MAGELLAN®
PROFESSIONAL

ConfigPack™

Reference Manual

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1. Installation

Introduction

ConfigPack is delivered on the Software Package CD-ROM. A set of installation diskettes can be generated from the CD-ROM to allow installation on PCs not equipped with CD-ROM drives.

Protection

When ordering this program, you were asked whether a hardware device (a dongle) or a software device (a license file) should be supplied for the im-plementation of the software protection on your PC.

Although more exacting than the hardware protection when first running ConfigPack (see the two procedures in *Running ConfigPack for the first time on page 4*), the software protection should be preferred whenever the risk of losing dongles is real. Traveling users for example are advised to choose this option. On the other hand, dongles are better suited for sedentary users.

In the absence of a protection device on your PC, you will still be allowed to run ConfigPack, but in this case only the DGNSS-related section of your configuration files will be accessible from the Select pane. In this particular way of using ConfigPack, long-time users of the Aquarius series will have recognized DSet Pack. As a matter of fact, DSet Pack is no longer provided with receivers from the Aquarius series as users continue to have the same tool at their disposal if they use ConfigPack without a protection.

Computer requirements

- Processor: DX2-66 minimum, Pentium recommended
- RAM: 16 Mbytes minimum, 24 Mbytes recommended
- Operating system: Windows 95, 98 or NT
- Display screen: SVGA, 17 inches recommended

Installation procedure from the CD-ROM

- Insert the CD-ROM into the drive
  The Auto-start procedure presents a selection of software packages to be installed
- Select ConfigPack and proceed with the installation as described when using diskettes.

Installation procedure from a set of 3¼" diskettes

- Insert the first diskette into the PC drive
- From the Windows taskbar, click Start
- Select Run from the pop-up menu
- In the text box which then appears, type: a:setup
- Click the OK button (or press [Enter]). This causes the Setup program to be started from the diskette. This program will assist you through the entire installation procedure.
  Below are the main stages in the installation.

1. Welcome Dialog box

As mentioned in this box, we recommend you to close all the active applications before proceeding with the installation.

2. Registration

- Specify the following in the two text boxes:
  - Your name
  - Your company's name.

3. Destination directory

- Specify the name of the target directory where you would like the software to be installed. You can specify a non-existing directory: the program will create it for you after confirmation.

4. Program folder

- Specify the name of the folder where you would like the program shortcuts to be created.

5. Start copying files

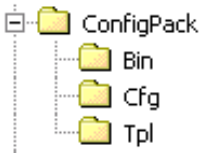
- Click the Next button to start installing the software (or click the Back button to come back to the installation parameters if you want to change any of them).
- After you have clicked Next, insert the next diskette when prompted by the Setup program (step to be repeated until the files from all the diskettes have been installed).

6. End of installation

- The end of installation is denoted by the message "Setup is complete".

7. Program folders and shortcuts

- After successful installation and using the explorer, the following is now visible on your disk:



- Bin: Contains all the program files (mainly *.exe, *.dll, *.hlp, *.ocx, etc.)
- Cfg: Default directory for the configuration files that you will create
- Tpl: Default directory for the configuration templates that you will create

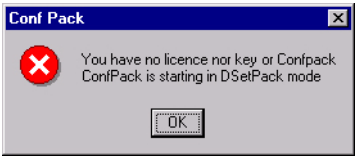
Running ConfigPack for the first time

❑ If you chose the hardware protection option

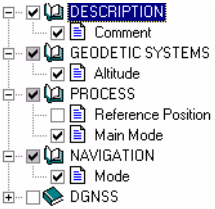
- Connect the dongle to the parallel port of your PC (the one usually used for printers). If a printer is already connected, insert the dongle between the printer cable and the PC connector. Then check that the printer is "on line".
- Double-click on the ConfigPack icon to start the program.

As long as the dongle remains present on the parallel port, ConfigPack will run normally every time you double-click on the ConfigPack icon.

If you accidentally remove the dongle, or if you are not in possession of the dongle, the following will appear on the screen when you start ConfigPack:



- After clicking the OK button, you will be allowed to use ConfigPack in its "light" version (equivalent to former DSet Pack software) offering a set of modules reduced to the following:
  (This operation mode is precisely the desired one when for example you just have to set the DGNSS-related section of an Aquarius receiver)



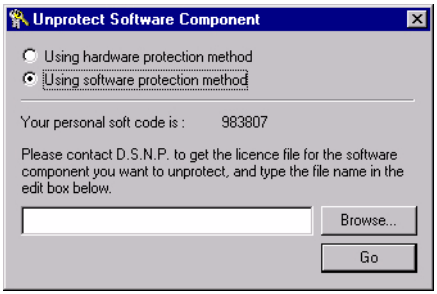
❑ If you chose the software protection option

After installing ConfigPack as described earlier, do the following:

- Run ConfigPack. A warning message informs you that only the "light" version of ConfigPack can be run
- Click OK. The ConfigPack main window then opens.

If you just want to work with the "light" version of ConfigPack, you can now start working on your configuration files. If you want to install the full version, do the following:

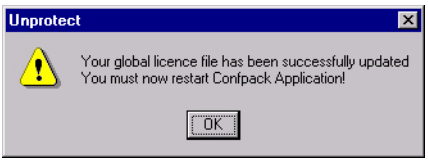
- Select Tools>Unprotect
- Check the Using software protection method button. The dialog box then looks like this:



- As prompted in the lower part of this dialog box, contact us so that we can generate a license file for you. This will be possible only after you have passed on your personal soft code to us (this code is also indicated in the above dialog box).

  In the example above, this code is "983808" but yours will probably be a different one.

- After receiving the license file (filename: dsnp.lic) and installing it somewhere on your PC, come back to the Unprotect Software Component dialog box above and select this file using the Browse.. button so that the filename appears in the field on the left
- Click the Go button. After successful installation, the following is displayed:



- Click the OK button and then re-start ConfigPack in order to benefit from the full version. ❑

2. Introduction

Configurations stored in GNSS receivers

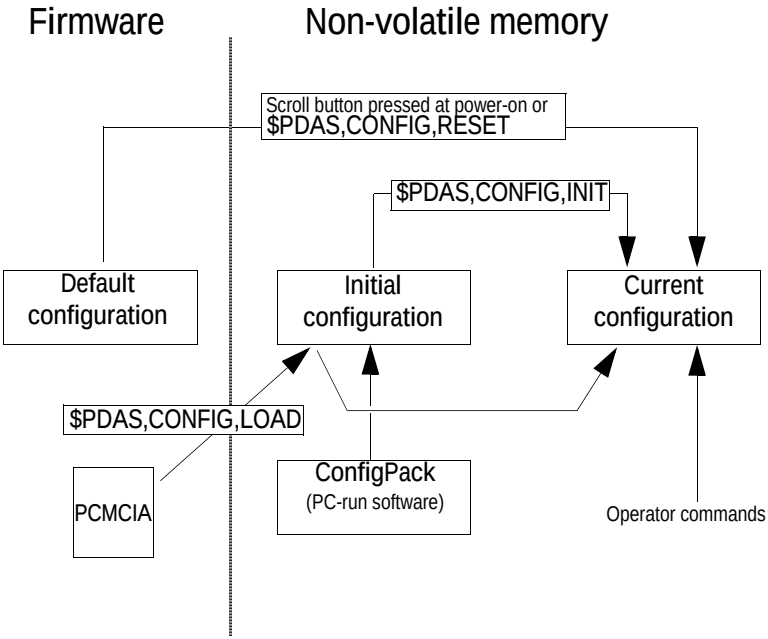
Three types of configurations are stored in a GNSS receiver:

- *Default configuration*, resident in the firmware. This configuration cannot be modified. It resets all parameters in the unit to known values (operating mode, serial port configuration, output messages, etc.)
- *Initial configuration*, saved in a non-volatile memory. It can be modified using ConfigPack. It contains the necessary parameter settings for the reference configuration of an application or for any particular operating mode (mobile, reference station, etc.).
- *Current configuration*, saved in a non-volatile memory. This configuration is modified by the operator's actions (through commands).

With Aquarius or Scorpio units, the *default configuration* can be loaded in place of the *current configuration* by pressing the push-button on the inte-grated display and holding it depressed, at power-on, or by sending the following command : $PDAS, CONFIG,RESET.

The command $PDAS,CONFIG,INIT can be used to load the *initial configuration* in place of the current configuration.

The command $PDAS,CONFIG,LOAD can be used to load a configuration file from a PCMCIA to a receiver unit to become its new *initial* and *current configurations*.


Firmware
Non-volatile memory
Scroll button pressed at power-on or
$PDAS,CONFIG,RESET
$PDAS,CONFIG,INIT
Default configuration
Initial configuration
Current configuration
$PDAS,CONFIG,LOAD
PCMCIA
ConfigPack
(PC-run software)
Operator commands

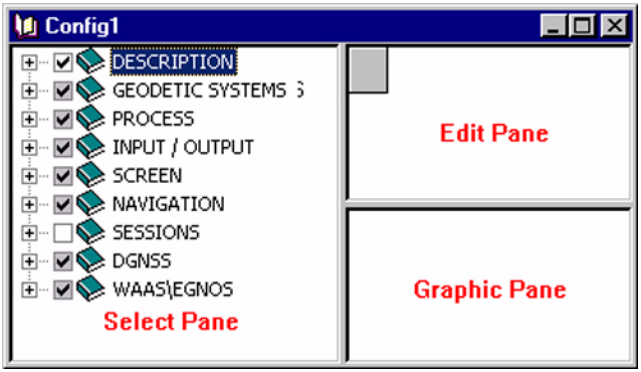
Introduction to ConfigPack

- ConfigPack is designed to help you create the configuration files needed to operate your GNSS receivers.
- ConfigPack is the only tool required for your configuration operations, whether your receivers are used in land or marine applications, at reference stations or in mobile receivers.
- Some configuration parameters being interdependent, ConfigPack will force the selection or deselection of some of them following your own selections or deselections.
- ConfigPack does not show the configuration file under its final aspect (i.e. a list of command lines executable in receivers) but instead provides a more user-friendly view, using three different panes, from which you can more easily create or modify the file. The resulting file can however be viewed using the Print Preview command from the File menu.
- ConfigPack lets you open several files concurrently if necessary. This feature allows you for example to overwrite an open file with the content of another open file.
- For effortless entry of such navigation parameters as waypoints, routes and beacons, ConfigPack lets you define these parameters through a simple click of the mouse on a map of your work region (conventional entry from the keyboard remains possible however). Waypoints can also be created by importing points from the 3SPack software.
- ConfigPack lets you write the scripts of your display screens and output messages according to a syntax specific to ConfigPack.
- ConfigPack also includes a communication tool so that, among other things, configuration files can be directly loaded into or read from your receivers.

  When creating a new configuration file, you should constantly keep in mind the nature of the target receiver, and so define only those parameters relevant to this receiver. For example, do not define anything in the SCREEN module if you use the receiver as a black box, etc.

How a configuration file is shown with ConfigPack

- When opening a configuration file with ConfigPack, a new window appears describing the file content through three distinct Panes (Select, Edit and Graphic), as illustrated below.
- These three panes have been designed so that you can work more easily on your configuration files (see illustration below).



1. Select Pane:

- Used to select/unselect parameter modules and sub-modules so that they be included or not in the configuration file currently created or modified. The Select Pane will automatically force the selection or deselection of parameters for those dependent on the presence or absence of others. Some sub-modules of parameters are necessarily part of any configuration you design.
- Also provides viewing options for each module (sub-modules can be shown or hidden by a simple click of the mouse).

2. Edit Pane:

- Shows the Editor table corresponding to the parameter sub-module you select.
- The number of columns in the Editor table is specific to the selected sub-module.
- The number of rows depends on the number of entries you make for this sub-module.
- The Edit Pane is updated whenever you click the document icon of a sub-module, whether selected or not, in the Select Pane. If the sub-module corresponding to the clicked icon is not currently selected, then the Edit Pane will turn blank.

3. Graphic Pane:

- Shows the entries you make in the Edit Pane in a more synthetic, user-friendly way (not an entry pane).
- In the case of the Navigation and DGNSS modules however, this pane operates as a graphic editor as any click of the mouse in this pane will be translated directly into an alpha-numerical entry (a waypoint, a route or a beacon) in the Edit pane.

4. Re-sizing the 3 panes of the ConfigPack main window

- Position the pointer inside the main window, on either a vertical or horizontal pane border. This causes the pointer to change shape:

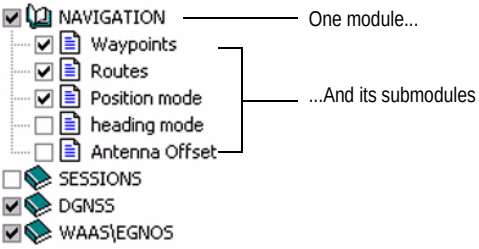
  •  if the pointer is on a vertical border,

  or

  •  if the pointer is on a horizontal border
- Using the left mouse button, drag the border to the desired location
- When you reach this location, release the mouse. This causes the three panes to be re-sized accordingly.

❑ Using the Select Pane

The Select Pane shows the eight possible modules of parameters which can be part of a configuration file.



Handling the Select Pane is much similar to working with Windows 95 ex-plorer. For each parameter module:

- The leftmost '+/-' button is used to show/hide all the sub-modules of a module:

  : sub-modules shown (book open)

  : sub-modules hidden (book close)

- The check button right-adjacent to the '+/-' button is used to select the module in order that it be part of the configuration file being created. Some of the modules cannot be unselected:

  : button checked: module selected

  : button cleared: module unselected

  : button turns gray when checked: only part of the sub-modules are currently selected

- The check button left-adjacent to a sub-module name is used to select that sub-module in order that it be part of the configuration file being created:

  : button checked: sub-module selected

  Clicking the document icon will cause the Editor table corresponding to that sub-module to appear in the Edit Pane.

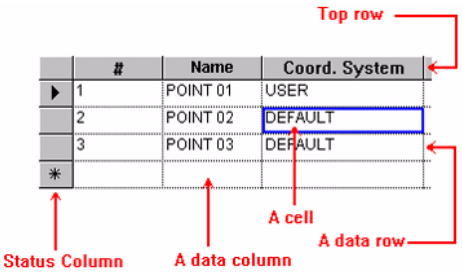
  : button cleared: sub-module unselected

  Clicking the document icon will cause the Edit Pane to turn blank.

❑ Using the Edit Pane

The Editor Pane shows the Editor table.

The Editor table consists of a top row (in gray), a Status column (leftmost column in gray) and a variable number of editable or non-editable cells ar-ranged in rows and columns (data rows and columns).

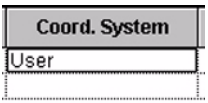


1. Cell types

There are 4 different types of cells:

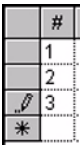
- Combo cells: Only the options from the combo box can be selected to be inserted into this type of cell

- Text cells: Can contain a limited number of alpha-numerical characters



- Numeral cells: Can only contain numerical values (with delimited range)

- Software-set cells: Controlled by ConfigPack



- Whenever the content of a cell is irrelevant to the current context, then the cell is locked (no data entry possible).

2. ·Re-sizing the editor table

Re-sizing rows:

- Position the pointer on the bottom border of any cell in the status column (leftmost gray column).

  The pointer shape then looks like this: 
- Using the left mouse button, drag the pointer downward to increase the row height, or upward to decrease it
- Release the mouse button when you get the desired height.
  Note that all other rows, if any, in the Editor table, are also re-sized according to your new setting.
  Note also that re-sizing the Editor table rows from any sub-module will also affect the Editor Table of all other modules and sub-modules

Re-sizing a column:

- Move the pointer into the in the header (top gray cell) of the column you want to re-size and position the pointer on the right-hand border of this cell.

  The pointer shape then looks like this: 
- Using the left mouse button, drag the pointer to the right to enlarge the column, or to the left to narrow it
- Release the mouse button when you obtain the desired width.

3. Editing instructions

- To move the cursor from cell to cell within the Editor table, use any of the 4 arrow keys. Alternately, you can use the tab key for horizontal forward jump, or the Shift+Tab keys for horizontal backward jump
- The Status column can contain the following symbols:

Indicates that a cell is selected somewhere in this row.

Denotes an editing operation in progress somewhere in the row.

Denotes the last row of the Editor table (necessarily an empty row). Unless you have created the last row possible in the table, this symbol will disappear as soon as you ente a single character anywhere in the row. A new empty row will then be created with this symbol in the first cell.

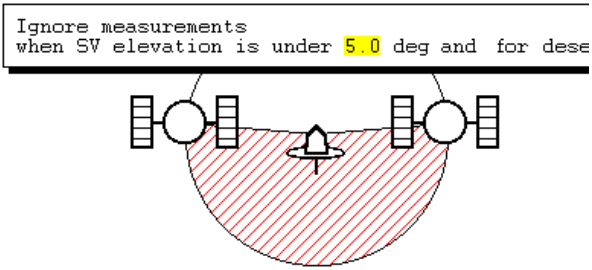
- The pointer will take the following shape if you move it on any cell (except the top cell) in the Status column:

Which means that you will select the entire row if you then click the left mouse button. This is useful when for example you want to delete the definition of a waypoint, a route or a coordinate system. In this case you just need to select the corresponding row and then depress the Delete key.

- When the definition of a row is finished, simply press the Enter key to stop editing.

❑ Using the Graphic Pane

- In most cases, the Graphic Pane will just display a summary of all the choices you have made in the selected sub-module. For example, choosing an elevation angle of 5 ° will be illustrated as follows in the Graphic Pane:



- The Graphic pane also provides an immediate simulation of the formats you have written whenever they are the subject of the Edit Pane, i.e. when either of the following sub-modules is selected:
  - Formats, Computed data (INPUT / OUTPUT module)
  - Presentation (SCREEN module)
- The Graphic Pane can also be used as an input device to define waypoints, routes and beacons.

❑ Changing the Options of ConfigPack

- In the toolbar, click  or from the menu bar, select **Tool** and then **Options**. A dialog box appears in which you can set the options of the process:

1. General tab

Timeout: Maximum time allowed for a receiver to send an ac-knowledge to ConfigPack. At the end of this time, if no connection is made, ConfigPack will cancel the operation in progress.

Screen Type: Defines the screen size of your receiver(s), as shown on the Graphic Pane when selecting the Appearance sub-module (from the SCREEN module).

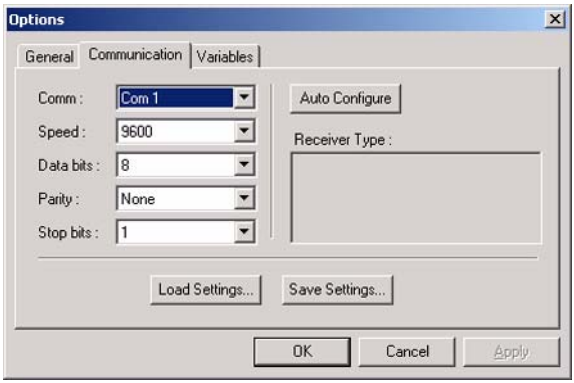
Line count: Number of lines on the screen

Line length: Number of characters in a line

Auto Line Feed: If checked, this option will terminate a too long character string at the end of a line and will place the extra characters on the next line (beneath).

If cleared, this option will let the character string extend beyond the end of the line. Extra characters, if any, will therefore be invisible on the receiver screen.

2. Communications tab



- Performs automatic settings of the serial port connected to a Magellan receiver or lets you enter these settings manually:
  Assuming a receiver is connected to your computer through a serial port:
  Automatic:
  - Click the Auto Configure button to initiate an automatic search for the Baud rate. Use this button if you are not sure about the Baud rate.
  - An automatic search for the Baud rate is only allowed with Magellan receivers as this requires that the receiver be capable of returning a consistent reply to a proprietary command.

  After choosing Auto Configure you are allowed to:
  - Disable the communication by clicking Cancel
  - Or, if the identification is successful, close the Communication Settings dialog box, by clicking OK. This enables communications between the computer and the GPS receiver and allows you to transfer configuration files to the receiver.

Manual:

- Enter the following communication parameters:
  - Serial port No.
  - Baud rate
  - Number of bits per character
  - Parity check option
  - Number of stop bits
- Click the OK button.

