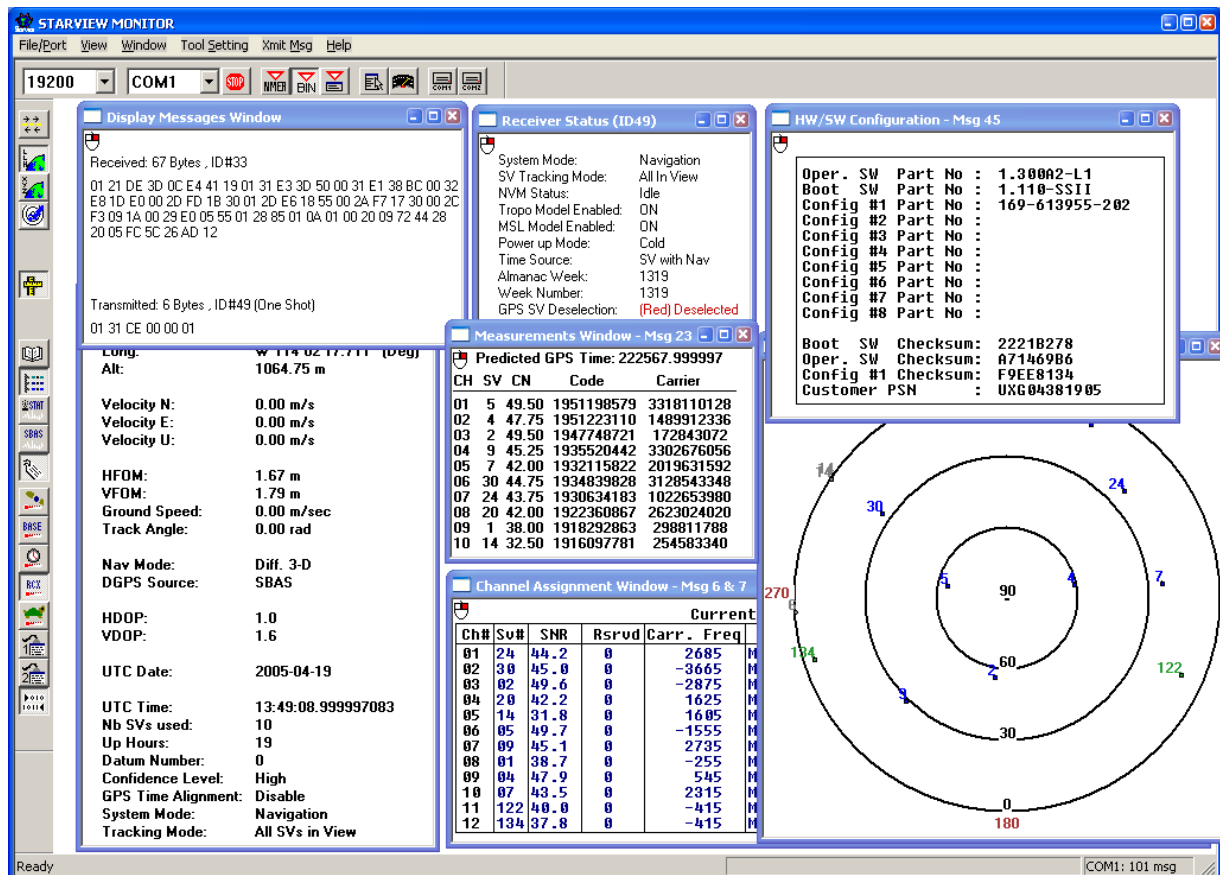


# StarView

## User Manual

(for NovAtel  
SUPERSTAR II-Based  
Products)



## StarView User Manual for SUPERSTAR II-Based Products

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NovAtel GPS Hotline:	<b>1-800-NOVATEL</b> (Canada and the U.S.) 403-295-4900 (International)
Fax:	403-295-4901
E-mail:	<a href="mailto:support@novatel.ca">support@novatel.ca</a>
Website:	<a href="http://www.novatel.com">www.novatel.com</a>
Write:	NovAtel Inc. Customer Service Dept. 1120 - 68 Avenue NE Calgary, Alberta, Canada T2E 8S5

- 
- ☒ Before contacting NovAtel Customer Service regarding software concerns, please do the following:
1. Issue the *NVM Reset* command, *Message ID# 99*, with value 0 to reset all NVM. Your receiver automatically resets after the NVM erase has been completed.  
(For details on individual commands and logs, refer to the *SUPERSTAR II Firmware Reference Manual*)
  2. Log the following data requests to a file on your PC for 30 minutes:

<i>Receiver Status, ID# 49</i>	one shot	<i>Navigation Data (ECEF), ID# 21</i>	continuous
<i>Ephemeris Data, ID# 22</i>	continuous	<i>Navigation Data (User), ID# 20</i>	continuous
<i>Measurement Block, ID# 23</i>	1 Hz	<i>Satellite Visibility, ID# 33</i>	continuous
<i>Fault Log, ID# 57</i>	one shot	<i>Channel Assignment, ID# 6</i>	continuous
<i>HW/SW Identification, ID# 45</i>	one shot		
  3. Send the file containing the log to NovAtel Customer Service, using the [support@novatel.ca](mailto:support@novatel.ca) e-mail address.
- 

## Firmware Updates

Firmware updates are firmware revisions to an existing model, which improves basic functionality of the GPS receiver. Refer also to the *Firmware Updates* section of the *SUPERSTAR II Firmware Reference Manual*, Reference [4] on *Page 9*.

Firmware upgrades are firmware releases, which increase basic functionality of the receiver from one model to a higher level model type. When available, upgrades may be purchased at a price, which is the difference between the two model types on the current NovAtel GPS Price List plus a nominal service charge.

If you need further information, please contact NovAtel using one of the methods given above.



# Foreword

This user manual is intended to help you install, test, gather information or perform maintenance using the *StarView* graphical user interface (GUI) software on NovAtel's SUPERSTAR II-based products. Results may be displayed in real time or stored in a file.

The SMART ANTENNA and FlexPak-SSII are SUPERSTAR II-based.

## User Manual Updates

The most up-to-date version of this manual can be downloaded from the Documentation Updates section on our website at <http://www.novatel.com/Downloads/docupdates.html>.

## Prerequisites

As this reference manual is focused on the SUPERSTAR II, it is necessary to ensure that the GPS receiver has been properly installed and powered up according to the instructions outlined in your product's companion hardware user manual before proceeding (references [5] to [6] in *Table 1* below). In these manuals you will find instructions on the basic setup of your GPS receiver as well as a DGPS setup.

You will also need:

A personal computer (PC) with a mouse, CD drive and Windows software: IBM or compatible 486 or Pentium version NT 3.51 or later, Windows 95 or later

## Related Publications

PUBLICATION NAME	PUBLICATION NAME
[1] ICD-GPS-200 Rev. B	NAVSTAR GPS Space Segment/Navigation Interface <sup>a</sup>
[2] RTCM-104 version 2.1, January 1994	Recommended Standards for Differential NAVSTAR GPS Radio Technical Commission for Maritime Services (RTCM) <sup>a</sup>
[3] NMEA-0183 Rev 2.20	National Marine Electronics Association Standard for Interfacing <sup>a</sup>
[4] SUPERSTAR II Firmware Reference Manual	NovAtel Part Number OM-20000086 <sup>b</sup>
[5] SMART ANTENNA User Manual	NovAtel Part Number OM-20000078 <sup>b</sup>
[6] SUPERSTAR II User Manual	NovAtel Part Number OM-20000077 <sup>b</sup>

a. Refer to the Standards/References section of the *GPS+ Reference Manual* available on our website at <http://www.novatel.com/Downloads/docupdates.html> for contact information.

b. See our website at the address shown in *a* above

**Table 1: Related Publications**

Many of the *StarView* windows are based on Message ID#s, details of which can be found in *Reference [4]* above. See also *Chapter 1, Getting Started on Page 13*.

## StarView Installation

Once the GPS receiver is connected to the PC, antenna, and power supply, install the *StarView* software. If a *StarView* CD is not supplied, *StarView* is available on our website (see *below*).

From CD:

1. Start up the PC.
2. Insert the *StarView* CD in the CD-ROM drive of the computer.
3. Install the *StarView* software and follow the steps on the screen. If the setup utility is not automatically accessible when the CD is inserted, select *Run* from the *Start* menu and press the *Browse* button to locate *Setup.exe* on the CD drive. Click on the *OK* button to install the *StarView* software and follow the steps on the screen.

From our website:

1. Start up the PC and launch your internet service program.
2. Go to our website at <http://www.novatel.com/Downloads/fwswupdates.html> and scroll down to the *Other Application Software* section.
3. Download the *StarView* setup program and save it in a temporary directory (for example, C:\temp).
4. Use the setup program to install the *StarView* software by following the steps on the screen.


---

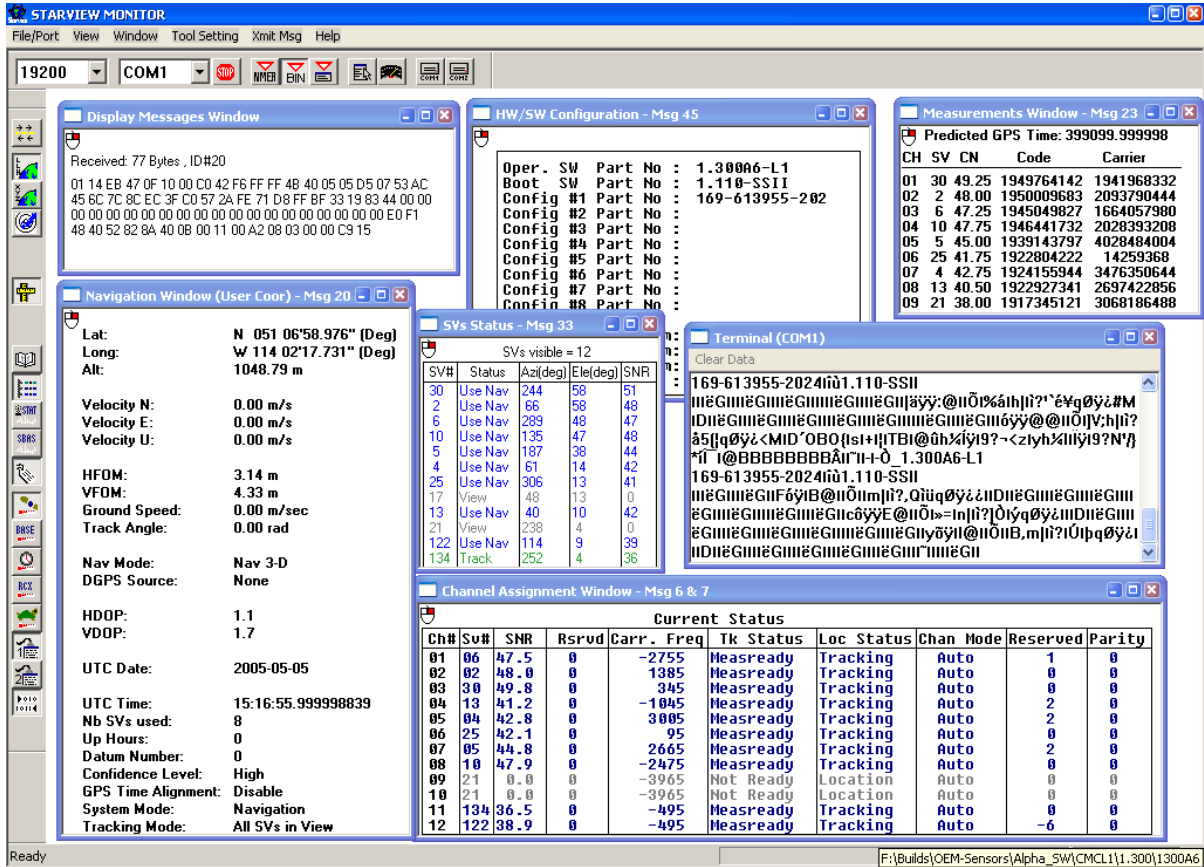
☒ After installation, *StarView* also appears in the Windows Start menu at *Start | Program Files | NovAtel LI Software*.

---

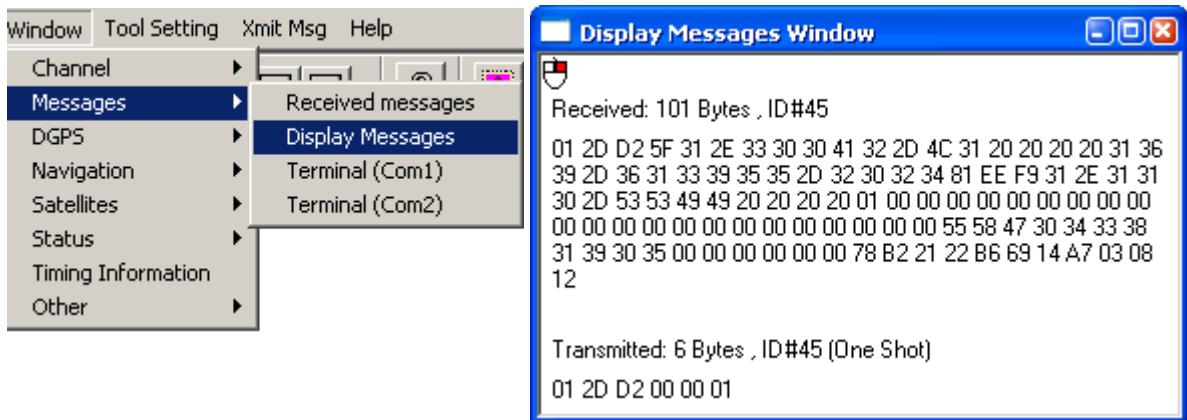
# Chapter 1

# Getting Started

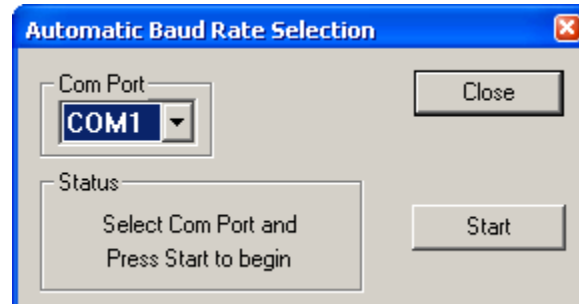
Once the *StarView* software is installed, see *Page 10*, double click the *StarView* icon: . The *StarView* window appears. The *StarView* window below shows some of the windows that you might typically have open.



These windows are opened from the *Window* menu. For example, select *Window | Messages | Display Messages* to show the Display Messages window:




Before you can transmit, receive or view data however, you must use the *File/Port* menu to open a connection between your GPS receiver and the PC. For example, select *File/Port | Auto Connect* from the main menu:

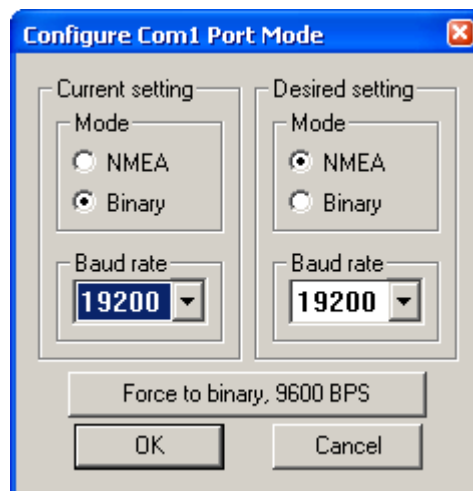


Select the COM port on your PC to which the GPS receiver is connected. Click on the *Start* button to activate the connection. Wait until a message appears to tell you that the connection is successful and then click on the *Close* button. If the connection is successful you will see the COM port displayed to the right of the status bar at the bottom of the *StarView* window. *StarView* is now ready to use, see also *Figure 1* on *Page 13*.

All menus are accessed from the main menu. The main menu is comprised of 6 menu items whether in NMEA or Binary protocol: File/Port, View, Windows, Tool Setting, Xmit Msg and Help.

