

WinFrog Device Group:	GPS
Device Name/Model:	POS/MV (NMEA)
Device Manufacturer:	
Device Data String(s) Output to WinFrog:	See Telegram Specification section below.
WinFrog Data String(s) Output to Device:	NONE
WinFrog Data Item(s) and their RAW record:	POSITION 303 TIMEDATE 999 HEADING 409 ATTITUDE 413

DEVICE DESCRIPTION:

This device is designed to read several NMEA telegrams from the POS/MV unit. Refer to the Telegram Specification section at the end of this document for more information on the NMEA telegrams supported by this device.

The POS/MV unit can output a DGPS or single point GPS position, a NMEA telegram to synchronize WinFrog's virtual time with GPS time as well as three dimensional orientation data.

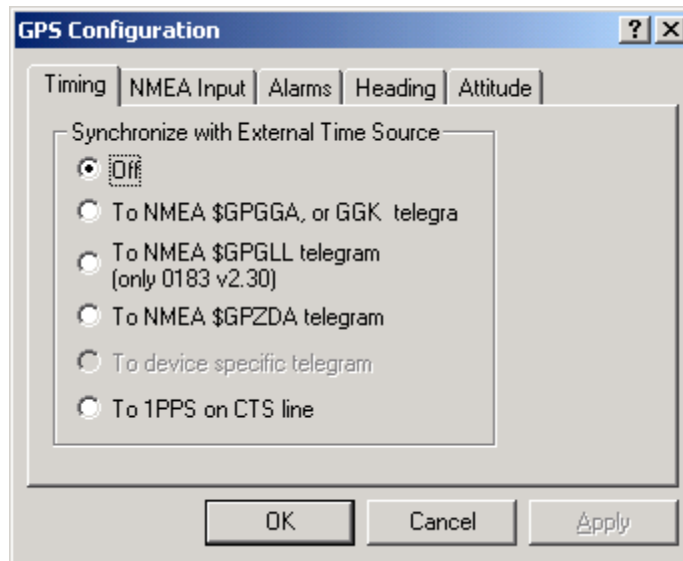
DEVICE CONFIGURATION INSTRUCTIONS

WINFROG I/O DEVICES > EDIT I/O:

Serial
Configurable Parameters

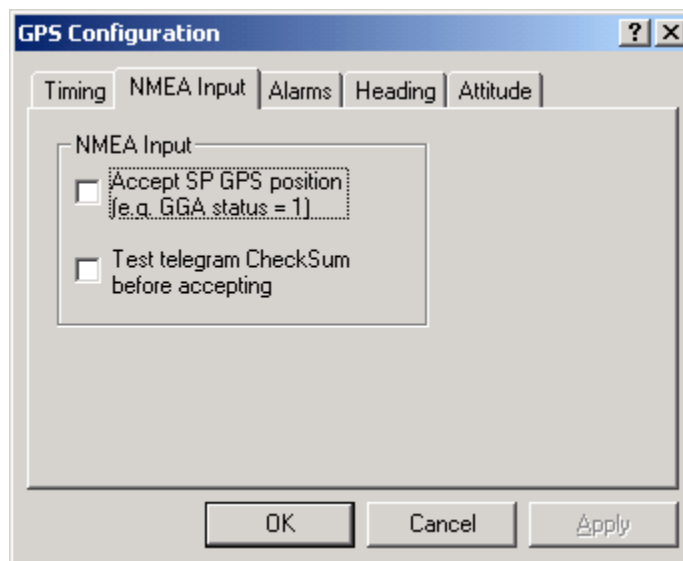
WINFROG I/O DEVICES > CONFIGURE DEVICE:

This device must be configured at the I/O Device window level. In the I/O Devices window, click the device name to select it, then right-click, select Configure Device and the GPS Configuration dialog box opens. This dialog consists of five tabs, the first of which, the Timing tab, is seen below.