- Allows you to save/restore port settings:
  Saving port settings:
  - Click the Save settings button. This opens a dialog box that allows you to save the serial port configuration currently enabled so that you can quickly retrieve it at a later date using the Load Settings push-button.
  - In the File Name text box, enter a name for the file to which the serial port configuration should be saved (typically with '.set' as the extension). Typically, the serial port configuration parameters are saved to the 'set' directory.
  - Click the Save button to save the following communication parameters
    - Serial port No.
    - Baud rate
    - Number of bits per character
    - Parity check option
    - Number of stop bits
  - Clicking Cancel would take you back to the Communication Settings dialog box without saving any settings.

Restoring port settings:

- Click the Load settings button. This opens a dialog box that allows you to select any serial port configuration file saved earlier using the Save Settings button.
- Click the desired file name in the list box, to select it (typically in the 'set' directory), and click Open. As a result the serial port parameters in the Communication Settings dialog box are automatically set as specified in the file you selected.
- Clicking Cancel would take you back to the Communication Settings dialog box without loading any settings.

3. Variables tab

- User-set values arbitrarily assigned to variables in ConfigPack. These variables are in fact those handled by a GNSS receiver in operation (L84, G84, H84, etc.)
- In ConfigPack these arbitrary values are used by the Graphic Pane to simulate screens or messages whenever the variables are invoked by the Editor Pane. ❑

3. Creating files with ConfigPack

❑ Creating a new configuration file

- In the Toolbar, click  or from the menu bar, select File and then New
- In the New dialog box which then appears, select any line containing "Configuration File" or "Configuration File (...)" and click OK, or double-click directly on this line. For more information on the bracketed term, see *Creating a new configuration template on page 24*.
- A new window appears showing a copy of the file selected earlier in the New dialog box. As shown in the title bar, the file is given the default name "Config1" (or "Confign" if "n-1" files have been created in the current ConfigPack session).
  The file is unsaved, which means that you will have to confirm or change this name whether you select File and Save, or File and Save As, after defining the content of the file.
- Select and view the desired modules and sub-modules of pa-rameters as described in Using the Select Pane.
- Define all your parameters. Refer to *Configuration Modules on page 59* for more information on these parameters.

- To save your file, in the toolbar, click  or from the menu bar, select File and then Save
- In the Save As dialog box which then appears, confirm or change the file name. The default extension is cfg, which we recommend to keep, and the default directory is Cfg (parent directory: ConfigPack).
- Click the Save button to complete the operation or Cancel to cancel it.

❑ Creating a new configuration template

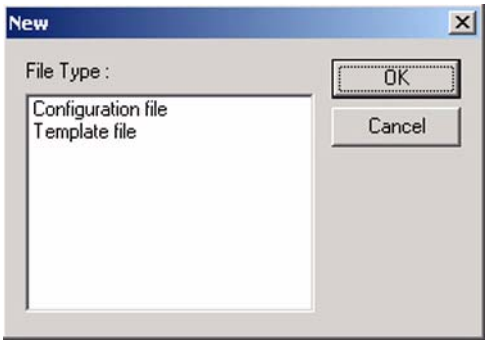
In its content, a template file is not very different from a configuration file. The only difference resides in the fact that a template is prompted as a possible model for a new configuration, which cannot be the case with a “simple” configuration file (although you can create a new file, using the Save As command, from the currently displayed and active configuration file).

- In the Toolbar, click  or select File from the menu bar and then New
- In the New dialog box that appears, select "Template File" and click OK (or double-click directly on this option).
- A new window appears showing a copy of the file selected earlier in the New dialog box. As shown in the title bar, the file is given the default name "Templ1" (or "TempIn" if "n-1" files have been created in the current ConfigPack session).
  The file is unsaved, which means that you will have to confirm or change this name whether you select File and Save, or File and Save As, after defining the content of the file.
- Select and view the desired modules and sub-modules of parameters as described elsewhere (see *Using the Select Pane on page 12*).
- Define all your parameters. Refer to *Configuration Modules on page 59* for more information on these parameters.

- To save your file, in the toolbar, click  or select File from the menu bar and then Save
- In the Save As dialog box that appears, confirm or change the file name. The default extension is tpl, which you should not change. The template should be saved in the TPL folder (parent directory: ConfigPack).
- Click the Save button to complete the operation or Cancel to cancel it.
  The name that you give to your template will appear between brackets in the New dialog box next time you open it.

About templates

Templates are used when you create a new file. When you select File>New from the main menu, the New dialog box that appears lists two options, as shown below.



The first option allows you to create a new configuration file from the default template.

The second option allows you to create a new template from the default template. Later, you will select the newly created template (available from the New dialog box) to create your own configuration files, therefore starting from a configuration that you will have "pre-adjusted" to your applications.

If you choose "Configuration file" and you click the OK button, a copy of the default template will appear in the ConfigPack main window from which you will be able to create a new configuration file.

❑ How to create a new template

You can create a new template only from the "Template file" option shown in the New dialog box. See *Creating a new configuration template on page 24*.

❑ How to remove a template from the New dialog box

Using Explorer, list the content of the TPL folder (parent folder: ConfigPack). Move the unwanted templates elsewhere or delete them.

Note that the default template ("Template file" in the New dialog box) cannot be removed as it is required to create new templates.

Copying all the data from an open file to another

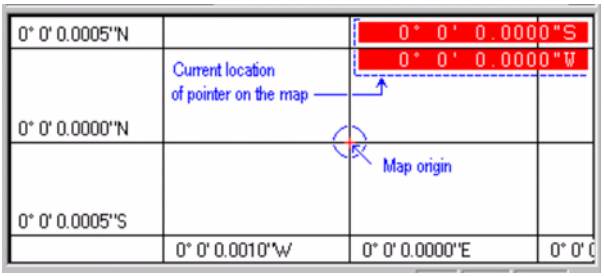
Assuming the two configuration files are open, do the following:

- Click the left mouse button anywhere within the Select Pane of the source file
- In the toolbar, click 
- Move the mouse pointer to the Select Pane of the target file and click the left mouse button anywhere within this pane
- In the toolbar, click  . A message box appears asking you to confirm the copy operation.
- Click the Yes button if you really want to overwrite the entire tar-get file with the data from the source file.

❑ Defining waypoints & routes with a simple mouse click

- When you first select the Waypoints or Routes sub-module (by clicking the corresponding document icon in the Select Pane), the Graphic Pane is changed into a map centered around the point 0° 0' 0.000"N - 0° 0' 0.000" E (WGS84 coordinate system used necessarily).
  A grid is represented, adapted to the size of the Graphic Pane. The map is magnified with the maximum zoom-in ratio possible.

The coordinates of the mouse pointer, as you move it within the pane, are reported in white, with red background, in the upper-right corner of the map.



- A Shortcut menu is available from within this pane through which you can perform the following operations (described in detail furtehr on):
  - Defining the region where to place your waypoints using the World Map editor
  - Zooming in, zooming out
  - Moving the map within the Graphic pane
  - Adjusting the Zoom so as to view all the waypoints
  - Placing waypoints on the map
  - Importing waypoints from the 3SPack software
  - Defining routes on the map

❑ Defining the region where to place your waypoints using the World Map editor

See *Defining your work region using the World Map editor on page 36*.

❑ Zooming in

- Position the mouse pointer anywhere on the Graphic Pane.
- Click with the right mouse button. The shortcut menu pops up.
- Choose the Zoom In command from the menu. As a result the menu vanishes and the pointer looks like  .
- Position the pointer somewhere on the region on which you want to zoom in and click with the left mouse button. As a result the window displays a magnified view of the region, centered around the clicked point
- You can zoom in repeatedly (i.e. so long as the mouse pointer looks like). The buzzer will sound if you try to zoom in and you have already reached the maximum zoom-in ratio.

❑ Zooming out

- Position the mouse pointer anywhere on the Graphic Pane.
- Click with the right mouse button. The shortcut menu pops up.
- Choose the Zoom Out command from this menu. As a result the menu vanishes and the pointer looks like  .
- Position the pointer somewhere on the region and click with the left mouse button. As a result the window displays a larger-scale view centered around the region.
- You can zoom out repeatedly (i.e. so long as the mouse pointer looks like ).The buzzer will sound if you try to zoom out and you have already reached the minimum zoom-out ratio.

❑ Moving the map within the Graphic pane

- Position the mouse pointer anywhere on the Graphic Pane.
- Click with the right mouse button. The shortcut menu pops up.
- Choose the Grabber command from this shortcut menu. As a result the menu vanishes and the pointer looks like  .
- Depress the left mouse button and drag the pointer in the direction where you want the map to be moved. Note that the move will take place only when you release the mouse button and it will be proportional to the distance covered by the pointer when you drag it.

❑ Adjusting the Zoom so as to view all the waypoints

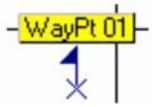
- Select the Zoom to Fit command from the Shortcut menu. This causes the map to be re-adjusted (through a zoom-and-grab operation) so that it can view all the waypoints you have defined.
- The Zoom to Fit command is executed automatically whenever corrections are made to the Editor table of the Waypoints sub-module

❑ Placing waypoints on the map

- Position the mouse pointer anywhere on the Graphic Pane.
- Click with the right mouse button. In the shortcut menu which then appears, choose the Draw command.

  As a result the menu vanishes and the pointer shape is changed to  .
- Watching the pointer coordinates displayed in the upper-right corner of the Graphic pane, position the pointer where you want a new waypoint to be created and click with the left mouse button.

As a result, a waypoint is created at this location: a flag is placed to indicate its location and a default name (WayPt nn) is assigned to it.



What's more, a new row is created at the bottom of the Editor table (Edit Pane) containing the definition of that new waypoint, expressed in the Default coordinate system.

#	Name	Coord. System	Input	L
1	WayPt 01	DEFAULT	L - G - A	0° 0' 0.(

Notes:

- Subsequent modifications to a waypoint defined graphically will be possible only from the corresponding row in the Editor table (and the Graphic Pane will then be updated accordingly).
- Following any correction to the definition of a waypoint in the Edi-tor table, the Graphic Pane is refreshed and the Zoom to Fit command is executed automatically.
- When deleting a waypoint named 'WayPt nn' from the Editor table, then all the next waypoints also named 'WayPt nn' are re-numbered accordingly.
- You cannot delete a waypoint if it is involved in the Navigation mode or in the definition of a route.

❑ Importing waypoints from the 3SPack software

This command can be used only if 3SPack has been installed on your computer (otherwise the command in the shortcut menu is dimmed).

- Position the mouse pointer anywhere on the Graphic Pane, click with the right mouse button and choose the Import from 3SPack... command.
  A dialog box appears listing the names of all the points available from 3SPack. Example:

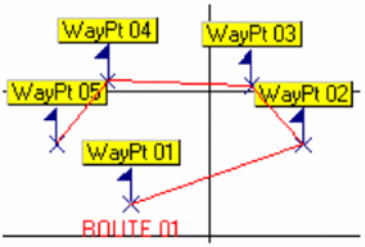
- Choose one or more of the prompted points (combining the Shift or Ctrl key with a click on the mouse) and then click the Import button.
  This causes the points to be added both in the Editor table and on the Graphic Pane. The Zoom to Fit command is then auto-matically run in order that the Graphic Pane can view all the points.

❑ Defining routes on the map

(After having created the necessary waypoints and after having selected the Routes sub-module from the Select Pane)

- Position the mouse pointer anywhere on the Graphic Pane, click with the right mouse button and choose the Draw command.

  As a result the menu vanishes and the pointer shape is changed to ∿.
- Click successively with the left mouse button on all the waypoints making up the route. Proceed in chronological order, from the first to the last waypoint:
- Click on the first waypoint. ConfigPack automatically assigns a default name to the new route (ROUTE nn), which appears beside this point with a software-set color.
- Move the pointer to the next waypoint and click with the left mouse button again. Note the segment drawn from the previous waypoint as you move the pointer. Note also the attraction of the waypoint location if you do not click exactly on the cross (at the base of the flag).
- When arriving on the last waypoint, double-click on that waypoint to tell ConfigPack the route definition is complete (or double-click anywhere on the map, except on a waypoint, after clicking on the last waypoint of the route).



What's more, a new row is created at the bottom of the Editor table (Edit Pane) containing the complete definition of that new route

	#	Name	Waypoint 1	Waypoint 2	Waypoint 3	W
	1	ROUTE 01	WayPt 01	WayPt 02	WayPt 03	Wa

Notes:

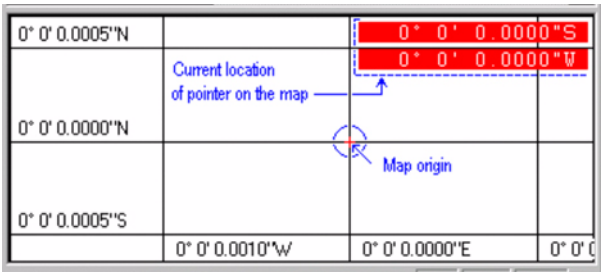
- Subsequent modifications to a route defined graphically will be possible only from the corresponding row in the Editor table (and the Graphic Pane will then be refreshed accordingly).
- When deleting a route named 'ROUTE nn' from the Editor table, then all the next routes also named 'ROUTE nn' are re-numbered accordingly.
- You cannot delete a route if it is involved in the Navigation mode.

Defining beacons with a simple click of the mouse

- As this also occurs with the Waypoints and Routes sub-modules, when you first select the Beacons sub-module (by clicking the corresponding document icon in the Select Pane), the Graphic Pane is changed into a map centered around the point 0° 0' 0.000"N - 0° 0' 0.000" E (WGS84 coordinate system used necessarily).

  A grid is represented, adapted to the size of the Graphic Pane. The map is magnified with the maximum zoom-in ratio possible.

  The coordinates of the mouse pointer, as you move it within the pane, are reported in white, with red background, in the upper-right corner of the map.



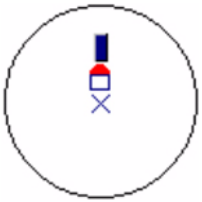
- A Shortcut menu is available from within this pane, much similar to the one accessible from the Graphic Pane of the Waypoints or Routes sub-module. The same operations can be performed:
  - Defining your work region using the World Map editor (see page 36).
  - Zooming in (see page 28)
  - Moving the map within the Graphic pane (see page 29).
  - Adjusting the Zoom so as to view all the waypoints (see page 29)
  - Placing beacons on the map (see page 35).

❑ Placing beacons on the map

- Position the mouse pointer anywhere on the Graphic Pane, click with the right mouse button and choose the **Draw** command from the shortcut menu.

  As a result the menu vanishes and the pointer shape is changed to  .
- Watching the pointer coordinates displayed in the upper-right corner of the Graphic pane, position the pointer where you want a new beacon to be created and click with the left mouse button.

  As a result, a beacon is created at this location: a milestone is placed to indicate its location and a default range (20 km is assigned to it, represented by a circle centered around that location.



What's more, a new row is created at the bottom of the Editor ta-ble (Edit Pane) containing the complete definition of that new beacon. Example (excerpt):

Beacon ID	Name	Lat	Long	Band. 1
0		0° 0'59.9999"N	0° 1'11.2455"E	UHF

Notes:

- No default name is assigned to a beacon defined graphically. The corresponding field in the Editor table is left blank and a blue rectangle is shown above the milestone in the Graphic Pane (see above). You should therefore enter a name in the corresponding **Name** field (in the Editor table).
- Also, in the same row, you will need to verify/change a number of parameters, such as transmission band, carrier frequency, modu-lation, encryption, etc, as these parameters are defined with defaults in the case of a beacon defined graphically.

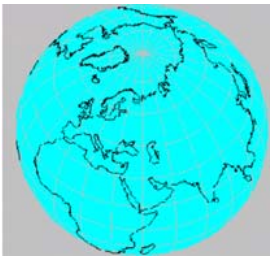
- Subsequent modifications to a beacon defined graphically will be possible only from the corresponding row in the Editor table (and the Graphic Pane will then be refreshed accordingly).
- You cannot delete a beacon if it is involved anywhere in the Mode sub-module (DGNSS module).

Using the World Map Editor

When from the Select Pane, you choose Waypoints or Routes (NAVIGA-TION module) or Beacons (DGNSS module), a shortcut menu is available from the Graphic Pane from which you can define the region of survey. This function uses the World Map editor described below.

❑ Defining your work region using the World Map editor

- Position the mouse pointer anywhere on the Graphic Pane, click the right mouse button to display the Map Shortcut menu and then select the Region... command. A new window appears showing the World Map editor.



A Shortcut menu is available from within this pane through which you can perform the following operations:

- *Rotating the globe (see page 37)*
- *Zooming in (see page 37)*
- *Zooming out (see page 37)*
- *Selecting a region on the World Map (see page 38)*
- *Changing the viewing options of the World Map (see page 39)*

❑ Rotating the globe

If the current view of the globe does not display the region where you would like to work in, a function is available allowing you to rotate the globe:

- Position the mouse pointer anywhere on the pane of the World Map window.
- Click the right mouse button. The World Map shortcut menu pops up.
- Choose the Grabber command from this menu. The menu vanishes and the pointer looks like 
- Depress the left mouse button and drag the pointer in the direction where your region is. Note that the globe will rotate only when you release the mouse button. Note also that the rotation angle is defined by the distance covered by the pointer when you drag it.

❑ Zooming in

- Position the mouse pointer anywhere on the pane of the World Map window.
- Click with the right mouse button. The World Map shortcut menu pops up.
- Choose the Zoom In command from the menu. As a result the menu vanishes and the pointer looks like  .
- Position the pointer somewhere on the region on which you want to zoom in and click with the left mouse button. As a result the window displays a magnified view of the region, centered around the clicked point
- You can zoom in repeatedly (i.e. so long as the mouse pointer looks like ). Up to 6 successive zoom-in operations are possible from the initial view of the World Map.

❑ Zooming out

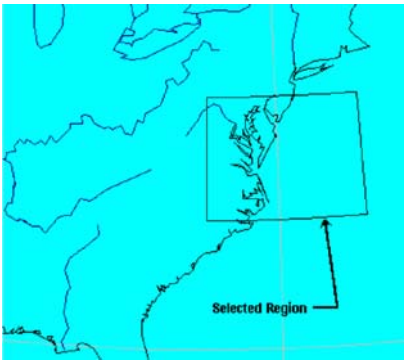
- Position the mouse pointer anywhere on the pane of the World Map window.
- Click with the right mouse button. The World Map shortcut menu pops up.
- Choose the Zoom Out command from this shortcut menu. As a result the menu vanishes and the pointer looks like  .
- Position the pointer somewhere on the region and click with the left mouse button. As a result the window displays a larger-scale view centred around the region

- You can zoom out repeatedly (i.e. so long as the mouse pointer looks like) until you reach the view of the entire globe.

❑ Selecting a region on the World Map

Assuming the desired region is now visible on the World Map, after rotation and Zoom-in operations, do the following:

- Choose the Draw command from the World Map shortcut menu
- Drag the mouse button so as to surround the desired region. Release the mouse when you agree with the selection



- Click the OK button.
  On the Graphic pane which then displays again, note that that the graduations have been updated to comply with your choice.

❑ Changing the viewing options of the World Map

- Position the mouse pointer anywhere on the pane of the World Map window.
- Click with the right mouse button. The World Map shortcut menu pops up.
- Choose the Options command from this shortcut menu. As a re-sult the Options dialog box appears. The default options are shown below.

Four levels of map resolution are available:

- Low
- Medium
- High
- Very High

The higher the resolution, the more accurate the details on the map.

Viewing the resulting configuration file

- Click the left mouse button anywhere within the Select Pane.
- In the toolbar, click  or from the menu bar, select File and then Print Preview.
  The preview shows the current content of the configuration file (a list of command lines interpretable by Magellan GNSS receivers).
  Example (partial view):

```
$PDAS,CONFIG,BEGIN,69
$PDAS,COMMNT,2,1,NR302K DEFAULT CONFIGURATION
$PDAS,COMMNT,2,2,BY PATRICE BONNIN
$PDAS,GEO,6,1,,
$PDAS,GEO,6,2,1,NTF
$PDAS,GEO,6,3,A,6378249.145,1/F,293.465000000,S,1.000000000,1
$PDAS,GEO,6,4,Dx,-168.000,Dy,-72.000,Dz,318.500,1
$PDAS,GEO,6,5,Ax,0.000000,Ay,0.000000,Az,0.554000,e
$PDAS,GEO,6,6,00,LGH NTF
$PDAS,GEO,8,1,,
$PDAS,GEO,8,2,2,NTF
$PDAS,GEO,8,3,A,6378249.145,1/F,293.465000000,S,1.000000000,1
$PDAS,GEO,8,4,Dx,-168.000,Dy,-72.000,Dz,318.500,1
$PDAS,GEO,8,5,Ax,0.000000,Ay,0.000000,Az,0.554000,e
$PDAS,GEO,8,6,02,LAMBERT,1
```

How to quit ConfigPack

- From the menu bar, select File and then Exit. Unless an unsaved configuration is still open, this causes the ConfigPack main window to be closed immediately.

