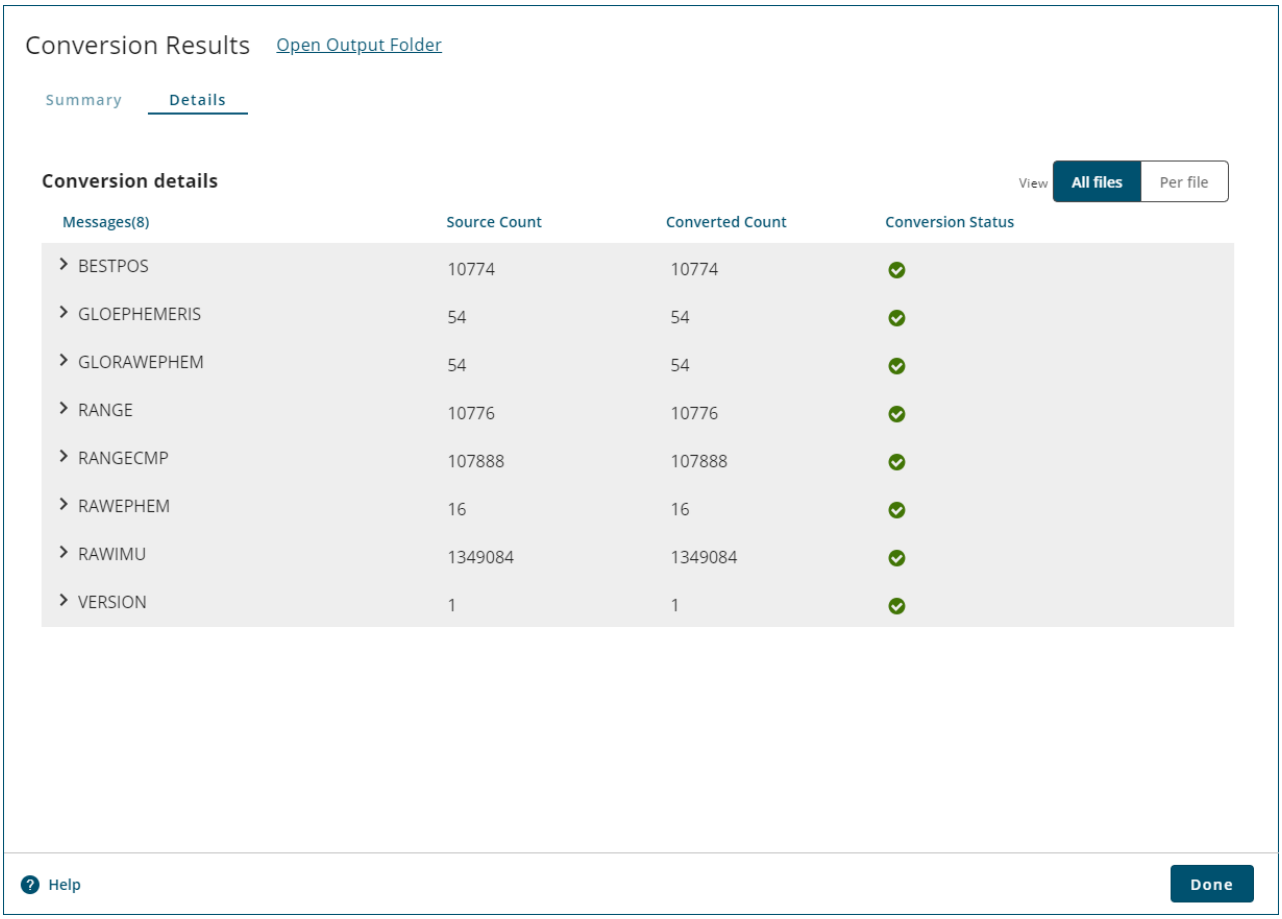
Formats

The *Formats* tile shows the conversion status of the formats that were selected to be converted.

If a format was not fully converted, the messages not converted are shown.

Conversion Details

To view the conversion details, click the **Details** tab.



The *Details* tile provides more information about the messages converted.

Messages	The *Messages* column shows the name of the message (log). When there are multiple source files, clicking the arrow (**>**) beside the message name opens a drop list below the message. This drop list shows the source files in which the messages were found and provides *Source Count*, *Converted Count* and *Status* for the messages found in each source file.
Source Count	The *Source Count* column shows the number of messages found in the source file or files.
Converted	The *Converted Count* column shows the number of messages that were successfully

Count	converted.
Conversion Status	The *Conversion Status* column shows the overall status of the conversion for the message.

When the **Per file** button is selected, the *Conversion details* tab provides the following information.

Files	The *Files* column shows the name of the source file.
Conversion Status	The *Conversion Status* column shows the status of the conversion for the source file.

