StarView

User Manual

(for NovAtel SUPERSTAR II-Based Products)
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   Customer Service Dept.
   1120 - 68 Avenue NE,
   Calgary, Alberta, Canada T2E 8S5

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Customer Service

Contact Information

If you have any questions or concerns regarding your SUPERSTAR II-based product, please contact NovAtel Customer Service using any one of the following methods:

NovAtel GPS Hotline: 1-800-NOVATEL (Canada and the U.S.)
403-295-4900 (International)

Fax: 403-295-4901

E-mail: support@novatel.ca

Website: www.novatel.com

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:
   - Receiver Status, ID# 49, one shot
   - Ephemeris Data, ID# 22, continuous
   - Measurement Block, ID# 23, 1 Hz
   - Fault Log, ID# 57, one shot
   - HW/SW Identification, ID# 45, one shot
   - Navigation Data (ECEF), ID# 21, continuous
   - Navigation Data (User), ID# 20, continuous
   - Satellite Visibility, ID# 33, continuous
   - Channel Assignment, ID# 6, continuous

3. Send the file containing the log to NovAtel Customer Service, using the 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

<table>
<thead>
<tr>
<th>PUBLICATION NAME</th>
<th>PUBLICATION NAME</th>
</tr>
</thead>
</table>


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/fwsupdates.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 L1 Software.
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:

![Receiver Status Window (ID49)](image)

**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:


### 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>
<thead>
<tr>
<th>Menu Option</th>
<th>Toolbar Button</th>
<th>Refer to</th>
</tr>
</thead>
</table>
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| (a)                   |                | Section 1.1.1, Serial Port on Page 15              |
| Auto Connect           |                | Chapter 1, Getting Started starting on Page 11     |
| Save Data              |                |                                                    |
| COM1 Port  
| (b)                   | ![COM1]        | Section 1.1.2, Save Data on Page 15                |
| COM2 Port  
| (b)                   | ![COM1]        | Section 1.1.2, Save Data on Page 15                |
| Automatic Logging      |                |                                                    |
| Playback Rate  
| (c)                   | ![Playback]    | Section 1.1.3, Input Log File on Page 15           |
| Input log file  
| (c)                   | ![Input]       | 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                   | ![Stop]        | Section 1.1.7, Stop on Page 16                     |
| Exit                   | ![Exit]        | Section 1.1.8, Exit on Page 16                     |
| StarView Interface  
| (d)                   | ![StarView]    | Page 12                                            |
| Baud Rate  
| (a d)                 | ![Baud]        | Section 1.1.1, Serial Port on Page 15              |
| COM Port  
| (a d)                 | ![COM]         | 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 Hibernate 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.

![Parser Active (Left) Verses Parser Inactive (Right)](image)

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.
Chapter 2  Binary Protocol

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.


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:

File/Port:

| 9600 | COM1 |

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

General:

See Section 2.5, Help starting on Page 51.

Tool Setting:

See Section 2.3, Tool Setting starting on Page 35.

Window:

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.

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**Status**

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<tr>
<td>Base Status (^c)</td>
<td>Page 31</td>
</tr>
<tr>
<td>Receiver Status</td>
<td>Page 32</td>
</tr>
<tr>
<td>Receiver Configuration</td>
<td>Page 32</td>
</tr>
<tr>
<td>Timing Information</td>
<td>Page 33</td>
</tr>
</tbody>
</table>

**Other**

<table>
<thead>
<tr>
<th>Automatic Log Summary</th>
<th>Page 34</th>
</tr>
</thead>
<tbody>
<tr>
<td>HW/SW Part Number (^c)</td>
<td>Page 34</td>
</tr>
</tbody>
</table>

---

\(^a\) 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.

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

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.
2.2.3 Display Messages

This window displays the input and output messages in hexadecimal format. The size and the number of the message are shown in decimal format.

![Display Messages Window](image)

2.2.4 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.

![Terminal (COM1) Window](image)
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.

TheMsg 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*.