  If one or more unsaved configurations are still open in the ConfigPack window, warning messages will appear successively for each of these configurations asking you to save the last changes made to the file before quitting ConfigPack. Click the Yes button to save the last changes made, or the No button to reject them. ❑

4. Using ConfigPack Connected to a Receiver

Preliminary steps

Using one of the serial ports of your computer, ConfigPack can connect to a Magellan GNSS receiver so that you can work on its configuration.

You can also use the Win Comm tool to send commands to the receiver or to log data from the receiver.

Prior to performing any of these functions, you should configure the PC se-rial port properly, using the **Communications** tab in the **Options** dialog box. (see *Communications tab on page 19*).

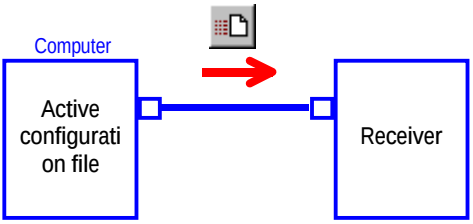
Then, and depending on what you intend to do, follow one of the procedures described in this section.

Before downloading or uploading a configuration file via one of the PC's serial ports using ConfigPack, do not forget to close the **WinComm** or Geoids window if these programs also use the same serial port. By doing this, you will make the port available to ConfigPack.

Remember the port settings may be specific to each utility program. For example WinComm may use port settings different from those requested by ConfigPack.

Writing a configuration into a receiver

Direction of transfer:

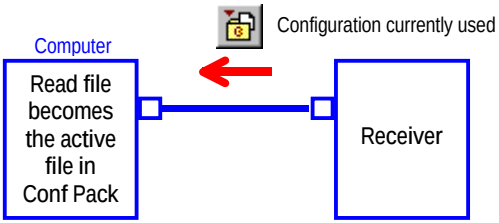


Assuming the receiver is properly connected and the serial line is properly configured:

- Open the configuration file you want to write into the receiver
- In the toolbar, click  or in the menu bar, select the **Transfer** menu and then **Write Initial**
- A dialog box appears asking you to confirm the write operation.
- Press the **Yes** button to start writing the active file into the receiver. A dialog box appears asking you to confirm or change the unit number assigned to the attached receiver.
  After sending the file, ConfigPack waits for a transfer acknowledgment from the receiver.
  If the acknowledge signal is returned in time, then the write operation is considered to be successful (the transferred file is then the receiver's new initial and current configurations).
  If no acknowledge signal is received, the write operation is aborted after the user-set time out (see *Changing the Options of ConfigPack on page 18*).

Reading the currently used configuration from a receiver

Direction of transfer:

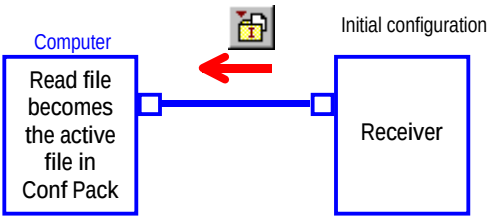


Assuming the receiver is properly connected and the serial line is properly configured:

- In the toolbar, click  or in the menu bar, select the **Transfer** menu and then **Read Current**
  ConfigPack then starts reading the current configuration file from the receiver. A new window is opened in ConfigPack showing this file (default name: Config).

Reading the initial configuration from a receiver

Direction of transfer:



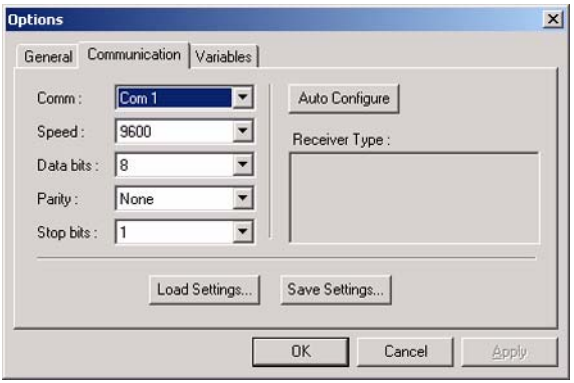
Assuming the receiver is properly connected and the serial line is properly configured:

- In the toolbar, click  or in the menu bar, select the **Transfer** menu and then **Read Initial**
  ConfigPack then starts reading the initial configuration file from the receiver. A new window is opened in ConfigPack showing this file (default name: Confign).

Sending commands to a receiver

After connecting the receiver to the PC via the desired port, do the follow-ing:

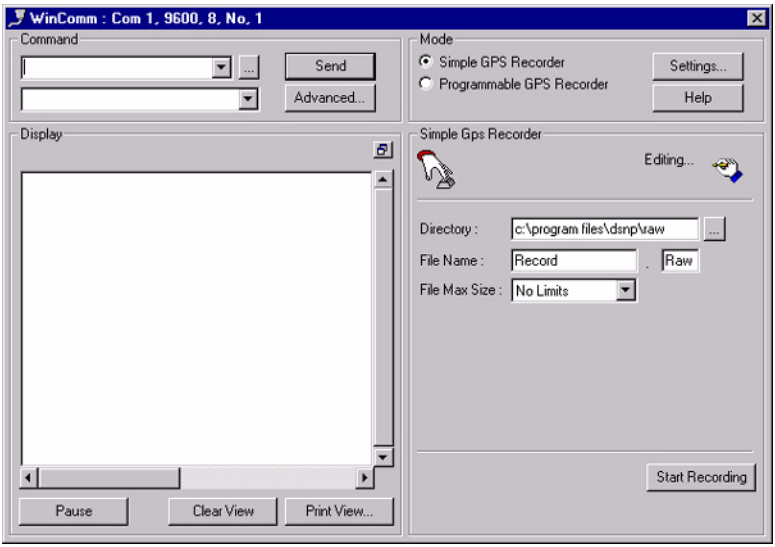
- In the toolbar, click  or in the menu bar, select **Tools** and then **Win Comm**. A new window is displayed showing the **Communication Settings** dialog box. Use this box to set the PC port connected to the receiver:



There are three different ways of setting the PC port:

- Either manually by selecting the desired parameter in each of the fields shown in the above window
- Or by asking ConfigPack to determine automatically which parameters should be used to communicate with the receiver. This is obtained by clicking on the **Auto Configure** button. After testing a number of combinations, ConfigPack will finally position each of the fields so that communication can take place with the receiver
- Or by loading a set of parameters which was saved earlier as a SET file (the **Save Settings**... button was then used for that purpose). This is simply obtained by first clicking on the **Load Settings**.. button and then choosing the desired SET file.

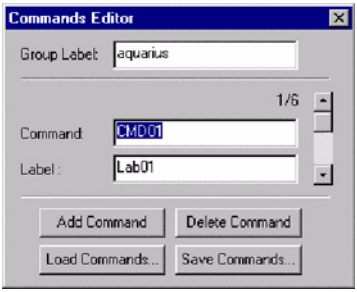
- Once the fields are properly filled, click OK. The Win Comm dialog box then appears. For more information on the Display Pane, see *Display Pane / Window on page 54*.



- To send a command, use the Command Pane (upper-left):
  - Directly type the command in the upper combo box, or select it from that combo box, or fill that box by choosing the corresponding label from the lower combo box.
  - Click the Send button.

❑ Adding new commands to the combo box

- Click the Advanced button in the Command Pane. The Commands Editor dialog box appears allowing you to set up a group of commands interpretable by the connected receiver. The commands you select in this dialog box will be prompted in the main window. (As a result, you will only need to choose the desired command from the list in the main window and click to send the command to the connected receiver).



The buttons in the Commands Editor dialog box allow you to load any command-group file available, make any change to the group and save your own command groups.

The selected command group will be available in the main window after you close the Commands Editor dialog box (by clicking in the upper-right corner).

❑ Using the Commands Editor dialog box

Group Label: Text box used to enter and/or view the name given to a command group. For example, this name can suggest the type of receiver connected when this command group should be used.

Command: Text box used to enter and/or view each command script. Use the associated scrollbar to browse through the list of available commands.

Label: Text box used to enter and/or view a plain label for each command script. Use the associated scrollbar to browse through the list of available commands.

Add command: Adds the command viewed in the text box to the list of available commands.

Delete command: Removes the command viewed in the text box from the list of available commands.

Load commands: Opens a dialog box that allows you to choose the appropriate command group file for the connected receiver so that the command group becomes available in the main window after you close the Commands Editor dialog box.

Save commands: Opens a dialog box that allows you to save your own command group (as viewed in the Commands Editor dialog box) (cmd extension).

- Click  to close the Commands Editor dialog box. This loads the selected command group to the main window.

Logging data sent by the receiver

Assuming the receiver is properly connected to the PC port:

- In the toolbar, click  or in the menu bar, select **Tools** and then **Win Comm**.
- In the window that appears, set the PC port as explained in *Sending commands to a receiver on page 45* in order to allow communication with the receiver.
- Press **OK**. A new window appears showing the **Win Comm** dialog box. For more information on the *Display* Pane, see *Display Pane / Window on page 54*.
  As shown in the right-hand part of the window, there are two different ways of logging the data, depending on the type of receiver used:
  - Simple recorder
  - Programmable recorder.

❑ Simple GPS recorder

All data output from the receiver's port is viewed in the main window's Dis-play pane / window. The data can be recorded to the file specified in the File Name and Directory text boxes.

When the **Simple GPS Recorder** option is activated, you start and stop the recording manually, by simply clicking the **Start/Stop Recording** button.

File Name: This text box is used to specify the name of the file to which you wish to record the data from the receiver.

Unless a maximum size is selected for the file, you are also allowed to enter an extension into the associated box.

File Max Size: This option box is used to specify whether a single file should be created on the disk (No Limits option) or the file should be split into 0.7 MB or 1.4 MB segments (with a view to storing it to floppy disks).

If you elect to split the file into segments, then the system will automatically add 001 as extension to the name of the first segment. This will automatically be incremented for each file segment generated, if the file exceeds the File Max Size selected.

Start Recording: Clicking this button causes the data to be recorded to the specified file until you click the button again. (The label of the button changes from Start Recording to Stop Recording).

❑ Programmable GPS recorder

The Programmable GPS Recorder option allows you to prepare one or more requests for recording the data output on the connected receiver port, by specifying a start date, time and duration for each planned recording session, and also a disk file name, directory and maximum size.

You can save the recording session requests you prepare (using the Save button) so that you can load them back at a later date (using the Load button).

Directory: This text box is used to specify the directory to which you wish to record the data from the receiver. Clicking the button to the right opens a dialog box that allows you to navigate through the directory tree on your hard disk or a floppy disk, and select the desired destination directory.

File Name: This text box is used to specify the name of the file to which you wish to record the data from the receiver.

- If you choose the Automatic File Name option (i. e. if the option box is checked), then the File Name text box is dimmed and the name is automatically assigned by the system, based on the date (month, day number) and time (hour, minute) of the recording session.

Example: 12240929 for a file recorded on December 24 at 9:29 a.m.

- If you do not select the Automatic File Name option, then you can enter a name of your own. Unless a maximum size is selected for the file, you are also allowed to enter an extension into the associated box.

File Max Size: This option box is used to specify whether a single file should be created on the disk (No Limits option) or the file should be split into 0.7 MB or 1.4 MB segments (with a view to storing it to floppy disks).

If you elect to split the file into segments, then the system will automatically add 001 as extension to the name of the first segment. This will automatically be incremented for each file segment generated, if the file exceeds the File Max Size selected.

Start Date: This text box is used to specify the day on which the recording session should begin. The current date is prompted by default.

Start Time: This text box is used to specify the time when the recording session should begin. The current time is prompted by default.

Duration: This text box is used to specify the planned duration of the recording session.

Automatic File Name: If you choose this option (i.e. if the option box is checked), then the File Name text box is dimmed and the name is automatically assigned by the system, based on the date (month, day number) and time (hour, minute) of the recording session. Example: 12240929 for a file recorded on December 24 at 9:29 a.m.

If you do not select the Automatic File Name option, then you can enter a name of your own. Unless a maximum size is selected for the file, you are also allowed to enter an extension.

Add Request: This button saves the recording session description currently displayed and increments the number of programmed sessions that appears at the bottom of the scrollbar. (This automatically selects the Automatic File Name option and prompts the next possible session, considering the specified Duration).

Delete Request: This button deletes the recording session description currently displayed and decrements the number of programmed sessions that appears at the bottom of the scrollbar.

Run Program: This button activates the Programmable GPS Recorder mode. This causes Win Comm to wait for the next scheduled recording session and perform recording as planned. The label of the button changes from Run Program to Stop Program. Until the planned recording is complete or you click Stop Program, all other buttons in the Programmable GPS Recorder pane are inhibited and you cannot change to another mode.

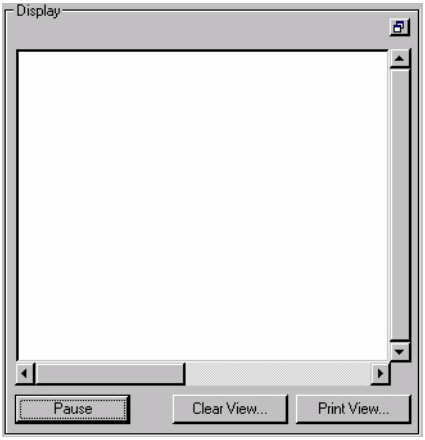
Load Program: This button opens a dialog box that allows you to select a file (typically a .pgm file) containing descriptions of planned recording sessions (saved earlier using the Save Program button). Select the desired file name and click Open.

Save Program: This button opens a dialog box that allows you to save descriptions of planned recording sessions so that they can be used at a later date (using the Load Program button). Enter a name into the File Name text box and click Save.

Print Program: This button opens a Print dialog box that allows you to print the descriptions of planned recording sessions currently loaded.

Display Pane / Window

After communication is enabled between the computer and a GPS receiver the Display pane allows you to view the data stream on the receiver port, including data output in response to any command generated by Win Comm.



If you wish to enlarge the Display pane, click in this pane (top right). This causes the pane to be transformed into a separate window which you can move/resize using the usual commands assigned to windows in the Windows95 environment. To restore the Display pane at the initial location, click - or (top right).

As the data may be refreshed every 0.1 seconds, you cannot log all the data that is relayed through the port for display at a later date as this would require a huge memory size. For this reason, only the latest 100 data lines are stored and can be viewed using the vertical scroll bar available.

Each data line ends with a CR LF code and/or when it reaches the maximum length (90 characters).

The Display pane contains the following buttons:

Pause: Freezes the Display pane and changes the label of the button to Resume.

Pressing the Pause button does not suspend the data flow on the receiver port or the recording in progress.

Pressing this button again (then changed to a Resume button) will re-activate the Display pane.

Clear View...: Deletes any data displayed in the Display pane / window.

Print View...: Opens a Print dialog box that allows you to print any data displayed in the Display pane / window.

Loading a new geoid

The Geoids module, a separate module that can be directly launched from ConfigPack, allows you to:

- Import geoids
- Extract data from a geoid to create a smaller file containing just the necessary data for your working area
- Load partial or complete geoid models directly into a GNSS receiver.

Three geoid models are available in the Geoids module: RAF98 (France), EGM96 (Global) and GDS95 (Canada)

❑ Starting the Geoids module

- On the ConfigPack Tools menu, select Geoids. This starts the Geoids module.

❑ Importing a new geoid model:

- In the Geoids window, select File>Import and indicate the location of the corresponding file.

❑ Opening a geoid model:

- In the Geoids window, select File>Open. This function indicates the following: geoid name, limits of geographical area, grid step, file size, number of points.

❑ Extracting data from a geoid model:

- A geoid model must be open in the window
- In the Geoids window, select File>Extract As.... Define the characteristics of the data extraction (name, format). To indicate the limits of your working area, you can advantageously use the World Map function, by clicking the World Map button, rather than type the coordinates of the N-W and S-E limits of the area.
- Click the Extract button to create the new file. This file is automatically opened in the Geoids window after being created by the module.

❑ Loading a geoid model into a receiver

- A geoid model must be open in the window (a complete or partial ge-oid). Establish a serial link between one of the ports on your PC and, for example, port A on the Scorpio (any RS232 port can be used on the Scorpio), using the appropriate cable.
- In the Geoids window, select Transfer>Write. A dialog box appears asking you to choose and set the serial port on your PC now connected to the Scorpio.
  After setting the port, click OK to start and complete the file transfer. ❑

5. Configuration Modules

Modules and sub-modules

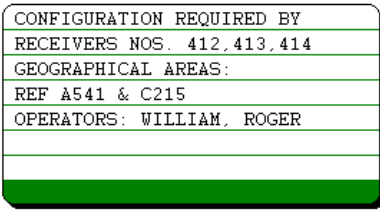
As shown in the Select Pane, the modules and sub-modules of configuration parameters are the following:

DESCRIPTION	Pseudo Ranges
Comment	GPS Data
GEODETIC SYSTEMS	Bit Flow
Coordinate systems	Event Time Mark
Current	SCREEN
Altitude	Appearance
PROCESS	Preferences
Satellites	NAVIGATION
Reference Position	Waypoints
Time	Routes
Filter	Navigation Mode
Filter selection	Heading Mode
Main Mode	Antenna Offset
Multi Mode	
Backup Threshold	SESSIONS
Heading Offset	Description
Maximum DOP	Sequencing
Quality Control	DGNSS
Iono	Beacons
Antenna Description	Mode
MobileAntenna	PRCs Time Out
INPUT / OUTPUT	DGNSS Data
Communications	WAAS/EGNOS
Formats	Mode
Computed Data	Data

DESCRIPTION

Comment: Free text limited to 30 characters per line; 6 lines max; a key note for clear identification of the configuration.

Example of comment as reported in the Graphic Pane:



GEODETIC SYSTEMS

❑ Coordinate Systems

You can create up to 10 rows in the Editor table. Each row should contain the complete description of a coordinate system, as defined below:

#: Software-set field, identifies the row in the Editor table where this coordinate system is defined

Coord. System: Name of the coordinate system

Datum: Name of the datum used

a: Semi-major axis of the datum used (in meters)

1/f: Inverse of the flattening coefficient

k: Scale Factor

Dx, Dy, Dz: X, Y, Z deviations of the datum compared with the reference ellipsoid (signed values in meters)

Rx, Ry, Rz: Angular deviations of the datum around the X, Y Z axes compared with the reference ellipsoid (angles in seconds)

Proj. Kind: Kind of projection used (Geocentric, Lat/Long, 1P-Lambert, 2P-Lambert, Stereographic, Rect-SkewOrtho or SkewOrtho, utm)

False Easting: Easting for projection center

False Northing: Northing for projection center

Central Meridian: Longitude of projection center

Central or North Lat.: Latitude of projection center or latitude of 1st parallel respectively

Scale or Ref Lat.: Scale factor or latitude of projection center respectively

Skew or South Lat.: Azimuth of initial line or latitude of 2nd parallel respectively

Example of coordinate system, as reported in the Graphic Pane:

```
Coord. System 1/1

System Name     : Txr
Datum Name      : Txr_dat
a               : 6378537.000 m
1/f             : 298.257223463
k               : 1.000000000000
DX              : 0.004 m
DY              : 0.020 m
DZ              : 0.000 m
RX              : 0.008500"
RY              : 0.000020"
RZ              : 0.000700"
Proj. Kind      : 2P-Lambert
False East      : 600000.000 m
False North     : 200000.000 m
Central Merid   :   0° 0' 0.0000"E
North Lat.      :   0° 0' 0.0000"N
Ref. Lat.       :  57°17'44.8062"N
South Lat.      :   0° 0' 0.0000"N
```

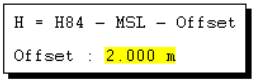
❑ Current

Current Coord. System: Name of the coordinate system which your receiver(s) will use by default.
Following the choice you make in this cell, the Graphic pane shows a sample of coordinate transformation resulting from your choice. The sample uses as input the coordinates entered in the Variables window (ac-cessed by selecting Tools>Options>Variables tab)

❑ Altitude

Mode: Choose the default altitude computation mode for your receiver(s):
- WGS84 - MSL: Altitude computed on Stanag geoid grid
- WGS84: Altitude computed on the WGS84 ellipsoid
- Ellipsoid: Altitude computed on user ellipsoid
- User geoid: Altitude computed on user geoid

Offset: Specify the antenna height with respect to the chosen reference (in meters)
Example of Altitude as reported in the Graphic Pane:



PROCESS

❑ Satellites

Minimum elevation: By default, only the satellites above this elevation angle, seen from the current location(s) of your receiver(s), will be used in the position processing

Deselected SVs: PRN numbers of the satellites you do not want your receiver(s) to use (whatever their elevation angles) (Default deselection). (From 1 to 33 for GPS satellites, from 120 to 138 for WAAS/EGNOS satellites)

❑ Reference Position

Precise coordinates of the DGPS reference station, or of the mobile receiver if KART or LRK initialization must be performed from this location.