First change the *StarView* interface to either NMEA or Binary by clicking on one of these buttons: 

Click on the *Protocol* button, , to display the *Configure COM1 Port Mode* edit window in order to change the protocol and baud rate of the GPS receiver's COM1 port:



- 
1. When you use the NMEA or BIN buttons, shown above, you are simply changing the *StarView* menus and windows. You must use the *Configure Port Mode* dialog to change the configuration of your card. The *Configure Port Mode* dialog is available using the *Protocol* button or by selecting *Tool Setting | Protocol* from the main menu.
  2. Your receiver's current settings must match those selected in the *Current setting* section of the dialog. If they do not match the protocol can not change. If you do not know your receiver's current settings, use the *Force to binary, 9600 BPS* button and then use the *Desired setting* section.
  3. The minimum baud rate is 300 bps and the maximum is 19200 bps.
- 

To save data to a file rather than only seeing it live on screen, select *File/Port | Save Data | Automatic Logging* from the main menu.

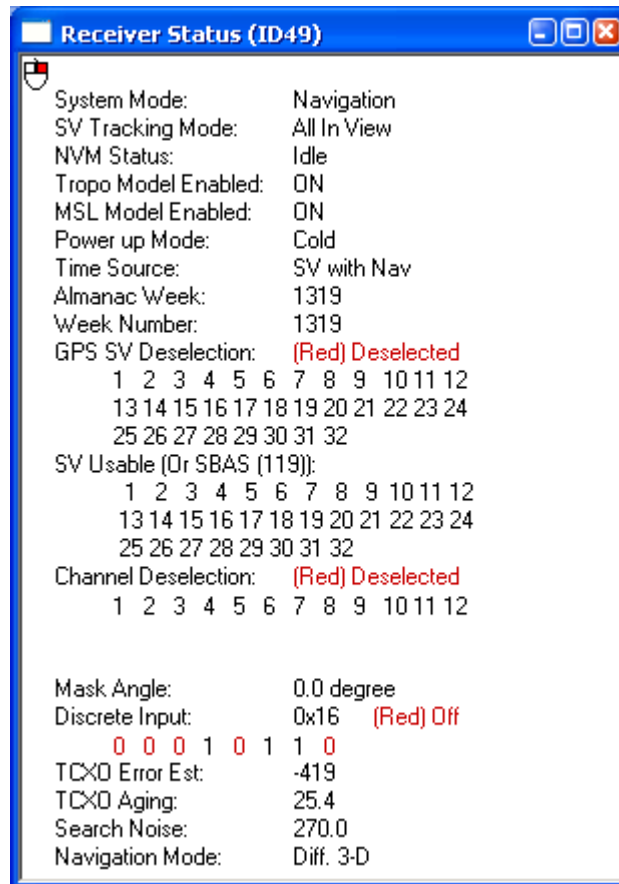
When you select menu options that are followed by an arrow, a pull down menu appears. Most of *StarView* binary functions are represented by a button as shown in *Chapter 2, Binary Protocol* starting on *Page 17*. *Chapter 3, NMEA Protocol* starts on *Page 52*.

When you mouse over menu items in *StarView*, there is often information in the status bar:



**Figure 1: Status Bar**

When an item is opened from the *Window* or *Xmit Msg* menus, the corresponding Message ID# may be shown in the title of the open window:










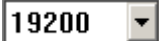

Please refer to the *SUPERSTAR II Firmware Reference Manual*, Reference [4] on *Page 9*, for details on individual messages.

## 1.1 File/Port Menu

The File/Port menu looks the same for both the NMEA and Binary protocols.

The File/Port menu, see *Table 2* on *Page 14*, allows you to select the communication port of the PC, locate a file for incoming data, save a configuration, stop communication between the PC and the GPS receiver, stop logging data and exit the application.

Table 2: File/Port Menu

Menu Option	Toolbar Button	Refer to
Serial Port <sup>a</sup>		Section 1.1.1, Serial Port on Page 15
Auto Connect		Chapter 1, Getting Started starting on Page 11
Save Data		
COM1 Port <sup>b</sup>		Section 1.1.2, Save Data on Page 15
COM2 Port <sup>b</sup>		
Automatic Logging		
Playback Rate <sup>c</sup>		Section 1.1.3, Input Log File on Page 15
Input log file <sup>c d</sup>		Section 1.1.3, Input Log File on Page 15
Save Config		Section 1.1.4, Save Config on Page 15
Restore Factory Config		Section 1.1.5, Restore Factory Config on Page 16
Parser Active		Section 1.1.6, Parser Active on Page 16
Stop		Section 1.1.7, Stop on Page 16
Exit		Section 1.1.8, Exit on Page 16
StarView Interface <sup>d</sup>		Page 12
Baud Rate <sup>a d</sup>		Section 1.1.1, Serial Port on Page 15
COM Port <sup>a d</sup>		Section 1.1.1, Serial Port on Page 15

a. COM port of the PC

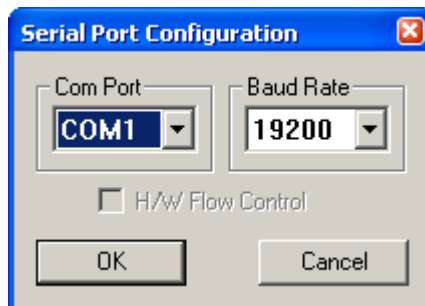
b. COM1/COM2 of the receiver

c. Available with the binary protocol and not NMEA

d. Not in the File/Port menu

### 1.1.1 Serial Port

Select a port to establish communication between the GPS receiver and *StarView*. I/O messages are transmitted through this port. The Serial Port Configuration dialog shows the available ports and baud rates. Consider the case where COM1 is being used by another application while COM2 is still available. To choose COM2 with a baud rate of 19200:



You can also select a COM port and baud rate, or stop the connection, directly from the File Port tools below the main menu:



- 
- ☒ 1. Data flow has no effect in your application.
  - 2. You can select or change the COM port on the toolbar to start a connection.
- 

### 1.1.2 Save Data

This option allows you to log messages from the GPS receiver into a file. Ensure messages are selected before activating logging mode using the *Tool Setting / Set Default Msg List* from the main menu in Binary or NMEA mode. Choose COM1, COM2, or allow the GPS receiver to automatically decide. All messages received are recorded in the log file. You are shown a Save As window. Give your log file a meaningful name to help you remember what it contains.

- 
- ☒ In Binary mode, *Message ID#s 20, 21, 22, 33, 45 and 49* are requested by default if you select *File/Port / Save Data / Automatic Logging* from the main menu.
- 

---

**WARNING:** When using *StarView*, ensure the Power Settings on your PC are not set to go into Hibernation or Standby modes. Data will be lost if one of these modes occurs during a logging session.

---

### 1.1.3 Input Log File

This option allows you to view data from a previously logged file (it is not in the menu but available as a button option). It is applicable only to binary protocol files. Choose how fast the data is viewed by selecting Playback Rate from the File/Port menu or by clicking on the *Playback Rate* button.

### 1.1.4 Save Config

Window positions can be saved in a configuration file. *StarView* keeps its configuration in a STARVIEW.CFG file. This file is created if it does not already exist, for example, when the application is launched for the first time. Toolbar settings are saved in a STARVIEW.INI file, which is created and managed by Windows.

- 
- ☒ *StarView* saves the windows on display but does not save any settings on the receiver.
-

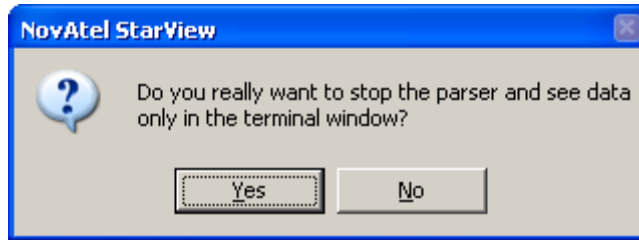
### 1.1.5 Restore Factory Config

This option sets the window positions and sizes to the default configuration.

### 1.1.6 Parser Active

Keep this menu option checked to see information in *StarView*.

If you uncheck Parser Active, a message asking you to confirm that you only want to see information in the Terminal window appears:



If you select Yes, a red Parser Inactive message appears in the main *StarView* window. See also *Figure 2* below.

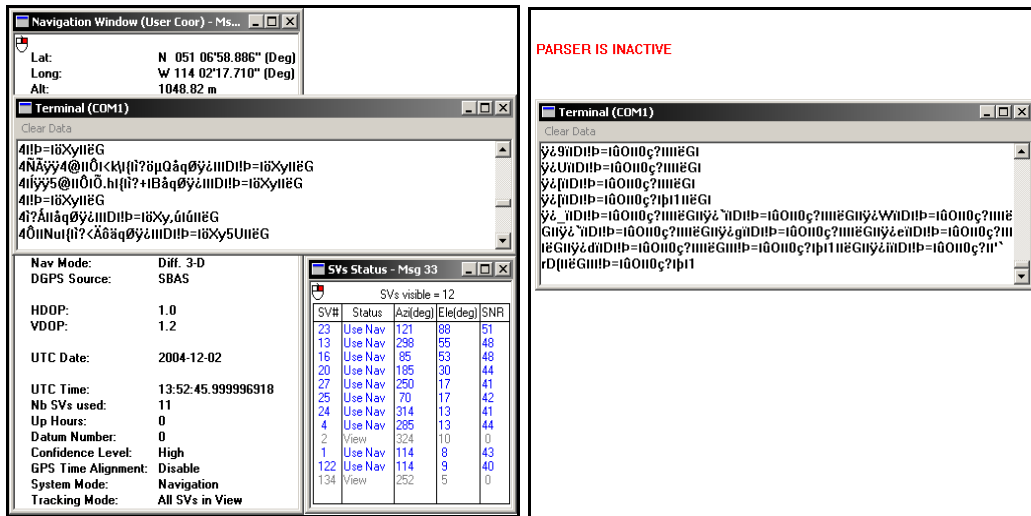


Figure 2: Parser Active (Left) Verses Parser Inactive (Right)

### 1.1.7 Stop

This option stops communication between your PC and the GPS receiver. File logging is also stopped.

### 1.1.8 Exit

The Exit menu option terminates the application session.



Binary messages are meant strictly as a machine readable format. They are also ideal for applications where the amount of data being transmitted is fairly high. Because of the inherent compactness of binary as opposed to ASCII data, the messages are much smaller. This allows a larger amount of data to be transmitted and received by the GPS receiver's communication ports. The message block structure of binary messages from a SUPERSTAR II-based receiver follows the general conventions as noted here:

byte 1:	Start of Header (SOH)
byte 2:	Message ID#
byte 3:	Complementary ID#
byte 4:	Message Data Length (0..255)
byte 5 .. n:	n-4 Data Bytes
byte n+1 .. n+2:	Checksum

StarView allows you to view binary messages in ASCII format. Saved data is stored in its original Binary format.

Please refer to the *SUPERSTAR II Firmware Reference Manual*, Reference [4] on Page 9, for more details on the structure of binary messages and for details on individual messages associated with windows and settings.

NMEA protocol information is in *Chapter 3* starting on Page 52.

All menus are accessed from the main menu. The main menu is comprised of 6 menu items whether in NMEA or Binary protocol:

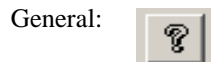
File/Port	See Section 1.1, File/Port Menu starting on Page 13
View	See Section 2.1, View below
Windows	See Section 2.2, Window starting on Page 18
Tool Setting	See Section 2.3, Tool Setting starting on Page 35
Xmit Msg	See Section 2.4, Send Messages starting on Page 49
Help	See Section 2.5, Help starting on Page 51

## 2.1 View

The View menu option allows you to select toolbars. Buttons are grouped by functionality in 4 toolbars:



See Section 1.1, File/Port Menu starting on Page 13.



See Section 2.5, Help starting on Page 51.



See Section 2.3, Tool Setting starting on Page 35.



See Section 2.2, Window starting on Page 18.

## 2.2 Window

The Window menu allows you to open one or more windows. Make sure you open the appropriate window(s) corresponding to the message(s) sent.




















- 
- ☒ The command message to be sent must be selected separately either from the Xmit Msg menu or by clicking the right mouse button over the window selected. The right mouse button is active when the  icon is present in the window. Selected windows are updated after command messages are sent.
- 

Table 3 shows the windows available when you select Window from the main menu.

**Table 3: Window Menu**

Menu Option	Toolbar Button	Refer to
Channel		
Channel assignment		Page 20
Message		
Received messages		Page 20
Display Messages		Page 21
Terminal (COM1)		Page 21
Terminal (COM2)		Page 22
DGPS		
DGPS Configuration		Page 22
DGPS Data		Page 23
DGPS Status <sup>a</sup>		Page 23
Navigation		
LLH Solution <sup>a</sup>		Page 24
XYZ Solution		Page 25
Plot		Page 26
Satellites		

Continued on Page 19

Status		Page 27
Position		Page 27
Health		Page 28
Almanac		Page 28
Ephemeris <sup>a</sup>		Page 30
Measurements <sup>a</sup>		Page 30
Status		
SBAS Status <sup>b</sup>		Page 31
Base Status <sup>c</sup>		Page 31
Receiver Status		Page 32
Receiver Configuration		Page 32
Timing Information		Page 33
Other		
Automatic Log Summary		Page 34
HW/SW Part Number <sup>c</sup>		Page 34

- a. Use your right mouse button to request this message in Continuous mode
- b. You must have an SBAS-capable model in order to use SBAS
- c. Use your right mouse button to request this message in One Shot mode

### 2.2.1 Channel Assignment

The Channel Assignment window shows you the current satellites assigned to channels 1 through 12. It is associated with *Message ID#s 6 and 7*.

Channel Assignment Window - Msg 6 & 7

Current Status									
Ch#	Sv#	SNR	Rsrvd	Carr. Freq	Tk Status	Loc Status	Chan Mode	Reserved	Parity
01	24	43.2	0	3065	Measready	Tracking	Auto	2	0
02	30	47.6	0	-2775	Measready	Tracking	Auto	1	0
03	02	50.9	0	-1475	Measready	Tracking	Auto	1	0
04	10	44.0	0	-4235	Measready	Tracking	Auto	0	0
05	06	43.7	0	-3535	Measready	Tracking	Auto	1	0
06	05	49.9	0	-75	Measready	Tracking	Auto	0	0
07	09	43.1	0	3255	Measready	Tracking	Auto	0	0
08	25	40.6	0	-2555	Measready	Tracking	Auto	0	0
09	04	47.5	0	1865	Measready	Tracking	Auto	1	0
10	07	42.6	0	2585	Measready	Tracking	Auto	-1	0
11	122	39.8	0	-425	Measready	Tracking	Auto	0	0
12	134	37.8	0	-425	Measready	Tracking	Auto	0	0

### 2.2.2 Received Messages

The Received Message window shows messages received from the GPS receiver. It also shows the size of the file used to save incoming data and protocol errors.

Received Messages Window

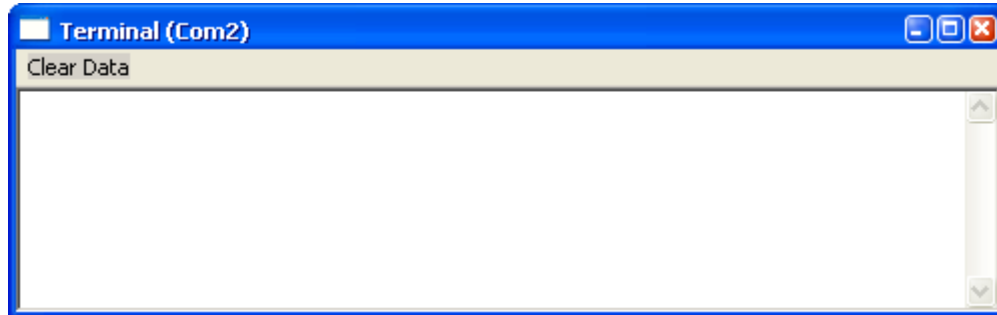
Buffer read: 77 (0.1%)      Valid msg: 865  
Protocol error: 0

	0	10	20	30	40	50	60	70	80	90	100	110	120
0	0	0	112	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	34	433	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0
6	140	0	0	0	0	0	0	0	0	0	0	0	5
7	140	0	0	0	0	0	0	0	0	0	0	0	
8	0	0	0	0	0	0	0	0	0	0	0	0	
9	0	0	0	0	1	0	0	0	0	0	0	0	



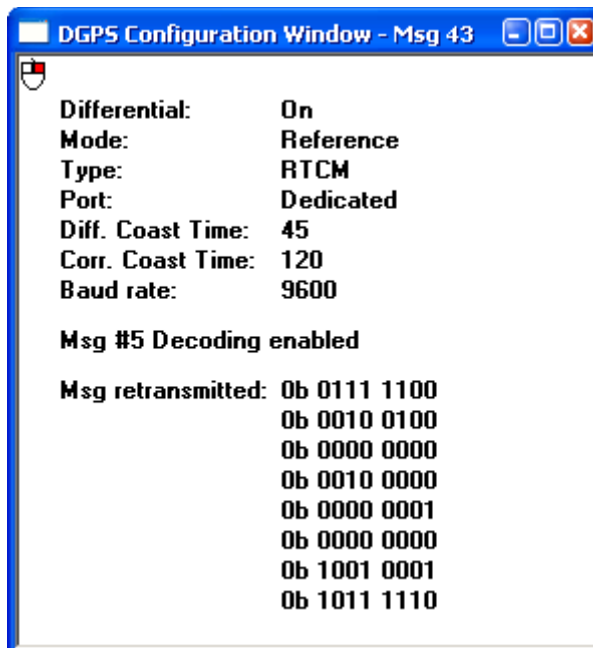
### 2.2.5 Terminal (COM2)

The Terminal (COM2) window shows the messages received from the COM2 port of the GPS receiver before processing. If COM2 is not the active port, *StarView* displays the Serial Port Configuration dialog for you to edit first, see *Page 15*.



