

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

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.

This device can provide time synchronization using \$-ZDA. See chapter 8.

DEVICE CONFIGURATION INSTRUCTIONS

WINFROG I/O DEVICES > EDIT I/O:

Serial

Configurable Parameters

WINFROG I/O DEVICES > CONFIGURE DEVICE:

This device does not require any configuration

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

Adding the NR103 Prop device creates one data item: POSITION.

Data item: GPS, NR103 Prop, 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 and click the Edit button. The Configure Position dialog box appears as seen below.

Configure Position

Calculation
 Primary Use for Heading Calculations
 Secondary

Graphics: Off On
Elevation: Off On
Accuracy: 5.00m
Code: 0

Multiple Position Source Options
 Disable Auto Switching of Primary
 Enable Auto Switching of Primary
Age of prime data when switch is to occur: 20sec

Offsets
Fore/Aft: 0.00m Port/Stbd: 0.00m Height: 0.00m

OK Cancel

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 data from a secondary device in the final solution of the vehicle's position.

If auto switching is enabled (see below) a secondary may automatically become a primary should all the primaries fail.

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.

Multiple Position Source Options:

This group box allows you to enable automatic switching of a secondary to primary should the data from all POSITION and PSEUDORANGE data items set to primary timeout. The **Age** entered is the length of time that the secondary will wait in the absence of data from all primaries, before taking over as primary. This age is only entered for the secondary.

For example, if the POSITION or PSEUDORANGE data items associated with two GPS receivers were set to primary and the POSITION or PSEUDORANGE data item of a third GPS receiver was set to secondary, both primary GPS receivers must time out before the secondary will become the primary. Upon the recovery of either of the original primary data items, the original primary will be reset to primary and the original secondary will be reset to secondary.

Note for the auto switching feature to work, there must be at least one primary and one secondary enabled. For example, given two data items, one set to primary with the auto switching disabled and the other set to secondary with the auto switching enabled, if the primary fails the secondary is not set to primary and the vehicle positioning stops until the primary data item recovers.

Disable Auto Switching of Primary:

If this data item is not to be involved in the auto switching process, check this box. As stated above, this data item is then not involved in the auto switching process in any way.

Enable Auto Switching of Primary:

If this data item is to be involved in the auto switching process, either as a primary or a secondary, check this box. If set to secondary, enter the Age of data the primary data items must reach before this secondary is switched to act as the primary.

In order for this option to be effective you must have at least one primary and one secondary. If there are multiple secondary data items that are enabled for switching, the first one to receive data will become primary.

Note: This option is not enabled unless WinFrog determines that there is more than one POSITION and/or PSEUDORANGE data item associated with the respective vehicle. The exception to this is the case of a WinFrog with the Remote module operating as a Controlled Remote being configured remotely from the Controller. In

this case, the option is always enabled even though it may not be applicable. The operator must be aware of what is available on the Remote and configure the data item accordingly.

Note: This option is not available in the WinFrog Remote package.

Note: This option is not available for USBL based POSITION data items.

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.)

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,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
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,IIII,II,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