(A single row possible in the Editor table).

Coord. System: Specify the coordinate system in which the reference position is expressed (choose one of the coordinate systems you have defined, or the default one)

Input: Type of coordinates used to express the reference position

Latitude/Northing: Latitude, or Easting of the reference position, depending on the coordinate system used

Longitude/Easting: Longitude, or Northing of the reference position, depending on the coordinate system used

Altitude/Height: Altitude of the reference position, depending on the coordinate system used

❑ Time

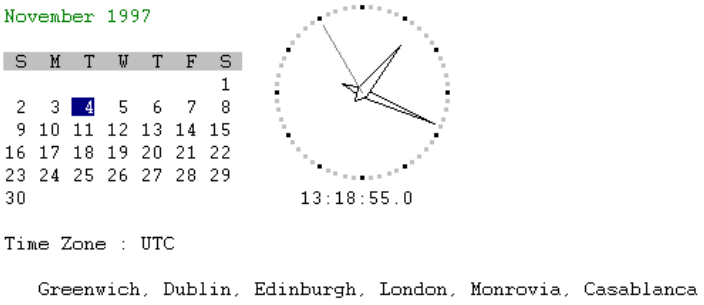
(A single row possible in the Editor table)

Date: Local date

Time: Local time

Time Zone: Time zone of the operating area

Example of time setting as reported in the Graphic Pane:



❑ Filter

Speed Filter Time Constant MEDIUM: Medium Speed Filter time constant (0.0 to 1000.0 seconds) (default: 20.0 seconds).

Speed Filter Time Constant MINIMUM: Minimum Speed Filter time constant (0.0 to 1000.0 seconds) (default: 6.0 seconds).

Speed Filter Time Constant MAXIMUM: Maximum Speed Filter time constant (0.0 to 1000.0 seconds) (default: 60.0 seconds).

❑ Filter Selection

Select...: Allows you to activate the desired filter. You can choose between one of the three filter time constants (Medium, Minimum and Maximum) defined earlier through the above Filter sub-module.

❑ Main Mode

Process: Position process type (this choice depends on the destination of your receiver)

Reference Station: Configuration file intended for a stationary receiver, associated with a reference station transmitting corrections

Monitoring Station: Configuration file intended for a stationary receiver, associated with a monitoring station

GPS Natural: Configuration file intended for a "pure" GPS receiver (i.e. not including a DGPS correction receiver)

DGPS: Configuration file intended for a GPS receiver capable of receiving and processing DGPS corrections

Multimode: Configuration file intended for a GPS receiver for which a primary mode and a backup mode are defined

EDGPS: Configuration file intended for a GPS receiver capable of receiving KART/LRK data and processing EDGPS solutions

KART/LRK: Configuration file intended for a GPS receiver capable of delivering a KART or LRK position solution with OTF initialization

L1...L2: Indicates which GPS frequencies will be processed (L1 or L1+L2) in the receiver. The only possible choice is L1/L2 for the first 4 options of Process (Reference station, Monitoring station, GPS Natural, DGPS). If Process=EDGPS or KART/LRK, the possible options are:

L1/L2: Dual-frequency processing

L1/L2 WL: Wide-Lane dual-frequency processing

L1 only: Single-frequency processing

The type of processing performed in the receiver will depend on the GPS & DGPS data received and the type of firmware options installed in the receiver.

System: Allows you to select the source of positioning data (GPS + corrections data) needed for the process you have chosen in the Process cell (previous cell). The possible options for this cell are also deduced from the selection you have made in the previous cell.

DGNSS Sta. or Geo. SV Fix Type or Data Ref.: Identification number(s) of the reference station(s) used (up to 4 stations) or GEO PRN, according to the selections in the Process and System cells (see table below).
The possible combinations of parameters are listed below:

Process	System	Corrections or data source	L1...L2	DGNSS Sta. or Geo. SV Fix Type or Data Ref.
Reference station	GPS Nat	GPS	L1/L2	-
Monitoring station	GPS Nat	GPS	L1/L2	-
	DGPS/ KART/LRK	GPS + Reference station or NMEA message	L1/L2	DGNSS station number
	WADGPS	GPS + GEO SV	L1/L2	-
GPS Nat	GPS Nat	GPS	L1/L2	-
DGPS	DGPS/ KART/LRK	GPS + Reference station or NMEA message	L1/L2	DGNSS station numbers
	WADGPS	GPS + GEO SV	L1/L2	Geo SV Numbers
EDGPS or KART/LRK	DGPS/ KART/LRK	GPS + Reference station or NMEA message	L1/L2, L1/ L2 WL or L1 only	DGNSS station numbers

Heading Relative:

None: Choose this option if you do not want your receiver to operate in any of these two processing modes (heading or relative)

Heading: Choose this option if you want your receiver to compute heading (Aquarius² only)

Relative: Choose this option if you want the Relative Positioning processing to be activated in your receiver.

❑ MultiMode

#: Software-set field, identifies the row in the Editor table where an operating mode is defined

Mode: Choose the type of operating mode you are defining in this row. Choose one of the following:

Primary: The mode defined in this row will nominally be the mode used in priority in the receiver. This does not mean that the primary mode has no degraded modes or that there cannoty be automatic swiching over to other DGNSS stations. In theory, there can only be one primary mode.

Manual_Backup: The mode defined in this row will be used as backup mode if the receiver can no longer operate in the primary mode. Switching back to the primary mode -when this mode comes back to its operating state- will require user action.

Automatic_Backup: The mode defined in this row will be used as the backup mode if the receiver can no longer operate in the primary mode. Switching back to the primary mode -when this mode comes back to its operating state- will be automatic.

Ref Pos: Choose the way the receiver will be informed of the position of the DGNSS reference station it has to work with:

Transmitted: The position of the reference station will be received via radio.

$PDAS,PREFLL: The position of the reference station will be entered in the receiver using command $PDAS,PREFLL or $PDAS,PREFNE

$PDAS,REFSTA[1]... to [6]: The receiver will work with the reference station whose description line number is indicated in the option you select. To find this station and its properties, the receiver will refer to the $PDAS,REFSTA command. For example, if you have selected $PDAS,REFSTA[3], the receiver will read the 3rd line returned by $PDAS,REFSTA to know the station to use as well as its position.

Normal/Reverse mode: Choose one of the two options below:

Normal: Normal mode of use in which the DGPS data received from the station is used to determine the position of the unit receiving this data.

Reverse: This option allows you to do just the opposite: it is the position of the station transmitting the DGPS data that is determined in this case.

Average Time (s): Enter the computed data averaging time, in seconds

Process: Set the GPS fix processing mode:

GPS Natural: Straight, or autonomous GPS

DGPS: Differential GPS

EDGPS: Enhanced DGPS, kinematic

KART/LRK: KART/LRK kinematic modes

L1... L2: Choose between the following three options:

L1/L2: Dual-frequency processing

L1/L2WL: Dual-frequency processing, wide lane

L1 only: Single-frequency processing

System: Allows you to select the source of positioning data (GPS + corrections data) needed for the process you have chosen in the Process cell above. The possible choices for this field are tied to the choice you made in the Process field

Process field set to:	Available choices
GPS Natural	GPS Nat.
DGPS	DGPS/KART/LRK WADGPS WADGPS Serial WADGPS All WADGPS All Serial
EDGPS or KART/LRK	DGPS/KART/LRK

DGNSS Sta. or Geo. SV Fix Type or Data Ref.: Identification number(s) of the reference station(s) used (up to 4 stations) or GEO PRN, according to the selections in the Process and System cells (see table below).
The possible combinations of parameters are listed below:

Process	System	Corrections or data source	L1...L2	DGNSS Sta. or Geo. SV Fix Type or Data Ref.
GPS Nat	GPS Nat	GPS	L1/L2	-
DGPS	DGPS/ KART/LRK	GPS + Reference station or NMEA message	L1/L2	DGNSS station numbers
	WADGPS	GPS + GEO SV	L1/L2	Geo SV Numbers
EDGPS or KART/LRK	DGPS/ KART/LRK	GPS + Reference station or NMEA message	L1/L2, L1/ L2 WL or L1 only	DGNSS station numbers

❑ Backup Threshold

(This sub-module is active only if at least one backup mode has been defined)

C/N0: The receiver will refer to the C/No threshold to switch over from the primary to secondary mode

Time Out: This parameter indicates the time that must elapse between the moment the primary mode gets back to the operating status up to the moment returning to this mode is effective.

❑ Heading Offset

Antenna baselength: Baseline length in meters (0 to 999 m)

Horizontal offset angle: Horizontal offset angle in degrees (0 to 360°)

Vertical offset angle: Vertical offset angle in degrees (-90 to +90°)

Filter: (0 to 60 s) Heading filtering time constant, in seconds

❑ Maximum DOP

Maximum Dop: Maximum Dilution of Position permitted (1 to 99) (future use)

❑ Quality Control

Autonomous QC: From the associated combo box, choose the desired option:

None

Or UKOOA

External QC: From the associated combo box, choose the external source of data ensuring Quality Control:

None

Or WAAS/EGNOS

Or RTCM_SC104

DGNSS Station or GEO. SV: Identification number of the reference station used or GEO PRN, according to the selection in the preceding cell.

❑ Iono

Use Iono Corr. with: Type of inospheric corrections used in the position computation (whether in standalone or differential mode). Choose one of the options below:

Klobuchar method: Ionospheric corrections will be those provided by the Klobuchar (Stanag) model

Dual-frequency: Inospheric corrections will be estimated from dual-frequency measurements

WAAS (EGNOS) sat: Ionospheric corrections will be received from a WAAS/EGNOS satellite.

Station or PRN num: Source of ionospheric corrections. Depending on the selection you have made for the previous parameter, enter a Station ID if you chose “Dual-frequency”, or a Geostationary satellite PRN if you chose “WAAS (EGNOS) sat”.

Filter (s): Filtering horizon, in seconds, for estimated ionospheric delays

❑ Antenna Description

Up to 5 different antennas can be described. For each antenna, enter the following parameters

Antenna Name: Antenna name

L2-L1 (cm): Vertical distance between L1 phase center and L2 phase center, in cm with 3 decimal places

❑ Mobile Antenna

Primary Antenna: Indicate the name of the antenna used as the primary antenna

Secondary Antenna: Indicate the name of the antenna used as the secondary antenna

INPUT / OUTPUT

❑ Communications

You can create as many rows as necessary in the Editor table. Each row should contain the complete description of a receiver port, as defined below:

Port: Port name (A, B, C or D)
Baud Rate: Port speed (300 to 115200 Bd)
Data Bits: Number of data bits (7 or 8)
Stop Bits: Number of stop bits (1 or 2)
Parity: None, odd or even

❑ Formats

You can create up to 40 rows in the Editor table. Each row should contain the complete description of a format or the name of a macro with its formatting parameters (n and d):

#: Software-set field, identifies the row in the Editor table where this format or macro name is entered
Format: Expression of the format or macro name.
(See *Displays and Data Outputs on page 89* for the design of screens & data outputs to learn how to write a format with the proper syntax).

❑ Computed Data

You can create up to 20 rows in the Editor table. Each row should contain the complete description of a computed-data message, as defined below:

#: Software-set field, identifies the row in the Editor table where this computed-data message is defined
Port: Receiver port on which this computed-data message will be available (A, B, C, D, P)

Output Mode: Event triggering the message:

STOP: Message inhibited (no trigger event, forces On/Off to OFF)

TIME: Message delivered at regular intervals of time (defined by Rate below)

EVENT: Message triggered by an external event

IMMEDIATE: Message triggered on releasing the message output (when changing the On/Off status to ON)

1PPS: Message triggered by the 1PPS output signal

MANUAL: Message triggered by operator

TR: Message triggered by the TR command sent by an external equipment through a serial port

On/Off: Default message status when turning on the receiver (ON or OFF)

Rate (in 1/10 s or ticks): Factor (0 to 99 999) defining the output rate for this message:

In TIME output mode, the value of output rate is expressed in 100-ms units

In all other output modes, the value of output rate will result from both the occurrence of the chosen trigger event, which is variable (except for the 1-Hz fixed frequency 1PPS), and the value of Rate, which specifies the required count of occurrences of the chosen trigger event before a new message is delivered.

For example, in EVENT mode, with Rate=2, a message will be issued every two occurrences of the external event signal. In 1PPS mode, with Rate=10, a message will be issued every ten seconds

In MANUAL output mode, Rate will generally be set at 1.

Format 1...Format 10: Numbers of 1st, 2nd, ..., 10th format or macro in the script generating this message.

❑ Pseudo Ranges

You can create up to 2 rows in the Editor table. Each row should contain the complete description of a pseudorange message, as defined below:

#: Software-set field, identifies the row in the Editor table where this pseudorange message is defined

Port: Port on which this Pseudoranges message will be available (A, B, C, D, P)

Output Mode: Event triggering this message:

STOP: Message inhibited (no trigger event)

TIME: Message triggered at regular intervals of time defined in the Rate column

EVENT: Message triggered at every occurrence of the signal chosen from the Rate column

On/Off: Default message status when turning on the receiver (ON or OFF)

Rate: In TIME output mode, Rate is a factor defining the output rate of the message (expressed in 100-ms units)

In EVENT output mode, Rate is a drop-down menu from which you should choose the trigger event (EVT1 or 1PPS). In this mode, the value of output rate will simply result from the occurrence of the chosen trigger event (1 second with 1PPS).

Format: SBIN@r, SBIN@R, SBIN@Q, SVAR!R or SVAR!Q

Antenna: “Main” or “Both”

GPS C/P Filter: GPS Code/Phase filter (0 to 600 s)

Minimum elevation: Minimum elevation angle setting for the satellite from which the pseudorange originates.

❑ GPS Data

You can create up to 2 rows in the Editor table. Each row should contain the complete description of a GPS-data message, as defined below:

#: Software-set field, identifies the row in the Editor table where this GPS-data message is defined

Port: Port on which this GPS-data message will be available (A, B, C, D, P)

On/Off: Default message status when turning on the receiver (ON or OFF)

Format: S_VAR! or S_BIN@

Ephemeris: Yes if ephemeris data included in the message, otherwise No

Almanacs: Yes if almanac data included in the message, otherwise No

Iono-UTC: Yes if Iono-UTC data included in the message, otherwise No

Health & A/S: Yes if Health & A/S data included in the message, otherwise No

❑ Bit flow

You can create up to 2 rows in the Editor table. Each row should contain the complete description of a bit-flow message, as defined below:

#: Software-set field, identifies the row in the Editor table where this bit-flow message is defined

Port: Port on which this bit-flow message will be available (A, B, D, P)

On/Off: Message type: OFF (none), SBIN@b or SVAR!B

Rate: Factor (1 to 15) defining the output rate of the message (0.6 to 9 seconds)

(expressed in 0.6-second units)

❑ Event Time Mark

You can create up to 2 rows in the Editor table. Each row should contain the complete description of a Time-Mark message, as defined below:

#: Software-set field, identifies the row in the Editor table where this message is defined

Port: Port on which this message will be available (A, B, C, D, P)

Output mode:

STOP: Message inhibited (no trigger event)

EVT1: Message triggered at every occurrence of the signal chosen from the Rate column

1PPS: Message triggered at regular intervals of time defined in the Rate column

On/Off: Default message status when turning on the receiver (ON or OFF)

Rate: Factor defining the output rate of the message (1/factor of event or 1PPS))

Format: Message type: S_VAR!M or S_BIN@M

SCREEN

❑ Appearance

This sub-module is inactive

❑ Preferences

(A single row possible in the Editor table)

Language: Language used in the operator interface of receivers (English, Spanish or French)

Lat Long Format: Specify the angle unit which ConfigPack should use: Degrees Minutes Seconds or Degrees Minutes

Distance Unit: Specify the distance unit which ConfigPack should use: Meters or Nautical Mile

North: Specify the definition of the North which ConfigPack should use: Geographic, Grid or Magnetic

Height Unit: Choose the unit you want to use for all heights (meters, imperial feet, or “keep current”). If you select “keep current”, the receiver will continue to use the last user-set height unit.

Speed Unit: Choose the unit you want to use for all speeds (km/h, knots, or “keep current”). If you select “keep current”, the receiver will continue to use the last user-set speed unit.

Precision: Number of decimal places (0, 1, 2, 3 or none) depending on the desired metric precision.

NAVIGATION

❑ Waypoints

You can create as many rows as necessary in the Editor table. Each row should contain the complete description of a waypoint, as defined below:

#: Software-set field, identifies the row in the Editor table where this waypoint is defined

Name: Name of the waypoint

Coord. System: Coordinate system in which the coordinates of this waypoint are expressed. Choose one of the coordinate systems you have defined, or the default one.

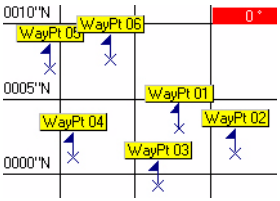
Input: Type of coordinates used to express the reference position

Latitude/Northing: Latitude or Northing of the waypoint, depending on the type of coordinate system used

Longitude/Easting: Longitude or Easting of the waypoint, depending on the type of coordinate system used

Altitude/Height: Altitude of the waypoint, depending on the altitude computation mode used

Example of waypoints as reported in the Graphic Pane:



Other procedure:

Waypoints can be defined directly from the Graphic Pane (see *Defining waypoints & routes with a simple mouse click on page 26*)

❑ Routes

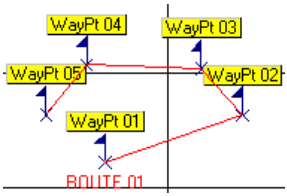
You can create as many rows as necessary in the Editor table. Each row should contain the complete description of a route, as defined below:

#: Software-set field, identifies the row in the Editor table where this route is defined

Name: Route name

Waypoint 01 to Waypoint 15: Numbers of the waypoints forming the route (up to 15 waypoints)

Example of routes as reported in the Graphic Pane:



Alternate procedure:

Routes can be defined directly from the Graphic Pane (see *Defining routes on the map on page 32*).

❑ Navigation Mode

(A single row possible in the Editor table)

Working Mode: Specify the nature of the position solution used in the navigation function. The available options are tied to the option you chose in the Process module, Mode sub-module (see *Main Mode on page 65*):

"(D)GPS" is the only possible option if you chose GPS Natural, DGPS or MDGPS

"(D)GPS" and "EDGPS" are the 2 options possible if you chose EDGPS

"(D)GPS", "EDGPS", "KART_A" and "KART_R" are the 4 options possible if you chose KART/LRK

This field, and also the whole Mode sub-module, is irrelevant to a station (reference or monitoring)

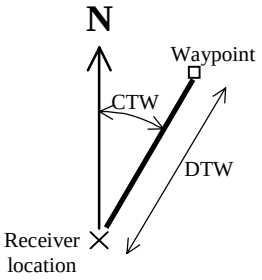
Mode: Choose the default Navigation mode. Only the Position mode can be used

POSITION: Provides basic positioning information (position, speed, course, etc.). This mode can be used when no further navigation information is required.

HOMING: Navigation mode based on a waypoint that you spec-ify. This mode will provide information to help the operator reach that point along a great circle (basic positioning information also available).