### 2.2.6 DGPS Configuration

The DGPS Configuration window shows the DGPS configuration of the GPS receiver. It is associated with *Message ID# 43*, see also *Page 41*.



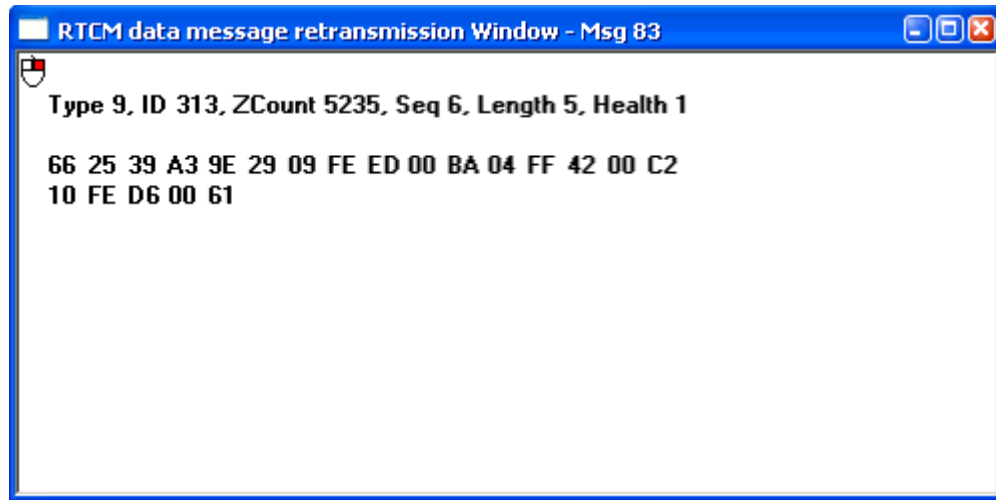

---

☒ The *Msg retransmitted* fields shown in the window above are not available and should be ignored.

---

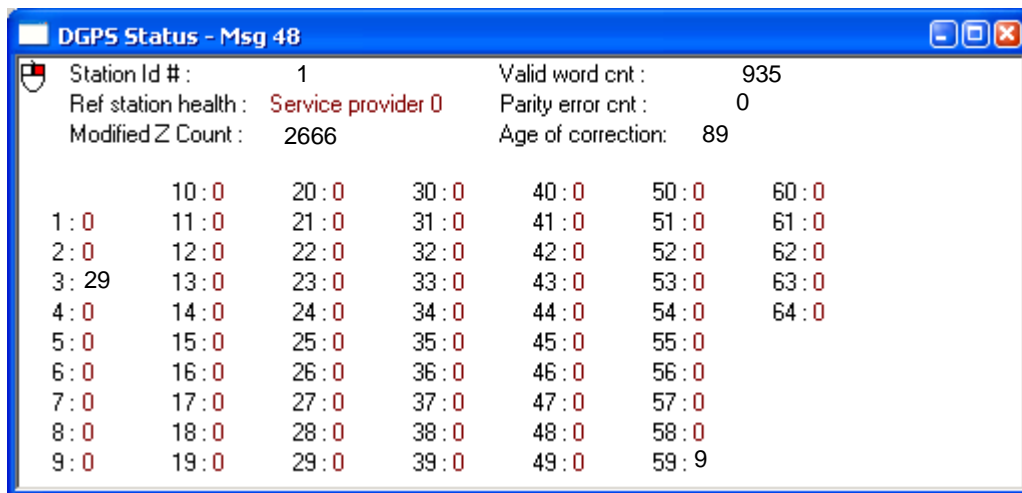
### 2.2.7 DGPS Data

The DGPS Data window shows the RTCM data received by the GPS receiver in hexadecimal format and some message information in ASCII format. It is associated with *Message ID# 83*.



### 2.2.8 DGPS Status

The DGPS Status window shows DGPS messages received unless the GPS receiver is a BASE model. In this case, it shows encoded DGPS messages. This window is associated with *Message ID# 48*.



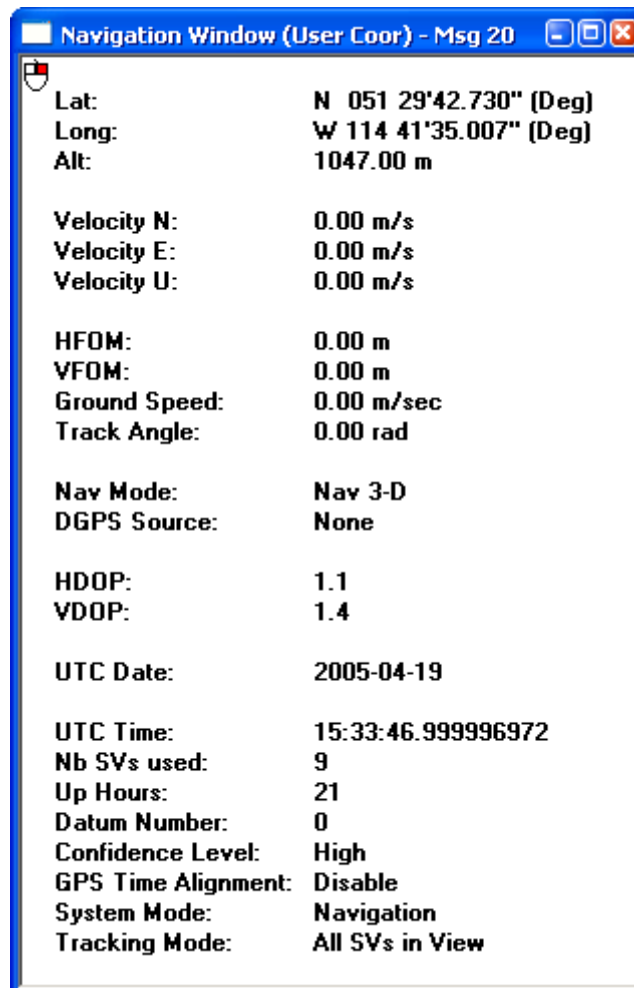
## 2.2.9 LLH Position

The Navigation Data (user coordinates) window contains the position (latitude, longitude and altitude coordinates) and velocity (m/s) computed by the GPS receiver. It is associated with *Message ID# 20*. In addition, it reports height and velocity Figures of Merit (FOMs) which are quality indicators.

☒ Datum #0 in StarView is the WGS84 datum. See also Tool Setting | Set Datum on *Page 40*.

The Nav Mode field displays one of the following navigation modes:

- Initialization Required
- Initialized
- NAV 3-D
- NAV 2-D
- Diff. 3-D
- Diff. 2-D
- Dead Reckoning

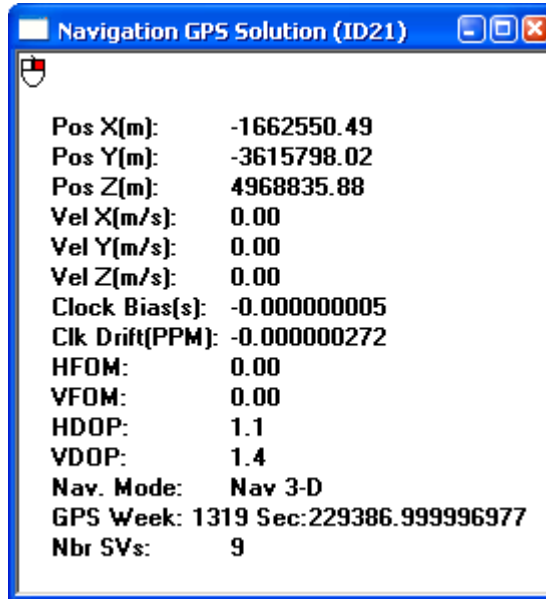




### 2.2.10 XYZ Position

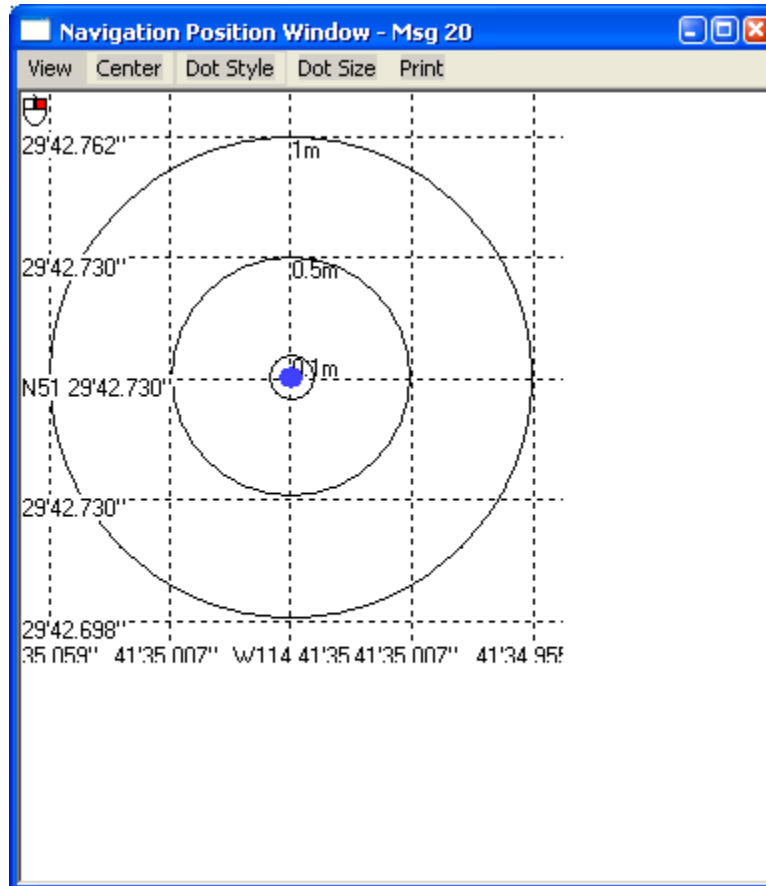
The Navigation Data window contains the GPS receiver's position and velocity in earth-centered-earth-fixed (ECEF) coordinates. It is associated with *Message ID# 21*. In addition, it reports height and velocity FOM and Dilution of Precision (DOP) values, which are quality indicators.

The Nav Mode field displays one of the navigation modes shown in *Section 2.2.9, LLH Position on Page 24*.



### 2.2.11 Plot

The navigation Plot window shows the position computed. You can compare it with the known position or with another computed solution. The window has a zoom range of 1 to 1000 m. This window has its own menu that includes options for viewing the coordinates or grid. Use the Dot Style and Dot Size menu to adjust the dot. See also *Section 2.2.9, LLH Position on Page 24*, which is also associated with *Message ID# 20*.



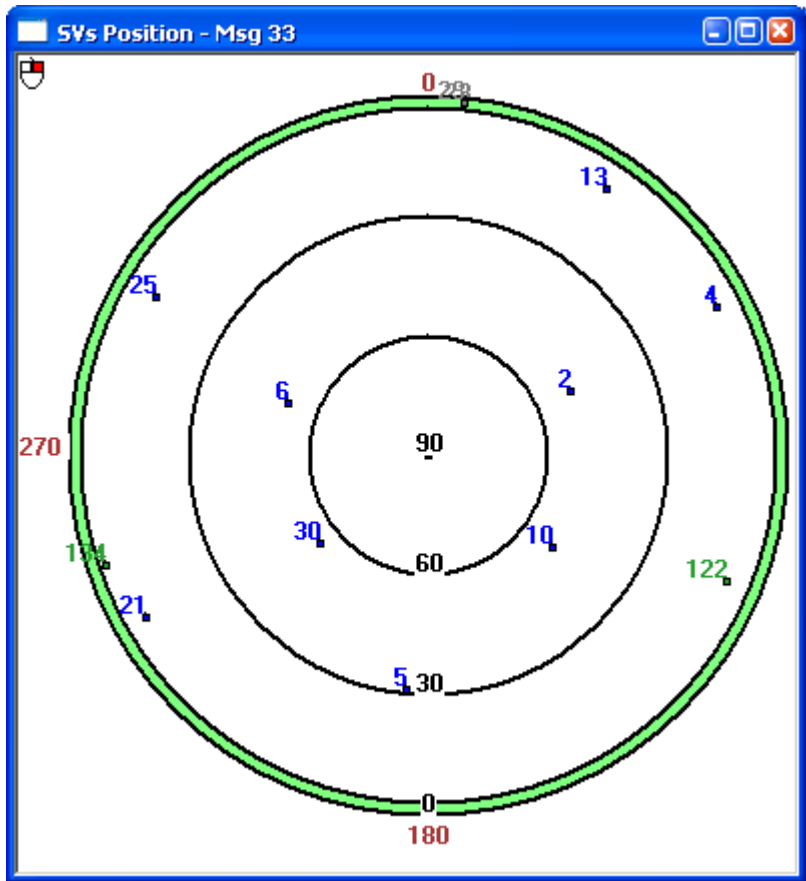
### 2.2.12 Satellites Status

The SVs Status window shows the status of each satellite in view. It also gives the elevation and azimuth of the satellites in the sky in degrees and the signal to noise ratio (SNR).

SVs visible = 12				
SV#	Status	Azi(deg)	Ele(deg)	SNR
30	Use Nav	233	56	49
2	Use Nav	66	53	49
6	Use Nav	290	52	48
10	Use Nav	129	50	49
5	Use Nav	186	33	47
25	Use Nav	302	13	43
13	Use Nav	35	10	43
4	Use Nav	62	10	44
21	Use Nav	239	8	42
23	Track	7	3	26
122	Track	113	9	40
134	Track	251	5	38

### 2.2.13 Satellites Position

The SVs Position window shows the satellites in view in the sky above you. The window also displays rings of azimuth and elevation in degrees. The window can also display the mask angle used by the GPS receiver.



### 2.2.14 Satellites Health

The Satellites Health window shows the health of each satellite. It is associated with *Message ID# 50*. A healthy satellite is shown with an ASCII H and binary indicator 00, otherwise it is unhealthy and is shown with an ASCII U and binary indicator 11.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
00	00	00	00	00	00	00	00	11	00	00	00	00	00	00	00
H	H	H	H	H	H	H	H	U	H	H	H	H	H	H	H

17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
00	00	00	11	00	00	00	00	00	00	00	00	11	11	00	00
H	H	H	U	H	H	H	H	H	H	H	H	U	U	H	H

### 2.2.15 Satellites Almanac

This message window contains the decoded almanac parameters from subframes four and five as received from the satellite with the parity information removed and appropriate scaling applied. It is associated with *Message ID# 76*. For more information on Almanac data, refer to the GPS SPS Signal Specification. Contact information is available in the *GPS+ Reference Manual* on our website at <http://www.novatel.com/Downloads/docupdates.html>.

The L1 family of receivers automatically saves almanac information in their non-volatile memory (NVM), therefore creating an almanac boot file is not necessary.

