

WinFrog Device Group:	GPS
Device Name/Model:	NMEA GPS (Sercel)
Device Manufacturer:	DSNP 16, Rue de Bel-Air – B.P. 433 44474 Carquefou Cedex, France Tel: 33 2 40 30 59 00 Fax: 33 2 40 30 58 92 E-mail: Info-DSNP@DSNP.com
Device Data String(s) Output to WinFrog:	GPGGA, ODP, GPZDA, GLL (without prefix)
WinFrog Data String(s) Output to Device:	N/A
WinFrog Data Item(s) and their RAW record:	POSITION 303 TIMEDATE 999

DEVICE DESCRIPTION:

The NMEA GPS SERCEL device provides WinFrog with GPS position and time information in its own “NMEA like” message standard. NMEA stands for the National Marine Electronics Association, a body that established standard message formats (in the form of coded "sentences") for data communication from a variety of devices found in the marine industry.

The only difference between the NMEA GPS SERCEL data string and the standard NMEA GPS data string is the status flag codes. See below for further details on the data formats

DEVICE CONFIGURATION INSTRUCTIONS

WINFROG I/O DEVICES > EDIT I/O:

Serial

Configurable Parameters

(Suggested: 4800-8-N-1)

The following NMEA strings can be output by this device:

GGA - Global Positioning System Fix Data:

\$--GGA,hhmmss.ss,lll.ll,a,yyyy.yy,a,x,xx,x.x,x.x,M,x.x,Mx.x,xxxx*hh<CR><LF>

\$--GGA,123519,4807.038,N,01131.324,E,29,08,0.9,545.4,M,46.9,M, , *42

Where:

123519	Fix taken at 12:35:19 UTC
4807.038,N	Latitude 48Deg. 07.038 min N
01131.324,E	Longitude 11Deg 31.324 min E
29	Fix quality- see below for definition of the different status
08	Number of satellites being tracked
0.9	Horizontal dilution of position
545.4,M	Altitude, Metres, above mean sea level
46.9,M	Height of geoid (mean sea level) above WGS84 ellipsoid
(Empty field)	Time in seconds since last DGPS update
(Empty field)	DGPS station ID number

NMEA (Sercel) Status types:

20= No Fix	21= SP GPS, with SA
22=SP GPS, No SA	23=SP GPS, No SA, Good HDOP/LPME
24=DGPS, 2D	25= DGPS, 2D, Good HDOP/LPME
26=DGPS, 3D, Poor RTCM/HDOP	27=DGPS, 3D, Poor HDOP, Good RTCM
28=DGPS, 3D, Good HDOP	29=DGPS, 3D, Good HDOP/RTCM

Note: The <CR> and <LR> may be ignored in the Sercel NMEA device.

ZDA-Time and Date

\$--ZDA,hhmmss.ss,dd,mm,yyyy,hh,mm*hh<CR><LF>

Where:

hhmmss.ss	UTC
dd	Day (01 to 31) UTC
mm	Month (01 to 12) UTC
yyyy	Year UTC
hh	Local zone hours (00 to ± 13 hrs)
mm	Local zone minutes (00 to +59)

GLL – Geographic Position – Latitude/Longitude:

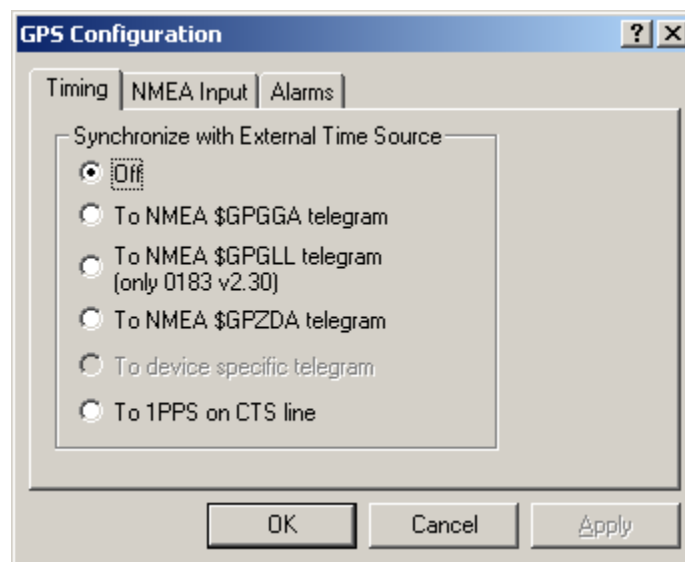
\$--GLL,IIII.II,a,yyyyy.yy,b,hhmmss.ss,A*hh<CR><LF>