Variables specific to the Homing Mode:

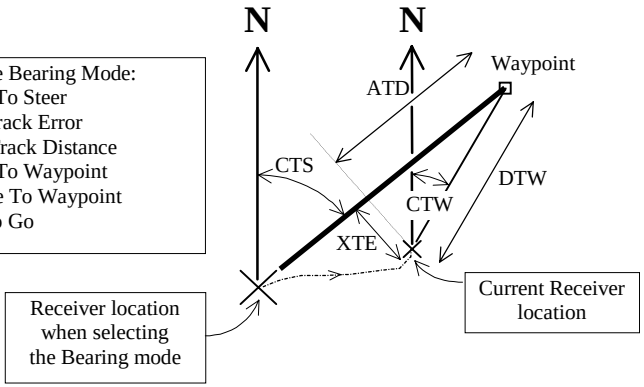
CTW : Course To Waypoint
DTW : Distance To Waypoint
TTG : Time To Go



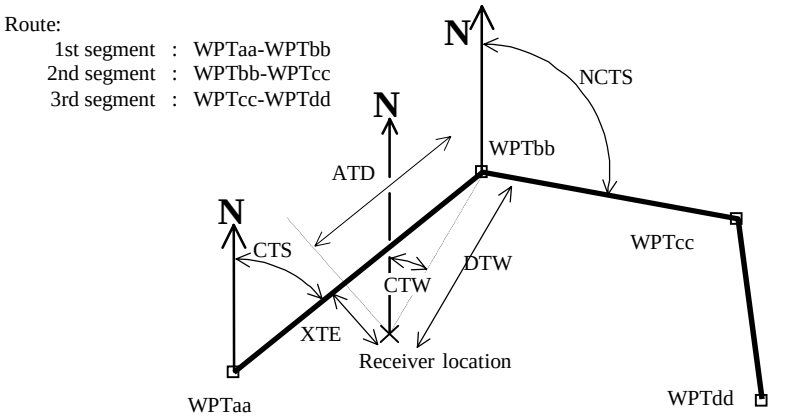
BEARING: Navigation mode also based on a waypoint that you specify. This mode will provide information to help the operator reach that point according to the bearing angle defined by the waypoint location and the current location when he/she selects this mode (basic positioning information also available).

Variables specific to the Bearing Mode:

CTS : Course To Steer
XTE : Cross Track Error
ATD : Along Track Distance
CTW : Course To Waypoint
DTW : Distance To Waypoint
TTG : Time To Go



PROFILE: Navigation mode based on a route that you specify. This mode will provide the information required to help the operator navigate along this route (basic positioning information also available).



Variables specific to the Profile Mode:					
CTS	:	Course To Steer	CTW	:	Course To Waypoint
NCTS	:	Next Course To Steer	DTW	:	Distance To Waypoint
XTE	:	Cross Track Error	ATD	:	Along Track Distance
TTG	:	Time To Go			

Waypoint or Route: If the Homing or Bearing mode is selected, specify the number of the target waypoint

If the Profile mode is selected, specify the route along which to navigate

Direction: If the Profile mode is selected, specify whether the route must be traveled Forward (from first to last waypoint) or Backward

If the Bearing mode is selected, specify the Course To Steer

Start on WPT: If the Profile mode is selected, specify the name of the waypoint to reach first (necessarily a waypoint part of the selected route).

❑ Heading Mode

Mode: Select the heading mode you want to use (Real or Accurate)

❑ Antenna Offset

Delta X: X component (in meters) of the antenna offset compared to the position of the point to be surveyed
Delta Y: Y component (in meters) of the antenna offset compared to the position of the point to be surveyed

SESSIONS

This module is inactive.

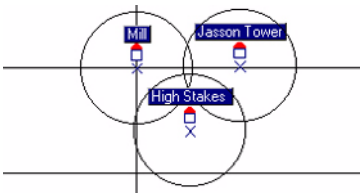
DGNSS

❑ Beacons

You can create up to 20 rows in the Editor table. Each row should contain the complete description of a beacon, as defined below:

Beacon ID: Identification number of the beacon
Name: Beacon name
Lat: Beacon latitude
Long: Beacon longitude
Band. 1: Transmission band used
Freq. 1 (Hz): Carrier frequency
Band. 2: For future use
Freq. 2 (Hz): For future use
Range (km): Estimated beacon range
Baud Rate: Data Transmission baud rate (100 if **Band. 1**= MF
Modulation: DQPSK (D) or GMSK (G)
Encryption: Yes (corrections encrypted) or No (corrections in plain)
C3 code: C3 encryption code, provided by the beacon's owner. You may not type C3 at this stage, but when later the receiver user wishes to work with that beacon, the receiver will request that code (6 figures).
Antenna No.: Antenna identification number as listed by the $PDAS,ANTEN command

Example of beacon as reported in the Graphic Pane



Other procedure:

Beacons can be defined directly from the Graphic Pane (see *Placing beacons on the map (see page 35)*).

❑ Mode

You can create up to 3 rows in the Editor table.

In each row, you define the receiver either as a corrections generator (a reference station) or a corrections receiver (a user receiver). You can define only a single reference station and two corrections receivers max.

#: Software-set field, identifies the row in the Editor table where this reference station is defined

Port: A, B, C or D

Mode: Reference station (XMTR) or corrections receiver (RCVR)

Beacon ID: Identification of the beacon connected to the reference station (if a reference station) or from which corrections are received (if a user receiver)

Period (XMTR): Data transmission rate (if a reference station)

Slot (XMTR): Number of the slot during which corrections are received from the specified beacon (if a user receiver)

Station ID (RCVR): Number of the reference station connected to the specified beacon

Station ID (RCVR): Number of the reference station connected to the specified beacon (if there is a second one)

Station ID (RCVR): Number of the reference station connected to the specified beacon (if there is a third one)

Station ID (RCVR): Number of the reference station connected to the specified beacon (if there is a fourth one).

You can only enter 4 different station ID's over the possible three rows of the Editor table.

❑ PRCs Time Out

PRC Time Out: Maximum age of corrections (1.0 to 100.0 seconds)

Max Iono Age: Maximum age of iono corrections (1.0 to 1500.0 seconds)

❑ DGNSS data

You can create up to 2 rows in the Editor table. Each row should contain the complete description of a DGNSS-data message, as defined below:

#: Software-set field, identifies the row in the Editor table where this DGNSS-data message is defined

Port: Port on which this DGNSS-data message will be available (A, B, C, D, P)

Output Mode: Event triggering this message:

STOP: Message inhibited (no trigger event)

TIME: Message triggered at regular intervals of time defined in the Rate column

EVENT: Message triggered at every occurrence of the signal chosen from the Rate column

IMMEDIATE: Message triggered on releasing the message output (when changing the On/Off status to ON).

On/Off: Default message status when turning on the receiver (ON or OFF)

Rate: In TIME output mode, Rate is a factor defining the output rate of the message (expressed in 100-ms units).

In EVENT output mode, Rate is a drop-down menu from which you should choose the trigger event (EVT1 or 1PPS). In this mode, the value of output rate will simply result from the occurrence of the chosen trigger event (1 second with 1PPS).

In IMMEDIATE output mode, Rate is irrelevant

Format: Type of DGPS data contained in the message:

RTCM_SC104: RTCM SC104-formatted data

LRK_UHF: DSNP-formatted data transmitted in the UHF band to operate in LRK

DSNP_UHF: DSNP-formatted data, transmitted in the UHF band, allowing operation in KART mode

SVAR!D: Non-configurable GPS data in ASCII format with field delimiters

USERS_DATA: Data transmitted in a user format

Station Type: Type of the station generating the DGPS corrections contained in the message:

ALL: Any type

UHF: Station transmitting in the UHF band

HF: Station transmitting in the HF band

MF: Station transmitting in the MF band

RTCM numeric: Station transmitting data in the RTCM format

Message Number: Number of the corrections sentence, from the selected type of station, chosen to be part of the message (excluding the others) (for RTCM-SC104 and KART formats only).

WAAS / EGNOS

❑ Mode

(A single row possible in the Editor table)

Selection mode: Choose the type of integrity control you want to implement using the WAAS / EGNOS:

OFF: none

Auto: the receiver will automatically find the GEO with which to work

Manual: the receiver will only work with the specified GEO (s) (see below)

First Selected SV: If Manual is selected (see first cell), enter the PRN of the GEO to be used first for the integrity control and WADGPS

Second Selected SV: If Manual is selected (see first cell), enter the PRN of the GEO to be used for the integrity control and WADGPS if the 1st one is not (or is no longer) available.

❑ Data

You can create up to 2 rows in the Editor table. Each row should contain the complete description of a data message, as defined below:

#: Software-set field, identifies the row in the Editor table where this GPS-data message is defined

Port: Port on which this data message will be available (A, B, C, D, P)

On/Off: Default message status when turning on the receiver (ON or OFF)

Format: S_BIN@W or S_VAR!W. ❑

6. Displays and Data Outputs

Terminology Used

Element: Basically, a piece of information whose result should be seen on the receiver screen or inserted into an output message. This can be text, the name of a variable or the expression of a mathematical operation on one or more variables, etc.

Format: A character string consisting of an element and notation instructions applying to this element.

Macro: A ready-to-use script, simply invoked by a three-letter name, and from which the receiver can generate a standard or proprietary NMEA0183 output message.

Notation: Refers to how an element should be presented in a screen or output message: maximum length permitted, number of decimal places, etc.

Result: A character string (numeric or alphanumeric) generated by the receiver, computed from what is contained in a format (i.e. element+notation).This can be text, the current value of a variable or the result of a mathematical operation on one or more variables, etc.

Script: A series of formats from which a receiver can generate a complete screen or output message.

Variable: Any numeric or alphanumeric data handled by a receiver.

Creating formats

Formats deliver data strings containing one or more parameters depending on their definition.

In a given configuration file, only the formats declared in the Formats submodule (see *Formats on page 72*) will be available for use in the Computed data submodule (see *Computed Data on page 72*).

When you define a new computed data message, all the formats you have created for your configuration file are listed in the combo box attached to each of the Format x cells, combined with the declared macros.

❑ General expression

The general expression of a format is:

E:n:d

where:

- E identifies the element contained in the format. E may be of different forms:
  - A character string (text) between single quotation marks: e.g.: 'Latitude'
  - A single variable: e.g.: L84 or a macro: e.g.: GGA
  - A combination of variables, operators and numerals: e.g.: SEXAM(LAT) or INT(DRMS)/2
- In general, n and d are two numerals defining the notation of the format. When E stands for a macro, n and d have a different meaning (see *Syntax on page 102*).
  The ":" symbol is used as a separator between E, n and d.

❑ Possible notations

Fixed notation: n > d

In this notation:

- n is the total number of characters, including the decimal point, used to display the result ($n \leq 20$)
- d is the number of characters reserved for the fractional part of the result (n includes d)

Free notation: $n \leq d$

In this notation:

- n is irrelevant
- d is the number of characters reserved for the fractional part of the result
- The result is presented with the number of characters needed, provided it is less than 20.

Particular cases:

n and d not specified:

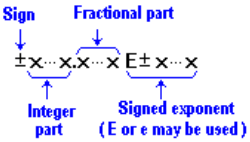
- Default values are then used for n and d. With most operators, n = d = 0, which means that the free notation is used, with no fractional part since we have d = 0.
- For some operators (HMS, LATM, LONM, SEXAM, SEXAS), the default value for d is "0", unlike n as the size of the result is generally known and n is adapted to the size.

n specified, d not specified:

- The default value d = 0 is chosen. The fixed notation is therefore used with no fractional part since we have d = 0.

❑ Numerals

General form:



Examples:

-451
17.58
-2.e-51 (=-2×10^{-51})
173.8E3 (= 173.8×10^{3})

All operations with numerals are processed with double precision.

❑ Leading spaces

All values are pushed to the right with leading spaces ahead of the value if the data field is larger than required. There are three exceptions, however:

- TXT pushes characters to the left (trailing spaces)
- ZERO pushes to the right, and adds leading zeros
- HEXA pushes to the right and adds leading spaces.

❑ Control characters

Comma: Delimiter between any two adjacent parameters

e.g.: CHR(3),CHR(10)

Quotation marks: Used to replicate the character string specified in between.

e.g.: 'Longitude' or 'User"s'

When present in text, the apostrophe character must be doubled to appear in the result, as shown in the second example above (resulting text: User's)

Colon: Used in the data formatting syntax

e.g.: COS(BR):5:3

Parentheses: Used to bound an operation within an expression. 6 parenthesis levels are possible.

e.g.: HEXA(INT(GDOP*100)+300):4

Square brackets: Used in indexed variables (indexes from 1 to n ac-cording to variable type)

e.g.: CSV[5]

Braces: Used by IF operator

Dot: Decimal point

❑ Overflow condition

Any overflow will result in the following type of value: *999 . . .9. Depending on the chosen notation (fixed or free), the number of 9's may vary and the decimal point may be present or not.

Operators

❑ Operators list

+	Addition
-	Subtraction
*	Multiplication
/	Division
=	Assigns a variable to UV[n]
ABS(x):n:d	Absolute value of the x variable
ARCTAN(x):n:d	Arctangent of the x variable
BYTE	
CAN:x	Provides satellite status data for the specified channel number (x) and for the next three ones
CHR(x)	Returns the ASCII character whose code is x
CHK:e:f	Computes the complement parity from the *e*th character up to the *f*th character
COS(x):n:d	Cosine of the x variable
CRC:e:f	Computes parity from the *e*th character up to the *f*th character
DAT(x):m:c	Returns the date with m characters in a format depending on c
DEG(x):n:d	Converts the x variable from radians to degrees
FRACT(x):n:d	Fractional part of the x variable
HEXA(x):m	Returns the x variable in hexadecimal notation with m characters
HMS(x):n:d	Converts the x variable from seconds to hours, minutes, seconds
INT(x):n:d	Returns the integer part of the x variable
KMH(x):n:d	Converts the x variable from m/s to km/hr
IF(x$y){f1}{f2}	Returns f1 or f2 depending on whether the x$y relation is true or not
KN(x):n:d	Converts the x variable from m/s to knots
LATM(x):n:d	Converts latitude x from radians to degrees, minutes, direction
LN(x):n:d	Natural logarithm of the x variable
LOG(x):n:d	Common logarithm of the x variable

LONG	
LONM(x):n:d	Converts longitude x from radians to degrees, minutes, direction
LREAL	
NM(x):n:d	Converts the x variable from meters to nautical miles
REAL	
SEXAM(x):n:d	Converts the x variable to sexagesimal value (degrees or hours, minutes)
SEXAS(x):n:d	Converts the x variable to sexagesimal value (degrees or hours, minutes, seconds)
SIGN(x):p:q	Returns p or q (ASCII characters), depending on the sign of the x variable
SIN(x):n:d	Sine of the x variable
SQRT(x):n:d	Square root of the x variable
TXT:x:n	Returns the text associated with the x variable, with n characters
WORD	
ZERO(x:n:d)	Puts leading zeros ahead of x (x: variable or expression)

For all operators using n and d, the format notation complies with the information provided in the fixed/free notation paragraph.

❑ More about some the available operators

CAN:

Delivers four lines of status data:

- The first line contains satellite status data corresponding to the specified reception channel (x),
- The 2nd, 3rd and 4th lines contain the status data corre-sponding respectively to reception channels x+1, x+2 and x+3 (if any)

Each line generated by this operator is formatted as follows:

CAN,<x>,<SV>,<elevation>,<azimuth>,<SVorbit>,<status>,<S/N>,<CR><LF>

Where:

x: channel number, as specified by operator

SV: PRN number of the SV being processed on that channel

Elevation: Satellite elevation (0.. 90°)

Azimuth: Satellite azimuth (0.. 360°)

SV orbit: Satellite orbit : Ascending (1) or descending (0)

(Ascending=negative Doppler; descending=positive Doppler)

Status: Channel status:

0: No satellite received (unused channel)
1: Satellite received (SV received & used)
2: Satellite received so far on that channel has been lost
3: Satellite usable (SV received, ephemeris available)
4: Same as 3 + SV involved in PVT processing (PVT=Position Velocity Time
5: Specified SV being tracked
6: SV received on that channel intentionally rejected
7: SV rejected by WAAS integrity test

S/N: Signal/Noise ratio, in dB

Any unavailable data will be denoted by the 3 symbols "***" in the corresponding field.

As the data block generated by the CAN operator is about 100 characters in size, and the maximum length of a computed-data message is 255 characters, you should do the following to output the status data of 16 channels:

- From the Formats sub-module of ConfigPack, define two formats as follows:
  Format #1:
  CAN:1,CAN:5
  (will generate status data for channels. 1 to 8)
  Format #2:
  CAN:9,CAN:13
  (will generate status data for channels. 9 to 16)
- From the Computed Data sub-module of ConfigPack, define two messages as follows:
  <port>,<output mode>,<On/Off>,<rate>,1
  <port>,<output mode>,<On/Off>,<rate>,2

CHK:

Same as CRC except that CHK provides the complement of the parity processing.

CRC:

Computes the parity on all characters from the eth to the fth characters in the message. The result is a hexadecimal value expressed with two characters, transmitted along with the message.

DAT:

If c=1, then dd/mm/yyyy

c=2, then yyyy/mm/dd

c=3, then dd,mm,yyyy

The result occupies 9 or 10 characters, depending on day (1 or 2 characters). A date with 10 characters will not be truncated if m=9

If m and c are not specified, default values are used (m=10 and c=1)

HEXA:

If m is not specified, then m=1

Leading spaces are added ahead of the result if too many char-acters have been reserved

Overflow condition not reported with this operator

IF:

$ can be one of the following six relation operators:

- <
- >
- >=
- ≤
- =
- < >

f1 and f2 are formats each bound by braces.

Example: IF(SOG<20){KN(SM):5:1}{'$$.$$'}

SIGN:

If x >= 0, then the result is p

If x < 0, then the result is q

If p and q are not specified, the following notation is used:

p = {space}

q = {hyphen}

TXT:

The following variables can be combined with this operator, thus issuing the following character strings (within quotation marks below) depending on context:

Variables	Output strings
DATM	"WGS84", "<Datum Name>"
DFT	".GPS.", "DGPS1", "DGPS2", "DGPS3", "DGPS4", "MDGPS", "EDGPS", "KINEA", "KINER", "GNOS", "WDGPS"
DS	"DIFF", "NAT", "HOLD"
FIXS	"GOOD", "BAD"
INTEGAP	"YES", "NO"
MODE	"H", "DR", "T", "2", "2T", "3", "3T"
NSVU	Lists all the SVs used (e.g. 3, 5, 12, 17, 24, 27)
SA	"ON", "OFF"
SALARM	See Anomalies & Alarms on page 147
ULA to ULD	"<Port A label>",... to "<Port D label>"

ZERO:

Inserts zeros ahead of the x variable if there is room, with n and d defining the notation of the variable (or expression). There are no default values for n and d, as the function is irrelevant unless n and d are specified.

Macros

Macros deliver data strings containing one or more parameters depending on their definition.

In a given configuration file, only the macros declared in the Formats submodule (see *Formats on page 72*) will be available for use in the Computed data submodule (see *Computed Data on page 72*).

When you define a new computed data message, all declared macros are listed in the combo box attached to each of the Format x cells, combined with the formats you have created for your configuration file.

❑ Macros list

All macros are NMEA 0183 compliant unless otherwise specified (proprietary).

AAM:n:d	Waypoint Arrival Alarm
ALM:n:d	GPS almanac data
BOD:n:d	Bearing and Origin to Destination
BWC:n:d	Bearing and Distance to Waypoint
DTM:n:d	Datum Reference
GGA:n:d	GPS Fix Data
GG84:n:d	GPS Fix Data, always WGS84 coordinates
GGAA:n:d	(Proprietary) Accurate position
GGAR:n:d	(Proprietary) Real-time position
GLL:n:d	Lat-Long Geographic Position
GMP:n:d	GNSS Map Projection Fix Data
GRS:n:d	GPS Range Residual
GSA:n:d	GPS DOP and Active Satellite
GST:n:d	GPS Pseudorange Noise Statistics
GSV:n:d	GPS Satellites in View
HDG:n:d	Heading, Deviation & Variation
HDT:n:d	Heading, True
HRP:n:d	(Proprietary) Heading, True
HRPA;n:d	(Proprietary) Heading, True, Accurate
HRPR:n:d	(Proprietary) Heading, True, Real Time
IMQ:n:d	(Proprietary) Heading, Roll/Pitch Standard Deviations
IMS:n:d	(Proprietary) True Heading, Roll/Pitch
OSD:n:d	Own Ship Data
PAT:n:d	(Proprietary)

RMB:n:d	Recommended Minimum Navigation Information
RMC:n:d	Recommended Minimum Specific GPS Data
ROT:n:d	Rate Of Turn
SBINO:n:d	(Proprietary) Relative mode data (binary)
SBINV:n:d	(Proprietary) Relative mode data (binary)
SVARO:n:d	(Proprietary) Relative mode data (ASCII)
SVARV:n:d	(Proprietary) Relative mode data (ASCII)
VBW:n:d	Dual Ground/Water Speed
VHW:n:d	Water Speed and Heading
VTG:n:d	Course Over Ground and Ground Speed
WCV:n:d	Waypoint Closure Velocity
WPL:n:d	Waypoint Location
XTE:n:d	Cross Track Error, Measured
ZDA:n:d	Time & Date
ZFO:n:d	UTC and Time from Origin Waypoint
ZTG:n:d	Origin and Time to Destination Waypoint

❑ Syntax

All macros are in the form:

XXX:n:d

where:

XXX: Macro name (3 letters)

n: Basically, n defines the number of decimal places for values of angles expressed in minutes (see detail in each macro). Indirectly, n also controls the number of decimal places for values of distances expressed in meters (number of decimal places= n -3 for n > 3) and for values of speed expressed in meters/second (number of decimal places= n -4 for n > 4).
If omitted, n is assumed to be 0 (except in GSA and ZDA where it is equal to 2).
Although n has no function in some macros it must be present when the checksum has to be placed at the end of the output string. With such macros, any value can be used for n.

d: Checksum code:
d = 0: no checksum at the end of the output string
d = 1: checksum added at the end of the output string
If omitted, d is assumed to be 0.