Pawbucklet Almanac Window - Msg 76

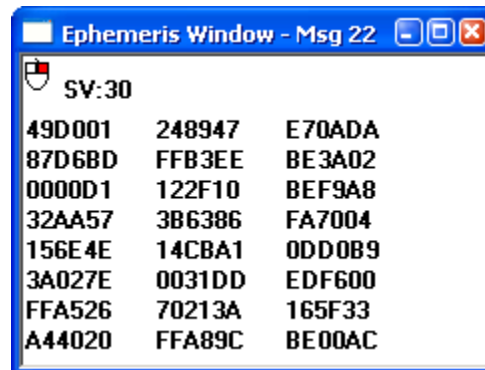
Satellites type: GPS

#SV	toa	Af0	Af1	M0	$\omega$	$\Omega_0$	$\delta\Omega$	$\sqrt{A}$	i	e	Week
1	61440	0.0004	0	-1.2	-1.652	-2.9	-7.8E-009	5.2E+003	0.041	0.0059	1319
2	61440	-2.6E-005	0	0.34	1.809	1.3	-8E-009	5.2E+003	0.013	0.0096	1319
3	61440	0.0001	3.6E-012	-0.6	0.601	0.16	-8.2E-009	5.2E+003	-0.015	0.0067	1319
4	61440	0.00028	-2.2E-011	2.7	0.045	1.3	-8E-009	5.2E+003	0.012	0.007	1319
5	61440	9.3E-005	3.6E-012	2.5	0.935	-0.88	-8E-009	5.2E+003	-0.006	0.006	1319
6	61440	0.00038	5.8E-011	-2.6	-1.930	0.22	-8.1E-009	5.2E+003	-0.007	0.0064	1319
7	61440	3.2E-005	2.9E-011	-0.41	-1.803	0.19	-8.1E-009	5.2E+003	-0.006	0.013	1319
8	61440	-2.7E-005	0	-2.5	2.537	-1.8	-7.9E-009	5.2E+003	0.025	0.0092	1319
9	61440	-3.9E-005	-3.6E-012	-2.9	1.134	-1.9	-8E-009	5.2E+003	0.013	0.017	1319
10	61440	6.2E-005	0	0.7	0.346	2.4	-7.7E-009	5.2E+003	0.036	0.0066	1319
11	61440	0.00022	3.6E-012	-2	0.245	1.2	-8.5E-009	5.2E+003	-0.040	0.0041	1319
12	0	0	0	0	0.000	0	0	0	0.000	0	1319
13	61440	-5.7E-006	0	0.75	0.918	-2.9	-7.8E-009	5.2E+003	0.045	0.0026	1319
14	61440	-3.1E-005	0	-0.47	-1.781	-2.9	-7.8E-009	5.2E+003	0.040	0.0017	1319
15	61440	0.00042	3.6E-012	-2.6	2.380	1.4	-7.9E-009	5.2E+003	0.019	0.0091	1319
16	61440	1.9E-006	0	2.4	-1.157	-0.8	-7.7E-009	5.2E+003	0.019	0.0028	1319
17	0	0	0	0	0.000	0	0	0	0.000	0	1319
18	61440	0	0	2.1	-2.813	2.4	-7.8E-009	5.2E+003	0.019	0.0058	1319
19	61440	-1.9E-005	0	1.2	-1.699	0.3	-7.9E-009	5.2E+003	0.017	0.0032	1319
20	61440	-7.2E-005	3.6E-012	1.8	1.409	2.3	-7.9E-009	5.2E+003	0.019	0.0026	1319
21	61440	9.8E-005	0	-2.7	3.135	1.3	-8E-009	5.2E+003	0.006	0.0097	1319
22	61440	2E-005	0	0.35	-1.492	2.4	-7.9E-009	5.2E+003	0.017	0.0048	1319
23	61440	0.0002	-3.6E-012	-0.08	2.231	-2.9	-8E-009	5.2E+003	0.022	0.0038	1319
24	61440	1E-005	3.6E-012	-1.7	-1.171	1.3	-7.9E-009	5.2E+003	0.023	0.0087	1319
25	61440	9.1E-005	0	-2.1	-1.473	-1.9	-8.1E-009	5.2E+003	0.006	0.012	1319
26	61440	1.9E-005	3.6E-012	-1.1	0.676	-2.9	-7.8E-009	5.2E+003	0.044	0.016	1319
27	61440	4.7E-005	7.3E-012	2.6	-2.047	-1.9	-8E-009	5.2E+003	0.010	0.019	1319
28	61440	4.7E-005	0	1.3	-2.329	-0.79	-7.7E-009	5.2E+003	0.017	0.01	1319
29	61440	1.3E-005	-2.5E-011	0.97	-1.145	-2.9	-7.8E-009	5.2E+003	0.041	0.0088	1319
30	61440	0.00013	2.5E-011	1.6	1.268	-0.83	-7.9E-009	5.2E+003	0.001	0.008	1319
31	589824	-3.6E-005	3.6E-011	-1.6	1.100	0.31	-8.1E-009	5.2E+003	-0.006	0.012	1319
32	0	0	0	0	0.000	0	0	0	0.000	0	1319

## 2.2.16 Ephemeris

The Ephemeris window shows ephemeris data for one satellite. It is associated with *Message ID# 22*. The data is transmitted at a rate of one message per second until the ephemeris data list is complete, and then it is transmitted only if there is new ephemeris data.

This data is received in ICD-GPS-200 format. Refer to the NAVSTAR GPS Space Segment/Navigation Interface document ICD-GPS-200 Rev. B or later for specifics on the format of the ephemeris data. NAVSTAR contact information may be found in the *Standard/References* section of the *GPS+ Reference Manual* available on our website at <http://www.novatel.com/Downloads/docupdates.html>.



SV:30		
49D001	248947	E70ADA
87D6BD	FFB3EE	BE3A02
0000D1	122F10	BEF9A8
32AA57	3B6386	FA7004
156E4E	14CBA1	0DD0B9
3A027E	0031DD	EDF600
FFA526	70213A	165F33
A44020	FFA89C	BE00AC

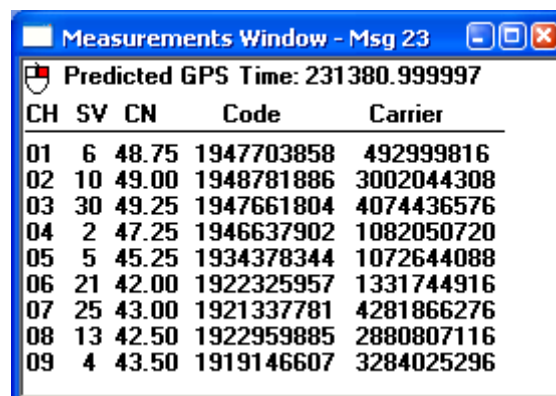
## 2.2.17 Measurements

The Measurements window shows raw data carrier phase and code phase data. It is associated with *Message ID# 23*. Measurements data can be sent at 1, 2, 5 or 10 Hz depending on your receiver model.

- 
- ☒ Sending this message in One Shot mode, turns it off and does not return any data. To start or turn the message back on, send it in Continuous Mode.
- 

Refer also to the *Measurements* appendix of the *SUPERSTAR II Firmware Reference Manual*, Reference [4] on *Page 9*, for details on raw code phase and carrier phase measurements.

- 
- ☒ This message is only available on GPS receiver models that have Carrier Phase Output capability (CP). Refer also to the *SUPERSTAR II Card Models* appendix in the *SUPERSTAR II Firmware Reference Manual*, Reference [4] on *Page 9*.
- 



Predicted GPS Time: 231380.999997				
CH	SV	CN	Code	Carrier
01	6	48.75	1947703858	492999816
02	10	49.00	1948781886	3002044308
03	30	49.25	1947661804	4074436576
04	2	47.25	1946637902	1082050720
05	5	45.25	1934378344	1072644088
06	21	42.00	1922325957	1331744916
07	25	43.00	1921337781	4281866276
08	13	42.50	1922959885	2880807116
09	4	43.50	1919146607	3284025296

### 2.2.18 SBAS Status

The SBAS Status window shows the number of SBAS (for example WAAS and EGNOS) messages received by the GPS receiver for specific SBAS satellites. It is associated with *Message ID# 68*. A global count of all valid and erroneous messages is also displayed. You must have an SBAS-capable model in order to use SBAS.

To enable SBAS, select Tool Setting | DGPS Config, see *DGPS Configuration* on Page 22. Set the DGPS Type to SBAS only or Automatic. The receiver then automatically tracks SBAS satellites in your coverage area.

SBAS Status - Msg 68						
SV Number:	122	Protocol errors:	0			
Valid Messages:	15269	Age of correction:	0 seconds			
0: 0	10: 1	20: 0	30: 0	40: 0	50: 0	60: 0
1: 1	11: 0	21: 0	31: 0	41: 0	51: 0	61: 0
2: 11	12: 0	22: 0	32: 0	42: 0	52: 0	62: 2
3: 11	13: 0	23: 0	33: 0	43: 0	53: 0	63: 10
4: 0	14: 0	24: 11	34: 0	44: 0	54: 0	
5: 0	15: 0	25: 8	35: 0	45: 0	55: 0	
6: 0	16: 0	26: 0	36: 0	46: 0	56: 0	
7: 1	17: 1	27: 0	37: 0	47: 0	57: 0	
8: 1	18: 1	28: 9	38: 0	48: 0	58: 0	
9: 1	19: 0	29: 0	39: 0	49: 0	59: 0	

### 2.2.19 Base Status

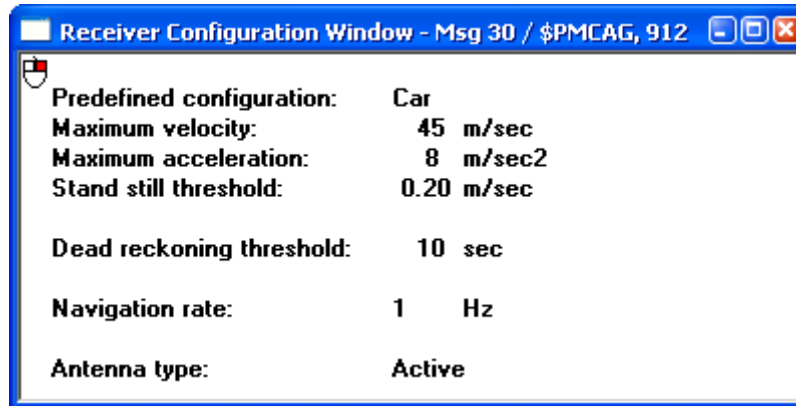
The Base Status window shows the position of the base station as received through RTCM messages. It is associated with *Message ID# 47*. The window also has the time remaining in the survey, the status of the base station, and the RTCM messages in use and their rates. This information is set at the base station using *Set Operating Mode* and *Set Differential Message Rate* dialogs. See Page 43 and Page 42 respectively for details on these commands.

In this example, the unit is in Base Station mode and the position is initialized.

Base Status - Msg 47	
<b>Base Status:</b>	Position Initialized
<b>Baud Rate:</b>	9600
<b>Time Survey Remaining: 0.00 hr(s)</b>	
<b>CEP:</b>	0.00 m
<b>Latitude:</b>	N 051 29'42.730" (Deg)
<b>Longitude:</b>	W 114 41'35.007" (Deg)
<b>Altitude:</b>	1047.00 m
<b>Nbr Diff Msg:</b>	0

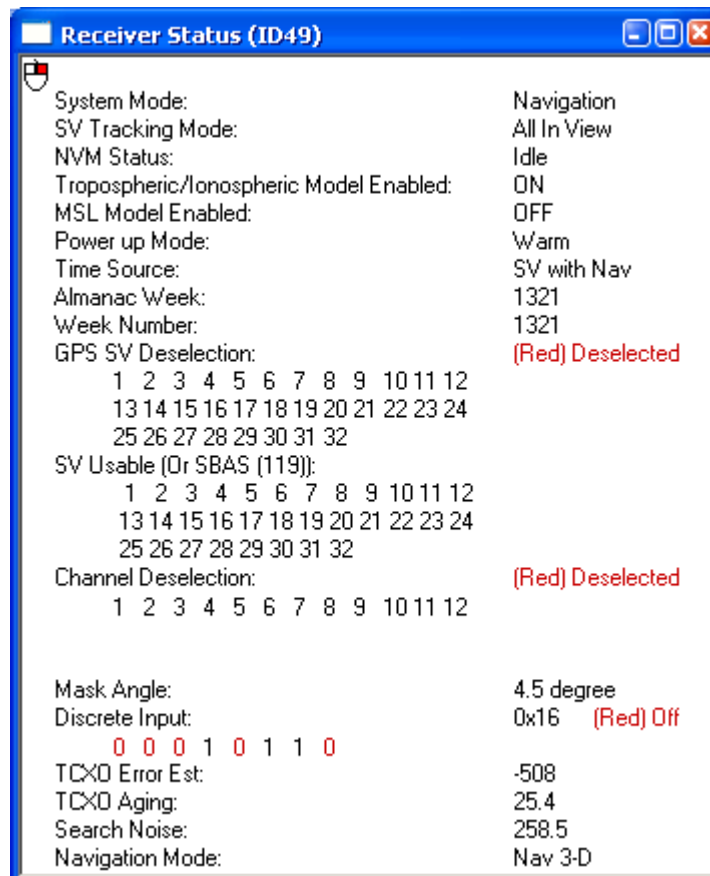
## 2.2.20 Receiver Configuration

The Receiver Configuration window shows receiver configuration data. It is associated with *Message ID# 30*. See also *Section 2.3.9, Set Configuration on Page 39*.



## 2.2.21 Receiver Status

The Receiver Status window shows the configuration of the GPS receiver. It is associated with *Message ID# 49*.



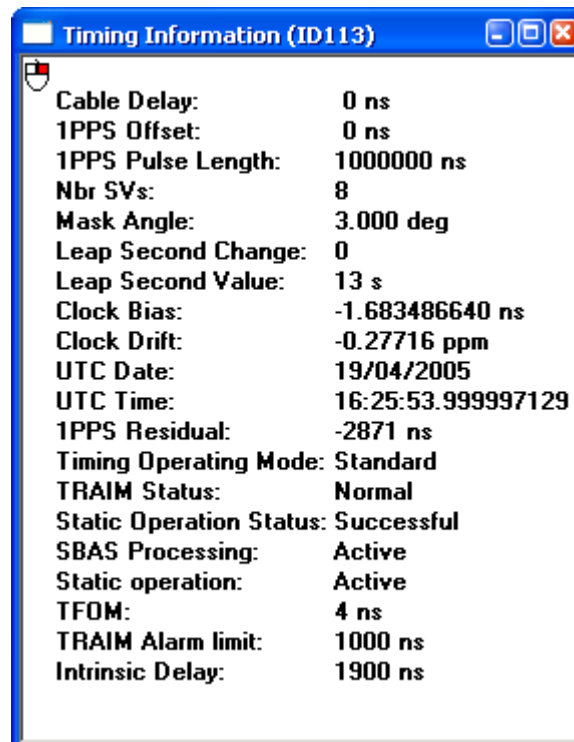


## 2.2.22 Timing Information

The Timing information window gives precise timing information. It is associated with *Message ID# 113*.

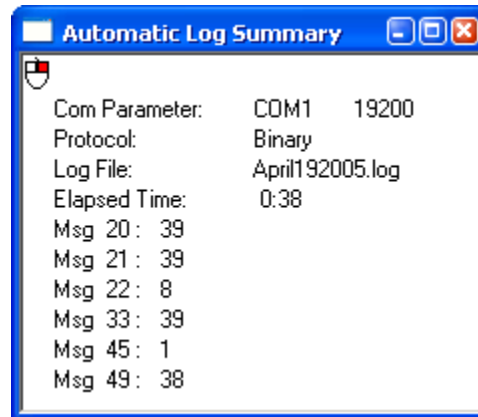
The clock bias and drift parameters are computed using the pseudorange measurements and the predicted true range (using the known user position). A Time Figure Of Merit (TFOM) for the clock errors is derived using the residuals of the least-square time solution. When using GPS measurements only, the TFOM does not take into account any bias in the residuals that may be induced by the atmospheric errors. Therefore it provides a relative accuracy estimate. When the SBAS channel is available, the clock bias estimate is virtually free of systematic errors and the computed TFOM approximates an absolute accuracy of the 1PPS output by the GPS receiver.