![DGPS Data Window](image)

**Type 9, ID 313, ZCount 5235, Seq 6, Length 5, Health 1**

```
66 25 39 A3 9E 29 09 FE ED 00 BA 04 FF 42 00 C2
10 FE D6 00 61
```

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*.

![DGPS Status Window](image)
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

![Navigation Window (User Coor) - Msg 20]

**Lat:** N 051° 29'42.7300" (Deg)
**Long:** W 114° 41'35.0070" (Deg)
**Alt:** 1047.00 m

**Velocity N:** 0.00 m/s
**Velocity E:** 0.00 m/s
**Velocity U:** 0.00 m/s

**HFOV:** 0.00 m
**VFOV:** 0.00 m
**Ground Speed:** 0.00 m/sec
**Track Angle:** 0.00 rad

**Nav Mode:** Nav 3-D
**DGPS Source:** None

**HDOP:** 1.1
**VDOP:** 1.4

**UTC Date:** 2005-04-19
**UTC Time:** 15:33:46.999996972
**Nb SVs used:** 9
**Up Hours:** 21
**Datum Number:** 0
**Confidence Level:** High
**GPS Time Alignment:** Disable
**System Mode:** Navigation
**Tracking Mode:** All SVs in View
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).

<table>
<thead>
<tr>
<th>SV#</th>
<th>Status</th>
<th>Az(deg)</th>
<th>Ei(deg)</th>
<th>SNR</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>Use Nav 233</td>
<td>55</td>
<td>49</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Use Nav 66</td>
<td>53</td>
<td>49</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Use Nav 290</td>
<td>52</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Use Nav 129</td>
<td>50</td>
<td>49</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Use Nav 186</td>
<td>33</td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Use Nav 302</td>
<td>13</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Use Nav 35</td>
<td>10</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Use Nav 62</td>
<td>10</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Use Nav 239</td>
<td>6</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Track 7</td>
<td>3</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>122</td>
<td>Track 113</td>
<td>9</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>134</td>
<td>Track 251</td>
<td>5</td>
<td>38</td>
<td></td>
</tr>
</tbody>
</table>

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.

![Satellites Health - Msg 50](image)

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](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.
### 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.

<table>
<thead>
<tr>
<th>SV</th>
<th>Code</th>
<th>Carrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>49D001</td>
<td>248947</td>
<td>E70ADA</td>
</tr>
<tr>
<td>87D6B2</td>
<td>FFB3EE</td>
<td>B3A02</td>
</tr>
<tr>
<td>000001</td>
<td>122F10</td>
<td>BE9A8</td>
</tr>
<tr>
<td>32AA57</td>
<td>386386</td>
<td>FA7004</td>
</tr>
<tr>
<td>156E4E</td>
<td>14CBA1</td>
<td>0DD8B9</td>
</tr>
<tr>
<td>3A027E</td>
<td>0031DA</td>
<td>EDF600</td>
</tr>
<tr>
<td>FFA526</td>
<td>70213A</td>
<td>165F33</td>
</tr>
<tr>
<td>A44020</td>
<td>FFA89C</td>
<td>BE00AC</td>
</tr>
</tbody>
</table>

### 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.


- 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.
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 Window](image)

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 Window](image)
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*.

![Receiver Configuration Window - Msg 30 / $PMCAG, 912](image)

- **Predefined configuration:** Car
- **Maximum velocity:** 45 m/sec
- **Maximum acceleration:** 8 m/sec²
- **Stand still threshold:** 0.20 m/sec
- **Dead reckoning threshold:** 10 sec
- **Navigation rate:** 1 Hz
- **Antenna type:** Active

2.2.21  **Receiver Status**

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

![Receiver Status (ID49)](image)