Use precautions:

Several macros can be chained to form a message. Remember however that the generated message should not exceed 511 characters in length.

Examples:

“GGA:2:1”: Global Positioning System Fix Data, 2 decimal places for variables expressed in minutes; checksum provided.

“ALM:1”: First 5 almanacs; no checksum

❑ AAM:n:d

The output string is in the form:

$GPAAM,A,A,x.x,N,c--c*hh<cr><lf>

$GPAAM	NMEA 0183 message identifier
A	Status: A=arrival circle entered V=arrival circle not entered
A	Status: A=perpendicular passed at waypoint V=perpendicular not passed
x.x,N	x.x: Arrival circle radius; N: Units of radius (Nautical Miles)
c--c	Waypoint number
*hh	Checksum, if requested (d=1)

Output String Example:

$GPAAM,V,V,0.8,N,104

❑ ALM:n:d

The output string is in the form:

$GPALM,x.x,x.x,xx,x.x,hh,hhhh,hh,hhhh,hhhh,hhhhhh,hhhhhh,hhhhhh,hhh hhh,hhh,hhh*hh<cr><lf>

$GPALM	NMEA 0183 message identifier
x.x	Total number of messages
x.x	Message number
xx	Satellite PRN number 01..32
x.x	GPS week number
hh	SV health
hhhh	e, eccentricity
hh	toa, almanac reference time
hhhh	(sigma)i, inclination angle
hhhh	OMEGADOT, Rate of right ascension
hhhhhh	Root (A), root of semi major axis
hhhhhh	Ω, argument of perigee
hhhhhh	ΩO, longitude of ascension node
hhhhhh	MO, mean anomaly
hhh	afO, clock parameter
hhh	af1, clock parameter
*hh	Checksum, if requested (d=1)

Output String Example:

$GPALM,27,1,01,982,00,21CB,7B,08E0,FD40,A10D57,BAEB05,435714,BD2E73,00C,080
$GPALM,27,2,02,982,00,9603,7B,FCEB,FD4A,A10CE9,A4C0D6,957F28,04E8E1,FF6,B7F
$GPALM,27,3,03,982,00,0B52,7B,0368,FD21,A10D06,60E6B4,C18F80,77A2A7,02D,080
$GPALM,27,4,04,982,00,2752,7B,16D8,FD43,A10CFD,DFD64E,EDD6E1,659931,19E,190
$GPALM,27,5,05,982,00,0B1C,7B,FED2,FD4B,A10E1E,F40F7A,963923,6EE9AB,00F,160

Comments:

You cannot output all the almanacs through a single macro, due to the size of the formatter buffer which is limited to 512 characters.

Instead, define a value for n to tell the formatter which group of almanacs must be output through the macro (the output string then consists of about 400 characters).

ALM:1	Initializes the acquisition of all the almanacs and outputs the first 5 almanacs (or the existing 1 to 5 ones)
ALM:1	Must be run before running any macro of the type ALM:n (where n=2..7)
ALM:2	Outputs 6th to 10th almanacs for SVs 6 to 10 (if any)
ALM:3	Outputs 11th to 15th almanacs (if any)
ALM:4	Outputs 16th to 20th almanacs (if any)
ALM:5	Outputs 21st to 25th almanacs (if any)
ALM:6	Outputs 26th to 30th almanacs (if any)
ALM:7	Outputs 31st and 32nd almanacs (if any)

❑ BOD:d:n

The output string is in the form:

$GPBOD,x.x,T,x.x,M,c--c,c--c*hh<cr><lf>

$GPBOD	NMEA 0183 message identifier
x.x,T	True bearing, in degrees
x.x,M	Magnetic bearing, in degrees
c--c	Destination waypoint ID
c--c	Origin waypoint ID
*hh	Checksum, if requested (d=1)

Output String Example:

$GPBOD,210.4,T,210.0,M,144,143

❑ BWC:n:d

The output string is in the form:

```
$GPBWC,hhmmss.ss,llll.ll,a,yyyyy.yy,a,x.x,T,x.x,M,x.x,N,c--c,a*hh<cr><lf>
```

$GPBOD	NMEA 0183 message identifier
hhmmss.ss	UTC of observation
llll.ll,a	Waypoint latitude, N/S
yyyyy.yy,a	Waypoint longitude, E/W
x.x,T	True bearing, in degrees
x.x,M	Magnetic bearing, in degrees
x.x,N	Distance, in Nautical miles
c--c	Waypoint ID
a	Mode indicator:
	A= Autonomous mode
	D= Differential mode
	E= Estimated (Dead-Reckoning) Mode
	M= Manual input mode
	S= Simulator mode
	N= Data not valid
*hh	Checksum, if requested (d=1)

Output String Example:

$GPBWC,075251.28,4712.25,N, 12153,E, 58.0,T,57.7,M,5.2,N,143,D

❑ DTM:n:d

The output string is in the form:

$GPDTM,ccc,,x.x,a,x.x,a,x.x,ccc*hh<cr><lf>

$GPDTM	NMEA 0183 message identifier
ccc	Local datum code : WGS84 = W84, User defined = 999
x.x,a	Latitude offset, in minutes (number of decimal places con-trolled by n), N/S
x.x,a	Longitude offset, in minutes (number of decimal plac-es controlled by n), E/W
x.x	Altitude offset, in meters (number of decimal places= n-3 if n>3)
ccc	Reference datum code : WGS84 = W84
*hh	Checksum, if requested (d=1)

Output String Example:

$GPDTM,W84,,0.000,N,0.000,E,0,W84*71

❑ GGA:n:d

The output string is in the form:

```
$GPGGA,hhmmss.ss,llll.l,a,yyyyy.y,a,x,xx,x.x,x.x,M,x.x,M, x.x,xxxx*hh<cr><lf>
```

Field type	Variable	Field Designation
$GPGGA		NMEA 0183 message identifier
hhmmss.ss	TUTC	UTC time of position computation (2 decimal places)
llll.l,a	LAT	Latitude in degrees (2 char.), minutes (2 char.), fraction of a minute (number of decimal places controlled by n), N/S indicator
yyyyy.y,a	LON	Longitude degrees (3 char.), minutes (2 char.), fraction of a minute (number of decimal places controlled by n), E/W indicator
x	DS	GPS quality figure: 0 : fix not available, or invalid 1 : straight GPS fix 2 : Differential GPS fix 4 : Real Time Kinematic (KINE A, KINE R, LRK or LRKW) 5 : Real Time Kinematic (EDGPS, KART or LRK initialization) 6 : Estimated (dead reckoning) mode
xx	NSVU	Number of SVs used to compute the fix
x.x	HDOP	Horizontal Dilution of Precision (-1 if not computed)
x.x,M	HP	Antenna altitude above MSL, in meters (if MSL different from 0) (number of decimal places= n-3 if n >3, otherwise (n<3) no decimal places). If MSL = 0, ZP is the altitude above the WGS84
x.x,M	MSL	Geoidal separation (between ellipsoid and Mean Sea Level) (number of decimal places= n-3 if n >3, otherwise (n<3) no decimal places)

x.x	DAGE	Age of Differential corrections, on average (null field if DGPS not used) (number of decimal places controlled by n)
xxxx	DSTA	Identification of reference station used (null field if not used).
*hh		Checksum, if requested (d=1)

Examples:

$GPGGA,192348.99,4716.10435,N,00129.45430,W,4,09,1.1,93.83,M,0.00,M,2.0,0055*5C

$GPGGA,192349.99,4716.10435,N,00129.45430,W,4,09,1.1,93.79,M,0.00,M,3.0,0055*5D

$GPGGA,192350.99,4716.10435,N,00129.45430,W,4,09,1.1,93.78,M,0.00,M,2.0,0055*51

❑ GG84:n:d

The difference between GG84 and GGA is unnoticeable (i.e. same identifier and output format). But there is an important difference, which is the following:

- With GG84, the llll.l,a (LAT) and yyyyy.y,a (LON) parameters are *always* WGS84 coordinates.

❑ GGAA:n:d

Same as GGA except for the following:

- Identifier is different: $PDAS is used as header
- Time provided as 1st parameter is the time when accurate position is computed
- Position provided in the next two fields is accurate position.

Example:

$PDAS,GGAA,141334.08,4718,N,00131,W,4,08,1.1,93,M,0,M,-0.9,0002

❑ GGAR:n:d

Same as GGA except for the following:

- Identifier is different: $PDAS is used as header
- Time provided as 1st parameter is the time when real-time position is computed
- Position provided in the next two fields is real-time (filtered) position.

Example:

$PDAS,GGAR,141335.88,4718,N,00131,W,4,08,1.1,93,M,0,M,0.9,0

❑ GLL:n:d

The output string is in the form:

```
$GPGLL,llll.l,a,yyyyy.y,a,hhmmss.ss,A,a *hh<cr><lf>
```

Field type	Variable	Field Designation
$GPGLL		NMEA 0183 message identifier
llll.l,a	LAT	Latitude in degrees (2 char.), min-utes (2 char.), fraction of a minute (number of decimal places controlled by n), N/S indicator
yyyyy.y,a	LON	Longitude in degrees (3 char.), min-utes (2 char.), fraction of a minute (number of decimal places controlled by n), E/W indicator
hhmmss.ss	TUTC	UTC time of position computation (2 decimal places)
A	FIXS	GPS quality figure
		V = Fix not available, or invalid
		A = GPS fix available
a		Mode indicator:
		A = Autonomous mode
		D = Differential mode
		E = Estimated (dead reckoning) mode
		N = Data not valid
*hh		Checksum, if requested (d=1)

Example:

$GPGLL,4716.10435,N,00129.45430,W,192531.99,A,D*70

$GPGLL,4716.10435,N,00129.45430,W,192532.99,A,D*71

$GPGLL,4716.10435,N,00129.45430,W,192533.99,A,D*7E

❑ GMP:n:d

The output string is in the form:

```
$GPGMP,hhmmss.ss,c--c,c--c,x.x,x.x,c--c,xx,x.x,x.x,x.x,x.x,x.x,x.x*hh <cr><lf>
```

Field type	Variable	Field Designation
$GPGMP		NMEA 0183 message identifier
hhmmss.ss	TUTC	UTC time (2 decimal places)
c--c		Map projection identification
c--c		Map zone
x.x		X(Northen) component of grid (or local) coordinates
x.x		Y(Eastern) component of grid (or local) coordinates
c--c		Mode indicator
xx		Total number of satellites in use
x.x		HDOP
x.x		Antenna altitude in meters, from mean-sea-level (geoid)
x.x		Geoidal separation in meters
x.x		Age of differential data
x.x		Differential reference station ID
*hh		Checksum, if requested (d=1)

Example:

$GPGMP,143322.99,UTM,M20,254265.12,104578.25,F,10,2.8,16.2,0.4,5.2,723

❑ GRS:n:d

The output string is in the form:

```
$GPGRS,hhmmss.ss,1,x.xx,x.xx,x.xx,x.x,.....,,,*hh <cr><lf>
```

Field type	Variable	Field Designation
$GPGRS		NMEA 0183 message identifier
hhmmss.ss	TUTC	UTC time (2 decimal places)
1		This "1" means that residuals were re-computed after the GGA GNS position was computed
x.x	CRE[i]	Range residuals in meters for satellites used in the navigation solution (null for unused field) (number of decimal places controlled by n),
*hh		Checksum, if requested (d=1)

Example:

$GPGRS,143322.99,1,10.34,,3.40,0.12,-24.49,-0.91,-6.47,6.90,,27.81,-16.70,,,,,*46
$GPGRS,143323.99,1,10.56,,3.46,0.11,-24.81,-0.77,-6.55,7.01,,28.03,-16.82,,,,,*42
$GPGRS,143324.99,1,10.71,,3.44,0.09,-25.23,-0.49,-6.72,7.08,,28.12,-16.92,,,,,*4C

❑ GSA:n:d

The output string is in the form:

```
$GPGSA,A,x,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,,,,,,, x.x,x.x,x.x*hh <cr><lf>
```

Field type	Variable	Field Designation
$GPGSA		NMEA 0183 message identifier
A		2D/3D automatic switching mode
x	MODE	Fix mode 1 = invalid fix 2 = 2D mode 3 = 3D mode
xx,...,xx	NSVU	PRN of SVs used in the solution (use n=3 to issue a 3-figure PRN; if omitted, n=2)
x.x	PDOP	Position DOP (-1.0 if not computed)
x.x	HDOP	Horizontal DOP (-1.0 if not computed)
x.x	VDOP	Vertical DOP (-1.0 if not computed)
*hh		Checksum, if requested (d=1)

Example:

$GPGSA,A,3,24,18,25,07,15,19,16,,04,14,,,,,,,,2.0,1.1,-1.0*19

$GPGSA,A,3,24,18,25,07,15,19,16,,04,14,,,,,,,,2.0,1.1,-1.0*19

❑ GST:n:d

The output string is in the form:

```
$GPGST,hhmmss.ss,,,,,x.xx,x.x,x.x*hh <cr><lf>
```

Field type	Variable	Field Designation
$GPGST		NMEA 0183 message identifier
hhmmss.ss	TUTC	UTC time (2 decimal places)
,,,,,		Null fields
x.x	NPSD	Standard deviation of latitude error (meters) (number of decimal places controlled by n)
x.x	EPSD	Standard deviation of longitude error (meters) (number of decimal places controlled by n)
x.x	HPSD	Standard deviation of altitude error (meters) (number of decimal places controlled by n)
*hh		Checksum, if requested (d=1)

Example:

```
$GPGST,080154.99,,,,,0.02,0.02,0.03*6C
$GPGST,080155.99,,,,,0.02,0.02,0.04*6A
$GPGST,080156.99,,,,,0.02,0.02,0.03*6E
$GPGST,080157.99,,,,,0.02,0.02,0.04*68
```

❑ GSV:n:d

The output string is in the form:

```
$GPGSV,x,x,xx,xx,xx,xxx,xx.....,xx,xx,xxx,xx*hh <cr><lf>
```

Field type	Variable	Field Designation
$GPGSV		NMEA 0183 message identifier
x		Total number of messages
x		Message number
xx	NSVR	Total number of satellites in view
xx	CSV[i]	Satellite ID number
xx	CEL[i]	Elevation, in degrees (90 max.)
xxx	CAZ[i]	Azimuth, in degrees, True (0 to 359)
xx	CSB[i]	SNR (C/No) (00 to 99 dB-Hz)
*hh		Checksum, if requested (d=1)

The last four parameters are provided for each satellite in view. Depending on the number of satellites in view, the message can occupy up to 3 lines.

Example:

```
$GPGSV,3,1,10,24,13,313,41,18,61,206,50,25,07,031,38,07,29,234,43*72
$GPGSV,3,2,10,15,08,136,41,19,09,168,39,16,78,020,50,13,03,222,37*78
$GPGSV,3,3,10,04,53,303,49,14,41,077,47*74
```

❑ HDG:n:d

The output string is in the form:

$GPHDG,x.x,x.x,a,x.x,a*hh <cr><lf>

Field type	Variable	Field Designation
$GPHDG		NMEA 0183 message identifier
x.x		Magnetic sensor heading, in degrees
x.x,a		Magnetic deviation, in degrees a=E/W
x.x,a		Magnetic variation, in degrees a=E/W
*hh		Checksum, if requested (d=1)

The last four parameters are provided for each satellite in view. Depending on the number of satellites in view, the message can occupy up to 3 lines.

Example:

$GPHDG,159.5, 0.8,E,0.1,E

❑ HDT:n:d

The output string is in the form:

$GPHDT,x.x,T*hh <cr><lf>

Field type	Variable	Field Designation
$GPHDT		NMEA 0183 message identifier
x.x,T		True heading, in degrees
*hh		Checksum, if requested (d=1)

The last four parameters are provided for each satellite in view. Depending on the number of satellites in view, the message can occupy up to 3 lines.

Example:

$GPHDG,159.5, 0.8,E,0.1,E

❑ HRP:n:d

The output string is in the form:

$PDAS,HRP,,,,,,,,*hh <cr><lf>

Field type	Variable	Field Designation
$PDAS,HRP		Proprietary message identifier
hhmmss.ss		UTC time
x.x,T		True heading, in degrees
x.x		Roll angle, in degrees
x.x		Pitch angle, in degrees
x.x		True heading standard deviation, in degrees
xx		Number of common satellites seen from both antennas involved in the heading processing
c--c		Mode indicator: A= Autonomous E= Estimated N= data not valid
*hh		Checksum, if requested (d=1)

Example:

$PDAS,HRP,141336.00,50.7,T,,1.8,0.14,9,A

❑ HRPA:n:d

Same as HRP, accurate solution

Example:

$PDAS,HRPA,133711.53,0,T,,0,,0,N

❑ HRPR:n:d

Same as HRP, real-time solution

Example:

$PDAS,HRPR,133711.53,0,T,,0,,0,N

❑ IMQ:n:d

The output string is in the form:

```
$PDAS,IMQ,,,,,,,,*hh <cr><lf>
```

Field type	Variable	Field Designation
$PDAS,IMQ		Proprietary message identifier
*hh		Checksum, if requested (d=1)

Example:

$PDAS,IMQ,141336.01,,,,,M,,M

❑ IMS:n:d

The output string is in the form:

```
$PDAS,IMQ,,,,,,,,*hh <cr><lf>
```

Field type	Variable	Field Designation
$PDAS,IMQ		Proprietary message identifier
*hh		Checksum, if requested (d=1)

Example:

$PDAS,IMS,141336.01,,,,,M,,M,

❑ OSD:n:d

The output string is in the form:

$GPOSD,x.x,A,x.x,a,x.x,a,x.x,x.x,a*hh <cr><lf>

Field type	Variable	Field Designation
$GPOSD		NMEA 0183 message identifier
x.x		True heading, in degrees
A		Heading status:
		A=Data valid
		V=Data invalid
x.x		True vessel course, in degrees
a		Course reference:
		B= Bottom tracking log
		M= Manually entered
		W= Water referenced
		R= Radar tracking (of fixed target)
		P= Positioning system ground reference
x.x		Vessel speed
a		Speed reference:
		B= Bottom tracking log
		M= Manually entered
		W= Water referenced
		R= Radar tracking (of fixed target)
		P= Positioning system ground reference
x.x		(Manually entered) True vessel set, in degrees
x.x		(Manually entered) Vessel drift (speed)
a		Speed units (K, N or S)
*hh		Checksum, if requested (d=1)

The last four parameters are provided for each satellite in view. Depending on the number of satellites in view, the message can occupy up to 3 lines.