- 
- ☒ 1. This message is only available on GPS receivers models that have Precise Timing (T) capability. See also the *SUPERSTAR II Card Models* appendix in the *SUPERSTAR II Firmware Reference Manual*, Reference [4] on *Page 9*.
  - 2. You must have an SBAS-capable model in order to use SBAS. To enable SBAS, select Tool Setting | DGPS Config, see *DGPS Configuration* on *Page 22*. Set the DGPS Type to SBAS only or Automatic. The receiver then automatically tracks SBAS satellites in your coverage area.
- 



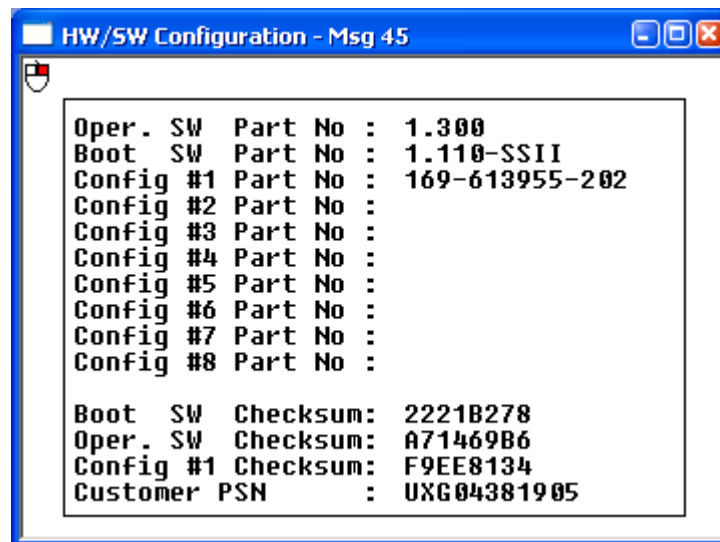
### 2.2.23 Automatic Log Summary

This window appears if you start a log file using the File/Port | Save Data | Automatic Logging menu, see *Page 15*. It shows a summary of the information contained in an example log file in progress.



### 2.2.24 HW/SW Part Number

The HW/SW Configuration window provides hardware and software identification information. It is associated with *Message ID# 45*.











Oper. SW Part No is the version of firmware loaded onto the receiver. Config #1 Part No is the model part number that is loaded onto the receiver. Refer also to the *SUPERSTAR II Card Models* appendix in the *SUPERSTAR II Firmware Reference Manual*, Reference [4] on *Page 9*.

## 2.3 Tool Setting

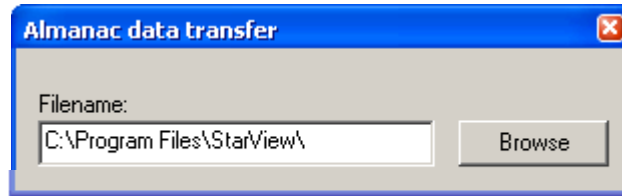
The Tool Setting menu allows you to send commands to the GPS receiver. *Table 4* shows the menu options available when you select Tool Setting from the main menu.

**Table 4: Tool Setting Menu**

Menu Option	Toolbar Button	Refer to
Almanac Data Transfer		Page 36
Clear NVM		Page 36
Deselect		
Channels		Page 37
SVs		Page 37
Fixed Height		
None Auto		Page 37
MSL Model Use		Page 38
Protocol		Page 38
Restart System		Page 38
Set Configuration		Page 39
Set Date/Time + Force 1shot 1PPS		Page 40
Set Datum		Page 40
Set Default Msg List		Page 41
Set DGPS Config		Page 41
Set Differential Msg Rate		Page 42
Set Mask Angle		Page 42
Set Operating Mode		Page 43
Set Timing Parameters		Page 47
Set Tropospheric/Ionospheric Model Use		Page 48
Track SV Request		Page 48

### 2.3.1 Almanac Data Transfer

This dialog allows you to transfer a YUMA almanac to the receiver. It is associated with *Message ID#s 78 and 79*.

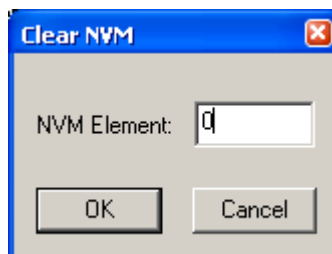


### 2.3.2 Clear NVM

This menu option erases the receiver NVM. It is associated with *Message ID# 99*.

The NVM Element options are

00	All
01-04	Reserved
05	Almanac
06-08	Reserved
09	TCXO parameters
10	IONO and UTC parameters
11	Position
12	Time
13	DGPS configuration
14	Default NMEA message list
15	RS232 configuration and default binary message list
16-19	Reserved
20	Ephemeris



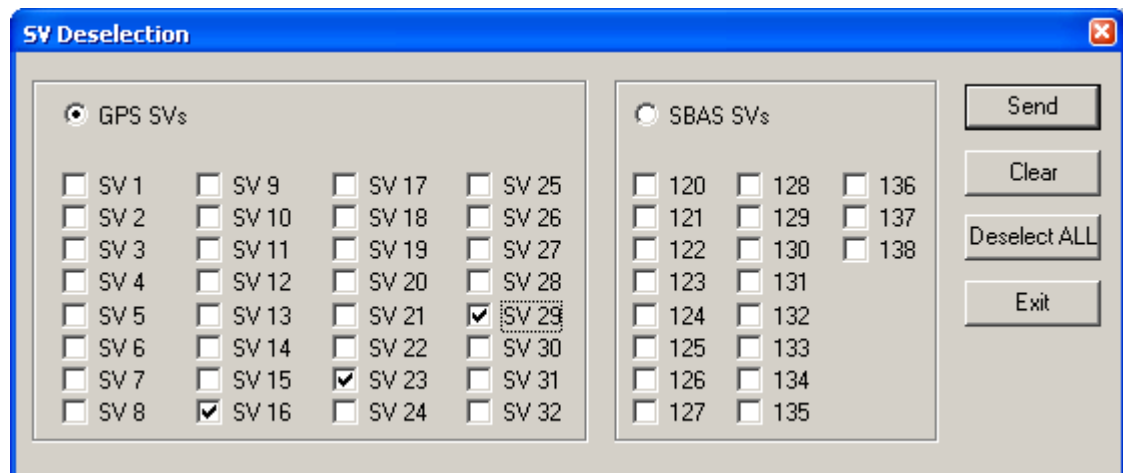
### 2.3.3 Deselect Channel

The Channels Deselect dialog is used to deselect channels. If you are unsure about which channels have been deselected, use the Clear button to clear all deselections followed by the Send button. Then deselect the channels you want to deselect and click on the Send button. This dialog is associated with *Message ID# 64*.



### 2.3.4 Deselect SVs

The SV Deselection dialog is used to deselect satellites. If you are unsure about which SV have been deselected, use the Clear button to clear all deselections followed by the Send button. Then deselect the SVs you want to deselect and click on the Send button. It is associated with *Message ID# 90*.



- 
- ✉ 1. You must have an SBAS-capable model in order to use SBAS.
  - 2. If you wish to deselect GPS and SBAS satellites, you must send them separately (click on the *Send* button after each satellite system selection).
  - 3. To reinstate a particular satellite, return to the SV Deselection dialog and uncheck, or clear, its checkbox. Then, click on the *Send* button.
- 

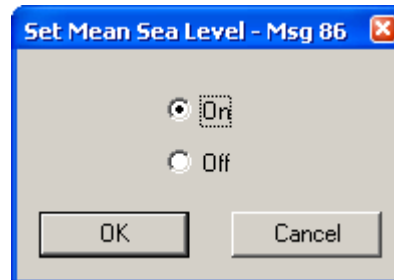
### 2.3.5 Fixed Height

This command is used to select a fixed height mode. When NONE is selected, the receiver can not go in 2-D mode. When AUTO is selected, the receiver automatically tries to go in 2-D mode if only 3 satellites are available. NONE is the default. This value is stored in NVM. See also *Receiver Status* on Page 32, which shows the Navigation Mode value.

### 2.3.6 MSL Model Use

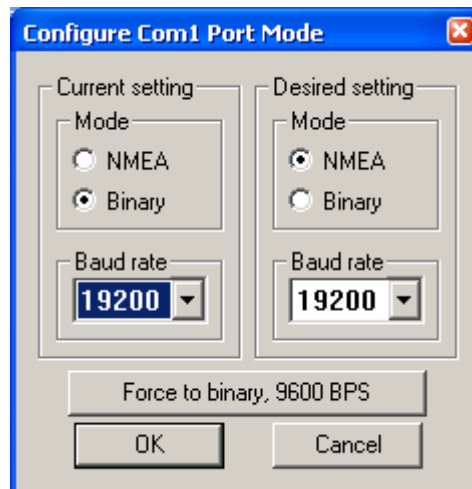
Use the Set Mean Sea Level dialog to enable (On) or disable (Off) the use of the mean sea level model. It is associated with *Message ID# 86*. The MSL model mode is Off by default.

- ☒ If you select Xmit Msg | General Message Request from the main menu and enter *Message ID# 86* then sending it in One Shot mode turns on MSL model use and sending it in Continuous mode turns off MSL model use. See also *Section 2.4, Send Messages on Page 49*.



### 2.3.7 Protocol

Use the Configure Main Port Mode dialog to switch the receiver mode (binary protocol or NMEA) and the baud rate. It is associated with *Message ID# 110*. The *Force to Binary, 9600 BPS* button allows you to set the receiver in binary mode at 9600 bps in binary protocol and with message \$PMCAG,000 in NMEA protocol.



- ☒ 1. Your receiver's current settings must match those selected in the *Current setting* section of the dialog. If they do not match the protocol can not change. If you do not know your receiver's current settings, use the *Force to binary, 9600 BPS* button and then use the *Desired setting* section.
- 2. When you use the NMEA or BIN buttons, shown on the right, you are simply changing the *StarView* menus and windows. You must use the *Configure Port Mode* dialog to change the configuration of your card. The *Configure Port Mode* dialog is available using the *Protocol* button or by selecting *Tool Setting | Protocol* from the main menu.



### 2.3.8 Restart System

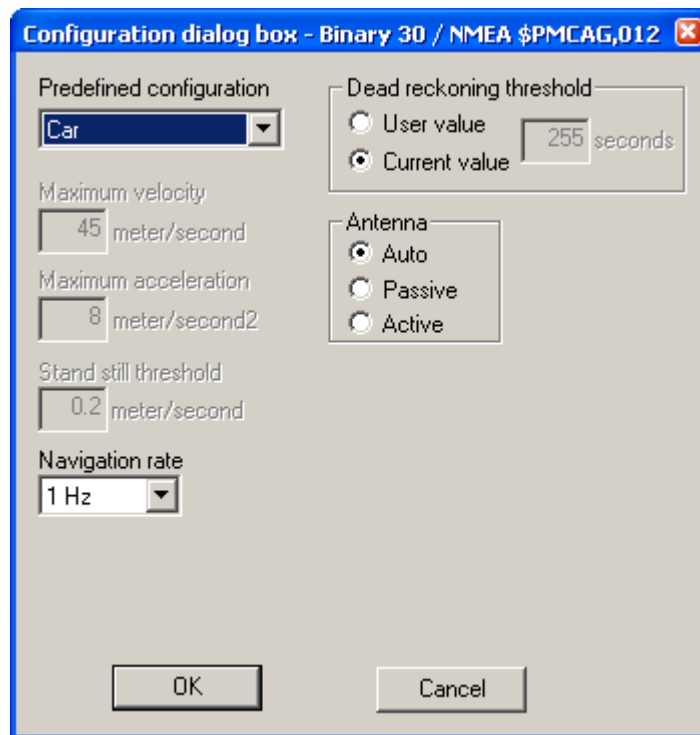
Select *Tool Setting | Restart System* to reset the GPS receiver and initiate a receiver cold start. This menu option is associated with *Message ID# 2*.

### 2.3.9 Set Configuration

The characteristics defined here are not limits where the receiver stops functioning. They are rather limits within which the receiver performance and behavior are optimal for the application. Exceeding these limits causes receiver performance to degrade when used in the specified application:

Preset Configuration	Maximum Velocity (m/s)	Maximum Acceleration (m/s <sup>2</sup> )	Stand Still Threshold (m/s)
Man	10	3	0.2
Car	45	8	0.2
Tractor	20	7	0.2
Marine	20	7	0.1
Plane	100	20	0.2
Rocket	510	40	0.2

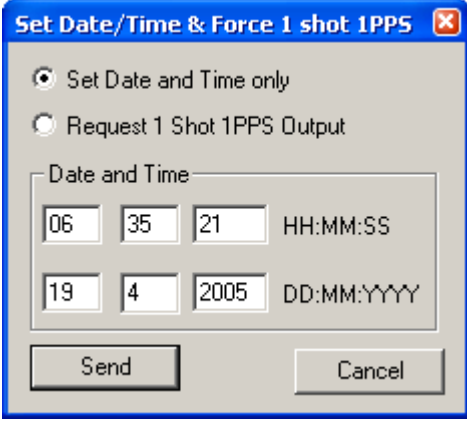
The Configuration dialog is associated with *Message ID# 30*.



- ✉ 1. SUPERSTAR II-based receivers are capable of a navigation rate of 1 Hz. If you have a model with 5 Hz PVT, select 5 Hz in the *Navigation rate* field above. Refer also to the *SUPERSTAR II Card Models* appendix in the *SUPERSTAR II Firmware Reference Manual*, Reference [4] on Page 9.
2. You must reboot your receiver for a new navigation rate to take effect.
3. If you choose Auto in the Antenna fields, the receiver starts with a Passive setting and then switches to Active if an active antenna is detected.

### 2.3.10 Set Date/Time and Force 1 Shot 1PPS

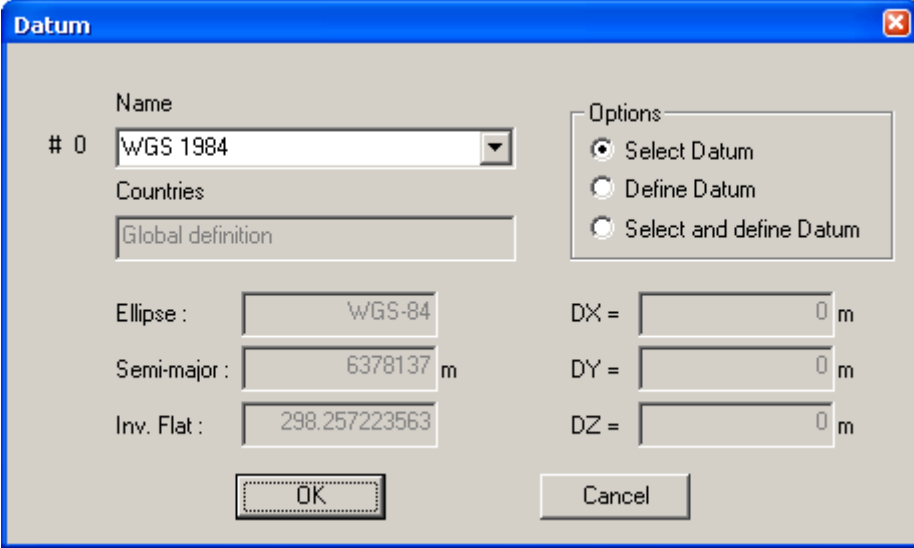
The Set Date/Time and Force 1 Shot 1PPS dialog is used to enter a date and a time into the GPS receiver and/or request One Shot 1PPS output. It is associated with *Message ID# 103*.



The dialog box titled "Set Date/Time & Force 1 shot 1PPS" contains two radio buttons: "Set Date and Time only" (selected) and "Request 1 Shot 1PPS Output". Below these is a "Date and Time" section with input fields for HH:MM:SS (06:35:21) and DD:MM:YYYY (19:4:2005). At the bottom are "Send" and "Cancel" buttons.

### 2.3.11 Set Datum

Use the Datum dialog to select or define a datum for the GPS receiver. It is associated with *Message ID# 88*. The position computed by the receiver is according to the set datum. Refer to the *SUPERSTAR II Firmware Reference Manual*, Reference [4] on Page 9, to see a complete *Datum Description* table.

