WinFrog Device Group:	**GPS**
Device Name/Model:	**NR103 Prop**
Device Manufacturer:	**DSNP** (Dassault Sercel) 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:	GGA, GSA, GST, GLL, SGD, SYS, VTG, ZDA, QLY
WinFrog Data String(s) Output to Device:	N/A
WinFrog Data Item(s) and their RAW record:	POSITION 303 TIMEDATE 999

DEVICE DESCRIPTION:
The NR103 PROP (Proprietary) receiver is a 15 channel GPS receiver that can be programmed to transmit a number of different NMEA data messages including: GGA, GSA, GST, GLL, SGD, SYS, VTG, ZDA, ZEV, and MRK. Note that the ZEV and MRK messages are not supported by WinFrog.
The NR103 PROP (Proprietary) receiver can also output #T, QLY messages types as well.

The NMEA SERCEL standard calls for data communication in the form of coded "sentences." Each sentence begins with the character "$" and ends with a carriage return and line feed (<CR><LF>). These last two characters are "control" characters and are not normally printed (for this reason they are shown enclosed in brackets). Between the beginning and end of each sentence are "fields" of data, each field separated by a comma. The first field in any sentence (field 0) begins with the two-letter talker mnemonic code ("talkers" are devices that send out information, "listeners" take it in) followed by the three-letter code for the sentence.
Here's an example:

```
 Field #:            0        1     2      3       4
    Sentence: $LCGLL,4001.74,N,07409.43,W<CR><LF>
```

The sentence begins with the start character "$." Next comes the talker identifier and sentence format code. LC stands for Loran-C, GLL for present position in Lat/Lon. Field 1 contains the set's current latitude. Field 2 is either N or S for North or South. Field 3 is the set's current longitude. Field 4 is W or E for West or East. Thus, this sentence reads "Loran-C present positions in Lat/Lon: 40 degrees 1.74 minutes North, 74 degrees 9.43 minutes West." A carriage return and line feed close the sentence. The GLL sentence is always displayed in this format.

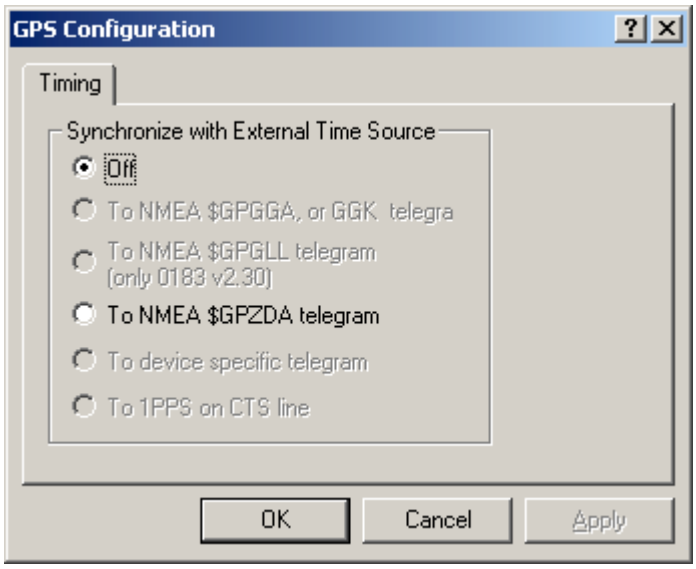
The only difference between the NMEA SERCEL and the NMEA 0183 is the status flag codes. Refer to the documentation on the NR103 Pseudo device for more information.

The main difference between the NR103 Prop and the NMEA GPS (Sercel) devices is in the data strings handled by WinFrog.