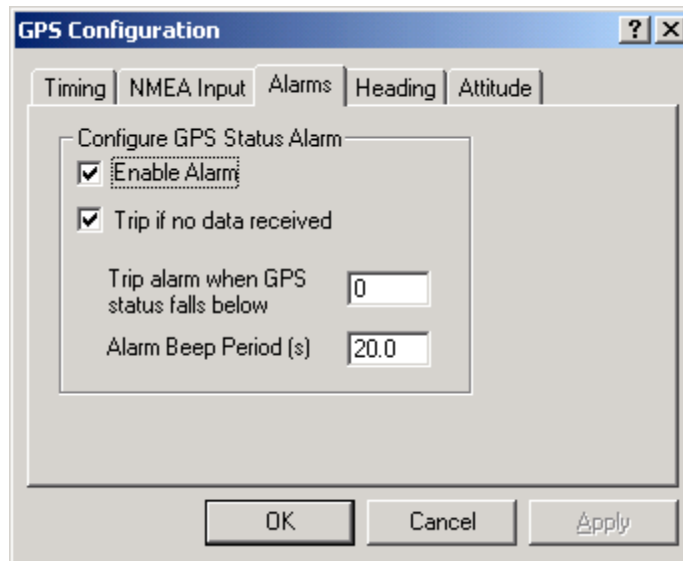
The options in this tab allow you to synchronize WinFrog's virtual time with the more accurate GPS time. The synchronization is not actually initiated from this dialog, (it is initiated from the TIMEDATE data item – see below), however, it is essential to configure the synchronization from this dialog first. Chose the appropriate option (telegram) that WinFrog will use to read External Time data.

The next tab is the NMEA Input tab as seen below.



Select (check) the first option if it is acceptable to allow WinFrog to accept a Single Point (SP) position in case of loss of differential signal. If the data telegram from the GPS device ends with a checksum and it is desirable for WinFrog to test the checksum before accepting the data, select the second option.

The next tab is the Alarms tab as seen below.

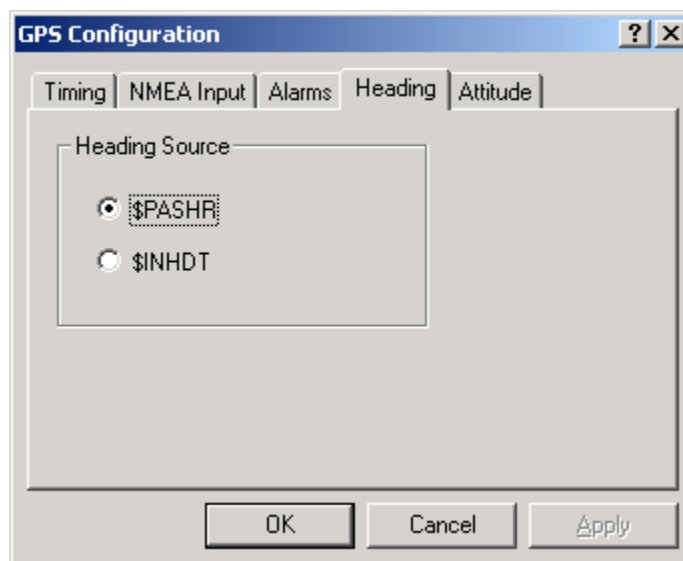


In this tab you can configure an audible alarm to sound if the above conditions exist, including loss of data or if the GPS Status falls below the value entered. The GPS Status values are;

- 0 = invalid
- 1 = GPS fix
- 2 = DGPS fix

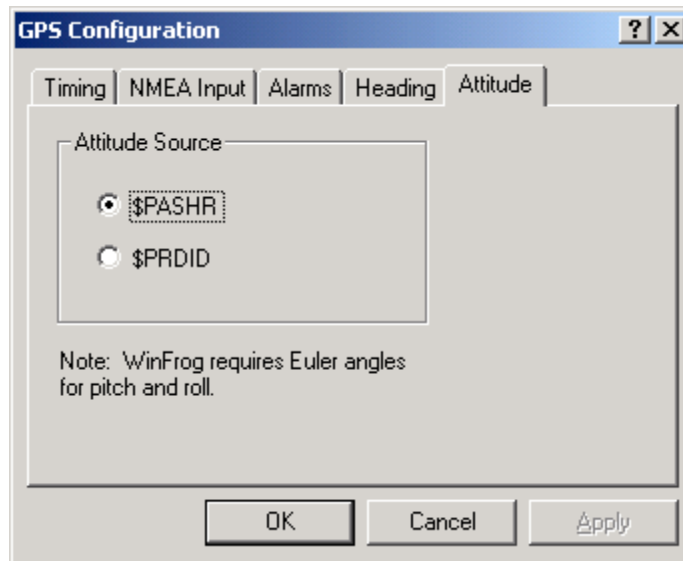
You can also specify the length of time for the alarm to sound.