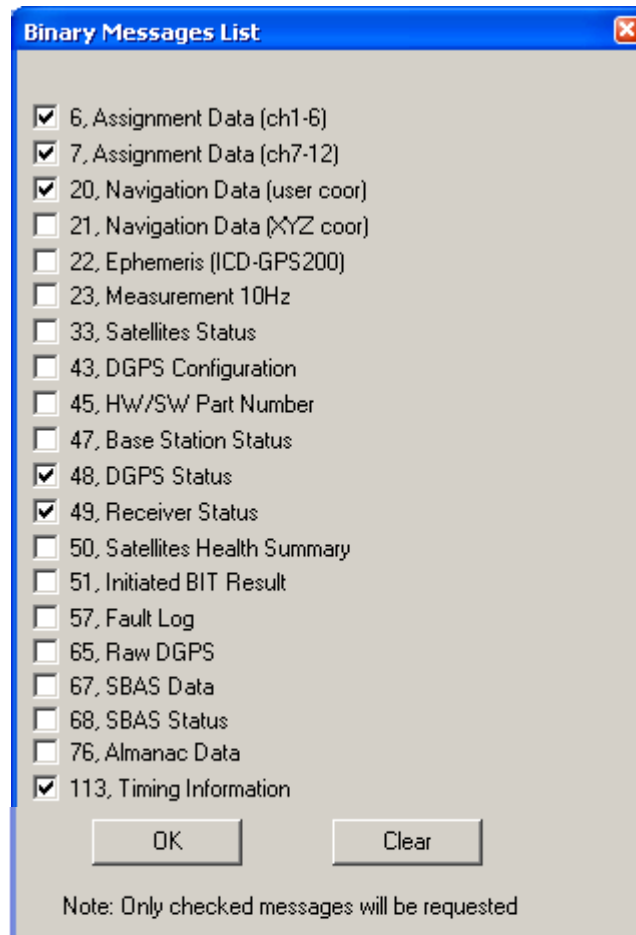


The "Datum" dialog box features a "Name" dropdown menu set to "WGS 1984" and a "Countries" text field containing "Global definition". An "Options" section has three radio buttons: "Select Datum" (selected), "Define Datum", and "Select and define Datum". Below are input fields for "Ellipse" (WGS-84), "Semi-major" (6378137 m), "Inv. Flat" (298.257223563), "DX" (0 m), "DY" (0 m), and "DZ" (0 m). "OK" and "Cancel" buttons are at the bottom.



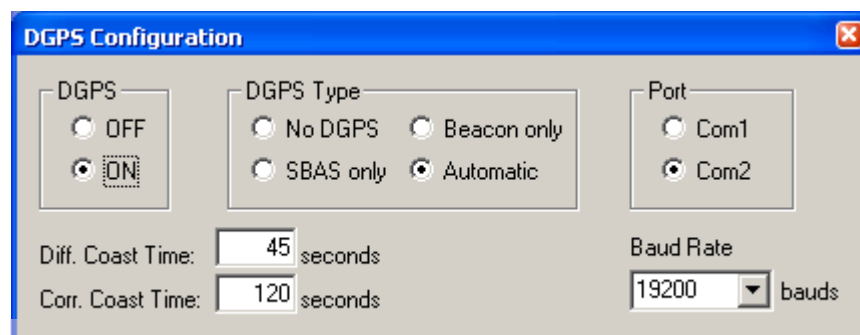
### 2.3.12 Set Default Msg List

Use the Binary Messages List dialog to select messages that you want the GPS receiver to output. It is associated with *Message ID# 105*. The messages you select here will be generated by default at start-up.



### 2.3.13 Set DGPS Config

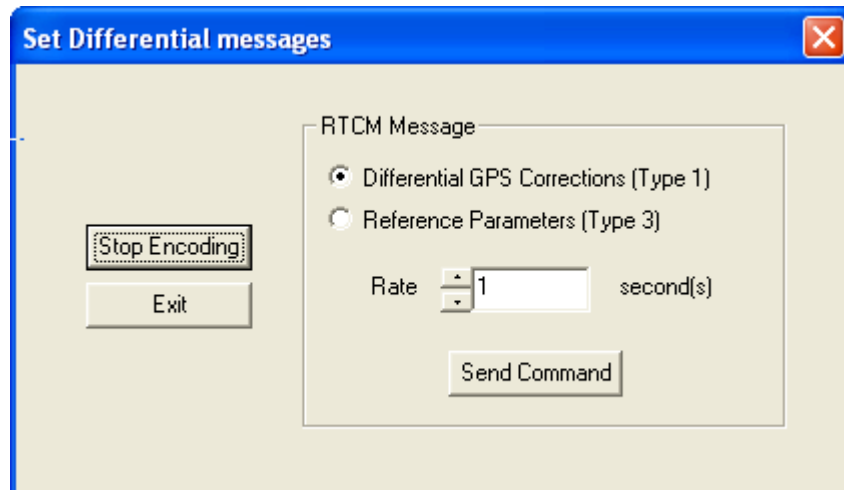
Use the DGPS Configuration dialog to specify the GPS receiver's differential mode parameters. It is associated with *Message ID# 83*.



### 2.3.14 Set Differential Msg Rate

Use the Set Differential messages dialog to specify which messages will be encoded by the GPS receiver and at what rate. It is associated with *Message ID# 91*. The default message periods are set as follows: RTCM Type 1 every second and RTCM Type 3 every 10 seconds. Use the arrows in the Rate field to change the message rate.

- ☒ 1. This message is only available on SUPERSTAR II-based BASE models. See also the *SUPERSTAR II Card Models* appendix in the *SUPERSTAR II Firmware Reference Manual*, Reference [4] on Page 9.
2. Use the *Send Command* button when you pick a message or rate from the *RTCM Message* section.



### 2.3.15 Set Mask Angle

Use the Set Mask Angle dialog to set the elevation angle below which your GPS receiver will not track satellites. It is associated with *Message ID# 81*. You can input a mask angle value in the Angle field within the range 0 to 90 degrees.



### 2.3.16 Set Operating Mode

Use the Operating Mode Setting dialog to switch a GPS receiver into a DGPS Base Station or to switch a DGPS Base Station into a GPS receiver if your receiver is a BASE model. It is associated with *Message ID# 80*. The station ID, station health and survey time are also set by this dialog. Remember to use the Send button before you exit this dialog.

- 
- ☒ In the *Mode* section, the *Go in Base Mode* options are only available on BASE model receivers. See also the *SUPERSTAR II Card Models* appendix in the *SUPERSTAR II Firmware Reference Manual*, Reference [4] on Page 9.
-

### 2.3.16.1 BASE STATION CONFIGURATION WITH KNOWN POSITION

Establish communication between the PC and the GPS receiver, see *Page 12*.



Select the *Set Operating Mode* button and the Operating Mode Setting dialog box will appear. Select the operating mode, Go in Base Mode (manual), from the Mode section:

Only the fields applicable to the chosen mode are active, the others appear gray.

Enter the Station ID and select the Health field to choose a health parameter:

☒ The Station ID can be a number between 0 and 1023 and the station health parameters are described in the RTCM specification.

Choose the LLH (user defined) or XYZ (ECEF) coordinates type and enter the coordinates.

Send information to the GPS receiver by clicking on the **Send Information** button.

The board is now a DGPS Base Station and the information is saved in NVM. If the DGPS Base Station loses power in this mode, it restarts in the same mode.

### 2.3.16.2 BASE STATION CONFIGURATION WITHOUT KNOW POSITION

Establish communication between the PC and the GPS receiver, see *Page 12*.



Select the *Set Operating Mode* button , the Operating Mode Setting dialog appears.

Select the operating mode, Go in Base Mode (self survey), from the Mode section:

The dialog shows a radio button selected for "Go in Base Mode (self survey)" and a button labeled "Get Survey Position".

Only the fields applicable to the chosen mode are active, the others appear gray.

Enter the Station ID and select the Health field to choose a health parameter:

The "Information" dialog shows "Station ID : 1" in a text box and "Health : Not Monitored" in a dropdown menu.

- 
- ☒ The Station ID can be a number between 0 and 1023 and the station health parameters are described in the RTCM specification.
- 


Enter a Survey Time:

The "Survey Time" dialog shows a text box containing "20" and the label "Hour(s)".

- 
- ☒ The Survey Time can be in fractions of hours, for example 12.5 hours. The Survey Time is limited to 48 hours.
- 

Send the information to the GPS receiver by clicking on the  button.

The board is now a DGPS Base Station and the information is saved in NVM. If the DGPS Base Station loses power in this mode, the Survey Time is not saved. When this occurs, the receiver is in Self Survey mode but the position is not initialized until you click on the *Get Survey Position* button.

Use the  button to set the DGPS Base Station position with the current position computed by itself. This functionality is useful when the entered Survey Time is too long or if the DGPS Base Station has reset during the Survey Mode.

The DGPS Base Station starts to encode differential messages when the Survey Time is completed or when you use the *Get Survey Position* button.

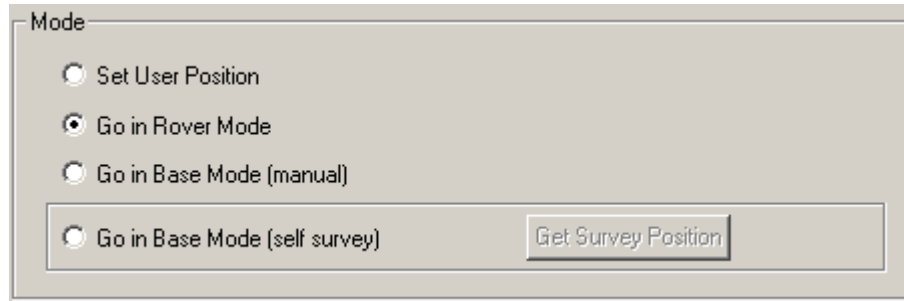
### 2.3.16.3 ROVER CONFIGURATION

Establish communication between the PC and the GPS receiver, see *Page 12*.




Select the *Set Operating Mode* button , the Operating Mode Setting dialog appears.

Select the operating mode, Go in Rover Mode, from the Mode section:



Only the fields applicable to the chosen mode are active, the others appear gray.

Use the  button to send the information to the receiver.

The board is now a rover receiver and the information is saved in NVM. If the rover receiver loses power, it restarts in the same mode.

### 2.3.17 Set Timing Parameters

Use the Set Timing Parameters dialog to configure timing parameters. It is associated with *Message ID# 69*.

There are 3 operating modes:

Constant: aligned on GPS time continuously

Free-Running: free-running or not-aligned

One Shot: aligns with GPS time on power up

Refer to the *Time Mark Output 1PPS* section in your product's hardware manual for more details on these modes and timing parameters. Refer also to the *Precise Timing* appendix of the *SUPERSTAR II Firmware Reference Manual*, Reference [4] on *Page 9*, for details on precise timing.

- ✉ This message is only available on GPS receivers models with Precise Timing (T) capability. See also the *SUPERSTAR II Card Models* appendix in the *SUPERSTAR II Firmware Reference Manual*, Reference [4] on *Page 9*.

The default operating mode for GPS receiver models without T capability is Free-Running.

**Set Timing Parameters**

Cable Propagation Delay:  ns  Modified

1 PPS Offset:  ns  Modified

1 PPS Pulse Length:  ns  Modified  
Value rounded to nearest 100 ns.

TRAIM Alarm Limit:  ns  Modified  
Value rounded to nearest 10 ns

Intrinsic Delay:  ns  Modified

Mode:  Modified

Free-Running  
 One Shot Alignment  
 Constant Alignment

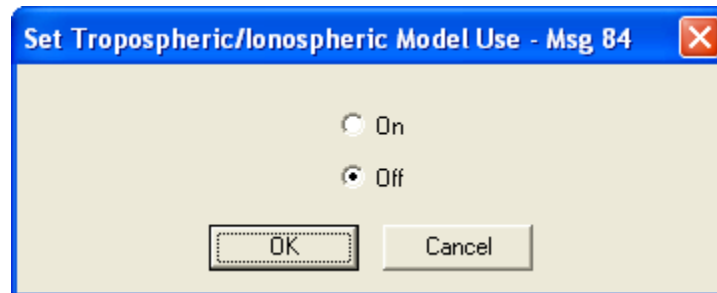
1PPS Output Control:  Modified

Continuously  
 Only when tracking at least 1 GPS SV  
 Only when an alarm not raised by TRAIM  
 Combination (1SV and not alarm by TRAIM)  
 No Output  
 Only when receiver has position  
 Combination (Position plus no alarm by TRAIM)

### 2.3.18 Set Tropospheric/Ionospheric Model Use

Use the Set Tropospheric/Ionospheric Model Use dialog to enable (On) or disable (Off) the use of tropospheric and ionospheric models. It is associated with *Message ID# 84*. The default is On.

- 
- ☒ 1. The Set Tropospheric/Ionospheric command should only be used by advanced users of GPS. Turning off this model will seriously affect your results.
  - 2. If you select Xmit Msg | General Message Request from the main menu and enter *Message ID# 84* then sending it in One Shot mode turns on tropospheric model use and sending it in Continuous mode, not recommended, turns off the model use. See also *Section 2.4, Send Messages on Page 49*.
- 

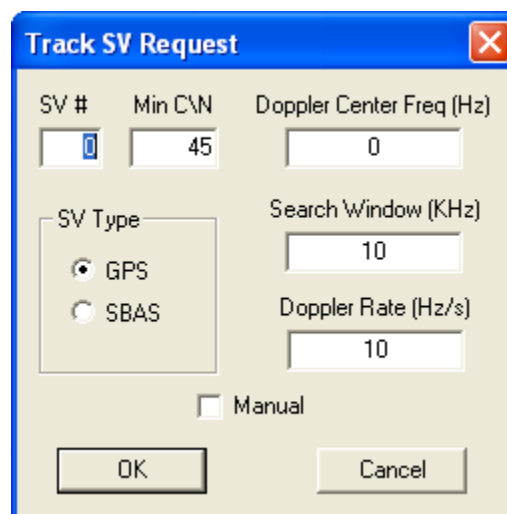


### 2.3.19 Track SV Request

Use the Track SV Request dialog to track a specific satellite. It is associated with *Message ID# 95*. This dialog allows you to track an SV# on any available channel that is not currently tracking or that has not been deselected. It starts the search at a given Doppler frequency offset to the carrier (Doppler Center Freq field). The search window option can be specified from 0 to 100 kHz in 1 kHz increments. Enter an SV# using the following guidelines (you must have an SBAS-capable model in order to use SBAS):

GPS      1 to 32  
 SBAS    120 to 138

By default, the receiver tracks the SV only if it is not already being tracked. If you select the Manual check box, the receiver is forced to track the SV on an idle channel.





- 
- ☒ In the dialog above, the satellite is directly above the user.
-



## 2.4 Send Messages

Send specific messages to your GPS receiver by selecting them from the Xmit Msg menu. To see the content of a requested message, open the corresponding window from the Window menu. See also the *Window* section starting on *Page 18*.

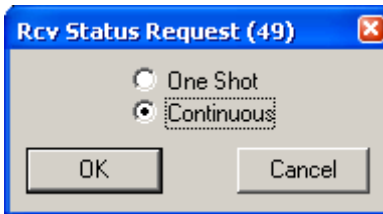
**Table 5: Transmit Messages (Xmit Msg) Menu**

Menu Option	Toolbar Button	Refer to
Channel		Page 49
Channel Assignment		
DGPS		
DGPS Status		
Navigation		
LLH Solution		
XYZ Solution		
Satellites		
Almanac Data Request		
GPS - One Shot		
GPS - Continuous		
SBAS <sup>a</sup> - One Shot		
SBAS <sup>a</sup> - Continuous		
Ephemeris		
Measurement Block		
1 Hz		
2 Hz		
5 Hz		
10 Hz		
One Shot		
Status		
Receiver Status		
SBAS Status <sup>a</sup>		
Base Status		
Initlink		
Timing Information		
Other		
HW/SW Part Number		
General Message Request		Page 51
Request All (ID#s 20, 21, 22, 23, 65) <sup>b</sup>		

a. You must have an SBAS-capable model in order to use SBAS.

b. Appears as a button only and is not in the Xmit Msg menu

When you select a message from the Xmit Msg menu, a rate dialog appears. Consider the case where you have selected Xmit Msg | Status | Receiver Status. The following dialog appears:



Select One Shot or Continuous. The table below indicates Message ID#s where using One Shot (Normal) or Continuous (Special) does not send the message out in One Shot or Continuous mode but rather as in *Table 6* below.