Where:

IIII.II	Latitude
a	North/South
yyyyy.yy	Longitude
b	East/West
hhmmss.ss	UTC of Position
A	Status: A= Data Valid; B= Data not valid

WINFROG I/O DEVICES > CONFIGURE DEVICE:

The NMEA GPS (Sercel) device is added to WinFrog from the GPS device group. The device must be configured at the I/O Device window level. The GPS Configuration dialog box appears, as seen below.



WinFrog is able to synchronize to external time sources, typically a GPS receiver, including the 1PPS pulse (new in v3.2). The time synchronization is done at the vehicle level using the TIMEDATE data item.

The NMEA GPS device supports the synchronization of WinFrog to the \$--ZDA telegram and/or 1PPS with \$--ZDA telegram.

This device also supports the synchronization of WinFrog to the NMEA \$--GGA and \$--GLL telegrams. However, these are not recommended as there is an inherent latency in the UTC time included in the telegram and the time the telegram is sent out. This is typically approximately 0.7 seconds for a \$--GGA telegram.

1. Interfacing

If using the 1PPS...

WinFrog looks for the 1PPS pulse on the CTS line of the serial port, therefore if the 1PPS signal is to be used, this must be connected to the CTS line at the WinFrog serial port.

Some GPS receivers produce a pulse that is too short and cannot be detected by a computer serial port. The signal must be stretched and/or increased in magnitude. The Trimble 4000 is an example of this. In this case a pulse stretcher is required. The stretched pulse needs to be connected to the CTS line of the same COM port that the GPS receiver is sending its time and navigation data to.

On many receivers, the 1PPS can be used as is, for example the Sercel NR203.

Besides the 1PPS signal, WinFrog requires a telegram defining the time of the pulse just received. Typically the NMEA \$--ZDA telegram is used unless a device specific telegram is used, for example in the case of the Trimble 1PPS device (Trimble 4000).

The 1PPS and associated time telegram must be input on the same port.

If using a NMEA telegram...

In the case of using a NMEA telegram such as the \$--ZDA alone to synchronize WinFrog, the reception of the starting character ('\$') of the telegram is detected and time stamped. This time stamp is used as the *pulse* detection time associated with the telegram's UTC time.

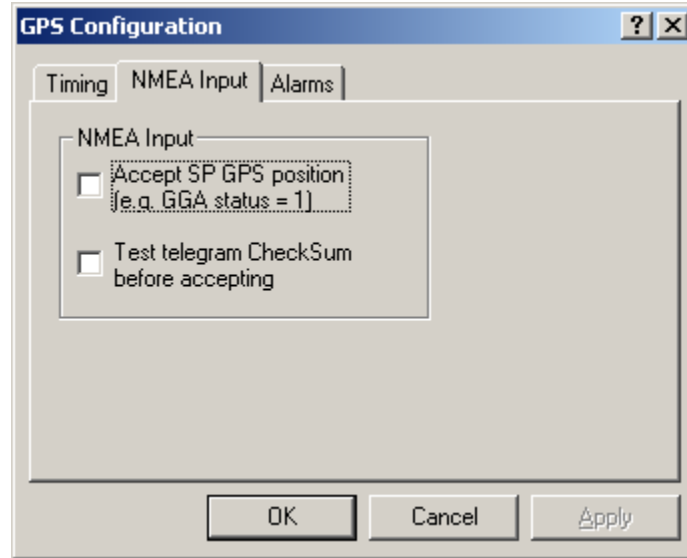
2. Configuring the Device

Timing

Select the synchronization option. Note that this configuration tells WinFrog what option is to be associated with the TIMEDATE data type once it has been associated with a vehicle, it does not initiate the actual synchronization.