The next tab is the Heading tab as seen below.



From the two options, select the data string that contains the valid heading data.

The final tab is the Attitude tab as seen below.



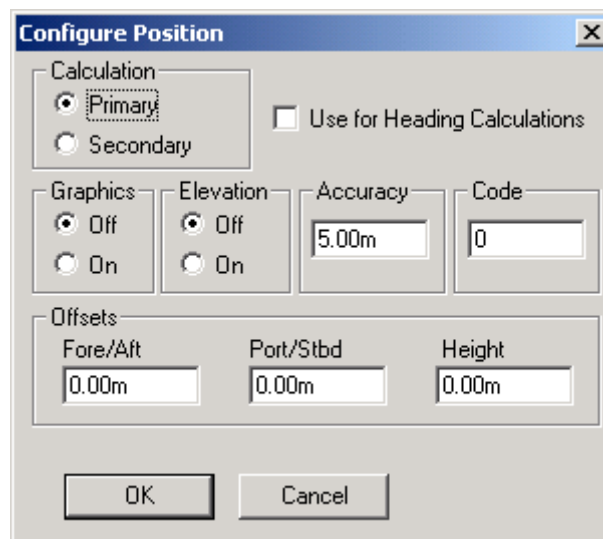
From the two options, select the data string that contains the valid attitude data.

WINFROG VEHICLE > CONFIGURE VEHICLE DEVICES > DEVICE DATA ITEM > EDIT:

Adding the POS/MV (NMEA) device creates four data items: POSITION, TIMEDATE, HEADING and ATTITUDE. Once the data items have been added to the vehicle, they must be edited to suit the application.

Data item: GPS, POS/MV (NMEA), POSITION

Highlight the data item in the vehicle's device list and click the Edit button. The Configure Position dialog box appears as seen below.



Calculation:

Set the Calculation selection to Primary or Secondary. Devices set to Primary calculation are used to provide a vessel position. Note that more than one Primary positioning device can be added to a vehicle's device list; data from these devices will be combined in a weighted mean solution. (See the paragraph on Accuracy below for more on the weighting of Primary calculation device data).

If the Calculation type is set to Secondary, WinFrog will simply monitor the device's data. WinFrog will not use the position data from the device in the final solution of the vehicles' position.

Note: In the case of Primary device failure, WinFrog will not automatically use the Secondary devices for the vessel's position computation. Instead, the vehicle's positioning will go to dead reckoning (if dead reckoning is turned on). You must manually change a Secondary device to Primary in order for the data to be utilized.

Use For Heading Calculations:

Select this checkbox if the device is to be used in conjunction with another GPS device for determination of the heading of the vessel. The vessel's heading will be derived by the inverse of the GPS antenna coordinates.

Graphics:

Select the On radio button to display a labeled square showing the raw (offset but unfiltered) location of the GPS antenna in the Graphics and Bird's Eye windows. This provides a means of comparing raw device and filtered vehicle positions.

Elevation:

Setting the Elevation option to "On" will result in the elevation determined by the GPS to be used as the elevation of the vessel's CRP, referencing the GPS (WGS84) Ellipsoid. The height of the antenna above (below) the CRP must be entered. The sounder data recorded in WinFrog's .RAW data files will not be affected. This option is meant only for those applications where there is no fixed vertical reference (i.e. mean sea level), such as on a river. For acceptable results, this option requires the use of high accuracy "RTK" GPS data.

Accuracy:

The Accuracy value entered provides WinFrog with the expected accuracy of the position from this device. This value is used in the weighting of this device compared to other positioning devices that may be added to the vehicle's device list. The smaller the value entered, the more accurate it is considered to be, and hence the more weight that will be applied to the device's data.

The Accuracy parameter can be changed from the suggested values. Changes should be made with caution, however, as they will affect the final filtered position of the vehicle.

Code:

This field is used when the GPS data is being received by a remote GPS receiver connected via telemetry link. If this is the case, set the Code to coincide with the code parameters associated with the GPS unit being used. For all other applications, the Code entry must be set to 0.