DEVICE CONFIGURATION INSTRUCTIONS

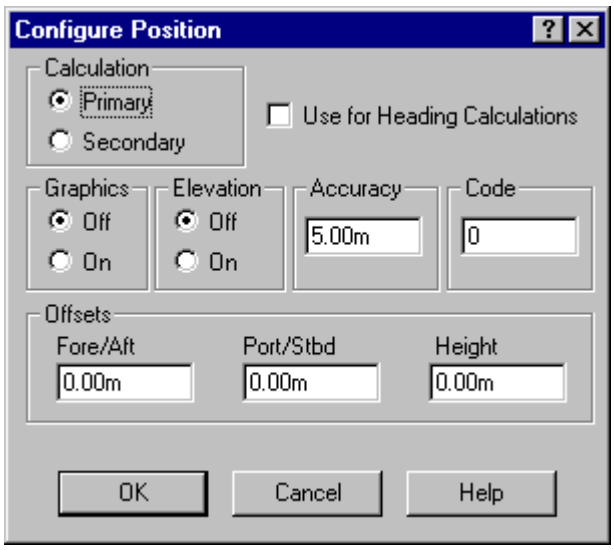
WINFROG I/O DEVICES > EDIT I/O:
Serial
Configurable Parameters

WINFROG I/O DEVICES > CONFIGURE DEVICE:
The NR103 PROP is added to WinFrog from the GPS device group, creating the POSITION and TIMEDATE data items. This device must be configured at the I/O Device window level to indicate which method is to be used for time synchronization. To edit this device, highlight NR103 PROP in the I/O Devices window, then right-click and select Configure Device. The GPS Configuration dialog box appears as seen below.



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.

WINFROG VEHICLE > CONFIGURE VEHICLE DEVICES > DEVICE DATA ITEM > EDIT:
The NMEA GPS Position device must be edited once it is added to a vehicle's device list. Highlight the **GPS, NR103 Prop, POSITION** device in the vehicle's device list, then select 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.

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.

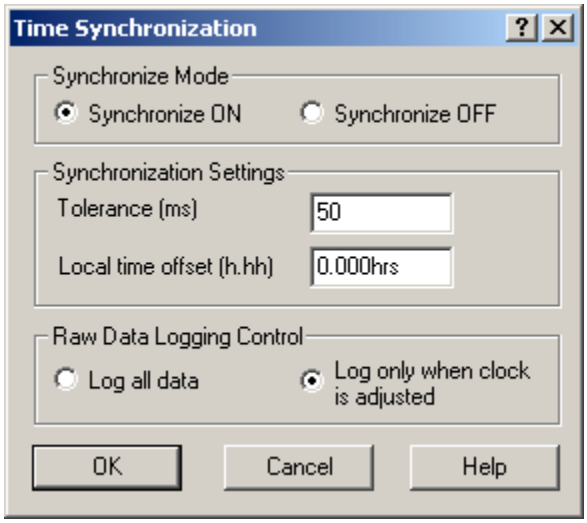
Code:
This entry window is used when the GPS data is being received by a remote GPS receiver connected via telemetry link. If this is the case, set the Code to coincide with the code parameters associated with the GPS unit being used.
For all other applications, the Code entry must be set to 0.

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.

GPS, CONSOLE, TIMEDATE

1. Interfacing
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
In the appropriate vehicle's Configure Vehicle - Devices dialog box, highlight the TIMEDATE data item 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 thus 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.

3. 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:

The NR103's RS-232 connector is a standard DB type connector.

Serial Port Connections

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

For NMEA interfacing, we are only concerned with Rx Data, signal ground (and possibly Tx Data, if we want the computer to talk to the GPS)

RAW DATA LOGGING:
A talker typically sends a group of sentences at intervals determined by the unit's update rate, but generally not more often than once per second. Characters following the "*" are a checksum. Checksums are optional for most sentences, according to the standard.

The following are the NMEA strings that the NR103 can output:

GGA - Global Positioning System Fix Data:

$--GGA,hhmmss.ss,llll.ll,a,yyyyy.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
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

ZDA-Time and Date

$--ZDA,hhmmss.ss,xx,xx,xxxx,xx,xx*hh<CR><LF>

Where:

hhmmss.ss	UTC
xx	Day (01 to 31) UTC
xx	Month (01 to 12) UTC
xxxx	Year UTC
xx	Local zone hours (00 to ±13 hrs)
xx	Local zone minutes (00 to +59)

Note: Local time zone is the magnitude of hours plus the magnitude of minutes added, with the sigh of local zone hours, to local time to obtain UTC. Local zone is generally negative for East longitudes with local exceptions near the International Date Line.