NOTE: The computer's system clock is not reset to the GPS time - only WinFrog's time is affected by enabling one of the synchronizing options.

NMEA Input



The **NMEA Input** dialog box allows you to configure WinFrog to “test” the received NMEA data string and react accordingly, as described below.

Accept SP GPS Position (e.g. GGA status=1)

Select this checkbox to have WinFrog utilize Single Point (i.e. non-differentially corrected) positional information. This non-differential status is identified in the GGA data string when a value of 1 is found in the Status field. (See below for further details on the GGA data string).

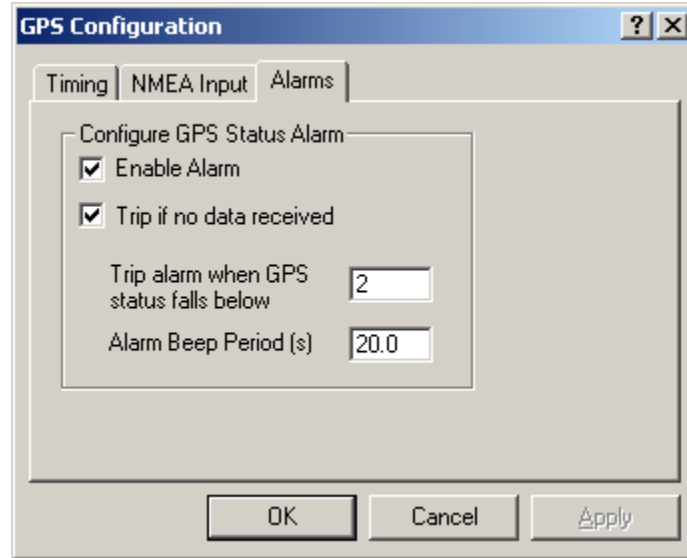
The GGA message must be used for this test; the GLL data string does not provide differential status information.

NOTE: Non-differential GPS data positioning is rated at only approx. plus/minus 20 meters. This may not be adequate for high accuracy positioning tasks.

Test Telegram CheckSum before accepting

Select this checkbox to have WinFrog utilize the **Checksum** value from the received data string. WinFrog will compare the checksum value to the number of values in the NMEA data string. If the number is not the same, WinFrog will not utilize the data string.

Alarms



Configure GPS Status Alarm:

Select the Enable Alarm checkbox to enable an audible (beeping) alarm. With this option enabled, you can define the alarm to sound if the **GPS Status falls below** a certain number, as entered in the provided field. The value to be entered refers to the GGA string status field, defined as follows:

- 0= no GPS signal
- 1= Single Point GPS Positioning Mode
- 2= DGPS Positioning Mode
- 3= GPS PPS Mode
- 99= Simulator Mode
- 10= Simulator Mode Edit

Enter a value in the **Alarm Beep Period(s)** entry box to define the period of the alarm beep, in seconds.

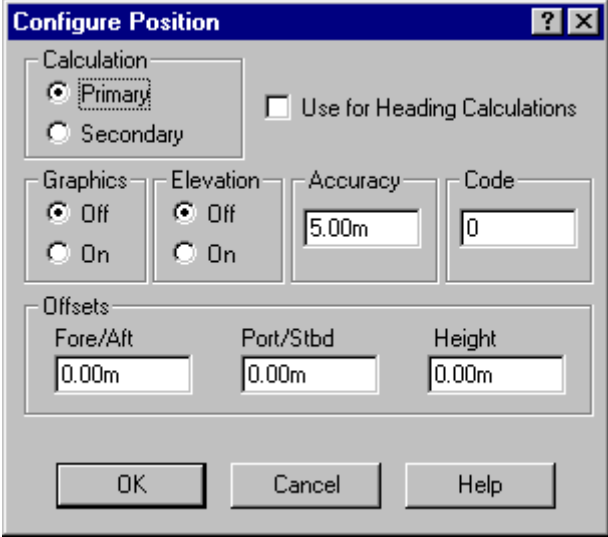
Enable the “Trip if no data received” to detect communications failure. Here if no decodeable data was received for 15 seconds the alarm will also occur.