Offsets:

Offsets are required to associate the GPS antenna position with the vessel's Common Reference Point (CRP). The offsets are applied *from* CRP (of the vehicle) to the GPS antenna location.

Forward Offsets are entered as positive values.

Aft Offsets are entered as negative values.

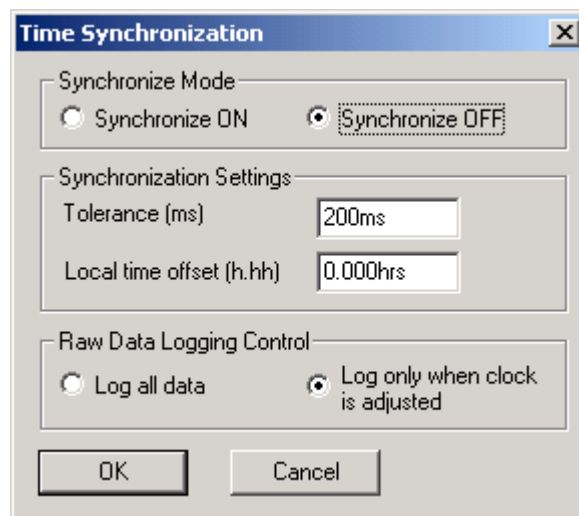
Starboard Offsets are entered as positive values.

Port Offsets are entered as negative values.

Height Offsets are positive upwards. (It is suggested that the vessel's Height origin should be at the water line.)

Data item: GPS, POS/MV (NMEA), TIMEDATE

Highlight the data item in the vehicle's device list and click the Edit button. The Time Synchronization dialog box appears as seen below.

**Synchronize Mode**

The synchronization can be turned On or Off. Note that multiple TIMEDATE data items can be added to the same or other vehicles, but WinFrog will only allow one to be set to On and actually be used to synchronize the WinFrog clock. The others can only be compared to the WinFrog clock.

Synchronization Settings

The tolerance setting controls the maximum limit of the deviation of the WinFrog clock from the timing device before WinFrog resets its clock. This should not be set

too small, or the clock will constantly be re-setting. A tolerance of 50 ms for a 1PPS pulse results in the resetting of the clock approximately every 5-6 minutes.

WinFrog monitors the variation between the UTC time and the WinFrog clock using a fading history of the last 20 samples of the variation between the WinFrog clock synchronization time stamp and the associated UTC time. This is filtered using a Central Tendency algorithm. When the filter result exceeds the tolerance, the clock is reset.

Local time offsets can be entered to allow synchronization to UTC while working in a local time zone. The offset is entered in +/-hours.

Raw Data Logging Control

You can control the logging of the TIMEDATE raw data records. Every time synchronization data reception update can be logged, i.e. a raw record every second. Alternatively, the data is only logged to the raw file when the clock is reset. The data logged includes the time of the clock adjustment and the amount it was adjusted.

Note that this is only in affect if Raw Data recording is turned on.

Monitoring the synchronization

The synchronization of the WinFrog clock can be monitored from the Calculation window using the Data Item Text and Time Series options (open a calculations window, click on the Setup button, check off both options, turn on the TIMEDATE data item and exit with OK).

In the Data Item Text panel, the following information is displayed:

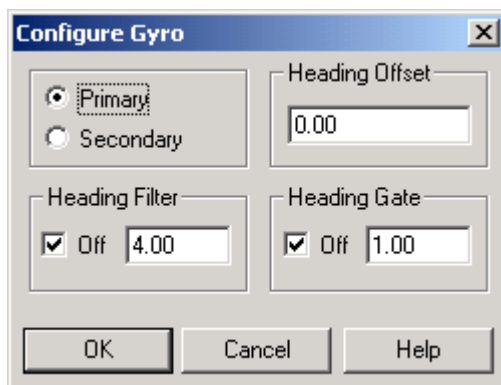
- Status
Displays the data type status (On/Off) and the associated device status
- Sync'd at
Displays the time the WinFrog clock was last adjusted
- Computer time
WinFrog clock time stamp of last synchronization data input
- UTC time
UTC time (from device) of last synchronization data input
- Raw Delta
The difference between the UTC and associated WinFrog time stamp (UTC – WinFrog) for the last epoch
- Filter Delta
The difference between the UTC and filtered WinFrog time for the last epoch

In the Time Series panel, the difference between the UTC time and the raw and filtered WinFrog times are plotted.