**Table 6: Message Modes**

Message ID#	Description	Normal Mode	Special Mode
2	Reset Receiver	Reset	N/A The information does not change so this is unnecessary - to continuously reset the receiver is not recommended
23	Request Measurement Block Data	Off Turns off Continuous mode and does not give a One Shot output	On (default)
45	HW/SW Identification Number	Identify	N/A The information does not change unless you update your software so this is unnecessary
83	Set DGPS Configuration	Set	N/A Once set, the DGPS mode does not need to be updated continuously
84	Ionospheric/Tropospheric Model Use	On (default)	Off It is not recommended that you turn off the use of this model - for advanced users of GPS only
86	Mean Sea Level Model Use	On	Off (default)
87	Set Fixed Height Mode	Auto The receiver automatically goes in 2-D mode if only 3 satellites are available	None (default) The receiver can not go in 2-D mode
103	Set Date and Time	Set	N/A Once set, the date and time do not need to be updated continuously

Please refer to the *Message Modes* table in the *Messages* chapter of the *SUPERSTAR II Firmware Reference Manual*, Reference [4] on *Page 9*, for more examples. See also the *Menu Option* column of *Table 5, Transmit Messages (Xmit Msg) Menu* on *Page 49* for a list of the available messages.


### 2.4.1 General Message Request

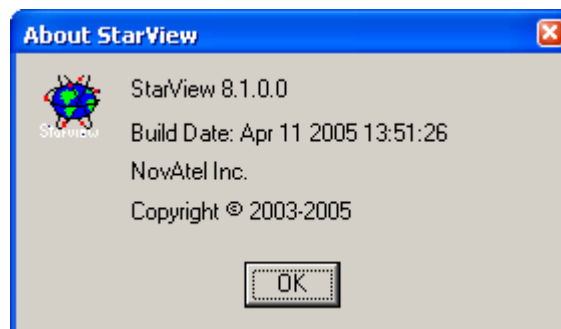
Use the General Message Request dialog to request a specific message.



## 2.5 Help

Select Help | About StarView... from the main menu or use the *General* toolbar button to view the About StarView information box.

Menu Option	Toolbar Button
Help	
About StarView	



An explanation of the supported NMEA protocol and its field definitions is provided in the *Message Formats* section of your product's hardware manual. Please refer to the *SUPERSTAR II Firmware Reference Manual*, Reference [4] on Page 9, for details on individual NMEA commands and logs.

For further details on the NMEA message structure and formats, please refer to NMEA 0183 specification. Contact information may be found in the *Standards/References* section of the *GPS+ Reference Manual* available on our website at <http://www.novatel.com/Downloads/docupdates.html>.

Binary protocol information is in *Chapter 2* starting on *Page 17*.

All menus are accessed from the main menu. The main menu is comprised of 6 menu items whether in NMEA or Binary protocol:

File/Port	See <i>Section 1.1, File/Port Menu</i> starting on <i>Page 13</i>
View	See <i>Section 3.1, View</i> below
Windows	See <i>Section 3.2, Window</i> starting on <i>Page 53</i>
Tool Setting	See <i>Section 3.3, Tool Setting</i> starting on <i>Page 60</i>
Xmit Msg	See <i>Section 3.4, Send Messages</i> starting on <i>Page 66</i>
Help	See <i>Section 3.5, Help</i> starting on <i>Page 66</i>

### 3.1 View

This menu option allows you to select toolbars. Buttons are grouped by functionality in 4 toolbars: File/Port, General, Tool Setting and Window. See also *Chapter 2, Binary Protocol* starting on *Page 17*.

These are the toolbar buttons that can be used with the NMEA protocol:

Window:  See *Page 59*.

General:  See *Page 51*.

## 3.2 Window

Window menus allow you to open one or more windows. Make sure you open the appropriate window(s) corresponding to the message(s) sent.





- ☒ The command message to send must be selected separately either from the Xmit Msg menu or by clicking the right mouse button over the window selected. The right mouse button is active when the  icon is present in the window. Selected windows are updated after command messages are sent.

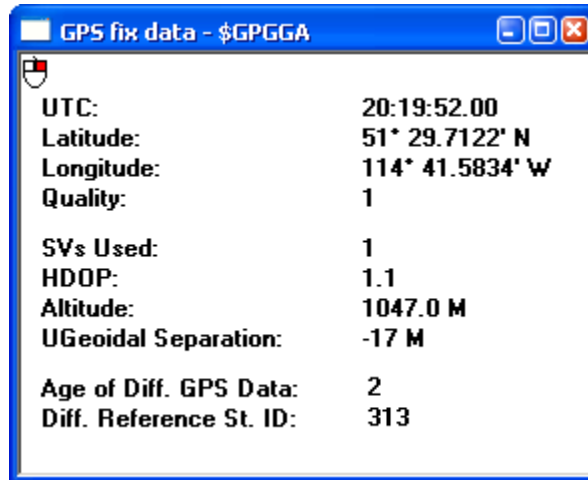
Table 7 shows the windows available when you select Window from the main menu.

**Table 7: NMEA Window Menu**

	Menu Option	Toolbar Button	Refer to
\$GPGGA	GPS Fix Data		Page 54
\$GPGLL	Geographic Position		Page 54
\$GPGSA	DOP & Active SVs		Page 54
\$GPGSV	SVs in View		Page 55
\$GPRMC	Recommended Minimum GPS		Page 55
\$GPVTG	Track and Speed		Page 55
\$GPZDA	Time and Date		Page 56
\$PMCAG, 900	Navigation Status		Page 56
\$PMCAG, 902	Self-Test Results		Page 56
\$PMCAG, 906	To Waypoint		Page 57
\$PMCAG, 907	User Position		Page 57
\$PMCAG, 908	Receiver Status		Page 58
\$PMCAG, 912	Receiver Configuration		Page 58
Received messages			Page 59
Messages			
Display Messages		Shows binary messages only.	
Terminal (COM1)			Page 59
Terminal (COM2)			Page 59

### 3.2.1 GPS Fix Data

The GPS system fix data - \$GPGGA window shows the position, the time, the number of satellites used in the solution and information about differential corrections.



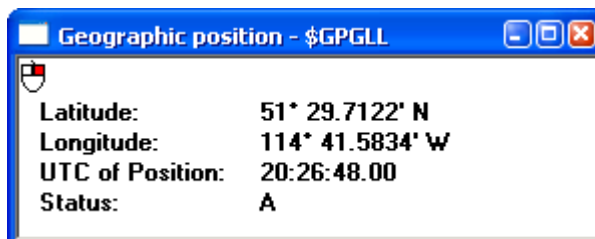
### 3.2.2 Geographic Position

The Geographic position - \$GPGLL window shows the position in latitude and longitude of the present solution, the time of position and the status.

In the Status row:

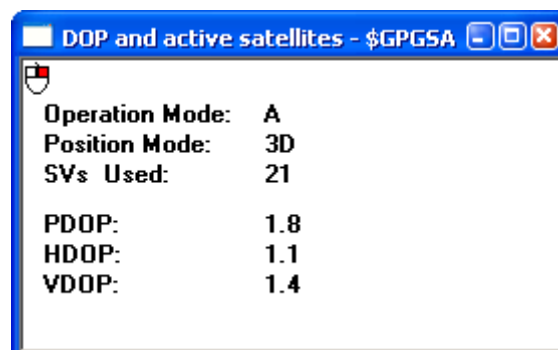
A = Data Valid

B, V = Data Invalid



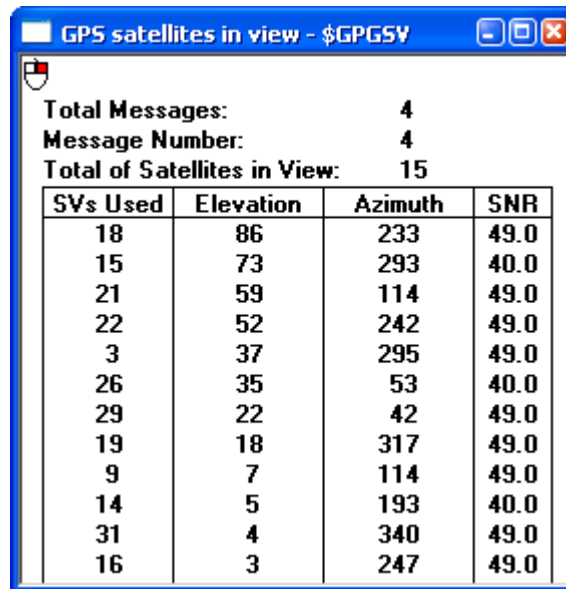
### 3.2.3 DOP & Active SVs

The DOP and active satellites - \$GPGSA window shows the satellites used by the GPS receiver for navigation, the DOP values and the position mode. The Operation Mode field is reserved.



### 3.2.4 SVs in View

The GPS satellites in view - \$GPGSV window shows the number of satellites in view, the satellite PRN numbers, their azimuth and SNR values.



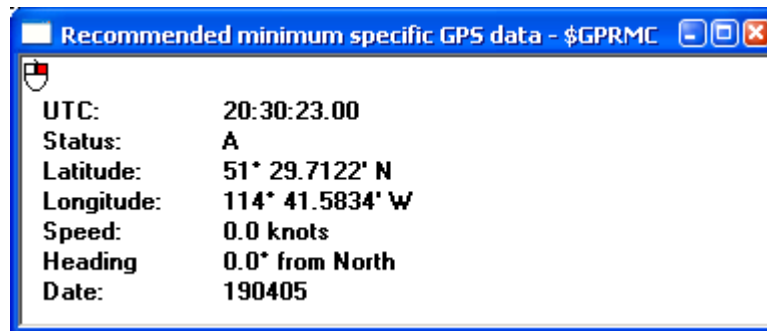
GPS satellites in view - \$GPGSV

Total Messages: 4  
 Message Number: 4  
 Total of Satellites in View: 15

SVs Used	Elevation	Azimuth	SNR
18	86	233	49.0
15	73	293	40.0
21	59	114	49.0
22	52	242	49.0
3	37	295	49.0
26	35	53	40.0
29	22	42	49.0
19	18	317	49.0
9	7	114	49.0
14	5	193	40.0
31	4	340	49.0
16	3	247	49.0

### 3.2.5 Recommended Minimum GPS

The Recommended minimum specific GPS data - \$GPRMC window shows the time, the date, the position, the course and the speed. See [Section 3.2.2, Geographic Position on Page 54](#) for details on the Status field.

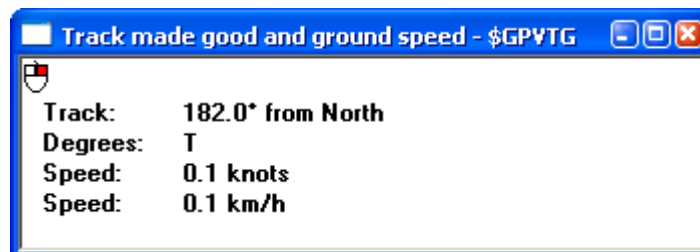


Recommended minimum specific GPS data - \$GPRMC

UTC: 20:30:23.00  
 Status: A  
 Latitude: 51° 29.7122' N  
 Longitude: 114° 41.5834' W  
 Speed: 0.0 knots  
 Heading: 0.0° from North  
 Date: 190405

### 3.2.6 Track & Speed

The Track made good and ground speed - \$GPVTG window shows the actual track made good and the speed relative to the ground.

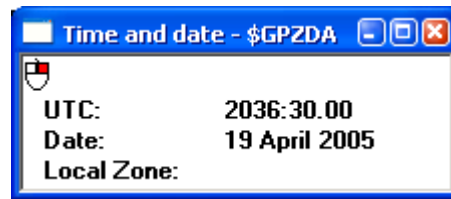


Track made good and ground speed - \$GPVTG

Track: 182.0° from North  
 Degrees: T  
 Speed: 0.1 knots  
 Speed: 0.1 km/h

### 3.2.7 Time & Date

The Time and date - \$GPZDA window shows the UTC time and date. Local zone is a reserved field that is not currently in use.

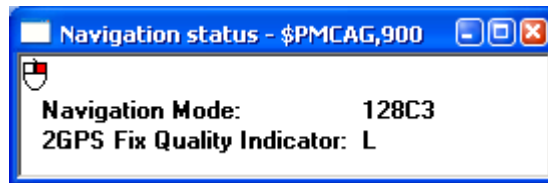


### 3.2.8 Navigation Status

The Navigation status - \$PMCAg,900 window shows the current navigation mode and GPS fix quality indicator where:

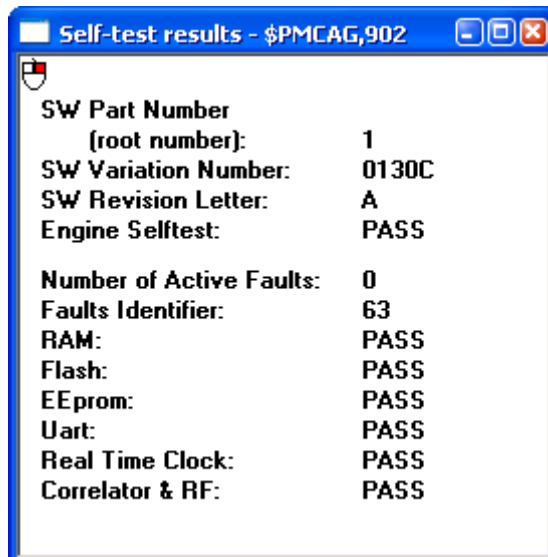
L = Low, navigation solution is computed from less than 5 satellite measurements

H = High, navigation solution is computed from at least 5 satellite measurements



### 3.2.9 Self-Test Results

The Self-test results - \$PMCAg,902 window shows the results of the GPS receiver self-test.

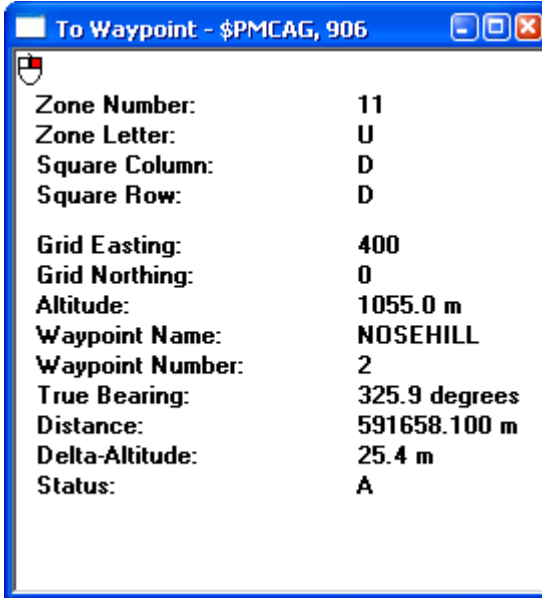




### 3.2.10 To Waypoint

The bearing, distance and delta-elevation to waypoint - \$PMCAg, 906 window shows its values to a specified waypoint from the present solution. The solution is computed along the great circle path.

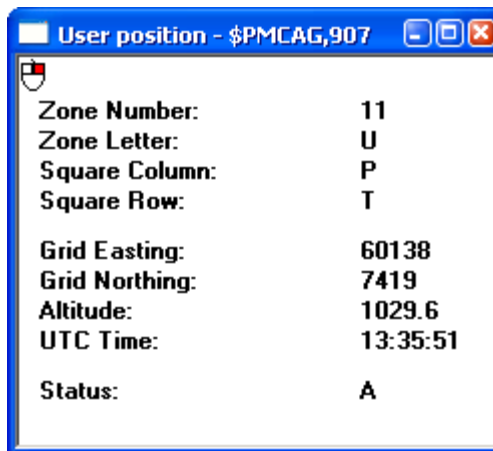
See Section 3.2.2, *Geographic Position on Page 54* for details on the Status field.



### 3.2.11 User Position

The User position - \$PMCAg, 907 window shows the current position in Military Grid Reference System (MGRS) format and the UTC time of position.

See Section 3.2.2, *Geographic Position on Page 54* for details on the Status field.



### 3.2.12 Receiver Status

The Receiver status - \$PMCAg, 908 window shows the configuration of the GPS receiver and the data it uses.