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

The Sercel NMEA GPS device creates two data items: POSITION and TIMEDATE. Once the data items have been added to the vehicle, they must be edited to suit the application.

Data item: GPS, NMEAGPS1, POSITION

The POSITION data item must be edited once it is added to a vehicle's device list. Highlight the data item in the vehicle's device list, then select the Edit button. The Configure Position dialog box appears as seen below.

The image shows a 'Configure Position' dialog box with a blue title bar and standard window controls. It contains several sections: 'Calculation' with radio buttons for 'Primary' (selected) and 'Secondary', and a checkbox for 'Use for Heading Calculations'; 'Graphics' with radio buttons for 'Off' (selected) and 'On'; 'Elevation' with radio buttons for 'Off' (selected) and 'On'; 'Accuracy' with a text field containing '5.00m'; 'Code' with a text field containing '0'; and 'Offsets' with three text fields for 'Fore/Aft', 'Port/Stbd', and 'Height', all containing '0.00m'. At the bottom are 'OK', 'Cancel', and 'Help' buttons.

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.

Graphics:

If On is selected, a labeled square will show 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 GPS to be used as the elevation of the vessel referencing the GPS (WGS84) Ellipsoid. 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 entry window 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 (i.e. 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.

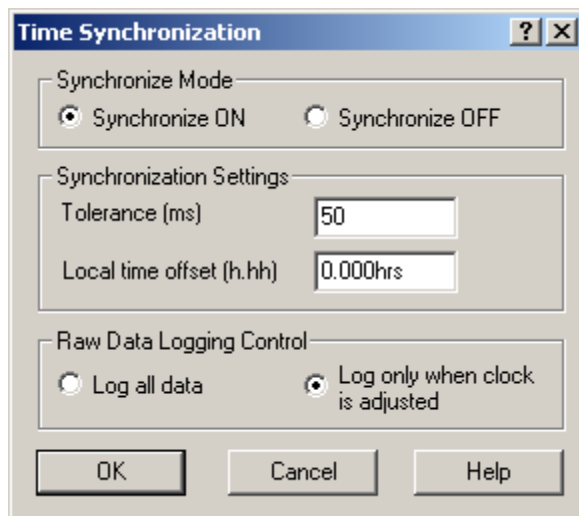
Starboard Offsets are entered as positive values.

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, NMEAGPS1, TIMEDATE

The TIMEDATE data item must be edited once it is added to a vehicle's device list. Highlight the data item in the vehicle's device list, then select 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.

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.

CONFIGURATION DETAILS:

Most NMEA GPS receivers output data utilizing the standard RS-232 serial protocols.

Serial Port Connections

DB-25	DE-9	Signal	Direction
2	3	Tx Data	→
3	2	Rx Data	←
4	7	Request to Send	→
5	8	Clear to Send	←
6	6	Data Set Ready	←
7	5	Signal Ground	
8	1	Data Carrier Detect	←
20	4	Data Terminal Ready	→
22	9	Ring Indicator	←

Typically, interfacing to a NMEA GPS device requires only the reception of data. If this is the case, you are required to connect only the **Tx** Data pin on the GPS device to the **Rx** Data pin on the WinFrog computer, and to connect the **Signal Ground** pins between the two devices.

RAW DATA LOGGING:

WinFrog records the positional data from the Sercel NMEA device as a type 303 raw file type. See Appendix B of the WinFrog User's Guide for details on this raw data string.