Example:

$GPOSD,159.5, 0.8,E,0.1,E

❑ PAT:n:d

The output string is in the form:

```
$PDAS,PAT,,,,,,,,*hh <cr><lf>
```

Field type	Variable	Field Designation
$PDAS,PAT		Proprietary message identifier
*hh		Checksum, if requested (d=1)

Example:

$PDAS,PAT,141336.00,4718,N,00131,W,93,0,,,,,0

❑ RMB:n:d

The output string is in the form:

$GPRMB,A,x.x,a,c--c,c--c,llll.ll,a,yyyyy.yy,a, x.x,x.x,x.x,A,a*hh <cr><lf>

Field type	Variable	Field Designation
$GPRMB		NMEA 0183 message identifier
A		Data status: A= Data valid V= Navigation receiver warning
x.x		Cross track error, in Nautical Miles
a		Direction to steer (L/R)
c- -c		Origin waypoint ID
c- -c		Destination waypoint ID
llll.ll,a		Destination waypoint latitude, N/S
yyyyy.yy,a		Destination waypoint longitude, E/W
x.x		Range to destination, in Nautical Miles
x.x		True bearing to destination, in degrees
x.x		Destination closing velocity, in knots
A		Arrival status: A= Arrival circle entered or perpendicular passed V= Not entered/passed
a		Mode indicator: A = Autonomous mode D = Differential mode E = Estimated (dead reckoning) mode M= Manual input mode S= Simulator mode N = Data not valid
*hh		Checksum, if requested (d=1)

Example:

$GPRMB,193612.99,A,0.5,R,143,144,4716.10,N,00129.45,W,5.3,221.4,2.5,V,D

❑ RMC:n:d

The output string is in the form:

```
$GPRMC, hhmmss.ss,a,llll.l,a,yyyyy.y,a, x.x,x.x,xxxxxx,,,a*hh <cr><lf>
```

Field type	Variable	Field Designation
$GPRMC		NMEA 0183 message identifier
hhmmss.ss	TUTC	UTC time (2 decimal places)
a	FIXS	GPS quality figure: V = Fix not available, or invalid A = GPS fix available
llll.l,a	LAT	Latitude in degrees (2 char.), minutes (2 char.), fraction of a minute (number of decimal places controlled by n), N/S indica-tor
yyyyy.y,a	LON	Longitude in degrees (3 char.), minutes (2 char.), fraction of a minute (number of decimal places controlled by n), E/W indica-tor
x.x	SOG	Speed Over Ground (knots) (number of decimal places= n-4 if n >4, otherwise (n<4) no decimal places)
x.x	COG	Course Over Ground (in degrees)
xxxxxx		Date (ddmmyy)
a		Mode indicator: A = Autonomous mode D = Differential mode E = Estimated (dead reckoning) mode N = Data not valid
*hh		Checksum, if requested (d=1)

Example:

$GPRMC,193612.99,A,4716.10435,N,00129.45430,W,0.0,0.0,041198,,,D*64
$GPRMC,193613.99,A,4716.10435,N,00129.45430,W,0.0,0.0,041198,,,D*65
$GPRMC,193614.99,A,4716.10435,N,00129.45430,W,0.0,0.0,041198,,,D*61

❑ ROT:n:d

The output string is in the form:

$GPROT,x.x,A*hh <cr><lf>

Field type	Variable	Field Designation
$GPROT		NMEA 0183 message identifier
x.x		Rate of turn, in degrees/minute "-"= Bow turns to port
A		Status: A= Data valid V= Data invalid
*hh		Checksum, if requested (d=1)

Example:

$GPROT,-1.5,A

❑ SBINxx and SVARxx macros

The table below summarizes all the macros that deal with the output of data pertaining to the Relative mode.

Macros delivering binary data	Macros delivering ASCII data	Output Components	Relative Mode
SBINV0	SVARV0	dX, dY, dZ in meters	External (1)
SBINV1	SVARV1	dLat, dLon, dH in meters	External
SBINO0	SVARO0	dX, dY, dZ in meters	Internal (2)
SBINO1	SVARO1	dLat, dLon, dH in meters	Internal

(1)"External" relative mode: Allows the receiver to determine the position of a secondary mobile in relation to a primary mobile.

(2)"Internal" relative mode: Allows the receiver to determine the position of the secondary antenna in relation to the primary antenna. Both antennas are connected to the same receiver.

The SBINxx and SVARxx macros do not use exactly the same syntax as the other macros: they do not need the "n" and "d" formatting parameters to be output.

Binary Data Format:

Use the appropriate SBINxx macro by referring to the table above. The ouput data is in the form:

<stb><V>	2 bytes
<long>	2 bytes
<Time tagging>	3 bytes
<Primary Mobile data>	16 bytes
<checksum>	2 bytes
<etb>	1 byte

Where:

- Time tagging (3 bytes):
  GPS time in week (unit: 1/10 s)

- Primary mobile Data:

1st byte	Primary Mobile identification, binary (0-255)
2nd byte	Bits 0 to 2: Fix quality 0: invalid 1: GPS (simple difference of Straight GPS positions) 2: DGPS 4: Kinematic (KART or LRK) 5: EDGPS 6: Estimated Mode Bits 3 to 6: Number of satellites involved in solution Bit 7: Data type provided 0: dX, dY, dZ (ECEF) (if “SBINV0” or “SBINO0” macro is run) 1: dLat, dLon, dH (if “SBINV1” or “SBINO1” macro is run)
3rd byte	GPS time in 1/10th of seconds, modulo 20 seconds
Next 3 bytes	**dX_{ECEF}** in cm or **dLat** in cm depending on bit 7 in 2nd byte: dX_{ECEF}=X_{ECEF} coordinate (primary) - X_{ECEF} coordinate (secondary) dLat [-/+8388607 cm], 23 bits + MS bit= 1 if negative value
Next 3 bytes	dY_{ECEF} in cm or **dLon** in cm depending on bit 7 in 2nd byte: dY_{ECEF}=Y_{ECEF} coordinate (primary) - Y_{ECEF} coordinate (secondary) dLon [-/+8388607 cm], 23 bits + MS bit= 1 if negative value
Next 3 bytes	dZ_{ECEF} in cm or **dH** in cm depending on bit 7 in 2nd byte: dZ_{ECEF}=Z_{ECEF} coordinate (primary) - Z_{ECEF} coordinate (secondary) dH [-/+8388607 cm], 23 bits + MS bit= 1 if negative value
Next 1.5 byte	σXY planimetric precision in cm [0.. 4095 cm]
Next 1.5 byte	σZ altimetric precision in cm [0.. 4095 cm]
Last byte	Not used

ASCII data format:

Use the appropriate SVARxx macro by referring to the summary table. The ouput data is in the form:

<stb><eoln>
<!V><Time tagging data><eoln>
<soln><Relative mode data line><eoln>
<etb>

Where:

- Time tagging data:
  !V,>GPS week number and time in week (Z count) in seconds. Reference time is 6 January 1980 at 00hr 00min (modulo 2^{10} ambiguity solved)

- Relative Mode Data:

<soln>	"*" symbol and primary item identification (2 characters totally)
<Quality>	Solution Quality: 0: invalid 1: GPS (simple difference of Straight GPS positions) 2: DGPS 4: Kinematic (KART or LRK) 5: EDGPS 6: Estimated Mode
<Num SV>	Number of SVs used in the solution
<Data type>	Data type=0: dX, dY, dZ (ECEF) (if "SVARV0" or "SVARO0" macro is run) Data type=1: dLat, dLon, dH (if "SVARV1" or "SVARO1" macro is run)
<dX> or <dLat>	in meters with 3 decimal places
<dY> or <dLon>	in meters with 3 decimal places
<dZ> or <dH>	in meters with 3 decimal places
σXY	Planimetric precision, in meters, with 3 decimal places
σZ	Altimetric precision, in meters, with 3 decimal places
<decimal data>	Null
<eoln>	End of Line

❑ VBW:n:d

The output string is in the form:

```
$GPVBW,x.x,x.x,A,x.x,x.x,A,x.x,A,x.x,A*hh <cr><lf>
```

Field type	Variable	Field Designation
$GPVBW		NMEA 0183 message identifier
x.x		Longitudinal water speed, in knots
x.x		Transverse water speed, in knots
A		Water Speed Status: A= Data valid
x.x		Longitudinal ground speed, in knots
x.x		Transverse ground speed, in knots
A		Ground Speed Status: A= Data valid
x.x		Stern transverse water speed, in Knots
A		Stern Water Speed Status: A= Data valid
x.x		Stern Transverse Ground Speed, in Knots
A		Stern Ground Speed Status: A= Data valid V= Data invalid
*hh		Checksum, if requested (d=1)

Example:

$GPVBW,5.10,0.15,A,5.79,0.13,A,0.11,A,0.14,A

❑ VHW:n:d

The output string is in the form:

$GPVHW,x.x,T,x.x,M,x.x,N,x.x,K*hh <cr><lf>

Field type	Variable	Field Designation
$GPVHW		NMEA 0183 message identifier
x.x,T		True heading, in degrees
x.x,M		Magnetic heading, in degrees
x.x,N		Speed, in knots
x.x,K		Speed, in km/hr
*hh		Checksum, if requested (d=1)

Example:

$GPVHW,159.5,T,158.9,M,1.0,N,1.85,K

❑ VTG:n:d

The output string is in the form:

$GPVTG,x.x,T,x.x,M,x.x,N,x.x,K,a*hh<cr><lf>

Field type	Variable	Field Designation
$GPVTG		NMEA 0183 message identifier
x.x,T	COG	True course over ground, in degrees
x.x,M		Magnetic course over ground, in degrees
x.x,N	SOG	Speed Over Ground (in knots) (number of decimal places controlled by n)
x.x,K	SOG	Speed Over Ground (in km/hr) (number of decimal places controlled by n)
a		Mode indicator: A = Autonomous mode D = Differential mode E = Estimated (dead reckoning) mode N = Data not valid
*hh		Checksum, if requested (d=1)

Example:

$GPVTG,120.4,T,,,5.74,N,10.63,K,D*45
$GPVTG,119.1,T,,,5.81,N,10.76,K,D*4E

❑ WCV:n:d

The output string is in the form:

```
$GPWCV,x.x,N,c--c,a*hh<cr><lf>
```

Field type	Variable	Field Designation
$GPWCV		NMEA 0183 message identifier
x.x,N		Velocity component, in knots
c--c		Waypoint identifier
a		Mode indicator:
		A = Autonomous mode
		D = Differential mode
		E = Estimated (dead reckoning) mode
		N = Data not valid
*hh		Checksum, if requested (d=1)

Example:

$GPWCV,5.2,N,143,D

❑ WPL:n:d

The output string is in the form:

```
$GPWPL,llll.ll,a,yyyyy.yy,a,c--c*hh<cr><lf>
```

Field type	Variable	Field Designation
$GPWPL		NMEA 0183 message identifier
llll.ll,a		Waypoint latitude, N/S
yyyyy.yy,a		Waypoint longitude, E/W
c--c		Waypoint identifier
*hh		Checksum, if requested (d=1)

Example:

$GPWPL,4730.54,N,00129.28,W,143

❑ XTE:n:d

The output string is in the form:

$GPXTE,A,A,x.x,a,N,a*hh<cr><lf>

Field type	Variable	Field Designation
$GPXTE		NMEA 0183 message identifier
A		Status: A= Data valid
A		Status: A= Data valid
x.x		Magnitude of cross-track error
a		Direction to steer, L/R
N		Units used (Nautical Miles)
a		Mode indicator: A= Autonomous D= Differential mode E= Estimated (Dead-Reckoning) mode N= Data not valid
*hh		Checksum, if requested (d=1)

Example:

$GPXTE, A,A,0.15,L,N

❑ ZDA:n:d

The output string is in the form:

$GPZDA,hhmmss.ss,xx,xx,xxxx,xx,xx*hh<cr><lf>

Field type	Variable	Field Designation
$GPZDA		NMEA 0183 message identifier
hhmmss.s	TUTC	UTC time (number of decimal places controlled by n)
xx,xx,xxxx	DUTC	UTC date (day, month, year)
xx		Local zone hours (00 to ± 13 hr)
xx		Local zone minutes (00 to + 59)
*hh		Checksum, if requested (d=1)

Example:

$GPZDA,075448.99,04,11,1998,+00,00*4A
$GPZDA,075449.99,04,11,1998,+00,00*4B

❑ ZFO:n:d

The output string is in the form:

$GPZFO,hhmmss.ss,hhmmss.ss,c--c*hh<cr><lf>

Field type	Variable	Field Designation
$GPZFO		NMEA 0183 message identifier
hhmmss.ss		UTC time of observation (number of decimal places controlled by n)
hhmmss.ss		Elapsed time (hh= 00 to 99)
c--c		Origin waypoint ID
*hh		Checksum, if requested (d=1)

Example:

$GPZFO,143203.02,160121.25,144

❑ ZTG:n:d

The output string is in the form:

```
$GPZTG,hhmmss.ss,hhmmss.ss,c--c*hh<cr><lf>
```

Field type	Variable	Field Designation
$GPZTG		NMEA 0183 message identifier
hhmmss.ss		UTC time of observation (number of decimal places controlled by n)
hhmmss.ss		Time to go (hh= 00 to 99)
c--c		Destination waypoint ID
*hh		Checksum, if requested (d=1)

Example:

$GPZTG,143203.02,000530.25,145

Variables

❑ Time Data

DP	Local Date (yyyymmdd) (*)
DUTC	UTC Date (yyyymmdd) (*)
GPSD	GPS - UTC time deviation, in seconds
GPST	GPS time in week, in seconds (*)
GPSW	GPS time week number
TP	Local Time, in seconds (*)
TUTC	UTC Time, in seconds (*)

(*): Interpolated variable

❑ Position Data

L84	WGS84 Latitude, in radians (**)
L84OFF	Offset latitude
G84	WGS84 Longitude, in radians (**)
G84OFF	Offset longitude
H84	Altitude above WGS84 ellipsoid, in meters (**)
L84AVR	Averaged WGS84 Latitude, in radians
G84AVR	Averaged WGS84 Longitude, in radians
H84AVR	Averaged altitude above WGS84 ellipsoid, in meters
X84	ECEF WGS84 Position, X coordinate, in meters (**)
Y84	ECEF WGS84 Position, Y coordinate, in meters (**)
Z84	ECEF WGS84 Position, Z coordinate, in meters (**)
X84SD	X component of standard deviation on ECEF WGS84 aver-age position, in meters
Y84SD	Y component of standard deviation on ECEF WGS84 aver-age position, in meters
Z84SD	Z component of standard deviation on ECEF WGS84 average position, in meters

(**) : Extrapolated variable except for accurate solution.

❑ Navigation Data

ATD	Along-track distance
CTE	Cross Track Error (m)
CTS	Course to steer
CTW	Course to waypoint
DTW	Distance to waypoint
NCTS	Next course to steer
TTG	Time to go
VDW	Altitude deviation from destination waypoint
WPF	Start waypoint label
WPN	Destination waypoint label
WPX	Longitude (or Easting) of destination waypoint
WPY	Latitude (or Northing) of destination waypoint
WPZ	Altitude of destination waypoint

❑ Heading Data

DE	External ΔEasting, in meters
DEA	External ΔEasting, in meters, accurate solution
DER	External ΔEasting, in meters, real-time solution
DH	External ΔHeight, in meters
DHA	External ΔHeight, in meters, accurate solution
DHR	External ΔHeight, in meters, real-time solution
DN	External ΔNorthing, in meters
DNA	External ΔNorthing, in meters, accurate solution
DNR	External ΔNorthing, in meters, real-time solution
DOE	Internal ΔEasting, in meters
DOEA	Internal ΔEasting, in meters, accurate solution
DOER	Internal ΔEasting, in meters, real-time solution
DON	Internal ΔNorthing, in meters
DONA	Internal ΔNorthing, in meters, accurate solution
DONR	Internal ΔNorthing, in meters, real-time solution
HDGA	True heading, in radians, accurate solution
HDGR	True heading, in radians, real-time solution
HDGT	True heading, in radians, selected
NBHDG	Number of satellites involved in heading processing
NBHDGA	Number of satellites involved in heading processing, accurate solution
NBHDGR	Number of satellites involved in heading processing, accurate solution
PITCH	Pitch angle, in radians, selected
PITCHA	Pitch angle, in radians, accurate solution
PITCHR	Pitch angle, in radians, real-time solution
ROLL	Roll angle, in radians, selected
ROLLA	Roll angle, in radians, accurate solution
ROLLR	Roll angle, in radians, real-time solution
SDHDG	Heading standard deviation, in meters, selected
SDHDGA	Heading standard deviation, in meters, accurate solution
SDHDGR	Heading standard deviation, in meters, real-time solution
SHDG	Heading validity tag (1=valid; 0= invalid), selected
SHDGA	Heading validity tag (1=valid; 0= invalid), accurate solution
SHDGR	Heading validity tag (1=valid; 0= invalid), real-time solution
THDG	Heading time, in seconds in GPS week, selected

THDGA	Heading time, in seconds in GPS week, accurate solution
THDGR	Heading time, in seconds in GPS week, real-time solution

❑ Speed Data

COG	Course Over Ground, in radians
P	Clock Offset, in seconds
PS	Clock drift speed, in seconds per second
SOG	Speed Over Ground, in meters/second
XS	Speed East component, in meters/second
YS	Speed North component, in meters/second
ZS	Speed vertical component, in meters/second

❑ Position status

CRE[i]	Residuals, in meters (i: channel number, 1 to 16)
CRS[i]	Residuals speed, in meters/second (i: channel number, 1 to 16)
DRMS	Deviation Root Mean Square, in meters (-1: not available)
DRT	Time elapsed since last fix, in seconds (if MODE=1)
FIXS	Position status: 1: "GOOD" (computed) 0: "BAD" (not computed) The string within quotation marks can be issued using the TXT:FIXS combination
GDOP	Geometrical DOP (-1: not available)
HDOP	Horizontal DOP (-1: not available)
TDOP	Time DOP (-1: not available)
PDOP	Position DOP (-1: not available)
VDOP	Vertical DOP (-1: not available)
LPME	Lines of position mean error, in meters (-1: not available)
M[ ]	Fix Variance/Covariance Matrix, in meters M[1]= Latitude variance M[2]= Latitude/longitude covariance M[3]= Longitude variance M[4]= Latitude/altitude covariance M[5]= Longitude/altitude covariance M[6]= Altitude variance

	M[7]= Latitude/clock covariance M[8]= Longitude/clock covariance M[9]= Altitude/clock covariance M[10]= Clock variance
MODE	Position processing mode: 0: "H" (Hold) 1: "DR" (Dead Reckoning) 2: "T" (Time) 3: "3T" (3D+T) 4: "3" (3D) 5: "2T" (2D+T) 6: "2" (2D) The string within quotation marks can be issued using the TXT:MODE combination (operator:variable)
MODEIO	Iono correction model: 0: Stanag 1: Estimated 2: WAAS
NSVR or NSVR1	Count of SVs received on L1
NSVR2	Count of SVs received on L2
NSVU	Count of SVs used (List of PRN numbers of SVs used). The list can be issued using the TXT:NSVU combination
QUAL	Fix confidence level 0..3= Straight GPS 4..5= 2D+T DGPS 6..9= 3D+T DGPS 10..13= EDGPS 14..19= KINE
SA	Selective Availability flag: 1: "ON" (SA on) 0: "OFF" (SA off) The string within quotation marks can be issued using the TXT:SA combination
SVU[i]	PRN of the SVs involved in the position processing (i: channel number, 1 to 16).

❑ External Integrity Control

INTEGAP	Indicates whether External integrity control is used. Must be combined with the TXT operator. The possible output strings are then the following (mentioned within quotation marks): "YES" (external integrity control used) "NO" (external integrity control not used)
INTEGID	Identification of the source of integrity data (GEO PRN if Integrity Control from WAAS, -1 if no integrity control)
INTEGST[i]	Integrity control result (i: channel number, 1.. 16): 0 (unmonitored) 1 (unhealthy) 2 (healthy)
UDRE[i]	Value of UDRE for each channel (i: chan. No., 1.. 16)

❑ GNSS Status

CAZ[i]	SV azimuth, in radians (i: channel number, 1 to 16)
CEIO[i]	Iono delay, in meters, estimated (=999 if no estimate available). (i: channel number, 1 to 16)
CEIOS[i]	Iono speed, in m/s, estimated (=999 if no estimate available) (i: channel number, 1 to 16)
CEL[i]	SV elevation, in radians (i: channel number, 1 to 16)
CIO[i]	Ionospheric correction, in meters (i: channel number, 1 to 16)
CRD[i]	Ascending or descending satellite, in radians (i: channel number, 1 to 16): 0: descending 1: ascending
CTR[i]	Tropospheric correction, in meters (i: channel number, 1 to 16)
CSB[i]	C/NO level, in dB (i: channel number, 1 to 16)
CST[i]	Channel status (i: channel number, 1 to 16): 0: free channel 1: channel used, SV received on this channel 2: channel used, no SV received on this channel or SV lost 3: same as 1 + ephemeris received on this channel

4: same as 3 + channel involved in fix processing
5: channel searching for SV
6: channel deselected manually
7: channel rejected by WAAS integrity control

CSV[i] PRN of the SV received on that channel (i: channel number, 1 to 16).