- **System Mode:** Navigation
- **SV Tracking Mode:** All In View
- **NVM Status:** Idle
- **Tropospheric/Ionospheric Model Enabled:** ON
- **MSL Model Enabled:** OFF
- **Power up Mode:** Warm
- **Time Source:** SV with Nav
- **Almanac Week:** 1321
- **Week Number:** 1321
- **GPS SV Deselection:** [Red] Deselected
  - 1 2 3 4 5 6 7 8 9 10 11 12
  - 13 14 15 16 17 18 19 20 21 22 23 24
  - 25 26 27 28 29 30 31 32
- **SV Usable (Or SBAS [119]):**
  - 1 2 3 4 5 6 7 8 9 10 11 12
  - 13 14 15 16 17 18 19 20 21 22 23 24
  - 25 26 27 28 29 30 31 32
- **Channel Deselection:** [Red] Deselected
  - 1 2 3 4 5 6 7 8 9 10 11 12
- **Mask Angle:** 4.5 degree
- **Discrete Input:** 0x16 [Red] Off
- **TCXO Error Est:** -508
- **TCXO Aging:** 25.4
- **Search Noise:** 258.5
- **Navigation Mode:** Nav 3-D
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.

![Timing Information (ID113)]
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.

![Automatic Log Summary](image)

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*.

![HW/SW Configuration - Msg 45](image)

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

![Almanac data transfer](image)

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

![Clear NVM](image)
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*.

![Channel Deselect](image)

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*.

![SV Deselection](image)

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.

- 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.
- 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:

<table>
<thead>
<tr>
<th>Preset Configuration</th>
<th>Maximum Velocity (m/s)</th>
<th>Maximum Acceleration (m/s²)</th>
<th>Stand Still Threshold (m/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Man</td>
<td>10</td>
<td>3</td>
<td>0.2</td>
</tr>
<tr>
<td>Car</td>
<td>45</td>
<td>8</td>
<td>0.2</td>
</tr>
<tr>
<td>Tractor</td>
<td>20</td>
<td>7</td>
<td>0.2</td>
</tr>
<tr>
<td>Marine</td>
<td>20</td>
<td>7</td>
<td>0.1</td>
</tr>
<tr>
<td>Plane</td>
<td>100</td>
<td>20</td>
<td>0.2</td>
</tr>
<tr>
<td>Rocket</td>
<td>510</td>
<td>40</td>
<td>0.2</td>
</tr>
</tbody>
</table>

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.

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.
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.

![Binary Messages List dialog]

Note: Only checked messages will be requested.

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*.

![DGPS Configuration dialog]
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.


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:

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.

Enter a Survey Time:

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 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, 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 Send Information 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.
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

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

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

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

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.

![Request I/O Message dialog](image)

2.5 **Help**

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

<table>
<thead>
<tr>
<th>Menu Option</th>
<th>Toolbar Button</th>
</tr>
</thead>
<tbody>
<tr>
<td>Help</td>
<td></td>
</tr>
<tr>
<td>About StarView</td>
<td>![Question Mark]</td>
</tr>
</tbody>
</table>

![About StarView dialog](image)
Chapter 3  NMEA Protocol

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

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>
<thead>
<tr>
<th>Menu Option</th>
<th>Toolbar Button</th>
<th>Refer to</th>
</tr>
</thead>
<tbody>
<tr>
<td>$GPGGA</td>
<td>GPS Fix Data</td>
<td>Page 54</td>
</tr>
<tr>
<td>$GPGLL</td>
<td>Geographic Position</td>
<td>Page 54</td>
</tr>
<tr>
<td>$GPGSA</td>
<td>DOP &amp; Active SVs</td>
<td>Page 54</td>
</tr>
<tr>
<td>$GPGSV</td>
<td>SVs in View</td>
<td>Page 55</td>
</tr>
<tr>
<td>$GPRMC</td>
<td>Recommended Minimum GPS</td>
<td>Page 55</td>
</tr>
<tr>
<td>$GPVTG</td>
<td>Track and Speed</td>
<td>Page 55</td>
</tr>
<tr>
<td>$GPZDA</td>
<td>Time and Date</td>
<td>Page 56</td>
</tr>
<tr>
<td>$PMCAG, 900</td>
<td>Navigation Status</td>
<td>Page 56</td>
</tr>
<tr>
<td>$PMCAG, 902</td>
<td>Self-Test Results</td>
<td>Page 56</td>
</tr>
<tr>
<td>$PMCAG, 906</td>
<td>To Waypoint</td>
<td>Page 57</td>
</tr>
<tr>
<td>$PMCAG, 907</td>
<td>User Position</td>
<td>Page 57</td>
</tr>
<tr>
<td>$PMCAG, 908</td>
<td>Receiver Status</td>
<td>Page 58</td>
</tr>
<tr>
<td>$PMCAG, 912</td>
<td>Receiver Configuration</td>
<td>Page 58</td>
</tr>
<tr>
<td>Received messages</td>
<td></td>
<td>Page 59</td>
</tr>
</tbody>
</table>