Example: At Chatham Is. (New Zealand) at 12:30 PM local time on June 10,1995
$GPZDA,234500,09,06,1995,-12,45*6C<CR><LF>

In the Cook Islands at 1500 local time on June 10,1995:
$GPZDA,0130000,11,06,1995,10,30*4A<CR><LF>

GSA - GPS DOP and active satellites

GSA,A,3,04,05,,09,12,,,24,,,,,2.5,1.3,2.1*39

Where:

A	Auto selection of 2D or 3D fix (M = manual)
3	3D fix
04,05...	PRNs of satellites used for fix (space for 12)
2.5	PDOP (dilution of precision)
1.3	Horizontal dilution of precision (HDOP)
2.1	Vertical dilution of precision (VDOP)

DOP is an indication of the effect of satellite geometry on the accuracy of the fix.

VTG - Track made good and ground speed

VTG,054.7,T,034.4,M,005.5,N,010.2,K

Where:

054.7,T	True track made good
034.4,M	Magnetic track made good
005.5,N	Ground speed, knots
010.2,K	Ground speed, Kilometers per hour

GST – GNSS Pseudo-range Error Statistics:

$--GST,hhmmss.ss,x.x,x.x,x.x,x.x,x.x,x.x,x.x,*hh<CR><LF>

Where:

hhmmss.ss	UTC time of the GGA or GNS fix associated with this sentence
x.x	RMS value of the standard deviation of the range inputs to the navigation process. Range inputs include pseudo-range and DGNSS corrections.
x.x	Standard deviation of the semi-major axis of the error ellipse.(m)
x.x	Standard deviation of the semi-minor axis of the error ellipse.(m)
x.x	Orientation of semi-major axis of the error ellipse. (Degrees from true north
x.x	Standard deviation of latitude error (m)
x.x	Standard deviation of longitude error (m)
x.x	Standard deviation of altitude error (m)

GLL - Geographic position, Latitude and Longitude:

$--GLL,llll,ll,a,yyyyy.yy,a,hhmmss.ss,A,a*hh<CR><LF>
GLL,4916.45,N,12311.12,W,225444,A

4916.46,N	Latitude 49 deg. 16.45 min. North
12311.12,W	Longitude 123 deg. 11.12 min. West
225444	Fix taken at 22:54:44 UTC
A	Data valid (V= Data invalid)
a	Mode Indicator

SDG – Position Accuracy Estimate:

$--SGD,x.x,N,x.x,f*hh<CR><LF>

Where:

x.x,N	Accuracy, nautical miles
x.x,f	Accuracy, feet

SYS – Hybrid System Configuration:

$--SYS,L,O,T,G,D,*hh<CR><LF>

Where:

L	Loran-C	
O	Omega	
T	Transit	Null fields for systems not in use
G	GPS	
D	Decca	

QLY – Position Status, Hardware Status, Position DRMS, SV:

$--QLY,x,x,xxx.x,M,xx…xx<CR><LF>

Where:

x	Position status: 0= position not computed, 1= position computed
x	Hardware status: 0= Major Failure, 1= Okay
xxx.x,M	Position DRMS(m), (Lsd: 10cm), -1.0= not available
xx…xx	SV number involved in fix computation, 0= no SV's

At the current time, the following data strings are output from the NR103, but cannot be utilized by WinFrog

#T – Time-trigger Raw Data:

#T,xx,xxxxxxx<CR><LF>

Where:

xx	GPS week number
xxxxxxx	GPS week time (Lsd 1/10 second)

ZEV – Event Timer:

#ZEV,hhmmss.ss, hhmmss.ss ,a,c—c*hh<CR><LF>

Where:

hhmmss.ss	UTC time of the fix associated with this sentence	
hhmmss.ss	Timers' initial value	
a	Control:	"+" = count up
		"-" = count down
		"V" = stop count
c	Waypoint ID	