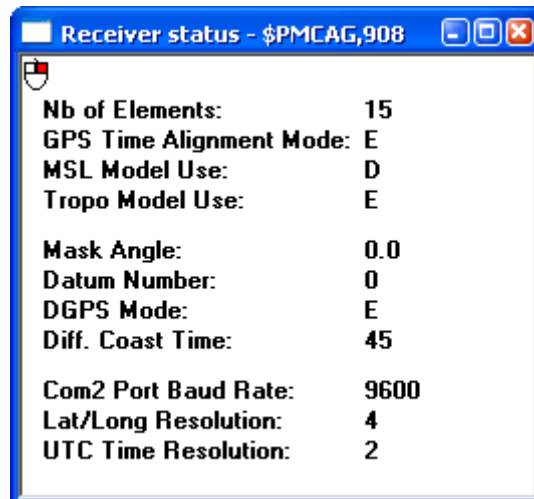
- 
- ☒ 1. You must have an SBAS-capable model in order to use SBAS.
  - 2. In StarView, Datum 0 is the WGS84 datum. See Tool Setting | Set Receiver Parameter on *Page 64*.
- 

In the MSL Model Use and Tropo Model Use rows:

E = Enabled  
D = Disabled

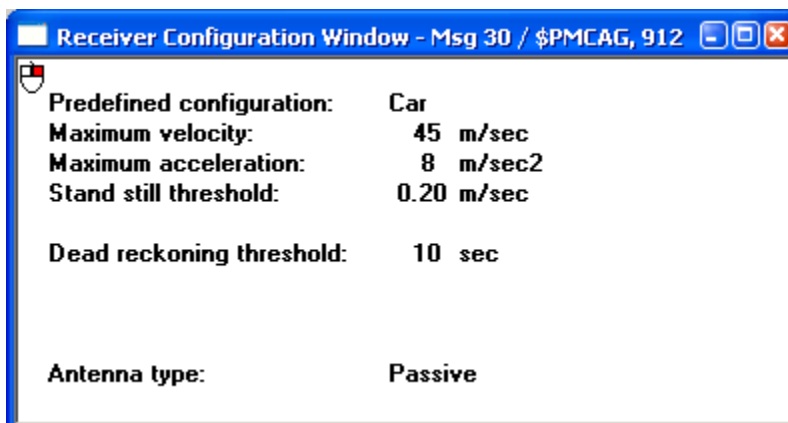
In the DGPS Mode row, the following apply:

D = Disable  
E = Automatic  
W = SBAS only  
B = DGPS only



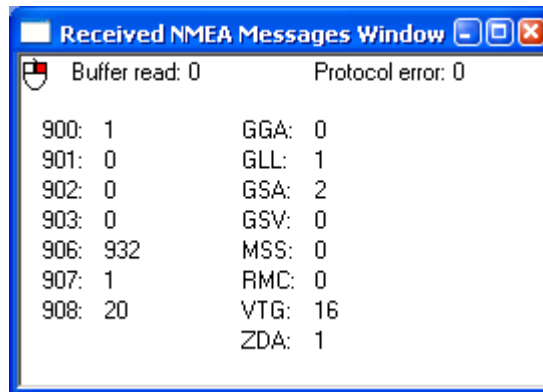
### 3.2.13 Receiver Configuration

The Receiver configuration - \$PMCAg, 912 window shows the configuration parameters of the GPS receiver. See also *Section 2.3.9, Set Configuration* starting on *Page 39* for applications and their limits.



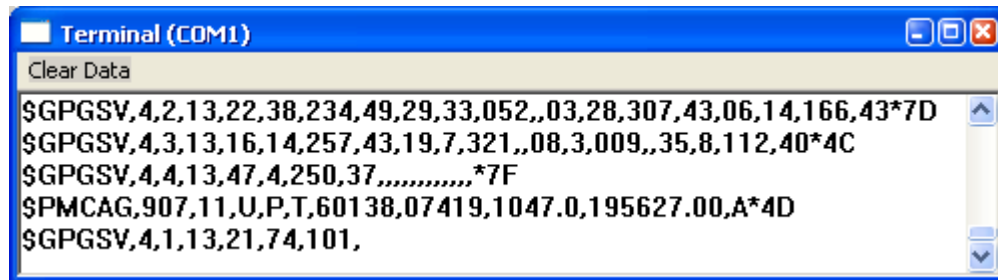
### 3.2.14 Received Messages

The Received NMEA Messages window shows the number of each NMEA message received from the GPS receiver. It also shows the size of the file used to save incoming data and protocol errors.



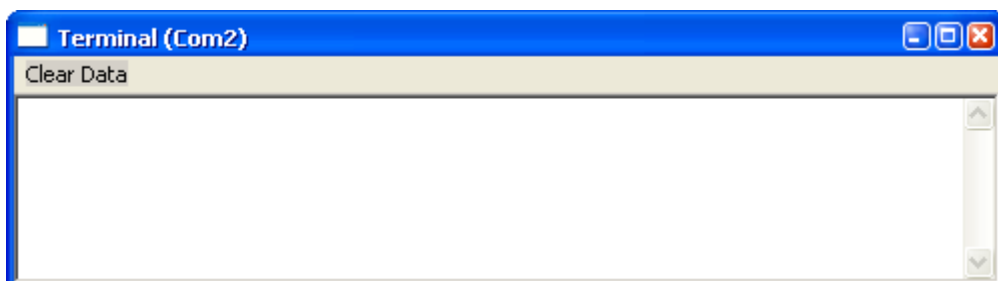
### 3.2.15 Terminal (COM1)

The Terminal (COM1) window shows the messages received from the COM1 port of the GPS receiver before processing. If COM1 is not the active port, *StarView* displays the Serial Port Configuration dialog for you to edit first, see *Page 15*.



### 3.2.16 Terminal (COM2)

The Terminal (COM2) window shows the messages received from the COM2 port of the GPS receiver before processing. If COM2 is not the active port, *StarView* displays the Serial Port Configuration dialog for you to edit first, see *Page 15*.



### 3.3 Tool Setting

The Tool Setting menu allows you to send commands to the GPS receiver. *Table 8* shows the menu options available when you select Tool Setting from the main menu.

**Table 8: Tool Setting Menu**

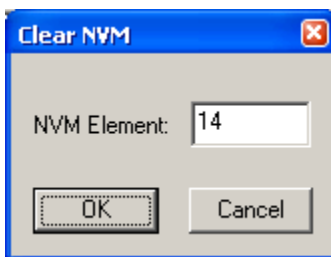
Menu Option	Refer to
Clear NVM	Page 60
Define Waypoint	Page 61
Select Waypoint	Page 61
Protocol	Page 62
Initialization Data	Page 63
Set Configuration	Page 63
Set Receiver Parameter	Page 64
Set Default Msg List	Page 65

#### 3.3.1 Clear NVM

This option erases the receiver NVM by sending NMEA message \$PMcAG,007.

The options are:

- 00 ALL <sup>1</sup>
- 01-04 Reserved
- 05 ALMANAC
- 06-08 Reserved
- 09 TCXO PARAMETERS
- 10 IONO & UTC PARAMETERS
- 11 POSITION
- 12 TIME
- 13 DGPS CONFIGURATION
- 14 DEFAULT NMEA MSG LIST
- 15 RS232 CONFIGURATION <sup>1</sup>

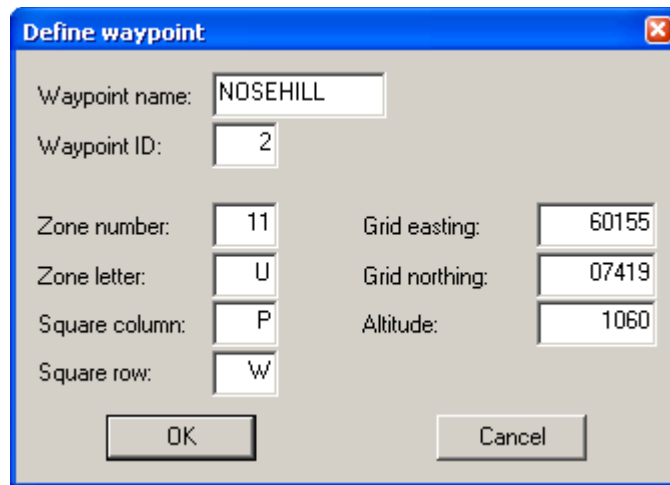


1. These commands force the receiver to go into binary mode at the default baud rate for your model on the next power-up.

### 3.3.2 Define Waypoint

Use the Define waypoint dialog to define waypoints in MGRS format.

- 
- ☒ If the Square Column field (latitude band) is X, then the Zone number field should not be set to 32, 34 or 36. These zones were incorporated into other zone numbers and do not exist. Refer also to NMEA message \$PMCA,009 in the *SUPERSTAR II Firmware Reference Manual*, Reference [4] on Page 9.
- 



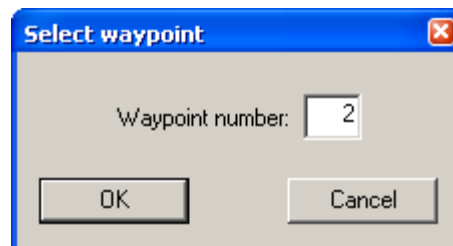
The "Define waypoint" dialog box contains the following fields and values:

Waypoint name:	NOSEHILL		
Waypoint ID:	2		
Zone number:	11	Grid easting:	60155
Zone letter:	U	Grid northing:	07419
Square column:	P	Altitude:	1060
Square row:	W		

Buttons: OK, Cancel

### 3.3.3 Select Waypoint

Use the Select waypoint dialog to choose an active waypoint to use in subsequent requests.



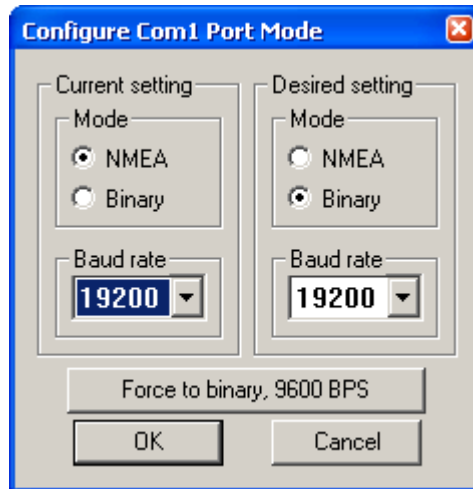
The "Select waypoint" dialog box contains the following field and value:

Waypoint number:	2
------------------	---

Buttons: OK, Cancel

### 3.3.4 Protocol

Use the Configure Main Port Mode dialog to switch the GPS receiver mode (binary protocol or NMEA) and the baud rate. The *Force to Binary, 9600 BPS* button allows you to set the GPS receiver in binary mode at 9600 bps. This option is associated with *Message ID# 110* in binary protocol and with message \$PMCA, 000 in NMEA protocol.



- 
- ✉ 1. Your receiver's current settings must match those selected in the *Current setting* section of the dialog. If they do not match the protocol can not change. If you do not know your receiver's current settings, use the *Force to binary, 9600 BPS* button and then use the *Desired setting* section.
  - 2. When you use the NMEA or BIN buttons, shown on the right, you are simply changing the *StarView* menus and windows. You must use the *Configure Port Mode* dialog to change the configuration of your card. The *Configure Port Mode* dialog is available using the *Protocol* button or by selecting *Tool Setting | Protocol* from the main menu.
- 



### 3.3.5 Initialization Data

Use the Initialization Data dialog to set the GPS receiver with reference UTC date, UTC time and your position.

**Initialization Data**

Date and Time

14 44 43 HH:MM:SS

20 4 2005 DD:MM:YYYY

Position

Altitude: 1048.207 meters

          Deg Min Sec

Latitude: 51 15 15.73

Longitude: -114 03 35.07

OK Cancel

### 3.3.6 Set Configuration

Use the Configuration dialog to set the GPS receiver configuration. If Tool Setting | Set Configuration in the main menu appears gray, you can access this dialog by right clicking in the Receiver Configuration window from the Window menu, see *Page 32*. See also *Section 2.3.9 on Page 39* for more details on this dialog.

**Configuration dialog box - Binary 30 / NMEA \$PMCG,012**

Predefined configuration

Car

Maximum velocity

45 meter/second

Maximum acceleration

8 meter/second<sup>2</sup>

Stand still threshold

0.2 meter/second

Dead reckoning threshold

User value 255 seconds

Current value

Antenna

Auto

Passive

Active

OK Cancel

### 3.3.7 Set Receiver Parameter

Use the Set receiver parameter dialog to set the GPS receiver configuration. This dialog is associated with many commands.

**Set receiver parameter**

	Enable	Disable
GPS Time Alignment	<input checked="" type="radio"/>	<input type="radio"/>
MSL Model Use	<input type="radio"/>	<input checked="" type="radio"/>
Tropospheric/Ionospheric Model Use	<input checked="" type="radio"/>	<input type="radio"/>

DGPS Mode

No DGPS    Beacon only  
 SBAS only    Automatic

Datum Number:  Datum

Mask Angle:  Degrees

Diff. Coast Time:  Seconds

Com2 Port Baud:  Bauds

Position Resolution:  Digits

Time Resolution:  Digits

OK   Cancel

---

☒ In the Set receiver parameter dialog, the maximum position resolution is 5 digits.

---



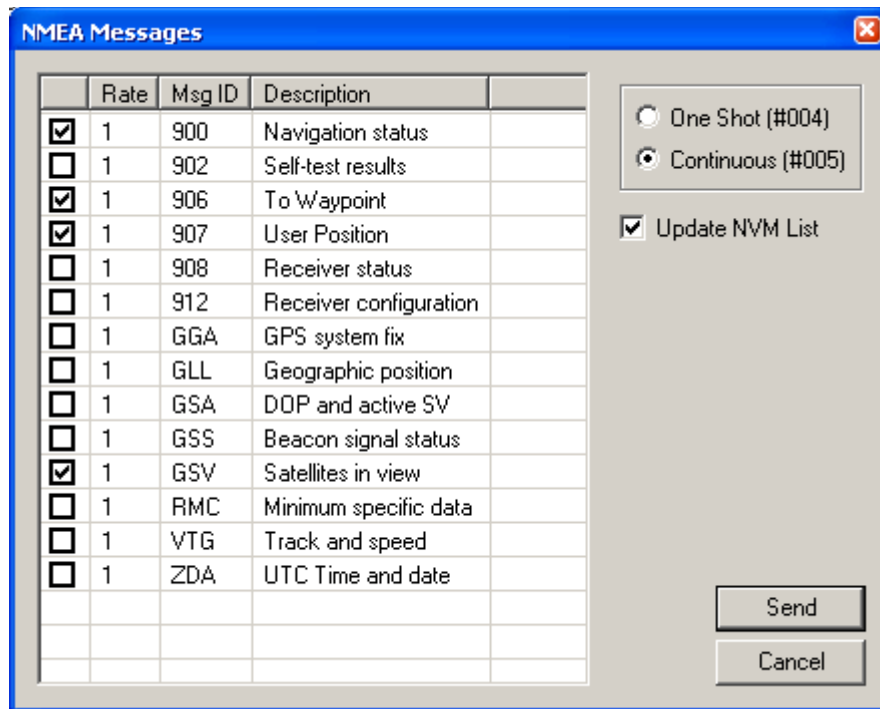
### 3.3.8 Set Default Message List

Select Tool Setting | Set Default Msg List to display the NMEA Messages dialog. The window allows you to request NMEA messages (in One Shot or Continuous mode) and to update the NMEA NVM Message List.

To change the requested data rate, select the row containing the message, highlight the row and then click once on its Rate field. To stop messages, set the Rate to 0 and select Continuous.

If you have a 5 Hz model, enter 999 for the rate. The NMEA messages that can be output at 5 Hz are GGA, GLL, GSA, RMC, VTG and 906. Refer also to the *SUPERSTAR II Card Models* appendix in the *SUPERSTAR II Firmware Reference Manual*, Reference [4] on Page 9.

When you click on the Send button, StarView requests all messages that are checked at their specified rates.



### 3.4 Send Messages

Send specific messages to your GPS receiver by selecting them from the Xmit Msg menu. To see the content of a requested message, open the corresponding window from the Window menu. See also the *Window* section starting on *Page 53*.

Menu Option	
\$GPGGA	GPS Fix Data
\$GPGLL	Geographic Position
\$GPGSA	DOP & Active SVs
\$GPGSV	SVs in View
\$GPRMC	Recommended Minimum GPS
\$GPVTG	Track and Speed
\$GPZDA	Time and Date
\$PMCAG, 003	Initiate Self Test
\$PMCAG, 900	Navigation Status
\$PMCAG, 902	Self-Test Results
\$PMCAG, 906	To Waypoint
\$PMCAG, 907	User Position
\$PMCAG, 908	Receiver Status

When you select a message from the Xmit Msg menu, a rate dialog appears.


Consider the case where you have selected Xmit Msg | \$GPGSV SVs in View. The following dialog appears:



Select One Shot or Continuous.

### 3.5 Help

Select Help | About StarView... from the main menu or use the *General* toolbar button to view the *About StarView* information box. See also *Section 2.5, Help* starting on *Page 51*.

Menu Option	Toolbar Button
Help	
About StarView	

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