Messages

<table>
<thead>
<tr>
<th>Display Messages</th>
<th>Shows binary messages only.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal (COM1)</td>
<td></td>
</tr>
<tr>
<td>Terminal (COM2)</td>
<td></td>
</tr>
</tbody>
</table>
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.

![GPS fix data - $GPGGA](image1)

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

![Geographic position - $GPGLL](image2)

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.

![DOP and active satellites - $GPGSA](image3)
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.

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

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.

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: 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.

![Time and date - $GPZDA window](image)

UTC: 2036:30.00  
Date: 19 April 2005  
Local Zone:

### 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

![Navigation status - $PMCAG, 900 window](image)

Navigation Mode: 128C3  
2GPS Fix Quality Indicator: L

### 3.2.9 **Self-Test Results**

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

![Self-test results - $PMCAG, 902 window](image)

SW Part Number  
{root number}: 1  
SW Variation Number: 0130C  
SW Revision Letter: A  
Engine Selftest: PASS  
Number of Active Faults: 0  
Faults Identifier: 63  
RAM: PASS  
Flash: PASS  
EEprom: PASS  
Uart: PASS  
Real Time Clock: PASS  
Correlator & RF: PASS
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

<table>
<thead>
<tr>
<th>Menu Option</th>
<th>Refer to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear NVM</td>
<td>Page 60</td>
</tr>
<tr>
<td>Define Waypoint</td>
<td>Page 61</td>
</tr>
<tr>
<td>Select Waypoint</td>
<td>Page 61</td>
</tr>
<tr>
<td>Protocol</td>
<td>Page 62</td>
</tr>
<tr>
<td>Initialization Data</td>
<td>Page 63</td>
</tr>
<tr>
<td>Set Configuration</td>
<td>Page 63</td>
</tr>
<tr>
<td>Set Receiver Parameter</td>
<td>Page 64</td>
</tr>
<tr>
<td>Set Default Msg List</td>
<td>Page 65</td>
</tr>
</tbody>
</table>

3.3.1 Clear NVM

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

The options are:

- `00`: ALL
- `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

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 $PMCAG,009 in the SUPERSTAR II Firmware Reference Manual, Reference [4] on Page 9.

3.3.3 Select Waypoint

Use the Select waypoint dialog to choose an active waypoint to use in subsequent requests.
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 $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.
3.3.5 Initialization Data

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

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.
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.

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.

<table>
<thead>
<tr>
<th>Menu Option</th>
<th>Toolbar Button</th>
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</thead>
<tbody>
<tr>
<td>$GPGGA</td>
<td></td>
</tr>
<tr>
<td>$GPGLL</td>
<td></td>
</tr>
<tr>
<td>$GPGSA</td>
<td></td>
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<tr>
<td>$GPGSV</td>
<td></td>
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<tr>
<td>$GPRMC</td>
<td></td>
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<tr>
<td>$GPVTG</td>
<td></td>
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<tr>
<td>$GPZDA</td>
<td></td>
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<tr>
<td>$PMCAG, 003</td>
<td></td>
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<tr>
<td>$PMCAG, 900</td>
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<tr>
<td>$PMCAG, 902</td>
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<tr>
<td>$PMCAG, 906</td>
<td></td>
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<tr>
<td>$PMCAG, 907</td>
<td></td>
</tr>
<tr>
<td>$PMCAG, 908</td>
<td></td>
</tr>
</tbody>
</table>

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.
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