❑ DGPS Status

CCS[i] or CCS1[i] L1 DGPS corrections availability (i: channel number, 1 to 16)
0 (not available)
1 (available)

CCS2[i] L2 DGPS corrections availability (i: channel number, 1 to 16)
0 (not available)
1 (available)

DAGE Age of DGPS corrections, on average, in seconds

DFT Type of DGPS used:
-1: "HOLD"
0: "GPS"
1: "DGPS1"
2: "DGPS2"
3: "DGPS3"
4: "DGPS4"
5: "MDGPS"
6: "EDGPS"
7: "<blank>" (Unassigned)
8: "KINE" (KART)
9: " EDGP1" (KART initialization)
20: "GNOS"
25: "WDGPS"
31: "LRK"
32: "EDGP2" (LRK initialization)
33: "WL" (LRK WL)
34: "EDGP2" (LRK WL initialization)
The string within quotation marks can be issued using the TXT:DFT combination.

DRCV DGPS reception quality

DS DGPS Status:

0: "NOFIX" (no position solution)
1: "AUTO" (straight GPS solution)
2: "DGPS" (DGPS solution)
3: "PREC" (for future use)
4: "RTK" (KART, LRK or LRK WL solution)
5: "FRTK "(EDGPS solution)
6: "ESTIM" (dead reckoning)
7: "MANU" (Manual input mode)
8: "SIMUL" (Simulation mode)
The string within quotation marks can be issued using the TXT:DS combination

DSTA — Identification of the DGPS station used

❑ Current Position

DATM — Identification of the transformation system used:
0: "WGS84"
1..9: "<datum name>"
The string within quotation marks can be issued using the TXT:DATM combination (10 characters max.)

EPAVR — Averaged Easting, from PVT (1) processing

EPSD — Standard deviation of average Easting, from PVT(1) processing

HPAVR — Averaged user altitude, in the chosen mode, in meters

HPSD — Standard deviation of averaged user altitude, in the chosen mode, in meters.

LAT — Latitude, from PVT (1) processing, expressed on the datum of the transformation system used, in radians (2)

LON — Longitude, from PVT (1) processing, expressed on the datum of the transformation system used, in radians (2)

NP — Northing, from PVT (1) processing, expressed in the transformation system used (2)

EP — Easting, from PVT (1) processing, expressed in the transformation system used (2)

HP — User altitude, expressed in the chosen mode, in meters (2)

NPAVR — Averaged Northing, from PVT (1) processing

NPSD — Standard deviation of averaged Northing, from PVT(1) processing

PGPSW — GPS week number, from PVT (1) processing

PGPST	GPS time in week, from PVT (1) processing

(1) PVT : French acronym for Position-Speed-Time
(2) Extrapolated variable (except if an accurate solution)

❑ Kinematic Data

AGESOL	Time elapsed since last solution found
EPKASD	Easting uncertainty (DRMS), accurate solution
HPKASD	Altitude uncertainty (DRMS), accurate solution
NPKASD	Northing uncertainty (DRMS), accurate solution
EPEDSD	Easting uncertainty
HPEDSD	Altitude uncertainty
NPEDSD	Northing uncertainty
EPKRSD	Easting uncertainty (DRMS), real-time solution
HPKRSD	Altitude uncertainty (DRMS), real-time solution
NPKRSD	Northing uncertainty (DRMS), real-time solution
MKIN	Kinematic Mode: 1: (EDGPS) 2: (INIT KART) 3: (INIT LRK) 4: (KART) 5: (LRK)
NBSOL	Count of solutions found
NSVUK	Count of satellites used
TINIT	Time elapsed since initialization was started (in seconds)

❑ Station Data

(i= count of stations, 1 to 4)

DSTSTA[i]	Distance between reference station and mobile, in meters
NIV[i]	
NIVUHF[i]	UHF reception level, in dB
REFUHF[i]	Station ID

UBUHF[i]	DC voltage delivered by the battery used at the station, in volts
ESTA[i]	Easting of reference station
NSTA[i]	Northing of reference station
HSTA[i]	Altitude of reference station expressed on the user's geodetic system, in meters
GSTA[i]	WGS84 longitude of reference station, in radians
LSTA[i]	WGS84 latitude of reference station, in radians
X84STA[i]	WGS84 ECEF X coordinate of reference station's antenna, in meters
Y84STA[i]	WGS84 ECEF Y coordinate of reference station's antenna, in meters
Z84STA[i]	WGS84 ECEF Z coordinate of reference station's antenna, in meters

❑ "Intermediate" Points Data

DAKA	Age of differential corrections involved in accurate solution, in seconds
DAKR	Age of differential corrections involved in real-time solution, in seconds
DBKA	Beacon ID involved in accurate solution
DBKR	Beacon ID involved in real-time solution
DKA	UTC date of accurate solution (yyyymmdd)
DKR	UTC date of real-time solution (yyyymmdd)
DQKA	Quality of differential reception in accurate solution (0..9)
DQKR	Quality of differential reception in real-time solution (0..9)
DTKA	Accurate solution type: 0: GPS 1: DGPS1 2: DGPS2 3: DGPS3 4: DGPS4 5: MDGPS 6: EDGPS 7: KINEA

	8: KINER
	20: GNOS
	25: WDGPS
DTKR	Real-time solution type:
	0: GPS
	1: DGPS1
	2: DGPS2
	3: DGPS3
	4: DGPS4
	5: MDGPS
	6: EDGPS
	7: KINEA
	8: KINER
	20: GNOS
	25: WDGPS
	NOTE: DTKA & DTKR cannot be combined with TXT
FDRKA	DRMS of accurate solution, in meters
FDRKR	DRMS of real-time solution, in meters
GKA	WGS84 Longitude, accurate solution, in radians
LKA	WGS84 Latitude, accurate solution, in radians
ZKA	Altitude from WGS84 ellipsoid, accurate solution, in meters
GKR	WGS84 Longitude, real-time solution, in radians
LKR	WGS84 Latitude, real-time solution, in radians
ZKR	Altitude from WGS84 ellipsoid, real-time solution, in meters
HDKA	Accurate solution HDOP
HDKR	Real-time solution HDOP
NKA	Count of satellites used in accurate solution
NKR	Count of satellites used in real-time solution
QKA	Accurate solution quality figure (0.. 9)
QKR	Real-time solution quality figure (0.. 9)
SKA	Accurate solution status:
	0: invalid
	1: valid
SKR	Real-time solution status:
	0: invalid

	1: valid
TKA	UTC time of accurate solution (no extrapolation made)
TKR	UTC time of real-time solution (no extrapolation made)

The following variables are still in use for compatibility with configuration files of the E2 type. The definition of the suffix [i] remains unchanged (com-pared to the former versions of ConfigPack), as recalled below:

i=1: MDGPS point
i=2: EDGPS point
i=3: KARTA point
i=4: KARTR point

D[i]	UTC Date (yyyymmdd)
DA[i]	Age of differential corrections, in seconds
DT[i]	Type of DGPS used: 0: GPS 1: DGPS1 2: DGPS2 3: DGPS3 4: DGPS4 5: MDGPS 6: EDGPS 7: KINEA 8: KINER 20: GNOS 25: WDGPS
DB[i]	Beacon ID
DQ[i]	Quality of differential reception (0.. 9)
HD[i]	HDOP
FDRM[i]	DRMS, in meters.
L[i]	WGS84 Latitude, in radians
G[i]	WGS84 Longitude, in radians
Z[i]	Altitude from WGS84 ellipsoid, in meters
N[i]	Count of satellites used
Q[i]	Quality figure: Q[1]= 0..9 Q[2]= 10..13 Q[3]= 14..19

	Q[4]= 14..19
S[i]	Position solution status: 0: invalid 1: valid
T[i]	UTC Time

❑ Anomalies & Alarms

ALARM[i]	Status of alarm i, where i: alarm number (1 to 128): 0: no alarm or anomaly 1: status positioned to "active", alarm or anomaly still per-sists 2: status still "active" but cause of alarm or anomaly has disappeared; alarm not acknowledged yet
CALARM[i]	Extra-code pertaining to anomaly or alarm (i: alarm number, 1 to 128)
DALARM[i]	Day when alarm or anomaly first occurred (i: alarm number, 1 to 128) DALARM[i]= 0..31
FALARM[i]	Time when alarm or anomaly first occurred (i: alarm number, 1 to 128) FALARM[i]= 0..86399 seconds
LALARM[i]	Time when alarm or anomaly last occurred (i: alarm number, 1 to 128) LALARM[i]= 0..86399 seconds (current time if alarm or anomaly still persisting)
SALARM	Number of active alarms or anomalies (128 max.) Combined with the TXT operator, provides the status of each of the alarms or anomalies in the form of a string of 32 ASCII-encoded hex characters (the least significant bit corresponds to Alarm No. 1, the most significant bit to Alarm No. 128). Any bit =1 means that the corresponding alarm is active.

Categories of anomalies & alarms

Alarms & anomalies are classified into categories, depending on the probable origin of error. The table below summarizes the 11 different categories:

Category number	Origin	Label
00	No errors	NONE
01	Core Module	CM
02	Application Configuration	CONFG
03	DGPS	DGPS
04	Coordinate system	GEODY
05	Input/Output	I/O
06	User Interface	IHM
07	Power supply/interface	INTRF
08	Navigation	NAVIG
09	Fix processing	POSIT
10	System	SYSTM
11	Data link	TD

Classification

Alarms & anomalies are classified into four groups depending on gravity:

- Simple information reported to user (code 1)
- Warnings (code 2). The receiver operates correctly but might be disturbed by the reported error.
- Serious errors (code 3). The receiver operates but delivers erroneous results.
- Fatal errors (code 4). The receiver can no longer operate correctly. You should re-initialize the receiver.

Codes List

No	Category	Gravity	Meaning	Label (for receivers fitted with display screens)
01	1 - CM	4	GPS not ready	GPS not ready
02	1 - CM	4	RAM error	RAM anomaly
03	1 - CM	3	Processor error	Processor anomaly
04	1 - CM	3	Timing error	Timing anomaly
05	1 - CM	3	Program memory error	Program memory anomaly
06	1 - CM	3	Data memory error	Data memory anomaly

No	Category	Gravity	Meaning	Label (for receivers fitted with display screens)
07	1 - CM	3	Reception circuit error	Reception circuit anomaly
08	1 - CM	3	Correlation circuit error	Correlation circuit anom
09	1 - CM	4	C/A-P/YCommunication error	Communication C/A - P/Y
10	1 - CM	2	Non-used output data	Unread output datas
11	1 - CM	2	Non-identified input data	Unknown input datas
12	1 - CM	2	Non-complying input data	Bad input datas
13	1 - CM	1	GPS data error	GPS data anomaly
14	1 - CM	1	DPRAM error	DPRAM anomaly
15	1 - CM	1	Erroneous message length	Bad message length
16	1 - CM	1	EEPROM error	EEPROM anomaly
17	1 - CM	3	Trigger time-tag error	Datation Trigger Error
18	2 - CONFG	4	Config integrity altered	Bad config integrity
19	2 - CONFG	3	Config parameter error	Config parameter error
20	3 - DGPS	3	No transmitting station	No sending dtation
21	3 - DGPS	3	CPU-DIFF overflow	CPU-DIFF overflow
22	4 - GEODY	3	Coordinate system error	Geodesy error
23	5 - I/O	2	Unknown remote command	Unknown telecommand
24	5 - I/O	2	Non-complying param. format	Bad parameter format
25	5 - I/O	2	Non-complying format block	Bad block format
26	5 - I/O	3	Command checksum error	Bad telecommand checksum
27	5 - I/O	3	DPR1 Input error	Input error on DPR1
30	5 - I/O	3	Non-complying LRK block	Bad LRK block on port D
31	5 - I/O	3	Port A Overflow	Overflow PortA
32	5 - I/O	3	Port B Overflow	Overflow PortB
33	5 - I/O	3	Port C Overflow	Overflow PortC
34	5 - I/O	3	Port D Overflow	Overflow PortD
35	5 - I/O	2	Format interpretation error	Format interpretation
36	5 - I/O	3	Port A Input error	Input error PortA
37	5 - I/O	3	Port B Input error	Input error PortB
38	5 - I/O	3	Port C Input error	Input error PortC

No	Category	Gravity	Meaning	Label (for receivers fitted with display screens)
39	5 - I/O	3	Port D Input error	Input error PortD
40	6 - IHM	2	User Interface error	IHM error
41	7 - INTRF	4	Xilinx Load	Xilinx Load
42	7 - INTRF	4	Low Power Command	Low Power Command
43	7 - INTRF	3	PCMCIA overflow	PCMCIA overflow
44	7 - INTRF	3	File system full	File system full
45	7 - INTRF	2	PC board not recognized	Unknown PC card
46	7 - INTRF	4	Battery voltage too low	Battery voltage
47	7 - INTRF	3	Corrupted file system	Corrupted file system
48	7 - INTRF	4	First antenna error	First antenna error
52	7 - INTRF	3	File-opening error	File open error
53	7 - INTRF	3	File-closing error	File close error
54	7 - INTRF	3	File-writing error	File write error
55	7 - INTRF	3	File-reading error	File read error
56	8 - NAVIG	3	Navigation error	Navigation error
57	9 - POSIT	1	No differential reception	No differential reception
58	9 - POSIT	1	Too few Svs	Too few Svs
59	9 - POSIT	1	GDOP too high	GDOP too high
60	9 - POSIT	3	LPME too high	LPME too high
61	9 - POSIT	1	No fix computation	No fix computation
62	10 - SYSTM	2	Frozen display	Frozen display
63	10 - SYSTM	2	Unknown option code	Unknown option code
64	10 - SYSTM	4	C3 codes checksum error	Bad checksum codes C3
65	10 - SYSTM	2	Log checksum error	Bad log checksum
66	10 - SYSTM	4	Real-time clock	Real Time Clock
67	10 - SYSTM	4	Dual-port RAM	Dual port RAM
68	11 - SYSTM	4	Core module not ready	Core module not ready
69	10 - SYSTM	4	Program checksum error	Bad program checksum
70	10 - SYSTM	4	Data memory test	Data memory test
71	10 - SYSTM	4	Coprocessor test	Coprocessor test

No	Category	Gravity	Meaning	Label (for receivers fitted with display screens)
72	10 - SYSTM	4	Serial port error	Error on serial port
73	10 - SYSTM	3	IDE file system mounting error	File system IDE mount err
74	10 - SYSTM	1	Option lending period has now elapsed	Option no more available
75	10 - SYSTM	4	Max. number of tries reached	Max option tries reached
76	10 - SYSTM	1	Journal full	Full anomalies journal
77	10 - SYSTM	3	CMOS date failed	CMOS date Failed
78	11 - TD	4	Selftest error	Autotest error
79	11 - TD	3	Erroneous blocks	Bad blocks
80	11 - TD	1	Count of restarts since selftest	Nb restart since autotest
81	10 - SYSTM	3	Mailbox overflow	Mailbox overflow
82	10 - SYSTM	3	PCMCIA removed	PCMCIA removed
83	5 - I/O	3	DPR1 Overflow	Overflow DPR1
86	POSIT	3	Kinematic initialization	Kinematic initialization
87	10 - SYSTM	3	Line in CM file too long	Line file CM too long
88	10 - SYSTM	3	CM identification error	Identification CM error
89	10 - SYSTM	3	CM card file inconsistency	Incoherence file card CM
90	10 - SYSTM	3	Flash CM clear error	Clear flash CM error
91	10 - SYSTM	3	CM program loading error	CM program file load error
92	6 - IHM	3	Kinematic mode change	Kinematic mode change
93	6 - IHM	3	No position computed	No computed position
94	7 - INTRF	4	Binary file inconsistency	Binary file incoherent
95	10 - SYSTM		RTC send error	RTC send error
96	4 - GEODY		Altimetry error	Altimetry error
97	10 - SYSTM		Application software Re-load error	Appli soft reload error
98	10 - SYSTM	4	Protected memory error	Back memory failure
99	10 - SYSTM	4	Stack overflow	Stack overflow
100	5 - I/O	2	Error on port A in reception	Receiving error on port A

No	Category	Gravity	Meaning	Label (for receivers fitted with display screens)
101	5 - I/O	2	Error on port B in reception	Receiving error on port B
102	5 - I/O	2	Error on port C in reception	Receiving error on port C
103	5 - I/O	2	Error on port D in reception	Receiving error on port D
104	10 - SYSTM	1	Unexpected software error	Software error

In case of a reported code number not mentioned in the above list, please contact Magellan for more information.

❑ Other Variables

DAVR	Averaging duration
DENR	Time (in s) elapsed since beginning of data recording on PC card ("0" if no recording in progress)
MAVR	Averaging process mode (only relevant to a transmitting sta-tion) 0: At initialization 1: Averaging process in progress 2: Averaging process complete
MSL	Mean Sea Level (Distance deviation between user geoid and WGS84 ellipsoid). Forced to 9999.0 m if user alti-tude cannot be determined)
NBAVR	Count of values involved in the averaging process
NBCOR	Count of computed corrections (only relevant to a station computing corrections)
PCA	Memory space currently available on PC card (PCMCIA), in bytes
PCS	Total memory space on PC card, in bytes
UB	Battery voltage
ULA, ULB, ULC, ULD, ULP	User labels on ports A to D, and P (PC card) (initialized by the TR command). Must be combined with the TXT operator
UM1 UM2 UM3 UM4	
UV[i]	User variables (i: 1 to 10)

❑

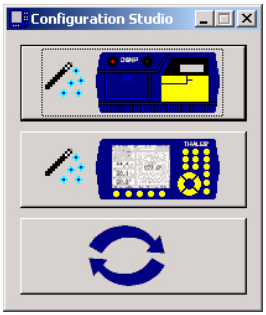
7. Configuration Studio

Presentation

"Configuration Studio" is the name given to the merged ConfPack/ConfigPack application.

Configuration Studio can:

- Run ConfPack 3.2 to read/write configurations from/to Aquarius 5000 or Scorpio 6000 Series
- Run ConfigPack 3.41 to read/write configurations from/to 3011, Sagitta or AquariusXX
- Convert configuration files from one application to the other.



Installation

The following is installed by the Setup program:

- ConfPack V3.2
- ConfigPack V3.41
- Configuration Studio V1.0
- Wincomm V7.00 alpha 7
- Geoid V7.10
- Rainbow sentinel drivers V5.41

Configuration Studio is fully compatible with previous software installed on the same PC (i.e. you don't need to uninstall previously installed software). Configuration Studio is launched at the end of the installation. Its default location on the disk is: C:\Program Files\Magellan\Configuration Studio.

An icon appears on the desktop and a menu is created in Start/Programs/Magellan.

Both the Setup program and the applications were successfully tested on Windows 98, 2000, NT and XP.

ConfPack V3.2

This is ConfPack's last official release. No changes have been made to this version.

Unless otherwise specified, ConfPack is software and/or hardware protected.

ConfigPack V3.41

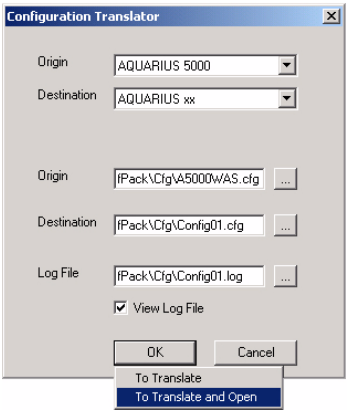
ConfigPack V3.41 is the latest version of ConfigPack.

Unless otherwise specified, ConfigPack V3.41 is software and/or hardware protected.

Translation Tool

This new software can convert configuration files:

- From/to the 5000 Series with firmware V20304, V20307 and V30207
- From/to the 3011/Sagitta/AquariusXX Series with firmware up to V2.13



Follow the procedure below:

- First select the source hardware (origin). The destination is then software-set.
- Select the configuration file you want to convert using the "..." button
- The Destination and Log files are automatically defined but you can change their names and paths if necessary
- Check/clear the "View Log File" option depending on whether or not you want to log the operations performed during the conversion
- Click OK to start the conversion. The "To Translate and Open" command (see above) is an easy way to open the newly converted file with the corresponding ConfigPack application.

Step-by-step Procedure

Typically, the steps you should follow to convert a configuration file from the 5000 Series to Aquarius XX are:

- Run Configuration Studio
- Click on the upper button to run ConfPack
- Using ConfPack, read the configuration file from the receiver and save it to the disk.
- Quit ConfPack
- Configuration Studio has been hidden during this phase until ConfPack quits
- Select the Translate Tool to convert the new downloaded file using the 'To Translate and Open' command
- ConfigPack appears and you can upload your new converted file to the Aquarius XX receiver
- Quit ConfigPack to return to Configuration Studio
- Quit Configuration Studio. ❑

ConfigPack™

Reference Manual

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