Data item: GPS, POS/MV (NMEA), HEADING

It should be noted that heading data from this device is contained in either the \$PASHR or \$INHDT data strings as configured in the I/O Devices > Configure Devices window.

Highlight the data item in the vehicle's device list and click the Edit button. The Configure Gyro dialog box appears as seen below.



Calculation (Primary/Secondary):

Set the type of calculation to Primary or Secondary by selecting the appropriate radio button. Devices set to Primary are used to provide the vehicle with heading information. However, unlike the Position data items, WinFrog does not calculate a weighted mean solution for multiple Heading data items. If more than one Heading data item is set to primary, the vessels heading, in WinFrog, will jump back and forth between the two. Devices set to Secondary are simply monitored, and are not used in the vehicle's calculations.

In the case of Primary device failure, WinFrog will not automatically use the Secondary device(s). You must manually change a Secondary device to Primary status in order for it to be used in the vehicle's calculations.

Heading Offset:

A correction value (as determined from a gyro calibration) can be input in the Heading Offset box. This value is added to the heading value from the data string to provide a corrected heading for the vehicle. Note that positive or negative values can be entered.

Heading Filter/Heading Gate:

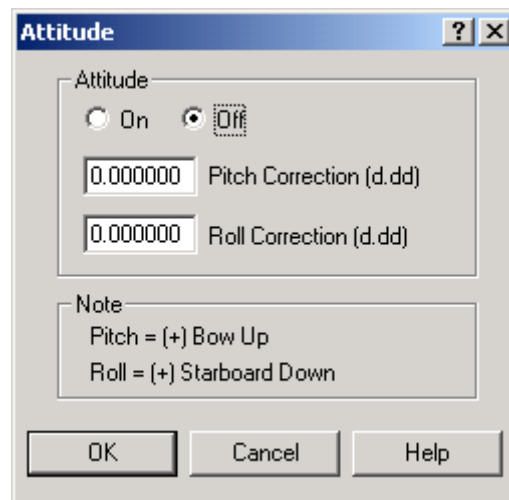
The Heading Filter is used to "smooth" heading values used by the vehicle. The value entered in the Heading Filter indicates the number of headings that will be used to predict the next heading value. The larger the value entered, the "heavier" the filter will be – i.e. the slower the vehicle's heading will respond to changes.

The Heading Gate defines a tolerance value to limit the use of anomalies in gyro readings. If the next observed gyro value received falls outside the specified range of predicted values (i.e. plus or minus the entered value), the value will not be used.

Data item: GPS, POS/MV (NMEA), ATTITUDE

It should be noted that heading data from this device is contained in either the \$PASHR or \$PRDID data strings as configured in the I/O Devices > Configure Devices window.

Highlight the data item in the vehicle's device list and click the Edit button. The Attitude dialog box appears as seen below



Attitude

By default, the sensor mode is off, meaning that Attitude data from the data string will not be used in the vehicle's calculations. Select 'On' to enable the use of the Attitude data and begin using the inclination corrections in the position output.

Correction values can also be added in this section of the dialog. The correction values (entered in units of degrees-decimal degrees) are added to the raw pitch and roll values received from the Attitude device before the data is applied to the vehicle's calculations.

Ensure that entered values adhere to the sign convention used by WinFrog. You can verify that the corrections are entered properly by viewing the pitch and roll values in the I/O Device window and the Vehicle Text window.

TELGRAM SPECIFICATION:

The following NMEA messages are supported:

HDT – Heading data
ZDA – Time data
GGA – GPS data
GLL – GPS data
VTG – speed data
GST - GNSS Pseudorange Error Statistics

Additional messages supported are:

PASHR

Field	Data
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1	'\$PASHR'
2	hmsTime
3	heading
4	roll
5	pitch
6	heave
7	rollAccuracy
8	pitchAccuracy
9	headingAccuracy
10	headingFlag (0=no aiding, 1=GPS aiding, 2=GPS & GAMS aiding)
11	imuFlag (0=satisfactory, 1=IMU out)

PRDID

Field	Data
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1	\$PRDID
2	pitch
3	roll
4	heading