When you have finished reviewing the conversion results, click the **Done** button. The *Get started* window displays.

4.5 Convert Command Line Interface

The Convert Command Line Interface (CLI) supports the same conversions and filters as the Convert user interface.

The Convert CLI should be run from the location where NovAtel Application Suite is installed. For example, *C:\Program Files\NovAtel Inc\NovAtel Application Suite>NovAtelApplicationSuite.exe --help*.

4.5.1 CLI Options

Option	Description
-h, --help	Outputs a help message for Convert CLI.
-f=, --format= [FORMAT]	Convert logs to **FORMAT** (ASCII|BINARY|ABBREV|RINEX*|KML). ASCII is the default conversion format.
--receiver-type= [TYPE]	Receiver type of the log files (OEM|GIII). OEM is the default receiver type.
-a, --asc, --ascii	Shortcut for -f=ascii.
-b, --bin, --binary	Shortcut for -f=binary.
--abbrev	Shortcut for -f=abbrev
-k, --kml	Shortcut for -f=kml.
-r, --rin, --rinex, -r3.04, --rin3.04, --rinex3.04	Shortcut for -f=rinex3.04.
-r3.03, --rin3.03, --rinex3.03	Shortcut for -f=rinex3.03.
-r3.02, --rin3.02, --rinex3.02	Shortcut for -f=rinex3.02.

Option	Description
-r3.01, --rin3.01, --rinex3.01	Shortcut for -f=rinex3.01.
-r2.1, --rin2.1, --rinex2.1	Shortcut for -f=rinex2.1.
-c=, --convert=[comma-separated list of MESSAGE IDs or MESSAGE ID ranges]	Convert only the MESSAGE logs listed in this command. MESSAGE can be a log number or log name. By default, all logs are converted. E.g., -c=RANGE,BESTPOS,RTKPOS
-e=, --exclude=[comma-separated list of MESSAGE IDs or MESSAGE ID ranges]	Do not convert MESSAGE logs listed in this command. All other logs will be converted. MESSAGE can be a log number or log name. E.g., -e=RAWSBASFRAME,RANGECMP,GPSEPHEM

4.5.2 Output Path

Option	Description
-o, --output= [PATH]	Use **PATH** for output. **PATH** is the path to the directory used to store the output files. If not specified, the output files will be located in the same directory as the input files. The output files will have the following folder structure: `Source/TimeStamp/Format/FileName` where: `Source` = the name of source file being converted `TimeStamp` = the date and time when the file was converted `Format` = the data format the file was converted to (ASCII, BINARY, ABBREV, KML or RINEX) `FileName` = the file name of the converted data with the extension *ascii*, *binary*, *abbrev* or *rinex* depending on the format.
--dd	Automatically create directory named after input file name and write the output files to it.
--md	Put the output files in <output file title>/convert
--dm	Put the output files in convert/<output file title>

4.5.3 Split

Option	Description
--split	Divide the output file into N files, one for each log type. The files' extensions will be the file name _ log names.
-l=, --limit-output-size= [SIZE (MB)]	Limit the size of the output file to **SIZE**. If the size is exceeded, multiple output files will be produced.
--limit-output-duration= [time(Secs)]	Limit the size of the output file to **time**. From the start of the file, the logs till the time duration (for example, 3600 seconds (1 hour)) will be output to one output file and the next 3600 seconds (1 hour) to the next output file and so on.
--daily-utc	Converts the log data on a 24 hours basis, which uses the UTC time zone.

4.5.4 Time Windowing

Option	Description
--start-time=<WEEK>,<SECONDS>	Convert logs after the start time. If **WEEK** is 0 or not given, then the week of the first log will be used.
--finish-time=<WEEK>,<SECONDS>	Convert logs up to the finish time. If **WEEK** is 0 or not given, then the week of the first log will be used.
--limit-duration=[SECONDS]	Convert only **SECONDS** of data from start time, or from start of file if no start time is given.

4.5.5 Log Conversion

Option	Description
--expand-cmp	Expand RANGECMP* logs to RANGE logs. The default is do not expand RANGECMP* logs to RANGE logs.
--unknown-bytes= [file|interleave|ignore]	Dump the unknown bytes to a separate file, interleave them in the output, or ignore them altogether.
--forcekinematicdataflag	Include the kinematic information for conversion.

4.5.6 Sampling

Option	Description
--decimate= [INTERVAL (Secs)]	Decimate logs that occur at **INTERVAL**. **INTERVAL** must be an integer value that will align with the logging interval of the given MESSAGE or All logs. *Example 1*: NovAtelApplicationSuite --decimate=5 (output BESTPOS logs at 5 second intervals) *Example 2*: NovAtelApplicationSuite -c=42 --decimate=42,30 (filter output to only contain BESTPOS(42) logs at 30 second intervals)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